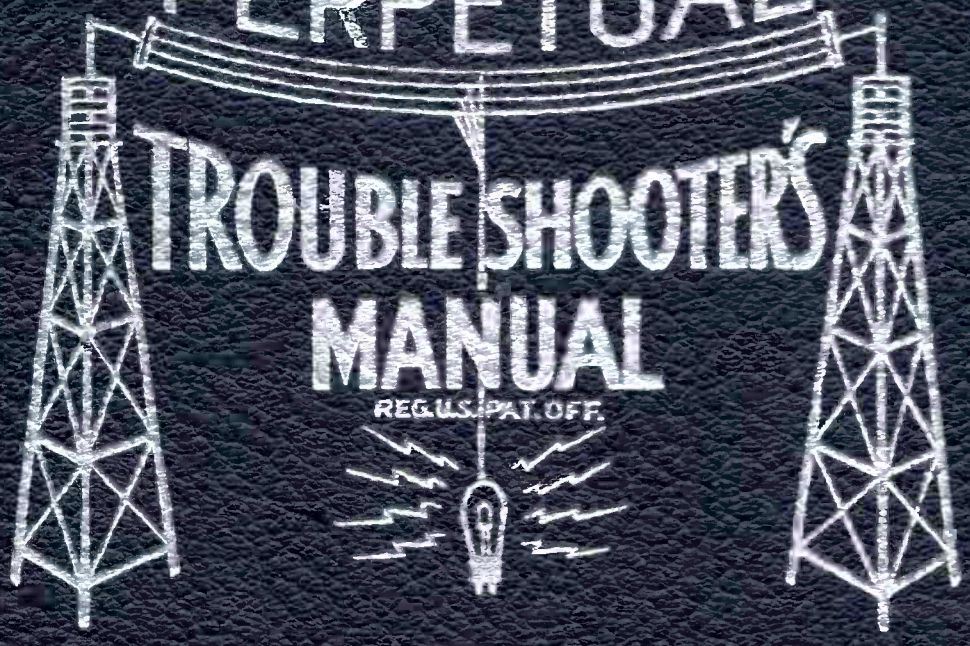
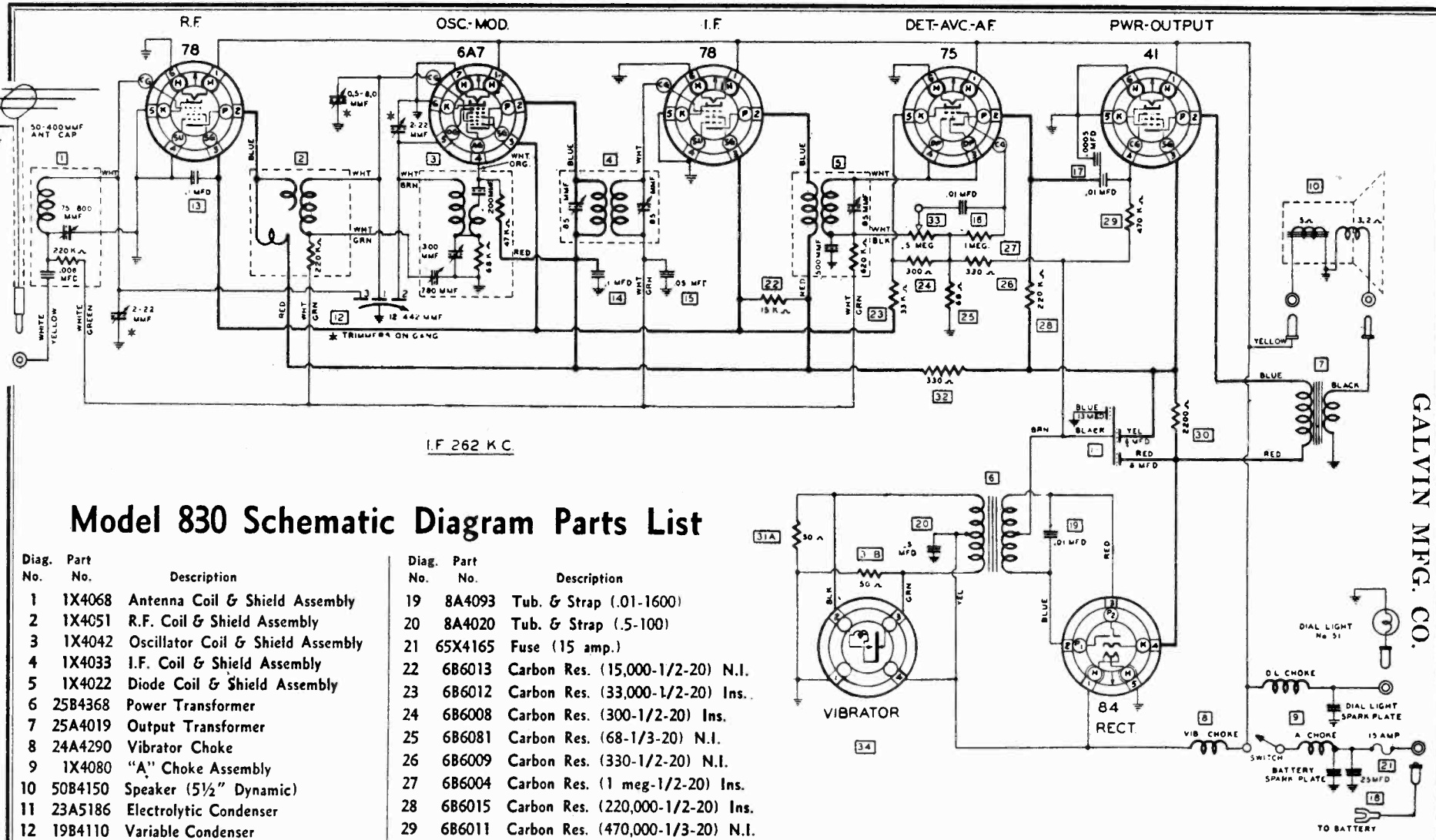
VOLUME IX

PERPETUAL TROUBLE SHOOTER'S MANUAL

REG. U.S. PAT. OFF.



JOHN F. RIDER



Model 830 Schematic Diagram Parts List

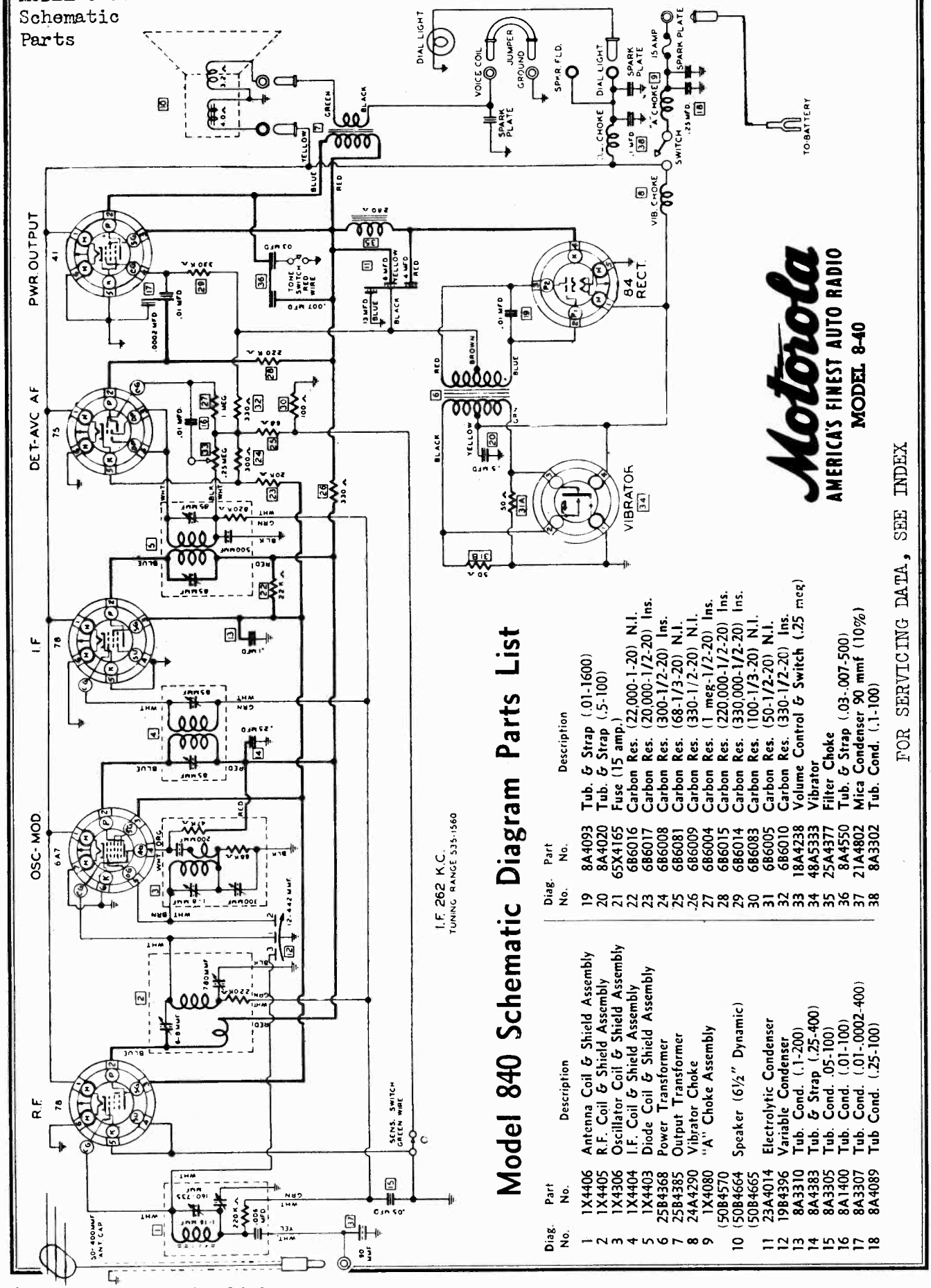
Diag. No.	Part No.	Description
1	1X4068	Antenna Coil & Shield Assembly
2	1X4051	R.F. Coil & Shield Assembly
3	1X4042	Oscillator Coil & Shield Assembly
4	1X4033	I.F. Coil & Shield Assembly
5	1X4022	Diode Coil & Shield Assembly
6	25B4368	Power Transformer
7	25A4019	Output Transformer
8	24A4290	Vibrator Choke
9	1X4080	"A" Choke Assembly
10	50B4150	Speaker (5½" Dynamic)
11	23A5186	Electrolytic Condenser
12	19B4110	Variable Condenser
13	8A3310	Tub. Cond. (.1-200)
14	8A4092	Tub. & Strap (.1-300)
15	8A3305	Tub. Cond. (.05-100)
16	8A1400	Tub. Cond. (.01-100)
17	8A3329	Tub. Cond. (.01-.0005-400)
18	8A4089	Tub. Cond. (.25-100)
19	8A4093	Tub. & Strap (.01-1600)
20	8A4020	Tub. & Strap (.5-100)
21	65X4165	Fuse (15 amp.)
22	6B6013	Carbon Res. (15,000-1/2-20) N.I.
23	6B6012	Carbon Res. (33,000-1/2-20) Ins.
24	6B6008	Carbon Res. (300-1/2-20) Ins.
25	6B6081	Carbon Res. (68-1/3-20) N.I.
26	6B6009	Carbon Res. (330-1/2-20) N.I.
27	6B6004	Carbon Res. (1 meg-1/2-20) Ins.
28	6B6015	Carbon Res. (220,000-1/2-20) Ins.
29	6B6011	Carbon Res. (470,000-1/3-20) N.I.
30	6B6006	Carbon Res. (2,200-1-20) N.I.
31A	6B6005	Carbon Res. (50-1/2-20) N.I.
31B	6B6005	Carbon Res. (50-1/2-20) N.I.
32	6B6010	Carbon Res. (330-1/2-20) Ins.
33	18A4046	Volume Control & Switch (.5 meg)
34	48A5333	Vibrator

Motorola
AMERICA'S FINEST AUTO RADIO
MODEL 8-30

FOR SERVICING DATA, SEE INDEX

MODEL 8-40
Schematic
Parts

GALVIN MFG. CO.

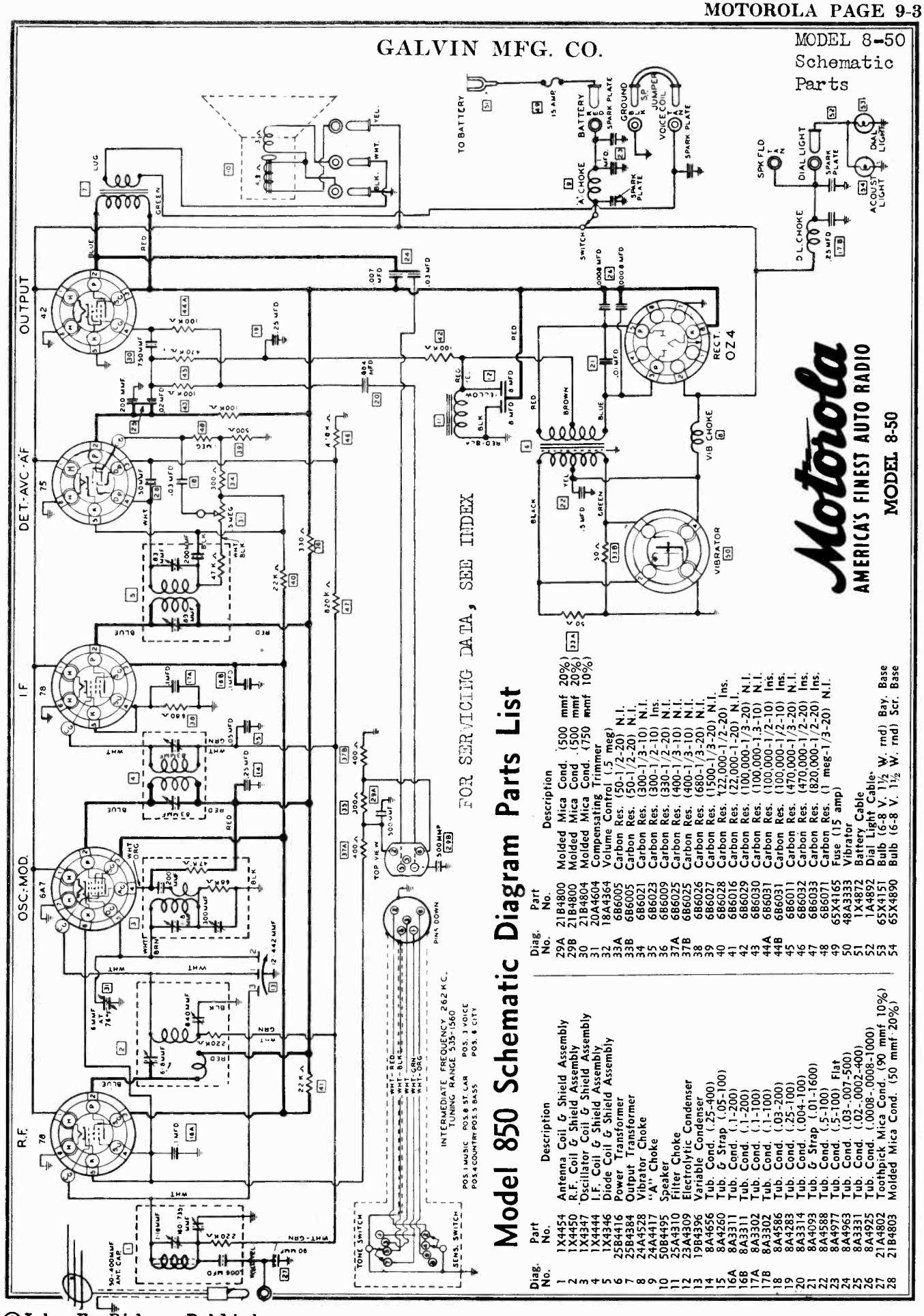


Model 840 Schematic Diagram Parts List

Diag. No.	Part No.	Description
1	1X4406	Antenna Coil & Shield Assembly
2	1X4405	R.F. Coil & Shield Assembly
3	1X4306	Oscillator Coil & Shield Assembly
4	1X4404	I.F. Coil & Shield Assembly
5	1X4403	Diode Coil & Shield Assembly
6	25B4368	Power Transformer
7	25B4385	Output Transformer
8	24A4290	Vibrator Choke
9	1X4080	"A" Choke Assembly
10	(50B4570 (50B4664 (50B4665	Speaker (6½" Dynamic)
11	23A4014	Electrolytic Condenser
12	19B4396	Variable Condenser
13	8A3310	Tub. Cond. (.1-200)
14	8A4383	Tub. & Strap (.25-400)
15	8A3305	Tub. Cond. .05-100)
16	8A1400	Tub. Cond. (.01-100)
17	8A3307	Tub. Cond. (.01-.0002-400)
18	8A4089	Tub Cond. (.25-100)
19	8A4093	Tub. & Strap (.01-1600)
20	8A4020	Tub. & Strap (.5-100)
21	65X4165	Fuse (15 amp.)
22	6B6016	Carbon Res. (22,000-1-20) N.I.
23	6B6017	Carbon Res. (20,000-1/2-20) Ins.
24	6B6008	Carbon Res. (300-1/2-20) Ins.
25	6B6081	Carbon Res. (68-1/3-20) N.I.
26	6B6009	Carbon Res. (330-1/2-20) N.I.
27	6B6004	Carbon Res. (1 meg-1/2-20) Ins.
28	6B6015	Carbon Res. (220,000-1/2-20) Ins.
29	6B6014	Carbon Res. (330,000-1/2-20) Ins.
30	6B6083	Carbon Res. (100-1/3-20) N.I.
31	6B6005	Carbon Res. (50-1/2-20) N.I.
32	6B6010	Carbon Res. (330-1/2-20) Ins.
33	18A4238	Volume Control & Switch (.25 meg)
34	48A5333	Vibrator
35	25A4377	Filter Choke
36	8A4550	Tub. & Strap (.03-.007-500)
37	21A4802	Mica Condenser 90 mmf (10%)
38	8A3302	Tub. Cond. (.1-100)

FOR SERVICING DATA, SEE INDEX

Motorola
AMERICA'S FINEST AUTO RADIO
MODEL 8-40

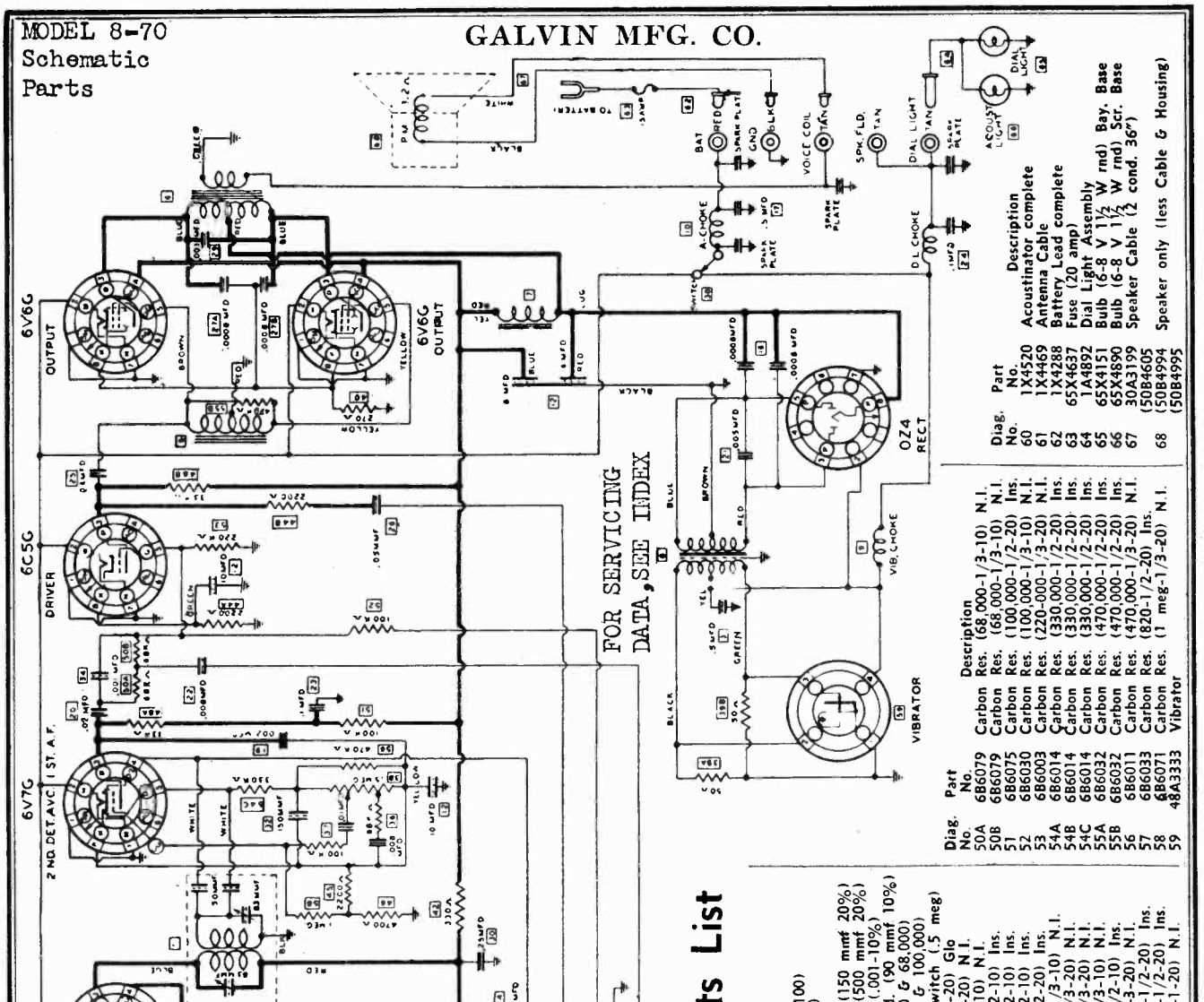


Model 850 Schematic Diagram Parts List

Diag. No.	Part No.	Description
1	1X4454	Antenna Coil & Shield Assembly
2	1X4450	R.F. Coil & Shield Assembly
3	1X4347	Oscillator Coil & Shield Assembly
4	1X4444	I.F. Coil & Shield Assembly
5	1X4346	Diode Coil & Shield Assembly
6	25B4416	Power Transformer
7	25B4384	Output Transformer
8	24A4528	Vibrator Choke
9	24A4417	"A" Choke
10	50B4495	Speaker
11	25A4310	Filter Choke
12	23A4309	Electrolytic Condenser
13	19B4396	Variable Condenser
14	8A4656	Tub. Cond. (.25-400)
15	8A4260	Tub. & Strap (.05-100)
16A	8A3311	Tub. Cond. (.1-200)
16B	8A3311	Tub. Cond. (.1-200)
17A	8A3302	Tub. Cond. (.1-100)
17B	8A3302	Tub. Cond. (.1-100)
18	8A4586	Tub. Cond. (.03-200)
19	8A4283	Tub. Cond. (.25-100)
20	8A3314	Tub. Cond. (.004-100)
21	8A4093	Tub. & Strap (.01-1600)
22	8A4588	Tub. Cond. (.5-100)
23	8A4977	Tub. Cond. (.5-100) Flat
24	8A4963	Tub. Cond. (.03-.007-500)
25	8A3331	Tub. Cond. (.02-.0002-400)
26	8A4925	Tub. Cond. (.0008-.0008-1000)
27	21A4802	Toothpick Mica Cond. (90 mmf 10%)
28	21B4803	Molded Mica Cond. (50 mmf 20%)
29A	21B4800	Molded Mica Cond. (500 mmf 20%)
29B	21B4800	Molded Mica Cond. (500 mmf 20%)
30	21B4804	Molded Mica Cond. (750 mmf 10%)
31	20A4604	Compensating Trimmer
32	18A4364	Volume Control (.5 meg)
33A	6B6005	Carbon Res. (50-1/2-20) N.I.
33B	6B6005	Carbon Res. (50-1/2-20) N.I.
34	6B6021	Carbon Res. (300-1/3-10) N.I.
35	6B6023	Carbon Res. (300-1/2-10) Ins.
36	6B6009	Carbon Res. (330-1/2-20) N.I.
37A	6B6025	Carbon Res. (400-1/3-10) N.I.
37B	6B6025	Carbon Res. (400-1/3-10) N.I.
38	6B6026	Carbon Res. (680-1/3-20) N.I.
39	6B6027	Carbon Res. (1500-1/3-20) N.I.
40	6B6028	Carbon Res. (22,000-1/2-20) Ins.
41	6B6016	Carbon Res. (22,000-1-20) N.I.
42	6B6029	Carbon Res. (100,000-1/3-20) N.I.
43	6B6030	Carbon Res. (100,000-1.3-10) N.I.
44A	6B6031	Carbon Res. (100,000-1/2-10) Ins.
44B	6B6031	Carbon Res. (100,000-1/2-10) Ins.
45	6B6011	Carbon Res. (470,000-1/3-20) N.I.
46	6B6032	Carbon Res. (470,000-1/2-20) Ins.
47	6B6033	Carbon Res. (820,000-1/2-20) Ins.
48	6B6071	Carbon Res. (1 meg-1/3-20) N.I.
49	65X4165	Fuse (15 amp)
50	48A3333	Vibrator
51	1X4872	Battery Cable
52	1A4892	Dial Light Cable
53	65X4151	Bulb (6-8 V. 1½ W. rnd) Bay. Base
54	65X4890	Bulb (6-8 V. 1½ W. rnd) Scr. Base

MODEL 8-70
Schematic
Parts

GALVIN MFG. CO.



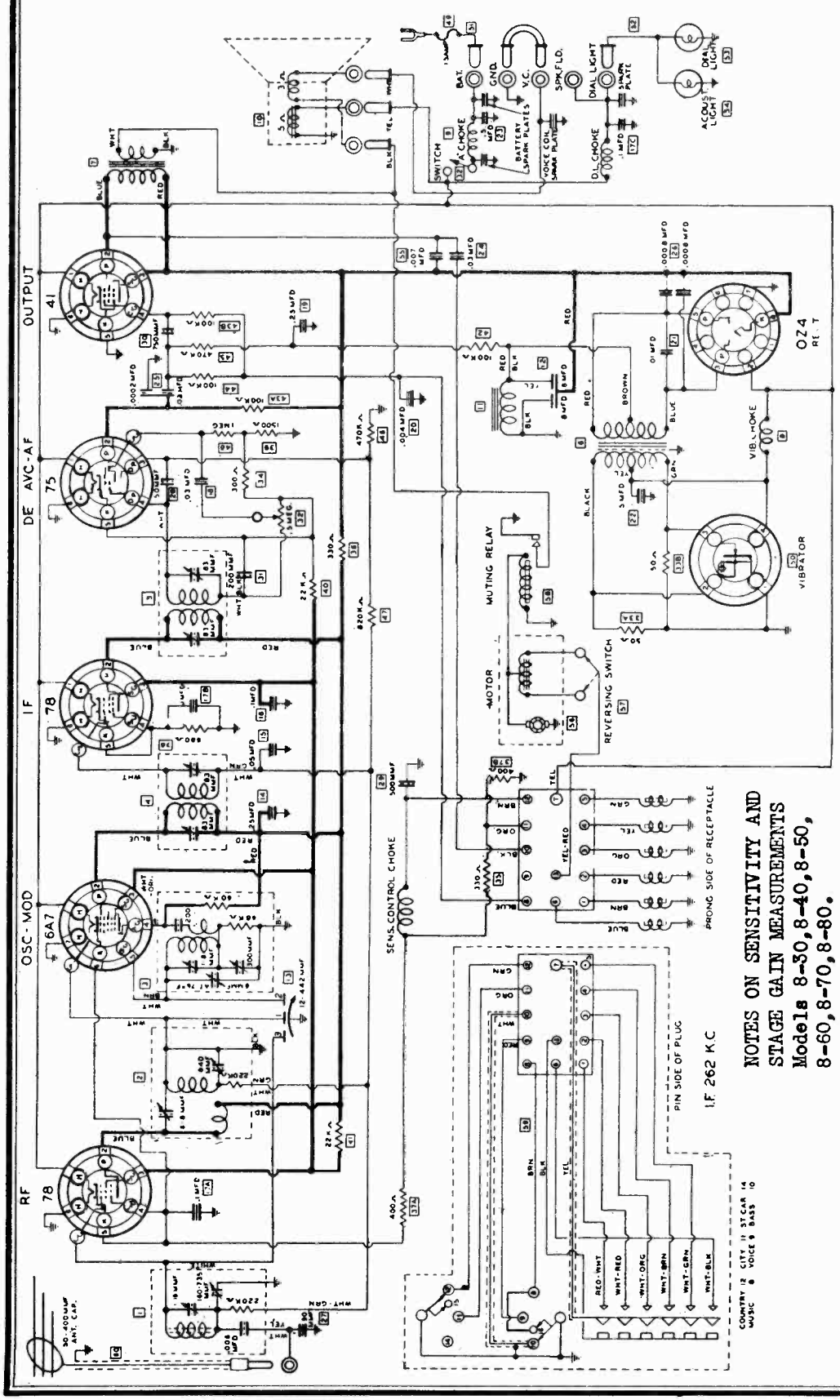
Model 870 Schematic Diagram Parts List

Diag. No.	Part No.	Description
1	1X4636	Antenna Coil & Shield Assembly
2	1X4635	R.F. Coil & Shield Assembly
3	1X4634	Oscillator Coil & Shield Assembly
4	1X4631	I.F. Coil & Shield Assembly
5	1X4630	Diode Coil & Shield Assembly
6	25B4237	Output Transformer
7	25A4239	Filter Choke
8	25B4236	Power Transformer
9	24A4654	Vibrator Choke
10	24A4909	"A" Choke
11	25A4479	Input Choke
12	23A4571	Electrolytic Condenser
13	19B4396	Variable Condenser
14	8A4648	Tub. Cond. (.2-300)
15	8A4260	Tub. & Strap (.05-100)
16	8A4925	Tub. Cond. (Dual .0008-1000)
17	8A4977	Tub. Cond. (.5-100) Flat
18	8A4961	Tub. Cond. (.03-100)
19	8A4736	Tub. Cond. (.002-400)
20	8A3304	Tub. Cond. (.02-400)
21	8A4627	Tub. & Strap (.005-1600)
22	8A4629	Tub. & Strap (.008-400)
23	8A4647	Tub. Cond. (.1-400)
24	8A3302	Tub. Cond. (.1-100)
25	8A4117	Tub. Cond. (.03-600)
26	8A4628	Tub. & Strap (.05-600)
27A	8A4962	Tub. Cond. (.0008-1000)
27B	8A4962	Tub. Cond. (.0008-1000)
28A	8A3311	Tub. Cond. (.1-200)
28B	8A3311	Tub. Cond. (.1-200)
29	8A4626	Tub. & Strap (.003-100)
30	8A4656	Tub. Cond. (.25-400)
31	8A4588	Tub. Cond. (.5-100)
32	21B4806	Molded Mica Cond. (150 mmf 20%)
33	21B4800	Molded Mica Cond. (500 mmf 20%)
34	21B4959	Molded Mica Cond. (.001-10%)
35	21A4802	Toothpick Mica Cond. (90 mmf 10%)
36	8A4649	Cond. Res. (.008-100 & 68,000)
37	8A4650	Cond. Res. (.01-200 & 100,000)
38	18A4204	Volume Control & Switch (.5 meg)
39A	6B6005	Carbon Res. (50-1/2-20) Glo
39B	6B6005	Carbon Res. (50-1/2-20) N.I.
40	6B6035	Carbon Res. (270-1-10) N.I.
41A	6B6022	Carbon Res. (330-1/2-10) Ins.
41B	6B6022	Carbon Res. (330-1/2-10) Ins.
41C	6B6022	Carbon Res. (330-1/2-10) Ins.
42	6B6010	Carbon Res. (330-1/2-20) Ins.
43	6B6086	Carbon Res. (1000-1/3-10) N.I.
44A	6B6072	Carbon Res. (2200-1/3-20) N.I.
44B	6B6072	Carbon Res. (2200-1/3-20) N.I.
45	6B6085	Carbon Res. (2200-1/3-10) N.I.
46	6B6080	Carbon Res. (4700-1/2-10) Ins.
47	6B6041	Carbon Res. (22,000-3-20) N.I.
48A	6B6012	Carbon Res. (33,000-1/2-20) Ins.
48B	6B6012	Carbon Res. (33,000-1/2-20) Ins.
49	6B6082	Carbon Res (33,000-1-20) N.I.
50A	6B6079	Carbon Res. (68,000-1/3-10) N.I.
50B	6B6079	Carbon Res. (68,000-1/3-10) N.I.
51	6B6075	Carbon Res. (100,000-1/2-20) Ins.
52	6B6030	Carbon Res. (100,000-1/3-10) N.I.
53	6B6003	Carbon Res. (220,000-1/3-10) N.I.
54A	6B6014	Carbon Res. (330,000-1/2-20) Ins.
54B	6B6014	Carbon Res. (330,000-1/2-20) Ins.
54C	6B6014	Carbon Res. (330,000-1/2-20) Ins.
55A	6B6032	Carbon Res. (470,000-1/2-20) Ins.
55B	6B6032	Carbon Res. (470,000-1/2-20) Ins.
56	6B6011	Carbon Res. (470,000-1/3-20) N.I.
57	6B6033	Carbon Res. (820-1/2-20) Ins.
58	6B6071	Carbon Res. (1 meg-1/3-20) N.I.
59	48A3333	Vibrator
60	1X4520	Acoustinator complete
61	1X4469	Antenna Cable
62	1X4288	Battery Lead complete
63	65X4637	Fuse (20 amp)
64	1A4892	Dial Light Assembly
65	65X4151	Bulb (6-8 V 1½ W rnd) Bay. Base
66	65X4890	Bulb (6-8 V 1½ W rnd) Scr. Base
67	30A3199	Speaker Cable (2 cond. 36")
	(50B4605	
68	(50B4994	Speaker only (less Cable & Housing)
	(50B4995	

GALVIN MFG. CO.

MODEL 8-60
Schematic
MODELS 8-30,8-40,8-50,
8-60,8-70,8-80
Sensitivity and Gain Notes

FOR PARTS AND SERVICING DATA, SEE INDEX



NOTES ON SENSITIVITY AND STAGE GAIN MEASUREMENTS

Models 8-30,8-40,8-50, 8-60,8-70,8-80.

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

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

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the top grid terminal of the tube through a .1 MF condenser, with a 500M Ohm resistor connected as a leak resistance between the grid of the tube and the grid cap which has been removed (See Fig. 3 on Page 4.)

When measuring over-all sensitivity at the antenna terminal, use a .00015 MF condenser in place of the .1 MF.

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

NOTE:—Readings on 8-50, 8-60, 8-70, and 8-80 should be taken with Acoustinator set at "Country" and "Voice" positions.

Motorola
SCHEMATIC DIAGRAM
MODEL 8-60

FOR SENSITIVITY AND GAIN MEASUREMENTS, SEE INDEX

MODEL 8-60
Parts
MODELS 8-30, 8-40, 8-50
8-60, 8-70, 8-80
Tuner Notes, Part 1

GALVIN MFG. CO.

AUTOMATIC SERVICE NOTES

FAILS TO RETAIN ORIGINAL SETTING

1. MAGNETS NOT LOCKED SECURELY. The lock nuts must be pulled down securely, otherwise, the shock of the sudden stopping of the latch bar will tend to slide them away from the original setting.
2. ORIGINAL SETTING NOT ACCURATE. It is extremely difficult to set the stations to the exact center of the carrier, by ear alone. A tuning meter is recommended. Resetting of magnets may be necessary after several days' use, during which time the mechanism goes through a "shaking down" process.
3. ELECTRICAL DRIFT. This is usually the result of a great change in temperature. Automatic compensation is provided in the circuit to take care of the normal operating temperature range. Before making original setting, turn the set on and permit it to play long enough to arrive at a constant operating temperature. In zero weather do not expect the set to tune "on the nose" until after a constant temperature has been reached. In severe cases of electrical drift occurring at normal operating temperature, change the compensating trimmer. This is located in the oscillator can in Models 8-60, 8-70, and Golden Voice. In Model 8-50, it is mounted on the condenser gang.
4. DEFECTIVE LATCH BAR. Inspect latch bar. If springs are bent or if the gap is too large, the mechanism will not tune accurately.

FAILS TO STOP AT MAGNET

1. OPEN MAGNET WINDING. Check for continuity and replace if necessary.
2. MAGNET CONTACT IN ACOUSTINATOR NOT CLOSING. Open Acoustinator and inspect contacts. Adjust or clean if necessary.
3. ROUNDED HEAD ON MAGNET CORE. The head of the magnet should have sharp corners. Rounded corners may cause the latch bar to slip going in one direction, although it will usually catch in the reverse direction.
4. LATCH BAR DEFECTIVE. Inspect latch bar to make sure that it has not been damaged. Replace latch bar and gear assembly, if required.
5. POOR CONTACT AT ACOUSTINATOR PLUG. A poor contact here means a voltage drop which reduces the pulling power of the magnet.
6. IMPROPER SPACING OF LATCH BAR. Check the spacing between the latch bar and the magnet. It should be somewhere between ten and twenty thousandths of an inch. If the spacing is greater the pulling power of the magnet is reduced.

MOTOR TURNS BUT TUNING MECHANISM DOES NOT

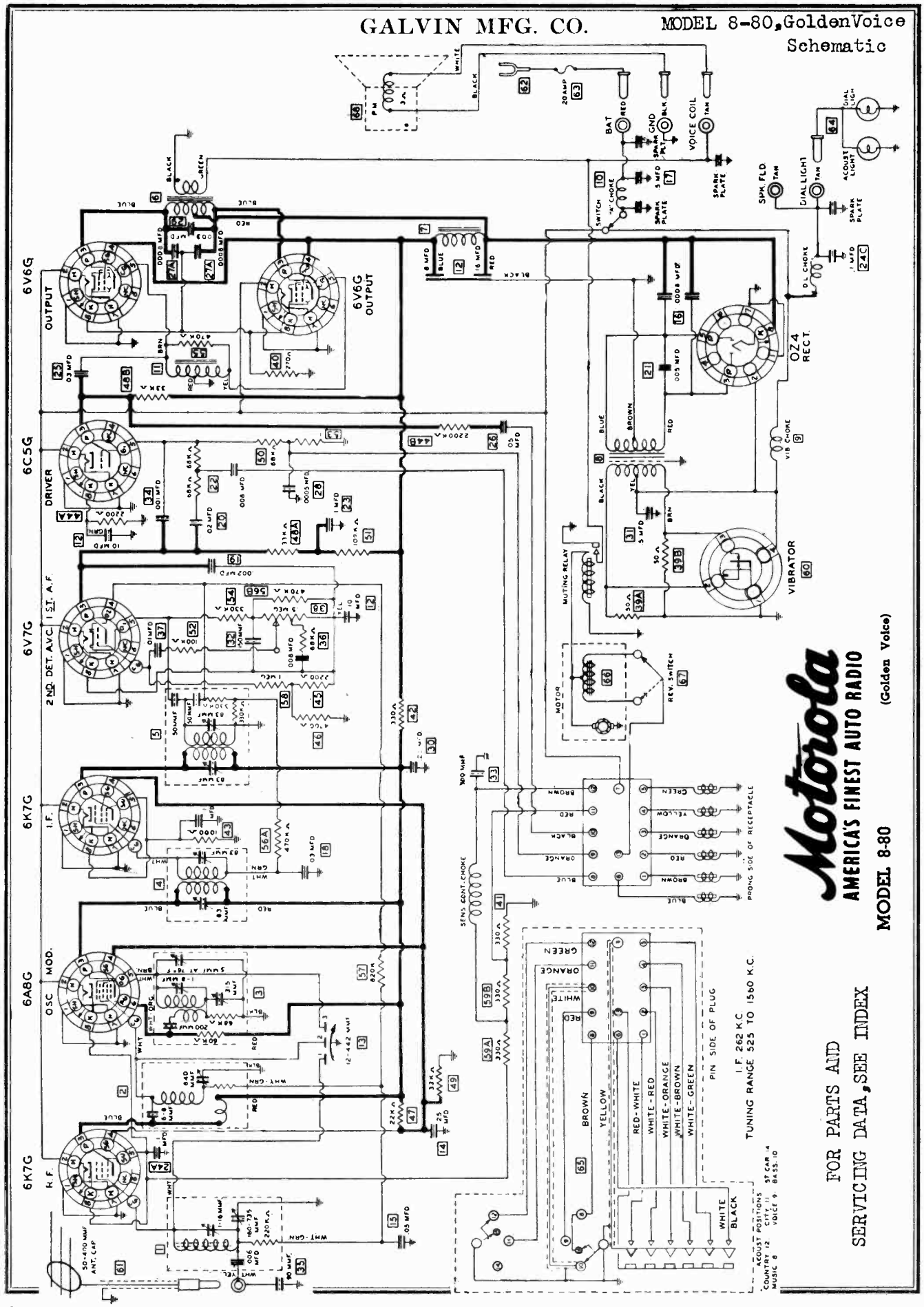
1. GEARS FAIL TO MESH. Check all gears to see that they are properly meshed.
2. MANUAL TUNING GEAR SLIPS. If the manual tuning gear assembly does not have enough tension between the fibre motor drive gear and the brass manual tuning gear, the motor will spin without turning the rest of the mechanism. Replace manual tuning gear assembly if necessary.

LATCH BAR STICKS ON MAGNET POLE

1. MANUAL TUNING SHAFT BINDS. Binding in the tuning control shaft causes the latch bar to press hard against one side of the magnet and may prevent it from releasing as the magnet is de-energized.
2. LATCH BAR SPRING WEAK. Check latch bar tension, to make sure it is pulling away from the magnet with sufficient force.
3. MAGNET CONTACT IN ACOUSTINATOR STUCK. Check the magnet switch in the Acoustinator to make sure it breaks contact when pressure is released on the button. Check for frozen contact points, or for sticking Acoustinator button.
4. ARMATURE RIVET WORN. There is a brass rivet at the tip of the armature, to prevent the armature freezing to the magnet. If this rivet is worn down, permitting the steel armature to actually touch the magnet pole, it may freeze in that position.
5. ROUGH SIDES ON MAGNET POLE. Inspect sides of magnet. If rigid or grooved, the latch bar may catch and fail to release.

Model 8-60 Schematic Diagram Parts List

Diag. No.	Part No.	Description
1	1X4950	Antenna Coil & Shield Assembly
2	1X4953	R.F. Coil & Shield Assembly
3	1X4954	Oscillator Coil & Shield Assembly
4	1X4956	I.F. Coil & Shield Assembly
5	1X4955	Diode Coil & Shield Assembly
6	25B4608	Power Transformer
7	25B4235	Output Transformer
8	24A4798	Vibrator Choke
9	24A4126	"A" Choke
10	50B4445 or 50B4201	Speaker (6" dynamic)
11	25A4886	Filter Choke
12	23A4309	Electrolytic Condenser
13	19B4507	Variable Condenser
14	8A4656	Tub. Cond. (.25-400)
15	8A3305	Tub. Cond. (.05-100)
16	8A3311	Tub. Cond. (.1-200)
17A	8A3302	Tub. Cond. (.1-100)
17B	8A3302	Tub. Cond. (.1-100)
17C	8A3302	Tub. Cond. (.1-100)
18	8A3303	Tub. Cond. (.03-100)
19	8A4283	Tub. Cond. (.25-100)
20	8A3314	Tub. Cond. (.004-100)
21	8A4722	Tub. & Strap (.01-1600)
22	8A4568	Tub. Cond. (.5-100)
23	8A4977	Tub. Cond. (.5-100) flat
24	8A4128	Tub. Cond. (.03-500)
25	8A4061	Tub. Cond. (.02-.0002-400)
26	8A4925	Tub. Cond. (dual .0008-1000)
27	21A4802	Toothpick Mica Cond. (90 mmf 10%)
28	21B4803	Molded Mica Cond. (50 mmf 20%)
29	21B4800	Molded Mica Cond. (500 mmf 20%)
30	21B4804	Molded Mica Cond. (750 mmf 10%)
31	21B4808	Molded Mica Cond. (200 mmf 20%)
32	18A4885	Volume Control & Switch (.5 meg)
33A	6B6005	Carbon Res. (50-1/2-20) N.I.
33B	6B6005	Carbon Res. (50-1/2-20) N.I.
34	6B6023	Carbon Res. (300-1/2-10) Ins.
35	6B6042	Carbon Res. (330-1/3-10) N.I.
36	6B6032	Carbon Res. (330-1/2-20) Ins.
37A	6B6025	Carbon Res. (400-1/3-10) N.I.
37B	6B6025	Carbon Res. (400-1/3-10) N.I.
38	6B6026	Carbon Res. (680-1/3-20) N.I.
39	6B6027	Carbon Res. (1500-1/3-20) N.I.
40	6B6028	Carbon Res. (22,000-1/2-20) Ins.
41	6B6016	Carbon Res. (22,000-1-20) N.I.
42	6B6029	Carbon Res. (100,000-1/3-20) N.I.
43A	6B6031	Carbon Res. (100,000-1/2-10) Ins.
43B	6B6031	Carbon Res. (100,000-1/2-10) Ins.
44	6B6030	Carbon Res. (100,000-1/2-10) N.I.
45	6B6011	Carbon Res. (470,000-1/3-20) N.I.
46	6B6032	Carbon Res. (470,000-1/2-20) Ins.
47	6B6033	Carbon Res. (820,000-1/2-20) Ins.
48	6B6071	Carbon Res. (1 meg-1/3-20) N.I.
49	65X4165	Fuse (15 amp)
50	48A3333	Vibrator
51	1X4872	Battery Cable
52	1K4166	Dial Light Cable
53	65X4151	Bulb (6-8 V. 1½ W. rnd) Bay. Base
54	65X4874	Bulb (6-8 V. frosted) Scr. Base
55	8A2289	Tub. Cond. (.007-500)
56	59B4792	Motor
57	40A4774	Reversing Switch
58	1X4913	Muting Relay Assembly
59	1X4960	Acoustinator Assembly
60	1X4469	Antenna Cable



MODEL 8-80
Parts
MODELS 8-30,8-40,8-50
8-60,8-70,8-80
Tuner Notes, Part 2

GALVIN MFG. CO.

AUTOMATIC SERVICE NOTES

BUTTONS STICK

1. BURR ON BUTTON. Remove the button from the Acoustinator and look for a tenite burr along one of the edges. Scrape the edges smooth with a pen knife. NOTE:—When removing the button, if you will press in on the adjacent button at the same time you are pulling out on the one to be removed, you will find that it comes out easily.

MOTOR FAILS TO START

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

MOVES FROM STATION AFTER BUTTON HAS BEEN RELEASED

1. MANUAL TUNING GEAR SLIPPING. This assembly is so constructed that a small amount of slippage will occur between the fibre motor drive gear and the brass manual tuning gear. The purpose of this design is to absorb the shock of stopping the motor quickly when a station is tuned. If the tension between the two gears is weak, the motor will not stop, but continues to spin slowly after the station has been tuned. When the magnet releases the latch bar, as the finger is removed from the button, the momentum of the motor pulls the condenser gang a little beyond the station. To remedy this condition install a new manual tuning gear assembly.

MOTOR FAILS TO REVERSE

1. DEFECTIVE REVERSING SWITCH. Replace if required.
2. LEADS TO REVERSING SWITCH CROSSED. Reverse leads.

MECHANISM RUNS SLUGGISHLY

1. LOW BATTERY VOLTAGE. A weak or defective battery will not deliver sufficient voltage to turn the motor at normal speed.
2. HIGH RESISTANCE CONTACT IN ACOUSTINATOR. High resistance at the Acoustinator contacts will cause a voltage drop which will prevent the motor from turning at normal speed.
3. POOR CONTACT BETWEEN ACOUSTINATOR PLUG AND RECEPTACLE. This will also result in voltage drop, and lessened motor power.
4. BINDING IN TUNING SHAFT. Binding in the flexible tuning shaft will place an additional load on the motor which can slow it down considerably. Install tuning shaft with minimum amount of bending and check alignment where the tuning shaft enters the receiver housing.
5. GEAR BEARINGS RUNNING DRY. The manual tuning gear and the large gear bearings must be properly lubricated. Because of the wide variation in temperatures encountered between summer and winter driving, special lubricants should be used. Use Motorola Ice Machine Oil, Part No. 11M 5057. Do not use ordinary machine oils. They will not stand zero temperatures.

Model 8-80 Schematic Diagram Parts List

Diag. No.	Part No.	Description
1	1X4725	Antenna Coil & Shield Assembly
2	1X4723	R.F. Coil & Shield Assembly
3	1X4720	Oscillator Coil & Shield Assembly
4	1X4715	I.F. Coil & Shield Assembly
5	1X4712	Diode Coil & Shield Assembly
6	25B4594	Output Transformer
7	25A4739	Filter Choke
8	25B4924	Power Transformer
9	24A4613	Vibrator Choke
10	24A4693	"A" Choke
11	25A4923	Input Choke
12	23A4662	Electrolytic Condenser
13	19B4507	Variable Condenser
14	8A4732	Tub. Cond. (.25-300)
15	8A3305	Tub. Cond. (.05-100)
16	8A4925	Tub. Cond. (dual .0008-1000)
17	8A4977	Tub. Cond. (.5-100) flat
18	8A3303	Tub. Cond. (.03-100)
19	8A4736	Tub. Cond. (.002-400)
20	8A3304	Tub. Cond. (.02-400)
21	8A4627	Tub. & Strap (.005-1600)
22	8A4734	Cond. Res. (.008-400&2 68,000)
23	8A4647	Tub. Cond. (.1-400)
24A	8A3302	Tub. Cond. (.1-100)
24B	8A3302	Tub. Cond. (.1-100)
24C	8A3302	Tub. Cond. (.1-100)
25	8A4117	Tub. Cond. (.03-600)
26	8A4628	Tub. & Strap (.05-600)
27A	8A4962	Tub. Cond. (.0008-1000)
27B	8A4962	Tub. Cond. (.0008-1000)
28	8A1946	Tub. Cond. (.0005-100)
29	8A4626	Tub. & Strap (.003-1000)
30	8A4656	Tub. Cond. (.25-400)
31	8A4588	Tub. Cond. (.5-100)
32	21B4806	Molded Mica Cond. (150 mmf 20%)
33	21B4803	Molded Mica Cond. (500 mmf 20%)
34	21B4959	Molded Mica Cond. (.001 mfd 10%)
35	21A4802	Toothpick Mica Cond. (90 mmf 10%)
36	8A4649	Cond. Res. (.008-100&1 68,000)
37	8A1400	Tub. Cond. (.01-100)
38	18A4740	Volume Control & Switch (.5 meg)
39A	6B6005	Carbon Res. (50-1/2-20) N.I.
39B	6B6005	Carbon Res. (50-1/2-20) N.I.
40	6B6035	Carbon Res. (270-1-10) N.I.
41	6B6022	Carbon Res. (330-1/2-10) Ins.
42	6B6010	Carbon Res. (330-1/2-20) Ins.
43	6B6086	Carbon Res. (1000-1/3-10) N.I.
44A	6B6072	Carbon Res. (2200-1/3-20) N.I.
44B	6B6072	Carbon Res. (2200-1/3-20) N.I.
45	6B6085	Carbon Res. (2200-1/3-10) N.I.
46	6B6080	Carbon Res. (4700-1/2-10) Ins.
47	6B6041	Carbon Res. (4700-1/2-10) Ins.
48A	6B6012	Carbon Res. (33,000-1/2-20) Ins.
48B	7B6012	Carbon Res. (33,000-1/2-20) Ins.
49	6B6082	Carbon Res. (33,000-1/2-20) N.I.
50	6B6079	Carbon Res. (68,000-1/3-10) N.I.
51	6B6029	Carbon Res. (100,000-1/3-20) N.I.
52	6B6075	Carbon Res. (100,000-1/2-20) Ins.
53	6B6030	Carbon Res. (100,000-1/3-10) N.I.
54	6B6014	Carbon Res. (330,000-1/2-20) Ins.
55	6B6032	Carbon Res. (470,000-1/2-20) Ins.
56A	6B6011	Carbon Res. (470,000-1/3-20) N.I.
56B	6B6011	Carbon Res. (470,000-1/3-20) N.I.
57	6B6000	Carbon Res. (820,000-1/3-20) N.I.
58	6B6071	Carbon Res. (1 meg-1/3-20) N.I.
59A	6B6042	Carbon Res. (330-1/3-10) N.I.
59B	6B6042	Carbon Res. (330-1/3-10) N.I.
60	48A3333	Vibrator
61	1X4469	Antenna Cable
62	1X4288	Battery Cable
63	65X4637	Fuse (20 amp)
64	1K4166	Dial Light Cable
65	1X4960	Acoustinator (complete)
66	59B4792	Motor
67	40A4774	Reversing Switch
68	50B4605	Speaker only (less cable and housing)
	50B4994	Speaker only (less cable and housing)
	50B4995	Speaker only (less cable and housing)

SOCKET VOLTAGES

Numerals refer to socket terminal as indicated on circuit diagram.

MODEL 8-30				Current 6.3 Amp.			Max. Pwr. Output 3.0 Watts		
TUBE	POSITION	1	2	3	4	5	6	7	8
78	RF	6.0	175	80	0	0	0	..	..
6A7	Osc.-Mod.	6.0	175	80	95	9.3	0	0	..
78	IF	6.0	175	80	0	0	0	..	..
75	Det.-AVC-AF	6.0	70	1.8	1.8	2.4	0	..	..
41	Output	6.0	230	185	.6	0	0	..	..
84	Rect.	6.0	295 AC	295 AC	245	0	..	..	..

MODEL 8-40				Current 6.5 Amp.			Max. Pwr. Output 3.1 Watts		
78	RF	6.0	220	60	0	0	0	..	..
6A7	Osc.-Mod.	6.0	220	60	105	21	0	0	..
78	IF	6.0	220	60	0	0	0	..	..
75	AF-Det.-AVC	6.0	85	1.6	1.6	1.6	0	..	..
41	Output	6.0	220	225	.6	0	0	..	..
84	Rect.	6.0	290 AC	290 AC	245	0	..	..	..

MODELS 8-50 AND 8-60				Current 6.5 Amp.			Max. Pwr. Output 3.6 Watts		
78	RF	6.0	225	75	0	4.0	0	..	..
6A7	Osc.-Mod.	6.0	225	75	115	15	4.0	0	..
78	IF	6.0	225	75	0	3.0	0	..	..
75	AF-Det.-AVC	6.0	125	0	.2	5.5	0	..	..
41 or 42	Output	6.0	215	225	.4	0	0	..	..
0Z4	Rect.	..	6.0	295 AC	..	295 AC	..	0	230

MODELS 8-70 AND 8-80				Current 8.5 Amp.			Max. Pwr. Output 13 Watts		
6K7G	RF	0	0	255	90	0	X	6.0	4.0
6A8G	Osc.-Mod.	0	6.0	255	90	9.4	120	0	4.0
6K7G	IF	0	0	255	90	4.4	X	6.0	4.4
6V7G	Det.-AVC	0	0	50	0	.2	X	6.0	7.0
6C5G	AF	..	0	150	X	0	X	6.0	5.6
6V6G	Output	0	0	255	255	0	X	6.0	15.0
0Z4	Rect.	0	0	300 AC	X	300 AC	X	6.0	260

"X" indicates socket terminals used as dummy tie points.

All readings except rect. plates are from chassis ground to socket terminal indicated. Measurements made with 1000 ohms per volt meter. Voltage at Battery—6.3 V. Voltage at Receiver—6.0 V.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

SEE NOTE WITH SCHEMATIC OF MODEL 8-60

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
		MODEL 8-30			
.25 Volts	400 Cycles	75 Grid	.1 MF	.5 Meg	1.73 Volts
25,000	262 K.C.	78 Grid(I.F.)	.1 MF	.5 Meg	1.73 Volts
700	262 K.C.	6A7 Grid	.1 MF	.5 Meg	1.73 Volts
800	600 K.C.	6A7 Grid	.1 MF	.5 Meg	1.73 Volts
45	600 K.C.	78 Grid(R.F.)	.1 MF	.5 Meg	1.73 Volts
3	600 K.C.	Ant. Lead	.00015 MF	None	1.73 Volts
		MODEL 8-40			
.25 Volts	400 Cycles	75 Grid	.1 MF	.5 Meg	1.73 Volts
20,000	262 K.C.	78 Grid(I.F.)	.1 MF	.5 Meg	1.73 Volts
600	262 K.C.	6A7 Grid	.1 MF	.5 Meg	1.73 Volts
700	600 K.C.	6A7 Grid	.1 MF	.5 Meg	1.73 Volts
30	600 K.C.	78 Grid(R.F.)	.1 MF	.5 Meg	1.73 Volts
1.5	600 K.C.	Ant. Lead	.00015 MF	None	1.73 Volts
		MODELS 8-50 AND 8-60			
.2 Volts	400 Cycles	75 Grid	.1 MF	.5 Meg	1.73 Volts
16,000	262 K.C.	78 Grid(I.F.)	.1 MF	.5 Meg	1.73 Volts
400	262 K.C.	6A7 Grid	.1 MF	.5 Meg	1.73 Volts
500	600 K.C.	6A7 Grid	.1 MF	.5 Meg	1.73 Volts
20	600 K.C.	78 Grid(R.F.)	.1 MF	.5 Meg	1.73 Volts
1.5	600 K.C.	Ant. Lead	.00015 MF	None	1.73 Volts
		MODELS 8-70 AND 8-80			
.15 Volts	400 Cycles	6V7G	.1 MF	.5 Meg	1.73 Volts
14,000	262 K.C.	6K7G(I.F.)	.1 MF	.5 Meg	1.73 Volts
300	262 K.C.	6A8G	.1 MF	.5 Meg	1.73 Volts
400	600 K.C.	6A8G	.1 MF	.5 Meg	1.73 Volts
15	600 K.C.	6K7G(R.F.)	.1 MF	.5 Meg	1.73 Volts
1	600 K.C.	Ant. Lead	.00015 MF	None	1.73 Volts

** For 1 Watt output.*
*** Output meter connected across voice coil.*
1.73 Volts equals 1 Watt output.
V.C. resistance—3 ohms.

ALIGNMENT PROCEDURE

PRELIMINARY STEPS

To properly align this receiver the chassis must be taken out of the housing and placed on the service bench.

A metal plate is advised for a good ground to chassis, the plate to be at least a foot square, with one terminal of the storage battery connected to it through a heavy lead, preferably a starter cable.
The "A" battery lead should likewise be brought up from the battery through as heavy a lead as possible (starter cable) to a terminal on the bench.

Plug in the Acoustinator, if the set undergoing alignment is thus equipped. Set Acoustinator at "Country" and "Voice" positions.

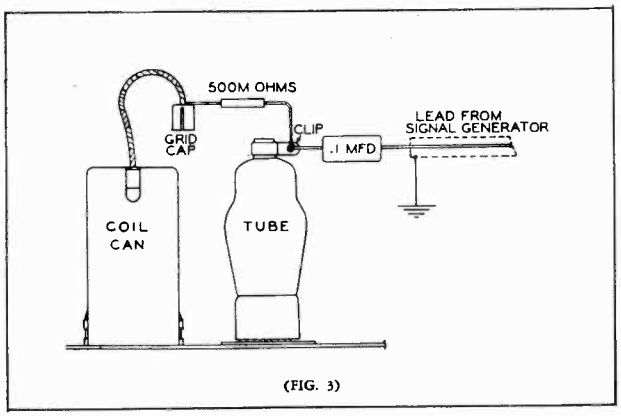
Connect the speaker to the chassis and plug the "A" lead into its receptacle.
Turn the volume control to maximum and leave it in that position throughout the alignment, reducing the signal generator output if necessary.

MPORTANT NOTE:

The trimmer labeled 600 K.C. in the R.F. coil can must not be adjusted in the field. It is the key point in the entire R.F. alignment and was carefully set in the factory by means of an accurate capacity bridge to its correct capacity (780 MMF in Models 8-30 and 8-40—840 MMF in Models 8-50, 8-60, 8-70, and 8-80). Before shipment, this trimmer was covered by a strip of black Scotch Tape, which should be left in position to eliminate any possibility of shifting its capacity through error. (In Model 8-30 only, this trimmer is located in the Osc. coil can.)

I.F. ALIGNMENT

1. Connect signal generator to control grid of the Osc.-Mod. tube (6A7 or 6A8G) through a .1 MF condenser, having first removed the grid cap from the top of the tube. (See Fig. 3.) Connect a 500,000 ohm resistor from the grid of the tube to the grid cap on the lead just removed from this tube. Turn condenser gang completely out of mesh. Connect output meter across speaker voice coil.
2. Set signal generator at 262 K.C. and carefully adjust the trimmers in the diode coil can to the point showing highest reading on the output meter.
3. Adjust the trimmers in the I.F. coil can to the point showing highest reading on the output meter.
4. Go over I.F. and diode adjustment several times to secure maximum accuracy.



(FIG. 3)

ALIGNMENT PROCEEDURE
(CONTINUED)

SETTING THE RANGE

1. Connect signal generator to the control grid of the R.F. tube (78 or 6K7G) through a .1 MF Condenser having first removed the grip cap from the top of the tube. Connect a 500,000 ohm resistor from the grid of the tube to the grid cap on the lead just removed from this tube. (See Fig. 3.)
2. Set signal generator at 1560 K.C. and, with condenser gang completely out of mesh, adjust for maximum deflection on the output meter, the trimmer in the oscillator coil can labeled 1400 K.C. (In Model 8-30 this trimmer is on the middle section of the condenser gang.)
3. Set signal generator at 535 K.C. Turn condenser plates completely in mesh and adjust for maximum deflection on output meter, the trimmer in the oscillator coil can marked 600 K.C.

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

R.F. AND ANTENNA ALIGNMENT

1. Connect the signal generator to the antenna lead through a .00015 MF condenser and to chassis ground. Set signal generator at 600 K.C. and turn condenser gang until signal is heard. Adjust trimmer on the antenna coil can labeled 600 K.C. for maximum deflection of output meter.
2. Set signal generator at 1400 K.C. Turn condenser gang until signal is heard. Adjust for maximum deflection of output meter, the trimmer in the antenna coil can marked 1400 K.C. (In Model 8-30 this trimmer is on the back section of the condenser gang.)
3. Adjust for maximum deflection of output meter, the trimmer in the R.F. coil can marked 1400 K.C. (In Model 8-30, this trimmer is on the front section of the condenser gang.)
4. Recheck steps 1, 2, and 3, for accuracy.

USE OF OSCILLOSCOPE IN ALIGNING I. F.'S

In service stations which possess the proper equipment, the visual method of adjusting the I.F. stage can be used to good advantage.

EQUIPMENT REQUIRED: Cathode Ray Oscilloscope and a frequency modulated signal generator. (NOTE: If your signal generator is unmodulated, a frequency modulator will be required to adapt it for use with the oscilloscope.)

PROCEDURE:

1. Align I.F. and diode trimmers in the regular manner as outlined in preceding paragraphs.
2. Connect "Wobbulator" to control grid of Osc.-Mod. tube (6A7 or 6A8G) through a .1 MF condenser, having first removed the grid cap from the top of the tube. Connect a 500,000 ohm resistor from the grid of the tube to the grid cap on the lead just removed from this tube. (Fig. 3).
3. Connect oscilloscope to the top or high side of the diode load resistor, which, in this case, is the volume control.
4. Adjust the "Wobbulator" frequency to 262 K.C. and observe the picture of the I.F. resonance curve as shown on the oscilloscope "screen". Correct alignment will result in a flat top curve, as shown in Fig. A.
5. Should the curve appear sharp at the "nose" with a shelf on either side of the peak, as shown in Fig. B, adjust the PLATE trimmer of the I.F. transformer slightly, until the curve approaches the condition shown in Fig. A. If the regular I.F. alignment has been properly carried out, it will be necessary only in rare instances to adjust other than the I.F. PLATE TRIMMER.

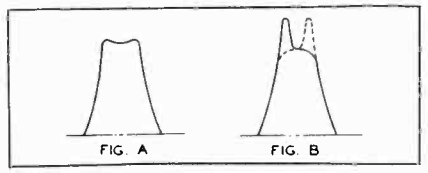


FIG. A FIG. B

GALVIN MFG. CO.

MODELS 8-30, 8-40, 8-50
8-60, 8-70, 8-80
Tuner Adjustments

PUSH-BUTTON TUNER ADJUSTMENT

The most important thing to remember when setting up the automatic Models 8-60 and 8-80 (Golden Voice) is that the magnets must be set accurately at the exact peak of the station carrier.

PRECAUTIONS: The adjustment can in most cases be made after the installation in the car, but if certain precautions are taken it is recommended that it be done on the service bench before the installation, since the mechanism is more accessible and it is therefore easier to do a careful job. The necessary precautions are as follows:

1. *Before proceeding with the adjustment, turn the set "on" and let it warm up long enough to reach a constant operating temperature.*
2. *Connect the receiver to an antenna of approximately the same capacity as the car antenna, and adjust the antenna trimmer for maximum sensitivity at 600 K.C.*
3. *After the receiver has been installed in the car, adjust the antenna trimmer at 600 K.C. for maximum noise level. If the noise level is too low, use a weak station. DO NOT TRIM ON A STRONG SIGNAL.*

MAGNET ADJUSTMENT: To set the stations, proceed as follows:

1. Turn the set on and let it play for NOT LESS THAN 10 MINUTES, to assure all electrical circuits reaching a constant operating temperature.
2. Select the 6 stations to be "set" and arrange the 6 magnets to the approximate station frequencies as indicated on the scale, locking them in position. DO NOT "SET" WEAK STATIONS. (Fig. 1.)
3. Press the first button. The motor will bring the mechanism to the first magnet. Loosen the locknut.
4. Tune manually to the exact peak of the station, using the tuning knob in the control head.
5. Press the first button half way in (far enough to energize the magnet, but not far enough to start the motor or mute the set.)
6. Slide the magnet in the direction of error until a "click" indicates that the latch bar has engaged in the stop.
7. Tighten the lock nut.
8. Proceed to "set" the other 5 stations.

NOTE: It may be necessary to rearrange the three spacing studs, located around the control ring, should they happen to be set at positions which interfere with the setting of favorite stations. This should be done in such a manner as to gain three point suspension for the center ring, permitting the magnets to slide freely while setting stations. (See Fig. 1.)

IMPORTANT NOTE: After "setting" each station, check your accuracy by retuning manually.

SPOT TUNER ADJUSTMENT

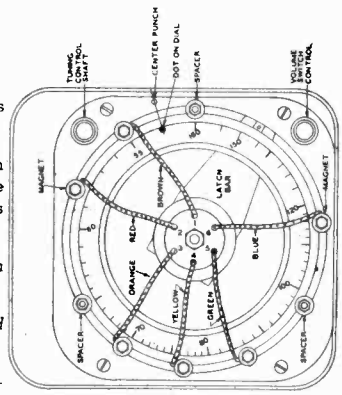
NOTE: Before setting any station, permit the radio to reach a constant operating temperature, as recommended for the push-button models.

1. Slip the spot tuner housing up the flexible control shaft far enough to expose the spot tuner mechanism, which consists of a small ball bearing, a brass raceway in which it moves, and a slotted retainer clip which acts as its guide.
2. Tune in the desired station as accurately as possible. A tuning meter is recommended, except for Model 8-40, which has no Acoustinator receptacle.
3. With a pair of slip jaw pliers, one jaw of which rests firmly on the small ball bearing, the other jaw of which rests on the bottom of the unit, apply enough pressure on the ball to force an indentation in the brass raceway in which it moves. (Fig. 2.)
   Proceed to set other favorite stations in the same manner.

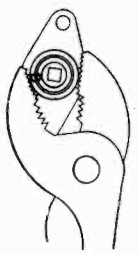
BEFORE APPLYING PRESSURE WITH THE PLIERS, BE SURE THE STATION IS TUNED ACCURATELY. The raceway has a double track. Therefore, should you desire to reset the SPOT TUNER to a new series of stations, it can be done by moving the ball bearing over to the second track. To do this, turn the condenser gang to full mesh (ball bearing at extreme end of raceway) and with a pointed instrument, force the ball bearing into the adjoining groove.

A THIRD SETTING CAN BE MADE ONLY BY INSTALLING A NEW RACEWAY. Order part No. 1X4487 from your Motorola Distributor.

To install a new raceway, force the blue steel clip off the assembly, taking care not to lose the ball bearing. Then remove the retainer spring and washer from the end of the assembly and slide the raceway out.



(FIG. 1)



(FIG. 2)

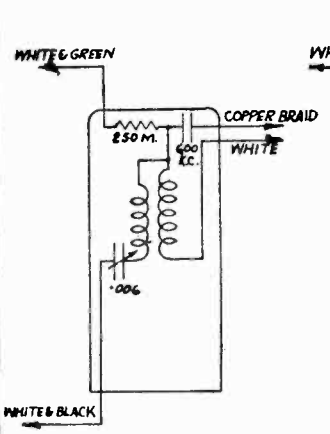
When the unit is reassembled, run the ball bearing down toward the mounting bracket, almost to the end of the raceway. Then turn the condenser gang in the receiver to full mesh and install the spot tuner on the receiver housing. This procedure aligns the units so the ball will travel the full length of the raceway, while the condenser gang also completes its full 180° movement.

TUNING METER: To assure an accurate setting on both the Acoustinator receptacle. It is sensitive and has additional utility in that it can be used to accurately read automatic and spot tuning models, we urgently recommend that a tuning meter be used. We have devised a resistance values between 0 and 100 ohms. Order No. 66x10415 Tuning and resistance meter, $4.95 net. ORDER simple meter that is easy to use since it merely plugs into FROM YOUR DISTRIBUTOR.

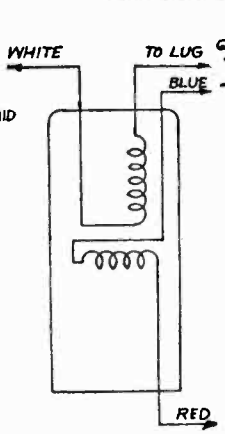
MODELS 35, 45, 65, 70,
Golden Voice
Coil Data

GALVIN MFG. CO.

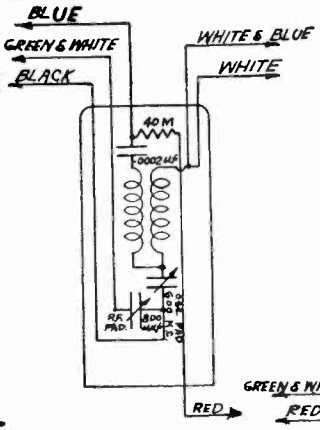
1937 Motorola UNIT COLOR CODE



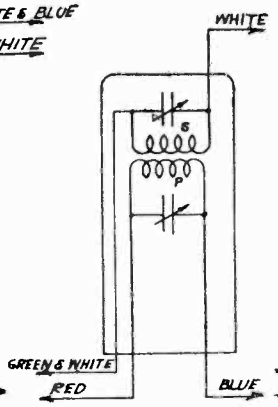
MODEL #35
ANTENNA COIL



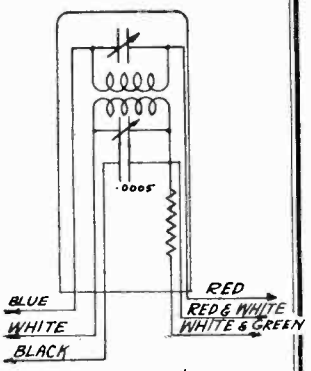
MODEL #35
R.F. COIL



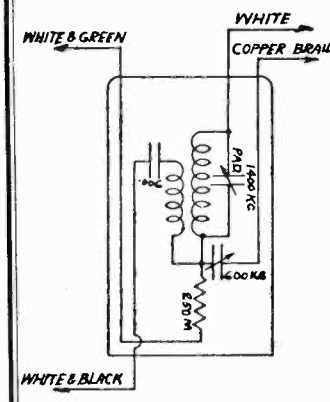
MODEL #35
OSC. COIL



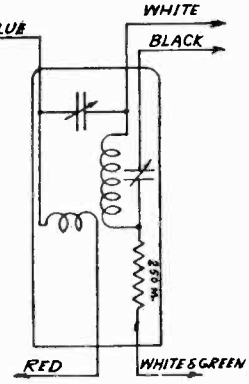
MODEL #35
I.F. COIL



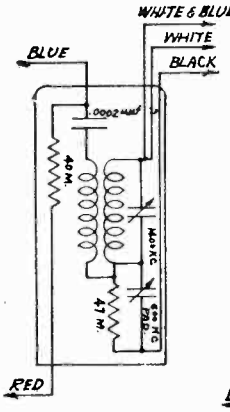
MODEL #35
DIODE COIL



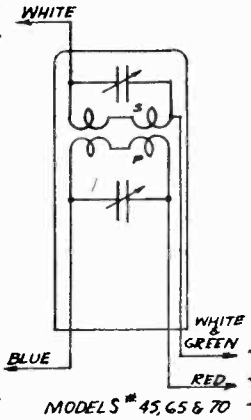
MODELS #45, 65, 70 & G.V.
ANTENNA COIL



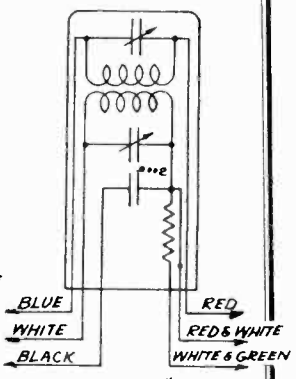
MODELS #45, 65, 70 & G.V.
R.F. COIL



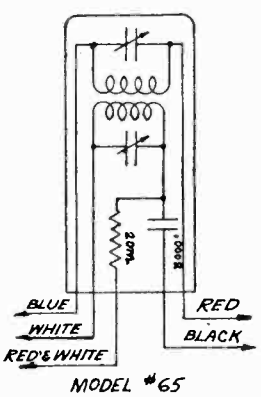
MODELS #45, 65, 70 & G.V.
OSC COIL



MODELS #45, 65 & 70
I.F. COIL



MODEL #45
DIODE COIL



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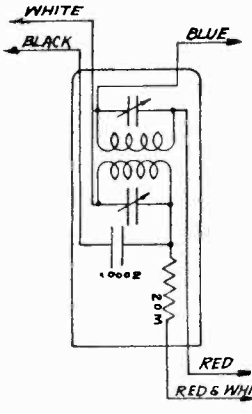
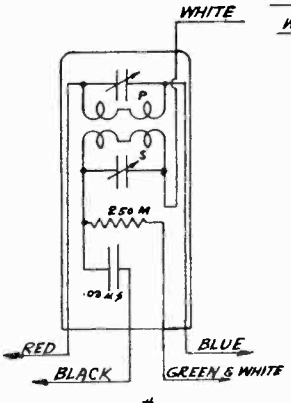
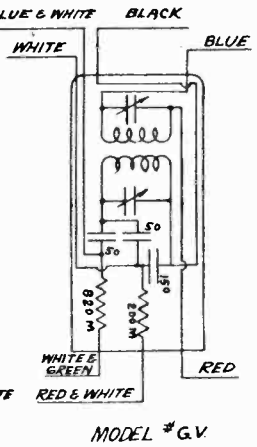
DIODE COIL



MODEL #70
DIODE COIL



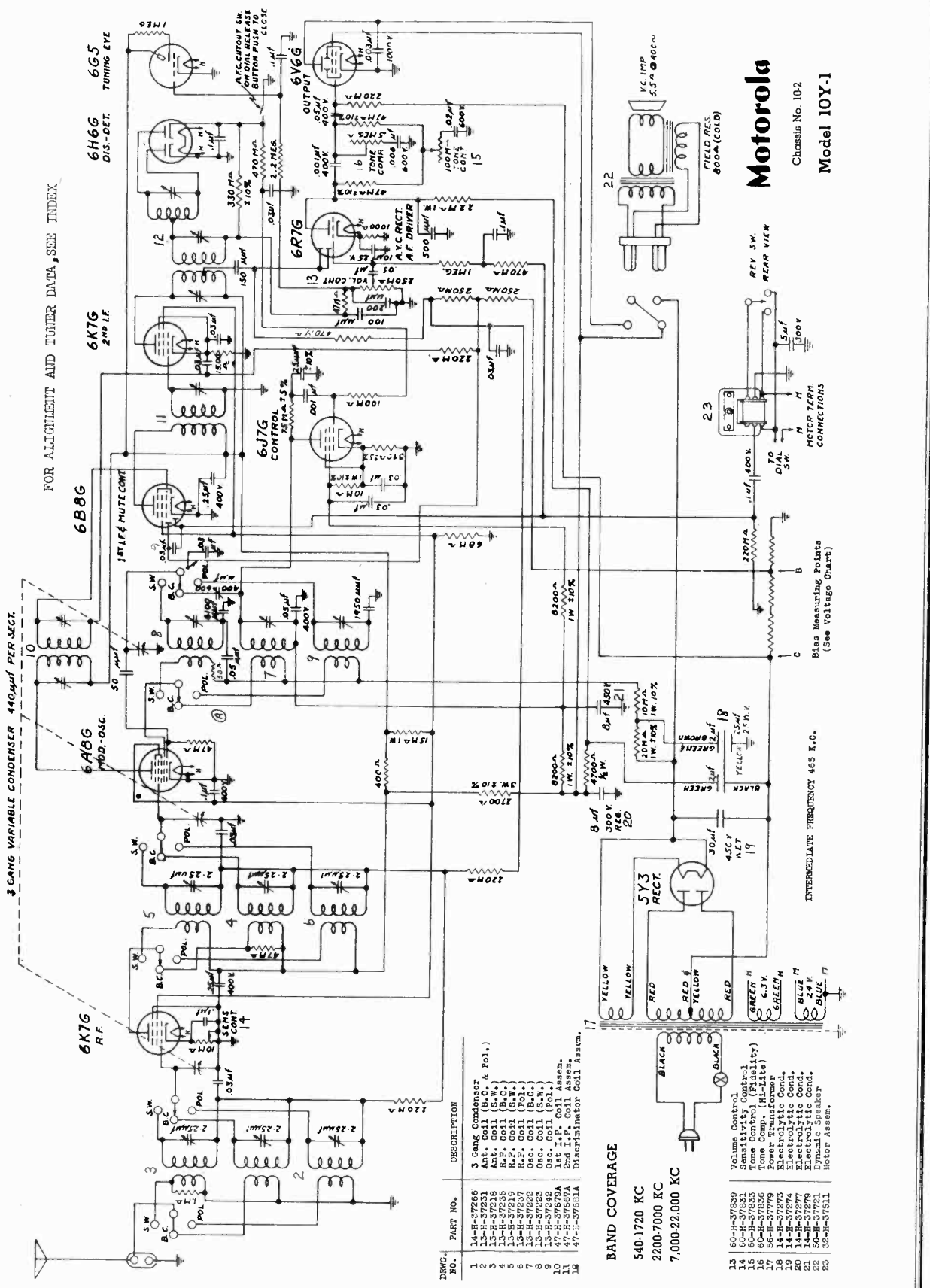
MODEL #G.V.
I.F. COIL



MODEL #G.V.
DIODE COIL

GALVIN MFG. CO.

MODEL 10Y-1
Chassis 10-2
Schematic, Parts

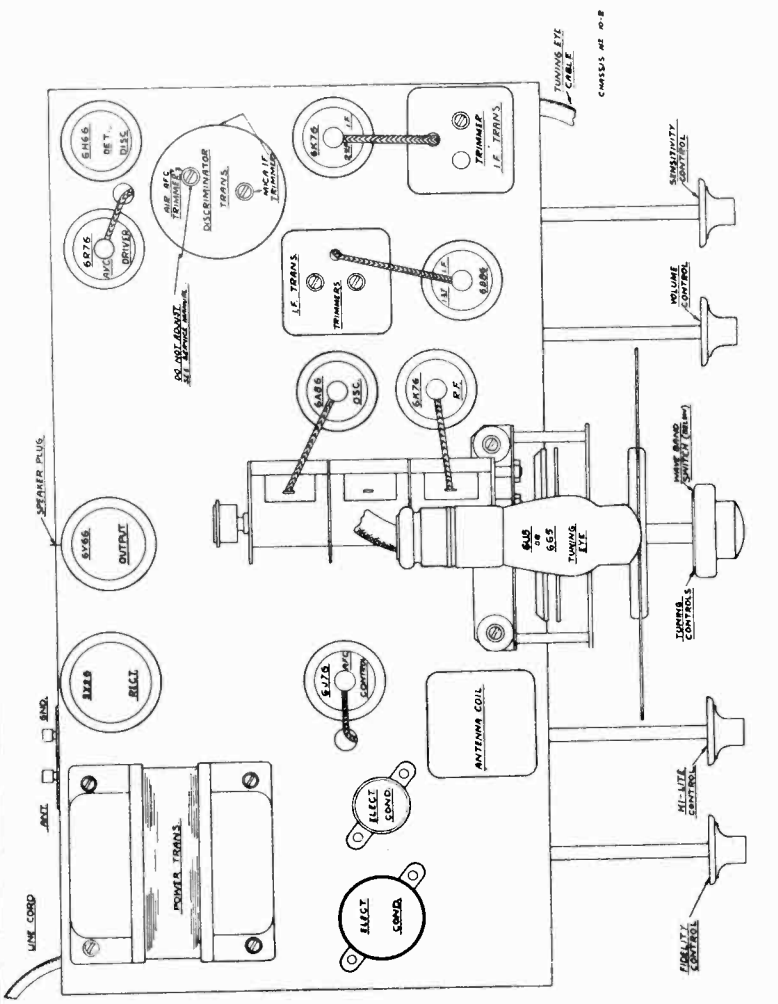


DWG. NO.	PART NO.	DESCRIPTION
1	14-H-37266	3 Gang Condenser
2	13-H-37231	Ant. Coil (B.C. & Pol.)
3	13-H-37218	Ant. Coil (S.W.)
4	13-H-37235	R.F. Coil (B.C.)
5	13-H-37219	R.F. Coil (S.W.)
6	13-H-37237	R.F. Coil (Pol.)
7	13-H-37221	Osc. Coil (B.C.)
8	13-H-37222	Osc. Coil (S.W.)
9	13-H-37242	Osc. Coil (Pol.)
10	47-H-37679A	1st I.F. Coil Assem.
11	47-H-37667A	2nd I.F. Coil Assem.
12	47-H-37681A	Discriminator Coil Assem.
13	60-H-37839	Volume Control
14	60-H-37831	Sensitivity Control
15	60-H-37833	Tone Control (Fidelity)
16	60-H-37836	Tone Comp. (Brilliance)
17	56-H-37779	Power Transformer
18	14-H-37273	Electrolytic Cond.
19	14-H-37274	Electrolytic Cond.
20	14-H-37277	Electrolytic Cond.
21	14-H-37279	Electrolytic Cond.
22	50-H-37521	Dynamic Speaker
23	32-H-37511	Motor Assem.

MODEL 10Y-1
Chassis 10-2
Socket, Trimmers
Voltage

GALVIN MFG. CO.

MODEL 10Y-1



TOP TERMINAL

BOTTOM VIEW OF SOCKET

CHASSIS LAYOUT (10-2)

SOCKET VOLTAGES (CHASSIS 10-2)

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6K7G	R. F.	0	6.3 AC	210	100	0	X	0	Note A	Note B
6A8G	1st Det. Osc.	0	6.3 AC	200	100	−13	195	0	0	Note B
6B8G	1st I. F.	0	6.3 AC	200	0	0	100	0	0	Note B
6K7G	2nd I. F.	0	0	195	100	0	X	6.3 AC	7	0
6H6G	2nd Det. AFC Disc.	0	6.3 AC	0	0	0	....	0	0	....
6J7G	AFC	0	6.3 AC	185	100	0	X	0	4.5	0
6R7G	AVC Driver	0	6.3 AC	150	0	0	X	0	4.5	0
6V6G	Output	0	6.3 AC	265	275	Note C	X	0	0	....
5Y3G	Rect.	0	5.0 AC	....	350 AC	....	350 AC	....	5.0 AC	....
6U5	Eye	0	Filament (Brown Wire) 6.3 AC Cathode (Black Wire) 0		Plate (Red Wire) 195 Grid (Green Wire) 0					

"X" indicates socket terminals used as dummy tie points.

Note A:—0 to 10.0 V. depending on position of sensitivity control.

Note B:—3.5 V. measured point B to ground on 10 V. scale (see circuit diagram).

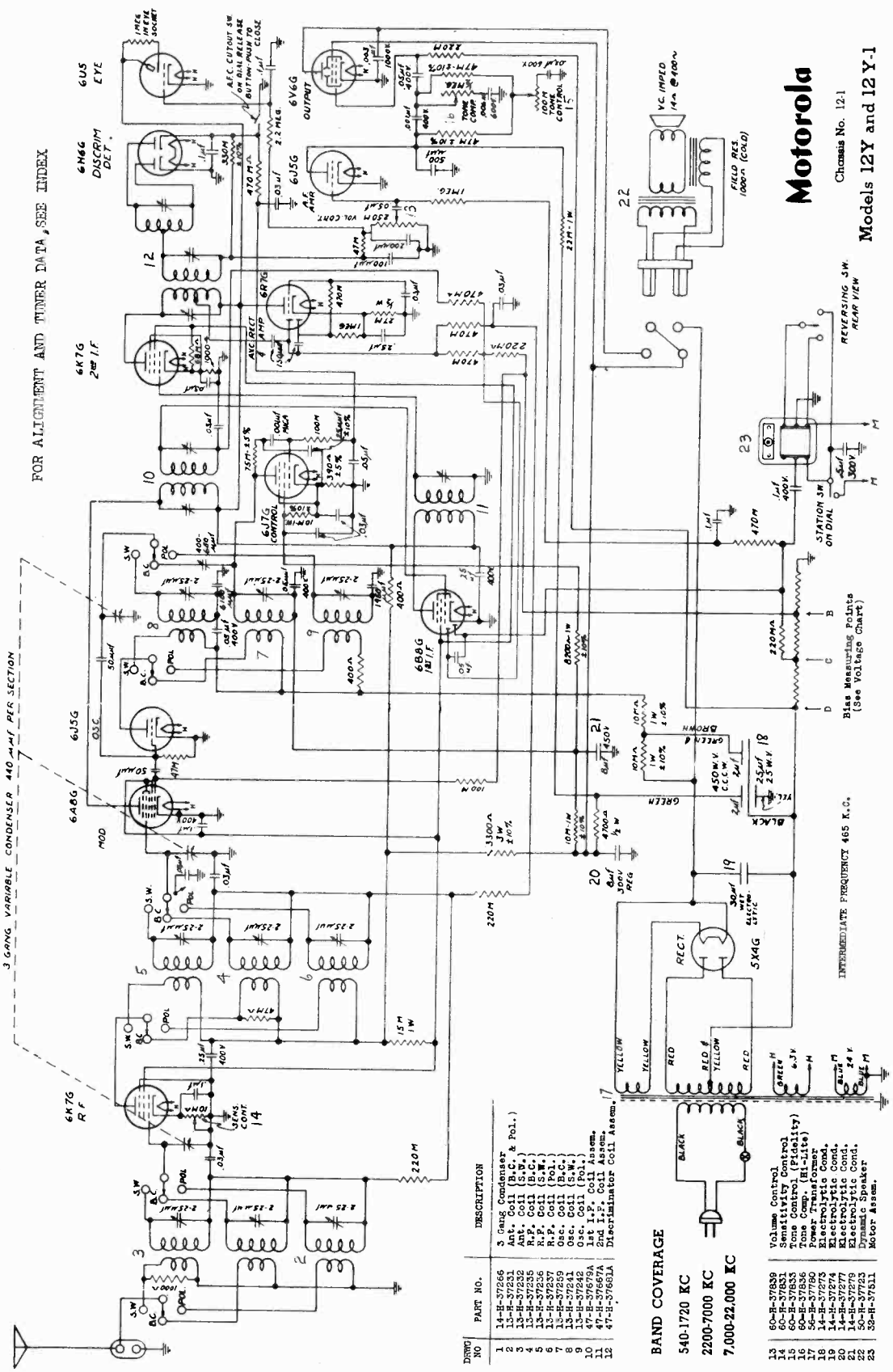
Note C:—14.0 V. measured point C to ground on 50 V. scale (see circuit diagram).

All voltages, except rectifier filaments, measured from socket terminal indicated to chassis ground, using 1000 ohms per volt meter.

Line voltage 115, Current consumption 100, Maximum power output 7.5 watts.

GALVIN MFG. CO.

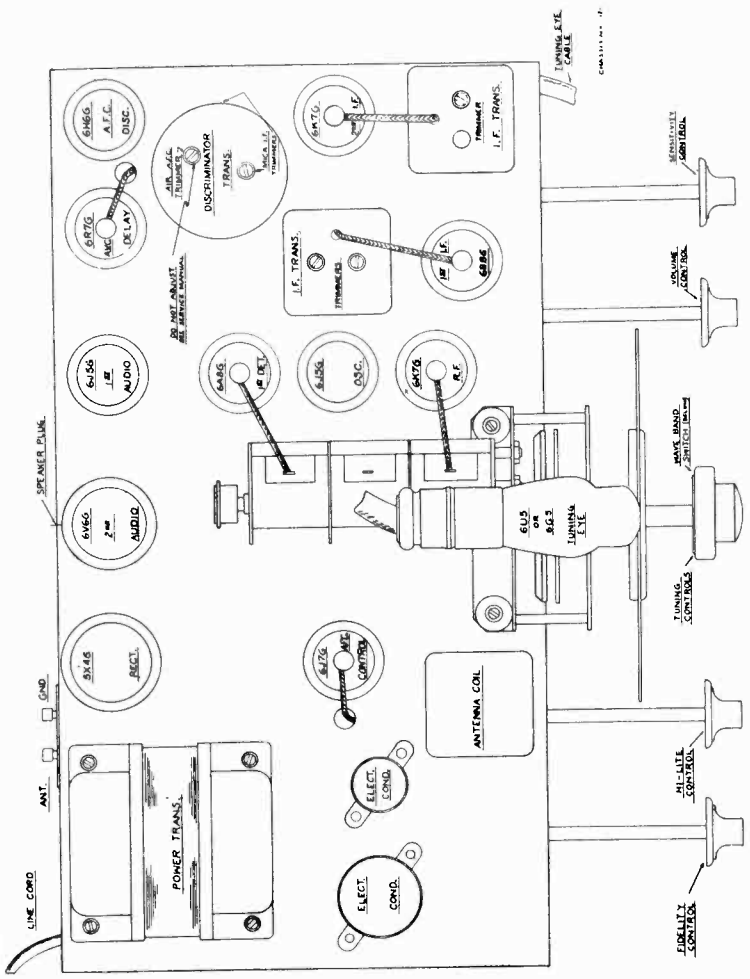
MODELS 12Y, 12Y-1
Chassis 12-1
Schematic, Parts



DRWG NO	PART NO.	DESCRIPTION
1	14-H-37266	3 Gang Condenser
2	13-H-37231	Ant. Coil (B.C. & Pol.)
3	13-H-37232	Ant. Coil (S.W.)
4	13-H-37235	R.F. Coil (B.C.)
5	13-H-37236	R.F. Coil (S.W.)
6	13-H-37237	R.F. Coil (Pol.)
7	13-H-37239	Osc. Coil (B.C.)
8	13-H-37241	Osc. Coil (S.W.)
9	13-H-37242	Osc. Coil (Pol.)
10	47-H-37667A	1st I.F. Coil Assem.
11	47-H-37668A	2nd I.F. Coil Assem.
12	47-H-37661A	Discriminator Coil Assem.
13	60-H-37839	Volume Control
14	60-H-37831	Sensitivity Control
15	60-H-37833	Tone Control (Fidelity)
16	60-H-37835	Tone Comp. (Hi-Lite)
17	56-H-37786	Power Transformer
18	14-H-37273	Electrolytic Cond.
19	14-H-37274	Electrolytic Cond.
20	14-H-37277	Electrolytic Cond.
21	14-H-37279	Electrolytic Cond.
22	50-H-37723	Dynamic Speaker
23	32-H-37511	Motor Assem.

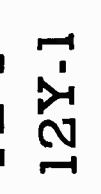
MODELS 12Y,12Y-1
Chassis 12-1
Socket,Trimmers
Voltage

GALVIN MFG. CO.



MODELS
12Y
12Y-1

TOP TERMINAL



BOTTOM VIEW OF SOCKET

CHASSIS LAYOUT (12-1)

SOCKET VOLTAGES (CHASSIS 12-1)

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6K7G	R. F.	0	6.3 AC	210	90	0	X	0	Note A	Note B
6J5G	Osc.	0	0	190	X	−28	....	6.3 AC	0	....
6A8G	1st Det.	0	0	205	95	−14	95	6.3 AC	0	Note B
6B8G	1st I. F.	0	6.3 AC	210	0	0	95	0	0	Note B
6K7G	2nd I. F.	0	0	210	95	6	X	6.3 AC	6	0
6H6G	2nd Det. AFC Disc.	0	6.3 AC	0	0	0	....	0	0	....
6J7G	AFC	0	6.3 AC	180	100	0	X	0	4.5	0
6R7G	AVC	0	6.3 AC	295	Note B	0	X	0	190	0
6J5G	AF	0	6.3 AC	150	0	Note C	X	0	0	....
6V6G	Output	0	6.3 AC	275	290	Note D	X	0	0	....
5X4G	Rect.	....	....	375 AC	....	375 AC	....	5.0 AC	5.0 AC	..
6U5	Eye	....	Filament (Brown Wire) 6.3 AC Cathode (Black Wire) 0		Plate (Red Wire) 200 Grid (Green Wire) 0					

"X" indicates socket terminals used as dummy tie points.

Note A:—0 to 8.5 V. depending on position of sensitivity control.

Note B:—3.5 V. measured point B to ground.

Note C:—6.0 V. measured point C to ground.

Note D:—15.0 V. measured point D to ground.

All voltages, except rectifier filaments, measured from socket terminal indicated to chassis ground, using 1000 ohms per volt meter.

Line voltage 115, Current consumption 130, Maximum power output 7.5 watts.

GALVIN MFG. CO.

MODEL 10Y-1
MODELS 12Y, 12Y-1
Dial Data, Trimmers
Alignment

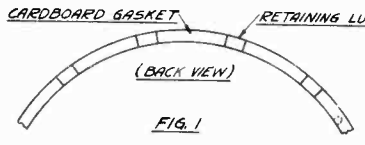


FIG. 1

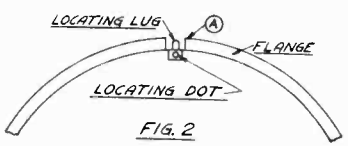


FIG. 2

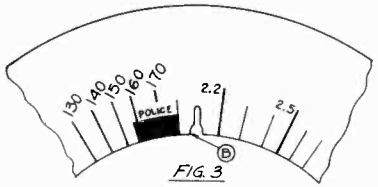


FIG. 3

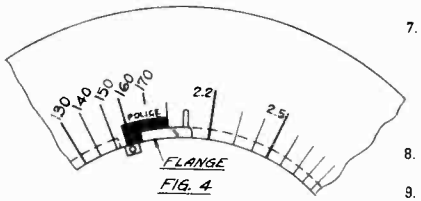


FIG. 4

REPLACING BROKEN DIAL SCALE

1. Tear out the remaining portion of the broken dial scale.
2. With long nosed pliers bend back the metal lugs that hold the dial scale in position (See Fig. 1). Also bend back the smaller locating lug. (Fig. 2.)
3. Tear out one of the cardboard dial retaining gaskets. (Fig. 1.)
4. With a hacksaw, make two cuts in the dial retaining flange, approximately one-eighth inch to either side of the locating dot (See Fig. 2). Bend outward and downward the one-quarter inch section between the two incisions. These cuts must go all the way to the bottom of the flange. (Sets of late manufacture have this cut out.)
5. Take a new dial scale that has a slot extending upwards from the inside edge, the slot being three-eighths of an inch long (See Fig. 3). If you have a dial scale without this slot, you can slot it with a fine hacksaw blade.
6. With a pair of pliers bend point "A" on the flange (Fig. 2) outward a trifle.
7. Thread the new dial scale into the flange by inserting point "B" on the dial scale (Fig. 3) behind point "A" on the flange (Fig. 2). Continue to thread the dial scale through this opening that has been made in the flange until you have made one complete revolution, at which time the dial scale will be in position, (Fig. 4) shows the start of this operation.
8. Adjust the dial scale until the slot is opposite the locating dot on the flange and with long nosed pliers bend the locating lug forward until it locks the dial scale in position.
9. Also with long nosed pliers, bend all of the dial retaining lugs forward firmly against the remaining cardboard retaining gasket. Also bend up the cut out section with dot.

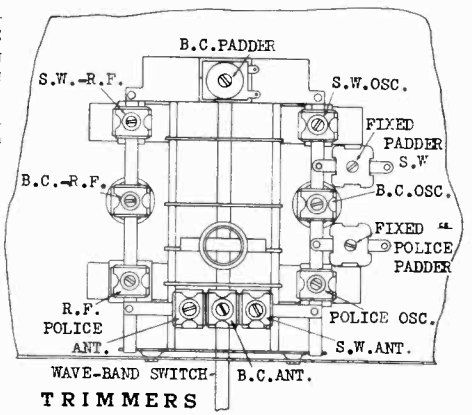
ALIGNMENT PROCEDURE

Chassis 10-2 and 12-1

NOTE: Because of AFC, alignment of these sets presents a slightly different problem than usual. The alignment is not difficult, but we suggest that these instructions be followed explicitly.

1. Place chassis on service bench. Remove band spread pointer and dial. Insert a small piece of paper between the front contacts of the switch that is located on the front of the automatic control drum. These contacts break the motor circuit. This is necessary to prevent the motor from running during the alignment.
2. Connect signal generator to control grid of first detector tube (6A8G) through a .05 M.F. Condenser, and to chassis. Do not remove grid cap. Also connect output meter across speaker voice coil. Turn band switch to "American Programs" position. Turn condenser gang completely out of mesh. Press the release button to short out AFC.
3. Set signal generator at 465 K.C. and carefully adjust the three I.F. trimmers in the tops of the two small I.F. cans (one I.F. can has one trimmer only) to point showing highest reading on output meter.
4. Adjust the two mica trimmers in the large I.F. can to point showing highest reading on output meter. (IMPORTANT NOTE:—One of these trimmers is located near the bottom of the right hand side of the can, inside the covered hole; the other trimmer is the front trimmer on top of the can. The back trimmer on top of the can is an air trimmer and *must not* be adjusted at this time.)
5. Attach a 0-5 high resistance volt-meter between the cathode (Terminal No. 8) of the 6J7G AFC control tube and ground. Turn signal generator up to full output (still set at 465 K.C.) backing down on receiver volume control, if necessary.
6. Note cathode voltage reading on volt-meter with AFC shorted out (release button pressed in), then note cathode voltage reading with AFC operating (press any tuning button, permitting release button to fly out). When AFC discriminator is properly balanced, there should be no difference in reading between the two positions. If a variation is noted, it indicates that the adjustment of the air trimmer on top of the I.F. can is not correct.
7. Using a non-metallic screw driver, turn the air trimmer just a trifle at a time, checking continually the cathode voltage reading on the volt-meter by pressing alternately on the release button and on one of the tuning buttons (connecting and disconnecting AFC). When a position is found where voltage remains the same in both positions, the adjustment is correct.

   NOTE:—While making this adjustment it will be necessary to remove the non-metallic screw driver from its position in order to check the reading accurately since body capacity has considerable effect at this point.
8. *Switch AFC off by pushing in the release button and leave it off through the remaining steps of the alignment.*
9. Leave band switch in "American Programs" position. Connect signal generator to antenna and ground terminals, using a .0002 MF condenser in antenna lead.
10. Set signal generator and receiver dial both at 1700 K.C. Adjust BC OSC. trimmer until 1700 K.C. signal is heard.
11. Set signal generator at 1400 K.C. and turn condenser gang to the signal at 1400 K.C. Adjust BC ANT. and BC RF trimmers to point showing highest reading on output meter.
12. Set signal generator at 600 K.C. and rock pointer at 600 K.C. position on dial scale, while adjusting BC padder, until combination is found which gives highest output reading.
    NOTE:—If there is noise level at 600 K.C., padder can be adjusted to maximum noise without rocking gang and without use of signal generator. (Use short wire for pick-up if necessary.)
13. Turn band switch to "Police and Aircraft" position. Replace .0002 M.F. condenser in signal generator lead with a 400 ohm carbon resistor.
14. Set signal generator and receiver dial both at 7.0 MC. Adjust POLICE OSC. trimmer until 7.0 MC signal is heard.
15. Set signal generator at 5.8 MC and turn condenser gang to signal at 5.8 MC. Adjust POLICE ANT. and POLICE RF. trimmers to point giving greatest output reading, while slightly rocking condenser gang.
16. Turn band switch to "Foreign Programs" position, still using 400 ohm carbon resistor in antenna lead to signal generator.
17. Set signal generator and receiver dial both at 22.0 MC. Adjust SW OSC. trimmer until 22.0 MC signal is heard.
18. Set signal generator at 18.7 MC and turn condenser gang to the signal at 18.7 MC. Adjust SW ANT. and SW RF. trimmers to point giving greatest output reading, while slightly rocking condenser gang.
19. Padders on "Police" and "Foreign" bands are fixed. (No adjustment necessary.)



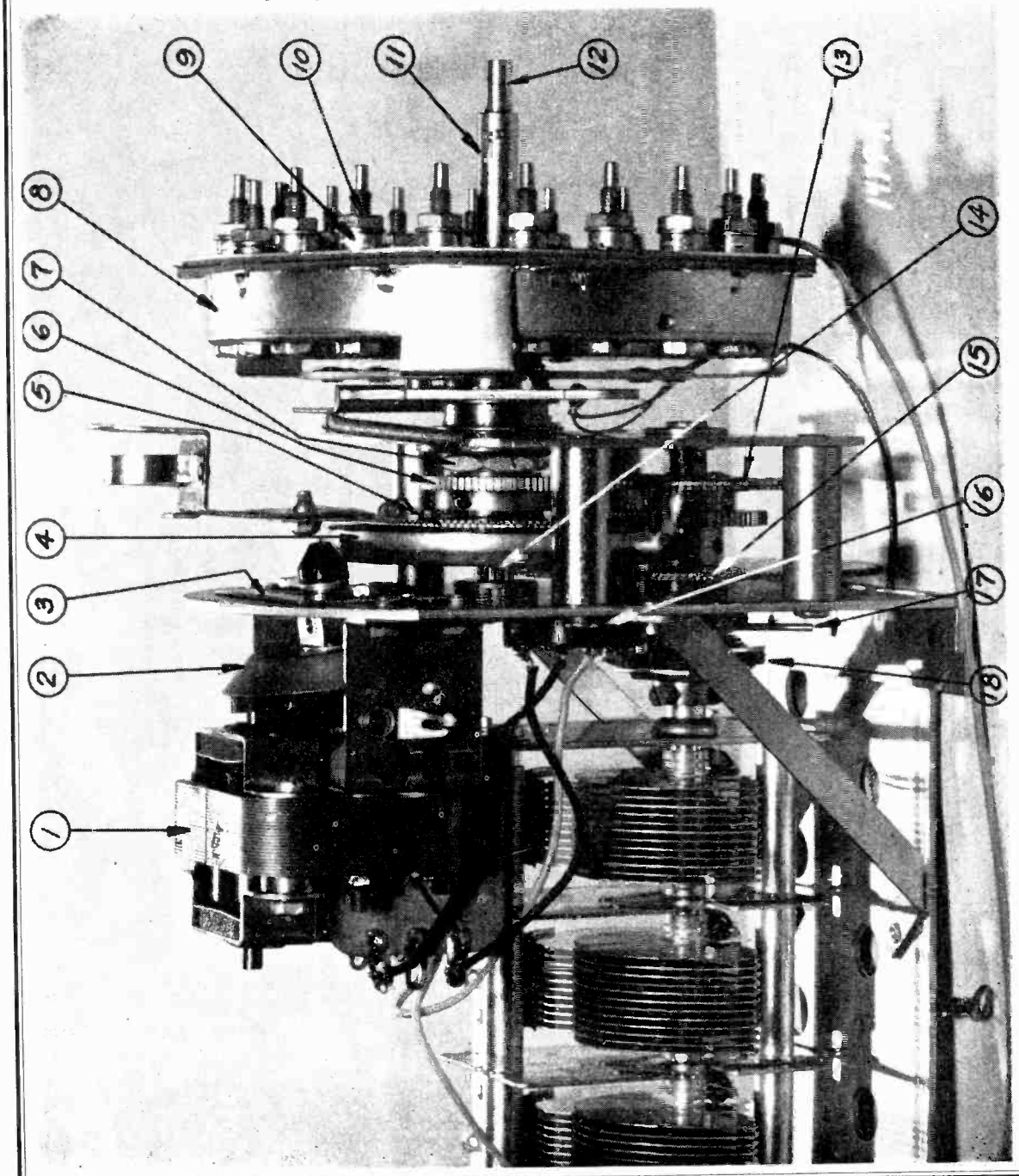
TRIMMERS

MODEL 10Y-1
MODELS 12Y,12Y-1
Tuner Assembly

GALVIN MFG. CO.

(Chassis 10-2)
(Chassis 12-1)

1. Motor assembly
2. Intermediate drive assembly
3. Adjustable mounting plate
4. Flywheel assembly
5. Travel-lite split gear assembly
6. Rotor gear
7. Drum holding nut
8. Drum assembly
9. Button plunger
10. Button lock nut
11. Planetary housing (main tuning shaft)
12. Planetary drive (vernier tuning shaft)
13. Rotor drive split gear
14. Planetary pinion gear
15. Condenser drive split gear
16. Reversing switch
17. Reversing pin
18. Flexible coupling



ELECTRIC AUTOMATIC TUNER

The Motorola electric automatic tuning system is simple in construction, having a minimum of moving parts. It is sturdy enough to stand severe usage. It is easy to service, since all parts liable to require attention are readily accessible. The mechanism is divided into three separate units; the automatic selector, the motor, and the driving mechanism.

THE DRUM

The automatic selector assembly is at the front of the unit—directly behind the escutcheon plate when the chassis is in the cabinet. Hereafter in this book it shall be referred to as the drum. Arranged in a circle round the edge of the drum are twenty plungers, to each of which a button is attached (after assembly in the cabinet). Nineteen of these buttons may be set up to tune automatically, nineteen different stations. The twentieth button, at the top, is a release button which should be pressed for manual tuning.

We do not recommend that the drum be opened for service, but a study of Fig. B, at the bottom of this page, will reveal how the mechanism works. This drawing shows the rotor and one button in its relative position. The drum housing is not shown. You will notice that the button plunger (No. 1) has a groove and shoulder running around its circumference. This serves to lock the button in when it is pressed, being held by a locking plate that hooks behind the shoulder.

The locking mechanism consists of three flat plates, the center of which is the locking plate. This locking plate is always under spring tension which tends to keep the holes out of line. (See Fig. C). However, when a button is pressed, the shoulder on the plunger forces the holes in alignment, releasing any button that may be held in at the time. A spring behind each button causes it to snap out when released. (No. 2 in Fig. B).

A button must be pressed one-sixteenth inch beyond its locking position in order to release any other button already locked in. Any number of buttons may be pressed at one time without damage to the mechanism. It will merely stop at the first button it reaches.

Behind the plunger for each station button is a stop arm (No. 3) which, when the lock nut in front of the plunger is loosened, can swing freely over a short arc. (Fig. A). In this manner, each button controls a small segment of the scale and may be set to any station that falls within its range. When the lock nut is tight, the arm is held rigidly in one position—that of the station to which it is set. A rounded extrusion on the end of the arm, engages in the slot on the rotor. The release button has no arm, its dual purpose being to release all station buttons and to operate the switch on the front of the drum, breaking the motor circuit and shorting out AFC.

The only other mechanism inside the drum is the rotor, also pictured on this page. The rotor is coupled through gears to the condenser assembly so that both turn simultaneously. At one point on the circumference of the rotor, an extrusion is made with a slot at the top. (No. 4, Figs. A and B.) When, in turning, the rotor reaches a button that has been pressed in, the stop arm on the button falls into this extruded slot, forming a mechanical stop, and at the same time opening the electrical circuit of the motor by operating the circuit breaker indicated by No. 5.

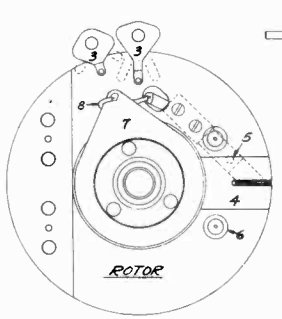


FIG. A

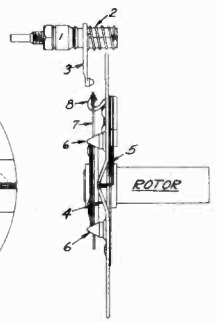


FIG. B

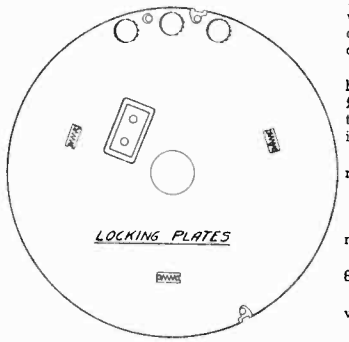
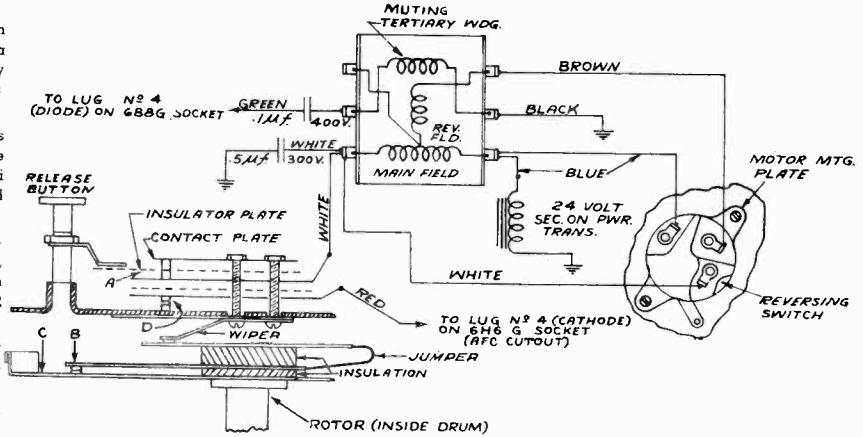


FIG. C

1. Button plunger
2. Button spring
3. Station stop arm
4. Rotor slotted stop
5. Circuit breaker
6. Rotor spacers
7. Rotor contact plate
8. Connecting wire



THE MOTOR CIRCUIT

A reversible synchronous motor is used, operated from a twenty-four volt winding in the power transformer. The armature itself acts as a clutch. When at rest, it is held back by a light coil spring. When the circuit is closed the armature automatically seeks its electrical center, thereby moving forward and forcing the rubber friction drive against the intermediate drive wheel.

The drawing shows the electrical circuits of the motor, the reversing switch, and includes an exploded view of the motor cut-off and AFC control switch, operated by the release button.

To trace the motor circuit, start with the twenty-four volt winding of the power transformer, one end of which is grounded. The circuit leads from the other end of this winding, up to the lower right hand terminal (looking at the motor from the rear), through the main field winding and through the white wire to the inside plate of the motor cut-off switch. From the inside plate the circuit leads to the outside plate when contacts "A" are closed, and through the two brass machine screws to the wiper arm inside of the drum. This wiper arm makes a wiping contact on the rotor contact plate. (No. 7, Fig. A.) This copper plate is wired to the rotor switch (circuit breaker) (Contacts B) one plate of which is grounded. This completes the circuit, since one end of the twenty-four volt transformer winding is also grounded. The reversing switch alternately connects the reversing field to either end of the main field.

In operation, contacts "A" and "B" must be closed, in order for the motor to run. When the release button is pressed for hand tuning, the motor circuit is broken at point "A". When any other button is pressed for automatic tuning, the release button jumps out, closing the circuit at point "A", the motor starts, turning the mechanism until the slot on the rotor reaches the button that has been pressed, at which time the circuit is broken at point "B", stopping the motor.

The lower contacts on the switch serve to short out AFC while tuning by hand, and automatically connect AFC for push-button tuning. AFC is shorted out by merely grounding the switch blade.

MUTING

To eliminate between-station noise, it is desirable that some muting system be used. In the Motorola models this is accomplished by adding an additional winding to the motor.

When the motor is running, a voltage is induced in this winding, which after being rectified in the 6B8G, is used to bias the first audio stage to cut-off, thereby muting the set until the station has been tuned in.

This same voltage is applied to the AVC network, temporarily reducing sensitivity so the AFC action will not begin until after the station has been tuned in.

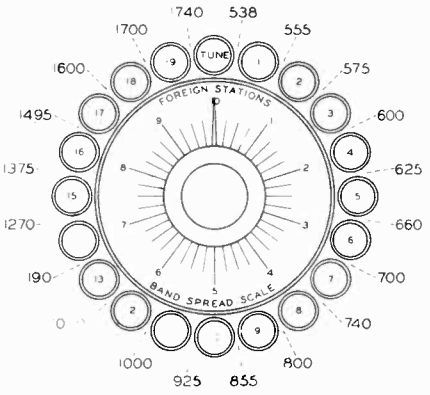
DRIVE MECHANISM

The automatic drive mechanism is likewise simple. A rubber friction cone on the end of the armature shaft bears against an intermediate drive wheel which, in turn, through another rubber friction cone drives the flywheel. This type of drive makes it possible to eliminate many gears, making the mechanism quiet in operation.

SETTING THE BUTTONS

To set the buttons, proceed as follows:

1. Select one of the stations you want to tune automatically and determine from the chart which button you must use in order to get that station.
2. Press this button and wait for the electric motor to bring the dial pointer to a stop. This should be at a position close to the exact frequency of the desired station.
3. Remove the button by unscrewing it on its spindle, and take out the felt washer exposing the lock nut directly underneath.
4. Loosen the lock nut not to exceed one-half turn, using the key supplied with the receiver, or a suitable socket wrench.
5. Press the Station Button and the Release (TUNE) Button down at the same time. While holding both buttons down, tune in the station accurately by hand, watching the eye for smallest shadow. (Holding the TUNE Button down permits accurate setting by shorting out A.F.C.)



6. Release the TUNE Button first, then the Station Button, and with the key tighten the lock nut securely.
7. Push the celluloid disc out of the button from the back, using a match or toothpick, replace the felt washer, and screw the button back into its original position.
8. Select the proper tab from those supplied, and insert it in the face of the button, taking care that the call letters are horizontal for the sake of appearance. If no tab has been provided for that station, print the call letters on one of the blank tabs.
9. Insert the celluloid disc over the station tab. If the station is one of your favorite "Network" stations, use one of the colored discs (Red for NBC "Red" Network, Blue for NBC "Blue" Network, Green for Columbia, and Yellow for Mutual). For other stations, use the Amber celluloid discs.
10. Repeat the above steps for the remaining buttons.

NOTE:—It is conceivable that the customer may want to tune automatically, two stations which normally fall on the same button. If there is a free button on either side of this button, one of these stations can be set to that adjoining button by shifting the rotor a few degrees. To do this proceed as follows:

1. Press the adjoining vacant button and wait until the motor stops.
2. Loosen the lock nut and turn the dial by hand toward the other button as far as it will move freely. This swings the station stop arm (No. 3, Fig. A, Page 4) toward the other button. Lock it in this position by tightening the lock nut.
3. Loosen the two Allen-head set screws in the brass rotor gear (No. 6 in photo on page 3). This permits the tuning condenser to be moved without moving the rotor inside the drum.
4. Manually tune in the first of the desired stations.
5. Re-set the Allen-head screws.
6. Proceed to re-set all of the buttons, since this shifting of the rotor will disturb their setting.

CAUTION:—Do not shift the rotor too much, since to do so may eliminate the possibility of setting buttons 1 or 19 to any station.

CHANGING AUTOMATIC CONTROL DRUMS

(To identify parts, refer to photo on Page 3)

REMOVING THE OLD DRUM

1st—Loosen the two Allen-head set screws in the large brass rotor gear (No. 6) located directly in front of the travel-lite split gear. (No. 5.)

2nd—With a thin 3/32" end wrench, loosen the large Hex nut (No. 7) that holds the drum in position. This nut is in front of the large brass gear. Press in on the small planetary drive shaft (No. 12) and pull the drum off from the front. Take care not to lose the ball bearings that are a part of the planetary system.

INSTALLING NEW DRUM

1st—Turn the tuning condenser until the dial light points to 540 K.C. (First black line beyond 550 K.C.)

2nd—Holding the new drum with the release button at the top, press the button to the right of the release button and turn the rotor by hand until the stop is engaged.

3rd—Loosen the lock nut on this button. The rotor will then turn freely over a small arc. Turn the rotor counter clockwise toward the release button as far as it will go and tighten the lock nut. (Steps 1, 2, and 3 are for the purpose of aligning the rotor and the variable condenser so each will complete its cycle simultaneously with the other.)

4th—Slip the drum in position over the planetary (Tuning Shaft), taking care that the planetary is assembled correctly. To do this properly, press in on the small planetary drive shaft (No. 12) at the same time that you slip the drum over the ball bearings.

NOTE:—There are five ball bearings in the planetary assembly, three of which are visible through holes in the housing. The other two are inside the housing with a small tension spring between them. Take care that you do not lose any of the ball bearings.

5th—Tighten the large Hex nut (No. 7) that holds the drum in place.

6th—Tighten the two Allen-head set screws in the large brass rotor gear (No. 6), but while doing this hold the brass gear back against the travel-lite split gear (No. 5), to reduce its wobble to a minimum. Do not hold it too tight, since this would cause binding.

TORQUE ADJUSTMENT

After the new drum is in position, check the driving mechanism to assure yourself that you are securing a maximum transfer of power from the motor to the gear train. If necessary, clean the rubber friction cones with carbon tetrachloride (Carbona), to remove any grease that might interfere with traction. The flywheel and intermediate drive wheel surfaces may be cleaned in the same manner.

You may be able to further improve torque by adjusting the intermediate drive wheel (No. 2). This is held in place by a mounting plate (No. 3) which has elongated mounting holes so it can be adjusted up or down.

To secure maximum traction, this mounting plate should be moved down until the rubber drive cone just barely misses touching the flywheel, (No. 4) so it will not interfere with manual tuning. The motor itself is also mounted on brackets that have elongated holes, and it may be necessary to change this adjustment as well.

AUTOMATIC SERVICE NOTES

In the following paragraphs, you will find possible failures that you may encounter in the automatic tuner, along with suggestions for their corrections.

BUTTONS FAIL TO RELEASE

1. *Burr on button plunger.* To check this, remove the plunger by taking off the lock nut and the washer. To do this it is necessary to press in on another button in order to release the one which you wish to remove. If available, replace the plunger with a new one, and lubricate with several drops of fine oil. If a new plunger is not available, polish the old one with some very fine sand paper or emery paper.
2. *Locking Plate Not Riding on Bearing.* This is usually caused by the drum housing being assembled too loosely to the front plate. To determine whether or not the bearing is properly seated, check to see if the locking plate has a circular motion when buttons are pressed. If not, this indicates the plate is off of its bearing. To correct this tap lightly on the front plate around the bushing on which the band spread scale is mounted. For best results, use some circular object that can fit completely around the bushing, such as a short section of 7/8" pipe.

BUTTONS FAIL TO LOCK IN

1. *Locking Plate Too Tight.* Check the locking plate to see that it moves freely when buttons are pressed, but not too freely. In this respect, a happy medium must be found. If too tight it indicates that the drum housing is assembled too tightly to the front plate. Some light oil might ease this a trifle.
2. *Locking Plate Springs Missing.* Check the front of the drum assembly to determine that all three coil springs are present in the locking plate assembly. If any springs are missing, replace them.
3. *Foreign Matter Between Plates.* There are three plates in the locking mechanism, the one in the center being the actual locking plate. Dirt or metallic burrs between these plates can prevent freedom of movement. You might try some oil. However, it may be necessary to take the drum apart, which is not ordinarily recommended. If available, change the drum.
4. *Button May Be Stuck In.* If the button fails to lock in when pressed, it may be because some other button is already locked in and fails to release. (See above notes for proper correction.)
5. *Worn Plunger.* Remove the plunger as outlined above, and check to see if locking groove and shoulder are intact. If worn, replace with new plunger. If new plunger is not available, turn plunger one-quarter turn from original position and reinstall.

MOTOR FAILS TO START

1. *Button Does Not Release.* If, when a button is pressed, the motor does not start, it may be that the previously depressed button has not released, thereby closing the motor switch on the rotor inside the drum. (See previous section on that subject.)
2. *Motor Circuit Open.* Check for open motor winding or for open transformer secondary (24 V. winding). Check motor switch contacts on front of drum and on the rotor inside of the drum
3. *Shorted Motor Filter Condenser.* Check the .5 MF motor noise filter condenser located directly under the motor. If shorted, motor will not run.

MOTOR FAILS TO STOP

1. *Ground In Motor Circuit.* Check the white lead from the motor to the switch on the front of the drum. Also check the switch. If ground exists in this circuit, the motor will not stop.
2. *Check Buttons One and Nineteen.* If the stop arms on the buttons on either side of the release button are adjusted too close to the release position the rotor may not reach them in its revolution before the reversing switch is tripped. This makes it impossible to break the motor circuit at the switch on the rotor. To correct this remove lock nut and plunger and with small pointed tool swing stop arm away from release position. Also check reversing switch to see if it reverses at the proper moment.
3. *Rotor Switch Fails To Open.* Check the switch on the rotor to see if the contact breaks properly when the button that has been pressed is reached. Setting of rotor switch contacts may be adjusted through inspection hole in back of drum housing. This should be done with exceptional care. The correction can sometimes be accomplished by inserting a thin shim washer under the button plunger. This spaces the station stop arm closer to the rotor.
4. *Drum Switch Fails To Open.* Check the switch on the front of the drum to see that it opens properly when the release button is pressed for manual tuning. If switch fails to break contact properly, motor will continue to run.

FAILS TO STOP AT BUTTON

This condition is a little different from the condition mentioned in the previous discussion. In this type of failure the motor will stop at most of the buttons, but may fail to stop properly on one or two buttons.

1. *Short Plunger.* If the plunger is too short the stop arm will be spaced too far back from the rotor. Try a new plunger. If this does not correct the failure, insert one or more thin shim washers under the plunger. This will space the stop arm closer to the rotor
2. *Skips Several Buttons.* If the motor skips several buttons located at different sections of the drum, treat each button as in Step No. 1 above. If, however, several adjacent buttons fail, then check the assembly of the drum housing to the front plate. It may be too loose along that particular edge of the drum. To correct this, peen the housing more firmly to the front plate.
3. *Too Much Torque.* Check the adjustment of the intermediate drive wheel, which can be moved up or down, to see that it releases promptly and freely when the circuit is broken. If it fails to release promptly, it would tend to carry the mechanism beyond the button. Adjust intermediate drive mounting plate if necessary.
4. *Lock Nut Loose.* Check all lock nuts to see that they are drawn up firmly. A loose lock nut outside the drum will mean a loose stop arm inside the drum.

MOTOR FAILS TO REVERSE

1. *Defective Reversing Switch.* If defective switch is found, replace it.
2. *Reversing Pin Collar Not Properly Set.* Check the adjustment of the reversing pin collar which is located directly in front of the flexible coupler, to see that the reversing switch trips exactly at the end of travel of the mechanism. The collar is adjustable, being held by two set screws.
3. *Open Reverse Winding In Motor.* Check the reversing field in the motor. If open, the motor will travel in one direction only.
4. *Travel-Lite Stops Not Properly Set.* Check the stops on the gear train studs that the travel-lite hits as it reaches either end of the dial. If the travel-lite bracket hits the stop before the reversing switch trips, the motor will not reverse. Stops may be either of two types: brass clamp or screw and lock nut.

BUTTONS FAIL TO RETAIN ORIGINAL SETTING

1. *Loose Lock Nut* A loose lock nut will permit the stop arm to move from its original setting.
2. *Loose Gear Bushing.* Check the gears in the gear train, particularly the split gears, to make sure there is no lost motion between the gear and the bushing.
3. *Loose Coupling.* Check the flexible rubber coupling between the mechanism and the tuning condenser for loose set screws, loose bushing, or loose rivets.
4. *Loose Drum-Holding Nut.* Check the large Hex drum-holding nut, to be sure the drum is held firmly in place.
5. *Loose Drum Front Plate.* Make sure the front plate is peened firmly to the drum housing.
6. *Loose Set Screws.* Check all set screws in the gear train.
7. *Improper Button Setting.* Check all button settings, to make sure they are set to the center of the station carrier. This is extremely important. When setting buttons, the release button must be held in firmly to short out AFC, otherwise it is impossible to make the setting at the center of the carrier.
8. *AFC Switch Grounded.* Check the AFC Switch which is the inside blade of the switch on the front of the drum. If this is grounded while tuning automatically, AFC does not operate. No automatic tuning mechanism is accurate enough to operate without AFC.

SLIPPAGE

1. *Rubber Drive Cones Worn.* Replace if necessary.
2. *Loose Set Screws in Gear Train.* Tighten all set screws firmly.
3. *Improper Adjustment of Intermediate Drive.* Check intermediate drive wheel to see that it bears firmly on the flywheel while the motor is running. If necessary, adjust intermediate drive mounting plate.
4. *Binding In Gear Train.* Press release button and tune set manually. If binding is noted, attempt to relieve it as follows: Loosen machine screws that extend through the rear mounting plate into the spacing studs that hold the gear train. If tension is relieved, insert shim and retighten machine screw.
5. *Rotor Drags.* If the mechanism turns too stiffly, it may be that the rotor inside the drum is dragging. Lubricate rotor bearing and check to see if drum housing is peened too firmly to front plate.
6. *Oil On Driving Surfaces.* Make sure that the rubber friction cones, the intermediate drive wheel and the flywheel are free from oil. If necessary, clean with several drops of carbon tetrachloride (Carbona.)

MANUAL CONTROLS TOO STIFF

1. *Intermediate Drive Dragging.* Check intermediate drive to see that it falls back away from flywheel when motor is not running. If necessary, readjust intermediate drive mounting bracket.
2. *Motor Armature Fails To Fall Back.* The failure in Item 1, may be caused by this. Check the spring in front of the armature, also check lubrication of armature bearings. If motor armature seems to turn too stiffly, see that it is properly aligned and is not dragging at any point on its circumference. The motor bearings are of the self-aligning type and can often be brought into alignment by tapping the laminations of the motor lightly with some heavy tool.

PLANETARY DRIVE (VERNIER) DOES NOT OPERATE CORRECTLY

1. *Weak Planetary Spring.* To check this you must be able to visualize the correct assembly of the planetary. The planetary mechanism uses five loose ball bearings in all, three of which are visible through holes in the planetary housing (large tuning shaft) when the drum assembly is removed. The other two ball bearings are located inside the housing with a tension spring in between. A sixth ball bearing is spot-welded to the end of the planetary drive shaft (small tuning shaft). When assembled correctly, the ball on the end of the planetary drive shaft bears against a free ball bearing which in turn bears against the planetary spring and this spring in turn rests on another ball bearing. A weak planetary spring will cause slippage.
2. *Ball Bearing Missing.* If any of the ball bearings in the planetary assembly are lost, and this can easily happen when changing drums, the planetary will not drive satisfactorily.
3. *Race-Way Worn.* The drum bearing has a race-way on the inside, around which the three ball bearings revolve. If this is worn the only correction is a new drum.
4. *Improper Lubricant.* The planetary must be properly lubricated with a heavy lubricant, preferably vaseline.
5. *Planetary Shaft Bent.* This sometimes happens, especially when the instrument has been handled roughly in transportation. Obviously, the only correction is a new planetary assembly.

OFF CALIBRATION

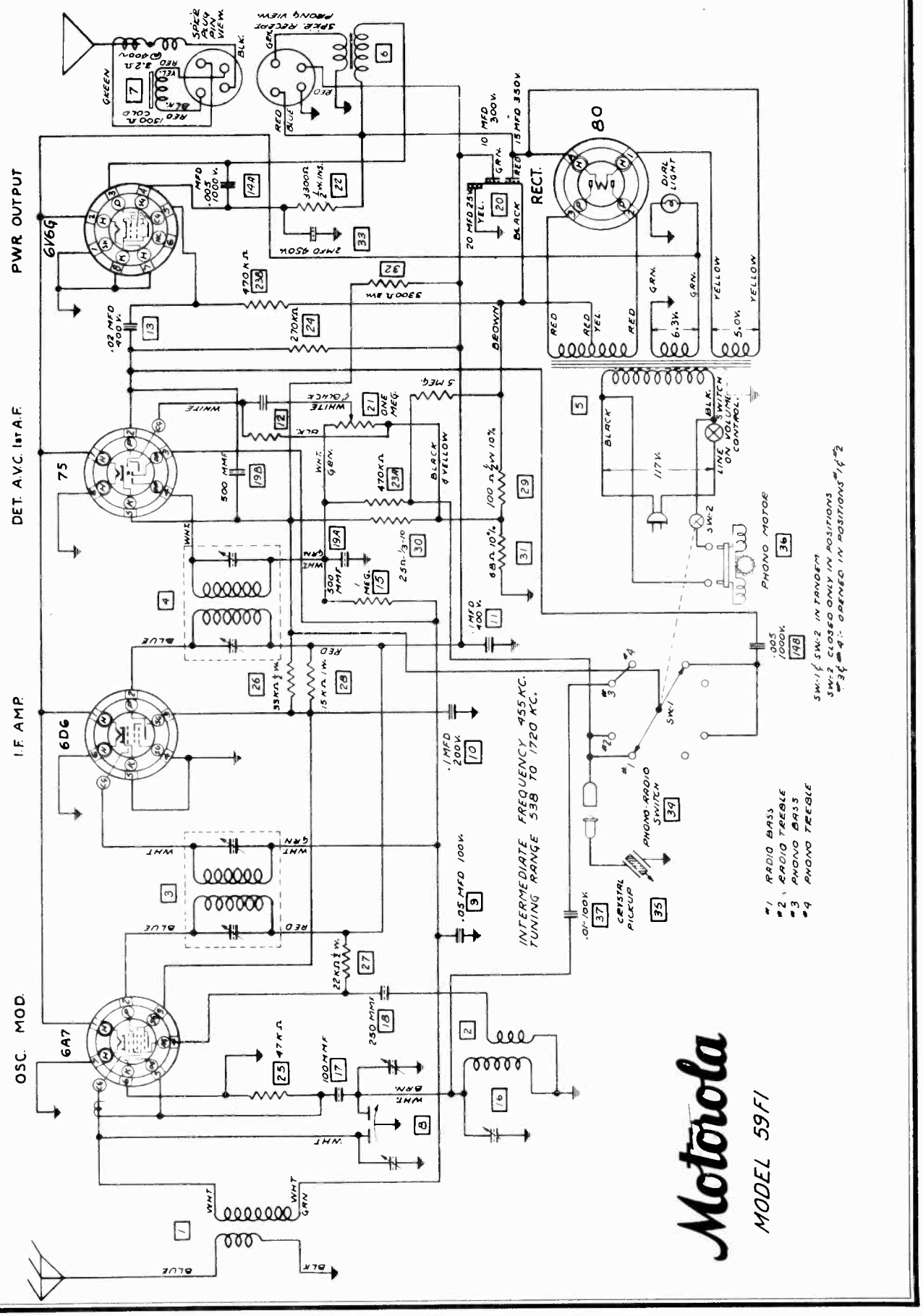
1. *Travel-Lite Improperly Adjusted.* Check adjustment of the travel-lite bracket. It is adjustable and can be moved over a considerable range.
2. *Travel-Lite Split Gear.* If the calibration is off so far that the adjustment of the travel-lite bracket will not correct it, then the travel-lite split gear has probably slipped in its adjustment on the large brass gear that drives it. It will be necessary to move the split gear several notches in the required direction. In changing this adjustment, be sure you do not lose any of the split gear coil springs, and be sure the split gear is re-assembled with proper spring tension.

MANUAL TUNING BROAD

1. *Set out of Alignment.* Check alignment, following procedure outlined in this book.
2. *AFC Not Shorted Out.* Check the switch on the front of the drum to make sure that the bottom blade grounds against the front plate of the drum when the release button is pressed in for manual tuning. If this bottom blade fails to touch the drum, increase tension of small black steel spring on the release button. Replace this spring if necessary.

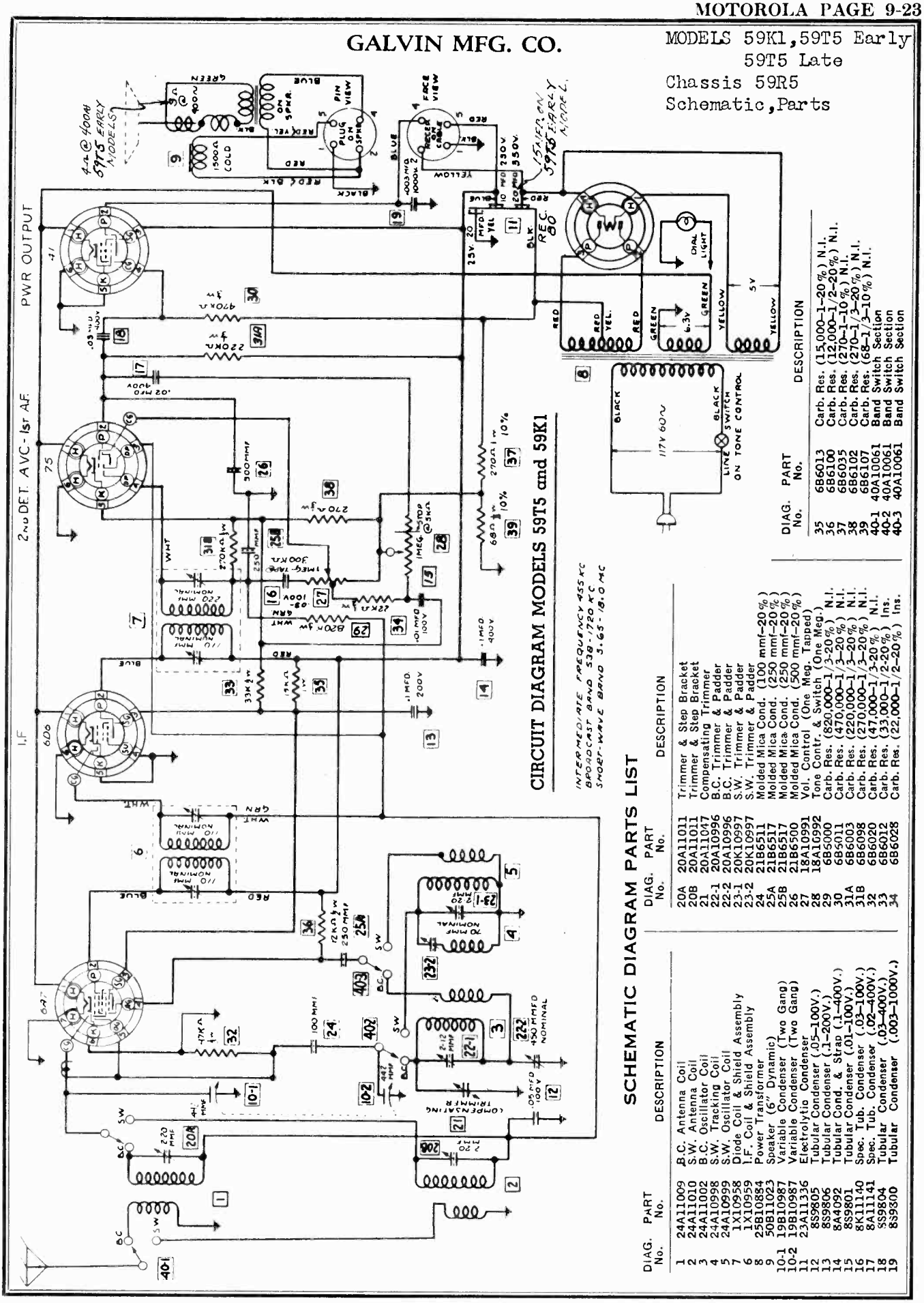
MODEL 59F1
Schematic

GALVIN MFG. CO.



GALVIN MFG. CO.

MODELS 59K1, 59T5 Early
59T5 Late
Chassis 59R5
Schematic, Parts



SCHEMATIC DIAGRAM PARTS LIST

DIAG. No.	PART No.	DESCRIPTION
1	24A11009	B.C. Antenna Coil
2	24A11010	S.W. Antenna Coil
3	24A11002	B.C. Oscillator Coil
4	24A10998	S.W. Tracking Coil
5	24A10999	S.W. Oscillator Coil
7	1X10958	Diode Coil & Shield Assembly
6	1X10959	I.F. Coil & Shield Assembly
8	25B10884	Power Transformer
9	50B11023	Speaker (6" Dynamic)
10-1	19B10987	Variable Condenser (Two Gang)
10-2	19B10987	Variable Condenser (Two Gang)
11	23A11336	Electrolytic Condenser
12	8S9805	Tubular Condenser (.05–100V.)
13	8S9806	Tubular Condenser (.1–200V.)
14	8A4092	Tubular Cond. & Strap (.1–400V.)
15	8S9801	Tubular Condenser (.01–100V.)
16	8K11140	Spec. Tub. Condenser (.03–100V.)
17	8A11141	Spec. Tub. Condenser (.02–400V.)
18	8S9804	Tubular Condenser (.03–400V.)
19	8S9300	Tubular Condenser (.003–1000V.)

DIAG. No.	PART No.	DESCRIPTION
20A	20A11011	Trimmer & Step Bracket
20B	20A11011	Trimmer & Step Bracket
21	20A11047	Compensating Trimmer
22-1	20A10996	B.C. Trimmer & Padder
22-2	20A10996	B.C. Trimmer & Padder
23-1	20K10997	S.W. Trimmer & Padder
23-2	20K10997	S.W. Trimmer & Padder
24	21B6511	Molded Mica Cond. (100 mmf–20%)
25A	21B6517	Molded Mica Cond. (250 mmf–20%)
25B	21B6517	Molded Mica Cond. (250 mmf–20%)
26	21B6500	Molded Mica Cond. (500 mmf–20%)
27	18A10991	Vol. Control (One Meg. Tapped)
28	18A10992	Tone Contr. & Switch (One Meg.)
29	6B5000	Carb. Res. (820,000–1/3–20%) N.I.
30	6B5011	Carb. Res. (470,000–1/3–20%) N.I.
31A	6B6003	Carb. Res. (220,000–1/3–20%) N.I.
31B	6B6098	Carb. Res. (270,000–1/3–20%) N.I.
32	6B6020	Carb. Res. (47,000–1/3–20%) N.I.
33	6B6012	Carb. Res. (33,000–1/2–20%) Ins.
34	6B6028	Carb. Res. (22,000–1/2–20%) Ins.

DIAG. No.	PART No.	DESCRIPTION
35	6B6013	Carb. Res. (15,000–1–20%) N.I.
36	6B6100	Carb. Res. (12,000–1/2–20%) N.I.
37	6B6035	Carb. Res. (270–1–10%) N.I.
38	6B6102	Carb. Res. (270–1/3–20%) N.I.
39	6B6107	Carb. Res. (68–1/3–10%) N.I.
40-1	40A10061	Band Switch Section
40-2	40A10061	Band Switch Section
40-3	40A10061	Band Switch Section

MODELS 59K1,59T1,59T2
59T3,59T4,59T5,69K1
Trimmers,Alignment

GALVIN MFG. CO.

Sensitivity,Gain
Voltage

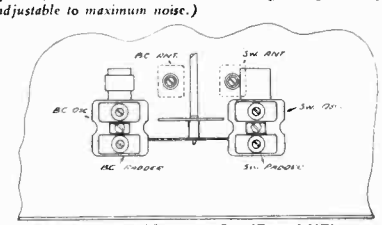
MODELS 59T1, 59T2, 59T3, 59T4, 59T5, 59K1, 69K1

GALVIN MANUFACTURING CORPORATION, 4545 W. Augusta Blvd., CHICAGO

ALIGNMENT PROCEDURE

MODELS 59T5, 59K1 and 69K1

1. Connect signal generator to control grid of Osc.-Mod. tube (6A7) through a .05 MF. condenser and to chassis. Do not remove grid cap. Also connect output meter across speaker voice coil. Turn band switch to "Broadcast" position. Turn condenser gang completely out of mesh.
2. Set signal generator at 455 K.C. and carefully adjust the four I.F. trimmers *(located in top of I.F. coil cans)* to point showing highest reading on output meter.
3. Leave band switch in "Broadcast" position. Connect signal generator to antenna and ground terminals, using a .0002 MF condenser in antenna lead.
4. Set signal generator and receiver dial both at 1700 K.C. Adjust BC OSC. trimmer until 1700 K.C. signal is heard.
5. Set signal generator at 1400 K.C. and turn condenser gang to the signal at 1400 K.C. Adjust BC ANT. trimmer to point showing highest reading on output meter.
6. Set signal generator at 600 K.C. and rock pointer at 600 K.C. position on dial scale, while adjusting BC padder, until combination is found which gives highest output reading. *(NOTE: If there is noise level at 600 K.C., padder can be adjusted to maximum noise without rocking gang and without use of signal generator. Use short wire for pick-up if necessary.)*
7. Turn band switch to "Short Wave" position. Replace .0002 MF condenser in signal generator lead with a 400 ohm carbon resistor.
8. Set signal generator and receiver dial both at 18.0 MC. Adjust S.W. OSC. trimmer until 18.0 MC signal is heard.
9. Set signal generator at 16.0 MC and turn condenser gang to signal at 16.0 MC. Adjust S.W. ANT. trimmer to point giving greatest output reading. *(Use non-metallic screw driver.)*
10. Set signal generator at 6.0 MC and rock pointer at 6.0 MC position on dial scale, while adjusting S.W. padder, until combination is found which gives highest output reading. *(NOTE: May also be adjustable to maximum noise.)*



TRIMMERS—MODELS 59T5, 59K1 and 69K1

MODELS 59T1, 2, 3, and 4

NOTE: When aligning 59T1 and 59T3 AC-DC models, it is advisable to use a blocking condenser in series with the ground connection to the signal generator. If your signal generator is AC operated it may not be possible to connect to 6A7 grid for I.F. alignment of AC-DC models, on account of AC hum. If this is so, feed 455 KC signal into antenna lead, advancing signal generator attenuator accordingly.

1. Connect signal generator to control grid of Osc.-Mod. tube (6A7) through a .05 MF condenser, and to chassis. Do not remove grid cap. Also connect output meter across speaker voice coil. Turn condenser gang completely out of mesh.
2. Set signal generator to 455 KC and carefully adjust the I.F. trimmers to point showing highest reading on output meter.
3. Connect signal generator to antenna and ground leads using a .0002 MF condenser in antenna lead.
4. Set signal generator and receiver dial both at 1700 KC. Adjust Osc. trimmer (on small section of condenser gang) until 1700 KC signal is heard.
5. Set signal generator at 1400 KC and turn condenser gang to the signal at 1400 K.C. Adjust antenna trimmer (on large section of condenser gang) to point showing highest reading on output meter.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

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

Starting with the intermediate frequency stage, working back stage by stage finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the tables.

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

When measuring over-all sensitivity at the antenna terminal, use a .0002 MF condenser in place of the .1 MF.

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

Stage gains are not given for Models 59T1 and 59T3 because of the difficulty in making accurate measurements on AC-DC receivers with the average signal generator, due to AC hum.

MODELS 59T2 AND 59T4

Microvolt Input	Generator Set at	Generator Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter **
2800	455 K.C.	6D6 Grid	.1 MF	.5 Meg	.4 Volts
50	455 K.C.	6A7 Grid	.1 MF	.5 Meg	.4 Volts
55	600 K.C.	6A7 Grid	.1 MF	.5 Meg	.4 Volts
20	600 K.C.	Ant. Lead	.0002 MF	None	.4 Volts

MODELS 59T5, 59K1 AND 69K1

Microvolt Input *	Generator Set at	Generator Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter **
2500	455 K.C.	6D6 Grid	.1 MF	.5 Meg	.25 Volts
25	455 K.C.	6A7 Grid	.1 MF	.5 Meg	.25 Volts
35	600 K.C.	6A7 Grid	.1 MF	.5 Meg	.25 Volts
15	600 K.C.	Ant. Lead	.0002 MF	None	.25 Volts

* For .05 Watts output. ** Output meter connected across voice coil.

SOCKET VOLTAGES

Numerals refer to socket terminals as indicated on circuit diagram

MODELS 59T1 AND 59T3 — POWER CONSUMPTION 50 WATTS

TUBE	POSITION	1	2	3	4	5	6	7	8
6A7	Osc.-Mod.	AC	85	55	85	0	7.5	AC	—
6D6	I.F.	AC	85	85	7.5	7.5	AC	—	—
75	Det.-Avc	AC	50	0	0	6.0	AC	—	—
25A7G	Output	100	AC	95	85	0	AC	AC	7.5
	Rect.								

MODELS 59T2 AND 59T4 — POWER CONSUMPTION 55 WATTS

TUBE	POSITION	1	2	3	4	5	6	7	8
6A7	Osc.-Mod.	6.0 AC	220	100	140	—10.0	0	0	
6D6	I.F.	6.0 AC	220	100	0	0	0	—	
75	Det.-Avc	6.0 AC	90	—7	—6	—1.7	0	—	
41	Output	6.0 AC	215	215	NOTE A	0	0	—	
80	Rect.	305	AC	AC	305	—	—	—	

NOTE A:—15 V. Measured at Bias Resistor.

MODELS 59T5 AND 59K1 — POWER CONSUMPTION 65 WATTS

6A7	Osc.-Mod.	6.0 AC	260	120	190	—28	0	0	
6D6	I.F.	6.0 AC	260	120	0	0	0	—	
75	Det.-Avc	6.0 AC	110	—9	—1.3	—2.3	0	—	
41	Output	6.0 AC	320	260	NOTE A	0	0	—	
80	Rect.	325	AC	AC	325	—	—	—	

NOTE A:—20 V. Measured at Bias Resistor.

MODEL 69K1 — POWER CONSUMPTION 80 WATTS

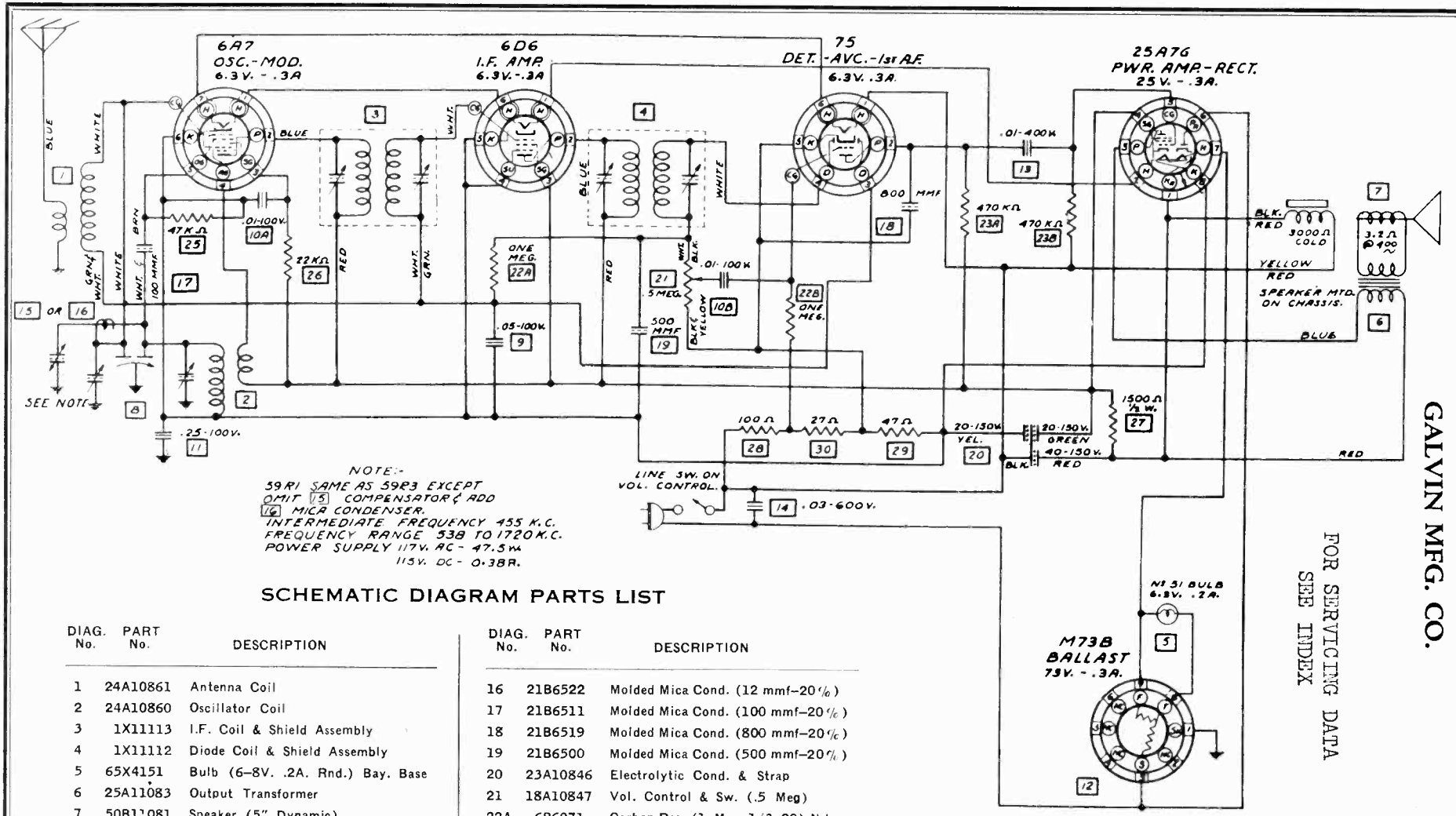
6A7	Osc.-Mod.	6.0 AC	207	96	157	—10	0	0	—
6D6	I.F.	6.0 AC	207	96	0	0	0	—	—
6Q7G	Det.-Avc	0	0	105	—1.5	—1.5	—	6.0 AC	—2.0
42	Output	6.0 AC	230	207	0	10	0	—	—
42	Output	6.0 AC	230	207	0	10	0	—	—
80	Rect.	322	AC	AC	322	—	—	—	—

All measurements made with 1000 ohms per volt meter.
On AC-DC models measure voltages from B— to socket terminal indicated.
On AC models measure from chassis ground to socket terminal indicated.
Line voltage 117 Volts.

GALVIN MFG. CO.

MODEL 59T1 Early
Chassis 59R1
MODEL 59T3
Chassis 59R3
Schematic, Parts

FOR SERVICING DATA
SEE INDEX



NOTE:-
59R1 SAME AS 59R3 EXCEPT
OMIT [15] COMPENSATOR & ADD
[16] MICA CONDENSER.
INTERMEDIATE FREQUENCY 455 K.C.
FREQUENCY RANGE 538 TO 1720 K.C.
POWER SUPPLY 117V. AC - 47.5W.
115V. DC - 0.38A.

CIRCUIT DIAGRAM MODEL 59T3

(Same circuit also used in early Type 59T1)

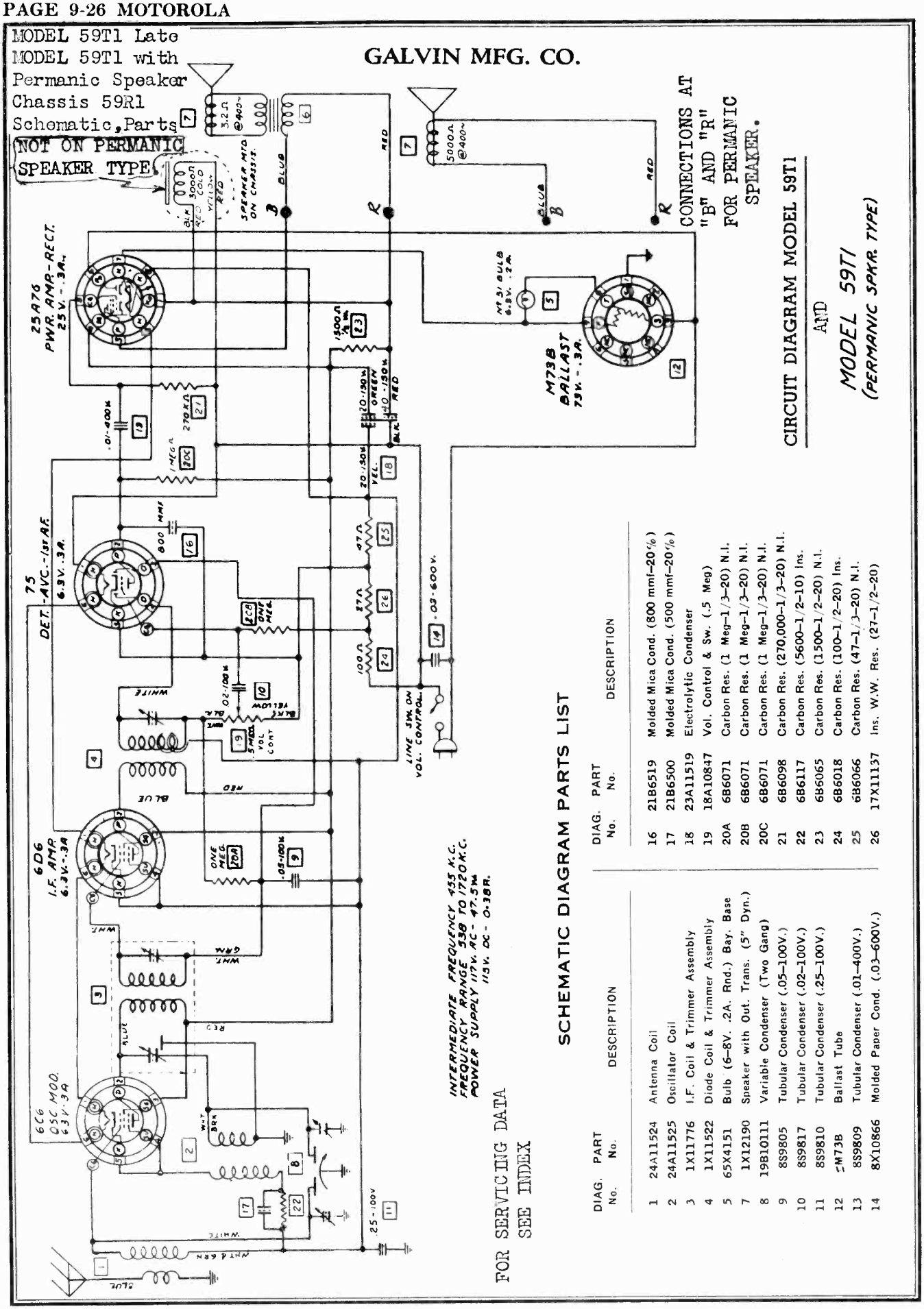
SCHEMATIC DIAGRAM PARTS LIST

DIAG. No.	PART No.	DESCRIPTION
1	24A10861	Antenna Coil
2	24A10860	Oscillator Coil
3	1X11113	I.F. Coil & Shield Assembly
4	1X11112	Diode Coil & Shield Assembly
5	65X4151	Bulb (6–8V. .2A. Rnd.) Bay. Base
6	25A11083	Output Transformer
7	50B11081	Speaker (5" Dynamic)
8	19B10111	Variable Condenser (Two Gang)
9	8S9805	Tubular Condenser (.05–100V.)
10A	8S9801	Tubular Condenser (.01–100V.)
10B	8S9801	Tubular Condenser (.01–100V.)
11	8S9810	Tubular Condenser (.25–100V.)
12	M73B	Ballast Tube
13	8S9809	Tubular Condenser (.01–400V.)
14	8A10866	Molded Paper Cond. (.03–600V.
15	20A11117	Compensating Condenser

DIAG. No.	PART No.	DESCRIPTION
16	21B6522	Molded Mica Cond. (12 mmf–20%)
17	21B6511	Molded Mica Cond. (100 mmf–20%)
18	21B6519	Molded Mica Cond. (800 mmf–20%)
19	21B6500	Molded Mica Cond. (500 mmf–20%)
20	23A10846	Electrolytic Cond. & Strap
21	18A10847	Vol. Control & Sw. (.5 Meg)
22A	6B6071	Carbon Res. (1 Meg–1/3–20) N.I.
22B	6B6071	Carbon Res. (1 Meg–1/3–20) N.I.
23A	6B6011	Carbon Res. (470,000–1/3–20) N.I.
23B	6B6011	Carbon Res. (470,000–1/3–20) N.I.
25	6B6020	Carbon Res. (47,000–1/3–20) N.I.
26	6B6050	Carbon Res. (22,000–1/3–20 N.I.
27	6B6065	Carbon Res. (1500–1/2–20) N.I.
28	6B6076	Carbon Res. (100–1/3–20) Ins.
29	6B6066	Carbon Res. (47–1/3–20) N.I.
30	17X11137	Ins. W.W. Res. (27–1/2–20)

MODEL 59T1 Late
MODEL 59T1 with
Permanic Speaker
Chassis 59R1
Schematic, Parts
NOT ON PERMANIC
SPEAKER TYPE

GALVIN MFG. CO.



SCHEMATIC DIAGRAM PARTS LIST

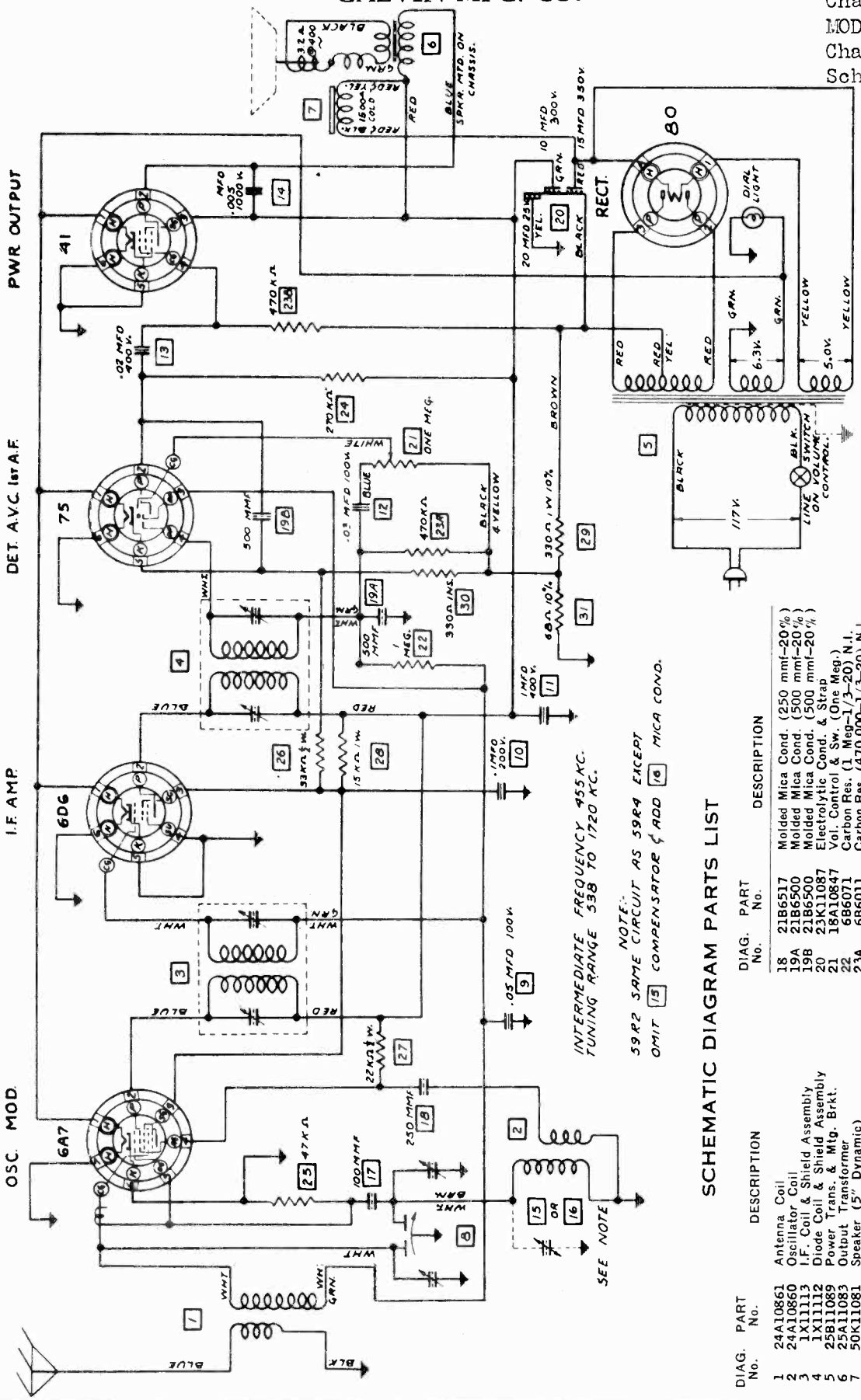
DIAG. No.	PART No.	DESCRIPTION
1	24A11524	Antenna Coil
2	24A11525	Oscillator Coil
3	1X11776	I.F. Coil & Trimmer Assembly
4	1X11522	Diode Coil & Trimmer Assembly
5	65X4151	Bulb (6-8V. .2A. Rnd.) Bay. Base
7	1X12190	Speaker with Out. Trans. (5" Dyn.)
8	19B10111	Variable Condenser (Two Gang)
9	8S9805	Tubular Condenser (.05-100V.)
10	8S9817	Tubular Condenser (.02-100V.)
11	8S9810	Tubular Condenser (.25-100V.)
12	=M738	Ballast Tube
13	8S9809	Tubular Condenser (.01-400V.)
14	8X10866	Molded Paper Cond. (.03-600V.)
16	21B6519	Molded Mica Cond. (800 mmf-20%)
17	21B6500	Molded Mica Cond. (500 mmf-20%)
18	23A11519	Electrolytic Condenser
19	18A10847	Vol. Control & Sw. (.5 Meg)
20A	6B6071	Carbon Res. (1 Meg-1/3-20) N.I.
20B	6B6071	Carbon Res. (1 Meg-1/3-20) N.I.
20C	6B6071	Carbon Res. (1 Meg-1/3-20) N.I.
21	6B6098	Carbon Res. (270,000-1/3-20) N.I.
22	6B6117	Carbon Res. (5600-1/2-10) Ins.
23	6B6065	Carbon Res. (1500-1/2-20) N.I.
24	6B6018	Carbon Res. (100-1/2-20) Ins.
25	6B6066	Carbon Res. (47-1/3-20) N.I.
26	17X11137	Ins. W.W. Res. (27-1/2-20)

FOR SERVICING DATA
SEE INDEX

CIRCUIT DIAGRAM MODEL 59T1
AND
MODEL 59TI
(PERMANIC SPKR. TYPE)

GALVIN MFG. CO.

MODEL 59T2
Chassis 59R2
MODEL 59T4
Chassis 59R4
Schematic, Parts



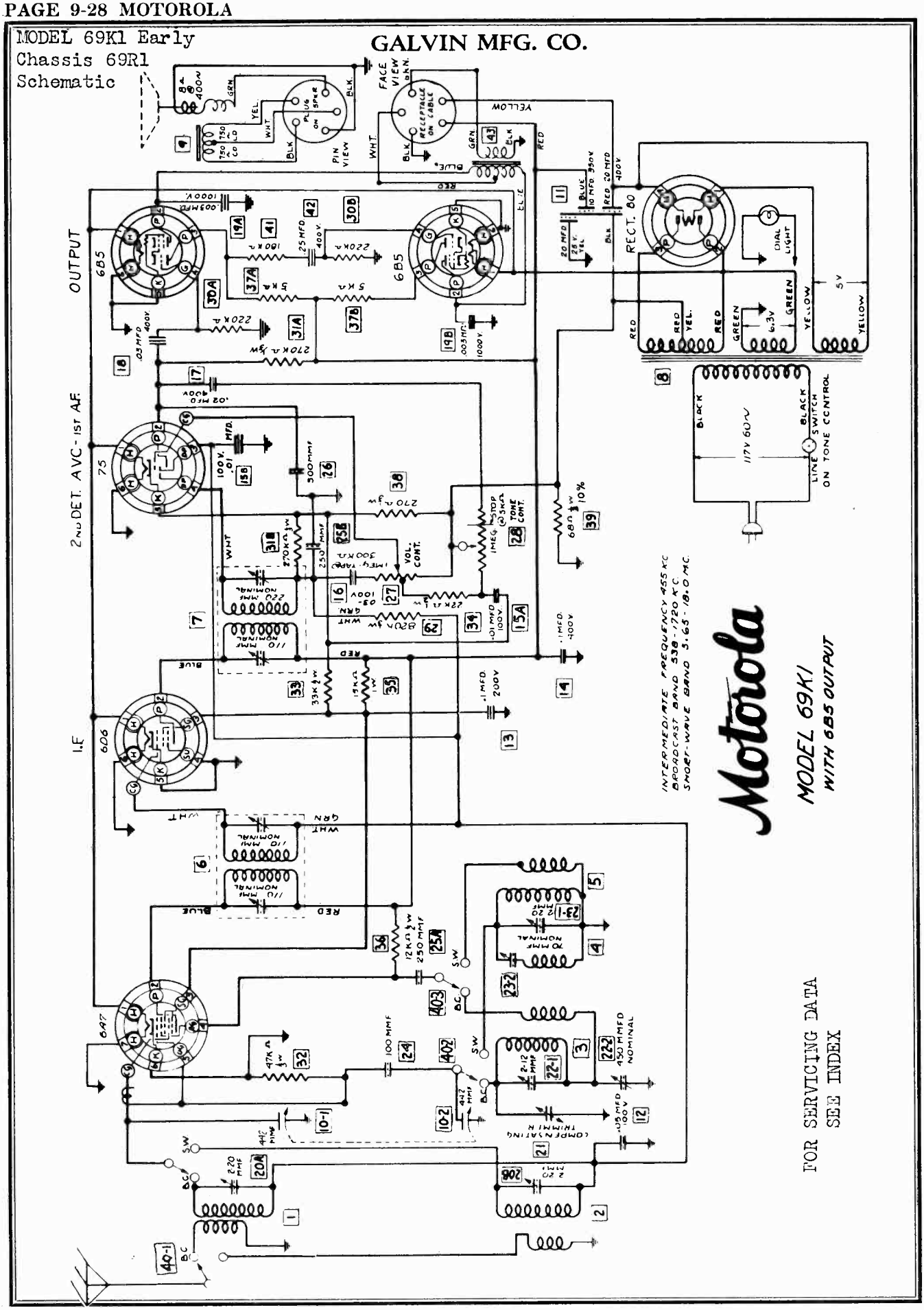
SCHEMATIC DIAGRAM PARTS LIST

DIAG. No.	PART No.	DESCRIPTION
1	24A10861	Antenna Coil
2	24A10860	Oscillator Coil
3	1X11113	I.F. Coil & Shield Assembly
4	1X11112	Diode Coil & Shield Assembly
5	25B11089	Power Trans. & Mtg. Brkt.
6	25A11083	Output Transformer
7	50K11081	Speaker (5" Dynamic)
8	19B10111	Variable Condenser (Two Gang)
9	8S9805	Tubular Condenser (.05–100V.)
10	8S9806	Tubular Condenser (.1–200V.)
11	8S9807	Tubular Condenser (.1–400V.)
12	8K11140	Spec. Tub. Condenser (.03–100V.)
13	8S9802	Tubular Condenser (.02–400V.)
14	8S9808	Tubular Condenser (.005–1000V.)
15	20A11117	Compensating Condenser
16	21B6522	Molded Mica Cond. (12 mmf–20%)
17	21B6511	Molded Mica Cond. (100 mmf–20%)
18	21B6517	Molded Mica Cond. (250 mmf–20%)
19A	21B6500	Molded Mica Cond. (500 mmf–20%)
19B	21B6500	Molded Mica Cond. (500 mmf–20%)
20	23K11087	Electrolytic Cond. & Strap
21	18A10847	Vol. Control & Sw. (One Meg.)
22	6B6071	Carbon Res. (1 Meg–1/3–20) N.I.
23A	6B6011	Carbon Res. (470,000–1/3–20) N.I.
23B	6B6011	Carbon Res. (470,000–1/3–20) N.I.
24	6B6098	Carbon Res. (270,000–1/3–20) N.I.
25	6B6020	Carbon Res. (47,000–1/3–20) N.I.
26	6B6012	Carbon Res. (33,000–1/2–20) Ins.
27	6B6088	Carbon Res. (22,000–1/2–20) N.I.
28	6B6013	Carbon Res. (15,000–1–20) N.I.
29	6B6103	Carbon Res. (330–1–10) N.I.
30	6B6010	Carbon Res. (330–1/2–20) Ins.
31	6B6063	Carbon Res. (68–1/3–10) N.I.

CIRCUIT DIAGRAM MODELS 59T2 and 59T4

FOR SERVICING DATA
SEE INDEX

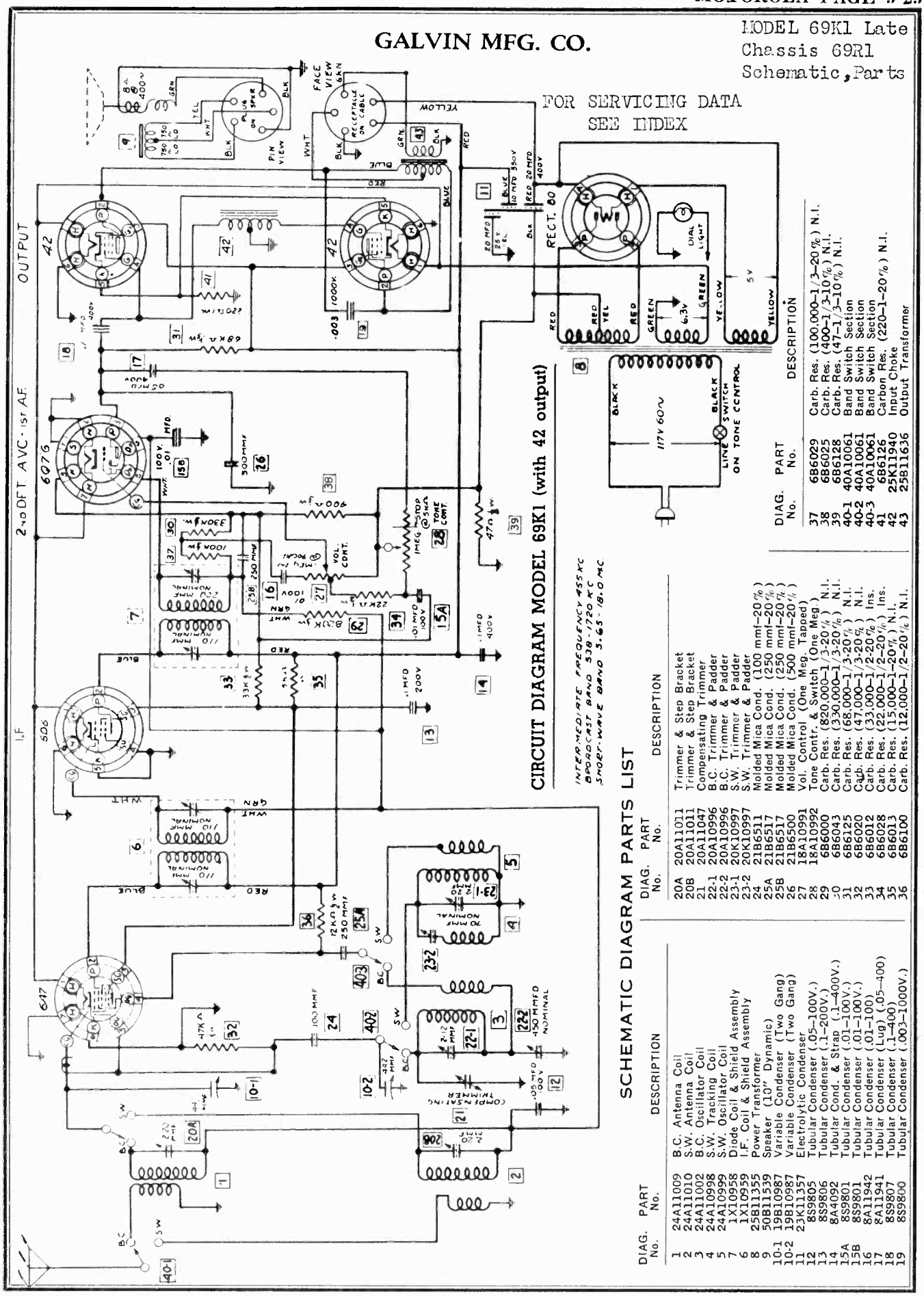
MODEL 69K1 Early
Chassis 69R1
Schematic



GALVIN MFG. CO.

MODEL 69K1 Late
Chassis 69R1
Schematic, Parts

FOR SERVICING DATA
SEE INDEX



CIRCUIT DIAGRAM MODEL 69K1 (with 42 output)

INTERMEDIATE FREQUENCY 455 KC
BROADCAST BAND 538-1720 KC
SHORT-WAVE BAND 5.65-18.0 MC

SCHEMATIC DIAGRAM PARTS LIST

DIAG. No.	PART No.	DESCRIPTION
1	24A11009	B.C. Antenna Coil
2	24A11010	S.W. Antenna Coil
3	24A11002	B.C. Oscillator Coil
4	24A10998	S.W. Tracking Coil
5	24A10999	S.W. Oscillator Coil
6	1X10958	Diode Coil & Shield Assembly
7	1X10959	I.F. Coil & Shield Assembly
8	25B11355	Power Transformer
9	50B11539	Speaker (10" Dynamic)
10-1	19B10987	Variable Condenser (Two Gang)
10-2	19B10987	Variable Condenser (Two Gang)
11	23K11357	Electrolytic Condenser
12	8S9805	Tubular Condenser (.05–100V.)
13	8S9806	Tubular Condenser (.1–200V.)
14	8A4092	Tubular Cond. & Strap (.1–400V.)
15A	8S9801	Tubular Condenser (.01–100V.)
15B	8S9801	Tubular Condenser (.01–100V.)
16	8A11942	Tubular Condenser (.01–100)
17	8A11941	Tubular Condenser (Lug) (.05–400)
18	8S9807	Tubular Condenser (.1–400)
19	8S9800	Tubular Condenser (.003–1000V.)
20A	20A11011	Trimmer & Step Bracket
20B	20A11011	Trimmer & Step Bracket
21	20A11047	Compensating Trimmer
22-1	20A10996	B.C. Trimmer & Padder
22-2	20A10996	B.C. Trimmer & Padder
23-1	20K10997	S.W. Trimmer & Padder
23-2	20K10997	S.W. Trimmer & Padder
24	21B6511	Molded Mica Cond. (100 mmf–20%)
25A	21B6517	Molded Mica Cond. (250 mmf–20%)
25B	21B6517	Molded Mica Cond. (250 mmf–20%)
26	21B6500	Molded Mica Cond. (500 mmf–20%)
27	18A10991	Vol. Control (One Meg. Tapped)
28	18A10992	Tone Contr. & Switch (One Meg.)
29	6B6000	Carb. Res. (820,000–1/3-20%) N.I.
30	6B6043	Carb. Res. (330,000–1/3-20%) N.I.
31	6B6125	Carb. Res. (68,000–1/3-20%) N.I.
32	6B6020	Carb. Res. (47,000–1/3-20%) N.I.
33	6B6012	Carb. Res. (33,000–1/2-20%) Ins.
34	6B6028	Carb. Res. (22,000–1/2-20%) Ins.
35	6B6013	Carb. Res. (15,000–1/2-20%) N.I.
36	6B6100	Carb. Res. (12,000–1/2-20%) N.I.
37	6B6029	Carb. Res. (100,000–1/3-20%) N.I.
38	6B6025	Carb. Res. (400–1/3-10%) N.I.
39	6B6128	Carb. Res. (47–1/3-10%) N.I.
40-1	40A10061	Band Switch Section
40-2	40A10061	Band Switch Section
40-3	40A10061	Band Switch Section
41	6B6126	Carbon Res. (220–1–20%) N.I.
42	25K11940	Input Choke
43	25B11636	Output Transformer

MODEL 89K1
Chassis 89R1
Schematic

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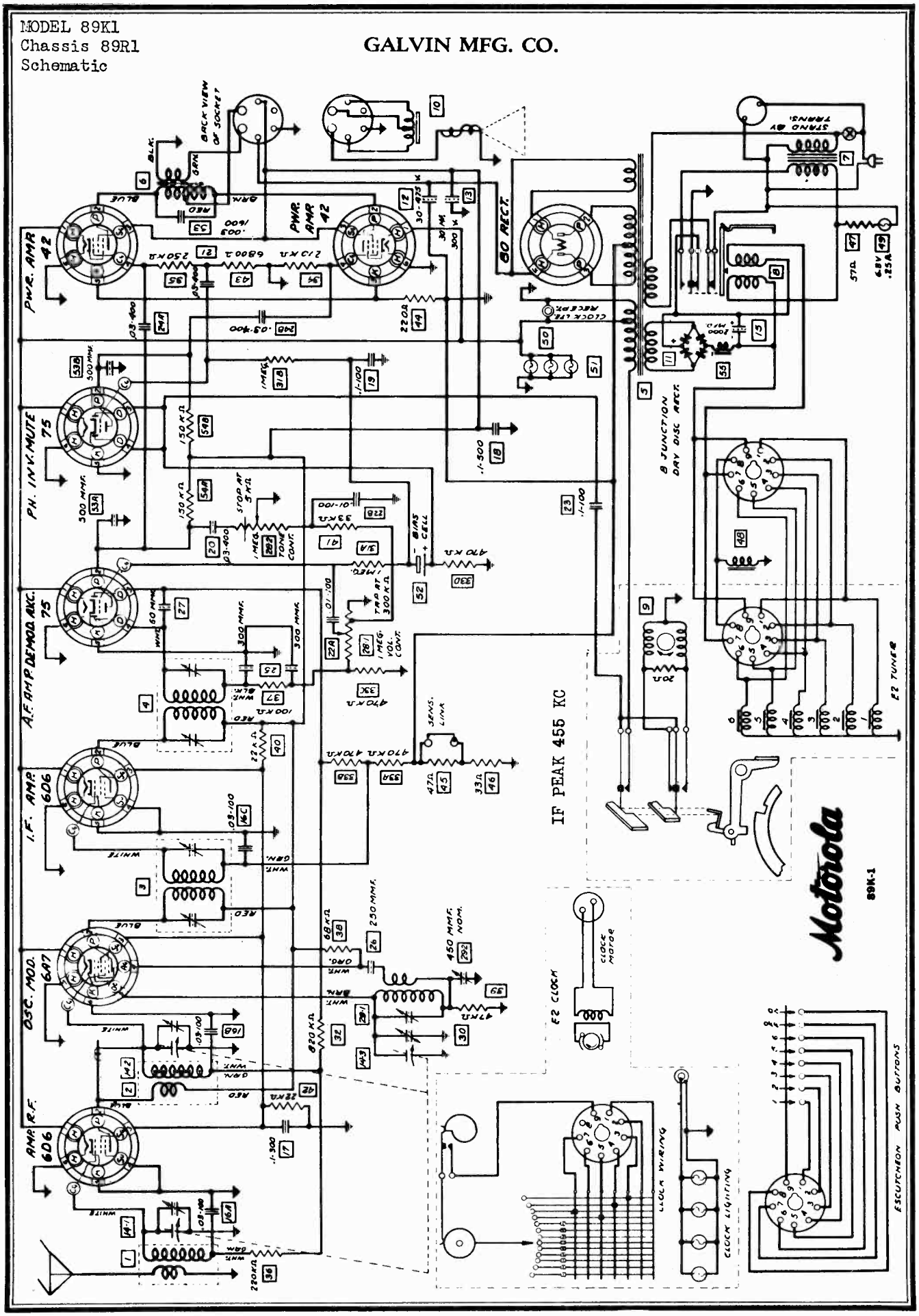


GALVIN MFG. CO.

MODEL 89K2
Schematic
MODELS 89K1, 89K2
Switch Details, Parts

47	17X11591	Ins. W. W. Res. (57-2-20)	59	1X11585	E-2D Push Button Control Assembly
48	1X11624	Tuner Magnet (Black)	60	65X4874	Bulb (6-8 V.-1½ W. Round) White No. 50 W
49	65X10867	Bulb (6.3 V.-.25 A. Long) No. 44 Clear	61	59B11817	Volume Control Motor (89K2)
50	65X12028	Bulb (6.3 V.-.25 A. Long) White No. 44 W			
51	65X4151	Bulb (6.3 V.-1½ W. Round) No. 51 Clear			
52	9X10089	Bias Cell			
53	21B6500	Molded Mica Cond. (500 MMF-20%)			
54	6B6130	Carbon Res. (150,000-1/3-10) N.I.			
55	1X11918	R. F. Choke (Blue)			
56	40X11975	Rotary Switch (SPST)			
57	1X11511	E-2T Electric Tuner Assembly			
58	1X11590	E-2C Clock Control Assembly			

Fig. 1

MOTOR REVERSING SWITCH

MAIN MOTOR SWITCH

RF AMP. 6D6 — OSC. MOD. 6A7 — I.F. AMP. 6D6 — A.F. AMP. DEMOD. AVC. 75 — PH. INV. MUTE 75 — PWR. AMP 42 — PWR. AMP 42

IF PEAK 455 KC

#6B6000

6B6003 — 6B6041 — 6B6029 — 6B6016 — 6B6011 — 6B6071 — 6B6095 — 6B6127 — 6B6112 — 6B6060

6B6118 — 6B6119 — 6B6129 — 6B6020

BACK VIEW OF SOCKET.

PLUG PIN VIEW

CLOCK MOTOR, CABLE & PLUG

80 RECT.

Diag. No.	Part No.	Description
1	24A11439	Antenna Coil and Mtg. Clip
2	24A11442	R.F. Coil and Mtg. Clip
3	1X11458	I.F. Coil and Shield Assembly
4	1X11457	Diode Coil and Shield Assembly
5	25B10031	Power Transformer (89K1)
5	25B11706	Power Transformer (89K2)
6	25B11638	Output Transformer
7	25A11576	Standby Transformer
8	1X12012	Power Relay E2P
9	59B11216	Tuner Motor and Resistor
10	50B11415	Speaker (10" Dynamic)
11	48A10032	Dry Disc Rectifier (8 Junc.) (89K1)
11	48K11592	Dry Disc Rectifier (12 Junc.) (89K2)
12	23A10045	Wet Elect. Cond. (30 MFD-475 V.)
13	23A10044	Wet Reg. Cond. (30 MFD-300 V.)
14	19B11454	Variable Condenser
15	23A12220	Electrolytic Cond. (2000 MFD-8 V.)
16	8S9803	Tubular Condenser (.03-100 V.)
17	8S9815	Tubular Condenser (.1-300 V.)
18	8A11464	Spec. Tub. Cond. (.1-500 V.)
19	8A3302	Spec. Tub. Cond. (.1-100 V.)
20	8A11968	Spec. Tub. Cond. (.03-400 V.)
21	8K11140	Spec. Tub. Cond. (.03-100 V.)
22	8S9801	Tubular Condenser (.01-100 V.)
23	8S9805	Tubular Condenser (.1-100 V.)
24	8S9804	Tubular Condenser (.03-400 V.)
25	21X11637	Metal Mica Cond. (300-300-30%)
26	21B6517	Molded Mica Cond. (250 MMF-20%)

Part numbers of resistors will be found at symbols

CHECKING CLOCK CONTINUITY

Although we have sealed the Time Tuning Clock against unauthorized tinkering, and have established a policy of voiding the guarantee if the seal is broken, it is possible to completely check the clock circuit for defects without removing the mechanism from its housing. This can be done by "ear" and by continuity.

The first step in checking a clock is to make sure that the motor runs and that it keeps accurate time. Just plug it into its receptacle on the chassis and check its time-keeping qualities against a known source of accurate time.

If this test indicates that the clock motor is not running, it would be advisable to make certain that the receptacle on the chassis base is "live" and that 110 volts, 60 cycle A.C. is available at that point.

Before attempting to check the clock continuity, it would be helpful to go through a little practice course in listening to the sounds the clock makes. First, remove the clock assembly from its mounting on the control panel of the receiver, and hold it in your hands while you turn the time set knob on the back. While turning the knob, hold the clock up to your ear, listening for the clicks. When the minute hand passes any of the four quarter-hour intervals into which each hour is divided, you will hear two clicks, the second of which falls very closely after the first one. These clicks are caused by the quarter-hour cam switch blades dropping off of the cams.

As you turn the time set knob, you will notice another single click which is a little louder and sounds a trifle more metallic than the double click which you get at the exact quarter-hour intervals. This single click will be heard when the minute hand is passing a point that is approximately half way between the quarter-hour positions. This click is caused by the contact on the twenty-four hour hand as it falls off of one time bar to make contact upon the next time bar.

If you will go through this operation several times, you will soon be able to identify these sounds. Once you are able to recognize them, you will be able to thoroughly check the continuity of the clock control circuit, without the necessity of looking inside the mechanism. Proceed as follows:

1. With the time set knob, turn the clock hands until they read fifteen minutes to twelve on the day cycle. Look through the peep-hole to make sure of this.
2. Slowly turn the time set knob forward until the minute hand indicates approximately two minutes to twelve. In the course of this movement you will hear, unless the clock is defective, a single click which indicates that the twenty-four hour contact has come to rest upon the twelve o'clock noon time bar.
3. Now *very slowly* continue to turn the time set knob forward until you hear the first click, which indicates that the top blade of the twenty-four hour cam switch has fallen off of the large cam, causing the cam switch circuit to close. As soon as you hear this first click, stop turning the time set knob, for if you turn it far enough to hear the second click, the contact will be broken. The trick is to turn it just far enough, but not too far.
4. Clear the clock of all previous settings by inserting a finger in the "OFF" position of the finger dial, and dialing counter-clockwise until the stop is reached.
5. With the round time-selecting knob on the front of the clock, turn the red time selecting pointer to 12:00 o'clock noon.
6. With a continuity meter, check continuity between Terminal No. 9 and all of the other terminals on the plug at the end of the clock cable. You should get no reading. Terminal No. 9 is connected to the common lead.
7. Dial the "OFF" position just as you would if you were setting up the clock to turn the radio off at 12:00 o'clock noon. Check continuity between Terminal No. 9 and Terminal No. 7. You should get a full scale reading indicating a complete circuit. (Terminal No. 7 connects to the off relay when the clock is plugged into the chassis).
8. Dial Station No. 1 and check continuity between Terminal No. 9 and Terminal No. 1 of the clock cable. A full scale reading should result.
9. In their respective order, dial Stations 2, 3, 4, 5, and 6, checking continuity after each dialing between Terminal No. 9 and Terminals 2, 3, 4, 5, and 6, respectively. In each case you should get a full scale deflection of your continuity meter between Terminal No. 9 and the terminal which corresponds in number to the position you have dialed on the finger ring.

The procedure through which you have gone up to this point will, if the proper readings have been obtained, tell you that the slider on the time bar which represents the 12:00 o'clock noon position, is making a proper contact with each of the station rings and the "OFF" ring in the clock.

10. Next turn the clock hands knob to the 12:15 o'clock position, also turn the red time-selecting pointer to the 12:15 o'clock position, and repeat Steps 1 to 9 for the 12:15 o'clock position. To check the clock 100%, it will be necessary to repeat the procedure ninety-six times, one for each fifteen minute interval of the twenty-four hour day.

However, if the test which you have made at the 12:00 o'clock noon position shows the mechanism to be O.K. it should not be necessary to go through the entire operation. A test made at 12:00 o'clock noon and 12:00 o'clock midnight, and tests at 6:00 A.M. and 6:00 P.M. should give you a fairly accurate test. However, it is possible that, due to damage or improper adjustment of one individual time bar or slider, the clock fails to operate at one particular quarter-hour period, although it operates as it should at all other times. In this case, a continuity test would be advisable at the particular time setting at which failure has been noted.

THE CLOCK

As indicated in the circuit diagrams, the clock tuner is connected in parallel with the push-buttons. The clock cable and the push-button cable are interchangeable and either one may be plugged into the 9 contact receptacle on the chassis base, or the one on top of the tuner. The clock is sealed at the factory and breakage of the seal voids the guarantee. Defective clocks should not be serviced in the field but should be returned to the Motorola distributor in the territory.

Although the clock is sealed, it is easy to check its continuity for defects without removing it from its housing, by following the instructions on this page.

THE REMOTE CONTROL

The station tuning buttons in the remote control box are also connected in parallel with the escutcheon push-buttons. The remote cable, however, has eleven leads instead of nine. The two extra leads are for the volume control motor.

TO SET AUTOMATIC TUNER

1. From the set of rectangular call letter tabs provided with the radio, detach the proper ones for your six favorite stations. The station tabs should then be inserted over the station tuning buttons in the order of frequency. For example, the station with the lowest frequency should be set for No. 1 button, the next station on the dial to No. 2 button, etc. High frequency stations (1200 to 1500 K.C.) should always be set for buttons No. 5 and No. 6. This will assure accurate tuning.
2. Loosen the AUTOMATIC LOCKING KNOB, which is located on the automatic tuner facing the rear. This knob should be turned counter-clockwise four or five revolutions—far enough to assure plenty of looseness.
3. Press button No. 1 and hold it down until the electric tuner has come to a complete stop.
4. Continue to hold No. 1 button down and tune in manually (by means of tuning knob) the station whose call letters you have inserted over the button. After the station has been tuned perfectly, remove your finger from the button.
5. Proceed to set up the remaining buttons to the selected stations, following the same procedure.
6. Tighten the automatic locking knob very securely. CAUTION: If by chance you wish to set up for automatic tuning, a police station in the 1712 K.C. Police band, you must be extremely careful in making the setting. There is a possibility of turning the mechanism so far to the high frequency end of the dial, that the latch bar with the trigger on it will not fall into the stop on the station control ring. If this occurs the mechanism will continue to run as long as the button is held down. To correct it, it will be necessary to go around to the rear of the receiver and turn the control ring back by hand until the stop will engage. If you are in doubt about this procedure, observe the operation of a latch bar that works correctly, and notice how it falls into the stop on the control ring.

MOTOR AND REVERSING SWITCH ADJUSTMENTS

Correct operation of the Motorola Automatic Tuner will depend to a great extent upon the spacing of the points on the main motor switch and the reversing switch.

Although proper adjustment is important, it is by no means critical and can be easily accomplished as follows:

TO ADJUST MAIN MOTOR SWITCH

1. Insert 1/16" feeler gauge between the latch bars and the high side of the latch rings. Adjust the fibre latch gate stop plate so the 1/16" spacing will be maintained when the latch bars are at rest.
2. Check main motor switch (mounted on top side of magnet support plate). Contacts should be open 1/16" when latch bars are at rest.
3. Pull down on No. 1 latch bar and check closing of main motor switch. Contacts should just close firmly when latch bar comes within .02" of latch ring (high side).
4. When latch bar is touching high side of latch ring, the bottom switch leaf should be lifted slightly from the heavy spacer leaf. TO ADJUST AN IMPROPER SPACING, BEND HEAVY SPACER LEAVES—NEVER BEND CONTACT LEAVES.

TO ADJUST MOTOR REVERSING SWITCH

5. Check open position of reversing switch (mounted on bottom side of magnet support plate). With latch bars at rest the top contacts should be closed and the bottom contacts open.
6. Pull down on No. 6 latch bar until it touches *high* side of latch ring and check reversing switch contacts. Top contacts should still be closed and bottom contacts open.
7. Pull down on No. 6 latch bar until it touches *low* side of latch ring. Top contacts should now be just slightly open and bottom contacts just firmly closed, with lower switch leaf lifted slightly from heavy spacer leaf. TO ADJUST BEND SPACER LEAVES—NEVER BEND CONTACT LEAVES.

ALIGNMENT PROCEDURE—MODELS 89K1 AND 89K2

1. Connect signal generator to control **grid on Osc.-Mod. tube (Type 6A7)** through an .05 MF condenser and to **chassis**. Do not remove grid cap. Also connect output meter across **speaker** voice coil.
2. Set signal generator at 455 K.C. and carefully adjust the four I.F. trimmers (located in top of I.F. coil cans) to point showing highest reading on output meter.
3. Connect signal generator to antenna and ground terminals, using a .0002 MF condenser in antenna lead.
4. Set signal generator and receiver dial both at 1700 K.C. and adjust oscillator trimmer until 1700 K.C. signal is heard. (Oscillator trimmer can be reached through hole in chassis base).
5. Set signal generator at 1400 K.C. and turn condenser gang to the signal at 1400 K.C. Adjust antenna trimmer (on rear section of gang) and R.F. trimmer (on front section of gang) to point showing highest reading on output meter.
6. Set signal generator at 600 K.C. and rock dial pointer at 600 K.C. position on dial scale while adjusting oscillator padder until combination is found which gives highest output reading. (Oscillator padder can be reached through hole in chassis base).

NOTE: If there is noise level at 600 K.C. padder can be adjusted to maximum noise without rocking gang and without use of signal generator. Use short wire for pick-up if necessary.

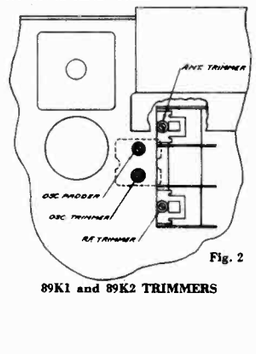


Fig. 2
89K1 and 89K2 TRIMMERS

SOCKET VOLTAGES—MODELS 89K1 AND 89K2

Numerals refer to socket terminals as indicated on circuit diagram.

TUBE	POSITION	1	2	3	4	5	6	7
6D6	R.F. Osc.-Mod.	6.0 AC	225 V.	80	250	105	0	
6A7	1st A.F.	6.0 AC	225 V.	80	250	105	0	
6D6	2nd A.F.	6.0 AC	225 V.	80	250	105	0	
42	Det.-1st Audio	6.0 AC	135 V.	0	0	0	0	
42	Output	6.0 AC	245 V.	250	250	250	250	
80	Rect.	6.0 AC	245 V.	220 AC	220 AC	12	12	
80				350	0		0	

SENSITIVITY DATA—MODELS 89K1 AND 89K2

Microvolt Input	Generator Set at	Generator Connected to	Dummy Antenna Capacity	Load Resistance	Output Meter**
1.0 Volts	400 Cycles	.75 Grid (Diode)	.1 MF	.5 Meg.	2.82 Volts
7500	455 K.C.	6D6 Grid (I.F.)	.1 MF	5 Meg.	2.82 Volts
185	1500 K.C.	6D6 Grid	.1 MF	5 Meg.	2.82 Volts
185	600 K.C.	6A7 Grid	.1 MF	5 Meg.	2.82 Volts
30	600 K.C.	6D6 Grid (R.F.)	.0002 MF	5 Meg.	2.82 Volts
	600 K.C.	Ant. Lead	.0002 MF	5 Meg. Noise	2.82 Volts

*For 1.0 Watt output.
**Output meter connected across voice coil.

ELECTRIC TUNER SERVICE SUGGESTIONS

Following you will find a list of troubles you may experience with the automatic tuning system as used in Models 89K1, 109K1, and their remote control versions. Each possible failure is followed by suggestions which may aid you in quickly solving your service problems with these models.

RECEIVER FAILS TO TURN "ON" AND "OFF"

1. **MASTER SWITCH "OFF"**—This switch is located on rear of chassis base. It must be in the "ON" position if the radio is to operate.
2. **OPEN RELAY**—Check relay magnet coils for open circuit. Replace if necessary. (NOTE: "ON" magnet is A.C. operated. "OFF" magnet is D.C. Do not reverse.)
3. **RELAY ARMATURE STUCK**—Check relay armature for sticking and freedom of movement. Readjust if possible or replace relay if necessary.
4. **RELAY COIL SHORTED**—This would reduce pulling power of relay magnet. Replace if necessary. "ON" magnet winding resistance should be 3.5 ohms. "OFF" magnet should measure 14.0 ohms.
5. **RELAY CONTACTS NOT CLOSING PROPERLY**—Double set of contacts for power transformer primary must close firmly in "ON" position and break cleanly (about 1/16") in "OFF" position. Triple set of contacts must reverse cleanly when relay reverses (about 1/16" break on open side and firm contact on closed side.) Adjust if necessary by careful bending.
6. **DEFECTIVE DRY DISC RECTIFIER**—If rectifier is defective, receiver will not turn OFF. A.C. input to rectifier should measure 6.75 volts with 115 volt A.C. line. (In remote control models 89K2 and 109K2, this value is 10.2 volts.) D.C. output from rectifier should measure 5 volts or higher. Measure voltage while pressing "ON" button. Replace rectifier if necessary.
7. **DEFECTIVE STAND-BY TRANSFORMER**—If primary or secondary of stand-by transformer is open, the set will not turn on. Secondary voltage should measure 13 volts A.C. with 115 volt line.
8. **SHORTED 2000 MF FILTER CONDENSER**—This is a filter and hash condenser connected across the dry disc rectifier.
9. **OPEN HASH CHOKE**—This choke looks like a tuning magnet and is connected in negative lead of rectifier output. Resistance .3 ohms.
10. **OPEN PUSH-BUTTON CIRCUIT**—Check push-button contacts on escutcheon, check cable for continuity and check plug receptacle on chassis base for poorly soldered connections or open leads. Make sure plug fits firmly in receptacle. (NOTE: Nine lead cables from escutcheon and clock are interchangeable and either one may be plugged into the nine terminal receptacle on the chassis base or the one on top of the tuner.)
11. **LOW LINE VOLTAGE**—The relay will operate down to about 100 volts in the A.C. line. Do not try to make the receiver work on lower voltage.
12. **"ON" COIL OPEN**—Do not confuse this with the "ON" magnet in the relay. It is a duplicate of a station magnet and is mounted under the chassis base on the back apron and near the nine terminal receptacle. (Resistance 1.4 ohms.)
13. **"TIME ON" LIGHT GROUNDED**—If the circuit leading to the light is grounded, the set will not turn "OFF."

RECEIVER FAILS TO TUNE STATIONS

1. **DEFECTIVE STATION MAGNET**—An open magnet coil or a shorted one will not pull latch bar down. Replace if necessary. Resistance of station magnets should be 1.4 ohms. Also check balance of magnet circuit.
2. **DEFECTIVE DRY DISC RECTIFIER**—Check output as above. Station magnets require 3.8 to 5.0 volts D.C. Measure under load by pressing any station button.
3. **LATCH BAR STICKING**—Check latch bars for binding or for sticking in latch ring of previously tuned station. Check for burr on tip of latch. Also check alignment of latch bars with reference to latch rings. The tip of the latch bar and the trigger must both fall within the width of the latch ring. Bend carefully if necessary to center them.
4. **OPEN PUSH-BUTTON CIRCUIT**—Check as outlined above.
5. **POOR SWITCH CONTACTS**—Main motor switch must make positive contact when latch gate is pulled down by latch bar and the latch bar is resting on the *high* side of the latch ring. The reversing switch must reverse positively when the latch bar falls to the *low* side of the latch ring. Clean contacts with Carbona. If necessary adjust as per instructions on page 3.
6. **DEFECTIVE LATCH TRIGGER**—If trigger fails to pull latch gate down, main motor switch will not close. Check trigger spring and trigger pivot for freedom from binding. Replace latch bar assembly if necessary.
7. **DEFECTIVE MOTOR**—Replace if necessary.
8. **MOTOR RESISTOR OPEN**—Check 20 ohm resistor mounted across motor terminals. (In Models 109K1 and 109K2, this resistor is replaced with a 60 MF motor starting condenser.)
9. **POWER TRANSFORMER OPEN**—Check output of power transformer secondary that supplies motor current. Should measure 24 volts across winding. In Model 89K1 only, this winding has a tap at 6.3 volts for dial lights.

TUNER OPERATES SLUGGISHLY

1. **HIGH RESISTANCE IN MOTOR CIRCUIT**—Check main motor and reversing switches. Clean and adjust if necessary.
2. **BINDING IN MECHANISM**—Tune receiver manually to make sure there is no binding in dial drive assembly or tuner assembly.
3. **GEARS NOT PROPERLY MESHED**—Check all gears in assembly for binding due to improper meshing.
4. **MECHANISM NOT PROPERLY LUBRICATED**—Apply light oil sparingly to all bearings and moving parts.
5. **LOW LINE VOLTAGE**—Measure line voltage. The receiver is not designed to work on less than 100 volts.
6. **DEFECTIVE MOTOR**—Replace.
7. **DEFECTIVE MOTOR RESISTOR**—Replace. (In 109K1 and 109K2, a 60 MF condenser is used.)

FAILS TO TUNE ACCURATELY

1. **ORIGINAL SETTING NOT ACCURATE**—Set up stations carefully, following instructions in installation book. Set high frequency stations on the inner rings (No. 5 and No. 6), low frequency stations on the outer rings.
2. **TOO MUCH TENSION ON LOCKING LEVERS**—When the automatic locking screw is loose, the station rings should move freely. If they don't, check the tension of the three lock washers under the three locking levers and if they cause the levers to still hold the station rings partially locked, the screws which hold the levers in position should be loosened one-quarter to one-half turns.
3. **BINDING AT LOCKING SCREW**—The automatic locking screw passes through a triangular shaped support bracket before it screws into the rotor assembly. If the nut into which it screws is not concentric with the rotor, the locking screw shaft will wobble slightly as it turns and when tightened will throw the station setting off, due to binding between the shaft and the triangular bracket. If this causes trouble, remove the bracket and leave it off. Its main purpose was to support the back end of the rotor while the receiver was in transit. It is not needed for the operation of the tuner. It has been left out of late type receivers.
4. **AUTOMATIC LOCKING SCREW LOOSE**—If this screw is not securely tightened, each operation of the tuner will cause the latch rings to slip a trifle.
5. **TIP OF LATCH BAR DOES NOT FALL INTO NOTCH**—To tune accurately, the latch bar must fall into notch on latch ring far enough to lock the rotor assembly firmly. If rear end of latch bar hits magnet pole before tip reaches bottom of notch, it may be necessary to bend latch bar slightly. Always bend at magnet end.

LATCH BAR STICKS ON MAGNET POLE

1. **ARMATURE RIVET WORN**—There is a brass rivet at the tip of the armature, to prevent the armature freezing to the magnet. If this rivet is worn down, permitting the steel armature to actually touch the magnet pole, it may freeze in that position.
2. **LATCH TRIGGER CATCHES ON EDGE OF LATCH RING**—Realign latch bar by bending so tip and trigger fall within width of latch ring.

MOVES FROM STATION AFTER BUTTON HAS BEEN RELEASED

1. **CHECK MAIN MOTOR SWITCH**—If the main motor switch points are spaced too close together the bounce of the latch gate, as the trigger releases it, will cause the main motor switch to close momentarily, causing the mechanism to move slightly away from the station.

MODEL 6K
Schematic, Coils
Socket

GAMBLE-SKOGMO, INC.

Power Consumption - - 7.8 Amperes at 6.3 Volts

Power Output - - 6 Watts Undistorted at 6.3 Volts

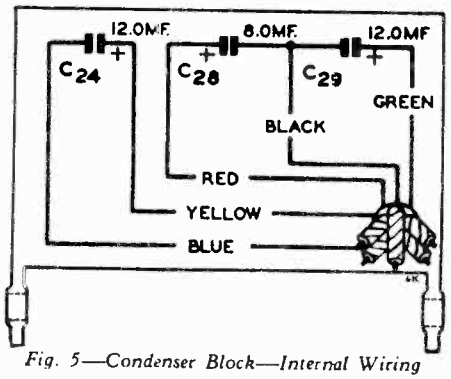


Fig. 5—Condenser Block—Internal Wiring

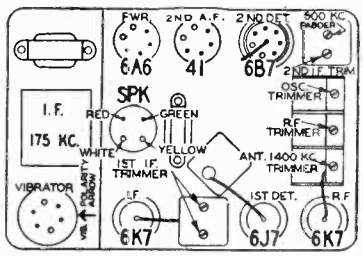


Fig. 2—Location of Tubes and Vibrator

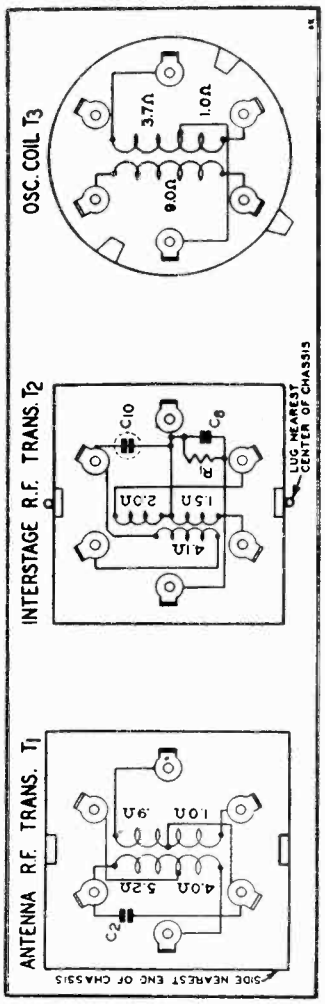


Fig. 4—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

Series 6K

June 1936

Tuning Frequency Range 530 to 1575 KC

Selectivity - - - 45 KC Broad at 1000 Times Signal

Sensitivity—1.0 Microvolt Absolute
(LD switch in distant position)

Fig. 1—Schematic Circuit Diagram

Series 6K — Automobile Radio

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.

Turn the Local-Distance switch to the Distance position and keep it in this position for all adjustments.

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.) The antenna plug must be correctly inserted, dependent on the capacity of the antenna used.

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.

Replacement Parts

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

MISCELLANEOUS

SOCKETS

Part No.		Description	List Price
P-3A223	6J7	Tube Socket	$0.15
P-3A211	6K7	Tube Socket	.15
P-3A205	6A6	Tube Socket	.15
P-3A116	41	Tube Socket	.10
P-3A120	6B7	Tube Socket	.15
P-3A229		6 Prong Socket (External Speaker)	.15
P-3A226		Antenna Socket	.10
P-3A228		Vibrator Socket	.15
P-3A231		4 Prong Socket (Internal Speaker)	.10

SPEAKER

P-12A242		6" Dynamic Speaker	$4.35

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 6K7 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 through a 150 mmf. condenser (1500 mmf. if antenna is high capacity).

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.

As shown in this illustration, the antenna plug is inserted in one of two ways, depending on whether the car has a high or low capacity antenna. Full instructions are in the installation manual packed with each radio.

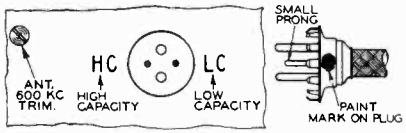


Fig. 3—Antenna Plug Insertion

In 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.

GENERAL

Part No.		Description	List Price
P-19A26		Vibrator Unit	$4.10
Specify Name and Model of Receiver		Chassis Case Only	3.80
		Chassis Case Cover Only	3.05
		Spring Clamp Button	.10
		Tone Control Knob	.10
		Local-Distance Switch Knob	.10
		8-32 x 3/16" Headless Cup Point Set Screw	Doz. .15
P-30X14		Grid Clip only—Glass Tube	.10
P-30X44		Grid Clip only—Metal Tube	.10
P 32X30		Tube Shield Base	.10
P-32X58		Tube Shield	.15
P-2A54		Local-Distance Switch	.40

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
P-9A580	T1	Antenna Transformer & Can Assembly	$1.60
P-9A581	T2	Interstage Transformer & Can Assembly	1.55
P-9A582	T3	Oscillator Coil & Can Assembly	.85
P-9A583	T4	1st I. F. Coil & Can Assembly	1.45
P-9A584	T5	2nd I. F. Coil & Can Assembly	1.80
P-50X32	T6	Input Transformer	1.30
P-51X43	T7	Output Transformer	1.60
P-53X124	T8	Power Transformer	3.10
P-9A586	L1, L3	Filament Reactor, R.F. "B" Reactor — One Assembly	.55

TRANSFORMERS AND COILS (Continued)

Part No.	Code	Description	List Price
P-9A588	L4	"A" Line Reactor	.20
P-52X45	L5	"B" Reactor	.80
P-9A585	L6	"B" Reactor	.30
P-9A587	L7	Vibrator Reactor	.50
P-9A614	L10	Filament Choke	.20

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
P-A94504	R1	500,000 Ohms	0.2	$0.15
P-C94173	R2	17,000 Ohms	1.0	.15
P-B94203	R3	20,000 Ohms	0.5	.15
P-A95105	R4	1 Megohm	0.2	.10
P-A95204	R5	200,000 Ohms	0.2	.10
P-A94452	R7	4,500 Ohms	0.2	.15
P-A94201	R8	200 Ohms	0.2	.15
P-B95503	R9	50,000 Ohms	0.5	.10
P-A95203	R10	20,000 Ohms	0.2	.10
P-A95254	R11	250,000 Ohms	0.2	.10
P-A95504	R12	500,000 Ohms	0.2	.10
P-B94252	R13	2,500 Ohms	0.5	.15
P-B95101	R15	500 Ohms	0.5	.10
P-C95303	R16	30,000 Ohms	1.0	.10
P-B94500	R17	50 Ohms	0.5	.15
P-B94500	R18	50 Ohms	0.5	.15

VARIABLE

P-36X217	R6	500,000 Ohms	Volume Control & Switch	1.00
P-40X212	R14	1 Megohm	Tone Control	.70

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
P-46X80	C4	.05 mf.	180	$0.15
P-46X181	C5	.10 mf.	240	.15
P-46X80	C13	.05 mf.	180	.15
P-46X185	C15	.06 mf.	180	.15
P-46X161	C19	.01 mf.	600	.15
P-46X189	C20	.25 mf.	360	.30
P-46X105	C21	.10 mf.	360	.20
P-46X143	C22	.25 mf.	360	.30
P-46X120	C23	.01 mf.	360	.15
P-46X101	C25	.006 mf.	600	.15
P-46X98	C26	.10 mf.	180	.20
P-46X105	C30	.10 mf.	360	.20
P-46X135	C31	.5 mf.	180	.40
P-46X183	C32	.0055 mf.	1,600	.20
P-46X135	C33	.5 mf.	180	.40
P-46X98	C34	.10 mf.	180	.20

ELECTROLYTIC

P-45X211	C24	12 mf.	25	Electrolytic Block	2.70
	C28	8 mf.	450		
	C29	12 mf.	450		

MOLDED

P-47X46	C2	30 mmf.		.15
P-47X53	C6	35 mmf.		.10
P-47X57	C14	100 mmf.		.10
P-47X65	C18	250 mmf.		.15
P-47X41	C27	2,000 mmf.		.20
P-47X41	C35	2,000 mmf.		.20

TRIMMER

P-17A48	C1	25-115 mmf.	Antenna Trimmer	.20
	C3		Antenna Trimmer—Part of Gang Condenser	
	C4		Oscillator Trimmer—Part of Gang Condenser	
P-17A44	C7, C14, C9	900-1,300 mmf.	600 KC Oscillator Padding Cond., 70-150 mmf. 2nd I. F. Primary Trimmer, Interstage Trimmer Part of Gang Condenser	.55
P-17A33	C11, C12	70-150 mmf.	1st I. F. Trimmer	.40

MISCELLANEOUS

	C10	40 mmf.	Integral Part of Interstage Transformer Assembly
	C17	150 mmf.	Integral Part of 2nd I. F. Transformer Assembly
P-14A51		Three Section Gang Condenser Assembly complete with Drive Gears	$4.50

Prices subject to change without notice.

