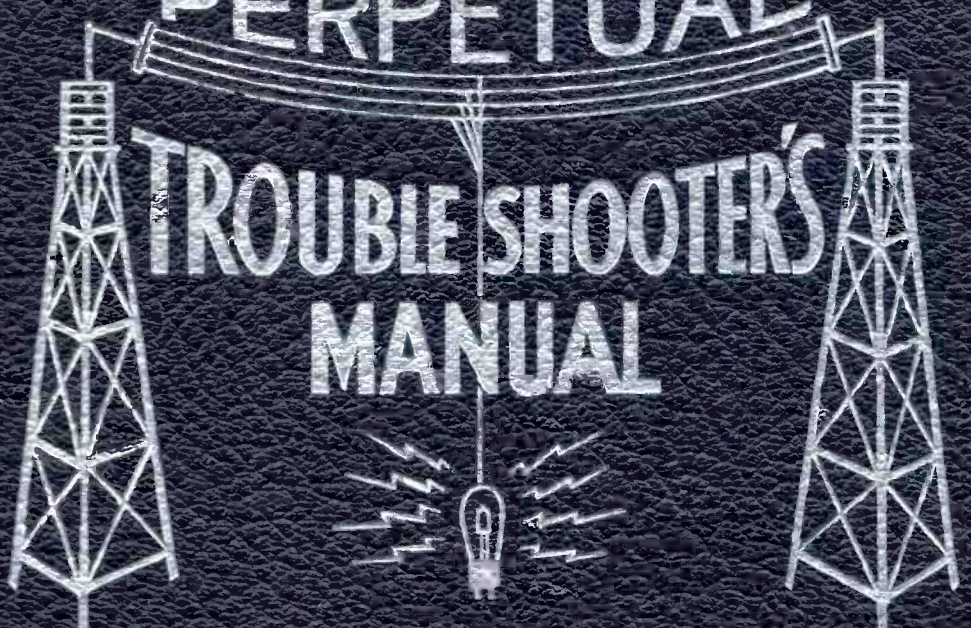
VOLUME V

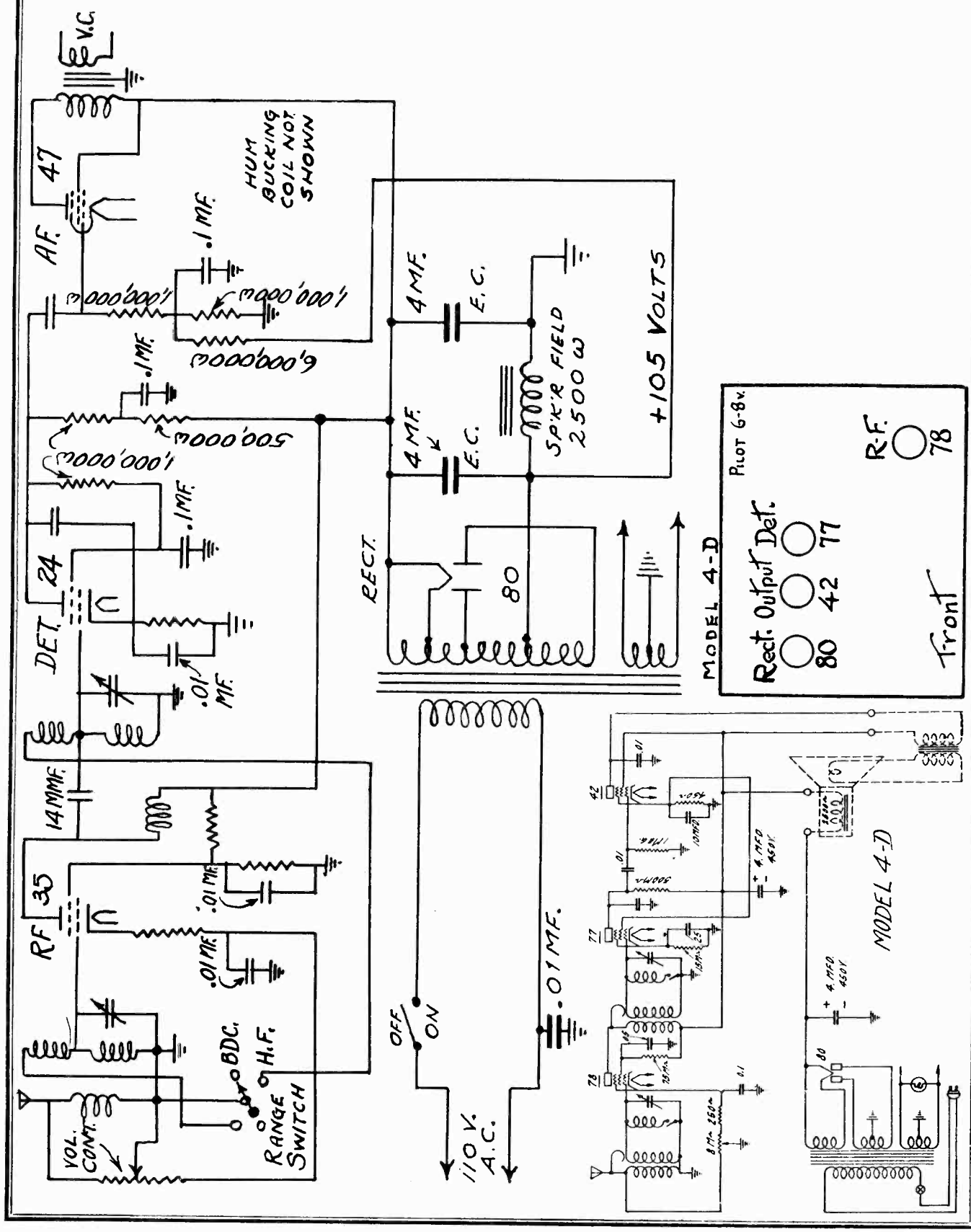
PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

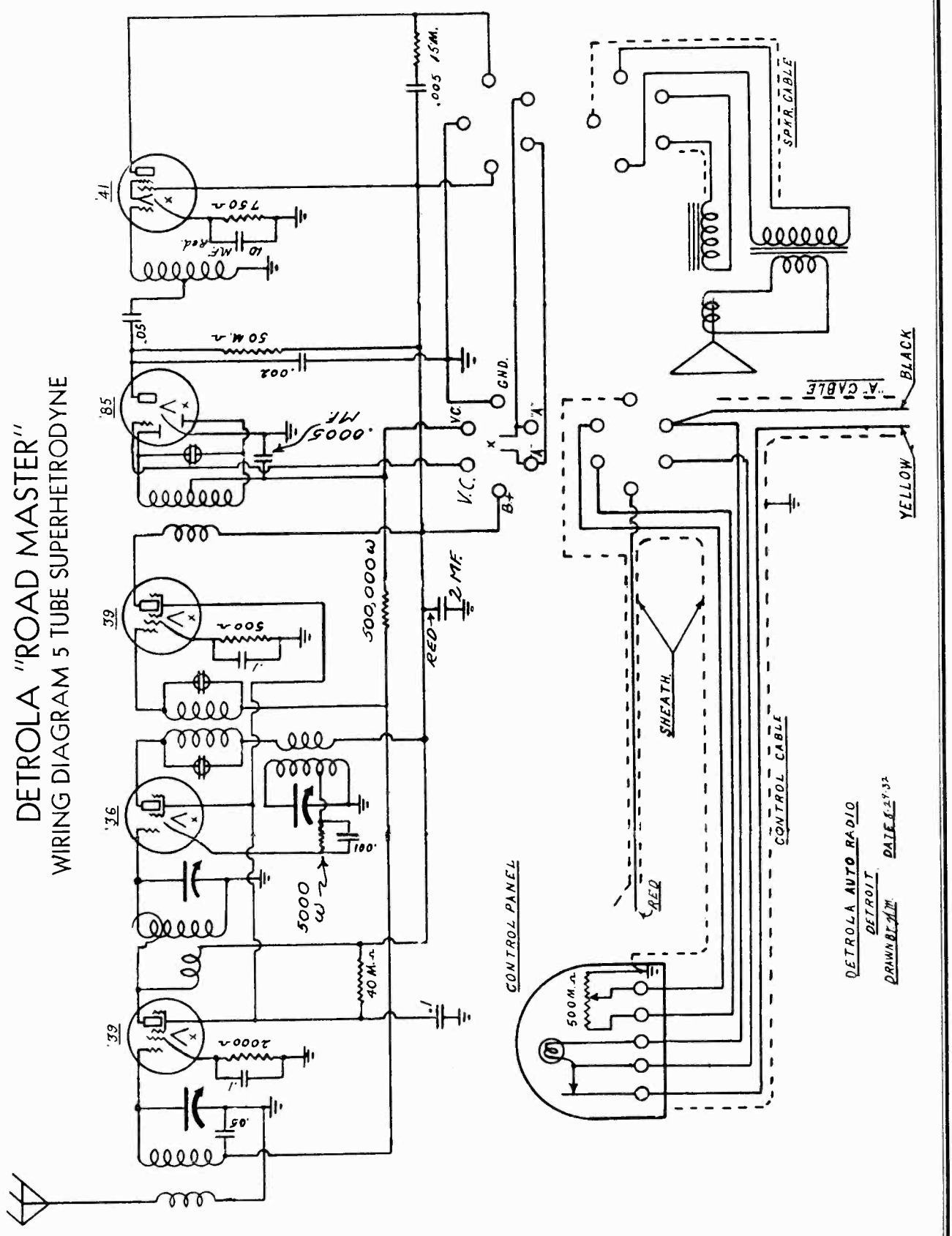
DETROLA RADIO CORP.

MODEL 4 Tube TRF '32
Schematic
MODEL 4-D
Schematic, Socket



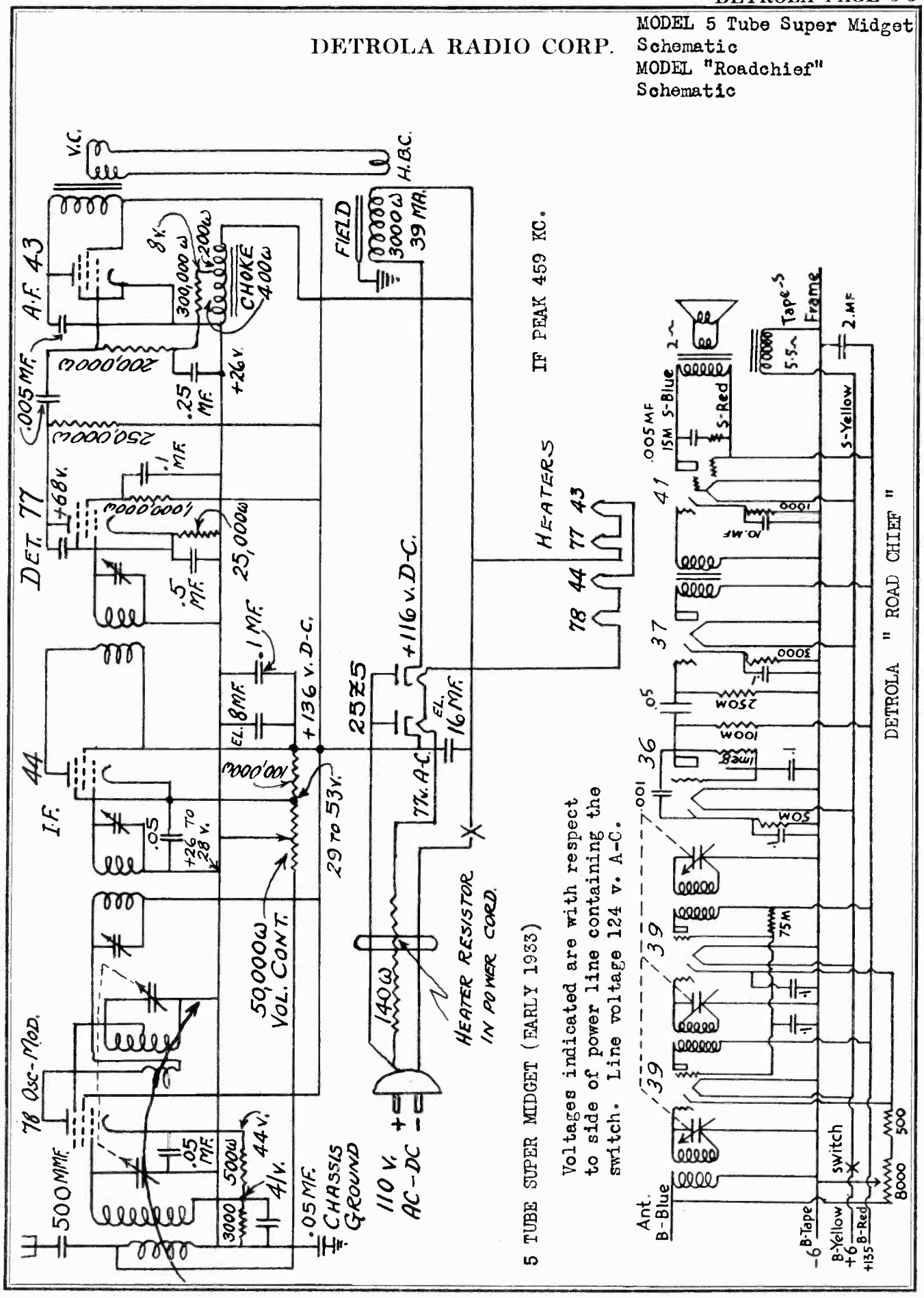
MODEL "Roadmaster"
Schematic

DETROLA RADIO CORP.

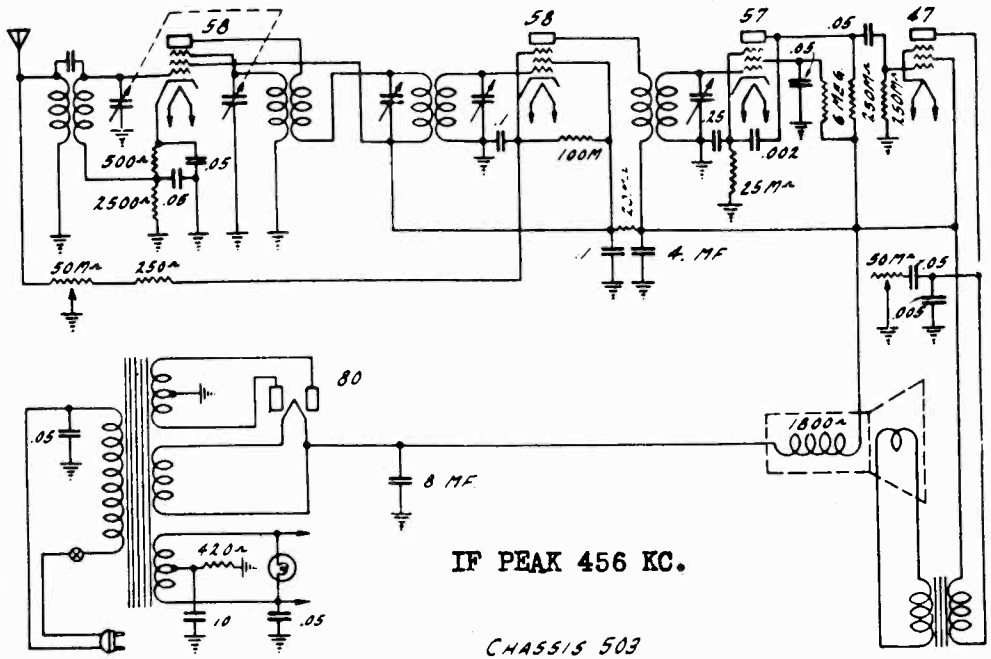


DETROLA RADIO CORP.

MODEL 5 Tube Super Midget
Schematic
MODEL "Roadchief"
Schematic



SCHEMATIC DIAGRAM OF MODEL 503 RADIO



VOLTAGE TABLE. Line Voltage 115 v. 60 cyc.

TUBE		Grid	Plate	Screen	Filament
58	Osc-Det	-2.5	60	60	2.5
58	IF	-2.0	250	75	2.5
57	2 Det.	-3.5	75	6	2.5
47	Output	-5.0	210	225	2.5
80	Rect. Fil.to Gnd. 325 volts.				5.0

PROCEDURE FOR ALIGNMENT:

Apply a modulated 456-kc. signal to modulator grid and align the four dual trimmers in the top of the I-F. cans for maximum output from the set.

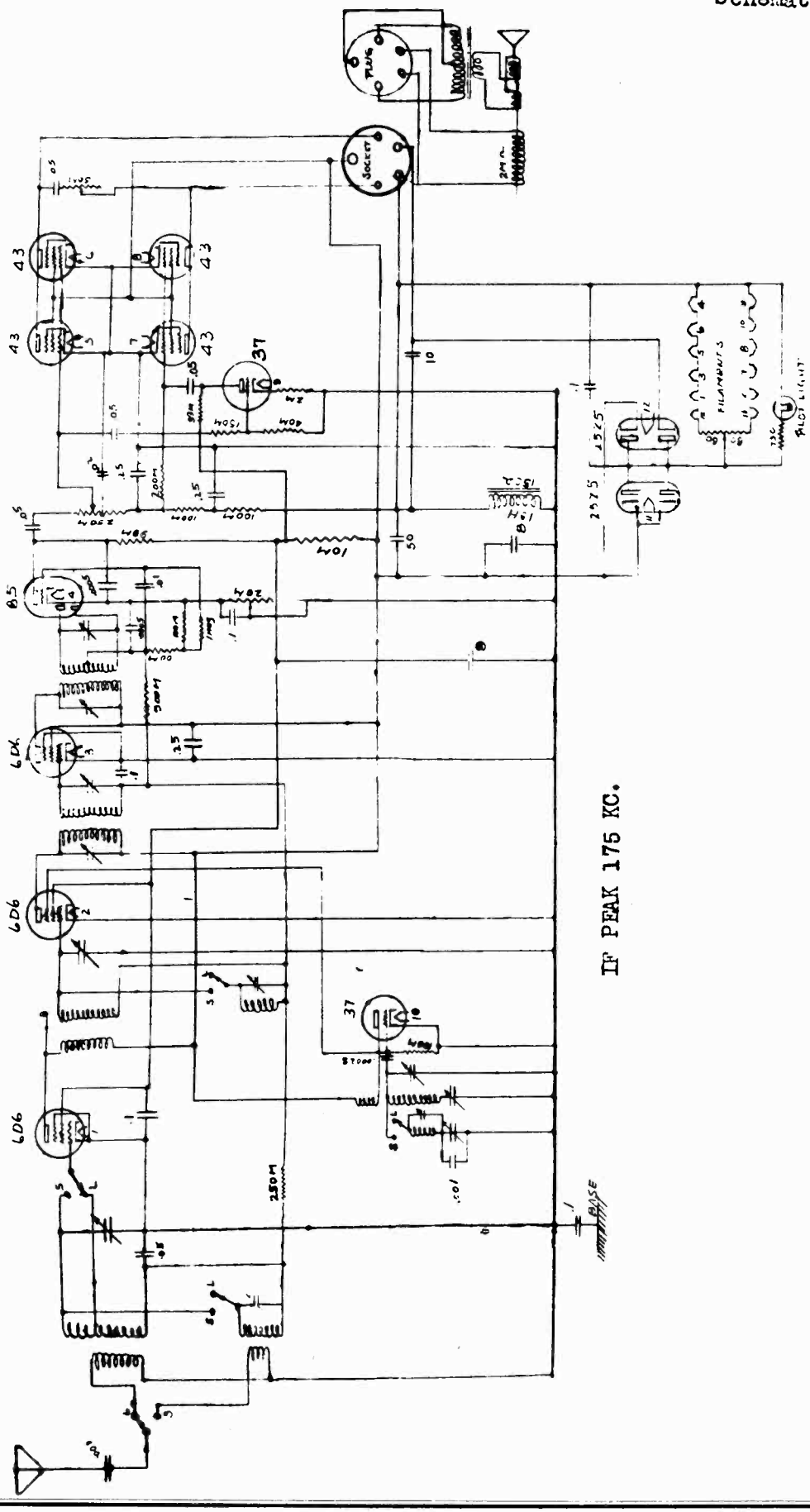
Apply a 600 kc. signal at the antenna and track the oscillator by varying the nut adjustment on the oscillator padding condenser until maximum response is obtained, by rotating the dial. Disregard calibration when making this adjustment.

At all steps in the above procedure the output should be kept only as high as is necessary for good alignment, but the output should be lowered always by decreasing the input to the receiver, never by reducing the setting of the volume control. This control should be set at maximum throughout any adjustments of the R-F. or I-F. circuits. Use a suitable output meter across the voice coil of the speaker for indicating the correct adjustment for maximum response.

DETROLA RADIO CORP.

MODEL 1200
Schematic

Schematic Drawing of Model 1200 Receiver (12 Tube)



MODEL 1200
Voltage
Alignment

DETROLA RADIO CORP.

1. Apply a modulated 175 Kilocycle signal to the grid of the modulator (1st detector) tube and align the four dual trimmer adjustments in the top of the IF transformer cans for maximum output from the receiver.

2. With the band switch knob in the 530-1500 Kilocycle or clockwise position, and the tuning dial set to 1400 Kilocycles, apply a 1400 Kilocycle signal at the antenna and adjust the three trimmer screws on the gana condenser for maximum output from the receiver.

3. Apply a 600 Kilocycle signal at the antenna and track the oscillator by varying the nut adjustment on the oscillator padding condenser and returning the dial until maximum response is obtained. This adjustment should be made disregarding calibration.

4. With the band switch in the short wave or counter-clockwise position and the dial set to 3.6 Megacycles, apply a 3600 Kilocycle signal at the antenna and align the three trimmers in the top of the short wave coil cans for maximum response.

5. Apply a 1600 Kilocycle signal at the antenna and track the oscillator as at 600 Kilocycles in the broadcast band by adjusting the slotted screw adjustment on the oscillator padding condenser.

Suitable harmonies of a broadcast oscillator may be used for alignment purposes in the short wave band.

At all steps in the aligning procedure, the output should be kept only as high as is necessary for good alignment but the output should always be lowered by decreasing the input to the receiver, never by reducing the volume control setting. The volume control should be at maximum setting during any adjustments of the RF and IF circuits. A suitable output meter should be connected across the speaker voice coil to indicate the correct adjustment for maximum response.

TABLE OF VOLTAGES

Line Voltage - 115 Volts - 60 Cycles AC
Interchannel Noise Suppressor Set for Maximum Sensitivity

Position	Tube	Plate	Screen	Cathode
RF	6D6	100	60	0
MOD	6D6	100	60	0
OSC	37	100		0
IF	6D6	100	100	0
DET	85	20		0
PHASE REVERSER	37	20		1-2V
OUTPUT	43		100	0

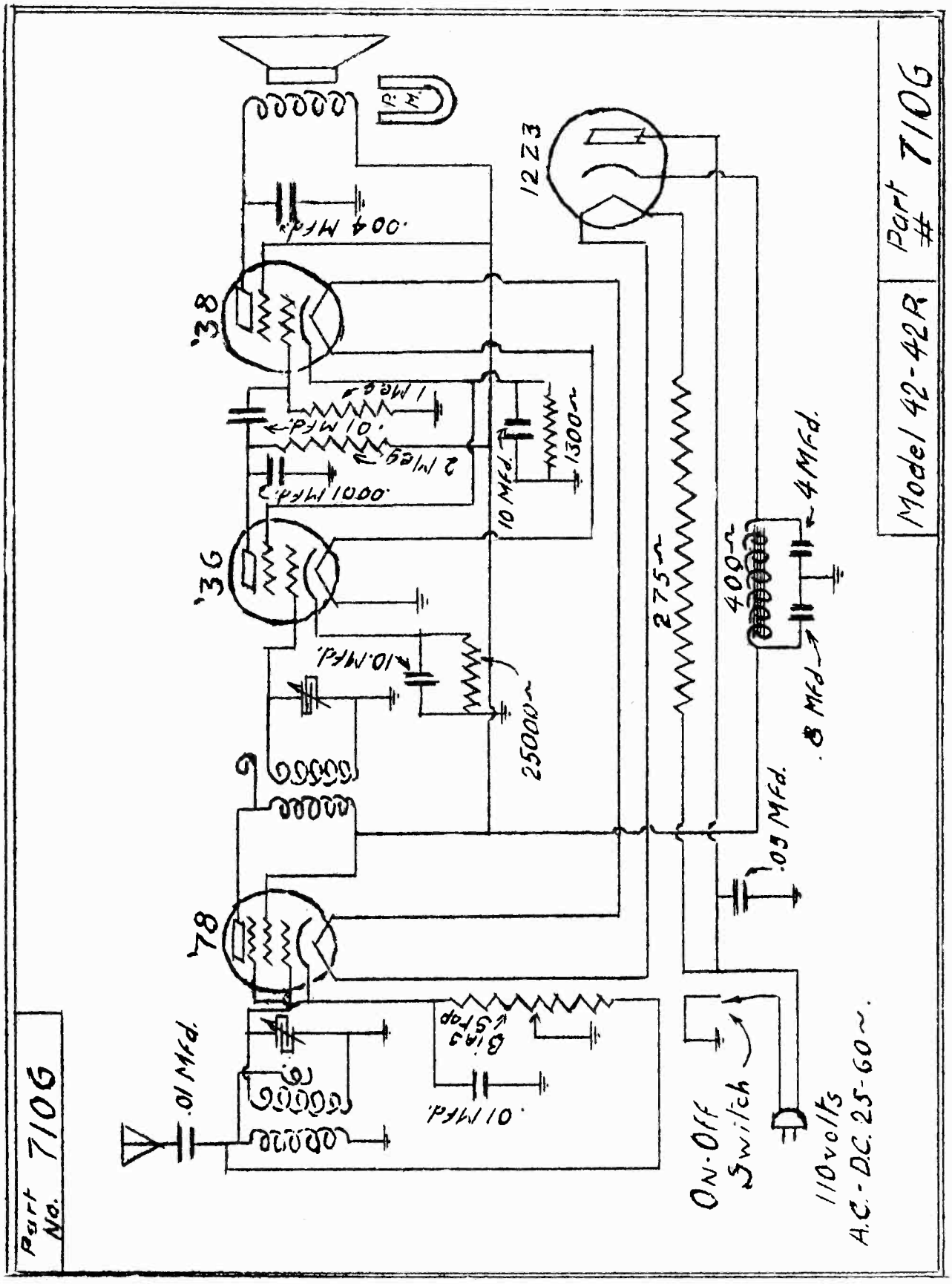
Above voltage's measured with 0-250 V--1000 ohm per volt DC Voltmeter
Drop ACROSS CHOKE - 18 Volts
Drop ACROSS SPEAKER FIELD -
When operated on 115 Volts DC or 25 cycle AC the above voltages will be slightly lower.

FILAMENT VOLTAGES

25Z5	-	25 Volts	-	AC or DC
43	-	25 "	-	AC " DC
6D6	-	6.3 "	-	AC " DC
37	-	6.3 "	-	AC " DC
85	-	6.3 Volts	-	AC " DC

