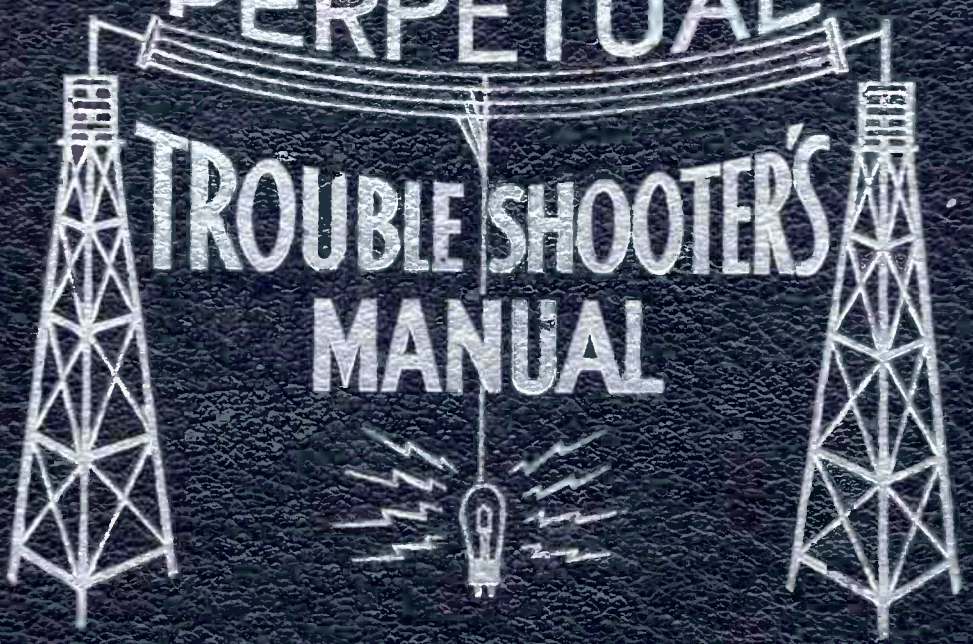
VOLUME II

PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

PERPETUAL

TROUBLE SHOOTER'S MANUAL

VOLUME II

by

JOHN F. RIDER

JOHN F. RIDER

1440 Broadway New York City

Other Manuals by John F. Rider

●

Perpetual Trouble Shooter's Manual . . . . Volume I
Perpetual Trouble Shooter's Manual . . . . Volume II
Perpetual Trouble Shooter's Manual . . . . Volume III
Specialized Auto Radio Manual . . . . . Volume I

●

These manuals are the "standard" in the radio service industry the world over. Their absolute superiority is proved by their use, sale and recommendation by the world's most famous tube companies such as

E. T. Cunningham, Inc.
National Union Radio Corp.
RCA Radiotron Co.
Raytheon Products Corp.

and the test instrument manufacturers such as

Weston, Hickok, Supreme and Readrite

also all the radio receiver manufacturers.

AUTHOR'S FOREWORD

THIS issue of Volume II is slightly different from earlier printings. One of the changes is the method of numbering the pages. You will note that it is the same as used in Volumes I and III, as recently issued.

The reason for this change is that the method of folio or page numbering originally introduced in Volume III proved so much more popular and simple to use than that previously employed in Volumes I and II, that it was deemed most advantageous to establish a uniform method of page numbering and indexing, which would serve best over a period of years.

Present owners of Volume III, that is owners of this manual, purchased prior to November 15, 1933, will find that the index which accompanies Volume III does not conform with the folio or page numbering in this edition of Volume II. This arrangement will cause a slight inconvenience, but we feel that it is for the better, with respect to the use of the manuals in the field.

The complete index contained in Volume III manuals, purchased prior to November 15 or thereabouts, can be used to determine if the information desired is in Volumes I or II or III. If in either of the first two named, further reference to the indices in these two manuals will show the correct page. The same method can be used in connection with this and all future issues of Volume II and Volume I.

Another change is that the point-to-point data, originally contained in one section in the front of the volume, now has been distributed among the respective manufacturers. In every other respect, this issue of Volume II is fully the equal of the earlier printings and in very many cases, has much information not contained in earlier printings.

The pages in this issue have been printed from engravings and we trust that the increased legibility of type, the increased number of cases where electrical values have been elaborated upon, the increased number of socket layouts—in general, more data—will be received with favor.

JOHN F. RIDER

NATIONAL UNION CHART OF PEAK FREQUENCIES USED IN MODERN SUPERHETERODYNE RECEIVERS

ALL-AMERICAN MOHAWK CORP.
See R. Wurlitzer Co.

ANSLEY RADIO CORP.
All Models.....175 kc.

ATWATER KENT MFG. CO.
Models
93 Converter.....1000 kc.
480 All Wave.....472.5 kc.
137 Med.&LongWave..125 kc.
81, 91, 636, 756,
246, 266, 155, 555
262.5 kc.
All Other Models....130 kc.

AUDIOLA RADIO CO.
Model 5W.....456 kc.
All Other Models..177.5 kc.

BALKEIT RADIO CO.
Models L7, 55, 85...175 kc.

BELMONT RADIO CORP.
Model 81.....105 kc.
525.....456 kc.
All Other Models....175 kc.

BOSCH RADIO CO.
Models 325, 20, 22,
36, 40, 91, 100,
150, 224.....125 kc.
Models 226, 236, 237,
242, 243, 250, 251,
310, 312, 313.....175 kc.
Models 305, 405, 805,
117, 127, 500.....456 kc.
Models 260, 261...517.5 kc.

BROWNING DRAKE RADIO CORP.
Models 40, 80.....175 kc.

BRUNSWICK.....175 kc.

BULOVA WATCH CO.....175 kc.

CLARION RADIO
See Transformer Corp.
of America

COLONIAL RADIO CORP.
Laboratory Models
132 and 139.....450 kc.
All Other Models....175 kc.

COLUMBIA PHONOGRAPH CO.INC.
All Models.....175 kc.

CROSLEY RADIO CORP.
Fiver & Leader.....456 kc.
Models 120, 121, 122,
123, 124, 125, 126,
127,128, 131.....175 kc.
All Other Models..181.3 kc.

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32 volt DC Super-
heterodyne 110 volt
AC Superheterodyne.175 kc.

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All Other Models....175 kc.

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Erla -- Sentinel
Models 510, 263, 540,
550, 560.....265 kc.
Model 570.....465 kc.
Models 1020, 1030...115 kc.
All Other Models....175 kc.

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GRAPH CORP.
Models 35, 30, 250,
300, 678, B10, H5S
172.5 kc.
Model L755.....115 kc.
Model H5L.....132 kc.
Model S755.....465 kc.
Model AW55.....445 kc.

ERLA
See Elec. Res. Lab. Inc.

FADA RADIO & ELEC. CORP.
Models RX93, RX95...125 kc.
" RN106, RN107.....470 kc.
All Other Models....175 kc.

FREED TEL. & RADIO CORP.
Models 58, 70, 72,
74.....177.5 kc.
Model 78.....462.5 kc.
Models 94, 55. 77,
A9, A7.....456 kc.
Model 76.....115 kc.

JESSE FRENCH.....175 kc.

GENERAL ELECTRIC CO.
All Models.....175 kc.

GRAYBAR.....175 kc.

GREBE.....175 kc.

GRIGSBY-GRUNOW CO.
Majestic
Models 260A, 260B..125 kc.
" 116, 370, 400...456 kc.
All Other Models...175 kc.

GULBRANSEN CO.
Models 130, 135, 235,
236, 237, 530, 535,
925, 3225, 3226,
3925, 8726.....175 kc.
Models 3521, 3525,
3622.....262 kc.

HAMMARLUND MFG. CO.
Comet All Wave Super-
heterodyne, Comet
Pro, Models A & B.468 kc.

CHARLES HOODWIN CO.
Models 11 tube rec.485 kc.
All Other Models...175 kc.

HOWARD RADIO CO.
Models
Auto Receivers....260 kc.
J Compact.....456 kc.
All Other Models...175 kc.

INSULINE CORP.
Models
Super-Six Long Wave,
Super Conqueror...115 kc.
All Other Models...175 kc.

KELLER-FULLER MFG.CO.LTD.
Radiette Models 70,
80, 90, 120, 50S..175 kc.

COLIN B. KENNEDY CORP.
Models 52, 56, 62,
62A, 62B, 63, 64, 64B,
66, 66A, 66B, 72..175 kc.
Model 52 (export)..135 kc.
Model 67 (export)..110 kc.

KOLSTER RADIO INC.
All Models.....175 kc.

LANG RADIO CORP.
Models MA7, MD7, SA7,
SD7, MA8, MD8, SA8,
SD8, SA9.....175 kc.

C. R. LEUTZ, INC.
Special short-wave
receiver.....450 kc.

LINCOLN RADIO CORP.
Deluxe SW-33, DC-SW10
480 kc.

LYRIC RADIO
See R. Wurlitzer Co.

MAJESTIC
See Grigsby-Grunow Co.

MONTGOMERY WARD (Contd.)
62-70, 62-70X, 62-72,
62-72X, 62-81,
62-81X.....455 kc.

MOTOMETER GAUGE & EQUIP.
Model 10A.....175 kc.

MOTOROLA AUTO RADIO
Model 77, 55.....456 kc.
All Other Models..175 kc.

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Models
Straight Models.177.5 kc.
Commercial All
Wave.....262.5 kc.
Amateur.....467.5 kc.

PHILCO RADIO & TEL. CORP.
7 Philco Transitone
175 kc.
15, 51, 52, 111,
112 Series.....175 kc.

NATIONAL UNION RADIO TUBES

MONTGOMERY WARD
Chassis or Model Number
1111, 811, 1111X, 811X,
62-14, 62-12, 62-14X,
62-11, 62-19, 62-19X,
62-40, 62-40X, 62-31,
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62-15, 11, 12, 17,
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1238, 1838, 1838X,
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62-43, 62-43X, 62-84,
62-84X, 62-94, 62-94X,
62-86, 62-86X.....262 kc.

90 with 45's and
47's in output...175 kc.
22, 23, 35, 36, 37,
71, 91, 89, 19,
14 Series.....260 kc.
47 DC Series.....260 kc.
70 with & without
AVC.....260 kc.
90 with 2-47's in
output.....260 kc.
43, 53.....450 kc.
80, 81.....460 kc.
4 and 4C Series..3600 kc.

PILOT RADIO & TUBE CORP.
Dragon, models
10 and 11.....115 kc.
Models 39, 41.....115 kc.
Models 148, 149...175 kc.

RCA-VICTOR CO. INC.
Models 60, 62, 64,
66, 67.....180 kc.
All Other Models..175 kc.

REMLER CO. LTD.
Model 10.....260 kc.
Models 11, 12, 13,
26.....450 kc.
Model 15.....180 kc.

SCOTT TRANSFORMER CO.
All Wave Super....470 kc.

SEARS ROEBUCK
All Silvertone
Models.....175 kc.

SENTINEL RADIO
See Elec. Res. Lab.

SILVER-MARSHALL, INC.
Models 36A, 41, 714,
716, 724, 724B,
726SW, 782-1040,
A,B,C,D-E,F,G,J
175 kc.
Models Q,QD,R-RT,
V,X,Y.....465 kc.

SIMPLEX RADIO CO.
Models V & T.....456 kc.
All Other Models..175 kc.

STIENITE.....175 kc.

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Models 10, 12, 14,
15, 16, 16AW, 18,
25, 26, 26AW, 27,
28, 30, 30A, 34,
35, 45.....172.5 kc.

STEWART-WARNER
All Models.....1775 kc.

STROMBERG-CARLSON
TELEPHONE MFG. CO.
All Models.....175 kc.

TRANSFORMER CORP. OF
AMERICA
Model 240.....490 kc.
125 (export).....100 kc.
All Other Models..175 kc.

TRAV-LER RADIO &
TELEVISION CORP.
Models S-9, S-10..175 kc.

UNITED AIR CLEANER
All Models.....175 kc.

5 M - 9-33

UNITED MOTORS SERVICE
Model 4048.....455 kc.
Models 2035, 4036,
Chevrolet and
BOP Receivers...262 kc.

U.S. RADIO & TELE. CORP.
Models 9A, 9B, 12B,
19B, 69, 120B...262 kc.
Models 5A, 70, 24,
25A, 3056.....455 kc.

VICTOR RADIO
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WARE MFG. CO.
Models S1, SB45,
SBA, SBF.....175 kc.

WELLS GARDNER, INC.
Series 052, 062.
072.....262 kc.
Series 50, 022,
572, 092.....175 kc.

WESTINGHOUSE
Flat top in some
cases.....175 kc.

WEXTARK RADIO INC.
Knight 7 tube and
9 tube.....175 kc.

WHOLESALE RADIO..175 kc.

WONDER BAR RADIO CORP.
All Models.....175 kc.

RUDOLPH WURLITZER CO.
Models SW8, SW80,
S40, V50.....480 kc.
All Other Models.175 kc.

ZENITH RADIO CORP.
Models 21C-5, 211-5,
270-5, 510-5....125 kc.
AH,CH,RH,LH,WH,MH,
BH,215, 216, 217,
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610, 611, 612. 614,
615, 616, 617, 618,
619, 620, 621, 622,
623.....175 kc.
Models 517, 518,
550.....485 kc.
Model 701.....456 kc.
Models 250, 251,
252, 260, 261, 272,
472, 473.....175 kc.
and
1000 kc.

CANADIAN RECEIVERS
Brunswick of
Canada.....175 kc.
Canadian Marconi
Co.....175 kc.
Canadian Westinghouse
Co. Ltd...Models
89, 90, 99, 99A,
110, 120.....171 kc.
Columaires 8, 10
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DeForest Crosley.175 kc.
Grimes Radio
Corp.....175 kc.
C.B. Kennedy of
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Co. Ltd.....175 kc.
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Sonora Corp. of
Canada.....175 kc.
Stewart Warner
of Canada.....175 kc.
Stromberg Carlson.175 kc.
Spartan of Canada.172.5kc.
Temple of Canada.178 kc.

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National Union Radio Cor oration acknowledges with particular thanks the assistance of the publishers of Radio Craft magazine, Mr. John F. Rider, Editor of "Service" and "Servicing Superheterodynes" and the many radio receiver manufacturers who have contributed to make this compilation possible.

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TEMPLE CORPORATION

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TODD ELECTRIC CO.

TRANSFORMER CORP. OF AMERICA

TRAV-LER RADIO & TELEVISION CORP.

TYRMAN ELECTRIC CORP.

UNITED AMERICAN BOSCH CORP.

UNITED REPRODUCERS CORP.

U. S. ELECTRIC CORP.

CONTINUITY TESTING

With the exception of the vacuum tube, the units designated by the terms inductance, capacity and resistance represent the three basic physical elements found within a radio receiver. The testing of these devices to determine the state of continuity represents the bulk of all the testing applicable to a radio receiver.

INDUCTANCE.

Common usage has affiliated the term "inductance" with windings of wire of all types. Thus the continuity testing of an inductance is the continuity testing of a winding of wire, irrespective of the type of core, the number of turns, the function or the physical appearance of the unit. Whatever the type of test said to be suitable for application to an inductance can be classed as being suitable with equal facility to any other form of winding which can be classed as an inductance. Thus the same type of test is applicable to radio frequency transformers, audio frequency transformers, power transformers, radio frequency chokes, audio frequency chokes, filter chokes, etc.

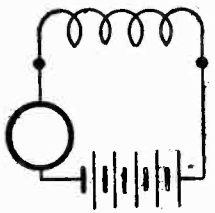


Fig. 1

The actual function of the winding is of very little significance as far as the test is concerned. Whether the winding carries direct or alternating current does not enter into the problem. As a rule all windings are usually designed to be continuous, that is the winding is complete so that a direct current will circulate through the turns when that coil is connected to a source of D.C. potential.

A simple method of testing windings is shown in figure 1. The schematic shows a meter and a battery. This combination may represent the usual voltmeter-battery test circuit or the more accurately calibrated ohmmeter. The terminals of the winding are designated by the two heavy dots. The same points can be considered as the terminals of the test unit.

Current flow through the winding as indicated upon the meter is representative of the state of continuity. If the test circuit is an ohmmeter, the resistance of the coil will be indicated upon the meter. If the test circuit is a voltmeter-battery unit, the magnitude of the deflection is the indication of the approximate resistance of the coil. An open coil will show no deflection because current flow is required to operate the voltmeter or the ohmmeter. Current of D.C. character cannot flow through an open winding.

The number of turns used for the winding and the rated resistance governs the ease of distinguishing between certain states possible in that winding. The ease of resistance approximation is also a matter of the design of the testing system. A test circuit which is capable of recording high resistances is as a rule incapable of recording low values of resistance. Thus if such a test system is connected across a coil of low resistance, the deflection upon the meter will be alike for perfect continuity or for a short circuit across the coil terminals.

If the test system is capable of indicating high values of resistance and is not calibrated when applied to windings of fairly high resistance, the magnitude of the indication affords an idea of the condition of the coil. A high resistance coil will cause a low reading upon the meter. The higher the indication upon the meter, the lower the resistance. A means of gauging the approximate resistance is as follows: Suppose the voltmeter is rated at 8 volts and 1000 ohms per volt. The battery is of 4.5 volts. The total resistance of the meter is 8000 ohms. If the deflection upon the meter is below 2.25 volts the resistance is greater than 8000 ohms. If the deflection upon the meter is greater than 2.25 volts the resistance of the winding is less than 8000 ohms.

To test coils of low resistance it is necessary to use an ohmmeter calibrated for low values of resistance or to employ an A.C. voltmeter rated at about 10 ohms and about 14 ohms per volt in conjunction with a 4.5 volt battery of the flashlight type. This combination assembled as shown in figure 1 will show the presence of a resistance of approximately 1 ohm. Thus a simple low and high range continuity tester would consist of two meters, an A.C. meter and a D.C. meter, either of which may be connected into the circuit by means of a switch. Other types of continuity testers and ohmmeters are to be found in "Practical Testing Systems" written by the author of these lines and available from the Radio Treatise Co. Inc. New York City.

For the guidance of the man who wishes to employ a D.C. voltmeter of 8 volts and 1000 ohms per volt in conjunction with a 4.5 volt battery, the following voltage indications are representative of the following values of resistance. Thus the test circuit becomes an ohmmeter.

0	ohms	4.5	volts					
500	"	4.23	"	5000	ohms	2.77	volts	40000 ohms	0.75 volts
1000	"	4.00	"	6000	"	2.57	"	50000 "	0.62 "
1500	"	3.79	"	7000	"	2.40	"	75000 "	0.46 "
2000	"	3.60	"	8000	"	2.25	"	100000 "	0.33 "
2500	"	3.42	"	9000	"	2.11	"		
3000	"	3.27	"	10000	"	2.00	"		
3500	"	3.13	"	15000	"	1.56	"		
4000	"	3.00	"	20000	"	1.28	"		
4500	"	2.88	"	30000	"	0.94	"		

One precaution must be exercised when testing windings located in radio receivers or which are parts of a complete circuit. This is the guarding against the possibility of a shunt D.C. path across the inductance, which would cause a misleading indication. The operator must check the circuit in question to locate any shunt across the coil.

CONDENSERS.

The continuity checking of condensers is carried out in the manner applied to inductances. The result of the test to indicate a perfect

condenser is the reverse of that for a perfect inductance. The perfect solid dielectric condenser will indicate an "open" when the continuity tester is applied. The test circuit is shown in figure 2. The heavy dots indicate the terminals upon the condenser and also the terminals upon the test unit. When testing condensers, resistance measurements are not in order. The purpose of the test is to determine whether the condenser is open, perfect, or shorted. Unfortunately it is difficult to arrange a simple test circuit to indicate an "open" because the indication for a good condenser is very similar to that for an open circuit in the condenser. The difference between the two is that a perfect condenser will cause a momentary deflection upon the test meter. The meter pointer "kicks" upward to indicate the flow of the charging current. However such an indication cannot be obtained when very small values of capacity are being tested, unless a high voltage and a high ohms-per-volt meter are used.

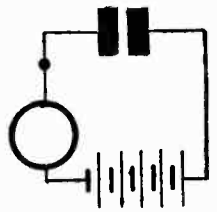


Fig. 2

An indication of some value between zero and maximum is a sign of a leak, that is a steady indication. A steady indication equal to the voltage rating of the battery is a sign of a short circuit in the condenser. During such tests the operator must be certain that the condenser under test is mounted upon an insulated surface and that his hands are not in contact with the uninsulated portions of the test prods. Physical contact with the test prods during the process of the test is apt to cause a misleading indication of leakage upon the voltmeter.

The test as stated is applicable only to solid dielectric condensers. The "dry" and "wet" types of electrolytic condensers must be tested in different fashion. These condensers should be tested for leakage by applying a D.C. potential equal to the rating of the condenser, approximately 350 volts. The polarity of the condenser must be observed. A milliammeter is connected into the test circuit. The correct value of leakage current for the "wet" type of electrolytic condenser is a maximum of about .5 milliampere per microfarad, and for the "dry" type of electrolytic condenser a maximum of about .1 to .25 milliampere per microfarad.

When checking condensers located in receivers be certain that no shunt D.C. path is present across the condensers. Thus it is impossible to check the continuity of tuning condensers in a conventional tuned radio frequency stage without disconnecting the tuned circuit. The same is true when checking the continuity of a fixed condenser connected across an audio frequency transformer. The condenser must be disconnected from the transformer. Opening one lead is sufficient.

RESISTANCES.

Continuity testing of resistances is usually in the form of a resistance test. In view of the fact that the function of the resistance in most cases is to produce a voltage drop, it is equally important to determine the ohmic value as well as the state of continuity. The method of applying the continuity tester-chmmeter is as shown in figure 1 and repetition of the schematic is unnecessary. A resistance which is intact will show a steady deflection. One that is open will show no deflection. If the rated resistance is known, the observed ohmic value can be compared with the rated value to determine the suitability of the resistor.

In connection with resistance tests or continuity tests upon resistances it is necessary to make mention that the current flow through many resistances is limited to a small value. Thus by employing a test circuit which does not require more than 1 milliampere current flow of maximum indication, one is reasonably certain of causing no damage to the resistor during the test.

In the event that the meter deflection is not steady when the test is made it might be well to investigate all connections in the circuit in order to determine if the unsteady deflection is due to a defect in the resistor. Resistances which are productive of unsteady deflections during a test will be found to be productive of noise when placed into a receiver, eliminator or amplifier.

CONTINUITY TESTING IN A FINISHED RECEIVER.

Perhaps we appear as placing too much stress upon continuity testing and upon circuit structure. We feel that what will follow will offer conclusive proof of the fact that a great deal of time may be saved by correct application of a continuity test and that it is absolutely necessary that the operator be familiar with the circuit under observation.

Basically the modern radio receiver is like its brethren of years gone by, but so many pet ideas are added that the actual testing of the circuit is somewhat more complicated than in the simple days of the past. Of course we still encounter radio receivers of simple yet effective design, in which case the conventional continuity test based upon the most elementary receiver is still applicable. Perhaps it might be well to consider receivers of different types. In view of the fact that voltage tests and the set analyzer have not as yet been discussed there shall be no reference to symptoms or to open circuits as indicated by a voltmeter or current meter test. The reader may if he so wishes imagine each of the circuits mentioned as being open at one point.

Let us start with a simple circuit. Figure 3 is the schematic of the Earl 21-22 receiver. An examination of the circuit shows that the ground is common to all grid circuits and to the B-circuit. Under the circumstances the ground contact can be used as the common point for most tests.

Suppose that we select the ground as the common terminal for the continuity tester and check the respective circuits. We shall call the ground terminal number 1. Other points will bear higher numerical designations. It is understood that the tubes are not in their respective sockets. For the want of more accurate data we will assume that the D.C. resistance of the respective radio frequency transformer secondary windings is 4 ohms each ; of the first stage audio frequency transformer secondary, 4000 ohms, the primary, 1000 ohms, the primary of the second stage audio transformer, 1600 ohms and the complete secondary is 10,000 ohms, 5000 ohms each side of the center tap. The two filter chokes in the power pack are assumed to have a resistance of 300 ohms each. Let us proceed.

From ground (1) to the L.A. binding post (2) would show continuity through the aerial coupling coil. Between L.A. (2) and the grid (3) of the first RF tube with the volume control set at minimum should show continuity of low resistance through the variometer. If this variometer is open the continuity would be high because of the presence of the 250000 ohm potentiometer. To

check the potentiometer it would be necessary to open the variometer circuit and this is the first illustration of parallel D.C.circuits. The possibility of checking the variometer circuit without opening the potentiometer system is present because of the very high resistance of the potentiometer. Yet one cannot feel certain that the potentiometer or the aerial variometer circuits are intact unless they are checked individually.

Circuit continuity between the ground and the 1st RF grid is available between 1 and 3. The circuit between the ground and the 2nd RF grid (4) should indicate a resistance of about 4 ohms. (It is necessary that the reader remember that we have set arbitrary values of resistance and that the actual measurement upon the receiver system may show entirely different values.

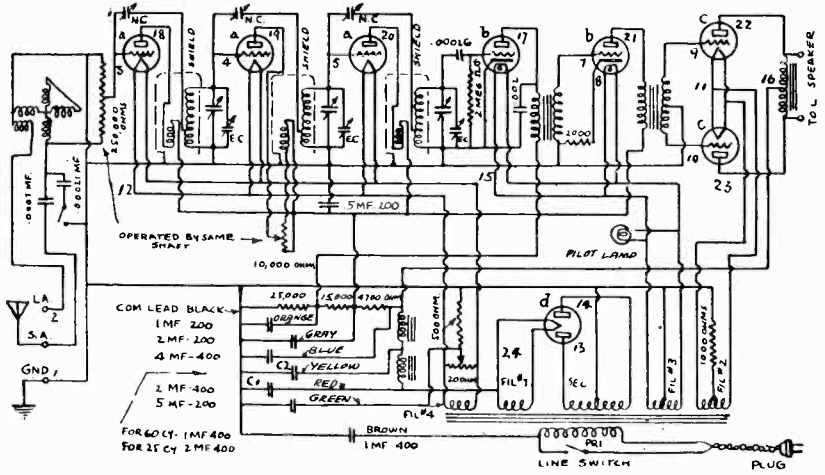


Fig. 3

This change in values will not affect the method of test.)

The circuit between (1) and (5),should show the continuity in the third radio frequency grid circuit. A short circuit in the first neutralizing condenser can be checked by opening the volume control circuit. This is done by inserting a piece of paper between the moving arm and the resistance portion. Then the test is made between(3) and (4) and between (3) and (1). There should be a difference in the readings because the two parts of the radio frequency transformer secondary are checked. A short circuit in the condensers connected across the grid circuits of the second radio frequency tube can be determined by a test between (4) and (5). The elements present between these two points include the two radio frequency transformer secondaries which are then in series. Perfect continuity is indicated by a value of resistance equal to the sum of the individual resistances of these windings.

Obviously a short circuit in the second or third stage condensers will create the same effect. If the presence of a short circuit is noted, it becomes necessary to check directly between (1) and (4) and between (1) and (5) The shorted coil will become evident.

A check between (1) and (6) will show the continuity of the grid leak. To check the tuning condensers the tester is connected across the condenser plates. If the result is not sufficiently clear, a supplementary test is between the terminal of the third neutralizing condenser and the ground and then between the same terminal upon the neutralizing condenser and the stator plate of the condenser. Incidently this test is suitable to determine an open in either section of the winding and at the same time a check of the condensers. If the condensers are shorted there will be no difference in the resistance between the two connections. If the condenser is intact there will be a difference in the resistance of the circuits during the two tests. A short circuit in the detector grid condenser can be checked by a test between (1) and (6). The circuit will indicate a very low value of resistance, that of the radio frequency transformer secondary. The value of the grid leak is so high that it has no effect. If the grid leak is open, the test between (1) and (6) will indicate an open.

The audio frequency system is checked in like manner. The test between (1) and (7) should indicate the resistance of the first audio frequency transformer secondary. The test between the ground and the cathode (8) should show the presence of the bias resistance. A short circuit between (1) and (8) indicates a short circuited bias bypass condenser. An open between (1) and (8) indicates an open bias resistance. The open is located in the transformer secondary if the test between (1) and (7) shows open..

Alternate tests between (1) and (9) and (1) and (10) should show the degree of continuity in the two halves of the second audio frequency transformer secondary. A test between (1) and (11), either side of the output tube filament should show the presence of the output tube bias resistance. A check between (1) and (12) should show the presence of the radio frequency tube bias resistance. If this circuit is open, one of two circuits may be open. One of these is the bias resistance and the other is the center tap connection upon the filament shunt resistance.

Alternate tests between (1) and (13) and (1) and (14) should show the continuity through the halves of the power transformer plate winding. A test between (1) and (15) would show the ground upon the heater winding of the detector and first audio frequency tubes.

It is understood that in the event of a short circuit or a discrepancy in the value of resistance observed that the normal method of determining the reason for the short circuit or the discrepancy would be the logical step. Thus for example a defect in the secondary winding of the second audio frequency transformer can be checked by testing between (9) and (10) to corroborate the tests between the ground and the respective grid circuits.

Proceeding into the plate circuit, we can check the total resistance of the voltage divider by contacting between (1) and (16), the center tap upon the speaker plug winding or the center tap upon the output transformer. A simpler method is to check between (1) and (17) ,the plate of the detector tube. The total resistance should be the sum of the associated part of the divider and the first audio transformer primary. A short circuit in the detector plate bypass condenser would cause zero reading. A short in the voltage divider bypass condenser would cause a reading equal to the resistance of the audio transformer primary.

A test between (1) and (18),(19) and (20) would indicate the continuity in the respective plate circuits. The resistance would be that of the divider sections present in the circuit. The test between (1) and (21) would indicate the continuity in the first audio frequency stage. Since all of these tube plates are tied to a common feeder an open in all the plate circuits would indicate an open in the feeder cable. An open in but one plate circuit would immediately localize the trouble to that particular stage. A short circuit in all the R.F.circuits would immediately localize the trouble to a short associated with the radio frequency part of the system, the bypass condenser or the voltage divider resistance. The audio amplifier plate circuit would show the resistance represented by the transformer primary. A short circuit in the audio frequency plate and an indication of low resistance between (1) and the respective radio frequency plates would immediately localize the trouble to a short in the first stage audio frequency plate circuit.

The reason for the aforementioned is that while the first audio frequency tube may be directly shorted to ground, the plates of the radio frequency amplifiers are still isolated from ground by the resultant resistance of the first stage audio frequency transformer in shunt with the associated portion of the voltage divider.

A test between (1) and (22) and between (1) and (23) will show the condition of the respective halves of the output transformer winding or choke and the divider section. If the voltage divider bypass condenser is shorted, the test between (1) and (22) will indicate the presence of the resistance represented by one half of the output unit winding. The same applies to the test between (1) and (23).

The first (input) filter condenser can be checked by a test between (1) and (24) the filament of the rectifier tube. The correct value of resistance in this circuit should total the complete divider plus the sum of the two filter chokes. A check between the filament of the rectifier and the center tap connection to the output unit(16) should show the resistance of the chokes. If the second filter condenser is shorted and a check is made between (1) and (24), the amount of resistance indicated will be that of the first filter choke. If the output filter condenser is shorted and the test is made between the two points last named, the value of resistance indicated will be the sum of the two chokes. The resistance of the divider does not influence the reading.

No doubt the reader has observed that a large number of tests can be made without removing the chassis from the cabinet. The proper contact with the respective socket terminals can be made by means of plugs or the conventional test prongs. We did not include every possible test. Undoubtedly a number presented themselves to the reader as we progressed through the continuity test of this receiver.

What has been said in these pages is not intended as a definite statement that all forms of test other than continuity should be discarded. The conventional voltage test provides the information necessary for the selection of the circuits to which will be applied whatever form of continuity test is being used by the operator. The continuity test should show whether or not the set can be repaired in the home.

Suppose we refer once more to figure 4. The conventional voltage test indicates that there is no plate voltage being applied to the radio frequency, detector and first audio frequency plate. The plate voltage applied to the output tube appears normal. The probable cause according to the diagram is in the voltage divider, or for that matter such would be the conclusion based upon a knowledge of eliminator systems. Unless a continuity test is made, it is impossible to definitely state whether or not all of the resistances must be replaced or if the connection between the filter choke and the high end of the divider is open or if the 4700 ohm resistance is open. A few minutes spent in a test between (1) and (17) would show if the 15000 ohm unit was intact, and another test between (17) and (20) would show if the 25000 ohm unit was intact. The last named test can also be made by checking between (1) and (18), (20) or (21). Radio frequency socket (19) could be used providing that the volume control unit was adjusted to minimum resistance or maximum signal.

Assuming that the fault is an open between the radio frequency plate voltage tap and the output end of the filter, a temporary repair is possible if the resistance is of the open wire type. If not, the man can call the following day with another replacement unit and make the change right in the home, thus obviating the necessity of carting the chassis, perhaps making entries in a receiving department and other such details.

Reference to the discussion about circuit continuity, with particular attention to the presence of the bleeder unit will show the difference involved during the continuity testing of such circuits. We suggest that the reader consult the section devoted to set analyzer application. The method of determining the presence of such bleeder units is discussed in detail.

Point To Point Resistance Data

The application of the point-to-point data is a matter entirely within your own hands. It has been prepared along the lines which will enable a routine test upon the receiver by working through the tube sockets, thus obviating the necessity for the removal of the chassis, until the defect has been located. The condenser test is in the majority of instances likewise applicable through the sockets.

Tolerance Limits.

One of the precautions which must be exercised in connection with resistance measurement and this applies to the point-to-point test or to the resistance test subsequent to the voltage test is to allow sufficient tolerance.

While it is true that the values shown in circuits are exact and definite, the actual units employed in the receiver do not have the exact values marked upon the diagrams. By this we mean that a certain amount of tolerance is employed in the manufacture of the resistor and this must be recognized during the test. The tolerance limits are in a way determined by the function of the resistor and its location in the circuit. Units used in circuits which do not carry direct current have tolerance values between 10 and 15 percent. Units which carry direct current have tolerance limits which range from about 3 to 10 percent. The lower limit is to be found in filament circuit and in voltage divider resistors. An optimum range of tolerance limits for units which carry current, exclusive of the filament system is from 5 to 10 percent plus or minus.

These tolerance limits are not present in resistance measurement methods of servicing only, but are also present in voltage testing, since the variation in resistance will cause a variation in the voltage. Furthermore, the final test during voltage measurement, is the resistance test, so that the same condition applies to that test.

Tolerance limits pertaining to the resistance of r-f and i-f windings are much closer. In a-f winding, a tolerance of from 5 to 10 percent will be experienced in practice. The exact limits used by the different radio receiver manufacturers are unknown, but this does not complicate matters for the simple reason that the organization which employs a close limit, will use resistors which very closely approximate the rated value.

Voltage Co-efficient in Resistors.

Another item which must be recognized in connection with the measurement of resistors in receivers and amplifiers is the voltage co-efficient of carbon resistors. We specify the type of unit, because the same condition does not as a rule apply to wire wound and metallic coated units.

Carbon resistors should be checked at the voltages employed by the resistor manufacturer. The reason for this is that the nature of the resistor is such that its resistance (d-c) will vary according to the test voltage applied because of the current flow through the unit. This item is not the temperature co-efficient of resistance. Checking at some voltage other than that employed by the resistor manufacturer will result in the determination of some value other than the true rating when the correct voltage is applied.

However, since the correct values of voltage are not known, it is best to employ the lowest possible test voltage required to show a normal indication upon the resistance measuring device. This problem of voltage co-efficient is not native to resistance measurement method of analysis only, but is to be found when resistance is measured subsequent to a voltage test. Perhaps some time in the future, certain standards will be evolved to designate the exact test voltage to be applied to carbon resistors of various values.

By employing the lowest possible test voltage, we at least safeguard the unit against damage by overload. An approximation of the correct voltage (test) can be had by noting the position of the unit in the circuit and the voltage drop across the unit. Thus high resistors used in the plate circuits of audio frequency and detector tubes are subjected to voltages ranging from about 90 to perhaps 150 volts. Low range units used in bias circuits, varying from 10,000 to about 50,000 ohms are usually subjected to voltages ranging from 10 to perhaps 30 volts. Fortunately, the presence of a defective resistor can be detected when a low voltage is applied, despite the fact that the correct test voltage for a resistor of the type and value being checked may be much higher. In this respect, you as the operator must apply your knowledge and make your own interpretations.

Electrolytic Condensers In The Circuit.

The presence of an electrolytic condenser across a resistor will influence the resistance between two prescribed points and at the same time influences the voltage which may be applied across those two points. The variation in resistance is due to two conditions. One of these is related to the polarization of the electrolytic condenser. This type of condenser possesses one value of resistance, fairly high when the test is made with the correct polarity and a low value of resistance when checked with incorrect polarity of the testing voltage.

Therefore, it is neoessary when checking resistors which may have connected across them some value of capacity, which may or may not be of the electrolytic type, to measure the resistance with the polarity of the testing voltage in both directions. This precaution is unnecessary, if the polarity of the testing voltage is maintained in conformity with the polarity of the circuit being checked. In some cases this is impossible, but it is possible in the majority of instances.

An example of the foregoing is the following. When testing grid bias resistors, the cathode or the filament centre tap are positive with respect to the chassis. The polarity of electrolytic condensers is taken into consideration when they are connected into the circuit. By arranging that the polarity of the resistance measuring system conform with the polarity of the resistor circuit when in operation, the correct polarity with respect to the electrolytic condenser is assured. In the event that the condenser connected across that resistor is not of the electrolytic type, all well and good, but if it is,correct testing circuit is applied.

A similar requirement of polarity is required when checking the resistance of units related to the rectifier filament. This terminal is positive with respect to the balance of the circuit when in operation and when making resistance tests from the rectifier filament to some other point, the polarity of the tester prod connected to the rectifier filament must be positive.

The second factor associated with electrolytic condensers is that of voltage. The usual circuit arrangement of the resistor being tested and its associated condenser is such that the voltage applied across the resistor is also applied across the condenser, since these two units are connected in parallel. Accordingly, the test voltage applied to the resistor for measurement of its ohmic value cannot exceed the operating voltage rating of the condenser. If it does,damage is the consequence.

Fortunately, low voltage electrolytic condensers are used in shunt with low values of resistance, as for example pentode bias units. Consequently, the test voltage required to check resistors of values ranging from 100 to perhaps 1000 ohms, will be sufficiently low so as not to damage the condenser or cause excessive leakage.

Electrolytic type bypass condensers in other circuits are usually within the 200 to 250 volt range, so that normal application of the tester is possible. As far as filter condensers of the electrolytic variety are concerned, the voltage rating is about twice as great as the usual testing voltage applied to the voltage divider circuits.

A third item related to electrolytic condensers and also associated with the measurement of resistance is the normal resistance of the condenser. As is well known, the insulation resistance of an electrolytic condenser is not as great as that of a solid dielectric unit. As a matter of fact, it is only a small fraction of the d-c resistance of a paper dielectric or mica dielectric unit. Accordingly, it will have some effect upon the resistance between any two prescribed points. Just what this resistance will be is not always known, but it is determined by the condition of the condenser and by the testing voltage.

If a receiver or amplifier has been inoperative for a long period of time, the ohmic value of a resistor shunted by an electrolytic condenser cannot be determined unless the condenser is disconnected. The reason for this is that the insulation resistance of an electrolytic condenser which has been inoperative for a long period of time is very low, in fact so low as to greatly influence the resistance across its terminals.

As far as perfect electrolytic condensers are concerned, the fact that leakage current flows through the condenser and that its insulation resistance is much lower than that of the solid dielectric unit must be taken into consideration. The electrolytic condenser connected across a resistor being checked is the equivalent of a shunt resistor of a certain value, determined by the leakage current through the condenser at the testing voltage.

If the voltage rating of the electrolytic condenser is high and the testing voltage applied across the circuit is low, the shunting effect of the condenser will be negligible, particularly if the ohmic value of the resistor being checked is low. It may be necessary to first determine if an electrolytic condenser is present in the circuit by comparing the readings obtained with the polarity of the test circuit, first in one manner and then reversed and then to disconnect the electrolytic unit. By maintaining the testing voltage at the lowest possible value, the effect of the shunt electrolytic condenser is minimized. Experience shows that the most frequent occasion for disconnecting the electrolytic condenser occurs when checking voltage divider circuits.

Fractional microfarad bypass condensers have low leakage. The normal rating of electrolytic condenser is somewhere around .1 to .25 milliampere per microfarad. For a .25 microfarad unit, the

leakage current at say 200 volts d-c after a normal period of application would be about .000061 ampere. This means a value of resistance sufficiently high to have very little effect upon whatever units are being bypassed by the condenser.

Because of the nature of the electrolytic condenser, the resistance test voltage applied across a resistor shunted by an electrolytic condenser should be kept across the contact for a short period of time, say at least a minute for fractional microfarad units, unless the measured value of resistance indicates a normal state. In every case, the shunt effect of the condenser will lower the resistance between the test points.

In the case of filter circuits, it may be necessary to keep the resistor test prods connected across the circuit for about 5 minutes, unless the measured value immediately after application shows a normal state. In work of this type, a great deal depends upon the operator.

Once more we wish to mention that the facts named, are not native to resistance measurement methods of service analysis, but will be experienced if the resistance test is made subsequent to the voltage test. If you are in the habit of removing the chassis before making the tests, which is not necessary with point-to-point method of operation, you may find it advantageous to disconnect the filter condensers, if they are of the electrolytic type.

Solid and Air Dielectric Condenser Tests.

Solid and air dielectric condensers, unless shorted, have no effect upon shunt resistors, and there is no need for polarity specification. However in certain instances, as for example across bias units and across the voltage divider it is best to always connect the ohmmeter as stated in connection with electrolytic condensers. In this manner, you are certain of having the correct polarity in the event that the condenser in the circuit is of the electrolytic variety.

Open Condensers.

One of the greatest service problems encountered today is the intermittent and permanently open condenser. It is true that condensers become shorted, but when shorted, will indicate that effect by short circuiting the associated resistors, hence will be detected when the resistance test is made.

It has been customary in the past to check for open condensers by connecting a perfect condenser across the terminals of the suspected condenser and noting the effects. However, this requires that the receive be in operation and there is possibility of electrical shocks to the operator and maybe short circuiting of circuits by accidental contacts. Another method is to disconnect the suspect condenser and check it for capacity; the design of the capacity measuring unit being such as to indicate the open.

Point To Point Resistance Data

Point to point resistance data contained in this manual appears in two forms. Where the information was compiled by the writer it appears as a coded tabulation. Where the information was compiled by the receiver manufacturer, it appears as a tabulation of normal order and is referred to as "Resistance Data" in the corner card. The same designation is applied to the writer's tabulation. The resistance test can be applied in any one of a number of ways. It is equally effective with the chassis removed or by operating via the tube sockets with the tubes removed.

The conditions under which these tests are made are as follows.

1. The tubes are tested separately.
2. The line voltage or battery voltage are determined independently of the receiver.
3. In a-c receivers, the a-c voltage applied to the receiver anodes is measured with an a-c meter without the rectifier or the other tubes in their sockets.
4. In a-c receivers the filament voltage is measured.

Additional conditions are named upon the pages giving the resistance details for the various receivers. The following abbreviations are used and the method of application will be described later.

TUBES

RF - rf	Radio Frequency
AF - af	Audio Frequency
IF - if	Intermediate Frequency
Det	Detector
Osc	Oscillator
Rect	Rectifier
AVC	Automatic Volume Control
AVCX	Combination automatic volume control and detector

TUBE ELEMENTS

Cg	Control grid
K	Cathode
F	Filament
H	Heater
Sg	Screen grid
Sup	Suppressor grid
P	Plate

CONDENSERS

BC	Bypass condenser
FC	Filter condenser
CC	Coupling condenser
BLC	Blocking condenser

MISCELLANEOUS

Tr	Transformer
Cplg	Coupling
wdg	Winding
Y	Chassis
chk	Choke
mfd.	Microfarad
mmfd.	Micromicrofarad

The data pages are arranged to show the test made between the chassis and the various tube elements or circuits listed in the first column. These points are reached through the tube sockets working from the top of the chassis, or from the load sockets assuming that a plug-cable method contacting the tube circuit is used.

The second column gives the correct value of resistance to be found in the circuit. These figures are the rated values and the tolerance limits must be applied. If the units used in the circuit are exactly as rated, the resistance to be expected is the quoted value. Of course electrolytic condensers must also be recognized.

The third column states probable reason for incorrect resistance between the points named, assuming that the tolerance limits have been applied. No special mention of open resistors is made unless they are in parallel circuits, on the assumption that if the resistance test indicates an open, the subsequent operation will be to locate the open resistor.

The tests have been arranged in such fashion as to enable isolation of the various units employed in the receiver, thereby enabling immediate localization of the defect in the event of a short circuit or an open circuit indication.

The third column states the probable fault and its location. An example is the following.

Tube	Correct	Incorrect
RF Plate	13,026 ohms	BC- rf P wdg- Y (1 mfd.) BC- 2 D AF Tr- 2 D K FC- 2 RF P wdg-Y (8 mfd)
RF Plate to '47 Screen	26 ohms	

Between the r-f tube plate and chassis, the resistance to be expected according to the units used in the circuit is 13,026 ohms, providing that everything is correct. Because of the nature of the circuit, that is, current flow through the system, the tolerance limit is quite low, between 5 and 10 percent. Supposing that it shows a marked difference, which means that the "incorrect" column would be referred to.

The first possible reason for the defect is the "bypass condenser connected between the rf plate winding and the chassis. It is a 1. mfd unit". The abbreviations used are not difficult to comprehend, since they are definitely associated with the names of the units.

The second possible reason for the defect is the "bypass condenser connected between the 2nd Detector tube audio frequency transformer and the 2nd detector cathode"

The third possible reason for tge defect is the "filter condenser connected between the 2nd radio frequency tube plate winding and the chassis, an 8 mfd. condenser".

Because of common circuit connections, the defect will not always be a part of the tube circuit immediately contacted. However, the defect in the circuit may be located in an associate tube.

The subsequent tabulation affords a means of isolating the radio frequency transformer primary winding, which is connected to the plate of the radio frequency tube. Naturally a defect in a resistance (r-f winding) of 26 ohms will have very little effect upon a total circuit resistance of 13,026 ohms, so that it is necessary to isolate the plate winding in order to check its resistance. This is done as stated.

Another example of the application of the abbreviations is as follows:

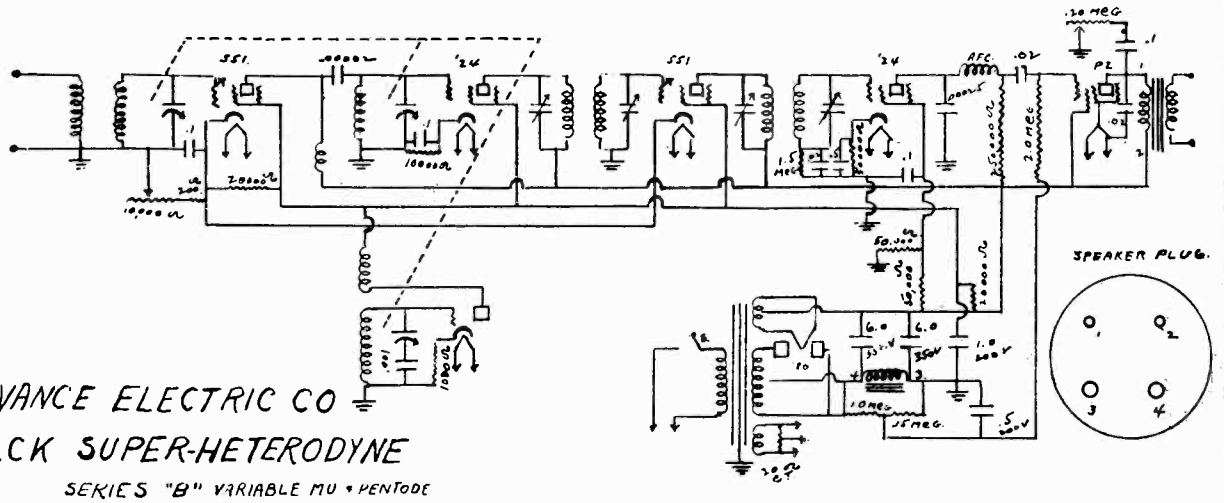
2 Detector Control Grid	50 ohms	TC- 2 D Cg-Y

This means that the correct resistance between the 2nd detector control grid and the chassis should be 50 ohms. If a defect is indicated, check the "tuning condenser connected between the 2nd detector control grid and the chassis"

All of the items listed under the incorrect heading are those which will influence the resistance between points. As far as open condensers are concerned, the condenser test must be applied. With respect to neutralization, incorrect alignment, etc., the routine operations are required.

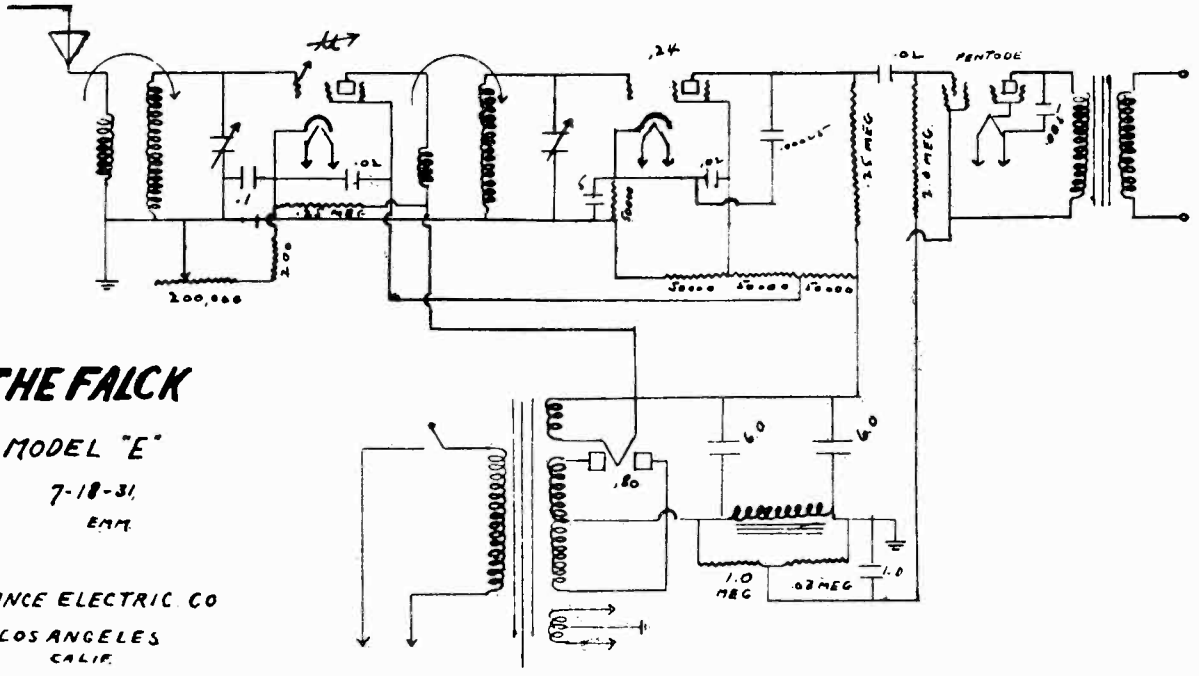
ADVANCE ELECTRIC CO.

MODEL
Falck Superhet "B"
MODEL "E"



ADVANCE ELECTRIC CO
FALCK SUPER-HETERODYNE
SERIES "B" VARIABLE MU • PENTODE

1931



THE FALCK

MODEL "E"

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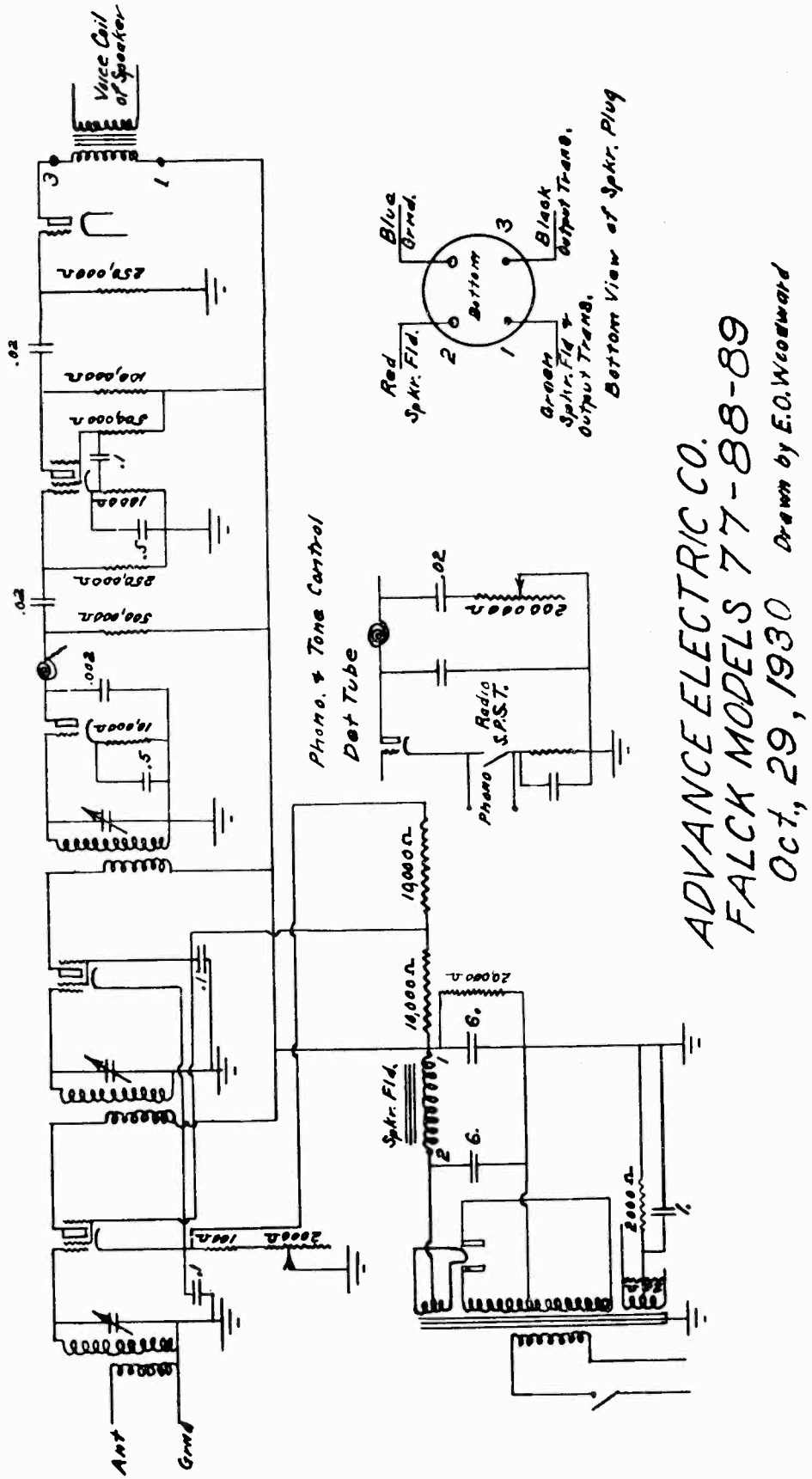
EMM

ADVANCE ELECTRIC CO
LOS ANGELES
CALIF.

MODEL Falck 77-88-89

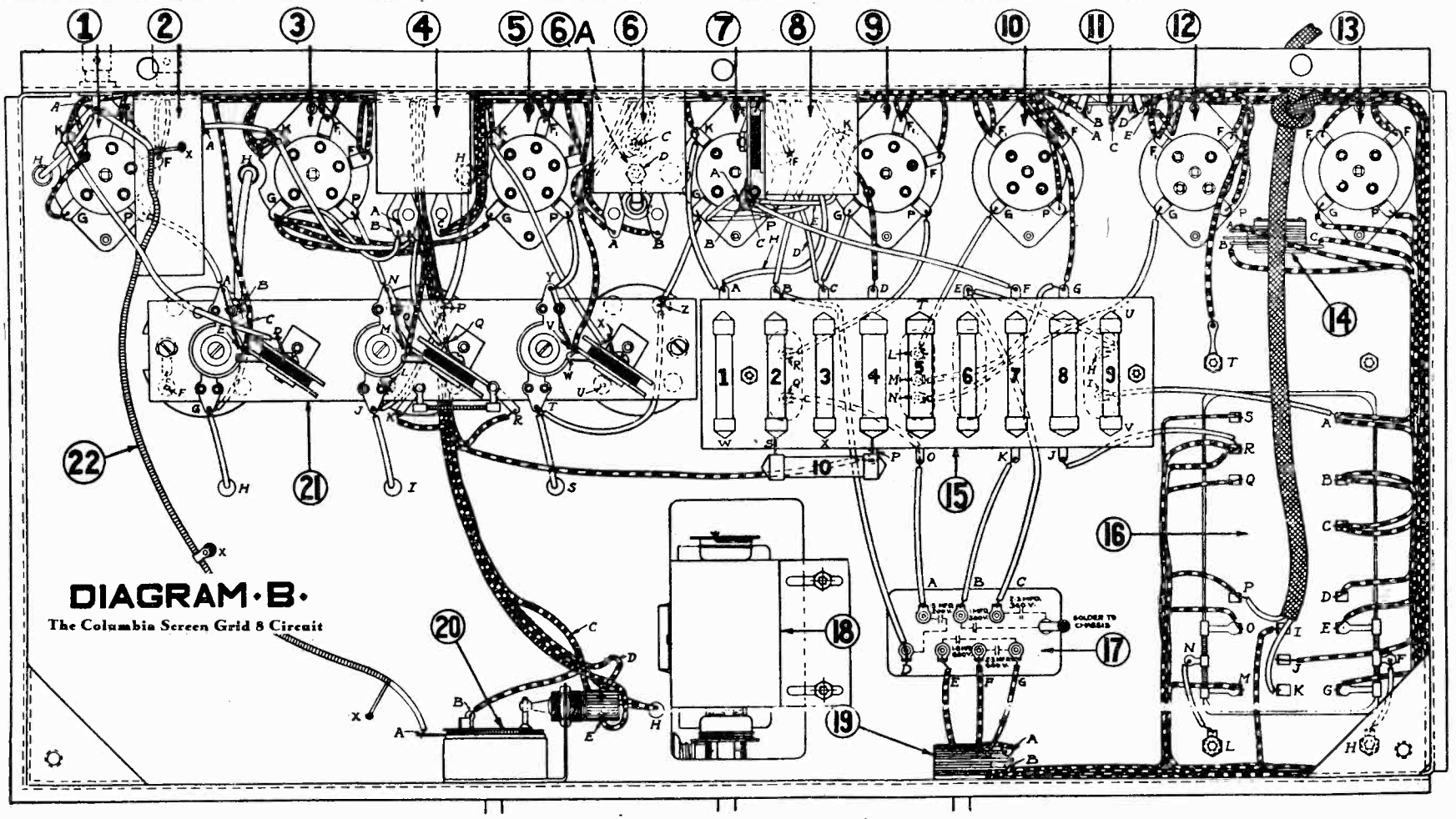
ADVANCE ELECTRIC CO



ALLIED RADIO CORP.

MODEL KNIGHT SG-8

Bottom View



KNIGHT MODEL SG-8 BOTTOM VIEW

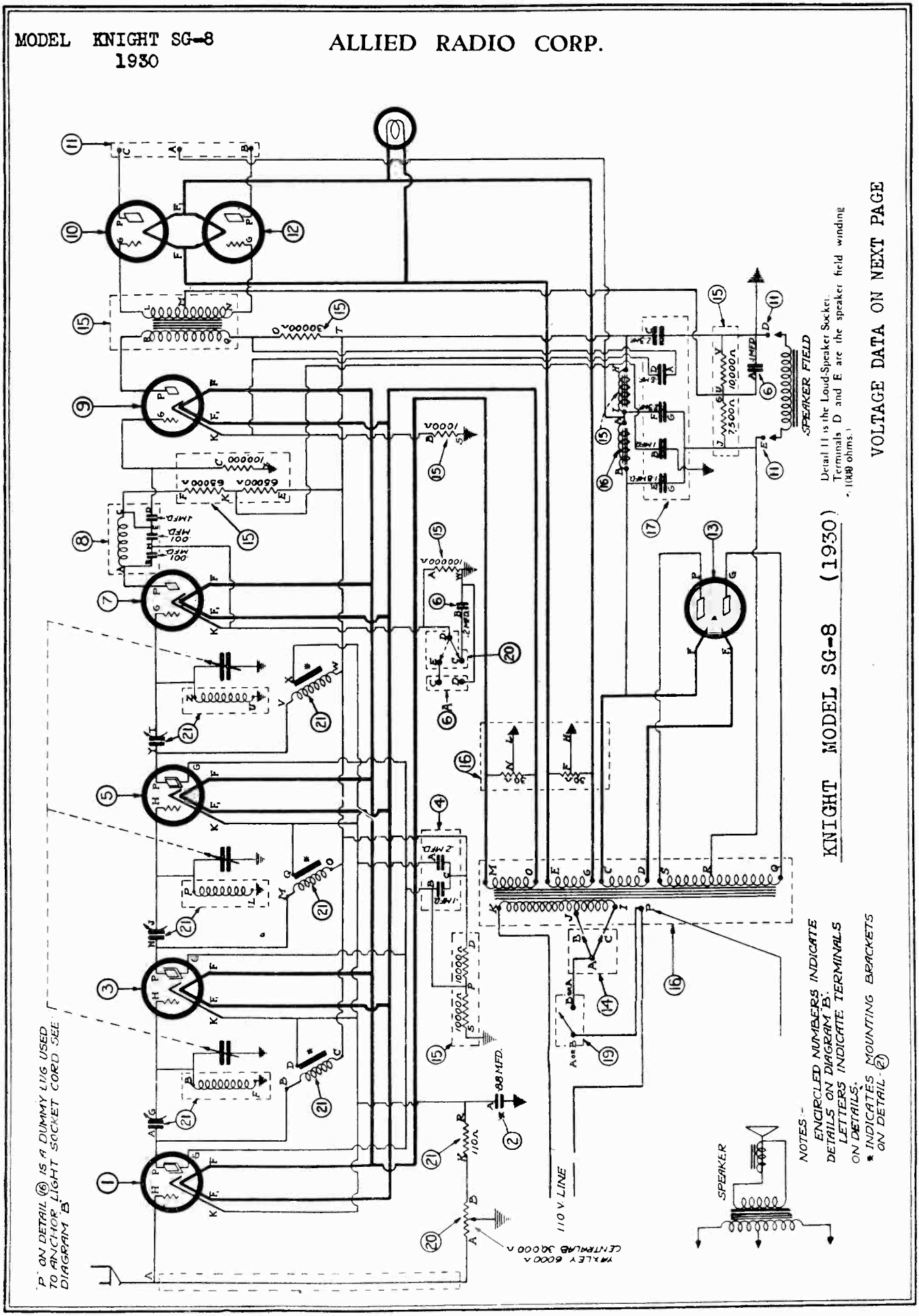
Readings, Plug In Socket Of Set

Tube No. In Order (1)	Type Of Tube (2)	Position of Tube 1st. R.F. Det., Etc. (3)	Tube Out		Tube In Tester							
			A Volts (4)	B Volts (5)	A Volts (6)	B Volts (7)	C Volts (Control Grid) (8)	Cathode —Heater Volts (9)	Normal Plate M.A. (10)	Plate M.A. Grid Test (11)	Plate Change M.A. (12)	Screen Grid Volts (13)
1	224	1st R.F.	2.45	180	2.4	174	—1.5	1.5	4.5	6.7	2.2	80
2	224	2nd R.F.	2.45	180	2.4	174	—1.5	1.5	4.5	6.7	2.2	80
3	224	3rd R.F.	2.45	180	2.4	174	—1.5	1.5	4.5	6.7	2.2	80
4	227	Det.	2.45	106	2.4	106	—14.5	14.5	.2	....	....	
5	227	1st A.F.	2.45	162	2.4	68	—3.	3.	3.2	3.8	.6	
6	245	2nd.A.F.	2.35	230	2.2	212	—3.8	..	20	23	3.	
7	245	2nd A.F.	2.35	230	2.2	212	—3.8	..	19	22	3..	

Line Voltage 115. Set on Low (1) Volt Tap. Volume Control Position Maximum.