VOLTAGES AT SOCKETS

Antenna Plug Withdrawn — L-D Switch in Distant Position — Battery 6.2 Volts under Load

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground
6K7	R.F.	5.6	260	110	3
6J7	1st Det.	5.6	260	110	
6K7	I.F.	5.6	260	110	3
6B7	2nd Det.	5.6	55	50	
41	2nd A.F.	5.7	255	55	30
6A6	Pwr.	5.7	275		

INSTALLATION ITEMS

CABLE AND FLEXIBLE SHAFT ASSEMBLIES

Part No.	Quan. Used	Description	List Price
P-18A40	2	20" Volume Control or Tuning Control Flexible Drive Shaft	ea. $1.10
P-18A42	2	25" Volume Control or Tuning Control Flexible Drive Shaft	ea. 1.30
P-18A44	2	36" Volume Control or Tuning Control Flexible Drive Shaft	ea. 1.65
P-13X252	1	Pilot Light Cable less Lamp	.65
P-13X253	1	48" Antenna Cable & Plug	.95
P-13X227	1	Battery Cable (long section with fuse receptacle)	.35
P-13X234	1	"A" Cable—Short Section Connected to Chassis (Part of Chassis Assembly)	.35

MOUNTING BOLT ASSEMBLY

P-20X59	3	Double End Hex Bolts for Mounting Chassis to Dash	ea. .10
	3	5 16"—18 Spring Locknut for above Mounting Assembly	doz. .10
P-19X18	6	Flat Washers for above Mounting Assembly	doz. .15
	6	5 16"—18 Hex Nuts for above Mounting Assembly	doz. .15
	1	5 16" Shakeproof Lockwasher to Ground Chassis Case to Metal Dash Surface on Engine Side	doz. .10

MISCELLANEOUS MOUNTING ITEMS

P-7A32	1	Pilot Light Bulb	.20
P-16X14	1	20 Ampere Fuse	.10
P-16X3	1	Fuse Shield	.10
P-21A6	1	Distributor Suppressor	.35
P-46X27	1	Generator Condenser	.45
P-21A5	1	Choke Condenser Unit (Not Shipped with Set)	1.50
P-21A7		Spark Plug Suppressors (Not Shipped with Set)	ea. .35

CONTROL HEAD AND PLATE ASSEMBLY

Part No.	Quan. Used	Description	List Price
*P-20A27	1	No. 4 Control Head only with 3/8" Hex Nut	3.00
*P-20A28	1	Volume Control Fitting complete with Retaining Spring, 3/8" Hex Nut and Lock Washer	.25
*	1	Dial Scale (Specify Name and Model of Radio)	.10
*P-15X45	1	Pointer	.10
*	1	Pointer Screw 3-48 x 5 16"	doz. .10
†P-17X13	1	Dial Crystal	ea. .25
†		Control Knobs—Specify Car, Year and Model	ea. .25

NOTE: Prices of Instrument Panel Plate Kits are shown in Chart on Page 5.
* Shipped with each Set
†Shipped with Panel Kit

ROOF MOUNTING SPEAKER KITS

1936 BUICK, CHEVROLET, PONTIAC, OLDSMOBILE

Part No.	Description	List Price
P-21A27	SPEAKER KIT ASSEMBLY COMPLETE. Includes	$5.35
P-12A234	5¼" Dynamic Speaker	3.05
P-23A56	Mounting Kit—Includes Trim Ring, Speaker Housing, Self Tapping Screws & Clamp Springs	2.00
P-13X248	Speaker Cable Assembly Complete	1.05
P-21A28	SPEAKER KIT ASSEMBLY COMPLETE. Includes	9.65
P-12A233	8" Dynamic Speaker	6.65
P-23A57	Mounting Kit—Includes Trim Ring and Self Tapping Screws	3.00
P-13X248	Speaker Cable Assembly Complete	1.05

1936 FORD—STANDARD AND DELUXE

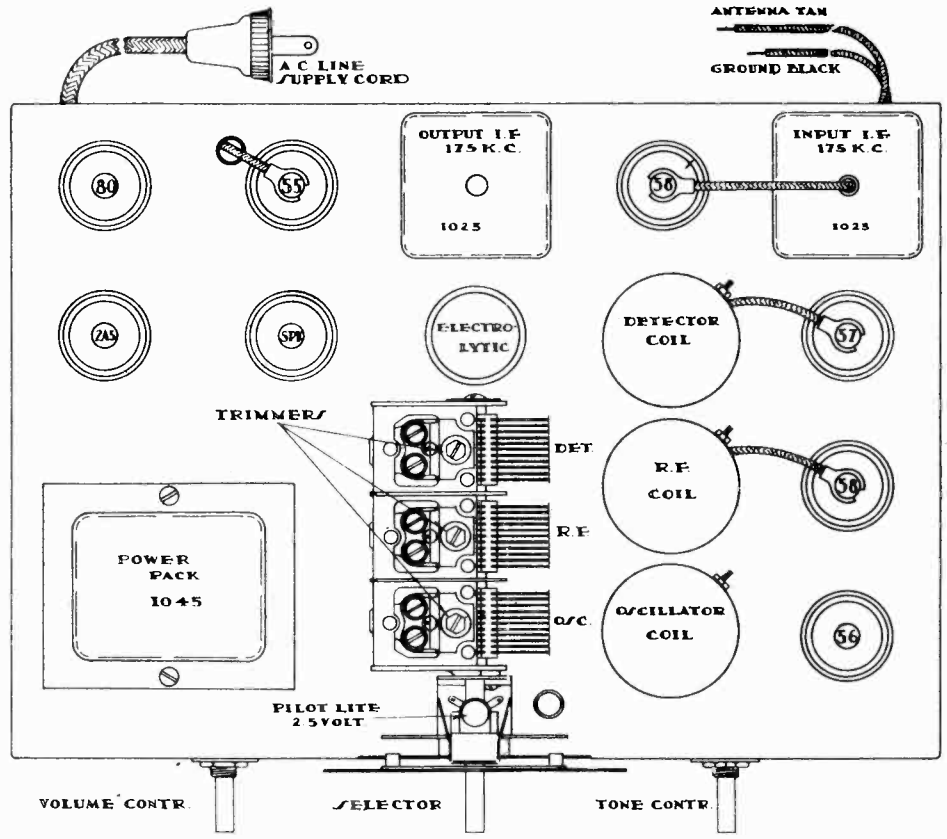
Part No.	Description	List Price
P-21A29	SPEAKER KIT ASSEMBLY COMPLETE. Includes	4.15
P-12A234	5¼" Dynamic Speaker	3.05
P-23A58	Mounting Kit—Includes Hex Nuts, Lockwashers and Bolts	.40
P-13X248	Speaker Cable Assembly Complete	1.05

To calibrate the radio, 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.

GAMBLE-SKOGMO, INC.

MODEL 71C
Schematic, Socket Alignment



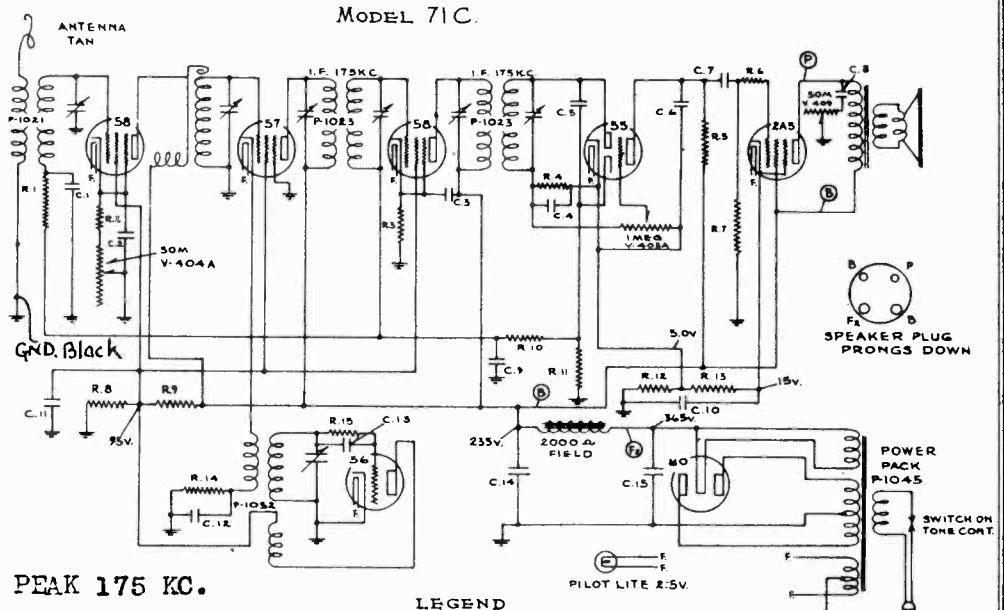
5J190001 - 3K192013.

SERVICE NOTES

To peak I.F. transformers connect oscillator (set at 175 KC) to grid of 57 first detector and (Black) ground wire. Adjust four trimmers from bottom of chassis (one nut and one screw on each transformer trimmer) to resonance (maximum deflection on an output meter connected across the primary of the speaker input transformer).

Connect an oscillator in series with a 200 MMFD condenser to the Tan (Antenna) wire and Black (ground) wire, with the oscillator set at 1720 KC and the variable condenser at its minimum position (extreme right of its rotation) adjust trimmer of oscillator (front) section of variable condenser to resonance. Set oscillator to 1400 KC and rotate variable condenser until signal is tuned in, then adjust ANT. and R.F. trimmers (center and rear sections of condenser) to resonance. Check output at 1200, 1000, 800, and 600 Kilocycles, bend plates of center and rear sections of variable condenser only if necessary.

MODEL 71C.



IF PEAK 175 KC.

LEGEND

RESISTORS

No.	VALUE	No.	VALUE
R.1 :-	500M	R.9 :-	15M *
R.2 :-	400	R.10 :-	1MEG.
R.3 :-	400	R.11 :-	500M
R.4 :-	500M	R.12 :-	150 *
R.5 :-	250M	R.13 :-	300 *
R.6 :-	100M	R.14 :-	10M
R.7 :-	500M	R.15 :-	250M
R.8 :-	25M *		

NUMBERS PREFIXED BY 'P' OR 'V' ARE PARTS.
* R.8, R.9, R.12 & R.13 IN ONE UNIT P-1049
* C.10, C.14, & C.15 " " " P-1047

CONDENSERS

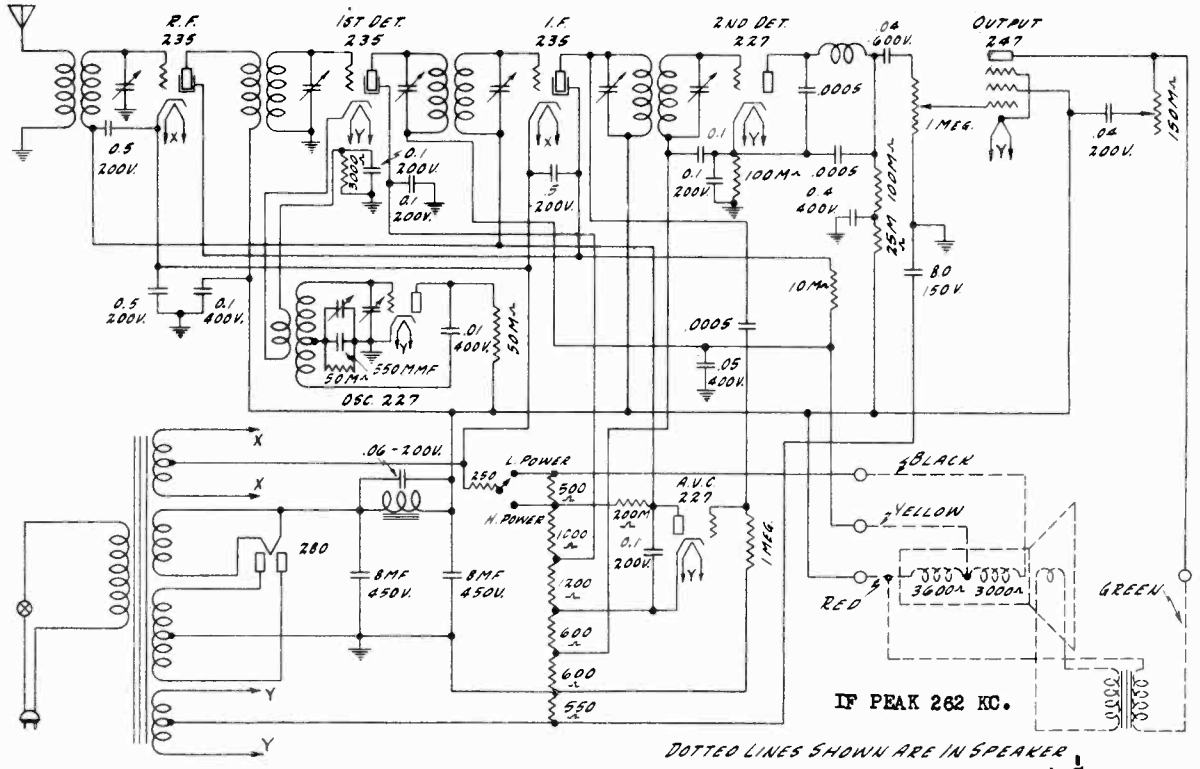
No.	VALUE	No.	VALUE
C.1 :-	.05	C.9 :- *	.05
C.2 :-	.05	C.10 :-	12.0MF. *
C.3 :-	.05	C.11 :-	.05
C.4 :-	500MMF.	C.12 :-	.05
C.5 :-	500MMF.	C.13 :-	500MMF.
C.6 :-	500MMF.	C.14 :-	4.0MF. *
C.7 :-	.02	C.15 :-	8.0MF. *
C.8 :-	.1		

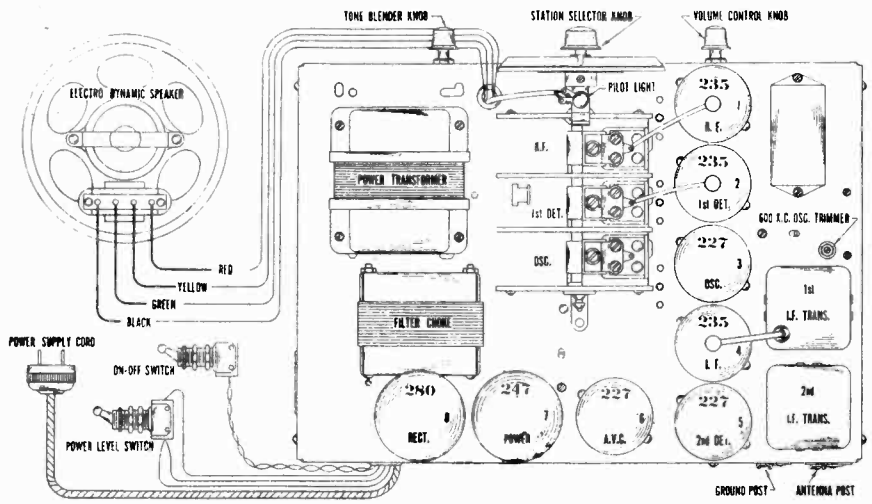
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL, WITH 119 VOLTS A.C. LINE.

53219

MODEL 72
Chassis 8,8X
Schematic,Socket
Trimmers,Voltage

GAMBLE SKOGMO, INC.

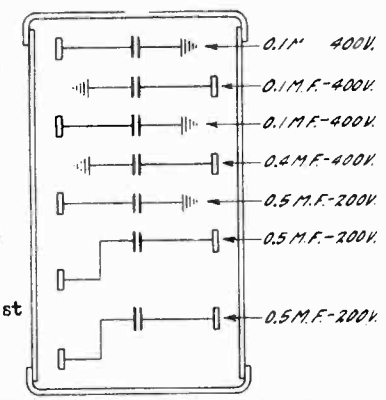




Top View of Chassis Showing Tube Location and Speaker Connections

Tube	A Volts	B Volts	V Volts	Scr. Volts	Plt. Crnt.
RF	2.3	190	2.3[1]	68.	3.8
1st Det	2.3	190	6.5	70.	2.0
Oso.	2.3	80	15-50[2]		4.7
IF	2.3	190	2.3[1]	68.	3.6
2nd Det	2.3	150	20.		.4[4]
AVC	2.3	65[3]	46.		0.
Power	2.35	260	20 [5]	280.	32.
Rect.	5.				41. [6]

[1] Across 250 ohm series resistor
[2] Governed by setting of tuning condenser
[3] Across 1000 and 1200 ohm sections of shunt resist
[4] Across two 600 ohm sections of shunt resistor
[5] Across 550 ohm series resistor
[6] Per Anode.

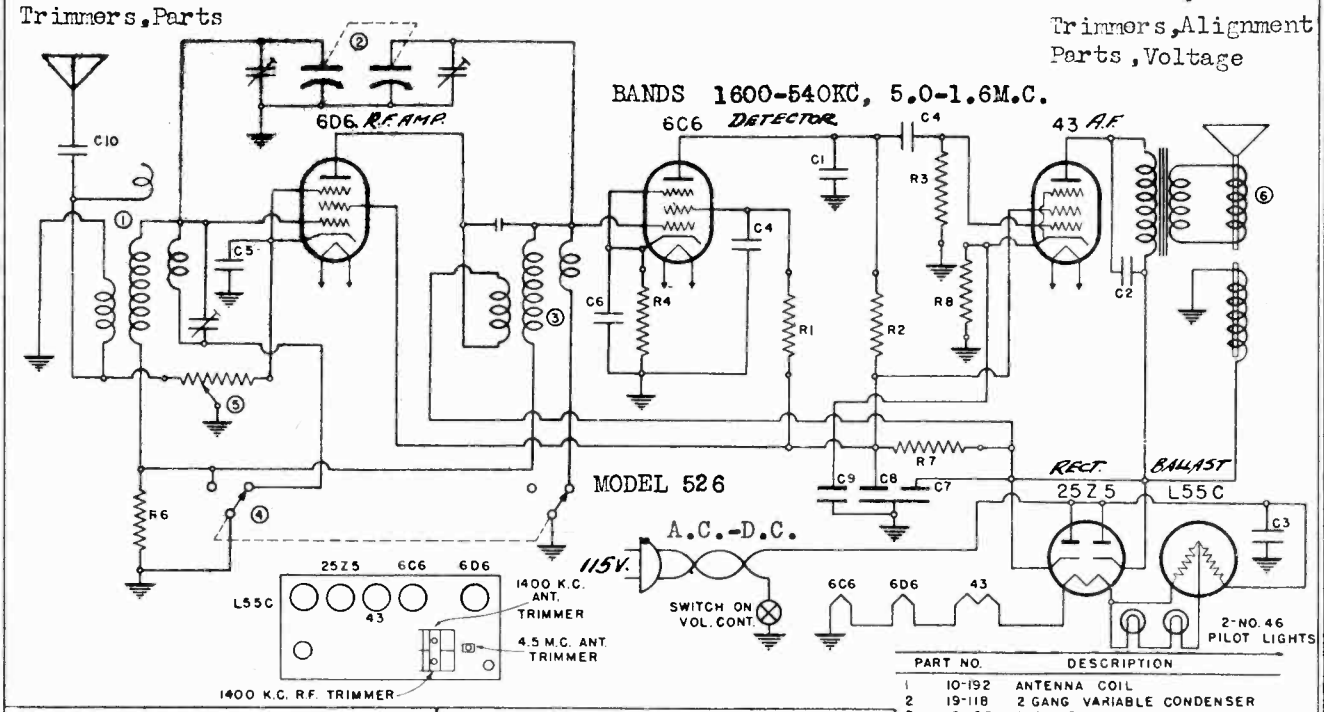


CHASSIS 8X is for 25 cycle operation, and is same as CHASSIS 8 except for power transformer and use of untuned filter system. The .06 mfd condenser connected across the filter choke, as shown in the schematic, is not used.
CHASSIS 8X can be used on a 60 cycle line. If hum is too loud, the above-mentioned .06 mfd condenser can be added.

MODELS 401, 402
Schematic, Socket
Trimmers, Parts

GAMBLE-SKOGMO, INC.

MODEL 526
Schematic, Socket
Trimmers, Alignment
Parts, Voltage



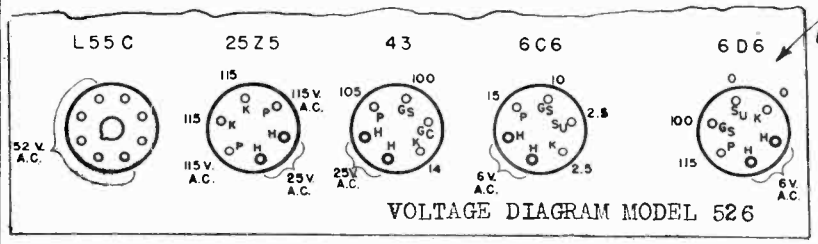
PART NO.		DESCRIPTION
R1	6020	2 MEG OHM 1/3 WATT CARBON RES.
R2	6017	1 " " " " " "
R3	6018	500,000 " " " " " "
R4	6025	50,000 " " " " " "
R6	6010	75 " " " " " "
R7	60-147	2000 " 1/2 " " "
R8	60-148	600 " " " " " "

PART NO.		DESCRIPTION
C1	1501	.0001 MFD. MICA CONDENSER
C2	1651	.004 " 600 V. TUBULAR CONDENSER
C3	1607	.05 " 400 V. " " "
C4	1603	.01 " " " " "
C5	1622	.05 " 200 V. " " "
C6	1600	1 " " " " "
C7		30 " " ELECTROLYTIC " "
C8	18-212	8 " " " " "
C9		4 " 25 V. " " "

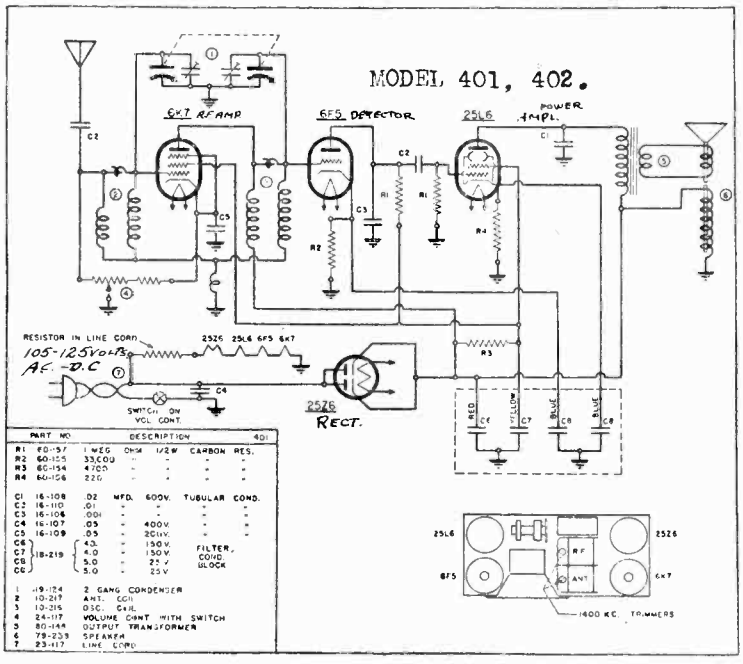
PART NO.		DESCRIPTION
1	10-192	ANTENNA COIL
2	19-118	2 GANG VARIABLE CONDENSER
3	10-193	R.F. COIL
4	69-113	WAVE SWITCH
5	24-112	VOLUME CONTROL WITH SWITCH
6	79-233	SPEAKER
G10	1670	.001 MFD 600 V TUBULAR COND

FILAMENT VOLTAGE MEASURED ACROSS SOCKET. ALL OTHER VOLTAGES MEASURED TO GROUND WITH 1000 OHMS-PER-VOLT VOLTMETER.

H - HEATER
P - PLATE
K - CATHODE
Gs - SCREEN GRID
Gc - CONTROL GRID
Su - SUPPRESSOR



VOLTAGE DIAGRAM MODEL 526



PART NO.		DESCRIPTION	401
R1	60-157	1 MEG OHM 1/2W CARBON RES.	
R2	60-155	33,000 " " " "	
R3	60-154	4700 " " " "	
R4	60-156	220 " " " "	
C1	16-108	.02 MFD. 600V. TUBULAR COND.	
C2	16-110	.01 " " " "	
C3	16-106	.004 " " " "	
C4	16-107	.05 " 400V. " "	
C5	16-109	.05 " 200V. " "	
C6	18-219	40 " 150V. FILTER COND BLOCK	
C7		8.0 " 150V.	
C8		5.0 " 25V	
C9		5.0 " 25V	
1	19-134	2 GANG CONDENSER	
2	10-219	ANT. COIL	
3	10-216	OSC. COIL	
4	24-117	VOLUME CONT. WITH SWITCH	
5	80-144	OUTPUT TRANSFORMER	
6	79-239	SPEAKER	
7	23-117	LINE CORD	

ALIGNMENT PROCEDURE MODEL 526 T.R.F. 2 BAND.

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

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 4000 ohms, to the plate and screen terminals of the 43 socket. The output meter remains connected during the entire alignment procedure.

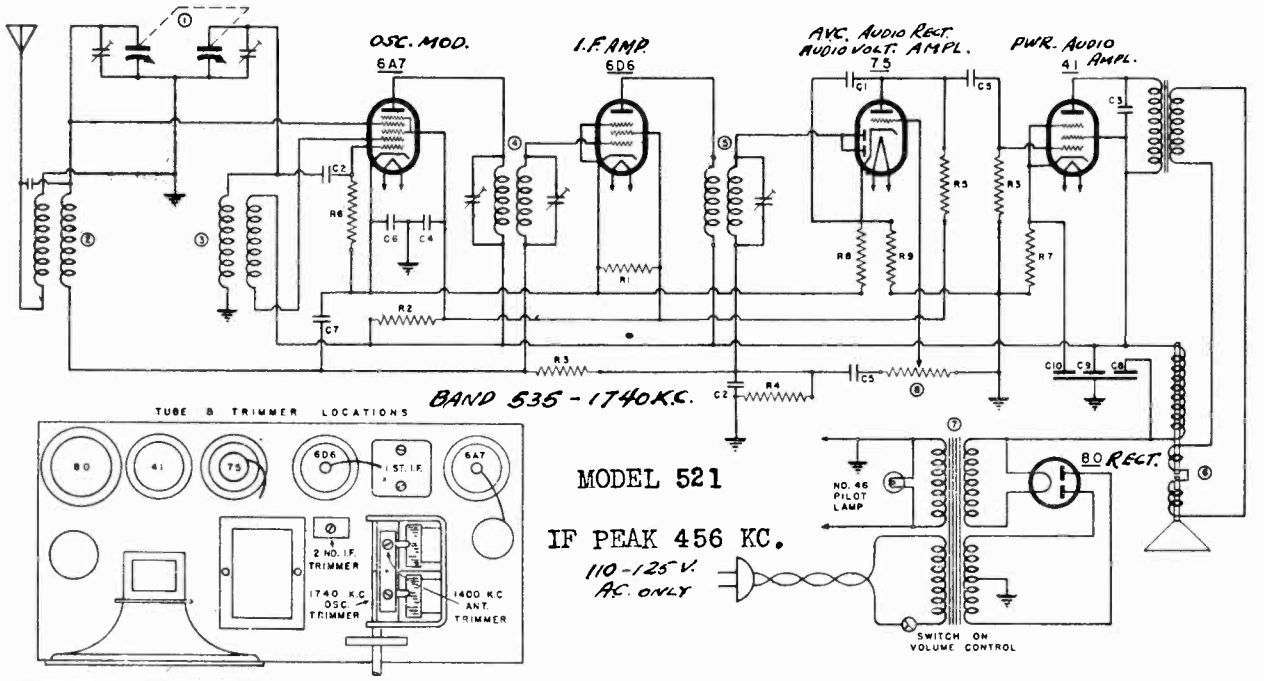
Connect the signal generator to the antenna lead through a .00025 M.F. condenser. Connect the ground of the generator to the receiver chassis through a .1 M.F. condenser. With the wave switch on broadcast position and the dial set to 1400 K.C., feed in a 1400 K.C. signal. Adjust the trimmers on top of the gang condenser until the maximum output is obtained.

Turn the wave switch to short wave position and tune in a 4.5 M.C. signal from the generator. Adjust the 4.5 M.C. antenna trimmer to maximum output.

MODEL 521
Schematic, Socket

GAMBLE-SKOGMO, INC.

Trimmers, Voltage
Parts



MODEL 521

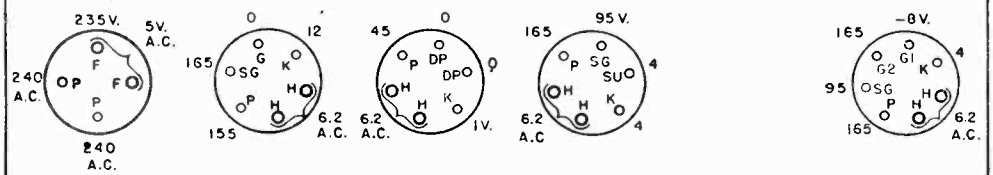
IF PEAK 456 KC.

110-125 V. AC. ONLY

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

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

(BOTTOM VIEW OF CHASSIS)



ALIGNMENT PROCEDURE

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

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the 2 small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 455 K.C. signal. Adjust the trimmers on top of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

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

PART NO.	DESCRIPTION
R1 G-7	25,000 OHM 1/2 WATT CARBON RES
R2 6103	10,000 " " " "
R3 6018	250,000 " 1/3 " "
R4 6024	250,000 " " " "
R5 6256	250,000 " " " "
R6 6025	50,000 " " " "
R7 6052	800 " " " "
R8 60-102	175 " " " "
R9 60058	50 " " " "

PART NO.	DESCRIPTION
C1 1504	.00025 MFD. MICA CONDENSER
C2 1501	.0001 " " "
C3 1651	.004 " 600 V. PAPER CONDENSER
C4 1607	.05 " 400 V. " "
C5 1603	.01 " " " "
C6 1614	.25 " 200 V. " "
C7 1622	.05 " " " "
C8	8.0 " 250 V. ELECTROLYTIC COND
C9 18-102	4.0 " " " "
C10	5.0 " 25 V. " "

PART NO.	DESCRIPTION
1	19-111 2 GANG VARIABLE CONDENSER
2	10-166 ANTENNA COIL
3	10-167 OSCILLATOR COIL
4	10-162 1 ST I.F. TRANSFORMER
5	10-163 2 ND. I.F. TRANSFORMER
6	73-214 SPEAKER
7	83-104 POWER TRANSFORMER
8*	24-104 VOLUME CONTROL WITH SWITCH

GAMBLE SKOGMO, INC.

MODEL 566
Schematic, Socket
Trimmers, Parts

CONDENSERS

C1	129-3	.00002 Mica—"0"—20%	
C2	129-49	.00009 Mica—"0"—5%	
C3	100-9	.05x200 Volt	
C4	100-8	.25x200 Volt	
C5	129-21	.0002 Mica—"MT"—"0"—20%	
C6	100-1	.1 x400 Volt 50%—10%	
C7	100-33	.1 x200 Volt 50%—10%	
C8	100-9	.05x200 Volt 25%—25%	
C9	100-1-B	.1 x400 Volt 50%—10%	
C10	129-12	.00025 Mica—"MT"—"0"—20%	
C11	100-9	.05 x200 Volt 25%—25%	
C12	129-5	.0001 Mica—"MT"—"0"—20%	
C13	116-15	.05 x400 Volt	
C14	116-15	.007x800 Volt	
C15	100-33	.1x200 Volt 50%—10%	
C16	119-20	8.0 Mfd. Electrolytic Condenser—350 Working Volts	
C17	119-20	4.0 Mfd. Electrolytic Condenser—350 Working Volts	
C18	100-38	.01x1400 Volt—10%	
C19	100-35	.5 x 200 Volt 50%—10%	
C20	100-35	.5 x 200 Volt 50%—10%	
C21	100-33	.1 x 200 Volt 50%—10%	
C22	124-17	Single Padder J-4-S	

NOTE: C-13 and C-14 in one unit—part number 116-15.

RESISTORS

R1	130-20	100M Ohm—½ Watt—20% 50 Volt—Carbon	
R2	130-79	400 Ohm—½ Watt—10% 10 Volt—Carbon	
R3	130-94	50M Ohm—½ Watt—10% 10 Volt—Carbon—Ins.	
R4	130-23	2M Ohm—½ Watt—20% 10 Volt—Carbon	
R5	130-42	20M Ohm—½ Watt—20% 100 Volt—Carbon—Ins.	
R6	130-68	1 Meg Ohm—½ Watt—10% 20 Volt—Carbon	
R7	130-79	400 Ohm—½ Watt—10% 10 Volt—Carbon	
R8	101-41	500M Ohm—Volume Control and Switch	
R9	130-106	50M Ohm—½ Watt—10% 100 Volt—Carbon—Ins.	
R10	130-101	600 Ohm—½ Watt—10% 10 Volt—Carbon—Ins.	
R11	130-68	1 Meg Ohm—½ Watt—10% 20 Volt—Carbon	
R12	130-95	12M Ohm—½ Watt—10% 100 Volt—Carbon	
R13	130-3	500M Ohm—½ Watt—20% 100 Volt—Carbon	
R14	130-5	300M Ohm—½ Watt—20% 10 Volt—Carbon	
R15	130-45	250M Ohm—½ Watt—20% 20 Volt—Carbon—Ins.	
R16	130-84	200 Ohm—½ Watt—20% 10 Volt—Carbon—Ins.	

T1	111-48	Antenna Filter Coil Assembly	
T2	111-47	Antenna Coil Assembly	
T3	108-09	Input I.F. Coil—465 K.C.	
T4	102-27	Two Gang Variable Condenser	
T5	108-70	Output I.F. Coil—465 K.C.	
T6	105-22	Output Transformer	
T7	110-37	Oscillator Coil Assembly	
T8	104-61	Power Transformer	
L1	105-23	Filter Choke	
L2	105-19	"A" Choke	
L3	105-25	"A" Filter Assembly	
L4	105-24	"A" Choke	
L5	114-34	5¼" Speaker (Field resistance 4 ohms)	
V		Vibrator	
		Steering Post Mounting	

MODEL 566
Alignment, Dial Data

GAMBLE SKOGMO, INC.

ALIGNING INSTRUCTIONS:

All of the adjustments have been very carefully set with signal generators at the factory and require no further adjustment, unless it becomes necessary to replace a coil or transformer or if the adjustments have been tampered with in the field. Under no circumstances attempt any adjustments without first making certain that adjustment is necessary and only after voltages, tubes and condensers have been checked and found to be normal. To properly re-align this receiver, a test oscillator, as well as an output meter, must be used.

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 175 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 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.

I.F. ALIGNMENT

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6K7 tube.
2. Adjust trimmer condensers of output I.F. transformer (No. 108-70) to resonance with oscillator.
3. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers of input I.F. transformer (No. 108-69) to resonance with oscillator, again going over trimmers of output I.F. transformer (No. 108-70). See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

BROADCAST ALIGNMENT

1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy to the antenna lead of the receiver.
2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is rear section of gang—see top view.)
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust antenna trimmer to resonance—see top view.
4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 K.C. Adjust series pad, rocking gang condenser to and fro, at the same time adjusting series pad for maximum gain.

   This adjustment is accessible from the top of chassis—see top view.
5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.
6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. UNDER NO CIRCUMSTANCES BEND PLATES OF VARIABLE CONDENSER SECTIONS TO CORRECT TRACKING.

SERVICE NOTES:

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

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

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

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

Failure to operate, noisy or weak reception is usually due to defective tubes, the tubes making poor contact with sockets or grid clips making poor contact with the caps of the tubes. Tubes may be checked very easily by replacing with other tubes which are known to be good. If fuse blows out frequently and insulating sleeve has been properly placed over fuse, the trouble is probably in the vibrator, it should be replaced. Do not attempt to make any adjustments on the vibrators.

DIAL ADJUSTMENT:

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 the back of the control head, and in that way adjust the dial pointer to the correct frequency setting.

CHECK FOR MOTOR NOISE (Chassis Pickup):

After the above instructions have been followed, with the hood clamped down to prevent radiation and the motor running, the receiver should be turned on and the dial turned off a station, with volume control at maximum. If motor noise is 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. Chassis pickup is due to the electrical interference being radiated or fed back through the frame of the car into the receiver or through the storage battery to the receiver.

It may be necessary when chassis pickup is present to ground the choke and gas throttle rods securely to the firewall at the point which they enter the drivers compartment.

Chassis pickup can be reduced by reducing the gap between 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. In stubborn cases a good grade mica .002 to .006 condenser connected across the breaker points will reduce interference. 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, as explained previously, 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.

NOTE—Where ignition coils are mounted in motor compartments a .5 mfd cond (148-1 or 148-3) connected between primary coil terminal and receiver mounting bolt will often reduce motor noise.

Accessories such as lighters, electric motor heaters, horns, light switches, automatic relays, electrical gauges such as oil, water and gas are often a source of interference. In these cases the procedure is to try a condenser from ground to various accessories until the interference is eliminated, then install the condensers in those places permanently. Spark intensifiers should not be used.

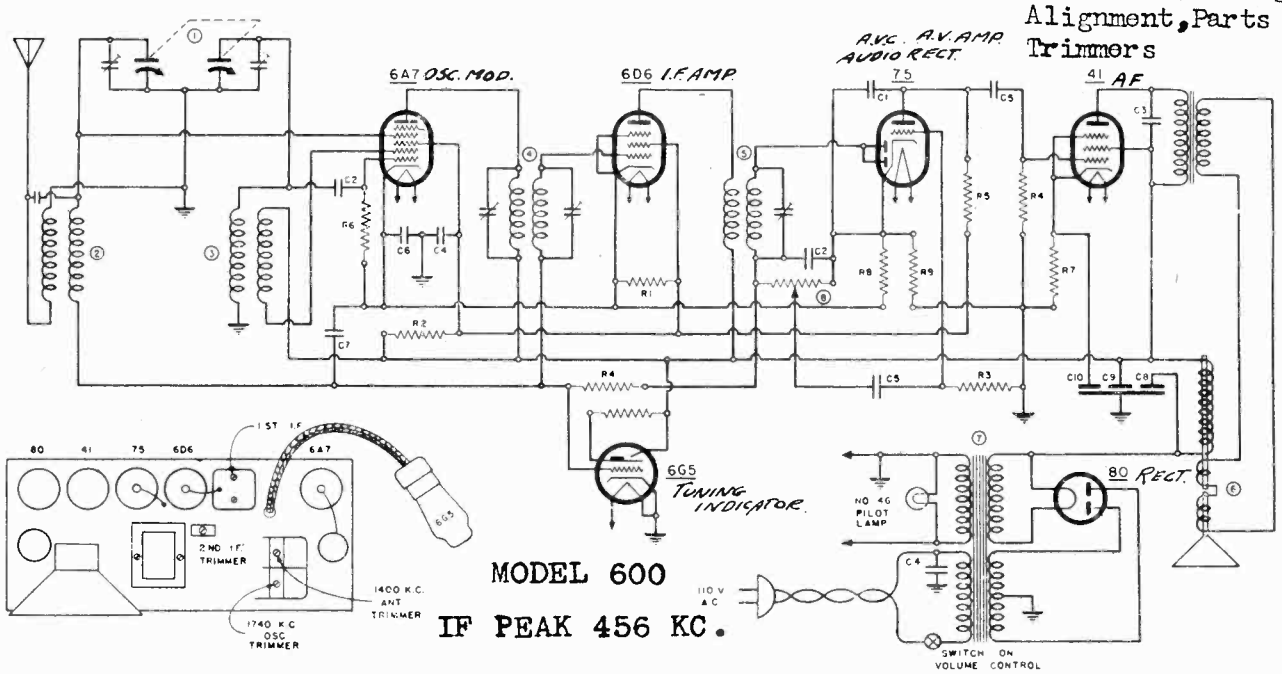
NO SPARK PLUG SUPPRESSORS ARE REQUIRED

MODEL 566

FIVE TUBE-SUPERHETERODYNE AUTO RADIO RECEIVER

GAMBLE SKOGMO, INC.

MODEL 600
Schematic, Voltage
Alignment, Parts
Trimmers



MODEL 600

IF PEAK 456 KC.

	PART NO.	DESCRIPTION				PART NO.	DESCRIPTION				629
R1	6117	25,000	OHM	1/2	WATT CARBON	RES	C1	1504	.00025	MFD.	MICA CONDENSER
R2	6105	10,000	"	"	" "	"	C2	1501	.0001	"	" "
R3	6017	1 MEG.	"	1/3	" "	"	C3	1651	.004	"	600 V. PAPER CONDENSER
R4	6018	500,000	"	"	" "	"	C4	1607	.05	"	400 V. " "
R5	6056	200,000	"	"	" "	"	C5	1603	.01	"	" " "
R6	6025	50,000	"	"	" "	"	C6	1614	.25	"	200 V. " "
R7	6052	800	"	"	" "	"	C7	1622	.05	"	" " "
R8	60-122	175	"	"	" "	10%	C8		8.0	"	250 V. ELECTROLYTIC COND.
R9	60098	50	"	"	" "	10%	C9	18-102	4.0	"	" " "
							C10		5.0	"	25 V. " "

	PART NO.	DESCRIPTION
1	19-111	2 GANG VARIABLE CONDENSER
2	10-166	ANTENNA COIL
3	10-167	OSCILLATOR COIL
4	10-162	1ST. I.F. TRANSFORMER
5	10-163	2ND. I.F. TRANSFORMER
6	79-239	SPEAKER
7	80-104	POWER TRANSFORMER
8	24-104	VOLUME CONTROL WITH SWITCH

ALIGNMENT PROCEDURE

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

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

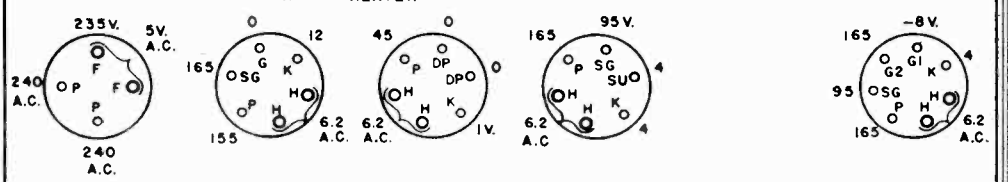
Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 456 K.C. signal. Adjust first and second I.F. trimmers for maximum output. Refer to chassis lay-out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

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

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

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

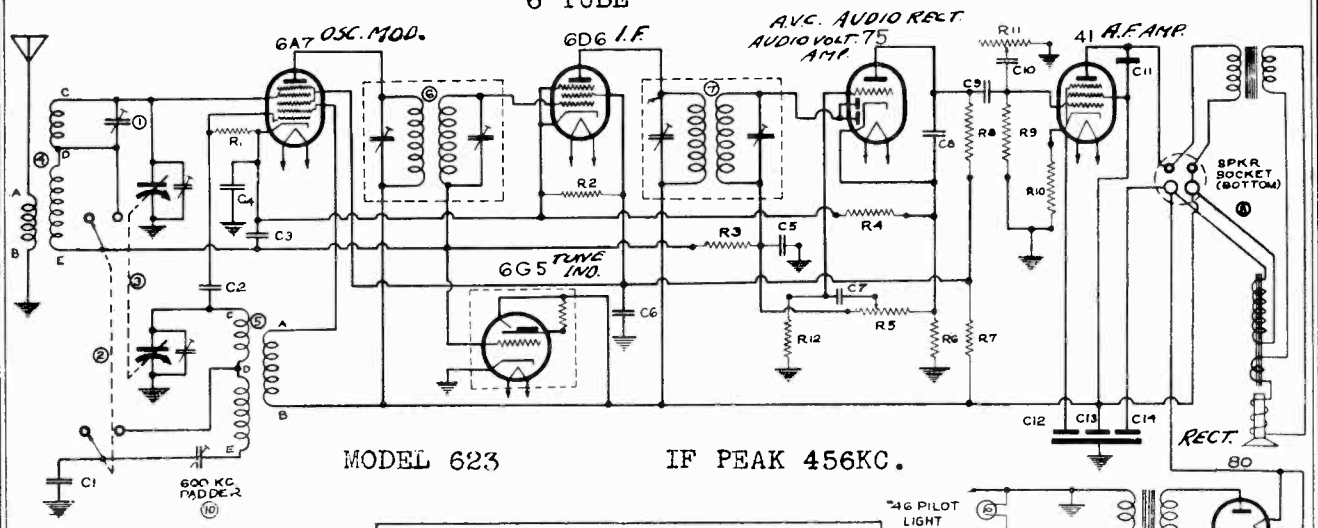
(BOTTOM VIEW OF CHASSIS)

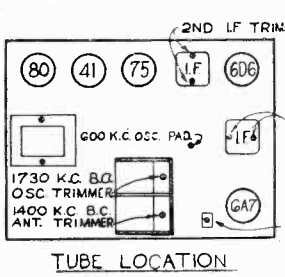


MODEL 623
Schematic, Socket
Trimmers, Voltage
Alignment, Parts

GAMBLE SKOGMO, INC.

A.C. SUPERHETERODYNE - TWO BAND, 1730-535 KC, 6.4-2.1 MC.
6 TUBE

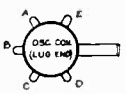


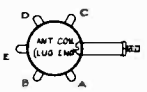


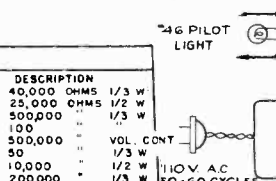
TUBE LOCATION

CIRCUIT DATA

PART NO.		DESCRIPTION		PART NO.	DESCRIPTION	
C1	15-1010	.00148 MFD.		R1	6028	40,000 OHMS 1/3 W
C2	1501	.0001		R2	6117	25,000 OHMS 1/2 W
C3	1622	.05	200v.	R3	6018	500,000 1/3 W
C4	1614	.25		R4	6011	100
C5	1504	.00025		R5	24-105	500,000 VOL. CONT
C6	1607	.05	400v.	R6	6009	50 1/3 W
C7	1608	.01		R7	6105	10,000 1/2 W
C8	1504	.00025		R8	6056	200,000 1/3 W
C9	1603	.01		R9	6013	500,000
C10	1651	.004	600 v	R10	6052	800
C11	1651	.004	600 v.	R12	6017	1.0 MEG
C12		4MFD. 25v. YELLOW		S	10-147	OSC. COIL
C13	18-102	4 " 250v. GREEN		6	10-175	FIRST I.F. COIL
C14		2 " 250v. RED		7	10-176	SECOND I.F.
1	2054	S.W. ANT. TRIMMER		8		SPEAKER
2	89-109	WAVE BAND S.W.		9	80-104	POWER TRANSFORMER
3	19-113	GANG CONDENSER		10	20-100	PADDER
4	10-173	ANT. COIL		R11	26-106	TONE CONTROL







ALIGNMENT PROCEDURE

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the 2 small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

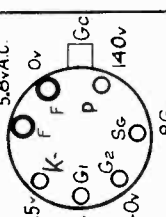
Connect the signal generator to the grid cap of the 6A7 tube through a 1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers on top of the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

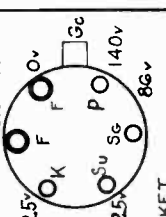
Leaving the wave switch on broadcast position turn the dial to the extreme high frequency end. Feed a 1730 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1730 K.C. broadcast oscillator trimmer until maximum output is shown. Set the generator to 1400 K.C. and tune in this signal on the receiver. Then adjust the 1400 K.C. broadcast antenna trimmer to maximum output. Set the generator to 600 K.C. and adjust the 600 K.C. broadcast oscillator pad to maximum output **while tuning the receiver back and forth across the signal** from the generator. This completes the alignment of the broadcast band.

The short wave band is aligned while feeding a 6.0 M.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Turn the wave switch to short wave position and tune in the 6.0 M.C. signal. Adjust the 6.0 M.C. short wave trimmer to maximum output.

SOCKET VOLTAGES

F - FILAMENT
P - PLATE
K - CATHODE
Sg - SCREEN GRID
Su - SUPPRESSOR
Dp - DIODE PLATE
Gc - CONTROL GRID
G1 - OSC. GRID
G2 - OSC. PLATE



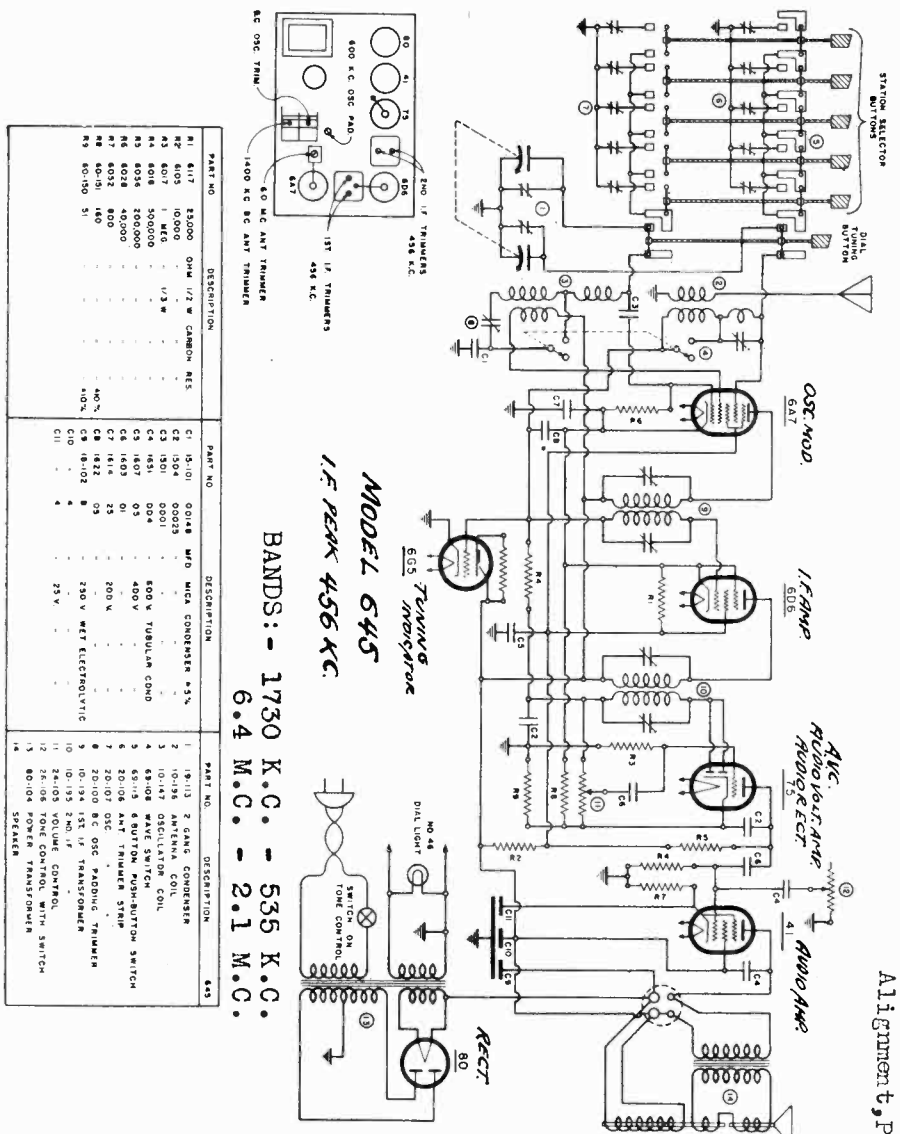


ALL OTHER VOLTAGES MEASURED ACROSS SOCKET PER VOLT VOLTMETER

FILAMENT VOLTAGES MEASURED ACROSS SOCKET TO GROUND WITH 1000 OHM

GAMBLE-SKOGMO, INC.

MODEL 645
Schematic, Socket
Trimmers, Voltage
Alignment, Parts



PART NO	DESCRIPTION	OHM	1/2 W CARBON RES
R1	6117	25000	-
R2*	6105	10,000	-
R3	6017	1 MEG	-
R4	6018	500000	-
R5	6036	200,000	-
R6	6028	40,000	-
R7	6032	800	-
R8	60-151	160	-
R9	60-150	51	-

PART NO	DESCRIPTION	MFD	MICA CONDENSER ±5%
C1	15-101	.00148	-
C2	1504	.00025	-
C3	1501	.0001	-
C4	1651	.004	-
C5	1607	.05	400 V
C6	1603	.01	-
C7	1614	.25	200 V
C8	1622	.05	-
C9	18-102	8	250 V WET ELECTROLYTIC
C10	-	4	-
C11	-	4	25 V

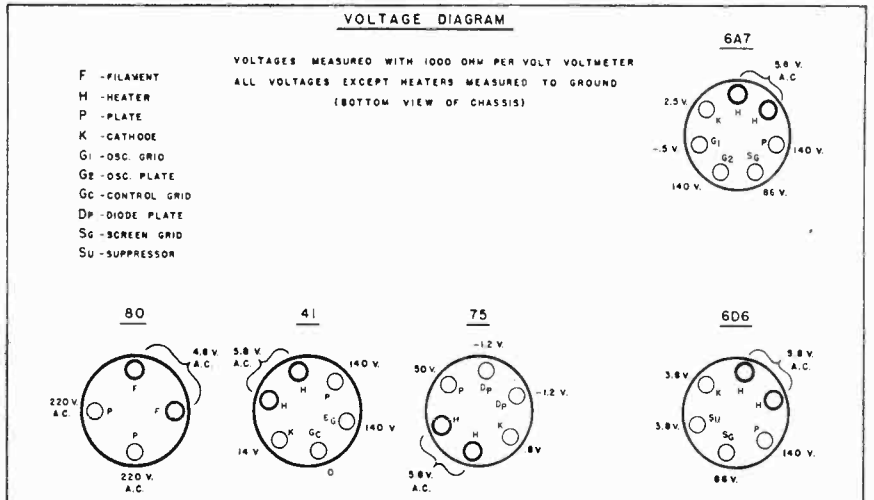
PART NO.	DESCRIPTION
1	19-113 2 GANG CONDENSER
2	10-196 ANTENNA COIL
3	10-147 OSCILLATOR COIL
4	69-108 WAVE SWITCH
5	69-115 6 BUTTON PUSH-BUTTON SWITCH
6	20-106 ANT TRIMMER STRIP
7	20-107 OSC " "
8	20-100 BC OSC PADDING TRIMMER
9	10-194 1ST I.F. TRANSFORMER
10	10-195 2ND I.F. "
11	24-105 VOLUME CONTROL
12	24-106 TONE CONTROL WITH SWITCH
13	80-104 POWER TRANSFORMER
14	SPEAKER

645

VOLTAGE DIAGRAM

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER
ALL VOLTAGES EXCEPT HEATERS MEASURED TO GROUND
(BOTTOM VIEW OF CHASSIS)

F -FILAMENT
H -HEATER
P -PLATE
K -CATHODE
G1 -OSC. GRID
Gs -OSC. PLATE
Gc -CONTROL GRID
Dp -DIODE PLATE
Sg -SCREEN GRID
Su -SUPPRESSOR



ALIGNMENT PROCEDURE

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

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the 2 small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

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

Leaving the wave switch on broadcast position turn the dial to the extreme high frequency end. Feed a 1730 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1730 K.C. broadcast oscillator trimmer until maximum output is shown. Set the generator to 1400 K.C. and tune in this signal on the receiver. Then adjust the 1400 K.C. broadcast antenna trimmer to maximum output. Set the generator to 600 K.C. and adjust the 600 K.C. broadcast oscillator pad to maximum output **while tuning the receiver back and forth across the signal** from the generator. This completes the alignment of the broadcast band.

The short wave band is aligned while feeding a 6.0 M.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Turn the wave switch to short wave position and tune in the 6.0 M.C. signal. Adjust the 6.0 M.C. short wave trimmer to maximum output.

MODEL 648
Schematic, Socket
Trimmers, Voltage
Tuner, Parts

GAMBLE SKOGMO, INC.

RANGE 1740 KC - 540 KC.

MODEL 648

IF PEAK 455 KC.

THIS MODEL HAS 6 AUTOMATIC PUSH BUTTONS

CODE	PART NO	DESCRIPTION
R1	66-225	22M OHM 1/3 WATT RESISTOR
R2	66-147	470M " " "
R3	66-335	33M " " "
R4	66-220	220M " " "
R5	66-177	2.2 MEGOHM 1/3 WATT RESISTOR
R6	66-147	470M OHM 1/3 WATT RESISTOR
R7	66-197	43 " 1/2 " "
R8	24-181	1 MEGOHM VOLUME CONTROL & SW.
R10	24-117	500M OHM TONE CONTROL

CODE	PART NO	DESCRIPTION
C1	30-151	.0001 MF. 600 V. TUBULAR CONDENSER
C2	16-118	.1 MF. 400 V. TUBULAR CONDENSER
C3	1804	.01 MFD 600V " " "
C4	1851	.05 " 600V " " "
C5	1852	.004 " 600V " " "
C6	16-109	.05 " 400V " " "
C7	16-183	.02 " 200V " " "
C8	16-226	8 X 10 MFD 400 V. ELECTROLYTIC CONDENSER
C9	16-131	8 X 10 MFD 450 V. " " "
C10	-	2 GANG VARIABLE CONDENSER

CODE	PART NO	DESCRIPTION
T1	80-133	ANTENNA R.F. COIL
T2	80-134	OSCILLATOR COIL
T3	80-139	POWER TRANSFORMER
T5	10-227	1ST I.F. "
T6	10-228	2ND I.F. "
-	-	SPEAKER

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

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

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

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

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

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

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

Carefully check each Push-Button for the accuracy of the setting.

GAMBLE SKOGMO, INC.

MODEL 648
Alignment
MODEL 735
Tuner, Voltage

MODEL 735 **CONTROLS**

This receiver has 4 controls, the left hand upper knob being the volume control, the left hand lower knob the tone control and "on-off" switch, the upper right hand knob the tuning control and the lower right hand knob the wave switch.

The wave switch has three positions. When turned to the left it is in position for the reception of standard broadcast stations. The other two positions are for the reception of short waves: police calls, amateurs, aircraft, etc.

The tuning knob selects the station desired and may be turned in either direction to its limit of rotation as shown by the dial.

In addition to these four controls there is also a row of six buttons located just below the dial. The use and the adjustment of these buttons is described in the "Operation" and "Instamatic Tuning" sections.

INSTAMATIC TUNING

The purpose of Instamatic tuning is to give the user instant, automatic tuning of any one of a selection of favorite broadcast stations. The control buttons are conveniently located just below the tuning dial. Pushing in any button will release any other button which happens to be already in. After the Instamatic tuning feature has been properly adjusted, this will instantly and automatically tune in the station selected by this button.

Before attempting to adjust or use Instamatic tuning, the "Installation" and "Operation" instructions must be carefully followed. When the receiver is operating satisfactorily using the tuning dial with the "Dial Tuning" button pressed in, the Instamatic feature may be easily adjusted by carefully following these instructions.

Located on the back of the chassis is a row of five pair of small bakelite adjustment knobs. Each pair of these knobs controls the tuning of the station for the Instamatic button which is in the same relative position.

With the receiver operating with the "Dial Tuning" button in and the wave switch on broadcast position, turn the tuning knob to the left until the 540 KC end of the band has been reached. Then turn the tuning knob to the right until a station, for which it it desired to have Instamatic tuning, is heard. Press in the Button No. 1. This is the button at the left hand end of the row. Reach around to the back of the receiver and turn upper knob of the Pair No. 1 until the same program is heard. Unless the wrong knob is being turned, several different stations will be heard during this procedure. If necessary to check that the same program is now tuned in, the "Dial Tuning" button may again be pressed. In this way it can be determined that the same station is tuned in with the Instamatic button as when the "Dial Tuning" button is in. If it is not the same station the adjustment knob should be turned again and these operations repeated until the same program is heard when either of these two buttons is pressed.

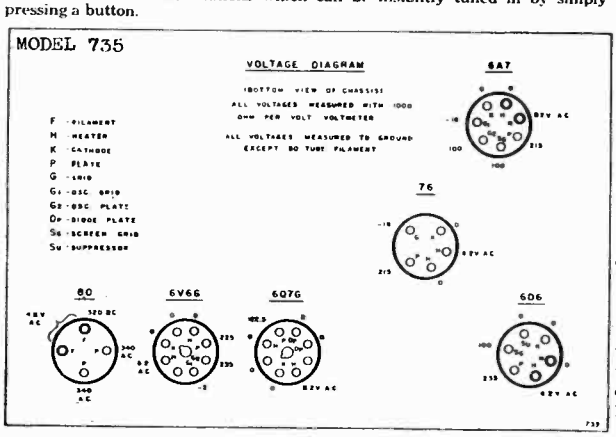
The bottom adjustment knob of the first pair is now turned until the station is heard the best. Both top and bottom knobs may then be adjusted to exact tuning by watching the magic eye and adjusting until the two edges of the green section are as close together as it is possible to get them.

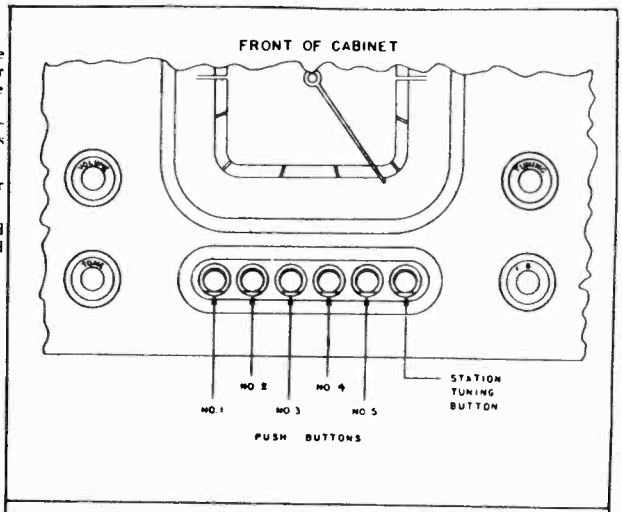
The first Instamatic button is now properly adjusted for the station which was tuned in on the dial and the station's call letters may be pushed out of the station list, moistened on the back, and pressed into the hollow end of the button.

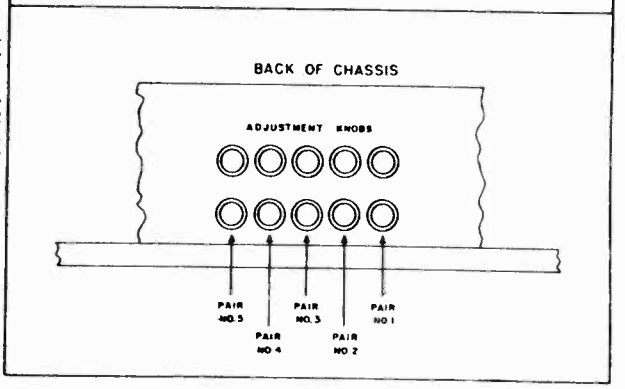
With the "Dial Tuning" button pressed in, the tuning knob is again turned to the right until the next station for which Instamatic tuning is wanted, is tuned in. The adjustment process for this station is the same as before, except that Button No. 2 and Pair No. 2 adjustment knobs are used. Proceeding in this way all five of the buttons may be properly adjusted for the stations desired.

It must be remembered that the "Dial Tuning" button must be pressed in whenever it is desired to tune in stations with the tuning knob, regardless of which wave band is in use. It must also be remembered that the wave switch must be in the broadcast position when Instamatic tuning is being used.

If desired the tuning dial may be left set to a station which is not set up on one of the buttons. The "Dial Tuning" button will then tune in this station when it is pressed. This will give an extra Instamatic tuned station, making a total of six different stations which can be instantly tuned in by simply pressing a button.







The approximate frequency coverage of each of the "Instamatic" control buttons is as follows:

1—Stations between 540 and 1000 KC.
2 Stations between 540 and 1000 KC.
3—Stations between 750 and 1200 KC.
4—Stations between 750 and 1200 KC.
5—Stations between 1000 and 1500 KC.

MODEL 648 **ALIGNMENT PROCEDURE**

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

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

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

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

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

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

ALIGNMENT PROCEDURE

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

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

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 6000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

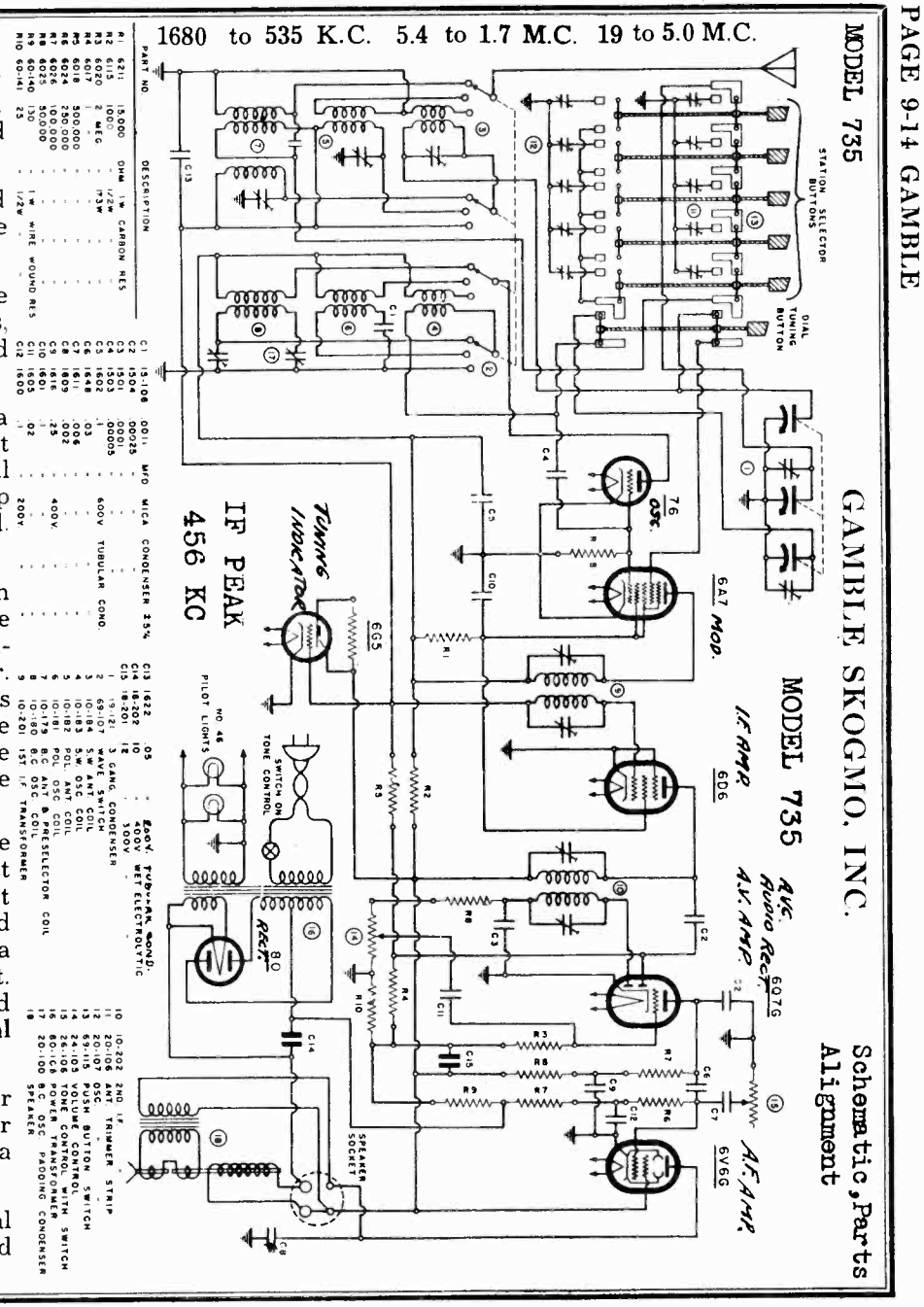
Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground post of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers on top of the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

Leaving the signal generator connected to the grid cap of the 6A7, turn the wave switch to the right hand (short wave) position. Set the dial and the signal generator to 15.0 M.C. Tune in the signal by adjusting the 15.0 M.C. oscillator trimmer. The signal will be heard at two different settings of the trimmer. The proper setting is the one where the signal is heard when the trimmer is the loosest. Also when the dial of the re iver is turned the signal will be heard again at about 14.0 M.C. If the signal is heard at about 16.0 M.C. on the dial instead of 14.0 M.C. the wrong setting has been used and should be corrected.

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

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

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



PART NO	DESCRIPTION
R1 6211	15,000 OHM 1W CARBON RES
R2 6020	2 MEG " " "
R3 6017	1 " " "
R4 6018	500,000 " " "
R5 6024	250,000 " " "
R6 6026	100,000 " " "
R7 6025	50,000 " " "
R8 60-140	150 " " "
R9 60-141	25 " " "
R10	1/2W WIRE WOUND RES
C1 19-108	.001 MFD MICA CONDENSER 5%
C2 1504	.00025 " " " "
C3 1501	.0001 " " " "
C4 1503	.00005 " " " "
C5 1602	.1 600V TUBULAR COND.
C6 1648	.03 " " "
C7 1611	.006 " " "
C8 1609	.002 " " "
C9 1616	.25 400V " "
C10 1605	.02 " " "
C11 1600	.1 200V " "
C12 1600	" " " "
C13 1622	.05 " " "
C14 18-202	10 " 400V TUBULAR COND.
C15 19-121	3 GANG CONDENSER
2 69-107	WAVE SWITCH
3 10-184	S.W. ANT COIL
4 10-183	S.W. OSC COIL
5 10-182	POL. ANT COIL
6 10-179	POL. OSC COIL
7 10-180	B.C. ANT & PRESELECTOR COIL
8 10-181	B.C. OSC COIL
9 10-201	1ST I.F. TRANSFORMER
10 10-202	2ND I.F. "
11 20-106	ANT. TRIMMER STRIP
12 69-115	PUSH BUTTON SWITCH
13 24-103	VOLUME CONTROL
14 26-106	TONE CONTROL WITH SWITCH
15 80-168	POWER TRANSFORMER
16 20-100	B.C. PADDING CONDENSER
17	SPEAKER

CONTINUITY TESTS

Continuity or resistance tests on various receiver circuits provide a rapid and simple method of locating practically all defects with the possible exception of open condensers. A direct reading ohmmeter, either as a separate instrument, or as incorporated in the usual set analyzer is necessary in making such tests. It should have a sufficiently wide range to allow for accurately reading such low resistances as R. F. or I. F. Coils as well as being capable of indicating the resistance of the highest resistance circuit which may be encountered in the receiver.

The continuity chart given in this manual shows the correct circuit resistance for all receiver circuits as well as some of the more common incorrect readings, which may be obtained due to various defects. In each case the cause for each incorrect reading is listed in the continuity chart. The resistance values given in the chart are the nominal ratings for each circuit, but it must be taken into consideration that manufacturing tolerance allows a variation in resistance of as high as twenty percent in certain circuits. Accordingly, if a reading slightly at variance with the chart value is obtained in some circuits do not immediately assume that the defect has been located but make such further tests as may be necessary to isolate the cause of the trouble. In the case of some items in the chassis a defective condition will affect several different circuits, as shown in the continuity chart. If a defect of one of these items is indicated by a continuity test of one circuit it can easily be checked by testing the other circuits which would be affected by the same defect.

ALIGNMENT

In order to properly align the R. F. and I. F. circuits of the No. 511 and 515 Chassis, a signal generator will be necessary. This generator must produce I. F. signals at 427 K. C. and 455 K. C. as well as signals throughout the broadcast band of 540 to 1500 K. C. An output meter is essential for determining when the circuits are aligned accurately.

The need for realignment will usually be evidenced by low sensitivity accompanied by poor selectivity. Realignment should, however, not be attempted until all other causes for this same condition, such as defective tubes, weak batteries or inefficient antenna installation have been checked and eliminated as a possible cause of the trouble.

All aligning adjustments are accessible from the top of the chassis making it unnecessary to remove it from the cabinet during alignment.

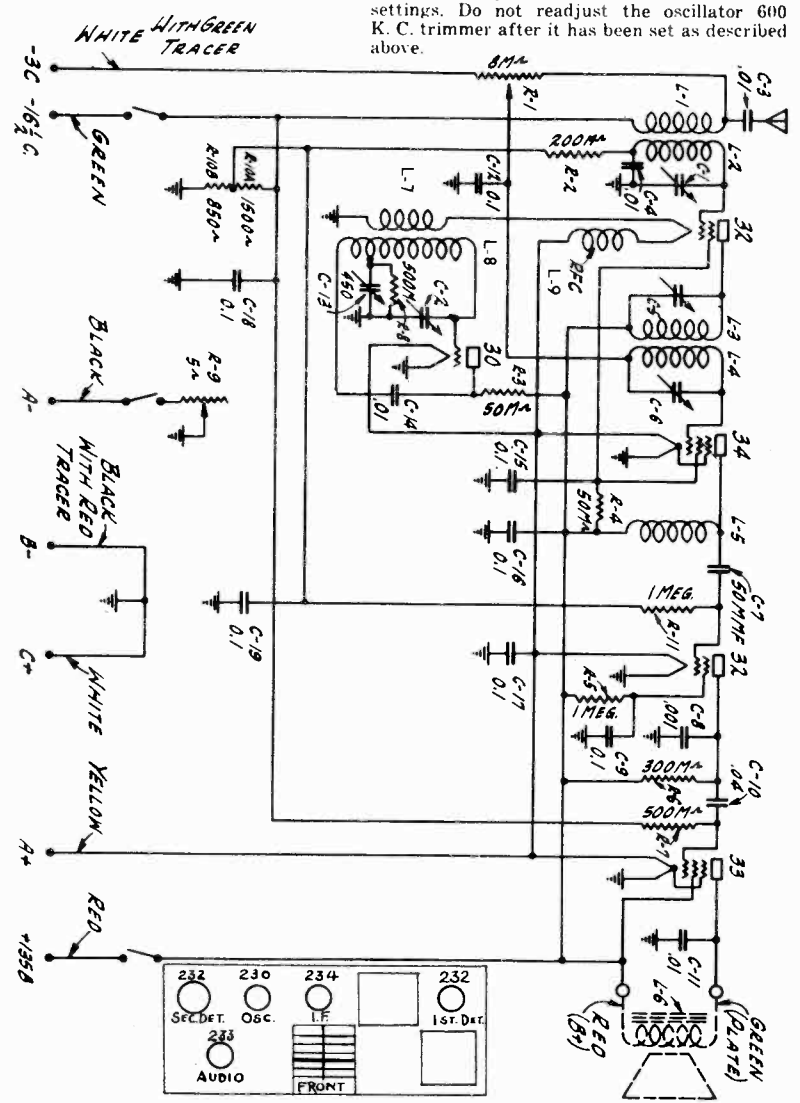
Aligning Intermediate Condensers—During alignment of the intermediate condensers the oscillator tube should be removed from its socket and the filament voltage control turned in a counter clockwise direction until the filament voltage applied to the remaining four tubes is exactly 2 volts. Place the signal generator in operation at the proper intermediate frequency as determined by the serial number of the chassis. If the plate coil of the 34 tube has been replaced, align the I. F. at 455 K. C. regardless of serial number. Connect the signal lead to the control grid contact of the 32 first detector tube. The ground lead from the signal generator is connected to the chassis of the receiver.

The intermediate condenser adjusting screws are two in number and are located on the top of the oscillator-I.F. assembly. Adjust these two intermediate condenser screws until maximum output is indicated upon the output meter. The adjustment of each screw should be checked at least twice to determine that the proper setting has been made.

Aligning R. F. and Oscillator Condensers—Replace the oscillator tube in its socket and advance the filament voltage control to give a filament voltage of 2 volts. Place the signal generator in operation at 1400 K. C. and connect the signal lead to the antenna lead from the chassis. Turn the tuning condenser rotor until the dial is set at exactly 1400 K. C. Then adjust the trimmer condensers which are located at the sides of the tuning condenser and mounted upon it. There are two such trimmer condensers on the oscillator section of the tuning condenser and one on the R. F. section. Adjust all three trimmers to give maximum output as indicated upon the output meter, adjusting first the two trimmers controlling the oscillator circuit. The oscillator tuning condenser is nearest the rear of the chassis.

Set the signal generator for a frequency of 600 K. C. and tune in this signal on the receiver. Then adjust the 600 K. C. trimmer condenser to give maximum deflection on the output meter. This condenser is located beneath the chassis with the adjusting screw accessible through a hole in the chassis immediately to the left of the tuning condenser as viewed from the rear. During adjustment of this condenser, it will be necessary to "Rock" the tuning condenser while varying the trimmer condenser. That is, the tuning condenser should be tuned back and forth through the resonant point, noting the deflection on the output meter for each setting of the trimmer condenser. The proper setting is that which gives greatest deflection on the output meter when the receiver is tuned through resonance.

Then set the signal generator for a signal of 1,000, 750 and 600 K. C. and check the R. F. 1400 K. C. and again check the setting of the and oscillator condensers for resonance. Bend trimmer condensers on the tuning condenser. the slotted rotor plate sections of each con- Next, set the signal generator for signals of denser which are last in mesh in or out until maximum output is obtained at each of these settings. Do not readjust the oscillator 600 K. C. trimmer after it has been set as described above.



CONTINUITY TEST CHART

Remove all tubes—Disconnect Batteries—turn switch to "On" Position—Turn Filament Voltage Control to minimum and Volume Control to Maximum—Test Continuity from each reference point to each measurement point listed below it.

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Detector Control Grid	200,855.5	0 5.5 Open	Shorted C-1 or Trimmer Shorted C-4 Open R-10B, R-2 or L-2
1st Detector Screen	Open	0 50,000 1,050,904	Shorted C-15 Shorted C-16 Shorted C-7
1st Detector Plate	Open	28 50,028	Shorted C-16 Shorted C-15
1st Det., -Fil.	.5	Open	Open L-7
Oscillator Control Grid	500,000	3 0 Open	Shorted C-13 Shorted C-2 or Trimmer Open L-8 or R-8
Oscillator Plate	Open	50,000 100,000	Shorted C-16 Shorted C-15
I. F. Control Grid	10,406	28	Shorted C-12
I. F. Screen	Same as 1st Det.		
I. F. Plate	Open	34 50,034 1,000,850	Shorted C-16 Shorted C-15 Shorted C-7
2nd Detector Control Grid	1,000,850	Open 1,000,000	Open R-10B or R-11 Shorted C-19
2nd Detector Screen	Open	0	Shorted C-9
2nd Detector Plate	Open	0 300,000 350,000 502,350	Shorted C-8 Shorted C-16 Shorted C-15 Shorted C-10
Audio Control Grid	502, 350	500,000	Shorted C-18
Audio Screen	Open	0 50,000 1,200	Shorted C-16 Shorted C-15 Shorted C-11
Audio Plate	Open	0	Shorted C-11
A+ Lead (Yellow)	Open	0	Shorted C-17
A— Lead (Black) (R-9 at Minimum)	5	Open	Open R-9
-16½C (Green)	2,350	0 Open	Shorted C-18 Open R-10A or R-10B
Tap on Divider Resistor	850	0 Open	Shorted C-19 Open R-10B

REFERENCE POINT—+B LEAD (RED)

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
1st Det. Screen	50,000	Open	Open R-4
1st Detector Plate	28	Open 0	Open L-3 Shorted C-5
Oscillator Plate	50,000	Open	Open R-8
I. F. Screen Grid	Same as 1st Det.		
I. F. Plate	34	Open	Open L-5
2nd Detector Plate	300,000	Open	Open R-6
Audio Screen	0	Open	Open Connection
Audio Plate	1,200	Open	Open L-6

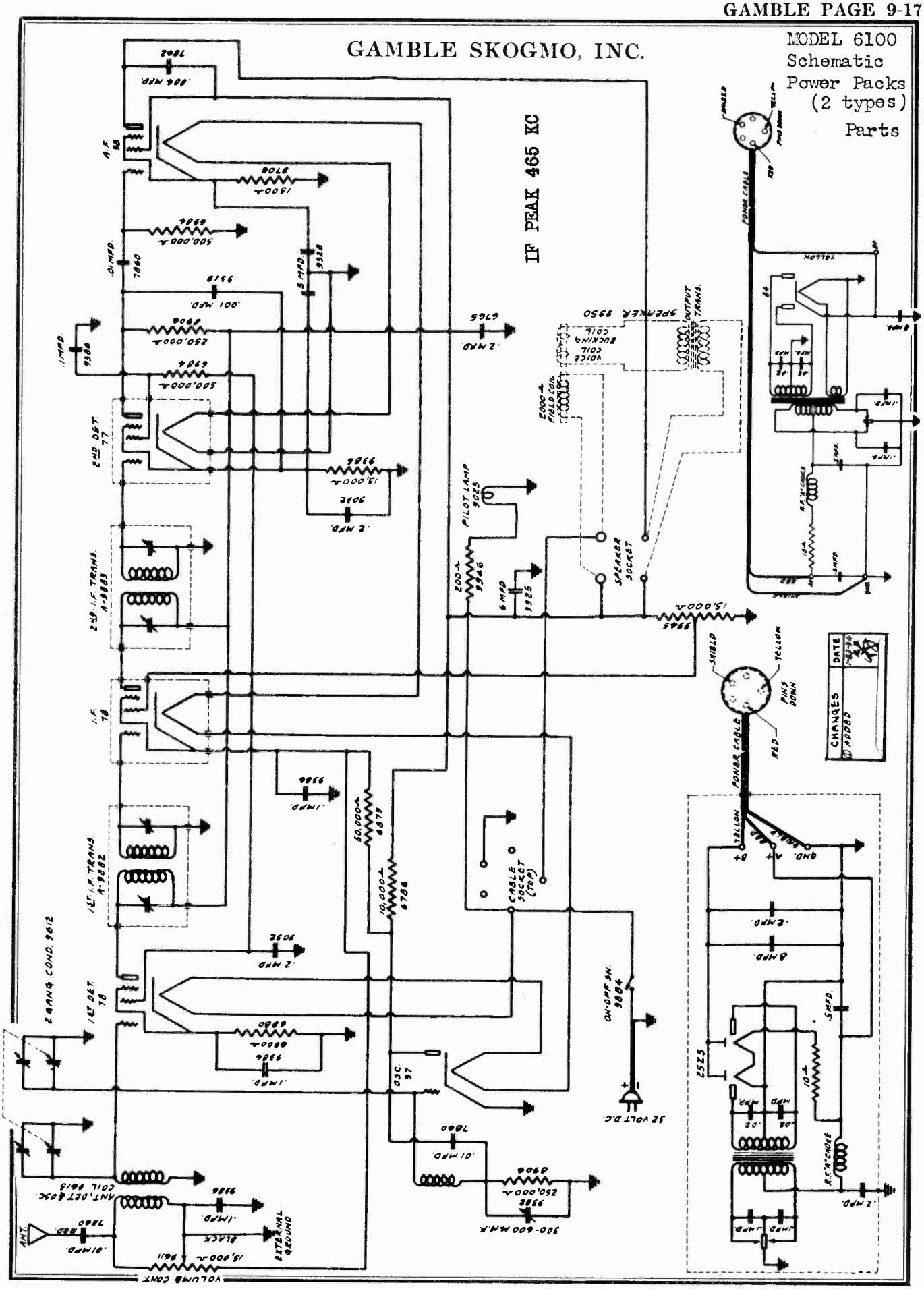
MISCELLANEOUS

Plate I. F. to Cont. Grid of 2nd Det.	Open	0	Shorted C-7
Plate 2nd Det. to Grid Audio	Open	0	Shorted C-10
Oscillator Plate to Grid	Open	4	Shorted C-14
I. F. Cont. Grid to arm of Vol. Control	28	Open 0	Open L-4 Shorted C-6
—16½C Lead to Ant. Lead	Open	28	Shorted C-3

MODELS 3132,3134,3140—VOLTAGES AT SOCKETS
VOLUME CONTROL AT MAXIMUM—B VOLTAGE 125 TOTAL

Type of Tube	*Position of Tube*	*Function*	*Filament Voltage*	*Control Grid Voltage*	*Screen Voltage*	*Screen Current MA*	*Plate Voltage*	*Plate Current MA*
32	1	1st Det.	2.0	2.0(1)	60	.3	120	1.2
34	2	I. F.	2.0	5.0(2)	60	.7	120	2.1
30	3	Osc.	2.0	.2(3)	—	—	50	1.2(3)
32	4	2nd Det.	2.0	1.6(1)	11(1)	.1	62(1)	.1
33	5	Audio	2.0	.5(1)	120	2.1	120	9.0

(1) Not true reading due to resistance in circuit.
(2) This reading will be 3 volts or 5 volts depending upon analyzer used.
(3) Varies with frequency. Affected by analyzer.



MODEL 6100
Voltage,Notes
Alignment,Parts

GAMBLE-SKOGMO, INC.

This receiver is designed to operate on 32 volt battery plants only and must not be used on 36 volt battery plants without a voltage regulator. Generally, it is not advisable to operate the receiver while the generator is charging the battery due to the fact that considerable radio interference (static noise) may be encountered. This is not a reflection on the receiver, but is due to interference caused by the power plant generator, itself. Some generators have built-in traps to eliminate this interference and when so constructed this particular type of plant generator will not cause interference. If excessive static noise is encountered be sure that it is not caused by the 32 volt plant generator.

THIRTY-TWO VOLT POWER UNIT: Two power units have been furnished with the six tube 32 volt receiver, one unit utilizes a 25Z5 tube and the other an 84 tube. Diagrams for both of these units are shown on the receiver circuit diagram. It will be noted from the parts and price list that all parts with the exception of the power transformer and tube sockets are interchangeable. When ordering these parts be sure to order by part number.

NOTE: The dynamotor type unit supplied with the five tube 32 volt receiver cannot be used with the six tube receiver nor can the power units (utilizing the 84 or 25Z5 tube) furnished with the six tube receiver be used with the five tube 32 volt set.

The 32 volt power unit is shipped unmounted and must be placed in the sound-proof celotex compartment. In the console models this is located below the receiver mounting board and in the table models it is located above the chassis. To install the power unit in the sound-proof box remove the wood screws which hold the celotex back to the box, then place the power unit on the rubber mounting blocks provided inside of this box so that the unit is floating free on these rubber insulators. It is very important that the unit does not touch the side of the box. If excessive vibration is noticed be sure to check the power unit installation, as excessive vibration will result if it is not properly mounted on all of the rubber supports or if it is permitted to touch the side of the celotex housing.

PILOT LIGHT: A type T-3¼ #40 6.3 volt pilot light is used. The pilot light is readily accessible for removal from the rear of the cabinet.

ANTENNA AND GROUND: Under ordinary conditions an aerial from twenty-five to seventy-five feet in length including lead-in will prove ample. In some locations which are located a considerable distance from broadcast stations it may be necessary to use a longer aerial than this to obtain satisfactory daylight reception. Never place the aerial lead-in in close proximity to the 32 volt lighting lines, as considerable static noise may be picked up if the antenna lead-in is run parallel to the 32 volt power lines for any distance.

INTERMEDIATE ALIGNMENT: Only when an intermediate transformer has become defective due to an open or burned out winding should it be necessary to readjust the intermediate transformer. For aligning either the intermediate transformer or the variable condenser it is necessary that an oscillator be used with some type of output measuring device. To align the intermediate transformer:

1. Connect the high side of the oscillator output to the control grid of the #36 modulator tube. The ground side of the oscillator should be connected to the ground lead.
2. Set the oscillator at 465 kilocycles (this must be accurate) and adjust the output of the oscillator so that a convenient reading is obtained on the output meter.
3. Align the first intermediate transformer by turning one of the intermediate transformer trimmer screws up and down until maximum reading is obtained on the output meter. Then adjust the other trimmer screw in the same manner.
4. The second I. F. transformer should next be adjusted in the same manner. The intermediate transformer trimmer screws are accessible through the small hole in the top of the intermediate transformer shields.

To align the variable condenser:

1. Connect the high output side of the oscillator to the set antenna lead and the ground side of the oscillator to the ground lead.
2. Tune the receiver to 1400 kilocycles on the dial and set the oscillator to this frequency.
3. Adjust the variable condenser trimmer screws for maximum output reading.
4. Tune the set to approximately 600 kilocycles on the dial and adjust the oscillator frequency to 600 kilocycles. Adjust the padding condenser located on the rear of the chassis adjacent to the antenna and ground leads and accessible through the hole in the chassis for maximum output reading.

When making this adjustment be sure to rock the variable condenser to the right and left using the position where the greatest reading is obtained.

VOLTAGE TABLE

Line Voltage : 32 Volts
Volume Control: Full On

TUBE		FIL.	PLATE	SCREEN	CATHODE
78	1st Detector	6.5	160	70	5
37	Oscillator	6.5	100		20
78	I.F.	6.5	160	70	25
77	2nd Detector	6.5	65*	25*	25
38	Output	6.5	150	160	15
25Z5	Rectifier or 84 Rectifier				

* Comparative voltage only.
Read voltage from socket to receiver chassis.

9946 Wire Wound Resistor Strip 15,000 Ohms
9945 Wire Wound Resistor Strip 200 Ohms
9925 6 Mfd. Electrolytic Condenser
9328 Dual 5 Mfd. Electrolytic Condenser
9882 First I. F. Transformer
9883 Second I. F. Transformer
9615 Antenna, Detector & Oscillator Coil
6765 .2 Mfd. 400 Volt Condenser
9032 .2 Mfd. 200 Volt Condenser
9386 .1 Mfd. 200 Volt Condenser

7860 .01 Mfd. 400 Volt Condenser
7862 .004 Mfd. 400 Volt Condenser
9319 .001 Mfd. Moulded Condenser
8906 250,000 Ohm 1/3 Watt Resistor
6984 500,000 Ohm 1/3 Watt Resistor
6786 10,000 Ohm 1/3 Watt Resistor
9706 1,500 Ohm 1/3 Watt Resistor
6880 6,000 Ohm 1/3 Watt Resistor
9385 15,000 Ohm 1/3 Watt Resistor
107 32 Volt Power Unit complete with 25Z5 Tube

107A 32 Volt Power Unit complete with 84 Tube
9907 Three Conductor Power Cable with Plug
8701 Vibrator
8702 .5 Mfd. Condenser
8703 .02-.02 Mfd. Condenser
8704 .1-.1 Mfd. Condenser
8705 8 Mfd. Condenser
8706 1 Mfd. Condenser

8707 Cord & Plug
8708 RF A Choke
8709 Transformer used with 25Z5 Tube
8710 Transformer used with 84 Tube
8711 5 Ohm Resistor

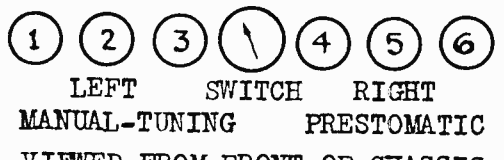
9884 Off and On Switch
9611 Volume Control
9382 Padding Condenser

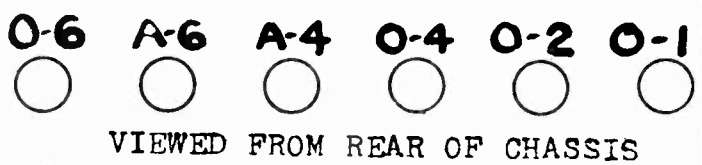
9612 Two Gang Condenser
9880 Tuning Dial
9881 Pilot Light Socket
9023 Pilot Light

Schematic, Voltage, Trimmers Alignment

GAROD RADIO CORP.

MODELS Challenger II
Challenger III

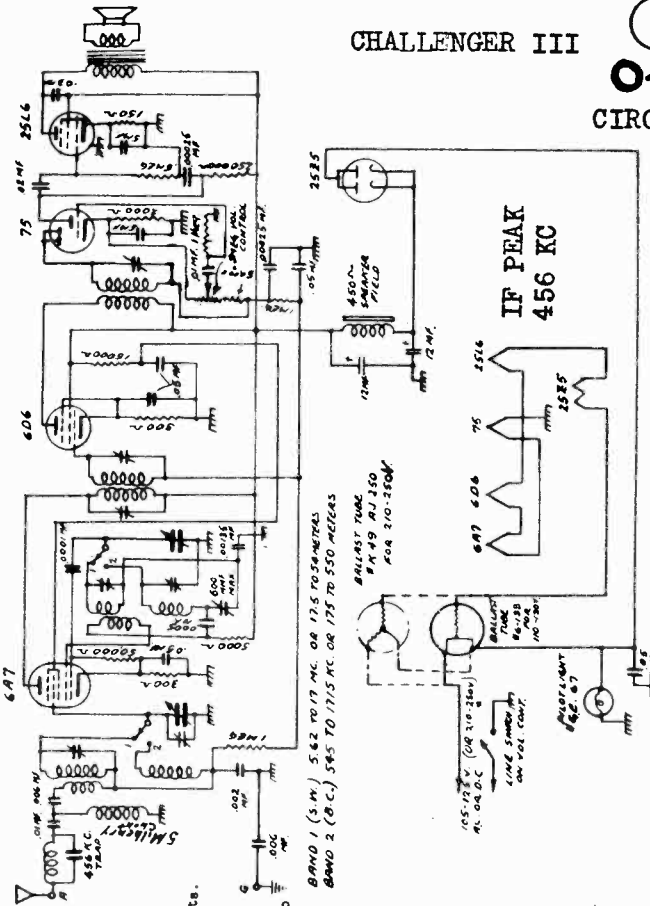




CHALLENGER III

CIRCUIT SCHEMATIC, ETC.--SAME AS CHALLENGER I

FOR ADJUSTMENT OF "PRESTOMATIC" SELECTOR-BUTTONS--SEE MODEL 782



CHALLENGER II

INSTRUCTIONS FOR INSTALLATION, OPERATION AND ALIGNMENT

POWER CONSUMPTION - 45 WATTS

This receiver operates on either direct current or alternating current of any frequency on voltage between 105 and 130. If voltages in excess of this value are to be applied to the receiver, a special Ballast Tube must be used. When operating from direct current, if after the receiver has been turned on for about three quarters of a minute, no reception is obtained, the plug must be reversed in the socket. On alternating current, there is generally no difference, though sometimes, quieter operation results.

ANTENNA: A small indoor antenna consisting of about 20 feet of wire, laid around the moulding, or placed under a rug, or thrown out the window is generally sufficient to give excellent operation. In locations very remote from broadcast stations, it is advantageous to use an outdoor antenna from 50 to 75 feet long. In particularly difficult cases, it may be necessary to use a special short-wave antenna with shielded or transposed lead-in. Kits containing all parts necessary for such an installation are available.

WAVE BAND SWITCH

POSITION	WAVE BAND
Left	17.5 to 53 meters - Foreign & American Short waves
Right	175 to 550 " - Regular Broadcast and some police calls.

Turn to left for short waves and to the right for regular broadcast reception. Some police calls can be obtained at the extreme end of the broadcast band as indicated on the dial.

To operate the receiver, turn the SWITCH & VOLUME CONTROL (shown in the illustration, all the way to the right, at which time the dial should light up. About a minute is required for the tubes to heat. The volume may be adjusted to any level by turning the knob to the left for less volume and to the right for more.

TUNING KNOB controls the DIAL, which is divided into two scales. The Broadcast frequency is read on the upper half and the short wave on the lower half of the dial.

1500 KILOCYCLE 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 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 right and the receiver dial set at 1500 kc. The oscillator trimmer is adjusted so as to bring the signal in at this setting. The oscillator trimmers are reached through holes on the front apron of the chassis, underneath the dial and to the right of the wave band switch. The 1500 kc. trimmer is the one nearest the wave band switch. After the oscillator is set, the antenna trimmer is adjusted for maximum output as indicated by the output meter. This trimmer is on the front section of the variable condenser.

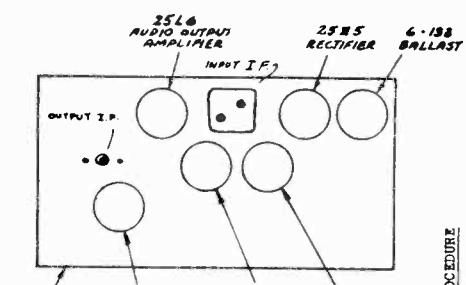
600 KC PADDER ADJUSTMENT - With all connections as above, the signal generator is set at 600 KC and the signal tuned in on the dial. The padder for this frequency is located on the right side of the variable condenser. This padder should be adjusted for maximum response of the receiver, while the tuning condenser is rocked slightly back and forth. The 1500 kc. adjustment should then be rechecked.

14 MEGACYCLE ADJUSTMENT - Turn the Wave Band Switch to the left. Set the signal generator to 14 M.C. 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. Then adjust the trimmer on top of the antenna coil (located behind and to the right of the dial) for maximum output.

VOLTAGE TABLE

TUBE	FUNCTION	H'T'R	PLATE	SC.GR.	CATH.	OSC.PL.
6A7	det.-osc.	6.3	92.	65.0	2.5	80.0
6D6	i.f. ampl.	6.3	92.	92.0	2.0	----
75	diode det. and 1st audio	6.3	40.0	----	----	----
25L6	audio outp.	25.	90.	92.0	7.5	----
25Z5	rectifier	25.	- 92.	----	120.	----

NOTE: All voltages measured with a high impedance A.C. voltmeter, other voltages with a high resistance. (1000 OHMS per volt) voltmeter.



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 wavebands, and an output meter for indicating the effects of adjustments, are required.

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 (rear) 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 can and on the chassis to the left of the 6D6 tube which are situated in the rear of the chassis.

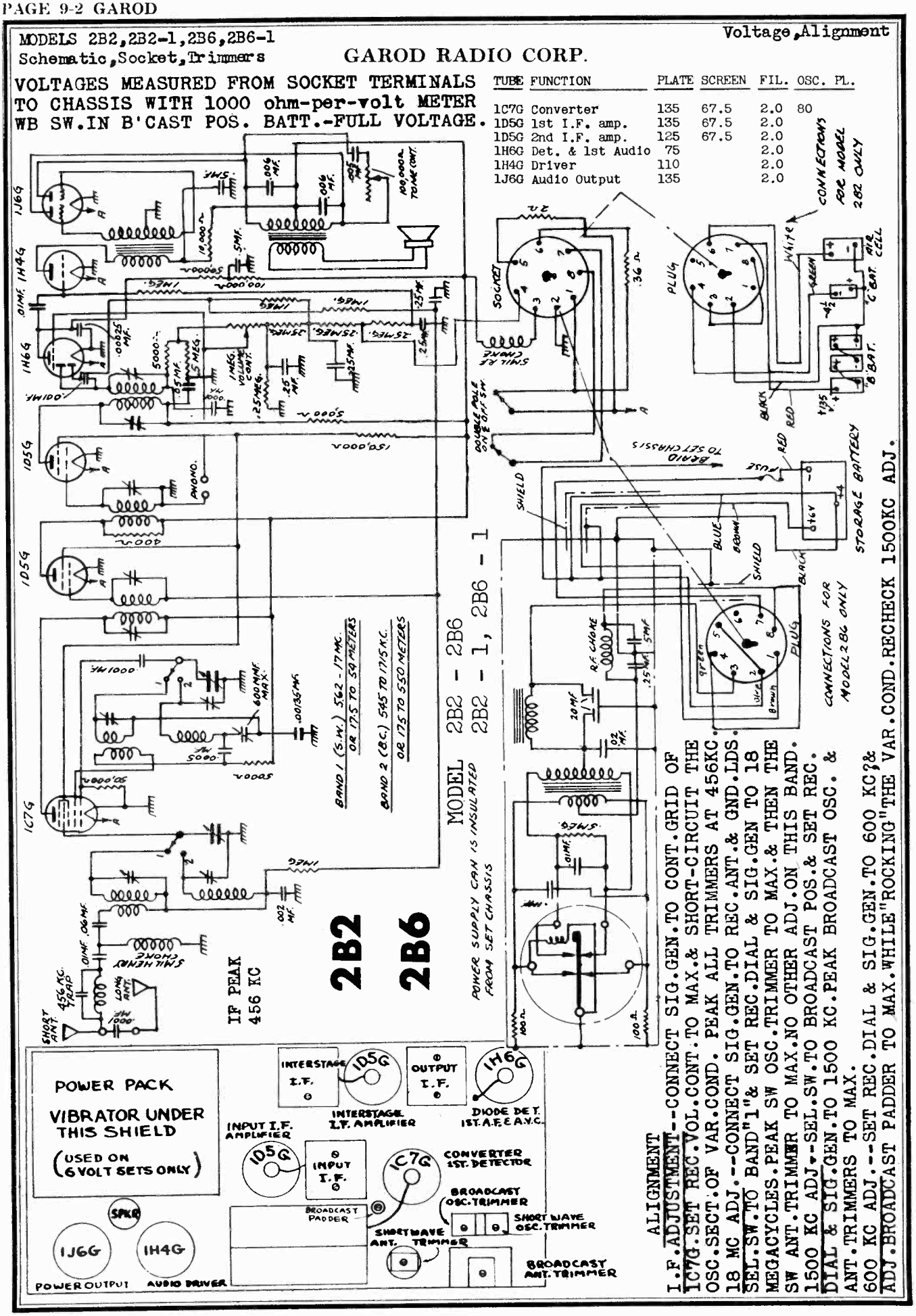
MODELS 2B2,2B2-1,2B6,2B6-1
Schematic,Socket,Trimmers

GAROD RADIO CORP.

Voltage,Alignment

VOLTAGES MEASURED FROM SOCKET TERMINALS TO CHASSIS WITH 1000 ohm-per-volt METER WB SW.IN B'CAST POS. BATT.-FULL VOLTAGE.

TUBE	FUNCTION	PLATE	SCREEN	FIL.	OSC. PL.
1C7G	Converter	135	67.5	2.0	80
1D5G	1st I.F. amp.	135	67.5	2.0	
1D5G	2nd I.F. amp.	125	67.5	2.0	
1H6G	Det. & 1st Audio	75		2.0	
1H4G	Driver	110		2.0	
1J6G	Audio Output	135		2.0	



ALIGNMENT

I.F.ADJUSTMENT--CONNECT SIG.GEN.TO CONT.GRID OF 1C7G.SET REC.VOL.CONT.TO MAX.& SHORT-CIRCUIT THE OSC.SECT.OF VAR.COND. PEAK ALL TRIMMERS AT 456KC.
18 MC ADJ.--CONNECT SIG.GEN.TO REC.ANT.& GND.LDS. SEL.SW.TO BAND"1"& SET REC.DIAL & SIG.GEN TO 18 MEGACYCLES.PEAK SW OSC.TRIMMER TO MAX.& THEN THE SW ANT.TRIMMER TO MAX.NO OTHER ADJ.ON THIS BAND.
1500 KC ADJ.--SEL.SW.TO BROADCAST POS.& SET REC. DIAL & SIG.GEN.TO 1500 KC.PEAK BROADCAST OSC. & ANT.TRIMMERS TO MAX.
600 KC ADJ.--SET REC.DIAL & SIG.GEN.TO 600 KC?& ADJ.BROADCAST PADDER TO MAX.WHILE"ROCKING"THE VAR.COND.RECHECK 1500KC ADJ.

MODELS 205C,205L,205-1,206L
206C,206-1,206P4

GAROD RADIO CORP

Schematic,Voltage,Alignment

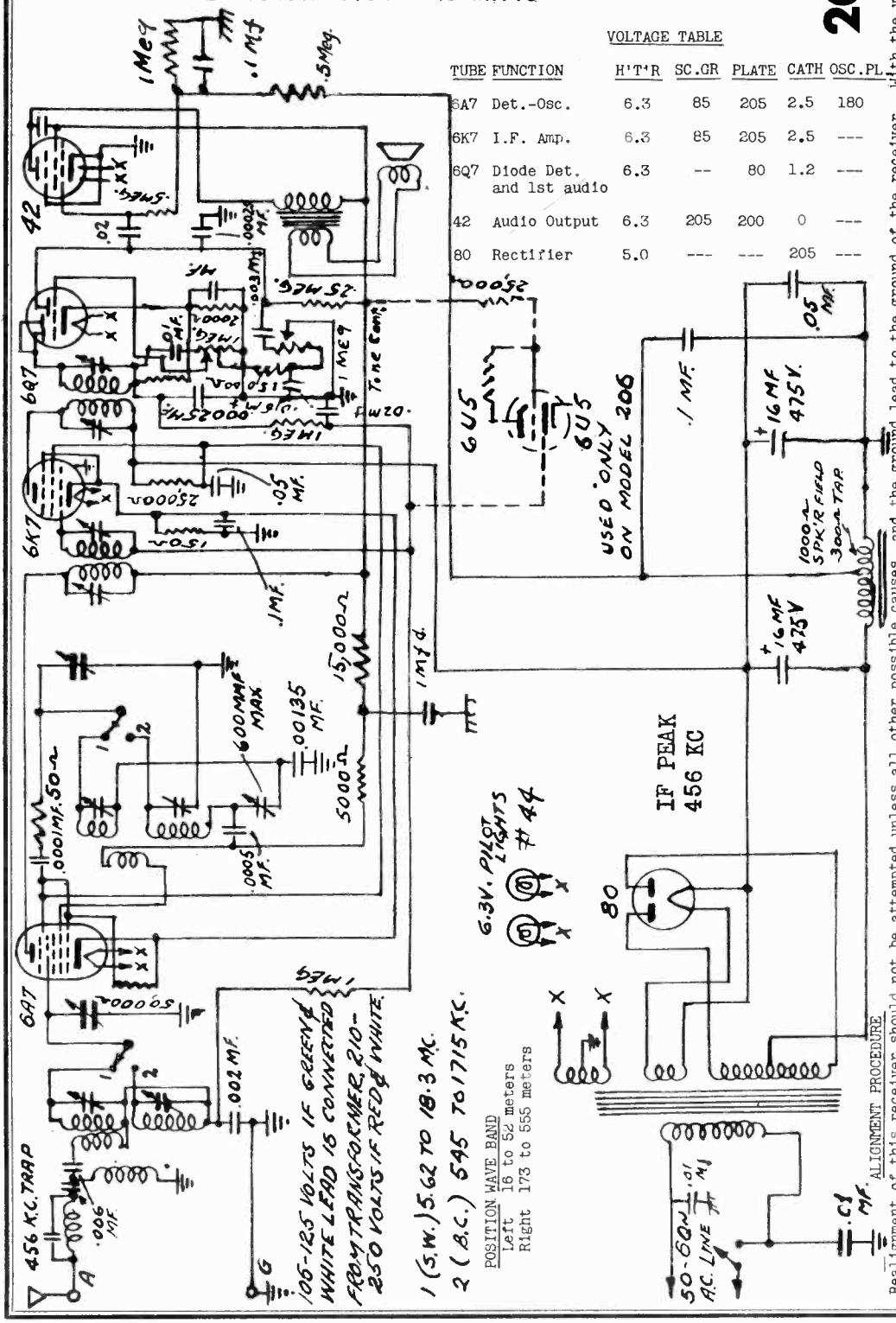
205-206

600 KC PADDER ADJUSTMENT - With all connections as before 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 1500 kc adjustment should then be rechecked.

MODEL 205C,206L,205L,205-1,206C.206L,206-1,206P4
POWER CONSUMPTION - 45 WATTS

VOLTAGE TABLE

TUBE	FUNCTION	H'T'R	SC.GR	PLATE	CATH	OSC.PL
6A7	Det.-Osc.	6.3	85	205	2.5	180
6K7	I.F. Amp.	6.3	85	205	2.5	---
6Q7	Diode Det. and 1st audio	6.3	--	80	1.2	---
42	Audio Output	6.3	205	200	0	---
80	Rectifier	5.0	---	---	205	---



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.

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.

1.8 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 18 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.

1500 KC KILOCYCLE ADJUSTMENT - Turn the Wave Band Switch to the right. Set the signal generator to 1500 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.

MODELS 237,337
Schematic

GAROD RADIO CORP.

SCHEMATIC CIRCUIT
MODEL 237-337

USED ON

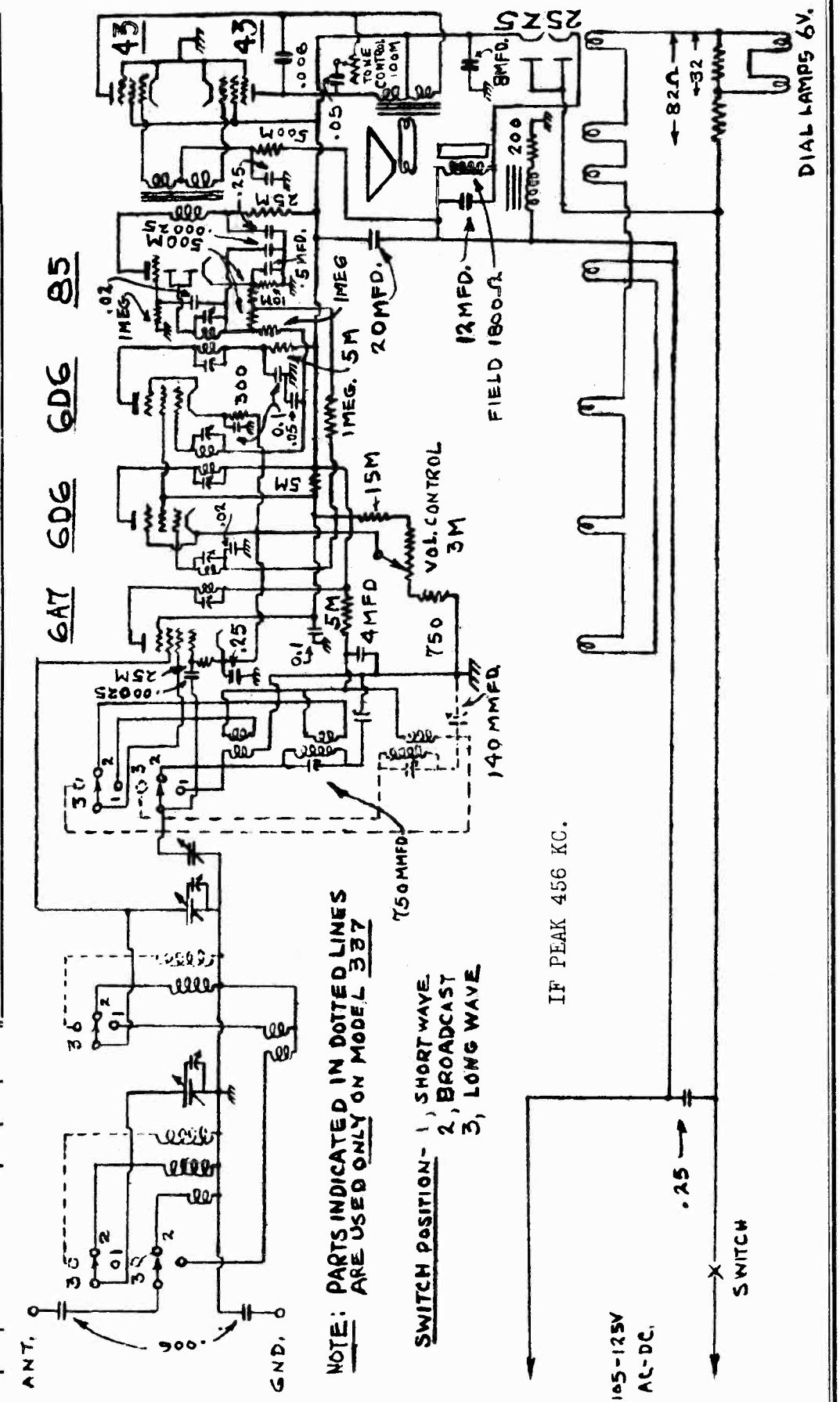
SCALE

DATE 12/9/36
DR. RS
TR.
CH. TAK
APPROVED

MATERIAL
STOCK PER
FINISH
TOOL NOS.
MAKE ALSO

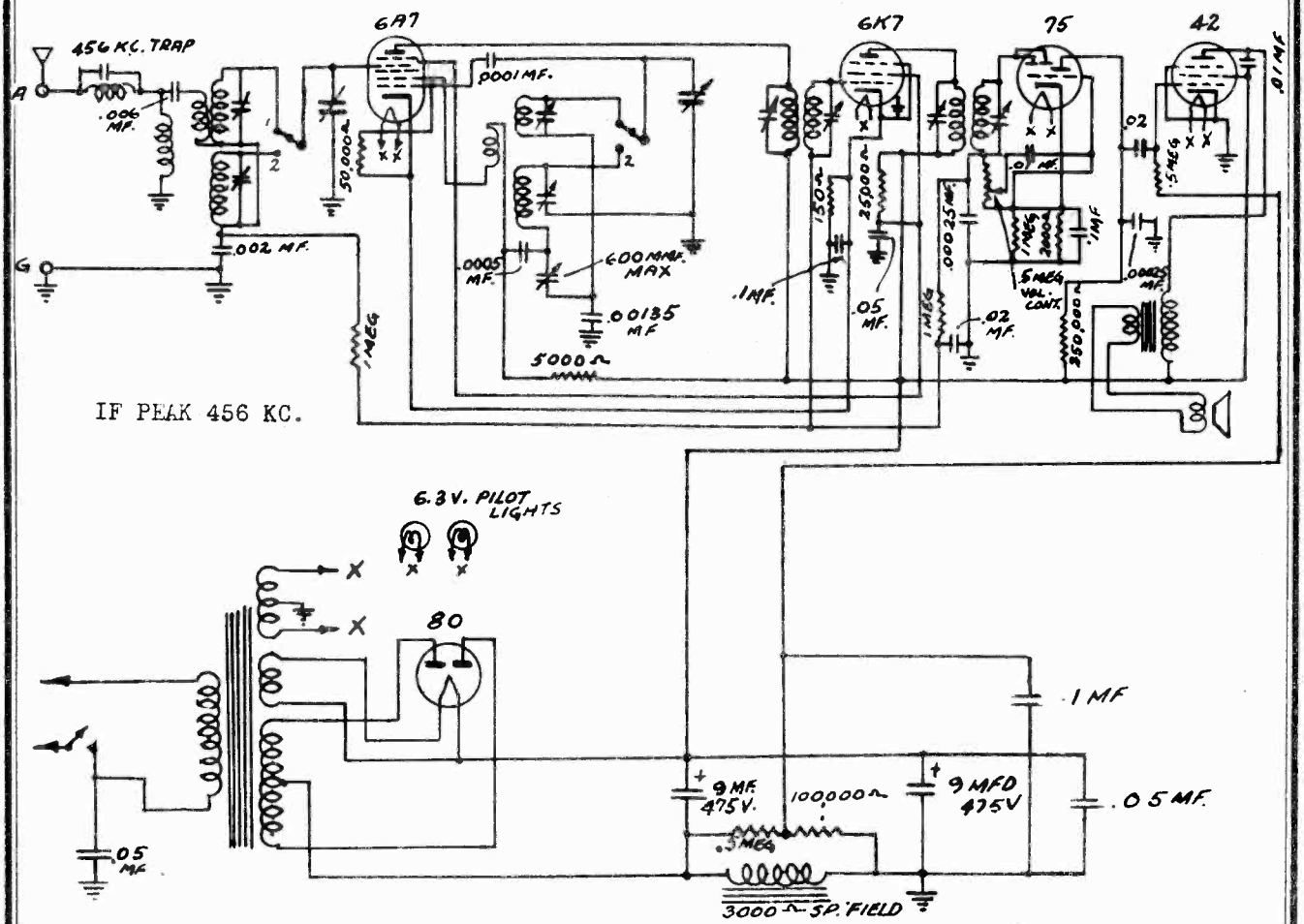
ALTERATION TABLE

LET.	ITEM	WAS	IN'L	APP.	DATE



GAROD RADIO CORP.

MODEL 250
Schematic, Voltage
Alignment



105-125 VOLTS IF GREEN & WHITE LEAD FROM TRANSFORMER
210-250 VOLTS IF RED & WHITE LEAD FROM TRANSFORMER

BAND 1 (S.W.) 5.62 TO 16 M.C. OR 18.5 TO 54 METERS
BAND 2 (B.C.) 545 TO 1715 K.C. OR 175-550 METERS

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.

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.

14 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 14 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.

1500 KC KILOCYCLE ADJUSTMENT - Turn the Wave Band Switch to the right. Set the signal generator to 1500 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 1500 kc adjustment should then be rechecked.

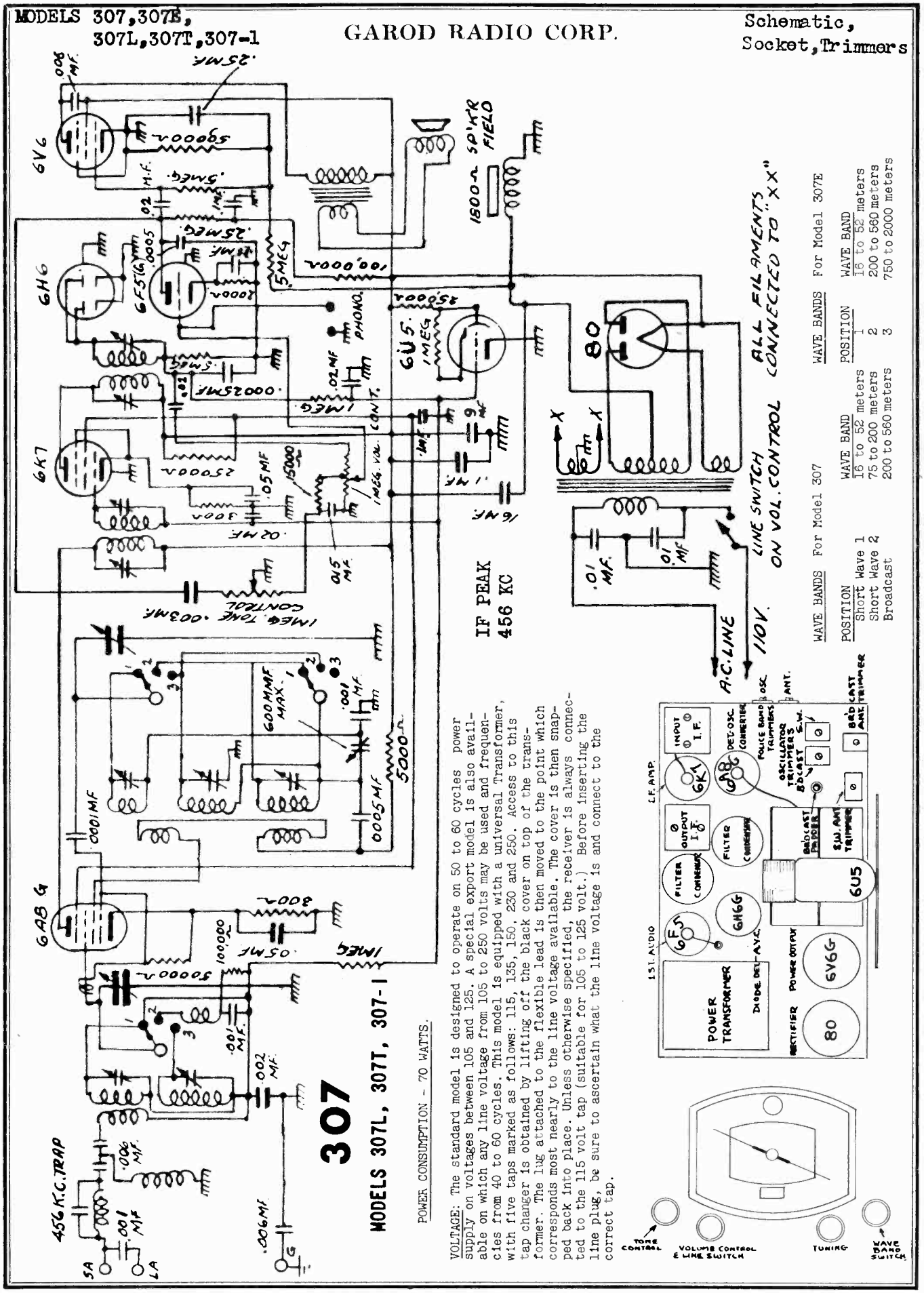
VOLTAGE TABLE

TUBE	FUNCTION	H'T'R	PLATE	SC.GR	CATH.	OSC.PL.
6A7	Det.-Osc.	6.3	205	85	2.5	180
6K7	I.F. Amp.	6.3	205	85	2.5	---
75	Diode Det., and 1st audio	6.3	80	--	1.2	---
42	Audio Output	6.3	200	205	0	---
80	Rectifier	5.0	---	---	205	---

MODELS 307,307E, 307L,307T,307-1

GAROD RADIO CORP.

Schematic, Socket,Trimmers



WAVE BANDS For Model 307

POSITION	WAVE BAND
Short Wave 1	16 to 52 meters
Short Wave 2	75 to 200 meters
Broadcast	200 to 560 meters

WAVE BANDS For Model 307E

POSITION	WAVE BAND
1	16 to 52 meters
2	200 to 560 meters
3	750 to 2000 meters

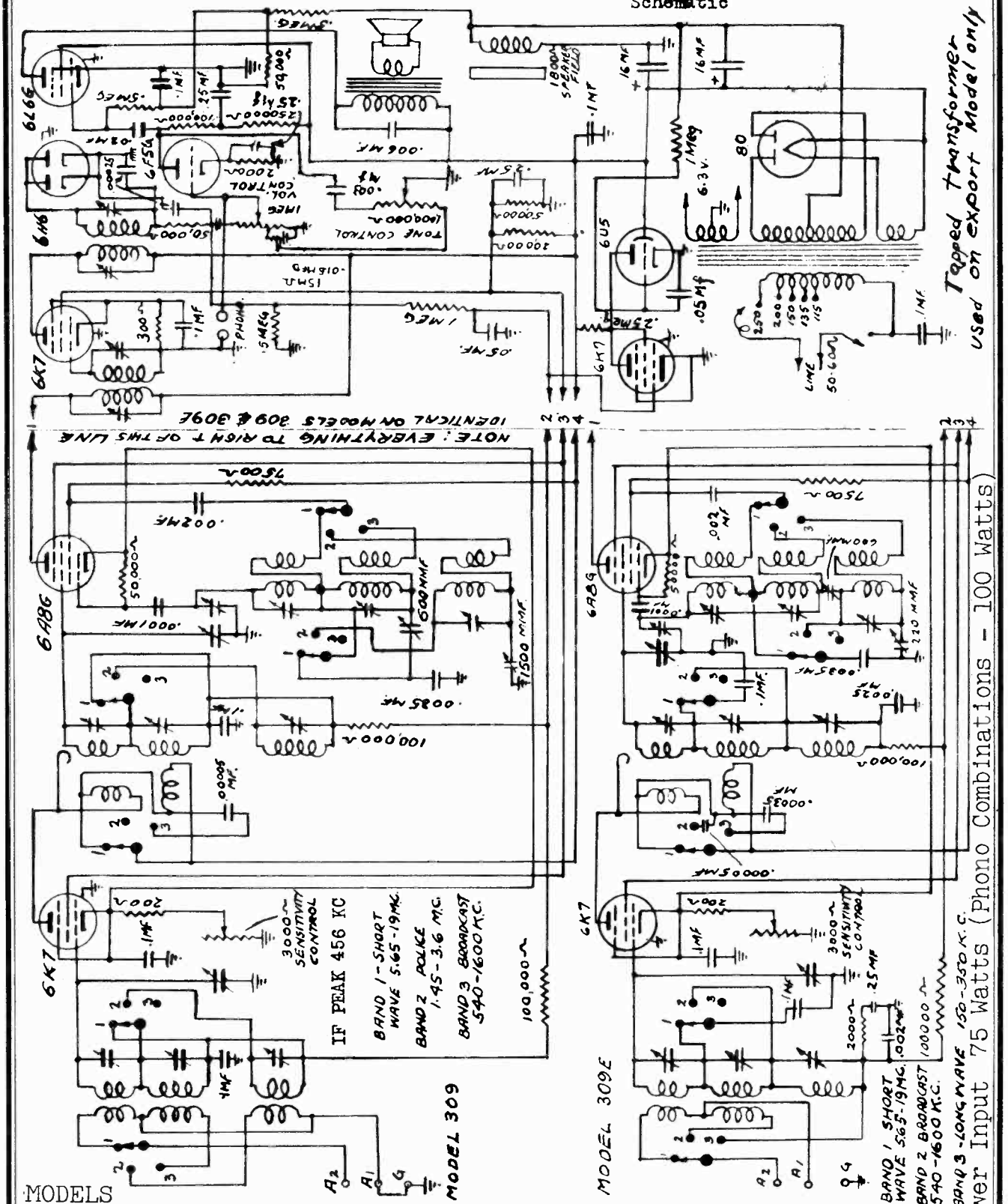
POWER CONSUMPTION - 70 WATTS.

VOLTAGE: The standard model is designed to operate on 50 to 60 cycles power supply on voltages between 105 and 125. A special export model is also available on which any line voltage from 105 to 250 volts may be used and frequencies from 40 to 60 cycles. This model is equipped with a universal Transformer, with five taps marked as follows: 115, 135, 150, 230 and 250. Access to this tap changer is obtained by lifting off the 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 115 volt tap (suitable for 105 to 125 volt.) Before inserting the line plug, be sure to ascertain what the line voltage is and connect to the correct tap.

MODELS 309T, 309L, 309E-1, 309-2
309-3, 309E-2, 309E-3, 309P-5, 309P-7
309E-P5, 309E-P7

GAROD RADIO CORP.

Schematic



MODELS

309T, 309L, 309 - t, 309E - 1; Consoles 309 - 2, 309 - 3, 309E - 2, 309E - 3, Combinations 309P - 5, 309P - 7, 309E - P5, 309E - P7.

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. Wave Band switch in broadcast position.

Filament voltages are taken from filament prong to filament prong at tube socket and may be measured with a low impedance AC voltmeter.

MODELS 309T,309L,309E-1,309-2
309-3,309E-2,309E-3,309P-5,309P-7 **GAROD RADIO CORP.** Socket,Trimmers,
309E-P5,309E-P7 Voltage,Alignment

SERVICE NOTES FOR THE MODEL 309 - 309E
9 TUBE, 3 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 (6A8) With the oscillator section of the tuning condenser short-circuited and the receiver volume control at its maximum position, the i.f. trimmers are adjusted for maximum output. These trimmers may be found on tops of the i.f. transformer shield cans.

MODEL 309

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 short wave band no. 1. The oscillator trimmer condenser is adjusted so that the 18 mc. signal is tuned in exactly at 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 sides of the shield cans and are opposite the lower openings. This is the only adjustment on Band #1.

1500 K.C. ADJUSTMENT - With the band selector switch in position for operation on The Broadcast band and the receiver and signal generator both set at 1500 K.C. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is opposite the upper opening. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans.

The Signal generator is set at 600 K.C. and the signal tuned on the dial. The padder condenser for this band is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 1500 K.C. adjustment should be rechecked. The 600 K.C. Padder is located on the right chassis apron, and is towards the front.

3 MC. ADJUSTMENT - The band selector switch is set in position for operation on the short wave 2. band. The receiver and signal generator are both set at 3 M.C. and the procedure outlined above is repeated. The oscillator trimmer is found on the Police Band Coil located under the chassis and is towards the rear. The other trimmers for this band are located in similar positions on the corresponding coils.

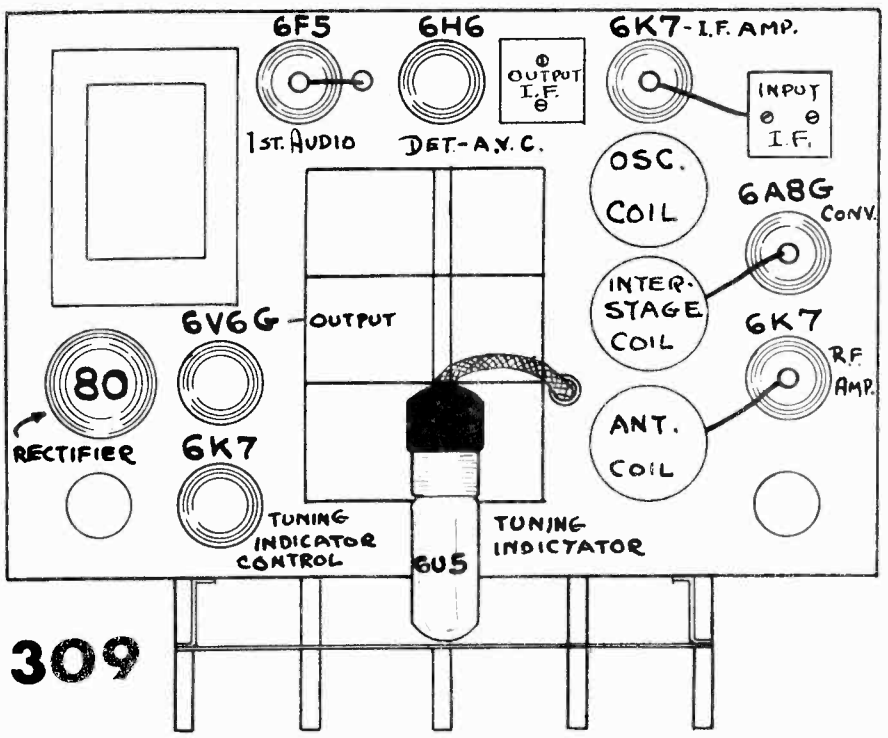
The signal generator is set at 1.7 M.C. and the signal tuned in on the dial. The padder condenser for the police band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 3 M.C. adjustment should then be rechecked. The 1.7 MC. padder is located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

MODEL 309E

Model 309E is the same as Model 309 except that the Long Wave band is substituted for the Police Band. Alignment procedure is identical for the Short Wave and Broadcast Bands. The Long Wave Band is aligned as follows:

300 KC. ADJUSTMENT - The band selector switch is set in a position for operation on band no. 3. The receiver and generator are both tuned to 300 Kc. and the procedure outlined above is repeated. The oscillator trimmer is located under the chassis and is mounted on the rear coil.

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 300 Kc. adjustment should then be rechecked. The 150 Kc. padder is located in a position corresponding to that of the 1.7 MC. padder on Model 309.

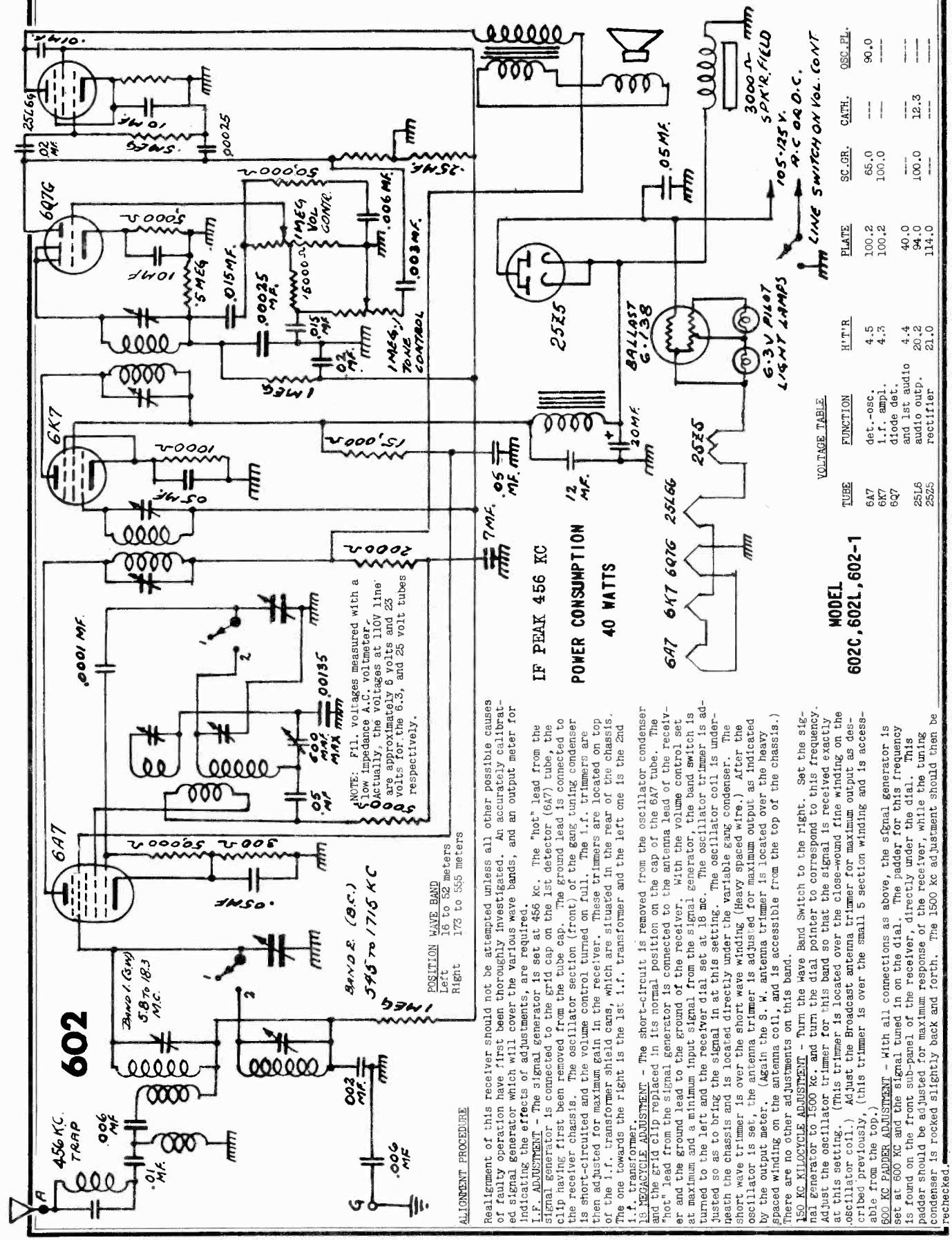


MODEL 309 - 309E

TUBE	FUNCTION	HEATER	PLATE	SC.GR.	CATH Volts	CATH Curr.	OSC. PL.
6K7	R.F. Amp.	6.3	265	110	3	7	220
6A8G	Det. Osc.	6.3	265	110	3	8	
6K7	I.F. Amp.	6.3	265	110	3.5	7	
6H6	Diode Det.	6.3	0				
6F5G	1st Audio Amp.	6.3	80	265	1	.5	
6V6G	Audio Output	6.3	255		0	52	
80	Rectifier	5.0			380	75	

GAROD RADIO CORP.

MODELS 602C, 602L, 602-1
Schematic, Voltage
Alignment



POSITION | WAVE BAND
Left | 16 to 52 meters
Right | 173 to 555 meters

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	1.f. ampl.	4.3	100.2	100.0	---	---
6Q7	diode det. and 1st audio	4.4	40.0	---	---	---
25L6	audio outp.	20.2	94.0	100.0	12.3	---
2525	rectifier	21.0	114.0	---	---	---

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.

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.

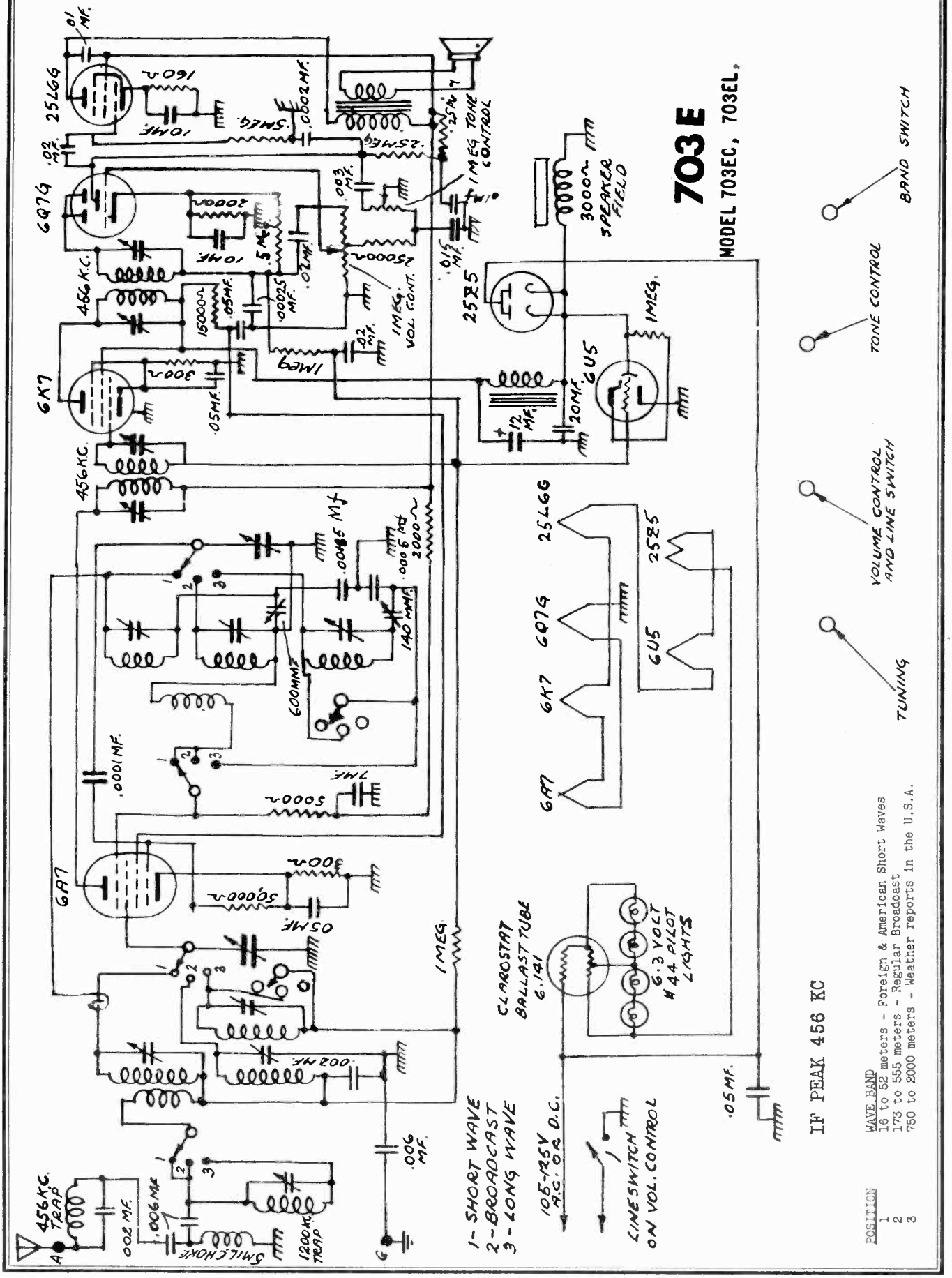
18 MEGACYCLE ADJUSTMENT - The short-circuit is removed from the oscillator condenser and the grid clip replaced in its normal position on the cap of the 6A7 tube. The "hot" lead from the signal generator is connected to the antenna lead of the receiver and the ground lead to the ground of the receiver. 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 18 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.

1500 KC KILOCYCLE ADJUSTMENT - Turn the wave Band Switch to the right. Set the signal generator to 1500 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 accessable 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 1500 kc adjustment should then be rechecked.

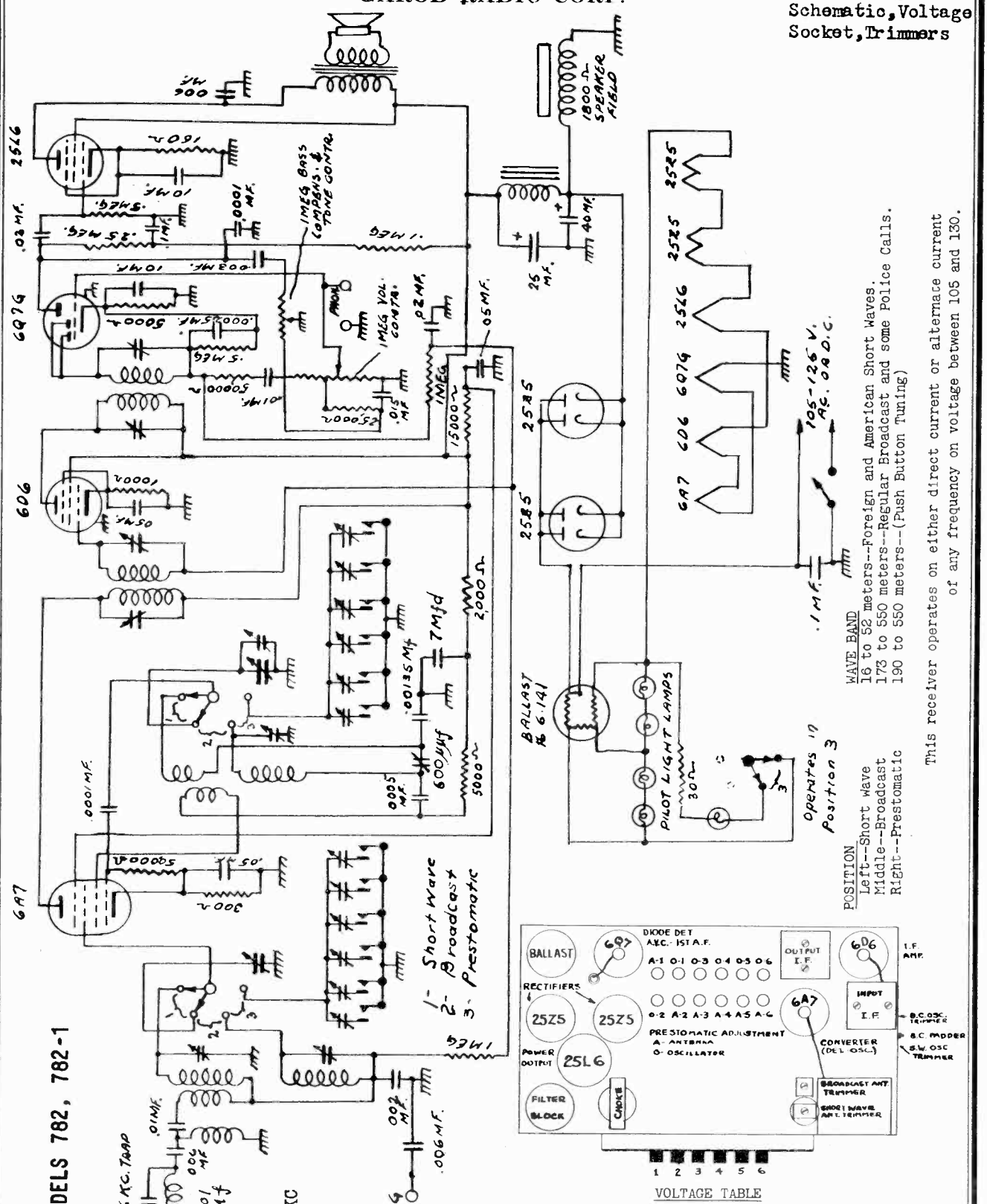
MODELS 703E, 703EC, 703EL
Schematic

GAROD RADIO CORP.



GAROD RADIO CORP.

MODELS 782,782-1
Schematic, Voltage
Socket, Trimmers



VOLTAGE TABLE

TUBE	FUNCTION	H'T'R	PLATE	SC.GR.	CATH.	OSC.PL.
6A7	det.-osc.	6.3	100.	65.	3.0	90.
6D6	I.F. Ampl.	6.3	100	100.	3.0	--
6Q7G	Diode det. and 1st audio	6.3	40.	--	1.0	--
25L6G	Audio outp.	25.0	94.	100.	12.3	--
2-25Z5	rectifiers	25.0	--	--	114.0	--

NOTE Fil. voltages measured with a high impedance A.C. voltmeter

MODELS 782,782-1
Alignment,Tuner

GAROD RADIO CORP.

MODEL 762
Tuner Data

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.

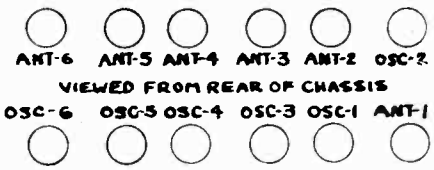
I. F. ADJUSTMENT The signal generator is set at 456 kc. The "hot" lead from the signal generator is connected to the grid cap on the 1st detector (6A7) tube, the clip having first been removed from the tube cap. The ground lead is connected to the receiver chassis. The oscillator section (rear) of the 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.

18 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 atenna lead of the receiver and the ground lead to the ground of the receiver. With the volume control set at maximum and a minimum imput signal from the signal generator, the band switch is turned to the left and the receiver dial set at 18 mc. The oscillator trimmer is adjusted so as to bring the signal in at this setting. This trimmer and the Broadcast oscillator trimmer are located on the side apron. The Short Wave trimmer is towards the front. After the oscillator is set, the antenna trimmer is adjusted for maximum output as indicated by the output meter. This trimmer is on the top of the chassis over the Antenna Coil.

1500 KC KILOCYCLE ADJUSTMENT Turn the Wave Band Switch to the right. Set the signal generator to 1500 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 as mentioned above.) Adjust the broadcast antenna trimmer for maximum output as described previously, (this trimmer is on the chassis behind the antenna coil).

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 over the oscillator trimmer. This padder should be adjusted for maximum response of the receiver, while the tuning condenser is rocked slightly back and forth. The 1500 kc adjustment should then be rechecked. After alignment, the setting of the Prestomatic buttons should be checked.

VIEWED FROM FRONT OF CABINET



Instructions for Adjusting the PRESTOMATIC Selector

To set up this receiver for PRESTOMATIC operation, it is necessary to make a few simple adjustments, in order to select the six stations to be controlled by the push buttons. By following these instructions carefully, the layman can very easily accomplish this without any special knowledge of radio or the use of any instruments other than a small screwdriver.

For the purpose of explanation, let us number the buttons from left to right as 1, 2, 3, 4, 5, 6. Each of these buttons is limited to a range of frequencies as follows:

1-1550	KILOCYCLES	to 1000 KILOCYCLES	4-1150	KILOCYCLES	to 655 KILOCYCLES
2-1500	"	to 830 "	5- 940	"	to 540 "
3-1150	"	to 655 "	6- 940	"	to 540 "

Determine which six stations are to be set up. These, of course, should be local stations from which dependable reception may be obtained, and their field strength should be sufficiently high so that they can be received with good volume above the noise level. Consult a newspaper or other station list for the frequency of each of these selected stations. One station must fall within each of the Kilocycle ranges listed above. If such is not the case, another choice must be made. Arrange the selected stations in the order of their frequencies. Having made this determination, proceed as follows:

Connect Antenna and Ground. Turn the receiver ON by turning the Volume Control all the way to the right. The Dial will light. There are three positions on the Wave Band Switch: Left--Short Wave, Middle-Broadcast, and RIGHT--PRESTOMATIC TUNING. Turn to the middle or BROADCAST position. The set may now be tuned in the usual way by rotating the dial mechanism. Starting at one end of the dial, tune in the first station on the list which you have selected. Note the program and throw the switch to the Right or PRESTOMATIC position. WITHOUT CHANGING THE DIAL SETTING, DEPRESS BUTTON #1 (or you may start at #6). Now insert a screwdriver into the hole which controls the OSCILLATOR corresponding to the button covering the range of the station to which you have just been listening. (SEE SKETCH) Rotate this slowly until the same program is heard. (Check by throwing the switch back and forth between the BROADCAST and PRESTOMATIC positions.)

The Antenna lead from the receiver is now disconnected from the Antenna and either held in the hand or twisted loosely around the lead-in wire in order to reduce the signal strength, so as to permit more accurate adjustment. Now carefully tune the corresponding ANTENNA adjustment (again refer to sketch) until the station is heard clearest and loudest.

Repeat these adjustments as a check. Now reconnect the Antenna and proceed to the next button, repeating the procedure outlined above for each of the other five stations selected. The station markers are now cut from the list provided and forced into the recesses in the buttons. The celluloid discs are then inserted over these to protect the markers.

NOTE When setting the OSCILLATOR trimmer, be sure that you are tuning in the same station, not another one on the chain broadcasting the same program. Stations should be heard equally well on the regular BROADCAST or PRESTOMATIC positions. If this is not the case, recheck the adjustment.

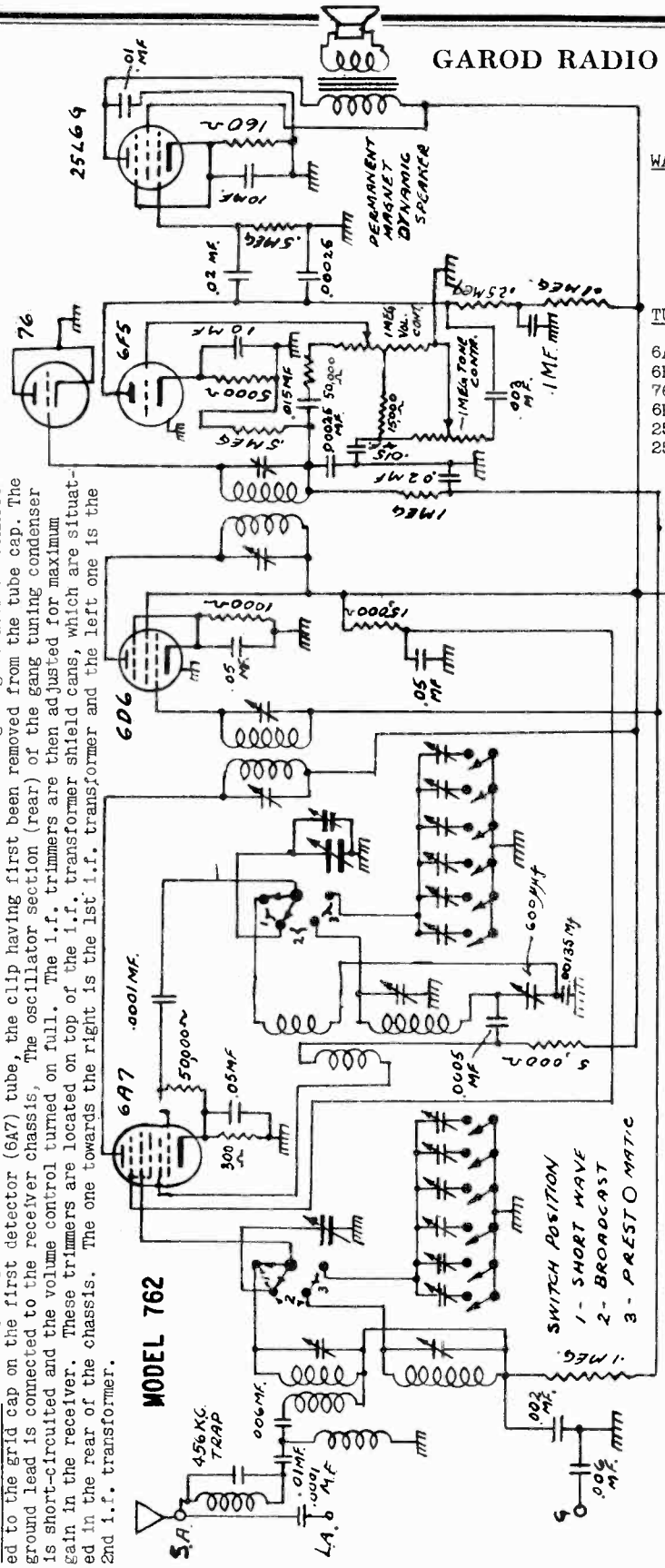
IMPORTANT It is recommended that these adjustments be checked after about one week of operation, since there may be some slight shift due to climatic or other conditions. After this very little trouble should be experienced.

IN THE PRESTOMATIC POSITION, the dial light dims and the pilot light in the lower part of the dial is illuminated.

MODEL 782

GAROD RADIO CORP.

MODEL 762
Schematic, Voltage Alignment, Tuner



WAVE BAND SWITCH

POSITION	WAVE-BAND
Left	16 to 52 meters
Middle	173 to 555 meters
Right	190 to 555 meters--Prestomatic

VOLTAGE TABLE

TUBE	FUNCTION	H'T'R	PLATE	OSC.PL.	SC. GR.	CATH.
6A7	det.-osc.	6.3	100.2	90.0	65.0	3.0
6K7	i.f. ampl.	6.3	100.2	--	100.0	3.0
76	diode det.	6.3	—	--	--	--
6F5	1st audio	6.3	40.0	--	--	1.0
25L6	audio outp.	25.0	94.0	--	100.0	12.3
25Z5	rectifier	25.0	--	--	--	114.0

NOTE Fil. voltages measured with a high impedance A.C. voltmeter.

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 first 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 (rear) 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.

After alignment. the setting of the PRESTOMATIC buttons should be checked.

FOR ADJUSTMENT OF "PRESTOMATIC" SELECTOR BUTTONS - SEE MODEL 782

1500 KC KILOCYCLE ADJUSTMENT Turn the Wave Band Switch to the middle. Set the signal generator to 1500 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 on the front apron and is the lower one of the two.) Adjust the broadcast antenna trimmer for maximum output, as described previously. (this trimmer is on top of the chassis directly behind the dial.

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 top of the chassis, slightly to the left and behind the antenna coil. This padder should be adjusted for maximum response of the receiver, while the tuning condenser is rocked slightly back and forth. The 1500 kc adjustment should then be rechecked.

18 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 18 mc. The oscillator trimmer is adjusted so as to bring the signal in at this set- The short wave trimmer is the upper one of the two on the front chassis apron. After the oscillator is setting. the antenna trimmer is adjusted for maximum output as indicated by the output meter. "The S. W. Antenna trimmer is located on top of the antenna coil, and is accessible from the top of the chassis.) There are no other adjustments on this band.

MODELS 1603,1604E,3016,4016E
Tuner Data

GAROD RADIO CORP.

AUTOMATIC TUNING DIAL

OPERATION:

The Automatic Tuning dial is of the familiar telephone type and is operated in a similar manner, except that only a single movement is needed to dial a station instead of a series of movements. The actual operation of "Dialing" a station is as follows:

The finger is inserted into the recess of the button which bears the marking of the desired station. The button is held by a spring which yields when pressed. When this is done the radio is "MUTED" or silenced, and no stations will be heard except rather faintly. If the volume control happens to be turned up all the way. With the button depressed, the dial is rotated so as to bring this button to the bottom of the dial as far as it will go, at which time a "click" will be heard and the dial can be moved no further. Should the dial come to a stop before the desired button reaches the bottom, and the pointer comes to the end of the calibration, it is necessary to reverse the direction of rotation, until the button is brought under the center of the dial and the click is heard. When the finger is removed, the desired station will be heard, perfectly tuned, without any necessity for re-adjustments.

The Volume and Tone controls are operated in the usual way to obtain the desired effect.

SETTING THE AUTOMATIC TUNING DIAL

Ten buttons are provided, which may very easily be set for ten desired stations. For the sake of explanation, we will number the buttons as shown in the sketch.

Each button will permit the selection of ONE station within its range. The range of frequencies which each will cover is tabulated below.

First consult your newspaper or other periodical for the frequencies of the various stations which you would like to select automatically, and make a list of them. Then tune in any of the stations on your list. See from the chart above, which button covers the frequency of the desired station. Now rotate the dial, with the button depressed so that this button is moved towards the bottom until a "CLICK" is heard and the dial can no longer be moved in either direction. Now loosen this button, by turning it to the left (counter-clockwise). It is now possible to rock the dial in either direction thru a small angle only (with the button depressed).

The station may now be tuned in accurately by watching the tuning indicator tube in the upper part of the dial. When the Dark area is narrowest, the station is properly tuned. It may also be desirable as a double check to turn the volume control up all the way so that the station may be heard faintly to make sure that you are tuning in the desired station and not one on an adjacent channel. It is also advisable to watch the dial pointer as a further precaution, to see that we are still on the same frequency.

When this condition of accurate tuning is obtained, as indicated by the "visual tuning indicator" and checked by ear, the adjustment may be locked by holding the dial rigidly in place with one hand and turning the button all the way to the right (clockwise) and tightening it as much as possible. The marker indicating the desired station is then inserted into the button and the celluloid disk is forced in over it to protect the marker.

The other buttons are then adjusted in the same way. It is suggested that a start be made at either button #1 or #10 and the others be taken in sequence.

BUTTON	MODEL 1203, 1204E, 3012, 4012E, 1603, 1604E, 3016, 4016E and variations.	MODEL 903, 903E, 309, 309 E and variations.
1	454 - 568 Kilocycles	545 - 568 Kilocycles
2	568 - 615 "	568 - 620 "
3	615 - 690 "	620 - 690 "
4	690 - 790 "	690 - 800 "
5	790 - 920 "	800 - 920 "
6	920 - 1078 "	920 - 1060 "
7	1078 - 1240 "	1060 - 1200 "
8	1240 - 1420 "	1200 - 1340 "
9	1420 - 1620 "	1340 - 1480 "
10	1620 - 1740 "	1480 - 1550 "

Any buttons not in use are filled with Blank markers.

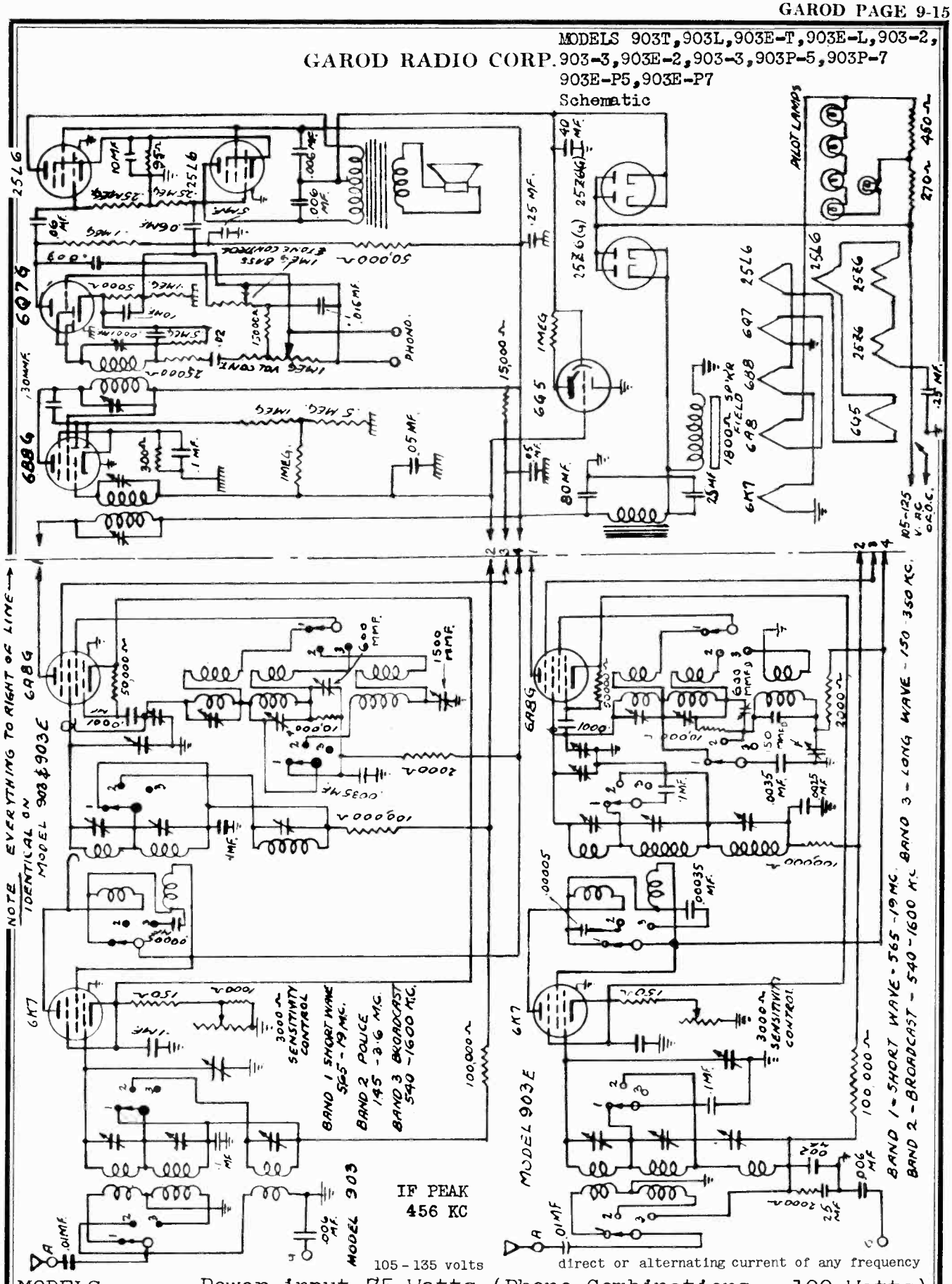
NOTE:

On Models 1603, 1604E, 3016, 4016E, when setting the Automatic Tuning Dial, the High Fidelity-Selectivity switch should be set in the "Selective" position, all the way to the right; and the Automatic Frequency control switched OFF. If this is not done, the setting will appear very broad, and operation may not be entirely satisfactory.

GAROD RADIO CORP.

MODELS 903T, 903L, 903E-T, 903E-L, 903-2, 903-3, 903E-2, 903-3, 903P-5, 903P-7 903E-P5, 903E-P7

Schematic



MODELS Power input 75 Watts (Phono Combinations - 100 Watts)
903T, 903L, 903E- T, 903E - L; Consoles 903 - 2, 903 - 3, 903E - 2, 903 - 3; Combinations 903P - 5; 903P - 7, 903E - P5, 903E - P7

MODELS 903T,903L,903E-T,903E-L,903-2,
903-3,903E-2,903P-5,903P-7,903E-P5,903E-P7
Socket,Trimmers,Voltage,Alignment

GAROD RADIO CORP.

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. Wave band switch in the broadcast position.

Filament voltages are taken from filament prong to filament prong at tube socket and measured with a high impedance AC voltmeter. (Rectifier Type)

ALIGNMENT PROCEDURE

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 (6A8). With the oscillator section of the tuning condenser short-circuited and the receiver volume control at its maximum position, the i.f. trimmers are adjusted for maximum output. These trimmers may be found on tops of the i.f. transformer shield cans.

MODEL 903

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 short wave 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 sides of the shield cans and are opposite the lower openings. This is the only adjustment on band #1.

1500 K.C. ADJUSTMENT - With the band selector switch in position for operation on the broadcast band and the receiver and signal generator both set at 1500 K.C. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is opposite the lower opening. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans.

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

3 MC ADJUSTMENT - The band selector switch is set in position for operation on the short wave 2 band. The receiver and signal generator are both set at 3 M.C. and the procedure outlined above is repeated. The oscillator trimmer is found on the police band coil located under the chassis and is towards the rear. The other trimmers for this band are located in similar positions on the corresponding coils.

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

MODEL 903E

Model 903E is the same as Model 903 except that the Long Wave band is substituted for the Police Band. Alignment procedure is identical for the Short Wave and Broadcast Bands. The Long Wave Band is aligned as follows:

300 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 3. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated. The oscillator trimmer is located under the chassis and is mounted on the rear coil.

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 300 kc. adjustment should then be rechecked. The 150 kc. padder is located in a position corresponding to that of the 1.7 M.C. padder on Model 903.

TUBE	FUNCTION	HEATER	PLATE	SC.GR.	CATH Volts	CATH Curr.	OSC. PL.
6K7	R.F. Amp.	6.3	120	120	2.0	7.0	
6A8G	Det. Osc.	6.3	120	50	2.0	5.5	100
6B8G	I.F. Amp. & AVC	6.3	120	120	1.2	4.	
6Q7G	Diode Det. & 1st Audio Amp.	6.3	80		2.0	.2	
25L6(2)	Audio Output	25.	125	120	8.5	52.	
25Z6G	Rectifier (B+ for RF Amp.)	25.			125	80.	
25Z6G	Rectifier (B+ for output tube plates)	25.			128	90.	

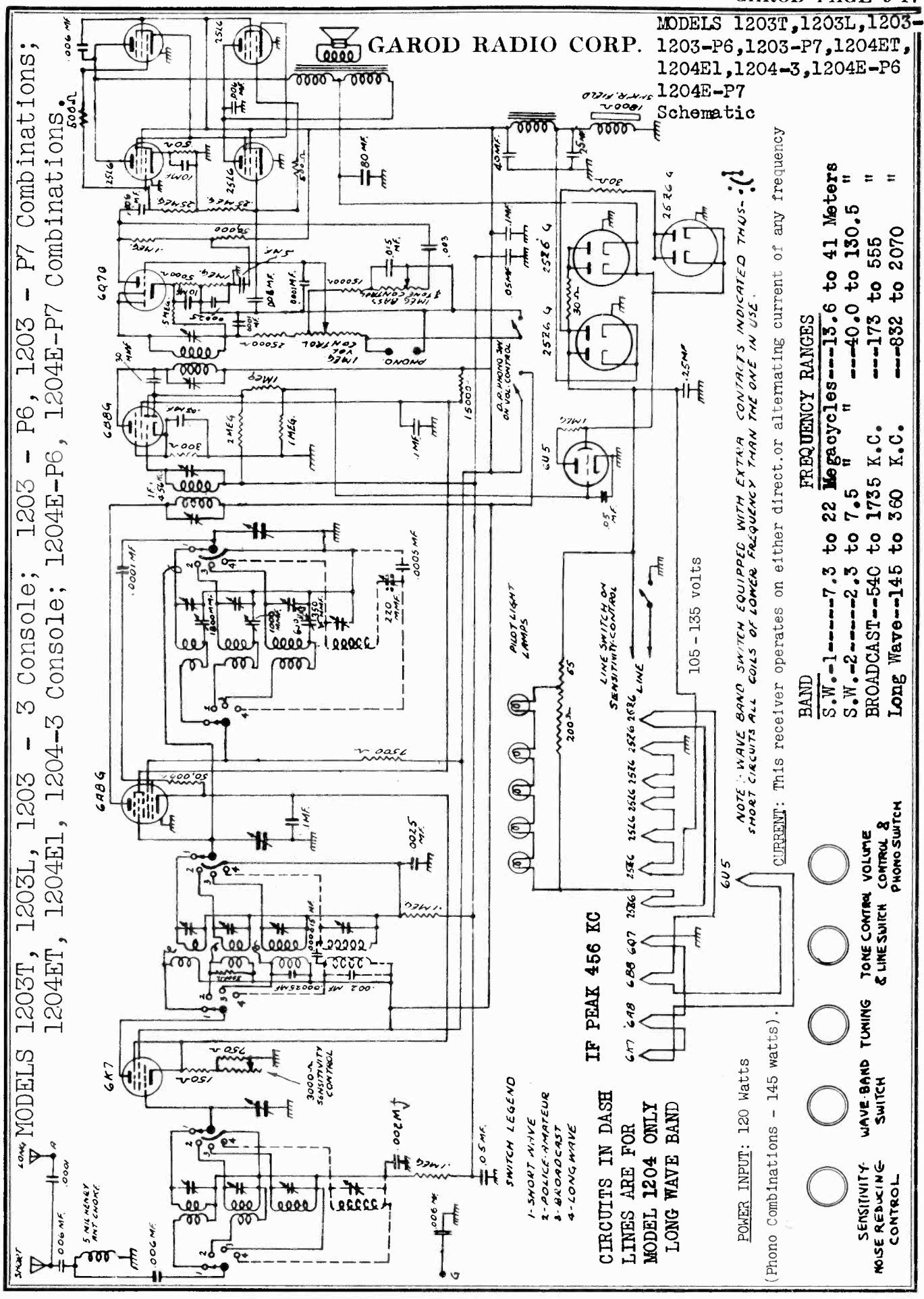
BAND FREQUENCY RANGES

MODEL 903
S.W.-1-----5.65 to 19 Megacycles---15.8 to 53 Meters
S.W.-2-----1.45 to 3.65 " " ---82 to 207 "
BROADCAST--540 to 1570 K.C. -----191 to 555 "

MODEL 903E
S.W. -----5.65 to 19 Megacycles---15.8 to 53 Meters
BROADCAST--540 to 1570 K.C. -----191 to 555 "
Long Wave--145 to 350 K.C. ------856 to 2070 "

MODEL **903**

9 TUBE, 3 BAND A.C.-D.C. SUPERHETERODYNE RECEIVER



MODELS 1203T,1203L,1203-3,1203-P6
1203-P7,1204ET,1204EL,1204-3, GAROD RADIO CORP.
1204E-P6,1204E-P7
Socket,Trimmers,Voltage,Alignment

MODELS 1203 1204

TUBE	FUNCTION	HEATER	PLATE	SC.GR.	CATH V	CATH I	OSC.PL
6K7	RF Amp.	6.3	100	100	1.75	8.0	
6A8G	1st Det. & Osc.	6.3	100	55	1.75	5.5	80
6B8G	IF Amp.	6.3	100	100	2.00	6.0	
25L6	(4) Audio Output	25	120	100	8.5	.50	
25Z6G	Rectifier for Set	25			107	87.	
25Z6G(2)	Rectifier for Output Plates	25			125	85.	
6Q7G	Det. & 1st Audio	6.3	80		20	.2	

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 high impedance AC voltmeter. (Rectifier Type).

ALIGNMENT PROCEDURE.

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 6A8G. 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 tops of the I.F. Transformers.

21 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 21 mc. with the selector switch in position for short wave band no.1. The oscillator trimmer condenser is adjusted so that the 21 mc. signal is tuned exactly at the 21 mc. calibration point, with the volume control on full and the signal generator adjusted for minimum input. The antenna preselector and interstage trimmers are then adjusted in the order named for maximum output. These trimmers are located as indicated in the bottom view of the chassis.

7.5 MEGACYCLE ADJUSTMENT - The signal generator is set at 7.5 megacycle and the signal tuned in on the dial. The short wave padding condenser is adjusted for maximum output, while the gang condenser is rocked slightly to the right and left. The 18 megacycle adjustment should then be rechecked.

7 MC. ADJUSTMENT - With the band selector switch in position for operation on short wave band no. 2 and the receiver and signal generator both set at 7 mc. the procedure outlined above is repeated.

The signal generator is set at 2.4 mc and the signal tuned in on the dial. The police band padder condenser is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 7 mc. adjustment should then be rechecked.

1500 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 1500 kc. and the procedure outlined above is repeated.

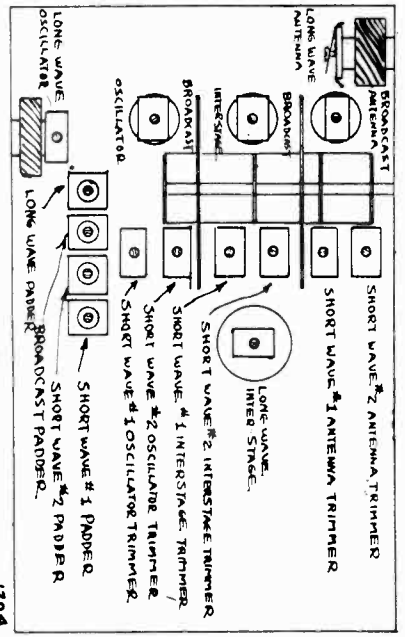
The signal generator is set at 600 kc. and the signal tuned in on the dial. The broadcast padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1500 kc. adjustment should then be rechecked

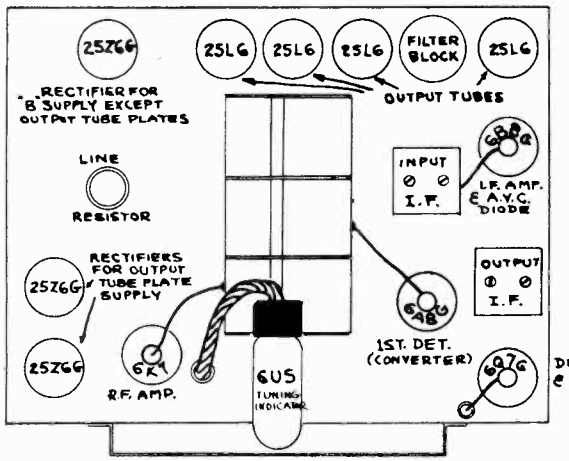
MODEL 1204 ONLY

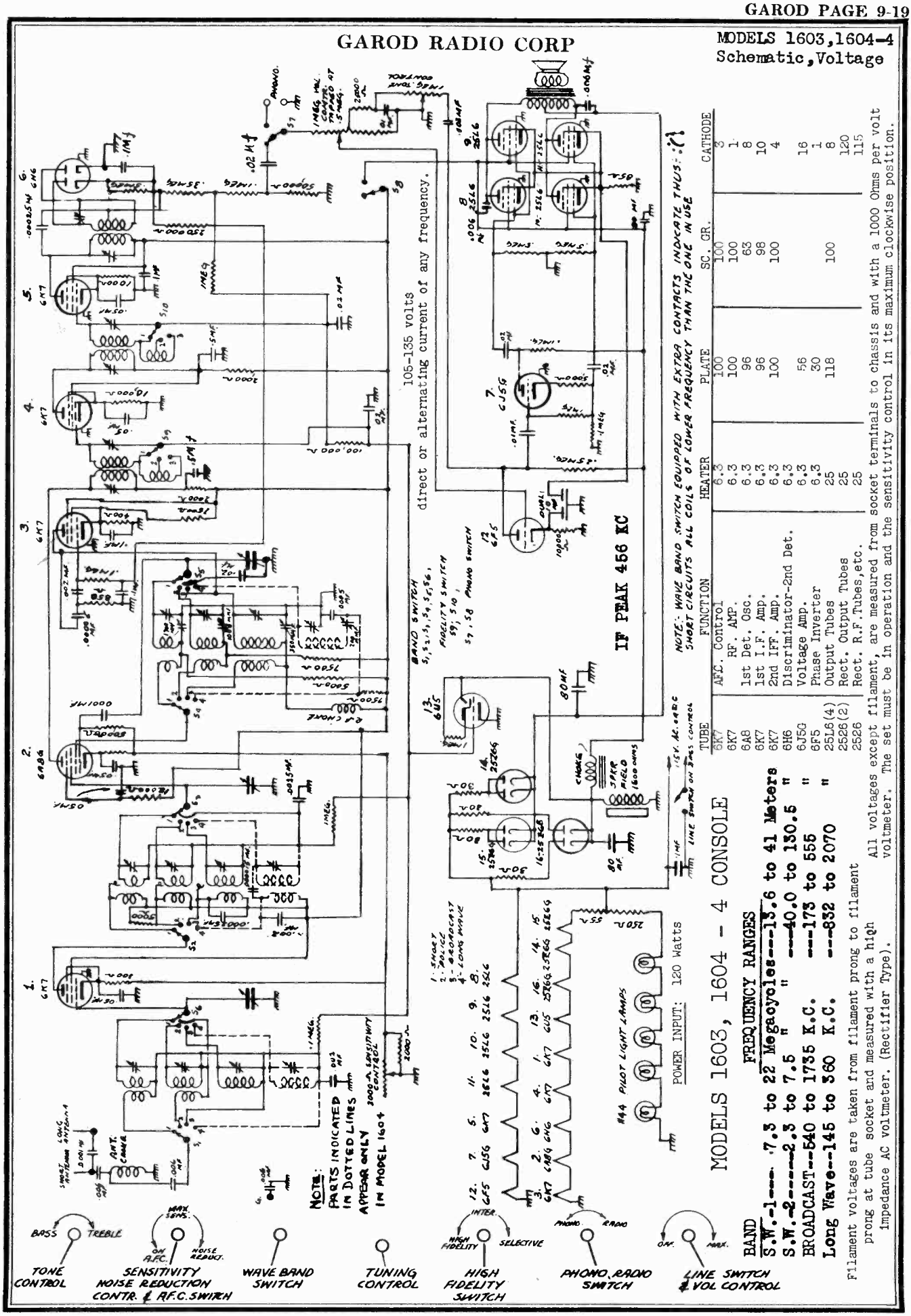
300 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no.4. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 300 kc. adjustment should then be rechecked.

12 TUBE 3 (OR 4) BAND A.C.-D.C. SUPERHETERODYNE RECEIVER







TUBE	FUNCTION	HEATER	PLATE	SC. GR.	CATHODE
6K7	AFC. Control	6.3	100	100	8
6K7	RF. AMP.	6.3	100	100	1
6A8	1st Det. Osc.	6.3	96	63	8
6K7	1st I.F. Amp.	6.3	96	98	10
6K7	2nd IFF. Amp.	6.3	100	100	4
6H6	Discriminator-2nd Det.	6.3			16
6J5G	Voltage Amp.	6.3	56		1
6F5	Phase Inverter	6.3	30		1
25L6(4)	Output Tubes	25	118	100	8
2526(2)	Rect. Output Tubes	25			120
2526	Rect. R.F.Tubes,etc.	25			115

MODELS 1603,1604-4
Socket, Trimmers
Alignment

GAROD RADIO CORP.

16 TUBE 3 (or4) BAND A.C.-D.C. SUPERHETERODYNE RECEIVER

FOR AUTOMATIC TUNING-DIAL DATA SEE INDEX

MODELS **1603-1604**

NOTE: LONG WAVE COILS & PADDERS USED ONLY ON MODEL 1604

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 6A8G. 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 tops of the I.F. Transformers.

21 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 21mc. with the selector switch in position for short wave band no. 1. The oscillator trimmer condenser is adjusted so that the 21 mc. signal is tuned exactly at the 21 mc. calibration point, with the volume control on full and the signal generator adjusted for minimum input. The antenna preselector and interstage trimmers are then adjusted in the order named for maximum output. These trimmers are located as indicated in the bottom view of the chassis.

7.5 MEGACYCLE ADJUSTMENT - The signal generator is set at 7.5 megacycle and the signal tuned in on the dial. The short wave padding condenser is adjusted for maximum output, while the gang condenser is rocked slightly to the right and left. The 18 megacycle adjustment should then be rechecked

7 MC. ADJUSTMENT - With the band selector switch in position for operation on short wave band no. 2 and the receiver and signal generator both set at 7 mc. the procedure outlined above is repeated.
The signal generator is set at 2.4 mc. and the signal tuned in on the dial. The police band padder condenser is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 7 mc. adjustment should then be rechecked.

1500 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 1500 kc. and the procedure outlined above is repeated.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The broadcast padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1500 kc. adjustment should then be rechecked.

AUTOMATIC FREQUENCY CONTROL - Should it be found that after a station is tuned in accurately (in the selective position) as indicated by the cathode ray tube, that when the A.F.C. switch is turned "ON", the signal is detuned or a change observed in the tone of the receiver, it will be necessary to readjust the "Discriminator" transformer which controls this action. A low range (0-5 or 0-10V) high resistance volt meter or preferably a microammeter is inserted in series with the diode load resistor at the grounded end, which will indicate a maximum when a signal is tuned TO exact resonance. This 500,000 Ohms load resistor is located directly under the discriminator transformer. A 0-10 milliammeter is inserted in the cathode circuit of the A.F.C. control tube. An R.F. signal (any frequency in the Broadcast Band) is fed into the antenna and the receiver is tuned as accurately as possible to resonance (with the switch turned OFF). The Hi-fidelity switch is in the selective position. Now throw the secondary trimmer of the discriminator off resonance. Tune the primary for maximum output as indicated by the diode load meter. Turn the AFC switch "ON". Now tune the secondary trimmer, located at the bottom of the discriminator coil, underneath the chassis, so that when the A.F.C. switch is turned from the ON to the OFF position and vice versa, no change takes place in the cathode, current of the A.F.C. control tube, as indicated by the milliammeter. Be sure that the receiver has been accurately tuned first without The A.F.C., or improper adjustment may result, whereby the frequency is automatically detuned instead of tuned. When this condition of no change in cathode current is obtained, it is indicated that no control voltage is being generated at exact resonance, which is the desired condition. If now the receiver is slightly detuned either above or below resonance, the cathode current will either increase or decrease above its normal value with the A.F.C. OFF, or no signal fed into the antenna. The voltage thus generated as indicated by this change in current serves to shift the frequency of the oscillator in the proper direction so as to automatically retune the oscillator to the exact frequency required to bring in the desired station with maximum clarity and a minimum of noise.

NOTE - IN ALLIGNING THE BROADCAST BAND (1500 KC AND 600 KC) THE A.F.C. MUST BE OFF.

MODEL 1604 ONLY

300 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 4. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 300 kc. adjustment should then be rechecked.

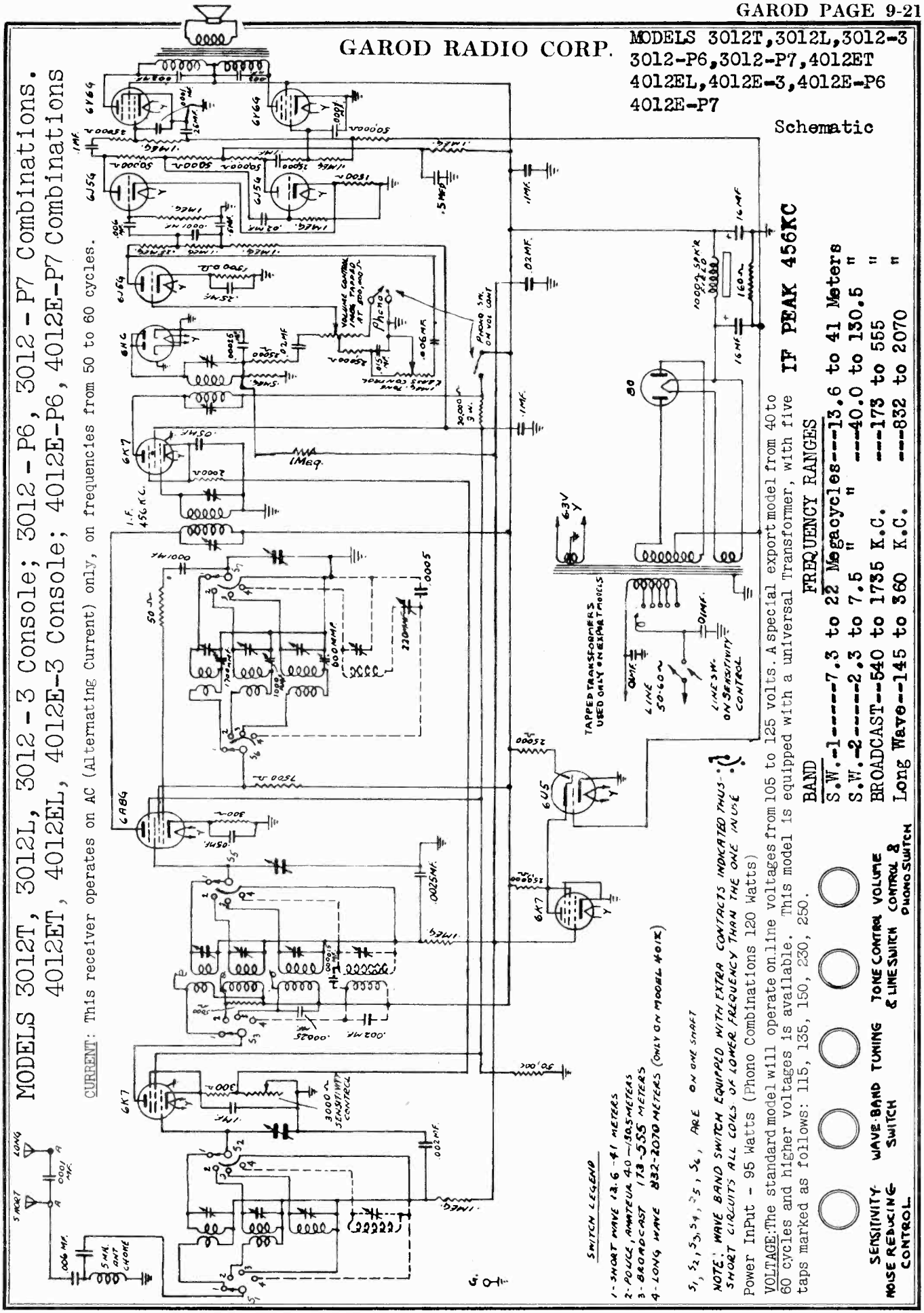
GAROD RADIO CORP.

MODELS 3012T, 3012L, 3012-3
3012-P6, 3012-P7, 4012ET
4012EL, 4012E-3, 4012E-P6
4012E-P7

Schematic

MODELS 3012T, 3012L, 3012-3 Console; 3012-P6, 3012-P7 Combinations.
4012ET, 4012EL, 4012E-3 Console; 4012E-P6, 4012E-P7 Combinations

CURRENT: This receiver operates on AC (Alternating Current) only, on frequencies from 50 to 60 cycles.



VOLTAGE: The standard model will operate on line voltages from 105 to 125 volts. A special export model from 40 to 60 cycles and higher voltages is available. This model is equipped with a universal Transformer, with five taps marked as follows: 115, 135, 150, 230, 250.

Power InPut - 95 Watts (Phono Combinations 120 Watts)

MODELS 3012T,3012L,3012-3,3012-P6
3012-P7,4012ET,4012EL,4012E-3
4012E-P6,4012E-P7
Socket,Trimmers,
Voltage,Alignment

GAROD RADIO CORP.

MODELS
3012
4012

12 TUBE 3 (OR 4) BAND A.C. SUPERHETERODYNE RECEIVER

TUBE	FUNCTION	HEATER VOLTAGE	PLATE VOLTAGE	SCREEN GRID V.	CATHODE VOLTAGE	GRID
6K7	R.F. Amp.	6.3	245	100	2	-
6A8G	Converter	6.3	245	100	2.4	-
6K7	I.F. Amp.	6.3	245	100	7	-
6H6	Diode Det.	6.3	-	-	-	-
6J5G	1st Audio	6.3	25	-	2.	-
6J5G	Phase Inverter	6.3	60	-	2.1	-
6J5G	Driver	6.3	55	-	2.1	-
6K7	Indicator Control		20	20	0	4.1
6V6G (2)	Power Output	6.3	232	245	0	4.1
80	Rectifier	5.0	360 V-R.M.S.	-	-	-

ALIGNMENT PROCEDURE

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 6A8G. 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 tops of the I.F. Transformers.

21 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 21 mc. with the selector switch in position for short wave band no.1. The oscillator trimmer condenser is adjusted so that the 21 mc. signal is tuned in exactly at the 21 mc. calibration point, with the volume control on full and the signal generator adjusted for minimum input. The antenna preselector and interstage trimmers are then adjusted in the order named for maximum input. These trimmers are located as indicated in the bottom view of the chassis.

7.5 MEGACYCLE ADJUSTMENT The signal generator is set at 7.5 megacycles and the signal tuned in on the dial. The short wave padding condenser is adjusted for maximum output, while the gang condenser is rocked slightly to the right and left. The 21 megacycle adjustment should then be rechecked.

7 MC. ADJUSTMENT - With the band selector switch in position for operation on short wave band no. 2. and the receiver and the signal generator both set at 7 mc. the procedure outlined above is repeated.

The signal generator is set at 2.4 mc. and the signal tuned in on the dial. The police band padder condenser is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 7 mc. adjustment should then be rechecked.

1500 KC. ADJUSTMENT - The band selector switch is set in position for operation on the broadcast band. The receiver and signal generator are both set at 1500 kc. and the procedure outlined above is repeated.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The broadcast padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1500 Kc. adjustment should then be rechecked.

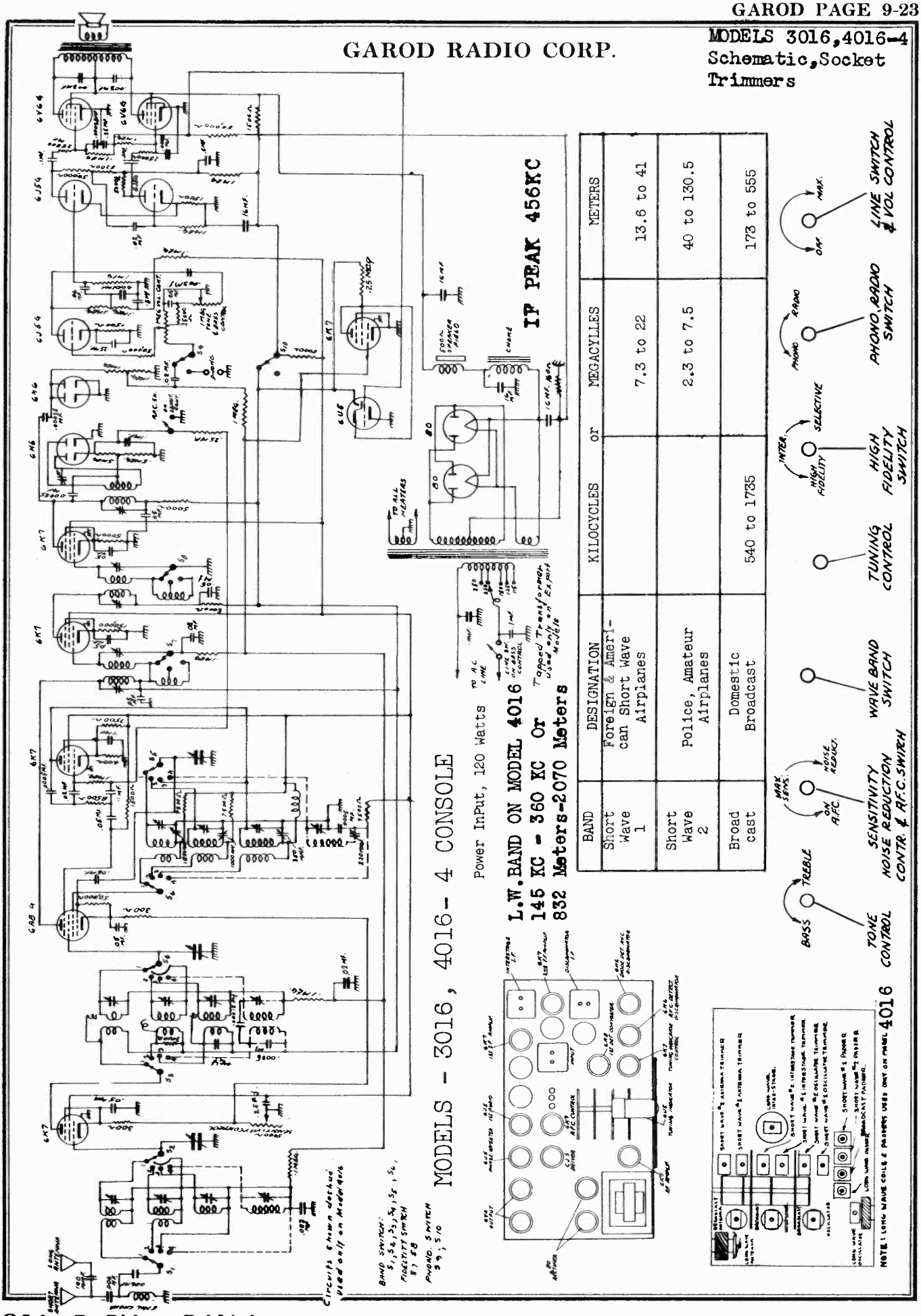
ON MODEL 4012 ONLY

300 KC. ADJUSTMENT - The band selector switch is set in position for operation on the long wave band. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 300 kc. adjustment should then be rechecked.

All D. C. voltages measured from socket terminal to ground. Sensitivity control turned up all the way (clockwise).
D.C. voltages measured with 250,000 Ohm meter for high voltages and 25,000 Ohms for voltages under 25.

Filament voltages are taken from filament prong to filament prong at tube socket and measured with a low impedance AC voltmeter.



BAND	DESIGNATION	KILOCYCLES	or	MEGACYLLES	METERS
Short Wave 1	Foreign & American Short Wave Airplanes			7.3 to 22	13.6 to 41
Short Wave 2	Police, Amateur Airplanes			2.3 to 7.5	40 to 130.5
Broad cast	Domestic Broadcast	540 to 1735			173 to 555

MODELS 3016,4016-4
Voltage,Alignment

GAROD RADIO CORP.

16 TUBE 3 (OR 4) BAND A.C.
SUPERHETERODYNE RECEIVER

MODELS
3016-4016
FOR AUTOMATIC TUNING-DIAL DATA
SEE INDEX

MODEL 3016- 4016 VOLTAGE CHART

		PLATE	SCREEN	CATHODE	
6K7	R.F. Amp.	250	100	3	
6A8G	Converter	100	100	3	
6K7	A.F.C. Control Tube	100	100	6.5	100 OSC. PLATE
6K7	1st I.F.	235	100	14	
6K7	2nd I.F.	235	100	5	
6H6	Discriminator	0		0	
6H6	Detector	0		0	
6J5G	1st Audio	30		2	
6J5G	2nd Audio	60		3	
6J5G	Phase Inverter	60		3	
2-6V6G	Output	295	300	Grid 20	
2-80	Rectifier			420	
6K7	Tuning Indicator Control	35	35		

Wave band switch in Broadcast position
Sensitivity control in counter-clockwise position
No signal.

All D.C. voltages measured from socket terminal to ground. Sensitivity control turned up all the way (clockwise).
D.C. voltages measured with 250,000 Ohm meter for high voltages and 25,000 Ohms for voltages under 25.

Filament voltages are taken from filament prong to filament prong at tube socket and measured with a low impedance AC voltmeter.

I.F. ADJUSTMENT - The signal generator is set at 456 kc. and is connected to the grid of the first detector 6A8G. 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 tops of the I.F. Transformers.

21 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 21 mc. with the selector switch in position for short wave band no.1. The oscillator trimmer condenser is adjusted so that the 21 mc. signal is tuned in exactly at the 21 mc. calibration point, with the volume control on full and the signal generator adjusted for minimum input. The antenna preselector and interstage trimmers are then adjusted in the order named for maximum output. These trimmers are located as indicated in the bottom view of the chassis.

7.5 MEGACYCLE ADJUSTMENT The signal generator is set at 7.5 megacycles and the signal tuned in on the dial. The short wave padding condenser is adjusted for maximum output, while the gang condenser is rocked slightly to the right and left. The 21 megacycle adjustment should then be rechecked.

7 MC. ADJUSTMENT - With the band selector switch in position for operation on short wave band no. 2. and the receiver and the signal generator both set at 7 mc. the procedure outlined above is repeated.

The signal generator is set at 2.4 mc. and the signal tuned in on the dial. The police band padder condenser is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 7 mc. adjustment should then be rechecked.

1500 KC. ADJUSTMENT - The band selector switch is set in position for operation on the broadcast band. The receiver and signal generator are both set at 1500 kc. and the procedure outlined above is repeated.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The broadcast padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1500 kc. adjustment should then be rechecked.

AUTOMATIC FREQUENCY CONTROL - Should it be found that after a station is tuned in accurately (in the selective position) as indicated by the cathode ray tube, that when the A.F.C. switch is turned "ON", the signal is detuned or a change observed in the tone of the receiver, it will be necessary to readjust the "Discriminator" transformer which controls this action. A low range (0-5 or 0-10V.) high resistance volt meter or preferably a microammeter is inserted in series with the diode load resistor at the grounded end, which will indicate a maximum when a signal is tuned to exact resonance. This 500,000 Ohms load resistor is located directly under the discriminator transformer. A 0-10 milliammeter is inserted in the cathode circuit of the A.F.C. control tube. An R.F. signal (any frequency in the Broadcast Band) is fed into the antenna and the receiver is tuned as accurately as possible to resonance (with the switch turned OFF). Now throw the secondary trimmer of the discriminator off resonance. Tune the primary for maximum output as indicated by the diode load meter. Turn the AFC switch "ON". Now tune the secondary trimmer, identified by a red paint mark, so that when the A.F.C. switch is turned from the ON to the OFF position and vice versa, no change takes place in the cathode, current of the A.F.C. control tube, as indicated by the milliammeter. Be sure that the receiver has been accurately tuned first without the A.F.C., or improper adjustment may result, whereby the frequency is automatically detuned instead of tuned. When this condition of no change in cathode current is obtained, it is indicated that no control voltage is being generated at exact resonance, which is the desired condition. If now the receiver is slightly detuned either above or below resonance, the cathode current will either increase or decrease above its normal value with the A.F.C. OFF, or no signal fed into the antenna. The voltage thus generated as indicated by this change in current serves to shift the frequency of the oscillator in the proper direction so as to automatically retune the oscillator to the exact frequency required to bring in the desired station with maximum clarity and a minimum of noise.

NOTE - IN ALLIGNING THE BROADCAST BAND (1500 KC AND 600 KC) THE A.F.C. MUST BE OFF

ON MODEL 4016 ONLY

300 KC. ADJUSTMENT - The band selector switch is set in position for operation on the long wave band. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated.

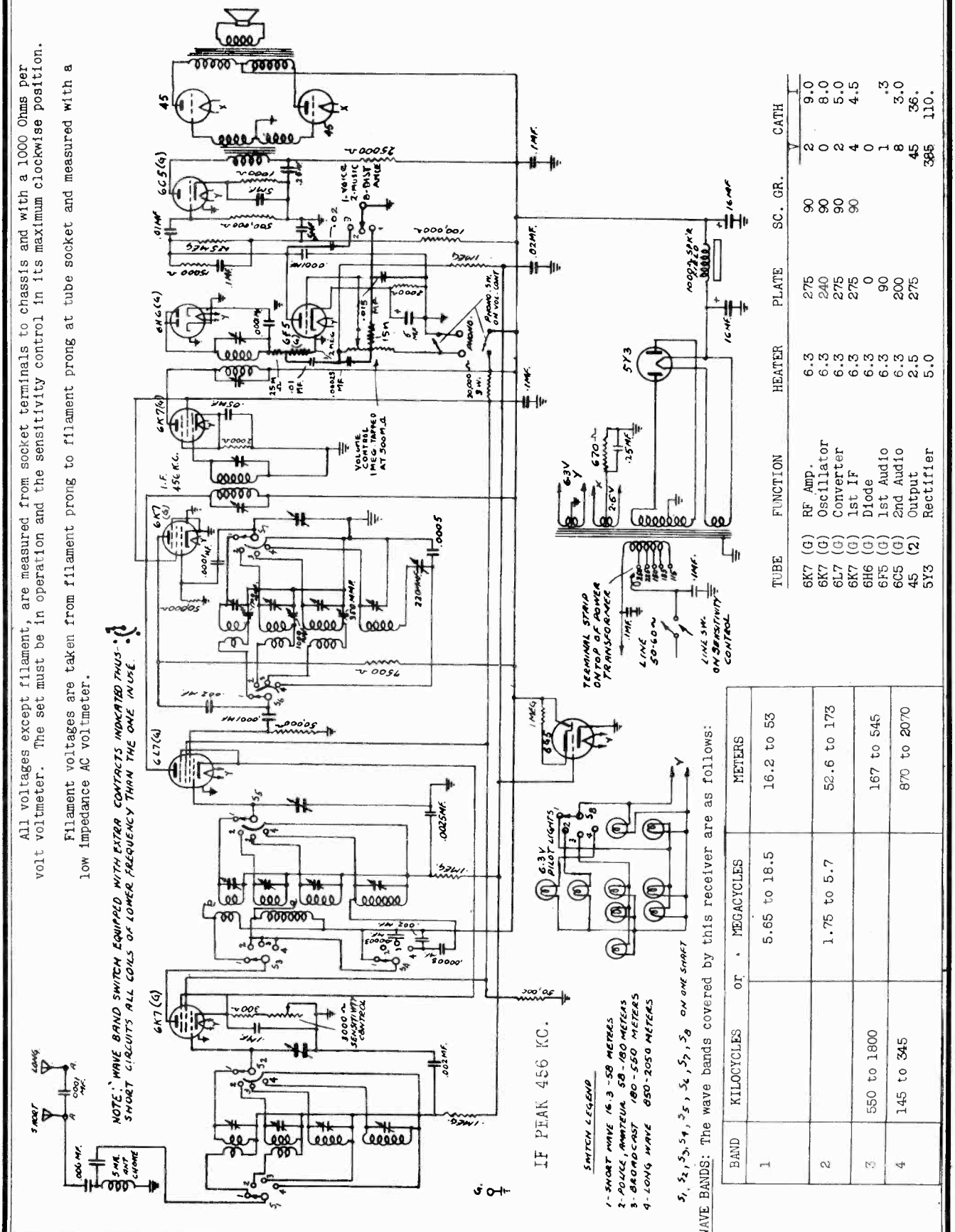
The signal generator is set at 150 kc. and the signal is tuned in on the dial. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 300 kc. adjustment should then be rechecked.

GAROD RADIO CORP.

MODELS 4110, 4110E, 4110KC
Schematic, Voltage

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.



TUBE	FUNCTION	HEATER	PLATE	SC. GR.	V	CATH I
6K7 (G)	RF Amp.	6.3	275	90	2	9.0
6K7 (G)	Oscillator	6.3	240	90	0	8.0
6L7 (G)	Converter	6.3	275	90	2	5.0
6K7 (G)	1st IF	6.3	275	90	4	4.5
6H6 (G)	Diode	6.3	0		0	
6F5 (G)	1st Audio	6.3	90		1	.3
6C5 (G)	2nd Audio	6.3	200		8	3.0
45 (2)	Output	2.5	275		45	36.
5Y3	Rectifier	5.0			385	110.

WAVE BANDS: The wave bands covered by this receiver are as follows:

BAND	KILOCYCLES	or • MEGACYCLES	METERS
1		5.65 to 18.5	16.2 to 53
2		1.75 to 5.7	52.6 to 173
3	550 to 1800		167 to 545
4	145 to 345		870 to 2070

MODELS 4110,4110E,4110KC
Socket,Trimmers,Alignment

GAROD RADIO CORP.

I.F.ADJUSTMENT - The signal generator is set at 456 kc. and is connected to the grid of the first detector (6A8). 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 tops of the I.F. Transformers.

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 interstage trimmers are then adjusted in the order named for maximum output. These trimmers are located as indicated in the bottom view of the chassis.

6 MEGACYCLE ADJUSTMENT - The signal generator is set at 6 megacycle and the signal tuned in on the dial. The short wave padding condenser is adjusted for maximum output, while the gang condenser is rocked slightly to the right and left. The 18 megacycle adjustment should then be rechecked.

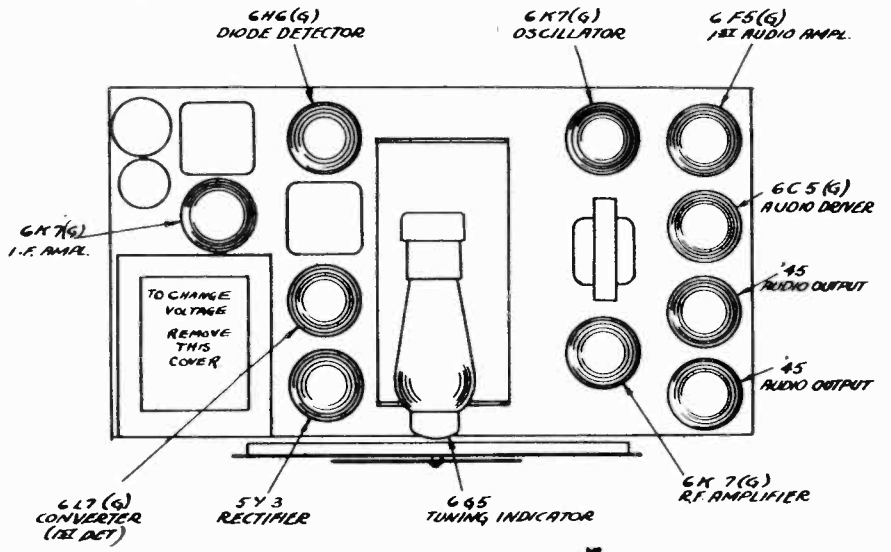
5 MC. ADJUSTMENT - With the band selector switch in position for operation on band no. 2. and the receiver and signal generator both set at 5 mc. the procedure outlined above is repeated.
The signal generator is set at 1.8 mc. and the signal tuned in on the dial. The police band padder condenser is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 5 mc. adjustment should then be rechecked.

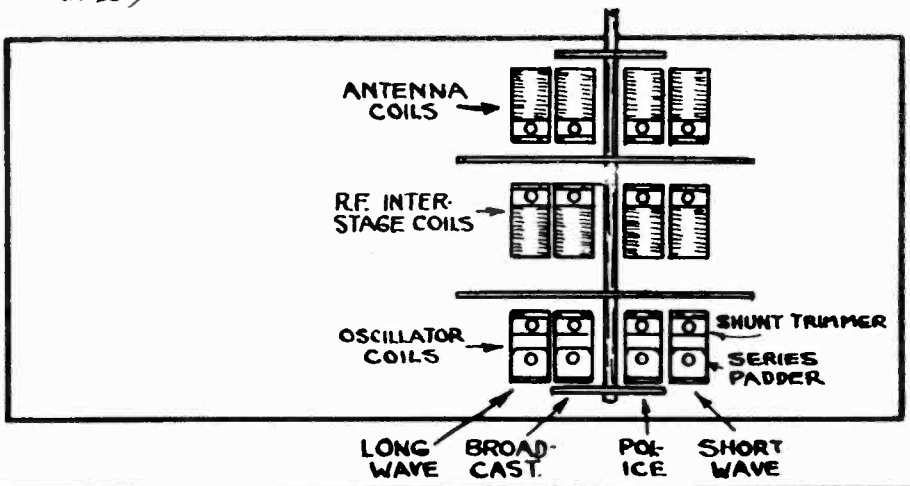
1500 KC. ADJUSTMENT - The band selector switch is set in position for operation on the no. 3. band. The receiver and signal generator are both set at 1500 kc. and the procedure outlined above is repeated.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The broadcast padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1500 kc. adjustment should then be rechecked.

300 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 4. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated.

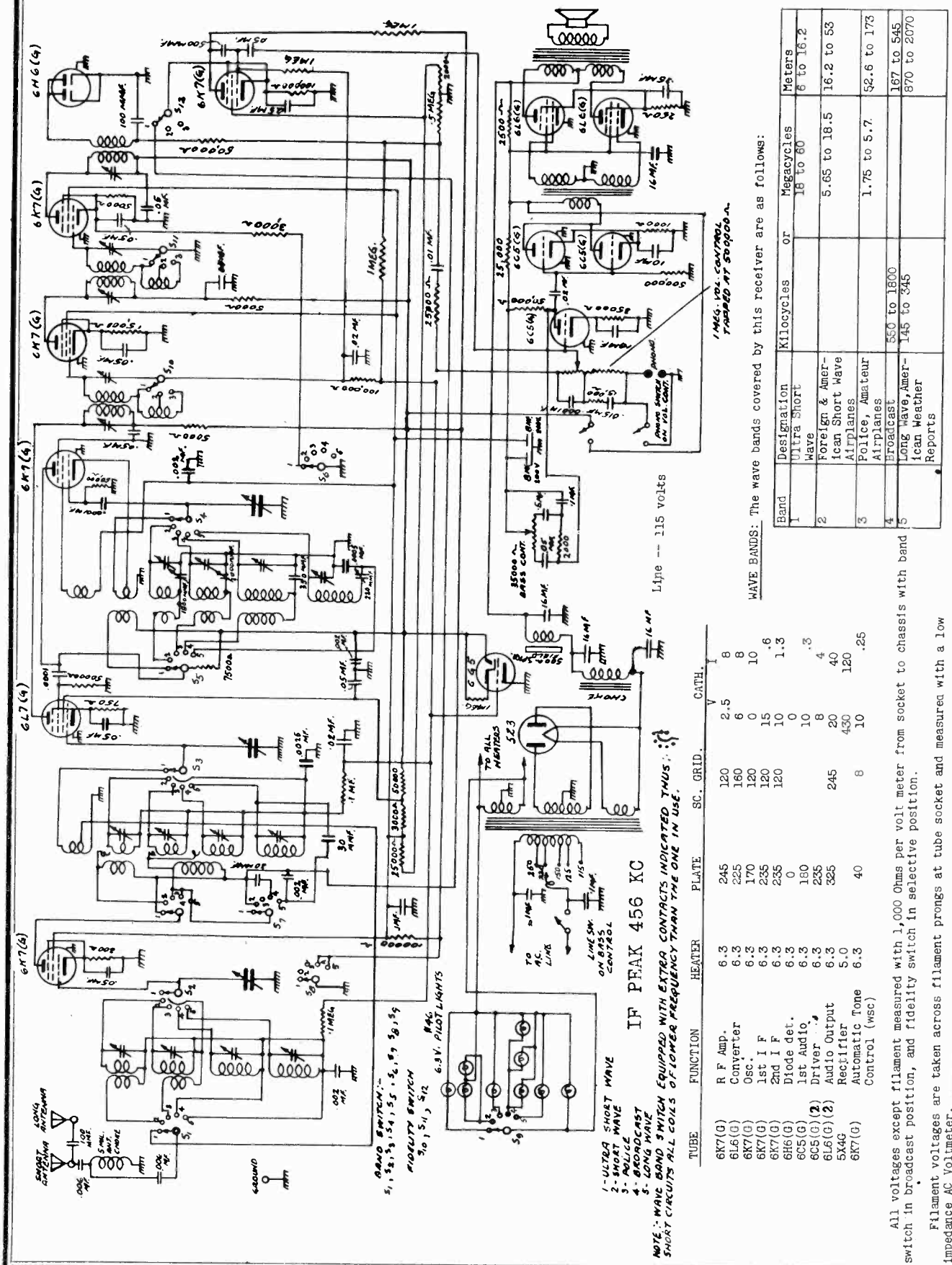
The signal generator is set at 150 kc. and the signal is tuned in on the dial. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 300 kc. adjustment should then be rechecked.





GAROD RADIO CORP.

MODEL 5140
Schematic
Voltage



TUBE	FUNCTION	HEATER	PLATE	SC. GRID.	CATH. V	CATH. I
6K7(G)	R F Amp.	6.3	245	120	2.5	8
6L6(G)	Converter	6.3	225	160	6	8
6K7(G)	Osc.	6.3	170	120	0	10
6K7(G)	1st I F	6.3	235	120	15	.6
6K7(G)	2nd I F	6.3	235	120	10	1.3
6H6(G)	Diode det.	6.3	0		0	
6C5(G)	1st Audio	6.3	180		10	.3
6C5(G)(2)	Driver	6.3	235		8	4
6L6(G)(2)	Audio Output	6.3	325	245	20	40
5X4G	Rectifier	5.0			430	120
6K7(G)	Automatic Tone Control (wsc)	6.3	40	8	10	.25

WAVE BANDS: The wave bands covered by this receiver are as follows:

Band	Designation	Kilocycles or Megacycles	Meters
1	Ultra Short Wave	18 to 60	8 to 16.2
2	Foreign & American Short Wave	5.65 to 18.5	16.2 to 53
3	Airplanes	1.75 to 5.7	52.6 to 173
4	Police, Amateur Airplanes	550 to 1800	167 to 545
5	Broadcast	145 to 345	870 to 2070
	Long Wave, American Weather Reports		

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.

Filament voltages are taken across filament prongs at tube socket and measured with a low impedance AC Voltmeter.

MODEL 5140
Socket, Trimmers
Alignment

GAROD RADIO CORP.

SERVICE NOTES FOR THE MODEL 5140
14 TUBE 5 BAND A.C. SUPERHETERODYNE RECEIVER
ALIGNMENT PROCEDURE

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 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. Unles 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.

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 (6L7). 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 tops of the I.F. transformers.

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 (Short Wave). 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 interstage trimmers are then adjusted in the order named for maximum output. These trimmers are located as indicated in the bottom view of the chassis.

6 MEGACYCLE ADJUSTMENT: The signal generator is set at 6 megacycles and the signal tuned in on the dial. The Short Wave padding condenser is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left.

5 MC. ADJUSTMENT: With the band selector switch in position for operation on band no. 3 (Police) and the receiver and signal generator both set at 5 mc. the procedure outlined above is repeated.

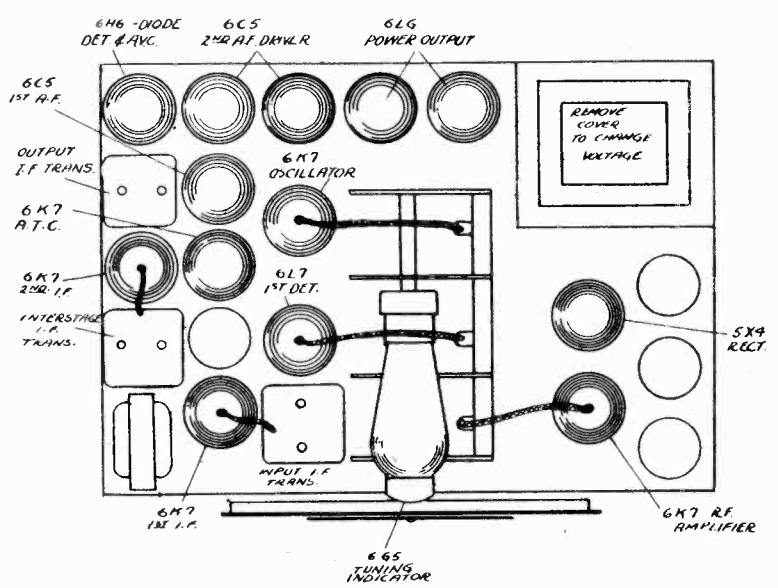
The signal generator is set at 1.8 mc. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 5 mc. adjustment should then be rechecked.

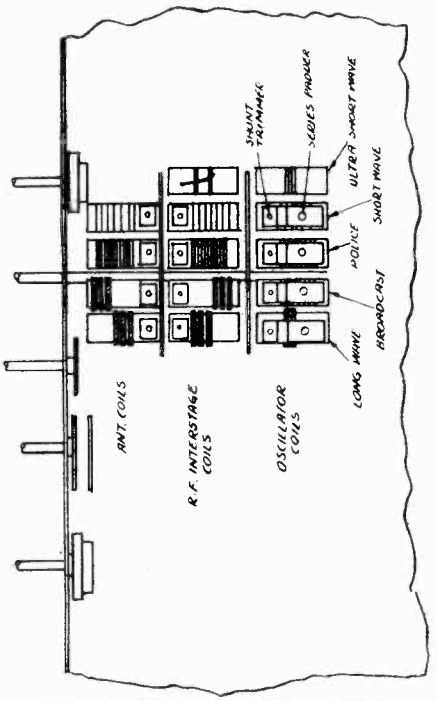
1500 KC. ADJUSTMENT: The band selector switch is set in position for operation on the no. 4 band. (Broadcast). The receiver and signal generator are both set at 1500 kc. and the procedure outlined above is repeated.

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 1500 kc. adjustment should then be rechecked.

