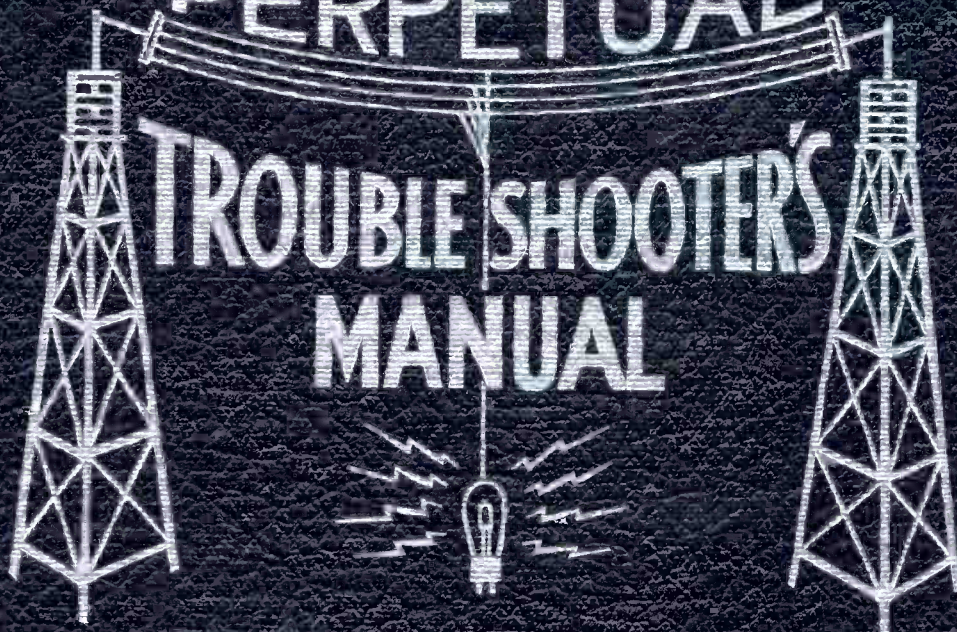


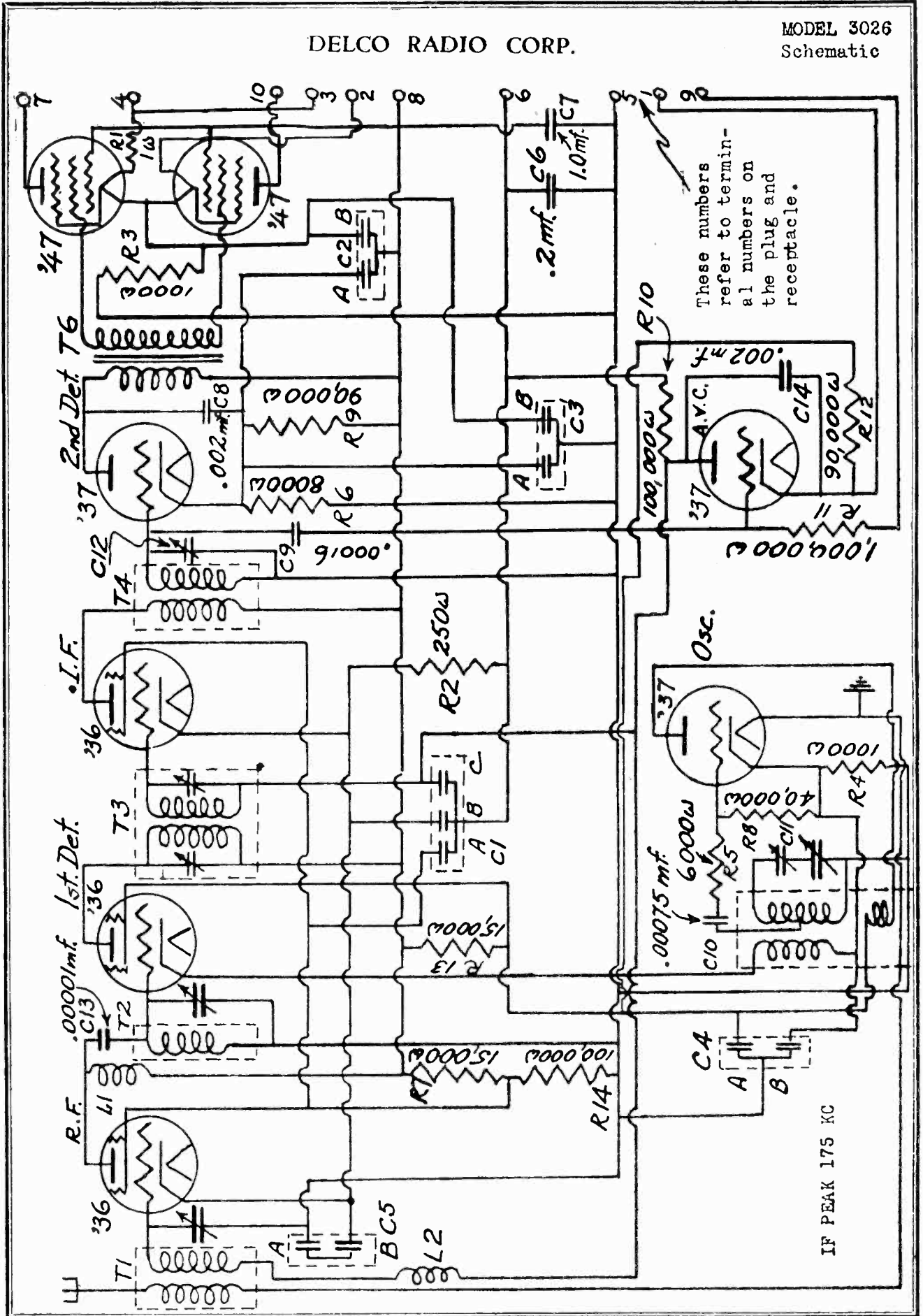
VOLUME IV
PERPETUAL
TROUBLE SHOOTER'S
MANUAL



JOHN F. RIDER

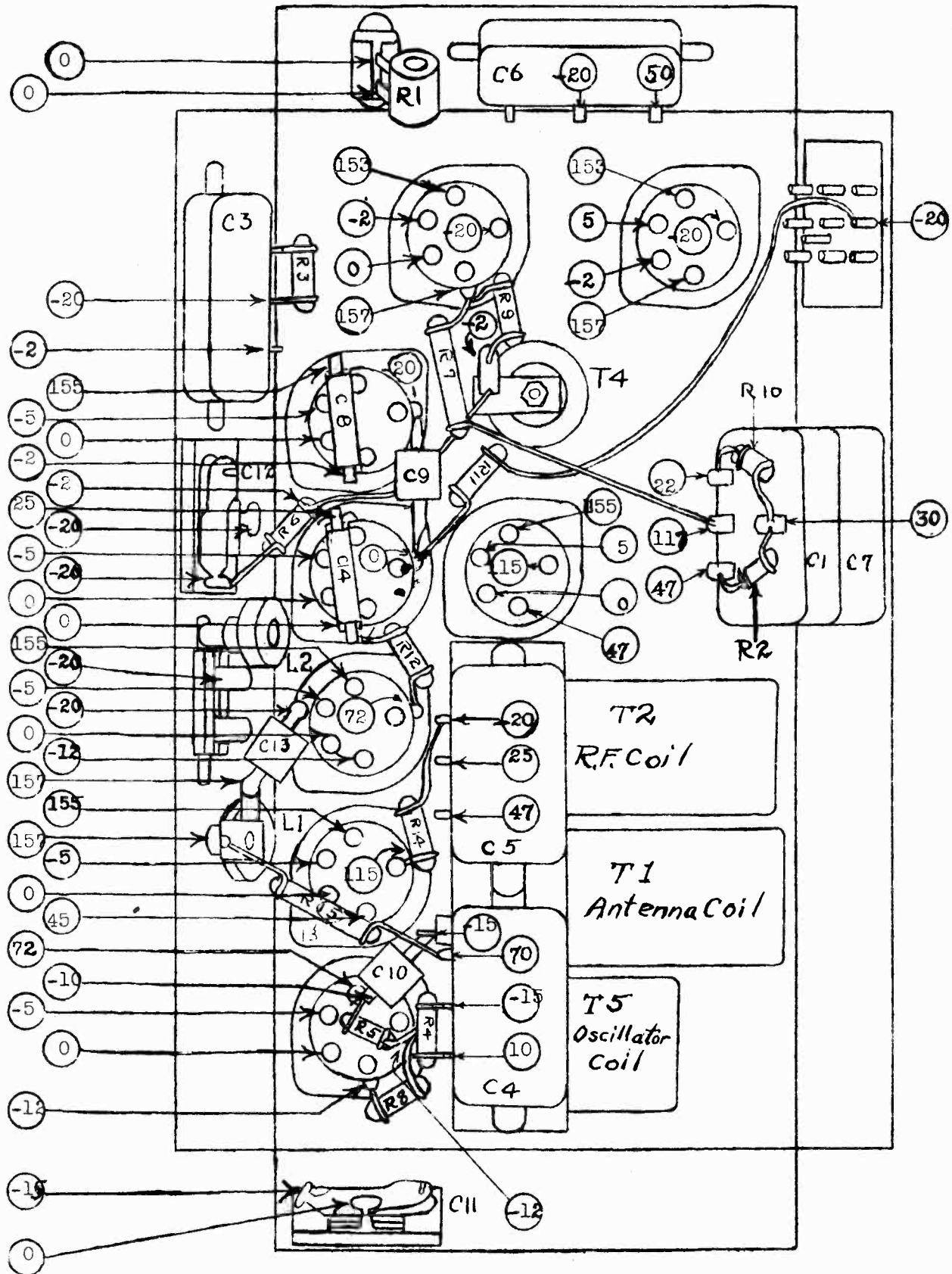
DELCO RADIO CORP.

MODEL 3026
Schematic



MODEL 3026
Chassis Layout
Below Serial 1400

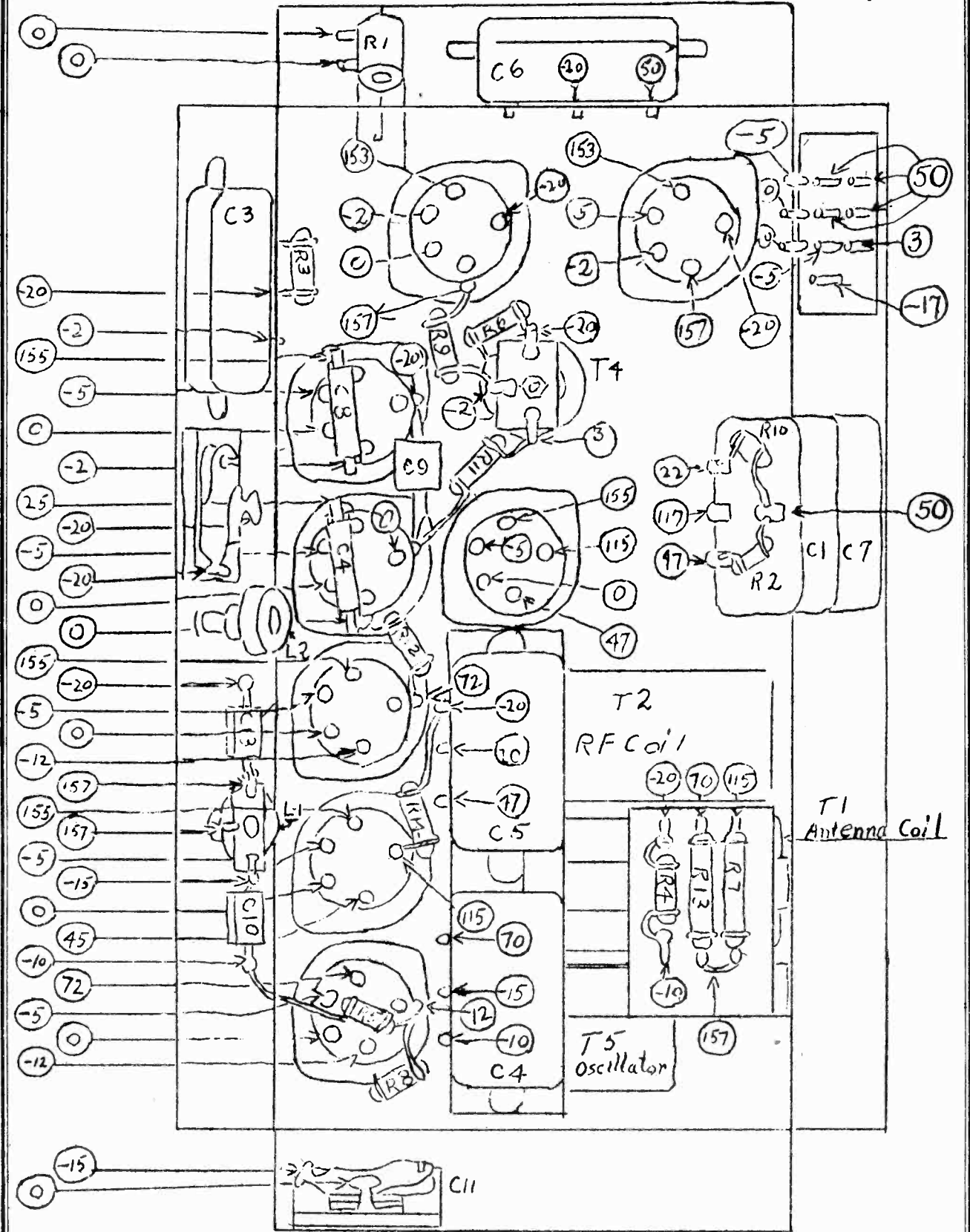
DELCO RADIO CORP.



BOTTOM OF CHASSIS
For sets with serial numbers below 1400

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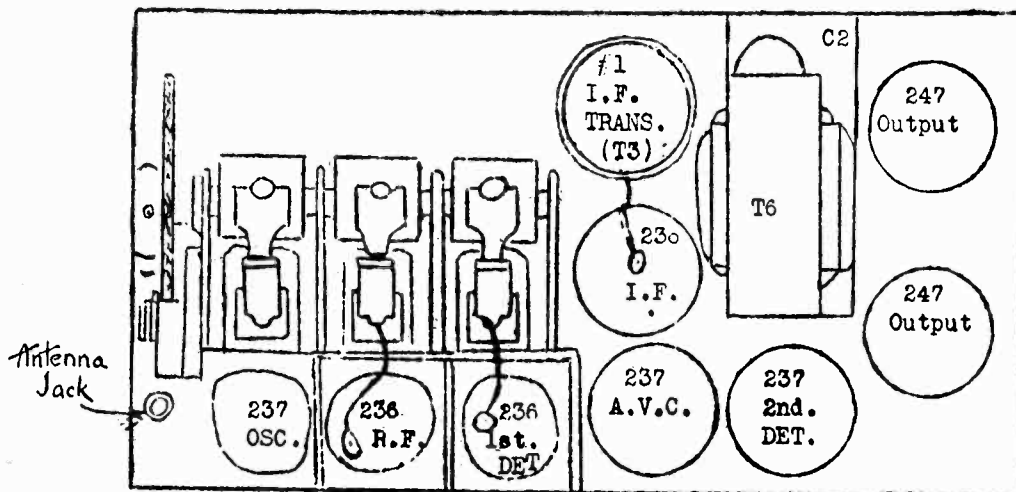
MODEL 3026
Above serial 1400
Chassis layout



Bottom of Chassis
For Sets with Serial Numbers above 1400

MODEL 3026
 Socket layout
 Cable data

DELCO RADIO CORP.



CABLE COLOR CODE:

BATTERY CABLE

<u>Color</u>	<u>Battery end</u>	<u>Terminal No.</u> <u>(Plug on Receiver Case)</u>
Red	B + 180V.	8
Maroon	B + 67½ V.	6
Yellow	B-	12
Black-Yellow A	A (hot side)	11
Black	A (ground side)	2

CONTROL UNIT CABLE

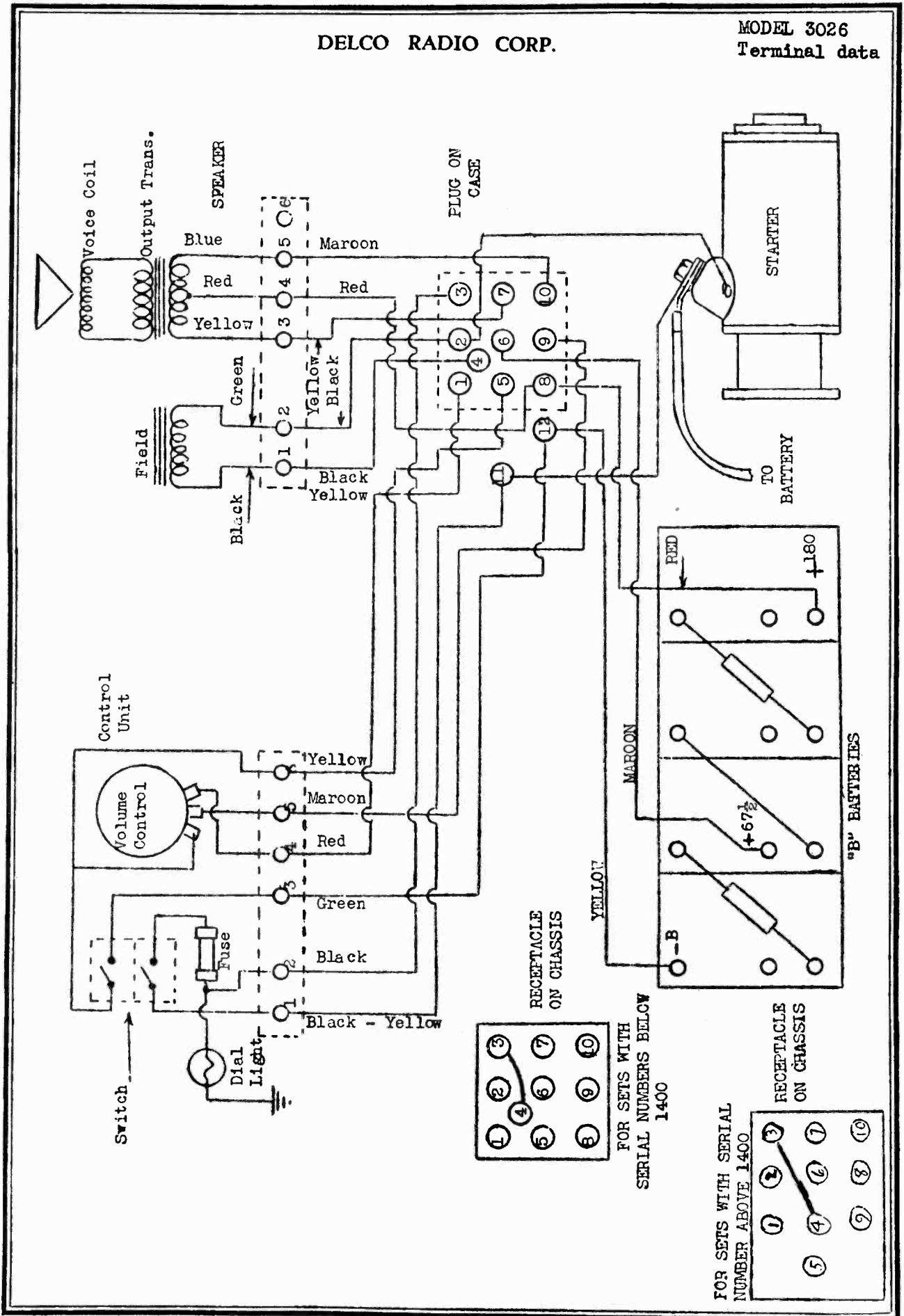
<u>COLOR</u> (Control Unit Term. Strip)	<u>FROM TERMINAL NO.</u>	<u>TO TERMINAL NO.</u>	<u>CONNECTS</u>
Black-Yellow	1	11	A (hot side) to switch
Black	2	3	Switch to filament
Green	3	12	B- from Battery
Red	4	1	A.V.C. cathode to high re- sistance side of Vol. Control.
Maroon	5	9	Grid resistor of A.V.C. tube to center tap of Vol. Control.
Yellow	6	5	B- to low resistance side of Vol. Control and to the switch

SPEAKER CABLE

<u>COLOR</u>	<u>FROM TERMINAL NO.</u> (Spkr. Term. Strip)	<u>TO TERMINAL NO.</u> (Plug on Rec. Case)	<u>CONNECTS</u>
Black-Yellow	1	4	One side of speaker field thru fuse to hot side of "A" Battery
Black	2	2	Other side of speaker field to ground side of "A" Battery
Yellow	3	7	Yellow lead of output trans. to plate of one 247 tube.
Red	4	8	Red lead of output trans. (cen- ter tap) to +180 "B" Battery.
Maroon	5	10	Blue lead of output trans to plate of the other 247 tube.

DELCO RADIO CORP.

MODEL 3026
Terminal data



MODEL 3026
Control drive data

DELCO RADIO CORP.

Be sure that four selector shaft stop washers and four plain washers are in position on the shaft. These washers should be arranged alternately with one plain washer against the rear bearing.

Replace the selector shaft stop pin, and with the windlass loose on the shaft, turn the shaft as far as it will go in a clockwise direction.

Hold the escutcheon plate in place on the front of the control unit and turn the selector dial until the last line beyond the 150 mark is lined up with the indicating pointers.

Place the windlass close enough to the front bearing to allow approximately 1/64" end play and tighten the two set screws in this position.

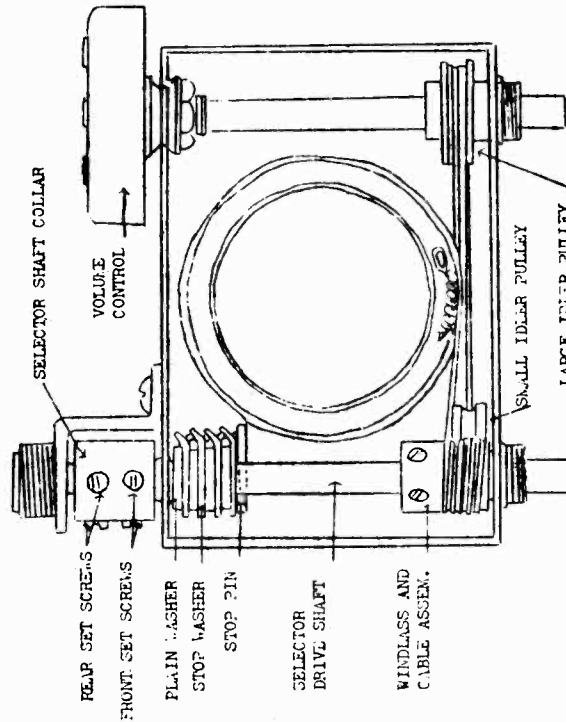


Figure 7

Remove the control drive cable from the rear of control unit.

Remove the control unit from the dash. Remove the top of the control unit, and the escutcheon plate.

Remove the stop pin from the selector drive shaft and loosen the two set screws in the cable windlass and the set screws in the selector shaft collar. Then push the selector drive shaft to the rear far enough to remove the windlass and cable assembly.

Hold the new windlass and cable, with the end containing the set screws in the left hand, and wind one complete turn of the short end of the cable around the windlass, in a clockwise direction, winding the cable in the groove away from the set screws.

Then wind three and one half turns of the long end of the cable around the windlass in a counter-clockwise direction, winding the cable in the groove toward the set screws.

Slip the cable clamp, Tool No. 1001, over the windlass to hold the cable in place

Place the windlass and cable in position with the set screws to the rear and push the selector drive shaft forward into position through the windlass. The long end of the cable should lead away from the windlass at the bottom. The short end of the cable should lead away from the windlass at the top.

Pull the long end of the cable under the small idler pulley near the windlass and around the larger idler pulley from bottom to top. Hook the spring on the loop at the end of the long section of the cable then lead the cable through the slot in the face of the selector dial drum and hook the free end of the spring over the ear in the drum, nearest the 50 mark.

Lead the short end of the cable once around the outside of the selector drum in a counter-clockwise direction and through the slot in the face of the drum. Hook the loop at the end of the cable over the ear in the drum nearest the 150 mark.

NOTE: On a number of sets of early production, the two ends of the cable are connected by the cable spring. The selector drum in this case has two notches and the cable is wound around the drum with the spring in the position shown in Figure 8

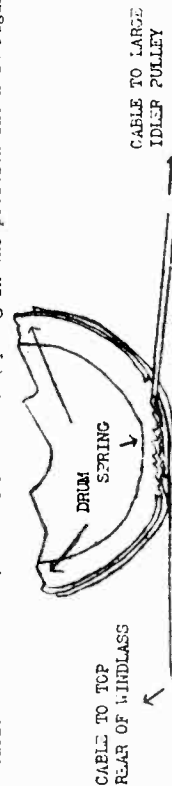


Figure 8

If it should be necessary to replace either the windlass and cable assembly or the dial and drum assembly described above, both parts should be replaced by the later type as listed in the part section of this manual.

DELCO RADIO CORP.

MODEL 3026
Voltage, Resistance
Plug data

Type of Tube	Position of Tube	Fil. Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Pentode Screen Volts	Normal Plate Current	Grid Test
37	Oscillator	5.5	65	-----	-----	5.0	-----	6.0	7.5
36	R. F.	5.5	105	.15	65	55.0	-----	2.5	3.5
36	1st Detector	5.5	165	5.50	80	5.0	-----	1.3	2.5
36	I. F.	5.5	110	2.50	75	52.0	-----	.5	3.0
37	A.V.C.	5.5	15	-----	-----	7.5	-----	---	---
37	2nd Detector	5.5	150	10.00	-----	5.0	-----	---	---
47*	A.F.	2.5	150	18.00	-----	-----	160	7.0	25.0
47*	A.F.	2.5	150	18.00	-----	-----	160	7.0	25.0
GA#	A.F.	5.0	150	18.00	-----	-----	160	7.0	25.0

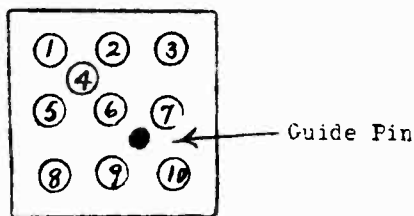
Volume Control on Max. "B" Battery Voltage 180

*Do not attempt to take readings on the type 47 (Pentode) tube unless your set analyzer is equipped to test sets using this type of tube. Otherwise, readings taken at the 47 sockets will be misleading.

#GA pentode used in Models 2027-A and 2029-A in place of '47 pentode output tubes.

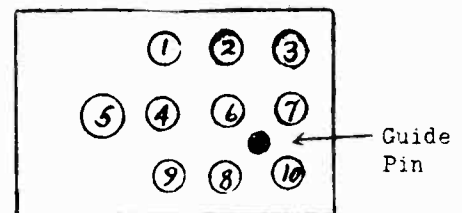
NOTE: It should be noted that readings obtained with different set analyzers will vary with battery voltage and with different tubes. The readings shown, therefore, are only average readings. For this reason, each service man should compile a chart similar to the one illustrated, using his own set analyzer with a set, and batteries that are known to be operating properly.

Test from contact No.	to contact No.	Correct Voltage Readings		Probable cause of trouble if voltage is below Min. Limit
		Min.	Max.	
5	8	120	180	Low "B" Batteries
5	6	45	67½	Low "B" Batteries
1	8	120	180	Open volume control
9	8	120	180	Defective volume control
5	7	120	180	Open speaker transformer
5	10	120	180	Open speaker transformer
2	3	6.0	6.8	Low storage battery
3	4	6.0	6.8	Open speaker field
8	2	No Reading		(If reading is obtained "B"
6	2	No Reading		Batteries may be grounded
				or "B" Battery wires may be
				grounded due to moisture be-
				tween the Batteries and "B"
				Battery box.)



Sets with serial numbers
Below 1400

View of plug in case with chassis removed.



Sets with serial numbers
Above 1400

MODEL 3026
Values, Changes

DELCO RADIO CORP.