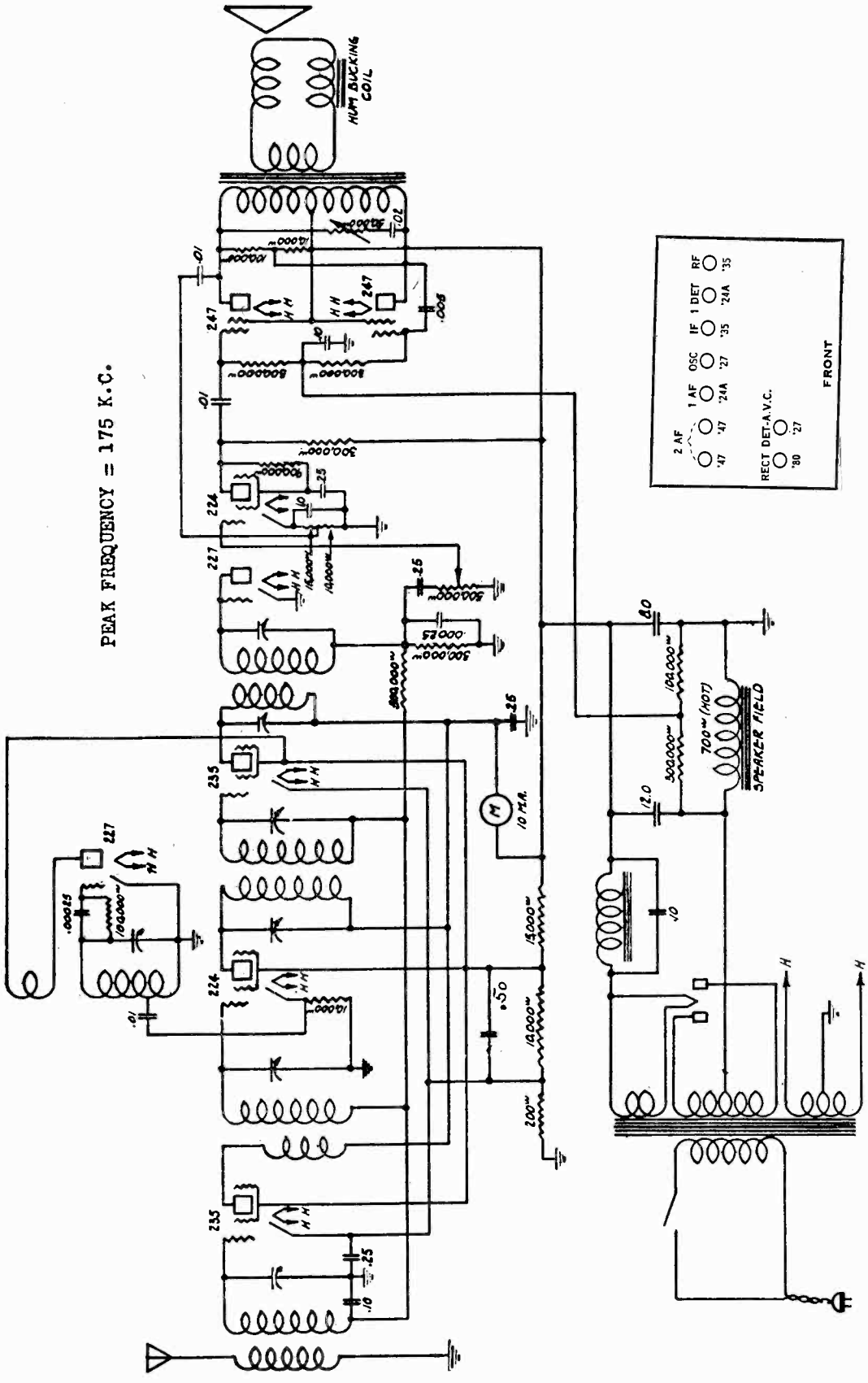
MODEL KNIGHT SG-8
1930

ALLIED RADIO CORP.



MODEL KNIGHT 118
AVC Super 1930

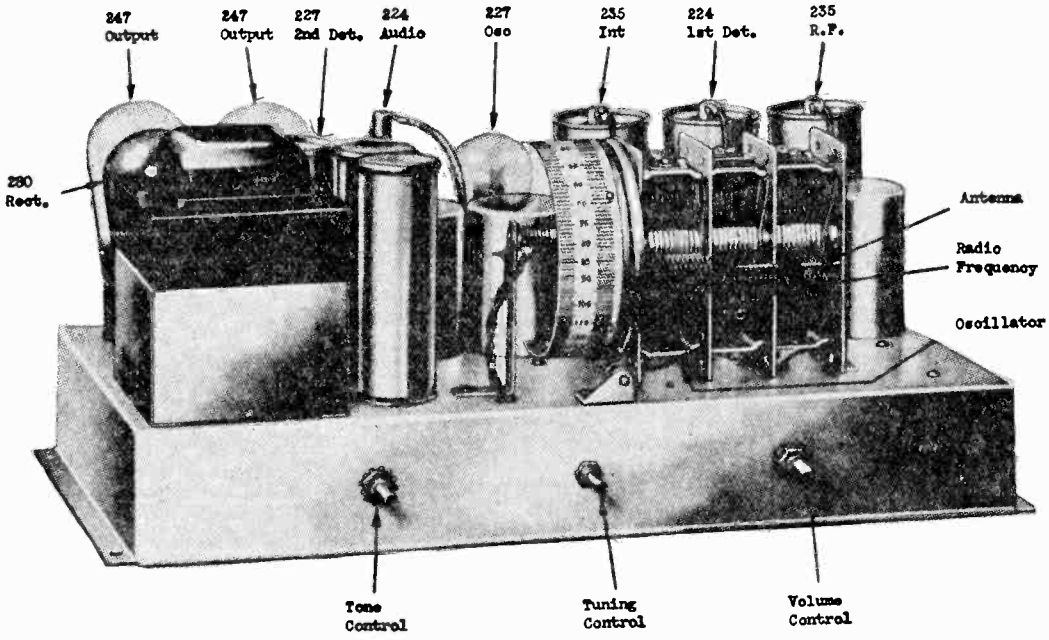
ALLIED RADIO CORP.



ELECTRO DYNAMIC SPEAKER:
The electro dynamic speaker field winding, which is 700 ohms, is utilized as an additional choke in the filter circuit. The correct bias for the two 247 output tubes is obtained from the voltage drop across the speaker field shunt resistors.

ALLIED RADIO CORP.

MODEL KNIGHT 118
Service Notes



ALIGNMENT OF RECEIVER:

Because of the construction and thorough impregnation of the intermediate coils, the intermediate stages should rarely need retracking. Only when an intermediate coil has become defective due to an open or burned out winding, should it be necessary to readjust the intermediate trimmers. Should this occur, it is necessary that an oscillator be used and the intermediate trimmers be adjusted at 175 kilocycles. To align the intermediate stages, connect the high side of the oscillator output to the grid circuit of the first detector, which is done by disconnecting the grid cap of the 224 first detector and connecting the high side of the test oscillator to the control grid of this tube. The ground side of the test oscillator should be connected to the ground post on the chassis. Set the oscillator at 175 kilocycles and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. Be sure that the output from the oscillator is not so large that it will overload the second detector. If during the alignment the meter goes off scale, reduce the output of the test oscillator or adjust the receiver volume control.

The trimmers of the intermediate coils are accessible through the small holes in the bottom of the chassis. There are two trimmers to each intermediate coil. Align the grid trimmer of the first intermediate coil. After a maximum reading is obtained by adjusting the grid trimmer on the first intermediate, adjust the primary for maximum reading and then recheck the grid side to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate coils. After both intermediate coils are properly aligned the adjustment of the intermediate stage is complete and they should not be further disturbed.

Replace the grid cap on the first detector and connect the oscillator output leads to the antenna and ground posts of the receiver and set the oscillator at 1435 kilocycles. Then tune the receiver to 1435 kilocycles on the dial. It is important that the receiver be tuned to this point. If the receiver is out of the cabinet it will be necessary to use some temporary indicator so that the position 1435 kilocycles on the the dial may be accurately located. (This indicator should be set so that when the variable condensers are at the maximum capacity stop the indicator points to the last line on the dial at the low frequency end.) Then track the variable condensers by adjusting the trimmer condensers in the following order: Oscillator, antenna and radio frequency - (reading from the front of the receiver toward the back, the variable condenser sections are: Oscillator, antenna and radio frequency). After the variable condensers have been properly tracked at 1435 kilocycles, adjust the oscillator to 1295 kilocycles. Tune the receiver to this frequency. Check alignment of the condensers at this point by bending the end plate of the rotors in and out, noting the change in reading on the output meter. If when the plates are bent in the reading is increased, it is an indication that that particular section requires more capacity and the end plate should be permanently bent in at this point; or, if when the end plate is bent away the reading is increased, the end plate should be bent away permanently, as it is an indication that that particular section requires less capacity at that particular point. The variable condensers should be checked in this manner at 1295, 880, 650 and 550 kilocycles. These points have been chosen so as to take advantage of the slots in the end plates of the variable condensers. This procedure of bending plates should rarely be necessary on the oscillator section, as the plates of the oscillator section are especially designed to properly track over the broadcast spectrum, providing the antenna and radio frequency stages are correctly aligned.

Tube Voltages

Type of tube	Position of Tube	Filament Volts	B Volts	C Volts	Normal Plate M.A.	Screen Volts
227	Oscillator	2.4	62.5		4.75	
235	Radio Frequency	2.4	240	2.15	2.75	27
224	1st Detector	2.4	230	4,35	.5	65
235	Intermediate	2.4	237	2.15	2.75	72
227	2nd Detector	2.4				
247	Pentode	2.4	220	8.**	32.5	250
247	Pentode	2.4	220	8.**	32.5	250
280	Rectifier	4.9			47.5 ea.plate	
224	1st Audio	2.4	100	2.1*	.5	35*

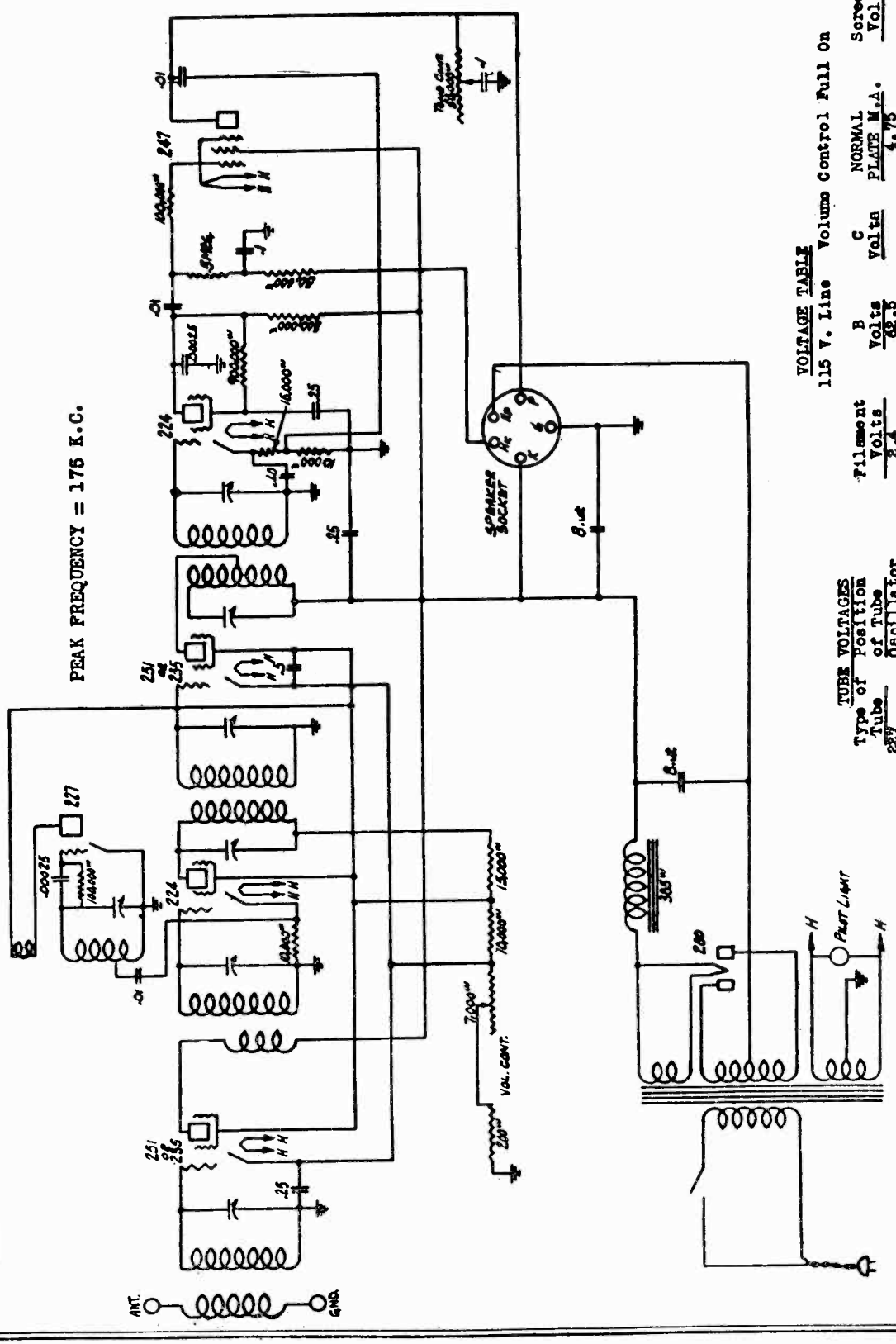
115 V. line Volume Control Full On

**To read the 247 bias, read between 247 grid and ground.

*These readings are only comparative and are not true voltages applied. The volt meter, when the readings are taken at these points, is in series with a very high resistance.

ALLIED RADIO CORP.

MODEL KNIGHT 7 Tube
Superhet '32



VOLTAGE TABLE
115 V. Line Volume Control Full On

TUBE VOLTAGES

Type of Tube	Position of Tube	Filament Volts	B Volts	C Volts	NORMAL PLATE M.A.	Screen Volts
227	Oscillator	2.4	68.5		4.75	
235	Radio Frequency	2.4	240	2.15	2.75	27
224	1st Detector	2.4	230	4.35	.5	65
235	Intermediate	2.4	237	2.15	2.75	72
224	2nd Detector	2.4	100*	2.1*	2.5	35*
247	Pentode	2.4	250	16.5**	32.5	250
280	Rectifier	4.95			27 ea.plate	

*These readings are only comparative and are not true voltages applied. The volt meter, when the readings are taken at these points, is in series with a very high resistance.
** To read the 247 bias, read between R.K.speaker socket and ground.

KNIGHT 7 TUBE SUPERHETERODYNE
1932 MODEL

MODEL Knight 7 Tube Superhet '32 Service Notes

ALLIED RADIO CORP.

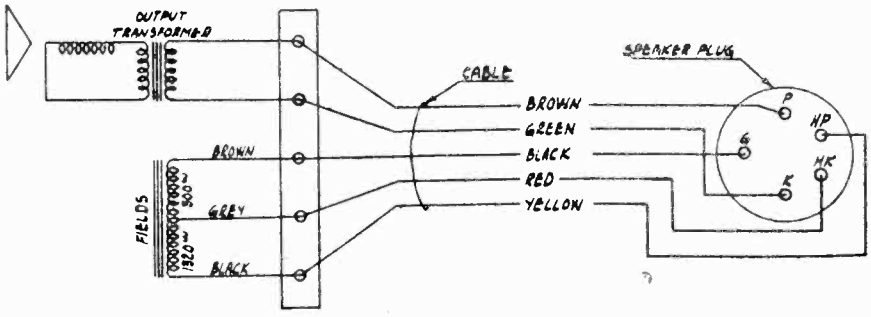
KNIGHT 7 TUBE SUPERHETERODYNE 1932 MODEL

INTERMEDIATE TRANSFORMERS:
The intermediate transformers are of the band pass type and of exceptionally high uniform gain. They are tuned to 175 kilocycles. The intermediate frequency trimmers are mounted on an isolantite base, preventing the transformer from becoming detuned due to the trimmer condensers absorbing moisture or warping. For this reason it should rarely, if ever, be necessary to re-track the intermediate frequency trimmers. In the event that it should be advisable to re-align the intermediate frequency coils, it is absolutely essential that a 175 kilocycle oscillator and an output measuring device be used.

ALIGNMENT OF RECEIVER:
Because of the construction and thorough impregnation of the intermediate coils, the intermediate stages should rarely need re-tracking. Only when an intermediate coil has become defective due either to an open or burned out winding, should it be necessary to re-adjust the intermediate trimmers. Should this occur, it is necessary that an oscillator be used and the intermediate trimmers be adjusted at 175 kilocycles. To align the intermediate stages, connect the high side of the oscillator output to the grid circuit of the first detector, which is done by disconnecting the grid cap of the 224 first detector and connecting the high side of the test oscillator to the control grid of this tube. The ground side of the test oscillator should be connected to the ground post on the chassis. Set the oscillator at 175 kilocycles and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. Be sure that the output from the oscillator is not so large that it will overload the second detector. If during the alignment the meter goes off scale, reduce the output of the test oscillator or adjust the receiver volume control.

The trimmers of the intermediate coils are accessible through the small holes in the top of the intermediate shield can. There are two trimmers to each intermediate coil. Align the grid trimmer of the first intermediate coil. After a maximum reading is obtained by adjusting the grid trimmer on the first int rmediate, adjust the primary for maximum reading and then re-check the grid side to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate coils. After both intermediate coils are properly aligned the adjustment of the intermediate stage is complete and they should not be further disturbed.

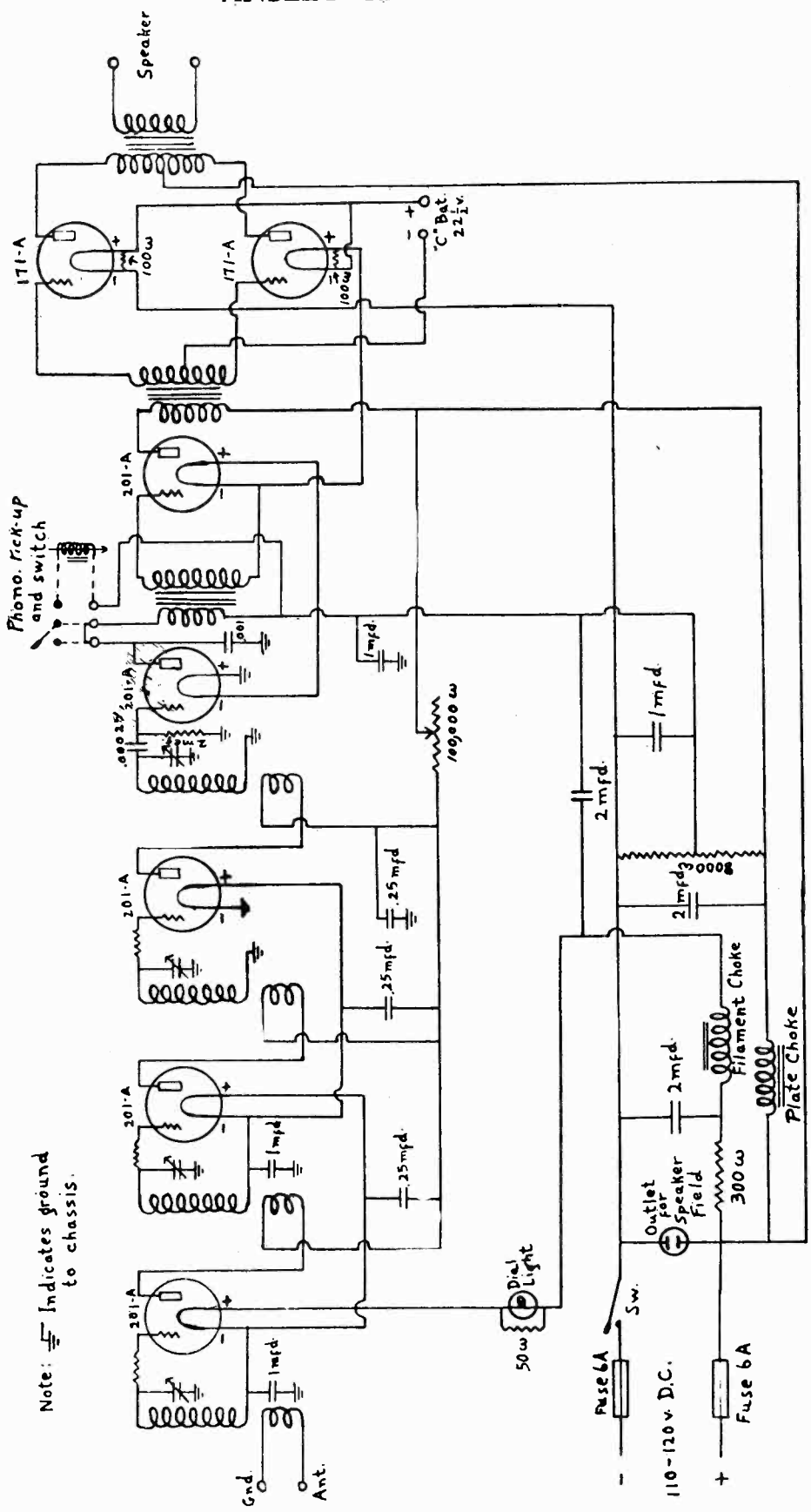
Replace the grid cap on the first detector and connect the oscillator output leads to the antenna and ground posts of the receiver and set the oscillator at 1435 kilocycles. Then tune the receiver to 1435 kilocycles on the dial. It is important that the receiver be tuned to this point. If the receiver is out of the cabinet it will be necessary to use some temporary indicator so that the position 1435 kilocycles on the dial may be accurately located. (This indicator should be set so that when the variable condensers are at the maximum capacity stop the indicator points to the last line on the dial at the low frequency end.) Then track the variable condensers by adjusting the trimmer condensers in the following order: Oscillator, antenna and radio frequency - (reading from the front of the receiver toward the back, the variable condenser sections are : Oscillator, antenna and radio frequency). After the variable condensers have been properly tracked at 1435 kilocycles, adjust the oscillator to 1295 kilocycles. Tune the receiver to this frequency. Check alignment of the condensers at this point by bending the end plate of the rotors in and out, noting the change in reading on the output meter. If when the plates are bent in the reading is increased, it is an indication that that particular section requires more capacity and the end plate should be permanently bent in at this point; or, if when the end plate is bent away, the reading is increased, the end plate should be bent away permanently, as it is an indication that that particular section requires less capacity at that particular point. The variable condensers should be checked in this manner at 1295, 880, 650 and 550 kilocycles. These points have been chosen so as to take advantage of the slots in the end plates of the variable condensers. This procedure of bending plates should rarely be necessary on the oscillator section, as the plates of the oscillator section are especially designed to properly track over the broadcast spectrum, providing the antenna and radio frequency stages are correctly aligned.



ELECTRO DYNAMIC SPEAKER:
The electro dynamic speaker has a tapped field winding - one section of which is 1320 ohms and is utilized as the second choke in the filter circuit. The other section, which is 300 ohms, is used to obtain the proper bias for the 247 tube, as well as acting as an additional filter choke.

MODEL DC
Electric Set

ANSLEY RADIO LABORATORIES

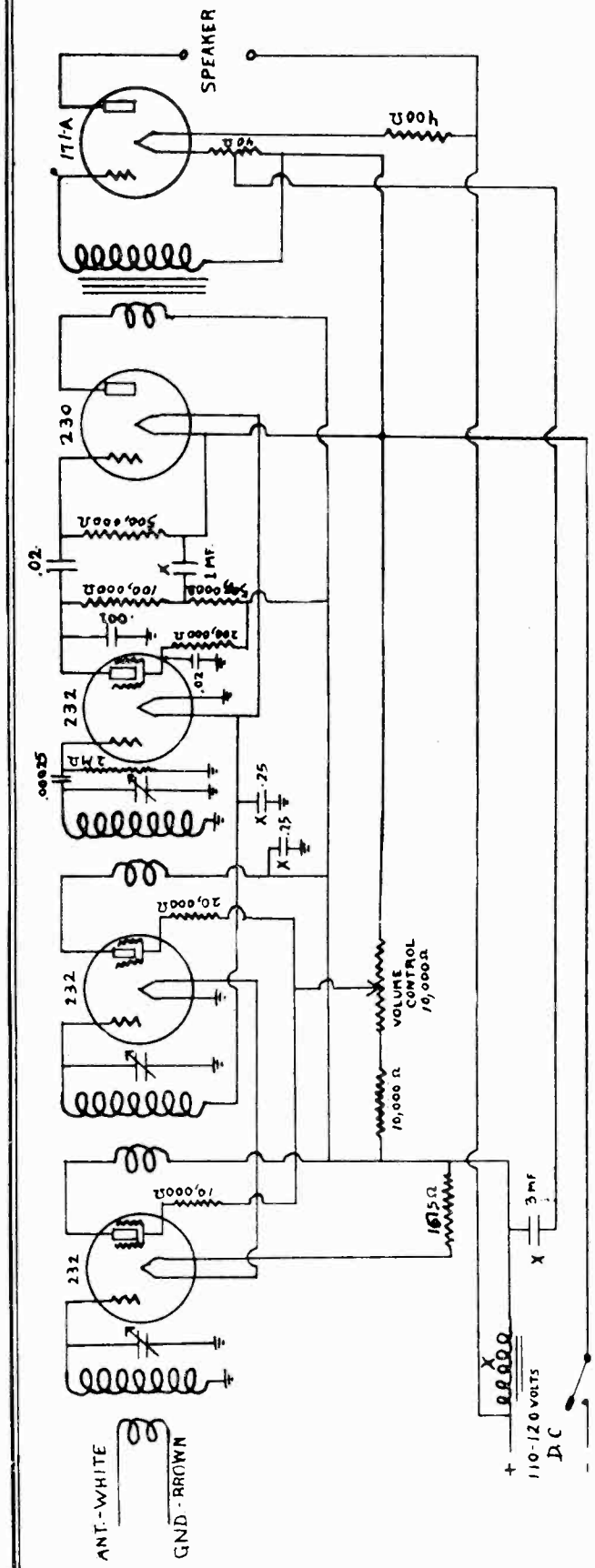


Arthur C. Ansley
New York
6/23/30

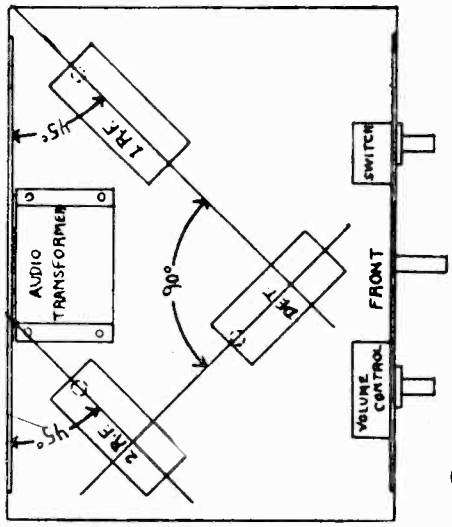
ANSLEY BUILT RADIO
D.C. ELECTRIC SET

MODEL MD-1

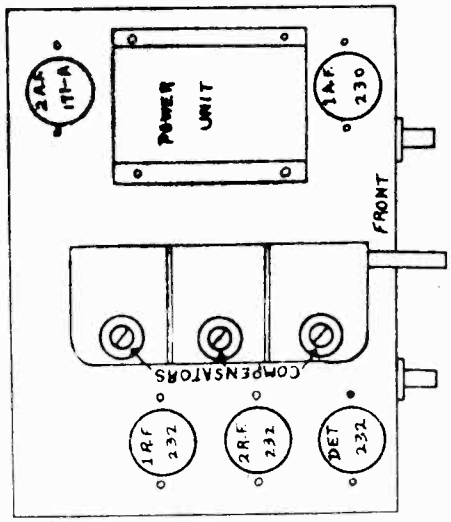
ANSLEY RADIO LABORATORIES



± INDICATES GROUND TO CHASSIS
PARTS MARKED 'X' ARE LOCATED IN POWER UNIT



BOTTOM VIEW OF CHASSIS
SHOWING CORRECT POSITION OF COILS



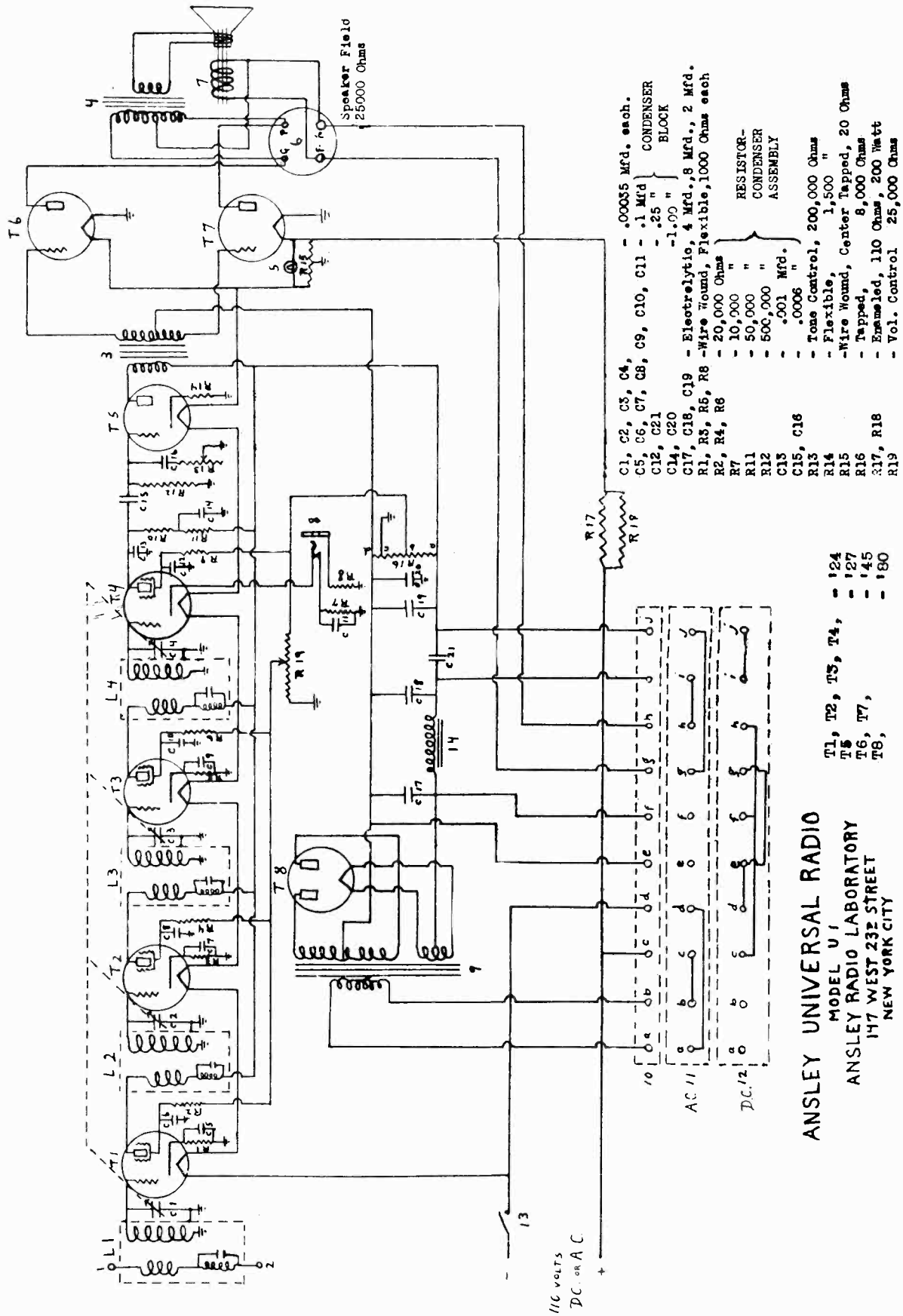
TOP VIEW OF CHASSIS

ANSLEY RADIO

SERVICE DIAGRAM MODEL MD1
ANSLEY RADIO LABORATORY
147 WEST 23RD STREET
NEW YORK CITY

MODEL U-1
AC / DC

ANSLEY RADIO LABORATORIES



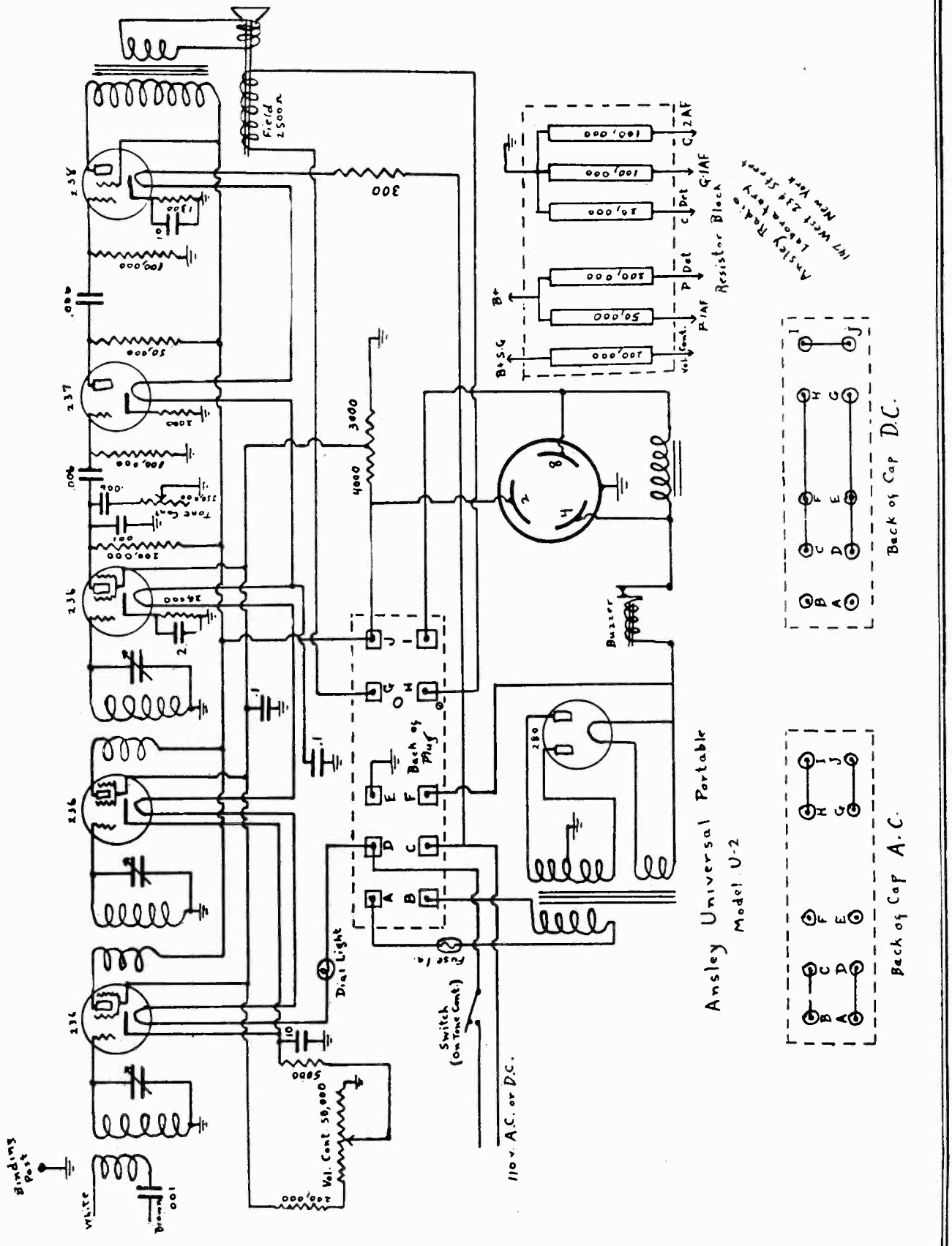
C1, C2, C3, C4, - .00035 Mfd. each.
C5, C6, C7, C8, C9, C10, C11 - .1 Mfd } CONDENSER
C12, C21 - .25 " } BLOCK
C14, C20 -1.00 "
C17, C18, C19 - Electrolytic, 4 Mfd.,8 Mfd., 2 Mfd.
R1, R3, R5, R8 -Wire Wound, Flexible,1000 Ohms each
R2, R4, R6 - 20,000 Ohms } RESISTOR-
R7 - 10,000 " } CONDENSER
R11 - 50,000 " } ASSEMBLY
R12 - 500,000 "
C13 - .001 Mfd.
C15, C16 - .0006 "
R13 - Tone Control, 200,000 Ohms
R14 - Flexible, 1,500 "
R15 -Wire Wound, Center Tapped, 20 Ohms
R16 - Tapped, 8,000 Ohms
R17, R18 - Enameled, 110 Ohms, 200 Watt
R19 - Vol. Control 25,000 Ohms

T1, T2, T3, T4, = 124
T5 = 127
T6, T7, = 145
T8, = 180

ANSLEY UNIVERSAL RADIO
MODEL U 1
ANSLEY RADIO LABORATORY
147 WEST 23rd STREET
NEW YORK CITY

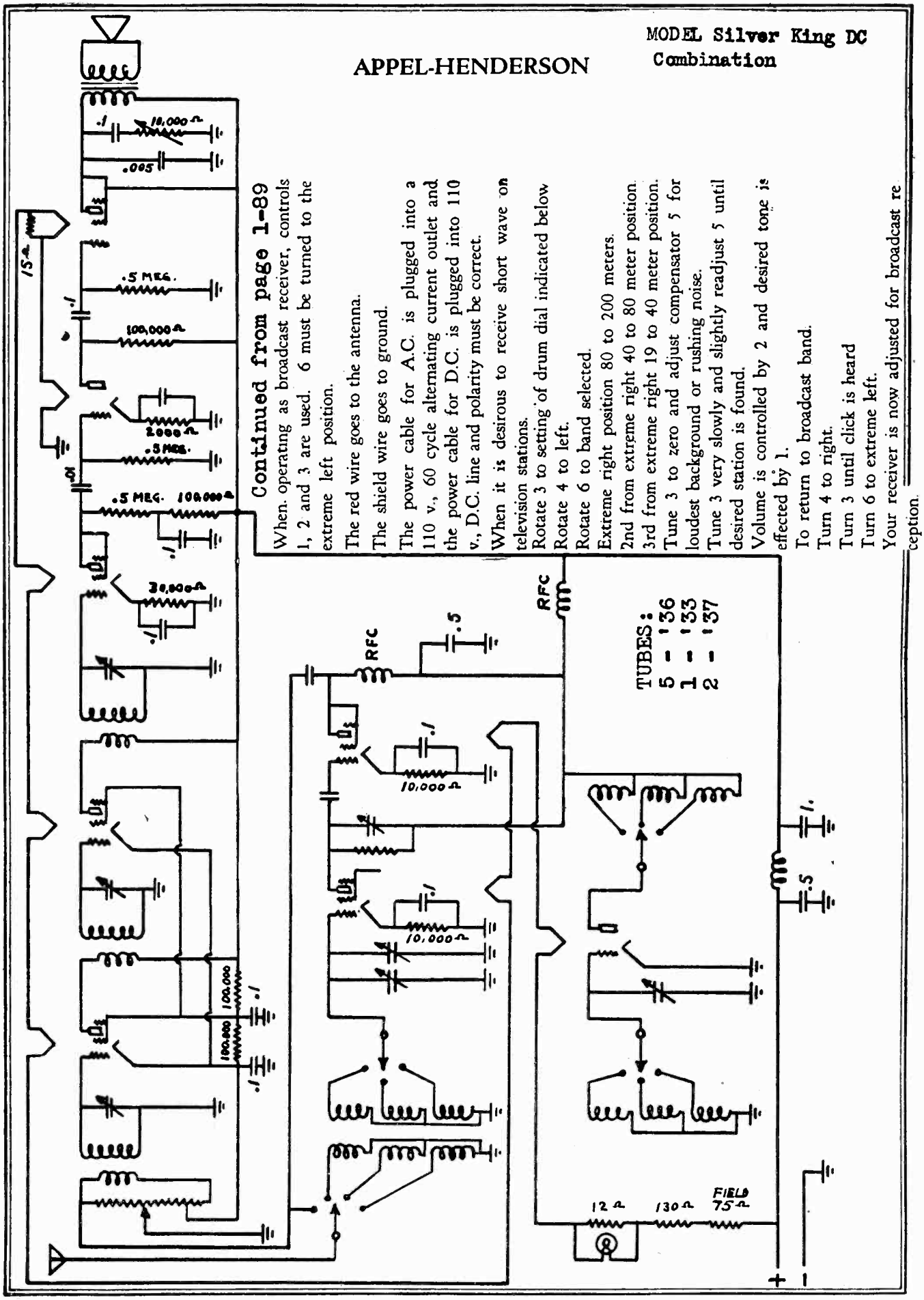
MODEL U-2
AC / DC

ANSLEY RADIO LABORATORIES



APPEL-HENDERSON

MODEL Silver King DC
Combination



Continued from page 1-89

When operating as broadcast receiver, controls 1, 2 and 3 are used. 6 must be turned to the extreme left position.

The red wire goes to the antenna.

The shield wire goes to ground.

The power cable for A.C. is plugged into a 110 v., 60 cycle alternating current outlet and the power cable for D.C. is plugged into 110 v., D.C. line and polarity must be correct.

When it is desirous to receive short wave or television stations.

Rotate 3 to setting of drum dial indicated below.

Rotate 4 to left.

Rotate 6 to band selected.

Extreme right position 80 to 200 meters.

2nd from extreme right 40 to 80 meter position.

3rd from extreme right 19 to 40 meter position.

Tune 3 to zero and adjust compensator 5 for loudest background or rushing noise.

Tune 3 very slowly and slightly readjust 5 until desired station is found.

Volume is controlled by 2 and desired tone is effected by 1.

To return to broadcast band.

Turn 4 to right.

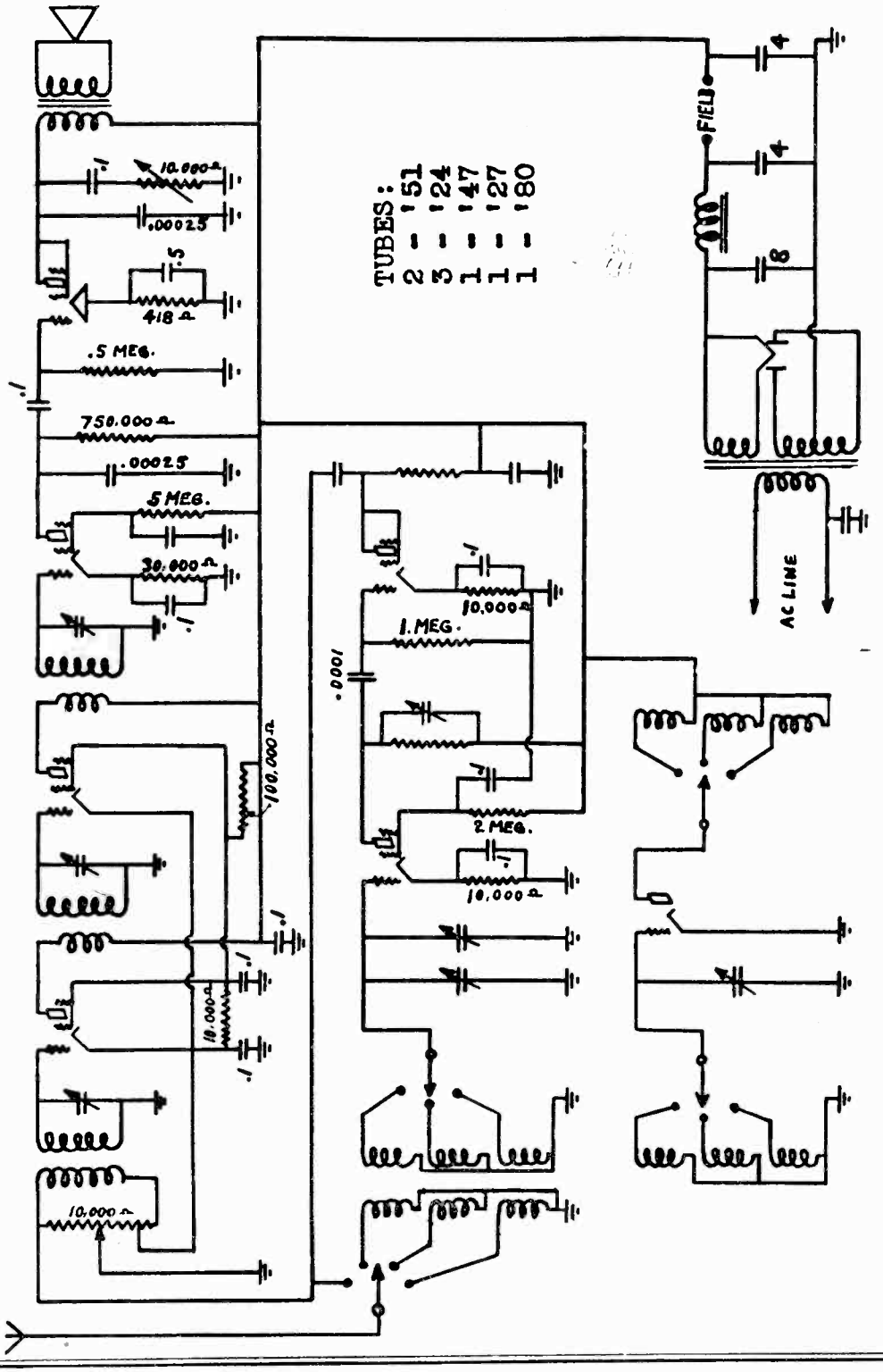
Turn 3 until click is heard

Turn 6 to extreme left.

Your receiver is now adjusted for broadcast reception.

MODEL Silver King AC
Combination

APPEL-HENDERSON



A. C. COMBINATION D. C. COMBINATION

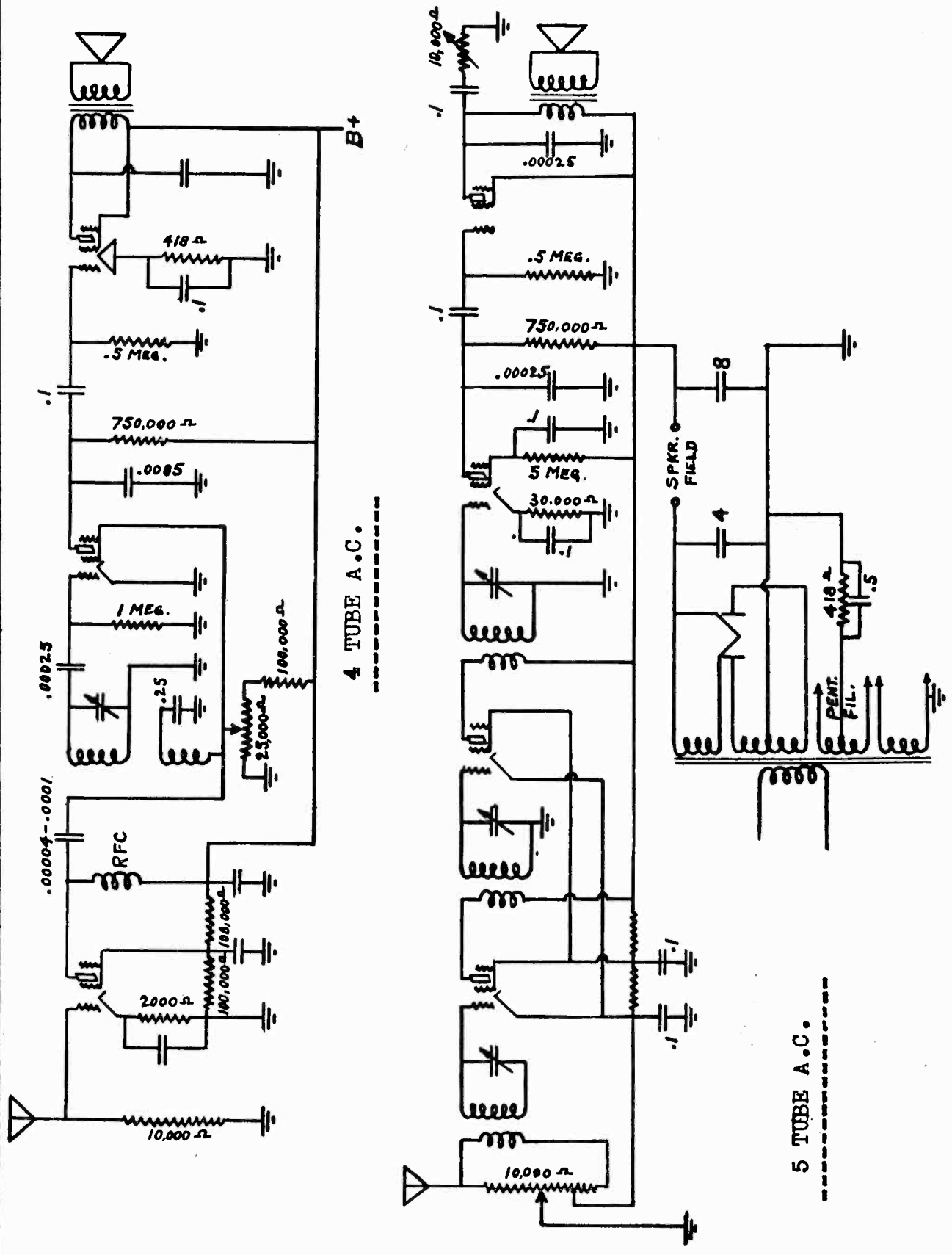
This receiver is a combination short and broadcast and television receiver, having only one tuning dial for the entire range of wavelengths covered. It tunes from 19 to 550 meters.
On the panel there will be found six controls.

1 is a tone control.
2 is the on-off switch and volume control.
3 is tuning dial
4 is short-long wave selector
5 is short wave compensator
6 is wave band selector dial

Continued on page 1-89-A

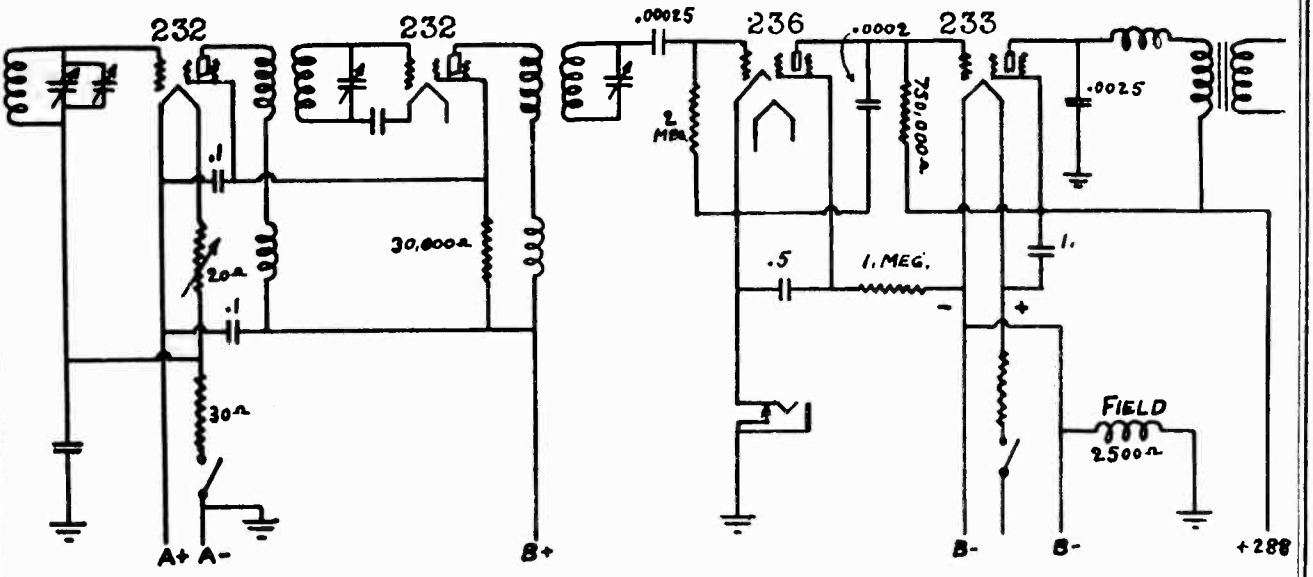
MODEL 5 Tube AC
MODEL 4 Tube AC

APPEL-HENDERSON

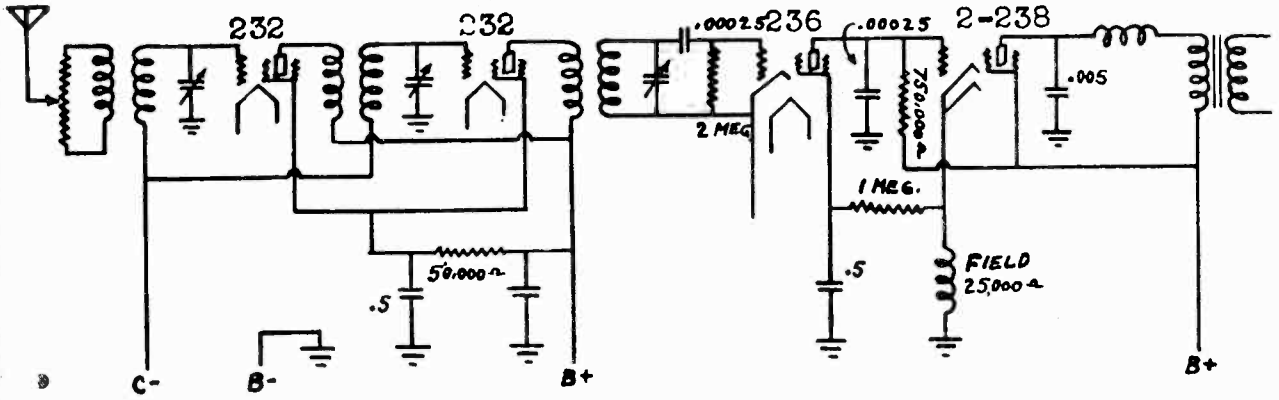


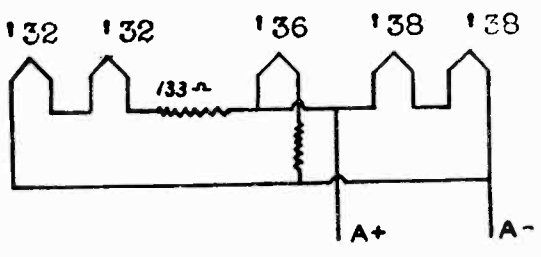
MODEL 4-Tube
Portable
MODEL 5-Tube
Battery Midget

APPEL-HENDERSON



4 TUBE PORTABLE RECEIVER.

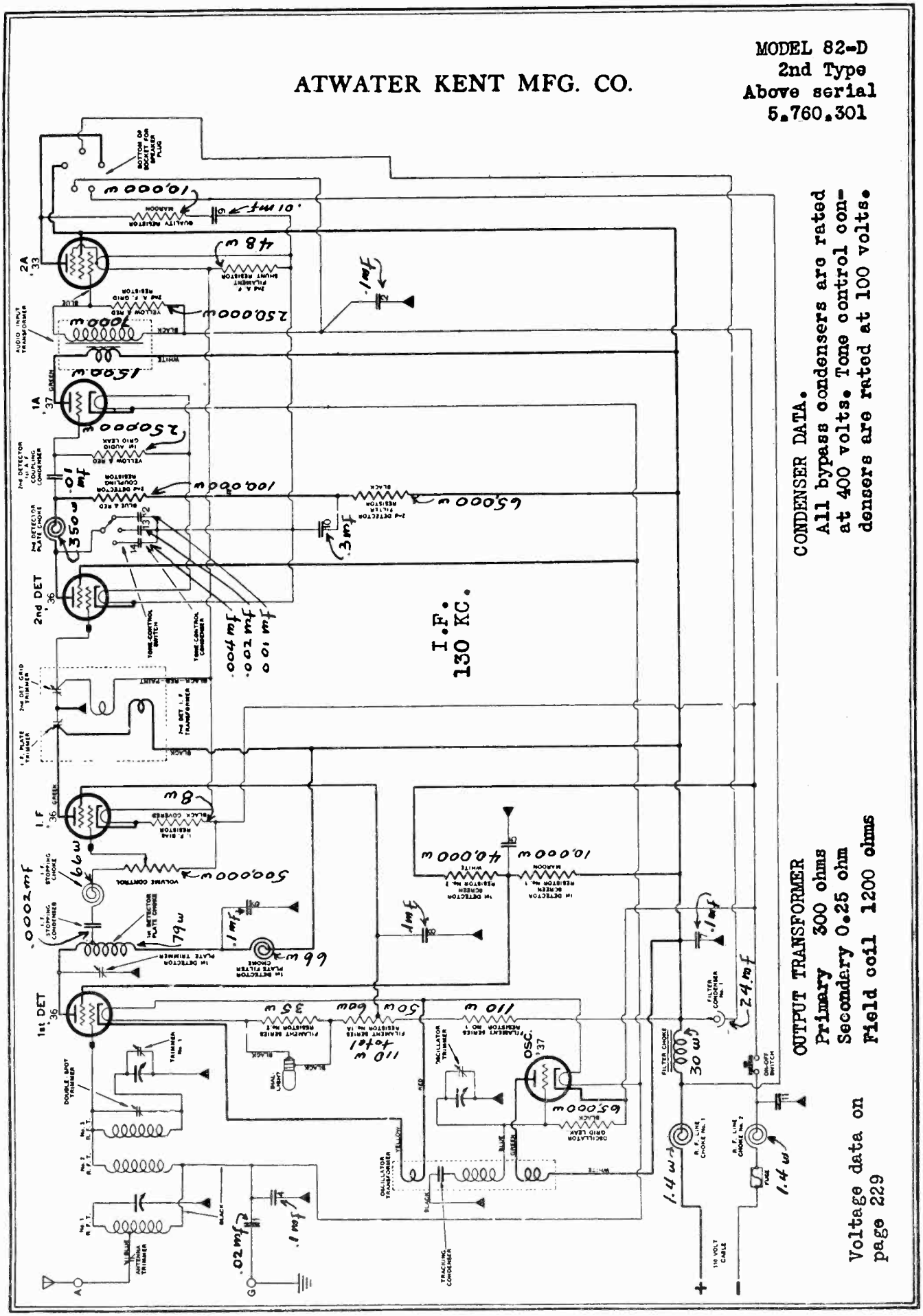




5 TUBE
BATTERY OPERATED MIDGET RECEIVER.

ATWATER KENT MFG. CO.

MODEL 82-D
2nd Type
Above serial
5.760.301



Voltage reference to page 2-5

MODEL 46,47,53
Data

ATWATER KENT MFG. CO.

Model 46, 47 and 53 Receivers

General Description

Model 46 is similar to Model 43, except that the power unit is enlarged to provide adequate plate supply for the 171A-type tubes used in the 2nd A.F. stage Also, the voltage regulator is not used, and the condensers in the power unit are contained in a separate replaceable section. Model 53 is a Model 46 with a type F-2C electro dynamic speaker mounted in a twenty six inch high metal cabinet.

Model 47 is similar to Model 46, but has four stages of R. F. amplification, with double R.F. transformers, thus providing greater sensitivity and selectivity.

The continuity tests given on page 103 may be applied to the receiver chassis of Models 46 and 53. The same tests may be applied to Model 47, with additional tests for the 4th R.F. socket contacts, which should give the same readings as the 2nd and 3rd R.F. sockets.

Special instructions for servicing the power unit in these three models are given below

Power Units in Models 46. 47 and 53

Apply the continuity test given in the table on page 104. If any one of the condensers is shorted or leaky, replace the condenser assembly. If the power transformer, filter-choke or output transformer is defective, replace the main sealed container, salvaging all other parts.

Replacing Condenser Assembly

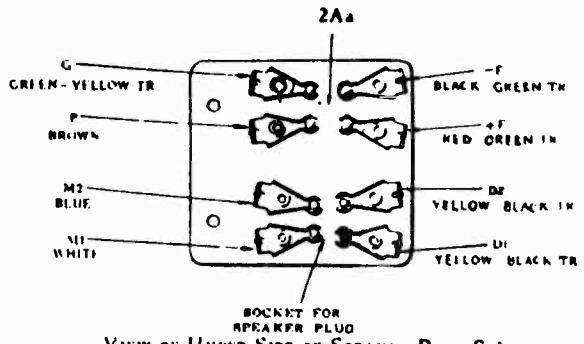
Release panel assembly from power unit and remove panel-mounting strip by taking out the machine screw at each end. Unscrew two bolts holding the condenser assembly retaining-spring and take out the spring and supporting strip. Cut the three leads (white, blue, and green-yellow tracer), which connect between the condenser assembly and the transformer-choke assembly, at about the mid-point of each lead. Unsolder black lead from ground lug. Unsolder yellow lead and two black-red tracer leads from panel terminals Unsolder leads at contacts of speaker-plug socket and socket 2Aa. Pull these leads up an inch or so through the hole in the socket-mounting angle and push the cable to one side of the unit to allow room for removal of the condenser assembly Take out the assembly, pulling the blue M2 lead up through the cable covering.