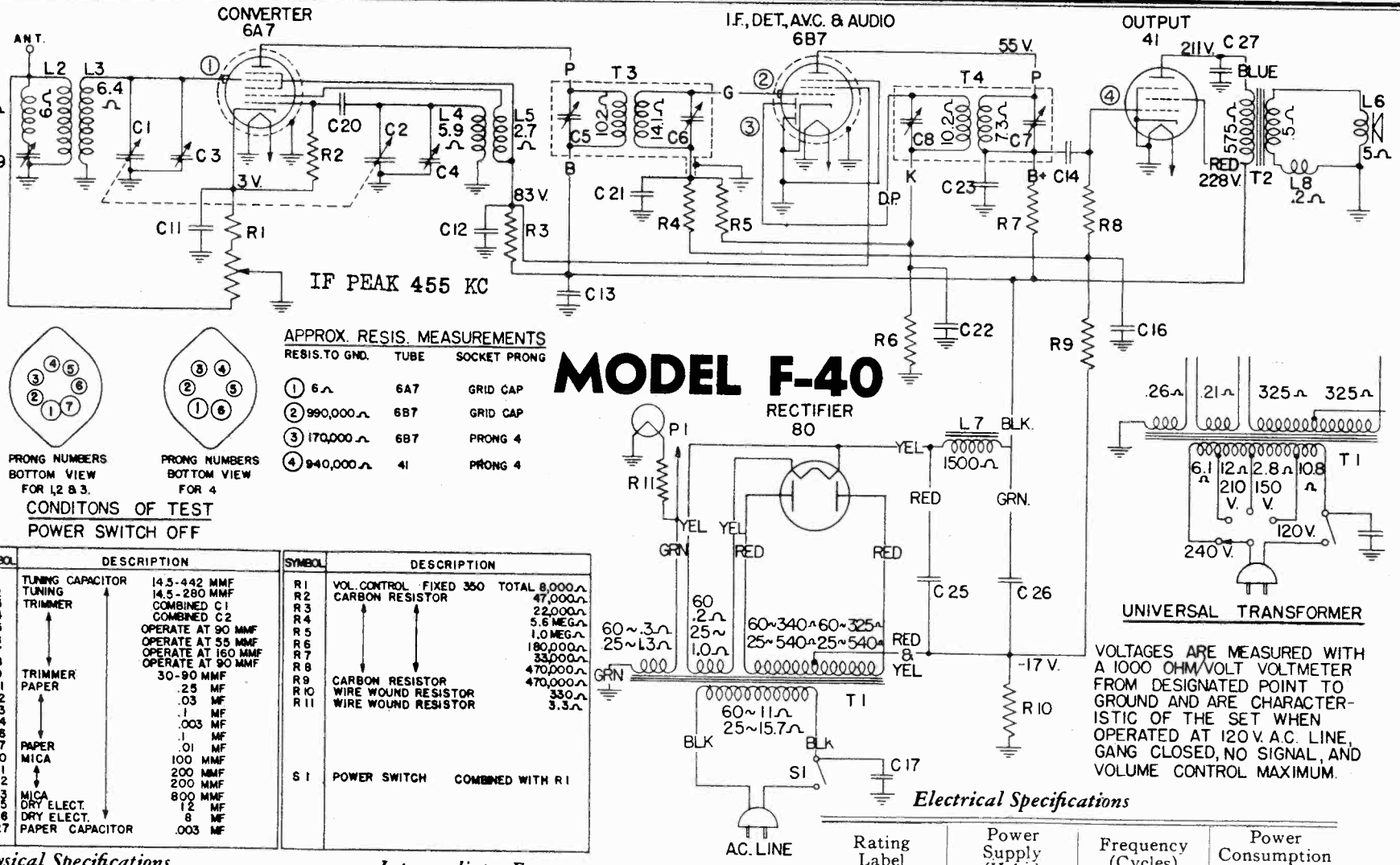
300 KC. ADJUSTMENT: The band selector switch is set in position for operation on band no. 5. The receiver and generator are both tuned to 300 kc. and the procedure outlined above is repeated.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The Long Wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 300 kc. adjustment should then be rechecked.





MODEL F-40



PRONG NUMBERS BOTTOM VIEW FOR 1,2 & 3.

PRONG NUMBERS BOTTOM VIEW FOR 4

APPROX. RESIS. MEASUREMENTS

RESIS. TO GND.	TUBE	SOCKET PRONG
① 6Ω	6A7	GRID CAP
② 990,000Ω	6B7	GRID CAP
③ 170,000Ω	6B7	PRONG 4
④ 940,000Ω	41	PRONG 4

CONDITONS OF TEST
POWER SWITCH OFF

SYMBOL	DESCRIPTION	
C1	TUNING CAPACITOR	14.5-442 MMF
C2	TUNING	14.5-280 MMF
C3	TRIMMER	COMBINED C1
C4		COMBINED C2
C5		OPERATE AT 90 MMF
C6		OPERATE AT 55 MMF
C7		OPERATE AT 160 MMF
C8		OPERATE AT 90 MMF
C9	TRIMMER	30-90 MMF
C11	PAPER	.25 MF
C12		.03 MF
C13		.1 MF
C14		.003 MF
C16		.1 MF
C17	PAPER	.01 MF
C20	MICA	100 MMF
C21		200 MMF
C22		200 MMF
C23	MICA	800 MMF
C25	DRY ELECT.	12 MF
C26	DRY ELECT.	8 MF
C27	PAPER CAPACITOR	.003 MF

SYMBOL	DESCRIPTION	
R1	VOL. CONTROL FIXED 350	TOTAL 8,000Ω
R2	CARBON RESISTOR	47,000Ω
R3		22,000Ω
R4		5.6 MEGΩ
R5		1.0 MEGΩ
R6		180,000Ω
R7		33,000Ω
R8		470,000Ω
R9	CARBON RESISTOR	470,000Ω
R10	WIRE WOUND RESISTOR	330Ω
R11	WIRE WOUND RESISTOR	3.3Ω
S1	POWER SWITCH	COMBINED WITH R1

VOLTAGES ARE MEASURED WITH A 1000 OHM/VOLT VOLTMETER FROM DESIGNATED POINT TO GROUND AND ARE CHARACTERISTIC OF THE SET WHEN OPERATED AT 120 V. A.C. LINE, GANG CLOSED, NO SIGNAL, AND VOLUME CONTROL MAXIMUM.

Physical Specifications

Model	F-40
Height	7¾ inches
Width	10¼ inches
Depth	7¾ inches
Weight packed	17 lbs

Tuning Control Drive Ratio 1:1

Tuning Frequency Range

Band "B" ..... 540-1800 kc.

Intermediate Frequency .... 455 kc.

Electrical Power Output

Undistorted	1.5 watts
Maximum	3.0 watts

Loud Speaker—Electrodynamic

Cone Diameter	6½-inch
Voice Coil Impedance	5.5 ohms at 400 cycles

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115-125	50-60	60
C	115-125	25-60	65
V	115-155 and 190-250	50-60	65

NOTE: Rating "V" receivers may be used on 40-cycle circuits provided the voltage does not exceed 110 volts on the 115-125 volt tap or 200 volts on the 190-220 volt tap.

GENERAL ELECTRIC

SERVICE NOTES RFS-40

Tubes

Converter	6A7 Pentagrid Converter
I.F. amplifier, diode det. and 1st audio	6B7 Duplex Diode Pentode
Output	41 Power Amplifier Pentode
Rectifier	80 Full-wave Rectifier
Pilot Lamp	Mazda No. 46

GENERAL INFORMATION

This compact, single band receiver employs four Pretested General Electric tubes described above in a highly efficient superheterodyne circuit which includes a single stage of I.F., partial automatic volume control, wave trap, and pentode power output.

Description of Circuit

The signal from the antenna is applied to the control grid of the 6A7 through the R.F. transformer L2 and L3, the secondary of which is tuned by the rear section of the gang condenser. The 6A7 pentagrid converter tube is employed as a combination first detector and oscillator which converts the incoming signal to 455 kc. The intermediate frequency is transferred to the next tube by the 1st I.F. transformer T-3. The second tube, 6B7, performs the triple function of I.F. amplifier, detector and AVC, and audio amplifier. This is accomplished by inserting the 455 kc. signal from T3 into the grid circuit of the pentode section of the 6B7. After amplification at I.F. frequency, the signal is coupled through the I.F. transformer T-4 to the diode section of the same tube where it is rectified and the AVC voltage developed across R6. This AVC is in turn applied through R5 to the grid of the 6B7, causing a control of the amplification dependent upon the strength of the carrier. The audio voltage developed across R6 is fed through R5 and through the secondary of T-3 to the grid of the 6B7.

After amplification in the 6B7 this audio frequency is taken off of the plate load, R-7, through the coupling capacitor C-14, and thence to the grid of the 41 pentode power output tube.

Volume is controlled by the variable potentiometer R-1 in the cathode circuit of the 6A7 tube. This changes the self-bias on this tube and thereby changes the gain of the input tube. This same control functions to gradually short the antenna to ground as volume is decreased.

Plate and grid bias voltages for all tubes are supplied by the power supply system employing an 80 type full-wave rectifier tube.

ALIGNMENT PROCEDURE

I.F.	Broadcast	Broadcast
455 kc.	1830 kc.	1500 kc.

In order to align this receiver 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.
3. An alignment tool consisting of an insulating shaft with a small screw driver blade.

The location of all alignment trimmers are shown in Fig. 2.

I.F. Alignment

With gang condenser plates closed, turn the volume control to maximum (extreme clockwise position). Short circuit the antenna and ground leads.

Connect the test oscillator output between the chassis and the control grid of the 6A7 tube. A .05 mfd. capacitor should be used in series with the signal generator lead to the control grid. Connect the output meter across the voice coil of the speaker. Set the test oscillator to 455 kc. and adjust the oscillator output until a small deflection is noted on the output meter.

The four I.F. trimmers, see Fig. 2, are adjusted in the following sequence:

1. Secondary trimmer of 2nd I.F. transformer
2. Primary trimmer of 2nd I.F. transformer
3. Secondary trimmer of 1st I.F. transformer
4. Primary trimmer of 1st I.F. transformer

For a final check, the above adjustments should be repeated, keeping the test oscillator output at a low level.

I.F. Wave Trap Alignment

After completion of the I.F. alignment with the test oscillator still set at 455 kc. point, apply this frequency to the antenna lead 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 lead. With the 455 kc. signal applied to the receiver antenna lead, adjust the I.F. wave trap trimmer (C-9) for a minimum output indication.

R.F. Alignment

Remove the chassis. Connect the signal generator to the antenna and ground leads of the chassis through a dummy antenna consisting of a 400 ohm resistor in series with a 250 mmf. capacitor. Connect the output indicator across the voice coil of the speaker. With the gang condenser set to the minimum capacity position, i.e., plates fully open, peak the oscillator trimmer C-4 (front section) for maximum output with the signal generator set at the 1830 kc. point. Now reduce the signal generator frequency to 1500 kc. and tune in carefully this new frequency by means of the gang condenser. Now peak the antenna trimmer (C-3) (rear section) for a maximum output. After replacing the chassis in the cabinet, set the pointer by turning the station selector to the extreme clockwise position. Grasp the dial pointer and turn clockwise until the long end is opposite the last mark beyond 160.

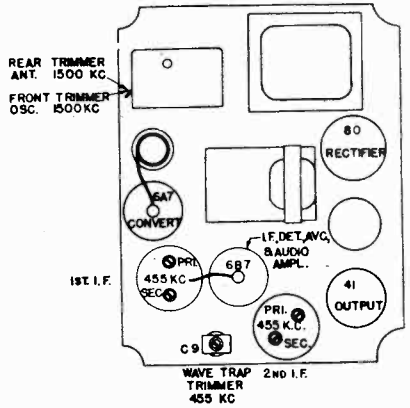


Fig. 2. Trimmer Location

REPLACEMENT PARTS LIST MODEL F-40

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
RB-070	BOARD—Terminal board (3 terminals)	$0.10
*RC-015	CAPACITOR—.003 Mfd., 400 V. paper (C-14)	.25
RC-055	CAPACITOR—.003 Mfd., 600 V. paper (C-15)	.25
*RC-083	CAPACITOR—.03 Mfd., 400 V. paper (C-12)	.25
*RC-123	CAPACITOR—.1 Mfd., 400 V. paper (C-13, C-16)	.35
RC-152	CAPACITOR—.25 Mfd., 400 V. paper (C-11)	.40
*RC-234	CAPACITOR—100 Mmf., mica (C-20)	.25
RC-252	CAPACITOR—200 Mmf., mica (C-21, C-22)	.30
RC-310	CAPACITOR—800 Mmf., mica (C-23)	.25
RC-585	CAPACITOR—12 Mfd., 450 V.; 8 Mfd., 450 V. dry electrolytic (C-25, C-26)	1.50
RC-644	CAPACITOR—Double trimmer, 2nd I.F. transformer (C-7, C-8)	.40
RC-669	CAPACITOR—Double trimmer, 1st I.F. transformer (C-5, C-6)	.30
RC-723	CONDENSER—2-gang tuning condenser and trimmers (C-1, C-2, C-3, C-4)	2.60
*RC-756	CAPACITOR—.01 Mfd., 200 V. paper (C-17)	.25
RC-1969	CUSHION—Cushion ring between speaker and cabinet	.15
*RC-863	CORD—Power cord	.65
RG-013	GRID CLIP—Control grid clip (Pkg. of 5)	.10
RK-024	KNOB—Volume or tone control knob (Ivory) (Pkg. of 5)	.40
RL-054	COIL—"B" Antenna Coil (L-2, L-3)	.70
RL-258	COIL—"B" Oscillator Coil (L-4, L-5)	.80
RP-754	POINTER—Pointer and two washers	.40
RQ-1299	RESISTOR—47,000 ohms, ½ watt carbon (R-2) (Pkg. of 5)	.70
RQ-1313	RESISTOR—180,000 ohms, ½ watt carbon (R-6) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohms, ½ watt carbon (R-8, R-9) (Pkg. of 5)	.70
RQ-1331	RESISTOR—1 megohm, ½ watt carbon (R-5) (Pkg. of 5)	.70
RQ-1349	RESISTOR—5.6 megohms, ½ watt carbon (R-4) (Pkg. of 5)	.70
RQ-1491	RESISTOR—22,000 ohms, 1 watt carbon (R-3)	.20
RQ-1495	RESISTOR—33,000 ohms, 1 watt carbon (R-7)	.20
RR-350	RESISTOR—3.3 ohms, 2 watt wire-wound (R-11)	.35
RR-1005	RESISTOR—330 ohms, 1 watt moulded (R-10)	.20
RS-179	SHIELD—Tube shield	.15
RS-180	SHIELD—2nd I.F. transformer shield	$0.20
RS-181	SHIELD—1st I.F. transformer shield	.20
RS-215	SOCKET—6-pin tube socket (Pkg. of 5)	.60
RS-217	SOCKET—4-prong tube socket (Pkg. of 5)	.50
RS-219	SOCKET—7-pin tube socket (Pkg. of 5)	.60
RS-423	SPRING—Knob spring (Pkg. of 10)	.25
RT-040	TRANSFORMER—Power transformer, 115-125 V., 60 cycles (T-1)	4.00
RT-041	TRANSFORMER—Power transformer, 115-125 V., 25 cycles (T-1)	6.60
RT-042	TRANSFORMER—Universal power transformer (T-1)	7.60
RT-249	TRANSFORMER—1st I.F. transformer (complete) (T-3)	1.60
RT-250	TRANSFORMER—2nd I.F. transformer (complete) (T-5)	1.45
RV-036	VOLUME CONTROL—Volume control and power switch (R-1, S-1)	.95
*RW-101	WASHER—Felt washer for knobs (Pkg. of 10)	.45
RW-405	WAVE TRAP—Wave trap coil and trimmer (L-1, C-9)	.75
RX-034	ASSEMBLY—Screws and washers for cabinet back	.05
RX-035	ASSEMBLY—Gang condenser mounting screws and cushions	.15
RX-036	ASSEMBLY—Chassis mounting screws and washer	.10
	DIAL MECHANISM	
RC-8018	CABLE—Condenser drive cord and spring	
RD-065	DIAL—Dial scale—Ivory	.80
RL-920	LAMP—Pilot light 6.3 V., .25 amps. (Pkg. of 10)	1.50
RP-752	PULLEY—Drive pulley on condenser	.15
RP-753	PULLEY—Drive pulley attached to pointer	.10
RR-916	REFLECTOR—Red pilot light reflector (Pkg. of 5)	.15
RS-216	SOCKET—Dial light socket assembly	.05
	SPEAKER ASSEMBLY	
RB-074	BOARD—Terminal board	.10
RC-923	CONE—6½-in. cone and voice coil assembly	.90
RC-1950	CLAMP—Voice coil spider clamp	.05
RS-065	SPEAKER—6½-in. speaker (complete)	6.10
RT-432	TRANSFORMER—Output transformer	1.25
	CABINET ASSEMBLY	
RN-005	NUT—Speed nut for mounting dial ring (Pkg. of 10)	.20
RS-909	SCREEN—Dial screen	.35
RZ-080	CABINET—Brown plastic (complete)	7.25

* Used on previous receivers.

Always Specify General Electric Pre-tested Tubes.

(Prices 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
6A7 Oscillator	83	....	3	5.3	6.3
6A7 Converter	228	83			
6B7 Amplifier	55	83	.....	5.7	6.3
41 Output	211	228	.....	33	6.3
80 Rectifier	600/300 R.M.S.	....	300 D-C	45	5.0

Line voltage 120. 1000 ohms per-volt meter. No signal. Volume control set for maximum. Gang condenser plates closed.

GENERAL ELECTRIC CO.

MODELS G-50, G-55
Schematic, Coils

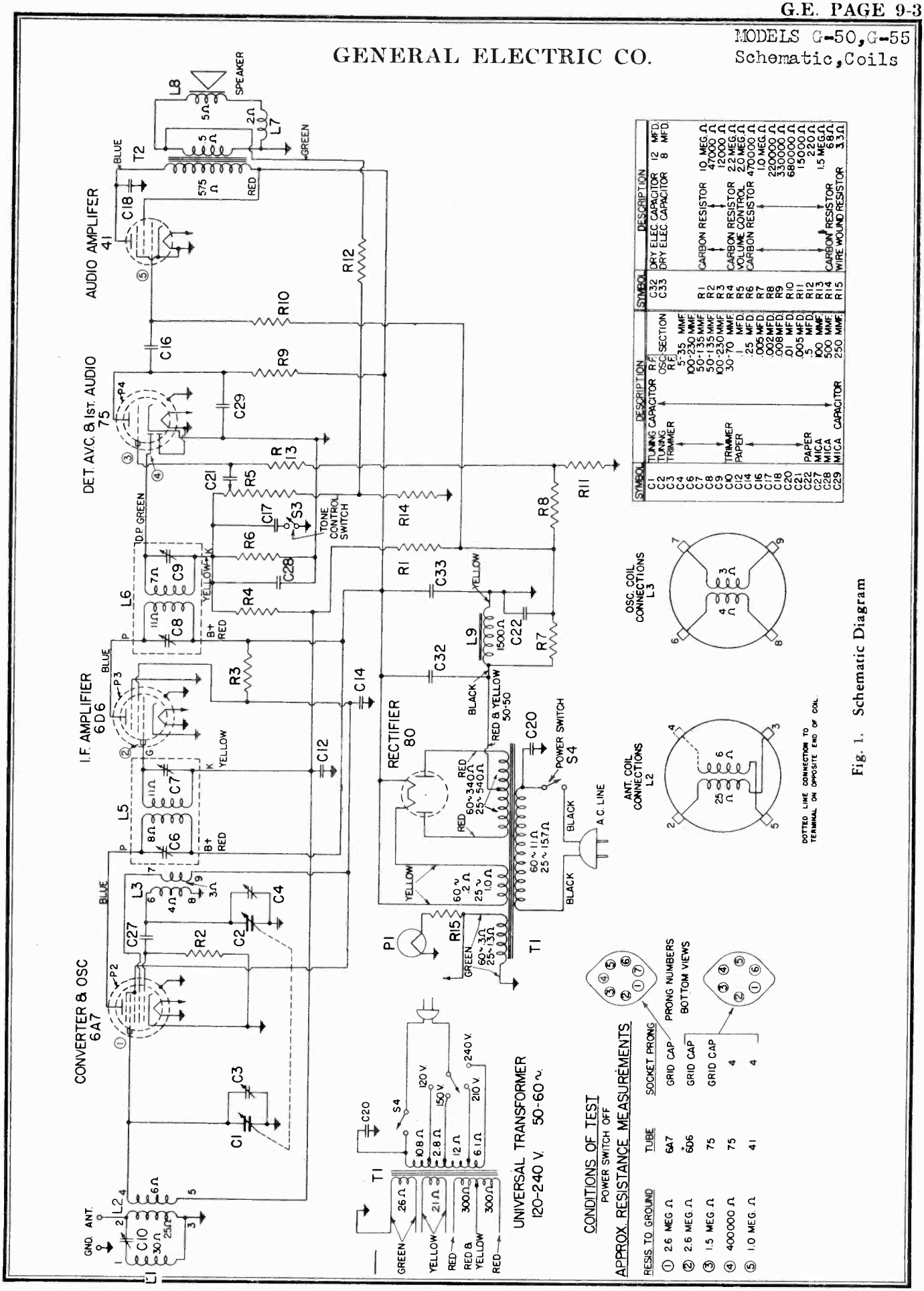


Fig. 1. Schematic Diagram

SERVICE DATA

Physical Specifications

Model	G-50	G-55
Height	10⅛ in.	38 inches
Width	14¼ in.	24 inches
Depth	7⅝ in.	10⅝ inches
Weight Packed	22 lbs	46 lbs.

Tuning Control Drive Ratio ..... 2 to 1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption Watts
A	115–125	60	60
C	115–125	25–60	65
V	115–125 140–155 190–220 220–250	60	65

NOTE: Rating "V" receivers may be used on 40-cycle circuits provided the voltage does not exceed 110 volts on 110–125 volt tap or 200 volts on the 190–220 volt tap.

Tuning Frequency Range

Band "B" ..... 540 to 1800 kc.

Intermediate Frequency ..... 465 kc.

Electrical Power Output

Undistorted ..... 2.3 watts
Maximum ..... 3.5 watts

Tone Control ..... Two Position —Bass and Normal

Loud-speaker—Electrodynamic

Cone: Model G-50 ..... 6½ inches
Model G-55 ..... 8.0 inches
Speaker Impedance ..... 5 ohms at 400 cycles

Tubes

Oscillator & Converter ..... 6A7 Pentagrid converter
I.F. Amplifier ..... 6D6 Triple-grid Super-control amplifier
Detector, AVC, 1st audio ..... 75 Duplex Diode and high-gain Triode
Audio Amplifier ..... 41 Power Amplifier Pentode
Rectifier ..... 80 Full-wave rectifier
Indicator Lamp ..... MAZDA No. 46 Green

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.
6A7	Oscillator	105	105	0	14.8	6.3
	Converter	230				
6D6	1st I.F. Amp.	230	105	0	10	6.3
75	Det A.V.C. 1st audio	100 *		0	.16	6.3
41	Output	215	230	0	29	6.3
80	Rectifier	300/600 RMS		315 to B—	54	

A-c line voltage 120. No signal input 1000 ohms per-voltmeter. Dial pointer at 530 kc.
* Measured on 500-volt scale.

GENERAL INFORMATION

The Models G-50 and G-55 employ five General Electric Pre-Tested Tubes as described above in a highly efficient super-heterodyne circuit. A unique arrangement of push buttons mechanically connected to the dial drive mechanism allows instantaneous and accurate selection of eight different stations automatically.

Description of Electrical Circuit

A signal from the antenna is applied to the control grid of the 6A7 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 6A7 tube the incoming signal is combined with the local oscillator signal which is 465 kc higher in frequency. A 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 used in conjunction with the oscillator coil. The special cut rotor of the front condenser section makes the use of a padding capacitor unnecessary.

The combination of the oscillator and incoming signal frequencies produces an intermediate frequency of 465 kc. This signal is applied to an I.F. amplifier consisting of a 6D6 tube and two transformers, the primary and secondaries of each being tuned to 465 kc. The amplified I.F. frequency is applied to the diode section of the 75 and rectification causes a current to flow through resistor R-6. This in turn causes a voltage to be built up across R-6 and this voltage is applied to the 6A7 and 6D6 control grids and produces the right amount of AVC action. A variable resistor R-5 is shunted across R-6 and by varying the slider of R-5 the desired amount of audio voltage is impressed on the control grid of the 75 which in turn amplifies the audio frequency. The output of the 75 is resistance coupled to the grid of the 41 output tube. A transformer is used in the output of the 41 to properly match the speaker to the tube.

Tone control action is obtained by inserting or removing capacitor C-17 by means of switch S-3. Part of the output voltage is fed back through resistor R-12 to a point between R-5 and R-14 to improve the frequency response and reduce distortion.

Plate and grid voltages for all tubes are supplied by the power supply system employing an 80 full-wave rectifier tube. A suitable resistor network across the speaker field provides the proper bias for the tubes.

TOUCH TUNING MECHANISM

Automatic tuning of the receiver is accomplished by the mechanism as shown in Fig. 4. By pressing in a station button and rotating it to the lower part of the assembly, the button arm (B) will engage between the two gates (A) allowing the set to be mechanically tuned to a pre-set station at this point. When the station button is not depressed, the arm (B) should clear the gates by ⅛ in. To adjust this clearance, merely loosen the two set screws (D) and slide the assembly (F) in the proper direction on the gang condenser drive shaft; then tighten set screws.

The red dot (C) indicates the position of the pointer and is an aid in locating the desired station when the pointer is removed.

Station Set-up

The buttons are easily set up for the station as follows: Use the wrench provided with the receiver to press in a button. Bring the button down until it locks into position, then loosen button lock nut. While still holding the button pressed in, tune in a station and then tighten the button lock nut.

To check the button tuning accuracy, merely press in the button and bring it down until it locks in position. The station should be correctly tuned. Each button will tune the following range of frequencies.

Button No.	Frequency range (Kilocycles)
1	540–590
2	570–670
3	630–780
4	710–940
5	830–1150
6	1020–1400
7	1220–1700
8	1580–1800

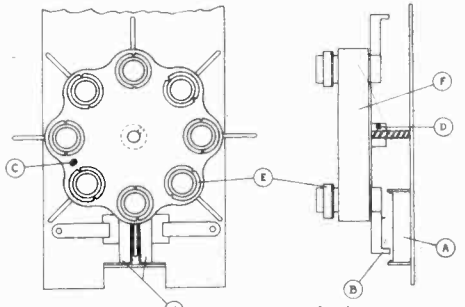


Fig. 4. Dial Mechanism

REPLACEMENT PARTS LIST
MODELS G-50 AND G-55

Insist on genuine factory-tested parts which may be purchased from authorized dealers

Stock No.	Description	List Price
*RB-041	BOARD—Terminal Board (2 terminals)	$0.10
*RB-066	BOARD—Terminal Board (4 terminals)	.10
*RB-078	BOARD—Terminal Board (7 terminals)	.10
*RC-011	CAPACITOR—.002 Mfd., 600 V. paper (C-17)	.25
*RC-023	CAPACITOR—.005 Mfd., 600 V. paper (C-16, 21)	.25
*RC-042	CAPACITOR—.01 Mfd., 1000 V. paper Capacitor (C-20)	.30
*RC-104	CAPACITOR—.1 Mfd., 600 V. paper (C-12)	.30
*RC-152	CAPACITOR—.25 Mfd., 400 V. paper (C-14)	.40
*RC-156	CAPACITOR—.5 Mfd., 100 V. paper (C-22)	.45
*RC-193	CAPACITOR—.008 Mfd., 600 V. paper (C-18)	.25
RL-259	COIL—Oscillator Coil (L-3)	.75
*RQ-685	RESISTOR—12,000 ohm, 2 w. carbon (R-3)	.25
*RQ-1231	RESISTOR—68 ohm, ½ w. carbon (R-14) (Pkg. of 5)	.70
*RQ-1243	RESISTOR—220 ohm, ½ w. carbon (R-12) (Pkg. of 5)	.70
*RQ-1287	RESISTOR—15,000 ohm, ½ w. carbon (R-11) (Pkg. of 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½ w. carbon (R-2) (Pkg. of 5)	.70
*RQ-1315	RESISTOR—220,000 ohm, ½ w. carbon (R-8) (Pkg. of 5)	.70
*RQ-1319	RESISTOR—330,000 ohm, ½ w. carbon (R-9) (Pkg. of 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½ w. carbon (R-6) (Pkg. of 5)	.70
*RQ-1327	RESISTOR—680,000 ohm, ½ w. carbon (R-10) (Pkg. of 5)	.70
*RQ-1331	RESISTOR—1 megohm, ½ w. carbon (R-7) (Pkg. of 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½ w. carbon (R-13) (Pkg. of 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½ w. carbon (R-4) (Pkg. of 5)	.70
*RQ-1355	RESISTOR—10 megohm, ½ w. carbon (R-1) (Pkg. of 5)	.70
*RR-350	RESISTOR—3.3 ohms, 2 w. wire wound (R-15)	.35
*RS-179	SHIELD—Tube Shield for 6A7 or 75	.15
*RS-181	SHIELD—1st or 2nd I.F. Transformer Shield	.20
*RS-183	SHIELD—Tube Shield for 6D6	.15
*RS-215	SOCKET—6-prong Tube Socket (Pkg. of 5)	.60
*RS-217	SOCKET—4-prong Tube Socket (Pkg. of 5)	.50
*RS-219	SOCKET—7-prong Tube Socket (Pkg. of 5)	.60
RS-375	SWITCH—Tone Control Switch (S-3)	.36
RT-253	TRANSFORMER—1st I.F. Transformer (complete)	1.25
RT-254	TRANSFORMER—2nd I.F. Transformer (complete)	1.25
*RT-0510	TRANSFORMER—Power Transformer 115-125 V., 50-60 Cycles (T-1)	3.95
*RT-0512	TRANSFORMER—Power Transformer 115-125 V., 25-60 Cycles (T-1)	6.50
*RT-0513	TRANSFORMER—Universal Power Transformer (T-1)	7.65
*RC-235	CAPACITOR—100 Mmf., mica (C-27)	$0.25
*RC-259	CAPACITOR—250 Mmf., Mica (C-22)	.30
*RC-296	CAPACITOR—500 Mmf., Mica (C-28)	.25
*RC-587	CAPACITOR—Dry Electrolytic 12 Mfd., 450 V.; 8 Mfd., 450 V. (C-32, 33)	1.15
RC-671	CAPACITOR—Double Trimmer 1st or 2nd I.F. Transformer (C-6, 7, 8, 9)	.40
RC-672	CAPACITOR—Oscillator Trimmer (C-4)	.15
RC-724	CONDENSER—2-gang Tuning Condenser (C-1, -2, -3)	3.00
RC-865	CORD—Power Cord with Plug	.45
RC-8024	CABLE—Speaker Cable with Female Plug	.55
RG-013	GRID CLIP—Control Grid Clip (Pkg. of 5)	.10
RK-025	KNOB—Control Knob (Pkg. of 5)	.40
RL-055	COIL—Antenna Coil (L-2)	.80
RV-038	VOLUME CONTROL—Volume Control and Power-Switch (R-5, S-4)	$0.95
*RW-101	WASHER—Felt Washer for Knobs (Pkg. of 10)	.45
*RW-406	WAVE TRAP—Wave Trap Assembly (L-1, C-10)	.85
RX-039	ASSEMBLY—Gang Condenser Mounting Cushions, Washer and Screws	.05
	SPEAKER ASSEMBLY G-50	
RB-074	BOARD—Terminal Board (2 terminals)	.10
*RC-923	CONE—6½-inch Cone and Voice Coil Assembly	.90
*RC-1950	CLAMP—Voice Coil Spider Clamp	.05
*RP-015	PLUG—Male Speaker Plug	.20
RS-068	SPEAKER—6½-inch Speaker (complete)	5.90
*RT-428	TRANSFORMER—Output Transformer (T-2)	1.20
	SPEAKER ASSEMBLY G-55	
*RC-924	CONE—8-inch Cone and Voice Coil Assembly	.90
*RC-990	CLAMP—Voice Coil Spider Clamp	.05
*RP-015	PLUG—Male Speaker Plug	.20
RS-069	SPEAKER—8-inch Speaker (complete)	6.10
*RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-433	TRANSFORMER—Output Transformer (T-2)	1.20
	DIAL MECHANISM	
RC-1971	CAP—Brass Push Button Cap and Window (Pkg. of 5)	.25
RC-8055	CARD—Station Letter Cards (Set of 5)	.25
RD-063	DIAL—Dial Scale	.95
RL-921	LEVER—Push Button Lever	.75
RN-003	NUT—Nut for Dial Pointer Disc	.15
RN-004	NUT—Lock Nut for Push Button	.20
RP-092	POINTER—Pointer Disc and Nut	.75
RR-921	REFLECTOR—Reflector Jewel and Holder	.10
RS-230	SOCKET—Lamp Socket Assembly	.10
RS-507	SLEEVE—Push Button Sleeve, Spring and Ring	.50
RW-500	WRENCH—Dial Nut and Push Button Wrench	.10
RX-040	ASSEMBLY—Push Button Dial Mechanism (complete)	7.35

* Used on previous receivers.

(Prices subject to change without notice)

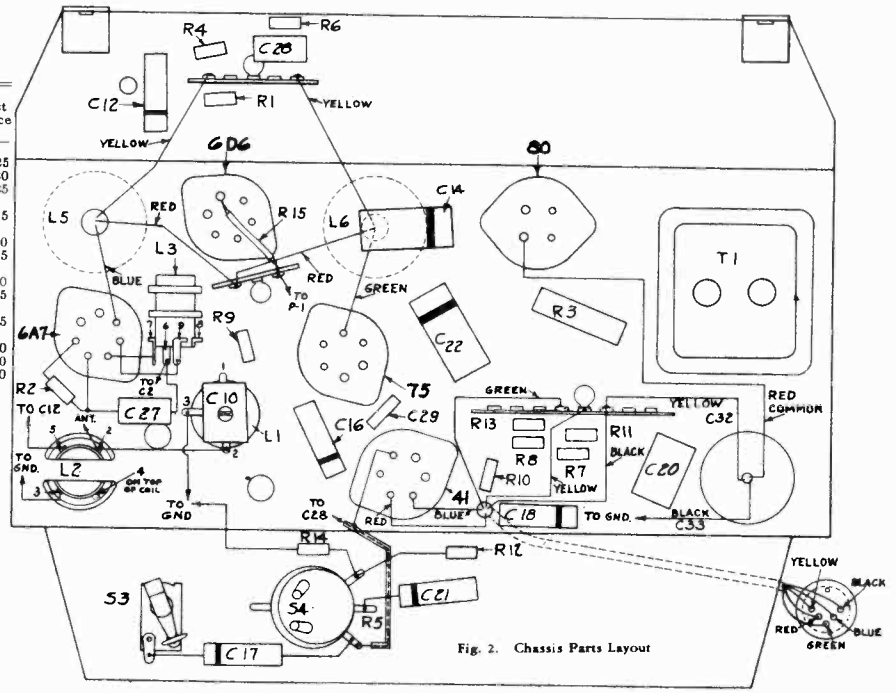


Fig. 2. Chassis Parts Layout

ALIGNMENT PROCEDURE

I.F.	*Broadcast*	*Broadcast*
465 kc.	*1500 kc.*	*1830 kc.*

In order to align these receivers properly, it is necessary to have the following test equipment.

1. A modulated test oscillator.
2. An output indicator such as an a-c voltmeter with a range of from 3 to 5 volts.
3. A screwdriver type aligning tool.

The trimmer locations are shown in Fig. 3.

I.F. Alignment

Turn the volume control to maximum (extreme clockwise position). Tune the receiver to a point where no signal comes in and short circuit the antenna and ground leads.

Connect the test oscillator output between the chassis and through a .05 Mfd. capacitor to the control grid of the 6A7 tube. Connect the output meter across the voice coil of the speaker. Set the test oscillator to 465 kc. and adjust the output until a small deflection is obtained on the output meter.

The four I.F. trimmers (see Fig. 3) 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 various stages are aligned. After these adjustments have been made the same procedure should be repeated as a final check.

I.F. Wave Trap Alignment

Leave the test oscillator set at 465 kc. and connect one output lead to the receiver chassis and the other through a 250 mmf. condenser in series with 400 ohms to the receiver antenna lead. Adjust C-10 for minimum output.

R.F. Alignment

Connect the signal generator to the antenna and ground leads of the chassis through a dummy antenna consisting of a 400 ohm resistor in series with a 250 mmf. capacitor. Connect the output indicator across the voice coil of the speaker. With the gang condenser set to the minimum capacity position, i.e., plates fully open, peak the oscillator trimmer C-4 (front section) for maximum output with the signal generator set at the 1830 kc. point. Now reduce the signal generator frequency to 1500 kc. and tune in carefully this new frequency by means of the gang condenser. Now peak the antenna trimmer (C-3) (rear section) for a maximum output.

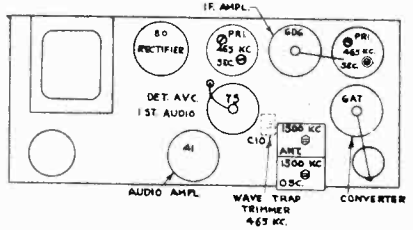
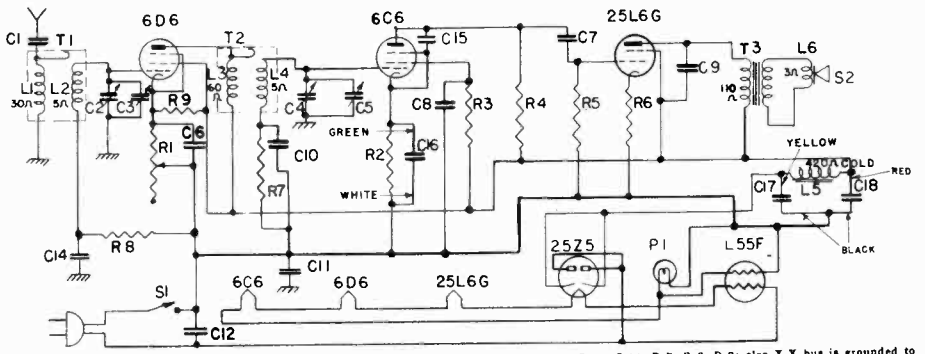


Fig. 3. Chassis Layout and Trimmer Location

MODELS GD-41,GD-41U
Schematic,Voltage
Alignment,Parts
Specifications

GENERAL ELECTRIC CO.



Note—The schematic shown is for the Model GD-41-U. Model GD-41-A omits items C-10, C-11, C-14, R-7, R-8, R-9; also X-X bus is grounded to chassis, coils L-2 and L-4 return to chassis, C-15 to chassis ground instead of to 6C6 cathode, low end of volume control is connected between C-1 and L-1.

SOCKET VOLTAGES

Tube No.	Plate to −B Volts D.C.		Screen to −B Volts D.C.		Cathode to −B Volts D.C.		Cathode Current M.A. D-C		Heater Volts	
	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
6D6	113	90	113	90	9.0	7.4	0.7	0.6	6.35	6.06
6C6	20 *	16.4 *	45	37	3.1	2.5	0.1	0.08	6.35	6.06
25L6G	108	88	113	90	7.6	6.2	40.5	33.1	25.0	23.5
25Z5	.....	.....	.....	.....	133	108	43.0	35.0	26.0	24.0

Line voltage 115 AC or DC—No signal input—1000 ohms per volt meter * Measured on 250 volt scale.
Dial pointer at 540 kc Volume control at minimum. Note—The B− is not chassis ground on the Model GD-41-U.

Symbol	Description	Symbol	Description
C-1	Capacitor—.01 Mfd. (GD-41)	R-5	Resistor—1 Megohm
C-1	Capacitor—Paper .001 Mfd. (GD-41-U)	R-6	Resistor—160 Ohms
C-2	Capacitor—Variable	R-7	Resistor—½ Megohm
C-3	Capacitor—Trimmer on gang	R-8	Resistor—¼ Megohm
C-4	Capacitor—Variable on gang	T-1	Antenna Transformer
C-5	Capacitor—Trimmer on gang	T-2	R.F. Transformer
C-6	Capacitor—Paper .05 Mfd.	T-3	Output Transformer (on speaker)
C-7	Capacitor—Paper .01 Mfd.	R-9	Resistor—50,000 Ohms
C-8	Capacitor—Paper .02 Mfd.	S-2	Power Switch (Comb. with R-1)
C-9	Capacitor—Paper .01 Mfd.		Loud-speaker—5-inch
C-10	Capacitor—Paper .01 Mfd.	C-18	Capacitor—Elect. .10 Mfd. 150 V.
C-11	Capacitor—Paper .1 Mfd.	R-1	Resistor—25,000 Ohms Volume Control
C-12	Capacitor—Paper .08 Mfd.	R-2	Resistor—30,000 Ohms
C-14	Capacitor—Paper .001 Mfd.	R-3	Resistor—3 Megohms
C-16	Capacitor—Elect. 5 Mfd. 25 V.	R-4	Resistor—1 Megohm
C-17	Capacitor—Elect. 16 Mfd. 150 V.		

MODELS GD-41 AND GD-41-U

Physical Specifications

Model	GD-41-U
Height	7¾ inches
Width	10⅜ inches
Depth	6⅛ inches
Weight packed	10 lbs.

Tuning Control Drive Ratio 8:1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
GD-41A	105-125	40-100	48
GD-41C	105-125	25-40	48
GD-41-U	105-125	40-100	48

Tuning Frequency Range

Band "B" ..... 540–1800 kc.
Alignment Frequency ..... 1500 kc.

Electrical Power Output

Undistorted ..... 1.0 watt
Maximum ..... 2.0 watts

Loud-speaker—Electrodynamic

Outside Cone Diameter ..... 5 inches
Voice Coil Impedance ..... 3.5 ohms at 400 cycles
Field Coil Resistance ..... 420 ohms (cold)

Tubes

R. F. Amplifier GE-6D6
Detector GE-6C6
Power Output GE-25L6G
Rectifier GE-25Z5
Ballast Tube Resistor L55F
Dial Lamp ..... MAZDA No. 44

GENERAL INFORMATION

Models GD-41 and GD-41-U are compact four tube AC-DC tuned radio frequency receivers that operate only in the broadcast band of frequencies. The Model GD-41 has one side of the power line connected directly to the chassis ground; while in the Model GD-41-U, condensers are used to isolate the power supply voltage from the chassis frame. Model GD-41-U is fully approved by Underwriters' Laboratories.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

ALIGNMENT

Connect the high side of the signal generator through a 250 mmf condenser to the antenna lead. The low side of the signal generator output should be connected to the receiver chassis through a .05 mfd. condenser. Connect a suitable output meter across the voice coil leads; then proceed as follows:

1. With gang condenser plates completely closed, the dial pointer should coincide with the horizontal dial line.

2. Tune receiver to the 1500 kc. point on the dial; then align trimmers (C-3 and C-5) on the gang condenser at 1500 kc. for a maximum output meter reading.

Precaution—One side of the power supply is connected to the chassis—Do not connect chassis to any external ground.

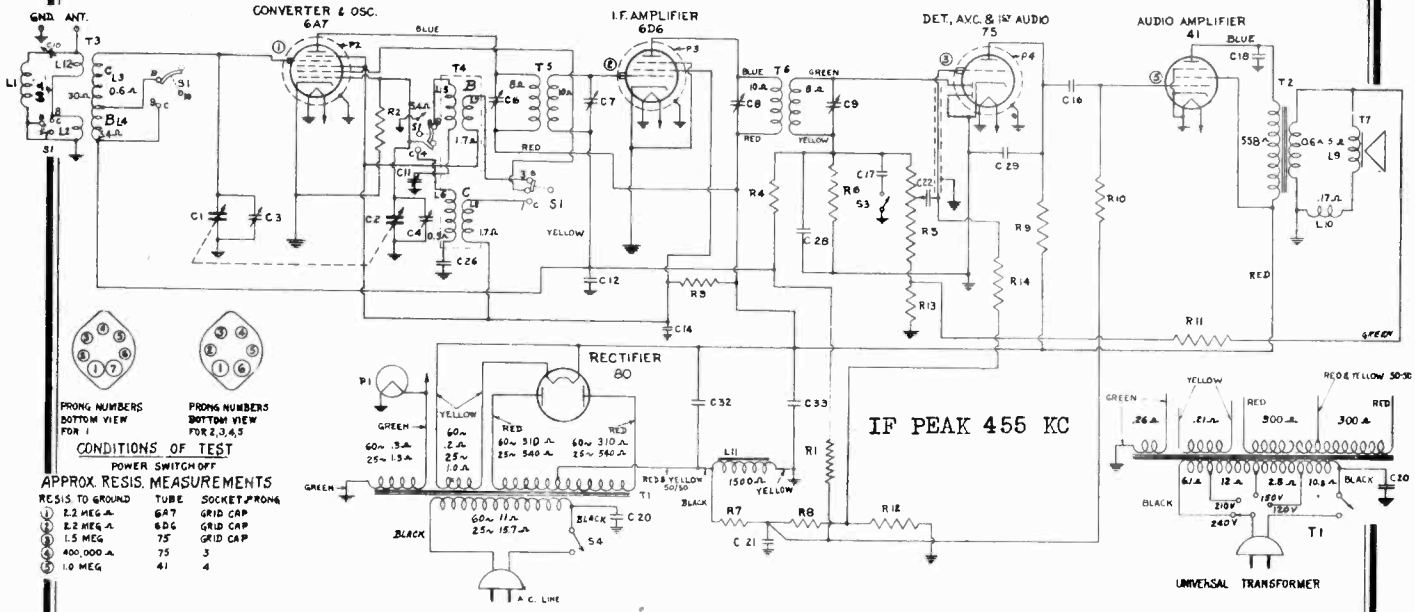
REPLACEMENT PARTS LIST

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RC-009	CAPACITOR—.001 mfd., 600 V., paper (C-1) (GD-41-U only)	$0.30
*RC-039	CAPACITOR—.01 mfd., 600 V. paper (C-7, 8, 10, 14) (C-1 on GD-41)	.25
*RC-048	CAPACITOR—.02 mfd., 600 V. paper (C-9)	.30
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-6, 12)	.30
*RC-104	CAPACITOR—1 mfd., 600 V. paper (used on GD-41-U only) (C-11)	.30
*RC-235	CAPACITOR—100 mmf., mica (C-15)	.25
RC-598W	CAPACITOR—5 mfd., 16 mfd., 10 mfd., dry electrolytic (C-16, 17, 18)	1.50
RC-730W	CONDENSER—2 gang tuning condenser (C-2, 3, 4, 5)	2.50
*RC-865	CORD—Power cord with plug	.45
RC-934W	CONE—5-inch speaker cone	2.50
RC-5103W	CAPACITOR—Dry electrolytic (C-16, 17, 18) (25 cycle only)	2.00
RC-8062W	CORD—Drive cord and spring	.25
RD-076W	DIAL—Dial scale	.40
RD-077W	DRIVE—Condenser drive drum assembly	.40
*RG-013	GRID CLIP—Control grid clip (Pkg. 5)	.10
RH-002W	HANK—Antenna hank—20-foot.	.30
RK-029W	KNOBS—Control knobs (Pkg. 2)	.40
RL-064W	COIL—Antenna coil (L-1, L-2) (GD-41-U only)	1.00
RL-068W	COIL—Antenna coil (L-1, L-2) (GD-41 only)	.90
RL-143W	COIL—R.F. coil (L-3, L-4) (GD-41-U only)	.95
RL-147W	COIL—R.F. coil (L-3, L-4) (GD-41 only)	.85
RL-352W	COIL—Speaker field coil	2.50
RP-114W	POINTER—Dial scale pointer	$0.50
*RQ-1239	RESISTOR—150 ohm, ½-W. carbon (R-6) (Pkg. 5)	.70
*RQ-1296	RESISTOR—35,000 ohm, ½-W. carbon (R-2) (Pkg. 5)	.70
*RQ-1299	RESISTOR—50,000 ohm, ½-W. carbon (R-9) (Pkg. 5)	.70
*RQ-1324	RESISTOR—0.5 megohm, ½-W. carbon (used on Model GD-41-U only) (R-7, 8) (Pkg. 5)	.70
*RQ-1331	RESISTOR—1.0 megohm, ½-W. carbon (R-4, 5) (Pkg. 5)	.70
*RQ-1343	RESISTOR—3.0 megohm, ½-W. carbon (R-3) (Pkg. 5)	.70
RR-741W	RESISTOR—Ballast tube resistor	.60
RS-078W	SPEAKER—5-inch dynamic speaker (GD-41)	4.25
RS-080W	SPEAKER—5-inch dynamic speaker (GD-41-U)	4.50
RS-189W	SHIELD—Tube shield, base and ring	.15
RS-191W	SHIELD—Asbestos shield (GD-41-U)	.15
*RS-200	SOCKET—8 pin tube socket (octal base) (Pkg. 5)	.75
*RS-215	SOCKET—6-prong socket (Pkg. 5)	.60
RS-913W	SHAFT—Drive shaft and "C" washer.	.20
RT-441W	TRANSFORMER—Output transformer (T-3)	2.50
RV-043W	VOLUME CONTROL—Combination volume control (R-1)	1.10
RW-026W	WINDOW—Dial scale window	.40
RX-050W	ASSEMBLY—Pilot lamp assembly (GD-41)	.20
RX-054W	ASSEMBLY—Pilot lamp assembly (GD-41-U)	.50
RZ-106W	CABINET—GD-41 or GD-41-U cabinet.	6.25

* Used on previous receivers.
(Prices subject to change without notice)

GENERAL ELECTRIC CO.

MODEL F-51
Schematic, Socket
Trimmers, Dial Data
Chassis Wiring



SYMBOL	DESCRIPTION	
C1	TUNING CAPACITOR	13.0-44.7 MMF
C2	TUNING CAPACITOR	13.0-44.7 MMF
C3	TRIMMER CAPACITOR	COMBINED C1
C4		COMBINED C2
C6		OPERATE AT 230 MMF
C7		OPERATE AT 135 MMF
C8		OPERATE AT 135 MMF
C9		OPERATE AT 230 MMF
C10	TRIMMER CAPACITOR	OPERATE AT 70 MMF
C11	PADDER CAPACITOR	OPERATE AT 559 MMF
C12	PAPER CAPACITOR	.05 MF
C14		.25 MF
C16		.001 MF
C17		.002 MF
C18	PAPER CAPACITOR	.005 MF
C20	MOULDED PAPER CAPACITOR	.01 MF
C21	PAPER CAPACITOR	.50 MF
C22	PAPER CAPACITOR	.005 MF
C26	MICA CAPACITOR	1600 MMF
C28		500 MMF
C29	MICA CAPACITOR	250 MMF
C32	DRY ELECTROLYTIC CAPACITOR	12 MF
C33	DRY ELECTROLYTIC CAPACITOR	8 MF
R1	CARBON RESISTOR	10 MEG Ω
R2		47,000 Ω
R3		12,000 Ω
R4	CARBON RESISTOR	1.8 MEG Ω
R5	VOLUME CONTROL	2 MEG Ω
R6	CARBON RESITOR	470,000 Ω
R7		1 MEG Ω
R8		220,000 Ω
R9		330,000 Ω
R10		680,000
R11		220 Ω
R12	CARBON RESISTOR	15,000
R13	CARBON RESISTOR	68 Ω
R14	CARBON RESISTOR	1.5 MEG Ω
S1	BAND CHANGE SWITCH	
S3	TONE CONTROL SWITCH	
S4	POWER SWITCH	COMBINED R5

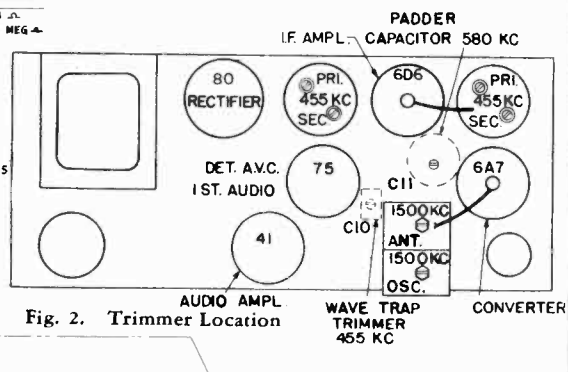


Fig. 2. Trimmer Location

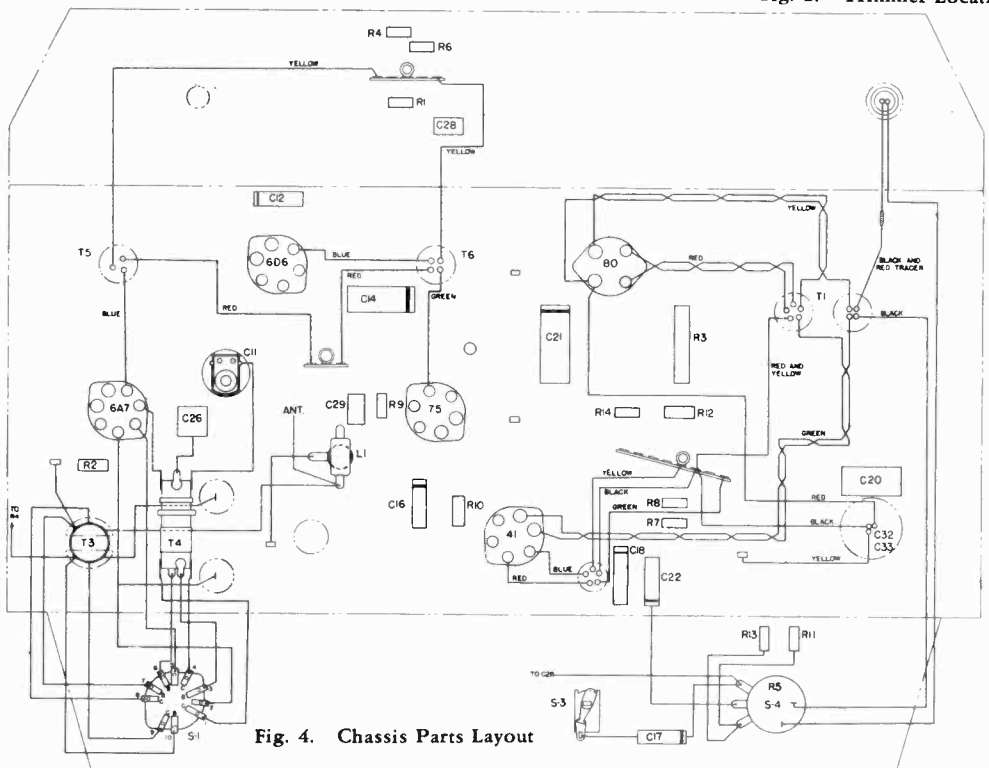


Fig. 4. Chassis Parts Layout

MODEL F-51

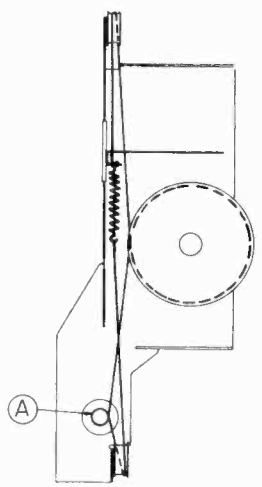


Fig. 3. Dial Mechanism

MODEL F-51
Alignment, Parts
Specifications
Voltage

GENERAL ELECTRIC CO.

RFS-51 *Radio Receiver, Model F-51*

REPLACEMENT PARTS LIST MODEL F-51

(Insist on genuine factory-tested parts which may be purchased from authorized dealers)

Stock No.	Description	List Price	Stock No.	Description	List Price
	CHASSIS ASSEMBLY		RQ-1355	RESISTOR—10 megohm, ½ watt carbon (R-1) (Pkg. of 5)	$0.70
*RB-041	BOARD—Terminal board (2 terminals)	$0.10	RS-179	SHIELD—Tube shield for 6A7 or 75	.15
RB-066	BOARD—Terminal board (4 terminals)	.10	RS-181	SHIELD—1st or 2nd I.F. transformer shield	.20
RB-078	BOARD—Terminal board (7 terminals)	.15	RS-183	SHIELD—Tube shield for 6D6	.15
*RC-023	CAPACITOR—.005 Mfd., 600 V., paper (C-16, C-22)	.25	RS-215	SOCKET—6-prong tube socket (Pkg. of 5)	.60
*RC-031	CAPACITOR—.008 Mfd., 1,600 V., paper (C-18)	.25	RS-217	SOCKET—4-prong tube socket (Pkg. of 5)	.50
*RC-091	CAPACITOR—.05 Mfd., 400 V., paper (C-12)	.30	RS-219	SOCKET—7-prong tube socket (Pkg. of 5)	.60
*RC-150	CAPACITOR—.25 Mfd., 400 V., paper (C-14)	.35	RS-423	SPRING—Knob spring (Pkg. of 10)	.25
RC-182	CAPACITOR—.5 Mfd., 100 V., paper (C-21)	.40	RS-377	SWITCH—Tone control switch (S-3)	.35
*RC-198	CAPACITOR—.002 Mfd., 1,000 V., paper (C-17)	.30	RS-378	SWITCH—Band change switch (S-1)	.75
*RC-259	CAPACITOR—250 Mmf., mica (C-29)	.30	RT-0510	TRANSFORMER—Power (T-4) transformer	3.95
*RC-296	CAPACITOR—500 Mmf., mica (C-28)	.25	RT-0512	TRANSFORMER—Power (T-1) transformer 115-125 V., 25-60 cycles (T-1)	6.50
*RC-348	CAPACITOR—1,600 Mmf., mica (C-26)	.35	RT-0513	TRANSFORMER—Universal power transformer (T-1)	7.65
RC-587	CAPACITOR—Dry Electrolytic, 12 Mfd., 450 V., 8 Mfd., 450 V. (C-32 C-33)	1.15	RT-255	TRANSFORMER—1st I.F. transformer (complete) (T-5)	1.25
*RC-634	CAPACITOR—350-550 Mmf., mica (C-27)	.35	RT-256	TRANSFORMER—2nd I.F. transformer (complete) (T-6)	1.25
RC-644	CAPACITOR—Double trimmers, 1st. or 2nd I.F. transformer (C-8, C-7, C-8, C-9)	.40	RV-039	VOLUME CONTROL—2 megohm tapped volume control and power switch (R-5, S-4)	1.00
RC-726	CAPACITOR—2 gang tuning condenser with trimmers (C-1, C-2, C-3, C-4)	2.20	*RW-101	WASHER—Felt washers on knob shafts (Pkg. of 10)	.25
*RC-756	CAPACITOR—.01 Mfd., 600 V., D.C. molded (C-20)	.25	RW-406	WAVE TRAP—Wave trap coil and trimmer (C-10, L-1)	.45
RC-8026	CABLE—Speaker cable with female plug	.55	RX-039	ASSEMBLY—Gang condenser mounting cushions, screws and washers	.85
RC-8019	CORD—Power cord without plug	.40	RX-041	ASSEMBLY—Chassis mounting cushions and screws	.05
RG-013	CLIP—Control grid clip (Pkg. of 5)	.10		***SPEAKER ASSEMBLY***	.10
RK-023	KNOB—Control knob (tan) (Pkg. of 5)	.40	RB-074	BOARD—Terminal board (2 terminals)	
RL-056	COIL—"B" and "C" Ant. coil (T-2)	1.25	RC-923	CONE—6½-in. cone and voice coil assembly	.90
RL-260	COIL—"B" and "C" Osc. coil (T-3)	1.15	RC-1950	CLAMP—Voice coil spider clamp	.05
RL-920	LAMP—Pilot lamp .25 Amps. 6.3 V. (Pkg. of 10)	1.50	RP-015	PLUG—Male speaker plug	.20
RQ-685	RESISTOR—12,000 ohm, 2 watt carbon (R-3)	.25	RS-070	SPEAKER—6½-in. speaker (complete)	6.20
RQ-1231	RESISTOR—68 ohm, ½ watt carbon (R-13) (Pkg. of 5)	.70	RT-434	TRANSFORMER—Output transformer	1.25
RQ-1243	RESISTOR—220 ohm, ½ watt carbon (R-12) (Pkg. of 5)	.70	RX-042	ASSEMBLY—Speaker mounting cushions and screws	.10
RQ-1287	RESISTOR—1,500 ohm, ½ watt carbon (R-11) (Pkg. of 5)	.70		***DIAL SCALE MECHANISM***	
RQ-1299	RESISTOR—47,000 ohm, ½ watt carbon (R-2) (Pkg. of 5)	.70	RC-8027	CABLE—Tuning condenser drive cord	.10
RQ-1315	RESISTOR—220,000 ohm, ½ watt carbon (R-8) (Pkg. of 5)	.70	RD-064	DIAL—Dial scale	.25
RQ-1319	RESISTOR—330,000 ohm, ½ watt carbon (R-9) (Pkg. of 5)	.70	RD-050	DRUM—Condenser drive drum	.30
RQ-1323	RESISTOR—470,000 ohm, ½ watt carbon (R-6) (Pkg. of 5)	.70	RP-093	POINTER—Dial scale pointer	.10
RQ-1327	RESISTOR—680,000 ohm, ½ watt carbon (R-10) (Pkg. of 5)	.70	RS-218	SOCKET—Dial Lamp socket assembly	.10
RQ-1331	RESISTOR—1 megohm, ½ watt carbon (R-7) (Pkg. of 5)	.70	*RS-401	SPRING—Tuning drive cord tension spring (Pkg. of 2)	.20
RQ-1335	RESISTOR—1.5 megohm, ½ watt carbon (R-14) (Pkg. of 5)	.70		***CABINET ASSEMBLY***	
RQ-1337	RESISTOR—1.8 megohm, ½ watt carbon (R-4) (Pkg. of 5)	.70	RZ-090	CABINET—Brown plastic cabinet (complete)	8.40
			RG-401	GRILL CLOTH—Grille cloth and backing	.15

* Used on previous receivers.

Always Specify General Electric Pre-tested Tubes.
(Prices subject to change without notice)

GENERAL ELECTRIC

SERVICE NOTES RFS-51

Tubes

Oscillator and Converter	6A7 Pentagrid converter
I.F. Amplifier	6D6 Triple-grid super-control amplifier
Detector, A.V.C. and 1st Audio	75 Duplex diode high-gain triode
Audio Power Amplifier	41 Power Amplifier Pentode
Rectifier	80 Full-wave Rectifier
Dial Lamp	MAZDA No. 46

GENERAL INFORMATION

This two-band receiver employs five General Electric Pretested tubes in a superheterodyne circuit. The circuit incorporates a wave trap and a two point tone control.

A signal from the antenna is coupled by the antenna transformer to the control grid on the 6A7 oscillator and converter tube. After conversion to 455 kc. the signal is amplified at this frequency by the intermediate frequency amplifier which employs two double tuned I.F. transformers.

The diode part of the 75 tube is used as a detector and provides the avc voltage. The 75 tube is resistance coupled to the 41 pentode amplifier output tube.

Minimum bias is supplied for all tubes by the voltage drop over the resistance R-7.

Negative feed back is used to improve the tone of reproduction. In this circuit voltage is fed back from the voice coil circuit to a tap on the volume control. This feed back voltage is out of phase with the input voltage to the audio amplifier. Engineers have shown that the resulting degeneration reduces distortion arising in the audio amplifier and extends the tone range.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.	Broadcast
455 kc.	1500 and 580 kc.

The location of all trimmers is shown in Fig. 2.

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set the test oscillator to 455 kc. and connect one output lead to the receiver chassis and the other through a .05 Mfd. condenser to the control grid of the 6A7. Do not remove the grid lead from the 6A7 as this would remove the minimum bias from this tube. Keep the test oscillator output as low as possible to give a readable output. The four I.F. trimmers, see Fig. 2, should be adjusted in the following sequence for maximum output.

1. Secondary trimmer (C-9) } on second I.F. transformer
2. Primary trimmer (C-8) }
3. Secondary trimmer (C-7) } on first I.F. transformer
4. Primary trimmer (C-6) }

Wave Trap Alignment

Leave the test oscillator set to 455 kc. and connect one output lead to the receiver chassis and the other through a 250 mmf. condenser in series with 400 ohms to the receiver antenna lead. Adjust C-10 for minimum output.

R.F. Alignment

Use the same dummy antenna (250 mmf. and 400 ohms). With 1500 kc. input, and the band switch on the broadcast position, adjust oscillator trimmer C-4 and antenna trimmer C-3 for maximum output. Next with 580 kc. input adjust the broadcast padder C-11 for maximum output while rocking the gang condenser in the vicinity of 580 kc. Repeat the adjustments at 1500 kc. No adjustment is required on "C" band.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	60
C	115–125	25–60	65
V	115–125 140–155 190–220 220–550	50–60	65

NOTE: Rating "V" receivers may be used on 40-cycle circuits provided the voltage does not exceed 110 on the 115–125 volt tap or 200 volts on the 190–220 volt tap.

TUNING DRIVE

The drive cable should be carefully threaded around the condenser drive drum and pulleys as shown in Fig. 3. "A" is the tuning shaft.

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.
6A7	Oscillator	105	105	0	14.8	6.3
	Converter	230				
6D6	1st I.F. Amp.	230	105	0	10	6.3
75	Det. A.V.C. 1st audio	100 *		0	.16	6.3
41	Output	215	230	0	29	6.3
80	Rectifier	300/600 RMS		315 to B—	54	

A.C. line voltage 120. No signal input 1000 ohms per-voltmeter.
Dial pointer at 530 K.C.
* Measured on 500-volt scale.

Physical Specifications

Height	9⅛ inches
Width	13 inches
Depth	7¾ inches
Weight packed	20 lbs

Tuning Drive Ratio ..... 8 to 1

Loudspeaker—Electrodynamic

Cone ..... 6.5 inches
Voice Coil Impedance 5.5 ohms at 400 cycles

Tuning Frequency Range

Band "B"	540–1720 kc.
Band "C"	2200–7000 kc.

Intermediate Frequency ..... 455 kc.

Electrical Output

Undistorted	2.3 watts
Maximum	3.5 watts

Tone Control ..... 2 point

GENERAL ELECTRIC COMPANY
APPLIANCE AND MERCHANDISE DEPARTMENT, BRIDGEPORT, CONN.

GENERAL ELECTRIC CO.

MODELS G-53, G-56
Schematic, Socket
Trimmers, Dial Data
Chassis Wiring

MODELS G-53 AND G-56

IF PEAK
455 KC

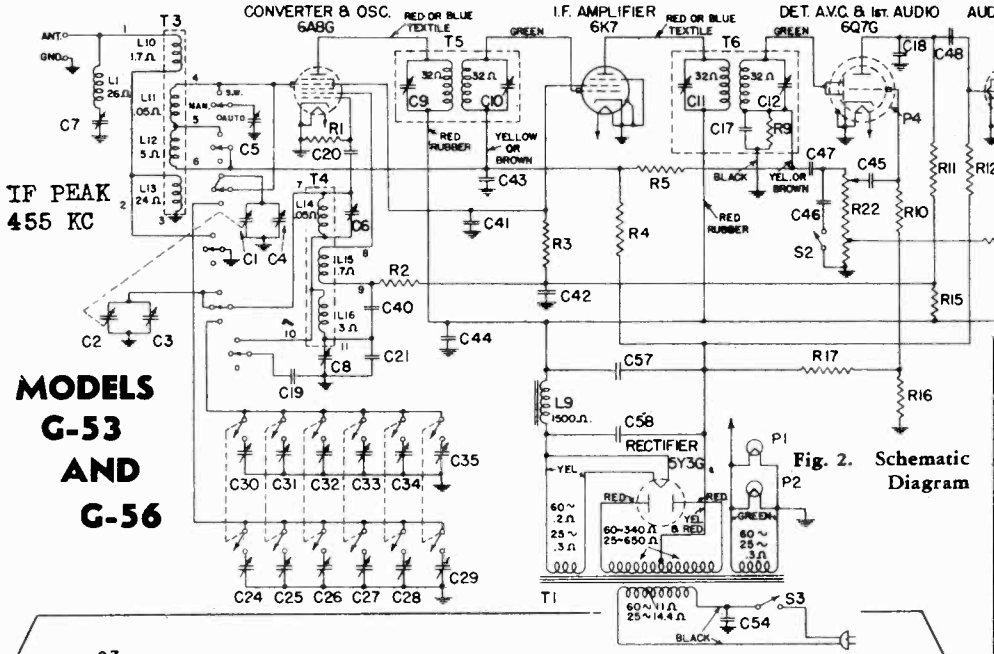


Fig. 2. Schematic Diagram

Fig. 6. Chassis Layout and Trimmer Location

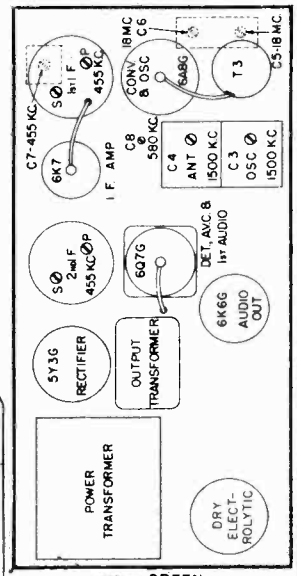


Fig. 4. Chassis Parts Layout

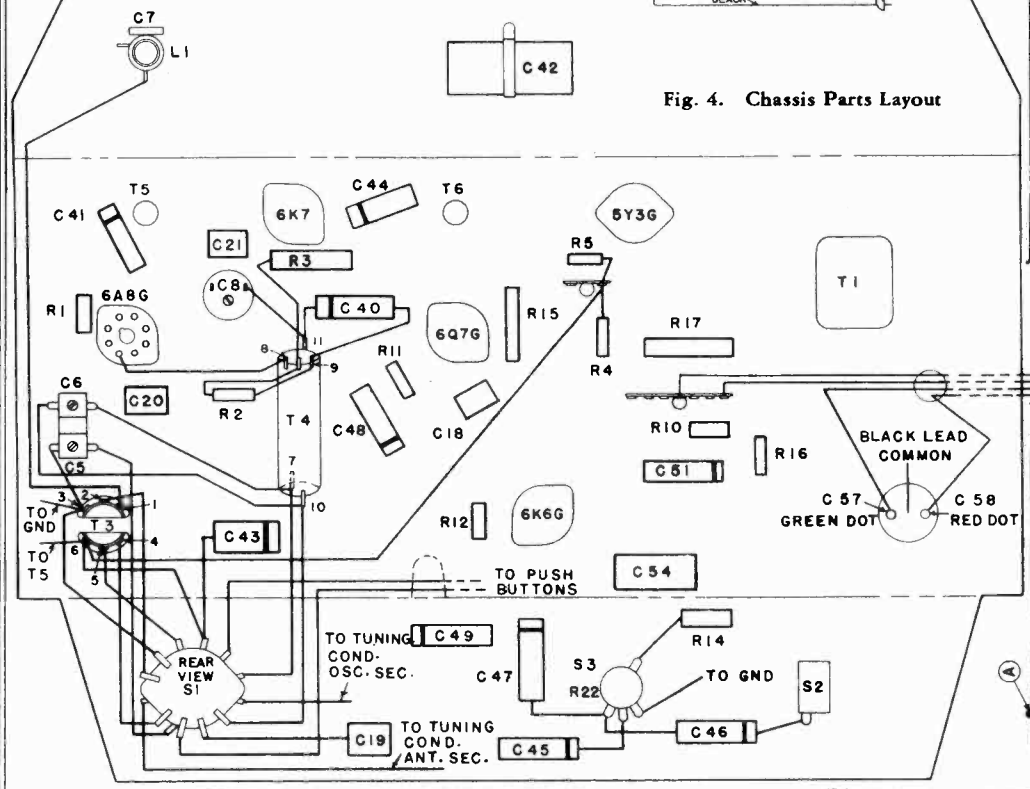


Fig. 3. Dial Drive Mechanism

Symbol	Description	Symbol	Description	Symbol	Description
C5	R.F. Trimmer Capacitor, "D" Band	C40	Paper Capacitor, 0.001 Mfd.	R10	Carbon Resistor, 2.2 Megohms
C6	Osc. Trimmer Capacitor, "D" Band	C41	Paper Capacitor, 0.05 Mfd.	R11	Carbon Resistor, 330,000 Ohms
C8	Osc. Padder Condenser, "B" Band	C42	Paper Capacitor, 0.5 Mfd.	R12	Carbon Resistor, 330,000 Ohms
C17	Mica Capacitor, 470 Mmf.	C43	Paper Capacitor, 0.05 Mfd.	R14	Carbon Resistor, 22,000 Ohms
C18	Mica Capacitor, 330 Mmf.	C44	Paper Capacitor, 0.05 Mfd.	R15	Carbon Resistor, 3900 Ohms
C19	Mica Capacitor, 3900 Mmf.	C45	Paper Capacitor, 0.01 Mfd.	R16	Carbon Resistor, 22 Ohms
C20	Mica Capacitor, 47 Mmf.	C46	Paper Capacitor, 0.001 Mfd.	R17	Carbon Resistor, 330 Ohms
C21	Mica Capacitor, 370 Mmf.	C47	Paper Capacitor, 0.005 Mfd.	R22	Volume Control, 2 Megohms, tap at 15,000 Ohms
C24	Mica Trimmer, 165-450 Mmf.	C48	Paper Capacitor, 0.005 Mfd.		
C25	Mica Trimmer, 95-345 Mmf.	C49	Paper Capacitor, 0.012 Mfd.	T1	Power Transformer
C26	Mica Trimmer, 80-235 Mmf.	C51	Paper Capacitor, 0.1 Mfd.	T2	Output Transformer
C27	Mica Trimmer, 35-175 Mmf.	C54	Molded Paper Capacitor, 0.01 Mfd.	L-8	Speaker, 6½ Inches (G-53)
C28	Mica Trimmer, 30-115 Mmf.	C57	Dry Electrolytic Capacitor, 8 Mfd.		Speaker, 12 Inches (G-56)
C29	Mica Trimmer, 11-60 Mmf.	C58	Dry Electrolytic Capacitor, 8 Mfd.	S1	Band Switch
C30	Mica Trimmer, 165-450 Mmf.	R1	Carbon Resistor, 47,000 Ohms	S2	Tone Control Switch
C31	Mica Trimmer, 95-345 Mmf.	R2	Carbon Resistor, 4700 Ohms	S3	Power Switch (Part of Volume Control)
C32	Mica Trimmer, 80-235 Mmf.	R3	Carbon Resistor, 18,000 Ohms		
C33	Mica Trimmer, 35-175 Mmf.	R4	Carbon Resistor, 10 Megohms	S4	Push-button Switches
C34	Mica Trimmer, 30-115 Mmf.	R5	Carbon Resistor, 1.5 Megohms		
C35	Mica Trimmer, 11-60 Mmf.	R9	Carbon Resistor, 470,000 Ohms		

MODELS G-53, G-56
Specifications
Alignment

GENERAL ELECTRIC CO.

RGS-53 Radio Receivers, Models G-53 and G-56

SPECIFICATIONS

Physical Specifications

Model	G-53	G-56
Height	10 11/32 in.	38½ in.
Width	18 7/8 in.	26 in.
Depth	7 11/32 in.	10½ in.
Weight Packed	22 lbs.	58 lbs.

Tuning Control Drive Ratio ..... 10 to 1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	65
V	115–125 140–155 190–220 220–250	50–60	70

Tuning Frequency Range

Band "B" ..... 540 to 1750 kc.
Band "D" ..... 5700 to 18,300 kc.

Intermediate Frequency ..... 455 kc.

Electrical Power Output

Undistorted 2.0
Maximum 3.8

Tone Control ..... 2 Point—
Bass and Normal

Loud-speaker—Electrodynamic
Voice Coil Impedance 3.5 ohms
at 400 cycles

Fig. 5. Over-all I.F. Curve

ALIGNMENT PROCEDURE

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-12) 2nd I.F. Pri. (C-11)	Gang condenser plates wide open—connect audio input of oscilloscope to ground and to the junction of C-47 and R-5—Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 5.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-10) 1st I.F. Pri. (C-9)	
3. Band "B"	455 K.C. Sweep	Antenna Post	250 Mmf. 200 Ohms	Wave Trap Trimmer (C-7)	Adjust trimmer for minimum amplitude.

I.F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-12) 2nd I.F. Pri. (C-11)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-10) 1st I.F. Pri. (C-9)	
3. Band "B"	455 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Wave Trap Trimmer (C-7)	Adjust trimmer for minimum output.

R.F. ALIGNMENT

1. Band "B"	....	....	....	....	Close gang condenser plates. Adjust pointer, to first line at left end of tuning scale.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-3) Ant. (C-4)	Connect output meter across voice coil—tone control on "bass" position—peak trimmers for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. Padder (C-8)	Adjust padder for a maximum output meter indication in vicinity of 580 kc. while rocking the gang condenser.
4. Band "B"	Repeat Operation 2				
5. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-6) Ant. (C-5)	Peak C-5 for maximum output while rocking the gang at the 18 mc. point. The image of any signal on "D" band should be heard 930 kc. **below** the input signal when proper peak is obtained on oscillator trimmer C-6. Example: 12 mc. image—11.09 mc.

GENERAL ELECTRIC CO.

MODELS G-53, G-56
Circuit Data, Voltage
Pick-up, Parts

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. D.C.	Heater Volts A.C.
6A8G	Converter	236	95	0	12.2	6.5
	Oscillator	186	....			
6K7		236	95	0	8.7	6.5
6Q7G		84 *	....	0	0.4	6.5
6K8G		220	236	0	30.1	6.5
5Y3G		....	....	320	51.4	5.3

A-C line voltage—120. No signal input. 1000 ohms per volt meter. Dial pointer at 530 kc. on "B" band.
* Measured on 500-volt scale.

Fig. 1. Pick-up Connections

GENERAL INFORMATION

Models G-53 and G-56 are two-band A-C operated receivers, employing five General Electric Pre-tested Tubes as described above, in a superhetrodyne circuit. They incorporate a simplified trimmer tuned "Touch-Tuning" system allowing a set-up of six stations for automatic tuning. Other features of design include I.F. wave trap, degenerative feedback and an improved dust-proof electrodynamic speaker.

Coil System

The "B" and "D" band antenna coils are wound on a single coil form (T-3) as shown in Fig. 2. T-4 is the oscillator transformer for both the "B" and "D" bands. All coil terminals are numbered in Fig. 2 and 4 to facilitate in service by showing common points on the schematic diagram, Fig. 2, and the pictorial wiring diagram, Fig. 4.

The following table shows the coils in use for the various positions of the wave change switch.

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid Coil	Oscillator Plate Coil	REMARKS
Short Wave	L-10	L-11	L-14	L-15	L-12 Shorted L-16 Shorted
Manual Broadcast	L-10 and L-13	L-11 and L-12	L-14 and L-16	L-15	Tuned by gang condenser C-1
Automatic Tuning	L-10 and L-13	L-11 and L-12	L-14 and L-16	L-15	C-1 and C-2 removed tuned by fixed trimmers

Loud-speaker

12-inch speaker—To center the voice coil, remove dust cover by softening with acetone. Loosen the two clamping screws and place three 1 in. by ¼ in. by 0.010 in. paper or celluloid strips equally spaced around pole piece for clearance—then tighten clamping screws. Remove strips and cement the dust cap back in place with glyptal cement.

6½-inch speaker—If the cone is off center in this speaker, it is necessary to replace cone. Remove cone and clean cementing surfaces. Cut a piece of 0.005 in. to 0.006 in. paper about 1¼ in. wide and 2¼ in. long and roll into a cylinder and place inside the voice coil collar. Apply a film of glyptal cement to the rim and spider shelf of speaker frame using the paper cylinder as a pilot over the center post, place the cone assembly in the housing making sure that the voice coil leads head toward the plug. Press the edge of the cone to contact the cemented surface, and, using a bent paper clip or similar tool, do the same to the edge of the spider. Give the cement sufficient time to set before removing the center shim. Cement dust cap in cone and connect speaker voice coil leads to the plug.

Phonograph Connection

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the G-53 or G-56 circuit for the reproduction of phonograph recordings. S-1 is either a rotary or toggle type double-pole, double-throw switch. A suitable loading circuit composed of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit. It is very important that the pick-up leads have a shield such as copper braid to prevent hum interference. This shield should be connected to the chassis ground.

The circuit should be opened between R-5 and C-47 and phonograph connections made as shown in Fig. 1. This procedure requires removal of the chassis from the cabinet.

When the pick-up is connected as shown, the regular radio volume and tone controls work for both radio and phonograph reproduction.

REPLACEMENT PARTS LIST
MODELS G-53 AND G-56

Stock No.	Description	List Price	Stock No.	Description	List Price
	CHASSIS ASSEMBLY	$0.10	RS-390	SWITCH—Tone Control Switch (S-2)	$0.35
RB-008	BOARD—Terminal Board (2 lug)	.10	RS-391	SWITCH—Band Change Switch (S-1)	.90
RB-093	BOARD—Terminal Board (6 lug)				
*RC-009	CAPACITOR—.001 mfd., 600 V. paper (C-40, 46)	.30	RT-0516	TRANSFORMER—Power Transformer (50-60 cycles) (T-1)	4.20
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-47, 48)	.25	RT-0517	TRANSFORMER—Power Transformer (25 cycles) (T-1)	7.05
*RC-039	CAPACITOR—.01 mfd., 200 V. paper (C-45)	.25	RT-0518	TRANSFORMER—Power Transformer —Universal (T-1)	9.00
RC-044	CAPACITOR—.012 mfd., 600 V. paper (C-49)	.25	RT-259	TRANSFORMER—2nd I.F. Transformer	1.40
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-41, 43, 44)	.30	RT-260	TRANSFORMER—1st I.F. Transformer (complete)	1.15
*RC-104	CAPACITOR—0.1 mfd., 600 V. paper (C-51)	.30	RT-438	TRANSFORMER—Output Transformer (T-2)	1.70
*RC-196	CAPACITOR—0.5 mfd., 600 V. paper (C-42)	.75	RV-040	VOLUME CONTROL—2 meg. Volume Control and Power Switch (R-22, S-3)	.95
RC-216	CAPACITOR—47 mmf., mica (C-20)	.25	*RW-101	WASHER—Felt Washers for Control Knobs (Pkg. of 10)	.45
*RC-274	CAPACITOR—330 mmf., mica (C-18)	.30			
RC-285	CAPACITOR—370 mmf., mica (C-21)	.25			
RC-294	CAPACITOR—470 mmf., mica (C-19)	.30	*RX-015	ASSEMBLY — Chassis Mounting Assembly	.10
RC-390	CAPACITOR—390 mmf., mica (C-17)	.35	RX-046	ASSEMBLY—Gang Condenser Mounting Assembly	.20
RC-593	CAPACITOR—8 mfd., 450 V., 8 mfd., 450 V. electrolytic (C-57, 58)	1.40			
*RC-630	CAPACITOR—Oscillator Padder (C-8)	.40			
RC-674	CAPACITOR—Wave Trap Trimmer (C-7)	.15		**SPEAKER ASSEMBLY G-53**	
KC-675	CAPACITOR—Trimmer Capacitors "D" Band (C-5, 6)	.30	RC-931	CONE—6¼-in. Cone and Voice Coil Assembly	.60
RC-727	CONDENSER—Tuning Condenser (C-1, 2, 3, 4)	2.25	RD-300	DUST CAP—6½-in. Cone Dust Cap (Pkg. of 6)	.10
RC-791	CAPACITOR—.01 mfd., 250 V. A.C. (C-54)	.30	RP-109	PLUG—Male Speaker Plug	.20
RC-8035	CABLE—Speaker Cable and Plug	.50	RS-071	SPEAKER—6¼-in. Speaker (complete)	3.75
*RC-863	CORD—Power Cord	.65	RX-047	ASSEMBLY—Speaker Nuts and Washers	.05
RG-016	GRID CLIP—Control Grid Clip (Pkg. of 5)	.10		**SPEAKER ASSEMBLY G-56**	
RK-027	KNOB—Winged Control Knob (Pkg. of 5)	.50	RC-932	CONE—12-in. Cone and Voice Coil Assembly	1.10
RK-028	KNOB—Plain Control Knob (Pkg. of 5)	.30	RD-301	DUST CAP—Speaker Dust Cap (Pkg. of 5)	.10
RL-061	COIL—Antenna Coil, Bands "B" and "D"	1.15	RP-109	PLUG—Male Speaker Plug	.20
RL-265	COIL—Oscillator Coil, Bands "B" and "D"	.75	RS-072	SPEAKER—12-in. Speaker (complete)	5.60
RL-603	COIL—Wave Trap Coil (L-1)	.60	RX-047	ASSEMBLY—Speaker Nuts and Washers	.05
*RQ-1219	RESISTOR—22 ohm, ½ watt Carbon (R-16) (Pkg. of 5)	.70		**TOUCH-TUNING AND DIAL SCALE MECHANISM**	
*RQ-1275	RESISTOR—4700 ohm, ½ watt carbon (R-2) (Pkg. of 5)	.70	RB-612	BUTTON—Molded Push Button (Pkg. of 6)	.35
*RQ-1291	RESISTOR—22,000 ohm, ½ watt carbon (R-14) (Pkg. of 5)	.70	RC-8034	CARD—Station Letter Card (Pkg. of 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½ watt carbon (R-11) (Pkg. of 5)	.70	RC-8073	CARD—Station Letter Card (set)	.45
*RQ-1319	RESISTOR—300,000 ohm, ½ watt carbon (R-12) (Pkg. of 5)	.70	RC-8073 (CFAC-KIT)	CARD—Station Letter Card (sheet 1)	.15
*RQ-1323	RESISTOR—470,000 ohm, ½ watt carbon (R-19) (Pkg. of 5)	.70	RC-8074 (KIUL-WEBQ)	CARD—Station Letter Card (sheet 2)	.15
*RQ-1335	RESISTOR—1.5 megohm, ½ watt carbon (R-5) (Pkg. of 5)	.70	RC-8075 (WEBR-WSM)	CARD—Station Letter Card (sheet 3)	.15
*RQ-1339	RESISTOR—2.2 megohm, ½ watt carbon (R-10) (Pkg. of 5)	.70	RC-8076 (WSMB-XEZ)	CARD—Station Letter Card (sheet 4)	.15
*RQ-1355	RESISTOR—10 megohm, ½ watt carbon (R-4) (Pkg. of 5)	.70	RD-070	DRUM—Condenser Drive Drum	.20
*RQ-1447	RESISTOR—330 ohm, 1 watt carbon (R-17)	.20	RD-204	DRIVE—Drive Shaft	.15
*RQ-1473	RESISTOR—3900 ohm, 1 watt carbon (R-15)	.20	RE-028	ESCUTCHEON—Dial Scale Escutcheon	1.60
*RQ-1489	RESISTOR—18,000 ohm, 1 watt carbon (R-3)	.20	*RP-075	PULLEY—Pointer Drive Cord Pulley (Pkg. of 6)	.20
RS-185	SHIELD—6Q7G Tube Shield (complete)	.15	RP-108	POINTER—Dial Scale Pointer	.15
			RS-392	SWITCH—Touch-tuning Switch (less trimmer strips)	2.35
*RS-200	SOCKET—Octal Base Tube Socket (Pkg. of 5)	.75	*RS-432	SPRING—Drive Cord Tension Spring (Pkg. of 5)	.20
*RS-204	SOCKET—Rectifier Tube Socket (Pkg. of 5)	.75	RS-444	SPRING—Spring for molded Push Button (Pkg. of 10)	.10
*RS-218	SOCKET—Lamp Socket Assembly	.10	RT-852	TRIMMER STRIP—Push Button Trimmer Strip: Osc. Section	1.05
*RS-223	SOCKET—Socket for 6A8G (Pkg. of 5)	.80	RT-853	TRIMMER STRIP—Push Button Trimmer Strip: R.F. Section	1.05

* Used on previous receivers.

(Prices subject to change without notice)

I. F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	465 kc. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-10) 2nd I.F. Pri. (C-9)	Gang condenser plates wide open—connect input of oscilloscope to B- and to the junction of R-3 and R-4 of the 2nd I.F. transformer—Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude.
2. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-7) 1st I.F. Pri. (C-6)	
3. Band "B"	465 kc. Sweep	Antenna Lead	250 Mmf. 400 Ohms	Wave Trap Trimmer (C-2)	Adjust trimmer for minimum amplitude.

I. F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	465 kc. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-10) 2nd I.F. Pri. (C-9)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output
2. Band "B"	465 kc. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-7) 1st I.F. Pri. (C-6)	
3. Band "B"	465 kc. with Modulation	Antenna Lead	250 Mmf. 400 Ohms	Wave Trap Trimmer (C-2)	Adjust trimmer for minimum output.

R. F. ALIGNMENT

1. Band "B"					Close gang plates—Adjust pointer to first line at left end of tuning scale.
2. Band "C"	No adjustments necessary				
3. Band "B"	1500 kc. with Modulation	Antenna Lead	250 Mmf. 400 Ohms	Osc. trimmer (Front sect. of gang cond.) Ant. trimmer (Rear sect. of gang cond.)	Connect output meter across voice coil—tone control on "bass" position—peak trimmers for maximum output with a low input signal.
4. Band "B"	580 kc. with Modulation	Antenna Lead	250 Mmf. 400 Ohms	Osc. padder (C-3)	Adjust padder for a maximum output meter indication in vicinity of 580 kc. while rocking the gang condenser.
5. Band "B"	Repeat operation No. 3				

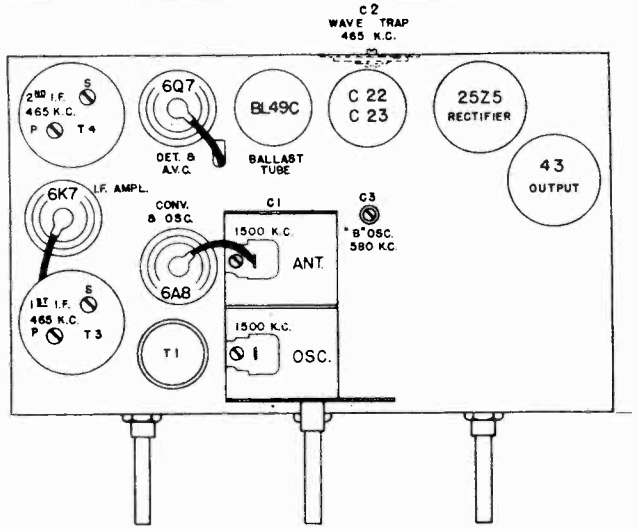


Fig. 3. Chassis Layout and Trimmer Location

REPLACEMENT PARTS LIST

Models FD-62 and FD-625

Insist on genuine factory-tested parts which may be purchased from authorized dealers.

Stock No.	Description	List Price
*RB-041	BOARD—Terminal board (3 terminals) (on rear chassis apron)	$0.10
RB-058	BOARD—Terminal board (8 terminals)	.10
RB-059	BOARD—Terminal board (4 terminals) (under 1st I.F.)	.10
RB-077	BOARD—Terminal board (4 terminals) (under 2nd I.F.)	.10
*RC-017	CAPACITOR—.0045 Mfd., 200 V. paper (C-13)	.25
*RC-023	CAPACITOR—.005 Mfd., 600 V. paper (C-20)	.25
*RC-042	CAPACITOR—.01 Mfd., 1,000 V. paper (C-5, C-12, C-17)	.30
*RC-080	CAPACITOR—.02 Mfd., 400 V. paper (C-14)	.25
*RC-091	CAPACITOR—.05 Mfd., 200 V. paper (C-8, C-18, C-26)	.30
*RC-149	CAPACITOR—.25 Mfd., 400 V. paper (C-15, C-21, C-25)	.35
*RC-198	CAPACITOR—.002 Mfd., 1,000 V. paper (C-19)	.30
*RC-213	CAPACITOR—50 Mmf. mica (C-27)	.25
*RC-234	CAPACITOR—100 Mmf. mica (C-24)	.25
*RC-259	CAPACITOR—260 Mmf. mica (C-11, C-16)	.30
*RC-348	CAPACITOR—1,600 Mmf. mica (C-4)	.35
RC-586	CAPACITOR—Dry electrolytic 50 Mfd., 150 V.; (C-22, C-23)	2.15
*RC-608	CAPACITOR—300-500 Mmf. "B" band padder (C-3)	.45
RC-644	CAPACITOR—Double trimmer pri. and sec., 1st or 2nd I.F. transformer (C-6, C-7, C-9, C-10)	.40
RC-670	CAPACITOR—5-100 Mmf. wave trap trimmer (C-2)	.30
RC-709-22	CONDENSER—2-gang tuning condenser (C-1)	3.25
RC-865	CORD—Power cord with plug	.45
RD-202	DRIVE—Planetary reduction drive (friction)	1.00
RE-025	ESCUTCHEON—Escutcheon and window (complete)	2.00
RG-001	GRID CAP—Control grid cap (Pkg. of 5)	.10
RG-300	GROMMET—Tuning shaft grommet and washer (Pkg. of 5)	.20
RK-017	KNOB—Control knob (Pkg. of 5)	.40
RK-018	KNOB—Wave change switch knob (Pkg. of 5)	.40
RL-042	COIL—"B" and "D" band antenna coil (T-1)	1.20
RL-244	COIL—"B" and "D" band oscillator coil (T-2)	.95
*RL-602	COIL—Wave trap coil (L-13)	.50
RL-920	LAMP—Dial lamp 6.3 V., .25 Amp. (Pkg. of 10)	1.50
RQ-1217	RESISTOR—18 ohm, ½ watt carbon (R-11) (Pkg. of 5)	.70
RQ-1239	RESISTOR—150 ohm, ½ watt carbon (R-10) (Pkg. of 5)	.70
RQ-1275	RESISTOR—4,700 ohm, ½ watt carbon (R-6) (Pkg. of 5)	.70
RQ-1287	RESISTOR—15,000 ohm, ½ watt carbon (R-9) (Pkg. of 5)	.70
RQ-1295	RESISTOR—33,000 ohm, ½ watt carbon (R-14, R-16) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 ohm, ½ watt carbon (R-1) (Pkg. of 5)	.70
RQ-1311	RESISTOR—150,000 ohm, ½ watt carbon (R-15) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 ohm, ½ watt carbon (R-12) (Pkg. of 5)	$0.70
RQ-1319	RESISTOR—330,000 ohm, ½ watt carbon (R-7, R-8) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohm, ½ watt carbon (R-2, R-4) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 megohm, ½ watt carbon (R-3) (Pkg. of 5)	.70
RQ-1447	RESISTOR—330 ohm, 1 watt carbon (R-13)	.20
RR-736	RESISTOR—Ballast resistor—Tube BL-49C	.80
RS-141	SHIELD—1st I.F. transformer shield	.15
RS-142	SHIELD—2nd I.F. transformer shield	.15
*RS-200	SOCKET—8-pin octal base socket (Pkg. of 5)	.75
RS-215	SOCKET—6-prong tube socket (Pkg. of 5)	.60
RS-322	SWITCH—Band Switch (S-1)	.75
RS-347	SWITCH—Tone control switch (S-2)	.50
RT-251	TRANSFORMER—1st I.F. transformer (T-3)	1.35
RT-252	TRANSFORMER—2nd I.F. transformer (T-4)	1.40
RT-434	TRANSFORMER—Output transformer	1.30
RT-952	TERMINAL—Speaker lead terminal (Pkg. of 10)	.05
RV-037	VOLUME CONTROL—2 megohm volume control, tap at 500,000 ohms, and power switch (R-5, S-3)	1.00
RW-018	WINDOW—Escutcheon window and rubber cushions	.35
*RW-101	WASHER—Felt washer for knobs (Pkg. of 10)	.45
*RX-015	ASSEMBLY—Chassis mounting screws and washers	.10
*RX-016	ASSEMBLY—Gang condenser mounting cushions and studs	.30
	SPEAKER ASSEMBLY FD-62	
RC-929	CONE—6½-inch cone and voice coil assembly	1.00
RS-066	SPEAKER—6½-inch P.M. speaker (complete)	4.95
	SPEAKER ASSEMBLY FD-625	
RC-930	CONE—8-inch cone and voice coil assembly	1.25
RS-067	SPEAKER—8-inch P.M. speaker (complete)	5.95
	DIAL SCALE MECHANISM	
RB-604	BUSHING—Volume control cable drive bushing	.10
RC-840	CABLE—Gang condenser drive cable (Pkg. of 5)	.45
RC-841	CABLE—Volume control drive cable (Pkg of 5)	.45
RC-842	CABLE—Tone control drive cable (Pkg. of 5)	.40
RD-051	DIAL—Dial scale	1.00
*RD-030	DRUM—Condenser drive drum	.40
RP-073	POINTER—Volume or tone control pointer (Pkg. of 5)	.10
RP-074	POINTER—Dial scale pointer (Pkg. of 5)	.90
RP-075	PULLEY—Small drive cord idler pulley (Pkg. of 6)	.20

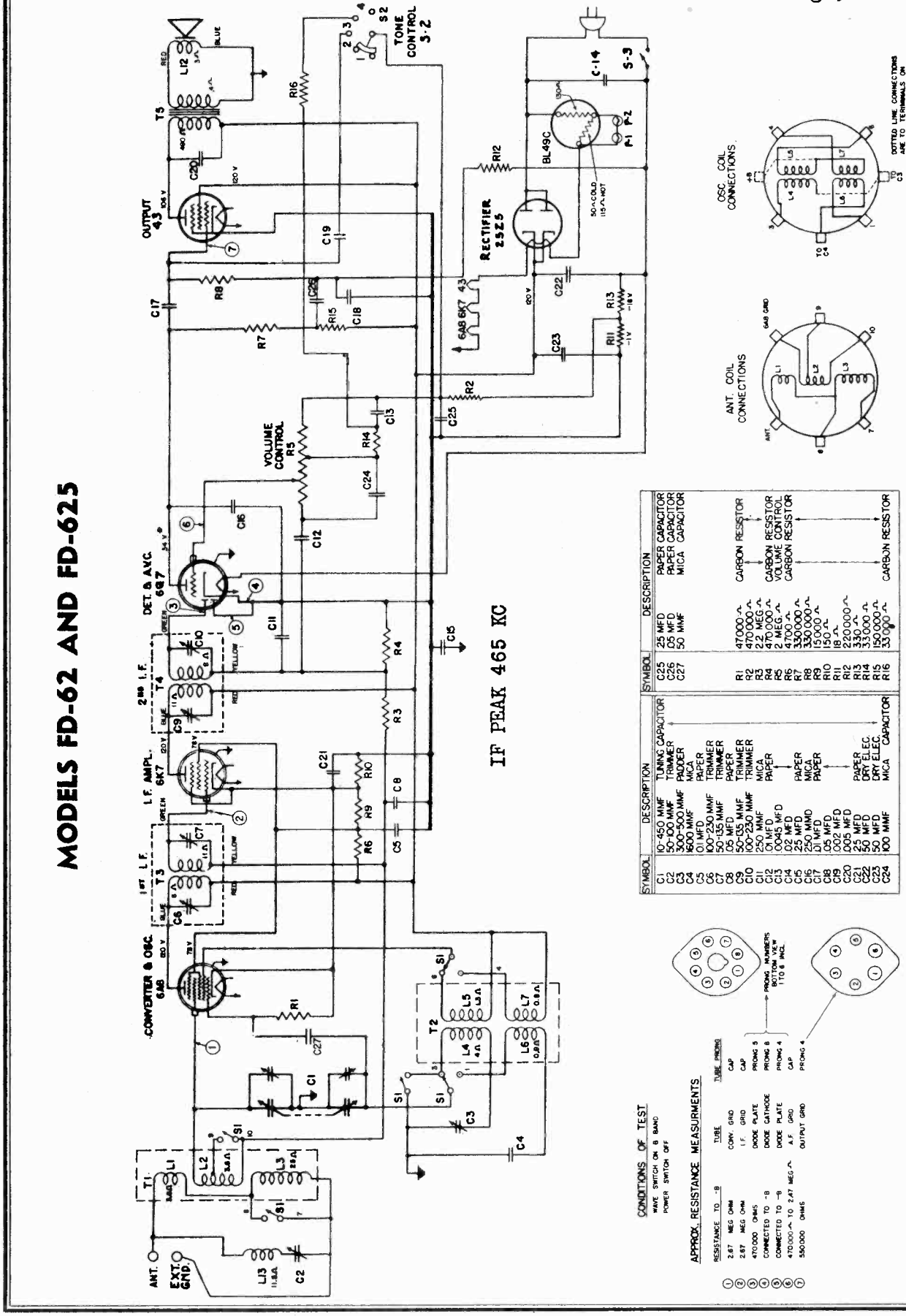
* Used on previous receivers.

(Prices subject to change without notice)

GENERAL ELECTRIC CO.

MODELS FD-62, FD-625
Schematic, Coils
Voltage, Resistance

MODELS FD-62 AND FD-625



SYMBOL	DESCRIPTION
C1	10-450 MMF TUNING CAPACITOR
C2	50-100 MMF TRIMMER
C3	300-500 MMF PADDER
C4	1600 MMF MICA
C5	.01 MFD PAPER
C6	100-230 MMF TRIMMER
C7	50-135 MMF TRIMMER
C8	.05 MFD PAPER
C9	50-135 MMF TRIMMER
C10	100-230 MMF TRIMMER
C11	250 MMF MICA
C12	.01 MFD PAPER
C13	.0045 MFD
C14	.02 MFD
C15	.25 MFD PAPER
C16	250 MMD MICA
C17	.01 MFD PAPER
C18	.05 MFD
C19	.002 MFD
C20	.005 MFD
C21	.25 MFD PAPER
C22	.25 MFD DRY ELEC.
C23	50 MFD DRY ELEC.
C24	100 MMF MICA CAPACITOR

SYMBOL	DESCRIPTION
C25	.25 MFD PAPER CAPACITOR
C26	.05 MFD PAPER CAPACITOR
C27	50 MMF MICA CAPACITOR
R1	470000 Ω CARBON RESISTOR
R2	470000 Ω
R3	2.2 MEG. Ω
R4	470000 Ω CARBON RESISTOR
R5	2 MEG. Ω VOLUME CONTROL
R6	4700 Ω CARBON RESISTOR
R7	330000 Ω
R8	330000 Ω
R9	15000 Ω
R10	150 Ω
R11	18 Ω
R12	220000 Ω CARBON RESISTOR
R13	33000 Ω
R14	15000 Ω
R15	33000 Ω
R16	33000 Ω CARBON RESISTOR

CONDITIONS OF TEST
WAVE SWITCH ON B BAND
POWER SWITCH OFF

APPROX. RESISTANCE MEASURMENTS

	RESISTANCE TO —B	TUBE	TUBE PRONG
①	2.67 MEG OHM	CONV. GRID	CAP
②	2.67 MEG OHM	I.F. GRID	CAP
③④⑤	470000 OHMS	DIODE PLATE	PRONG 5
	CONNECTED TO —B	DIODE CATHODE	PRONG 6
	CONNECTED TO —B	DIODE PLATE	PRONG 4
⑥	470000 Ω TO 2.67 MEG Ω	A.F. GRID	CAP
⑦	330000 OHMS	OUTPUT GRID	PRONG 4

PRONG NUMBERS WHEN VIEWED FROM BOTTOM OF SOCKET

Fig. 1. Schematic Circuit Diagram

SERVICE DATA

Physical Specifications

	FD-62	FD-625
Model		
Height	8¼ in.	38½ in.
Width	17⅞ in.	24 in.
Depth	7¼ in.	11⅛ in.
Wt. Packed	20 lb.	48 lb.

Tuning Control Drive Ratio ..... 8 to 1

Electrical Specifications

Power Supply (Volts)	Frequency (Cycles on A.C.)	Power (Watts)
100-125 A-C or D-C	40-100	50

Tuning Frequency Range

Band "B" ..... 540–1740 kc.
Band "C" ..... 2.2–7.0 mc.

Intermediate Frequency ..... 465 kc.

Electrical Power Output

Undistorted ..... 0.56 Watts
Maximum ..... 2.0 Watts

Tone Control ..... 4-point control

Loud-speaker—Permanent Magnet Dynamic

Cone: Model FD-62 ..... 6½ in.
Model FD-625 ..... 8 in.
Speaker Impedance ..... 3.5 ohms at 400 cycles

Tubes

Oscillator and Converter	6A8 Pentigrid converter
IF Amplifier	6K7 Triple-grid Super-control Amplifier
Detector, AVC, and First Audio Amplifier	6Q7 Duplex-Diode High-gain Triode
Audio Power Amplifier	43 Power Amplifier Pentode
Rectifier	25Z5 Half-wave Rectifier
Ballast tube	BL-49C
Dial Lamp	MAZDA No. 46

GENERAL INFORMATION

These two-band receivers employ six General Electric tubes described above in a superheterodyne circuit which includes a single stage of I.F., automatic volume control, four-point tone control, wave trap and pentode output.

L1, L2 and L3 are the components of the "B" band antenna coil and are wound on the same coil form. When operating in the "C" band, L3 and a part of L2 are shorted out by the wave-change switch. L4–L5 and L6–L7 are the "B" and "C" band oscillator coils respectively and are wound on the same coil form. The "B" band oscillator grid coil is shorted out by a contact of S-1 when the set is operating on the "C" band.

The intermediate frequency amplifier consists of a 6K7 tube and two transformers, both of which have tuned primaries and secondaries.

The output of this amplifier is applied to one plate of the diode section of the 6Q7 tube. The diode serves as a detector and source of the automatic volume control voltage.

The audio voltage developed over the resistor R-4 is fed through the capacitor C-12 to the volume control R-5 which is in the grid circuit of the 6Q7 tube. The 6Q7 is resistance coupled to the 43 pentode output tube, which is in turn coupled through the output transformer to the "alnicore" permanent magnet dynamic speaker.

The 6A8 and 6K7 tubes have a combination of self and fixed bias which is the voltage drop over the resistor R-10. The 6Q7 and 43 tubes are supplied with semi-fixed bias obtained from the voltage drop over the resistors R-11 and R-13 in the B- lead.

One section of the BL49C ballast tube serves as a voltage dropping resistor in series with tube heaters. The second section of the BL49C is a low resistance shunt across the pilot lights. When the tubes reach their normal operating temperature this shunt across the pilot lights has more than doubled in resistance and thus allows the correct voltage drop across the pilot lights.

D-C Operation

When operating from a d-c source, it is necessary to insert the plug with proper polarity. If the set fails to function, after allowing time for the tubes to reach their operating temperature, reverse the power plug in the receptacle.

When the set is used on a d-c supply, the 25Z5 rectifier tube and the filter remain in the circuit and serve two purposes. If the power cord should be plugged in with incorrect polarity, the 25Z5 tube protects the filter condensers from damage. On correct d-c polarity the 25Z5 tube passes the d-c and the filter circuit aids in smoothing the supply voltage-thus minimizing line noise.

A-C Operation

When the set is used on alternating current, all d-c potentials are supplied by a 25Z5 rectifier tube and its associated filter circuit. The tube is connected as a half-wave rectifier.

If any hum is noticed when the set is used on a-c reverse the power plug in the receptacle. When the set has not been used for some time, a slight hum may be audible when the set is first turned on. This hum may not immediately clear up upon reversal of the power plug. However, it will probably be eliminated after approximately five minutes operation by which time the anode plates of the electrolytic capacitors will have re-formed.

TONE CONTROL

On the "Normal" position, No. 1 of the tone control bass compensation is obtained by the resistor R-14 and capacitor C-13 across the lower portion of the volume control. C-24 serves to inject higher frequencies at the tap.

The "Bass" position connects C-19 effectively across R-8 the grid resistor of the 43 tube thus limiting the high frequency input to that tube.

The "Foreign" position places R-16 in parallel with C-13 and thus reduces the bass compensation. C-19 is left connected across the grid circuit of the 43 tube and again limits the high frequency input to that tube. The result is a middle range response.

The "Speech" position removes C-19 from the circuit, so the high frequency response is the same as in the "Normal" position. However R-16 is left across C-13 thus removing the bass compensation. This arrangement adds clarity to programs predominating in speech.

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an a-c voltmeter with a scale reading of 3 to 5 volts.
3. A screwdriver-type alignment tool.

To realize all the performance built into these receivers at the factory, alignment using cathode-ray equipment is to be preferred. The alignment procedure is given in table form on page 5 along with a trimmer location drawing Fig. 3. The "Dummy Antenna" is the capacitor or capacitor and resistor used in series with the signal generator antenna lead. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F.

SOCKET VOLTAGES

Tube No.	Plate to B- VOLTS D-C		Screen Grid to B- VOLTS D-C		Cathode to B- VOLTS D-C		Cathode Current M.A.		Heater VOLTS
	A-C	D-C	A-C	D-C	A-C	D-C	A-C	D-C	
6A8 Oscillator	120	102	..	..	..	..	..	..	
6A8 Converter	120	102	78	68	2.6	2.1	7.0	5.2	6.3
6K7 1st I.F. Amp	120	102	78	68	2.6	2.1	5.3	4.6	6.3
BL49C Ballast	Series section 52 V. drop		Lamp Shunt Section 9.0 Volt drop						
6Q7 Det and 1st Audio	34*	32*	..	..	.9	.8	.12	.10	6.3
43 Output	106	90	120	102	..	..	40.	33.	25.
25Z5 Rectifier	120 a-c	106 d-c	..	..	120	102	54.	44.	25.

Line voltage 120 A-C or D-C—No signal input—1000 ohms per-volt meter.
Dial pointer at 530 kc.
* Measured on 500 volt scale.
Note: The chassis is not the "B-" lead of the power supply. For voltage measurements, the "B-" may be taken at the green terminal of the electrolytic capacitor.

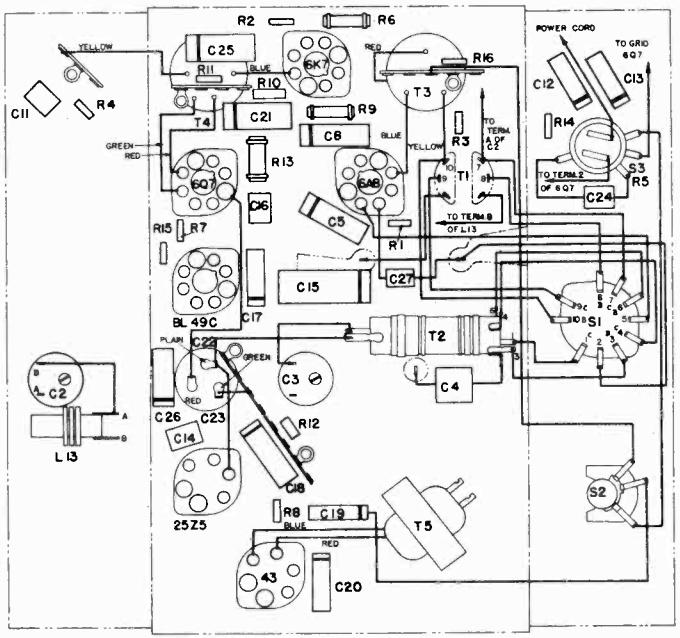
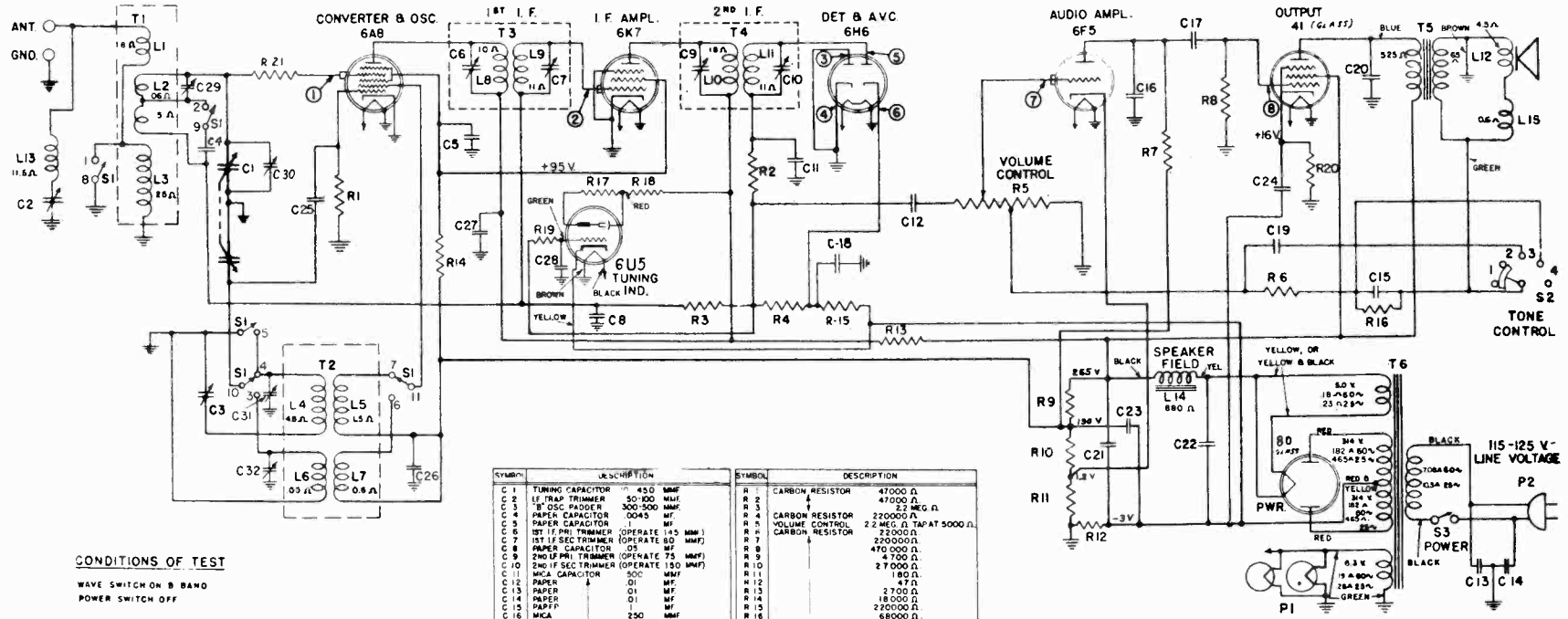


Fig. 2. Chassis Parts Layout

GENERAL ELECTRIC CO.

MODELS F-74, F-77
Schematic, Resistance
Transformer Data
Voltage



SYMBOL	DESCRIPTION		
C 1	TUNING CAPACITOR	450	MMF
C 2	I.F. TRAP TRIMMER	50-100	MMF
C 3	"B" OSC. PADDER	300-500	MMF
C 4	PAPER CAPACITOR	.0045	MF.
C 5	PAPER CAPACITOR	.1	MF
C 6	1ST I.F. PRI. TRIMMER (OPERATE 145 MMF)		
C 7	1ST I.F. SEC. TRIMMER (OPERATE 80 MMF)		
C 8	PAPER CAPACITOR	.05	MF
C 9	2ND I.F. PRI. TRIMMER (OPERATE 75 MMF)		
C 10	2ND I.F. SEC. TRIMMER (OPERATE 150 MMF)		
C 11	MICA CAPACITOR	500	MMF
C 12	PAPER	.01	MF.
C 13	PAPER	.01	MF.
C 14	PAPER	.01	MF.
C 15	PAPER	.1	MF.
C 16	MICA	250	MMF
C 17	PAPER	.005	MF.
C 18	PAPER	.1	MF.
C 19	PAPER	.01	MF.
C 20	PAPER	.008	MF.
C 21	DRY ELECT.	8	MF.
C 22	DRY ELECT.	12	MF.
C 23	DRY ELECT.	8	MF.
C 24	DRY ELECT.	10	MF.
C 25	MICA	50	MMF
C 26	PAPER	.05	MF.
C 27	PAPER	.1	MF.
C 28	PAPER CAPACITOR	.02	MF.
C 29	"D" ANT. TRIMMER	3-20	MMF.
C 30	"B" ANT. TRIMMER	3-20	MMF.
C 31	"B" OSC. TRIMMER	5-40	MMF.
C 32	"D" OSC. TRIMMER	2-12	MMF.

SYMBOL	DESCRIPTION	
R 1	CARBON RESISTOR	47000 Ω
R 2		47000 Ω
R 3		2.2 MEG. Ω
R 4	CARBON RESISTOR	220000 Ω
R 5	VOLUME CONTROL	2.2 MEG. Ω TAPAT 5000 Ω
R 6	CARBON RESISTOR	22000 Ω
R 7		220000 Ω
R 8		470 000 Ω
R 9		4700 Ω
R 10		27000 Ω
R 11		180 Ω
R 12		47 Ω
R 13		2700 Ω
R 14		18 000 Ω
R 15		220000 Ω
R 16		68000 Ω
R 17		1.0 MEG. Ω
R 18		15 000 Ω
R 19	CARBON RESISTOR	2.2 MEG. Ω
R 20	WIRE WOUND RESISTOR	410 Ω
R 21	CARBON RESISTOR	68 Ω
S 1	BAND CHANGE SWITCH	
S 2	TONE CONTROL SWITCH	
S 3	POWER SWITCH (PART OF VOLUME CONTROL)	

CONDITIONS OF TEST

WAVE SWITCH ON B BAND
POWER SWITCH OFF

APPROX. RESISTANCE MEASURMENTS

	RESISTANCE TO GROUND	TUBE	TUBE PRONG
ANT.	2.64 MEG OHM	CONV. GRID	CAP
GND.	2.64 MEG OHM	I.F. GRID	CAP
GROUNDED		DIODE PLATE	PRONG 3
GROUNDED		DIODE CATHODE	PRONG 4
	487,000 OHM	DIODE PLATE	PRONG 5
	220,000 OHM	DIODE CATHODE	PRONG 8
	0-2 MEG OHM VOL. CONT.	A.F. GRID	CAP
	470,000 OHM	OUTPUT GRID	PRONG 6

* MEASURED WITH VOLTMETER OF AT LEAST 500,000 OHMS RESISTANCE

ALL VOLTAGES TO GROUND UNLESS OTHERWISE SPECIFIED

ALL VOLTAGES MEASURED WITH ANT. & GND. TERMINALS SHORTED & 120 VOLTS ON PRI.

UNIVERSAL TRANSFORMER

Oscillator and Converter.....6A8 Pentagrid converter
I.F. Amplifier..6K7 Triple Grid Super-control Amplifier
Detector and AVC.....6H6 Twin diode
Tuning Indicator.....6U5 Electron-ray Tube
First Audio Amplifier.....6F5 High-gain Triode
Audio Power Amplifier.....41 Power Amplifier Pentode
Rectifier.....80 Full Wave Rectifier
Dial Lamp.....MAZDA No. 46

Tuning Frequency Range

Band "B".....540–1720 kc.
Band "D".....5,600–18,000 kc.

Intermediate Frequency.....465 kc.
Electrical Power Output
Undistorted.....2.5 watts
Maximum.....5.0 watts

Tone Control.....4-point control

Loud-speaker—Electrodynamic

Cone: Model F-74.....8 inch
Model F-77.....12 inch

Voice coil impedance.....5.5 ohms at 400 cycles

MODELS F-74,F-77
Socket,Trimmers
Chassis Wiring

GENERAL ELECTRIC CO.

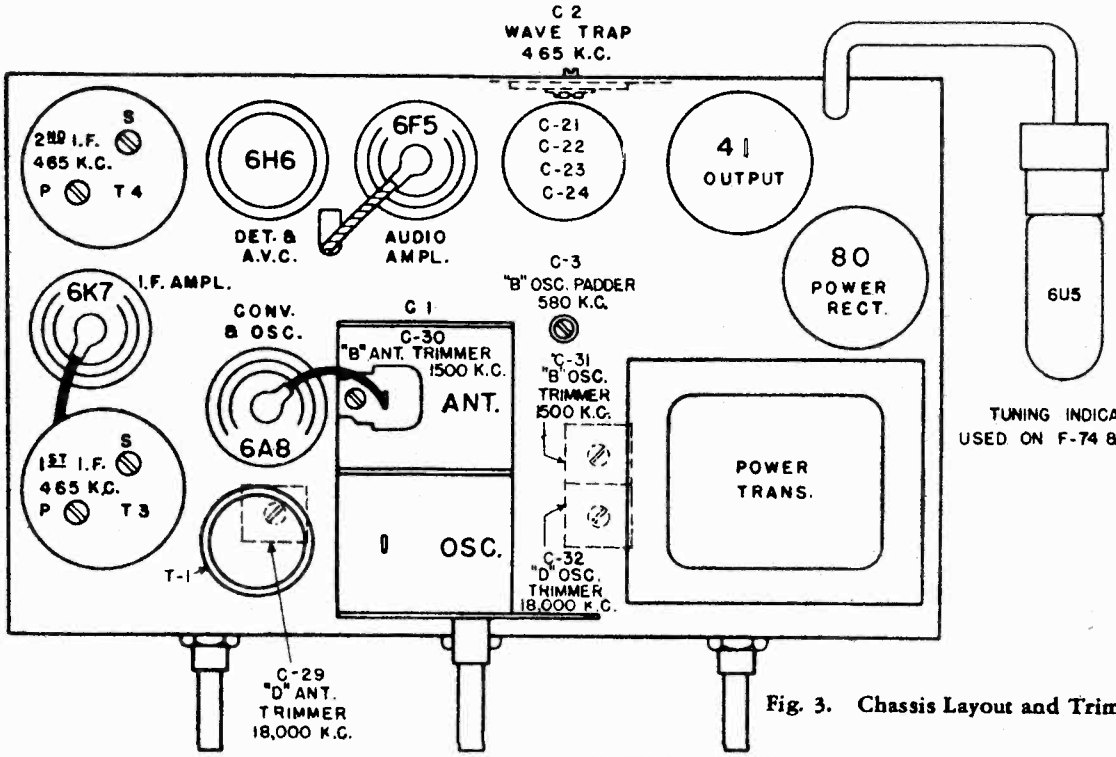


Fig. 3. Chassis Layout and Trimmer Location

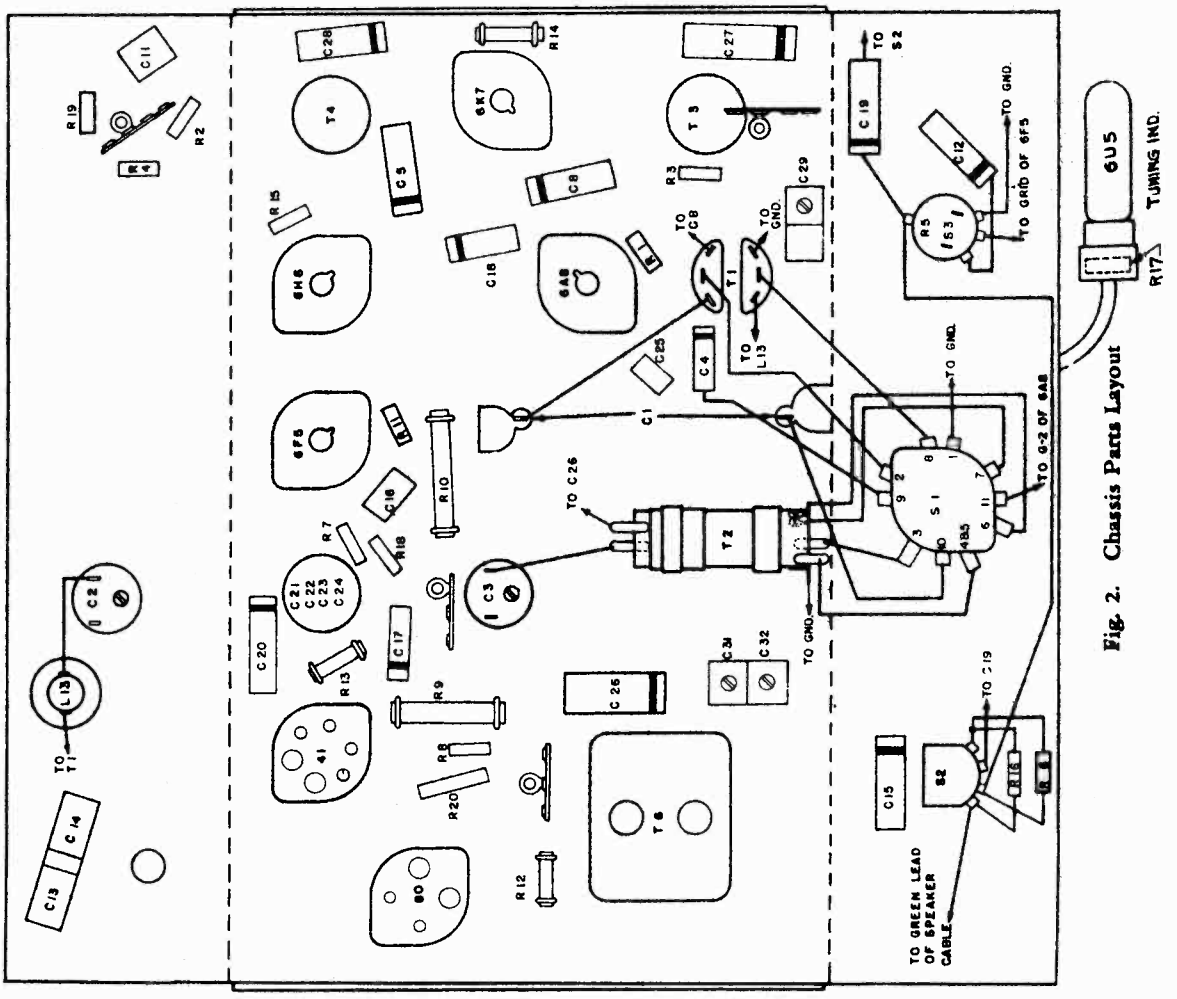


Fig. 2. Chassis Parts Layout

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an a-c voltmeter with a scale reading of 3 to 5 volts.
3. A screwdriver-type alignment tool.

To realize all the performance built into these receivers at the factory, alignment using cathode-ray equipment is to be preferred. The alignment procedure is given in table form on page 5 along with a trimmer location drawing Fig. 3. The "Dummy Antenna" is the capacitor or capacitor and resistor used in series with the signal generator antenna lead. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	75
C	115–125	25–60	75
V	115–125 140–155 190–220 220–250	50–60	80

NOTE: Rating "V" receivers may be used on 40 cycle circuits provided the voltage does not exceed 110 volts on the 115-125 volt tap or above 200 volts on the 190-220 volt tap.

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	465 K.C. Sweep	I.F. Grid	0.5 Mfd. or Larger	2nd I.F. Sec. (C-10) 2nd I.F. Pri. (C-9)	Gang condenser plates wide open—connect audio input of oscilloscope to ground and to the junction of R-3 and R-4 of the 2nd I.F. transformer—Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude.
2. Band "B"	465 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-7) 1st I.F. Pri. (C-6)	
3. Band "B"	465 K.C. Sweep	Antenna Post	250 Mmf. 400 ohms	Wave Trap Trimmer (C-2)	Adjust trimmer for minimum amplitude.

I.F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	465 K.C. with Modulation	I.F. Grid	0.5 Mfd. or Larger	2nd I.F. Sec. (C-10) 2nd I.F. Pri. (C-9)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	465 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-7) 1st I.F. Pri. (C-6)	
3. Band "B"	465 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Wave Trap Trimmer (C-2)	Adjust trimmer for minimum output.

R.F. ALIGNMENT

1. Band "B"	.....	.....	.....	.....	Close gang condenser plates. Adjust pointer, to first line at left end of tuning scale.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-31) Ant. (C-30)	Connect output meter across voice coil—tone control on "bass" position—peak trimmers for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. Padder (C-3)	Adjust padder for a maximum output meter indication in vicinity of 580 kc. while rocking the gang condenser.
4. Band "B"	Repeat Operation 2				
5. Band "D"	18 MC. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-32) Ant. (C-29)	Peak C-29 for maximum output while rocking the gang at the 18 mc. point. (*Start with C-29 at minimum capacity. The first peak is correct.*) The image of any signal on "D" band should be heard 930 kc. above the input signal when proper peak is obtained on oscillator trimmer C-32. Example: 12 mc. image—12.93 mc.

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	195	...	...	...	...
	Converter	240	95	0	12	6.3
6K7	I.F. Amplifier	240	95	0	9	6.3
6F5	Audio Amplifier	100*	...	1.2	0.3	6.3
41	Output	240	250	16	35	6.3
6U5	Tuning Indicator	110*	210 target	−3	4	6.3
80	Power Rectifier	600/300 RMS	...	...	60	5.0

A-C line voltage 115. No signal input. 1000 ohms per volt meter. Dial pointer at 530 kc. on "B" band.
* Measured on 500-volt scale.

REPLACEMENT PARTS LIST
MODELS F-74 AND F-77

Insist on genuine factory-tested parts which may be purchased from authorized dealers

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-040	BOARD—Terminal board (3 lugs)	$0.10
*RB-041	BOARD—Terminal board (2 lugs) (on rear wall)	.10
RB-072	BOARD—Terminal board (2 lugs)	.10
RB-073	BOARD—Terminal board (4 lugs)	.10
RB-158	BRACKET—Tuning indicator bracket	.15
*RC-017	CAPACITOR—.0045 mfd. 200 V. paper (C-4)	.25
*RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-17)	.25
*RC-031	CAPACITOR—.008 mfd. 1600 V. paper (C-20)	.25
*RC-042	CAPACITOR—.01 mfd. 1000 V. paper (C-12, C-19)	.30
*RC-080	CAPACITOR—.02 mfd. 400 V. paper (C-28)	.25
RC-091	CAPACITOR—.05 mfd. 400 V. paper (C-8, C-26)	.25
*RC-123	CAPACITOR—.1 mfd. 400 V. paper (C-5, C-15, C-18, C-27)	.35
*RC-213	CAPACITOR—50 mmf. mica (C-25)	.25
*RC-259	CAPACITOR—250 mmf. mica (C-16)	.30
*RC-296	CAPACITOR—500 mmf. mica (C-11)	.25
RC-589	CAPACITOR—Dry electrolytic 8 mfd. 450 V; 12 mfd. 450 V; 8 mfd. 350 V; 10 mfd. 25 V. (C-21, C-22, C-23, C-24)	2.10
*RC-608	CAPACITOR—"B" band osc. padding condenser 300-500 mmf. (C-3)	.45
*RC-609	CAPACITOR—Wave trap trimmer	.40
RC-644	CAPACITOR—1st or 2nd I.F. transformer double trimmer condenser (C-6, C-7, C-9, C-10)	.40
RC-664	CAPACITOR—"B" and "D" band osc. trimmer (C-31, C-32)	.35
RC-663	CAPACITOR—"D" band ant. trimmer 3-20 mmf. (C-29)	.20
RC-721	CAPACITOR—Two gang tuning condenser and "B" band ant. trimmer (C-1, C-30)	3.75
*RC-755	CAPACITOR—Line capacitor 250 V. A.C. paper (C-13, C-14)	.40
RC-884	CORD—Power cord	.50
RC-8016	CABLE—Tuning indicator cable	.55
RC-8022	CABLE—Speaker cable and female socket	.60
RD-202	DRIVE—Planetary reduction drive	1.00
RE-014	ESCUTCHEON—Escutcheon plate and window	1.75
RE-021	ESCUTCHEON—Tuning indicator escutcheon	.35
*RG-001	CLIP—Control grid clip (Pkg. of 5.)	.10
RG-301	GROMMET—Grommet and metal washer for tuning shaft (Pkg. of 5)	.20
RK-017	KNOB—Control knob (Pkg. of 5)	.40
RK-018	KNOB—Band change knob (Pkg. of 5)	.40
RL-052	COIL—"B" and "D" band ant. coil (T-1)	1.20
RL-256	COIL—"B" and "D" band osc. coil (T-2)	1.00
*RL-602	WAVE TRAP—Wave trap (coil only) (L-13)	.50
RL-920	LAMP—Dial lamp 6.3 V. .25 amps (Pkg. of 10)	1.50
RQ-675	RESISTOR—4,700 ohms 2 watt carbon (R-9)	.20
RQ-693	RESISTOR—27,000 ohms 2 watt carbon (R-10)	.20
RQ-1227	RESISTOR—47 ohms ½ watt carbon (R-12) (Pkg. of 5)	.70
RQ-1231	RESISTOR—68 ohms ½ watt carbon (R-21) (Pkg. of 5)	.70
RQ-1241	RESISTOR—180 ohms ½ watt carbon (R-11) (Pkg. of 5)	.70
RQ-1269	RESISTOR—2,700 ohms ½ watt carbon (R-13) (Pkg. of 5)	.70
RQ-1287	RESISTOR—15,000 ohms ½ watt carbon (R-18) (Pkg. of 5)	.70
RQ-1289	RESISTOR—18,000 ohms ½ watt carbon (R-14) (Pkg. of 5)	.70
RQ-1291	RESISTOR—22,000 ohms ½ watt carbon (R-8) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 ohms ½ watt carbon (R-1, R-2) (Pkg. of 5)	.70
RQ-1303	RESISTOR—68,000 ohms ½ watt carbon (R-16) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 ohms ½ watt carbon (R-4, R-7, R-15) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohms ½ watt carbon (R-6) (Pkg. of 5)	$0.70
RQ-1331	RESISTOR—1.0 meg. ½ watt carbon (R-17) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 meg ½ watt carbon (R-3, R-19) (Pkg. of 5)	.70
RR-727	RESISTOR—410 ohms 1½ watt moulded (R-20)	.15
RS-141	SHIELD—1st I.F. transformer shield	.15
RS-142	SHIELD—2nd I.F. transformer shield	.15
RS-178	SHIELD—Tuning indicator light shield (Pkg. of 5)	.05
*RS-200	SOCKET—Octal tube socket (Pkg. of 5)	.75
RS-215	SOCKET—6-prong tube socket (Pkg. of 5)	.60
RS-217	SOCKET—4-prong tube socket (Pkg. of 5)	.50
*RS-322	SWITCH—Band change switch (S-1)	.75
RS-347	SWITCH—Tone control switch (S-2)	.50
RT-241	TRANSFORMER—1st I.F. transformer (T-3)	1.60
RT-242	TRANSFORMER—2nd I.F. transformer (T-4)	1.65
RT-0712	TRANSFORMER—Power transformer 50-60 cycles 115-125 V (T-6)	5.30
RT-0713	TRANSFORMER—Power transformer 25-60 cycles 115-125 V. (T-6)	8.10
RT-0714	TRANSFORMER—Power transformer 50-60 cycles, Universal 115-250 V. (T-0)	8.20
RV-028	VOLUME CONTROL—2 meg potentiometer and power switch (tapped at 5000 ohms) (R-5, S-3)	.95
*RW-101	WASHER—Felt washer for knobs (Pkg. of 10)	.45
*RX-016	ASSEMBLY—Gang condenser mounting cushions and studs	.30
RX-032	ASSEMBLY—Chassis mounting screws, washers and rubber cushions	.10
	SPEAKER ASSEMBLY F-74	
RC-924	CONE—8-inch cone and voice coil assembly	.90
*RC-990	CLAMP—Voice coil spider clamp	.05
RP-015	PLUG—Male speaker plug	.20
RS-063	SPEAKER—8-inch speaker (complete)	6.10
RS-416	SPRING—Voice coil leads spring (Pkg. of 2)	.10
RT-428	TRANSFORMER—Output transformer	1.20
	SPEAKER ASSEMBLY F-77	
*RC-925	CONE—12-in. cone and voice coil assembly	1.25
*RC-991	CLAMP—Spider clamp	.05
*RP-015	PLUG—Male speaker plug	.20
RS-057	SPEAKER—12-in. type speaker (complete)	7.10
*RS-416	SPRING—Voice coil leads spring (Pkg. of 2)	.10
RX-030	ASSEMBLY—Speaker mtg. cushions and nuts	.15
RT-421	TRANSFORMER—Output transformer (T-5)	1.30
	DIAL SCALE MECHANISM	
RB-604	BUSHING—Volume control cable drive bushing	.10
RC-840	CABLE—Dial pointer drive cable (Pkg. of 5)	.55
RC-841	CABLE—Volume control pointer drive cable (Pkg. of 5)	.45
RC-842	CABLE—Tone control pointer drive cable (Pkg. of 5)	.40
RD-030	DRUM—Condenser drive drum	.40
RD-060	DIAL—Dial scale	1.15
RP-073	POINTER—Volume or tone control pointer (Pkg. of 5)	.10
RP-074	POINTER—Dial scale pointer (Pkg. of 5)	.90
RP-075	PULLEY—Small drive cord idler pulley (Pkg. of 6)	.20
RP-076	PULLEY—Tone control cord drive pulley	.15
RS-218	SOCKET—Lamp socket assembly	.10
RS-426	SPRING—Volume or tone control cable tension spring (Pkg. of 5)	.10
RS-432	SPRING—Tuning drive cable tension spring (Pkg. of 5)	.20

*Used on previous receivers.

(Prices subject to change without notice)

October, 1937 (20M)

Always Insist on General Electric Pre-tested Tubes

MODELS F-80 AND F-85

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	465 K.C. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-22) 3rd I.F. Pri. (C-21)	Gang condenser plates wide open—connect vertical input of oscilloscope to ground and the junction of C-24 and R-9 on 3rd I.F. transformer. Adjust trimmers for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Figure 3.
2. Band "B"	465 K.C. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-20) 2nd I.F. Pri. (C-19)	
3. Band "B"	465 K.C. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-18) 1st I.F. Pri. (C-17)	
4. Band "B"	465 K.C. Sweep	Antenna Post	250 Mmf. 400 ohms	Wave Trap Trimmer (C-4)	Adjust for minimum amplitude.

I.F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	465 K.C. with Modulation	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-22) 3rd I.F. Pri. (C-21)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control at maximum. Adjust all trimmers in order mentioned for maximum output. Do not attempt an overall realignment after stage by stage alignment has been accomplished.
2. Band "B"	465 K.C. with Modulation	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-20) 2nd I.F. Pri. (C-19)	
3. Band "B"	465 K.C. with Modulation	Converter	.05 Mfd.	1st I.F. Sec. (C-18) 1st I.F. Pri. (C-17)	
4. Band "B"	465 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Wave Trap Trimmer (C-4)	Adjust for minimum output.

R.F. ALIGNMENT

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-3) Ant. (C-2)	Connect output meter across voice coil—tone control on "Bass" position. The image of any "D" band signal should be heard 930 K.C. above signal input when (C-3) is on proper peak. Example: 15 M.C. image—15,930 K.C. Peak (C-2) while rocking the gang condenser.
3. Band "C"	No adjustments necessary.				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-12) Ant. (C-7)	Peak trimmers for maximum output with a low input signal.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. Padder (C-13)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-12) Ant. (C-7)	Peak trimmers for maximum output with a low input signal.

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	190				
	Converter	235	100	0	11	6.3
6K7 1st I.F. Amplifier		235	105	0	5	6.3
6K7 2nd I.F. Amplifier		235	105	0	7	6.3
6H6 Detector and A.V.C.		0 sig. −5 delay		0 sig. −5 delay	0 0	6.3
6U5 Indicator		110 *	Target 210	−5.0	4	6.3
6F5 Audio Amplifier		120 *		1.2	0.2	6.3
42 Output		250	265	16	39	6.3
80 Power Rectifier		640/320 RMS		335 D-C	70	5.0

A-C line voltage 120—No signal input—1000 ohms per volt-meter—dial pointer at 530 K.C.
* Measured on 500-volt scale.

Stock No.	Description	List Price
*RB-008	BOARD—Terminal Board (2 Terminals)	$0.10
*RB-026	BOARD—Ant. & Gnd. Terminal Board	.10
RB-158	BRACKET—Tuning indicator bracket	.15
*RC-017	CAPACITOR—.0045 Mfd., 200 V. Paper (C-6)	.25
*RC-023	CAPACITOR—.005 Mfd., 600 V. Paper (C-24)	.25
*RC-034	CAPACITOR—.01 Mfd., 200 V. Paper (C-26) (Close Tolerance)	.25
*RC-042	CAPACITOR—.01 Mfd., 1000 V. Paper (C-5, C-36)	.30
*RC-080	CAPACITOR—.02 Mfd., 400 V. Paper (C-27, C-28)	.25
*RC-091	CAPACITOR—.05 Mfd., 400 V. Paper (C-11, C-15, C-23)	.30
RC-103	CAPACITOR—0.1 Mfd., 200 V. Paper (Close Tolerance) (C-25)	.30
*RC-123	CAPACITOR—.1 Mfd., 400 V. Paper (C-16, C-30, C-37)	.35
*RC-213	CAPACITOR—50 Mmf. Mica (C-14)	.25
*RC-259	CAPACITOR—250 Mmf. Mica (C-29 C-35)	.30
RC-339	CAPACITOR—1300 Mmf. Mica (C-10)	.35
RC-575	CAPACITOR—Dry Electrolytic; 8 Mfd., 350 V; 10 Mfd., 25 V; 8 Mfd., 400 V; 12 Mfd., 450 V; (C-31, C-32, C-33, C-34)	2.10
*RC-618	CAPACITOR—"B" Band Osc. Trimmer 5-45 Mmf. (C-7, C-12)	.25
RC-634	CAPACITOR—"B" Band Osc. Padder 350-550 Mmf. (C-13)	.35
RC-635	CAPACITOR—Double Trimmer, 1st or 2nd I.F. Transformer (C-18, C-17, C-19, C-20)	.45
*RC-637	CAPACITOR—Double Trimmer, 3rd I.F. Transformer (C-21, C-22)	.60
*RC-710-22	CONDENSER—2-gang Tuning Condenser (C-1, C-2, C-3)	3.60
*RC-754	CAPACITOR—Line Filter Capacitor .01-.01 Mfd., 250 V., A.C. (C-8, C-9)	.40
RC-843	CABLE—Speaker Cable and Plug	.35
RC-8016	CABLE—Tuning indicator cable	.55
RC-865	CORD—Power Cord and Plug	.45
RD-203	DRIVE—Planetary reduction drive	1.10
RE-014	ESCUTCHEON—Escutcheon Plate Assembly	1.75
RE-021	ESCUTCHEON—Tuning indicator escutcheon	.35
*RF-010	FOOT—Mounting Foot Assembly (Pkg. of 2)	.30
*RG-001	GRID CLIP—Control Grid Clip (Pkg. of 5)	.10
RG-300	GROMMET—Tuning Shaft Grommet (Pkg. of 5)	.20
RK-017	KNOB—Control Knob (Pkg. of 5)	.40
RK-018	KNOB—Wave Change Switch Knob (Pkg. of 5)	.40
RL-043	COIL—"B," "C," and "D" Band Ant. Coil (T-3)	1.50
RL-245	COIL—"D" Band Oscillator Coil (T-4)	.65
RL-246	COIL—"B" and "C" Band Oscillator Coil (T-5)	1.05
RL-920	LAMP—Dial Lamp, 6.3 V., 0.25 Amp. (Pkg. of 10)	1.50
RQ-1225	RESISTOR—39 Ohms, ½ W. Carbon (R-16) (Pkg. of 5)	.70
RQ-1267	RESISTOR—2,200 Ohms, ½ W. Carbon (R-4) (Pkg. of 5)	.70
RQ-1273	RESISTOR—3,900 Ohms, ½ W. Carbon (R-15) (Pkg. of 5)	.70
RQ-1275	RESISTOR—4,700 Ohms, ½ W. Carbon (R-7) (Pkg. of 5)	.70
RQ-1287	RESISTOR—15,000 Ohms, ½ W. Carbon (R-18) (Pkg. of 5)	.70
RQ-1291	RESISTOR—22,000 Ohms, ½ W. Carbon (R-13) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 Ohms, ½ W. Carbon (R-2) (Pkg. of 5)	.70
RQ-1303	RESISTOR—68,000 Ohms, ½ W. Carbon (R-8, R-14) (Pkg. of 5)	.70
RQ-1307	RESISTOR—.1 Meg., ½ W. Carbon (R-6) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 Ohms, ½ W. Carbon (R-5, R-9) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 Ohms, ½ W. Carbon (R-3) (Pkg. of 5)	.70
RQ-1331	RESISTOR—1.0 Megohm, ½ W. Carbon (R-10) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 Megohm, ½ W. Carbon (R-19) (Pkg. of 5)	.70
RQ-1349	RESISTOR—5.6 Megohms, ½ W. Carbon (R-22) (Pkg. of 5)	$0.70
RR-726	RESISTOR—Candohm Tapped Resistor (R-11)	.65
RR-727	RESISTOR—410 Ohms, 1½ W. Molded Resistor (R-12)	.15
RS-172	SHIELD—Shield for 1st, 2nd or 3rd I.F. Transformer	.25
RS-174	SHIELD—6F5 Grid Shield Cap (Pkg. of 5)	.25
*RS-200	SOCKET—8-pin Octal Base Socket (Pkg. of 5)	.75
RS-215	SOCKET—6-prong Tube Socket (Pkg. of 5)	.60
RS-217	SOCKET—4-prong Tube Socket (Pkg. of 5)	.50
RS-348	SWITCH—Tone Control and Power Switch (S-2, S-3)	.85
RS-349	SWITCH—Band Change Switch (S-1)	1.30
RT-078	TRANSFORMER—Power Transformer, 115-125 V., 60 cycles (T-2)	4.30
RT-0710	TRANSFORMER—Universal Power Transformer (T-2)	7.40
RT-0711	TRANSFORMER—Power Transformer, 115-125 V., 25-60 cycles (T-2)	7.60
*RT-232	TRANSFORMER—3rd I.F. Transformer (Complete) (L-8, C-21, C-22)	1.75
RT-233	TRANSFORMER—1st or 2nd I.F. Transformer (Complete) (L-6, C-17, C-18; L-7, C-19, C-20)	1.50
RV-029	VOLUME CONTROL—2 Megohm Volume Control (R-1)	.75
RW-015	WINDOW—Escutcheon Window with Rubber Mountings	.45
*RW-101	WASHER—Felt Washers for Knobs (Pkg. of 10)	.45
*RW-400	WAVE TRAP—Wave Trap Complete (L-1, C-4)	.80
*RX-016	ASSEMBLY—Gang Condenser Mounting Assembly	.30
RX-021	ASSEMBLY—Chassis Mounting Assembly	.10
	SPEAKER ASSEMBLY F-80	
RC-924	CONE—8-in. Cone and Voice Coil Assembly	.90
*RC-990	CLAMP—Voice Coil Spider Clamp	.05
*RP-015	PLUG—Male Speaker Plug	.20
RS-056	SPEAKER—8-inch Speaker (Complete)	5.90
*RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-421	TRANSFORMER—Output Transformer	1.30
	SPEAKER ASSEMBLY F-85	
RC-925	CONE—12-in. Cone and Voice Coil Assembly	1.25
*RC-991	CLAMP—Voice Coil Spider Clamp	.05
*RP-015	PLUG—Male Speaker Plug	.20
RS-057	SPEAKER—12-in. Speaker Complete	6.80
*RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-421	TRANSFORMER—Output Transformer	1.30
	DIAL SCALE MECHANISM	
RB-155	BRACKET—Band Change Bracket	.05
RB-604	BUSHING—Volume Control Cable Drive Bushing	.10
RC-840	CABLE—Gang Condenser Drive Cable (Pkg. of 5)	.55
RC-844	CABLE—Tone Control Cable (Pkg. of 5)	.45
RC-845	CABLE—Volume Control Cable (Pkg. of 5)	.45
*RD-030	DRUM—Condenser Drive Drum	.40
RD-052	DIAL—Dial Scale	1.40
RP-073	POINTER—Volume or Tone Control Pointer (Pkg. of 5)	.10
RP-075	PULLEY—Small Drive Cord Idler Pulley (Pkg. of 6)	.20
RP-076	PULLEY—Tone Control Drive Pulley	.15
RP-077	POINTER—Dial Scale Pointer (Pkg. of 5)	.90
RR-910	REFLECTOR—Lamp Reflector	.10
RS-218	SOCKET—Lamp Socket Assembly	.10
RS-425	SPRING—Tuning Drive Cord Tension Spring (Pkg. of 5)	.10
RS-426	SPRING—Tone or Volume Control Drive Cord Spring (Pkg. of 5)	.10
RX-022	ASSEMBLY—Band Indicator Assembly (Includes Cord, Pointer, and Spring)	.20

*Used on previous receivers.

(Prices subject to change without notice)

October, 1937 (20M)

GENERAL ELECTRIC CO.

MODELS F-80, F-85
Schematic, Socket
Trimmers, Transformer
Resistance, Voltage

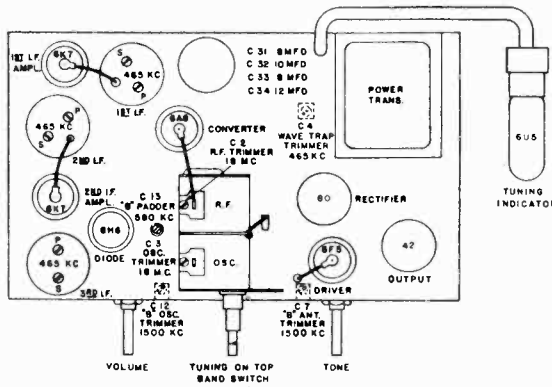


Fig. 4. Chassis Layout and Trimmer Location

MODELS F-80 AND F-85

Fig. 1. Schematic Diagram

IF PEAK 455 KC

SYMBOL	DESCRIPTION
R1	VOLUME CONTROL WITH 2 MEGS. TAP AT 500,000Ω
R2	CARBON RESISTOR 470,000Ω
R3	2,200Ω
R4	22,000Ω
R5	22,000Ω
R6	22,000Ω
R7	47,000Ω
R8	68,000Ω
R9	22,000Ω
R10	1 MEGΩ
R11	CARBON 410Ω
R12	CARBON 20,000Ω
R13	MOLDED 20,000Ω
R14	CARBON 6,800Ω
R15	22Ω
R16	1,500Ω
R17	2.2 MEGΩ
R18	5.6 MEGΩ
R19	
R22	CARBON RESISTOR
T1	OUTPUT TRANSFORMER
T2	POWER
T3	1ST I.F.
T4	2ND I.F.
T5	3RD I.F. TRANSFORMER
T6	
T7	
T8	
L1	WAVE TRAP COIL
L9	SPEAKER FIELD
L10	VOICE
L11	HUM
S1	BAND CHANGE SWITCH
S2	TONE CONTROL SWITCH
S3	POWER SWITCH

SYMBOL	DESCRIPTION	CAPACITOR
C1	TUNING CAPACITOR	10-450 MMF
C2	1ST A. TRIM.	2-20 MMF
C3	1ST O. TRIM.	2-20 MMF
C4	1ST O. TRAP TRIM.	.01 MF
C5	PAPER	.0045 MF
C6	PAPER TRIM.	5-45 MMF
C7	PAPER	.01 MF
C8	MICA	1300 MMF
C9	PAPER TRIM.	5-45 MMF
C10	2ND O. TRIM.	350-550 MMF
C11	2ND PADDER TRIM.	5-45 MMF
C12	MICA	.05 MF
C13	PAPER	.05 MF
C14	PAPER	.1 MF
C15	PAPER PRI. TRIM.	335 MMF
C16	1ST I.F. SEC. TRIM.	335 MMF
C17	2ND I.F. PRI. TRIM.	335 MMF
C18	2ND I.F. SEC. TRIM.	335 MMF
C19	3RD I.F. PRI. TRIM.	190 MMF
C20	3RD I.F. SEC. TRIM.	.005 MF
C22	PAPER	.05 MF
C23		.1 MF
C24	PAPER	.01 MF
C25	PAPER PRI. TRIM.	.02 MF
C26	1ST I.F. SEC. TRIM.	335 MMF
C27	2ND I.F. PRI. TRIM.	335 MMF
C28	2ND I.F. SEC. TRIM.	335 MMF
C29	3RD I.F. PRI. TRIM.	190 MMF
C30	3RD I.F. SEC. TRIM.	.005 MF
C31	PAPER	.01 MF
C32	PAPER	.01 MF
C33	MICA	250 MMF
C34	MICA	250 MMF
C35	DRY ELECT.	8 MF
C36		.1 MF
C37	DRY ELECT.	8 MF
C38	MICA	250 MMF
	PAPER	.01 MF
	PAPER	.02 MF
	PAPER	CAPACITOR

CONDITIONS OF TEST
WAVE SWITCH ON B BAND
POWER SWITCH OFF

APPROXIMATE RESISTANCE MEASUREMENTS

	RESISTANCE TO GROUND	TUBE	SOCKET PRONG
① Ⓑ	1.2 MEG Ω	CONV. GRID	CAP
② Ⓑ	1.2 MEG Ω	1ST I.F. GRID	CAP
③ Ⓑ	100,000Ω	2ND I.F. GRID	CAP
④ Ⓑ	290,000Ω	DIODE PLATE	PRONG 3
⑤ Ⓑ	1.2 MEG Ω	DIODE PLATE	PRONG 5
⑥ Ⓑ	100,000Ω	DIODE CATH.	PRONG 6
Ⓒ Ⓓ	GROUNDED	DIODE CATH.	PRONG 8
Ⓔ Ⓕ	0-2 MEG Ω VOL. CONT.	1ST AUDIO GRID	CAP
Ⓖ Ⓑ	470,000Ω	OUTPUT GRID	PRONG 4

PRONG NUMBERS BOTTOM VIEW 1 TO 8 INCL.

PRONG NUMBERS BOTTOM VIEW FOR 9

ALL VOLTAGES TO GROUND UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES MEASURED WITH ANT & GND. TERMINALS SHORTED & 120V ON PRI

UNIVERSAL TRANSFORMER
120-240 VOLTS

SERVICE DATA

RFS-80 Radio Receivers, Models F-80 and F-85

Physical Specifications

	F-80	F-85
Model		
Height	11 7/16 in.	40 in.
Width	20 3/4 in.	25 1/8 in.
Depth	9 in.	12 1/4 in.
Wt. Packed	29 pounds	68 pounds

Tuning Control Drive Ratio

Fast Tuning	8 to 1
Vernier Tuning	40 to 1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	80
C	115–125	25–60	85
V	115–125 140–155 190–220 220–250	50–60	85

NOTE: Rating "V" receivers may be used on 40-cycle circuits provided the voltage does not exceed 110 volts on the 115-125 volt tap or 200 volts on the 190-220 volt tap.

Tuning Frequency Range

Band "B"	540– 1600 K.C.
Band "C"	1550– 5800 K.C.
Band "D"	5400–18000 K.C.

Intermediate Frequency ..... 465 K.C.

Electrical Power Output

Undistorted	2.5 watts
Maximum	5.0 watts

Tone Control ..... 4-point control

Loud-speaker—Electrodynamic

Cone: Model F-80	8 in.
Model F-85	12 in.
Speaker Impedance	5.5 ohms at 400 cycles

Tubes

Oscillator and Converter	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
Tuning Indicator	6U5 Electron-ray Tube
First Audio Amplifier	6F5 High-gain Triode
Audio Power Amplifier	42 Power Amplifier Pentode
Rectifier	80 Full-wave Rectifier
Dial Lamp	MAZDA No. 46

GENERAL INFORMATION

The Models F-80 and F-85 employ eight General Electric tubes described above in a superheterodyne circuit, which includes two stages of I.F. and wave trap, compensated volume control, four-point tone control, and ample pentode power output.

The "B," "C," and "D" band antenna coils are wound on a single coil form designated as T-3 in Fig. 1. Coils L4, L5, and L6 are the components of the "B" band antenna coil. When operating in the "C" band, L4 is used for the grid coil while L3 acts as the antenna primary. L2 is the "D" band antenna grid coil using L3, as in the "C" band, for the antenna primary coil. T4 consisting of plate and grid coils L7 and L8 are the components of the "D" band oscillator coil. L12, L13 and L14, L15 are the "C" and "B" band oscillator coils respectively and are wound on the same coil form. The "B" and "C" band oscillator grid coils are shorted out by a contact of S1 when the set is operating in the "C" and "D" bands respectively.

The intermediate frequency amplifier consists of two 6K7 tubes and three tuned transformers. The output of the third I.F. transformer is applied to one plate of the 6H6 diode, which is a combined detector, initial bias and automatic volume control tube.

Volume is controlled by the variable potentiometer R1 in the grid circuit of the 6F5 audio amplifier tube. The output of the 6F5 is resistance coupled to the grid of the type 42 power amplifier pentode. The plate circuit of the 42 tube is matched to the loud-speaker by means of a suitable step-down output transformer.

Proper bias for the various tubes are obtained by the use of a tapped bleeder resistance (R-11). One of the cathodes of the 6H6 diode is returned to −5 volts on this bleeder in order to provide initial bias to all tubes controlled by the AVC.

Tone Control

When the tone control is in the "normal" position, a portion of the output voltage of the receiver is fed back through a resistor-capacitor network consisting of C-25, R-14 and R-13 to a tap on the volume control. This feedback voltage is out of phase with the input and the resulting degeneration reduces the speaker resonance boom due to pentode output, gives an extended and relatively flat response to a wide range of low frequencies, and reduces distortion arising in the audio amplifier. In the "bass" position, the tone control switch connects C-26 in parallel with the above network. The value of C-26 is such that more degeneration of the high than the low frequency notes occurs, thereby increasing the bass response. The "foreign" position of the switch shorts out capacitor C-25 and resistor R-14 and places C-26 and R-13 in parallel which gives a frequency response best suited for short-wave reception. In the speech position, C-25 and R-14 are shorted out; C-26 is removed from the circuit, leaving R-13, thereby providing flat degeneration at all frequencies which is the most desirable condition for the reception of programs predominating in speech. The tone control switching described can be traced on the schematic diagram shown in Fig. 1.

Tuning Indicator

The 6U5 tuning indicator tube is the remote cut-off type which enables it to operate on a wide range of signal strengths. The avc voltage is maximum when the set is tuned to resonance. This avc voltage is applied to the grid of the 6U5 tube so that the 6U5 triode plate current decreases as the avc voltage increases. As the triode plate voltage rises the voltage on the ray control electrode, which is connected to the plate, rises and changes the electron stream hitting the target. Resonance is indicated by the 6U5 tube when the dark sector reaches minimum width.

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an a-c voltmeter with a scale reading of 3 to 5 volts. A cathode-ray oscilloscope is preferred for I.F. alignment.
3. A screw-driver-type alignment tool.

The alignment procedure is given in table form on page 5 along with the trimmer location drawing, Fig. 4. A "dummy antenna" should be used in all alignments and is the capacitor or capacitor and resistor used in series with the signal generator. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. as this would remove the grid bias from the tube.

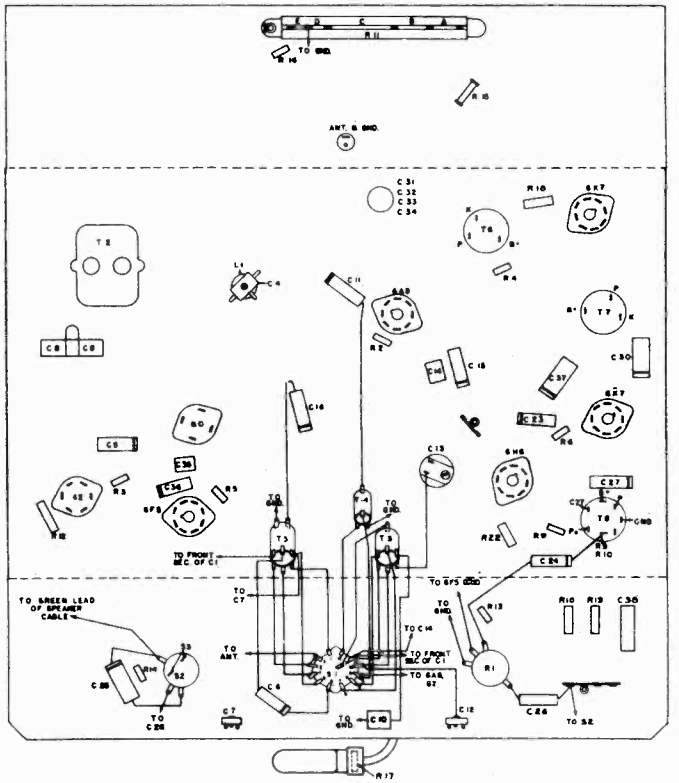


Fig. 2. Chassis Parts Layout

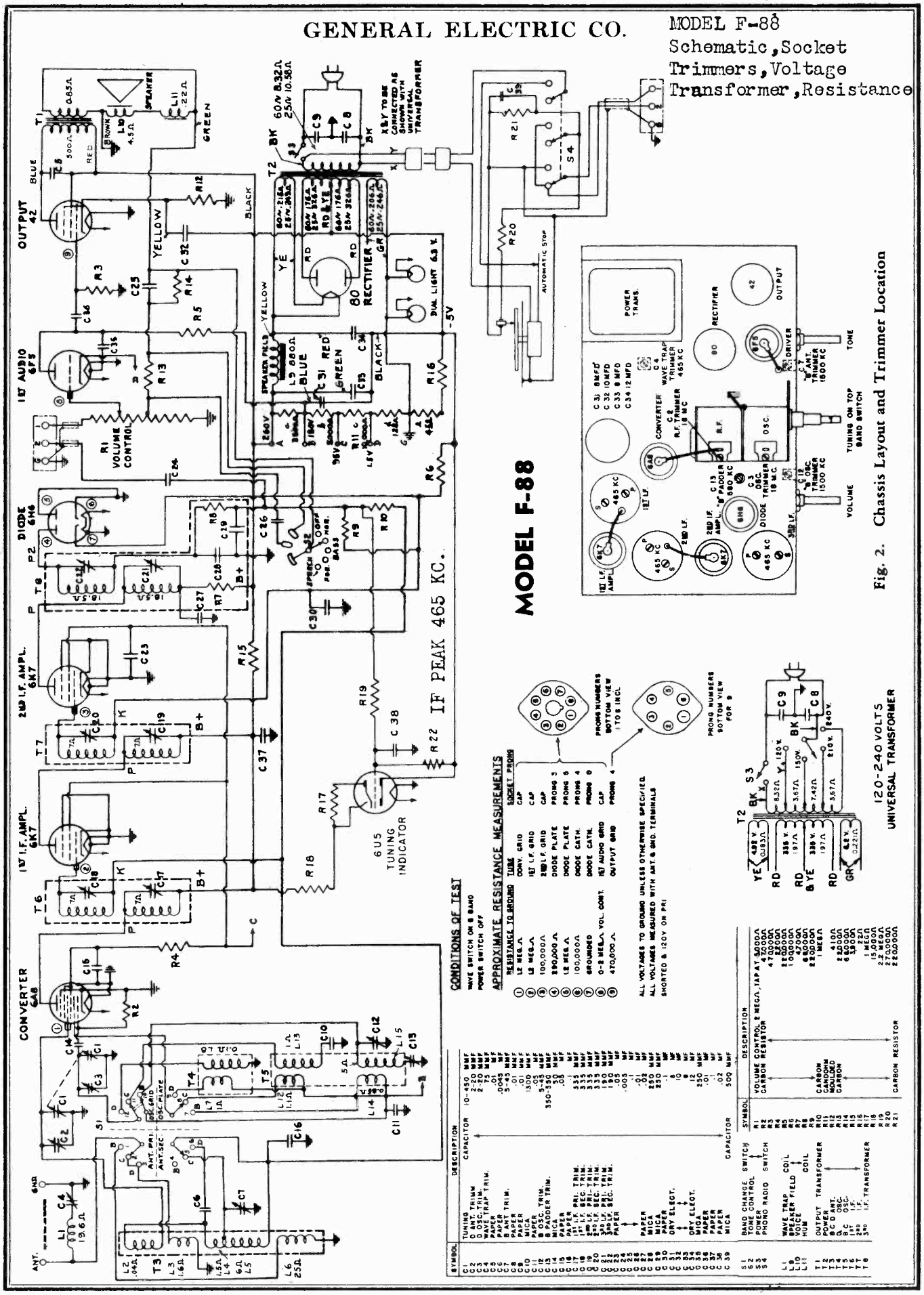


Fig. 2. Chassis Layout and Trimmer Location

MODEL F-88
Changes, Voltage

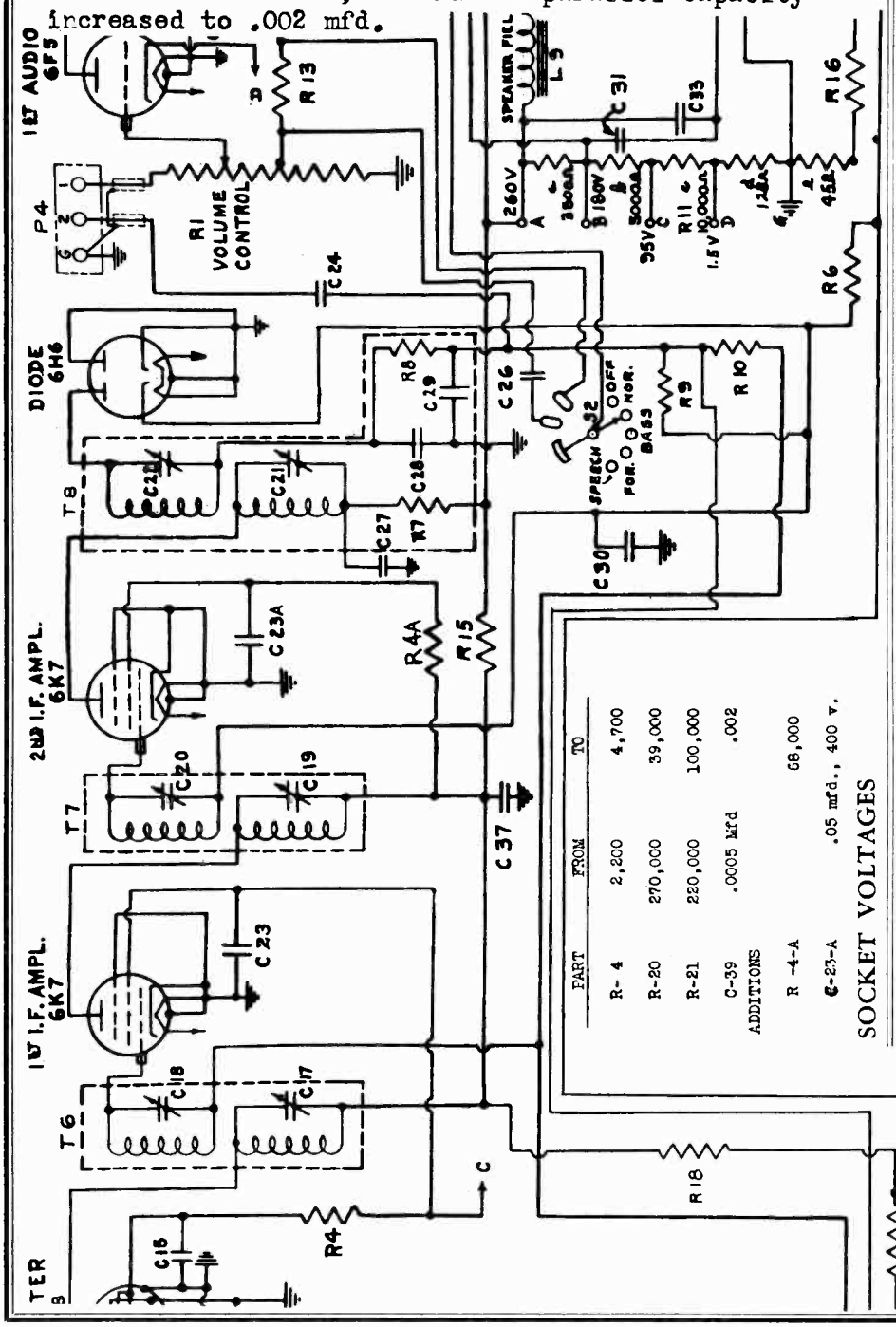
GENERAL ELECTRIC CO.

Bypass condenser C-23 has been disconnected from the 2nd I.F. screen grid and connected to the screen of the first I.F.

Second I.F. screen grid has been connected to the converter and first I.F. plate voltage supply lead through a 68,000 ohms dropping resistor, R4A, which has been bypassed by C-23A, a .05 mfd 400 v. condenser.

The 6A8 screen grid resistor R4 has been changed from 2200 ohms to 4700 ohms.

The resistance in series with the crystal pickup has been reduced to 39,000 ohms, the parallel resistance reduced to 100,000 and the parallel capacity increased to .002 mfd.



PART	FROM	TO
R- 4	2,200	4,700
R-20	270,000	39,000
R-21	220,000	100,000
C-39	.0005 Mfd	.002
ADDITIONS		
R -4-A		68,000
C-23-A	.05 mfd., 400 v.	

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	190	...	...	...	...
Converter	235	100	0	11	6.3
6K7 1st I.F. Amplifier	235	105	0	5	6.3
6K7 2nd I.F. Amplifier	235	105	0	7	6.3
6H6 Detector and A.V.C. Sig. Plate	-5V	...	-5V	0	6.3
6F5 Audio Amplifier	120*	...	1.2	0.2	6.3
42 Output	250	265	16	39	6.3
6U5 Tuning Indicator	250	Target 250	-5V	3.5	6.3
80 Power Rectifier	640/320 RMS	...	335DC	74.0	5.0

A.C. line voltage 120—No signal input—1000 ohms per volt-meter—Dial pointer at 530 K.C. *Measured on 500-volt

PRODUCTION CHANGES

Model F-88

MODEL F-88
Specifications
Chassis Wiring

GENERAL ELECTRIC CO.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A-6	115–125	60	115
A-5	115–125	50	115
C-2	115–125	25	115
V-6	115–250	60	115
V-5	115–250	50	115

Physical Specifications

Model.....F-88
Height.....42 inches
Width.....27½ inches
Depth.....17¼ inches

Tuning Control Drive Ratio

Fast Tuning..... 8 to 1
Vernier Tuning.....40 to 1

Tuning Frequency Range

Band "B"..... 540–1600 K.C.
Band "C".....1550–5800 K.C.
Band "D".....5400–18000 K.C.

Intermediate Frequency.....465 K.C.

Electrical Power Output

Undistorted.....2.5 watts
Maximum.....5.0 watts

Tone Control.....4-point control

Loud-speaker—Electrodynamic

Cone diameter.....12-inch
Speaker Impedance.....5.5 ohms at 400 cycles

Phonograph Pick-up

Type.....Crystal
Impedance.....80,000 ohms at 1000 cycles

Tubes

Oscillator and Converter..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
First Audio Amplifier....6F5 High-gain Triode
Audio Power Amplifier...42 Power Amplifier Pentode
Rectifier.....80 Full-wave Rectifier
Tuning Indicator.....6U5 Electron-ray Tube
Dial Lamp.....MAZDA No. 46, 6.3 volt, 0.25 amp.

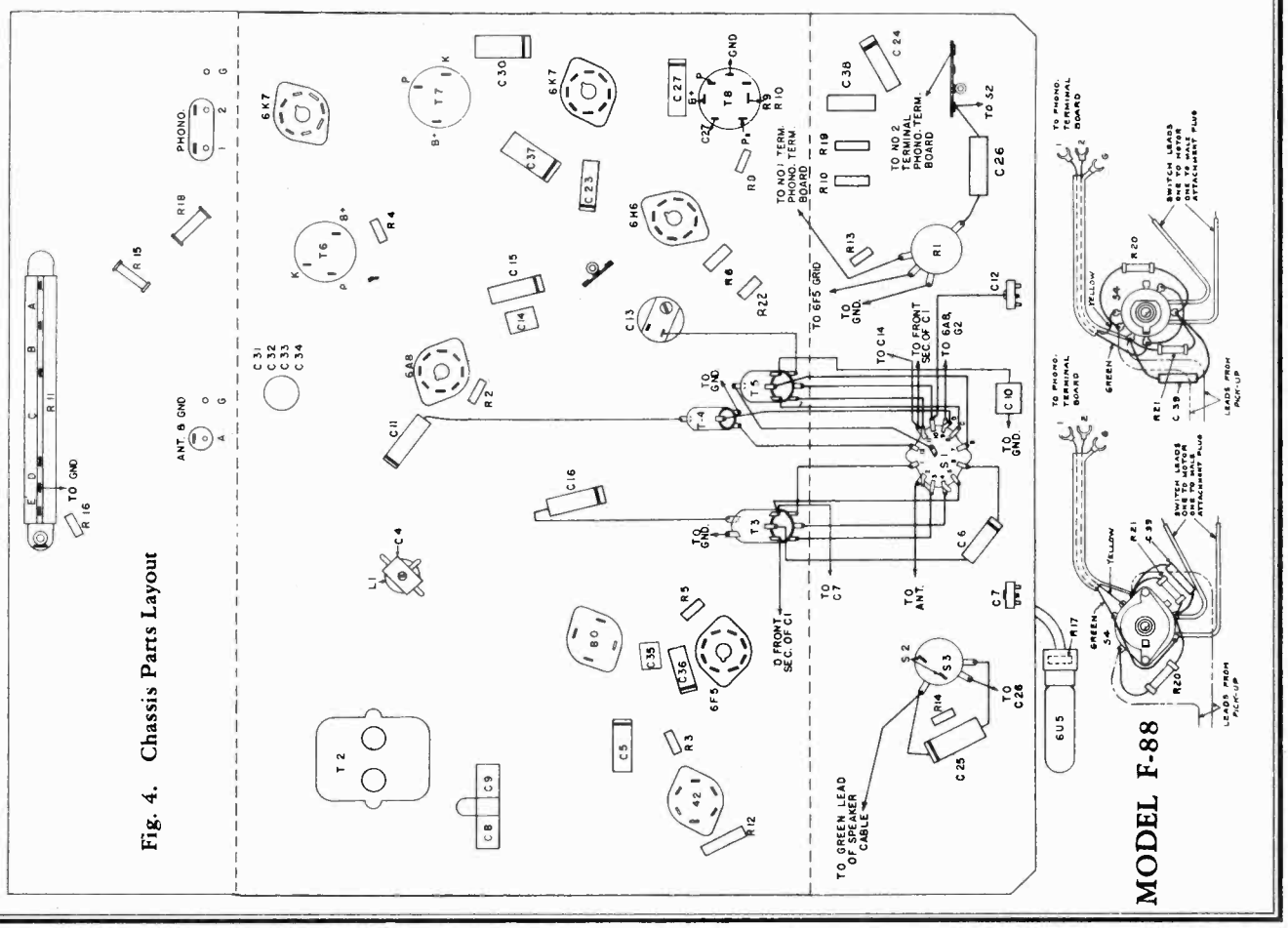


Fig. 4. Chassis Parts Layout

MODEL F-88
Circuit Data
Alignment, Phono.

GENERAL ELECTRIC CO.

RFS-88 Radio Receiver, Model F-88

SERVICE DATA

GENERAL INFORMATION

The Model F-88 is a three-band A-C operated radio receiver with the added facilities for the reproduction of phonograph recordings. It employs eight General Electric tubes in a superheterodyne circuit as described above. The receiver circuit incorporates two stages of I.F. amplification, I.F. wave trap, four-point tone control, and other features of design as described in the following paragraphs.

Coil System

The "B", "C" and "D" band antenna coils are wound on a single coil form designated as T-3 in Fig. 1. Coils L4, L5 and L6 are the components of the "B" band antenna coil. When operating in the "C" band, L4 is used for the grid coil while L-3 acts as the antenna primary. L2 is the "D" band antenna grid coil using L3, as in the "C" band, for the antenna primary coil. T4 consisting of plate and grid coils L7 and L8 are the components of the "D" band oscillator coil. L12, L13 and L14, L15 are the "C" and "B" band oscillator coils respectively and are wound on the same coil form.

The oscillator grid coil on the next lower frequency band to the *one in use* is shorted out by a wave switch contact of the switch S1.

The various contact terminals of the wave-change switch are numbered from 1 to 12 to facilitate the tracing of the circuit to the switch when transposing from the schematic to the parts layout diagrams.

Receiver Operation

The intermediate frequency amplifier consists of two 6K7 tubes and three tuned transformers. The output of the third I.F. transformer is applied to one plate of the 6H6 diode which is a combined detector and automatic volume control tube.

Volume is controlled by the variable potentiometer R-1 in the grid circuit of the 6F5 audio amplifier tube. The output of the 6F5 is resistance coupled to the grid of the type 42 power amplifier pentode.

Proper bias for the various tubes is obtained by the use of a tapped bleeder resistance (R-11). The diode load resistance R-9 is returned to approximately −5 volts on R-11 in order to provide an initial bias to all tubes controlled by the AVC.

Tone Control

When the tone control is in the "normal" position, a portion of the output voltage of the receiver is fed back through a resistor-capacitor network consisting of C-25, R-14, and R-13 to a tap on the volume control. This feedback voltage is out of phase with the input and the resulting degeneration reduces the speaker resonance boom due to pentode output, gives an extended and relatively flat response to a wide range of low frequencies, and reduces distortion arising in the audio amplifier. In the "bass" position, the tone control switch connects C-26 in parallel with the above network. The value of C-26 is such that more degeneration of the high than the low frequency notes occurs, thereby increasing the bass response. The "foreign" position of the switch shorts out capacitor C-25 and Resistor R-14 and places C-26 and R-13 in parallel which gives a frequency response best suited for short-wave reception. In the speech position, C-25 and R-14 are shorted out: C-26 is removed from the circuit, leaving R-13, thereby providing flat degeneration at all frequencies which is the most desirable condition for the reception of programs predominating in speech. The tone control switching described can be traced on the schematic diagram shown in Fig. 1.

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an AC voltmeter with a scale reading of 3 to 5 volts. A cathode ray oscilloscope is preferred for I.F. alignment.
3. A screw-driver type alignment tool.

The alignment procedure is given in table form on Page 3 along with the trimmer location drawing, Fig. 2. A "dummy antenna" should be used in all alignments and is the capacitor or capacitor and resistor used in series with the signal generator. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. as this would remove the grid bias from the tube.

Phonograph

The record-reproducing facilities consist of a high impedance crystal pick-up with its associated balanced tone arm connected across the volume control R-1 so that the regular audio system is used. When changing from radio reception to phonograph reception, the phono-radio switch S-4 simultaneously disconnects the 6H6 diode from the volume control, connects the crystal pick-up across this control, and shorts the 6H6 diode output, rendering the radio receiver section inoperative.

The motor switch is turned "on" when the phono-radio switch is placed in the phonograph position. A separate manual motor switch is provided to permit starting and stopping. The automatic stop lever also actuates the manual switch.

PHONOGRAPH MECHANISM

The phonograph mechanism used in this receiver has been designed to be as simple as possible and give long and trouble-free performance. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are explained in the following paragraphs.

Motor Adjustments

The speed of the turntable is controlled by a governor which allows correct adjustment of the turntable rotation to 78 revolutions per minute. The speed may be checked by placing a piece of paper under and counting the number of revolutions in a minute while the record is being played. If adjustment is necessary lift up the turntable and the speed regulator set screw will be found adjacent to the turntable hub of the motor. Clockwise rotation of this set screw reduces speed.

The motor bearings and gears are properly lubricated for long operation under normal weather conditions. If the motor chatters or runs uneven, place a few drops of light machine oil on the governor felt.

Trip Mechanism

The trip mechanism is of simple design and consists of a latch bar connected to the motor switch and a trip lever. The latch is held closed by means of a spring between the latch bar and the trip lever. The motor switch is mechanically connected to the latch bar so that when the trip mechanism is released the motor switch is in the "off" position. Be sure this latch bar mechanism works freely without binding.

The trip is actuated by an adjustable arm on the trip lever. When the eccentric groove in the record swings the tone arm back and forth, it pushes the latch out of engagement.

Crystal Pick-up

The astatic crystal pick-up employs a crystal element which is coupled to a light needle chuck. The needle movement bends the crystal element thus generating voltage by the piezo-electric effect. The voltage developed is dependent upon the needle movement amplitude and the load resistance.

The crystal cartridge is a factory-sealed unit and no adjustments are provided. In case of replacement the cartridge is held in the tone arm by means of two screws. The pick-up and tone arm assembly should require very little servicing and if treated with reasonable care should perform its function without attention for long periods of time.

REPLACEMENT PARTS LIST — MODEL F-88

Stock No.	Description	List Price
RQ-1287	RESISTOR—15,000 ohms, ½ W. carbon (R-18) (Pkg. of 5)	$0.70
RQ-1291	RESISTOR—22,000 ohms, ½ W. carbon (R-13) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 ohms, ½ W. carbon (R-2) (Pkg. of 5)	.70
RQ-1303	RESISTOR—68,000 ohms, ½ W. carbon (R-8, R-14) (Pkg. of 5)	.70
RQ-1307	RESISTOR—.1 meg., ½ W. carbon (R-6) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 ohms, ½ W. carbon (R-5, R-9, R-21) (Pkg. of 5)	.70
RQ-1317	RESISTOR—270,000 ohms, ½ W. carbon (R-20) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohms, ½ W. carbon (R-3) (Pkg. of 5)	.70
RQ-1331	RESISTOR—1.0 megohm, ½ W. carbon (R-10, R-17) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 megohm, ½ W. carbon (R-19) (Pkg. of 5)	.70
RQ-1349	RESISTOR—5.6 megohm, ½ W. carbon ($R^{1}22$) (Pkg. of 5)	.70
RR-726	RESISTOR—Candohm tapped resistor (R-11)	.65
RR-727	RESISTOR—410 ohm, 1½ W. molded resistor (R-12)	.15
RS-172	SHIELD—Shield for 1st, 2nd, or 3rd IF transformer	.25
RS-174	SHIELD—6F5 grid shield cap (Pkg. of 5)	.25
*RS-200	SOCKET—8-pin octal base socket (Pkg. of 5)	.75
RS-215	SOCKET—6-prong tube socket (Pkg. of 5)	.60
RS-217	SOCKET—4-prong tube socket (Pkg. of 5)	.50
RS-348	SWITCH—Tone control and power switch (S-2, S-3)	.85
RS-349	SWITCH—Band change switch (S-1)	1.30
RT-078	TRANSFORMER—Power transformer, 115-125 V., 60 cycles (T-2)	4.30
RT-079	TRANSFORMER—Power transformer, 115-125 V., 25 cycles (T-2)	7.60
RT-0710	TRANSFORMER—Universal power transformer (T-2)	7.40
*RT-232	TRANSFORMER—3rd I.F. transformer (Complete) (L-8, C-21, C-22, C-28)	1.75
RT-233	TRANSFORMER—1st or 2nd I.F. transformer (complete) (L-6, C-17, C-18, L-7, C-19, C-20)	1.50
RV-029	VOLUME CONTROL—2 megohm volume control (R-1)	.75
RW-015	WINDOW—Escutcheon window with rubber mountings	.45
*RW-101	WASHER—Felt washers for knobs (Pkg. of 10)	.45
*RW-400	WAVE TRAP—Wave trap complete (L-1 C-4)	.80
*RX-016	ASSEMBLY—Gang condenser mounting assembly	.30
RX-021	ASSEMBLY—Chassis mtg. assembly	.10
	SPEAKER ASSEMBLY	
RC-925	CONE—12-in. cone and voice coil assembly	$1.25
*RC-991	CLAMP—Voice coil spider clamp	.05
*RP-015	PLUG—Male speaker plug	.20
RS-057	SPEAKER—12-in. speaker complete	6.80
*RS-416	SPRING—Voice coil leads spring (Pkg. of 2)	.10
RT-421	TRANSFORMER—Output transformer	1.30
	DIAL SCALE MECHANISM	
RB-155	BRACKET—Band change bracket	.05
RB-604	BUSHING—Volume control cable drive bushing	.10
RC-840	CABLE—Gang condenser drive cable (Pkg. of 5)	.55
RC-844	CABLE—Tone control cable (Pkg. of 5)	.45
RC-845	CABLE—Volume control cable (Pkg. of 5)	.45
*RD-030	DRUM—Condenser drive drum	.40
RD-052	DIAL—Dial scale	1.40
RP-073	POINTER—Volume or tone control pointer (Pkg. of 5)	.10
RP-075	PULLEY—Small drive cord idler pulley (Pkg. of 6)	.20
RP-076	PULLEY—Tone control drive pulley	.15
RP-077	POINTER—Dial scale pointer (Pkg. of 5)	90

Stock No.	Description	List Price
RR-910	REFLECTOR—Lamp reflector	.10
RS-218	SOCKET—Lamp socket assembly	.10
RS-425	SPRING—Tuning drive cord tension spring (Pkg. of 5)	.10
RS-426	SPRING—Tone or volume control drive cord spring (Pkg. of 5)	.10
RX-022	ASSEMBLY—Band indicator assembly (includes cord, pointer, and spring)	.20
	PHONOGRAPH ASSEMBLY	
RA-405	ARM—Pick-up tone arm	2.30
RC-5000	CRYSTAL—Crystal cartridge assembly	6.00
RC-8021	CABLE—Radio-phono shielded cable	.35
RK-018	KNOB—Radio-phono switch knob (Pkg. of 5)	.40
RM-106	MOTOR—Motor complete, 78 R.P.M., 115-125 V., 60 cycles	13.75
RM-107	MOTOR—Motor complete, 78 R.P.M., 115-125 V., 50 cycles	13.75
RM-108	MOTOR—Motor complete, 78 R.P.M., 115-125 V., 25 cycles	15.25
*RP-024	PLUG—Two contact round female plug	.60
*RP-025	PLUG—Two contact round male connector plug	.20
RS-366	SWITCH—Radio-phono switch	1.10
RS-374	SWITCH—Automatic stop and switch (complete)	1.50
RS-859	SCREW—Needle clamp screw	.10
RT-903	TURNTABLE—10-inch turntable (brown velveteen)	1.75
RX-037	ASSEMBLY—Motor mounting assembly	.20
*RB-008	BOARD—Terminal board (2 terminals)	$0.10
*RB-026	BOARD—Ant. & Gnd. terminal board	.10
RB-158	BRACKET—Tuning Indicator Bracket	.10
*RC-017	CAPACITOR—.0045 Mfd., 200 V. paper (C-6)	.25
*RC-023	CAPACITOR—.005 Mfd., 600 V. paper (C-24)	.25
*RC-034	CAPACITOR—.01 Mfd., 200 V. paper (C-26) (close tolerance)	.25
*RC-042	CAPACITOR—.01 Mfd., 1000 V. paper (C-5, C-36)	.30
*RC-080	CAPACITOR—.02 Mfd., 400 V. paper (C-27, C-38)	.25
*RC-091	CAPACITOR—.05 Mfd., 400 V. paper (C-11, C-15, C-23)	.30
RC-103	CAPACITOR—0.1 Mfd., 200 V. paper (close tolerance) (C-25)	.30
*RC-123	CAPACITOR—.1 Mfd., 400 V. paper (C-16, C-30, C-37)	.35
*RC-213	CAPACITOR—50 Mmf. Mica (C-14)	.25
*RC-259	CAPACITOR—250 Mmf. Mica (C-29, C-35)	.30
*RC-296	CAPACITOR—500 Mmf. Mica (C-39)	.25
RC-339	CAPACITOR—1300 Mmf. Mica (C-10)	.35
RC-575	CAPACITOR—Dry electrolytic, 8 Mfd. 350 V; 10 Mfd., 25 V; 8 Mfd., 400 V; 12 Mfd., 450 V; (C-31, C-32, C-33, C-34)	2.10
*RC-618	CAPACITOR—"B" band osc. trimmer 5-45 Mmf. (C-7, C-12)	.25
RC-634	CAPACITOR—"B" band osc. padder 350-550 Mmf. (C-13)	.35
RC-635	CAPACITOR—Double trimmer, 1st or 2nd IF transformer (C-18, C-17, C-19, C-20)	.45
*RC-637	CAPACITOR—Double trimmer, 3rd IF transformer (C-21, C-22, C-28)	.60
*RC-710	CONDENSER—2-gang tuning condenser (C-1, C-2, C-3)	$3.60
*RC-754	CAPACITOR—Line filter capacitor, .01-.01 Mfd., 250 V. A.C. (C-8, C-9)	.40
RC-843	CABLE—Speaker cable and plug	.35
RC-865	CORD—Power cord and plug	.45
RC-8018	CABLE—Tuning Indicator Cable and Socket	.65
RD-203	DRIVE—Tuning Condenser friction drive reduction	1.10
RE-014	ESCUTCHEON—Escutcheon plate (assembly)	1.75
RE-021	ESCUTCHEON—Tuning Indicator escutcheon	.35
*RF-010	FOOT—Mounting foot assembly (Pkg. of 2)	.30

ALIGNMENT PROCEDURE

I. F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	465 K.C. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-22) 3rd I.F. Pri. (C-21)	Gang condenser plates wide open—connect vertical input of oscilloscope to ground and the junction of C-24 and R-9 on 3rd I.F. transformer. Adjust trimmers for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Figure 3.
2. Band "B"	465 K.C. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-20) 2nd I.F. Pri. (C-19)	
3. Band "B"	465 K.C. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-18) 1st I.F. Pri. (C-17)	
4. Band "B"	465 K.C. Sweep	Antenna Post	250 Mmf. 400 ohms	Wave Trap Trimmer (C-4)	Adjust for minimum amplitude.

I. F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	465 K.C. with Modulation	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-22) 3rd I.F. Pri. (C-21)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control at maximum. Adjust all trimmers in order mentioned for maximum output. Do not attempt an overall realignment after stage by stage alignment has been accomplished.
2. Band "B"	465 K.C. with Modulation	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-20) 2nd I.F. Pri. (C-19)	
3. Band "B"	465 K.C. with Modulation	Converter	.05 Mfd.	1st I.F. Sec. (C-18) 1st I.F. Pri. (C-17)	
4. Band "B"	465 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Wave Trap Trimmer (C-4)	Adjust for minimum output.

R. F. ALIGNMENT

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-3) Ant. (C-2)	Connect output meter across voice coil—tone control on "Bass" position. The image of any "D" band signal should be heard 930 K.C. above input signal when (C-3) is on proper peak. Example: 15 M.C. image—15,930 K.C. Peak (C-2) while rocking the gang condenser.
3. Band "C"	No adjustments necessary.				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-12) Ant. (C-7)	Peak trimmers for maximum output with a low input signal.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. Padder (C-13)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 400 ohms	Osc. (C-12) Ant. (C-7)	Peak trimmers for maximum output with a low input signal.

Stock No.	Description	List Price
*RG-001	GRID CLIP—Control grid clip (Pkg. of 5)	.10
RG-300	GROMMET—Tuning shaft grommet (Pkg. of 5)	.20
RK-017	KNOB—Control knob (Pkg. of 5)	.40
RK-018	KNOB—Wave change switch knob (Pkg. of 5)	.40
RL-043	COIL—"B", "C", and "D" band ant. coil (T-3)	1.50
RL-245	COIL—"D" band oscillator coil (T-4)	.65
RL-246	COIL—"B" and "C" band oscillator coil (T-5)	1.05
RL-920	LAMP—Dial lamp, 6.3 V., 0.25 amp. (Pkg. of 10)	1.50
RQ-1219	RESISTOR—22 ohms, ½ W. carbon (R-16) (Pkg. of 5)	.70
RQ-1267	RESISTOR—2,200 ohms, ½ W. carbon (R-4) (Pkg. of 5)	.70
RQ-1273	RESISTOR—3900 ohms, ½ W. carbon (R-15) (Pkg. of 5)	.70
RQ-1275	RESISTOR—4700 ohms, ½ W. carbon (R-7) (Pkg. of 5)	.70

*Used on previous receivers. (Prices subject to change without notice)

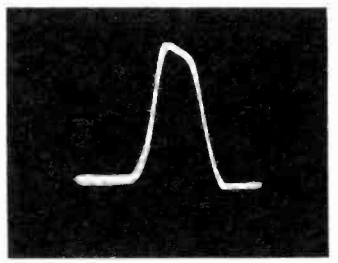


Fig. 1. Over-all I.F. Curve

SERVICE DATA

Physical Specifications

Model	F-96
Height	41 in.
Width	26½ in.
Depth	14¼ in.
Weight packed	81 lb

Tuning Control Drive Ratio

Fast tuning	10 to 1
Vernier tuning	55 to 1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	110–120 and (120–130)*	50–60	105
C	110–120 and (120–130)*	25–60	105

*The receiver as shipped from the factory, has the power cord connected to the 120–130 volt tap of the transformer, (red and black lead). If the normal voltage of your power supply is always below 115 volts, the power cord should be removed from this tap and connected to the lower voltage tap, (yellow and black lead). Solder and tape the joint and also tape the exposed end of the unused lead.

Tuning Frequency Range

Band "B"	540–1640 kc.
Band "C"	1600–5650 kc.
Band "D"	5640–18,000 kc.

Intermediate Frequency

465 kc.

Electrical Power Output

Undistorted	2.5 watts
Maximum	5.0 watts

Tone Control

4-point

Loud-speaker—Electrodynamic

Cone	12-inch
Voice Coil Impedance	5.5 ohms at 400 cycles

Tubes

R.F. Amplifier	6K7 Triple-grid, super-control Amplifier
Oscillator and Converter	6A8-G Pentagrid Converter
A.F.C. Control	6J5-G Detector Amplifier Triode
1st I.F. Amplifier	6K7 Triple-grid, Super-control Amplifier
2nd I.F. Amplifier	6K7 Triple-grid, Super-control Amplifier
Detector AFC and AVC	6H6 Twin Diode
First Audio Amplifier	6F5 High Gain Triode
Audio Power Amplifier	42 Power Amplifier Pentode
Rectifier	80 Full-wave Rectifier
Dial Lamp	Mazda No. 46—6.3 volts, 0.25 amps.

GENERAL INFORMATION

Model F-96 is a three band a-c operated receiver employing nine General Electric Pre-tested Tubes as described above in a superheterodyne circuit. The receiver circuit consists of an R.F. amplifier, an oscillator-converter with automatic frequency control, a two stage I.F. amplifier, a detector, avc and discriminator circuit and the audio amplifier. Added features are a four point tone control, wave trap, and the "Touch Tuning" system with its seven buttons allowing the instant selection of seven stations.

Receiver Operation

The R.F. amplifier consists of the antenna transformer (T-6) connected to the 6K7 which is coupled to the 6A8-G through the R.F. transformer (T-4). The signal is converted to an intermediate frequency of 465 kc by the oscillator and converter tube 6A8-G. The intermediate frequency is then amplified by the two 6K7 tubes used in conjunction with the three double tuned I.F. transformers. The primary and secondary coils of these I.F. transformers are carefully adjusted midway between the points of critical and over coupling so as to give the I.F. amplifier a broadened band width with the resultant improvement in fidelity of the received program.

The output of the I.F. amplifier is applied to a 6H6 twin diode, which is a combination detector, automatic volume control and discriminator voltage source for the automatic frequency control tube 6J5-G.

A detailed explanation of A.F.C. will be found in a following paragraph.

The volume is controlled by a potentiometer in the grid circuit of the 6F5 audio amplifier tube. This tube is resistance coupled to the 42 pentode output tube. The output transformer is designed to correctly load the 42 tube over a broad range of frequencies thus enabling the tube to deliver ample undistorted output to the 12-inch speaker.

Tone Control

Negative feed back is used to control the quality and tone of reproduction. The frequency response of the audio circuit is varied by the tone control switch and its associated network as follows:

In the "Normal" position, voltage from the voice coil is fed back through R-23, R-2 and C-49 to a tap on the volume control. C-31 serves to inject high frequencies into a tap higher up on the volume control. This arrangement gives an extended high frequency response, holds down the "boom" caused by pentode output and speaker resonance, and at the same time improves the quality and response to an extended range of both high and low frequencies.

In the "Bass" position, the high frequency input to the audio system is limited by the addition of C-41 across the volume control and its coupling condenser; and, also, by the omission of the high frequency injector capacitor C-31. This permits the true reproduction of a wide range of low frequencies without the "boom" at speaker resonance.

In the "Foreign" position R-2 and C-49 are shorted out of the network used for "Bass." C-41 is used, as in the "Bass" position, to limit the high frequency input to the audio amplifier. This permits more degeneration of the lower frequencies, and provides a tone range most suited for foreign reception. This position may be used to reduce noise and also to reduce bass on programs which predominate in low frequency tones.

C-41 is removed from the circuit in the "Speech" position; R-2 and C-49 are shorted out leaving R-23 and C-31 in the circuit, thus allowing flat degeneration of all frequencies. This arrangement has been found to give the best response for programs predominating in speech.

Coil System

The coils for the three bands are wound on a single form. The antenna transformer is designated as T-6, the R.F. transformer as T-4 and the oscillator transformer as T-5. All contacts on the band switch are numbered in Fig. 5 and Fig. 6 to facilitate tracing the coil circuits.

The band switch connects the coils to operate as follows:

	Primary	Secondary	Remarks
Ant.			
"B"	L-6	L-4 & L-5	
"C"	L-3	L-4	L-5 shorted
"D"	L-2 & L-3	L-1	L-4 & L-5 shorted
R.F.			
"B"	L-13	L-11 & L-12	
"C"	L-10	L-11	L-12 shorted
"D"	L-9 & L-10	L-8	L-11 & L-12 shorted
Osc.			
"B"	L-19	L-18	
"C"	L-17	L-16	Connects C-30 across L-18
"D"	L-15	L-14	Connects C-30 across L-16

On "D" band contact No. 9 is used to provide a ground for the General Electric noise-reducing antenna systems KV-300 and FT-40.

Automatic Frequency Control

The Automatic Frequency Control used in this receiver shifts the oscillator frequency so that the correct intermediate frequency is very closely produced even when the receiver is mistuned several kilocycles.

The essential elements are the discriminator transformer T-9, the twin diode 6H6 with its balanced discriminator network, and the 6J5-G control tube connected across the broadcast oscillator plate coil.

The discriminator transformer is designed to deliver (when properly tuned to 465 kc.) equal voltages to each section of the 6H6. Under this condition the voltage drop across R-21 is equal and opposite to the voltage across the total resistance of R-19, R-22, and R-17; thus no discriminator voltage is produced to control the 6J5-G tube.

However, if the signal frequency is increased above 465 kc. unequal voltages are applied to the diodes and the voltage over R-21 is greater than the voltage over the combined resistance of R-19, R-22, and R-17. The difference of these two voltages is positive and is applied to the 6J5-G control tube.

When the signal frequency is decreased below 465 kc. the result is less voltage over R-21 and a greater voltage over the combined resistances R-19, R-22 and R-17. The difference of these two voltages, as applied to the 6J5-G control tube, is negative.

Thus three conditions arise:

On resonance:	no discriminator voltage developed
Above 465 kc.:	a positive control voltage
Below 465 kc.:	a negative control voltage

The 6J5-G A.F.C. control tube has a combination of self and fixed bias, the latter being the result of the current supplied through R-8 to the cathode resistor R-4. The R.F. voltage applied to the control grid of the 6J5-G is obtained from the drop across the C-6 series padder and C-30. The vector sum of these two voltages is applied to the phase-shifting network C-25 and R-3 and in turn to the control grid. This phase-shifting network causes the control tube to appear as a reactance in parallel with the oscillator coil. The value of the apparent reactance depends upon the control voltage produced by the discriminator.

When the set is mistuned above the incoming signal, the converter output is above the 465 kc. required. A positive discriminator voltage is produced as explained above. This causes the 6J5-G tube to act as more capacitive reactance and thus lower the oscillator frequency; this gives a lower converter output frequency, approximately 465 kc.

When the set is mistuned below the incoming signal, the converter output is below the 465 kc. required. A negative discriminator voltage is produced as explained above. This causes the 6J5-G to act as less capacitive reactance thus increasing the oscillator frequency. This in turn gives a higher converter output frequency, approximately 465 kc.

A decided A.F.C. action is apparent on short waves. The discriminator voltage is produced in the same manner as above. However, the action of the 6J5-G tube is different. The 6A8-G oscillator plate voltage and 6J5-G plate voltage are supplied through the same resistor (R-5). A positive discriminator voltage allows the 6J5-G plate current to increase, thus reducing the 6A8-G oscillator plate voltage. This causes a lower oscillator frequency with the resultant lower converter output frequency, approximately 465 kc.

With a negative discriminator voltage the 6J5-G plate current is less, thus increasing the 6A8-G oscillator plate voltage. This causes a higher oscillator frequency with the resultant higher converter output frequency, approximately 465 kc.

Touch Tuning

This receiver employs six pairs of selector trimmers to tune the antenna and oscillator circuits to six different stations in the broadcast band. By leaving the gang condenser tuned to a station, not tuned by the above trimmers, any one of seven stations is available by merely touching a button.

The manual button operates the switches S-6, S-7, S-8, and S-9 simultaneously. The switches are shown in the manual position in Fig. 5. S-9 is used to provide the ground connection for the 1500 kc. antenna trimmer C-2, and it also grounds the antenna selector trimmers.

Pressing any one of the buttons releases any other button which may have been depressed. When the manual button is in the released position, S-6 opens the antenna transformer connection to the grid of the 6K7 R.F. amplifier, and replaces the antenna section of the gang condenser with the antenna selector trimmers.

S-7 opens the circuit to the R.F. stage and connects the 6A8-G grid to the antenna transformer. It should be noted that both the input and output circuits of the R.F. stage are disconnected.

S-9 removes the ground from C-2 and from the antenna selector trimmers. It shorts out R-32 thus decreasing the self bias on the 6K7, 1st I.F. amplifier, and consequently increasing the sensitivity.

S-8 connects the oscillator selector trimmers in the place of the oscillator section of the gang condenser C-20.

A depressed station button simultaneously connects the antenna and oscillator selector trimmers. As an example, the extreme left-hand button connects C-65 and C-71 to the antenna and oscillator transformers respectively.

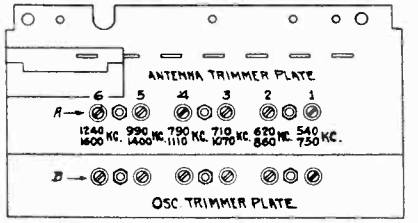


Fig. 1. Selector Trimmer Location

The frequency range covered by each trimmer is shown in Fig. 1. To set up a pair of trimmers for a station within their range, press the corresponding button until it locks in position. First tune the oscillator trimmer to the station and then tune the antenna trimmer for maximum output. Weak stations may require an approximate setting of the antenna trimmer before it will be possible to tune in the station with the oscillator trimmer. Be sure the A.F.C. switch is turned off while making these adjustments. The trimmers in the top row tune the antenna transformer while those in the lower row are used to tune the oscillator.

When operating with the manual button depressed, the gang condenser is used to tune the secondary circuits as described under coil system. The manual button must be depressed when operating on "C" and "D" bands.

SERVICE HINTS

If depressing a button does not release another button which was depressed, check the latch-bar spring. If there is only one spring, and that spring is in the center of the latch bar, decreasing the tension will remedy the trouble. Another solution is to replace the center spring with two springs, one at each end of the latch bar. They should have approximately the same tension. Make sure that the ears on the latch bar are twisted sufficiently to reduce, to a minimum, play in the direction of key movement.

C-2 was connected directly to ground in some of the early production receivers; connecting C-2 as shown in Fig. 5 will extend the high-frequency range of the antenna selector trimmers, because C-2 is then connected across only a small part of the antenna secondary when operating the touch tuning.

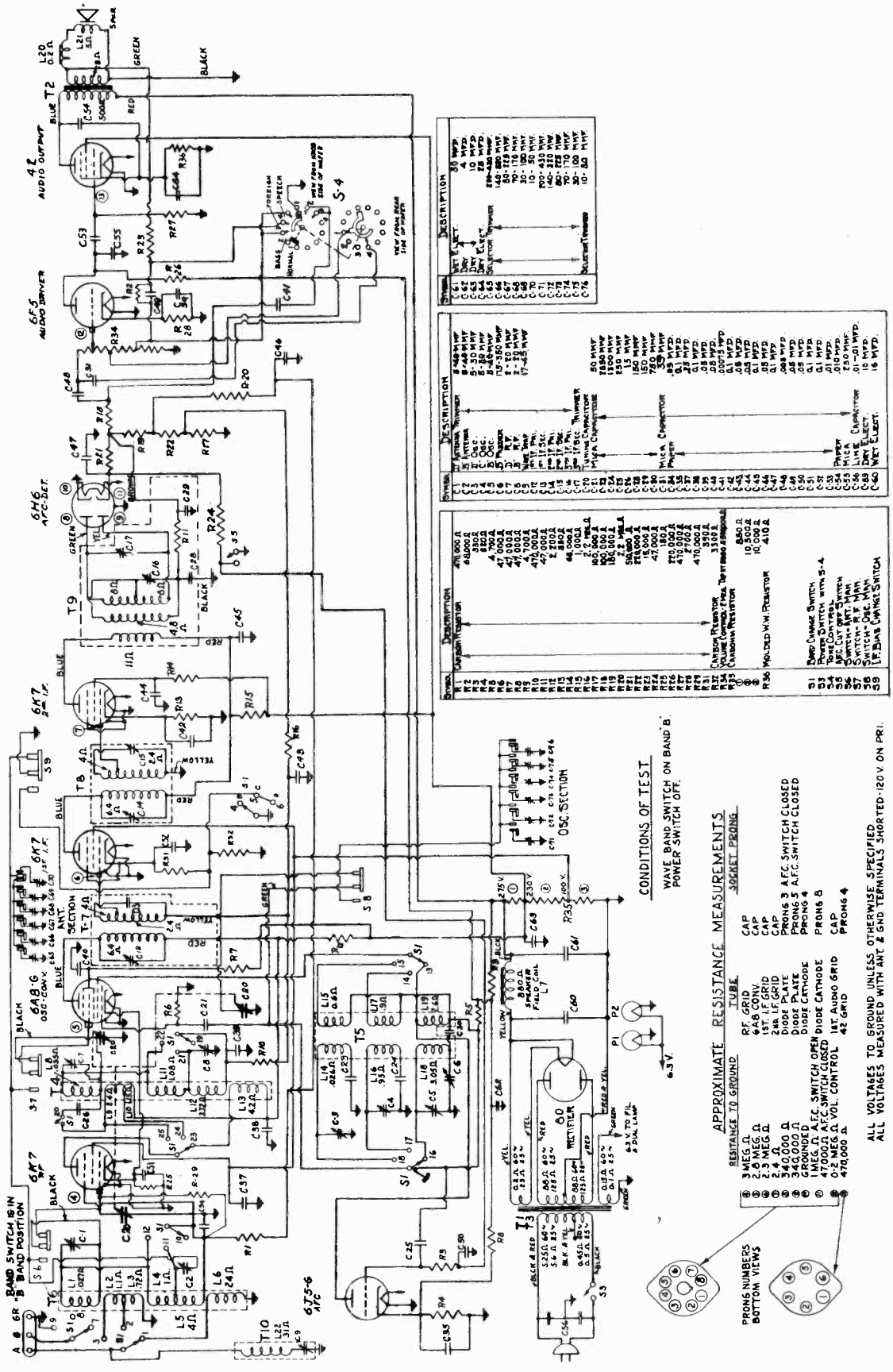
Where local conditions require a special range trimmer, this can be obtained by selecting a trimmer of lower capacity and shunting it with a good grade low power factor mica capacitor. Replacement parts RC-207, RC-211, RC-228 and RC-236 have capacities of 25, 50, 85 and 100 Mmf. respectively and should fill the requirements.

Where trimmers do not cover the high-frequency range assigned to them, inspect the trimmer for a bent lug. The lug may be bent in such a manner that the trimmer plates do not separate sufficiently to reach minimum capacity.

It will be found that stability is better if care is exercised to operate the trimmers near maximum capacity where possible, rather than using the trimmer of the next higher range and thus operating that trimmer at minimum capacity.

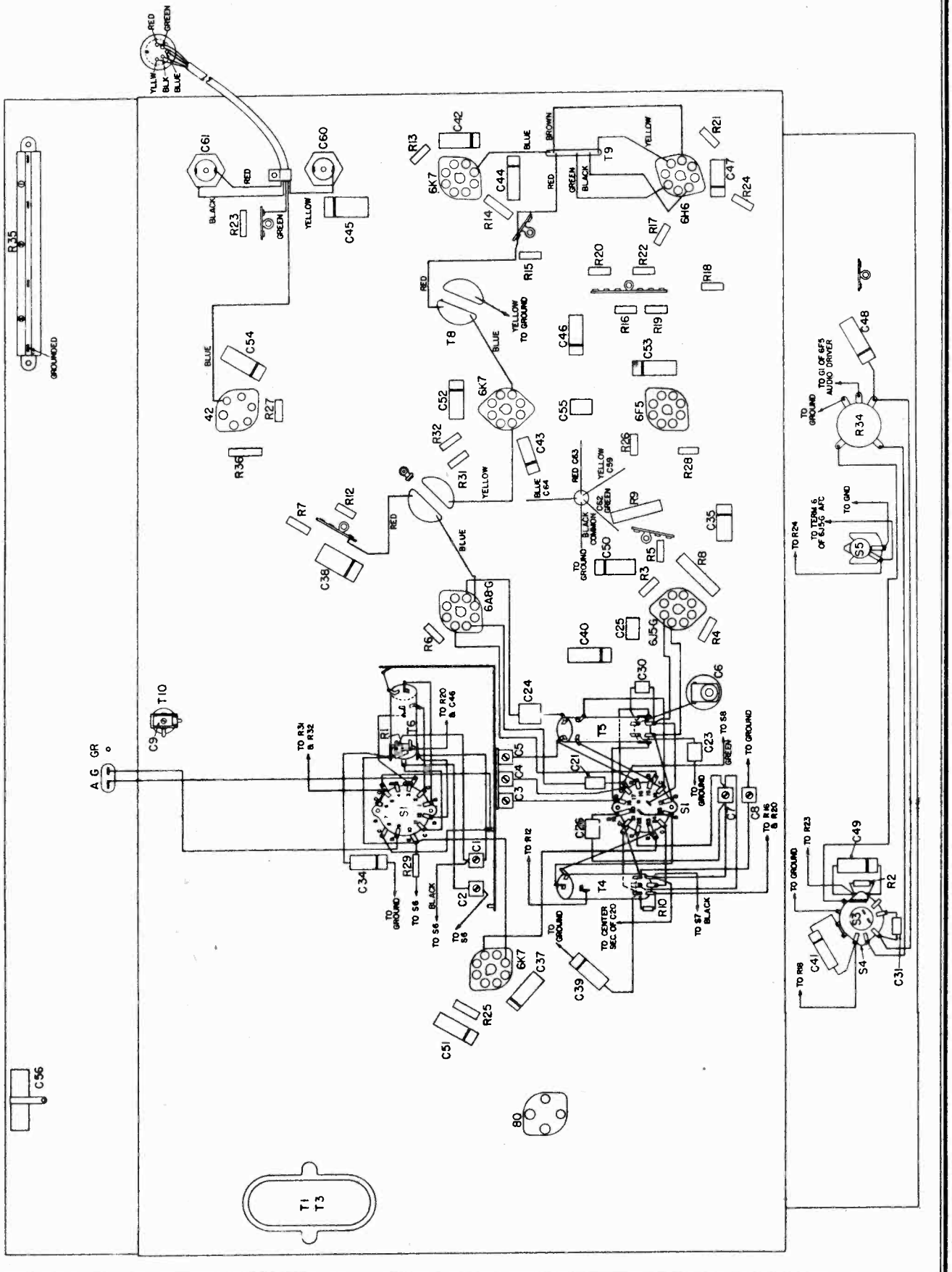
GENERAL ELECTRIC CO.

MODEL F-96
Schematic
Resistance



MODEL F-96
Chassis Wiring

GENERAL ELECTRIC CO.



ALIGNMENT PROCEDURE

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer (See Fig. 2)	Remarks
1. Band "B"	465 kc. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Pri. (C-16)	A.F.C. switch "off"—Condenser gang at minimum capacity—vertical input ground and the junction of R-18, R-19, R-21 and brown lead from the 3rd I.F. trans. Adjust trimmers in order listed for a single curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 3.
2. Band "B"	465 kc. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-15) Pri. (C-14)	
3. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-13) Pri. (C-12)	
4. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd.	3rd I.F. Sec. (C-17)	Disconnect one end of C-47—Turn A.F.C. switch "on"—Vertical input of oscilloscope to ground and discriminator cathode; prong No. 8 on 6H6. Adjust trimmer for cross on horizontal axis Fig. 4.
5. Band "B"	465 kc. Sweep	Antenna Post	250 Mmf. 400 Ohms	Wave Trap Trimmer (C-9)	Adjust for minimum amplitude.

I.F. Alignment with Output Meter

1. Band "B"	465 kc. Modulated	2nd I.F. Grid	.05 Mfd.	3rd I.F. Pri. (C-16)	A.F.C. switch "off"—Condenser gang at minimum capacity—output meter connected across the voice coil—volume control at maximum—input as low as practical. Adjust all trimmers in order listed for maximum output. Do not attempt an over-all re-alignment once a stage alignment has been completed.
2. Band "B"	465 kc. Modulated	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-15) Pri. (C-14)	
3. Band "B"	465 kc. Modulated	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-13) Pri. (C-12)	
4. Band "B"	.....	.....	.....	3rd I.F. Sec. (C-17)	See paragraph on A.F.C. adjustment.
5. Band "B"	465 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Wave Trap Trimmer (C-9)	Adjust for minimum amplitude.