TABLE OF CONDENSERS AND RESISTORS:

CONDENSERS			Part No.
Wiring Diagram Code	Section of Condenser	Capacity	
C-1	A	.1 Mfd.	1206834
C-1	B	.1 Mfd.	1206834
C-1	C	.5 Mfd.	1206834
C-2	A	1.0 Mfd.	1206156
C-2	B	3.0 Mfd.	1206156
C-3	A	.1 Mfd.	1206397
C-3	B	.1 Mfd.	1206397
C-4	A	.1 Mfd.	1206397
C-4	B	.1 Mfd.	1206397
C-5	A	.1 Mfd.	1206397
C-5	B	.1 Mfd.	1206397
C-6		.2 Mfd.	1206397
C-7		1.0 Mfd.	1207239
C-8		.002 Mfd.	1203894
C-9		.00016 Mfd.	1203387
C-10		.00075 Mfd.	1206432
C-11		Below Serial No. 1400	1200425
C-12		Above Serial No. 1400	1204265
C-13		Oscillator Series Trimmer.	1206749
		No. 2 I.F. Trimmer	
C-14		.00001 Mfd.	1203388
		Below Serial No. 1400	1203386
		Above Serial No. 1400	1203894

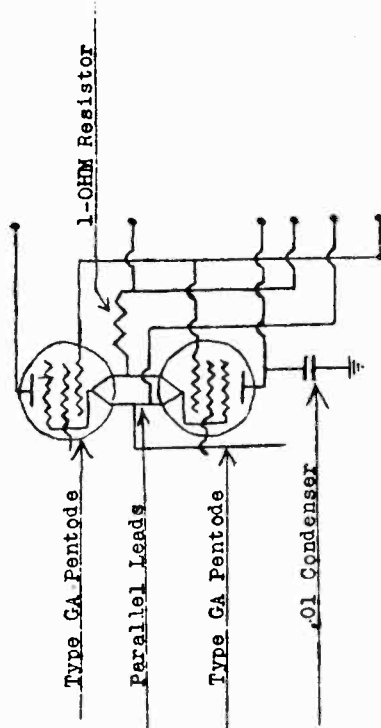
RESISTORS

CODE	OHMS	WATTS	BODY	END	SPOT	PART NO.
R1	1	5	Tubular Enameled Resistor			1206977
R2	250	1/2	Red	Green	Brown	1204109
R3	1,000	1/2	Brown	Black	Red	1201630
R4	1,000	1	Brown	Black	Red	1201615
R5	6,000	1/2	Blue	Black	Red	1204106
R6	8,000	1/2	Gray	Black	Red	1204132
R7	15,000	1	Brown	Green	Orange	1204111
R8	40,000	1/2	Yellow	Black	Orange	1201636
R9	90,000	1/2	White	Black	Orange	1204133
R10	100,000	1/2	Brown	Black	Yellow	1201635
R11	1,000,000	1/2	White	Black	Green	1201618
R12	90,000	1/2	White	Black	Orange	1204133
R13	15,000	1/2	Brown	Black	Orange	1204111
R14	100,000	1/2	Brown	Black	Yellow	1201635

MODELS 2027-A AND 2029-A

WIRING CHANGE FROM TYPE 247 PENTODE TO TYPE GA PENTODE

In order to re-operate the 2027 or 2029 chassis to the new 2027-A or 2029-A, there are three distinct operations which are as follows:

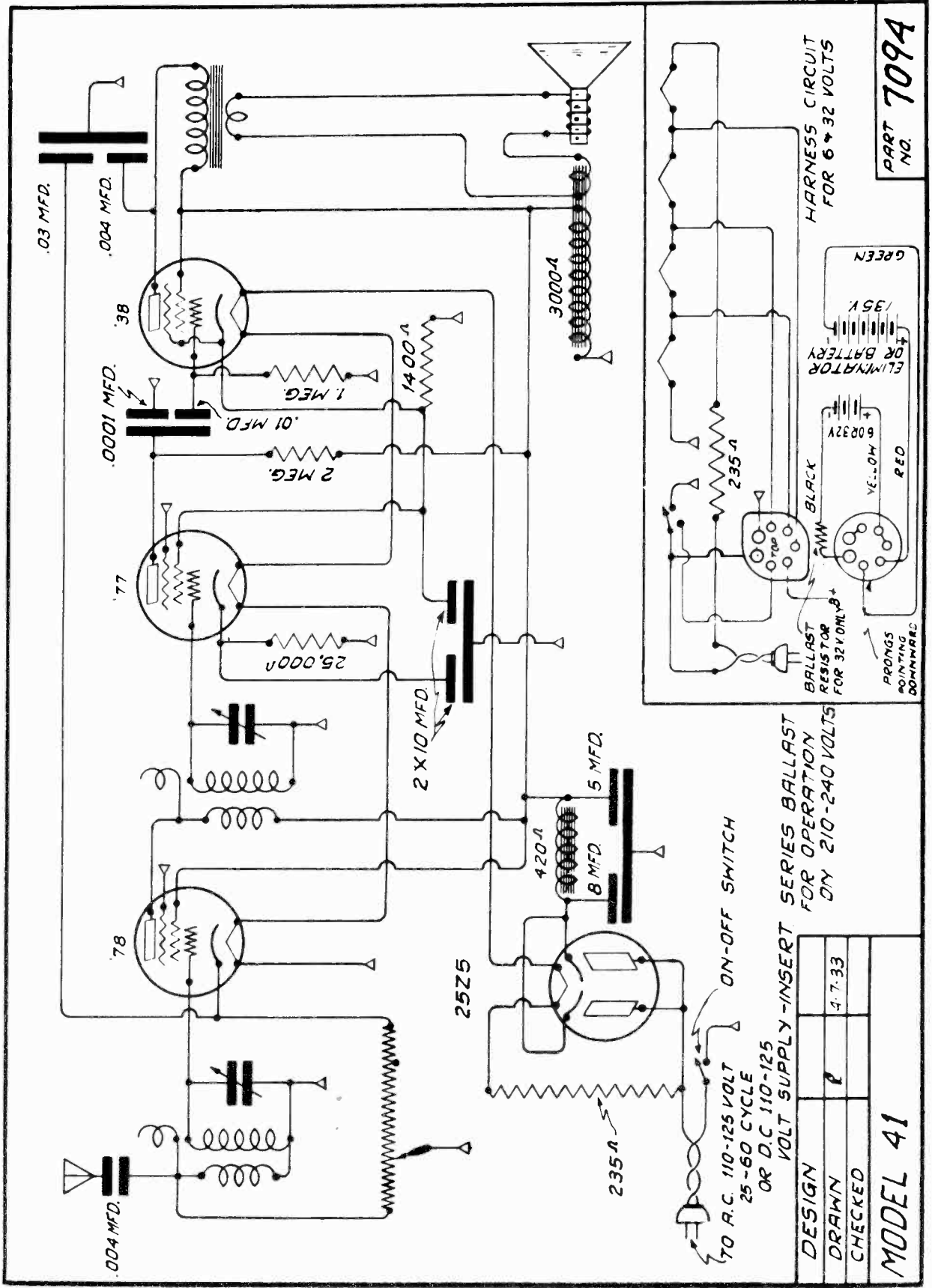


1. Change Filament leads which are connected in series, for use with the 247 tube, to parallel connections.
2. Insert the Black tubular 1-ohm Resistor in the positive lead. This does not necessitate moving the resistor.
3. Connect a .01 Mfd. condenser from the plate terminal on one pentode socket to ground.

The choke coils, which were mounted on the 2027-A and 2029-A sets received from the factory, are not necessary in making this change.

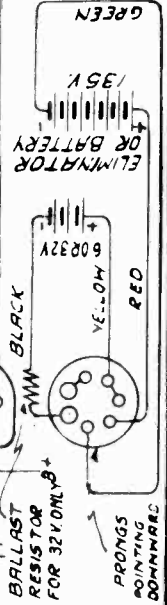
DEWALD RADIO

MODEL 41
Schematic



HARNESS CIRCUIT
FOR 6 + 32 VOLTS

PART NO. 7094



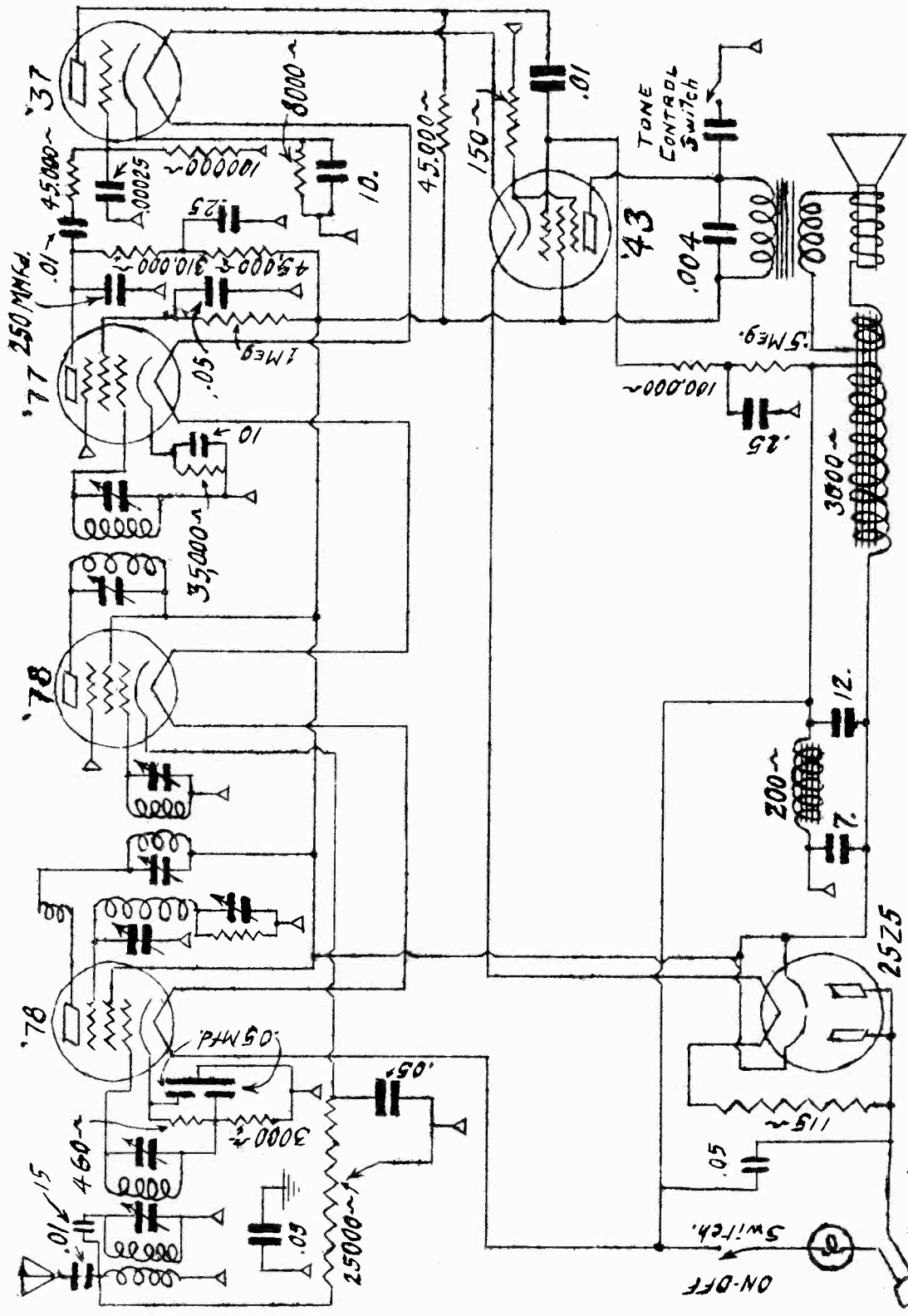
TO A.C. 110-125 VOLT
25-60 CYCLE
OR D.C. 110-125
VOLT SUPPLY - INSERT

DESIGN	
DRAWN	4-7-33
CHECKED	
MODEL 41	

ELIMINATOR
OR BATTERY
1.5V
60R32V
YE...OH
RED
BLACK
235-ohm
BALLAST
RESISTOR
FOR 32V0N15
PRONGS
POINTING
DOWNWARD

DEWALD RADIO

MODEL 60 Ex
Schematic



⊥ CHASSIS GROUND ⊥ EXTERNAL GROUND

PEAK I.F. AT 175 K.C. - FOR MODELS WITH SERIAL NO. OVER 1300 - BELOW THIS PEAK AT 455 K.C.

PART NO. 7096 MODEL 60 EX.

DEWALD RADIO

MODEL 61
Socket layout
Alignment

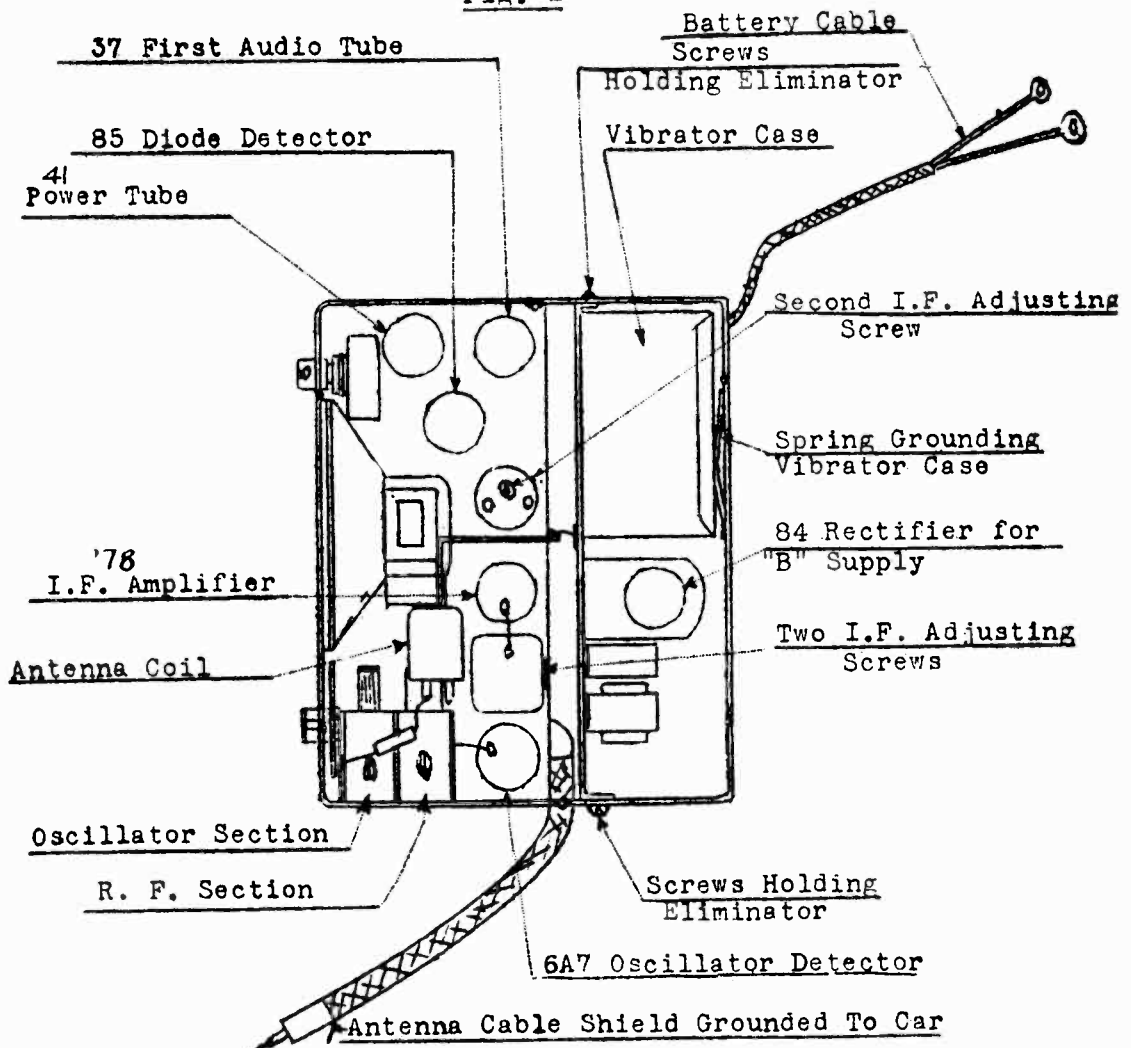
RECEIVER
ALIGNMENT

To align the I.F. circuit, an oscillator supplying 456 K.C. should be connected to the control grid of the 6A7 and the variable condenser frame. The grid cap normally on the 6A7 should be removed. The oscillator section of the variable condenser should be short circuited. This may be done by putting a small clip on the terminal of the oscillator condenser trimmer and running a wire to ground. It is preferable to use an output meter for accurate work, which may be connected into circuit of the 41 by means of an adapter having leads brought out from plate and screen through a .5 mfd stopping condenser. See Fig. #4.

The volume control on the receiver should be turned to maximum and the three I.F. adjusting screws shown in Fig. #2 set to give maximum on the output meter. This operation may be performed with the receiver in the can if a pair of long nose pliers or offset screw driver is used.

For R.F. alignment, remove oscillator condenser short circuit, replace grid cap on 6A7 and connect oscillator covering broadcast range to antenna wire and its shield.

Fig. 2



MODEL 61

DEWALD RADIO

Notes

Be sure shield of battery cable is soldered to can at left side of receiver.

When cover is placed on can, a heavy spring on the inside grounds the top of "B" supply unit. Be sure contacts is good and pressure heavy.

Condenser from antenna transformer should run to front of variable condenser. If further difficulty is experienced check ground of chassis and "B" supply unit to can at various points with heavy screw driver.

The wire on vibrator which runs from its coil to the frame, should be securely soldered on frame and on inside of vibrator case.

POSSIBLE SET TROUBLES

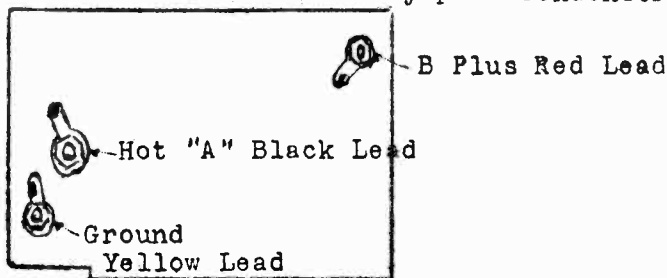
A. Low volume or weak signals

1. Defective tubes.
2. Poor antenna (small size shielded wire must not be used to extend present antenna, as capacity between shield and inside is too great.
3. Open circuit in radio frequency or audio stage.
4. Defective resistors.
5. Defective by pass condensers.
6. Defective volume control
7. Low "B" voltage.

B. Intermittent reception.

1. Antenna shorting (use high resistance continuity to check car antenna-set disconnected)
2. Defective tubes.
3. Loose connection.
4. Film breaking down in electrolytic condenser
5. Defective speaker
6. Defective volume control
7. Defective by pass condenser

Fig. 3b



View Showing Eliminator Three Terminals & Color Code of Connections

Adapter for 41 Showing Wires to Screen Grid & Plate Plus Circuit

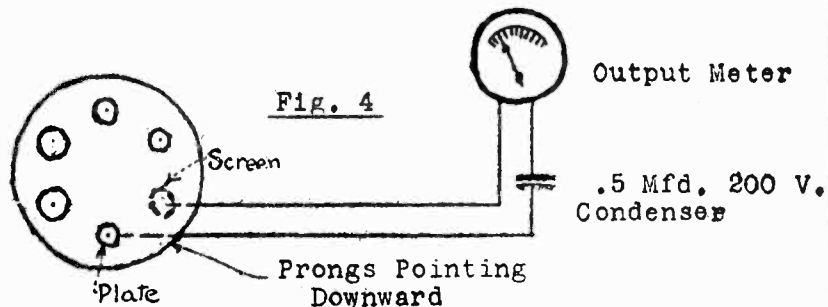


Fig. 4

DEWALD RADIO

MODEL 61
Vibrator data.

VIBRATOR ADJUSTMENT To examine vibrator, remove "B" supply unit from can by unsoldering 3 leads (see Fig.3) removing 6 screws at ends of unit. Take cover off vibrator case and vibrator may be removed without unsoldering its lead wires. It will be seen that there are a top and a bottom set of contacts. The normal clearance on these contacts is .003" to .004" and this may be adjusted with screws provided.

Any dirt on contacts should be removed with pipe cleaner before adjustment. If top clearance is too great vibrator may operate but not close this circuit (operate half wave) and the voltage will be low. If bottom clearance is too great, vibrator will pull down but not vibrate. Too small a bottom clearance may short bottom contacts and cause in-operative vibrator and heavy current drain.

If both contact clearances are small, the vibrator will operate at a higher pitch and voltage, but sparking will occur.

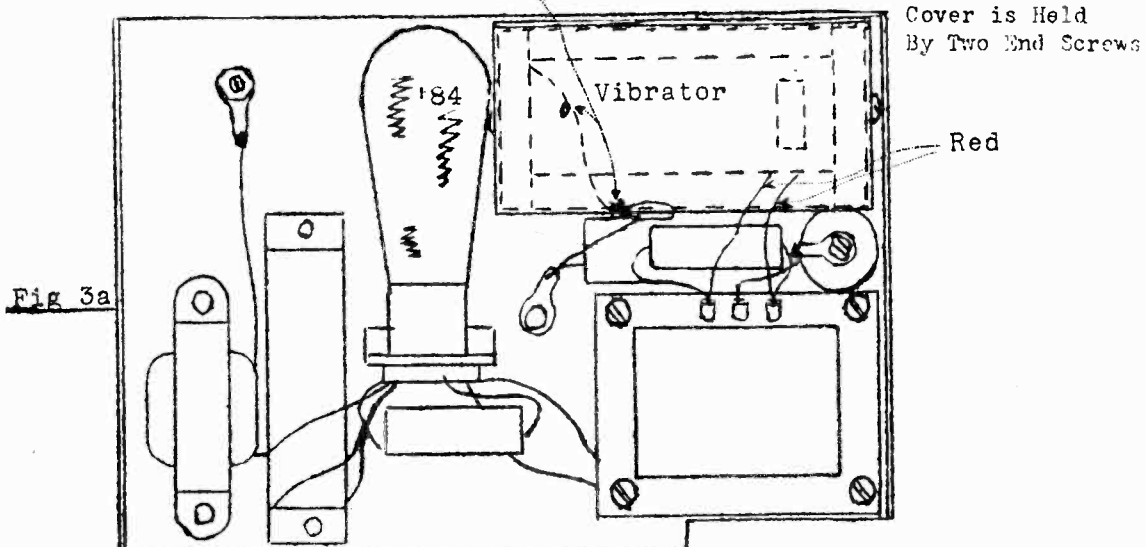
Check of vibrator operation may be made by running three temporary jumpers from "B" supply unit outside can to the receiver, (See Fig.3) and operating the vibrator outside its case so it is visible. The tone should be low pitched, even and regular, and no appreciable sparking should occur. To remove vibrator for replacement purposes, unsolder the three vibrator wires at the terminals of the step up transformer and at the ground terminal near the tube. Leads should be left attached to vibrator.

If set is not available or is in doubtful condition a 4000 ohm load resistance of 5 watts or larger may be used from plus "B" to ground of eliminator in place of set. The 6-volt supply is applied to the two terminals at the vibrator end of "B" unit.

If gaps are okay, and sparking persists, check for dirty contacts or open condenser across primary of step-up transformer.

Vibrator Base is Grounded
to Vibrator Case

Vibrator
Cover is Held
By Two End Screws



MODEL 61
Parts List
Alignment

DEWALD RADIO

Set test oscillator at 1500 K.C. and receiver variable condenser at minimum capacity. Adjust to maximum output with trimmers on top of variable condenser.

Apply 600 K.C. from test oscillator, tune in on receiver and check variable condenser alignment by bending one R.F. condenser rotor plate in or out slightly to give maximum output. Repeat procedure at 800, 1000, and 1200 kilocycles.

MODEL #61 RECEIVERNUMBERS AND LIST PRICES OF REPLACEMENT PARTS

1165.....	Second Detector Transformer.....	\$ 1.40
1166.....	Dual I.F. Tuned Transformer.....	1.70
1168.....	Oscillator Coil.....	.70
1169.....	Antenna Coil.....	.85
2033.....	.25 Cub Condenser.....	.35
2046.....	.05 Cub Condenser.....	.35
2047.....	.00025 Mica Condenser.....	.35
2056.....	.01 Cub Condenser.....	.35
2081.....	.00015 Mica Condenser.....	.35
2123.....	.0001 Mica Condenser.....	.35
2133.....	5 Mfd Elect. Condenser.....	.75
2135.....	2 X .05 Cub Condenser.....	.45
2147.....	8 Mfd Elec. Condenser.....	1.00
2152.....	.25 Gen. Condenser.....	.50
3192.....	Spark Plug Suppressor.....	.50
3193.....	Distributor Suppressor.....	.50
5064.....	Antenna Cable.....	.50
5069.....	Battery Cable.....	.90
7095.....	Speaker.....	5.20
8308.....	Combination Controls (Vol Cont. & Switch)	1.15
9257.....	Drive Cover.....	.50
9270.....	Baffle Board.....	.15

MODEL #61 ELIMINATOR

1163.....	Choke R.F.....	.60
1162.....	Transformer.....	2.50
2070.....	.5 Mfd Cub Condenser.....	.35
2033.....	.25 Cub Condenser.....	.35
2145.....	.025 Mfd Cub Condenser.....	.35
2147.....	8 Mfd Elect. Condenser.....	1.00
8304.....	Vibrator.....	5.00
9289.....	T. & B. Cushion 3/8 X-2-1/16 X 4-3/8.....	.25
9290.....	Side Cushion 3/8 X 1-3/16 X 3-5/8.....	.20
9291.....	End Cushion 3/8 X 1-3/16 X 2-1/16.....	.20
1161.....	Filter Choke.....	.75
9202-9203..	Drive Cable Ably.....	1.75
8317.....	Driven Gear Ably.....	1.00

THOMAS A. EDISON, INC.

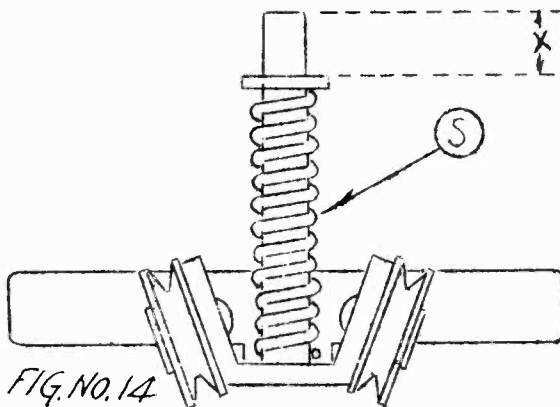
MODEL "Light-O-Matic"
Cable drive data

1. **DRIVE MECHANISM.** Twenty pound test line is specified and used for driving the dial mechanism. Each end of the belt is secured to the large pulley wheel. The ends pass through holes on opposite sides of this pulley and are held by knots tied in the belt itself. The belt passes over two smaller pulleys in a spring-actuated take-up assembly, thence to a worm which slips over the tuning knob shaft. Five turns are made by the belt around this worm. The worm is not directly secured to the tuning knob shaft but is held in position between two collars locked to the shaft. A spring washer is inserted between the worm and the front collar. The spring washer being adjusted so as to provide friction to a sufficient degree, exceeding the driving resistance of the dial mechanism itself and its associated condensers; yet insufficient friction to resist continued rotation of the tuning knob when the dial mechanism has been rotated to either extreme end, thus preventing slippage or breakage of the belt after proper adjustment has once been made.

2. **SPRING-WASHER.** Receiver units bearing serial numbers ranging above 725000 have been equipped with a spring washer of improved design, greatly diminishing the possibility of dial slippage. The improved washer may be distinguished from the earlier style washer by its cup-shaped appearance, much of which it retains even when adjusted to a position for maximum friction.

3. **DIAL SLIPS OR STICKS.** Sticking or slipping of the dial may result if the spring washer is not adjusted for sufficient friction against the drive worm or if the belt is too loose.

4. **ADJUSTMENT OF SPRING WASHER FOR INCREASED FRICTION.** Note Figure 12. Observe the relative positions of front collar, spring washer, drive worm, rear collar and bearing plate "B".



NOTE: If dial slips and continues to slip after collar has been forced forward for maximum friction of spring washer against worm, then inspect "take-up assembly". If distance "x" is less than 1-16th inch, belt should be tightened in accordance with instructions.

MODEL "Light-O-Matic"
Cable drive data

THOMAS A. EDISON, INC.

Rotate dial to approximate position as shown in Figure No. 12 so that these parts are most readily accessible with long blade screw driver. Loosen both set screws in rear collar. Insert screw driver blade between rear collar and bearing bracket, indicated by "Z". Force the rear collar forward, in the direction of the tuning knob, by twisting the blade or prying against the bearing bracket. This action compresses the spring washer between the worm and front collar, providing greater friction. Then, with a narrow blade screw driver, tighten set screws in rear collar, making sure that rear collar does not shift before the second set screw is tightened. This operation properly performed will eliminate slippage of the worm.

5. OIL should not be applied to the spring washer or worm. The application or presence of oil on these parts promotes slipping and will defeat proper functioning.

6. TO TIGHTEN BELT. Although not absolutely necessary greater accessibility may be had by removal of the front panel. Then remove the right hand variable condenser shield. Loosen the two set screws in dial mechanism that hold the shaft of the right hand variable condenser, and then push the rotor plate assemblies into position of maximum capacity so that the possibility of damage to them is reduced to a minimum. Consult Figure No. 13. Rotate the tuning knob until the large pulley with the knot "K" is in the approximate relative position shown in Figure No. 13. Insert screw driver blade as shown between chassis shelf and take-up assembly bracket. Lift upward on this screw driver, compressing take-up assembly spring "S", and loosening belt "B". Block screw driver blade as illustrated at point "X", thus maintaining looseness of belt. Then pull knot "K", taking up slack in belt "B". Then tie a new knot in this belt as near as possible to the pulley face. It is usually advisable, if possible, to untie the original knot to avoid its rubbing against the condenser shield. When the new knot has been formed, remove the screw driver, rotate the tuning knob in a counter clockwise direction (to the left), turning it as far as possible. Then tighten the set screws that hold the dial mechanism to the shaft of the right hand variable condenser. Replace the right hand condenser shield, front panel and knobs.

7. NOTE. It is always advisable, after removal or replacement of panel or when any adjustment of the variable condensers is made, to reneutralize and then recompensate to insure most accurate calibration. These operations are explained in detail in bulletins numbered 3 and 4.

THOMAS A. EDISON, INC.

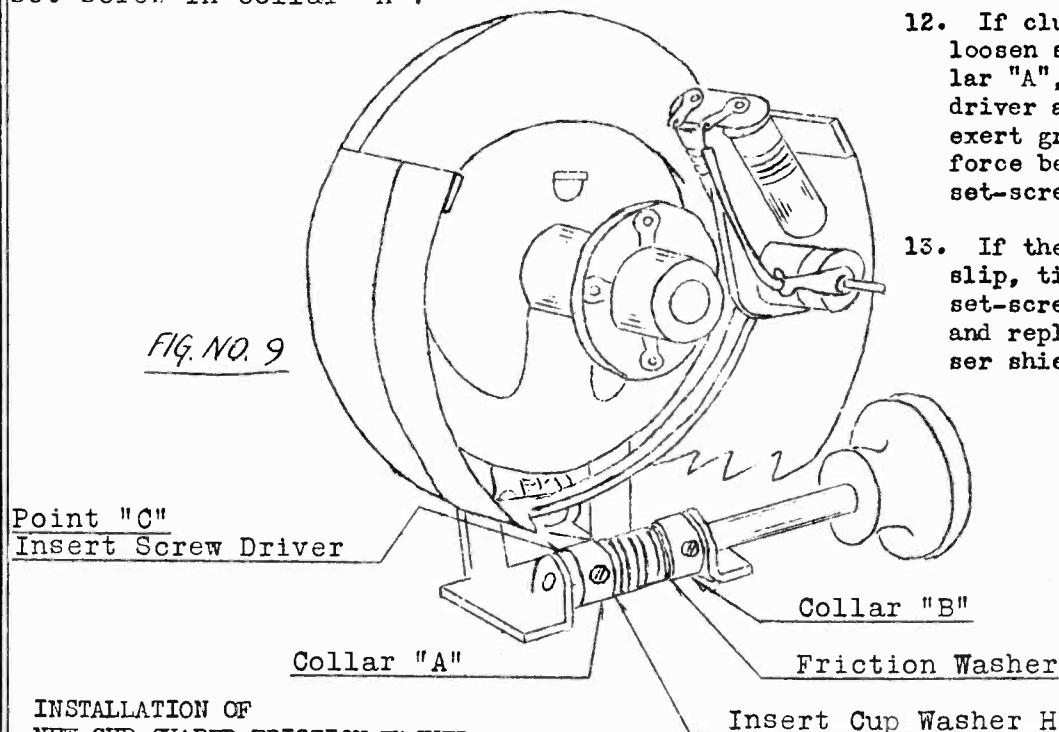
MODEL "Light-O-Matic"
Cable drive data

1. A cup-shaped friction washer is now being used on Light-O-Matic Models to prevent slipping of the belt driving worm.
2. It is recommended that this cup-shaped friction washer be installed in addition to the regular friction washer wherever the worm has a tendency to slip. This is done in the following manner.
3. Remove left hand gang condenser shield housing.
4. Loosen both set screws in clutch collars "A" and "B". (See Figure No. 9.)
5. Pull out tuning knob shaft slowly about $\frac{1}{2}$ inch or until collar "A" can be removed, taking care to hold shaft straight so drive cord will not change its position on worm.
6. Push tuning shaft back in slightly and place cup-shaped washer on end of this shaft.
7. Replace collar "A" in position and push tuning knob shaft through into its original position.
8. Tighten both set screws in collar "B".
9. Insert a screw driver between collar "A" and frame bearing at point "C".
10. Twist screw driver, forcing collar "A" toward panel thereby compressing friction washer, and while holding it in this position, tighten one set screw.
11. If friction clutch does not slip, tighten the other set screw in collar "A".