Insert a new condenser assembly, reversing above procedure Insulate the joints on the blue, white, and green-yellow tracer leads which connect the condenser assembly to the transformer-choke assembly

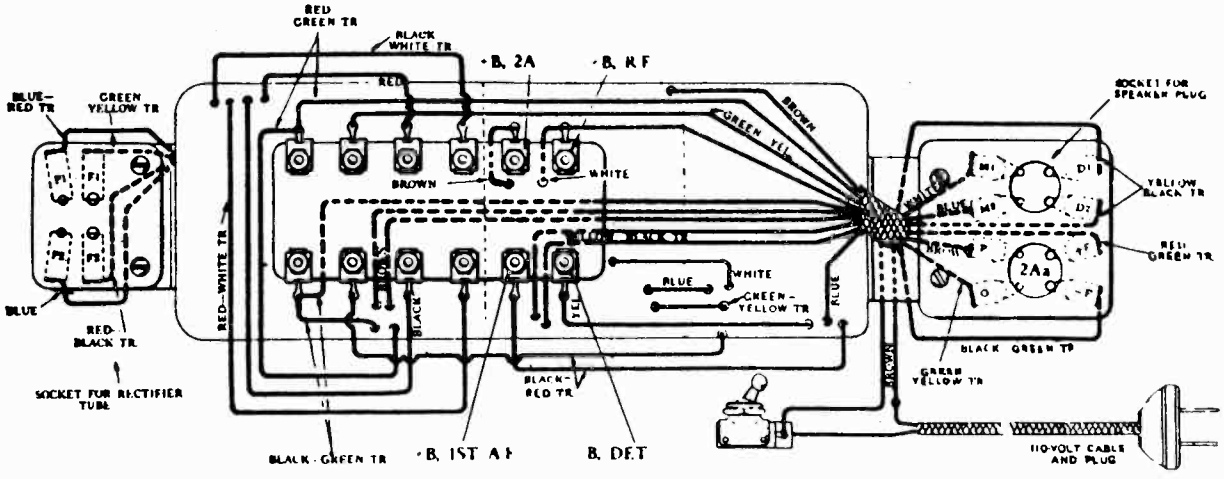
Replacing Transformer-Choke Assembly

Unsolder leads from socket plates at both ends of container and remove these sockets Unsolder primary winding leads at points where they connect to the toggle switch and to one side of the 110-volt cable respectively Release panel assembly from unit. Unscrew panel-mounting strip and condenser-retaining spring. Pull the primary leads, the yellow-black tracer output leads and the brown P2Aa lead (No. 18 wire) up through the cable covering. Cut the three leads (white, blue, and green-yellow tracer) which connect the transformer-choke assembly and the condenser assembly. Cut each lead at about the mid-point Unsolder the six filament winding leads, the brown +B, 2A lead, and the white +B, R.F lead from terminals on panel assembly. Unsolder black lead from ground lug Remove the condenser and panel assemblies

Substitute a new transformer-choke assembly, mount the salvaged parts and connect exactly like the original, reversing procedure outlined above

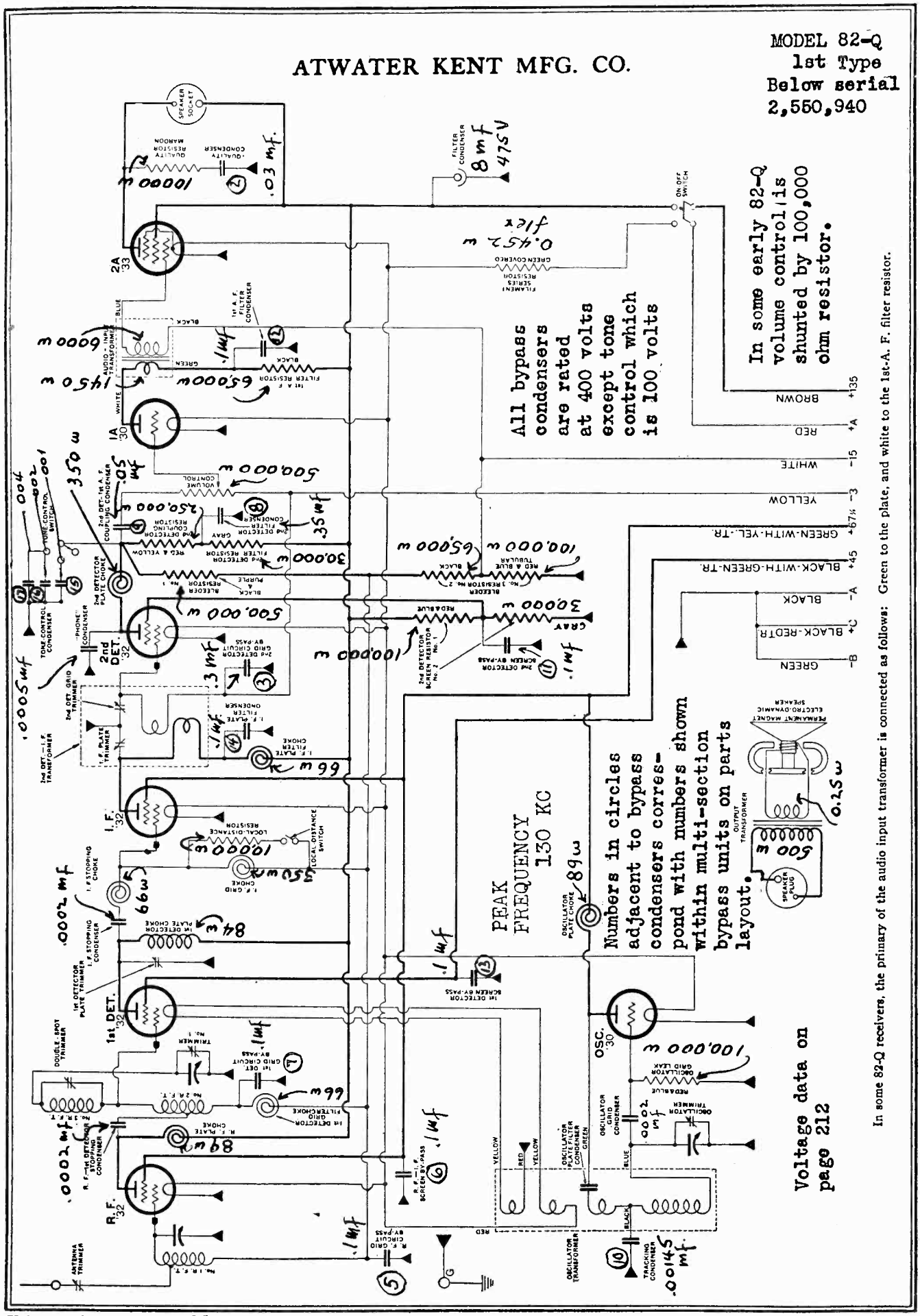


VIEW OF UNDER-SIDE OF SPEAKER-PLUG SOCKET AND SOCKET 2Aa ON MODELS 13, 16, 17 AND EARLY 53



SHOWING CONNECTIONS AND APPROXIMATE POSITION OF LEADS FROM SEALED CONTAINER IN POWER UNIT FOR MODELS 46, 47 AND 53

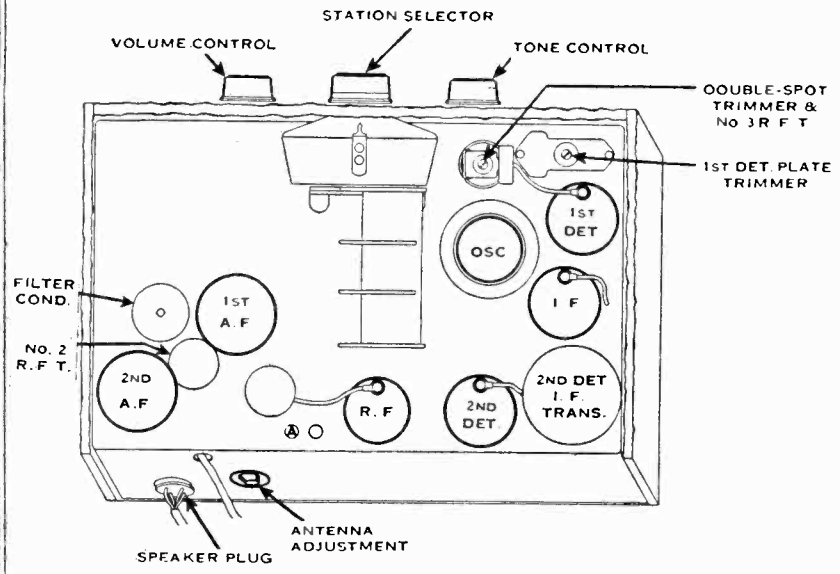
This view shows the panel assembly moved to the left of its normal position. The replaceable condenser assembly is in the right-hand end of the container. A black lead from the condenser assembly and a green lead from the transformer assembly are connected to a ground lug under the left-hand panel mounting angle. In some units of this type the two leads to D1 and D2 are red (No. 18 wire) instead of yellow-with-black-tracer



Voltage reference to page 2-5

MODEL 82-Q
1st Type
Below serial
2,550,940

ATWATER KENT MFG. CO.



TOP VIEW OF MODEL 82-Q.

RF Bypass # 1
21170
RF Bypass # 2
15262
RF Bypass #3
19150
RF Bypass # 4
15262

Tone Control
16490

By-pass Condensers in Model 82-Q

R. F. By-pass No. 1

1—Not used.
2—Quality condenser.
3—2nd-detector grid-circuit by-pass.

R. F. By-pass No. 2

4—+B filter condenser.
5—R. F. grid-circuit by-pass.
6—R. F.—I. F screen by-pass.
7—1st-detector grid-circuit by-pass.

R. F. By-pass No. 3

8—2nd-detector filter condenser.
9—2nd-detector—1st-A. F. coupling condenser.
10—Tracking condenser.

R. F. By-pass No. 4

11—2nd-detector screen by-pass.
12—1st-A. F. filter condenser.
13—1st-detector screen by-pass.
14—I. F. plate filter condenser.

Tone-control Condenser

15—Tone condenser.
16—Tone condenser.
17—Tone condenser.
18—Not used.

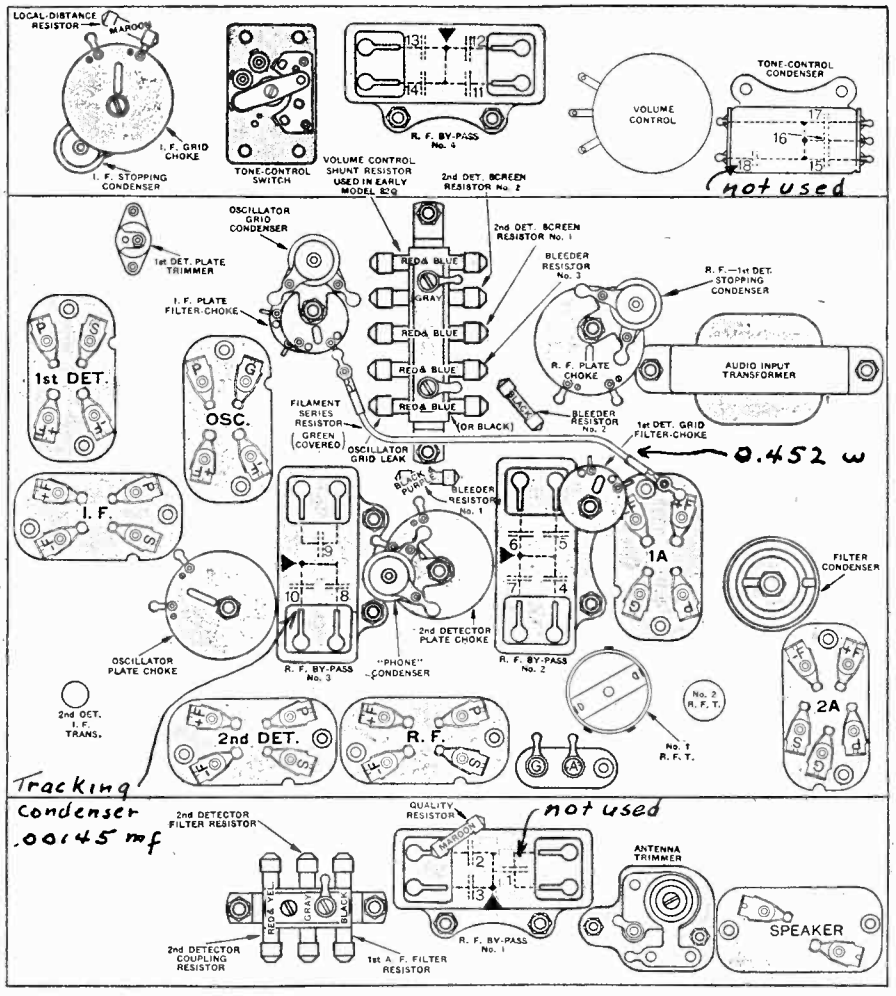


CHART OF MODEL 82-Q.

VOLTAGE DATA

ATWATER KENT MFG. CO.

VOLTAGE TABLE

FOR MODEL 80, 81, 82, 82-D, 82-Q, 83, 84, 84-D, 84-Q, 85, 85-Q, 86, 87 and 89

The voltages listed in this table are only approximate, and are measured values, not actual operating values. Turn volume control to maximum.

Use 250-volt scale of a 1000-ohm-per-volt D. C. voltmeter.

All plate, screen and grid measurements are made from cathode in heater-type tube, and from —F in plain-filament-type tube.

When replacing a tubular resistor, use a resistor of the same identifying color. In a few cases, owing to engineering changes, the color of a resistor in a chassis may not agree with the color specified in the diagram. In such a case, disregard the diagram and use a replacement resistor having the same color as the defective unit. However, if a resistor has been removed, or its identification destroyed, replace it with a resistor having the color that is specified in the diagram for that set.

		MODEL 80	MODEL 81	MODEL 82	MODEL 82-D	MODEL 82 Q	MODEL 83	MODEL 84	MODEL 84 D	MODEL 84 Q	MODEL 85	MODEL 85-Q	MODEL 86	MODEL 87	MODEL 89
	LINE VOLTAGE	110	—	110	112	—	110	110	120	—	110	—	115	110	110
	TOTAL "B" VOLTAGE	—	125	—	—	125	—	—	—	125	—	125	—	—	—
R. F. TUBE**	FILAMENT	—	5.5	—	—	2	—	—	—	2	—	—	2.4	2.4	2.4
	PLATE	—	125	—	—	125	—	—	—	125	—	—	125	170	125
	SCREEN	—	75	—	—	60	—	—	—	65	—	—	40	80	50
	GRID	—	SMALL	—	—	3	—	—	—	3	—	—	2	2	2
1ST DET. TUBE†	FILAMENT	2.4	5.5	2.4	5.5	2	2.4	2.4	5.7	2	2.4	2	2.4	2.4	2.4
	PLATE	225	95	135	70	125	225	205	80	125	135	125	125	160	120
	SCREEN	90	—	50	50	40	90	65	50	25	50	40	35	70	45
	GRID	5	7	4	5	3	5	6	5	3	3	3	4	11	4
I. F. TUBE	FILAMENT	2.4	—	2.4	6	2	2.4	2.4	6.5	2	2.4	2	2.4	2.4	2.4
	PLATE	230	—	140	95	125	230	215	105	125	135	125	125	170	125
	SCREEN	95	—	50	50	60	95	65	55	65	50	65	40	80	50
	GRID	2	—	SMALL	SMALL	3	2	3	SMALL	SMALL	2	3	2	2	2
2ND DET. TUBE	FILAMENT	2.4	—	2.4	5.5	2	2.4	2.4	5	2	2.4	2	2.4	2.4	2.4
	PLATE	110	—	105	55	45	110	90	55	60	100	40	95	90	120
	SCREEN	45	—	65	10	25	45	45	10	25	65	25	60	—	—
	GRID	5	—	8	2	3	5	6	1	3	7	3	8	SMALL	15
1ST A. F. TUBE	FILAMENT	2.4	5.5	2.4	5.5	2	2.4	2.4	6	2	2.4	2	2.4	2.4	2.4
	PLATE	230	120	230	75	55	230	205	80	55	215	55	210	90	120
	SCREEN	240	123	240	—	—	240	215	—	—	225	—	220	—	—
	GRID	4	11	5	3	3	4	5	2.5	3	5	3	5	3	4
2ND A. F. TUBE	FILAMENT	—	—	—	2	2	—	—	2	2	—	2	—	2.4	2.4
	PLATE	—	—	—	85	120	—	—	90	120	—	120	—	200	225
	SCREEN	—	—	—	90	125	—	—	95	125	—	125	—	210	235
	GRID	—	—	—	7	15	—	—	7	5	—	15	—	14	14
OSC. TUBE	FILAMENT	2.4	—	2.4	5	2	2.4	2.4	6	2	2.4	2	2.4	2.4	2.4
	PLATE	95	—	95	100	60	100	70	110	60	100	40	95	85	100
	GRID	*	—	*	*	*	*	*	*	*	*	*	*	*	*
CONTROL TUBE	FILAMENT	—	5.5	2.4	—	—	—	—	—	—	2.4	—	2.4	—	2.4
	PLATE	—	3	15	—	—	—	—	—	—	15	—	30	—	25
	SCREEN	—	—	8	—	—	—	—	—	—	7	—	7	—	5
	GRID	—	2	4	—	—	—	—	—	—	5	—	4	—	3

* The measured oscillator grid voltage will vary dependent on the capacity of the voltmeter leads. In some cases, the presence of the leads will stop oscillation and no reading will be secured for grid bias. In other cases, the reading will be only slight, or it may be as high as 10 volts.

**This includes the 1st, 2nd and 3rd R. F. tubes in Model 81. †This is the detector tube in Model 81.

MODEL 84,84-F
Early

ATWATER KENT MFG. CO.

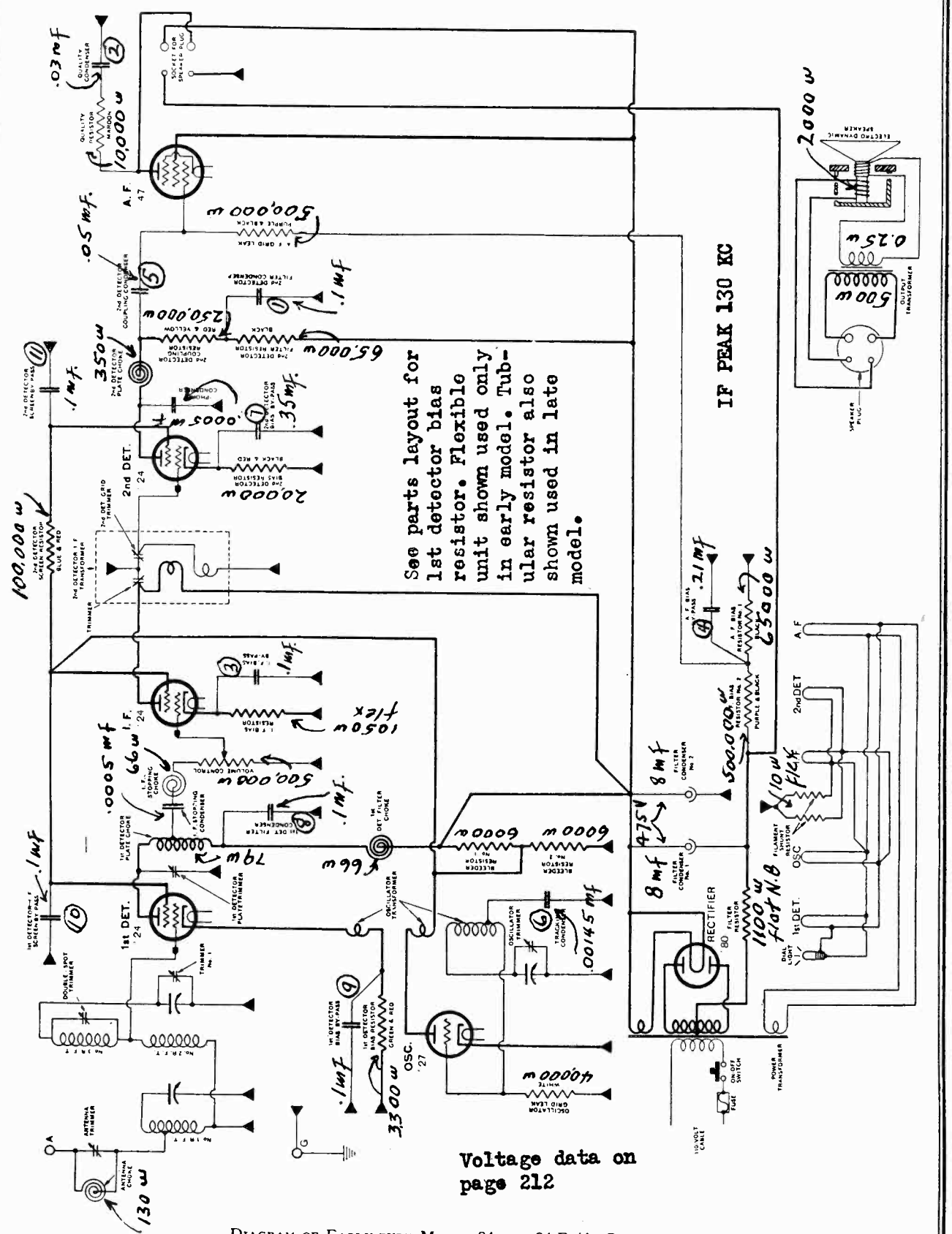


DIAGRAM OF EARLY-TYPE MODEL 84 AND 84-F (A. C.-OPERATED).

In Model 84-F, the filter resistor (connected in series with the center-tap of the high-voltage winding) is NOT used.

Voltage reference to page 2-5

ATWATER KENT MFG. CO.

MODEL 84, 84-F
Late

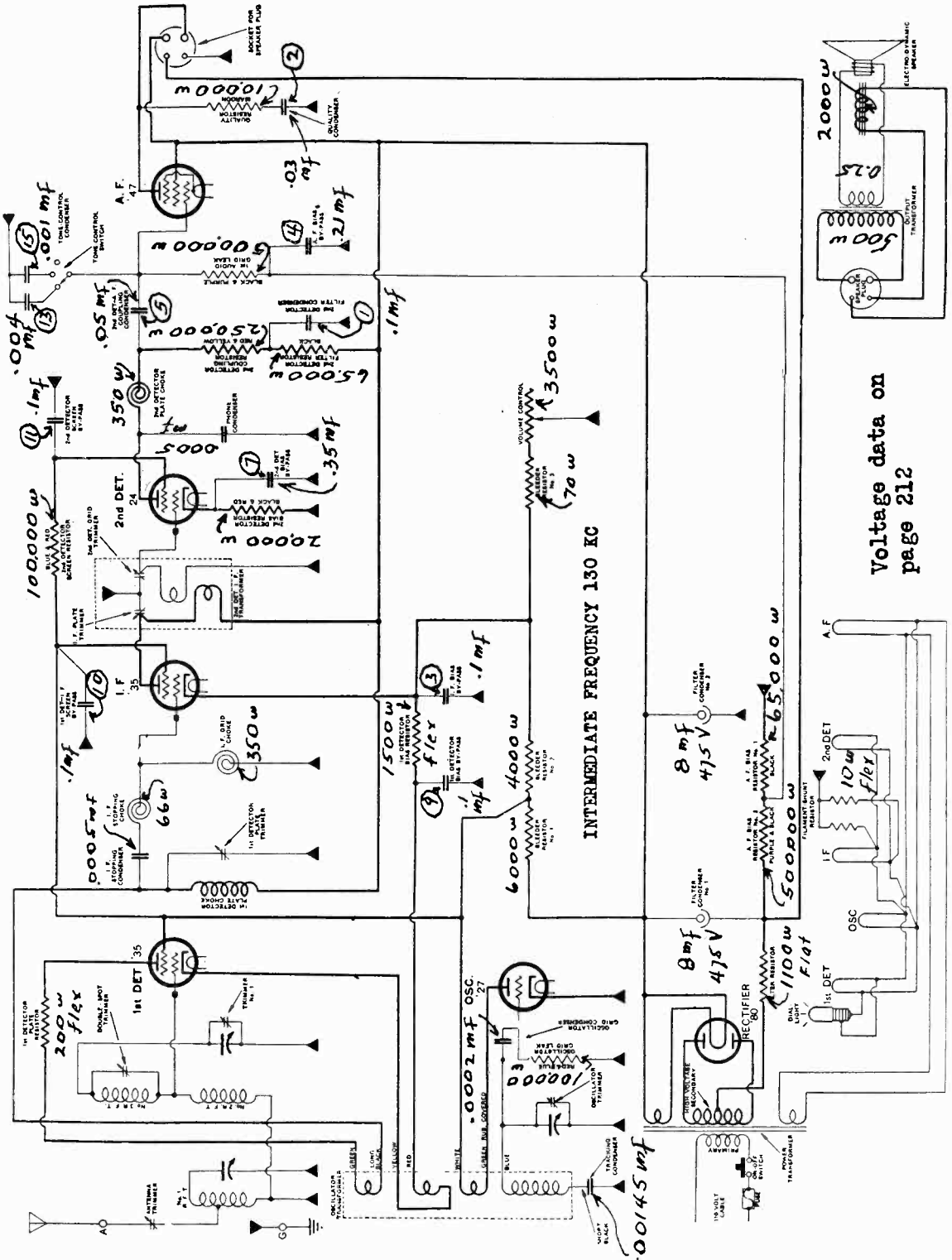


DIAGRAM OF LATE-TYPE MODEL 84 AND 84-F (A. C.-OPERATED).

A few late-type Model 84 and 84-F receivers have slightly different oscillator transformers, as explained in the notes accompanying the parts list for these sets. The filter resistor shown in the above diagram is NOT used in Model 84-F. This set has a 1st-detector plate filter choke and condenser not shown in the diagram.

SPECIAL NOTE. Numerals within circles and adjacent to bypass condensers correspond with numbers marked within multi-section bypass condensers shown on parts layout. See next page.

Voltage reference to page 2-5

MODEL 84, 84-F CHARTS

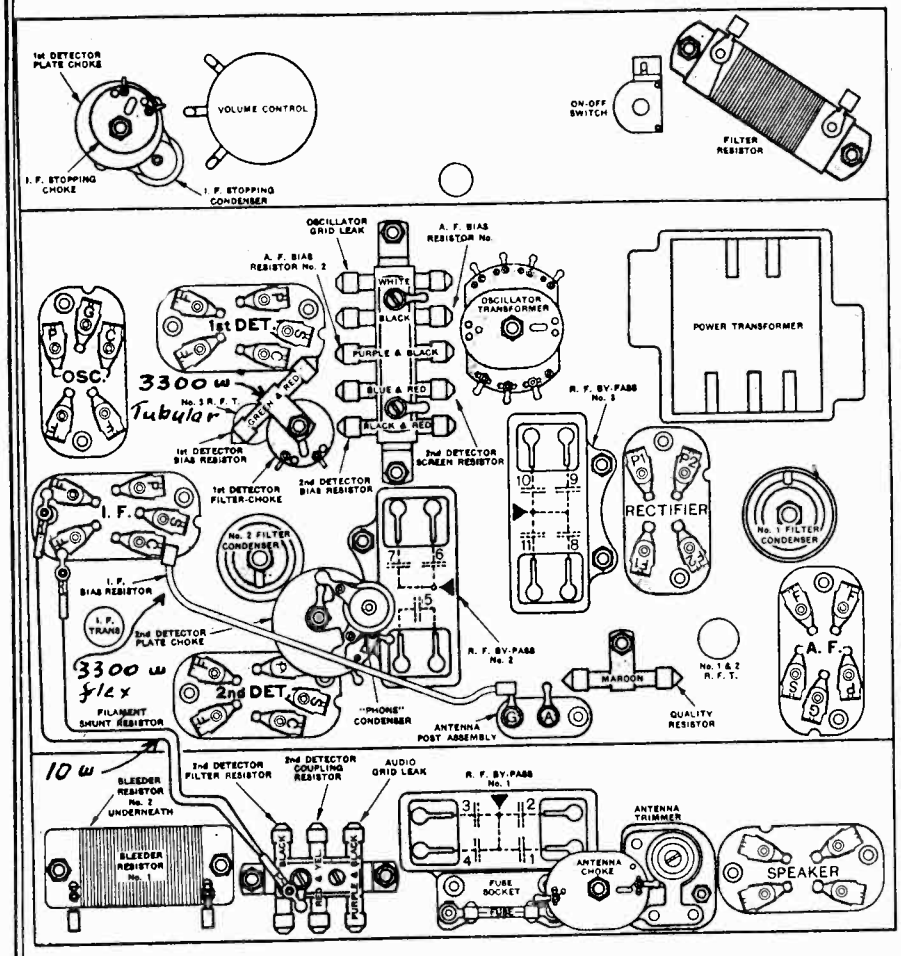


CHART OF EARLY-TYPE MODEL 84, 84-F.

In some early-type Model 84, 84-F, the 1st-detector bias resistor is a flexible type, and the quality resistor is wire-wound. These are both superseded by the tubular resistors indicated above. The filter-resistor at top-right is NOT used in any Model 84-F

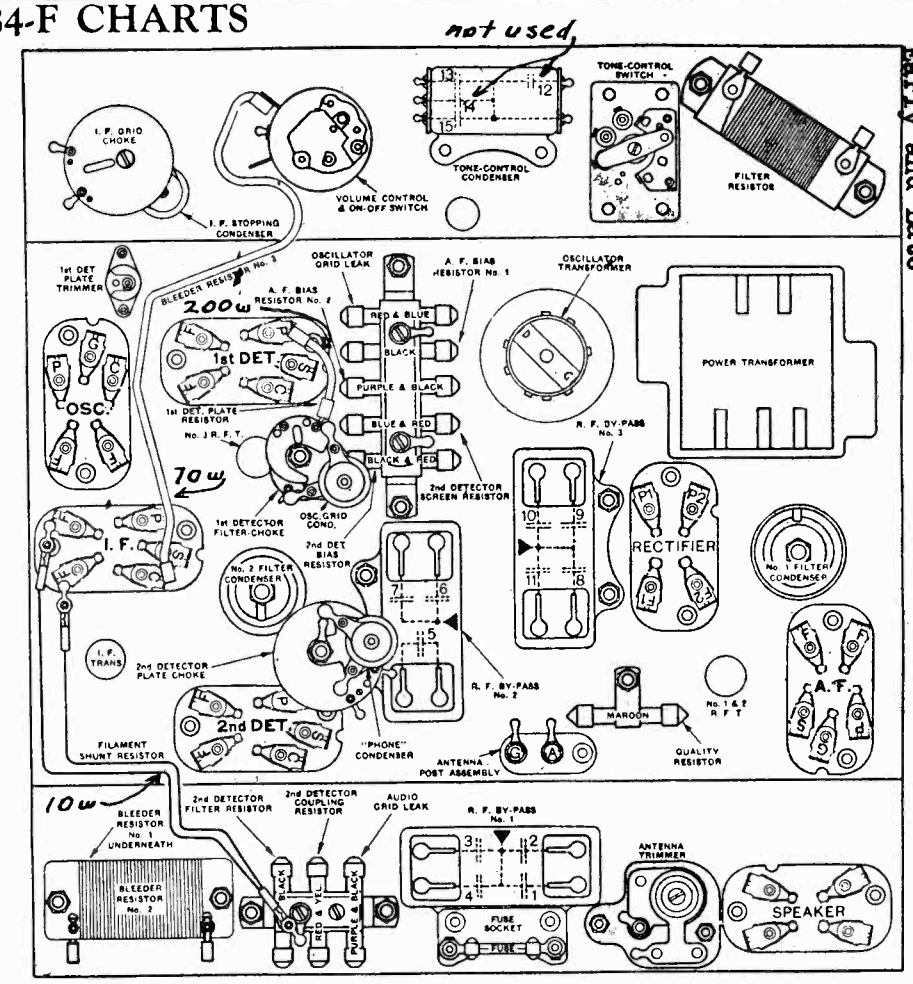


CHART OF LATE-TYPE MODEL 84, 84-F.

Some late-type Model 84, 84-F receivers have slightly different oscillator transformers and connections than indicated in the diagram. When servicing such sets, carefully note and adhere to the original method of wiring. A flexible type 1st-detector bias resistor (not shown above) is connected from condenser 9 to condenser 3.

By-pass Condensers in Model 84, 84-F.

400 Volts

R. F. By-pass No. 1

1—2nd-detector filter condenser.
2—Quality condenser
3—I. F. bias by-pass.
4—A. F. bias by-pass.

R. F. By-pass No. 2

5—2nd-detector—A. F. coupling condenser
6—Tracking condenser
7—2nd-detector bias by-pass.

400 Volts

R. F. By-pass No. 3

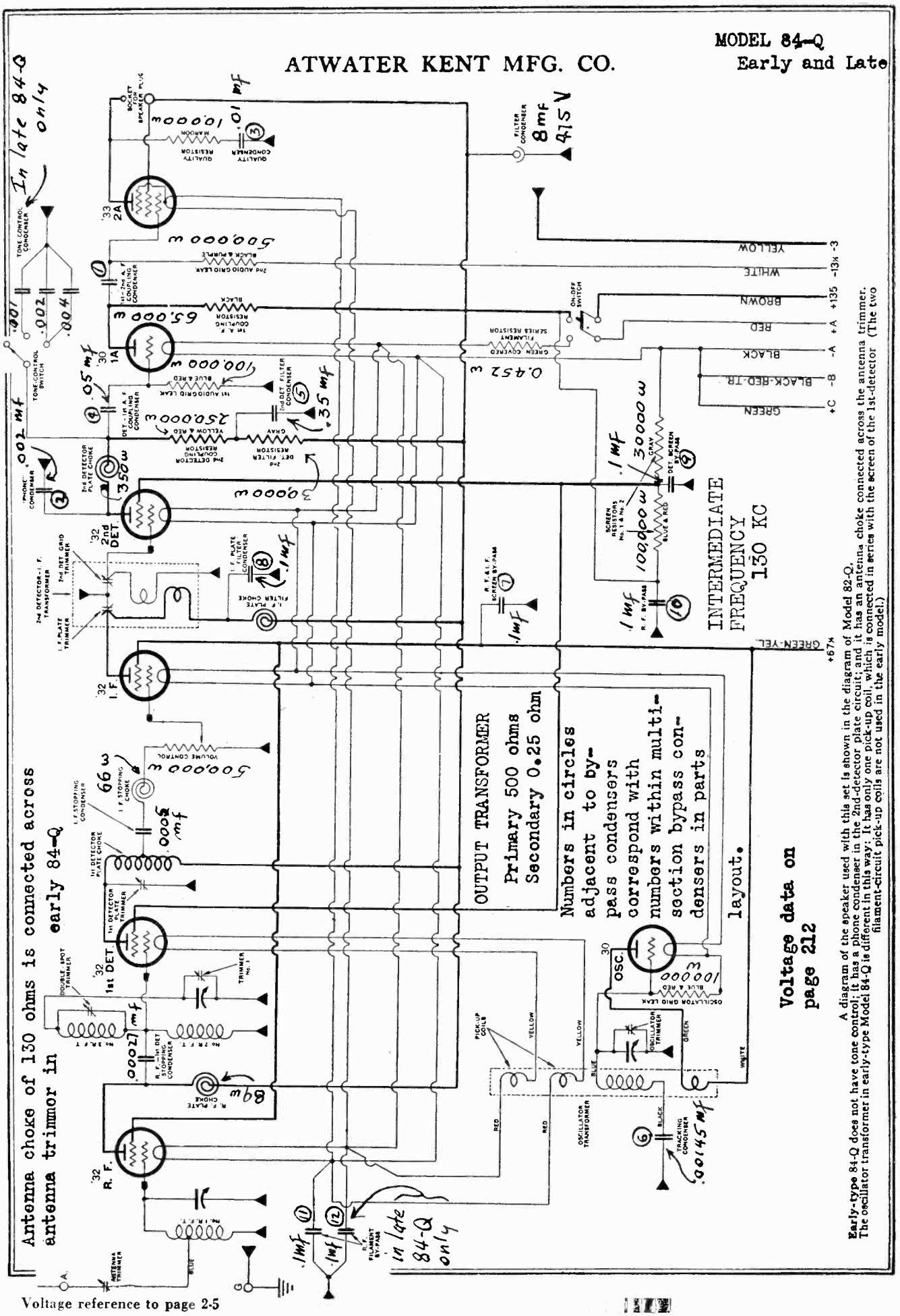
8—1st-detector filter condenser.
9—1st-detector bias by-pass.
10—1st-detector—I. F. screen by-pass.
11—2nd-detector screen by-pass.

400 Volts

100 Volts

Tone-control Condenser
(used only in late type)

12—Not used.
13—Tone-control condenser.
14—Not used.
15—Tone-control condenser.



A diagram of the speaker used with this set is shown in the diagram of Model 82-Q.
Early-type 84-Q does not have tone control; it has a phone condenser in the 2nd-detector plate circuit; and it has an antenna choke connected across the antenna trimmer.
The oscillator transformer in early-type Model 84-Q is different in this way: It has only one pick-up coil, which is connected in series with the screen of the 1st-detector (The two filament-circuit pick-up coils are not used in the early model.)

Voltage reference to page 2-5

MODEL 84-Q
Early and Late.

ATWATER KENT MFG. CO.

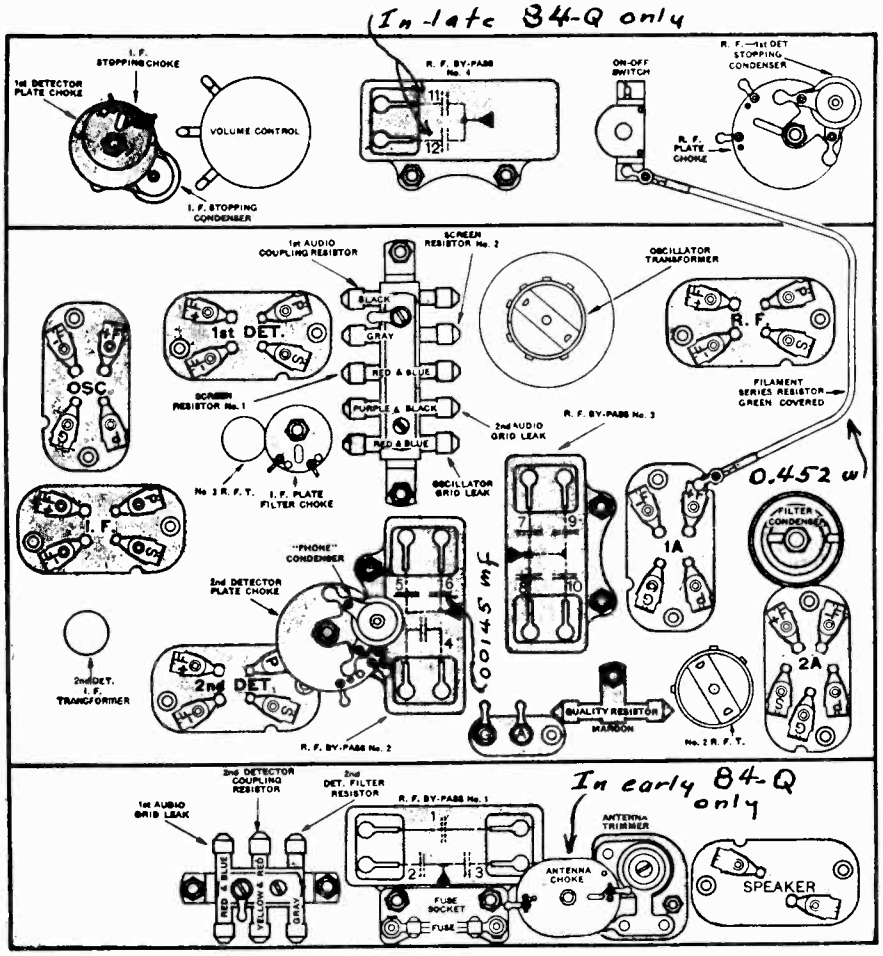


CHART OF MODEL 84-Q. (EARLY TYPE WITHOUT TONE CONTROL.)

MODEL 84-Q

By-pass Condensers in Model 84-Q

R. F. By-pass No. 1

1—1st-2nd A. F. coupling condenser
2—Phone condenser.
3—Quality condenser.

400 Volts

R. F. By-pass No. 2

4—2nd-detector—1st-A. F. coupling condenser.
5—2nd-detector filter condenser.
6—Tracking condenser.

400 Volts

R. F. By-pass No. 3

7—R. F.-I. F. screen by-pass.
8—I. F. plate filter condenser.
9—1st-detector—2nd-detector screen by-pass.
10—+B filter condenser.

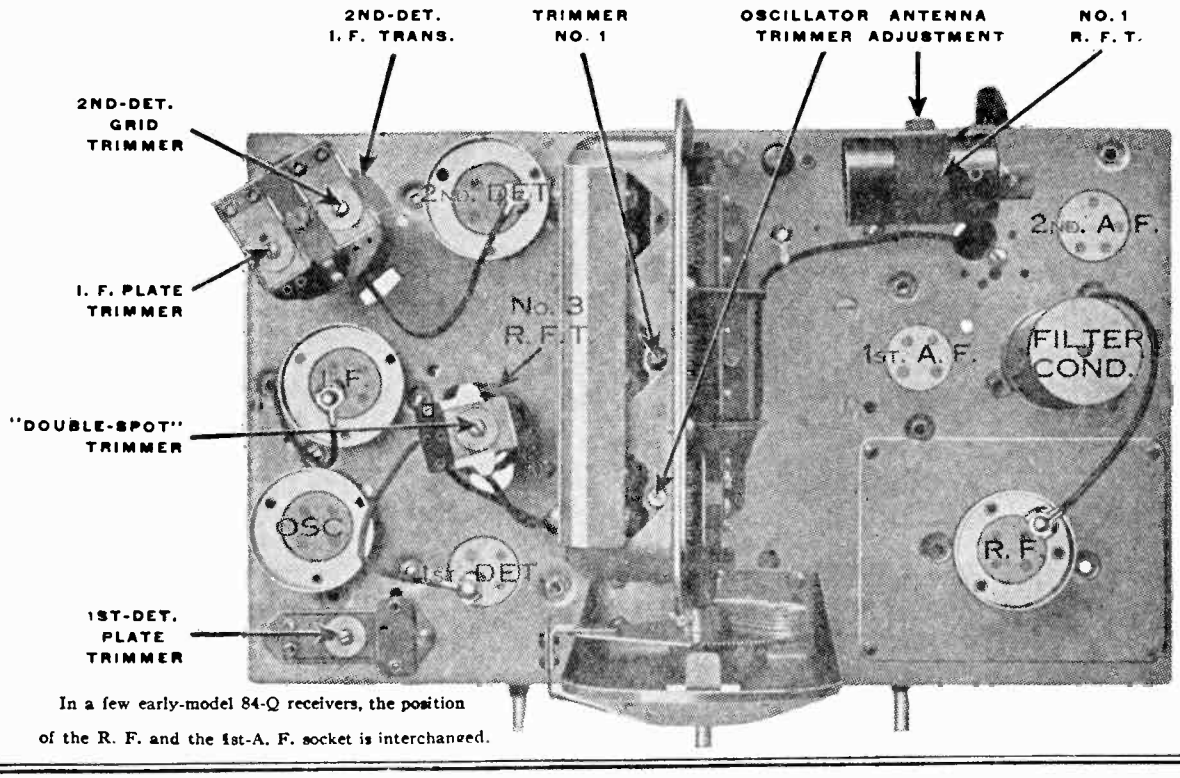
400 Volts

R. F. By-pass No. 4 (Later 84-Q only)

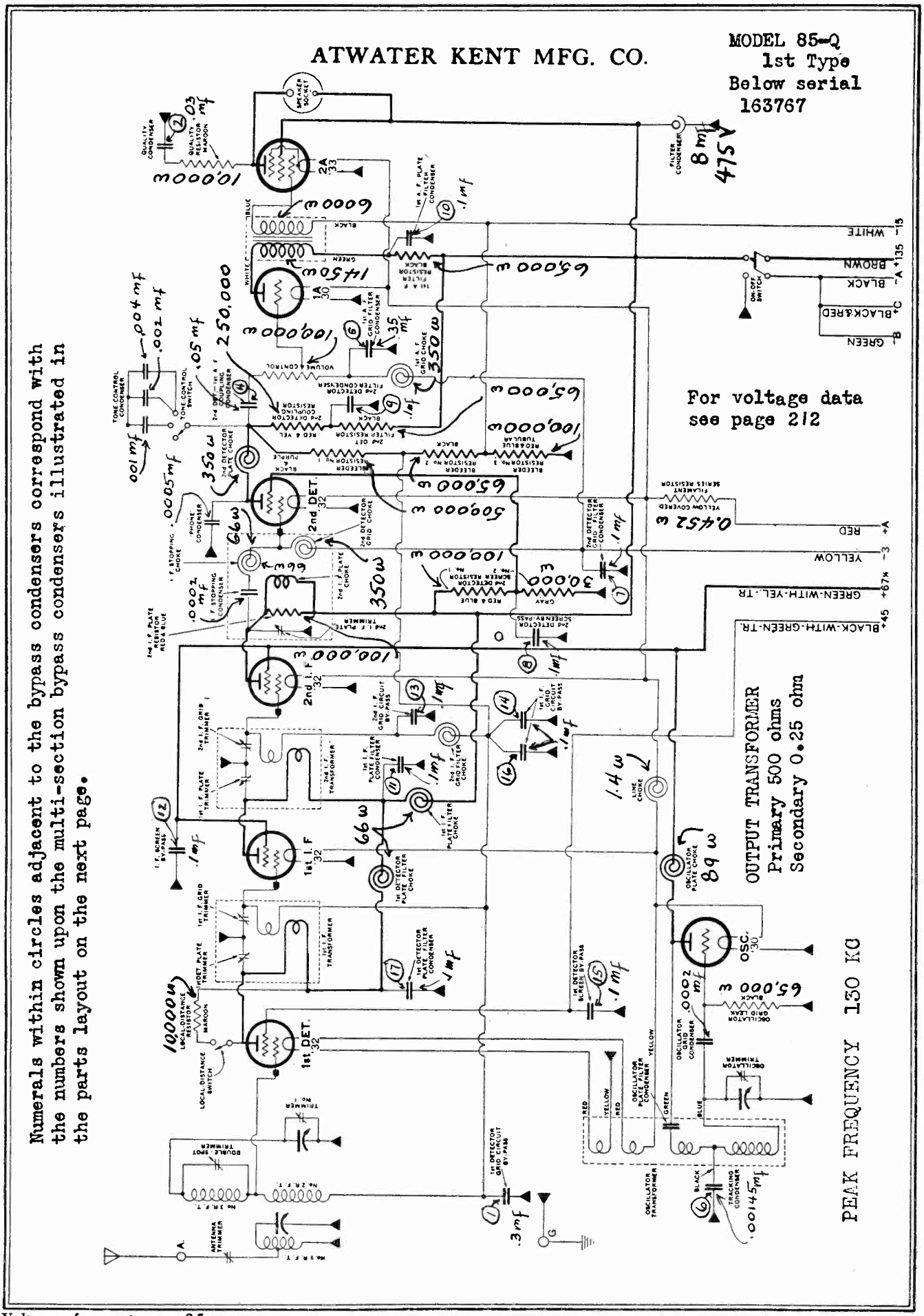
11—R. F. filament by-pass.
12—R. F. filament by-pass.

400 Volts

Tone control is 100 V.



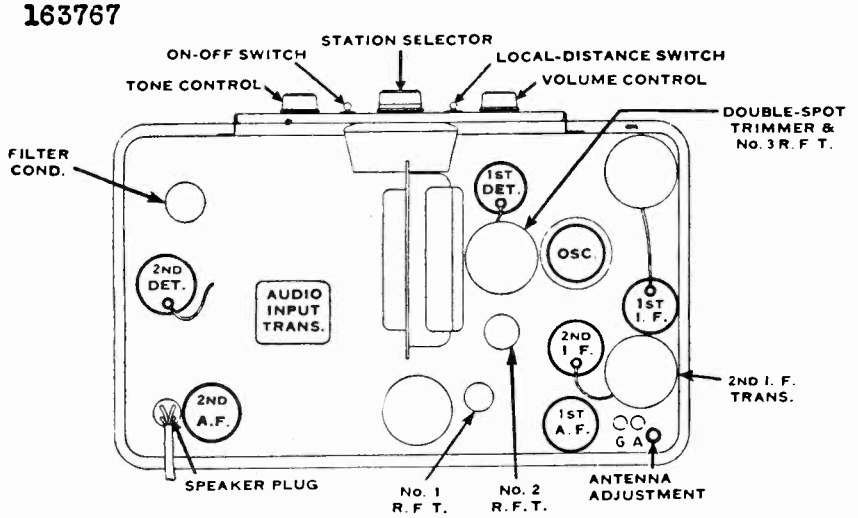
In a few early-model 84-Q receivers, the position of the R. F. and the 1st-A. F. socket is interchanged.



Voltage reference to page 2-5

MODEL 85-Q
1st Type
Below serial
163767

ATWATER KENT MFG. CO.



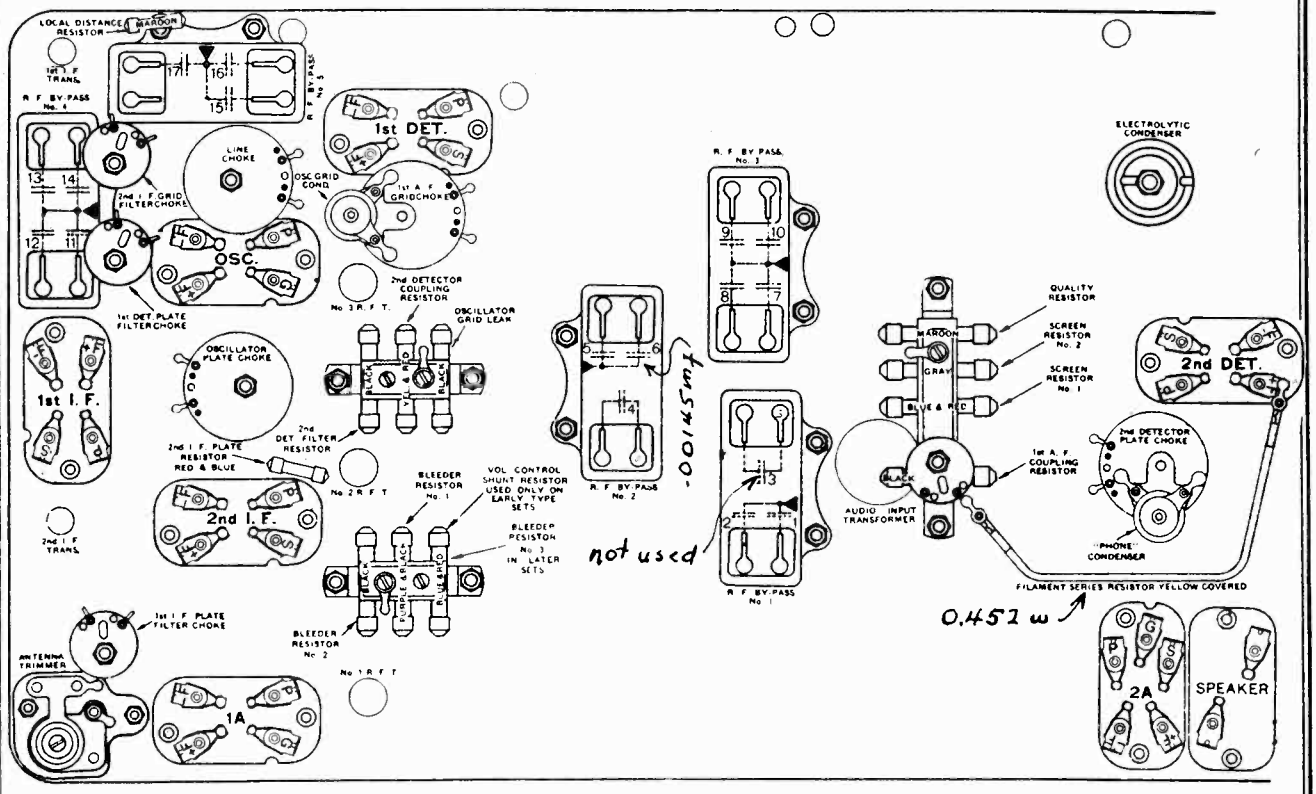
TOP VIEW OF MODEL 85-Q.

The circle in the top right corner indicates the shield for the coupling unit between the 1st-detector and the 1st-I. F. tubes. The circle in the bottom center is the shield covering the coupling unit between the 2nd-I. F. and the 2nd-detector tubes.

CONDENSERS

RF Bypass # 1
19980
400 volts
RF Bypass # 2
19150
400 volts
RF Bypass # 3
15262
400 volts
RF Bypass # 4
15262
400 volts
RF Bypass # 5
15262
400 volts

Tone Control condenser # 16490 100 volts



By-pass Condensers in Model 85-Q.

R. F. By-pass No. 1

1—1st-detector grid-circuit by-pass.
2—Quality condenser.
3—Not used.

R. F. By-pass No. 2

4—2nd-detector—1st-A. F. coupling condenser.
5—1st-A. F. grid filter condenser.
6—Tracking condenser.

R. F. By-pass No. 3

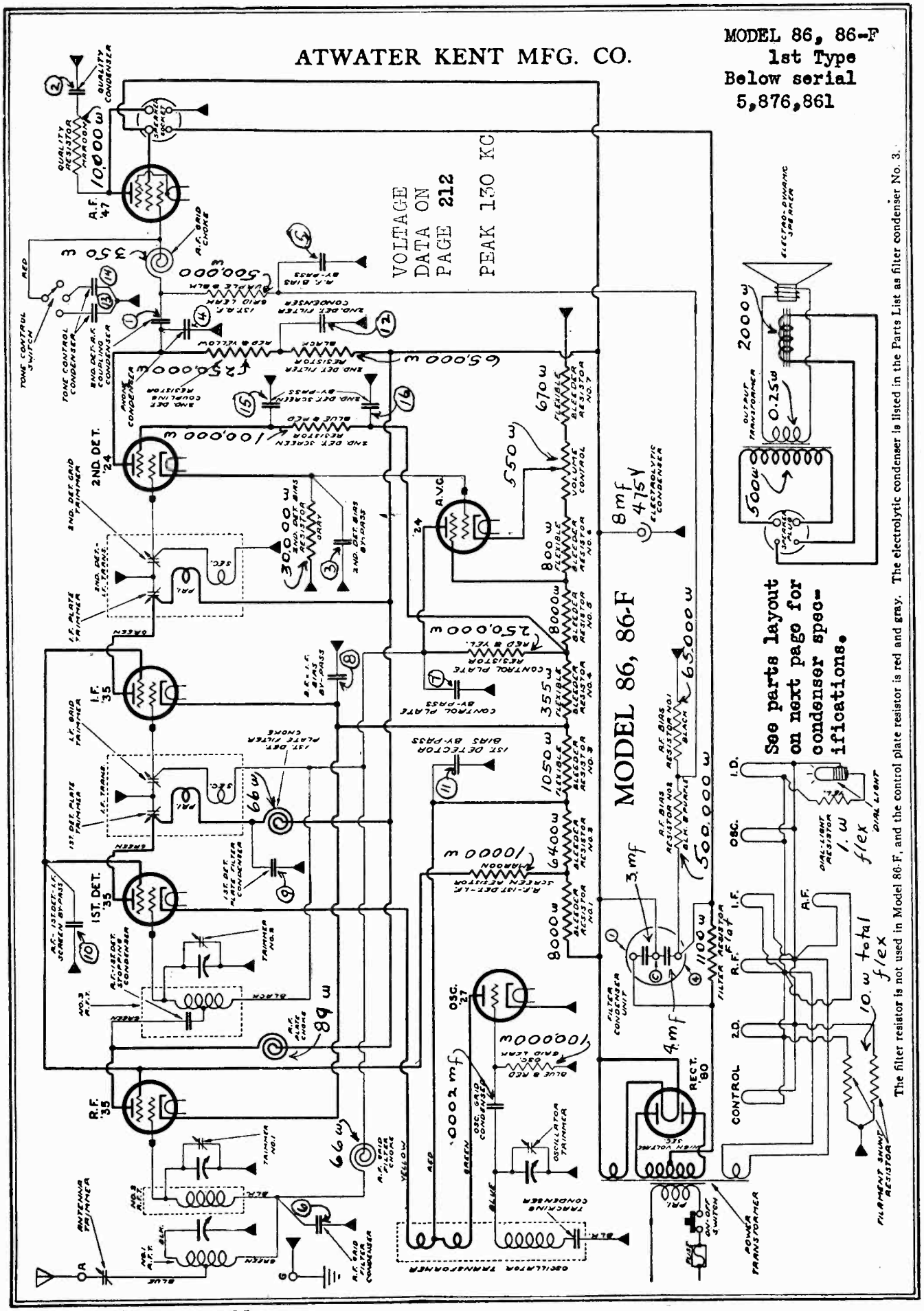
7—2nd-detector grid filter condenser.
8—2nd-detector screen by-pass.
9—2nd-detector filter condenser.
10—1st-A. F. plate filter condenser.

R. F. By-pass No. 4

11—1st-I. F. plate filter condenser.
12—I. F. screen by-pass.
13—2nd-I. F. grid-circuit by-pass.
14—1st-I. F. grid-circuit by-pass.

R. F. By-pass No. 5

15—1st-detector screen by-pass.
16—1st-I. F. grid-circuit by-pass.
17—1st-detector plate filter condenser.



Voltage reference to page 2-5

MODEL 86, 86-F
1st Type
Below serial
5,876,861

ATWATER KENT MFG. CO.

FILTER CONDENSER. The two small numbers adjacent to the filter condenser representations correspond with the numbers upon the condenser. The capacity between terminal (1) and the center stud is 3. mfd and between terminal (4) and the center stud it is 4. mfd.

BYPASS CONDENSER. The numbers in circles adjacent to the bypass condensers correspond with the designations within the multi-section units shown on the parts layout.

RF Bypass # 1	1.	.01 mfd	400 volts	2.	.03 mfd	400 volts	# 21170
	3.	.3 mfd	400 volts	4.	.0006 mfd	400 volts	
RF Bypass # 2	5.	.3 mfd	200 volts	6.	.02 mfd	200 volts	# 23330
	7.	.04 mfd	200 volts	8.	.05 mfd	200 volts	
RF Bypass # 3	9.	.1 mfd	400 volts	10.	.1 mfd	400 volts	# 15262
	11.	.1 mfd	400 volts	12.	.1 mfd	400 volts	
Tone Control	13.	.001 mfd	100 volts	14.	.003 mfd	100 volts	# 20010
	15.	.1 mfd	100 volts	16.	.1 mfd	100 volts	

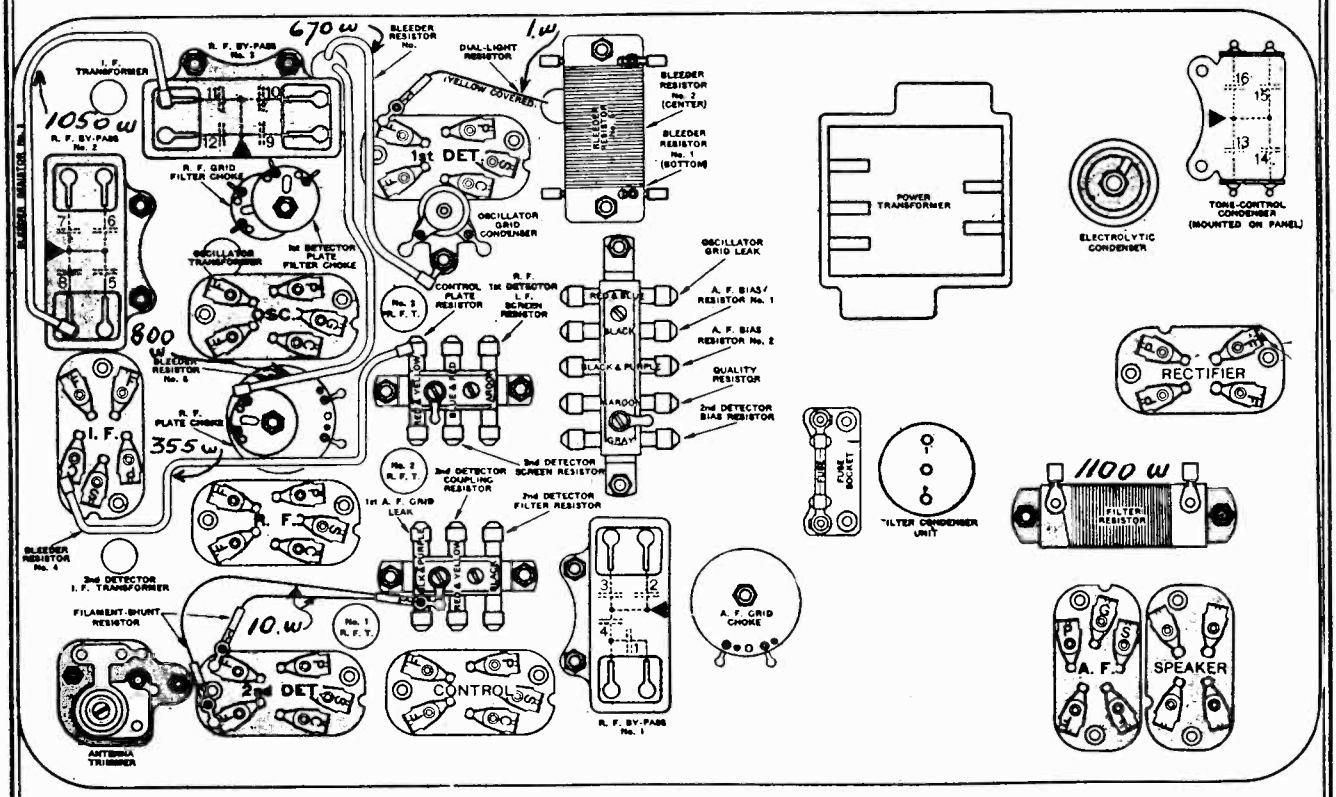


CHART OF MODEL 86, 86-F.

The filter resistor is not used in Model 86-F.

By-pass Condensers in Model 86, 86-F

R. F. By-pass No. 1

1—2nd-detector—A. F. coupling condenser.
2—Quality condenser.
3—2nd-detector bias by-pass.
4—Phone condenser.

R. F. By-pass No. 2

5—A. F. bias by-pass.
6—R. F. grid filter condenser.
7—Control plate by-pass.
8—R. F.—I. F. bias by-pass.

R. F. By-pass No. 3

9—1st-detector plate filter condenser.
10—R. F.-1st-detector—I. F. screen by-pass
11—1st-detector bias by-pass.
12—2nd-detector filter condenser.

Tone-control Condenser

13—Tone-control condenser.
14—Tone-control condenser.
15—2nd-detector screen by-pass.
16—2nd-detector screen by-pass.

ATWATER KENT MFG. CO.

MODEL 87
1st Type
Below serial
2,525,871

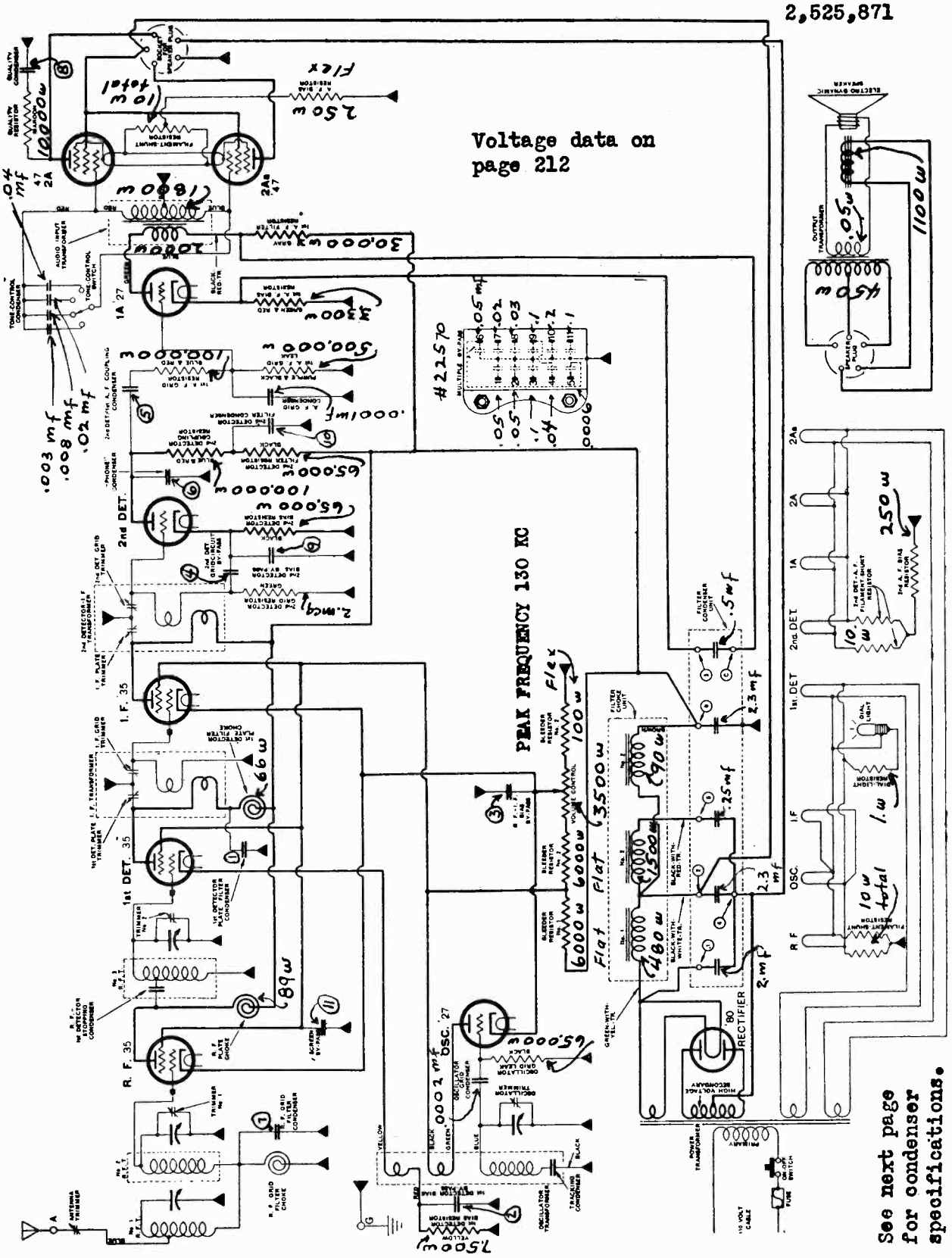


DIAGRAM OF MODEL 87 (A. C.-OPERATED).

In a few early-type Model 87 receivers, No. 2 and No. 3 R. F. transformers are connected between the R. F. tube and the 1st-detector, similar to the arrangement used in early Model 89

Voltage reference to page 2-5

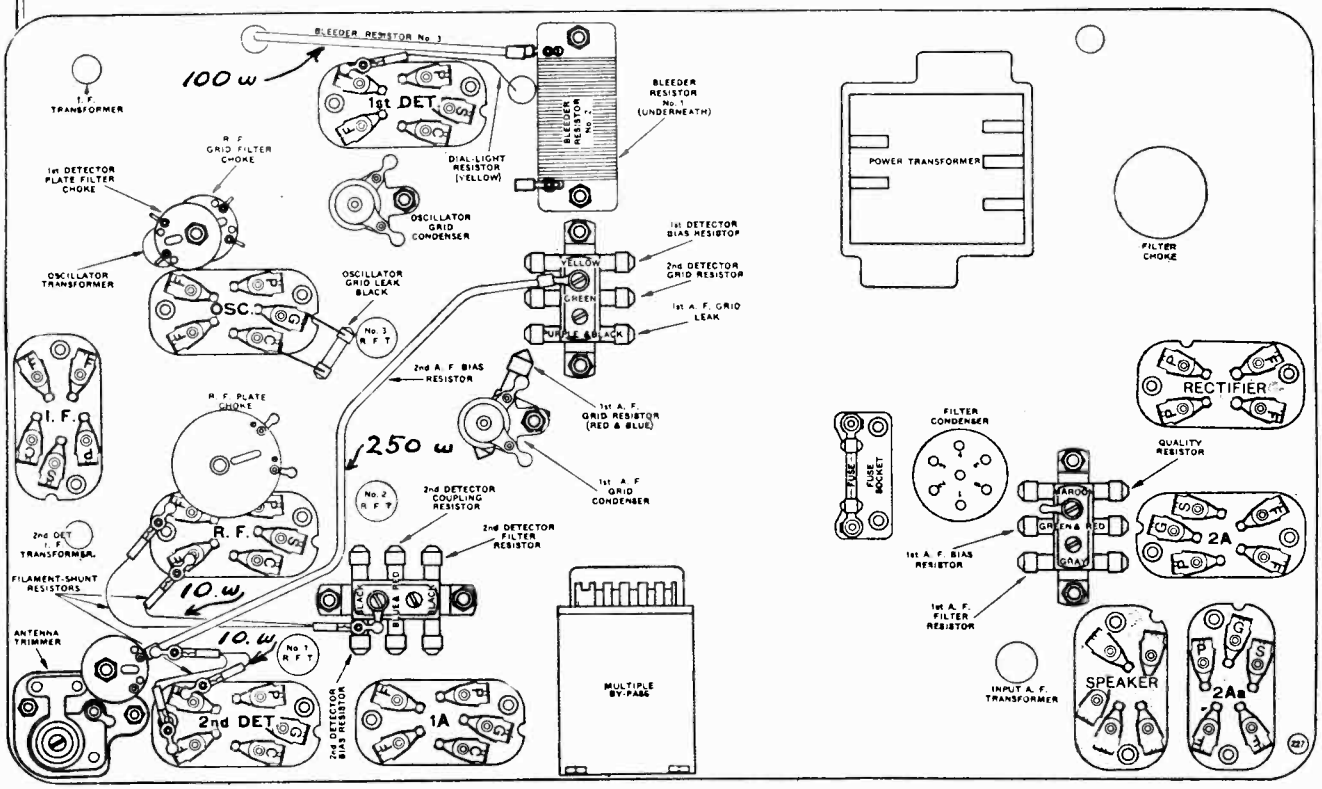
MODEL 87
1st Type
Below serial
2,525,871

ATWATER KENT MFG. CO.