R.F. Alignment

1. Band "B"	.....	.....	.....	.....	Turn A.F.C. switch "off"—Set dial pointer to first line at left-hand end of dial scale with condenser gang fully meshed.
2. Band "D"	18 mc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. (C-3) R.F. (C-7) Ant. (C-1)	Connect output meter across voice coil—Turn tone control to bass. D band image should be 930 kc. *below* input signal when oscillator trimmer (C-3) is peaked properly. Example: 15 mc.—image 14.07 mc. Peak C-7 and C-1 while rocking gang condenser.
3. Band "C"	5220 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. (C-4)	Adjust trimmer for greatest output with dial pointer at 5220 kc.
4. Band "B"	1500 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. (C-5) R.F. (C-8) Ant. (C-2)	Adjust trimmers, in order listed, for greatest output at 1500 kc.
5. Band "B"	580 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. Padder (C-6)	Adjust padder for maximum output in vicinity of 580 kc. while rocking gang condenser.
6. Band "B"	Repeat operation No. 4				

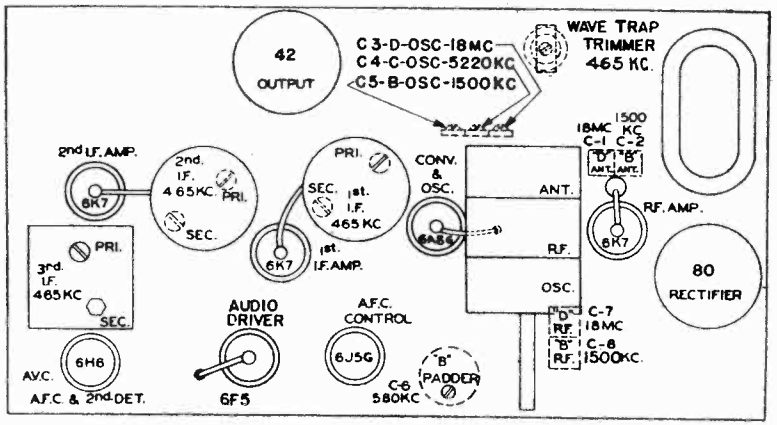


Fig. 2. Chassis Layout and Trimmer Location

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an AC voltmeter with a scale reading of 3 to 5 volts. A cathode ray oscilloscope is preferred for I.F. Alignment.
3. A screwdriver type alignment tool.

The alignment procedure is given in table form along with the trimmer location drawing, Fig. 2. A "dummy antenna" should be used in all alignments and is the capacitor, or capacitor and resistor, used in series with the signal generator. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. as this would remove the grid bias from the tube.

4. Alignment of the "touch tuning" trimmers is discussed in the section on "Touch Tuning."

Automatic Frequency Control Adjustments

After I.F. alignment is completed with output meter, without disturbing the generator setting, remove the signal generator lead from the grid of the 6A8-G converter. Apply the 465 kc. signal to the 6A8-G grid capacitively through the insulation of the grid lead.

Tune in a weak broadcast station at about 1000 kc. and, with the A.F.C. switch "off," tune the receiver carefully for "zero" beat between this carrier and the 465 kc. generator signal. Throw the A.F.C. switch on and adjust the 3rd I.F. secondary trimmer (C-17) to zero beat. This adjustment is very critical and must be made with great care. When the alignment is correctly done, there will be no appreciable difference in the beat note with the A.F.C. switch "on" or "off."

Another method of A.F.C. adjustment, after I.F. alignment with an output meter, is to connect a low range voltmeter between the cathodes of the 6H6 A.F.C. tube. Leave the signal generator connected to the 6A8-G grid and, without disturbing the 465 kc. setting of the signal generator, adjust C-17. It will be noticed that the meter reads plus when C-17 is tuned off resonance on one side and negative when tuned on the opposite side of resonance. The correct adjustment of C-17 is between these positions when the voltmeter reads zero.

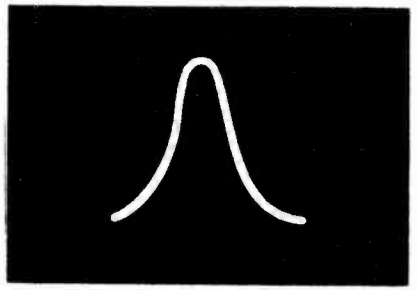


Fig. 3. Over-all I.F. Curve

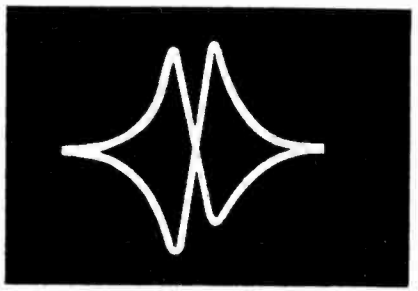


Fig. 4. A.F.C. Alignment Curve

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
6K7	R.F. Amp.	215	100	3.0	7.6	6.15
6A8-G	Oscillator	180	...	3.0	9.0	6.15
	Converter	215	83			
6J5-G	A.F.C. control	170	...	6.5	4.0	6.15
6K7	1st I.F. Amp.	225	100	3.0 C & D bands 7.5 B band	7.9 2.0	6.15
6K7	2nd I.F. Amp.	225	100	3.0	8.5	6.15
6P5	Audio	120*	...	1.0	0.37	6.15
42	Output	255	230	13.5	33.0	6.15
80	Rectifier	680/340 RMS*	...	354	83.0	5.0

A.C. line voltage 120 on Primary 125-volt tap—No signal input—1000 ohms per-voltmeter.
Dial pointer at 530 kc.
* Measured on 500-volt scale.

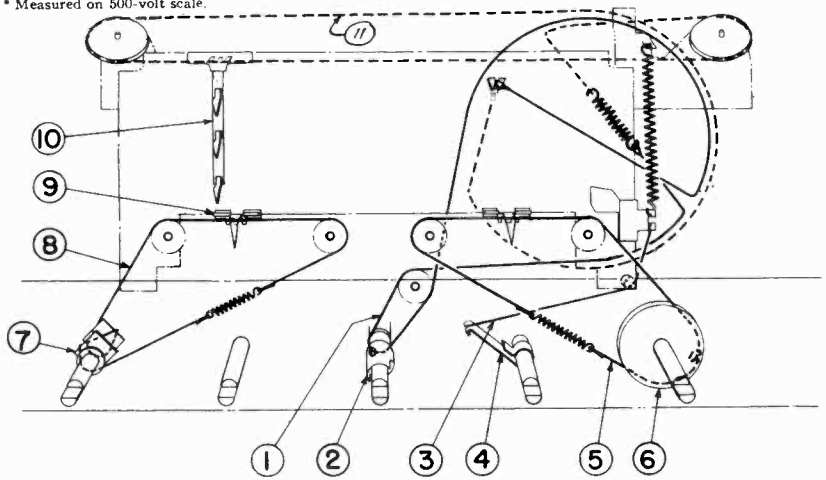


Fig. 7 Dial Mechanism

DIAL MECHANISM

The dial mechanism (Fig. 7) is rigidly mounted to the chassis by means of two brackets and four self-tapping screws. The gang condenser is operated by means of an "automatic vernier" reduction drive unit, mounted on the receiver chassis, and connected to the gang drive drum by a drive cable.

The dial pointer is connected to the gang condenser drum by a cable which passes around two idler pulleys. The pointer is guided on a rail in the rear of the dial scale. The following instruction will aid in making repairs to this mechanism.

To Replace Drive Cable and Pointer Cable

Remove the dial scale. This will allow ready access to all the dial mechanism.

To replace the drive cable (1), set the drive drum to the relative position as shown in Fig. 7, loop the cord over the tab on the drum, then thread it once around the vernier drive of the pointer set the tone control in the extreme counter-clockwise position. Slide the pointer until it extends about 1/16 in. over the left-hand end of the guide rail. After the dial scale has been replaced, a final adjustment may be made by loosening the setscrew and slightly rotating the drive pulley (6).

To Replace Volume Control Cable

Thread the cable (8) around the drive pulley (7) as shown in Fig. 7. Fasten the loops of the cable into the tension spring. To adjust the pointer, turn the control to the extreme clockwise direction and set the pointer so that the left-hand side of the pointer coincides with the left-hand edge of the rail. Crimp the pointer tab on the drive cable. A final adjustment of this pointer may be made by adjusting the pulley (7) on the volume control shaft after the scale has been replaced.

Band Indicator Control

The threading and assembly of the band indicator is self-explanatory from an inspection of Fig. 7. It must be adjusted

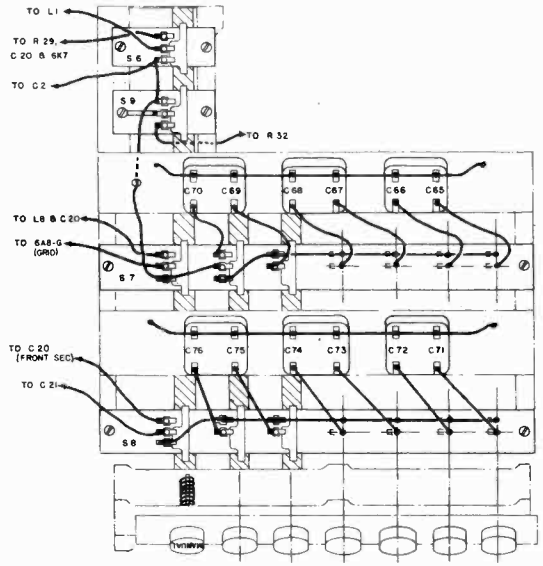


Fig. 8. "Touch Tuning" Mechanism

as indicated. The other end of the cord is looped through one end of the tension spring in back of the drive drum.

To replace the wire pointer drive cable (11), set the drive drum to the relative position as shown in Fig. 7. Loop the cord over the tab on the drum, and thread it around the drive pulley and idler pulleys and back to the tension spring on the drive drum. Slide the pointer (10) in place, as shown, but do not solder. Replace the dial scale and rotate the gang until the plates are fully meshed. Slide the pointer until it coincides with the last mark at the left end of the dial and then solder it to the wire cable (11).

To Replace Tone Control Cable

First set the tone control switch so that the pulley (6) is in the position shown. Thread the cable (5) as shown in Fig. 7 around the drive pulley (6), loop it in the notch as shown, then around the idler pulleys. Fasten the ends in the tension spring. Be sure that the tension spring does not touch either the idler or the drive pulley when the tone control is in either of the extreme positions. For adjustment with the dial in place by rotating the bracket (4) on the band switch shaft.

To Adjust "Automatic Vernier" Drive

The vernier drive used on this receiver includes a planetary reduction unit equipped with a clutch which automatically changes the reduction ratio. This clutch consists of a sleeve mounted on the knob shaft. To adjust, loosen the locking screw and move the sleeve (2) axially along the shaft until the cam surface in the end of the sleeve engages with the pin in the knob shaft. This engagement should take place at a point on the cam surface as near to the stop as possible and still allow complete release of the clutch.

To Change Dial Lamps

Dial lamps are located at either end of the dial scale assembly. Slide the dial lamp socket assembly off the projection at the top of the light reflector. The bulbs are readily replaced without removing the chassis from the cabinet.

GENERAL ELECTRIC CO.

"TOUCH-TUNING" RADIO

THREE-BAND A-C SUPERHETERODYNE

MODEL F-96

Stock No.	Description	List Price
RS-217	SOCKET—4-prong tube socket (Pkg. of 5)	$0.50
RS-223	SOCKET—Special socket for oscillator (Pkg. of 5)	.80
RS-356	SWITCH—A.F.C. switch (S-5)	.40
RS-370	SWITCH—Manual control switch (4 sections) (S-6, S-7, S-8, S-9)	8.15
RS-371	SWITCH—Tone control and power switch (S-3, S-4)	1.15
RS-372	SWITCH—Wave change switch (S-1)	2.50
RS-431	SPRING—Key spring, staple and spacer (Pkg. of 5)	.05
RS-433	SPRING—Latch bar spring (Pkg. of 5)	.10
RT-096	TRANSFORMER—Power transformer 115-125 V., 25-60 cycles (T-1)	9.30
RT-097	TRANSFORMER—Power transformer 115-125 V., 60 cycles (T-3)	5.95
RT-247	TRANSFORMER—3rd I.F. (A.F.C.) transformer (complete) (T-9)	3.95
RT-248	TRANSFORMER—1st or 2nd I.F. transformer and trimmers (no shield) (T-7, T-8)	1.20
RV-035	VOLUME CONTROL—2 Megohm volume control tap at 5,000 and 500,000 ohm (R-34)	.90
RW-014	WINDOW—Escutcheon window and rubber mounting	.45
RW-017	WINDOW—Push-button celluloid window (Pkg. of 25)	.10
*RW-101	WASHER—Felt washer for control shafts (Pkg. of 10)	.45
RW-403	WAVE TRAP—Wave trap (complete) (L-8, C-9)	.70
RX-027	ASSEMBLY—Chassis mounting bolts and washers	.15
	SPEAKER ASSEMBLY F-96	
RC-925	CONE—12-in. cone and voice coil assembly	1.25
*RC-991	CLAMP—Voice coil spider clamp	.05
*RP-015	PLUG—Male speaker plug	$0.20
RS-057	SPEAKER—12-in. speaker (complete)	6.80
*RS-416	SPRING—Voice coil leads spring (Pkg. of 2)	.10
RT-421	TRANSFORMER—Output transformer (T-2)	1.30
RX-030	ASSEMBLY—Speaker mounting cushions and nuts	.10
	DIAL SCALE MECHANISM	
RB-155	BRACKET—Band change bracket	.05
RB-604	BUSHING—Volume control cable drive bushing	.10
RC-869	CABLE—Volume or tone control pointer cable (Pkg. of 5)	.30
RC-870	CABLE—Dial pointer drive cable (Pkg. of 5)	.70
RC-871	CABLE—Tuning condenser drive cable (Pkg. of 5)	.45
*RD-013	DRUM—Condenser drive drum	.35
RD-062	DIAL—Dial scale	3.50
RL-920	LAMP—Pilot lamp 6.3 V., .25 amp. (Pkg. of 10)	1.50
*RP-049	PULLEY—Pointer cable pulley	.15
RP-073	POINTER—Volume or tone control pointer (Pkg. of 5)	.10
RP-075	PULLEY—Small drive cord idler pulley (Pkg. of 6)	.20
RP-076	PULLEY—Tone control cord drive pulley	.15
RP-077	POINTER—Dial scale pointer (Pkg. of 5)	.90
RP-091	PULLEY—Tuning drive cord idler pulley	.10
RS-218	SOCKET—Lamp socket assembly	.10
*RS-401	SPRING—Tuning condenser cable tension spring (Pkg. of 2)	.20
RS-426	SPRING—Volume or tone control cable tension spring (Pkg. of 5)	.10
RX-023	ASSEMBLY—Band indicator, cord and spring	.20

* Used on previous receivers.

REPLACEMENT PARTS LIST

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-008	BOARD—Terminal board (2 terminals)	$0.10
*RB-009	BOARD—Terminal board (1 terminal)	.15
*RB-023	BOARD—Terminal board (4 terminals)	.10
*RB-049	BOARD—Antenna ground terminal board	.10
*RB-053	BOARD—Terminal board (3 terminals)	.10
RB-062	BOARD—Terminal board (6 terminals)	.10
RB-606	LATCH BAR—Latch bar for push buttons	.10
RB-607	BUTTON—Push button (Pkg. of 5)	.20
RC-002	CAPACITOR—.00075 Mfd., 200 V. paper (C-41)	.25
*RC-023	CAPACITOR—.005 Mfd., 600 V. paper (C-48)	.25
*RC-042	CAPACITOR—.01 Mfd., 1,000 V. paper (C-53, C-54)	.30
*RC-091	CAPACITOR—.05 Mfd., 400 V. paper (C-34, C-39, C-40, C-43, C-44, C-46, C-49, C-50)	.30
*RC-123	CAPACITOR—1 Mfd., 400 V. paper (C-35, C-38, C-42, C-45, C-47, C-51, C-52)	.35
*RC-150	CAPACITOR—.25 Mfd., 400 V. paper (C-37)	.35
*RC-204	CAPACITOR—15 Mmf., mica (C-26)	.25
RC-206	CAPACITOR—50 Mmf., mica (special for oscillator) (C-21)	.25
RC-208	CAPACITOR—35 Mmf., mica (C-31)	.25
*RC-242	CAPACITOR—150 Mmf., mica (C-28, C-29)	.25
*RC-259	CAPACITOR—250 Mmf., mica (C-25, C-55)	.30
RC-308	CAPACITOR—750 Mmf., mica (C-30)	.35
*RC-360	CAPACITOR—2,850 Mmf., mica (C-23)	.50
RC-364	CAPACITOR—1,300 Mmf., mica (C-24)	.35
RC-427	CAPACITOR—Wet electrolytic 16 Mfd., 450 V. (C-60)	1.05
RC-428	CAPACITOR—Wet electrolytic 30 Mfd., 450 V. (C-61)	1.20
RC-579	CAPACITOR—Dry electrolytic 10 Mfd., 12 V., 4 Mfd., 400 V., 10 Mfd., 400 V., 25 Mfd., 25 V. (C-59, C-62, C-63, C-64)	1.70
RC-650	CAPACITOR—Double trimmer "B" and "D" band antenna 5-40 Mmf. (C-1, C-2)	.25
RC-651	CAPACITOR—Double trimmer "B" and "D" band R.F. 2-20 Mmf. (C-7, C-8)	.25
RC-652	CAPACITOR—"B" band padder 175-350 Mmf. (C-6)	.30
RC-655	CAPACITOR—Double trimmer 3rd I.F. transformer (C-16, C-17)	1.55
RC-661	CAPACITOR—"B," "C" and "D" band oscillator triple trimmer (C-3, C-4, C-5)	.60
RC-665	CAPACITOR—Double trimmer antenna or oscillator selector 200-430 Mmf. and 140-320 Mmf. (C-65, C-66, C-71, C-72)	.50
RC-668	CAPACITOR—Double trimmer, antenna or oscillator selector 80-225 Mmf. and 70-170 Mmf. (C-67, C-68, C-73, C-74)	.45
RC-667	CAPACITOR—Double trimmer, antenna or oscillator selector 30-100 Mmf. and 10-50 Mmf. (C-69, C-70, C-75, C-76)	.40
RC-673	CAPACITOR—Double trimmer 1st or 2nd I.F. transformer (C-12, C-13, C-14, C-15)	.45
RC-722	CONDENSER—3-gang tuning condenser (C-20)	5.10
*RC-755	CAPACITOR—Line capacitor .01-.01 Mfd., 250 V. A.C. (C-56)	.40
*RC-863	CORD—Power cord with plug	.65
*RC-992	CUSHION—Gang condenser mounting cushions (Pkg. of 3)	$0.10
RC-1968	CUSHION—Cushion for push button assembly (Pkg. of 5)	.05
RC-8025	CABLE—Speaker cable and female plug	.60
RD-201	DRIVE—Vernier drive mechanism	1.55
RE-023	ESCUTCHEON—Push button escutcheon	.70
RE-024	ESCUTCHEON—Escutcheon for dial (complete)	2.10
*RG-001	GRID CLIP—Control grid clip (Pkg. of 5)	.10
RK-017	KNOB—Control knob (Pkg. of 5)	.40
RK-018	KNOB—Band or A.F.C. switch knob (wing) (Pkg. of 5)	.40
RK-201	KEY—Push button key (Pkg. of 5)	.15
RL-053	COIL—"B," "C" & "D" band antenna coils (T-6)	1.20
RL-139	COIL—"B," "C" and "D" band R.F. coils (T-4)	1.10
RL-257	COIL—"B," "C" and "D" band oscillator coils (T-5)	1.25
RQ-1241	RESISTOR—180 ohm, ½ watt carbon (R-25) (Pkg. of 5)	.70
RQ-1247	RESISTOR—330 ohm, ½ watt carbon (R-3, R-13) (Pkg. of 5)	.70
RQ-1249	RESISTOR—390 ohm, ½ watt carbon (R-31) (Pkg. of 5)	.70
RQ-1257	RESISTOR—820 ohm, ½ watt carbon (R-4) (Pkg. of 5)	.70
RQ-1259	RESISTOR—1,000 ohm, ½ watt carbon (R-15) (Pkg. of 5)	.70
RQ-1269	RESISTOR—2,700 ohm, ½ watt carbon (R-28) (Pkg. of 5)	.70
RQ-1271	RESISTOR—3,300 ohm, ½ watt carbon (R-32) (Pkg. of 5)	.70
RQ-1275	RESISTOR—4,700 ohm, ½ watt carbon (R-5) (Pkg. of 5)	.70
RQ-1287	RESISTOR—15,000 ohm, ½ watt carbon (R-23) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 ohm, ½ watt carbon (R-6, R-7, R-11, R-24) (Pkg. of 5)	.70
RQ-1303	RESISTOR—68,000 ohm, ½ watt carbon (R-2, R-14) (Pkg. of 5)	.70
RQ-1307	RESISTOR—100,000 ohm, ½ watt carbon (R-17, R-18) (Pkg. of 5)	.70
RQ-1313	RESISTOR—180,000 ohm, ½ watt carbon (R-19) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 ohm, ½ watt carbon (R-22, R-26) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohm, ½ watt carbon (R-1, R-10, R-27, R-29) (Pkg. of 5)	.70
RQ-1324	RESISTOR—510,000 ohm, ½ watt carbon (R-21) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 Megohm, ½ watt carbon (R-16, R-20) (Pkg. of 5)	.70
RQ-1475	RESISTOR—4,700 ohm, 1 watt carbon (R-9) (Pkg. of 5)	.70
RQ-1499	RESISTOR—47,000 ohm, 1 watt carbon (R-8)	.20
RR-727	RESISTOR—410 ohm, 1 watt moulded (R-36)	.15
RR-733	RESISTOR—Candohm tapped resistor (R-35)	.60
*RS-139	SHIELD—3rd I.F. transformer shield	.20
RS-175	SHIELD—1st or 2nd I.F. transformer shield	.25
RS-179	SHIELD—Tube shield (includes base)	.10
*RS-200	SOCKET—8-pin octal base socket (Pkg. of 5)	.75
RS-215	SOCKET—6-prong tube socket (Pkg. of 5)	.60

* Used on previous receivers.

(Prices subject to change without notice)

MODELS G-105, G-106
Specifications
Tuner Data

GENERAL ELECTRIC CO.

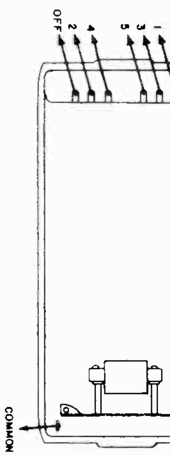


Fig. 12. Pre-timer Wiring Diagram

Physical Specifications

Model	G-105	G-106
Height	42 inches	43 inches
Width	28¼ inches	29½ inches
Depth	15⅝ inches	17⅛ inches
Weight Packed	100 lbs.	130 lbs

Manual Tuning Drive Ratio . . 50:1

Tuning Frequency Range

Band "B"	540–1575 kc
Band "C"	1575–5700 kc
Band "D"	5700–18,000 kc

Intermediate Frequency 455 kc

Electrical Power Output

Undistorted	11.0 watts
Maximum	13.0 watts

Tone Control . . . 5 Position

Loud-speaker—Electrodynamic

Outside Cone Diameter	12-inch
Voice Coil Impedance	3.5 ohms at 400 cycles
Field Coil Resistance	460 ohms (cold)

Tubes

R.F. Amplifier	GE-6K7
Converter and Oscillator	GE-6A8G
I.F. Amplifier	GE-6K7
Detector and A.V.C.	GE-6H6
Audio Driver	GE-6F5
Audio Inverter	GE-6J5G
Audio Power Amplifier	(2) GE-6V6G
Tuning Indicator	GE-6U5
Rectifier	GE-5U4G
Dial Lamp	(2) MAZDA No. 44

TOUCH-TUNING

The General Electric "Touch-Tuning" system consists of three essential units: the keyboard assembly of fourteen keys, used for touch-tuning control; the motor and drive mechanism; and the split contact segment with its adjustable station buttons, allowing a set up of thirteen different stations to be tuned automatically.

Thirteen keys are used for the selection of pre-set stations while the No. 14 key is used to turn power "Off." Pressing-in any key will lock the key in a semi-depressed position and release any other that may be in the circuit, thus the selection of any station by a station key will release the "Off" key, turning the set power on.

The tuning motor is operated as a 23-volt split-phase induction motor using capacitor C-51 as the phase shifting device. On the Model G-105, the 23 volts is supplied directly from the receiver power transformer while on the Model G-106 the voltage is obtained from a separate transformer which operates the motor only and is always connected to the power line. In this receiver the "Off" key resembles a station key in its operation and is set up when the receiver is assembled at the factory. A special button is assembled on the fan tail assembly, at the rear of the gang condenser, for the "Off" position. This button is white to distinguish it from the regular station buttons and the contact point is narrower so that no bounce back is allowed on the "Off" position.

Fig. 6 shows a simplified schematic of the control circuit and the following cycle of operation may be traced very easily. When a key is depressed, it completes the 23-volt circuit through the button making contact with the contact segment (CT) and energizes one winding of the motor. The other winding on the motor is energized through the condenser C-51. The direction of rotation of the motor is dependent upon whichever half of the contact segment (CT) that the station button first energizes. When voltage is applied to the motor, the rotor is pulled further into motor field, and engages its rubber cone hub (I) with the dial drive wheel (D), (see Fig. 9) which in turn rotates the gang condenser and contact segment (CT). This operation continues until the insulated segment (1) breaks the station button circuit to the contact segment and removes voltage from the motor. The inertia in the tuning system drives the insulated segment past the station button and makes contact with the other half of the contact segment. This energizes the other winding of the motor and causes the motor to reverse. The brake on the dial drive wheel does not allow the tuning system to store up enough inertia to go past this insulated strip on the reversal of the motor and thus allows the station button to come to rest on the narrow insulated segment, thus stopping the tuning operation to this pre-set position.

The motor scan switch S-7 is incorporated to allow finger-tip control of the motor drive. Normally, the switch contacts are open and control of the motor is had by closing either of the two sides of the switch dependent upon the direction of travel desired.

On 25-cycle receivers, two motor capacitors (RC-597) are used to obtain the necessary phase shift. The brake pad tension should be re-adjusted when operating a 25-cycle receiver on a 60-cycle circuit.

Silent Tuning

During period of motor operation, either for automatic station selection or for scanning, silent tuning is incorporated. This is accomplished by a circuit which gives both instantaneous cut-off of the audio amplifier and time delay in restoring the response. By reference to the schematic Fig. 5, it will be observed that one half of the 6H6 diode is used to rectify the 23 volts A.C. available from the motor and the resulting D.C. voltage is used to bias the audio amplifier tube to cut-off. Note that the charging time of the bias circuit is only determined by the diode resistance which is very small. The time required for the audio amplifier (6F5) to return to normal bias however, is determined by the product of R-26 and C-56 and is therefore controllable.

Drive Wheel Brake Adjustment

A friction brake has been incorporated on the drive wheel circumference (D) to accomplish accurate stopping of the motor driven tuning system. When the button passes into the insulated segment it will easily over-ride the insulated segment on the contactor drum, since this segment is very narrow. If this condition continues an oscillatory motion or "hunting" is set up and the motor will not come to rest as long as the station key is pressed. The brake, located at the left side of dial scale, should be adjusted on normal line voltage so that the motor only has to make one or two reversals.

This adjustment should be made under an average operating line voltage and allowance made for changes in voltage over the 24-hour period.

Lubrication

For smooth and noiseless operation of the tuning system, it is absolutely necessary to keep it well lubricated.

Contactor Drum—use thin film of petroleum jelly
Dial Pointer Guide Rods—use thin film of petroleum jelly
Motor Bearings—these are oil-less type and do not require lubrication

Dial Mechanism

A sketch showing the threading of the dial mechanism controls is shown in Fig. 9.

The manual drive involves two extra parts in addition to the motor drive; these are, the manual rubber drive cone (J) and its shaft (C), see Fig. 9. If the idler drive wheel (D) on which the manual drive cone engages is set up too high, the manual drive cone is liable to wedge underneath the idler drive wheel, thus not allowing the motor drive cone to engage when using Touch-Tuning. If this occurs by only a normal pressure on manual control, then the idler drive wheel must be moved down and the motor drive cone adjusted accordingly. The bracket which mounts the large idler drive wheel has slots and mounting screws so that idler drive wheel can be moved either up or down.

The 25-cycle receivers as they leave the factory have a larger rubber manual drive cone than the 60-cycle receivers. The cone for the 60-cycle receiver may be substituted for replacement provided the idler drive wheel is lowered slightly.

REMOTE CONTROL

The GM-8 Remote Control is merely another station keyboard assembly that is wired in parallel with the regular station keys. In addition, a remotely controlled motor is used to either raise or lower the volume at the receiver. By referring to Fig. 11, the details of the operation of this device may be readily understood. Leads No. 2 to No. 7 are the automatic tuning button control leads that parallel any six of the regular receiver station keys. Lead No. 1 supplies 23 volts to the remote keyboard assembly while leads No. 8 and No. 9 are the phase-reversing leads to the volume control motor.

When the remote control is attached to a receiver, then the semi-depressed positions of the receiver push-button keys may or may not indicate which station is tuned in. This will then depend upon whether the receiver was last operated from the remote control or from the station keys of the receiver itself. For this reason, the key assembly of the remote control has not been equipped with a latch bar. All keys of the remote control key assembly are wired in series to avoid possibility of two keys completing the circuit to the motor at the same time.

The remote volume control motor uses a phase-shifting resistor in place of a condenser as used on the tuning motor when operating from a 50- or 60-cycle power supply. When operation is desired from 25 cycles replace the 30-ohm, 10-watt resistor across the volume control motor terminals with a 60 microfarad motor capacitor (RC-597).

The mechanical installation of the volume control motor is shown in Fig. 10. For full installation instructions refer to service notes RGMS-8.

Remote Control Notes

1. If key assembly on remote control unit is too high in the case, it is possible that one or all of the keys may be slightly depressed at all times so as to cause faulty operation of the system. To remedy, lower the complete assembly by loosening the two setscrews on the inside of the case and then lower assembly—tighten setscrews.

2. The tension of the friction clutch on the remote control motor is adjusted at the factory and should not require resetting. If it is set too tight, the volume control may be damaged when "VOL. DEC." key is held in a depressed position after the volume control is turned to the minimum position. If this slip clutch is too loose the control will fail to turn.

AUTOMATIC STATION PRE-TIMER G-106

The Pre-timer is quite similar to the remote control in operation in that it works in parallel with the regular station keys; turning "On" and "Off" power and tuning stations. The operation, however, instead of being controlled manually, is controlled by a synchronous motor. This allows a parallel circuit to be made with a selected station key by a pre-set timing contact.

The 96 timing contacts project through slots in the clock panel and are supported by two metal plates at the rear. A molded carriage is propelled from left to right during the 12 hours of the AM period and from right to left during the PM period, by means of a lead screw having right and left-handed threads, which is rotated continuously by the clock motor. Projections on the timing contacts engage sliders on the carriage corresponding to the stations to which the contacts are set. When the contact is made the pre-timer energizes the corresponding station button on the fantail (in back of the gang condenser) and thus drives the tuning motor to the desired station. In order to differentiate between AM and PM operations, a limit switch is provided that is operated by the carriage at the end of its travel. This switch causes the AM sliders to be energized during the AM period, and the PM sliders during the PM period.

As the contact carriage moves very slowly, the accuracy with which it makes and breaks the control circuits is not sufficient. In order to obtain accurate timing, the contacts on the carriage are arranged so as to engage the sliders several minutes before and to disengage several minutes after the quarter hour and a cam-operated switch is provided in series with the common return lead. This switch closes the control circuit exactly on the quarter hour, and opens it after ample time has elapsed for the completion of the tuning operation, in this case, about ten seconds.

The clock motor is of the self-starting synchronous type with enclosed gearing running in a bath of oil. It operates on the 110-volt power supply.

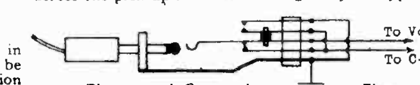
The circuit controlling the receiver is shown on the lower left-hand portion of Fig. 5. The wiring diagram to the clock panel is shown in Fig. 12.

Phonograph Connections

Fig. 13 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the G-105 or G-106 circuit for the reproduction of phonograph recording. This method uses a two-circuit jack and is connected into the receiver by opening the circuit between C-32 and the volume control (R-19) and connecting the jack terminals as shown. A telephone plug is attached to the pick-up leads; and for phonograph operation, it is merely necessary to insert it into the jack. The jack may be mounted on the rear chassis deck and all connecting leads should be properly shielded to prevent pick-up.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction.

NOTE.—In most cases a suitable loading circuit composed of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit.



Phonograph Connections Fig. 13.

GENERAL ELECTRIC CO.

MODEL G-105
Schematic, Dial Data

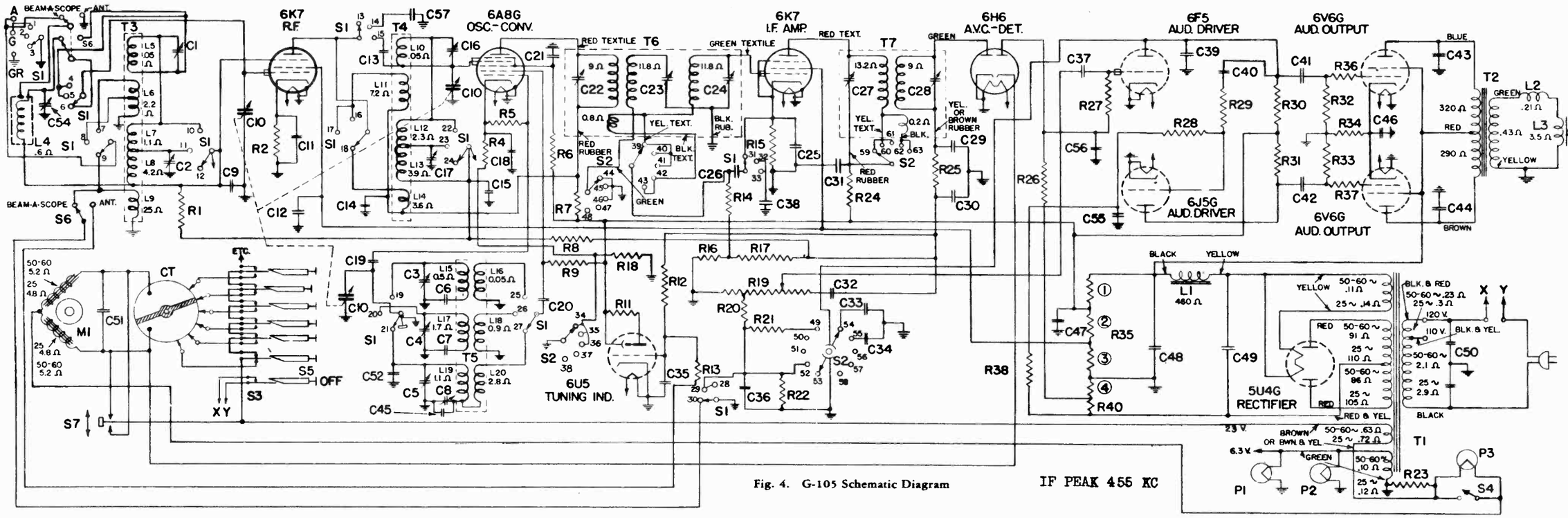


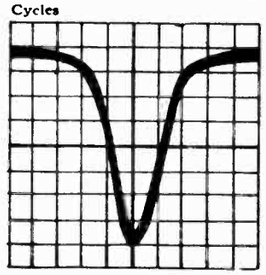
Fig. 4. G-105 Schematic Diagram

SYMBOL	DESCRIPTION
R-1	220,000 Ohm Carbon Resistor
R-2	330 Ohm Carbon Resistor
R-4	330 Ohm Carbon Resistor
R-5	47,000 Ohm Carbon Resistor
R-6	39,000 Ohm Carbon Resistor
R-7	1,000 Ohm Carbon Resistor
R-8	1.8 Megohm Carbon Resistor
R-9	22,000 Ohm Carbon Resistor
R-11	1 Megohm Carbon Resistor
R-12	2.2 Megohm Carbon Resistor
R-13	2.7 Megohm Carbon Resistor
R-14	2.2 Megohm Carbon Resistor
R-15	330 Ohm Carbon Resistor
R-16	56,000 Ohm Carbon Resistor
R-17	220,000 Ohm Carbon Resistor
R-18	330 Ohm Carbon Resistor
R-19	2 Megohm, 1 Megohm Tap. Vol. Control
R-20	68,000 Ohm Carbon Resistor
R-21	68,000 Ohm Carbon Resistor
R-22	1.2 Megohm Carbon Resistor
R-23	1,000 Ohm Carbon Resistor
R-24	1,000 Ohm Carbon Resistor
R-25	47,000 Ohm Carbon Resistor
R-26	470,000 Ohm Carbon Resistor
R-27	1.5 Megohm Carbon Resistor
R-28	82,000 Ohm Carbon Resistor
R-29	1.2 Megohm Carbon Resistor
R-30	68,000 Ohm Carbon Resistor
R-31	68,000 Ohm Carbon Resistor
R-32	220,000 Ohm Carbon Resistor
R-33	220,000 Ohm Carbon Resistor
R-34	230 Ohm Resistor (W.W.)
R-35	4 Sections Voltage Divider
1	1600 Ohms
2	9000 Ohms
3	9000 Ohms
4	11 Ohms
R-36	1,000 Ohm Carbon Resistor
R-37	1,000 Ohm Carbon Resistor

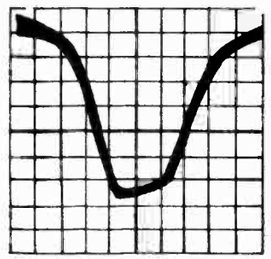
SYMBOL	DESCRIPTION
R-38	470,000 Ohm Carbon Resistor
R-40	20 Ohm W.W. Resistor
C-1	5-40 MMF. "D" Ant. Trimmer
C-2	5-40 MMF. "B" Ant. Trimmer
C-3	2-20 MMF. "D" Osc. Trimmer
C-4	2-20 MMF. "C" Osc. Trimmer
C-5	7-23 MMF. "B" Osc. Trimmer
C-6	3200 MMF. Mica Capacitor
C-7	2100 MMF. Mica Capacitor
C-8	160-375 MMF. "B" Padder
C-9	.05 MFD. Paper Capacitor
C-10	10-450 MMF. Tuning Capacitor
C-11	.05 MFD. Paper Capacitor
C-12	.05 MFD. Paper Capacitor
C-13	18 MMF. Mica Capacitor
C-14	.1 MFD. Paper Capacitor
C-15	.05 MFD. Paper Capacitor
C-16	2-20 MMF. "D" R.F. Trimmer
C-17	3-30 MMF. "B" R.F. Trimmer
C-18	.05 MFD. Paper Capacitor
C-19	50 MMF. Silver Plated Capacitor
C-20	4,700 MMF. Mica Capacitor
C-21	.05 MFD. Paper Capacitor
C-22	100-230 MMF. 1st I.F. Pri. Trimmer
C-23	50-135 MMF. 1st I.F. Sec. Trimmer
C-24	50-135 MMF. 1st I.F. Tert. Trimmer
C-25	.05 MFD. Paper Capacitor
C-26	.05 MFD. Paper Capacitor
C-27	50-135 MMF. 2nd I.F. Pri. Trimmer
C-28	100-230 MMF. 2nc I.F. Sec. Trimmer
C-29	150 MMF. Mica Capacitor
C-30	150 MMF. Mica Capacitor
C-31	.05 MFD. Paper Capacitor
C-32	.02 MFD. Paper Capacitor
C-33	.0055 MFD. Paper Capacitor
C-34	.002 MFD. Paper Capacitor
C-35	.05 MFD. Paper Capacitor
C-36	.0055 MFD. Paper Capacitor
C-37	.02 MFD. Paper Capacitor

SYMBOL	DESCRIPTION
C-38	.01 MFD. Paper Capacitor
C-39	270 MMF. Mica Capacitor
C-40	.02 MFD. Paper Capacitor
C-41	.05 MFD. Paper Capacitor
C-42	.05 MFD. Paper Capacitor
C-43	.003 MFD. Paper Capacitor
C-44	.003 MFD. Paper Capacitor
C-45	175 MMF. Compensating Capacitor
C-46	25 MFD. 25 V. W.V. Dry Electro.
C-47	10 MFD. 400 V. W.V. Dry Electro.
C-48	30 MFD. 450 V. W.V. Wet Electro.
C-49	30 MFD. 450 V. W.V. Wet Electro.
C-50	.01-.01 MFD. 250 V A-C Line Capacitor
C-51	60 MFD. 40 V A-C Dry Electro.
C-52	20 MMF. Compensating Capacitor
C-54	2-20 MMF. Trimmer Capacitor
C-55	.25 MFD. Paper Capacitor
C-56	.25 MFD. Paper Capacitor
C-57	82 MMF. Mica Capacitor
T-1	Power Transformer, 50-60 cycles—25 cycles
T-2	Output Transformer
T-3	Ant. Transformer
T-4	R.F. Transformer
T-5	Osc. Transformer
T-6	1st I.F. Transformer
T-7	2nd I.F. Transformer
L-1	Field Coil 460 Ohms cold
L-2	Hum Buck Coil
L-3	Voice Coil, 3.5 Ohms
L-4	Beam-a-Scope
CT	Contactor Assembly
P-1	Pilot Lamp 6.3 V.—.25 Amp.
P-2	Pilot Lamp 6.3 V.—.25 Amp.
P-3	Tuning Lamp 25 V.—.2 Amp.
S-1	Band Change Switch
S-2	Tone Control Switch
S-3	Power Supply Switch

SYMBOL	DESCRIPTION
S-4	Tuning Lamp Switch
S-5	Station Selector Switch
S-6	Beam-a-Scope—Ant. Switch
S-7	Motor Scan Switch
M	Tuning Motor 23 V. 50-60 Cycles,—25 Cycles



(a) Sharp position



(b) Expanded position

Fig. 2. I.F. curves taken on G-E oscilloscope OFM-1

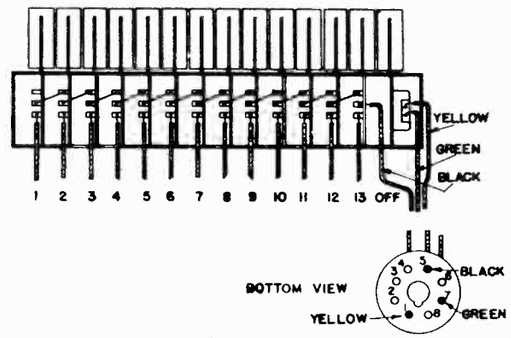


Fig. 7. Keyboard Wiring Diagram—G105

Stopping Accuracy

The exact location at which the dial pointer will come to rest may be made more accurate by slightly lowering the insulated segment (X) on the contactor wheel as shown in Fig. 8. Merely loosen the two screws (Y) and lower the yoke, (Z).

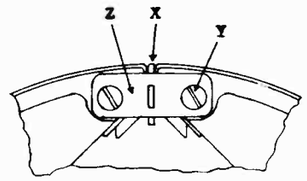


Fig. 8

The proper adjustment is made at the factory and should not require alteration provided the contactor drum is kept well lubricated.

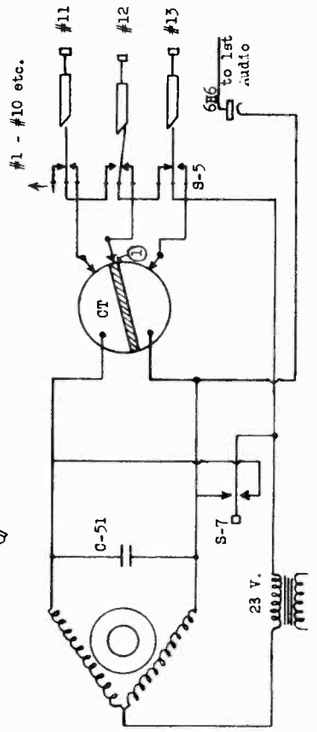
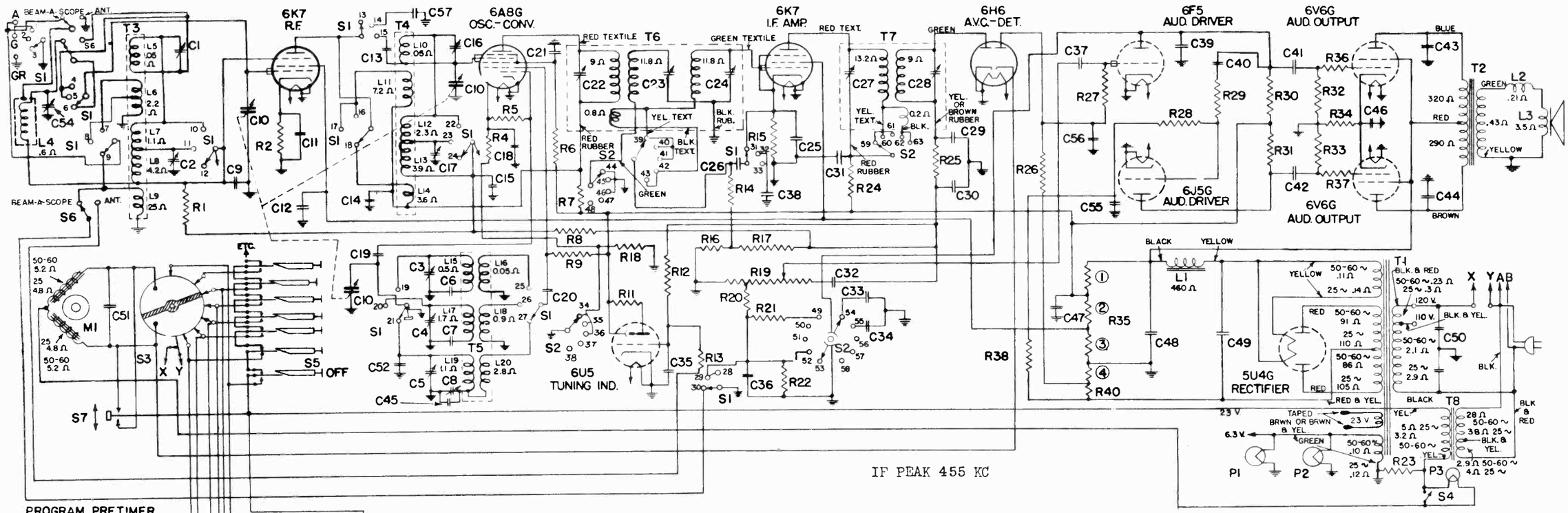
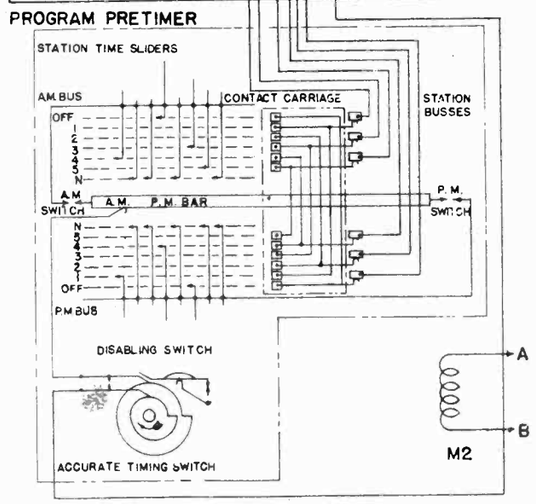


Fig. 6. Schematic of Touch-Tuning System

MODEL G-106
Schematic

GENERAL ELECTRIC CO.





SYMBOL	DESCRIPTION	
R-1	Resistor Carbon	220,000 Ohms
R-2	Resistor Carbon	330 Ohms
R-4	Resistor Carbon	330 Ohms
R-5	Resistor Carbon	47,000 Ohms
R-6	Resistor Carbon	39,000 Ohms
R-7	Resistor Carbon	1,000 Ohms
R-8	Resistor Carbon	1.8 Megohms
R-9	Resistor Carbon	22,000 Ohms
R-11	Resistor Carbon	1 Megohm
R-12	Resistor Carbon	2.2 Megohms
R-13	Resistor Carbon	2.7 Megohms
R-14	Resistor Carbon	2.2 Megohms
R-15	Resistor Carbon	330 Ohms
R-16	Resistor Carbon	56,000 Ohms
R-17	Resistor Carbon	220,000 Ohms
R-18	Resistor Carbon	330 Ohms
R-19	Volume Control	2 Megohms
R-20	Resistor Carbon	68,000 Ohms
R-21	Resistor Carbon	68,000 Ohms
R-22	Resistor Carbon	1.2 Megohms
R-23	Resistor Carbon	1,000 Ohms
R-24	Resistor Carbon	1,000 Ohms
R-25	Resistor Carbon	47,000 Ohms
R-26	Resistor Carbon	470,000 Ohms
R-27	Resistor Carbon	1.5 Megohm
R-28	Resistor Carbon	82,000 Ohms
R-29	Resistor Carbon	1.2 Megohms
R-30	Resistor Carbon	68,000 Ohms
R-31	Resistor Carbon	68,000 Ohms
R-32	Resistor Carbon	220,000 Ohms
R-33	Resistor Carbon	220,000 Ohms
R-34	Resistor W.W.	230 Ohms
R-35	4 Sections Voltage Divider	
1	1600 Ohms	
2	9000 Ohms	
3	9000 Ohms	
4	11 Ohms	

SYMBOL	DESCRIPTION	
R-36	Resistor Carbon	1,000 Ohms
R-37	Resistor Carbon	1,000 Ohms
R-38	Resistor Carbon	470,000 Ohms
R-40	Resistor W.W.	20 Ohms
C-1	Capacitor Trimmer Ant.	5-40 MMF. "D"
C-2	Capacitor Trimmer Ant.	5-40 MMF. "B"
C-3	Capacitor Trimmer Osc.	2-20 MMF. "D"
C-4	Capacitor Trimmer Osc.	2-20 MMF. "C"
C-5	Capacitor Trimmer Osc.	7-23 MMF. "B"
C-6	Capacitor Mica	3200 MMF.
C-7	Capacitor Mica	2100 MMF.
C-8	Capacitor Padder	160-375 MMF. "B"
C-9	Capacitor Paper	.05 MFD.
C-10	Capacitor Tuning	10-450 MMF.
C-11	Capacitor Paper	.05 MFD.
C-12	Capacitor Paper	.05 MFD.
C-13	Capacitor Mica	18 MMF.
C-14	Capacitor Paper	.1 MFD.
C-15	Capacitor Paper	.05 MFD.
C-16	Capacitor Trimmer R.F.	2-20 MMF "D"
C-17	Capacitor Trimmer R.F.	3-30 MMF. "B"
C-18	Capacitor Paper	.05 MFD.
C-19	Capacitor Silver Plated	50 MMF.
C-20	Capacitor Mica	4700 MMF.
C-21	Capacitor Paper	.05 MFD.
C-22	Capacitor Trimmer I.F. Pri.	100-230 MMF. 1st
C-23	Capacitor Trimmer I.F. Sec.	50-135 MMF. 1st
C-24	Capacitor Trimmer I.F. Tert.	50-135 MMF. 1st

SYMBOL	DESCRIPTION	
C-25	Capacitor Paper	.05 MFD.
C-26	Capacitor Paper	.05 MFD.
C-27	Capacitor Trimmer I.F. Pri.	50-135 MMF. 2nd
C-28	Capacitor Trimmer I.F. Sec.	100-230 MMF. 2nd
C-29	Capacitor Mica	150 MMF.
C-30	Capacitor Mica	150 MMF.
C-31	Capacitor Paper	.05 MFD.
C-32	Capacitor Paper	.02 MFD.
C-33	Capacitor Paper	.0055 MFD.
C-34	Capacitor Paper	.002 MFD.
C-35	Capacitor Paper	.05 MFD.
C-36	Capacitor Paper	.0055 MFD.
C-37	Capacitor Paper	.02 MFD.
C-38	Capacitor Paper	.01 MFD.
C-39	Capacitor Mica	270 MMF.
C-40	Capacitor Paper	.02 MFD.
C-41	Capacitor Paper	.05 MFD.
C-42	Capacitor Paper	.05 MFD.
C-43	Capacitor Paper	.003 MFD.
C-44	Capacitor Paper	.003 MFD.
C-45	Capacitor Compensating	175 MMF.
C-46	Capacitor Dry Electro.	25 MFD. 25 V. W.V.
C-47	Capacitor Dry Electro.	10 MFD. 400 V.W.V.
C-48	Capacitor Wet Electro.	30 MFD. 450 V.W.V.
C-49	Capacitor Wet Electro.	30 MFD. 450 V.W.V.
C-50	Capacitor Line	.01-.01 MFD. 250 V. A.C.
C-51	Capacitor Dry Electro-	60 MFD. 40 V.A.C (Use Quan. 2 on 25-cycle receivers)
C-52	Capacitor Compensating	20 MMF.
C-54	Capacitor Trimmer	2-20 MMF.
C-55	Capacitor Paper	.25 MFD.
C-56	Capacitor Paper	.25 MFD.

SYMBOL	DESCRIPTION
C-57	Capacitor Mica 82. MMF.
T-8	23 volt Transformer 50-60 cycles—25 cycles
T-1	Power Transformer 50-60 cycles—25 cycles
T-2	Output Transformer
T-3	Ant. Transformer B.C.D.
T-4	R.F. Transformer B.C.D.
T-5	Osc. Transformer B.C.D.
T-6	1st I.F. Transformer
T-7	2nd I.F. Transformer
L-1	Field Coil 460 Ohms Cold
L-2	Hum Buck Coil
L-3	Voice Coil 3.5 Ohms
L-4	Beam-a-Scope
CT	Contactor Assembly
P-1	Pilot Lamp 6.3 V.—.25 Amp.
P-2	Pilot Lamp 6.3 V.—.25 Amp.
P-3	Tuning Lamp 25 V.—.2 Amp.
S-1	Band Change Switch
S-2	Tone Control Switch
S-3	Power Supply Switch
S-4	Tuning Lamp Switch
S-5	Station Selector Switch
S-6	Beam-a-Scope—Ant. Switch
S-7	Motor Scan Switch
M-1	Tuning Motor 23 V. 50-60 cycles—25 cycles
M-2	Pre-timer Motor—60 cycles, 50 cycles, 25 cycles

Fig. 5. G-106 Schematic Diagram

GENERAL ELECTRIC CO.

MODELS G-105, G-106
Chassis Wiring, Socket
Trimmers, Dial Mechanism
Volume Control Motor

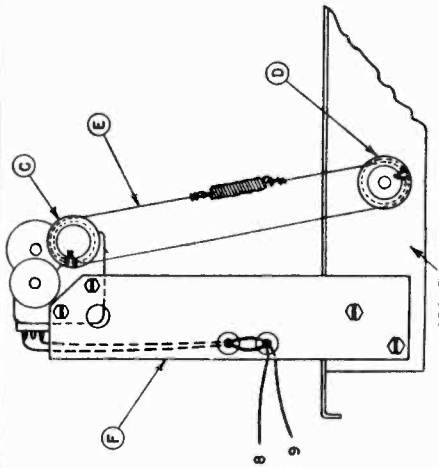


Fig. 10. Volume Control Motor Mounting

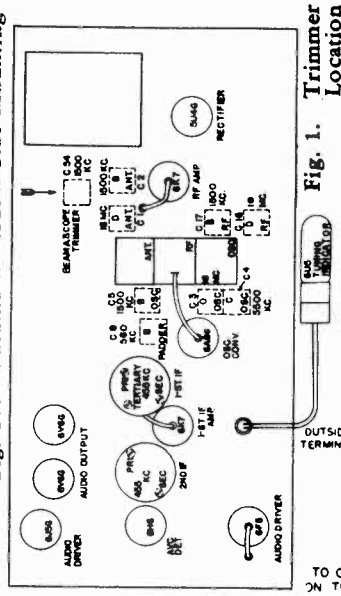


Fig. 1. Trimmer Location

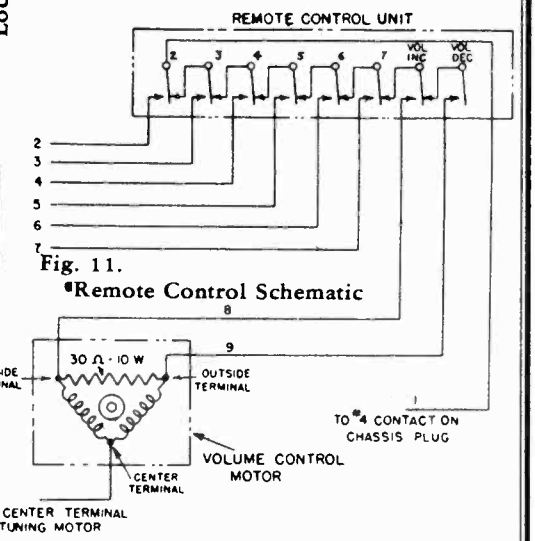


Fig. 11. Remote Control Schematic

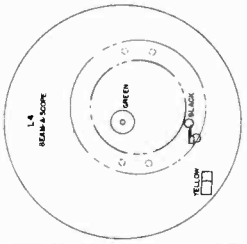


Fig. 3. Chassis Parts Layout

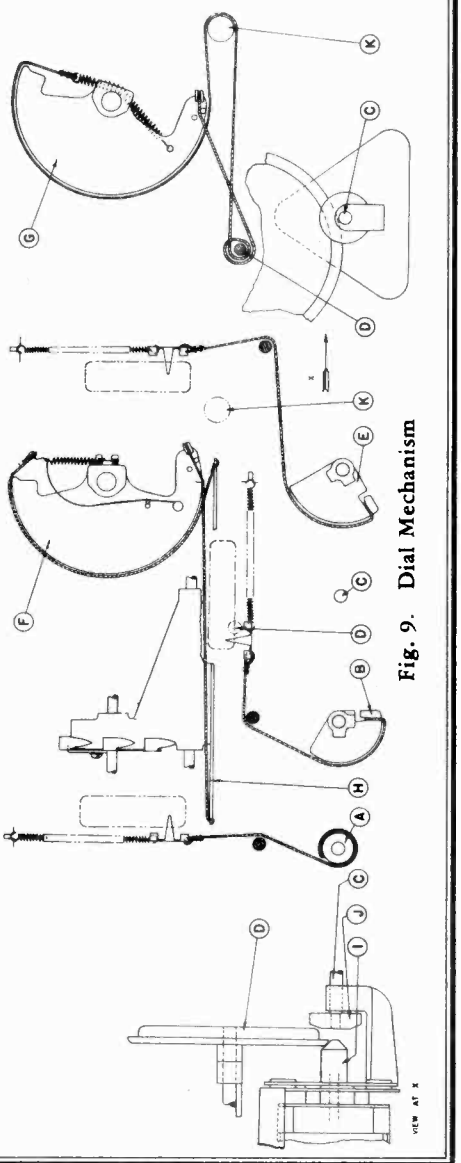


Fig. 9. Dial Mechanism

MODELS G-105, G-106
Circuit Data
Alignment

GENERAL ELECTRIC CO.

KEYBOARD TOUCH-TUNING
THREE-BAND SUPERHETERODYNE RECEIVERS

SERVICE DATA

MODELS G-105 AND G-106

Electrical Specifications

Model G-105:
Rating "A" . . . 105–115 (115–125)* volts, 50–60 cycles, 155 watts
Rating "C" . . . 105–115 (115–125)* volts, 25–60 cycles, 160 watts

Model G-106:
Rating "A" . . . 105–115 (115–125)* volts, 60 cycles, 155 watts
Rating "B" . . . 105–115 (115–125)* volts, 50 cycles, 155 watts
Rating "C" . . . 105–115 (115–125)* volts, 25 cycles, 160 watts

* The receivers as shipped from the factory have the power cord connected to the 115–125-volt tap of the transformer (black and red lead). If the normal voltage of the power supply is always below 110 volts, the connection of the power cord should be removed from this lead and soldered to the 105–115-volt tap (black and yellow lead). After changing the connection, tape the soldered joint as well as the exposed end of the unused lead. This change requires removal of the chassis from the cabinet.

GENERAL INFORMATION

The Models G-105 and G-106 are three band A.C operated receivers employing ten General Electric Pre-tested tubes in a superheterodyne circuit as described above. These receivers are equipped with a simplified Touch Tuning system allowing motor-tuning of thirteen stations, and the new and exclusive self-contained antenna system, "Beam-a-Scope". Other features of design include; electric finger-tip dial drive control, R.F. Amplifier, five position hi-fidelity tone control, special I.F. transformers and push-pull output.

The Model G-106 not only has all the above features, but it also incorporates an ingenious automatic program preselector which permits the automatic tuning of favorite programs at 15-minute intervals throughout a 24-hour period.

BEAM-A-SCOPE

The "Beam-a-Scope" is essentially a tuned coil antenna wound on an impregnated frame and shielded by a Faraday screen against electrostatic disturbances. This construction discriminates in favor of the desired signal as against a local man-made noise source in three ways. First, since any noise source is composed of two components—electrostatic and magnetic fields—the "Beam-a-Scope" may be revolved so that a null point is found where no voltage is produced from these two components in the direction where the noise originates. Due to the fact that this null point is very sharp, it is very unusual that any desired station will be in a direct line with the rejected noise signal and thereby have its signal strength reduced appreciably. In the second place, the "Beam-a-Scope" eliminates the external return path to ground present in the case of an unshielded antenna. This reduces or eliminates local man-made noise sources in much the same way as a shielded antenna lead-in does in an ordinary antenna installation. In the third place, the "Beam-a-Scope" discriminates against the electrostatic component of an incoming wave in comparison with the magnetic component, because of the Faraday shield. Since the electrostatic component of a local noise source is a great deal larger than the magnetic component, this rejection property brings about an enormous increase in signal-to-noise ratio.

The above operation is only available on the broadcast band and in this position the Beam-a-Scope is also the first tuned grid circuit. On the "C" and "D" bands, the Beam-a-Scope is connected to operate as a capacity type antenna.

Switch (S-6) located at the rear of the chassis is the Beam-a-Scope-antenna transfer switch to allow operation on all bands with either the Beam-a-Scope or an outside antenna. This switch also reduces the sensitivity of the 6U5 tuning indicator tube in the "B" band only.

Loud-speaker

To center the voice coil, remove dust cover by softening with acetone. Loosen the two spider clamping screws and place three 1 in. by ¼ in. by 0.010 in. paper or celluloid strips equally spaced around pole piece for clearance; then tighten clamping screws. Remove centering strips and cement the dust cap back in place with Glyptal cement.

Coil System

The "B," "C" and "D" band antenna coils are wound on a single coil form T-3 as shown in Fig. 4 and 5. T-4 and T-5 are the R.F. and oscillator transformers respectively for the "B," "C" and "D" bands. All switch points are numbered in Fig. 4 and 5 to facilitate in locating these switch points on the pictorial wiring diagram, Fig. 3.

The following table gives the coils in use for the various positions of the wave change switch.

Coil	Band "B"	Band "C"	Band "D"
Antenna Primary Beam-a-Scope	L-9	Lower portion of L-6	L-6
Regular Antenna		Lower portion of L-6	L-6
Wave change switch point	Gnd to (3) Ant to (9)	Gnd to (2) Ant to (8)	Gnd to (1) Ant to (7)
Antenna Secondary Beam-a-Scope	L-4 (Beam-a-Scope)	L-5 + L-7	L-6
Regular antenna	L-5 + L-7 + L-8	L-5 + L-7	L-5
Wave change switch point	C-9 to (12) . 6K7 grid to (6)	C-9 to (11) & (12) . 6K7 grid to (5)	C-9 to (10) and (11) . 6K7 grid to (4)
R.F. Primary	L-14	L-11	L-11
Wave change switch point	6K7 plate to (13) and (18)	6K7 plate to (14) and (17)	6K7 plate to (15) and (16)
R.F. Secondary	L-10 + L-12 + L-13	L-10 + L-12	L-10
Wave change switch point	C-15 to (24)	C-15 to (23) and (24)	C-15 to (22) and (23)
Oscillator Primary	L-19	L-17	L-15
Wave change switch point	Osc. grid to (21)	Osc. grid to (20) Gnd to (21)	Osc. grid to (19) Gnd to (20)
Oscillator Secondary	L-20	L-18	L-16
Wave change switch point	C-20 to (27)	C-20 to (26)	C-20 to (25)

In the "C" and "D" bands, the band switch removes bias compensation by grounding capacitor C-36, increases the I.F. sensitivity and also increases the sensitivity of the tuning indicator tube.

NOTE.—When replacing capacitors C-45 and C-52, it is absolutely necessary to replace with the specified parts as these are special negative temperature coefficient capacitors that compensate for oscillator drift with temperature.

ALIGNMENT PROCEDURE

Alignment Procedure

Use a "dummy" antenna in making all alignments. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. amplifier.

I.F. Alignment with Oscilloscope*

Band Switch Setting	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1. Band B	455 K.C. and 30 K.C. Sweep	Normal	I.F. 6K7 Grid	2nd I.F. Sec. 2nd I.F. Pri.	Condenser gang at minimum capacity—vertical input to ground and junction at R-25, R-12, and R-17. Adjust trimmers in order mentioned for a single curve of maximum applitude. The resulting curve on the "normal" position is shown in Fig. 2A. The expanded curve taken with tone control at "Treble I" is shown in Fig. 2B
2. Band B	455 K.C. and 30 K.C. Sweep	Treble I	Converter 6A8 Grid	1st I.F. Sec. 1st I.F. Pri.	
3. Band B	455 K.C. and 30 K.C. Sweep	Normal	Converter 6A8 Grid	1st I.F. Tertiary	
4. Band B	455 K.C. and 30 K.C. Sweep	Normal	Converter 6A8 Grid	All I.F. Trimmers	

I.F. Alignment with Output Meter*

Band Switch Setting	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1. Band B	455 K.C. modulated	Normal	I.F. 6K7 Grid	2nd I.F. Sec. 2nd I.F. Pri.	Condenser gang at minimum capacity-output meter connected across voice coil-volume control at maximum-input as low as practical. Adjust all trimmers in order listed for maximum output. Note:—Do not attempt alignment in the expanded position.
2. Band B	455 K.C. modulated	Normal	Converter 6A8 Grid	1st I.F. Sec. 1st I.F. Pri. 1st I.F. Tertiary	
3. Band B	455 K.C. modulated	Normal	Converter 6A8 Grid	All I.F. Trimmers	

R.F. Alignment**

Band Switch Setting	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1. Band B					Mechanically adjust dial pointer to first line at left-hand end of dial scale with condenser gang fully meshed.
2. Band B	1500 K.C. modulated	Bass	Antenna Post	Osc. (C-5) R.F. (C-17) Ant. (C-2)	Connect output meter across voice coil-antenna switch turned to counter-clockwise position. Adjust trimmers in order listed for maximum output.
3. Band B	580 K.C. modulated	Bass	Antenna Post	Osc. Padder (C-8)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking gang condenser.
4. Band B	1500 K.C. modulated				
5. Band C	5500 K.C. modulated	Bass	Antenna Post	Osc. (C-4)	Adjust trimmer for greatest output with dial pointer at 5500 K.C.
6. Band D	18.0 M.C. modulated	Bass	Antenna Post	Osc. (C-3) R.F. (C-16) Ant. (C-1)	Peak C16 and C1 while rocking gang condenser. The image of any signal on the D band should be 910 K.C. below input signal. Example: 15 M.C. image 14.09 M.C.
7. Band B	1500 K.C. modulated	Bass	Antenna Post	Beam-a-scope (C-54)	Turn antenna switch to clockwise position, align Beam-a-scope trimmer for maximum output.

* Use "dummy" antenna consisting of .05 mfd. capacitor between signal generator and point of input.
** Use "dummy" antenna consisting of 250 mmf. capacitor in series with 200-ohm resistance between the signal generator and the point of input.

MODELS G-105 AND G-106

Insist on genuine factory-tested parts, which may be purchased from authorized dealers.

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-008	BOARD—Terminal Board (2 lugs) (25-cycle set)	$0.10
*RB-023	BOARD—Terminal Board (4 lugs)	.10
*RB-049	BOARD—Antenna-ground terminal board	.10
*RB-062	BOARD—Terminal board (6 terminals)	.10
*RB-066	BOARD—Terminal board (4 lugs)	.10
*RB-070	BOARD—Terminal board (3 lugs)	.10
RB-094	BOARD—Terminal board (7 lugs)	.10
RB-163	BRACKET—Tuning motor transformer bracket (G-106 only)	.80
*RC-011	CAPACITOR—.002 mfd., 600 V. paper (C-34)	.25
RC-020	CAPACITOR—.003 mfd., 1500 V. paper (C-43, -44)	.25
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-33, -36)	.25
*RC-039	CAPACITOR—.01 mfd., 600 V. paper (C-38)	.25
*RC-048	CAPACITOR—.02 mfd., 600 V. paper (C-32, -37, -40)	.30
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-9, 11, -12, -15, -18, -21, -25, -26, -31, -35, -41, -42)	.30
*RC-104	CAPACITOR—.1 mfd., 600 V. paper (C-14)	.30
*RC-136	CAPACITOR—.25 mfd., 200 V. paper (C-55, -56)	.30
RC-217	CAPACITOR—50 mmf., mica (silver plated) (C-19)	.35
RC-219	CAPACITOR—18 mmf., mica (C-13)	.25
RC-227	CAPACITOR—82 mmf., mica (C-57)	.25
RC-230	CAPACITOR—20 mmf., compensating capacitor (C-52)	.35
*RC-242	CAPACITOR—150 mmf., mica (C-29, -30)	.25
RC-245	CAPACITOR—175 mmf., compensating capacitor (C-45)	.45
RC-263	CAPACITOR—270 mmf., mica (C-39)	.25
*RC-349	CAPACITOR—2100 mmf., mica (C-7)	.30
*RC-353	CAPACITOR—3200 mmf., mica (C-6)	.70
RC-393	CAPACITOR—4700 mmf., mica (silvered) (C-20)	.50
*RC-429	CAPACITOR—30 mfd., 450 V. wet electrolytic (C-48, -49)	1.35
RC-596	CAPACITOR—25 mfd., 25 V.; 10 mfd., 400 V.; dry electrolytic (C-46, -47)	1.10
RC-597	CAPACITOR—60 mfd., 40 V. A-C motor capacitor (C-51)	1.00
RC-678	CAPACITOR—160-375 mmf., "B" padder (C-8)	.30
RC-679	CAPACITOR—2-20 mmf., trimmer (C-54)	.20
RC-680	CAPACITOR—2-20 mmf., 3-30 mmf., double trimmers (C-16, -17)	.35
RC-681	CAPACITOR—7-23 mmf., "B" osc. trimmer (C-5)	.90
RC-682	CAPACITOR—2-20 mmf., double trimmers (osc.) (C-3, -4)	.35
RC-683	CAPACITOR—5-40 mmf., double trimmers (ant.) (C-1, -2)	.35
RC-729	CONDENSER—3 gang tuning condenser (C-10)	5.60
*RC-863	POWER CORD—Power cord	.65
RC-1977	CLAMP—Tuning indicator clamp and thumb screw	.10
RC-8035	Cable—Speaker cable and plug	.50
RC-8040	CABLE—Tuning indicator cable and socket	.45
RC-892	CABLE—Clock connector cord and plug	.50
RG-016	GRID CLIP—Control grid clip (for metal tubes) (Pkg. of 5)	.10
RK 027	KNOB—Tone and band change knobs (Pkg. of 5)	.50
RK-028	KNOB—Control knobs (plain) (Pkg. of 5)	.30
RL-063	COIL—Ant. coil band "B," "C," and "D" (T-3)	1.25
RL-142	COIL—R.F. coil band "B," "C," and "D" (T-4)	1.15
RL-267	COIL—Osc. coil band "B," "C," and "D"	$1.25
RL-500	BEAM-A-SCOPE—Beam-a-scope antenna complete	9.15
*RQ-1247	RESISTOR—330 ohm, ½-W. carbon (R-2, -4, -15, -18) (Pkg. of 5)	.70
*RQ-1259	RESISTOR—1000 ohm, ½-W. carbon (R-7, -24, -36, -37) (Pkg. of 5)	.70
*RQ-1291	RESISTOR—22,000 ohm, ½-W. carbon (R-9) (Pkg. of 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½-W. carbon (R-5, -25) (Pkg. of 5)	.70
*RQ-1301	RESISTOR—56,000 ohm, ½-W. carbon (R-16) (Pkg. of 5)	.70
*RQ-1303	RESISTOR—68,000 ohm, ½-W. carbon (R-20, -30, -31) (Pkg. of 5)	.70
RQ-1305	RESISTOR—82,000 ohm, ½-W. carbon (R-28) (Pkg. of 5)	.70
*RQ-1315	RESISTOR—220,000 ohm, ½-W. carbon (R-1, -17, -32, -33) (Pkg. of 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½-W. carbon (R-26, -38) (Pkg. of 5)	.70
*RQ-1331	RESISTOR—1.0 megohm, ½-W. carbon (R-11) (Pkg. of 5)	.70
*RQ-1333	RESISTOR—1.2 megohm, ½-W. carbon (R-22, -29) (Pkg. of 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½-W. carbon (R-27) (Pkg. of 5)	.70
*RQ-1337	RESISTOR—1.8 megohm, ½-W. carbon (R-8) (Pkg. of 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½-W. carbon (R-12, -14) (Pkg. of 5)	.70
RQ-1341	RESISTOR—2.7 megohm, ½-W. carbon (R-13) (Pkg. of 5)	.70
RQ-1459	RESISTOR—1000 ohm, 1-W. carbon (R-23)	.20
RQ-1497	RESISTOR—39,000 ohm, 1-W. carbon (R-6)	.20
RR-740	RESISTOR—Voltage divider resistor (R-35)	.85
RR-1006	RESISTOR—20 ohm, ½-W. carbon W.W. resistor (R-40) (Pkg. of 5)	.70
RR-1007	RESISTOR—230 ohm, 2-W. carbon resistor (R-34)	.20
*RS-174	SHIELD—Grid shield cap (Pkg. of 5)	.25
*RS-200	SOCKET—8 prong octal base socket (Pkg. of 5)	.75
*RS-204	SOCKET—5 prong octal tube socket (Pkg. of 5)	.75
RS-225	SOCKET—Dial light bayonet socket assembly	.10
RS-226	SOCKET—Octal base (on rear deck of chassis)	.15
RS-227	SOCKET—Tube socket (low loss octal base)	.15
RS-228	SOCKET—Station set-up lamp socket	.20
RS-229	SOCKET—Tube socket (6A8G)	.35
RS-508	SPACER—Tuning motor transformer spacer (Pkg. of 4)	.25
RS-396	SWITCH—Tone control switch (S-2)	1.35
RS-397	SWITCH—Station set-up lamp switch (S-4)	.20
RS-398	SWITCH—Motor scan switch (S-7)	.75
RS-399	SWITCH—Antenna loop switch (S-6)	.85
RS-3007	SWITCH—Band change switch (S-1)	3.00
RS-3001	SWITCH—Tuning motor "Off" switch	1.00
RT-104	TRANSFORMER—Power transformer, 105-125 V., 25-60 cycles (T-1)	14.75
RT-105	TRANSFORMER—Power transformer, 105-125 V., 50-60 cycles (T-1)	9.00
RT-106	TRANSFORMER—Tuning motor transformer, 50-60 cycles	3.70
RT-107	TRANSFORMER—Tuning motor transformer, 25 cycles	11.10
RT-263	TRANSFORMER—1st I.F. transformer and shield (T-6)	2.30
RT-264	TRANSFORMER—2nd I.F. transformer and shield (T-7)	1.60
RT-439	TRANSFORMER—Output transformer (T-2)	3.20
RV-042	VOLUME CONTROL—2 megohm volume control (R-19)	$0.75
*RW-101	WASHERS—Felt washers for knobs (Pkg. of 10)	.45
*RX-027	ASSEMBLY—Chassis mounting assembly	.15
RX-049	ASSEMBLY—Condenser mounting assembly	.15
	DIAL SCALE AND AUTOMATIC DRIVE ASSEMBLY	
RB-160	BRACKET—Reduction drive wheel bracket	.20
RB-161	BRACKET—Manual and motor drive bracket	.40
RB-162	BRACKET—Tuning condenser mounting bracket (front)	.45
RB-700	BRAKE—Drive wheel friction brake (complete)	.20
RC-8041	CABLE—Dial pointer drive cable (2 cords)	.15
RC-8042	CABLE—Tone or volume control indicator cable (Pkg. of 5)	.40
RC-8043	CABLE—Band indicator cable (Pkg. of 5)	.35
RC-8044	CABLE—Condenser drive cable (Pkg. of 5)	.65
RD-073	DIAL—Dial scale	2.25
RE-031	ESCUTCHEON—Dial scale escutcheon	1.75
RM-112	MOTOR—Tuning motor, 50-60 cycles	4.00
RM-113	MOTOR—Tuning motor, 25 cycles	5.35
*RP-048	DRIVE PULLEY—Condenser drive pulley (G)	.35
*RP-079	PULLEY—Volume control drive pulley assembly (A)	.15
*RP-083	PULLEY—Band change drive cord pulley (E)	.10
*RP-084	PULLEY—Tone control drive pulley (B)	.10
RP-110	POINTER—Band change, tone and volume indicator pointer (Pkg. of 5)	.20
RP-111	POINTER—Dial scale pointer and clamp	.15
RP-300	PULLEY—Rubber cone drive pulley (motor) (I)	.25
RP-301	PULLEY—Drive cord idler pulley (Pkg. of 2)	.10
RP-302	DRIVE PULLEY—Pointer and drive pulley (F)	.35
*RS-427	SPRING—Volume, tone and band indicator tension springs (Pkg. of 5)	.20
RS-446	SPRING—Drive cord tension spring (Pkg. of 5)	.25
RS-911	SHAFT—Drive wheel shaft and collar	.15
RS-912	SHAFT—Manual drive shaft and rubber cone pulley	.20
RW-022	WINDOW—Volume control window	.30
RW-023	WINDOW—Tone control window	.30
RW-024	WINDOW—Band change window	.30
RW-900	WHEEL—Idler drive wheel (D)	.45
	AUTOMATIC PROGRAM PRESELECTOR—G-106 ONLY	
RC-8079	CARDS—Station letter cards (set)	.35
RC-8080	CARDS—Neutral (card) (Strip of 5)	.05
RE-041	ESCUTCHEON—Clock face escutcheon and window	.65
RW-028	WINDOW—Celluloid station windows (Pkg. of 10)	.05
	PUSH-BUTTON MECHANISM	
RC-8045	CARDS—Station letter cards (set)	$0.60
RC-8046	CABLE—Power cable and plug to push-button assembly	.50
RC-8047	CABLE—Station selector button cable	.95
RK-203	KEY—Station key (Pkg. of 5)	.30
RS-444	SPRING—Station button springs (Pkg. of 10)	.10
RS-864	SCREWS—Keyboard assembly thumb screws (Pkg. of 10)	.40
RS-3008	SWITCH—Push button "On-Off" switch	.50
RT-906	TAB—"Off" tab for station button (Strip of 10)	.05
RW-025	WINDOW—Celluloid station window (Pkg. of 25)	.15
RX-051	ASSEMBLY—Keyboard touch-tuning assembly switch complete (G-105)	7.40
RX-052	ASSEMBLY—Keyboard touch-tuning assembly switch (complete) (G-106)	7.45
	STATION SELECTOR ASSEMBLY (BEHIND TUNING CONDENSER)	
RB-701	BAND—Contactor band	.10
RC-1978	CONTACT—Thumb screw contact (complete) (Pkg. of 5)	.45
RC-1979	CONTACT—Stationary contact complete (For "Off" switch) (G-106 only)	.15
RI-108	INSULATOR—Contactor band insulator (Pkg. of 5)	.15
RS-447	SPRING—Contactor band tension spring (Pkg. of 5)	.15
RW-901	WHEEL—Contactor wheel (CT) complete	2.00
	SPEAKER ASSEMBLY	
RC-936	CONE—12-inch cone and voice coil assembly	1.10
RC-991	CLAMP—Cone spider clamp	.05
RD-301	DUST CAP—Speaker cone dust cap (Pkg. of 5)	.10
RP-109	PLUG—Male speaker plug	.20
RS-075	SPEAKER—12-inch speaker	5.50
*RX-030	ASSEMBLY—Speaker mounting assembly	.10

(Prices subject to change without notice.)

***Used on previous receivers.**

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 MA	Heater Volts A-C
6K7 R.F.	215	95	2.6	7.5	6.4
6A8 Conv.	215	85	2.7	9.0	6.4
6A8 Osc.	135	...			
6K7 I.F.	215	95	2.6	7.5	6.4
6H6 Det.	...	...	...	...	6.4
6F5 Audio	150*	...	0	1.0	6.4
6J5G Inverter	85*	...	0	2.0	6.4
6V6G Output	280	290	17.5	40 each	6.4
6U5 Indicator	220	...	...	0.5	6.4
5U4G Rectifier	Plate to Plate 680 RMS		350	120	5.1

6F5 Bias Supply Voltage—1.2 Volts
6J5G Bias Supply Voltage—3.5 Volts

AC Line voltage—120 No signal input—1000 ohms per volt meter—dial pointer at 530 K.C. on broadcast band.
* Measured on 500-volt scale.

MODEL F-107
Parts

GENERAL ELECTRIC CO.

REPLACEMENT PARTS LIST
Model F-107

Insist on genuine factory-tested parts which may be purchased from authorized dealers.

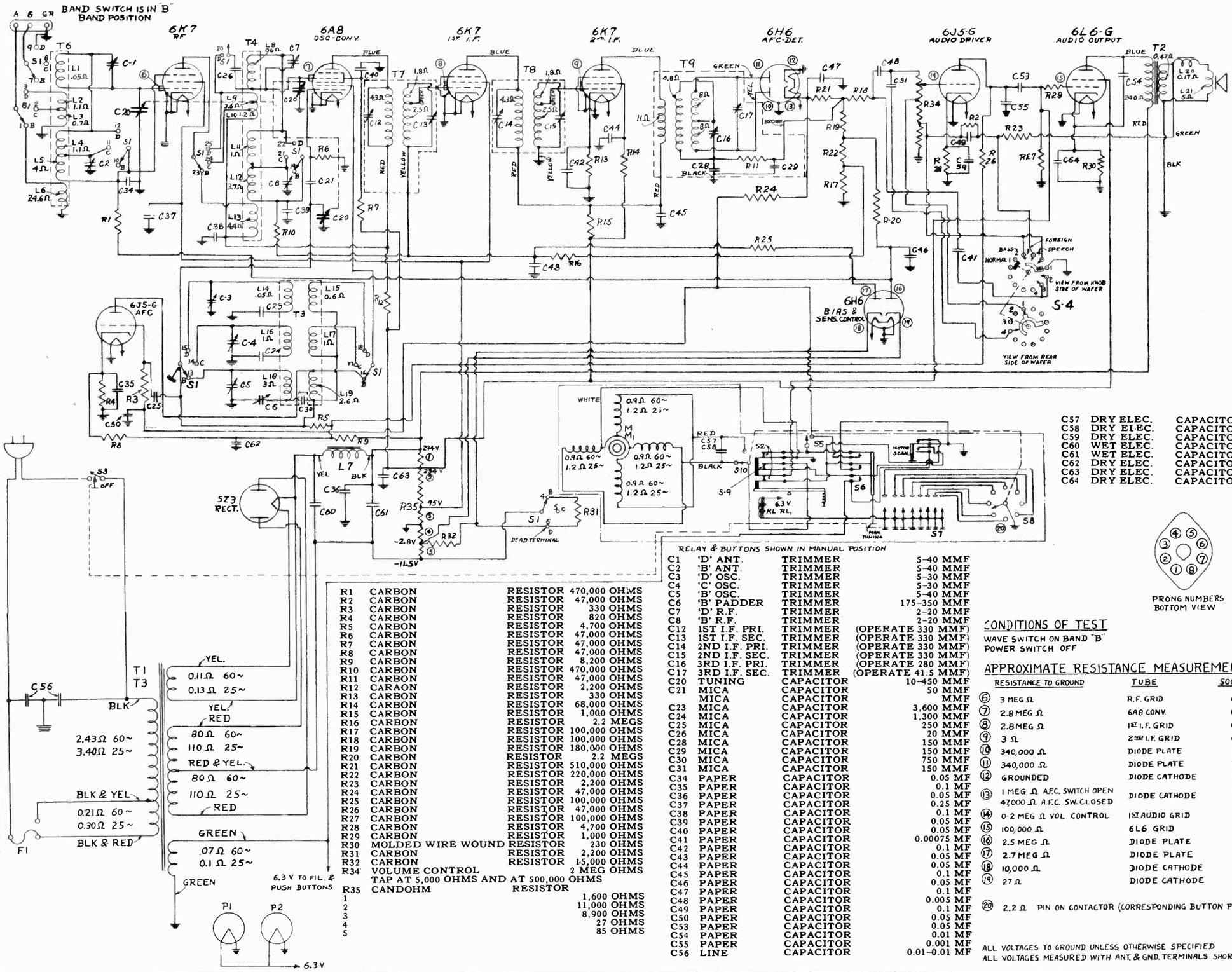
Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-008	BOARD—2 lug terminal board	$0.10
*RB-023	BOARD—4 lug terminal board (near 6J5 socket)	.10
*RB-049	BOARD—Ant. and ground terminal board	.10
*RB-053	BOARD—3 lug terminal board (near 1st and 2nd I.F.)	.10
RB-063	BOARD—Fuse terminal board and bracket	.25
RB-062	BOARD—6 lug terminal board (near 6H6 socket)	.10
RC-002	CAPACITOR—.00075 mfd., 200 V. paper (C-41)	.25
RC-005	CAPACITOR—.001 mfd., 400 V. paper (C-55)	.25
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-48)	.25
*RC-042	CAPACITOR—.01 mfd., 1,000 V. paper (C-54)	.30
*RC-091	CAPACITOR—.05 mfd., 400 V. paper (C-34, C-39, C-40, C-43, C-44, C-46, C-50, C-53)	.30
RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-36)	.35
*RC-123	CAPACITOR—.1 mfd., 400 V. paper (C-35, C-38, C-42, C-45, C-47, C-49)	.35
*RC-150	CAPACITOR—.25 mfd., 400 V. paper (C-37)	.35
*RC-205	CAPACITOR—20 mmf., mica (C-26)	.35
RC-206	CAPACITOR—50 mmf., mica (C-21) (special for osc.)	.35
*RC-242	CAPACITOR—150 mmf., mica (C-28, C-29, C-31)	.25
*RC-259	CAPACITOR—250 mmf., mica (C-25)	.30
RC-308	CAPACITOR—750 mmf., mica (C-30)	.35
*RC-357	CAPACITOR—3,600 mmf., mica (C-23)	.50
RC-364	CAPACITOR—1,300 mmf., mica (C-24)	.35
RC-427	CAPACITOR—16 mfd., 450 V. wet electrolytic (C-60)	1.05
RC-428	CAPACITOR—30 mfd., 450 V. wet electrolytic (C-61)	1.20
RC-579	CAPACITOR—Dry electrolytic, 10 mfd., 12 V. A.C.; 4 mfd., 400 V.; 10 mfd., 400 V.; 25 mfd., 25 V. (C-59, C-62, C-63, C-64)	1.70
RC-582	CAPACITOR—1,000 mfd., 12 V. A.C. dry electrolytic (C-58) for 50–60 cycle sets	$2.45
RC-588	CAPACITOR—2300 mfd., 12 V. A.C. dry electrolytic for 25-cycle sets (C-57)	4.50
RC-650	CAPACITOR—Double trimmers (5-40 mmf.) (C-1, C-2) "B" and "D" band antenna	.25
RC-651	CAPACITOR—Double trimmers (2-20 mmf.) (C-7, C-8) "B" and "D" band R.F.	.25
RC-652	CAPACITOR—"B" band padder (175–350 mmf.) (C-6)	.25
RC-654	CAPACITOR—Double trimmers, pri. and sec., 1st or 2nd I.F. transformer (C-12, C-13, C-14, C-15)	.45
RC-655	CAPACITOR—Double trimmers, pri. and sec., 3rd I.F. transformer (C-16, C-17)	1.55
RC-661	CAPACITOR—"B", "C" and "D" band oscillator trimmer (C-3, C-4, C-5)	.60
RC-719	CONDENSER—3-gang tuning condenser (C-20)	5.15
*RC-755	CAPACITOR—Line capacitor .01–.01 mfd., 250 V. A.C. (C-56)	.40
*RC-863	CORD—Power cord with plug	.65
*RC-992	CUSHION—Condenser mounting cushion assembly (Pkg. of 3)	.10
RC-8011	CABLE—Speaker cable with female plug	.60
*RF-301	FUSE—3 amp. fuse (Pkg. of 10)	1.00
*RG-001	GRID CAP—Control grid cap (Pkg. of 5)	.10
RK-017	KNOB—Volume and tone control knobs (Pkg. of 5)	.40
RK-018	KNOB—Band and A.F.C. switch knobs (Pkg. of 5)	.40
RK-021	KNOB—Manual tuning knob (Pkg. of 5)	.50
RL-046	COIL—Antenna coil "A", "B", and "C" bands (T-6)	1.35
RL-134	COIL—R.F. coil "A", "B", and "C" bands (T-4)	1.25
RL-249	COIL—Osc. coil, "A", "B" and "C" bands (T-3)	1.50
RP-078	PLATE—Fuse cover plate	.10
RQ-1247	RESISTOR—330 ohm, ½ watt carbon (R-3, R-13) (Pkg. of 5)	.70
RQ-1257	RESISTOR—820 ohm, ½ watt carbon (R-4) (Pkg. of 5)	.70
RQ-1259	RESISTOR—1,000 ohm, ½ watt carbon (R-15, R-29) (Pkg. of 5)	$0.70
RQ-1267	RESISTOR—2,200 ohm, ½ watt carbon (R-12, R-23) (Pkg. of 5)	.70
RQ-1275	RESISTOR—4,700 ohm, ½ watt carbon (R-5, R-28) (Pkg. of 5)	.70
RQ-1287	RESISTOR—15,000 ohm, ½ watt carbon (R-32) (Pkg. of 5)	.70
RQ-1291	RESISTOR—22,000 ohm, ½ watt carbon (R-31) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 ohm, ½ watt carbon (R-2, R-6, R-7, R-11, R-24, R-26) (Pkg. of 5)	.70
RQ-1303	RESISTOR—68,000 ohm, ½ watt carbon (R-14) (Pkg. of 5)	.70
RQ-1307	RESISTOR—100,000 ohm, ½ watt carbon (R-17, R-18, R-25, R-27) (Pkg. of 5)	.70
RQ-1313	RESISTOR—180,000 ohm, ½ watt carbon (R-19) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 ohm, ½ watt carbon (R-22) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohm, ½ watt carbon (R-1, R-10) (Pkg. of 5)	.70
RQ-1324	RESISTOR—510,000 ohm, ½ watt carbon (R-21) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 megohm, ½ watt carbon (R-16, R-20) (Pkg. of 5)	.70
RQ-1481	RESISTOR—8,200 ohm, 1 watt carbon (R-9)	.20
*RQ-1499	RESISTOR—47,000 ohm, 1 watt carbon (R-8)	.20
RR-730	RESISTOR—Tapped bleeder resistor (R-35)	.70
RR-1004	RESISTOR—230 ohm, 1½ watt moulded (R-30)	.15
*RS-139	SHIELD—3rd I.F. transformer shield	.20
RS-175	SHIELD—1st or 2nd I.F. transformer shield	.25
*RS-200	SOCKET—8-pin tube socket (Pkg. of 5)	.75
RS-217	SOCKET—4-prong tube socket (Pkg. of 5)	.50
RS-221	SOCKET—8-pin socket (push button control cable receptacle) (Pkg. of 5)	.60
RS-223	SOCKET—8-pin socket for osc. and converter (Pkg. of 5)	.80
RS-356	SWITCH—Manual A.F.C. switch (S-5)	.40
RS-357	SWITCH—Tone control switch (S-4)	.70
RS-358	SWITCH—Band change switch (S-7)	2.50
RT-101	TRANSFORMER—Power trans., 110–130 V., 50–60 cycles (T-1)	5.90
RT-102	TRANSFORMER—Power Transformer, 100–130 V., 25–60 cycles (T-3)	10.00
RT-103	TRANSFORMER—Power transformer, 110–250 V., universal (T-1)	10.50
RT-246	TRANSFORMER—1st or 2nd I.F. transformer (complete) (T-4, T-5)	1.80
RT-247	TRANSFORMER—3rd I.F. transformer (complete) (T-6)	3.95
RV-033	VOLUME CONTROL—2 megohm volume control, tap at 5,000 ohms and 500,000 ohms (R-34)	1.05
*RW-101	WASHER—Felt washer for knobs (Pkg. of 10)	.45
RX-027	ASSEMBLY—Chassis mounting assembly	.15
	DIAL SCALE ASSEMBLY	
RC-868	CORD—Band indicator, tone control and volume control pointer cord (Pkg. of 5)	.60
RC-8012	CABLE—Tuning drive cables (Pkg. of 5 pairs)	.55
RD-054	DRUM—Condenser drive drum	.30
RD-056	DIAL—Dial scale assembly	3.50
RE-017	ESCUTCHEON—Dial escutcheon (complete)	1.95
RL-920	LAMP—Dial lamp 6.3 volt, .25 amp. (Pkg. of 10)	1.50
RP-079	PULLEY—Volume control cord drive pulley	.15
RP-080	POINTER—Volume or tone control pointer (Pkg. of 5)	$0.15
RP-081	POINTER—Band change indicator (Pkg. of 5)	.20
RP-082	POINTER—Dial scale pointer (includes support) (Pkg. of 5)	.55
RP-083	PULLEY—Band switch cord drive pulley	.10
RP-084	PULLEY—Tone control cord drive pulley	.10
RP-911	REFLECTOR—Lamp reflector	.75
RS-222	SOCKET—Lamp socket assembly	.45
*RS-401	SPRING—Tuning drive cord tension spring (Pkg. of 2)	.20
RS-427	SPRING—Volume, tone or band indicator cord tension spring (Pkg. of 5)	.20
RW-016	WINDOW—Escutcheon window and cushion	.30
	AUTOMATIC DRIVE AND MOTOR ASSEMBLY	
RA-404	ARM—Motor reversing switch arm (on gang condenser shaft)	.15
RB-156	BRACKET—Guide and spiral rod bracket; includes bearing (motor end)	.10
RB-157	BRACKET—Spiral rod bracket with bearing (Manual tuning end)	.10
RB-605	BELT—Motor belt	.25
RG-010	GEAR—Manual drive beveled idler gear and tuning shaft gear	.40
RG-011	GEAR—Manual drive leather faced bevel gear on spiral rod	.20
RM-104	Motor—25-cycle automatic tuning motor (motor only)	4.45
RM-105	MOTOR—50–60 cycle automatic tuning motor (motor only)	4.05
RP-085	PULLEY—Spiral rod pulley (belt driven)	.15
RR-912	RIDER—Spiral rod rider nut	.30
RR-913	ROD—Pointer slider guide rod	.15
RR-914	SPIRAL ROD—Tuning pointer spiral drive rod	.25
RR-915	RELAY—60-cycle relay (complete)	2.80
RR-917	RELAY—25-cycle relay (complete)	3.10
RS-359	SWITCH—Tuning motor reversing switch (operated by gang condenser shaft)	.70
RS-429	SPRING—Motor relay armature spring (Pkg. of 2)	.20
RS-505	SLIDER—Dial pointer slider assembly	.70
RS-908	SHAFT—Manual tuning shaft	.05
RS-028	ASSEMBLY—Motor clutch assembly (complete)	.30
RX-029	ASSEMBLY—Drive motor mounting assembly	.15
	STATION SELECTOR ASSEMBLY Behind Tuning Condenser	
RC-1962	COLLAR—Contactor shaft collar	.10
RC-1963	SLIDING CONTACTOR—Bakelite mounted rotating contactor and holder	.40
RC-1964	CONTACT—Thumbscrew contact (complete) (Pkg. of 10)	.95
RI-103	INSULATORS—Insulators and washers (Thumbscrew contact) (Pkg. of 10)	.05
RP-087	PLATE—Contact mounting segment	.55
RU-002	COUPLING UNIT—Flexible coupling with contactor arm	.75
RW-106	WICK—Wick assembly (Pkg. of 5)	.50
	PUSH BUTTON AUTOMATIC TUNING MECHANISM	
RB-064	TERMINAL BOARDS—Terminal strips (7 terminals) (pair)	.40
RB-065	TERMINAL BOARD—Terminal strip (6 terminals) (long)	.20
RB-068	TERMINAL BOARD—Terminal strip (6 terminals) (short)	.20
RB-606	LATCH BAR—Push button mechanism latch bar	$0.10
RB-607	BUTTON—Moulded push button (Pkg. of 5)	.20
RC-1965	CLAMP—Push button cable clamp (Pkg. of 10)	.10
RC-1966	CONTACTOR CLIP—Clip and insulator (on leads from terminal strip) (Pkg. of 5)	.15
RC-8013	CABLE—"On", "Off", "Scan" switch cable with plug	.65
RE-018	ESCUTCHEON—Touch tuning button escutcheon plate	1.50
RI-104	INSULATOR—Insulator between key and switch blade (Manual and off switches) (Pkg. of 5)	.15
RI-107	INSULATOR—Escutcheon separating insulator (Pkg. of 10)	.05
RI-105	Insulator between key and switch blade (Scan switch) (Pkg. of 10)	.10
RK-200	KEY—Push button key (Pkg. of 5)	.15
*RP-026	PLUG—A-c line connector female plug	.45
*RP-027	PLUG—A-c line connector male plug	.45
RS-361	SWITCH—Tuning control switch (3 section)	1.10
RS-430	SPRING—Latch bar spring (Pkg. of 5)	.10
RS-431	SPRING—Key spring and staple (Pkg. of 5)	.05
RS-506	SPACER—Contact point spacer (fiber) (Pkg. of 10)	.05
RW-017	WINDOW—Push button celluloid window (Pkg. of 25)	.10
RW-105	WASHER—Fiber washer on push button key (Pkg. of 10)	.05
RX-031	ASSEMBLY—Push button assembly (complete)	9.50
	SPEAKER ASSEMBLY	
RC-925	CONE—Cone and voice coil	$1.25
*RC-991	CLAMP—Cone spider clamp and screw	.05
*RP-015	PLUG—Male speaker plug	.20
RS-060	SPEAKER—12 in. speaker (complete)	7.50
*RS-416	SPRING—Voice coil leads spring (Pkg. of 2)	.10
RT-430	TRANSFORMER—Output transformer (T-2)	1.70
RX-030	ASSEMBLY—Speaker mounting bushings and nuts	.10
	REMOTE CONTROL UNIT	
RA-551	ADAPTER—Adapter socket	.75
RB-075	BOARD—Terminal board (9 terminals) (top)	.25
RB-076	BOARD—Terminal board (9 terminals) (bottom)	.25
RB-607	BUTTON—Moulded push button	.05
RB-608	LATCH BAR—Latch bar for keys	.10
RC-1970	CLAMP—Remote cable clamp	.05
RC-8023	CABLE—Flat cable (10 leads)	6.90
RK-201	KEY—Push button key	.10
RK-202	KEY—Push button key (silent)	.10
RS-430	SPRING—Latch bar spring (Pkg. of 5)	.10
RS-431	SPRING—Key spring and spacer (Pkg. of 5)	.10
RT-950	TERMINAL—Terminal for No. 10 lead (Pkg. of 5)	.05
RT-951	TERMINAL—Terminal on leads No. 1 to No. 9 and rubber insulator (Pkg. of 5)	.05
RW-017	WINDOW—Push button celluloid window (Pkg. of 25)	.05

* Used on previous receivers.

(Prices subject to change without notice)

GENERAL ELECTRIC CO.

MODEL F-107
Schematic, Resistance
Specifications



Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	110–120	50–60	145
	(120–130)*		
C	110–120	25	145
	(120–130)*		

*The receivers, as shipped from the factory, have the fuse clipped to the 120–130 volt tap of the transformer, marked 125 on the fuse board. If the normal voltage of your power supply is always below 115 volts, the fuse should be removed from this tap and placed in the lower voltage clip marked 115.

Tuning Frequency Range
Band "B" . . . . . 540–1680 kc.
Band "C" . . . . . 1600–5600 kc.
Band "D" . . . . . 5400–18,000 kc.

Intermediate Frequency . . . . . 465 kc.

Electrical Power Output
Undistorted . . . . . 5½ watts
Maximum . . . . . 10 watts
*Tone Control . . . . . 4-point control

Loud-speaker—Electrodynamic
Cone diameter . . . . . 12 inch
Voice coil impedance . . . . . 5.5 ohm at 400 cycles

C57	DRY ELEC.	CAPACITOR	2,300 MF
C58	DRY ELEC.	CAPACITOR	1,000 MF
C59	DRY ELEC.	CAPACITOR	10 MF
C60	WET ELEC.	CAPACITOR	16 MF
C61	WET ELEC.	CAPACITOR	30 MF
C62	DRY ELEC.	CAPACITOR	4 MF
C63	DRY ELEC.	CAPACITOR	10 MF
C64	DRY ELEC.	CAPACITOR	25 MF

R1	CARBON	RESISTOR	470,000 OHMS
R2	CARBON	RESISTOR	47,000 OHMS
R3	CARBON	RESISTOR	330 OHMS
R4	CARBON	RESISTOR	820 OHMS
R5	CARBON	RESISTOR	4,700 OHMS
R6	CARBON	RESISTOR	47,000 OHMS
R7	CARBON	RESISTOR	47,000 OHMS
R8	CARBON	RESISTOR	47,000 OHMS
R9	CARBON	RESISTOR	8,200 OHMS
R10	CARBON	RESISTOR	470,000 OHMS
R11	CARBON	RESISTOR	47,000 OHMS
R12	CARAON	RESISTOR	2,200 OHMS
R13	CARBON	RESISTOR	330 OHMS
R14	CARBON	RESISTOR	68,000 OHMS
R15	CARBON	RESISTOR	1,000 OHMS
R16	CARBON	RESISTOR	2.2 MEGS
R17	CARBON	RESISTOR	100,000 OHMS
R18	CARBON	RESISTOR	100,000 OHMS
R19	CARBON	RESISTOR	180,000 OHMS
R20	CARBON	RESISTOR	2.2 MEGS
R21	CARBON	RESISTOR	510,000 OHMS
R22	CARBON	RESISTOR	220,000 OHMS
R23	CARBON	RESISTOR	2,200 OHMS
R24	CARBON	RESISTOR	47,000 OHMS
R25	CARBON	RESISTOR	100,000 OHMS
R26	CARBON	RESISTOR	47,000 OHMS
R27	CARBON	RESISTOR	100,000 OHMS
R28	CARBON	RESISTOR	4,700 OHMS
R29	CARBON	RESISTOR	1,000 OHMS
R30	MOLDED WIRE WOUND	RESISTOR	230 OHMS
R31	CARBON	RESISTOR	2,200 OHMS
R32	CARBON	RESISTOR	15,000 OHMS
R34	VOLUME CONTROL		2 MEG OHMS
	TAP AT 5,000 OHMS AND AT 500,000 OHMS		
R35	CANDOHM	RESISTOR	
1			1,600 OHMS
2			11,000 OHMS
3			8,900 OHMS
4			27 OHMS
5			85 OHMS

C1	'D' ANT.	TRIMMER	5–40 MMF
C2	'B' ANT.	TRIMMER	5–40 MMF
C3	'D' OSC.	TRIMMER	5–30 MMF
C4	'C' OSC.	TRIMMER	5–30 MMF
C5	'B' OSC.	TRIMMER	5–40 MMF
C6	'B' PADDER	TRIMMER	175–350 MMF
C7	'D' R.F.	TRIMMER	2–20 MMF
C8	'B' R.F.	TRIMMER	2–20 MMF
C12	1ST I.F. PRI.	TRIMMER	(OPERATE 330 MMF)
C13	1ST I.F. SEC.	TRIMMER	(OPERATE 330 MMF)
C14	2ND I.F. PRI.	TRIMMER	(OPERATE 330 MMF)
C15	2ND I.F. SEC.	TRIMMER	(OPERATE 330 MMF)
C16	3RD I.F. PRI.	TRIMMER	(OPERATE 280 MMF)
C17	3RD I.F. SEC.	TRIMMER	(OPERATE 41.5 MMF)
C20	TUNING	CAPACITOR	10–450 MMF
C21	MICA	CAPACITOR	50 MMF
	MICA	CAPACITOR	MMF
C23	MICA	CAPACITOR	3,600 MMF
C24	MICA	CAPACITOR	1,300 MMF
C25	MICA	CAPACITOR	250 MMF
C26	MICA	CAPACITOR	20 MMF
C28	MICA	CAPACITOR	150 MMF
C29	MICA	CAPACITOR	150 MMF
C30	MICA	CAPACITOR	750 MMF
C31	MICA	CAPACITOR	150 MMF
C34	PAPER	CAPACITOR	0.05 MF
C35	PAPER	CAPACITOR	0.1 MF
C36	PAPER	CAPACITOR	0.05 MF
C37	PAPER	CAPACITOR	0.25 MF
C38	PAPER	CAPACITOR	0.1 MF
C39	PAPER	CAPACITOR	0.05 MF
C40	PAPER	CAPACITOR	0.05 MF
C41	PAPER	CAPACITOR	0.00075 MF
C42	PAPER	CAPACITOR	0.1 MF
C43	PAPER	CAPACITOR	0.05 MF
C44	PAPER	CAPACITOR	0.05 MF
C45	PAPER	CAPACITOR	0.1 MF
C46	PAPER	CAPACITOR	0.05 MF
C47	PAPER	CAPACITOR	0.1 MF
C48	PAPER	CAPACITOR	0.005 MF
C49	PAPER	CAPACITOR	0.1 MF
C50	PAPER	CAPACITOR	0.05 MF
C53	PAPER	CAPACITOR	0.05 MF
C54	PAPER	CAPACITOR	0.01 MF
C55	PAPER	CAPACITOR	0.001 MF
C56	LINE	CAPACITOR	0.01–0.01 MF

PRONG NUMBERS BOTTOM VIEW

CONDITIONS OF TEST
WAVE SWITCH ON BAND "B"
POWER SWITCH OFF

APPROXIMATE RESISTANCE MEASUREMENTS

	RESISTANCE TO GROUND	TUBE	SOCKET PRONG
⑥	3 MEG Ω	R.F. GRID	CAP
⑦	2.8 MEG Ω	6A8 CONV.	CAP
⑧	2.8 MEG Ω	1ST I.F. GRID	CAP
⑨	3 Ω	2ND I.F. GRID	CAP
⑩	340,000 Ω	DIODE PLATE	PRONG 3 A.F.C. SW. CLOSED
⑪	340,000 Ω	DIODE PLATE	PRONG 5 A.F.C. SW. CLOSED
⑫	GROUNDED	DIODE CATHODE	PRONG 4
⑬	1 MEG Ω A.F.C. SWITCH OPEN 47,000 Ω A.F.C. SW. CLOSED	DIODE CATHODE	PRONG 8
⑭	0-2 MEG Ω VOL. CONTROL	1ST AUDIO GRID	PRONG 5
⑮	100,000 Ω	6L6 GRID	PRONG 5
⑯	2.5 MEG Ω	DIODE PLATE	PRONG 3
⑰	2.7 MEG Ω	DIODE PLATE	PRONG 5
⑱	10,000 Ω	DIODE CATHODE	PRONG 8
⑲	27 Ω	DIODE CATHODE	PRONG 4
⑳	2.2 Ω PIN ON CONTACTOR (CORRESPONDING BUTTON PRESSED)		

L7 FIELD COIL 460 OHMS COLD

S1 BAND CHANGE SWITCH
S2 AFC S.T. SWITCH (ON RELAY)
S3 POWER SWITCH
S4 TONE CONTROL SWITCH
S5 AFC CUT-OFF SWITCH
S6 MANUAL TUNING BUTTON
S7 STATION SELECTOR BUTTONS
S8 TUNING CAP. BRAKE SWITCH
S9 MOTOR STOP (ON RELAY)
S10 MOTOR REVERSING SWITCH

PRODUCTION CHANGES
R-9, 7500 OHMS, 2 WATT
C-31 35 MMF

ALL VOLTAGES TO GROUND UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES MEASURED WITH ANT. & GND. TERMINALS SHORTED & 120 V ON PRI. 125 V Tap

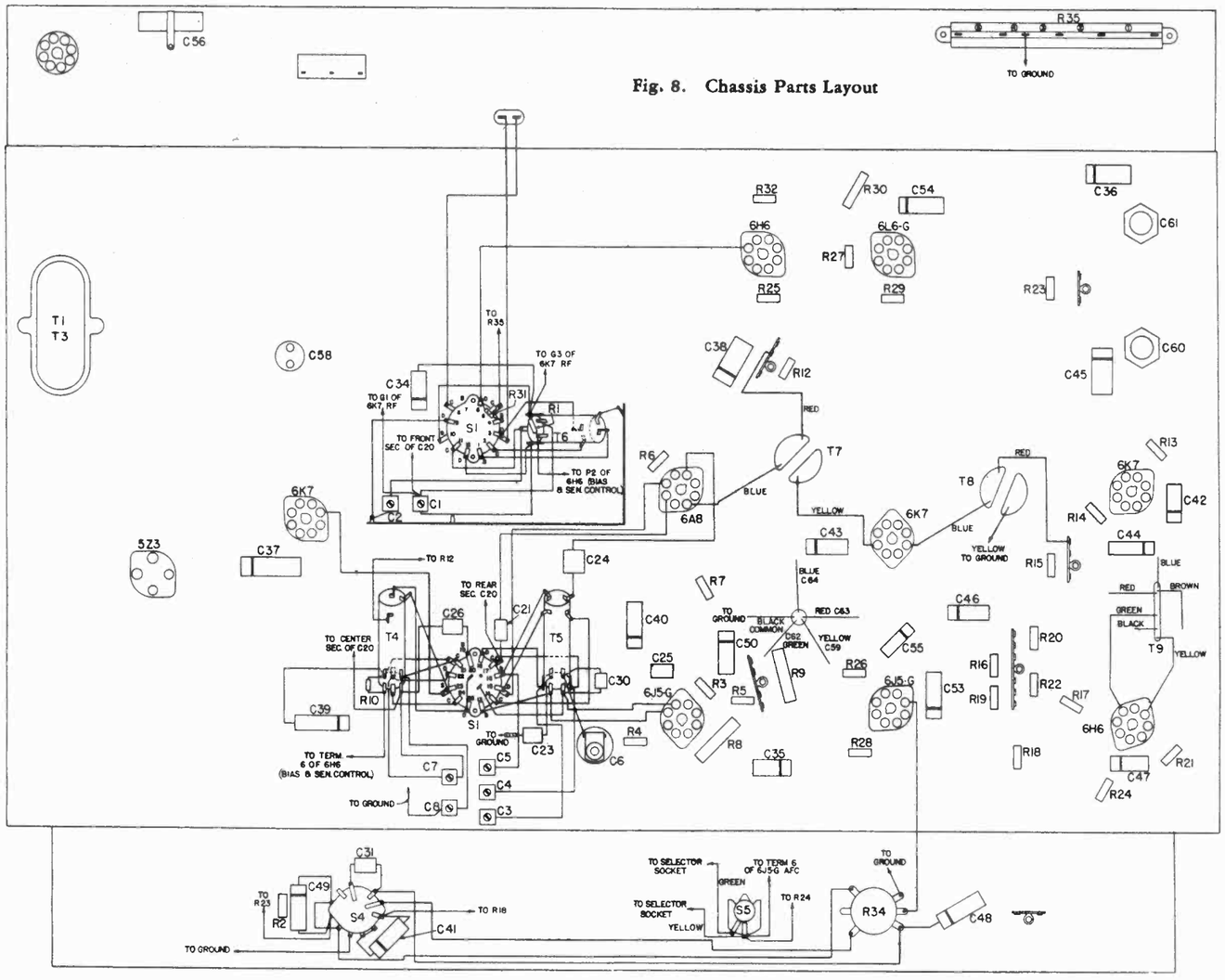


Fig. 8. Chassis Parts Layout

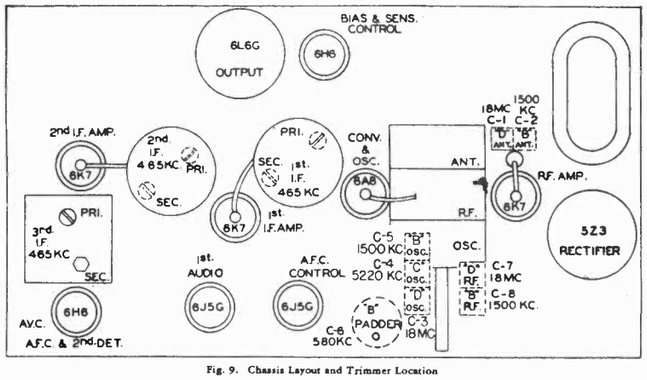


Fig. 9. Chassis Layout and Trimmer Location

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an AC voltmeter with a scale reading of 3 to 5 volts. A cathode ray oscilloscope is preferred for I.F. alignment.
3. A screw-driver type alignment tool.

The alignment procedure is given in table form along with the trimmer location drawing, Fig. 9. A "dummy antenna" should be used in all alignments and is the capacitor or capacitor and resistor used in series with the signal generator. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. as this would remove the grid bias from the tube.

Automatic Frequency Control Adjustments

After I.F. alignment is completed with output meter and without disturbing the generator setting, remove the signal generator lead from the grid of the 6A8 converter. Apply the 465 kc. signal, to the 6A8 grid capacitively through the insulation of the grid lead.

Tune in a weak broadcast station at about 1000 kc. and, with the A.F.C. switch "off," tune the receiver carefully for "zero" beat between this carrier and the 465 kc. generator signal. Throw the A.F.C. switch on and adjust the 3rd I.F. secondary trimmer (C-17) to zero beat. This adjustment is very critical and must be made with great care. When the alignment is correctly done, there will be no appreciable difference in the beat note with the A.F.C. switch "on" or "off."

Another method of A.F.C. adjustment after I.F. alignment with an output meter is to connect a low range voltmeter between the cathodes of the 6H6 discriminator. Leave the signal generator connected to the 6A8 grid and without disturbing its setting adjust C-17. It will be noticed that the meter reads plus when C-17 is tuned off resonance on one side and negative when tuned on the opposite side of resonance. The correct adjustment of C-17 is between these positions, when the voltmeter reads zero.

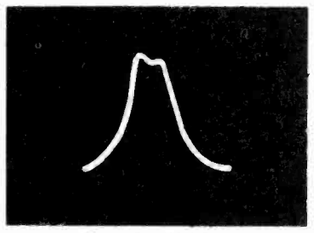


Fig. 10. Over-all I. F. Curve

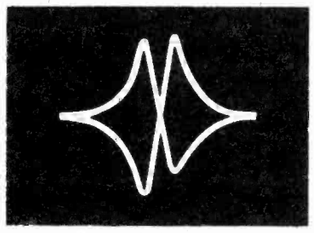


Fig. 11. AFC Adjustment Curve

COIL SYSTEM

The coils for the three bands are wound a single form. The antenna transformer is designated as T-6, the R.F. transformer as T-4 and the oscillator transformer is marked T-3. All contacts on the band switch are numbered in Fig. 7 and Fig. 8 to facilitate tracing the coil circuits.

The band switch connects the coils to operate as follows:

Ant.	Primary	Secondary	Remarks
"B"	L-6	L-4 & L-5	
"C"	L-3	L-4	L-5 shorted
"D"	L-2 & L-3	L-1	L-4 & L-5 shorted

R.F.			
"B"	L-13	L-11 & L-12	
"C"	L-10	L-11	L-12 shorted
"D"	L-9 & L-10	L-8	L-11 & L-12 shorted
Osc.			
"B"	L-19	L-18	
"C"	L-17	L-16	Connects C-30 across L-18
"D"	L-15	L-14	Connects C-30 across L-16

On "D" band contact No. 9 is used to provide a ground for the General Electric noise reducing antenna systems RV-300 and PT-40.

ALIGNMENT PROCEDURE

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer (See Fig. (9)	Remarks
1. Band "B"	465 kc. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Pri. (C-16)	A.F.C. switch "off"—Condenser gang at minimum capacity—vertical input ground and the junction of R-18, R-19, R-21 and brown lead from the 3rd I.F. trans. Adjust trimmers in order listed for a single curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 10.
2. Band "B"	465 kc. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-15) Pri. (C-14)	
3. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-13) Pri. (C-12)	
4. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd.	3rd I.F. Sec. (C-17)	Disconnect one end of C-47—Turn A.F.C. switch "on"—Vertical input of oscilloscope to ground and discriminator cathode, prong No. 8 on 6H6.—Adjust trimmer for cross on horizontal axis. Fig. 11.

I.F. Alignment with Output Meter

1. Band "B"	465 kc. Modulated	2nd I.F. Grid	.05 Mfd.	3rd I.F. Pri. (C-16)	A.F.C. switch "off"—Condenser gang at minimum capacity—output meter connected across the voice coil—volume control at maximum—input as low as practical. Adjust all trimmers in order listed for maximum output. Do not attempt an over-all re-alignment once a stage alignment has been completed.
2. Band "B"	465 kc. Modulated	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-15) Pri. (C-14)	
3. Band "B"	465 kc. Modulated	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-13) Pri. (C-12)	
4. Band "B"	.....	.....	.....	3rd I.F. Sec. (C-17)	See paragraph on A.F.C. adjustment.

R.F. Alignment

1. Band "B"					Turn A.F.C. switch "off"—Set dial pointer to first line at left-hand end of dial scale with condenser gang fully meshed.
2. Band "D"	18 mc. Modulated	Antenna post	250 Mmf. 400 ohms	Osc. (C-3) R.F. (C-7) Ant. (C-1)	Connect output meter across voice coil—Turn tone control to bass. D band image should be 930 kc. below input signal when oscillator trimmer (C-3) is peaked properly. Example: 15 mc.—image 14.07 mc. Peak C-7 and C-1 while rocking gang condenser.
3. Band "C"	5220 kc. Modulated	Antenna post	250 Mmf. 400 ohms	Osc. (C-4)	Adjust trimmer for greatest output with dial pointer at 5,220 kc.
4. Band "B"	1500 kc. Modulated	Antenna post	250 Mmf. 400 Ohms	Osc. (C-5) R.F. (C-8) Ant. (C-2)	Adjust trimmers, in order listed, for greatest output at 1500 kc.
5. Band "B"	580 kc. Modulated	Antenna post	250 Mmf. 400 Ohms	Osc. padder (C-6)	Adjust padder for maximum output in vicinity of 580 kc. while rocking gang condenser.
6. Band "B"	Repeat operation No. 4				

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
6K7	R.F. Amplifier	220	95	.....	6.0	6.3
6A8	Oscillator	150	.....	.....	10	6.3
	Converter	220	90			
6J5-G	A.F.C. Control	150	.....	6.1	3.5	6.3
6K7	1st I.F. Amplifier	236	92	.....	7.0	6.3
6K7	2nd I.F. Amplifier	225	102	3.0	8.6	6.3
6J5-G	Audio	130	.....	5.5	1.3	6.3
6L6-G	Output	280	234	13.5	57	6.3
5Z3	Rectifier	660/330 R.M.S	.....	360 d-c	110	5.0

A-C line voltage—120 volts with fuse clipped in the 125 volt tap—no signal input—1000 ohms per volt meter—dial pointer at 530 kc. on Broadcast band.

AUTOMATIC FREQUENCY CONTROL

The Automatic Frequency Control used in this receiver shifts the oscillator frequency so that the correct intermediate frequency is very closely produced even when the receiver is mistuned several kilocycles.

The essential elements are the discriminator transformer T-9, the twin diode 6H6 with its balanced discriminator network, and the 6J5-G control tube connected across the broadcast oscillator plate coil.

The discriminator transformer is designed to deliver (when properly tuned to 465 kc.) equal voltages to each section of the 6H6 when the receiver is correctly tuned to give an I.F. frequency of 465 kc. Under this condition the voltage drop across R-21 is equal and opposite to the voltage across the total resistance of R-19, R-22 and R-17; thus no discriminator voltage is produced to control the 6J5-G tube.

However, if the signal frequency is increased above 465 kc., unequal voltages are applied to the diodes and the voltage over R-21 is greater than the voltage over the combined resistance of R-19, R-22 and R-17. The difference of these two voltages is positive and is applied to the 6J5-G control tube.

When the signal frequency is decreased below 465 kc., the result is less voltage over R-21 and a greater voltage over the combined resistances R-19, R-22 and R-17. The difference of these two voltages, as applied to the 6J5-G control tube, is negative.

Thus three conditions arise:

On resonance: no discriminator voltage developed
Above 465 kc.: a positive control voltage
Below 465 kc.: a negative control voltage

The 6J5-G A.F.C. control tube has a combination of self and fixed bias, the latter being the result of the current supplied through R-8 to the cathode resistor R-4. The R.F. voltage applied to the control grid of the 6J5-G is obtained from the drop across the C-6 series padder and C-30. The vector sum of these two voltages is applied to the phase shifting network C-25 and R-3 and, in turn, to the control grid. This phase shifting network causes the control tube to appear as a reactance in parallel with the oscillator coil. The value of the apparent reactance depends upon the control voltage produced by the discriminator.

When the set is mistuned above the incoming signal, the converter output is above the 465 kc. required. A positive discriminator voltage is produced as explained above. This causes the 6J5-G tube to act as more capacitive reactance and thus lower the oscillator frequency; this gives a lower converter output frequency, approximately 465 kc.

When the set is mistuned below the incoming signal, the converter output is below the 465 kc. required. A negative discriminator voltage is produced as explained above. This causes the 6J5-G to act as less capacitive reactance thus increasing the oscillator frequency. This in turn gives a higher converter output frequency, approximately 465 kc.

A decided A. F. C. action is apparent on short waves. The discriminator voltage is produced in the same manner as above. However, the action of the 6J5-G tube is different. The 6A8 oscillator plate voltage and 6J5-G plate voltage are supplied through the same resistor (R-5). A positive discriminator voltage allows the 6J5-G plate current to increase, thus reducing the 6A8 oscillator plate voltage. This causes a lower oscillator frequency with the resultant lower converter output frequency, approximately 465 kc.

With a negative discriminator voltage the 6J5-G plate current is less, thus increasing the 6A8 oscillator plate voltage. This causes a higher oscillator frequency with the resultant higher converter output frequency, approximately 465 kc.

DIAL MECHANISM

(A) Manual drive leather-faced bevel gear
(B) Beveled idler gear
(C) Tuning shaft gear
(D) Volume control drive cord pulley
(E) Band switch drive cord pulley
(F) Tone control drive cord pulley
(G) Belt driven spiral rod drive pulley
(1) Spiral drive rod rider
(2) Pointer slider guide rod
(3) Tuning pointer spiral drive rod
(4) Motor belt
(5) Spiral rod bracket with bearing
(6) Motor shaft collar
(7) Clutch tension spring
(8) Pulley dog
(9) Motor shaft collar
(10) Tone control pointer
(11) Tone control cord pulley stud
(12) Band switch indicator
(13) Band switch indicator cord pulley stud
(14) Long dial drive cord
(15) Dial scale pointer
(16) Volume control pointer
(19) Short dial drive cord
(20) Stationary spring support } Fig. 4
(23) Relay armature extension } Fig. 4
(24) Armature back stop } Fig. 4

Tuning mechanism diagram (Fig. 1) is self-explanatory. The tuning condenser drive cord can be easily replaced without removing *any* part of the chassis while all dial indicating control cords are made readily accessible for servicing by merely removing the seven small screws holding the dial reflector assembly.

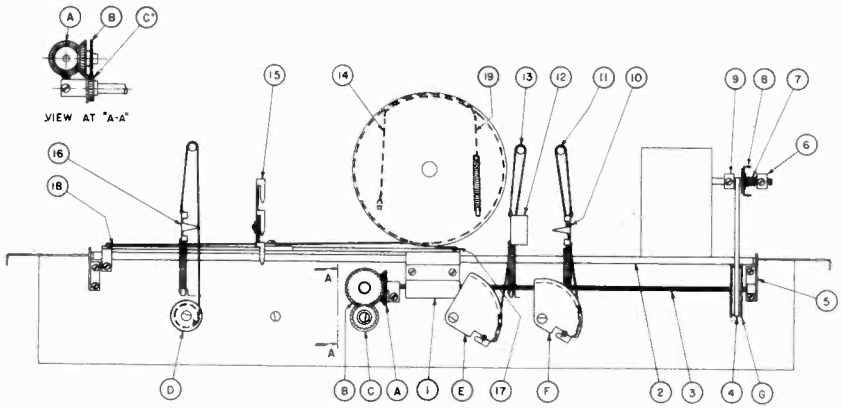


Fig. 1. Dial Mechanism

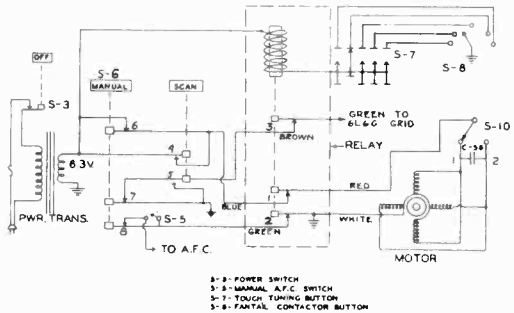


Fig. 2. Schematic of "Touch Tuning" System

TOUCH TUNING

General Electric "Touch Tuning" consists of three essential units; the push-button assembly of sixteen buttons, used by the operator for control; the motor and relay assembly, operating in conjunction with the buttons to provide fast and accurate tuning; and the contact segment with its sliding contactor and adjustable contacts enabling selection of thirteen different stations to be tuned automatically.

Of the sixteen push-buttons, thirteen are used for station selection. The other buttons are used for "Manual" control (No. 8), "Scanning" (No. 15) and "Off" (No. 16). Depression of any button except No. 15 will lock the depressed button and release any other that may be in the circuit. Thus the selection of any station button or of "Manual" will release the "Off" switch turning the set on.

The tuning motor is operated as a capacitor type squirrel cage induction motor, with capacitor, C-58 as the phase shifting device. By tracing the motor circuit it will be seen that C-58 is in series with one set of poles when the motor reversing switch is in the position shown in Fig. 2. When the switch S-10 is reversed the capacitor C-58 is in series with the opposite set of poles. This causes the motor field to rotate in the opposite direction with the resultant change in motor rotation.

The motor power is supplied from the tube heater circuit through "Manual" switch (contact No. 6), Fig. 2, the relay (contact No. 1) and the motor reversing switch (S-10) with the chassis as common return. It will continue to run until the sliding contactor (S-8) contacts the stud on the contact segment which is connected to the button in the circuit. When this contact is made, the relay field coil is energized, causing the relay to open the motor circuit (contact No. 1). At the same time the relay arm also engages the motor clutch, causing instantaneous stopping of tuning mechanism travel. Depression of another station button causes another similar cycle.

Pressing the "Manual" button (S-6) releases any depressed button. Thus S-7 is opened and the relay field coil can not be energized. Contact No. 6 opens the motor circuit. Contacts No. 7 and No. 8 remove the ground from the grid of the 6L6-G and from the A.F.C. circuit respectively.

With the receiver set for "Manual" operation, depression of the "Scan" button closes the motor circuit by the shunting of contact No. 6 on the "Manual" switch allowing continuous motor operation and dial travel. As the motor drives to the dial limits on either end, S-10 is automatically thrown, causing reversal of motor rotation.

During periods of motor operation, either for automatic station selection or for scanning, the grid of the 6L6-G is shorted to ground. This "silent tuning," accomplished by relay contact No. 3, in the former case or scan button contact (No. 5) in the latter, avoids reception of unwanted stations or inter-station noise when tuning automatically or by means of the "Scan" button.

The use of automatic frequency control on "Manual" is made optional by the A.F.C. switch (S-5). When any one of the thirteen "Touch Tuning" buttons is depressed, circuit is made through contact No. 8 on S-6 and is completed through relay contact No. 2, thus removing A.F.C. while the motor is in operation. When the station is reached the relay opens contact No. 2, thus removing the ground on the A.F.C. circuit. *The A.F.C. is automatically turned on when "Touch Tuning" is being used.*

REMOTE CONTROL

There are ten leads in the "Remote Touch Tuning Control" cable. These leads serve the following functions:

The No. 1 and No. 2 leads are connected to the octal base adapter and serve to connect the silencing button to the output tube.

The No. 3 to No. 9 leads correspond to the button numbers and, with the No. 10 lead, provide the selection of stations from the remote control unit. These leads are to be connected to pins on the contact segment on the rear of the chassis.

Remove the least desirable station's letters from one of the "Touch Tuning" buttons of the receiver and insert the "Remote" tab. Note the number of this button as marked on the escutcheon.

Remove from a pin on the contact segment on the receiver, the lead which bears this number, and connect it to the No. 10 lead from the remote control cable, Fig. 3.

(The pin on the contact segment from which this lead was removed is left vacant.)

Now note the number of a receiver push button which bears the same call letters as a remote unit button. Remove the lead with this number from the pin on the contact segment. Connect to this pin the lead from the remote cable which corresponds to the above-mentioned remote unit button. Fasten the lead with a hex nut and tighten lightly with a pair of pliers or small wrench. Now re-connect the original lead to the pin. Proceed in the same manner until the seven remote button leads are connected.

Remove the 6L6G tube and place in the 6L6G tube socket the adapter which is connected to leads No. 1 and No. 2. Insert the 6L6G tube in this adapter.

When the "Remote Touch Tuning Control" unit is connected, as explained above, the action is identical with that of the regular station selection circuit. The remote button unit is in series with the "Remote" button lead on the receiver through lead No. 10 of the remote unit cable. The relay field coil circuit is completed through the set "Remote" button (S-7); the common (No. 10) lead; the depressed control button; its lead to a pin on the contact segment, and to ground through the sliding contactor. *The "Silent" button must be in the released position when operating the receiver from either the remote control unit or from the receiver controls or no audio output will be obtained.*

RELAY ADJUSTMENTS

The following adjustments should be made with relay assembled on the motor bracket, Fig. 4.

(1) Make sure contacts are adjusted to open in correct sequence: center contacts (motor) first, contacts farthest from armature (AFC) second, contacts nearest armature (silent tuning) last. *It is very important that the silent tuning switch open last.*

(2) Adjust backstop (24) so that the armature snaps closed when the relay coil is energized with 4.5 volts A.C. The backstop must make a positive contact with the back of the armature in the open position; otherwise sluggish operation of the relay will result which will cause the motor drive to skip buttons. If the relay will not close at 4.5 volts and still maintain proper travel and sequence, weaken the spring on the rear of the armature plate by bending the stationary spring support (20).

(3) Loosen the setscrew on the motor shaft collar nearest motor (9) and adjust collar so that the pulley dog (8) misses the relay armature extension by .001 in. (relay not energized). All contacts must be closed when the relay armature touches the end of the motor dog; if the motor contacts open in this position the armature will chatter.

(4) Spring adjustment (7) on slip clutch should be just tight enough so as not to allow slippage of motor when driving the dial mechanism. Loosen setscrew on outside shaft collar (6) and screw the collar on the shaft to tighten slip clutch.

(5) The pole piece of the relay coil is divided in two semicircles. The relay armature should only touch the pole segments towards the motor shaft. There should be a .001 in. clearance between the back segment (21) and the armature when closed; otherwise a buzzing will be heard. Sometimes a front pole segment that is not perfectly flat will cause the same trouble. File off the offending bump.

(6) Backstop setting should be such that the distance (22) is 26/32 in. with the relay closed and 29/32 in. with the relay open.

(7) Spacing between relay contact points when open should be .015 to .018 inches for contact No. 1 and .008 to .010 inches for contact No. 2 and No. 3.

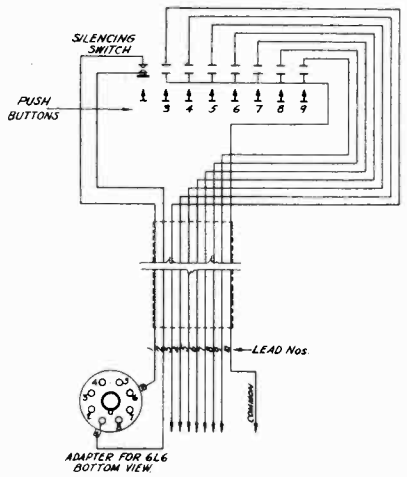


Fig. 3. Schematic of Remote Control

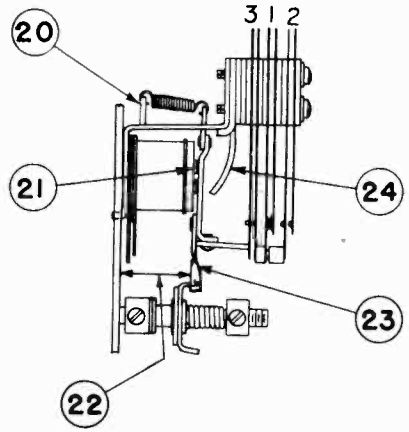


Fig. 4. Relay

INCORRECT OPERATION AND SUGGESTED REMEDIES

Skipping of Stations

(a) "Touch Tuning" button leads not making good contact to adjustable contact pins. Clean contacts and re-insert.

(b) Sliding contactor blade either covered by thin piece of bakelite or dirty. Carefully run fine file over top of sliding contactor, making sure not to leave any sharp corners. Sliding contactor should have a small amount of vaseline on beveled surface to prevent chattering.

(c) Nipple too sharp on adjustable contacts will cause sliding contactor blade to jump across. Smooth off with fine sand paper.

(d) Relay armature out of adjustment causing sluggish operation of relay switch. See paragraph 2 under Relay Adjustments.

(e) Excessive side play in sliding contactor. Loosen the setscrew on the back of the sliding contactor and slide holder together. Final adjustment should allow sliding contactor to rock freely.

(f) Not enough tension on sliding contactor arm. Loosen collar on shaft in rear of contact segment and move sliding contactor arm towards the contact segment; then tighten collar on shaft.

(g) If the contacts at the rear of the "Touch Tuning" button assembly shafts do not close or make good contact, the motor will continue to scan the dial without stopping at the desired station.

(h) Contact segment may be bent out of shape. This should be perpendicular to chassis deck and parallel to rear chassis apron in order to allow the contactor arm to wipe the adjustable contacts evenly.

No Action When Station Button Is Pressed

(a) Relay remains energized and audio continues to function—push button escutcheon grounded. Be sure dial and push button escutcheons are insulated from each other or from the control shafts.

(b) "Off" switch contacts do not close.

(c) If set does not tune automatically unless scan button is also depressed, contacts No. 6, Fig. 2, require closer spacing.

(d) Open or shorted motor capacitor—Characterized by motor armature humming but no torque. Replace 1000 mfd. capacitor C58

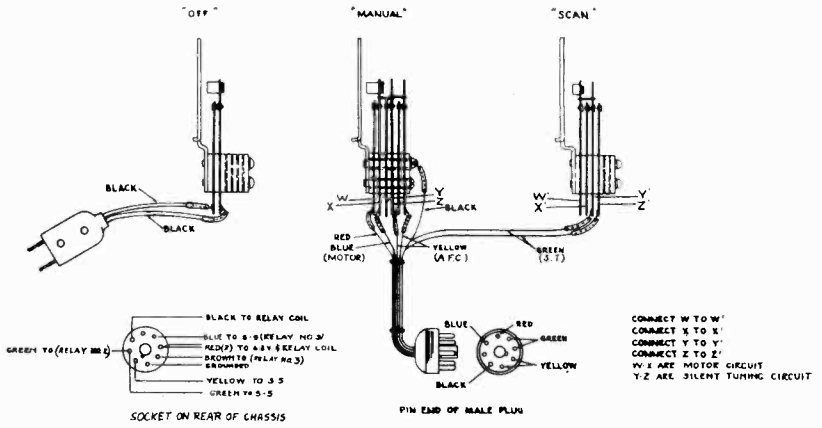


Fig. 5. Wiring Diagram of "Off," "Manual" and "Scan"

(e) Open or shorted coil in motor—Characterized by no torque or low torque in one direction. Replace motor or repair coil.

(f) Drive mechanism bound, or too tight for motor to drive.

(g) Not enough friction in Slip Pulley—The friction of the slip pulley is adjusted by tightening the collar on the end of the motor shaft. Care should be exercised that the setscrew does not hit the relay armature.

(h) Belt slippage—The tension of the belt may be increased by raising the motor on the relay bracket. If the belt still slips, reverse belt and use other surface or use belt dressing.

Noise in Audio Output While "Touch Tuning"

(a) Improper sequence—If the relay switch contacts open in improper sequence, audio output will be available too soon, and the break in the motor switch will be heard in the speaker. Correct as described in (1) under Relay Adjustments.

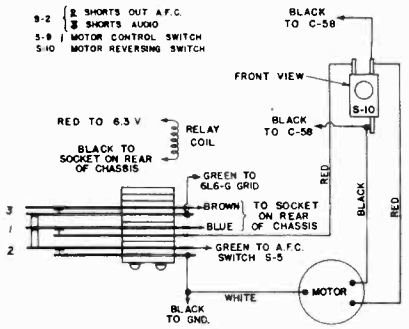


Fig. 6. Motor Relay Wiring Diagram

(b) Dressing of Silent Tuning Lead—Early production receivers had silencing lead from 6L6 grid run to connector socket on rear apron, up to "Push Button" switch, and return through socket connector to the relay switch where the ground wires of AFC, motor and silent tuning contacts were connected together and grounded to chassis. Reconnect as follows: Ground A.F.C. and motor contacts to a point of the chassis directly underneath the motor. The green grid lead from the 6L6 should be rewired over the top of the chassis deck to the silencing contact, Fig. 6, of the relay switch; the lead from the other relay silencing contact should be connected to a prong of the connector plug, Fig. 5; from this point, connection is made to the silencing portion of the "Touch Tuning" switch, and a return to ground from this point is made through the connector plug to the chassis near the connector plug socket.

(c) Noise through filter circuit—The "blurp" in the speaker on early production due to the sudden application of audio may be reduced by placing a .05 mfd., 600-volt capacitor (RC-092) across the output filter capacitor (C-61).

Miscellaneous Adjustments

(a) When a "Touch Tuning" button will not remain in a locked position, it usually indicates that the springs at each end of the latch bar are not in proper adjustment. They should exert an equal pull on each end.

(b) The fork on the tuning condenser should be adjusted so that the motor reversing switch clicks over when the pointer approximately reaches the 540 and 1620 kc. markings on the dial scale. With the pointer at the extreme end of calibrations when tuning manually, the reversing switch lever should be set so there is not more than 1/16 in. nor less than 1/32 in. clearance between the lever and the switch trigger after the switch has snapped.

(c) The motor and relay mounting plate should rest parallel to the chassis deck. Do not adjust the spring tension foot; raise or lower motor on bracket, as required. Make sure that there is no electrical connection between the motor frame and the chassis.

(d) The "Off" switch on the "Touch Tuning" assembly should stay closed for at least one-half the movement of the key, opening only on the final click. If firm contact does not exist between the points, vibration of the set may cause an intermittent noise.

(e) The silent tuning contacts of the "Manual" and "Scan" switches should open last to permit quiet operation.

GENERAL ELECTRIC CO.

MODEL G-97
Schematic, Socket
Trimmers, Resistance
Dial Mechanism

MODEL G-97

Fig. 3. Schematic Diagram

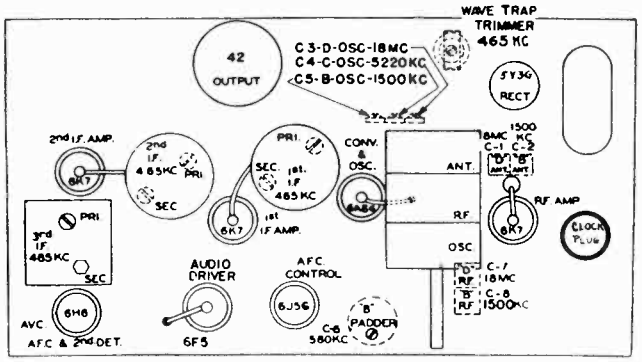


Fig. 1. Trimmer Location

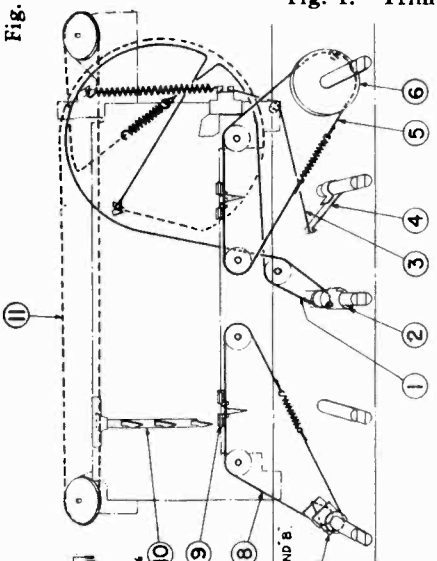


Fig. 2. Dial Mechanism

Symbol	Description	
R1	Carbon Resistor	470,000 Ω
R2		68,000 Ω
R3		330 Ω
R4		820 Ω
R5		4,700 Ω
R6		47,000 Ω
R7		47,000 Ω
R8		47,000 Ω
R9		4,700 Ω
R10		470,000 Ω
R11		47,000 Ω
R12		2,700 Ω
R13		330 Ω
R14		68,000 Ω
R15		1,000 Ω
R16		2.2 Meg. Ω
R17		150,000 Ω
R18		100,000 Ω
R19		150,000 Ω
R20		2.2 Meg. Ω
R21		56,000 Ω
R22		220,000 Ω
R23		15,000 Ω
R24		47,000 Ω
R25		150 Ω
R26		270,000 Ω
R27		470,000 Ω
R28		2700 Ω
R29		470,000 Ω
R30		390 Ω
R32	Carbon Resistor	3300 Ω
R34	Volume Control - 2 Meg. Taper with 8000 Ω Resistor Ω	
R35	Carbon Resistor	850 Ω
		10,500 Ω
		10,000 Ω
R36	Molded W.W. Resistor	410 Ω
S1	Band Change Switch	
S3	Power Switch with S-4	
S4	Tone Control	
S5	A.F.C. Cut Off Switch	
S6	Switch - Ant. Man.	
S7	Switch - R.F. Man.	
S8	Switch - Osc. Man.	
S9	I.F. Band Change Switch	
C1	Antenna Trimmer	8-48 MMF
C2	Antenna	8-40 MMF
C3	Osc.	5-30 MMF
C4	Osc.	8-30 MMF
C5	Osc.	8-40 MMF
C6	Padder	115-350 MMF
C7	R.F.	2-20 MMF
C8	R.F.	2-20 MMF
C9	Wave Trap	17-45 MMF
C10	1st I.F. Pri.	
C11	1st I.F. Pri.	
C12	1st I.F. Sec.	
C13	2nd I.F. Pri.	
C14	2nd I.F. Sec.	Trimmer
C15	Tuning Capacitor	
C16	Mica Capacitor	50 MMF
C17		2850 MMF
C18		1300 MMF
C19		250 MMF
C20		15 MMF
C21		150 MMF
C22		150 MMF
C23		750 MMF
C24		35 MMF
C25	Mica Capacitor	.05 MFD.
C26	Paper	.01 MFD.
C27		.01 MFD.
C28		.05 MFD.
C29		.05 MFD.
C30		.05 MFD.
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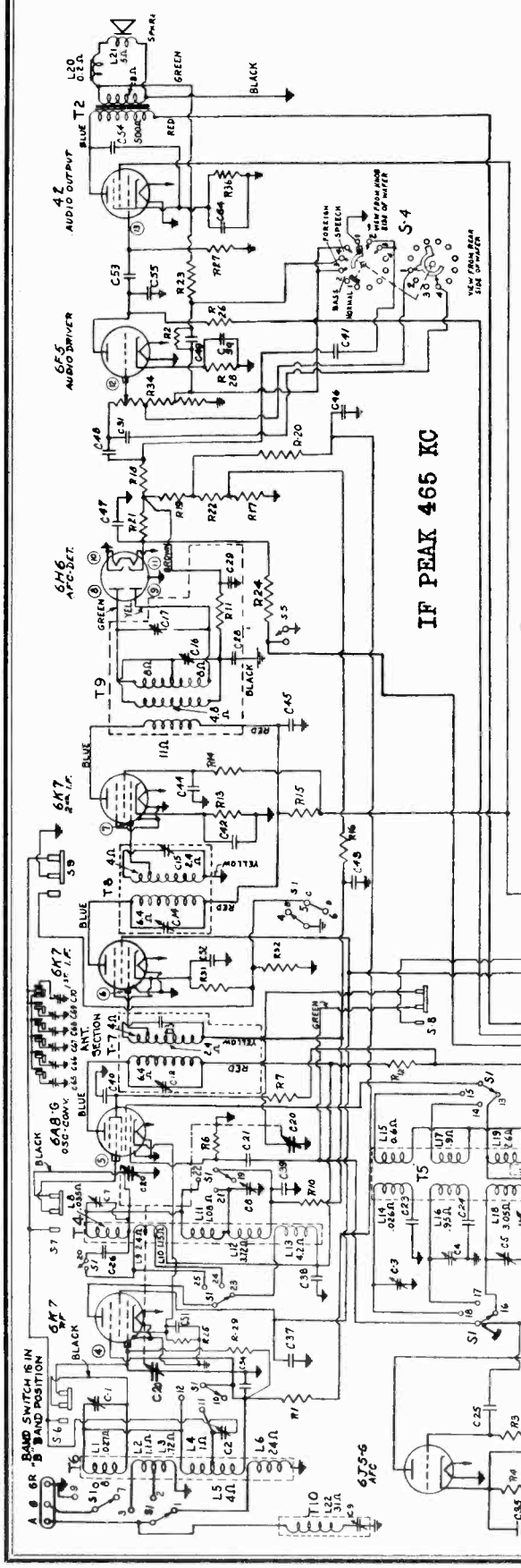
C167		.05 MFD.
C168		.05 MFD.
C169		.05 MFD.
C170		.05 MFD.
C171		.05 MFD.
C172		.05 MFD.
C173		.05 MFD.
C174		.05 MFD.
C175		.05 MFD.
C176		.05 MFD.



MODEL G-97
Specifications
Circuit Data, Alignment
Tuner, Parts

GENERAL ELECTRIC CO.

SERVICE DATA

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	110–120 (120–130)*	60	105
For 50 cycles only	110–120 (120–130)*	50	105
For 25 cycles only	110–120 (120–130)*	25	105

* The receiver as shipped from the factory, has the power cord connected to the 120–130 volt tap of the transformer (red and black lead). If the normal voltage of your power supply is always below 115 volts, the power cord should be removed from this tap and connected to the lower voltage tap (yellow and black lead). Solder and tape the joint and also tape the exposed end of the unused lead.

Tubes

R.F. Amplifier	6K7 Triple-grid, super control amplifier
Osc. and Converter	6A8-G Pentagrid Converter
AFC Control	6J5-G Detector Amplifier Triode
1st I.F. Amplifier	6K7 Triple-grid, super control amplifier
2nd I.F. Amplifier	6K7 Triple-grid, super control amplifier
Detector, AVC and AFC	6H6 Twin Diode
1st Audio Amplifier	6F5 High Gain Triode
Audio Power Amplifier	42 Power Amplifier Pentode
Rectifier	5Y3G Full-wave Rectifier
Dial Lamp	MAZDA No. 46-6.3 volts; 0.25 amps.

GENERAL INFORMATION

Model G-97 is a three-band AC operated receiver, employing nine General Electric pre-tested tubes as described above, in a superheterodyne circuit. It incorporates the simplified "Touch-Tuning" system as well as the Automatic Station Timer. The "Touch-Tuning" system allows a set-up of six buttons for automatic tuning of your favorite stations. The Automatic Station Timer may be set up in advance so that the set power will be automatically turned on at a predetermined time and in a similar manner it will turn "off" the receiver at any pre-set quarter-hour interval. Other features of design include automatic frequency control, four-point tone control by degeneration, and two stages of I.F. amplification.

Receiver Operation

The R.F. amplifier consists of the antenna transformer (T-6) connected to the 6K7 which is coupled to the 6A8-G through the R.F. transformer (T-4). The signal is converted to an intermediate frequency of 465 kc. by the oscillator and converter tube 6A8-G. The intermediate frequency is then amplified by the two 6K7 tubes used in conjunction with the three double-tuned I.F. transformers. The primary and secondary coils of these I.F. transformers are carefully adjusted midway between the points of critical and over coupling so as to give the I.F. amplifier a broadened band width with the resultant improvement in fidelity of the received program.

The output of the I.F. amplifier is applied to a 6H6 twin diode, which is a combination detector, automatic volume control and discriminator voltage source for the automatic frequency control tube 6J5-G.

The volume is controlled by a potentiometer in the grid circuit of the 6F5 audio amplifier tube. This tube is resistance coupled to the 42 pentode output tube. The output transformer is designed to correctly load the 42 tube over a broad range of frequencies thus enabling the tube to deliver ample undistorted output to the 12-inch speaker.

A detailed description of the inverse-feedback tone control, coil system, AFC, and touch-tuning as used in this receiver, will be found in the Model F-96 service notes.

Operation

There are 48 keys located on the circumference of the clock dial, each of which represents a 15-minute interval. When a key is pulled out, the timer will automatically turn on the radio for the indicated 15 minutes; i.e., by pulling out the red key at 6, the power will be turned "on" at 6:00 and turned "off" at 6:15. The operating period actually starts a minute or two before the indicated time so that the tubes will have a chance to reach their operating temperature before the program begins. Likewise, the operating period is prolonged beyond the indicated time by a minute or two. At the end of the operating period, the power will be automatically turned off unless the next key (in a clockwise direction) is also pulled out.

Since the tone control operates the manual power switch, it is necessary to leave the tone control in the "off" position whenever automatic operation by the Station Timer is desired. In the "off" position (refer to Fig. 3), the tone control is set for the same range of frequencies that is available on the "normal" position except for a slight loss in the treble due to the removal of the injector capacitor, C-31.

Station Timer Operating Notes

1. Timer keys cannot easily be pulled out except in advance of the program. Keys may be pushed in at any time, but unless this is done during the first half of the 15-minute interval, the receiver will continue to operate until the conclusion of this 15-minute interval.
2. Receiver will operate normally without clock plug in chassis receptacle. The four-prong plug merely connects the clock switch in parallel with the receiver switch and connects the clock to the power supply.
3. After the Automatic Timer has been used, the keys will automatically reset to their "off" position so that the program will not be repeated at the end of 12 hours unless the keys are again pulled out.
4. Red keys indicate hours.
5. The receiver may be tuned manually or with "Touch-Tuning" at any time during operation without disturbing the Timer Operation.

DIAL MECHANISM

The dial mechanism is rigidly mounted to the chassis by means of two brackets and four self-tapping screws. The gang condenser is operated by means of an "automatic vernier" reduction drive unit, mounted on the receiver chassis, and connected to the gang drive drum by a drive cable. The threading of the various controls is shown in Fig. 2.

ALIGNMENT PROCEDURE

Refer to the Model F-96 service notes for a detailed description of the R.F. and I.F. alignment procedure. A cut showing the trimmer location and alignment frequencies is shown in Fig. 1.

To align the Automatic Frequency Control Circuit, the following method is recommended: after aligning the I.F. at 465 kc.; without disturbing the signal generator setting, apply the 465 kc. from the signal generator lead to the 6A8-G grid capacitively through the insulation of the grid lead.

Tune in a weak broadcast station at about 1000 kc. and, with the AFC switch "off," tune the receiver carefully for "zero" beat between this carrier and the 465 kc. generator signal. Throw the AFC switch on and adjust the 3rd I.F. secondary trimmer (C-17) to zero beat. This adjustment is very critical and must be made with great care. When the alignment is correctly done, there will be no appreciable difference in the beat note with the AFC switch "on" or "off."

Physical Specifications

Model	G-97
Height	41½ inches
Width	28¾ inches
Depth	14¼ inches
Weight (packed)	94 lbs.

Tuning Control Drive Ratio

Fast Tuning	10 to 1
Vernier Tuning	55 to 1

Loud-speaker—Electrodynamic

Cone	12-inch
Voice Coil Impedance	5.5 ohms at 400 cycles

Tuning Frequency Range

Band "B"	540–1640 kc.
Band "C"	1600–5650 kc.
Band "D"	5600–18,000 kc.

Intermediate Frequency ..... 465 kc.

Electrical Power Output

Undistorted	2.5 watts
Maximum	5.0 watts

Tone Control 4-position

AUTOMATIC STATION TIMER

The Automatic Station Timer is a self-starting, synchronous motor clock which controls a power switch by 48 15-minute intervals. This clock-controlled power switch is connected in parallel with the regular receiver power switch incorporated in the tone control mechanism, allowing the set power to be automatically turned "on" or "off" at a predetermined time. The clock is properly lubricated as it leaves the factory and should require no further attention.

To Set Timer

Pull out the setting knob on the back of the clock and turn it to the left. Rotation to the right will loosen the setting knob.

REPLACEMENT PARTS

Model G-97

The following revisions, in conjunction with the Model F-96 replacement parts list constitute a complete parts list for the Model G-97 receiver. When ordering parts, refer to the RFS-96 service notes, noting the following changes:

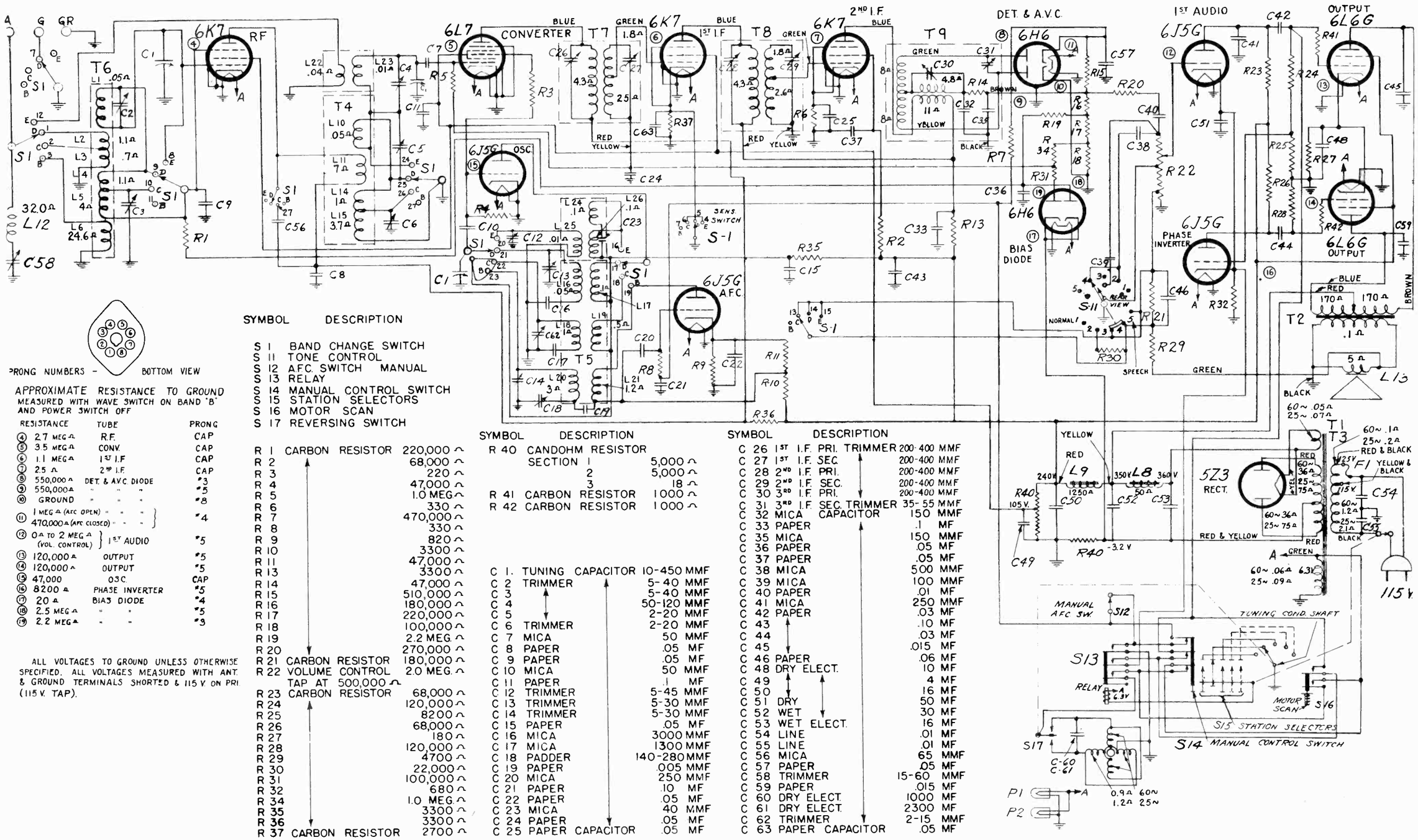
Stock No.	Description	List Price	Stock No.	Description	List Price
	Remove			**Add**	
RB-607	BUTTON—Push Button (Pkg. of 5)	$0.20	RB-615	BUTTON—Touch-tuning Button (Pkg. of 5)	$0.45
RD-062	DIAL—Dial Scale	3.50	RD-075	DIAL—Dial Scale	1.25
RE-023	ESCUTCHEON—Push-button Escutcheon	.70	RE-034	ESCUTCHEON—Dial Scale Escutcheon	2.00
RE-024	ESCUTCHEON—Escutcheon for Dial (Complete)	2.10	RE-035	ESCUTCHEON—Touch-tuning Escutcheon	.85
RK-017	KNOB—Control Knob (Pkg. of 5)	.40	RK-027	KNOB—Control Knob (Winged) (Pkg. of 5)	.30
RK-018	KNOB—Control Knob (Winged) (Pkg. of 5)	.40	RK-028	KNOB—Control Knob (Plain) (Pkg. of 5)	.50
			*RS-204	SOCKET—Tube Socket (5Y3G) (Pkg. of 5)	.75
			RS-865	SCREWS—Escutcheon Screws (Pkg. of 20)	.05

(Prices subject to change without notice)

* Used on previous receivers.

GENERAL ELECTRIC CO.

MODEL F-135
Schematic, Resistance



PRONG NUMBERS – BOTTOM VIEW

APPROXIMATE RESISTANCE TO GROUND
MEASURED WITH WAVE SWITCH ON BAND 'B' AND POWER SWITCH OFF

	RESISTANCE	TUBE	PRONG
④	2.7 MEG Ω	R.F.	CAP
⑤	3.5 MEG Ω	CONV.	CAP
⑥	1.1 MEG Ω	1ST I.F.	CAP
⑦	2.5 Ω	2ND I.F.	CAP
⑧	550,000 Ω	DET. & AVC DIODE	#3
⑨	550,000 Ω	" " "	#5
⑩	GROUND	" " "	#8
⑪	1 MEG Ω (AFC OPEN) / 470,000 Ω (AFC CLOSED)	" " "	#4
⑫	0 Ω TO 2 MEG Ω (VOL. CONTROL)	1ST AUDIO	#5
⑬	120,000 Ω	OUTPUT	#5
⑭	120,000 Ω	OUTPUT	#5
⑮	47,000	OSC.	CAP
⑯	8200 Ω	PHASE INVERTER	#5
⑰	20 Ω	BIAS DIODE	#4
⑱	2.5 MEG Ω	" "	#5
⑲	2.2 MEG Ω	" "	#3

ALL VOLTAGES TO GROUND UNLESS OTHERWISE SPECIFIED. ALL VOLTAGES MEASURED WITH ANT. & GROUND TERMINALS SHORTED & 115 V. ON PRI (115 V. TAP).

SYMBOL DESCRIPTION

S 1 BAND CHANGE SWITCH
S 11 TONE CONTROL
S 12 A.F.C. SWITCH MANUAL
S 13 RELAY
S 14 MANUAL CONTROL SWITCH
S 15 STATION SELECTORS
S 16 MOTOR SCAN
S 17 REVERSING SWITCH

R 1	CARBON RESISTOR	220,000 Ω
R 2		68,000 Ω
R 3		220 Ω
R 4		47,000 Ω
R 5		1.0 MEG Ω
R 6		330 Ω
R 7		470,000 Ω
R 8		330 Ω
R 9		820 Ω
R 10		3300 Ω
R 11		47,000 Ω
R 13		3300 Ω
R 14		47,000 Ω
R 15		510,000 Ω
R 16		180,000 Ω
R 17		220,000 Ω
R 18		100,000 Ω
R 19		2.2 MEG. Ω
R 20		270,000 Ω
R 21	CARBON RESISTOR	180,000 Ω
R 22	VOLUME CONTROL	2.0 MEG. Ω
	TAP AT	500,000 Ω
R 23	CARBON RESISTOR	68,000 Ω
R 24		120,000 Ω
R 25		8200 Ω
R 26		68,000 Ω
R 27		180 Ω
R 28		120,000 Ω
R 29		4700 Ω
R 30		22,000 Ω
R 31		100,000 Ω
R 32		680 Ω
R 34		1.0 MEG. Ω
R 35		3300 Ω
R 36		3300 Ω
R 37	CARBON RESISTOR	2700 Ω

SYMBOL DESCRIPTION

R 40	CANDOHM RESISTOR	
	SECTION 1	5,000 Ω
	2	5,000 Ω
	3	18 Ω
R 41	CARBON RESISTOR	1000 Ω
R 42	CARBON RESISTOR	1000 Ω

C 1.	TUNING CAPACITOR	10-450 MMF
C 2	TRIMMER	5-40 MMF
C 3		5-40 MMF
C 4		50-120 MMF
C 5		2-20 MMF
C 6	TRIMMER	2-20 MMF
C 7	MICA	50 MMF
C 8	PAPER	.05 MF
C 9	PAPER	.05 MF
C 10	MICA	50 MMF
C 11	PAPER	.1 MF
C 12	TRIMMER	5-45 MMF
C 13	TRIMMER	5-30 MMF
C 14	TRIMMER	5-30 MMF
C 15	PAPER	.05 MF
C 16	MICA	3000 MMF
C 17	MICA	1300 MMF
C 18	PADDER	140-280 MMF
C 19	PAPER	.005 MMF
C 20	MICA	250 MMF
C 21	PAPER	.10 MF
C 22	PAPER	.05 MF
C 23	MICA	40 MMF
C 24	PAPER	.05 MF
C 25	PAPER CAPACITOR	.05 MF

SYMBOL DESCRIPTION

C 26	1ST I.F. PRI. TRIMMER	200-400 MMF
C 27	1ST I.F. SEC.	200-400 MMF
C 28	2ND I.F. PRI.	200-400 MMF
C 29	2ND I.F. SEC.	200-400 MMF
C 30	3RD I.F. PRI.	200-400 MMF
C 31	3RD I.F. SEC. TRIMMER	35-55 MMF
C 32	MICA CAPACITOR	150 MMF
C 33	PAPER	.1 MF
C 35	MICA	150 MMF
C 36	PAPER	.05 MF
C 37	PAPER	.05 MF
C 38	MICA	500 MMF
C 39	MICA	100 MMF
C 40	PAPER	.01 MF
C 41	MICA	250 MMF
C 42	PAPER	.03 MF
C 43		.10 MF
C 44		.03 MF
C 45		.015 MF
C 46	PAPER	.06 MF
C 48	DRY ELECT.	10 MF
C 49		4 MF
C 50		16 MF
C 51	DRY	50 MF
C 52	WET	30 MF
C 53	WET ELECT.	16 MF
C 54	LINE	.01 MF
C 55	LINE	.01 MF
C 56	MICA	65 MMF
C 57	PAPER	.05 MF
C 58	TRIMMER	15-60 MMF
C 59	PAPER	.015 MF
C 60	DRY ELECT.	1000 MF
C 61	DRY ELECT.	2300 MF
C 62	TRIMMER	2-15 MMF
C 63	PAPER CAPACITOR	.05 MF

GENERAL ELECTRIC CO.

MODEL F-135
Socket, Trimmers
Alignment

ALIGNMENT PROCEDURE

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer (See Fig. 9)	Remarks
1. Band "B"	465 kc. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Pri. (C-30)	A.F.C. switch "off" —Condenser gang at minimum capacity vertical input of oscilloscope to ground and the junction of R-15, R-16, R-20 and Brown lead from the 3rd I.F. trans. Adjust trimmers in order listed for a single curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 10.
2. Band "B"	465 kc. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-29) Pri. (C-28)	
3. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-27) Pri. (C-26)	
4. Band "B"	465 kc. Sweep	Converter Grid	.05 Mfd.	3rd I.F. Sec. (C-31)	Disconnect one end of C-57—Turn A.F.C. switch "on"—vertical input of oscilloscope to ground and discriminator cathode; prong no. 4 on 6H6. Adjust trimmer for cross on horizontal axis. Fig. 11.
5. Band "B"	465 kc. Sweep	Antenna Post	250 Mmf. 400 Ohms	Wave Trap Trimmer (C-58)	Adjust for minimum amplitude.

I.F. Alignment with Output Meter

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer (See Fig. 9)	Remarks
1. Band "B"	465 kc. Modulated	2nd I.F. Grid	.05 Mfd.	3rd I.F. Pri. (C-30)	A.F.C. switch "off"—Condenser gang at minimum capacity output meter connected across the voice coil—volume control at maximum—input as low as practical. Adjust all trimmers in order listed for maximum output. Do not attempt an over-all re-alignment once a stage by stage alignment has been completed.
2. Band "B"	465 kc. Modulated	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-29) Pri. (C-28)	
3. Band "B"	465 kc. Modulated	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-27) Pri. (C-26)	
4. Band "B"	....	....	....	3rd I.F. Sec. (C-31)	See paragraph on A.F.C. adjustment.
5. Band "B"	465 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Wave Trap Trimmer (C-58)	Adjust for minimum output.

R.F. Alignment

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer (See Fig. 9)	Remarks
1. Band "B"	....	....	....	....	Turn A.F.C. switch "off"—Set dial pointer to first line at left-hand end of dial scale with condenser gang fully meshed.
2. Band "E"	42 mc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. (C-12) Ant. (C-4)	Connect output meter across voice coil—Turn tone control to bass. "E" band image should be 930 kc *above* input signal when oscillator trimmer (C-12) is peaked properly.
3. Band "D"	18 mc. Modulated	Antenna Post	250 Mmf 400 Ohms	Osc. (C-13) R.F. (C-5) Ant. (C-2)	"D" band image should be 930 kc. *below* input signal when oscillator trimmer (C-13) is peaked properly. Example: 15 mc.—image 14.07 mc. Peak C-2 and C-5 while rocking gang condenser.
4. Band "C"	5220 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. (C-62)	Adjust trimmer for greatest output with set dial at 5220 kc.
5. Band "B"	1500 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. (C-14) R.F. (C-6) Ant. (C-3)	Adjust trimmers, in order listed, for greatest output at 1500 kc.
6. Band "B"	580 kc. Modulated	Antenna Post	250 Mmf. 400 Ohms	Osc. Padder (C-18)	Adjust padder for maximum output in vicinity of 580 kc while rocking gang condenser.
7. Band "B"	Repeat operation No. 5				

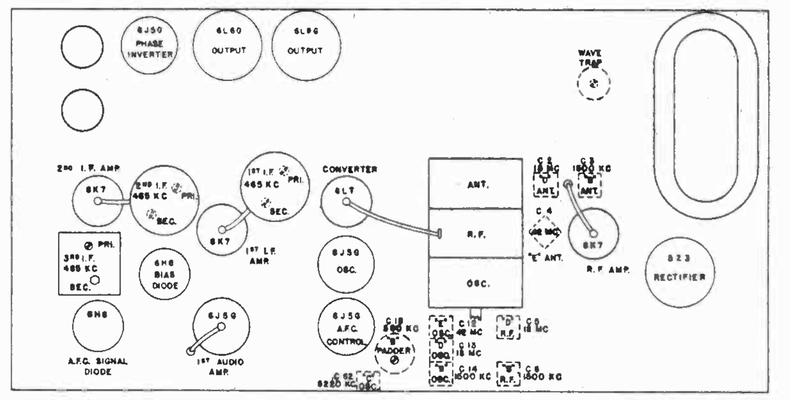


Fig. 9. Chassis Layout and Trimmer Location

ALIGNMENT PROCEDURE

In order to align these receivers properly, it is necessary to have the following test equipment:

1. A modulated test oscillator.
2. An output indicator such as an A-C voltmeter with a scale reading of 3 to 5 volts. A cathode ray oscilloscope is preferred for I.F. alignment.
3. A screw-driver type alignment tool.

The alignment procedure is given in table form along with the trimmer location drawing, Fig. 9. A "dummy antenna" should be used in all alignments and is the capacitor or capacitor and resistor used in series with the signal generator. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. as this would remove the grid bias from the tube.

Automatic Frequency Control Adjustments

After I.F. alignment is completed with output meter, and without disturbing the generator setting, remove the signal generator lead from the grid of the 6L7 converter. Apply the 465 kc. signal to the 6L7 grid capacitively through the insulation of the grid lead.

Tune in a weak broadcast station at about 1000 kc. and, with the A.F.C. switch "off," tune the receiver carefully for "Zero" beat between this carrier and the 465 kc. generator signal. Throw the A.F.C. switch on and adjust the 3rd I.F. secondary trimmer C-31 to zero beat. This adjustment is very critical and must be made with great care. When the alignment is correctly done, there will be no appreciable difference in the beat note with the A.F.C. switch "on" or "off."

Another method of A.F.C. adjustment, after I.F. alignment with an output meter, is to connect a low range voltmeter between the cathodes of the 6H6 discriminator. Leave the signal generator connected to the 6L7 grid and, without disturbing this 465 kc. setting of the signal generator, adjust C-31. It will be noticed that the meter reads plus when C-31 is tuned off resonance on one side and negative when tuned on the opposite side of resonance. The correct adjustment of C-31 is between these positions, when the voltmeter reads zero.

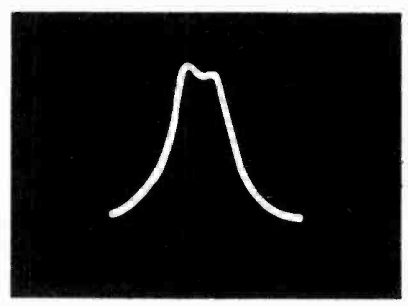


Fig. 10. Over-all I. F. Curve

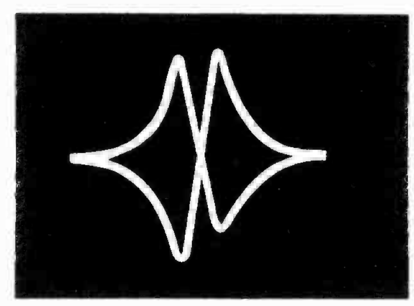


Fig. 11. A.F.C. Adjustment Curve

MODEL F-135
Voltage
Chassis Wiring

GENERAL ELECTRIC CO.

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
6K7 R.F. Amplifier	218	107	0	9.0	6.3
6J5 Oscillator	203	....	0	12.0	6.3
6L7 Converter	218	107	0	4.2	6.3
6J5-G A.F.C. Control	203	....	7.9	10.0	6.3
6K7 1st I.F. Amp.	218	107	4.1	2.0	6.3
6K7 2nd I.F. Amp.	218	102	3.0	9.6	6.3
6J5-G Inverter 6J5-G 1st Audio	95	....	3.2	2.2	6.3
6L6-G Output 6L6-G Output	327	222	17.0	43	6.3
5Z3 Rectifier	670/350 RMS	....	....	152	5.0

A-c line voltage 115 with the fuse clipped to the 115-volt tap—no signal input—1000 ohms per volt meter—dial pointer at 530 kc.

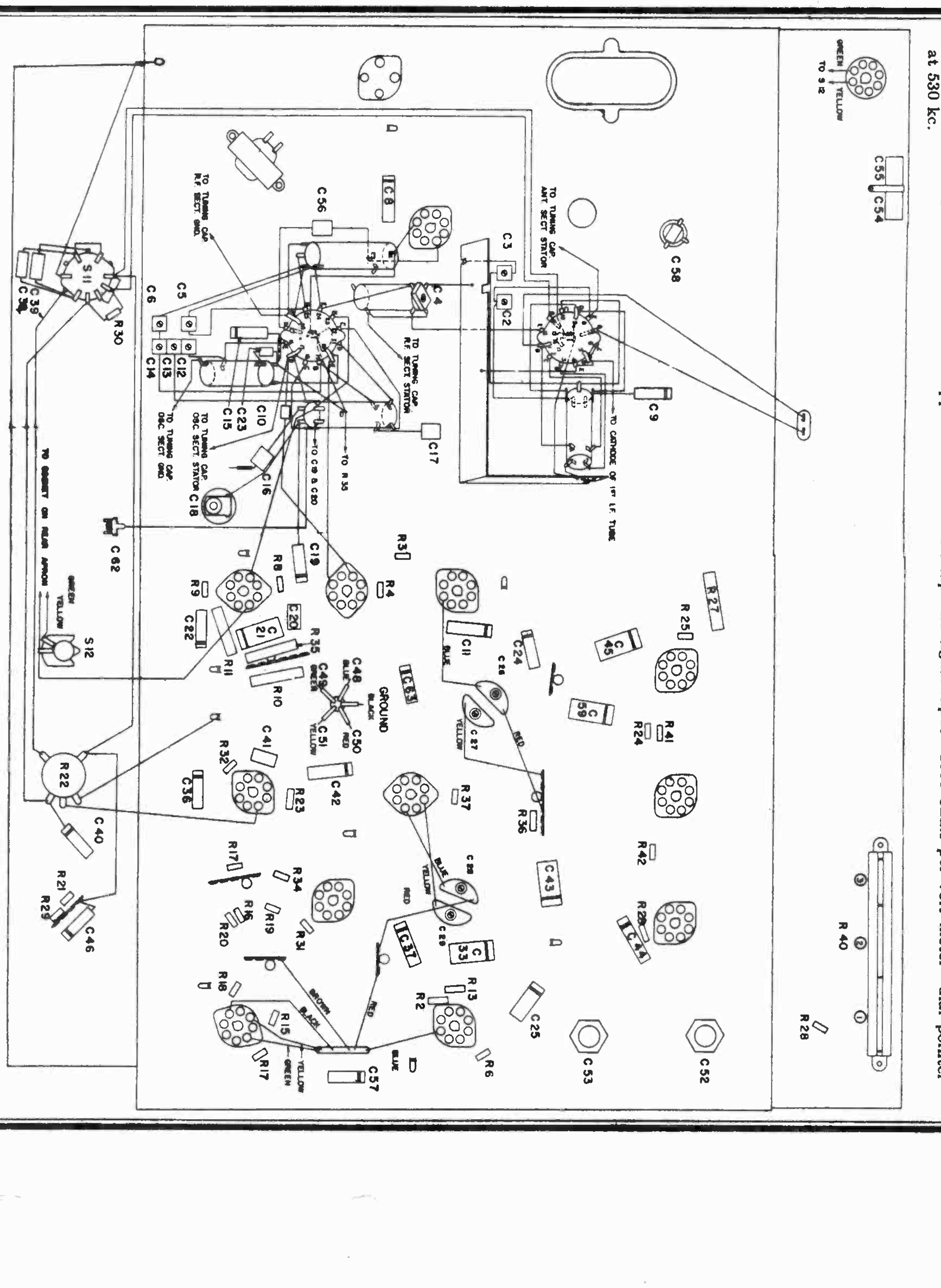


Fig. 8. Chassis Parts Layout

SERVICE DATA

Physical Specifications

Model	F-135
Height	43⅜ in.
Width	29¼ in.
Depth	15⅛ in.
Weight Packed	123 lbs.
Tuning Control Drive Ratio Manual	90–1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	110–120 (120–130)*	50–60	200
C	110–120 (120–130)*	25	210

*The receivers, as shipped from the factory, have the fuse clipped to the 120–130 volt tap of the transformer, marked 125 on the fuse board. If the normal voltage of your power supply is always below 115 volts, the fuse should be removed from this tap and placed in the lower voltage clip marked 115.

Tuning Frequency Range

Band "B"	540–1620 kc.
Band "C"	1620–5600 kc.
Band "D"	5600–18,000 kc.
Band "E"	18,000–43,000 kc.
Intermediate Frequency	465 kc.

Electrical Power Output

Undistorted	15 watts
Maximum	20 watts
Tone Control	5-point control
Loud-speaker—Electrodynamic	
Cone Diameter	12 inch
Voice Coil Impedance	5.5 ohm at 400 cycles

Tubes

R.F. Amplifier	6K7 Triple-grid, super control amplifier
Converter	6L7 Pentagrid, mixer amplifier
Oscillator	6J5-G Detector amplifier triode
A.F.C. Control	6J5-G Detector amplifier triode
1st I.F. Amplifier	6K7 Triple-grid, super control amplifier
2nd I.F. Amplifier	6K7 Triple-grid, super control amplifier
A.F.C. Discriminator and Detector	6H6 Twin diode
Bias and Sensitivity Control	6H6 Twin diode
1st Audio Amplifier	6J5-G Detector amplifier triode
Phase Inverter	6J5-G Detector amplifier triode
Audio Output	6L6-G Beam power amplifier
Audio Output	6L6-G Beam power amplifier
Rectifier	5Z3 Full wave rectifier
Dial Lamps	Mazda No. 46—6.3 volts, 0.25 amps.

GENERAL INFORMATION

The Model F-135 receiver is a four-band a-c operated receiver employing thirteen General Electric Pre-tested Tubes in a superheterodyne circuit. This receiver incorporates automatic "Touch Tuning" with thirteen station buttons, finger-tip dial "Scan" control, R.F. amplifier, two stages of I.F. amplification, five-point tone control, wave trap and other features of design as described in the following paragraphs.

Receiver Operation

The antenna transformer T-6, used in conjunction with a 6K7 tube, and the R.F. transformer T-4 are the essential elements of the R.F. amplifier. The output from the R.F. amplifier and the output from the 6J5-G oscillator tube are combined in the 6L7 converter tube to give an output frequency of 465 kc. The 465 kc. signal is then amplified by the I.F. amplifier which consists of three double-tuned transformers and two 6K7 tubes. The primary and secondary coils of these transformers are carefully adjusted midway between the points of critical and overcoupling so as to give the I.F. amplifier a broadened band width with a subsequent better fidelity of the received program.

The output of the I.F. amplifier is applied to a 6H6 diode rectifier, which is a combination detector, automatic volume control, and discriminator voltage source for the automatic frequency control tube. A detailed explanation of the A.F.C. will be found in a following paragraph. A second 6H6 diode is used to supply minimum bias to all tubes controlled by the avc. One of the plates (18) of this diode supplies initial bias to the R.F. stage, while the other plate (19) supplies the 6L7 converter and 1st I.F. amplifier with the proper bias. Since the cathodes of the 6H6 are connected to a 3.2 volt point on the bleeder resistance R-40, this allows the avc controlled tubes to have a constant −3.2 volt bias with no signal input. This bias will remain constant until the point at which the avc voltage developed, becomes greater than this −3.2 volts, at which time the bias on these tubes will then be dependent upon the avc developed by the strength of the carrier. The sensitivity is automatically increased on "C," "D," and "E" bands by a section on the band switch which grounds the cathode of the 6K7 1st I.F. amplifier. This ground removes the self bias which is necessary on "B" band to reduce interstation noise.

The volume is controlled by the variable potentiometer (R-22) in the grid circuit of the 6J5-G 1st audio amplifier tube. This tube is resistance coupled to both the 6L6-G output tube and to the 6J5-G phase inverter tube. The phase inverter tube is used to drive the second 6L6-G output tube 180 degrees out of phase with the first 6L6-G. Engineers have carefully balanced this circuit so that the 6L6-G tubes are operating push-pull into the output transformer which they designed to correctly load these tubes over the entire audio range of frequencies.

This careful balance together with controlled negative feed back enables the two 6L6-G tubes to deliver ample undistorted power output to the twelve-inch electrodynamic speaker.

TONE CONTROL

Negative feed back is used to control the quality and tone of reproduction. The frequency response of the audio circuit is varied by the tone control switch and its associated network as follows:

In the "Normal" position, voltage from the voice coil is fed back through R-29, R-21 and C-46 to a tap on the volume control. The tone control switch S-11 is in No. 1 position and does not make any connection with the circuit. Engineers have carefully chosen the value of R-29 and C-46 so that the negative feed back voltage holds down the "boom" caused by pentode output and speaker resonance. This arrangement improves the quality and response to an external range of both high and low frequencies.

No. 2 is the "Bass" position. The long arm of S-11 (Fig. 7) grounds C-38 thus connecting this capacitor across the volume control and limiting the high frequency input to the audio amplifier. The negative feed back circuit is the same as used in the "Normal" position. The result is the true reproduction of a wide range of low frequencies without the "boom" at speaker resonance.

The "Treble" position is No. 3 where high frequencies are injected into the second tap on the volume control. It should be noted that C-38 is removed from the circuit, and the short arm on S-11 (Fig. 7) connects C-39 across the top part of the volume control thus increasing the higher frequencies present in the lower portion of R-22. The shorting bar of S-11 across No. 2 and No. 3 connects R-30 in parallel with R-21 and C-46. This allows more degeneration of the lower frequencies. The result is improved quality with a nearly flat low frequency response and a very much extended high frequency range.

In the "Foreign" position No. 4 highs are again limited by C-38. The shorting bar across contacts No. 3 and No. 4 shorts out R-21 and C-46 thus leaving only R-29 in the feed back circuit. Because of the limiting of highs by C-38 and more degeneration of lows by the feed back circuit, a middle range response is obtained. This position may be used to reduce noise and to reduce bass response on programs which predominate in low frequency tones.

C-38 is removed from the circuit in the "Speech" position. R-21 and C-46 are shorted out of the feed back circuit. R-29 is left in the circuit to limit the amount of feed back voltage. This arrangement gives improved quality and flat response to the entire audio range of frequencies.

It should be noted that on "C," "D," and "E" bands contacts No. 13, 14, and 15 of the band switch S-1 short out R-21 and C-46 so that the feed back circuit provides flat degeneration at all times. This reduces the possibility of howl on short waves due to excessive vibration of the chassis on low frequency notes.

COIL SYSTEM

The antenna coils for three bands are wound on a single form designated as T-6. The R.F. coils T-4 and the oscillator coils T-5 are constructed on two separate forms. The "E" band antenna and oscillator coils are each supported on separate forms. All contacts on the band switch are numbered in Fig. 7 and Fig. 8 to facilitate tracing the coil circuits.

The band switch connects the coils to operate as follows:

	Primary	Secondary	Remarks
Ant.			
"B"	L-6	L-4 & L-5	
"C"	L-3	L-4	L-5 shorted
"D"	L-2 & L-3	L-1	L-4 & L-5 shorted
"E"	L-22	L-23	Coupled directly to 6L7
R.F.			
"B"	L-11	L-14 & L-15	
"C"	L-11	L-14	L-15 shorted and C-56 connected across L-11, L-14, & L-15 shorted
"D"	L-11	L-10	R.F. 6K7 grid shorted
"E"			L-10, L-14, & L-15 shorted
Osc.			
"B"	L-21	L-20	
"C"	L-19	L-18	Connects B+ lead to L-20
"D"	L-17	L-16	Connects B+ lead to L-18 & L-20
"E"	L-24 & L-26	L-25	Connects B+ lead to L-16, L-18, & L-20

On "D" band contact, No. 7 is used to provide a ground for the General Electric noise reducing antenna systems KV-300 and FT-40. Contacts No. 4, 5, and 6 short out R-37 on "C," "D," and "E" bands. This removes the self bias from the 6K7 1st I.F. amplifier and thus increases the sensitivity of the receiver on short wave bands.

Contacts No. 13, 14, and 15 short out the selective portion of the negative feed back circuit as explained under tone control.

DIAL MECHANISM

(A) Manual drive leather faced bevel gear
(B) Beveled idler gear
(C) Tuning shaft gear
(D) Volume control drive cord pulley
(E) Band switch drive cord pulley
(F) Tone control drive cord pulley
(G) Belt driven spiral rod drive pulley
(1) Spiral drive rod rider
(2) Pointer slider guide rod
(3) Tuning pointer spiral drive rod
(4) Motor belt
(5) Spiral rod bracket with bearing
(6) Motor shaft collar
(7) Clutch tension spring
(8) Pulley dog
(9) Motor shaft collar
(10) Tone control pointer
(11) Tone control cord pulley-stud
(12) Band switch indicator
(13) Band switch indicator cord pulley-stud
(14) Long dial drive cord
(15) Dial scale pointer
(16) Volume control pointer
(19) Short dial drive cord
(20) Stationary spring support
(23) Relay armature extension } Fig. 4
(24) Armature back stop

Tuning mechanism diagram (Fig. 1) is self-explanatory. The tuning condenser drive cord can be easily replaced without removing *any* part of the chassis while all dial indicating control cords are made readily accessible for servicing by merely removing the seven small screws holding the dial reflector assembly.

AUTOMATIC FREQUENCY CONTROL

The Automatic Frequency Control used in this receiver shifts the oscillator frequency so that the correct intermediate frequency is always produced.

The essential elements are the discriminator-transformer T-9, the twin diode 6H6 with its balanced discriminator network, and the 6J5-G control tube connected across the broadcast oscillator plate coil.

The discriminator transformer is designed to deliver (when properly tuned to 465 kc.) equal voltages to each section of the 6H6. Under this condition the voltage drop across R-15 is equal and opposite to the voltage across the

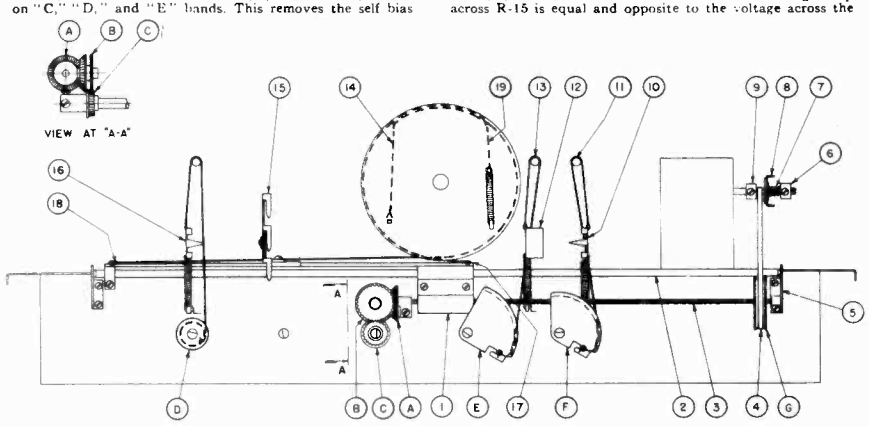


Fig. 1. Dial Mechanism

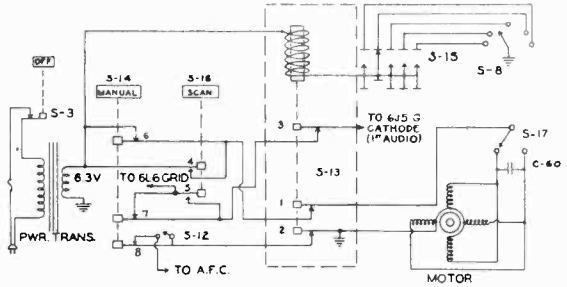


Fig. 2. Schematic of "Touch Tuning" System

total resistance of R-16, R-17, and R-18, thus no discriminator voltage is produced to control the 6J5-G tube.

However, if the signal frequency is increased above 465 kc. unequal voltages are applied to the diodes, and the voltage over R-15 is greater than the voltage over the combined resistance of R-16, R-17, and R-18. The difference of these two voltages is positive and is applied to the 6J5-G control tube.

When the signal frequency is decreased below 465 kc. the result is less voltage over R-15 and a greater voltage over the combined resistances R-16, R-17, and R-18. The difference of these two voltages, as applied to the 6J5-G control tube, is negative.

Thus three conditions arise:

On resonance, no discriminator voltage developed
Above 465 kc., a positive control voltage
Below 465 kc., a negative control voltage

The 6J5-G A.F.C. control tube has a combination of self and fixed bias, the latter being the result of the current supplied through R-10 and R-11 to the cathode resistor R-9. The R.F. voltage applied to the control grid of the 6J5-G is obtained from the drop across the C-18 series padder and C-19. The vector sum of these two voltages is applied to the phase-shifting network C-20 and R-8 and in turn to the control grid. This phase-shifting network causes the control tube to appear as a reactance in parallel with the oscillator coil. The value of the apparent reactance depends upon the control voltage produced by the discriminator.

When the set is mistuned above the incoming signal the converter output is above the 465 kc. required. A positive discriminator voltage is produced as explained above. This causes the 6J5-G tube to act as more capacitive reactance and thus lowers the oscillator frequency; this gives a lower converter output frequency, approximately 465 kc.

When the set is mistuned below the incoming signal, the converter output is below the 465 kc. required. A negative discriminator voltage is produced as explained above. This causes the 6J5-G to act as less capacitive reactance thus increasing the oscillator frequency. This in turn gives a higher converter output frequency approximately 465 kc.

TOUCH TUNING

"General Electric Touch Tuning" consists of three essential units: the push-button assembly of sixteen buttons, used by the operator for control; the motor and relay assembly, operating in conjunction with the buttons to provide fast and accurate tuning; and the contact segment with its sliding contactor and adjustable contacts enabling selection of thirteen different stations to be tuned automatically.

Of the sixteen push-buttons, thirteen are used for station selection. The other buttons are used for "Manual" control (No. 8), "Scanning" (No. 15), and "Off" (No. 16). Depression of any button except No. 15 will lock the depressed button and release any other that may be in circuit. Thus the selection of any station button or of "Manual" will release the "Off" switch, turning the set on.

The tuning motor is operated as a capacitor type squirrel-cage induction motor, with capacitor C-60 as the phase-shifting device. By tracing the motor circuit it will be seen that C-60 is in series with one set of poles when the motor reversing switch is in the position shown in Fig. 2. When the switch S-17 is reversed, the capacitor C-60 is in series with the opposite set of poles. This causes the motor field to rotate in the opposite direction with the resultant change in motor rotation.

The motor power is supplied from the tube heater circuit through "Manual" switch (contact No. 6), the relay (contact No. 1) and the motor reversing switch (S-17) with the chassis as common return. It will continue to run until the sliding contactor (S-8) contacts the stud on the contact segment which is connected to the button in circuit. When this contact is made, the relay field coil is energized, causing the relay to open the motor circuit (contact No. 1). At the same time, the relay arm also engages the motor clutch, causing instantaneous stopping of tuning mechanism travel. Depression of another station button causes another similar cycle.

Pressing the "Manual" button (No. 8) releases any depressed button. Thus S-15 is opened and the relay field coil can not be energized. Contact No. 6 opens the motor circuit.

With the receiver set for "Manual" operation, depression of the "Scan" button closes the motor circuit by the shunting of contact No. 6 on the "Manual" switch, allowing continuous motor operation and dial travel. As the motor drives to the dial limits on either end, S-17 is automatically thrown causing reversal of motor rotation.

During periods of motor operation, either for automatic station selection or for scanning, the grid of the 6L6-G is shorted to the common cathode connection of the first audio and phase inverter tubes. This "silent tuning," accomplished by relay contact No. 3 in the former case, or scan button contact No. 5 in the latter, avoids reception of unwanted stations or interstation noise when tuning automatically or by means of the "Scan" button.

The use of automatic frequency control on "Manual" is made optional by the A.F.C. switch. When any one of the thirteen "Touch Tuning" buttons is depressed, circuit is made through contact No. 8 on S-14 and is completed through relay contact No. 2, thus removing A.F.C. while the motor is in operation. When the station is reached, the relay opens contact thus removing the ground on the A.F.C. circuit. *The A.F.C. is automatically turned on when "touch tuning" is being used.*

REMOTE CONTROL

There are ten leads in the "Remote Touch Tuning Control" cable. These leads serve the following functions:

The No. 1 and No. 2 leads are connected to the octal base adapter and serve to connect the silencing button to the output tube.

The No. 3 to No. 9 leads correspond to the button numbers and, with the No. 10 lead, provide the selection of stations from the remote control unit. These leads are to be connected to pins on the contact segment on the rear of the chassis.

Remove the least desirable station's letters from one of the "Touch Tuning" buttons of the receiver and insert the "Remote" tab. Note the number of this button as marked on the escutcheon.

Remove from a pin on the contact segment on the receiver, the lead which bears this number, and connect it to the No. 10 lead from the remote control cable, Fig. 3.

(The pin on the contact segment from which this lead was removed is left vacant.)

Now note the number of a receiver push button which bears the same call letters as a remote unit button. Remove the lead with this number from the pin on the contact segment. Connect to this pin the lead from the remote cable which corresponds to the above-mentioned remote unit button. Fasten the lead with a hex nut and tighten lightly with a pair of pliers or small wrench. Now reconnect the original lead to the pin. Proceed in the same manner until the seven remote button leads are connected.

There are three glass tubes in a row along the back of this receiver. Remove the center one of these tubes which is a 6L6-G and place the adapter in the socket. Insert the 6L6-G in the adapter.

When the "Remote Touch Tuning Control" unit is connected, as explained above, the action is identical with that of the regular station selection circuit. The remote button unit is in series with the "Remote" button lead on the receiver through lead No. 10 of the remote unit cable. The relay field coil circuit is completed through the set "Remote" button (S-15); the common (No. 10) lead; the depressed control button; its lead to a pin on the contact segment, and to ground through the sliding contactor. *The "silent" button must be in the released position when operating the receiver from either the remote control unit or from the receiver controls, otherwise no audio output will be obtained.*

RELAY ADJUSTMENTS

The following adjustments should be made with relay assembled on the motor bracket, Fig. 4.

(1) Make sure contacts are adjusted to open in correct sequence: center contacts (motor) first, contacts furthest from armature (AFC) second, contacts nearest armature (silent tuning) last. *It is very important that the silent tuning switch open last.*

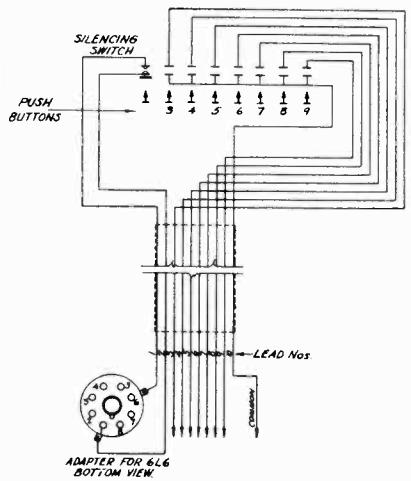


Fig. 3. Schematic of Remote Control

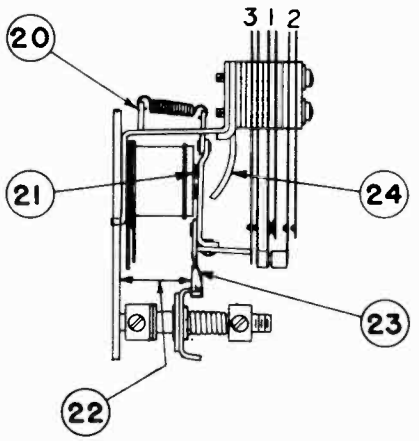


Fig. 4. Relay

(2) Adjust backstop (24) so that the armature snaps closed when the relay coil is energized with 4.5 volts A.C. The backstop must make a positive contact with the back of the armature in the open position; otherwise sluggish operation of the relay will result which will cause the motor drive to skip buttons. If the relay will not close at 4.5 volts and still maintain proper travel and sequence, weaken the spring on the rear of the armature plate by bending the stationary spring support (20).

(3) Loosen the setscrew on the motor shaft collar nearest motor (9) and adjust collar so that the pulley dog (8) misses the relay armature extension by .001 in. (relay not energized). All contacts must be closed when the relay armature touches the end of the motor dog; if the motor contacts open in this position, the armature will chatter.

(4) Spring adjustment (7) on slip clutch should be just tight enough so as not to allow slippage when driving the dial mechanism. Loosen setscrew on outside shaft collar (6) and screw the collar on the shaft to tighten slip clutch.

(5) The pole piece of the relay coil is divided in two semi-circles. The relay armature should only touch the pole segments towards the motor shaft. There should be a .001 in. clearance between the back segment (21) and the armature when closed; otherwise a buzzing will be heard. Sometimes a front pole segment that is not perfectly flat will cause the same trouble. File off the offending bump.

(6) Backstop setting should be such that the distance (22) is 26/32 in. with the relay closed and 29/32 in. with the relay open.

(7) Spacing between relay contact points when open should be .015 to .018 inches for contact No. 1, and .008 to .010 inches for contact No. 2 and No. 3.

INCORRECT OPERATION AND SUGGESTED REMEDIES

Skipping of Stations

(a) "Touch Tuning" buttons' leads not making good contact to adjustable contact pins. Clean contacts and reinsert.

(b) Sliding contactor blade either covered by thin piece of bakelite or dirty. Carefully run fine file over top of sliding contactor, making sure not to leave any sharp corners. Sliding contactor should have small amount of vaseline on beveled surface to prevent chattering.

(c) Nipple too sharp on adjustable contacts will cause sliding contactor blade to jump across. Smooth off with fine sandpaper.

(d) Relay armature out of adjustment causing sluggish operation of relay switch. See paragraph 2 under Relay Adjustments.

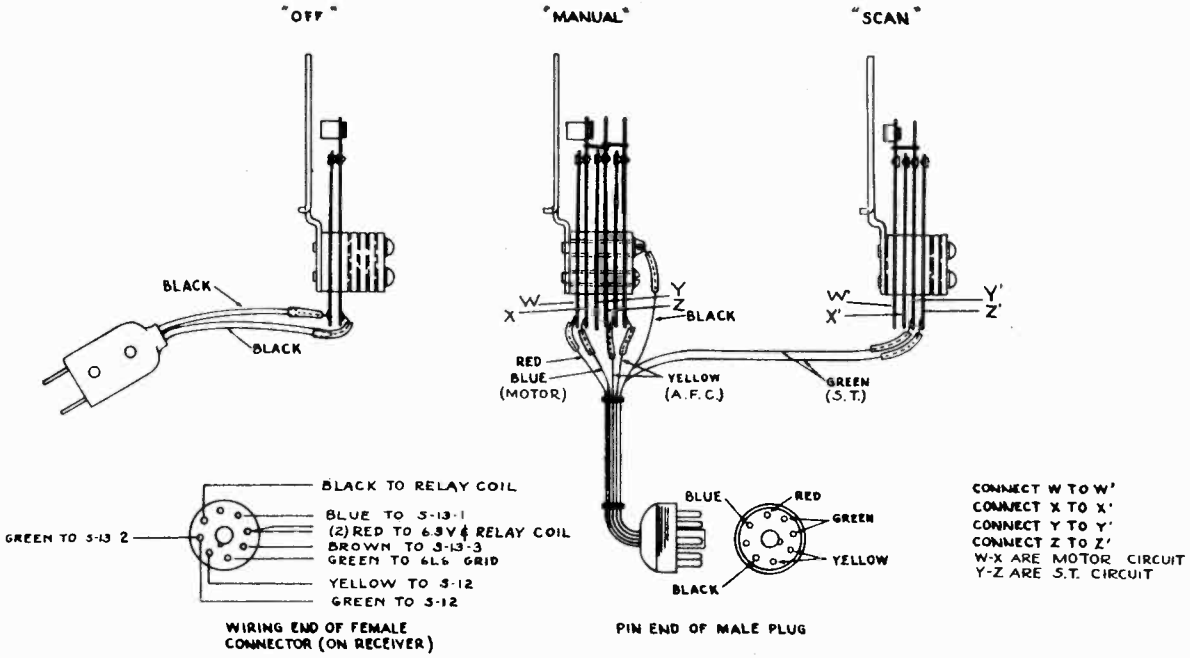


Fig. 5. Wiring Diagram of "Off," "Manual," and "Scan"

(e) Excessive side play in sliding contactor. Loosen the setscrew on the back of the sliding contactor and slide holder together. Final adjustment should allow sliding contactor to rock freely.

(f) Not enough tension on sliding contactor arm. Loosen collar on shaft in rear of contact segment and move sliding contactor arm towards the contactor segment; then tighten collar on shaft.

(g) If the contacts at the rear of the "Touch Tuning" button assembly shafts do not close or make good contact, the motor will continue to scan the dial without stopping at the desired station.

(h) Contact segment may be bent out of shape. This should be perpendicular to chassis deck and parallel to rear chassis apron in order to allow the contactor arm to wipe the adjustable contacts evenly.

No Action When Station Button Is Pressed

(a) Relay remains energized and audio continues to function—push-button escutcheon grounded. Be sure dial and push-button escutcheons are insulated from each other or from the control shafts.

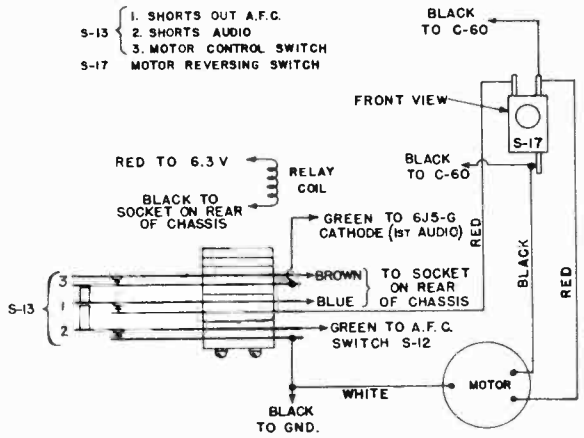


Fig. 6. Motor Relay Wiring Diagram

(b) "Off" switch contacts do not close.

(c) If set does not tune automatically unless scan button is also depressed, contacts No. 6, Fig. 2, require closer spacing.

(d) Open or shorted motor capacitor—Characterized by motor armature humming but no torque. Replace 1000 mfd. capacitor C-60.

(e) Open or shorted coil in motor—Characterized by no torque or low torque in one direction. Replace motor or repair coil.

(f) Drive mechanism bound, or too tight for motor to drive.

(g) Not enough friction in Slip Pulley—The friction of the slip pulley is adjusted by tightening the collar on the end of the motor shaft. Care should be exercised that the setscrew does not hit the relay armature.

(h) Belt slippage—The tension of the belt may be increased by raising the motor on the relay bracket. If the belt still slips, reverse belt and use other surface or use belt dressing.

Miscellaneous Adjustments

(a) When a "Touch Tuning" button will not remain in a locked position, it usually indicates that the springs at each end of the latch bar are not in proper adjustment. They should exert an equal pull on each end.

(b) The fork on the tuning condenser should be adjusted so that the motor reversing switch clicks over when the pointer approximately reaches the 540 and 1620 kc. markings on the dial scale. With the pointer at the extreme end of calibrations when tuning manually, the reversing switch lever should be set so there is not more than 1/16 inch nor less than 1/32 in. clearance between the lever and the switch trigger after the switch has snapped.

(c) The motor and relay mounting plate should rest parallel to the chassis deck. Do not adjust the spring tension foot; raise or lower motor on bracket, as required. Make sure that there is no electrical connection between the motor frame and the chassis.

(d) The "Off" switch on the "Touch Tuning" assembly should stay closed for at least one-half the movement of the key, opening only on the final click. If firm contact does not exist between the points, vibration of the set may cause an intermittent noise.

(e) The silent tuning contacts of the "Manual" and "Scan" switches should open last to permit quiet operation.

REPLACEMENT PARTS LIST

MODEL F-135

Insist on genuine factory-tested parts which may be purchased from authorized dealers.

Stock No.	Description	List Price
	RECEIVER CHASSIS ASSEMBLY	
*RB-008	BOARD—2 lug terminal board	$0.10
RB-013	BOARD—1 lug terminal board	.10
*RB-023	BOARD—4 lug terminal board	.10
RB-046	BOARD—5 lug terminal board	.15
*RB-049	BOARD—Ant. and ground terminal board	.10
*RB-053	BOARD—3 lug terminal board	.10
RB-063	BOARD—Fuse terminal board and bracket	.25
*RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-19)	.25
*RC-042	CAPACITOR—.01 mfd., 1000 V. paper (C-40)	.30
*RC-045	CAPACITOR—.015 mfd., 1500 V. paper (C-45, C-59)	.25
RC-083	CAPACITOR—.03 mfd., 400 V. paper (C-42, C-44)	.25
*RC-091	CAPACITOR—.05 mfd., 400 V. paper (C-8, C-9, C-15, C-22, C-24 C-25, C-36, C-37, C-57, C-63)	.30
RC-093	CAPACITOR—.06 mfd., 200 V. paper (C-46)	.25
*RC-123	CAPACITOR—.1 mfd., 400 V. paper (C-11, C-21, C-33, C-43)	.35
*RC-150	CAPACITOR—.25 mfd., 400 V. paper (C-37)	.35
RC-206	CAPACITOR—50 mmf., mica, special for osc.	.35
*RC-213	CAPACITOR—50 mmf., mica (C-34)	.25
*RC-214	CAPACITOR—40 mmf., mica (C-23)	.25
RC-215	CAPACITOR—65 mmf., mica (C-56)	.25
RC-234	CAPACITOR—100 mmf., mica (C-39)	.25
*RC-242	CAPACITOR—150 mmf., mica (C-32, C-35)	.25
*RC-259	CAPACITOR—250 mmf., mica (C-20, C-41)	.30
*RC-296	CAPACITOR—500 mmf., mica (C-7, C-38)	.25
RC-308	CAPACITOR—750 mmf., mica (C-30)	.35
*RC-344	CAPACITOR—1300 mmf., mica (C-17)	.35
RC-368	CAPACITOR—3000 mmf., mica (C-16)	$0.35
RC-427	CAPACITOR—16 mfd., 450 V. wet electrolytic (C-53)	1.05
RC-429	CAPACITOR—30 mfd., 450 V. wet electrolytic (C-52)	1.35
RC-580	CAPACITOR—10 mfd., 25 V.; 4 mfd., 300 V.; 16 mfd., 400 V.; 50 mfd., 6 V. dry electrolytic (C-48, C-49, C-50, C-51)	1.75
RC-583	CAPACITOR—1000 mfd., 12 V. A.C. dry electrolytic (C-60) for 50-60-cycle sets	2.45
RC-588	CAPACITOR—2200 mfd., 12 V. A.C. dry electrolytic (C-61) for 25-cycle sets	4.50
RC-645	CAPACITOR—"C" band oscillator trimmer (2-15 mmf.) (C-62)	.15
RC-650	CAPACITOR—Double trimmers (5-40 mmf.) (C-2, C-3)	.25
RC-651	CAPACITOR—Double trimmers (2-20 mmf.) (C-5, C-6)	.25
RC-654	CAPACITOR—Double trimmers, pri. and sec., 1st or 2nd I.F. transformer (C-26, C-27, C-28, C-29)	.45
RC-655	CAPACITOR—Double trimmers, pri. and sec., 3rd I.F. transformer (C-30, C-31)	1.55
RC-660	CAPACITOR—"E" band ant. trimmer (50-120 mmf.) (C-4)	.20
RC-661	CAPACITOR—Triple trimmer (C-12, C-13, C-14)	.60
RC-662	CAPACITOR—"B" band padder (140-280 mmf.) (C-18)	.25
RC-719	CONDENSER—3-gang tuning condenser (C-1)	5.15
*RC-755	CAPACITOR—Line capacitor .01-.01 mfd., 250 V. A.C. (C-54, C-55)	.40
*RC-863	CORD—Power cord with plug	.65
*RC-992	CUSHION—Condenser mtg. cushion assembly (Pkg. of 5)	.15
RC-8015	CABLE—Speaker cable with female plug	.60
RC-8028	CARDS—Station letter cards (set)	.35
*RF-301	FUSE—3 amp. fuse (Pkg. of 10)	1.00
*RG-001	GRID CAP—Control grid cap (Pkg. of 5)	.10
RK-017	KNOB—Volume and tone control knobs (Pkg. of 5)	.40
RK-018	KNOB—Band and A.F.C. switch knobs (Pkg. of 5)	$0.40
RK-021	KNOB—Manual tuning knob (Pkg. of 5)	.50
RL-050	COIL—Ant. coil "B," "C," and "D" bands (T-6)	1.40
RL-051	COIL—Ant. coil "E" band (L-22 and L-23)	1.10
RL-138	COIL—R.F. coil "B," "C," and "D" bands (T-4)	1.05
RL-254	COIL—Osc. coil "B," "C," and "D" bands (T-5)	1.60
RL-255	COIL—Osc. coil "E" band (L-24, L-25 and L-26)	1.05
RL-334	REACTOR—Filter choke (L-8)	1.40
RP-078	PLATE—Fuse cover plate	.10
RQ-1243	RESISTOR—220 ohm, ½ watt carbon (R-3) (Pkg. of 5)	.70
RQ-1247	RESISTOR—330 ohm, ½ watt carbon (R-6, R-8) (Pkg. of 5)	.70
RQ-1255	RESISTOR—680 ohm, ½ watt carbon (R-32) (Pkg. of 5)	.70
RQ-1257	RESISTOR—820 ohm, ½ watt carbon (R-9) (Pkg. of 5)	.70
RQ-1259	RESISTOR—1000 ohm, ½ watt carbon (R-41, R-42) (Pkg. of 5)	.70
RQ-1269	RESISTOR—2700 ohm, ½ watt carbon (R-37) (Pkg. of 5)	.70
RQ-1271	RESISTOR—3300 ohm, ½ watt carbon (R-13, R-36) (Pkg. of 5)	.70
RQ-1275	RESISTOR—4700 ohm, ½ watt carbon (R-29) (Pkg. of 5)	.70
RQ-1281	RESISTOR—8200 ohm, ½ watt carbon (R-25) (Pkg. of 5)	.70
RQ-1291	RESISTOR—22,000 ohm, ½ watt carbon (R-30) (Pkg. of 5)	.70
RQ-1299	RESISTOR—47,000 ohm, ½ watt carbon (R-4, R-14) (Pkg. of 5)	.70
RQ-1303	RESISTOR—68,000 ohm, ½ watt carbon (R-2, R-23, R-26) (Pkg of 5)	.70
RQ-1307	RESISTOR—100,000 ohm, ½ watt carbon (R-18, R-31, R-33) (Pkg. of 5)	.70
RQ-1309	RESISTOR—120,000 ohm, ½ watt carbon (R-24, R-28) (Pkg. of 5)	.70
RQ-1313	RESISTOR—180,000 ohm, ½ watt carbon (R-16, R-21) (Pkg. of 5)	.70
RQ-1315	RESISTOR—220,000 ohm, ½ watt carbon (R-1, R-17) (Pkg. of 5)	.70
RQ-1317	RESISTOR—270,000 ohm, ½ watt carbon (R-20) (Pkg. of 5)	.70
RQ-1323	RESISTOR—470,000 ohm, ½ watt carbon (R-7) (Pkg. of 5)	.70
RQ-1324	RESISTOR—510,000 ohm, ½ watt carbon (R-15) (Pkg. of 5)	.70
RQ-1331	RESISTOR—1 megohm, ½ watt carbon (R-5, R-34) (Pkg. of 5)	.70
RQ-1339	RESISTOR—2.2 megohm, ½ watt carbon (R-19) (Pkg. of 5)	.70
RQ-1471	RESISTOR—3300 ohm, 1 watt carbon (R-10, R-35)	.20
*RQ-1499	RESISTOR—47,000 ohm, 1 watt carbon (R-11)	.20
RR-732	RESISTOR—Tapped bleeder resistor (R-40)	.60
RR-1004	RESISTOR—230 ohm, 1½ watt moulded (R-30)	.15
*RS-139	SHIELD—3rd I.F. transformer shield	.20
RS-175	SHIELD—1st or 2nd I.F. transformer shield	.25
*RS-200	SOCKET—8 pin tube socket (Pkg. of 5)	.75
RS-217	SOCKET—4 prong tube socket (Pkg. of 5)	.50
RS-221	SOCKET—8 pin socket (push-button control cable receptacle) (Pkg. of 5)	.60
RS-223	SOCKET—8 pin socket for osc. and converter (Pkg. of 5)	.80
RS-356	SWITCH—Manual A.F.C. switch (S-5)	.40
RS-368	SWITCH—Tone control switch (S-11)	$0.70
RS-369	SWITCH—Band change switch (S-1 to S-10)	2.85
RT-134	TRANSFORMER—Power transformer 110-130 V.; 50-60 cycles (T-1)	8.50
RT-135	TRANSFORMER—Power transformer 110-130 V.; 25-60 cycles (T-1)	13.95
RT-246	TRANSFORMER—1st or 2nd I.F. transformer (complete) (T-7, T-8)	1.80
RT-247	TRANSFORMER—3rd I.F. transformer (complete) (T-9)	3.95
RV-033	VOLUME CONTROL—2 megohm, volume control, tap at 5000 ohms and 500,000 ohms (R-22)	1.05
*RW-101	WASHER—Felt washer for knobs (Pkg. of 10)	.45
RW-404	WAVE TRAP—Wave trap complete	.70
RX-027	ASSEMBLY—Chassis mounting assembly	.15
	DIAL SCALE ASSEMBLY	
RC-868	CORD—Band indicator, tone control and volume control pointer cord (Pkg. of 5)	.60
RC-8012	CABLE—Tuning drive cables (Pkg. of 5 pairs)	.55
RD-054	DRUM—Condenser drive drum	.30
RD-059	DIAL—Dial scale assembly	3.70
RE-017	ESCUTCHEON—Dial escutcheon plate complete	1.95
RL-920	LAMP—Dial lamp 6.3 volt .25 amp. (Pkg. of 10)	1.50
RP-079	PULLEY—Volume control cord drive pulley	.15
RP-080	POINTER—Volume or tone control pointer (Pkg. of 5)	.15
RP-083	PULLEY—Band switch cord drive pulley	.10
RP-084	PULLEY—Tone control cord drive pulley	.10
RP-089	POINTER—Dial scale pointer (includes support) (Pkg. of 5)	.60
RP-090	POINTER—Band change indicator (Pkg. of 5)	.90
RR-911	REFLECTOR—Lamp reflector	.75
RS-222	SOCKET—Lamp socket assembly	.45
*RS-401	SPRING—Tuning drive cord tension spring (Pkg. of 2)	.20
RS-427	SPRING—Volume, tone or band indicator cord tension spring (Pkg. of 5)	.20
RW-016	WINDOW—Escutcheon window and cushion	.30
	AUTOMATIC DRIVE AND MOTOR ASSEMBLY	
RA-404	ARM—Motor reversing switch arm (on gang condenser shaft)	.15
RB-156	BRACKET—Guide and spiral rod bracket, includes bearing (motor end)	.10
RB-157	BRACKET—Spiral rod bracket with bearing (manual tuning end)	.10
RB-605	BELT—Motor belt	.25
RG-010	GEAR—Manual drive beveled idler and tuning shaft gear	.40
RG-011	GEAR—Manual drive leather faced bevel gear	.20
RM-104	MOTOR—25-cycle automatic tuning motor (motor only)	4.45
RM-105	MOTOR—50-60-cycle automatic tuning motor (motor only)	4.05
RP-085	PULLEY—Spiral drive rod pulley (belt driven)	.15
RR-912	RIDER—Spiral drive rod rider	.30
RR-913	ROD—Pointer slider guide rod	.15
RR-914	SPIRAL ROD—Tuning, pointer spiral drive rod	.25
RR-915	RELAY—50-60-cycle relay (complete)	$2.85
RR-917	RELAY—25-cycle relay (complete)	3.10
RS-359	SWITCH—Tuning motor reversing switch (Operated by gang cond. shaft) (S-17)	.70
RS-429	SPRING—Motor relay armature spring (Pkg. of 2)	.20
RS-505	SLIDER—Dial pointer slider assembly	.70
RS-908	SHAFT—Manual tuning shaft (shaft only)	.05
RX-028	ASSEMBLY—Motor clutch assembly (complete)	.30
RX-029	ASSEMBLY—Drive motor mounting cushions and screws	.15
	STATION SELECTOR ASSEMBLY (Behind Tuning Condenser)	
RC-1962	COLLAR—Contactor shaft collar	.10
RC-1963	SLIDING CONTACTOR—Bakelite mounted rotating contactor and holder	.40
RC-1964	CONTACT—Thumbscrew contact (complete) (Pkg. of 10)	.95
RI-103	INSULATORS—Insulators and washers (thumbscrew contact) (Pkg. of 10)	.05
RP-067	PLATE—Contactor mounting segment	.55
RU-002	COUPLING UNIT—Flexible coupling with contactor arm	.75
RW-106	WICK—Wick assembly (Pkg. of 5)	.50
	PUSH BUTTON AUTOMATIC TUNING MECHANISM	
RB-064	2 TERMINAL BOARDS—Terminal strips (7 terminals)	.40
RB-065	TERMINAL BOARD—Terminal strip (6 terminals) (long)	.20
RB-068	TERMINAL BOARD—Terminal strip (short) (6 terminals)	.20
RB-606	LATCH BAR—Push button mechanism latch bar	.10
RB-607	BUTTON—Molded push button (Pkg. of 5)	.20
RC-1965	CLAMP—Push button cable clamp (Pkg. of 10)	.10
RC-1966	CONTACTOR CLIP—Clip and insulator (on leads from terminal strip) (Pkg. of 5)	.15
RC-8013	CABLE—"Off," "Manual," "Scan" switch cable with plug	.65
RE-018	ESCUTCHEON—Touch tuning button escutcheon plate	1.50
RI-104	INSULATOR—Insulator between key and switch blade (manual and off switches) (Pkg. of 5)	.15
RI-105	INSULATOR—Insulator between key and switch blade (scan switch) (Pkg. of 5)	.10
RI-107	INSULATOR—Escutcheon separating insulators (Pkg. of 10)	$0.05
RK-200	KEY—Push button key (Pkg. of 5)	.15
*RP-026	PLUG—A.C. line connector female plug	.45
*RP-027	PLUG—A.C. line connector male plug	.45
RS-361	SWITCH—Tuning control switch (3 section) "Off," "Manual," "Scan" (complete) (S-14, S-16)	1.10
RS-430	SPRING—Latch bar spring (Pkg. of 5)	.10
RS-431	SPRING—Key spring and staple (Pkg. of 5)	.05
RS-506	SPACER—Contact point spacer (fiber) (Pkg. of 10)	.05
RW-017	WINDOW—Push button celluloid window (Pkg. of 25)	.10
RW-105	WASHER—Fiber washer on push button key (Pkg. of 10)	.05
RX-031	ASSEMBLY—Push button assembly (complete)	9.50
	SPEAKER ASSEMBLY	
RC-925	CONE—Cone and voice coil	1.25
*RC-991	CLAMP—Cone spider clamp and screw	.05
RP-058	PLUG—Speaker plug	.20
RS-062	SPEAKER—12-in. type speaker (complete)	8.30
*RS-416	SPRING—Voice coil leads spring (Pkg. of 2)	.10
RT-431	TRANSFORMER—Output transformer (T-2)	2.30
RX-030	ASSEMBLY—Speaker mounting bushings and nuts	.10
	REMOTE CONTROL UNIT	
RA-551	ADAPTER—Adapter socket	.75
RB-075	BOARD—Terminal board (9 terminals) (top)	.25
RB-076	BOARD—Terminal board (9 terminals) (bottom)	.25
RB-607	BUTTON—Moulded push button (Pkg. of 5)	.20
RB-608	LATCH BAR—Latch bar for keys	.10
RC-1970	CLAMP—Remote cable clamp	.05
RC-8023	CABLE—Flat cable (10 leads) *	6.90
RK-201	KEY—Push button key	.10
RK-202	KEY—Push button key (silent)	.10
RS-430	SPRING—Latch bar spring (Pkg. of 5)	.10
RS-431	SPRING—Key spring and spacer (Pkg. of 5)	.10
RT-950	TERMINAL—Terminal for No. 10 lead (Pkg. of 5)	.05
RT-951	TERMINAL—Terminal on leads No. 1 to No. 9 and rubber insulator (Pkg. of 5)	.05
RW-017	WINDOW—Push button celluloid window (Pkg. of 25)	.10

* Used on previous receivers. (Prices subject to change without notice.)