12. If clutch still slips, loosen set-screw in collar "A", reinsert screwdriver at point "C" and exert greater twisting force before tightening set-screw.

13. If the clutch does not slip, tighten the other set-screw in collar "A" and replace gang condenser shield housing.

FIG. NO. 9

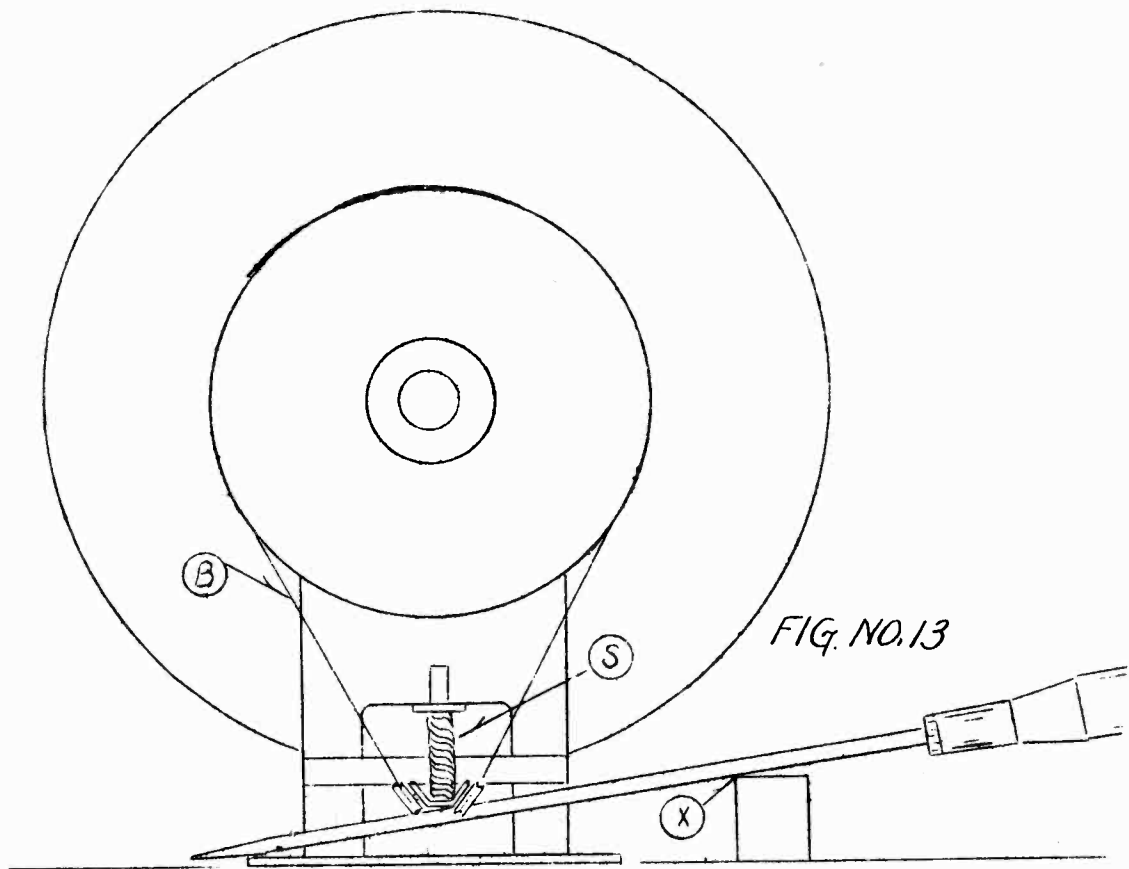
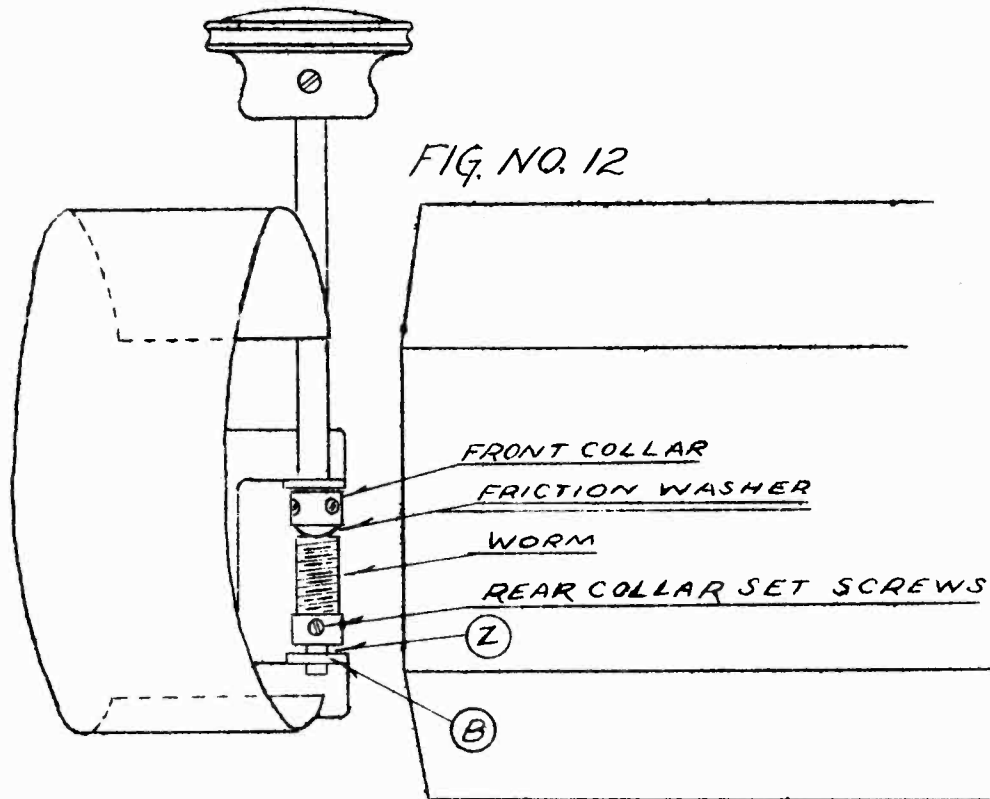


INSTALLATION OF
NEW CUP-SHAPED FRICTION WASHER

Insert Cup Washer Here

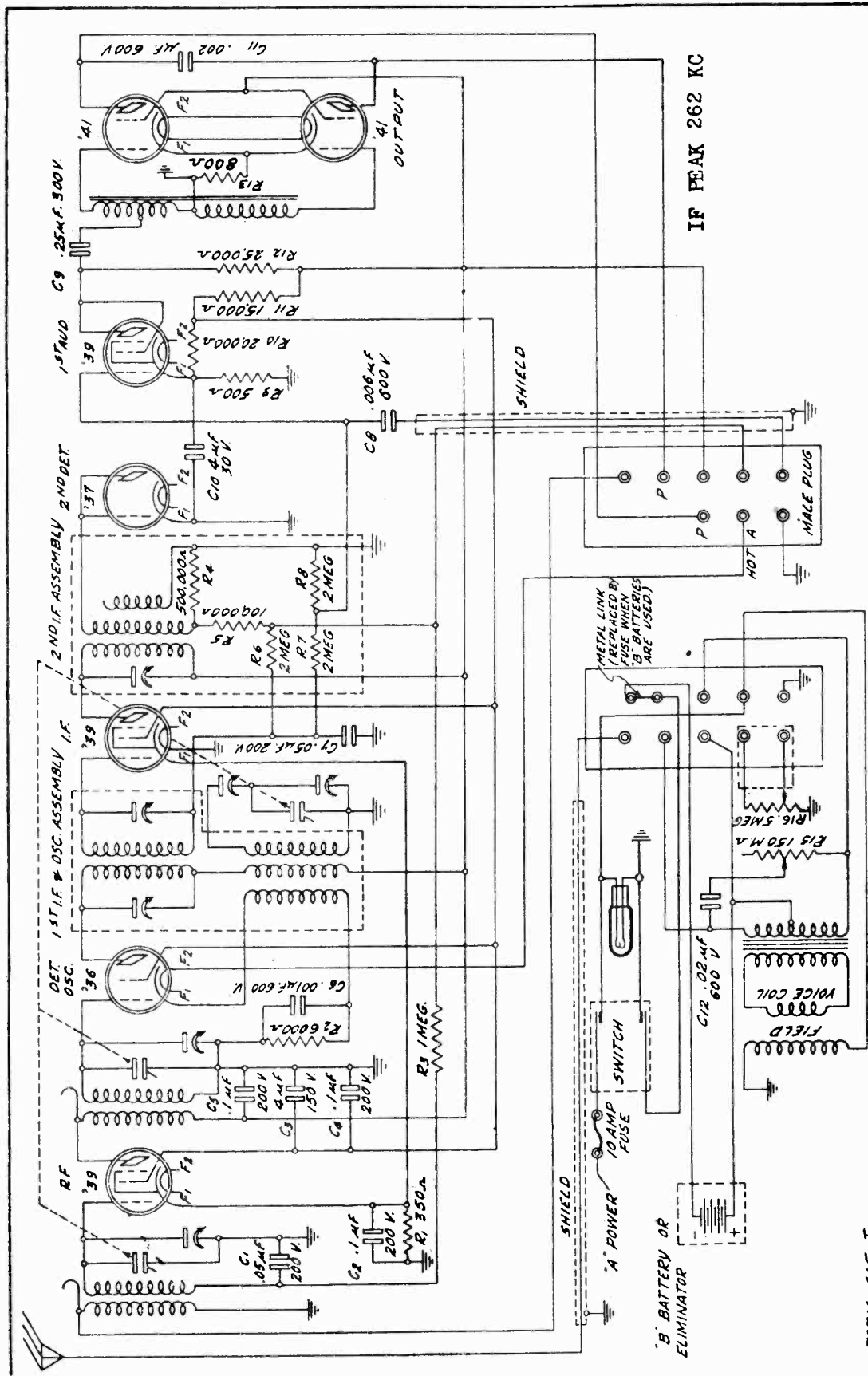
MODEL "Light-O-Matic"
Cable drive data

THOMAS A. EDISON, INC.



MODEL 072-A
Schematic

ELECTRIC AUTO LITE CO.



FORM 415-J

MODEL 072-A

ELECTRIC AUTO LITE CO.

Installation notes

The chassis is received with the condenser pulley, spring and centering ring mounted in the proper position on the tuning condenser and the cable chuck through which the drive cable passes mounted on the chassis box.

All that it is necessary to do is to mount the control unit on the steering column, cut the cable and housing to length if necessary, attach the cable to the drive pulley, and secure the housing in the chuck.

MOUNTING THE CONTROL UNIT

The control unit is mounted on the steering column with the knobs extending toward the right hand side. The proper distance below the steering wheel can be determined by trial.

Two clamps are provided to secure the control unit to the steering column. Use the lockwashers supplied under the heads of the clamp screws to secure the clamps on the control unit.

If the steering column is $1\frac{1}{2}$ " in diameter, use the leather spacers supplied. If $1-5/8$ ", split the spacers or wrap the column with about $1/16$ " of friction tape under the brackets. If the column is $1-3/4$ ", no spacers are required.

ATTACHING THE CABLE

The drive cable should be run in as straight a line as possible. Avoid any sharp bends.

After the control unit has been mounted and before securing the drive cable and housing at the chassis, cut it to length if necessary. Be sure that enough cable is allowed to avoid any sharp bends. Do not coil the excess length in short loops.

To cut the cable proceed as follows: With a sharp three-corner file, file across one of the turns of the tubular housing until it is practically severed. Then bend it only slightly back and forth until it breaks off. Do not bend sharply as in so doing permanent injury to the inner element of the cable might result.

Turn the station selector knob on the control unit as far as it will go in a counter-clockwise direction. The cable will then extend out of the housing the greatest distance.

Loosen the large jam nut on the cable chuck. Insert the free end of the cable and its tubular housing. Be sure that the housing with its weatherproof covering is inside the chuck. Then tighten the jam nut. This will secure the housing and weatherproof braid in place. As explained above, the station selector knob should be turned to the extreme counter-clockwise position. The rotor of the tuning condenser is held at the extreme clockwise position by the action of the spring. Bring the free end of the cable around the pulley, loosen the cable clamp screw at the top of the pulley, insert the cable under the clamp washer and then tighten in place. Cut off any excess cable to prevent tangling with other parts of the receiver. Care should be taken not to put a sharp bend in the exposed portion of the drive cable, as the latter may be permanently injured.

After the cable head is in place on the chassis and after the drive cable is attached to the pulley, check the centering of the cable chuck with the pulley. If necessary to re-center, loosen the nut which secures the chuck to the chassis box. Then move the chuck until the cable is centered relative to the groove in the pulley and re-tighten the nut.

DIAL LAMP

The dial lamp may be replaced by removing the station selector knob and the two screws on the sides of the control housing. Use a standard 6-8 V. screw base lamp which may be procured from the factory. As a temporary measure, a 6 volt pilot light bulb may be procured from any radio store.

MODEL "Electronic B"
ELECTRONIC LABORATORIES, INC. Schematic, Notes

INSTRUCTIONS FOR INSTALLING ELECTRONIC BTM POWER SUPPLY

1. INSTALL ELIMINATOR IN MOST CONVENIENT POSITION IN CAR, BEING SURE THAT ELIMINATOR IS SECURELY GROUNDED TO SOME GROUNDED METAL PART OF THE CAR.
2. CONNECT "HOT" SET LEAD TO H.S. TERMINAL OF ELIMINATOR.
3. CONNECT "HOT" BATTERY LEAD TO A.H. TERMINAL OF ELIMINATOR.
4. CONNECT NEGATIVE RADIO SET LEAD TO B- TERMINAL OF ELIMINATOR.
5. CONNECT POSITIVE RADIO SET LEAD TO B+ TERMINAL OF ELIMINATOR.
6. IF RADIO SET HAS AN INTERMEDIATE VOLTAGE TAP, CONNECT IT TO B_m TERMINAL OF ELIMINATOR. THIS INTER-

EDIATE VOLTAGE SHOULD BE ADJUSTED IN ACCORDANCE WITH SET MANUFACTURER'S INSTRUCTIONS, THE VOLTAGE BEING MEASURED WITH A HIGH RESISTANCE VOLTMETER. IF THIS IS NOT AVAILABLE, THE SLOTTED ADJUSTING SHAFT IN THE CENTER OF THE B TERMINAL STRIP SHOULD BE TURNED TO ABOUT THE CENTER POSITION AND VARIED A LITTLE EITHER WAY UNTIL BEST RADIO RECEPTION IS OBTAINED.

7. IF RADIO SET B CABLE HAS SHIELDING, CONNECT IT TO THE G TERMINAL OF ELIMINATOR.

NOTE.—SOME RADIO SETS HAVE ONLY ONE B LEAD WHICH IS POSITIVE, THE NEGATIVE LEAD BEING THE SHIELDING. IN THIS CASE CONNECT THE SHIELDING TO THE B- TERMINAL AND TO THE G TERMINAL.

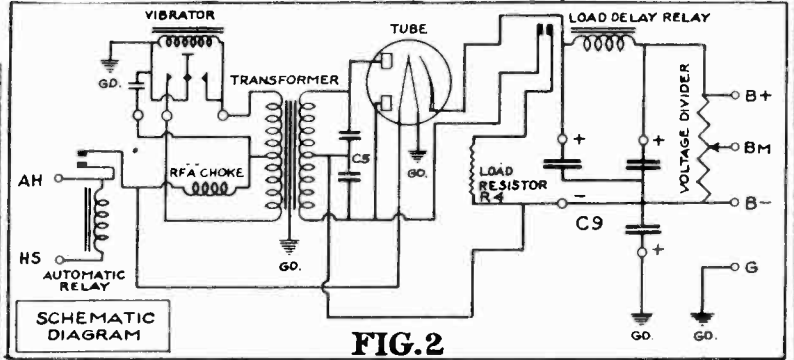
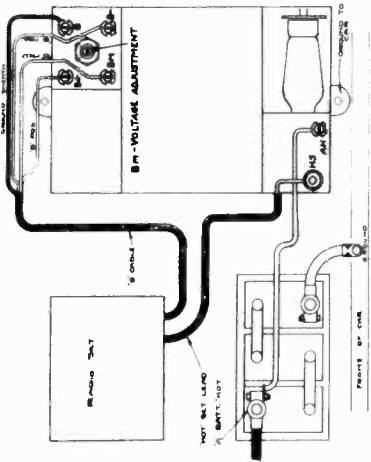


FIG. 2

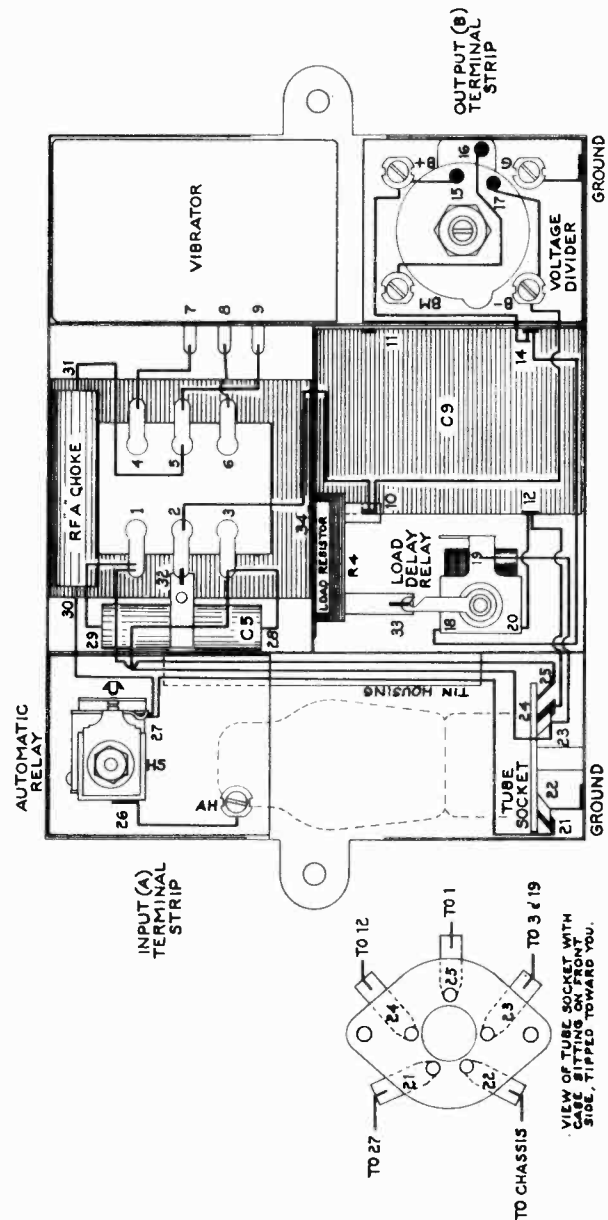


FIG. 1

ELECTRONIC LABORATORIES, INC.

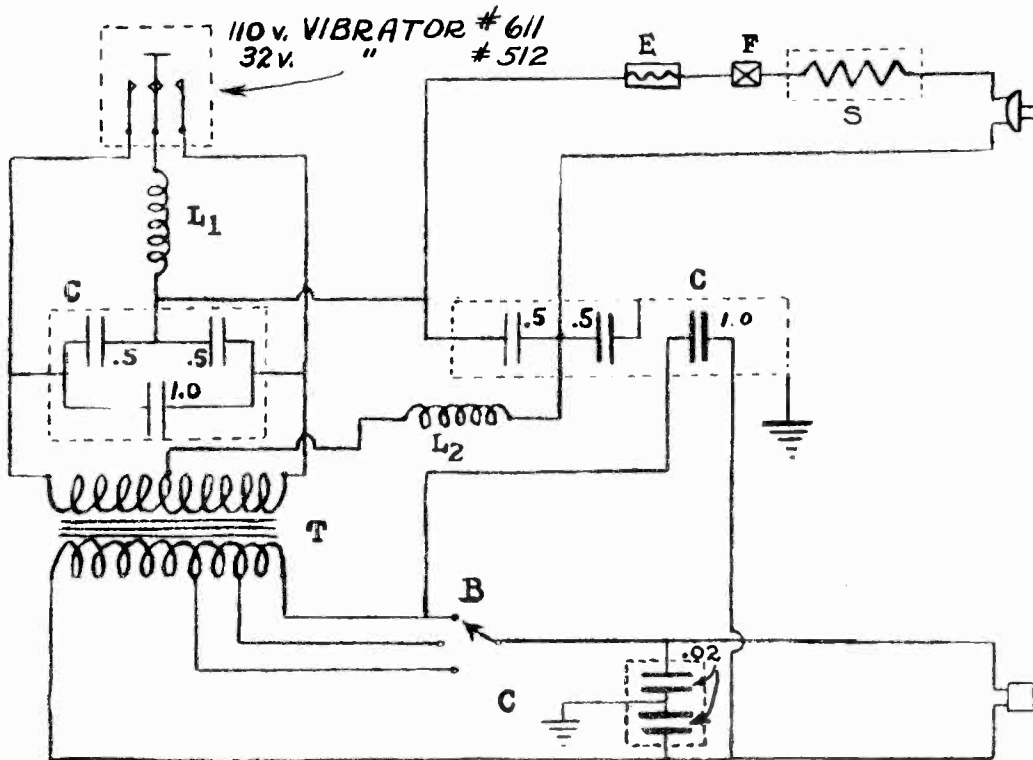
MODEL 338,339
DC Converters
Schematic

ENGINEERING SPECIFICATIONS

PART NO. F27A

SUBJECT: CIRCUIT DIAGRAM OF 32 AND 110-VOLT D-C. CONVERTERS
TYPES 338 AND 339

PARTS LIST	MATERIAL	FINISH
------------	----------	--------



- B Tap Switch
- C Condenser Block
- E Fuse
- F Toggle Switch
- L-1 Choke (32 volts, 10 turns)
- L-2 Choke (100 turns)
- S Resistance Cord (32 volts, 1 ohm; 110 volts, 10 ohms)
- T Transformer

CHANGES	DATE	SUPPLIERS	THEIR PART NO.	PRICE	ELECTRONIC LABORATORIES, INC. 122 W. NEW YORK ST., INDIANAPOLIS, IND.	
A CHOKES L ₁ & L ₂	11-22				DRAWN BY LK	DATE 11-22-33
B					APPROD. BY W.M.	DATE
					USED ON	SEE ASS. PART NO.

MODEL 30 AW, 33 AW,
250 AW, 321 AW,
350 AW

EMERSON RADIO AND PHONOGRAPH
CORPORATION

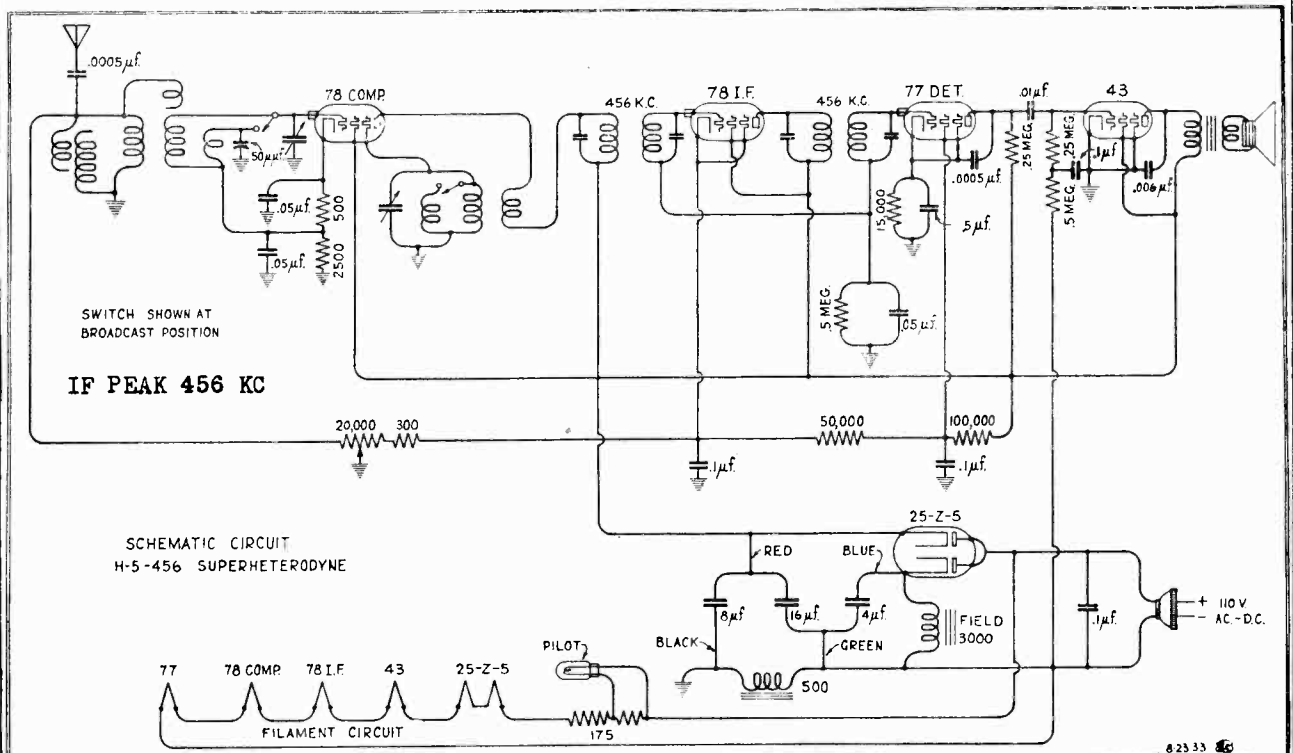
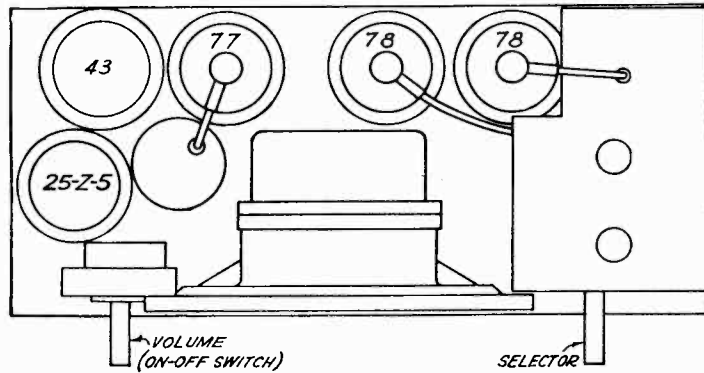
Schematic, Voltage,
Socket
Voltage Readings:

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

Using	300-volt scale Plate to Ground	300-volt scale Screen to Ground	30-volt scale Cathode to Ground	A.C.-D.C. . . 100-135 Volts . . 25-70 Cycles Also Available for 220 Volts.
78—Detector Oscillator ..	98	98	1.6	Broadcast 540—1500 Kilocycles 1500—200 Meters
78—I. F. Amplifier.....	98	98	2.8	Short Wave 1500—3000 Kilocycles 200—100 Meters
77—2nd Detector	35	25	1.5	
43—Power Amplifier	92	98	..	
25Z5—Rectifier .....	..	..	98	

Voltage across speaker field 100 volt.

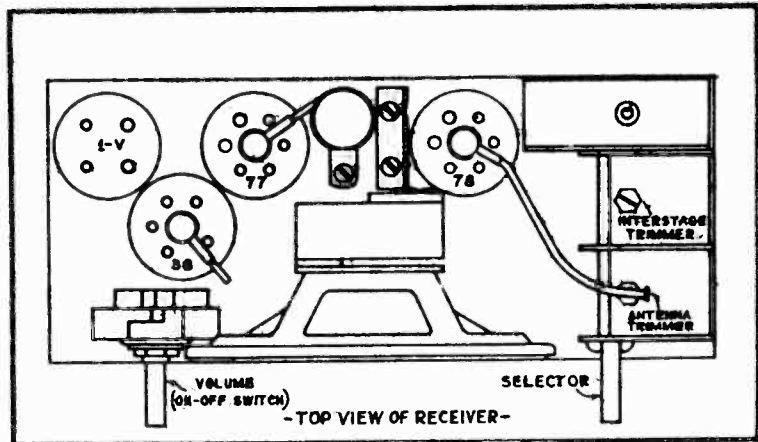
Bias for 43 tube is measured across filter choke and should
be 15 to 18 volts.