BYPASS CONDENSERS: All bypass condensers located within the multiple unit are rated at 200 volts. The numbers shown within circles adjacent to the bypass condensers correspond with the numbers shown within the multiple bypass unit shown in connection with the schematic diagram. The multiple condenser unit is not marked with numbers. The condensers and numbers closest to the mounting holes represent the side of the condenser nearest the mounting holes.

FILTER CONDENSERS. The numbers in circles correspond with the numbers marked upon the filter unit. The following are the connections.

Filter # 1	2.0 mfd connected between terminals (1) and (4)
Filter # 2	2.3 mfd connected between terminals (2) and (4)
Filter # 3	2.3 mfd connected between terminal (6) and can
1st A-F Bias	.5 mfd connected between terminal (3) and center stud
Hum	.25 mfd connected between terminals (4) and (5)
	.1 mfd connected between center stud and can
	.1 mfd connected between terminal (2) and can



Condensers in Multiple By-pass Model 87

The internal connections of the multiple by-pass are shown

1—1st-detector plate filter condenser
2—1st-detector bias by-pass.
3—R. F.—I. F bias by-pass.
4—2nd-detector grid-circuit by-pass.
5—2nd-detector—1st-A. F coupling condenser.
6—Phone condenser
7—R. F. grid filter condenser.
8—Quality condenser.
9—2nd-detector bias by-pass.
10—2nd-detector filter condenser.
11—R. F.—1st-detector—I. F. screen by-pass.

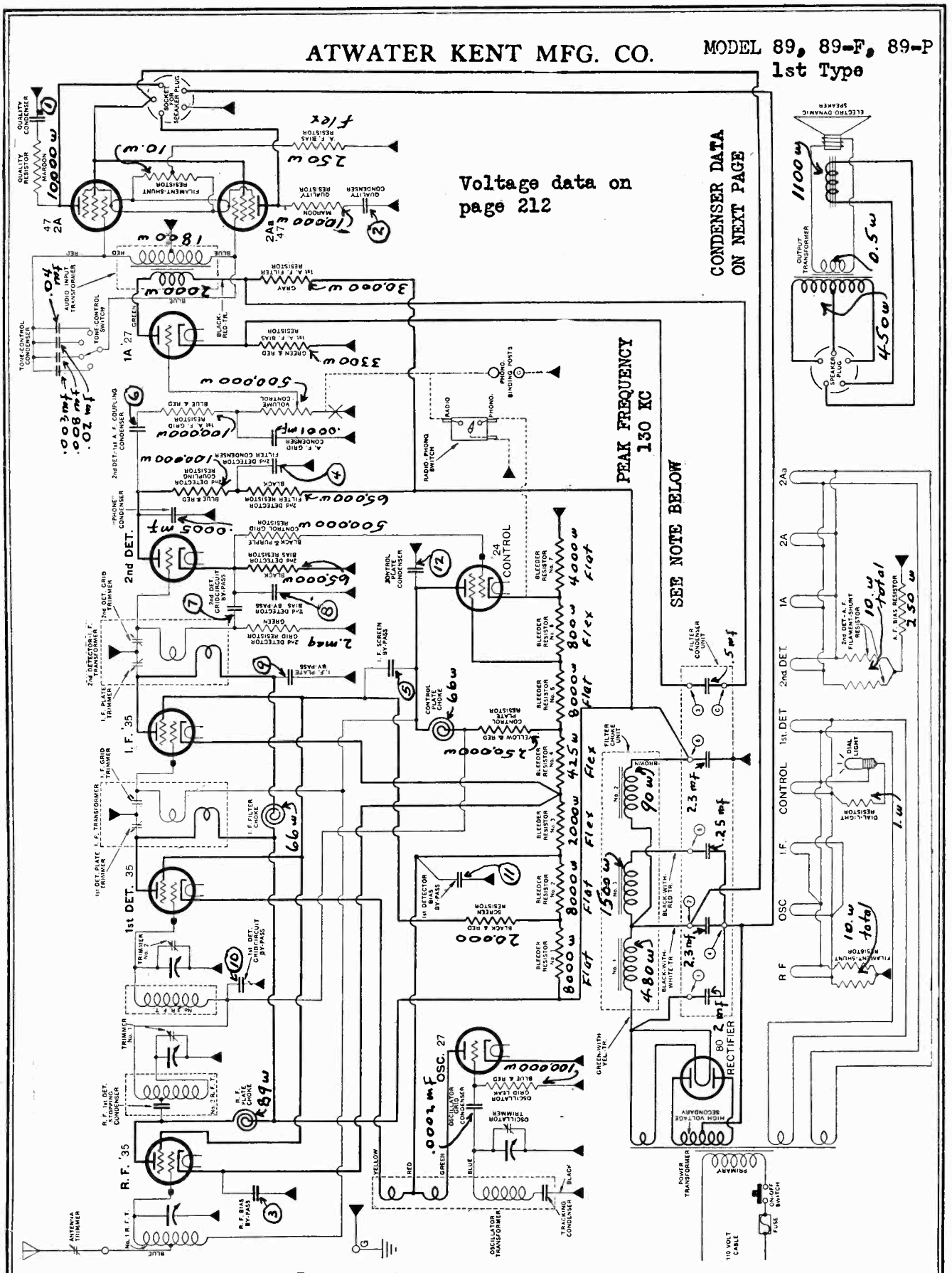


DIAGRAM OF MODEL 89, 89-F, AND 89-P (A. C.-OPERATED).

The 2nd-detector grid resistor and the 2nd-detector grid-circuit by-pass are NOT used in this set, and the grid-return of the 2nd-detector connects directly to the chassis.

Later types of this Model have No. 1 and No. 2 R. F. transformers connected **ahead** of the R. F. tube, as shown in the diagram of Model 87

The phonograph-switching circuit in 89-P is shown above in dotted lines.

Voltage reference to page 2-5

MODEL 89,89-F,89-P ATWATER KENT MFG. CO.
89 Below serial 6,755,181
89-F Below serial 1,585,395
89-P Below serial 1,935,904

FILTER CONDENSERS. The numerals adjacent to the filter condensers shown upon the wiring diagram correspond with the numbers stamped upon the condenser terminal block. The following are the connections:

Filter # 1	2.0 mfd	connected between terminals (1) and (4)
Filter # 2	2.3 mfd	connected between terminals (2) and (4)
Filter # 3	2.3 mfd	connected between terminal (6) and can
Hum	.25 mfd	connected between terminals (5) and (4)
A-F Filter	.5 mfd	connected between terminal (6) and center stud

BYPASS CONDENSERS. The numerals within circles adjacent to the bypass condensers shown upon the schematic wiring diagram correspond with the numbers shown upon the multi-section bypass units below.

Quality Condenser	1.	.03 mfd	450 volts	2.	.03	mfd	450 volts	# 21450
RF Bypass # 1	6.	.05 mfd	400 volts	7.	.04	mfd	400 volts	# 21440
	8.	.3 mfd	400 volts	*	See Note.			
RF Bypass # 2	3.	.1 mfd	400 volts	4.	.1	mfd	400 volts	# 22050
	5.	.3 mfd	400 volts					
RF Bypass # 3	9.	.1 mfd	400 volts	10.	.02	mfd	400 volts	# 21430
	11.	.06 mfd	400 volts	12.	.1	mfd	400 volts	

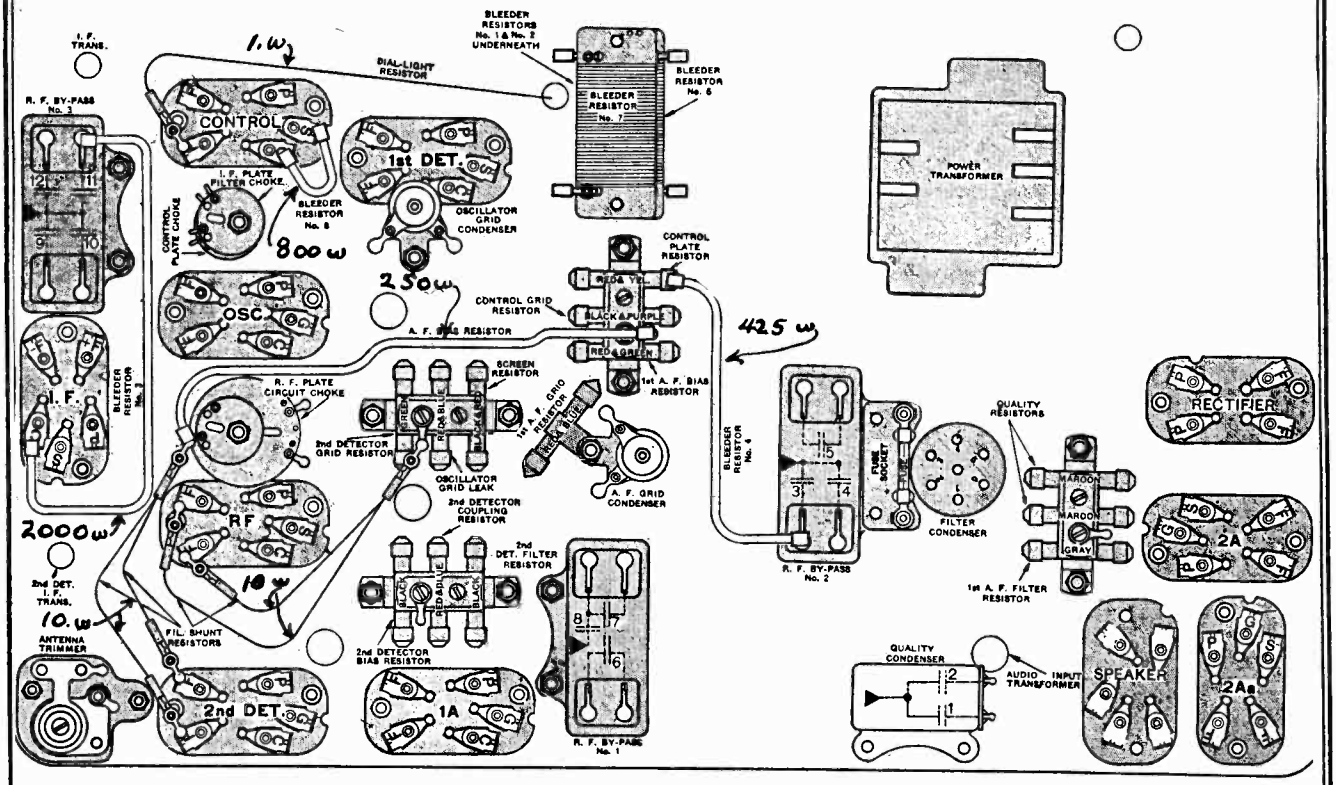


CHART OF MODEL 89, 89-F.

The 2nd-detector grid resistor is not used in late-type Model 89 89-F, 89-P.

Quality Condenser

1—Quality condenser.
2—Quality condenser.

R. F. By-pass No. 1

6—2nd-detector—1st-A. F. coupling condenser.
7—2nd-detector grid-circuit by-pass.
8—2nd-detector bias by-pass.
(A small "phone" condenser, not shown, is connected internally to the lower-left terminal of by-pass No. 1.)

R. F. By-pass No. 2

3—R. F. bias-by-pass.
4—2nd-detector filter condenser.
5—I. F. screen by-pass.

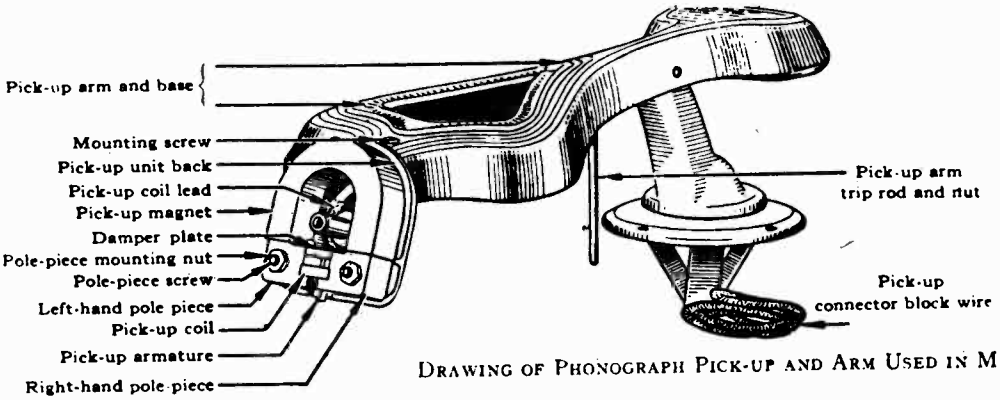
R. F. By-pass No. 3

9—I. F. plate by-pass.
10—1st-detector grid-circuit by-pass.
11—1st-detector bias by-pass.
12—Control-plate condenser.

ATWATER KENT MFG. CO.

PHONOGRAPH PICKUP AND INDUCTION DISC MOTOR

(USED IN MODELS 75 AND 89-P)



DRAWING OF PHONOGRAPH PICK-UP AND ARM USED IN MODEL 75.

PHONOGRAPH PICK-UP

ARMATURE ADJUSTMENT

The armature-pivot bearings consist of two small strips of rubber (armature spacing cushions) which space the armature from the bearing surfaces on each pole piece.

The top end of the armature fits in a slit in a flat rubber damper. The damper is fastened to a small brass plate that may be adjusted to the right or to the left, in order to center the armature in the magnet gap.

If the armature is off center, as indicated by erratic reproduction, loosen the two round-head screws that hold the damper plate, and move the plate slightly to the right or left to a point where the armature is centered. Tighten the two screws.

When the armature is correctly centered, it should take as much force to move the needle to the left as to the right.

If the rubber damper plate or armature spacing cushions are dried out, or lack life, replace them with new pieces of rubber, which may be secured from your distributor.

If the pick-up magnet must be removed from the pick-up *FIRST* place a steel or iron keeper (a large nail will do across the sides of the magnet poles, *THEN* remove the magnet.

Do *NOT* take off the keeper until *AFTER* the magnet is placed back on its pole pieces in the pick-up.

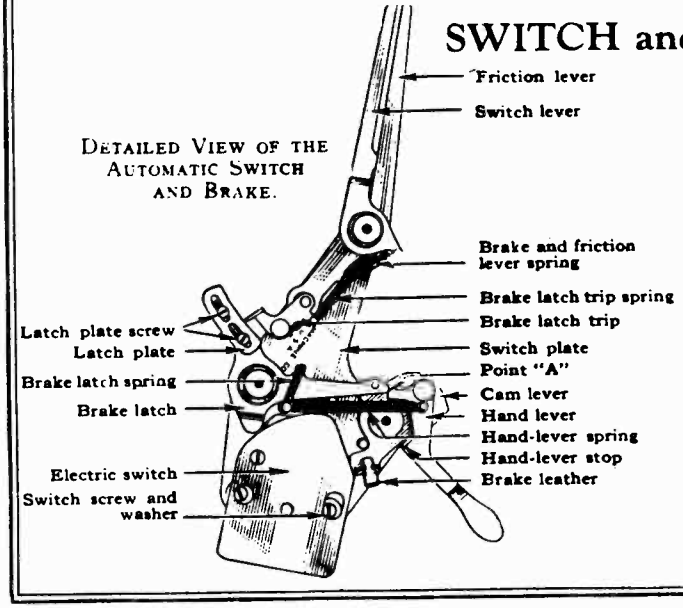
If the magnet is weak, have it re-magnetized, but be sure to place a keeper across the sides of the magnet poles before removing it from the magnetizer, and do not remove the keeper until after the magnet is placed back on its pole pieces in the pick-up.

CONTINUITY TESTS

Test across the two contacts on the neck of the molded pick-up back. The continuity reading should be nearly full. No reading indicates an open pick-up coil or leads.

Test from either contact on the pick-up to each pole piece, and to the armature. If there is any reading, it indicates that the pick-up coil or leads are grounded. This must be eliminated. Use two small pieces of thin cambric cloth to insulate the pick-up coil from the pole pieces.

AUTOMATIC ELECTRIC SWITCH and FRICTION BRAKE



DETAILED VIEW OF THE AUTOMATIC SWITCH AND BRAKE.

ADJUSTMENTS

(1) If the latch does not trip, or trips before completion of a record, bend the hand-lever stop slightly to the right or left, as necessary.

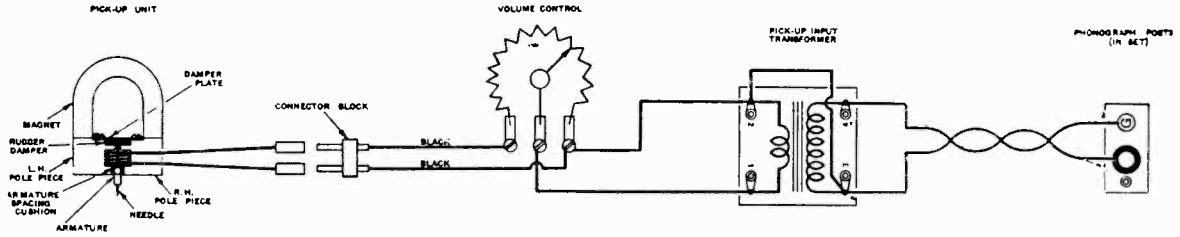
(2) If the latch trip does not engage correctly with the latch-plate, loosen the two latch-plate screws and shift the plate one way or the other, as necessary. Re-tighten the screws Remove any burrs from the teeth of the latch plate with fine emery paper.

(3) If the electric switch does not make and break contact when the hand-lever is turned on and off, it may be necessary to bend the long contact spring, or loosen the two switch screws and move the switch until the correct position is found. In the off position, there should be at least $\frac{1}{16}$" gap between the contact points.

PHONOGRAPH PICKUP

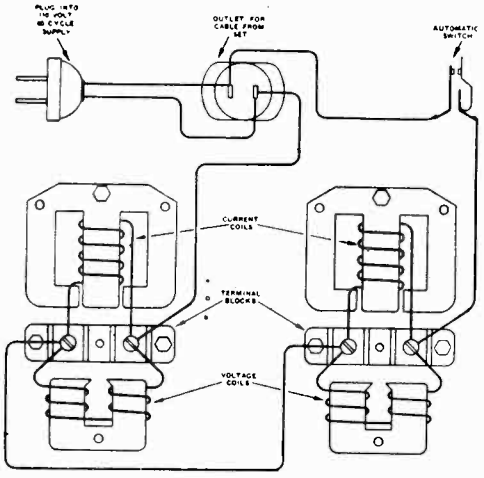
ATWATER KENT MFG. CO.

PHONOGRAPH PICKUP AND INDUCTION DISC MOTOR (USED IN MODELS 75 AND 89-P)

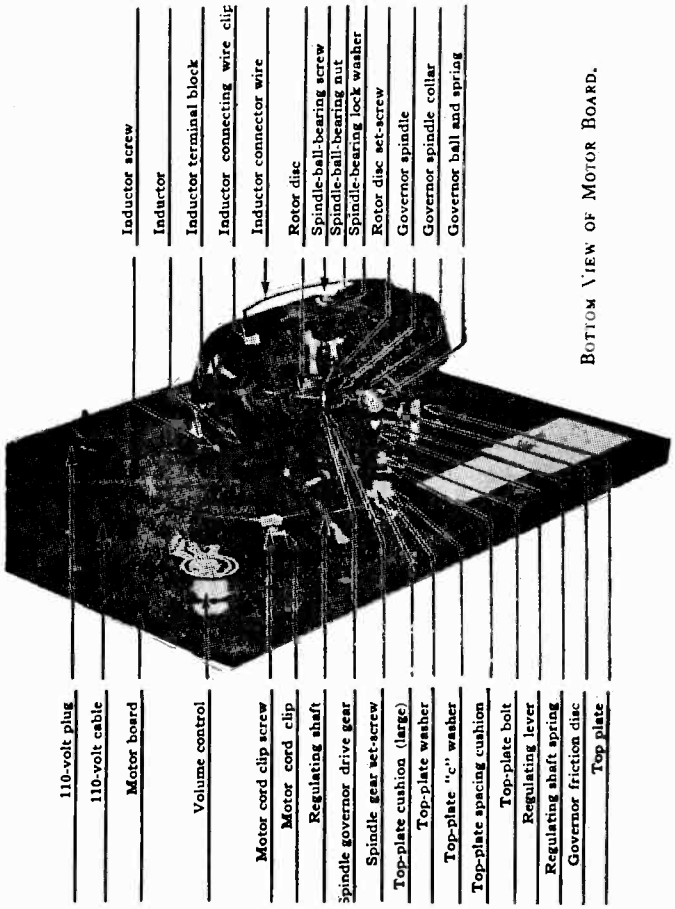


ELECTRICAL CONNECTIONS OF PICK-UP, VOLUME CONTROL AND INPUT TRANSFORMER.

INDUCTION DISC PHONOGRAPH MOTOR



ELECTRICAL CONNECTIONS OF THE INDUCTION-DISC PHONOGRAPH MOTOR.



BOTTOM VIEW OF MOTOR BOARD.

The induction-disc phonograph motor has two sets of field coils or "inductors." Each inductor has three coils and five "poles." A magnetic field is produced between the poles by the alternating current flowing through the three coils.

The edge of a non-magnetic rotor disc fits in the narrow gap between the poles on each inductor. The magnetic field between the poles causes the disc to rotate.

The rotor disc itself has no coils, and there are no electrical connections to it.

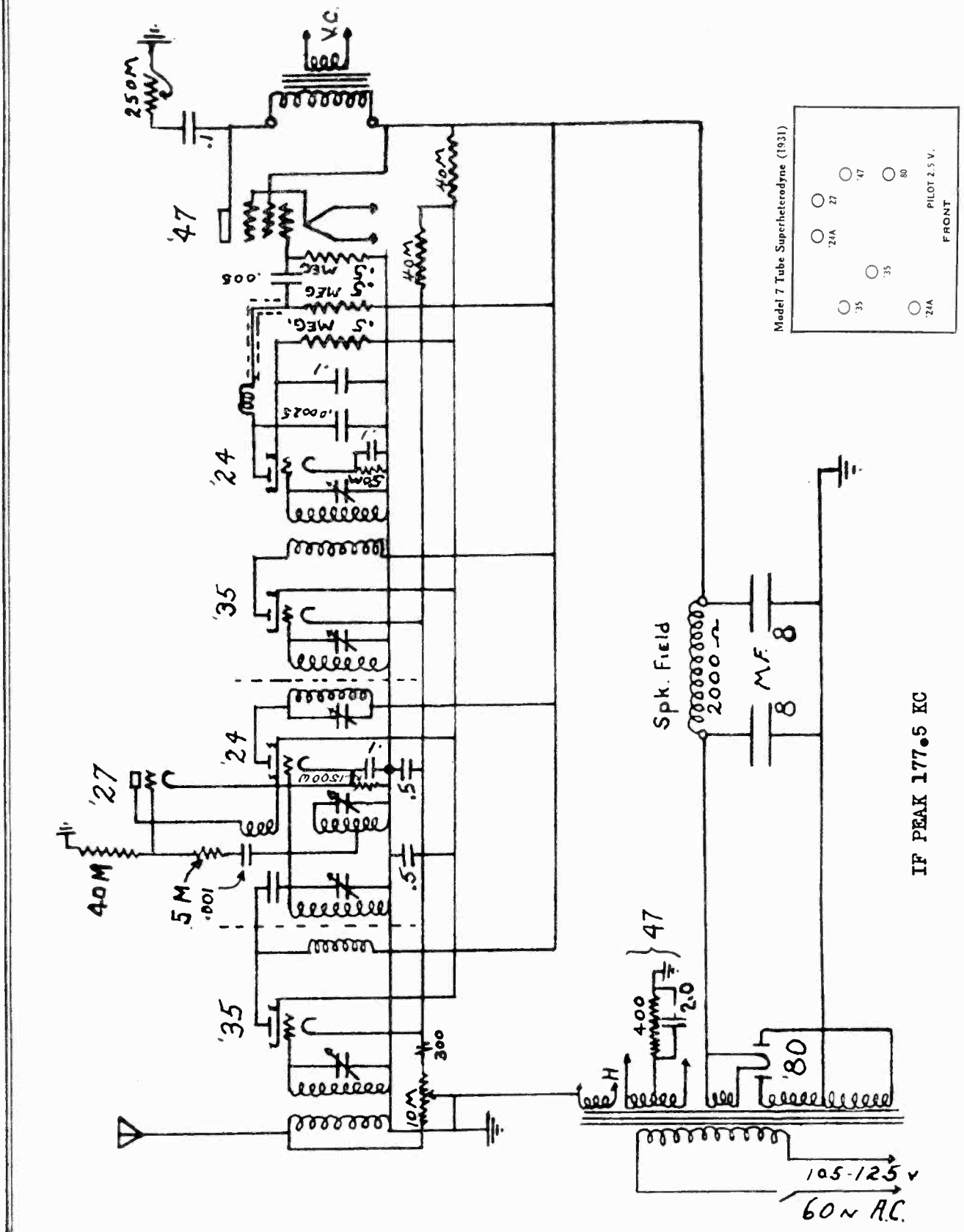
The speed of the rotor disc is controlled by a governor and a regulating screw device. The correct speed is 78 revolutions per minute (with pick-up on record). The speed may be determined by counting the number of revolutions made by the turntable in one minute. It is preferable, however, to regulate the speed with the aid of a stroboscope disc, which may be purchased from your distributor. Simple instructions for the use of this inexpensive device are printed on the back of the stroboscope disc. The speed should be checked at least twice a year.

The motor and governor bearings and gears must be kept well greased at all times. See chart on bottom of motor board.

When an induction-disc motor requires repair, it is advisable to tear it down completely, replace the defective parts, clean and grease all parts, and reassemble correctly.

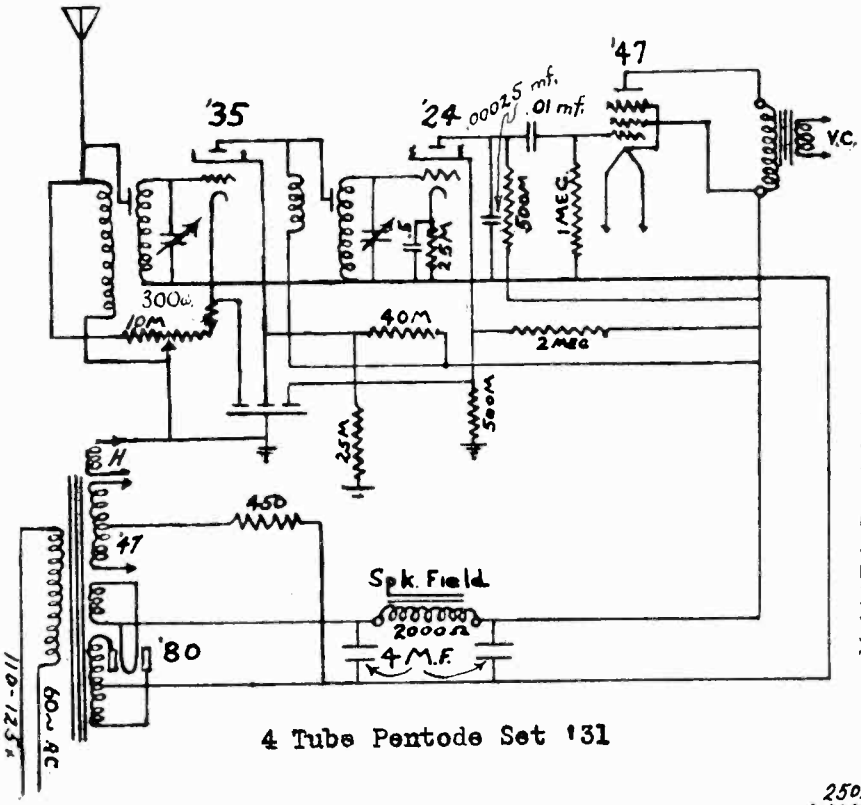
MODEL 7 Tube Super
Pentode '31

AUDIOLA RADIO CO.

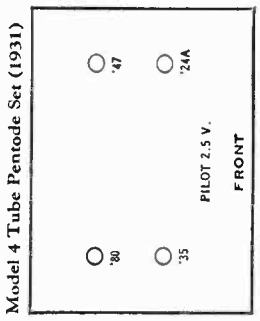


MODEL 4 Tube Pentode '31
MODEL 5 Tube Pentode '31

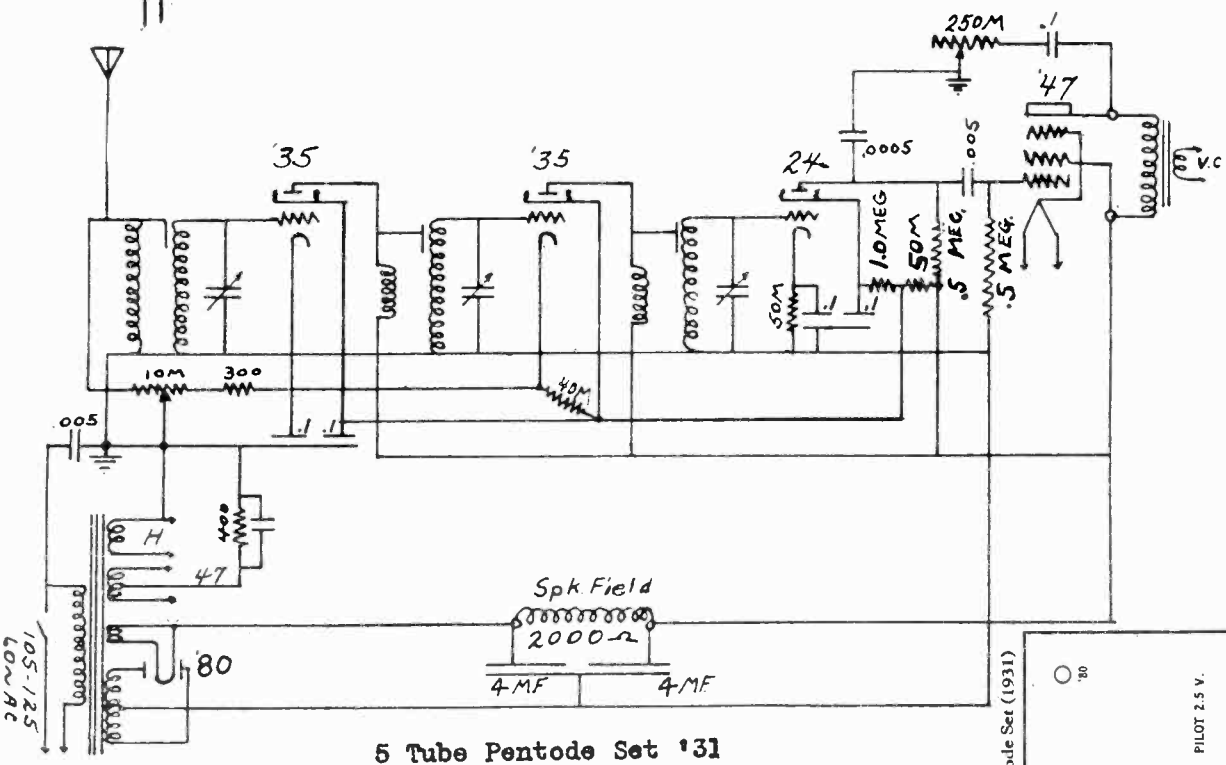
AUDIOLA RADIO CO.



4 Tube Pentode Set '31

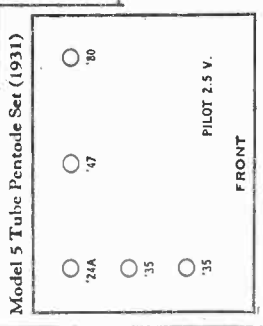


#62231
4T-31-RF



5 Tube Pentode Set '31

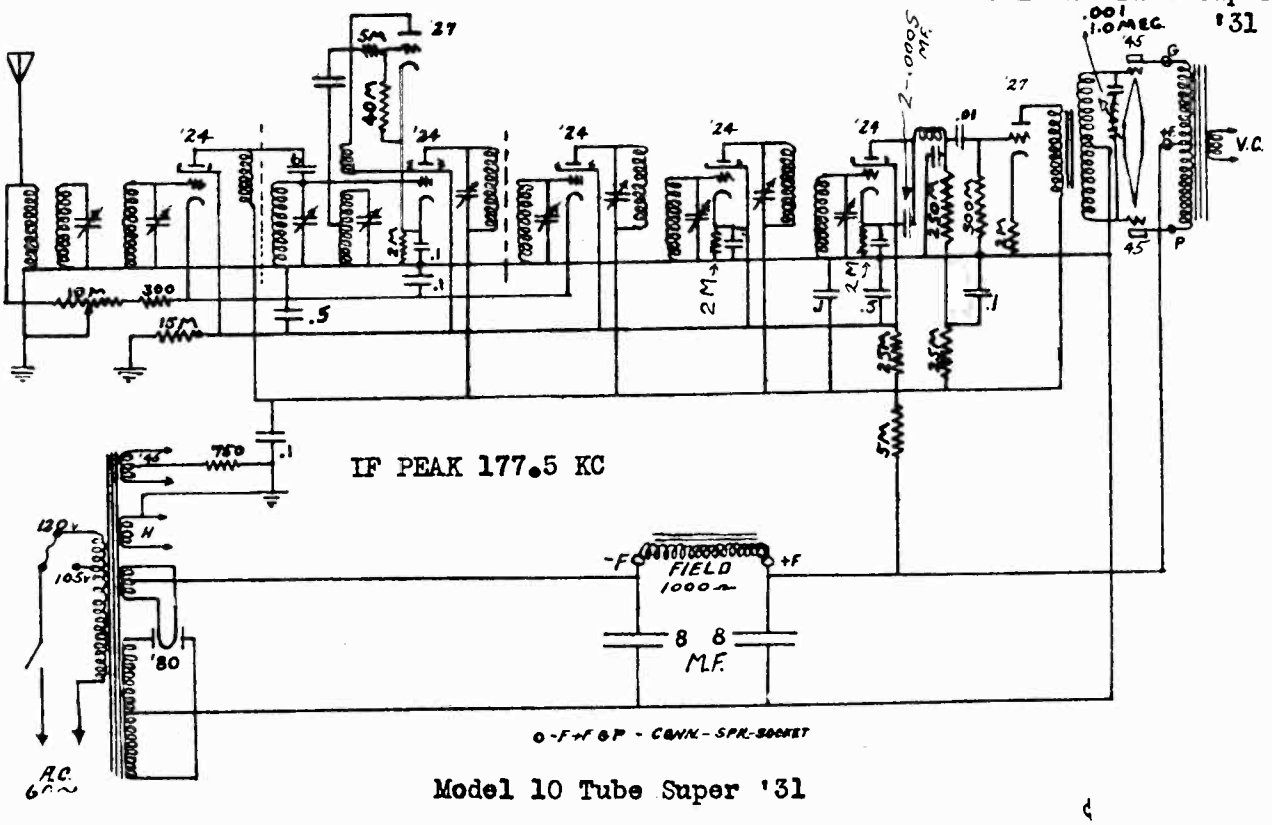
13T5



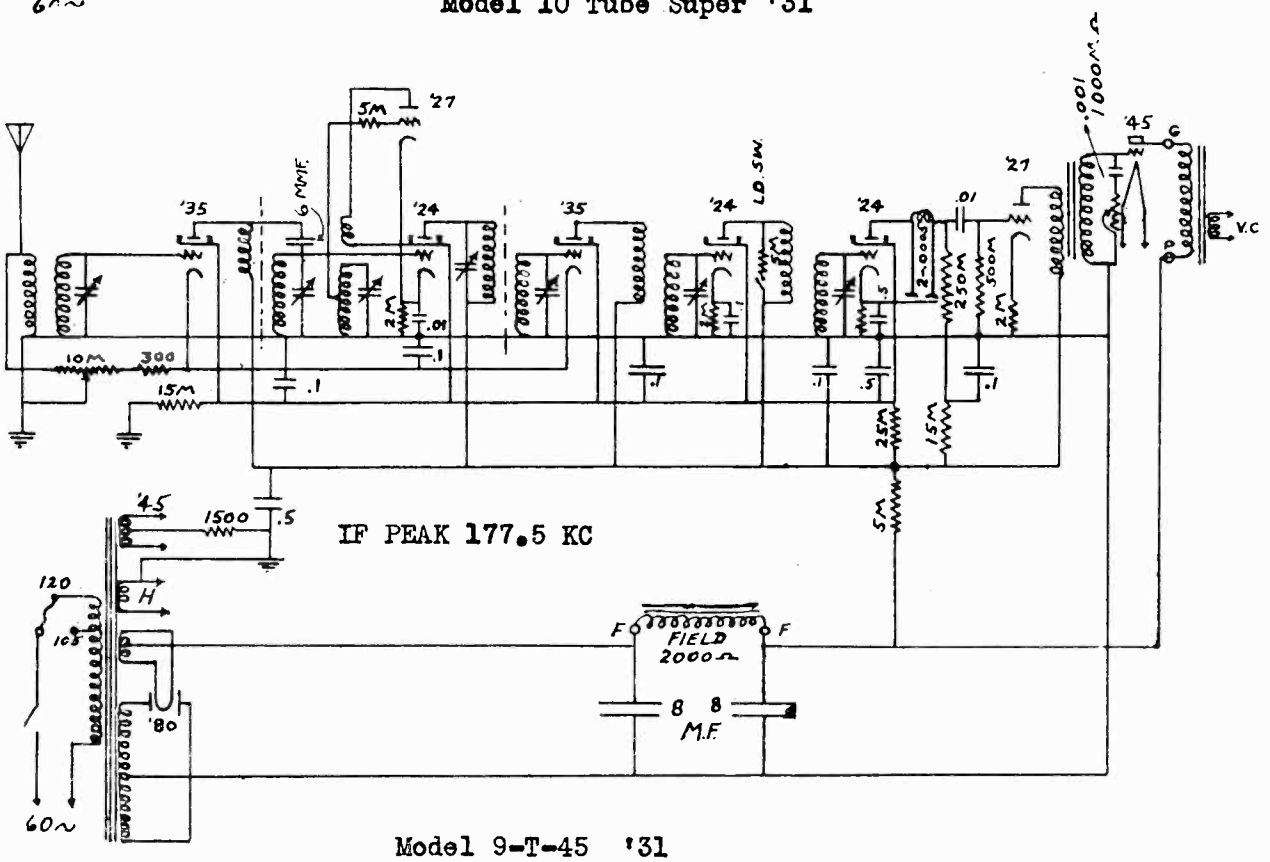
AUDIOLA RADIO CO.

MODEL 9-T-45 Super '31

MODEL 10 Tube Super '31



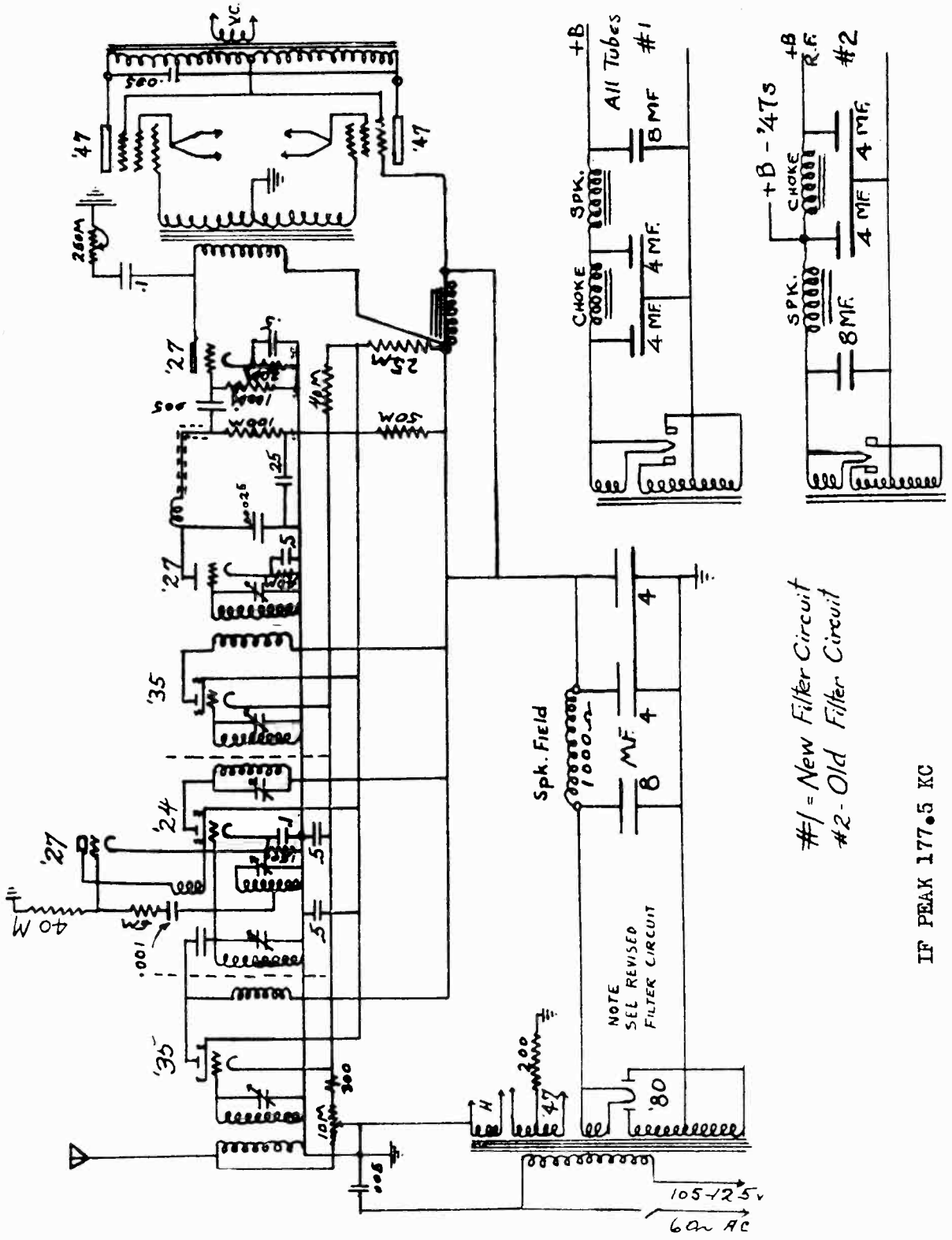
Model 10 Tube Super '31



Model 9-T-45 '31

MODEL 9 Tube Super
(2) Pentode '31
"13-S-9"

AUDIOLA RADIO CO



#1 = New Filter Circuit
#2 - Old Filter Circuit

IF PEAK 177.5 KC

SERVICE NOTES

A There are ten tuned circuits, all of which must be in accurate adjustment in order to allow this receiver to operate at its maximum efficiency These adjustments are made by means of eleven trimming condensers which are carefully set and locked at the factory and should need no further attention provided they are not tampered with. These condensers are all of the compression type and are adjusted by the rotation of the long nut and locked by means of a hardened steel set screw The service man should delicately attempt rotation of these nuts with a special nut wrench to determine if they are loose, and if all are tight and locked they should never be touched unless it is definitely assured that the set is out of alignment after every other service possibility has been exhausted.

A piece of thin fiber tubing about 7" long and with ¼" bore which can be supplied by us for this purpose may form the nut wrench. The locking screw driver should be long and thin enough to slip down thru the fiber tubing and lock the set screw, while the nut is held from turning by the tubing wrench.

By inspection of the service wiring diagram it will be noted that there are six capacity adjustments, one on each primary and one on each secondary of the three intermediate-frequency transformers. These condensers resonate the tuned circuits of the intermediate-frequency amplifier to exactly 175 KC. There are also four trimming condensers, one on each section of the four gang variable condenser. The three trimming condensers associated with the pre-selector, R.F. and detector stages balance these three stages to resonance while the fourth trimming condenser, which is on the oscillator section of the four gang variable condenser, forms part of the network which adjusts the oscillator to its constant frequency difference of 175 KC. There is also another oscillator trimming condenser located next to the last section of the four gang tuning condenser and adjacent to the first detector tube. In some chassis this is reached thru a hole in the top of the condenser gang near the front and in others thru a hole in the chassis in front of the dial. This condenser is called the 600 KC oscillator trimming condenser, while the one on the oscillator section of the tuning condenser gang is the 1400 KC oscillator trimming condenser.

In order to adjust all of these trimming condensers properly it is necessary that an R. F. oscillator giving a modulated signal at exactly 1400 KC and 600 KC, and also at 175 KC be secured. An output measuring instrument is also necessary. The General Radio Company type 360-A or Radio Products Co., Dayton, Ohio, HR 180 test oscillators are suitable for this purpose.

The output meter leads should be connected across the cone coil connections of the loud speaker. The cone coil may remain connected or be disconnected, satisfactory results being obtained in either case, altho if the cone is left connected an audible check on the instrument readings is obtained.

The receiver must be balanced from back to front or left to right, that is, the last I. F. transformer is adjusted first, then the next to last I. F. transformer, etc., working backwards thru the first detector, oscillator, R. F. and pre-selector.

The following procedure should be followed:

3. Adjust the secondary and then the primary trimming condenser of the last I. F. transformer until a maximum reading is obtained on the output meter. These two circuits must be accurately peaked to 175 KC and will be found quite sharp.

4. After adjusting the third I. F. transformer shift the coupling lead to the control grid connection of the first I. F. tube and place the lead at a greater distance from the oscillator. Be sure the shields are on all tubes except that to which the coupling lead is connected. Turn the volume control up slightly and in exactly the same manner adjust the secondary and primary of the second I. F. transformer until a maximum indication is obtained. The output must be kept low enough to give a sharp peak.

5. Clip the coupling lead on to the control grid cap of the first detector tube, replacing all other shields and proceed to peak the secondary and primary of the first I. F. transformer. If the set oscillates it is due to the coupling lead being connected to the grid of the first detector and the volume control should be slightly reduced to prevent oscillation. Now with a given indication on the output meter proceed to "touch up" all of the adjusted trimming condensers to take advantage of any slight increase in reading that might be obtained by more careful peaking, and after they are all correctly balanced lock them by holding with the nut wrench and tightening the set screw with a long screw driver. The insertion of the metallic screw driver will affect the reading of the output meter but it should return to normal when the screw driver is removed. Note carefully that the locking does not throw the stage out of alignment. It may be easier for the service man who is not familiar with this operation to slightly reduce the capacity of the trimming condenser and lock the screw down fairly tight and then after removing the screw driver, slowly bring the unit up to its peak reading This may be found difficult at first but with a little experience the I F stages can be rapidly balanced.

6. Now set the test oscillator in operation at exactly 1400 KC, place the set in normal operation and replace the oscillator tube and all shields Make sure the receiver is properly grounded and has an average antenna Set the local-distance switch in the distance position thereby connecting the antenna. Couple the test oscillator to the antenna by means of its coupling lead. Locate the 600 KC oscillator trimming condenser and turn it nearly all the way in, about one-half revolution from full in.

7. Tune in the 1400 KC signal, adjusting the volume control to give a good indication on the output meter, then adjust the tuning knob until the scale reads 1400 KC. Now adjust the 1400 KC oscillator trimming condenser (on the oscillator section of the four gang condenser), the first detector, R. F. and pre-selector circuit trimming condensers in the order given until maximum output is obtained. The oscillator section of the gang condenser is the second section from the dial. When the set is not in a cabinet the location of a pointer for dial calibration is determined at maximum capacity of the condensers by a line provided at the low frequency end of the tuning scale.

8. Tune the test oscillator to exactly 600 KC. Tune in the signal on the set and adjust the 600 KC oscillator trimming condenser for maximum output on the output meter while revolving the gang condenser back and forth, by rotating the tuning knob.

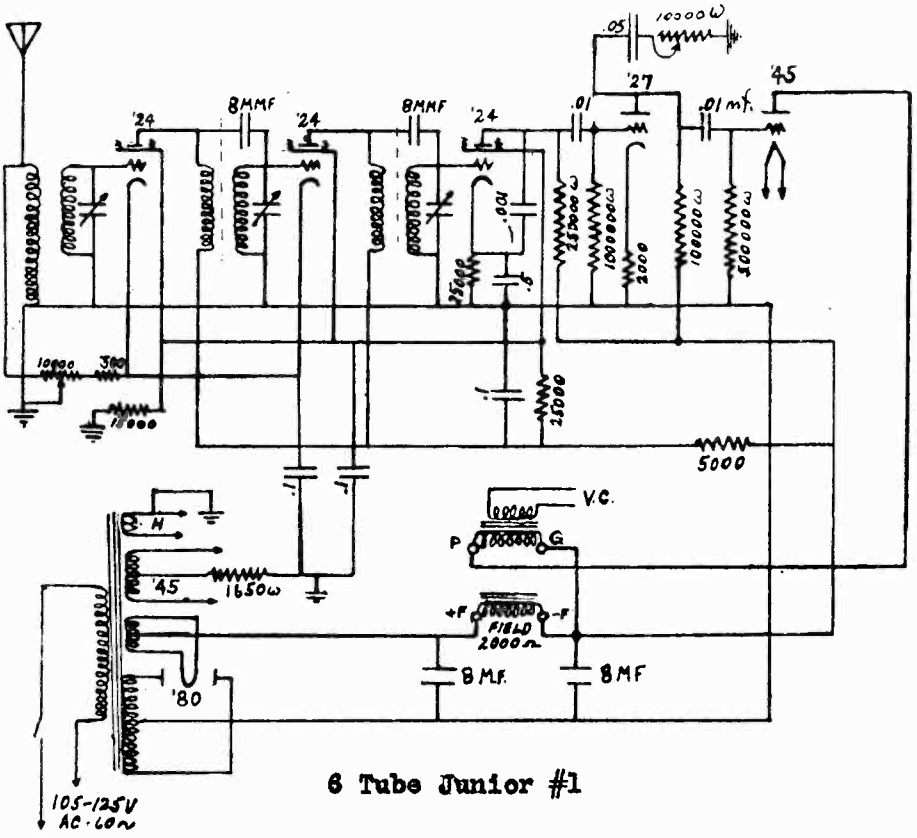
9. Set the test oscillator frequency to 1400 KC and set the selector scale at exactly 1400 KC. Adjust the four trimming condensers as in No. 7 in the order given until maximum output is obtained.

10. Place the test oscillator again in operation at 600 KC and tune in the signal and if adjustments have been properly made the signal will be received at maximum output when the scale reads exactly 600 KC. If not the operations described above must be repeated.

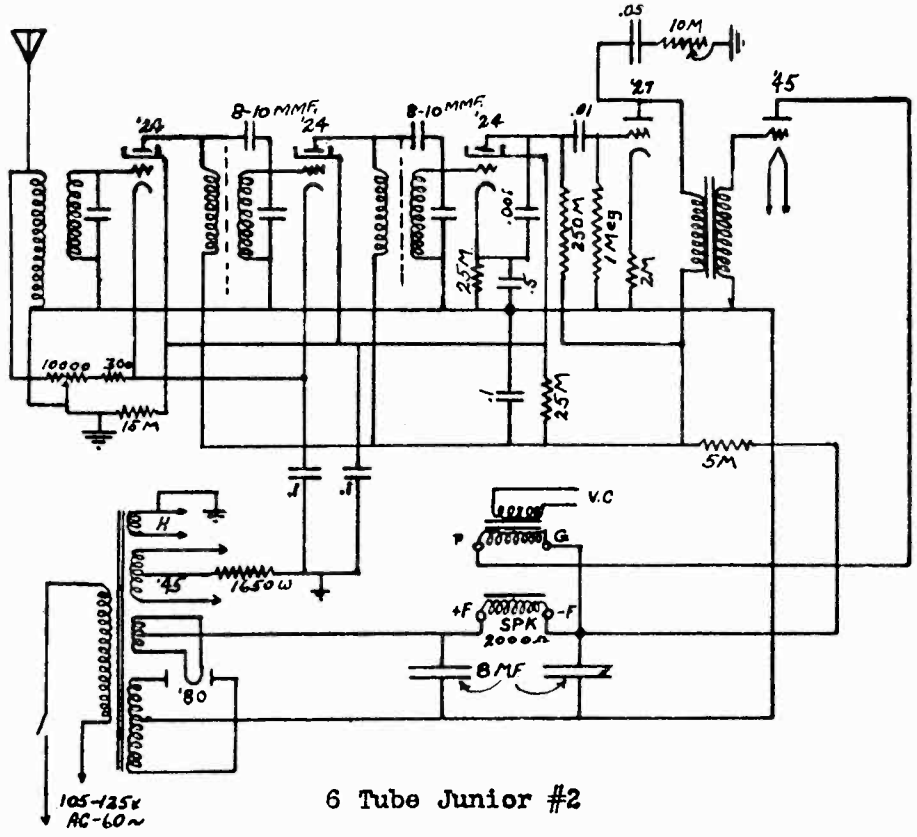
11. Now lock all trimmers as described in the instructions for locking the intermediate frequency trimmers (paragraph 5) while carefully watching the output meter to make sure that the locking action does not throw the stage out of alignment.

MODEL 6 Tube Jr. #1
MODEL 6 Tube Jr. #2

AUDIOLA RADIO CO.



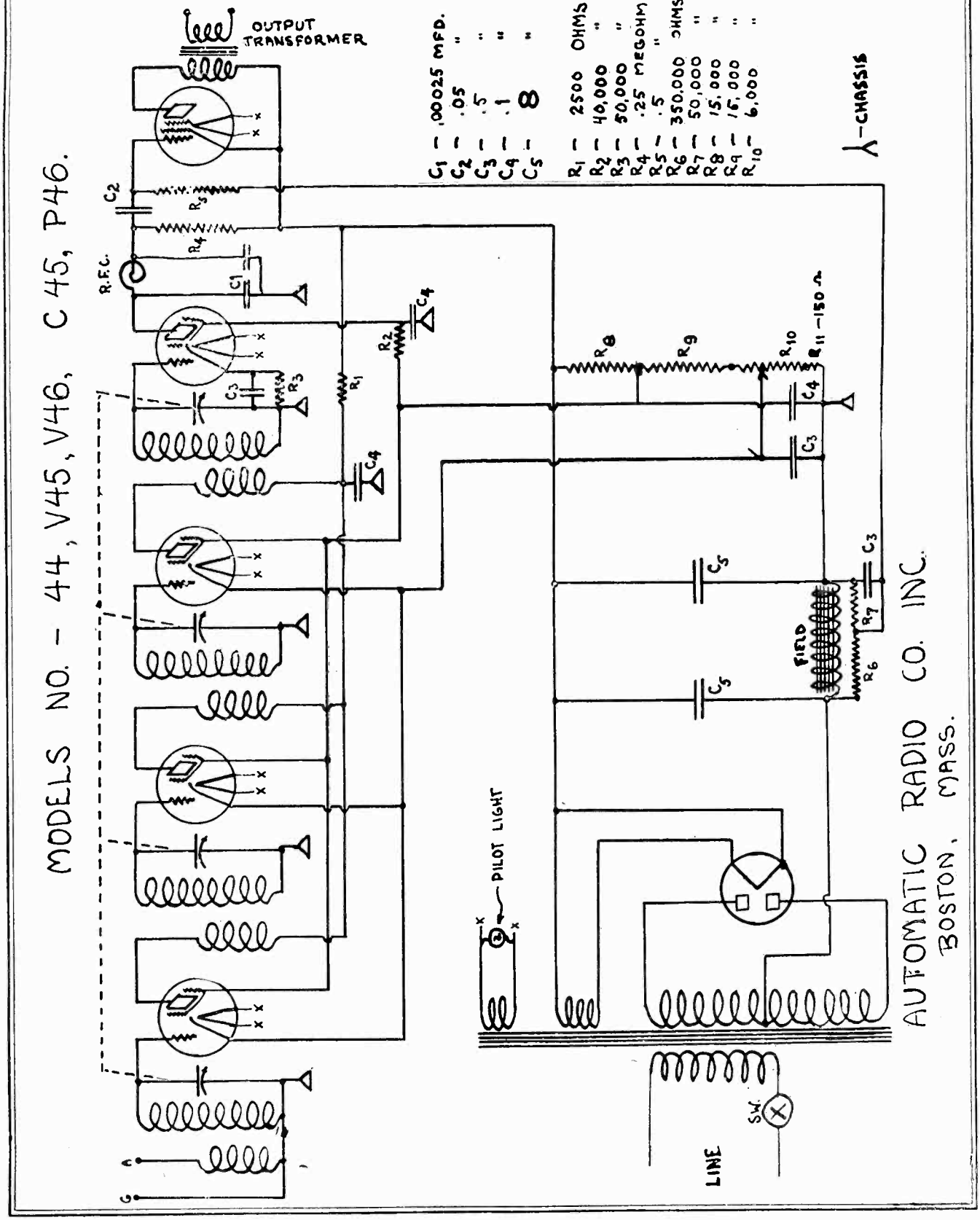
6 Tube Junior #1



6 Tube Junior #2

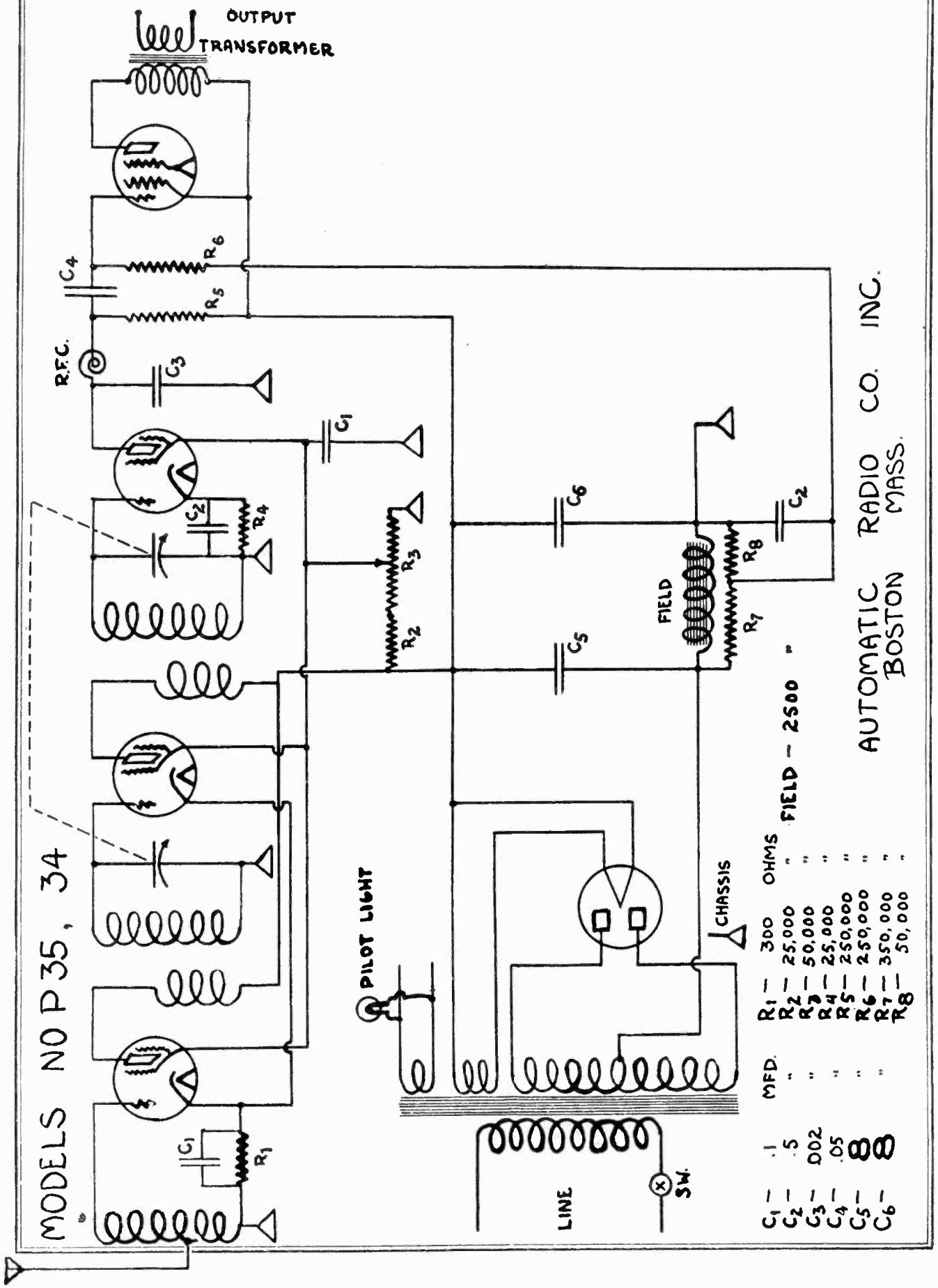
AUTOMATIC RADIO MFG. CO

MODEL 44
MODEL V-45, V-46
MODEL C-45
MODEL P-46



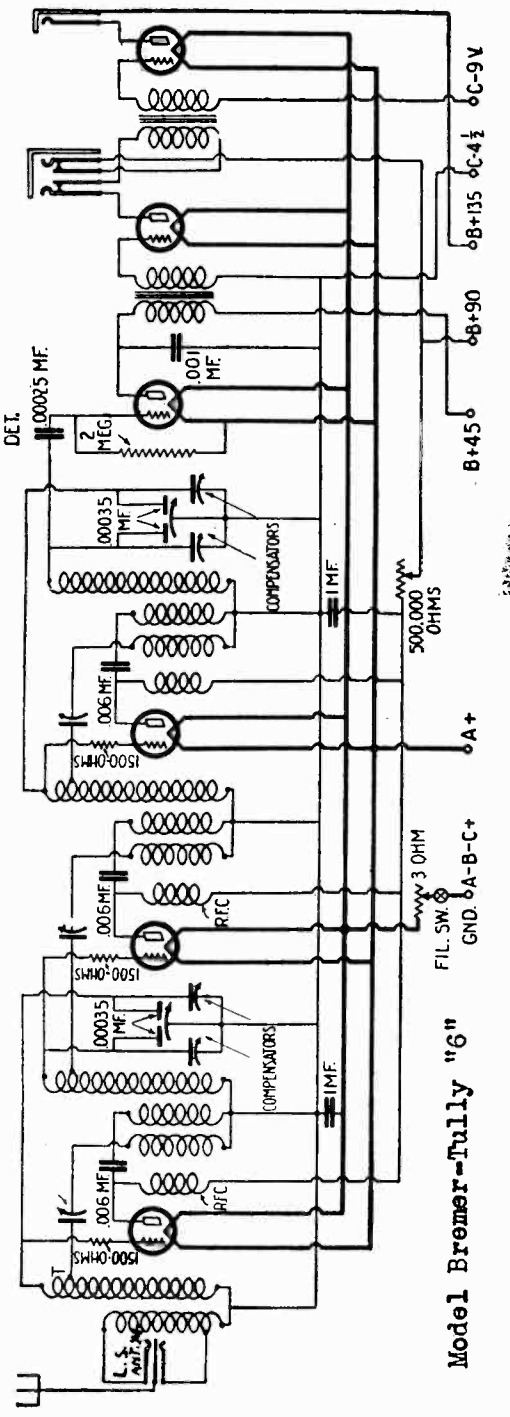
MODEL P-35, 34

AUTOMATIC RADIO MFG. CO.