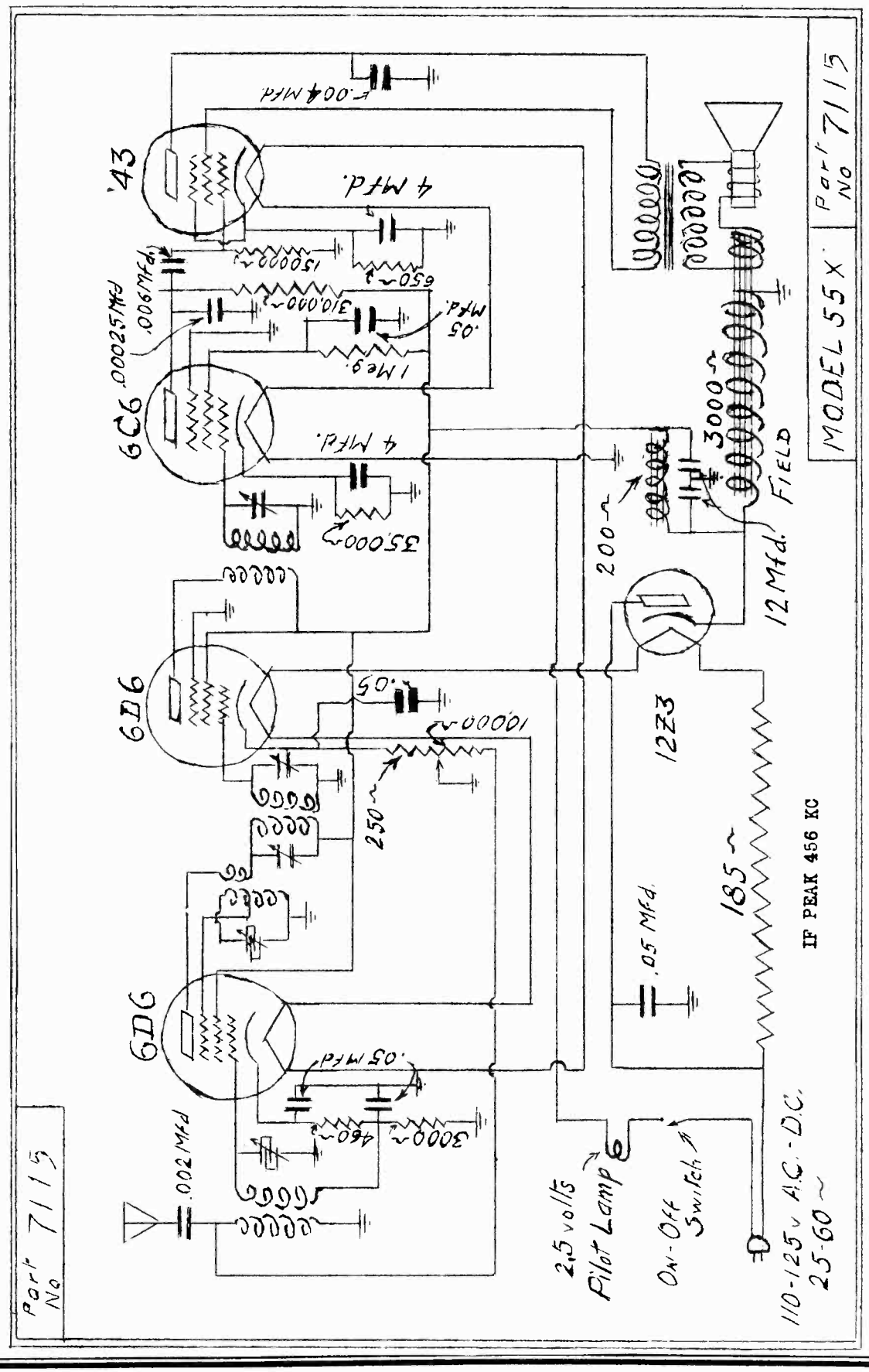
MODEL 42,42-R
Schematic

DEWALD RADIO



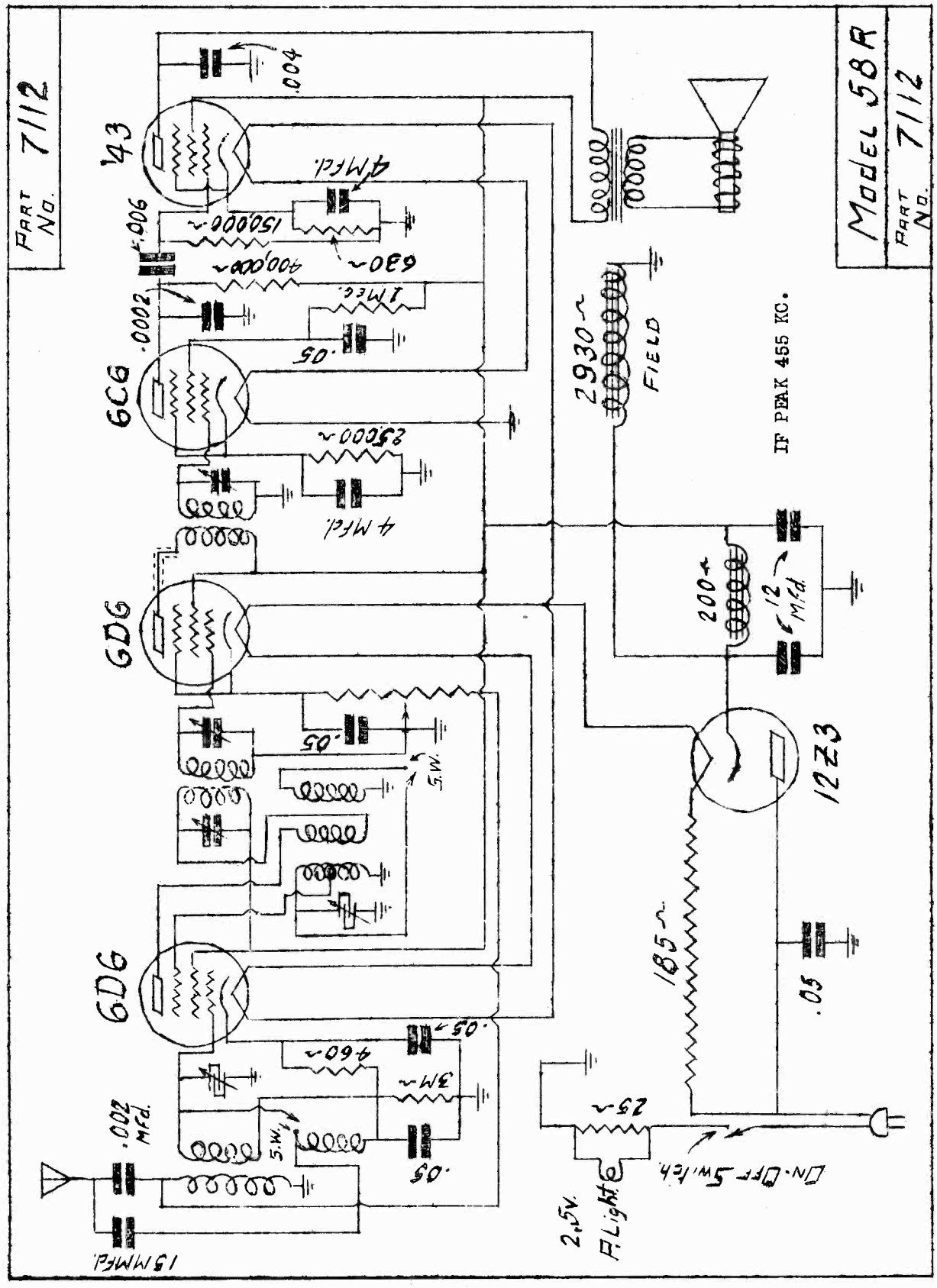
MODEL 55-X
Schematic

DEWALD RADIO



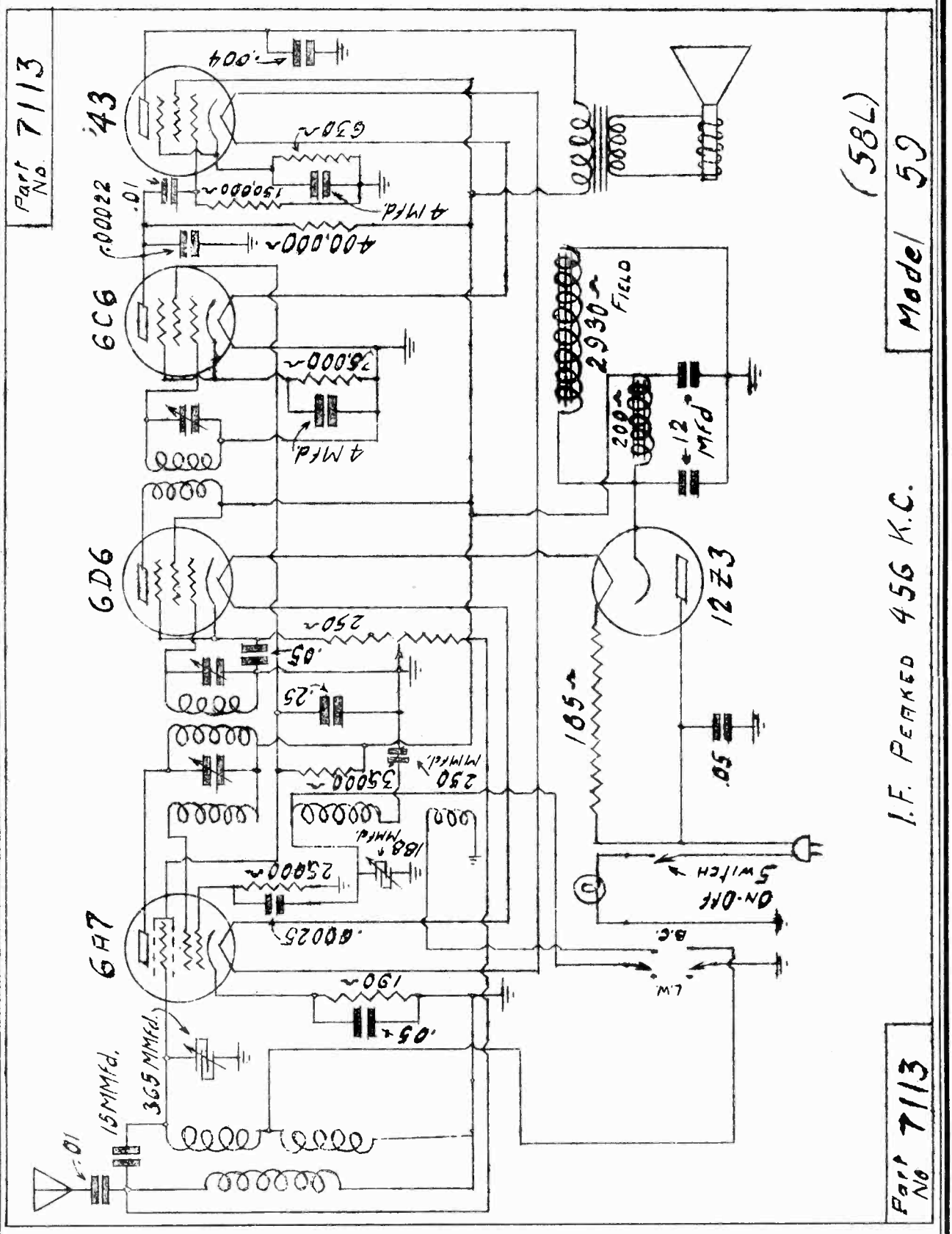
MODEL 58-R
Schematic

DEWALD RADIO



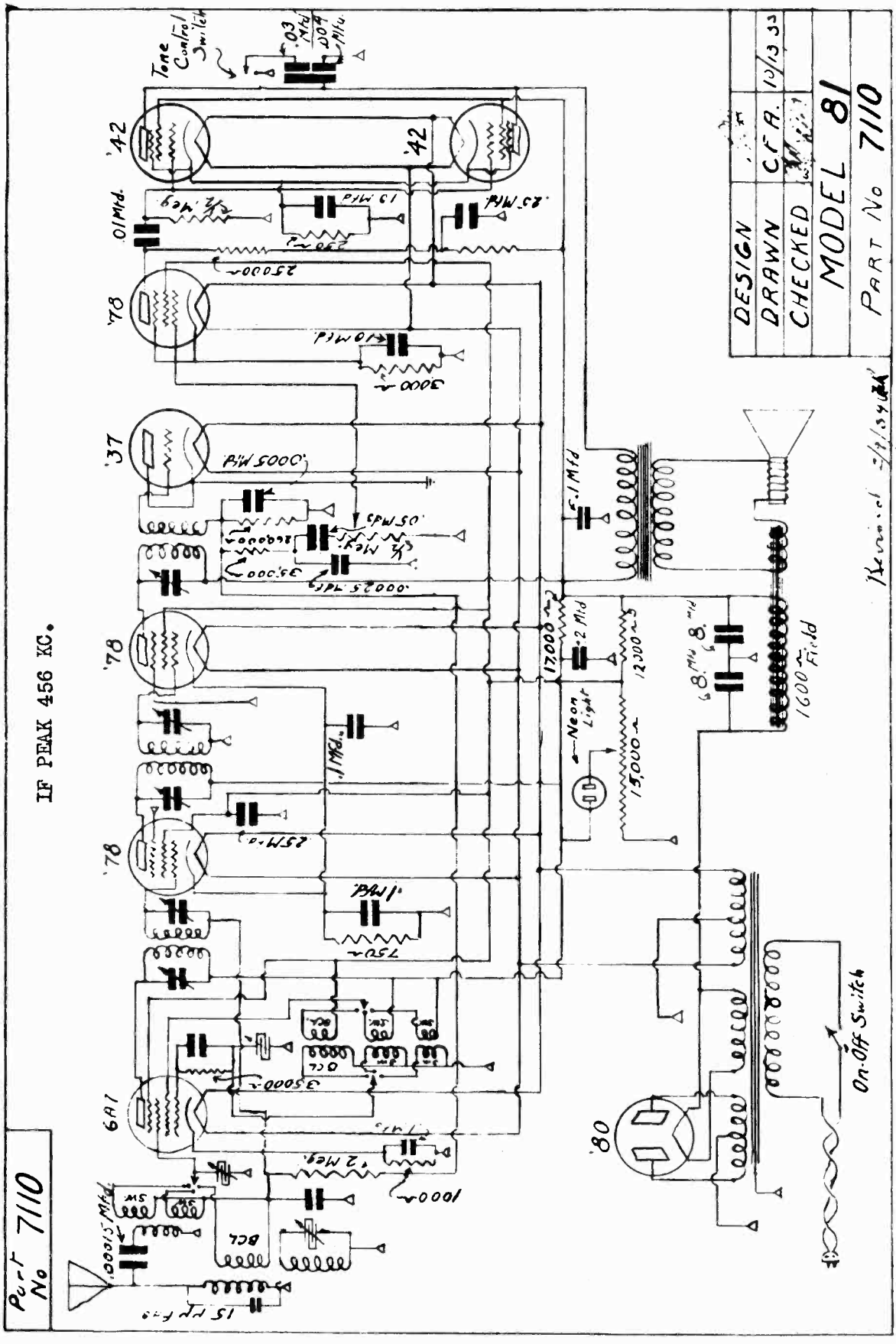
MODEL 58-L, 59
Schematic

DEWALD RADIO



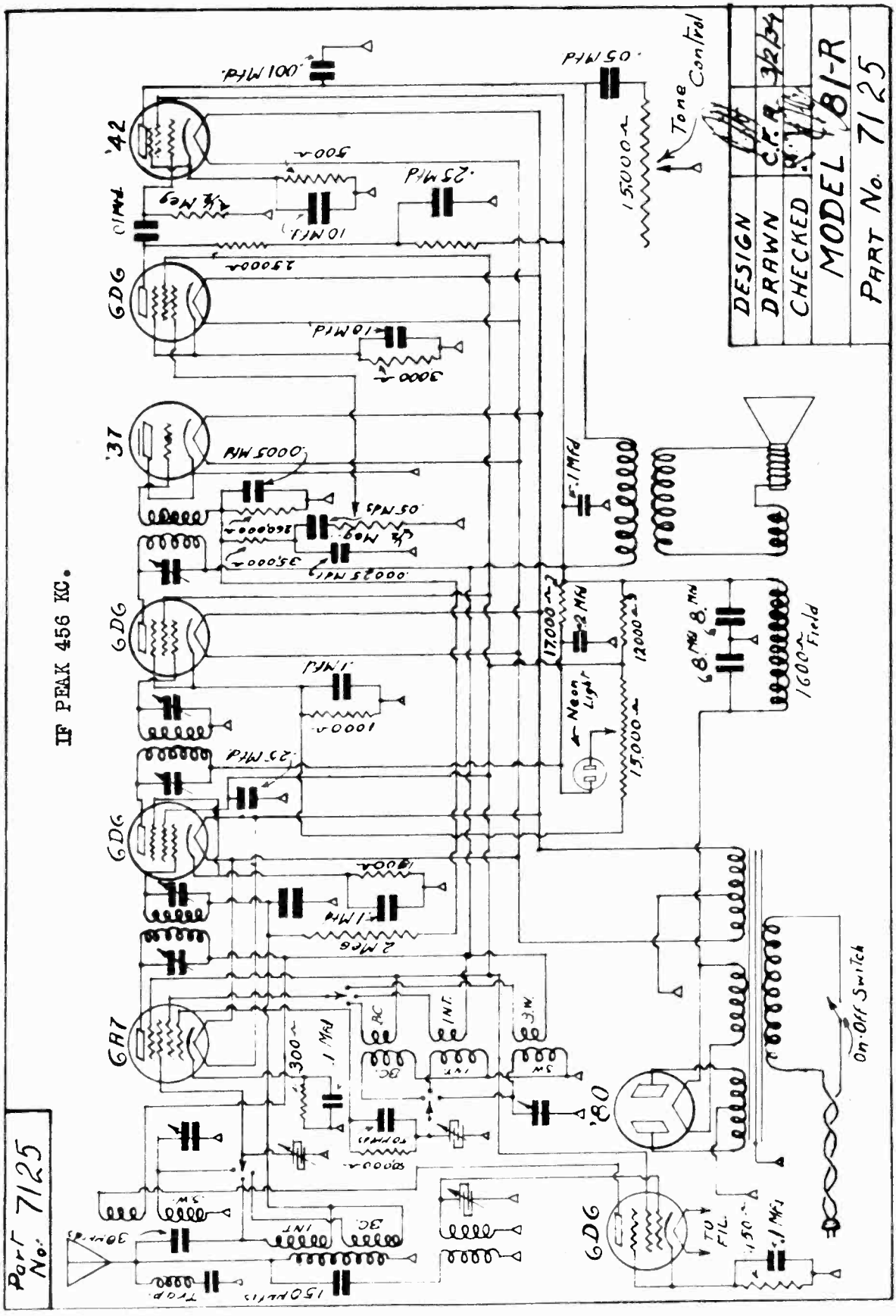
MODEL 81
Schematic

DEWALD RADIO



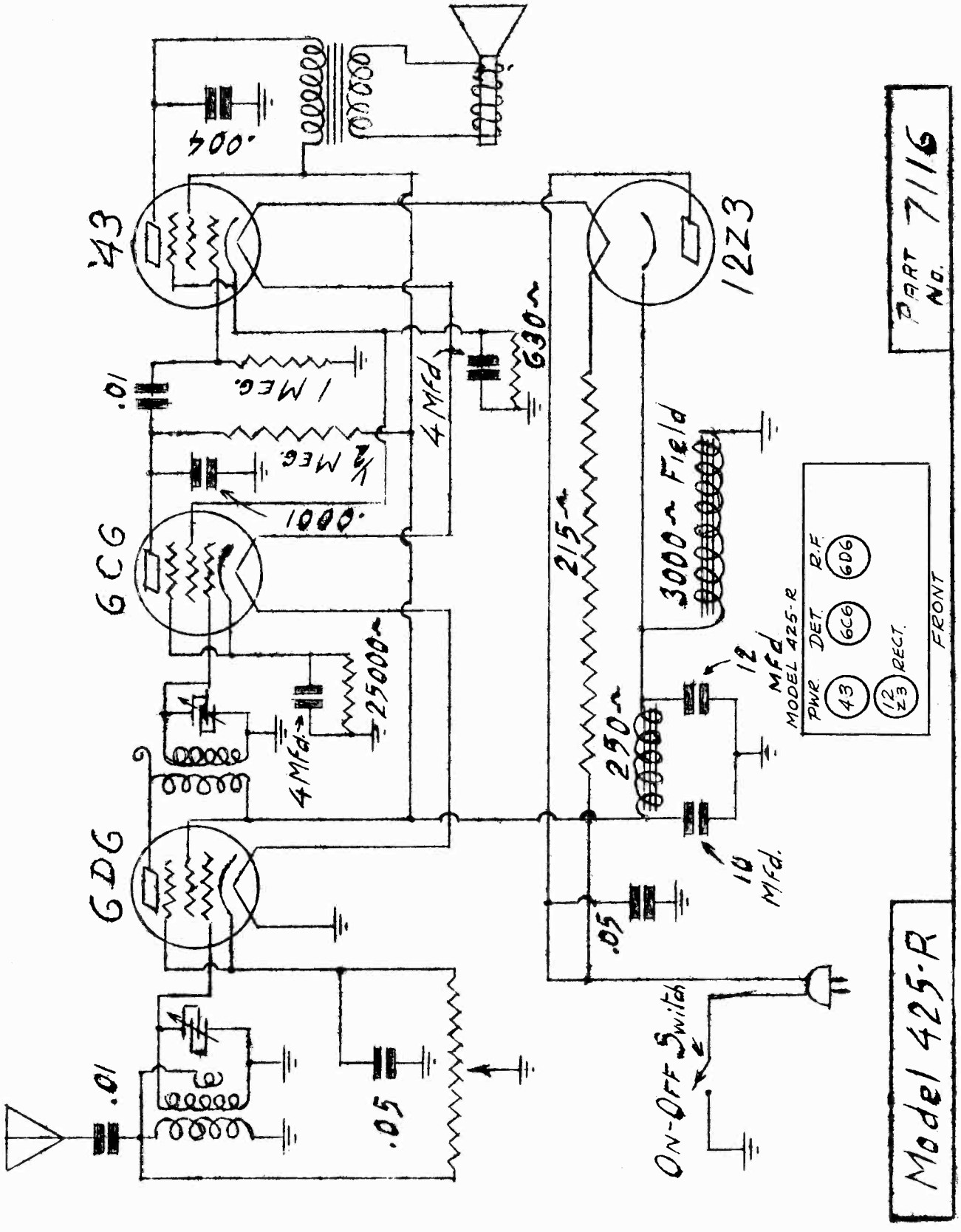
MODEL 81-R
Schematic

DEWALD RADIO



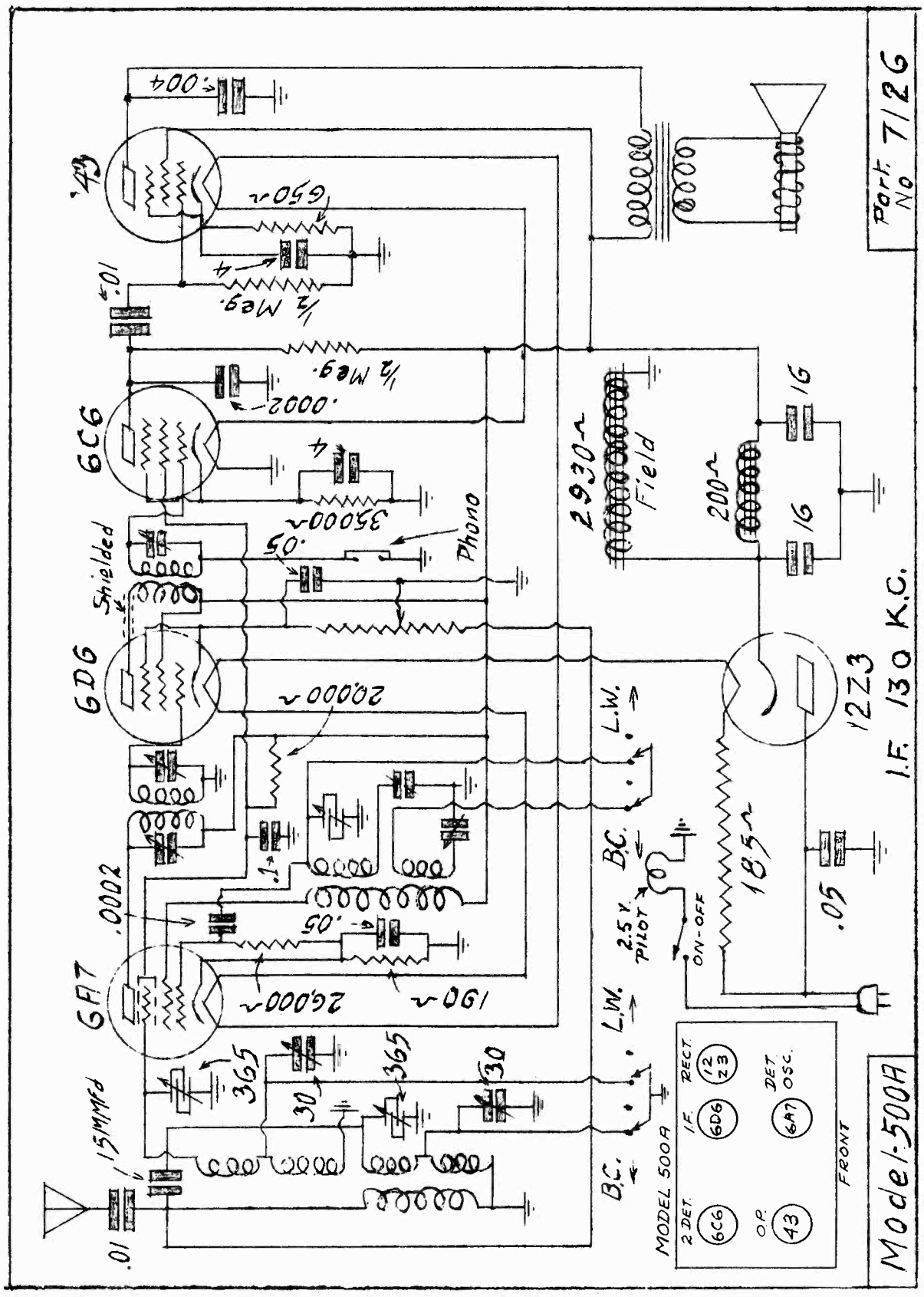
DEWALD RADIO

MODEL 425-R, 440
Schematic,
Socket Layout



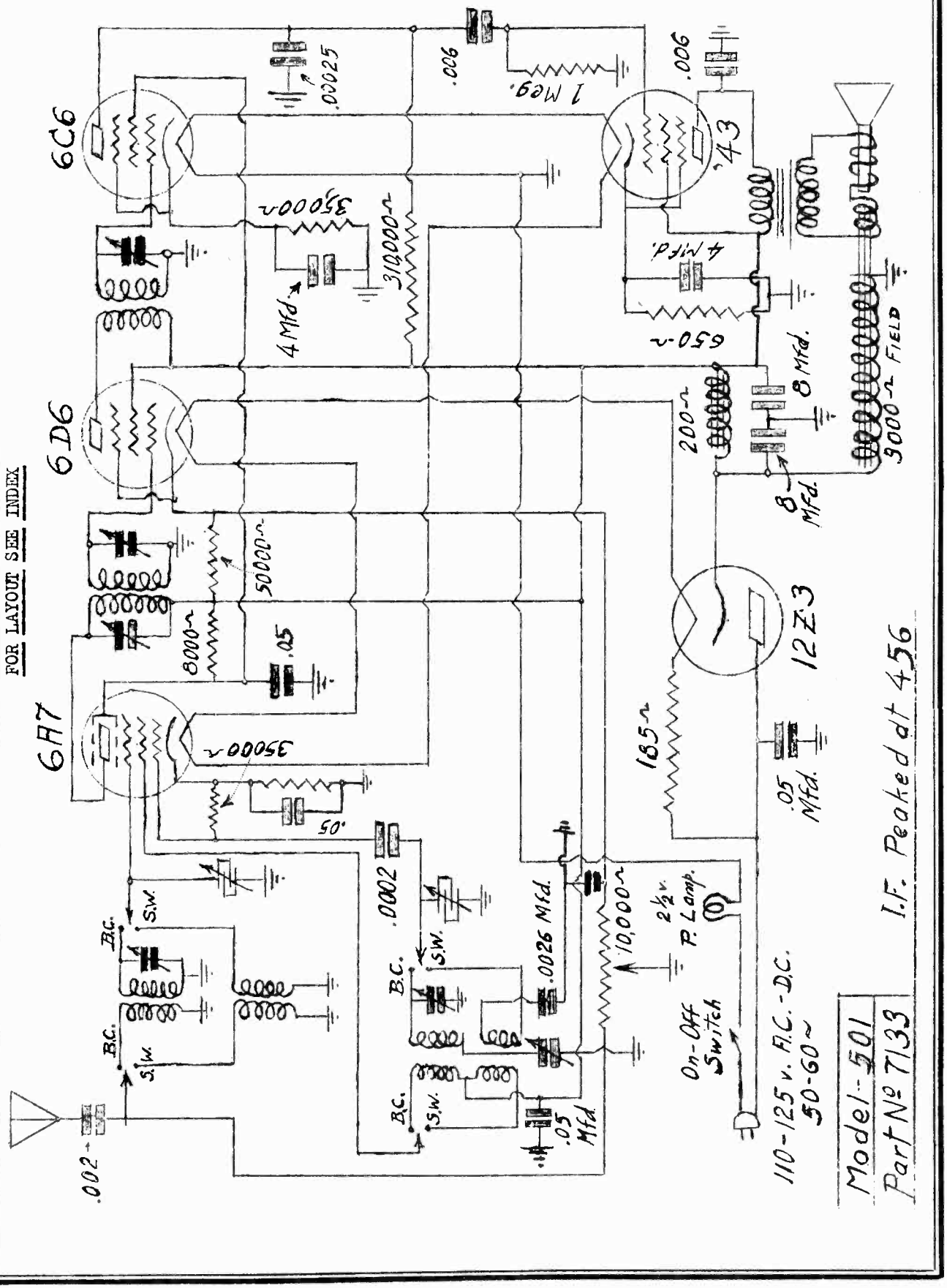
MODEL 500-A
Schematic
Socket Layout

DEWALD RADIO



MODEL 501
Schematic

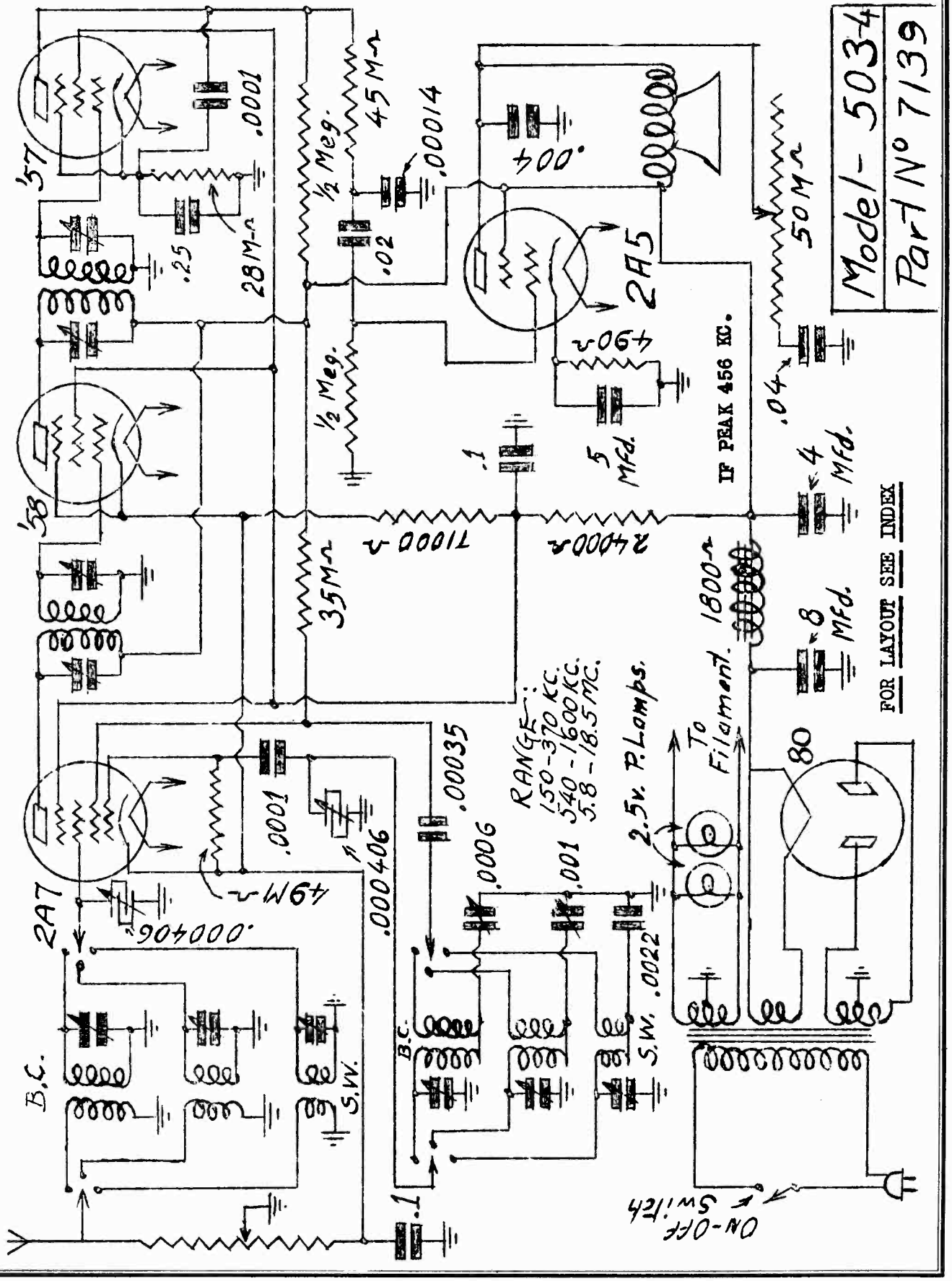
DEWALD RADIO



FOR LAYOUT SEE INDEX

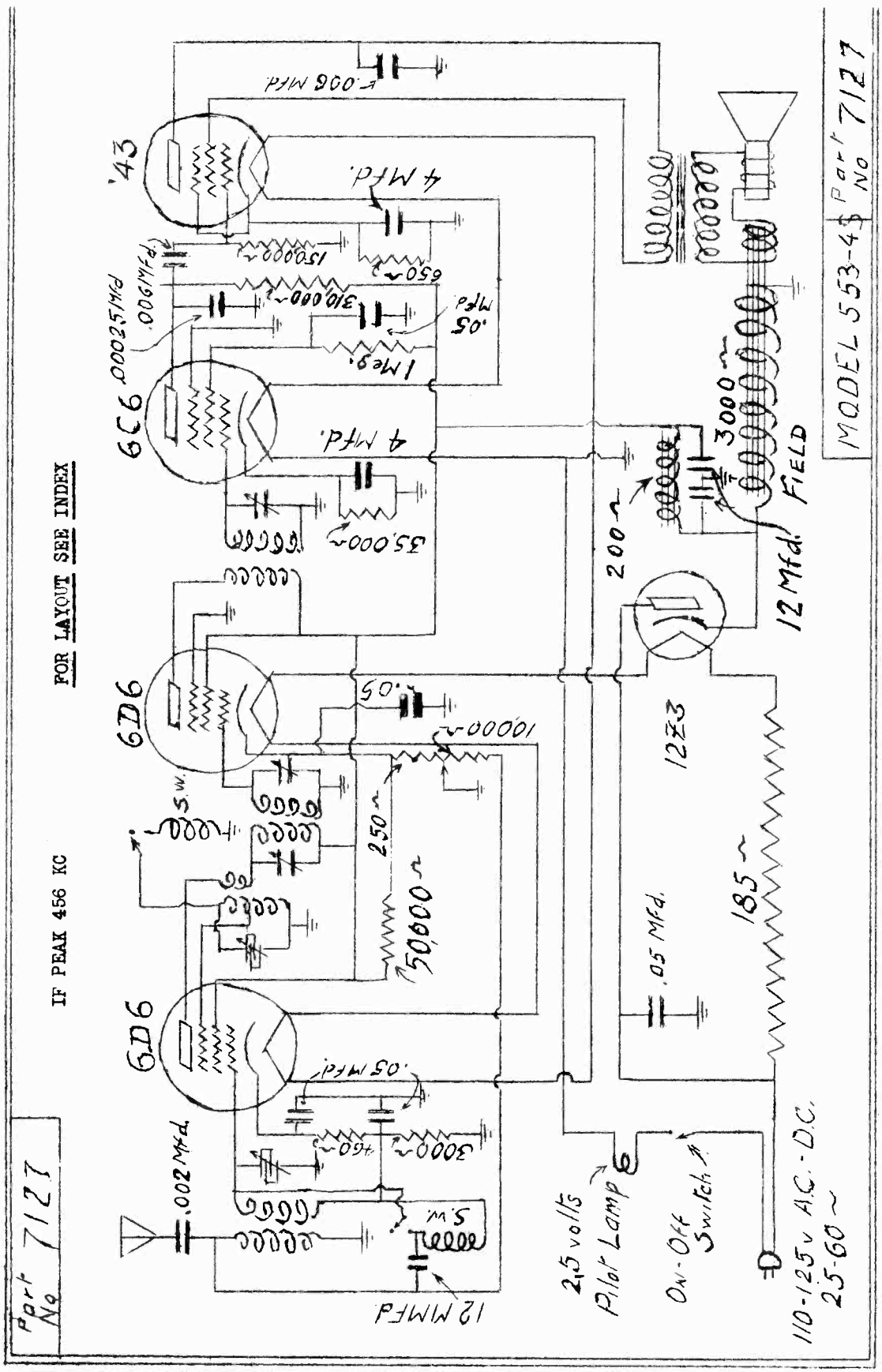
MODEL 503-4
Schematic

DEWALD RADIO



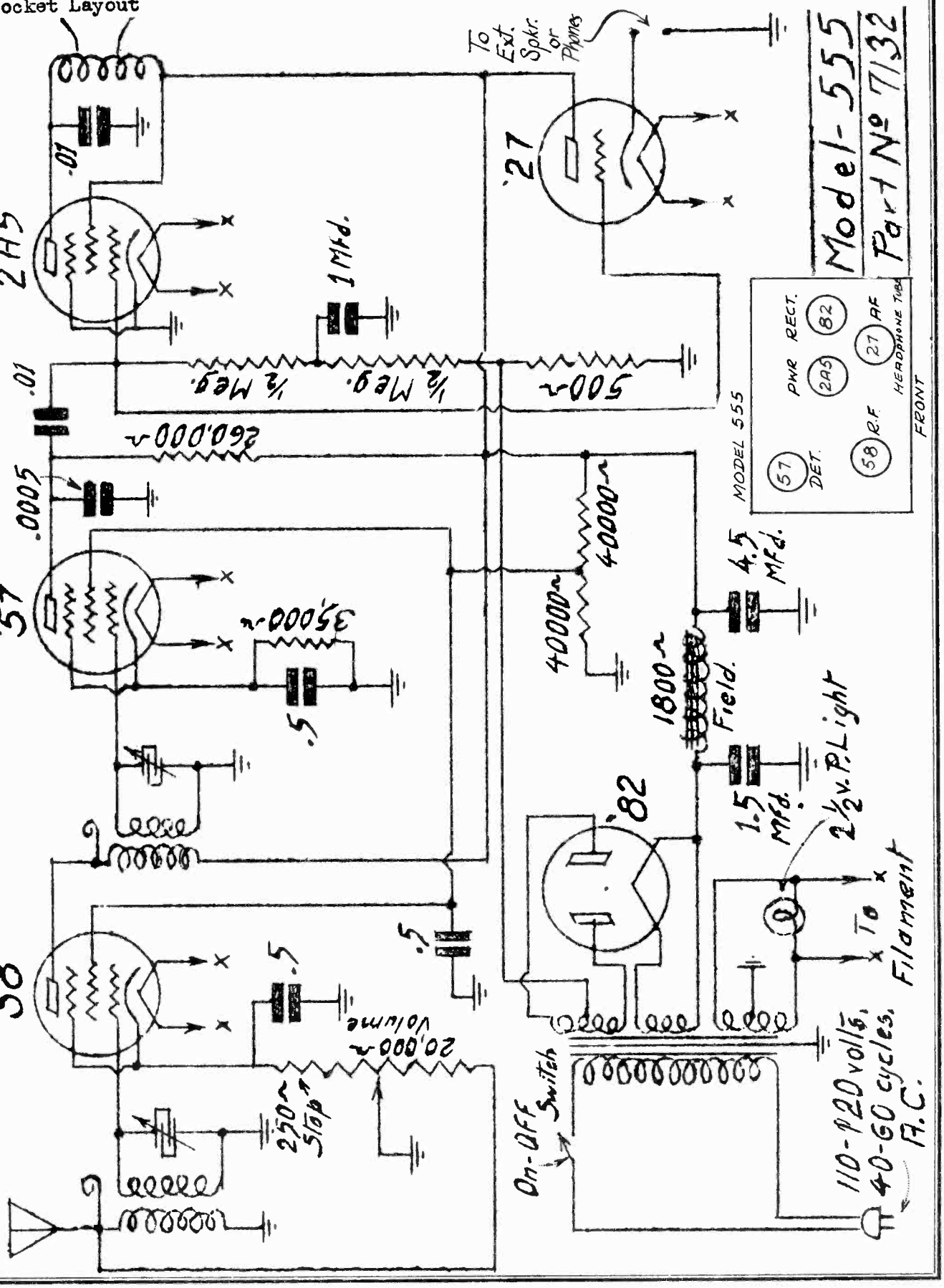
MODEL 553-4S
Schematic

DEWALD RADIO



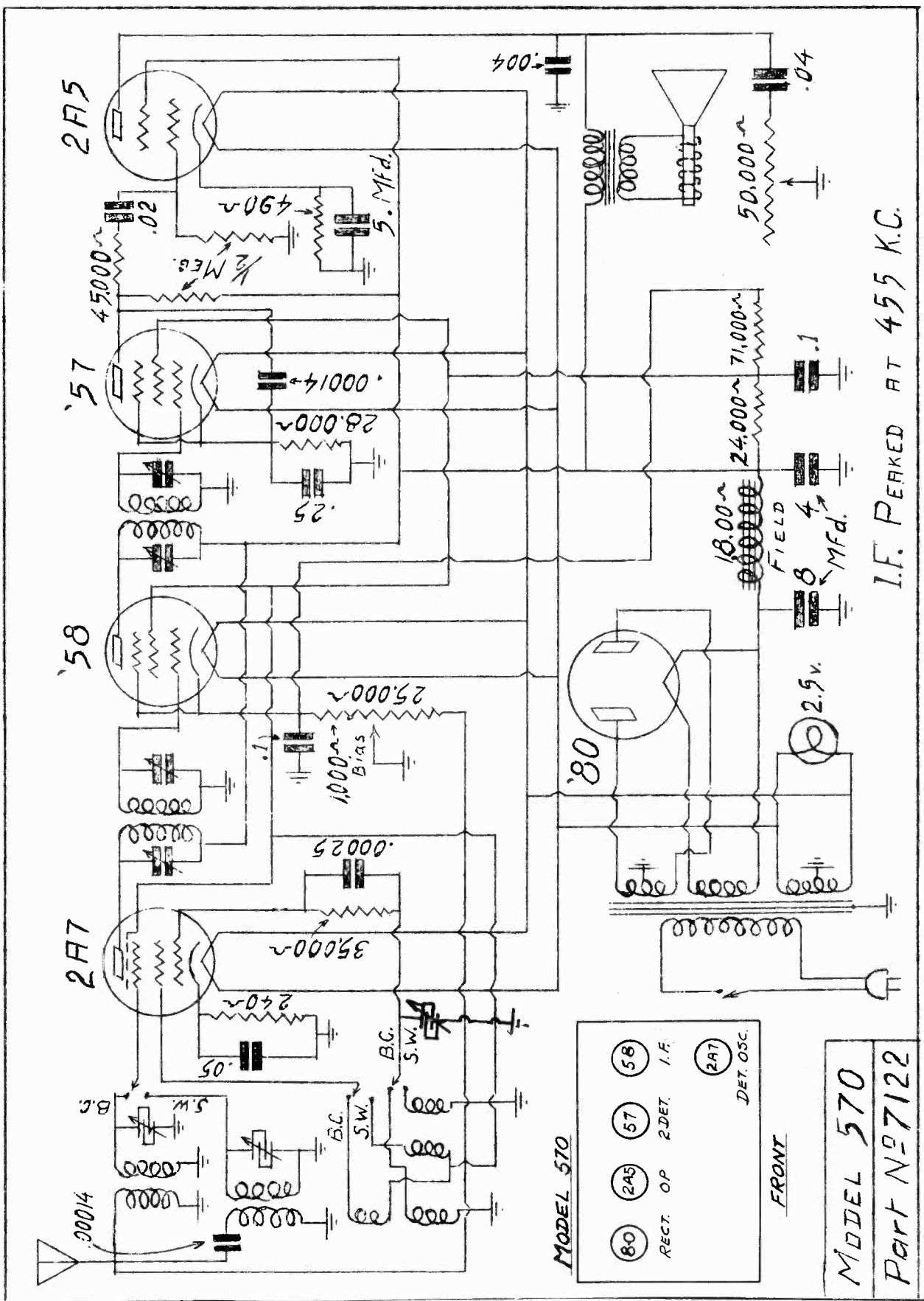
MODEL 555
Schematic
Socket Layout

DEWALD RADIO



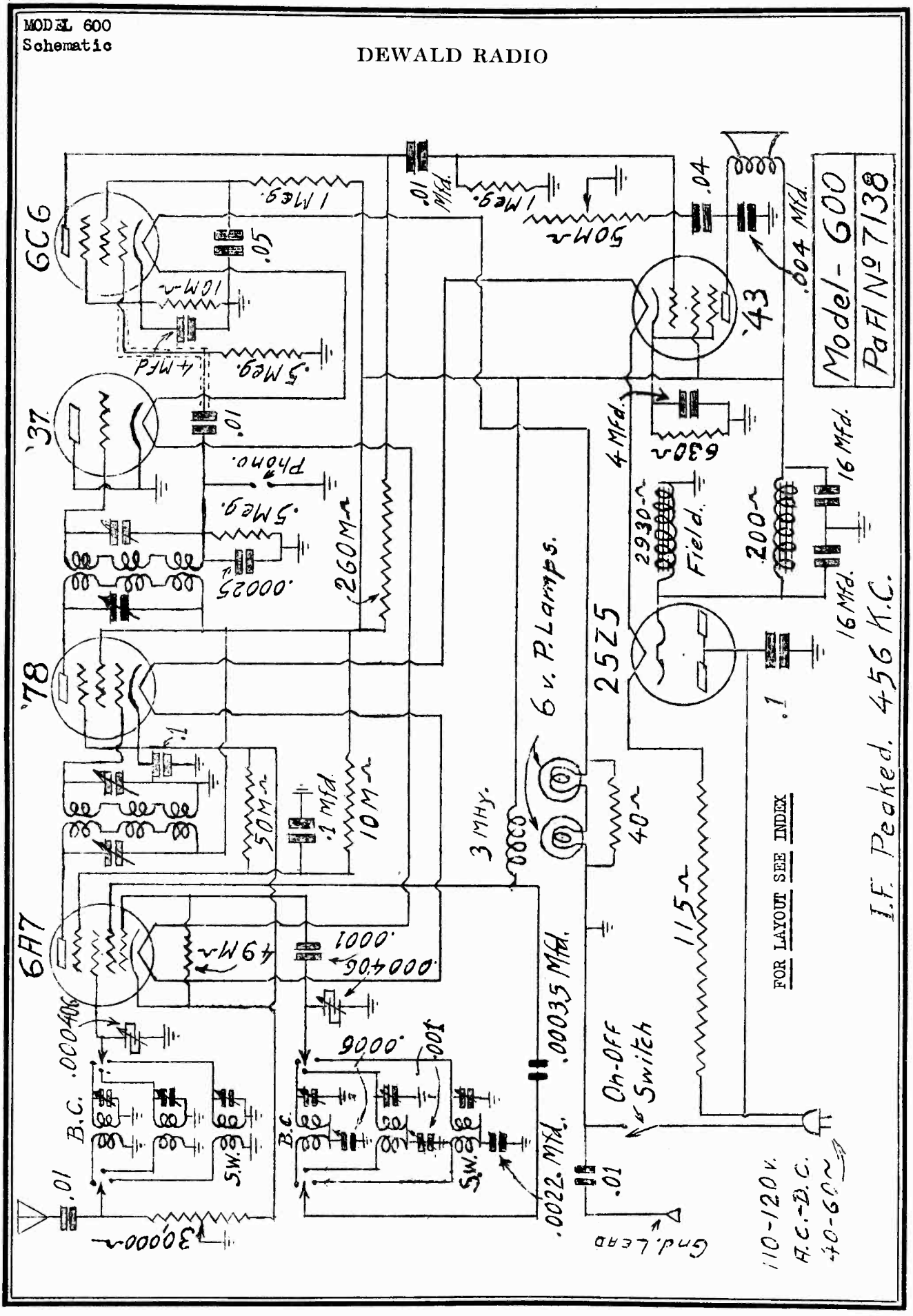
DEWALD RADIO

MODEL 570
Schematic
Socket Layout



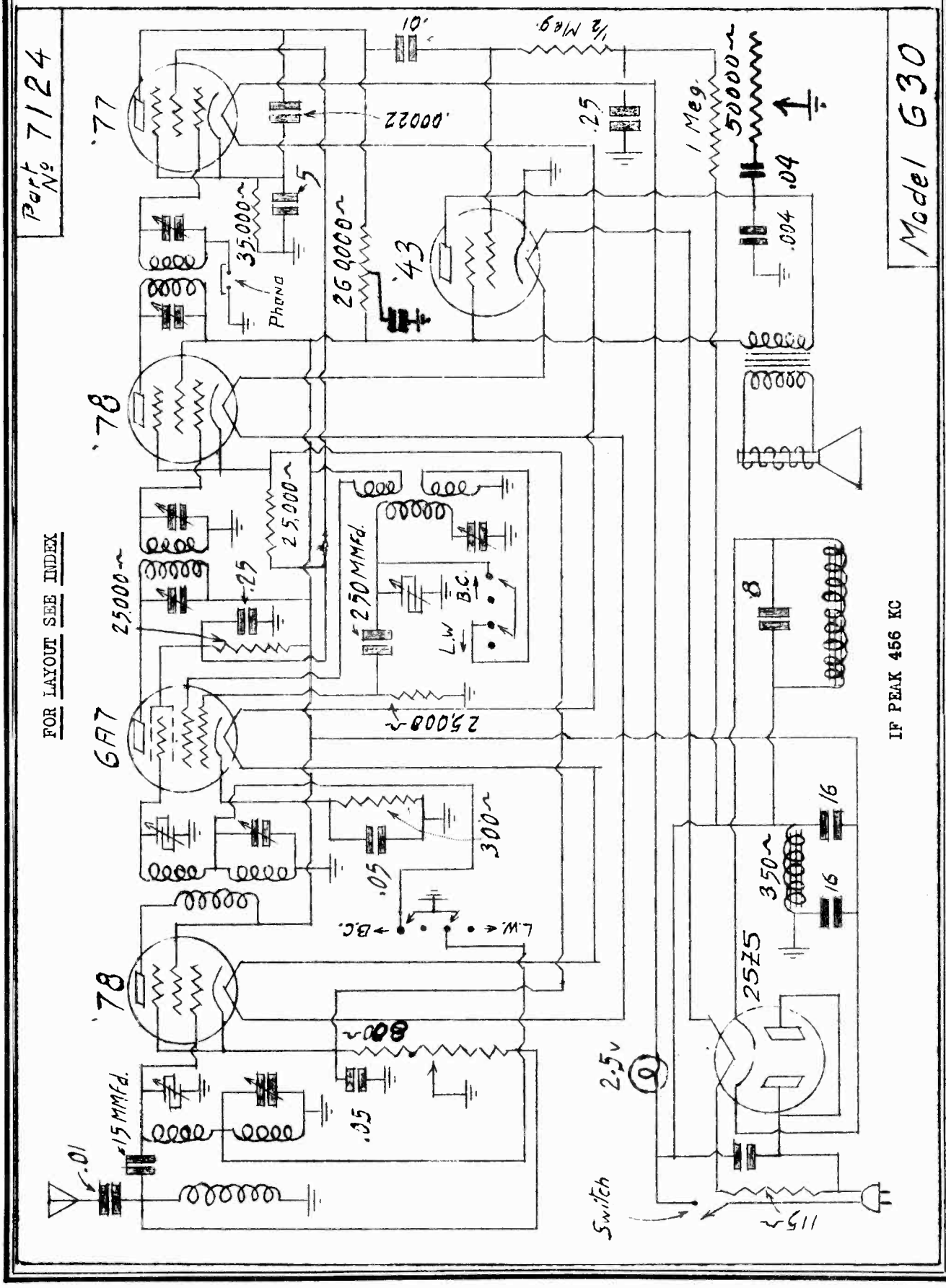
MODEL 600
Schematic

DEWALD RADIO



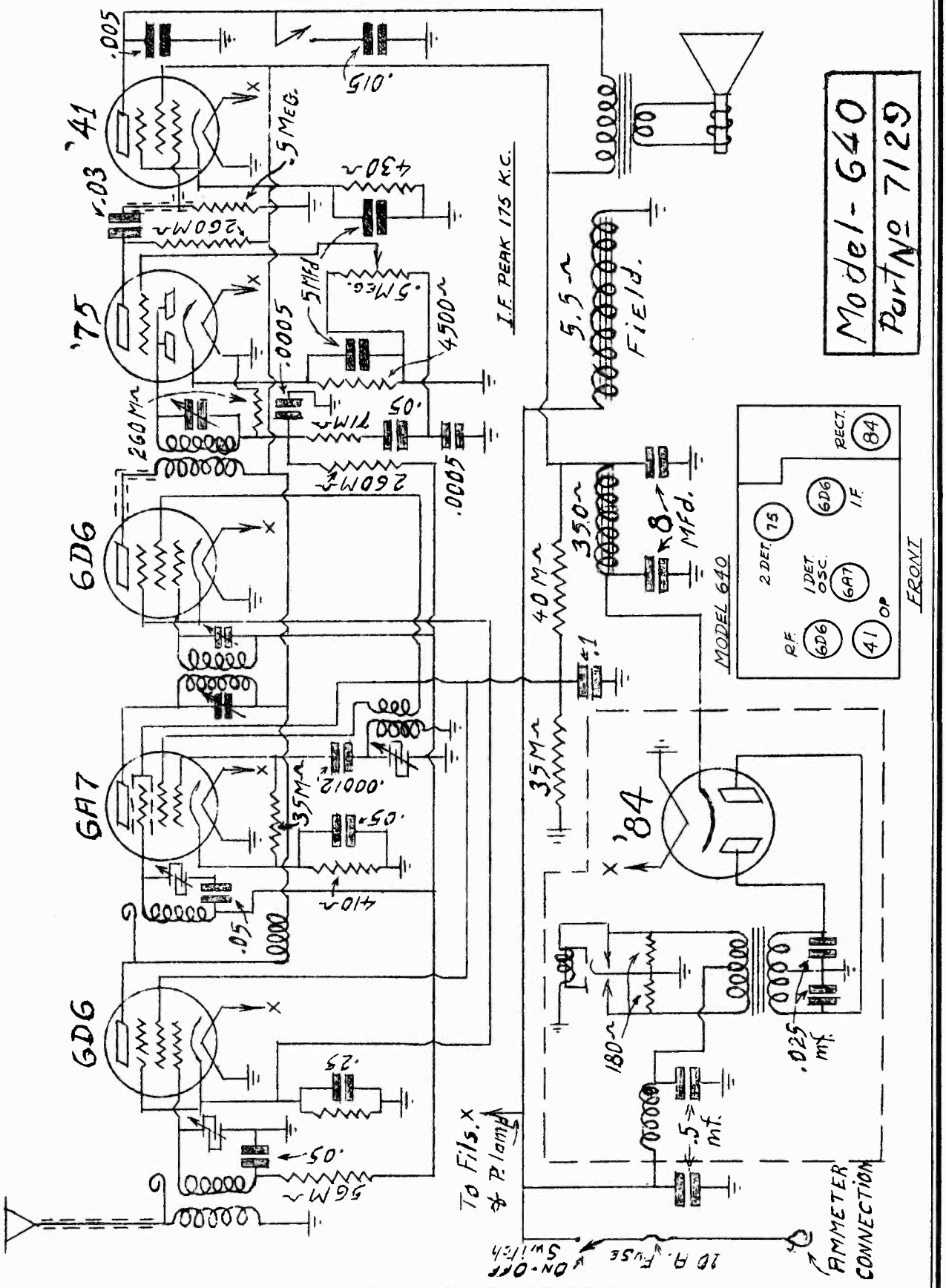
MODEL 630
Schematic

DEWALD RADIO



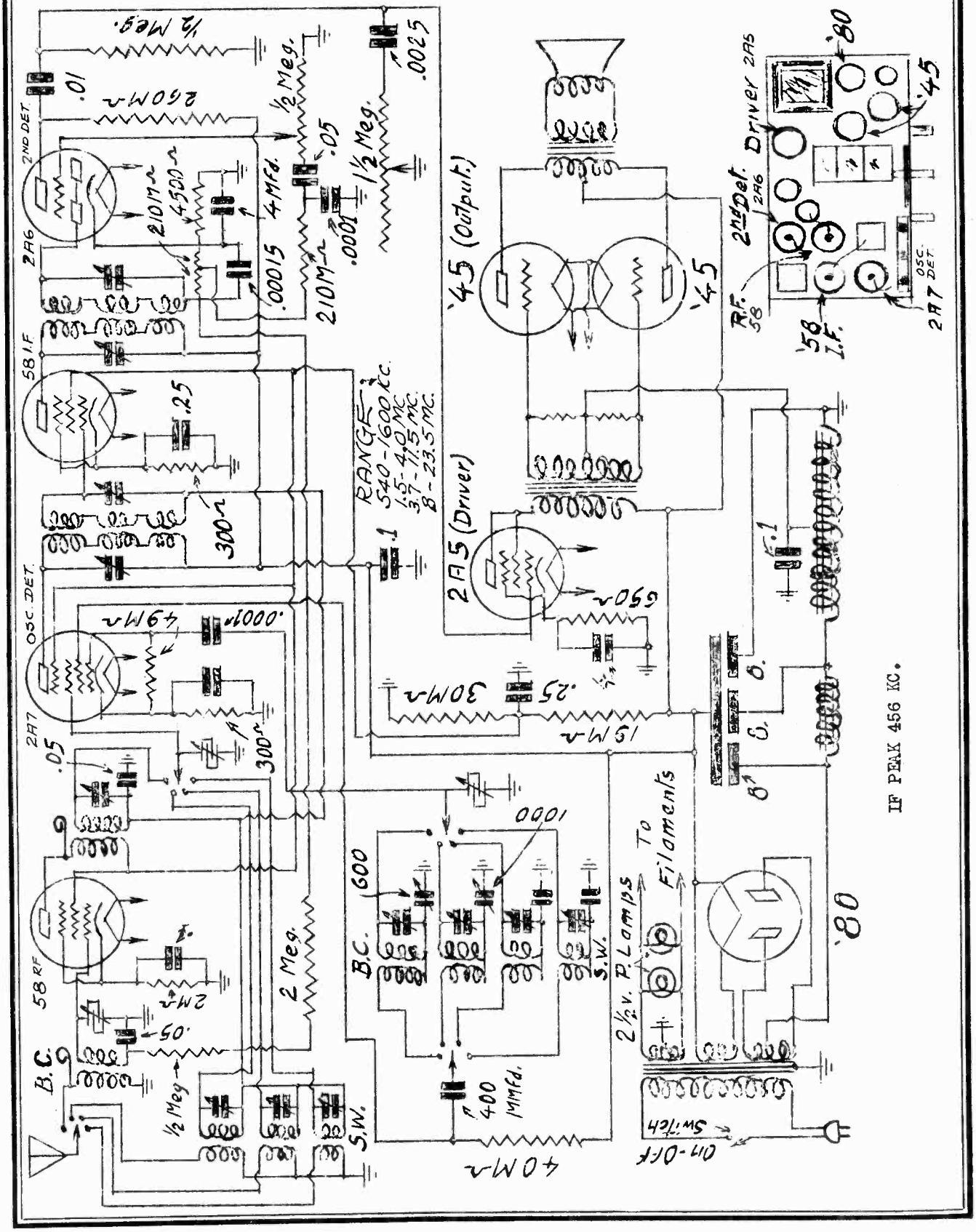
MODEL 640
Schematic
Socket Layout

DEWALD RADIO



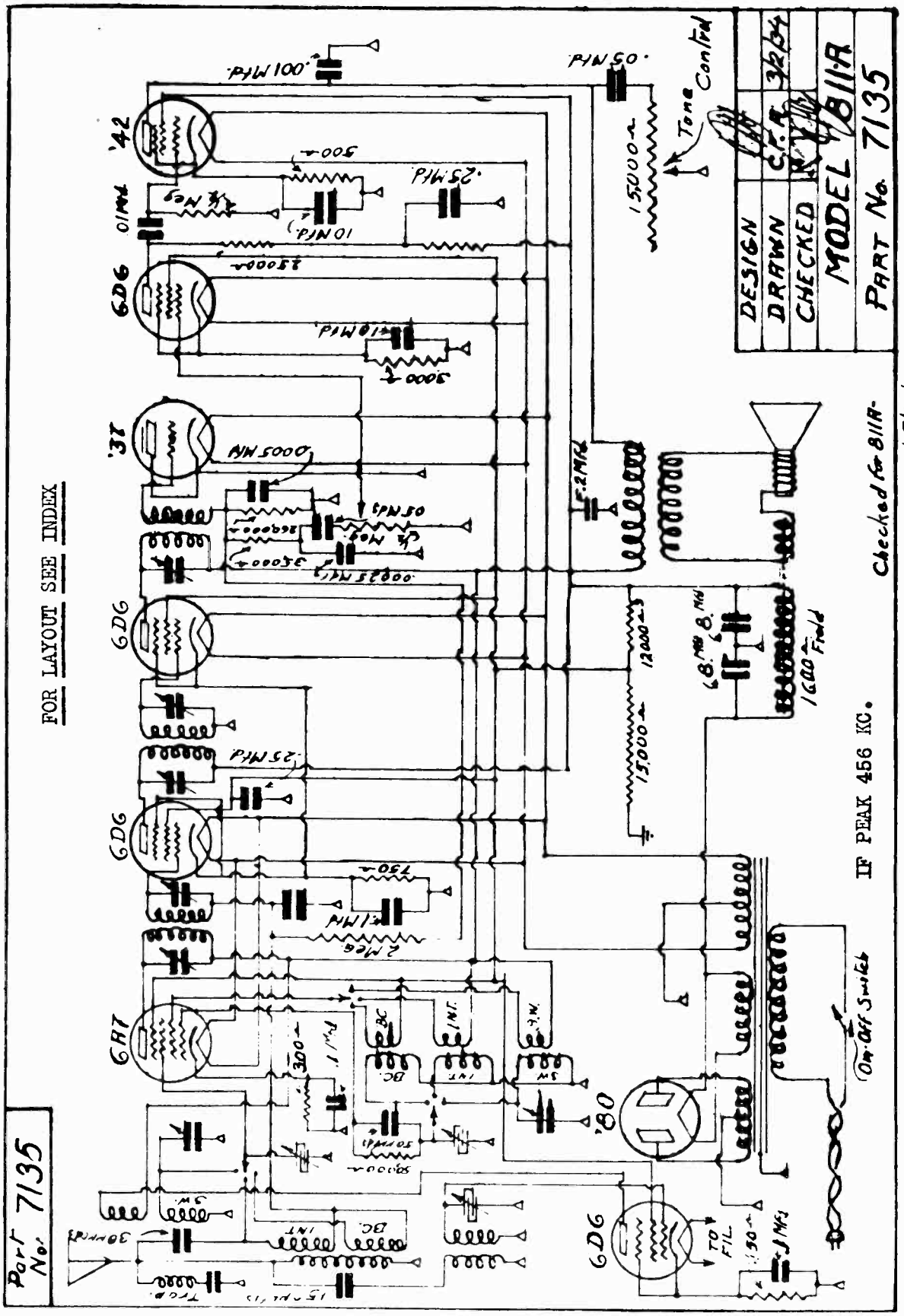
MODEL 802
Schematic

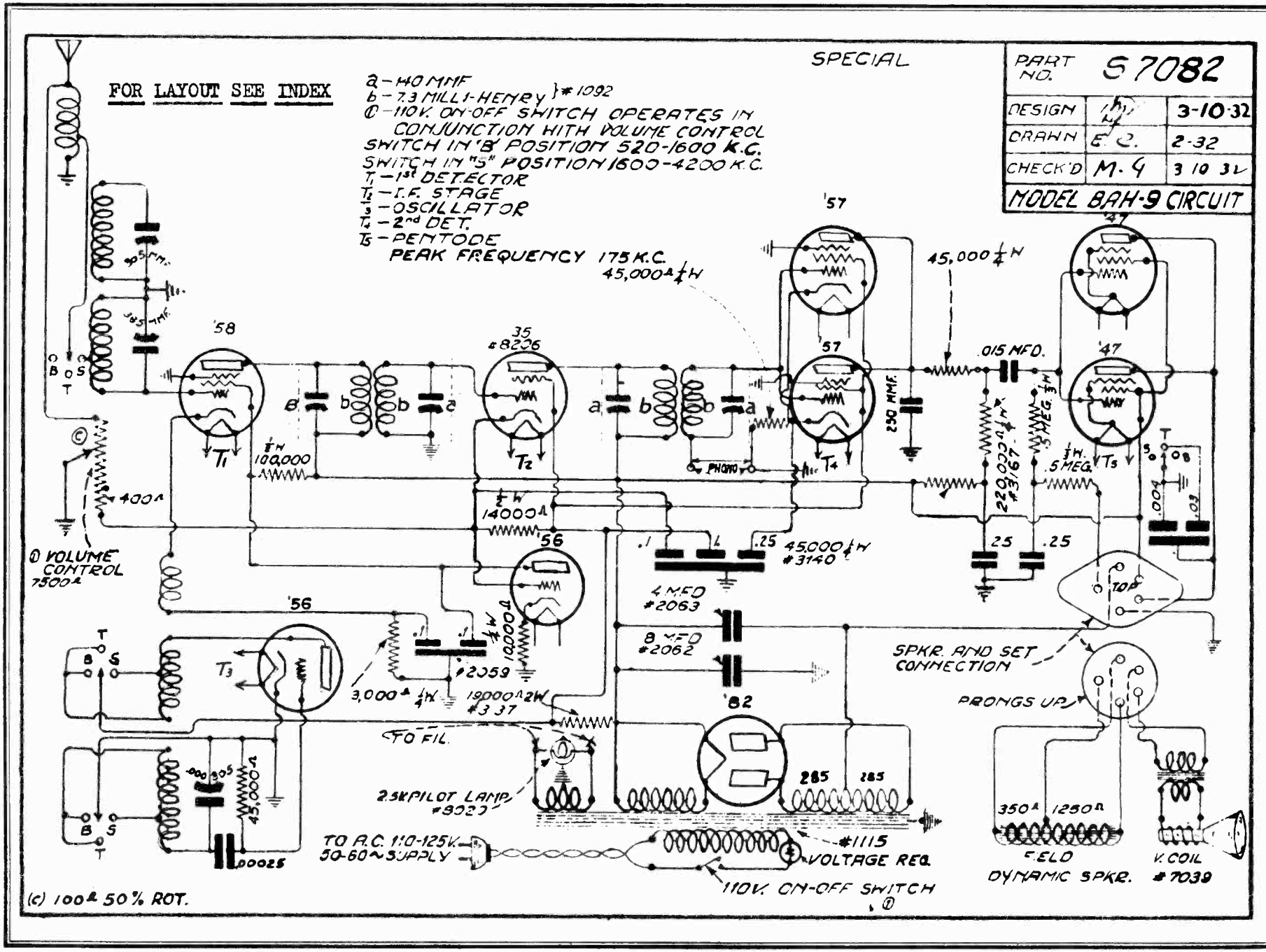
DEWALD RADIO



MODEL 811-A
Schematic

DEWALD RADIO



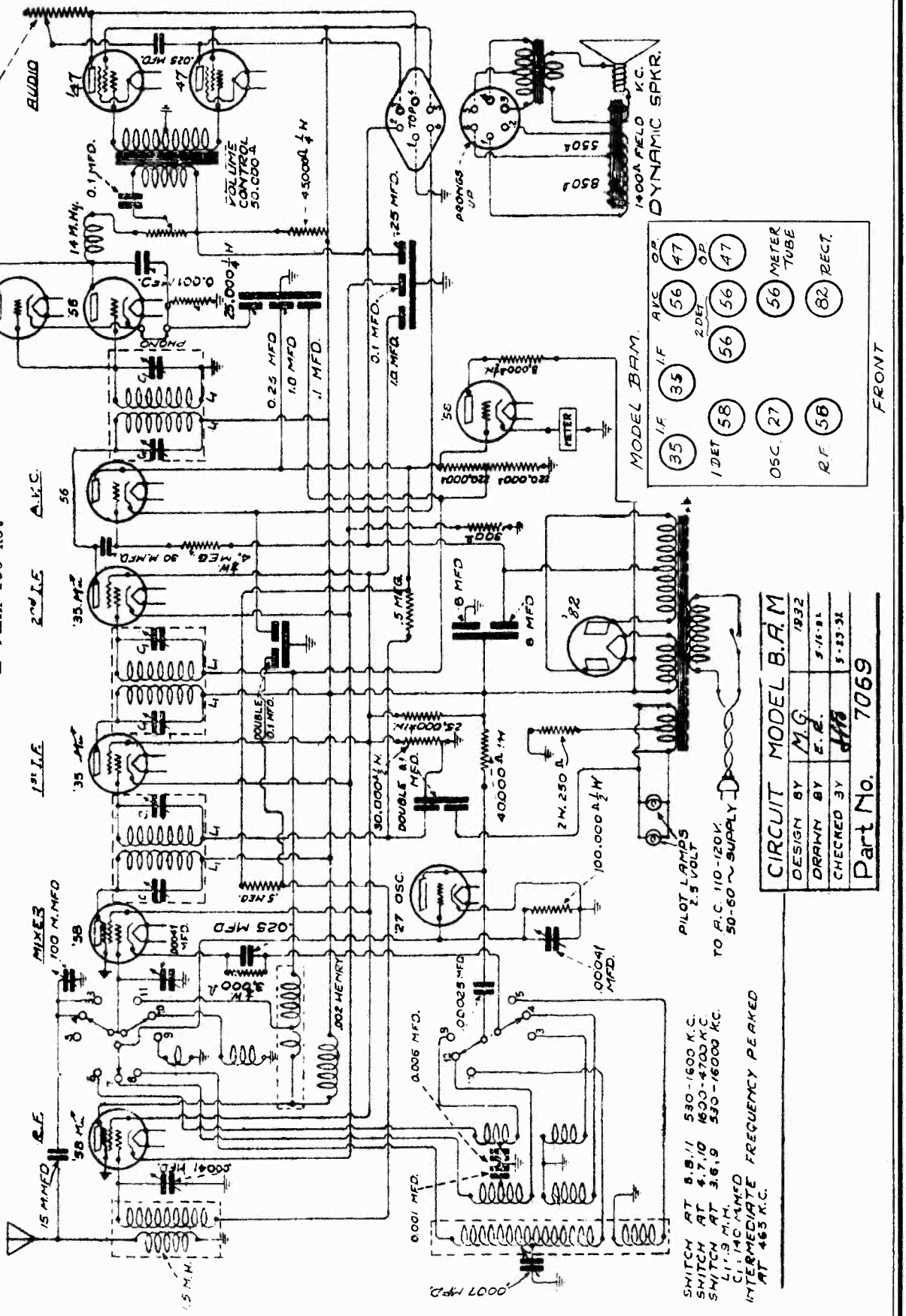


DEWALD RADIO

MODEL B-4-H-9
Schematic

MODEL B-A-M
Schematic
Socket Layout

DEWALD RADIO

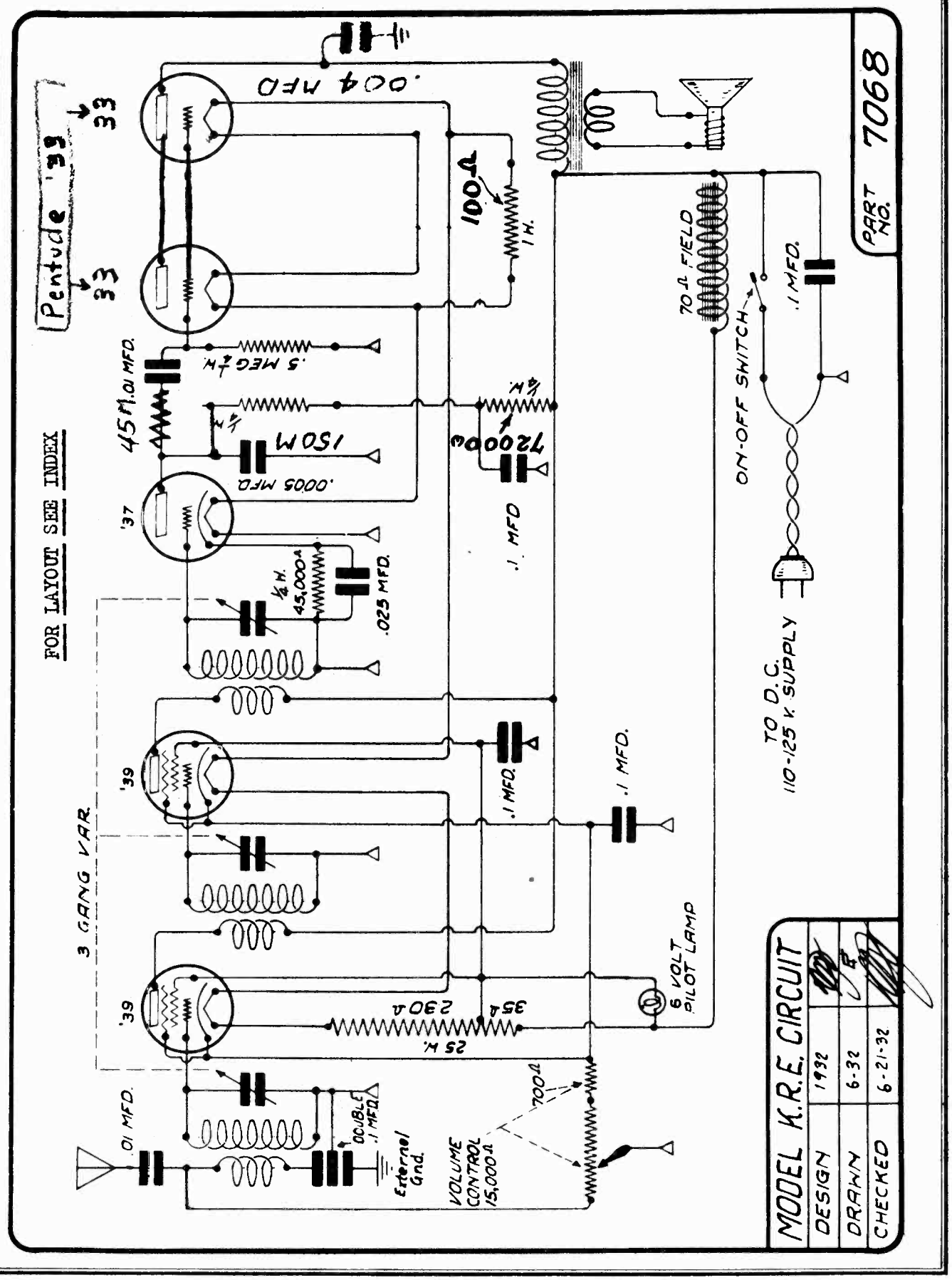


CIRCUIT MODEL B.A.M		
DESIGN BY	M.G.	1932
DRAWN BY	E.E.	5-16-32
CHECKED BY	[illegible]	5-23-32

Part No. 7069

DEWALD RADIO

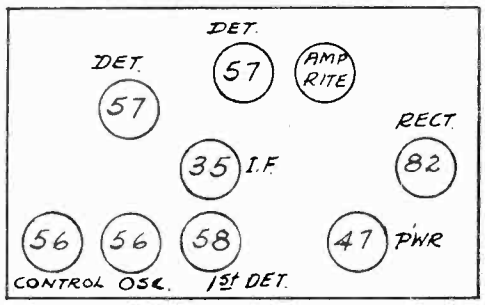
MODEL K-R-E
Schematic



MODEL BAH-9, KRE, 501
503-4, 553-4-S,
600-A, 601-A, 630,
811-A
Socket Layouts

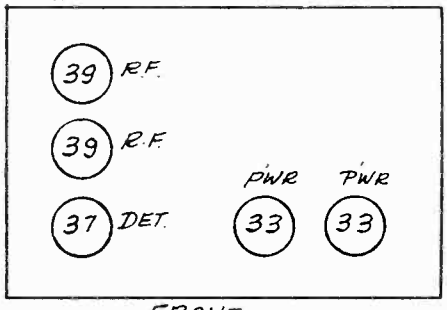
DEWALD RADIO

MODEL BAH-9



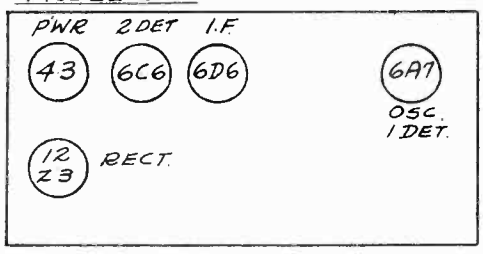
FRONT

MODEL K.R.E.



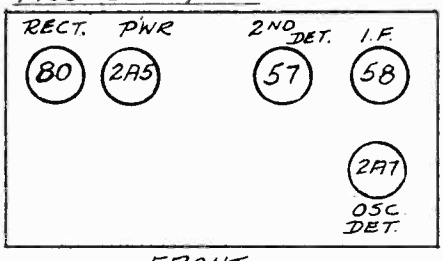
FRONT

MODEL 501



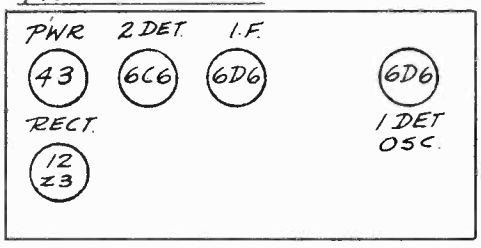
FRONT

MODEL 503, 504



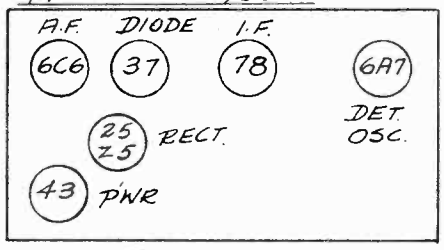
FRONT

MODEL 553-4-S



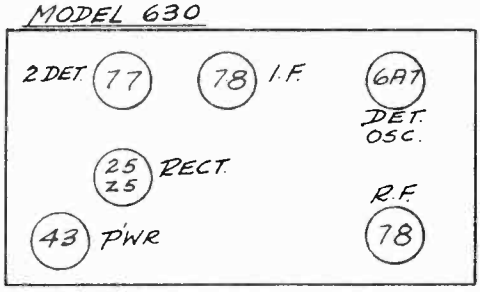
FRONT

MODEL 600A, 601A



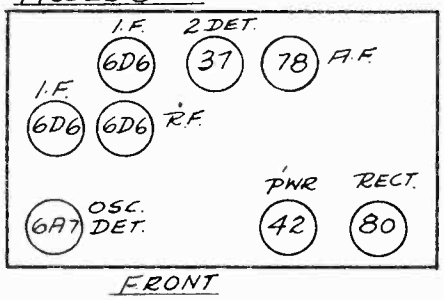
FRONT

MODEL 630



FRONT

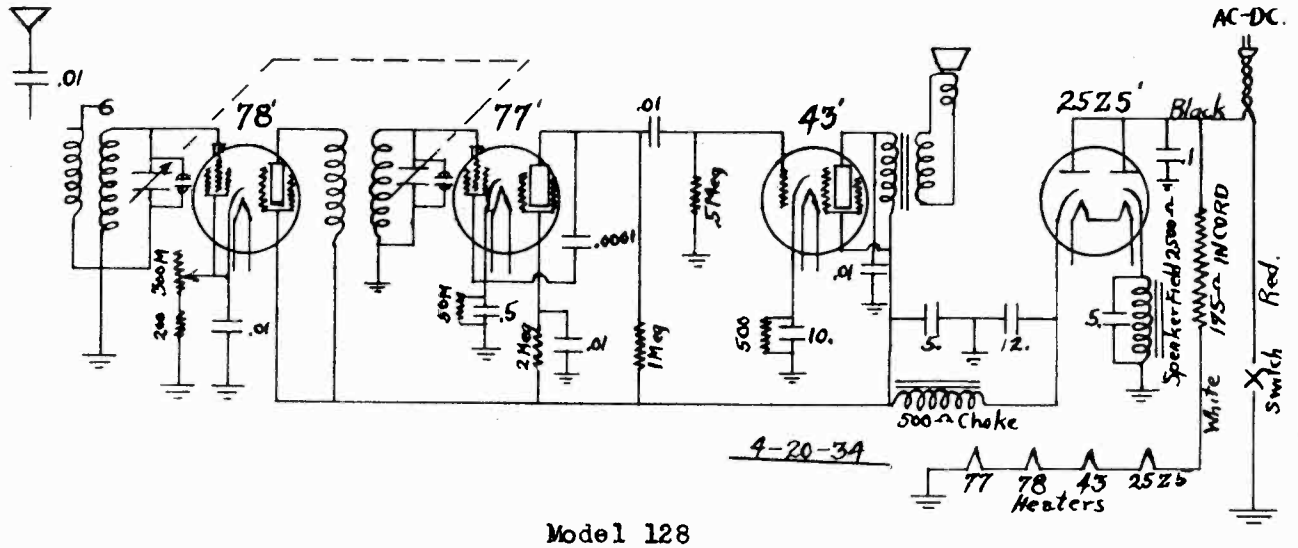
MODEL 811A



FRONT

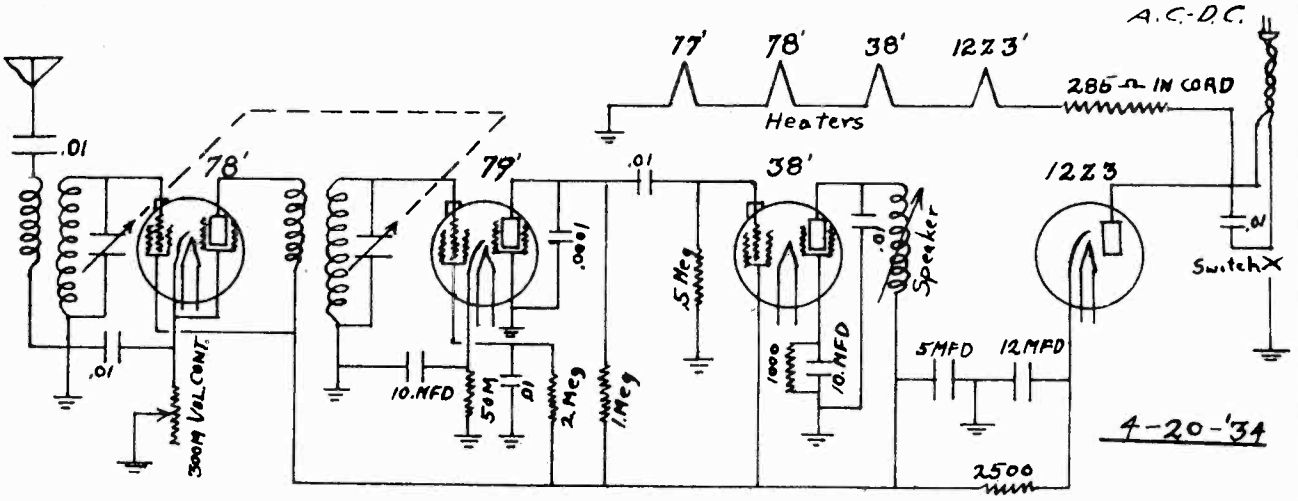
ECHOPHONE RADIO CORP.

MODEL 111
MODEL 128
Schematic, Data



Model 128

To balance set, first remove chassis from cabinet; second, tune condenser to about 1720 kc and align trimmer condenser on detector stage, then do same to antenna stage until loudest noise level is obtained.



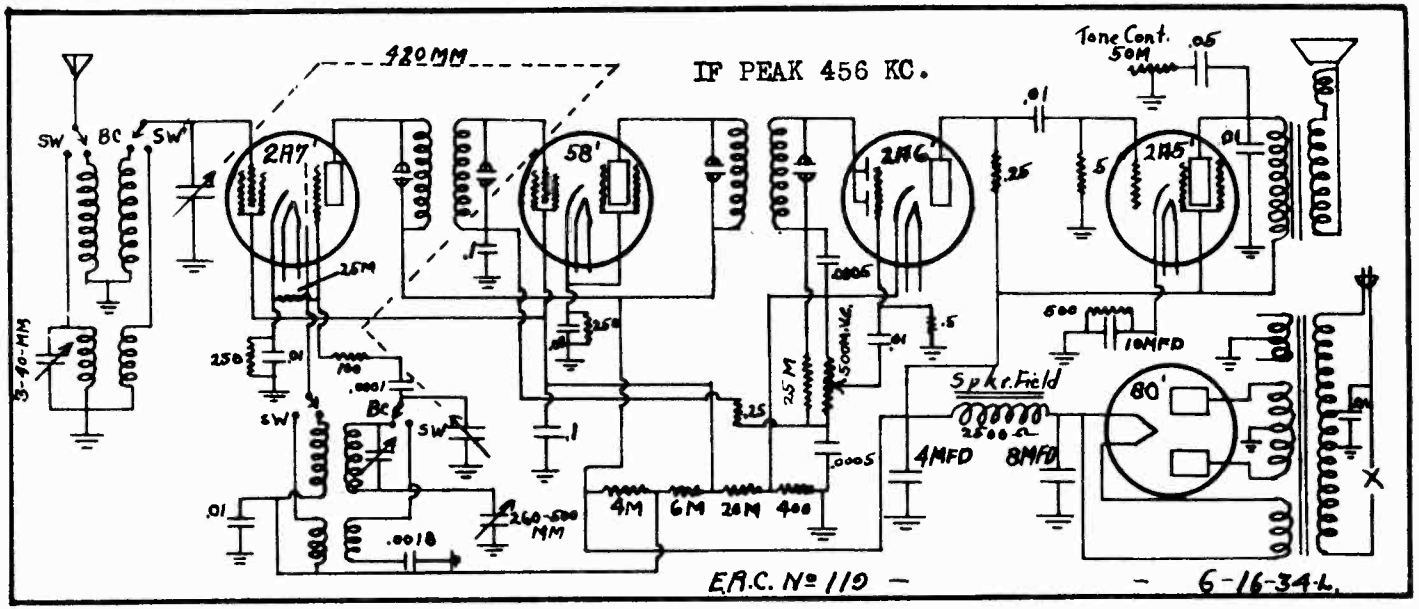
Model 111

This set is designed to oscillate across a major portion of the broadcast band. This regeneration is controllable by reducing the volume of the set. Oscillation in a set of this type increases the sensitivity from ten to twenty times.

MODEL 119
Schematic, Parts List
Alignment

ECHOPHONE RADIO CORP.

405 Escutcheon Plate
406 Silvertone Pyralin Plate
407 Dual 3-40 mmf trimmer cond.
408 260-500 Padder condenser
409 Candohm
410 Knob #XK 3444
451 Variable condenser
455 Power Transformer



This set is designed to operate on 105 to 120 volts AC - 60 cycles only. Also furnished for 25 cycles. Covers the regular broadcast band from 1720-540 KC and 15-55 meters.

The circuit is a superheterodyne, using 1-2A7 1st detector and oscillator, 1 -58 IF, 1-2A6 second detector, first audio and a.v.c., 1- 2A5 power output and 1-80 rectifier.

To align receiver, proceed as follows:

1-Peak the two IF transformers, applying a 456 note at the 2A7 control grid.

2-Turn variable condenser all the way open, peaking the oscillator stage of variable condenser, applying a 1712 KC signal into the antenna, then peak the RF stage.

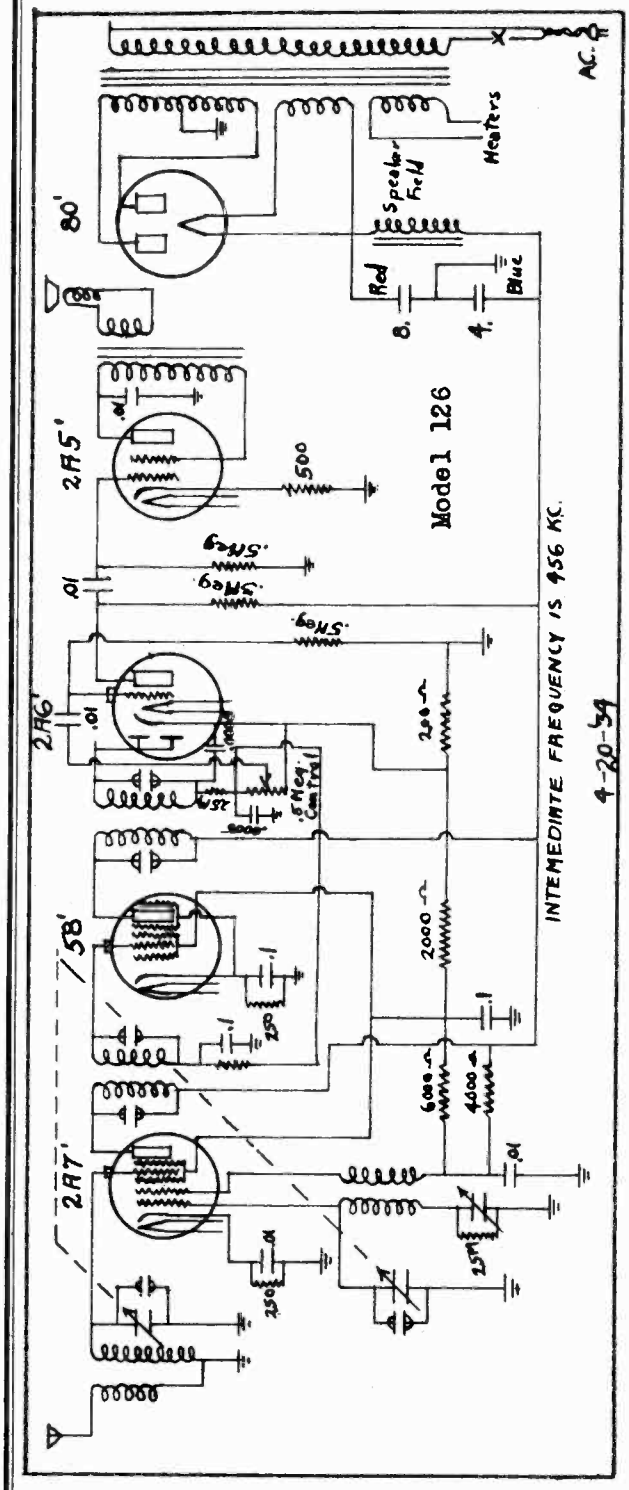
3-Tune gang condenser to approximately 600 KC and adjust low frequency padder to maximum noise level.

4-Tune to some weak signal at 1400 KC and readjust RF section of variable condenser.

No.	
156	8&4 mfd Electrolytic cond.
158	Power cord and plug
256	Volume control 1/switch
306	Tone control w/switch
307	10 mfd 25 volt electrolytic
310	.0018 mica condenser
401	Dynamic speaker
402	Set of coils complete
402a	BC Antenna coil
402b	SW " "
402c	BC & SW Oscillator coil
402d	Series wnd. I.F. Unit- top or bottom grid
403	Short wave switch
404	Tuning unit with dial

ECHOPHONE RADIO MFG. CO.

MODEL 124
Schematic, Alignment
MODEL 126
Schematic, Alignment



Model 126

To balance set, first align the IF transformers at 456 kc with gang condenser closed, next turn condenser all way open and align at 1720 kc, then adjust padder condenser at 600 kc, then go back and check at 1720 kc.

Model 124

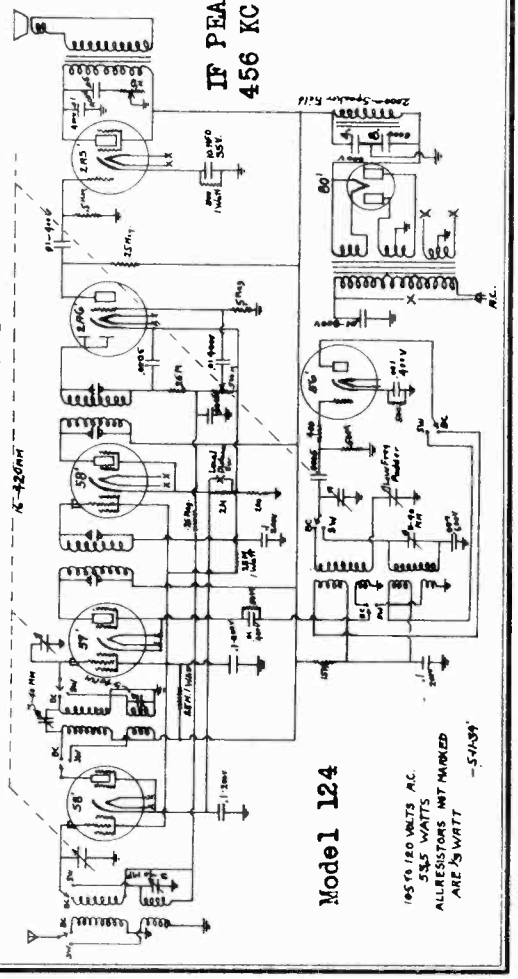
To align set on broadcast, remove 56 oscillator tube, trim Intermediate Frequency Transformers at 456 KC from an oscillator, feeding same into 57, first detector grid. Secondly, open gang condenser wide open and adjust trimmer condensers on top to maximum noise level, then adjust low frequency padder at approximately 600 KC; after doing this go back and recheck at 1700 KC.

To adjust short wave, turn switch left and tune gang condenser to 31 meters on dial and trim small padders underneath to maximum noise level or some station, checking oscillator coil padder with gang condenser tuned at different points.

Model 124

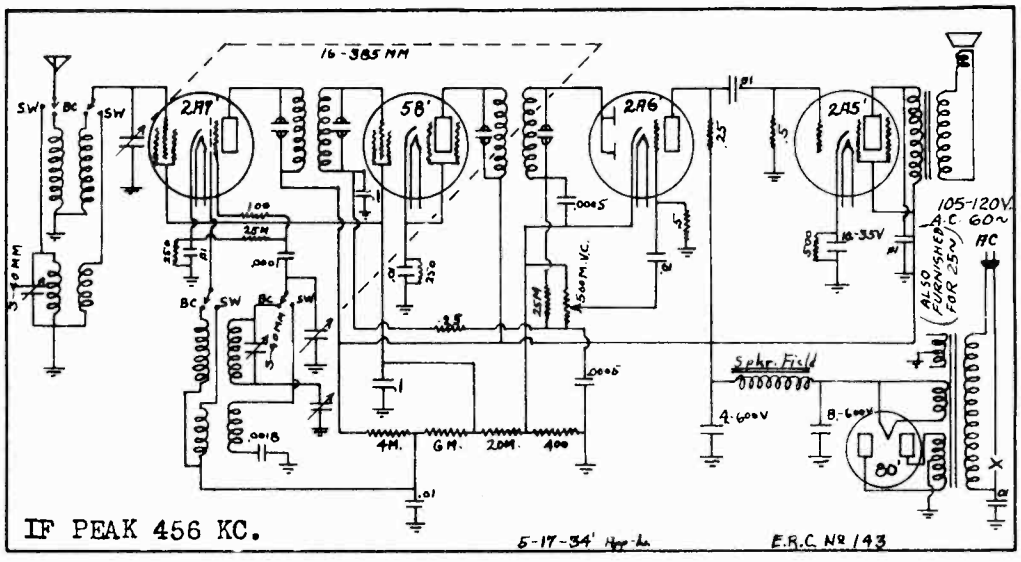
This set is designed to operate on 105-120 volts, A.C. The regular band covers from 1712 KC-550 KC and short wave from 15-55 meters.

IF PEAK 456 KC.



MODEL 143
Schematic, Alignment
Parts List

ECHOPHONE RADIO MFG. CO.



This set covers from 1720 KC to 540 KC regular broadcast including 1712 KC police and 15 - 55 meters short wave which covers major foreign stations.

The circuit uses 1-2A7 1st detector and oscillator; 1-58 IF; 1-2A6 second detector and first audio; 1-2A5 power output and 1-80 rectifier.

To align receiver proceed as follows:

1. Peak the two IF transformers, applying a 456 note at the 2A7 grid.
2. Turn variable condenser wide open, peaking oscillator stage at 1712 KC- then peak RF and antenna stage.
3. Adjust low frequency with gang tuned to 600 KC, to maximum peak.
4. Go back and check trimmers on gang condenser at 1400 KC.

If radio stops playing turn off immediately - check tubes. For-

Hum -check for
- Open resistor
- Bad Filter condenser
- Open by pass condenser
- Defective tube or tubes.