EMERSON RADIO AND PHONOGRAPH CORPORATION

MODELS 415, 416
Schematic
Layout
Voltage

Universal Compact
Operates on either AC or DC
110-120 Volts, 25-60 Cycles
Adaptable for 220-Volt Current
with use of 220-Volt Resistor



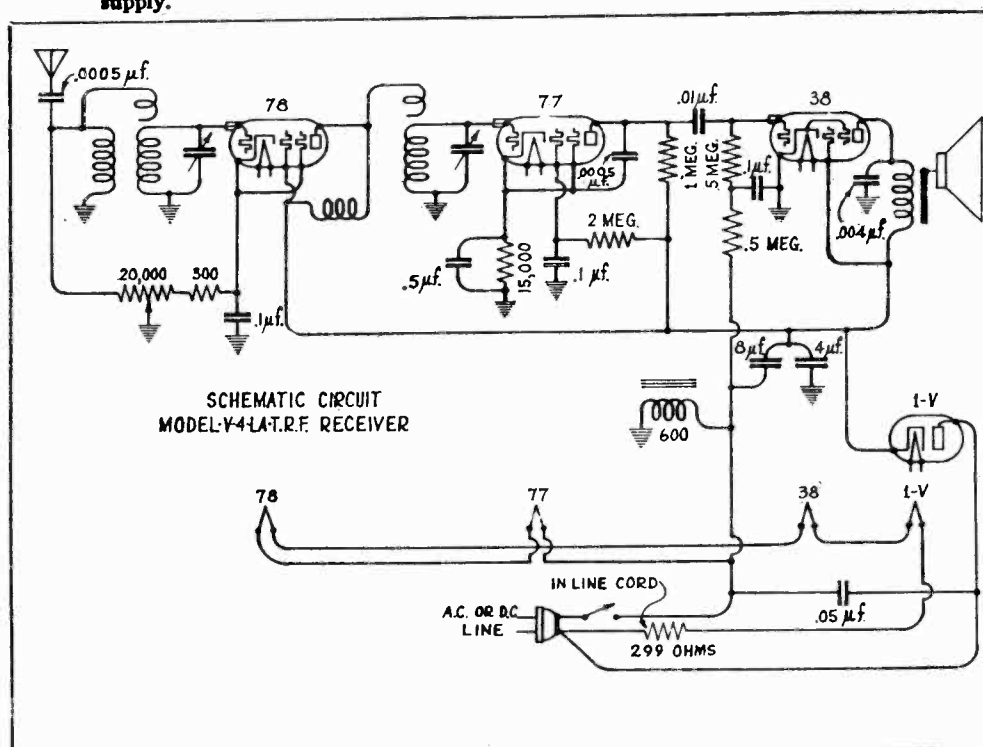
Voltage Readings:

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.

<u>Chassis</u>	<u>To— Plate</u>	<u>Screen</u>	<u>Cathode</u>
77—Detector	10- 15	9- 12	1- 2
78—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.

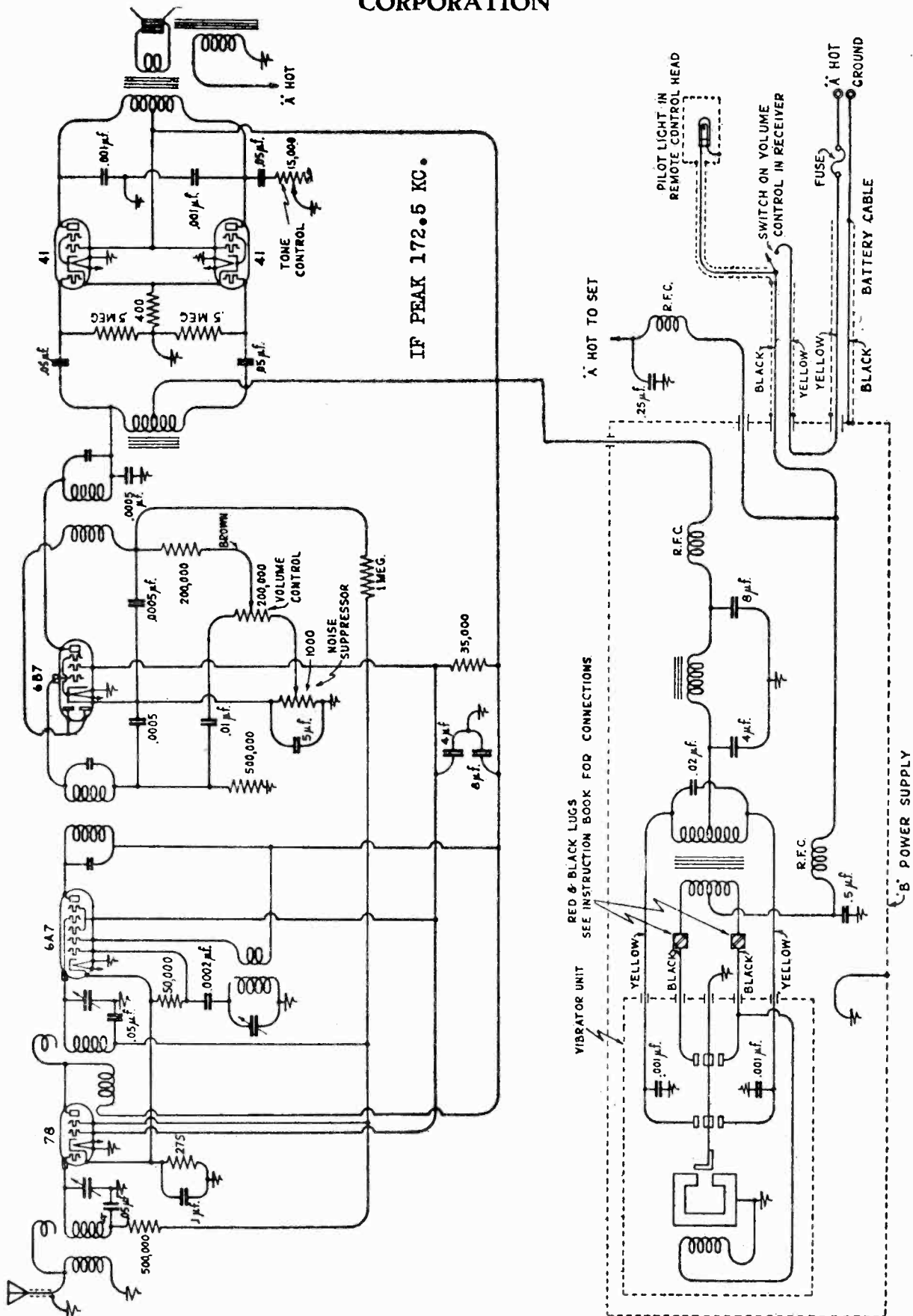


Circuit Wiring Diagram

MODEL 678

Schematic Type 2

EMERSON RADIO AND PHONOGRAPH CORPORATION



6-10-33

EMERSON RADIO AND PHONOGRAPH
CORPORATION

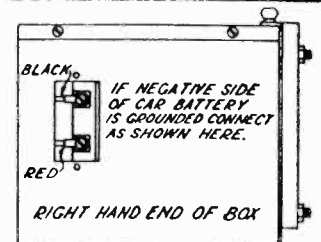
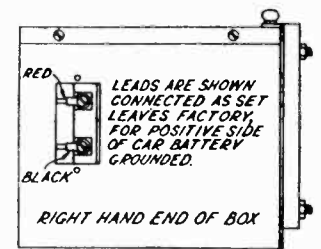
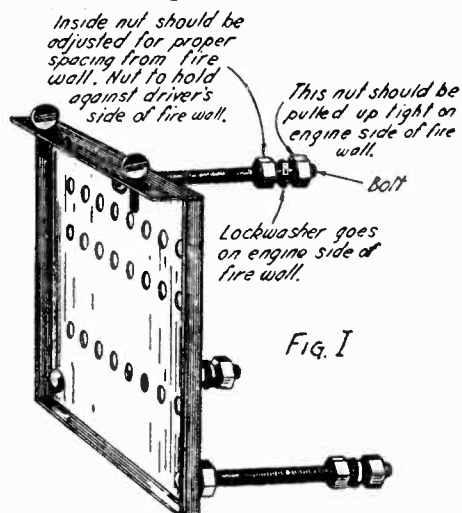
MODEL 678
Installation Notes

INSTALLATION PROCEDURE

(Follow closely for easy installation)

1. Open carton, unpack set and check equipment furnished.
2. Remove the two thumb-screws holding the mounting plate to the radio cabinet proper. Tip the mounting plate back and unhook it.
3. Remove the top cover and check visually conditions in general, i.e., tubes, grid caps, remote tuning drive, etc.
4. Using the mounting plate (Figure I) for exploring, determine the most satisfactory position for mounting in the car. As the mounting plate has the same area as the frontal area of the radio cabinet, any space which will accommodate the mounting plate will be satisfactory, (allowing clearance for the set to tilt forward for inspection after being installed).
5. Using the mounting plate as a template, locate the holes for the three mounting bolts. Check under engine hood to see if bolts will be clear. Optional mountings may utilize 2, 3, 4 or 5 mounting bolts.
6. Drill these three holes. (Suggest using $\frac{1}{8}$ " drill as a pilot hole then finish with $\frac{3}{8}$ " drill.) Put one lock washer on each $\frac{5}{16}$ " bolt and insert thru the plate. Put a nut on each bolt and fasten securely against plate. Put a spacer nut and lock-washer on each bolt and mount the plate on auto bulk-head. Allow $\frac{1}{2}$ " to 1" clearance between back of mounting plate and bulk-head for ventilation and good tone quality. Now tighten the bolts from the engine side of the bulk-head using a lock-washer and nut for each bolt.
7. Before proceeding further, at this time, check the polarity of the car battery; that is, determine which side of the battery is grounded. This may be done most conveniently with a low reading D.C. volt-meter. However, experienced mechanics may recognize the positive terminal of the battery by the fact that it is usually larger and blacker than the negative terminal. If there is any corrosion present, GREEN corrosion will be found at the POSITIVE terminal. **Do not take chances or guess at the polarity but use every means to determine it correctly, as the wrong connections may cause serious damage to the receiver and car battery!**
8. If the POSITIVE terminal of the battery is grounded, no changes are necessary and the installation may proceed.

If the NEGATIVE terminal of the battery is GROUNDED, it is required to make a slight change in the receiver. This is done quite conveniently by removing the top screw and loosening the bottom screw holding the serial number plate to the right side of the receiver cabinet. Tip the plate down and reverse the red and black-marked spade lugs. When this is done, the black-marked lug will be on top and the red-marked lug will be the lower one. (See Figure II and red tag on battery cable.)



MODEL 678

Installation Notes

EMERSON RADIO AND PHONOGRAPH
CORPORATION

9. Replace the top cover on the receiver cabinet, using the screws to fasten it and attach the radio cabinet to the mounting plate; first, by hooking the two hooks on rear of the cabinet into the slots of the mounting plate; second, by inserting the two thumb-screws into the holes on the top of the mounting plate and screwing them into the holes of the cabinet. This completes the mounting of the radio cabinet.

10. Attach Remote-Control Unit to a convenient position on the steering wheel column, allowing the cables to take a smooth path to the set. Leather strips are furnished to accommodate unusual size steering wheel columns and also to prevent marring finish. *Screw down the set screws in the center of the clamps in order to ground the remote-control unit to the steering post.* Fasten the cable to the steering column and other points in order to prevent vibration and interference with the operation of the car.

11. Connect the two-conductor shielded cable to the battery, the BLACK wire always connects to the GROUNDED terminal of battery and the YELLOW wire always connects to the HOT terminal of battery regardless of polarity. (Re-read and check paragraph 7.) It is advisable to run this cable as directly as possible to the battery, keeping away from the engine compartment and other high tension wires. Grounding the cable as often as possible along its entire length reduces motor noise and is recommended. Poor connections at the battery terminals cause noise; therefore, clean the terminals and make good connections. (Connections to the ammeter are not recommended, in general.)

12. Before connecting the antenna, check it for a possible ground. If ungrounded, connect to the antenna lead of the radio by splicing a good connection, taping the joint and sliding the section of insulated tubing over the connection. In the event that the antenna lead-in is shielded, do not neglect to connect the shielding to the shielding on the antenna lead from the set. A word of caution here: *Do not run the antenna lead-in thru the engine compartment and keep it away from all high-tension parts and leads.* Ground the shielding of the antenna lead-in along its entire length, if possible.

13. Turn switch-key halfway in remote control unit. The dial should light up immediately if everything is correct. Turn volume control (small knob) clockwise to a position for loud volume and when the tubes are warmed up, turning the station dial (large knob) will tune in stations. Adjust volume by the volume control knob, never by detuning the station, as this ruins quality. The separate, delayed automatic volume control will counteract fading and blasting and requires little or no adjustment by the manual control.

14. If the installation thus far has been carefully followed, starting and running the motor causes very little interference generally. However, the amount of motor noise WITHOUT SUPPRESSION may be noted as a check on a good installation.

15. Fasten the condenser supplied for generator-noise-suppression by slipping the grounded lug of the condenser under a screw in the generator frame. Connect the live lead of the condenser to the generator side of the cut-out relay mounted on the generator (connecting the live lead to the battery side of the cut-out relay is more effective in some cases. This may be determined by test.)

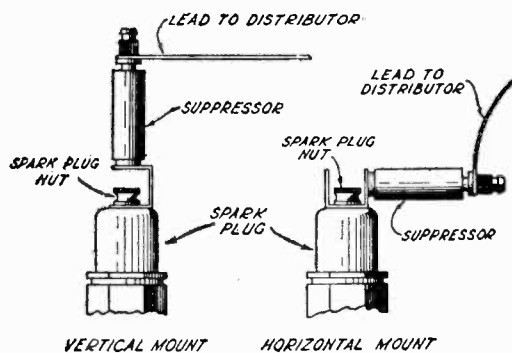


Fig. 111

16. Fasten a spark plug suppressor to each spark plug (see Figure III) and the distributor suppressor in the head of the distributor. Fasten the suppressors firmly to the plugs and to the leads so that the connections will not shake loose and ground. If special types of suppressors are required for certain cars, these may be obtained.

17. In general, this should suppress motor noise effectively. However, an auxiliary suppressor condenser connected from ground to battery side of ammeter may sometimes prove effective. (See further details under "Notes on Ignition Suppression.")

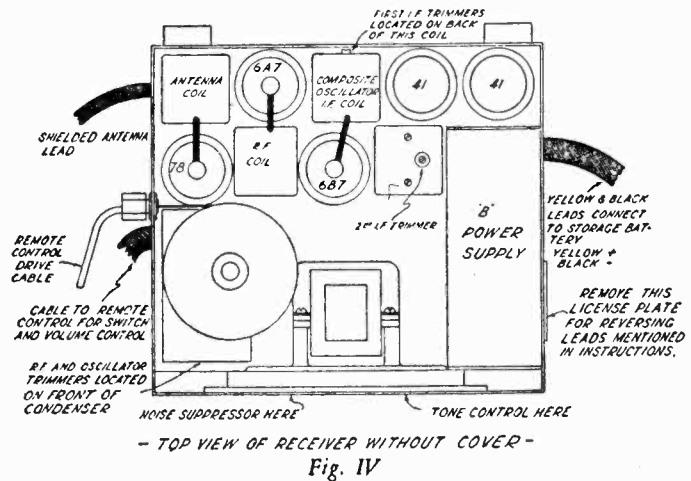
EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 678
Voltage, Socket,
Adjustments

Tubes: 1—78, 1—6A7, 1—6B7, 2—41 (5 tubes).
Total Battery Drain: 4.8 amperes.
Max. output: 4 watts.
Electro-Dynamic Speaker Field Resistance: 6 ohms.
Vibrator: Full wave synchronous rectifier.

Tube-Functions and circuit analysis:

- | | | |
|-----|---|---|
| 78 | { | 1 Radio-frequency amplifier
2 Automatic fidelity control
3 Automatic selectivity control |
| 6A7 | { | 4 High gain modulator,
5 Electron coupled oscillator |
| 6B7 | { | 6 High gain I. F. Amplifier
7 Neutralized space-charge diode detector |
| 6B7 | { | 8 Separate delayed automatic volume control
9 Automatic noise suppression
10 Reflexed audio-frequency amplifier |
| 41 | { | 11 Push-pull output tube Class A* |
| 41 | { | 12 Push-pull output tube Class A* |
| | { | 13 Full wave synchronous vibrator rectifier |



VOLTAGE ANALYSIS

Use a high resistance voltmeter. Storage battery should be fully charged. Readings taken with no signals received.

Tube	Cathode to Ground	Screen Grid to Ground	Plate to Ground	Heater to Ground
78	3- 3.5V.	75-85V.	200-210V.	6V.
6A7	3- 3.5	75-85	200-210	6
6B7	3.5-4.5	75-85	200-210	6
41	14-18	200-210	190-200	6
41	14-18	200-210	190-200	6

Voltage across speaker field—6 volts.

ADJUSTMENTS

The receiver was carefully adjusted and aligned when it left the factory. Under no conditions should these adjustments be disturbed unless there is no question that it is absolutely necessary.

Intermediate-Frequency

To line up the Intermediate Frequency Amplifier, use a good modulated oscillator giving 172½ K.C. and a rectifier type output meter. Connect the oscillator output to the grid cap of the 6A7 and ground. Connect the output meter across the voice coil of the speaker or across primary of speaker transformer.

Ground the antenna lead and turn the tuning dial so that no signal is received (other than the test oscillator), with the volume control set at maximum volume.

Using the smallest output from the test oscillator to get an output reading, adjust the double-tuned input transformer and the single tuned output transformer for maximum output. It is preferable to use a non-metallic screw driver for this purpose. (See Figure IV.)

Radio-Frequency

To line up the R. F. section, due to the extreme sensitivity of the receiver, use only a high-grade oscillator. Couple the oscillator through a standard dummy antenna to the antenna lead and ground of the receiver. Attach the output meter to the voice coil of the speaker and align the trimmers on the variable condenser for a weak high frequency signal (between 1350—1450 K.C.). Readjust the trimmers to get accurate settings. (See Figure IV.)

If a high grade oscillator and output meter is not available, it is suggested that the alignments be made on broadcast. Tune in a weak station between 1350—1450 K.C. and align the trimmers carefully. Readjust the trimmers as above.

MODEL 678
Notes, Changes

EMERSON RADIO AND PHONOGRAPH
CORPORATION

The following changes and additions are the effects of improvements in mechanical and electrical construction made on the "Auto Dynamic"—Model 678—since the release of the "Service Manual."

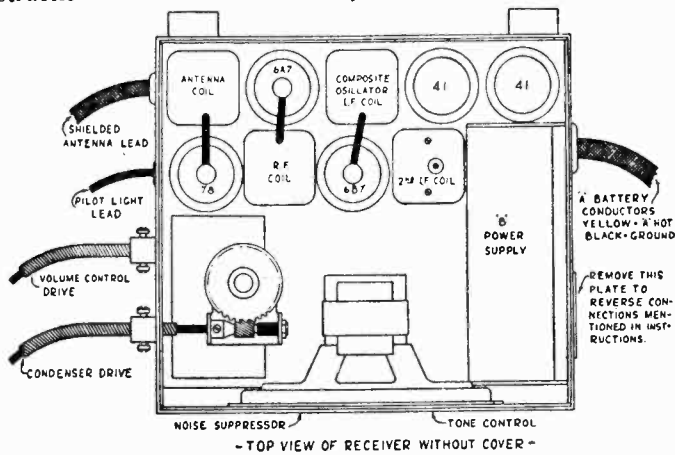


FIG. IV (Substitute for Fig. IV. now appearing in "Service Manual".)

that line up under these conditions and slip a lockwasher and nut on this bolt. Finally fasten both bolts securely so that the control head will not turn. Bond the cables at numerous points along the steering column to eliminate vibration and prevent interference with the operation of the car.

* * * * *

Paragraph 13 of the same section should read:

13. Place the switch-key in the slot provided for it and turn clockwise until a snap is felt and the dial illuminated. The light will indicate that the receiver is properly wired and ready to operate or ready for advance in installation procedure. Turn the volume control completely clockwise by means of the switch key to the maximum volume level. When the receiver is warmed up (this will be indicated by noise) tune a station carefully to resonance by means of the right-hand knob. Re-adjust the volume to a satisfactory level. Never attempt volume attenuation by de-tuning the station, as this will distort the quality of tone translation. The separate, delayed-automatic-volume control incorporated internally will tend to counteract fading and blasting, retaining the volume at the level determined by the manual volume control.

The illuminated dial and the tuning control mechanism are mutually self-aligning. If the calibration of the dial does not check reasonably well with the frequencies of the stations received, it is only necessary to turn the tuning control knob slowly clockwise until it stops. If the dial pointer is at the extreme counter-clockwise position they are aligned. If not, turn the knob slowly, counter-clockwise, until it stops and the dial is completely clockwise. If either or both these instructions are carried out the calibration should check.

* * * * *

THE FOLLOWING NOTES APPLY TO THE SERVICE SECTION

If it becomes necessary to disconnect the remote control unit; progress by loosening the two set screws which clamp the volume control cable to the lower stud on the receiver case, and by pulling the cable totally out of the recess provided for it. To detach the turning control cable, remove the cover of the receiver box and loosen the set screws which hold the cable to the worm gear drive. Unbind the two set screws which hold the cable to the receiver box and pull the cable out. Lastly, remove the bottom of the set and unsolder the two connections for the pilot light, pull it out of the grommet and the operations are complete.

To replace the control unit, it is only necessary to reverse the above process, being sure that the "tongue" of the volume control cable slips into the slot provided for it. This may be accomplished by rotating the volume control knob slowly, and pushing the cable in simultaneously until the tongue engages the slot.

Replacement of the fuse in the event of a burn-out requires a removal of the floor board of the car. Remove both cables from the battery and unlock the fuse receptacle in the yellow lead, the fuse should drop out easily. A fuse of 10 ampere capacity, as indicated on the defective fuse, should replace it. The cause for the burn-out of the fuse should be determined before a new one is put in.

TONE CONTROL ADJUSTMENT

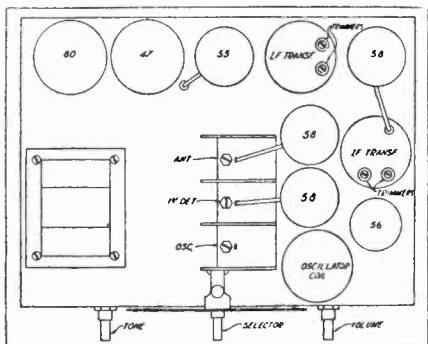
The adjustment as the receiver leaves the factory is set for full register reproduction. This is recommended for closed cars and for vocal programs. Turning the control clockwise brings up the low tones and is recommended for open cars and musical programs. Incidentally in this position, static and other noises are decreased greatly. Do not turn clockwise more than necessary as definition of speech may be lost due to the attenuation of higher tones by the car interior.

Paragraph 10 of the section "Installation Procedure" should read:

10. By means of the adjustable strap supplied, fasten the remote-control unit in a convenient position on the steering column, allowing the cables to take a smooth path to the set. The procedure to follow being to place the end of the strap with a single hole under one of the holes in either flange on the control head. Place a bolt through the holes, slipping a lockwasher and nut on the other end. Do not fasten the bolt; leave it loose temporarily. Twist the strap through a radius around the steering column so that with a snug fit one of the three remaining holes in the strap lines up with the hole in the other flange of the control head. Insert a bolt through the two holes

MODEL M-755, 50-M
 Schematic, Voltage EMERSON RADIO AND PHONOGRAPH
 Parts List CORPORATION

M-AC-7



Voltage Readings:

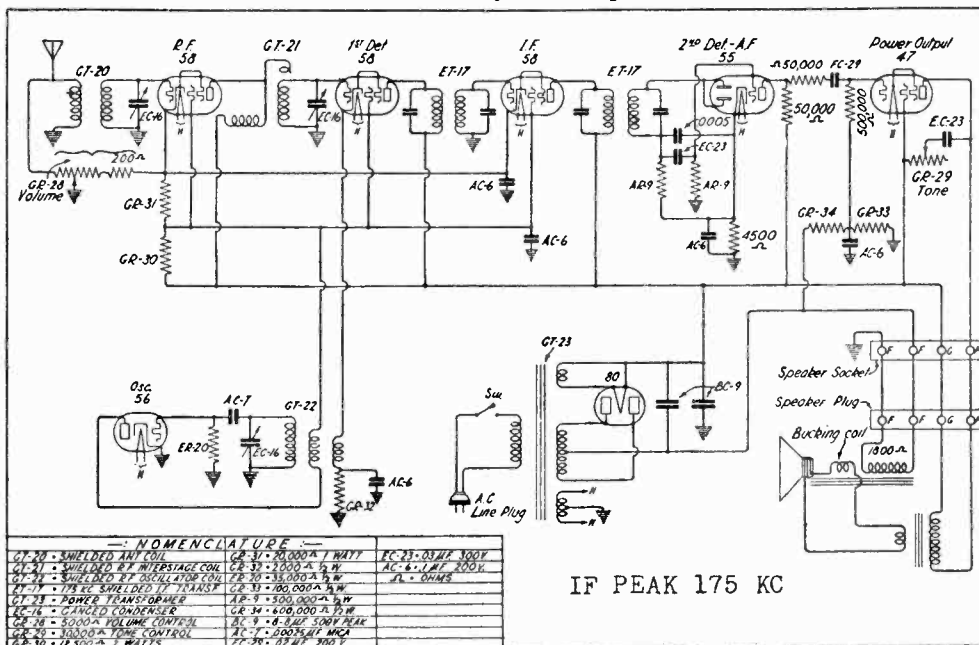
Readings should be taken with the Volume Control fully on and the Station Selector set for 550 K.C.

Use a high resistance D.C. voltmeter.

	Ground to—	Plate	Screen	Cathode
56 Oscillator		80-100		3-5
58 R.F. Amplifier		235-250	90-110	5-7
58 1st Detector		235-250	90-110	3-4
58 I.F. Amplifier		235-250	90-110	8-11
58 2nd Detector		125-135		
47 Output Pentode		215-225	235-250	
Line Voltage		115		

The bias on the 47 cannot be read with the voltmeter.

Part No.	Description	List Price
GT-20	Antenna Coil	\$.65 each
GT-21	Interstage R.F. Coil .....	.65 "
GT-22	Oscillator Coil .....	.65 "
ET-17	I. F. Transformer	1.15 "
GT-23	Power Transformer	1.95 "
GR-28	Volume Control .....	.80 "
GR-29	Tone Control .....	.60 "
GR-30	12,500 ohm 2 wt. Resistor .....	.25 "
	Any other Carbon Resistor (specify Part No. and value—refer to diagram for value) .....	.15 "
EC-16	3-Gang Variable Condenser	2.45 "
BC-9	8 & 8 mfd. Electrolytic Condenser .....	.65 "
	Any Size Tubular or Mica Condenser (specify Part No. and Value — Refer to diagram for Value) .....	.10 "
	Any socket (specify tube number marked on socket) .....	.08 "
GD-5	Dial Assembly .....	.90 "
AL-2	Pilot Light .....	.08 "
AK-1	Knobs .....	.10 "
GS-19	Dynamic Speaker	5.65 "



EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 375, 40

MODEL 420

MODEL S-755, S-50

MODEL L-755, L-50

Parts List Description Model 375,40 LIST PRICE

P-T-67	Antenna Coil in Shield	.....	.80	each
P-T-68	Interstage R.F. Coil in Shield	.....	.80	"
P-T-66	Composite I.F. and Oscillator Coil	.....	1.20	"
L-T-41	2nd I.F. Transformer in Shield	.....	1.20	"
L-T-45	Filter Choke	.....	.60	"
P-C-82	Variable Condenser—3-Gang	.....	2.40	"
P-C-83	Filter Condenser—Triple 4, 12 and 16	.....	1.40	"
I-C-43	Roll Type Electrolytic Condenser—5 Mfd.	.....	.50	"
E-C-19	.5 Mfd. Roll Type Paper Condenser	.....	.20	"
	Any other Roll Type Paper Condenser	.....	.12	"
	Give size or location in the circuit.			
	Any Socket—Give Tube Number	.....	.12	"
	Any Carbon Resistor	.....	.14	"
	Give value or location in circuit.			
L-R-59	Ballast-Resistor 160-ohm 15-watt Wire Wound	.....	.40	"
P-D-9	Vernier Dial Complete	.....	.60	"
L-B-3	Pilot Lamp Socket	.....	.10	"
K-L-6	Pilot Lamp Bulb	.....	.15	"
PR-81	Volume Control with Switch	.....	.90	"
PS-52	Dynamic Speaker	.....	4.50	"
	Special 220-Volt Ballast Resistor	.....	2.00	"
	For operation on 220-volts.			