GENERAL ELECTRIC CO.

MODEL A-205
Schematic

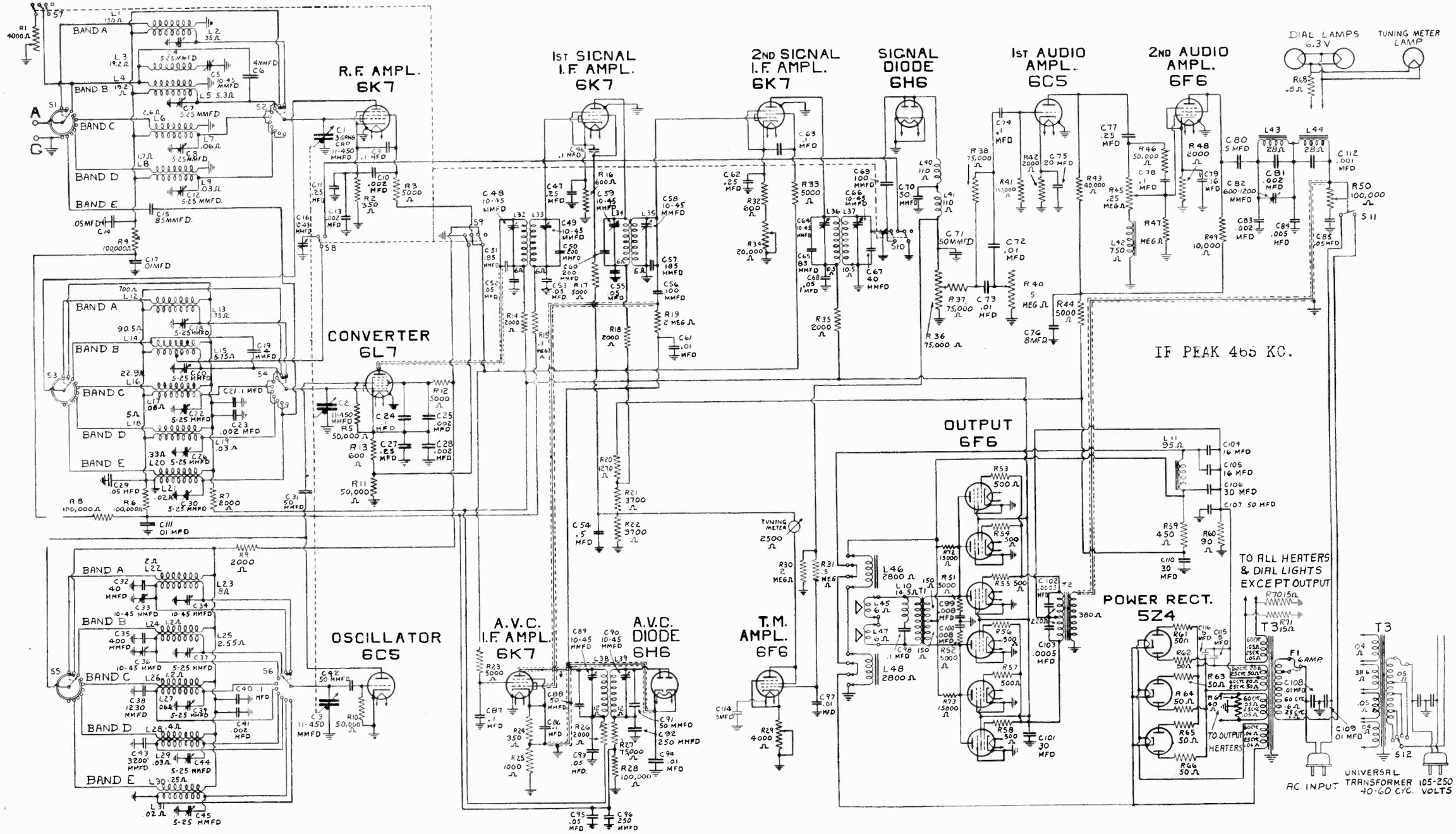


Fig. 2. Model A-205 Schematic Circuit Diagram

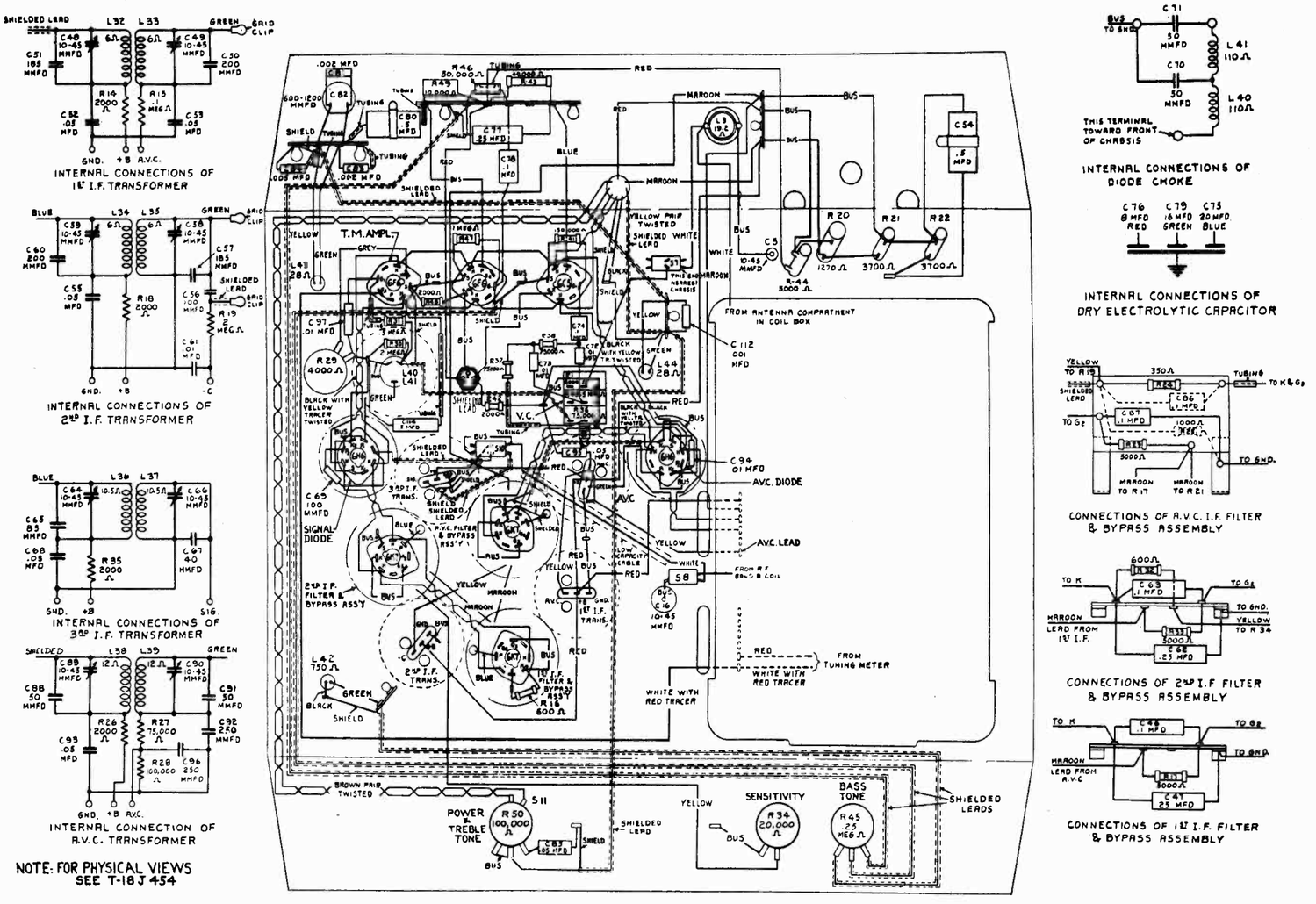


Fig. 1. Model A-205 Chassis Wiring Diagram

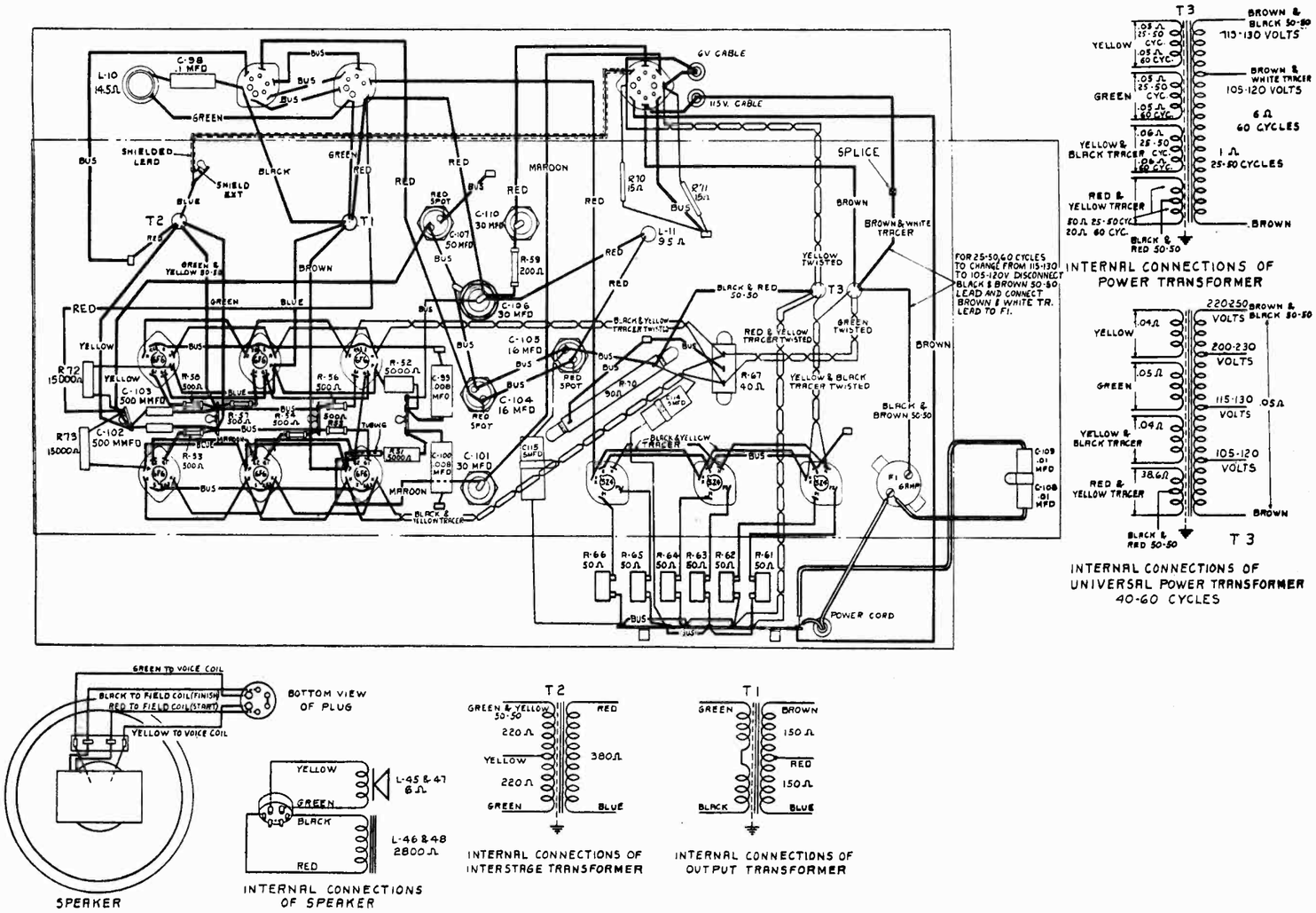


Fig. 7. Model A-205 Speaker and Power Unit Wiring

GENERAL ELECTRIC CO.

MODEL A-208
Schematic

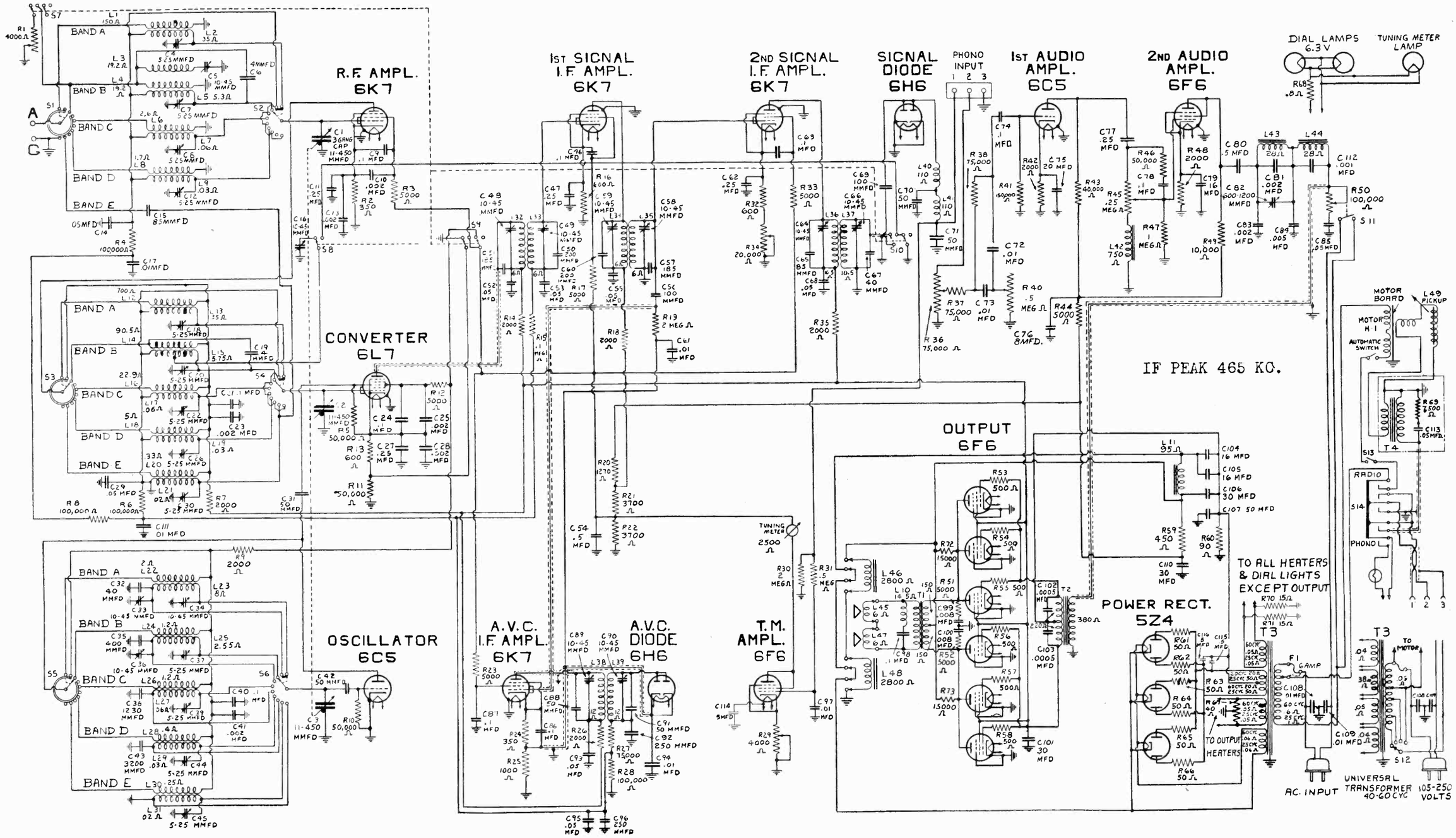


Fig. 3. Model A-208 Schematic Circuit Diagram

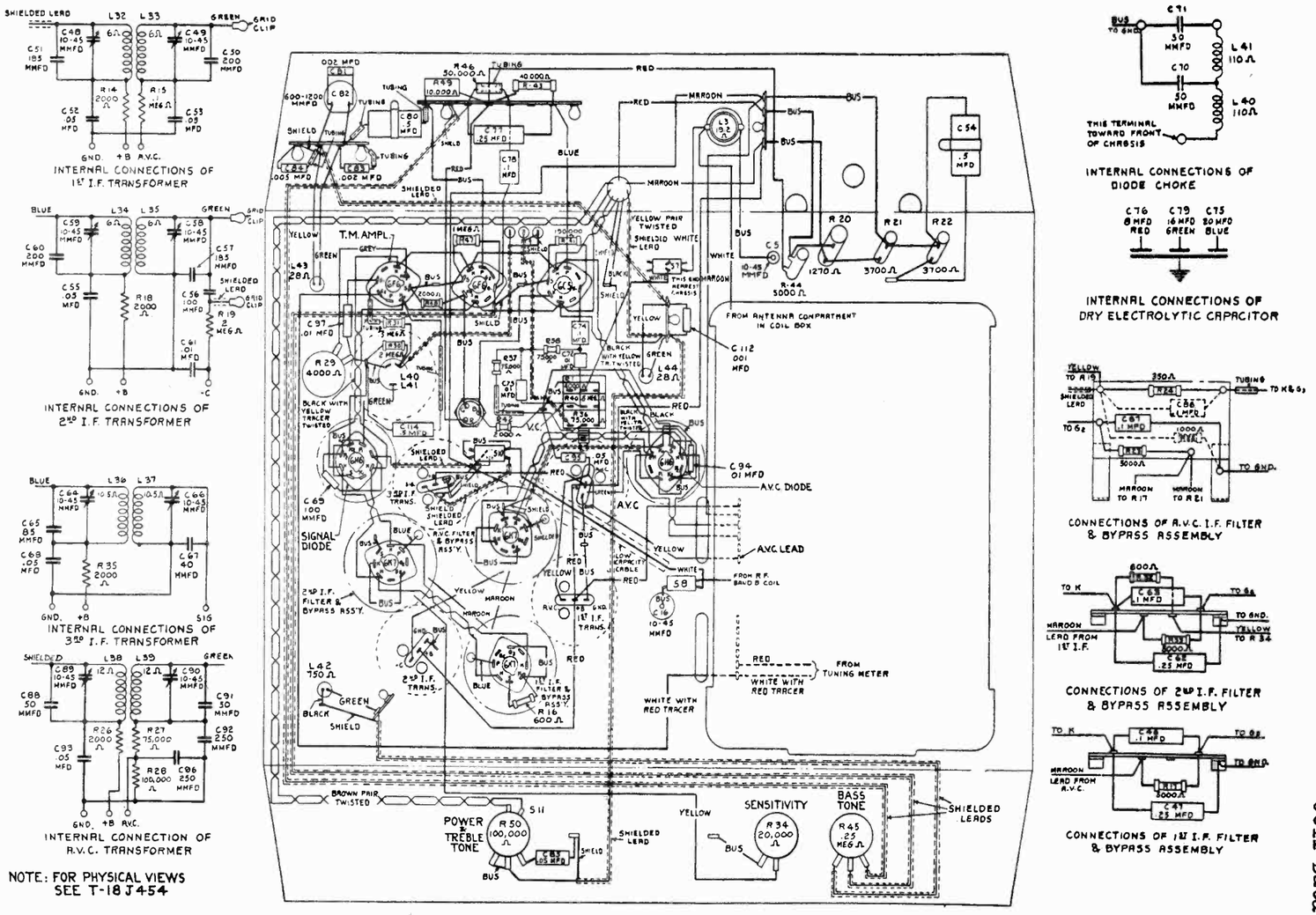


Fig. 4. Model A-208 Chassis Wiring Diagram

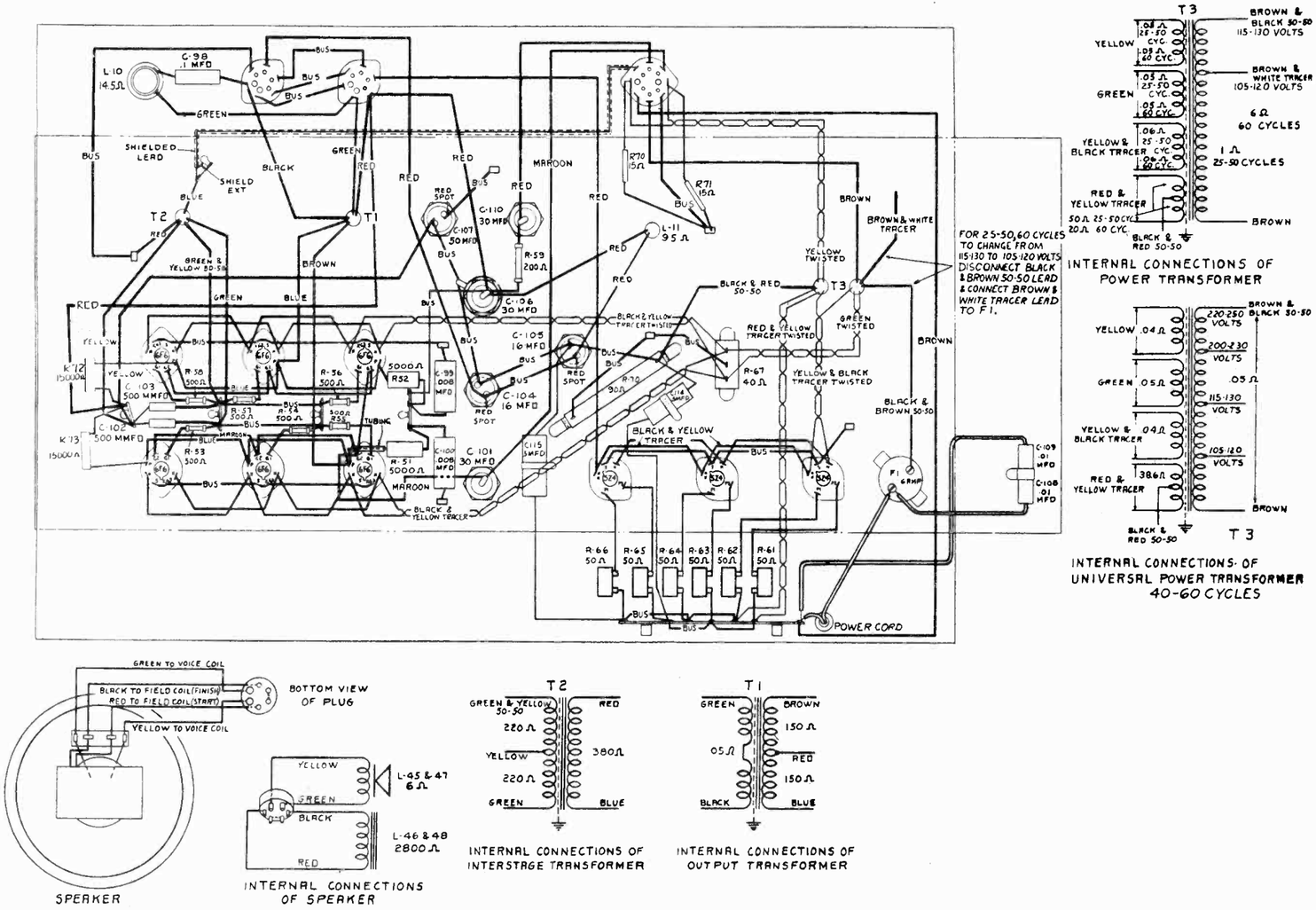


Fig. 8. Model A-208 Speaker and Power Unit Wiring

GENERAL ELECTRIC CO.

MODELS A-205, A-208
"Sentry Box" Wiring

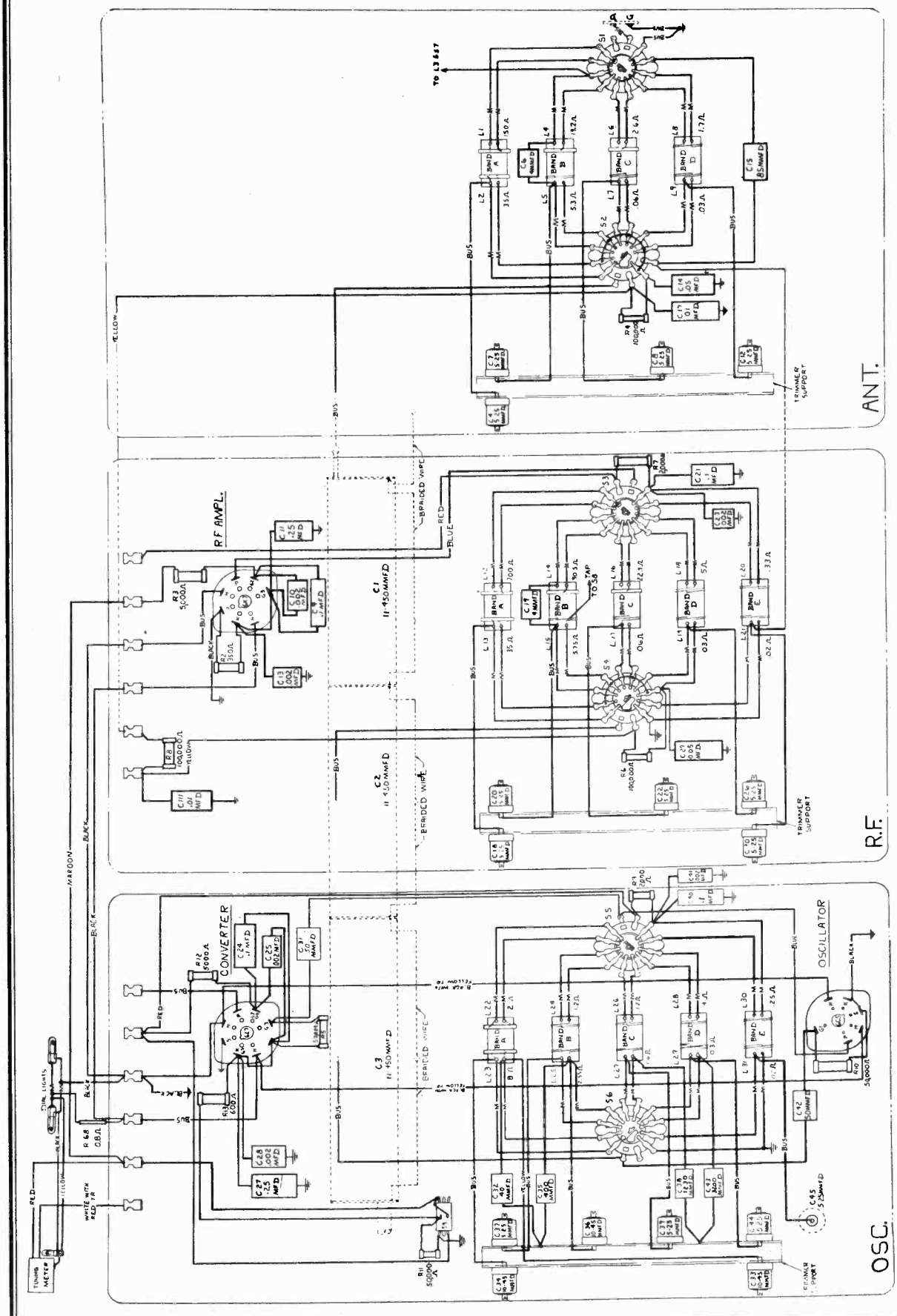


Fig. 6. Sentry Box Wiring Diagram

MODELS A-205, A-208
Socket, Trimmers
Voltage

GENERAL ELECTRIC CO.

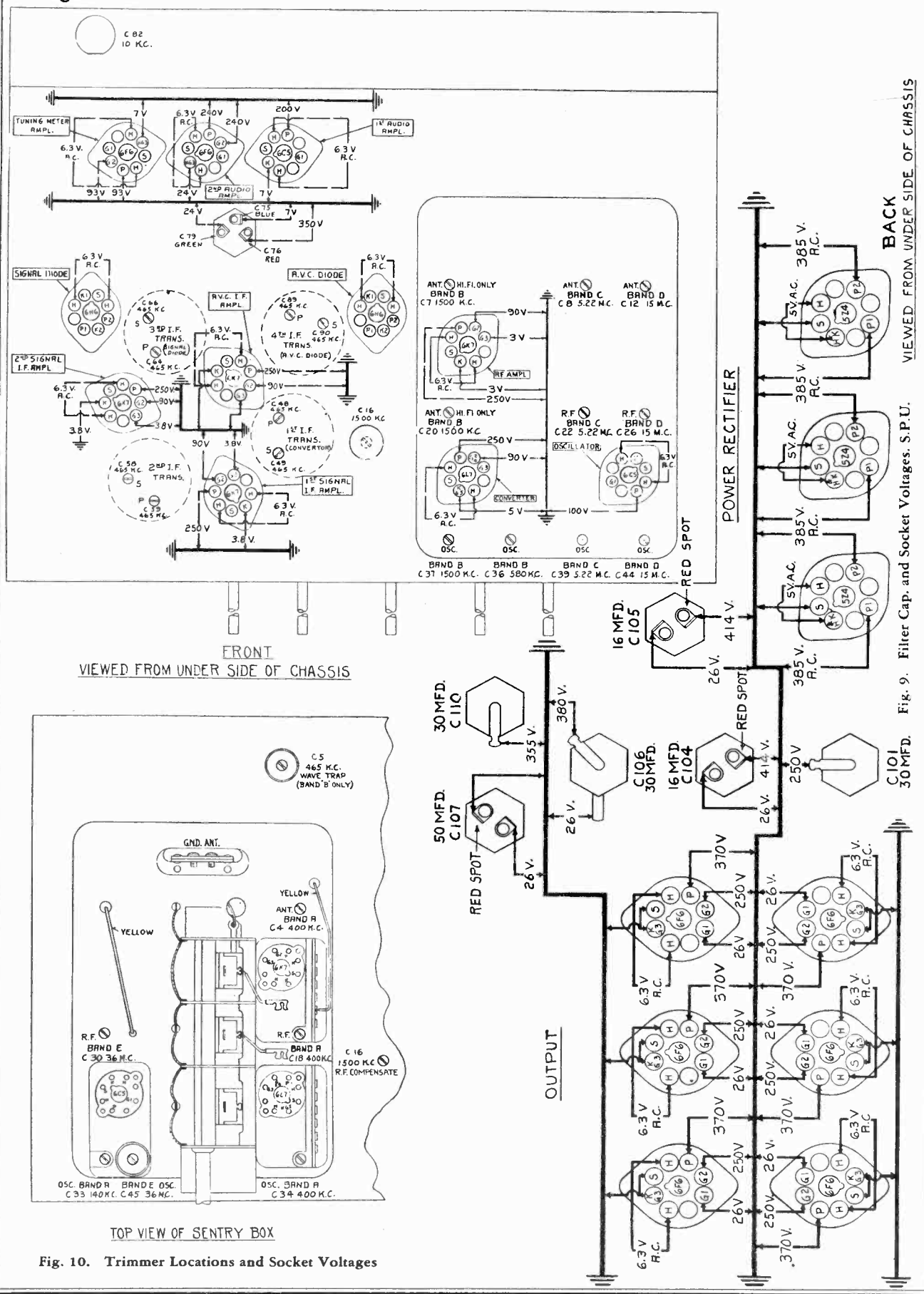


Fig. 10. Trimmer Locations and Socket Voltages

Fig. 9. Filter Cap. and Socket Voltages. S.P.U.

GENERAL ELECTRIC CO.

MODEL A-208
Assembly Wiring

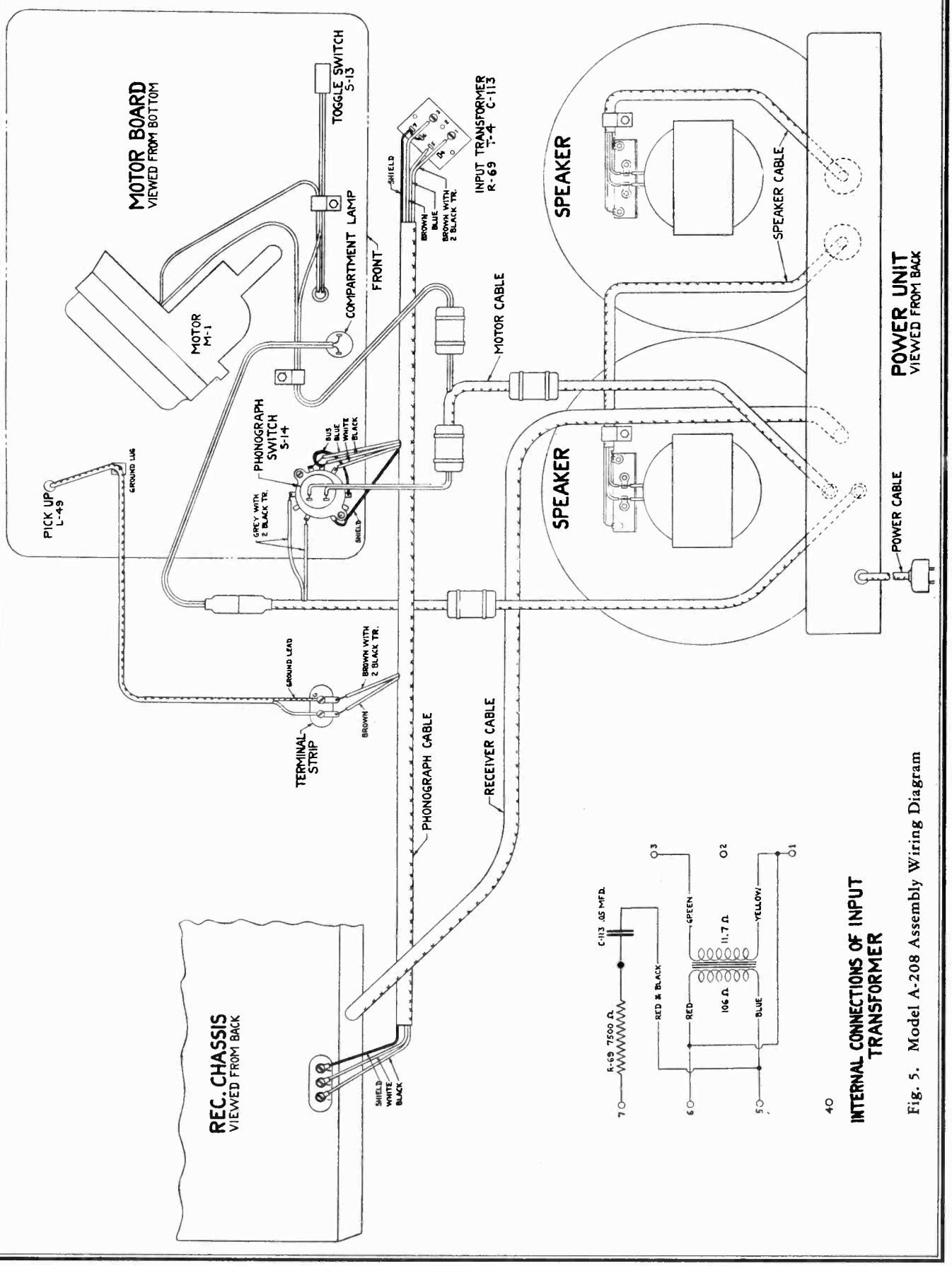


Fig. 5. Model A-208 Assembly Wiring Diagram

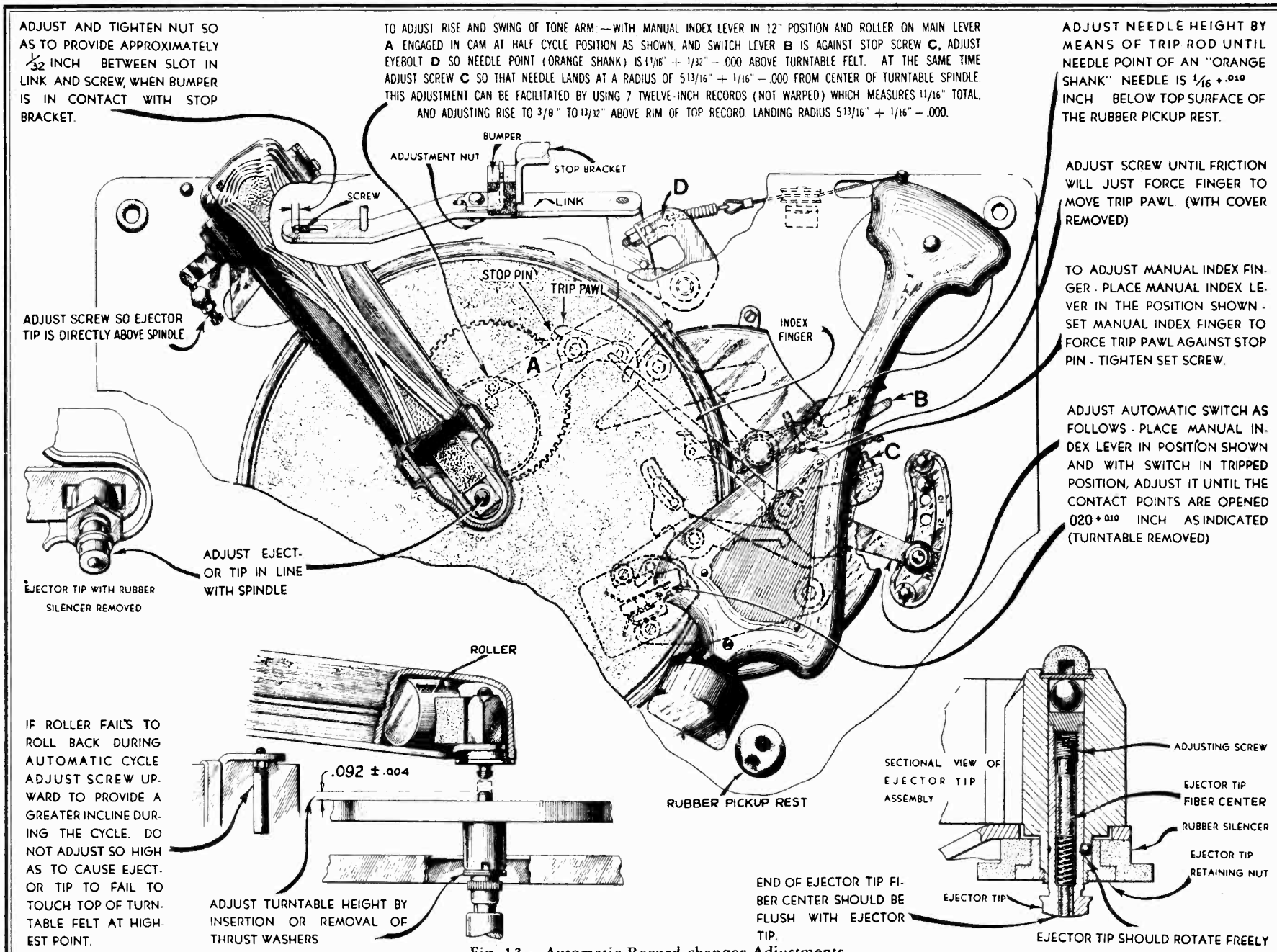


Fig. 13. Automatic Record-changer Adjustments

GENERAL ELECTRIC CO.

MODELS A-205, A-205E A-208, A-208E

Specifications Circuit Data, Alignment

A-205, A-208

SERVICE DATA

Physical Specifications

Model	A-205	A-208
Height	46 5/16 i.	40 1/16 in.
Width	33⅝ in.	53¾ in.
Depth	18 11/16 in.	21 5/16 in.
Weight Packed	215 lb.	294 lb.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	105–130	60	325
C	105–130	25–60	340
V	105–130 and 200–250	40–60	340

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.

Tuning Frequency Range

Band A	140-410 KC
Band B	540-1650 KC
Band C	1650-5450 KC
Band D	5450-18,000 KC
Band E	18-41 MC

Tuning Control Drive Ratio

Fast Tuning Drive Ratio 5½ to 1
Slow Tuning Drive Ratio 55 to 1
Precision Tuning Indicator Ratio 12 to1

Tuning Meter

Shadow Type D.C. milliammeter—operating from a separate 6F6 D.C. amplifier.

Electrical Power Output

Undistorted	28 watts
Maximum	40 watts

Loud-speaker Unit—Duo-Electrodymamic

Each Cone: 10¼ in. overall, 9¼ in. effective diameter
Each cone coil impedance: 6 ohms at 400 cycles
Total Series Impedance: 12 ohms at 400 cycles

Phonograph Pickup, Model A-208 Only

Viscoloid Damped
Pick-up Coil Impedance: 4.6 ohms at 1000 cycles

Record Changer, Model A-208 Only

Record Ejector Type
Capacity: Nine 10-in. records or eight 12-in. records
Turntable Speed: 78 rpm
Time to complete record-changing cycle: 4½ seconds.

Tubes

R. F. Amp	6K7 Super Control Amp.
Converter	6L7 Hexode Converter
Oscillator	6C5 Low Mu Triode
1st I. F. Amp. (Sig.)	6K7 Super Control Amp.
2nd I. F. Amp. (Sig.)	6K7 Super Control Amp.
I. F. AVC Amp.	6K7 Super Control Amp
Detector	6H6 Twin Diode
A. V. C. Rectifier	6H6 Twin Diode
First Audio Tube	6C5 Low Mu Triode
2nd Audio Tube	6F6 (Triode connected)
Output (Push Pull Class A-B)	6-6F6 Power Amplifier
Power Rectifiers	3-5Z4 Parallel
Tuning Meter Amp.	1-6F6 (Triode connected)
Dial Lamps (three)	Mazda No. 46

A-205, A-208, A-205E, A-208E
DESCRIPTION OF ELECTRICAL CIRCUIT

Models A-205 and A-208 employ twenty metal envelope tubes connected so as to offer with the turning of a single knob the choice of either an all-wave superheterodyne circuit giving excellent selectivity and sensitivity on frequencies from 140 kc to 41,000 kc; or an R.F. amplifier employing two tuned circuits giving high fidelity reception from 540 kc to 1650 kc. Separate groups of coils are used for each frequency band, all radio frequency coils for both circuits 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 change over between "High Fidelity" and "High Selectivity" is accomplished by means of four switches mechanically linked to the change-over knob shaft.

* A-205E, A-208E USE 19 TUBES

High Fidelity Receiver

On high fidelity position the receiver is operative only on band B. The four change-over switches make the following connections: S7 connects the antenna to ground through a 4000-ohm variable resistor which is one of the three units of the volume control and is necessary to minimize cross talk. S8 connects the output of the second R.F. transformer to a lead which in turn carries the R.F. power directly to the 6H6 diode detector. S9 removes the 6C5 oscillator plate voltage and renders the 6L7 inoperative by removing the screen voltage and placing the cathode positive with respect to the two control grids. S10 selects for the diode input power from the R.F. amplifier stage.

Having in mind the connections for high fidelity one may trace the course of the signal as follows. The signal on the antenna is applied to first R.F. transformer, the secondary of which is tuned and is connected to the control grid of the 6K7 R.F. amplifier. The signal is amplified and appears on the second R.F. transformer, the secondary of which is also tuned. A mid-tap on the secondary (Band B only) takes power from the coil and applies it to the plates of the 6H6 diode detector. From this point on, receiver operation is the same for both "High Fidelity" and "High Selectivity" and it is best that the high selectivity circuit be described next.

High Selectivity Receiver

On "High Selectivity" position the receiver is operative on all bands. Connections effected by the four change-over switches are as follows:

S7 removes the attenuating resistor R1 from the antenna, thus allowing full signal strength to be impressed on the first R.F. transformer at all times. S8 connects the mid-tap of the second R.F. transformer to a compensating condenser which takes the place of the lead formerly supplying R.F. to the 6H6 diode. S9 connects plate voltage to the 6C5 oscillator and screen voltage to the 6L7 converter. S9 also grounds the cathode return circuit of the 6L7 so as to properly bias it. S-10 connects the 6H6 diode detector plates to the output of the second intermediate frequency amplifier.

The course followed by the signal on the "High Selectivity" connection is as follows:

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 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 grid of the 6K7 first I.F. signal amplifier tube. Here the I.F. signal is amplified and appears on the first I.F. signal amplifier transformer. This transformer consists of two tuned circuits and transfers the energy to the control grids of the second 6K7 signal I.F. amplifier tube and the 6K7 AVC (automatic volume control) I.F. amplifier tube. Separate I.F. channels are used for further signal amplification and for automatic volume control. The sensitivity of the receiver is controlled by a variable resistor in the cathode circuit of the second 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.

The output from the second signal I.F. amplifier tube is coupled to the 6H6 diode detector through the second signal I.F. transformer. Both primary and secondary coils of this transformer are tuned.

Signal for automatic volume control is amplified by the 6K7 AVC I.F. amplifier tube, the plate circuit of which is connected to 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. An initial negative voltage of about 11 volts, obtained from the bias resistor R25 of the AVC 6K7 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-28 due to the rectified signal supplies full automatic bias to the R.F. amplifier and converter tubes and to the signal I.F. amplifier.

Detector and Audio Frequency Circuits

In the 6H6 tube the signal is rectified, the audio frequency component producing a corresponding voltage drop across the R-36 section of the manual volume control. This is a triple control, the second or lo-note compensation section (R-40) acting with capacitors C-72 and C-73 and resistor R-38 to preserve proper balance between high and low audio frequencies as the volume is changed. The third section of the volume control is the aforementioned antenna attenuator, R1. The manual volume control selects the amount of audio signal applied through coupling capacitor C-74 to the grid of the 6C5 first audio amplifier tube and thus controls the output of the receiver.

Power from the 6C5 audio amplifier is applied through C-77 to the input network of the 6F6 triode audio stage. This network consists of resistors R-45, R-46, R-47, condenser C-78 and inductance L-42, and comprises the bass tone control. Voltage developed across the 6F6 plate resistor R-49 is applied through condenser C-80 to the high cut-off network, L-43, L-44, C-81, C-82, C-83, C-84, C-112. This circuit is very effective in rejecting unwanted heterodyne signals which otherwise might be annoying on high fidelity reception.

The audio signal is then impressed on the grids of the high power output amplifier through transformer T2. R-50 and C-85 across the primary of T2 comprise the treble tone control. The power amplifier consists of six 6F6's in Pentode push-pull parallel with a maximum output of 40 watts. This amplifier is in turn matched to the dual stabilized dynamic speaker unit through transformer T1.

Tuning Meter

The tuning meter operates on both "High Fidelity" and "High Selectivity," its action being dependent on the d-c voltage developed across R-37 caused by the rectified incoming signal. This voltage is impressed on the grid of the 6F6 T.M. (tuning meter) amplifier tube and affects the plate current of this tube. The meter is in the plate circuit of this tube and is sensitive to changes in plate current. Thus, the meter gives relative readings of the incoming signal strength. The 6F6 T.M. amplifier is biased by voltage across R-29 (which is adjusted at the factory) to give maximum meter deflection for a strong signal.

Power Supply

Plate and grid voltages for all tubes and power for the speaker unit fields are supplied by the power supply system employing three 5Z4 full wave rectifiers with their corresponding plates in parallel. Equal distribution of the current load among the rectifiers is assured by the plate series resistors R-61 to R-66 inclusive. Filtering action is obtained by the filter choke L-11 and its associated filter condensers, while various resistors throughout the set fix the appfied voltages at their proper values.

Phonograph, Model A-208 Only

The record-reproducing facilities consist of a low impedance magnetic pick-up with its associated inertia-type tone arm, and the compensated volume control, audio amplifier and loud-speaker of the receiver. In changing from radio reception to phonograph reproduction the radio-phono switch simultaneously disconnects the 6H6 diode from the volume control, connects the secondary of the phonograph input transformer across this control, and renders the radio frequency amplifier inoperative by inserting a high resistance in the cathode circuit of the 6A8 converter and oscillator tube.

The turntable assembly consists of the perfected automatic record changer, which is simple and foolproof in operation. A separate motor switch is provided to permit starting and stopping the phonograph motor independently without operating the radio-phono switch.

ALIGNMENT PROCEDURE

Alignment Frequencies

	Band "A"	Band "B"	Band "C"	Band "D"	Band "E"
I.F.					
465 KC	145 KC	580 KC	5220 KC	15,000 KC	36,000 KC
	400 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 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. 10. *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.*

If the phonograph cable is disconnected from the chassis on Model A-208, it is necessary to connect terminals 1 and 2 together before the receiver will operate.

NOTE: To remove the chassis from Model A-208 it is necessary to take off the front right curved panel of the cabinet. The screws holding this panel are accessible from the front upon opening the right-hand record compartment door.

1. I.F. Alignment Adjustments

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 A.V.C. 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 loud-speaker. Turn on the receiver and set the volume and sensitivity controls to maximum (extreme clockwise position). Place the test oscillator in operation and set the test oscillator dial to 465 KC. 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 a temporary removal of the 6H6 A.V.C. rectifier tube makes no appreciable difference in output.

Before touching the receiver trimmers, adjust the *test oscillator* for maximum response. Note the exact 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 for the I.F. adjustment following, unless bad misalignment is definitely evident, in which case the most accurate known test oscillator setting may be used. Trimmer locations are shown in Fig. 4.

Alignment adjustments should be made in the following sequence:

1. 3rd I.F. Transformer (Signal Diode)

Remove the test oscillator connection from the grid of the 6L7 tube and attach it to the connected grid clip of the 6K7 2nd signal I.F. amplifier tube. Adjust each of the two 3rd 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. 2nd I.F. Transformer

Remove the test oscillator connection from the grid of the 2nd signal I.F. tube and attach it to the connected grid clip of the 6K7 1st I.F. amplifier tube. Adjust each of the two 2nd I.F. transformer trimmers alternately several times until a maximum output is obtained. Do not touch these trimmers again.

3. 1st I.F. Transformer (Converter)

After the alignment of the 2nd signal I.F. transformer is finished, restore the test oscillator connection to the grid clip of the 6L7 converter tube. Adjust each of the two converter (1st) I.F. trimmers alternately several times until a maximum output is obtained. Do not touch these trimmers again.

4. 4th I.F. Transformer (A.V.C. Diode)

After alignment of the 3rd I.F. transformer, 2nd I.F. transformer and converter transformer is completed, remove the output meter from the cone coil. Then remove the test oscillator connection from the grid of the 6L7 tube and attach it to the connected grid clip of the 6K7 A.V.C. I.F. amplifier.

Next remove the guard over the terminal boards on the "Sentry Box." Connect a high resistance voltmeter (this meter should have at least 1000 ohms per volt resistance and should be used on the 100-volt position or higher) to the yellow A.V.C. lead (See Fig. 1) on the R.F. compartment terminal strip and the chassis. The A.V.C. rectifier tube has delay bias voltage which should be removed by connecting its cathodes to the chassis. Then adjust each of the two A.V.C. I.F. trimmers alternately several times until a maximum output is obtained on the voltmeter. The peak, however, being rather broad, when properly trimmed, may be somewhat difficult to obtain. Do not touch the A.V.C. I.F. trimmers again.

Restore all original connections; this completes the I.F. alignment.

2. R.F. "Sentry Box" Alignment Adjustments

Bands "A" and "B" each require four trimmer adjustments, while Bands "C" and "D" each require three, and Band "E" only two. 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. RC258) 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 be at the extreme left-hand scale mark on the Band "B" scale for maximum capacitance position of the main tuning condenser (plates fully engaged).

The Oscillator, Converter Input and Antenna Compartments of the Sentry Box are conveniently referred to as "OSC", "R.F." and "ANT", respectively, thereafter. 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.

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)

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. Be sure the center control knob is in the high-selectivity position.

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. To reduce noise pick-up it is advisable to turn the sensitivity control to minimum sensitivity (counterclockwise) position. 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 pick-up 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" (530-1660 KC)

Set the band change switch to the position where the scale indicates the above range. Turn the hi-fidelity switch to the *hi-fidelity* position. Make sure the test oscillator output is quite high. Tune the test oscillator to 1500 KC, set the pointer at 1500 KC on the receiver dial, and adjust the Band "B" R.F. and ANT trimmers for maximum output, reducing input to maintain a low or moderate signal.

Now reduce the test oscillator output and without changing the receiver or test oscillator frequencies, throw the high fidelity switch to the high selectivity position. At this point adjust the Band "B" OSC trimmer for maximum output. Adjust the compensating Band "B" R.F. trimming, which is on top of the chassis between the 1st I.F. transformer (converter) and the Sentry Box, for maximum output.

Next tune the oscillator to 580 KC. Keep slowly rocking the tuning knob through the resonance point, at the same time adjusting the Band "B" padding trimmer for maximum output.

The interaction between the trimmer adjustments at each end of the scale make 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 adjustments of this band.

Band "C" (1.58-5.4 MC)

Set the band change switch to the position where the scale indicates the above range. Be sure the center control knob is in high selectivity position.

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" (5.3-18.3 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 position 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 RF 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" (16-41 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 position 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 RF 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 RF trimmer capacitance until a maximum response is obtained. There is no ANT trimmer to adjust.

This completes the alignment of Band "E"; do not touch these trimmers again.

Adjustment of Wave Trap

To adjust the 465 KC Wave Trap set the dial scale for Band "B," increase the output of the test oscillator and adjust it to 465 KC, leaving it connected to the ANT and GND posts of the receiver. Now adjust the 465 KC trimmer (C5) which is mounted on top of the chassis immediately behind the "Sentry Box," to *minimum* output. This completes this alignment; do not adjust this trimmer again.

Adjustment of 10 Kc Trap

Obtain an audio oscillator; tune it to 10 KC; connect its output to the signal diode plate. This can be done by removing the signal diode and connecting to either of its plates by means of a test prod. Now adjust the trimmer (C82) on the back skirt of the chassis for minimum output in the cone coil. This completes this adjustment. Do not disturb it again.

Dual Unit Speaker

If, for any reason, it is necessary to disconnect one or both of the speaker units the speaker wiring diagram (see Fig. 5 and 7) should be carefully followed upon reconnecting either unit. It is important that both the field coil and voice coil of each be connected properly in order that the voice coils operate in phase.

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

In order to properly connect the oscilloscope for visual alignment, it is necessary to remove the base pan shield from the bottom of the receiver chassis. After this is done a preliminary alignment should be made as outlined under I.F. Alignment Procedure using the oscilloscope as an output meter. To do this connect the vertical plates of the oscilloscope across the receiver volume control (R36) and turn off the horizontal sweep entirely, using only the vertical deflection as an indication of output. In carrying out this preliminary alignment the test oscillator sweep mechanism is not used.

Final Visual Adjustments

Connect the test oscillator output to the control grid of the 6L7 converter tube and place the sweep mechanism in operation. Turn on the horizontal sweep of the oscilloscope and synchronize it correctly with the test oscillator sweep mechanism. Now adjust the *test oscillator* so that the two I.F. response curves are coincident as nearly as possible. This gives a setting for the test-oscillator frequency which must not be changed throughout the rest of the procedure.

To align the signal I.F. and converter I.F. transformers connect the test oscillator as described in I.F. alignment beginning on page 15 and adjust the corresponding transformer trimmers so as to cause the resulting I.F. response curves to be coincident and as high as possible.

After alignment of the signal and converter I.F. transformers has been completed, the vertical plates of the oscilloscope should be connected to the yellow A.V.C. lead and the chassis. Connect the test oscillator output to the grid of the A.V.C. 6K7 I.F. amp. and ground the cathode of the A.V.C. diode. Adjust the A.V.C. I.F. trimmers so that the response curves are coincident and of maximum height. 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.

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 coil 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.

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

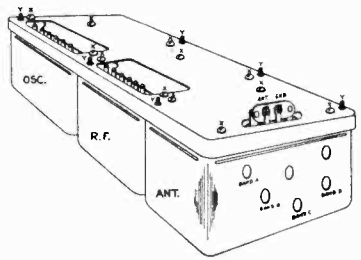


Fig. 11. "Sentry Box" Coil Locations and Assembly

switch shaft out, any shield can be easily removed by unscrewing the two mounting stud nuts ("Y," Fig. 11).

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 bolts ("X," Fig. 11) 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.

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. 12. 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. 12.

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.

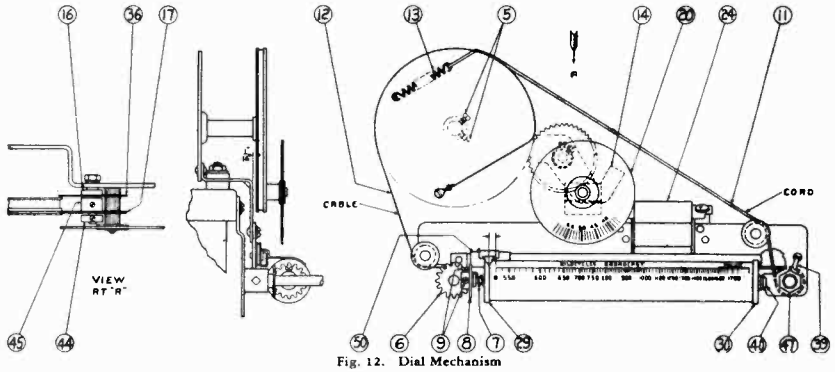


Fig. 12. Dial Mechanism

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. 12, 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. 12. 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.

PHONOGRAPH SERVICE DATA
A-208 & A-208E ONLY

Replacing Transformer

When installing a new phonograph input transformer, T4, first make all connections without screwing the new transformer to the cabinet. Then, with the power on and the Phono-Radio switch turned to Phono, rotate the transformer until the position is found in which hum is reduced to a minimum. The transformer should then be mounted permanently in this position.

AUTOMATIC RECORD EJECTOR

The record-changing mechanism is designed to be simple and fool-proof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in Fig. 13.

It is important when servicing the automatic mechanism, to have it placed on a level support. It is also important to refrain from forcing the mechanism if there is a tendency to bind or jam, since bent levers and possibly broken parts may result.

The tip of the record ejector is adjustable in relation to the turntable spindle, the two being exactly coaxial when properly adjusted. To align the tip, remove the rubber silencer of the ejector assembly, loosen ejector tip retaining nut and slide the tip assembly to the position where it is in true line with the axis of the turntable spindle. This adjustment may be simplified by placing several records on the turntable, depressing the spindle through the top record hole and lining up the ejector tip in the spindle hole of the record.

To insure that the ejector tip rotates freely, apply a slight amount of oil to the shank of the tip at the point where it is in contact with the ball bearing.

MAGNETIC PICKUP

The pickup used in the phonograph unit is of an improved design, having several variations from the usual type of pickup. The magnetic assembly is one rigid piece. The horseshoe magnet is solidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and provides a damping effect on the movement of the armature. A neutralizing coil is mounted in the magnet assembly in such manner that it balances out hum induced by stray magnetic fields but does not affect the audio signal. The frequency response is uniform over a wide range.

Service operations which may be necessary on the pickup are as follows:

Centering Armature

Refer to Fig. 14 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, *i.e.*, exactly centered. Whenever this centering adjustment has been disturbed, the screws A, B, and C should be loosened and the armature clamp adjusted to the

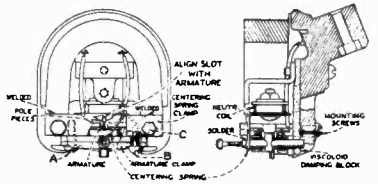


Fig. 14. Details of Pickup

point where the vertical axis of the armature is at right angles to the horizontal axis of the pole pieces, and centered between them. This centering operation may be facilitated by inserting a small rod or nail into the armature needle hole, using it as a lever to test the angular movement of the armature. The limitations of the movement in each direction will be caused by the armature striking the pole pieces. The proper adjustment is obtained when there is equal angular displacement of the armature and adjustment rod or nail to each side of the vertical axis of the magnet and coil assembly. The screws A and B should then be secured, observing care not to disturb the adjustment of the armature clamp. Then place the pickup in a vise and secure the centering spring-clamp by means of the screw C, allowing the centering spring to remain in the position at which the armature is exactly centered between the pole pieces. With a little practice, the correct adjustment of the armature may be readily obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other such foreign materials which would obstruct the movement of the pickup armature.

A-205,A-208 Damping Block A-205E,A-208E

The viscoloid block which is attached to the back end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, it may be done by removing the armature and viscoloid assembly from the mechanism and taking off the old viscoloid block. The surface of the armature which is in contact with the viscoloid should be thoroughly cleaned with fine emery cloth and then inserted into the new block so that it occupies the same position as it did originally. Make certain that the block is in correct vertical alignment with the armature. The hole in the new viscoloid block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the viscoloid aligned on the armature, heat should be applied to the armature (viscoloid side) so that the viscoloid block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron constructed as shown in Fig. 15 will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block and cause a small bulge on both sides. The pickup should then be carefully reassembled and the armature centered as previously explained.

Fig. 15. Special Soldering-iron Tip

Replacing Coils

Whenever there is defective operation due to open or shorted pickup coils, these coils should both be replaced. The method of replacement will be obvious upon inspection of the pickup assembly and by study of the cut-away illustrations. It is important to readjust the armature as previously explained after reassembly of the mechanism. It is also necessary to have the hum and signal coils mounted in proper relation to each other in order that there may be the intended neutralization between them. Make certain that the slot in the center screw of the neutralizing coil is aligned directly over the armature tip, as illustrated. Only rosin core solder should be used for soldering the coil leads in the pickup. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care, due to the fact that the magnet and pole pieces are one unit and the magnetic circuit remains closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to remagnetize the entire structure. This should be done by placing the pickup assembly on the poles of a standard pickup magnetizer and charging the pickup in accordance with the instructions accompanying the magnetizer. It is preferable to check the polarity of the pickup magnet and to remagnetize it so that the same polarity is maintained.

REPLACEMENT PARTS

A-205,A-208

† Indicates Parts Used In Model A-208 Only.
* Indicates Parts Used In Model A-205 Only.

RECEIVER CHASSIS ASSEMBLIES

Stock No.	Description	List Price
RA-402	ARM—Crank arm on changeover shaft for long switching link, pkg. of 2	$0.10
RA-403	ARM—Crank arm on changeover shaft for short switching link, pkg. of 2	.10
RB-006	BOARD—Terminal board near 10 kc filter trimmer condensers	.15
RB-009	BOARD—Terminal board on same bracket as S7	.15
RB-019	BOARD—Three lug terminal board on rear apron near L3	.10
RB-030	BOARD—Terminal board inside AVC 6K7 socket shield	.10
RB-031	BOARD—Terminal board inside 1st and 2nd signal I.F. 6K7 socket shields	.10
RB-033	BOARD—1st, 2nd, 3rd and AVC I.F. Transformer Assembly Board	.35
RB-034	BOARD—Eight lug terminal board on rear chassis apron	.15
†RB-036	BOARD—Phonograph Connector Terminal Board	.20
RB-128	BRACKET—Treble tone control mounting bracket, pkg. of 2	.10
RB-129	BRACKET—Supports switch S10	.10
RB-130	BRACKET—Bracket supporting switch S7, and changeover shaft	.10
RB-131	BRACKET—Volume control mounting bracket, pkg. of 2	.10
RB-132	BRACKET—Bracket for mounting S8 and C16	.15
RC-033	CAPACITOR—.01 mfd.—200 V. Paper (C72)	.25
RC-034	CAPACITOR—.01 md. 200 Volt Paper (C61, C73, C94, C95, C97)	.25
RC-072	CAPACITOR—.05 mfd. 200 V. Paper (C53, C85)	.25
RC-091	CAPACITOR—.05 mfd. 400 V. Paper (C52, C55, C68, C93)	.30
RC-096	CAPACITOR—.1 mfd. 200 V. Paper (C46, C63, C74, C78, C86, C87)	.30
RC-136	CAPACITOR—.25 mfd. 200 V. Paper (C47, C62)	.30
RC-150	CAPACITOR—.25 mfd. 400 V. Paper (C77)	.30
RC-178	CAPACITOR—.5 mfd. 200 Volts Paper (C54, C114)	.40
RC-180	CAPACITOR—.5 mfd. 400 V. Paper (C80)	.50
RC-211	CAPACITOR—50 mmfd. Mica (C70, C71)	.25
RC-213	CAPACITOR—50 mmfd. Low Power Factor Mica (C88, C91)	$0.25
RC-214	CAPACITOR—40 mmfd. Low Power Factor Mica (C67)	.25
RC-228	CAPACITOR—85 mmfd. Low Power Factor Mica (C65)	.25
RC-236	CAPACITOR—100 mmfd. Low Power Factor Mica (C56, C69)	.25
RC-247	CAPACITOR—185 mmfd. Low Power Factor Mica (C51, C57)	.30
RC-252	CAPACITOR—200 mmfd. Low Power Factor Mica (C50, C60)	.30
RC-259	CAPACITOR—250 mmfd. Low Power Factor Mica (C92, C96)	.30
RC-335	CAPACITOR—.001 mfd. Mica (C112)	.30
RC-350	CAPACITOR—.002 mfd. Low Power Factor Mica (C81, C83)	.35
RC-392	CAPACITOR—.005 mfd. Mica (C84)	.50
RC-520	CAPACITOR—20 mfd. 25 V.; 8 mfd. 450 V.; 16 mfd. 50 V. (C75, C79, C76)	2.60
RC-602	CAPACITOR—Permaliner Trimmer Capacitor 10-45 mmfd. (C5, C16, C48, C49, C58, C59, C64, C66, C89, C90)	.50
RC-616	CAPACITOR—10 kc Filter Padder Condenser, 600, 1200 mmfd. (C82)	.65
RC-810	CABLE—Receiver Chassis Power Cable with Plug	2.40
RC-979	CONDUIT—Concentric Transmission Conduit, from S8 to S10	.35
*RC-980	COVER—Cabinet Back Cover Screen	3.75
RC-981	CLAMP—Cable Clamp (near S7), pkg. of 5	.10
RC-982	CLAMP—I.F. Permaliner Trimmer Mounting Clamp, pkg. of 4	.15
RC-983	CUP—Cup for Mounting Permaliner, pkg. of 4	.10
†RC-985	COVER—Cabinet Back Cover Screen	5.95
*RE-008	ESCUTCHEON	1.10
†RE-009	ESCUTCHEON—Escutcheon Front Panel and Under Block	13.15
RG-005	GASKET—Felt Speaker Gasket, pkg. of 2	.25
*RI-003	INSULATOR—Escutcheon Shaft Insulator Bushing, pkg. of 10	.40
RK-002	KNOB—Control Knobs, pkg. of 5	.50
RL-306	COIL—Signal Diode Choke Coil (L40 and L41)	1.15
RL-307	COIL—Bass Tone Control Reactor (L42)	3.40
RL-308	COIL—10 kc Filter Reactor (L44)	3.95
RL-309	COIL—10 kc Filter Reactor (L43)	3.95
RL-401	COIL—1st I. F. Transformer Coil (L32, L33)	$0.95
RL-402	COIL—2nd I. F. Transformer Coil (L34, L35)	.95
RL-403	COIL—3rd I. F. Transformer Coil (L36, L37)	1.00
RL-404	COIL—AVC I.F. Transformer Coil (L38, L39)	1.10
RL-501	COIL—Wave Trap Coil (L3)	.80
RL-906	LINK—Short Switching Link for S9	.10
RL-907	LINK—Long Switching Link for S10	.15
RM-002	METER—Tuning Meter (48)	2.70
*RN-001	NUT—Escutcheon Mounting Nut, pkg. of 10	.45
*RP-014	PLATE—Escutcheon Mounting Plate, pkg. of 2	.25
RP-034	PLUG—Receiver Chassis 8 prong Plug	.20
*RP-035	PLATE—Control Knob Name Plate	.35
RP-036	PIN—Taper Pin in Front End of Changeover Shaft, pkg. of 5	.10
RR-007	RESISTOR—350 ohm ¼ watt (R24), pkg. of 5	.70
RR-010	RESISTOR—1000 ohm ¼ watt Carbon (25), pkg. of 5	.70
RR-016	RESISTOR—5000 ohm ¼ watt Carbon (R-17, R-23, R-33), pkg. of 5	.70
RR-022	RESISTOR—600 ohm ¼ watt Carbon (R16, R32), pkg. of 5	.70
RR-035	RESISTOR—50,000 ohm ¼ watt Carbon (R46), pkg. of 5	.70
RR-042	RESISTOR—75,000 ohm ¼ watt Carbon (R27, R37, R38), pkg. of 5	.60
RR-049	RESISTOR—100,000 ohm ¼ watt Carbon (R15, R28), pkg. of 5	.70
RR-054	RESISTOR—150,000 ohm ⅛ watt Carbon (R41), pkg. of 5	.70
RR-064	RESISTOR—.5 megohm ¼ watt Carbon (R31), pkg. of 5	.60
RR-068	RESISTOR—2 megohm ¼ watt (R19, R30), pkg. of 5	.60
RR-163	RESISTOR—2000 ohm ½ watt Carbon (R14, R18, R26, R35, R42, R48), pkg. of 5	.70
RR-202	RESISTOR—1 megohm ½ watt Carbon (R47), pkg. of 5	.60
RR-281	RESISTOR—40,000 ohms 2 watt Carbon (R43)	.30
RR-627	RESISTOR—3700 ohms 10 watt (R21, R22)	.45
RR-628	RESISTOR—5000 ohm 10 watt (R44)	.45
RR-631	RESISTOR—10,000 ohm 10 watt (R49)	.45
RR-712	RESISTOR—1270 ohm 20 watt (R20)	.45
RR-900	REFLECTOR—Dial Light Reflector	.15
RS-126	SHIELD—AVC Diode Socket Shield Can	.15
RS-127	SHIELD—Signal Diode Socket Shield Can	.15
RS-128	SHIELD—1st I.F. 6K7 Tube Socket Shield Can	.30
RS-129	SHIELD—2nd I.F. 6K7 Tube Socket Shield Can	.30
RS-130	SHIELD—AVC 6K7 Tube Socket Shield Can	.30
RS-131	SHIELD—1st I.F. Transformer Shield Can	.30
RS-132	SHIELD—2nd I.F. Transformer Shield Can	.30
RS-133	SHIELD—Shield Can for 3rd I.F. Transformer, AVC I.F. Transformer and Signal Diode Detector Plate Choke	.30
*RS-134	SHIELD—Base Shield with Mounting Feet	2.75
†RS-135	SHIELD—Base Shield with Mounting Feet	2.80
RS-200	SOCKET—Eight Pin Tube Socket, pkg. of 5	.75
RS-318	SWITCH—Toggle Switch near Sentry Box (S8)	1.00
RS-319	SWITCH—Toggle Switch next to AVC 6K7 Socket Shield (S10)	1.90
RS-320	SWITCH—Rear Hi-Fidelity Changeover Toggle Switch (S7)	2.45
RS-413	SPRING—Spring on Back End of Changeover Shaft, pkg. of 4	.10
RS-414	SPRING—Spring on Long and Short Switching Links, pkg. of 4	.10
*RS-802	SENSITIVITY CONTROL—20,000 ohm Resistor (R34)	.95
†RS-803	SENSITIVITY CONTROL—20,000 ohm (R34)	.95
*RS-903	SHAFT—High Fidelity Switch Shaft Assembly	4.75
†RS-904	SHAFT—High Fidelity Switch Shaft Assembly	4.75
*RT-702	TONE CONTROL—Bass Tone Control 250,000 ohm Potentiometer (R45)	.95
*RT-706	TONE CONTROL—Treble Tone Control and Power Switch 100,000 ohm Potentiometer (R50, S11)	1.20
RT-707	TUNING METER CONTROL—4000 ohm Potentiometer (R29)	.90
†RT-708	TONE CONTROL—Bass Tone Control 250,000 ohm Potentiometer (R45)	.95
†RT-709	TONE CONTROL—Treble Tone Control Switch 100,000 ohm Potentiometer (R50, S11)	1.25
*RV-010	VOLUME CONTROL—3 Section (R1, R36, R40)	4.30
†RV-011	VOLUME CONTROL—3 Section (R1, R36, R40)	4.50
*RW-002	WINDOW—Dial Window	.15
†RW-003	WINDOW—Dial Window	.35
RW-101	WASHER—Felt Washer for Control Shafts, pkg. of 10	.45
RX-004	SCREW ASSEMBLY—Chassis Mounting Screw Assembly	.10

"SENTRY BOX" ASSEMBLIES

Stock No.	Description	List Price
RB-010	BOARD—Connection Terminal Boards on Top Side of Sentry Box	.10
RB-012	BOARD—Ant. and Ground Terminal Board	.15
RB-127	BRACKET—Toggle Switch Mounting Bracket for S9	.15
RC-034	CAPACITOR—.01 mfd 200 V. Paper (C17)	.25
RC-072	CAPACITOR—.05 mfd. 200 V. Paper (C14, C29)	.25
RC-096	CAPACITOR—.1 mfd. 200 V. Paper (C9, C24)	.30
RC-123	CAPACITOR—.1 mfd. 400 V. Paper (C21, C40)	.35
RC-136	CAPACITOR—.25 mfd. 200 V. Paper (C11, C27)	.30
RC-202	CAPACITOR—4 mmfd. Low Power Factor Mica (C6, C19)	.25
RC-211	CAPACITOR—50 mmfd. Low Power Factor Mica (C31, C42)	.25
RC-212	CAPACITOR—40 mmfd. Low Power Factor Mica (C32)	.25
RC-228	CAPACITOR—85 mmfd. Low Power Factor Mica (C15)	.25
RC-289	CAPACITOR—400 mmfd. Mica (C35)	.25
RC-340	CAPACITOR—1230 mmfd. Low Power Factor Mica (C38)	.50
RC-349	CAPACITOR—.002 mfd. Low Power Factor Mica (C10, C13, C23, C25, C28, C41)	.30
RC-353	CAPACITOR—3200 mmfd. Mica (C43)	.70
RC-602	CAPACITOR—10-45 mmfd. Permaliner Trimmer Capacitor (C33, C34, C36)	.50
RC-603	CAPACITOR—5-25 mmfd. Permaliner Trimmer Capacitor (C4, C7, C8, C12, C18, C20, C22, C26, C30, C37, C39, C44, C45)	.55
RC-702	CONDENSER—Three Gang Tuning Condenser	4.25
RG-001	GRID GAP, pkg. of 5	.10
RG-100	GUARD—Terminal Strip Guard	.15
RL-003	COIL—Ant. Coil Band A (L1 and L2)	1.00
RL-014	COIL—Ant. Coil Band B (L4 and L5)	.75
RL-015	COIL—Ant. Coil Band C (L6, L7)	.65
RL-016	COIL—Ant. Coil Band D (L8 and L9)	.60
RL-103	COIL—R. F. Coil Band A (L12 and L13)	1.60
RL-116	COIL—R. F. Coil Band B (L14 and L15)	1.05
RL-117	COIL—R. F. Coil Band C (L16 and L17)	.65
RL-118	COIL—R. F. Coil Band D (L18 and L19)	.60
RL-119	COIL—R. F. Coil Band E (L20 and L21)	.60
RL-207	COIL—Osc. Coil Band A (L22 and L23)	.70
RL-217	COIL—Osc. Coil Band B (L24 and L25)	.85
RL-218	COIL—Osc. Coil Band C (L26 and L27)	.60
RL-219	COIL—Osc. Coil Band D (L28 and L29)	.60
RL-220	COIL—Osc. Coil Band E (L30 and L31)	.85
RR-001	RESISTOR—350 ohm ¼ watt Carbon (R2), pkg. of 5	.70
RR-015	RESISTOR—5000 ohm ¼ watt Carbon (R3, R12), pkg. of 5	.70
RR-022	RESISTOR—600 ohm ¼ watt Carbon (R13), pkg. of 5	.70
RR-036	RESISTOR—50,000 ohm ¼ watt Carbon (R5, R10), pkg. of 5	.70
RR-049	RESISTOR—100,000 ohm ¼ watt Carbon (R4, R6, R8), pkg. of 5	.70
RR-163	RESISTOR—2000 ohm ½ watt Carbon (R7, R9), pkg. of 5	.70
RR-192	RESISTOR—50,000 ohm ½ watt Carbon (R11), pkg. of 5	.70
RR-304	RESISTOR—Dial Light Series Resistor .8 ohm (R68), pkg. of 5	.70
RS-111	SHIELD—Osc. Compartment Shield Can	1.20
RS-112	SHIELD—R.F. Compartment Shield Can	1.25
RS-125	SHIELD—Ant. Compartment Shield Can	1.25
RS-303	SWITCH—Osc., R. F. or Ant. Band Change Switch (S5, S6, or S3, S4, or S1, S2)	1.20
RS-317	SWITCH—Toggle Switch (S9)	1.05
RX-002	CUSHION ASSEMBLY—Tuning Condenser Mounting Cushions, Nut and Washers	.10

POWER UNIT CHASSIS ASSEMBLIES

Stock No.	Description	List Price
RB-008	BOARD—Two Lug Terminal Board	$0.10
RB-032	BOARD—7 Lug Terminal Board	.15
RC-031	CAPACITOR—.008 mfd. 1500 V. Paper (C99, C100)	.25
RC-099	CAPACITOR—.1 mfd. 200 V. Paper (C98)	.25
RC-196	CAPACITOR—.5 mfd. 500 V. Paper (C115, C116)	.75
RC-296	CAPACITOR—.0005 mfd. 500 V. Mica (C102, C103)	.25
RC-411	CAPACITOR—30 mfd. 510 V. Wet Electrolytic (C101, C106, C110)	1.55
RC-512	CAPACITOR—50 mfd. 50 V. Dry Electrolytic (C107)	1.75
RC-515	CAPACITOR—16 mfd. 500 V. Dry Electrolytic (C104, C105)	2.70
RC-751	CAPACITOR—Twin .01 mfd. Line Capacitors (C108 and C109)	.45
†RC-813	CABLE—Cable and female plug for connection to phono. lamp cable	.90
†RC-814	CABLE—Cable and female plug for connection to phonograph motor	.90
RC-859	CORD—Power Cord	.60
RC-978	COVER—Fuse Cover	.10
RF-009	FOOT—S.P.U. Chassis Mounting Foot Assembly	.25
RL-304	COIL—Filter Reactor (L11)	7.45
RL-305	COIL—Speaker Filter Coil (L10)	.60
RR-012	RESISTOR—500 ohm ¼ watt Carbon (R53, R54, R55, R56, R57, R58) (Pkg. of 5)	.70
RR-309	RESISTOR—15 ohm 1 watt Flexible (R70, R71) (Pkg. of 5)	.90
RR-628	RESISTOR—5000 ohm Vitreous Enamel (R-51, R-52)	.45
RR-705	RESISTOR—50 ohm Vitreous Enameled (R61, R62, R63, R64, R65, R66)	.40
RR-708	RESISTOR—90 ohm Vitreous Enameled Resistor (R69)	.75
RR-709	RESISTOR—450 ohm Vitreous Enamel (R59)	.40
RR-710	RESISTOR—40 ohm Center Tapped Candohm (R67)	.35
RR-711	RESISTOR—15,000 ohm Vitreous Enamel (R72, R73)	.50
RR-851	RECEPTACLE—Fuse Receptacle	.45
RS-161	SHIELD—"T" shaped Partition Shielding T1 and T2	.30
RS-207	SOCKET—Six Prong Socket for Speaker Plugs	.35
RS-208	SOCKET—8 Prong Socket Receiver Chassis Plug	.25
RS-209	SOCKET—8 Prong Socket for 6F6 Power Tubes, (Pkg. of 5)	.80
RT-191	TRANSFORMER—Power Transformer 105-130 V. 60 C. (T3)	25.90
RT-192	TRANSFORMER—Power Transformer 105-130 V., 25-60 C. (T3)	37.50

Stock No.	Description	List Price
RT-193	TRANSFORMER—Power Transformer 105-130 and 200-250 V. 40-60 cycles (T3)	31.80
RT-410	TRANSFORMER—Output Transformer (T1)	10.25
RT-503	TRANSFORMER—Interstage Transformer (T2)	10.30
RW-103	WASHER—Insulating Washer for Mounting Capacitor (C106) (Pkg. of 10)	.20
RW-104	WASHER—Insulating Washer for Mounting C104 and C105 (Pkg. of 4)	.15

DIAL MECHANISM ASSEMBLY

Stock No.	Description	List Price
RB-114	BRACKET—Precision Tuning Indicator Bracket (14)	$0.15
RB-120	BRACKET—Dial Mechanism Supporting Post	.15
RB-125	BRACKET—Mounting Bracket Assembly	.90
RB-126	BRACKET—Dual Lamp Bracket	.25
RC-802	CABLE—Metal Braid Dial Cable (12) (Pkg. of 5)	.55–5
RC-856	CORD—Dial Cord (11) (Pkg. of 5)	.65–5
RC-954	CAP—Scale Cap Assembly Gear End (29)	.10
RC-955	CAP—Scale Cap Free End (30)	.10
RC-957	COLLAR—Microlog Retaining Split Collar (Pkg. of 5)	.10–5
RC-962	COLLAR—Precision Drive Gear Shaft Collar External (44)	.15
RC-963	COLLAR—Precision Drive Gear Shaft Collar Internal (45)	.15
RD-009	DRUM—Tuning Condenser Drive Drum & Gear Teeth	.45
RD-010	DIAL—Precision Dial and Pinion Gear (20)	$0.60
*RD-022	DRIVE—Differential Reduction Drive	1.00
RD-023	DIAL—Cylindrical Dial Scale	.65
†RD-026	DRIVE—Differential Drive	1.00
RF-200	FASTENER—Dial Fastener (40) (Pkg. of 10)	.10–10
RG-002	GEAR—Dial Gear Assembly and Set Screws (8 & 9) 2 Screws Fil. Hd. 4-40 x 5/32 cup pt.	.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)	.15–5
RI-004	INDEXING PLATE—Front Plate and Set Screw for Band Switch Shaft	.50
*RP-033	POINTER—Dial Pointer (Pkg. of 2)	.20–2
†RP-038	POINTER—Dial Pointer (Pkg. of 2)	.15–2
RS-401	SPRING—Drum Spring (13) (Pkg. of 2)	.10–2
RS-402	SPRING—Precision Dial Backlash Spring (16)	.15
RS-403	SPRING—Dial Scale Spring (7) (Pkg. of 2)	.10–2
RS-500	STUD—Precision Dial Gear Stud	.20
†RS-905	SHAFT—Round and Flat Shafts and Gear for Band Change Switch (6)	.45
*RS-906	SHAFT—Round and Flat Shafts and Gear for Band Change Switch (6)	.40

SPEAKER ASSEMBLIES

Stock No.	Description	List Price
RB-035	BOARD—Speaker Terminal Board Assembly	$0.10
RC-811	CABLE—Speaker Cable	.40
RC-903	CONE—11" Type Cone and Voice Coil and Gasket	1.50
RC-960	CLAMP—Speaker Cable Clamp	.10
RC-984	CUSHION—Rubber Speaker Mounting Cushion (Pkg. of 8)	.30
RP-037	PLUG—6 Pin Speaker Plug	.25
RR-801	RING—Cone Clamping Ring (Pkg. of 4)	.40
RS-021	SPEAKER—Single 11" Type Reproducer Complete	17.50
RX-014	SCREW ASSEMBLY—Nuts, Bushings, and Washers for Mounting One Speaker	.50

PHONOGRAPH REPLACEMENT PARTS, RECORD CHANGING MECHANISM

Stock No.	Description	List Price
RC-965	CAM—Cam and Gear Assembly	$1.18
RC-966	CLUTCH—Trip Lever Friction Clutch	.30
RC-967	COVER—Metal Cover for Trip Lever and Friction Finger Assembly	.36
RF-400	FINGER—Manual Index Lever Finger Assembly	.25
RF-401	FINGER—Friction Finger Assembly	.32
RL-901	LEVER—Manual Index Lever—Less Pin	.62
RL-902	LEVER—Main Lever and Link Assembly	2.10
RL-903	LEVER—Main Spring Lever	.42
RL-904	LEVER—Pick-up Arm Cable Lever Assembly—Comprising Lever with Cable, Screw, Spring and Nut	.40
RL-905	LEVER—Trip Lever and Friction Clutch Assembly	.94
RP-018	PAWL—Trip Pawl Assembly	.40
RP-019	PLATE—Eject Arm Actuating Plate Assembly	.50
RS-405	SPRING—Actuating Spring—pkg. of 10	.24
RS-406	SPRING—Cable Lever Tension Spring—pkg. of 10	.44
RS-407	SPRING—Manual Index Lever Finger Tension Spring—pkg. of 10	.30
RS-408	SPRING—Main Spring Lever Tension Spring—pkg. of 10	.38
RS-409	SPRING—Trip Lever Latch Plate Tension Spring—pkg. of 10	.30
RS-850	SCREW—Cable Lever Screw and Nut, pkg. of 10	.60
RS-851	SCREW—Manual Index Lever Finger Set Screw—pkg. of 10	.20
RS-852	SCREW—Trip Lever Clutch Tension Adjustment Screw—pkg. of 10	.22
RS-853	SCREW—Special Screw Used to Fasten Main Lever and Link Assembly Bushing—pkg. of 10	.30
RS-950	SPACER—Pick-up Arm Mounting Spacer	.28
RW-100	WASHER—Spring Washer "U" Type—pkg. of 10	.25

PICK-UP AND ARM ASSEMBLIES

Stock No.	Description	List Price
RA-401	ARM—Pick-up Arm Complete—Less Pick-up Mounting Screw, Escutcheon and Pick-up Unit	$4.80
RA-500	ARMATURE—Pick-up Armature	.72
RB-600	BACK—Pick-up Back	.52
RC-806	CABLE—Pick-up Arm Operating Cable—pkg. of 5	1.00
RC-971	COVER—Pick-up Front Cover	.22
RC-972	COVER—Pick-up Back Cover with Mounting Screws	.14
RD-100	DAMPER—Pick-up Damper—pkg. of 5	.65
RL-800	COIL—Pick-up Coil (L-29)	.80
RL-801	COIL—Pick-up Hum Bucking Coil (L-32)	.60
RP-021	PICK-UP—Pick-up Unit Complete	4.80
RS-856	SCREW—Pick-up Front Cover Screw—pkg. of 10	.42
RS-857	SCREW—Pick-up Needle Screw—pkg. of 10	$0.42
RX-007	SCREW ASSEMBLY—Screw, Nut and Washer for Mounting Pick-up to Arm—pkg. of 10	.40

MOTOR BOARD ASSEMBLIES

Stock No.	Description	List Price
RC-973	COVER—Turntable Cover	$0.88
RE-006	EXCUTCHEON—Index Escutcheon Engraved Manual—12-10	.44
RN-002	NUT—Cap Nut for Motor Board Suspension Assembly, pkg. of 4	.40
RP-022	Manual Index Pin	.42
RR-902	ROLLER—Pick-up Arm Cable Guide Roller—Comprising Bracket, Roller and Guide Pin	.34
RR-903	REST—Pick-up Rest	.14
RS-307	SWITCH—Motor Switch, Toggle Type (S-9)	.72
RT-901	TURNTABLE—Turntable Complete	2.90
RX-008	SPRING ASSEMBLY—Suspension Spring, Washer and Bolt Assembly for Motor Board—Comprising One Bolt, Two Cup Washers, Two Springs, Two "C" Washers and One Cap Nut	.42

AUTOMATIC SWITCH ASSEMBLIES

Stock No.	Description	List Price
RC-974	COVER—Motor Switch Cover	$0.26
RP-023	PLATE—Automatic Brake Latch Plate—pkg. of 5	.40
RS-308	SWITCH—Automatic Switch Complete	1.90
RS-309	SWITCH—Motor Switch	.75
RS-412	SPRINGS—Automatic Brake Springs—pkg. of 2	.50

MISCELLANEOUS ASSEMBLIES

Stock No.	Description	List Price
RB-020	BOARD—Terminal Board for Pick-up Leads	$0.15
RB-510	BOX—Used Needle Box	.40
RB-601	BASE—Phonograph Compartment Lamp Base	.55
RC-807	CABLE—Motor Connection Cable	.50
RC-812	CABLE—Phonograph Input Transformer Cable	.45
RC-975	COVER—Cap Cover for RP-028	.25
KK-003	KNOB—Radio-Phono Switch Knob	.25
RP-017	PLATE—Radio-Phono Switch Metal Nameplate	.25
RP-024	PLUG—Two-contact Female Connector Plug—Round	.60
RP-025	PLUG—Two Contact Male Connector Plug—Round	.20
RP-026	PLUG—Two-contact Female Connector Plug—Flat	.45
RP-027	PLUG—Two-contact Male Connector Plug—Flat	.45
RR-850	RECEPTACLE—New Needle Card Holder	.38
RS-310	SWITCH—Radio-phono Switch (S-10)	1.65
RS-502	SHADE—Phonograph Compartment Lamp Shade	.16
RT-601	TRANSFORMER—Phonograph Input Transformer includes R-69, C-113	5.42

MOTOR ASSEMBLIES

Stock No.	Description	List Price
RM-100	MOTOR—105-130 volts, 25 cycles (M-1)	$36.48
RM-102	MOTOR—105-130 volts, 50 cycles (M-1)	25.88
RM-103	MOTOR—105-130 volts, 60 cycles (M-1)	25.88
RX-006	SPRING ASSEMBLY—Motor Mounting Spring Washer and Stud Assembly—Comprising Six Springs, Six Cup Washers, Three Spring Washers and Three Studs	.58

EJECT ARM ASSEMBLIES

Stock No.	Description	List Price
RA-400	ARM—Eject Arm Complete	$0.82
RB-300	BALL—1/4-in. Diameter Steel Ball—pkg. of 10	.20
RB-301	BALL—1/8-in. Diameter Steel Ball—pkg. of 20	.25
RB-121	BRACKET—Eject Arm Bracket	1.72
RB-400	BEARING—Ejector Tip Bearing and Nut	.32
RC-968	COLLAR—Eject Arm Shaft Collar and Set Screw	.24
RC-969	COVER—Eject Arm Cover	1.52
RC-970	CUSHION—Counter Balance Roller Cushion—Located Inside of Eject Arm	.14
RP-020	POST—Vertical Adjustment Post—Located on Eject Arm Bracket	.30
RR-901	ROLLER—Eject Arm Counter Balance Roller—Located Inside of Eject Arm	.45
RS-410	SPRING—Eject Arm Bracket Spring—pkg. of 10	.30
RS-411	SPRING—Ejector Tip Spring—pkg. of 10	.42
RS-501	SILENCER—Ejector Tip Silencer	.14
RS-854	SCREW—No. 6-32 1/8-in. Square Head Set Screw for Eject Arm Collar—pkg. of 10	.25
RS-855	SCREW—No. 8-36 1/32-in. Special Screw for Eject Arm Tip Center Adjustment—pkg. of 10	.14
RS-902	SHAFT—Eject Arm Vertical Action Shaft and Collar Assembly	.15
RT-900	TIP—Ejector Tip with Tip Center, Adjusting Screw and Cap	.32
RY-001	YOKE—Eject Arm Yoke Assembly	.94

MODELS A-205E, A-208E
Specifications

GENERAL ELECTRIC CO.

"Colorama" Data
Voltage

MODELS A-205E AND A-208E

PHYSICAL SPECIFICATIONS

	A-205E	A-208E
Model		
Height	46 5/16 in.	40 1/16 in.
Width	33 5/8 in.	53 1/4 in.
Depth	18 11/16 in.	21 5/16 in.
Weight Packed	239 lb	430 lb

Tuning Control Drive Ratio
Fast Tuning Drive Ratio. . . 5½ to 1
Slow Tuning Drive Ratio. . . 55 to 1
Band Spread Dial Ratio . . . 12 to 1

ELECTRICAL SPECIFICATIONS

RATING LABEL	POWER SUPPLY VOLTS	FREQUENCY (CYCLES)	POWER CONSUMPTION (WATTS)
A	105-130	60	325

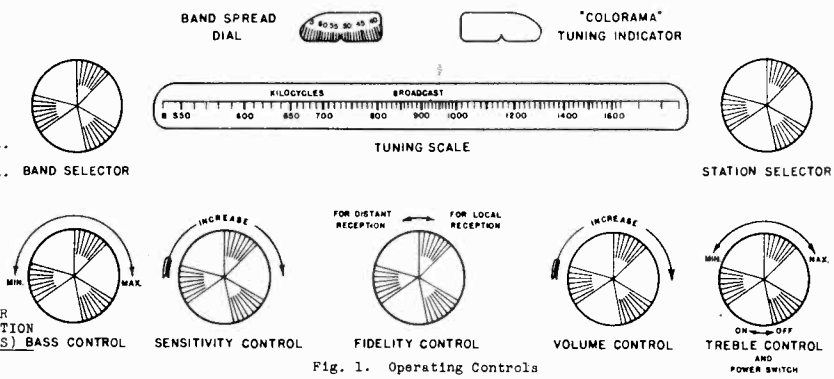


Fig. 1. Operating Controls

Tuning Frequency Range
Band "A" ..... 140 - 410 K.C.
Band "B" ..... 540 - 1650 K.C.
Band "C" ..... 1650 - 5450 K.C.
Band "D" ..... 5450 - 18,000 K.C.
Band "E" ..... 18,000 - 41,000 K.C.

Intermediate Frequency ..... 465 K.C.

Electrical Power Output
Low frequency audio channel output ..... 40 Watts
High frequency audio channel output ..... 10 Watts

Loudspeakers - Electrodynamic
Low frequency audio channel .... 2 speakers
Cone 10½-inch
Total Series Impedance ..... 12 ohms at 400 cycles
High frequency audio channel ... 1 speaker
Cone 8-inch
Voice coil impedance ..... 5.5 ohms at 400 cycles

Phonograph Pickup, Model A-208E Only
Viscoloid Damped
Pickup Coil Impedance ..... 4.6 ohms at 1000 cycles

Record Changer, Model A-208E Only
Record Ejector Type
Capacity: Nine 10-in. records or eight 12-in. records
Turntable Speed: 78 Rpm
Time to complete record-changing cycle: 4½ seconds

Tubes
R.F. Amplifier.....6K7 Super Control Amplifier
Converter .....6L7 Pentagrid Mixer Amplifier
Oscillator ..... 6C5 Low Mu Triode
1st I.F. Amp (Select.)... 6K7 Super Control Amp
2nd I.F. Amp (Select.)... 6K7 Super Control Amp
1st I.F. Amp (Fidelity).. 6K7 Super Control Amp
Detector, A.V.C. (Fidelity)..... 6H6 Twin Diode
Detector, Color Tuning Amp
A.V.C. (Select.).... 6B8 Duplex-diode Pentode
1st Audio Amp
(Hi.freq. channel)..... 6C5 Low Mu Triode
2nd Audio Amp
(Hi.freq. channel).... 6F6 (Triode connected)
1st Audio Amp
(Lo freq. channel)..... 6C5 Low Mu Triode
2nd Audio Amp
(Lo freq. channel) ... 6F6 (Triode connected)
Output push-pull
(Hi.freq. channel)..... 6F6 Power Amplifier
Output push-pull
(Lo freq. channel)6L6 Power Amplifier Tetrode
Power rectifiers..... 3 - 5Z4 Parallel
Dial Lamps (three)..... Mazda No. 46
Tuning Lamp (Red) RL-917
Tuning Lamp (Green) RL-918

Colorama Tuning Indicator

These receivers are equipped with a novel tuning aid located directly above the tuning scale. When no signal is being received, the indicator will be red in color, but as a station is tuned in, the indicator will change to green. Powerful stations will produce the darkest green color. When the Fidelity Control is in the "Local Reception" position, some stations may not cause the indicator to flood green. Such stations may be considered of insufficient power to be satisfactorily received in the "Local Reception" position.

For Method of Service Procedure-Sentry Box, Adjustment of Dial Mecharism. Phonograph Service DataModel A208 ONLY, Automatic Record Ejector, Automatic Record Changer Adjustments. Alignment Frequencies Visual Alignment of I F, R.F. "Sentry Box" Alignment Adjustments, Alignment of bards A, B, C, D, and E, Adjustment of Wave Trap and 10KC Trap SEE MODELS A205, A208.

Alignment of Fidelity Channel (#2)
1. Turn band selector to broadcast band position; sensitivity control to maximum; fidelity control to "Local Reception" position (clockwise).
2. Connect the vertical plates of the oscilloscope across the volume control (R-81).
3. Connect the test oscillator to the control grid of the "Fidelity" I.F. Amplifier (6K7), through a .05 mfd. capacitor.
4. Adjust the 2nd I.F. Fidelity transformer trimmers so that a symmetrical curve is obtained with a distinct dip in the center.
5. Move the test oscillator lead to the converter (6L7) control grid and adjust the 1st I.F. transformer trimmers. The curve obtained should be symmetrical and of maximum amplitude.

Alignment of Selective Channel (#1)
1. Set Fidelity control to "Distant Reception" position (counterclockwise).
2. Connect the test oscillator to the control grid of the "Selective" 2nd I.F. amplifier (6K7) and adjust the 3rd I.F. Selective channel transformer trimmers for a single, symmetrical curve of maximum amplitude.
3. Move the test oscillator lead to the control grid of the "Selective" 1st I.F. Amplifier (6K7) and adjust the 2nd I.F. Selective channel transformer trimmers.
4. Place the test oscillator lead on the control grid of the 6L7 converter and examine the curve for symmetry and height. Since the trimmers on the 1st I.F. transformer were adjusted when the Fidelity channel alignment was made, no further adjustment of these trimmers should be necessary.

Alignment of Color Tuning Transformer
1. Connect the vertical plates of the oscilloscope at the junction of R-39 and R-40, and ground.
2. Apply the test oscillator lead to the control grid of the selective 1st I.F. amplifier (6K7).
3. Adjust color tuning transformer trimmers for a sharp curve of maximum amplitude.

SOCKET VOLTAGES

	CONTROL GRID TO GROUND VOLTS D-C	CATHODE TO GROUND VOLTS D-C	SCREEN GRID TO GROUND VOLTS D-C	PLATES TO GROUND VOLTS D-C	HEATER VOLTS A-C
6K7 R.F. Amp	AVC	3	90	230	6.3
6L7 Converter	AVC	5	90	230	6.3
6C5 Oscillator	...	Grounded	..	130	6.3
6K7 1st I.F. Amp (Select.)	AVC	4	90	230	6.3
6K7 2nd I.F. Amp (Select.)	0	4	90	230	6.3
6K7 1st I.F. Amp (Fidelity)	0	4	90	230	6.3
6H6 Det. A.V.C. (Fidelity)	...	Grounded	..	...	6.3
6B8 Det. Color Tuning Amp A.V.C. (Select.)	...	Grounded	80	220	6.3
6C5 1st A.F. Amp (Hi-freq. channel)	0	5	..	125	6.3
6F6 2nd A.F. Amp (Hi-freq. channel)	0	15	160	160	6.3
6C5 1st A.F. Amp (Lo-freq. channel)	0	5	...	132	6.3
6F6 2nd A.F. Amp (Lo-freq. channel)	0	20	250	250	6.3
6F6 Output PP (Hi-freq. channel)	25	Grounded	302	290	6.3
6L6 Output PP (Lo-freq. channel)	25	Grounded	302	375	6.3
5Z4 rectifiers (3)	...	410	...	...	5.0

Line voltage 115 - no signal input - 1000 ohms per voltmeter -- dial pointer at 530 KC- Fidelity switch on "Local Reception" position - Sensitivity Control clockwise.

TUBE CURRENTS

TUBE	*6L6 OUTPUT	*6F6 OUTPUT	6F6 DRIVER	5Z4 RECTIFIER
Cathode Current	54-60 MA	33-40 MA	20-22 MA	113 MA each

*When replacing a power output tube, the cathode currents of the two output tubes should be within ten per cent of each other.

GENERAL ELECTRIC CO.

MODELS A-205E, A-208E
Schematic

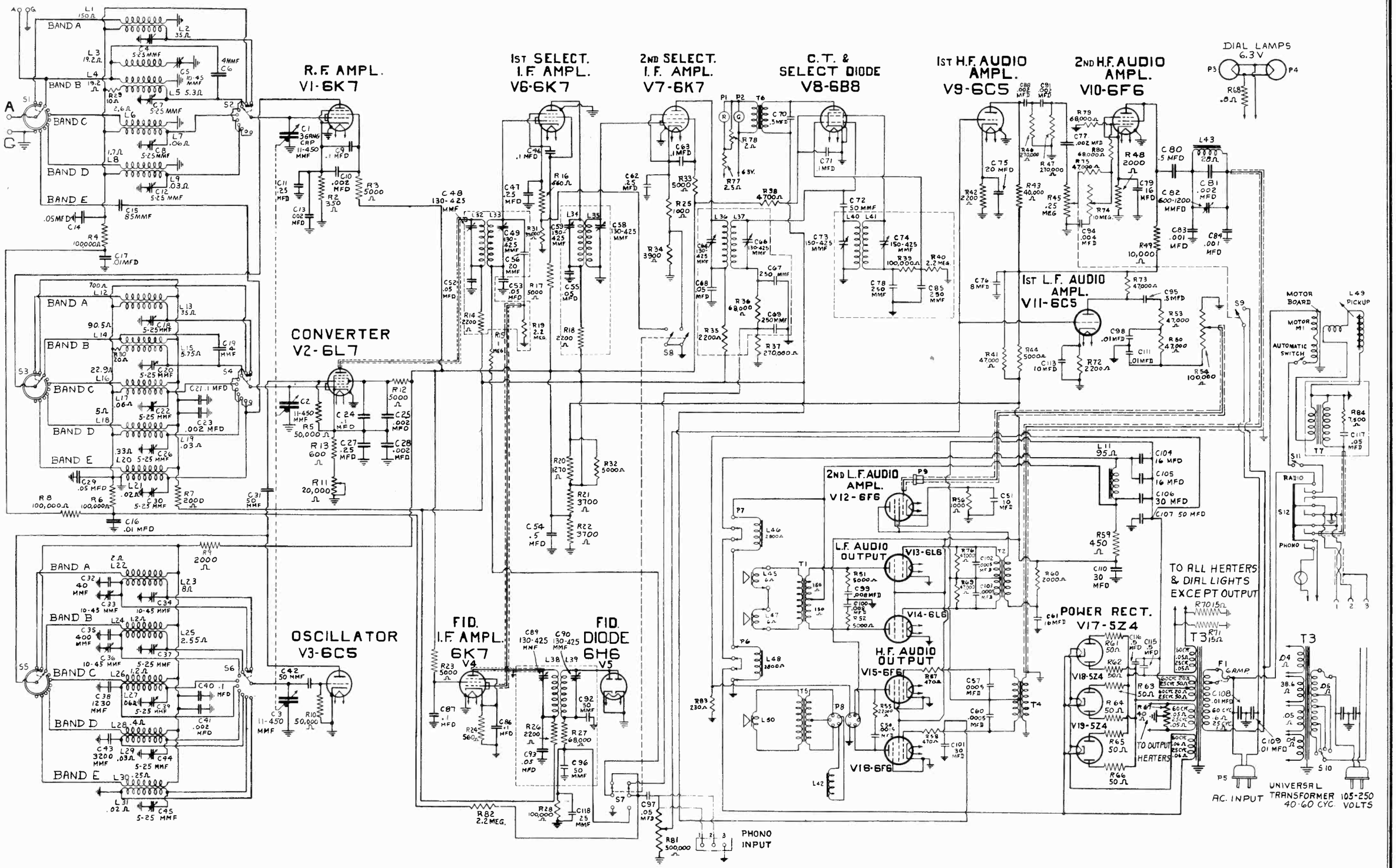


Fig. 3. Schematic Circuit Diagram

Trimmers

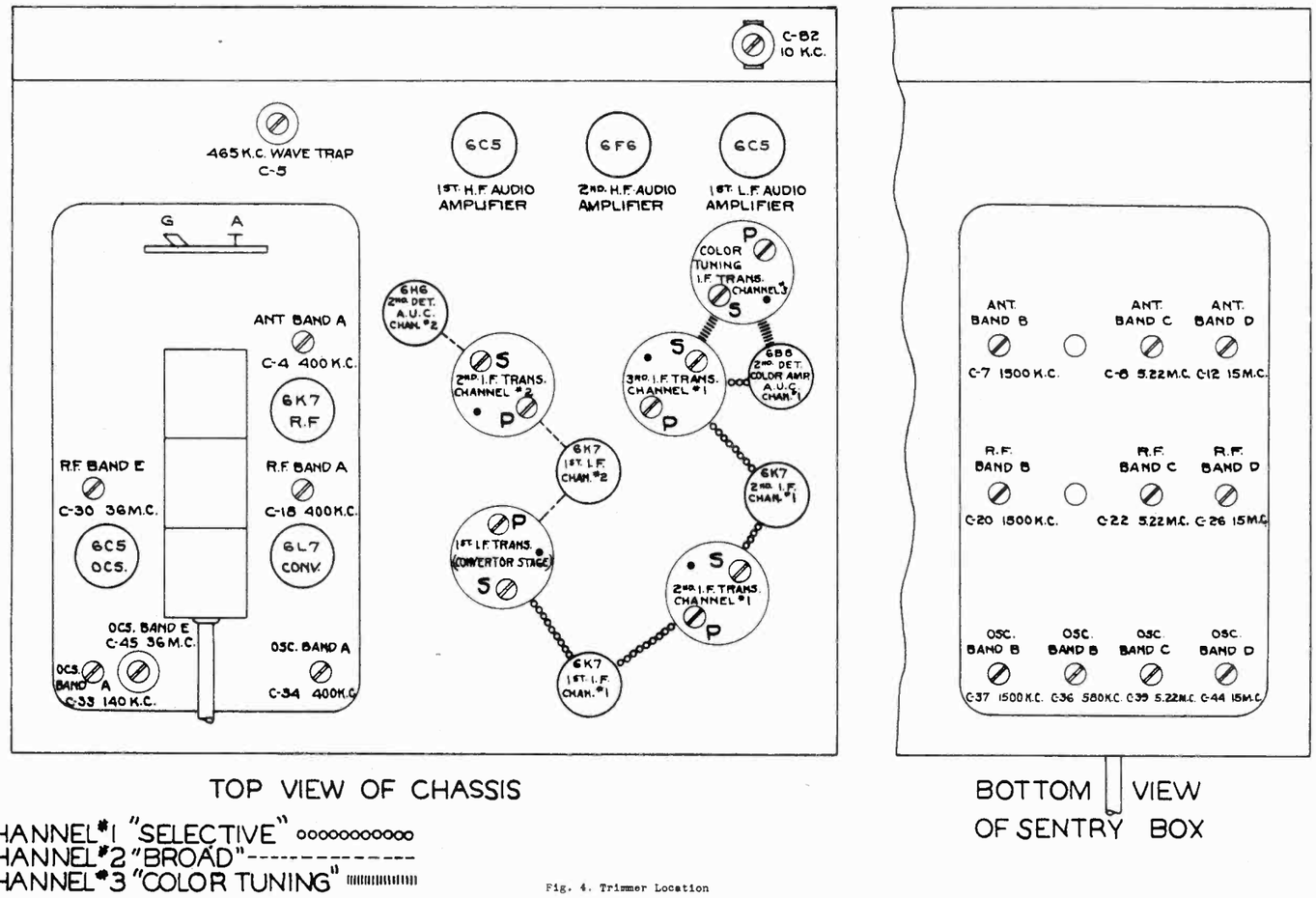


Fig. 4. Trimmer Location

Phono. Data, Installation

MODEL A-208E
PHONOGRAPH OPERATION

The volume and tone for phonograph reproduction are regulated by the volume, Bass and Treble controls on the radio panel, while the mechanical operations of the phonograph are regulated by controls located in the phonograph compartment.

For automatic operation, the turntable accommodates a stack of seven or eight records at one loading, the maximum number depending on the thickness and variations in flatness of the records selected. In loading the turntable, all records selected for the stack must be of the same nominal diameter (either 10 or 12 inches). Record changing is accomplished by the Record Ejector, which swings to the left after each selection, carrying the top record from the turntable to the eject pocket at the side of the cabinet. The last or bottom record, however, remains on the turntable and will be repeated until the mechanism is attended.

The following steps are necessary to prepare to play records:

1. Turn the Power Switch "ON" (Fig. 1), making sure the Motor Switch is "OFF" (Fig. 2).
2. Set the Radio-Phono Switch to "Phono" (Fig. 2).
3. With Index Lever at "Manual" (Fig. 2), insert needle in electric pickup and place pickup on rubber rest.
4. Raise Record Ejector Arm to upright position; load records on turntable, then lower Ejector carefully on motor spindle.

Do not attempt to overload the turntable; it is fully loaded when the uppermost record is nearly flush with the top of the spindle, but will not slide off when pushed laterally at the edge. Further, each record must be equipped with an eccentric or spiral "stopping" groove near the center, that groove being depended upon to initiate the automatic mechanism. Use a flat, unwarped record at the bottom of the stack on the turntable. Make sure that the record eject pocket is empty beforeproceeding.

Care also should be observed in the choice of needles that will afford satisfactory reproduction. The orange Chromium needle is recommended for general-purpose use and should play approximately 75 consecutive selections. As alternatives, green Chromium or full-volume Tungstone needles may be used. With care, the former should play approximately 100 and the Tungstone from 100 to 150 selections. Never replace a partially worn Chromium needle (either green or orange) in the pickup, as damage to records would result. Also, do not play transparent-face (illustrated) or Victrolac records with the Tungstone needle.

After the above steps have been carried out, the phonograph is placed in operation as follows:

1. Place electric pickup on smooth outer rim of record; then--for automatic operation only - move the Index Lever to position "10" or "12," corresponding to the diameter of records on the turntable. Do not move the Index Lever from the "Manual" position until the pickup is set on the rim of the record; also be careful not to move the Index Lever beyond the proper hole. For playing records individually, leave the Index Lever at "Manual."
2. Turn the Motor Switch "on" and see that the needle is in the outermost groove of the record.
3. Close the cabinet lid and adjust the Volume Control for the desired volume level. The Volume, Bass and Treble Controls, on the radio panel, control volume and tone both for radio reception and for phonograph reproduction. Set the Tone Controls for full-range reproduction (clockwise); if needle scratch reproduction is considered excessive, decrease treble response slightly.

Note 1. To reject any record being played automatically, lift the electric pickup, move the pickup arm to the extreme left and hold lightly until again moved by the mechanism. The last record on the turntable will be played repeatedly until the motor is stopped.

Note 2. For correct automatic operation, the instrument must be level. After a record has been played and changed, the needle is lowered automatically onto the smooth rim of the next record and is fed by gravity into the starting groove. After leveling with reference to the top of the cabinet, further slight compensation may be necessary, thus: (1) If the needle fails to enter the playing groove, the right-hand side of the instrument must be raised by inserting thin blocks under the cabinet on that side; or (2) if the needle slides over several grooves, thus failing to reproduce the beginning of the selection, the left-hand side of the instrument must be similarly raised.

4. To reload the turntable, turn the Motor Switch "off," move the Index Lever to "Manual" and place pickup on rubber rest. Do not change this order. When through operating, turn the Power Switch "off."

IMPORTANT

1. Never restrain by force the normal motion of any part of the automatic mechanism while it is changing records.
2. Never experiment or tamper with any adjustment device.

With normal use and handling, trouble-free service is to be expected. The automatic phonograph mechanism and associated parts, however, should be kept clean and well lubricated. To insure continued efficient operation, it is recommended that the entire instrument be thoroughly inspected and adjusted by an experienced service man once each year.

INSTALLATION MODEL A-208E

The receiver is shipped with the chassis braced on the inside of the cabinet. In order to put the set into service proceed as follows:

1. Remove the set from its packing case.
2. Lay the set on its back and remove the four lag screws which hold the skid to the bottom of the cabinet. It is necessary that this be done first while other parts of the set are still held in place by packing materials. Care should be taken that the top lids do not swing to the floor while the set is tipped.
3. Right the set and remove the back screen from the cabinet. Take out the three copper plated screws at the corners of the radio chassis. Washers under the brackets through which these screws pass should also be removed.
4. Remove the two copper-plated screws on the under side of the phonograph board. Both the receiver chassis and the phonograph should be floating free on their suspensions.
5. Remove the envelope tacked to the upper chassis mounting board.
6. Thread the antenna and ground leads and the power cord through the hole in the back screen. Connect the antenna and ground leads to the antenna and ground terminal posts.
7. Replace the back screen; additional screws to hold it on will be found in the envelope just mentioned.
8. Remove the packing materials from inside the phonograph compartment.

Operating control knobs, felt washers, used-needle cup, and phonograph needles are shipped in the envelope also. The knobs are easily attached to the control shafts by tightening the knob set screw onto the shaft with a screw driver. The felt washers should be placed between the knobs and the panel so that there will be no possibility of the knobs rubbing on the panel. The phonograph turntable will be found in the package packed with the receiver. To install the turntable, lift the record ejector to its upright position and mount the turntable on the motor spindle. Make certain that the spindle drive key engages the slot in the turntable hub. Record albums will be found packed in the record compartments.

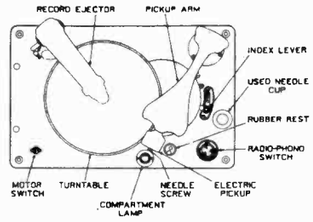


Fig. 2. Phonograph Compartment

INSTALLATION MODEL A-205E

After unpacking the receiver, remove the copper-plated shipping screws from the top of the cabinet shelf so that the chassis floats freely on its rubber mounting feet. It is essential that these shipping screws be removed before the receiver is placed in operation.

To detach the wooden skid which is fastened to the bottom of the cabinet, take off the back of the cabinet and remove the four large black nuts (two at each end of the power unit) which hold the skid bolts. The cabinet may then be lifted off the skid.

Operating control knobs are shipped in an envelope which will be found packed inside the cabinet of the receiver. The knobs are easily attached to the control shafts by tightening the knob set screws onto the shaft with a screwdriver. Sufficient clearance should be left between the knob and the panel so that there will be no danger of the knobs rubbing on the panel.

INSTALLATION - GENERAL

TUBES - Each receiver is equipped and tested at the factory with the tubes that are shipped with the instrument. The location of each tube is shown on the chassis rating label. To install any tube, place the tube directly above the proper socket, pins down, and insert the locating pin in the socket. Keeping the tube at right angles to the chassis deck, rotate the tube in its socket until the locating key slips into the socket groove. Then press the tube into place.

POWER SUPPLY - Before plugging in the power cord make sure that the power supply voltage and frequency available at the outlet agree with the rating label on the receiver chassis. Make sure also that all tubes are in place.

If, when first installed, the receiver fails to operate properly, it is probable that one or more of the tubes may have jarred loose in shipment. Make certain, therefore:

(1) That all tubes are in place in the proper sockets and pressed down firmly. Do not apply power to the receiver unless all tubes are in place.
(2) That the spring connectors of the short flexible (grid) leads shown on the diagram are securely attached to the dome terminals of the proper tubes.

All power must be disconnected from the receiver before changing tubes.

ANTENNA AND GROUND - To obtain the best possible reception from an all-wave receiver, a good antenna system is essential, particularly on short waves. The General Electric "V-Doublet" Antenna System is designed especially for use with all-wave receivers and will give excellent results on both domestic broadcasts and short waves. This system is scientifically correct to insure maximum signal strength and least interference, and is inexpensive, neat in appearance and very easily installed. The General Electric "V-Doublet" Antenna Kit, Stock No. KV-300, is available as an accessory from your General Electric Radio Dealer.

As a less desirable alternative, an antenna of the conventional type 25 to 75 feet long including lead-in and ground connection may be used. The antenna should be well insulated from all objects and run neither close nor parallel to electrical circuits inside or outside the building. Generally an indoor antenna of short or medium length will be found fairly satisfactory for broadcast reception. An outdoor antenna is recommended for localities remote from broadcasting stations and is necessary when the receiver is installed in a building of metallic construction.

A good ground connection is essential for best performance. The ground lead should be as short and direct as possible, and should be connected preferably to a cold water pipe. An approved ground clamp should be used to insure a tight and permanent connection.

Two terminals are provided at the rear of the receiver for antenna and ground connections. These terminals are so spaced as to provide direct connection to the receiver coupling transformer of the "V-Doublet" Antenna Kit.

REPLACEMENT PARTS - MODELS A-205E AND A-208E

(Insist on genuine factory-tested parts which may be purchased from authorized dealers)

RECEIVER CHASSIS ASSEMBLIES

Stock No.	Description	List Price
*RA-402	ARM--Crank arm on changeover shaft for long switching link (pkg.of 2)....	$ .10
*RB-006	BOARD--Terminal board near 10 K.C. filter trimmer condensers	.15
*RB-009	BOARD--Terminal board on same bracket as S-7	.15
*RB-019	BOARD--Three-lug terminal board on rear apron near L-3	.10
*RB-034	BOARD--8-lug terminal board on rear chassis apron	.15
*RB-036	BOARD--Phonograph connector terminal board	.20
*RB-128	BRACKET--Treble control mounting bracket (pkg. of 2)	.10
*RB-129	BRACKET--Supports switch S-8	.10
*RB-130	BRACKET--Bracket supporting switch S-7 and changeover shaft	.10
*RB-131	BRACKET--Volume control mounting bracket (pkg. of 2)	.10
RC-010	CAPACITOR--.002 mfd., 400 V. paper (C-77, C-88, C-91)	.25
*RC-021	CAPACITOR--.004 mfd., 200 V. paper (C-94)	.25
*RC-034	CAPACITOR--.01 mfd., 200 V. paper (C-98, C-111)	.25
*RC-072	CAPACITOR--.05 mfd., 200 V. paper (C-53, C-97)	.25
*RC-091	CAPACITOR--.05 mfd., 400 V. paper (C-52, C-55, C-68, C-93)	.30
*RC-096	CAPACITOR--.1 mfd., 200 V. paper (C-46, C-63, C-86)	.30
*RC-123	CAPACITOR--.1 mfd., 400 V. paper (C-71)	.35
*RC-136	CAPACITOR--.25 mfd., 200 V. paper (C-47, C-62)	.30
*RC-178	CAPACITOR--.5 mfd., 200 V. paper (C-54)	.40
*RC-180	CAPACITOR--.5 mfd., 400 V. paper (C-70, C-80, C-95)	.50
*RC-205	CAPACITOR--20 mmf. mica (C-56)	.35
*RC-211	CAPACITOR--50 mmfd. mica (C-72, C-92, C-96)	.25
*RC-261	CAPACITOR--250 mmfd. mica (C-67, C-69, C-78, C-85)	.25
*RC-333	CAPACITOR--.001 mfd. mica (C-83, C-84)	.30
*RC-350	CAPACITOR--.002 mfd. mica (C-81)	.35
*RC-504	CAPACITOR--10 mfd., 25 V. dry electrolytic (C-113)	.70
*RC-520	CAPACITOR--20 mfd., 25 V; 8 mfd., 450 V; 16 mfd., 50 V. (C-75, C-76, C-79)	2.60
*RC-616	CAPACITOR--600-1200 mmfd. trimmer (C-82)	.65
*RC-810	CABLE--Receiver chassis power cable with plug	2.40
*RC-981	CLAMP--Cable clamp (near S-7) (pkg. of 5)	.10
*RE-008	ESCUTCHEON--Escutcheon for model A-205E	$ 1.10
*RE-009	ESCUTCHEON--Escutcheon front panel and under block for model A-208E.....	13.15
*RI-003	INSULATOR--Escutcheon shaft insulator - bushing used on A-205E only (pkg.of 10)	.40
RI-006	INDICATOR--"Colorama" tuning indicator	
*RK-002	KNOB--Control knobs (pkg. of 5)	.50
*RL-309	COIL--10 K.C. filter reactor (L-43)	3.95
RL-330	REACTOR--Colorama tuning saturable reactor (T-6)	2.10
*RL-601	COIL--Wave trap coil (L-3)	.80
*RL-907	LINK--Long switching link for S-8	.15
RL-917	LAMP--Colorama tuning red lamp 3.2 volts (P-1) (pkg of 10).....	1.50
RL-918	LAMP--Colorama tuning green lamp 3.2 volts (P-2) (pkg of 10).....	1.50
*RN-001	NUT--Escutcheon mounting nut for A-205E only (pkg of 10)	.45
*RP-014	PLATE--Escutcheon mtg. plate for A-205E only (pkg of 2).....	.25
*RP-034	PLUG--Receiver chassis 8-prong plug	.20
*RP-035	PLATE--Control knob name plate (for A-205E only).....	.35
*RP-036	PIN--Taper pin in front end of changeover shaft (pkg. of 5)	.10
RQ-053	RESISTOR--560 ohm, ½ watt carbon (R-16, R-24) (pkg. of 5)	.60
*RQ-059	RESISTOR--1000 ohm, ½ watt carbon (R-25) (pkg. of 5)	.70
(RR-014)		
*RQ-067	RESISTOR--2200 ohm, ½ watt carbon (R-14, R-18, R-26, R-35, *R-42, R-72) (pkg. of 5)	.60
RQ-073	RESISTOR--3900 ohm, ½ watt carbon (R-34) (pkg. of 5)	.60
*RQ-075	RESISTOR--4700 ohm, ½ watt carbon (R-38) (pkg. of 5)	.60
*RQ-097	RESISTOR--39,000 ohm, ½ watt carbon (R-31) (pkg. of 5)	.60
*RQ-099	RESISTOR--47,000 ohm, ½ watt carbon (R-50, R-53, R-73, R-75)(pkg. of 5)..	.60
*RQ-103	RESISTOR--68,000 ohm, ½ watt carbon (R-27, R-36, R-79, R-80)(pkg. of 5)..	.60
*RQ-107	RESISTOR--100,000 ohm, ½ watt carbon (R-28, R-39) (pkg. of 5)	.70
(RR-050)		
*RQ-117	RESISTOR--270,000 ohm, ½ watt carbon (R-37, R-46, R-47) (pkg. of 5)	.70
*RQ-131	RESISTOR--1 meg. ½ watt carbon (R-15) (pkg. of 5)	.70
(RR-067)		
*RQ-139	RESISTOR--2.2 meg. ½ watt carbon (R-19, R-40, R-82) (pkg. of 5)	.70
RQ-499	RESISTOR--47,000 ohm, 1 watt carbon (R-41) (pkg. of 5)	.75
*RR-016	RESISTOR--5000 ohm, ½ watt carbon (R-17, R-23, R-33) (pkg. of 5)	.70
*RR-163	RESISTOR--2000 ohm, ½ watt carbon (R-48) (pkg. of 5)	.70
*RR-281	RESISTOR--40,000 ohm, 2 watt carbon (R-43)	.30
RR-304	RESISTOR--.8 ohm, ½ watt flexible (R-68) (pkg. of 5)	.70
RR-601	RESISTOR--2.5 ohm, 5 watt vitreous (R-77)	.30
RR-602	RESISTOR--2.0 ohm, 5 watt vitreous (R-78)	.30
*RR-627	RESISTOR--3700 ohm, 10 watt vitreous (R-21, R-22)	.45
*RR-628	RESISTOR--5000 ohm, 10 watt vitreous (R-32, R-44)	.45
*RR-631	RESISTOR--10,000 ohm, 10 watt vitreous (R-49)	.45
*RR-712	RESISTOR--1270 ohm, 20 watt vitreous (R-20)	.45
*RR-900	REFLECTOR--Dial light reflector	.15
*RS-126	SHIELD--Fidelity diode socket shield can	.15
*RS-127	SHIELD--Selectivity diode socket shield can	.15
*RS-128	SHIELD--1st I.F. 6K7 tube socket shield can	.30
*RS-129	SHIELD--2nd I.F. 6K7 tube socket shield can	.30
*RS-130	SHIELD--Fidelity 6K7 tube socket shield can	.30
*RS-134	SHIELD--Base shield with mounting feet (for A-205E only).....	2.75
*RS-135	SHIELD--Base shield with mounting feet (for A-208E only).....	2.80
*RS-200	SOCKET--Eight-pin tube socket (pkg. of 5)	.75
*RS-319	SWITCH--Toggle switch next to fidelity 6K7 socket shield (S-8)	1.90
*RS-320	SWITCH--Double pole-double throw switch (S-7)	2.45
*RS-413	SPRING--Spring on back end of changeover shaft (pkg. of 4)	.10
*RS-414	SPRING--Spring on switching link (pkg. of 4)	.10
*RS-903	SHAFT--Fidelity switch shaft assembly (used on A-205E only).....	4.75
*RS-904	SHAFT--Fidelity switch shaft assembly (used on A-208E only).....	4.75
*RT-709	VOLUME CONTROL--Bass volume control, 100,000 ohms - (R-54)	1.20
RV-024	VOLUME CONTROL--500,000 ohm volume control (for A-205E only)(R-81)	
RV-025	VOLUME CONTROL--500,000 ohm volume control (for A-208E only)(R-81)	
RV-026	VOLUME AND TONE CONTROL--High frequency audio channel volume control (for A-205E only)(R-45, R-74, S-9)	
RV-027	VOLUME AND TONE CONTROL--High frequency audio channel volume control (for A-208E only)(R-45, R-74, S-9)	
*RW-002	WINDOW--Dial window (used on A-205E).....	.15
*RW-003	WINDOW--Dial window (used on A-208E).....	.35
*RW-101	WASHER--Felt washer for control shafts (pkg. of 10)	.45
*RX-004	SCREW ASSEMBLY--Chassis mounting screw assembly	.10

"SENTRY BOX" ASSEMBLIES

*RB-010	BOARD--Connection terminal board on top side of sentry box.....	.10
*RB-012	BOARD--Antenna and ground terminal board	.15
*RC-034	CAPACITOR--.01 mfd., 200 V. paper (C-16, C-17)	$ .25
*RC-072	CAPACITOR--.05 mfd., 200 V. paper (C-14, C-29)	.25
*RC-096	CAPACITOR--.1 mfd., 200 V. paper (C-9, C-24)	.30
*RC-123	CAPACITOR--.1 mfd., 400 V. paper (C-21, C-40)	.35
*RC-136	CAPACITOR--.25 mfd., 200 V. paper (C-11, C-27)	.30
*RC-202	CAPACITOR--4 mmf. mica (C-6, C-19)	.25
*RC-211	CAPACITOR--50 mmf. mica (C-31, C-42)	.25
*RC-212	CAPACITOR--40 mmf. mica (C-32)	.25
*RC-228	CAPACITOR--85 mmf. mica (C-15)	.25
*RC-289	CAPACITOR--400 mmf. mica (C-35)	.25
*RC-340	CAPACITOR--1230 mmfd. mica (C-38)	.50
*RC-349	CAPACITOR--.002 mfd. mica (C-10, C-13, C-23, C-25, C-28, C-41)	.30
*RC-353	CAPACITOR--3200 mmfd. mica (C-43)	.70
*RC-602	CAPACITOR--10-45 mmfd. permaliner trimmer (C-5, C-33, C-34, C-36)	.50
*RC-603	CAPACITOR--5-25 mmf. permaliner trimmers (C-4, C-7, C-8, C-12, C-18, C-20, C-22, C-26, C-30, C-37, C-39, C-44, C-45)	.55
*RC-702	CONDENSER--3 gang tuning condenser	4.25
*RG-001	GRID CAP--Control grid cap (pkg. of 5)	.10
*RG-100	GUARD--Terminal strip guard	.15
*RL-003	COIL--Antenna coil band "A" (L-1 and L-2)	1.00
*RL-014	COIL--Antenna coil band "B" (L-4 and L-5)	.75
*RL-015	COIL--Antenna coil band "C" (L-6 and L-7)	.65
*RL-016	COIL--Antenna coil band "D" (L-8, L-9)	.60
*RL-103	COIL--R.F. coil band "A" (L-12, L-13)	1.60
*RL-116	COIL--R.F. coil band "B" (L-14, L-15)	1.05
*RL-117	COIL--R.F. coil band "C" (L-16, L-17)	.65
*RL-118	COIL--R.F. coil band "D" (L-18, L-19)	.60
*RL-119	COIL--R.F. coil band "E" (L-20, L-21)	.60
*RL-207	COIL--Osc. coil band "A" (L-22, L-23)	.70
*RL-217	COIL--Osc. coil band "B" (L-24, L-25)	.85
*RL-218	COIL--Osc. coil band "C" (L-26, L-27)	.60
*RL-219	COIL--Osc. coil band "D" (L-28, L-29)	.60
*RL-220	COIL--Osc. coil band "E" (L-30, L-31)	.85
RQ-011	RESISTOR--10 ohm, ½ watt carbon (R-29) (pkg. of 5)	.60
RQ-018	RESISTOR--20 ohm, ½ watt carbon (R-30) (pkg. of 5)	.60
*RR-001	RESISTOR--350 ohm, ½ watt carbon (R-2) (pkg. of 5)	.70
*RR-015	RESISTOR--5000 ohm, ½ watt carbon (R-3, R-12) (pkg. of 5)	.70
*RR-022	RESISTOR--600 ohm, ½ watt carbon (R-13) (pkg. of 5)	.70
*RR-036	RESISTOR--50,000 ohm, ½ watt carbon (R-5, R-10) (pkg. of 5)	.70
*RR-049	RESISTOR--100,000 ohm, ½ watt carbon (R-4, R-6, R-9) (pkg. of 5)	.70
*RR-163	RESISTOR--2000 ohm, ½ watt carbon (R-7, R-9) (pkg. of 5)	.70
*RR-192	SENSITIVITY CONTROL--20,000 ohm potentiometer (R-11)	.95
*RS-111	SHIELD--Osc. compartment shield can	1.20
*RS-112	SHIELD--R.F. compartment shield can	1.25
*RS-125	SHIELD--Antenna compartment shield can	1.25
*RS-303	SWITCH--Osc. R.F. pr antenna band change switch (S-1, S-2, S-3, S-4, S-5 S-6)	1.20
*RX-002	CUSHION ASSEMBLY--Tuning condenser mounting cushions, nut and washers ...	.10

MODELS A-205E, A-208E
Parts concluded

GENERAL ELECTRIC CO.

MISCELLANEOUS ASSEMBLIES

*RB-020	BOARD--Terminal board for pickup leads	.15
*RB-510	BOX--Used needle box	.40
*RB-601	BASE--Phonograph compartment lamp base	.55
*RC-807	CABLE--Motor connection cable	.50
*RC-812	CABLE--Phonograph input transformer cable	.45
*RK-003	KNOB--Radio Phono switch knob	.25
*RP-017	PLATE--Radio phono name plate	.25
*RP-024	PLUG--Two contact round female plug	.60
*RP-025	PLUG--Two contact male connector plug - round	.20
*RP-026	PLUG--Two contact female connector plug - flat	.45
*RP-027	PLUG--Two contact male connector plug - flat	.45
*RR-850	RECEPTACLE--Needle card holder	.38
*RS-310	SWITCH--Radio phono switch	1.65
*RS-502	SHADE--Phonograph compartment lamp shade	.16
*RT-601	TRANSFORMER--Phonograph input transformer (includes C-117 and R-84)	5.42

MOTOR ASSEMBLIES

*RM-102	MOTOR--105-130 V., 50 cycles	25.88
*RM-103	MOTOR--105-130 V., 60 cycles	25.88
*RX-006	SPRING ASSEMBLY--Motor mounting spring, washer, and stud assembly. Six springs, six cup washers, three spring washers and three studs	.58

(Prices subject to change without notice)

*Used on previous "A" and "E" line receivers.

POWER UNIT CHASSIS ASSEMBLIES

*RB-008	BOARD--Two-lug terminal board	.10
*RB-032	BOARD--7-lug terminal board	.15
*RC-031	CAPACITOR--.008 mfd., 1500 V. paper (C-99, C-100)	.25
RC-195	CAPACITOR--.0015 mfd., 1000 V. paper (C-50)	.25
*RC-196	CAPACITOR--.5 mfd., 500 V. paper (C-115, C-116)	.75
*RC-296	CAPACITOR--.0005 mfd., 500 V. mica (C-57, C-60, C-102, C-103)	.25
*RC-406	CAPACITOR--16 mfd., 400 V. wet electrolytic (C-61)	1.25
*RC-411	CAPACITOR--10 mfd., 25 V. wet electrolytic (C-51), C-106, C-110)	1.70
*RC-504	CAPACITOR--10 mfd., 25 V. dry electrolytic (C-107)	1.75
*RC-512	CAPACITOR--50 mfd., 50 V. dry electrolytic	2.70
*RC-515	CAPACITOR--16 mfd., 500 V. dry electrolytic (C-104, C-106)	.45
*RC-751	CAPACITOR--.01 mfd., 250 V. A-C twin line capacitors (C-108, C-109)	
*RC-813	CABLE--Cable and female plug for connection to phono lamp cable (for A-208E only)	.90
*RC-814	CABLE--Cable and female plug for connection to phonograph motor	.90
*RC-859	COND--Power cord	.60
*RC-878	FOOT--Speaker cloth mounting foot assembly	.20
*RP-009	FUSE--Plug type 6 amp fuse (F-1)	.20
RF-305	CHOKE--Filter reactor (L-11)	7.45
*RL-304	RESISTOR--470 ohm, ½ watt carbon (R-57, R-58) (pkg. of 5)	.60
*RQ-051	RESISTOR--47,000 ohm, ½ watt carbon (R-69, R-76) (pkg. of 5)	.60
*RQ-099	RESISTOR--1000 ohm, 1 watt carbon (R-56)	.15
*RQ-459	RESISTOR--2000 ohm, 2 watt carbon (R-60)	.30
RQ-666	RESISTOR--22,000 ohm, 2 watt carbon (R-55)	.35
RQ-691	RESISTOR--15 ohm, 1 watt flexible (R-70, R-71) (pkg. of 5)	.90
*RR-309	RESISTOR--210 ohm, 5 watt vitreous (R-63, R-68)	.45
*RR-606	RESISTOR--50,000 ohm, 10 watt vitreous (R-61, R-62, R-65, R-66)	.40
*RR-628	RESISTOR--450 ohm vitreous enameled (R-59)	.40
*RR-709	RESISTOR--40 ohm center tapped cardohm (R-67)	.35
*RR-710	RECEPTACLE--Fuse receptacle	.45
RR-851	SOCKET--6-prong socket for speaker plugs	.35
*RS-207	SOCKET--8-prong socket receiver chassis plug	.25
*RS-208	TRANSFORMER--Power transformer 105-130 volt, 60 cycle (T-3)	25.90
*RT-191	TRANSFORMER--High frequency channel output transformer (T-5)	1.90
*RT-406	TRANSFORMER--Low frequency channel output transformer (T-4)	10.30
*RT-410	TRANSFORMER--Low frequency channel interstage transformer (T-1)	5.50
*RT-505	TRANSFORMER--Low frequency channel interstage transformer (T-2)	.20
*RW-103	WASHER--Insulating washer for mounting capacitor (C-106) (pkg. of 10)	.15
*RW-104	WASHER--Insulating washer for mounting (C-105 and C-104) (pkg. of 4)	

DIAL MECHANISM ASSEMBLY

*RB-114	BRACKET--Precision tuning indicator bracket (14)	.15
*RB-120	BRACKET--Dial mechanism supporting post	.15
*RB-125	BRACKET--Mounting bracket assembly	.90
*RB-126	BRACKET--Dial lamp bracket	.30
*RC-802	CABLE--Metal drive cable (12) (pkg. of 5)	.65
*RC-856	CORD--Dial cord (11) (pkg. of 5)	.10
*RC-954	CAP--Scale cap assembly gear end (29)	.10
*RC-955	CAP--Scale cap free end (30)	.10
*RC-957	COLLAR--Micrelog retaining split collar (pkg. of 5)	.15
*RC-962	COLLAR--Precision drive gear shaft collar external (44)	.15
*RC-963	COLLAR--Precision drive gear shaft collar internal (45)	.15
*RD-009	DRUM--Tuning condenser drive drum and gear teeth	.45
*RD-010	DIAL--Precision dial and pinion gear (20)	.50
*RD-022	DRIVE--Differential reduction drive (for A-205E only)	1.00
*RD-023	DIAL--Dial scale (for A-205E only)	1.65
*RD-024	DRIVE--Differential reduction drive (for A-208E only)	1.00
*RF-200	FASTENER--Dial fastener (40) (pkg. of 10)	.10
*RG-002	GEAR--Dial gear assembly and set screws (8 and 9) 2 screws fil. hd. 4-40 x 5/32 cup pt.	.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
*RI-004	INDEXING PLATE--Front plate and set screw for band switch shaft	.30
*RP-033	POINTER--Dial pointer (for A-205E only) (pkg. of 2)	.10
*RP-038	POINTER--Dial pointer (for A-208E only) (pkg. of 2)	.10
*RS-401	SPRING--Drum spring (13) (pkg. of 2½)	.10
*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
*RS-905	SHAFT--Round and flat shafts and gear for band change switch (6) (for A-205E only)	.45
*RS-906	SHAFT--Round and flat shafts and gear for band change switch (6) (for A-208E only)	.40

SPEAKER ASSEMBLIES

(11-Inch Speaker Assembly)

*RB-035	BOARD--Speaker terminal board assembly	.10
*RC-811	CABLE--Speaker cable	.40
*RC-960	CONE--11-inch type cone, voice coil and gasket	1.50
*RC-963	CLAMP--Speaker cable clamp	.10
*RC-964	CUSHION--Rubber speaker mounting cushion (pkg. of 8)	.30
*RP-034	PLUG--Female speaker plug (complete)	.45
*RR-801	RING--Cone clamping ring (pkg. of 4)	.20
*RS-021	SPEAKER--Single 11-inch type speaker (complete)	17.50
*RX-014	SCREW ASSEMBLY--Nuts, bushings, and washers for mounting one speaker	.50

(8-Inch Speaker Assembly)

RC-921	CONE--8-inch type cone and voice coil	1.20
*RP-690	CUP--8-inch cone spider clamp	.05
*RP-012	PLUG--Female speaker plug	.20

RECORD CHANGING MECHANISM MODEL A-208E

*RC-965	CAM--Cam and gear assembly	$ 1.18
*RC-966	CLUTCH--Trip lever frictional clutch	.30
*RC-967	COVER--Metal cover for trip lever and friction finger assembly	.36
*RP-400	FINGER--Manual index lever finger assembly	.25
*RP-401	FINGER--Friction finger assembly	.32
*RL-901	LEVER--Manual index lever less pin	.62
*RL-902	LEVER--Trip lever and link assembly	2.10
*RL-903	LEVER--Main spring lever	.42
*RL-904	LEVER--Pickup arm cable lever assembly	.40
*RL-905	LEVER--Trip lever and friction clutch assembly	.94
*RP-018	PAWL--Trip pawl assembly	.40
*RP-019	PLATE--Eject arm actuating plate assembly	.50
*RS-406	SPRING--Actuating spring (pkg. of 10)	.24
*RS-407	SPRING--Cable lever tension spring (pkg. of 10)	.44
*RS-408	SPRING--Manual index lever finger tension spring (pkg. of 10)	.30
*RS-409	SPRING--Main spring plate tension spring (pkg. of 10)	.30
*RS-850	SCREW--Cable lever screw and nut (pkg. of 10)	.60
*RS-851	SCREW--Manual index lever set screw (pkg. of 10)	.20
*RS-852	SCREW--Trip lever clutch tension adjustment screw (pkg. of 10)	.22
*RS-853	SCREW--Special screw fastening main lever and link assembly bushing (pkg. of 10)	.30
*RS-950	SPACER--Pickup arm mounting spacer (pkg. of 10)	.28
*RW-100	WASHER--Spring washer "U" type (pkg. of 10)	.25

EJECT ARM ASSEMBLIES

*RA-400	ARM--Eject arm complete	.82
*RB-300	BRACKET--Ejector tip bracket	1.72
*RB-301	BALL--1/2-in. diameter steel ball (pkg. of 10)	.20
*RB-400	BALL--3/16-in. diameter steel ball (pkg. of 20)	.25
*RC-968	BEARING--Ejector tip bearing and nut	.32
*RC-969	COLLAR--Eject arm shaft collar and set screw	.24
*RC-970	COVER--Eject arm cover	1.52
*RP-020	CUSHION--Counterbalance roller cushion located inside of eject arm	.14
*RR-901	POST--Vertical adjustment post located on eject arm bracket	.30
*RR-410	ROLLER--Eject arm counter balance roller (pkg. of 10)	.45
*RS-411	SPRING--Eject arm bracket spring (pkg. of 10)	.42
*RS-501	SILENCER--Ejector tip silencer	.14
*RS-854	SCREW--6-32 x 3/16" square head set screw for eject arm collar (pkg. of 10)	.25
*RS-855	SCREW--8-36 x 7/32" special for eject arm tip center adjustment (pkg. of 10)	.14
*RS-902	SHAFT--Eject arm vertical action shaft and collar assembly	.15
*RT-900	TIP--Ejector tip with tip center adjusting screw and cap	.92
*RY-001	YOKE--Eject arm yoke assembly	.94

PICKUP ARM ASSEMBLIES

*RA-401	ARM--Pickup arm complete less pickup mounting screw escutcheon and pickup unit	4.80
*RA-500	ARMATURE--Pickup armature	.72
*RB-600	BACK--Pickup back covering	.52
*RC-806	CABLE--Pickup arm connecting cable (Pkg. of 5)	1.00
*RC-970	COVER--Pickup arm front cover	.22
*RC-972	COVER--Pickup back cover with mounting screw	.14
*RD-100	DAMPER--Pickup damper (Pkg. of 5)	.65
*RL-800	COIL--Pickup coil	.80
*RL-801	COIL--Pickup hum bucking coil	.60
*RP-021	PICKUP--Pickup unit complete	4.80
*RS-856	SCREW--Pickup cover screw (Pkg. of 10)	.42
*RS-857	SCREW--Pickup needle screw (Pkg. of 10)	.42
*RX-007	SCREW ASSEMBLY--Screw, nut and washer for mounting pickup to arm (Pkg. of 10)	.40

MOTOR BOARD ASSEMBLIES

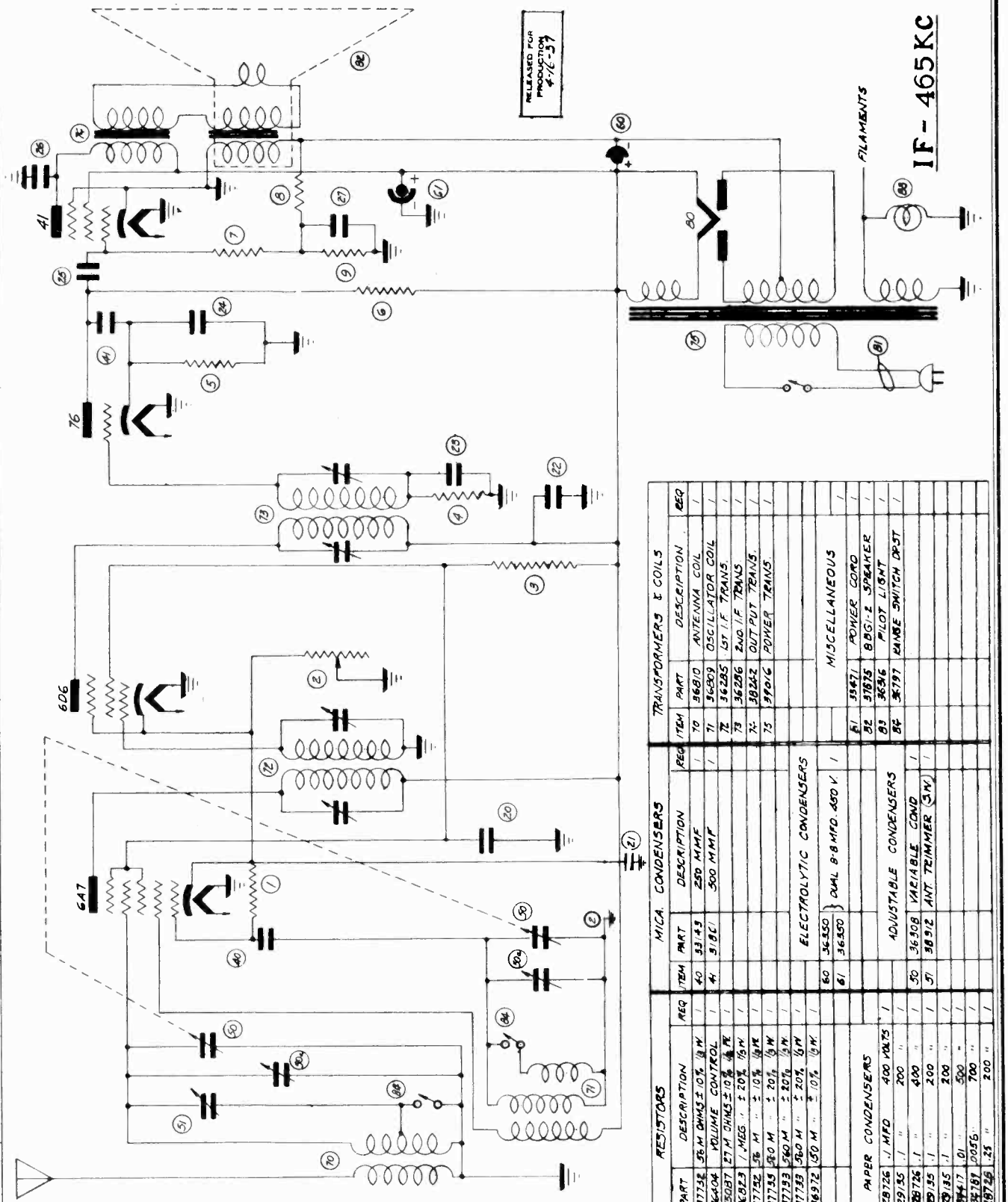
*RC-973	COVER--Turntable cover	$ .88
*RE-004	ESCUTCHEON--Index escutcheon manual 12-10	.44
*RN-002	NUT--Cap nut for motor board suspension assembly (Pkg. of 4)	.40
*RP-022	PIN--Manual index pin	.42
*RR-902	ROLLER--Pickup arm cable guide roller, bracket roller and pin	.34
*RR-903	REST--Pickup rest	.14
*RS-307	SWITCH--Motor toggle switch	.72
*RT-901	TURNTABLE--Turntable complete	2.90
*RX-004	SPRING ASSEMBLY--Suspension spring, washer and bolt assembly for motor board - comprising one bolt, two cup washers, two springs, two washers and one cap nut	.42

AUTOMATIC SWITCH ASSEMBLIES

*RC-974	COVER--Motor switch cover	.26
*RP-023	PLATE--Automatic brake latch plate (Pkg. of 5)	.40
*RS-021	SWITCH--Automatic switch complete	1.90
*RS-308	SWITCH--Motor switch	.75
*RS-309	SPRINGS--Automatic brake springs (Pkg. of 2)	.50
*RS-412		

GENERAL HOUSEHOLD UTILITIES CO.

MODELS 576,578
Chassis 5T
Schematic, Parts



ITEM	PART	RESISTORS DESCRIPTION	REQ
1	37732	36 M OHMS ± 10% ½ W	/
2	36404	VOLUME CONTROL	/
3	35087	27 M OHMS ± 10% ½ W	/
4	36823	1 MEG " ± 20% ½ W	/
5	37732	36 M " ± 10% ½ W	/
6	37739	90 M " ± 10% ½ W	/
7	37733	360 M " ± 20% ½ W	/
8	37733	360 M " ± 20% ½ W	/
9	36872	30 M " ± 10% ½ W	/

ITEM	PART	PAPER CONDENSERS DESCRIPTION	REQ
20	28726	.1 MFD 400 VOLTS	/
21	29135	.1 " 200 "	/
22	28726	.1 " 400 "	/
23	29135	.1 " 200 "	/
24	29135	.1 " 200 "	/
25	28417	.01 " 500 "	/
26	36181	.0025 " 700 "	/
27	28726	.25 " 200 "	/

ITEM	PART	MICA CONDENSERS DESCRIPTION	REQ
40	33143	250 MMF	/
41	31801	300 MMF	/

ITEM	PART	ELECTROLYTIC CONDENSERS DESCRIPTION	REQ
60	36350	DUAL 8-8 MFD. 450 V.	/
61	36350		

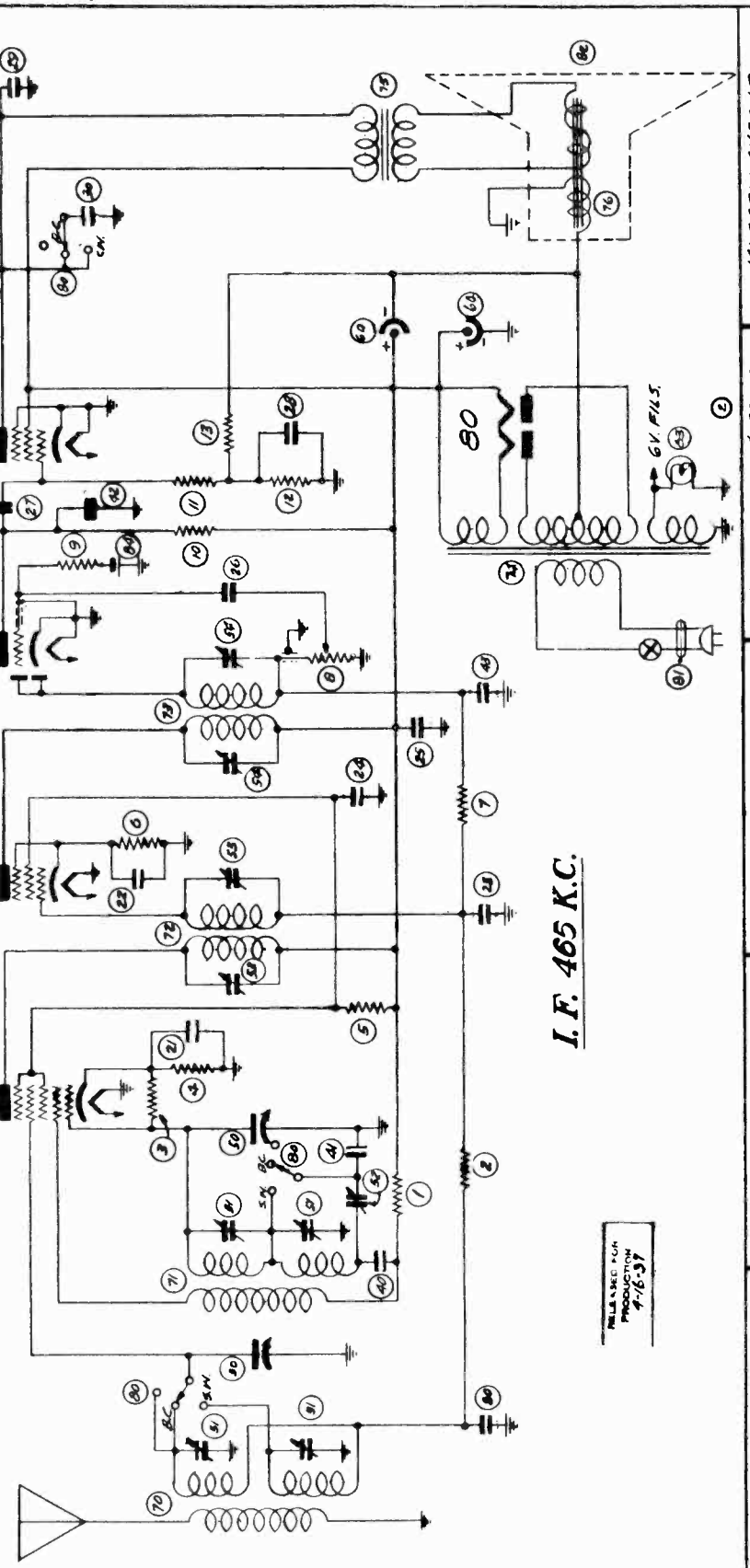
ITEM	PART	ADJUSTABLE CONDENSERS DESCRIPTION	REQ
50	36308	VARIABLE COND	/
51	38912	ANT TRIMMER (3W)	/

ITEM	PART	TRANSFORMERS & COILS DESCRIPTION	REQ
70	36810	ANTENNA COIL	/
71	36809	OSCILLATOR COIL	/
72	36285	1ST I.F. TRANS	/
73	36286	2ND I.F. TRANS	/
74	38242	OUTPUT TRANS.	/
75	37016	POWER TRANS.	/

ITEM	PART	MISCELLANEOUS DESCRIPTION	REQ
81	35471	POWER CORD	/
82	31875	8 BGI-2 SPEAKER	/
83	36316	PILOT LIGHT	/
84	36797	RANGE SWITCH DPST	/

MODELS 583,585,586
588 Chassis 5W
Schematic,Parts

GENERAL HOUSEHOLD UTILITIES CO.



RESISTORS

ITEM	PART	DESCRIPTION	QTY
1	37515	20 OHMS ± 10% ½ WATT	1
2	36826	1000 OHMS ½ WATT	1
3	37722	5.6 M OHMS ± 10% ½ WATT	1
4	36828	500 OHMS ± 10% ½ WATT	1
5	36505	33 M OHMS 1 WATT	1
6	36826	350 OHMS ± 10% ½ WATT	1
7	36822	1 MEGOHM ½ WATT	1
8	36823	2 MEGOHMS VOLUME CONTROL W/SWITCH ½ WATT	1
9	36823	2 MEGOHM ½ WATT	1
10	36833	220 OHMS ± 10% ½ WATT	1
11	37713	50 OHMS ½ WATT	1
12	36106	50 OHMS ± 10% ½ WATT	1
13	36107	150 OHMS ± 10% ½ WATT	1

PAPER CONDENSERS

ITEM	PART	DESCRIPTION	QTY
20	36103	.05 MFD 200 VOLT	1
21	2835	.1 MFD 200 VOLT	1
22	2835	.1 MFD 200 VOLT	1
23	36104	.05 MFD 200 VOLT	1
24	28326	.1 MFD 400 VOLT	1
25	28326	.1 MFD 400 VOLT	1
26	3947	.01 MFD 500 VOLT	1
27	3947	.01 MFD 500 VOLT	1
28	28328	.25 MFD 200 VOLT	1
29	36787	.0058 MFD 700 VOLT	1
30	37403	.02 MFD 500 VOLT	1

MICA CONDENSERS

ITEM	PART	DESCRIPTION	QTY
40	37506	1000 MMF ± 5%	1
41	27420	230 MMF ± 5%	1
42	37421	1000 MMF ± 5%	1
43	3946	500 MMF. ± 20%	1

ADJUSTABLE CONDENSERS

ITEM	PART	DESCRIPTION	QTY
50	3819	VARIABLE CONDENSER	1
51	25520	TRIMMER CONDENSER	1
52	37634	BROAD CAST PADDER	1
53	37641	.5 MF TRIMMER	1
54	37642	.2 MF TRIMMER	1

ELECTROLYTIC CONDENSERS

ITEM	PART	DESCRIPTION	QTY
60	36356	DUAL 40 MFD 450 VOLT	1

TRANSFORMERS & COILS

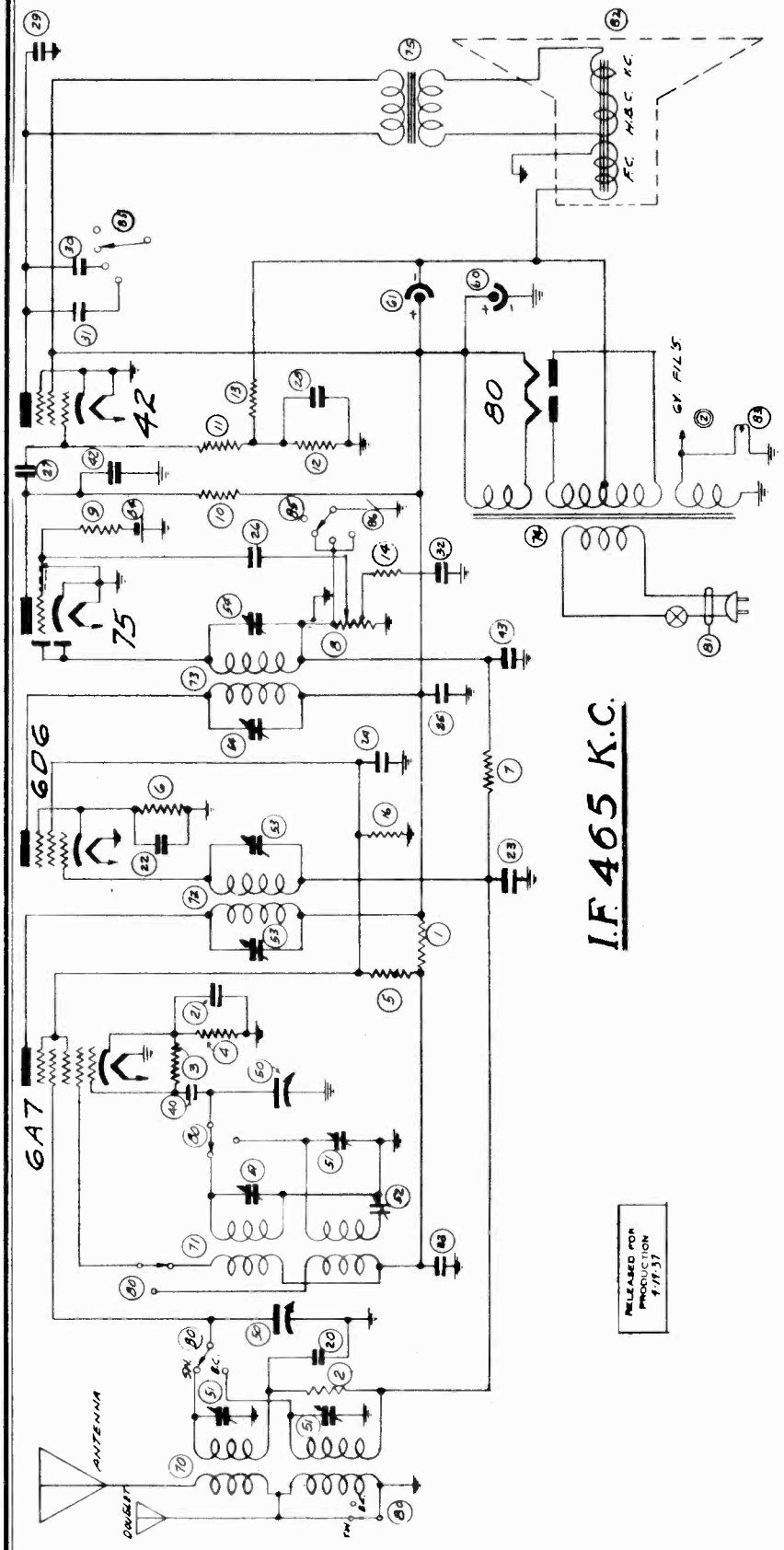
ITEM	PART	DESCRIPTION	QTY
70	36627	ANTENNA COIL	1
71	37616	OSCILLATOR COIL	1
72	37637	I.F.'S	1
73	37620	2.5 H.F.	1
74	37610	POWER TRANSFORMER	1
75	37642	OUTPUT TRANSFORMER	1
76	3944	FIELD COIL	1

MISCELLANEOUS

ITEM	PART	DESCRIPTION	QTY
80	3944	RANGE SWITCH	1
81	3947	LINE CORD	1
82	3864	SPEAKER 8" - 3	1
83	3880	SPEAKER MTG. (SPEAKER)	1
82	3961	SPEAKER MTG. (CHASSIS)	
84	3960	PILOT LIGHT	1
85	3883	GLASS CYCL	1

GENERAL HOUSEHOLD UTILITIES CO.

MODELS 587,589,599
Chassis 5U,5P
Schematic, Parts



RESISTORS

ITEM	PART	DESCRIPTION	
1	38797	6.5M OHMS ±10%	1W
2	36836	100M "	½W
3	37772	36M "	½W
4	36967	590 "	½W
5	30926	27M "	1W
6	38708	470 "	½W
7	36823	1MEG "	½W
8	37576	WW. CONT. 250M. Ω	
9	38618	(TAPED) VOLUME CONTROL	
10	36833	1 MEGOHM	½W
11	36833	220M OHMS	½W
12	37778	560M " ±10%	½W
13	35726	150M " ±10%	½W
14	35707	560M " ±10%	½W
15	36978	39M " ±2½%	½W
16	36829	47M ± 10 %	½W

PADDE CONDENSERS

ITEM	PART	DESCRIPTION	
20	33760	.006 MFD.	700 VOLTS
21	29935	.1 "	200 "
22	29936	.1 "	" "
23	30143	.05 "	" "
24	29935	.1 "	" "
25	28726	.1 "	400 "
26	30417	.01 "	500 "
27	30417	.01 "	" "
28	31693	.20 "	400 "
29	28717	.002 "	700 "
30	28813	.004 "	700 "
31	31417	.01 "	500 "
32	33665	.03 "	200 "
33	28722	.06 "	400 "

MICA CONDENSERS

ITEM	PART	DESCRIPTION
40	31358	50 MMF.
41	33742	1000 MMF.
42	31861	500 MMF.

ADJUSTABLE CONDENSERS

ITEM	PART	DESCRIPTION	
50	38662	VARIABLE COND.	
51	38522	TRIMMER COND.	
52	30151	BROADCAST PADDER	
53	35701	" " TRIMMER	
54	35703	2 GANG " "	

ELECTROLYTIC CONDENSERS

ITEM	PART	DESCRIPTION	
60	33469	16 MFD. 300 VOLT	
61	33569	12 MFD. 450 V.	

TRANSFORMERS & COILS

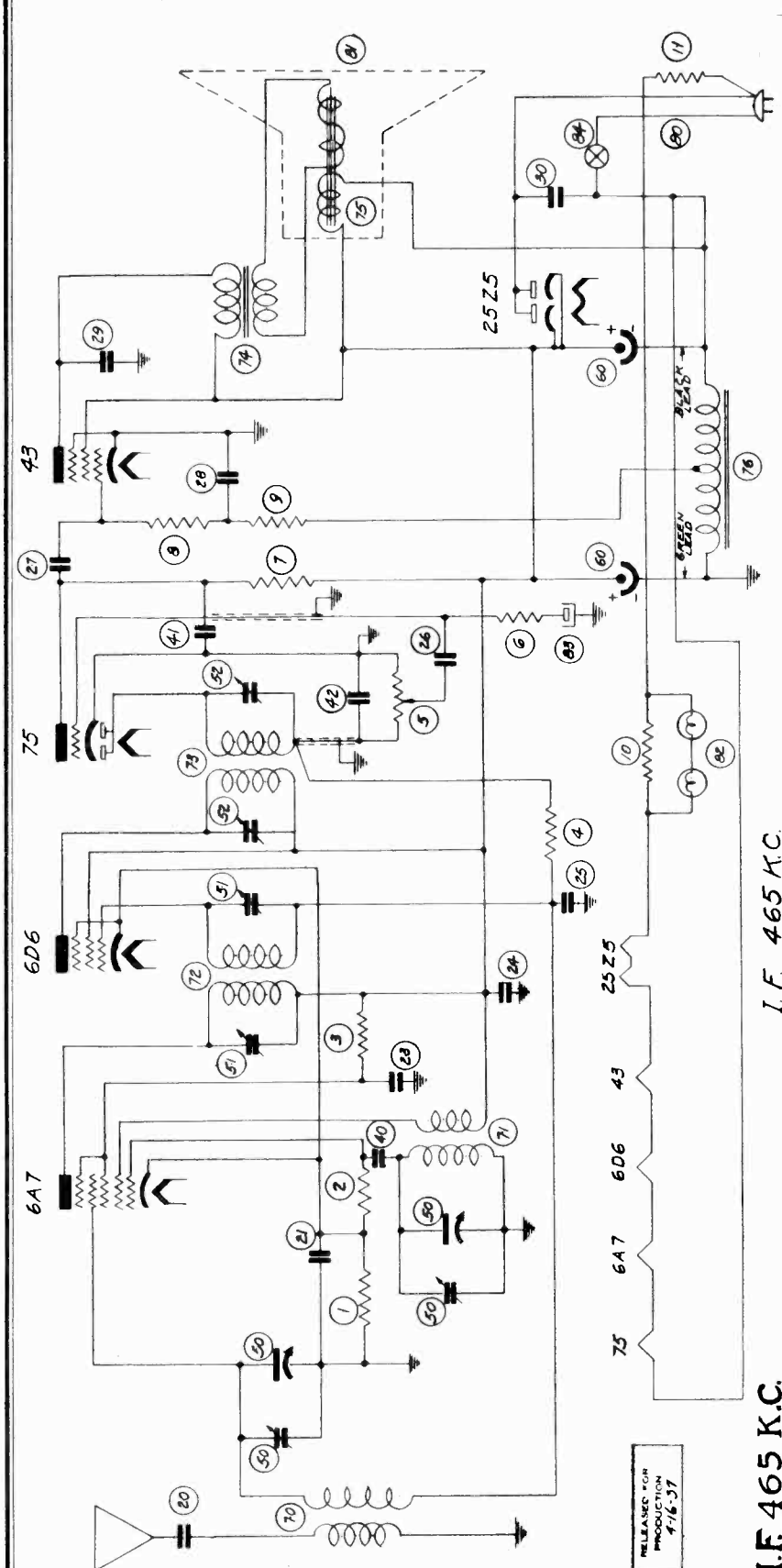
ITEM	PART	DESCRIPTION	
70	38736	ANTENNA COIL	
71	38795	OSCILLATOR COIL	
72	33376	" "	
73	33591	2 GANG " "	
74	37710	POWER TRANSF.	
75	37883	2 GANG OUTPUT TRANSF.	
75	37869	INPUT TRANS. 6Q7	

MISCELLANEOUS

ITEM	PART	DESCRIPTION	
80	3354	KNOB SMALL	
81	33471	LINE CORD	
82	38962	BAKELITE SHAFT (587,589)	
82	38842	" " (599)	
83	38647	PILOT LIGHT	
84	33033	BIAS CELL	
85	31880	POWER CONTROL	
86		SILENCER, SWITCH	

MODELS 592,594
Chassis 5N
Schematic, Parts

GENERAL HOUSEHOLD UTILITIES CO.



I.F. 465 K.C.

RESISTORS

ITEM	PART	DESCRIPTION	REQ
1	37880	220 OHMS ½ WATT 10%	1
2	37732	.5 M OHMS ½ WATT 10%	1
3	37881	1.0 M OHMS ½ WATT 10%	1
4	36828	1 MEG ½ WATT 20%	1
5	35119	VOLUME CONTROL 250000 Ω	1
6	36823	1 MEG ½ WATT 20%	1
7	36833	220 M OHMS ½ WATT 10%	1
8	37733	360 M OHMS ½ WATT 20%	1
9	36833	220 M OHMS ½ WATT 10%	1
10	27455	CANDOHM 4 OHMS	1
11	37880	LINE CORD RES. 120 OHMS	1

PAPER CONDENSERS

ITEM	PART	DESCRIPTION	REQ
20	34787	.0058 MFD 700 VOLT	1
21	29135	.1 MFD 200 VOLT	1
23	30143	.05 MFD 200 VOLT	1
24	29135	.1 MFD 200 VOLT	1
25	30143	.05 MFD 200 VOLT	1
26	34417	.01 MFD 500 VOLT	1
27	34417	.01 MFD 500 VOLT	1
28	28728	.25 MFD 200 VOLT	1
29	34787	.0058 MFD 700 VOLT	1
30	29453	.01 MFD 400 VOLT	1

MICA CONDENSERS

ITEM	PART	DESCRIPTION	REQ
40	33143	250 MMF	1
41	33142	1000 MMF	1
42	33143	250 MMF	1

ADJUSTABLE CONDENSERS

ITEM	PART	DESCRIPTION	REQ
50	38279	VARIABLE COND	1
51	35341	1ST I.F. TRIMMER COND	1
52	35342	2ND I.F. TRIMMER COND	1
53			
54			
55			
56			

ELECTROLYTIC CONDENSERS

ITEM	PART	DESCRIPTION	REQ
60	35177	16/16 MFD 150 VOLT	1
61			

TRANSFORMERS & COILS

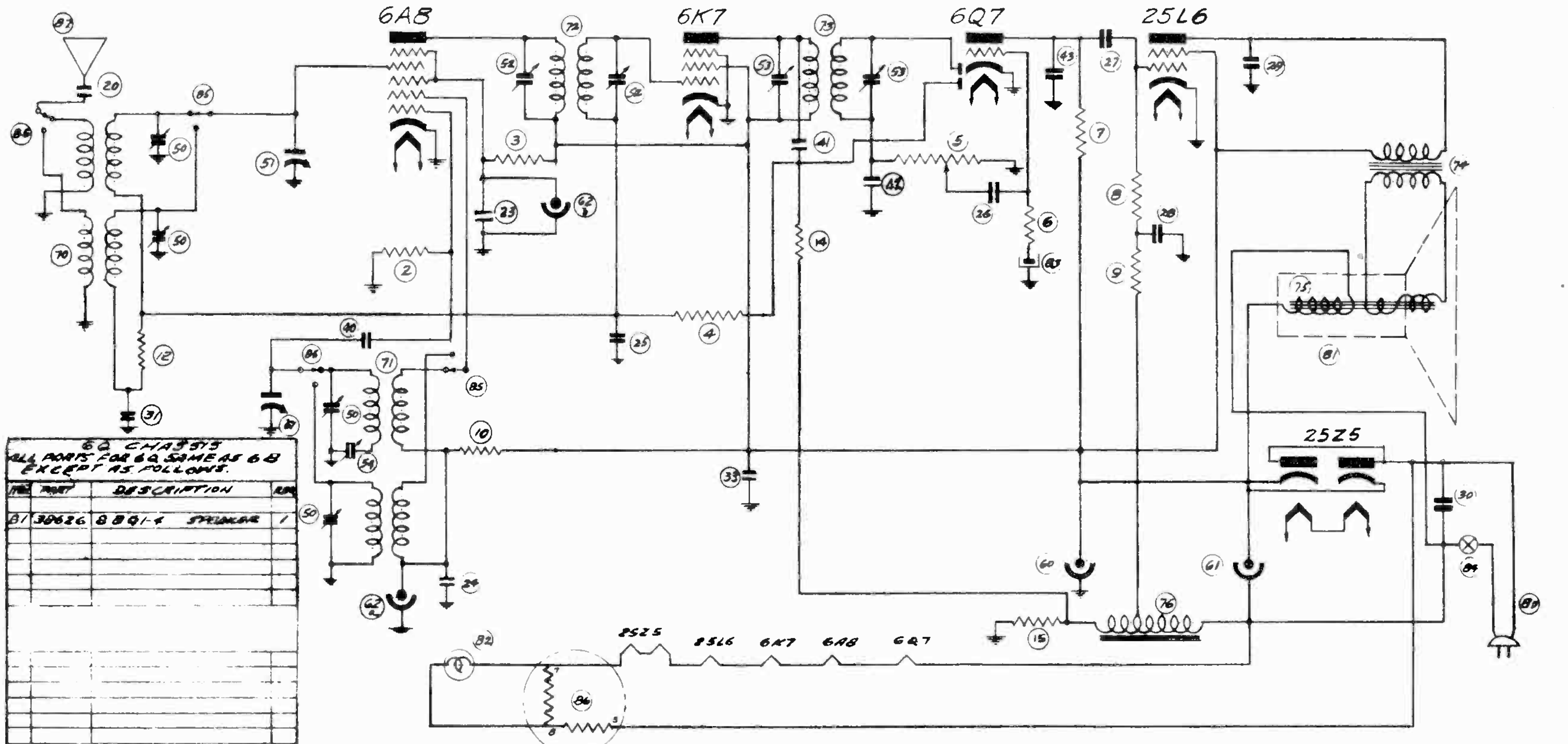
ITEM	PART	DESCRIPTION	REQ
70	34946	ANTENNA COIL	1
71	34947	OSCILLATOR COIL	1
72	35270	1ST I.F.	1
73	35288	2ND I.F.	1
74	SPKR	OUTPUT TRANSF.	1
75	SPKR	FIELD COIL	1
76	35142	FILTER CHOKE	1

MISCELLANEOUS

ITEM	PART	DESCRIPTION	REQ
80	35168	LINE CORD	1
81	35176	SPEAKER	1
82	36316	PILOT LITES	2
83	33883	BIAS CELL	1
84	VOL CONT.	POWER LINE SWITCH	1
85			

GENERAL HOUSEHOLD UTILITIES CO.

MODELS 622, 624
Chassis 6B, 6Q
Schematic, Parts



6Q CHASSIS ALL PARTS FOR 6Q SAME AS 6B EXCEPT AS FOLLOWS.			
ITEM	PART	DESCRIPTION	REQ
81	38626	8 BQ1-4 SPEAKER	1

I.F. 465 K.C.

RESISTORS				PAPER CONDENSERS			
ITEM	PART	DESCRIPTION	REQ	ITEM	PART	DESCRIPTION	REQ
1				20	34787	.0058 MFD. 700 V.	1
2	38707	39 M.Ω 1/3 " ±10%	1	21			
3	36973	39 M. " 1/3 " ±10%	1	22			
4	36823	1 MEG. " 1/3 " ±20%	1	23	30143	.05 " 200V	1
5	38062	VOL. CONT. 250 M. OHMS	1	24	29135	.1 " 200V	1
6	36823	1 MEG. OHM 1/3 WATT ±20%	1	25	30143	.05 " 200V	1
7	36835	220 M. " 1/3 " ±10%	1	26	34417	.01 " 500V	1
8	36822	330 M. " 1/3 " ±20%	1	27	34435	.02 " 400V	1
9	36822	330 M. " 1/3 " ±20%	1	28	36563	.2 " 200V	1
10	38706	27 M. " 1/3 " ±20%	1	29	38700	.025 " 400V	1
11				30	29455	.01 " 400V	1
12	36827	47 M. " 1/3 " ±20%	1	31	33760	.006 " ±5% 700V	1
13				32			
14	37733	560 M. " 1/3 " ±20%	1	33	29135	.1 " 200V.	1
15	38708	33 Ω 1/3 " ±10%	1				

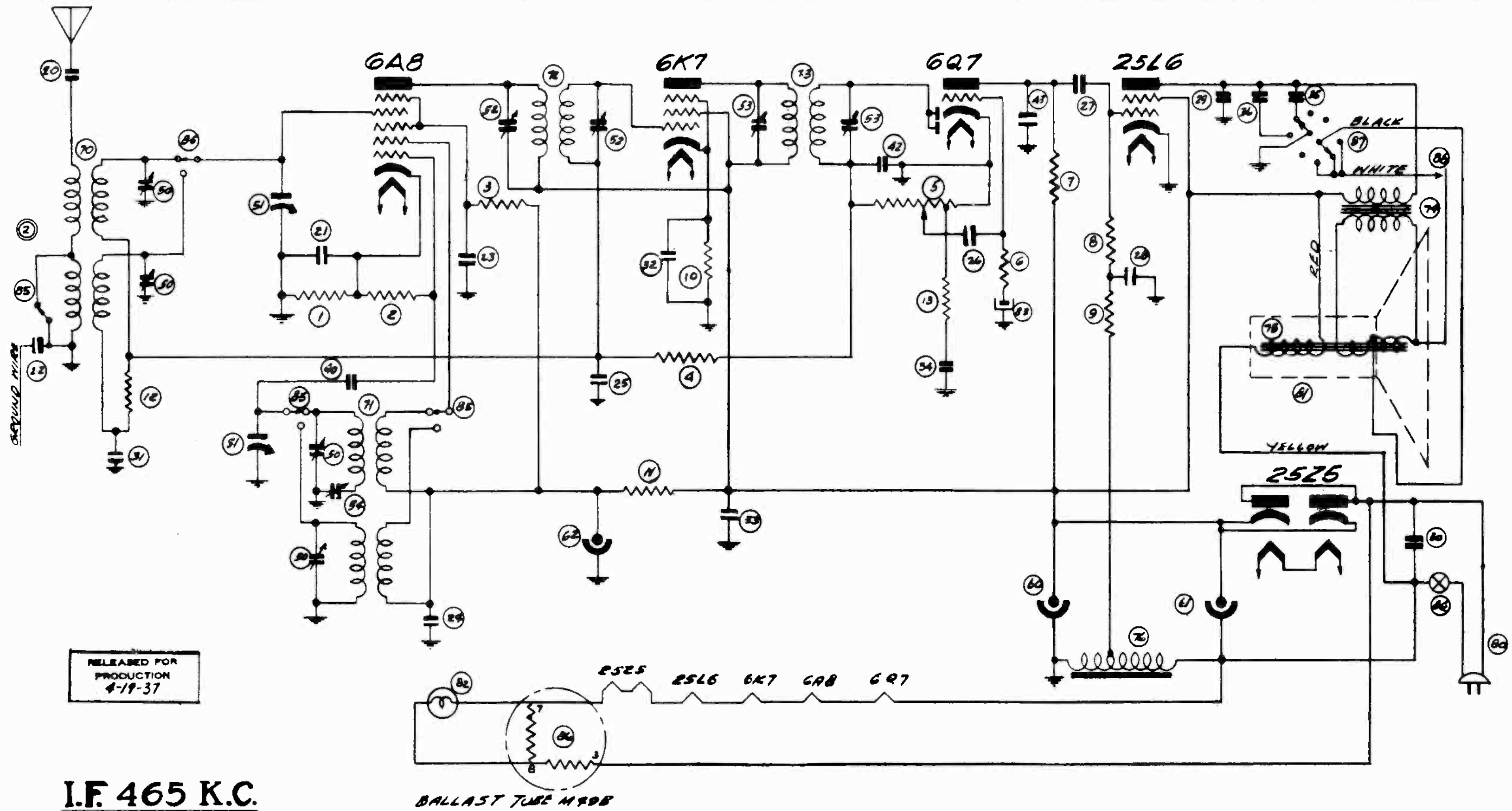
ADJUSTABLE CONDENSERS				TRANSFORMERS & COILS				MISCELLANEOUS			
ITEM	PART	DESCRIPTION	REQ	ITEM	PART	DESCRIPTION	REQ	ITEM	PART	DESCRIPTION	REQ
50	38078	TRIMMER ASSY	1	70	38065	ANTENNA COIL	1	80	33471	LINE CORD	1
51	38662	VARIABLE COND	1	71	38066	OSCILLATOR COIL	1	81	38627	6 BG-6 SPEAKER	1
52	35341	1ST I.F. TRIMMER	1	72	35280	1ST I.F.	1	82	38647	PILOT LIGHT	1
53	35342	2ND I.F. TRIMMER	1	73	35296	2ND I.F.	1	83	33885	BIAS CELL	1
54	35170	PADDER COND.	1	74	38241	OUTPUT TRANS	1	84	VOL. CONT.	LINE SWITCH	1
				75	38628	FIELD COIL	1	85	38540	RANGE SWITCH	1
				76	38240	FILTER CHOKE	1	86	38710	BALLAST TUBE (M49B)	1
								87	28127	ANTENNA HANK	

MICA CONDENSERS				ELECTROLYTIC CONDENSERS			
ITEM	PART	DESCRIPTION	REQ	ITEM	PART	DESCRIPTION	REQ
40	31358	50 M.M.F. ±10%	1	60	38610	25 MFD. 150V.	1
41	31358	50 " ±10%	1	61	38608	20 MFD. 150V.	1
42	33145	250 " ±20%	1	62	38709	DUAL 8 MFD. DRY 100V.	1
43	33142	1000 " ±20%	1	63			

RELEASED FOR PRODUCTION 4-19-37

MODELS 623,627
Chassis 6K
Schematic,Parts

GENERAL HOUSEHOLD UTILITIES CO.



I.F. 465 K.C.

RESISTORS

ITEM	PART	DESCRIPTION		REQ.
1	36967	390 Ω ±10%	⅓ W.	1
2	36831	60M. Ω ±10%	⅓ W.	1
3	36838	4700 Ω ±10%	⅓ W.	1
4	36823	1 MEGOHM ±20%	⅓ W	1
5	37576	VOL. CONT. 250M. OHMS		1
5	38614	NEW VOLUME CONTROL		1
6	36823	1 MEGOHM ±20%	⅓ W.	1
7	36883	220M. OHM ±10%	⅓ W.	1
8	36822	330M. " ±20%	⅓ W.	1
9	36822	330M. " ±20%	⅓ W.	1
10	36967	390 " ±10%	⅓ W.	1
11	38624	2700 " ±10%	⅓ W.	1
12	36827	47M. " ±20%	⅓ W.	1
13	36973	33M. " ±20%	⅓ W.	1

PAPER CONDENSERS

ITEM	PART	DESCRIPTION		REQ.
24	29135	.1 MFD.	200 V.	1
25	30143	.05 "	200 V.	1
26	34417	.01 "	500 V.	1
27	34435	.02 "	400 V.	1
28	36562	.2 "	200 V.	1
29	34788	.025 "	400 V.	1
30	29153	.01 "	400 V.	1
31	33760	.006 " ±5%	700 V.	1
32	29135	.1 "	200 V.	1
33	29135	.1 "	200 V.	1
34	33665	.03 "	200 V.	1
35	28723	.05 "	400 V.	1
36	28726	.1 "	400 V.	1

ADJUSTABLE CONDENSERS

ITEM	PART	DESCRIPTION	REQ.
50	38522	TRIMMER ASSEM	1
51	38662	VARIABLE COND.	1
52	35341	1ST I.F. TRIMMER	1
53	35302	2ND I.F. TRIMMER	1
54	38551	PADDER COND.	1

PAPER CONDENSERS

ITEM	PART	DESCRIPTION		REQ.
20	34707	.0058 MFD.	700 V.	1
21	29135	.1 MFD.	200 V.	1
22	29135	.1 MFD.	200 V.	1
23	34147	.05 MFD.	200 V.	1

TRANSFORMERS & COILS

ITEM	PART	DESCRIPTION	REQ.
70	38796	ANTENNA COIL	1
71	38613	OSCILLATOR COIL	1
72	35275	1ST I.F.	1
73	35291	2ND I.F.	1
74	38241	OUTPUT TRANS.	1
75	SPKR.	FIELD COIL	1
76	38240	FILTER CHOKE	1

MICA CONDENSERS

ITEM	PART	DESCRIPTION		REQ.
40	31358	50 MMF.	±10%	1
41				
42	33148	250 "	±20%	1
43	33142	1000 "	±20%	1

MISCELLANEOUS

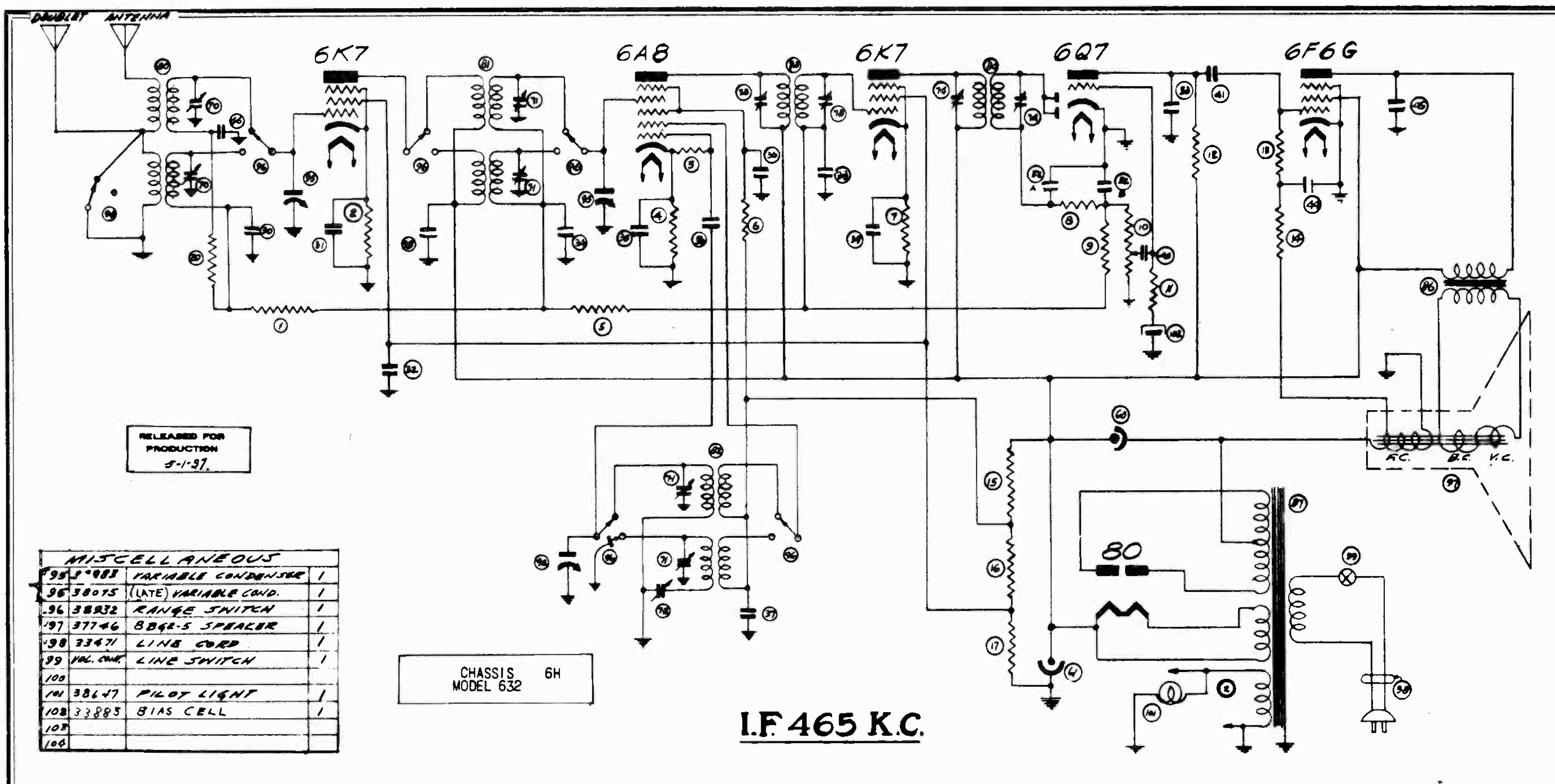
ITEM	PART	DESCRIPTION	REQ.
80	33671	LINE CORD	1
81	38636	8R61-4 SPEAKER	1
82	38647	PILOT LIGHT	1
83	33863	BIAS CELL	1
84	VOL. CONT.	LINE SWITCH	1
85	38341	RANGE SWITCH	1
86	38710	BALLAST TUBE	1
87	38580	TONE CONTROL	1
88	[illegible]	SILENCER SWITCH	1

ELECTROLYTIC CONDENSERS

ITEM	PART	DESCRIPTION	REQ.
60	38610	25 MFD. 150 V.	1
61	38608	20 MFD. 150 V.	1
62	38611	4 MFD. DRY 150 V.	1

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 632
Chassis 6H
Schematic, Parts



MISCELLANEOUS

Item	Part No.	Description	Req.
95	3°983	VARIABLE CONDENSER	1
95	38075	(LATE) VARIABLE COND.	1
96	38932	RANGE SWITCH	1
97	37746	8B4R-5 SPEAKER	1
98	33471	LINE CORD	1
99	VOL. CONT.	LINE SWITCH	1
100			
101	38647	PILOT LIGHT	1
102	33883	BIAS CELL	1
103			
104			

RESISTORS

Item	Part No.	Description	Req.
1	36826	100 M. OHM ±20% ⅓ W.	1
2	36825	600 " ±10% ⅓ W.	1
3	36826	100 M. " ±20% ⅓ W.	1
4	38798	470 " ±10% ⅓ W.	1
5	37732	56 M. " ±10% ⅓ W.	1
6	37732	56 M. " ±10% ⅓ W.	1
7	36825	600 " ±10% ⅓ W.	1
8	36827	47 M. " ±20% ⅓ W.	1
9	36823	1 MEG. " ±20% ⅓ W.	1
10	38937	300 M. " VOL. CONTROL	1
11	36823	1 MEG. " ±20% ⅓ W.	1
12	36833	220 M. " ±10% ⅓ W.	1
13	37733	560 M. " ±20% ⅓ W.	1
14	36826	100 M. " ±20% ⅓ W.	1
15	36822	5 M. " ±20% 1 W.	1
16	36971	20 M. " ±10% 1 W.	1
17	36827	47 M. " ±20% ⅓ W.	1
18			
19			
20	36826	100 M. " ⅓ W ±20%	1

PAPER CONDENSERS

Item	Part No.	Description	Req.
30	30143	.05 MFD 200 V.	1
31	29135	.1 " 200 V.	1
32	29135	.1 " 200 V.	1
33	28726	.1 " 400 V.	1
34	30143	.05 " 200 V.	1
35	29135	.1 " 200 V.	1
36	28723	.05 " 400 V.	1
37	28726	.1 " 400 V.	1
38	30143	.05 " 200 V.	1
39	29135	.1 " 200 V.	1
40	34417	.01 " 500 V.	1
41	34435	.02 " 500 V.	1
42			
43			
44	28728	.25 " 200 V.	1
45	31864	.005 " 700 V.	1
46	33760	.006 " ±5% 700 V.	1
47			
48			
49			

MICA CONDENSERS

Item	Part No.	Description	Req.
50	31358	50 M.M.F. ±10%	1
51			
52	29074	A=250 MMF B=100 MMF	1
53	31861	500 M.M.F. ±20%	1
54			
55			

ELECTROLYTIC CONDENSERS

Item	Part No.	Description	Req.
60	33369	12 M.F.D 450 V.	1
61	33469	18 " 300 V.	1
62			

ADJUSTABLE CONDENSERS

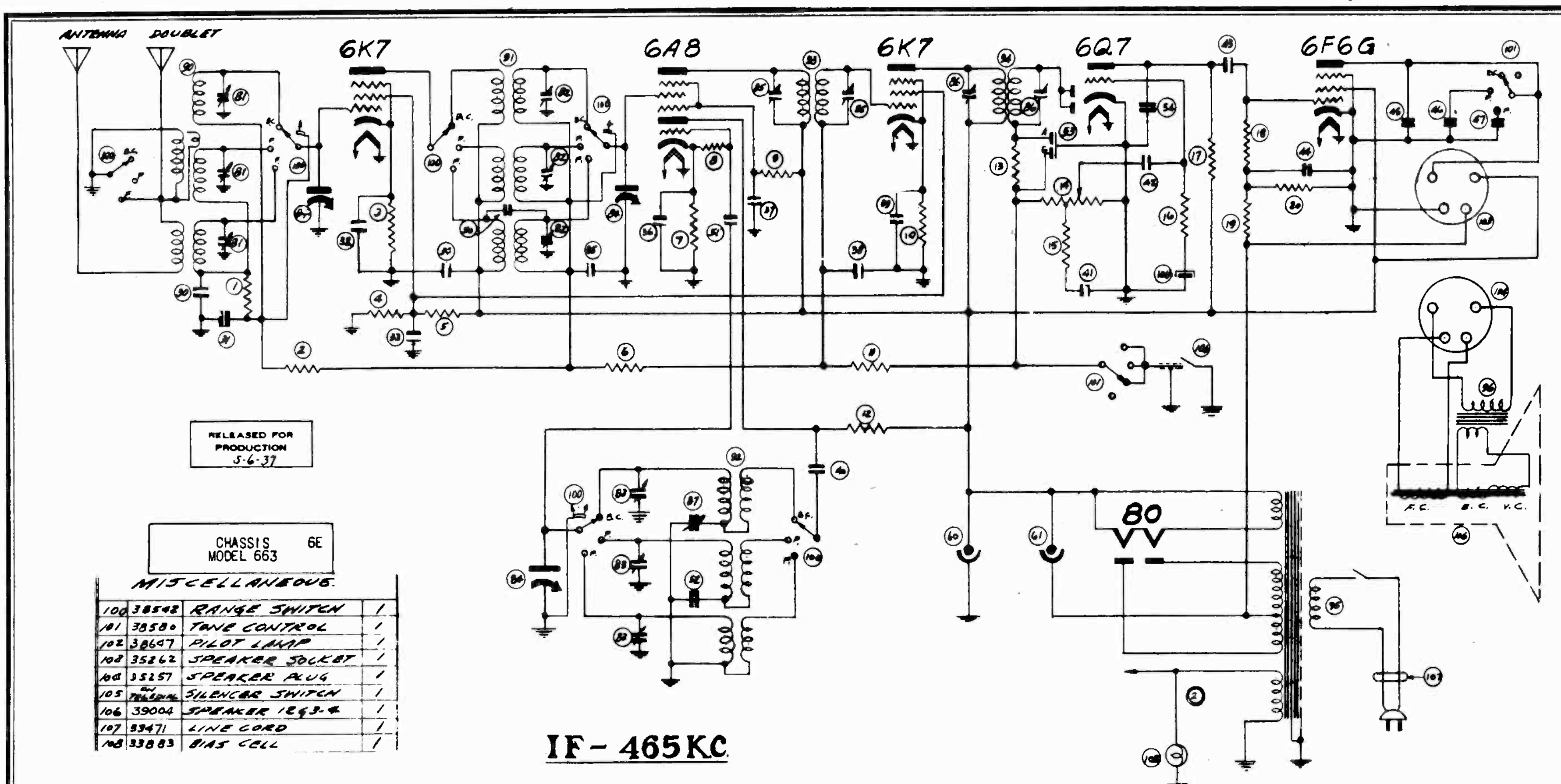
Item	Part No.	Description	Req.
70	37729	ANT. TRIMMER ASSEM.	1
71	37730	DET. OSC. " "	1
72	35170	PADDER	1
73	35341	1ST I.F. TRIMMER	1
74	35342	2ND I.F. "	1
75			
76			
77			

TRANSFORMERS & COILS

Item	Part No.	Description	Req.
80	38885	ANT. COIL	1
81	36887	DET. COIL	1
82	38886	OSC. COIL	1
83	35281	1ST I.F.	1
84	35206	2ND I.F.	1
85			
86	37859	OUTPUT TRANS.	1
87	37718	POWER TRANS.	1
88			
89			
90			

MODEL 663
Chassis 6E
Schematic, Parts

GENERAL HOUSEHOLD UTILITIES CO.



MISCELLANEOUS.

Item	Part No.	Description	Req.
100	38542	RANGE SWITCH	1
101	38580	TONE CONTROL	1
102	38647	PILOT LAMP	1
103	35262	SPEAKER SOCKET	1
104	35257	SPEAKER PLUG	1
105	ON TELEDIAL	SILENCER SWITCH	1
106	39004	SPEAKER 12G3-4	1
107	33471	LINE CORD	1
108	33883	BIAS CELL	1

RESISTORS

Item	Part No.	Description	Req.
1	36826	100 M. OHM ±20% ⅓ W.	1
2	36826	100 M. " ±20% ⅓ W.	1
3	36967	390 " ±10% ⅓ W.	1
4	36827	47 M. " ±20% ⅓ W.	1
5	35105	33 M. " ±20% 1 W.	1
6	36826	100 M. " ±20% ⅓ W.	1
7	36967	390 " ±10% ⅓ W.	1
8	37732	56 M. " ±10% ⅓ W.	1
9	36759	68 M. " ±10% ⅓ W.	1
10	36825	600 " ±10% ⅓ W.	1
11	36823	1 MEG. " ±20% ⅓ W.	1
12	36971	20 M. " ±10% 1 W.	1
13	36827	47 M. " ±20% ⅓ W.	1
14	38994	250 M. " VOL. CONTROL W.	1
15	36973	33 M. " ±20% ⅓ W.	1
16	36823	1 MEG. " ±20% ⅓ W.	1
17	36833	220 M. " ±20% ⅓ W.	1
18	37733	560 M. " ±20% ⅓ W.	1
19	35107	560 M. " ±10% ⅓ W.	1
20	35106	150 M. " ±10% ⅓ W.	1

PAPER CONDENSERS

Item	Part No.	Description	Req.
30	33760	.006 M.F.D. 700 V.	
31	30143	.05 " 200 V.	
32	29135	.10 " 200 V.	
33	29135	.10 " 200 V.	
34	28726	.10 " 400 V.	
35	30143	.05 " 200 V.	
36	29135	.10 " 200 V.	
37	28723	.05 " 400 V.	
38	30143	.05 " 200 V.	
39	29135	.10 " 200 V.	
40	34417	.01 " 500 V.	
41	33663	.03 " 200 V.	
42	34417	.01 " 500 V.	
43	34435	.02 " 400 V.	
44	28728	.25 " 200 V.	
45	28717	.002 " 700 V.	
46	29813	.004 " 700 V.	
47	34417	.01 " 500 V.	

MICA CONDENSERS

Item	Part No.	Description	Req.
50	32989	10 M.M.F. ±20%	1
51	31358	50 " ±10%	1
52	33262	1065 " ±5%	1
53	29074	A=250 " B=100 MMF.	1
54	31861	500 " ±20%	1

ELECTROLYTIC CONDENSERS.

Item	Part No.	Description	Req.
60	33463	16 MFD 300 V. REG.	1
61	33369	12 " 450 V.	1

ADJUSTABLE CONDENSERS

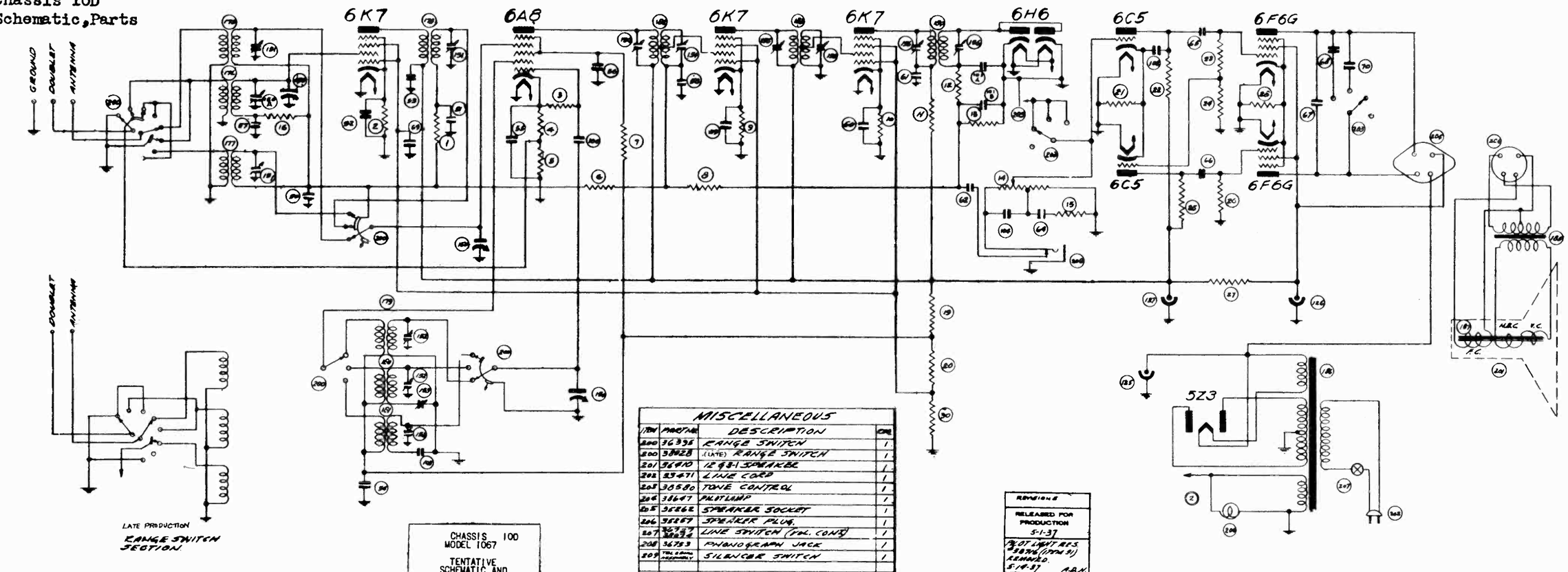
Item	Part No.	Description	Req.
81	35655	R.F. TRIMMER STRIP	1
82	35654	" " "	1
83	35656	" " "	1
84	38983	GANG CONDENSER	1
84	38075	(LATE) VARIABLE	1
85	35341	I.F. TRIMMER	1
86	35342	" "	1
87	38551	B.C. PADDER	1

TRANSFORMERS & COILS.

Item	Part No.	Description	Req.
90	38882	ANT. COIL	1
91	38884	DET. COIL	1
92	38883	OSC. COIL	1
93	35282	1ST I.F.	1
94	35297	DIODE I.F.	1
95	37718	POWER TRANS.	1
96	37869	OUTPUT TRANS.	1

MODEL 1067
Chassis 10D
Schematic, Parts

GENERAL HOUSEHOLD UTILITIES CO.



MISCELLANEOUS

ITEM	PART NO.	DESCRIPTION	QTY.
200	36395	RANGE SWITCH	1
200	38028	(LATE) RANGE SWITCH	1
201	36910	12 PM-1 SPEAKER	1
202	23471	LINE CORD	1
203	36580	TONE CONTROL	1
204	38647	PILOT LAMP	1
205	35262	SPEAKER SOCKET	1
206	35267	SPEAKER PLUG	1
207	36784 38034	LINE SWITCH (Vol. CONT.)	1
208	36783	PHONOGRAPH JACK	1
209	TOTAL 6 BASIC ASSEMBLY	SILENCER SWITCH	1

REVISIONS
RELEASED FOR PRODUCTION 5-1-37
PILOT LIGHT RES. 38016 (ITEM 91) REMARKED. 5-14-37 A.B.N.

CHASSIS 100
MODEL 1067

TENTATIVE SCHEMATIC AND PARTS LIST

GRUNOW RADIO

GENERAL HOUSEHOLD UTILITIES COMPANY

CHICAGO, U.S.A.

I.F. - 465 K.C.

RESISTORS

ITEM	PART NO.	DESCRIPTION	QTY.
1	36826	100 M OHMS ±2% ½ W.	1
2	36825	600 " ±10% ½ W.	1
3	36823	47M " ±10% ½ W.	1
4	36967	390 " ±10% ½ W.	1
5	36967	390 " ±10% ½ W.	1
6	36827	47M " ±20% ½ W.	1
7	36823	47M. " ±10% ½ W.	1
8	36829	MEG. " ±20 ½ W.	1
9	36828	600 " ±10 ½ W.	1
10	36687	.100 " ±10 ½ W.	1
11	36828	2200 " ±20 ½ W.	1
12	36829	47M. " ±10 ½ W.	1
13	36833	220M. " ±10 ½ W.	1
14	36727	1 MEG. " VOL. CONT.	1
15	38074	NEW 1 MEG. VOL. CONT.	1
16	36827	47 M. OHMS ±20 ½ W.	1
16	36826	100 M. " ±20 ½ W.	1
17			
18			
19	38877	3000 " ±10 1 W.	1
20	36836	3000 " ±10 2 W.	1
21	36832	1500 " ±10 ½ W.	1
22	36830	68 M. " ±20 ½ W.	1
23	36821	330 M. " ±5 ½ W.	1
24	36841	24,300 " ±5 ½ W.	1
25	36831	68 M. " ±10 ½ W.	1
26	36822	330 M. " ±10 ½ W.	1
27	36837	500 " ±10 2 W.	1
28	36761	805 " ±10 2 W.	1
29			
30	36838	10M. " ±10 1 W.	1

RESISTORS

ITEM	PART NO.	DESCRIPTION	QTY.
31			

PAPER CONDENSERS

ITEM	PART NO.	DESCRIPTION	QTY.
50	39760	.006 M.F.D. 700V.	1
51	36486	.021 " 400V.	1
52	29138	.1 " 200V.	1
53	28726	.1 " 400V.	1
54	28723	.05 " "	1
55	29136	.1 " 200V.	1
56	28723	.05 " 400V.	1
57	30148	.05 " 200V.	1
58	30148	.05 " "	1
59	29136	.1 " "	1
60	29138	.1 " "	1
61	29567	.02 " 600V.	1
62	34417	.01 " 500V.	1
63			
64	30143	.05 " 200V.	1
65	39436	.06 " 400V.	1
66	39436	.05 " "	1
67	37502	.001 " 700V.	1
68	31866	.01 " 500V.	1
69	29136	.1 " 200V.	1
70	28717	.002 " 700V.	1

MICA CONDENSERS

ITEM	PART NO.	DESCRIPTION	QTY.
100	31358	50 M.M.F. ±10%	1
101	29078	DUAL 475 M.M.F. & 100 M.M.F.	1
102	31861	500 M.M.F. ±20%	1
103	33162	1065 M.M.F. ±5%	1
104	28281	100 M.M.F. STYLE 2 ±20%	1

ELECTROLYTIC CONDENSERS

ITEM	PART NO.	DESCRIPTION	QTY.
125	36782	25 MFD 450 V.	1
126	36780	30 " 300 V.	1
127	36781	12 " 300 V.	1

ADJUSTABLE CONDENSERS

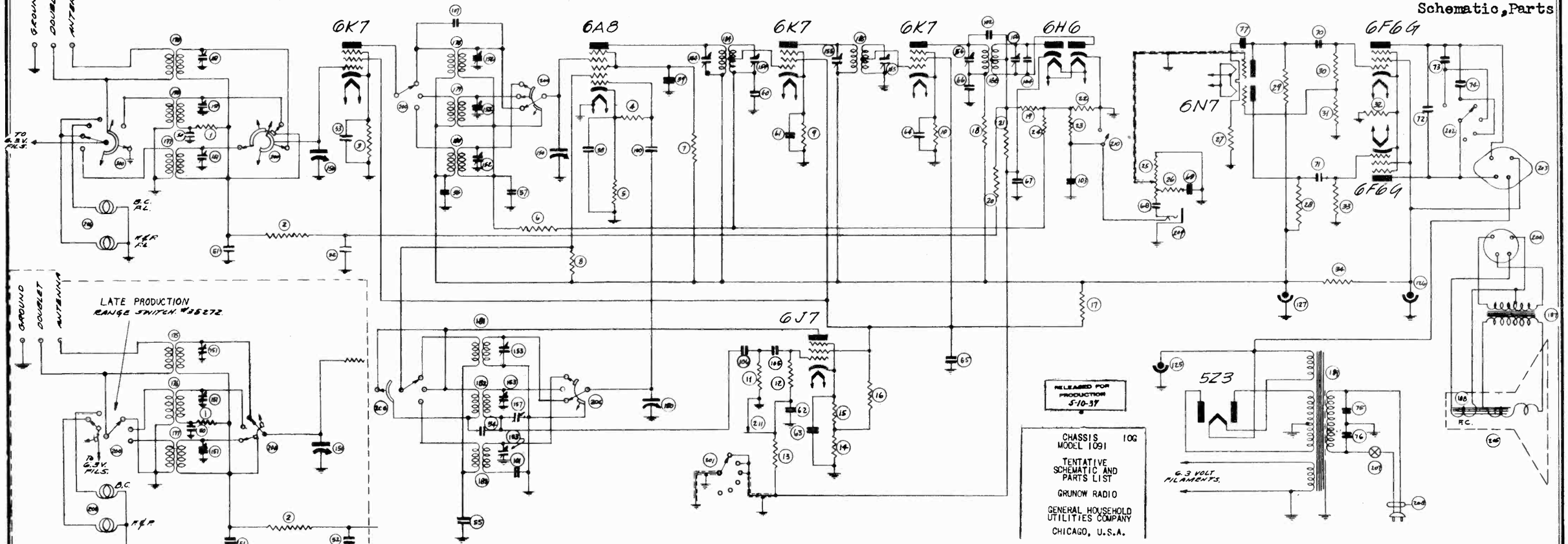
ITEM	PART NO.	DESCRIPTION	QTY.
150	38993	VARIABLE CONDENSER	1
151	35684	ANT. COIL TRIMMER STRIP	1
152	35665	OSC. " " "	1
153	36170	PADDER CONDENSER	1
154	36787	1ST I.F. TRIMMER COND.	1
155	36787	2ND I.F. " "	1
156	35342	DOUBLE " "	1

TRANSFORMERS & COILS

ITEM	PART NO.	DESCRIPTION	QTY.
175	38010	"A" BAND ANT. COIL	1
176	38015	"B" " " "	1
177	38012	"C" " " "	1
178	38013	"B" " INTERLACE "	1
179	38009	"C" " OSC. "	1
180	38014	"B" " " "	1
181	38011	"A" " " "	1
182	38000	1ST I.F. TRANS.	1
183	38001	2ND I.F. "	1
184	38002	DIODE I.F. "	1
185	35264	OUTPUT "	1
186	38100	POWER "	1
187		SPKR. FIELD COIL	1
188			

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 1091
Chassis 10G
Schematic, Parts



I.F. 465 K.C.