Poor tone- check for
- Bad resistor
- Voice coil in speaker rubbing
- Defective by pass condenser
- Defective filter condenser

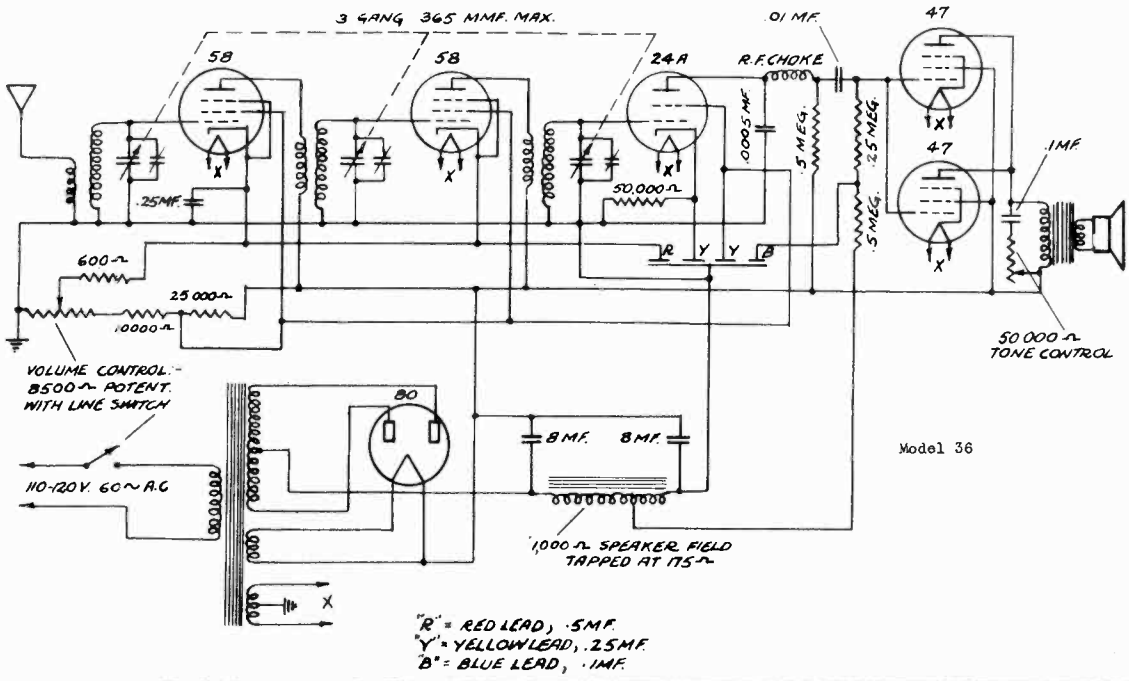
PARTS LIST

No.	
450	Dynamic Speaker
451	Variable condenser
452	Volume control w/switch
453	Short wave switch
454	Airplane Dial complete
455	Power Transformer
456	Set of coils-complete
456a	RFE Antenna coil-S.W.
456b	RFE Oscillator "
456c	RF Antenna BC
457D	456 KC IF units
156	8&4 mfd condenser
307	10 mfd 25v electrolytic
308	Terminal strip - 5 lug
310	.0018 Mica condenser
309	.01 mfd 800v cond. in can
108	Padder condenser 7 plate
158	Power cord & plug
	Any tube socket (state no.of prongs)
	Any resistor (state ohms & watts)
	Any by pass-not listed above(state capacity)

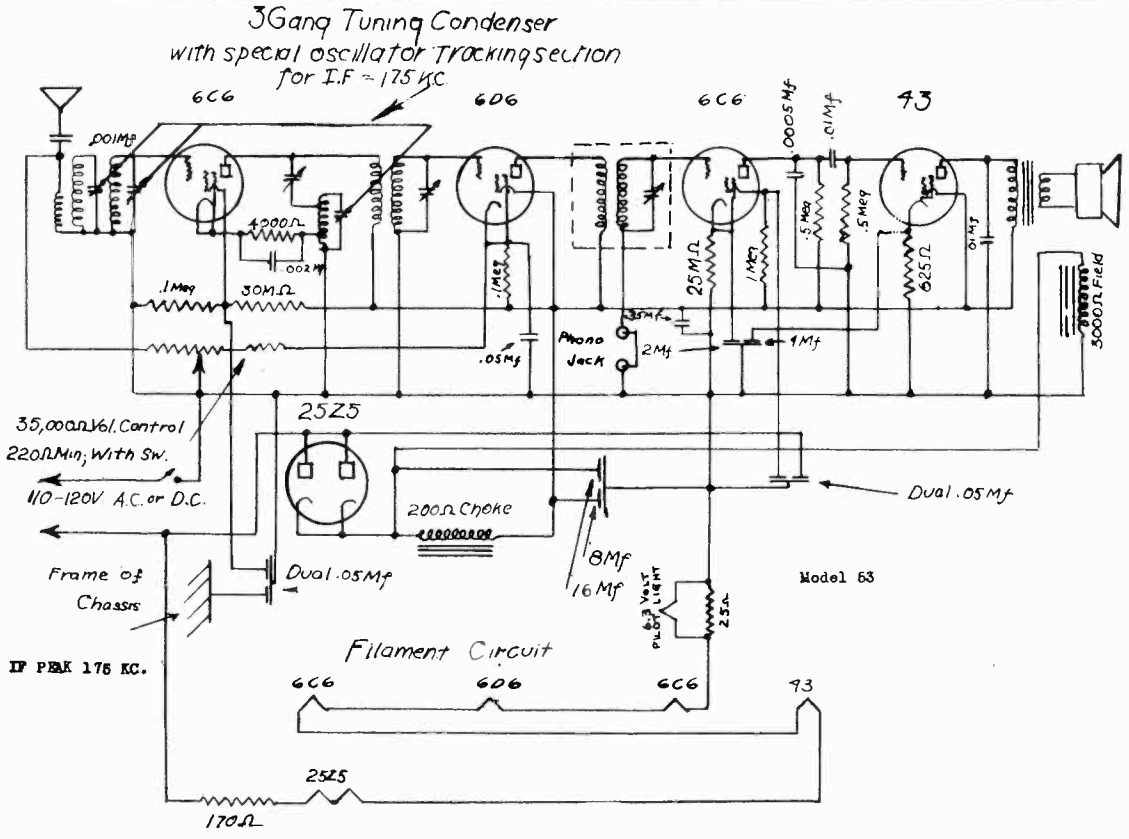
Weak - check for
- Set out of balance
- Defective coils
- Bad resistor
- Bad condenser

MODEL 36
MODEL 53
Schematics

EDISON-BELL CO., INC.



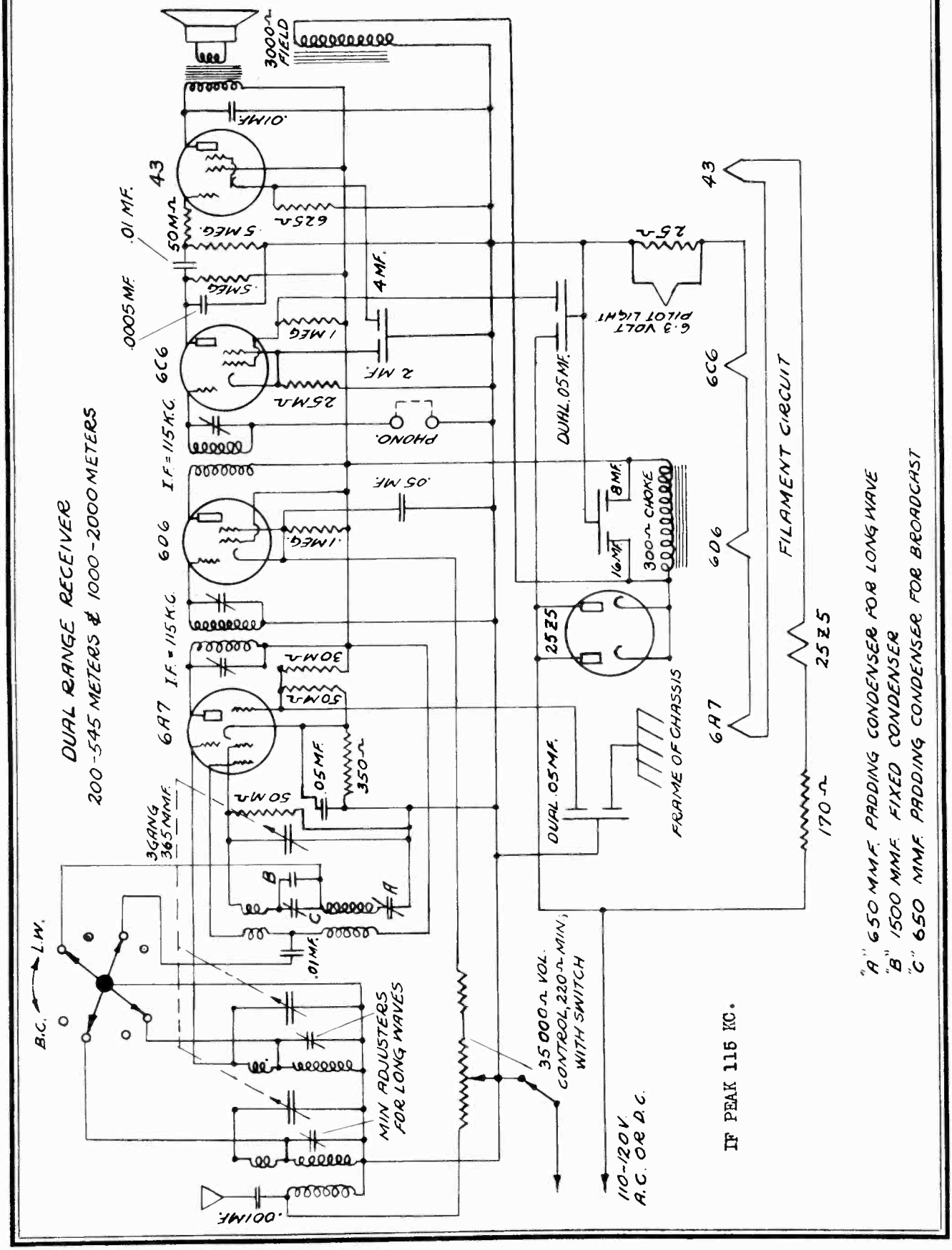
Model 36



Model 53

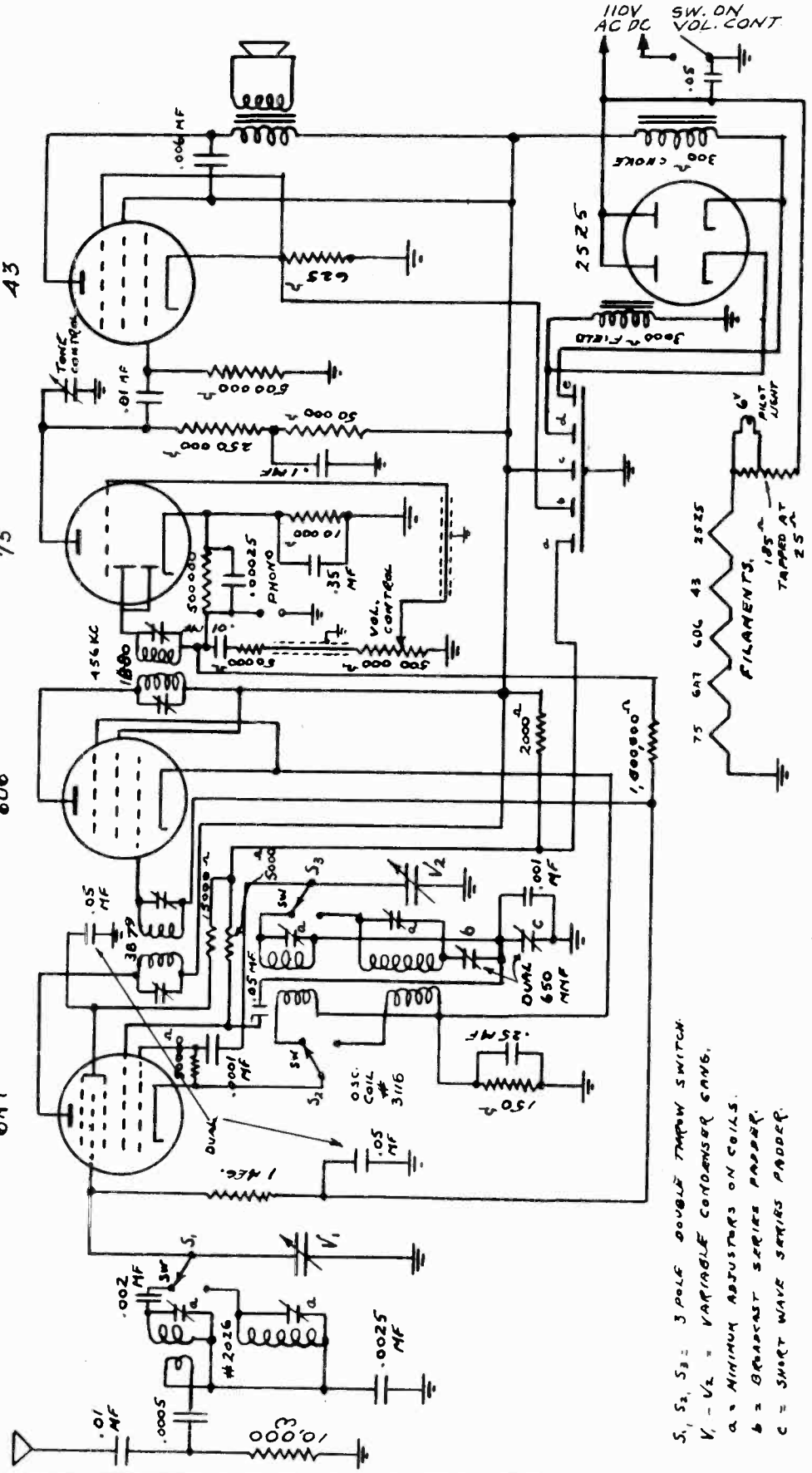
MODEL 53 LW
Schematic

EDISON-BELL CO., INC.



EDISON-BELL CO., INC.

MODEL 55 AW
Schematic



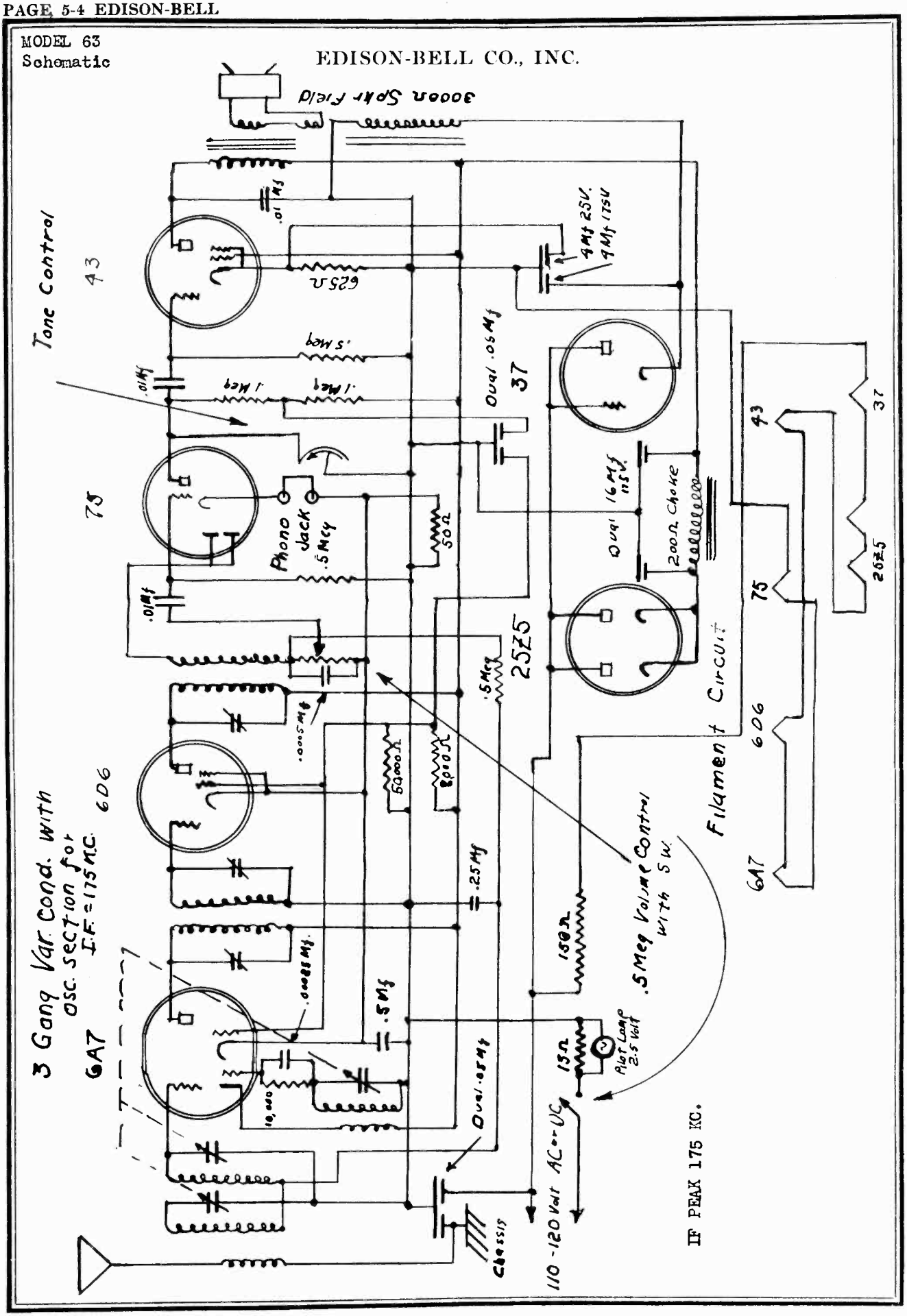
IF PEAK 456 KC.

S_1, S_2, S_3 = 3 POLE DOUBLE THROW SWITCH.
V_1 - V_2 = VARIABLE CONDENSER GANG.
a = MINIMUM ADJUSTERS ON COILS.
b = BROADCAST SERIES PADDER.
c = SHORT WAVE SERIES PADDER.

CONDENSER BLOCK:
a = 2 MF 100 VOLT (GREEN)
b = 4 MF 25 VOLT (RED)
c = .1 MF 100 VOLT (YELLOW)
d = 4 MF 100 VOLT (BLUE)
e = 16 MF 100 VOLT (YELLOW)

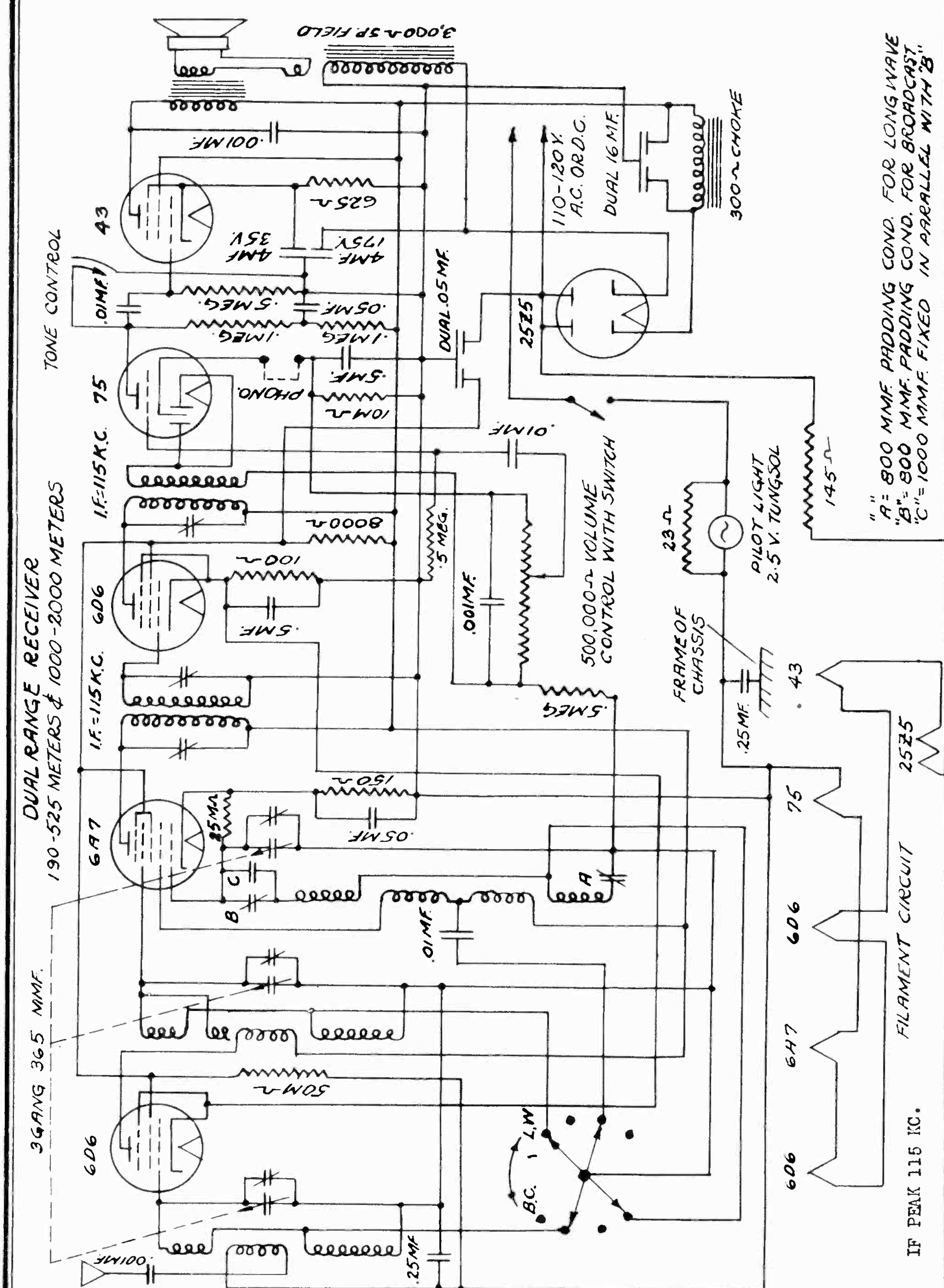
MODEL 63
Schematic

EDISON-BELL CO., INC.



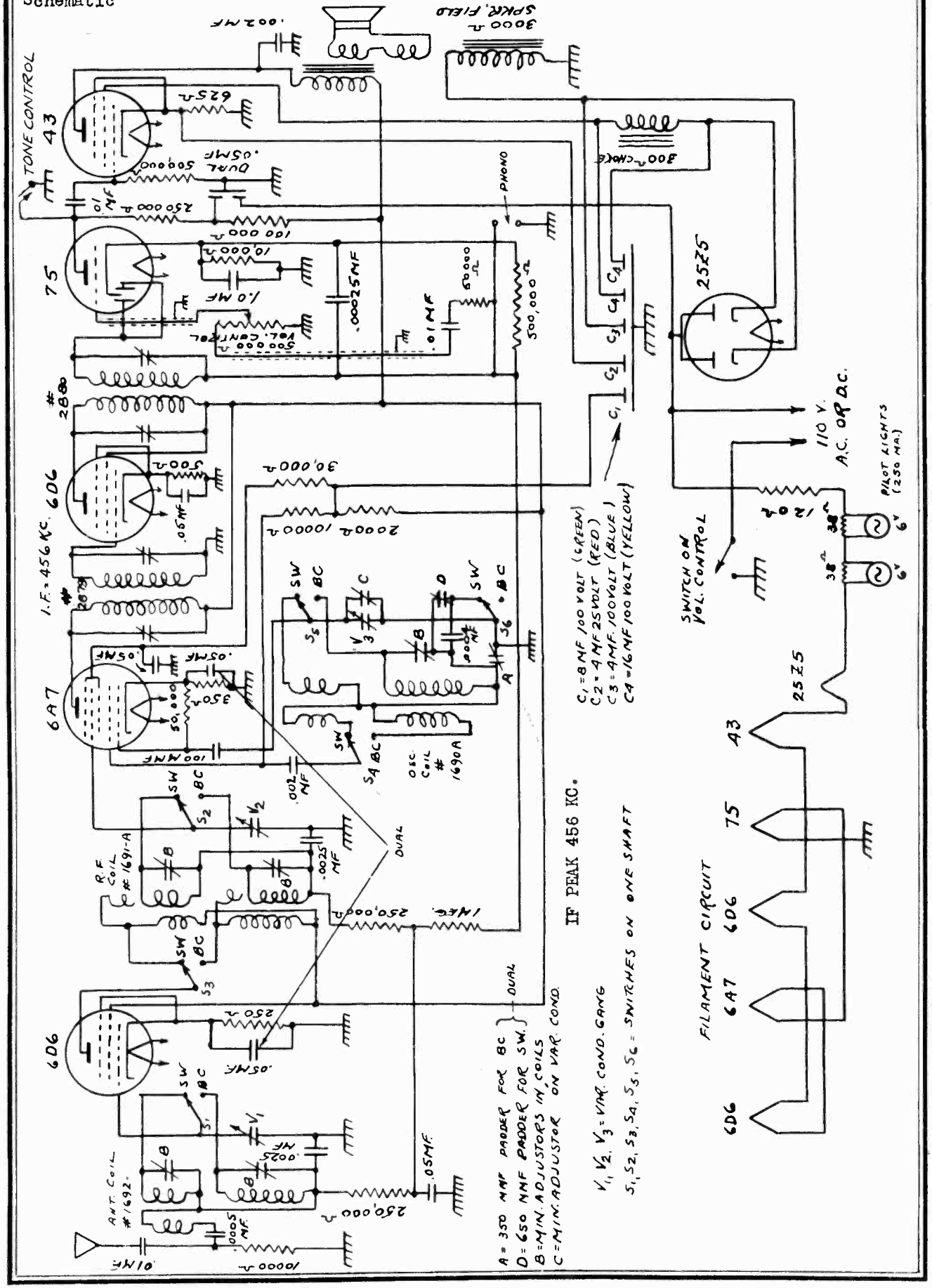
EDISON-BELL CO., INC.

MODEL 63 LW
Schematic



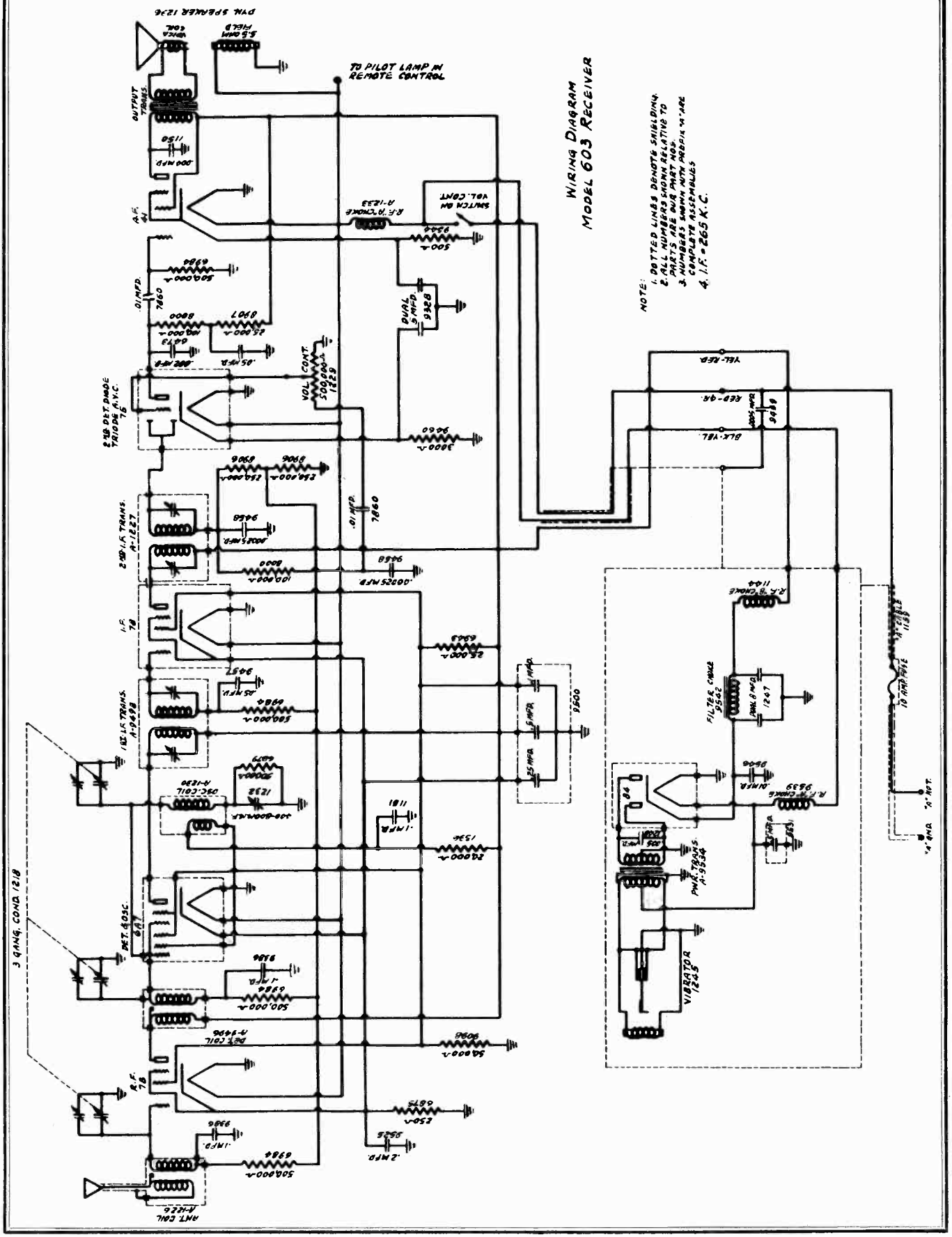
MODEL 66 AW
Schematic

EDISON-BELL CO., INC.



MODEL 603
Schematic

ELECTRICAL RESEARCH LABS.



MODEL 603
Voltage, Alignment
Parts List

ELECTRICAL RESEARCH LABS.

ALIGNMENT PROCEDURE: For properly aligning either the intermediate transformer or the variable condenser it is necessary that an accurately calibrated oscillator be used with some type of output measuring device.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the oscillator output to the control grid of the 6A7 tube leaving the control grid cap disconnected. Connect the ground side of the oscillator to the receiver chassis.

2. Set the oscillator frequency at 265 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 trimmer screws up and down until maximum reading is obtained on the output meter, and then adjust the other trimmer screw of the intermediate transformer for maximum sensitivity.

4. Adjust the second intermediate transformer in the same manner.

NOTE: Two types of intermediate transformer trimmers have been used in this model receiver. One type has two parallel holes in the top of the shield, one for each trimmer. The other type has a brass hex nut for adjusting one intermediate trimmer, the other intermediate trimmer being adjusted with the trimmer screw located inside of the brass hex nut. Regardless of which type trimmer is used the procedure is the same.

TO ALIGN THE VARIABLE CONDENSER: It is not necessary to remove the receiver chassis from the set housing to align the gang condenser. Regardless of whether or not the receiver is or is not mounted in the set housing the alignment procedure is the same. Three holes are provided in the left hand side of the set housing for the gang condenser trimmers and one in the front of the set housing for the 600 kilocycle padding condenser.

1. Properly connect the remote control head and shafts and adjust the dial needle on the dial face so that the dial calibration is correct.

2. Connect the high output side of the oscillator to the antenna and the ground to the receiver chassis.

3. Tune the receiver to exactly 1400 kilocycles on the dial and adjust the oscillator to this frequency. BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE OSCILLATOR GANG CONDENSER TRIMMER. Looking at the side of the receiver and reading from top to bottom the trimmer condensers are the antenna, R. F. and oscillator sections. Next, adjust the R. F. and antenna sections of the gang condenser for maximum sensitivity

4. Tune the receiver to approximately 600 kilocycles on the dial and set the oscillator to this frequency. Then adjust the 600 kilocycle padding condenser, which is located on and accessible through the hole in the front of the chassis for maximum output. Always rock the condenser slightly to the right and left when making this adjustment using the position of greatest output.

TYPE OF TUBE	POSITION OF TUBE	FILAMENT VOLTS	TUBE VOLTAGES PLATE VOLTS	CATHODE VOLTS	SCREEN VOLTS	GRID NO.1	GRID NO.2	GRID NO.3	GRID No.5
78	Radio Frequency	6	210	4	80				
6A7	Oscillator & Modulator	6	210	4		35	140	80	80
78	Intermediate Frequency	6	210	4	80				
75	2nd Detector Diode & AVC	6	100	1.5					
41	Output	6	200	8	210				
84	Rectifier	6	260##	235					

A. C. each plate
Total "A" current - 6.0 amperes
Read all voltages from socket to chassis

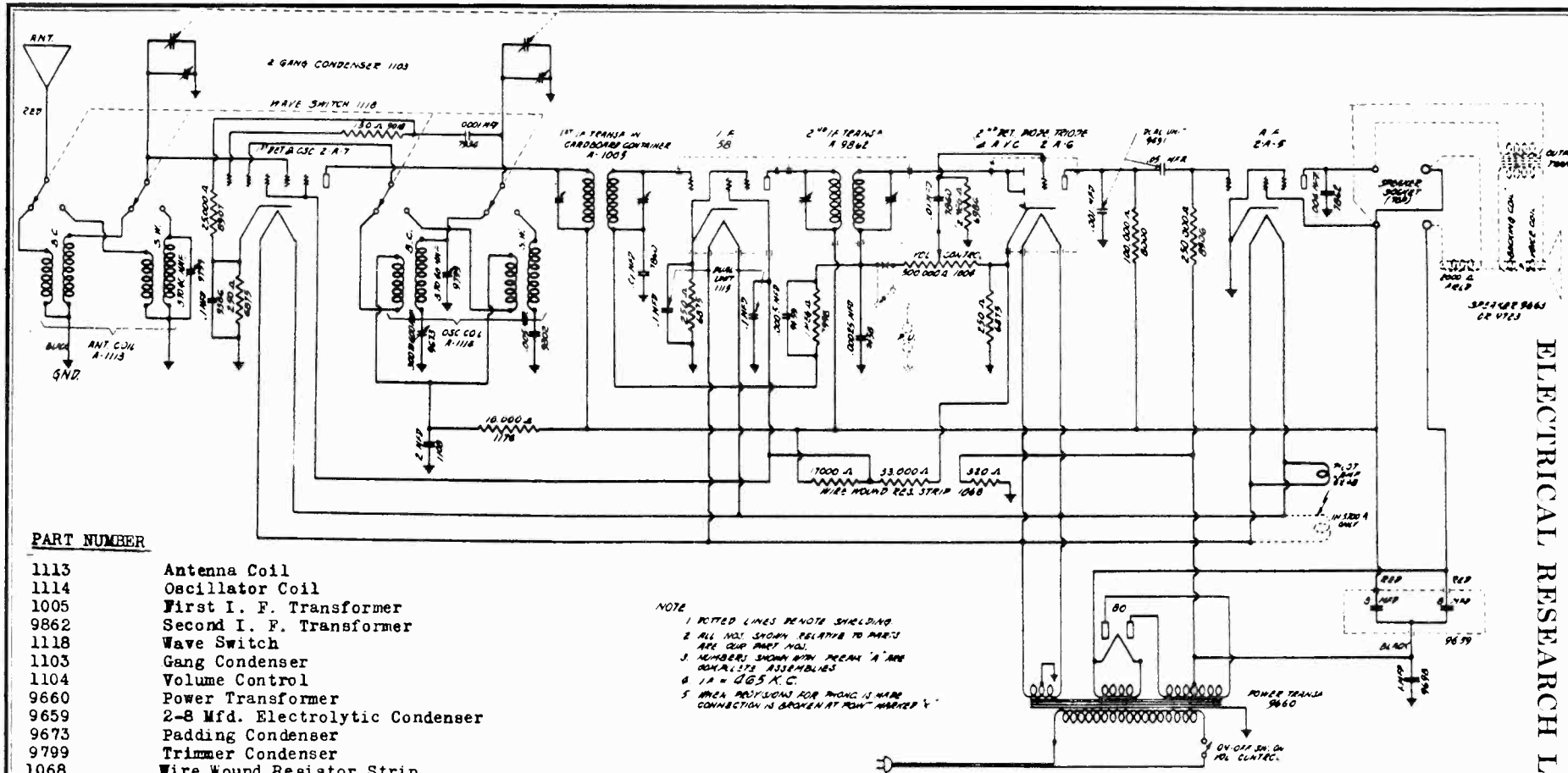
PART NUMBER		LIST PRICE
1226	Antenna Coil	$1.77
9496	Detector Coil	.99
1230	Oscillator	1.01
9498	1st I. F. Transformer	1.49
1227	2nd I. F. Transformer	2.03
1236	Dynamic Speaker	7.00
1158	Antenna Lead	.34
1244	Set Cable	.60
9098	50,000 Ohm 1/2 Watt Resistor	.19
6943	25,000 Ohm 1 Watt Resistor	.21
6984	500,000 Ohm 1/3 Watt Resistor	.19
8000	100,000 Ohm 1/3 Watt Resistor	.19
9460	3,000 Ohm 1/3 Watt Resistor	.19
9544	500 Ohm 1 Watt Resistor	.21
6875	250 Ohm 1/3 Watt Resistor	.19
8906	250,000 Ohm 1/3 Watt Resistor	.19
8907	25,000 Ohm 1/3 Watt Resistor	.19
1336	20,000 Ohm 1/2 Watt Resistor	.19
1232	Padding Condenser	.55
1218	Three Gang Condenser	4.10
9500	Bypass Condenser (1-.1,1-.25, 1-.5 Mfd.)	1.29
7860	.01 Mfd. 400 Volt Condenser	.17
9386	.1 Mfd. 200 Volt Condenser	.18
6473	.002 Mfd. 400 Volt Condenser	.17
9525	.2 Mfd. 200 Volt Condenser	.24
9203	.1 Mfd. 400 Volt Condenser	.20
1150	.004 Mfd. 400 Volt Condenser	.18
9328	Dry Electrolytic Condenser (2-5 Mfd.)	1.15
9133	Generator .5 Mfd. Condenser	.55
9597	Spark Plug Suppressor	.55
9598	Distributor Suppressor	.55
9600	Wood Mounting Block	.16
7717	Housing Carriage Bolt 3/8" x 3"	.10
7718	Hex Nut for 3/8" Carriage Bolt	.05
7716	Mounting Bolt Steel Washer	.10
9458	.0025 Mfd. Mica Condenser	.17
9463	No. 75 Tube Socket	.13
9422	No. 78 Tube Socket	.13
9493	No. 41 Tube Socket	.13

PART NUMBER		LIST PRICE
9453	6A7 Tube Socket	$ .13
1255	Set Housing Back	.25
1284	Set Housing Cover	.55
1223	Set Housing	3.52
9581	10 Ampere Fuse	.06
1159	"A" Battery complete with Fuse and Receptacle	.90
9063	Tube Shield Retainer Base	.05
1361	Tube Shield	.11
1253	R. F. "A" Choke	.28
1229	Volume Control with Switch	1.22
109	"B" Eliminator	15.00
1246	Vibrator Rubber Case	.40
1245	Vibrator	5.50
9534	Power Transformer	2.75
9542	Filter Choke	.85
9539	R. F. "A" Choke	.40
1144	R. F. "B" Choke	.32
1247	2x 8 Mfd. Condenser Block	2.75
9531	.5 Mfd. Bypass Condenser	.58
9546	.01 Mfd. 600 Volt Condenser	.18
1248	.005 Mfd. 1000 Volt Condenser	.23
9559	.0005 Mfd. Moulded Condenser	.21
9529	No. 84 Tube Socket	.13
9513	"B" Eliminator Housing Case	.55
9514	"B" Eliminator Housing Case Cover	.35
1249	"B" Terminal Strip with Screws	.60
1240	Remote Control Complete	9.00
1458	Tuning Control Ring	.77
1459	Volume Control Ring	.77
1460	Dial Light Assembly	.44
1460A	Pilot Light Bulb	.44
1461	Condenser Pulley Assembly	1.20
1462	Vol. Control Pulley Assembly	1.00
1463	Drive Cable Assembly	2.30
1464	Dial Glass & Sticker Assembly	.40
1465	Steering Post Clamp	.11
1466	Key	.17
1467	Dial Scale Assembly	.33
1468	Dial Glass Retaining Ring	.11

Prices are subject to change without notice.

ELECTRICAL RESEARCH LABS.

MODEL 5700, 5721
Schematic, Voltage
Parts List



PART NUMBER	
1113	Antenna Coil
1114	Oscillator Coil
1005	First I. F. Transformer
9862	Second I. F. Transformer
1118	Wave Switch
1103	Gang Condenser
1104	Volume Control
9660	Power Transformer
9659	2-8 Mfd. Electrolytic Condenser
9673	Padding Condenser
9799	Trimmer Condenser
1068	Wire Wound Resistor Strip
6984	500,000 Ohm 1/3 Watt Resistor
7997	1 Meg Ohm 1/3 Watt Resistor
8000	100,000 Ohm 1/3 Watt Resistor
8906	250,000 Ohm 1/3 Watt Resistor
6875	250 Ohm 1/3 Watt Resistor
9018	150 Ohm 1/3 Watt Resistor
8907	25,000 Ohm 1/3 Watt Resistor
1176	10,000 Ohm 1/3 Watt Resistor
9698	1 Mfd. 100 Volt Condenser
9386	.1 Mfd. 200 Volt Condenser
7862	.004 Mfd. 400 Volt Condenser
7860	.01 Mfd. 400 Volt Condenser
1115	2x.1 Mfd. 200 Volt Condenser
9691	.05 Mfd. & .001 Mfd, 400 Volt Cond
1108	2 Mfd. Dry Electrolytic Condenser
9307	.005 Mfd. Moulded Condenser
9458	.00025 Mfd. Moulded Condenser
7934	.0001 Mfd. Moulded Condenser
9459	.0005 Mfd. Moulded Condenser

VOLTAGE TABLE

Line : 115
Volume : Full on

TUBE		FIL.	PLATE	SCREEN	CATHODE	GRID NO.1	GRID NO.2	GRID NO. 3 & 5
58	I. F. Amplifier	2.45	205	80	2			
2A7	Oscillator & 1st Detector	2.45	205		2.5	1.5	160	80
2A6	Second Detector Diode AVC and Triode	2.45	100##		1			
2A5	Output	2.45	190	205	.8###			
80	Rectifier	4.85						

Triode Plate. Comparative voltage only.

Read all voltages from socket to chassis unless otherwise specified.

Read from grid to chassis.

MODEL 5700,5721
Alignment

ELECTRICAL RESEARCH LABS.

NOTE: It may be found that stations on the short wave band are received at a slightly different dial setting than formerly received after changing the aerial dimensions. Using one of the antenna transmission systems designed for man-made static elimination may prove beneficial for very difficult locations. Care must be taken in using this type aerial system as an improperly designed transmission system will decrease the range of the receiver, particularly on short wave reception. Simply using a transmission system will not eliminate the noise unless the flat top of the aerial can be erected outside of the field of disturbance. A shielded lead-in is not recommended as the signal loss on short waves will be excessive. The antenna should be connected to the red lead coming out at the rear of the chassis and for best results it is recommended that a good ground be connected to the black lead coming out at the rear of the chassis.

BAND SELECTOR SWITCH: Two different frequency bands are available, the frequency range being:

1715 to 535 Kilocycles- 175 to 560.75 Meters
16 to 5.2 Megacycles- 18.7 to 57.7 Meters

Selection of the desired frequency band is made with the band selector switch knob, which is located on the lower right front of the cabinet. When the band selector switch is placed in the maximum left hand position the receiver is operating on the 5.2 to 16 megacycle band. For operation on the 1715 to 535 kilocycle band place the band selector switch knob in the maximum right hand position. Both bands are calibrated on a single dial, one section of which is calibrated in kilocycles, 1715 to 535 kilocycles, and the other section is calibrated in megacycles, 16 to 5.2 megacycles.

ALIGNMENT PROCEDURE: Only when an IF transformer, antenna or oscillator coil is replaced should it ever be necessary to realign the receiver. For aligning either the intermediate transformer or the variable condenser it is absolutely necessary that a good accurate calibrated oscillator be used with some type of output measuring device.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the oscillator output to the control grid of the 2A7 tube leaving the grid cap disconnected. The ground side of the oscillator should be connected to the receiver chassis.

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 the intermediate transformer brass hext adjusting nut located on top of the intermediate transformer can up and down until maximum reading is obtained on the output meter. Then adjust the trimmer screw located inside the brass hex nut for maximum output.

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

VARIABLE CONDENSER ALIGNMENT: It is essential that the following instructions be carefully adhered to in the order given otherwise the receiver will be insensitive and the dial calibration will be inaccurate.

1. Connect the high side of the oscillator output to the set antenna lead and the oscillator ground to the receiver chassis.

2. Place the band selector switch for operation on the 16 to 5.2 megacycle band.

3. Set the oscillator frequency to exactly 15 megacycles and adjust the receiver dial to exactly 15 megacycles. Then BRING IN THE 15 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE trimmer condenser of the oscillator gang condenser section. The oscillator trimmer condenser is mounted on top of the rear section of the variable condenser. The front section of the variable condenser tunes the antenna stage.

4. Place the band selector switch for operation on the 1715 to 535 kilocycle band, set the oscillator to exactly 1400 kilocycles and tune the receiver dial to 1400 kilocycles. BRING IN THIS 1400 KILOCYCLE SIGNAL BY ADJUSTING THE SMALL TRIMMER CONDENSER which is located underneath near the center and towards the front of the chassis.

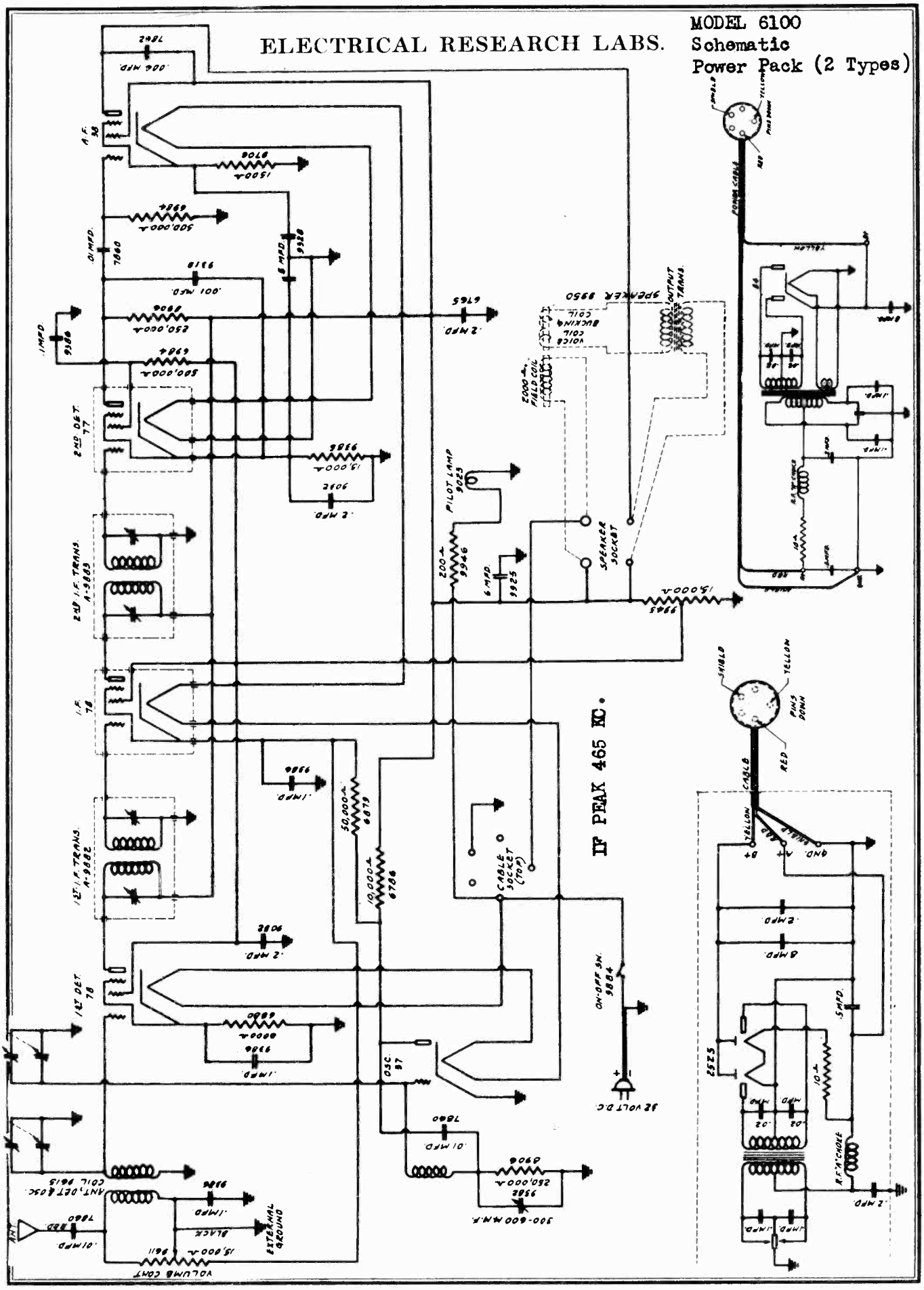
5. Next adjust the antenna variable gang condenser section trimmer condenser for maximum output (front section).

6. Leave the receiver operating on the same band and set the oscillator frequency to approximately 600 kilocycles and adjust the dial to approximately 600 kilocycles. Then while rocking the variable condenser slightly to the right and left, adjust the 600 kilocycle padding condenser which is located below the speaker and accessible through the front of the chassis for maximum output.

7. Recheck the 1400 kilocycle adjustment.

8. Place the band selector switch for operation on the 16 to 5.2 megacycle band and tune the dial to exactly 15 megacycles and set the oscillator frequency to 15 megacycles. Then adjust the trimmer condenser which is located underneath and toward the center of the right hand side of the chassis for maximum output.

This completes the alignment procedure and it is suggested that all the adjustments be rechecked.



MODEL 6100
Voltage, Alignment
Parts List

ELECTRICAL RESEARCH LABS.

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.

32 VOLT SIX TUBE SUPERHETERODYNE RECEIVER.

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:

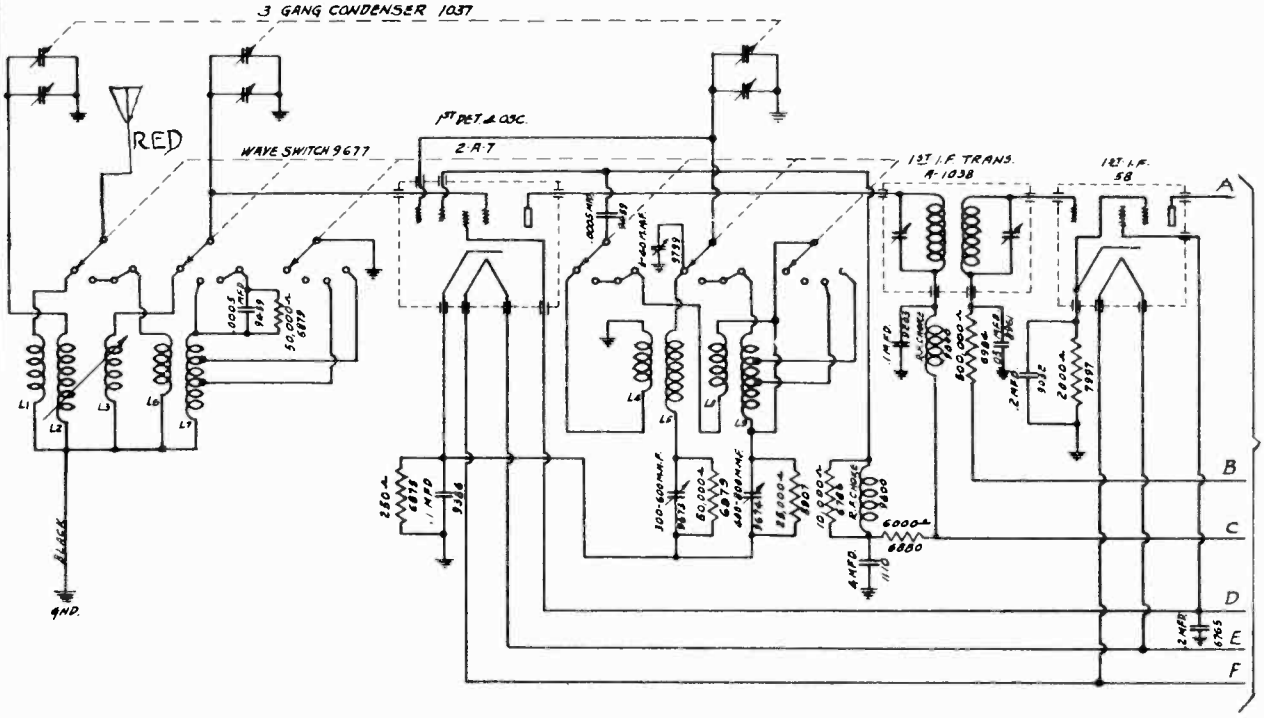
1. Connect the high output side of the oscillator to the set antenna lead and the ground side of the oscillator to the ground lead.
2. Tune the receiver to 1400 kilocycles on the dial and set the oscillator to this frequency.
3. Adjust the variable condenser trimmer screws for maximum output reading.
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.

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		
9611	Volume Control		
9382	Padding Condenser		

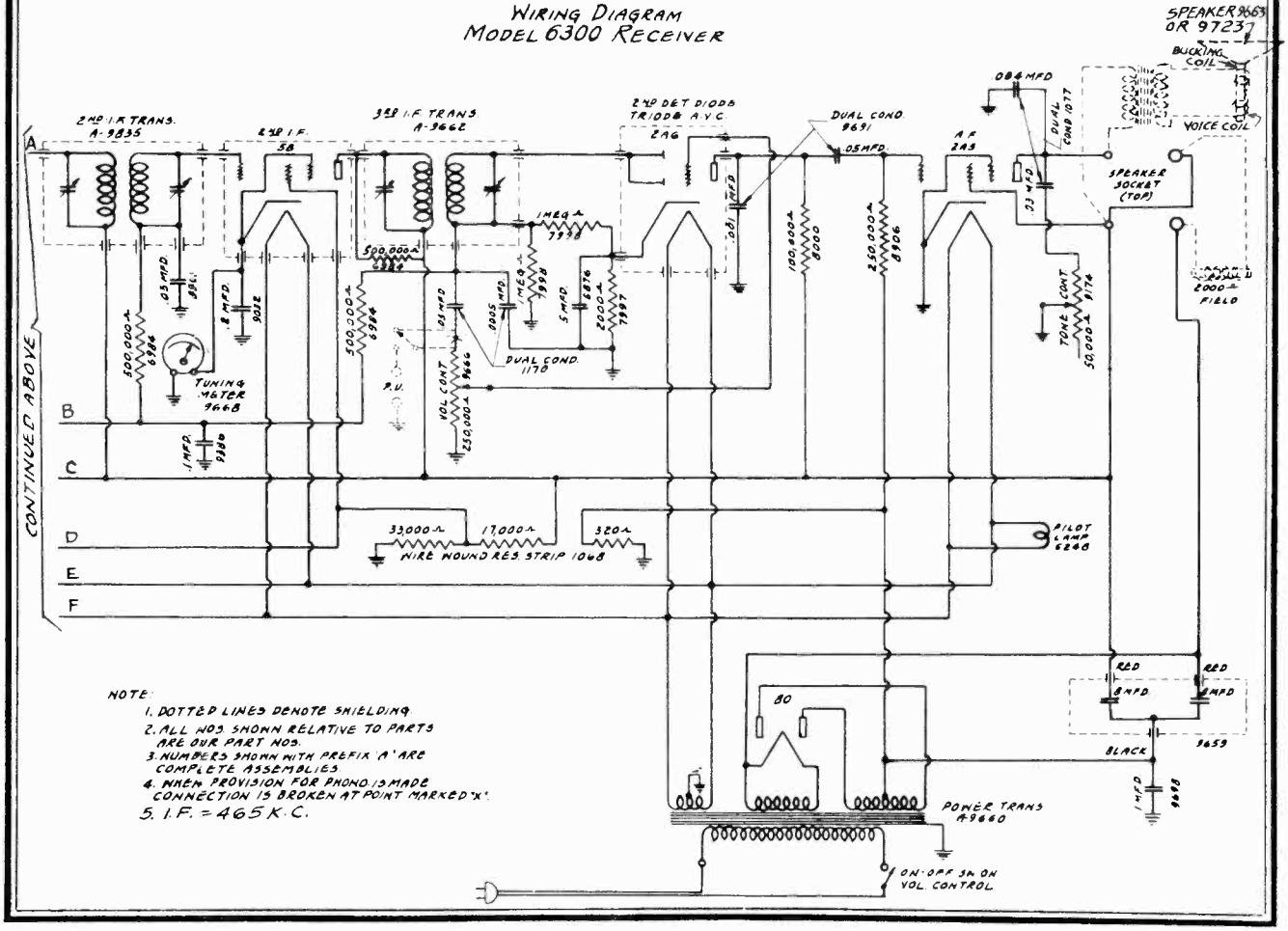
MODEL 6300, 6315, 6317, 6323
Schematic

ELECTRICAL RESEARCH LABS.



L1, L2, L3, L5 & L6 = BROADCAST PRESELECTOR & OSCILLATOR COIL ASSEMBLY 1039
L5 & L7 = SHORT WAVE ANTENNA & 1ST DETECTOR COIL ASSEMBLY A-1092
L8 & L9 = SHORT WAVE OSCILLATOR COIL A-1083

WIRING DIAGRAM
MODEL 6300 RECEIVER



NOTE:
1. DOTTED LINES DENOTE SHIELDING
2. ALL NOS. SHOWN RELATIVE TO PARTS ARE OUR PART NOS.
3. NUMBERS SHOWN WITH PREFIX 'A' ARE COMPLETE ASSEMBLIES
4. WHEN PROVISION FOR PHONO IS MADE CONNECTION IS BROKEN AT POINT MARKED 'X'.
5. I.F. = 465 K.C.

ELECTRICAL RESEARCH LABS.

SHORT WAVE TRIMMER: A short wave trimmer control is incorporated in the receiver and is used for a fine tuning adjustment when tuning for short wave reception from 1.5 megacycles to 24 megacycles. The band selector switch knob consists of two sections. The small front section knob is used for adjusting the short wave trimmer and the large rear section is the band selector switch knob. When tuning for short wave reception always rotate the tuning control slowly until a station is heard with maximum volume. Don't hurriedly skim over the dial or pass up any weak signals. After adjusting the tuning control so as to bring the station in at its loudest point adjust the short wave trimmer control by turning the trimmer knob first in the clockwise and then in the counter-clockwise direction to the position of greatest volume. Occasionally after tuning in this manner still better results may be obtained by readjusting the tuning control,and then further fine adjustment should be made with the short wave trimmer for maximum volume. It may be found that when adjusting the short wave trimmer that the signal will disappear, indicated by the elimination of signal, static and background noises. Rotating the short wave trimmer control slightly either clockwise or counter-clockwise will bring the signal in again. When operating the receiver on the broadcast band (1500 K.C. to 540 K.C.) the trimmer is inoperative.

Line Voltage : 115
Volume Control: Full on
Wave Band : Broadcast

TUBE	Fil.	Plate	Screen	Cathode Volts	Grid No.1	Grid No.2	Grid No. 3 & 5
2A7 Oscillator 1st Detector	2.45	220		2.2	3.5	200	90
58 First I. F. Amplifier	2.45	220	90	6			
58 Second I. F. Amplifier	2.45	220	90	3.5			
2A6 Second Detector	2.45	120##		1			
2A5 Output	2.45	210	220				
80 Rectifier	4.89						

Triode Plate. Comparative voltage only. The voltmeter is in series with a high resistance and is therefore not the true voltage applied. Read all voltages from socket to chassis unless otherwise specified.

ALIGNMENT PROCEDURE: Only when an antenna, oscillator or I. F. transformer has become defective due to an open or shorted winding should it be necessary to realign the receiver. For aligning either the intermediate transformer or variable condenser it is necessary that an oscillator be used with some type of output measuring device.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the oscillator output to the control grid of the 2A7 First Detector tube, leaving the grid clip disconnected. The ground side of the oscillator should be connected to the chassis.

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 the brass hex nut of the first intermediate transformer trimmer up and down until maximum reading is obtained on the output meter, then adjust the trimmer screw located inside of the brass hex nut in the same manner. The intermediate transformer trimmer screws are accessible through the small hole in the top of the intermediate transformer shields.

4. The second and third I. F. transformers should next be adjusted in the same manner as the first I.F. transformer.

TO ALIGN THE VARIABLE CONDENSER: It is important when aligning the variable condenser and padding condensers to follow the procedure given carefully, otherwise the receiver will be insensitive and the dial calibration will be incorrect.

1. Connect the high output side of the oscillator to the antenna and the ground to the chassis.

2. Place the band selector switch for operation on the 1.5 to 4 megacycle band. Tune the receiver to exactly 1.7 megacycles onthe dial, set the short wave trimmer about half the distance between maximum clockwise and counter-clockwise rotation and adjust the oscillator frequency to exactly 1.7 megacycles.

Next, bring this 1.7 megacycle signal in to maximum output by adjusting the padding condenser accessible through the hole in the right hand side and closest to the rear of the chassis.

3. Leave the band selector switch for operation on the 1.5 to 4 megacycle band and tune the receiver to exactly 3.4 megacycles on the dial.

Next, set the test oscillator to exactly 3.4 megacycles and tune the signal in by adjusting the oscillator variable condenser trimmer mounted on top of the variable condenser. The middle section of the variable condenser is the oscillator section. Recheck the 1.7 megacycle adjustment after making the adjustment at 4 megacycles. For best results it is always advisable to check each adjustment several times. NOTE: This completes the short wave adjustment.

4. Adjust the band selector switch for operation on the broadcast band (1500 to 540 kilocycles) and tune the receiver to exactly 1400 kilocycles on the dial and set the oscillator to this frequency. Turn the receiver on end and bring this 1400 kilocycle signal in to maximum output by adjusting the trimmer screw on the small trimmer,which is located adjacent to the short wave switch underneath the chassis.

Next, adjust the antenna and preselector variable condenser section trimmers mounted on top of the variable condenser for maximum signal output. (These are the front and rear gang sections).

5. Leave the band selector switch for operation on the broadcast band (1500 to 540 kilocycles) and tune the receiver and oscillator to approximately 600 kilocycles. Then adjust the 600 kilocycle padding condenser which is located on the right hand side and towards the front of the chassis for maximum output reading. This adjustment is quite critical and it is necessary to rock the condenser slightly to the right and left to obtain maximum sensitivity.

Always recheck the 1400 kilocycle alignment after making the adjustment at 600 kilocycles.

ELECTRICAL RESEARCH LABS.