No.	Description	Model 420	Price
No. 1	EMERSON 6-Volt "B" Eliminator and Cable. (For automobiles and motorboats, camps, etc.)	.....	\$15.00 each
No. 2	220-Volt Ballast Adapter (where 220-volt AC or DC current is available)	.....	2.00 "
No. 3	EMERSON 32-Volt "B" Eliminator and Cable (for farm lighting plants and wherever 32-volt power is used)	.....	15.00 "
V4Z	Zipper Type Carrying Case	.....	2.00 "
HT-24	Antenna Coil	.....	.60 "
HT-25	R. F. Coil	.....	.60 "
QT-61	Filter Choke	.....	.60 "
QR-77	Volume Control and Switch	.....	.90 "
QC-77	Variable Condenser	.....	1.80 "
QC-78	Dual 4-mfd. Electrolytic Condenser	.....	1.05 "
QW-28	Power Cord and Resistor with 7-prong Socket and Line Plug	.....	1.20 "
HS-24	Speaker	.....	4.50 "
	Any Carbon Resistor. (Order by size)	.....	.15 "
	Any Tubular Condenser or Mica Condenser. (Order by part number)	.....	.15 "
	Any Socket. (Order by tube number)	.....	.10 "

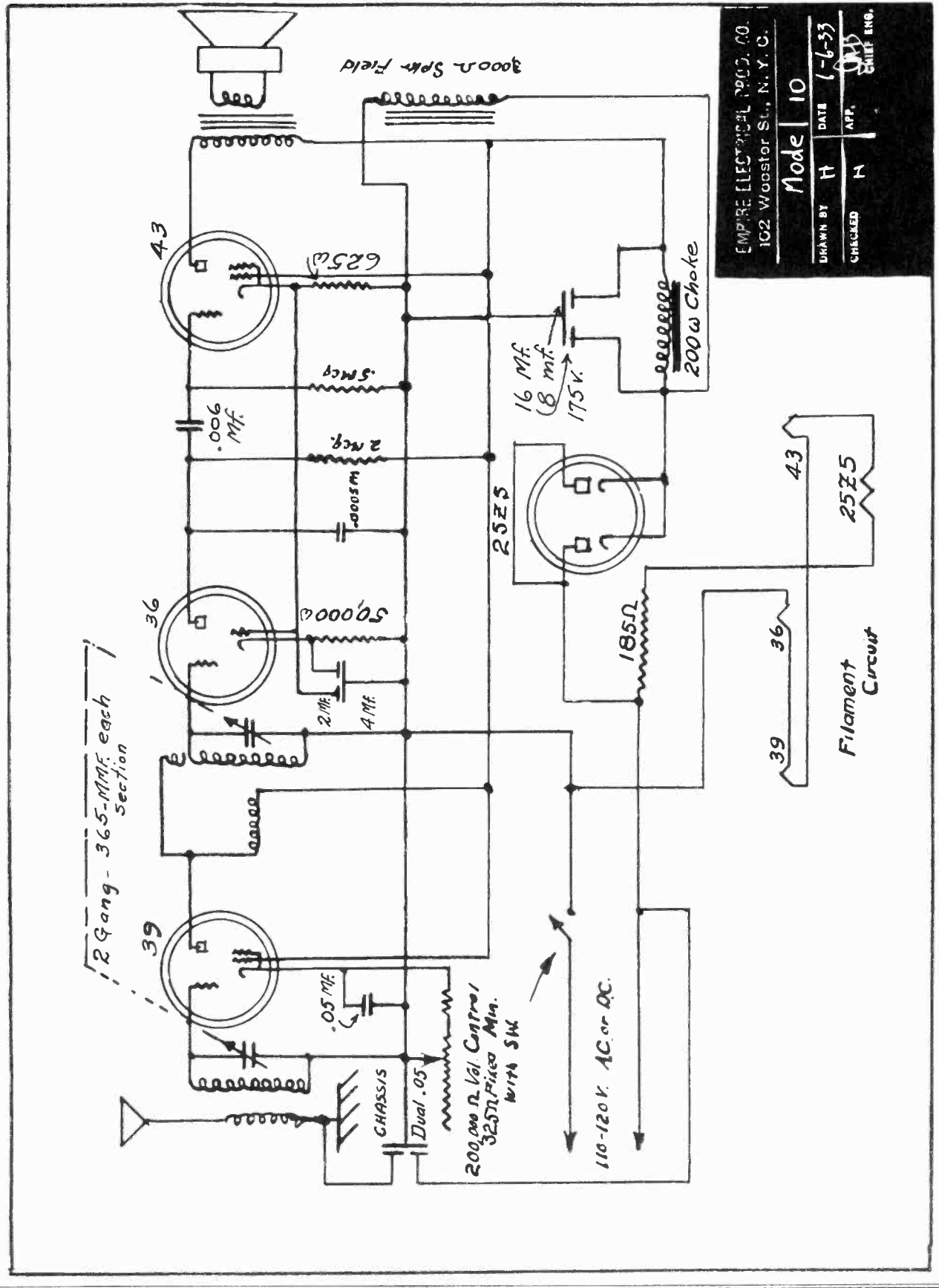
Part No.	Description	Model S-755, S-50	List Price
IT-27	Antenna Coil	.....	.90 each
IT-28	R. F. Coil	.....	.90 "
IT-29	Oscillator Coil	.....	.90 "
IT-31	I. F. Transformer	.....	1.05 "
GT-23	Power Transformer	.....	2.25 "
GR-28	Volume Control	.....	.80 "
	Any Carbon Resistor (specify Part No. and Value—refer to Diagram for Value)	.....	.12 "
IC-41	3-Gang Variable Condenser	.....	2.30 "
IC-42	Double 8 Mfd. Electrolytic Condenser	.....	1.25 "
	Any size Tubular or Mica Condenser (specify Part No. and Value—refer to Diagram for Value)	.....	.20 "
	Any Socket (specify Tube No. marked on Socket)	.....	.10 "
ID-6	Dial Assembly	.....	.90 "
AL-2	Pilot Light	.....	.12 "
	Knobs	.....	.15 "
IS-29	Dynamic Speaker	.....	5.90 "
IT-30	Four Section Universal Choke Coil	.....	.45 "
IC-39	Selectivity Control Condenser	.....	.60 "
IS-27	Band Switch	.....	1.50 "
IC-40	Adjustable Padding Condenser	.....	.60 "
IZ-29	Phonograph Jack	.....	.30 "

Model L-755, L-50

Part No.	Description	List Price
JT-32	Antenna Coil	.....
JT-33	Interstage Coil	.....
JT-34	Oscillator Coil	.....
JT-35	I. F. Transformer	.....
IT-35A	I. F. Transformer	.....
GT-23	Power Transformer	.....
JR-46	Volume Control	.....
GR-29	Tone Control	.....
GR-30	12,500 ohm 2 wt. Resistor	.....
	Any other Carbon Resistor (Specify Part No. and Value—Refer to Diagram)	.....
JS-32	Wave-Change Switch	.....
JC-53	3-Gang Variable Condenser	2.25 "
IC-42	Dual Electrolytic Condenser	1.25 "
IC-54	Dual .1 Condenser	.20 "
IC-43	5 mfd. Tubular Condenser	.45 "
IC-40	Adjustable Padder Condenser	.60 "
	Any Other Size Tubular or Mica Condenser (Specify Part No. and Value (Refer to Diagram))	.20 "
	Any Socket (Specify Tube No.)	.10 "
JD-7	Dial Assembly	.90 "
AL-2	Pilot Light	.15 "
AK-1	Knobs	.10 "
JS-29	Dynamic Speaker	4.75 "
JRC-3	Resistor and Condenser Assembly	1.50 "

EMPIRE ELECTRICAL PRODUCTS

MODEL 10
Schematic



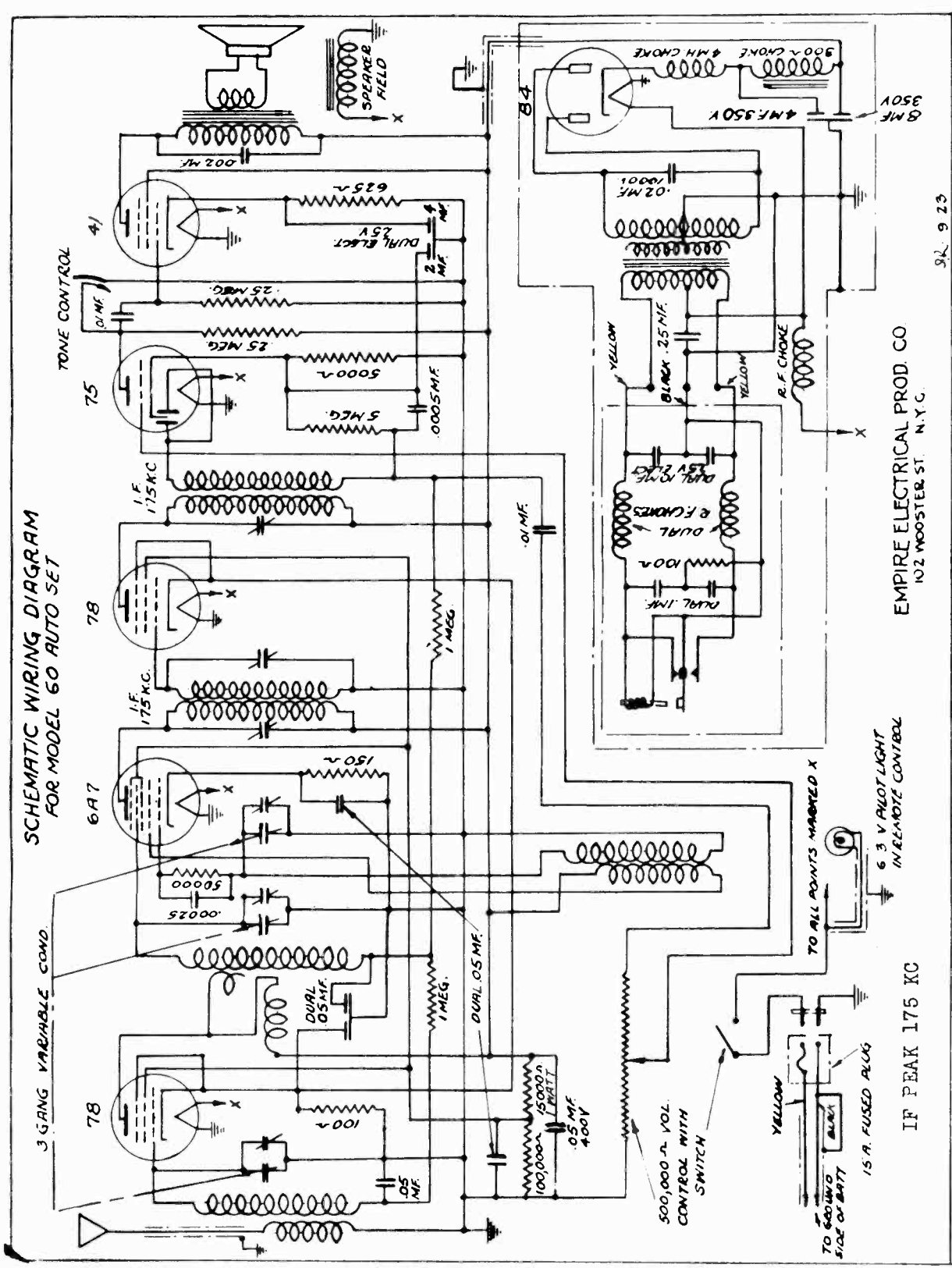
EMPIRE ELECTRICAL PRODUCTS CO.
102 Wooster St., N. Y. C.

Mode 10

DRAWN BY	H	DATE	7-6-33
CHECKED	H	APP.	[Signature] CHIEF ENG.

EMPIRE ELECTRICAL PRODUCTS

MODEL 60
Schematic



SCHEMATIC WIRING DIAGRAM
FOR MODEL 60 AUTO SET

EMPIRE ELECTRICAL PROD. CO
102 WOOSTER ST. N.Y.C.

92. 9 23

IF PEAK 175 KC

6.3 V PILOT LIGHT
IN REMOTE CONTROL

TO ALL POINTS MARKED X

TO 600/010
SIDE OF BATT

15-A FUSED PLUG

500,000-ohm
CONTROL WITH
SWITCH

YELLOW

YELLOW

BLACK .25 MF

YELLOW

R.F. CHOKES

DUAL 100A

DUAL 100A

DUAL 100A

DUAL 100A

DUAL 100A

DUAL 100A

DUAL 100A

DUAL 100A

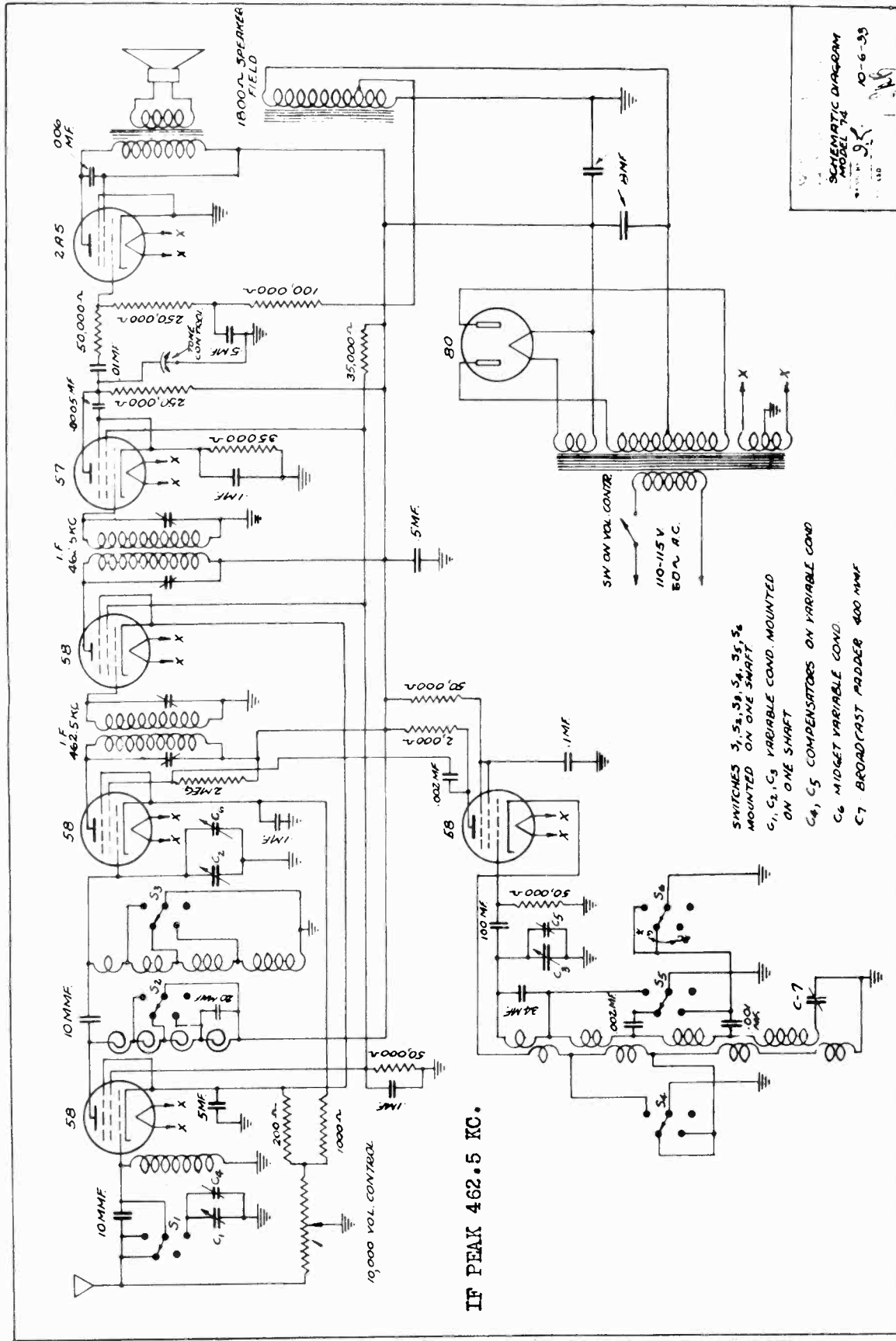
DUAL 100A

DUAL 100A

DUAL 100A

MODEL 74
Schematic

EMPIRE ELECTRICAL PRODUCTS



MODEL "RX"
Alignment data

FADA RADIO & ELECTRIC CORP.

COMPENSATING INSTRUCTIONS FOR
RX RECEIVER - MODELS 93 & 95

In order to accurately adjust the various trimmer condensers of this Receiver in accordance with the following instructions, it is essential to use a shielded generator capable of giving a modulated carrier frequency which can be accurately attenuated at 2402 meters (125 kilocycles), 1999 meters (150 kilocycles), 856.6 meters (350 kilocycles), 499.7 meters (600 kilocycles) and 214.2 meters (1400 kilocycles).

ADJUSTMENT OF I. F. CONDENSERS

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

- 1st - Disconnect the outside antenna system from the Receiver.
- 2nd - Connect a lead wire from the output 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. Install a 250 mmfd. condenser in series with the signal generator 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.
- 4th - Turn the band selector switch to the long-wave position.
- 5th - Place the signal generator in operation and adjust the frequency output to 2402 meters (125 kilocycles). 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 1/4" (#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 condensers and can be adjusted with the aid of an ordinary screw driver. There are three (3) holes in the overall condenser shield housing cover to permit the insertion of a screw driver for compensating purposes.

- 1st - Remove the lead wire which is connected to both the control grid of the first detector tube and to the antenna system of the signal generator.
- 2nd - Connect the antenna (red) wire of the Receiver to the output system of the signal generator. The ground (slate) wire should remain connected to the ground post of the signal generator.
- 3rd - Set the band selector switch to the normal-wave position.
- 4th - Adjust the carrier frequency output of the signal generator to 214.2 meters (1400 kilocycles).
- 5th - Set the calibrated dial of the Receiver to read 214.2 meters (1400 kilocycles).
- 6th - Adjust each compensator in the order given on the sketch, that is, first, second, etc. for maximum signal output as indicated on the output meter. Do not disturb the setting of the gang condenser during these operations. Leave the volume control at maximum and regulate the signal output with the attenuator control of the signal generator.

ADJUSTMENT OF THE NORMAL WAVE OSCILLATOR SERIES CONDENSER

The oscillator series condenser can be adjusted through the hole in the side of the chassis as indicated in the sketch.

- 1st - Adjust the carrier frequency output of the signal generator to 499.7 meters (600 kilocycles).
- 2nd - Set the calibrated dial of the Receiver to read 499.7 meters (600 kilocycles).
- 3rd - With the aid of a 1/4" (#4) socket wrench, adjust the normal wave oscillator series condenser until a maximum output signal is indicated on the output meter. To insure perfect adjustment it is necessary to "rock" the variable gang condenser back and forth in order to follow the maximum signal output.
- 4th - After the normal wave oscillator series condenser is properly adjusted, turn the calibrated dial of the Receiver to 214.2 meters (1400 kilocycles) and set the signal generator to the same frequency. Readjust all variable condenser compensators as outlined in the foregoing instructions.

FADA RADIO & ELECTRIC CORP.

MODEL "RX"
Alignment dataADJUSTMENT OF LONG - WAVE PADDING COMPENSATORS

Two (2) of the compensators are located on the right side of the chassis and one in the front as indicated in the sketch. These compensators can be readily identified by the red mark placed on the adjustment hole.

- 1st - Turn the band selector switch to the long-wave position and adjust the carrier frequency output of the signal generator to 856.6 meters (350 kilocycles).
- 2nd - Set the calibrated dial of the Receiver to read 856.6 meters (350 kilocycles).
- 3rd - With the aid of a 1/4" (#4) socket wrench, adjust all three (3) padding compensators in the order marked in the sketch.

ADJUSTMENT OF LONG-WAVE OSCILLATOR SERIES CONDENSER

The long wave oscillator series condenser can be adjusted through the hole in the side of the chassis as indicated on the sketch.

- 1st - Adjust the carrier frequency output of the signal generator to 1999 meters (150 kilocycles).
- 2nd - Set the calibrated dial of the Receiver to read 1999 meters (150 kilocycles).
- 3rd - With the aid of a 1/4" (#4) socket wrench, adjust the long wave oscillator series condenser until a maximum output signal is indicated on the output meter. To insure perfect adjustment it is permissible to "rock" the variable condenser back and forth in order to follow the maximum signal output.

RESISTOR-CONDENSER Specifications

FADA RADIO & ELECTRIC CORP.

IDENTIFYING BY-PASS CONDENSERS

PART #	CAP.	VOLTS	TYPE
1238 Ms	1.0 Mfd	200 Volts	I
1239 Ms	2.0	200	I
1240 Ms	1.0	400	I
1241 Ms	0.5	200	I
1242 Ms	0.5	200	I
1418 Ms	.25-25	200-400	II
1419 Ms	.5	400	I
1490 Ms	.15	400	I
1225 Ms	.25	400	I
2-1307 Ms	.07	400	I
2-1340 Ms	.25	200	I
2-1341 Ms	.25-25	400-400	III
2-1353 Ms	.25-25	200-200	II
2-1360 Ms	.25-25	200-200	III

On the above, type I has two lugs. Type II has three leads and a red lead connects to a 400 volt section, a brown lead to a 200 volt section and the black lead is common.

Type III condensers have four leads. A red lead connects to 400 volt sections and a brown lead to 200 volt sections. Thus a 400-400 condenser has two red leads and two black leads, a 200-200 condenser has two brown leads and two black leads. The black leads are not common in type III.

Wound Resistances in Fada Sets

Wire wound resistances used in Fada receivers are identified by spots of color in accordance with the listing below. If you wish to order any of these resistances, be sure to specify both the part number and the value of the resistance in ohms. Your careful attention to this detail will result in our being able to give you much prompter service.

Our Part No.	Resistance in Ohms	Identification
1458-Ms	75	Red & White
1414-Ms	250	Yellow & White
1459-Ms	500	Blue & Green
1460-Ms	600	Red & Blue
1461-Ms	750	Red & Green
1328-Ms	1,000	Yellow
2-1219-Ms	1,200	Green & Yellow
1415-Ms	2,000	Green & White
2-1218-Ms	2,500	Blue & White
1416-Ms	3,000	White & White
1462-Ms	6,000	Red & Yellow
1463-Ms	10,000	Blue & Yellow
2-1249-Ms	65	Red
2-1250-Ms	65 Tap at 40	Blue
2-1251-Ms	10	Yellow
2-1311-Ms	20	White
2-1312-Ms	200 taps at 10 & 160	Green
2-1379-Ms	1500	Red & Red
2-1390-Ms	5000	Blue & Blue

How to Identify Fada Carbon Resistances

All fixed resistances used in Fada sets are identified by color. If you wish to order any of these resistances, please be sure to specify both the part number and the value of the resistance in ohms. This will result in giving you much prompter service.

Our Part No.	Resistance Ohms ± 10%	Identification	Diameter in Inches
1408-Ms	2-Megs	Red	1/4"
2-1299-Ms	250	Light Brown	1/4"
2-1300-Ms	750	Green	3/8"
2-1207-Ms	2000	Black	1/4"
1265-Ms	3000	White	1/4"
2-1308-Ms	5000	Orange	1/4"
1341-Ms	20,000	Green	1/4"
1417-Ms	50,000	Blue	1/4"
2-1315-Ms	70,000	Violet	1/4"
1375-Ms	125,000	Gray	1/4"
1311-Ms	250,000	Yellow	1/4"
1394-Ms	500,000	Brown	1/4"
1467-Ms	2000	None	3/8"
2-1330-Ms	3000	White	3/8"
2-1334-Ms	1200	Dark Green	1/4"
		Green with yellow end	
2-1344-Ms	1000	Red with yellow end	3/8"
2-1345-Ms	2500	Gray with yellow end	3/8"
2-1346-Ms	125	Blue with yellow end	1/4"
2-1347-Ms	10,000	Brown with blue end	1/4"
2-1358-Ms	500	Yellow with blue end.	1/4"
2-1364-Ms	7500		

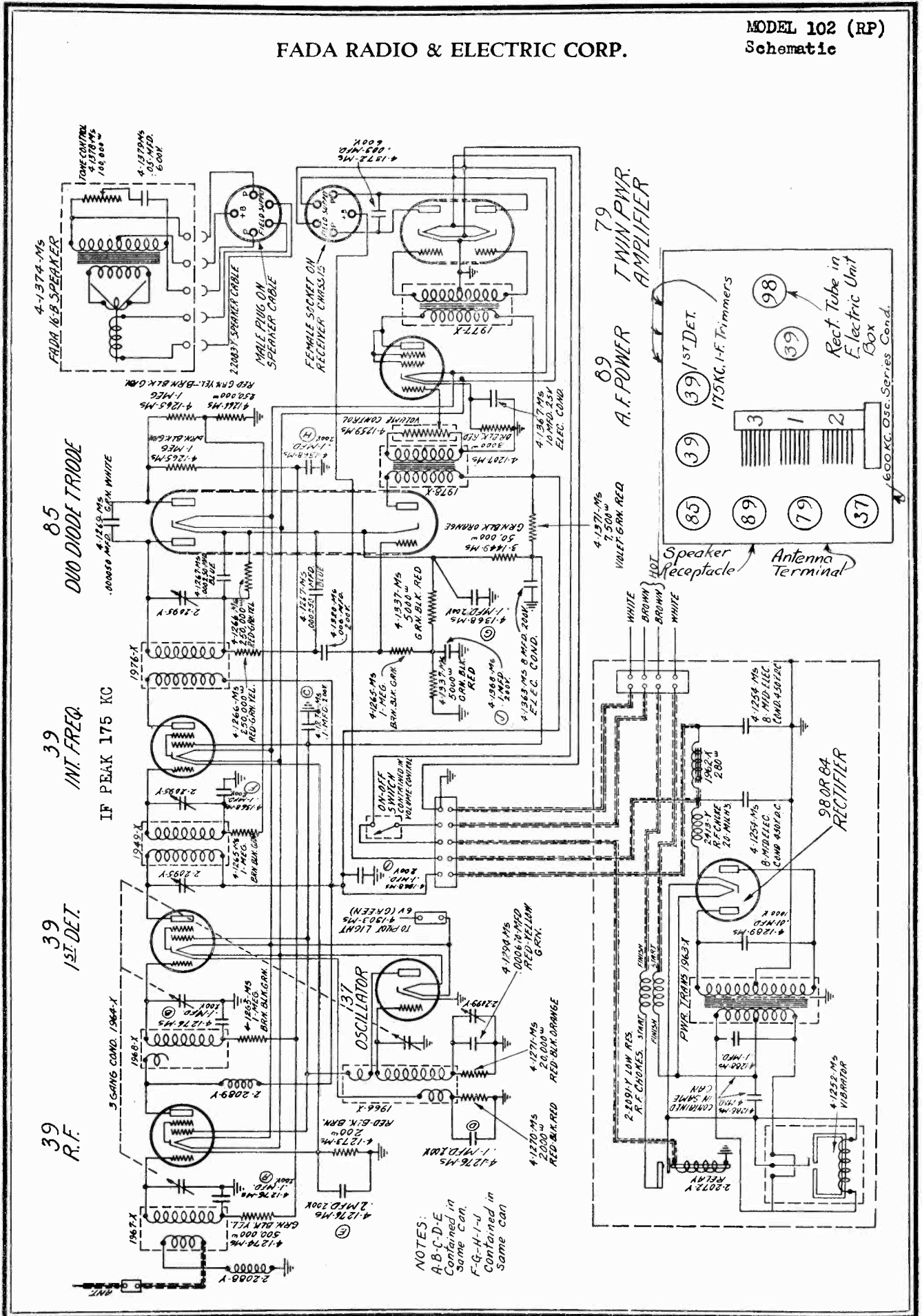
Carbon Resistances

Carbon resistances it will be noticed are of two different styles. The black units with tinned ends have small spots of paint for identification of their resistance values. Another type have leads soldered on them and the entire unit dipped in an insulating paint of identifying color. In addition some of these units will have the part number stamped on them. The following is a table of identification.

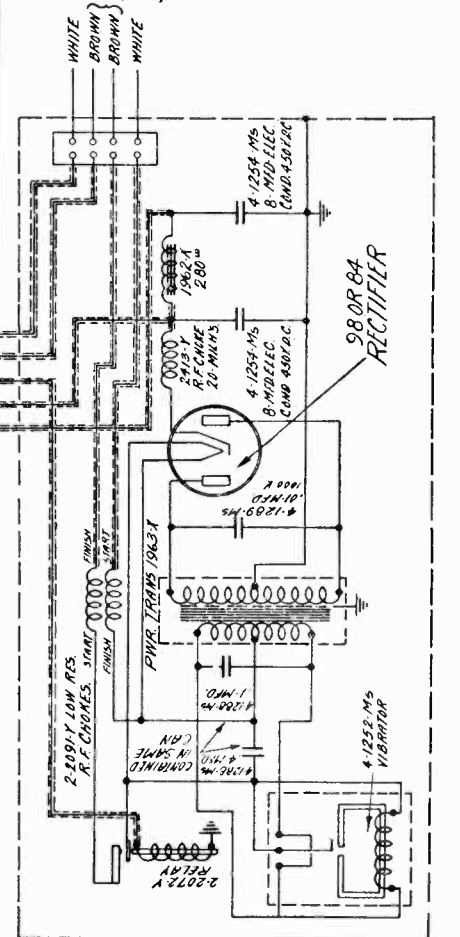
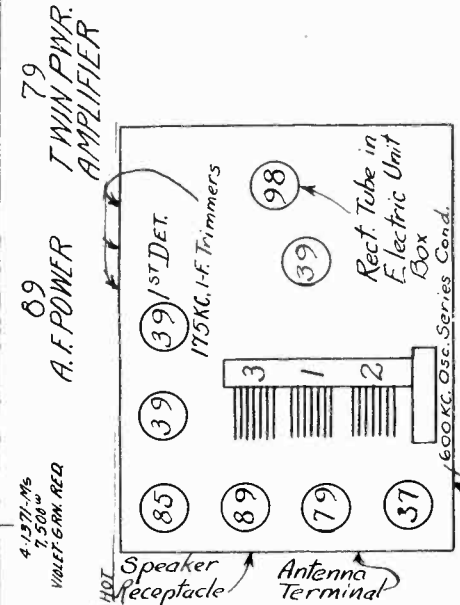
Part No.	Resistance	Black Unit Identification	Other Type Unit Identification
1265-MS	3,000 ohms	White and Yellow	.....
1311-MS	250,000 ohms	Gray and Yellow	Yellow
1341-MS	20,000 ohms	Red and Green	Green
1375-MS	125,000 ohms	Gray and Green	Gray
1394-MS	500,000 ohms	Yellow and Black	.....
1408-MS	2 megs	.....	Red
1417-MS	50,000 ohms	.....	Blue

FADA RADIO & ELECTRIC CORP.

MODEL 102 (RP)
Schematic



NOTES:
A-B-C-D-E
Contained in
Same Can.
F-G-H-I-J
Contained in
Same Can



MODEL 102 (RP)
Alignment notes

FADA RADIO & ELECTRIC CORP.

- (1) A six (6) inch length of 1/4" brass rod with a standard tuning knob attached can be inserted in the condenser coupling for test purposes, thus eliminating the necessity of using the remote control.
- (2) The wire from the output of the signal generator should be removed from the control grid of the first detector tube and attached to the antenna terminal of the MOTASET instead.
- (3) Place the F-37 oscillator tube back in its socket.
- (4) Adjust the carrier frequency output of the signal generator to 1400 K.C.
- (5) With the aid of the brass shaft inserted in the condenser coupling, turn the gang condensers until the 1400 K.C. signal is tuned in.
- (6) Adjust each compensator in the order given (that is, 1st, 2nd, 3rd) in the sketch, for maximum signal output as indicated by the loudest signal from the speaker. 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 of the signal generator.

ADJUSTMENT OF OSCILLATOR SERIES CONDENSER

The oscillator series condenser can be adjusted through the hole in the side of the chassis, as indicated in the sketch. It will be noted that it is close to the F-37 oscillator tube.

- (1) Adjust the carrier frequency output of the signal generator to 800 K.C.
- (2) With the aid of the brass rod inserted in the condenser coupling, turn the gang condensers until the 800 K.C. signal is received from the signal generator.
- (3) With the aid of a #4 Stevens Spintite Socket Wrench or its equivalent, adjust the oscillator series condenser until the loudest possible signal is heard through the speaker. In order to adjust the oscillator series condenser to its maximum peak it will be necessary to "rock" the variable gang condenser back and forth to follow the strongest signal.
- (4) After the oscillator series condenser is properly adjusted, set the signal generator in operation at 1400 K.C. and tune in the signal on the MOTASET, then re-adjust all variable condenser compensators as outlined in the foregoing instructions.

MOTASET -- MODEL 102

In order to accurately adjust the various trimmer condensers of the MOTASET in accordance with the following instructions; it is essential to use a shielded signal generator capable of giving a modulated carrier frequency which can be accurately attenuated at 175 K.C., 800 K.C. and 1400 K.C.

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

Before any adjustments can be made it will be necessary to remove the chassis from its housing in accordance with "Instructions For Removing MOTASET chassis from its Housing."