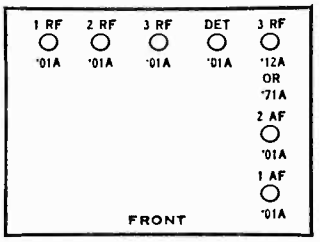
BREMER-TULLY MFG. CO

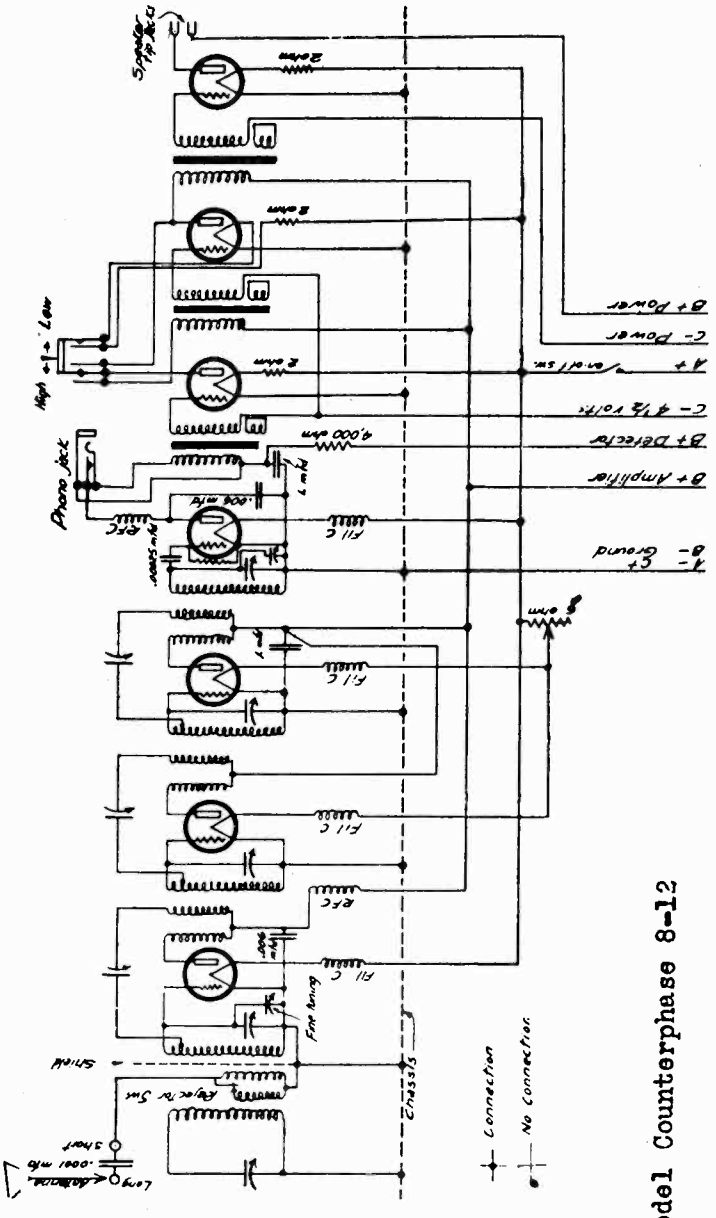
MODEL B-T 6
MODEL 8-12
Counterphase



Model Bremer-Tully "6"

Models 8-12, 8-16

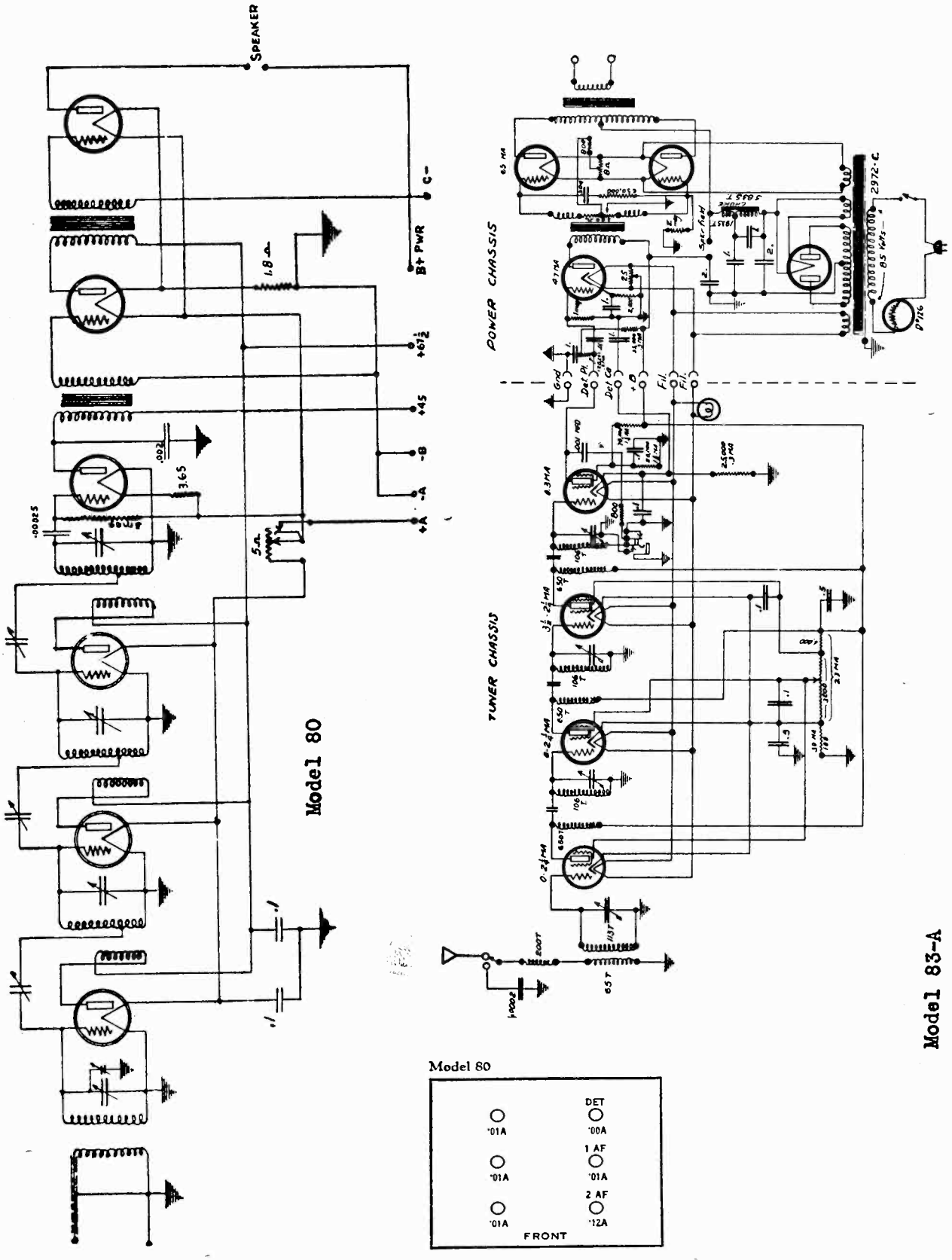




Model Counterphase 8-12

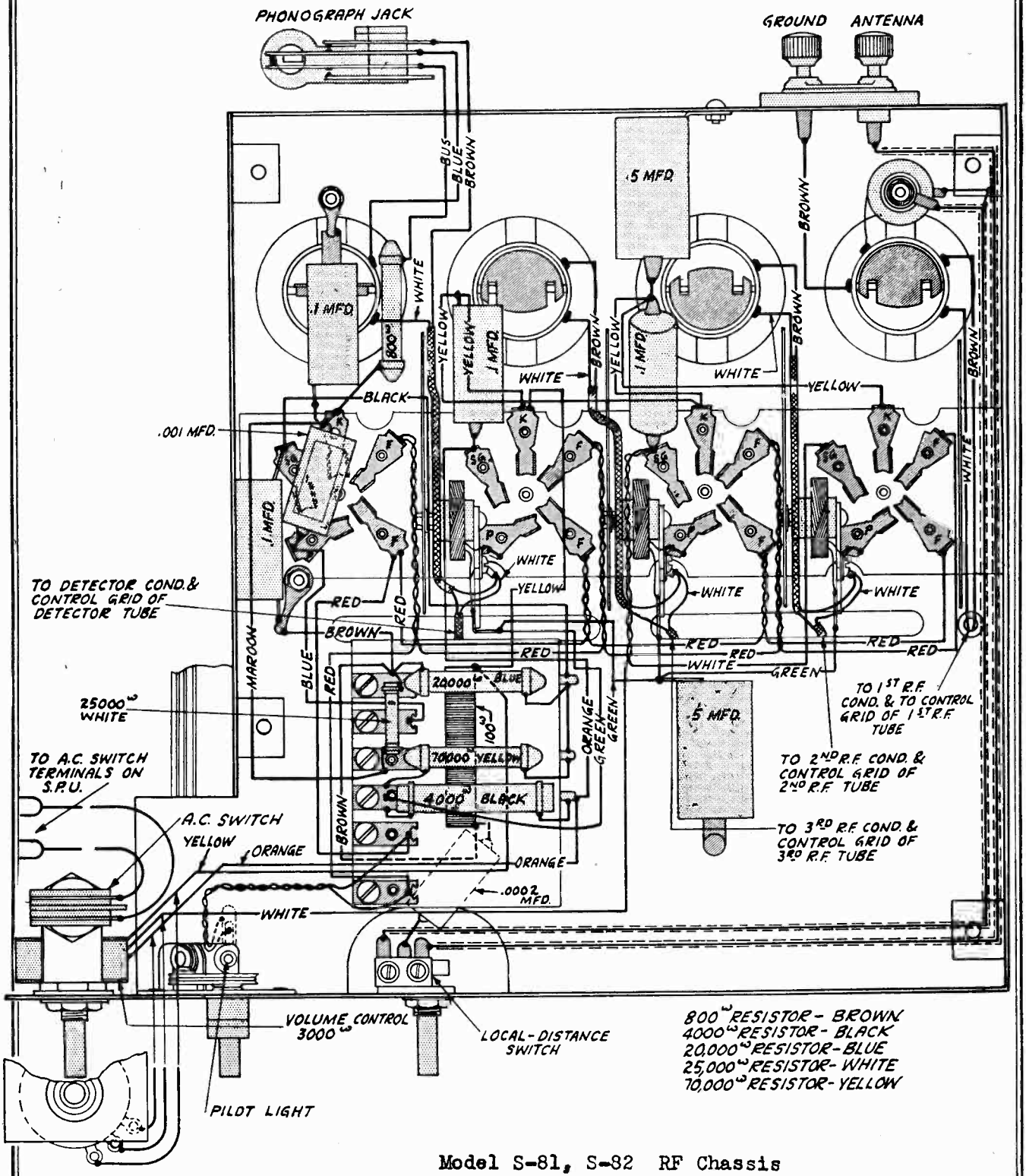
MODEL 80
MODEL 83-A

BREMER-TULLY MFG. CO



MODEL S-81, S-82
RF Chassis

BREMER-TULLY MFG. CO



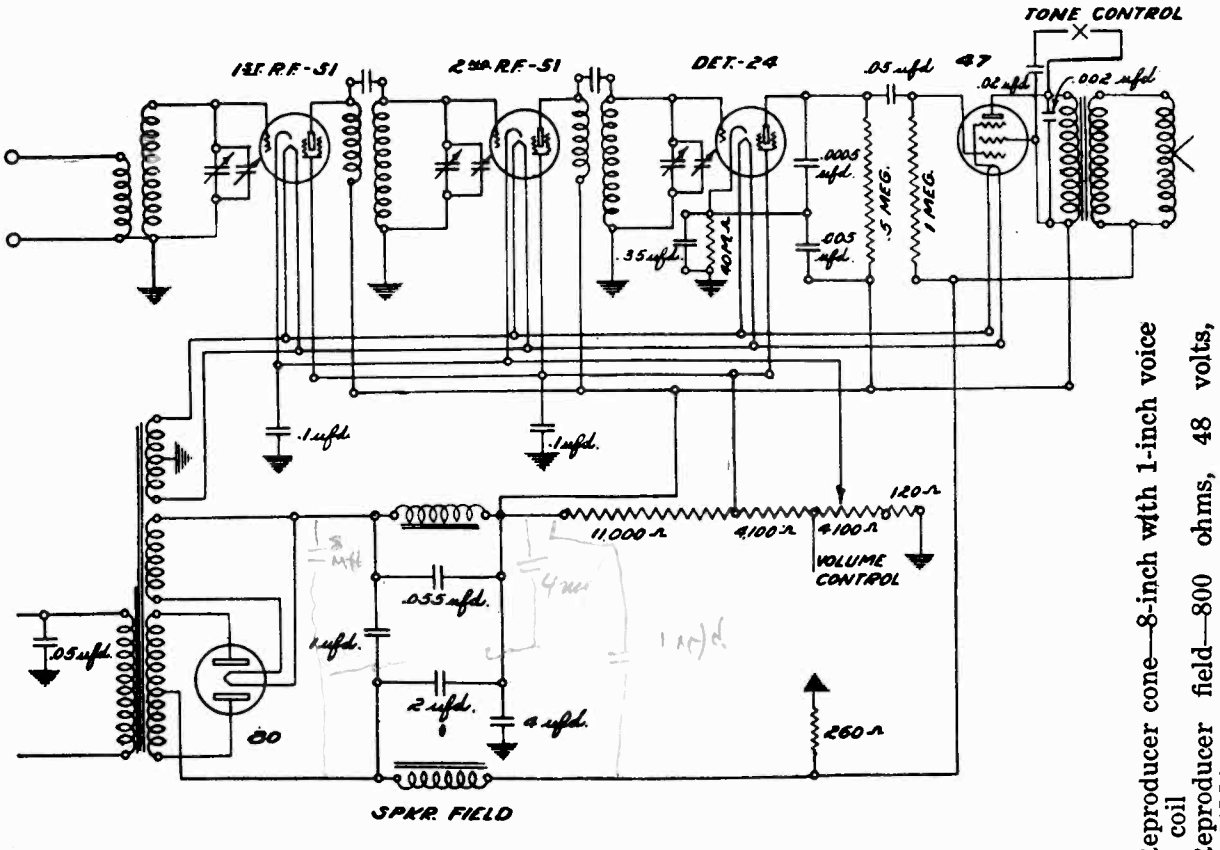
Model S-81, S-82 RF Chassis

SCHEMATIC CIRCUIT OF RADIO CHASSIS USING UY-224 TUBES

7008

BRUNSWICK RADIO CORPORATION

MODEL 10
Schematic and Voltage



Reproducer cone—8-inch with 1-inch voice coil
Reproducer field—800 ohms, 48 volts, 60MA

VOLTAGE ANALYSIS

No.	Stage	Type Tube	Fil. Volts	Plate Volts	Cont. Grid Volts	Cath. Volts	S. G. Volts	Ip. Normal
1	1st R. F.	C. L. 51	2.1	225	2.1	2	75	5
2	2nd R. F.	C. L. 51	2.1	230	2.2	2	75	4.5
3	Det.	C. L. 24	2.1	160*	7	7.5	75	.02
4	Output	C. L. 47	2.1	215	5*	0	225	26.5
5	Rect.	C. L. 80	4.8	280				†30

*Reading dependent upon resistance of meter.

†Reading taken for one anode only: 60 milliamperes would be about correct.

Volume control position full. Line voltage 115—60 cycle.

RESISTANCE TABLE

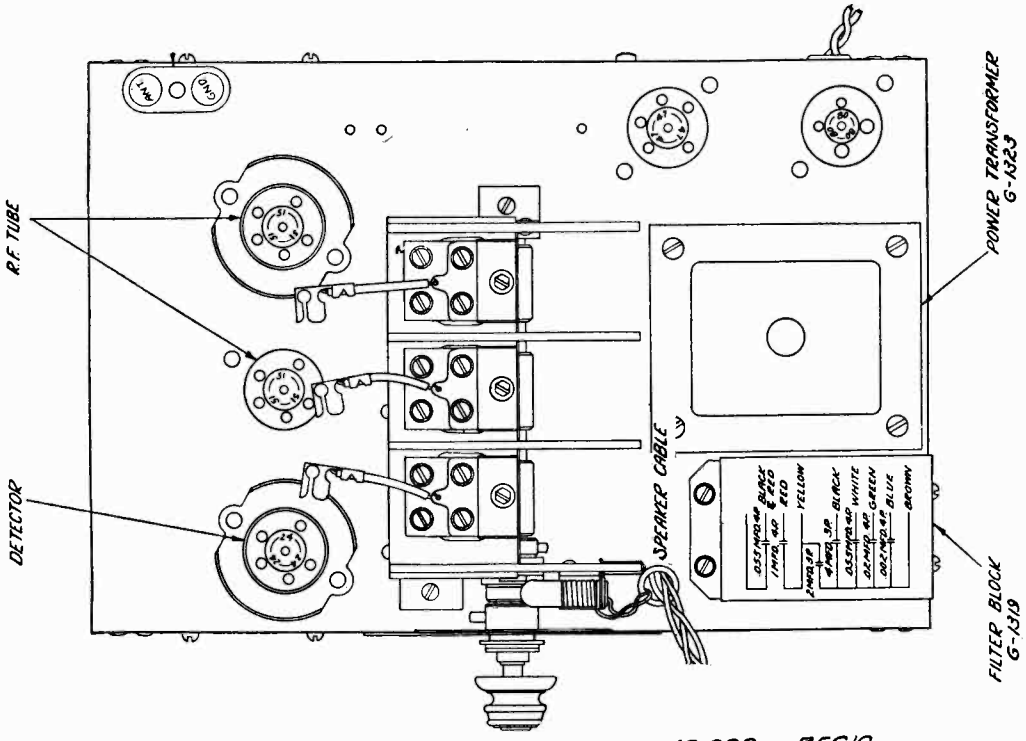
(Using 10-volt range meter 1,000 ohms per volt and 6-volt battery)

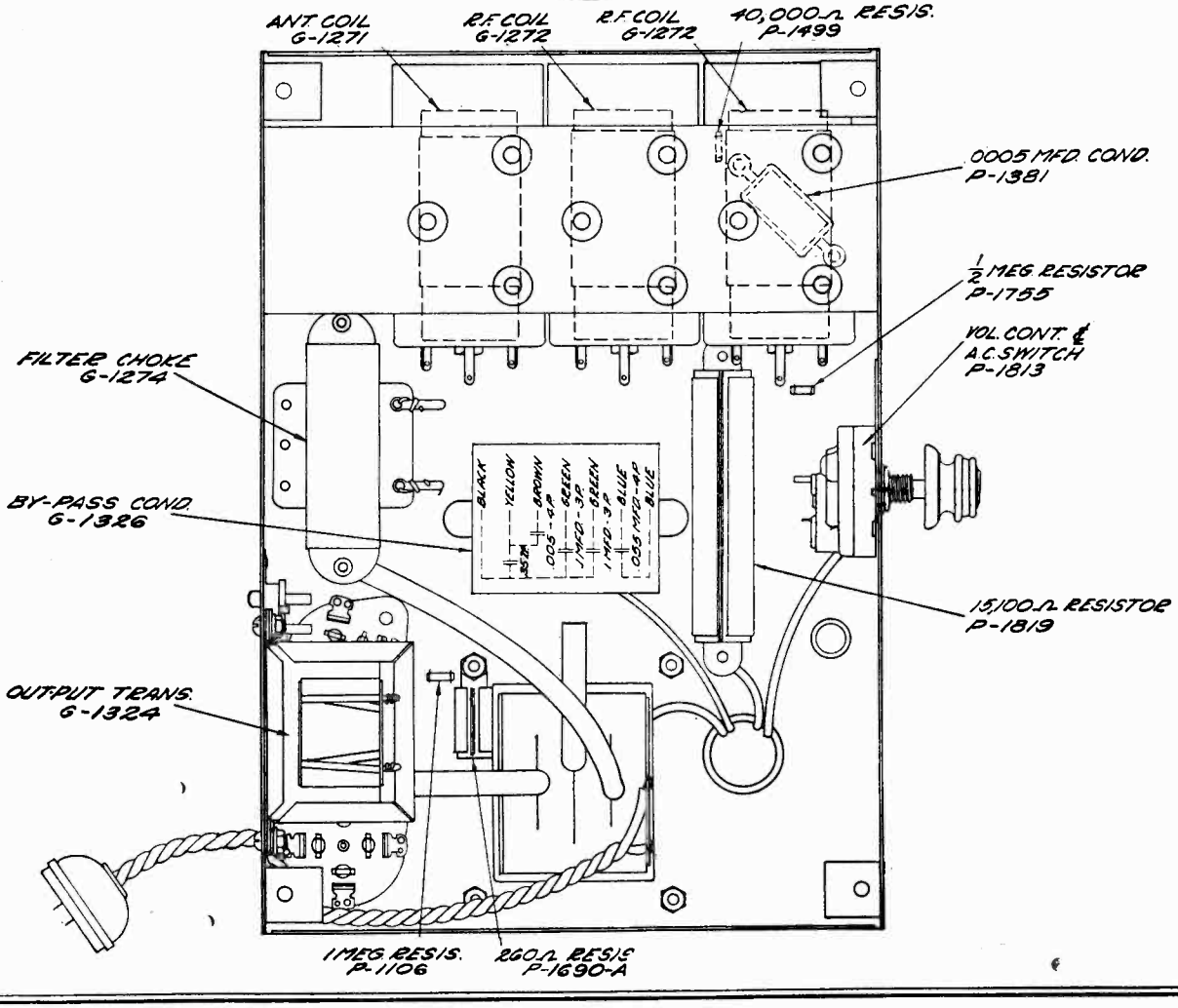
Item	Color Code*	From	To	Reading	Your Reading	Resistance in Ohms
Det. Cath. Resistor	Yel., Blk., Or.	Det. Cath.	Gnd.	1.3		40,000
Pent. Grid Resistor	Br. Blk. Green	Pent Grid	Spkr. Field	Slight Deflection		1,000,000
Wire Wound	Black	VoiceCoil.Black	Gnd.	5.9		260
Voltage Divider. Short End	Black	Volume Cont. Green Lead	S. G. Ckt.	4.2		4,100
Voltage Divider. Long End	Black	Plate	S. G. Ckt.	3.		11,000
Det. Plate Resistor	Gr., Blk., Yellow	Det. Plate	Pent. Space Chg. Grid.	.1		500,000
Vol. Control "on"		Gnd.	R. F. Cathode	4.2		4,100

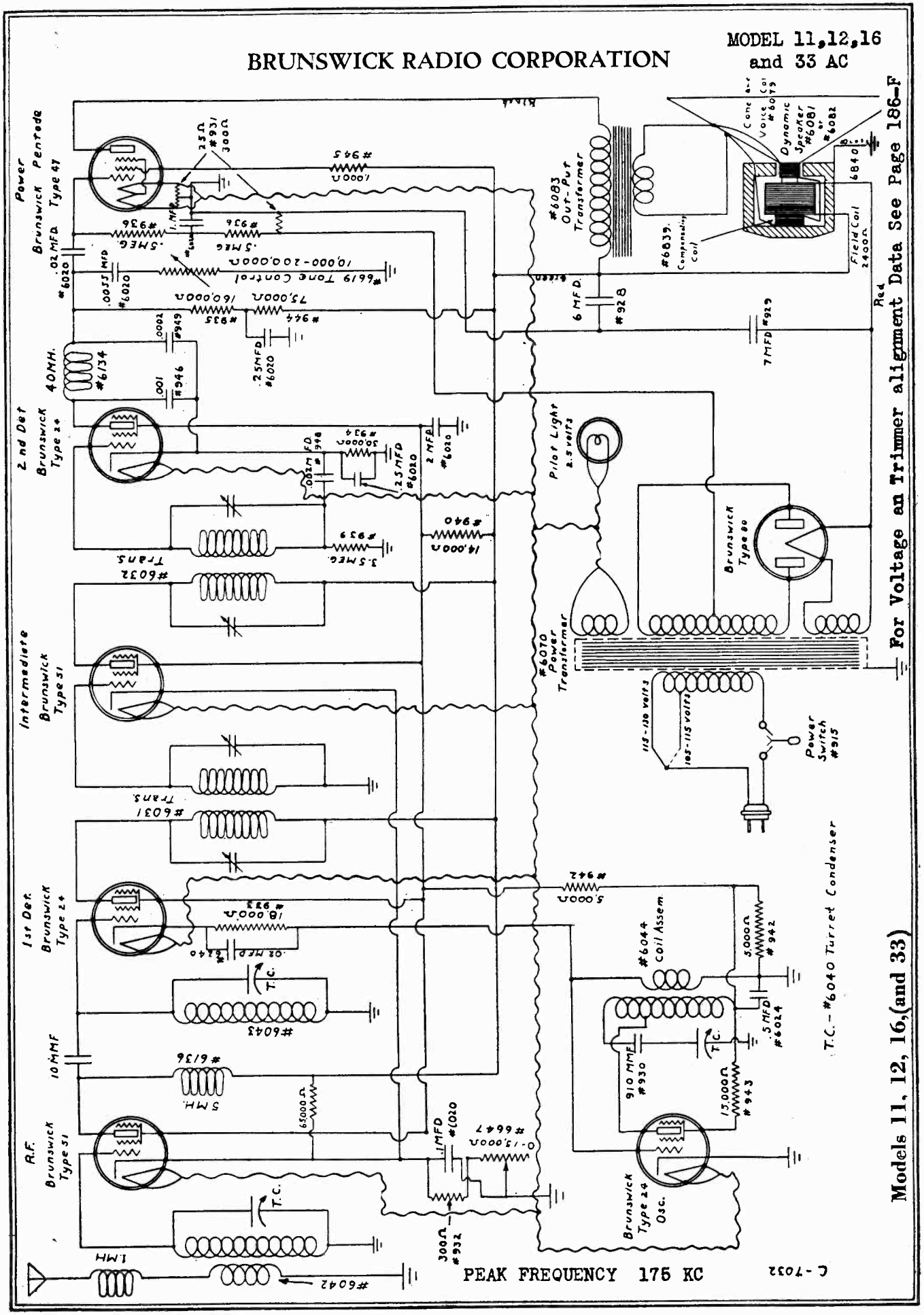
Color code: read body color first, tip second and dot last.

MODEL 10
Chassis

BRUNSWICK RADIO CORPORATION







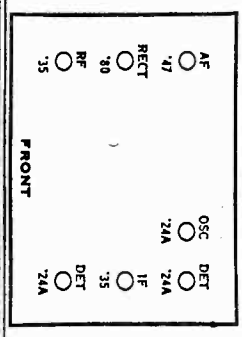
MODEL 11,12,16 and 33 Service Notes

BRUNSWICK RADIO CORPORATION

MODELS 11,12,&16.

SOCKET ANALYSIS—120 VOLT LINE

Volume Control Set at Maximum—Short Antenna to Ground



Position	Type Tube	Heater Voltage	Control Grid Voltage	Plate Voltage	Plate Current	Screen Grid Voltage
1st R.F.	—51	2.25	3.5	230	3.4 MA	70
1st Det.	—24	2.25	5.8	220	.4 MA	62
I.F.	—51	2.25	3.8	220	9 MA	60
2nd Det.	—24	2.25	.2	115*	.3 MA	60
Osc.	—24	2.25	0	35	1.2 MA	22
Power Output	—47	2.25	1	220	33 MA	220
Rec. Tube	—80	4.7		(530 (530	(26 MA	

* Readings will vary according to resistance of meter. Tubes used in this test are average tubes.

METHOD OF ALIGNING R.F. CIRCUITS

In the event the antenna and first detector tuned circuits are out of alignment, they may be adjusted with the aid of a weak high frequency (1300 to 1500 K. C.) signal—produced by a distant station or a local test oscillator. Tune this signal in very carefully for maximum volume, or better still, if one is available, for maximum deflection on an output meter. Adjust the antenna tuned circuit adjustment screw (located near the type 47 tube on the top plate of the turret condenser) for maximum volume or for maximum deflection on an output meter. Then, without changing the position of the tuning knob, adjust the first detector adjustment screw—located adjacent to the A. C. switch—for maximum volume or maximum deflection on an output meter. Before tightening the lock unit on each adjustment screw, go over the adjustments a second time to secure the greatest possible accuracy. A drop of ambroid glue or collodian should be placed on each adjustment screw after the lock nut has been tightened to prevent handling and speaker vibrations from changing the adjustment.

In most cases it will be unnecessary to touch the oscillator adjustment screw (located between the antenna and first detector adjustment screws.) If this adjustment is necessary it is recommended that the intermediate frequency transformer circuits be tuned first (see following paragraph). Then tune oscillator circuit, employing same method as explained above for antenna tuned circuit and first detector circuit. In the event any circuit does not tune properly, check the circuit thoroughly for open and short circuits. If the trouble cannot be located, the coil should be replaced with a new one.

METHOD OF ALIGNING I.F. TRANSFORMERS

In the event the receiver is still insensitive and lacks proper selectivity after making the foregoing adjustments, the intermediate frequency transformers should be adjusted by one of the following methods:

1. Tuning Intermediate Transformers with 175 K.C. Oscillator

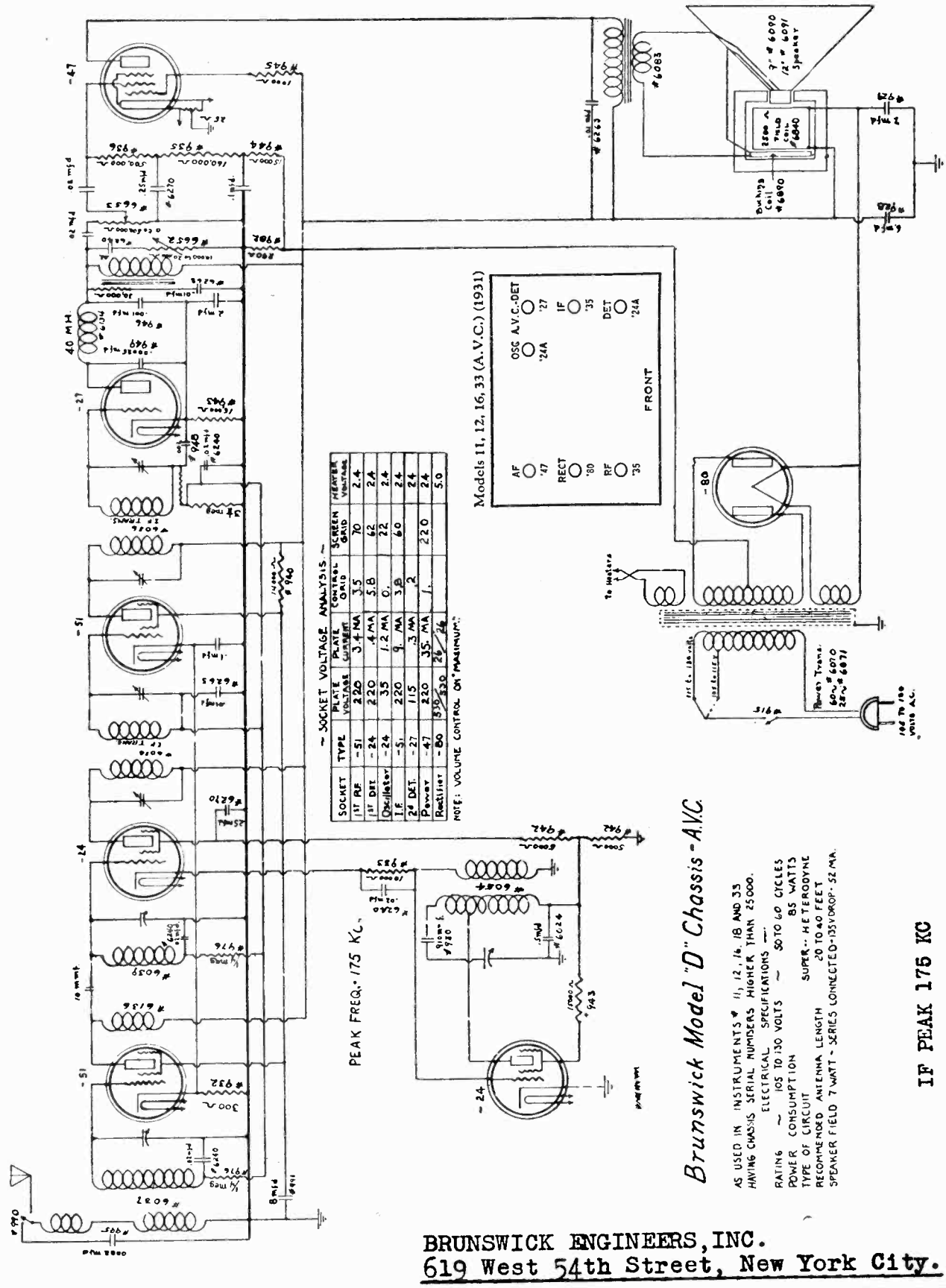
By far the best method of aligning the tuned circuits in the intermediate frequency transformers is to employ a 175 K.C. oscillator and output meter. In making this test, remove the oscillator tube and connect the output of the oscillator to the grid cap of the first detector. Usually it will not be necessary to remove the grid cap from the tube, this depending on the strength of the oscillator and the amount the I.F. transformers are out of line. Connect the output meter across the primary of the output transformer located on the speaker (terminals 3 and 7 counting from left to right). The four I.F. adjustment screws on the I.F. transformers, located inside the chassis, should be adjusted with a non-metallic screw driver for maximum deflection on the output meter. Go over all four adjustments a second time to secure maximum accuracy.

2. Tuning Intermediate Transformers without 175 K.C. Oscillator

In the event a 175 K.C. oscillator is not available a fairly close adjustment may be made by tuning in a faint broadcast signal, and with the volume control turned on full, adjust the transformers for maximum volume with a non-metallic screw driver. After adjusting the I.F. transformers, the R.F. circuits should be realigned as explained before.

BRUNSWICK RADIO CORPORATION

MODEL 11,12, 16,18,33 AVC Chassis D.

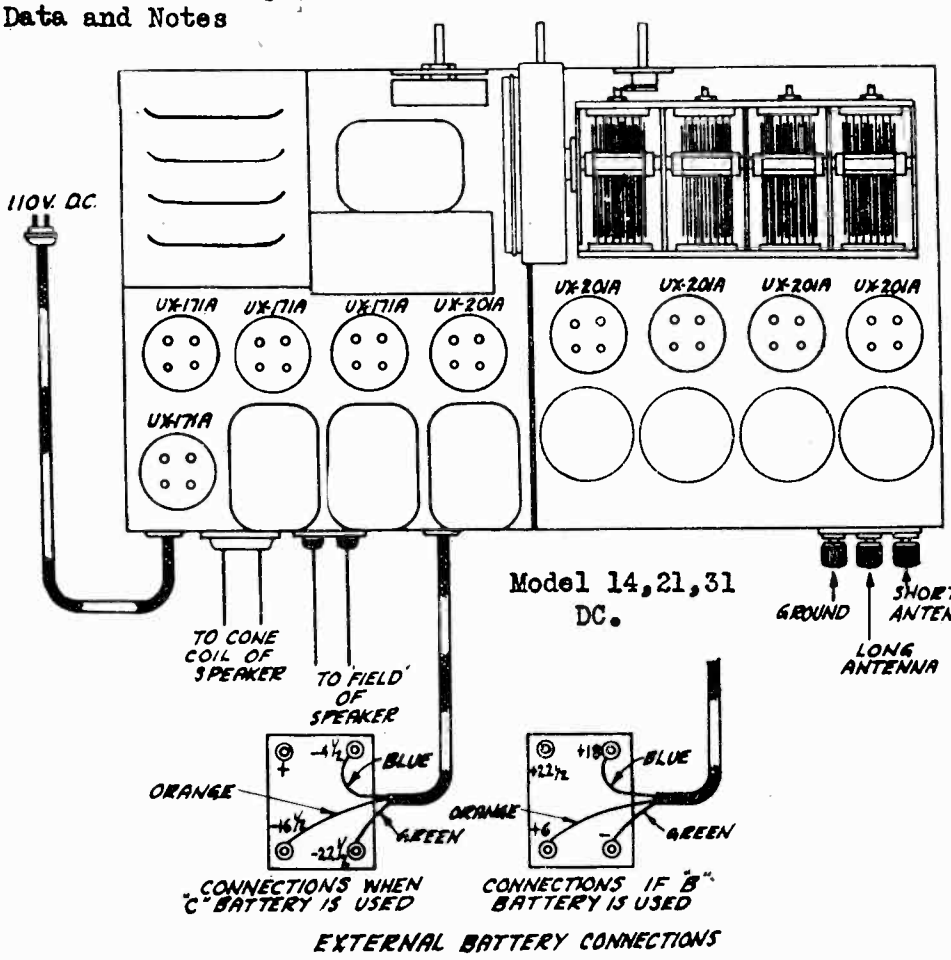


SOCKET	TYPE	PLATE VOLTAGE	PLATE CURRENT	CONTROL GRID	SCREEN GRID	HEATER VOLTAGE
1st RF	-51	220	3.4 MA	3.5	70	2.4
1st DET	-24	220	.4 MA	5.8	62	2.4
Oscillator	-24	35	1.2 MA	0.	22	2.4
I.F.	-51	220	9. MA	3.8	60	2.4
2d DET.	-27	115	.3 MA	2		2.4
Power	-47	220	35 MA	1.	220	2.4
Rectifier	-80	350/330	26/26			5.0

BRUNSWICK ENGINEERS, INC.
619 West 54th Street, New York City.

MODEL 14,21,31 DC
Socket and Voltage Data and Notes

BRUNSWICK RADIO CORPORATION



EXTERNAL BATTERY CONNECTIONS

Part No.	Choke Mounting Brackets
X-1314	Choke Mounting Brackets
X-1315	5" Bolt for Mtg. Resistor
X-1316	R.F. Socket Strip
X-1130	6 Volt Pilot Light
X-1300	D.C. Chassis Complete - Models 14 and 21
X-1310	D.C. Chassis Complete - Model 31
X-1317	D.C. Phono Motor (Gordon Type)
X-1318	Audio Chassis for D.C. Models 14 and 21.
X-1319	R.F. Chassis for D.C. Models 14, 21, and 31
X-1320	Audio Chassis for D.C. Model 31

REPLACEMENT PARTS LIST FOR D.C. MODELS 14, 21, & 31

Part No.	
X-1301	Resistance Unit, 200 ohms (Large Brown)
X-1302	Resistance Unit, 220 ohms (Large Brown)
X-1303	Resistance Unit, 500 ohms (Large Brown)
X-1304	Resistance Unit, 120 ohms (Purple)
X-1306	Resistance Unit, 200 ohms (Gray)
X-673	Resistance Unit, 35,000 ohms (Yellow)
X-1307	Resistance Unit, 40 ohms (Wire Wound)
X-1308	Double Filament By-Pass Cond. - 5 mfd. (W-6428)
X-1309	Series Ground Cond. - .002 mfd.
X-1311	Insulating Bushings for Vol. Cont.
X-1312	Insulating Bushings for Gnd. Binding Post.
X-1313	Heavy Duty Filament Choke

VOLTAGE READINGS AT SOCKETS

Socket	Tube	Type	Filament	Grid	Plate
#1	1st R.F.	UX-201-A	5.5	-9	80
#2	2nd R.F.	" "	5.	-9	80
#3	3rd R.F.	" "	5.25	-5	80
#4	Detector	" "	5.25	0	32
#5	1st Audio	" "	5.75	-9	88
#6	Power Stage	UX-171-A	5.	-24	96
#7	" "	" "	5.	-15	88
#8	" "	" "	4.3	-15	92
#9	" "	" "	4.3	-22½	96

These readings will hold within 10% when taken with any reliable make of set analyzer with the tube in the socket of the set analyzer, the line voltage at 120 volts, and the volume control on maximum. Filament voltage will vary with different tubes because their filament resistance varies.

METHOD OF ADJUSTING NEUTRALIZING CONDENSERS.

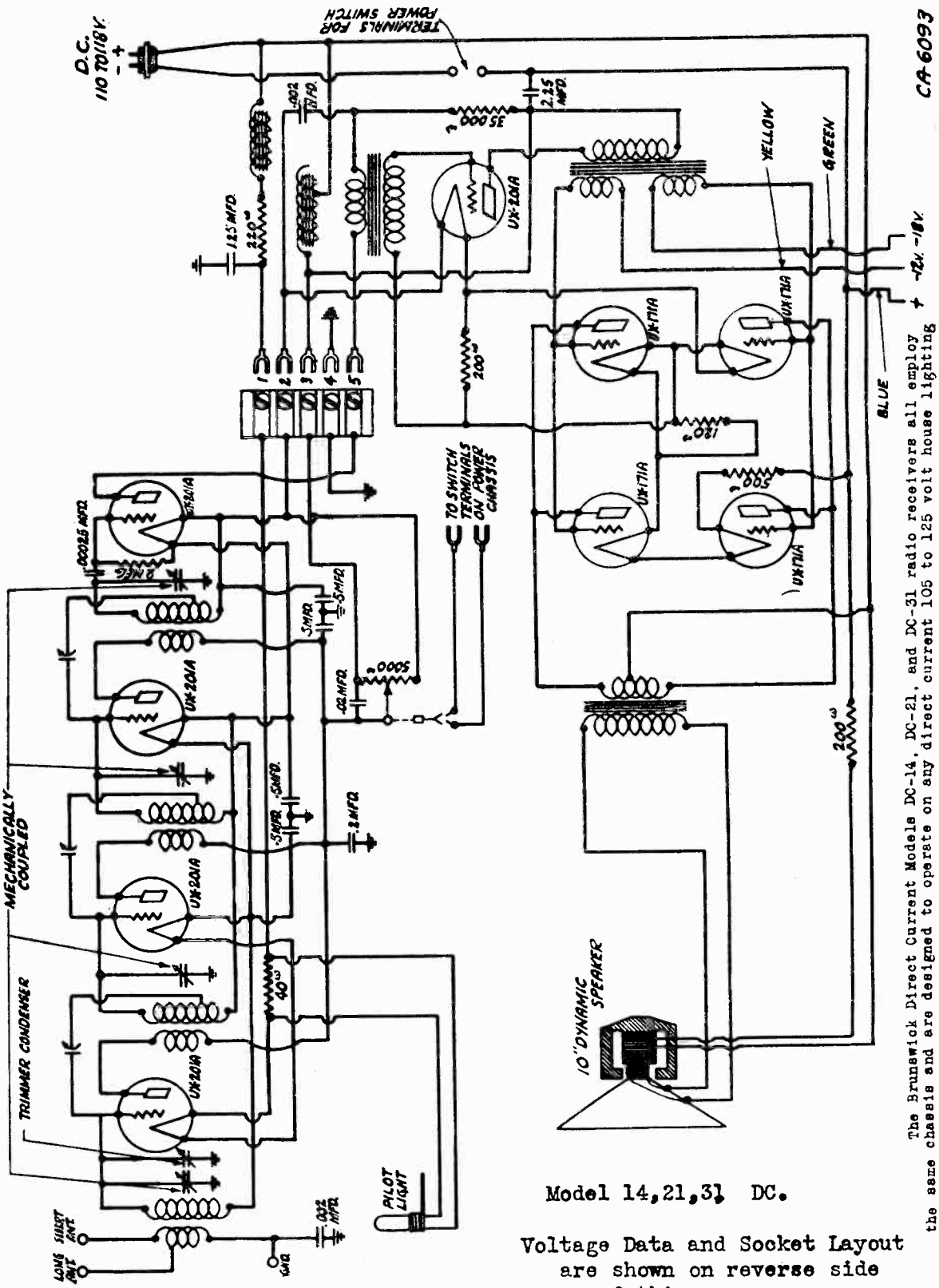
In the event the receiver oscillates at any or all parts of the tuning range, the ground and antenna should be inspected to be sure there is not a poor connection at some point. If the oscillation still persists, try changing the tubes around, and if this does not eliminate the trouble, the receiver should be neutralized by the following method:

Select a good UX-201-A tube of the same make that is to be used in the receiver and cut off one filament prong close to the base. Because the filaments of all tubes are connected in series, it will be necessary to connect a 1.25 ohm resistor across the filament contacts of the socket in which the dummy tube is to be used. (The filament of another tube may be used for this purpose.) Tune the receiver to a powerful local station broadcasting on a frequency of between 1000 and 1500 kilocycles, and adjust volume control and antenna trimmer condenser for maximum volume. Insert the dummy tube in the first socket and connect the resistor or tube filament across the filament circuit - the first neutralizing condenser should now be adjusted until no sound, or the minimum sound, is heard in the reproducer. Adjust the other two stages in the same manner and the receiver is neutralized.

In the event the receiver cannot be neutralized the R.F. by-pass condensers should be tested for open circuits and a different dummy tube should be tried.

MODEL 14,21,31 DC
Schematic

BRUNSWICK RADIO CORPORATION



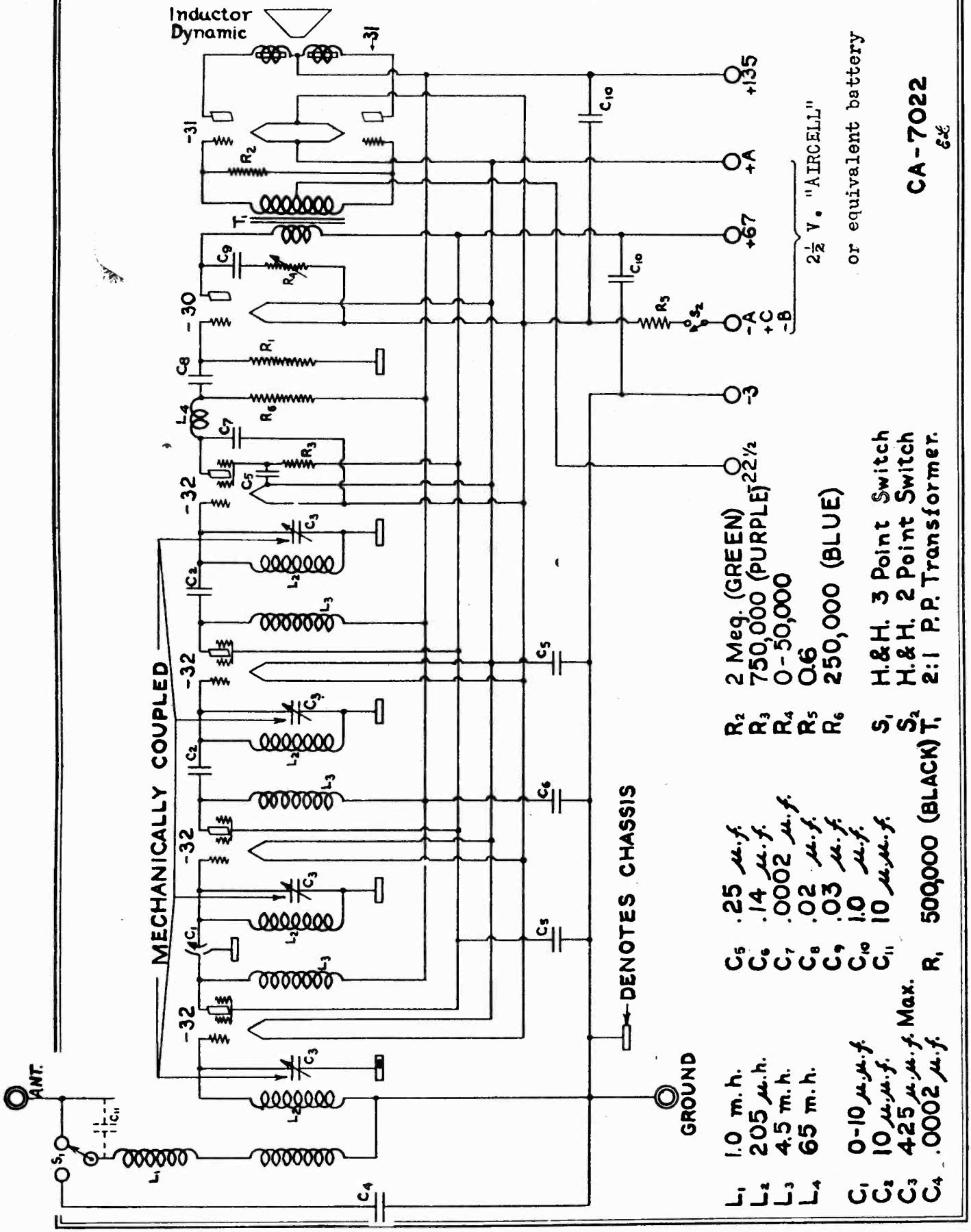
Model 14,21,31 DC.

Voltage Data and Socket Layout are shown on reverse side of this page.

The Brunswick Direct Current Models DC-14, DC-21, and DC-31 radio receivers all employ the same chassis and are designed to operate on any direct current 105 to 125 volt house lighting circuit.

MODEL 15-B
Schematic

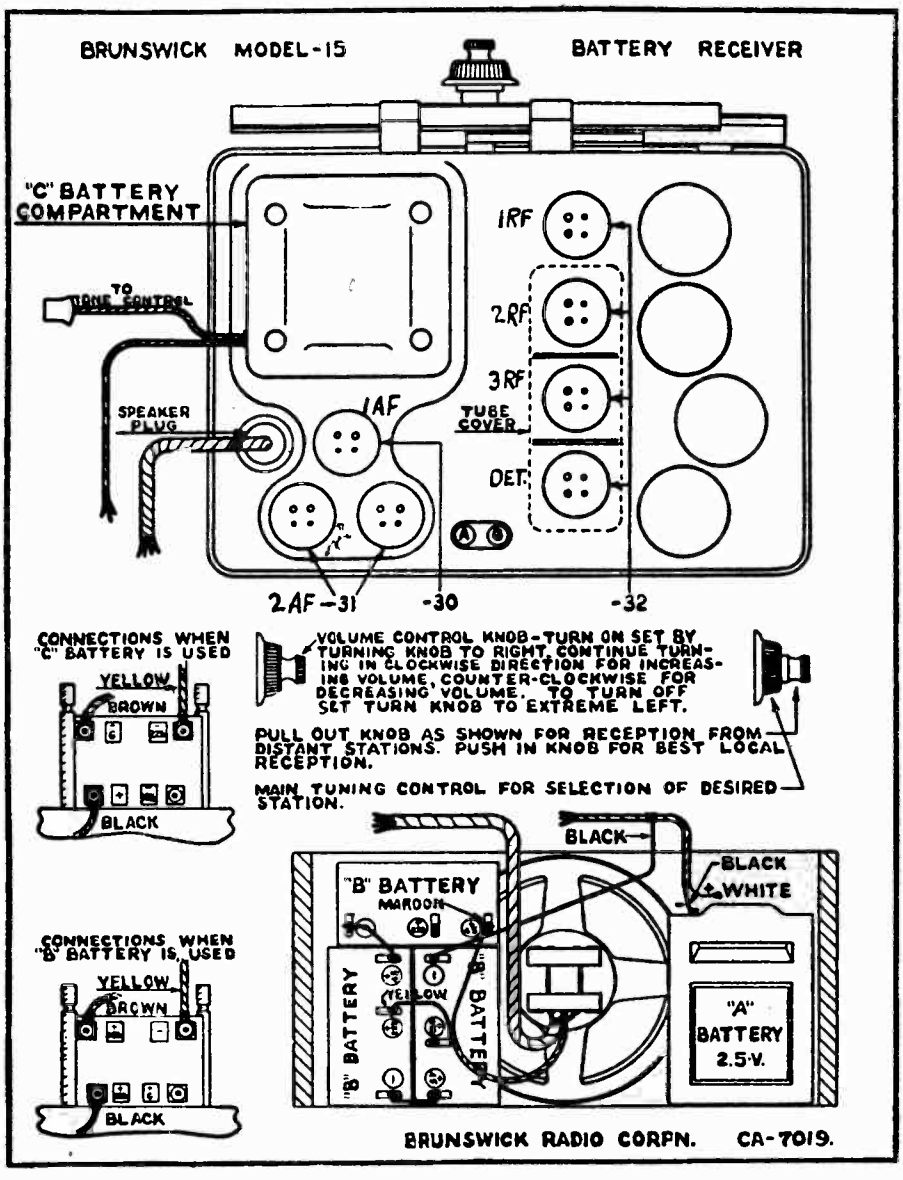
BRUNSWICK RADIO CORP.



L_1	1.0 m.h.	C_5	.25 mf.	R_2	2 Meg. (GREEN)
L_2	205 mh.	C_6	.14 mf.	R_3	750,000 (PURPLE)
L_3	4.5 m.h.	C_7	.0002 mf.	R_4	0-50,000
L_4	65 m.h.	C_8	.02 mf.	R_5	0.6
C_1	0-10 mmf.	C_9	.03 mf.	R_6	250,000 (BLUE)
C_2	10 mmf.	C_{10}	1.0 mf.	S_1	H.&H. 3 Point Switch
C_3	425 mmf. Max.	C_{11}	10 mmf.	S_2	H.&H. 2 Point Switch
C_4	.0002 mf.	R_1	500,000 (BLACK)	T_1	2:1 P.P. Transformer.

MODEL 15-B Voltage and Socket Layout

BRUNSWICK RADIO CORP.



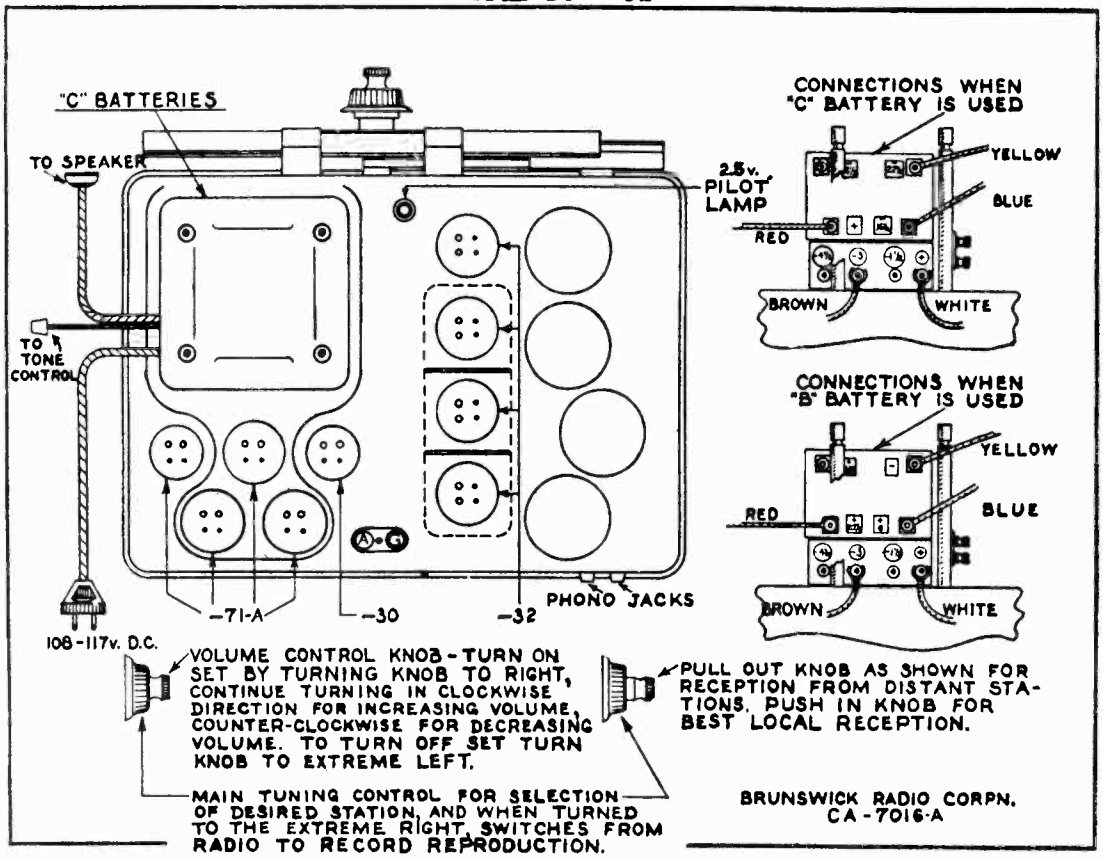
Tube Position	Filament Voltage	Plate Voltage	Plate Current	Screen Grid Voltage	Control Grid Voltage
1st R. F.	2. volts	135 volts	1.1 M. A.	69 volts	-3 volt
2nd R. F.	2. "	135 "	1.1 M. A.	69 "	-3 "
3rd R. F.	2. "	135 "	1.1 M. A.	69 "	-3 "
Detector	2. "	67.5 " *	.03 M. A.	69 "	-3 "
1st Audio	2. "	67.5 "	2.4 M. A.	—	-3 "
Power amp.	2. "	135. "	6.2 M. A.	—	-22.5"
" "	2. "	135. "	6.2 M. A.	—	-22.5"

NOTE:
(*) Because of the large resistance in the plate and screen grid circuit of this tube, the voltage reading on most analyzers will be in the neighborhood of 5. volts.

MODEL 15, 22, 32 DC
Socket and Voltage Data
Used in Model 42 DC

BRUNSWICK RADIO CORP.

MODEL DC - 32



TUBE SOCKET ANALYSIS

For Models DC-15, 22 and DC-32

The values given in the following table are correct for standard analyzers on 118-volt direct current lines:

Tube Position	Filament Voltage	Plate Voltage	Plate Current	Screen Grid Voltage	Control Grid Voltage
1st R. F.	2.1 volt	100 Volt	1.4 M. A.	50	-3 volts
2nd R. F.	2.1 volt	100 Volt	1.4 M. A.	50	-3 volts
3rd R. F.	2.1 volt	100 volt	1.4 M. A.	50	-3 volts
Detector	2.1 volt	23 volt	.2 M. A.	50*	-5 volts*
1st Audio	2.1 volt	62 volt	2. M. A.	--	-3 volts**
Pwr. rear right	5.2 volt	112 volt	13. M. A.	--	17. volts
" rear left	5.2 volt	110 volt	14. M. A.	--	22. volts
" front right	5.1 volt	111 volt	11. M. A.	--	22. volts
" front left	5.1 volt	110 volt	11. M. A.	--	17.5 volts

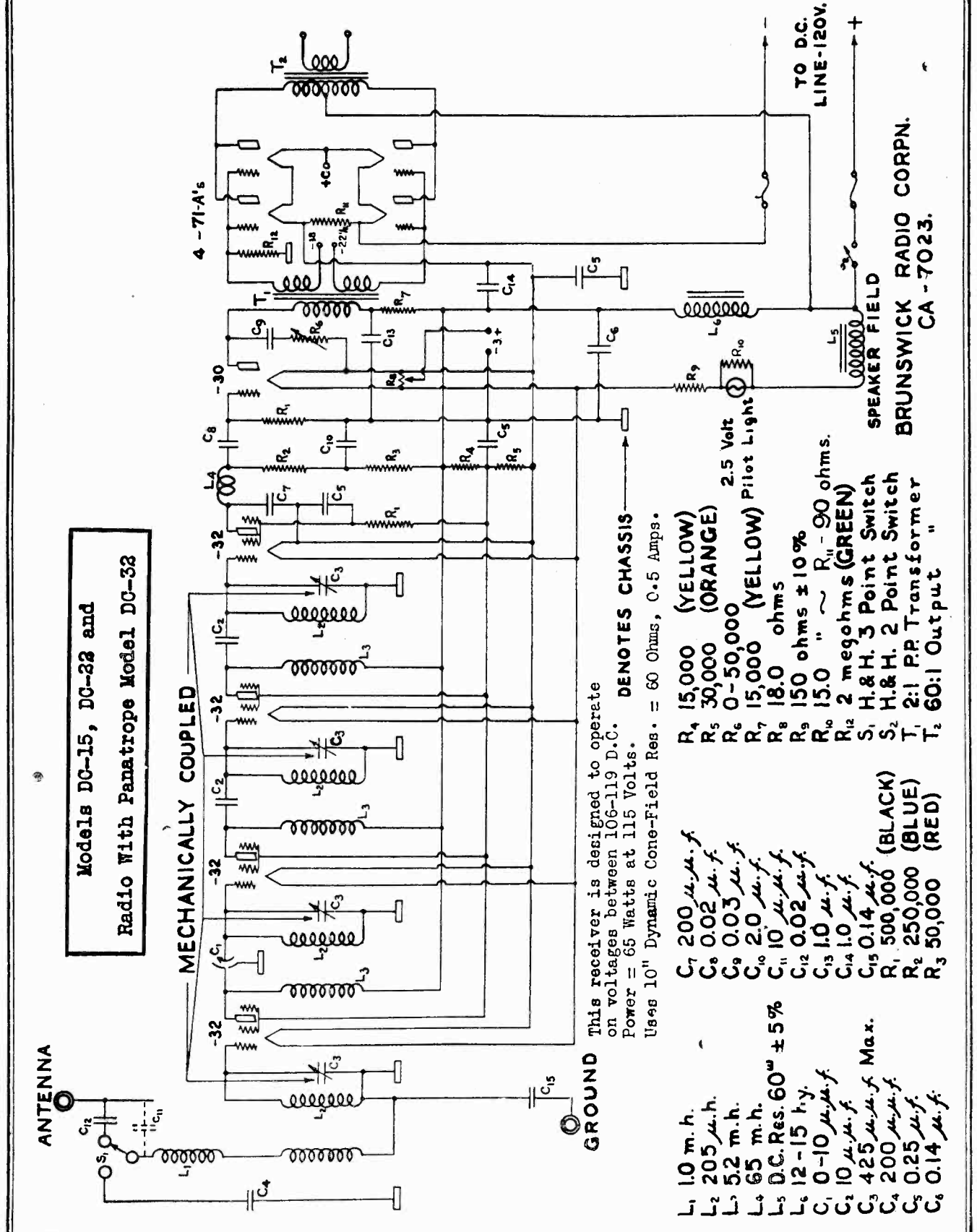
NOTE: (*) Because of the high resistance in this circuit a much lower reading will be obtained on most analyzers.

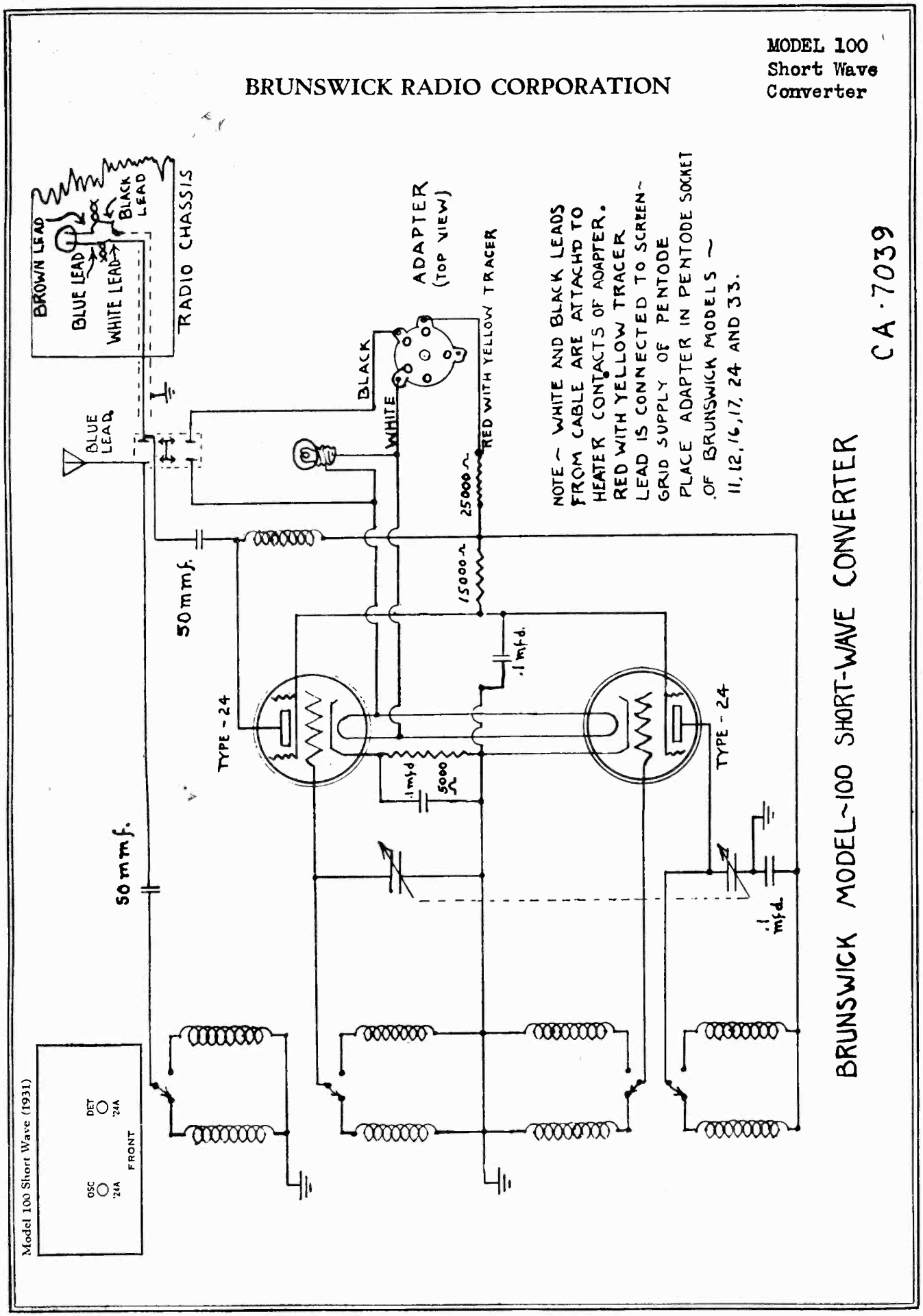
(**) A potentiometer, located on the under side of the audio panel, varies this grid-bias and should be adjusted to give the above voltage.