MODEL 6300,6315
6317,6323
Parts List,Notes

SIX TUBE SUPERHETERODYNE RECEIVER
24 Megacycles to 540 Kilocycles

Band No. 1 - from 10 Megacycles to 24 Megacycles
Band No. 2 - from 4 Megacycles to 10 Megacycles
Band No. 3 - from 1.5 Megacycles to 4 Megacycles
Band No. 4 - from 1500 Kilocycles to 540 Kilocycles

Selection of the desired frequency band is made with the band selector switch knob (large rear knob of double knob) which is located on the lower right front of the cabinet below the tuning control knob. When the band selector switch is placed in the maximum left hand position the receiver is operating on Band No. 1, 10 megacycles to 24 megacycles. Rotating the band selector knob in the clockwise direction the three other positions are in the order named, Band No. 2, 4 megacycles to 10 megacycles, Band No. 3, 1.5 to 4 megacycles and Band No. 4, 1500 kilocycles to 540 kilocycles. All four frequency bands are calibrated on a single dial. The calibrated section of the dial for the band that the receiver is adjusted to operate on is indicated by the dial indicator which is automatically adjusted by the band selector switch knob.

SHORT WAVE RECEPTION: The usual careless tuning that is sufficient to bring in the long wave length regular broadcast stations will fail in tuning in short wave reception. In tuning for short wave stations, great care must be taken so that the stations are not passed over, as the tuning is very sharp and quite critical. Many times a lack of results when tuning for short wave stations is due not only to the operator tuning the receiver incorrectly, but also to the operator trying to pick up foreign and North American short wave stations when the stations are not broadcasting. An important consideration is the time difference between the United States and European Countries;ie., at 10:00 P.M. Central Standard Time it is 4:00 A. M. in England and 5:00 A. M. in most other countries in Europe and, as a rule, no stations are broadcasting at that time. While short wave reception presents a varied and more thrilling entertainment than we have been accustomed to hearing on the broadcast band, the many peculiarities and difficulties of short wave reception have been minimized and the possibilities over-emphasized, which has resulted in the erroneous belief that reception of foreign short wave stations is an easy accomplishment. To the contrary, short wave stations are not tuned in with the ease we have been accustomed to in tuning in local broadcast stations, but requires patience, extreme care in tuning, an understanding of the proper procedure and favorable conditions. Reception of short wave stations, as a rule, is not comparable to the clear, static-free programs received from the local broadcast stations, but is more erratic and is generally accompanied by fading and static although occasionally reception may be as good as local programs.

Reception of short wave stations varies from season to season and between daylight and after sunset.

Band No. 4 (regular broadcast band) from 1500 to 540 kilocycles varies also in that the range of the station is materially increased after dark and fading of distant stations becomes more pronounced. In some locations stations that are received during daylight occasionally fade so badly after sundown that it is impossible to receive good reception after dark. Other stations which cannot be heard during daylight provide good reception after darkness.

Band No. 3, 1.5 to 4.0 megacycles permits reception of police calls and some amateur phone stations. The range of the stations broadcast within this band is increased after sundown.

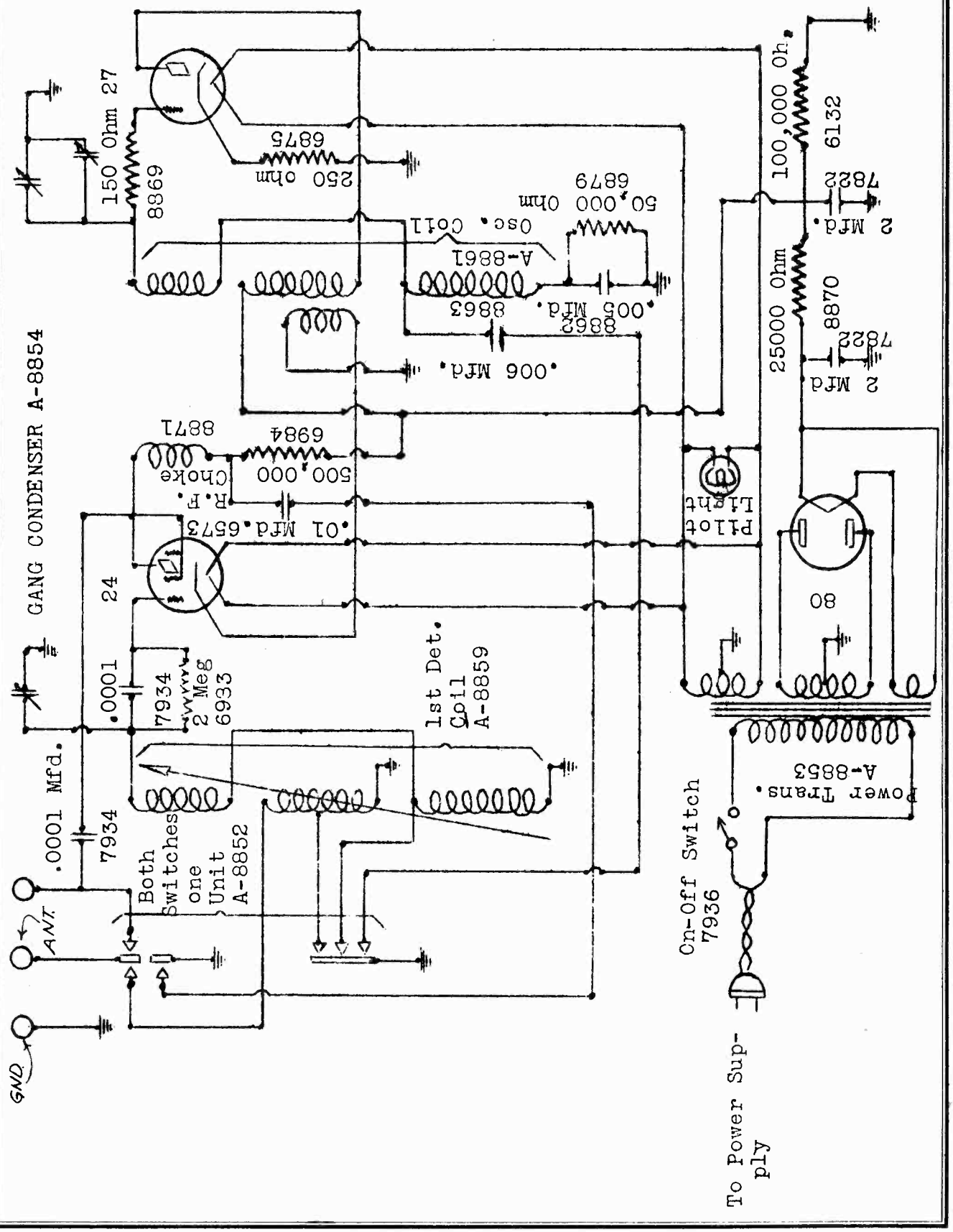
Band No. 2 from 10.0 to 4.0 megacycles includes the 49 meter band, the 31 meter band and some amateur stations. Stations broadcast within this band include many of the foreign short wave stations and North American Stations. Reception of stations transmitting on the 49 meter band is most reliable during the Summer months when located approximately 300 miles or more during daylight which increases to 1,500 miles or more when a large portion of the signal path lies in darkness. The Winter range is approximately 600 miles during daylight and 2,000 miles or more after sundown. Stations operating on the 31 meter band are most reliable when the receiver is located about 800 miles away during daylight in the Summer months increasing to 2,500 miles after sundown.

Band No. 1, from 24 megacycles to 10.0 megacycles includes the 25, 19 and 16 meter bands. Reception of stations in the 25 meter band is best during daylight when the receiver and transmitter are located 1,000 miles or less than 2,000 miles apart. After sundown reception may be expected only from stations located a distance of 2,000 miles or more away from the receiver. Stations operating on the 19 meter band provide satisfactory reception generally during daylight hours only. After nightfall or when any appreciable portion of the transmission path is in darkness signals are rarely heard. Stations operating below 19 meters are generally useful only when transmitting during daylight and over a distance of 2,000 miles or more. Ordinarily they cannot be received after sunset.

1039	Broadcast, Antenna, Preselector & Oscillator Coil
1083	Short Wave Oscillator Coil
1092	Short Wave Antenna & First Detector Coil
1038	First I. F. Transformer
9835	Second I. F. Transformer
9662	Third I. F. Transformer
9800	R. F. Choke
6786	10,000 Ohm 1/3 Watt Resistor
7998	1 Meg Ohm 1/3 Watt Resistor
8906	250,000 Ohm 1/3 Watt Resistor
6880	6,000 Ohm 1/3 Watt Resistor
9287	Short Wave Trimmer Disc. Assembly
9682	Short Wave Trimmer Worm Tuning Rod
9673	Padding Condenser
9674	Padding Condenser
9799	Trimmer Condenser
9659	Electrolytic Condenser Dual 8 Mfd.
8876	Electrolytic Condenser 5 Mfd.
1110	Electrolytic Condenser 4 Mfd.
9660	Power Transformer
9663	Dynamic Speaker 6"
9723	Dynamic Speaker 8"
9666	Volume Control
9174	Tone Control
9668	Tuning Meter
1068	Wire Wound Resistor Strip
9671	Pilot Lamp Socket
6248	2.5 Volt Pilot Lamp Bulb
8980	Tube Shield
9082	Tube Shield Cap
9459	.0005 Mfd. Moulded Condenser
9698	1 Mfd. 100 Volt Condenser
9203	.1 Mfd. 400 Volt Condenser
9386	.1 Mfd. 200 Volt Condenser
8961	.05 Mfd. 400 Volt Condenser
1077	.03 Mfd. & .004 Mfd. 400 Volt Condenser
1170	.0005 Mfd. & .05 Mfd. 400 Volt Condenser
9691	.001 Mfd. & .05 Mfd. 400 Volt Condenser
6765	.2 Mfd. 400 Volt Condenser
9032	.2 Mfd. 200 Volt Condenser
784	500,000 Ohm 1/3 Watt Resistor
8000	100,000 Ohm 1/3 Watt Resistor
6879	50,000 Ohm 1/3 Watt Resistor
8907	25,000 Ohm 1/3 Watt Resistor
6875	250 Ohm 1/3 Watt Resistor
7997	2,000 Ohm 1/3 Watt Resistor

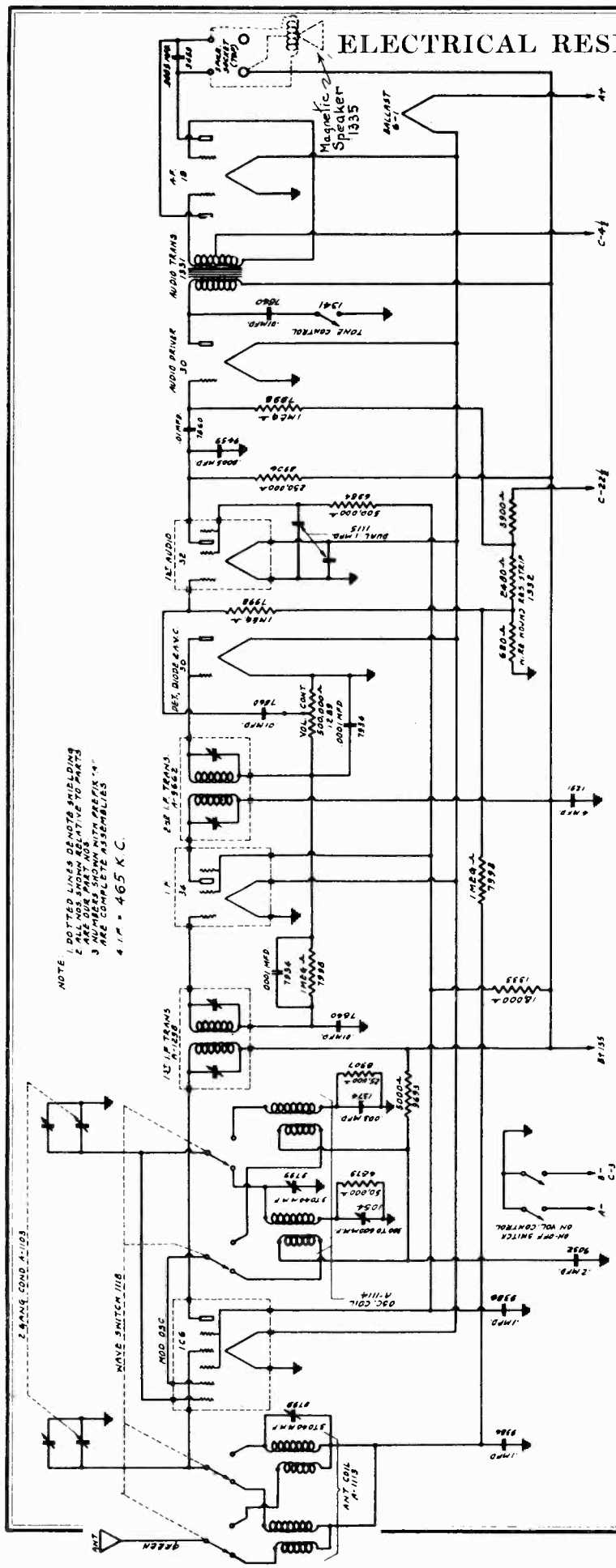
MODEL SW Converter
Schematic

ELECTRICAL RESEARCH LABS.



ELECTRICAL RESEARCH LABS.

MODEL 7700,7732,7741
Schematic, Voltage



VOLTAGE TABLE

"A" Battery - 3 Volt Dry Cell
"B" Battery - 3 45 Volt "B" Batteries
"C" Battery - 1 22½ Volt Battery

TUBE		FIL.	PLATE	SCREEN	GRID NO.2	GRID NO 3 & 5
1C6	Oscillator & 1st Detector	2.1	135		115	
30	Second Detector	2.1				
34	I. F.	2.1	135	67½		
32	1st Audio	2.1	37.5##	20##		
30	Driver	2.1	135			67½
19	Output	2.1	135 each plate			

Total "B" Drain - .023 Amperes
Total "A" Drain - .620 Amperes

Comparative voltage only
Read all voltages from socket to chassis

When making tube voltage checks use batteries that deliver full voltage with the receiver turned on.

SERVICE NOTES
for the
BATTERY OPERATED
SEVEN TUBE SUPERHETERODYNE RECEIVER

ALIGNMENT PROCEDURE: For properly aligning either the intermediate transformer or the gang condenser it is necessary that an accurately calibrated oscillator be used with some type of output measuring device.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the oscillator output to the control grid of the 1C6 tube leaving the grid cap disconnected. Connect the ground side of the oscillator to the receiver chassis.

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

3. Align the first intermediate ansformer by turning one of the trimmer screws up and down until maximum reading is obtained on the output meter, and then adjust the other trimmer screw of the same transformer for maximum sensitivity.

4. Adjust the second intermediate transformer in the same manner.

NOTE: Two type intermediate transformer trimmers have been used in this receiver. One type has two parallel holes in the top of the shield, one for each trimmer. The other type has a brass hex nut for adjusting one trimmer, the other intermediate trimmer being adjusted with the trimmer screw located inside of the brass hex nut. Regardless of which type trimmer is used the procedure is the same.

TO ALIGN THE VARIABLE CONDENSER: It is important when aligning to follow the procedure carefully, otherwise the receiver will lack sensitivity and the dial calibration will be incorrect.

1. Connect the high output side of the oscillator to the receiver antenna lead and the ground to the chassis.

2. Place the band selector switch for operation on the short wave band, tune the receiver to exactly 15 megacycles on the dial and set the test oscillator frequency to exactly 15 megacycles. THEN TUNE IN THE 15 MEGACYCLE SIGNAL BY ADJUSTING THE TRIMMER MOUNTED ON TOP OF THE OSCILLATOR SECTION OF THE GANG CONDENSER TO MAXIMUM OUTPUT.

Looking at the front of the receiver the oscillator section is the rear section of the gang condenser.

3. Set the band selector switch for operation on the broadcast band, adjust the test oscillator frequency to 1400 kilocycles and set the receiver dial to exactly 1400 kilocycles. NEXT, BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE TRIMMER LOCATED UNDERNEATH AND NEAR THE CENTER FRONT OF THE CHASSIS.

4. After making this adjustment tune the dial to 1720 kilocycles and set theoscillator frequency to 1720 kilocycles. If the 1720 kilocycle signal cannot be received reduce the 1400 kilocycle trimmer capacity until the 1720 kilocycle signal is brought in.

5. Next, set the receiver dial and test oscillator to exactly 1400 kilocycles, and adjust the trimmer located on the front section of the gang condenser for maximum sensitivity.

6. Leave the band selector switch for operation on the broadcast band, tune the receiver and set the oscillator to approximately 600 kilocycles. Then adjust the 600 kilocycle padding condenser,which is located on and accessible through the small hole in the front of the chassis, for maximum sensitivity. As this adjustment is quite critical it is necessary to rock the condenser slightly to the right and left to find the point of greatest sensitivity.

7. Place the band selector switch for operation on the short wave band, adjust the test oscillator frequency to exactly 15 megacycles and set the receiver dial to 15 megacycles. Turn the receiver on its back with the dial up and adjust the trimmer, which is mounted on the top of the coil underneath and near the right hand side of the chassis, for maximum output. Be sure to rock the condenser slightly to the right and left when making this adjustment.

This completes the alignment procedure. It is recommended that all of the adjustments be gone over again Generally it will be found that improved results can be obtained if this is done.

PART NUMBER		LIST PRICE
1113	Antenna Coil	$1.63
1114	Oscillator Coil	1.63
1298	1st I. F. Transformer	2.05
9662	2nd I. F. Transformer	2.05
1331	Audio Transformer	1.40
1291	4 Mfd. Wet Electrolytic Condenser	.85
1115	Dual .1 Mfd. 200 Volt Condenser	.35
7860	.01 Mfd. 400 Volt Condenser	.17
9032	.2 Mfd. 200 Volt Condenser	.23
9459	.0005 Mfd. Mica Mould Condenser	.21
7934	.0001 Mfd. Mica Mould Condenser	.21
1374	.003 Mfd. Mica Mould Condenser	.21
1332	Wire Wound Resistor Strip	.35
7998	1 Meg Ohm 1/3 Watt Resistor	.19
6984	500,000 Ohm 1/3 Watt Resistor	.19
8906	250,000 Ohm 1/3 Watt Resistor	.19
6879	50,000 Ohm 1/3 Watt Resistor	.19

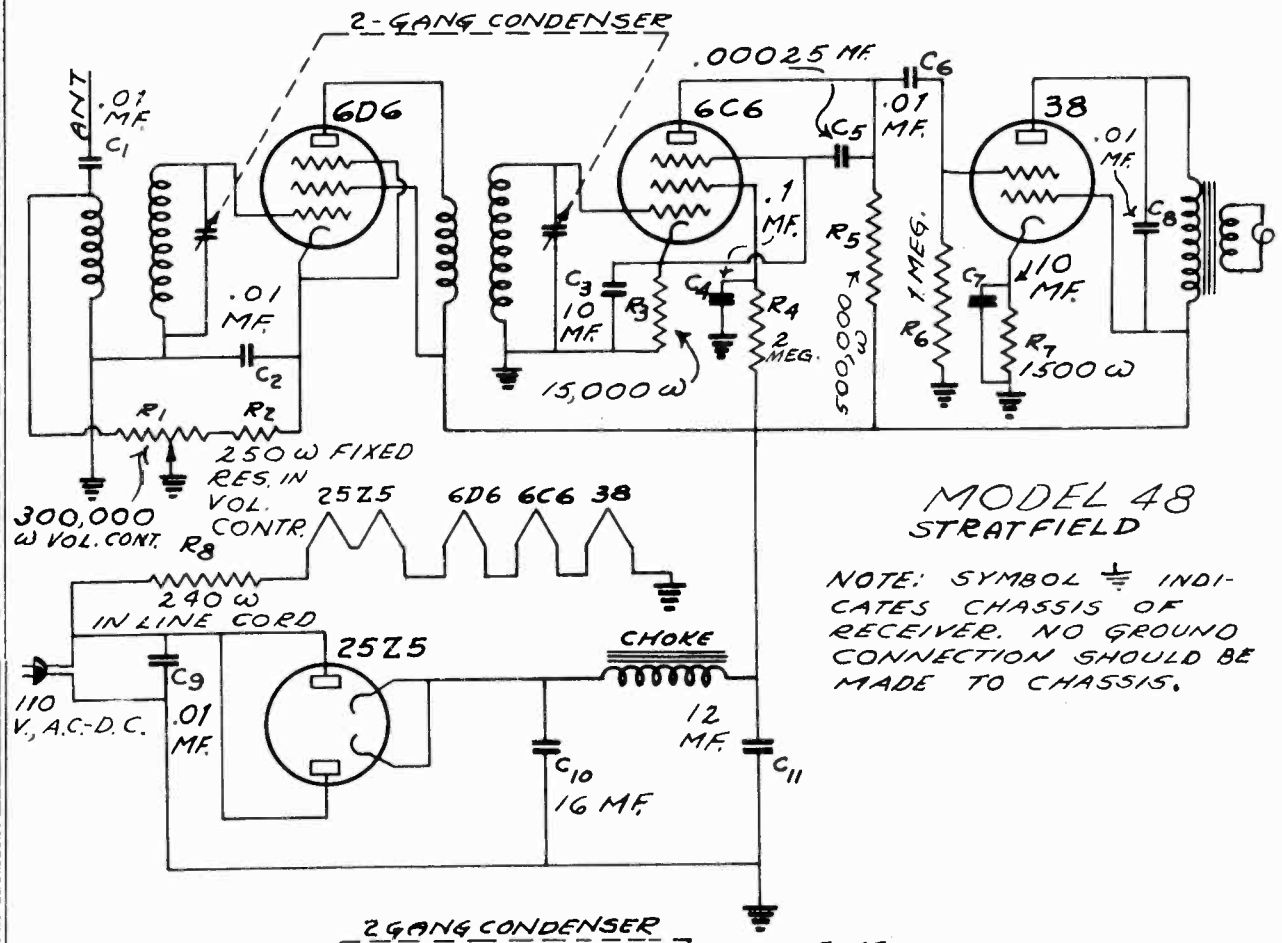
PART NUMBER		LIST PRICE
1333	18,000 Ohm 1/2 Watt Resistor	$ .19
9693	5,000 Ohm 1/3 Watt Resistor	.19
8907	25,000 Ohm 1/3 Watt Resistor	.19
1292	6 Conductor Battery Cable	.68
1289	Volume Control with D. P. S. T. Switch	1.24
1341	Tone Control Switch	.40
1370	One Color Tuning Dial	.30
1338	Two Color Tuning Dial	.35
1103	Two Gang Condenser	3.93
1361	Tube Shield	.15
9988	Tube Shield	.11
1053	Padding Condenser	.50
1054	Padding Condenser	.55
9799	Trimmer Condenser	.15
6-1	Voltage Regulator Tube	3.00
1179	Knob, Large	.15
1180	Knob, Small with Dot	.17
9758	Knob, Small	.14

Prices are subject to change without notice.

PART NO. 7700

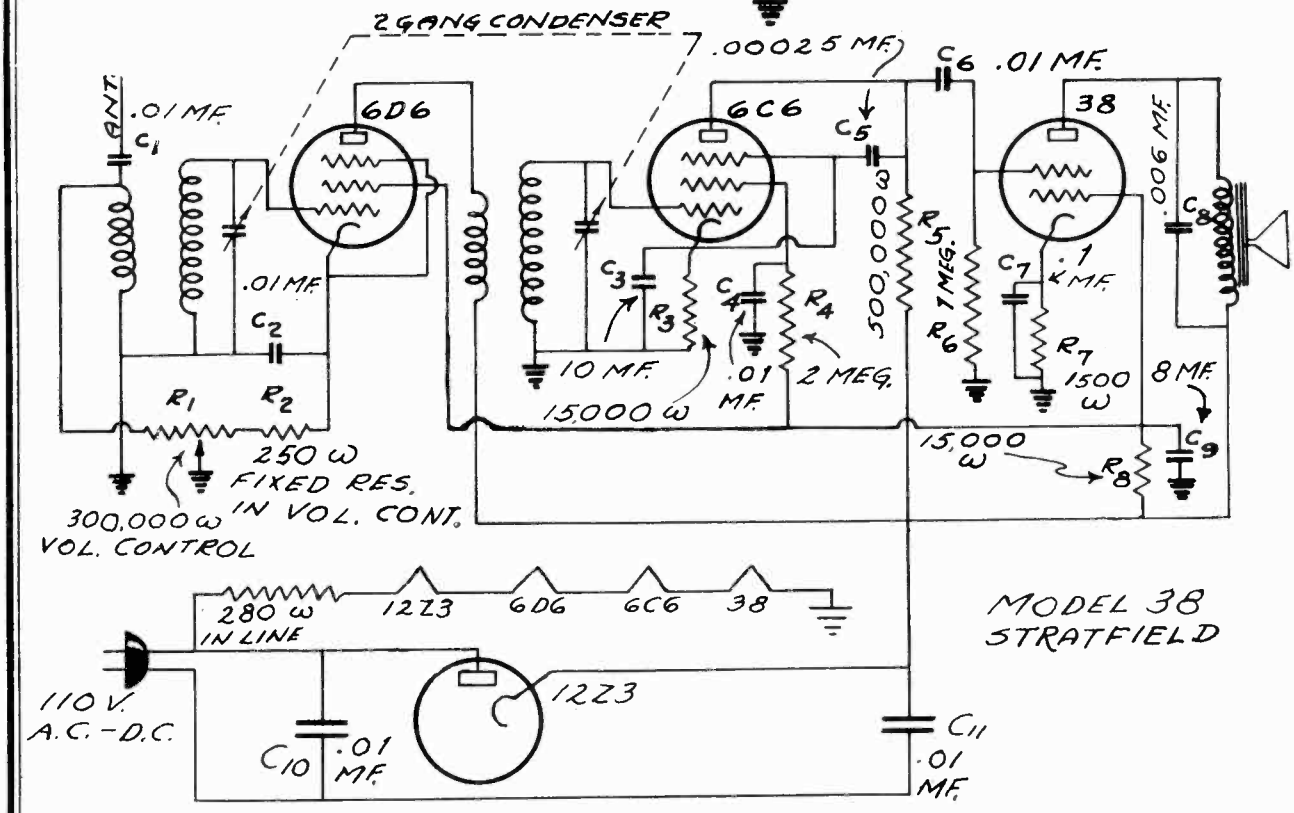
ELECTRIC SPEC. EXPORT CORP.

MODEL 38
Schematic
MODEL 48
Schematic



MODEL 48
STRATFIELD

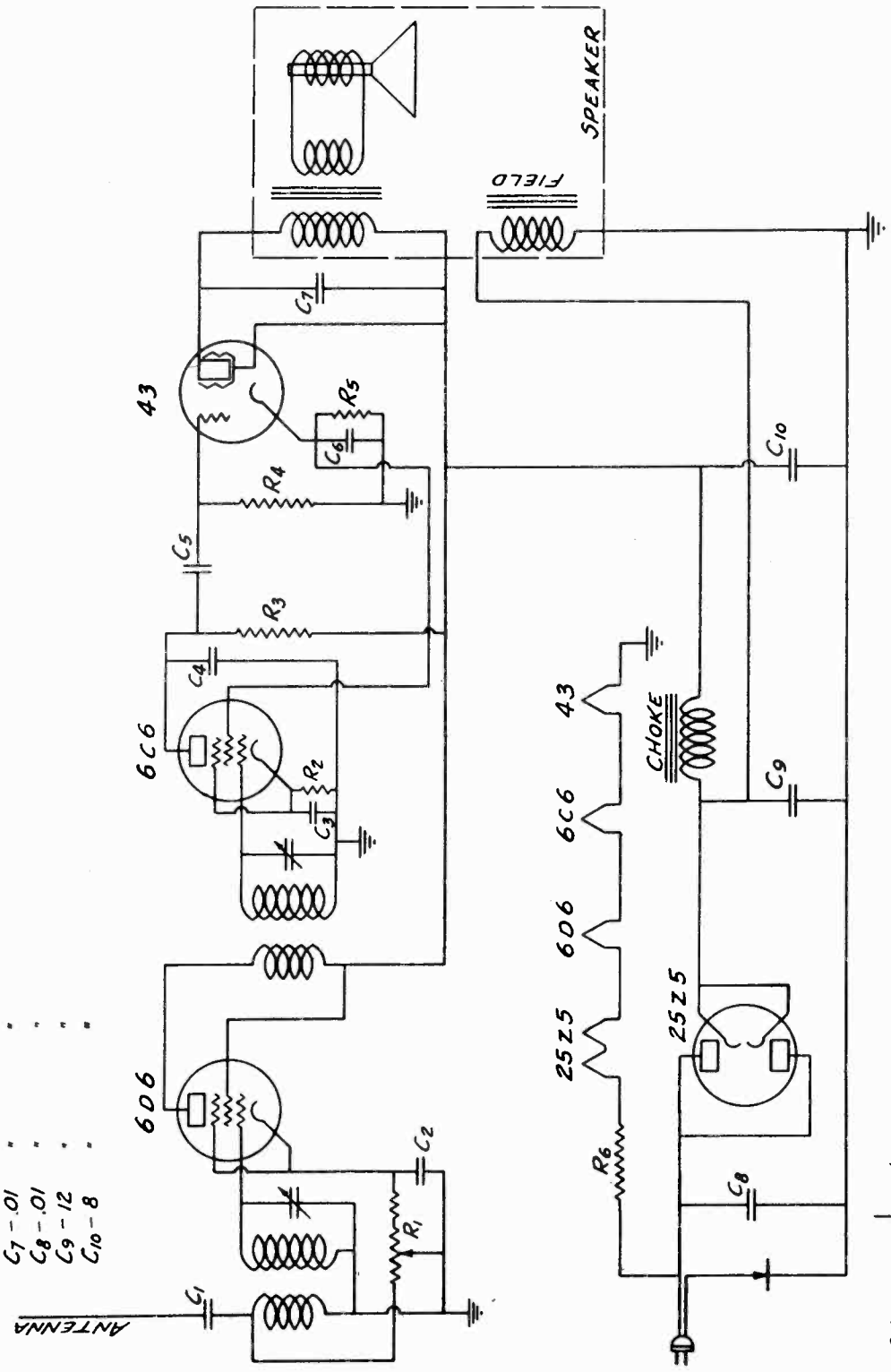
NOTE: SYMBOL ⏚ INDICATES CHASSIS OF RECEIVER. NO GROUND CONNECTION SHOULD BE MADE TO CHASSIS.



MODEL 38
STRATFIELD

MODEL 45
Schematic

ELECTRIC SPEC. EXPORT CORP.



C_1 - .01 MFD. CONDENSER
C_2 - .1 " "
C_3 - 10 " "
C_4 - .00015 MFD. "
C_5 - .01 MFD. " "
C_6 - 10 " "
C_7 - .01 " "
C_8 - .01 " "
C_9 - 12 " "
C_{10} - 8 " "

R_1 - 300 M OHM VOLUME CONTROL WITH 250 OHM FIXED BIAS RESISTOR
R_2 - 15 M OHM RESISTOR.
R_3 - 500 M " "
R_4 - 500 M " "
R_5 - 600 " "
R_6 - 150 " "

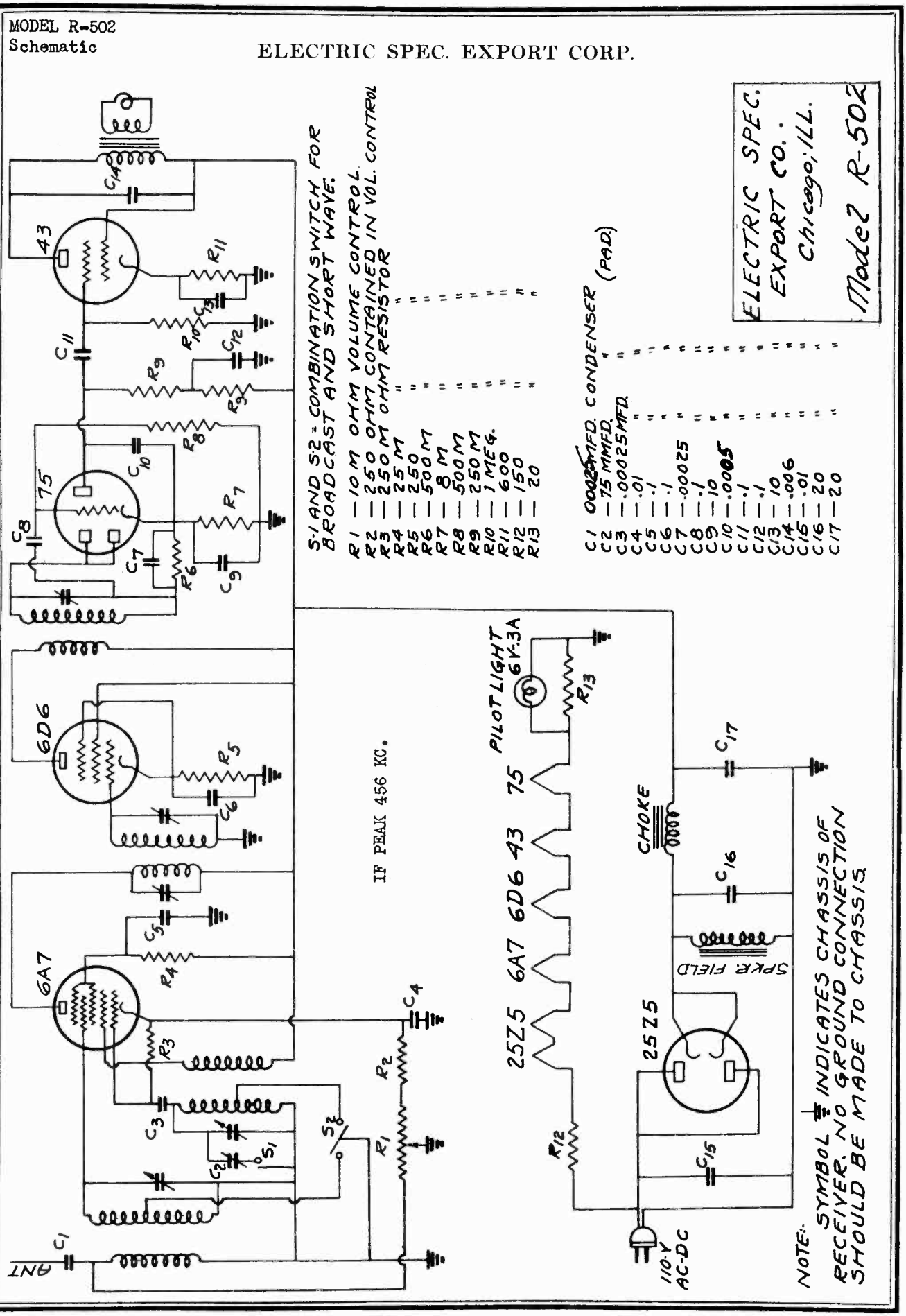
NOTE :- ⏚ SYMBOL INDICATES CHASSIS OF RECEIVER. NO GROUND CONNECTION SHOULD BE MADE TO CHASSIS.

MODEL 69
Schematic

ELECTRIC SPEC. EXPORT CORP.

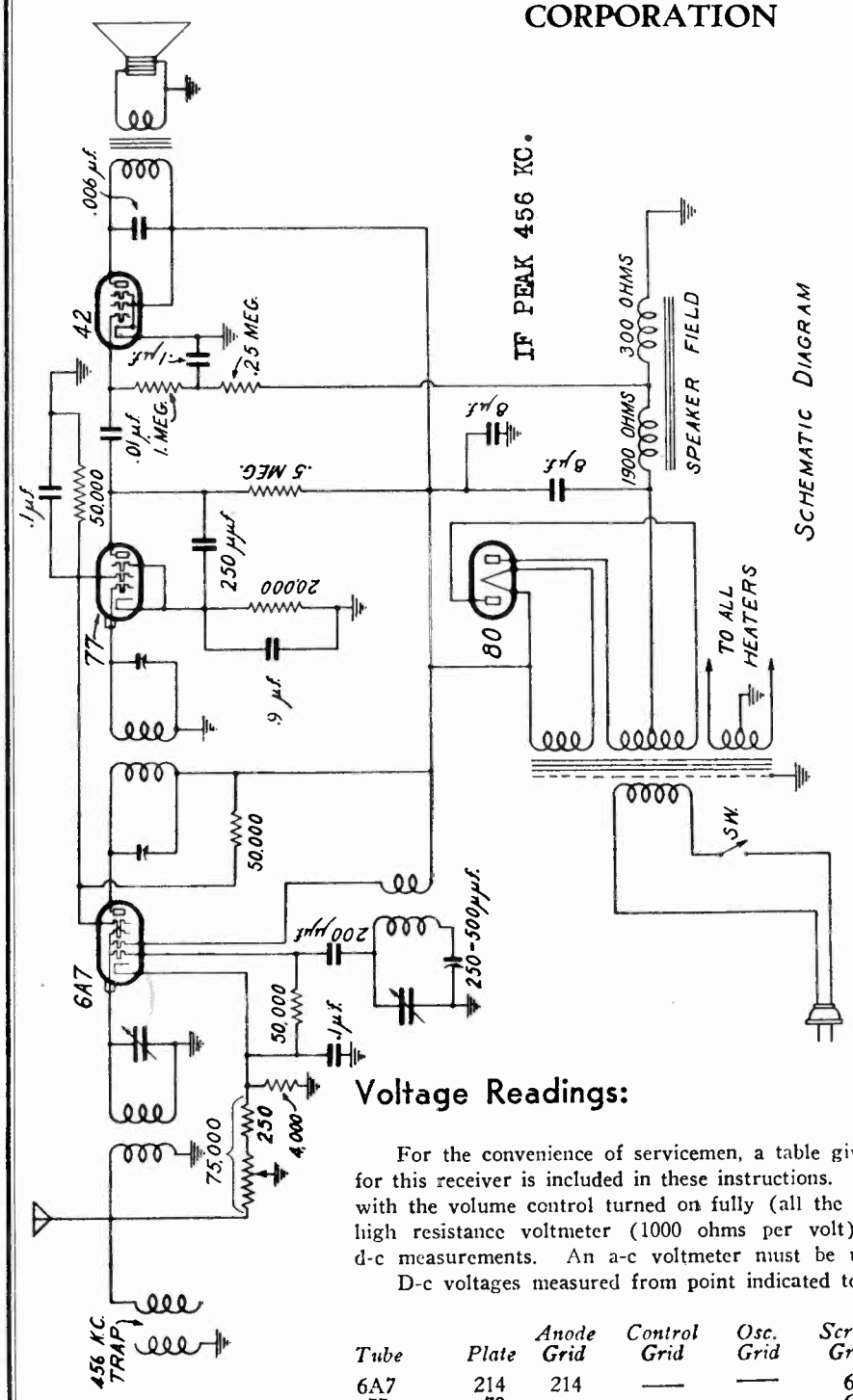
MODEL R-502
Schematic

ELECTRIC SPEC. EXPORT CORP.



MODEL 23 (4-B)
Schematic, Voltage
Parts List

EMERSON RADIO AND PHONOGRAPH CORPORATION



Model 23
Chassis Model 4B

Part No.	Description	List Price Effective as of Sept. 1st, 1934
BBT-111	Antenna Coil	$ .75 each
BBT-112	Oscillator Coil	.50 "
BBT-113	Intermediate Transformer	1.50 "
BBT-114	Power Transformer	2.70 "
BBR-112	Volume Control with Switch	.90 "
BBC-120	Two Gang Variable Condenser	2.20 "
UC-93	Electrolytic Filter Condenser—Dual 8 mfd.	1.80 "
BBC-121	Padding Condenser	.30 "
BBS-74	Dynamic Speaker	5.00 "

Any Resistor (give location or specify value—refer to wiring diagram)	.16
Any Mica Condenser (give location)	.16
BBC-131 .9 mfd. Roll Type Condenser	.35
Any Other Roll Type Condenser (give location)	.16

Voltage Readings:

For the convenience of servicemen, a table giving the voltage readings for this receiver is included in these instructions. Readings should be taken with the volume control turned on fully (all the way to the right) and a high resistance voltmeter (1000 ohms per volt) must be used for the d-c measurements. An a-c voltmeter must be used on the a-c circuits.

D-c voltages measured from point indicated to ground.

Tube	Plate	Anode Grid	Control Grid	Osc. Grid	Screen Grid.	Suppressors	Cathode
6A7	214	214	—	—	62	—	2
77	70	—	—	—	62	4	4
42	194	—	*—13	—	215	—	—
80	—	—	—	—	—	—	—

*Measured from ground to tap on speaker field winding.

Voltage across field—100 volts d-c.

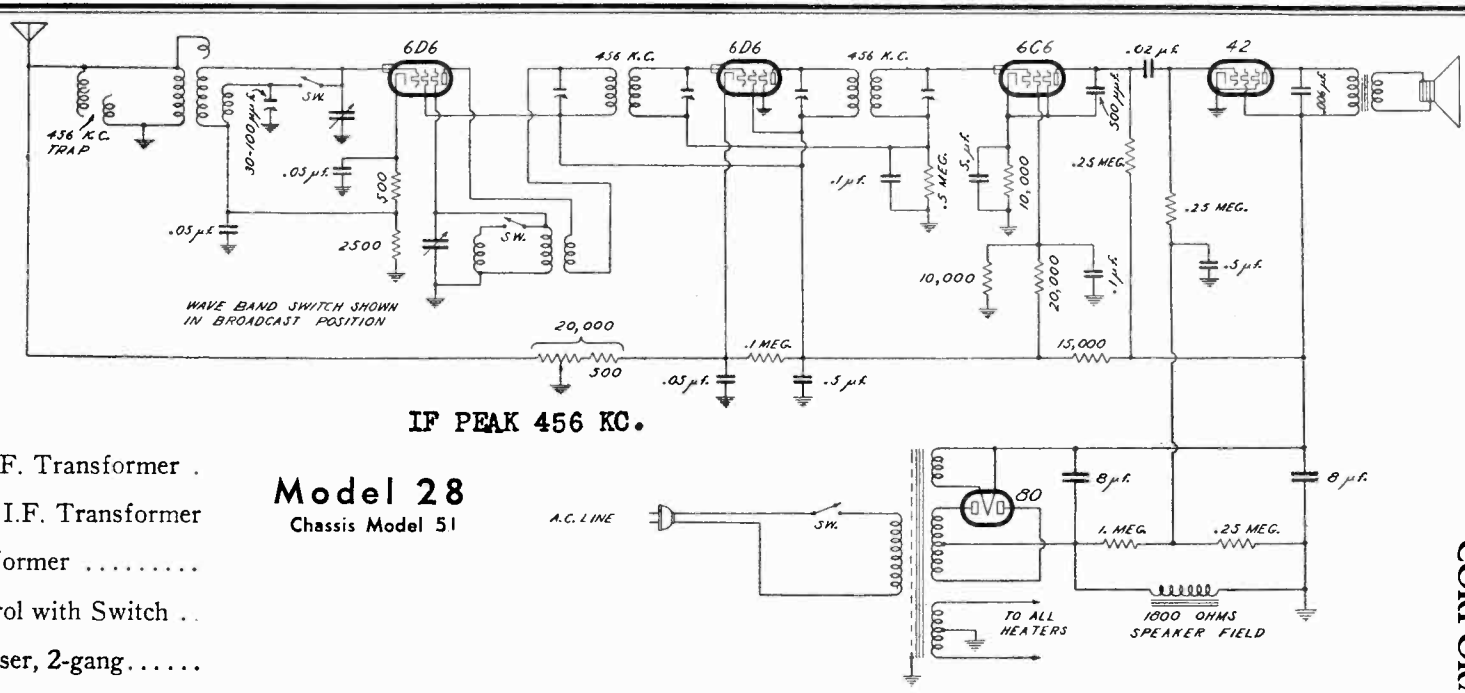
Voltage across 80 filament—5 volts a-c.

Voltage across all other filaments or heaters—6.2 volts a-c.

The above voltages, with slight variations, should be obtained with an a-c input line voltage of 117.5.

Broadcast
540—1500 Kilocycles
550— 200 Meters

Short Wave
1500—3000 Kilocycles
200— 100 Meters



Model 28
Chassis Model 51

Part No.	Description
ST-62	Antenna Coil
ST-63	Oscillator Coil
DDT-120	First Stage I.F. Transformer .
DDT-121	Second Stage I.F. Transformer
DDT-122	Power Transformer .....
DDR-121	Volume Control with Switch ..
UC-90	Variable Condenser, 2-gang.....
UC-93	8x8 Mfd. Electrolytic Condenser .
IC-43	5 Mfd. Electrolytic Condenser ...
EC-19	.5 Mfd. Roll-type Paper Condenser.
	Any other Condenser, (specify capacity or location in circuit)
UR-90	15,000-ohm 2-watt Resistor.....
	Any other Resistor, (give resistance or location in circuit)
	Any socket (specify tube no.).....
UD-10	Dial Assembly .....
KL-6	Pilot Lamp .....
DDS-78	Dynamic Speaker .....
US-56	Short-wave to Broadcast change-over Switch
SC-81	Adjustable Trimmer Condenser .....

Voltage Readings:

For the convenience of servicemen, the following voltage readings will serve as a guide in trouble shooting.

Readings are to be taken with all the tubes in their places, volume control turned on full and antenna wire grounded to chassis.

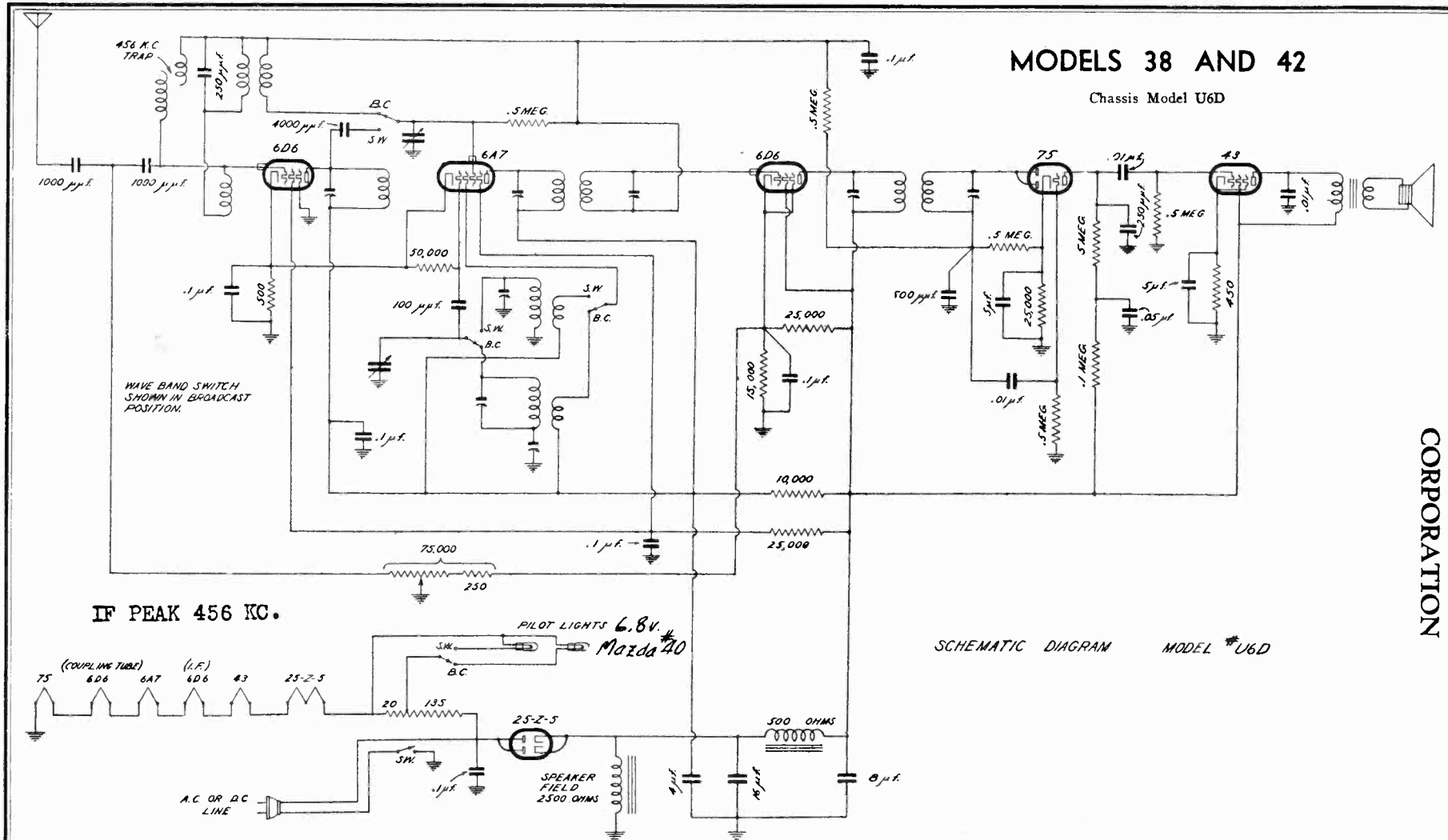
The D.C. Voltmeter used should be 1000 ohms per volt, or over. Line volts 117 A.C.

	Fil.	Ground to Plate	Ground to Screen	Ground to Cathode	Ground to Suppressor
6D6 Osc. 1st Det.	6.3 A.C.	80 D.C.	80 D.C.	12 D.C.	.....
6D6 I.F. Amplifier	6.3 A.C.	80 D.C.	80 D.C.	3 D.C.	.....
6C6 2nd Det.....	6.3 A.C.	150 D.C.	30 D.C.	1.7 D.C.	1.7 D.C.
42 Output	6.3 A.C.	245 D.C.	255 D.C.	.....	.....
80 Rectifier	5.0				

Voltage across speaker field, 90.

MODELS 38 AND 42

Chassis Model U6D



SCHEMATIC DIAGRAM MODEL #U6D

Voltages listed below are from the point indicated to ground.

	Plate	Screen	Suppressor	Cathode
6D6 R.f.	70	50	0	3
6A7 Oscillator-Modulator	70	50	—	3
6D6 I.f.	100	100	3.5	3.5
75 A.f.	60	—	—	1
43 Output	100	100	—	12.5

Voltage across field 125 volts.

Line voltage—117.5 volts a.c.

EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 38, 42 (U-6-D) Schematic, Voltage

MODEL 38,42 (U-6-D)
Parts List, Alignment

EMERSON RADIO AND PHONOGRAPH CORPORATION

Alignment procedure:

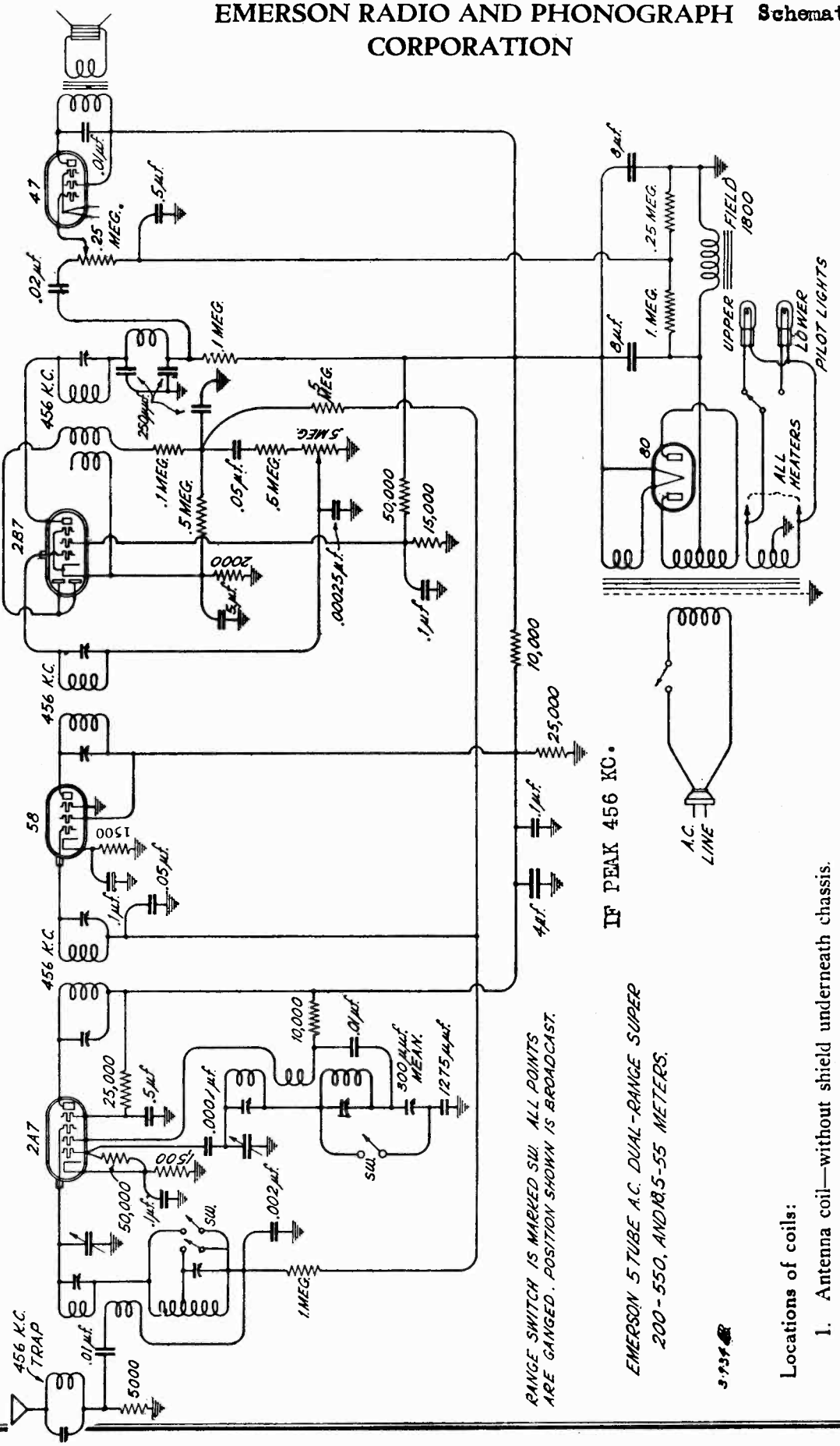
1. Short circuit oscillator stator of the variable condenser to ground.
2. Introduce the 456 kc signal on the grid of the 6D6 i-f tube.
3. Adjust the single tuned i-f transformer for maximum response on the output meter.
4. Remove the 456 kc signal from the 6D6 grid and put it on the 6A7 grid.
5. Adjust both trimmers on first i-f transformer for maximum response.
6. Remove 456 kc signal from 6A7 grid.
7. Remove the short circuit from the stator of the oscillator section of the gang condenser.
8. Set the range changing switch to the broadcast band.
9. Make sure that the needle on the dial reaches its extreme position at both ends of the broadcast band when the gang condenser is at maximum and minimum. If the needle does not do this, loosen the set-screw on the hub of the dial and rotate the gang condenser to maximum capacity. Then rotate the needle of the dial (by means of the selector knob) to its extreme position at the 550 kc end of the broadcast band. Tighten the set-screw securely and proceed to realign the set.
10. Set the needle on the dial to 1600 kc.
11. Introduce a 1600 kc signal into the antenna.
12. Adjust oscillator trimmer (the one farthest from the chassis on the oscillator coil) for maximum response.
13. Introduce a 600 kc signal into the antenna. Rock the gang condenser back and forth around the 600 kc dial reading and at the same time adjust the series padding condenser for maximum output. Leave the series padder set to the point of maximum sensitivity. The series padder is on the front of the chassis.
14. Check alignment on 1600 kc.
15. Now throw the range switch to short-wave position and introduce a 15 megacycle (mc) signal into the antenna.
16. Set the dial needle to 15 mc.
17. Adjust oscillator trimmer for maximum output. The short-wave oscillator trimmer is the one nearest the oscillator coil.
18. Connect the antenna to the set and adjust the interstage coil for maximum noise at 15 mc. The interstage coil is the one with only one trimmer on it. Before starting the adjustment turn the trimmer out so as to have minimum capacity and gradually increase it. A peak will be noticed and then as the capacity is increased the noise diminishes and disappears. When the capacity is increased further, the noise may increase again. The peak with the trimmer having less capacity than it has when the noise disappears is the proper peak.

Part No.	*Description*
CCT-115	Composite broadcast short-wave antenna coil
CCT-116	Short-wave r-f interstage tuning choke
CCT-117	Composite broadcast—short wave oscillator coil
CCT-118	Double-tuned 456 kc first i-f transformer
CCT-119	Double-tuned 456 kc second i-f transformer
KT-40	Iron-core filter choke
CCR-117	Volume control with switch
CCC-125	4-8-16 mf, 150 volt d.c., electrolytic filter cond
HC-32	Dual 5 mf electrolytic condenser, 25 volts d-c
CCC-126	.004 mfd. mica condenser
CCC-124	Two-gang variable condenser
BBC-121	250-500 mmf padding condenser
CCR-116	Special ballast resistor
CCR-118	450 ohm 1 watt wire-wound resistor
CCD-15	Dial assembly
KL-6	Pilot lamp, Mazda No. 40
CCS-76	Range—change switch
CCS-75	5" dynamic speaker

MODEL 39,59 (D-S5)

EMERSON RADIO AND PHONOGRAPH CORPORATION

Schematic



Locations of coils:

1. Antenna coil—without shield underneath chassis.
2. Oscillator coil—in round can fastened to front of chassis, underneath.
3. Last i.f. coil—fastened to back of chassis, in small can, underneath.
4. First i.f. coil—on top of chassis with grid lead feeding into 58 tube.
5. Second i.f. coil—on top of chassis with grid lead feeding into 2B7.

MODEL 39,59 (D-S5)
Voltage
Alignment

EMERSON RADIO AND PHONOGRAPH CORPORATION

Line voltage 115 volts, A.C.—60 Cycles

	Plate to ground	*Screen to ground*	*Cathode to ground*
2A7 Oscillator	70	50	6
2A7 Modulator	90	...	...
58	90	90	5.5
47	227	235	...
2B7	115	53	3

ADJUSTMENTS

This instrument was carefully aligned and adjusted at the factory. ***No one but an experienced serviceman should make an attempt at re-aligning the receiver.*** If it becomes necessary, the following procedure should be accurately executed: :

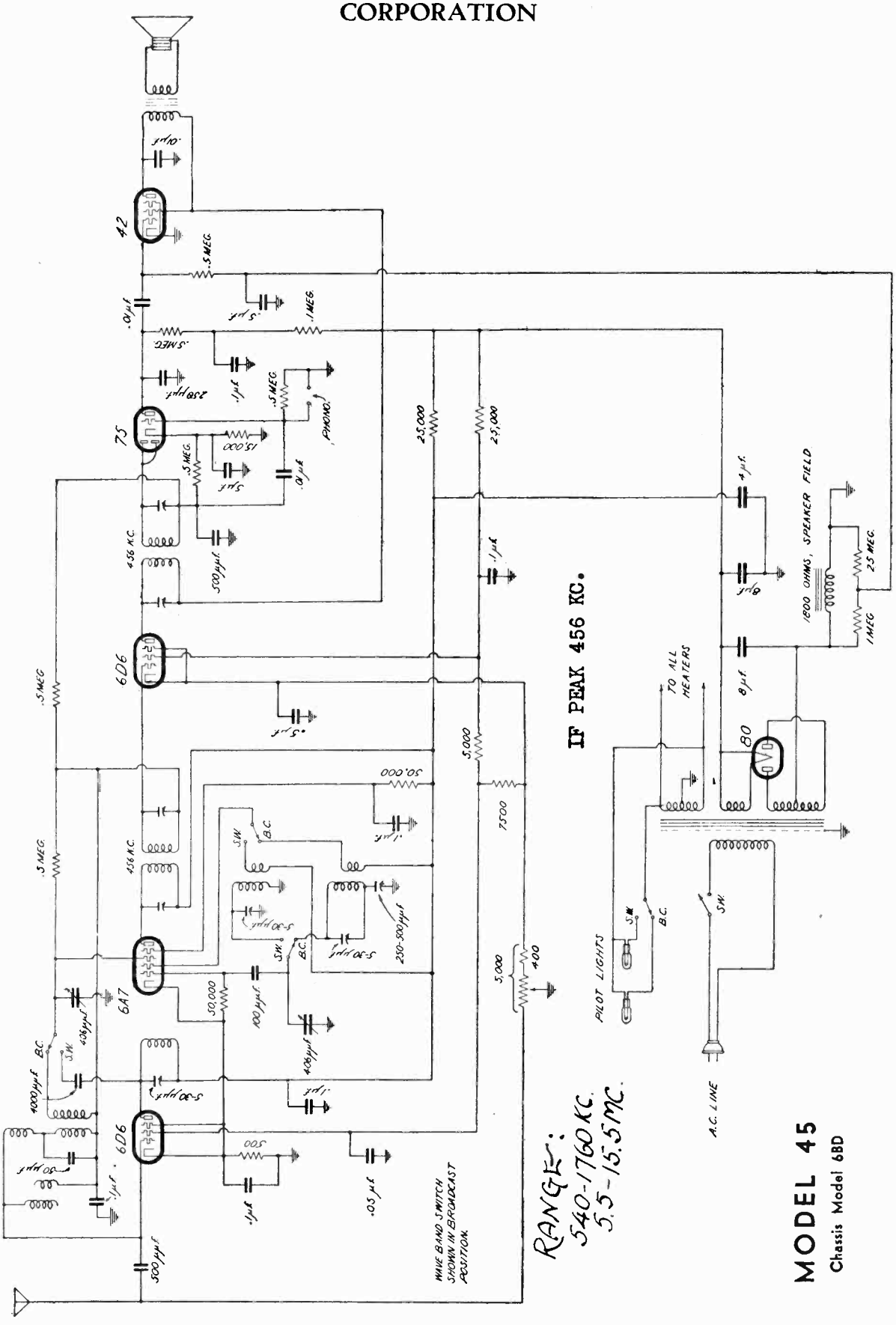
A good accurate oscillator should be used with frequencies of 456 k.c., 600 k.c., 1425 k.c., and 15,000 k.c. In addition, an output meter across the voice coil should be used for the precise results necessary.