ADJUSTMENT OF I. F. COMPENSATORS

The three (3) I. F. compensators are located in the side of the chassis itself as indicated in the sketch.

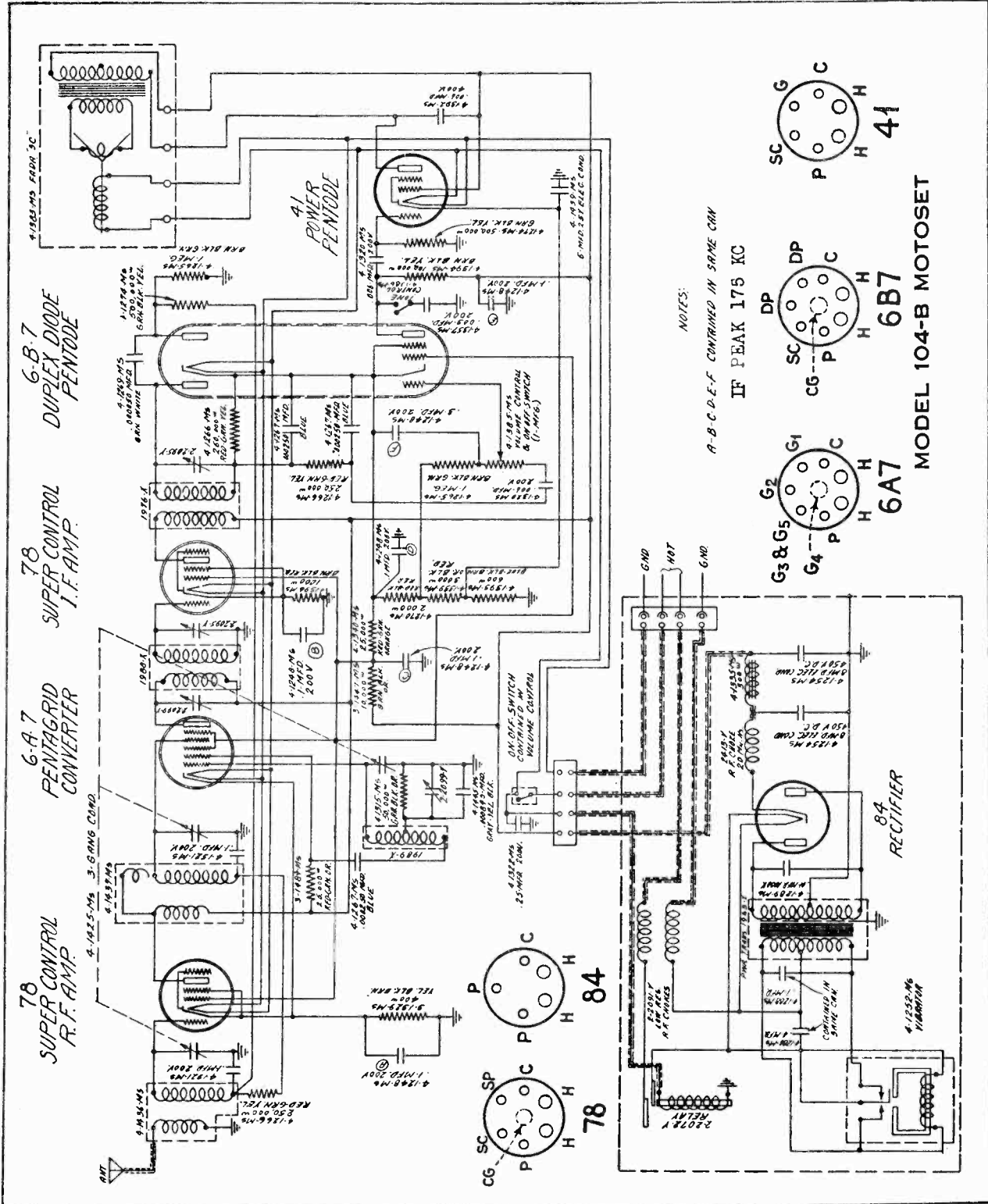
- (1) Insert the speaker plug into the receptacle of the MOTASET chassis.
- (2) Connect a lead wire from the output of the signal generator to the control grid of the first detector tube. Do not disconnect the control grid connector from the tube.
- (3) Connect a wire from the ground terminal of the signal generator to some part of the MOTASET chassis proper.
- (4) Remove the F-37 oscillator tube from the Receiver socket.
- (5) Place the signal generator in operation and adjust the carrier frequency output to 175 K.C. Regulate the attenuator control so that the output signal is low enough to insure accuracy in adjusting the I. F. compensators of the MOTASET.
- (6) With the aid of a #4 Stevens Spintite Socket Wrench or its equivalent, adjust the compensators to resonance as indicated by the loudest signal from the speaker.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

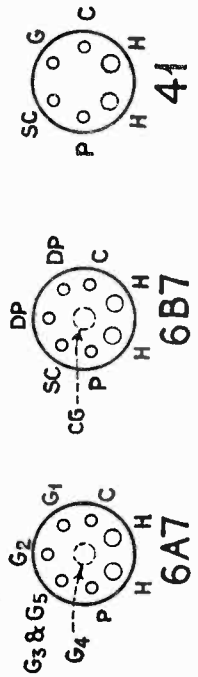
The compensators are located at the top of their respective tuning condensers and can be adjusted with the aid of a screw driver.

FADA RADIO & ELECTRIC CORP.

MODEL "RV" (104-B) Auto Schematic



NOTES:
IF PEAK 175 KC
A-B-C-D-E-F CONTAINED IN SAME CAN



MODEL 104-B MOTOCSET

MODEL "RY"
Schematic

FADA RADIO & ELECTRIC CORP.

IF PEAK 470 KC.

X = BROADCAST & LONG
WAVE SWITCH
= CHASSIS

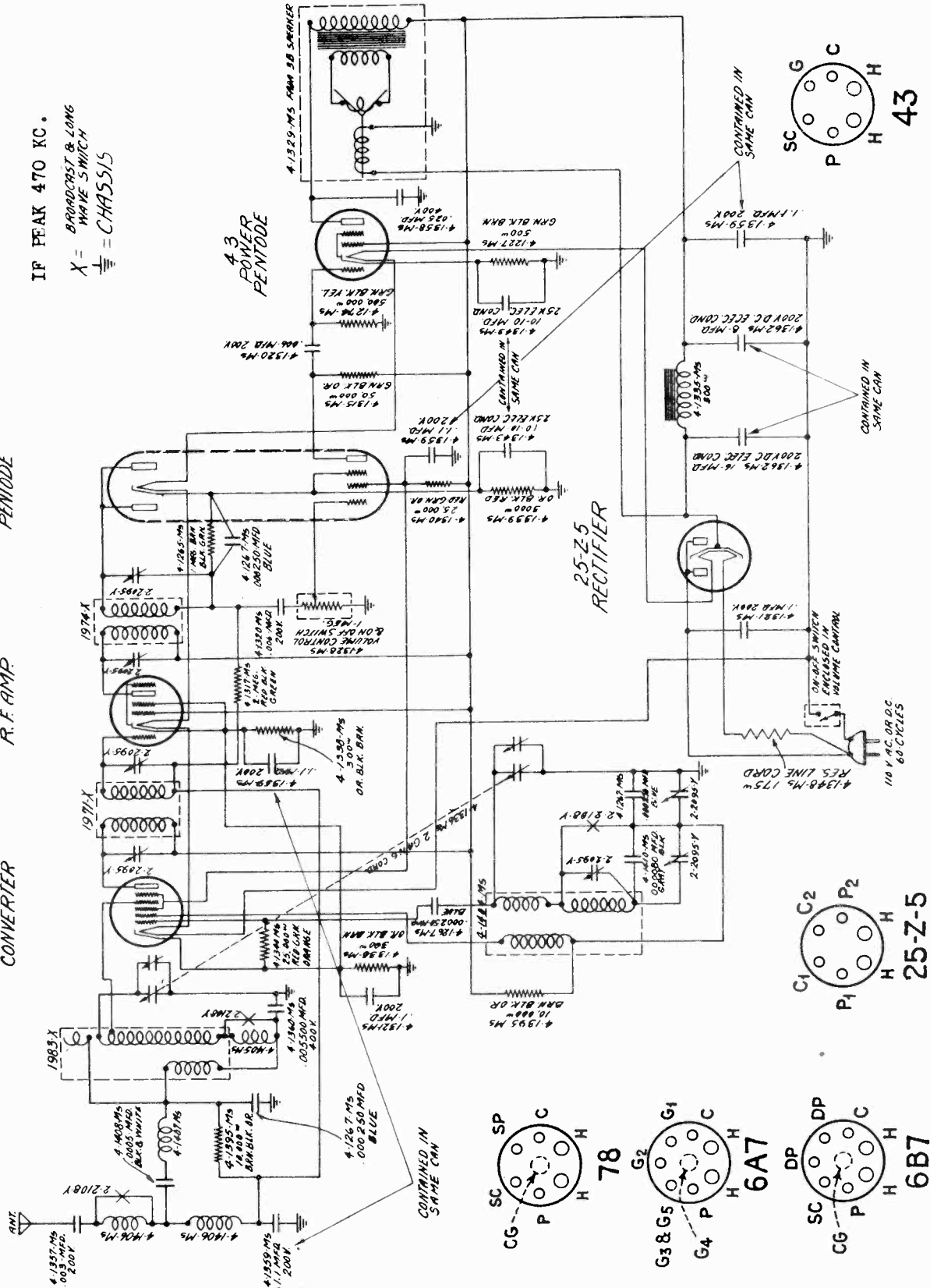
6A7
PENTAGRID
CONVERTER

7B
SUPER CONTROL
R.F. AMP

6B7
DUPEX DIODE
PENTODE

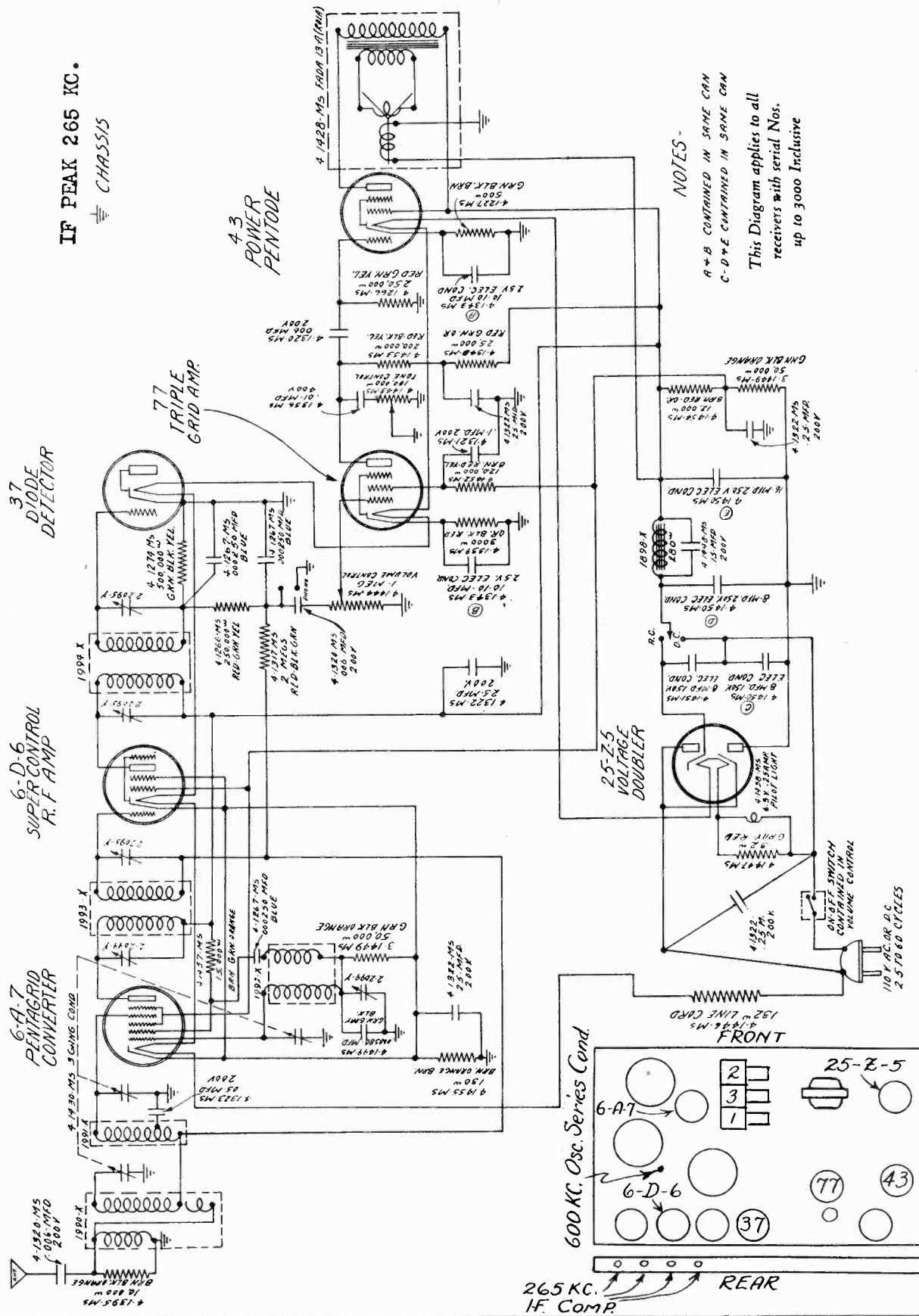
4-3
POWER
PENTODE

25-Z-5
RECTIFIER

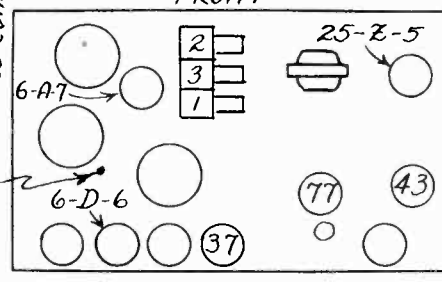


MODEL "RU" (131,132)
Schematic

FADA RADIO & ELECTRIC CORP.



NOTES -
A+B CONTAINED IN SAME CAN
C-D+E CONTAINED IN SAME CAN
This Diagram applies to all
receivers with serial Nos.
up to 3000 Inclusive



FADA RADIO & ELECTRIC CORP.

MODEL "RU" (131,132)
Alignment notesCOMPENSATING INSTRUCTIONS FOR RU RECEIVER
MODELS 131 and 132 -- AC--DC

In order to accurately adjust the various trimmer condensers of the Receiver in accordance with the following instructions, it is essential to use a shielded signal generator capable of giving a modulated carrier frequency which can be accurately attenuated at 265 KC., 600 KC. and 1400 KC.

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

It will be found advantageous to change the capacity in the output circuit of the signal generator from the conventional 250 mmfd. to 100 mmfd. in order to insure correct alignment of the antenna compensator.

ADJUSTMENT OF THE I. F. CONDENSERS

The four (4) I. F. condensers are located at the rear of the chassis as shown in the sketch.

- (1) Turn rotor plates of variable condensers all the way out to avoid possible interference from broadcast stations.
- (2) Disconnect the outside antenna system from the Receiver antenna.
- (3) Connect a wire from the dummy antenna system of the signal generator to the control grid of the 6-A-7 tube. Do not disconnect the control grid connector from the tube, nor remove the tube shield.
- (4) A thermo-galvanometer (Weston type 425) with a 2½ volt pilot light in series can be placed directly across the speaker voice coil as a means of obtaining visual readings of the Receiver output in addition to the audible signal.
- (5) 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.
- (6) With the aid of a #4 Stevens Spintite Socket Wrench (or equivalent) adjust the four (4) I. F. condensers in the order given in the sketch.

ADJUSTMENT OF THE GANGED VARIABLE CONDENSER COMPENSATORS

The compensators are located at the top of their respective tuning condensers, and can be adjusted with the aid of a screw driver.

- (1) Remove the lead wire which is connected to both the control grid of the 6-A-7 tube and the output of the signal generator.
- (2) Connect the Receiver antenna wire directly to the output terminal of the signal generator.
- (3) Adjust the carrier frequency output of the signal generator to 1400 KC.
- (4) Tune the Receiver to pick-up the 1400 KC. signal from the signal generator.
- (5) Adjust the compensators to maximum signal as indicated by the greatest swing of the needle on the output meter or galvanometer. The oscillator compensator (marked #1 in sketch) should be adjusted first.

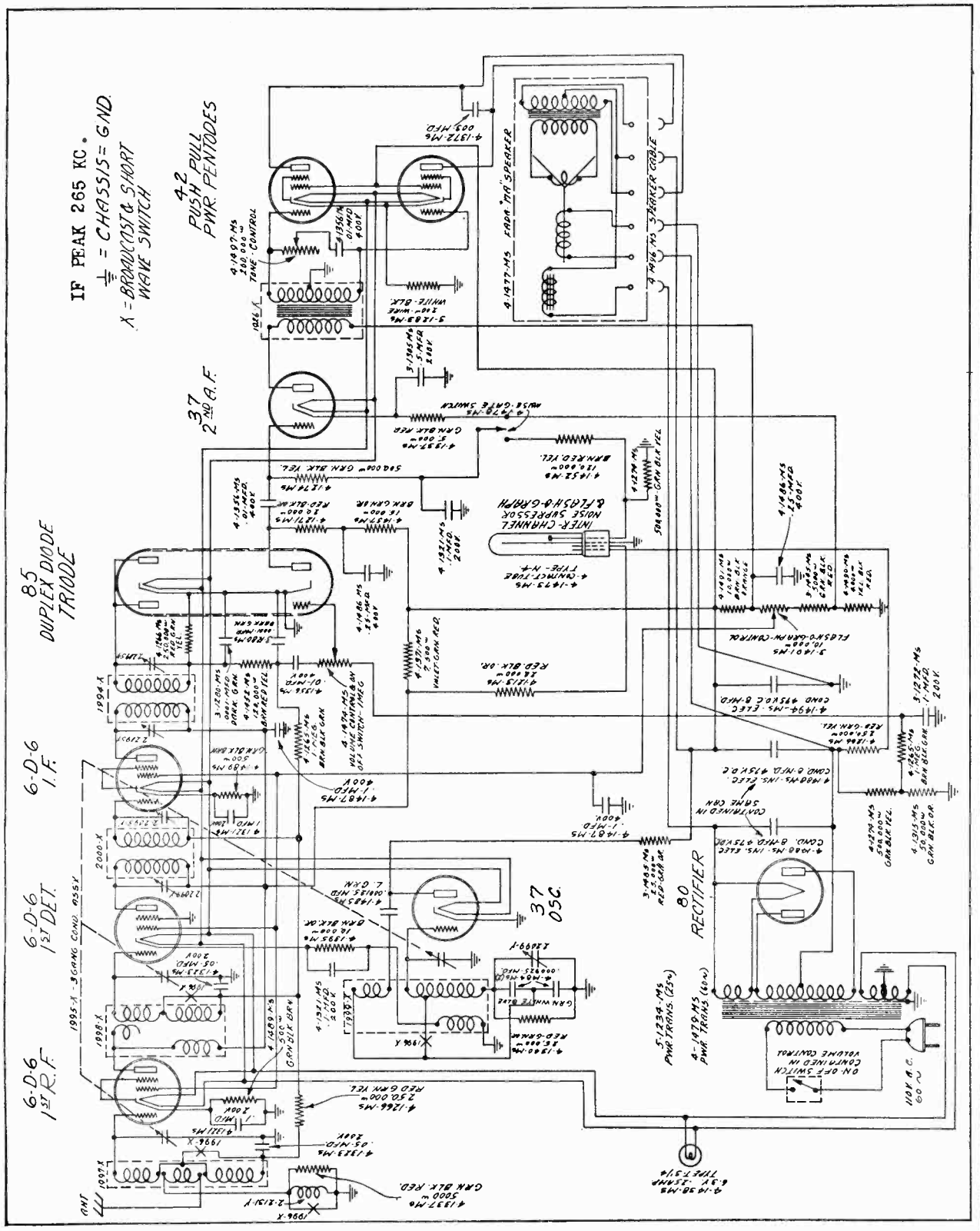
ADJUSTMENT OF OSCILLATOR SERIES CONDENSER

The oscillator series condenser is located in the top of the chassis (see sketch) and can be adjusted with the aid of a #4 Stevens Spintite Socket Wrench (or equivalent).

- (1) Adjust the carrier frequency output of the signal generator to 600 KC.
- (2) Tune the Receiver to 600 KC. signal of the signal generator.
- (3) With the aid of a #4 Stevens Spintite Socket Wrench (or equivalent) adjust the oscillator series condenser until a maximum signal output is indicated by the greatest swing of the needle on the galvanometer or output meter. To insure perfect alignment it is necessary to "rock" the ganged variable condenser in order to follow the maximum signal output.
- (4) After the oscillator series condenser is properly adjusted, tune the Receiver to 1400 KC., set the signal generator to 1400 KC., and then re-adjust the three variable condenser compensators as outlined in the foregoing instructions.

FADA RADIO & ELECTRIC CORP.

MODEL "RV" (133,134,135
Schematic 78-10,79-10,
97-10



IF PEAK 265 KC.
 = CHASSIS = GND.
 X = BRUNNOSTO & SHORT
 WAVE SWITCH

4-2
 PUSH PULL
 PWR. FENOTIDES

37
 A.F.

85
 DUPLICATION
 TRIODE

6-D-6
 I.F.

6-D-6
 1ST DET.

6-D-6
 1ST R.F.

37
 OSC.

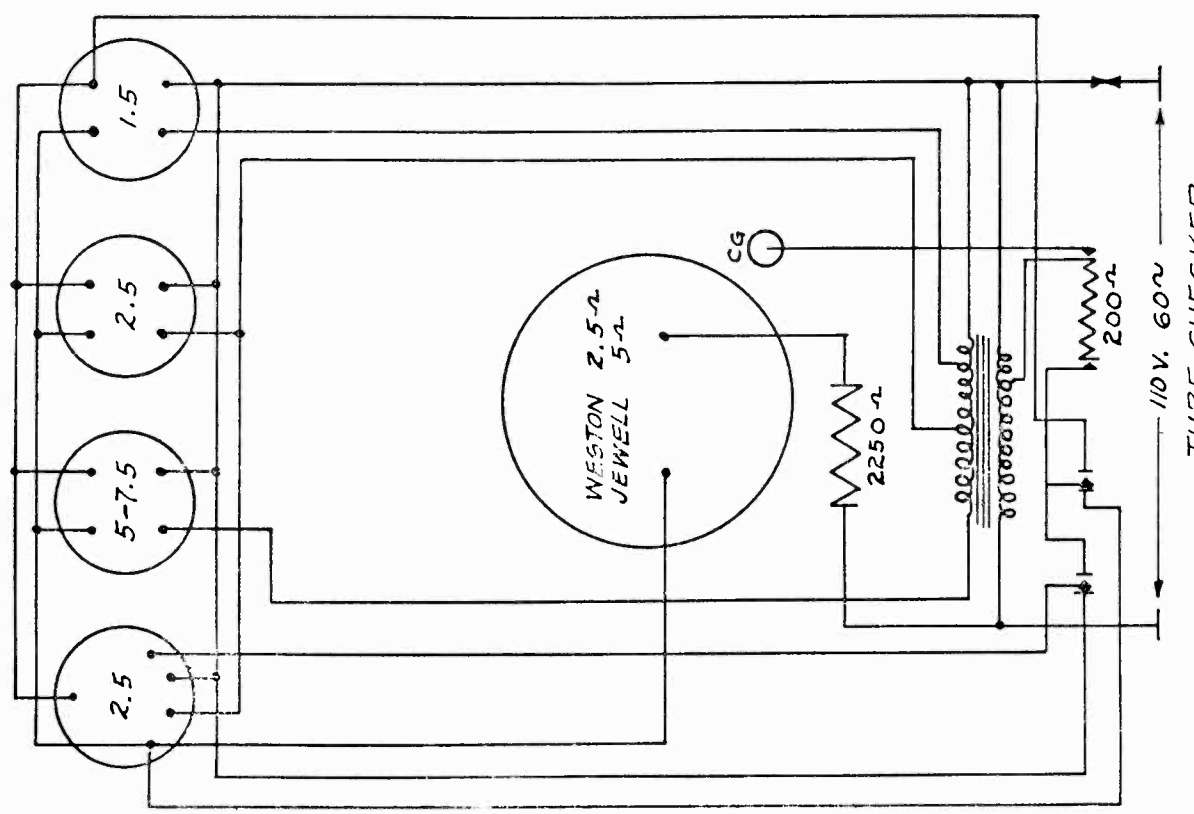
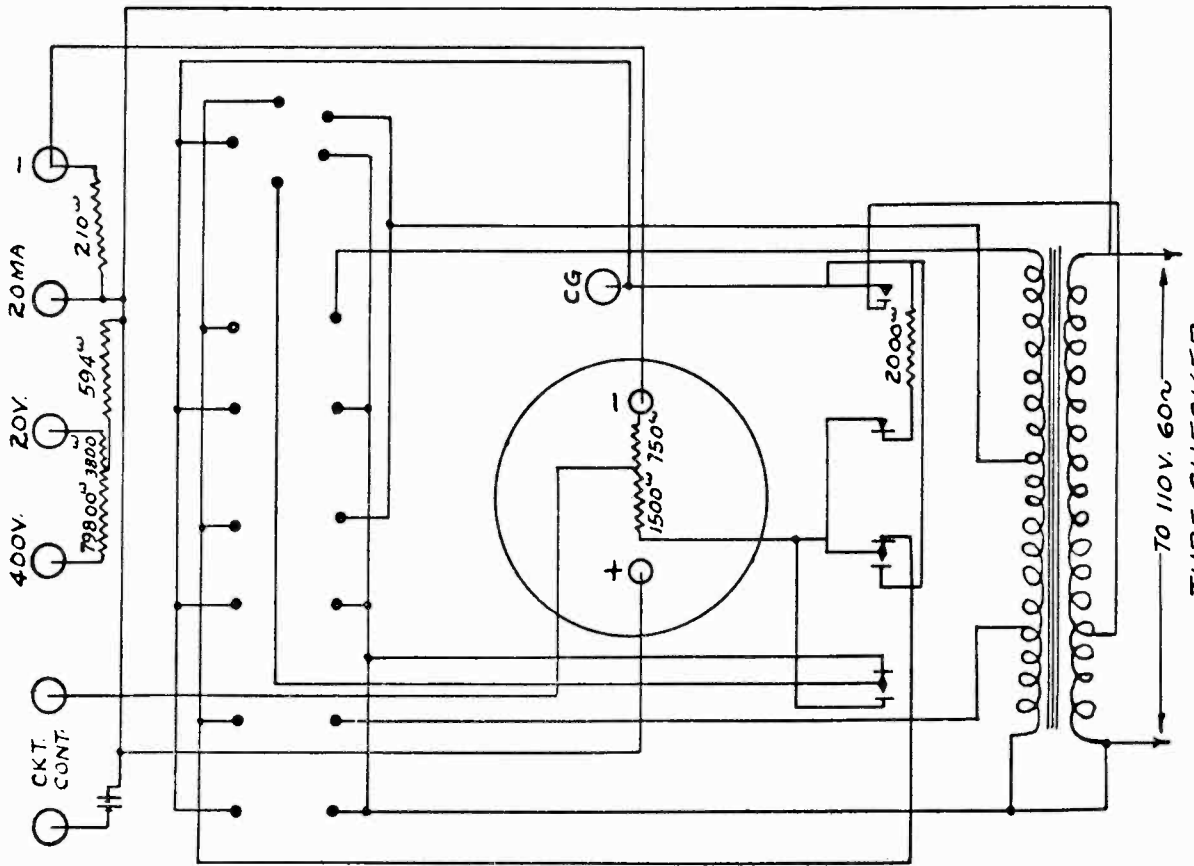
80
 RECTIFIER

5-1234-MS
 PWR TRANS (25)

4-1979-MS
 PWR TRANS (60)

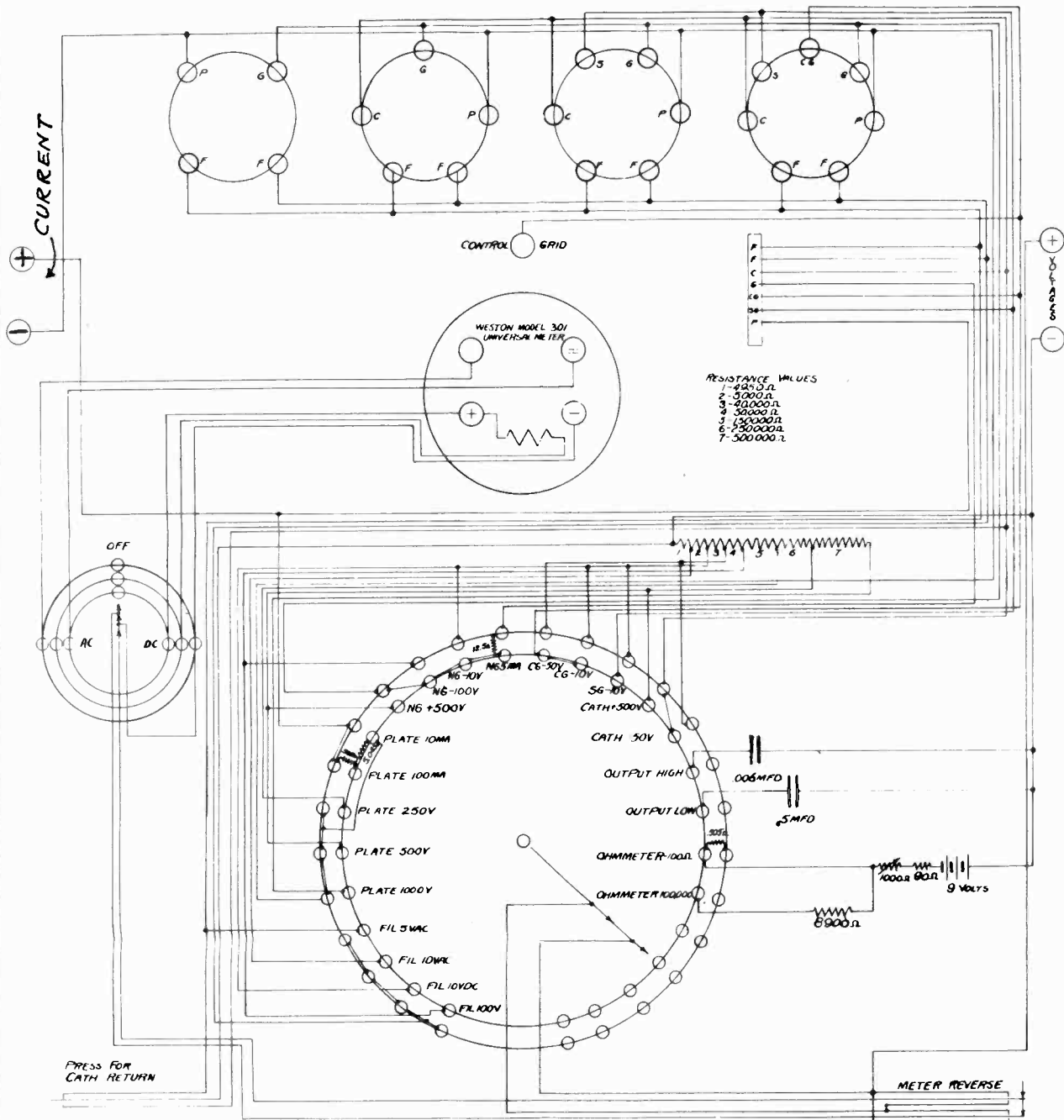
FRANKLIN RADIO CORP.