RESISTORS

ITEM	PART NO.	DESCRIPTION	REQ.
1	36827	47M. OHMS ±20% (R.S.) ½ W.	1
2	36933	1MEG. " ±20% ½ W.	1
3	36967	390 " ±10% ½ W.	1
4	36829	47M. " ±10% ½ W.	1
5	36967	390 " ±10% ½ W.	1
6	36827	47M. " ±20% ½ W.	1
7	36959	68M. " ±10% ½ W.	1
8	36971	80M. " ±10% 1 W.	1
9	36967	390 " ±10% ½ W.	1
10	36967	390 " ±10% ½ W.	1
11	37591	300 " ±10% ½ W.	1
12	36826	100M. " ±20% ½ W.	1
13	36969	1MEG. " ±20% ½ W.	1
14	36976	500 " ±5% ½ W.	1
15	36863	500 " ±10% ½ W.	1
16	36838	1MEG " ±10% 1 W.	1
17	38244	12M " ±10% 2 W.	1
18	36828	2200 " ±20% ½ W.	1
19	36822	33M " ±10% ½ W.	1
20	36823	1MEG. " ±20% ½ W.	1
21	36778	470M. " ±5% ½ W.	1
22	36972	150M " ±10% ½ W.	1
23	36829	47M. " ±10% ½ W.	1
24	36823	1MEG. " ±20% ½ W.	1
25	38267	1MEG. VOL. CONTROL	1
26	36833	220M. OHMS ±10% ½ W.	1
27	36832	1500 " ±10% ½ W.	1
28	38970	33M. " ±10% ½ W.	1
29	38970	33M. " ±10% ½ W.	1
30	36762	330M. " ±5% ½ W.	1
31	38971	20M. " ±5% ½ W.	1
32	36761	205 " ±10% 2 W.	1
33	36822	330M. " ±10% ½ W.	1
34	36837	500 " ±10% 2 W.	1

PAPER CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
50	30143	.05 MFD. (R.S.) 200 V.	1
51	33760	.006 " (R.S.) 780 V.	1
52	30148	.05 " 200 V.	1
53	29135	.1 " 200 V.	1
56	38417	.01 " (R.S.) 500 V.	1
55	38417	.01 " (R.S.) 500 V.	1
56	28736	.1 " 400 V.	1
57	30143	.05 " (R.S.) 200 V.	1
58	29135	.1 " 200 V.	1
59	28738	.05 " 400 V.	1
60	30143	.05 " 200 V.	1
61	29135	.1 " 200 V.	1
62	30143	.05 " 200 V.	1
63	29135	.1 " 200 V.	1
64	29135	.1 " 200 V.	1
65	29135	.1 " 200 V.	1
66	28736	.1 " 400 V.	1
67	36563	.2 " 200 V.	1
68	38417	.01 " 500 V.	1
69	29453	.01 " 400 V.	1
70	34436	.05 " 400 V.	1
71	34436	.05 " 400 V.	1
72	37502	.001 " 700 V.	1
73	31866	.01 " 500 V.	1
74	28717	.002 " 700 V.	1
75	34485	.02 " MOULDED 400 V.	1
76	34485	.02 " MOULDED 400 V.	1
77	28717	.002 " 700 V.	1

MICA CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
100	31358	50 MMF. (R.S.) ±10%	1
101	33262	1885 " (R.S.) ±5%	1
102	24881	100 " (R.S.C.)	1
103	24251	100 "	1
104	34440	80 " (R.S.C.)	1
105	26256	1000 " ±10%	1
106	36996	200 " ±10%	1
107	32989	10 " (R.S.) ±20%	1

ELECTROLYTIC CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
125	36752	25 M.F.D. 450 V.	1
126	36720	30 " 300 V.	1
127	36721	12 " "	1

ADJUSTABLE CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
150	37998	VARIABLE COND.	1
151	35655	3 GANG TRIMMER COND.	1
152	35654	" " " "	1
153	35655	" " " "	1
154	36758	1ST I.F. TRIMMER "	1
155	36758	2ND " " "	1
156	36439	OSCILL. " "	1
157	36975	1.95 MMF. PADDER	1

TRANSFORMERS & COILS

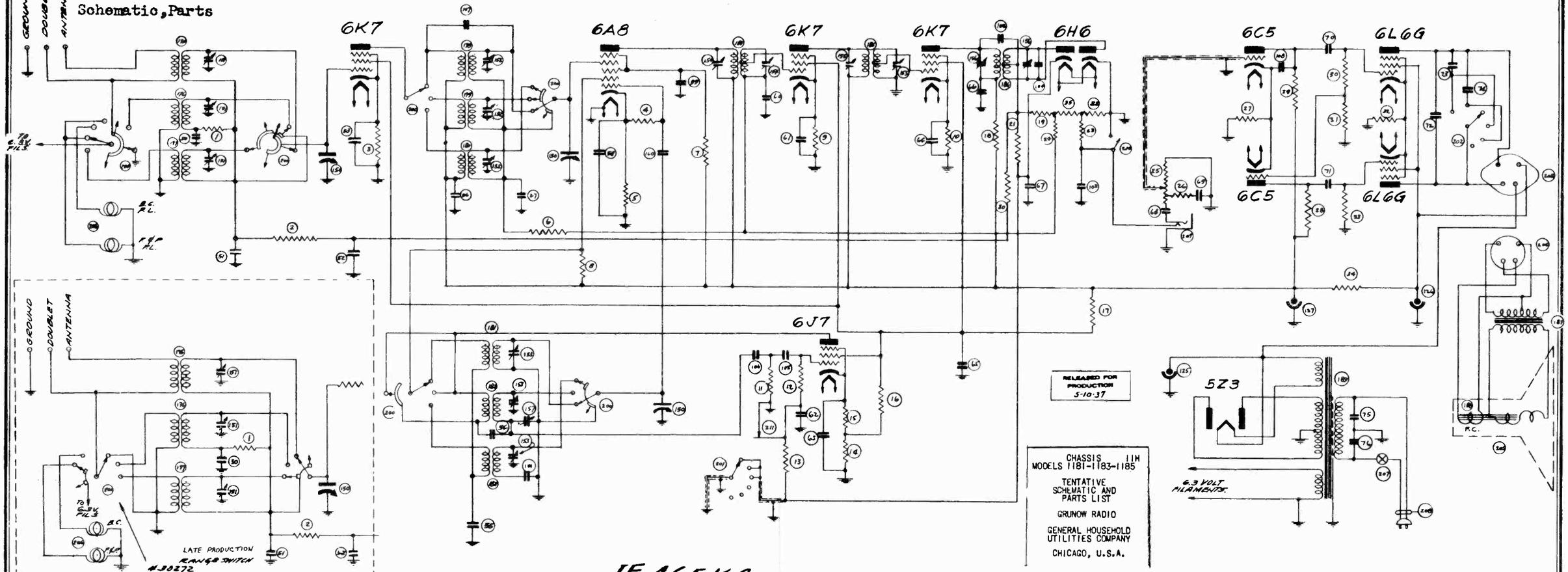
ITEM	PART NO.	DESCRIPTION	REQ.
175	38878	"F" BAND ANT. COIL	1
175	38876	(LATE) "F" " " "	1
176	38870	"E" " " "	1
176	38871	(LATER) "E" " " "	1
177	38878	"D" " " "	1
177	38875	(LATE) "D" " " "	1
178	38877	"C" " OSC. "	1
179	38873	"B" " " "	1
180	38876	"A" " " "	1
181	38873	"A" " OSC. "	1
182	38874	"B" " " "	1
183	38875	"D" " " "	1
184	38226	1ST I.F. TRANS.	1
185	38225	2ND " "	1
186	36452	DISCRIMINATOR TRANS.	1
187	35264	OUTPUT TRANS.	1
188	SPKR.	FIELD COIL	1
189	38791	POWER TRANS.	1

MISCELLANEOUS

ITEM	PART NO.	DESCRIPTION	REQ.
200	36725	RANGE SWITCH	1
200	38272	(LATE) RANGE SWITCH	1
201	36714	A.F.C. "	1
202		TONE CONTROL SWITCH	1
201	38582	(LATE) A.F.C. "	1
202		TONE CONTROL SWITCH	1
203	35262	SPEAKER SOCKET	1
204	35257	SPEAKER PLUG	1
205	36628	12 "A-1 SPEAKER	1
206	36316	PILOT LIGHT	2
207	MFR. CONT	LINE SWITCH	1
208	35471	LINE CORD	1
209	36758	PHONO JACK	1
210	TELEDIAL & SUBS.	SUBSTATION SILENCER SWITCH	1
211	TELEDIAL & SUBS.	TELEDIAL SWITCH	1

MODELS 1181,1183,1185
Chassis 11H
Schematic, Parts

GENERAL HOUSEHOLD UTILITIES CO.



RELEASED FOR PRODUCTION 5-10-37

CHASSIS 11H
MODELS 1181-1183-1185

TENTATIVE SCHEMATIC AND PARTS LIST

GRUNOW RADIO

GENERAL HOUSEHOLD UTILITIES COMPANY

CHICAGO, U.S.A.

I.F. 465 K.C.

RESISTORS

ITEM	PART NO.	DESCRIPTION	REQ.
1	36827	47M. OHMS (R.S.) ± 20% ½ W.	1
2	36823	1MEG. " ±20% ½ W.	
3	36967	390 " ± 10% ½ W.	
4	36829	47M. " ± 10% ½ W.	
5	36967	390 " ± 10% ½ W.	
6	36827	47M. " ± 20% ½ W.	
7	36769	68M. " ± 10% ½ W.	
8	36971	20M. " ± 10% 1 W.	
9	36967	390 " ± 10% ½ W.	
10	36967	390 " ± 10% ½ W.	
11	37591	300 " ± 10% ½ W.	
12	36826	100M. " ± 20% ½ W.	
13	36969	4MEG. " ± 20% ½ W.	
14	36976	500 " ± 5% ½ W.	
15	36863	800 " ± 10% ½ W.	
16	36838	1MEG. " ± 10% ½ W.	
17	38246	1MEG. " ± 10% 2 W.	
18	36828	2210 " ± 20% ½ W.	
19	36822	330M. " ± 10% ½ W.	
20	36823	1MEG. " ± 20% ½ W.	
21	36774	470M. " ± 5% ½ W.	
22	38794	100M. " ± 10% ½ W.	
23	36829	47M. " ± 10% ½ W.	
24	36823	1MEG. " ± 20% ½ W.	
25	38267	1 MEG. VOL. CONTROL W.	
26	36833	220M OHMS ± 10% ½ W.	
27	36832	1500 " ± 10% ½ W.	
28	36831	68M. " ± 10% ½ W.	
29	36830	68M. " ± 20% ½ W.	
30	36762	330M. " ± 5% ½ W.	
31	36861	24,500 " ± 5% 1 W.	
32	36983	260 " ± 10% 2 W.	
33	36822	330M. " ± 10% ½ W.	
34	36837	500 " ± 10% 2 W.	
35	36829	47M. OHMS ± 10% ½ W.	1

PAPER CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
50	30143	.05 M.F.D. (R.S.) 200 V.	1
51	33760	.006 " (R.S.) 700 V.	1
52	30143	.05 " 200 V.	1
53	29135	.1 " 200 V.	1
54	36417	.01 " (C.S.) 500 V.	1
55	29417	.01 " (R.S.) 500 V.	1
56	28726	.1 " 400 V.	1
57	30143	.05 " (C.S.) 200 V.	1
58	29135	.1 " 200 V.	1
59	28728	.05 " 400 V.	
60	30143	.05 " 200 V.	1
61	29135	.1 " 200 V.	1
62	30193	.06 " 200 V.	1
63	29135	.1 " 200 V.	1
64	29185	.1 " 200 V.	1
65	29135	.1 " 200 V.	1
66	28726	.1 " 400 V.	1
67	36563	.2 " 200 V.	1
68	36417	.01 " 600 V.	1
69	29453	.01 " 400 V.	1
70	34436	.05 " 400 V.	1
71	34436	.06 " 400 V.	1
72	28717	.002 " 700 V.	1
73	33816	.015 " 400 V.	1
74	31864	.005 " 700 V.	1
75	34485	.02 " MOULDED 400 V.	1
76	34485	.02 " 400 V.	1

MICA CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
100	31358	50 M.M.F. (R.S.) ± 10%	1
101	33268	1085 " (R.S.) ± 5%	1
102	24251	100 " (DISC)	1
103	24251	100 "	1
104	36440	80 " (DISC.)	1
105	24254	1000 " ± 10%	1
106	36996	800 " ± 10%	1
107	32909	10 " (R.S. ± 20%	1
108	24254	1000 "	1

ELECTROLYTIC CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
125	36752	25 M.F.D. 450 V.	1
126	36720	30 " 300 V.	1
127	36721	12 " 300 V.	1

ADJUSTABLE CONDENSERS

ITEM	PART NO.	DESCRIPTION	REQ.
150	37998	VARIABLE CONDENSER	1
151	35655	3 GANG TRIMMER COND.	1
152	35654	3 " " "	1
153	35656	3 " " "	1
154	36738	1ST I.F. TRIMMER "	1
155	36738	2ND " " "	1
156	36439	DISCRIM. " "	1
157	36975	135 M.M.F. PADDER	1

TRANSFORMERS & COIL

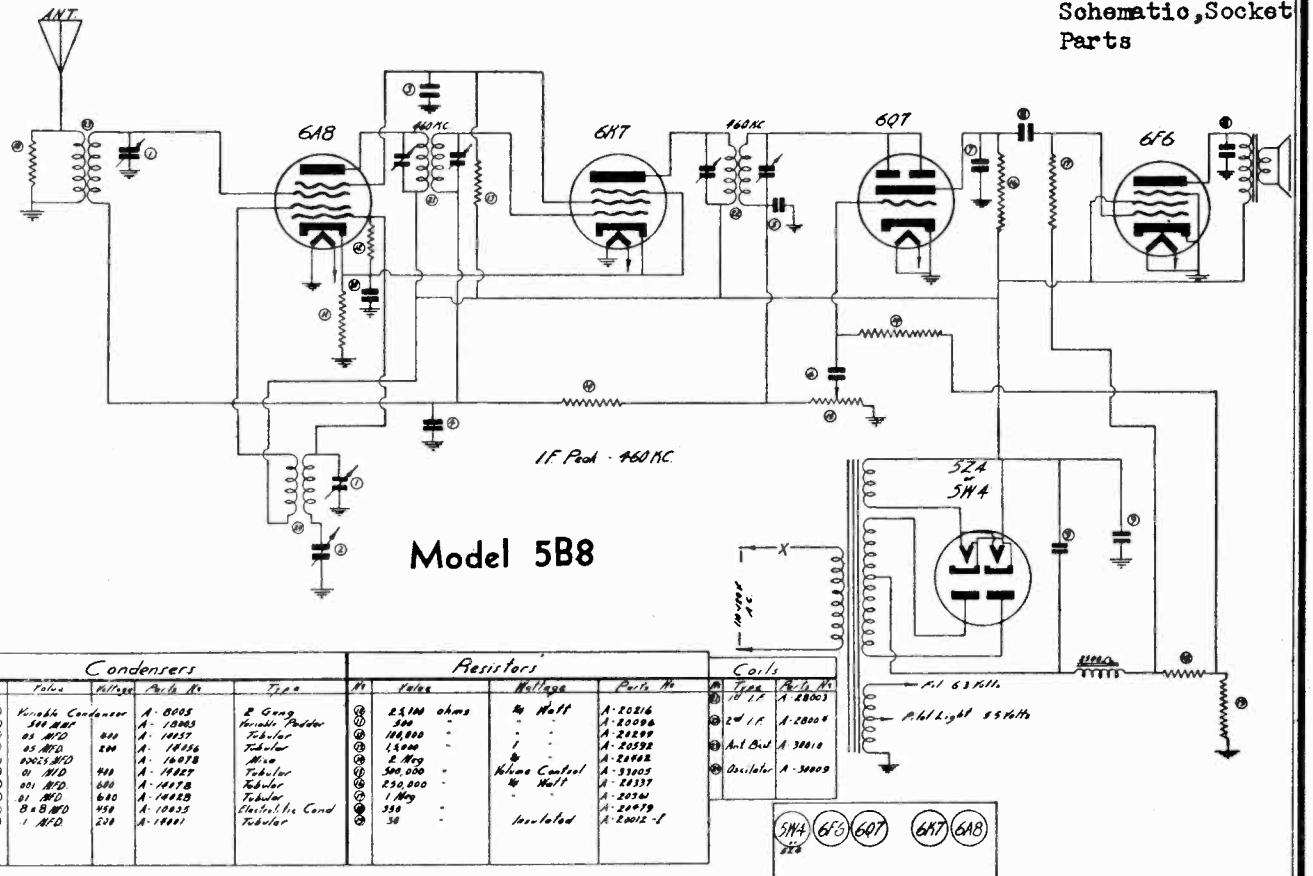
ITEM	PART NO.	DESCRIPTION	REQ.
175	38876	"F" BAND ANT. COIL	1
175	38876	(LATE) "F" " " "	1
176	38870	"B" " " "	1
176	38871	(EARLY) "B" " " "	1
177	38878	"E" " " "	1
177	38875	(LATE) "E" " " "	1
178	38877	"C" " DET. "	1
179	38873	"D" " " "	1
180	38876	"F" " " "	1
181	38873	"D" " OSC. "	1
182	38874	"B" " " "	1
183	38875	"E" " " "	1
184	38824	1ST I.F. TRANS.	1
185	38825	2ND I.F. TRANS.	1
186	36852	DISCRIMINATOR TRANS.	1
187	36956	OUTPUT TRANS.	1
188	SPKR.	FIELD COIL	1
189	38791	POWER TRANS.	1

MISCELLANEOUS

ITEM	PART NO.	DESCRIPTION	REQ.
200	36725	RANGE SWITCH	1
200	38272	(LATE) RANGE SWITCH	1
201	36746	A.F.C. "	
202		TONE CONTROL SWITCH	1
201	38582	(LATE) TONE	
202		A.F.C. CONTROL	1
203	35362	SPEAKER SOCKET	1
204	35257	SPEAKER PLUG	1
205	36857	12 OHM SPEAKER.	1
206	36716	PILOT LIGHT	2
207	PIL. LIGHT	LINE SWITCH	1
208	37471	LINE CORD	1
209	36753	PHONOGRAPH JACK	1
210	38229	INTERSTATION SILENCER SWITCH	1
211	TELEPHONE ATTACH.	TELEPHONE SWITCH.	1

GILFILLAN BROS.

MODEL 5B8
MODEL 5G8
Schematic, Socket
Parts



Model 5B8

Condensers

No.	Value	Voltage	Parts No.	Type
	Variable Condenser		A-8005	2 Gang
	500 MMF		A-18005	Variable Padder
	.05 MFD	400	A-10057	Tubular
	.05 MFD.	200	A-10056	Tubular
	.00025 MFD		A-16077	Mica
	.01 MFD	400	A-10026	Tubular
	.001 MFD.	600	A-10078	Tubular
	.01 MFD.	600	A-10028	Tubular
	B+B MFD	450	A-10035	Electrolytic Cond
	.1 MFD.	200	A-10001	Tubular

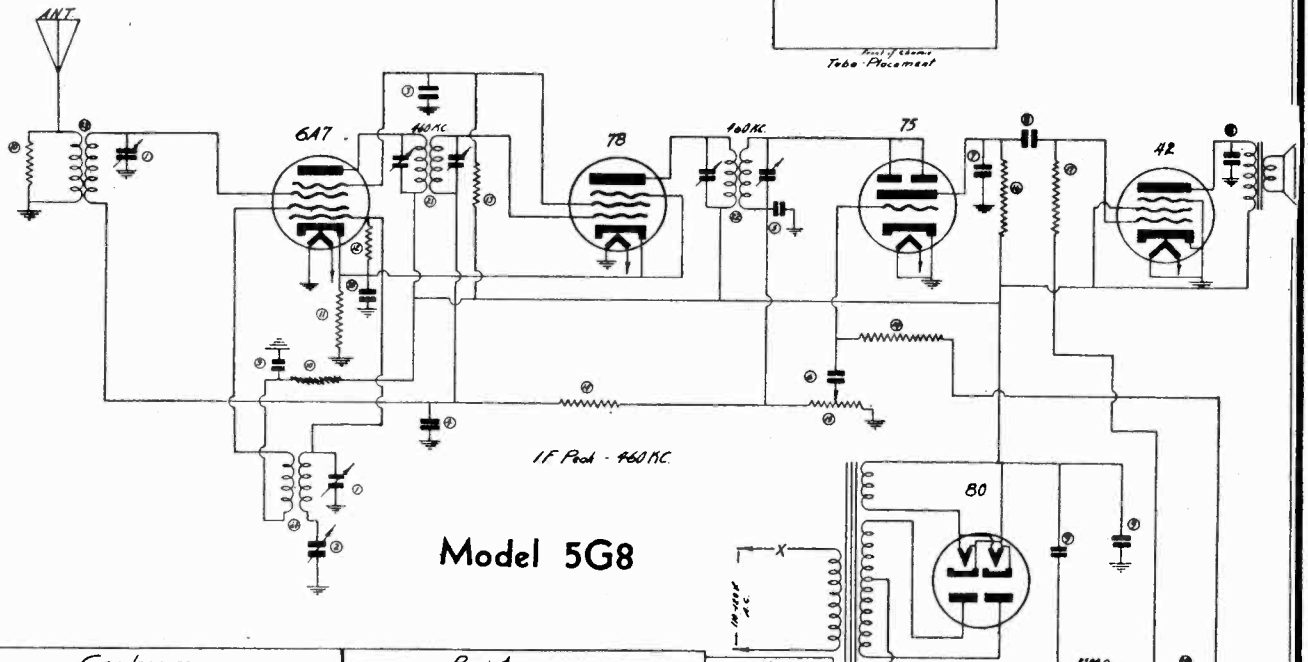
Resistors

No.	Value	Voltage	Parts No.
	25,000 ohms	½ Watt	A-20216
	500	- -	A-20096
	100,000	- -	A-20299
	1,500	- -	A-20592
	2 Meg	½ -	A-20908
	500,000	Volume Control	A-33005
	250,000	½ Watt	A-20337
	1 Meg	- -	A-20340
	350	- -	A-20979
	30	Insulated	A-20012-F

Coils

No.	Type	Parts No.
	1st I.F.	A-28003
	2nd I.F.	A-28004
	Ant. Coil	A-30010
	Oscillator	A-30009

Tube Placement



Model 5G8

Condensers

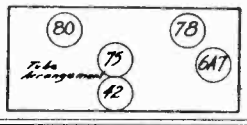
No.	Value	Voltage	Parts No.	Type
	Variable Condenser		A-8005	2 Gang
	500 MMF		A-18005	Variable Padder
	.05 MFD.	400	A-10057	Tubular
	.05 MFD.	200	A-10056	Tubular
	.00025 MFD		A-16077	Mica
	.01 MFD	400	A-10026	Tubular
	.001 MFD.	600	A-10078	Tubular
	.01 MFD.	600	A-10028	Tubular
	B+B MFD	450	A-10035	Electrolytic Cond
	.1 MFD.	200	A-10001	Tubular

Resistors

No.	Value	Voltage	Parts No.
	25,000 ohms	½ Watt	A-20215
	500	- -	A-20051
	100,000	- -	A-20299
	1,500	- -	A-20592
	2 Meg	½ -	A-20961
	500,000	Volume Control	A-33005
	250,000	½ Watt	A-20336
	1 Meg	- -	A-20340
	350	- -	A-20979
	30	Insulated	A-20012-F

Coils

No.	Type	Parts No.
	1st I.F.	A-28003
	2nd I.F.	A-28004
	Ant. Coil	A-30011
	Oscillator	A-30012

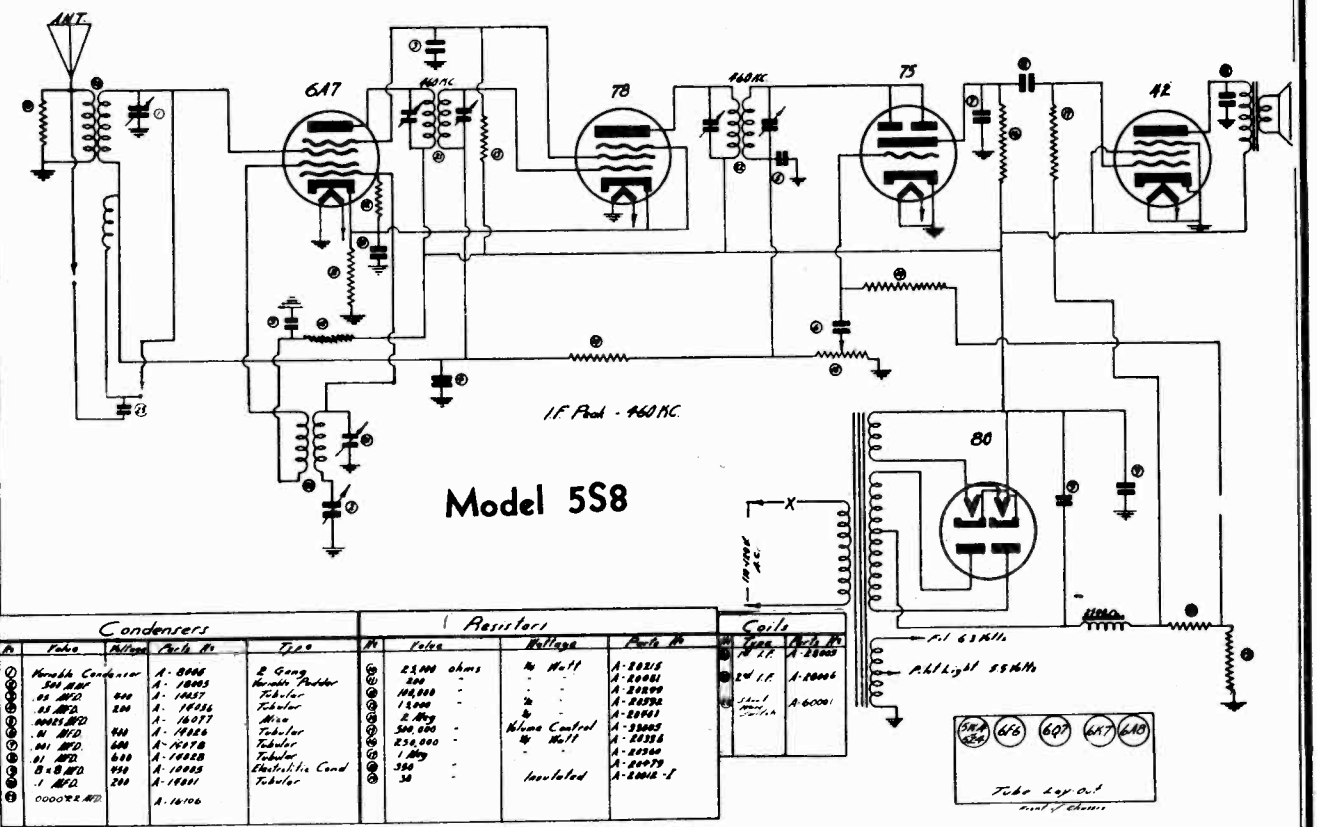


Tube Arrangement

MODEL 5S8
MODEL 6X8

GILFILLAN BROS.

Schematic, Socket Parts



Condensers

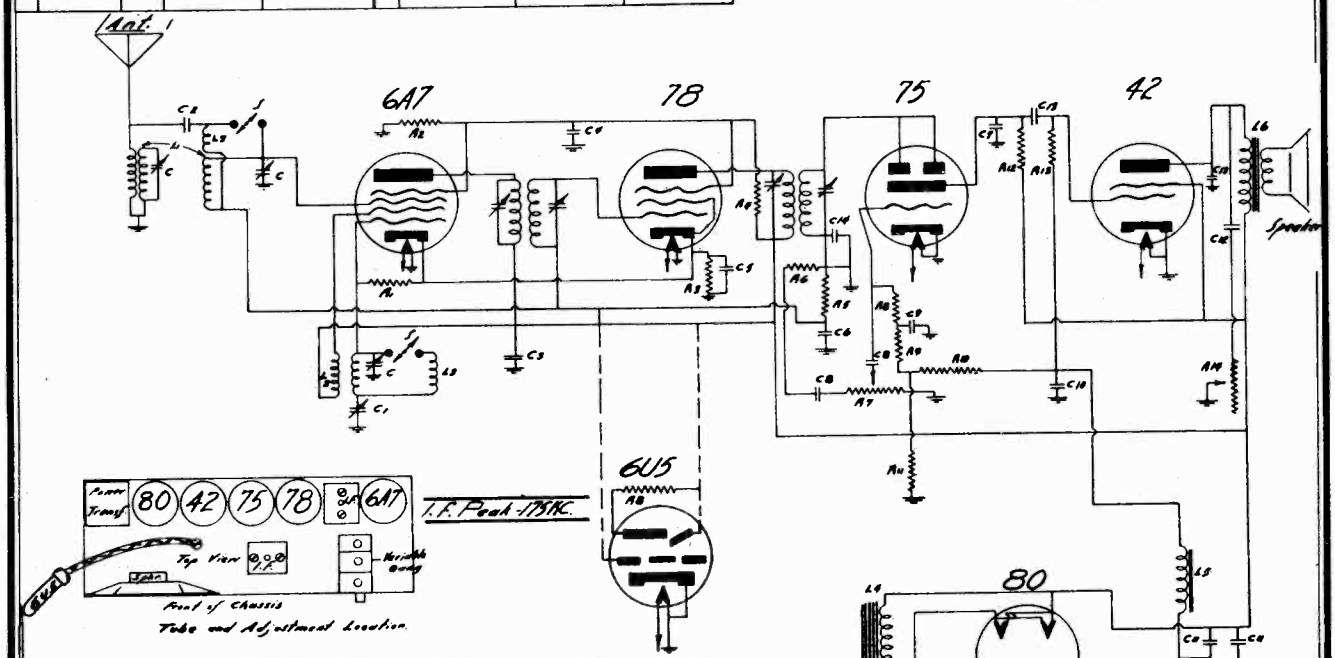
Mk	Value	Voltage	Code No.	Type
	Variable Condenser		A-8006	2 Gang
	500 MMFD		A-18003	Variable Padder
	.05 MFD.	400	A-18037	Tubular
	.25 MFD.	200	A-16056	Tubular
	.00025 MFD.		A-16077	Mica
	.1 MFD.	400	A-19026	Tubular
	.001 MFD.	600	A-16078	Tubular
	.01 MFD.	600	A-16028	Tubular
	8 x 8 MFD.	450	A-18035	Electrolytic Cond
	.1 MFD.	200	A-18031	Tubular
	0000PER MFD		A-16106	

Resistors

Mk	Value	Wattage	Code No.
	25,000 ohms	½ Watt	A-20215
	200 -	- -	A-20081
	100,000 -	- -	A-20899
	1,000 -	½ -	A-20892
	2 Meg	½ -	A-20903
	500,000 -	Volume Control	A-33002
	250,000 -	½ Watt	A-20905
	1 Meg -	- -	A-20900
	350 -	- -	A-20979
	30 -	Insulated	A-20912-S

Coils

Mk	Type	Code No.
	1st I.F.	A-20003
	2nd I.F.	A-20006
	Final Tuned	A-60001



CONDENSERS

Code	Value	Voltage	Type
C	Variable	Condenser	2 Gang
C1	1000 MFD.		Mica
C2	.00025 -		-
C3	.25 -	400	Tubular
C4	.1 -	-	-
C5	.25 -	200	-
C6	.05 -	400	-
C7	.0001 -		
C8	.01 -	400	Tubular
C9	.1 -	200	-
C10	10 -	35	-
C11	8 -	450	Electrolytic (Filter)
C12	.03 -	800	Tubular
C13	.1 -	600	"
C14	.00025 -		-

RESISTORS

Code	Value	Ohms	Watts	Type
A1	100,000	-	⅛	
A2	50,000	-	½	
A3	300	-	¼	
A4	10,000	-	1	
A5	2 Meg	-	-	
A6	250,000	-	½	
A7	500,000	Variable Volume Control		(1 in tube unit of 600)
A8	1 Meg	-	-	
A9	100,000	-	½	
A10	350	-	¼	
A11	30	-	-	
A12	200,000	-	-	
A13	500,000	-	-	
A14	50,000	Variable Tone Control.		

Misc.

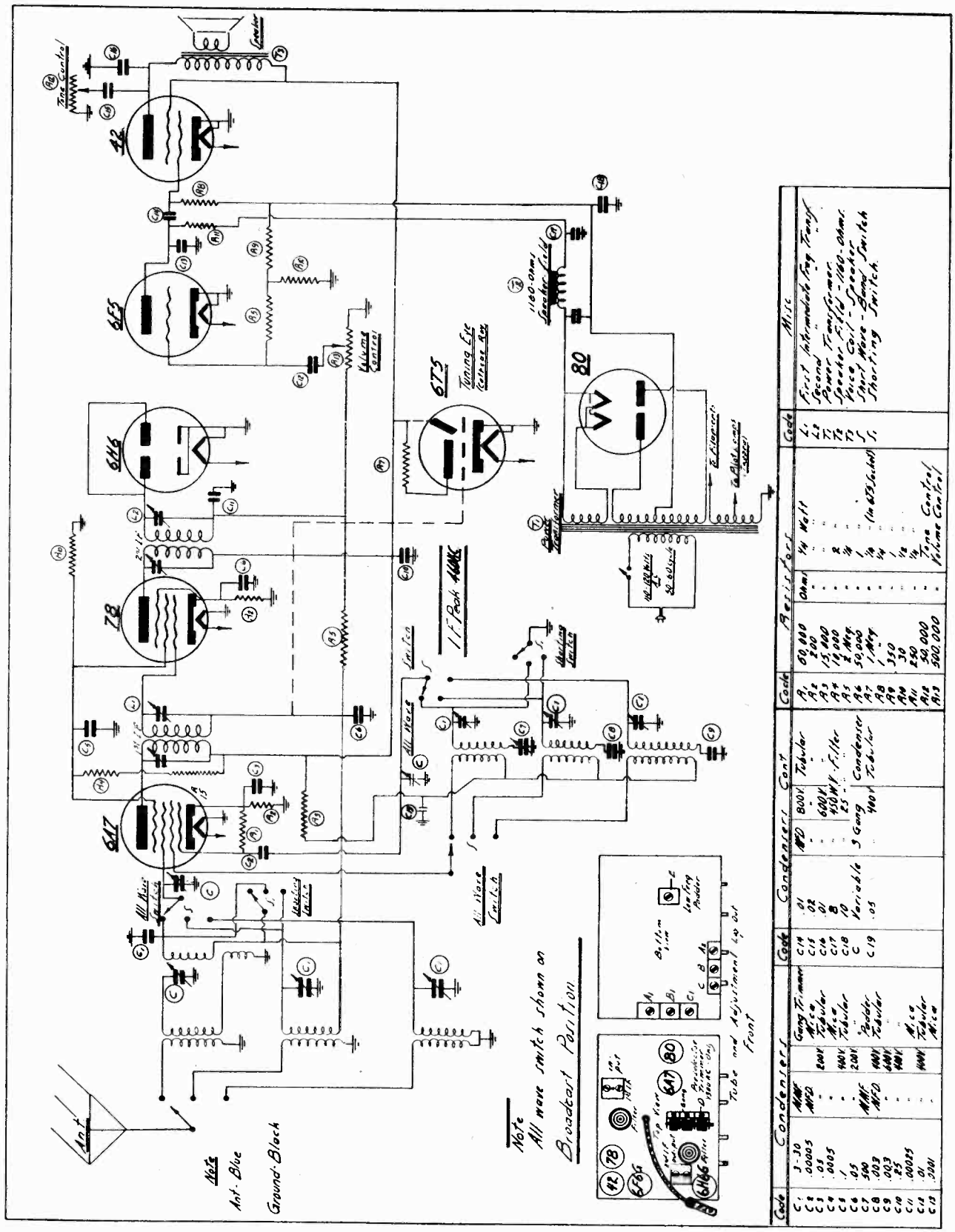
L1	Speaker Field and coil.
L2	Osc. Coil.
L3	Short wave coil
L4	Power Transf.
L5	Speaker field
L6	Voice Coil
S	75 Switch S.W.

Gilfillan Bros. Inc.

Model 6X8
1937-38

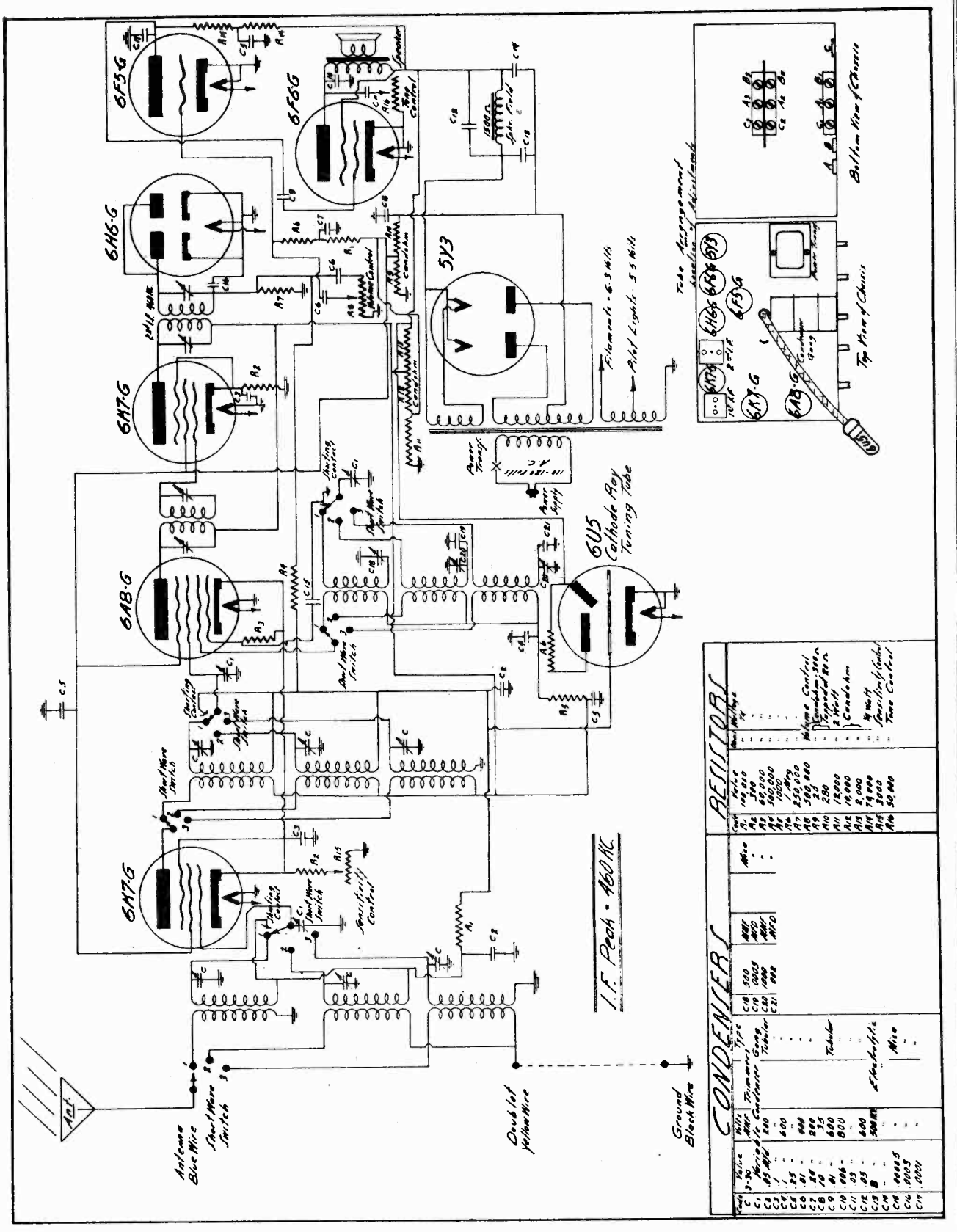
GILFILLAN BROS.

MODEL 7T8
Schematic, Socket
Trimmers



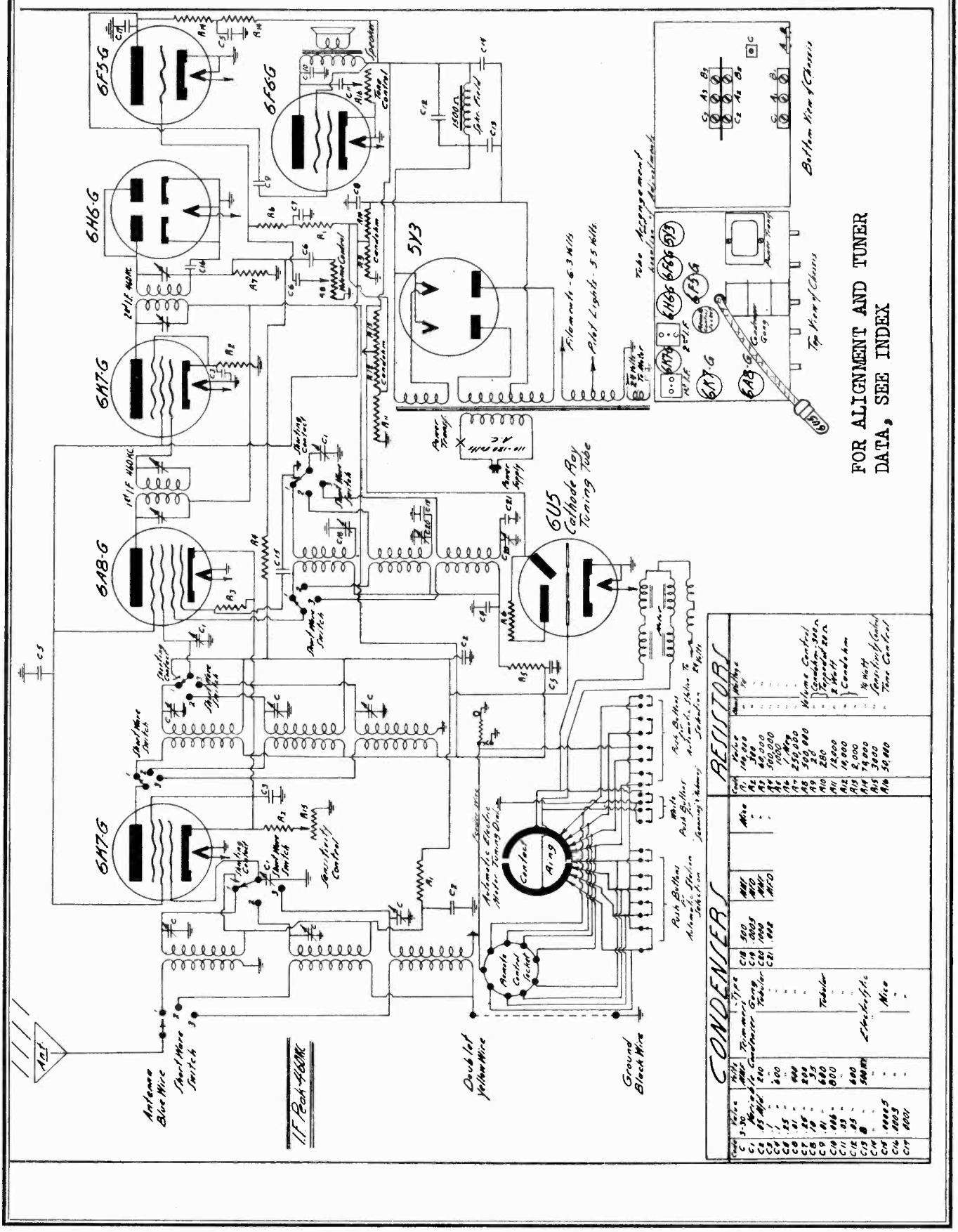
MODELS 8T8,8C8
Schematic,Socket
Trimmers

GILFILLAN BROS.



GILFILLAN BROS.

MODELS 8T8E, 8C8E
Schematic, Socket
Trimmers



MODELS 8T8E 8C8E AND 13C8-E

ALIGNMENT AND CALIBRATION

This Radio was 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 460, 1715, 1300, 600, 5400, 9000, 14400, 16200, 17400 and 18000 K.C. and an output indicating meter or V.T. volt meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

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

I. F. AMPLIFIER ADJUSTMENT

Adjust signal generator to give proper output at 460 K.C. Connect the output of the signal generator to the antenna of the receiver.

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

Turn the band switch to Range A. position (Standard wave band). Connect the vacuum tube volt meter to the A.V.C. buss of the receiver and adjust trimmers in the I.F. stage to resonance. During this procedure short out the front or oscillator section of the variable tuning condenser. Broad and sharp switch should be turned to extreme left position—**sharp**—for all alignments.

RANGE A ALIGNMENT - 525 to 1750 K.C.

Turn the rotor of the tuning condenser to full maximum position. Set both ends of pointer to true horizontal line.

1. Turn pointer to 1712 K.C. and set signal generator output to 1712 K.C. and adjust oscillator high frequency trimmer "A1" for maximum output.
2. Turn pointer to 600 K.C. and adjust signal generator to 600 K.C. output. Then use low frequency trimmer "A" and adjust for maximum output.
3. Turn pointer to 1300 K.C. and set signal generator output to 1300 K.C. and adjust modulator high frequency trimmer "A2" and "A3" radio frequency stage for maximum output.

Then turn pointer to 600 K.C. and readjust trimmer "A" but do not adjust "A2" and "A3" at this point.

RANGE B ALIGNMENT - 1700 to 5800 K.C.

1. Turn pointer to 5400 and set signal generator at 5400 K.C. and adjust high frequency trimmer "B1" to resonance of 5400 K.C. on the dial.
2. Turn pointer to 1800 K.C. and adjust signal generator to 1800 K.C. output. Then use low frequency trimmer B.
3. Then repeat No. 1 operation and also adjust "B2" and "B3."

RANGE C ALIGNMENT - 18000 to 5400 K.C.

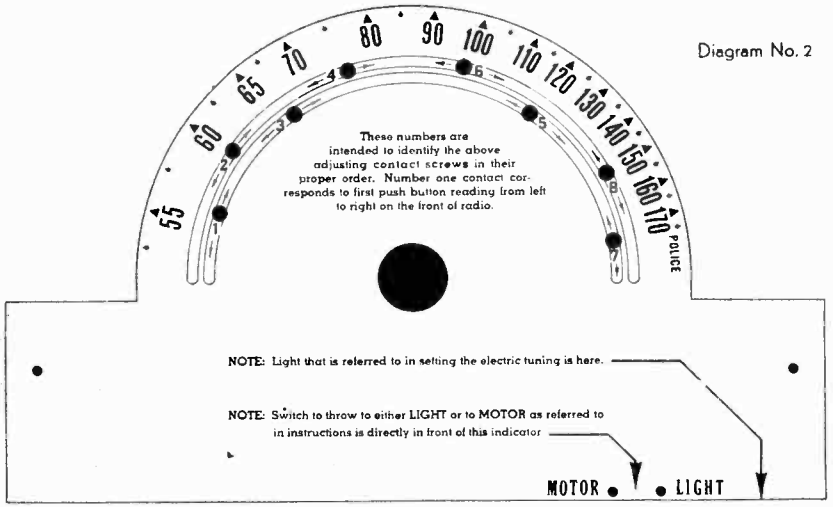
1. Turn pointer to 18 Meg. and set signal generator at 18 Meg. and adjust high frequency trimmer "C1" to resonance at 18 Meg. on dial. Then adjust trimmer "C2" and "C3" for maximum output.
2. Turn pointer to 6000 K.C. and set signal generator at 6000 K.C. and adjust low frequency trimmer "C" for maximum output.

CAUTION

During this procedure it is very easy to set the oscillator high frequency trimmer on the image side of signal which will give incorrect alignment. The oscillator trimmers are always tuned to a frequency that is higher than that of the true signal that the receiver is receiving.

NOTE—In the event this receiver does not operate properly—consult your **Dealer or Serviceman.**

Diagram No. 2



STEPS FOR SETTING ELECTRIC TUNING OF GILFILLAN ELECTRIC TUNING RADIO

Select eight most desired stations in your locality. Arrange in order kilocycles, i.e. station operating on lowest K.C. first, next lowest second, and so on.

Refer to diagram No. 1 showing numbering of buttons. Assign station with lowest K.C. to button No. 1, next lowest to button No. 2, and so on. From chart of stations furnished, cut out index card for stations selected and insert in slot directly above buttons.

To set selector buttons to tune desired stations:

1. Turn Number 1 knob to extreme left.
2. Hand tune the station desired to be selected by selector button.
3. Push in the selector button for which you are setting station.
4. At rear of chassis throw toggle switch to "light" (see diagram No. 2).
5. Loosen slightly the adjusting contact screw of number to correspond with button being set. Move adjusting contact screw to right or to left until light (see diagram No. 2) goes out, then tighten adjusting contact screw.
6. Throw switch to "motor."
7. By hand turn pointer away from station that has been selected.
8. Turn Number 1 knob to extreme right (motor tuning) position and station indicator should turn automatically back to station you have just set.

For each station you wish to set, follow this same series of steps.

The motor that operates the automatic feature of the dial is thermostatically controlled. After ten minutes of constant operation the motor will automatically cut "off."—Do not get alarmed or call your service man.—This is merely a protective feature and as soon as the motor cools to operating temperature the motor will cut "on" again.

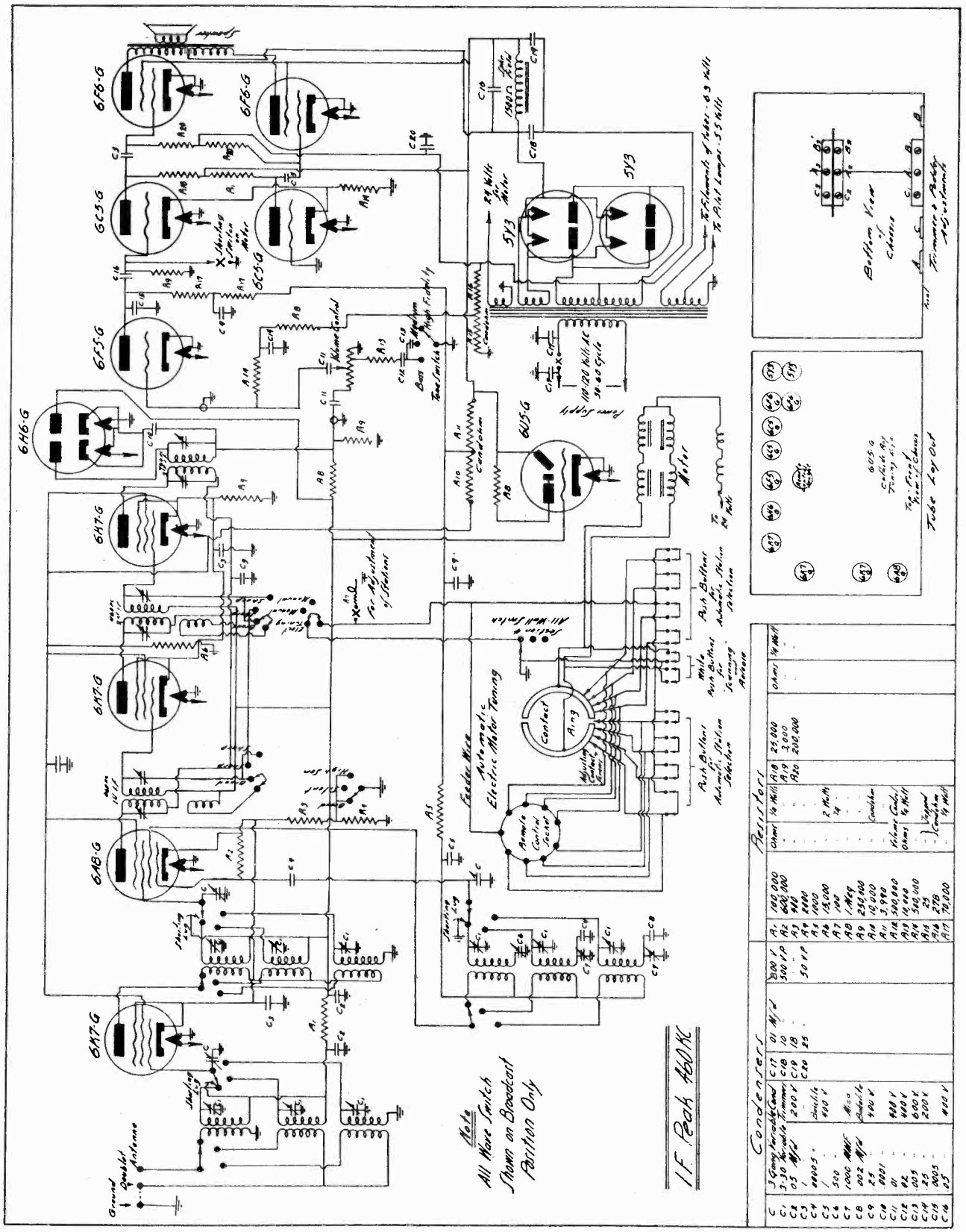
REMOTE CONTROL

If Remote Control is purchased for this radio, merely insert plug into plug socket immediately in rear of condenser gang. Cut out station index cards from chart and insert in slots directly above buttons so that stations indicated on remote control buttons correspond to buttons on receiver.

To use Remote Control, all buttons on receiver must be released. This is done by pushing in either "scan" button on the set. Before buttons on receiver can be used after using Remote Control, Remote buttons must be released by pushing in "Release" button.

GILFILLAN BROS.

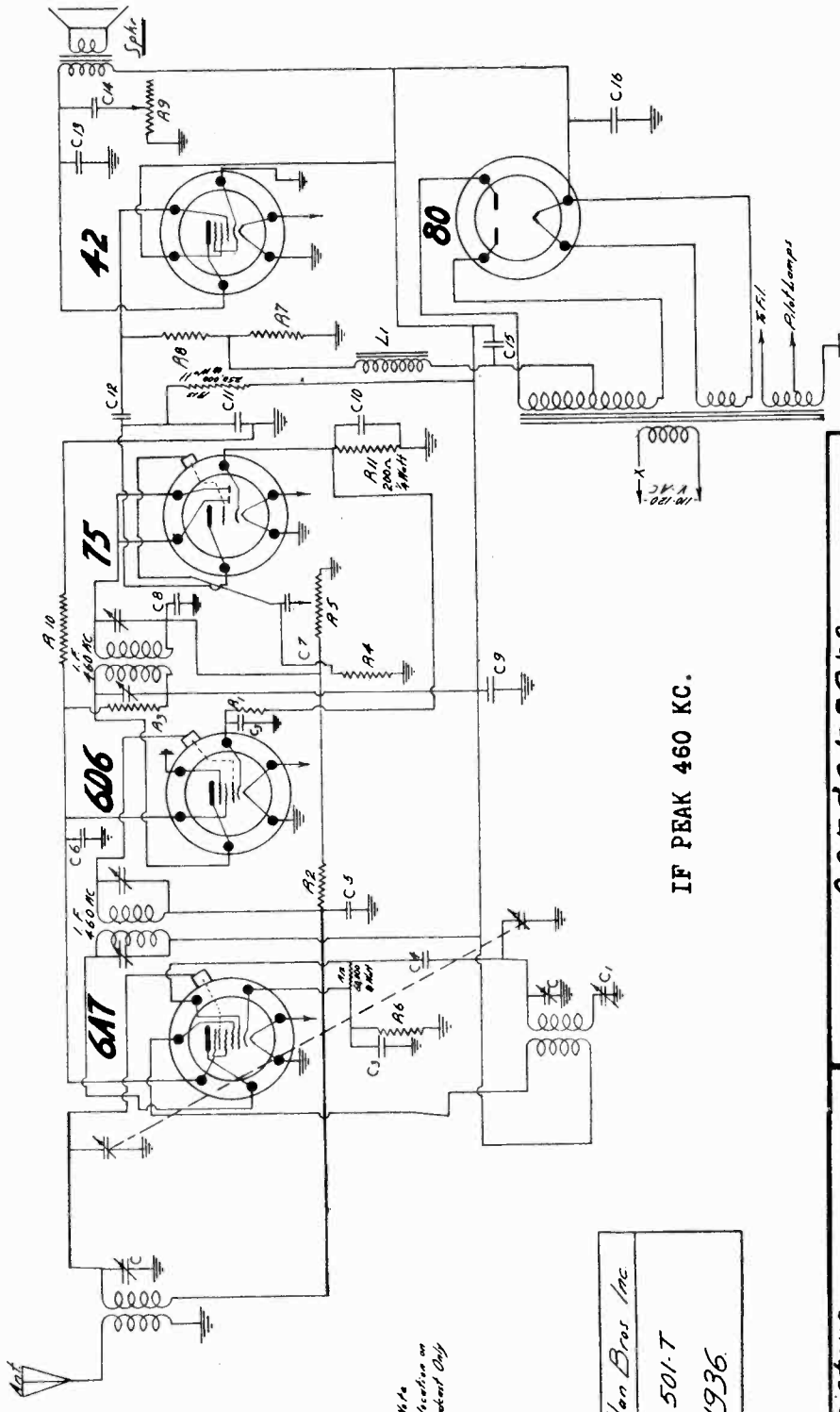
MODEL 13C8E
Schematic, Socket
Trimmers



FOR ALIGNMENT AND TUNER DATA, SEE INDEX

MODEL 501-T
Schematic

GILFILLAN BROS.



Resistors

R1	200 Ohms - 1 Watt - Wire wound - 10%
R2	1 Meg - ½ " - Carbon " "
R3	250,000 Ohms - 1 " - " "
R4	500,000 " - ½ " - " "
R5	500,000 " Volume Control
R6	500 " - ½ Watt - Carbon " "
R7	300 " - 1 " - " "
R8	500,000 " - ½ " - " "
R9	50,000 " - Tone Control
R10	100,000 " - ½ Watt - Carbon " "

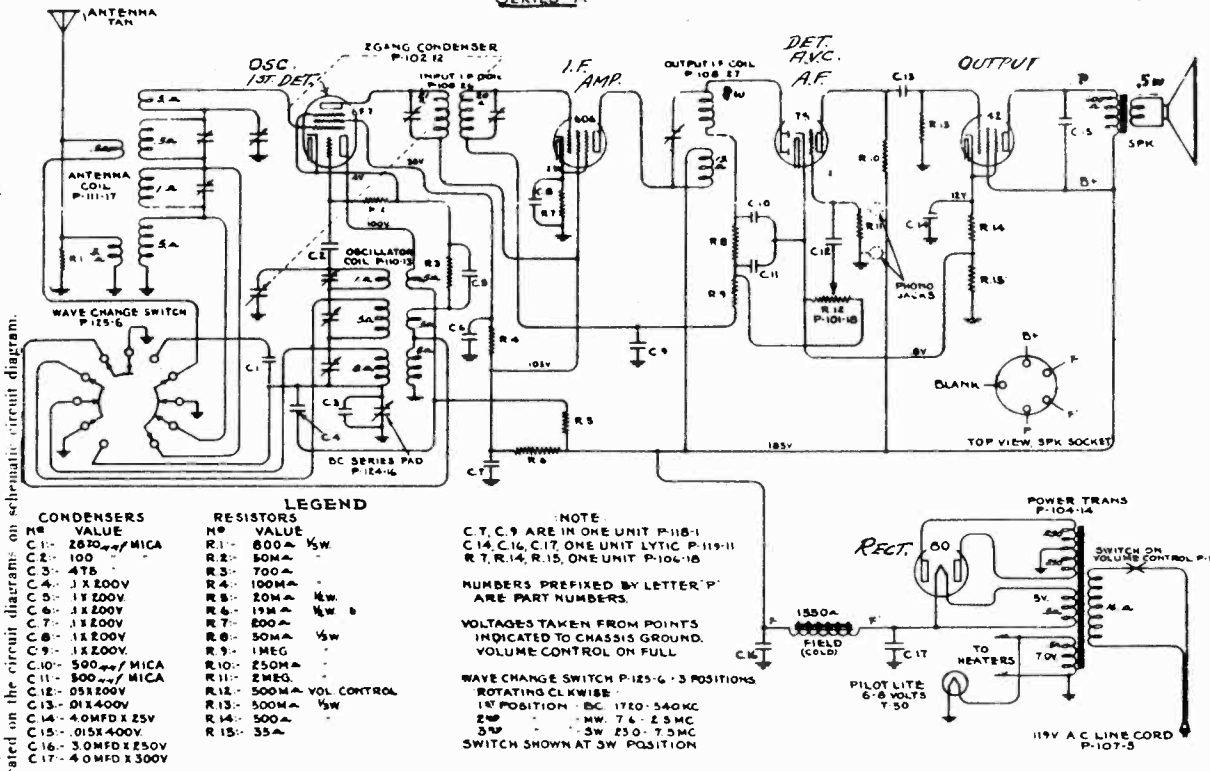
Condensers

C	3-30 MMFD Single Plate Trim-
C1	500 " Variable Padder
C2	003 MFD Mica 10%
C3	05 " - 200 Volts
C4	.00005 MMFD Bakelite 10% Type
C5	05 MFD 200 Volts
C6	1 " - " "
C7	.01 " - " "
C8	.00025 MFD Bakelite 10% Type
C9	1 MFD - 200 Volts
C10	10 " - 35 " Electrolytic
C11	.00025 MFD Bakelite 10% Type
C12	.02 MFD - 400 Volts
C13	.006 " - 800 "
C14	.02 " - 600 "
C15	5 " - " " - Filter
C16	" - " "

GOODYEAR SERVICE

MODEL 585
Series A,B,C
Schematics,Voltage

SERIES A



LEGEND

CONDENSERS		RESISTORS	
№	VALUE	№	VALUE
C.1	2820 μμf MICA	R.1	800Ω ½W
C.2	100 " "	R.2	50MΩ "
C.3	475 " "	R.3	700Ω "
C.4	.1 X 200V	R.4	100MΩ "
C.5	.1 X 200V	R.5	20MΩ ½W
C.6	.1 X 200V	R.6	19MΩ ½W
C.7	.1 X 200V	R.7	200Ω "
C.8	.1 X 200V	R.8	50MΩ ½W
C.9	.1 X 200V.	R.9	1MEG "
C.10	500 μμf MICA	R.10	250MΩ "
C.11	500 μμf MICA	R.11	2MEG. "
C.12	.05 X 200V	R.12	500MΩ VOL CONTROL
C.13	.01 X 400V	R.13	500MΩ ½W
C.14	4.0MFD X 25V	R.14	500Ω "
C.15	.015 X 400V	R.15	35Ω "
C.16	3.0MFD X 250V		
C.17	4.0 MFD X 300V		

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

NUMBERS PREFIXED BY LETTER "P" ARE PART NUMBERS.

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

WAVE CHANGE SWITCH P-125-6 - 3 POSITIONS
ROTATING CLKWISE
1ST POSITION - BC. 1720 - 540 KC
2ND " - MW. 7.6 - 2.5 MC
3RD " - SW. 25.0 - 7.5 MC
SWITCH SHOWN AT SW POSITION

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.

Series "B" and "C" may be identified by the letter "B" and "C" at the end of the serial numbers.

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

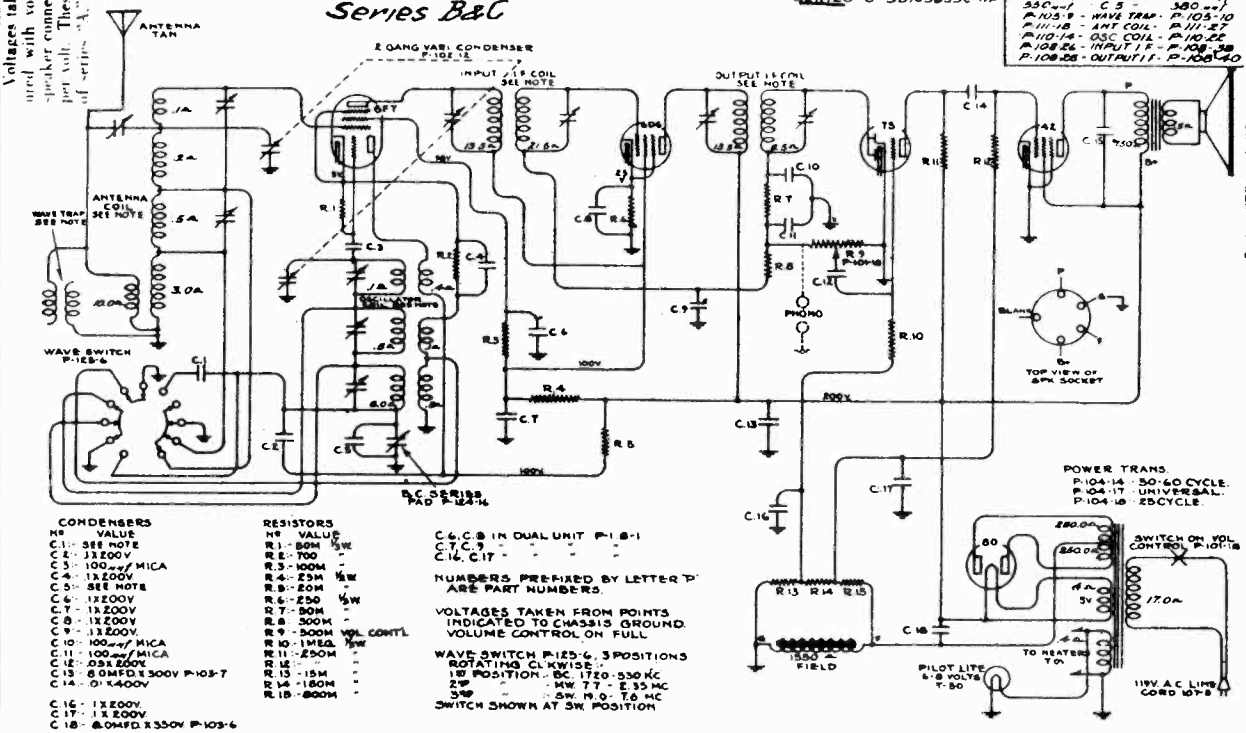
I. F. FREQUENCY:
Series A, Series B } 370 K.C.
Series C 465 K.C.

Series B&C

SERIAL NUMBERS
SERIES B 3A1005108 UP
SERIES C 3B1056350 UP

SERIES B NOTE
2870 μμf - C1 -
350 μμf - C5 -
P-105-9 - WAVE TRAP
P-111-18 - ANT COIL
P-110-14 - OSC. COIL
P-108-54 - INPUT I.F.
P-108-56 - OUTPUT I.F.

SERIES C
2000 μμf
350 μμf
P-105-10
P-111-27
P-110-26
P-108-58
P-108-60



CONDENSERS		RESISTORS	
№	VALUE	№	VALUE
C.1	SEE NOTE	R.1	80Ω ½W
C.2	.1 X 200V	R.2	700 "
C.3	100 μμf MICA	R.3	100M "
C.4	.1 X 200V	R.4	25M ½W
C.5	SEE NOTE	R.5	20M "
C.6	.1 X 200V	R.6	250 ½W
C.7	.1 X 200V	R.7	80M "
C.8	.1 X 200V	R.8	300M "
C.9	.1 X 200V	R.9	500M VOL CONTL
C.10	100 μμf MICA	R.10	1MEG ½W
C.11	100 μμf MICA	R.11	250M "
C.12	.05 X 200V	R.12	" "
C.13	8.0MFD 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	8.0MFD X 350V P-103-6		
C.15	.015 X 800V		

C.6, C.8 IN DUAL UNIT P-118-1
C.7, C.9 " " " "
C.14, 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

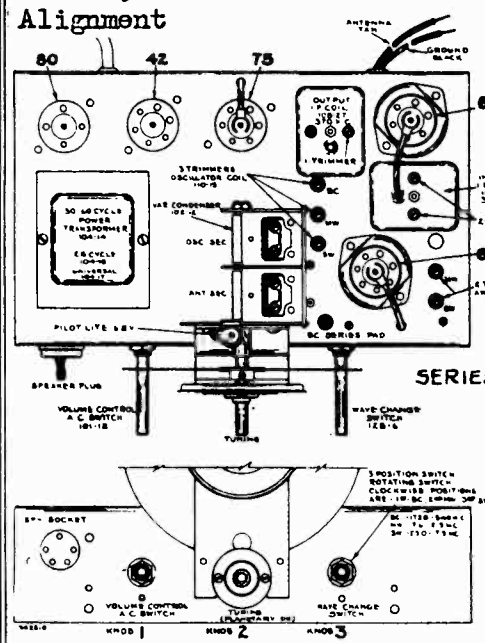
Transformers are available and chassis are sometimes equipped with universal transformers for operation on 40 and 60 cycles and with primary taps for 108, 125, 150, 220 and 250 volts (see illustrations) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not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

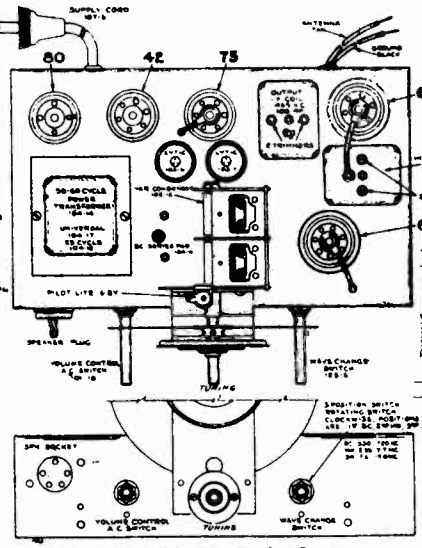
Series "B" and "C" chassis are serially numbered on the back flange of the chassis, series "B" beginning with number "5A1005108" and up; series "C" chassis, beginning with number "5B1056350" differs only from series "B" in that the I.F. frequency was changed from 370 to 465 kilocycles.

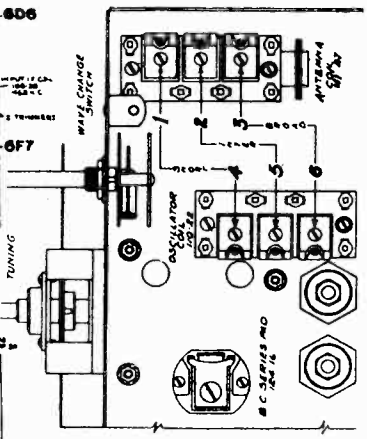
Series "A" chassis are equipped with dry electrolytic filter condensers and are serially numbered on paper tags which are attached to the line cord and to the inside of the cabinet.

MODEL 585
Series A,B,C
Socket,Trimmers
Alignment

GOODYEAR SERVICE







BOTTOM VIEW OF CHASSIS SERIES B AND C

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.

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)

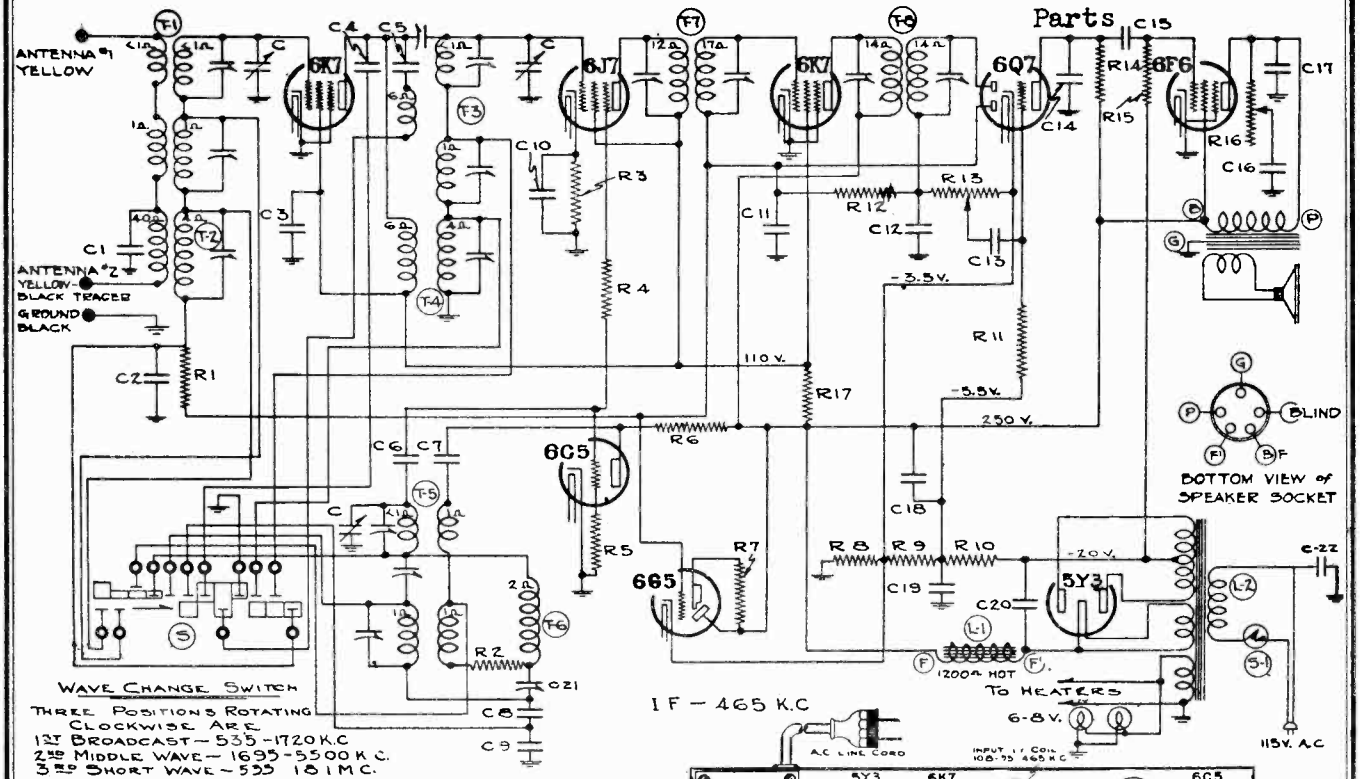
1. This band is aligned after the I.F. adjustments have been completed. Set wave changing switch to short wave position, extreme right of its rotation, set dial pointer to 18 megacycles.
   (a) With external oscillator adjusted to 18 megacycles and connected in series with short wave dummy antenna to 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.

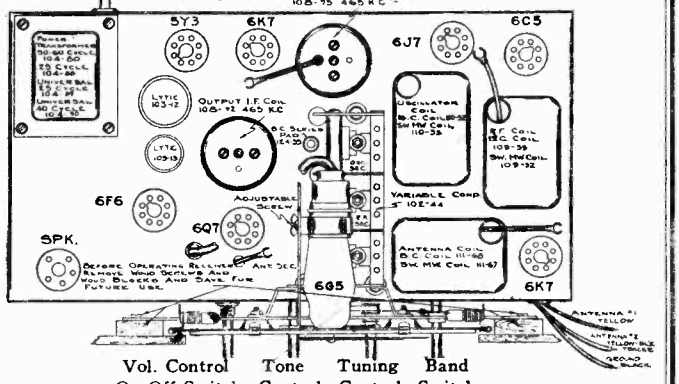
Intermediate Band Alignment—
(2.35 - 7.7 Megacycles)

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.

GOODYEAR SERVICE

MODELS 888,889
Schematic, Voltage
Socket, Trimmers
Parts





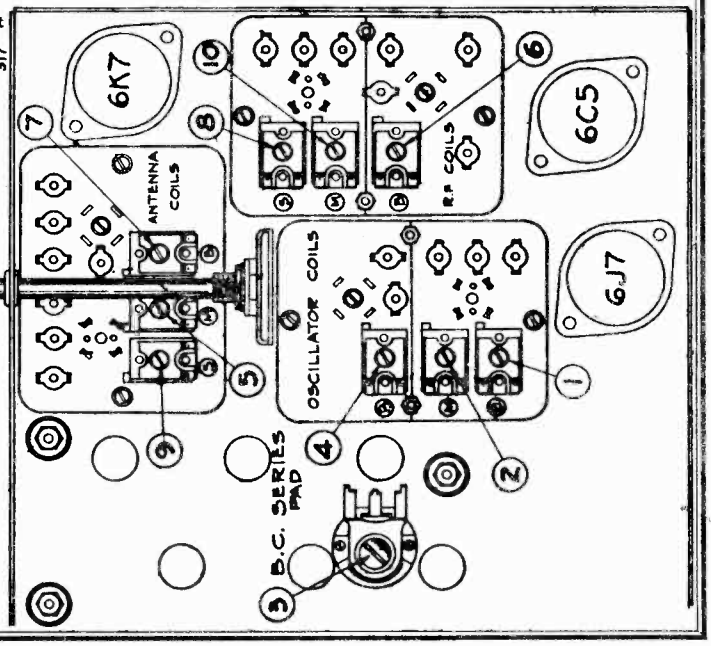
Vol. Control On-Off Switch | Tone Control | Tuning Control | Band Switch

	R1	130-103	100M ohm—1/3 w.—10%
	R2	130-60	100 ohm—1/3 w.—20%
	R3	130-159	2500 ohm—1/3 w.—10%
	R4	130-60	100 ohm—1/3 w.—20%
	R5	130-52	50M ohm—1/3 w.—20%
	R6	130-77	10M ohm—1 w.—20%
	R7	130-110	1 megohm—1/10 w.—10%
	R8	106-33	55 ohm—Muter
	R9	106-33	30 ohm—Muter
	R10	106-33	240 ohm—Muter
	R11	130-4	3 megohm—1/3 w.—20%
	R12	130-38	2 megohm—1/3 w.—20%
	R13	101-65	500M ohm—Volume Control
	R14	130-103	100M ohm—1/3 w.—10%
	R15	130-102	500M ohm—1/3 w.—10%
	R16	101-53	50M ohm—Tone Control
	R17	130-160	10M ohm—2 w.—Wire Wound 10%

NOTE: R8—R9—and R10 in one unit Part No. 106-33

	C1	129-40	.0001 Mica—10%
	C2	100-9	.05x200 v.—25%
	C3	100-53	.25x400 v.—25%
	C4	129-59	.0003 Mica—5%
	C5	129-38	.00005 Mica—10%
	C6	129-38	.00005 Mica—10%
	C7	100-25	.002x600 v.—25%
	C8	129-70	.004 Mica—2½%
	C9	129-71	.002 Mica—2½%
	C10	100-20	.1x200 v.—25%
	C11	100-26	.02x400 v.—25%
	C12	129-40	.0001 Mica—10%
	C13	100-11	.01x400 v.—25%
	C14	129-2	.0005 Mica—20%
	C15	100-11	.01x400 v.—25%
	C16	100-27	.025x600 v.—25%
	C17	100-25	.002x600 v.—25%
	C18	103-13	8.0x400 v.—Lytic
	C19	100-20	.1x200 v.—25%
	C20	103-12	8.0x275 v.—Lytic Regulating
	C21	124-35	Series Pad
	C22	100-61	.02x600 ±20%
	C	102-44	Section of three gang condenser
T4 109-33 B. C.-R. F. Coil Assembly	T1	111-67	MW-SW Antenna Coil Assembly
T5 110-53 M. W.-S. W. Oscillator Coil Assembly	T2	111-68	Broadcast Antenna Coil Assembly
T6 110-52 B. C. Osc. Coil Assembly	T3	109-32	MW-SW R. F. Coil Assembly
T7 108-93 Input I. F. Coil 465 kc.			
T8 108-92 Output I. F. Coil 465 kc.			
L1 114-56 Speaker 6"			
L1 114-65 Speaker 10"—field Resistance—1200 ohm			
L2 104-80 Power Transformer—50-60 cycles			
S 125-25 Band Switch			
S1 101-65 On-off switch on Volume Control			

FREQUENCY RANGE
535 to 1720 K.C. (Kilocycles)
1695 to 5500 K.C. (Kilocycles)
5.35 to 18.1 M.C. (Megacycles)



MODELS 888,889
Alignment

GOODYEAR SERVICE

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.

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 with the external oscillator.

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

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

Part No. 108-92 Output I.F. Transformer
Part No. 108-93 Input I.F. Transformer

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

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-92) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6J7 and adjust input I.F. transformer (No. 108-93) to resonance.

BROADCAST BAND ALIGNMENT:

535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 4; see bottom view of coil assembly, Fig. 3)
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast R.F. trimmer (adjustment number 6) and broadcast antenna trimmer (adjustment number 7), to resonance.
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 3), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:

5.35 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer (adjustment number 1) to resonance.
   (b) Adjust short wave R.F. trimmer (adjustment number 8), and short wave antenna trimmer (adjustment number 9), to resonance.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 6 megacycles for band coverage and sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 17 megacycle signal can be tuned in not only at 17 on the dial but also at approximately 16.1 megacycles.

MIDDLE WAVE BAND ALIGNMENT:

1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5 megacycles and connected in series with "Dummy 3" to the antenna and ground leads make the following adjustments:
   (a) Move dial pointer to 5 megacycles and adjust middle wave oscillator trimmer (adjustment number 2) to resonance.
   (b) Adjust middle wave R.F. trimmer (adjustment number 10), and middle wave antenna trimmer (adjustment number 5), to resonance.
   (c) Re-set external oscillator and check sensitivity at 1800 kilocycles.
   (d) Recheck broadcast band alignment.

ANTENNA AND GROUND LEADS:

You will notice three wires coming out of the back of the chassis, — the **yellow** wire and the **black with yellow tracer** wire are used for doublet antenna connections. The **black** wire is the ground connection.

For conventional types of antennas connect the **yellow** wire to the antenna lead and the **yellow with black tracer** and the **black** wire together to the ground lead.

When a doublet antenna is used connect the **yellow** wire and **the yellow with black tracer** wire to the doublet antenna and the solid **black** wire to the ground lead. (See Fig. 1—Top View, page 2).

ANTENNA:

For the best results an outside antenna approximately 75-100 feet long including the lead-in should be used. It should be erected as high as possible and as far from surrounding objects as practical. Both the antenna and lead-in should be placed at right angles to street car lines and incoming power lines and as far from any electrical apparatus which may be in the vicinity (such as elevator motors) as practical.

DESCRIPTION:

The tube complement of this chassis consists of the following metal and octal base glass tubes which are interchangeable with metal tubes:

1—Type 6K7 Remote cut-off pentode R.F. amplifier.
1—Type 6J7—pentode first detector.
1—Type 6C5 Oscillator.
1—Type 6K7 Remote cut-off pentode I.F. amplifier (465 K.C.)
1—Type 6Q7G duplex diode triode second detector, A.V.C. and audio.
1—Type 6F6G—pentode output amplifier.
1—Type 5Y3G or 5W4—high vacuum rectifier.
1—Type 6G5 Cathode ray tuning indicator.

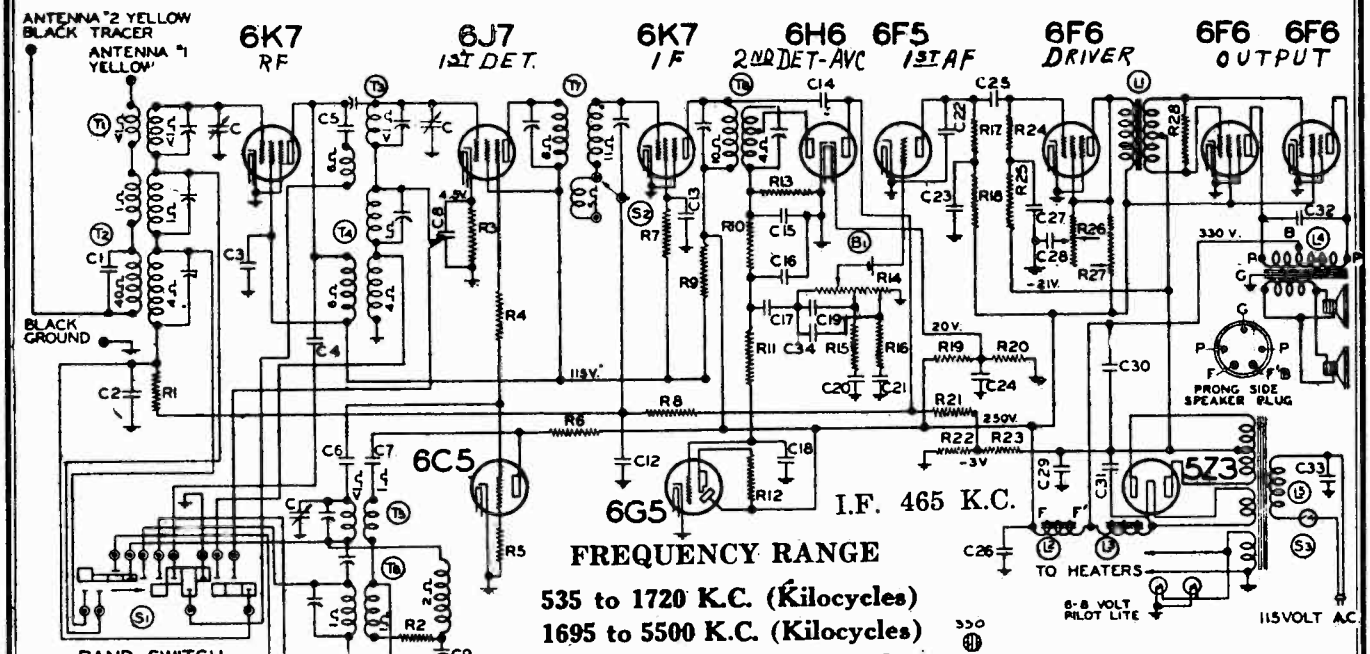
Transformers are available and chassis are sometimes equipped with universal transformers for operation on 25, 40 and 60 cycles and with primary taps for 108, 127, 150, 225, and 260 volts, (see instructions) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

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.

Socket, Trimmers
Parts

GOODYEAR SERVICE

MODEL 1174
Schematic, Voltage



R1	130-20	100M - 1/3 w. - 20%
R2	130-166	150 ohm - 1/3 w. - 10%
R3	130-129	2500 ohm - 1/3 w. - 10%
R4	130-60	100 ohm - 1/3 w. - 20%
R5	130-12	50M ohm - 1/3 w. - 20%
R6	130-133	15 M ohm - 1/2 w. - 20%
R7	130-76	30M ohm - 1/3 w. - 20%
R8	130-19	1 megohm - 1/3 w. - 20%
R9	130-88	10M ohm - 2 w. - 20% - wire
R10	130-20	100 M ohm - 1/3 w. - 20%
R11	130-4	3 megohm 1/3 w. - 20%
R12	130-110	1 megohm - 1/10 w. - 20%
R13	130-20	100M ohm - 1/3 w. - 20%
R14	101-36	.1 megohm - Volume Control
R15	130-22	5M ohm - 1/3 w. - 20%
R16	130-85	3M ohm - 1/3 w. - 20%
R17	130-20	100M ohm - 1/3 w. - 20%
R18	130-20	100M ohm - 1/3 w. - 20%
R19	130-130	100M ohm - 1/2 w. - 10%
R20	130-82	10M - 1/3 w. - 10%
R21	130-3	500M ohm - 1/3 w. - 20%
R22	106-31	27 ohms
R23	106-31	175 ohms
R24	130-45	250M ohm - 1/3 w. - 20%
R25	130-45	250M ohm - 1/3 w.
R26	101-40	Tone Control
R27	130-131	20M ohm - 1/2 w.
R28	130-21	20M ohm - 1/3 w.
		R22 and R23 in one
C	102-35	3 gang variable cond
C1	129-40	.0001 Mica 10%
C2	100-9	.05 x 200 v. 25%
C3	100-53	.25 x 400 v. 20%
C4	129-59	.0003 Mica 5%
C5	129-38	.00005 Mica 10%
C6	129-38	.00005 Mica 10%
C7	100-25	.002 x 600 v. 25%
C8	100-20	.1 x 200 v. 25%
C9	124-35	.00074 Series Pad.
C10	129-70	.004 Mica 2½%
C11	129-71	.002 Mica 2½%
C12	100-9	.05 x 200 25%
C13	100-11	.01 x 400 25%
C14	129-3	.00002 Mica 20%
C15	129-60	.00015 Mica 20%
C16	129-60	.00015 Mica 20%
C17	100-22	.05 x 200 25%
C18	100-11	.01 x 400 25%
C19	129-2	.0005 Mica 20%
C20	100-22	.05 x 200 25%
C21	100-22	.05 x 200 25%
C22	129-40	.0001 Mica 10%
C23	100-20	.1 x 200 25%
C24	100-19	.006 x 600 v. 25%
C25	100-13	.05 x 400 25%
C26	103-8	14 mfd. x 400 w. v. lytic
C27	100-20	.1 x 200 25%
C28	100-45	.1 x 600 v. 25%
C29	100-20	.1 x 200 v. 25%
C30	103-10	30 mfd. x 450 w. v. lytic
C31	103-5	8 mfd. lytic 475 w. v.
C32	100-32	.0005 x 1000 v. 20%
C33	100-61	.02 x 600 v. Bakelite 20%
C34	129-60	.00015 Mica 20%

PARTS

B1	116-22	Bias Cell
T1	111-67	M.W. - S.W. Antenna
T2	111-68	B.C. Antenna
T3	109-32	M.W. -S.W. - R. F.
T4	109-33	B.C. - R.F.
T5	110-53	M.W. - S.W. Oscillator
T6	110-52	B.C. Oscillator
T7	108-64	Input I.F.
T8	108-63	Output I.F.
L1	105-33	Audio Transformer
L2		Speaker field (1225 ohm) hot
L3	105-41	Choke (100 ohms)
L4	114-53-114-54	Dual Speakers
L5	104-72	Power Transformer-50-60 cycle
S1	125-29	Band Switch
S2		Fidelity switch on tone control
S3		On-off switch on volume control

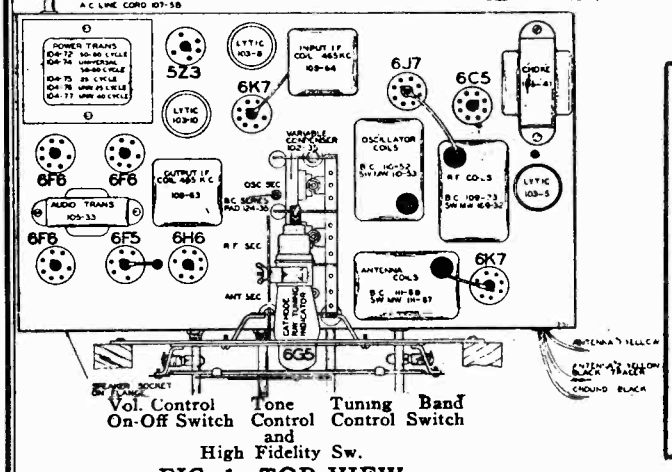


FIG. 1—TOP VIEW

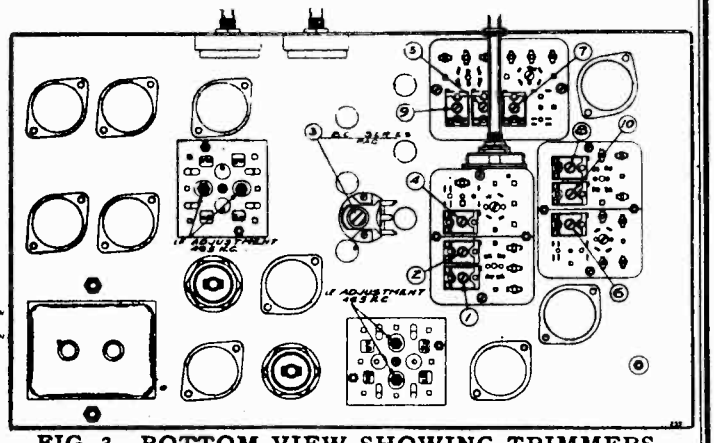


FIG. 3.—BOTTOM VIEW SHOWING TRIMMERS

MODEL 1174
Alignment

GOODYEAR SERVICE

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 5 prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of the multi-range meter should be used.

DUMMY ANTENNAS:

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

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

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

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

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

Part No. 108-63 Output I.F. Transformer
Part No. 108-64 Input I. F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the underside of chassis (see bottom view Fig. 3).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), the tone control on "Hi" part of the sharp position (as much right rotation as possible without operating the Hi Fidelity switch), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 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.

SHORT WAVE BAND ALIGNMENT:
5.35 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer (adjustment number 1) to resonance.
   (b) Adjust short wave R.F. trimmer (adjustment number 8), and short wave antenna trimmer (adjustment number 9), to resonance.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 6 megacycles for band coverage and sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 17 megacycle signal can be tuned in not only at 17 on the dial but also at approximately 16.1 megacycles.

MIDDLE WAVE BAND ALIGNMENT:
1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5 megacycles and connected in series with "Dummy 3" to the antenna and ground leads make the following adjustments:
   (a) Move dial pointer to 5 megacycles and adjust middle wave oscillator trimmer (adjustment number 2) to resonance.
   (b) Adjust middle wave R.F. trimmer (adjustment number 10), and middle wave antenna trimmer (adjustment number 5), to resonance.
   (c) Re-set external oscillator and check sensitivity at 1800 kilocycles.

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 4; see bottom view of coil assembly, Fig. 3)
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast R.F. trimmer (adjustment number 6) and broadcast antenna trimmer (adjustment number 7), to resonance.
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 3) to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**
   (f) Recheck short wave and middle wave band alignment.

ANTENNA AND GROUND LEADS:

You will notice three wires coming out of the back of the chassis, — the yellow wire and the black with yellow tracer wire are used for doublet antenna connections. The black wire is the ground connection.

For conventional types of antennas connect the yellow wire to the antenna lead and the yellow with black tracer and the black wire together to the ground lead.

When a doublet antenna is used connect the yellow wire and the yellow with black tracer wire to the doublet antenna and the solid black wire to the ground lead. (See Fig. 1—Top View, page 2).

ANTENNA:

For the best results an outside antenna approximately 75-100 feet long including the lead-in should be used. It should be erected as high as possible and as far from surrounding objects as practical. Both the antenna and lead-in should be placed at right angles to street car lines and incoming power lines and as far from any electrical apparatus which may be in the vicinity (such as elevator motors) as practical.

Reception on the short wave band can be sometimes improved by means of an approved doublet antenna.

DESCRIPTION:

The tube complement of this chassis consists of the following metal and octal base glass tubes which are interchangeable with metal tubes:

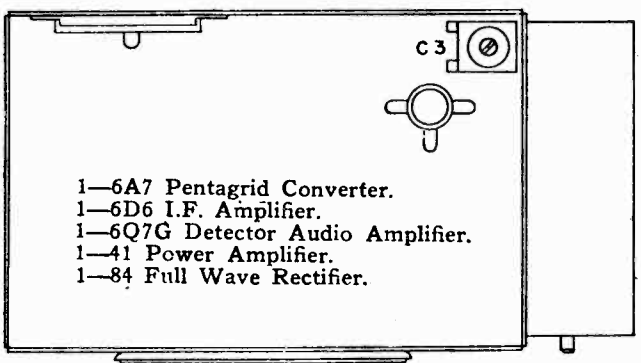
1—Type 6K7 Remote cut-off pentode R.F. amplifier
1—Type 6J7 Pentode first detector
1—Type 6C5 Oscillator
1—Type 6K7 Remote cut-off pentode I.F. amplifier (465 K.C.)
1—Type 6H6 Duplex diode second detector and A.V.C.
1—Type 6F5 First audio amplifier
1—Type 6F6 Triode driver stage
2—Type 6F6 Class AB Output pentodes in push-pull
1—Type 5Z3 High vacuum rectifier
1—Type 6G5 Cathode Ray Tuning Indicator.

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 25, 40 and 60 cycles and with primary taps for 108, 127, 150, 225, and 260 volts, (see instructions) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

Alignment, Tuner
Socket, Trimmers

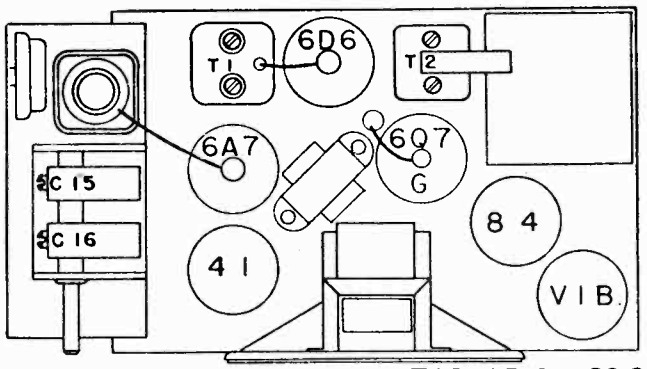
GOODYEAR SERVICE

MODEL 101500
Wings Junior
Schematic, Voltage



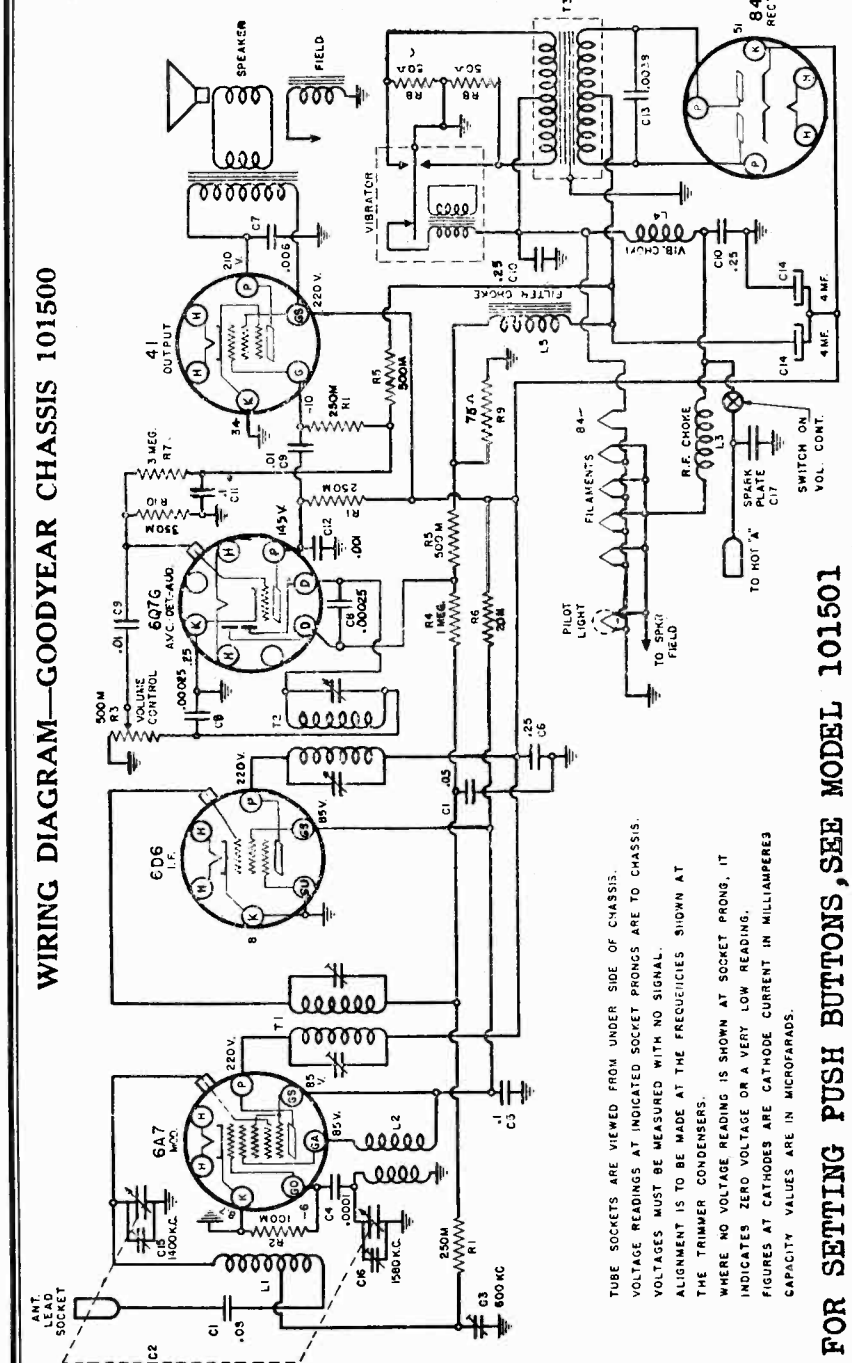
1—6A7 Pentagrid Converter.
1—6D6 I.F. Amplifier.
1—6Q7G Detector Audio Amplifier.
1—41 Power Amplifier.
1—84 Full Wave Rectifier.

LOCATIONS OF PARTS UNDER CHASSIS



LOCATIONS OF PARTS ON TOP OF CHASSIS

WIRING DIAGRAM—GOODYEAR CHASSIS 101500



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

FOR SETTING PUSH BUTTONS, SEE MODEL 101501

ALIGNMENT PROCEDURE

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

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

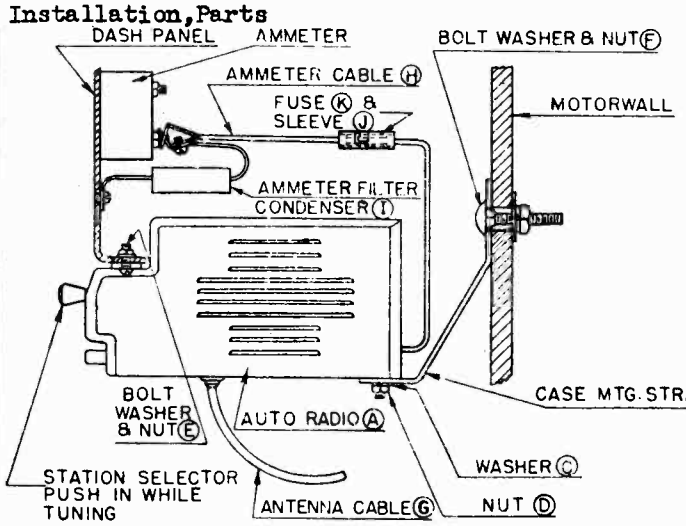
The variable condenser should be at 600 k.c. for antenna adjustment.

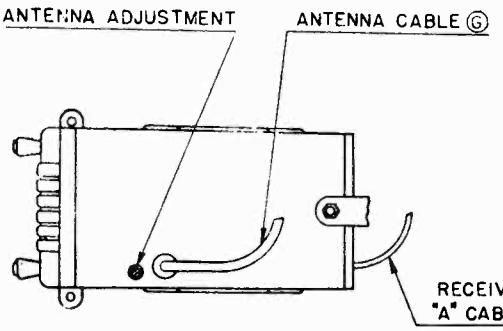
The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy. A final adjustment of antenna padder condenser C3 is always made after the receiver is installed in the car, in order to match the car antenna.

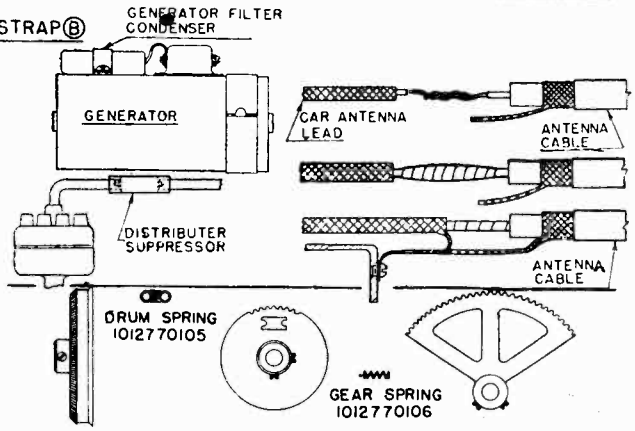
Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

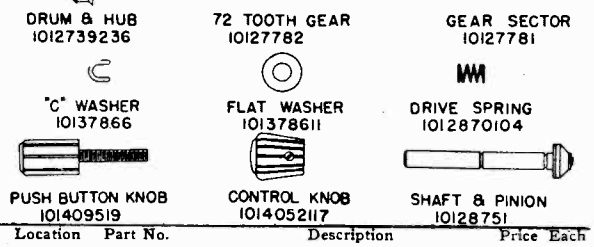
MODEL 101500
Wings Junior
Installation, Parts

GOODYEAR SERVICE









Location	Part No.	Description	Price Each
E	101379701	Bolt—⅜-16x3" Carriage	$0.05*
	10141944	Booklet—Instruction	.30
	1011323121	Cable—"A"	.15
G	1011323125	Cable—Antenna	.85
H	1011323122	Cable Ammeter	.25
L3	1011633210	Choke—R.F. (Ignition)	.20
L4	1011633211	Choke—R.F. (Vibrator)	.20
L5	1011733209	Choke—Filter—325 ohms	.75
C1		Condenser—.05 mfd. 200 volt (Tubular)	.25
C2	1012019127	Condenser—Variable Tuning C15 and C16	2.00
C3	1011920117	Condenser—300-600 mmfd. (Padder)	.30
C4		Condenser—100 mmfd. 600 volt (Mica)	.25
C5		Condenser—.1 mfd. 400 volt (Tubular)	.25
C6		Condenser—.25 mfd. 400 volt (Tubular)	.25
C7		Condenser—.006 mfd. 600 volt (Tubular)	.25
C8		Condenser—250 mmfd. 600 volt (Mica)	.25
C9		Condenser—.01 mfd. 400 volt (Tubular)	.25
C10	1012216111	Condenser—.25 x .25 mfd. 200 volt (Tubular)	.35
C11		Condenser—.1 mfd. 200 volt (Tubular)	.25
C12		Condenser—1000 mmfd. 600 volt (Mica)	.25
C13		Condenser—.0038 mfd. 1600 volt (Tubular)	.35
C14		Condenser—4. mfd. 350 volt (Electrolytic)	.55
C17	10164991	Condenser—Spark Plate	.15
I	1012118225	Condenser—Ammeter	.30
L	1012118224	Condenser—Generator	.35
R3	1012524119	Control—Volume 500M ohm	.80
	1012739236	Drum (with Hub)	.35
	1012940113	Escutcheon—(Station Tab)	.50
	1013722103	Eyelets (Dial) Doz.	.10
	10127111	Frame—Dial (Pulley Assem.)	.55
K	101314300	Fuse—15 amps.	.10
	10127782	Gear Assem. 72 tooth	.30
	10127781	Gear Sector	.30
	10127485	Glass—Dial	.20
	1014052117	Knob—Volume and Selector	.15
	101409519	Knob—Push Button with Stem	.15
	101318908	Light—Dial 6 volt	.15
F	101375604	Nut ⅜"-16 Doz.	.15
E	1013756103	Nut No. 10-32 Doz.	.10
D	1013756104	Nut ¼"-20 Doz.	.15
	10146588	Pointer	.10
M	10148961	Resistor (Distributor Suppressor)	.35
R1		Resistor—250M ohm ½ Watt	.20
R2		Resistor—100M ohm ½ Watt	.20
R4		Resistor—1 megohm ½ Watt	.20
R5		Resistor—500M ohm ½ Watt	.20
R6		Resistor—20M ohm 1 Watt	.20
R7		Resistor—3 megohm ½ Watt	.20
R8		Resistor—50 ohm ½ Watt	.20
R9		Resistor—75 ohm ½ Watt	.20
R10		Resistor—350M ohm ½ Watt	.20
	1012667370	Scale—Dial	.25
E	101137976	Screw—10-32x¾ R.H.M.S. Doz.	.10
	10128751	Shaft Assembly Drive	.15
	10149717	Shield—Tube (6D6)	.15
	101497114	Shield—Tube and Cap (6A7)	.20
J	101497052	Sleeve—Fibre (Fuse)	.05
	10138871	Socket—Pilot Light	.10
	101386355	Socket—8 Prong	.15
	101386853	Socket—7 Prong	.15
	101386852	Socket—6 Prong	.15
	101386851	Socket—5 Prong	.10
	101386850	Socket—4 Prong	.10
	1015179240	Speaker—5" Dynamic	3.35
	1016180157	*Transformer	1.25
	1012770106	Spring—72 tooth Gear Assem.	.05
	1012770105	Spring—Drum	.05
	1012870104	Spring—Compression	.05
B	10111111	Strap—Mounting (Case)	.25
	1012783107	String	.15
N	10141461	Tabs—(Station Booklet)	.15
O	10141486	Tabs—(Clear Celluloid) Set	.10
L1	1011810223	Transformer—(Antenna)	.50
L2	1011810224	Transformer—(Oscillator)	.70
T1	1015510221	Transformer—1st I.F. Complete	1.25
T2	1015710222	Transformer—2nd I.F. Complete	1.25
T3	1016580153	Transformer—Power	2.35
	10123951	Tuner—Push Button	3.10
	1016234101	Vibrator	3.50
C	101378610	Washer—Lockwasher—¼" Doz.	.10
F	101378628	Washer—Lockwasher—⅜" Doz.	.10
E	10137864	Washer—Lockwasher—No. 10 Doz.	.10
E	101378634	Washer—Flat—No. 10 Doz.	.10
F	101378629	Washer—Flat—⅜"x1" O.D. Doz.	.10
	101378611	Washer—Flat—(Shaft) Doz.	.10
	10137865	Washer—"C" Doz.	.10

*When ordering speaker output transformer refer to number stamped on speaker frame.

GOODYEAR SERVICE

MODEL 101501
Wings All Weather
Schematic, Voltage
Alignment, Socket
Trimmers

LOCATIONS OF PARTS ON TOP OF CHASSIS

LOCATIONS OF PARTS UNDER CHASSIS

GOODYEAR CHASSIS 101501

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

ALIGNMENT PROCEDURE

PRELIMINARY

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

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

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

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

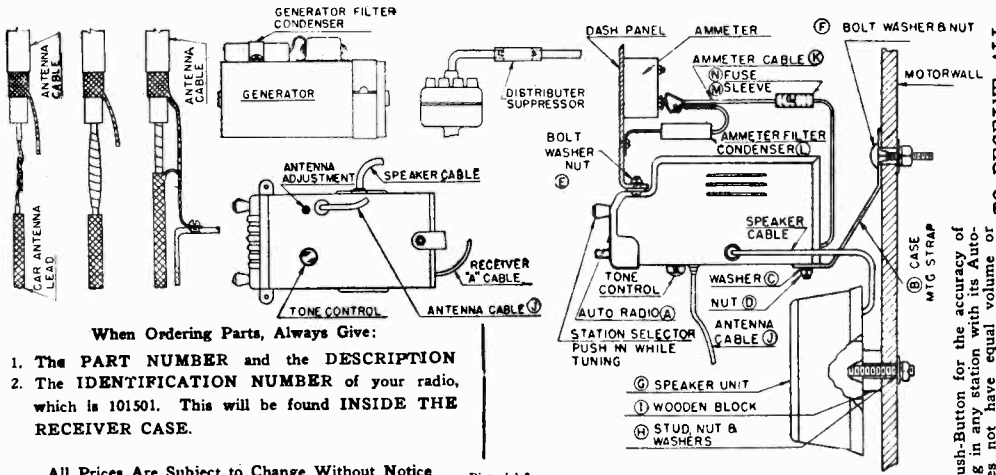
A final adjustment of the antenna padder condenser C5 is always made after the receiver is installed in the car, in order to match the car antenna.

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

MODEL 101501
Wings All Weather
Installation, Tuner
Parts

GOODYEAR SERVICE

MODELS 101500, 101503
Tuner Data



When Ordering Parts, Always Give:

1. **The PART NUMBER and the DESCRIPTION**
2. **The IDENTIFICATION NUMBER of your radio, which is 101501. This will be found INSIDE THE RECEIVER CASE.**

All Prices Are Subject to Change Without Notice

Pictorial & Schematic Location	Part Number	Description	Selling Price, Each
F	101379701	Bolt ¾—16x3" Carriage Bolt	.05
	10141945	Booklet Instruction	.30
	1011323121	Cable—"A"	.15
J	1011323124	Cable—Antenna	.85
K	1011323122	Cable—Ammeter	.25
L1	1011733208	Choke—Filter	.85
L2	1011633212	Choke—R.F. (Ignition)	.20
L3	1011633211	Choke—R.F. (Vibrator)	.20
C1		Condenser—.05 mfd. 200 volt (Tubular)	.25
C4	1012019128	Condenser—Variable Tuning C2 and C3	3.00
C9	1011920117	Condenser—300-600 mmfd. (Padder)	.30
C6	101192052	Condenser—2-20 mmfd. (Trimmer)	.15
C7	1011915110	Condenser—.0012 mfd. 600 volt (Mica)	.25
C8		Condenser—100 mmfd. 600 volt (Mica)	.25
C5	1011920116	Condenser—600-1200 mmfd. (Padder)	.40
C10		Condenser—.05 mfd. 400 volt (Mica)	.25
C11		Condenser—250 mmfd. 600 volt (Mica)	.25
C12		Condenser—1000 mmfd. 600 volt (Mica)	.25
C13	1012216120	Condenser—.25 mfd. 200 volt (Tubular)	.25
C14		Condenser—.01 mfd. 600 volt (Tubular)	.25
C15		Condenser—.5 mfd. 200 volt (Tubular)	.50
C16		Condenser—.005 mfd. 1600 volt (Tubular)	.25
C17	1012118222	Condenser—8. mfd. 350 volt (Electrolytic)	.65
C18	10164991	Condenser—Spark Plate	.15
L	1012118225	Condenser—Ammeter	.30
O	1012118224	Condenser—Generator	.35
R10	1012426115	Control—Tone 200M ohm	.70
R11	1012524119	Control—Volume—500M ohm	.80
	1012739236	Drum (with Hub)	.35
	1012940114	Escutcheon (Station Tab)	.50
	10137413	Eyelet (Dial and Crystal) Doz.	.10
	101271111	Frame—Dial (pulley assem.)	.55
N	101314300	Fuse—15 Amps.	.10
	10127782	Gear Assem. 72 teeth	.30
	10127781	Gear Sector	.30
	10127485	Glass—Dial	.20
	1014052118	Knob-Tone Control	.15
	1014052119	Knob—Volume and Selector	.15
	101409520	Knob—Push Button with stem	.15
	101318908	Light—Dial 6 volt	.15
F	101375604	Nut ¾—16 Doz.	.15
E	1013756103	Nut No. 10-32 Doz.	.10
D	1013756104	Nut ¼"-20 Doz.	.15
	1013722108	Plug—¼" Button	.10
	10146588	Pointer	.10
P	10148961	Resistor—(Distributor Suppressor)	.35
R1		Resistor—250M ohm ½ Watt	.20
R2		Resistor—50M ohm ½ Watt	.20
R3		Resistor—20M ohm ½ Watt	.20
R4		Resistor—1 megohm ½ Watt	.20
R5		Resistor—500M ohm ½ Watt	.20
R6		Resistor—50 ohm ½ Watt	$0.20
R7		Resistor—20M ohm 1 Watt	.20
R9		Resistor—150M ohm ½ Watt	.20
	1012667371	Scale—Dial	.25
E	101137976	Screw—10-32x¾ R.H.M.S. Doz.	.10
	10128751	Shaft Assembly Drive	.15
	101497114	Shield—Tube with No. 7115 Cap	.15
M	101497052	Sleeve—Fibre (Fuse)	.05
	1013845102	Socket (Antenna Lead)	.10
	10138871	Socket—Pilot Light	.10
		Socket—8 Prong	.15
		Socket—4 Prong	.10
	1013845107	Socket—Speaker	.10
G	10151841	Speaker and Housing Assembly	8.25
G	1015179241	Speaker	4.35
G	1016180156	Transformer*	1.50
G	10150631	Housing	1.25
G	10150641	Ring—Metal	.70
H	1015074113	Stud 4"—5/16-18	.05
I	1015083113	Wood Block	.10
H	1015056107	Nut 5/16-18 Cad. Plated Doz.	.10
H	101508613	Washer—Flat ⅜ I.D. x 1¼ Doz.	.10
H	101508628	Washer—Lockwasher Split ⅜ Doz.	.10
G	1015056106	Pal Nuts 6-32 (Ring Mtg.) Doz.	.10
G	1015074114	Screws—6-32x⅝ (Ring Mtg.) Doz.	.10
G	1015036102	Grille	.65
G	1015023120	Cable—Speaker	1.15
	1012770106	Spring—72 Tooth Gear Assem.	.05
	1012770105	Spring—Drum	.05
	1012870104	Spring—Compression	.05
B	10111111	Strap—Mtg. (Case)	.25
	1012783107	String	.15
Q	10141461	Tabs (Station Call Letter Booklet)	.15
R	10141486	Tabs (Clear Celluloid) Set	.10
T1	1011810208	Transformer (Antenna)	.45
T3	1011810210	Transformer (Oscillator)	.70
T2	1011810209	Transformer R. F. Less Trimmer	.85
T4	1015510225	Transformer—1st I. F. with Trim.	1.25
T5	1015710226	Transformer—2nd I. F. with Trim.	1.25
T6	1016580150	Transformer—Power	2.95
	10128951	Tuner—Push Button	3.10
	1016234101	Vibrator	3.50
C	101378610	Washer—Lockwasher—¼" Doz.	.10
F	101378628	Washer—Lockwasher—⅜" Doz.	.10
E	10137864	Washer—Lockwasher—No. 10 Doz.	.10
E	101378634	Washer—No. 10 Flat 5/16 Doz.	.10
	101378611	Washer- -Flat—(Shaft) Doz.	.10
	10137866	Washer—C (Drive Shaft) Doz.	.10
F	101378629	Washer—Flat ⅜"x1" O. D. Doz.	.10

*When ordering speaker output transformer refer to number stamped on speaker frame.

HOW TO ADJUST AND OPERATE THE GOODYEAR WINGS SAFETY AUTOMATIC PUSH-BUTTON TUNING

The automatic tuning feature of your radio makes it possible to set up 6 favorite American broadcast stations and tune them in quickly with the Automatic Tuner.

The Automatic Tuner has 6 adjustable Push-Buttons. Each button can be adjusted for one of your favorite stations. CHOOSE STATIONS FOR PUSH-BUTTON OPERATION HEARD WITH GOOD VOLUME AT ALL TIMES. It is not necessary to use all six buttons, if it is not desired.

INDEX TABS

Cut the call letters of your 6 selected stations from the list supplied (See "Q" in Fig. 1) with your receiver and slip them into the Tab Holder FROM THE TOP with the clear celluloid (see "R" in Fig. 1) in front of the call letters to protect them. Arrange the call letters in the Tab Holder from right to left. Have the call letters of the lowest frequency station at the extreme right and work progressively to the left so that the highest frequency call letters will be at the extreme left.

SETTING PUSH-BUTTONS

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

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

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

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

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

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

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

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

TO RECEIVE ALL OTHER STATIONS IN THE REGULAR MANNER, PUSH IN THE STATION SELECTOR KNOB AND TURN IT TO THE FREQ. OF THE DESIRED STATION.

MODEL 101503
Schematic, Voltage

GOODYEAR SERVICE

LOUD SPEAKER:

Type .....Electro Dynamic
Size ..... 8"

OPERATING FEATURES:

Automatic Volume Control
Push Button Tuning
Tone Control

CHASSIS FEATURES:

Number I.F. Stages .....One
Antenna .....Conventional
Condenser, gang .....Two
Automatic Push Buttons.....Six
Tone Control .....Continuous
Wave Band Switch.....Two-Position
Wave Trap .....One

POWER OUTPUT:

Type .....Beam, Parallel
Undistorted .....3 Watts
Maximum .....3.5 Watts

FREQUENCY RANGE:

Broadcast .....535 Kc-1750 Kc
Foreign .....5 Mc-18 Mc

ALIGNMENT FREQUENCIES:

Osc. Trimmer	BC Antenna Trimmer	BC Osc. Padder	S.W. Antenna Trimmer	Wave Trap Trimmer
1750 Kc	1400 Kc	600 Kc	16 Mc	456 Kc

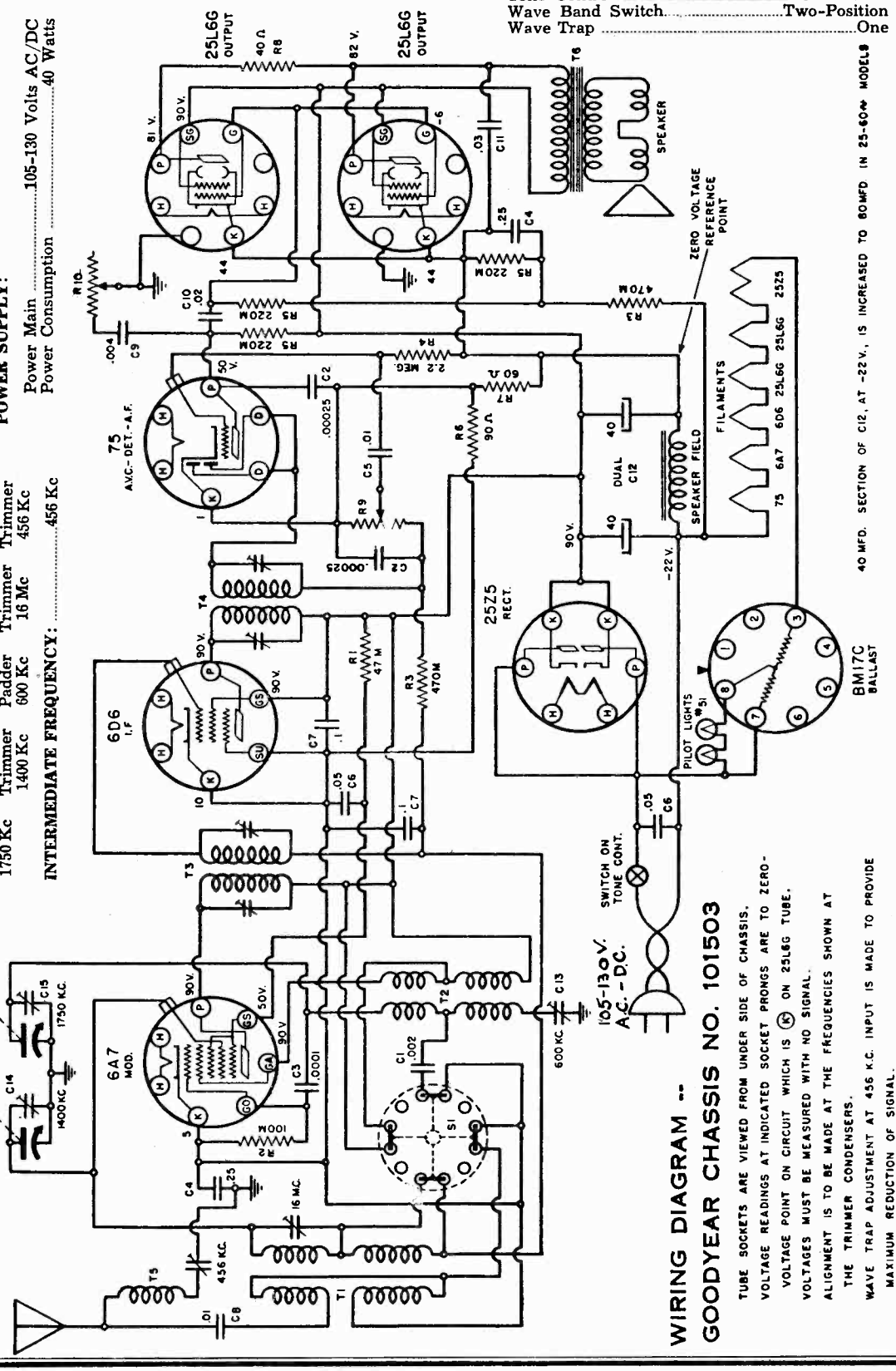
INTERMEDIATE FREQUENCY: .....456 Kc

TUBES AND FUNCTION:

1—6A7 .....Modulation
1—6D6 .....I.F.
1—75 .....AVC-Det-AF
2—25L6G .....Output
1—25Z5 .....Rect.
1—BM17C .....Ballast

POWER SUPPLY:

Power Main .....105-130 Volts AC/DC
Power Consumption .....40 Watts



WIRING DIAGRAM -- GOODYEAR CHASSIS NO. 101503

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.

VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO ZERO-VOLTAGE POINT ON CIRCUIT WHICH IS (K) ON 25L6G TUBE.

VOLTAGES MUST BE MEASURED WITH NO SIGNAL.

ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER CONDENSERS.

WAVE TRAP ADJUSTMENT AT 456 K.C. INPUT IS MADE TO PROVIDE MAXIMUM REDUCTION OF SIGNAL.

WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONG, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.

40 MFD. SECTION OF C12, AT -22 V., IS INCREASED TO 80MFD IN 25-60~ MODELS

FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES.

CAPACITY VALUES ARE IN MICROFARADS.

MODEL 101503
Socket, Trimmers
Chassis, Alignment
Coils, Parts, Tuner

GOODYEAR SERVICE

GOODYEAR CHASSIS NO. 101503

FOR SETTING PUSH-BUTTONS, SEE MODEL 101501

MECHANICAL SPECIFICATIONS

OPERATING CONTROLS: — **CONTROL OPERATION:**

1. Left Knob Bottom....."On-Off" Switch & Tone — Turning right; Power on; Tone high
2. Right Knob bottom.....Wave Band Switch — Right S. W.; Left, Broadcast
3. Left Knob top .....Volume — Turning right; Volume Increase
4. Right Knob top .....Station Selector — Tuning Ratio; 8½ to 1
5. Lower Buttons .....Automatic Tuning — 6 Mechanical Station Selection Push Buttons

ALIGNMENT PROCEDURE

PRELIMINARY:

Output Meter Connections	Across Loud Speaker Voice Coil
Output Meter Reading to Indicate 1 Watt	2.28 Volts
Generator Ground Lead Connection	Receiver Chassis
Dummy Antenna Value to Be in Series with Generator Output	See Chart Below
Connection of Generator Output Lead	See Chart Below
Generator Modulation	30%, 400 Cycles
Position of Volume Control	Fully On

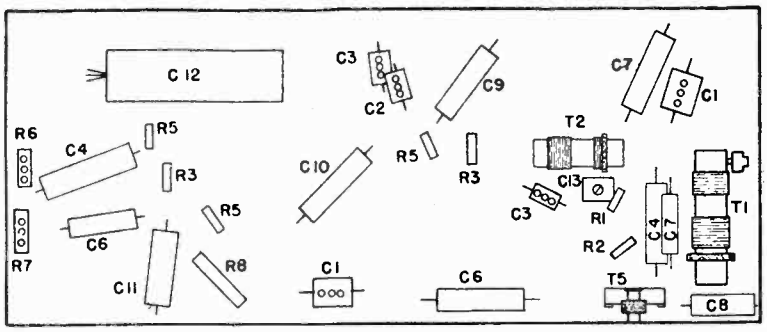
POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTIONS	TRIMMER ADJUSTMENT (In Order Shown)	TRIMMER FUNCTION
Closed	456 Kc.	.1 mfd.	6A7 Grid	T3 - T4	I. F.
Closed	456 Kc.	.0002 mfd.	Antenna Conn.	T5 (Min. Output)	Wave Trap
Fully Open	1750 Kc.	.0002 mfd.	Antenna Conn.	C15	Osc. Trimmer
1400 Kc.	1400 Kc.	.0002 mfd.	Antenna Conn.	C14	Ant. Trimmer
600 Kc.	600 Kc.	.0002 mfd.	Antenna Conn.	C13	Osc. Padder
16 Mc.	16 Mc.	400 ohm	Antenna Conn.	T1	S.W. Ant. Trimmer

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

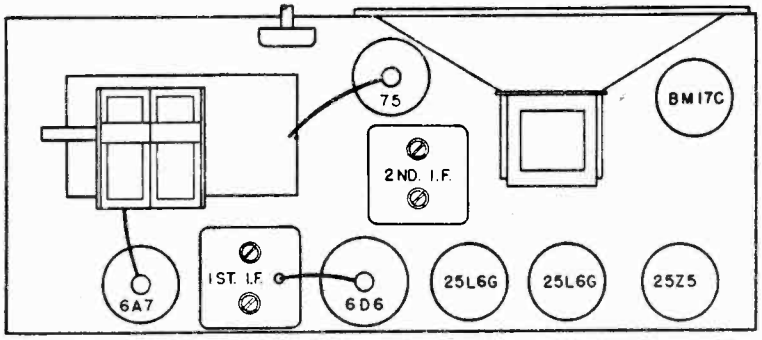
The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

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

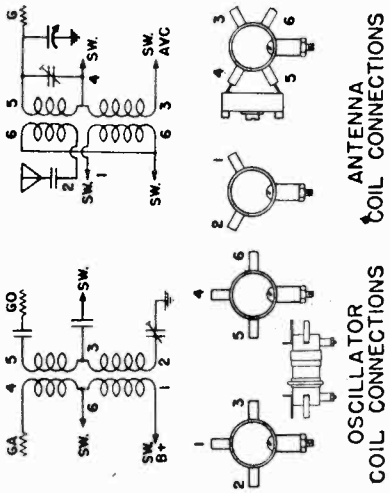
When adjusting T5, Antenna Wave Trap, Trimmer, increase generator output. To obtain clearly defined trimmer setting for a minimum output.



LOCATION OF PARTS UNDER CHASSIS



LOCATION OF PARTS ON TOP OF CHASSIS



PARTS LIST - SOURCE NO. 101

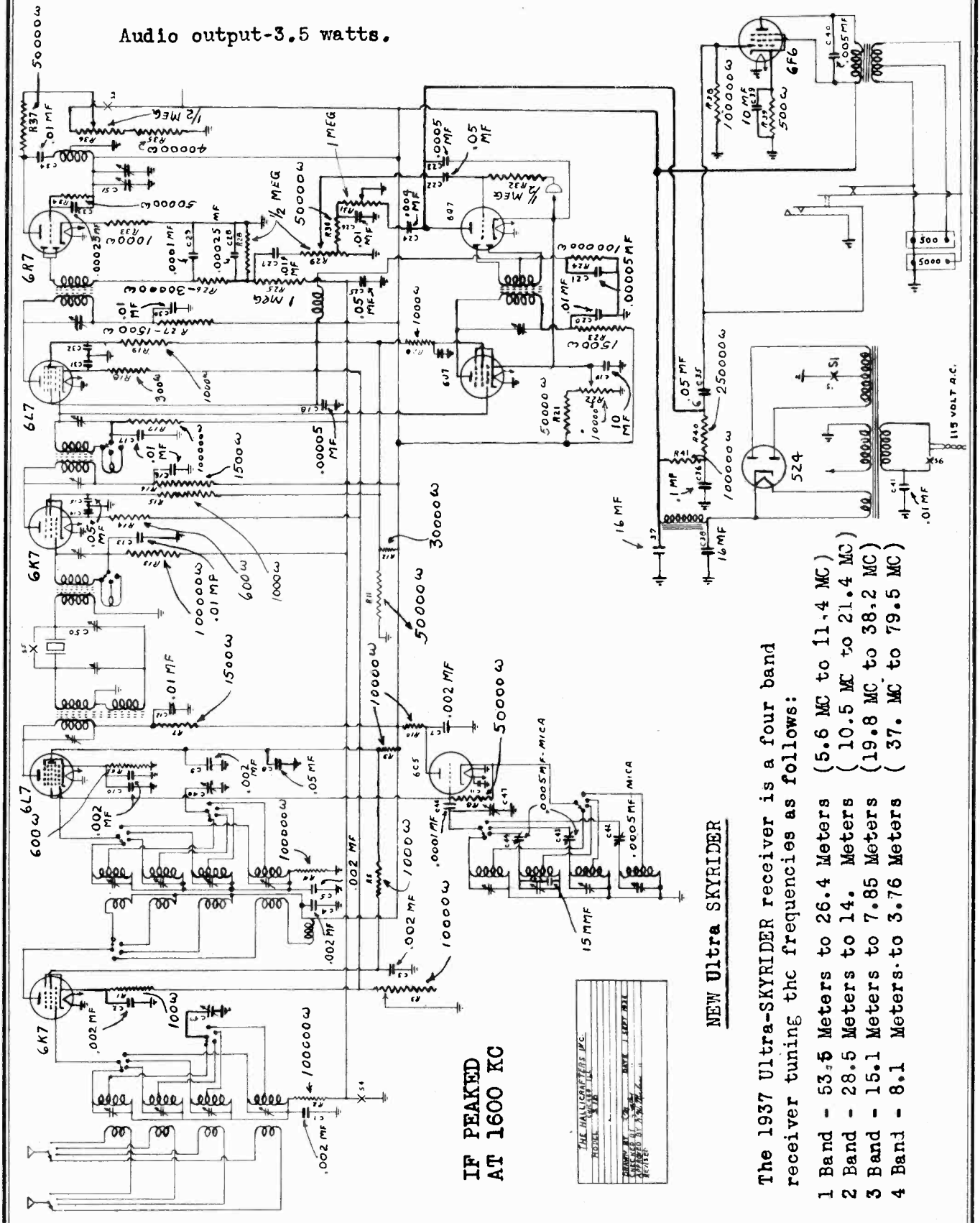
All prices are subject to change without notice.

Pictorial & Schematic Location	Part No.	Description	Selling Price Each
		Booklet—Instruction	$0.05
		Bolts—(Mounting Bolts)	.25
	1011242181	Cabinet	8.75
C1		Condenser—2000 mmfd. Mica	.25
C2		Condenser—250 mmfd. Mica	.25
C3		Condenser—100 mmfd. Mica	.25
C4		Cond.—.25 mfd. 200 volt (Tubular)	.25
C5		Cond.—.01 mfd. 200 volt (Tubular)	.25
C6		Cond.—.05 mfd. 400 volt (Tubular)	.25
C7		Cond.—.1 mfd. 200 volt (Tubular)	.25
C8		Cond.—.01 mfd. 400 volt (Tubular)	.25
C9		Cond.—.004 mfd. 600 volt (Tubular)	.25
C10		Cond.—.02 mfd. 400 volt (Tubular)	.25
C11		Cond.—.03 mfd. 600 volt (Tubular)	.25
C12	1012118227	Cond.—40x40 mfd. 200 W. V. (Electrolytic)	1.00
C13	1011920117	Cond.—300-600 mmfd. (Padder)	.30
C14 and 15		Condenser—Variable	2.00
R10	1012426116	Control—Tone—500 ohm with A.C. Switch	.75
R9	1012524120	Control—Volume—500M ohm	.60
	101132307	Cord—110 volt Line	.30
	1012739239	Drum (with Hub)	.35
	1012940116	Escutcheon & Dial Crystal	1.10
	1012940117	Escutcheon—(Station Tab)	.43
	1013922103	Eyelets (Tri-Points)—Dial Scale Doz.	.10
	10127782	Gear Assem. 72 teeth	.30
	10127781	Gear Sector	.30
	1014052122	Knob—Push Button with Stem	.15
	1014052125	Knob—Tuning	.15
	1014052124	Knob—Tone	.15
	1014052123	Knob—Volume	.15
	1014052126	Knob—Wave Band Switch	.15
		Light—Dial 6 volt	.15
		Lugs—Spade (Tuner) 6-32x7-16 Doz.	.10
	1013956102	Nut—⅜-in. Hex. Doz.	.10
	10146589	Pointer	.05
		Pulley—Idler	.05
R1		Resistor—47M ohm	.20
R2		Resistor—100 M ohm	.20
R3		Resistor—470M ohm	.20
R4		Resistor—2.2 megohm	.20
R5		Resistor—220M ohm	.20
R6	1014760181	Resistor—90 ohm	.20
R7	1014760182	Resistor—60 ohm	.20
R8	1014760133	Resistor—40 ohm	.20
		Rivets—(Idler Pulley) Doz.	.10
	1012667382	Scale—Dial	.50
		Screws—Set 8-32x3-16 Doz.	.10
	10128752	Shaft—Drive Assembly	.15
	10149717	Shield—Tube and Base	.15
	10138872	Socket—Pilot Light Assembly	.30
	101386855	Socket—8 Prong	.15
	101386853	Socket—7 Prong	.15
	101386852	Socket—6 Prong	.15
	1015179243	Speaker—Complete with Transformer	5.45
T6		*Transformer	1.00
	1013770106	Spring—72 Tooth Gear Assem.	.05
	1012770105	Spring—Drum	.05
	1012870104	Spring—Compression (Dial Drive)	.05
	1012783107	String	.15
	1015269120	Switch—Wave Band	.60
	10141461	Tabs—(Station Call Letter Booklet)	.15
	10141486	Tabs—(Clear Celluloid)	.10
T1	1011810229	Transformer (Antenna)	.90
T2	1011810230	Transformer—(Oscillator)	.60
T3	1015510227	Transformer—1st I. F.	.95
T4	1015710228	Transformer—2nd I. F.	.95
		Tube—(Ballast—BM17C)	.60
	10128952	Tuner—Push Button	3.10
T5	1016310213	Wave Trap—(Coil & Trimmer)	.45
	10139862	Washer—⅜-in. Shakeproof Doz.	.10
		Washer—No. 4 Shakeproof Doz.	.10
	10128866	Washer—"C" Doz.	.10

*When ordering speaker output transformer refer to number stamped on speaker frame.

HALLICRAFTERS, INC.

MODEL S-10
Ultra Skyrider
Schematic

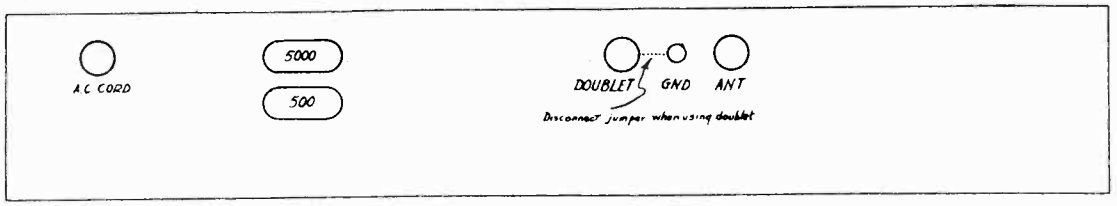


The 1937 Ultra-SKYRIDER receiver is a four band receiver tuning the frequencies as follows:

1 Band - 53.5 Meters to 26.4 Meters (5.6 MC to 11.4 MC)
2 Band - 28.5 Meters to 14. Meters (10.5 MC to 21.4 MC)
3 Band - 15.1 Meters to 7.85 Meters (19.8 MC to 38.2 MC)
4 Band - 8.1 Meters to 3.76 Meters (37. MC to 79.5 MC)

MODEL S-10
Ultra Skyrider
Socket, Trimmers

HALLICRAFTERS, INC.



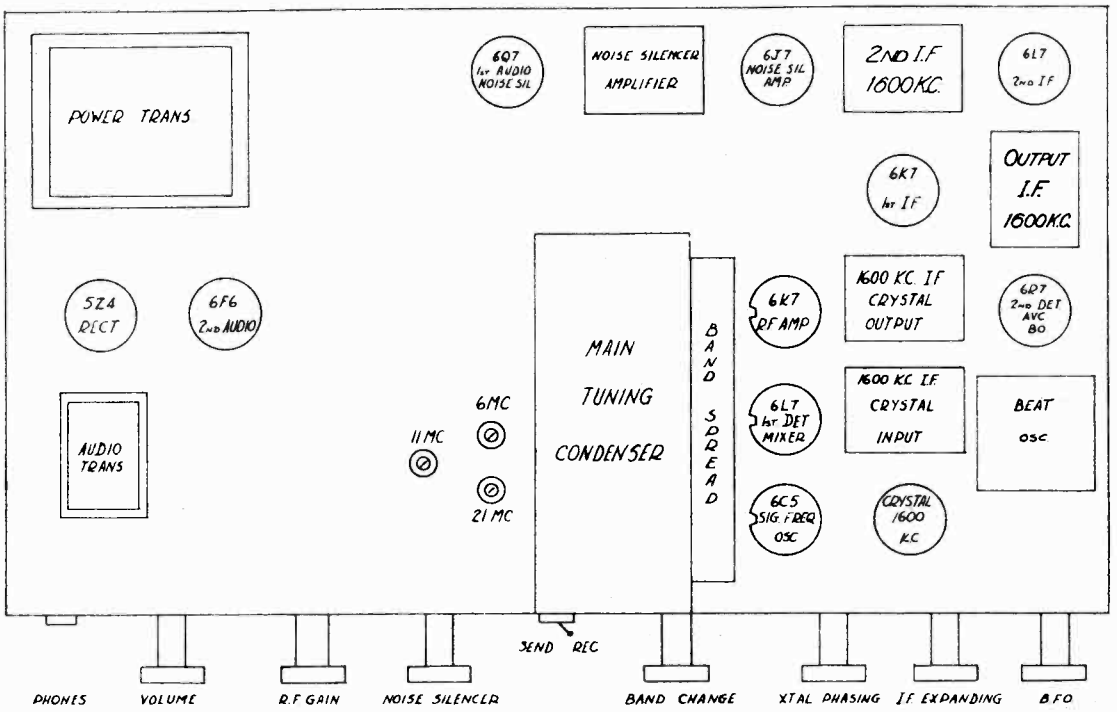
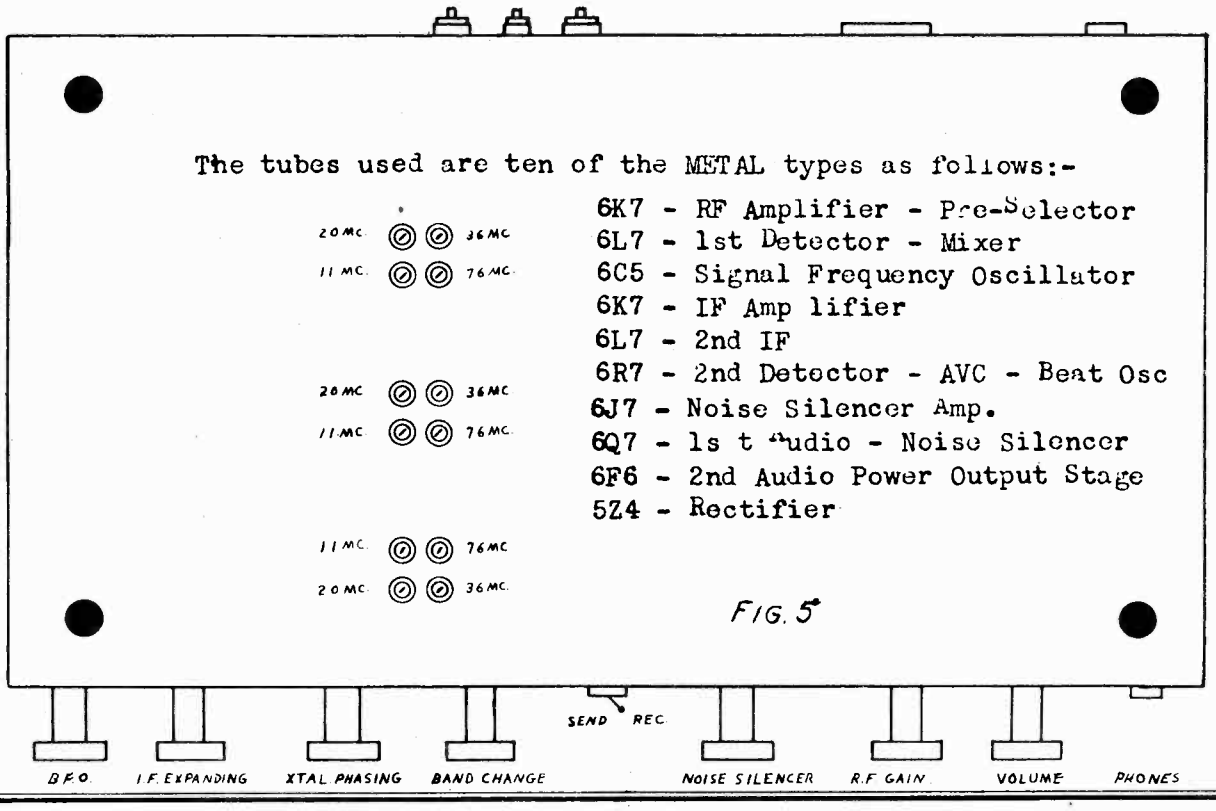


FIG. 1



The tubes used are ten of the METAL types as follows:-

6K7 - RF Amplifier - Pre-Selector
6L7 - 1st Detector - Mixer
6C5 - Signal Frequency Oscillator
6K7 - IF Amp lifier
6L7 - 2nd IF
6R7 - 2nd Detector - AVC - Beat Osc
6J7 - Noise Silencer Amp.
6Q7 - 1s t Audio - Noise Silencer
6F6 - 2nd Audio Power Output Stage
5Z4 - Rectifier

FIG. 5

Intermediate Frequency Alignment.

If the receiver is equipped with a crystal, use the crystal in a separate oscillator.

If the receiver is not an SX10 model set the signal generator for 1600 KC output.

Before I.F. or R.F. alignment see that:

Expander is in the "sharp" position.
B.F.O. switch off.
Audio gain control set at maximum.
R.F. gain control set at maximum.
A.V.C. switch off.
Crystal switch off.
Crystal phasing condenser adjusted for maximum noise level.
Noise silencer control set at 50% rotation.
Do not remove the bottom plate from the chassis.

Remove 6C5 oscillator tube from its socket and connect generator output directly to the grid of the 6L7 1st Detector.

As an output indicator it is suggested a 0-3 volt A.C. Voltmeter be connected across the speaker voice coil.

Align all I.F. trimmers for maximum output.

To adjust noise silencer circuit, set generator output for a strong signal (200MV). Slowly turn noise silencer control clockwise until there is a noticeable dip in the output meter. Now the trimmer on the noise silencer can directly behind the main tuning gang should be tuned for a dip. Adjust noise silencer control and trimmer until maximum rejection of signal is obtained. After this adjustment has been reached set the noise selencer control at a position where rejection of signal just starts to take place. Now retrim the plate trimmer of second I.F. (See which is plate trimmer by shorting trim screw against can for a spark.) The I.F. alignment of the receiver is now complete.

R.F. ALIGNMENT

Check dial - at maximum capacity of gang condenser the dial should stop so that "0" on the dial is opposite "5" on Vernier scale; the pointer which indicates bands should then be on the black line of the dial.

Put the 6C5 tube back in oscillator socket.

Connect generator output through 400 ohm resistor to antenna and ground posts on receiver. (Junper should remain connected.)

Be sure band spread condenser is set at 200 degrees or minimum capacity position.

Set generator for 100 meg output signal at maximum output of generator. During alignment back off on R.F. gain control or the gain on the generator once the signal is hear. Leave the audio control in maximum position at all times.

Set Band Switch to highest frequency range: 38 to 79 megacycles.

Check 40 magacycles on dial for calibration.

If no signal is heard at 40 megacycles and a good signal is heard at 50 megacycles try changing the 6C5 oscillator tube until one which will oscillate at 40 megs is obtained. May be necessary to try various makes of tubes until a good one is obtained.

After signal heard at 40 megacycles, re-set dial to 60 megs. Now adjust the 60 MC trimmer in oscillator section until signal is heard.

Re-set dial to approximately 63 megs and check for image. If image is heard at 63 megs you are on the right side. Note-image is on the high frequency side on this hand.

Return dial to 60 megs and peak R.F. and antenna 60 MC. trimmers for greatest output.

Not go back to 40 megs and make sure you are getting a good signal.

While R.F. and antenna trimmers are being peaked the main tuning gang should be rocked backand forth across the signal.

Change band switch to position covering 20 to 38 MC.
Set generator for 6 MC signal.
Set dial at 20 megacycles.
Adjust 20 MC pad on top os chassis until signal is heard.
Re-set dial to 36 MC
Trim 36 MC Oscillator trimmer until signal is heard.
Check for image at 33 megs. Note image is on Low Frequency side.

Now peak R.F. and antenna trimmers for maximum output, rocking main tuning gang while peaking.

Recheck at 20 MC for calibration. A signal should also be heard at 24, 30 and 36 megs, using 6 megacycle signal input.

Set Band switch to 20 to 11 megacycle position.
Set signal generator for 11 megs output.
Set dial at 11 megs. Trim oscillator pad on top of chassis for signal.
Set generator ro 20 meg signal.
Set dial for 20 megs. Adjust osciallator trimmer below chassis for signal.

Now adjust R.F. and antenna trimmers for maximum output, rocking main tuning gang while peaking.

Go backand re-check at 11 megacycles.

Set band switch to 5.5 to 1' megacycle position.
Set generator for 6 MC output.
Set dial to 6 MC - adjust 6 MC pad on top of chassis until signal is heard.
Set generator to 11 MC.
Set dial to 11 MC - adjust oscillator trimmers underneath chassis for signal.

Now peak R.F. and antenna trimmers for maximum output, rocking main tuning gang while peaking.

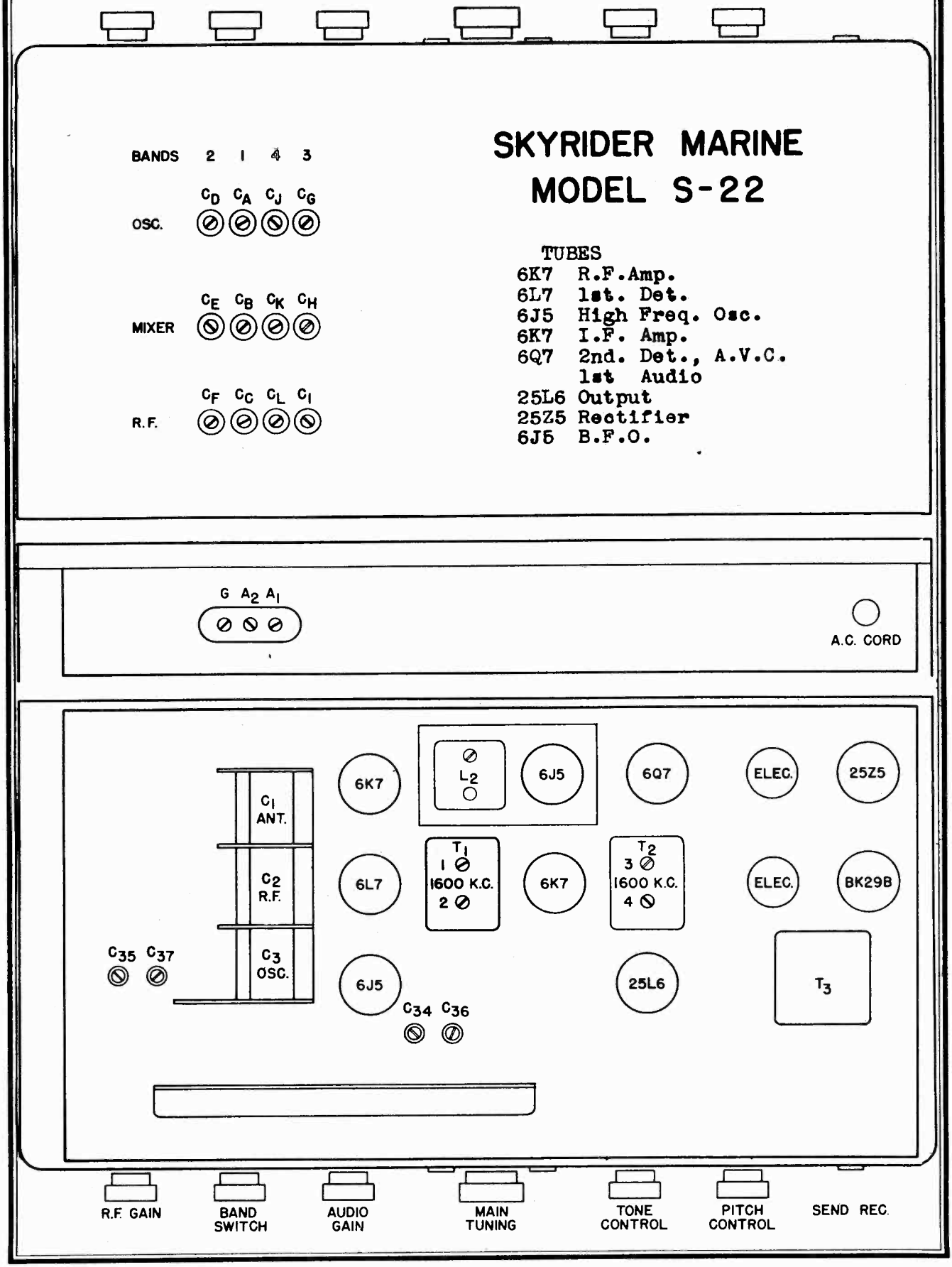
It may be necessary to go through the above procedure on each band two or three times before maximum performance is secured. A small change at one end of each band will affect the other end.

CRYSTAL FILTER INPUT TRANSFORMER - 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 IF transformer. The crystal and crystal phasing circuit is inserted between these transformers in crystal phasing condenser cause single signal action to take place - this action varies by the setting of crystal phasing condenser - when switch is at "out" position the signal is impressed directly on the second transformer.

Crystal filter output transformer has a set-up ratio so that the voltage impressed on grid of 6K7, I.F. Amplifier, is increased over the normal IF 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, than if a choke coil is used to supply this tube.

MODEL S-22
Skyrider Marine
Socket, Trimmers

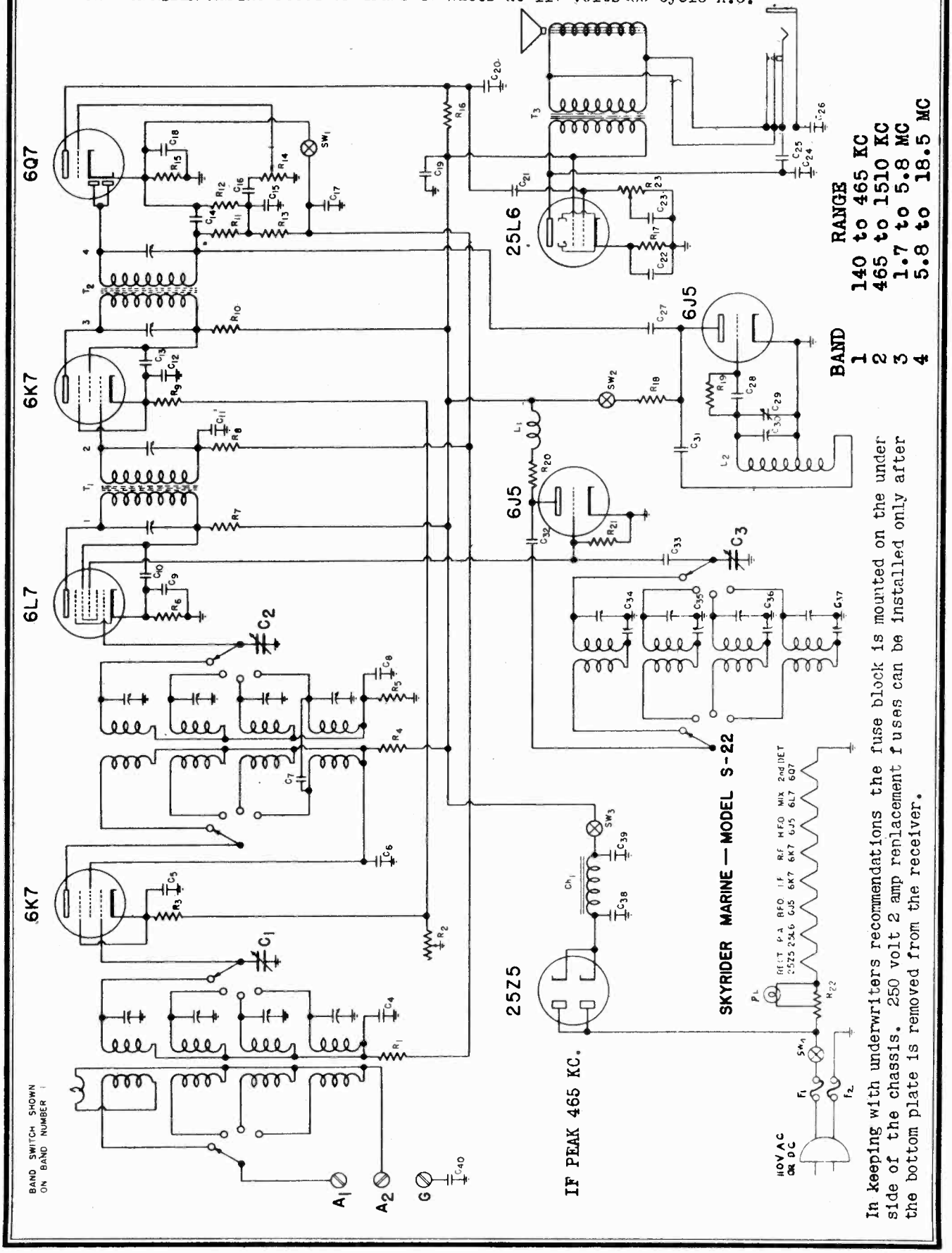
HALLICRAFTERS, INC.



HALLICRAFTERS, INC.

MODEL S-22
Skyrider Marine
Schematic

The SKYRIDER Marine receiver draws 47 watts at 117 volts 60 cycle A.C.



BAND	RANGE
1	140 to 465 KC
2	465 to 1510 KC
3	1.7 to 5.8 MC
4	5.8 to 18.5 MC

In keeping with underwriters recommendations the fuse block is mounted on the under side of the chassis. 250 volt 2 amp replacement fuses can be installed only after the bottom plate is removed from the receiver.

MODEL S-22
Skyrider Marine
Alignment, Parts

HALLICRAFTERS, INC

NOTE: Because this receiver can be operated on either 110 volt AC or DC current the chassis is electically placed above ground. DO NOT ground the receiver at any other point than the G terminal on the rear of the receiver.

ALIGNMENT PROCEDURE FOR SKYRIDER MARINE MODEL S22

Intermediate Frequency Alignment

Have the controls set as follows:-

A.V.C.-B.F.O. switches in the "OFF" position.

Adjust A.F. and R.F. gain controls for maximum volume.

Set Band Switch on #1 Band.

Set main dial at 485 KC or minimum capacity position.

Remove 6L7 grid cap - connect the signal generator through a .1 MFD condenser to the grid of this tube. Connect the ground of the signal generator to the G terminal of the receiver.

The chassis is insulated from the cabinet so do not ground the cabinet.

After the above adjustments have been made, set the signal generator for 1600 KC signal output.

Now adjust the trimmers on T1 and T2 transformers for exact resonance which will be indicated by maximum signal output. If you prefer an output meter as an indicator it should be of the rectifier type and connected to the voice coil leads of the speaker, or to the plate of the 25L6 output tube through suitable coupling condenser.

R.F. Alignment

Replace the .1 MFD condenser in series with the generator leads with a 400 ohm resistor. Connect the generator to the A1 terminal on the strip mounted on the rear of the chassis. Leave the jumper between A2 and G connected. All pad adjustments are for the low frequency ends of the bands and are reached from the top of the chassis. All trimmer adjustments are for the high frequency ends of the bands and are adjusted through the bottom plate. Remove the guarantee card on the bottom of the cabinet by placing a knife under the small snap fasteners which hold it in place.

Band #1

Place the band switch on Band 1. Set generator for 350 KC output and adjust main dial for that frequency. Adjust oscillator trimmer CA, mixer trimmer, CB and antenna CC for maximum signal. Reset generator and receiver to 150 KC and resonate pad C34 for maximum signal.

Band #2

Turn Band Switch to Band 2. Set generator and receiver to 1400 KC and adjust CD CE CF for maximum output. Reset generator and receiver to 600 KC - add adjust Pad C35 for maximum signal.

Band #3

Adjust Band Switch to Band 3. Set generator and receiver to 4 MC and adjust C9 CH C1 for maximum signal. Reset generator and receiver to 1.8 MC and tune pad C36 for maximum output.

Band #4

Set Band Switch on Band 4. Tune generator and receiver to 14 MC and adjust CJ, CK, CL for maximum signal. Reset generator and receiver to 6MC and adjust pad C37 for maximum output.

RESISTORS

NO.	OHMS	WATTAGE	PARTS NO.
R1	100,000	1/3	20-093
2	25,000	R. F. Gain	25-039
3	600	1/3	22-125
4	1,000	1/3	20-033
5	100,000	1/3	20-093
6	200	1/3	20-015
7	1,000	1/3	20-033
8	100,000	1/3	20-093
9	600	1/3	22-125
10	1,000	1/3	20-033
11	100,000	1/3	20-093
12	1,000,000	1/3	20-108
13	1,000,000	1/3	20-108
14	500,000	Audio Gain	25-041
15	7,500	1/3	20-060
16	250,000	1/3	20-099
17	140	1/2	22-011
18	5,000	1/3	20-054
19	50,000	1/3	20-084
20	1,000	1/3	20-033
21	50,000	1/3	20-084
22	94	total - type BK 29B resistor tube	
23	500,000	Tone Control	25-040

CONDENSER

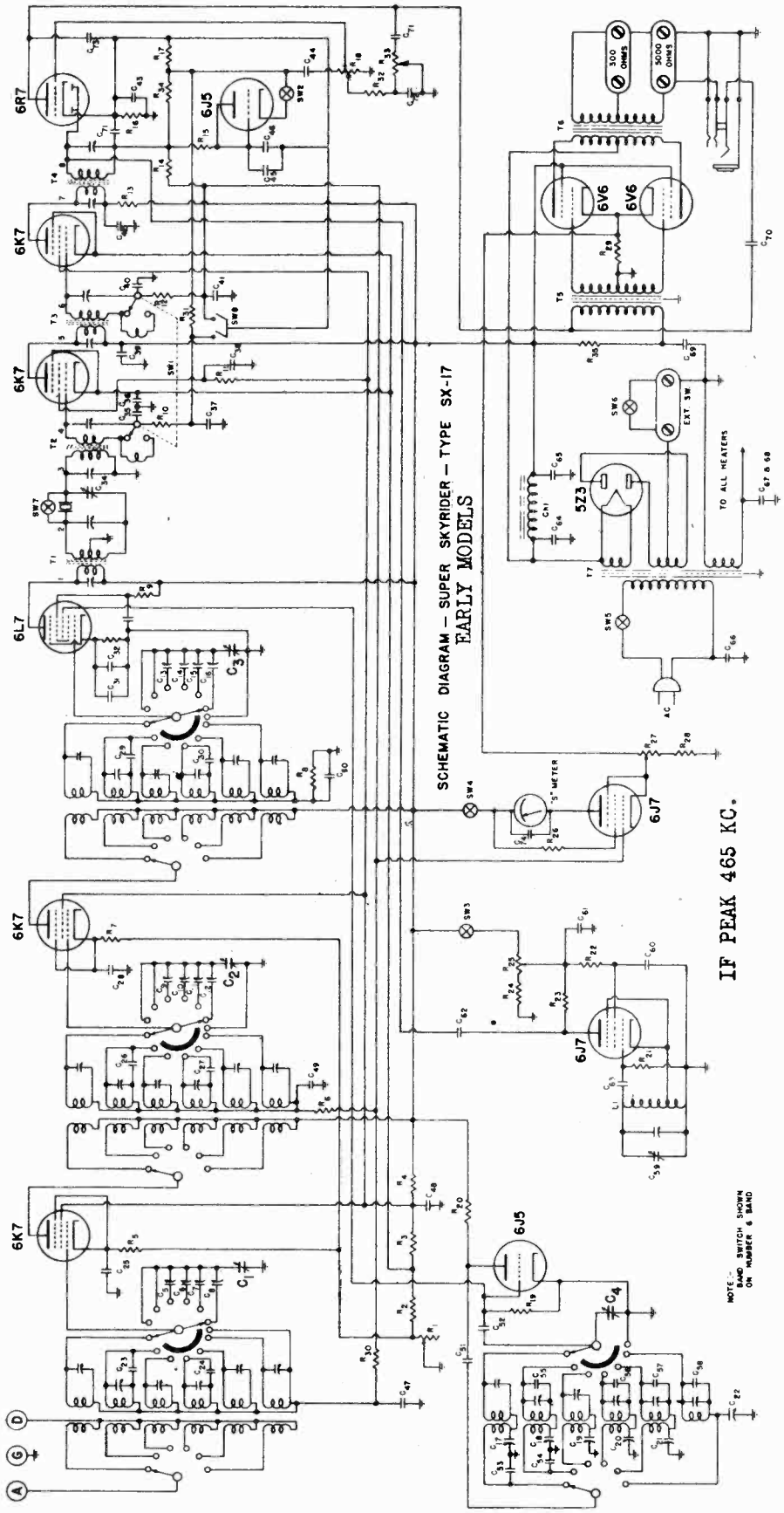
NO.	CAPACITY	TYPE	VOLTAGE	PARTS NO.
C1				
2	408. mmfd.	Main Gang		48-022
3				
4	.05 mfd.		400	41-005
5	.01 "		400	41-001

CONDENSER - Continued

NO.	CAPACITY	TYPE	VOLTAGE	PARTS NO.
C6	.01 mfd.		400	41-001
7	10 mmfd.	ceramic		40-021
8	.01 mfd.		"	41-001
9	.01 "		"	41-001
10	.01 "		"	41-001
11	.01 "		"	41-001
12	.02 "		"	41-003
13	.01 "		"	41-001
14	.0001 "	mica		40-007
15	.0001 "	"		40-007
16	.05 "		"	41-005
17	.01 "		"	41-001
18	20. "	electrolytic	25	42-025
19	.1 "		400	41-007
20	.00025 "	mica		40-024
21	.05 "		"	41-005
22	20. "	electrolytic	25	42-025
23	.005 "		600	40-020
24	.005 "		"	40-020
25	.01 "		400	41-001
26	.01 "		"	41-001
27	10. mmfd.	ceramic		40-021
28	.00025 mfd.	mica		40-024
29	.0003 "	in pitch control		
30	.00025	pitch control		48-021
31	.01		"	41-001
32	.002	mica		40-013
33	.0001	"		40-007
34	50. mmfd.	Pad.		44-027
35	100. "	"		44-026
36	375. "	"		44-027
37	1,080. "	"		44-026
38	40 mfd.		150	42-026
39	40 "		"	42-026
40	.01 "		400	41-001

HALLICRAFTERS, INC.

MODEL SX-17 Early Super Skyrider Schematic, Changes



This unit has been constructed on special order. In outward appearance it is identical to the SX-16 Model. The differences in the two receivers consists of a second R.F. stage and a noise silencer. These additions make the total number of tubes in the receiver 13.

FOR ALIGNMENT SEE S-17 , SX-17 LATE MODELS

CHANGES FOUND IN SOME EARLY MODELS WHICH PRECEDE THE SX-17 LATE MODELS.

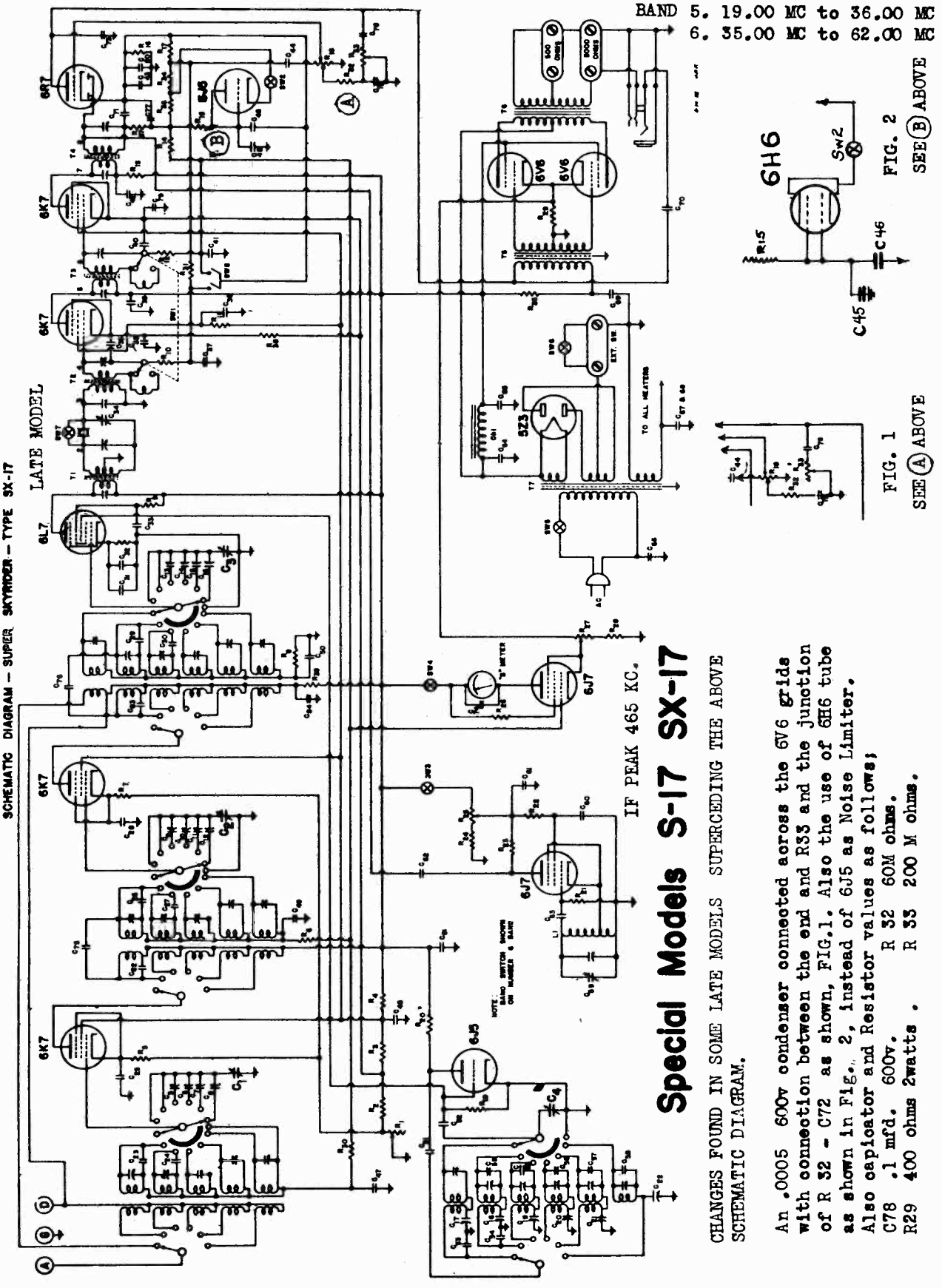
R14- 1 meg.
R15- 1meg.
R16- 950 ohms.
R17- 250 ohms.
R34- 100M ohms.
C43- 10 mfd. 25v.
C44-.05 mfd. 200v.
C45- .1 mfd. 200v.
C46-.002 mfd. mica.

NOISE SILENCER LEADS AS SHORT AS POSSIBLE FOR BEST RESULTS.

MODELS S-17, SX-17 Late Super Skyrider Schematic, Changes

HALLICRAFTERS, INC.

BAND 1. 545 KC to 1,555 KC
2. 1,545 KC to 4,300 KC
BAND 3. 4.2 MC to 10.2 MC
4. 9.8 MC to 20.5 MC
BAND 5. 19.00 MC to 36.00 MC
6. 35.00 MC to 62.00 MC



Special Models S-17 SX-17

CHANGES FOUND IN SOME LATE MODELS SUPERCEDING THE ABOVE SCHEMATIC DIAGRAM.

An .0005 600v condenser connected across the 6V6 grids with connection between the end and R33 and the junction of R 32 - C72 as shown, FIG.1. Also the use of 6H6 tube as shown in Fig. 2, instead of 6J5 as Noise Limiter.
Also capicator and Resistor values as follows;
C78 .1 mfd. 600v. R 32 60M ohms.
R29 400 ohms 2watts . R 33 200 M ohms.

Alignment Procedure for SPECIAL Super Skyrider Models S-17, SX17

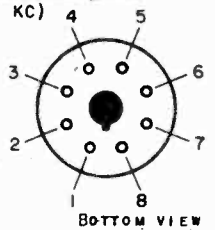
The following measurements made with 1000 ohms per volt meter and taken from the point indicated to ground. Antenna and Ground disconnected and R. F. and A. F. Gain controls set at maximum. Line voltage of 115 at the time measurements were taken. Normal tolerance allows variation of plus or minus 10% from the indicated values. "DL" means Dead Lug but will indicate voltage when used as a tie.

Tube	Function	1	2	3	4	5	6	7	8
6K7	RF Amp (1)			260	100	8	0 ON 50 OFF	6.3	8
6K7	RF Amp (2)			260	100	8	0 ON 50 OFF	6.3	8
6L7	Mixer			260	85	-13	DL	6.3	2.5
6J5G	Osc			175	DL	-13	DL	6.3	0
6K7	IF Amp (1)			260	100	11	100	6.3	10
6K7	IF Amp (2)			260	100	10	.5 ON 50 OFF	6.3	10
6R7G	2nd Det A.V.C.			175	1	1	0	6.3	-7
6V6G	1st Audio Output			300	250	0	DL	6.3	16
6V6G	Output			300	250	0	DL	6.3	16
6J7	Beat Osc.	(tube out)		250	240	0	DL 260	6.3	0
6J7G	Meter Amp			260	120	10	250	6.3	10
6J5	Silencer	(ON)		-2	-2	-2	-3.5	6.3	-2

Intermediate Frequency Alignment (465 KC)

Have the controls set in the following positions:

Noise Silencer "OFF" (switch to the left)
B.F.O. Injector "OFF"
A.F. and R.F. gain controls on full.
Selectivity switch on "SHARP" position.
Crystal phasing condenser midway (pointer straight up).
A.V.C. switch "OFF".
Crystal switch "IN".
Band switch on #1 Band - Tuning gang open.
Remove oscillator tube.
Remove 6L7 grid cap.



Bottom view of socket

Connect Signal Generator to grid of 6L7 tube through a .1 mfd condenser. Tune signal Generator to 465 KC and then adjust the following trimmers for maximum output: T-4#7,8; T3-#5,6; T2-#3,4; T1-#1,2; throw crystal switch to out position and readjust trimmers #2, 3 for maximum output. When the "Selectivity" switch is snapped into the "Broad" position a slight drop in gain should be indicated. A rectifier type output meter is suggested as an output indicator.

Alignment using a 465 KC crystal

Should the receiver be a crystal model it is necessary that the crystal be used in an external oscillator in place of a signal generator such as the above. The output of this crystal-controlled oscillator is then fed to the grid of the 6L7 tube and the above procedure followed. When the I F amplifier has been aligned from the crystal oscillators output, re-inserting the crystal in the receiver will show very little difference in output whether the crystal is "IN" or "OUT" of the circuit as indicated by the crystal switch.

R. F. Alignment Procedure

On Band #1, or Broadcast, use a .0002 mfd condenser in series with the output lead from generator to receiver. On the other bands use a 400 ohm resistor. BE SURE jumper from doublet post to Gnd. remains connected when aligning the receiver.
All PAD adjustments (located on the top of the chassis) are for the low frequency ends of the bands.
All TRIMMER adjustments (located on the bottom of the chassis) are for the high frequency ends of the bands.
Reduce the R.F. gain control below the point of blocking or overloading; Also be sure that the Crystal switch is in the "OUT" position as well as the A.V.C. switch in the "OFF" position.
BE SURE TO CHECK IMAGES - Images will fall a little less than 1,000 kc lower in frequency than the fundamental or harmonic of the signal from the generator. Because of the two RF stages images will be greatly attenuated in comparison to a unit with one stage of RF.
The tuning gang must be rocked when making these adjustments.

Note#1 Harmonics of suitable frequencies may be used if the following suggested frequencies are not available.

" 2 It is necessary to repeat each pair of operations several times until no change is noted.

" 3 Great care should be exercised in aligning and accurately resonating each circuit in the SPECIAL Super Skyrider; otherwise your errors will be cumulative and the set will function poorly.

Crystal Operation

To properly adjust the crystal circuit for best performance the following procedure should be carefully followed:

Have the AVC switch in the "OFF" position. Tune in some station transmitting continuously. Be very careful to get the signal right on the nose. After you are sure that you have the signal resonated perfectly, operate the "BFO INJECTOR" control and leave the pointer of that knob in a vertical position. You should hear a whistle, or beat note. After the BFO is on rotation of the "PITCH CONTROL" will change the tone of the beat note. Proper operation of this control will be indicated by hearing the signal twice in one complete rotation of the knob; there being two positions at which no signal, or whistle, will be heard. These two positions are known as the "ZERO BEAT" positions.

Now snap the "CRYSTAL" switch to the "ON" position. You will notice a reduction in noise. Carefully retune the signal using the BAND SPREAD dial. Notice how sharply the signal peaks. Now tune through the signal and find which side of the signal is the weaker. Tune in the weaker side and then carefully adjust the "CRYSTAL PHASING" control until the signal is inaudible. Going back to the other side of the signal should find no change in its original volume, and knife-like selectivity resulting. Use whichever side of zero-beat adjustment of the "PITCH CONTROL", in conjunction with critical adjustment of the "PHASING CONTROL" gives the greater rejection of the interfering signal.

NOTE*** The PHASING control affects the sensitivity and selectivity of the receiver whether the crystal is in the circuit or not.

MODELS S-17, SX-17
Super Skyrider
Socket, Trimmers
Alignment, Parts

HALLICRAFTERS, INC.

OPR.	BAND	RECEIVER DIAL SETTING	SIGNAL GENERATOR FREQUENCY	ADJUST OSC. WITH	TRIMMERS ADJ. FOR MAX GAIN	ADJUST OSC. WITH	PADDERS ADJ. FOR MAX GAIN
1	1	600Kc	600Kc	------	--------	C22	--------
2	1	1400Kc	1400Kc	CA	Cb Cc Cd	------	--------
3	2	1800Kc	1800Kc	------	--------	C21	--------
4	2	4000Kc	4000Kc	CE	Cf Cg Ch	------	--------
5	3	5000Kc	5000Kc	------	--------	C19	C5 C9 C13
6	3	9000Kc	9000Kc	CI	CJ CK CL	------	--------
7	4	10,000Kc	10,000Kc	------	--------	C20	C6 C10 C14
8	4	18,000Kc	18,000Kc	CM	CN Co Cp	------	--------
9	5	20,000Kc	10,000Kc	------	--------	C18	C7 C11 C15
10	5	30,000Kc	10,000Kc	Cq	CR Cs Ct	------	--------
11	6	40,000Kc	20,000Kc	------	--------	C17	C16
12	6	60,000Kc	20,000Kc	Cu	Cv	------	--------

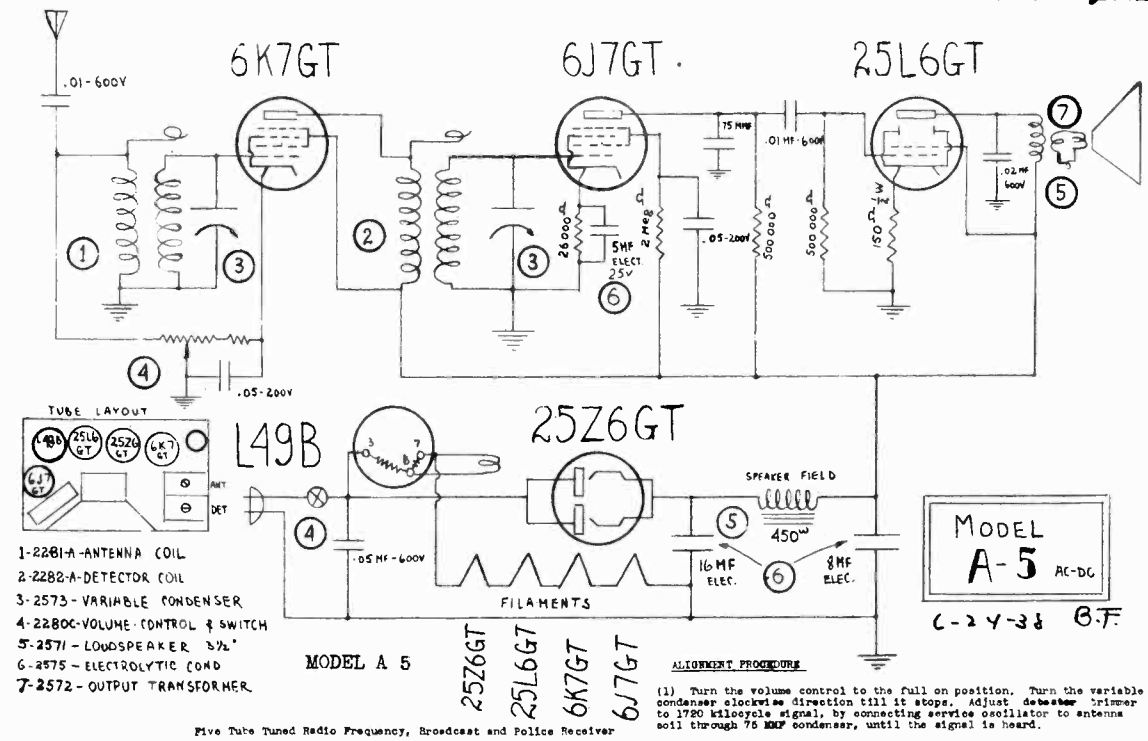
SWITCHES
S 1 SELECTIVITY DPDT
2 NOISE SILENCER SPST
3 BFO (MOUNTED ON CONTROL)
4 "S" METER (MOUNTED ON
5 A.C. OFF AND ON (MOUNTED
R.F. GAIN CONTROL)
6 SEND RECEIVE SPST
ON TONE CONTROL)
7 CRYSTAL SPST
8 AVC DPST

SUPER-SKYRIDER MODELS S-17, SX-17 No.	CAPACITY	TYPE	VOLTAGE	PARTS No.	No.	CAPACITY	TYPE	VOLTAGE	PARTS No.
C1	420 MMFD	MAIN		48-018	62	10 MMFD	MICA	600	45-002
2					63	.00025 MFD	"		45-002
3		GANG			64	16 "		400	40-021
4		PAD			65	16 "		400	40-024
5	100 "	"		44-019	66	.01 "		400	42-019
6	100 "	"			67	.002 "	"	600	42-019
7	310 "	"		44-020	68	.002 "	"		45-002
8	880 "	"			69	1. "			40-013
9	1,400 "	"		44-018	70	.01 "	"	400	40-013
10	590 "	"			71	.0001 "	"	600	41-013
11	1,000 "	"		44-017	72	.005 "	"		45-002
12	350 "	"			73	.0005 "	"	600	40-003
13	1,400 "	"		44-018	74	.005 "	"		45-009
14	590 "	"			75	10 MMFD	"		43-008
15	1,000 "	"		44-017	76	10 "	"		40-019
16	350 "	"			77	50 "	"		40-021
17	180 "	"		44-016	78	.02 MFD	"	600	40-002
18	120 "	"			79	.05 "	"	400	45-010
19	1,000 "	"		44-017	80	.1 "	"	400	41-005
20	350 "	"			81	.002 "	"		41-007
21	180 "	"		44-016	82	10 MMFD	"		40-013
22	120 "	"			83	10 "	"		40-021
23	10 "	"	MICA	40-021	84	.05 MFD	"	600	40-021
24	10 "	"	"	40-021	85	10 MMFD	"		45-007
25	.002 MFD	"	"	40-013					40-021
26	10 MMFD	"	"	40-021		List of Resistors			
27	10 "	"	"	40-021	No.	OHMS	WATTAGE		PARTS No.
28	.002 MFD	"	"	40-013					25-021
29	10 MMFD	"	"	40-021	R 1	5,000	R. F. GAIN		24-040
30	10 "	"	"	40-021	2	500	1/3		24-037
31	.002 MFD	"	"	40-013	3	10,000	2.5		24-038
32	.05 "	"	"	41-005	4	10,000	1/3		20-093
33	.05 "	"	AIR	45-007	5	700	"		24-038
34	25 MMFD	"	"	48-012	6	100,000	"		20-093
35	.05 MFD	"	"	41-005	7	700	"		20-093
36	.05 "	"	"	41-005	8	100,000	"		22-075
37	.05 "	"	"	41-005	9	30,000	1.		20-093
38	.1 "	"	"	45-008	10	100,000	1/3		20-033
39	.25 "	"	"	45-009	11	1,000	"		20-093
40	.05 "	"	"	41-005	12	100,000	"		20-033
41	.05 "	"	"	41-005	13	1,000	"		20-108
42	.1 "	"	"	45-008	14	1,000,000	"		20-108
43	10. "	"	"	42-002	15	1,000,000	"		22-032
C44	.05 MFD	"	MICA	41-005	16	950	"		20-099
45	.002 "	"	"	40-013	17	250,000	"		20-099
46	.1 "	"	"	41-007	18	1,000,000	A. F. GAIN		25-023
47	.05 "	"	"	41-005	19	50,000	1/3		20-084
48	.1 "	"	"	45-008	20	10,000	1.		20-061
49	.05 "	"	"	41-005	21	100,000	1/3		20-093
50	.05 "	"	"	41-005	22	100,000	"		20-093
51	.002 "	"	"	40-013	23	50,000	"		20-084
52	100 MMFD	"	"	40-007	24	50,000	"		20-084
53	50 "	"	"	40-002	25	500,000	BFO CONTROL		25-024
54	50 "	"	"	40-002	26	100,000	1/3		20-093
55	10 "	"	"	41-021	27	500	METER ADJ.		25-022
56	15 "	"	"	40-022	28	95	1/2		22-007
57	15 "	"	"	40-022	29	250	1.		20-099
58	25 "	"	"	40-024	30	100,000	1/3		20-093
59	25 "	"	AIR	48-012	31	1,000,000	"		20-108

No.	OHMS	WATTAGE	PARTS No.
32	20,000	"	20-072
33	1,000,000	TONE CONTROL	25-013
34	100,000	1/3	20-093
35	10,000	"	20-063
36	100,000	"	20-093
37	20,000	"	20-072
38	150	"	22-011
39	1,000	"	20-033

HALSON RADIO & TELEV., INC.

MODEL A-5
MODELS C-6,163
Schematics, Socket
Trimmers, Alignment



Five Tube Tuned Radio Frequency, Broadcast and Police Receiver

LINE VOLTAGE — 120 Volts AC or DC, Alternating or Direct Current.

TUNING RANGE — 545 Kilocycles (540 meters) to 1720 Kilocycles (175 meters).

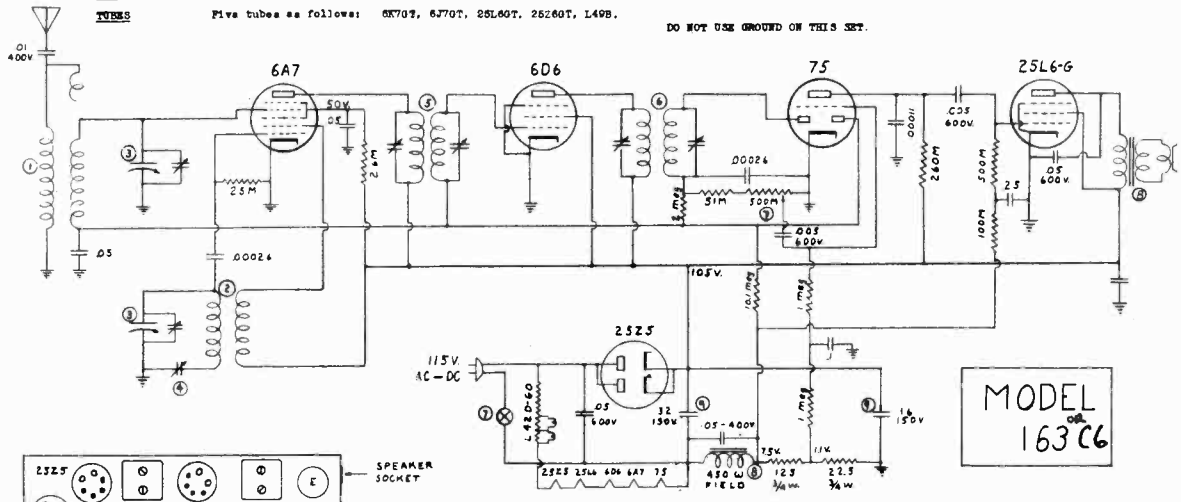
TUBES — Five tubes as follows: 6K7GT, 6J7GT, 25L6GT, 25Z6GT, L49B.

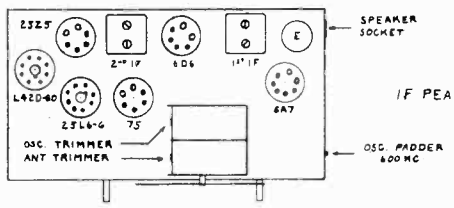
ALIGNMENT PROCEDURE

(1) Turn the volume control to the full on position. Turn the variable condenser clockwise direction till it stops. Adjust **debeater** trimmer to 1720 kilocycle signal, by connecting service oscillator to antenna coil through 75 MMF condenser, until the signal is heard.

(2) Feed the 1500 kilocycle signal and turn the variable counterclockwise until the peak of this signal is reached. Adjust the antenna trimmer for maximum response.

DO NOT USE GROUND ON THIS SET.





IF PEAK - 456 KC

ALL RESISTORS ARE ½ WATT AND ALL CONDENSERS ARE 200 VOLTS UNLESS OTHERWISE MARKED.
ALL VOLTAGES MEASURED TO CHASSIS.

10-22-37 E.

TUBE LAYOUT & TRIMMER LOCATION

PARTS LIST

1 -	2387-1	ANTENNA COIL
2 -	2388-2	OSCILLATOR COIL
3 -	2422-2	VARIABLE CONDENSER
4 -	1621-1	OSCILLATOR PADDER CONDENSER
5 -	2389-A	1ST IF TRANSFORMER
6 -	2390-B	2nd IF TRANSFORMER
7 -	1645-A	VOLUME CONTROL & SWITCH
8 -	2366-1	SPEAKER ASSEMBLY
9 -	2444-A	ELECTROLYTIC CONDENSER

MODEL 163 or C6

Six Tube Superheterodyne, Broadcast And Police Receiver

INSTRUCTION SHEET — SERVICE DATA

LINE VOLTAGE — 110 to 120 Volts, A C or D C, Alternating or Direct Current.

TUNING RANGES — Broadcast Band-545 Kilocycles (540 Meters) to 1550 Kilocycles (195 Meters).
Police Band- State and Municipal Police - 1600 Kilocycles (190 Meters) to 1750 Kilocycles (170 Meters)

TUBES — Six tubes as follows: 6A7, 6D6, 75, 25L6-G, 25Z5 and a L42D-60.

ALIGNMENT PROCEDURE

1) Turn the volume control to the full on position and tune the receiver at the high frequency end of the band so that no signal is received.

Connect the service oscillator output through a .1 mfd. isolating condenser to the top grid cap of the 6A7 tube and set to 456 kilocycles. Adjust the intermediate frequency trimmers for the maximum response. As the set is brought into line and the signal becomes stronger, attenuate the service oscillator

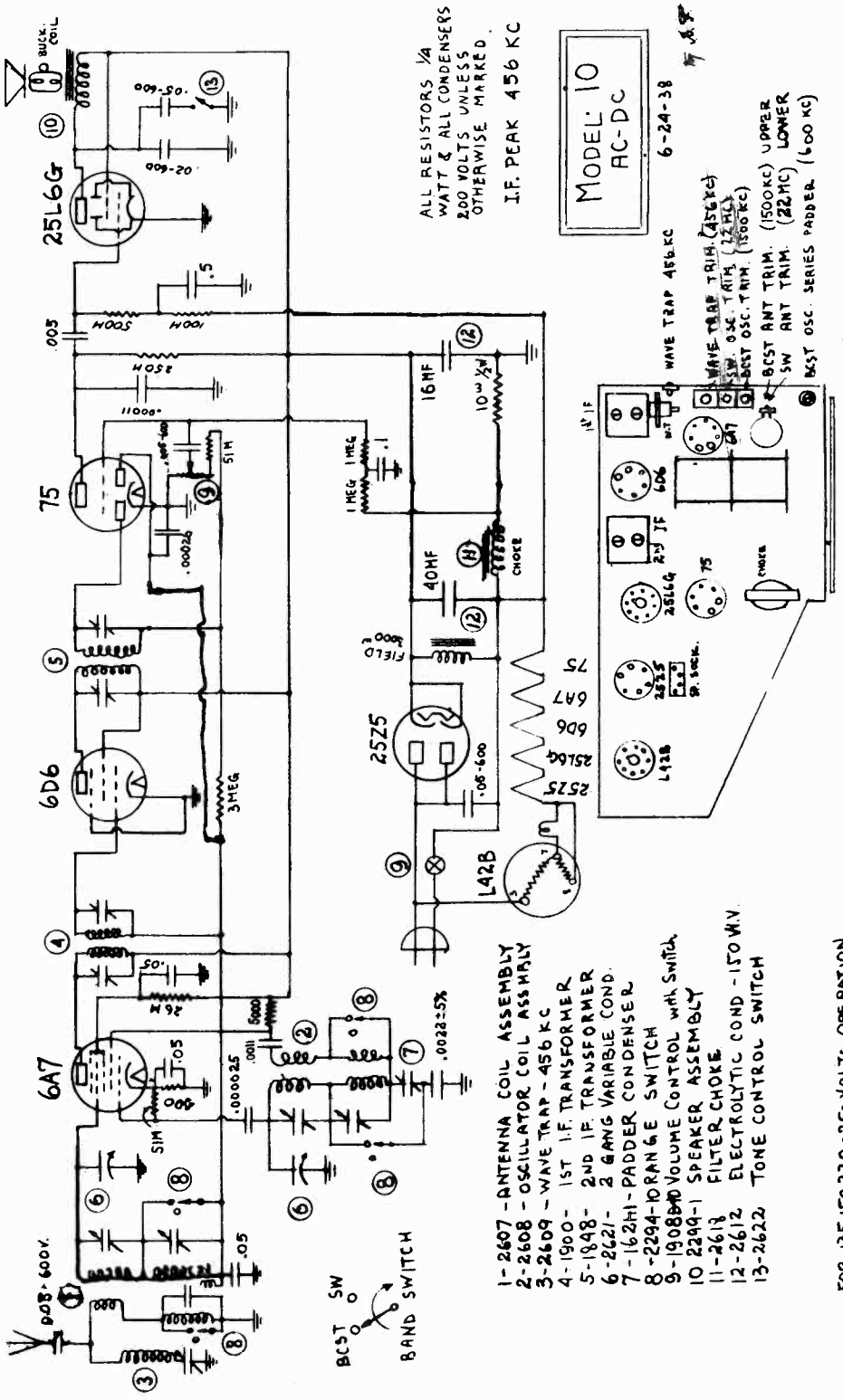
2) Set the dial pointer to the 1500 kilocycle calibration. Feed a 1500 kilocycle signal from the service oscillator through a .00015 condenser to the antenna. Adjust the oscillator trimmer until the signal is heard, then adjust the antenna trimmer for maximum response.

3) Set the service oscillator to 600 kilocycles and adjust the oscillator padder for maximum response by simultaneously adjusting the padder and rocking the tuning control.

4) Repeat the procedure of numbers 2 and 3 for greater accuracy.

MODEL 10
Schematic, Socket
Trimmers, Alignment
Parts

HALSON RADIO & TELEV., INC.



TUBE LAYOUT AND TRIMMER LOCATION

Six Tube Superheterodyne, Broadcast and Foreign Short Wave

INSTRUCTION SHEET SERVICE DATA

LINE VOLTAGE 110 to 120 Volts, AC or DC, Alternating or Direct Current.

TUNING RANGES Broadcast and State Police Band - 545 KC (540 meters) to 1780 KC (meters)
Short Wave, Foreign Broadcast - 7.5 MC (40 meters) to 25 MC (12 meters).

MINOR REASONS FOR FAILURE TO FUNCTION - Defective tubes, grid caps off, volume control not fully turned on, line plug reversed on DC, tubes not in their proper sockets, shorted aerial defective plug or wiring loose in socket.

ALIGNMENT PROCEDURE -

(1) Set service oscillator to 456 KC and connect the output lead to the top grid of 6A7. Adjust the I.F. trimmers for maximum response.

(2) Connect oscillator set at 456 KC to the antenna lead through a .0002 MFD condenser band switch in the broadcast position, and adjust the wave trap for minimum response.

(3) Set oscillator for 22 MC, band switch in the short wave position, dial pointer set for 22 MC calibration, and adjust the short wave oscillator trimmer until the signal is heard.

(4) Turn the band switch to the broadcast position, set dial to 1500 KC calibration and feed a 1500 KC signal from the oscillator through the antenna. Adjust the broadcast oscillator trimmer until the signal is heard, then adjust the broadcast antenna trimmer for maximum response.

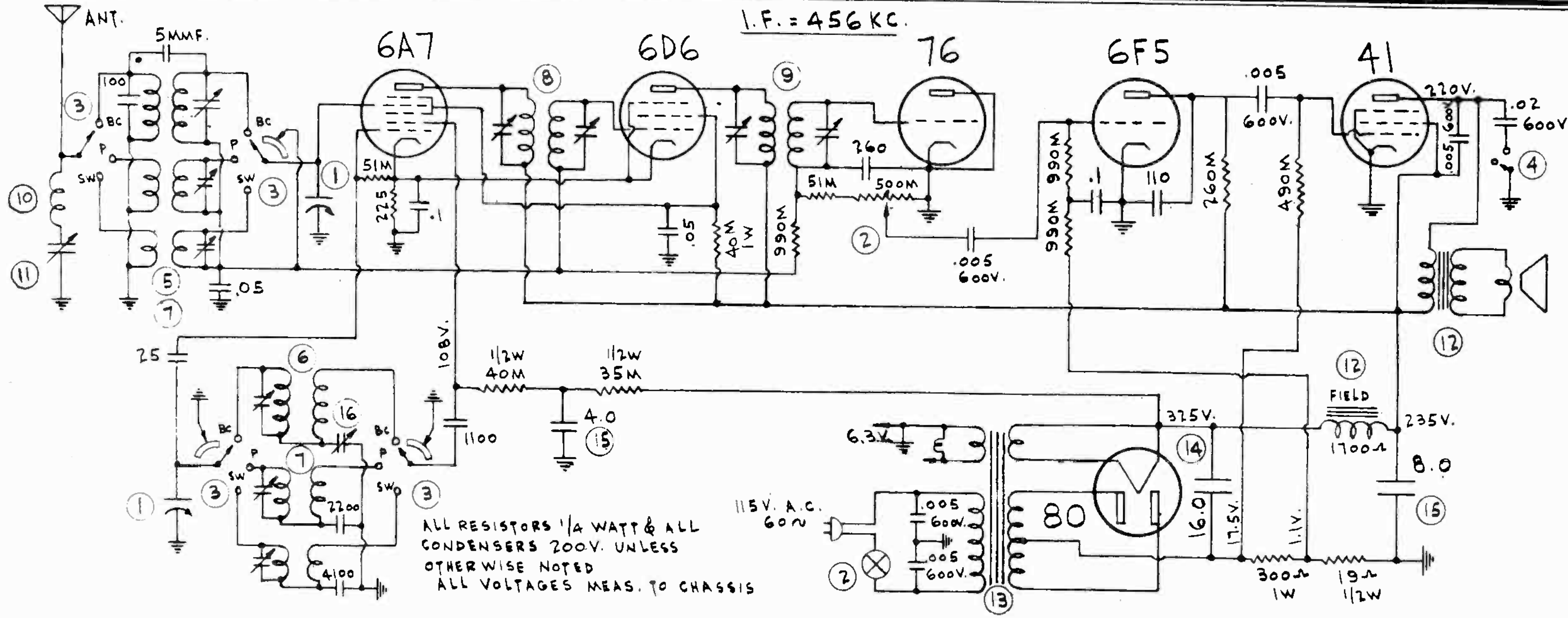
(5) Set the test oscillator to 600 KC and adjust the broadcast osc. series padder for maximum response by simultaneously adjusting the padder and rocking the tuning dial.

(6) Repeat procedure numbers 4 and 5 for greater accuracy.

(7) Turn the set to the S.W. Band, set the test oscillator to 22 MC, tune in signal with the set and adjust the S.W. antenna trimmer for maximum response. Use 400 ohm dummy antenna.

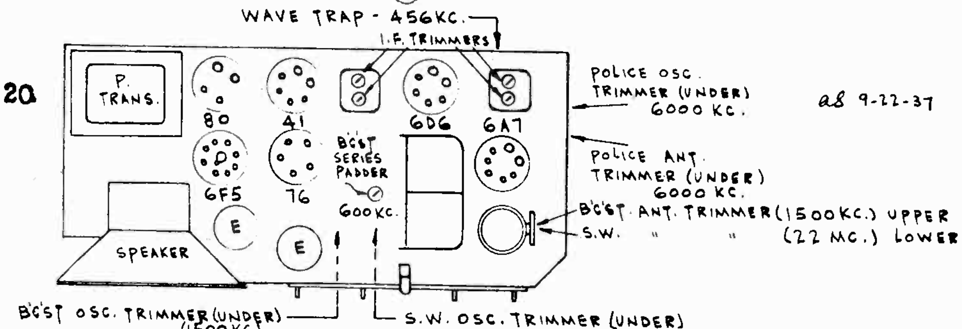
HALSON RADIO & TELEV., INC.

MODEL 20
Schematic, Socket Trimmers, Alignment Parts



1 = 2466 - VARIABLE CONDENSER 495 MMFD.
2 = 1500EE - VOLUME CONTROL & SWITCH
3 = 2345A - RANGE SWITCH
4 = 1439C - TONE CONTROL SWITCH
5 = 2466 - ANTENNA COIL ASSEMBLY
6 = 2485 - OSCILLATOR " "
7 = 2490 - ANT.-OSC. " " (POLICE BAND)
8 = 1900L - I.F. TRANSFORMER - 1ST - 456 K.C.
9 = 1848P - " " - 2ND - "
10 = 2297-1 - WAVE TRAP COIL - 456 KC.
11 = 2337-1 - " " TRIMMER
12 = 2272-1 - SPEAKER ASSEMBLY
13 = 2311 - POWER TRANSFORMER - 115V. - 60~
14 = 2353 - ELECT. COND. (WET) 16 MFD. 450V.
15 = 2308-2 - " " 8-4 MFD. 350V.
16 = 1621-1 - PADDER COND. 200-685 MMFD.

MODEL 20



TUBE LAYOUT & TRIMMER LOCATIONS

LINE VOLTAGE 110 to 120 volts Alternating Current, 60 Cycles

TUNING RANGES Broadcast - 540 KC (555 meters) to 1725 KC (174 meters)
Police - 2.3 MC (130 meters) to 7.9 MC (38 meters)
Foreign Short Wave - 7.4 MC (40 meters) to 25 MC (12 meters)

ALIGNMENT PROCEDURE

(1) Set service oscillator to 456 kc and connect the output lead to the top grid of 6A7. Adjust trimmers for maximum response.

(2) Connect oscillator set at 456 kc to the antenna lead through a .0002 mfd. condenser; variable condenser closed, and adjust wave trap trimmer for minimum response. Band switch to be in broadcast position.

(3) Turn band selector to the short wave band, set the test oscillator to 22 mc and connect to antenna lead through 400 ohm dummy antenna. Set dial pointer to 22 mc and adjust short wave oscillator trimmer until signal is heard. Then adjust short wave antenna trimmer for maximum response.

(4) Turn band selector to police band, set test oscillator to 6000 kc, connect to antenna lead through 400 ohm dummy antenna. Set dial pointer to 6000 kc and adjust police oscillator trimmer until signal is heard. Then adjust broadcast antenna trimmer for maximum response.

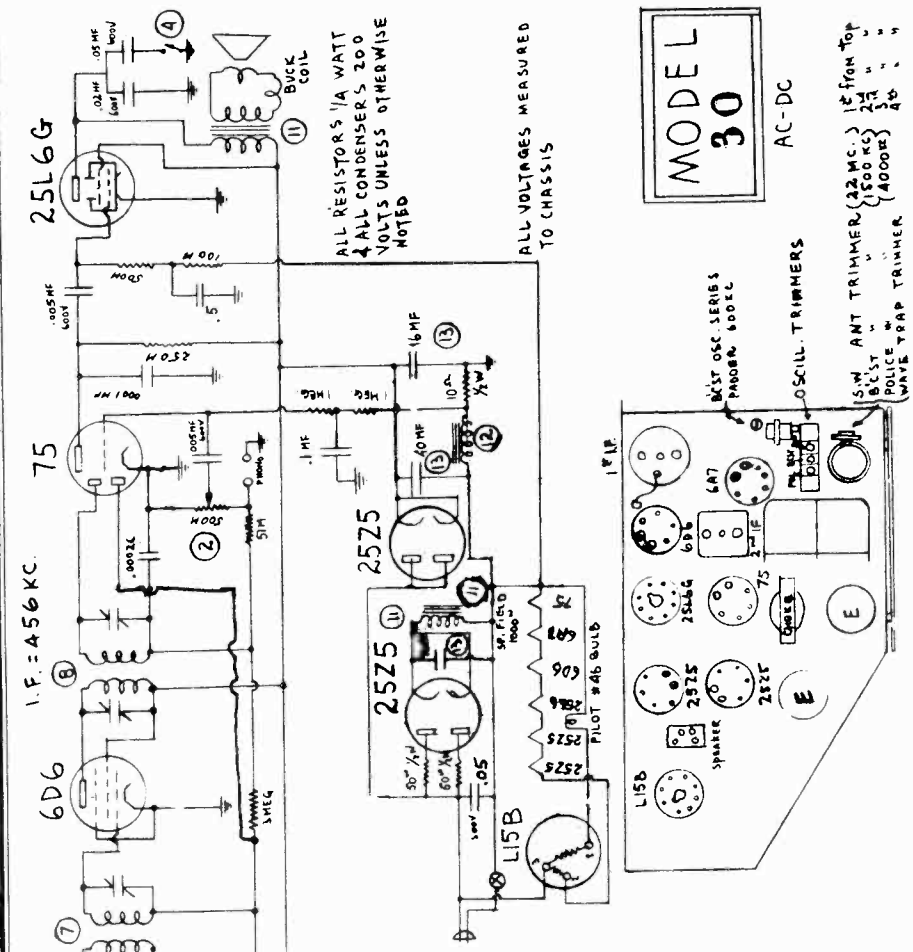
(5) Turn band selector to broadcast band, set test oscillator to 1500 kc, connect to antenna lead through a .0002 mfd. condenser. Set dial at 1500 kc and adjust broadcast oscillator trimmer until signal is heard. Then adjust broadcast antenna trimmer for maximum response.

(6) With band selector in broadcast position, set test oscillator to 600 kc and adjust broadcast oscillator series padder for maximum response by simultaneously adjusting the padder and rocking the tuning dial.

(7) Repeat procedures 5 and 6 for greater accuracy.

MODEL 30
Schematic, Socket
Trimmers, Alignment, Parts

HALSON RADIO & TELEV., INC.



1 = 2621 — VARIABLE CONDENSER - 495 MMFD.
2 = 1908-30 - VOLUME CONTROL & SWITCH
3 = 2638 - RANGE SWITCH
4 = 2639 — TONE CONTROL SWITCH
5 = 2632 — ANTENNA COIL ASSEMBLY
6 = 2633 — OSCILLATOR " "
7 = 2382-30 I F TRANSFORMER, 1st - 456 KC
8 = 1848-30 - I.F TRANSFORMER - 2nd - 456 KC
9 = 2609 - WAVE TRAP COIL - 456 KC
10 2623 — " " TRIMMER
11 = 2350-2 - SPEAKER ASSEMBLY
12 = 2618 — FILTER CHOKE 95Ω
13 2634 — ELECTROLYTIC COND 40-16-16
14 1621-1 - PADDER COND. 200 - 685 MMFD

FOR 135V, 150V, 220V & 250V OPERATION USE L15 BX BALLAST TUBE

TUBE LAYOUT & TRIMMER LOCATION

6-28-38

Seven Tube Superheterodyne Broadcast, Police & Foreign Short Wave

INSTRUCTION SHEET SERVICE DATA

LINE VOLTAGE 110 to 120 Volts AC or DC, Alternating or Direct Current

TUNING RANGES Broadcast - 540 KC (555 meters) to 1735 KC (175 meters).
Police - 2.3 MC (130 meters) to 7.5 MC (40 meters).
Foreign Short Wave - 7.5 (40 meters) to 24 MC. (13 meters).

MINOR REASONS FOR FAILURE TO FUNCTION - Defective tubes, grid caps off, volume control not fully turn on, line plug reversed on DC, tube not in their proper sockets, shorted antenna, defective plug or wiring loose in sockets.

ALIGNMENT PROCEDURE

(1) Set service oscillator to 456 kc. and connect the output lead to the top grid of 6A7. Adjust trimmers for maximum response.

(2) Connect oscillator set at 456 kc. to the antenna lead through a .0002 mfd. condenser, band switch in the broadcast position, variable condenser closed, and adjust wave trap trimmer for minimum response.

(3) Turn the band selector to the short wave band, set the test oscillator to 22 mc. connect to antenna lead through 400 ohm dummy antenna, set dial pointer to 22mc. and adjust short wave oscillator trimmer for maximum response.

(4) Turn band selector to police band, set test oscillator to 6 mc., connect to antenna lead through 400 ohm dummy antenna. Set dial pointer to 6 mc. and adjust police oscillator trimmer until signal is heard. Then adjust police antenna trimmer for maximum response.

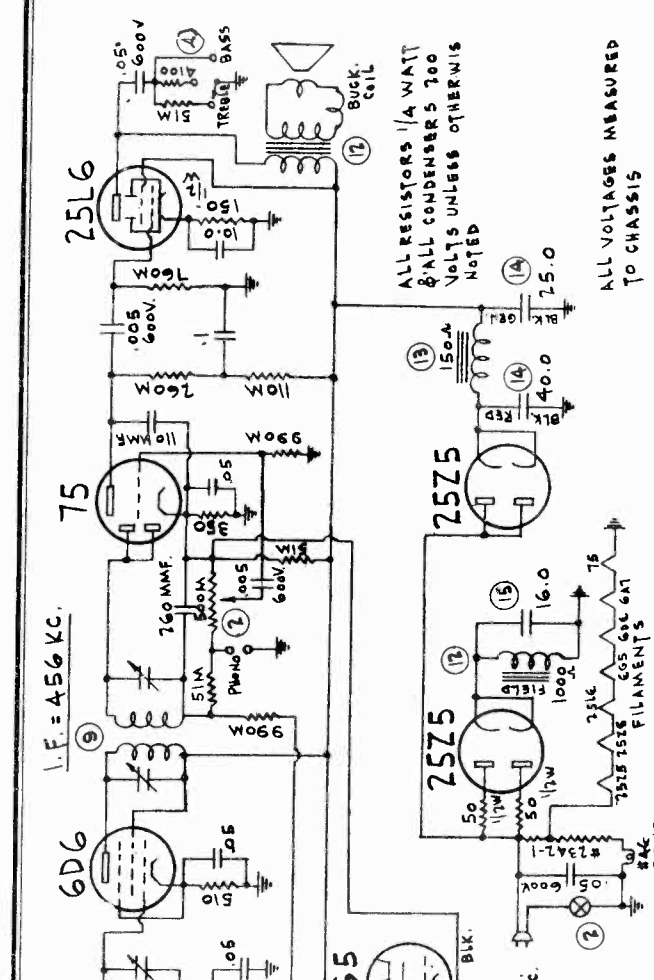
(5) Turn band selector to broadcast band, set test oscillator to 1500 kc, connect to antenna lead through a .0002 mfd. condenser. Set dial pointer at 1500 kc and adjust broadcast oscillator trimmer until signal is heard. Then adjust broadcast antenna trimmer for maximum response.

(6) With band selector in broadcast position, set test oscillator to 600 kc and adjust broadcast oscillator series padder for maximum response by simultaneously adjusting the padder and rocking the tuning diel.

(7) Repeat procedures 5 and 6 for greater accuracy.

HALSON RADIO & TELEV.,INC.