Alignment procedure:

1. Short circuit oscillator stator of variable condenser to ground.
2. Introduce 456 k.c. on the grid of the 58 tube.
3. Adjust the trimmer on the single tuned i.f. coil for maximum response on the output meter.
4. Adjust the two trimmers on the double tuned i.f. coil following the 58 tube.
5. Remove the oscillator signal from the 58 grid and introduce it on the grid of the 2A7 tube.
6. Adjust the two trimmers on the first i.f. coil.
7. Re-align all i.f. trimmers for maximum response on the output meter.
8. Remove the 456 k.c. signal from the 2A7 grid. It will not be used again.
9. Remove the short circuit from the stator of the oscillator section of the condenser.
10. Rotate the range changing switch to the left for the short-wave range.
11. Make sure that the needle on the dial reaches its extreme position at both ends of the broadcast scale when the condenser is at maximum and minimum. If this condition is not obtained, loosen the set-screw on the hub of the dial and rotate the condenser plates to maximum capacity. Then rotate the needle of the dial (by means of the selector knob) to its extreme position at the 550 k.c. end of the broadcast scale. Tighten the set-screw securely once again and re-alignment may proceed.
12. Set the pointer of the dial to a little above the higher wave length edge of the 19-meter, brown segment, on the dial.
13. Introduce a strong 15,000 k.c. signal into the antenna.
14. Adjust the short-wave oscillator trimmer, (the trimmer nearest the chassis on the oscillator coil), until the signal comes to maximum. Attenuate the signal.
15. Adjust the short-wave antenna trimmer (the one on the free end of the antenna coil) until the signal again comes to maximum. When these conditions are fulfilled the receiver is aligned on the short-wave range. Remove the 15,000 k.c. signal from the antenna.
16. Rotate the range switch to the right (broadcast position) and set the pointer of the dial to 1425.
17. Introduce the 1425 k.c. signal into the antenna. Adjust the oscillator trimmer (the trimmer on the oscillator coil, furthest from the edge of the chassis) for maximum response. Attenuate this signal.
18. Adjust the broadcast antenna trimmer for maximum response (the trimmer on the end of the antenna coil closest to the chassis). Remove the 1425 k.c. signal from the antenna.
19. Introduce 600 k.c. into the antenna. Rock the gang condenser back and forth around the 600 k.c. dial reading, and at the same time, adjust the series padding condenser for maximum output. Leave the series padder set to the point of maximum sensitivity. (Series padder is on side of oscillator coil can). Broadcast alignment is now complete.

MODEL 45 (6-BD)
Schematic

EMERSON RADIO AND PHONOGRAPH CORPORATION



MODEL 45 (6BD)
Alignment
Voltage

EMERSON RADIO AND PHONOGRAPH CORPORATION

1. Short circuit oscillator stator of the variable condenser to ground.
2. Introduce the 456 kc signal on the grid of the 6D6 I-f tube.
3. Adjust both trimmers of the second stage I-f transformer for maximum response on the output meter.
4. Remove the 456 kc signal from the 6D6 grid and put it on the 6A7 grid.
5. Adjust both trimmers on first I-f transformer for maximum response.
6. Remove 456 kc signal from 6A7 grid.
7. Remove the short circuit from the stator of the oscillator section of the gang condenser.
8. Set the range changing switch to the broadcast band.
9. Make sure that the needle on the dial reaches its extreme position at both ends of the broadcast band when the gang condenser is at maximum and minimum. If the needle does not do this, loosen the set-screw on the hub of the dial and rotate the gang condenser to maximum capacity. Then rotate the needle of the dial (by means of the selector knob) to its extreme position at the 550 kc end of the broadcast band. Tighten the set-screw securely and proceed to re-align the set.
10. Introduce a 1600 kc signal into the antenna.
11. Rock the gang condenser back and forth around the unmarked cardinal division at the bottom of the high frequency end of the dial and at the same time adjust oscillator trimmer (the one farthest from the chassis on the oscillator coil) for maximum response.
12. Introduce a 600 kc signal into the antenna. Rock the gang condenser back and forth around the 600 kc dial reading and at the same time adjust the series padding condenser for maximum output. Leave the series padder set to the point of maximum sensitivity. The series padder is on the front of the chassis.
13. Check alignment on 1600 kc.
14. Now throw the range switch to short-wave position and introduce a 15 megacycle (mc) signal into the antenna.
15. Set the dial needle to 15 mc.
16. Adjust oscillator trimmer for maximum output. The short-wave oscillator trimmer is the one nearest the chassis on the oscillator coil.
17. Connect the antenna to the set and adjust the interstage coil for maximum noise at 15 mc. The interstage coil is the one with only one trimmer on it. Before starting the adjustment turn the trimmer out so as to have minimum capacity and gradually increase it. A peak will be noticed and then as the capacity is increased the noise diminishes and disappears. When the capacity is increased further, the noise may increase again. The peak with the trimmer having less capacity than it has when the noise disappears is the proper peak.

Voltage Analysis:

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

Voltages listed below are from the point indicated to ground. With volume control on full.

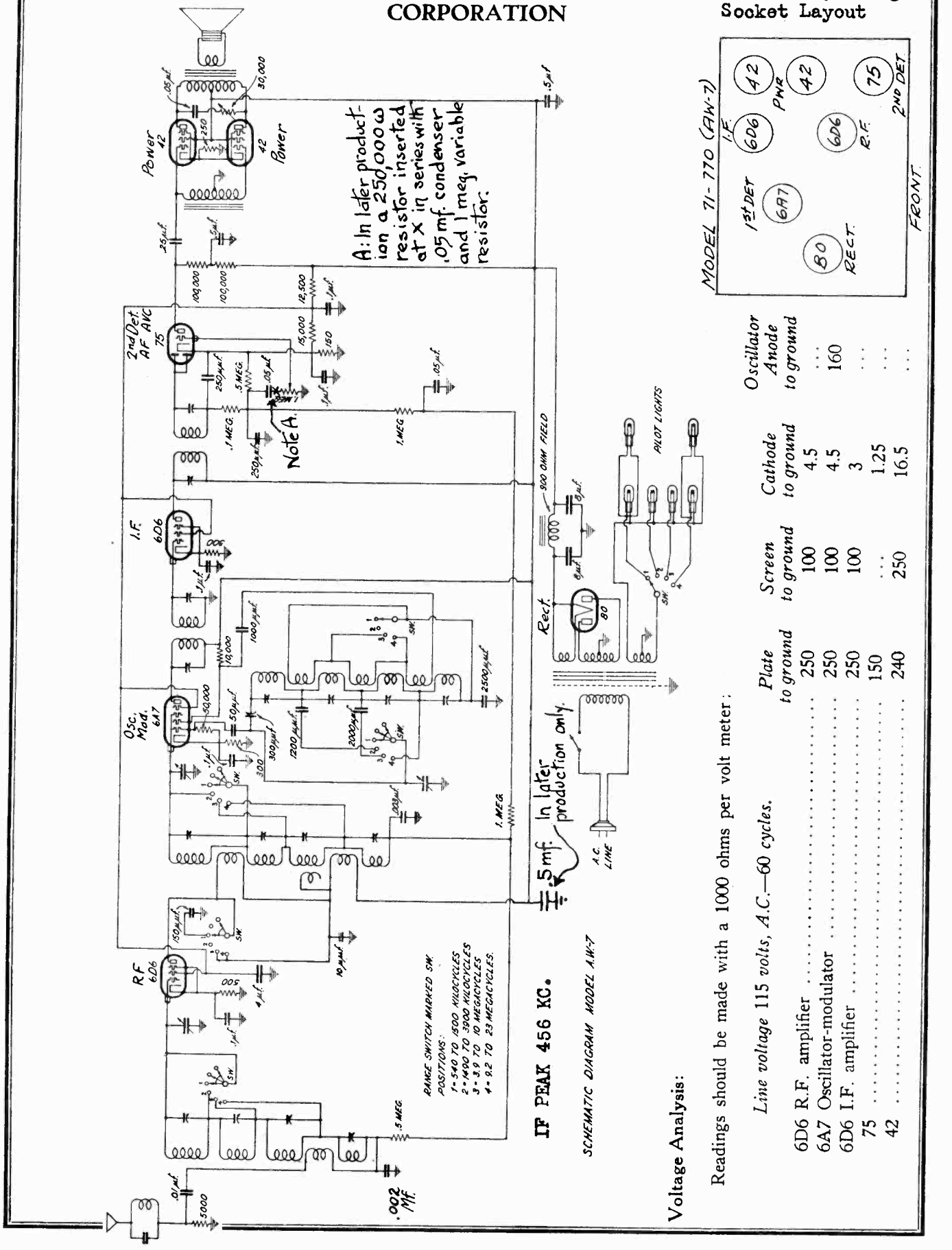
	Plate	*Screen*	*Suppressor*	*Cathode*
6D6 R-f.	100	45	3.0	3.0
6A7 Oscillator-Modulator	100	50	—	3.0
6D6 I-f.	250	80	4.0	4.0
75 A-f.	85	—	—	1.5
42 Output	230	250	—	0

The pilot lights used are Mazda No. 40, 6-8 volts and .15 ampere.

Voltage across field 100 volts. Line voltage—117.5 volts a.c.

EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 71,770 (AW-7)
Schematic, Voltage
Socket Layout



SCHEMATIC DIAGRAM MODEL AW-7

Voltage Analysis:

Readings should be made with a 1000 ohms per volt meter;

Line voltage 115 *volts, A.C.—60 cycles.*

	Plate to ground	*Screen to ground*	*Cathode to ground*	*Oscillator Anode to ground*
6D6 R.F. amplifier	250	100	4.5	...
6A7 Oscillator-modulator	250	100	4.5	160
6D6 I.F. amplifier	250	100	3	...
75	150	...	1.25	...
42	240	250	16.5	...

MODEL 415, 416
Revised
Voltage, Schematic

EMERSON RADIO AND PHONOGRAPH CORPORATION

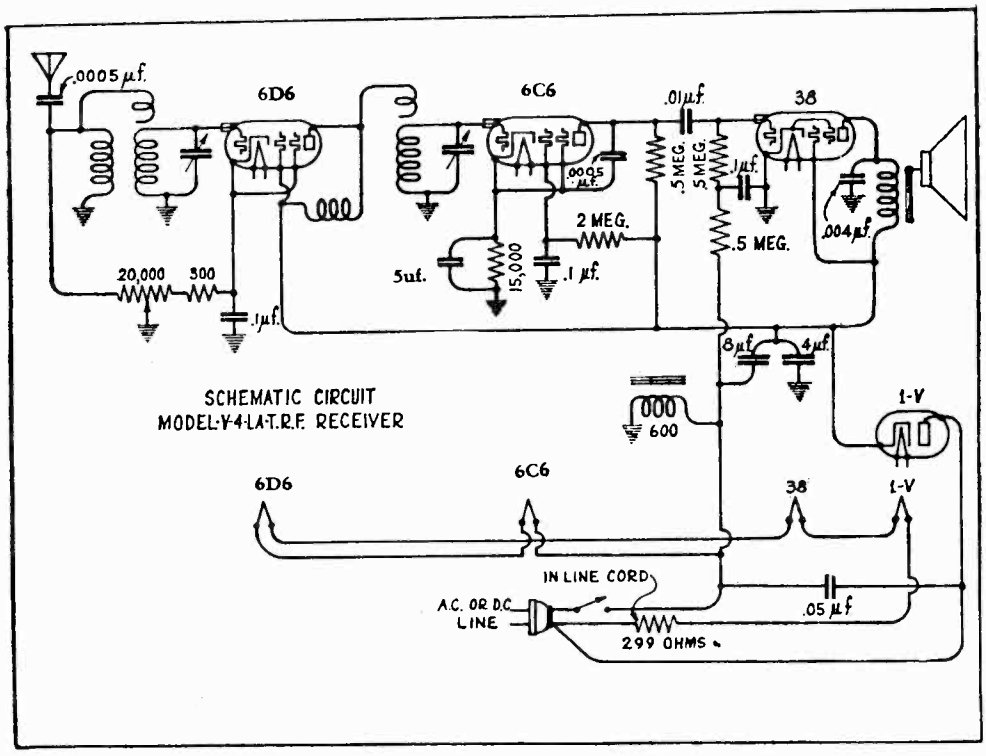
Voltage Readings:

Readings should be taken with Volume Control fully on, Tuning Control set for 550 KC, and antenna outside of set. Use a D. C. voltmeter having a resistance of 1000 ohms per volt.

Chassis	*To— Plate*	*Screen*	*Cathode*
6C6—Detector	10- 15	9- 12	1- 2
6D6—R.F. Amplifier	105-115	105-115	2- 3
38—Output Pentode	105-115	105-115	——

Voltage across filter choke is "C" bias for 38 Tube=10v.

Readings will not change materially regardless of type of power supply.



Notes:

Due to the compact construction of this Model, in order to keep the heat out of the cabinet, the filament dropping resistor has been placed in the cord, thus dissipating the heat along a greater area. The cord will, therefore, become warm under normal operating conditions, without impairing the performance and without damage to the set. Allowing the heat to be radiated by the cord instead of in the set, assures more efficient operation of the set. The total heat and current drain is about the same as a 30 watt electric bulb. To insure normal heating of the cord during operation, stretch out to its full length.

Do not attempt to shorten cord by cutting out a section, as this will ruin the cord.

The antenna can be replaced in its compartment by winding the wire in a small coil. Start the winding close to the set so that the loose end of the wire forms the last coil. If the coil is begun with the end away from the set the wire will twist and kink as it is wound.

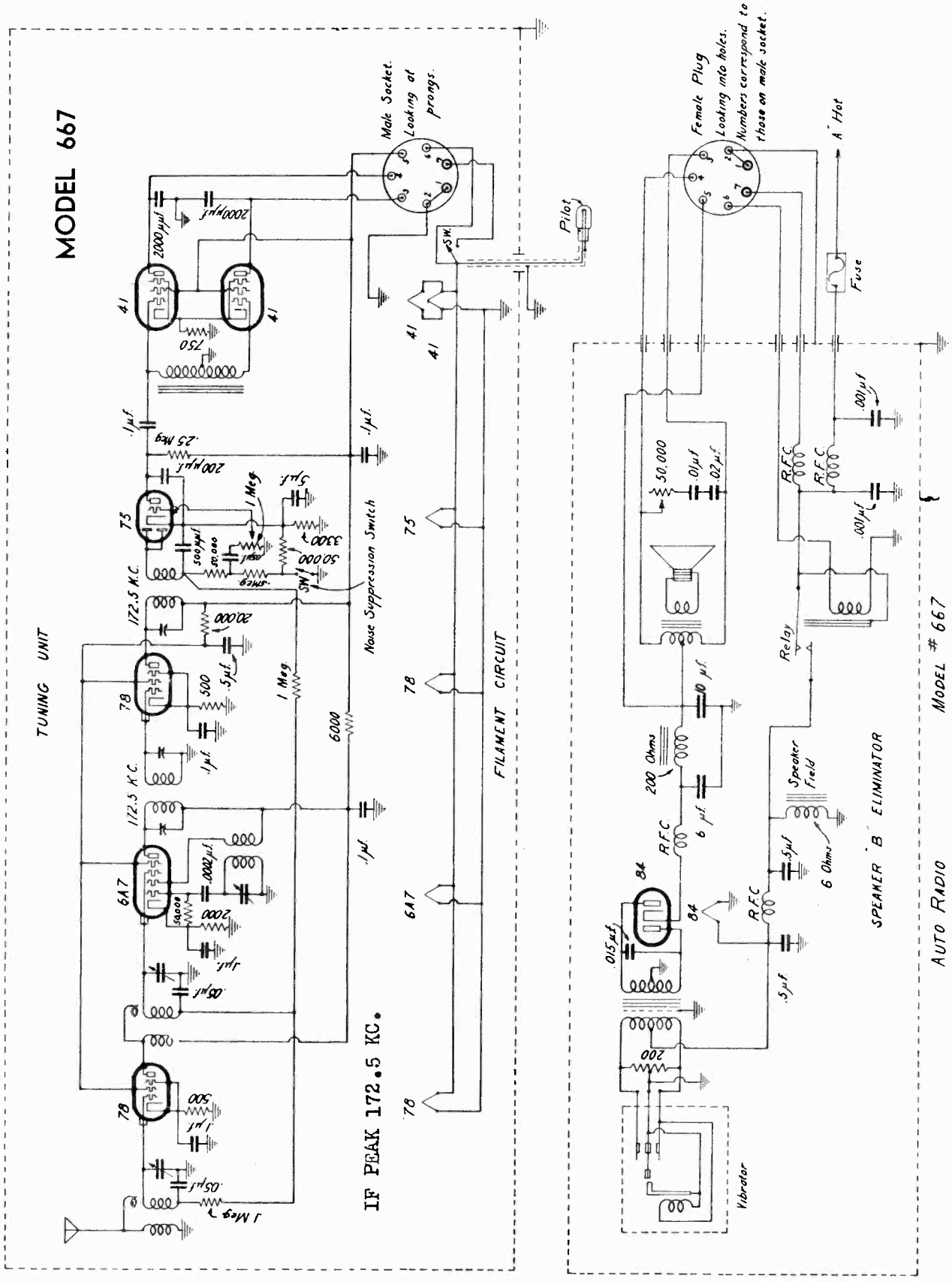
Tubes may be replaced by removing the back of the cabinet.

Instructions for Replacing Shielded Tubes:

1. Remove lead at top of tube.
2. Take firm hold of tube and shield and remove both (at the same time) from socket.
3. Slip off ring toward base of tube.
4. TO REPLACE SHIELD REVERSE ABOVE PROCEDURE.

MODEL 667
Schematic

EMERSON RADIO AND PHONOGRAPH CORPORATION



After unpacking the receiver and before starting to install it, a careful check of the parts furnished should be made.

The following is a list of the items:

1. The receiver proper, complete with six tubes in their places inside, and with front cover intact.
2. Receiver mounting bracket with plate, nut, and lockwasher.
3. Remote control head.
4. Two drive cables.
5. Speaker-eliminator complete with vibrator, tube, mounting bracket, battery cable and receiver connector cable with plug.
6. One distributor suppressor.
7. Six spark plug suppressors.
8. One generator condenser.
9. One ammeter condenser.
10. Four screws and four lock washers for securing bracket to receiver.
11. Two bolts, two nuts and two lockwashers for mounting speaker.

Make a general examination of the receiver. See that the tubes are pushed down in their sockets and that the grid caps are in place on the proper tubes. In order to do this it will be necessary to remove the cap nuts from the front cover plate and slide the receiver out of its housing by pulling out on the cover plate.

Mounting the receiver—while the receiver may be mounted in any available location, three recommended positions are listed below—

1. Mounted so that the control cables face right.
2. Mounted so that the control cables face front.
3. Mounted so that the control cables face left.

Positions 2 and 3 will be found best for most cars. It should be borne in mind that the controls will operate more smoothly if the cables are bent as little as possible. Select a position for the receiver that will allow the cables to fall in an easy sweep. There should be no sharp bends or kinks.

Hold the receiver up against the dash in the desired location with the cables in the direction chosen. Mark around it with a pencil, and in the center of the area bounded by the pencil lines drill a ½" hole through the dash.

Mount the bracket on the receiver using the four screws and lockwashers. Put a lockwasher under the head of each screw and insert the screws through the bracket holes and into the tapped holes in the case. Screw up tightly.

Now lift the receiver into place, pushing the bracket bolt through the hole in the dash. On the engine side of the dash put the mounting plate on the bolt, then the lockwasher and nut. After making certain that the receiver is straight, tighten the nut securely.

Mount the control head on the steering column and connect the cables to control head, following instructions given on the red tag.

To attach the control cables to the receiver insert the free end of the right hand cable into the upper chuck on the receiver. Push the cable in lightly while turning the right hand knob back and forth until the tongue on the drive cable engages with the slot in the condenser shaft. While holding the cable in place tighten the set screw in the chuck enough to prevent turning or withdrawal of the cable housing. If the set screws are too tight the cables will bind.

Proceed in the same manner to connect the other drive cable, inserting the key or key knob into the key hole at the left on the control head, and turning back and forth as before. On turning all the way to the left, the switch will snap to the "off" position.

Connect the pilot light leads to the control head, the black wire going to the insulated post.

Tie the control cables and pilot light lead to the steering column and the dash, using friction tape. Do this at as many points as is necessary to prevent swinging and vibration, always bearing in mind the fact that smooth operation of the controls depends on the manner in which the cables are run.

Now line up the dial pointer, following the instructions furnished on the red tag.

Install the speaker in any convenient location that the length of cable will allow. Drill two ⅜" holes and mount the bracket, using the ⅜" bolts.

Two cables extend from the speaker. On one of these cables is the female end of a detachable six prong plug, the male end of which is on the receiver. Connect the speaker to the receiver by means of this plug, observing that the two large pins on the male half of the plug engage with the two large holes in the female half of the plug. Do not try to force the plug together in any other manner.

A 10 ampere fuse is located in a small tubular holder in the battery lead. To replace the fuse, remove the cap, insert the fuse and replace the cap. The fuse is intended to protect the receiver, and in no case should one larger than 10 amperes be used.

The other cable terminates in a clip, designed for connection to the ammeter binding post. Before attaching this clip the remote control should be tested. See that the knob for the volume control and switch operates properly. When turned all the way to the left the switch should be heard to snap to the "off" position. On turning the knob to the right the switch first snaps on and then operates as the volume control.

The clip on the battery cable may now be attached. Squeeze the sides of the clip together so that the holes are in line, then push it over the battery post of the ammeter and release. If uncertain as to which post is on the battery side of the ammeter, connect the clip to either post and switch on the set by turning the left hand control knob to the right. The dial will immediately light up. Now notice the reading on the ammeter as the set is turned on and off. If when the set is on the ammeter shows discharge, turn off the set and move the clip to the other post.

At this point the antenna should be connected. Proceed as follows:

Assuming that the car is already equipped with a suitable antenna, see that the lead-in is shielded and kept away from the motor compartment and high tension ignition wires.

Check the antenna for a possible ground and if found satisfactory connect it to the inner wire extending through and beyond the shield of the antenna lead on the receiver. Be careful to make a good splice, soldering if possible. Make the splice close enough to both shields so that the portion of wire left unshielded will be short.

Cover the splice with several layers of friction tape and then connect both shields together, again soldering if possible. Ground the shield at one or more points to the dash or car body.

For installations in cars not equipped with built-in antennae, see the instructions given under "Antenna".

The installation of the receiver may now be considered complete, provided all the foregoing instructions were faithfully carried out. A preliminary test can now be made, after which the suppression of any motor noises that are present may be undertaken.

Intermediate Frequency.

To align the intermediate frequency transformers use a good modulated oscillator set for 172.5 k.c. Set the volume control for maximum volume and short circuit the rear section of the variable condenser.

Connect the oscillator output across the grid of the 6A7 tube and ground. Connect an output meter across the primary of the speaker transformer or across the voice coil. Using the smallest output from the test oscillator that will give a small reading on the meter, adjust the two i.f. transformers for the largest reading obtainable. Use a non-metallic screw driver if possible.

Radio frequency and oscillator stages.

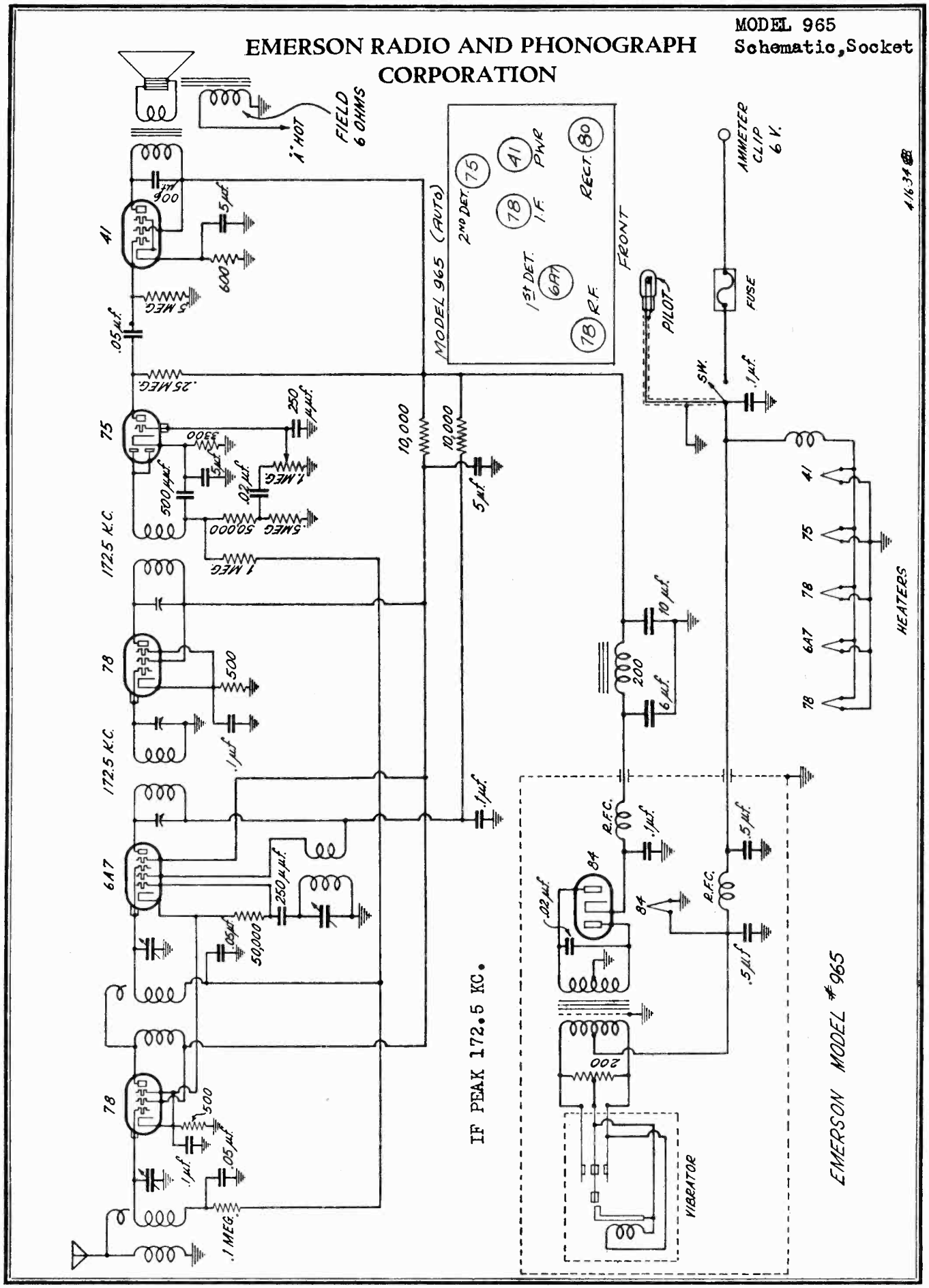
To align the r.f. and oscillator sections, remove the short from the variable condenser, and couple the oscillator through a standard dummy antenna to the antenna lead and ground of the receiver. Set the test oscillator to some frequency between 1350 and 1450 k.c. Set the dial to the frequency selected, following the pointer alignment instructions on the red tag. Adjust the trimmers on the variable condenser, beginning with the oscillator trimmer. Reduce the output of the test oscillator and repeat. In the absence of an oscillator, the r.f. sections may be aligned by tuning in a weak station between 1350 and 1450 k.c. and aligning as before. If an output meter is not available, adjust for maximum volume from the speaker.

Voltage analysis:

Note: All "B" and "C" voltages should be measured on a high resistance voltmeter of 1000 ohms per volt or over. Voltages are measured from the chassis (ground) to the point indicated. Ground the antenna to the shield when taking readings.

Voltage across battery—6 volts.
Voltage across speaker field—6 volts scant.
Voltage across all heaters—6 volts scant.

Tube	*Plate*	*Screen*	*Cathode*	*Suppressor*	*Osc. Plate*
78 R.f.	135	90	3.5	3.5	.....
6A7	135	90	12.5	.....	140
78 I.f.	180	90	3.	3.	.....
75	75	.....	1.	.....	.....
41	185	192	16.5	.....	.....
41	185	192	16.5	.....	.....



MODEL 965
Voltage, Alignment

EMERSON RADIO AND PHONOGRAPH CORPORATION

Tubes and their functions:

1—78 Radio frequency amplifier.

1—6A7 {Electron coupled oscillator. {First detector.

1—78 Intermediate frequency amplifier.

1—75 {Diode second detector. {Audio frequency amplifier. {Automatic volume control.

1—41 Output power tube.

1—84 Full-wave rectifier.

1—Non-synchronous vibrator inverter.

Voltage Analysis:

Note: All "B" and "C" voltages should be measured on a high resistance voltmeter of 1000 ohms per volt or over.

The voltages are measured to ground from the points named. Ground the antenna to its shield when taking readings.

Battery volts—6. Volts across heaters—6 scant. Volts across speaker field—6 scant.

Tube	*Plate*	*Screen*	*Cathode*	*Suppressor*	*Osc. plate*
78	110	110	6	6	—
6A7	170	110	6	—	170
75	110	—	1.3	—	—
78	110	110	3.5	3.5	—
41	210	220	15	—	—

If the set fails to operate look for some minor cause which might be one of the following:—

1. No "A" supply—"A" lead to set not making contact with ammeter post. Fuse blown.
2. Low "A" supply—The car battery needs recharging.
3. Tubes not in place in their sockets.
4. Grid caps not in place.
5. Defective tubes.
6. Antenna lead shorted to shield at splice, or otherwise grounded.

A 10-ampere fuse is located in a small tubular holder in the battery lead. To replace the fuse, unscrew the threaded cap, insert the fuse and replace the cap, screwing up firmly. The fuse is intended to protect the receiver and in no case should one larger than 10 amperes be used.

ADJUSTMENTS

Intermediate Transformers

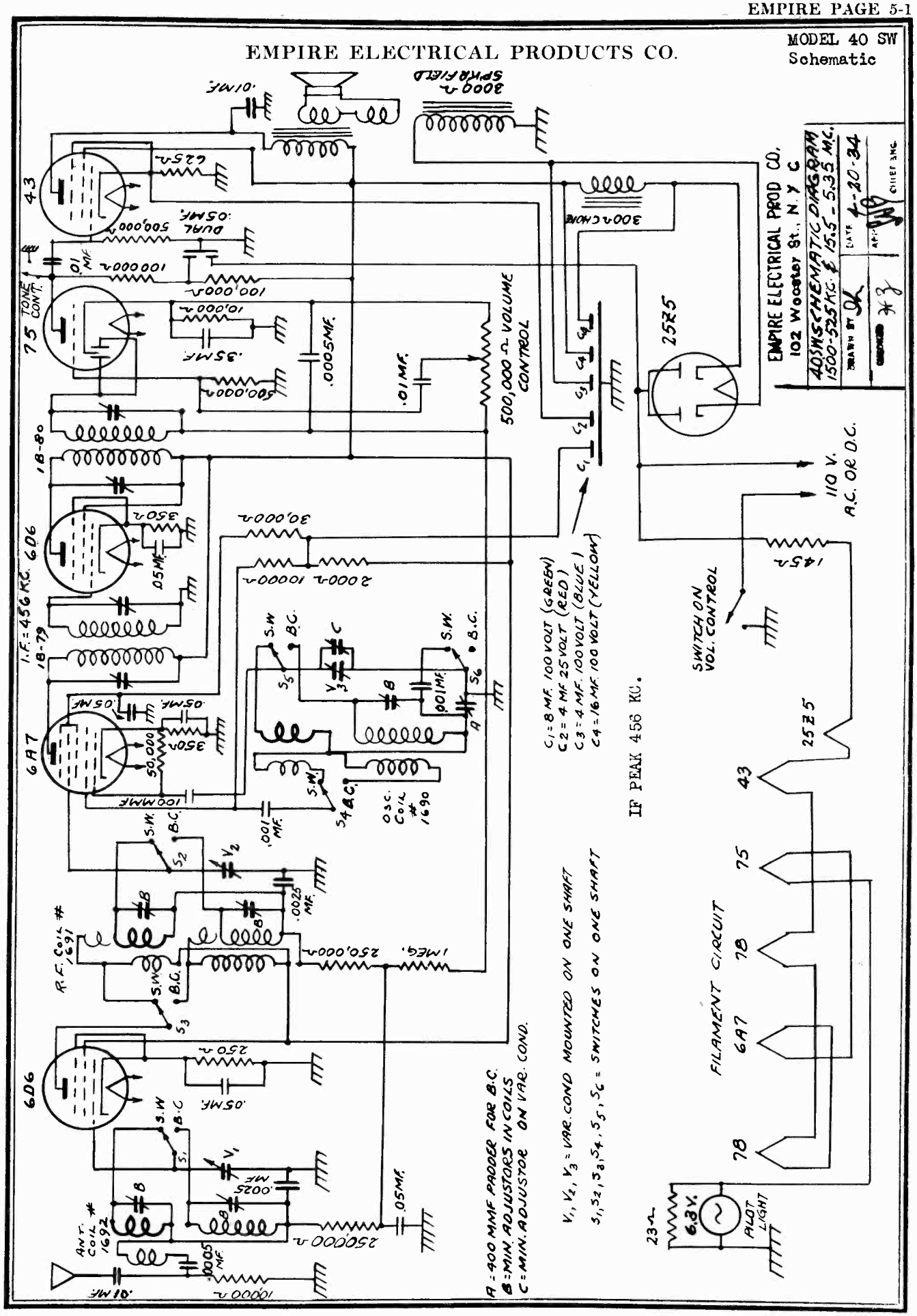
To align the intermediate frequency transformers, use a good modulated oscillator set for 172½ k.c. Set the volume control for maximum volume and turn the dial to a point where little or no signal is received; then ground the antenna.

Connect the oscillator output between the grid of the 6A7 tube and ground. Connect an output meter across the primary of the speaker transformer or across the voice coil. Using the smallest output from the test oscillator that will give a small reading on the meter, adjust the two I.F. transformers for the largest reading obtainable. Use a non-metallic screw driver if possible.

Radio Frequency and Oscillator

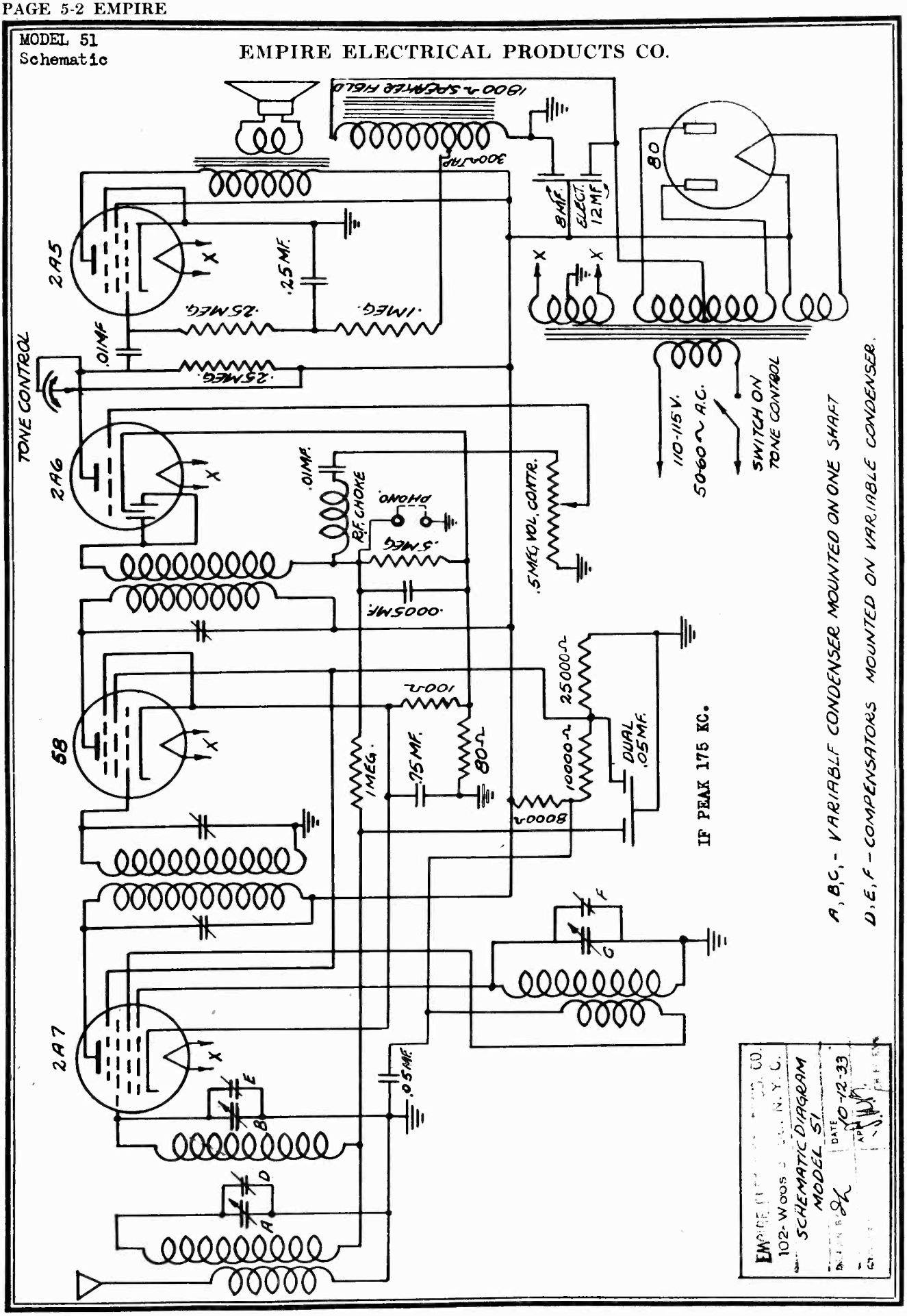
To align the R.F. and oscillator sections, couple the oscillator through a standard dummy antenna to the antenna lead and ground of the receiver. Set the test oscillator to some frequency between 1350-1450 k.c. Set the dial to the frequency selected. Adjust trimmers on the variable condenser beginning with the oscillator trimmer. Reduce the output of the test oscillator and repeat. In the absence of an oscillator, the R.F. sections may be aligned on broadcast.

Tune in a weak station between 1350 and 1450 k.c. and align as before. If an output meter is not available, adjust for maximum volume, then reduce the input and repeat.



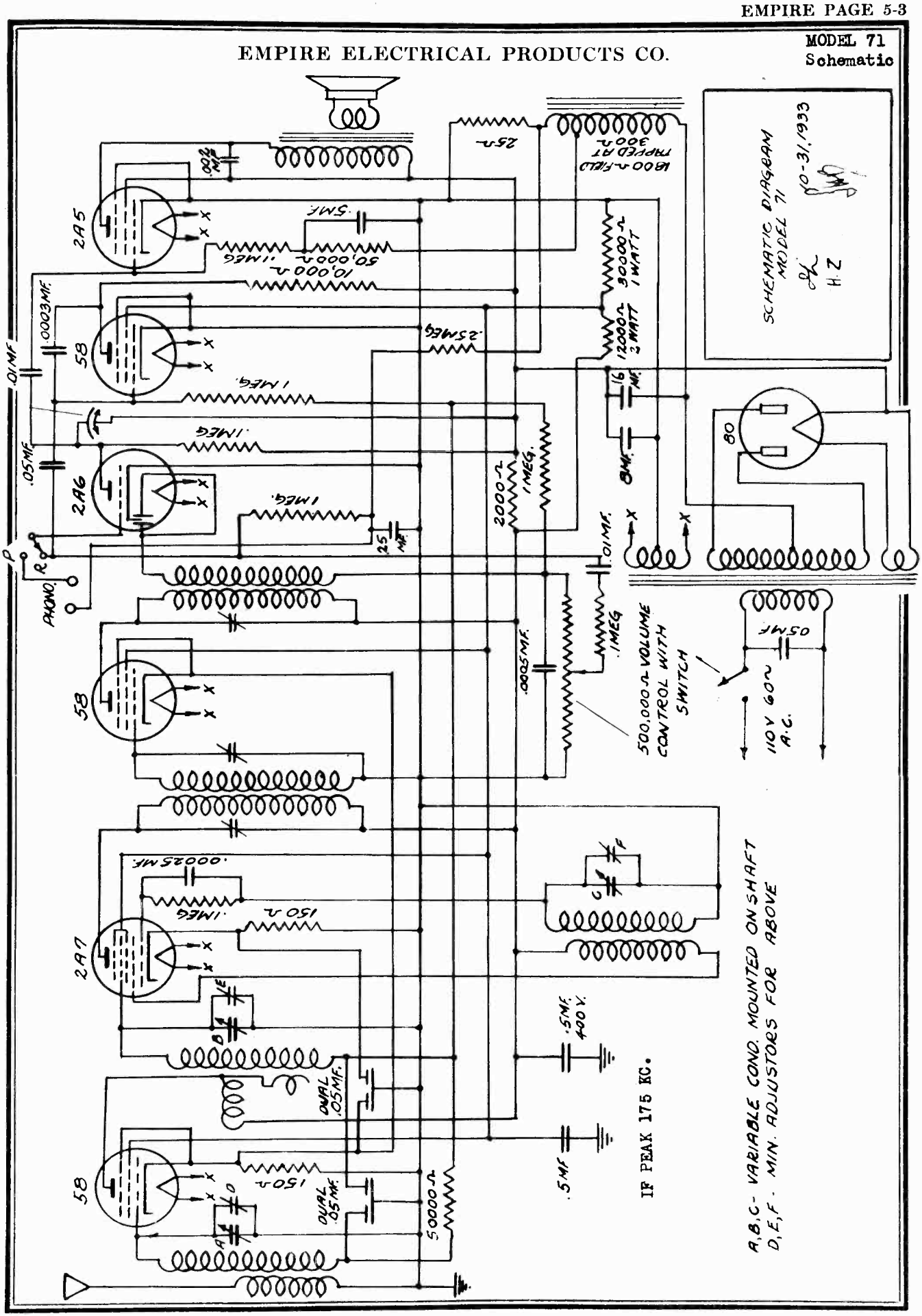
MODEL 51
Schematic

EMPIRE ELECTRICAL PRODUCTS CO.



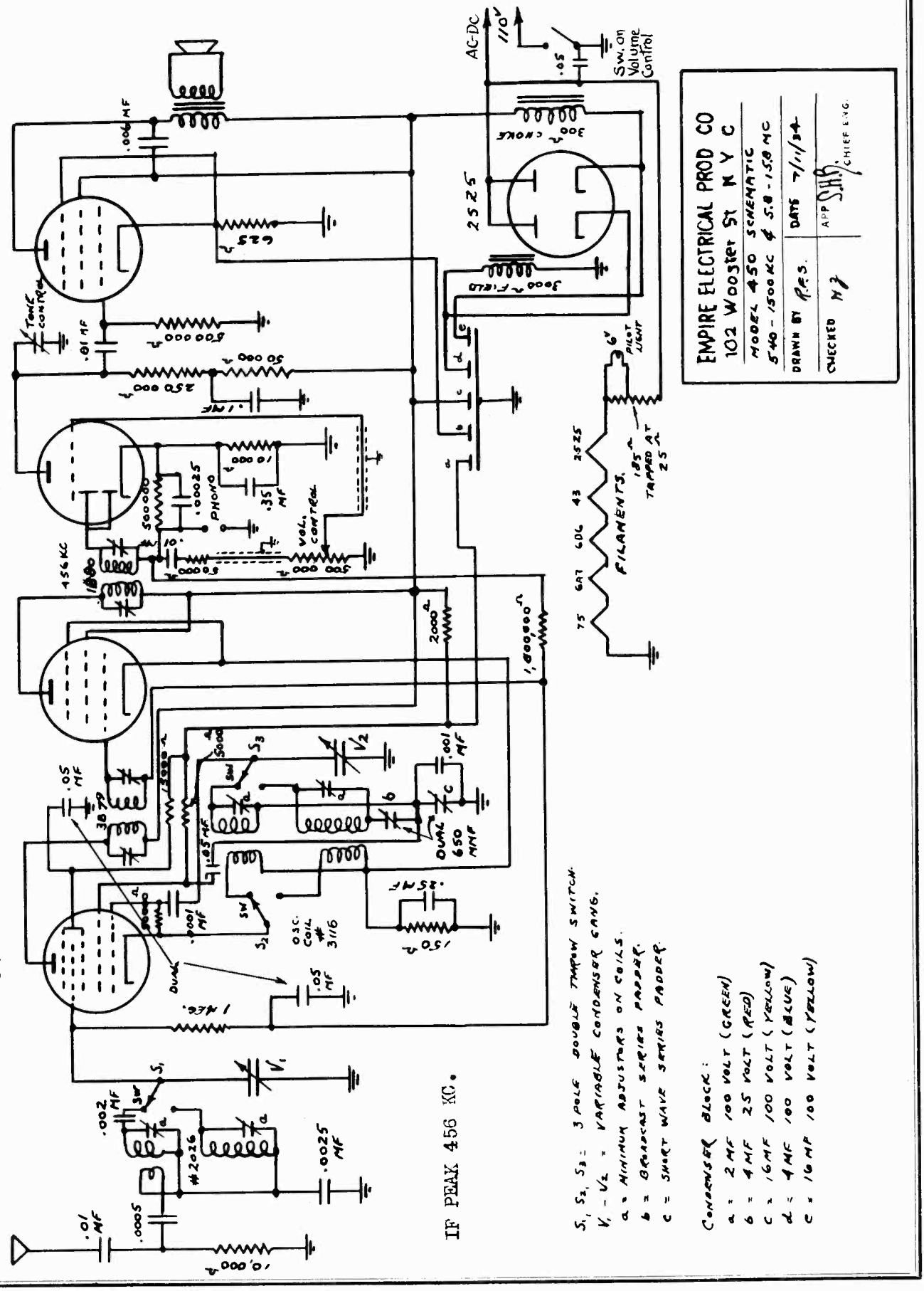
EMPIRE ELECTRICAL PRODUCTS CO.

MODEL 71
Schematic



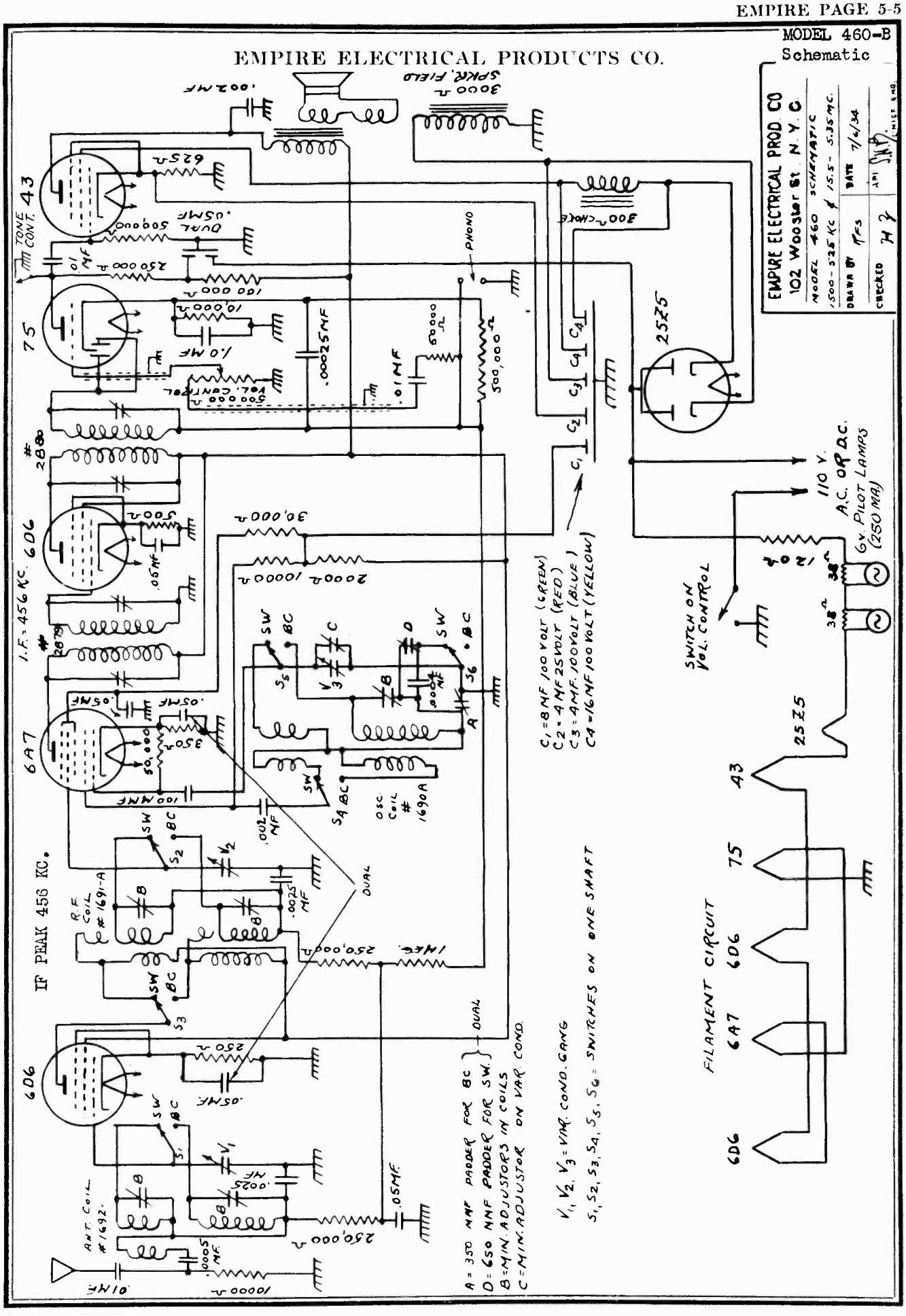
MODEL 450-A
Schematic

EMPIRE ELECTRICAL PRODUCTS CO.



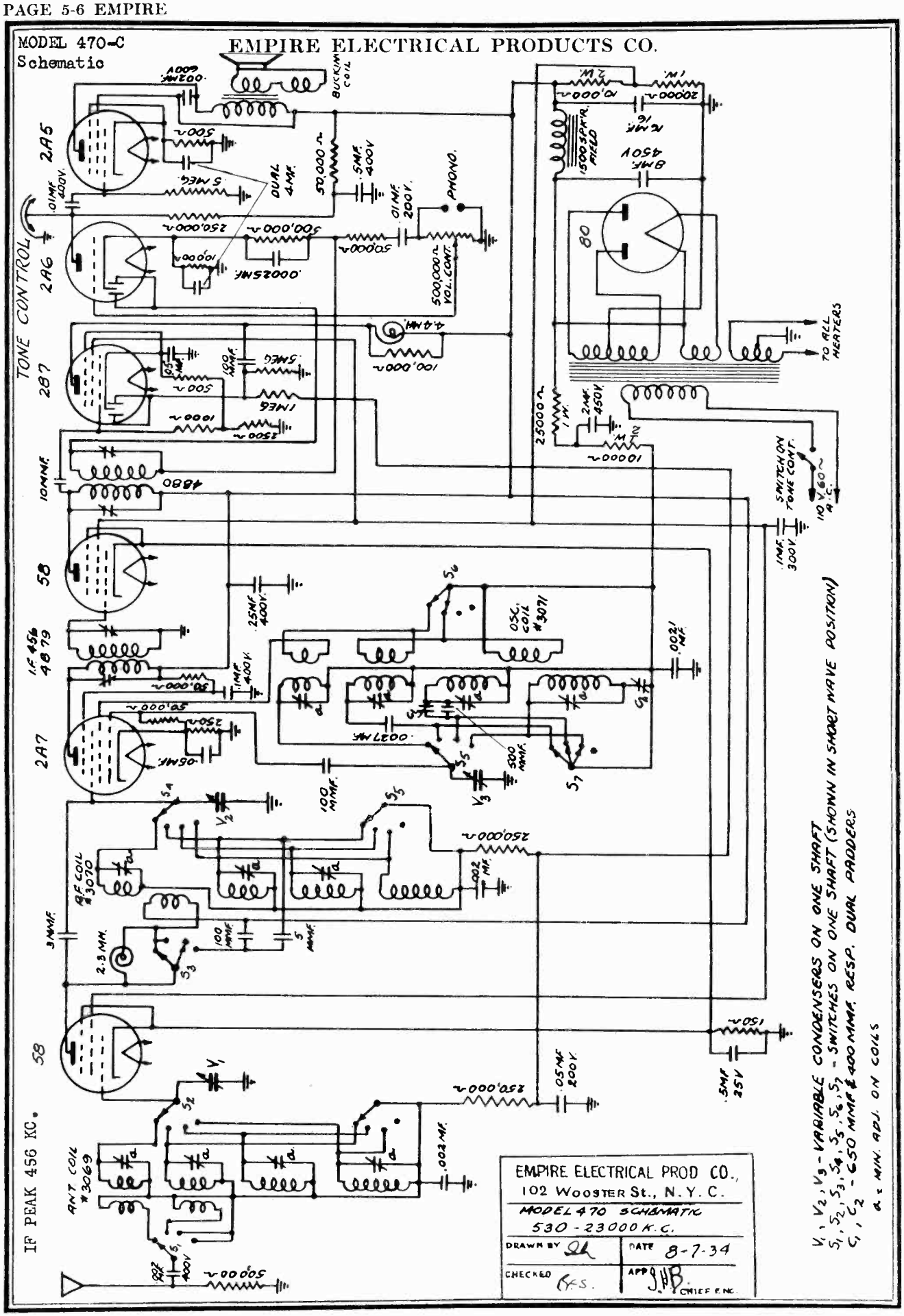
S_1, S_2, S_3 = 3 POLE DOUBLE THROW SWITCH.
V_1 - V_2 = VARIABLE CONDENSER GANG.
a = MINIMUM ADJUSTERS ON COILS.
b = BROADCAST SERIES PADDER.
c = SHORT WAVE SERIES PADDER.

CONDENSER BLOCK:
a = 2 MF 100 VOLT (GREEN)
b = 4 MF 25 VOLT (RED)
c = 16 MF 100 VOLT (YELLOW)
d = 4 MF 100 VOLT (BLUE)
e = 16 MF 100 VOLT (YELLOW)



MODEL 470-C
Schematic

EMPIRE ELECTRICAL PRODUCTS CO.

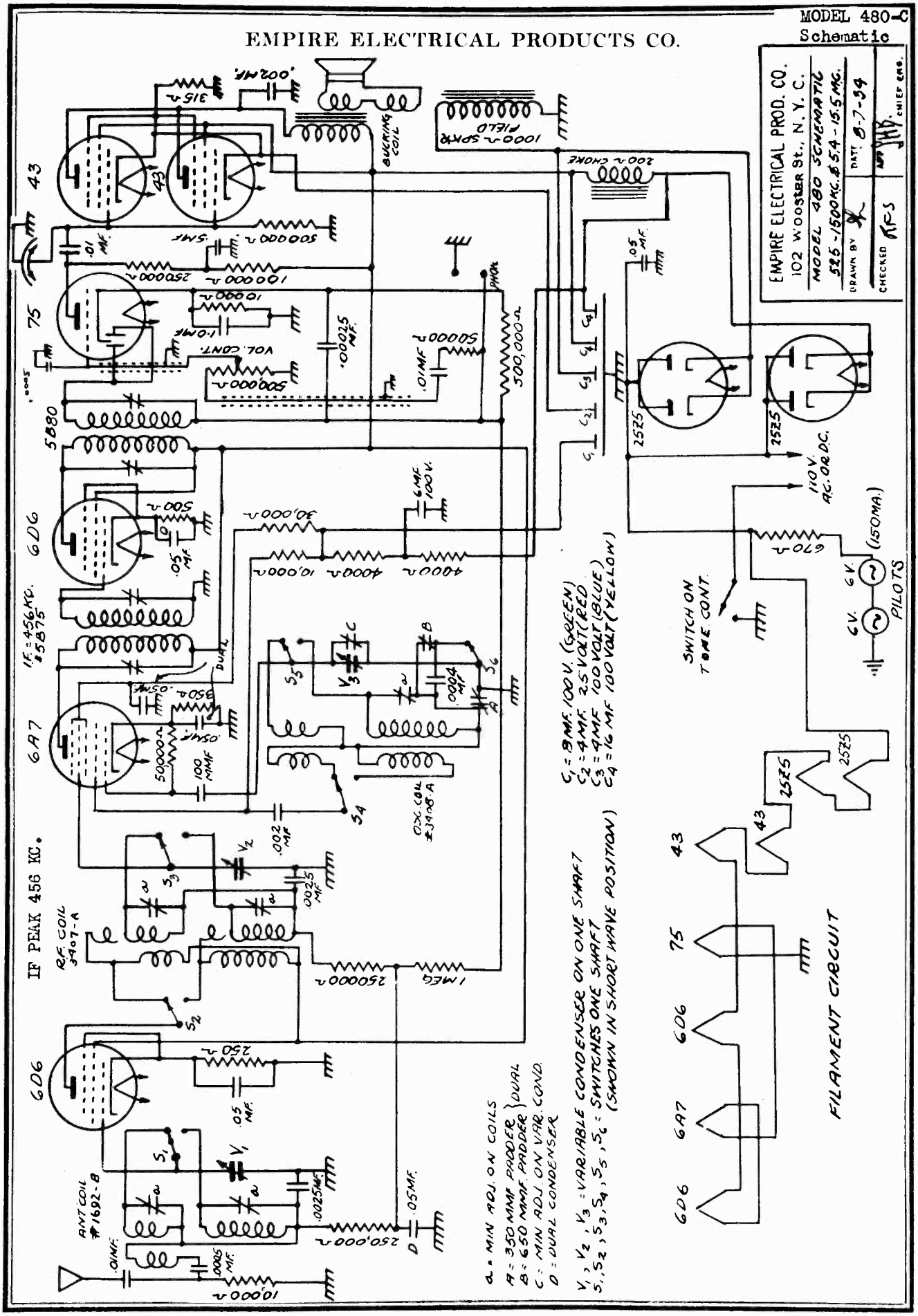


V_1, V_2, V_3 - VARIABLE CONDENSERS ON ONE SHAFT
$S_1, S_2, S_3, S_4, S_5, S_6, S_7$ - SWITCHES ON ONE SHAFT (SHOWN IN SHORT WAVE POSITION)
C_1, C_2 - 650 MMF & 400 MMF. RESP. DUAL PADDERS
a = MIN. ADJ. ON COILS

EMPIRE ELECTRICAL PROD CO., 102 Wooster St., N.Y.C.	
MODEL 470 SCHEMATIC 530 - 23000 K.C.	
DRAWN BY QL	DATE 8-7-34
CHECKED G.F.S.	APP'D J.H.B. CHIEF E.NG.

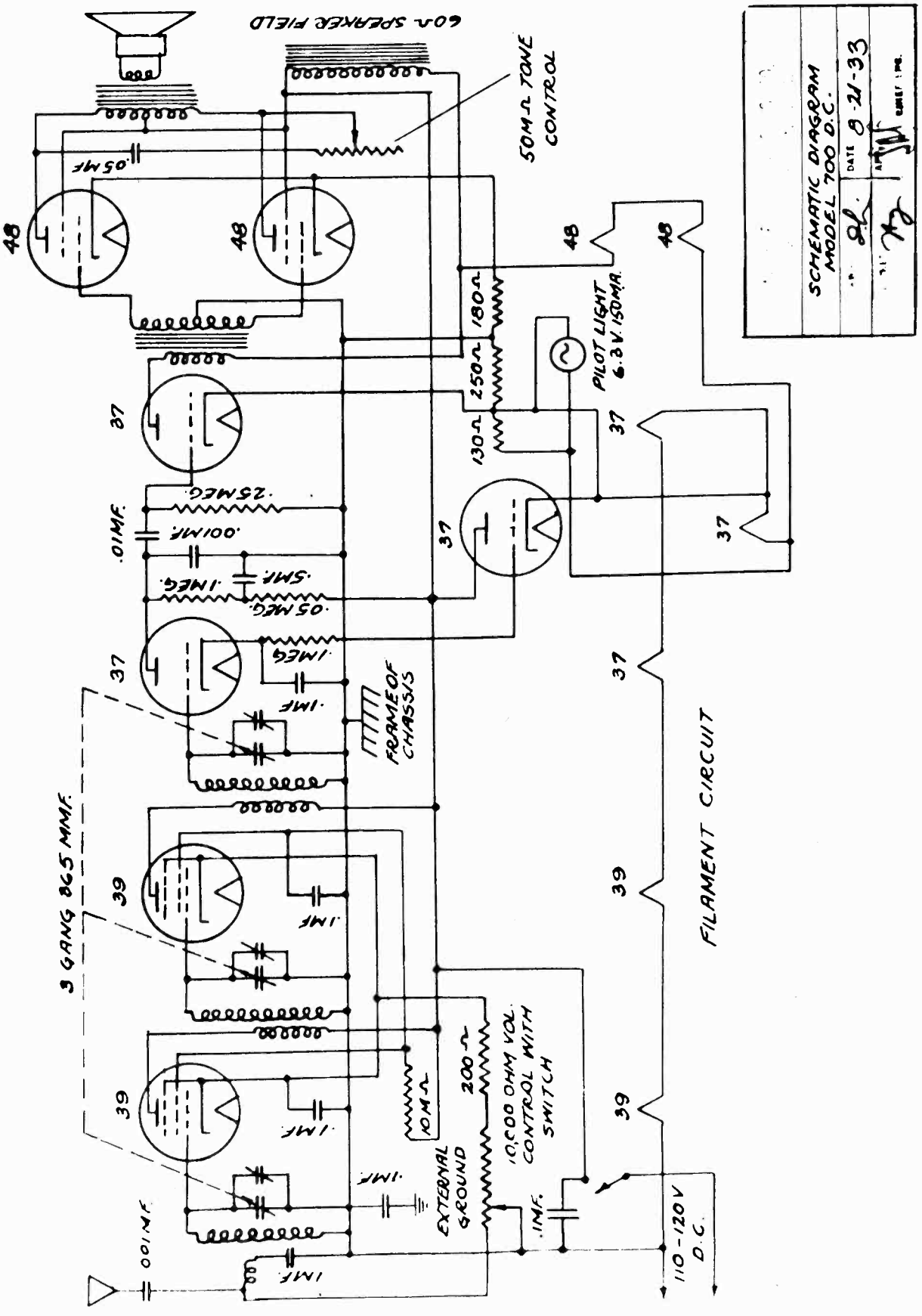
MODEL 480-C
Schematic

EMPIRE ELECTRICAL PRODUCTS CO.