MODEL 15, 22, 32 DC
Schematic

BRUNSWICK RADIO CORP.

Used in Model 42 DC





BRUNSWICK AUTOMATIC PANATROPE WITH RADIO

PART I

ELECTRICAL SPECIFICATIONS

MODEL 42

Rating	105 to 130 volts—60 cycles
Also available	105 to 130 volts—50 cycles
	105 to 130 volts—25 cycles
	105 to 125 volts—direct current
Power consumption of radio set—60 cycles	85 watts
Power consumption of Panatrope and Radio	110 watts
Type of circuit	Screen-grid tuned radio frequency
Type of tubes —80	1
—45	2
—24	4
Recommended antenna length	30 to 70 feet
Average sensitivity	4.0 micro volts per meter
Number of radio frequency stages	3
Type of detection	Linear type—power detector
Number of audio stages	1
Type of audio amplification	Parallel operated—45's
Type of rectifier	125 ma. full wave type—80
Type of loudspeaker	10-inch cone—dynamic
Speaker field	Series connected—1600 ohms—100 volts—drop—62.5 ma.—6.25 watts

INTRODUCTION

The Brunswick Model 42 Automatic incorporates the same armored chassis and dynamic speaker that is used in the Models 15 and 22. In addition it has the added feature of the Automatic Panatrope which will play twenty records without attention, and then shut itself off.

It is the purpose of this bulletin to show only those features which deal with the Automatic equipment, its connections to the radio chassis, and also the information dealing with coin operation. All other data on the radio set can be obtained from Service Bulletin No. 71.

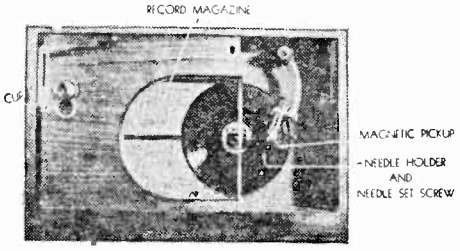


Fig. 1

The operation of the Automatic Panatrope is extremely simple, as will be readily seen by the following explanation:

Figures 1 and 2 show top and front views of the Model 42 and indicate the various components that enter into its use.

With the station selector control turned past the 1500 K. C. mark, and twenty or less records in the record magazine, turn the "off" and "on" switch to the "on" position. Then press the "start" button. This will do the following: connect the power to the radio chassis so that the audio amplifier can be used for record reproduction; starts the motor and automatic mechanism for the cycles of playing the record and ejecting the played record into the reject compartment.

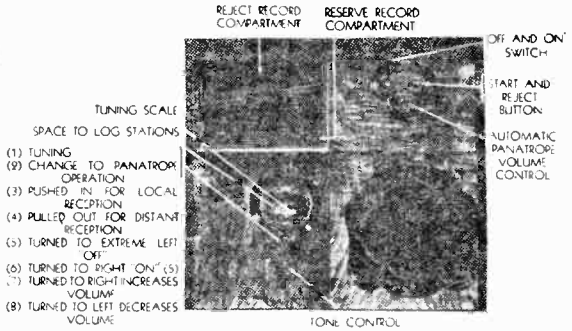


Fig. 2

PART II

THE STORY OF THE AUTOMATIC AND ITS OPERATION THROUGH A COMPLETE CYCLE

The accompanying series of sketches have been prepared in order to present a clear idea of the cycle of operations through which the Automatic mechanism goes during the playing, the rejection of a record, and the starting of a new record. In conjunction with the following explanation, these sketches should make what appears to be a complicated mechanism really a very simple piece of apparatus. An automatic record playing instrument may be made in innumerable ways, but the simplicity of its mechanism reflects the true engineering skill behind it. There should be no more apparatus necessary than that required to accomplish the purpose of the machine. In servicing such a machine, this is a factor to be appreciated.

In Sketch 1 the record is shown in the playing position. As the magnetic pickup moves toward the center of the record, beneath the top plate of the mechanism the suspension arm is pulling a special switch with it. This is shown in Sketch 2. When the end of the record is reached, this switch hits against an adjustable stop, closing the switch contacts.

From this point on, many things occur in a short space of time, ten seconds or less. Reference to the schematic circuit appearing in Figure 6 will also help to clear up a few points. In fact, it will more than pay the person who meets up with this model to sit down and follow out this circuit along with this description.

The switch just mentioned is designated as the "Suspension Arm Switch" in the schematic circuit. When this closes, the line voltage is placed directly across the solenoid coil, also shown in Sketch 3. Immediately the solenoid armature pulls the stop lever from the dotted line to the solid line position. The projection "r" on this lever (follow to Sketch 4) moves out of the way of the clutch pawl, allowing the latter under the tension of the small spring to slip in and engage with the teeth of the clutch. The only revolving parts up to now have been the motor, ejector friction disc, and the turntable. Sketch 5 shows the parts which start revolving when the clutch engages. A little further on, the reason for these gears will become evident.

As the master gear revolves, three cams on its under side function. The first is shown in Sketch 6, operating the cycle switch. This switch closes (refer to scematic circuit and

note that the "reset" and "off-on" switches are closed) in order to maintain a closed power circuit to the motor when the "reset" switch opens a little later. Immediately thereafter, the second cam on the master gear, not shown, has revolved to a position where it actuates a lever raising the pickup arm, see Sketch 6.

Referring to Sketch 7—with the pickup raised off the record, the third cam raises the ejector wheel to a position where the friction cone rides on the ejector friction disc. As the ejector wheel comes up and starts to revolve, it also brings up the push rod opening the "reset" switch (see schematic). The revolving ejector wheel sends the finished record out into the reject record compartment.

In Sketch 8, note the lever arm marked "t." Functioning through its mechanical connection to the master gear, it starts moving the pickup suspension arm out of the way of the next record coming down from the magazine. The levers "x" and "y" are also working at the same time and through the connecting rod "z," as the pickup moves to the right, sends a new record down to the turntable. Sketches 8 and 9 show the respective positions of the mechanism and top of the Automatic Panatrope at the middle of the record change operation. The master gear only revolves once. The reasons for the two reduction gears, Sketch 5, should now be apparent; namely, because the turntable shaft revolves at 78 R.P.M., and this speed is entirely too high for direct application to the other moving parts, suspension arm, etc. Even if it were, the size of the motor would have to be much greater to supply all the power required during the record change. The gears serve to keep the power consumption of the Panatrope down to a minimum.

When the new record drops on the turntable, it hits the push rod closing the "reset" switch, thus keeping the power circuit to the motor and chassis closed even though the cycle switch is still closed. The position of the record, ejector wheel and push rod are now shown by Sketch 10.

Going back to Sketch 8, the suspension arm return lever, "w," now comes into play. This is during the last half of the master gear revolution. As the master gear returns to its original position, the suspension arm return lever, "w," catches the projecting pin that was pushed over by "t," carrying the suspension arm back until the other end of "w" hits the stud "s." This releases the pin, leaving the suspension arm and pickup in position over the first grooves of the new record. With the return of the suspension arm, the arm "v" in the record magazine has moved back ready to advance the next record. The pickup is lowered to the record and the master gear, completing its cycle, allows the stop lever arm to drop to the position indicated by the solid lines of Sketch 11 under the tension of the spring "u." The projection "r," Sketch 3, engages the clutch pawl, preventing the gears from revolving further. The cycle switch opens and the new record continues the program.

There is one more point to consider. Had the record magazine been empty, the mechanism would have worked in the same manner with one exception, the push rod would have remained up and the "reset" switch open. From the scematic circuit, it is evident that upon the opening of the cycle switch, the power supply circuit is broken and the whole machine shuts off.

PART III

ADJUSTMENT AND CARE

All initial adjustments are made at the factory so that the instrument is ready for immediate use when properly installed. The turntable speed should be 78 R.P.M., but if for any reason it is thought that this speed is not being maintained, by placing a paper clip at some point on the record's edge for an indicator and timing the turntable, it is possible to check this. The motor speed control is directly above the motor and is readily located when the cabinet back is removed.

The motor should be oiled about once a month; a little oftener if the machine is used steadily. The oil holes are located directly beneath the turntable. A few drops will suffice; do not flood the motor with oil as this can do more harm than good.

The Brunswick Permo-Point needle, which accompanies each instrument, will play in excess of 2,000 records. It is recommended that this needle be used in preference to all other types.

Some of the simple adjustments which may be necessary to accommodate slight differences in records, as well as some suggestions to take care of possible changes caused by shipment, are given below.

We recommend that the first time any of these adjustments are made, that the plate covering the mechanism be removed. This can be accomplished as follows:

(a) Lift off the turntable.

(b) Remove all screws around the edge of plate covering mechanism, as well as those around the suspension arm.

(c) Remove the nut which holds the suspension arm to the cast iron base.

(d) Carefully lift up the suspension arm about three-quarters of an inch and remove the plate by pulling up the front end and gently lifting out--taking care not to mar the cabinet. Removing this plate will bring the mechanism into view, permitting the adjustment of four primary points.

1. Adjustment determining the point at which the magnetic pickup is lowered to edge of record.
   Replace the turntable, re-tighten suspension arm nut, and place a record in the record magazine; press the start button. As the master gear starts through the last half revolution (see Sketch 8) it will be seen that the eccentric stop "s" controls the release of the lever "w," which is pulling the suspension arm toward the record. The adjustment of this "stop" allows the needle of the magnetic pickup to drop on the edge of the record about a sixteenth of an inch from the grooves.
2. Also in Sketch No. 8 there will be seen a spring, "q."
   After the needle has come in contact with the record, this spring pulls the suspension arm over until the needle rides in the starting grooves of the record. If the spring tension be too great, the needle may jump several grooves, or on the other hand, if it is too weak, will not pull the needle into the starting grooves at all. The earlier models with serial numbers up to 2,000 have this spring attached to a fixed stud and the tension can be varied by shortening or stretching the spring. Those with serial numbers above this have an adjustable bracket to which the spring is attached, permitting the tension to be varied without touching the spring. The remedy is obvious.
3. At the base of the suspension arm, see Sketch No. 2, is a switch which controls the rejection of a record at the finish of its playing. There are two types of these switches, the earlier type—on models with serial numbers less than 2,000 (this type is shown on the actual wiring diagram Figure 5)—and the later one that is indicated in Sketch 2.
   Removing the cover, the action of this switch can be observed. As the record plays, the switch casting is slowly carried along with the suspension arm. In the earlier type of switch the floating contact member does not touch either side contact until the magnetic pickup reaches either the inside groove of a concentric grooved record where a stop (see Sketch 2) causes the left contact to close; or on an eccentric grooved record will cause the right contact to be closed. If either of these two contacts are too close to the floating contact there is a possibility of the record rejecting before it is finished. Also, if the separation from the right

MODEL 42
AC-DC

BRUNSWICK RADIO CORP.

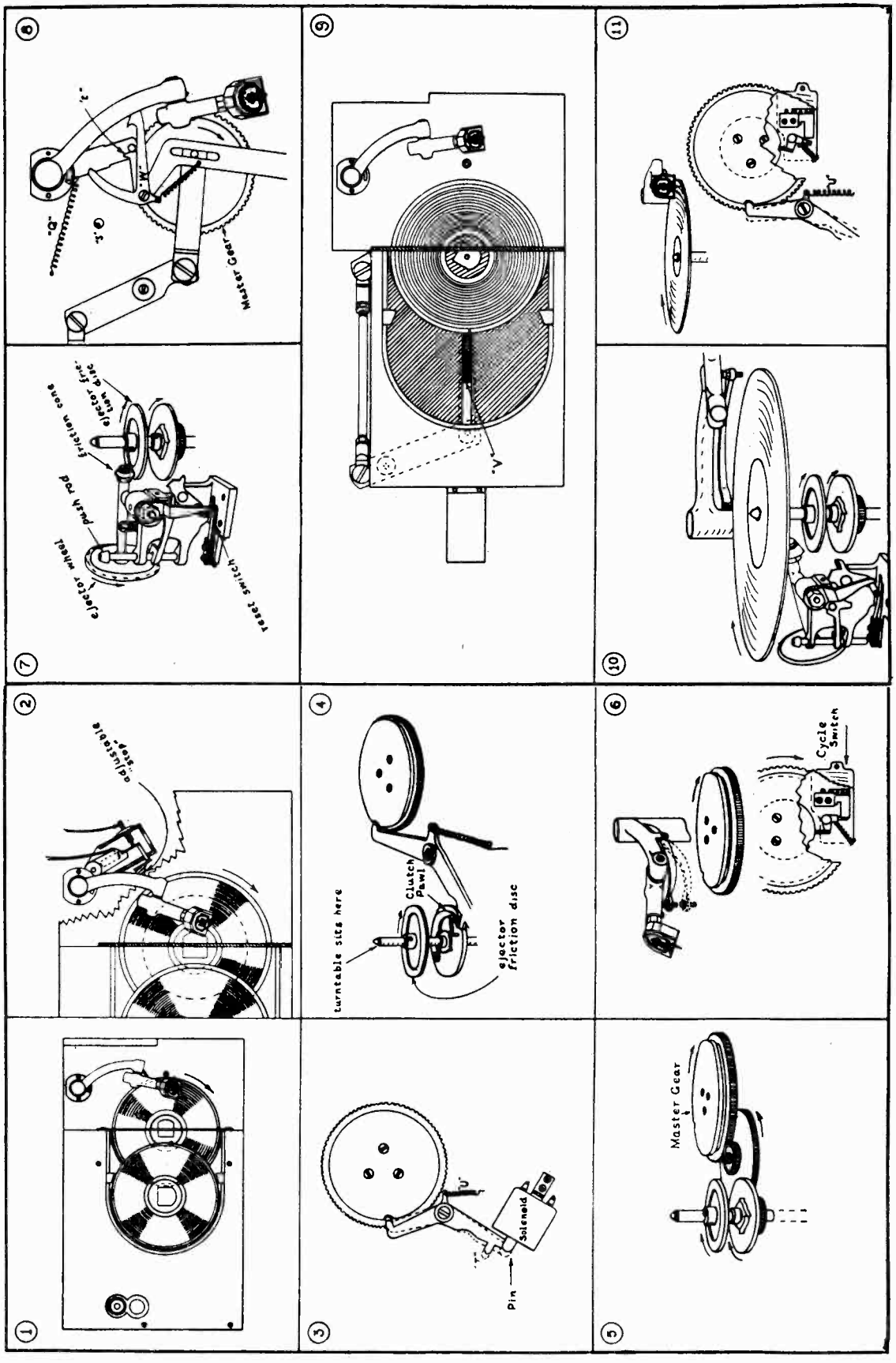
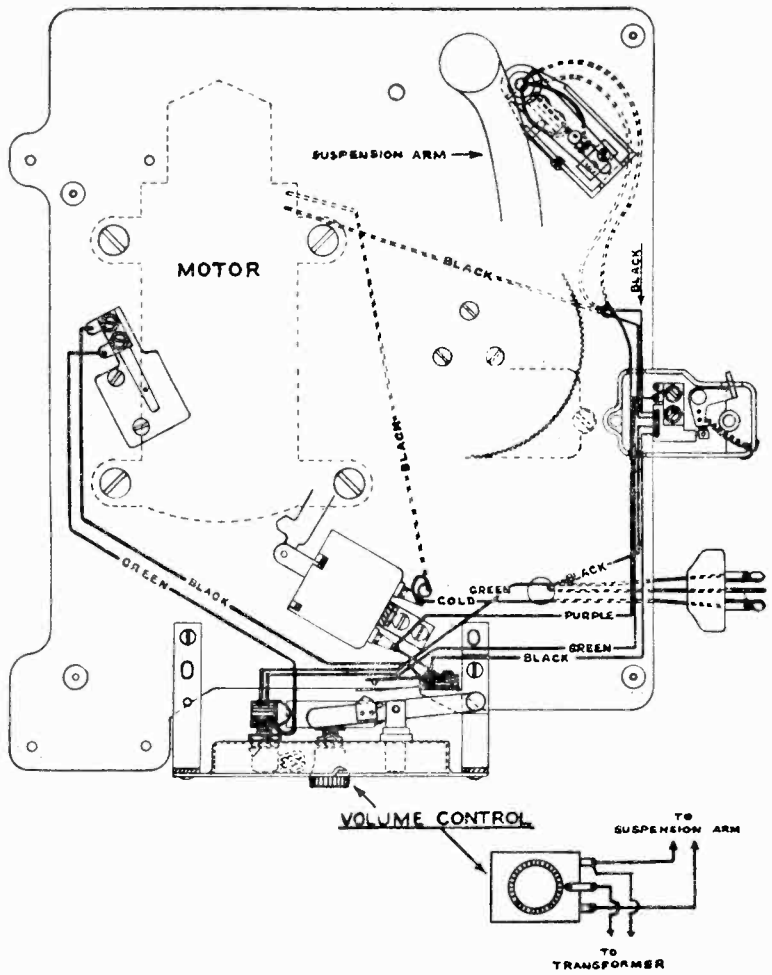


Figure 4

Figure 3



WIRING DIAGRAM - MODEL 42 - AUTOMATIC
CA - 7011

Figure 5

contact is too great, the switch will not close on an eccentrically grooved record. If the stop for the concentric grooved record is set too far to the left the contact will not close, and if set too far to the right, the record is rejected before the selection finishes.

The later type of switch has been simplified somewhat in construction, having only one contact, but accomplishes the same work. If the previous discussion has been carefully followed, similar reasoning applies to the adjustment and operation of this later type of switch. On the models with this later type switch the "stop" previously mentioned is adjustable through a hole in the plate covering the mechanism.

4. Solenoid operation:

Remove the turntable and press the start button. This energizes the solenoid coil which in turn operates the lever, which starts the functioning of the record-changing mechanism. After the record-changing mechanism completes its cycle, the electrical circuit of the solenoid is opened and it is de-energized. The spring, "u," Sketch 11, pulls the lever into its normal position. If the solenoid for any reason does not draw the armature in properly, or the armature vibrates against the solenoid, it can be adjusted by means of the two screws which mount the solenoid to the base. Also, if the spring "u" is too weak, the record-changing mechanism will not stop, but will continue to reject the records. If too strong, the solenoid will not have sufficient power to operate the record-changing mechanism. The solenoid armature is hollow and contains a rubber bumper which dampens out alternating current vibrations.

GENERAL POINTS TO CHECK UP IF THE AUTOMATIC PANATROPE IS INOPERATIVE

1. Be sure that the power line plug is connected to the receptacle and that this is "alive." The latter can be readily determined by plugging in a floor lamp or other similar electrical device.

2. The power plug joining the Automatic mechanism and radio chassis should be solidly connected.

3. The Panatrope input transformer tip leads should be well seated in the tip jacks at the rear of the radio chassis.

4. There should be not more than twenty records in the magazine and reject record compartment at one time to prevent the possibility of jamming and record breakage.

5. The "Off-On" switch on the Panatrope control panel should be placed at the "On" position, and the volume control turned up far enough to insure sufficient volume.

6. The station selector scale should be turned past the 1500 K. C. mark until the clicks of the Radio-Panatrope change-over switches are heard.

7. By pressing the "start" button for an instant, the radio tuning scale should be illuminated and the turntable set in motion. If the latter revolves, but the scale is not illuminated, the fuses under the power transformer cover should be tested and any defective ones replaced. Check the pilot light for continuity if the radio tubes light up.

8. If everything checks up to this point, and still no reproduction is obtained, see that the group of three tubes at the left of the radio chassis (when viewed from the rear) are lighted. Remove the cover on the three screen-grid tubes and replace the tube nearest the rear of the chassis with one known to be okay.

9. For pickup trouble see Service Bulletin No. 70, page 9.

In conjunction with the following possibilities of trouble and their remedies, it would be well for the one contemplating service on the instrument to stop for a moment before

delving into the machine and try to analyze the cause of the trouble. This will save much time and unnecessary work.

Records Jamming in Mechanism

There are several conditions which may cause this; the most likely are those due to (a) warped records, (b) the record feed fingers on the record magazine bent, (c) the spring on the record gate (which supports the records while stored in the magazine) adjusted too closely, allowing only thin records to pass through; or the other extreme, too wide, allowing two records to go through, (d) the space under the record feed fingers allows two records to be caught instead of a single one.

Obviously, for (a) the record should be placed on a warm flat surface until it is once more flat. For (b) it will be necessary to remove the mechanism from the cabinet (see paragraph headed "Removal of Mechanism from Cabinet") to get at the small spring which provides tension for this finger. After once seeing how this particular part functions, the average service man can effect the repair by running the mechanism to the middle of a cycle, at which point the record feed finger will be at the edge of the magazine. If the spring is broken and enough remains to permit stretching it, too much tension will not be a serious drawback on the finger; otherwise, it is necessary to replace the spring with a similar one. For (c) refer to Figure 1. This shows the record gate in question, situated immediately over the center of the record on the turntable. This has a spring clip at its center which is adjustable either up or down. To adjust for two records coming through at once, lower the gate, and for a single thick record raise it. If records of standard make, and not warped, are used, very little trouble will be experienced from this point after it is once set. In a few cases (d) it has been found that the space under the record feed finger of the magazine lever permits two records to be caught at once. Should this be the case, the part of the lever which goes under the record first can be raised a small amount, thus lowering the height of the finger when it comes forward to select the next record for reproduction. In case the turntable does not revolve after these troubles have been remedied, turn the motor governor by hand until the mechanism reaches the start position; then it will run as usual.

Adjustment of Feeder Rod

The feeder rod is located at the back of the automatic mechanism, and is made accessible by removing the wooden top cover around the record magazine. Also refer to Sketch 9. Its length controls the distance through which the magazine lever moves. This does not often need attention but can be changed in length as follows: Loosen the lock nuts at either end of the rod. To shorten, turn the rod in a clockwise direction, or in case the rod is to be lengthened, turn in a counter-clockwise direction. Then tighten the lock nuts.

Record Ejector Wheel Not Functioning Properly

Sometimes the record ejector wheel will come up but fail to turn and throw the record out. This may be due to neglect in oiling the shaft to which it is attached. As this is only a friction drive, any opposition to its turning, in addition to the ejection of the record, may be detrimental. Other possibilities are that the friction cone is covered with oil, or is worn down. Clean it off and check before going further. If it has worn down, check the spring in the plunger which pushes this wheel up. See that this spring has some life in it by noting whether the ejector wheel rebounds readily when pushed down. If, after this the trouble is not obvious, try placing a very thin washer behind the friction cone to move it forward a little or replace the cone.

Solenoid Trouble

Vibration during record changing cycle. This may be due to the solenoid being improperly centered, or caused by the rubber bumper in the hollow solenoid armature not functioning properly. Loosen the screws which hold the solenoid to the iron base, and push it forward. Center the plunger pin and tighten the two screws. Check the smoothness of the plunger action by operating it with the finger. It is absolutely essential that the armature be properly centered. It may even be necessary to place a small piece of paper beneath the bracket near either of the two screws, or one side of the bracket to center it, but be sure it is finally centered. If the solenoid rattles after this, take the armature out and determine whether the rubber has lost its elasticity, due to excessive heat or moisture. If so, replace it and center the solenoid again. Also see "Solenoid Operation" at beginning of Part III. For an open winding in the solenoid there is no alternative but to replace the coil.

Gear and Clutch Mechanism--Cycle Switch

This is the heart of the whole mechanism. Once properly set, the likelihood of its causing trouble is small. If for any reason it becomes necessary to remove the gears, the easiest way to reset the timing is to loosen the solenoid, set the solenoid stop lever (see Sketches 3 and 4) in a position such that it has the projection "r" directly over the slot in the clutch disc. To do this it will be necessary to unfasten the solenoid lever. Raise the master gear sufficiently to clear the intermediate gear and rotate it to a position such that the end of the stop lever is in position near the slot in the master gear. Lower the master gear so that it engages the intermediate gear cogs and then drop the stop lever into position. Set the stop lever snugly in place in the slot of the clutch disc. At this point, the clutch pawl is disengaged from the clutch. If this is not possible, raise the stop lever arm and master gear again and move the latter a single cog or two in the direction which will permit the stop lever to fit properly, then set the stop lever in place and fasten down the master gear by means of the nut under the base. It may be necessary to try this procedure several times before getting perfect operation, but once it has been successfully accomplished, it will be an easy point to tackle afterwards. In case it is found that the two gear segments on the intermediate gear have become loose within each other, this part should be replaced.

The cycle switch is shown in Sketch 6, and has only one moving contact. In the event this remains open circuited, the mechanism will stop just after the rejected record has left the turntable and before the next record drops down from the magazine.

Ejector Wheel Push Rod Assembly

The case may arise where the push rod does not come up high enough to open the reset switch. First, check this rod for bends by turning it around with the finger when it is in the upper position. If it is bent, carefully straighten the push rod and apply a slight amount of oil at the guide holes. The spring tension needs very little adjusting, and if the whole assembly is oiled once every six months, it should give no trouble. Also see latter part of paragraph under heading of "Record Ejector Wheel not Functioning Properly."

Removal of Mechanism From Cabinet

Wherever it is necessary to remove the entire mechanism from the cabinet, the following procedure should be followed:

1. Disconnect the instrument from the power line, and also open the power and Panatrope plug connections between the radio chassis and the Automatic mechanism.
2. Four large nuts hold the mechanism in the cabinet, these being located at the four corners of the cast iron base. Remove these and the rubber cushions.
3. Remove the volume control knob on the control panel.
4. Remove the four screws that fasten the lid supports to the top cover of the cabinet, and gently lay the cover back.
5. Remove the wooden top piece which contains the "good" and "used" needle receptacles.

This exposes the entire mechanism and permits its removal from the cabinet.

PART IV
COIN OPERATION

A coin operation kit has been made up, designated as Part No. 1000, for use in conjunction with the Automatic Panatrope mechanism. Full instructions accompany each kit showing the connections and physical locations of each part.

This equipment will permit the Panatrope to reproduce one record for each nickel inserted up to the capacity of the magazine—twenty records. The coin control device is actuated by the feeder rod at the back of the mechanism. If the machine is used exclusively for coin operation, the "Off-On" switch should be disconnected from the circuit behind the panel to prevent the whole magazine contents from playing on a single coin.

Connection to the circuit is extremely simple, as all that need be done is to separate the power plug from the chassis to mechanism and insert the extension plug provided with the apparatus. This layout and the connections are given in the accompanying diagram.

As this equipment is of rugged construction, it will give very little trouble. The most important point to check is to be sure the actuating lever is securely fastened to the protruding arm of the lever box. This lever normally assumes a vertical position and the ratchet wheel moves one notch with each record played. An improper placing of this lever results in either too much strain on it, or else it does not move the ratchet wheel.

Complete installation instructions are supplied with each coin operation kit which may be purchased from any Brunswick Distributor or Branch.

PART V
12-INCH RECORD OPERATION

Prior to Serial No. 2500 the Model 42 Automatic Panatrope with Radio was not provided with a means for playing 12-inch records. A demand on the part of music lovers, who already had a library of 12-inch records, however, made it advisable to provide manual operation for 12-inch records. A kit of the necessary parts to make this change may be ordered from any Brunswick Distributor or Branch by specifying Part No. 4161. Directions for attaching these parts are as follows:

DIRECTIONS FOR INSTALLING PART No. 4464 KIT ON MODEL 42 AUTOMATIC PANATROPE WITH RADIO TO PERMIT MANUAL OPERATION OF TWELVE INCH RECORDS

Parts Required:
- 1 Twelve-inch Record Kit (Part No. 4164) consisting of:
  - 1 Record guide plate assembly (right).
  - 1 Record guide plate assembly (left.)
  - 2 Record guide screw-plates with screws.
  - 1 Switch cam and record locator assembly.

Tools Required:
- 1 Hack-saw with proper blades for cutting 3-16-inch steel stock
- 1 Hand drill and the following drills, sizes:
  - 1—11-164" drill (a 3-16" drill may be used instead if available)
  - 1—3-32" drill.
- 1—12-inch flat file
- 1—8-inch Bastard file.
- The usual assortment of screwdrivers, pliers, soldering iron, etc., available in every service department.

All of the above tools should be at hand before the installation of this kit is attempted.

METHOD OF PROCEDURE

1. Removal of Record-Change Mechanism from cabinet:
   - (a) Slide "oil drip" board out of the back of the cabinet.
   - (b) Disconnect the power cable plugs between radio chassis and record-change mechanism.
   - (c) Remove the four large nuts and associated rubber cushions located at the four corners of the cast iron base of the record-change mechanism.
   - (d) Remove volume control knob on front control panel (fastened to shaft with one set screw).
   - (e) Remove the wood panel containing the needle cups located around record hopper (held in place with three wood and three machine screws).
   - (f) Remove four screws that fasten lid to lid supports and lay lid gently out of the way.
   - (g) Lift record-change mechanism from cabinet by pulling entire assembly straight up.
2. Cut Triangular-Shaped Slot in Record Hopper:
   - (a) From the dimensions given in Figure No. 9 Page 16, (see detail "b") mark in pencil the exact shape of the cut to be made on the front record hopper support (note that only the front support is to be so cut). The important dimensions are the base line (1½-inch above the turned in portion of the record hopper leg), the length of the base line (1⅞-inch long as a minimum and 2-inches long as a maximum), the width of the cut at the front (⅞-inch to 1 inch wide) and the angle at which the top of the cut intersects the base line (the easiest way to draw this is to make the cut ½-inch deep at the inside.
   - (b) Remove the two record-guide arms from the record hopper cross bar and remove the record hopper cross bar from the record hopper.
   - (c) After marking the proposed shape of the cut on the front leg of the record hopper, as directed in paragraph "a" above, saw along the two horizontal lines with a hack-saw until the inside vertical line is reached. Then bend the piece of metal to be removed back and forth until it breaks off. File the edges smooth.
   - (d) File the protruding edges of the record hopper (indicated by "c" on the drawing) back at a 30-degree angle so that these points will not scratch the 12-inch records when they are placed on and removed from the turntable.
   - (e) Fasten the record hopper cross bar and the two adjustable record guides (supplied with the kit) on the record hopper by means of the four machine screws and the two screw blocks (also supplied with the kit).
3. Fasten New Record Bumper and Switch Assembly to Top Plate:
   - (a) Remove the eight machine screws that fasten the right hand top plate to the record-change mechanism; the two machine screws that hold the suspension arm collar to the top plate and remove the top plate
   - (b) Remove the rubber-covered record bumper from the top plate and also remove the rivet 9-16-inch above the record bumper hole.
   - (c) Remove the rubber-covered adjustable record bumper and switch throw cam from the switch assembly supplied with the kit so that the base plate may be used as a template.
   - (d) Fasten the base plate of the switch to the under side of the top plate (the switch should be mounted toward the outside edge of the top plate) using the two holes provided by the removal of the rubber-covered record bumper and the rivet (these two holes are referred to as "a" and "b" in the diagram).
   - (e) Mark the location of the third hole (referred to as "c" in Figure No. 9) with a punch, remove the switch plate and drill this hole with a 11-64-inch or 3-16-inch drill.
   - (f) The switch may now be assembled on the top plate.
   - (g) Rotate the record bumper lever through its 180-degree arc several times and a ¾-inch circle will be inscribed on the top plate. Turn the record bumper lever half way between its two end positions and mark the two places on the circle that are in line with holes "a" and "c." Use a 3-32-inch drill and drill at these two points two countersunk holes about ¼ of the way through the top plate. These two holes serve as stop positions for the adjustable record bumper.
4. Connect Switch to Solenoid Circuit:
   - (a) Remove the black and brown leads from the right hand side of the solenoid and connect them to one of the switch leads. Connect the other switch lead to the solenoid terminal thus left vacant. This permits the operator (by turning the record bumper to the right) to disconnect the solenoid from the circuit so that the record-change mechanism will not function while a 12-inch record is being played
5. Replace the Record-Change Mechanism in the Cabinet

To Play 12-inch Records Manually:

1. Turn station selector scale past the 1500 kilocycle mark until a click is heard and turn the "off-on" switch on the automatic panatrope control panel to the "on" position.

2. Turn the two 10-inch record guide arms, located on opposite sides of the record hopper, up, and rotate the rubber-covered record bumper (located at the right of the turntable) toward the right-hand side of the cabinet as far as it will go, so as to allow 12-inch record to fit on turntable.

3. Move the magnetic pickup toward the right-hand side of the cabinet as far as it will go and gently slide the 12-inch record on the turntable from the right side of the cabinet.

4. The magnetic pickup can now be freely moved. and by placing it in the first playing groove of the record the 12-inch records can be played.

To Change Back for 10-inch Record Automatic Operation:

Turn the record guide arms, located on the record hopper, down, and rotate the rubber-covered record bumper arm in toward the turntable. The instrument will now play 10-inch records automatically.

MODEL 42
AC-DC

BRUNSWICK RADIO CORP.

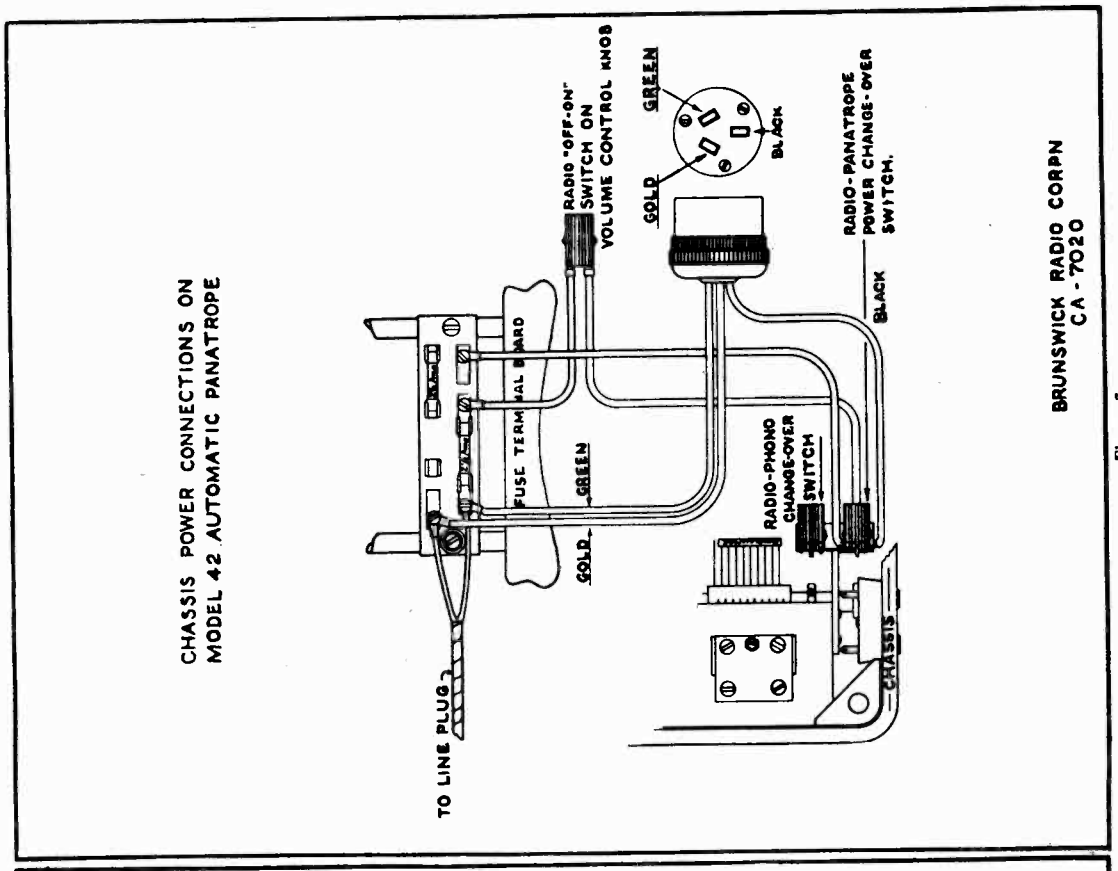


Figure 7

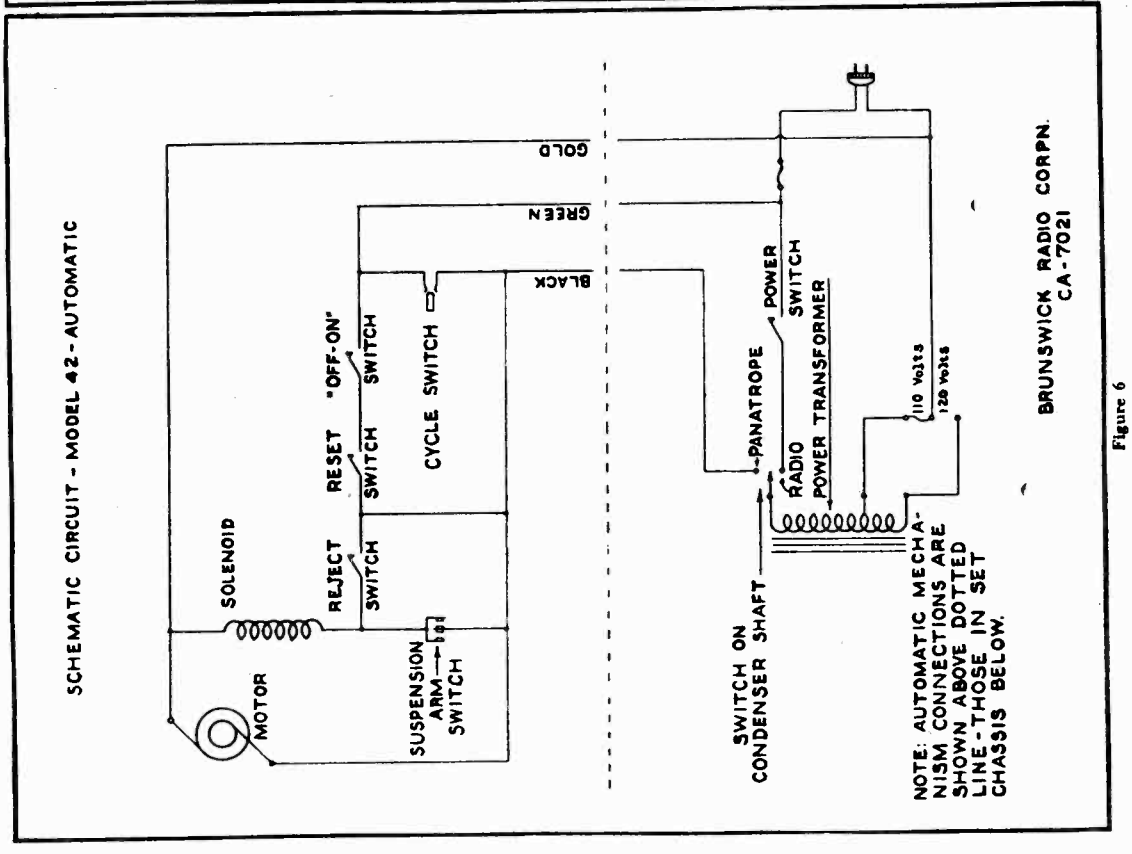
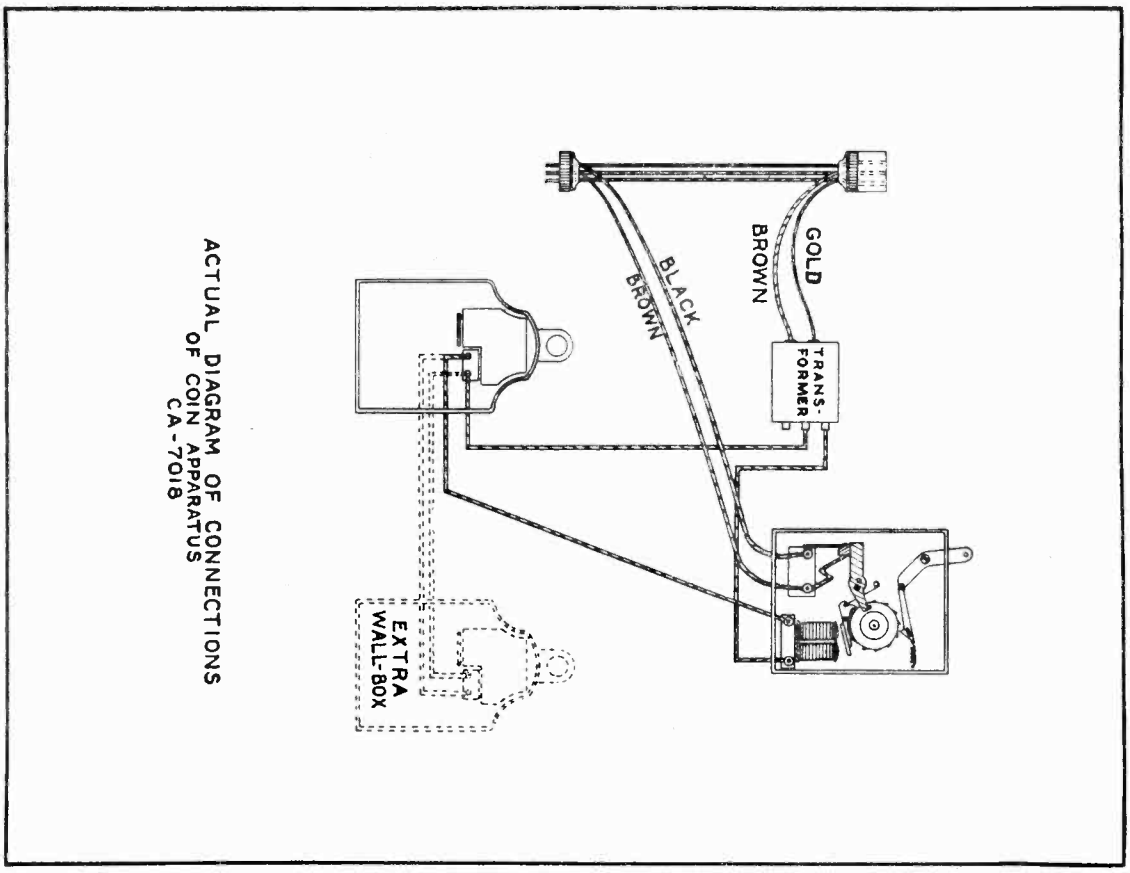


Figure 6

MODEL 42
AC-DC

BRUNSWICK RADIO CORP.



ACTUAL DIAGRAM OF CONNECTIONS OF COIN APPARATUS CA-7018

Figure 8

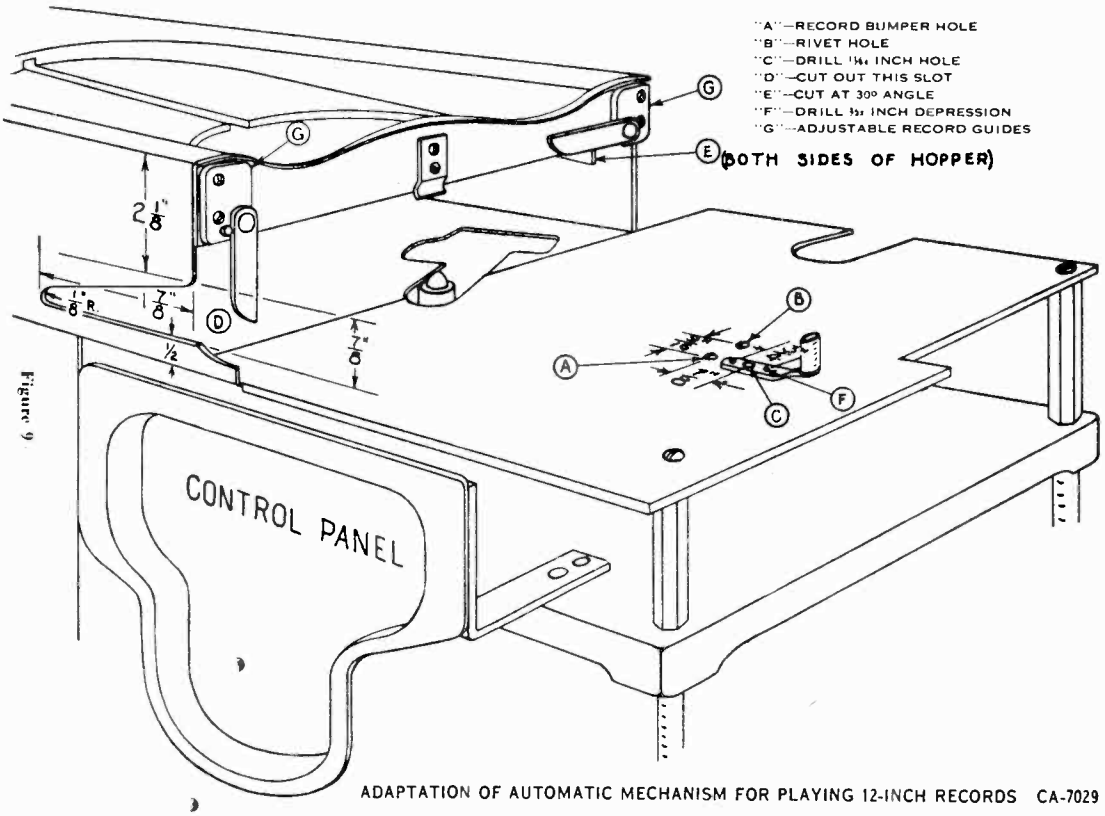


Figure 9

ADAPTATION OF AUTOMATIC MECHANISM FOR PLAYING 12-INCH RECORDS CA-7029

MODEL 3 NC8, 5 NC8
Alignment Data

BRUNSWICK RADIO CORP.

Service Operations on X-1102 and X-1103 Chassis.

A. Adjustment of R. F. Compensating Condenser.

If it is definitely known that no other defect exists in the set, antenna or ground and if the receiver is insensitive, distorts or oscillates over any or all portions of the dial then the R. F. compensating condenser should be adjusted as follows:

(a) Tune in a long wavelength station to maximum volume, or use special test oscillator at 600 K. C.

(b) Place non-metallic screw driver in slot of compensating condenser (located beneath panel on right side, see Print CA-6039) and turn screw in a clockwise direction until the receiver goes into oscillation. Then turn screw in opposite direction until set goes out of oscillation, and will not whistle, squeal or howl on local stations. This is the correct position of the compensating condenser.

B. Adjustment of Oscillator Trimming Condenser.

If after above adjustment explained in paragraph "A" the set is still insensitive and distorts the signal, proceed to adjust the oscillator trimming condensers in the following manner:

Material needed: Special radio frequency oscillator equipped with milliammeter, non-metallic screw driver and necessary leads.

(a) Place special oscillator near receiver and secure the transfer of R.F. energy by twisting output lead from oscillator around blue antenna lead of receiver. The receiver ground connection should be connected to ground. In order that the milliammeter on oscillator panel will function as a tube voltmeter it is necessary to place this meter in series with the plate lead of the second detector tube. This is accomplished by removing the red wire from the terminal strip of the Socket Power Unit and connecting the resonance meter in series with this lead and the terminal from which it was removed. So that the current drawn by the power tube shall not flow through the resonance meter remove the red wire from the terminal strip of the Rectox unit and connect a jumper wire from the terminal left vacant to the terminal on the SPU which is now connected to the resonance meter. Turn volume control to minimum on receiver. Turn receiver on, then turn oscillator on and watch needle on resonance meter. If needle goes off scale to the left, reverse meter connections. Adjust oscillator for 1400 kilocycle operation and tune receiver to secure maximum deflection on resonance meter, turning the volume control up just far enough during tuning operation to keep needle at about three-fourths full scale deflection.

(b) Adjust trimming condenser under 2nd detector tube (condenser No. 1 in Print CA-6039) with insulated screw driver, until maximum deflection is obtained on milliammeter.

(c) Tune oscillator to 600 kilocycles and adjust trimming condenser No. 2 (to be found under oscillator tube) to maximum deflection on milliammeter.

(d) Now re-adjust at 1400 kilocycles as in paragraph "B."

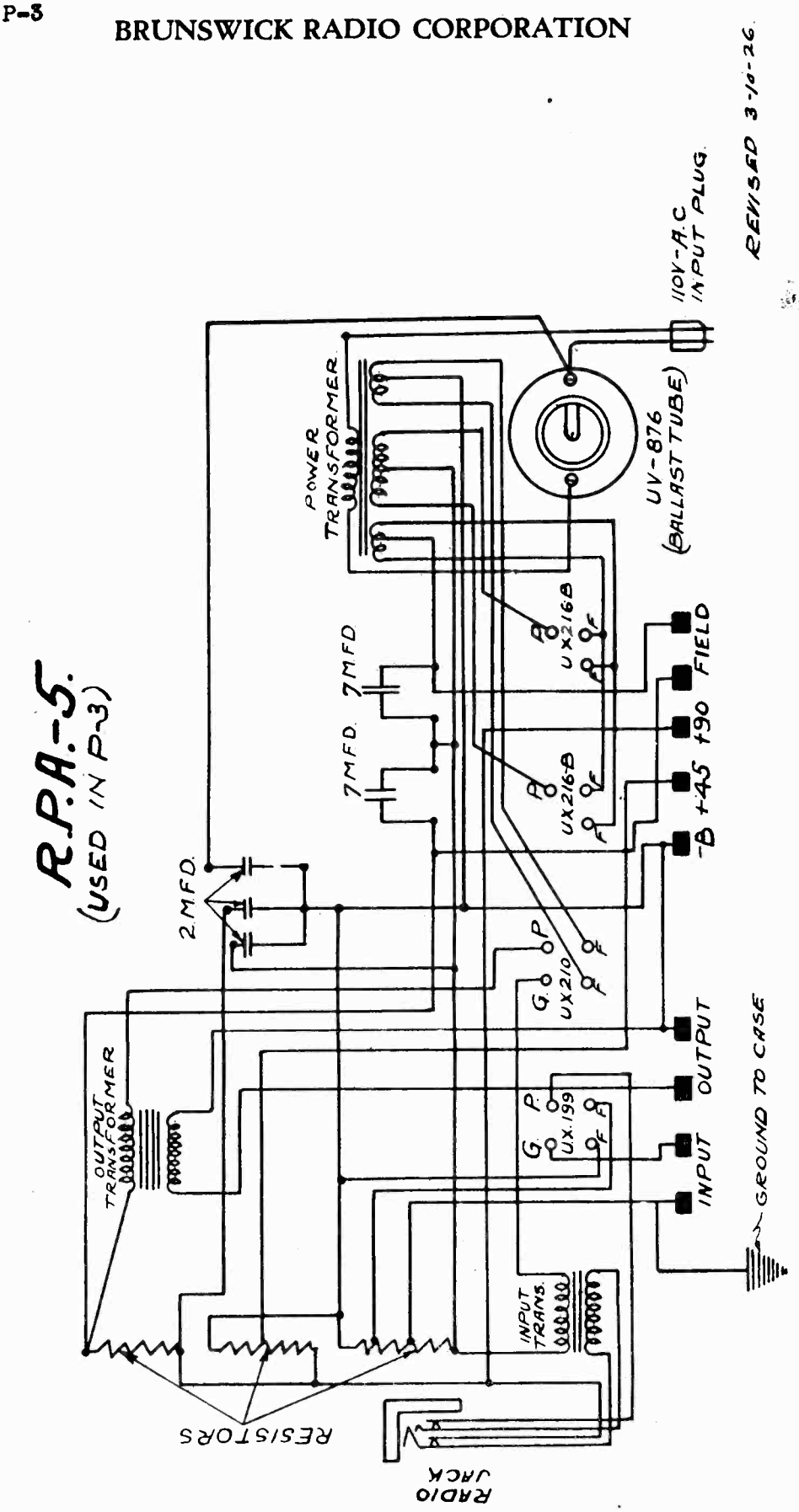
Oscillator circuit is now adjusted to give 180 kilocycles beat note over entire tuning range.

C. Part 1—Adjustment and Neutralization of I. F. Transformer.

This operation is only to be attempted when Technician is sure that the lack of sensitivity or oscillation is not due to some other fault or when it is definitely known that one of the transformers is burnt out, shorted or grounded. To test the I. F. transformers, use ohmmeter, resistance bridge or voltmeter, with milliammeter, and Ohms' law, i.e., resistance is equal to the voltage divided by the current in amperes. Primary resistance should be 20 ohms, secondary 100 ohms overall or 50 ohms from grid to center tap

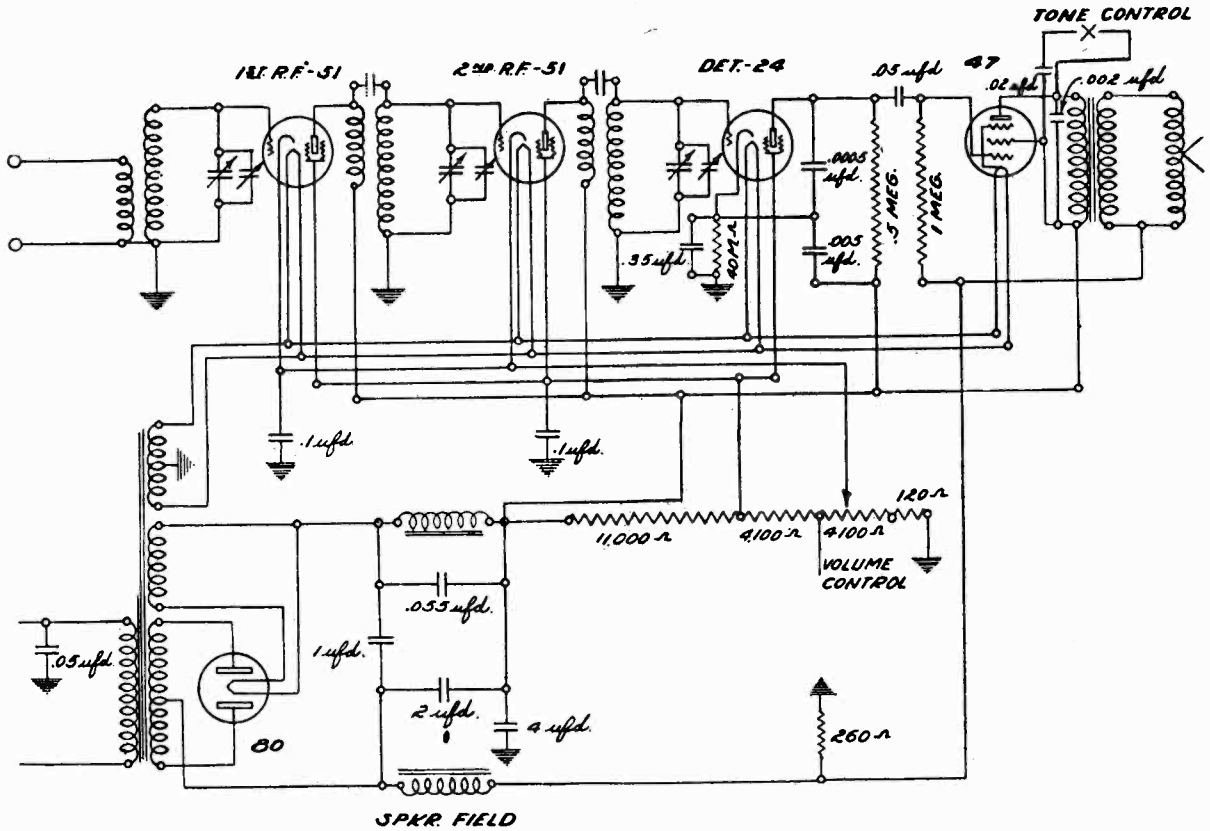
MODEL RPA-5
Used in P-3

BRUNSWICK RADIO CORPORATION



MODEL M-501

BULOVA WATCH COMPANY



CONTINUITY TEST TABLES

(Using 10-volt scale 1,000 ohms per volt: meter with 6-volt battery)

Circuit Tested	From	To	Reading	Your Reading
Ant. coil pri.	Ant. post	Ground	6.	
Ant. coil sec.	Grid 1st tube	Ground	6.	
1st R. F. Plate ckt.	Plate of tube	Brown lead of filter pack	6.	
1st R. F. Screen ckt.	Screen prong	Center lead Voltage divider	6.	
1st R. F. Cathode ckt.	Cath. prong	Center tap Volume Control "ON"	6.	
2nd R. F. Grid ckt.	Grid Clip	Ground	6.	
2nd R. F. Plate ckt.	Plate prong	Brown lead of filter pack	6.	
2nd R. F. Screen ckt.	Screen prong	Center tap Voltage divider	6.	
2nd R. F. Cathode ckt.	Cathode prong	Center tap Volume Control "ON"	6.	
Det. Grid ckt.	Gird Clip	Ground	6.	
Det. Plate ckt.	Plate prong	Brown lead of filter pack	6.	
Det. Screen ckt.	Screen prong	Center Voltage divider	6.	
Det. Cathode ckt.	Cathode prong	Ground	1.4	
P. Z. cont. grid	Grid prong	Sec output trans. black lead.	(slight deflection)	
P. Z. space chg. grid ckt.	S. C. Grid Prong	Brown lead of filter pack	6.	
P. Z. Plate ckt.	Plate prong	Brown lead of filter pack	5.7	
Output Sec.	One side	Other side	5.9	
Pri Power Trans.	Across A. C. Plug	Switch on	5.9	
Hi volts Sec.	Across 280 plate prongs		5.6	
Speaker field	Red wire	Green Wire	5.4	
Speaker voice coil	Green wire	Black	6.	
Filter Choke	Across red leads		5.6	
Voltage divider	Ground	Brown lead of filter pack	2.2	

RESISTANCE TABLE

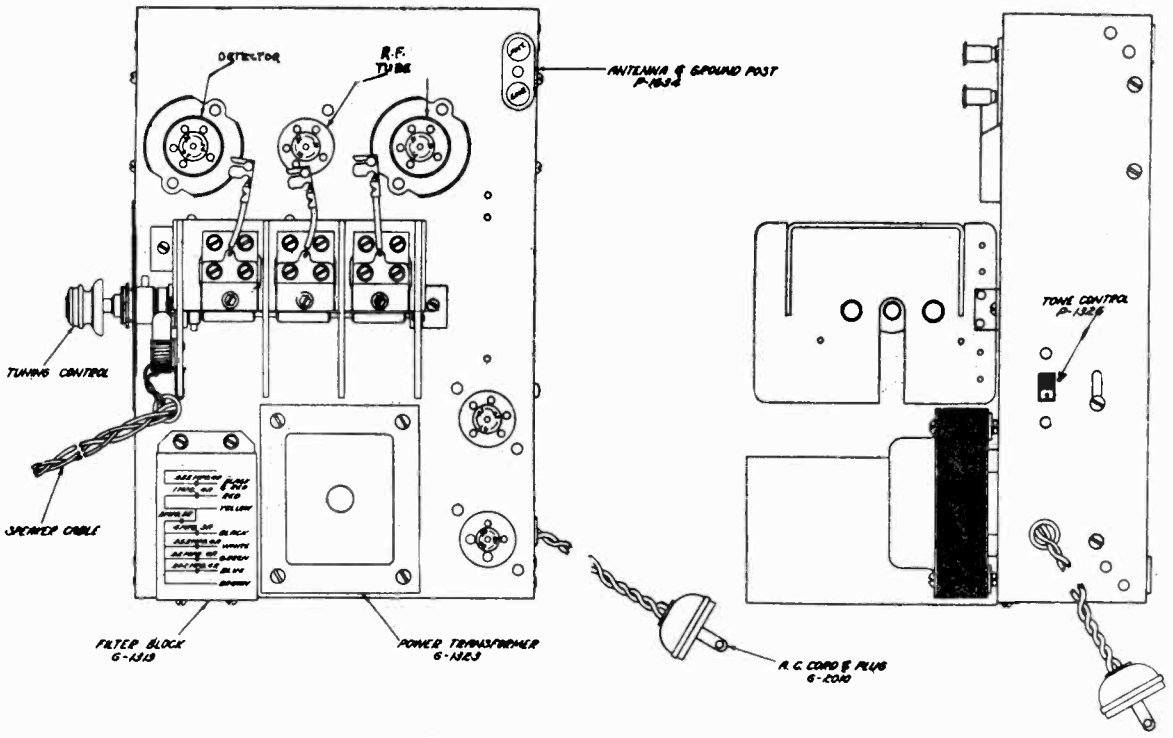
(Using 10-volt range meter 1,000 ohms per volt and 6-volt battery)

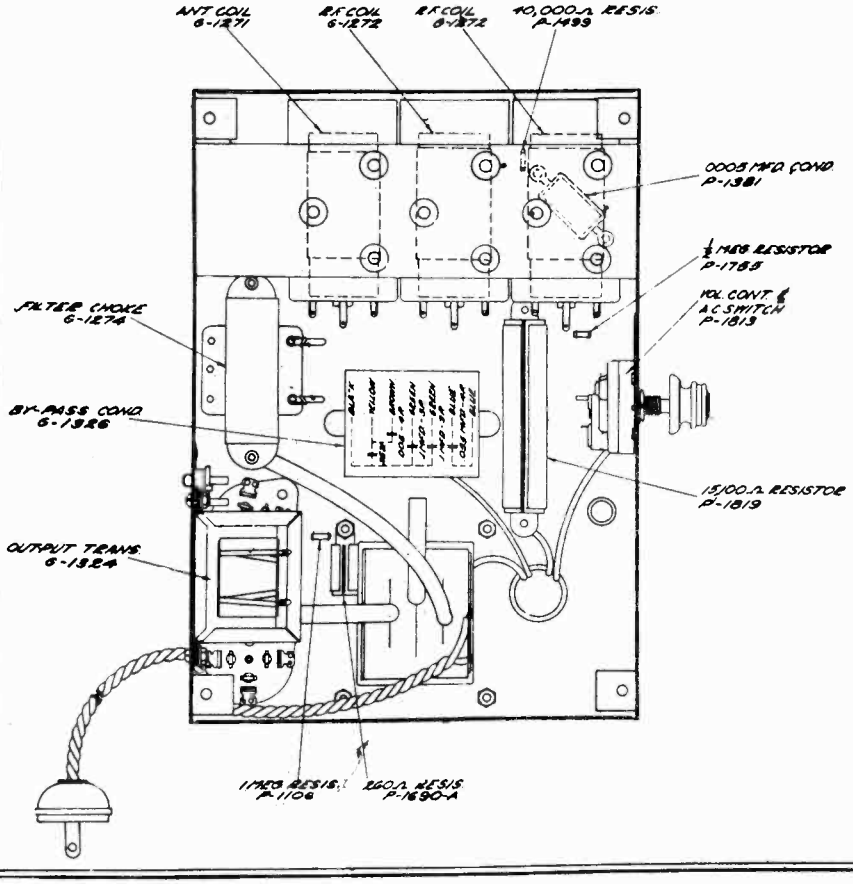
Item	Color Code*	From	To	Reading	Your Reading	Resistance in Ohms
Det. Cath. Resistor	Yel., Blk., Or.	Det. Cath.	Gnd.	1.3		40,000
Pent. Grid Resistor	Br. Blk., Green	Pent Grid	Spkr. Field	Slight Deflection		1,000,000
Wire-Wound	Black	VoiceCoil.Black	Gnd.	5.9		260
Voltage Divider. Short End	Black	Volume Cont. Green Lead	S. G. Ckt.	4.2		4,100
Voltage Divider. Long End	Black	Plate	S. G. Ckt.	3.		11,000
Det. Plate Resistor	Gr., Blk., Yellow	Det. Plate	Pent. Space Chg. Grid.	.1		500,000
Vol. Control "on"		Gnd.	R. F. Cathode	4.2		4,100

*Color code read body color first, tip second and dot last.