MODEL 412
Schematic, Socket Trimmers, Alignment Parts



1 = 2290-3 - VARIABLE CONDENSER - 495 MMFD.
2 = 1908D-3 - VOLUME CONTROL & SWITCH
3 = 2345 - RANGE SWITCH
4 = 2187 - TONE CONTROL SWITCH
5 = 2347 - ANTENNA COIL ASSEMBLY
6 = 2348 - OSCILLATOR " "
7 = 2349 - ANT. - OSC. " " (POLICE BAND)
8 = 2382-1 - I.F. TRANSFORMER - 1ST - 456 KC.
9 = 1846 - " " - 2ND - " "
10 = 2297-1 - WAVE TRAP COIL - 456 KC.
11 = 2331-1 - " " TRIMMER
12 = 2360-2 - SPEAKER ASSEMBLY
13 = 2301 - FILTER CHOKE - 150Ω
14 = 2307 - ELECT. COND. - 40-25 MFD. - 150V.
15 = 2357 - " " (WET) 16 MFD. - 150V.
16 = 1621-1 - PADDER COND. 200 - 685 MMFD.

Eight Tube Superheterodyne — Broadcast, Police & Foreign Short Wave

LINE VOLTAGE — 110 to 120 Volts AC or DC, Alternating or Direct Current

TUNING RANGES — Broadcast - 540 KC (555 meters) to 1735 KC (173 meters)
Police - 1.6 MC (180 meters) to 5.8 MC (52 meters)
Foreign Short Wave - 5.6 MC. (53 meters) to 19 MC. (16 meters)

ALIGNMENT PROCEDURE

(1) Set service oscillator to 456 kc. and connect the output lead to the top grid of 6A7. Adjust trimmers for maximum response.

(2) Connect oscillator set at 456kc to the antenna lead through a .0002 mfd condenser; band switch in the broadcast position, variable condenser closed, and adjust wave trap trimmer for minimum response.

(3) Turn the band selector to the short wave band, set the test oscillator to 16 mc, connect to antenna lead through 400 ohm dummy antenna, set dial pointer to 16mc and adjust short wave oscillator trimmer until signal is heard. Then adjust short wave antenna trimmer for maximum response.

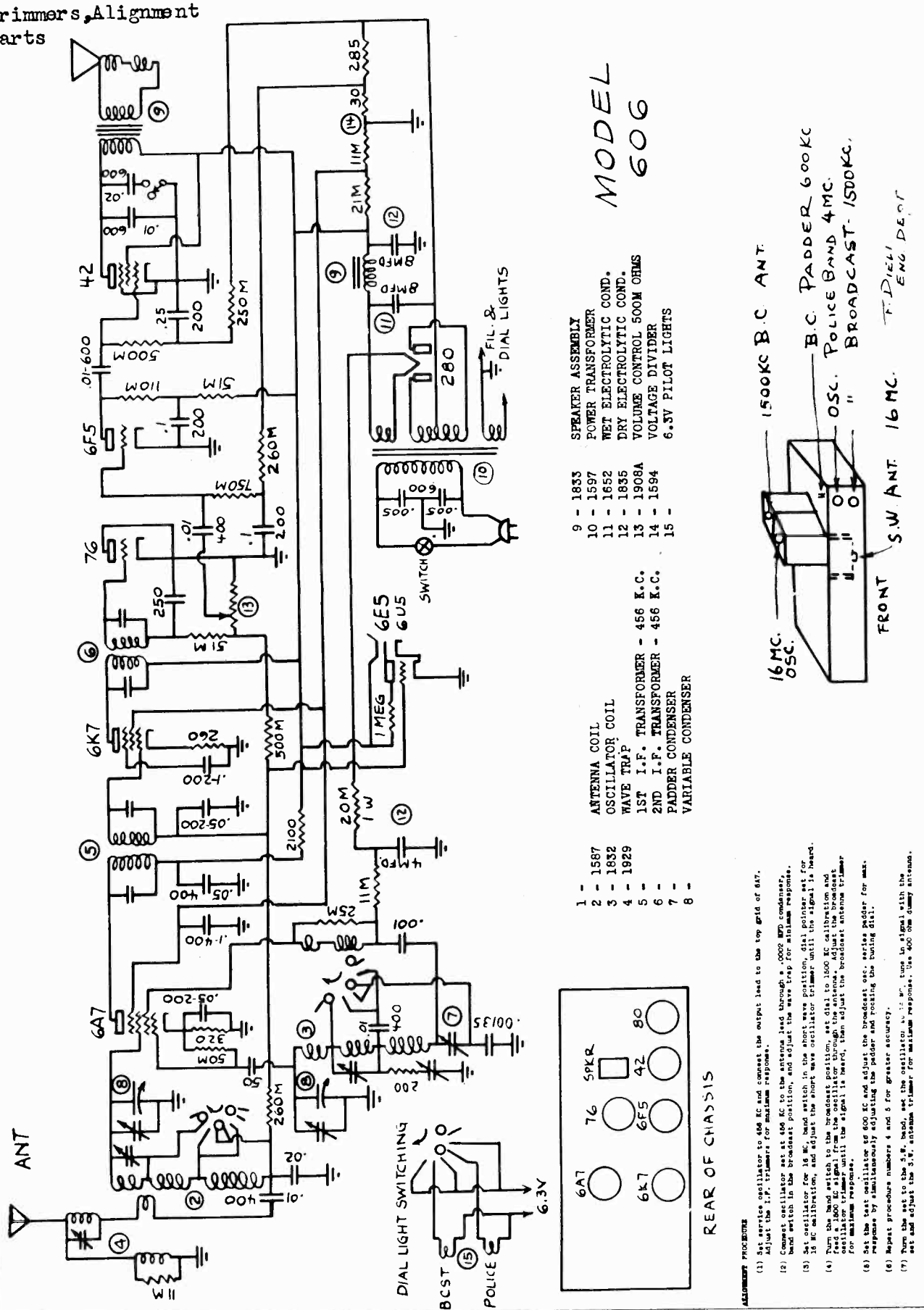
(4) Turn band selector to police band, set test oscillator to 4000 kc, connect to antenna lead through 400 ohm dummy antenna. Set dial pointer to 4000 kc and adjust police oscillator trimmer until signal is heard. Then adjust police antenna trimmer for maximum response.

(5) Turn band selector to broadcast band, set test oscillator to 1500 kc, connect to antenna lead through a .0002 mfd. condenser. Set dial pointer at 1500 kc and adjust broadcast oscillator trimmer until signal is heard. Then adjust broadcast antenna trimmer for maximum response.

(6) With band selector in broadcast position, set test oscillator to 600 kc and adjust broadcast oscillator series padder for maximum response by simultaneously adjusting the padder and rocking the tuning dial.

MODEL 606
Schematic, Socket
Trimmers, Alignment
Parts

HALSON RADIO & TELEV., INC.



1 -		
2 - 1587	ANTENNA COIL	
3 - 1832	OSCILLATOR COIL	
4 - 1929	WAVE TRAP	
5 -	1ST I.F. TRANSFORMER - 456 K.C.	
6 -	2ND I.F. TRANSFORMER - 456 K.C.	
7 -	PADDER CONDENSER	
8 -	VARIABLE CONDENSER	
9 - 1833	SPEAKER ASSEMBLY	
10 - 1597	POWER TRANSFORMER	
11 - 1652	WET ELECTROLYTIC COND.	
12 - 1835	DRY ELECTROLYTIC COND.	
13 - 1908A	VOLUME CONTROL 500M OHMS	
14 - 1594	VOLTAGE DIVIDER	
15 -	6.3V PILOT LIGHTS	

ALIGNMENT PROCEDURE

(1) Set service oscillator to 456 KC and connect the output lead to the top grid of 6A7. Adjust the I.F. trimmers for maximum response.

(2) Connect oscillator set at 456 KC to the antenna lead through a .0002 MFD condenser, band switch in the broadcast position, and adjust the wave trap for minimum response.

(3) Set oscillator for 16 MC, band switch in the short wave position, dial pointer set for 16 MC calibration, and adjust the short wave oscillator trimmer until the signal is heard.

(4) Turn the band switch to the broadcast position, set dial to 1500 KC calibration and tune in 1500 KC signal from the service oscillator. Adjust the broadcast oscillator trimmer until the signal is heard, then adjust the broadcast antenna trimmer for maximum response.

(5) Set the test oscillator to 600 KC and adjust the broadcast osc. series padder for max. response by simultaneously adjusting the padder and rocking the tuning dial.

(6) Repeat procedure numbers 4 and 5 for greater accuracy.

(7) Turn the set to the S.W. band, set the oscillator to 16 MC, tune in signal with the set and adjust the S.W. antenna trimmer for maximum response. Use 400 ohm dummy antenna.

HALSON RADIO & TELEV.,INC.

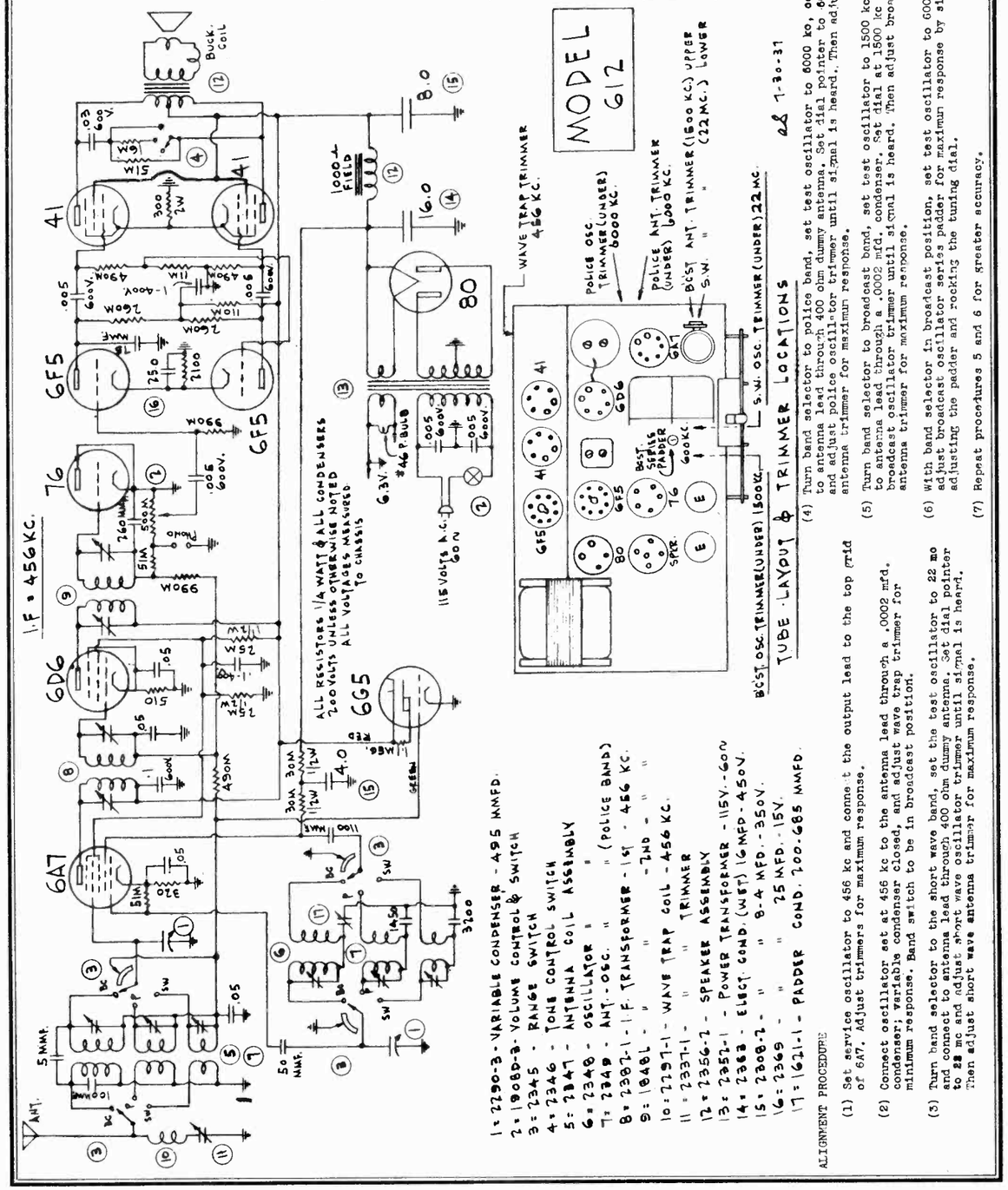
MODEL 612
Schematic, Socket
Trimmers, Alignment
Parts

Nine Tube Superheterodyne — Broadcast, Police & Foreign Short Wave

INSTRUCTION SHEET — SERVICE DATA

LINE VOLTAGE — 110 to 120 volts Alternating Current, 60 cycles

TUNING RANGES — Broadcast - 540 KC (555 meters) to 1725 KC (174 meters)
Police 2.3 MC (130 meters) to 7.9 MC (38 meters)
Foreign Short Wave - 7.4 MC (40 meters) to 25 MC (12 meters)



1 = 2290-3 - VARIABLE CONDENSER - 495 MMFD.
2 = 19080-3 - VOLUME CONTROL & SWITCH
3 = 2345 - RANGE SWITCH
4 = 2346 - TONE CONTROL SWITCH
5 = 2347 - ANTENNA COIL ASSEMBLY
6 = 2348 - OSCILLATOR " "
7 = 2349 - ANT.-OSC. " " (POLICE BAND)
8 = 2387-1 - I.F. TRANSFORMER - 1st - 456 KC.
9 = 1848 - " " - 2nd - " "
10 = 2297-1 - WAVE TRAP COIL - 456 KC.
11 = 2337-1 - " " TRIMMER
12 = 2356-2 - SPEAKER ASSEMBLY
13 = 2352-1 - POWER TRANSFORMER - 115V.-60~
14 = 2388 - ELECT. COND. (WET) 16 MFD.-450V.
15 = 2308-2 - " " 8-4 MFD.-350V.
16 = 2369 - " " 25 MFD.-15V.
17 = 1621-1 - PADDER COND. 200-685 MMFD.

ALIGNMENT PROCEDURE

(1) Set service oscillator to 456 kc and connect the output lead to the top grid of 6A7. Adjust trimmers for maximum response.

(2) Connect oscillator set at 456 kc to the antenna lead through a .0002 mfd. condenser; variable condenser closed, and adjust wave trap trimmer for minimum response. Band switch to be in broadcast position.

(3) Turn band selector to the short wave band, set the test oscillator to 22 mc and connect to antenna lead through 400 ohm dummy antenna. Set dial pointer to 28 mc and adjust short wave oscillator trimmer until signal is heard. Then adjust short wave antenna trimmer for maximum response.

(4) Turn band selector to police band, set test oscillator to 6000 kc, connect to antenna lead through 400 ohm dummy antenna. Set dial pointer to 6000 kc and adjust police oscillator trimmer until signal is heard. Then adjust police antenna trimmer for maximum response.

(5) Turn band selector to broadcast band, set test oscillator to 1500 kc, connect to antenna lead through a .0002 mfd. condenser. Set dial at 1500 kc and adjust broadcast oscillator trimmer until signal is heard. Then adjust broadcast antenna trimmer for maximum response.

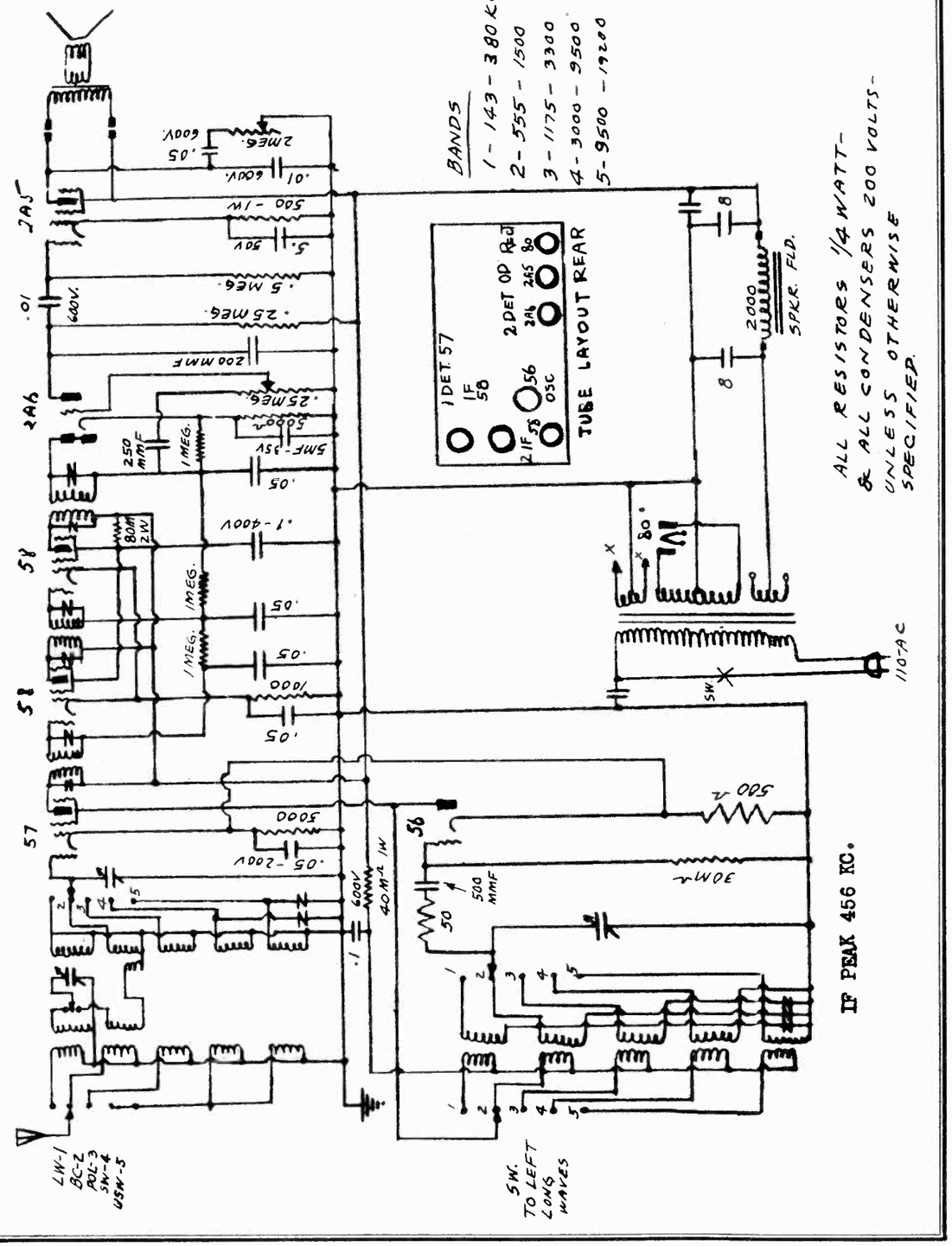
(6) With band selector in broadcast position, set test oscillator to 600 kc and adjust broadcast oscillator series padder for maximum response by simultaneously adjusting the padder and rocking the tuning dial.

(7) Repeat procedures 5 and 6 for greater accuracy.

TUBE LAYOUT & TRIMMER LOCATIONS

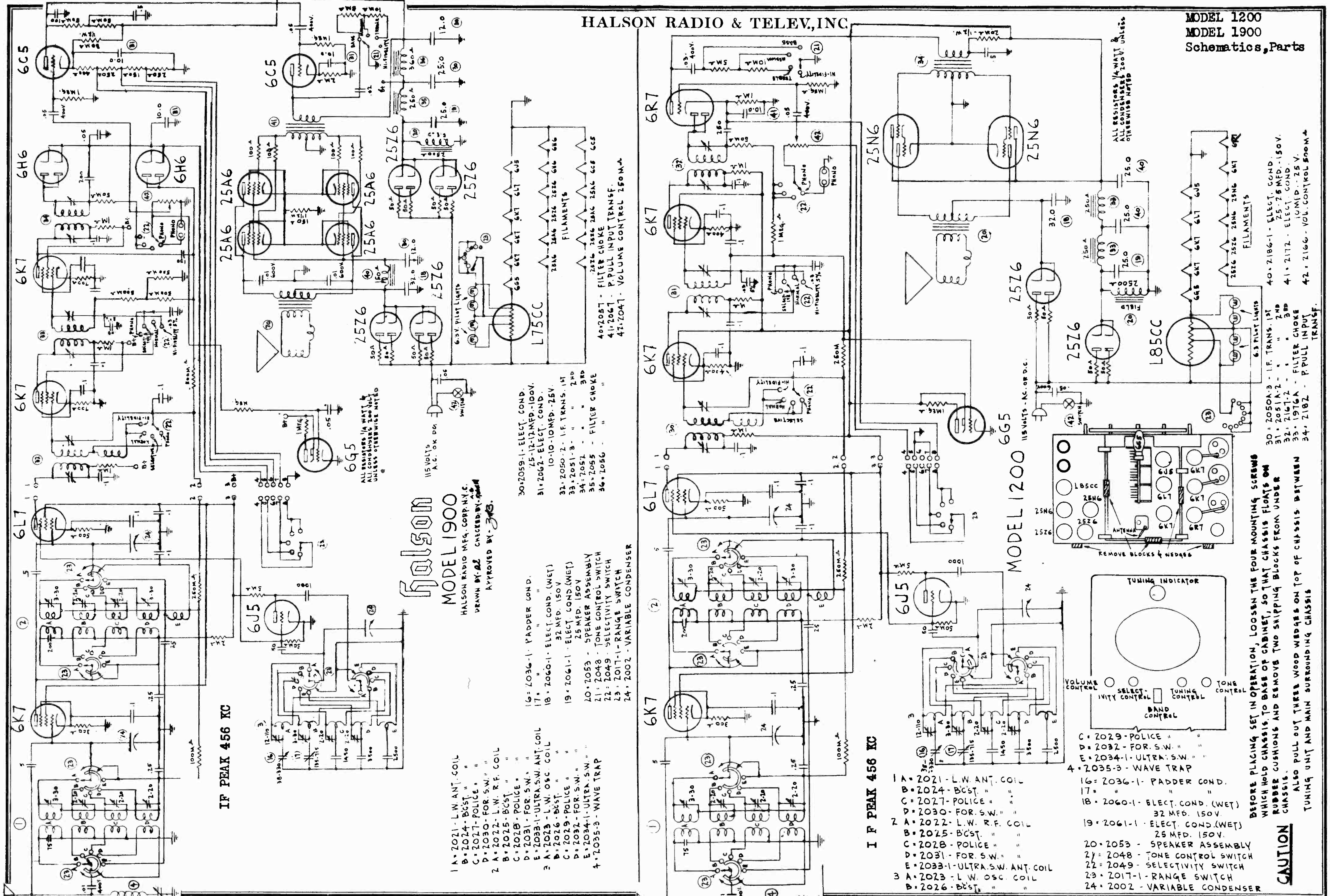
MODEL 770AW Late
Schematic, Socket

HALSON RADIO & TELEV.,INC.



HALSON RADIO & TELEV.,INC.

MODEL 1200
MODEL 1900
Schematics,Parts



Schematic, Trimmers, Crystal Circuit
Terminal Voltages

HAMMARLUND MFG. CO., INC.

MODELS SP110X, SP120X, SPR110X, SPR120X
Super Pro Standard Model-SP110 Series

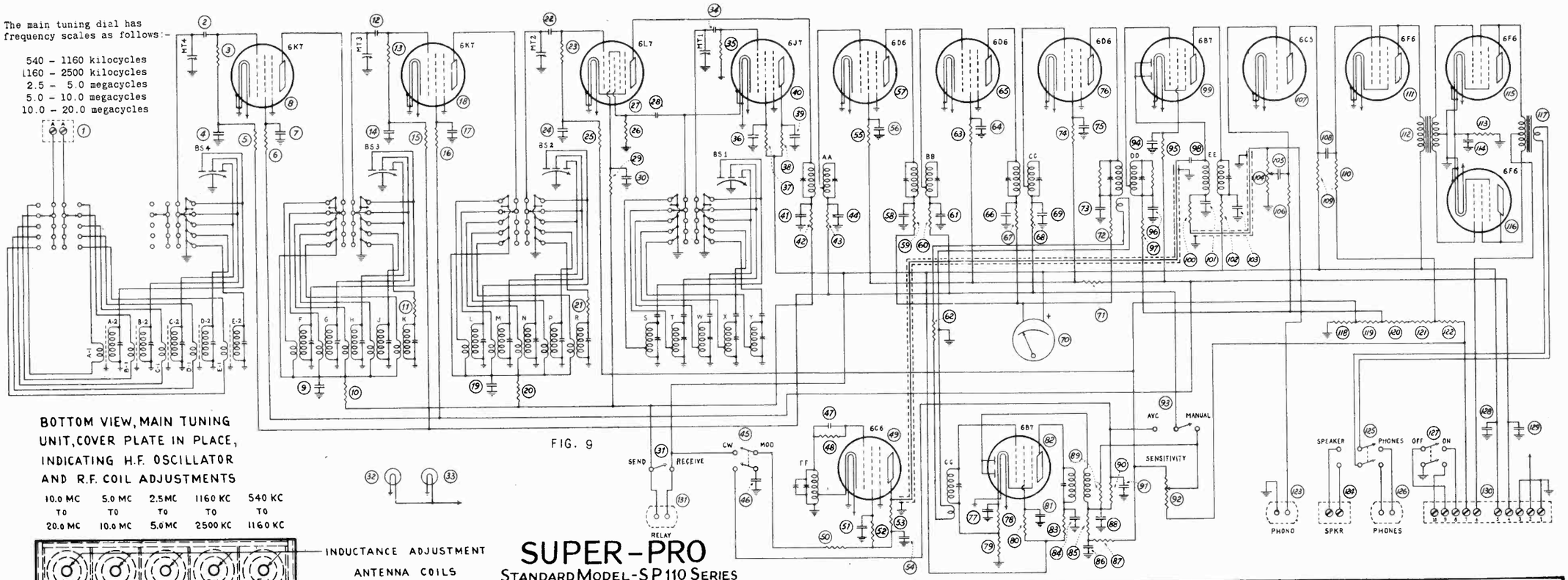


FIG. 9

BOTTOM VIEW, MAIN TUNING UNIT, COVER PLATE IN PLACE, INDICATING H.F. OSCILLATOR AND R.F. COIL ADJUSTMENTS

10.0 MC TO 20.0 MC	5.0 MC TO 10.0 MC	2.5 MC TO 5.0 MC	1160 KC TO 2500 KC	540 KC TO 1160 KC

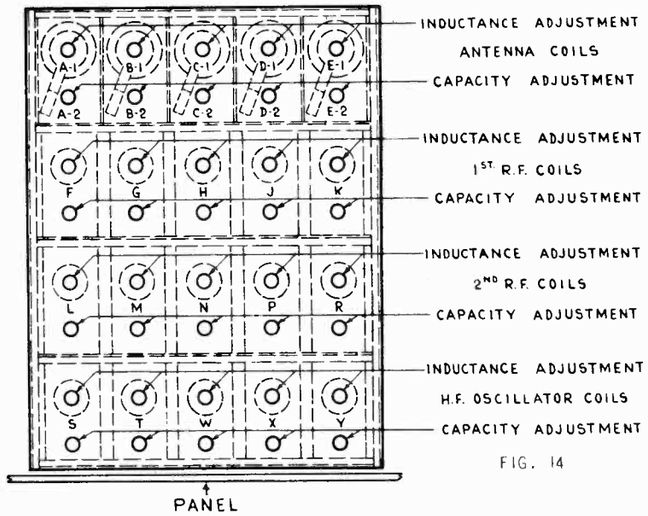


FIG. 14

VOLTAGES AT TERMINAL STRIP OF RECEIVER (Looking At Rear Of Chassis)

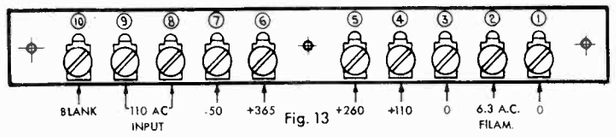
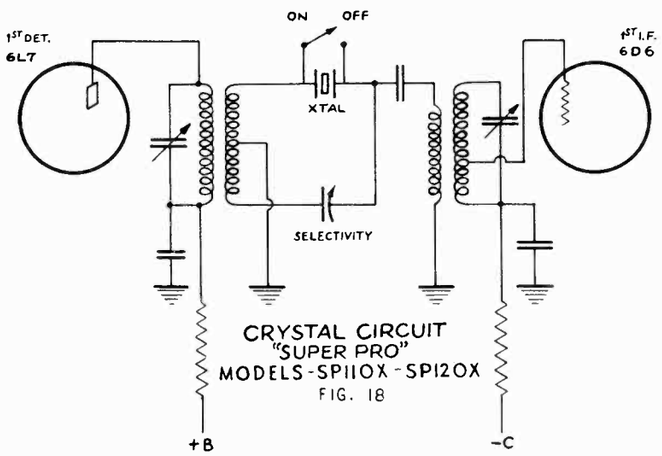


Fig. 13

All measurements were made on a 120 volt A. C. power supply line with line voltage adjustment set at the 125 volt tap. Sensitivity 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 No. 2 on strip. Terminal No. 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.

SUPER-PRO
STANDARD MODEL-SP 110 SERIES



CRYSTAL CIRCUIT
"SUPER PRO"
MODELS-SP110X-SP120X
FIG. 18

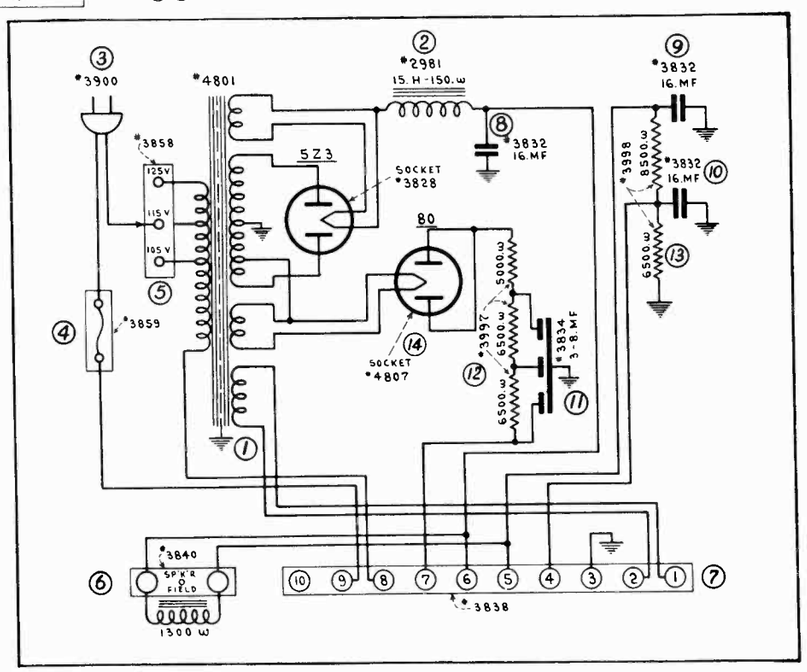


FIG. 10

MODELS SP110X,SP120X,SPR110X,SPR120X
Parts List

HAMMARLUND MFG. CO., INC.

"SUPER-PRO" PARTS LIST

Model SP-110 Series

SCHEMATIC DESIGNATION	DESCRIPTION - RECEIVER PARTS	PART NUMBER
A1	Antenna Input Coil Assembly 10.0 to 20.0 m.c.	SA-46
A2	Antenna Output Coil Assembly 10.0 to 20.0 m.c.	SA-110
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-113
C1	Antenna Input Coil Assembly 2.5 to 5.0 m.c.	SA-48
C2	Antenna Output Coil Assembly 2.5 to 5.0 m.c.	SA-116
D1	Antenna Input Coil Assembly 1160 to 2500 k.c.	SA-49
D2	Antenna Output Coil Assembly 1160 to 2500 k.c.	SA-119
E1	Antenna Input Coil Assembly 540 to 1160 k.c.	SA-50
E2	Antenna Output Coil Assembly 540 to 1160 k.c.	SA-122
F	1st R.F. Coil Assembly 10.0 to 20.0 m.c.	SA-111
G	1st R.F. Coil Assembly 5.0 to 10.0 m.c.	SA-114
H	1st R.F. Coil Assembly 2.5 to 5.0 m.c.	SA-117
J	1st R.F. Coil Assembly 1160 to 2500 k.c.	SA-120
K	1st R.F. Coil Assembly 540 to 1160 k.c.	SA-123
L	2nd R.F. Coil Assembly 10.0 to 20.0 m.c.	SA-111
M	2nd R.F. Coil Assembly 5.0 to 10.0 m.c.	SA-114
N	2nd R.F. Coil Assembly 2.5 to 5.0 m.c.	SA-117
P	2nd R.F. Coil Assembly 1160 to 2500 k.c.	SA-120
R	2nd R.F. Coil Assembly 540 to 1160 k.c.	SA-123
S	High Frequency Osc. Coil Assembly 10.0 to 20.0 m.c.	SA-112
T	High Frequency Osc. Coil Assembly 5.0 to 10.0 m.c.	SA-115
W	High Frequency Osc. Coil Assembly 2.5 to 5.0 m.c.	SA-118
X	High Frequency Osc. Coil Assembly 1160 to 2500 k.c.	SA-121
Y	High Frequency Osc. Coil Assembly 540 to 1160 k.c.	SA-124
AA	1st I.F. Transformer Coil Assembly	SA-89
BB	2nd I.F. Transformer Coil Assembly	SA-90
CC	3rd I.F. Transformer Coil Assembly	SA-90
DD	2nd Detector Input Coil Assembly	SA-91
EE	2nd Detector Output Coil Assembly	SA-92
FF	Beat Osc. Coil Assembly	SA-93
GG	A.V.C. Input Coil Assembly	SA-42
HH	A.V.C. Output Coil Assembly	SA-94
1	Antenna Terminal Strip	3842
2-12-22	Capacitor-Fixed Mica Type 600 mmf.	3989
28-34-47	Capacitor-Fixed Mica Type 100 mmf.	3929
4-14-24-44-61-69	Capacitor-Fixed Tubular Type .01 mfd.-400 volts	3813
7-17-30-36-39-41-51-54-56-58-64-66-73-75-77-81-84-86-94-96-103-105	Capacitor-Fixed Tubular Type .05 mfd.-400 volts	3817
108	Capacitor-Fixed Tubular Type .05 mfd.-600 volts	4829
9-19-91	Capacitor-Fixed Tubular Type .02 mfd.-400 volts	3815
46-128-129	Capacitor-Fixed Tubular Type .25 mfd.-400 volts	3820
88	Capacitor-Fixed Mica Type .003 mfd.	3902
98	Capacitor-Fixed Mica Type 7 mmf.	3996
101	Capacitor-Fixed Mica Type 50 mmf.	3994
114	Capacitor-Dry Electrolytic - 50 mfd. - 50 volts	3835
3-13-23-90-106-110-85	Resistor 500,000 ohms metallized 1/2 watt	3988
5-15-25-43-48-60-68-97	Resistor 100,000 ohms metallized 1/2 watt	3811
6-16-55-63-74-87-95	Resistor 10,000 ohms metallized 1/2 watt	4811
10-20-42-50-59-67-72-83-102	Resistor 5,000 ohms metallized 1 watt	3801
38	Resistor 5,000 ohms metallized 1/2 watt	4814
11-21	Resistor 20 ohms metallized 1/2 watt	3987
26-35-37	Resistor 50,000 ohms metallized 1/2 watt	3917
29	Resistor 25,000 ohms metallized 2 watts	3999
53-71-109	Resistor 50,000 ohms metallized 1 watt	3803
52-80	Resistor 60,000 ohms metallized 1 watt	3804
62	Resistor 100 ohms metallized 1/2 watt	4812
78	Resistor 400 ohms metallized 1 watt	4813
79-122	Resistor 3,000 ohms metallized 1 watt	3809
89	Resistor 1,000,000 ohms metallized 1/2 watt	3993
100	Resistor 400,000 ohms metallized 1/2 watt	3992
113	Resistor 750 ohms wire wound 10 watts	3836
118-119-120	Resistor 300 ohms metallized 1 watt	3806
121	Resistor 1,100 ohms metallized 1 watt	3808
8-18	Tube socket 6K7	4802
27	Tube socket 6L7	4803
40	Tube socket 6J7	4804
49	Tube socket 6C6	3823
57-65-76	Tube socket 6D6	3821
107	Tube socket 6C5	4805
82-99	Tube socket 6B7	3824
111-115-116	Tube socket 6F6	4806
70	Tuning Meter	3894
31	Send-Receive Switch	2988
32-33	Dial Lamps 6.3 volts	3920
45	CW-Mod. Switch	2991
92	Sensitivity Control	3891
93	A.V.C.-Manual Switch	2990
104	Audio Frequency Gain Control	4816
112	Push-pull Input Transformer	4827
117	Push-pull Output Transformer	4828
123	Phono Tip Jack	3849
124	Speaker-Voice Coil Terminal Strip	3843
125	Speaker-Phones Switch	2990
126	Head Phone Tip Jack	3850
127	Off-On Switch	2983
131	Relay Tip Jack	4831
130	Connecting Terminal Strip	3838
132	Main Tuning Dial Indicator	SA-27
133	Band Spread Dial Indicator	SA-28
	Speaker-Voice Coil Connecting Cable	SA-65
	Speaker-Field Coil Connecting Cable	SA-66
	Metal Dust Cover - Standard Model (Receiver)	2975
	Operating Knobs - Large	3856
	Operating Knobs - Small	3857
	Panel Cap Nuts	2951
	Dust Cover Thumb Screws	2952
	Connecting Cable	SA-35

DESIGNATION	DESCRIPTION - POWER SUPPLY PARTS	PART NUMBER
1	Power transformer 110 volts 60 cycle A.C.	4801
2	Filter Choke	2981
3	A.C. Input Cord and Plug	3900
4	Fuse Block	3859
5	Line Voltage Adjusting Strip	3858
6	Speaker Field Terminal Strip	3840
7	Connecting Terminal Strip	3838
8-9-10	Filter Condenser 16 mfd. Electrolytic - 450 volts	3832
11	Filter Condenser 8-8-8 mfd. " - 450 volts	3834
12	Resistor 18,000 ohms	3997
13	Resistor 15,000 ohms	3998
14	Tube Socket 80	4807
15	Tube Socket 5Z3	3828

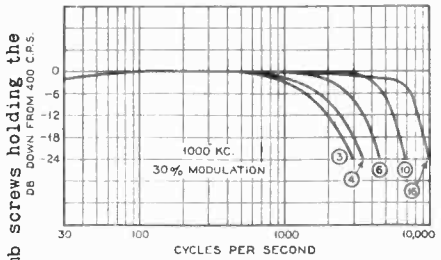
MODELS SP110X, SP120X
SPR110X, SPR120X

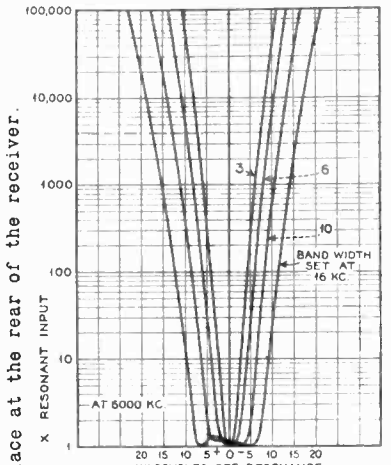
HAMMARLUND MFG. CO., INC.

Tuning Data, Resonance Curves
Connections

Band Spread Tuning - The Band Spread dial operates on the three high-frequency bands from 2.5 to 20.0 mc. Below 2.5 mc. it is automatically disconnected by the band change switch. The calibration of the main dial is based on a Band Spread dial setting of 100. Decreasing the setting of the Band Spread dial decreases the resonant frequency of the receiver. Band spread may therefore be obtained by setting the Main Tuning dial to the highest frequency in the band may be tuned by means of the Band Spread dial only.

ANTENNA-The input circuit of the "Super Pro" has been designed to connect directly to a balanced transmission line having an impedance of the order of 115 ohms. The ordinary twisted pair lead-in wire, generally supplied with doublet antenna systems, has such an impedance. Although some antenna kits are provided with a matching transformer to connect between the lead-in and the receiver, the use of such a transformer is neither necessary nor desirable with the "Super Pro". 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.





variable band width control set at 3, 4, 6, 10 and 16

The filter is very accessible, being located between the front panel and the first intermediate frequency transformer. By removing the two screws which hold the top plate of the holder, the crystal can be removed for inspection. Inasmuch as the clearance between the crystal and the top plate of the holder is but .003" great care should be exercised in replacing it, since any foreign matter between crystal and plate may render the filter inoperative.

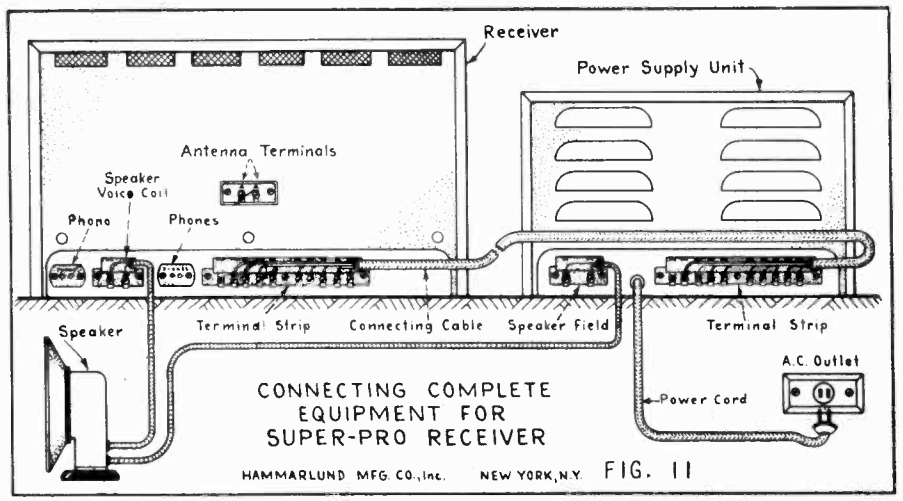


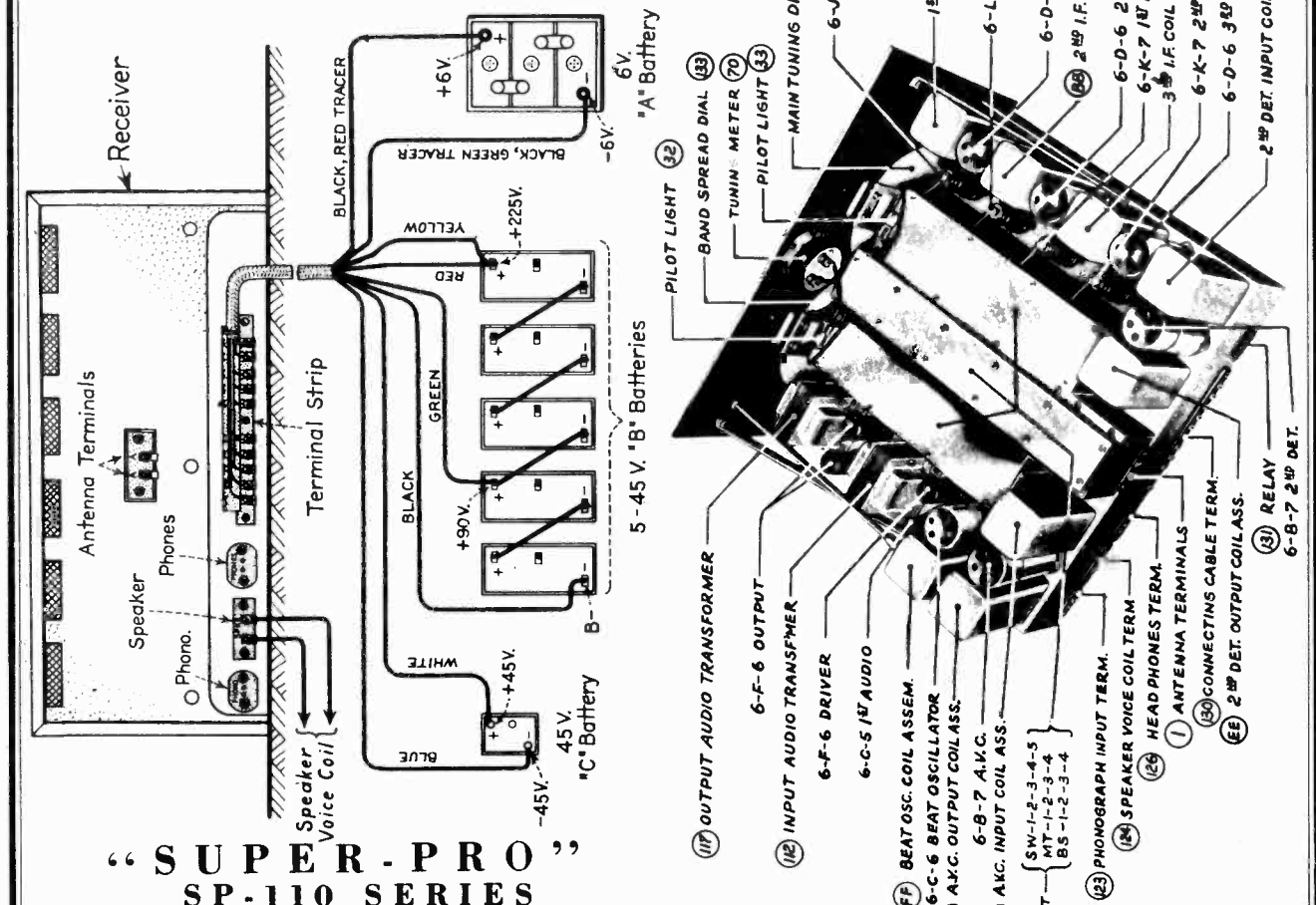
FIG. 11

Tuning Meter - The meter in the center of the panel may be used as a tuning meter when operating on A.V.C. It will show a dip as each carrier is tuned in and the amount of the dip is an appropriate indication of carrier strength. When operating on "Manual" the meter indicates the relative Sensitivity, since increasing the setting of the Sensitivity control results in higher meter readings.

MODELS SP110X, SP120X
SPR110X, SPR120X

HAMMARLUND MFG. CO., INC.

Chassis, Voltage, Connections



"SUPER-PRO"
SP-110 SERIES
CRYSTAL FILTER MODELS
(SP-110-X; SP-120-X; SPR-110-X; SPR-120-X)

TABULATION OF VOLTAGES APPLIED TO RECEIVER TUBES

1 - 6J7 - High Frequency Oscillator
2 - 6K7 - R.F. Amplifiers
3 - 6D6 - I.F. Amplifiers
1 - 6L7 - First Detector
1 - 6C6 - Beat-Oscillator
2 - 6B7 - Second detector and A.V.C.
1 - 6C5 - First A.F. Amplifier
3 - 6F6 - Driver and Class AB output
1 - 523 - Plate voltage rectifier
1 - 80 - Grid bias rectifier

TUBE	FUNCTION IN RECEIVER	PLATE VOLTAGE	SCREEN VOLTAGE	CATHODE VOLTAGE
6 - L - 7	1st DETECTOR	240	100	0
6 - J - 7	HIGH FREQUENCY OSCILLATOR	225	150	0
6 - K - 7	1st RADIO FREQUENCY	250	100	0
6 - K - 7	2nd " "	250	110	0
6 - D - 6	1st INTERMEDIATE FREQUENCY	250	110	0
6 - D - 6	2nd " "	250	100	0
6 - D - 6	3rd " "	250	100	0
6 - B - 7	2nd DETECTOR	225	100	0
6 - B - 7	AUTOMATIC VOLUME CONTROL	230	140	30
6 - C - 6	BEAT OSCILLATOR	105	110	0
6 - C - 5	1st AUDIO	150	0	0
6 - F - 6	DRIVER	250	250	0
6 - F - 6	CLASS A. B. AUDIO	360	360	35
6 - F - 6	" " " "	360	360	35

MODELS SP110X,SP120X,SPR110X,SPR120X
Alignment

HAMMARLUND MFG. CO., INC.

ALIGNMENT

The receiver has been accurately aligned at the factory and under normal operating conditions, should retain this adjustment indefinitely. When replacing tubes or making periodical inspections, it may be desirable to check the alignment. Removing the dust cover and bottom cover plate of the receiver, will make all adjustment easily accessible. The many tuned circuits requiring adjustment may make the alignment procedure appear complicated but if the following instructions are carefully carried out, no difficulty should be experienced in obtaining the optimum performance of the receiver. CAUTION – Any changes in re-alignment from original setting will be relatively small and extreme care should be exercised when checking adjustments. This is especially true of the H.F. Oscillator circuits S,T,W,X, and Y. Do not manipulate the insulated screw driver indiscriminately.

EQUIPMENT REQUIRED

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. 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 (6L7) through a small fixed condenser. Front panel controls should be set as follows:

SENSITIVITY CONTROL ON 0
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 on 10
BAND-WIDTH on 3
BAND SPREAD DIAL set on 100

MAIN TUNING DIAL set near low frequency end of scale, being careful not to conflict with a powerful local signal. Adjust the Sensitivity control so that a reading of approximately one volt is obtained on the out-put meter. As the various circuits are adjusted for resonance reduce the Sensitivity 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 Sensitivity Control until the panel meter reads between 2 and 3. Then adjust the capacitor on H.H. for minimum panel meter reading. There should be a pronounced dip of the panel meter as this adjustment 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 capacitor on coil assembly H.H. is adjusted.

Set the A.V.C.-MANUAL Switch on MANUAL, the C.W.-MOD-switch on C.W. and adjust the trimmer capacitor on coil assembly F.F. for zero beat. For this adjustment the Beat oscillator control knob, on the front panel should be adjusted to zero. 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.

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 crystal 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 cut out of circuit. Unless this procedure is carefully carried out, maximum crystal efficiency will not be obtained, since the peak of the I.F. selectivity curve must coincide exactly with the resonant peak of the crystal

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:

(1) – Band Change Switch on 540 – 1160 K.C. (2) – Main Tuning Dial on 1100 K.C. (3) – Band spread Dial on 100 (4) – Sensitivity Control "To Produce appropriate output meter reading" (5) – Audio Gain Control "Full On" (6) – C.W. – MOD switch on "MOD" (7) – A.V.C.-MANUAL Switch on "MANUAL" (8) – SEND – RECEIVE Switch on "RECEIVE" (9) – "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, together 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 condenser 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 inductance 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 Sensitivity 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:

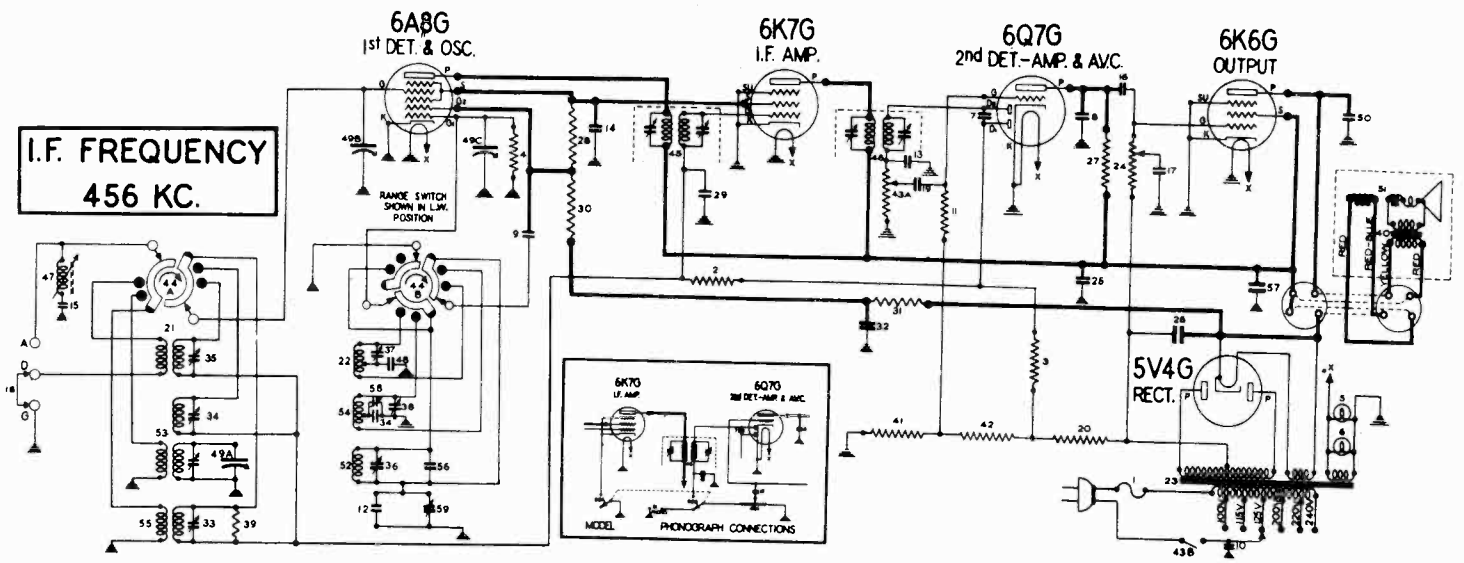
RANGE	CAPACITY ADJUSTING FREQUENCY	COILS	INDUCTANCE ADJUSTING FREQUENCY	COILS
1160 to 2500 K.C.	2500 K.C.	X-P-J-D2	1200 K.C.	X-P-J-D1
2.5 to 5.0 MC	5.0 MC	W-N-H-C2	2.5 MC	W-N-H-C1
5.0 to 10.0 MC	10.0 MC	T-M-G-B2	5.0 MC	T-M-G-B1
10.0 to 20.0 MC	20.0 MC	S-L-F-A2	10.0 MC	S-L-F-A1

The capacity and inductance adjustments in each band should be re-checked 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.

The frequency range of the model SP-110 series is 540 kilocycles to 20.0 megacycles covered in five bands controlled by the band-change switch. Two other models are available, viz., the SP-110-S having a frequency range of from 40 mc. to 1250 kc., and the SP-110-L having a frequency range of from 20 mc. to 150 kc. In the SP-110-L model, the 300 kc. to 150 kc. band is substituted for the 2.5 to 5 mc. band.

MODEL H61 6 TUBES A. C. — 16 TO 2140 METERS

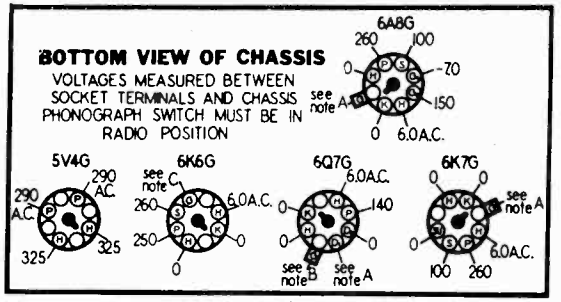


PARTS LIST H61, H62, HP61, HP62
6 TUBE A.C. 16-2100 METERS

Diagram Number	Part Number	Description
1	145510	Fuse 1 amp. (use on line voltages of 100 to 125 volts)
1	1211989	Fuse 3/4 amp. (use on line voltages of 200 to 240 volts)
2-3	1210470	Carbon resistor 510,000 ohm 1/4 watt
4	1210116	Carbon resistor 51,000 ohms 1/4 watt
5-6	1209000	Dial lamp 6 to 8 volt
7-8-9	1211432	Mica condenser 260 mmfd.
10	1211338	Shielded condenser .01ż mfd. 1,000 volt
11	1209885	Carbon resistor 1.1 megohm 1/4 watt
12	1211541	Mica condenser 70 mmfd.
13	1211430	Mica condenser 110 mmfd.
14	1211438	Paper condenser .1 mfd. 150 volt
15	1211934	Mica condenser 51 mmfd.
16	1211435	Paper condenser .02 mfd. 400 volt
17	1211437	Paper condenser .01 mfd. 400 volt
18	1211422	Ground connector
19	1211440	Paper condenser .05 mfd. 200 volt
20	1209463	Carbon resistor 270 ohm 1 watt
21	1211402	Antenna coil (16.6 to 51.8 meters) with trimmer
22	1211401	Oscillator coil (16.6 to 51.8 meters) with trimmer
23	1211668	Universal power transformer (100-240 volts 25-133 cycle)
24	1211398	Tone control (500,000 ohms)
25	1211967	Paper condenser .25 mfd. 300 volt
26	1211445	Electrolytic condenser 16 mfd. 400 volt
27	1210119	Carbon resistor 210,000 ohm 1/4 watt
28	1211999	Carbon resistor 11,000 ohm 1/2 watt
29	1211442	Condenser (low loss) .05 mfd. 150 volt
30-31	1211998	Carbon resistor 11,000 ohm 1 watt
32	1212000	Electrolytic condenser 4 mfd. 250 volt
33-34-35 36-37-38	1211336	Trimmer condenser
39	1212026	Carbon resistor 160,000 ohm 1/4 watt
40	1211470	Output transformer for 1211425 speaker
41	1211969	Wire wound resistor 35 ohm 1/2 watt
42	1211328	Wire wound resistor 20 ohm 1/2 watt
43A 43B	1211962	Volume control (250,000 ohm) A.C. line switch
44A-44B	1211394	Range switch
45	1211933	1st I.F. transformer
46	1211405	2nd I.F. transformer
47	1212005	Wave trap coil assembly
48	1211331	Mica condenser 3,860 mmfd.
49A to C	1211395	Gang condenser
50	1211966	Paper condenser .004 mfd. 750 volt
51	1211425	8 inch dynamic speaker
52	1212002	Oscillator coil (750 to 2,140 meters) with trimmer
53	1212003	Antenna coil (172 to 568 meters) with trimmer
54	1211964	Oscillator coil (172 to 568 meters) with trimmer
55	1212004	Antenna coil (750 to 2,140 meters) with trimmer
56	1207625	Mica condenser 50 mmfd.
57	1211444	Electrolytic condenser 16 mfd. 300 volt
58-59	1211337	Padding condenser (20 to 120 mmfd.)
60A-60B	1211669	Phonograph toggle switch
61	1211670	Phonograph terminal strip

SOCKET VOLTAGES

VOLUME CONTROL ON FULL — ANTENNA GROUNDED
RANGE SWITCH ON BROADCAST POSITION
DIAL TUNED TO 568 METERS



REAR OF CHASSIS

IMPORTANT: Use a high resistance voltmeter of 1,000 ohms per volt.

NOTE A: The grid bias for the 6A8G, 6K7G, and the anode voltage of the A.V.C. section of the 6Q7G is -1.5 volts measured across resistors 41 and 42.

NOTE B: The grid bias for the audio section of the 6Q7G is -1.0 volt measured across resistor 41.

NOTE C: The grid bias for the 6K6G output tube is -18.5 volts measured across resistors 41, 42 and 20.

MODELS H61,H62,HP61,HP62
Socket,Trimmers,Alignment
Parts

HETRO ELECTRICAL INDUSTRIES

CALIBRATION AND ALIGNMENT

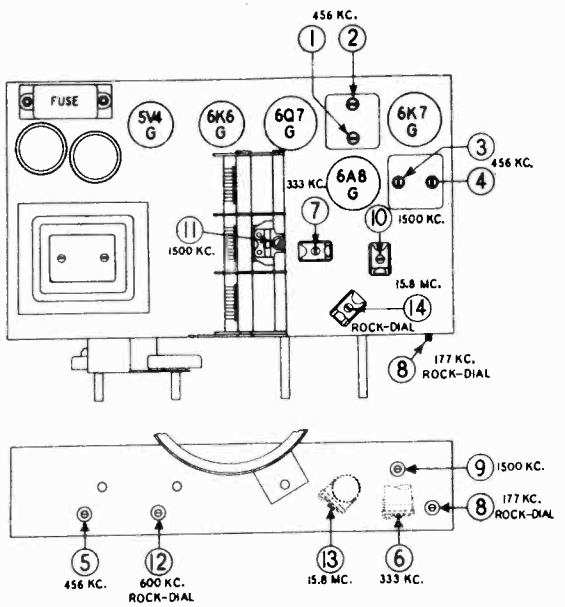
ALIGNING EQUIPMENT: For proper alignment, an output meter and an accurately calibrated oscillator with a tuning range from 19 to 1700 meters (15.8 MC. to 177 KC.) are required.

Connect the output meter from the plate of the output tube to chassis. A convenient point to make the plate connection is to the yellow wire on the speaker socket.

ALIGNING THE I. F. AMPLIFIER: Turn the volume control to maximum volume position and keep it in this position throughout the entire alignment procedure. Turn the range switch to the broadcast band (center position of band selector).

Connect the test oscillator output leads to the 6A8G control grid and chassis with a .1 mfd. condenser in series with the oscillator output. Set the oscillator to exactly 657.5 meters (456 KC.). Set the receiver dial at any point where it has no tuning effect on the oscillator signal.

Adjust the four I.F. trimmers, Nos. 1, 2, 3 and 4, for maximum output meter deflection, then repeat the trimmer adjustment.



TRIMMER LOCATIONS

Trimmer Number		Alignment Wavelength	Alignment Frequency
1-2	1st I.F. transformer trimmers	657.5 M.	456 KC.
3-4	2nd I.F. transformer trimmers	657.5 M.	456 KC.
5	Wave-trap trimmer	657.5 M.	456 KC.
6	Long wave oscillator shunt trimmer	900 M.	333 KC.
7	Long wave antenna shunt trimmer	900 M.	333 KC.
8	Long wave oscillator series padder	1700 M.	177 KC.
9	Broadcast oscillator shunt trimmer	200 M.	1500 KC.
10	Broadcast detector shunt trimmer	200 M.	1500 KC.
11	Broadcast antenna shunt trimmer	200 M.	1500 KC.
12	Broadcast padding trimmer	500 M.	600 KC.
13	Short wave oscillator shunt trimmer	19 M.	15.8 MC.
14	Short wave antenna shunt trimmer	19 M.	15.8 MC.

WAVE-TRAP ADJUSTMENT: The wave-trap adjustment screw, No. 5 is located on the front of the chassis. Take off the lock nut and washer on this adjusting screw. Leave the test oscillator at 657.5 meters (456 KC.). Connect the oscillator output to the A and G terminals of the receiver with a 400 ohm resistor in series with the A terminal and oscillator output. Then adjust the wave-trap screw No. 5 for minimum output. If some particular station with a frequency near 657.5 meters (456 KC.) causes code interference, it may be desirable to adjust the wave-trap on the actual frequency of the interfering station. Having completed this operation it is very necessary to replace the washer and tighten the lock nut.

LONG WAVE BAND CALIBRATION AND ALIGNMENT

With the gang condenser in full mesh, the main dial pointer should be on the vertical line between 175 and 550 meters on the dial scale. If it is not, hold the dial gear and turn the pointer to the correct position.

Turn the range switch to the long wave band (fully clockwise position) and leave the test oscillator output connected to the A and G terminals of the receiver with a 400 ohm carbon resistor in series with the A terminal and the oscillator output.

Adjust the test oscillator to exactly 900 meters (333 KC.).

Tune in the 900 meter oscillator signal and determine whether the receiver dial calibration is correct at this point on the dial. If the calibration is correct, do not adjust the long wave oscillator shunt trimmer No. 6. If the calibration is incorrect, adjust trimmer No. 6 to give proper calibration.

Carefully tune the receiver to the oscillator signal and adjust trimmer No. 7 for maximum output.

Adjust the test oscillator to 1700 meters (177 KC.) and tune the receiver to the signal. Adjust trimmer No. 8 for maximum output. Then try to increase the output meter by detuning No. 8 slightly and retuning the receiver dial. If the output goes down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured. This operation is commonly known as "rocking" and when performed as described will give maximum selectivity and sensitivity even though the dial may be slightly off calibration at 1700 meters.

BROADCAST BAND CALIBRATION AND ALIGNMENT

Turn the range switch to the broadcast band (center position). Adjust the test oscillator to exactly 200 meters (1500 KC.) and leave its output connected to the A and G terminals through a 400 ohm carbon resistor.

Tune in the 200 meter oscillator signal and determine whether the dial calibration is correct at the low wave length end of the dial. The 200 meter point is the first dial division above 175 meters on the yellow dial scale, i.e. the yellow dial division nearest to the 19 meter indication on the red scale.

If the calibration is correct, do not adjust the broadcast oscillator shunt trimmer No. 9. If the calibration is incorrect, adjust trimmer No. 9 to give proper calibration.

Carefully tune the receiver to the 200 meter oscillator signal and adjust trimmers No. 10 and 11 for maximum output.

Adjust the test oscillator to 500 meters (600 KC.) and tune the receiver to the signal. Adjust trimmer No. 12 for maximum output. Then try to increase the output meter reading by detuning No. 12 slightly and retuning the receiver dial. If the output goes down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured. This operation is commonly known as "rocking" and when performed as described will give maximum selectivity and sensitivity even though the dial may be slightly off calibration at 500 meters.

SHORT WAVE BAND CALIBRATION AND ALIGNMENT

Turn the range switch to the extreme counter-clockwise position. Be sure that the D and G terminals on the antenna terminal strip are connected together.

Set the test oscillator to exactly 19 meters (15.8 MC.). Tune in the 19 meter oscillator signal on the receiver dial to determine whether the receiver dial calibration is correct at 19 meters. If it is, do not adjust the short wave band oscillator shunt trimmer No. 13. If the calibration is incorrect, set the receiver dial pointer exactly at 19 meters and adjust the oscillator shunt trimmer No. 13 until the oscillator signal comes in at this point.

Check to see that it has been adjusted to the proper peak by tuning the receiver to approximately 20.1 meters. A repeat signal should be heard at this point. If none is present, even with greatly increased oscillator output, retune the receiver to 19 meters and adjust trimmer No. 13 to the proper peak with the trimmer screw farther out.

Carefully tune the receiver to the signal and adjust trimmer No. 14 to a peak. Then try to increase the output by detuning the trimmer No. 14 slightly and retuning the dial until a maximum output meter deflection is secured. Check the adjustment by tuning the receiver to the image at about 20.1 meters. The image should be weaker than the 19 meter signal. If the signal at 20.1 meter dial setting is equal to or stronger than the 19 meter signal trimmer No. 14 is not set to the proper peak. Turn the trimmer in a turn or so, then readjust as above.

MISCELLANEOUS PARTS

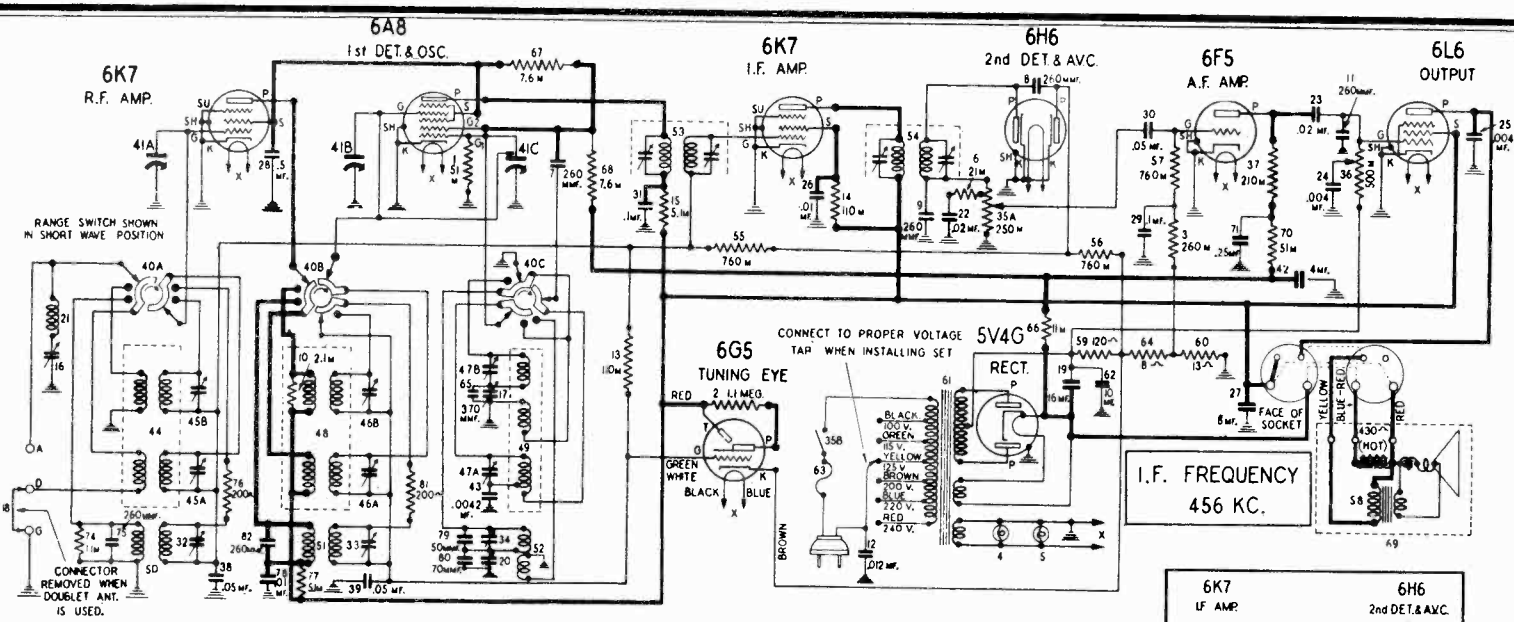
Part Number	Description
106261	Flat steel mounting washer
1211423	Fuse mounting strip
1211424	Fuse cover
1211450	Terminal strip G.D.A.
1211539	Rubber chassis mounting bushing
1211540	#10x1-1/4 chassis mounting screw
1211549	Knob (for volume control)
1211554	Knob (for tuning and tone control)
1211670	Phonograph terminal strip
1211914	Speaker socket (4 prong)
1211948	#2x3/8 R.H.W. screw for escutcheon
1211936	Felt washer (for back of knobs) also used for chassis mounting
1211937	Embossed washer (used with 1211444 electrolytic condenser)
1211938	Felt washer for back of knobs
1212011	Knob (for range switch)
1212027	Tube shield assembly

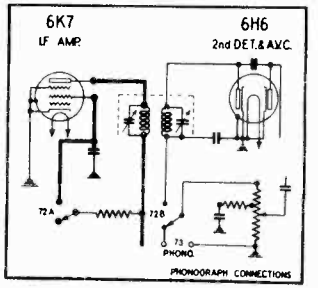
TUNING DRIVE AND DIAL PARTS

Part Number	Description
1211465	Dial ring and bracket assembly
1211466	Dial disc and bushing assembly
1211489	Dial lamp shield
1211493	Dial light socket
1211522	Escutcheon with glass
1211697	Dial scale retaining clip
1211939	Drive shaft and bracket assembly
1211954	Dial background
1211990	Dial drive shaft
1211991	Spring for dial drive shaft
1212006	Pointer and stud assembly
1212009	Dial scale

Date 2/2/38

SERVICE DATA FOR MODELS H61, H62, HP61, HP62. 6 TUBE AC. 16-2100 METERS

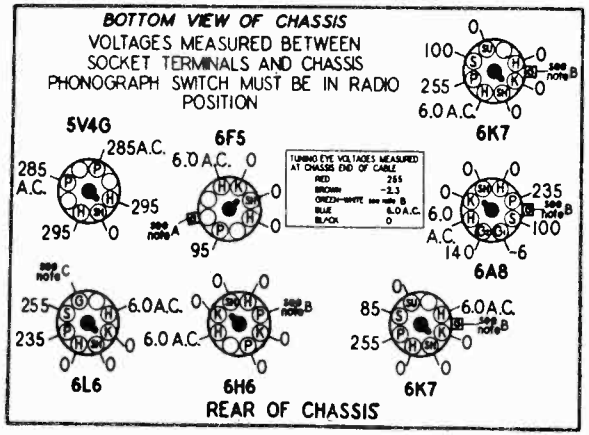




SOCKET VOLTAGES

RANGE SWITCH ON BROADCAST POSITION — DIAL TUNED TO 568 METERS

VOLUME CONTROL ON FULL — ANTENNA GROUNDED



TUNING EYE VOLTAGES MEASURED AT CHASSIS END OF CABLE

RED	255
BROWN	-2.3
GREEN-WHITE see note B	
BLUE	6.0 A.C.
BLACK	0

IMPORTANT: Use a high resistance voltmeter of 1,000 ohms per volt.

NOTE A: The grid bias for the 6F5 is -1.5 volts measured across resistor 60.

NOTE B: The grid bias for the 6A8, 6K7's, and the anode voltage of the A.V.C. section of the 6H8 is -2.3 volts measured across resistors 60 and 64.

NOTE C: The grid bias for the 6L8 output tube is -15 volts measured across resistor 58, 64 and 60.

PARTS LIST H63, H64, HP63, HP64

Diagram Number	Part Number	Description
1	1210116	Carbon resistor 51,000 ohm 1/4 watt
2	1209885	Carbon resistor 1.1 megohm 1/4 watt
3	1210117	Carbon resistor 260,000 ohm 1/4 watt
4-5	1209000	Pilot lamp No. 40, 6-8 volts
6	1210862	Carbon resistor 21,000 ohm 1/4 watt
7-8-9	1211432	Mica condenser 260 mmfd.
10	1212020	Carbon resistor 2,100 ohm 1/4 watt
11	1211432	Mica condenser 260 mmfd.
12	1211338	Shield condenser .012 mfd. 1,000 volt
13-14	1209883	Carbon resistor 110,000 ohm 1/4 watt
15	1211065	Carbon resistor 5,100 ohm 1/4 watt
16	1211337	Wave trap condenser
17	1211337	Padding condenser
18	1211422	Ground connector
19	1211972	Electrolytic condenser 16 mfd. 400 volt
20	1211337	Padding condenser
21	1211408	Wave trap coil assembly
22-23	1211435	Paper condenser .02 mfd. 400 volt
24	1211436	Paper condenser .004 mfd. 400 volt
25	1211966	Paper condenser .004 mfd. 750 volt
26	1211437	Paper condenser .01 mfd. 400 volt
27	1211870	Electrolytic condenser 8 mfd. 350 volt
28	1211992	Paper condenser .5 mfd. 150 volt
29	1211436	Paper condenser .1 mfd. 150 volt
30	1211440	Paper condenser .05 mfd. 200 volt
31	1211441	Paper condenser .1 mfd. 300 volt
32-33-34	1211338	Trimmer condenser
35A 35B	1211396	Volume control (250,000 ohms) & A. C. line switch
38	1211398	Tone control (500,000 ohms)
37	1210119	Carbon resistor 210,000 ohm 1/4 watt
38-39	1211442	Condenser (low loss) .05 mfd. 150 volt
40A to C	1211464	Range switch
41A to C	1211932	Gang condenser
42	1211931	Electrolytic condenser 4 mfd. 250 volt
43	1211334	Mica condenser .0042 mfd.
44	1211409	Antenna coil & shield (172 to 568 M.) & (16.7 to 54.5 M.) with trimmer
45A-45B 46A-46B 47A-47B	1211498	Trimmer condenser
48	1211410	R.F. coil & shield (172 to 568 M.) and (16.7 to 54.5 M.) with trimmer
49	1211411	Oscillator coil & shield (172 to 568 M.) & (16.7 to 54.5 M.) with trimmer
50	1211961	Antenna coil (750 to 2,140 M.) with trimmer
51	1211961	Detector coil (750 to 2,140 M.) with trimmer
52	1211960	Oscillator coil (750 to 2,140 M.) with trimmer
53	1211930	1st I.F. transformer
54	1211959	2nd I.F. transformer
55-56-57	1211136	Carbon resistor 760,000 ohm 1/4 watt
58	1211963	Output transformer for 1211965 speaker
	1211945	Output transformer for 121109 speaker
59	1211970	Wire wound resistor 120 ohm 2 watt
60	1211971	Wire wound resistor 13 ohm 1/2 watt
61	1211958	Universal power transformer 100-240 volt 25-133 cycles
62	1211455	Electrolytic condenser 10 mfd. 25 volt
63	1211993	Fuse 1.5 amp. 100-125 volts
	145510	Fuse 1 amp. 200-240 volts
64	1211968	Wire wound resistor 8 ohm 1/2 watt
65	1211434	Mica condenser 370 mmfd.
66	1211998	Carbon resistor 11,000 ohm 1 watt
67	1212024	Carbon resistor 7,600 ohm 1/2 watt
68	1212025	Carbon resistor 7,600 ohm 1 watt
69	1211965	8 inch dynamic speaker
	121109	12 inch dynamic speaker
70	1210116	Carbon resistor 51,000 ohm 1/4 watt
71	1207931	Paper condenser .25 mfd. 200 volt
72A-72B	1211689	Phonograph toggle switch
73	1211670	Phonograph terminal strip
74	1212021	Carbon resistor 11,000 ohm 1/4 watt
75-82	1211432	Mica condenser 260 mmfd.
76	1211006	Carbon resistor 200 ohm 1/4 watt
77	1211066	Carbon resistor 5,100 ohm 1/4 watt
78	1211437	Paper condenser .01 mfd. 400 volt
79	1207625	Mica condenser 50 mmfd.
80	1211541	Mica condenser 70 mmfd.
81	1211006	Carbon resistor 200 ohm 1/4 watt

MODELS H63,H64,HP63,HP64
Socket,Trimmers,Alignment
Parts

HETRO ELECTRICAL INDUSTRIES

DATE 2/2/38

CALIBRATION AND ALIGNMENT

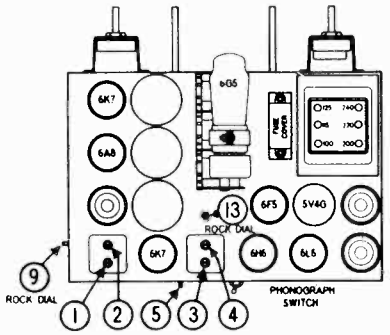
ALIGNING EQUIPMENT

For proper alignment, an output meter and an accurately calibrated oscillator with a tuning range from 19 to 1700 meters (15.8 MC. to 177 KC.) are required.

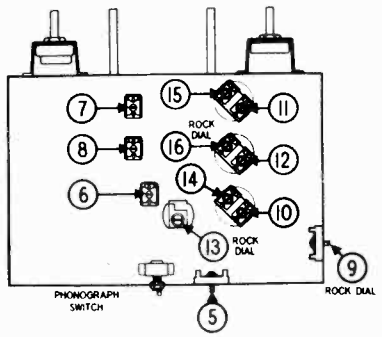
Connect the output meter from the plate of the output tube to chassis. A convenient point to make the plate connection is to the yellow wire on the speaker socket.

ALIGNING THE I.F. AMPLIFIER

Turn the volume control to maximum volume position and keep it in this position throughout the entire alignment procedure. Turn the range switch to the intermediate broadcast position (fully clockwise).



TOP VIEW OF CHASSIS



BOTTOM VIEW OF CHASSIS

Connect the test oscillator output leads to the 6A8 control grid and chassis with a .1 mfd. condenser in series with the oscillator output. Set the oscillator to exactly 658 meters (456 KC.). Set the receiver dial at any point where it has no tuning effect on the oscillator signal.

Adjust the four I.F. trimmers, Nos. 1, 2, 3 and 4, for maximum output meter deflection, then repeat the trimmer adjustment.

WAVE-TRAP ADJUSTMENT

The wave-trap adjusting trimmer, No. 5, is located on the back of the chassis. Leave the test oscillator at 658 meters (456 KC.). Connect the oscillator output to the A and G terminals of the receiver with a 400 ohm resistor in series with the A terminal and oscillator output. Then adjust the wave-trap trimmer No. 5 for minimum output. If some particular station with a frequency near 657.5 meters (456 KC.) causes code interference, it may be desirable to adjust the wave-trap on the actual frequency of the interfering station.

LONG WAVE BAND CALIBRATION AND ALIGNMENT

With the gang condenser in full mesh, the main dial pointer should be on the vertical line between 175 and 550 meters on the dial scale. If it is not, hold the dial gear and turn the pointer to the correct position.

Turn the range switch to the center position (long wave) and leave the test oscillator output connected to the A and G terminals of the receiver with a 400 ohm carbon resistor in series with the A terminal and the oscillator output.

Adjust the test oscillator to exactly 900 meters (333 KC.).

Tune in the 900 meter oscillator signal and determine whether the receiver dial calibration is correct at this point on the dial. If the calibration is correct, do not adjust the long wave oscillator shunt trimmer No. 6. If the calibration is incorrect, adjust trimmer No. 6 to give proper calibration.

Carefully tune the receiver to the oscillator signal and adjust trimmers No. 7 and 8 for maximum output.

Adjust the test oscillator to 1700 meters (177 KC.) and tune the receiver to the signal. Adjust trimmer No. 13 for maximum output. Then try to increase the output meter by detuning No. 13 slightly and retuning the receiver dial. If the output goes down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured. This operation is commonly known as "rocking" and when performed as described will give maximum selectivity and sensitivity even though the dial may be slightly off calibration at 1700 meters.

BROADCAST BAND CALIBRATION AND ALIGNMENT

Turn the range switch to the broadcast position (fully clockwise) Adjust the test oscillator to exactly 200 meters (1500 KC.) and leave its output connected to the A and G terminals through a 400 ohm carbon resistor.

Tune in the 200 meter oscillator signal and determine whether the dial calibration is correct at the low wave length end of the dial. The 200 meter point is the first dial division above 175 meters on the yellow dial scale, i.e. the yellow dial division nearest to the 19 meter indication on the red scale.

If the calibration is correct, do not adjust the broadcast oscillator shunt trimmer No. 10. If the calibration is incorrect, adjust trimmer No. 10 to give proper calibration.

Carefully tune the receiver to the 200 meter oscillator signal and adjust trimmers No. 11 and 12 for maximum output.

Adjust the test oscillator to 500 meters (600 KC.) and tune the receiver to the signal. Adjust trimmer No. 9 for maximum output. Then try to increase the output meter reading by detuning No. 9 slightly and retuning the receiver dial. If the output goes down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured. This operation is commonly known as "rocking" and when performed as described, will give maximum selectivity and sensitivity even though the dial may be slightly off calibration at 500 meters.

SHORT WAVE BAND CALIBRATION AND ALIGNMENT

Turn the range switch to the extreme counter-clockwise position.

Be sure that the D and G terminals on the antenna terminal strip are connected together.

TRIMMER LOCATIONS

Trimmer Number		Alignment Frequency	Alignment Wave-Length
1-2	1st I.F. transformer trimmer--------	456 KC.	658 M.
3-4	2nd I.F. transformer trimmer--------	456 KC.	658 M.
5	Wave trap trimmer-------------------	456 KC.	658 M.
6	Long wave oscillator shunt trimmer--	333 KC.	900 M.
7	Long wave antenna shunt trimmer-----	333 KC.	900 M.
8	Long wave detector shunt trimmer----	333 KC.	900 M.
9	Broadcast oscillator series padder--	600 KC.	500 M.
10	Broadcast oscillator shunt trimmer--	1500 KC.	200 M.
11	Broadcast antenna shunt trimmer-----	1500 KC.	200 M.
12	Broadcast detector shunt trimmer----	1500 KC.	200 M.
13	Long wave oscillator series padder--	177 KC.	1700 M.
14	Short wave oscillator shunt trimmer-	15.8 MC.	19 M.
15	Short wave antenna shunt trimmer----	15.8 MC.	19 M.
16	Short wave detector shunt trimmer---	15.8 MC.	19 M.

Set the test oscillator to exactly 19 meters (15.8 MC.). Tune in the 19 meter oscillator signal on the receiver dial to determine whether the receiver dial calibration is correct at 19 meters. If it is, do not adjust the short wave band oscillator shunt trimmer No. 14. If the calibration is incorrect, set the receiver dial pointer exactly at 19 meters and adjust the oscillator shunt trimmer No. 14 until the oscillator signal comes in at this point.

Check to see that it has been adjusted to the proper peak by tuning the receiver to approximately 20.1 meters. A repeat signal should be heard at this point. If none is present, even with greatly increased oscillator output, retune the receiver to 19 meters and adjust trimmer No. 14 to the proper peak with the trimmer screw farther out.

Carefully tune the receiver to the signal and adjust trimmers No. 15 and 16 to a peak. Then try to increase the output by detuning the trimmer No. 16 slightly and retuning the dial until a maximum output meter deflection is secured. Then readjust trimmer No. 15 to a peak. Check the adjustment by tuning the receiver to the image at about 20.1 meters. The image should be much weaker than the 19 meter signal. If the signal at 20.1 meter dial setting is equal to or stronger than the 19 meter signal trimmer No. 16 is not set to the proper peak. Turn the trimmer in a turn or so, then readjust as above.

MISCELLANEOUS PARTS

Part Number	Description
120306	Flat steel mounting washer
1211450	Terminal strip G.D.A.
1211468	Shaft for range selector
1211464	Tuning indicator cable & plug
1211538	#14x1-1/4 chassis mounting screw
1211539	Rubber chassis mounting bushing
1211549	Knob (used with tone & volume control)
1211550	Knob (for range switch)
1211551	Knob (front section) for tuning control
1211552	Knob (rear section) for tuning control
1211935	Felt washer (for rear of tuning knob)
1211936	Felt washer (for back of knobs)
1211937	Embossed washer (used with 1211972 electrolytic condenser)
1211940	Bracket for range selector shaft
1211948	#2x3/8 R.H.W. screw (for escutcheon)
1211949	Link and lever assembly
1211957	Escutcheon for magic eye
1211984	#1x1/4 R.H.W. screw for eye escutcheon

TUNING DRIVE AND DIAL PARTS

Part Number	Description
1211461	Spring washer (for planetary drive)
1211462	Dual ratio planetary drive
1211469	Idler gear tension spring
1211489	Dial lamp shield
1211493	Dial lamp socket
1211494	Compression spring for band indicator
1211522	Escutcheon with glass
1211897	Dial scale retaining clip
1211941	Idler gear and pinion assembly
1211942	Shaft for second pointer
1211943	Dial disc and bushing assembly
1211944	Dial ring, bracket and shaft assembly
1211951	Pointer (second hand)
1211955	Dial background
1211956	Bracket and light bracket assembly
1211994	Idler gear tension spring
1212006	Pointer & stud assembly
1212007	Dial scale
1212023	Band indicator and link assembly

MODELS A,B Tuners
Installation Data

HETRO ELECTRICAL INDUSTRIES

MODEL HA67
Schematic,Voltage

The tuner is secured to the cabinet by the two machine screws provided. The escutcheon with two wood screws provided. Insert rubber washer of proper thickness between cabinet and tuner. The Black knob should be in position "6" to distinguish the manual tuning button from the other five automatic tuning buttons with Brown knobs. These knobs merely slip over the shafts by pushing them firmly. The tuner is supplied with 3 connecting wires, 12 inches long. Before connecting the tuner, select the location in the cabinet, if possible, directly above the tuning condenser or anywhere that will permit short connections. Then drill the cabinet using the template supplied with the tuner, and connect it to the set. Lead wires should come from the right hand side of the unit. Connect the tuner in one of the methods suggested. Tuner may be connected and tested before drilling the cabinet. Once the tuner is adjusted, the trimmers or the connecting wires should not be moved, or it will be necessary to reset the trimmers slightly.

For sets with 3 section condenser

Method 2 -- RED TRACER wire to RADIO FREQUENCY section of tuning condenser (usually the center section). BLUE TRACER wire to Oscillator section. This section usually has no wire connecting it to grid cap of tube. WHITE wire to frame or Ground lug of tuning condenser. Make sure that RED TRACER is not connected to antenna section.

Method 2B - Recommended for sets with short wave bands (3 section condenser)

RED TRACER wire to the Grid terminal of the Broadcast band radio frequency coil. BLUE TRACER wire to the Grid terminal of the Broadcast band Oscillator coil. These connections may be either at the coil or at the band switch, whichever is shorter. WHITE WIRE to frame or Ground lug of tuning condenser. By using this method, the tuner is only connected to the circuit when the wave band switch is In the Broadcast position and the short wave reception and dial calibrations are not affected. NOTE: If tuning coils have all secondary winding in series, this method will revert to #2 which would then be preferable, because it is easier to connect. In this case, we recommend realigning the receiver with the Master button #"6" pushed in. This applies particularly to the short wave band.

NOTE: WIRES SUPPLIED WITH TUNER ARE 12 INCHES LONG, CUT THESE LEADS SHOULD BE AS SHORT AS POSSIBLE. TO PROPER LENGTH;

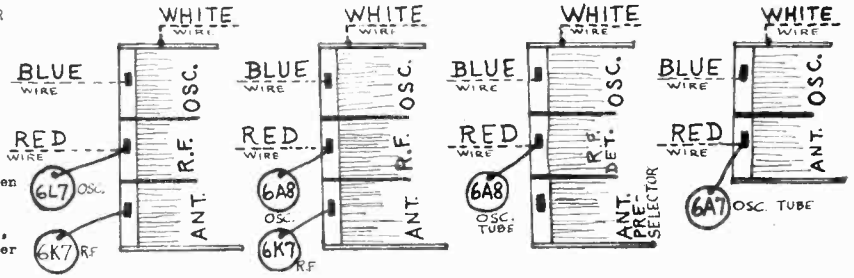
INSTRUCTIONS FOR HETRO TUNERS

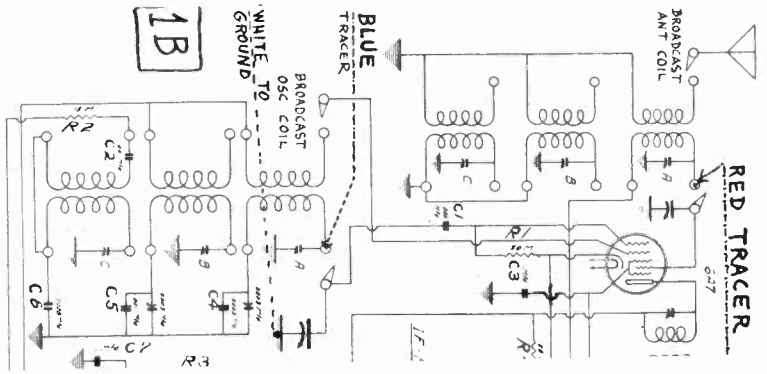
Models A and B

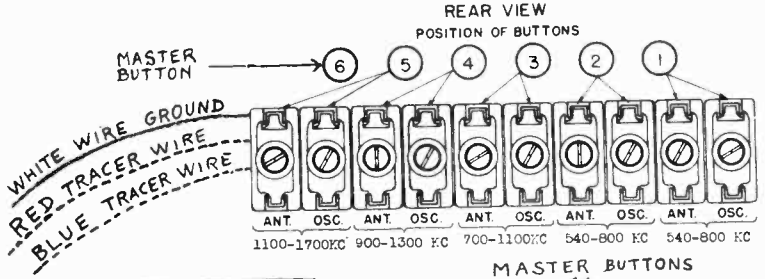
HETRO ELECTRICAL INDUSTRIES

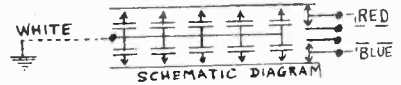
Method 1 -- Connect wire with RED TRACER to ANTENNA section of tuning condenser; BLUE TRACER to OSCILLATOR section of tuning condenser. WHITE wire to Ground if possible to frame or Ground lug on the tuning condenser. All connections should be well soldered. For sets with 2 section variable condenser

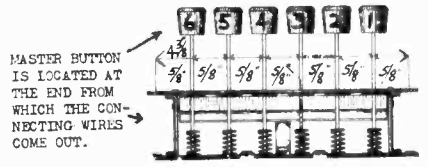
Method 1B - Recommended for sets with short wave bands (2 section condenser) Connect RED TRACER to the grid terminal of Broadcast band antenna coil. BLUE TRACER wire to the grid terminal of the Broadcast band oscillator coil. These connections may be made at the coils or at the wave band switch, whichever is shorter. WHITE wire to Ground if possible to frame or Ground lug on the tuning condenser. By using this method, the tuner is only connected to the circuit when the waveband switch is in the Broadcast position, and short wave reception and dial calibrations are not affected. NOTE: If tuning coils have all secondary winding in series, this method will revert to #1 which would then be preferable, because it is easier to connect. In this case, we recommend that after the tuner has been installed, that the receiver be realigned with the Master button #"6" pushed in; this applies particularly to the short wave band.

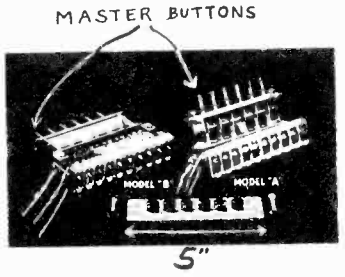












ADJUSTMENT

Set band selector switch to "Broadcast" position and turn station selector tuning control toward higher kilocycle readings (i.e. 550 toward 1600) as far as it will go. (Rotor plates of tuning condenser entirely out). The stations desired should be decided upon as this will determine which button should be used. Buttons Number 1 and 2 as indicated in Figure 2, are used for stations whose transmitting frequencies are between 540KC and 800KC. Button 3 is for stations whose frequencies are between 700 and 1100KC. Button 4 is for stations whose frequencies are between 900KC and 1300KC. Button 5 is for those stations whose frequencies are above 1100KC. These ranges may be altered slightly up or down.

Starting with the first position, fully depress button 1. Check if tuning condenser is open as far as it will go. (i.e. that is toward the extreme high frequency end of the dial).

With a screw driver (insulated or bakelite if possible) turn adjusting screw 1-O (oscillator) until the desired station is heard, then turn screw 1-A (antenna) until the station is heard with maximum volume. On sets using tuning eye, adjustment can be made for maximum closing of the eye.

DO NOT FORCE the screws as the threads may be sheared and rendered useless. This may happen if you do not observe what range the station falls into, and thus use the wrong push button

Proceed with button 2 in a similar way, first pressing in button 2 until the previous button is released. Adjust corresponding trimmers as described above. Buttons, 3, 4, and 5 are adjusted in a similar manner using trimmers 3-O and 3A for the third button; 4-O and 4-A for the fourth button, etc.

The station call letters from the sheet of call letters provided, can now be inserted in the escutcheon slots.

OPERATION

To operate the automatic tuning control, turn station selector knob toward the highest frequency reading (highest KC dial reading), until the stop position is reached. Then depress the button corresponding to the station desired.

For manual tuning, press the Black button (Number 6) which releases the automatic tuner and proceed to tune stations in the usual manner with the station selector knob.

Do not attempt to press more than one button at a time as this will not tune any additional stations. Although this will not in any way injure the unit, it may result in squealing and excessive interference.

The Manual tuning control should not be used when any of the station tuning buttons are pushed in, because different stations other than those originally selected will be received when pushing the different buttons; in some cases this may be desirable.

THE BLACK BUTTON SHOULD ALWAYS BE "IN" WHENEVER THE REGULAR TUNING KNOB IS USED TO SELECT THE STATIONS. The Automatic Tuning unit will not operate unless the pointer on the dial is turned as far as it will go towards the high numbers on the dial.

CAUTION

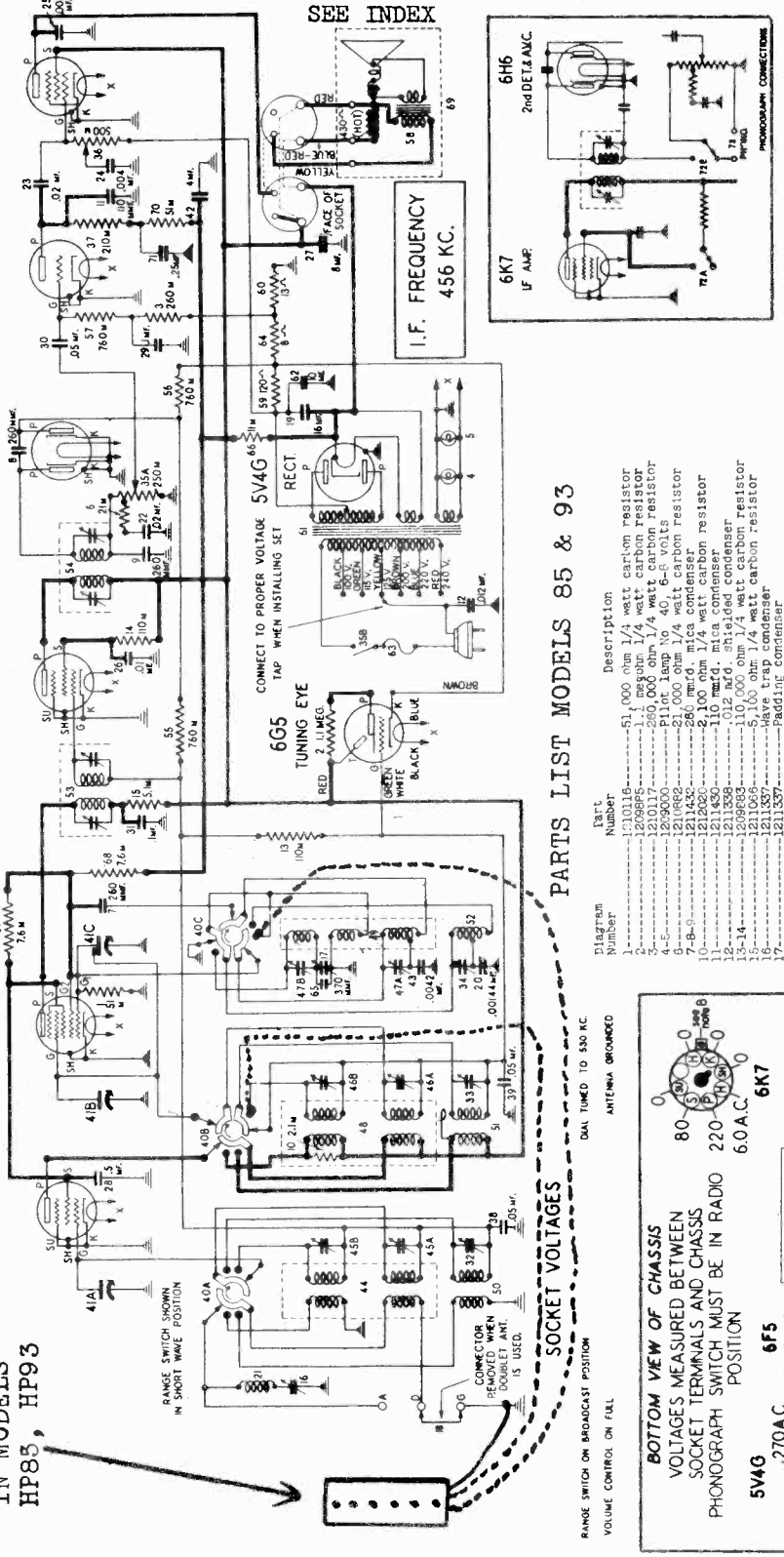
It is important that the adjustments be carefully made otherwise the reception of the radio station will be distorted and lacking in volume. It is advisable to readjust all of the trimmers a few days after the initial setting to compensate for any "drift" due to room temperature, humidity, and metal fatigue.

HETRO ELECTRICAL INDUSTRIES

MODELS H85,H93,HP85,HP93
Schematic,Voltage,Parts
Phono.Circuit

MODELS H85, HP85, H93, HP93
8 TUBE A.C. 16.6-555 METERS

Date 2/2/38
FOR DATA ON MODEL A TUNER, SEE INDEX



PARTS LIST MODELS 85 & 93

Diagram Number	Part Number	Description
1	1210116	51,000 ohm 1/4 watt carbon resistor
2	1209P5	1.1 megohm 1/4 watt carbon resistor
3	1210117	280,000 ohm 1/4 watt carbon resistor
4-5	1209000	Pilot lamp No 40, 6-8 volts
6	1210R82	21,000 ohm 1/4 watt carbon resistor
7-8-9	1211432	260 mmfd. mica condenser
10	1212020	2,100 ohm 1/4 watt carbon resistor
11	1211430	110 mmfd. mica condenser
12	1213538	.002 mfd. shielded condenser
13-14	1209668	100,000 ohm 1/4 watt carbon resistor
15	1209P68	5,100 ohm 1/4 watt carbon resistor
16	1211337	Wave trap condenser
17	1211337	Padding condenser
18	1211432	Ground connector
19	1211972	.16 mfd. 400 volt electrolytic condenser
20	1211333	.00144 mfd. mica condenser
21	1211408	Antenna trap coil
22-23	1211435	.02 mfd. 400 volt paper condenser
24	1211436	.004 mfd. 400 volt paper condenser
25	1211966	.004 mfd. 750 volt paper condenser
26	1211437	.01 mfd. 400 volt paper condenser
27	1211870	.8 mfd. 350 volt electrolytic condenser
28	1211992	.15 mfd. 150 volt paper condenser
29	1211436	.15 mfd. 150 volt paper condenser
30	1211441	.1 mfd. 200 volt paper condenser
31	1211336	.1 mfd. 300 volt paper condenser
32-33-34		Trimmer condenser
35A	1211936	Volume control (250,000 ohms)
35B		A.C. line switch
36	1211398	Tone control (500,000 ohms)
37	1210119	210,000 ohm 1/4 watt carbon resistor
38-39	1211442	.05 mfd. 150 volt condenser (low loss)
40A to C	1211464	Range switch
41A to C	1211932	Gang condenser
42	1211931	.4 mfd. 250 volt electrolytic condenser
43	1211334	.0042 mfd. mica condenser
44	1211409	Antenna coil & shield (530 to 1750 KC.) and (5.6 to 17.5 MC.) bands; with trimmer
45A-45B	1211496	Trimmer condenser
46A-46B		
47A-47B		
48	1211410	R.F. coil & shield (530 to 1750 KC.) and (5.6 to 17.5 MC.) bands; with trimmer
49	1211411	Oscillator coil & shield (530 to 1750 KC.) & (5.6 to 17.5 MC.) bands; with trimmer

Diagram Number	Part Number	Description
50	1211413	Antenna coil assembly (1.6 to 5.4 MC.) with trimmer
51	1211412	R.F. coil assembly (1.6 to 5.4 MC.) with trimmer
52	1211414	Oscillator coil assm. (1.6 to 5.4 MC.) with trimmer
53	1211930	1st I.F. transformer
54	1211929	2nd I.F. transformer
55-56-57	1211136	760,000 ohm 1/4 watt carbon resistor
58	1211963	Output transformer for 1211965 speaker
58	1211945	Output transformer for 121109 speaker
59	1211970	120 ohms 2 watt carbon resistor
60	1211971	13 ohms 1/2 watt carbon resistor
61	1211968	Universal power transformer 100-250 volts 25-133 cycles
62	1211455	.10 mfd. 25 volt electrolytic condenser
63	1211993	Fuse 1.5 amp. (100-125 volts)
	1456310	Fuse 1 amp. (200-240 volts)
64	1211968	9 ohm 1/2 watt wirewound resistor
65	1211964	5,000 ohm mica compound resistor
66	1211994	11,000 ohm 1 watt carbon resistor
67	1212024	7,600 ohm 1/2 watt carbon resistor
68	1212025	7,600 ohm 1 watt carbon resistor
69	1211965	8 inch dynamic speaker
	121109	12 inch dynamic speaker
70	1210116	51,000 ohm 1/4 watt carbon resistor
71	1207931	.25 mfd. 200 volt paper condenser
72A-72B	1211669	Phonograph toggle switch
73	1211670	Phonograph terminal strip

IMPORTANT: Use a high resistance voltmeter of 1000 ohms per volt.

NOTE A: The grid bias for the 6F5 is -1.3 volts measured across resistor 80.

NOTE B: The grid bias for the 6A8, 6K7's, and the anode voltage of the A.V.C. section of the 6H6 is -2.0 volts measured across resistors 60 and 64.

NOTE C: The grid bias for the 6L6 output tube is -13.0 volts measured across resistor 82, 84 and 60.

MODELS H85,H93,HP85,HP93
Socket,Trimmers,Alignment
Parts

HETRO ELECTRICAL INDUSTRIES

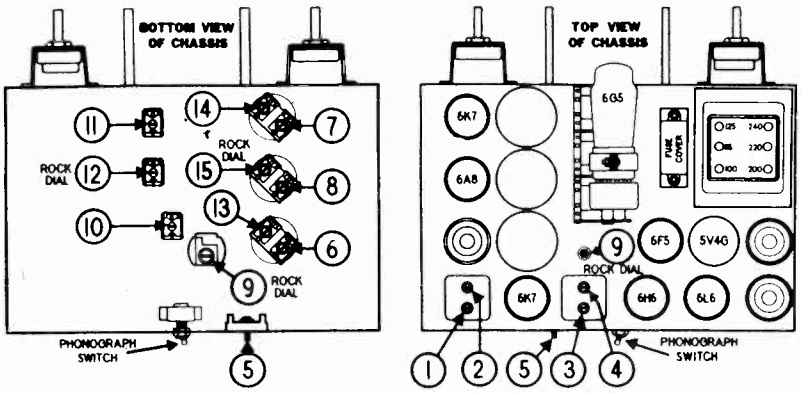
SERVICE DATA MODELS H85, HP85, H93, Hp93. 8 TUBE A.C. 16.6-555 METERS

CALIBRATION AND ALIGNMENT

ALIGNING EQUIPMENT: For proper alignment, an output meter and an accurately calibrated oscillator with a tuning range from 456 KC. to 16 MC. are required.

Connect the output meter from the plate of the output tube to chassis. A convenient point to make the plate connection is to the yellow wire on speaker socket.

ALIGNING THE I. F. AMPLIFIER: Turn the volume control to maximum volume position and keep it in this position throughout the entire alignment procedure. Turn the range switch to the broadcast position (fully clockwise).



Connect the test oscillator output leads to the 6A8 control grid and chassis with a **.1 mfd. condenser in series with the oscillator output.** Set the oscillator to exactly 456 KC. Set the receiver dial at any point where it has no tuning effect on the oscillator signal.

Adjust the four I.F. trimmers, Nos. 1, 2, 3 and 4, for maximum output meter deflection, then repeat the trimmer adjustment.

WAVE-TRAP ADJUSTMENT: The wave-trap adjusting trimmer, No. 5, is located on the back of the chassis. Leave the test oscillator at 456 KC. Connect the oscillator output to the A and G terminals with a 400 ohm resistor in series with the A terminal and oscillator output. Then adjust the wave-trap trimmer No. 5 for **minimum** output. If some particular station with a frequency near 456 KC. causes code interference, it may be desirable to adjust the wave-trap on the actual frequency of the interfering station.

BROADCAST BAND CALIBRATION AND ALIGNMENT: With the gang condenser in full mesh, the dial pointer should be on the white horizontal line below 530 KC. on the dial scale. Leave the range switch in the extreme clockwise position, and leave the test oscillator connected to the A and G terminals of the receiver through a 400 ohm resistor.

Adjust the test oscillator to exactly 1500 KC. and turn the receiver dial pointer to 1500 KC. on the tuning dial. To calibrate the dial, adjust trimmer No. 6 for maximum output.

Carefully tune the receiver to the signal and adjust trimmers Nos. 7 and 8 for maximum output.

Adjust the test oscillator to 600 KC. and tune the receiver to the signal. Adjust trimmer No. 9 for maximum output. Then try to increase the output meter reading by detuning No. 9 slightly and retuning the receiver dial. If the output goes down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured. This operation is commonly known as "rocking" and when performed as described will give maximum selectivity and sensitivity even though the dial may be slightly off calibration at 600 KC.

BAND NO. 2 CALIBRATION AND ALIGNMENT: Turn the range switch to the center position.

Adjust the test oscillator to exactly 5.0 MC. and turn the receiver dial pointer to exactly 5.0 MC. on the tuning dial.

To calibrate the dial, adjust trimmer No. 10 for maximum output. If two peaks are found, the proper one is that with the trimmer screw farthest out.

Carefully tune the receiver to the signal and adjust trimmers Nos. 11 and 12 for maximum output. Then try to increase the output by detuning No. 12 slightly and retuning the receiver dial. Continue detuning No. 12 and retuning the dial until the output meter deflection is a maximum. Then readjust No. 11 for maximum output.

BAND NO. 3 CALIBRATION AND ALIGNMENT: Turn the range switch to the extreme counter-clockwise position. Be sure the D and G terminals on the antenna terminal strip are connected together.

Set the test oscillator to 16 MC. and turn the receiver dial pointer to exactly 16 MC. on the tuning dial.

To calibrate the dial, adjust trimmer No. 13 for maximum output. Check to see that it has been adjusted to the proper peak by tuning the receiver to approximately 15.1 MC. A repeat signal should be heard at this point. If none is present, even with greatly increased oscillator output, retune the receiver to 16 MC. and adjust trimmer No. 13 to the proper peak with the trimmer screw farther out.

Carefully tune the receiver to the signal and adjust trimmers Nos. 14 and 15 to a peak. Then try to increase the output by detuning No. 15 slightly and retuning the dial until a maximum output meter deflection is secured. Then readjust No. 14 for maximum output. Check the adjustment by tuning the receiver to the image at about 15.1 MC. The image should be much weaker than the 16 MC. signal. If the signal at 15.1 MC. dial setting is equal to or stronger than the 16 MC. signal, trimmer No. 15 is not set to the proper peak. Turn the trimmer in a turn or so, then readjust as above.

TRIMMER LOCATIONS

Trimmer Number		Alignment Frequency
1	1st I.F. transformer trimmer	456 KC.
2	1st I.F. transformer trimmer	456 KC.
3	2nd I.F. tranformer trimmer	456 KC.
4	2nd I.F. tranformer trimmer	456 KC.
5	Wave trap trimmer	456 KC.
6	Broadcast oscillator shunt trimmer	1500 KC.
7	Broadcast antenna shunt trimmer	1500 KC.
8	Broadcast detector shunt trimmer	1500 KC.
9	Broadcast oscillator series padder	600 KC.
10	Police oscillator shunt trimmer	5 MC.
11	Police antenna shunt trimmer	5 MC.
12	Police detector shunt trimmer	5 MC.
13	Short wave oscillator shunt trimmer	16 MC.
14	Short wave antenna shunt trimmer	16 MC.
15	Short wave detector shunt trimmer	16 MC.

MISCELLANEOUS PARTS

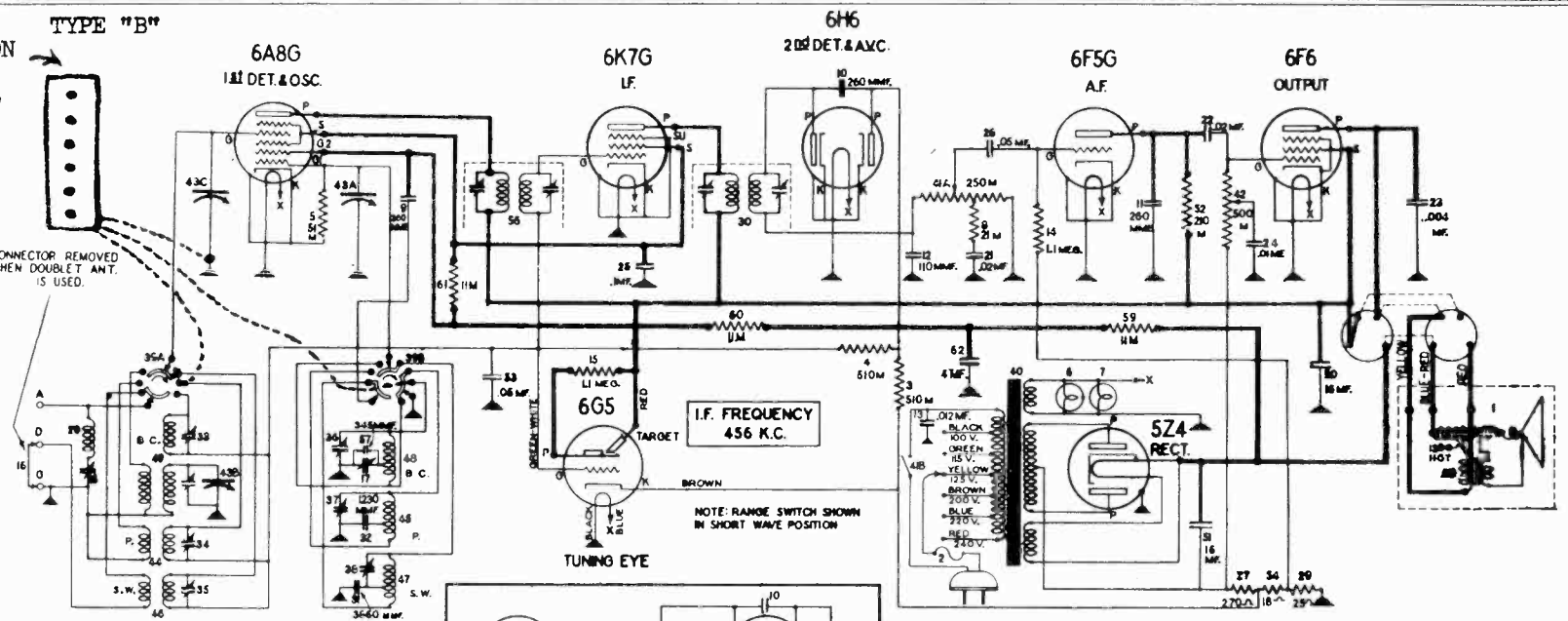
Part Number	Description
1211450	Terminal strip G.D.A.
1211468	Shaft for range selector
1211484	Tuning indicator cable & plug
1211538	#14x1-1/4 chassis mounting screw
1211539	Rubber chassis mounting bushing
1211549	Knob (used with tone & volume control)
1211550	Knob (for range switch)
1211551	Knob (front section) for tuning control
1211552	Knob (rear section) for tuning control
1211935	Felt washer (for rear of tuning knob)
1211936	Felt washer (for back of knobs)
1211937	Embossed washer (used with 1211972 electrolytic condenser)
1211940	Bracket for range selector shaft
1211948	#2x3/8 R.H.W. screw (for escutcheon)
1211949	Link and lever assembly
1211957	Escutcheon for magic eye
1211984	#1x1/4 R.H.W. screw for eye escutcheon
120386	Flat steel mounting washer

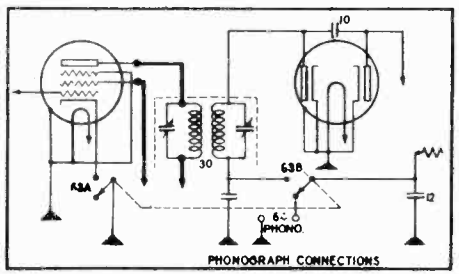
TUNING DRIVE AND DIAL PARTS

Part Number	Description
1211461	Spring washer (for planetary drive)
1211462	Dual ratio planetary drive
1211469	Idler gear tension spring
1211489	Dial lamp shield
1211493	Dial lamp socket
1211494	Compression spring for band indicator
1211522	Escutcheon with glass
1211697	Dial scale retaining clip
1211941	Idler gear and pinion assembly
1211942	Shaft for second pointer
1211943	Dial disc and bushing assembly
1211944	Dial rim, bracket and shaft assembly
1211950	Band indicator and link assembly
1211951	Pointer (second hand)
1211952	Pointer & stud assembly
1211955	Dial background
1211956	Bracket and light bracket assembly
1211994	Idler gear tension spring
1212008	Dial scale

MODELS H87, HP87. 7 TUBES 16.6 555 METERS

Date 2/2/53





PARTS LIST H87, HP87

Diagram Number	Part Number	Description
1	1211428	5-8 inch Dynamic speaker
2	145510	Fuse, 1 amp. (use on line voltage of 100 to 125 volts)
2	1211989	Fuse, 3/4 amp. (use on line voltages of 200 to 240 volts)
3-4	1210470	510,000 ohm 1/4 watt carbon resistor
5	1210116	51,000 ohm 1/4 watt carbon resistor
6-7	1209000	Pilot lamp (6 to 8 volts)
8	1210882	21,000 ohm 1/4 watt carbon resistor
9-10-11	1211432	260 mmfd. mica condenser
12	1211430	110 mmfd. mica condenser
13	1211338	.012 mfd. 1000 volt shielded condenser
14-15	1209885	1.1 megohn 1/4 watt carbon resistor
16	1211337	20 to 120 mmfd. mica wave trap trimmer
17	1211337	20 to 120 mmfd. mica padding trimmer
18	1211422	Ground jumper for antenna strip
20	1211408	456 KC. wave trap coil
21-22	1211435	.02 mfd. 400 volt paper condenser
23	1211966	.004 mfd. 750 volt paper condenser
24	1211437	.01 mfd. 400 volt paper condenser
25	1211438	.1 mfd. 150 volt paper condenser
26	1211440	.05 mfd. 200 volt paper condenser
27	1209463	270 ohm 1 watt carbon resistor
29	1211326	25 ohm 1/2 watt wire wound resistor
30	1211405	2nd I.F. transformer with shield
31	1211331	3860 mmfd. mica condenser
32	1211332	1230 mmfd. mica condenser
33-34-35	1211336	Dual trimmer condenser
36-37-38		
39A & B	1211394	Range switch
40	1211668	Universal power transformer 100 to 240 volts, 25-133 cycles
41-A	1211396	Volume Control 250,000 ohm
41-B		A.C. line switch

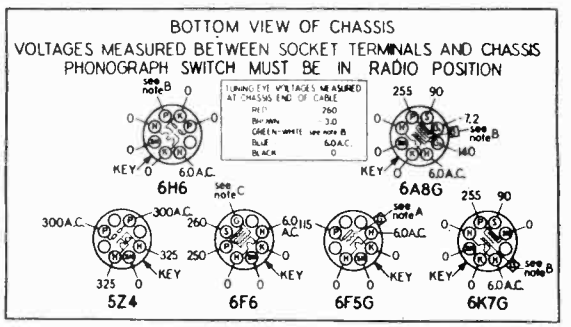
Diagram Number	Part Number	Description
42	1211398	Tone control (500,000 ohms)
43A to C	1211395	Gang Condenser
44	1211404	Antenna coil with trimmer (1.6 to 5.4 MC.)
45	1211399	Oscillator coil (1.6 to 5.4 MC.)
46	1211402	Antenna coil with trimmer (5.6 to 17.5 MC.)
47	1211401	Oscillator coil with trimmer (5.6 to 17.5 MC.)
48	1211403	Oscillator coil (530 to 1750 KC.)
49	1211400	Antenna coil with trimmer (530 to 1750 KC.)
50	1211444	16 mfd. 300 volt electrolytic condenser
51	1211445	16 mfd. 400 volt electrolytic condenser
52	1210119	210,000 ohm 1/4 watt carbon resistor
53	1211442	.05 mfd. 150 volt condenser (low loss)
54	1211671	18 ohm 1/2 watt wire wound resistor
55	1211467	Output transformer for 1211428 spkr.
56	1211488	1st I.F. transformer
57	1211576	345 mmfd. mica condenser
59-60	1211998	11,000 ohm 1 watt carbon resistor
61	1211999	11,000 ohm 1/2 watt carbon resistor
62	1212000	4 mfd. 250 volt electrolytic condenser
63A & B	1211669	Phonograph toggle switch
64	1211670	Phonograph terminal strip.

FOR DATA ON MODEL B TUNER, SEE INDEX

SOCKET VOLTAGES

VOLUME CONTROL ON FULL — ANTENNA GROUNDED

RANGE SWITCH ON BROADCAST POSITION — DIAL TUNED TO 530 KC.



REAR OF CHASSIS

IMPORTANT: Use a high resistance voltmeter of 1000 ohms per volt.

NOTE A: The grid bias for the 6F5G is -1.3 volts measured across resistor 29.

NOTE B: The grid bias for the 6A8G, 6K7G, and the anode voltage of the A.V.C. section of the 6H6 is -3.0 volts measured across resistors 29 and 54.

NOTE C: The grid bias for the 6F6 output tube is -17.0 volts measured across resistors 29, 54 and 27.

MODELS H87,HP87
Socket,Trimmers
Alignment,Parts

HETRO ELECTRICAL INDUSTRIES

SERVICE DATA FOR MODELS H87, HP87.

CALIBRATION AND ALIGNMENT

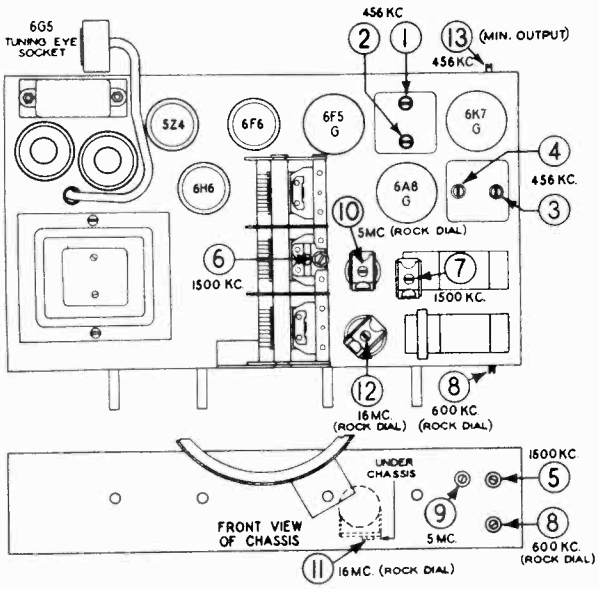
ALIGNING EQUIPMENT: For proper alignment, an output meter and an accurately calibrated oscillator with a tuning range from 456 KC. to 16 MC. are required.

Connect the output meter from the plate of the output tube to chassis. A convenient point to make the plate connection is to the yellow wire on the speaker socket.

ALIGNING THE I. F. AMPLIFIER: Turn the volume control to maximum volume position and keep it in this position throughout the entire alignment procedure. Turn the range switch to the broadcast position (fully clockwise).

Connect the test oscillator output leads to the 6A8 control grid and chassis with a .1 mfd. condenser in series with the oscillator output. Set the oscillator to exactly 456 KC. Set the receiver dial at any point where it has no tuning effect on the oscillator signal.

Adjust the four I.F. trimmers, Nos. 1, 2, 3 and 4, for maximum output meter deflection, then repeat the trimmer adjustment.



TRIMMER LOCATIONS

Trimmer Number		Alignment Frequency
1.	2nd I.F. transformer trimmer	456 KC.
2.	2nd I.F. transformer trimmer	456 KC.
3.	1st I.F. transformer trimmer	456 KC.
4.	1st I.F. transformer trimmer	456 KC.
5.	Broadcast oscillator shunt trimmer	1500 KC.
6.	Broadcast antenna shunt trimmer	1500 KC.
7.	Broadcast detector shunt trimmer	1500 KC.
8.	Broadcast oscillator series padder	600 KC.
9.	Police oscillator shunt trimmer	5 MC.
10.	Police antenna shunt trimmer	5 MC.
11.	Short wave oscillator shunt trimmer	16 MC.
12.	Short wave antenna shunt trimmer	16 MC.
13.	Wave-trap trimmer	456 KC.

BROADCAST BAND CALIBRATION AND ALIGNMENT: With the gang condenser in full mesh, the dial pointer should be on the white horizontal line below 530 KC. on the dial scale.

Turn the range switch to the extreme clockwise position and connect the test oscillator output to the A and G terminals of the receiver with a 400 ohm carbon resistor in series with the A terminal and the oscillator output.

Adjust the test oscillator to exactly 1500 KC. and turn the receiver dial pointer to 1500 KC. on the tuning dial. To calibrate the dial, adjust trimmer No. 5 for maximum output.

Carefully tune the receiver to the signal and adjust trimmers Nos. 6 and 7 for maximum output.

Adjust the test oscillator to 600 KC. and tune the receiver to the signal. Adjust trimmer No. 8 for maximum output. Then try to increase the output meter reading by detuning No. 8 slightly and retuning the receiver dial. If the output goes down, detune the trimmer in the opposite direction. Continue detuning the trimmer and retuning the receiver dial until maximum output meter deflection is secured. This operation is commonly known as "rocking" and when performed as described will give maximum selectivity and sensitivity even though the dial may be slightly off calibration at 600 KC.

WAVE-TRAP ADJUSTMENT: The wave-trap adjusting trimmer, No. 13, is located on the back of the chassis. Leave the test oscillator connected to the A and G terminals through a 400 ohm resistor and set the oscillator at 456 KC. Then adjust the wave-trap trimmer No. 13 for minimum output. If some particular station with a frequency near 456 KC. causes code interference, it may be desirable to adjust the wave-trap on the actual frequency of the interfering station.

Check the adjustment of trimmers 5, 6, and 7 at 1500 KC.

BAND NO. 2 CALIBRATION AND ALIGNMENT: Turn the range switch to the center position.

Adjust the test oscillator to exactly 5.0 MC. and turn the receiver dial pointer to exactly 5.0 MC. on the tuning dial.

To calibrate the dial, adjust trimmer No. 9 for maximum output. If two peaks are found, the proper one is that with the trimmer screw farthest out.

Carefully tune the receiver to the signal and adjust trimmer No. 10 for maximum output. Then try to increase the output by detuning No. 10 slightly and retuning the receiver dial. Continue detuning No. 10 and retuning the dial until the output meter deflection is a maximum.

BAND NO. 3 CALIBRATION AND ALIGNMENT: Turn the range switch to the extreme counter-clockwise position. Be sure the D and G terminals on the antenna terminal strip are connected together.

Set the test oscillator to 16 MC. and turn the receiver dial pointer to exactly 16 MC. on the tuning dial.

To calibrate the dial, adjust trimmer No. 11 for maximum output. Check to see that it has been adjusted to the proper peak by tuning the receiver to approximately 15.1 MC. A repeat signal should be heard at this point. If none is present, even with greatly increased oscillator output, retune the receiver to 16 MC. and adjust trimmer No. 11 to the proper peak with the trimmer screw farther out.

Carefully tune the receiver to the signal and adjust trimmer No. 12 to a peak. Then try to increase the output by detuning the trimmer slightly and retuning the dial until a maximum output meter deflection is secured. Check the adjustment by tuning the receiver to the image at about 15.1 MC. The image should be much weaker than the 16 MC. signal. If the signal at 15.1 MC. dial setting is equal to or stronger than the 16 MC. signal, trimmer No. 12 is not set to the proper peak. Turn the trimmer in a turn or so, then readjust as above.

MISCELLANEOUS PARTS

Part Number	Description
1211424	Fuse cover
1211450	Antenna-ground terminal strip
1211484	Tuning indicator cable and plug
1211523	Escutcheon for tuning eye
1211539	Rubber chassis mounting bushing
1211540	#10x1/4 chassis mounting screw
1211548	Knob for band switch
1211549	Knob for volume control
1211554	Knob for tone and tuning control mounting screw)
1211937	Embossed washer for 1211445 electrolytic condenser
1211938	Felt washer for back of knob
1211948	#2x3/8 R.H.W. screw for dial escutcheon
1212027	Tube shield assembly

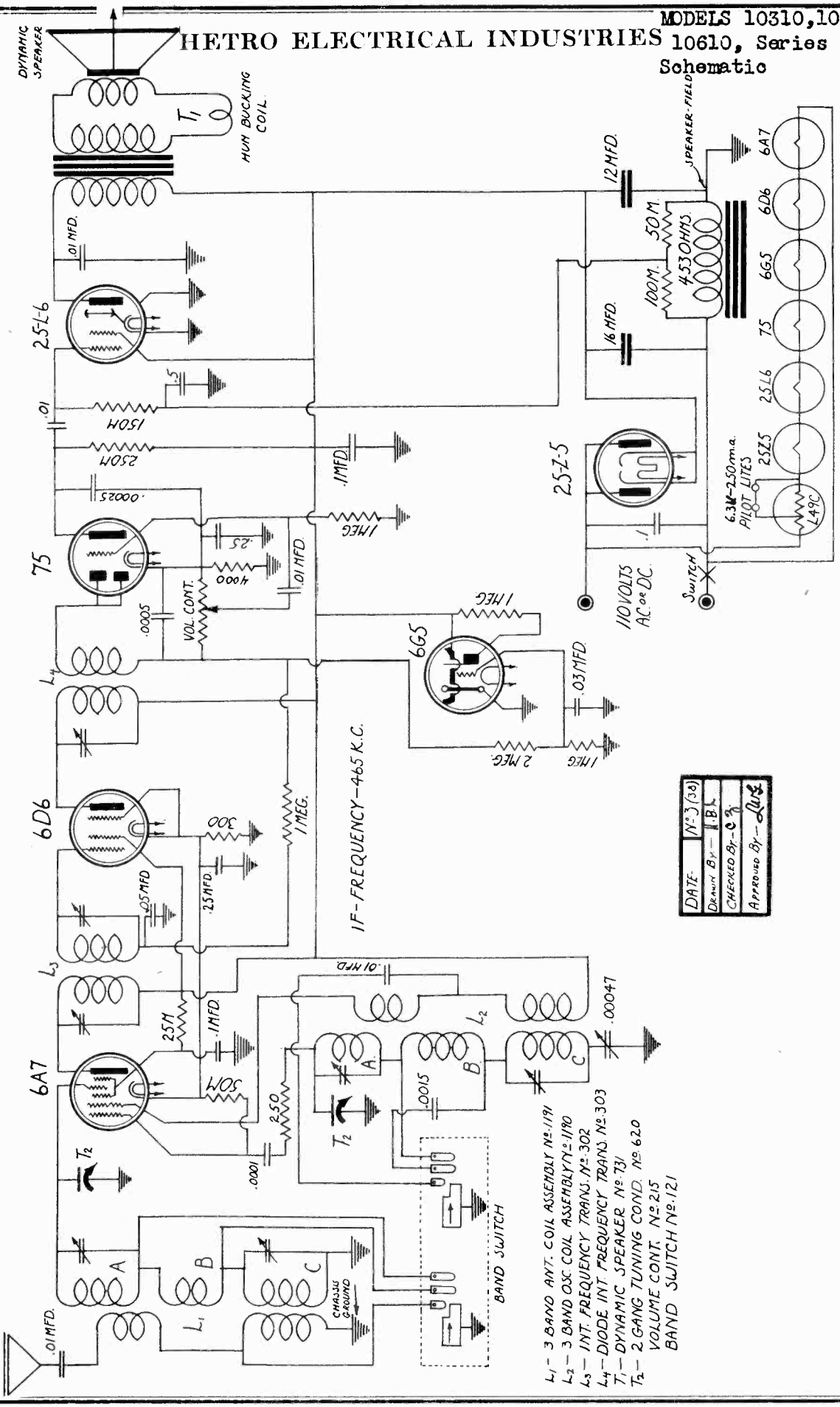
TUNING DRIVE AND DIAL PARTS

Part Number	Description
1211463	Pointer and stud assembly
1211465	Dial ring and bracket assembly
1211466	Dial disc and bushing assembly
1211489	Dial lamp shield
1211493	Dial lamp socket
1211522	Escutcheon with glass
1211524	Dial scale
1211954	Dial background
1211990	Dial drive shaft
1211991	Dial drive shaft retainer spring

TO ADJUST AUTOMATIC PRESS-A-BUTTON TUNER IN MODELS HP85 & HP93, SEE INSTRUCTIONS SUPPLIED WITH TUNER

HETRO ELECTRICAL INDUSTRIES

MODELS 10310,10410,10510
10610, Series "B"
Schematic

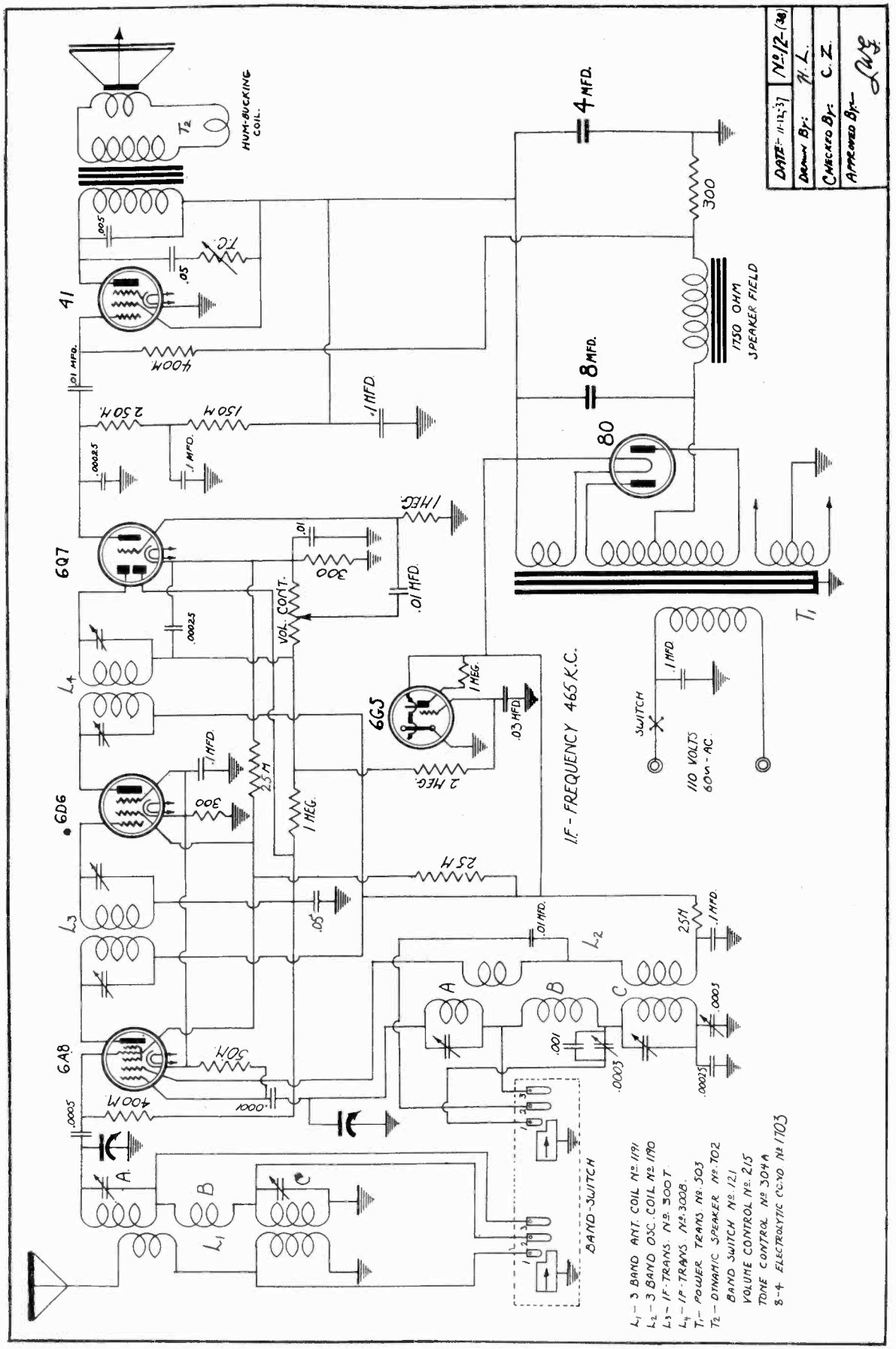


L1 - 3 BAND ANT. COIL ASSEMBLY No. 1191
L2 - 3 BAND OSC. COIL ASSEMBLY No. 1190
L3 - INT. FREQUENCY TRANS. No. 302
L4 - DIODE INT. FREQUENCY TRANS. No. 303
T1 - DYNAMIC SPEAKER No. 731
T2 - 2 GANG TUNING COND. No. 620
VOLUME CONT. No. 215
BAND SWITCH No. 121

HETRO MODELS 10310, 10410, 10510, 10610 SERIES "B"

MODELS H47,H48
Schematic

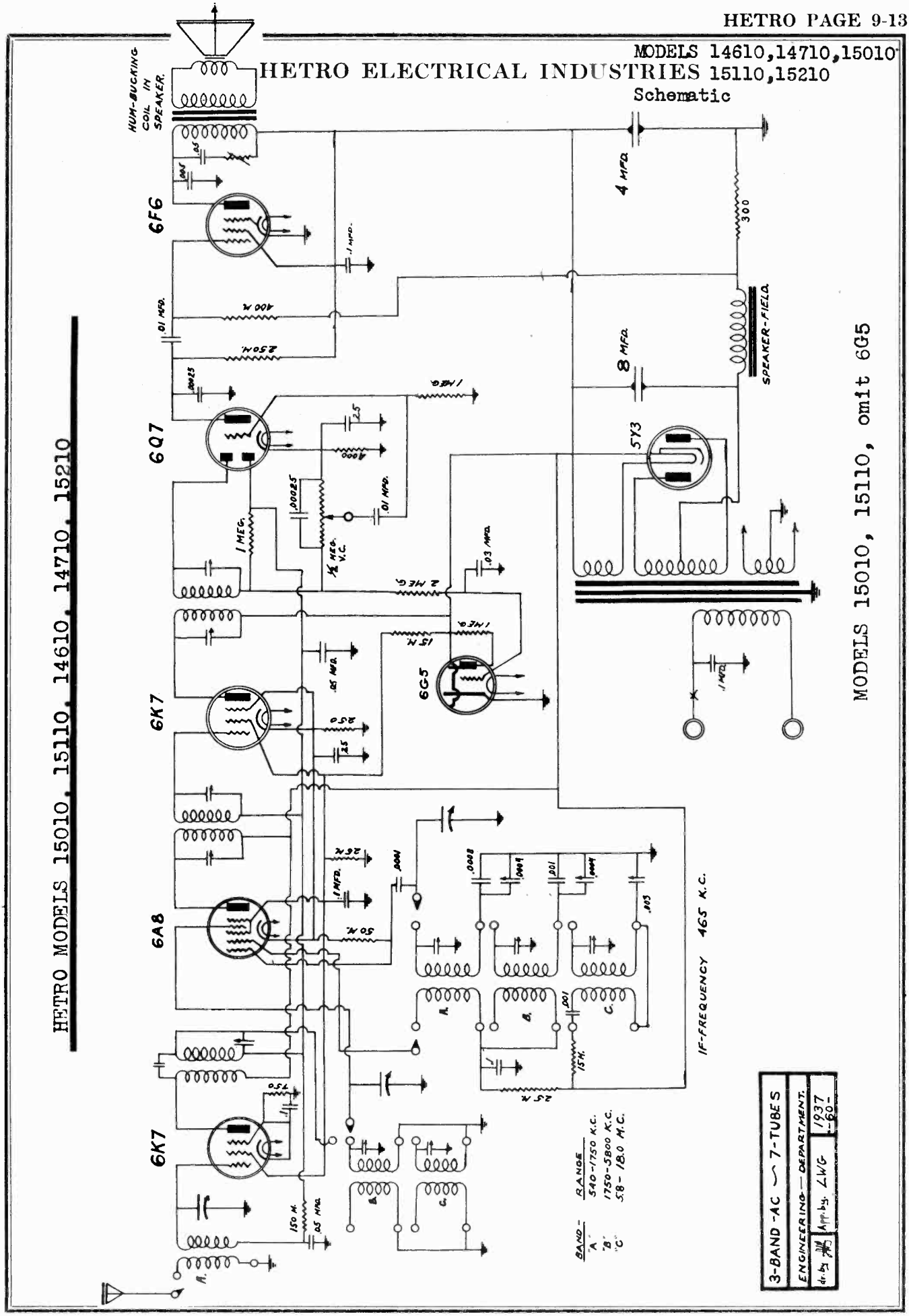
HETRO ELECTRICAL INDUSTRIES



MODELS 14610,14710,15010

HETRO ELECTRICAL INDUSTRIES 15110,15210

Schematic

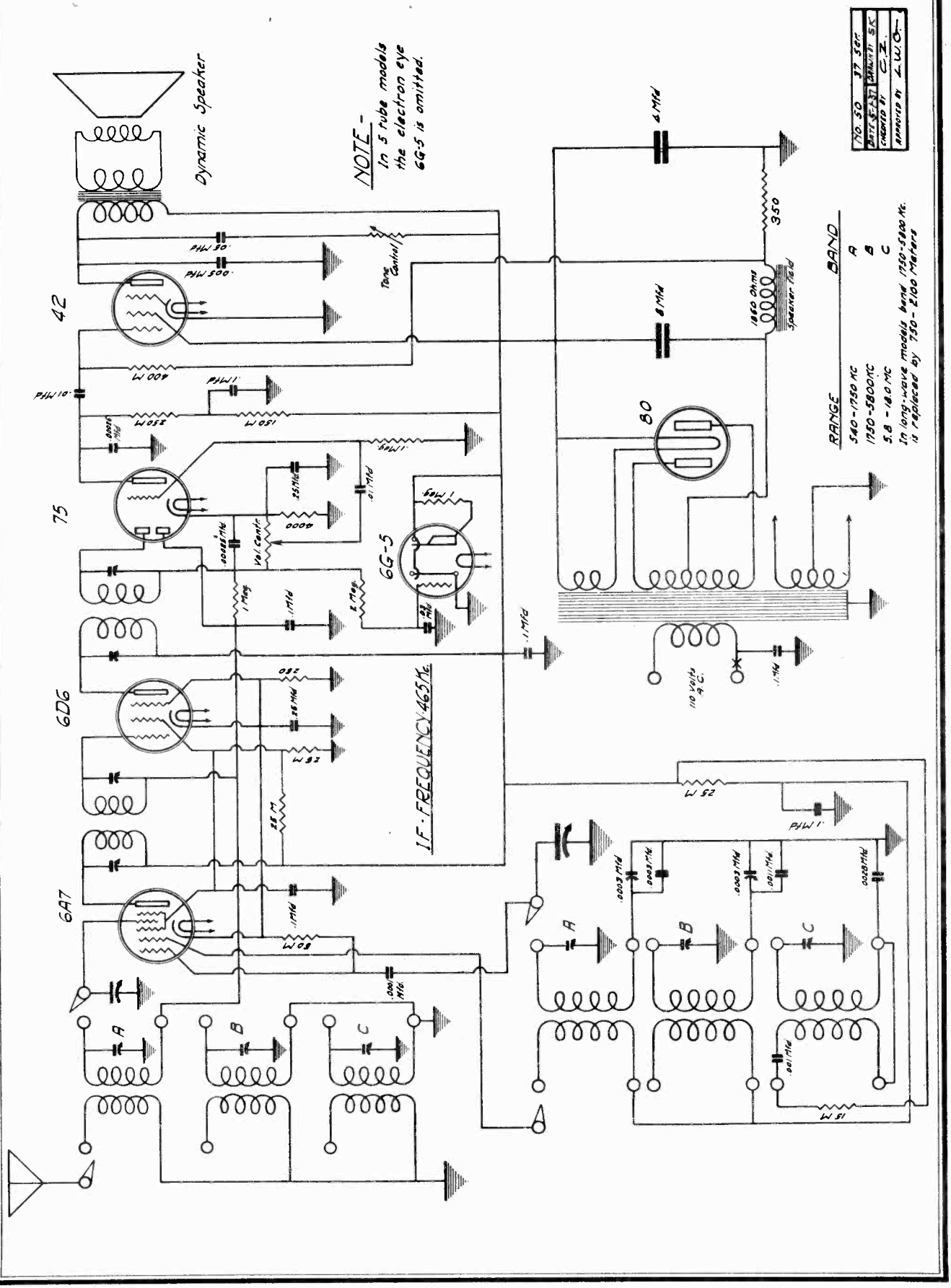


HETRO MODELS 15010, 15110, 14610, 14710, 15210

MODELS 15010, 15110, omit 6G5

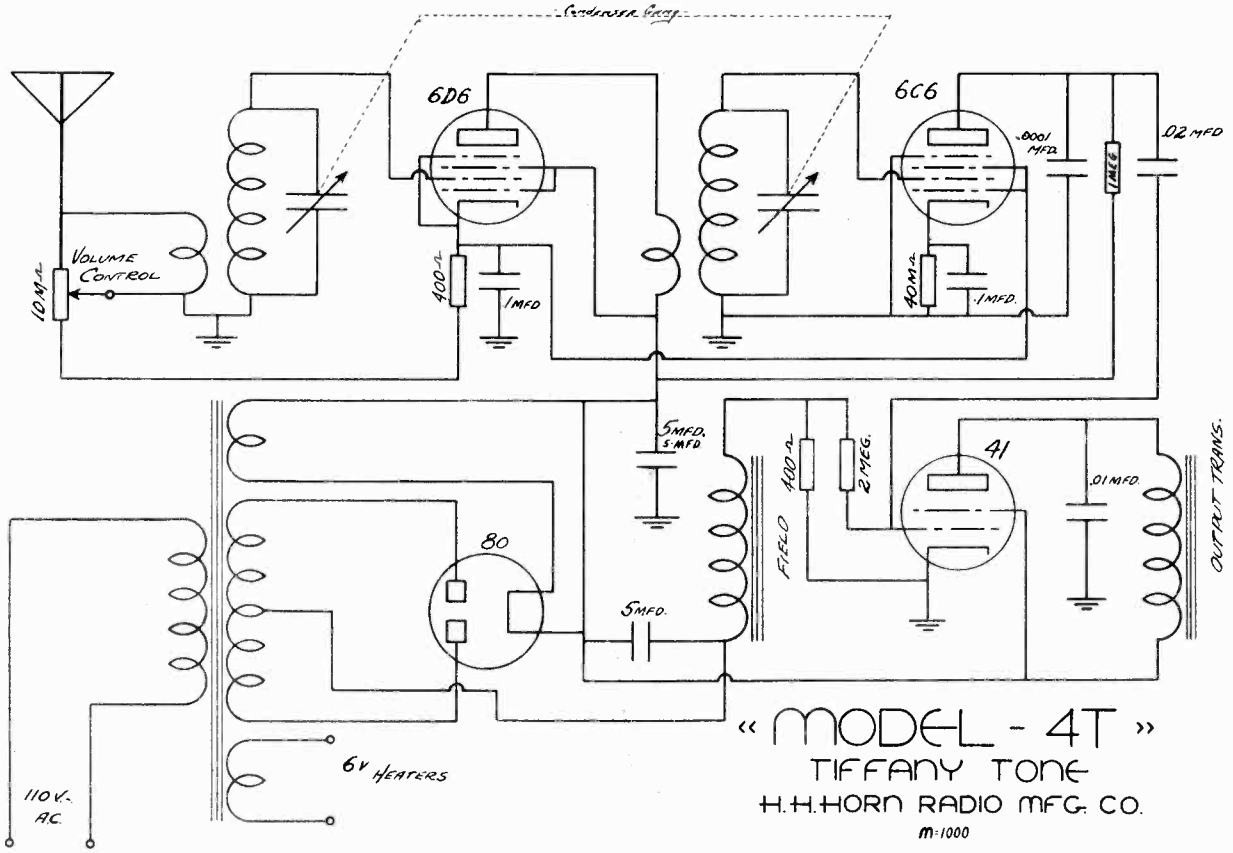
MODELS 14810,14890,
14910,14990
Schematic

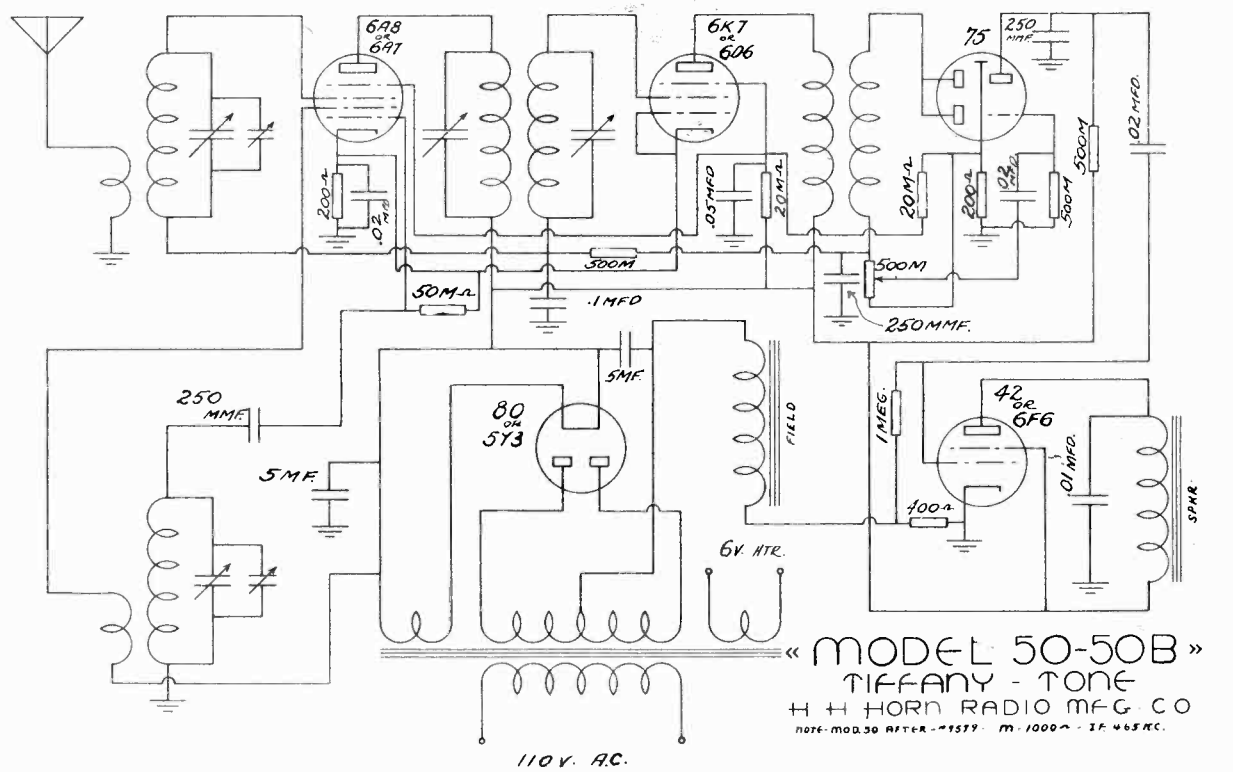
HETRO ELECTRICAL INDUSTRIES



HERBERT H. HORN

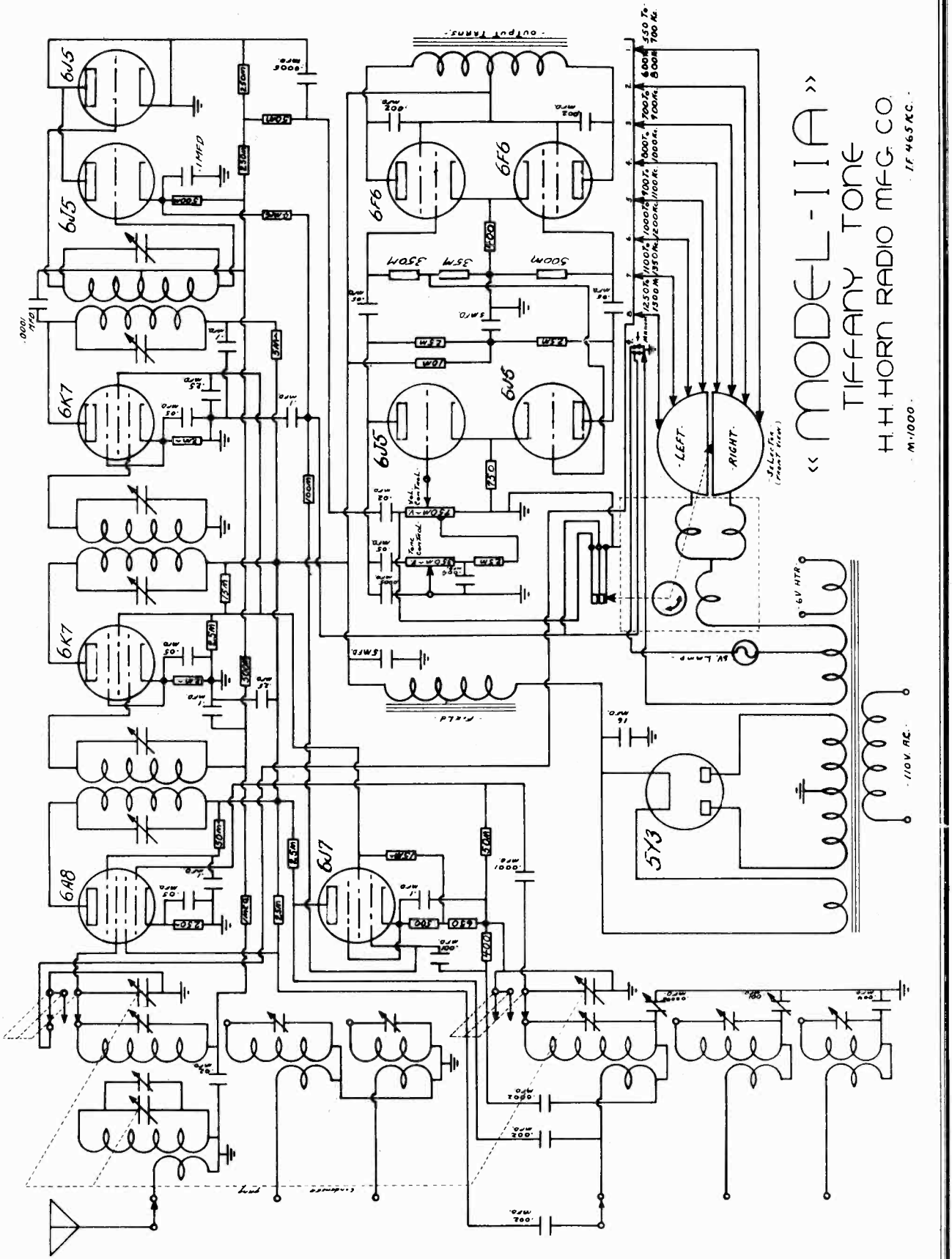
MODEL 4T
MODELS 50,50B
Schematics





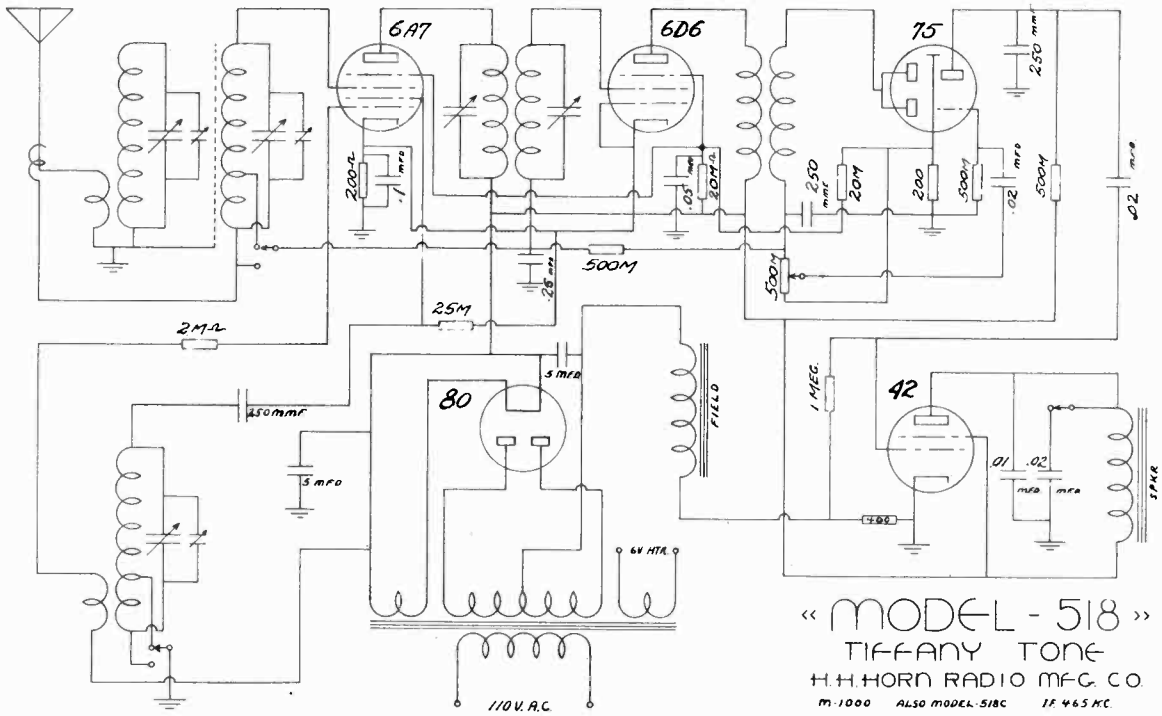
MODEL 11A
Schematic

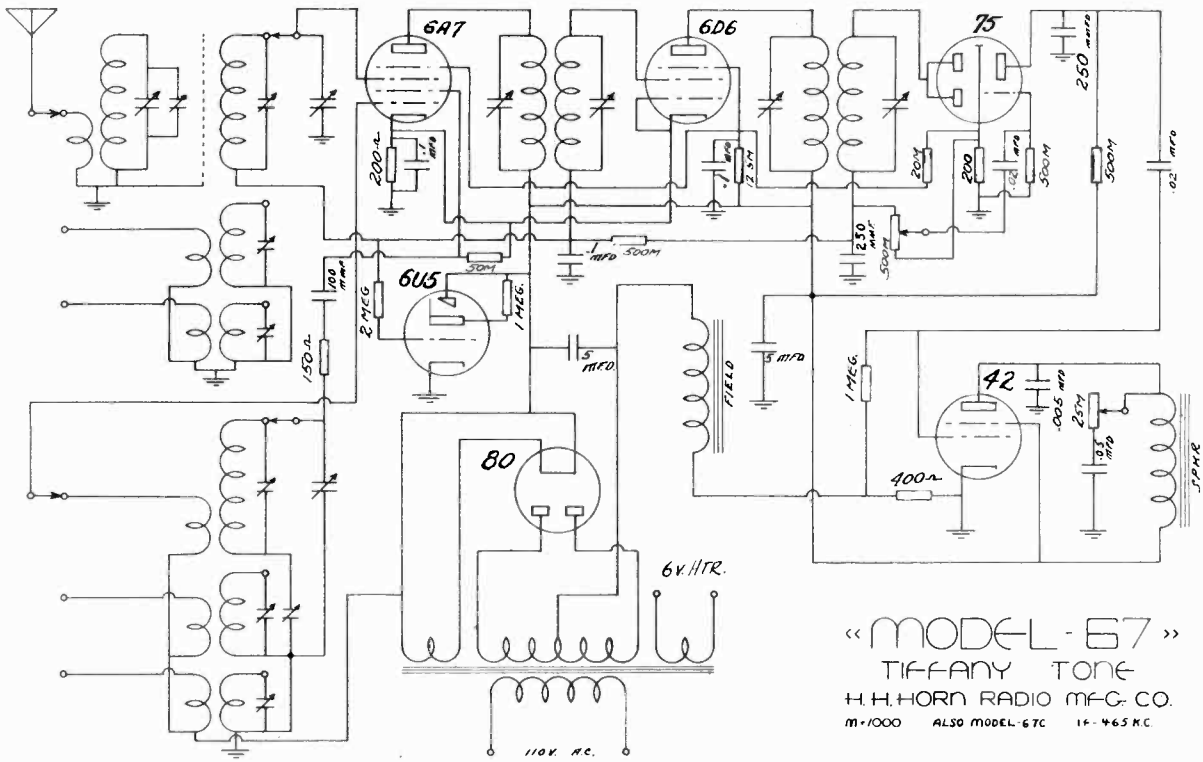
HERBERT H. HORN



HERBERT H. HORN

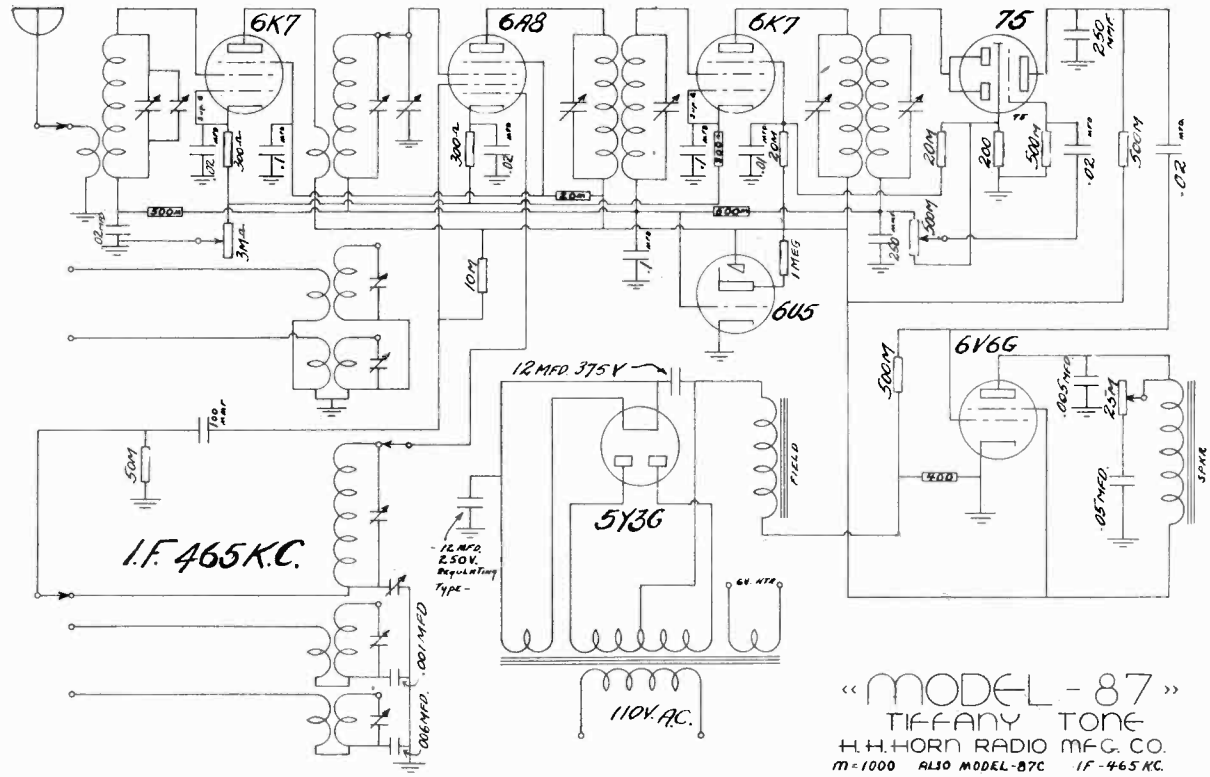
MODEL 67
MODEL 518
Schematics

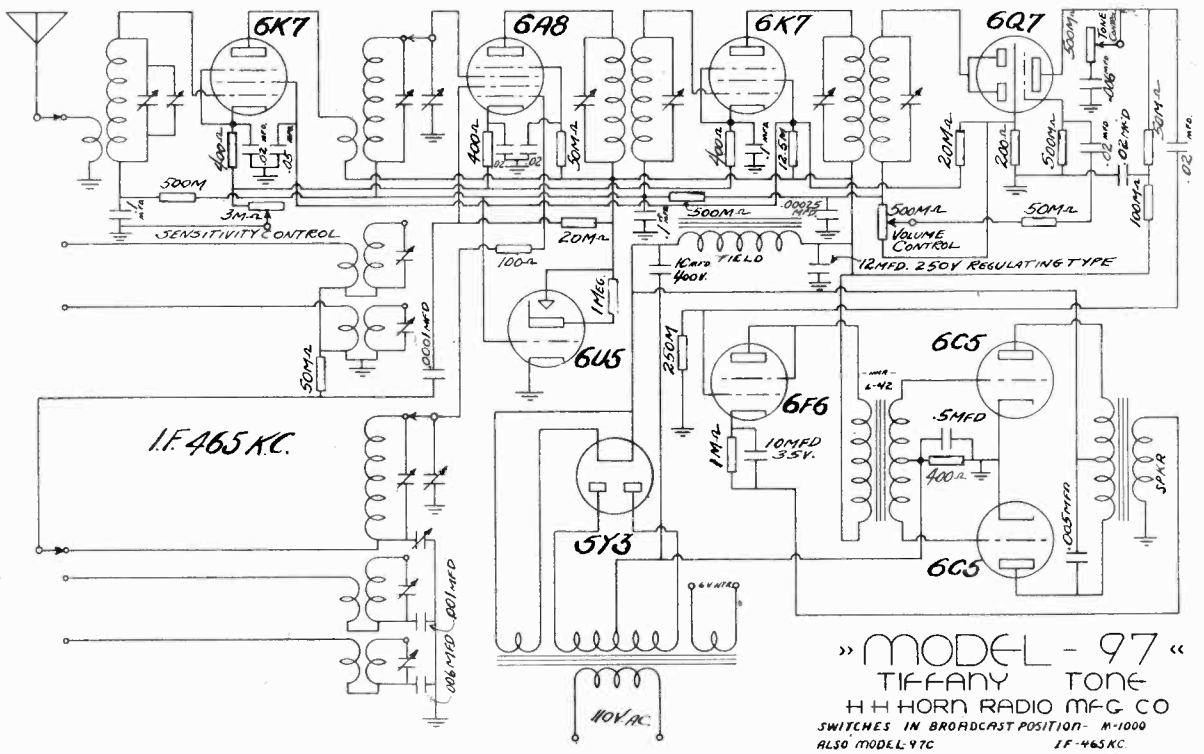




MODEL 87
MODEL 97
Schematics

HERBERT H. HORN





MODELS E5B,E256,E259
Phono.,Headphone Circuits

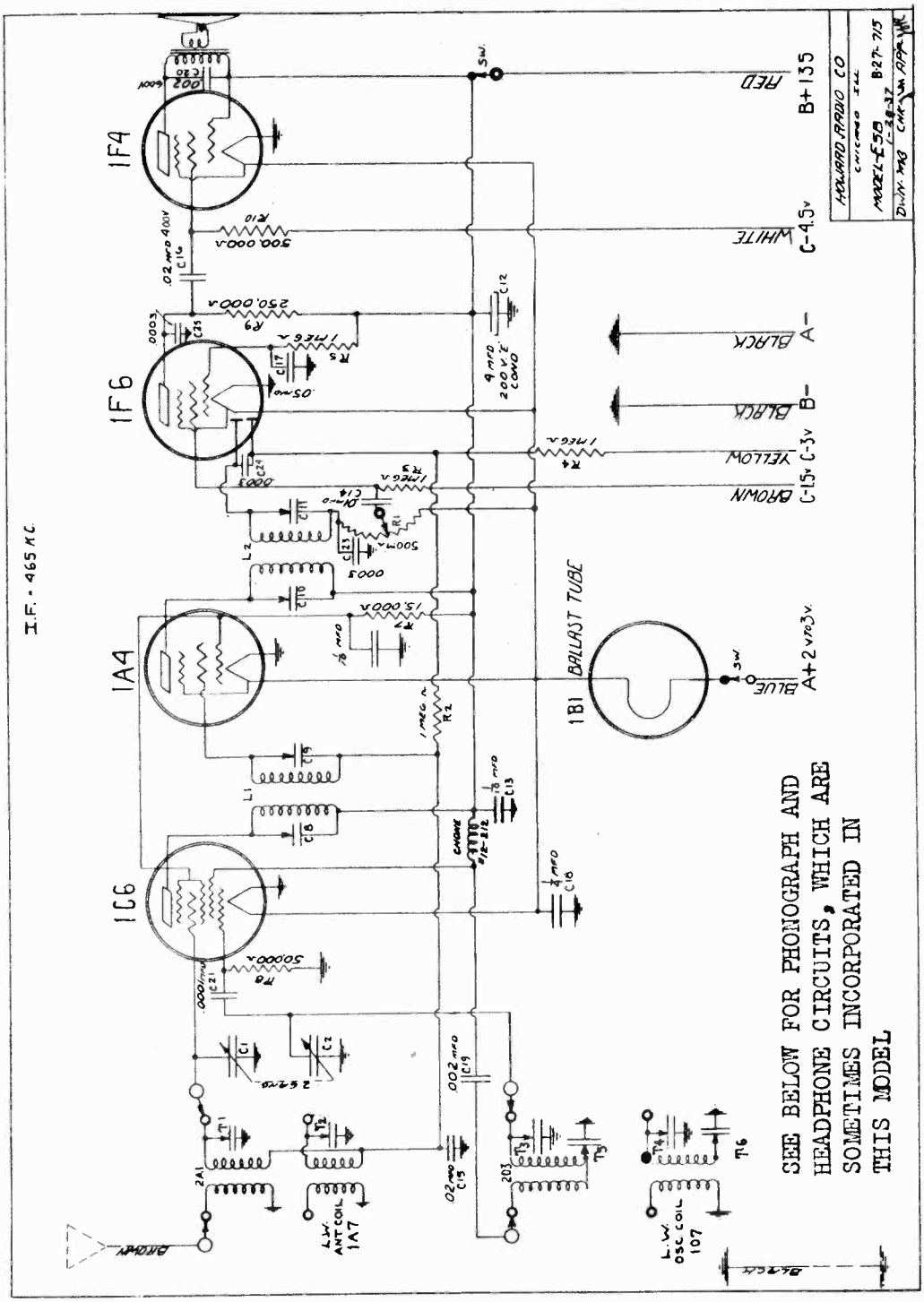
HOWARD RADIO CO.

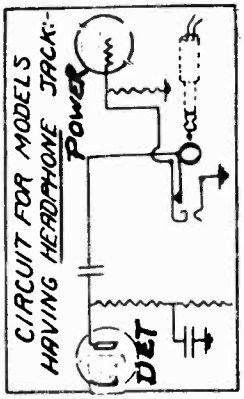
MODEL E5B
Schematic

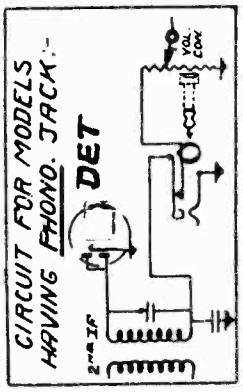
For Model E259 an auxillary line cord of 200 ohms resistance must be placed in series with the regular cord to use the set on 230 volt line.

For the AC Models, when a universal transformer is being used a separate instruction sheet is enclosed with the receiver showing the right combination of leads for various line voltages.

The diagram below shows the fundamental circuits used for PHONO JACK and HEADPHONE JACK. NOTE: With models that do not have the cathode grounded, the terminal on the jack that would ordinarily be grounded would be common to the cathode return. This also applies to the power tube grid circuit.

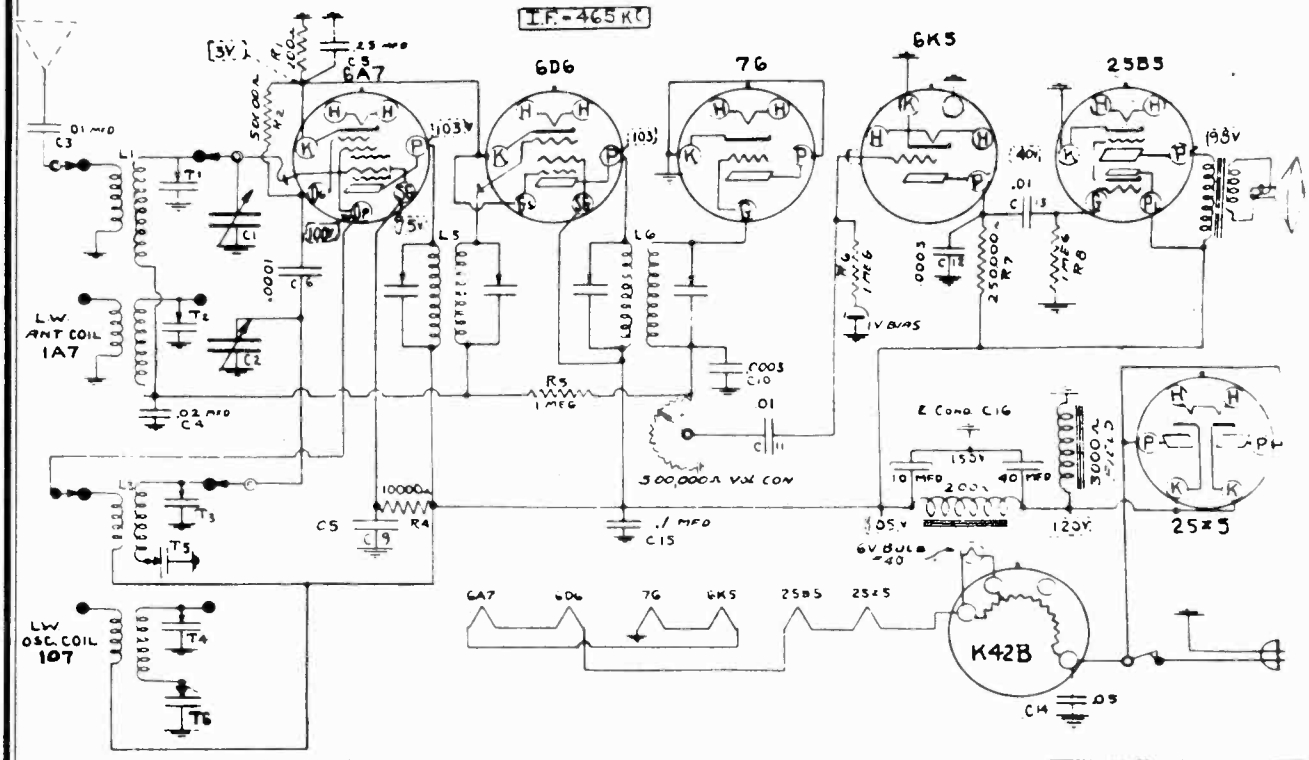






MODEL E256
MODEL E259
Schematics, Voltage

HOWARD RADIO CO.

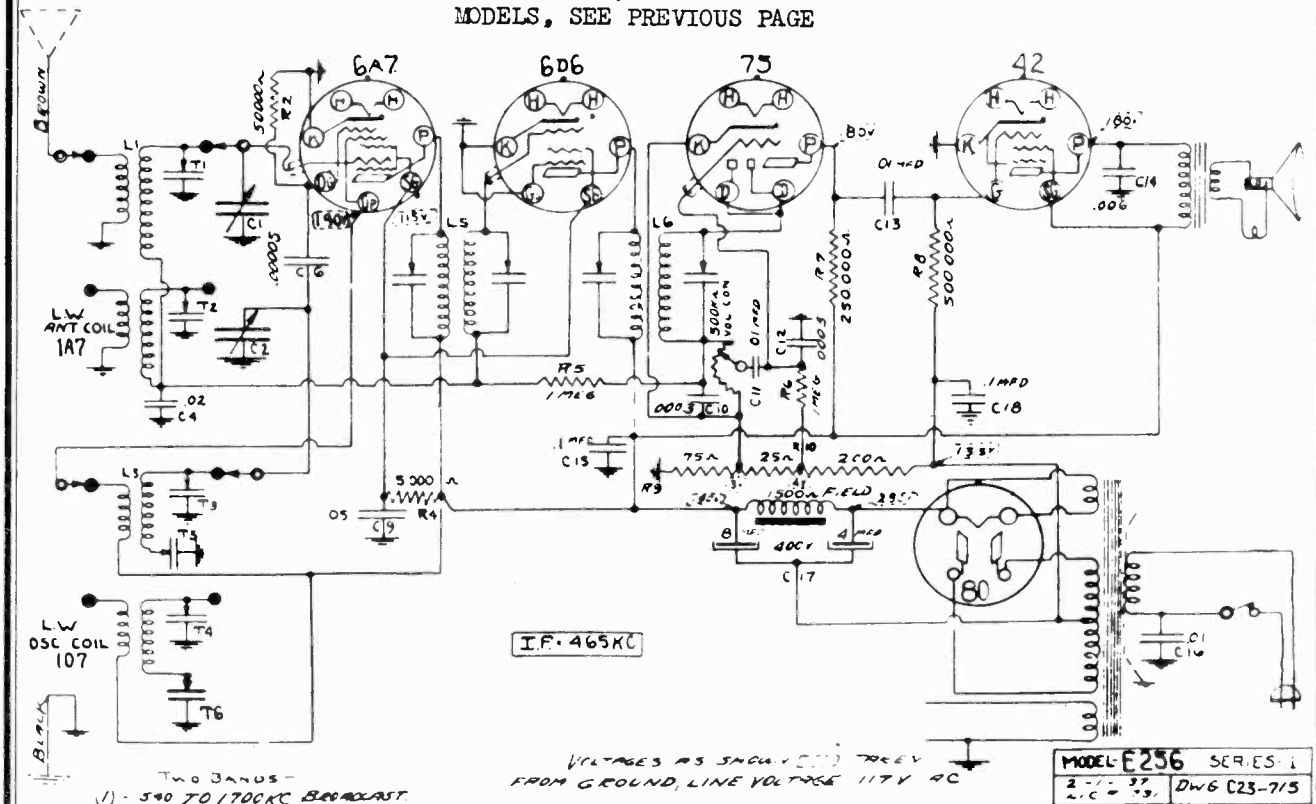


TWO BANDS:-
1) 540 To 1700 KC - BROADCAST
2) 160 To 400 KC Long Wave

VOLTAGES AS SHOWN ( ) TAKEN FROM GROUND, LINE VOLTAGE - 117 V AC

MODEL E259 SERIES 1		
2-1-37	DWG NO. C24-715	
DWN 7-15-3	CHKD	APD JHK

FOR PHONOGRAPH AND HEADPHONE JACK CONNECTIONS, SOMETIMES IN THESE MODELS, SEE PREVIOUS PAGE



TWO BANDS -
(1) - 540 TO 1700 KC BROADCAST
(2) 150 KC To 400 KC Long Wave.

VOLTAGES AS SHOWN ( ) TAKEN FROM GROUND, LINE VOLTAGE 117 V AC

MODEL E256 SERIES 1		
2-1-37	DWG C23-715	
DWN 7-15-3	CHKD	APD JHK

HOWARD RADIO CO.

MODELS E5B,E256,E259
Trimmers,Alignment

I. THE I. F. STAGES

The intermediate frequency stages are aligned in the usual manner on Models E259 and E59 by feeding 465 KC into the grid of the mixer tube after removing grid cap, placing a series resistor of 500,000 ohms from tube grid to the cap and a series condenser from the tube grid to the hot lead from the signal generator. NOTE WITH MODEL E256 LEAVE GRID CAP ON THE MIXER TUBE, TURN BAND SWITCH TO BROADCAST BAND POSITION AND VARIABLE CONDENSER ALL THE WAY OUT TO MINIMUM CAPACITY.

The sensitivity of the I. F. System alone for Models E256 and E259 will be about 25 to 50 Microvolts for a 50 Milliwatt output, and about 125 Microvolts for Model E5B.

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.

Always use as low an output as possible from the signal generator when making the various adjustments.

II. THE BROADCAST BAND

First check the position of the dial hand by rotating the condenser plates 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, remove dial glass to get at the screw holding the hand.

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.

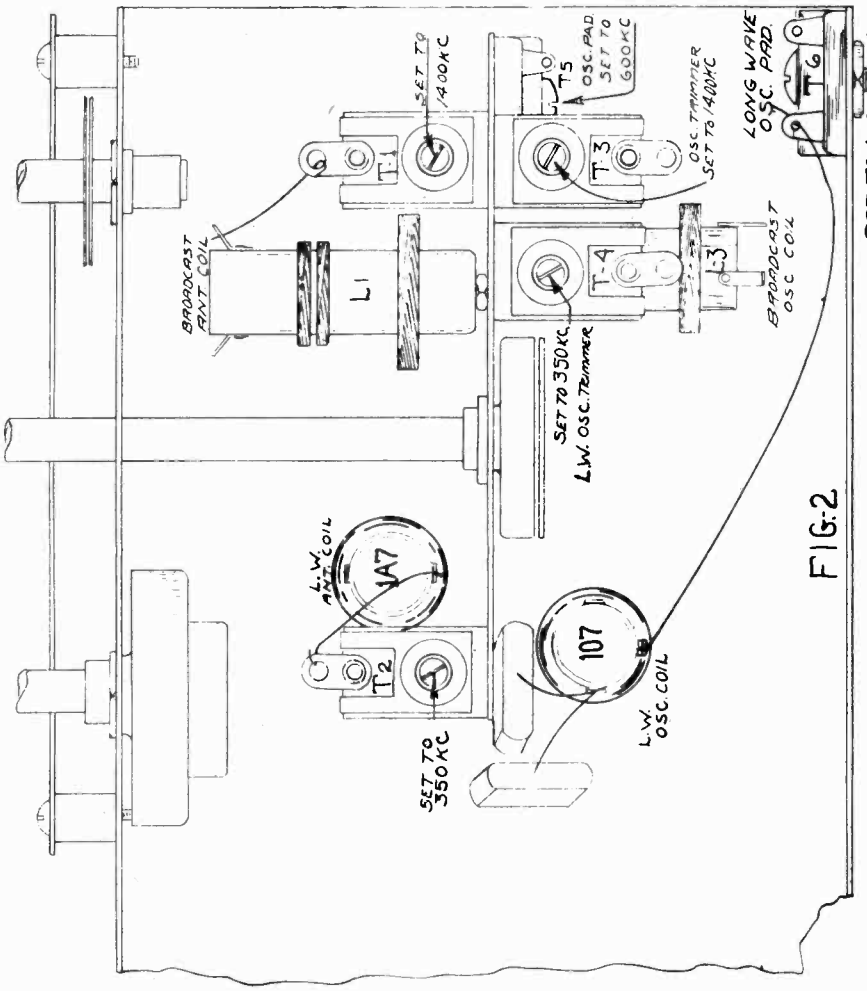


FIG. 2

Peak oscillator trimmer T3 to 1400 KC from the signal generator.

Peak antenna trimmer T1 to 1400 KC after adjusting oscillator.

Set dial hand to 600 KC and adjust oscillator padding condenser T5 to 600 KC.

III. THE LONG WAVE BAND

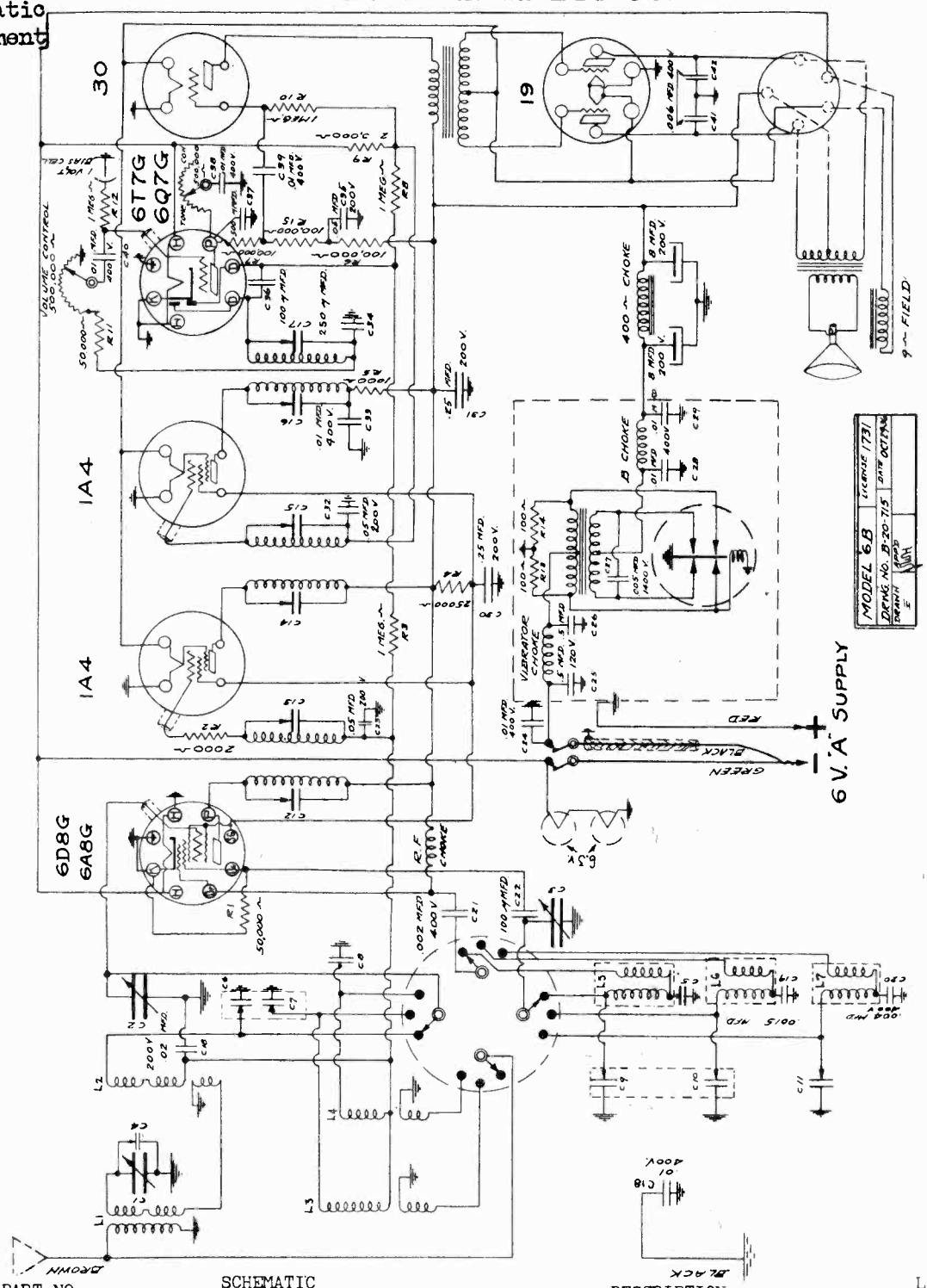
With the Band switch in position for the Long Wave Band, (all the way to the left) peak oscillator trimmer T4 to 350 KC.

After oscillator trimmer is set, peak Antenna Circuit trimmer T2 to 350 KC.

Turn dial hand to 150 KC and adjust oscillator padding condenser T6 to 150 KC.

MODEL 6B
Schematic
Alignment
Parts

HOWARD RADIO CO.



5820	Switch - Wave Band, 3 position. 1.10
4206	Transformer - Power (Vibrator). 2.00
4323	Transformer - Audio Input - P.P 1.50
6601	Tube Shield 16
9605	Vibrator. 3.20

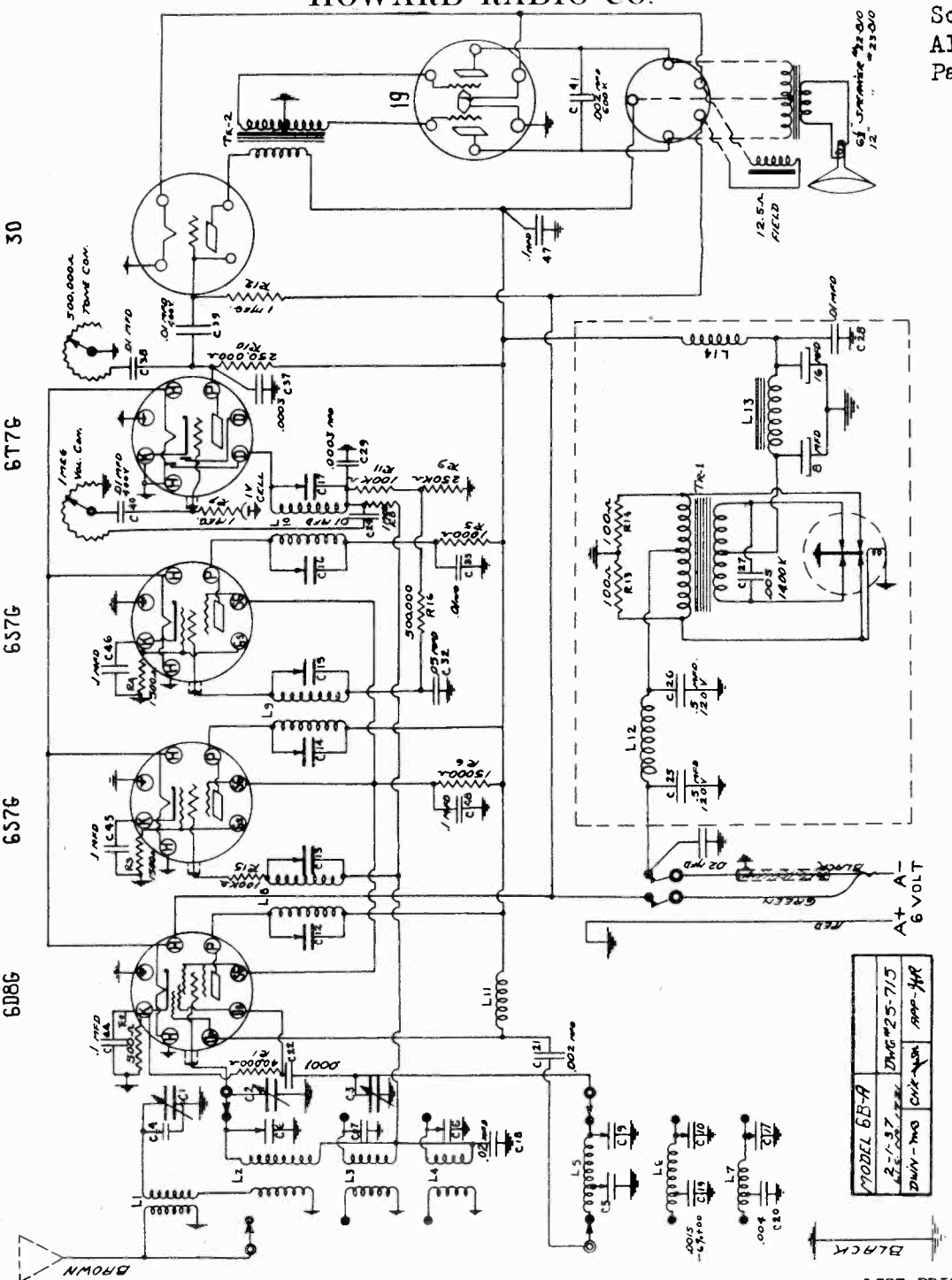
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

ALIGNMENT SAME AS MODEL-268 SEE INDEX

PART NO.	SCHEMATIC LOCATION	DESCRIPTION	LIST PRICE
7601		Bias Cell - 1 Volt.	$0.30
4303		Choke - B Plus.	1.25
8544	L2	Coil - B.C. Grid.	.80
4158-3	L5	Coil - B.C. Oscillator, Complete.	.80
8543	L1	Coil - B.C. Antenna	.80
8547-2	L6	Coil - Police Oscillator, Complete.	.80
8546-2	L3	Coil - Police Antenna, Complete	.80
8549-2	L7	Coil - Foreign Band, Oscillator	.80
8548	L4	Coil - Foreign Band, Antenna.	.80
8539		Coil - Oscillator, Plate Choke.	.70
8540		Coil - Hash Filter Choke.	.70
8560		Coil - "A" Choke.	.70
8572		Coil - 1st. and 2nd. I.F. Assembly, Complete.	1.30
8542-3		Coil - 3rd. I.F. Assembly, Complete.	1.30

HOWARD RADIO CO.

MODEL 6B-A
Schematic
Alignment
Parts



Switch - Wave Band	1.10
Transformer - Power (Vibrator	2.00
Transformer - Audio Input - P.P.	1.50
Tube Shield	.16
Vibrator	3.20

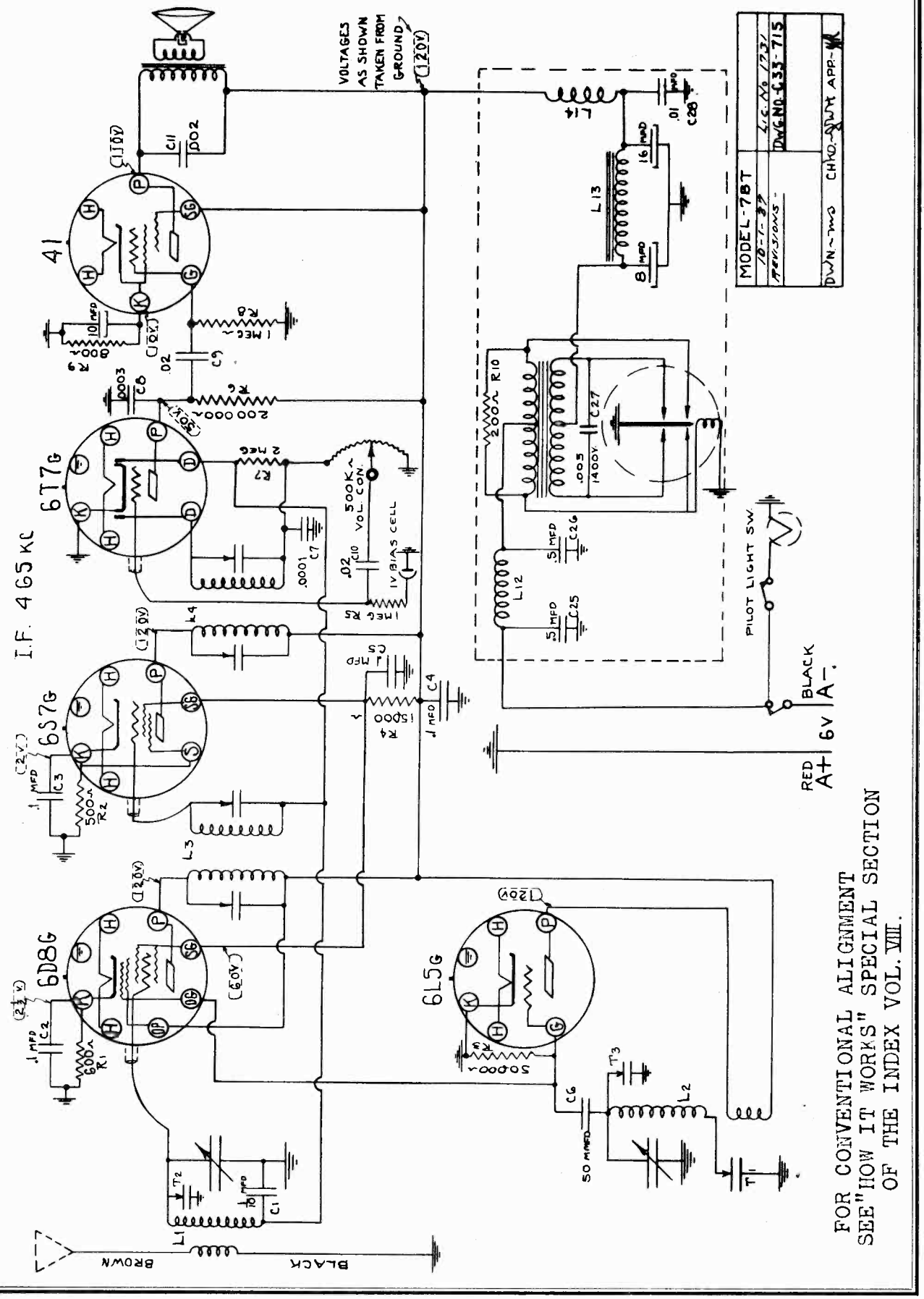
TR1	5820
TR2	4206-1
	4323
	6601
	9605-1

PART NO.	SCHEMATIC LOCATION	DESCRIPTION	LIST PRICE
7601		Bias Cell -.1 Volt	.30
5536-1		Cable - 3 Wire - Battery	.75
11-212	L13	Choke - "B" Plus	1.25
13-212	L12	Choke - "A"	.70
12-212	L14	Choke - "B" Plus - Hash Filter	.70
8544	L2	Coil - B. C. Grid, Complete	.80
8543	L1	Coil - B. C. Antenna	.80
4158-3	L5	Coil - B. C. Oscillator, Complete	.80
8547-2	L6	Coil - Police Oscillator, Complete	.80
8546-2	L3	Coil - Police Antenna, Complete	.80
8549-2	L7	Coil - Foreign Band, Oscillator	.80
8548-2	L4	Coil - Foreign Band, Antenna	.80
8539	L11	Coil - Oscillator Plate Choke	.70
20-936	L8	Coil - 1st. I. F. Assembly	1.30
22-936	L9	Coil - 2nd. I. F. Assembly	1.30
23-936	L10	Coil - 3rd. I. F. Assembly	1.30

ALIGNMENT SAME AS
FOR MODEL-268
SEE INDEX

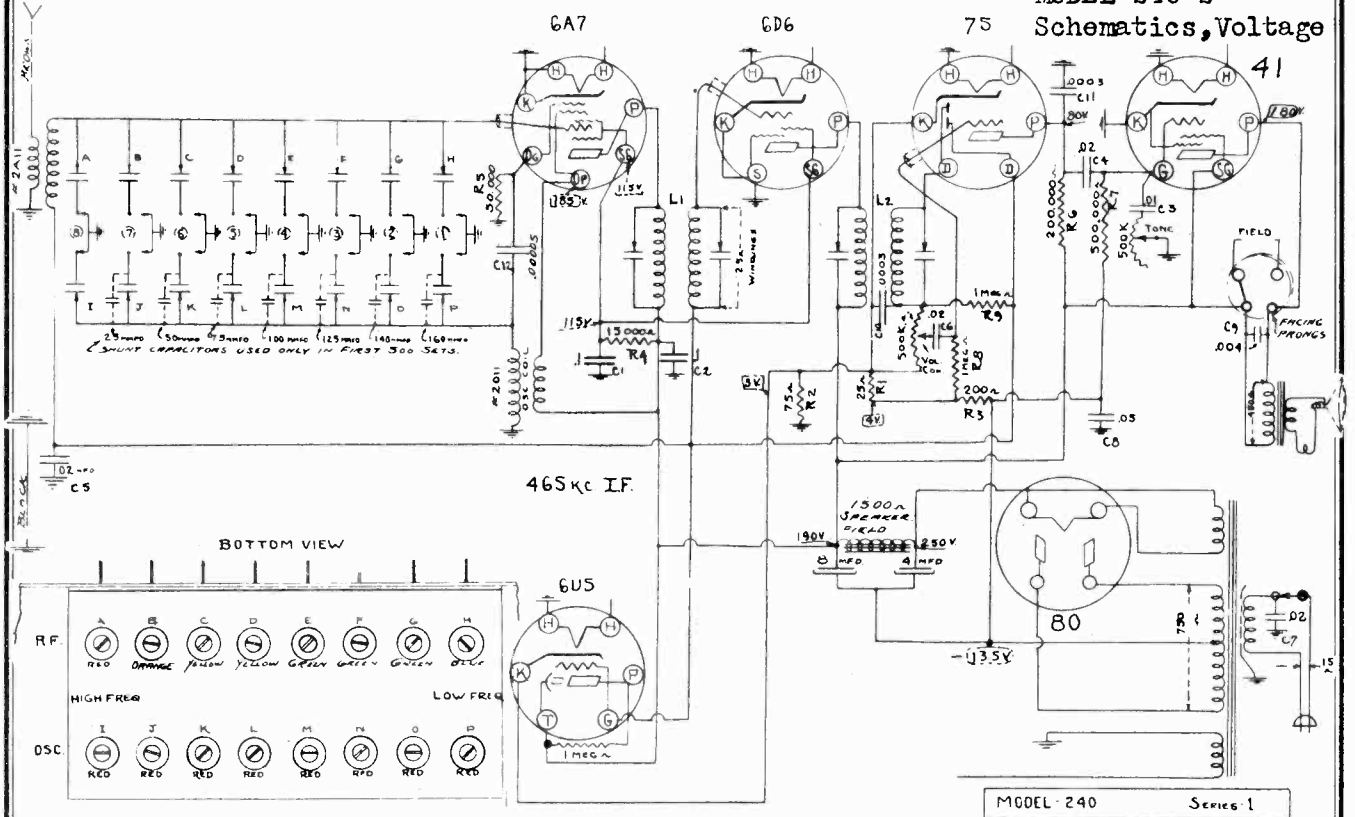
MODEL 7BT
Schematic, Voltage

HOWARD RADIO CO.



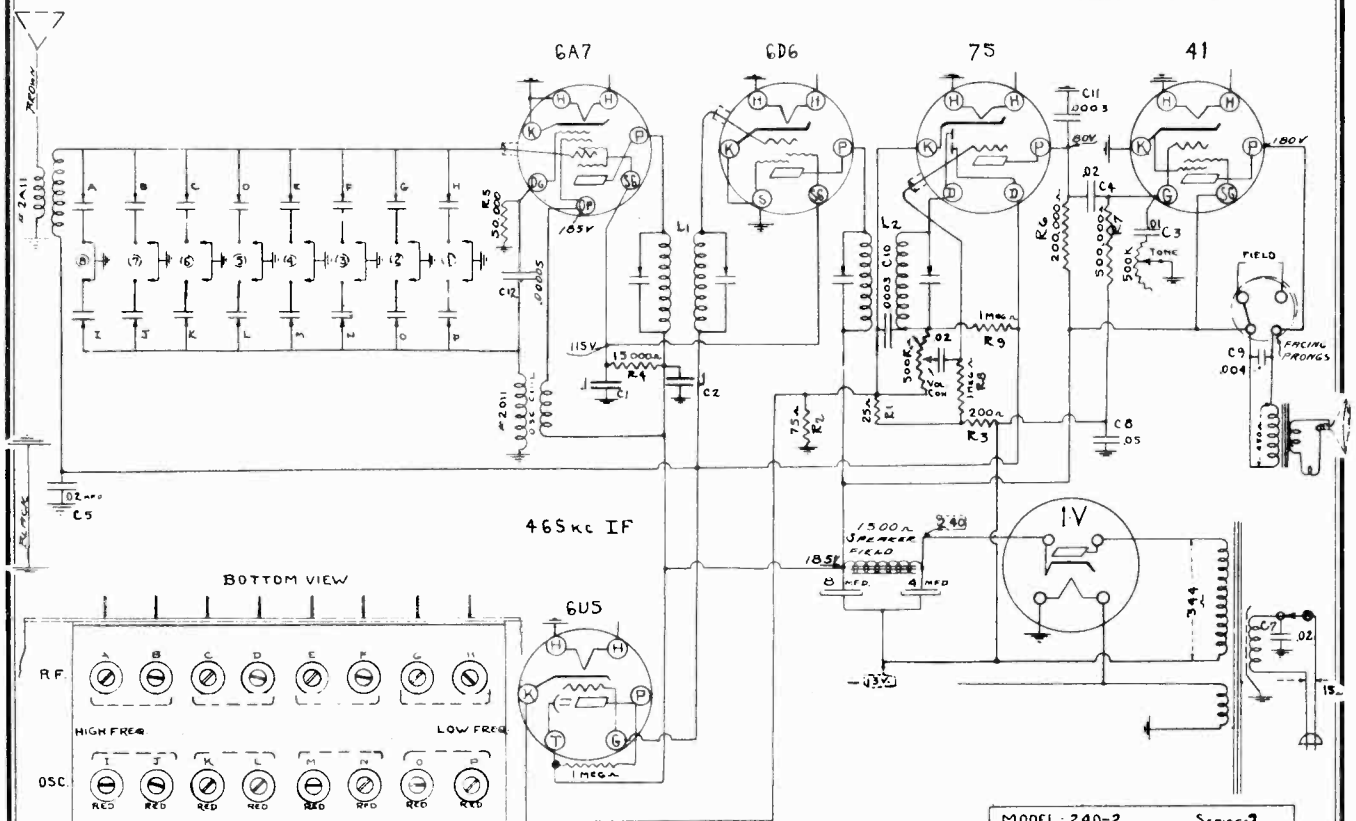
HOWARD RADIO CO.

MODEL 240-1
MODEL 240-2
Schematics, Voltage



FOR NOTES AND ALIGNMENT
SEE INDEX

Voltages Shown ☐ Taken from Ground. Line Voltage = 117 AC



Voltages Shown ☐ Taken from Ground. Line V. = 117 AC

MODELS 240-1, 240-2
Phono. Data, Parts
Tuner Data

HOWARD RADIO CO.

SET-UP INSTRUCTIONS

8	7	6	5	4	3	2	1
1150-1750 KC POLICE	1000-1500 KC	800-1200 KC	800-1200 KC	600-900 KC	600-900 KC	600-900 KC	550-800 KC

CONNECT AERIAL, POWER SUPPLY AND TURN ON VOLUME BEFORE STARTING STATION SET-UP

SET-UP INSTRUCTIONS

FIRST – Select button by number that will tune desired station according to frequency vs. buttons as shown above.

SECOND – Depress the button selected, then adjust red adjustment (be sure to adjust the adjustment having the same number as the depressed button.) Move this adjustment until desired station is heard.

THIRD – Next move the adjustment directly above until electric eye shows maximum deflection, then slightly re-adjust red adjustment for maximum eye deflection.

FOURTH – Insert the station call letter tab over button number just selected. Repeat this procedure for the remaining buttons.

EXAMPLE

Station desired, WGN. WGN frequency is 720 KC, therefore Button 2, 3, or 4 can be used. Button 3 is depressed on front of panel, the red adjustment above No. 3 is moved until WGN comes in. The adjustment directly above the red one is adjusted for maximum eye deflection, the red adjustment is again moved slightly to check eye for maximum deflection. WGN tab is removed from tab sheet and inserted in escutcheon over No. 3. Insert tab by pushing in place with finger-tip.

SUGGESTIONS

FIRST – Do not try to extend the adjustments beyond their frequency rating.

SECOND – Move adjustments slowly.

THIRD – Double-check before moving any adjustment to make sure adjustment number corresponds to button number. Carelessness in this manner will cause you to misadjust adjustments already completed.

FOURTH – Check adjustments occasionally for maximum deflection of eye, while receiver is in service. This will not have to be done often but it is good assurance that your receiver is always tuned properly. Sometimes it helps to have another receiver operating on the station desired so that station being tuned in by adjustment can be quickly recognized.

REPLACEMENT PARTS AND PRICE LIST
Models 240-1 and 240-2

PART NO.	LIST PRICE	DESCRIPTION	CIRCUIT LOCATION	PART NO.	LIST PRICE	DESCRIPTION	CIRCUIT LOCATION
32-936	$1.30	Coil - 1st I.F. Assembly, Complete. . . .	L1	46-262	$0.16	Condenser - .0003 Mfd. Mica	C10,C11
33-936	1.30	Coil - 2nd I.F. Assembly, Complete. . . .	L2		.16	Condenser - .00005 Mfd. Mica.	C12
2A11	.40	Coil - Antenna.		29-281	.75	Control - Volume.	
2011	.40	Coil - Oscillator		14-278	.95	Control - Tone and Switch	
28-266	1.25	Condenser - 8-4 Mfd. 400 Volt, Electrolytic.		1-290	.35	Cord - Line and Plug.	
				21-352	1.00	Escutcheon Plate.	
32-262	.25	Condenser - Trimmer - 2 Plate Model 240-1	A,I,J,K, L,M,N,O,P	22-490	.10	Button for Station Selector	
				460	.04	Grid Cap.	
33-262	.25	Condenser - Trimmer - 3 Plate Model 240-1	B	16-490	.10	Knob - Black Bakelite	
34-262	.25	Condenser - Trimmer - 4 Plate Model 240-1	C,D		.12	Resistor - 25 Ohm 1/2 Watt.	R1
35-262	.25	Condenser - Trimmer - 5 Plate Model 240-1	E,F,G		.12	Resistor - 75 Ohm 1/2 Watt.	R2
36-262	.30	Condenser - Trimmer - 6 Plate Model 240-1	H		.12	Resistor - 200 Ohm 1/3 Watt	R3
39-262	.40	Condenser - Trimmer - Dual Model 240-2	GH		.12	Resistor - 15,000 Ohm 1/2 Watt.	R4
40-262	.40	Condenser - Trimmer - Dual Model 240-2	EF		.12	Resistor - 50,000 Ohm 1/2 Watt.	R5
41-262	.40	Condenser - Trimmer - Dual Model 240-2	CD		.12	Resistor - 200,000 Ohm 1/3 Watt	R6
42-262	.35	Condenser - Trimmer - Dual Model 240-2	AB		.12	Resistor - 500,000 Ohm 1/3 Watt	R7
43-262	.40	Condenser - Trimmer - Dual Model 240-2	OP		.12	Resistor - 1 Megohm 1/3 Watt.	R8,R9
44-262	.40	Condenser - Trimmer - Dual Model 240-2	MN	2744	.15	Socket - 4 Prong.	
45-262	.40	Condenser - Trimmer - Dual Model 240-2	LK	2746	.15	Socket - 6 Prong.	
46-262	.35	Condenser - Trimmer - Dual Model 240-2	IJ	2747	.15	Socket - 7 Prong.	
	.16	Condenser - .1 Mfd. 400 Volt.	C1,C2	6-772	.15	Socket - 4 Prong, Speaker	
	.16	Condenser - .01 Mfd. 400 Volt	C3	9-917	2.50	Switch - Push-button, selector.	
	.16	Condenser - .02 Mfd. 400 Volt	C4	6601	.15	Tube Shield Shell	
	.16	Condenser - .02 Mfd. 200 Volt	C5,C6	9-771	.65	Tuning Eye Socket and Cable	
	.20	Condenser - .02 Mfd. Moulded.	C7	27-938	2.75	Transformer - Model 240-1 for 80 Tube . .	
	.16	Condenser - .05 Mfd. 200 Volt	C8	39-938	2.75	Transformer - Model 240-2 for 1V Tube . .	
	.16	Condenser - .004 Mfd. 400 Volt.	C9	42-810	4.00	Speaker - 5½" with plug	

NOTE: When ordering speaker parts such as cone, transformer or the field it is necessary that the number on the back of the speaker be specified. Also make of speaker.