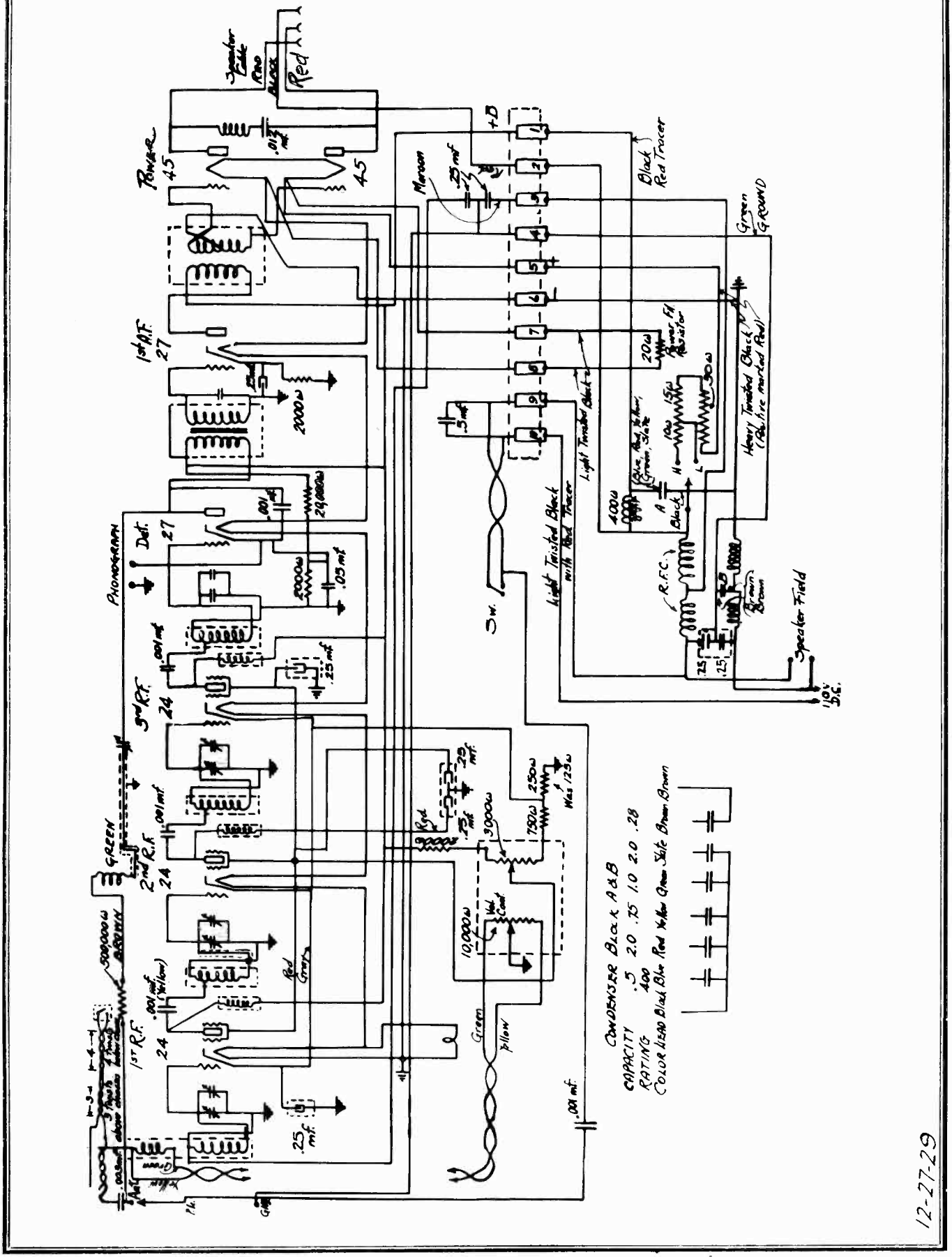
MODEL 700 DC
Schematic

EMPIRE ELECTRICAL PRODUCTS CO.



FADA RADIO & ELECTRIC CORP.

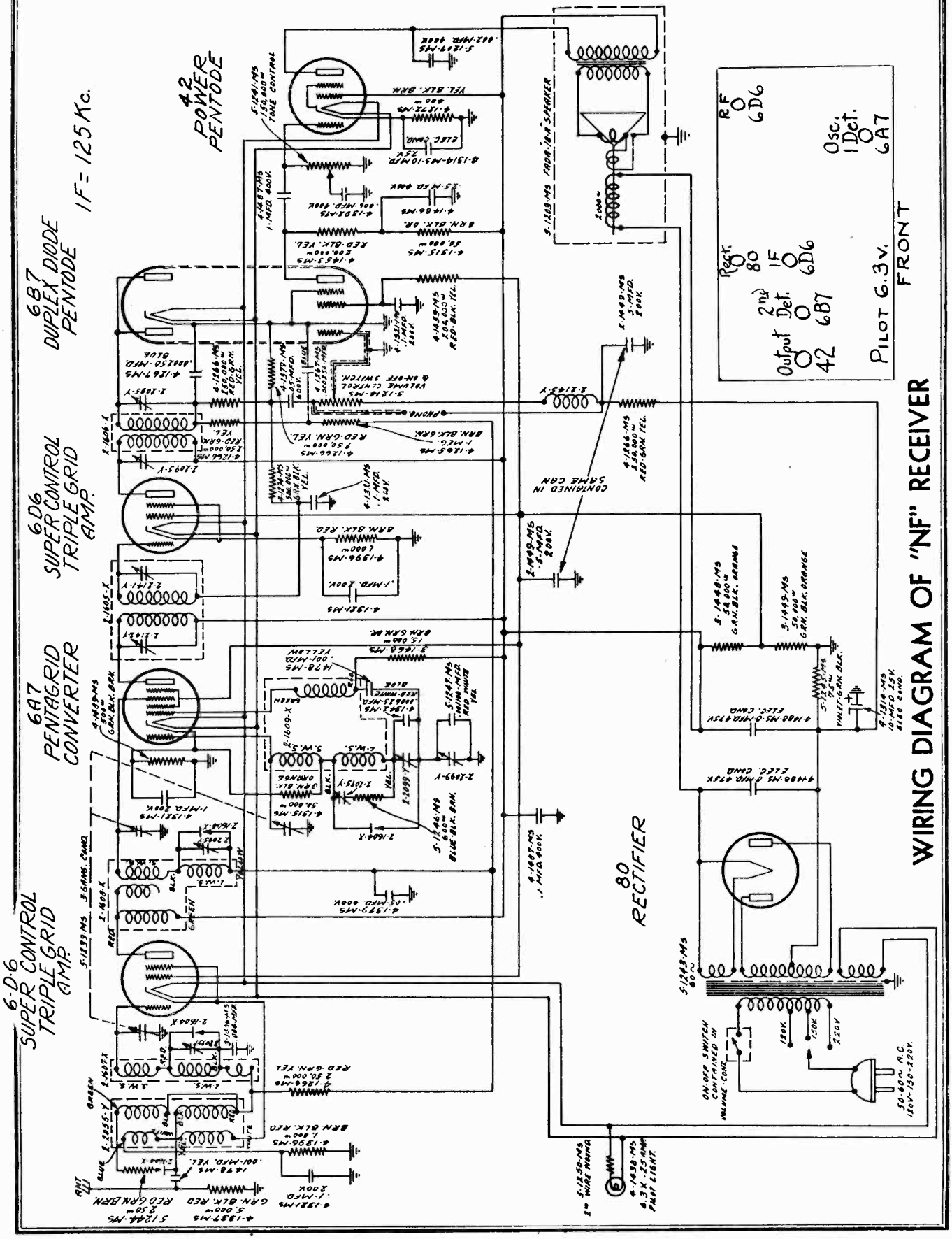
MODEL S, 26-36
Schematic



12-27-29

MODEL NF
Schematic
Socket Layout

FADA RADIO & ELECTRIC CORP.



FADA RADIO & ELECTRIC CORP.

MODEL 133,134,135
(RW)
Alignment, Trimmers
Socket Layout

COMPENSATING INSTRUCTIONS FOR MODELS 133, 134, 135 ETC.

"RW" CHASSIS (60-25 CYCLES)

NOTE:- The wave band switch is to be in the normal wave (550 to 1500 KC) position for the following adjustments.

ADJUSTMENT OF I.F. CONDENSERS

The four (4) I.F. condensers are located as indicated in the sketch.

1st - Disconnect the outside antenna system from the receiver.

2nd - Remove the shield cap from the first detector tube shield. Connect a lead wire from the dummy antenna system of the signal generator to the control grid of the first detector tube. Do not disconnect the control grid connector from the tube, nor remove the tube shield. Connect the ground (slate) lead of the receiver to the ground post of the signal generator. In the event that the signal generator being used does not have a dummy antenna system, connect a 250 mmfd. condenser in series with the lead wire.

3rd - Remove the F-37 oscillator tube from the receiver socket.

4th - Place an output meter across the secondary of the receiver output transformer (which is mounted on the speaker) so that the variations in signal output can be noted. Output meters (with a multi-range scale) are generally supplied with good quality commercial signal generators.

5th - Place the signal generator in operation and adjust the frequency output to 265 KC. Regulate the attenuator control so that the output signal is low enough to insure accuracy in adjusting the I.F. condensers of the receiver.

6th - With the aid of a #4 socket wrench, adjust the four (4) I.F. condensers to resonance as indicated by the greatest deflection on the output meter.

ADJUSTMENT OF OSCILLATOR SERIES COMPENSATOR

The oscillator series compensator can be adjusted through the hole near the input push-pull transformer (see sketch)

1st - Adjust the carrier frequency output of the signal generator to 600 KC.

2nd - Set the calibrated dial of the receiver to read 600 KC.

3rd - With the aid of a #4 socket wrench adjust the oscillator series compensator until a maximum output signal is indicated on the output meter. To insure perfect adjustment it is necessary to "rock" the ganged variable condenser in order to follow the maximum signal output.

4th - After the oscillator series compensator is properly adjusted, turn the calibrated dial of the receiver to 1400 KC and adjust the signal generator to the same frequency. Then readjust all variable condenser compensators as outlined in the foregoing instructions.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

There are three holes (see sketch) in the overall condenser shield housing which permit the insertion of a screw driver for compensating purposes.

1st - Place F-37 oscillator tube in socket.

2nd - Remove the lead wire which is connected to both the control grid of the first detector tube and to the dummy antenna system of the signal generator. Replace the shield cap on the first detector tube shield.

3rd - Connect the antenna (red) wire of the receiver to the dummy antenna system of the signal generator. The ground (slate) wire should remain connected to the ground post of the signal generator.

4th - Adjust the carrier frequency output of the signal generator to 1400 KC.

5th - Set the calibrated dial of the Receiver to read 1400 KC.

6th - Starting with the compensator nearest the rear of the Receiver, adjust each compensator (as indicated on sketch) in turn for maximum signal output. Do not disturb the setting of the ganged variable condenser during these operations. Leave the volume control on full and regulate the signal output with the attenuator control of the signal generator.

This receiver is equipped with an automatic volume control which necessitates setting the manual volume control of the receiver to its maximum position, to assure accuracy in alignment. To control the signal output of the receiver it will be necessary to use the attenuator control of the signal generator.

ADJUSTMENT OF I.F. CONDENSERS

The four (4) I.F. condensers are located as indicated in the sketch.

1st - Disconnect the outside antenna system from the receiver.

2nd - Connect a lead wire from the dummy antenna system of the signal generator to the control grid of the 6A7 first detector tube. Do not disconnect the control grid connector from the tube nor remove the tube shield. Connect the ground (slate) lead of the receiver to the ground post of the signal generator. In the event that the signal generator being used does not have a dummy antenna system, connect a 250 mmfd. condenser in series with the lead wire.

3rd - Place an output meter across the secondary of the receiver output transformer (which is mounted on the speaker) so that the variations in signal output can be noted. Output meters (with a multi-range scale) are generally supplied with good quality commercial signal generators.

4th - Place the signal generator in operation and adjust the carrier frequency output to 265 KC. Regulate the attenuator control so that the output signal is low enough to insure accuracy in adjusting the I.F. condensers of the receiver.

5th - With the aid of a #4 socket wrench, adjust the four (4) I.F. condensers to resonance as indicated by the greatest swing of the needle on the output meter.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

The compensators are located at the top of their respective tuning condenser section and can be adjusted with the aid of a screw driver in the order indicated on the attached sketch.

1st - Remove the lead wire which is connected to both the control grid of the first detector tube and to the dummy antenna system of the signal generator.

2nd - Connect the antenna (red) wire of the receiver to the dummy antenna system of the signal generator. The ground (slate) wire should remain connected to the ground post of the signal generator.

3rd - Adjust the carrier frequency output of the signal generator to 1400 KC.

4th - Set the calibrated dial of the receiver to read 1400 KC.

5th - Starting with the compensator nearest the rear of the receiver, adjust each compensator (as indicated on sketch) in turn for maximum signal output. Do not disturb the setting of the gang condenser during these operations. Leave the volume control on full and regulate the signal output with the attenuator control of the signal generator.

COMPENSATING INSTRUCTIONS FOR MODELS 141 & 141-Z

"NA" CHASSIS (60-25 CYCLES)

ADJUSTMENT OF OSCILLATOR SERIES COMPENSATOR

The oscillator series compensator can be adjusted through the hole in the right hand side of chassis (see sketch).

1st - Adjust the carrier frequency output of the signal generator to 600 KC.

2nd - Set the calibrated dial of the receiver to read 600 KC.

3rd - With the aid of a #4 socket wrench adjust the oscillator series compensator until a maximum output signal is indicated on the output meter. To insure perfect adjustment it is necessary to "rock" the gang variable condenser in order to follow the maximum signal output.

4th - After the oscillator series compensator is properly adjusted, turn the calibrated dial of the receiver to 1400 KC and adjust the signal generator to the same frequency. Then readjust all variable condenser compensators as outlined in the foregoing instructions.

CONTINUITY AND VOLTAGE READINGS ON
NA CHASSIS -- MODEL 141 (60 CYCLE)

Line voltage - 115 volts A.C. -- Input watts 50

TYPE OF TUBE	POSITION OF TUBE	PLATE VOLTS	PLATE MA CURRENT	CONTROL GRID VOLTS	SCREEN GRID VOLTS
6-A-7	1st Det.-Osc.	236	2.5	2.2**	88
6-D-6	Int. freq.	236	7.5	2.2**	88
37	2nd Det.	---	---	---	--
77	1st A.F.	78*	0.23	2.1**	54*
42	Pwr.Pentode	204	30.0	14.0	224
80	Rectifier	---	58. TOTAL		

*These readings were taken with a 1,000 ohm per volt meter and are not indicative of effective voltages.

**Correct readings cannot be obtained at control grid due to series resistors. To be measured across each respective bias resistor.

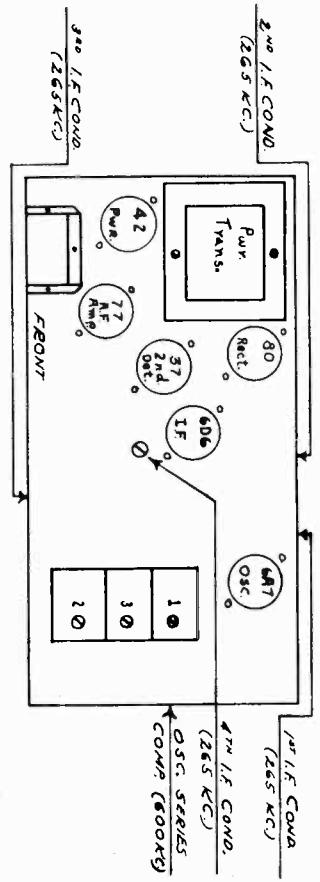
VOLTAGE ACROSS ELECTROLYTIC CONDENSER (5-1209-Ms)

1st section	2nd section
361 volts	238 volts

Voltage across 2,000 ohm speaker field - - - - - - - - - 123 volts

D.C. RESISTANCE VALUES

		PRIMARY	SECONDARY
2-1601-X	Antenna coil	20.0 ohms	5.4 ohms
2-1602-X	Pre-selector coil	---------	5.4 "
2-1603-X	Oscillator coil --Total winding	---------	5.3 "
1993-X	I.F. trans.	36.3 ohms	77.0 "
1994-X	I.F. trans.	50.0 "	50.0 "
Output trans. (mounted on 18-A speaker)		672.0 "	.4 "
Speaker field coil		2,000	ohms
Speaker voice coil		3.5	"
2-2134-Y	Hum oucking choke	.4	"
5-1204-Ms	Power trans. high voltage sec. winding	410.0	" (green)
"	" " primary "	9.0	" (white)
"	" " heater sec. "	0.16	" (red)
"	" " rectifier sec. "	0.18	" (yellow)



MODEL (52),5212, 5212-A,5241 Schematics

FAIRBANKS-MORSE HOME APP., INC.

MODEL (51),5106, 5107,5108,5109, 5111,5112,5141, 5143

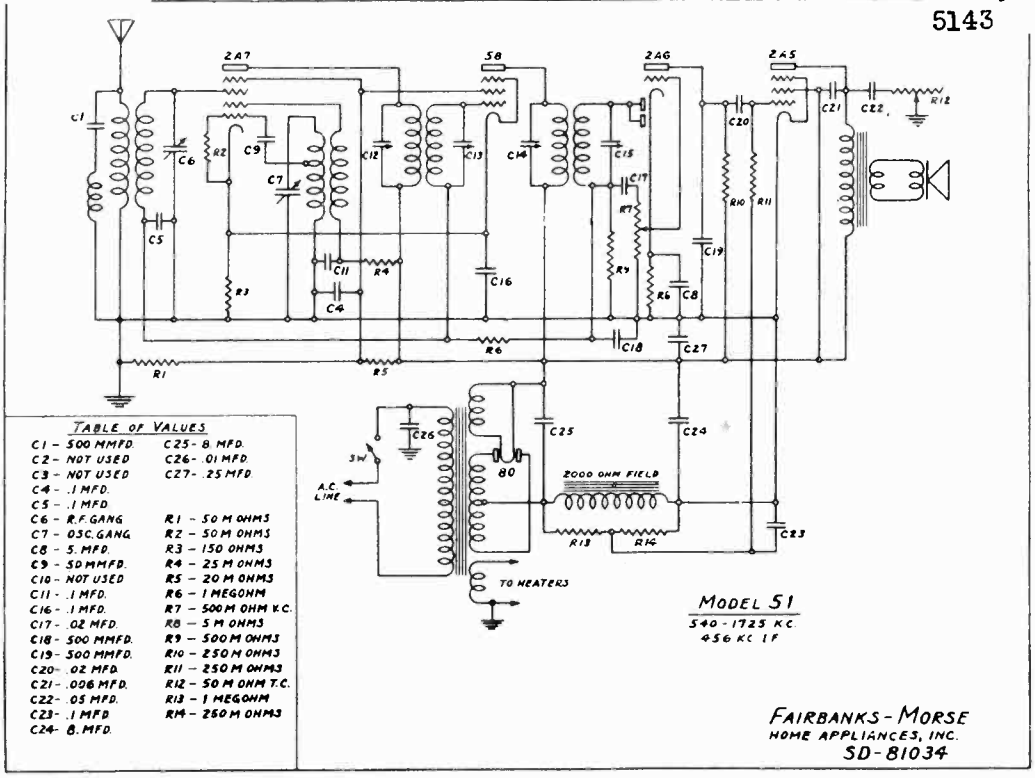


TABLE OF VALUES

C1 - 500 MMFD.	C25 - 8. MFD.
C2 - NOT USED	C26 - .01 MFD.
C3 - NOT USED	C27 - .25 MFD.
C4 - .1 MFD.	
C5 - .1 MFD.	
C6 - R.F. GANG	R1 - 50 M OHMS
C7 - OSC. GANG	R2 - 50 M OHMS
C8 - 5. MFD.	R3 - 150 OHMS
C9 - 50 MMFD.	R4 - 25 M OHMS
C10 - NOT USED	R5 - 20 M OHMS
C11 - .1 MFD.	R6 - 1 MEGOHM
C16 - .1 MFD.	R7 - 500 M OHM V.C.
C17 - .02 MFD.	R8 - 5 M OHMS
C18 - 500 MMFD.	R9 - 500 M OHMS
C19 - 500 MMFD.	R10 - 250 M OHMS
C20 - .02 MFD.	R11 - 250 M OHMS
C21 - .006 MFD.	R12 - 50 M OHM T.C.
C22 - .05 MFD.	R13 - 1 MEGOHM
C23 - .1 MFD.	R14 - 250 M OHMS
C24 - 8. MFD.	

MODEL 51
540 - 1725 KC.
456 KC I.F.

FAIRBANKS - MORSE
HOME APPLIANCES, INC.
SD-81034

Model 51

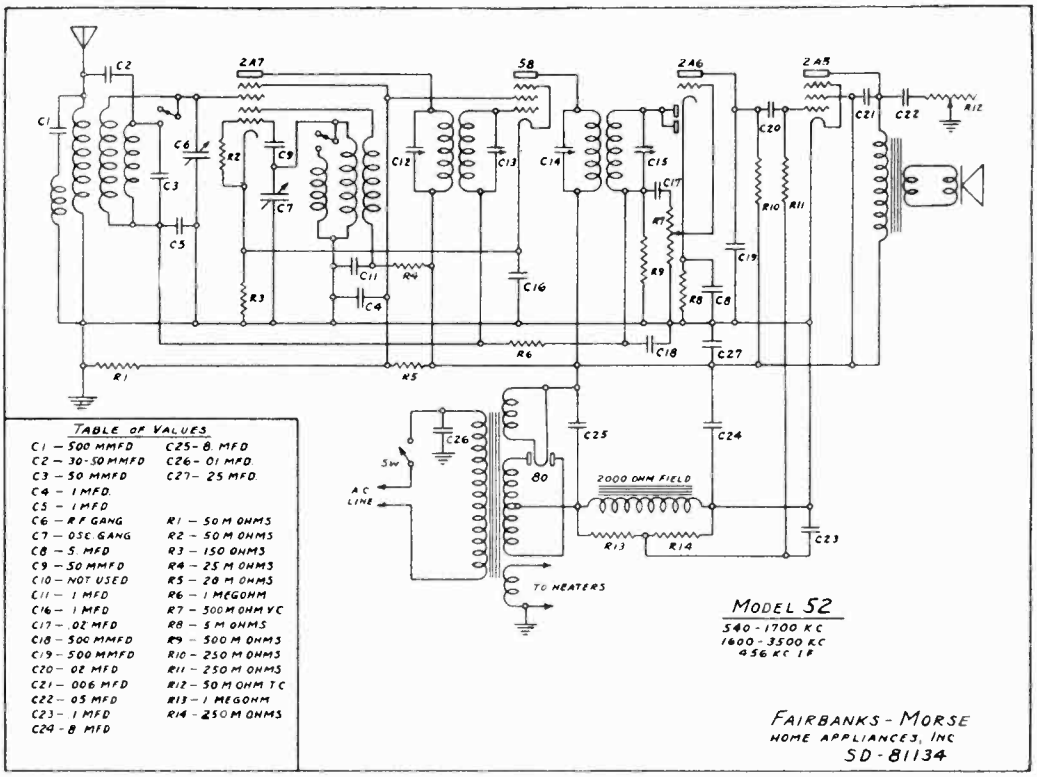


TABLE OF VALUES

C1 - 500 MMFD	C25 - 8. MFD
C2 - 30-50 MMFD	C26 - 01 MFD.
C3 - 50 MMFD	C27 - 25 MFD.
C4 - 1 MFD.	
C5 - 1 MFD	
C6 - R F GANG	R1 - 50 M OHMS
C7 - OSC. GANG	R2 - 50 M OHMS
C8 - 5. MFD	R3 - 150 OHMS
C9 - 50 MMFD	R4 - 25 M OHMS
C10 - NOT USED	R5 - 20 M OHMS
C11 - 1 MFD	R6 - 1 MEGOHM
C16 - 1 MFD	R7 - 500 M OHM V.C.
C17 - 02 MFD	R8 - 5 M OHMS
C18 - 500 MMFD	R9 - 500 M OHMS
C19 - 500 MMFD	R10 - 250 M OHMS
C20 - 02 MFD	R11 - 250 M OHMS
C21 - 006 MFD	R12 - 50 M OHM T.C.
C22 - 05 MFD	R13 - 1 MEGOHM
C23 - 1 MFD	R14 - 250 M OHMS
C24 - 8 MFD	

MODEL 52
540 - 1700 KC
1600 - 3500 KC
456 KC I.F.

FAIRBANKS - MORSE
HOME APPLIANCES, INC
SD - 81134

Model 52

MODEL (53) 5312,
5312-A, 5341
Schematic, Coil Data

FAIRBANKS-MORSE HOME APP., INC.

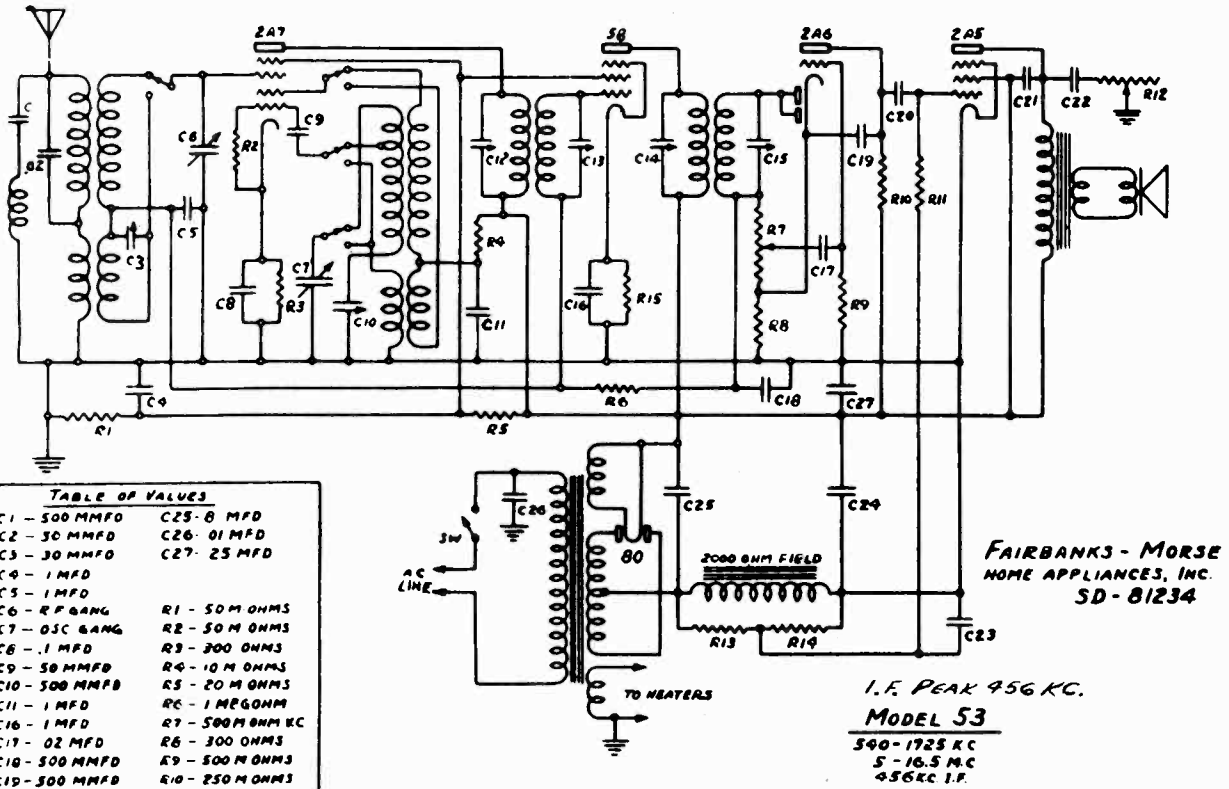


TABLE OF VALUES

C1 - 500 MMFD	C25 - 8 MFD
C2 - 30 MMFD	C26 - .01 MFD
C3 - 30 MMFD	C27 - 25 MFD
C4 - 1 MFD	
C5 - 1 MFD	
C6 - R F GANG	R1 - 50 M OHMS
C7 - OSC GANG	R2 - 50 M OHMS
C8 - .1 MFD	R3 - 300 OHMS
C9 - 50 MMFD	R4 - 10 M OHMS
C10 - 500 MMFD	R5 - 20 M OHMS
C11 - 1 MFD	R6 - 1 MEGOHM
C16 - 1 MFD	R7 - 500 M OHM TC
C17 - .02 MFD	R8 - 300 OHMS
C18 - 500 MMFD	R9 - 500 M OHMS
C19 - 500 MMFD	R10 - 250 M OHMS
C20 - .02 MFD	R11 - 250 M OHMS
C21 - 006 MFD	R12 - 50 M OHM TC
C22 - .05 MFD	R13 - 1 MEGOHM
C23 - 1 MFD	R14 - 250 M OHMS
C24 - 8 MFD	R15 - 300 OHMS

MISCELLANEOUS RESISTANCE — TABLE —

PART	MODELS	PRIMARY	SECONDARY
Antenna Wave Trap Coil	51-52-53		4 OHMS
Antenna Coil	51-(52-53-B.C.)	24 OHMS	3 OHMS
	52 S.W.	24 OHMS	1 OHM
	53 S.W.	1 OHM	.1 OHM
Oscillator Coil (Grid)	51-(52-53-B.C.)		3 OHMS
	52-S.W.		1.5 OHMS
	53-S.W.		1 OHM
Oscillator Coil (Plate)	51-(52-53-B.C.)	3 OHMS	
	52-S.W.	3 OHMS	
	53-S.W.	1 OHM	
First I. F. Transformer	51-52	12 OHMS	12 OHMS
	53	8 OHMS	8 OHMS
Second I. F. Transformer	51-52-53	12 OHMS	12 OHMS
Output Transformer	51-52-53	600 OHMS	.75 OHM
Speaker (Voice Coil)	51-52-53	2 OHMS	
(Field)			2000 OHMS
Power Transformer Primary	51-52-53	15 OHMS	
High Voltage Secondary (Each Half)			250-275

FAIRBANKS-MORSE HOME APP., INC. **MODEL 51,52,53 Series Alignment, Color Code, Notes**

MODELS 51, 52, AND 53

THE CIRCUIT

Models 51, 52, and 53 are 5 tube superheterodynes. The circuits are very similar, the only differences being those made necessary in order to cover different wave bands. These sets are in many ways a radical departure from conventional design. Maximum performance with a minimum number of tubes is accomplished thru the use of new multi-purpose tubes and new type, high efficiency, I. F. transformers. Due to the use of a high impedance primary, a litz wire secondary, and a wave trap, very good pre-selection and high gain are obtained in the tuned antenna stage. The antenna circuit is fed into a 2A7 which serves the triple purpose of R. F. amplifier, electron coupled oscillator, and first detector. The I. F. output of this tube is fed into the double tuned, first I. F. transformer and from there into the 58 I. F. amplifier. The output of this tube is fed into the second, double tuned, I. F. transformer. The output of this transformer is fed into the 2A6 where three functions are accomplished. Detection, automatic volume control, and audio amplification. The A. F. output of this tube is resistance coupled to the grid circuit of the 2A5, high gain, output tube from where it is transfered to the loudspeaker. A familiar type 80 rectifier is used in a conventional power supply circuit.

WAVE BANDS

The model 51 chassis is a standard broadcast receiver covering a frequency range of 540 to 1725 kilocycles. The model 52 is a dual band chassis covering frequency ranges of 540 to 1700 kilocycles and 1600 to 3500 kilocycles. The model 53 is a split band chassis covering frequency ranges of 540 to 1725 kilocycles and 5 to 16.5 megacycles.

SUGGESTED SERVICE PROCEDURE

If the set does not operate test all tubes. If no tube tester is available replace the tubes in the set, one by one, with tubes known to be good. A noisy tube cannot always be found by checking in a tube tester, however by sharply tapping each of the tubes in the set the bad tube can usually be located.

If, after replacing any defective tubes, the set is still inoperative follow the instructions given under Resistance and voltage analysis.

ALIGNMENT PROCEDURE

Proper adjustment of the tuned circuits will only be possible thru the use of a good service oscillator and output meter.

The gang condenser plates are properly adjusted in the factory and under no condition should it be necessary to bend them.

All adjustments should be made with the volume control full "on". The wave band switch on models 52 and 53 should be in the broadcast position.

1. Supply a 456 kilocycle signal to the grid of the 2A7 thru a .00005 Mfd. condenser. Carefully adjust both trimmers on the first I. F. transformer. The center screw will peak the grid side and the hexagon nut will peak the plate side. Next adjust the second I. F. transformer in the same manner. Since these adjustments are very critical it is advisable to go back over them to make sure they are correct.

2. Turn the gang condenser until it is fully meshed. The dial should read 540 kilocycles, if it is incorrect loosen the set screw and move the dial until the reading is correct.

3. Supply a 1500 kilocycle signal from the test oscillator to the antenna of the set. Tune the set until the dial reads 1500 kilocycles. Adjust the trimmer on the oscillator section of the gang condenser (front section) until the signal comes in at 1500 on the dial. Adjust the trimmer on the R. F. section, of the gang condenser, for maximum output with minimum input from the service oscillator. Some sets do not have a trimmer on the oscillator section and in this case it will only be necessary to adjust the R. F. trimmer for maximum output with the set tuned to the correct frequency reading.

4. On the model 53 a low frequency padding condenser will be found located on the front of the chassis. To adjust this condenser tune the set and the service oscillator to 600 kilocycles. Adjust the padding condenser for maximum output at the same time tune the set back and forth across the 600 kilocycle signal to make sure the correct peak is obtained.

5. If all adjustments have been carefully made the dial readings will be approximately correct on all frequencies If not it will be necessary to go over the entire procedure again.

6. On models 51 and 53 it will sometimes be necessary to make high frequency adjustments at 1200 kilocycles rather than 1500 in the event police calls do not come in properly after alignment.

7. On the model 53 a small trimmer condenser will be found under the chassis and connected across the secondary of the short wave R. F. coil. This condenser should be peaked at 16 megacycles. Turn the band selector to the short wave position and tune the set to 16 megacycles. Supply a 16 megacycle signal to the antenna and adjust the trimmer for maximum output. If no oscillator, supplying a 16 megacycle signal, is available it may be possible to pick up the tenth harmonic of the 1500 kilocycle signal (15 megacycles) from a standard service oscillator. If neither is available it will be necessary to use the signal from a short wave station, near 16 megacycles, or adjust for maximum noise level.

COLOR CODES

SHORT WAVE COIL ASSEMBLY MODEL 53

ANTENNA COIL	OSC. GRID COIL
White—Antenna	Green—Grid
Other End—Ground	Other End—Ground
OSC. PLATE COIL	**RF GRID COIL**
Blue Plate	Green and White—Grid
Red B Plus	Black and White—Grid Return

CONDENSER BY-PASS CAN ASSEMBLY

Red Lead	.25	MFD	400 Volts—C-27
Brown Lead	.1	MFD	300 Volts—C-16
Blue Lead	.1	MFD	300 Volts—C-11
Green	.1	MFD	300 Volts—C-23
Red with White	.1	MFD	300 Volts—C- 4

CAN—COMMON GROUND

POWER TRANSFORMER	FIRST I. F. TRANSFORMER
Black (two) 2.5 Volts	Blue—P-2A7
Brown (two) PRIMARY	Red—B PLUS
Yellow (two) 5. Volts	Green—Grid
Green (two) High Voltage	Black and White—Grid Return
Red C. T. High Voltage	

SECOND I. F. TRANSFORMER

Blue—Plate
Red—B PLUS
Green—Diode Plates
Black and White—Diode Plate Return

The inner screw on the adjustment condenser is the grid adjustment. The outer hex nut is the plate adjustment.

STANDARD RMA RESISTOR AND CONDENSER COLOR CODE

0—Black	2—Red	4—Yellow	6—Blue	8—Grey
1—Brown	3—Orange	5—Green	7—Purple	9—White

RESISTORS

The **body color** represents the **first figure** of the resistance value.

The **end color** represents the **second figure** of the resistance value.

The **dot color** represents the **number of ciphers** following the first two figures.

MICA CONDENSERS

The **first dot** on the condenser represents the **first figure** of the capacity.

The **second dot** on the condenser represents the **second figure** of the capacity.

The **third dot** on the condenser represents the **number of ciphers** following the first two figures.

MODEL 51,52,53 Series
Voltage

FAIRBANKS-MORSE HOME APP., INC.

RESISTANCE AND VOLTAGE ANALYSIS

The following chart gives detailed information regarding the resistance from various points to various other points on the chassis. The measured voltage from the various tube socket contacts to ground is also given. When this chart is faithfully followed little difficulty should be experienced in finding almost any fault that may develop.

Resistance Tests. These tests should be made with an accurate ohm-meter. The speaker should be connected. All tubes should be removed from the set. The volume and tone controls should be full "on". The A. C. line plug must be removed from the A. C. outlet.

Voltage Tests. These readings should be taken with all tubes in their sockets. The volume and tone controls should be full "on". The antenna should be disconnected. Tune the set to a point where no signal is received.

RESISTANCE AND VOLTAGE ANALYSIS CHART

FROM	TO	MODEL	•VOLTS	†OHMS	POSSIBLE FAULTY UNITS
K-2A7	GND	51-52	2.5	150	C-16 R-3
		53	2.5	300	C-8 R-3
OSC G 2A7	K 2A7	51-52-53	....	50M	R-2
OSC P 2A7	GND	51-52	135	95M	R-1 R-4 R-5 COIL C-4 C-11 C-24 C-25 C-27
		53	170	80M	R-1 R-4 R-5 COIL, SWITCH, C-4 C-11 C-24 C-25 C-27
CG-2A7	GND	51-52	0	1.5 MEG	R-6 R-9 COIL (SWITCH 52) C-5 C-17 C-18
		53	0	1.5 MEG	R-6 R-7 R-8 COIL, SWITCH, C-5 C-17 C-18
P 2A7	GND	51-52-53	205	70M	R-1 R-5 COIL, C-4 C-11 C-24 C-25 C-27
SG 2A7	GND	51-52-53	85	50M	R-1 C-4
K 58	GND	51-52	2.5	150	C-16 R-3
		53	2.5	300	C-16 R-15
SG 58	GND	51-52-53	85	50M	R-1 C-4
CG 58	GND	51-52	0	1.5 MEG	R-6 R-9 COIL, (SWITCH 52) C-5 C-17 C-18
		53	0	1.5 MEG	R-6 R-7 R-8 COIL, SWITCH, C-5 C-17 C-18
P 58	GND	51-52-53	205	70M	R-1 R-5 COIL, C-4 C-11 C-24 C-25 C-27
DP 2A6	GND	51-52-53	....	500M	C-17 C-18 R-7 R-8
G 2A6	GND	51-52	0	500M	R-7 C-17 (VOLUME CONTROL "GN")
		53		500M	R-9 C-17 (VOLUME CONTROL "ON")
P 2A6	GND	51-52-53	85	320M	R-1 R-5 R-10 C-4 C-19 C-24 C-25 C-27
K 2A6	GND	51-52	.8	5M	R-8 C-8
		53	.125	300	R-8
P 2A6	G 2A5	51-52-53	....	820M	C-20
K 2A5	GND	51-52-53	0	0	.....
G 2A5	GND	51-52-53	0	500M	R-11 R-14 C-23
SG 2A5	GND	51-52-53	205	70M	C-4 C-24 C-25 C-27 R-1 R-5
SG 2A5	P 2A5	51-52-53	....	600	C-21 PRI. OUTPUT TRANSFORMER
P 2A5	GND	51-52-53	195	70600	R-1 R-5 C-4 C-22 C-24 C-25 C-27 PRI. OUTPUT TRANSFORMER
F 80	GND	51-52-53	205	70M	R-1 R-5 C-4 C-24 C-25 C-27
P 80	GND	51-52-53	80	2250 2275	OPEN H.V. SECONDARY, FIELD SHORTED H.V. SECONDARY, FIELD
ANT	GND	51-52-53	....	26	ANT. COIL PRIMARY
AC PLUG	GND	51-52-53	....	OPEN	C-26 (SWITCH "ON")

•VOLTAGE AS MEASURED WITH 1000 OHM PER VOLT WESTON METER.
•†VARIATIONS OF 10% PLUS OR MINUS ARE ALLOWABLE ON ALL READINGS.
†IF SOME RESISTANCE READINGS ARE LOW TRY REVERSING POLARITY OF OHM-METER.

MODEL 51 CHASSIS EMPLOYED IN MODELS

5106—5107—5108—5109

5111—5112—5141—5143

MODEL 52 CHASSIS EMPLOYED IN MODELS

5212—5212A—5241

MODEL 53 CHASSIS EMPLOYED IN MODELS

5312—5312A—5341

COMPOSITE PARTS LIST MODELS 51 - 52 - 53

Part Number	Used on Models	Description of Part	List Price
14061	51-52-53	Wave Trap Coil	1.00
14007	51-52-53	Combination Antenna Oscillator Coil	2.50
14104	52	Short Wave Oscillator and R. F. Coil	1.50
14206	53	Short Wave Coil Assembly	2.50
14210	53	First I. F. Transformer	3.00
11022	51-52	First I. F. Transformer	1.50
11023	51-52-53	Second I. F. Transformer	1.50
14003	51-52-53	Power Transformer 115 Volt 60 Cycle	4.00
T-6204	51-52-53	Power Transformer 115 Volt 25 Cycle	6.00
T-6203	51-52-53	Power Transformer 240 Volt 60 Cycle	4.50
T-6202	51-52-53	Power Transformer 110 and 220 Volt 60 Cycle	5.00
T-6201	51-52-53	Power Transformer 135 Volt 50 Cycle	5.00
14002	51-52	Gang Condenser Clockwise (With Tracking Section)	3.00
14055	51-52	Gang Condenser Counter Clockwise (No Tracking Section)	3.00
14203	53	Gang Condenser Clockwise	3.00
14201	53	Gang Condenser Counter Clockwise	3.00
14009	51	Dial Assembly (Scale and Hub)	.50
14111	52	Dial Assembly (Scale and Hub)	.50
14022	51-52-53	Escutcheon (Peep Type)	.50
14522	53	Escutcheon (Full Vision)	1.00
14056	52-53	Aeroplane Dial—Disc and Hub with Two Pilot Light Sockets	1.00
14211	53	Dial Assembly (Scale and Hub)	.50
14212	53	Aeroplane Dial Scale (Celluloid)	.50
14005	51-52-53	5 Inch Speaker 2000 OHM Field	6.00
14004	51-52-53	6 Inch Speaker 2000 OHM Field	8.00
14552	51-52-53	8 Inch Speaker 2000 OHM Field	12.00
S-5910	51-52-53	Speaker Socket	.10
S-5911	51-52-53	2A5 Socket	.10
S-5912	51-52-53	2A6 Socket	.10
S-5913	51-52-53	2A7 Socket	.10
S-5914	51-52-53	80 Socket	.10
S-5915	51-52-53	58 Socket	.10
14024	51-52-53	Dial Lamp 2.5 Volt	.10
S-5820	51-52-53	Tube Shield	.15
V-6503	51-52-53	Volume Control and Switch R-7	1.20
V-6504	51-52-53	Tone Control—R-12	.80
R-1836	51-52-53	250,000 OHM ½ Watt Resistor R-10	.20
R-1236	51-52-53	250,000 OHM ¼ Watt Resistor R-11	.20
R-1296	51-52-53	1 Megohm ¼ Watt Resistor R-13	.20
R-1266	51-52-53	500,000 OHM ¼ Watt Resistor R-9	.20
R-1581	51-52	5,000 OHM ½ Watt Resistor R-8	.20
R-1716	51-52	25,000 OHM ½ Watt Resistor R-4	.20
R-1746	51-52-53	50,000 OHM ½ Watt Resistor R-1	.20
R-1146	51-52-53	50,000 OHM ¼ Watt Resistor R-2	.20
R-1431	51-52	150 OHM ½ Watt Resistor R-3	.20
R-2901	51-52-53	20,000 OHM 1 Watt Resistor R-5	.20
R-846	53	300 OHM ¼ Watt Resistor R-3	.20
R-1656	53	10,000 OHM ½ Watt Resistor R-4	.20
EC-16	51-52-53	By-Pass Condenser Can Assembly (C-4-C11-C-16-C-23-C-27)	1.60
EL-8	51-52-53	8 MFD. Electrolytic Cond. 450 Volt C-24-25	1.00
EC-4	51-52-53	.05 Tubular Condenser 400 Volt C-22	.20
EC-12	51-52-53	.006 Tubular Condenser 400 Volt C-21	.20
EC-3	51-52-53	.02 Tubular Condenser 400 Volt C-20	.20
EC-2	51-52-53	.01 Tubular Condenser 400 Volt C-26	.20
EC-5	51-52-53	.1 Tubular Condenser 300 Volt C-4-C-5-C-8-C-11-C16	.25
EL-6	51-52	5. MFD. Tubular Elect. Cond. 25 Volt C-8	.50
C-304	51-52-53	500 MFD. (.0005 MFD.) Moulded C-1-C-18-C-19	.20
C-303	51-52-53	200 MFD. (.002 MFD.) Moulded C-9	.20
C-301	51-52-53	50MMFD. (.00005 MFD.) Moulded C-9	.20
C-207	53	Trimmer Condenser (Short Wave) C-3	.25
C-203	52-53	Padding Condenser C-10	1.00
14058	51-52-53	A. C. Line Cord and Plug Assembly	.40
14025	52	Band Selector Switch	1.00
14202	53	Band Selector Switch	1.25
		Knobs, each	.20

When ordering knobs give coloring, size, shape, shaft size, if push or set screw type, model of set, and style of cabinet.

NOTE

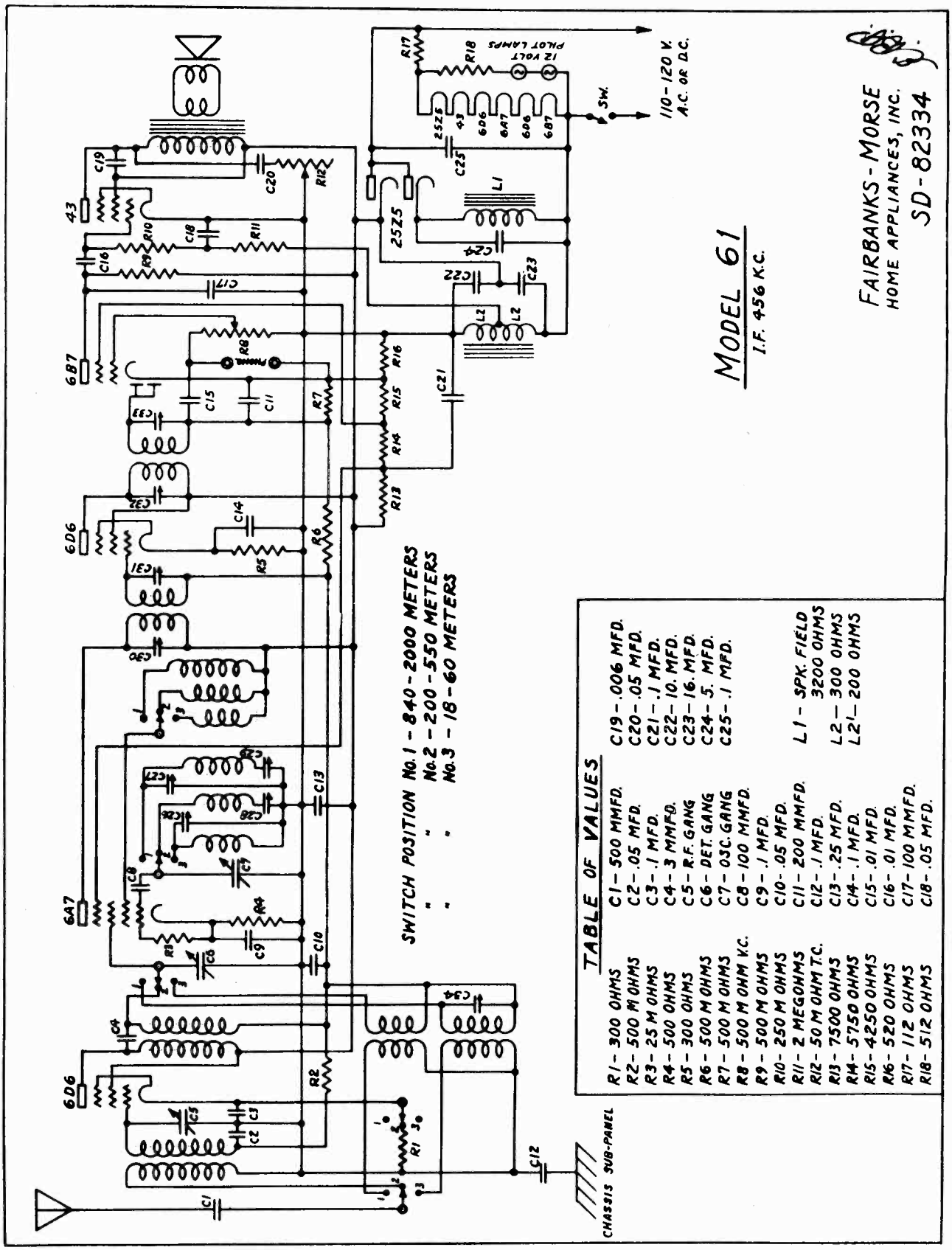
Speaker cones cannot be supplied.

Speakers on which cones have been damaged will be repaired at the following prices:

5 Inch Speaker Cone Repair	2.50
6 Inch Speaker Cone Repair	2.50
8 Inch Speaker Cone Repair	2.50

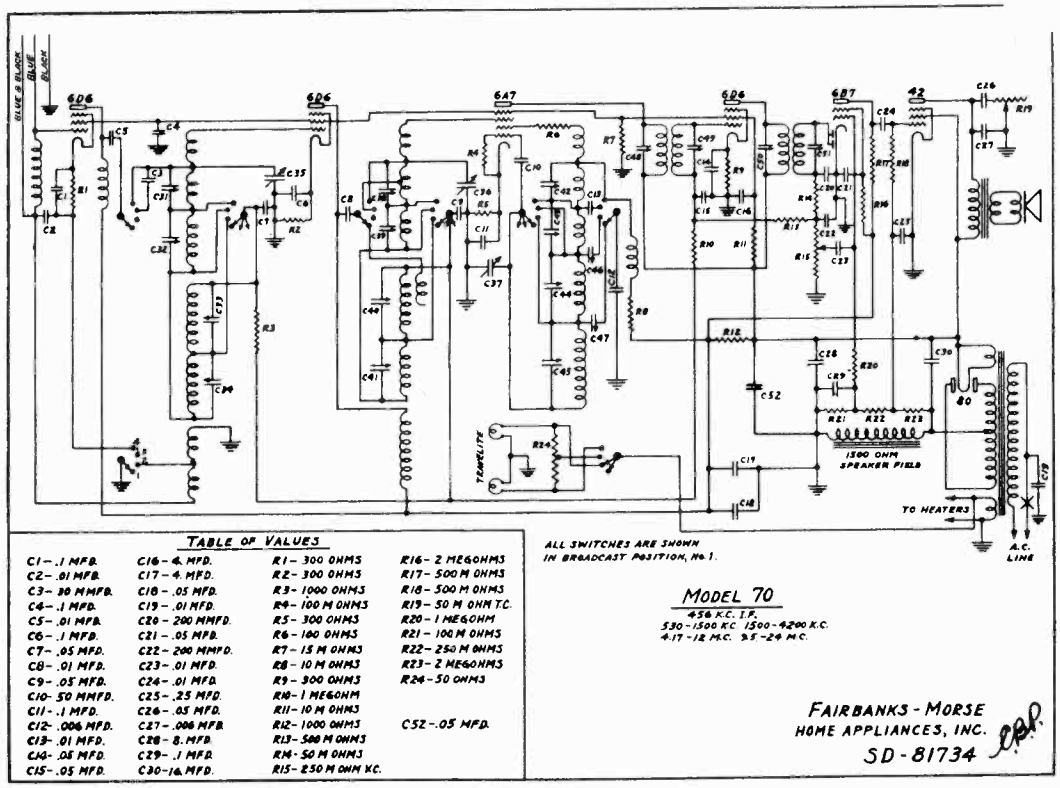
MODEL 61
Schematic

FAIRBANKS-MORSE HOME APP., INC.



MODEL (70),7014,
7040,7052
Schematic,Coil Data

FAIRBANKS-MORSE HOME APP., INC.



First I.F. Transformer

Plate	Blue
"B" Plus	Red
Grid Return	Black
Grid (Top)	Green
Capacity Lead	Green or Black

Second I.F. Transformer

Plate	Blue
"B" Plus	Red
Diode Return	Black
Diodes	Green

FIGURE 2

Power Transformer

Primary	Two White Leads
6.3 Volt Filament	Two Black Leads
5. Volt Filament	Two Green Leads
High Voltage	Two Yellow Leads
C.T. High Voltage	Green and Yellow

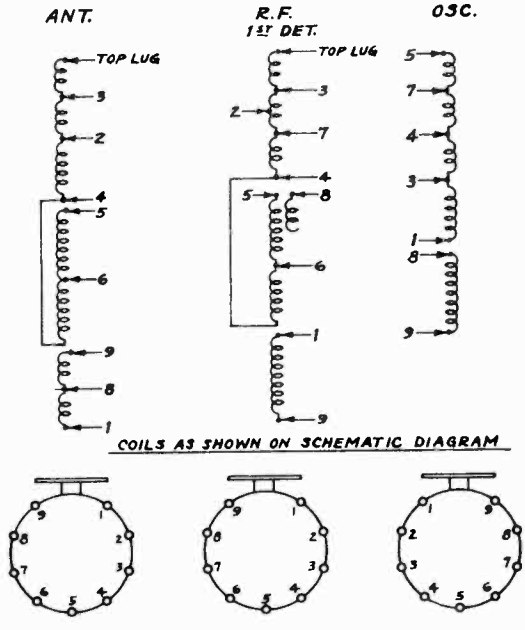
Dry Electrolytic Condenser (EL-18)

4 Mfd. 300 Volt	Blue Lead
4 Mfd. 300 Volt	Red and White
Common Ground	Black Lead

COIL RESISTANCE VALUES

(Refer to Figure 5 for reference point numbers)

COIL	FROM	TO	D. C. RESISTANCE
Antenna	Top Lug	3	.13 Ohm
	3	2	.02 Ohm
	2	4	.04 Ohm
	5	6	3.5 Ohms
	6	4	1. Ohm
	1	8	3. Ohms
	8	9	5.75 Ohms
R. F. First Detector	Top Lug	3	.08 Ohm
	3	2	.03 Ohm
	2	7	.025 Ohm
	7	4	.025 Ohm
	5	6	3.6 Ohms
	6	4	1. Ohm
	1	9	19. Ohms
Oscillator	9	8	.6 Ohm
	1	3	.02 Ohm
	3	4	.06 Ohm
	4	7	.9 Okm
	7	5	4.5 Ohms



MISCELLANEOUS RESISTANCES

Power Transformer

Primary Winding	6. Ohms
6.3 Volt Winding	.12 Ohm
5. Volt Winding	.14 Ohm
High Voltage Winding	350. Ohms

Oscillator "B" Choke
11. Ohms
Antenna Choke
.7 Ohm
Antenna Plate Choke
3.5 Ohms

FIGURE 5

MODEL (70),7014,
7040,7042
Alignment,Parts

FAIRBANKS-MORSE HOME APP., INC.

DISTORTIONLESS AUTOMATIC VOLUME CONTROL

Full automatic volume control, detection, and audio amplification are obtained through the use of a 6B7 tube. The diode plates of the tube are connected together to form a half wave rectifier. Due to the characteristics of this portion of the tube, current flows from the cathode to the diode plates and through the secondary of the second I.F. transformer through resistors R-14 and R-15 to ground, and back to the cathode to form a complete circuit. A voltage drop is produced across resistor R-15. The D. C. component of this drop is added to the fixed bias on the 6A7 and two of the 6D6 tubes to produce automatic volume control. The magnitude of this voltage is dependent on the strength of the incoming signal carrier. This circuit has been carefully designed so that no delay is present. This avoids any possibility of audio distortion. R-3; R-10; and R-13 are decoupling resistors. C-7; C-9; and C-15 are R.F. by-pass condensers, to provide a direct path to ground for signal currents. Resistor R-14 and condensers C-20 and C-22 form a filter circuit to remove extraneous noises from the rectified current.

The audio component of the voltage drop across resistor R-15 is taken off through condenser C-23 and is applied to the grid of the pentode section of the 6B7.

ALIGNMENT PROCEDURE

To insure the performance this set is capable of delivering the following instructions should be carefully studied before any alignment adjustments are attempted.

Proper adjustment of the tuned circuits will only be possible through the use of a reliable, all wave, service oscillator and an output meter. Two types of service oscillators have been tested in our laboratories and found satisfactory for use in aligning the model 70. The new Clough-Brengle, continuously variable, Model OC manufactured by the Clough-Brengle Company, 1134 West Austin Avenue, Chicago, Illinois, was very satisfactory. The Triumph Universal, Model 100 built by the Triumph Manufacturing Co., 4017 West Lake Street, Chicago, Illinois, was also satisfactory.

All adjustments should be made with the volume control full "on". Any desired variations in signal strength should be obtained by adjusting the output of the service oscillator.

I. F. ALIGNMENT

All Intermediate Frequency alignment adjustments must be made with the band selector switch in the broadcast position (Band Number One).

1. Supply a 456 Kilocycle signal, from an accurate service oscillator, to the grid of the 6A7 tube. A small condenser, about .00005 Mfd. (50 Mmfd.), should be connected in series with the oscillator lead to prevent the characteristics of the oscillator circuit from affecting the I. F. transformer.

2. Adjust the grid side (the center screw, Figure 3) of the first I. F. transformer, carefully, for maximum output with minimum input from the service oscillator.

3. Adjust the plate side (the hexagon nut, Figure 3) of the first I. F. transformer, carefully, for maximum output with minimum input from the service oscillator.

4. Repeat steps 2 and 3 on the second I. F. transformer.

5. Much of the sensitivity and selectivity of the receiver depend upon the proper setting of these critical adjustments, for this reason it is advisable to go back over them to make sure they are correct.

ANTENNA, R.F. FIRST DETECTOR, AND OSCILLATOR

The adjustment condensers for the antenna, R.F. first detector, and oscillator stages are located in the same shields that house the coils for these stages. These coils are contained in the three large aluminum shield cans located to the right of the gang condenser, on the chassis. Four holes are located in the side of each of these cans through each of which a condenser adjusting screw is accessible.

On each coil the **upper screw** is for **band number one** (530—1500 kilocycles). The **second screw**, from the top, is for **band number two** (1500—4200 Kilocycles). The **third screw**, from the top, is for **band number three** (4.17—12 Megacycles). The **fourth screw**, from the top, is for **band number four** (9.5—24 Megacycles).

The first shield, from the front of the chassis, contains the oscillator coil. The second shield, from the front of the chassis, contains the R.F. first detector coil. The third or rear shield contains the antenna coil.

The adjustment condensers located in these three coil cans serve the same purpose as the small trimmers usually found on the gang condenser of a strictly broadcast receiver. Since this set covers four wave bands, four separate trimmers are necessary for each stage. A non-metallic tool must be used for making adjustments on these condensers.

BAND NUMBER ONE
(530-1500 Kilocycles)

1. Supply a 1500 Kilocycle signal to the antenna of the set. Turn the gang condenser all the way out of mesh. Adjust the oscillator trimmer condenser for maximum output with minimum input from the service oscillator.

2. Supply a 1400 Kilocycle signal to the antenna of the set. Tune the gang condenser to 1400 Kilocycles. Adjust the R.F. first detector trimmer for maximum output with minimum input from the service oscillator. Adjust the antenna trimmer for maximum output with minimum input from the service oscillator.

3. Supply a 600 Kilocycle signal to the antenna of the set. Tune the gang condenser to 600 Kilocycles. Adjust the **upper section** (C-47, Figure 4) of the low frequency padding condenser for maximum output with minimum input from the service oscillator. At the same time rock the gang condenser back and forth across the signal to make sure the correct peak is obtained. The low frequency padding condensers are located on the right front side of the chassis.

BAND NUMBER TWO
(1500-4200 Kilocycles)

1. Supply a 4200 Kilocycle signal to the antenna of the set. Turn the gang condenser all the way out of mesh. Adjust the oscillator trimmer condenser for maximum output with minimum input from the service oscillator.

2. Supply a 3900 Kilocycle signal to the antenna of the set. Tune the gang condenser to 3900 Kilocycles. Adjust the R.F. first detector trimmer for maximum output with minimum input from the service oscillator.

Adjust the antenna trimmer for maximum output with minimum input from the service oscillator.

3. Supply a 1650 Kilocycle signal to the antenna of the set. Tune the gang condenser to 1650 Kilocycles. Adjust the **lower section** (C-46, Figure 4) of the low frequency padding condenser for maximum output with minimum input from the service oscillator. At the same time rock the gang condenser back and forth across the signal to make sure the correct peak is obtained. The low frequency padding condensers are located on the right front side of the chassis.

BAND NUMBER THREE
(4.17—12 Megacycles)

1. Supply a 12 Megacycle signal to the antenna of the set. Turn the gang condenser all the way out of mesh. Adjust the oscillator trimmer condenser for maximum output with minimum input from the service oscillator.

2. Supply an 11 Megacycle signal to the antenna of the set. Tune the gang condenser to 11 Megacycles. Adjust the R.F. first detector trimmer for maximum output with minimum input from the service oscillator.

Adjust the antenna trimmer for maximum output with minimum input from the service oscillator.

BAND NUMBER FOUR
(9.5—24 Megacycles)

1. Supply a 24 Megacycle signal to the antenna of the set. Turn the gang condenser all the way out of mesh. Adjust the oscillator trimmer condenser for maximum output with minimum input from the service oscillator.

2. Supply a 22 Megacycle signal to the antenna of the set. Tune the gang condenser to 22 Megacycles. Adjust the R.F. first detector trimmer for maximum output with minimum input from the service oscillator.

Adjust the antenna trimmer for maximum output with minimum input from the service oscillator.

GANG CONDENSER PLATES

The adjustment of the various plates of the gang condenser is very critical since it must be accurate on four bands. These adjustments are made in the factory with precision equipment and under no condition should it be necessary to change them by bending plates.

DIAL CALIBRATION

Tune in a weak station of known frequency, on the low frequency end of the broadcast band. If the reading on the dial scale is incorrect, loosen the set screw on the hub of the dial. Turn the dial carefully until the correct reading is obtained. This should be done in such a manner as not to disturb the setting of the gang condenser. After the station comes in at the correct frequency tighten the set screw.