MODEL M-501

BULOVA WATCH COMPANY





VOLTAGE ANALYSIS

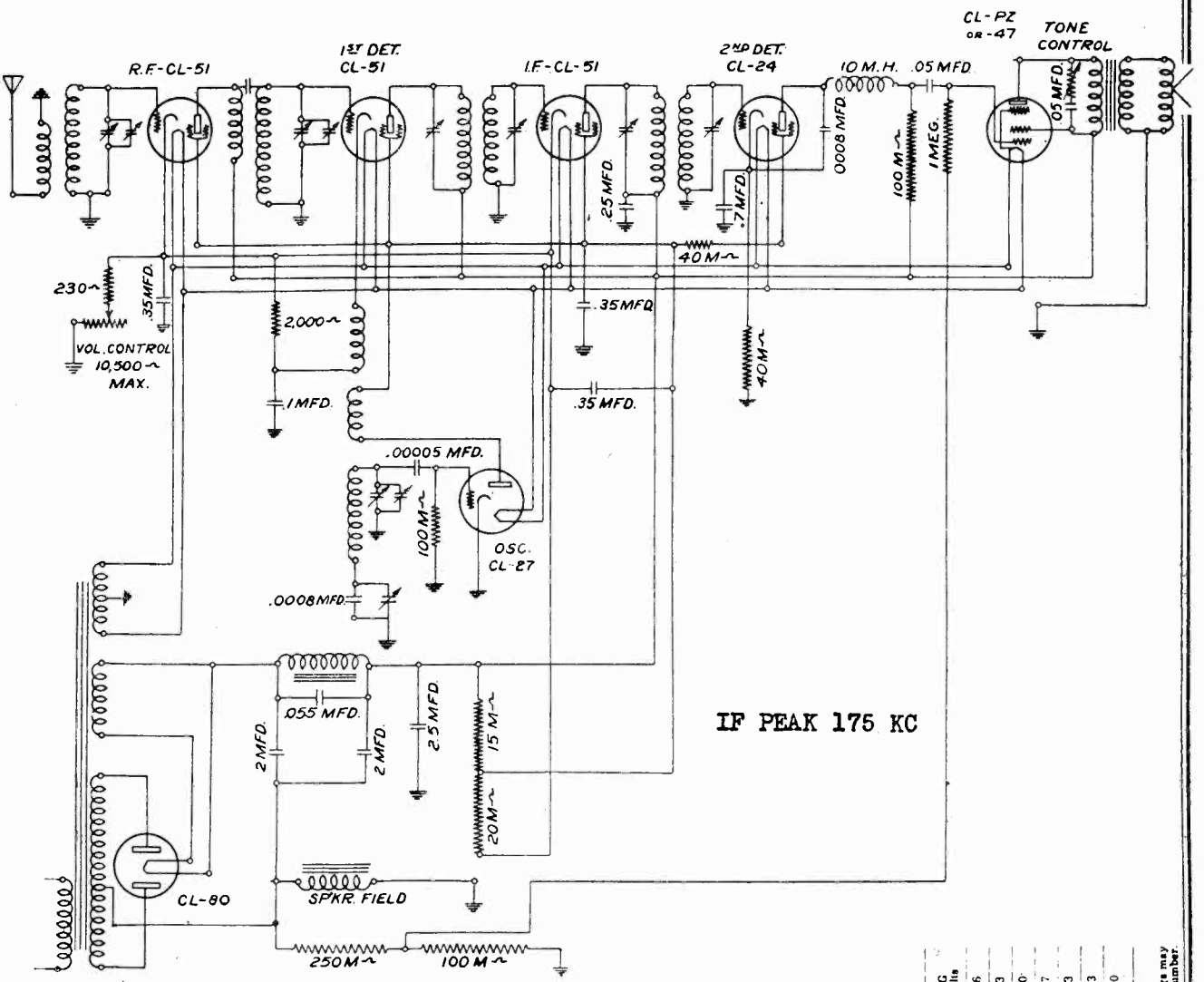
READINGS TAKEN WITH WESTON MODEL 565 ANALYZER

No.	Stage	Type Tube	Fil. Volts	Plate Volts	Cont. Grid Volts	Cath. Volts	S.G. Volts	Ip. Normal
1	1st R. F.	C. L. 51	2.1	225	2.1	2	75	5
2	2nd R. F.	C. L. 51	2.1	230	2.2	2	75	4.5
3	Det.	C. L. 24	2.1	160*	7	7.5	75	.02
4	Output	C. L. 47	2.1	215	5*	0	225	26.5
5	Rect.	C. L. 80	4.8	280				130

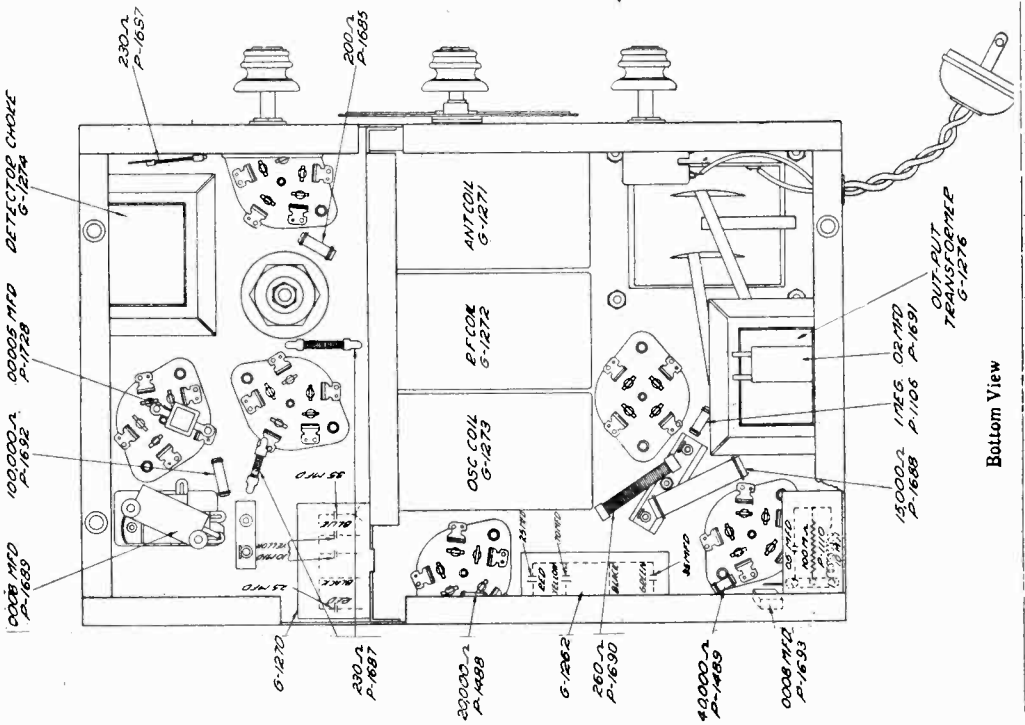
*Reading dependent upon resistance of meter.
†Reading taken for one anode only: 60 milliamperes would be about correct.
Volume control position full. Line voltage 115—60 cycle.

BULOVA WATCH COMPANY

MODEL M-701
MODEL G-781



IF PEAK 175 KC



Bottom View

No.	Stage	Type Tube	A Volts	B Volts	Cont. Grd Volts	Cath. Volts	Ip' Norm.	SG Volts
1	r. f.	CL-51*	2.2	233	3	3	5	66
2	1st Det.	CL-51	2.2	233	1	7	2.3	73
3	Osc.	CL-27	2.2	80	0	0	4	0
4	I.F.	CL-51	2.2	233	3	3	5	77
5	2nd det.	CL-24	2.2	162	6.2	7.2	5	73
6	Output	CL-PZ	2.2	278	15	0	27	233
7	Rect.	CL-80	4.8	300	0	0	30	0

Volume control position Full — Line Voltage 115

Note: Since resistance tolerances in the sets are plus or minus 10%, and tubes may vary over 20%, your readings may disagree with the above by plus or minus 30%. CL-PZ is also known as CL-47, the latter being the final type number.

MODEL M-701
MODEL G-781
Automatic Clock Control

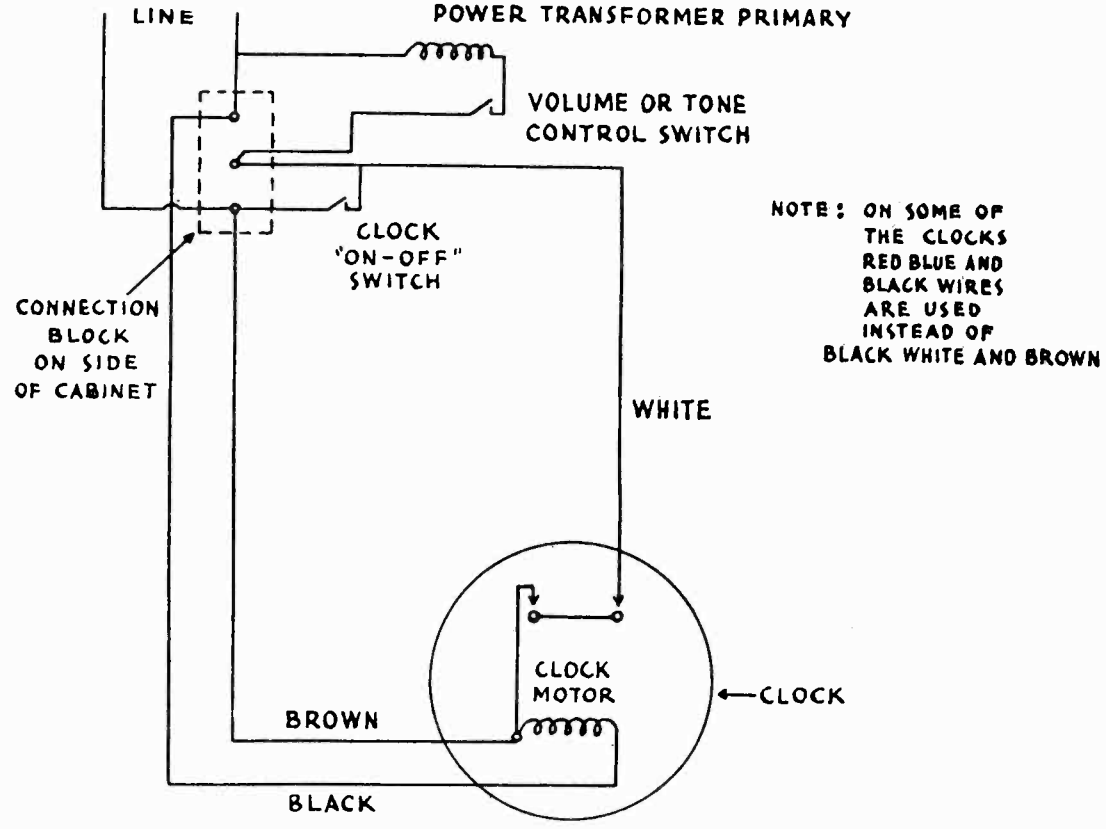
BULOVA WATCH COMPANY

Resistance Table

(Using 10 volt range meter 1000 ohms per volt and 6 volt battery)

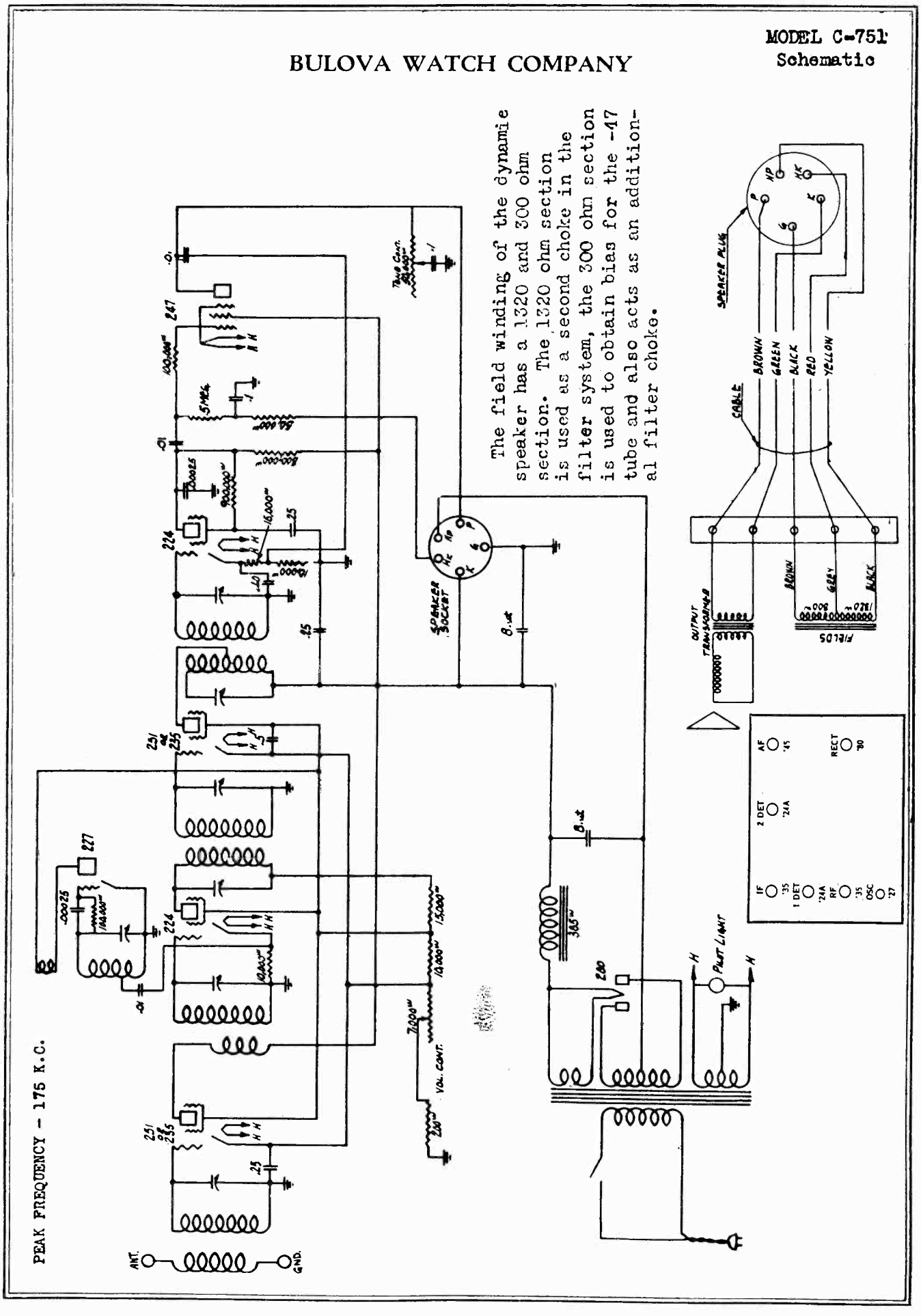
Item Tested	Description Color—Code	From	To	Reads	Your Reading	Ohms Resistance
r. f.-grid. bias resist.	Black Strap type Wire wound	r. f. cath. prong	Vol. cont. ungrounded terminal	5.9		230
Volume control	Variable at max. resistance	Test between its two terminals (connected)		3.2		Max. 10,500
1st det. grid bias resist.	Red Black tip	r. f. cath. prong	Other end of resist.	5.1		2,000
1st det. screen grid volts resist.	Black Strap type Wire wound	1st det. screen grid prong	Other end of resist.	5.9		230
1st det. plate resist.	Black Strap type Wire wound	Solder lug on Electrolytic cond.	B plus term. of 1st i. f. trans.	5.9		230
Oscillator grid-resist.	Brown Yellow spot Black tip	Oscillator grid prong	Ground	0.6		43,000
1. f. and r. f. cathode-bias resist.	Red Orange spot Black tip	1. f. cath. prong	1. f.-screen grid prong	2.3		20,000
1. f. and det. screen grid volts resist.	Brown Orange spot Green tip	1. f. screen grid prong	Solder lug on electrolytic cond.	2.7		15,000
2nd det. grid-bias resist.	Yellow Orange spot Black tip	2nd det. cath. prong	Ground	1.3		40,000
2nd det. plate resist.	Inside 3rd term. det. r. f. filter assem.	Test between solder lugs on det. r. f.-filter assem. with red wires attached		0.6		100,000 in series with 10m.h. choke
Pentode grid-resist.	Brown Green spot Black tip	Pentode Grid prong	Dummy solder lug off output trans. sec.	0.5		1 Meg.
Pentode grid-bias	Wire wound Strap type	Dummy solder lug off-output trans. sec.	Ground	5.9		260

AUTOMATIC CLOCK CONTROL WIRING DIAGRAM



MODEL C-751
Schematic

BULOVA WATCH COMPANY



MODEL C-751
Voltage and
Service Notes

BULOVA WATCH COMPANY

BULOVA CLOCK RADIO MODEL C-751.

VOLTAGE TABLE

Never check voltages until all tubes are fully warmed up to proper operating condition. The voltage table given below is taken at 115 volts line with a Model 547 Weston set checker. It must be remembered that the voltage readings taken vary directly at the line voltage and also with the accuracy of the meters used. A variation of 10% plus or minus is permissible.

115 V. Line Volume Control Full On

TUBE VOLTAGES

Type of Tube	Position of Tube	Filament Volts	B Volts	C Volts	NORMAL PLATE M.A.	Screen Volts
227	Oscillator	2.4	62.5		4.75	
235	Radio Frequency	2.4	240	2.15	2.75	27
224	1st Detector	2.4	230	4.35	.5	65
235	Intermediate	2.4	237	2.15	2.75	72
224	2nd Detector	2.4	100*	2.1*	2.5	35*
247	Pentode	2.4	250	16.5**	32.5	250
280	Rectifier	4.95			27.ea.plate	

*These readings are only comparative and are not true voltages applied. The volt meter, when the readings are taken at these points, is in series with a very high resistance.

** To read the 247 bias, read between H.K.speaker socket and ground.

INTERMEDIATE TRANSFORMERS:

The intermediate transformers are of the band pass type and of exceptionally high uniform gain. They are tuned to 175 kilocycles. The intermediate frequency trimmers are mounted on an isolantite base, preventing the transformer from becoming detuned due to the trimmer condensers absorbing moisture or warping. For this reason it should rarely, if ever, be necessary to re-track the intermediate frequency trimmers. In the event that it should be advisable to re-align the intermediate frequency coils, it is absolutely essential that a 175 kilocycle oscillator and an output measuring device be used.

ALIGNMENT OF RECEIVER:

Because of the construction and thorough impregnation of the intermediate coils, the intermediate stages should rarely need re-tracking. Only when an intermediate coil has become defective due either to an open or burned out winding, should it be necessary to re-adjust the intermediate trimmers. Should this occur, it is necessary that an oscillator be used and the intermediate trimmers be adjusted at 175 kilocycles. To align the intermediate stages, connect the high side of the oscillator output to the grid circuit of the first detector, which is done by disconnecting the grid cap of the 224 first detector and connecting the high side of the test oscillator to the control grid of this tube. The ground side of the test oscillator should be connected to the ground post on the chassis. Set the oscillator at 175 kilocycles and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. Be sure that the output from the oscillator is not so large that it will overload the second detector. If during the alignment the meter goes off scale, reduce the output of the test oscillator or adjust the receiver volume control.

The trimmers of the intermediate coils are accessible through the small holes in the top of the intermediate shield can. There are two trimmers to each intermediate coil. Align the grid trimmer of the first intermediate coil. After a maximum reading is obtained by adjusting the grid trimmer on the first intermediate, adjust the primary for maximum reading and then re-check the grid side to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate coils. After both intermediate coils are properly aligned the adjustment of the intermediate stage is complete and they should not be further disturbed.

Replace the grid cap on the first detector and connect the oscillator output leads to the antenna and ground posts of the receiver and set the oscillator at 1435 kilocycles. Then tune the receiver to 1435 kilocycles on the dial. It is important that the receiver be tuned to this point. If the receiver is out of the cabinet it will be necessary to use some temporary indicator so that the position 1435 kilocycles on the dial may be accurately located. (This indicator should be set so that when the variable condensers are at the maximum capacity stop the indicator points to the last line on the dial at the low frequency end.) Then track the variable condensers by adjusting the trimmer condensers in the following order: Oscillator, antenna and radio frequency - (reading from the front of the receiver toward the back, the variable condenser sections are : Oscillator, antenna and radio frequency). After the variable condensers have been properly tracked at 1435 kilocycles, adjust the oscillator to 1295 kilocycles. Tune the receiver to this frequency. Check alignment of the condensers at this point by bending the end plate of the rotors in and out, noting the change in reading on the output meter. If when the plates are bent in the reading is increased, it is an indication that that particular section requires more capacity and the end plate should be permanently bent in at this point; or, if when the end plate is bent away, the reading is increased, the end plate should be bent away permanently, as it is an indication that that particular section requires less capacity at that particular point. The variable condensers should be checked in this manner at 1295, 880, 650 and 550 kilocycles. These points have been chosen so as to take advantage of the slots in the end plates of the variable condensers. This procedure of bending plates should rarely be necessary on the oscillator section, as the plates of the oscillator section are especially designed to properly track over the broadcast spectrum, providing the antenna and radio frequency stages are correctly aligned.

RECORD CHANGER

Model 10-12-C

ASSEMBLY OF MOTOR TO BASE PLATE

The motor is attached to the base plate by three bolts, and mounted on rubber cushions.

The brace that is over the turntable spindle and bolted to the base plate serves as an excellent gauge for aligning the motor in the center.

When removing the two screws that hold the turntable locating plate over the turntable spindle, preparatory to operating the instrument, be sure that the locating plate lines up with the holes that the screws are just removed from.

If the motor has become shifted in transit there will be a tendency for the holes in the locating plate and base plate to not perfectly line up.

In this case it is necessary to slightly loosen the three bolts holding the motor to the base plate and shift the motor to such position that the holes in the brace and the base plate align perfectly, and while the brace is still in place, tighten the suspension bolts to hold the motor in that particular position. The brace must then be removed before the turntable is mounted on the shaft.

In placing the turntable on the shaft, be certain that the rubber driving washer is in proper place with clips over the spindle pin.

After the turntable is put on the shaft, force it down by hand to be sure that the rubber washer and turntable are making perfect contact.

To level the turntable, place a straight edge across the turntable and adjust the three suspension bolts holding the motor to the base plate until the same distance is obtained from the bottom edge of the straight edge to the base plate near the three points where the suspension bolts are located.

This measurement should be approximately 11/16". This adjustment must be made so that there is no free movement of the motor by either of the suspension bolts being too loose.

TONE ARM ADJUSTMENT FOR TEN INCH AND TWELVE INCH RECORDS

Pickup change lever No. 5509 is for changing the instrument from 10 inch to 12 inch record operation and vice versa.

The lever changes the position of the pickup return lever in such a manner that the needle is let down for the 10 inch or the 12 inch record, as desired.

To adjust for playing 10 inch records, loosen the forward lever stop No. 5526 and hold the lever in such a position that the needle will come down on a 10 inch record exactly 4-11/16" from the edge of the center pin. (A scale should be placed on the record with the end of the scale against the centering pin in such a position that the needle point will come down on the scale at the 4-11/16" inch position.)

When the proper location of lever No. 5509 is ascertained, then the front stop may be set snug against this lever and the screw tightened, which will allow the lever to always be thrown over to that exact position when desiring to play 10 inch records.

To adjust for playing 12 inch records, loosen the back lever stop No. 5527 and hold the lever in such position that the needle will come down exactly 5-11/16" from the edge of the centering pin. (A scale should be placed on the record with the end of the scale against the centering pin in such position that the needle point will come down on the scale at the 5-11/16" position.)

In the event you are unable to properly adjust for either 10 inch or 12 inch records by the above method, make the adjustment as nearly correct as possible then refer to instructions on Page 6 and check Tone Arm Bracket Lever adjustment making certain the adjustment is correct.

Then loosen the lock nut holding the adjustment screw on the tone arm return lever No. CA5687 and turn the adjusting screw either in or out, as the occasion requires, to bring the needle to the proper location for the size record you are unable to adjust for by the lever stop method. It will then be necessary to readjust the lever stop which was originally set in position for the other size record.

The lever stop screws must be set tight so the lever stops will not be jarred out of position as the lever is thrown from one position to the other.

ADJUSTMENT OF PICKUP WEIGHT

Make this adjustment while music is being played, and only one record is on the turntable. With a delicate pair of scales, having a range of 0 to 12 ounces, catch the needle screw and lift the pickup from the record until the audio quality breaks, at which time a reading of 5½ to 6 ounces should be shown on the scales. Raising or lowering the spring support No. 5575 which is affixed to the tone arm lifting rod No. 5553 adjusts the weight of the pickup.

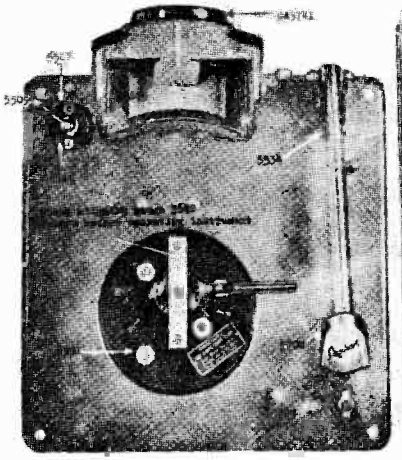


Fig. 1

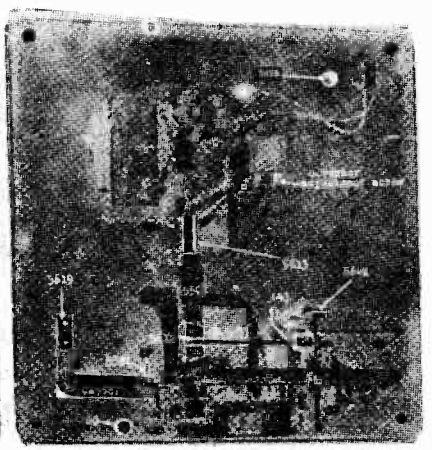
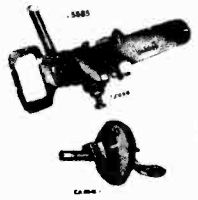


Fig. 2



GOVERNOR ADJUSTMENT

If the turntable speed cannot be regulated to 78 R. P. M. by the speed control lever located under the turntable, then loosen the set screw holding the governor to the governor shaft and move the governor either in or out, as the case may be, to increase or decrease the speed of the motor.

This adjustment must be made when the speed control lever under the turntable is in the center position.

To increase the speed of the turntable motor, move the governor out, and to decrease the speed of the turntable, move the governor in.

Do not, under any conditions, change the adjustment of the end thrust bearing screws.

An occasional drop of oil on the governor brake will assist in maintaining a constant speed.

OVER

ASSEMBLY AND ADJUSTMENT OF OSCILLATING AND SPIRAL TRIP LEVER AND PICKUP SILENCER

To time the automatic switch so the instrument will automatically trip and change records, proceed as follows:
First: Thoroughly acquaint yourself with the different part numbers.
Second: Study the photographs carefully and note the relative location of the various parts.
Third: Complete each of the following operations before going on to the next operation.

Operation No. 1.

Turn the master cam No. 5504 until the large timing mark is exactly above the timing mark on the tone arm lifting lever No. 5761.

Operation No. 2.

Hold the switch lever and cam assembly No. 5612 against the driven clutch No. 5616, so the radius of the cam will center against the clutch. (Be sure that cam No. 5612 is directly under the driven clutch No. 5616.)

Operation No. 3.

Set the pickup silencer switch No. 5643 against the casting bearing so the shaft of cam No. 5612 cannot be moved further toward the automatic switch.

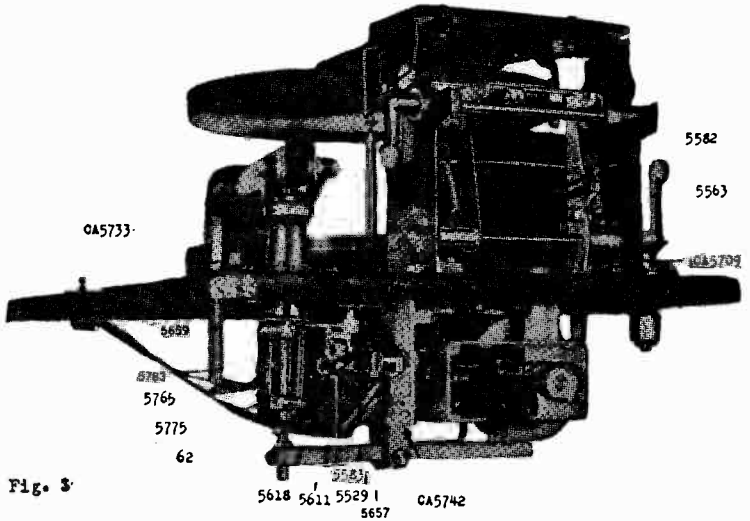


Fig. 3

62 1¼-28 Hex Head Screw.
5529 Spiral Trip Cam.
5783 Tone Arm Lift Rod.
5554 Eccentric Pin.
5563 Slide Finger Eccentric.
5582 Link Spring-Upper.
5583 Trip Lever Spring.
5611 Trip Lever & Hub Assy.
5618 Oscillating Trip Dog Assy.
5659 Tone Arm Bracket Lever & Pin Assy.
5657 Oscillating Trip Lever Assy.
CA5709 Slide Finger & Shaft Assy.
CA5733 Reject Stud Assy.
CA5742 Switch Panel Assy.
5765 Tone Arm Weight Adj. Spring
5775 Tone Arm Spring Hook

Operation No. 4.

Hold the tail of cam No. 5612 against the lug on the inside of the master cam No. 5504 and adjust the trip lever No. 5611 until it is 1/16" beyond the catch in the oscillating trip lever No. 5657. This adjustment is made while the tail of the cam No. 5612 is held against the outside of the lug inside the master cam No. 5504.)

Operation No. 5.

Care must be exercised to have the end play of the oscillating trip shaft just free. This is taken care of in adjusting the pickup silencer switch No. 5643, so a good contact is made on the pickup short circuiting switch WHEN THE NEEDLE IS ON THE RECORD AND THE AUTOMATIC SWITCH HAS BEEN TRIPPED.

After the pickup silencer switch No. 5643 has been set according to the above instructions, the resetting of the automatic trip should allow the contacts on the pickup silencing switch to open.

If the above operations are followed out in detail, and adjustments properly made, the clutch will automatically disengage when the pin on the clutch No. 5616 has travelled approximately one-half of the distance of cam No. 5612.

At the time the pin has travelled one-half of the distance of the clutch release cam, the small timing mark on cam No. 5504 should be exactly above the timing mark on the tone arm lifting lever No. 5761.

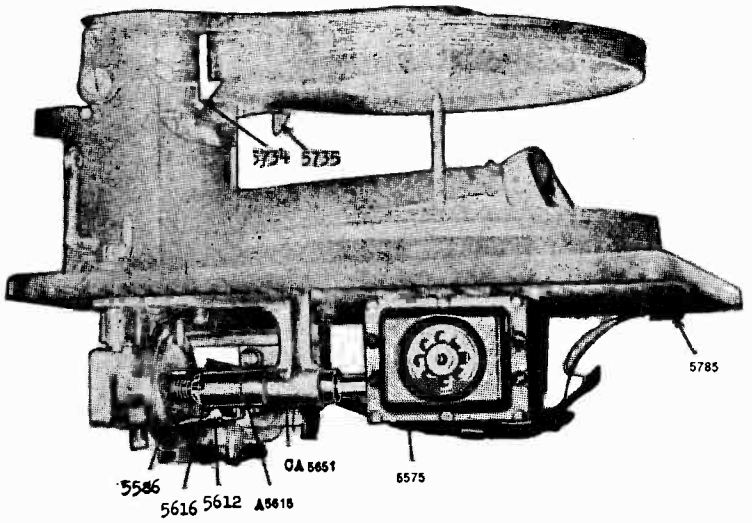


Fig. 4

5612 Trip Lever & Cam Assy.
A5615 Drive Shafe Assy.
5615 Drive Shaft Assy.
5616 Driven Rachet & Pin Assy.
CA5651 Main Drive Assy.
5785 Switch Double Circuit H & H.
5586 Clutch Spring.
5575 Motor, give voltage and cycles.
5690 Governor Assy.
5734 Record Lock Lever & Hook Assy-Left.
5735 Record Lock Lever & Hook Assy-Right.

OVER

ADJUSTMENT OF THE SPIRAL TRIP CAM

To adjust the spiral trip cam, turn the master cam No. 5504 until the small timing mark is exactly above the timing mark on the tone arm lift lever No. 5761 at which time the automatic trip can be manually reset or tripped at will.

Lay a steel scale, graduated in 64ths, flat on the record under the pickup, with the end of the scale against the turntable spindle in such position that the needle rests on the scale. By sliding the needle toward the center of the record, the spiral cam should cause the automatic trip to operate when the point of the needle is 1-49 64" from the edge of the turntable spindle.

If the automatic trip operates before the needle has come to 1-49 64" position, then the spiral cam is set too far ahead and must be moved very slightly back, while, if the needle comes closer to the turntable spindle than 1-49 64", then the spiral cam is set too far back and must be set ahead to the proper position.

Failure to properly adjust the spiral trip cam so the automatic trip operates when the needle is 1-49/64" from the edge of the turntable spindle will cause the instrument to change records before the music is finished, or to not change records automatically.

To adjust the spiral trip cam No. 5529, slightly loosen the two screws holding the cam to automatic switch lever No. 5657 and pry the cam forward or back as required to obtain the proper setting.

To test the position of the spiral cam, it is necessary to carry the pickup back to the edge of the record each time to manually reset the automatic trip.

ASSEMBLY OF TRIP BRACKET TO BASE PLATE

The automatic trip bracket No. CA 5742 is mounted to the base plate by two nickle plated bolts and lock washers.

The end that the bakelite panel is mounted on is to be mounted toward the front of the base plate in such a manner that the bearing aligns perfectly with the bearing in the drive bracket. The final alignment can be made when the trip lever shaft No. 5612 is being installed and adjusted.

TONE ARM BRACKET LEVER ADJUSTMENT

Set lever No. 5509 to 10 inch record operating position, and slightly loosen the clamp screw holding the bracket lever No. 5704 to the bracket under the tone arm base, and turn the bracket lever to such position that the slot, where the bracket lever clamps together around the bracket, is exactly centered on each side of the aligning notch cut in the lower rim of the bracket.

Then lay a scale, graduated in 64ths, on the turntable, placing the end of the scale against the turntable spindle in such position that when the needle is automatically let down the point of the needle will come to exactly 4-11 16" from the edge of the turntable shaft.

If the needle does not automatically come down at the 4-11 16" position refer to page 2 and make final adjustment at lever stop on lever No. 5509.

Care should be exercised to lock the tone arm return bracket lever, allowing .015 inch clearance between the cork insert and the tone arm base.

After the adjustment is properly made, tighten the clamp holding the tone arm bracket lever No. 5704 in place, which should leave ample clearance between the cork insert and the tone arm housing to allow perfect freedom of the tone arm operation.

If needle fails to feed into music groove, lift tone arm bracket lever No. 5704 tightly against tone arm housing and manually move tone arm back and forth to relieve any uneveness that might occur on the face of the cork insert.

ASSEMBLY AND ADJUSTMENT OF RECORD MAGAZINE

The record magazine pin No. 5555 must be tightened in the elongated hole in the magazine top plate No. A5736 in such a manner that the offset at the bottom of the pin extends directly away from the record support shelf.

The magazine pin must also be adjusted to such a position that exactly 4⅞" clearance is obtained between the back center of the offset at the bottom of the magazine pin, and the extreme right and left corners of the record support shelf. This adjustment is to be made when the record magazine is in 10 inch playing position.

TO ADJUST THE RECORD SUPPORT HOOKS

First, throw lever No. 5509 to the 10 inch position, and place a 10 inch record on the magazine pin, bringing the magazine down to playing position.

The record suport hooks are adjusted by bending to proper position.

The record support hooks must be kept 1/16" from the edge of the record support shelf and must be adjusted far enough back to just clear the edge of a 10 inch record, as the record is released from the record support shelf.

The record support hooks must also be low enough to clear the bottom side of the record, as it is supported on the magazine shelf.

The record support hooks should operate fresly in either 10 inch or 12 inch position.

ASSEMBLY OF RECORD MAGAZINE AND STANDARD TO BASE PLATE: AND ALIGNMENT OF TURNTABLE SHAFT

Mount the magazine and standard on the base plate with four bolts, tightening the bolts only tight enough to hold the complete magazine assembly in position. The magazine assembly must be so adjusted by shifting the standard on the base plate to bring the offset at the bottom end of the magazine pin exactly over the center of the point of the turntable spindle.

This adjustment cannot be made until the motor has been aligned according to the instructions on page one.

Enough clearance is allowed in the four bolt holes to take care of this adjustment.

After the adjustment is made perfect, the bolts must be securely tightened with lock washers.

ASSEMBLY AND ADJUSTMENT OF RECORD SLIDE SHELF AND FINGER

First, set the master cam No. 5504 so the lug on the cam at the side of the large timing mark comes directly under the end of the record release finger No. CA 5709.

The eccentric stud No. 5563 affixed to the main record release finger controls the adjustment of record release finger. Turn the eccentric stud No. 5563 until the record slide shelf No. 5521 is 1/64" past the front edge of record support shelf No. 5520 at which time it should be possible to obtain a slight amount of clearance between the end of the record release finger and the point of the lug on the master cam without causing the safety spring, (which is a part of this lever assembly) to give.

The two points on the record slide shelf must come to the edge of the radius on the record support shelf at the same time.

RECORD WEIGHT ADJUSTMENT

The record weight No. 5759 must be so adjusted at the bearing pivot that the lower edge of the record weight does not touch the record slide shelf while in the 10 inch position, but comes low enough to hold one record in proper position for the slide plate to unload it on the turntable.

ASSEMBLY OF DRIVE BRACKET ASSEMBLY TO BASE PLATE AND MOTOR

The drive bracket No. 5651 must be bolted to the base plate in such a manner as to align the drive shaft with motor shaft so the coupling is free. A flexible coupling No. 5613 takes care of any minor lack of alignment between the drive shaft and the motor shaft, because of the motor hanging on rubber cushions.

OVER

MODEL 10,12-C
Service Notes

CAPEHART CORPORATION

TONE ARM LIFT LEVER AND ITS ADJUSTMENT

Turn the master cam to such position that the small timing mark is directly above the timing mark on the tone arm lifting lever No. 5761.

Without a record on the turntable, and the needle in playing position, adjust the tone arm lift lever screw No. 62 until a visiting card can be slid between the top of the lever screw No. 62 and the lower end of the tone arm lifting rod No. 5553.

TIMING OF CAM No. 5576

To time cam No. 5576, turn the master cam No. 5504 by hand, bringing the lug near the large timing mark on the cam, directly under the end of the record release finger No.CA5709. At this time, hold the master cam in position and turn cam No. 5576 to the right until the corner of the cam touches but does not raise the switch contact lever on switch No. A5732.

Care must be exercised that the switch contacts on switch No. A5732 make perfect contact when cam No. 5576 is away from the switch lever, and when the cam is in the down position 1 32" clearance is maintained between the switch finger and the low side of the cam. This should insure a perfect contact at the switch points.

It is important, in the adjustment of cam No. 5576, that 1 64" clearance be allowed between the back side of this cam and the bearing through which the shaft passes.

After the above adjustment is made, check the instrument with one record on turntable, by shutting current switch off and see that instrument comes to an automatic stop position when the lug on the master cam No. 5504 has completely passed under the end of record release finger No. CA 5709. If the lug has not entirely passed under the end of the record release finger, then move cam No. 5576 to the left as little as possible to allow the lug to clear the cam when instrument stops automatically with one (1) record on turntable.

TONE ARM RETURN LEVER AND ITS ADJUSTMENT

The tone arm return lever No. CA5687 is mounted on an eccentric pin with the bushing extended downward, the tone arm change and adjusting lever No. 5509 is mounted on the same shaft and located on the top back left corner of the chassis.

The sharp point of the cam, which is a part of the eccentric pin is to be mounted toward the tension spring which is affixed to the base plate, so that when the lever is thrown to 10 inch or 12 inch position the spring will hold the cam in that particular position.

The coil spring No. 5585 is attached from the lug on the tone arm return lever to the lug on the automatic trip bracket in such a manier that the spring is held as far down as possible by the lugs.

NOTE: The adjustment screw found on the tone arm return lever is covered in the instructions on page 1, and after once being properly set, should need no further adjustment.

Care must be exercised to have clearance between the high point of the master cam No. 5504 and the tone arm return lever.

MOUNTING AND ADJUSTMENT OF REJECTOR

The reject button is located at the right of the tone arm and is for the purpose of discontinuing a record before it has finished playing. With the automatic trip set and the instrument playing music, there should be 1/16" clearance between the bottom of the reject pin and the lateral pin affixed to the automatic trip lever No. 5657.

If this distance is too great, one will not be able to reject a record. If this distance is too small the automatic trip will not properly reset. Adjustment can be made by CAREFULLY bending the lateral pin to its proper position with relation to the rejector pin.

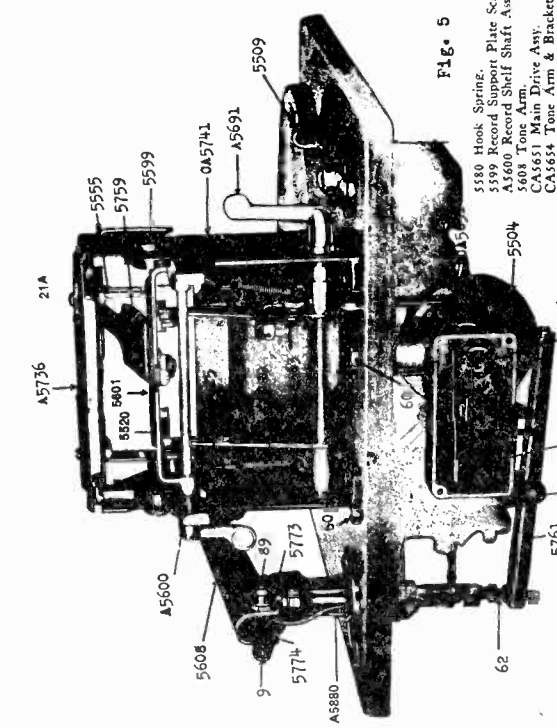


Fig. 5

5580 Hook Spring.
5599 Record Support Plate Screw.
A5600 Record Shelf Shaft Assy.
5608 Tone Arm.
CA5651 Main Drive Assy.
CA5654 Tone Arm & Bracket Assy.
A5691 Record Unloading Lever.
A5732 Switch Panel Assy.
A5736 Record Support Plate Assy.
CA5741 Standard Assy.
5759 Record Weight & Felt Assy.
5761 Tone Arm Lift Lever Assy.
5773 Tone Arm Insulating Bushing.
5774 Tone Arm Pivot Bushing.
A5880 Tone Arm Bracket Assy.

9 10-32 Hex Head Screw.
21A Acorn Nut.
60 ¼-20 Hex Head Screw.
62 ¼-28 Hex Head Screw.
89 10-32 Headless Set Screw 60 rqui
5504 Master Cam.
5509 Eccentric Handle.
5520 Record Shelf.
5601 Record Slide.
5525 Spring Hook.
5552 Tone Arm Lift Lever Pin
5555 Record Support Pin.
5563 Slide Finger Eccentric.
5576 Switch Finger Cam.

ASSEMBLY OF TONE ARM HOUSING TO BASE PLATE

The tone arm base is attached to the base plate with three screws. This can be mounted only in the proper position.

The two pivot screws holding the tone arm to tone arm bracket must be so adjusted that the pickup is free to come down on to the record by its own weight and still the points of bearing must be in good contact in such a manner that the tone arm cannot be twisted from side to side.

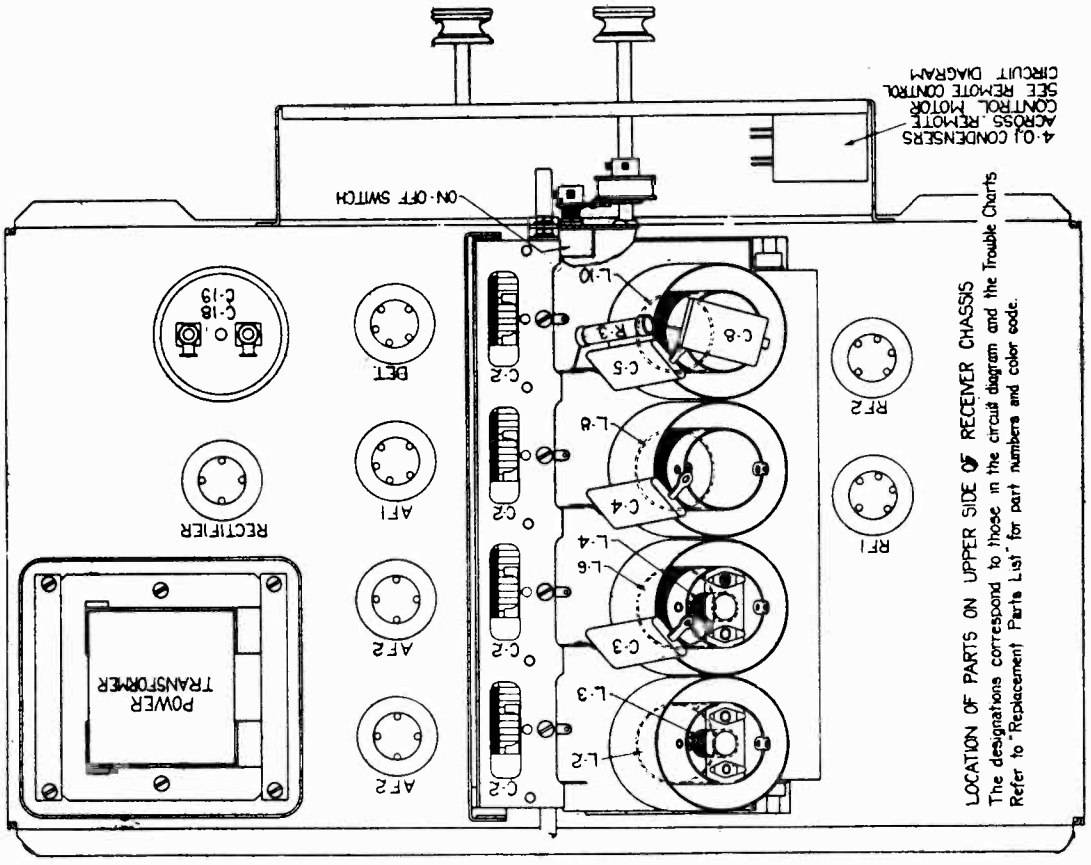
TO ADJUST FOR NEEDLE PLAYING POSITION

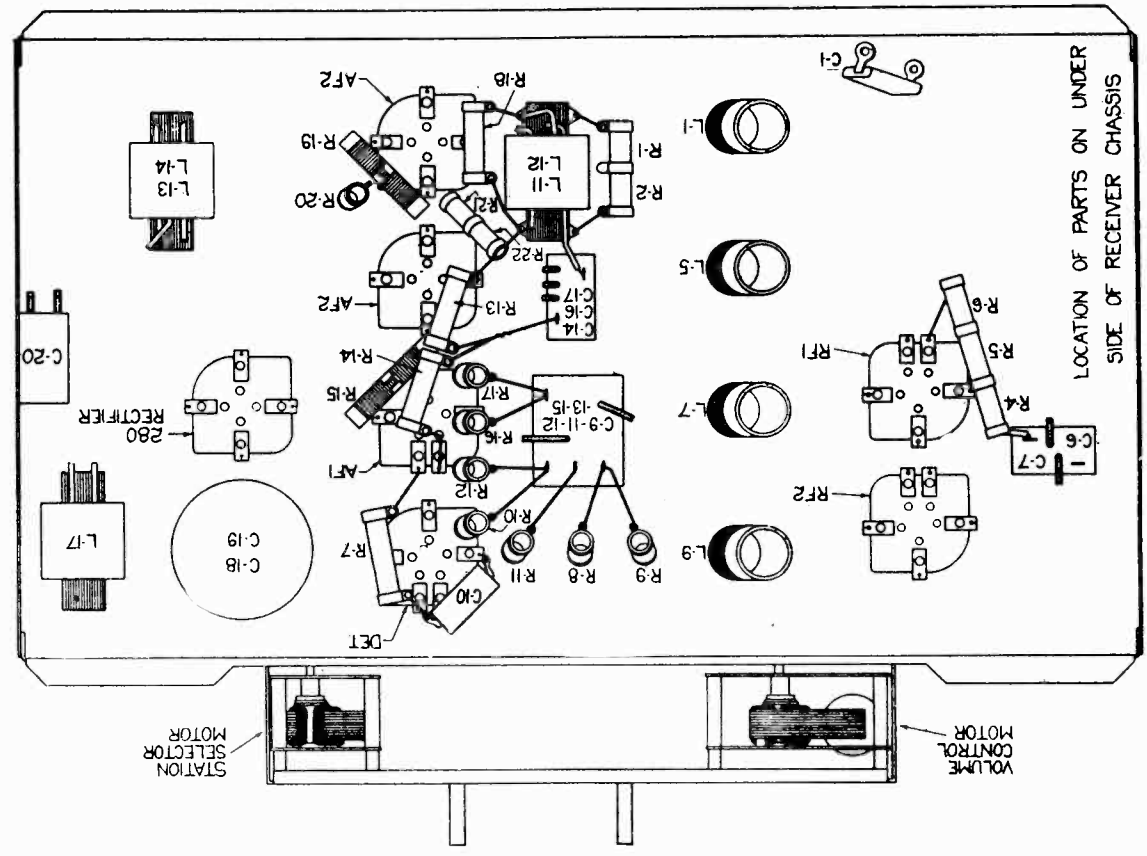
Turn the master cam until the small tifhing mark is exactly above the timing mark on the tone arm lifting lever No. 5761, at which time there will be no pickup weight on the tone arm lifting rod.

Then, without a record on the turntable, and the needle (of the length that is regularly going to be used with the instrument) properly inserted in the pickup, the "T" shaped tone arm rest No. 5634 should be adjusted to allow the tone arm to lower to such a position that the needle just clears the highest point of the turntable surface. THIS ADJUSTMENT PROPERLY MADE WILL ELIMINATE THE POSSIBILITY OF THE NEEDLE DAMAGING THE TURNTABLE SURFACE.

MODEL 33,34,35 AC
Layouts

COLONIAL RADIO CORP..





The two models, 33AC and 34AC, are identical electrically except that Model 34 has a more sensitive loudspeaker, capable of finer reproduction. Further, the push-pull output transformer is mounted on the speaker frame instead of in the receiver chassis, as in the model 33.

The Colonial 33AC and 34AC are obtainable both with and without the remote-control automatic-tuning unit. This unit is easily installed in those receivers not having it as an integral part. It in no way interferes with the ordinary manual operation of the receiver, should that be desired. Either method of control may be used without the necessity for disconnecting, switching or changing anything. The employment of one control system does not render the other inoperative.

Due to an automatic anti-overloading feature incorporated in the receiver, it will be found that when receiving *strong signals, advancing* the volume control beyond a certain point will result in a *decrease* in volume.

Sometimes it is found that volume is better *without a ground connection*. This is due to the electric light wires acting as an antenna and feeding signals to the receiver. Under such conditions reception will usually be noisy. Connection of the ground wire causes the line filter condensers to effectively drain off both unwanted noise and whatever signal there may be picked up by the line.

The spark obtained when the ground wire is touched to the ground binding post or to the chassis is a *normal* occurrence. It is due to the discharge of the condensers used in the line filter.

A poor detector tube will create an objectionable hum in the speaker.

The fuse in the double mounting on the rear of the chassis provides a means for compensating for deviation of the line voltage from normal values. Normally the fuse is in the left side of the mounting, facing the rear of the chassis. It should be put in the right side only when the line voltage is known to be consistently below 110 volts. It is important that this adjustment be made, since excessive voltage will shorten the life of the tubes, and *insufficient* voltage will make the set *insensitive*.

ACTUAL VOLTAGES APPLIED TO TUBES

	RF1	RF2	Det.	AF1	AF2	280 Rectifier
Plate Voltage	180v.	180v.	150v.	100v.	240v.	....
Control-Grid Voltage	-3	-3	-2	-6	-45	....
Screen-Grid Voltage	90	90	35	....	....	....
Plate Current	3m.a.	3m.a.	0.2m.a.	3m.a.	28m.a.	....

VOLTAGES AS READ ON A 1000 OHMS PER VOLT METER
(PLATE VOLTAGES ON THE 250v.scale; GRID VOLTAGES ON THE 50 v.scale)

Plate Voltage	180v.	180v.	60v.	70v.	235v.	....
Control-Grid Voltage				-0.5	-22	....
Screen-Grid Voltage	80	80	12	....	....	....
Plate Current	3m.a.	3m.a.	0.2m.a.	3m.a.	....	50 ma. each plate

The discrepancies between the applied and the measured voltages result from variations in tubes and from increased voltage drops in series resistors due to the current taken by the voltmeter. Unless the measured voltages differ by more than 25 per cent from those given in the chart, it should not be taken as a definite indication of a fault. Usually any deviation greater than 25 per cent means trouble. These readings assume a 120v. line. If the line voltage differs from 120 volts, the measured voltages will differ from those given in the chart in approximately the same ratio.

The Remote-Control Automatic-Tuning Unit

Since the servicing of the remote-control automatic-tuning unit will be simple if its operation is thoroughly understood, the circuit diagram and the following explanation should be studied carefully.

*Fig. 4 shows the circuit used. As is seen, it consists essentially of two motors, one for turning the volume control and the other the tuning condensers, and means for controlling the direction and amount of rotation of the motors from a remote point. Each of the motors has two field windings, poled in such way that switching from one to the other reverses the direction of motor rotation.

When the remote-control push buttons are not pressed, the circuit is open and no current flows through the motors. When the "Vol. Inc." button is pressed, the circuit is completed through that field winding of the volume control motor which will cause rotation in the proper direction to secure an increase of volume. When the "Vol. Dec." button is pressed, the other field winding is connected, the motor runs in the opposite direction, and the volume control is turned to a lower setting. Just before its minimum position, the volume control operates the receiver line switch. Since a friction drive is used no damage will result if the button is kept pressed. After the volume control has reached the limit of its movement, the motor will merely continue running with the friction drive slipping.

* Study of fig. 4 reveals that when any one of the station buttons is pressed, the circuit is completed through the contact stud connected to it and the station-selector motor revolves, turning the tuning condensers and the split brass disk fastened to the condenser shaft. The motor continues to drive the condenser shaft (through a friction drive) until the insulating slit in the brass disk comes directly under the contact stud and breaks the circuit. When the slit is under the contact stud, the tuning condensers are in proper position for reception of the station. Should the momentum of the motor be sufficient to carry the disk past the point where the stud and slit coincide, the stud will make contact with the other half of the disk, energizing the other field winding. This reverses the motor direction, bringing the disk back until the insulating slit and the contact stud do coincide.

The button marked "Quiet", when pressed, removes the voltage applied to the screen-grids of the R.F. tubes, preventing reception of stations while the automatic-tuning mechanism is in action.

Should either or both of the drive-motors refuse to run, or run in only one direction the following procedure may be followed: Connect one end of a length of wire to contact "C" of the receptacle (fig 4.) and touch the other end alternately to each lug of the condenser mounted next to the volume control drive motor. If the motors run, and in both directions, the trouble is in either the cable, the remote-control push-button box, or the contacts on the brass disk. A continuity check will reveal the open circuit.

If the motors do not run when the wire is touched to the condenser lugs, the fault may lie in the voltage supply, the motor proper or in the 0.1 mfd filter condensers. An a.c. voltmeter connected from "C" (fig. 4) to the chassis should give a reading of approximately ten volts. If no reading is obtained, the trouble may be either a blown fuse or an open transformer. If a reading is obtained the 0.1 condensers should be tested for breakdown. If they prove perfect, the trouble is in the motors and they should be tested for shorted or open windings. In particular, the brushes should be examined for good contact with the commutator, and the commutator itself brightened with a piece of very fine sandpaper. In time the spider washers in the friction drive may lose some of their tension, resulting in slippage in the drive. These washers are easily removed and bent to increase their tension.

If the line voltage is above 110, the fuse should be in the right side of its mounting, facing the rear of the set. It should be put in the left side for a line voltage of less than 110.

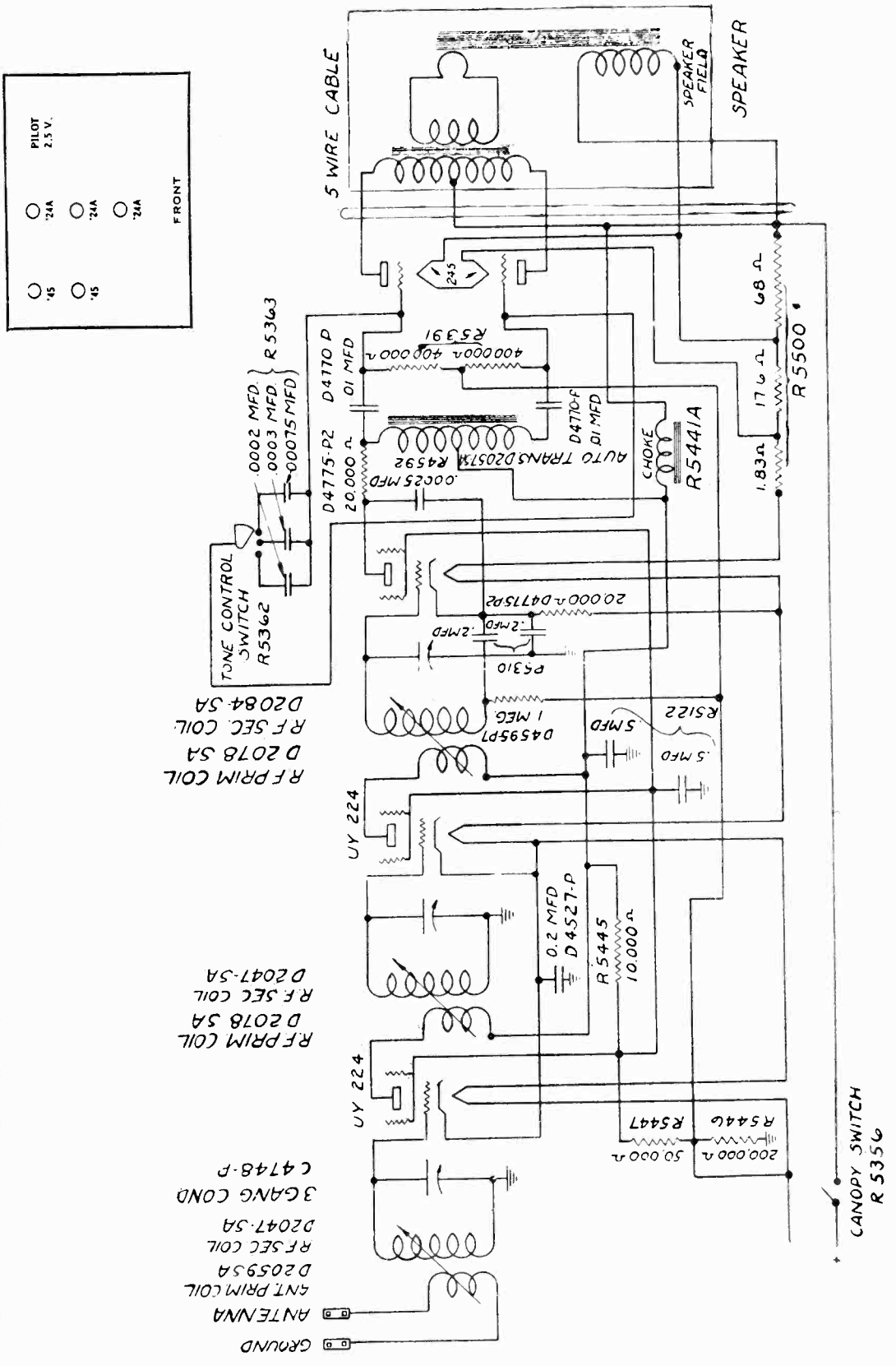
REPLACEMENT PARTS LIST

Circuit Designation	Value	Part No.	Remarks
R 1	100,000 ohms	4635—P	Center-tapped 200,000 ohm resistor
R 2	100,000	4635—P	
R 3	750,000	4595—P—6	Orange
R 4	11,000	4593—P	Tapped resistor
R 5	60,000	4593—P	
R 6	50,000	4593—P	
R 7	20,000	4595—P—5	Grey
R 8	750,000	4595—P—6	Orange
R 9	750,000	4595—P—6	Orange
R 10	200,000	4595—P—2	Brown
R 11	50,000	4595—P—4	Red
R 12	200,000	4595—P—2	Brown
R 13	400,000	4595—P—1	Yellow
R 14	1,000,000	4595—P—7	Blue
R 15	20	4529—P	Center tapped
R 16	20,000	4595—P—5	Grey
R 17	50,000	4595—P—4	Red
R 18	100,000	4595—P—3	Green
R 19	20	4529—P	Center tapped
R 20	800	4596—P	Blue vitreous enamel type resistor
R 21	210	4594—P	Center tapped 420 ohm resistor
R 22	210	4594—P	
C 1	00025 mfd.	4534—P	Ant. series condenser
C 2	.0003	1842—SA	Tuning condenser
C 3	.2	4527—P	
C 4	.2	4527—P	
C 5	.2	4527—P	
C 6	.5	4514—P	Red lead and adjacent lug
C 7	.2	4514—P	Black lead and adjacent lug
C 8	.2	4527—P	
C 9	.5	4513—P	Black lead and furthest lug in row of three
C 10	.0001	4597—P	
C 11	.005	4513—P	Red lead and middle lug in row of three
C 12	.0001	4513—P	Black lead and middle lug in row of three
C 13	1.	4513—P	Black lead and nearest lug in row of three

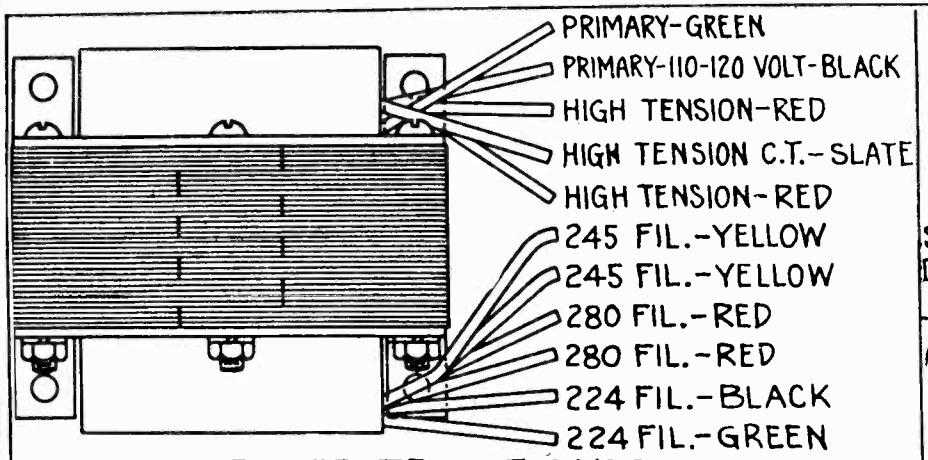
Circuit Designation	Value	Part No.	Remarks
L 1		1821—SA	Ant. primary
L 2		1826—SA	R.F. transformer secondary
L 3		1827—SA	Link coil
L 4		1827—SA	Link coil
L 5		1823—SA	R.F. transformer primary
L 6		1826—SA	R.F. transformer secondary
L 7		1823—SA	R.F. transformer primary
L 8		1826—SA	R.F. transformer secondary
L 9		1823—SA	R.F. transformer primary
L 10		1826—SA	R.F. transformer secondary
L 11		1843—SA	Push-pull input transformer
L 12		1843—SA	
L 13		1835—SA	Push-pull output transformer (Model 33)
L 14		1835—SA	
L 15		1866—SA	Cone and voice coil (Model 33
L 16		1904—SA—1	Speaker field coil (Model 33)
		1959—SA	Speaker field coil (Model 34)
L 17	4.5 henries	1829—SA	Filter choke 4.5 henries
L 18		1830—SA	60 cycle power transformer (Model 33)
L 19			
L 20		1952—SA	60 cycle power transformer (Model 34)
L 21		1946—SA	25 cycle power transformer (Model 33)
L 22		1985—SA	25 cycle power transformer (Model 34)
L 23			
		1964—SA	Model 34—Push-pull output transformer (Primary)
		1960—SA	Model 34—Cone, actuating ring and secondary
		4506—P	Model 33 and 34 line switch
C 14	.2	4521—P	Black lead and adjacent lug
C 15	.25	4513—P	Black lead and solitary lug
C 16	.2	4521—P	Black lead and further lug
C 17	.0005	4521—P	Yellow leads
C 18	8.	4503—P	Mershon condenser
C 19	8.	4503—P	
C 20	.1	4598—P	Line buffer
	.1	4724—P	25 cycle R.F. screen-grid bi-pass condenser

MODEL 36 DC

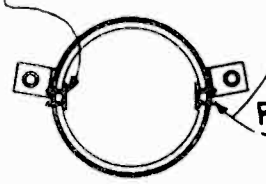
COLONIAL RADIO CORP.



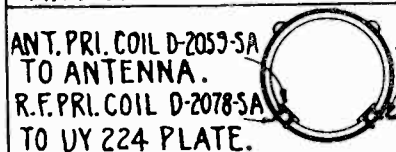
MODEL 36, 114.