MODEL D-32
MODEL H-32



MODEL 33-B
Analyzer
Schematic

FRANKLIN RADIO CORP.



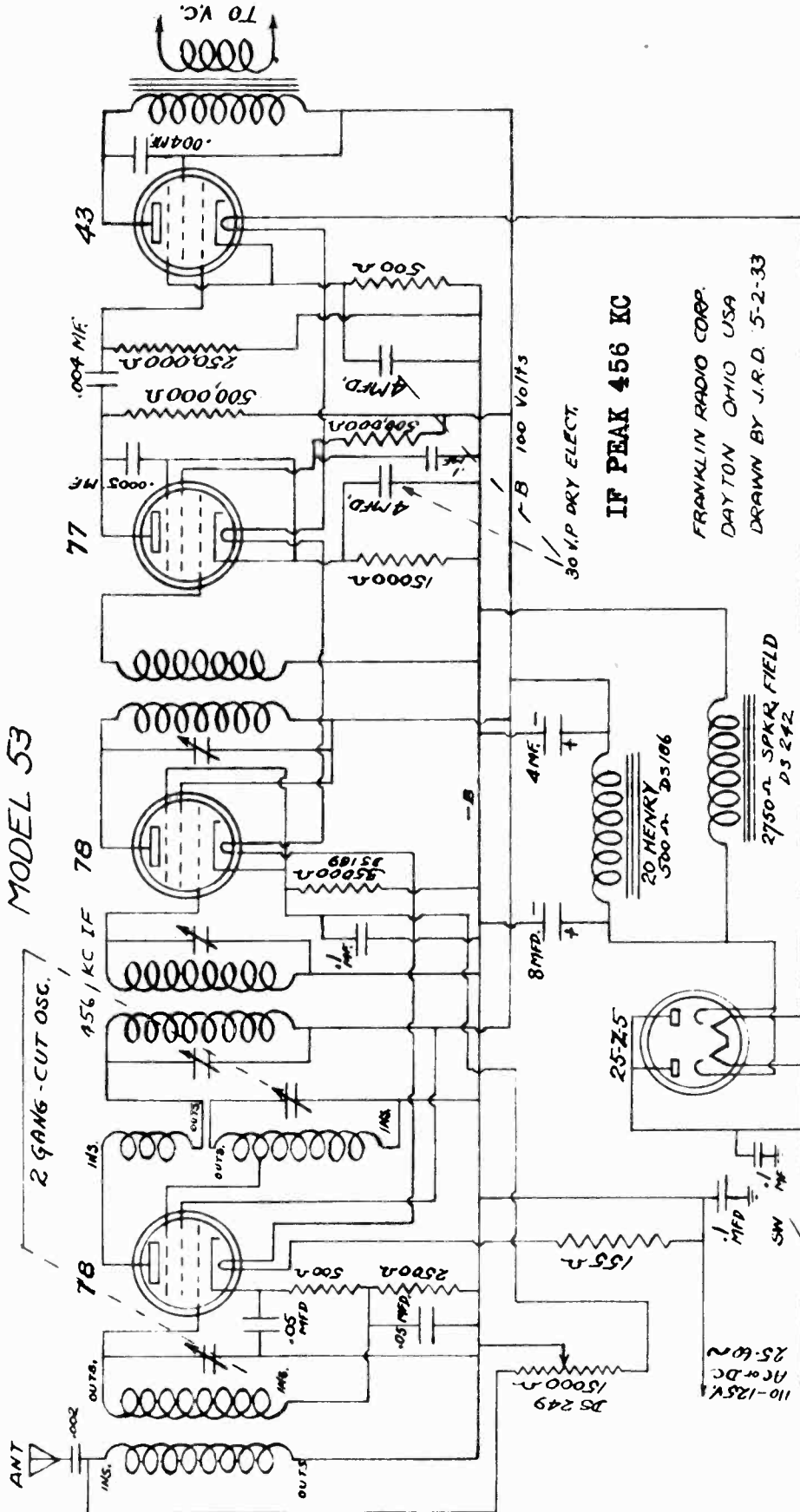
RADIO SET ANALYZER MODEL 33-B
 MANUFACTURED BY
 THE FRANKLIN RADIO CORPORATION
 DAYTON, OHIO, U.S.A.

BRADEN 10-21-32

FRANKLIN RADIO CORP.

MODEL 53
Schematic

FRANKLIN FIVE TUBE SUPER AC-DC 1715 KC - 540 KC
MODEL 53



IF PEAK 456 KC

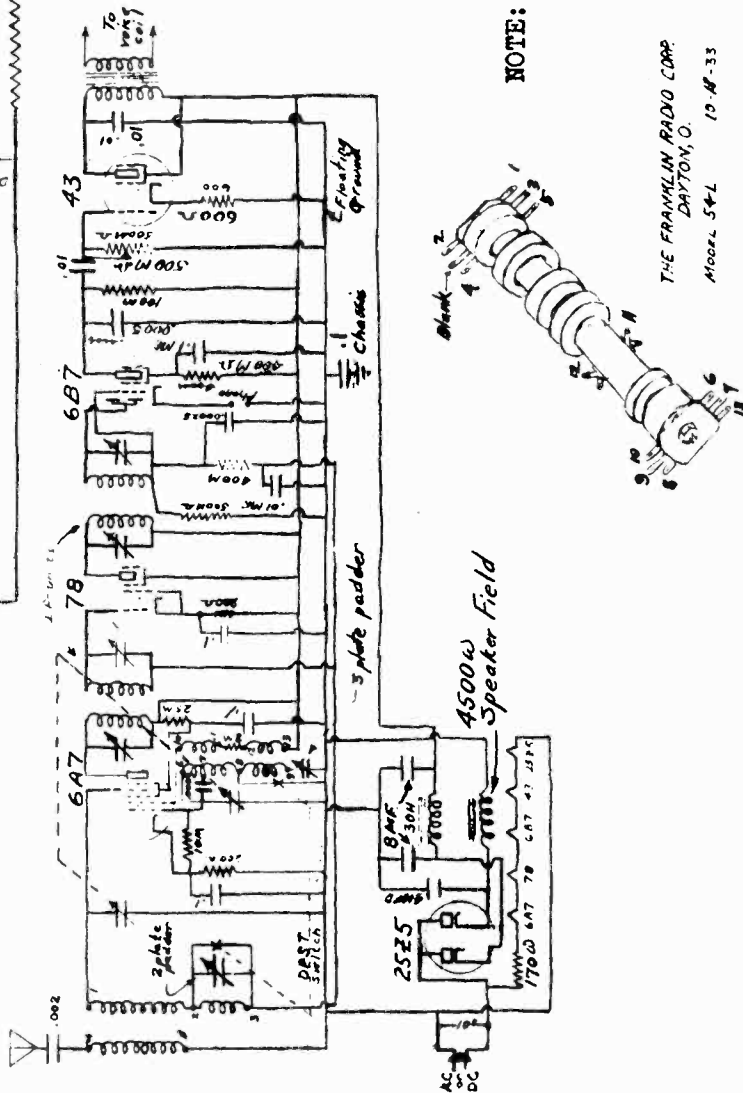
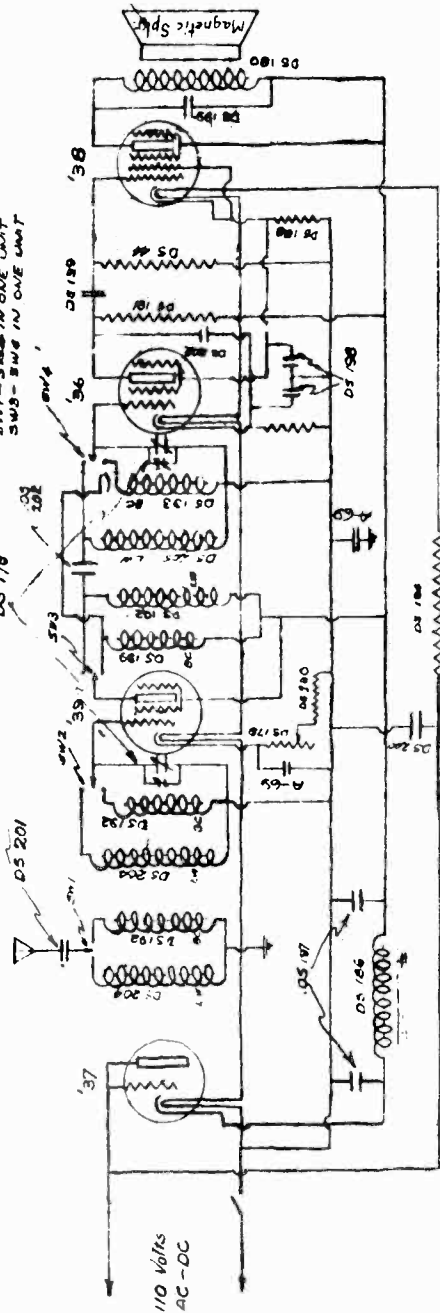
FRANKLIN RADIO CORP.
DAYTON OHIO USA
DRAWN BY J.R.D. 5-2-33

MODEL 43 AB or C-L
Schematic
MODEL 54-L
Schematic

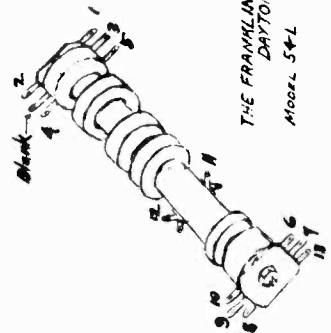
FRANKLIN RADIO CORP.

FRANKLIN LONG-BC AC-DC MIDGET RECEIVER

MODEL 43-AB OR C-L
SW1 - SW2 IN ONE UNIT
SW3 - SW4 IN ONE UNIT



NOTE: Model 54-L covers a waveband of 200-560 and 1000-2000 meters.
Model 54 covers a waveband of 200-560 meters and does not contain the padding condensers or coils 2-3 and 8-9.

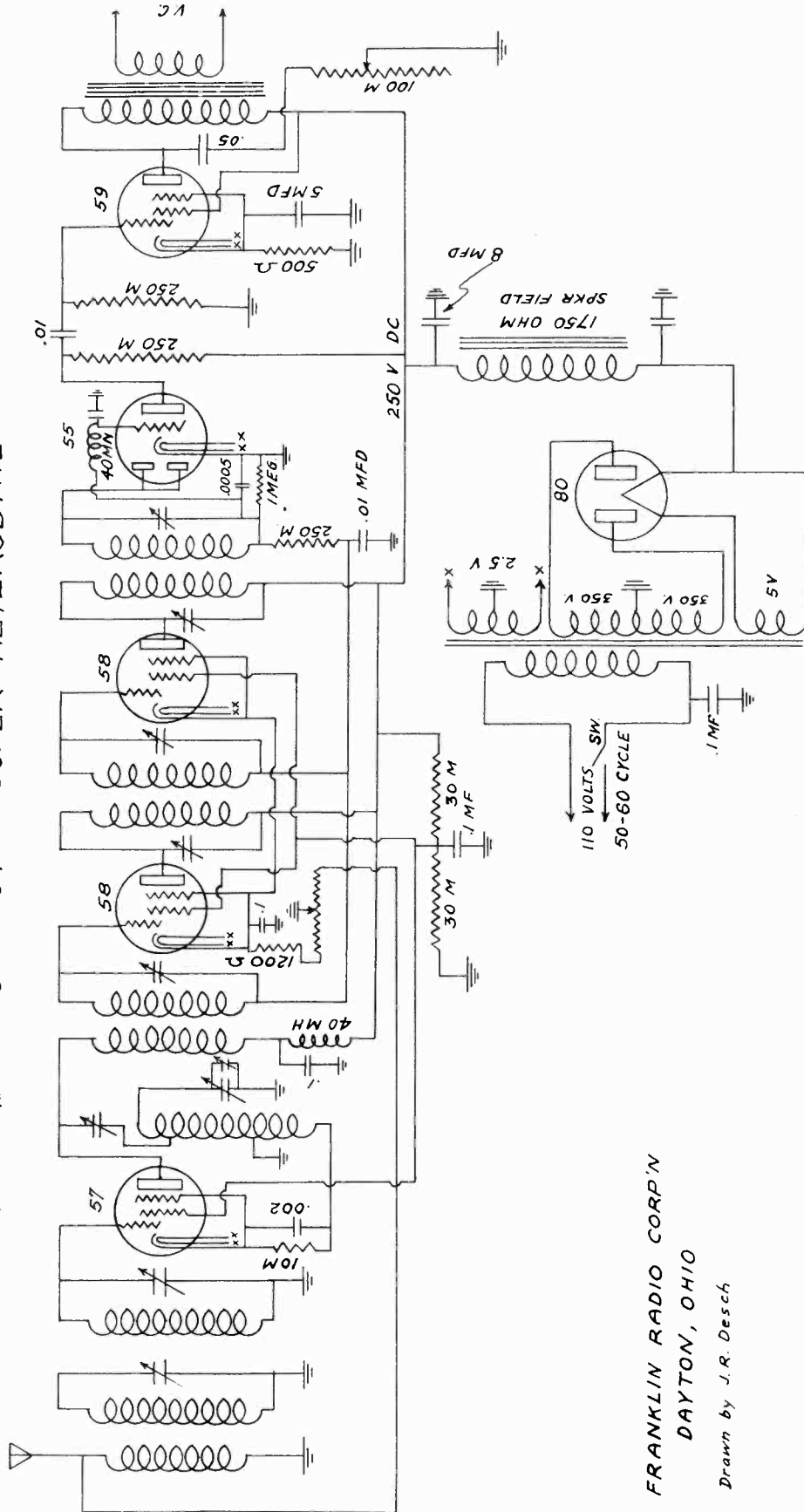


THE FRANKLIN RADIO CORP.
DAYTON, O.
MODEL 54-L 10-18-33

MODEL 64
Schematic

FRANKLIN RADIO CORP.

FRANKLIN MODEL 64 SUPER-HETERODYNE



FRANKLIN RADIO CORP'N

DAYTON, OHIO

Drawn by J. R. Desch

MODEL 94

Notes

FRANKLIN RADIO CORP.

ALIGNMENT OF FRANKLIN MODEL 94 ALL-WAVE RADIO RECEIVER

Receiver should be circuit tested, and any high or low voltages should be corrected. This will reasonably insure the correct use of the resistors. However a visual inspection of the resistors and condensers should be made so that the alignment operations which are to follow will not be frustrated. A table of voltages which are to appear at the various terminals is appended. When circuit testing is completed, proceed as follows:

- (1) Set up signal of exactly 450 Kc, 30% modulation, 400-1000 cycles, oscillator to be very stable.
- (2) Either apply high resistance voltmeter (AC) across plates of 59 tubes, or insert 15 MA DC Meter in the common cathode lead of the I.F. tubes (in lead to rotor of sensitivity control), or if tuning meter is used simply observe tuning meter variations.
- (3) Apply I.F. Osc. signal lead to grid of #2 I.F. tube.
- (4) Adjust trimmers on #3 I.F. Transformer for max. signal and max. reading on sensitivity indicators.
- (5) Apply I.F. Osc. signal lead to grid #1 I.F. tube and repeat operation #4 adjusting trimmers on #2 I.F. Transformer.
- (6) Apply I.F. Osc. signal lead to antenna post and adjust trimmers on #1 I.F. Transformer and observe as in #4.

NOTE: Speaker is never disconnected so that audible signal is always present to aid peaking operations.

- (7) Set wave band selector switch on B.C. Band (Farthermost clockwise position).
- (8) Set tuning dial at 1500 Kc., checking that dial reads 100 when gang condenser is completely closed,
- (9) Apply 1500 Kc. Osc. signal (30% mod. 400-1000 cycles) to ant-gnd posts.
- (10) Adjust trimmer on osc. section of gang condenser (section #1) for maximum signal.
- (11) Adjust trimmer on first detector grid coil (Trimmer on section #4 of gang) for max. signal.
- (12) Adjust trimmer on B.C. Preselector circuit (Trimmer on section #3 of gang) for max. signal.
- (13) Set tuning dial on 570 Kc. and adjust osc. signal to exactly 570 Kc.
- (14) Adjust series osc. padding condenser for max. signal (condenser C-3 on circuit diagram) (this condenser is located beneath chassis but is adjusted from top of chassis thru hole in chassis. It is the trimmer located nearest to front of set).
- (15) Check peaking at 1500 Kc and make minor adjustment if necessary repeating operation 10.

FRANKLIN RADIO CORP.

MODEL 94
Notes

- (16) Check alignment at about 800 Kc to see if osc. and 1st det. are tracking.
- (16-A) If when checking alignment at 800 Kc. and it is found that 1st det. does not track with oscillator, necessitating an increase of trimmer capacity on section 4 (also then on pre-selector section #3) then proceed as follows:
- (a) Turn dial to 1500 Kc.
 - (b) Loose set screw on dial and turn dial on the condenser shaft about 1 or 2 degrees counterclockwise and re-lock with set screw.
 - (c) Then proceed with operations #8, #9, #10, #11, #12, #13, #14, #15 and #16.

Alignment should now be better at 800 Kc. or perfect. If not, repeat operation set down in #16-A. Of course if in 16-A it was found that trimmer condenser had to be reduced in capacity on section #4 (also then section #3) then reverse the direction in which the dial was slipped on the gang cond. shaft (move it clockwise in this case). Repeat the same operations as outlined in 16-A-c above.

- (17) Move band selector switch to next higher freq. band (1550-4200 Kc.) counterclockwise one notch.

NOTE: AFTER COMPLETION OF OPERATION 16-A DO NOT TOUCH TRIMMERS ON SECTIONS #1, #3, and #4 OF GANG CONDENSER.

- (18) Set up 4000 Kc. Osc. signal and connect leads from oscillator to ant-grnd posts on set. Turn dial of set to max. signal (will be close to 0 or 1500 Kc. on tuning dial).
- (19) Adjust 1st det air-trimmer (located on control panel, second knob from left) for max. signal. If max. signal is secured at either extremity of this control travel, then it will be necessary to make coil adjustments.
- (a) If this trimmer peaked or attempted to peak at its max. capacity then 1st det coil lacks sufficient inductance (too few turns or coil diameter incorrect).
 - (b) If this trimmer peaked or attempted to peak at its min. capacity (farthest counterclockwise position) then 1st det. coil has too high an inductance (too many turns). Remove 1 turn and repeat operation 19 until this first detector trimmer peaks the 4000 Kc. signal at 1/4 of its total travel from its farthest counterclockwise position.
- (20) Set up oscillator signal at 1550 Kc. and turn tuning dial to farthest counterclockwise position (max. capacity).
- (21) Adjust series osc. trimmer (C-2) (second from front of set, located beneath chassis but adjustable from top of chassis) until max. signal is secured. 1st det. air-trimmer should peak this 1550 Kc. signal somewhere in its range.

NOTE: If in operation #18, tuning dial did not pick up 4000 Kc. signal at 10 or nearly 10 on dial, then oscillator coil for this band is in error having a wrong number of turns. This difficulty must be corrected before proceeding with operations #19, #20 and #21.

- (22) Move band selector switch to next high freq. band (CC one notch) (11000 to 4200 Kc.).

MODEL 94

Notes

FRANKLIN RADIO CORP.

- (23) Set up oscillator signal at 11000 Kc. Move tuning dial and gang condenser to farthestmost clockwise position (min. cap.). Adjust cap. C-1 for max. signal. (For operations which are to follow set must be standing on LEFT END. Condenser (C-1) is mounted on rectangular coil and switch shield beneath chassis.
- (24) If 11000 Kc. signal cannot be tuned in with gang condenser at min. cap. even after adjusting C-1, then osc. coil inductance is either high or low. If inductance is low then 11000 Kc. signal can be tuned in by increasing gang cond. cap. (rotating gang). If osc. inductance is too high then this fact can be determined by varying Oscillator signal to some lower frequency until signal is audible in receiver.
If this osc. coil inductance is incorrect, examine the coil for correct turns and diameter. Inductance can be lowered by sliding last turn or last 2 turns away from rest of turns of coil.
- (25) Check at what position the 1st det. air-trimmer peaks this 11000 Kc. signal. Max. signal should be obtained at about 1/4 total travel of this condenser from its min. cap. setting. If this does not occur, then first det. coil has wrong inductance value and must be adjusted by sliding end turn or turns. Sliding turns outward away from main body of coil decreases inductance.
- (26) Set up 4200 Kc. Osc. signal and move tuning dial and gang to Max. Cap. Signal should be heard close to 100 on dial. Check 1st det. trimmer to see that it peaks this 4200 Kc. signal within its tuning range.
- (27) If in checking in #26 the 4200 Kc. signal cannot be heard (receiver does not tune to 4200 Kc. signal) then the osc. coil inductance for this band is too low and consequently C-1 in operation 24 was adjusted to too high a capacity so that the facts in the case are that the osc. ind. is too low and distributed cap. too high. Therefore add 1 or $\frac{1}{2}$ turn to osc. coil and repeat operations 23, 24, 25 and 26.
- (28) Check 1st det. trimmer at several points in this band to see that it peaks properly.
- (29) Move band selector switch to next higher freq. band (22000 Kc. to 11000 Kc.) (farthestmost CC position).
- (30) Set up osc. signal at 21800 Kc. and move gang condenser to min. capacity setting. Adjust trimmer on #2 section of gang cond. until signal is heard.
- (31) If signal cannot be tuned in then osc. coil has too high an inductance and must be corrected and same procedure followed as in #24 except that in this case higher frequencies are used.
- (32) Peak 1st det. trimmer at 21800 Kc. signal. (Be sure that #5 trimmer is set at min. cap.). Should peak at 1/4 trimmer condenser travel from min. setting. If this does not occur then ind. of 1st det. coil is incorrect and must be corrected. If air-trimmer closes more than 1/4 its travel the inductance of 1st det. coil is too low and conversely too high if trimmer cond. does not close 1/4 its travel. Adjust ind. of coil by sliding turns inward or outward.

FRANKLIN RADIO CORP.

MODEL 94
Voltage, Notes

- (33) Set up osc. signal at 11000 Kc. and move tuning dial and cond. toward max. cap. At 100 or close thereto the signal should be heard. Be sure the signal received is the fundamental of osc. First det. trimmer should peak within its tuning range. No trouble should be encountered here unless some high distributed or lumped capacity has been introduced in 1st det. circuit which should not be present. This must be corrected if 1st det. trimmer does not peak correctly at 11000 Kc. signal freq.
- (34) If signal is received at a much lower (5 to 10 div.) than 100 on dial then osc. coil inductance is too high and should be reduced. Then repeat operations #30, #31, #32, #33 which will give a high capacity setting on trimmer on section #2 of gang.
- (35) Check air-trimmer of 1st det. in various settings of gang between high and low freq. extremes to see that trimmer peaks at these points.

NOTE: When performing operations set down for the two high frequency bands no violent or sudden changes should occur in 1st detector air-trimmer settings. If such is experienced then operator has peaked trimmer on frequency on wrong side of oscillator.

CIRCUIT TEST VOLTAGES FOR MODEL 94 ALL-WAVE

Cathode 1st det. to gnd.-----6 $\frac{1}{2}$	volts-----	30	volt scale
Cathode oscillator to gnd.-----0	volts-----		
Cathode 59 tubes to gnd.-----18	volts-----	30	volt scale
Cathode 58 tube-----13.5	volts-----	30	volt scale
Cathode 2B7 to gnd.-----115.0	volts-----	300	volt scale
Cathode I.F. Tubes to gnd.-----130.0	volts-----	300	volt scale
Plate 1st Det. to gnd.-----280.0	volts-----	600	volt scale
Plate I.F. Tubes to gnd.-----370.0	volts-----	600	volt scale
Plate 2B7 to gnd.-----280.0	volts-----	600	volt scale
Plate 56 to gnd.-----270.0	volts-----	600	volt scale
Plate 59 tubes to gnd.-----260.0	volts-----	600	volt scale
Plate 57 osc. tube to gnd.-----140.0	volts-----	600	volt scale
Screen 1st det. tube to gnd.---140.0	volts-----	600	volt scale
Screen I.F. Tubes to gnd.-----270.0	volts-----	600	volt scale
Screen 2B7 to gnd.-----140	volts-----	600	volt scale
Screen 59 Tubes to gnd.-----260	volts-----	600	volt scale
Screen 57 osc. Tube to gnd.---120	volts-----	600	volt scale
Drop across 20 Henry choke-----30	volts-----	30	volt range
Drop across field coil-----105	volts		
Normal "B" Voltage DC from filament 5Z3 to C.T. HV Trans.-----400	volts		
Potential between cathode of 2B7 and cathodes of 58 tubes-----3	volts		
(Use 300 volt range) This is effective grid bias (no signal)			
Also observe this polarity. Cathodes of I.F. Tubes should be positive with respect to cathode of 2B7.			

MODEL 200
Installation notes

FRANKLIN RADIO CORP.

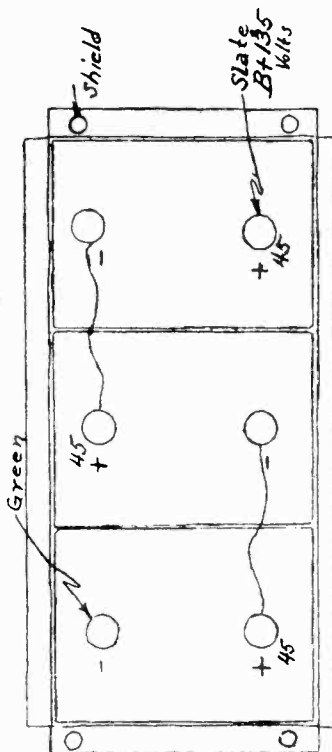
MOUNTING "B" BATTERY CONTAINER

Included with each radio is a special container for the "B" batteries. This container is to be mounted through the floor boards of the car, wherever possible. In mounting this "B" battery box, be sure that you check underneath the floor boards to see that there are no brake rods, mufflers, storage batteries or other parts of the car located directly below the space in the floor boards. The proper method for locating the place for the "B" battery container is to hold it against the floor boards from underneath car, drilling four small holes up through the floor board at the four corners of the box. After doing this, you can cut the hole from above and feel assured that you will not run into obstructions underneath the floor boards.

If it is a wooden floor board, you can very easily cut this with a key-hole saw. If, however, the floor boards are metal, we recommend cutting the hole with a cold chisel and a hammer, using a shearing action by holding the cold chisel as nearly parallel to the floor boards as possible. By using this method, you will find it very easy to cut these metal floors.

Whenever cutting through floor boards, be sure to do it in such a manner so as not to weaken floor boards of the car. In some cases, you will have to fasten braces underneath the floor boards at the edge of "B" battery can to strengthen the floor of car, due to the fact that sometimes the only location for the "B" battery can necessitates cutting through the whole width of one floor board.

When placing "B" batteries in "B" battery container, wedge cardboard or wooden shims beside the batteries to hold them securely from rattling. The proper method of connecting these batteries together is illustrated in the following diagram:

MOUNTING THE RADIO SET AND SPEAKER**WARNING--**

When locating a position for the receiver, always bear in mind that you must allow sufficient room for mounting the speaker.

The Franklin Auto Radio has been designed to be mounted on the steering column or dash board. You may mount the set either in the driver's compartment of the car, or in the motor compartment. When locating the three mounting holes for radio, be sure that you locate them accurately. The reason for this is that if the holes are not perfectly in line with the bolts on chassis, you will badly warp the receiver can on mounting it to the dash board.

After mounting the radio receiver, the next operation is to mount the speaker. We recommend that you mount the speaker as high as possible behind the instrument panel, the reason for this being that when mounted in this position, the speaker receives full advantage of the resonance effect of this space behind the instrument panel. You can easily prove this for yourself, by turning on the radio receiver and placing the speaker in various positions in the car.

You will then note the advantage of placing the speaker according to our instructions. After mounting the radio receiver, drill a 3/8" hole directly below the receiver in back board. This hole is to be used for allowing A and B battery wires to pass through into the motor compartment. Directions for connecting these wires will be found in the following sheets.

The tuning control should be clamped on to the steering column at a height equal to that of the top of shift lever, as this makes tuning a natural motion. In cases where the steering column is of a smaller diameter than that of the clamp, use the leather shims furnished with the tuning control.

When running the wires and tuning control cable from radio to control be sure that you do not kink them excessively, as this will make the tuning control work hard. Always be sure to securely tape the tuning control at about every six inches along its length to some solid part of the car. If you do not do this and the control is left free to swing, it will de-tune the radio.