Part Number	Description	List Price
14516	3 Gang Variable Condenser	$6.00
C-204	4 Gang Trimming Condenser	.60
C-208	Dual Padder Condenser (C-46, C-47)	1.50
EC-2	.01 Tubular Condenser (C-5, C-13, C-23, C-24) 400 Volt	.20
EC-4	.05 Tubular Condenser (C-18, C-21, C-26) 400 Volt	.20
EC-5	.1 Tubular Condenser (C-1, C-4, C-6, C-11, C-29) 300 Volt	.25
EC-7	.25 Tubular Condenser (C-25) 300 Volt	.30
EC-12	.006 Tubular Condenser (C-12, C-27) 400 Volt	.20
EC-20	.01 Tubular Condenser Metal Clad (C-19) 400 Volt	.40
EC-26	.05 Tubular Condenser (C-7, C-9, C-14, C-15) 300 Volt	.20
C-305	.0002 Mica Condenser Wire Lead (C-20, C-22)	.20
C-310	.00005 Mica Condenser Wire Lead (C-10)	.20
R-5004	Travelite Unit 50 Ohms (Wirewound) (R-24)	.50
V-6508	250 M Volume Control (R-15)	.80
V-6509	50 M Tone Control and Switch (R-19)	1.20
R-816	100 Ohm ¼ Watt Resistor (R-6)	.20
R-846	300 Ohm ¼ Watt Resistor (R-1, R-2, R-5, R-9)	.20
R-1146	50M Ohm ¼ Watt Resistor (R-4, R-14, R-19, R-24)	.20
R-1191	100M Ohm ¼ Watt Resistor (R-21) (R-4 Early Sets)	.20
R-1236	250M Ohm ¼ Watt Resistor (R-15, R-22)	.20
R-1266	500M Ohm ¼ Watt Resistor (R-13, R-17, R-18)	.20
R-1296	1 Megohm ¼ Watt Resistor (R-20)	.20
R-1311	2 Megohm ¼ Watt Resistor (R-16)	.20
R-1491	1M Ohm ½ Watt Resistor (R-3, R-12)	.20
R-1656	10M Ohm ½ Watt Resistor (R-8, R-11)	.20
R-1896	1 Megohm ½ Watt Resistor (R-10)	.20
R-2286	15M Ohm 1 Watt Resistor (R-7)	.20
R-2856	10M Ohm 3 Watt Resistor (R-8, R-11)	.30
14527	Antenna Coil Assembly in Can	3.50
14528	R. F. First Detector Coil Assembly in Can	3.50
14529	Oscillator Coil Assembly in Can	3.50
14548	Antenna Choke Coil	.50
14549	R. F. Primary Coil	.75
14550	Oscillator Choke Coil	1.00
14530	8 Inch D-16 Speaker	12.00
14531	10 Inch D-19 Speaker	16.00
K-565	Knobs, Small, Round ⅞" Diameter	Each .20
K-569	Knobs, Large, Round 1⅛"	Each .25

FAIRBANKS-MORSE HOME APP., INC.

MODEL (70)
7040,7042,7014
Socket,Trimmers
Parts View

FIGURE 3

FIGURE 4

WAVE BANDS

The Model 70 is an all wave chassis covering a frequency range from 530 Kilocycles to 24 Megacycles in four bands. Band selection is accomplished by means of a dual four gang switch, controlled by a knob located on the right side of the front panel. The counter-clockwise (extreme left) position is **Band Number One** (530—1500 Kilocycles); turning in a clockwise direction, the next position is **Band Number Two** (1500—4200 Kilocycles); the next position is **Band Number Three** (4.17—12 Megacycles); and the next position (extreme right) is **Band Number Four** (9.5—24 Megacycles). One Megacycle is 1000 Kilocycles.

TUBES AND CIRCUIT

New multi-purpose tubes are employed thereby giving performance equal to the ordinary ten tube set. Two type 6D6 tubes are used as first and second radio frequency amplifiers. A 6A7 is used as a combined oscillator and first detector. A 6D6 is used as the intermediate frequency amplifier. A 6B7 tube is employed and performs three functions, second detector, distortionless automatic volume control, and first audio amplifier. A 42 is used as the audio output tube. A familiar type 80 rectifier is used in a full wave power supply circuit.

Several unique features will be found in this chassis. The most unusual is that two radio frequency amplifier stages are employed on both of the higher frequency bands. Special low loss coils are used. Each coil has a separate high frequency trimmer for each band. A total of eight tuned circuits are brought into use on each band. A new type, high gain, intermediate frequency transformer is used.

HUM

A ground is made to the A. C. line through a .01 Mfd. condenser, connected to the primary of the power transformer. If a hum is noted in the set the A. C. plug should be reversed to connect the grounded side of the line to the grounded side of the set. In most cases the line ground is some distance from the wall outlet to which the set is connected, for this reason an external ground should be used.

STANDARD R M A
Resistor and Condenser Color Code

0 Black	2 Red	4 Yellow	6 Blue	8 Grey
1 Brown	3 Orange	5 Green	7 Purple	9 White

Resistors

The **Body Color** represents the **first figure** of the resistance value.
The **End Color** represents the **second figure** of the resistance value.
The **Dot Color** represents the **number of ciphers** following the first two figures.

Mica Condensers
(Capacity in Micro-Microfarads)

The **First Dot** on the condenser represents the **first figure** of the capacity.
The **Second Dot** on the condenser represents the **second figure** of the capacity.
The **Third Dot** on the condenser represents the **number of ciphers** following the first two figures.
The colors on the condensers should be read from left to right with the condenser in an upright position.

MODEL (70) Series
Voltage Data

FAIRBANKS-MORSE HOME APP., INC.

VOLTAGE ANALYSIS CHART

Voltage readings should be taken with all tubes in their sockets. The volume and tone controls should be full "on". The antenna should be disconnected. The blue wire and the blue and black wire should be twisted to the black wire.

FROM GROUND TO†	MEASURED VOLTAGES**				METER††	
	Band 1 530-1500 Kilocycles	Band 2 1500-4200 Kilocycles	Band 3 4.17-12 Megacycles	Band 4 9.5-24 Megacycles	Range in Volts	Resistance of Range In Ohms
6D6 Ant. Stage						
1. Cathode	17	16	2.5	2.5	30	30,000
2. Suppressor	17	16	2.5	2.5	30	30,000
3. Screen	100	100	85	85	300	300,000
4. Plate	225	225	210	210	300	300,000
5. Heater	0	0	0	0	...	.....
6. Heater	6.15 A. C.	6.15 A. C.	6.15 A. C.	6.15 A. C.	...	.....
7. Grid	0	0	0	0	...	.....
6D6 R. F. Stage						
8. Cathode	3	3	2.5	2.5	30	30,000
9. Suppressor	3	3	2.5	2.5	30	30,000
10. Screen	100	100	85	85	300	300,000
11. Plate	225	225	210	210	300	300,000
12. Heater	0	0	0	0	...	.....
13. Heater	6.15 A. C.	6.15 A. C.	6.15 A. C.	6.15 A. C.	...	.....
14. Grid	0	0	0	0	...	.....
6A7 Converter						
15. Cathode*	2.8	3	3.5	4	30	30,000
16. Osc. Grid G1*	—6.5	—3	2	2	30	30,000
17. Osc. Plate G2	180	175	150	130	300	300,000
18. Screen G3-G5	100	100	85	85	300	300,000
19. Plate	235	235	230	230	300	300,000
20. Heater	6.15 A. C.	6.15 A. C.	6.15 A. C.	6.15 A. C.	...	.....
21. Heater	0	0	0	0	...	.....
22. Grid	0	0	0	0	...	.....
6D6 I. F. Stage						
23. Cathode	2.5	2.5	2	2	30	30,000
24. Suppressor	2.5	2.5	2	2	30	30,000
25. Screen	100	100	85	85	300	300,000
26. Plate	235	235	230	230	300	300,000
27. Heater	6.15 A. C.	6.15 A. C.	6.15 A. C.	6.15 A. C.	...	.....
28. Heater	0	0	0	0	...	.....
29. Grid	0	0	0	0	...	.....
6B7 Det. and A. F.						
30. Cathode	0	0	0	0	...	.....
31. Diode Plate	0	0	0	0	...	.....
32. Diode Plate	0	0	0	0	...	.....
33. Screen	30	30	27.5	27.5	300	300,000
34. Plate	35	35	35	35	300	300,000
35. Heater	0	0	0	0	...	.....
36. Heater	6.15 A. C.	6.15 A. C.	6.15 A. C.	6.15 A. C.	...	.....
37. Grid	.....	.....	.....	.....	...	.....
42 Output						
38. Cathode	0	0	0	0	...	.....
39. Grid	— 1	— 1	— 1	— 1	30	30,000
40. Screen	235	235	230	230	300	300,000
41. Plate	225	225	220	220	300	300,000
42. Heater	0	0	0	0	...	.....
43. Heater	6.15 A. C	6.15 A. C	6.15 A. C.	6.15 A. C.	...	.....
80 Rectifier						
44. Plate	—130	—130	—135	—135	300	300,000
45. Plate	—130	—130	—135	—135	300	300,000
46. Filament	235	235	230	230	300	300,000
47. Filament	235	235	230	230	300	300,000
	A. C. Line—115 Volts					

†The figures in the first column refer to the socket hole numbers shown on Figure 3.
††It is essential that a meter be used which is similar to the one indicated in the last two columns.
**Allowable variation—10% plus or minus on all readings.
*Subject to large variations due to 6A7 characteristics.

FAIRBANKS-MORSE HOME APP., INC.

MODEL 70 Series
Voltage Data

RESISTANCE ANALYSIS CHART

These tests should be made with an accurate ohm-meter. The speaker must be connected. All tubes must be removed from the set. The volume and tone controls should be full "on". The A.C. line plug must be removed from the A.C. outlet.

FROM†	TO	Resistance In Ohms*	If Reading Differs More Than 10% Plus or Minus From Stated Value Check These Parts
6D6 Ant. Stage			
1. Cathode	Ground	300	C-1; R-1; Switch (switch must be on Band 3 or 4)
2. Suppressor	Ground	300	C-1; R-1; Switch (switch must be on Band 3 or 4)
3. Screen	Ground	15,000	C-4; C-16; C-52; C-28; C-30; C-26; C-27; C-17; C-18; C-12; R-7; R-11; R-12
4. Plate	Ground	26,000	C-5; C-8; C-17; C-18; C-28; C-30; C-16; C-4; C-52; R-12; R-11; R-7; Plate Choke
5. Heater	Ground	0	Open Ground
6. Heater	Ground	0	Filament Winding; Travelite
7. Grid	Ground	10	Antenna Choke; R. F. Primary
6D6 R. F. Stage			
8. Cathode	Ground	300	C-6; R-2
9. Suppressor	Ground	300	C-6; R-2
10. Screen	Ground	15,000	C-4; C-16; C-52; C-28; C-30; C-26; C-27; C-17; C-18; C-12; R-7; R-11· R-12
11. Plate	Ground	26,000	C-5; C-8; C-17; C-18; C-28; C-30; C-16; C-4; C-32; R-12; R-11; R-7; Coil Primary
12. Heater	Ground	0	Open Ground
13. Heater	Ground	0	Filament Winding; Travelite
14. Grid	Ground	1.75 Meg.	C-7; C-9; C-15; C-22; R-3; R-10; R-13; R-15; Coil; Switch
6A7 Converter			
15. Cathode	Ground	300	C-11; R-5
16. Osc. Grid G1	Ground	50,300	C-10; C-11; R-4; R-5 (100,000 on early production)
17. Osc. Plate G2	Ground	36,100	C-13; C-17; C-18; C-28; C-30; C-52; C-26; C-27; C-16; C-4; C-12; R-8; R-6; R-12; R 11; R-7; Coil; Choke; Switch
18. Screen G3-G5	Grouud	15,000	C-4; C-16; C-52; C-28; C-30; C-26; C-27; C-17; C-18; C-12; R-7; R-11; R-12
19. Plate	Ground	25,000	C-52; C-28; C-30; C-16; C-4; C-17; C-18; C-26; C-27; R-11; R-7; R-12; I. F. Primary
20. Heater	Ground	0	Filament Winding
21. Heater	Ground	0	Open Ground
22. Grid	Ground	1.75 Meg.	C-7; C-9; C-15; C-22; R-10; R-13; R-15; Coil; Switch
6D6 I. F. Stage			
23. Cathode	Ground	300	C-14; R-9
24. Suppressor	Ground	300	C-14; R-9
25. Screen	Ground	15,000	C-4; C-16; C-52; C-28; C-30; C-26; C-27; C-17; C-18; C-12; R-7; R-11; R-12
26. Plate	Ground	25,000	C-52; C-28; C-30; C-16; C-4; C-17; C-18; C-26; C-27; R-11; R-7; R-12; I. F. Primary
27. Heater	Ground	0	Filament Winding; Travelite
28. Heater	Ground	0	Open Ground
29. Grid	Ground	750,000	C-15, C-22; R-13; R-15; I. F. Secondary
6B7 Det. and A. F.			
30. Cathode	Ground	0	Connection
31. Diode Plate	Ground	300,000	C-20; C-22; C-23; R-14; R-15; I. F. Secondary
32. Diode Plate	Ground	300,000	C-20; C-22; C-23; R-14; R-15; I. F. Secondary
33. Screen	Ground	2 Meg.	C-21; R-16; R-12; R-11; R-7
34. Plate	Ground	526,000	C-24; C-5; C-8; C-17; C-18; C-28; C-30; C-16; C-4; C-32; R-17; R-12; R-11; R-7
35. Heater	Ground	0	Open Ground
36. Heater	Ground	0	Filament Winding; Travelite
37. Grid	Ground	1.1 Meg.	C-23; C-29; R-20; R-21
42 Output			
38. Cathode	Ground	0	Connection
39. Grid	Ground	800,000	C-24; C-25; C-29; R-18; R-21; R-22; R-23; Field
40. Screen	Ground	25,000	C-30; C-28; C-52; C-16; C-4; C-26; C-27; C-17; C-18
41. Plate	Ground	25,450	C-26; C-27; C-30; C-28; C-52; C-16; C-4; C-17; C-18; Output Transformer
42. Heater	Ground	0	Open Ground
43. Heater	Ground	0	Filament Winding; Travelite
80 Rectifier			
44. Plate	Ground	1,675	High Volgage Secondary; Field
45. Plate	Ground	1,675	High Voltage Secondary; Field
46. Filament	Ground	25,000	C-30; C-28; C-52; C-16; C-4; C-26; C-27; C-17; C-18
47. Filament	Ground	25,000	C-30; C-28; C-52; C-16; C-4; C-26; C-27; C-17; C-18
Miscellaneous			
48. A. C. Line	Ground	Open	C-19; Primary; Switch
49. A. C. Line	Ground	Open	C-19; Primary; Switch
50. Ant. (Blue)	Ground	0	Antenna Choke; R. F. Primary
51. Doublet (Blue & Black)	Ground	0	R. F. Primary
52. Ground (Black)	Ground	0	Connection
48. A. C. Line	49. A. C. Line	6	Primary; Switch; A. C. Cord; Plug
44. Plate 80	45. Plate 80	350	High Voltage Secondary
46. Fil. 80	47. Fil. 80	0	Rectifier Filament Winding

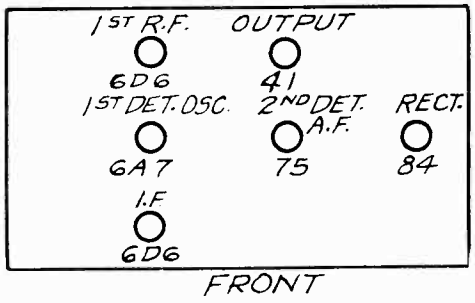
Travelite sockets and R-24 must be checked separately.

*If some resistance readings are low try reversing polarity of Ohm-meter.

†The figures in the first column refer to the socket hole numbers shown on Figure 3.

MODEL 346,B-6
MODEL 347
Schematics,Voltage
Socket

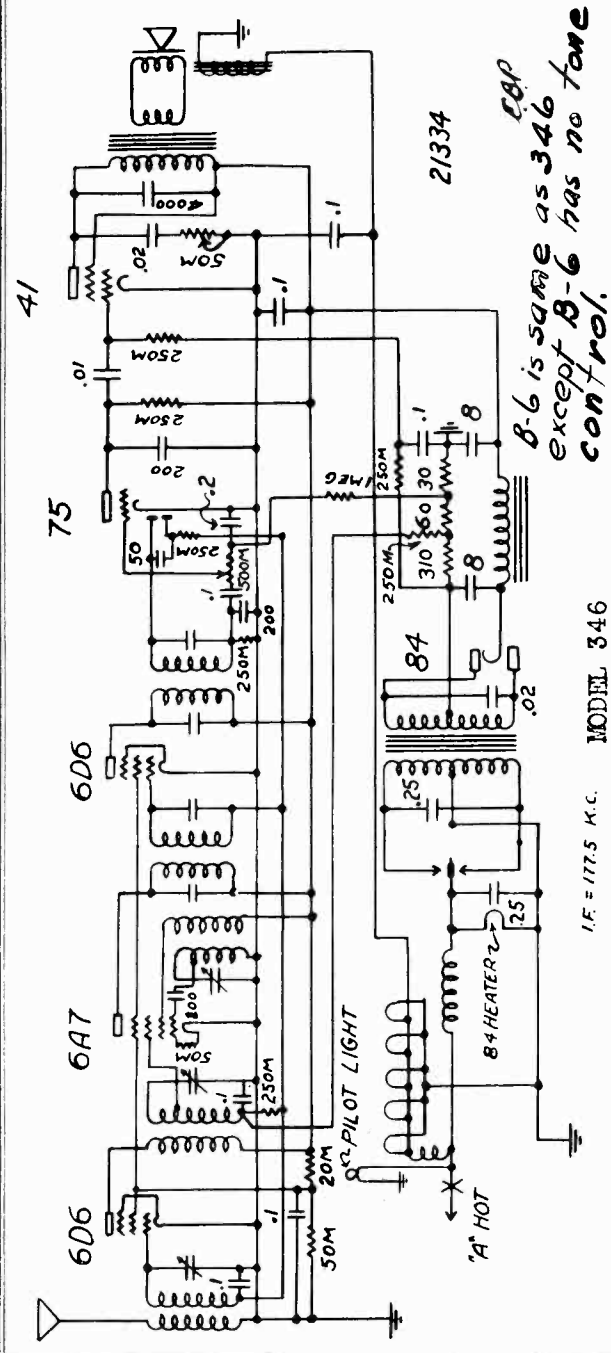
FAIRBANKS-MORSE HOME APP., INC.

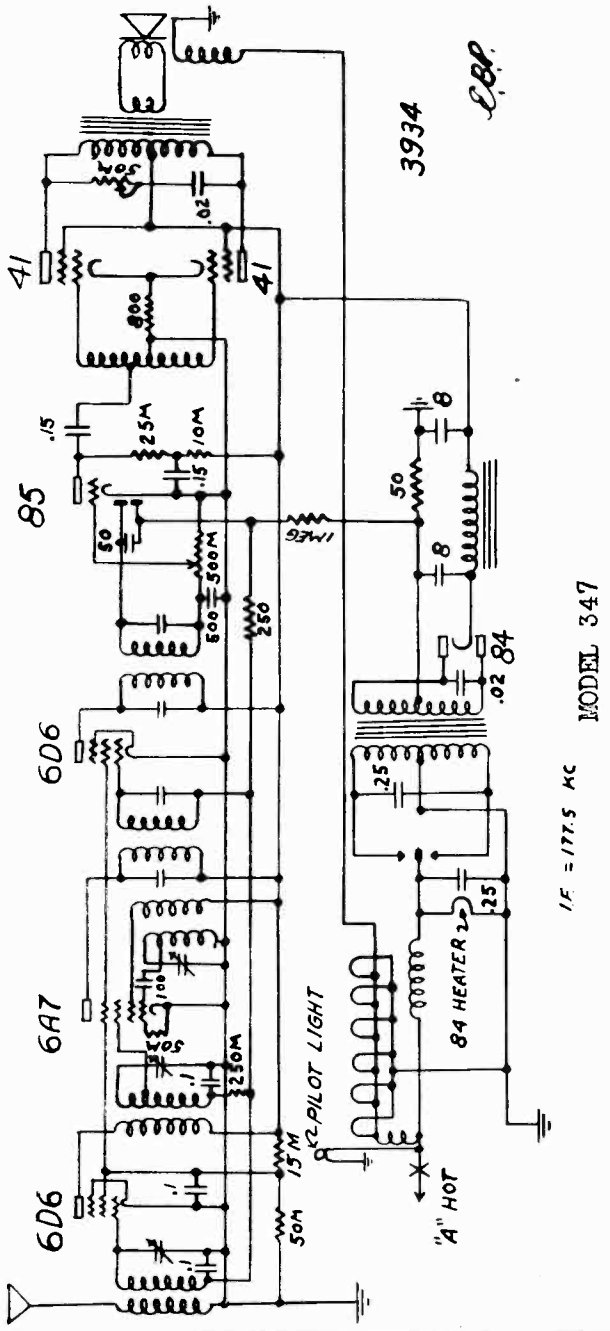


VOLTAGE CHART

The following chart gives the voltages and plate currents of all the tubes when the set is in operating condition, but with no signal being received. A thousand ohm-per-volt meter of the 0-250 volt type is used for all voltage readings.

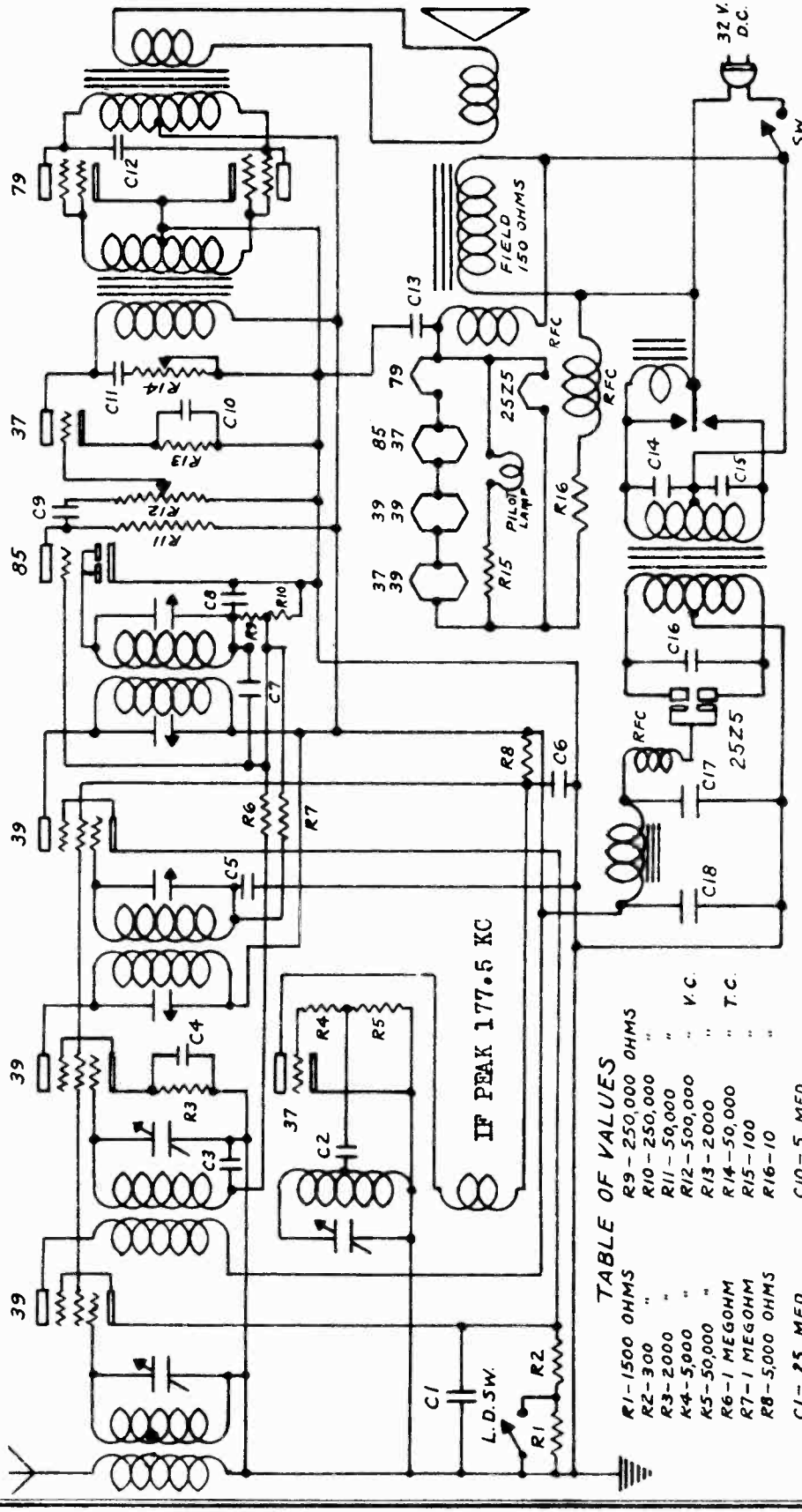
Type of Tube	Function	Heater Voltage	Plate to Ground	Screen to Ground	Grid to Ground	Normal Plate M.A.
6D6	R. F.	6.1	230	100	1b	5
6A7	1st Det.		230			2.5
	and Osc.	6.1	230a	100	1b	5.5a
6D6	I. F.	6.1	230	100	1b	5
75	2nd Det.					
	1st Audio	6.1	120			.3
41	Output	6.1	215	230	10c	15





FAIRBANKS-MORSE HOME APP., INC.

MODEL 32 Volt
Schematic



FAIRBANKS - MORSE
HOME APPLIANCES, INC.
32 VOLT DIRECT CURRENT RECEIVER
S.D. 8234

TABLE OF VALUES

R1-1500 OHMS	R9-250,000 OHMS	C10-.5 MFD.	
R2-300 "	R10-250,000 "	C11-.05 "	
R3-2000 "	R11-50,000 "	C12-.01 "	
R4-5,000 "	R12-500,000 "	V.C.	C13-.1 "
R5-50,000 "	R13-2000 "	T.C.	C14-.25 "
R6-1 MEGOHM	R14-50,000 "		C15-.25 "
R7-1 MEGOHM	R15-100 "		C16-.06 "
R8-5,000 OHMS	R16-10 "		C17-.8 "
C1-.25 MFD.			C18-.8 "
C2-500 MMFD.			
C3-.1 MFD.			
C4-.05 "			
C5-.1 "			
C6-.25 "			
C7-.05 "			
C8-1000 MMFD.			
C9-.02 MFD.			

MODEL 32 Volt
Voltage, Parts
Alignment

FAIRBANKS-MORSE HOME APP., INC.

VOLTAGES

Tolerances of about 10% plus or minus are allowable on the following list of measured voltages. In the event all voltages are low try replacing the 25Z5 rectifier tube or vibrator. All measurements are made to ground except on filament voltage.

TUBE		PLATE	GRID	SCREEN	CATHODE	HEATER
39	1st Det.	205	0	120	12.5	6.3
39	R. F.	205	0	120	5	6.3
39	I. F.	205	0	120	5	6.3
37	Osc.	120	0	-	0	6.3
37	A. F.	185	0	-	12.5	6.3
85	2nd Det.	45	0	-	0	6.3
79	A. F.	205 each	0 each	-	0	6.3
25Z5	Rect.	-	-	-	-	-

ALIGNMENT PROCEDURE

If the set is weak or broad it is possibly out of alignment and the following adjustments should be made.

1. A 177.5 kilocycle signal, from a good service oscillator, should be supplied to the grid of the 39 first detector tube thru a small condenser (.00005 MFD). The trimmers on the first and second I. F. transformers should be adjusted for maximum output with minimum input from the service oscillator. The first I. F. transformer is located at the left of the chassis and the second I. F. at the right of the chassis, viewed from the front. These trimmers may be reached from the bottom of the chassis.
2. Supply a 1500 kilocycle signal to the antenna of the set. Tune the dial to 1500 kilocycles. Adjust the trimmer on the oscillator section of the gang condenser (the rear section) for maximum output with minimum input from the service oscillator.

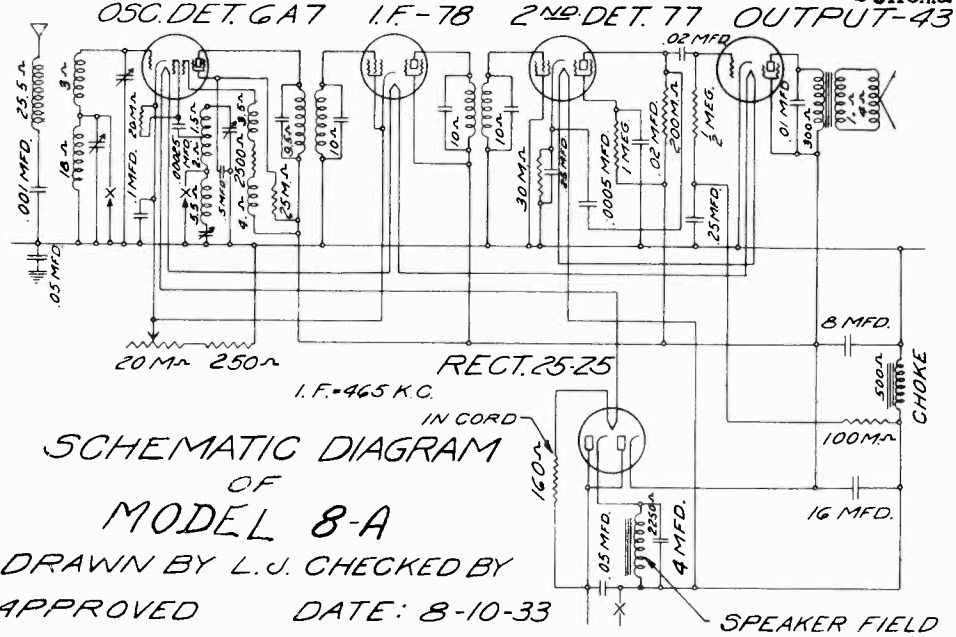
3. Adjust the trimmers on the R. F. and first detector sections of the gang condenser for maximum output with minimum input from the service oscillator.

PARTS LIST

Part Number	Description of Part
R-5005	10 Ohm Resistor Wire Wound
R-5006	100 Ohm Resistor Wire Wound
R-1446	300 Ohm Resistor 1/2 Watt
R-1506	1500 Ohm Resistor 1/2 Watt
R-921	2000 Ohm Resistor 1/4 Watt
R-1521	2000 Ohm Resistor 1/2 Watt
R-1581	5000 Ohm Resistor 1/2 Watt
R-1746	50,000 Ohm Resistor 1/2 Watt
R-2346	50,000 Ohm Resistor 1 Watt
R-1236	250,000 Ohm Resistor 1/4 W.
R-1836	250,000 Ohm Resistor 1/2 W.
14611	Dial Assembly Complete
V-6511	Volume Control
V-6512	Tone Control
SW-6102	Switch
R-1896	1 Megohm Resistor 1/2 Watt
C-304	500 MMFD. Moulded Condenser
C-311	1000 MMFD. Moulded Condenser
EC-1	.004 MFD. Condenser Tub. 400 V.
EC-3	.02 MFD. Condenser Tubular 400 V.
EC-4	.05 MFD. Condenser Tubular 400 V.
EC-5	.1 MFD. Condenser Tubular 300 V.
EC-6	.25 MFD. Condenser Tubular 400 V.
EC-7	.25 MFD. Condenser Tubular 300 V.
EL-6	5. MFD. Cond. Tub. Electrolyt. 25 V.
EL-9	8. MFD. Cond. Tub. Electrolyt. 250V.
14601	Power Transformer
14602	Vibrator Assembly
14603	Filter Choke
14604	Antenna Coil

FEDERATED PURCHASER

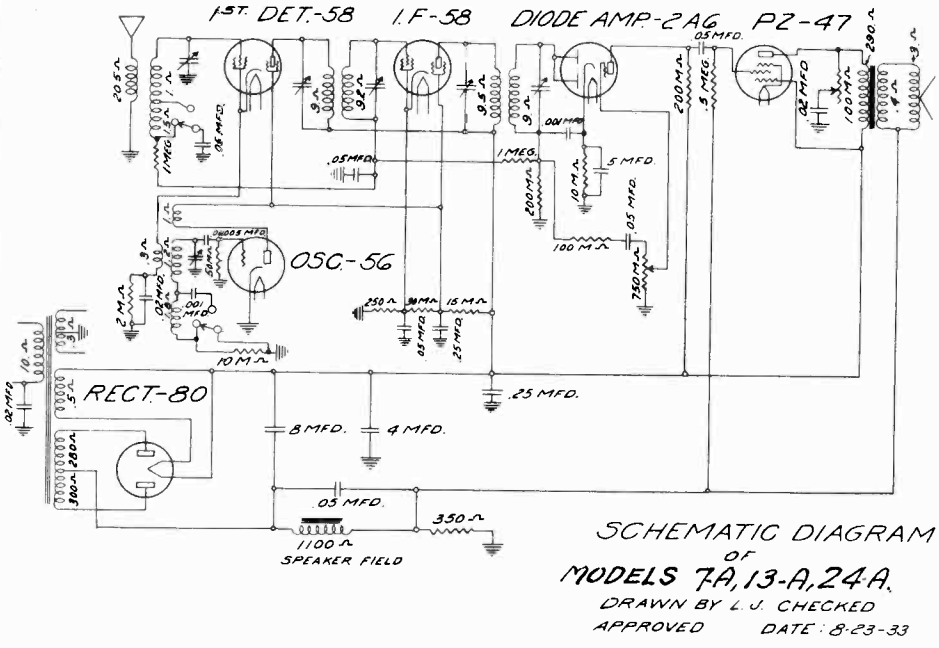
MODEL 8-A
Schematic, Voltage
MODEL 7-A, 13-A, 24-A
Schematic, Voltage



SOCKET VOLTAGE ANALYSIS OF MODEL 8-A
Line Voltage 110

TUBE	STAGE	Ep	Eg	Ek	Esg	Esug	Ip	Ep-O	Eg-O	Ip-O
6A7	Osc-Det.	105	2.4	20	38		1	92	.1	3
78	I-F.	105	2.1	20	105	0	6.5			
77	2 Det.	35	15	18	.6	1.4	.1			
43	Output	100	.3	18	107		19			
25Z5	Rectif.	110*		110**			37*			

* per plate ** per cathode Vol. Cont. Full On O-Oscillator



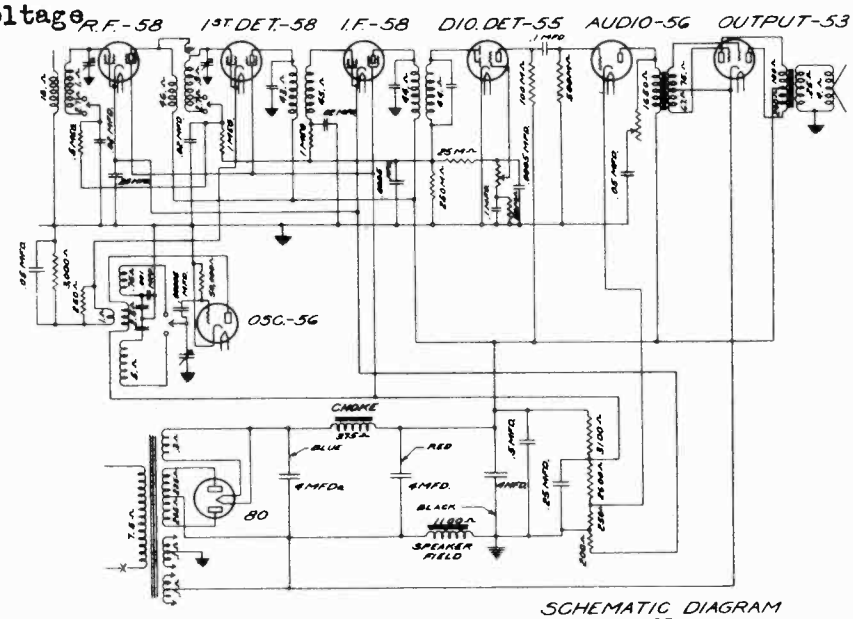
SOCKET VOLTAGE ANALYSIS OF MODELS 7-A, 13-A, 24-A
Line Voltage - 109 v.

TUBE	STAGE	Ep	Eg	Ek	Esg	Esug	Ip	Ef
58	1 Det	235	.4	7	80	0	2.7	2.1
56	Osc.	95	.6	0			5	2.1
58	I-F.	243	.3	2.2	85	0	6	2.1
2A6	Diode	140	4.	1.1	.1**		.2	2.1
47	Output	235	.5	240			24	2.1
80	Rectif.	328*					24*	4.7

* per plate ** Diode plate Vol.Cont.-Full On

MODEL 6-A,12-A
Schematic
MODEL 14-A
Schematic,Voltage

FEDERATED PURCHASER



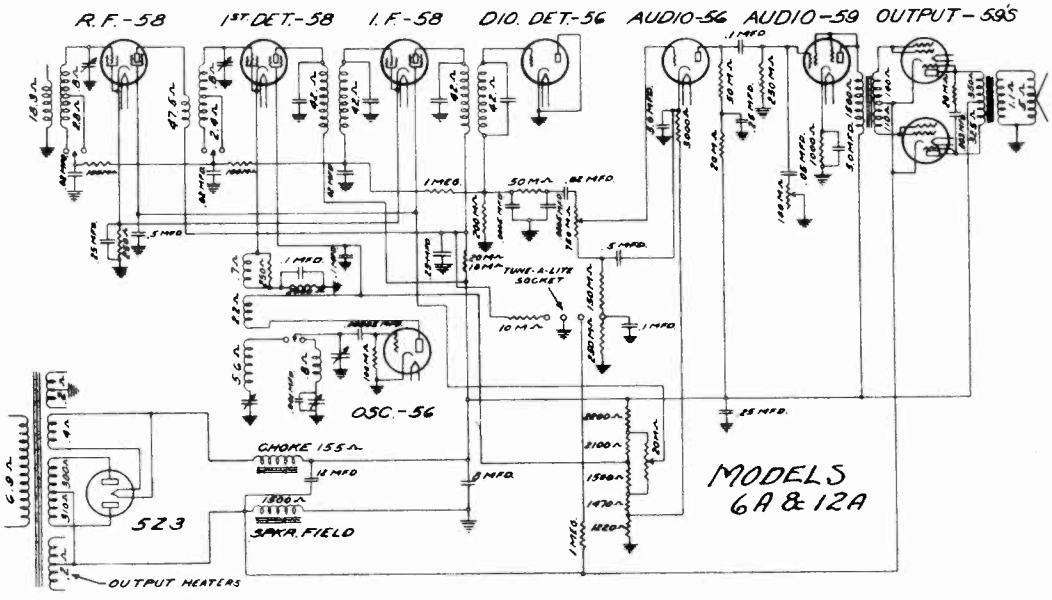
IF - 175 K.C.

SCHEMATIC DIAGRAM OF MODEL 14-A
DRAWN BY L.V. CHECKED BY
APPROVED DATE - 11-8-33

SOCKET VOLTAGE ANALYSIS OF MODEL 14-A
Line Voltage - 107 v.

TUBE	STAGE	Ep	Eg	Ek	Esg	Esug	Ip
58	R-F	190	.3	2.9	83	0	6
58	1 Det.	190	.3	7	78	0	2
56	Osc.	83	.3	0			4.5
58	I-F.	190	.3	2.9	83	0	5.5
55	Diode	36	.2	0	.2**		2
56	A-F.	198	.2	10			5
53	Output	292*	0	0			12*
80	Rectif.	292*					37*

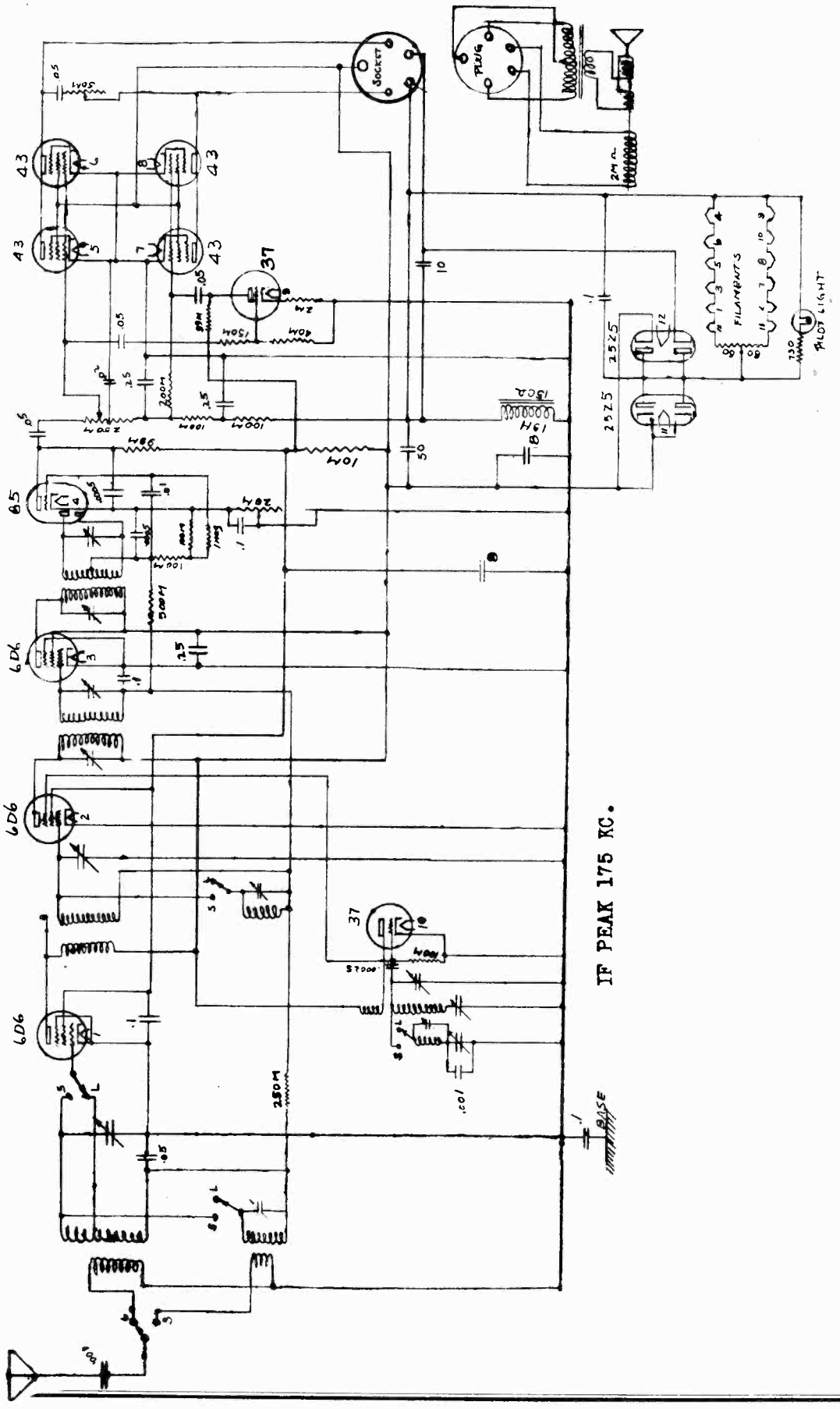
* per plate **Diode voltage Vo.Cont.Full On



I.F. = 175 K.C.

MODEL 32-A, 36-A
Schematic

FEDERATED PURCHASER



MODEL 32-A,36-A
Alignment,Voltage

FEDERATED PURCHASER

TABLE OF VOLTAGES

Line Voltage - 115 Volts - 60 Cycles AC
Interchannel Noise Suppressor Set for Maximum Sensitivity

Position	Tube	Plate	Screen	Cathode
RF	6D6	100	60	0
MOD	6D6	100	60	0
OSC	37	100		0
IF	6D6	100	100	0
DET	85	20		0
PHASE REVERSER	37	20		1-2V
OUTPUT	43		100	0

Above voltage's measured with 0-250 V--1000 ohm per volt DC Voltmeter
Drop ACROSS CHOKE - 18 Volts
Drop ACROSS SPEAKER FIELD -
When operated on 115 Volts DC or 25 cycle AC the above voltages will be slightly lower

FILAMENT VOLTAGES

25Z5	-	25 Volts	-	AC or DC
43	-	25 "	-	AC " DC
6D6	-	6.3 "	-	AC " DC
37	-	6.3 "	-	AC " DC
85	-	6.3 Volts	-	AC " DC

ALIGNMENT PROCEDURE

Should it ever become necessary to realign the RF and IF circuits, the procedure outlined below should be followed.

1. Apply a modulated 175 Kilocycle signal to the grid of the modulator (1st detector) tube and align the four dual trimmer adjustments in the top of the IF transformer cans for maximum output from the receiver.

2. With the band switch knob in the 530-1500 Kilocycle or clockwise position, and the tuning dial set to 1400 Kilocycles, apply a 1400 Kilocycle signal at the antenna and adjust the three trimmer screws on the gana condenser for maximum output from the receiver.

3. Apply a 600 Kilocycle signal at the antenna and track the oscillator by varying the nut adjustment on the oscillator padding condenser and returning the dial until maximum response is obtained. This adjustment should be made disregarding calibration.

4. With the band switch in the short wave or counter-clockwise position and the dial set to 3.6 Megacycles, apply a 3600 Kilocycle signal at the antenna and align the three trimmers in the top of the short wave coil cans for maximum response.

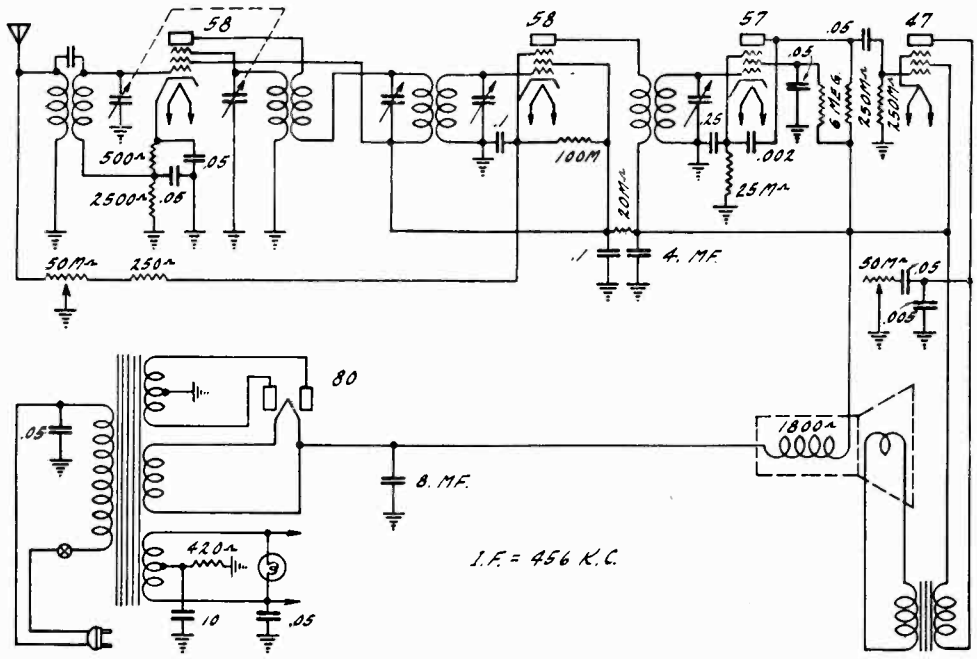
5. Apply a 1600 Kilocycle signal at the antenna and track the oscillator as at 600 Kilocycles in the broadcast band by adjusting the slotted screw adjustment on the oscillator padding condenser.

Suitable harmonies of a broadcast oscillator may be used for alignment purposes in the short wave band.

At all steps in the aligning procedure, the output should be kept only as high as is necessary for good alignment but the output should always be lowered by decreasing the input to the receiver, never by reducing the volume control setting. The volume control should be at maximum setting during any adjustments of the RF and IF circuits. A suitable output meter should be connected across the speaker voice coil to indicate the correct adjustment for maximum response.

FEDERATED PURCHASER

MODEL 38-A
Schematic, Voltage
Alignment



ALIGNMENT PROCEDURE

1. Apply a modulated 456 KC. signal to the grid of the modulator tube and align the four dual trimmer adjustments in the top of the I-F. transformer cans for maximum output from the receiver.

2. Apply a 600 KC. signal at the Antenna and track the Oscillator by varying the nut adjustment on the Oscillator Padding Condenser and turning the dial until maximum response is obtained. This adjustment should be made disregarding calibration.

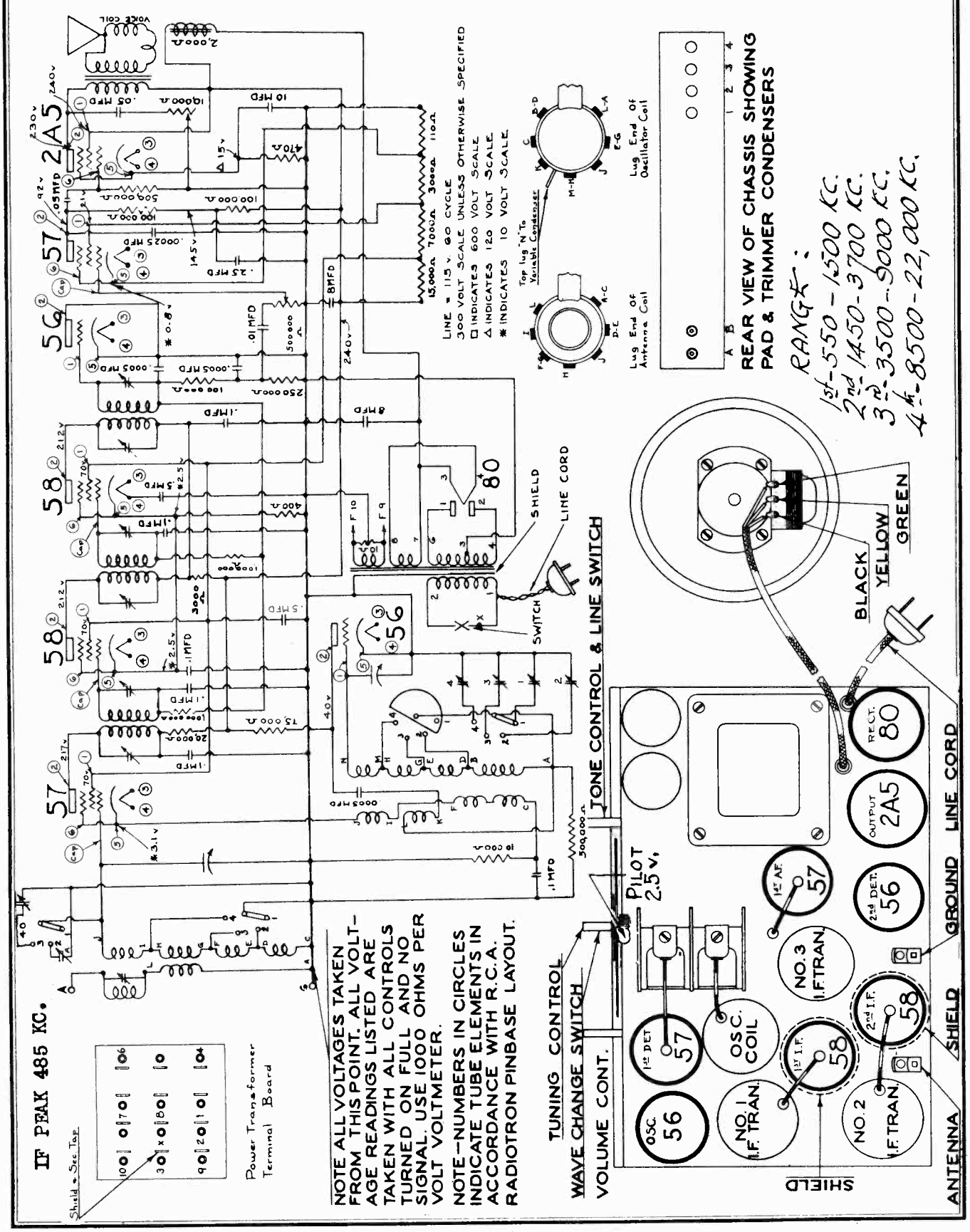
During the aligning procedure, the output should be kept only as high as is necessary for good alignment, but the output should ALWAYS BE LOWERED by decreasing the input to the receiver, NEVER by reducing the Volume Control setting. The Volume Control should be set at maximum during any adjustments of the R-F. and I-F. circuits. A suitable output meter should be connected across the speaker voice coil to indicate the correct adjustment for maximum response.

TABLE OF VOLTAGES Line: 115 volts, 60 cycles

TUBE	FUNCTION	GRID	PLATE	SCREEN	FILAMENT
58	Osc.1st Det.	-2.5	60	60	2.5
58	IF	-2.0	250	75	2.5
57	2nd Det.	-3.5	75	6	2.5
47	Output	-5.0	210	225	2.5
80	Rectifier Filament to Ground 325 volts.				5.0

MODEL 39-A, 43-A, 44-A,
86, 87
Schematic, Voltage,
Trimmers, Socket

FEDERATED PURCHASER



FEDERATED PURCHASER

IN ALL GANGING OPERATIONS USE THE WEAKEST SIGNAL THAT WILL GIVE A SATISFACTORY INDICATION ON THE OUTPUT METER, AND TURN THE VOLUME & TONE CONTROLS TO THEIR MAXIMUM POSITIONS (clockwise).

The I.F. trimmer adjustments are carefully made at the factory and should not be tampered with unless a thorough investigation definitely proves the I.F. amplifier to be at fault, in that event:-

(1) Attach the output meter from plate to screen of 2A5 tube.
(2) Feed the signal from the local oscillator tuned to exactly 485 kc. into the receiver at the control grid of the first detector, providing a D.C. path from the point to ground.
(3) Adjust the I.F. trimmers to give maximum indication on the output meter. There are three I.F. transformers, each with two screw adjustments. On the early models these adjustments are on the bottom of the transformers, accessible from the under side of the chassis. On the later models these adjustments are on the top of the transformers.
(4) NEXT-feed the 485 kc. signal in at the antenna post, replace the first detector grid cap, and adjust the wave trap condenser for MINIMUM indication on the output meter. This adjustment is a $\frac{1}{4}$" hex nut on a two plate trimmer under the chassis, below the gang condenser, near the band switch.

(1) Set the dial to the point where a station (or oscillator) of known frequency, about 1400 kc., should come in.
(A) Set Band switch to band 1 (top scale).
(B) Adjust oscillator trimmer (screw adjustment, top-rear of gang condenser) until desired signal is heard. There will be two peaks in adjusting this trimmer. The peak obtained with the loosest trimmer setting is correct.
(2) Repeat operation 1 at, or near, 550 kc., using band 1.
(A) Adjust oscillator pad (fourth adjustment from right, on rear of chassis pan) until desired signal is heard.
(3) Repeat operation 1 at, or near, 1450 kc., using band 2.
(A) Adjust oscillator pad (third adjustment from right on rear of chassis pan) until the desired signal is heard.
(4) Repeat operation 1 at, or near, 3500 kc., using band 3.
(A) Adjust oscillator pad (second adjustment from right on rear of chassis pan) until the desired signal is heard.
(5) Repeat operation 1 at, or near, 8500 kc., using band 4.
(A) Adjust oscillator pad (extreme right adjustment on rear of chassis pan) until the desired signal is heard.

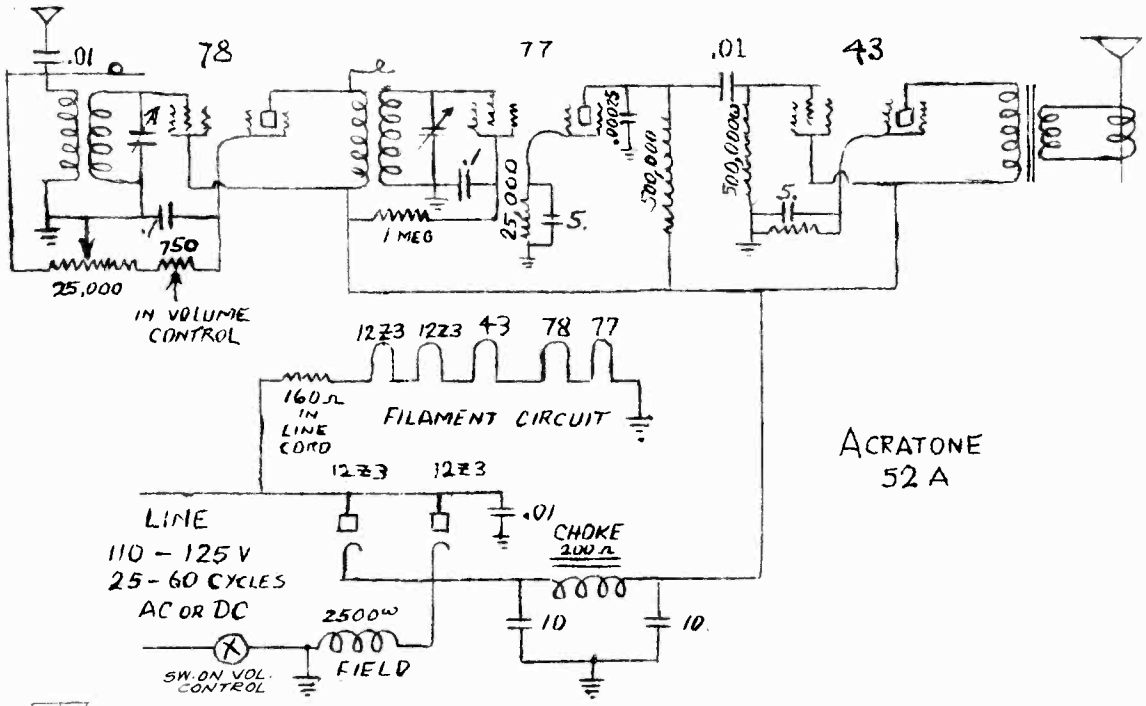
TO ALIGN (or gang) THE R.F. CIRCUITS

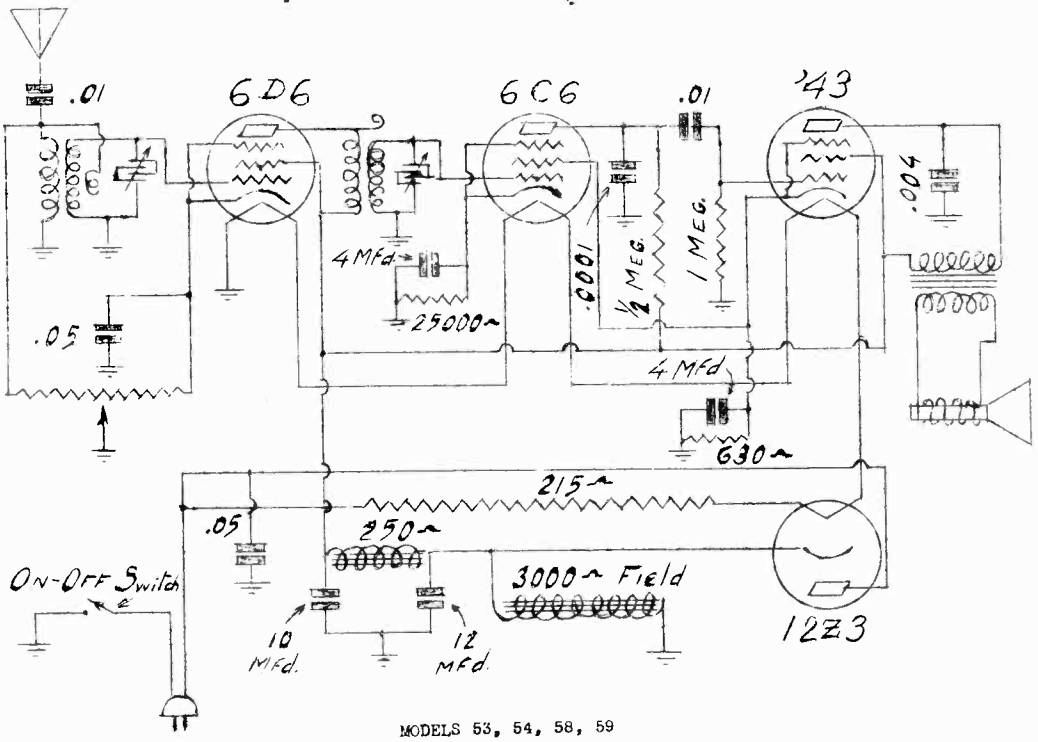
(1) Set the dial to 1400 kc., using band 1.
(A) Attach oscillator, tuned to set, to antenna post.
(B) Attach output meter from screen to plate of 2A5 tube.
(C) Adjust R. F. trimmer (screw adjustment, top-front-of gang condenser) for maximum output. KEEP SIGNAL INPUT LOW!
(2) Set the dial to 3700 kc., using band 2.
(A) Tune the oscillator to the receiver and adjust R.F. trimmer (extreme left adjustment on rear of chassis pan) for maximum output. KEEP SIGNAL INPUT LOW!
(3) Set the dial to 9000 kc., using band 3.
(A) Tune the oscillator to the receiver and adjust R.F. trimmer (second adjustment from left on rear of chassis pan)

Note 1-In case the local oscillator will not reach the higher alignment frequencies, harmonics of lower frequencies may be used.

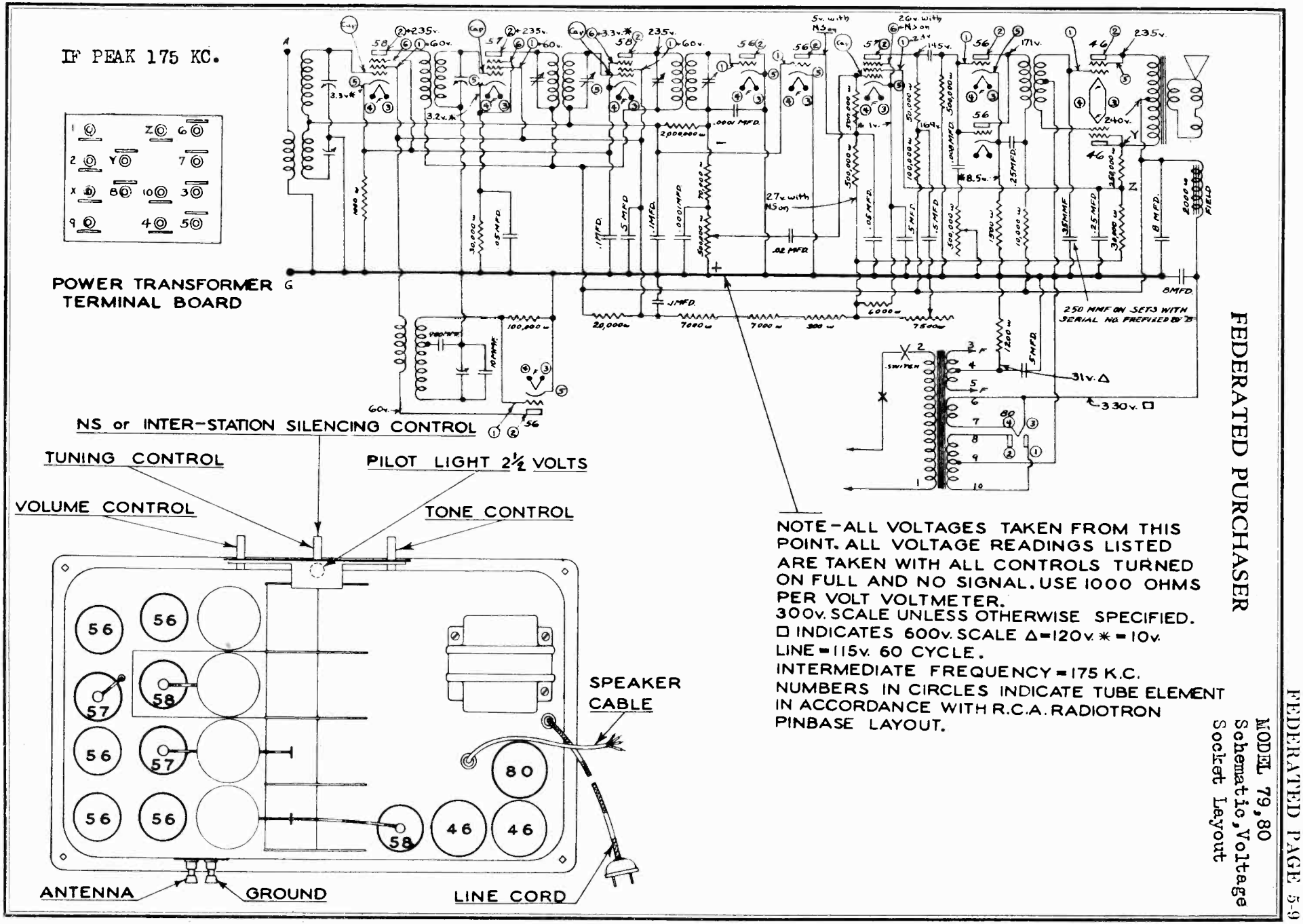
MODEL 52-A
MODEL 53,54,58,59
Schematic

FEDERATED PURCHASER





MODELS 53, 54, 58, 59



FEDERATED PURCHASER

MODEL 79,80
Schematic, Voltage
Socket Layout

MODEL 79,80
Alignment

FEDERATED PURCHASER

IN ALL GANGING OPERATIONS USE THE WEAKEST SIGNAL THAT WILL GIVE A SATISFACTORY INDICATION ON THE OUTPUT METER, and TURN ALL CONTROLS TO THEIR MAXIMUM POSITIONS (CLOCKWISE).