THE ADAPTION OF THE SET FOR USE WITH PHONOGRAPH

Out of the back of the chassis there extends three lugs as shown in Diagram Fig. 1.
For phonograph use, the jumper is removed and a single pole, double throw switch is connected as shown in Fig. 2. The pick-up leads from the pick-up are connected to Nos. 1 and 2 terminals, with the overall shield grounded to No. 3 terminal.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

FIG. 1

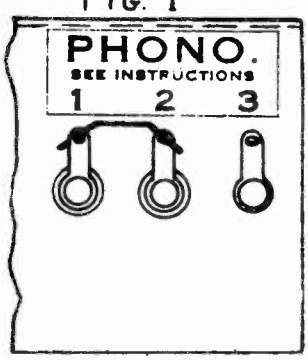
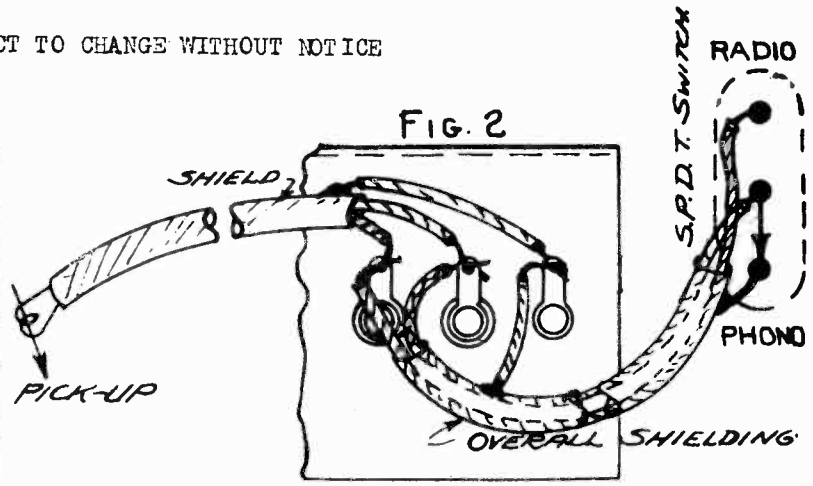
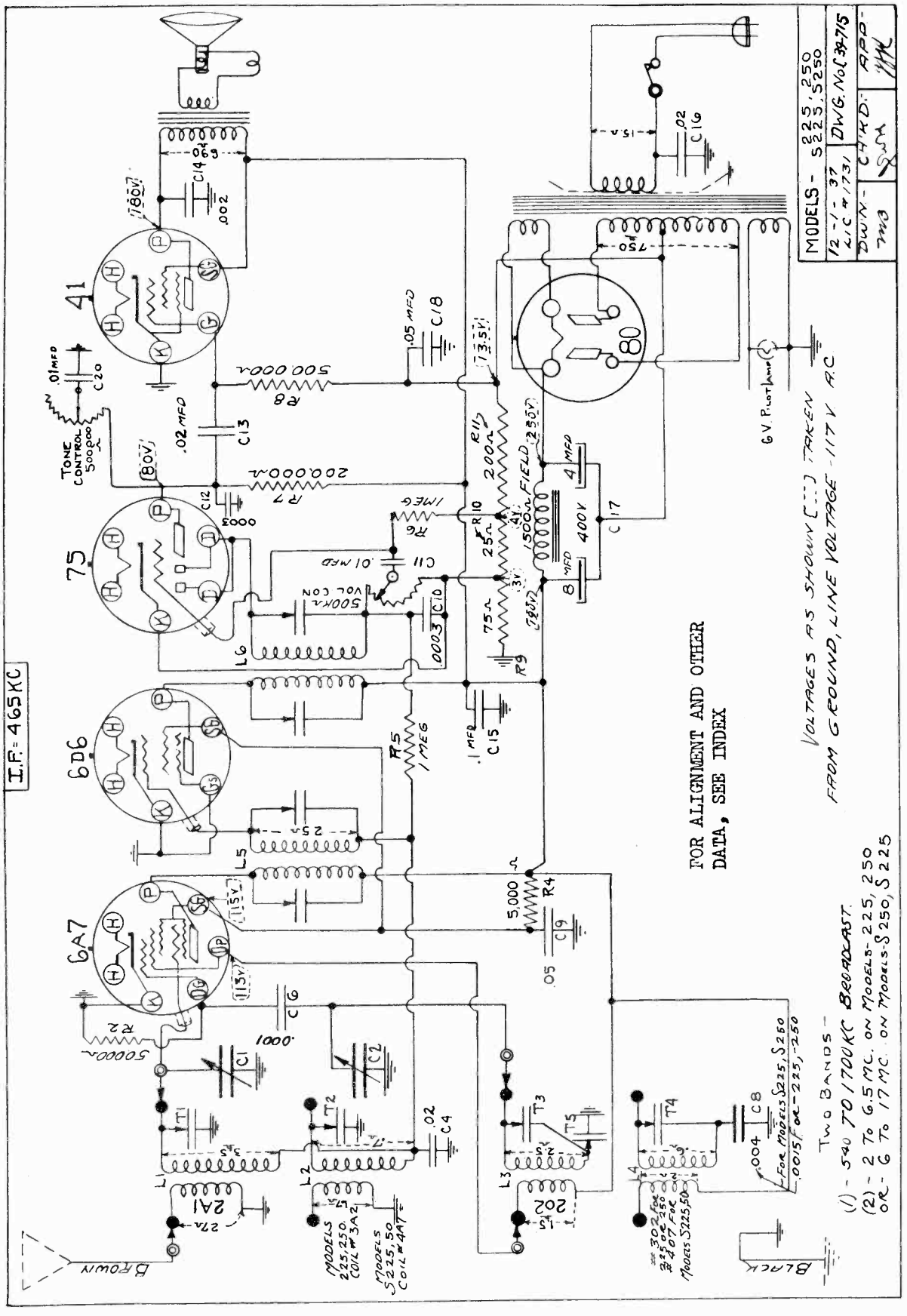


FIG. 2



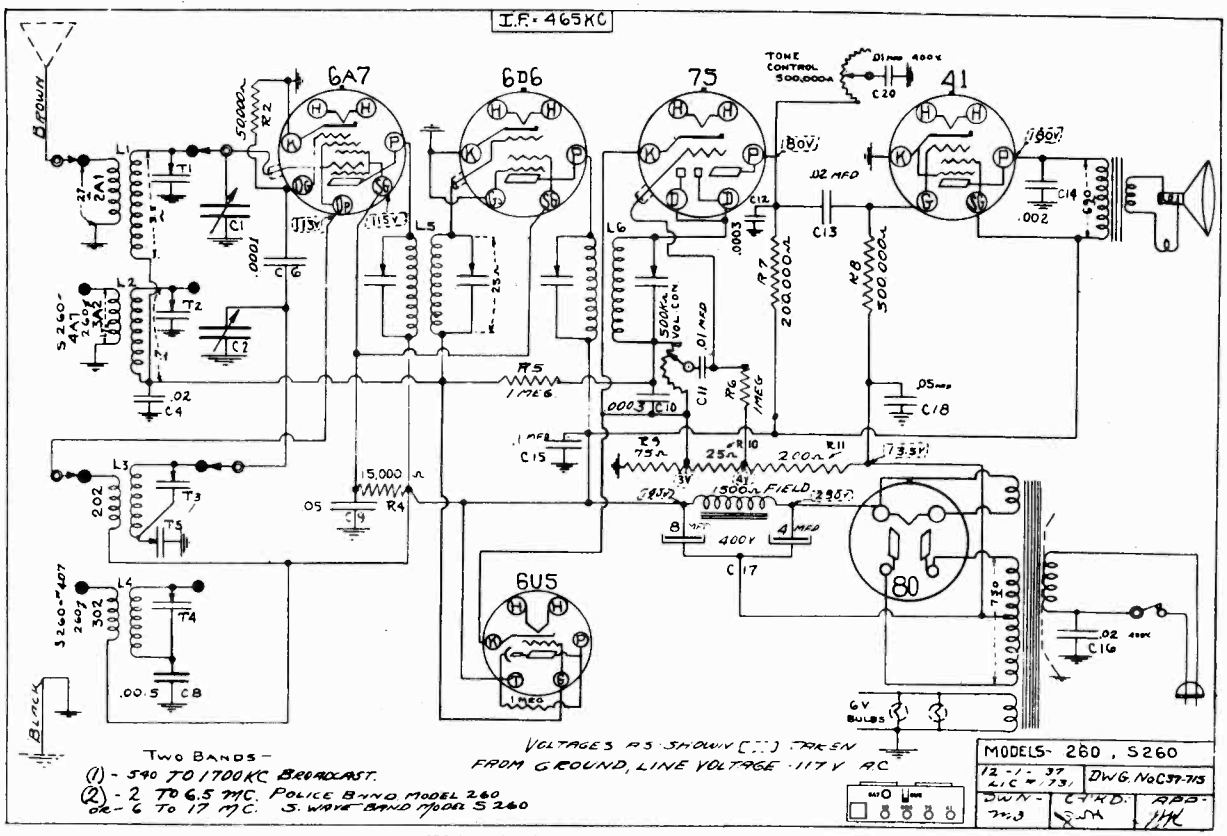
HOWARD RADIO CO.

MODELS 225, S225, 250, S250
Schematic, Voltage



MODELS 260,S260
Schematic,Voltage
Phono.Data,Parts

HOWARD RADIO CO.



MODELS - 225, 250 AND S225, S250, AND 260, S260

REPLACEMENT PARTS LIST

PART NO.	LIST PRICE	DESCRIPTION	CIRCUIT LOCATION	PART NO.	LIST PRICE	DESCRIPTION	CIRCUIT LOCATION
22-936	1.30	Coil - 1st. I. F. Assembly	L5	20-720	.04	Drive Shaft	
23-936	1.30	Coil - 2nd. I. F. Assembly	L6	4041	.05	Friction Disc - 1"	
2A1	.80	Coil - B. C. Antenna	L1	655	.01	Grommet - Black Rubber - For Antenna Lead	
202	.80	Coil - B. C. Oscillator	L3				
3AE	.40	Coil - S. W. Antenna	L2	7806	.04	Grommet - Rubber - 3/8" Hole	
For 225, 250, 260		#4A7 for S225, S250, S260		460	.05	Grid Cap - Large	
302	.40	Coil - S. W. Oscillator	L4	8-490	.15	Knob - Small	
For 225, 250, 260		#407 for S225, S250, S260		18-490	.15	Knob - Large	

THE ADAPTION OF THE SET FOR USE WITH PHONOGRAPH

Out of the back of the chassis there extends three lugs as shown in Diagram Fig. 1.
For phonograph use, the jumper is removed and a single pole, double throw switch is connected as shown in Fig. 2. The pick-up leads from the pick-up are connected to Nos. 1 and 2 terminals, with the overall shield grounded to No. 3 terminal.

FOR ALIGNMENT AND OTHER DATA, SEE INDEX.

FIG. 1

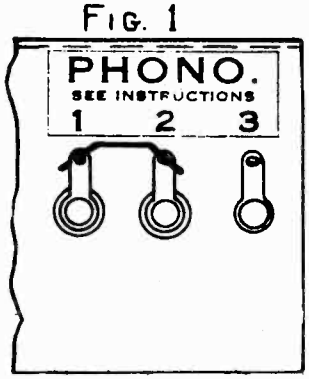
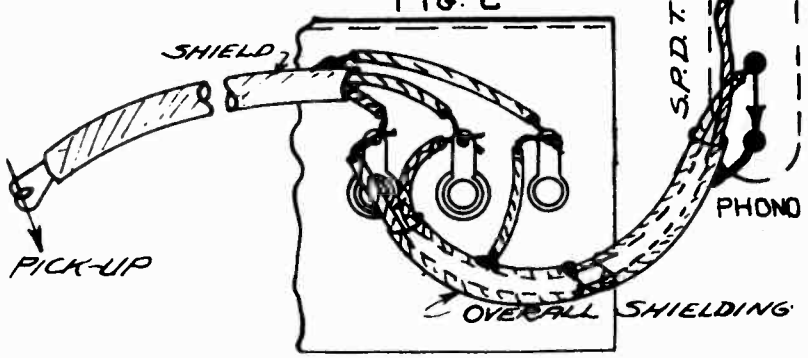
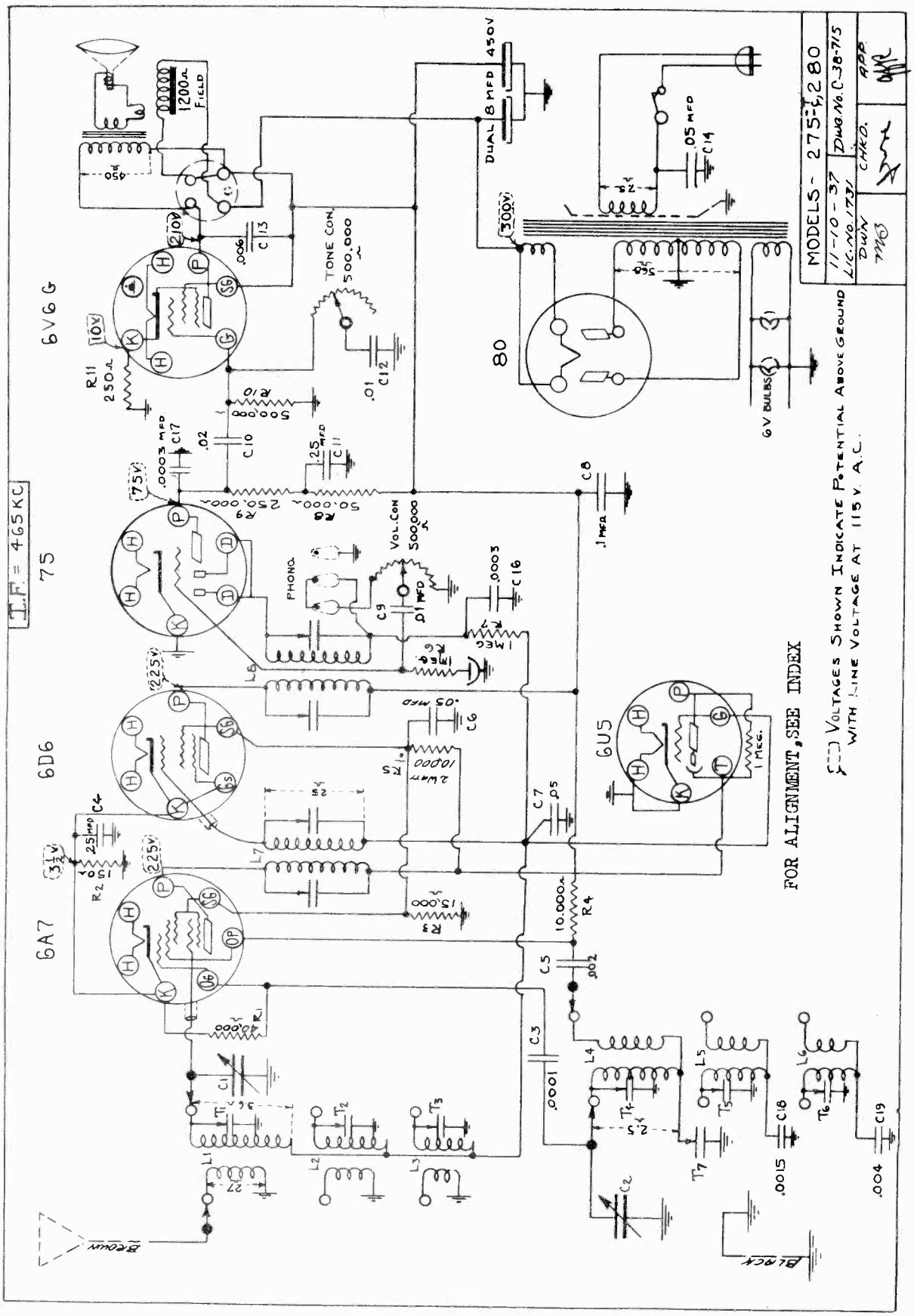


FIG. 2



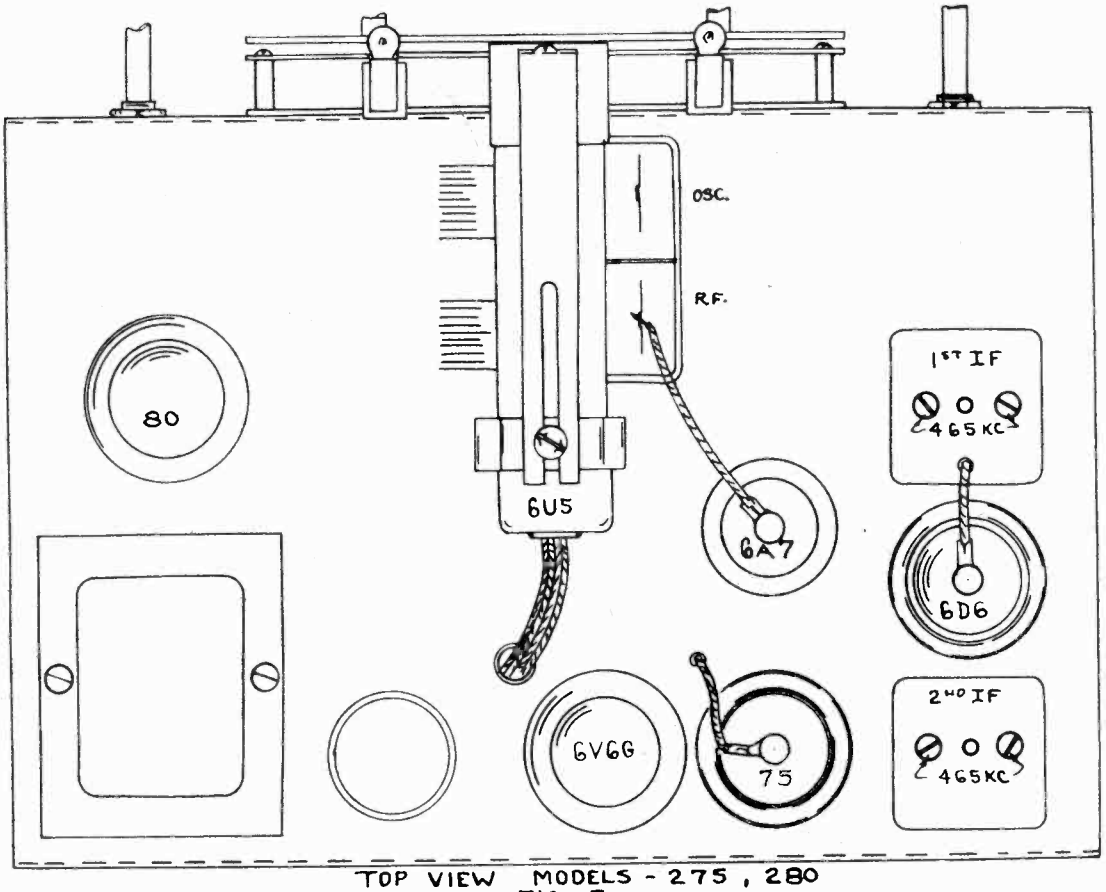
HOWARD RADIO CO.

MODELS 275C, 275T, 280
Schematic, Voltage

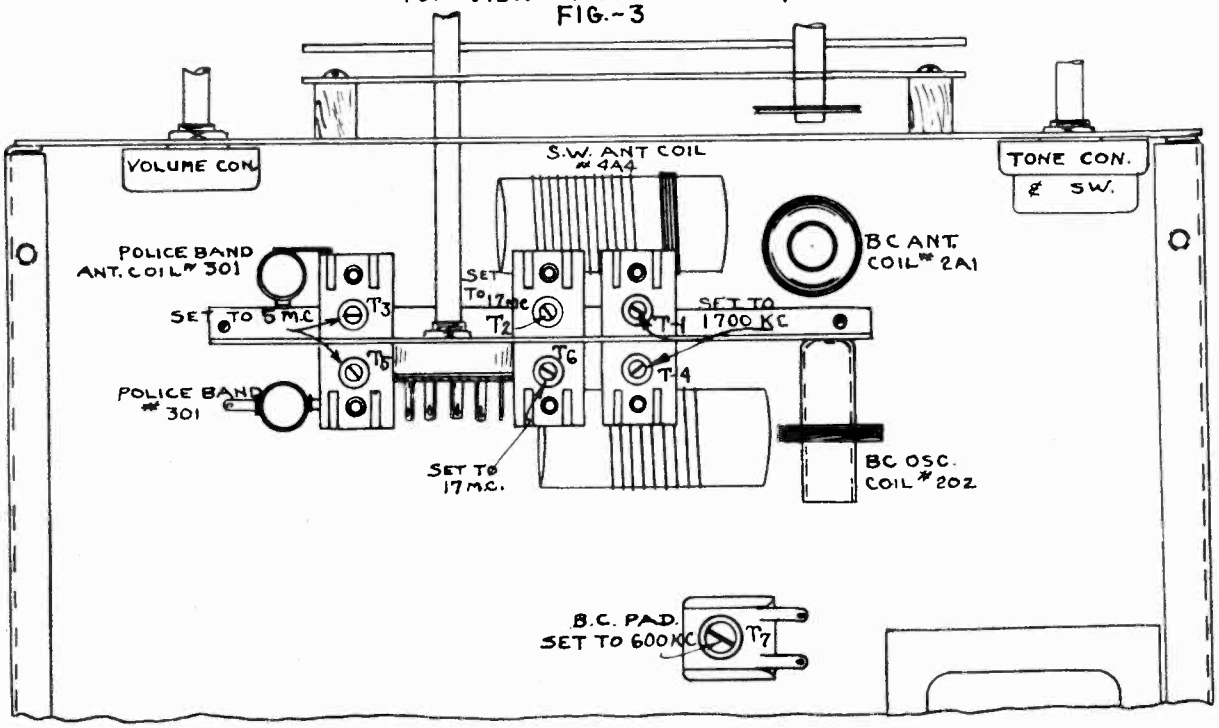


MODELS 275C, 275T, 280
Socket, Trimmers

HOWARD RADIO CO.



TOP VIEW MODELS - 275, 280
FIG.-3



BOTTOM VIEW MODELS 275, 280
FIG.-4

MODELS 225,250,260
Trimmers,Alignment,Part 1
MODELS 275C,275T,280
Alignment,Part 1

HOWARD RADIO CO.

MODELS 225,S225,250,S250
Socket,I-F Trimmers
Alignment,Part 1

THE I. F. STAGES

The I. F.'s are aligned by the usual system of feeding the intermediate frequency of 465 KC 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 T8, T9, T10, T11. (see pictorial diagram). Fig. 1.

The Sensitivity of the I. F. stages will be 25 to 50 microvolts or better for a 50 milliwatt output.

Always use as low an output as possible from the test oscillator in making the various adjustments.

ALIGNMENT OF POLICE BAND 2 TO 6.5 MEGACYCLES

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 6 megacycles.
2. Turn wave band switch all the way to right for Police Band, and set dial hand to 6 M. C.
3. Peak trimmer condenser T4 of the oscillator coil Fig. 2 to resonance with 6 M. C. fed into antenna.
4. Adjust antenna coil trimmer T2 to same frequency after the above mentioned oscillator trimmer has been set.

THE BROADCAST BAND FIG. 2 OR FIG. 2S

1. Turn wave band switch all the way to left and dial hand set to 1400 KC (the top scale).
2. Peak oscillator trimmer T3 to 1400 KC and antenna trimmer T1 to same frequency.
3. Set dial hand to 600 KC and adjust oscillator padding condenser T5 to 600 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.

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.

The models 225 and 250 are electrically the same chassis; the only difference being the cabinets in which they are mounted. These models have two band circuits covering the Broadcast Band 550 to 1700 KC and the so-called Police Band from 2 to 6.5 megacycles, having separate Antenna and Oscillator coils for each band.

The models S225 and S250 cover the Broadcast Band 550 to 1700 KC and the short wave band 5.5 to 18 MC.

The models 260 and S260 have the same circuit or the 225, S225 respectively with the addition of the tuning eye tube to indicate resonance.

The models 275, 275C and 280 are the same electrically, covering 3 bands, 550 to 1700 KC, 1.7 to 5.5 MC, and 5.5 to 18 MC.

THE OVERALL SENSITIVITY for the models described in this folder will be about 15 to 30 microvolts.

THE MAXIMUM OUTPUT to be obtained from the models 225, 250, 260 series will be about 2.25 watts. The undistorted output about 1-1/2 watts.

The 275 series will give you a maximum output of 5 watts, undistorted about 4 watts.

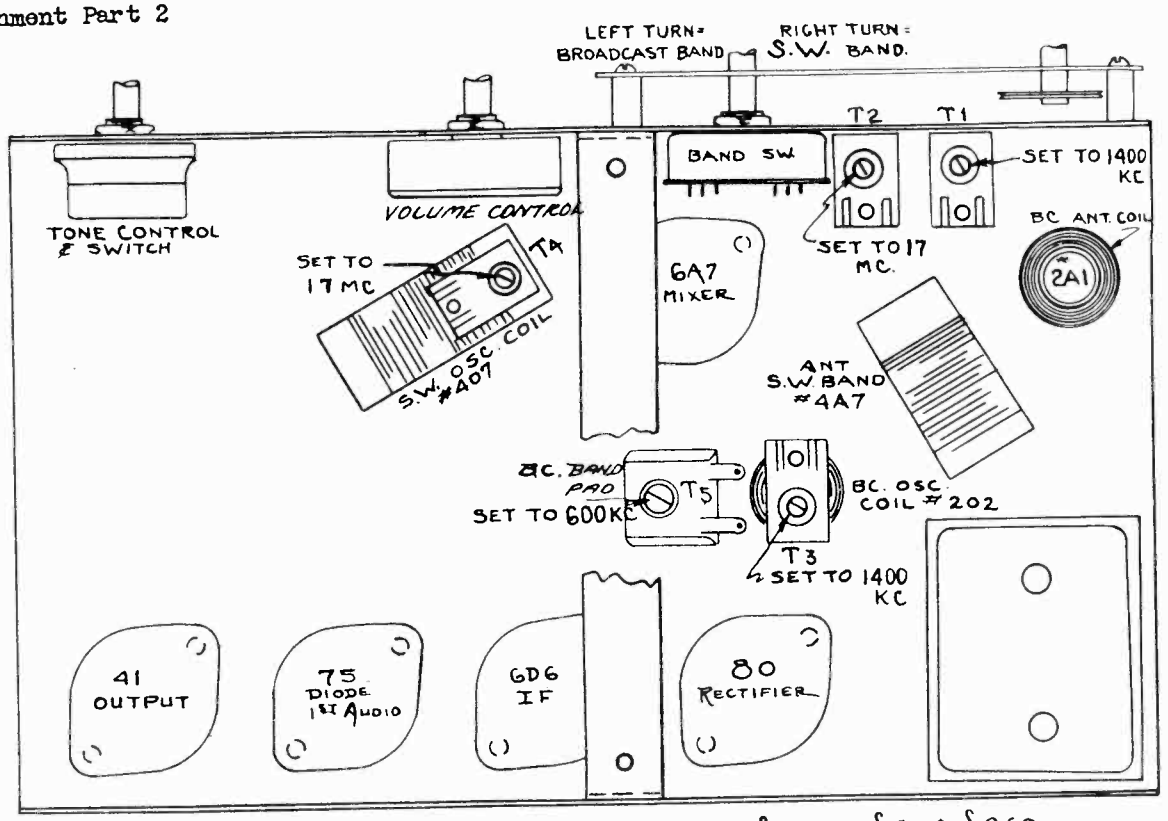
TOP VIEW 225,250,S225,S250
FIG. 1

BOTTOM VIEW - 225, 250, 260.
FIG. 2

MODELS S225,S250,S260
Trimmers,Alignment Part 2.

MODELS 275C,275T,280
Alignment Part 2

HOWARD RADIO CO.



BOTTOM VIEW - S 225, S 250, S 260
FIG.- 2S

ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M. C. ON ALL "S" MODELS - FIG. 2-S, ALSO FOR MODELS 275, 280

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 of the oscillator coil to resonance with 17 M. C. fed into antenna.
4. Adjust antenna trimmer to same frequency after the above mentioned oscillator trimmer has been set.

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.

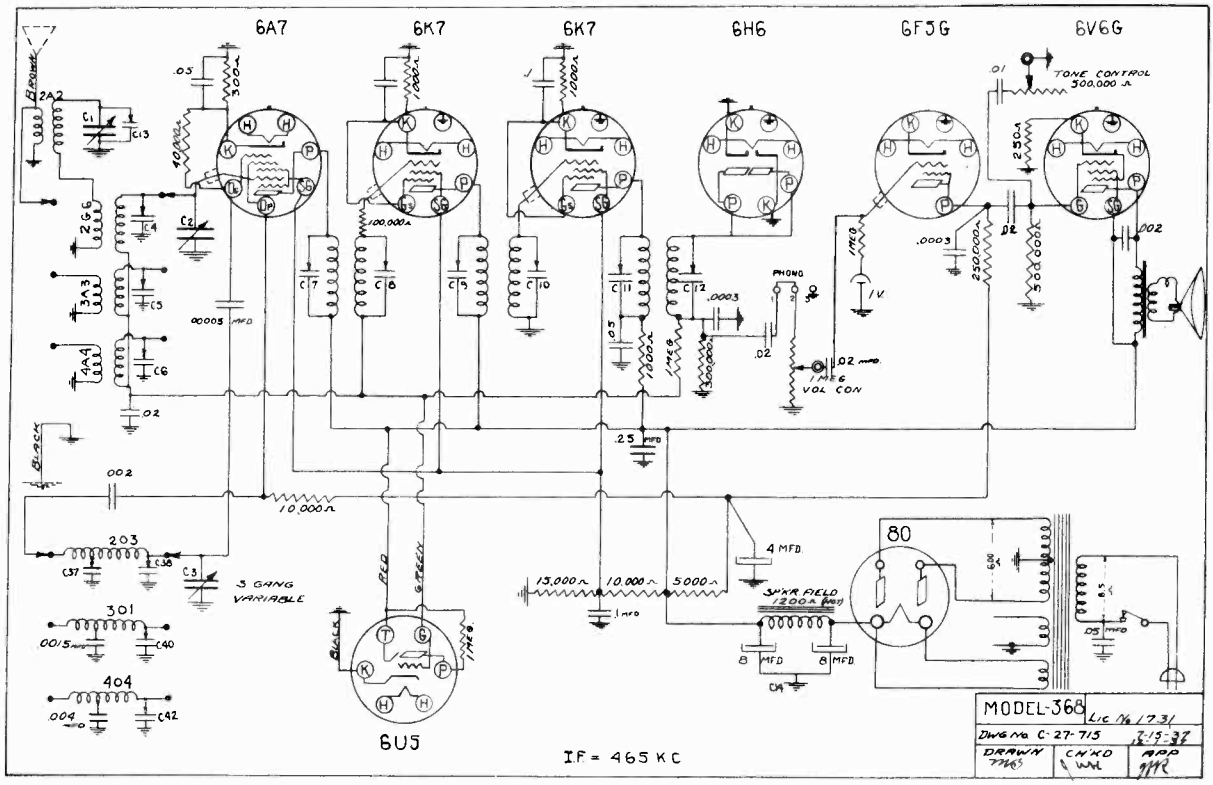
If no signal is heard, let oscillator trimmer off until it is heard at 16.9 M. C.

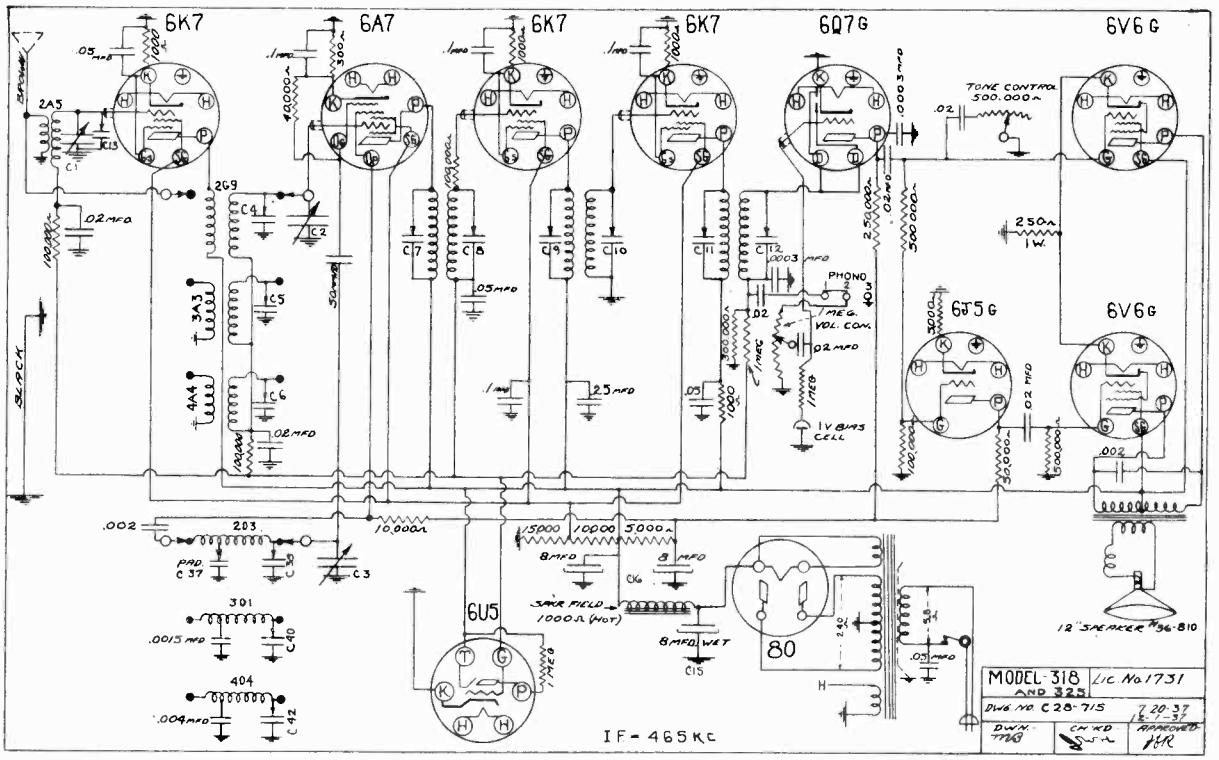
Reduce signal voltage from generator, go back to 17 M. C. and slightly correct this last trimmer adjustment.

The same applies to the 5 M. C. adjustment.

HOWARD RADIO CO.

MODELS 318,325
MODEL 368
Schematics





MODELS 318,325
MODEL 368
Parts List

HOWARD RADIO CO.

REPLACEMENT PARTS AND PRICE LIST

PART NO.	SCHEMATIC LOCATION	DESCRIPTION	LIST PRICE
7601		Bias Cell - 1 Volt.	.30
2A5		Coil - B. C. Preselector - Model 318.	.80
2A2		Coil - B. C. Preselector - Model 368.	.80
2C3		Coil - B. C. Oscillator	.80
2C9		Coil - B. C. Grid - Model 318	.80
2C6		Coil - B. C. Grid - Model 368	.80
4A4		Coil - S. W. Antenna.	.40
4C4		Coil - S. W. Oscillator	.40
3A3		Coil - P. B. Antenna.	.40
3C1		Coil - P. B. Oscillator	.40
20-936A		Coil - 1st. I. F. Assembly.	1.30
22-936A		Coil - 2nd. I. F. Assembly.	1.30
23-936A		Coil - 3rd. I. F. Assembly.	1.30
25-262	C-37	Condenser - Padding - 5 Plate	.25
8218-3	C4,C5,C6,C38,C40,C42	Condenser - Trimmer - 1 Section	.15
8116	C1,C2,C3	Condenser - Variable, 3 Gang.	3.75
8826-5	C16	Condenser - Dual 8 Mfd. 450Volt - Model 318	1.60
8824	C15	Condenser - 8 Mfd. 475 V. (Wet) - Model 318	1.15
19-266	C14	Condenser - 8-8-4 Mfd. - Model 368	1.75
		Condenser - .1 Mfd. 200 Volt.	.16
		Condenser - .1 Mfd. 400 Volt.	.16
		Condenser - .01 Mfd. 400 Volt	.16
		Condenser - .02 Mfd. 200 Volt	.16
		Condenser - .02 Mfd. 400 Volt	.16
		Condenser - .05 Mfd. 200 Volt	.16
		Condenser - .05 Mfd. 400 Volt	.16
		Condenser - .05 Mfd. 400 Volt - Moulded	.20
		Condenser - .25 Mfd. 400 Volt	.20
		Condenser - .002 Mfd. 200 Volt.	.16
		Condenser - .002 Mfd. 600 Volt.	.16
		Condenser - .004 Mfd. 400 Volt.	.16
		Condenser - .004 Mfd. 600 Volt.	.16
		Condenser - .006 Mfd. 600 Volt.	.16
		Condenser - .0015 Mfd. Mica	.25
		Condenser - .0003 Mfd. Mica	.16
		Condenser - .00005 Mfd. Mica.	.16
24-381		Control - Volume - 1 Megohm	.75
11-278		Control - Tone and switch	.95
1-290		Cord - A. C. Line and Plug.	.35
33-310		Dial Glass - Calibrated	1.00
7-235		Dial Glass Mounting Fingers	.01
15-448		Dial Hand	.20
21-270		Drive Shaft 1/4" dia.	.01
11-328		Drive Disc - .020, pyralin.	.15
4043		Drive Disc - 1" Friction - 7/16" hole	.05
4041		Drive Disc - 1" Friction - 5/16" hole	.05
17-352		Escutcheon.	.50
10-427		Escutcheon Glass.	.30
6-235		Escutcheon Mounting Fingers	.01
19-490		Knob - Large.	.15
19-490C		Knob - Coded.	.15
2-498		Lamp - Dial - 6 V. Bayonet Type	.12
		Resistor - 1 Megohm 1/3 Watt.	.12
		Resistor - 250 Ohm 1 Watt	.15
		Resistor - 300 Ohm 1/3 Watt	.12
		Resistor - 1,000 Ohm 1/3 Watt	.12
		Resistor - 5,000 Ohm 1/3 Watt	.12
		Resistor - 10M Ohm 1/2 Watt	.12
		Resistor - 30M Ohm 1/3 Watt	.12
		Resistor - 40M Ohm 1/3 Watt	.12
		Resistor - 50M Ohm 1/3 Watt	.12
		Resistor - 50M Ohm 1/2 Watt	.12
		Resistor - 100M Ohm 1/3 Watt.	.12
		Resistor - 250M Ohm 1/3 Watt.	.12
		Resistor - 300M Ohm 1/3 Watt.	.12
		Resistor - 500M Ohm 1/3 Watt.	.12
4-335		Resistor - Candohm - 3 Section.	.50
11-768		Socket - Pilot Light, & wire assembly	.15
2744		Socket - 4 Prong.	.15
2747		Socket - 7 Prong.	.15
6008		Socket - 8 Prong.	.15
6-772		Socket - 4 Prong (Special).	.15
18-914		Switch - Wave Band - 4 Pole, 3 Position	.80
		Switch - S.P.D.T. with Bracket for Phono.	.60
30-938		Transformer - Power - Model 318	4.25
29-938		Transformer - Power - Model 368	3.75
6-164		Tuning Eye Bracket Assembly	.20
6-771		Tuning Eye Socket & Cable	.65
17-400		Tuning Eye Sleeve	.04
1-167		Rubber Bumper - Dial Glass Mounting	.02
3-167		Rubber Bumper - Dial Face	.02
966		Rubber Grommet - Cabinet Mounting	.04
6515-2		Wing Screw - Cabinet Mounting	.04
36-810		Speaker - 12" with Plug - Model 318	8.50
35-810		Speaker - 6½" with Plug - Model 368	4.50

NOTE: When ordering speaker parts such as cone, transformer or the field it is necessary that the number on the back of the speaker be specified. Also make of speaker.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

MODELS 318, 325 AND 368

HOWARD RADIO CO.

MODELS 318,325
MODEL 368
Socket, Trimmers
Voltage

VOLTAGE READINGS TAKEN FROM GROUND WITH
LINE VOLTAGE AT 117 VOLTS AC
NO SIGNAL IN ANTENNA

MODEL 368

TUBE	PLATE	CATHODE	S.G.	
6A7	205	3	95	Osc. Plate = 180
6K7	205	4	95	
6K7	200	4.5	95	
6H6	-	-	-	
6F5G	85	-	-	
6V6G	190	12	210	
80	-	-	-	High V = 300 V

MODEL 318, 325

TUBE	PLATE	CATHODE	S.G.	
6K7	240	5.5	125	1st Stage
6A7	240	3	125	Osc. Plate = 145
6K7	240	6	125	I.F. Stage
6K7	240	6	-	
6Q7G	60	-	-	
6J5G	105	5½	-	
6V6G	230	16	240	
6V6G	230	16	240	
80	-	-	-	H. V. = 330

BOTTOM VIEW - MODELS. 368, 318, 325.
FIG-3

It is advisable to check the position of the tuning eye tube to make certain that it is not pushed against the inside of the dial card. With the adjustment screw on the bracket, allow a small amount of clearance between the end of the tube and the dial to avoid any possibility of the heat from the tube affecting the dial card.

MODELS 240-1,240-2
MODELS 318,325
MODEL 368
Alignment,Notes

HOWARD RADIO CO.

THE MAXIMUM OUTPUT for the models

MODEL	MAXIMUM	UNDISTORTED
368	5 Watts	4 Watts
318,325	11 Watts	9 Watts
240	2.25 Watts	1.5 Watts

The normal voltage readings at the sockets are given in a separate chart

GENERAL DESCRIPTION

THE MODEL 368 is an 8 tube set having three bands, coverage being 550 to 1700 KC, 1.7 to 5.5 MC and 5.5 to 18 MC. There are separate oscillators and R.F. coils for each band. For the broadcast band only a preselector coil is used, being tuned by the back section of the gang condenser.

The three I. F. stages are tuned to 465 KC followed with the conventional diode, amplifier, and single output circuits.

THE MODELS 318, 325 are the same chassis (the model numbers refer to different cabinet styles). This ten tube set has a similar R. F. and I. F. coil system except that the preselector stage on the broadcast band includes the 6 K7 tube. The output is push pull "beam power", the 6J5G being the inverter tube.

THE MODEL 240 series 1 and 2 is strictly a push-button tuner having no gang condenser. The eight push-button station selectors complete the ground circuit of the oscillator and R. F. tuned condensers previously set to whatever frequency desired. The eight circuits cover the complete range of the broadcast band from 540 to 1750 KC. The instructions for the set-up are shown on separate page of this manual.

The model 240-1 used the 80 tube for a rectifier and the model 240-2 uses the 1V type tube.

FOR REPLACEMENT PARTS refer to the part list. When ordering specify serial number of set as well as the part number.

FOR CIRCUIT VOLTAGES refer to the charts shown in the following pages for models 368 and 318. The voltages for the model 240 are shown on the schematic diagrams.

THE ALIGNMENT PROCEDURE

The alignment procedure for the 368-318 models is given in the following pages. We suggest, however, that no attempt be made in changing the trimmer adjustments unless it is found that a change is necessary.

We suggest in case of any trouble the tubes, especially the 6J5G and the 6F5 types, be checked.

The only other trouble that might occur is in cases of extreme low A. C. line voltage of 100 volts or less, by which the oscillator plate voltage might drop to too low a potential.

THE OVERALL SENSITIVITY for the model 368 will be about 8 to 12 microvolts, model 318, 325 about 2 to 4 microvolts and the model 240, 15 to 30 microvolts.

I. THE I.F. STAGES

The intermediate frequency stages are aligned in the usual manner by feeding 465 K.C. into the grid of the mixer tube 6A7.

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.

Always use as low an output as possible from the signal generator when making the various adjustments.

The sensitivity of the I.F. system alone will be found to be between 15 and 20 Microvolts.

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 of the oscillator coil to resonance with 17 M. C. fed into antenna. T6
4. Adjust antenna trimmer to same frequency after the above mentioned oscillator trimmer has been set. T2

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.

ALIGNMENT OF POLICE BAND 1.7 TO 5.5 M.C.

1. Set the test oscillator to 6 megacycles.
2. Turn wave band switch to the middle position for Police Band, and set dial hand to 6 M. C.
3. Peak trimmer condenser T5 of the oscillator coil Fig. 4 to resonance with 6 M. C. fed into antenna.
4. Adjust antenna coil trimmer T3 to same frequency after the above mentioned oscillator trimmer has been set.

THE ALIGNMENT OF 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 T4 to 1400 KC and antenna trimmer T1 to same frequency. Likewise C13 trimmer on the gang condenser.
3. Set dial hand to 600 KC and adjust oscillator padding condenser T5 to 600 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.

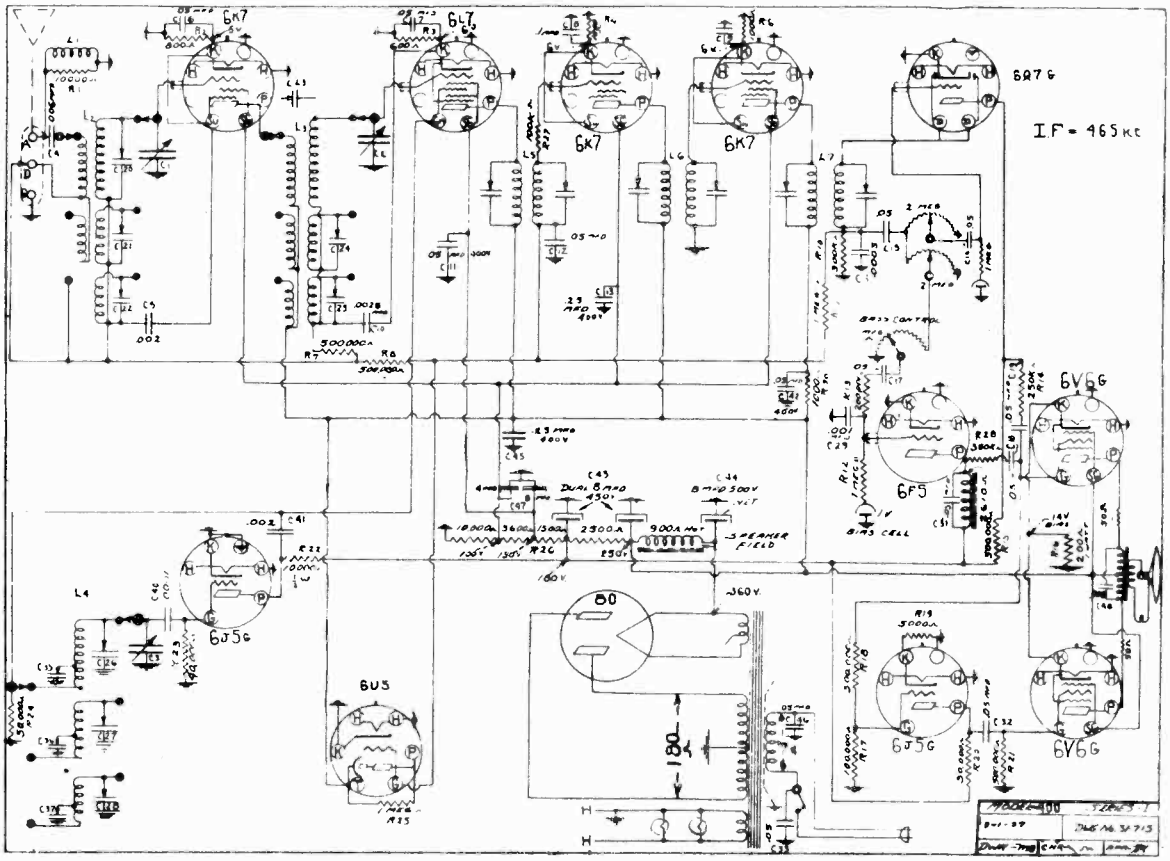
NOTES

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.

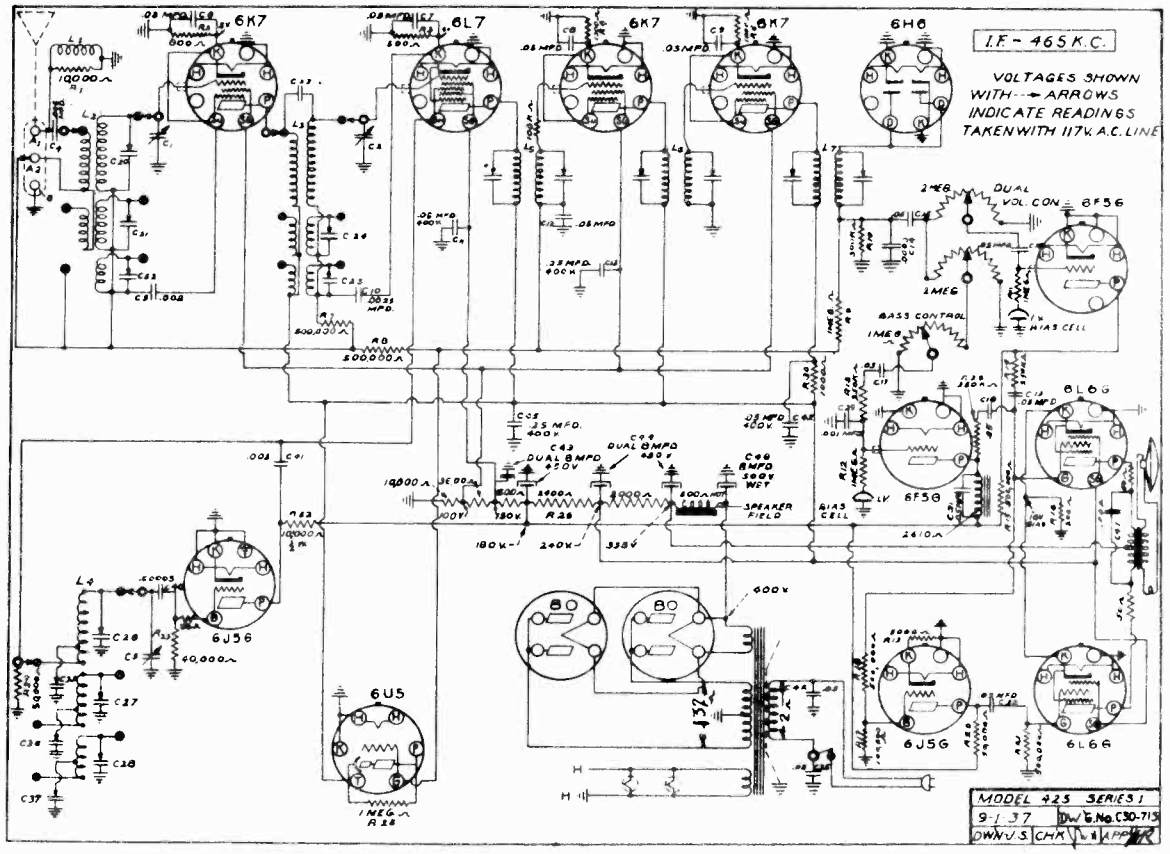
HOWARD RADIO CO.

MODEL 400
MODEL 425
Schematics, Voltage

400



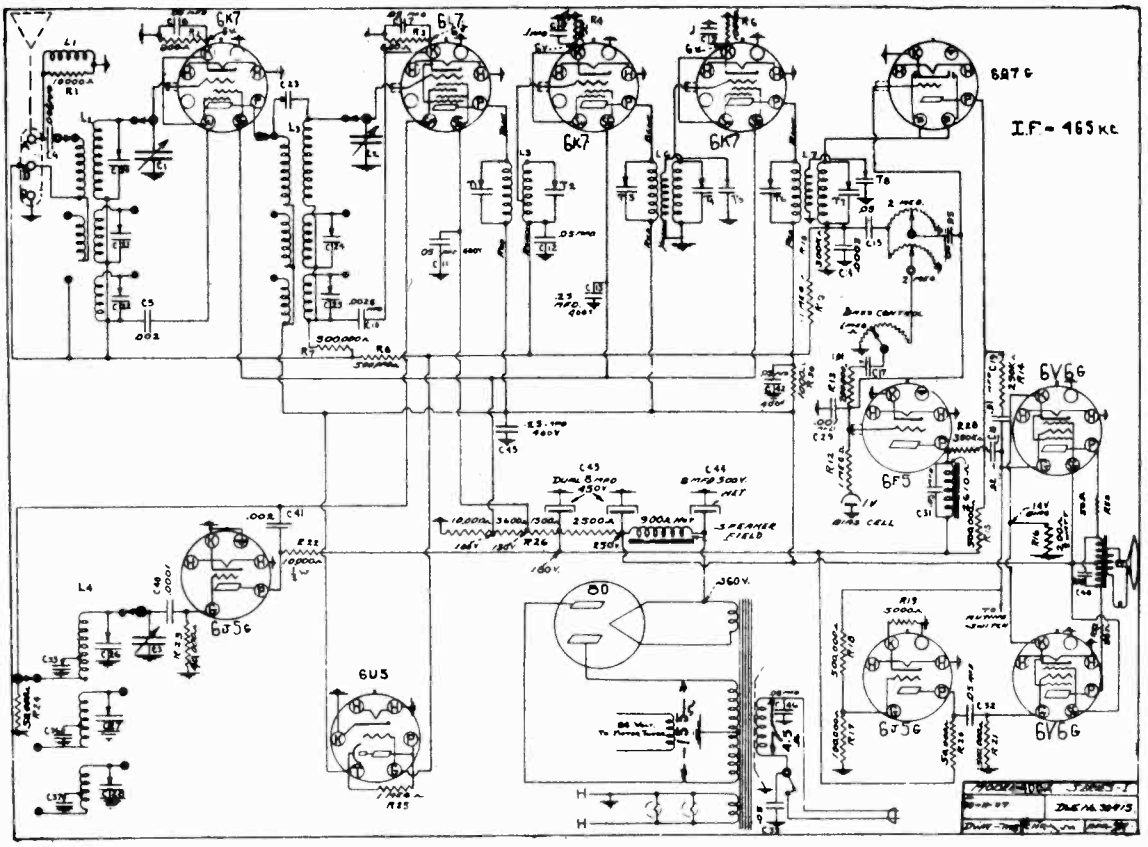
425



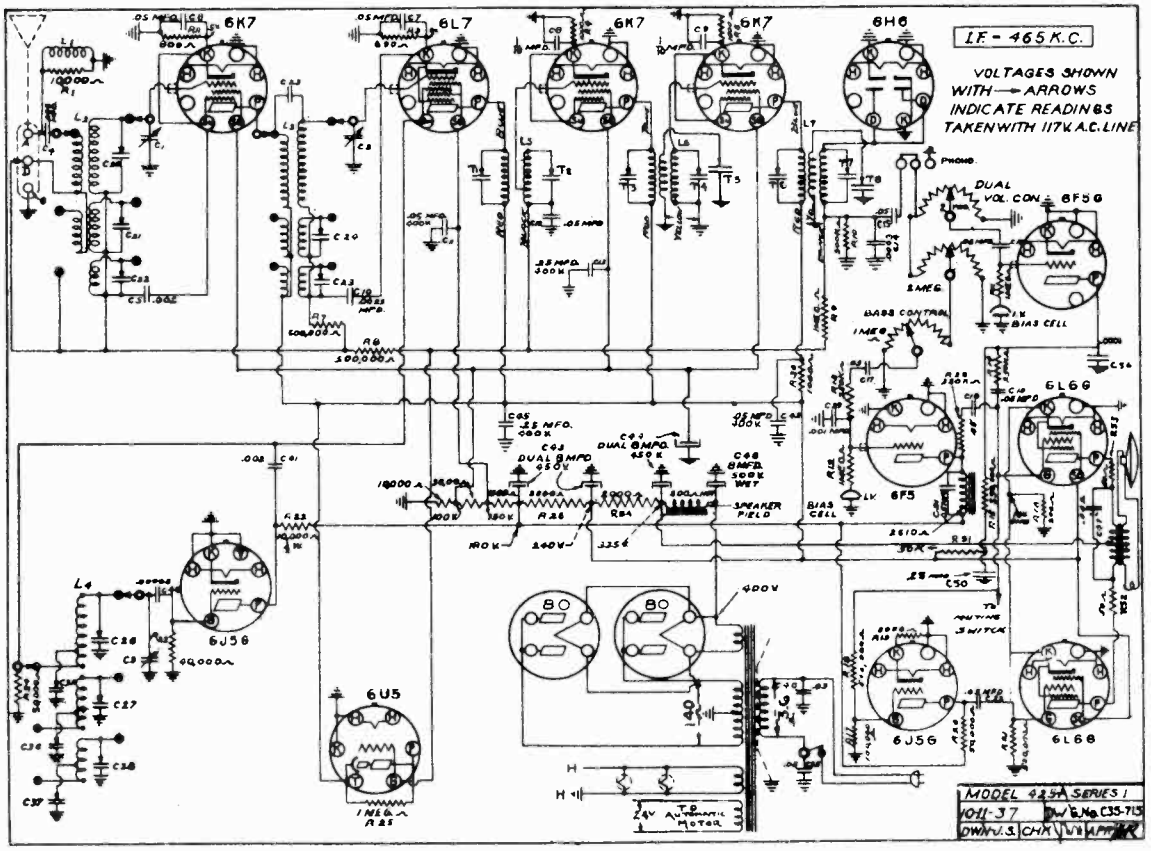
MODEL 400-A
MODEL 425-A
Schematics, Voltage

HOWARD RADIO CO.

400-A



425-A



HOWARD RADIO CO.

MODELS 400,400-A
MODELS 425,425-A
Parts,Phono.,Notes

MODEL 400A AND 425A

REPLACEMENT PARTS LIST

PART NO.	LIST PRICE	DESCRIPTION	400A CIRCUIT LOCATION	425A CIRCUIT LOCATION
AC-2	.30	Antenna Choke	L1	L1
7601	.30	Bias Cell - 1 Volt.		
14-212	.90	Choke - Audio		
34-936	2.20	Coil - 1st. I. F. Assembly, 400A-425A	L5	L5
35-936	2.20	Coil - 2nd. I. F. Assembly, 400A-425A	L6	L6
36-936	2.20	Coil - 3rd. I. F. Assembly, 400A-425A	L7	L7
3681	3.50	Coil - Antenna Assembly, Complete.	L2	L2
3682	3.50	Coil - Interstage Assembly, Complete.	L3	L3
3683	3.50	Coil - Oscillator Assembly, Complete.	L4	L4
25-262	.25	Condenser - 5 Plate - Padding	C35	C35
26-262	.30	Condenser - 9 Plate - Padding	C36	C36
27-262	.40	Condenser - 13 Plate - Padding	C37	C37
23-270	7.00	Condenser - Variable, 3 Gang, 400A-425A	C1, C2, C3	C1, C2, C3
17-266	1.20	Condenser - 8 Mfd. 475 Volt (Wet)	C44	C48
29-266	1.75	Condenser - 8-8 Mfd. 450 Volt	C43	C43, C44
	.18	Condenser - .1 Mfd. 200 Volt	C8, C9	C8, C9
	.16	Condenser - .05 Mfd. 200 Volt	C6, C7, C12, C15	C6, C7, C12, C31
	.16	Condenser - .05 Mfd. 400 Volt	C16, C31	C15, C16, C17
			C11, C32, C42	C11, C32, C42
	.20	Condenser - .05 Mfd. 400 Volt - Moulded.	C18, C19	C18, C19
	.18	Condenser - .02 Mfd. 400 Volt	C33, C46	C35, C46
	.16	Condenser - .25 Mfd. 400 Volt	C13, C45	C45, C60, C13
	.16	Condenser - .002 Mfd. 600 Volt.	C41, C48	C41, C47
	.16	Condenser - .01 Mfd. 400 Volt	C19, C17	
	.16	Condenser - .006 Mfd. 600 Volt.	C4	C4
1801	.25	Condenser - .001 Mfd. Mica.	C29	C29
2287	.25	Condenser - .002 Mfd. Mica.	C5	C5
2366	.16	Condenser - .0001 Mfd. Mica	C40	C50
8304	.16	Condenser - .0003 Mfd. Mica	C14	C14
8305	.25	Condenser - .0025 Mfd. Mica	C10	C10
	.16	Condenser - .00005 Mfd. Mica.		C40
12-278	.90	Control - Bass with Switch.		
25-281	1.35	Control - Volume - Dial Section		
1-290	.40	Cord - A.C. Line and Plug		
9-427	1.25	Dial Glass - Calibrated ∮ 32-310.		
7-235	.01	Dial Glass Clip		
16-448	.20	Dial Hand		
3-658	.01	Knurled Head Screw for Hand 6-32 x 1/2		
8-448	.15	Band Spread Hand		
17-352	1.25	Escutcheon		
10-427		Escutcheon Glass		
6-235	.12	Channel Rubber for above - 22"		
1-553	.01	Escutcheon Mounting Clip		
22-720	.04	Speed Nut for Escutcheon		
4-328	.10	Drive Shaft - Pyrolin, 3"		
4-331	.05	Drive - Idler Disc - Pyralin, 3"		
7806	.04	Friction Disc Assembly		
966	.04	Grommet - Live Rubber for 3/8" hole		
19-490	.15	Grommet - Chassis Mounting		
19-490C	.15	Knob - Large.		
		Knob - Large, Coded for Band Switch		

PART NO.	LIST PRICE	DESCRIPTION	400A CIRCUIT LOCATION	425A CIRCUIT LOCATION
2-498	.12	Lamp - Dial, Bayonett Type.		
	.12	Resistor - 50 Ohm 1/2 Watt.	R52, R53	R52, R53
	.15	Resistor - 200 Ohm 2 Watt	R16	R16
	.12	Resistor - 800 Ohm 1/3 Watt	R3	R3
	.12	Resistor - 800 Ohm 1/3 Watt	R2	R2
	.12	Resistor - 1,000 Ohm 1/3 Watt	R6, R4, R30	R30, R4, R6
	.15	Resistor - 2,000 Ohm 2 Watt		R54
	.12	Resistor - 5,000 Ohm 1/3 Watt	R19	R19
	.12	Resistor - 10,000 Ohm 1/3 Watt.	R1	R1
	.16	Resistor - 10,000 Ohm 1/2 Watt.	R22	R22
	.15	Resistor - 40,000 Ohm 1/2 Watt.	R23	R23
	.12	Resistor - 50,000 Ohm 1/3 Watt.	R20, R24	R20, R24, R51
	.12	Resistor - 100,000 Ohm 1/3 Watt	R17	R17
	.15	Resistor - 100,000 Ohm 1/2 Watt		
	.12	Resistor - 200,000 Ohm 1/3 Watt	R13	R13
	.12	Resistor - 250,000 Ohm 1/3 Watt	R14	R14
	.12	Resistor - 300,000 Ohm 1/3 Watt	R10	R10
	.12	Resistor - 350,000 Ohm 1/3 Watt	R28	R28
	.12	Resistor - 500,000 Ohm 1/3 Watt	R18, R15, R8, R21	R15, R8, R21
	.12	Resistor - 500,000 Ohm 1/2 Watt	R7	R7
	.12	Resistor - 1 Megohm 1/3 Watt	R9, R12	R9, R12
3-335	1.20	Resistor - Cardohm - 4 Section.	R26	R26
	.04	Screw - Wing, for Chassis Mounting.		
11-766	.15	Socket - Pilot Light.		
2744	.16	Socket - 4 Prong.		
6008	.15	Socket - 6 Prong.		
7-772	.15	Socket - 5 Prong (Special).		
39-610	8.00	Speaker - 12" - (Model 400A).		
39-610	14.25	Speaker - 15" - (Model 425A).		
22-914	1.75	Switch - Wave Band, 3 Position.		
33-938	7.00	Transformer - Power - (Model 400A)		
34-938	7.00	Transformer - Power - (Model 425A)		
6-771	.65	Tuning Eye Socket and Cable		
21-400	.04	Tuning Eye Sleeve		

PARTS FOR MOTOR AUTOMATIC

PART NO.	LIST PRICE	DESCRIPTION
1-548	5.75	Automatic Tuning Motor.
7-917	2.50	Selector Button Switch.
13-6020	.90	Selector Cable with Plug.
8-772	.20	Selector Socket for above.
8-917	.30	Switch - S.P.S.T. Toggle (Muting Switch).
20-352	1.00	Escutcheon for Push-Buttons.
1-285	2.60	Commutator Disc Assembly, Complete.
5-450	.25	Selector Brush Holder (Station Contactor) with washers.
1-575	.15	Contactor Pin for above (Steel) No. 2-575 for carbon type.
49-786	.05	Spacer for mounting rear hand.
19-448	.20	Dial Hand (Rear).
4-658	.10	Numbered Screws - (4-36 x 3/16).
6-829	.10	Spring Coil Type - 3/8 long (For Contact Pin).
5-829	.10	Spring - Coil Type, for contact sleeve
	.03	Screws - ∮ 6 x 1/4" Knurled (Button Plate).
8-502	.30	Station Lettered Tab Sheet.
	.06	Contact Lugs for Button Assembly.
	.06	Push Buttons.

PARTS FOR MODELS 400 AND 425
Same as above with following exceptions:

PART NO.	LIST PRICE	DESCRIPTION	LOCATION
20-936	$1.30	Coil 1st. I. F. Assembly	C1, 2, 3
22-936	1.30	Coil 2nd. I. F. Assembly	
28-936	1.30	Coil 3rd. I. F. Assembly	

PART NO.	LIST PRICE	DESCRIPTION	LOCATION
22-270	$6.00	Condenser 3 Gang	
31-938	5.50	Power Transformer Model 400	
32-938	6.25	Power Transformer Model 425	

THE ADAPTION OF THE SET FOR USE WITH PHONOGRAPH

Out of the back of the chassis there extends three lugs as shown in Diagram Fig. 1.
For phonograph use, the jumper is removed and a single pole, double throw switch is connected as shown in Fig. 2. The pick-up leads from the pick-up are connected to Nos. 1 and 2 terminals, with the overall shield grounded to No. 3 terminal.

THE OVERALL SENSITIVITY for all models 425,425-A,400,400-A will be from 1 to 3 microvolts.

THE MAXIMUM OUTPUT for the models 400 and 400-A will be about 12 watts, undistorted 10 watts.

The models 425 and 425-A have maximum output of 20 and undistorted about 15 w

FIG. 1

FIG. 2

MODELS 400,400-A
MODELS 425,425-A
Antenna Data, Notes
Tuner

HOWARD RADIO CO.

THE MODEL 400 is a 12 tube, 3 band receiver with all coils shielded. (See Fig. 4) for the coil location with its trimmers and padding condensers for each band. It has three stages of I. F. tuned to 465 KC. The 6F5 is a bass boost stage regulated by the bass control. The 6J5G is a phase inverter with push-pull 6V6Gs in the output. See schematic for further details.

THE MODEL 425 is a 14 tube set having the same R. F. and I. F. circuits as the Model 400. The output stage uses two 6L6Gs. See schematic.

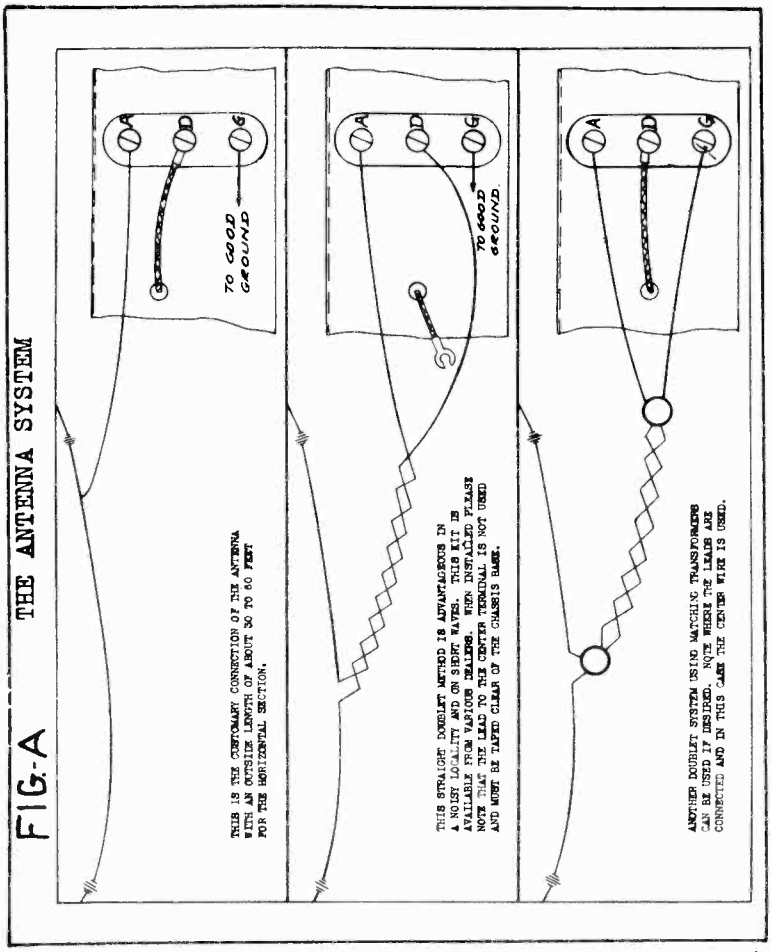


FIG-A THE ANTENNA SYSTEM

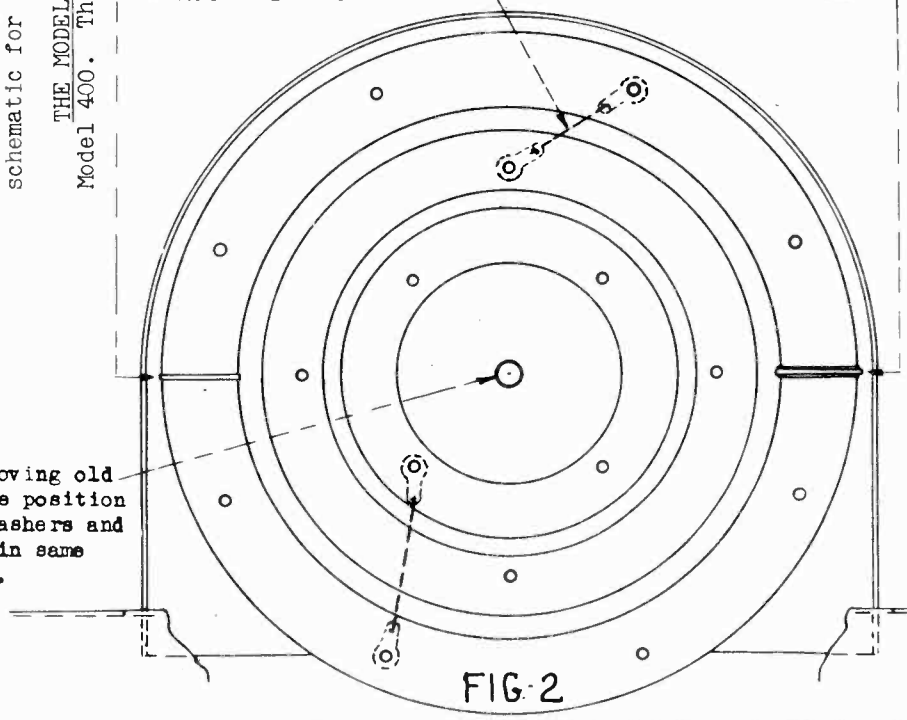
THE MODELS 400-A and 425-A have the same electrical circuit as the 400 and 425 respectively. (See Fig. 5) for coil location. These models employ the Howard motor automatic tuning feature by use of the reversible motor controlled by the commutator disc near the back of the set.

Set-up instructions are included in the following pages. Fig. 1 shows the schematic circuit of the motor system.

Should any replacement of a part on the contact-commutator system be necessary (See Fig. 2) for directions. In case of any trouble with the contacts or commutator disc, carefully examine the split groove to see if it is smooth and in good shape.

No trouble will be experienced with the motor itself. In shipment sometimes the motor shaft might get bent due to the tuning knob being struck.

BE SURE SHORT JUMPER (ON OPPOSITE SIDE) IS AT THE TOP WHEN MOUNTING DISC INTO POSITION. ALSO GANG CONDENSER MUST BE AT FULL CAPACITY AND THE SLOTS IN THE DISC STRAIGHT ACROSS.



The slot insulators must be smooth, even with the face plate and without grooves.

When removing old disc note position of lockwashers and remount in same position.

BACK VIEW

DIRECTIONS FOR PROPERLY LOCATING COMMUTATOR DISC

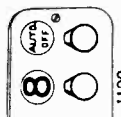
FIG-2

HOWARD RADIO CO.

MODEL 400-A
MODEL 425-A
Tuner Data

ADJUSTMENT OF HOWARD MOTOR AUTOMATIC

FIRST - Select and depress the push-button by number that will include the desired station according to frequency chart listing below:-



1	2	3	4	5	6	7	8
540 to 580 KC	570 to 620 KC	600 to 670 KC	650 to 720 KC	700 to 820 KC	800 to 990 KC	880 to 1720 KC	1100 to 1720 KC

Frequency Chart Listing

NOTE - The above chart shows selector set-up for continuous coverage. However there are many alternate arrangements possible. Refer to the frequency calibration on selector back-plate for any other arrangement necessary for the particular locality.

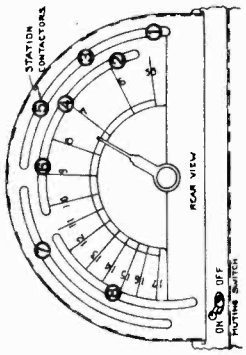
SECOND - Reach to back of chassis and turn muting switch to OFF position.

LOCATE THE SAME NUMBERED STATIONS CONTACTOR ON BACK OF TUNING CONDENSER THAT CORRESPONDS TO THE BUTTON DEPRESSED IN FIRST PARAGRAPH, AND SLIDE UNTIL THE DESIRED STATION IS TUNED IN.

With the muting switch in the OFF position the stations will be heard while moving the slide contactor. For silent tuning after all adjustments are made, turn switch to ON position.

THIRD - Remove station call letter tab from tab sheet and insert in place with finger tip in front of escutcheon plate over the number that was selected. Repeat above procedure for each of remaining buttons.

NOTE - When tuning the set by hand or if a remote cable is used the selector button AUTO-OFF must be depressed.



EXAMPLE

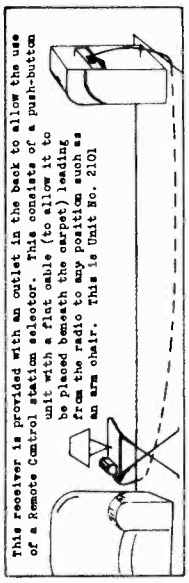
Station, WGN - Frequency 720 KC Button No.4 will tune 720 Kilocycles. Push-button No.4 is depressed. Muting switch turned to OFF position. Station contactor No.4 on back of tuning condenser is moved along its track until WGN is perfectly tuned in. WGN tab is removed from tab sheet and inserted over No.4 in the escutcheon. Muting switch is turned to ON position. WGN can now be automatically selected by its labeled push-button.

SUGGESTIONS

It will simplify setting up if the eight desired stations are first arranged in order according to frequency. Starting with the lowest frequency station first, let this be push-button No.1 and set up in rotation.

Be careful not to move a selector that has been already placed.

Check the adjustment of selector by the electric eye for maximum deflection.



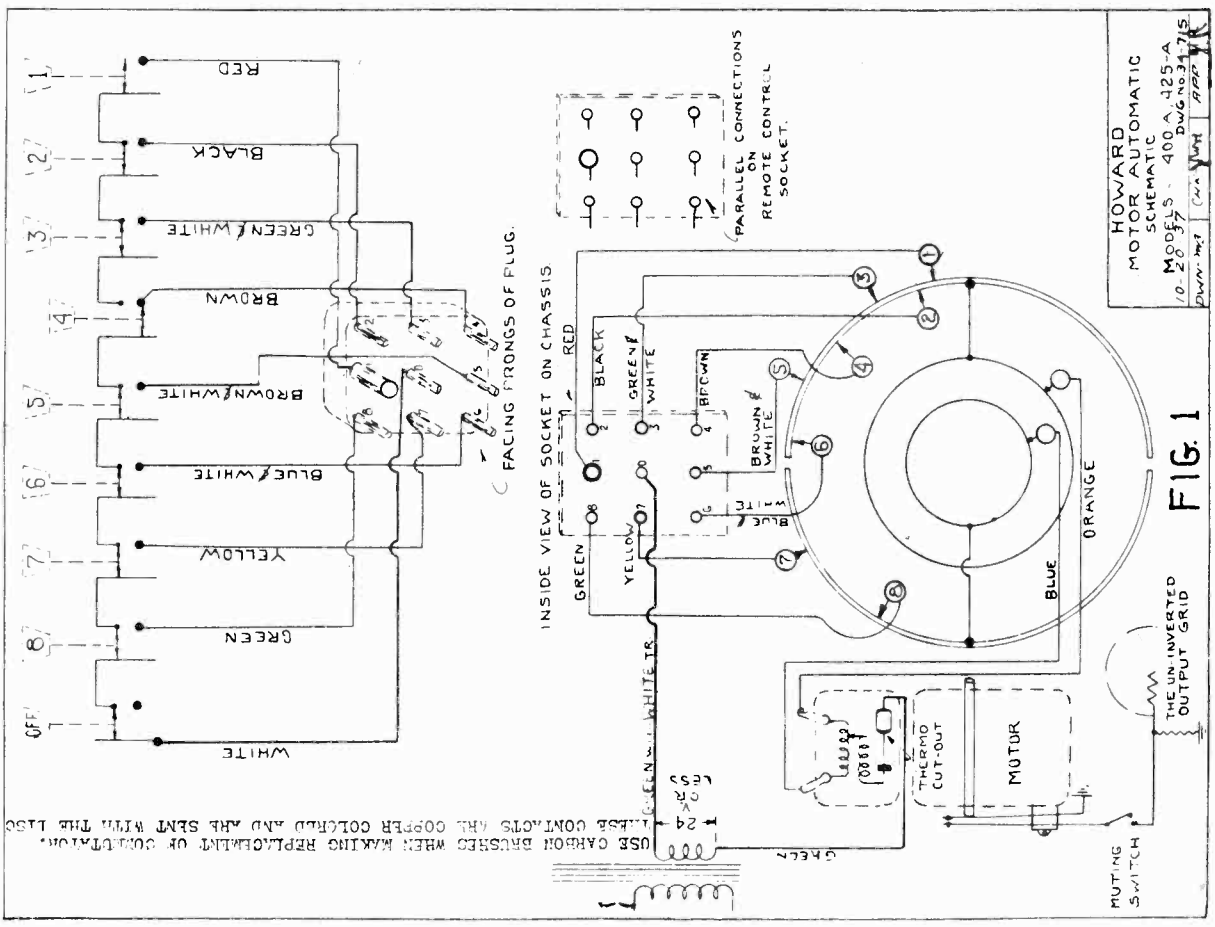


FIG. 1

MODELS 400,400-A
MODELS 425,425-A
Socket,Trimmers

HOWARD RADIO CO.

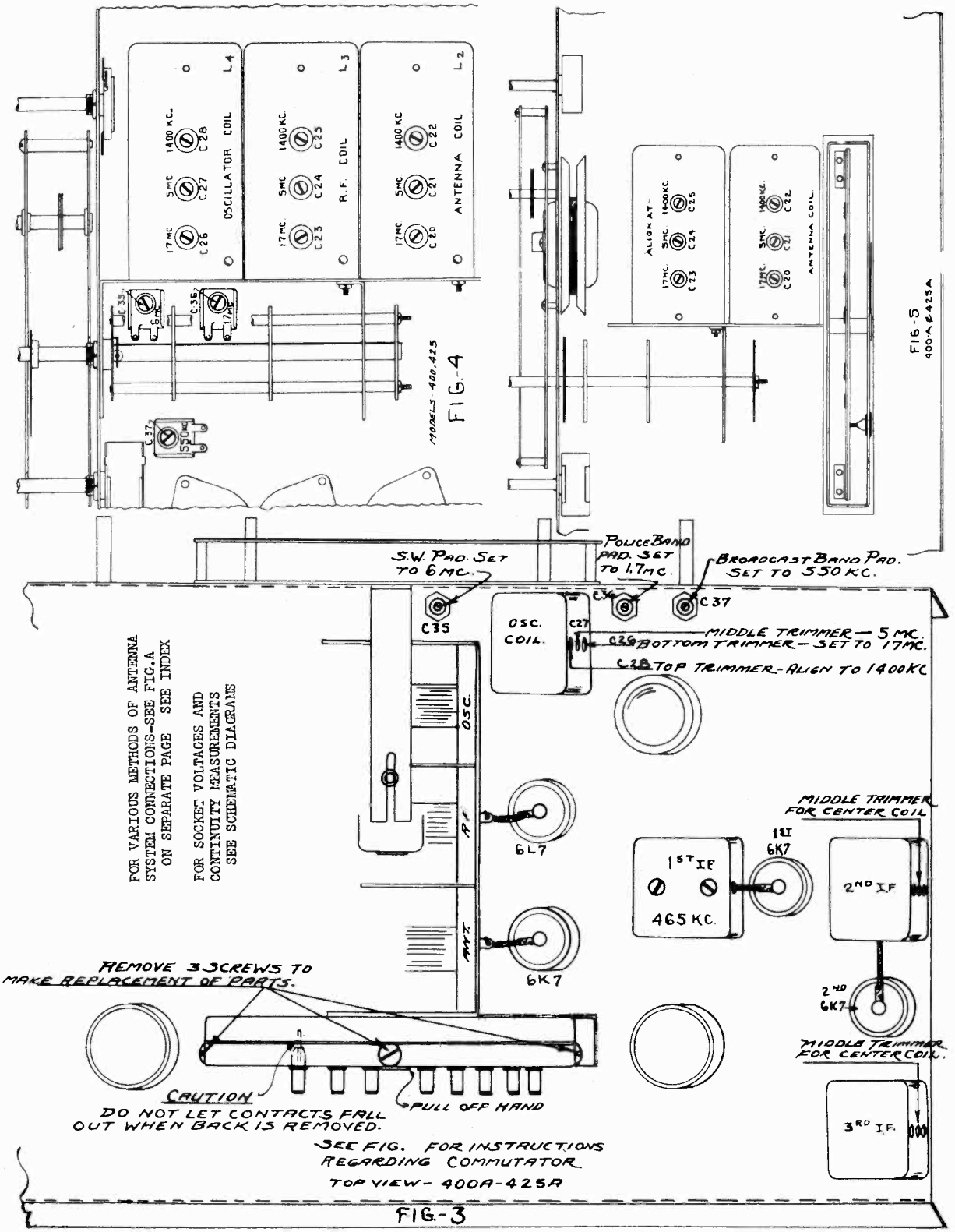


FIG. 3

1. Seal all trimmers after their final adjustment.

2. Be sure that the settings are being made to the true fundamental eignal from the oscillator and not on a harmonic or image frequency.

3. Refer to the schematic for the voltages at the tube sockets.

4. When making adjustments on the high band (5.5 to 18 megacycles), the position of the leads, by-pass condensers, and resistors are very critical at the 18 MC end of the band in their capacity relation to ground and other parts of the chassis. When the chassis leaves the factory these parts have been properly located.

When replacing the oscillator tube it is suggested that the set be checked at 18 MC since it is possible to have certain 6J5G tubes that will not oscillate at that frequency. Also low line voltage may reduce plate voltage to a point where the tube will not oscillate.

5. In cases of any instability in the audio circuits be sure the plate leads of the output tubes are not coupling with the grid lead of the inverter tube.

6. For hum trouble check the 6J5 tube first by replacing same. This may be caused by cathode leakage within the tube.

THE I. F. STAGES ON MODELS 400, 425

The I. F.'s are aligned by the usual system of feeding the intermediate frequency of 465 KC into the grid of the 6L7 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.

The Sensitivity of the I. F. stages will be 15 to 20 microvolts or better for a 50 milliwatt output.

Always use as low an output as possible from the test oscillator in making the various adjustments.

ALIGNMENT OF FLAT TOP I. F. STAGES FOR MODELS 400A AND 425A. Fig. 3

The 1st. I. F. Transformer has the trimmer screws at the top of the can.

The 2nd. and 3rd. I. F. Transformers are aligned through the side of the cans. The middle trimmer is for the center winding.

Exact alignment can only be obtained by use of the oscillograph. However, if the following instructions are carefully carried out, the alignment will be found satisfactory.

FIRST: Open yellow ground leads for center coils which are seen below the 2nd. and 3rd. I. F. Transformers. Then feed a 465 KC signal into the grid of the first 6K7 tube. Align outside trimmers on both 2nd. and 3rd. I. F. Transformers.

SECOND: Resolder yellow leads to ground on both transformers. Take a 10,000 ohm resistor and a .1 mfd. condenser and connect them in series. This is now connected across the phono lugs from the two insulated ones to the ground lug. Connect generator lead to second 6K7 grid and with sufficient signal adjust center trimmer on output I. F. Transformer to resonance.

THIRD: Move generator lead to first 6K7 grid, remove condenser and resistor from the phono lugs and connect from the grid cap to ground of the second 6K7 tube. Now adjust center trimmer of 2nd. I. F. Transformer.

FOURTH: Move generator lead to 6L7 grid and adjust input I. F. to best response. Remove condenser and resistor from 2nd. 6K7 grid to the first 6K7 grid to ground. Readjust the first I. F. Trimmers to their new resonance points. Disconnect the resistor and condenser from 1st. 6K7 grid and solder a 50,000 ohm resistor from B+ to 6L7 plate and again check alignment of trimmers of 1st. I. F. If the I. F. has been aligned properly the set should tune into a station signal and hold about the same output level when moved 3 or 4 KC either side of the center of resonance. In other words, there is a flat top response of about 7 or 8 KC with this system.

If an oscilloscope and a frequency modulated generator are available it is advisable to recheck the trimmers of the input or 1st. I. F. Transformer for the flatness of response. The above procedure being first completed before the oscilloscope is used.

ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M.C. MODELS 400, 425, SEE FIG. 4
MODELS 425A, 400A, SEE FIG. 3 AND FIG. 5

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 C 26 of the oscillator coil (See pictorial) to resonance with 17 M.C. fed into antenna.

4. Adjust antenna and R.F. coil trimmers C-20 and C 23 to same frequency after the above mentioned oscillator trimmer has been set.

5. Turn dial hand to 6 M.C. on same band and peak padding condenser C 35 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 C 27 to 5 M.C.

3. Peak antenna and R.F. trimmers C-21 and C-24 to 5 M.C.

4. Rotate dial to 1.7 M.C. and adjust Padding Condenser C 36 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 C 28 to 1400 KC and R.F. circuit trimmers C-22 and C-25 to same frequency.

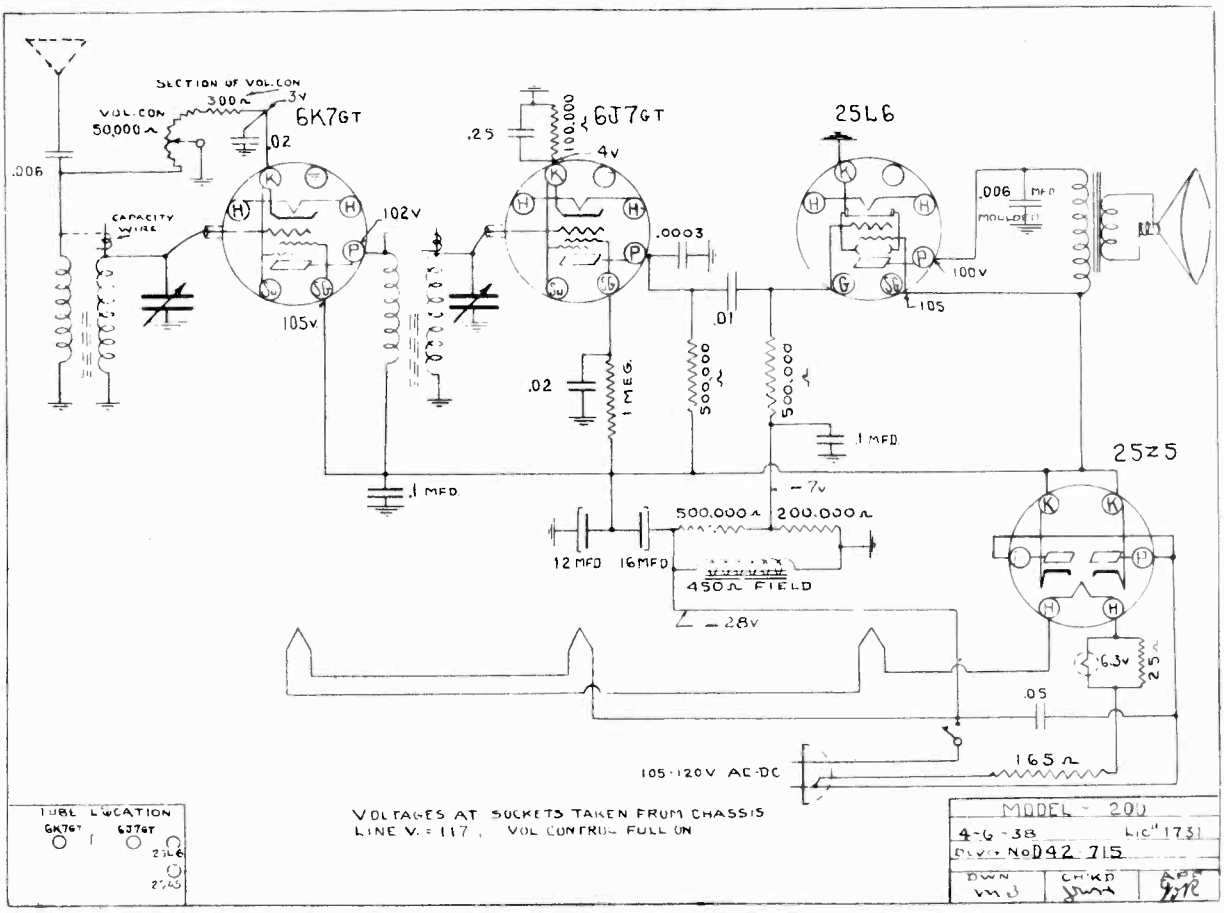
3. Set dial hand to 550 KC and adjust oscillator padding condenser C 37 to 550 KC.

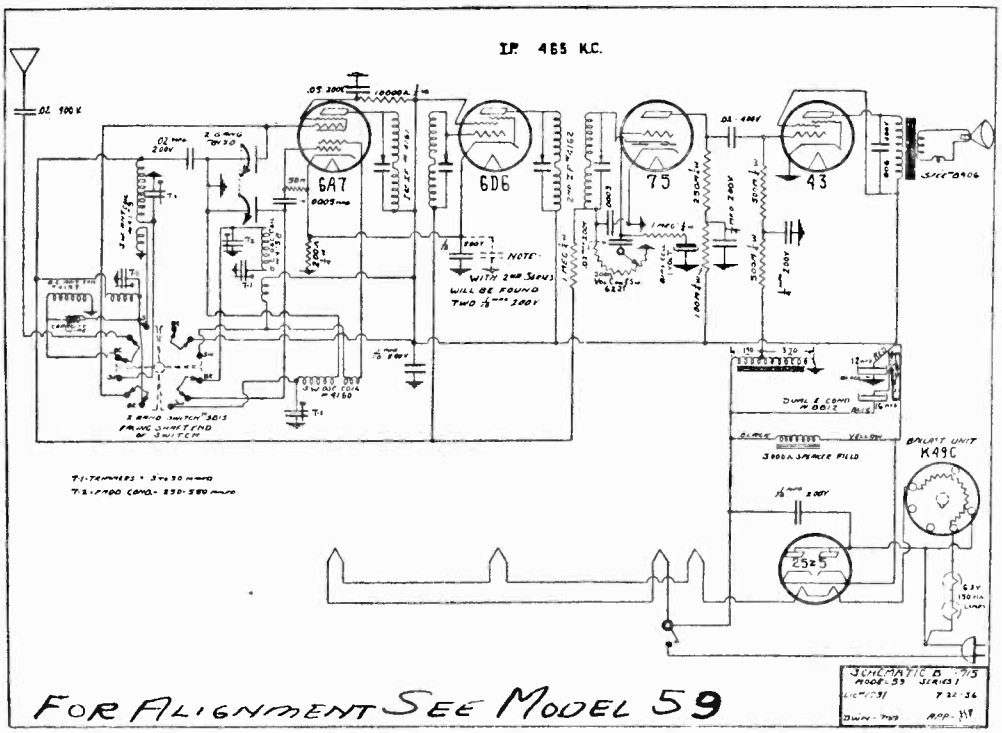
4. Recheck dial at 1400 KC as in number (1) and (2).

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.

MODEL 59
MODEL 200
Schematics, Voltage

HOWARD RADIO CO.





FOR ALIGNMENT SEE MODEL 59

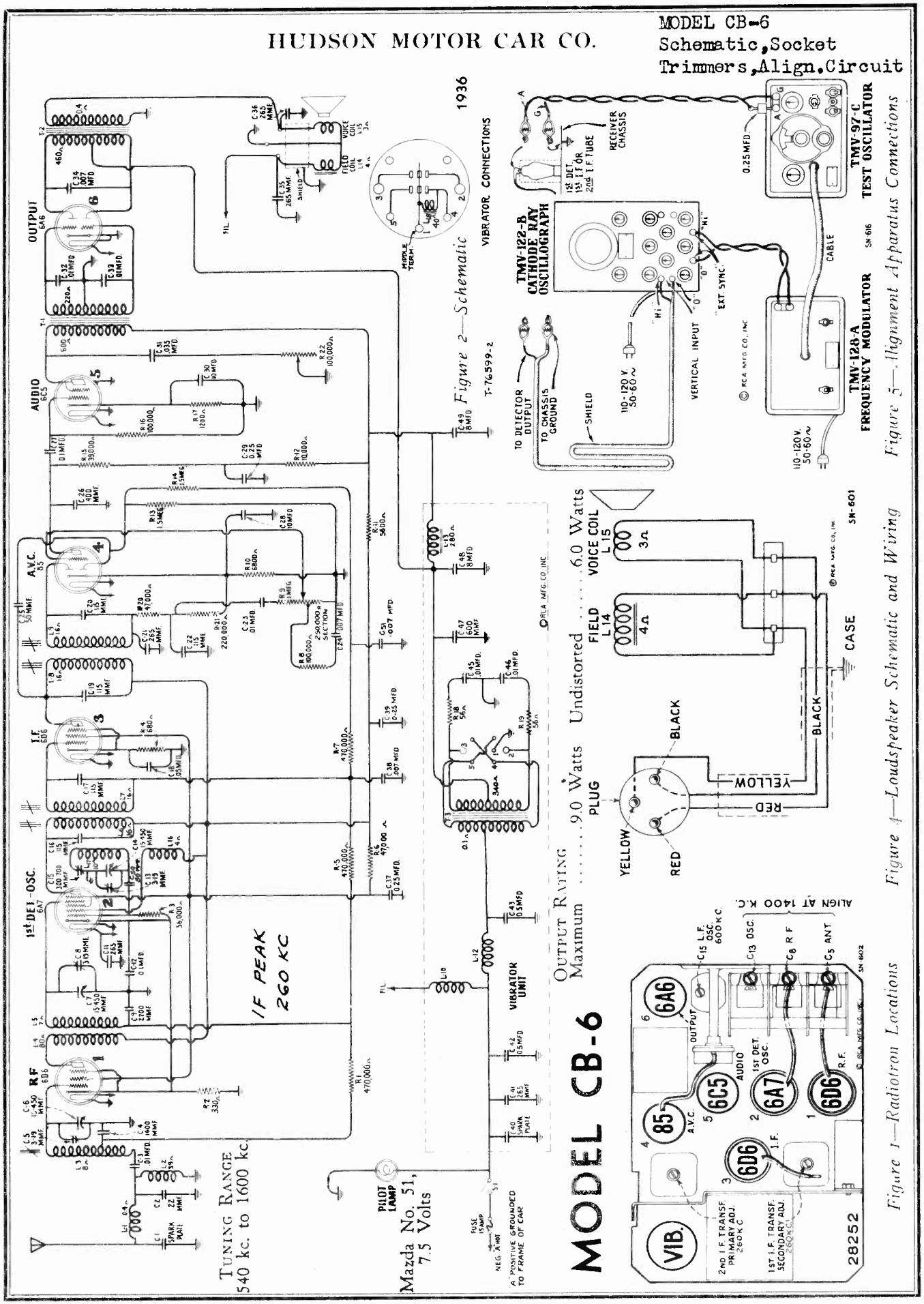


Figure 1—Radiotron Locations

Figure 2—Schematic

Figure 3—Alignment Apparatus Connections

Figure 4—Loudspeaker Schematic and Wiring

MODEL CB-6
Chassis Wiring

HUDSON MOTOR CAR CO.

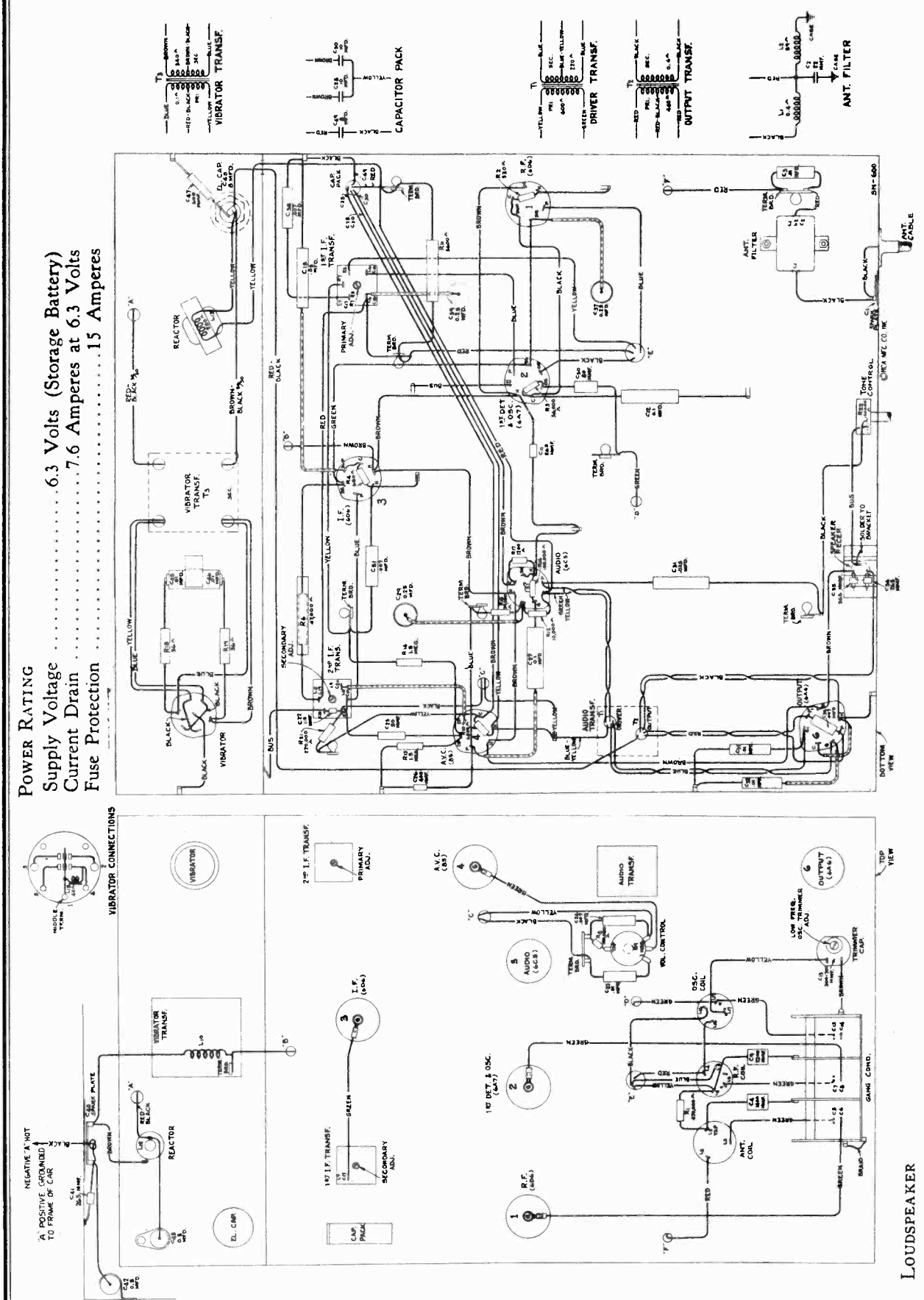


Figure 3—Chassis Wiring Diagram

This alignment refers to several models, see notes on next page.

TUBE COMPLEMENT MODEL CB-6

(1) RCA-6D6.....Radio Frequency Amplifier (4) RCA-85...Detector, A-F Amplifier, and A.V.C.
(2) RCA-6A7.....Oscillator and First Detector (5) RCA-6C5.....Driver
(3) RCA-6D6.....Intermediate Amplifier (6) RCA-6A6.....Power Output Amplifier

ALIGNMENT FREQUENCIES

I-F Transformers .....260 kc. Detector Coil .....1400 kc.
Oscillator Coil.....600 kc. and 1400 kc Antenna Coil .....1400 kc.

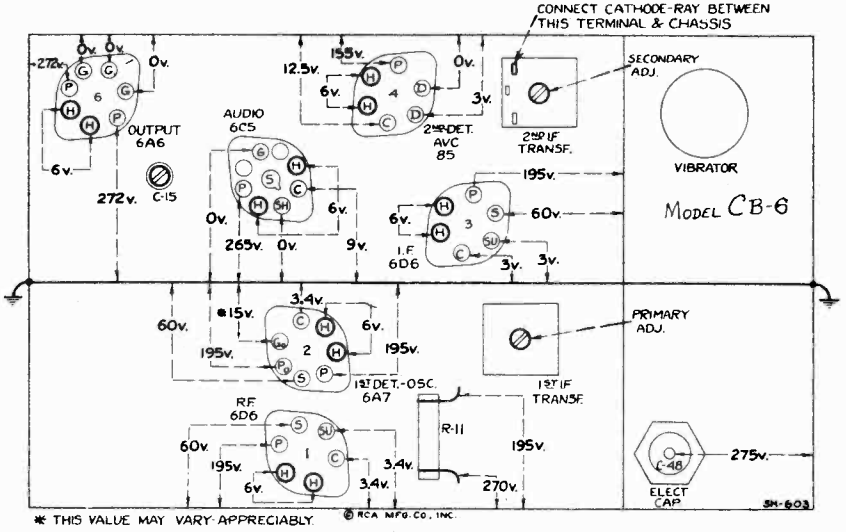


Figure 6—Radiotron Socket Voltages to Chassis

(Measured at 6.3 volts battery supply—Volume Control Maximum—No Signal)

Alignment Procedure

All of the adjustable circuits of this receiver have been properly aligned at the factory to give correct performance, and their settings should remain intact indefinitely when the receiver is used under ordinary conditions. However, necessity for readjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for service purposes, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the receiver to be insensitive, non-selective, and subnormal in respect to tone quality. Such indications will usually exist simultaneously.

In readjusting the tuning circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the RCA Stock No. 9595, will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. Two indication methods are applicable. One requires use of cathode-ray oscillograph equipment, and the other requires a voltmeter or glow type of indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode-Ray Oscillograph. Alignment by the output meter method should be indicated by an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. The two procedures are outlined as follows:

OUTPUT METER ALIGNMENT

Place the receiver in operation, with its two covers removed. Attach the output indicator across the loudspeaker voice coil circuit or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6D6) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Adjust the frequency of the oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

(b) Adjust the two screws (attached to iron cores) of the second i-f transformer, one on top and one on bottom, until maximum output is produced by the indicating device.

(c) Remove the oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (RCA-6A7) and chassis ground, using the 0.25 mfd. capacitor as previously. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in (a).

(d) Adjust the two screws of the first i-f transformer for maximum (peak) receiver output. The indication for this adjustment will be broad, due to the "flat-top" characteristic of the i-f system. The two screws should, therefore, be very carefully adjusted so that the indicator remains fixed at maximum as the oscillator is shifted through a range 2 kc. above and below its normal setting of 260 kc. An irregular double-peaked indication is to be avoided.

R-F Adjustments

NOTE: To eliminate vibrator interference, it may be advisable to replace the bottom cover before making the r-f adjustments.

(a) Check the calibration of the dial scale of the remote control unit by rotating the tuning control until the variable condenser plates are in full mesh (maximum capacity). This will carry the dial pointer to its minimum frequency position. The knurled shaft at the rear of the control box should then be turned until the dial pointer sets exactly on the last graduation at the low-frequency end of the dial scale.

(b) Connect the output of the test oscillator to the antenna-ground terminals of the receiver with a 150 mmfd. capacitor in series with the antenna lead. There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Tune the oscillator to 1400 kc. Allow the output indicator to remain attached to the receiver output.

(c) Tune the receiver so that the dial reading is 1400 kc. Then adjust the oscillator, detector, and antenna coil trimmers, C-13, C-8, and C-5 respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, C-15, should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from the combined operations. The adjustment of C-15 should be repeated as in (c) to correct for any change in its alignment due to the adjustment of C-15.

NOTE: The antenna coil has an iron core which is adjusted at the factory for the correct inductance. **This adjustment should not be disturbed.**

CATHODE-RAY ALIGNMENT

Attach the cathode-ray oscillograph vertical input terminals to the second detector output, with the "Hi" connected to the junction of the two resistors, R-20 and R-21, and the "0" connected to the receiver chassis. Advance the vertical amplifier gain control of the oscillograph to full-on, allowing it to remain at such position for all adjustments. Turn the vertical "A" amplifier to "On." Set the oscillograph power switch to "On" and adjust the intensity and focusing controls to give a sharply defined spot on the screen. Interconnect the frequency modulator impulse generator terminals to the oscillograph "Ext. Sync." terminals, as shown by Figure 5.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6D6) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Tune the oscillator to 260 kc., place its modulation switch to "On" and its output range switch to "Hi." The frequency modulator must not be connected to the oscillator for the preliminary adjustments.

(b) Set the cathode-ray oscillograph horizontal "B" amplifier to "Timing" and the synchronizing switch (timing) to "Int." Place the synchronizing input and frequency controls to about their mid-positions. Turn the range switch to its No. 1 position.

(c) Increase the output of the oscillator until a deflection is noticeable on the oscillograph screen. The figure obtained represents several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400-cycle waves) to be spread completely across the screen by advancing the horizontal "B" gain control. The image should be synchronized and made to remain motionless by adjustment of the synchronizing input and frequency controls.

(d) Adjust the two screws (attached to iron cores) of the second i-f transformer, one on top and one on bottom, to produce maximum vertical deflection of the oscillographic wave which is present on the screen. This adjustment places the transformer in exact resonance with the 260 kc. signal.

continued on next page

CB-6 alignment-continued

(e) The sweeping operation should follow, using the frequency modulator. Shift the oscillograph synchronizing switch to "Ext.", change its range switch to No. 2 position and set the frequency control to its mid-position. Place the frequency modulator in operation, with its sweep range switch in the "Lo" position. Interconnect the test oscillator and frequency modulator with the special shielded patch cord provided. Turn the oscillator modulation switch to "Off."

(f) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. These waves will be identical in shape, but will be totally disconnected and appearing in reversed positions. They will have a common base line, which is discontinuous. Adjust the frequency and synchronizing input controls of the oscillograph to get the proper waves and to make them remain motionless on the screen. Continue increasing the oscillator frequency until the forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will obtain at an oscillator setting of approximately 360 kc.

(g) With the images established as in (f), readjust the two screws on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(h)[10] Without altering the adjustments of the apparatus, shift the output connections of the oscillator to the input of the i-f system, i. e., between the first detector (RCA-6A7) control grid and ground.[10] Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.

(i) The two first i-f transformer adjustment screws, one on top and one on bottom, should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

(a)[11] Calibrate the scale of the receiver by rotating the tuning control until the variable condenser is at full mesh, and then turning the knurled shaft at the rear of the control box to bring the dial pointer to the last graduation at the low-frequency end of the scale.

(b)[12] Attach the output of the test oscillator to the receiver input, i. e., between the antenna and ground terminals, with a 150 mmfd. capacitor in series with antenna lead. There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Accurately tune the oscillator to 1400 kc. The oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int." position and turn the range switch to its No. 1 position.

(c)[13] Tune the receiver to a dial reading of 1400 kc. Then regulate the oscillator output so as to increase the amplitude of the waves on the oscillograph screen to a conveniently observable size. The several waves of detected signal, as appearing on the screen, should be synchronized by operation of the synchronizing and frequency controls. Trimmers, C-13, C-8, and C-5, of the oscillator, detector, and antenna coils should then be adjusted so that each causes maximum vertical deflection (amplitude) of the images.

(d) The oscillator modulation should then be turned to "Off" and the frequency modulator placed in operation, connected to the oscillator with the shielded patch cord. Change the oscillograph synchronizing switch to "Ext.", set its range switch to its No. 2 position and the frequency control slightly above its mid-position.

(e) Increase the frequency of the test oscillator gradually, until the point is reached where the two similar, distinct and separate wave images appear on the screen and become coincident at their highest points. This will occur at an oscillator setting of approximately 1500 kc. These waves should be synchronized on the oscillograph screen by careful readjustment of the synchronizing and frequency controls. Readjust trimmers, C-13, C-8, and C-5,[14] to produce complete coincidence at maximum amplitude of the two waves.

(f) Disconnect the frequency modulator from the oscillator. Place the modulation switch of the oscillator to "On" and tune the oscillator to 600 kc. Set the synchronizing switch of the oscillograph to "Int." and turn the range switch to No. 1 position.

(g) Tune the receiver station selector control so as to pick up the 600 kc. signal, disregarding the dial reading at which it is best received.

(h) Change the oscillograph synchronizing switch to "Ext." and place the oscillator modulation switch to "Off." Interconnect the frequency modulator and oscillator with the special shielded patch cord. Return the range control of the oscillograph to its No. 2 position and set the frequency control slightly above its mid-position.

(i) Shift the test oscillator to its 200-400 kc. range and tune it to the point at which the forward and reverse waves show on the oscillograph screen. This condition will obtain at an oscillator setting of approximately 230 kc. The signal obtained from the oscillator for this adjustment will be the third harmonic of 200 kc. An increase in the oscillator output may be necessary. The trimmer C-15[15] should then be adjusted to the point which produces maximum amplitude of the oscillographic images. It will not be necessary to rock the tuning control for this adjustment, inasmuch as the frequency modulator is varying the signal in an equivalent manner.

(j) Retune trimmers C-13, C-8, and C-5[16] as in (c), (d), and (e) to correct for any change in high-frequency alignment which may have been caused by the adjustment of C-15.[17]

After the receiver has been replaced in the car, it may be necessary to make a final correction of the dial pointer by tuning in a station of known frequency and adjusting the pointer by means of the knurled shaft on the rear of the control head.[18]

Reference Notes;

Ref.	MODEL SA-37	MODEL DB-37
1	Tube is 6 K 7	Tube is 6 K 7
2	Tube is 6 A 8	Tube is 6 A 7
3	as follows; The slotted screw-head on the top of the control box should then be turned until the dial scale sets exactly on the last graduation at the low-frequency end of the dial scale.	as for SA 37
4	as follows;	as for SA 37
(b)	Connect the output of the test oscillator to the antenna-ground cable of the receiver with a 300 mmfd. capacitor in series with the antenna lead. If the antenna lead-in is used, the value of this capacitor should be 210 mmfd. Tune the oscillator to 1,400 kc. Allow the output indicator to remain attached to the receiver output.	
5	C14, C9, & C5.	as for CB-6
6	substitute	as for CB-6
(d)	Shift the oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, C-12, should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from the combined operations. The adjustment of C-14, C-9, and C-5 should be repeated as in (c) to correct for any change in their alignment due to the adjustment of C-12.	
	NOTE: The antenna coil has a magnetite core which is adjusted at the factory for the correct inductance. **This adjustment should not be disturbed.**	
7	R6 & R8	as for CB-6
8	(RCA-6K7)	(RCA-6 K7)
9	magnetite core	magnetite core
10	as follows;	as for CB-6
(h)	Without altering the adjustments of the apparatus, shift the output connections of the oscillator to the input of the i-f system, i. e., between the first detector (RCA-6A8) control grid and ground through a 0.25 mfd. capacitor. Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.	
11	as follows;	as for SA-37
(a)	Calibrate the receiver dial scale by rotating the tuning control until the variable condenser is in full mesh. The slotted screw-head on the top of the control box should then be turned until the dial scale rests exactly on the last graduation at the low-frequency end.	
12	as follows;	as for SA-37
(b)	Attach the output of the test oscillator to the receiver input, i. e., between the antenna-ground cable, with a 300 mmfd. capacitor in series with antenna lead. If the antenna lead-in is used, the value of this capacitor should be 210 mmfd. Accurately tune the oscillator to 1,400 kc. The oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int." position and turn the range switch to its No. 1 position.	
13	as follows;	as for CB-6
(c)	Tune the receiver to a dial reading of 1,400 kc. Adjust trimmers C-14, C-9, and C-5 of the oscillator, detector, and antenna coils so that each causes maximum vertical deflection (amplitude) of the images. The output of the oscillator should be regulated so that the waves on the oscillograph screen are of a convenient observable size. Adjustment of the synchronizing and frequency controls on the oscillograph will cause the waves to remain motionless on the screen.	
14	C14, C9, & C5	as for CB-6
15	C12	"
16	C14, C9, & C5	"
17	of C12	"
18	as follows;	as for SA-37
	and adjusting the scale by means of the slotted screw-head on the top of the control head.	
20	as for CB-6	through a 0.25 mfd. capacitor.

Radiotron Socket Voltages (MODEL CB-6 ONLY)

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figure 6 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ± 20% when this instrument is normally operative, with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale; and above 250 on the 500-volt scale.

For meters of the 1,000-ohm-per-volt type, but ranges other than above, use the nearest ranges to those specified. If the range is higher the voltage may be higher, if the range is lower the voltage may be lower; either condition depending on the percentage of circuit current drawn by the meter.

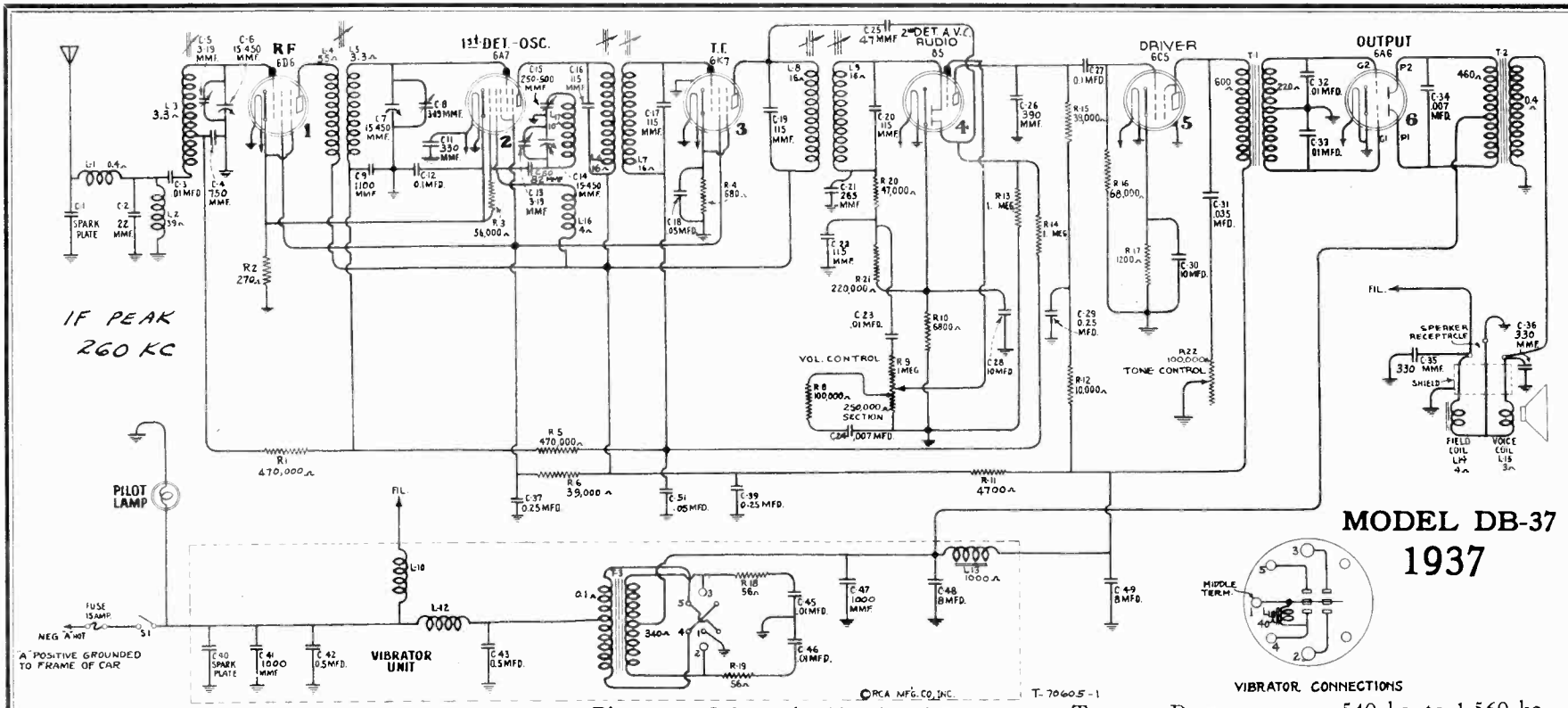


Figure 2—Schematic Circuit Diagram

MODEL DB-37
1937

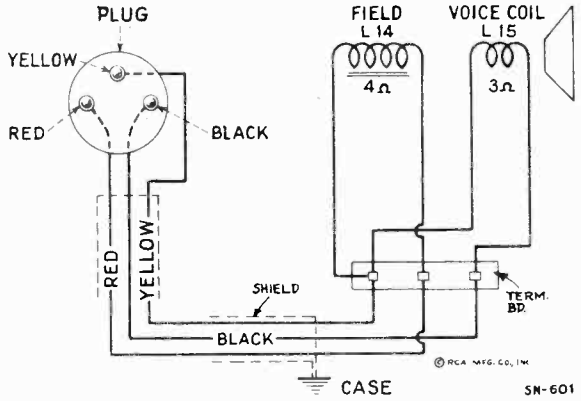


Figure 4—Loudspeaker Schematic and Wiring

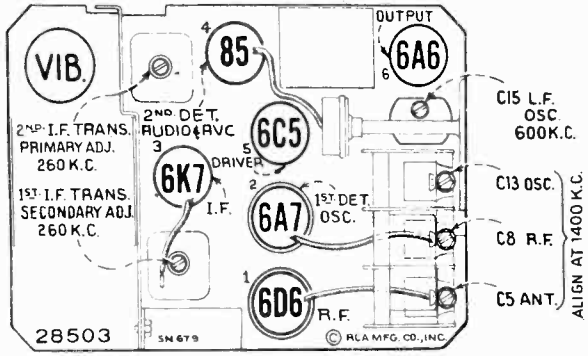


Figure 1—Radiotron Locations

FOR ALIGNMENT, SEE INDEX

TUNING RANGE .....540 kc. to 1,560 kc.

OUTPUT RATING

Maximum	9.0 Watts
Undistorted	6.0 Watts

POWER RATING

Supply Voltage	6.3 Volts (Storage Battery)
Current Drain	7.6 Amperes at 6.3 Volts
Fuse Protection	15 Amperes

PILOT LAMP ..... Mazda No. 51, 7.5 Volts

ALIGNMENT FREQUENCIES

I-F Transformers	260 kc.
Oscillator Coil	600 kc. and 1,400 kc.
Detector Coil	1,400 kc.
Antenna Coil	1,400 kc.

LOUDSPEAKER

Type	Electrodynamic
Impedance (v.c.)	3.0 ohms at 400 cycles

MODEL DB-37
Chassis Wiring

HUDSON MOTOR CAR CO.

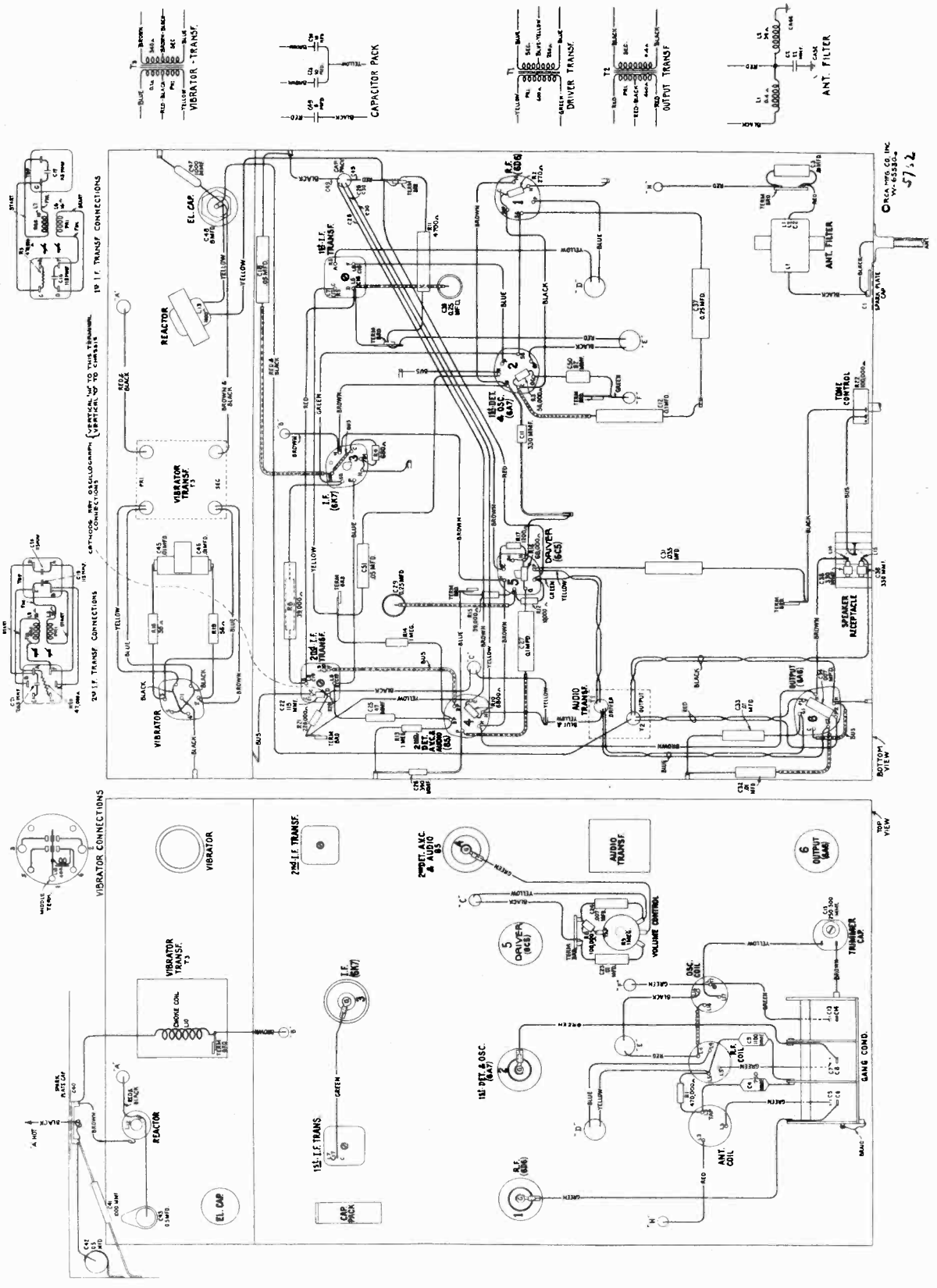


Figure 3—Chassis Wiring Diagram

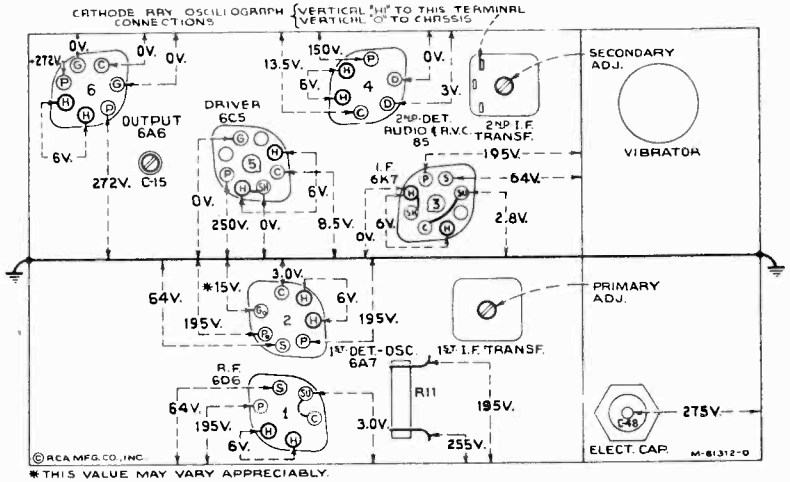


Figure 6—Radiotron Socket Voltages to Chassis

(Measured at 6.3 volts battery supply—Volume Control Minimum—No Signal)

Radiotron Socket Voltages

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figure 6 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ± 20% when this instrument is normally operative, with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale; and above 250 on the 500-volt scale.

For meters of the 1,000-ohm-per-volt type, but ranges other than above, use the nearest ranges to those specified. If the range is higher the voltage may be higher, if the range is lower the voltage may be lower; either condition depending on the percentage of circuit current drawn by the meter.

Hudson Stock No.	RCA Stock No.	DESCRIPTION
		RECEIVER ASSEMBLIES
BO 153817	12511	Cap—Grid contact cap for metal tubes—Package of 5
BO 153818	12118	Cap—Grid contact cap for glass tubes—Package of 5
BO 153819	13375	Capacitor—Adjustable capacitor (C15)
BO 153820	13141	Capacitor—47 mmfd. (C25)
BO 153821	12813	Capacitor—82 mmfd. (C50)
BO 153822	13433	Capacitor—115 mmfd. (C22)
BO 152067	11998	Capacitor—115 mmfd. (C16, C17, C19, C20)
BO 153823	12761	Capacitor—265 mmfd. (C21)
BO 153824	13432	Capacitor—330 mmfd. (C11, C35, C36)
BO 153825	12764	Capacitor—390 mmfd. (C26)
BO 153826	13429	Capacitor—750 mmfd. (C4)
BO 153827	12762	Capacitor—1,000 mmfd. (C41)
BO 153828	13430	Capacitor—1,100 mmfd. (C9)
BO 151320	5148	Capacitor—.007 mfd. (C24, C34)
BO 152072	4858	Capacitor—.01 mfd. (C3, C23, C32, C33)
BO 151324	5196	Capacitor—.035 mfd. (C31)
BO 152073	4836	Capacitor—.05 mfd. (C18, C51)
BO 153826	4841	Capacitor—.1 mfd. (C12)
BO 153829	12484	Capacitor—0.25 mfd. (C37)
BO 152074	12237	Capacitor—0.25 mfd. (C29, C39)
BO 151329	11418	Capacitor—0.5 mfd. (C42)
BO 152075	5019	Capacitor—0.5 mfd. (C43)
BO 152076	12234	Capacitor—8 mfd. (C48)
BO 152077	12233	Capacitor pack—Comprising 2 sections of .01 mfd. (C45, C46)
BO 152078	12238	Capacitor pack—Comprising one 8 mfd. and two 10 mfd. sections (C28, C30, C49)
BO 152079	12235	Coil—Choke coil (L12)
BO 153830	13378	Coil—Antenna coil with shield (L3)
BO 153831	13377	Coil—R. F. coil with shield (L4, L5)
BO 153832	13376	Coil—Oscillator coil, less shield (L16, L17)
BO 153833	13371	Condenser—3 gang variable tuning condenser (C5, C6, C7, C8, C13, C14)
BO 152084	12006	Core—Adjustable core for I. F. Trans. Stock No. 12229 or No. 13419
BO 152085	12289	Coupling—Station selector flexible shaft coupling
BO 152086	12239	Filter—Antenna filter (L1, L2, C2)
BO 153834	13372	Gear—Large gear for tuning condenser—located on condenser shaft
BO 153835	13373	Gear—Worm gear, screw and lock-nut for variable condenser
BO 152089	12242	Guide—Station selector shaft guide
BO 153836	13111	Reactor—Filter reactor—iron core (L13)
BO 152091	5034	Resistor—56 ohm—carbon type—½ watt (R18, R19)—Package of 5
BO 153837	13454	Resistor—270 ohms—insulated—¼ watt (R2)—Package of 5
BO 152093	12262	Resistor—680 ohms—insulated—¼ watt (R4)—Package of 5
BO 152094	12267	Resistor—1,200 ohms—insulated—¼ watt (R17)—Package of 5
BO 153838	11768	Resistor—4,700 ohms—carbon type 2 watts (R11)
BO 153849	13438	Cover—Control box back cover
BO 153850	13450	Crystal — Station selector dial crystal
BO 153851	13451	Dial—Station selector dial scale
BO 151726	4286	Ferrule—"A" lead connector, fuse connector or lamp socket bushing and ferrule—Package of 10
BO 71406	5023	Fuse—15 amperes—Package of 5
BO 153852	13439	Gear—Gear for dial sprocket
BO 153853	13443	Gear—Intermediate gears and shaft assembly for dial scale
BO 152125	4290	Insulator—Fuse connector insulator —Package of 10
BO 153278	13421	Knob—Tuning or volume control knob—Package of 5
BO 71641	11765	Lamp—Dial lamp—Package of 5
BO 152127	12274	Lead—"A" lead complete with female section of connector—connects control box switch to receiver
BO 153854	13549	Lead—"A" lead and bracket complete with male section of connector — connects control box switch to fuse connector
BO 152128	12276	Lead—"A" lead—complete with female section of fuse connector —less fuse and fuse insulator —connects car A terminal to control box
BO 153855	13551	Nut—Knurled nut—less set screw for dial sprocket adjustment—Package of 5
BO 153856	13446	Retainer—Retainer spring for intermediate shaft and gear assembly—Package of 5
BO 153857	13447	Retainer—Retainer spring for station selector or volume control knob shaft—Package of 5
BO 153858	13422	Roller—Bracket and roller assembly for dial scale—Package of 10
BO 153205	13442	Screw—No. 6-32 x 7/32 inch headless, cone point set screw for tuning or volume control knob—Package of 10
BO 153859	4387	Screw—No. 6-32 x ¼ inch headless set screw for dial sprocket adjustment nut
BO 153860	13444	Shaft — Station selector control shaft complete with worm gear
BO 153861	13546	Shaft — Tuning control flexible shaft complete approximately 16¾ inches long
BO 153862	13547	Shaft — Volume control flexible shaft complete approximately 20¾ inches long
BO 153863	13445	Shaft—Volume control shaft complete with switch operating pin
BO 153864	13550	Socket—Dial lamp socket and lead
BO 151724	4284	Spring—"A" lead connector, fuse connector or lamp socket spring —Package of 10
BO 153204	13553	Spring—Retaining spring for tuning or volume control knob—Package of 10
BO 153865	13449	Spring—Tension spring for bracket and roller assembly—Package of 5
BO 153866	13440	Sprocket—Dial sprocket—less gear
BO 153867	13441	Switch—"On-Off" operating switch
BO 151725	4285	Washer—"A" lead connector, fuse connector or lamp socket insulat-
BO 152096	12265	Resistor—6,800 ohms—insulated—¼ watt (R10)—Package of 5
BO 152097	12288	Resistor—10,000 ohms—insulated—¼ watt (R12)—Package of 5
BO 152098	12266	Resistor—39,000 ohms—insulated—¼ watt (R15)—Package of 5
BO 153839	5176	Resistor—39,000 ohms—carbon type —1 watt (R6)
BO 151352	5132	Resistor—47,000 ohms—carbon type 1/10 watt (R20)—Package of 5
BO 152100	12286	Resistor—56,000 ohms—insulated—¼ watt (R3)—Package of 5
BO 153840	13453	Resistor—68,000 ohms—insulated—¼ watt (R16)—Package of 5
BO 152102	11281	Resistor — 100,000 ohms — carbon type—1/10 watt (R8)—Package of 5
BO 152103	12264	Resistor—220,000 ohms—insulated —¼ watt (R21)—Package of 5
BO 152104	12285	Resistor—470,000 ohms—insulated —¼ watt (R1)—Package of 5
BO 152105	11452	Resistor — 470,000 ohms — carbon type—1/10 watt (R5, R7)—Package of 5
BO 153841	12200	Resistor—1 megohm—insulated—¼ watt (R13, R14)—Package of 5
BO 151360	3584	Ring—Retaining ring for oscillator coil—Package of 5
BO 152107	12290	Shield—6D6 or 6A7 radiotron shield
BO 151363	3623	Shield—Oscillator coil shield
BO 152108	12227	Socket—8 contact 6C5 or 6K7 radiotron socket
BO 152109	4786	Socket—6 contact 6D6 or 85 radiotron socket
BO 152110	4787	Socket—7 contact 6A7 radiotron socket
BO 152111	12241	Socket—6 contact vibrator socket
BO 152112	12243	Socket—7 contact output 6A6 radiotron socket
BO 153842	12007	Spring—Retaining spring for core —Stock No. 12006—Package of 5
BO 152113	12226	Stud—Variable tuning condenser mounting stud assembly
BO 153843	13419	Transformer—First intermediate frequency transformer (L6, L7, C16, C17, R5)
BO 152115	12229	Transformer—Second intermediate frequency transformer (L8, L9, C19, C20, C21, R20)
BO 152116	12230	Transformer—Audio transformer pack comprising driver and output transformer (T1, T2)
BO 152117	12231	Transformer — Vibrator power transformer (T3)
BO 152118	12236	Vibrator—Complete (L18)
BO 152119	12240	Volume control (R9)
		MISCELLANEOUS ASSEMBLIES
BO 152136	4287	Body—Antenna connector body—Package of 10
BO 152137	12253	Bolt—5/16—18 x ¾ inches hex head bolt with lockwasher for receiver mounting—Package of 10
BO 152138	4288	Cap—Antenna or "A" lead connector cap—Package of 10
BO 151402	11447	Capacitor—0.25 mfd.—gas gauge capacitor
BO 152021	12256	Capacitor—0.25 mfd.—temperature gauge capacitor
BO 152022	12255	Capacitor—0.5 mfd.—generator capacitor
BO 153869	13381	Cover—Receiver housing top cover with escutcheon assembled
BO 153870	13383	Cover—Receiver housing bottom cover

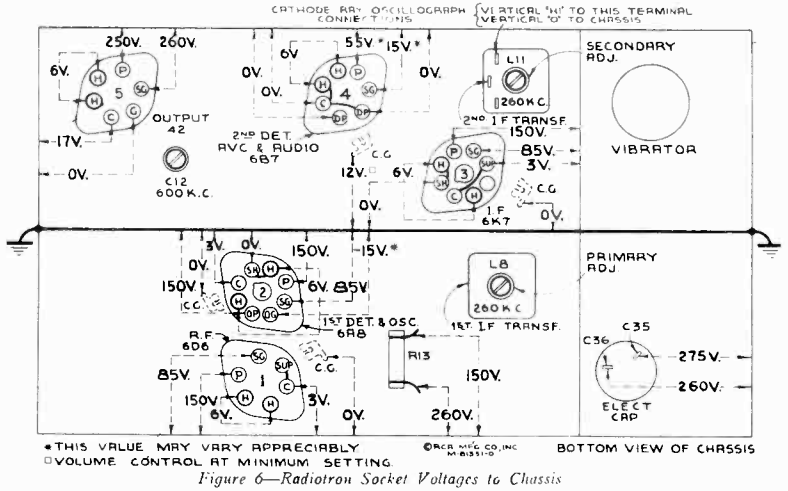


Figure 6—Radiotron Socket Voltages to Chassis

(Measured at 6.3 volts battery supply—Volume Control Minimum No Signal)

Radiotron Socket Voltages

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figure 6 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ± 20% when this instrument is normally operative, with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale, and above 250 on the 500-volt scale.

For meters of the 1,000-ohm-per-volt type, but ranges other than above, use the nearest ranges to those specified. If the range is higher the voltage may be higher, if the range is lower the voltage may be lower; either condition depending on the percentage of circuit current drawn by the meter.

Hudson Stock No.	RCA Stock No.	DESCRIPTION
		RECEIVER ASSEMBLIES
BO 153817	12511	Cap—Grid contact cap for metal tubes—Package of 5
BO 153818	12118	Cap—Grid contact cap for glass tubes—Package of 5
BO 153819	13375	Capacitor—Adjustable capacitor (C12)
BO 153822	13433	Capacitor—115 mmfd. (C23)
BO 152067	11998	Capacitor—115 mmfd. (C15, C16, C20, C21)
BO 153824	13432	Capacitor—330 mmfd. (C10)
BO 153825	12764	Capacitor—390 mmfd. (C25)
BO 153826	13429	Capacitor—750 mmfd. (C4)
BO 153827	12762	Capacitor—1,000 mmfd. (C29)
BO 153899	13434	Capacitor—1,000 mmfd. (C34)
BO 153828	13430	Capacitor—1,100 mmfd. (C7)
BO 153900	4838	Capacitor—.005 mfd. (C27)
BO 152072	4858	Capacitor—.01 mfd. (C3, C18, C26)
BO 153901	4839	Capacitor—.1 mfd. (C24)
BO 153829	12484	Capacitor—0.25 mfd. (C17, C19)
BO 153902	4840	Capacitor—0.25 mfd. (C11)
BO 151329	11418	Capacitor—0.5 mfd. (C30)
BO 152075	5019	Capacitor—0.5 mfd. (C31)
BO 152077	12233	Capacitor pack—Comprising 2 sections of .01 mfd. each (C32, C33)
BO 153903	13114	Capacitor pack—Comprising 2 sections of 8 mfd. each (C35, C36)
BO 152079	12235	Coil—Choke coil (L14)
BO 153830	13378	Coil—Antenna coil with shield (L3)
BO 153904	13418	Coil—R. F. coil less shield (L4, L5)
BO 153832	13376	Coil—Oscillator coil less shield (L6, L7)
BO 153833	13371	Condenser—3-gang variable tuning condenser (C5, C6, C8, C9, C13, C14)
BO 152084	12006	Core—Adjustable core for I. F. Trans. Stock No. 12229 or No. 13419
BO 152085	12289	Coupling—Station selector flexible shaft coupling
BO 152086	12239	Filter—Antenna filter (L1, L2, C2)
BO 153834	13372	Gear—Large gear for tuning condenser—located on condenser shaft
BO 153835	13373	Gear—Worm gear screw and locknut for variable condenser
BO 152089	12242	Guide—Station selector shaft guide
BO 153905	12485	Pin—Contact pin for speaker leads—Package of 5
BO 152090	12232	Reactor—Filter reactor—iron core (L13)
BO 152091	5034	Resistor—56 ohms—carbon type—½ watt (R14, R15)—Package of 5
BO 153907	13428	Resistor—150 ohms—insulated—¼ watt (R2)—Package of 5
BO 153908	11845	Resistor—560 ohms—carbon type—1 watt (R12)—Package of 5
BO 152095	8097	Resistor—5,600 ohms—carbon type—2 watts (R13)
BO 153909	3066	Resistor—12,000 ohms—carbon type—1 watt (R5)—Package of 5
BO 151352	5132	Resistor—47,000 ohms—carbon type—1/10 watt (R6)—Package of 5
BO 152100	12286	Resistor—56,000 ohms—insulated—¼ watt (R3)—Package of 5
BO 152127	12274	Lead—"A" lead complete with female section of connector—connects control box switch to receiver
BO 153854	13549	Lead—"A" lead and bracket complete with male section of connector—connects control box switch to fuse connector
BO 152128	12276	Lead—"A" lead complete with female section of fuse connector—less fuse and fuse insulator—connects car "A" terminal to control box
BO 153855	13551	Nut—Knurled—less set-screw for dial sprocket adjustment—Package of 5
BO 153856	13446	Retainer—Retainer spring for intermediate shaft and gear assembly—Package of 5
BO 153857	13447	Retainer—Retainer spring for station selector or volume control knob shaft—Package of 5
BO 153858	13442	Roller—Bracket and roller assembly for dial scale
BO 153205	13422	Screw—No. 6-32 x 7/32" headless, cone point set-screw for tuning or volume control knob—Package of 10
BO 153859	4387	Screw—No. 6-32 x ¼" headless set-screw for dial sprocket adjustment nut—Package of 10
BO 153860	13444	Shaft—Station selector control shaft complete with worm gear
BO 153861	13546	Shaft—Tuning control flexible shaft complete, approximately 16¾" long
BO 153862	13547	Shaft—Volume control flexible shaft complete, approximately 20¾" long
BO 153863	13445	Shaft—Volume control shaft complete with switch operating pin
BO 153864	13550	Socket—Dial lamp socket and lead
BO 151724	4284	Spring—"A" lead connector, fuse connector or lamp socket spring—Package of 10
BO 153204	13553	Spring—Retaining spring for tuning or volume control knob—Package of 10
BO 153865	13449	Spring—Tension spring for bracket and roller assembly—Package of 5
BO 153866	13440	Sprocket—Dial sprocket—less gear
BO 153867	13441	Switch—"On-Off" operating switch
BO 152103	12264	Resistor—220,000 ohms—insulated—¼ watt (R10)—Package of 5
BO 153910	12452	Resistor—330,000 ohms—insulated—½ watt (R11)—Package of 5
BO 152104	12285	Resistor—470,000 ohms—insulated—¼ watt (R1)—Package of 5
BO 152105	11452	Resistor—470,000 ohms—carbon type—1/10 watt (R4, R7)—Package of 5
BO 153841	12200	Resistor—1 megohm—insulated—¼ watt (R9)—Package of 5
BO 152106	12287	Resistor—1.5 megohms—insulated—¼ watt (R7)—Package of 5
BO 151360	3584	Ring—Retaining ring for R. F. or oscillator coil—Package of 5
BO 152107	12290	Shield—Radiotron shield
BO 151363	3623	Shield—R. F. or oscillator coil shield
BO 152108	12227	Socket—8-contact 6A8 or 6K7 Radiotron socket
BO 152109	4786	Socket—6-contact 6D6 or 42 Radiotron socket
BO 152110	4787	Socket—7-contact 6B7 Radiotron socket
BO 152111	12241	Socket—6-contact vibrator socket
BO 153842	12007	Spring—Retaining spring for core, Stock No. 12006—Package of 5
BO 152113	12226	Stud—Variable tuning condenser mounting stud assembly
BO 153843	13419	Transformer—First intermediate frequency transformer (L8, L9, C15, C16, R4)
BO 152115	12229	Transformer—Second intermediate frequency transformer (L10, L11, C20, C21, C22, R6)
BO 153911	12364	Transformer—Output transformer (T2)
BO 152117	12231	Transformer—Vibrator power transformer (T1)
BO 152118	12236	Vibrator—Complete (L17)
BO 153912	13420	Volume control (R8)
		CONTROL HEAD AND FLEXIBLE SHAFT ASSEMBLIES
BO 153844	13548	Body—"A" lead connector body—female section—Package of 10
BO 153845	13437	Body—Control box body
BO 152135	12291	Body—Fuse connector body—female section—Package of 10
BO 153292	13436	Box—Control box complete—less cables, flexible shafts and knobs
BO 153293	13379	Bushing—⅜—24-19/32 threaded bushing to mount control head—Package of 2
BO 153849	13438	Cover—Control box back cover
BO 153850	13450	Crystal—Station selector dial crystal
BO 153851	13451	Dial—Station selector dial scale
BO 151726	4286	Ferrule—"A" lead connector, fuse connector or lamp socket bushing and ferrule—Package of 10
BO 71406	5023	Fuse—15 amperes—Package of 5
BO 153852	13439	Gear—Gear for dial sprocket
BO 153853	13443	Gear—Intermediate gears and shaft assembly for dial scale
BO 152125	4290	Insulator—Fuse connector insulator—Package of 10
BO 153278	13421	Knob—Tuning or volume control knob—Package of 5
BO 71641	11765	Lamp—Dial lamp—Package of 5
BO 151725	4285	Washer—"A" lead connector, fuse connector or lamp socket insulating washer—Package of 10
BO 153868	13552	Washer—Felt washer for dial sprocket shaft—Package of 10
		MISCELLANEOUS ASSEMBLIES
BO 152136	4287	Body—Antenna connector body—Package of 10
BO 152137	12253	Bolt—5/16—18 x ¾" hex. head bolt with lockwasher for receiver mounting—Package of 10
BO 152138	4288	Cap—Antenna or "A" lead connector cap—Package of 10
BO 153913	12665	Capacitor—0.25 mfd.—antenna capacitor
BO 151402	11447	Capacitor—0.25 mfd.—gas gauge capacitor
BO 152021	12256	Capacitor—0.25 mfd.—temperature gauge capacitor
BO 152022	12255	Capacitor—0.5 mfd.—generator capacitor

HUDSON MOTOR CAR CO.

MODEL SA-37
Schematic, Socket
Trimmers, Specifications

FOR ALIGNMENT, SEE INDEX

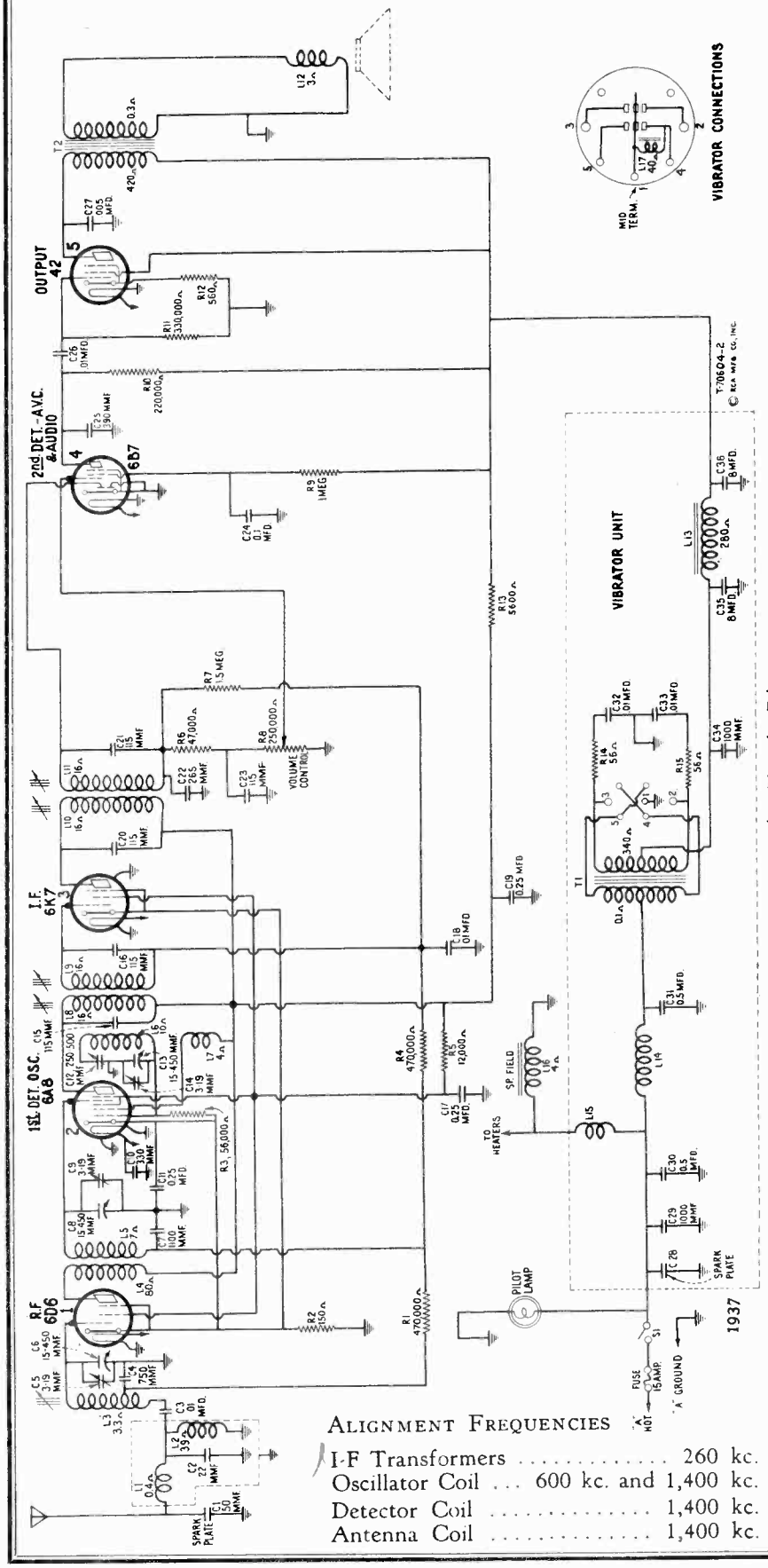


Figure 2—Schematic Circuit Diagram

ALIGNMENT FREQUENCIES

I-F Transformers	260 kc.
Oscillator Coil ...	600 kc. and 1,400 kc.
Detector Coil	1,400 kc.
Antenna Coil	1,400 kc.

TUNING RANGE ..... 540 kc. to 1,560 kc.

OUTPUT RATING

Maximum	3.5 Watts
Undistorted	2.25 Watts

POWER RATING

Supply Voltage	6.3 Volts (Storage Battery)
Current Drain	6.5 Amperes at 6.3 Volts
Fuse Protection	15 Amperes

PILOT LAMP ... Mazda No. 51, 7.5 Volts

LOUDSPEAKER

Type	Electrodynamic
Impedance (v.c.)	3.0 ohms at 400 cycles

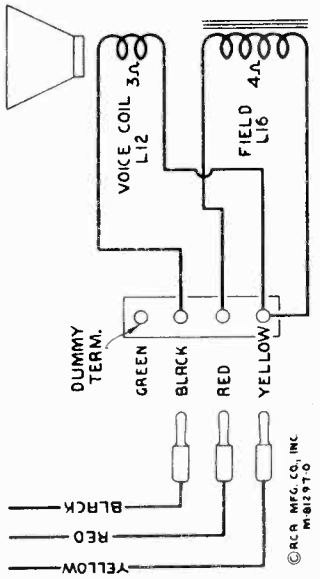


Figure 4—Loudspeaker Schematic and Wiring

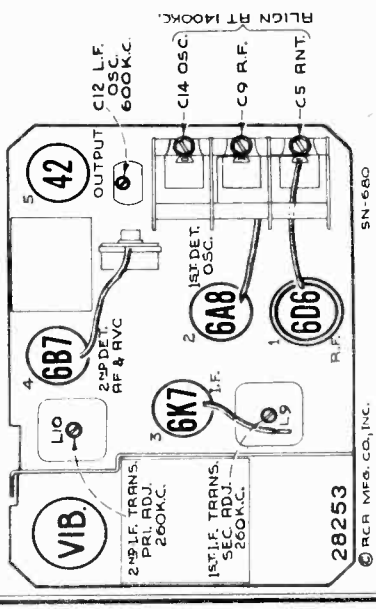


Figure 1—Radiotron Locations

MODEL SA-37
Chassis Wiring

HUDSON MOTOR CAR CO.

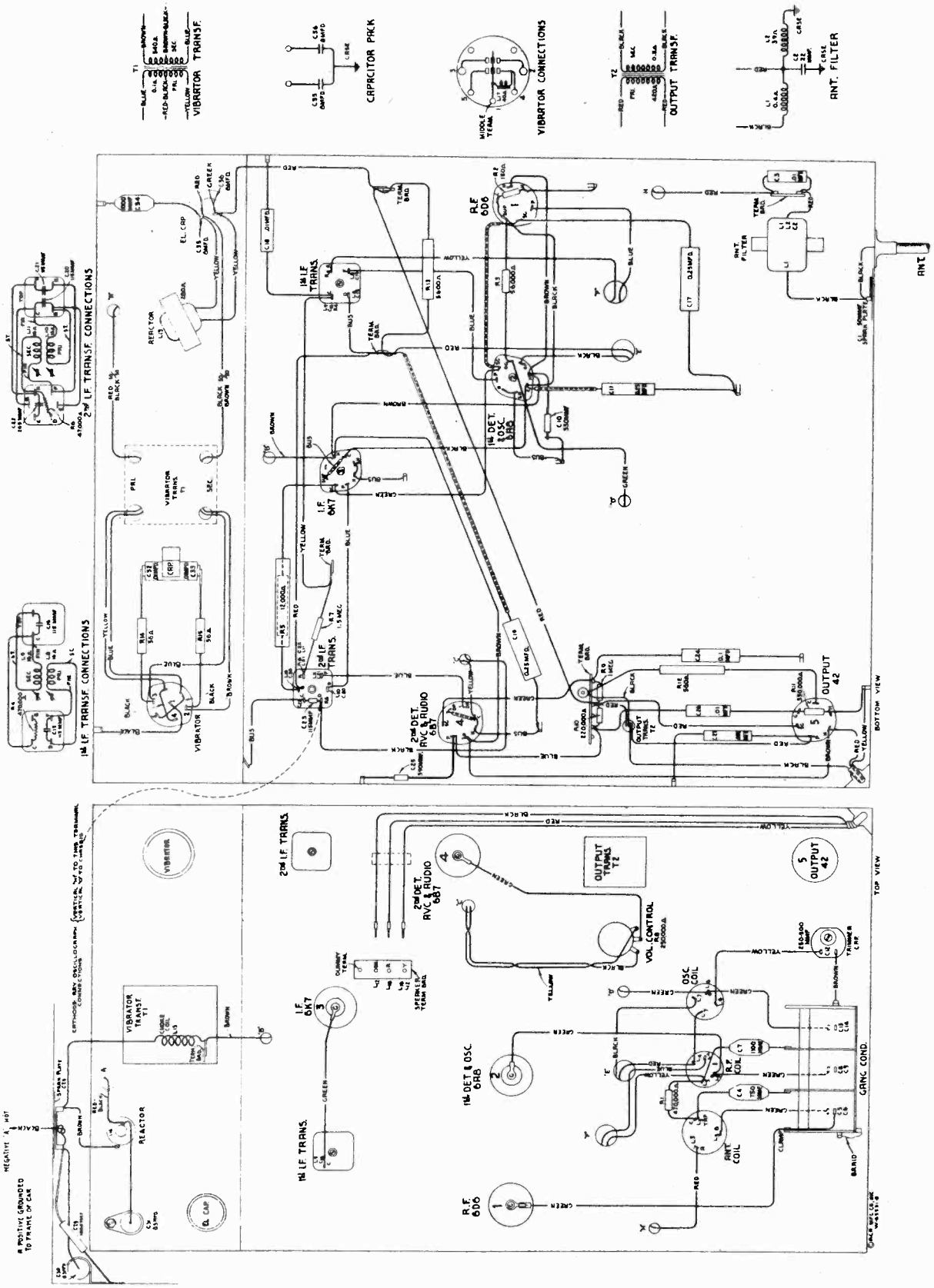


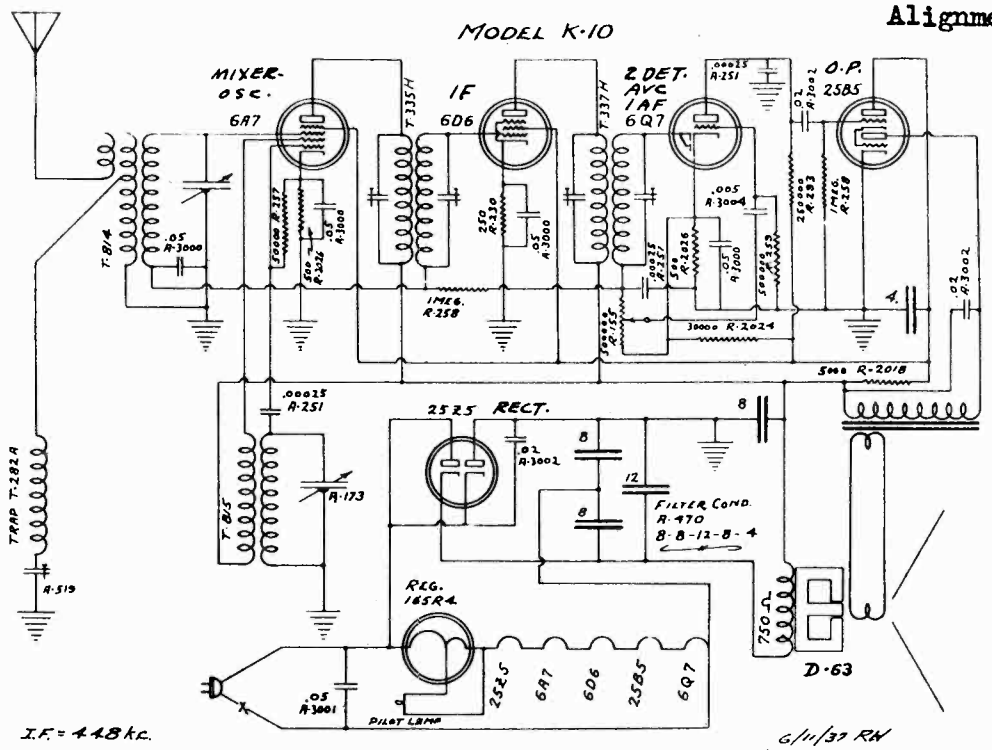
Figure 3—Chassis Wiring Diagram

INTERNATIONAL RADIO CORP.

MODEL 10
MODELS 25 to 28 incl.
Schematics, Socket Alignment, Voltage

ALIGNMENT-SAME AS FOR MODEL K-25(below)

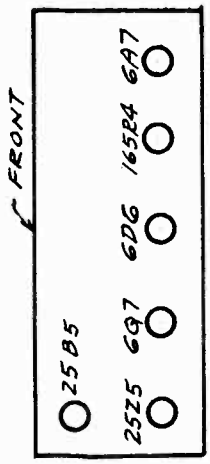
MODEL K-10



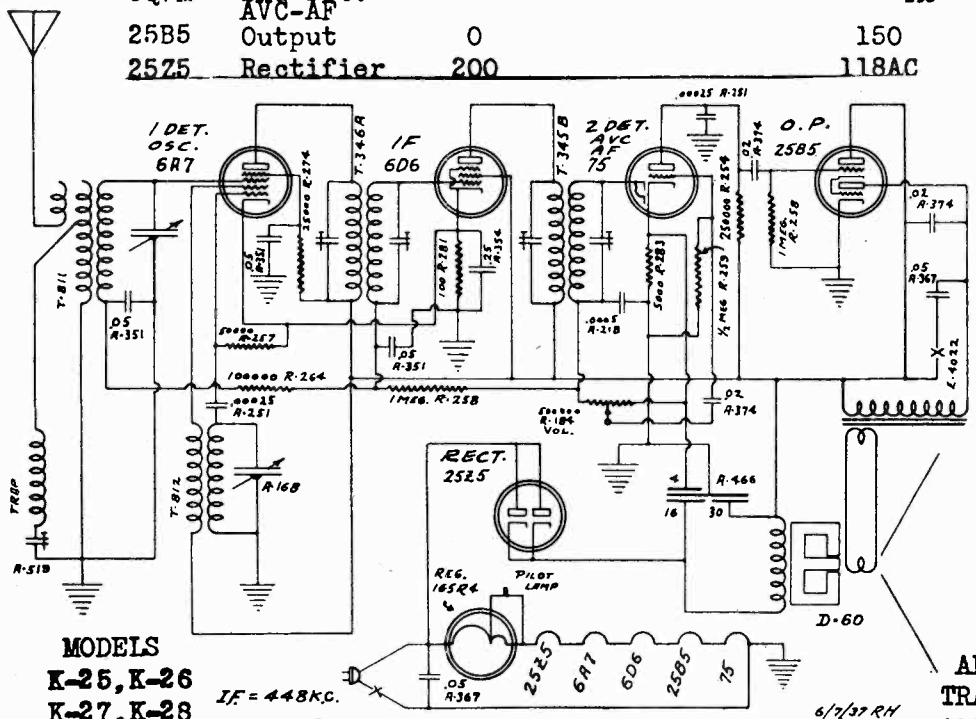
I.F. = 448 kc.

6/11/37 RH

TUBE	POSITION	EK	ESU	EGS	EGA	EP	EP INPUT
6A7	Mixer-Osc.	4		90	150	150	
6D6	I.F.	2.5	2.5	90		150	
6Q7M	2nd Det. AVC-AF	1.3				*-50 THRU 250 A.	
25B5	Output	0				150	90
25Z5	Rectifier	200				118AC	



FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION OF VOLUME VIII



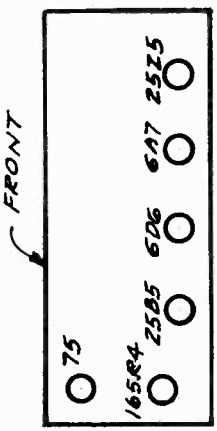
MODELS
K-25, K-26
K-27, K-28

IF = 448 KC.

Power Cord U-118

6/7/37 RH

TUBE	POSITION	EK	IGA	ESU	EGS	EP	EP INPUT
6A7	Det.-Osc.	*-1.8	100		60	100	
6D6	I.F.	*-1.8		*-1.8	100	100	
75	2nd Det. A.V.C.-A.F.	*-.6				-40	
25B5	Output	0				90	1--
25Z5	Rectifier	100				118 AC	

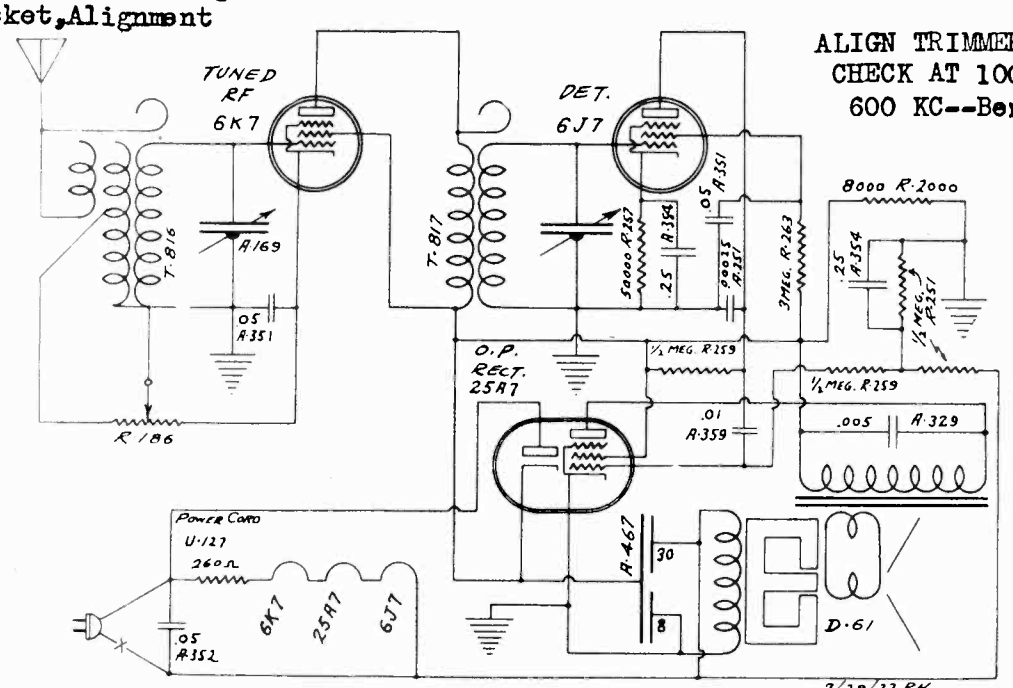


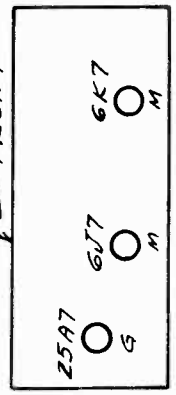
ADJUST I.F. AND WAVE TRAP AT 448 KC. ALIGN BROADCAST-BAND TRIMMERS AT 1400 KC. NO PADDER AT 600 KC, bend plates if adjustment is needed.

MODELS 41,43
MODEL 617
Schematics, Voltage
Socket, Alignment

INTERNATIONAL RADIO CORP.

ALIGN TRIMMERS AT 1500 KC.
CHECK AT 1000 KC and at
600 KC--Bend plates if
necessary

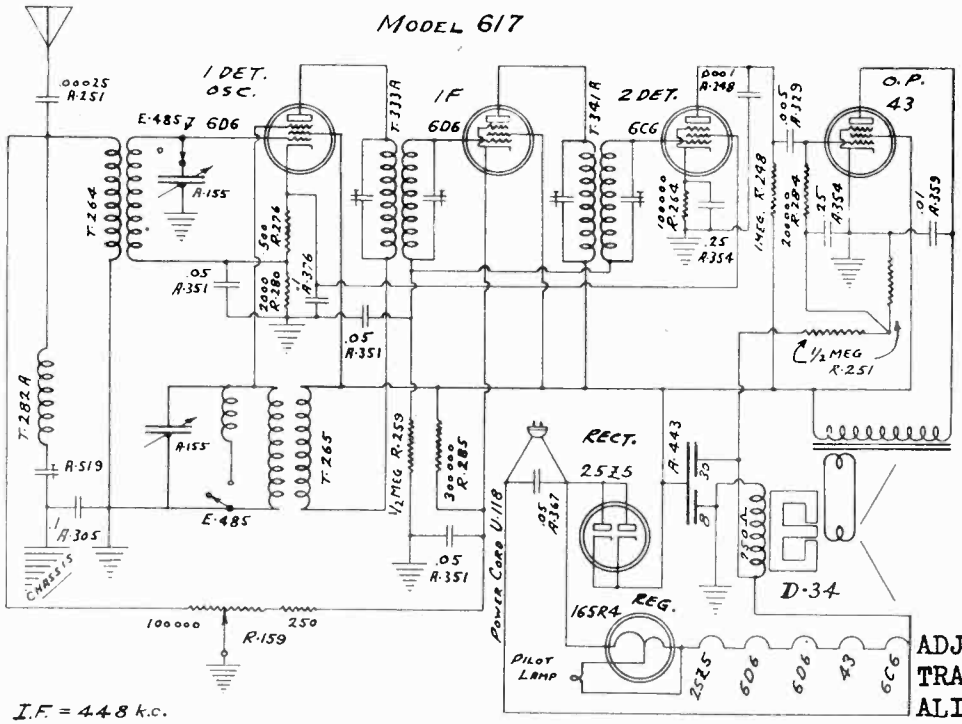


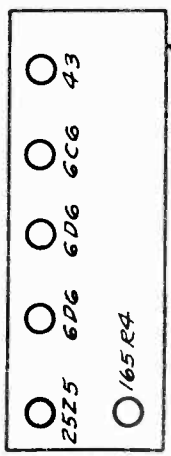


MODELS K-41 & K-43

TUBE	POSITION	EK	EG	EGS	ESU	EP	EP	EK
6K7	R.F.	*-3 10V. SCALE	0	100	*-3	100		
6J7	Det.	*-1.2 10V SCALE	0	-10 THRU 3 MEG	*-1.2	-20. THRU .5 MEG		
25A7g	Output							
	Rectifier	0		100		100	118 AC	100

MODEL 617





FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION OF VOL. VIII

I.F. = 448 k.c.

ADJUST "IF" AND WAVE TRAP AT 448 KC.
ALIGN BROADCAST-BAND TRIMMERS AT 1400 KC
NO PADDER AT 600 KC, bend plates if requires adjustment.

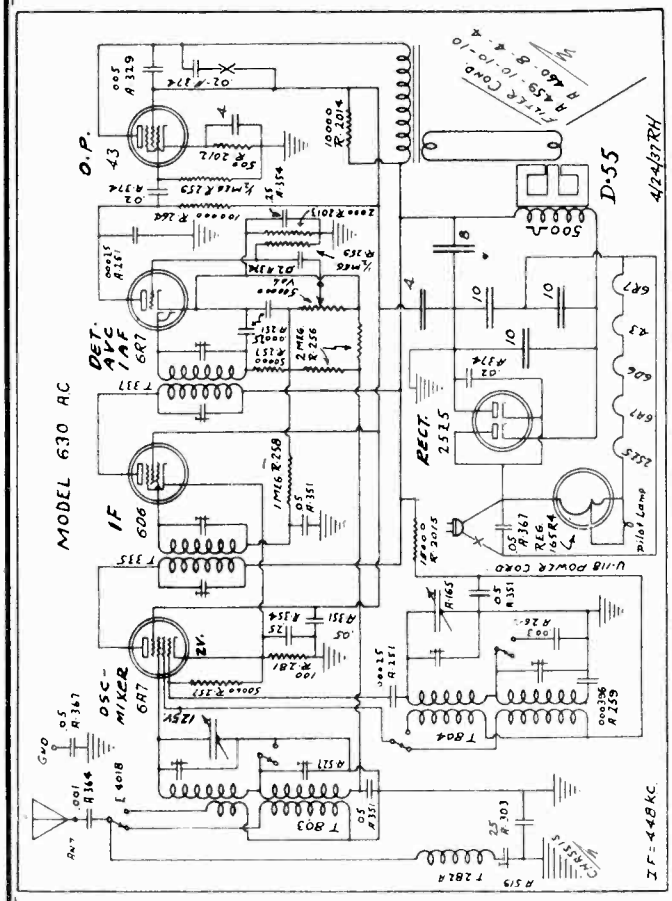
NO ALIGNMENT NECESSARY ON SHORT-WAVE BAND

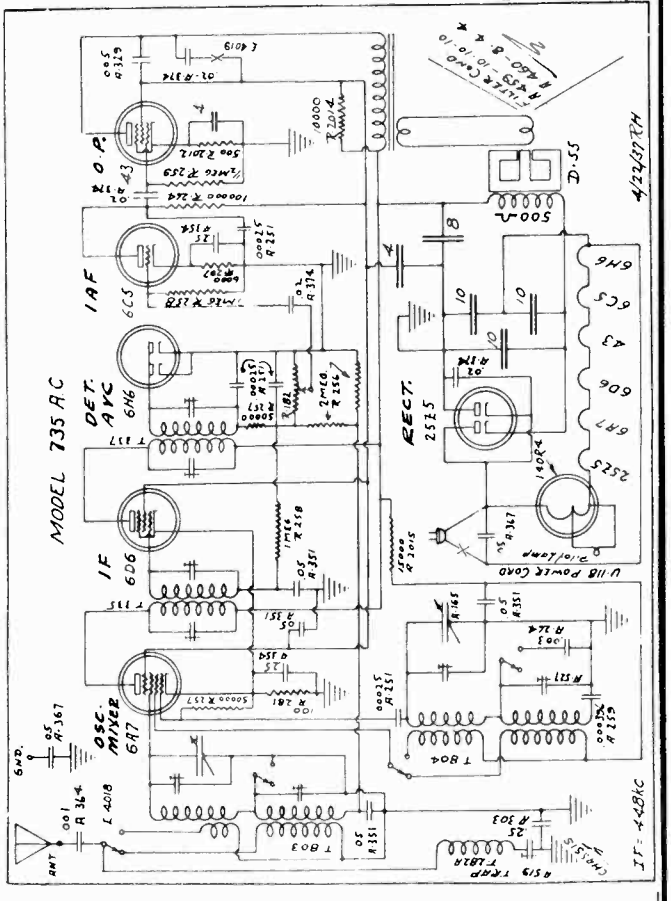
TUBE	POSITION	EK	EG3	EG2	EP
6D6	Det.-Osc.	14	0	100	100
6D6	I.F.	1	1	100	100
6C6	2nd Det.	2.5		14	25
43	Output	0		100	87
2525	Rect.	100			35

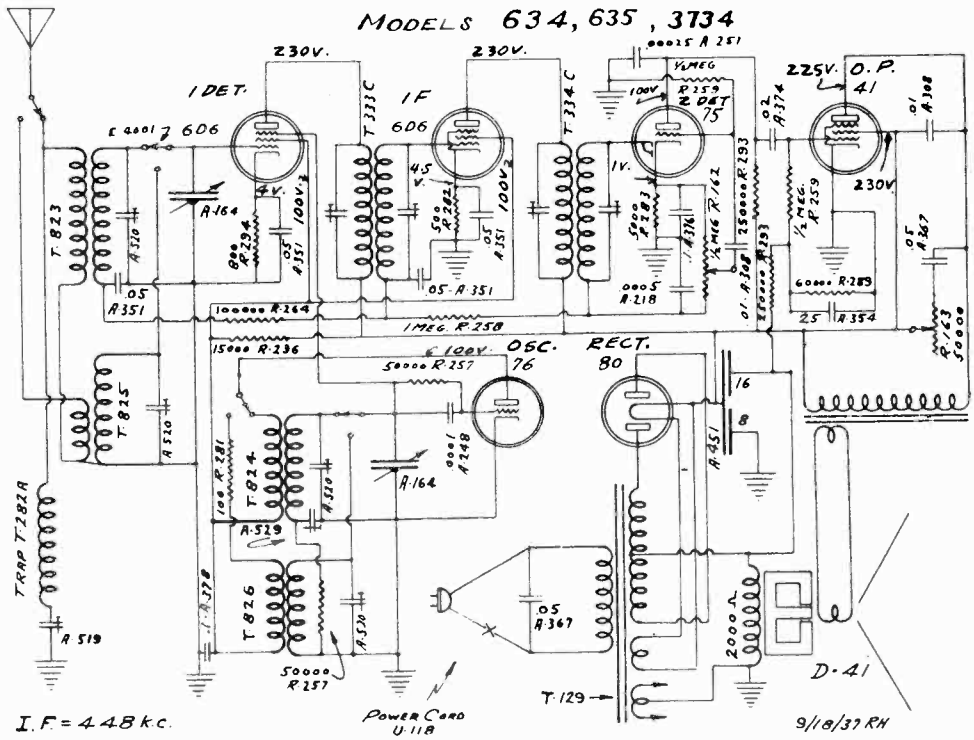
MODEL 735
Schematic

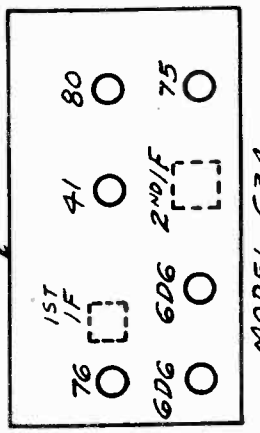
INTERNATIONAL RADIO CORP.

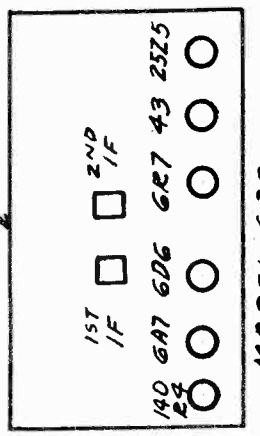
MODEL 630
MODELS 634, 635, 3734
Schematics, Socket











KADETTE MODELS K-630 & K-735

These chassis are designed to operate from 110-125 volt, 50-60 cycle alternating current power lines. They are two band receivers covering American broadcast and foreign short wave bands. (540-1550 Kc. and 5.3 to 17.5 meg.)

The following tubes are employed:

MODEL 630

6A7	Oscillator-Mixer
6D6	I.F. Amplifier
6R7	2nd Detector-A.V.C., 1st A.F. (Metal)
43	Audio output
25Z5	Rectifier
165R4	Ballast

MODEL 735

6A7	Oscillator-Mixer
6D6	I.F. Amplifier
6H6	2nd Detector-A.V.C. (Metal)
6C5	1st Audio
43	Audio output
25Z5	Rectifier
140R4	Ballast

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. The short wave trimmers are on the tuning gang and the broadcast are on the two section strip mounted between the volume control and band switch. The short wave band *must* be aligned *first* as the short wave trimmers affect the broadcast alignment.

INTERMEDIATES: To align the I.F. circuits set the signal generator to 448 Kc. and feed its modulated signal direct to the antenna. Turn the band switch to the broadcast position. Adjust the first I.F. transformer trimmers for maximum meter reading. Next repeat the process on the second I.F. transformer. Go over both adjustments at least three or four times for accuracy. If adjustments are not made accurately, selectivity and sensitivity will be poor and I.F. oscillation may result. Finally adjust the trimmer on the tuned wave trap for *minimum* meter reading.

SHORT WAVE: Turn the band switch to the short wave position and the dial to 15 megacycles and feed a weak 15 megacycle signal to the antenna. Adjust the short wave oscillator trimmer for maximum reading. Then, peak the short wave antenna trimmer to this setting. There is no adjustable padder on this band so no further alignment is required.

BROADCAST: Turn the band switch to the broadcast position and the dial to 1400 Kc. and feed a weak 1400 Kc. signal to the antenna. Adjust broadcast oscillator trimmer for maximum reading. Then, peak the broadcast antenna trimmer to this oscillator setting.

There is no adjustable padder condenser in this model so resonance at 1000 and 600 Kc. is accomplished by bending plates on the tuning condenser, if necessary.

AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
6A7	Osc.-Mixer	2	0	125	110	—	210
6D6	I.F. Amp.	2	0	—	110	2	210
6R7	Det.-A.V.C. 1st A.F. (Model 630)	1.5	0	—	—	—	†30
6H6	Det. A.V.C. (Model 735)	0	—	—	—	—	A.V.C.
6C5	1st A.F. (Model 735)	3	0	—	—	—	†30
43	Audio Output	12	0	—	110	—	190
25Z5	Rectifier	230	—	—	—	—	A.C.

Line 118 volts. No signal. Measurements made from tube prongs to circuit ground with 1000 ohms per volt instrument.
† Measured through .1 megohm.

KADETTE MODELS K-634, K-635, K-3734

This chassis is designed to operate from 110-125 volt, 60 cycle, alternating current power lines. It is a two band receiver covering the American broadcast and Foreign short wave bands.

The following tubes are employed:

76	—Oscillator
6D6—1st Detector	
6D6—I.F. Amplifier	
75	—2nd Detector—A.V.C.—A.F.
41	—Pentode Output
80	—Rectifier

ALIGNMENT

The standard type of output meter should be used to indicate signal strength. It should be connected from the plate of the 41 to ground. Tone control should be turned "high." The signal from the signal generator *must be kept at a very low level.*

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc. On both bands the oscillator frequency is 448 kilocycles higher than the signal frequency. Aligning should be done on the following frequencies: Broadcast band, 1400 and 600 Kc.; Short wave band 15 megacycles and 8 megacycles.

The four trimmers on the bottom of the chassis are, reading from the side of the chassis by switch toward the center, Short wave antenna, Broadcast antenna, Short wave oscillator and Broadcast oscillator.

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 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. Then peak Broadcast antenna trimmer to this oscillator setting.

Turn dial and signal generator to 600 Kc. and rock the padder into correct adjustment. This is accomplished by very slowly adjusting the padder condenser and at the same time turning the dial slightly back and forth across 600 Kc. until an adjustment is obtained producing maximum output. Go back to 1400 Kc. and readjust the oscillator trimmer slightly if necessary. Then recheck padder at 600 Kc.

SHORT WAVE BAND: Place the band change switch on the Short Wave position. Turn the dial to 15 megacycles and feed a very weak 15 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. Then peak S.W. antenna trimmer to this oscillator setting.

Instead of bending condenser plates at 8 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 15 megacycles.

AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Esu_3	Egs_2	Ep
76	Oscillator	0	0	—	100
6D6	Detector	4	—	100	230
6D6	I. F.	4.5	4.5	100	230
75	2nd Det. A.V.C.—A.F.	1	—	—	100
41	Output	0	—	230	225
80	Rectifier	—	—	—	118 AC

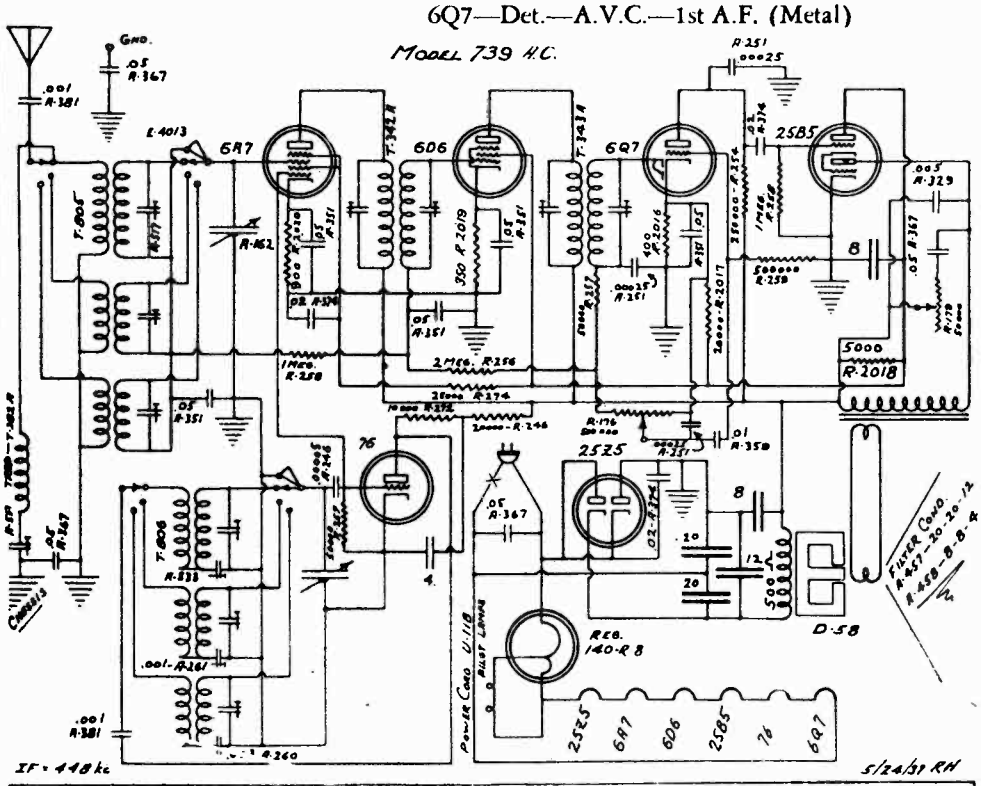
Line 118 volts 10% variation allowable. Measurements made from tube prongs to circuit ground and made with 1000 ohms per volt instrument on 250 volt scale.

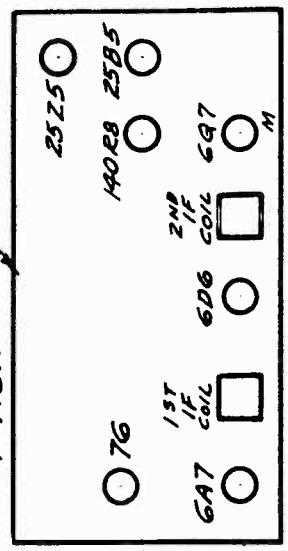
INTERNATIONAL RADIO CORP.

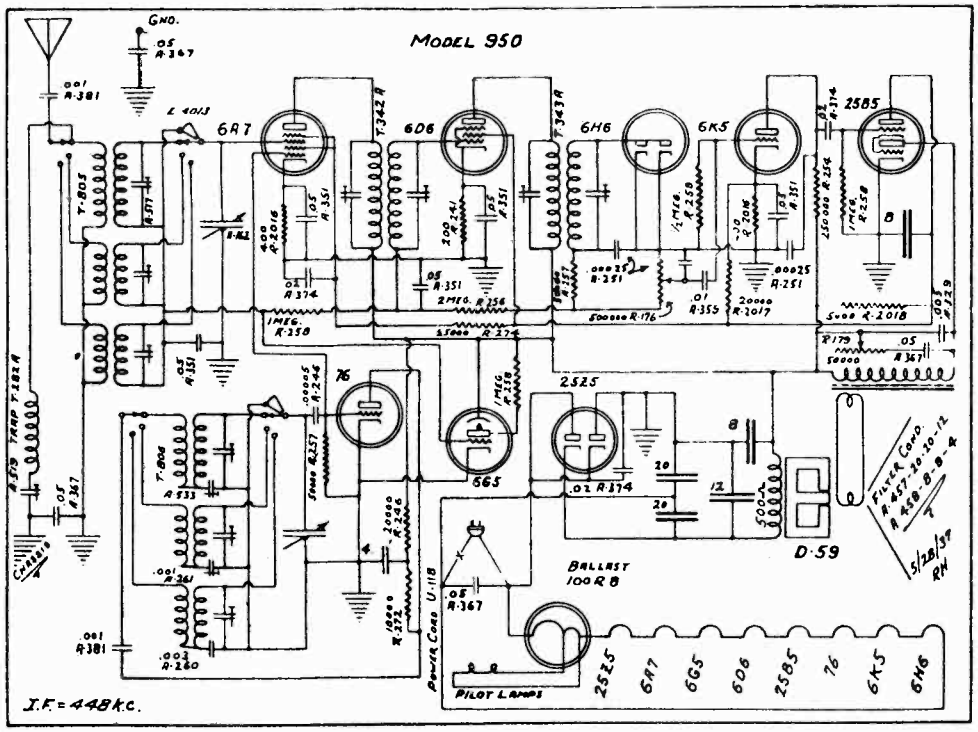
MODEL 739
MODEL 950
Schematics
Socket

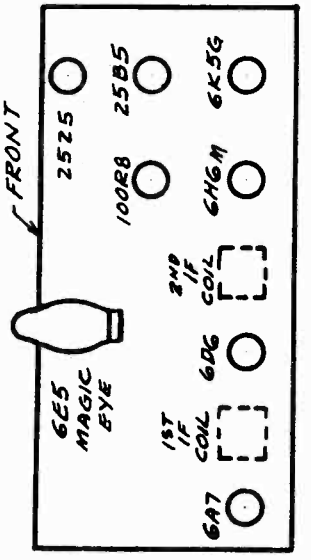
The following tubes are employed:

76—Oscillator
6A7—Mixer
6D6—I.F.
6Q7—Det.—A.V.C.—1st A.F. (Metal)
25B5—Output
25Z5—Rectifier
140R8—Ballast









The following tubes are employed:

76 Oscillator
6A7 Mixer
6D6 I.F.
6H6 Det.-A.V.C. (Metal)
6K5 1st A.F.
25B5 Output
6G5 Tuning indicator tube
25Z5 Rectifier
140R8 Ballast

MODELS K-1129, K-1149 & K-1159

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 plate to plate on the 41 tubes.

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.

SHORT WAVE

Turn the dial to 6000 Kc. and feed a *very weak* 6000 Kc. modulated signal from your signal generator to the antenna. Adjust the Short Wave oscillator trimmer for maximum reading. Then peak antenna coupling condenser to this oscillator setting. Do not attempt to align the low frequency end of this band.

BROADCAST

Turn the dial to 1400 Kc. and feed a *very weak* 1400 Kc. modulated signal to the antenna. Adjust Broadcast oscillator trimmer for maximum reading. Then peak Broadcast antenna trimmer to this oscillator setting.

There is no adjustable padder condenser in this model so resonnance on lower frequencies is accomplished by bending plates on tuning condenser.

MODELS K-1129 & K-1149 AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
6A7	Osc.-Mixer	*-2.6	0	165	100	—	165
6D6	I.F.	*-2	0	—	100	*-2	165
76	Det.	0	0	—	—	—	0
76	1st Audio	0	‡	—	—	—	†-25
76	Inverter	*-2.3	0	—	—	—	†-25
41	Output	**-12.5	0	—	165	—	160
41	Output	**-12.5	0	—	165	—	160
25Z5	Rectifier	165	—	—	—	—	A.C.

Line 118 volts. 10% variation allowable. Measurements made from tube prong to circuit ground with 1000 ohms per volt instrument on 250 volt scale except * 10 volt scale and ** 50 volt scale.
† Through .1 megohm ‡Diode biased.

MODEL K-1159 AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
6A7	Osc.-Mixer	*-2.6	0	165	100	—	165
6D6	I.F.	*-2	0	—	100	*-2	165
76	Det.	0	0	—	—	—	0
76	1st Audio	0	‡	—	—	—	†-25
76	Inverter	*-2.3	0	—	—	—	†-25
41	Output	**-12.5	0	—	165	—	160
41	Output	**-12.5	0	—	165	—	160
25Z5	Rectifier	165	—	—	—	—	A.C.

MODELS K-739 & K-950

ALIGNMENT

The standard type of output meter should be used as an indicator. It should be connected from the output plate of the 25B5 tube to ground. Tone control should be on "high". The signal from the signal generator must be kept at a very low level.

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc. On all bands the oscillator frequency is 448 Kc. higher than the signal frequency.

The trimmers are in the can containing the associated coils and are available through the holes in the cans. The can in front, next to the dial, contains the oscillator coils and the rear can, the antenna coils. The top trimmers are the broadcast, the middle the mid-band, and the bottom the short wave.

INTERMEDIATES. To align the I.F. circuits, set the signal generator to 448 Kc. and feed its modulated signal direct to the antenna. Turn the band switch on Broadcast position. 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 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. Then peak Broadcast antenna trimmer to this oscillator setting.

Turn dial and signal generator to 600 Kc. and rock the padder into correct adjustment. This is accomplished by very slowly adjusting the padder condenser and at the same time turning the dial slightly back and forth across 600 Kc. until an adjustment is obtained producing maximum output. Go back to 1400 Kc. and readjust the oscillator trimmer slightly if necessary. Then recheck padder at 600 Kc.

MIDDLE BAND: Turn the band change switch to the middle position and tune radio and test oscillator to 5000 Kc. Adjust the oscillator trimmer and then the antenna trimmer for maximum output.

Rock in the padder condenser at 2000 Kc. Then recheck at 5000 Kc. and 2000 Kc.

SHORT WAVE BAND: Turn band change switch to short wave band. Tune radio and test oscillator to 15 megacycles and adjust trimmers. No padder condenser is used on the short wave band so no other adjustments are necessary.

MODEL K-739 AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
76	Oscillator	0	0	–	–	–	80
6A7	Mixer	*3	0	50	50	–	190
6D6	I.F.	4	0	–	110	4	190
6Q7	Det-AVC 1st Audio	2	0	–	–	–	†100
25B5	Output	0	0	–	–	–	Input 110 Output 180
25Z5	Rectifier	220	–	–	–	–	118 A.C.

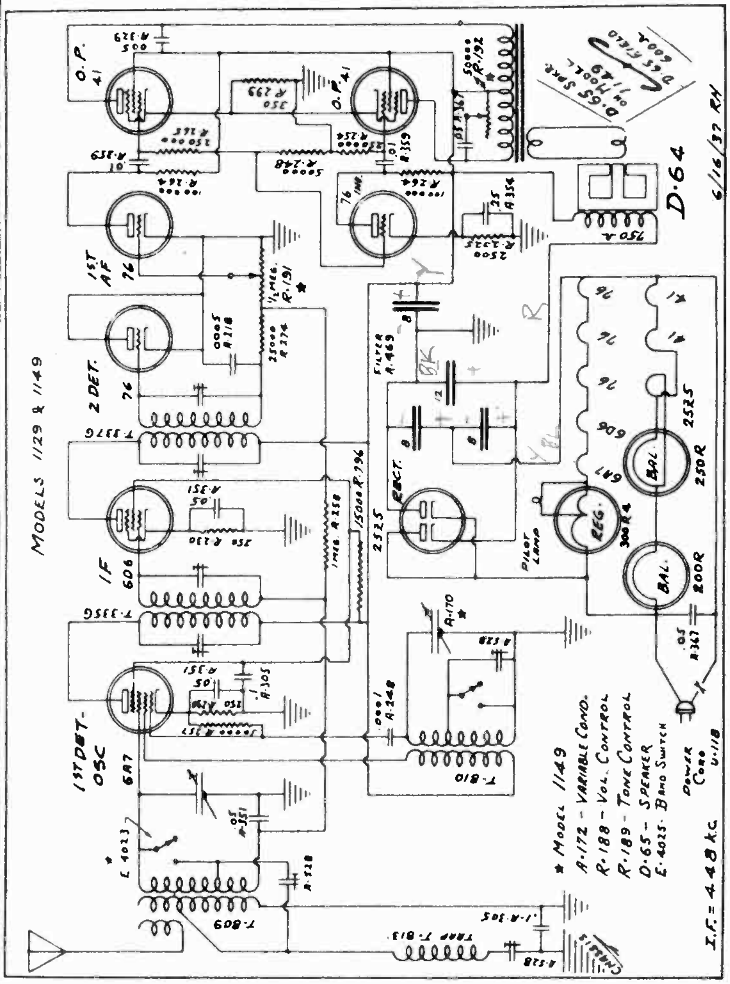
Line 118 volts. 10% variation allowable. Measurements made from tube prong to circuit ground with 1000 ohms per volt instrument on 250 volt scale except * on 10 volt scale
† through .25 megohm.

MODEL K-950 AVERAGE SOCKET VOLTAGES

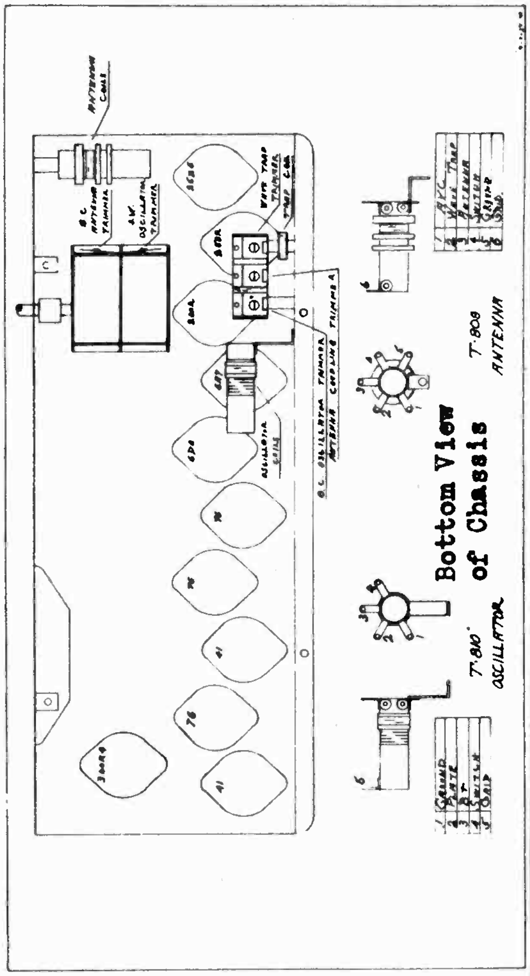
Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
76	Oscillator	0	0	—	—	—	80
6A7	Mixer	*3	0	50	50	—	190
6D6	I.F.	4	0	—	110	4	190
6H6	Det.-A.V.C.	0	—	—	—	—	A.V.C.
6K5	1st Audio	2	0	—	—	—	†100
25B5	Output	0	0	—	—	—	Input 110 Output 180
6G5	Tun. Indic.	0	A.V.C.	—	—	—	100
25Z5	Rectifier	220	—	—	—	—	118 A.C.

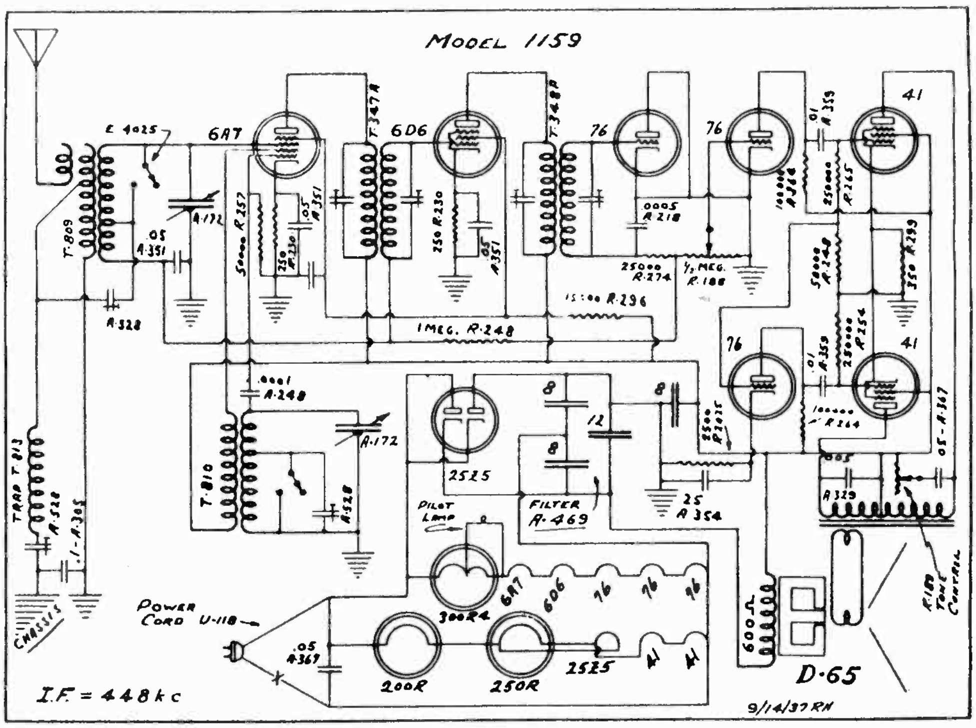
INTERNATIONAL RADIO CORP.

MODELS 1129,1149
MODEL 1159
Schematics,Socket



FOR ALIGNMENT AND VOLTAGE,SEE INDEX





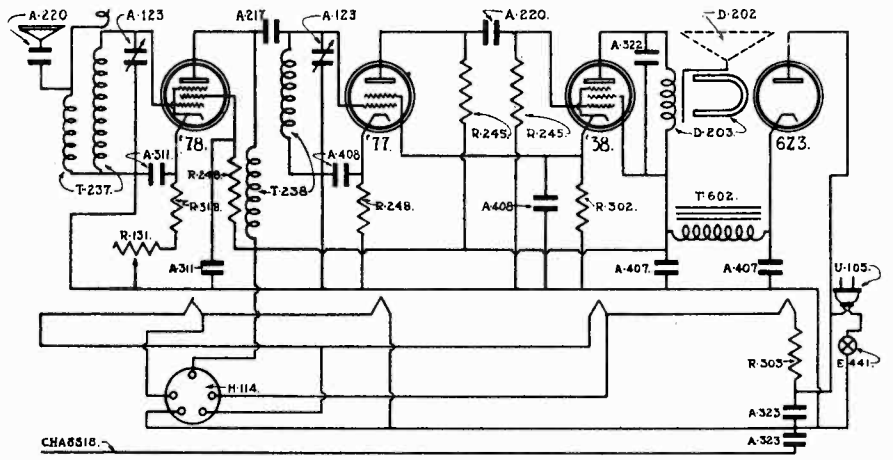
The following tubes are employed:

6A7—1st Detector-Oscillator
6D6—I.F. Amplifier
76 —2nd Detector
76 —1st Audio
76 —Inverter
41 —Audio Output

41 —Audio Output
200R —Ballast tube
25Z5 —Rectifier
250R —Ballast tube
300R4—Regulator tube

MODEL P
MODEL 210 Converter
Schematics, Notes

INTERNATIONAL RADIO CORP.



MODEL "P" SYMBOLS FOR SETS BEARING SERIAL NUMBERS 100,001 AND OVER

A-123	2-GANG VARIABLE CONDENSER	$1.75	A-408	DUAL 5 MFD BYPASS CONDENSER	.50
A-217	15 MMFD WIRE WOUND	.10	D-202	SPEAKER CONE	.45
A-220	.002 MFD MICA CONDENSER	.25	D-203	SPEAKER UNIT	1.50
A-311	.01 MFD BYPASS CONDENSER	.15	E-441	POWER SWITCH	.30
A-322	.006 MFD CONDENSER	.15	H-114	AUTO PLUG	.50
A-323	.05 MFD BYPASS CONDENSER	.15	R-131	VOLUME CONTROL	.60
A-407	FILTER CONDENSER	1.00	R-245	2 MEG. CARBON RESISTOR	.20
R-248	50M OHM CARBON RESISTOR	.20			
R-302	1500 OHM WIRE WOUND RESISTOR	.25			
R-303	310 OHM WIRE WOUND RESISTOR	.75			
R-318	150 OHM WIRE WOUND RESISTOR	.25			
T-237	ANTENNA COIL ASSEMBLY	.30			
T-238	R. F. COIL ASSEMBLY	.35			
T-602	FILTER CHOKE	.65			

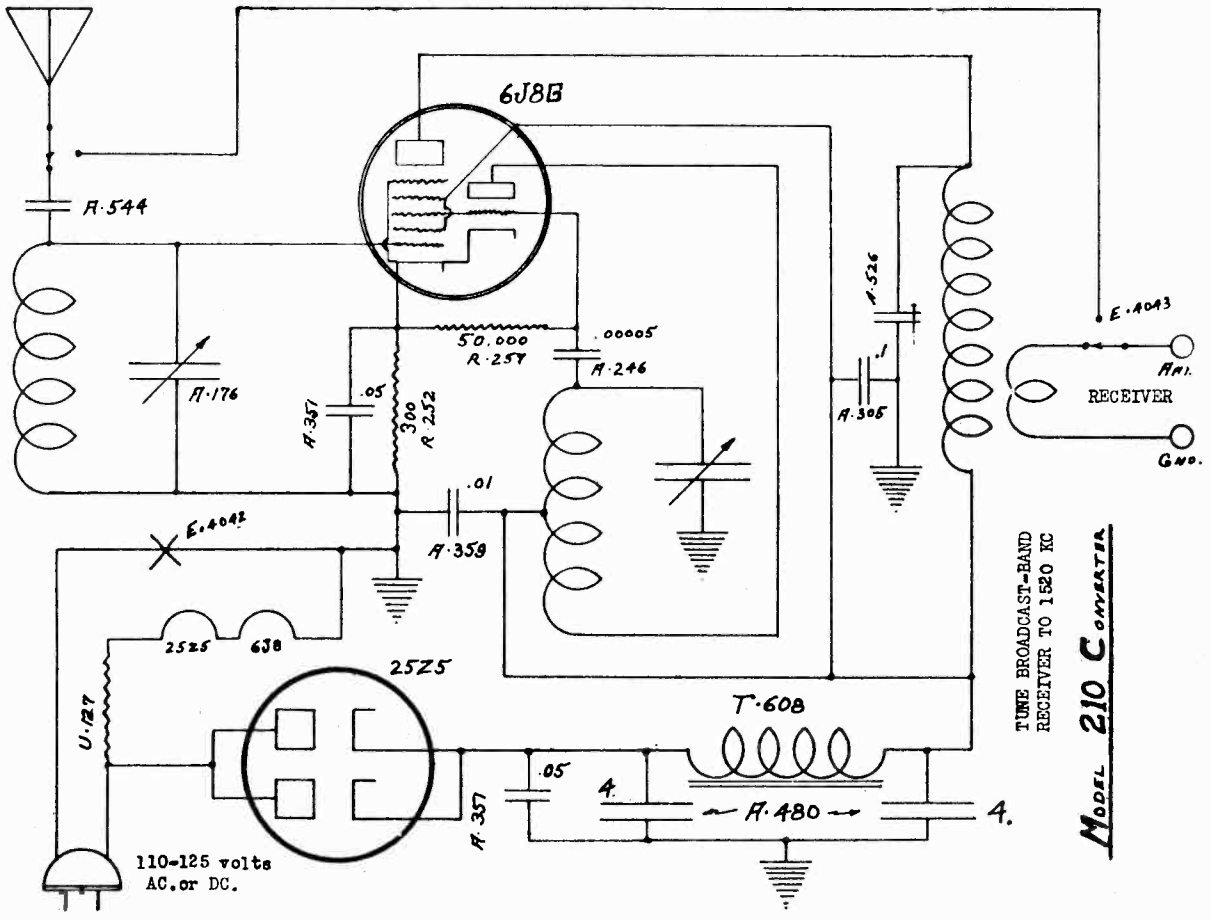
The out-put tube is now a "dome" type 38.

The new rectifier tube is 6Z3 and is interchangeable with the KR-1. The chief difference is that the new tube contains no mercury, and will therefore, be free from internal short circuits which have occurred occasionally in the KR-1 tube due to the condensation of mercury. The use of the new tube permits the elimination of the resistor R-304 in the plate circuit.

MODEL P--later production differs from earlier type as follows--uses types 77, 78 and 6Z3 tubes in place of types 36 and KR-1.

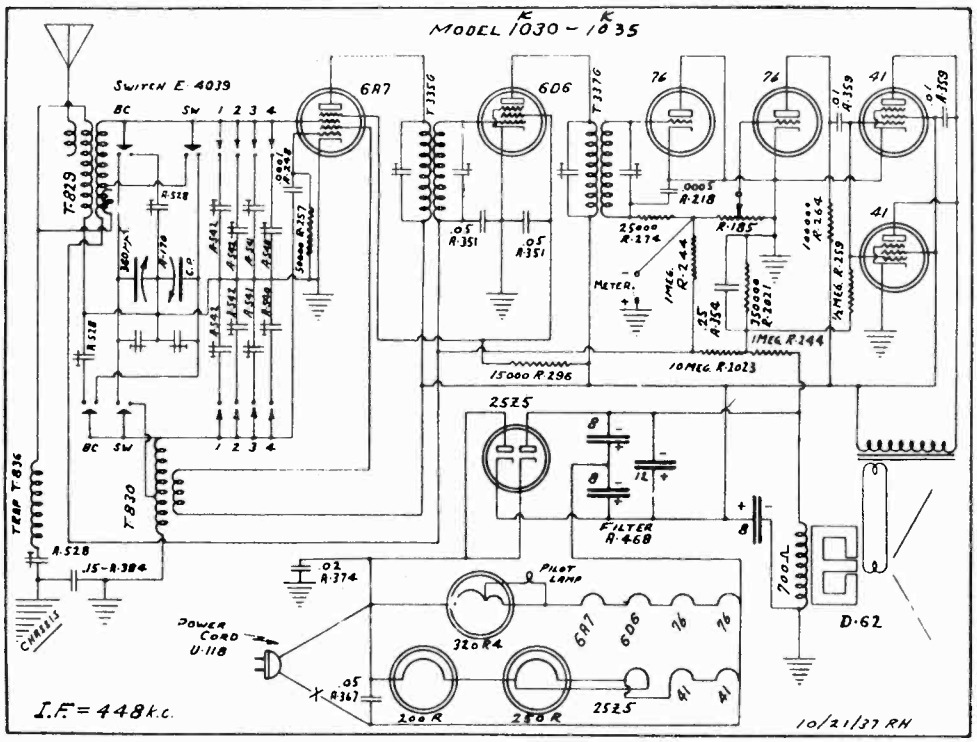
The type 78 is used in the R.F. stage. The screen voltage has been dropped on this tube through a 50K ohm resistor R-248 which is by-passed by an .01 Mfd. condenser A-311. The voltage on the screen is about 55 volts with the volume full on.

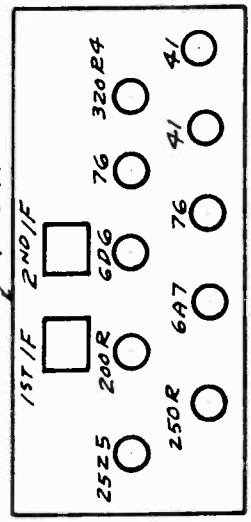
The voltages and connections to the detector socket are the same as in the earlier models. The tube is now a 77.

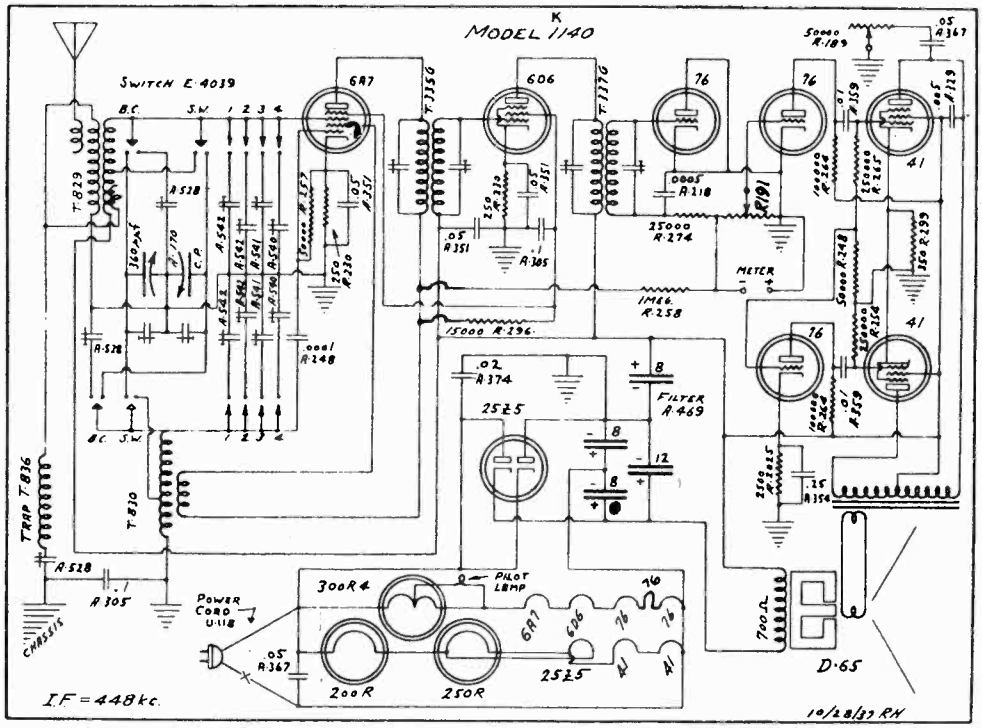


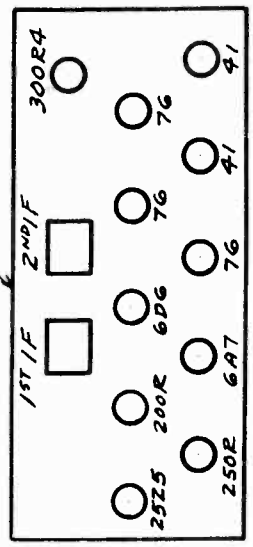
INTERNATIONAL RADIO CORP.

MODELS 1030,1035
MODEL 1140
Schematics, Socket









FOR
BOTTOM VIEW OF CHASSIS
SEE MODEL-1129

KADETTE MODELS K-1030 & K-1035 K - 1 1 4 0

This chassis is designed to operate on 110-120 volt, 50-60 cycle alternating current power lines. It is a two band receiver covering the American broadcast band and Police, Airport and 49 meter European bands.

The following tubes are employed:

6A7	Oscillator-Mixer		41	Audio Output
6D6	I. F. Amplifier	Additional 76	200R	Ballast tube
76	Detector	as Inverter on	25Z5	Rectifier
76	1st Audio	Model K-1140	250R	Ballast tube
41	Audio output		320R4	Regulator tube (300R4 on K-1140)

ESSENTIAL DATA

GENERAL INFORMATION: 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 plate to plate on the 41 tubes. The trimmer on the high capacity section of the tuning condenser is the Short Wave *oscillator* trimmer. The trimmer on the low capacity (cut plate) section of the tuning condenser is the Short Wave antenna (this trimmer will have been removed at the factory in most sets). The trimmer in the center of the three gang strip is the Broadcast oscillator trimmer. The one on the opposite end from the wave trap is the Broadcast antenna. The Short Wave *must* be aligned *first* as the trimmer settings affect the broadcast alignment.

THE PUSH BUTTONS: Six push buttons will be noted below the dial. Depressing the right-hand button marked "Dial" connects the tuning condenser across the broadcast coils for manual operation of the set, with the dial, on the broadcast band. Depressing the next to right-hand button marked "S. W." connects the tuning condenser across the short wave coils for manual operation of the set, with the dial, on the short wave band. Each of the other four buttons connects one of the pairs of trimmers on the back of the receiver across the broadcast coils. These are tuned to each of the four fixed stations desired by the customer. (See section on alignment of Preselected Push-button Stations.)

THE "METER" JACK: This jack is connected across the A.V.C. load resistor so that, with a signal into the set, a voltmeter will show a deflection where inserted in these jacks. Maximum reading on such a meter will be a resonance indicator which can be used on broadcast station signals. As high a resistance meter as possible should be used.

ALIGNMENT

INTERMEDIATES: To align the I.F. circuits set the signal generator to 448 Kc. and feed its modulated signal direct to the antenna. Depress the right-hand button marked "Dial". Keep the signal as low as possible, turning down the oscillator output as the set approaches resonance and the sensitivity increases. Adjust the first I.F. transformer trimmers for maximum meter reading. Repeat this process on the 2nd I.F. transformer. Go over both adjustments at least three or four times for accuracy. If the adjustments are not made accurately sensitivity and selectivity will be poor and I.F. oscillation may result. Finally, adjust the trimmer on the tuned wave trap for *minimum* meter reading.

SHORT WAVE: Depress the button marked "S.W.". Turn the dial to minimum frequency (6800 Kc.) and feed a very weak 6800 Kc. signal to the antenna. Adjust the short wave oscillator trimmer to maximum reading. If not removed, peak short wave antenna trimmer to this setting. Do *not* attempt to align at the lower frequencies on this band.

BROADCAST: Depress the button marked "Dial". Turn the dial to 1400 Kc. and feed a very weak 1400 Kc. signal to the antenna. Adjust the broadcast oscillator trimmer for maximum reading. Then peak the broadcast antenna trimmer to this oscillator setting. Alignment at lower frequencies is accomplished by bending plates on the tuning condenser. Alignment should be checked at 1000 and 600 Kc.

PRESELECTED PUSH BUTTON STATIONS: When placing the receiver in operation it is necessary to adjust, or align, it to the user's choice of four favorite stations. There are four pairs of adjusting screws at the rear of the receiver. They are numbered from 1 to 4, reading from *right* to *left;* pair number 1 being the adjustment for the first (left hand) button—pair number 2 the adjustment for the next button (second from left) and so on. The upper (top) trimmers are across the oscillator coil. Always "find" the station with this trimmer. Then peak the bottom (antenna) trimmer to this using the voltmeter in the jacks as a resonance indication. While the receiver may be adjusted "by ear" with fair, and usable, accuracy—particularly on strong nearby stations—the use of a meter is highly desirable for greatest accuracy and best operation. When this receiver was tested at the factory, the adjusting screws, at the rear, were set approximately in the middle of the range, in frequency, shown above them on the dial. To adjust any pair of screws to a lower frequency, turn them to the right. To adjust to a higher frequency, turn them to the left.

With the right-hand button depressed, tune-in a desired station by means of the tuning knob and dial—preferably the station having the lowest frequency (in kilocycles) of the four selected for automatic operation. Then after noting the program, depress the first button on the left and, at the rear, adjust the number 1 pair of trimmers to this station and program.

Then with the right-hand button depressed, tune-in the second of the four selected stations—the one next to the lowest in frequency preferably. After noting the station and program, depress the second button from the left and, at the rear, adjust the number 2 pair of trimmers to the station and program.

In a similar manner the stations may be located, identified and the adjustments at the rear made for the balance of the first four buttons. It is desirable to adjust so that the first button, at the left, tunes-in the lowest frequency of the desired four stations, and the fourth button the station with the highest frequency. Note approximate ranges indicated on the label at the rear of the receiver, above the trimmers.

A printed sheet of call-letters is provided with each receiver. The call-letters of the four selected favorite stations may be cut from the sheet and inserted in the corresponding knobs in the space provided.

NOTE: Alignment may frequently be made more rapidly by connecting the antenna to a calibrated oscillator or signal generator. Adjustment of each of the pairs of trimmers can then be quickly made to the signal of the calibrated oscillator which is set, in turn, to the approximate frequencies of the desired stations. The adjustments should be finally made on the stations themselves, however, using a meter and the procedure indicated above. This method of aligning, or adjusting, will avoid the possibility of setting them to the wrong station as there are times when other stations, near to the desired station in frequency, are broadcasting the same program. When this condition exists it may be necessary to wait to hear station announcement unless the calibrated oscillator has been used to obtain the approximate settings.

K-1030, K1035 AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
6A7	Det.-Osc.	0	*-1.5	165	90	—	165
6D6	I.F.	0	*-1.5	—	90	0	165
76	2nd Det.	0	*-.45	—	—	—	0
76	1st Audio	0	‡	—	—	—	†35
41	Output	0	*-12.5	—	165	—	160
41	Output	0	*-12.5	—	165	—	160
25Z5	Rect.	165	—	—	—	—	AC

Line voltage 118 volts, 10% variation allowable. Measurements made from tube prong to circuit ground with 1000 ohms per volt instrument on 250 volt scale.
* Not measureable-calculate from 50 volt drop across speaker field.
† Through .1 megohm ‡ Diode biased

K-1140 AVERAGE SOCKET VOLTAGES

Tube	Position	Ek	Eg	Ega	Egs	Esu	Ep
6A7	Osc.-Mixer	*-2.6	0	165	100	—	165
6D6	I.F.	*-2	0	—	100	*-2	165
76	Det.	0	0	—	—	—	0
76	1st Audio	0	‡	—	—	—	†-25
76	Inverter	*-2.3	0	—	—	—	†-25
41	Output	**-12.5	0	—	165	—	160
41	Output	**-12.5	0	—	165	—	160
25Z5	Rectifier	165	—	—	—	—	A.C.

Line 118 volts. 10% variation allowable. Measurements made from tube prong to circuit ground with 1000 ohms per volt Instrument on 250 volt scale except *-10 volt scale and **-50 volt scale.
† Through .1 megohm ‡Diode biased.