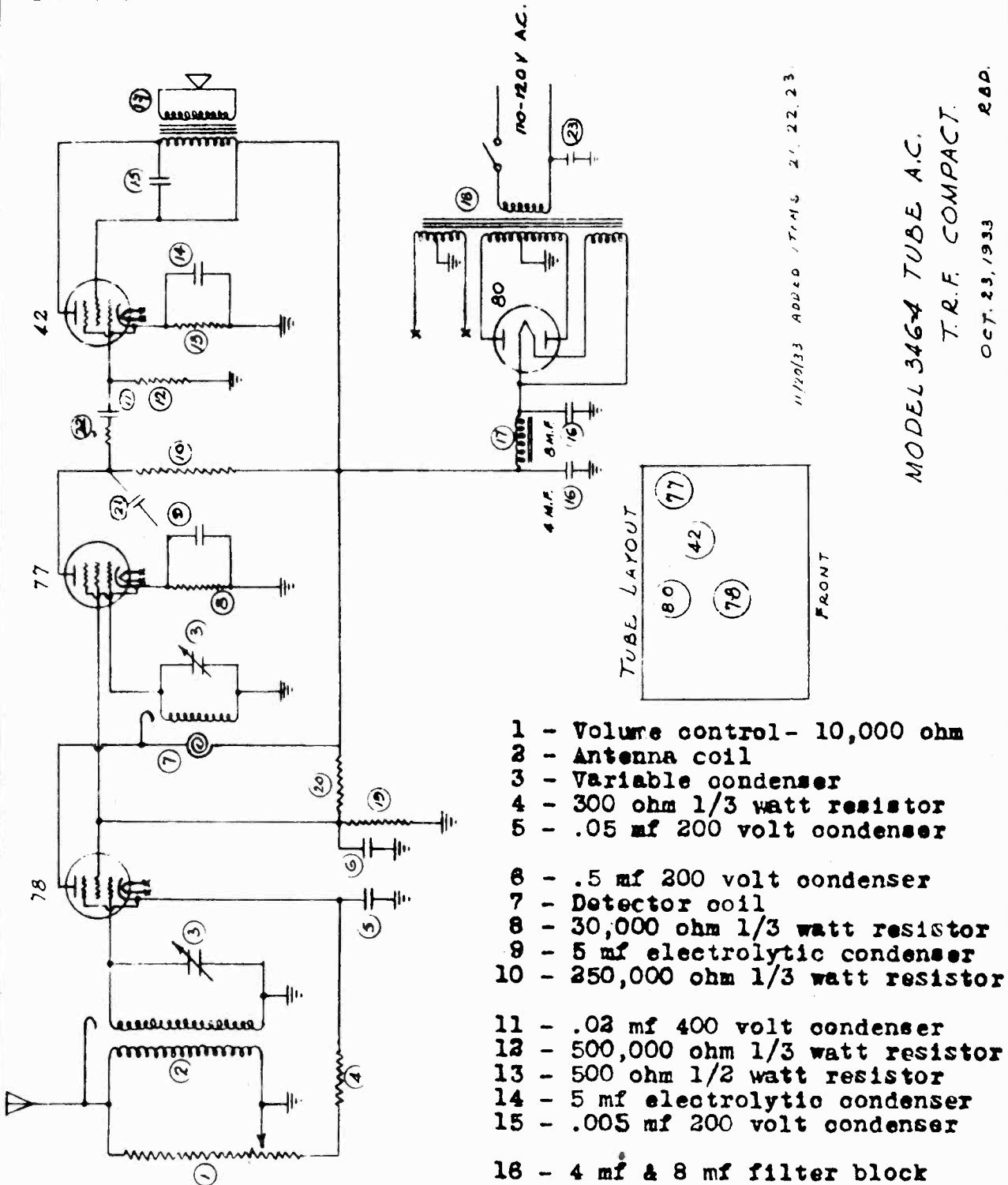
CONNECTING "A" BATTERY

The "A" battery connections of the Franklin Auto Radio have no polarity. By this we mean, neither negative or positive, but the heavy green wire with tracer must always be attached to the "hot" side of storage battery (the un-grounded side of storage battery). The sheath may be attached to any convenient ground connection, such as any bolt passing into the frame of the car or direct to the grounded terminal of the storage battery.

The heavy green wire with tracer may be attached either directly at the "hot" side of the storage battery or to the heavy cable running to the starter switch. Never, under any circumstances, attach this heavy green wire with yellow tracer to any of the ignition wires or light wires. Special warning is given against connecting this wire to the generator wire anywhere along its length. It is also convenient and advantageous to connect this wire to one side of the car ammeter, so that when the receiver is turned on, the battery load is indicated on the ammeter.

MODEL 346-4
Schematic, Socket
Parts List

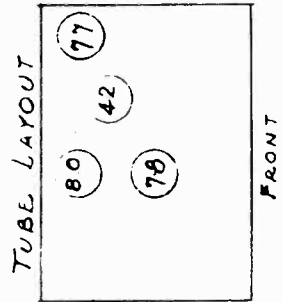
FREED RADIO AND TELEVISION CORP.



11/20/33 ADDED / TMS 21, 22, 23

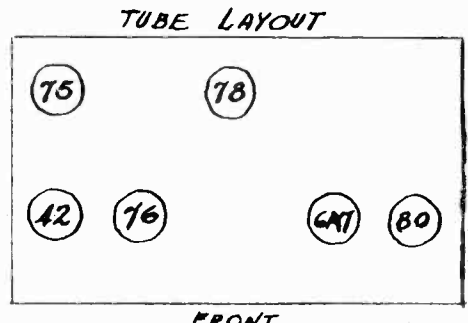
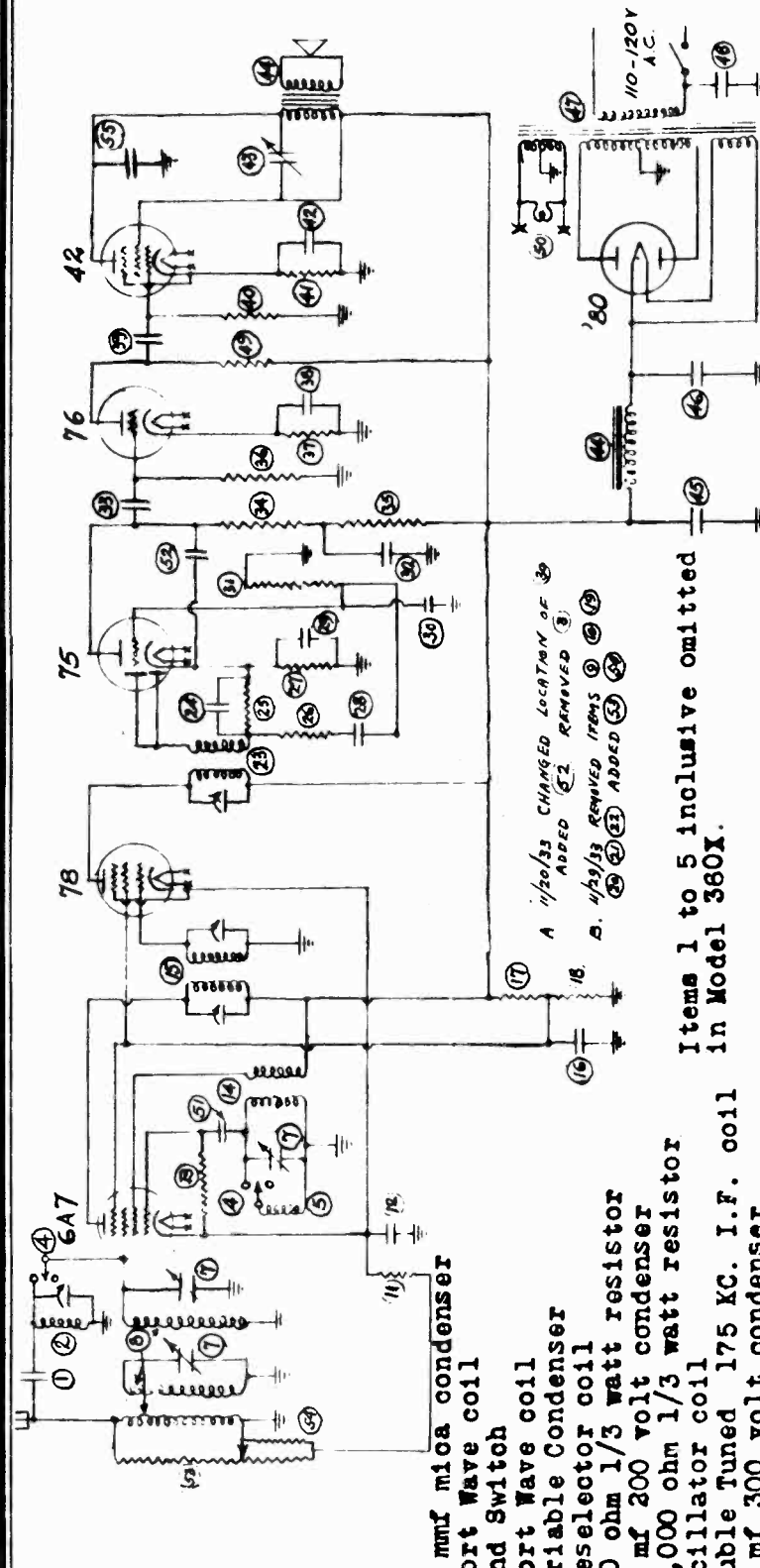
MODEL 346-4 TUBE A.C.
T.R.F. COMPACT
OCT. 23, 1933 R.S.P.

- 1 - Volume control- 10,000 ohm
- 2 - Antenna coil
- 3 - Variable condenser
- 4 - 300 ohm 1/3 watt resistor
- 5 - .05 mf 200 volt condenser
- 6 - .5 mf 200 volt condenser
- 7 - Detector coil
- 8 - 30,000 ohm 1/3 watt resistor
- 9 - 5 mf electrolytic condenser
- 10 - 250,000 ohm 1/3 watt resistor
- 11 - .02 mf 400 volt condenser
- 12 - 500,000 ohm 1/3 watt resistor
- 13 - 500 ohm 1/2 watt resistor
- 14 - 5 mf electrolytic condenser
- 15 - .005 mf 200 volt condenser
- 16 - 4 mf & 8 mf filter block
- 17 - 1800 ohm field
- 18 - Power Transformer
- 19 - 10,000 ohm 1 watt resistor
- 20 - 10,000 ohm 2 watt resistor
- 21 - .0002 mica condenser
- 22 - 50,000 ohm 1/3 watt resistor
- 23 - .1 mf 200 volt condenser



FREED RADIO AND TELEVISION CORP.

MODEL 360, 360X
Schematic
Socket layout



MODELS 360 & 360X.
6 TUBE A-C SUPER
OCT. 26, 1933 R.A.D.

- 1 - 10 mmf mica condenser
- 2 - Short Wave coil
- 3 - Band Switch
- 4 - Short Wave coil
- 5 - Variable Condenser
- 6 - Preselector coil
- 7 - 300 ohm 1/3 watt resistor
- 8 - .5 mf 200 volt condenser
- 11 - 50,000 ohm 1/3 watt resistor
- 12 - Oscillator coil
- 13 - Double Tuned 175 KC. I.F. coil
- 14 - .1 mf 300 volt condenser
- 15 - 25,000 ohm 1/2 watt resistor
- 16 - 50,000 ohm 1/2 watt resistor
- 17 - Single Tuned 175 KC. I.F. coil
- 18 - .0002 mf mica condenser
- 19 - 500,000 ohm 1/3 watt resistor
- 20 - 50,000 ohm 1/3 watt resistor
- 21 - 1,500 ohm 1/3 watt resistor
- 22 - .02 mf 200 volt condenser
- 23 - 5 mf 35 volt electrolytic condenser
- 24 - .0002 mf mica condenser
- 25 - 500,000 ohm 1/3 watt resistor
- 26 - 50,000 ohm 1/3 watt resistor
- 27 - 1,500 ohm 1/3 watt resistor
- 28 - .02 mf 200 volt condenser
- 29 - 5 mf 35 volt electrolytic condenser
- 30 - .0002 mf mica condenser
- 31 - 500,000 ohm 1/3 watt resistor
- 32 - .1 mf 400 volt condenser
- 33 - .02 mf 400 volt condenser
- 34 - 100,000 ohm 1/3 watt resistor
- 35 - 50,000 ohm 1/3 watt resistor
- 36 - 50,000 ohm 1/3 watt resistor
- 37 - 3,000 ohm 1/3 watt resistor
- 38 - 5 mf 35 volt electrolytic condenser
- 39 - .02 mf 400 volt condenser

Items 1 to 5 inclusive omitted in Model 360X.
IF PEAK 175 KC.

- 40 - 500,000 ohm 1/3 watt resistor
- 41 - 500 ohm 1/2 watt resistor
- 42 - 5 mf 35 volt electrolytic condenser
- 43 - Filtermatic tone control
- 44 - Speaker - 1800 ohms - 1/42"
- 45 - 4 mf 450 volts filter condenser
- 46 - 8 mf 450 "
- 47 - Power transformer
- 48 - .1 mf 200 volt condenser
- 49 - 25,000 ohm 1/3 watt resistor
- 50 - 6 volt pilot light
- 51 - .0001 mf mica condenser
- 52 - .0002 mf mica condenser
- 53 - 5 mf 35 volt electrolytic condenser
- 54 - 10,000 ohm 1/3 watt resistor

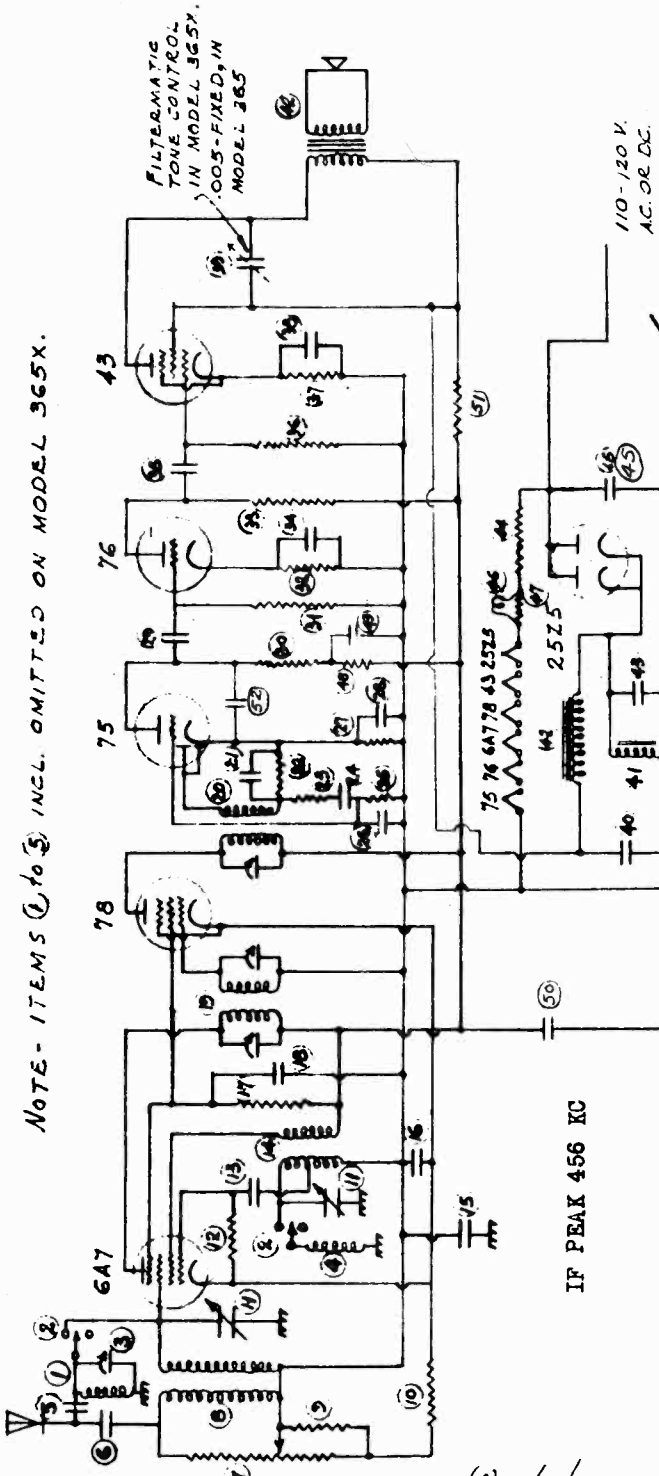
A. 1/20/33 CHANGED LOCATION OF 39
ADDED 62 REMOVED 8
B. 1/29/33 REMOVED ITEMS 9, 19
ADDED 20, 21, 22, 23, 24, 25, 26, 27, 28, 29

MODEL 365, 365X

Schematic

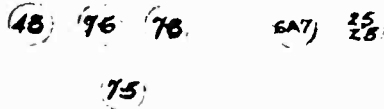
Socket layout

FREED RADIO AND TELEVISION CORP.



NOTE - ITEMS (1, 10, 5) INCL. OMITTED ON MODEL 365X.

TUBE LAYOUT



(A) 11/20/33
Added items
48-52 inclusive

- 1 - Short wave coil
- 2 - Band switch
- 3 - 50-100 mmf padder
- 4 - Short wave coil
- 5 - 10 mmf mica
- 6 - .002 mf
- 7 - 10,000 ohm volume control
- 8 - Antenna coil
- 9 - 3,000 ohm 1/3 watt
- 10 - 400 ohm "
- 11 - Variable condensers
- 12 - 50,000 ohm 1/3 watt
- 13 - .0001 mf mica
- 14 - Oscillator coil
- 15 - .1 mf 200 volt
- 16 - .1 " " "
- 17 - 30,000 ohm 1/3 watt
- 18 - .05 mf 200 volt
- 19 - 456 KC Double tuned I.F. coil
- 20 - 456 KC Single " "
- 21 - .0002 mf mica
- 22 - 500,000 ohm 1/3 watt
- 23 - 50,000 " "
- 24 - .02 mf 200 volt
- 25 - 500,000 ohm 1/3 watt
- 26 - .0002 mf mica
- 27 - 3,500 ohm 1/3 watt
- 28 - 5 mf 35 volt elec.
- 29 - .02 mf 200 volt
- 30 - 100,000 ohm 1/3 watt
- 31 - 50,000 " " "
- 32 - 3,000 " " "
- 33 - 25,000 " " "
- 34 - 5 mf 35 volt Electrolytic
- 35 - .02 mf 200 volt
- 36 - 500,000 ohm 1/3 watt
- 37 - 750 " 1/2 "
- 38 - 5 mf 35 volt elec.
- 39 - (Filtermatic T.C. in 365X
{ .005 mf 200 volt in 365
- 40 - 14 mf filter cond.
- 41 - 3,000 ohm field
- 42 - 270 " "B" choke
- 43 - 25 mf filter cond.
- 44 - 135 ohm line cord
- 45 - .1 mf 200 volt
- 46 - 6 volt pilot lamp
- 47 - 15 ohm Res.

- * Omitted from 365X
- 48 - 50,000 Ohm, 1/3 watt resistor
- 49 - .1 mf 200 volt condenser
- 50 - 6 mf 150 volt electrolytic con
- 51 - 1000 ohm, 1/3 watt resistor
- 52 - .0002 mf mica condenser

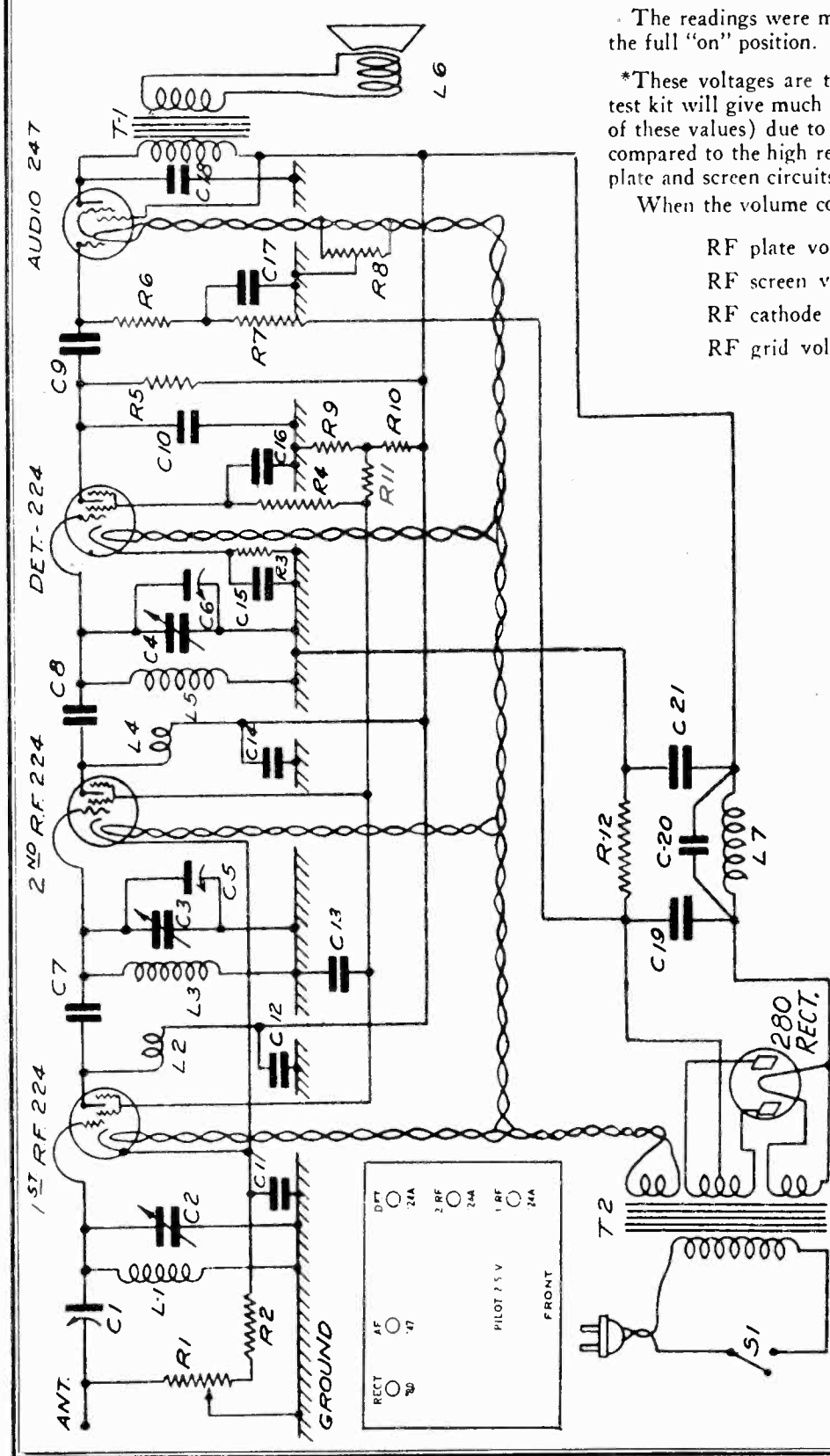
MODELS 365 & 365X.
6 TUBE UNIV. SUPER

OCT. 26, 1933

R.B.D.

FROST-MINTON

MODEL 4 PW
Schematic, Voltage
Socket layout



The readings were made with the volume control in the full "on" position.

*These voltages are the correct values. The average test kit will give much lower readings, (as low as 1/10 of these values) due to the low resistance of the meters compared to the high resistance included in the detector plate and screen circuits and the audio grid circuit.

When the volume control is reduced the

- RF plate voltage remains constant
- RF screen voltage increases
- RF cathode voltage increases
- RF grid voltage increases

SOCKET VOLTAGES

Stage	Tube	Fil.	Plate	Screen	Cathode	Grid	Plate MA
1st RF	224	2.3	250	90	2.5	2.5	4.5
2nd RF	224	2.3	250	90	2.5	2.5	4.5
Det.	224	2.3	*150	*20	3.0	1.5	.5
Audio	247	2.3	250	250	.....	*16	32
Rect.	280	4.8					

Plate current of each plate—20

MODEL 4 PW**Electrical values****Transformer notes****NOMENCLATURE**

- C 1—Antenna Trimmer Condenser
 C 2—Tuning Condenser
 C 3—Tuning Condenser
 C 4—Tuning Condenser
 C 5—Alignment Condenser
 C 6—Alignment Condenser
 C 7—Coupling Capacity
 C 8—Coupling Capacity
 C 9—Audio Coupling Condenser .006 mfd.
 C 10—Det. plate By-pass .0001 mfd.
 C 11—RF Cathode By-pass .05 mfd.
 C 12—RF Plate By-pass .05 mfd.
 C 13—RF Screen By-pass .25 mfd.
 C 14—RF Plate By-pass .05 mfd.
 C 15—Det. Cathode By-pass 1.00 mfd.
 C 16—Det. Screen By-pass .25 mfd.
 C 17—Audio Grid By-pass .01 mfd.
 C 18—Audio Plate By-pass .01 mfd.
 C 19—Filter Condenser 4. mfd.
 C 20—Field Condenser .08 mfd.
 C 21—Filter Condenser 4. mfd.
 R 1—Volume Control 10,000 ohms
 R 2—RF Cathode Resistor 300 ohms
 R 3—Det. Cathode Resistor 50,000 ohms
 R 4—Det. Screen Resistor 2 megohms
 R 5—Det. Plate Resistor 1 megohm
 R 6—Audio Grid Resistor ½ megohm
 R 7—Audio Grid Resistor 100,000 ohms
 R 8—Mid Tap Resistor
 R 9—Divider Resistor 50,000 ohms
 R 10—Screen Resistor 50,000 ohms
 R 11—Screen Resistor 10,000 ohms
 R 12—Audio Bias Resistor 400 ohms
 L 1—Antenna Coil
 L 2—Primary } of RF Coil
 L 3—Secondary }
 L 4—Primary } of RF Coil
 L 5—Secondary }
 L 6—Speaker Moving Coil
 L 7—Speaker Field Coil
 T 1—Audio Output Transformer
 T 2—Power Transformer

FROST-MINTON**Filter Condenser**

The three leads from the main filter condenser are connected as follows:

- Black—to center tap of 280 plate winding
 Green—to filament terminal of 280 socket
 Red—to +B connection on terminal strip

By-pass Condenser Assembly

The condensers incorporated in this unit are identified as follows:

- 1.0 mfd. Green Leads
 .01 mfd. Green and White Leads
 .05 mfd. Black Leads
 .25 mfd. Red Leads

Resistors

- 300 ohms—Orange, Black, Brown
 400 ohms—Yellow, Black, Brown
 10,000 ohms—Blue, Yellow
 50,000 ohms—Green, White
 100,000 ohms—Blue, White
 ½ megohm—Gray
 1 megohm—Black
 2 megohm—Black, White

Power Transformer

Six leads are brought out of the transformer winding on the side next to the terminal strip. Three are located on the opposite side. The transformer is connected as follows:

- Primary Winding—Stranded wires, terminal strip side
 224 and 247 filaments—Heavy wires, terminal strip side
 280 filament—Small wires, terminal strip side
 280 plates—Two leads nearest front of set, opposite side
 280 center tap—Lead nearest back of set, opposite side

The trimmer condenser mounted on the loud speaker must be adjusted for maximum volume.

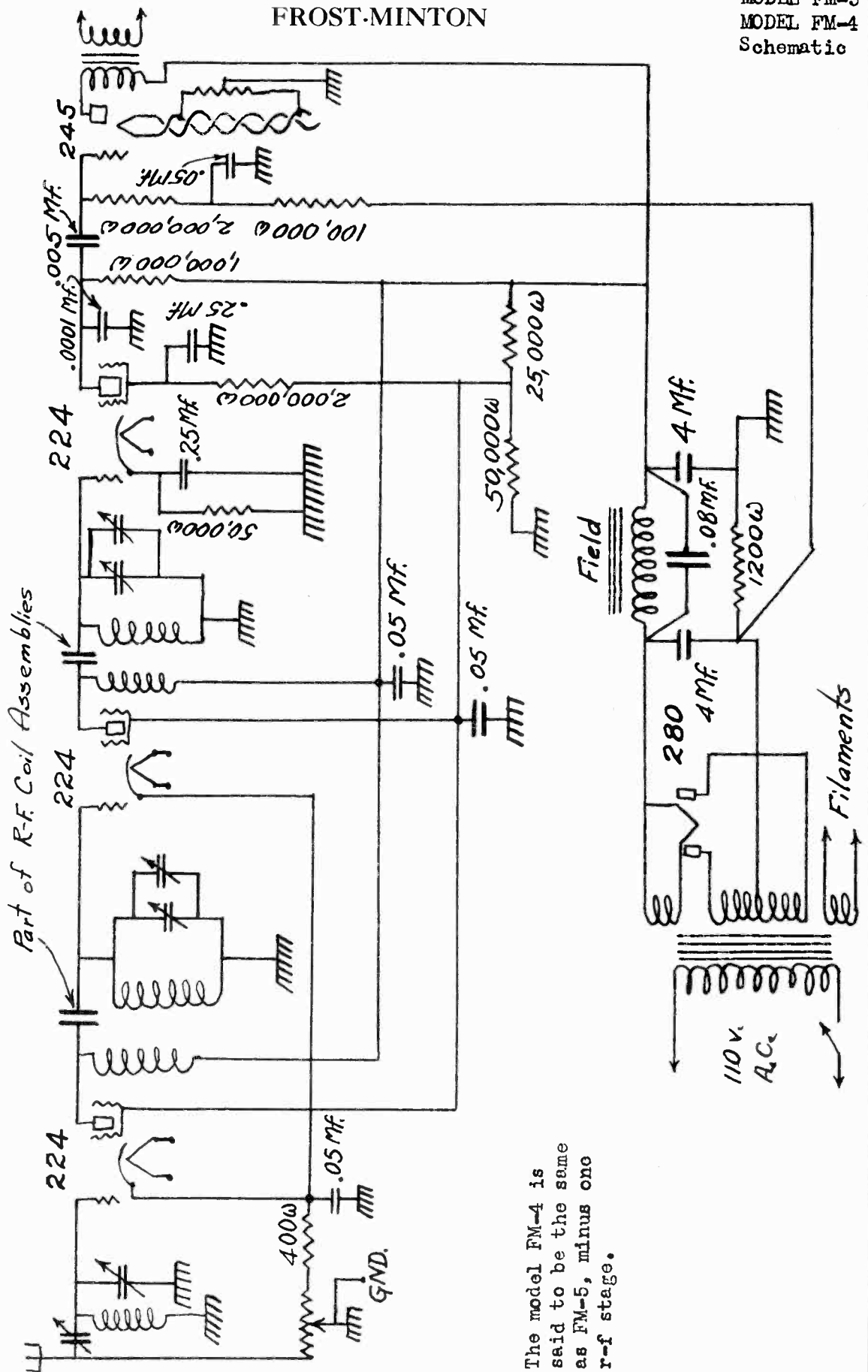
Some types of the 247 Pentode operate normally with a blue glow. This action does not, therefore, denote that the tube is defective due to gas.

It is very important that no tube is removed from its socket with the receiver "on" as to do this will damage the receiver or the Pentode tube.

Make sure that the lead from the top of each 224 tube to the variable condenser follows closely along the metal partition between the tubes. Oscillation may occur if this lead lies too close to the tube itself.

FROST-MINTON

MODEL FM-5
 MODEL FM-4
 Schematic



The model FM-4 is said to be the same as FM-5, minus one r-f stage.