The I. F. trimmer adjustments are carefully made at the factory and should not be tampered with unless a thorough investigation definitely proves the I. F. amplifier to be at fault. In that event:-

(1) Attach the output meter from plate to plate of the 46 tubes.

(2) Feed the signal from the local oscillator tuned to exactly 175 kc. into the receiver at the control grid of the 57 first detector, providing a D. C. path from this point to ground

(3) Adjust the I. F. trimmers to give maximum indication on the output meter. The 4 I. F. trimmers are mounted under the chassis pan, adjustable through holes in the chassis pan under the gang condenser, accessible when the rotor plates of the gang condenser are completely engaged with the stator plates. The adjustments are $\frac{1}{4}$" hex nuts. A recheck of each adjustment to insure perfect alignment of the I. F. stages is recommended.

(1) Set the dial to the point where a station (or oscillator) of known frequency, about 1400 kc., should be received.

(A) Adjust the oscillator trimmer (screw adjustment, top front end of gang condenser) until desired signal is heard.

(2) Set the dial to the point where a station (or oscillator) of known frequency, about 1100 kc., should be received.

(A) Bend rotor plates of front section of gang condenser to correct the calibration. If the dial reading for resonance with the desired signal is higher than the true frequency bend the rotor plates out, and vica versa.

(3) Repeat operation 2 at, or near, 750 kc.

(4) Repeat operation 2 at, or near, 600 kc.

This completes the alignment procedure, and this (front) section of the gang condenser is NOT TO BE DISTURBED during the alignment of the R. F. circuits.

TO ALIGN (or gang) THE R. F. CIRCUITS

(1) Set the dial to 1400 kc.

(A) Attach the output meter from plate to plate of the 46 tubes.

(B) Attach the local oscillator to the antenna post of the receiver and adjust to resonance with the receiver.

(C) Adjust the R. F. trimmers (screw adjustments, top of gang condenser, ALL EXCEPT FRONT SCREW, for maximum indication on the output meter. KEEP SIGNAL INPUT LOW!

(2) Set the dial to 1100 kc.

(A) Adjust local oscillator to resonance with receiver.

(B) Bend rotor plates on ALL EXCEPT FRONT SECTION for maximum indication on the output meter. KEEP SIGNAL INPUT LOW!

(3) Repeat operation 2 at 750 kc.

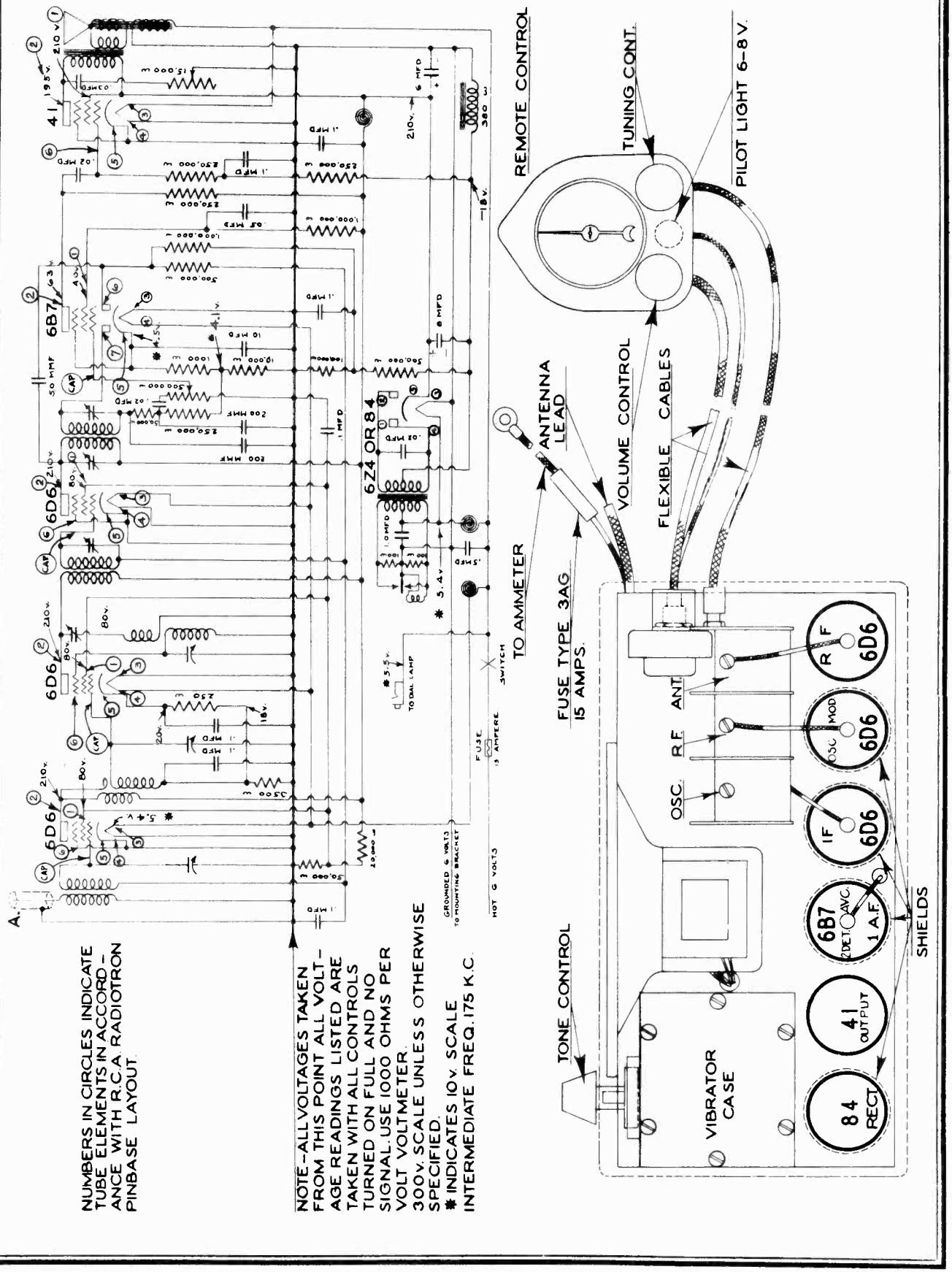
(4) Repeat operation 2 at 600 kc.

This completes the alignment of the R. F. circuits.

The alignment operations involving plate bending should be performed with utmost care if maximum results are to be obtained.

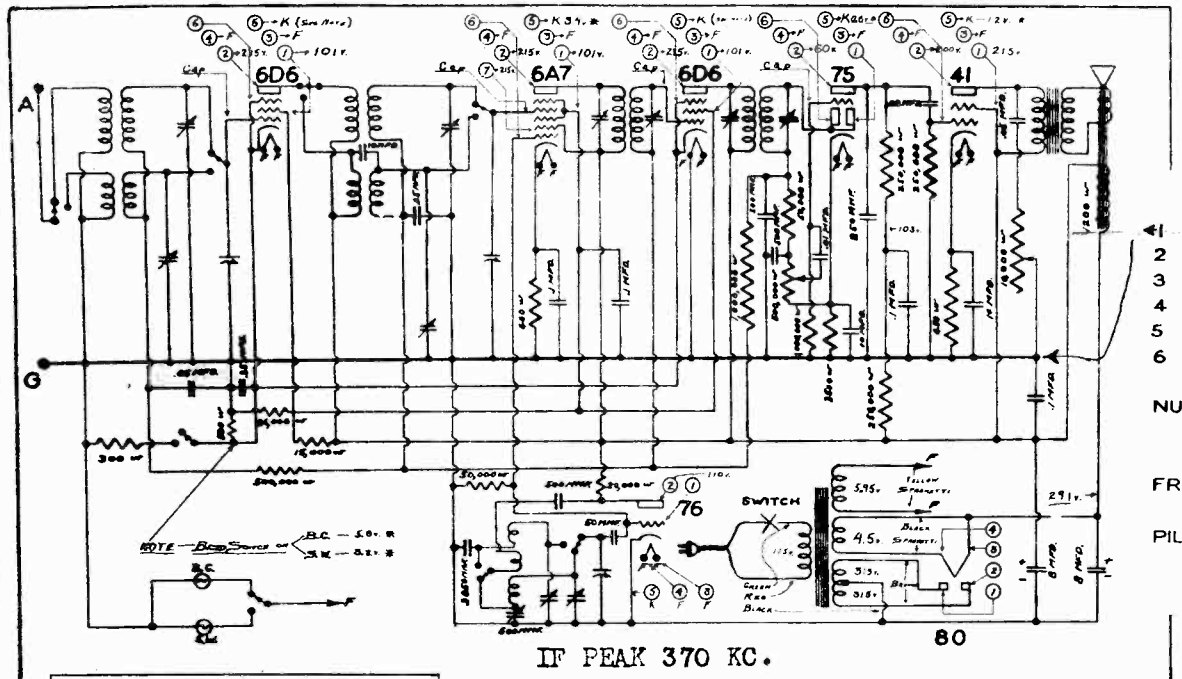
FEDERATED PURCHASER

MODEL 92
Schematic, Voltage
Socket Layout



MODEL 93,94,96,97
Schematic, Voltage
Socket Layout
Trimmers

FEDERATED PURCHASER



IF PEAK 370 KC.

NOTES

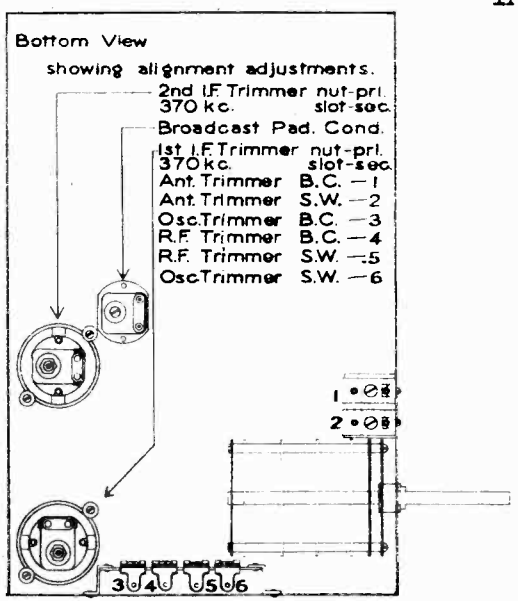
ALL VOLTAGES MEASURED

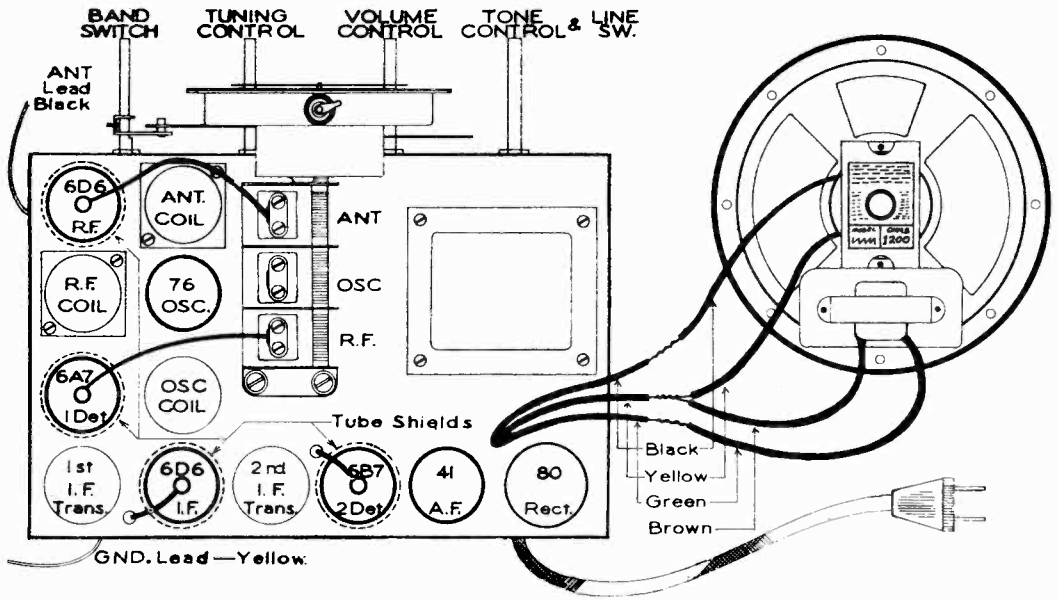
1. From this point (ground) with line at 115 v. 60 c.
2. With a 1000 ohm/volt voltmeter
3. With all controls turned full ON (on BC band)
4. With NO SIGNAL! Short ant. lead if necessary.
5. Use the 300v. scale unless otherwise indicated.
6. △ Indicates 100v. scale ✳ Indicates 10v. scale.

NUMBERS IN CIRCLES indicate tube elements in accordance with R.C.A-Cunn. Pinbase Layout.

FREQUENCY RANGE 550 to 1550kc. & 6 to 16mc.

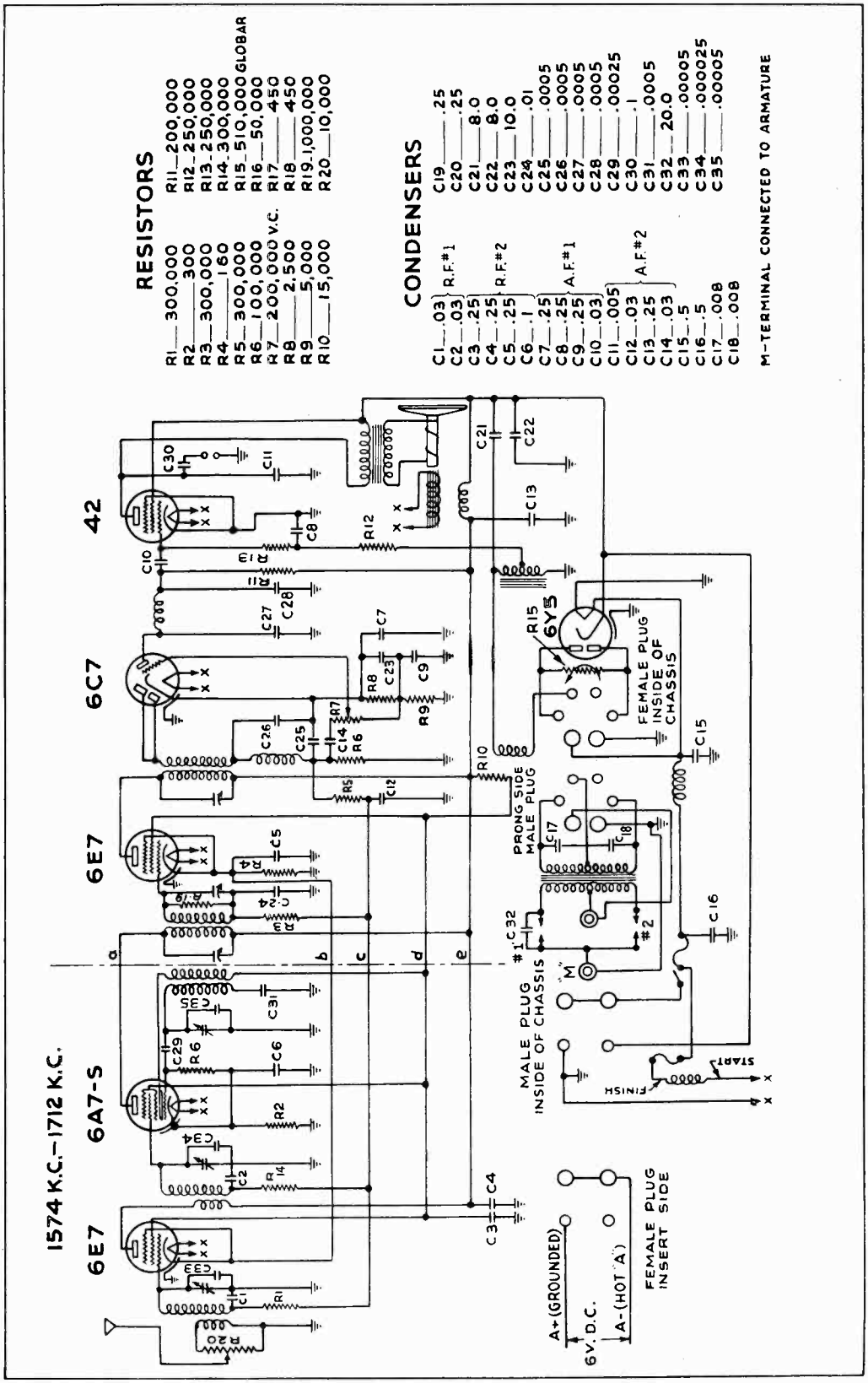
PILOT LIGHTS – 6.3v. 2 req'd. code ···· blue bead
NOTE – pilot lites wired to band switch to light only the calibration of the band in use.





FORD MOTOR CAR CO.

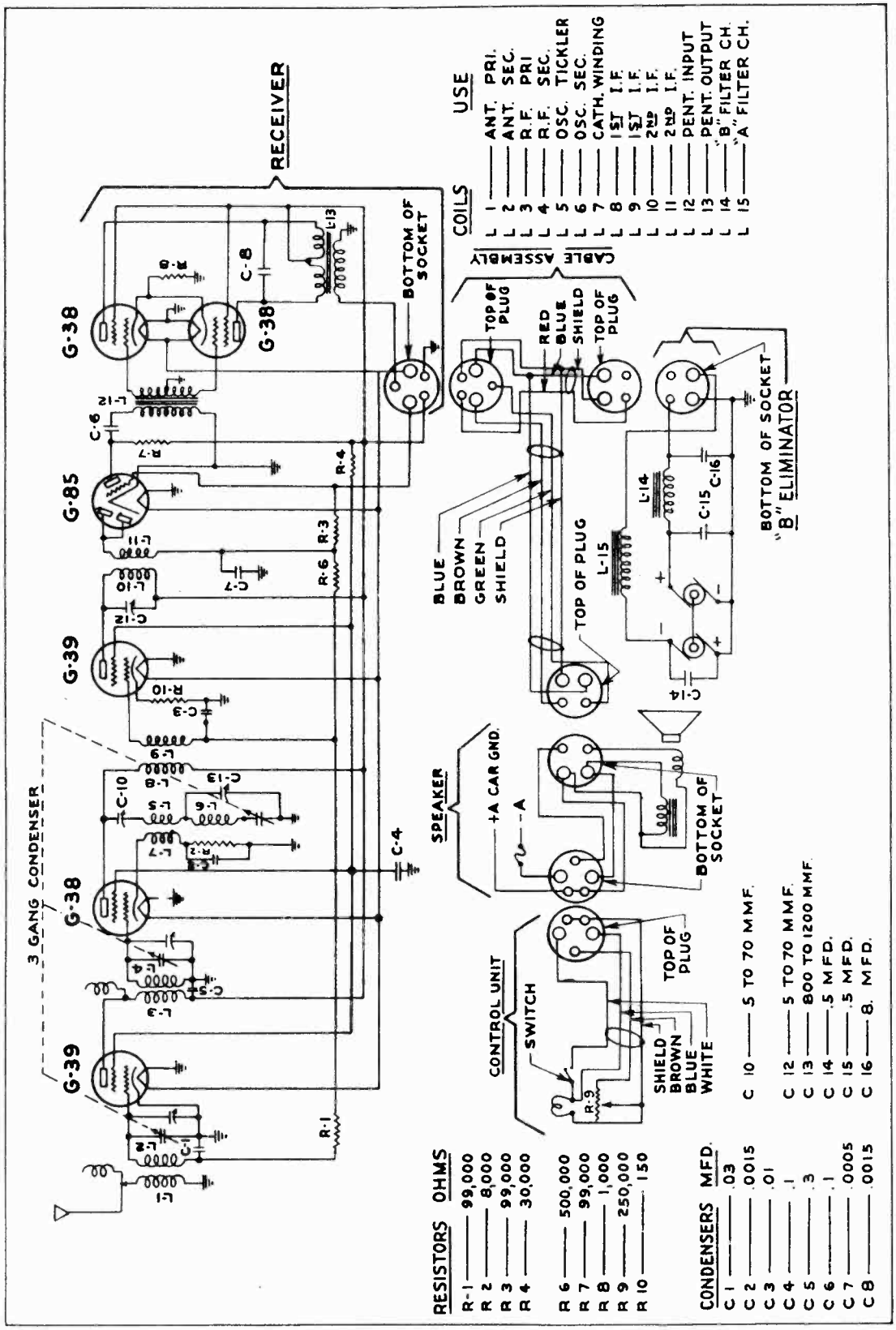
MODEL Ford Glove Box
Type Police Radio
Built by Grigsby-
Grunow
Schematic



FORD GLOVE BOX TYPE POLICE AUTO RADIO RECEIVER (BUILT BY GRIGSBY GRUNOW CO.)

MODEL Ford B-18805
Auto Radio Built by
Grigsby-Grunow
Schematic

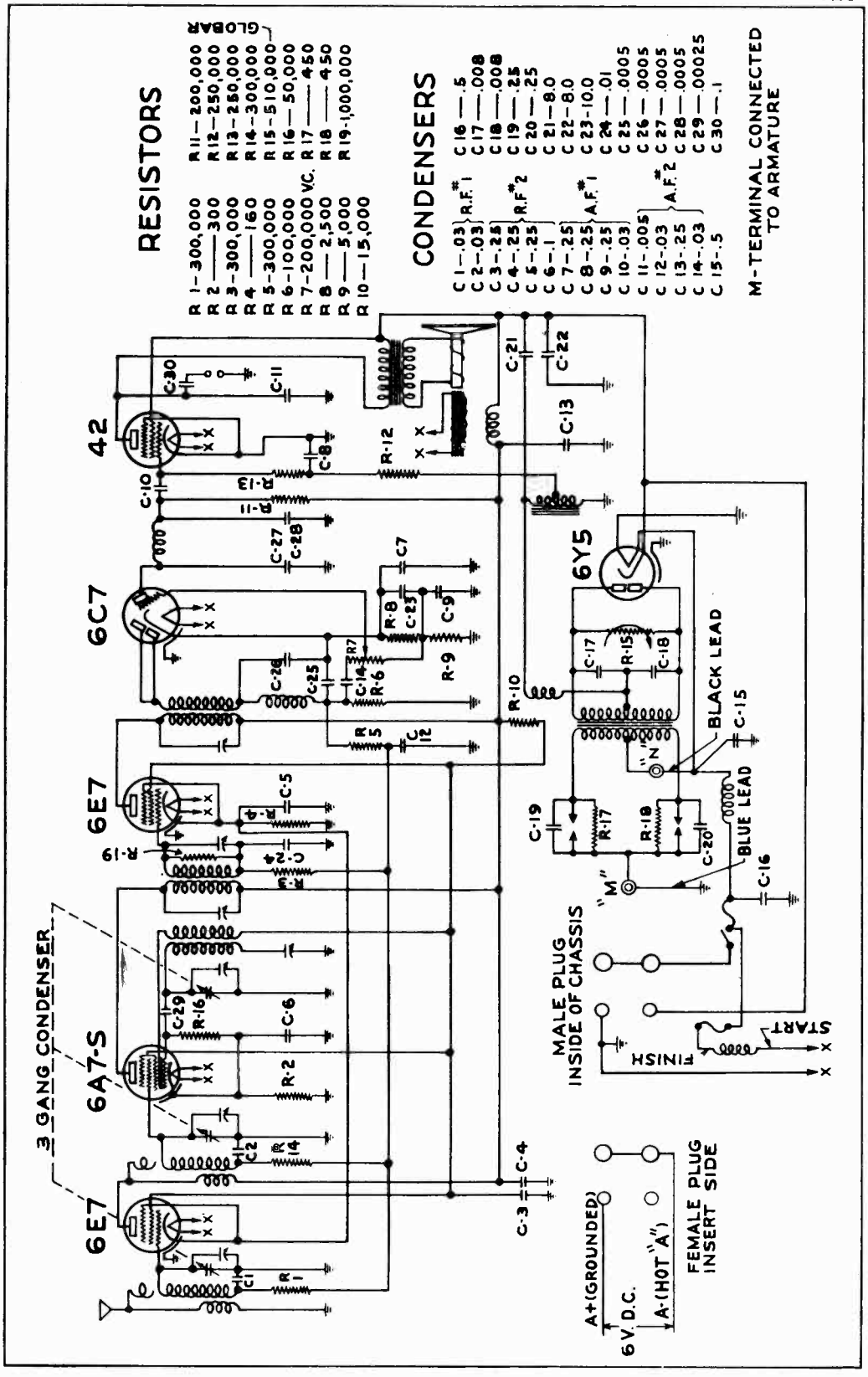
FORD MOTOR CAR CO.



FORD B-18805 AUTO RADIO RECEIVER WITH MOTOR-GENERATOR "B" SUPPLY

FORD MOTOR CAR CO.

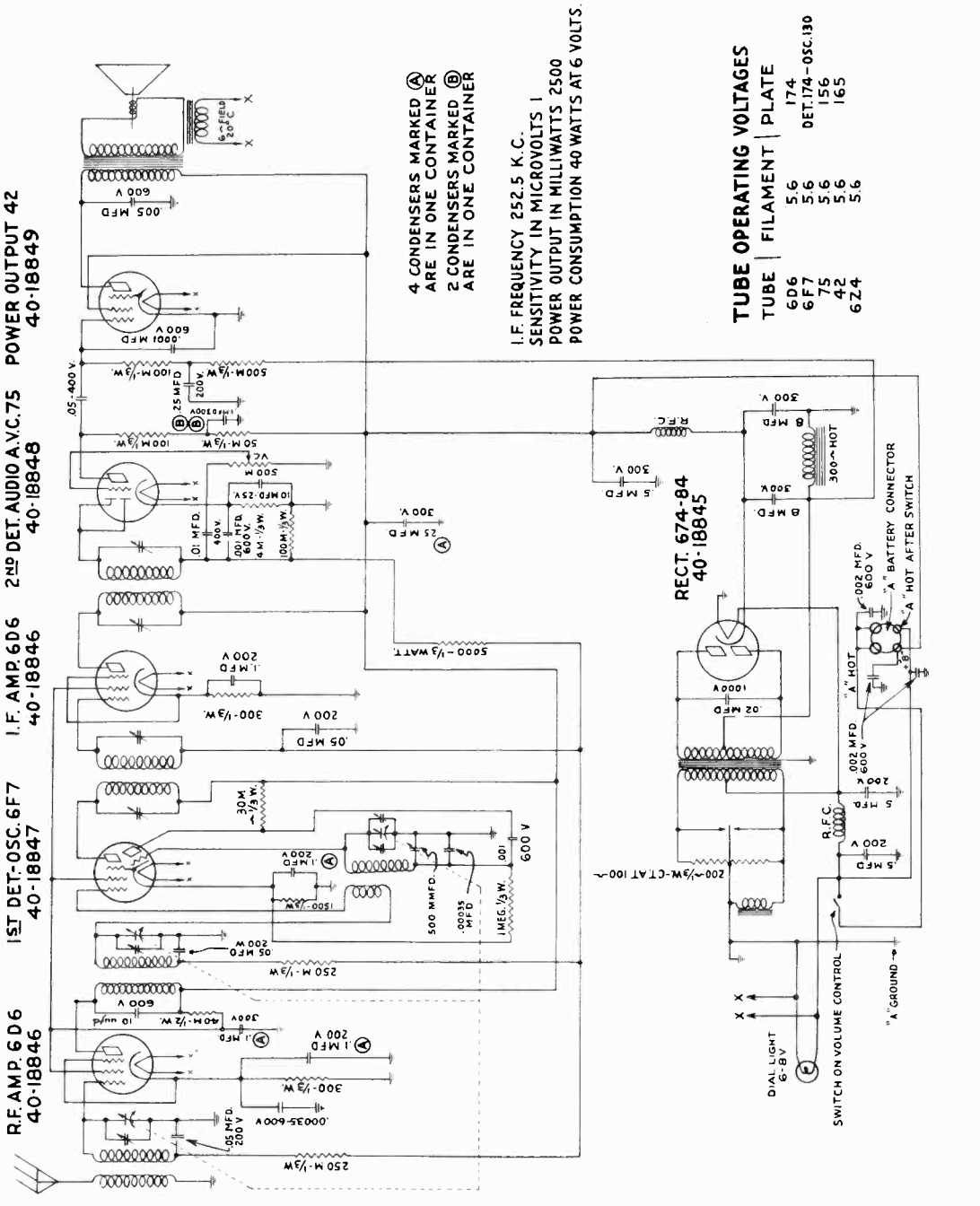
MODEL Ford 40-18805
Glove Box Auto Radio
Built by Grigsby-Grunow
Schematic



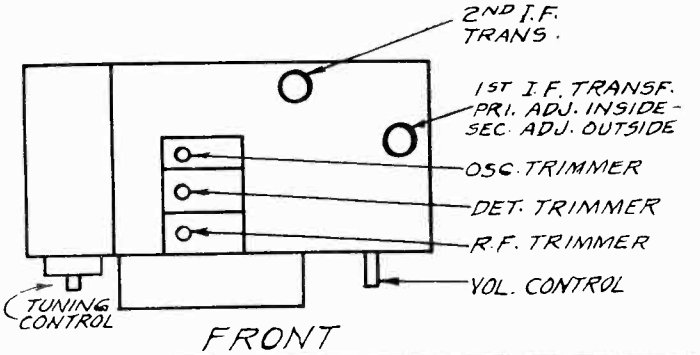
FORD 40-18805-B GLOVE BOX TYPE AUTO RADIO RECEIVER (BUILT BY GRIGSBY GRUNOW CO.)

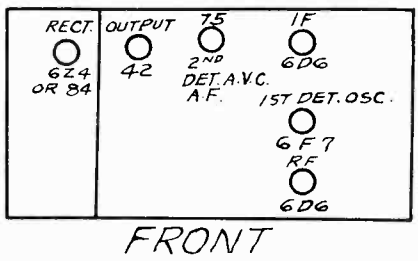
MODEL Ford-Lincoln
Auto Radio Built by
Zenith
Schematic

FORD MOTOR CAR CO.



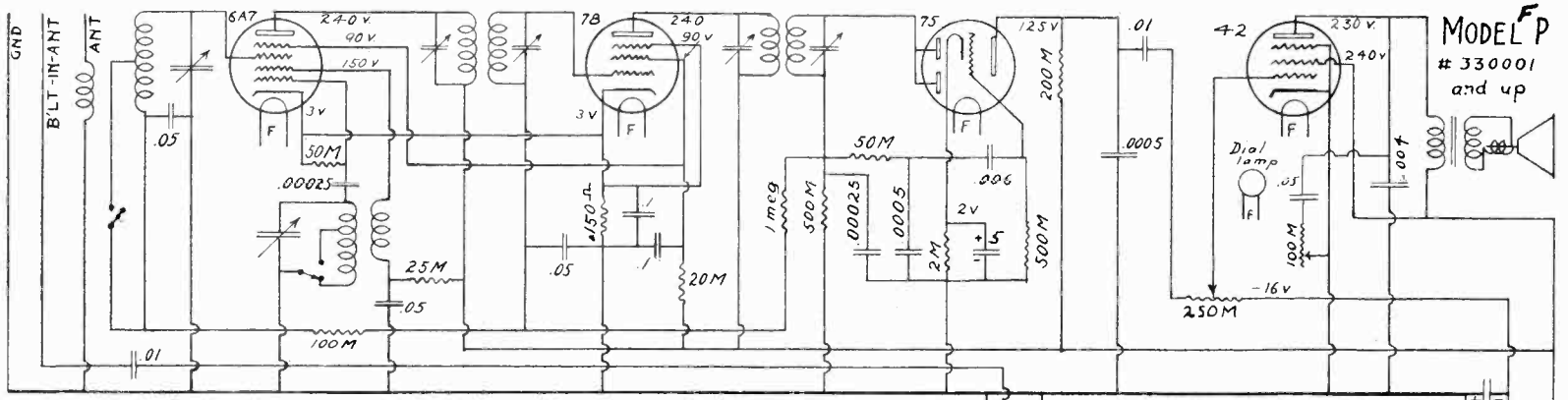
FORD GLOVE BOX TYPE AUTO RADIO RECEIVER (BUILT BY ZENITH RADIO CORP.)





FORDSON RADIO, INC.

MODEL FP (330001 up) Schematic, Alignment
MODEL FP Battery (173501 up) Schematic, Alignment



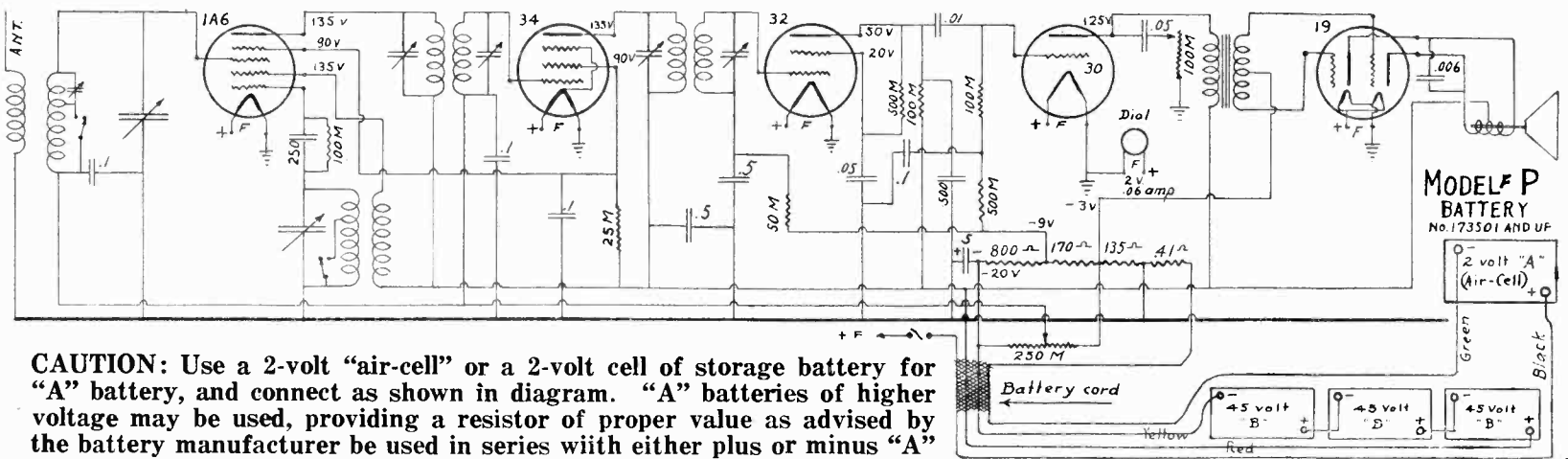
CAUTION: *Do not attempt to operate on current other than that noted on instrument*

INSTALLATION: Twist "ANT" and "BLT-IN-ANT" leads together for operation without aerial. Best results, however, may be had with a good outdoor aerial especially on short wave.

SHORT WAVE: Left hand knob, when clear to left, is on Short Wave. A one-quarter inch movement to the right and it is on regular broadcast. Beyond this point it functions as a tone control.

PHONOGRAPH: Use single pole toggle switch mounted as near as possible to socket marked "75". Connect one side to green resistor with yellow dot found shunted by .00025 mica condenser and connected to black wire coming from coil can adjacent to 75 tube, connect other side of switch in series with phonograph pickup to ground.

SERVICE NOTES- Intermediate stage is carefully phased to 456 K. C. at the factory. Should rephasing be necessary feed 456 K. C. signal into grid cap of 6A7 tube and adjust double trimmers in top of coil cans to loudest signal. Phase tuning condenser by setting dial to 1400. carefully remove chassis from cabinet, feed 1400 K. C. Signal into "ANT" lead and adjust trimmers on tuning condenser to loudest signal

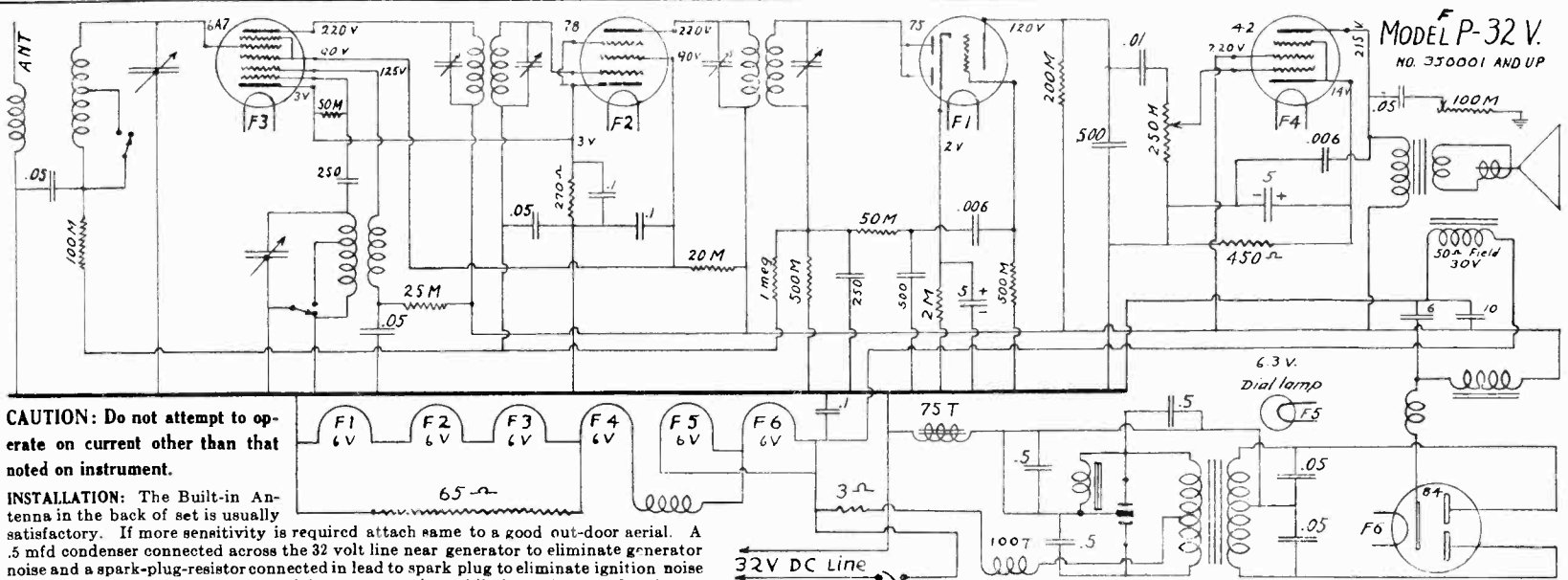


CAUTION: Use a 2-volt "air-cell" or a 2-volt cell of storage battery for "A" battery, and connect as shown in diagram. "A" batteries of higher voltage may be used, providing a resistor of proper value as advised by the battery manufacturer be used in series wiith either plus or minus "A" lead. Use three blocks of "B" battery of 45 volts each, connected as shown in diagram.

INSTALLATION: A good outdoor aerial will give best results, especially on short wave. No ground wire is usually required.

PHONOGRAPH: Use single pole toggle switch mounted as near as possible to socket marked "32." Cut black wire coming from bottom of coil can adjacent to this tube and connect across switch. Connect phonograph pickup across switch.

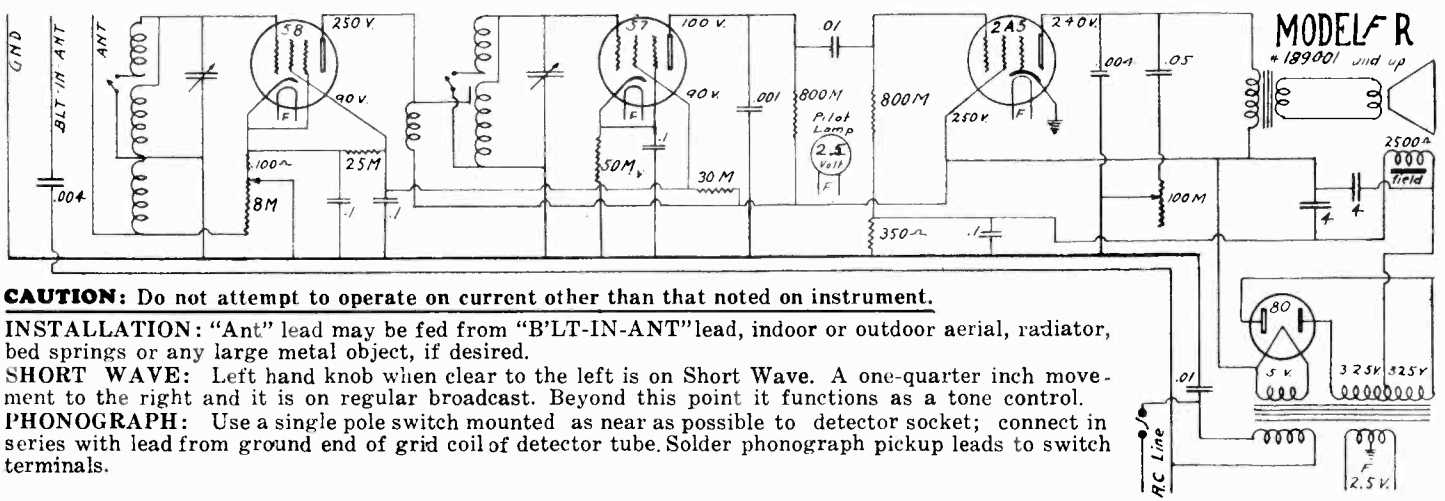
SERVICE NOTES: Intermediate stage is carefully phased to 456 k.c. at the factory. Should rephasing be necessary, feed 456 k.c. signal into grid cap of "1A6" tube, and adjust double trimmers in top of coil cans to loudest signal. Phase tuning condenser by setting dial to 1400 k.c., carefully remove chassis from cabinet, feed 1400 k.c. signal into antenna lead and adjust trimmers on tuning condenser to loudest signal.



CAUTION: Do not attempt to operate on current other than that noted on instrument.

INSTALLATION: The Built-in Antenna in the back of set is usually satisfactory. If more sensitivity is required attach same to a good out-door aerial. A .5 mfd condenser connected across the 32 volt line near generator to eliminate generator noise and a spark-plug-resistor connected in lead to spark plug to eliminate ignition noise may sometimes be required for satisfactory reception while batteries are charging.

USE NO GROUND CONNECTION ON SET. **SHORT WAVE:** Left hand knob, when clear to left, is on Short Wave. A one-quarter inch movement to the right and it is on regular broadcast. Beyond this point it functions as a tone control. **PHONOGRAPH:** Use single pole toggle switch mounted as near as possible to socket marked "75". Connect one side to green resistor with yellow dot found shunted by .00025 mica condenser and connected to black wire coming from coil can adjacent to 75 tube, connect other side of switch in series with phonograph pickup to ground. **SERVICE NOTES-** Intermediate stage is carefully phased to 456 K. C. at the factory. Should rephasing be necessary feed 456 K. C. signal into grid cap of 6A7 tube and adjust double trimmers in top of coil cans to loudest signal. Phase tuning condenser by setting dial to 1400, carefully remove chassis from cabinet, feed 1400 K. C. Signal into "ANT" lead and adjust trimmers on tuning condenser to loudest signal

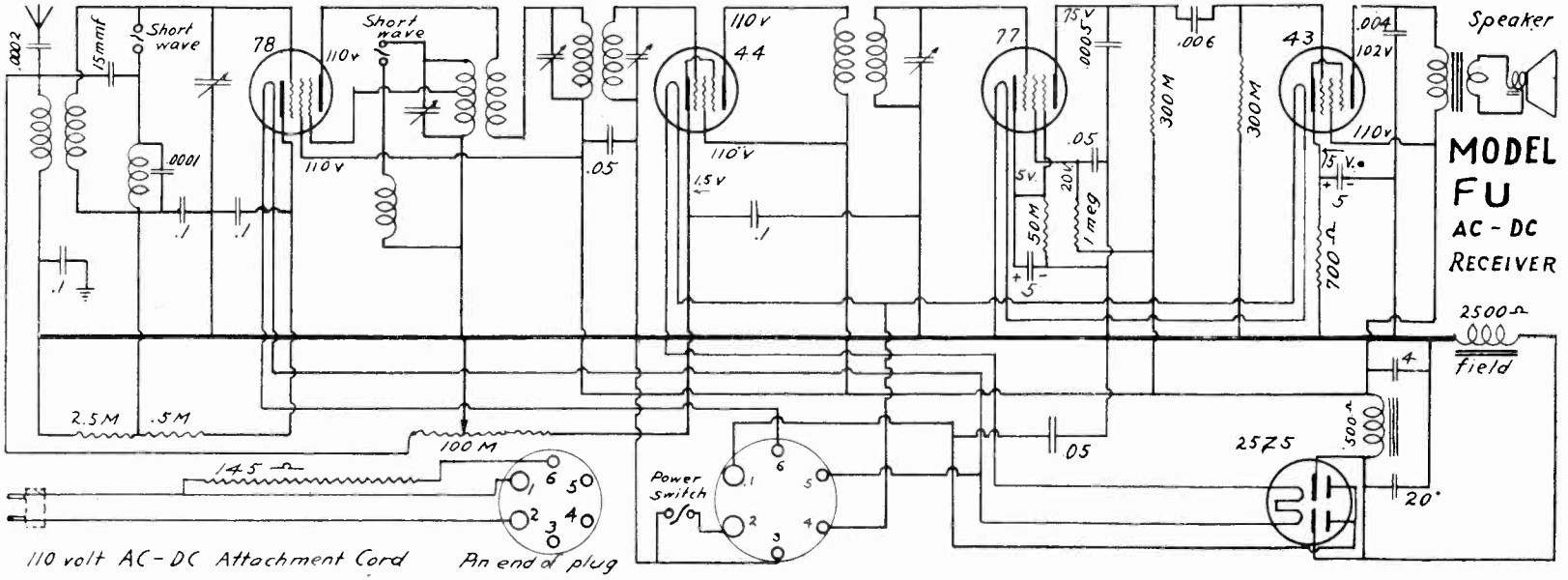


CAUTION: Do not attempt to operate on current other than that noted on instrument.

INSTALLATION: "Ant" lead may be fed from "B'LT-IN-ANT" lead, indoor or outdoor aerial, radiator, bed springs or any large metal object, if desired.

SHORT WAVE: Left hand knob when clear to the left is on Short Wave. A one-quarter inch movement to the right and it is on regular broadcast. Beyond this point it functions as a tone control.

PHONOGRAPH: Use a single pole switch mounted as near as possible to detector socket; connect in series with lead from ground end of grid coil of detector tube. Solder phonograph pickup leads to switch terminals.



OPERATING INSTRUCTIONS

Model FU Long and Short Wave

CAUTION:

This instrument is equipped for operation on 110 volts D. C. or A. C., any frequency from 25 to 133 cycles per second. Before attempting to operate on any other voltage be sure that the proper adaptors are connected and the instructions accompanying them are understood. Special adaptors can be secured from the factory at a slight extra cost, for operating this receiver on automobiles, 32 volt farm light plants and 220 volt A. C. or D. C. ALWAYS plug cord into back of set before plugging into power supply. Cord for 110 volt or 220 volt heats moderately as the cord contains resistance necessary for operation at these voltages. The 20 ft. aerial wire extending from the back of the set should be unwound, laid out along the floor or hung outside a window and is ordinarily all the aerial required. No ground connection should be used. Sometimes results are better if the tip of the antenna wire is connected to a radiator or other ground connection or to an outside aerial.

TO OPERATE:

Turn left hand knob to right as far as it will go. Wait a few moments for tubes to heat. Turn right hand knob slowly back and forth till a station is heard. Numbers on the dial correspond to kilocycle of station when one zero is added. Adjust this knob carefully to secure best tone and adjust left hand knob to volume desired. When left knob is turned entirely to left a click is heard and power is turned off. When operating on D. C. current and set fails to operate after waiting a reasonable time for tubes to heat up, reverse power supply plug.

TO RECEIVE SHORT WAVES:

Push handle of switch in rear toward end of cabinet for short wave position. Local police calls, etc., will then be heard at approximately 65 and 100 on the dial, and amateurs, etc., at various other positions. Often local conditions make short wave reception difficult unless the aerial wire is grounded or attached to outside aerial. Reception of short wave requires a good aerial and more careful adjustment of both knobs than is necessary on the broadcast band.

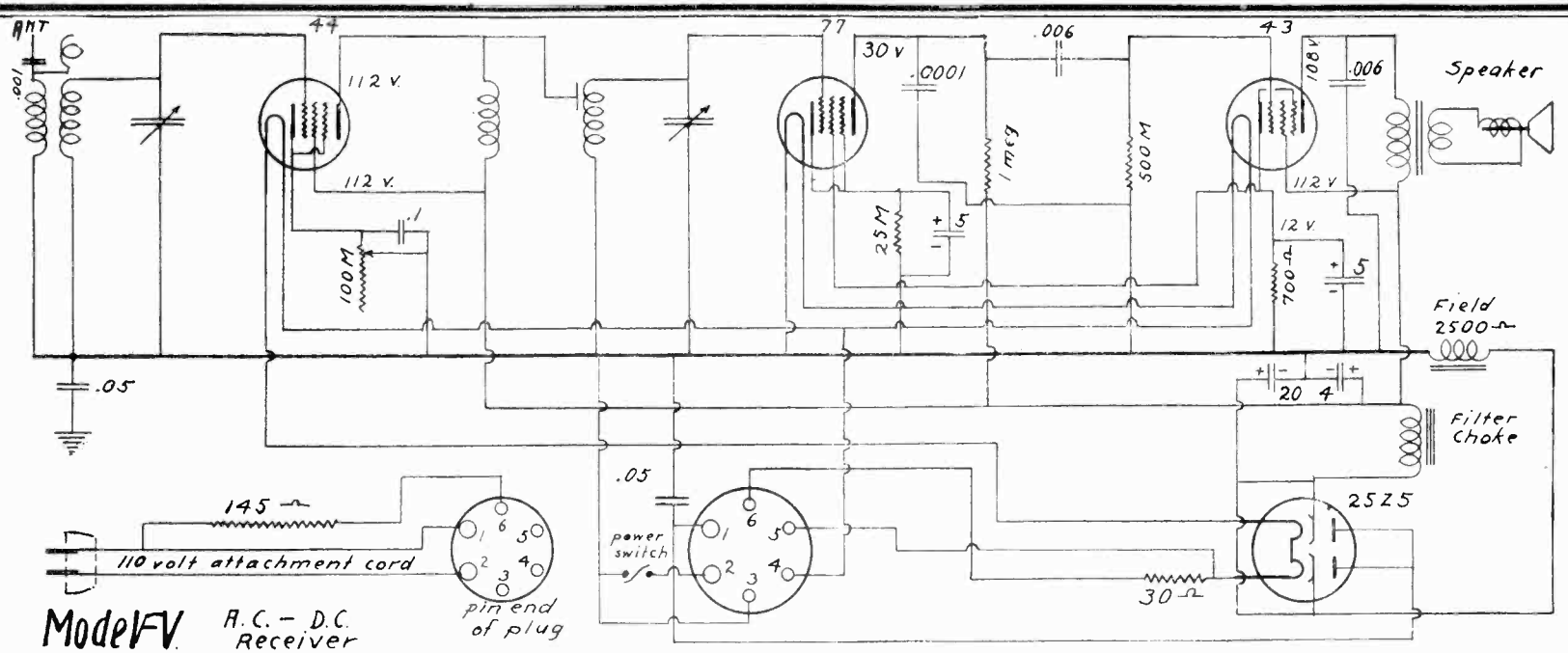
PHONOGRAPH:

Trace wire from cap of tube in left rear socket to where it solders to bracket in chassis. Note that a black wire connects between the adjacent bracket and chassis. Disconnect black wire at the bracket, inserting small single pole switch between wire and bracket. Solder phonograph pick-up leads to switch terminals.

SERVICE NOTES:

To balance set remove from cabinet. Intermediates are first balanced. Feed a 456 K. C. signal into grid of 78 tube. Adjust double and single trimmers through rear flange of chassis. Next, trim radio frequency coil by first setting tuning condenser to 1400 K. C. on dial, carefully remove from cabinet and attach test oscillator to antenna lead and feed 1400 K. C. signal to antenna coil. Adjust trimmers on tuning condenser to loudest signal.

If used in automobile, antenna stage should be trimmed to car antenna at time of installation.



OPERATING INSTRUCTIONS

Model FV

CAUTION:

This instrument is equipped for operation on 110 volts D. C. or A. C., any frequency from 25 to 133 cycles per second. Before attempting to operate on any other voltage be sure that the proper adaptors are connected and the instructions accompanying them are understood. Special adaptors can be secured from the factory at a slight extra cost, for operating this receiver on automobiles, 32 volt farm light plants and 200 volt A. C. or D. C. ALWAYS plug cord into back of set before plugging into power supply. Cord for 110 volt or 220 volt heats moderately, as the cord contains resistance necessary for operation at these voltages. The 20 ft. aerial wire extending from the back of the set should be unwound, laid out along the floor or hung outside a window and is ordinarily all the aerial required. No ground connection should be used. Sometimes results are better if the tip of the antenna wire is connected to a radiator or other ground connection or to an outside aerial.

TO OPERATE:

Turn left-hand knob to right as far as it will go. Wait a few moments for tubes to heat. Turn right-hand knob slowly back and forth till a station is heard. Adjust this knob carefully to secure best tone and adjust left-hand knob to volume desired. When left knob is turned entirely to left a click is heard and power is turned off. When operating on D. C. current and set fails to operate after waiting a reasonable time for tubes to heat up, reverse power supply plug.

PHONOGRAPH:

Connect pick-up leads to single pole toggle switch, which may be mounted in large hole in rear flange of set. Unsolder black wire and 5 mfd condenser from ground lug of coil on under side of chassis and resolder to one side of toggle switch. Solder other side of switch to ground lug of coil.

SERVICE NOTES:

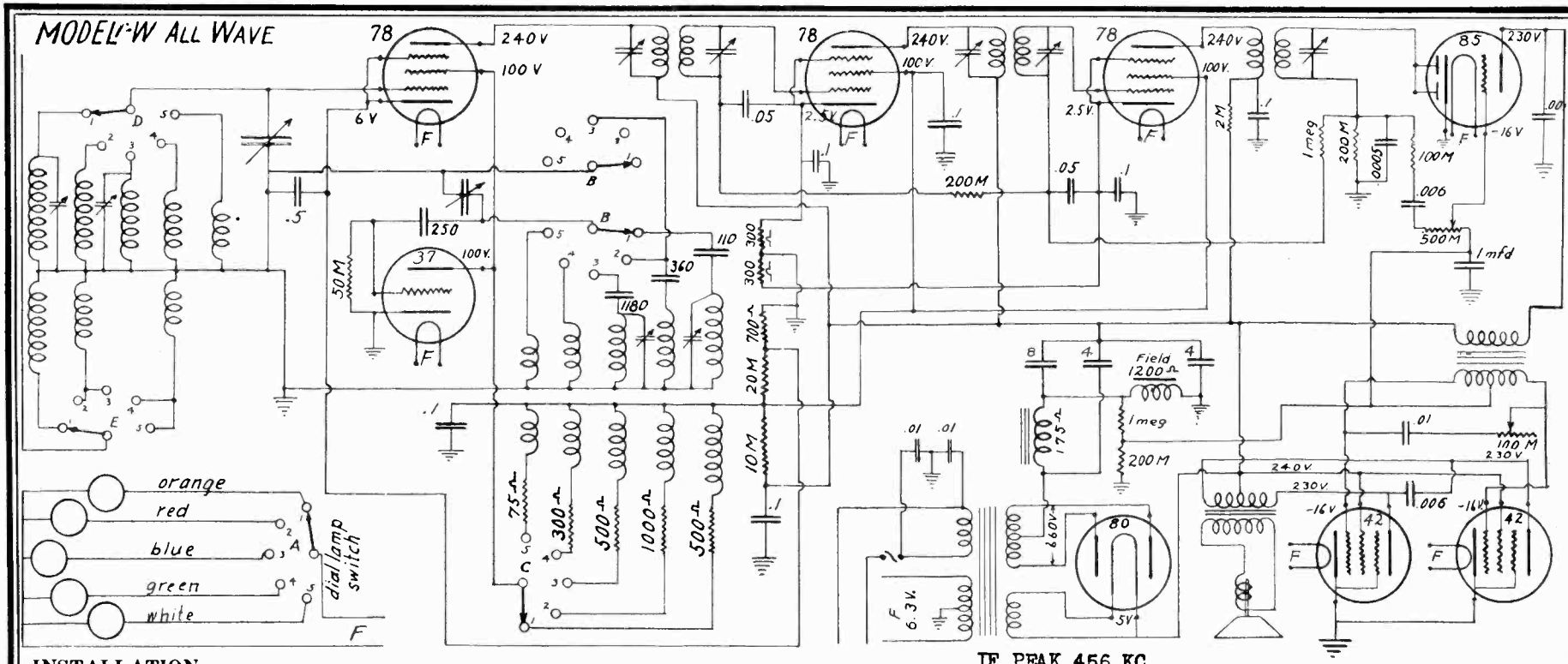
To remove set from cabinet, disconnect from power supply, remove knobs, remove back if compact model, and unscrew the four felt headed screws on bottom of cabinet.

To balance set remove from cabinet, turn tuning condenser plates completely out, attach a test oscillator delivering 1712 K. C. to antenna of set and adjust trimmers on tuning condenser to loudest signal. Change test oscillator signal to 1400 K. C., turn tuning condenser until signal is tuned in and check trimmers again without moving tuning condenser.

If used in automobiles antenna stage should be trimmed to the car antenna at time of installation.

GUARANTEE:

This instrument is guaranteed for ninety days, within which period any part showing electrical or mechanical defect will be replaced without charge when returned prepaid to the factory.



IF PEAK 456 KC

INSTALLATION:

The built-in aerial at the back of the set usually gives satisfactory sensitivity when stretched around the edge of the floor or along the picture moulding of the room. A good outside aerial connected to the built-in aerial sometimes increases sensitivity. Power noise interferes especially with short-wave reception. If set is located where power noise is prevalent it may be necessary to install an aerial high above the street and use a "transposition" lead-in to the set. Any radio dealer can supply such an aerial kit with full instructions for installing.

CONTROL KNOBS:

The lower middle knob is for selecting the various frequency bands as indicated on the dial. The upper middle knob is tuning control. The right-hand knob is power switch and volume control and the left-hand knob is tone control.

PHONOGRAPH:

Mount a single pole toggle switch and two insulated pin jacks in the rear of the chassis near the tube socket marked "85," connect one side of the switch to one pin jack, the remaining pin jack to one outside terminal of the volume control and the remaining switch terminal to the other outside terminal of the volume control. Plug the phonograph pickup leads into the pin jacks.

SERVICE NOTES:

The intermediate stages are carefully phased to 456 kilocycles at the factory. Should rephasing be necessary, feed a 456 kilocycle signal from a test oscillator to the grid cap of the tube marked "78," located at the rear end of the tuning condenser, then adjust the double trimmers in the top of the coil cans nearest this tube, also the single trimmer in the top of the coil can near the "85" tube, to loudest volume, being sure to keep the oscillator signal at a low volume level. In trimming the frequency bands, first set the dial to the third group of figures from the right-hand end. Trim the "red" band first by adjusting the trimmers on the top of the tuning condenser until a signal of the proper frequency applied to the built-in aerial is heard at its loudest. Next, trim the "orange" band by adjusting the three-plate trimmers, located on the underside of the chassis, to loudest volume with proper signal frequency applied to the antenna. Next, trim the "blue" band by adjusting the two-plate trimmers located adjacent to the three-plate trimmers, to loudest volume with the proper signal frequency applied to the antenna. In trimming the various bands be sure that the band switch is set to the proper band as indicated by the color of the dial lamp. Also, keep the oscillator-signal to as low volume level as possible for accuracy.

NOTE: Should it be necessary to write to the factory for parts or information, always give the serial number of the set as stamped on the back of the chassis.

SHORT WAVE TIPS:

In listening for short-wave broadcast DON'T forget to consider the difference in time between the location of the broadcaster and the receiver. DON'T expect to hear a station because it is on the air, as many things govern short-wave reception. DON'T get discouraged if reception is poor one night; it may be fine the next. DON'T expect stations to tune broadly; most stations tune sharply. DON'T tune below 10,000 kilocycles (above 30 meters) for distant stations in daylight. DON'T tune above 12,000 kilocycles (below 25 meters) for distant stations after dark. DON'T expect to find stations on all parts of the dial. Short-wave stations are widely separated, except in a few instances. DON'T skim over the dial. It requires some knowledge of tuning to get good results. Tune very slowly. DON'T pass up any weak signal, as it may often be brought in stronger by careful tuning.

FORDSON RADIO, INC.

MODEL FW

Schematic, Alignment