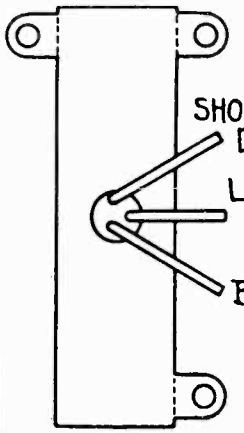
POWER TRANSFORMER
2050-SA = 60 CYCLE
R-5367-A = 25 CYCLE



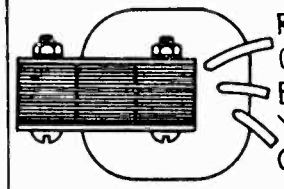
SECONDARY COIL
DET. SEC. COIL = D-2084-SA (YELLOW SPOT)
R.F. SEC. COIL = D-2047-SA (PLAIN)



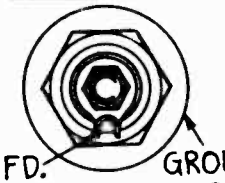
PRIMARY COIL
ANT. PRI. COIL = D-2059-SA (YELLOW SPOT)
R.F. PRI. COIL = D-2078-SA (PLAIN)



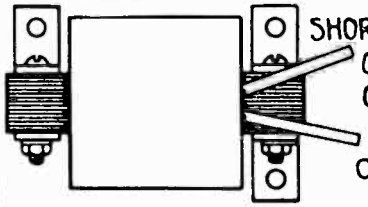
D-4766-P = 60 CYCLE
R-5366 = 25 CYCLE



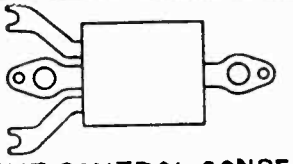
AUTO TRANSFORMER = 2057-SA



D-4758-P



CHOKE = D-4809-A

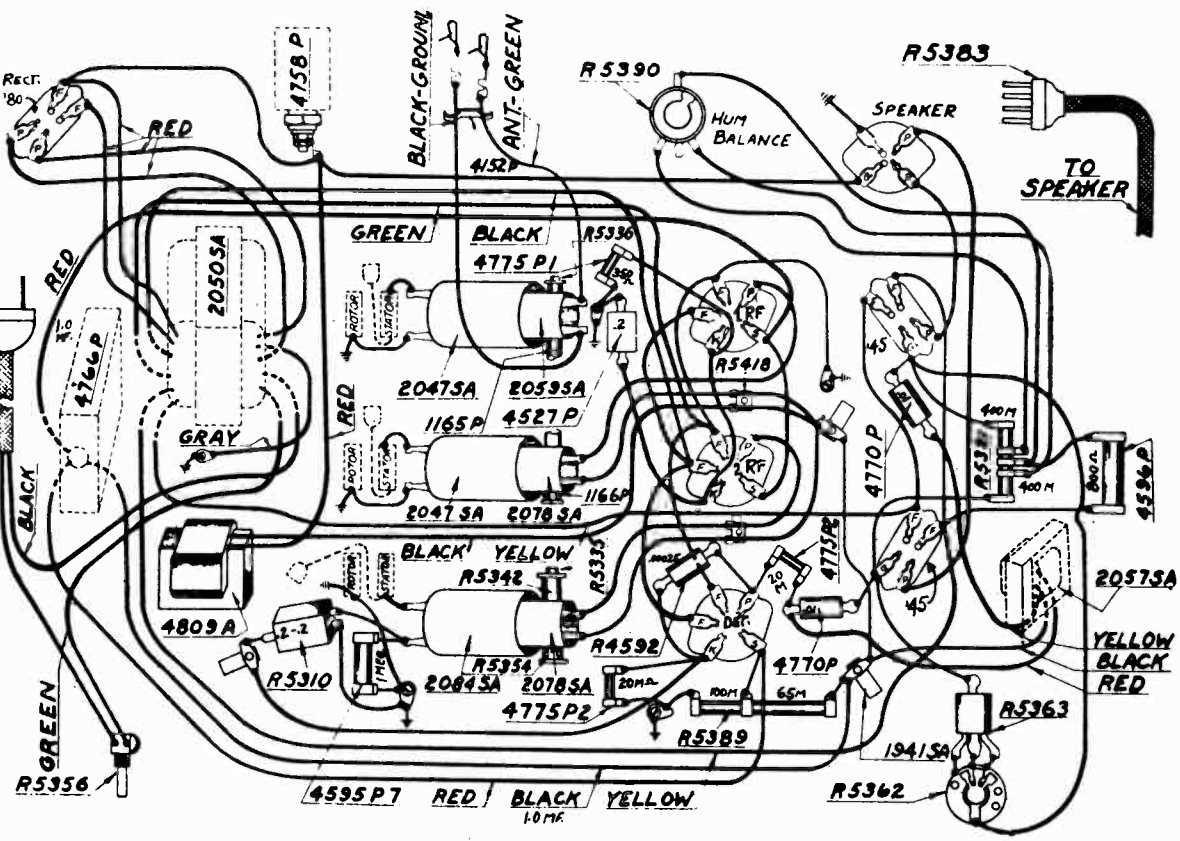


TONE CONTROL CONDENSER
R-5363

LEAD DETAILS OF POWER & AUTO TRANSFORMER, CHOKE, FILTER, TONE CONTROL, & ELECTROLYTIC CONDENSERS-PRIMARY & SECONDARY R.F. COILS.

MODEL 36
114
Chassis and Parts

COLONIAL RADIO CORP.

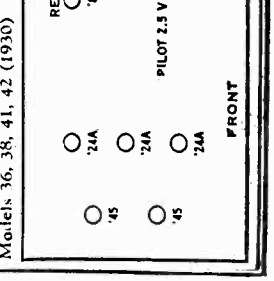


CHASSIS WIRING MODEL 36, 114.

MODELS 36, 36-P & 41-P
Parts list & color code.

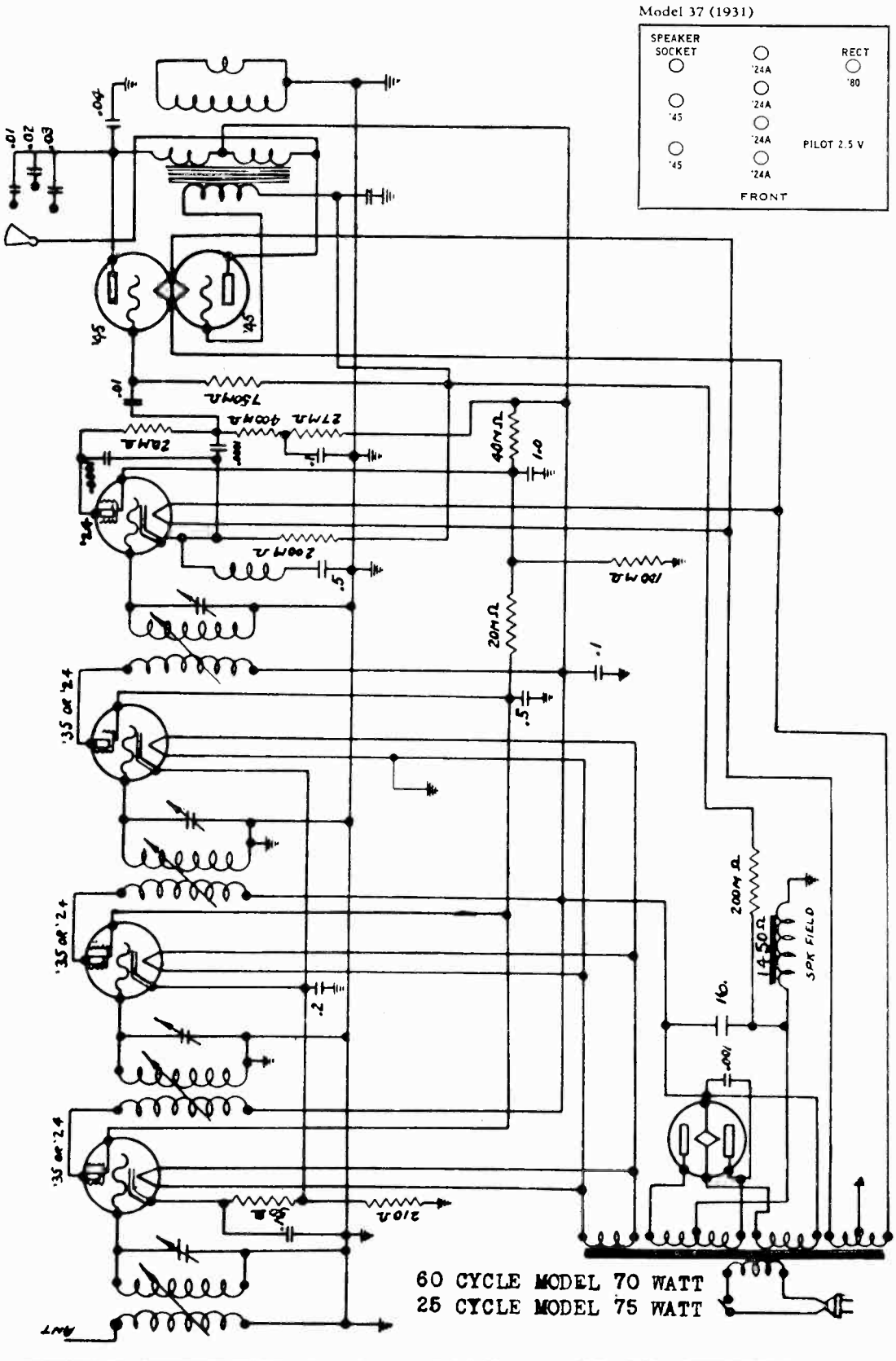
R-4354	Resistor 50 M. ohm Grey (D.C.)
D-4527-P	Condenser .2 Midget
R-4592	Condenser .00025 Mfd.
D-4595-P-7	Resistor .1 Meg. Blue
D-4596-P	Resistor 800 ohm - Purple
D-4766-P	Condenser 1.5 Filter
D-4770-P	Condenser .01 Midget
D-4775-P-1	Resistor - 350 ohm Black
D-4775-P-2	" - 20 M ohm Grey
D-4782-P	Resistor 800 M ohm Yellow Tapped (D.C.)
R-5122	Condenser .5 Dual (D.C.)
R-5310	Condenser .2 Dual
R-5342	Resistor 800 M ohm Yellow
R-5366	Condenser - .5 Mfd. 25 cycle Filter
R-5369	Spacer - Dual .5 cond. (D.C.)
R-5389	Resistor - 165 M. ohm Green & Black
R-5390	Potentiometer 600 ohm
R-5431	Speaker 10"
R-5445	Resistor 10 M ohm Black (D.C.)
R-5447	Resistor 50 M ohm Red (D.C.)
R-5544	Resistor - large (D.C.)
R-5819	Resistor 100 M. ohm R.M.A.
R-5820	Resistor 65 M. ohm R.M.A.
R-5821	Resistor 20 M. ohm R.M.A.
R-5822	Resistor 400 M. ohm R.M.A.
R-5823	Resistor 1 Meg. R.M.A.
R-5824	Resistor 350 ohm R.M.A.
R-5417	Filter Condenser

Models 36, 38, 41, 42 (1930)



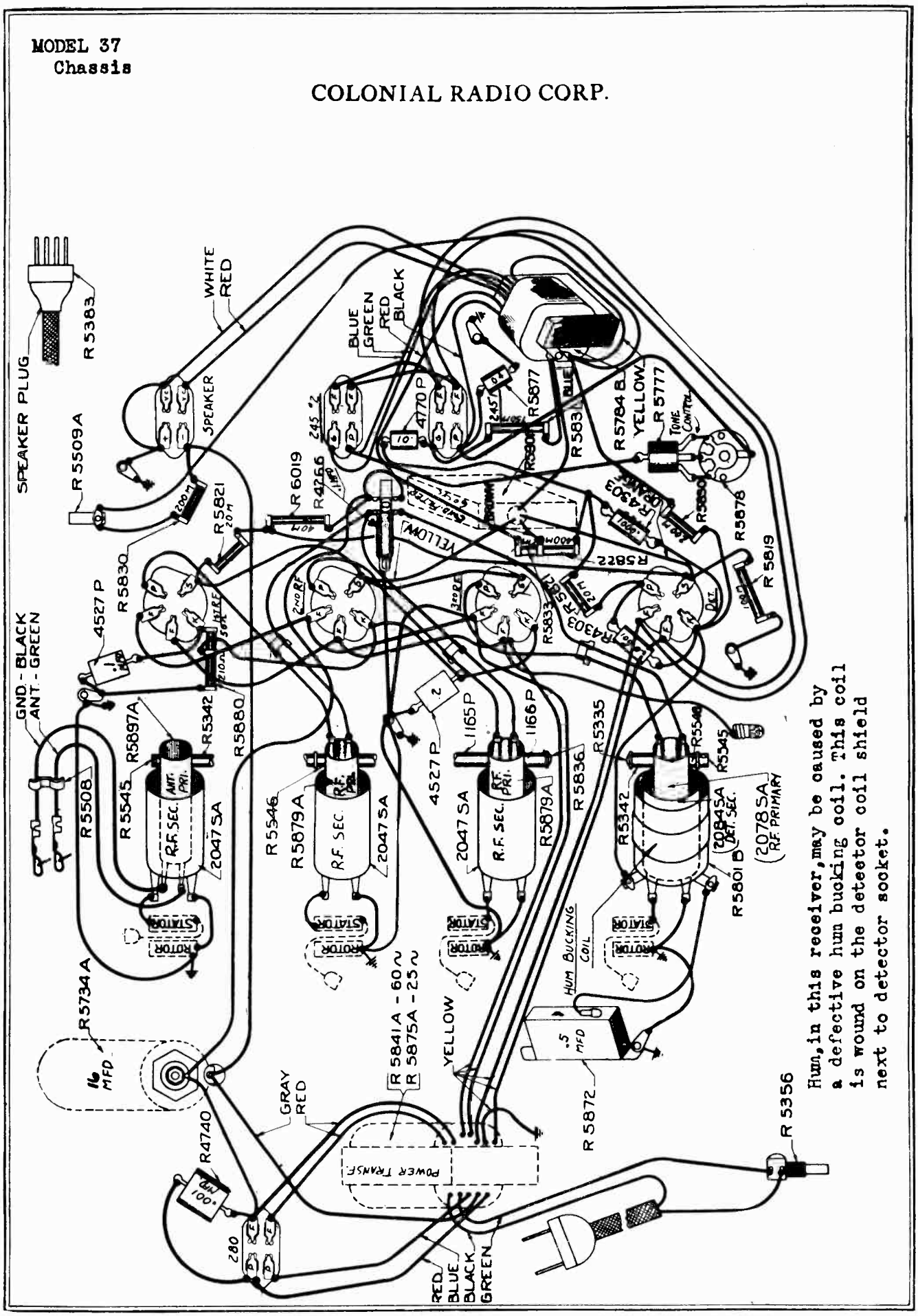
MODEL 37
Schematic

COLONIAL RADIO CORP.



MODEL 37
Chassis

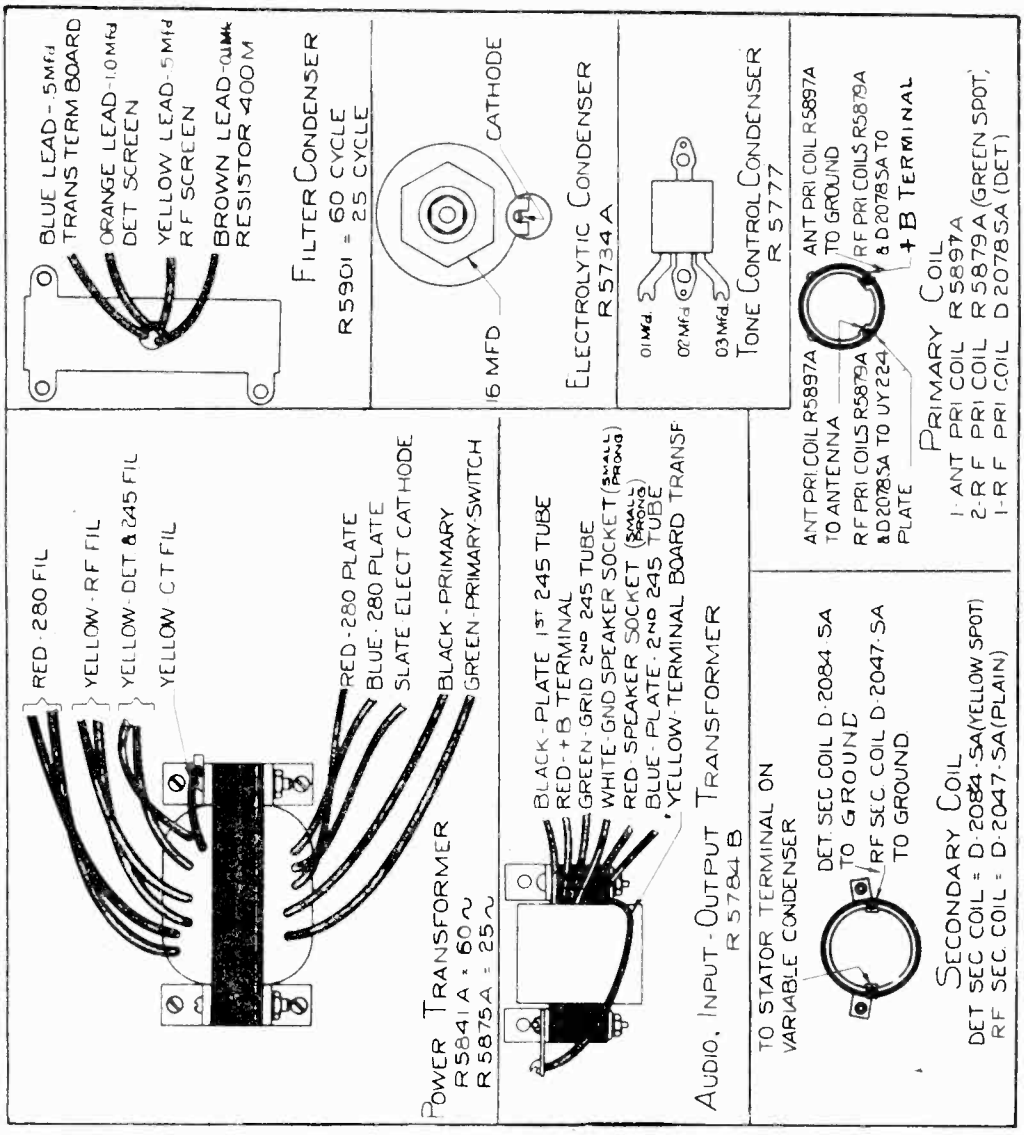
COLONIAL RADIO CORP.



Hum, in this receiver, may be caused by a defective hum bucking coil. This coil is wound on the detector coil shield next to detector socket.

MODEL 37
Parts Coding
Voltage

COLONIAL RADIO CORP



LEAD DETAILS OF POWER & AUDIO TRANSFORMER, FILTER, TONE CONTROL, ELECTROLYTIC CONDENSERS AND R.F. COILS.

VOLTAGE READINGS - MODELS 37 & 37-P

60 Cycle	Line Voltage 115							
	RF1	RF2	RF3	Det.	245#1	245#2	280AC	280DC
Plate Voltage D.C.	250	250	250	115	250	250	345	350
Screen Voltage D.C.	65	65	65	100				
Heater Voltage A.C.	2.4	2.4	2.4	2.4	2.4	2.4	4.8	
Control Grid Voltage D.C.	2.2	2.4	2.4	10	20	48		
Speaker Field Voltage	100							
Total Rectifier Current	.070							

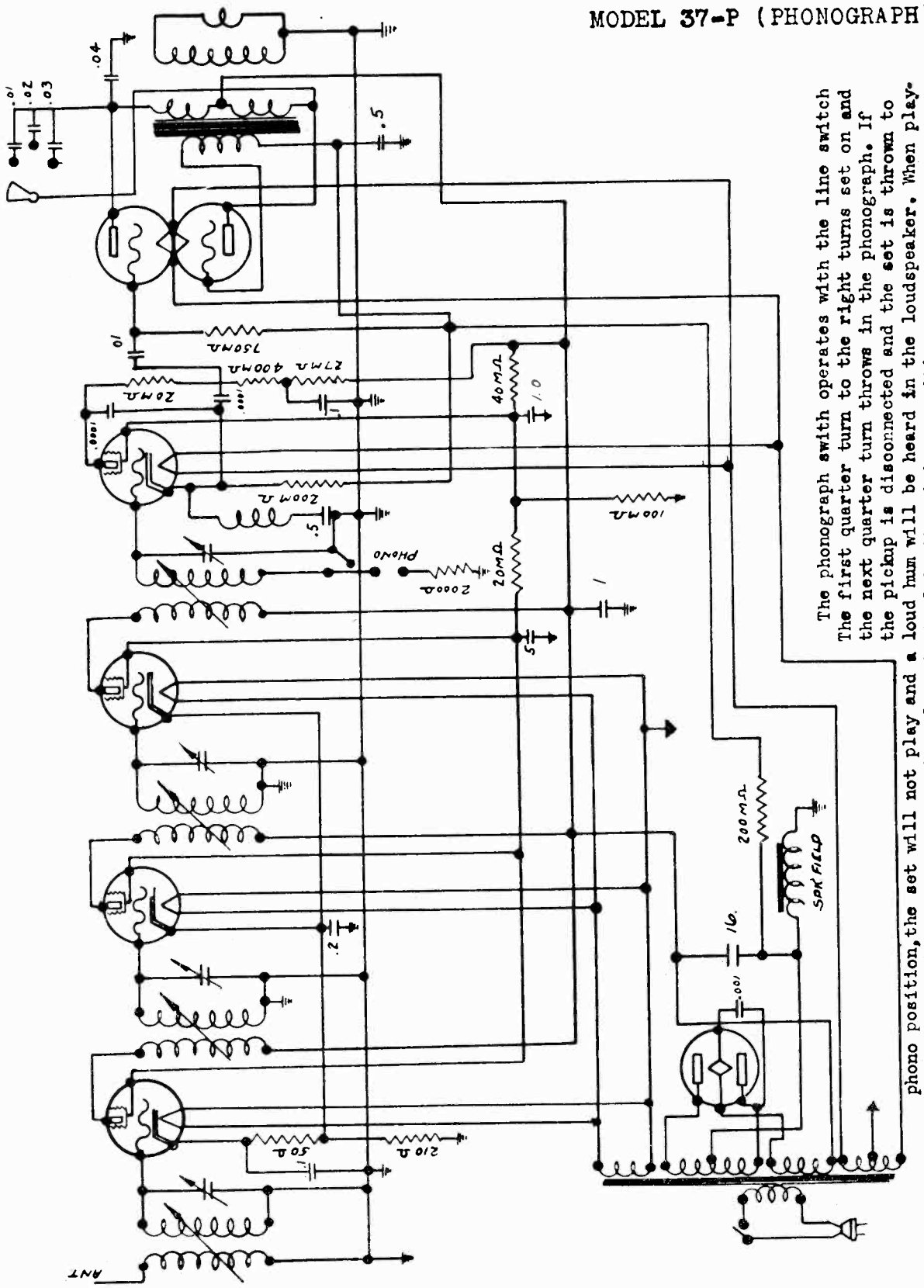
25 Cycle	Line Voltage 115							
	RF1	RF2	RF3	Det.	245#1	245#2	280AC	280DC
Plate Voltage D.C.	240	240	240	100	240	240	340	340
Screen Voltage D.C.	65	65	65	100				
Heater Voltage A.C.	2.4	2.4	2.4	2.4	2.4	2.4	4.8	
Control Grid Voltage D.C.	2.2	2.4	2.4	10	20	45		
Speaker Field Voltage	100							
Total Rectifier Current MADC	.070							

Control grid voltage measured from cathode to ground or from cathode to filament. 245 grid voltage measured from grid to ground.

MODEL 37-P
Schematic

COLONIAL RADIO CORP.

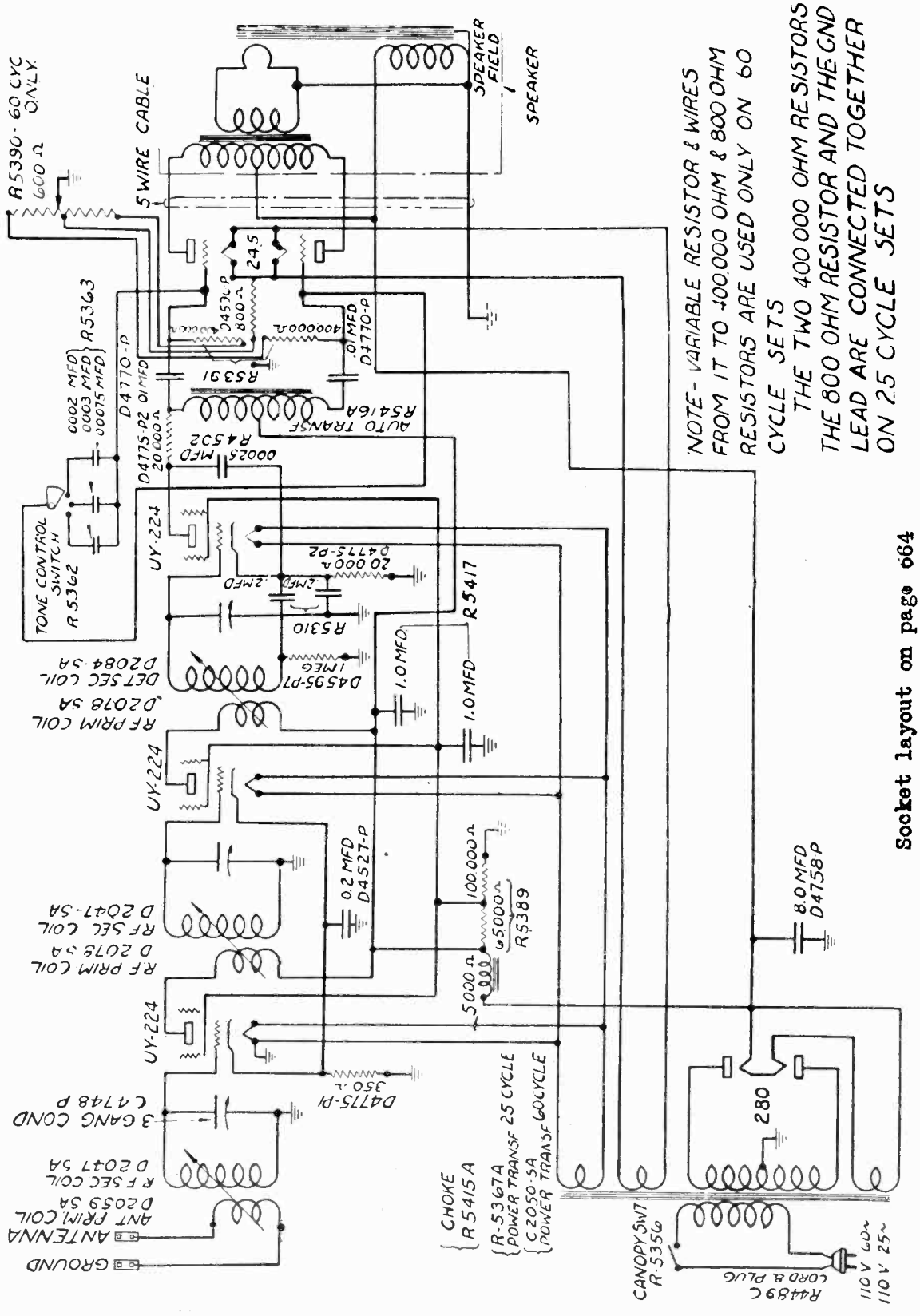
MODEL 37-P (PHONOGRAPH)



The phonograph swith operates with the line switch
The first quarter turn to the right turns set on and
the next quarter turn throws in the phonograph. If
the pickup is disconnected and the set is thrown to
phono position, the set will not play and a loud hum will be heard in the loudspeaker. When play-
ing records be sure to turn Radio Volume Control to the minimum position.
*The electrical characteristics of this receiver are identical to model 37.

MODEL 38
117

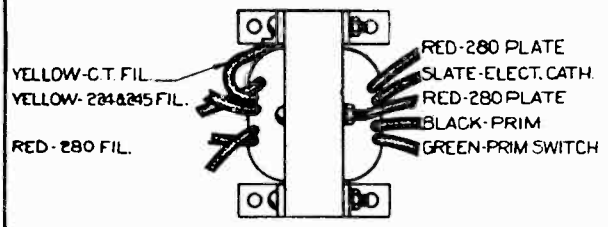
COLONIAL RADIO CORP.



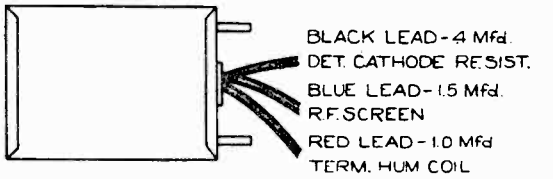
Socket layout on page 664

MODEL 39, 125
Voltage
Parts Coding

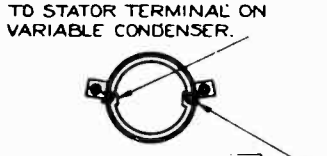
COLONIAL RADIO CORP.



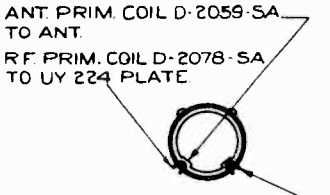
POWER TRANSFORMER
R5567A • 60~
R5574A • 25~



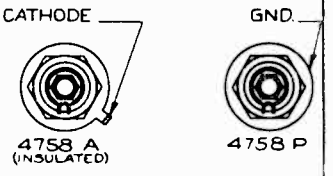
FILTER CONDENSER
R5575 • 60 CYCLE
25 CYCLE



SECONDARY COIL
DET. SEC. COIL • D-2084-SA (YELLOW SPOT)
R.F. SEC. COIL • D-2047-SA (PLAIN)



PRIMARY COIL
ANT. PRIM. COIL • D-2059-SA (YELLOW SPOT)
R.F. PRIM. COIL • D-2078-SA (PLAIN)



ELECTROLYTIC CONDENSERS

Model 39 ——— LEAD DETAILS OF POWER TRANSFORMER, FILTER & ELECTROLYTIC CONDENSERS, PRIMARY & SECONDARY R.F. COILS.

60 Cycle Line Voltage 115

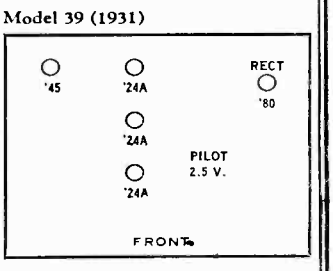
	RF1	RF2	Det.	245#1	245#2	280AC	280DC
Plate Voltage D.C.	245	245	120	240		320	340
Screen Voltage D.C.	75	75	75				
Heater Voltage A.C.	2.4	2.4	2.4	2.4		4.85	
Control Grid Voltage D.C.	2.6	2.6	7	30			
Speaker Field Voltage 100							
Total Rectifier Current .040							

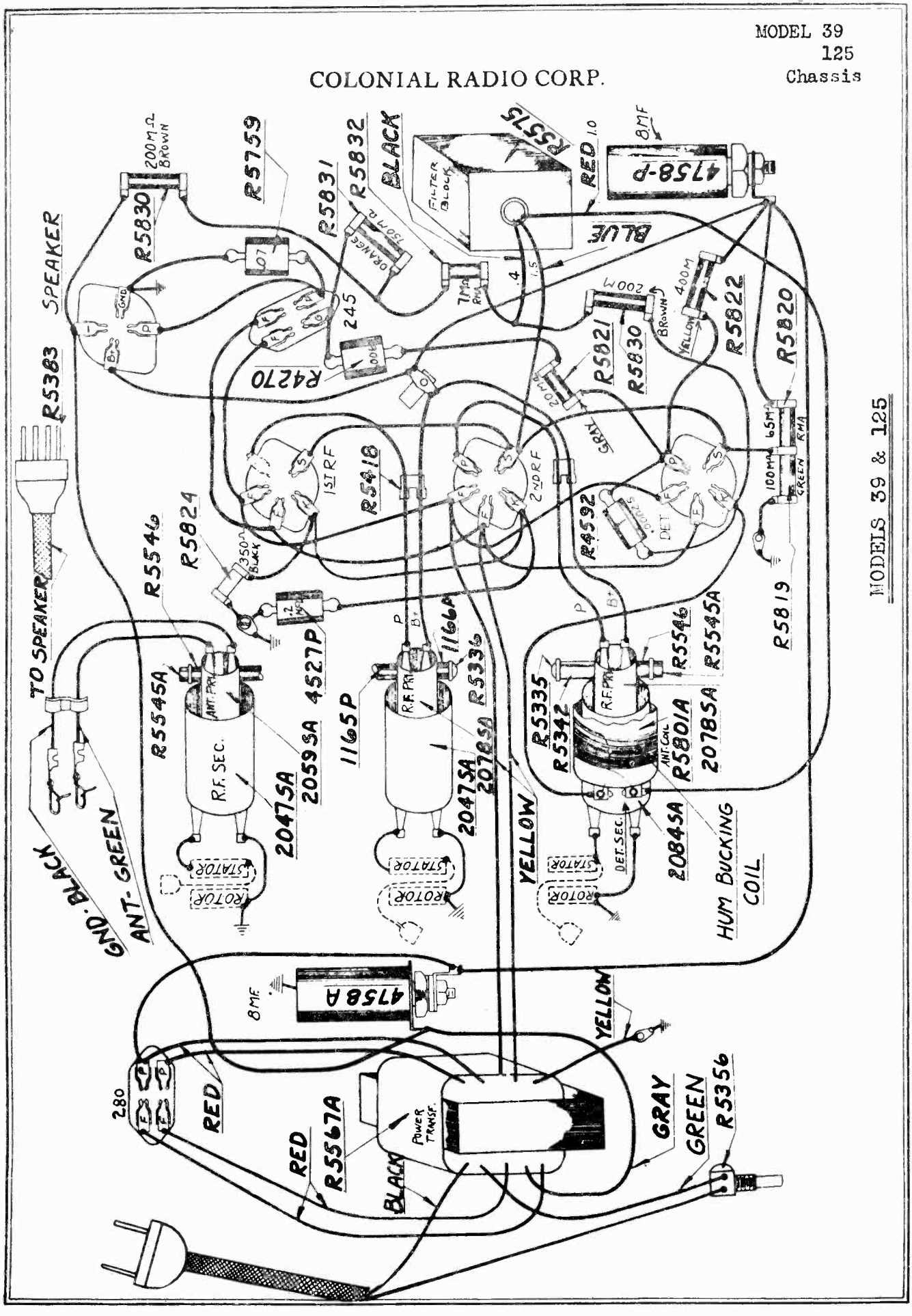
25 Cycle Line Voltage 115

	RF1	RF2	Det.	245#1	245#2	280AC	280DC
Plate Voltage D.C.	250	250	110	245		325	350
Screen Voltage D.C.	75	75	75				
Heater Voltage A.C.	2.4	2.4	2.4	2.4		4.85	
Control Grid Voltage D.C.	2.5	2.5	7.5	30			
Speaker Field Voltage 100							
Total Rectifier Current .040							

Note: Control grid volts are measured from Cathode to ground or Cathode to Heater. 245 Grid Voltage measured from Grid to Ground or Filament.

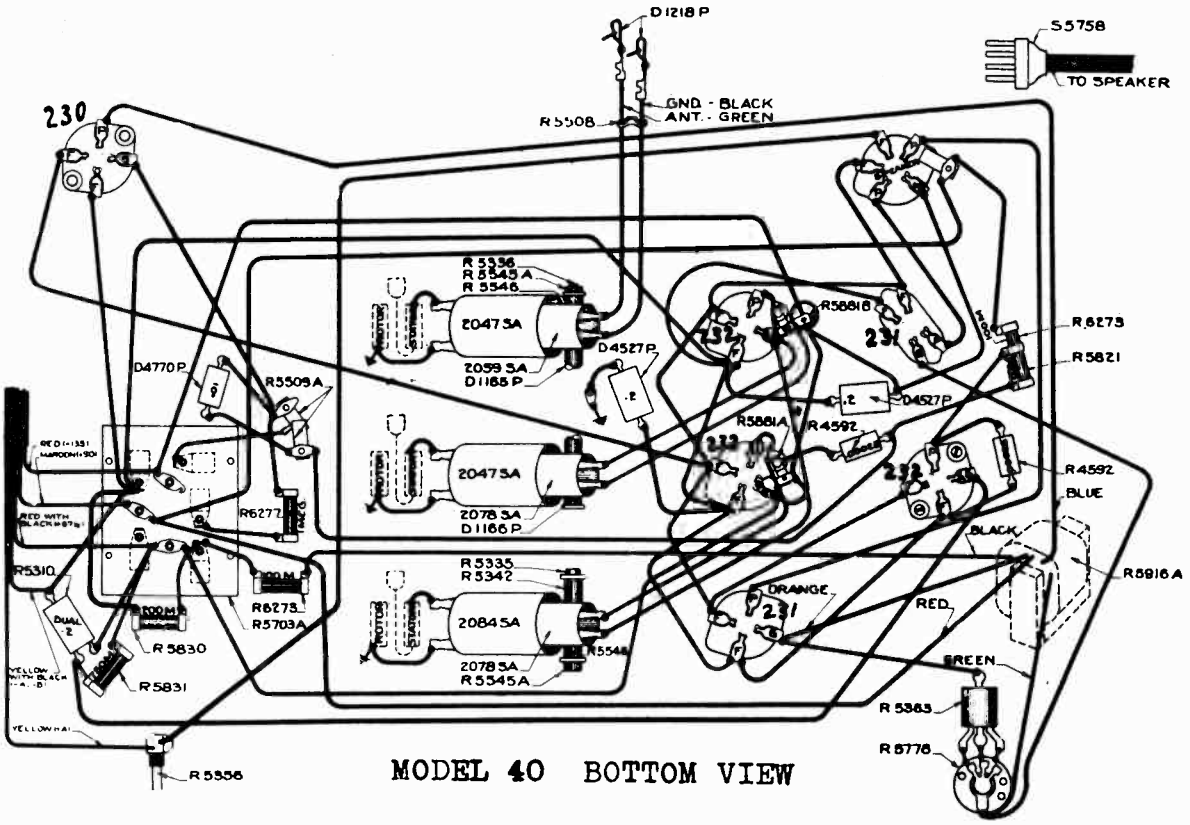
Model 39 (1931)



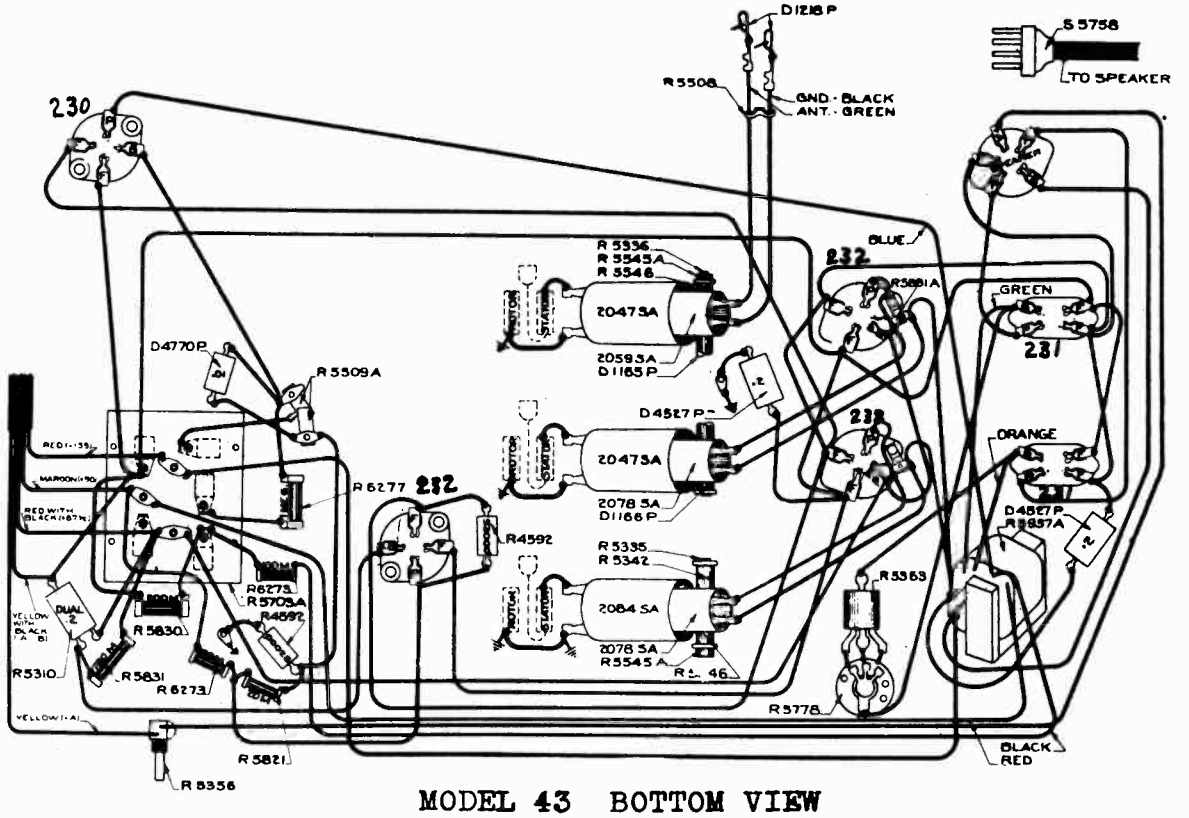


MODEL 40, 43
Battery
Chasses

COLONIAL RADIO CORP.



MODEL 40 BOTTOM VIEW

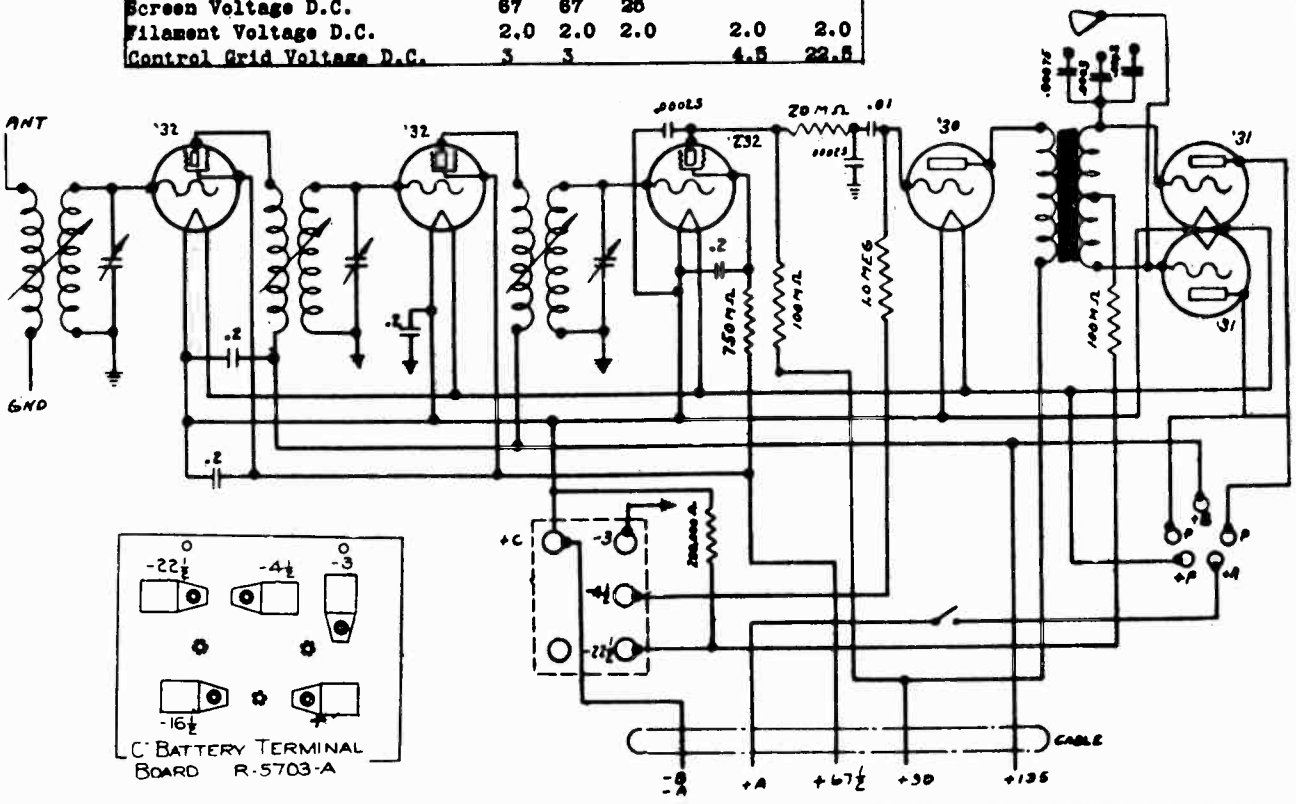


MODEL 43 BOTTOM VIEW

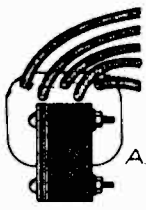
MODEL 40, 43
Battery
Schematic

COLONIAL RADIO CORP.

Model 40	RF1	RF2	Det.	1st Audio	231
Plate Voltage D.C.	135	135	80	90	130
Screen Voltage D.C.	67	67	25		
Filament Voltage D.C.	2.0	2.0	2.0	2.0	2.0
Control Grid Voltage D.C.	3	3		4.5	22.5

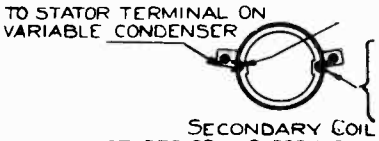


C BATTERY TERMINAL
BOARD R-5703-A



GREEN LEAD - PP GRID
BLUE LEAD - 1ST A.F PLATE
BLACK LEAD - .100M RESISTOR
RED LEAD - +B90
ORANGE LEAD - PR GRID

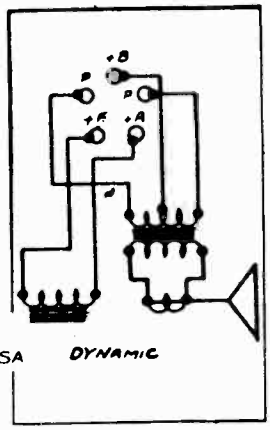
A.F INPUT TRANSFORMER
R-5916-A Mod. 40
R-5937-A Mod. 43

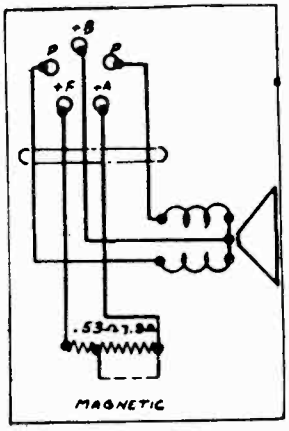


TO STATOR TERMINAL ON VARIABLE CONDENSER

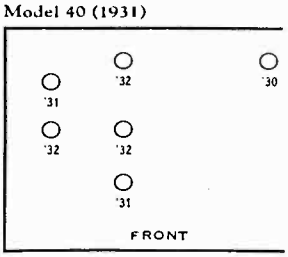
R.F. SEC. COIL D-2047-SA TO GND.
DET. SEC. COIL D-2084-SA TO GND.

SECONDARY COIL
DET SEC COIL = D-2084-SA (YELLOW SPOT)
R.F SEC COIL = D-2047-SA (PLAIN)





Model 40 (1931)



ANT. PRIM. COIL D-2059-SA TO ANT

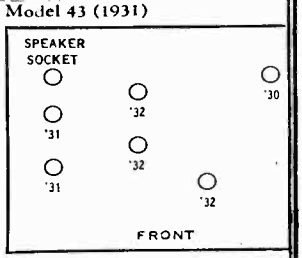
R.F. PRIM. COIL D-2078-SA TO 232 PLATE

ANT PRIM. COIL D-2059-SA TO GND

R.F. PRIM. COIL D-2078-SA TO +B TERM.

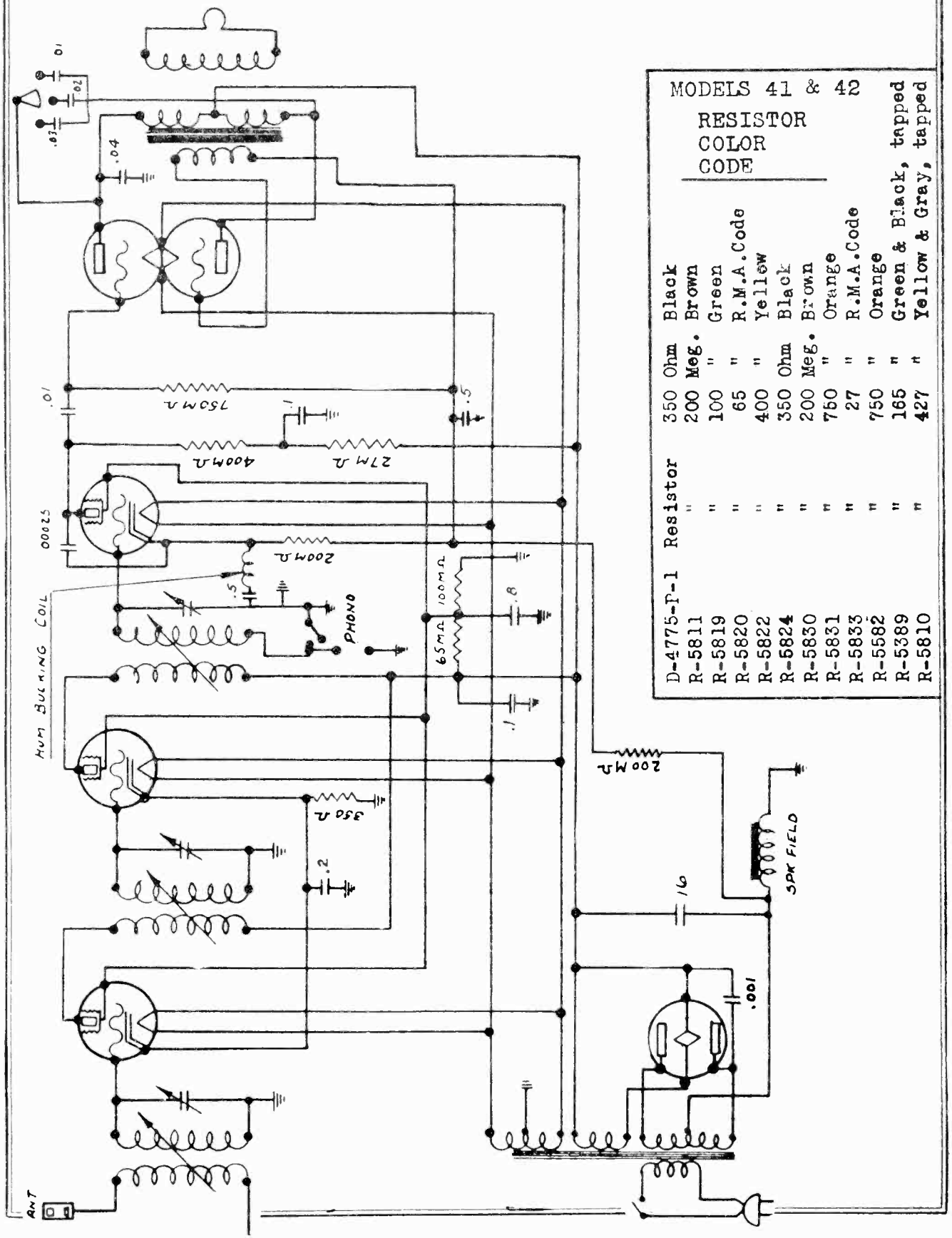
PRIMARY COIL
ANT PRIM COIL = D-2059-SA (YELLOW SPOT)
R.F. PRIM. COIL = D-2078-SA (PLAIN)

Model 43 (1931)



MODEL 41-P
Schematic

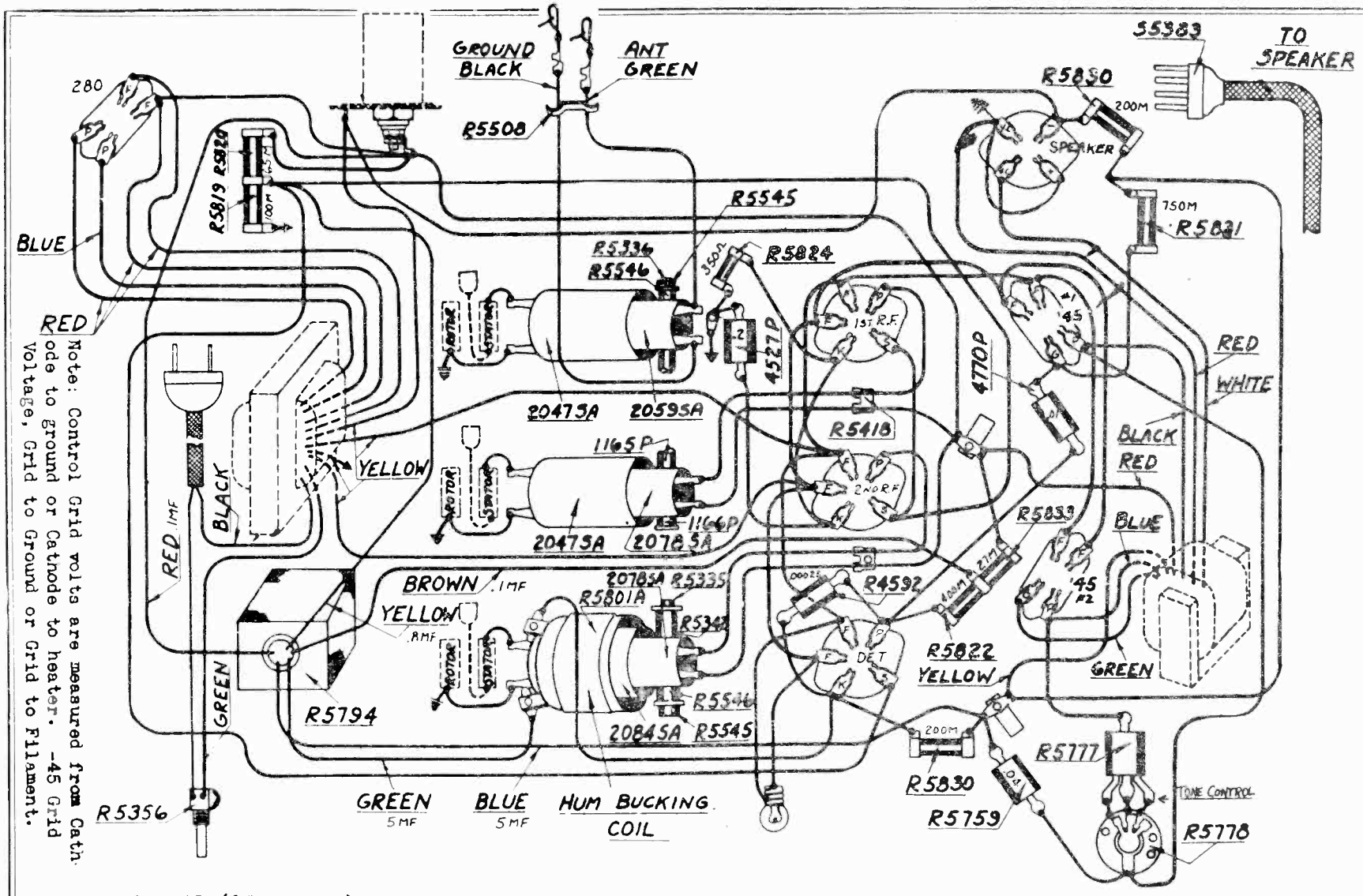
COLONIAL RADIO CORP.



MODELS 41 & 42
RESISTOR COLOR CODE

D-4775-P-1	Resistor	350 Ohm Black
R-5811	"	200 Meg. Brown
R-5819	"	100 " Green
R-5820	"	65 " R.M.A.Code
R-5822	"	400 " Yellow
R-5824	"	350 Ohm Black
R-5830	"	200 Meg. Brown
R-5831	"	750 " Orange
R-5833	"	27 " R.M.A.Code
R-5582	"	750 " Orange
R-5389	"	165 " Green & Black, tapped
R-5810	"	427 " Yellow & Gray, tapped

MODEL 41
Chassis
Voltage



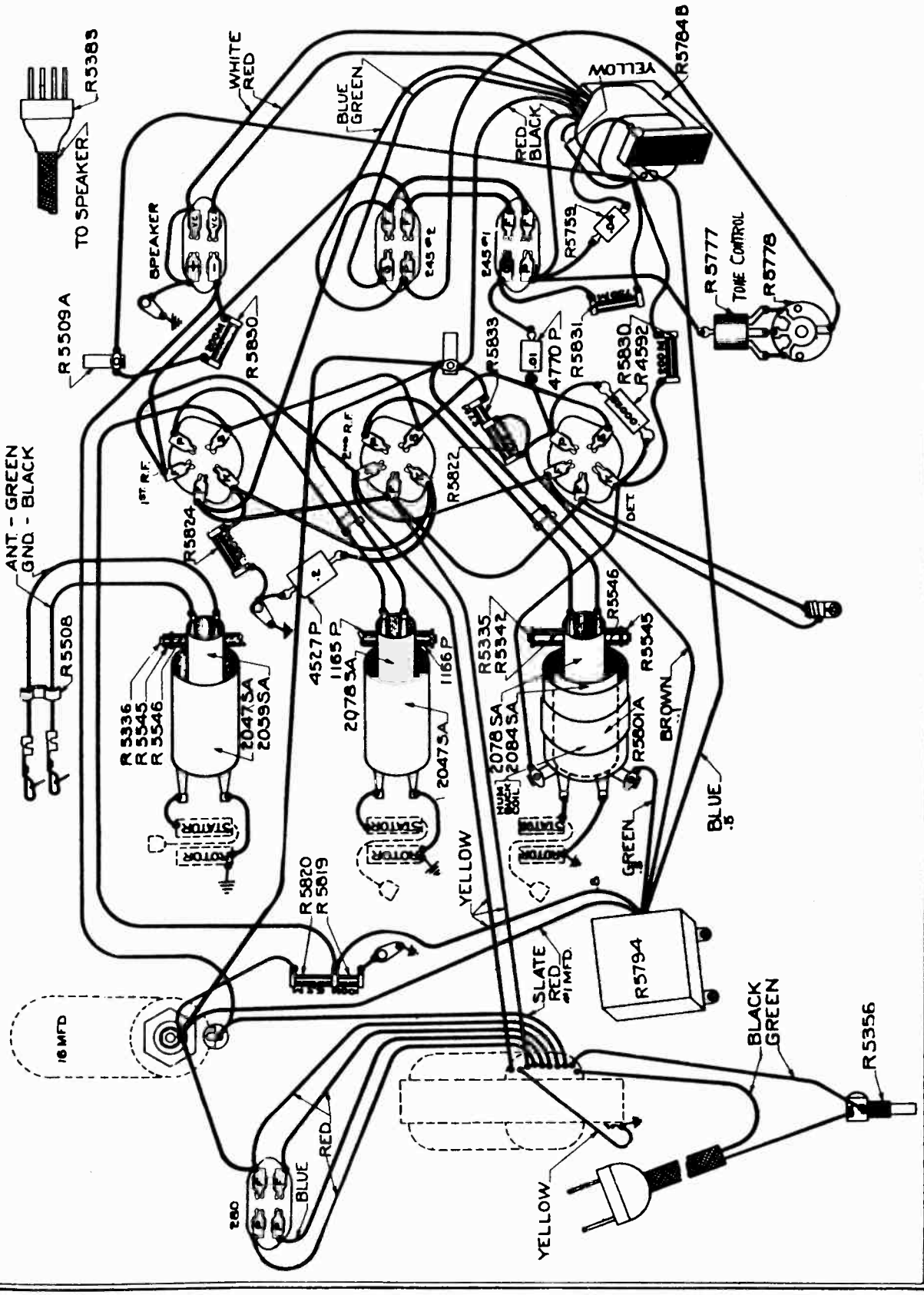
MODELS 41 & 42 (25 & 60~)	RF1	RF2	Det.	245#1	245#2	280AC	280DC
Plate Voltage D.C.	240	240	95	240	240	340	340
Screen Voltage D.C.	85	85	85				
Heater Voltage A.C.	2.4	2.4	2.4	2.4	2.4	4.85	
Control Grid Voltage D.C.	3	3	8	20	45		
Speaker Field Voltage 100							
Total Rectifier Current .065							

LINE VOLTS 115.

MODELS 41 & 42 - Type '35 tubes may be used in place of '24 type in R.F. stages.
Note that speaker field is in negative side of filter circuit. Voltage drop across field is used to obtain bias.

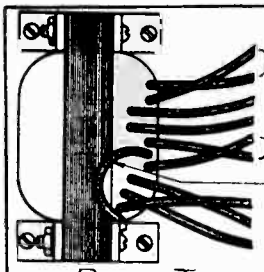
MODEL 42
Chassis

COLONIAL RADIO CORP.

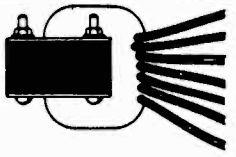


MODELS 41 and 42
Parts Coding

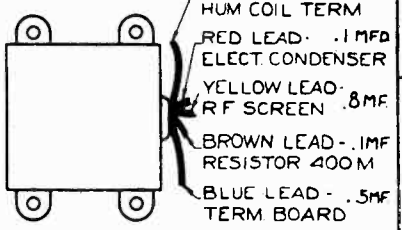
COLONIAL RADIO CORP.



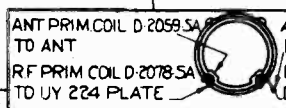
POWER TRANSFORMER
R 5779 A - 60 ~
R 5826 A - 25 ~



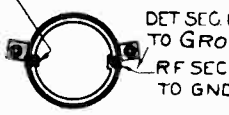
AUDIO, INPUT-OUTPUT TRANSFORMER
R 5784 A



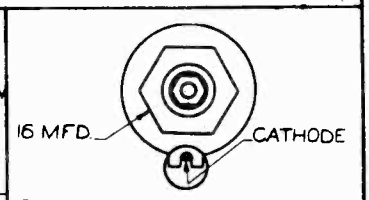
FILTER CONDENSER
R 5794 - 60 CYCLE
25 CYCLE



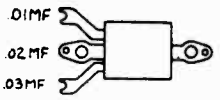
PRIMARY COIL
ANT. PRIM. COIL - D-2059-SA (YELLOW SPOT)
R.F. PRIM. COIL - D-2078-SA (PLAIN)



SECONDARY COIL
DET. SEC. COIL - D 2084 SA (YELLOW SPOT)
R.F. SEC. COIL - D 2047 SA (PLAIN)



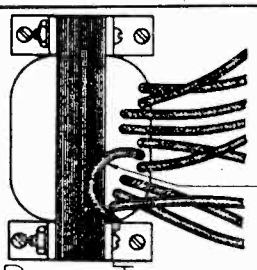
ELECTROLYTIC CONDENSER
R 5734 A



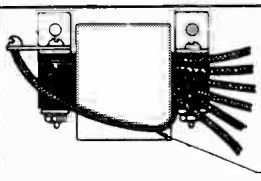
TONE CONTROL CONDENSER
R 5777

LEAD DETAILS OF POWER & AUDIO TRANSFORMER, FILTER, TONE CONTROL & ELECTROLYTIC CONDENSERS, PRIMARY & SECONDARY R.F. COILS

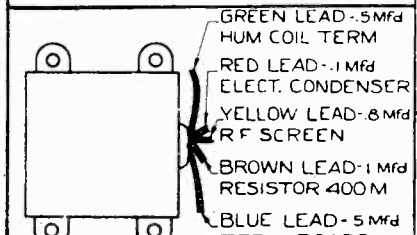
MODEL 41



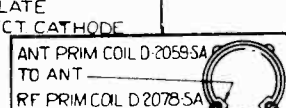
POWER TRANSFORMER
R 5779 A - 60 ~
R 5826 A - 25 ~



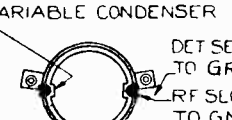
AUDIO INPUT-OUTPUT TRANSFORMER
R 5784 B



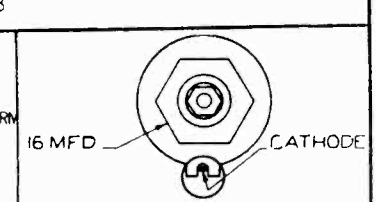
FILTER CONDENSER
R 5794 - 60 CYCLE
25 CYCLE



PRIMARY COIL
ANT PRIM COIL - D-2059-SA (YELLOW SPOT)
R F PRIM COIL - D-2078-SA (PLAIN)



SECONDARY COIL
DET SEC COIL - D-2084 SA (YELLOW SPOT)
RF SEC COIL - D-2047-SA (PLAIN)



ELECTROLYTIC CONDENSER
R 5734 A

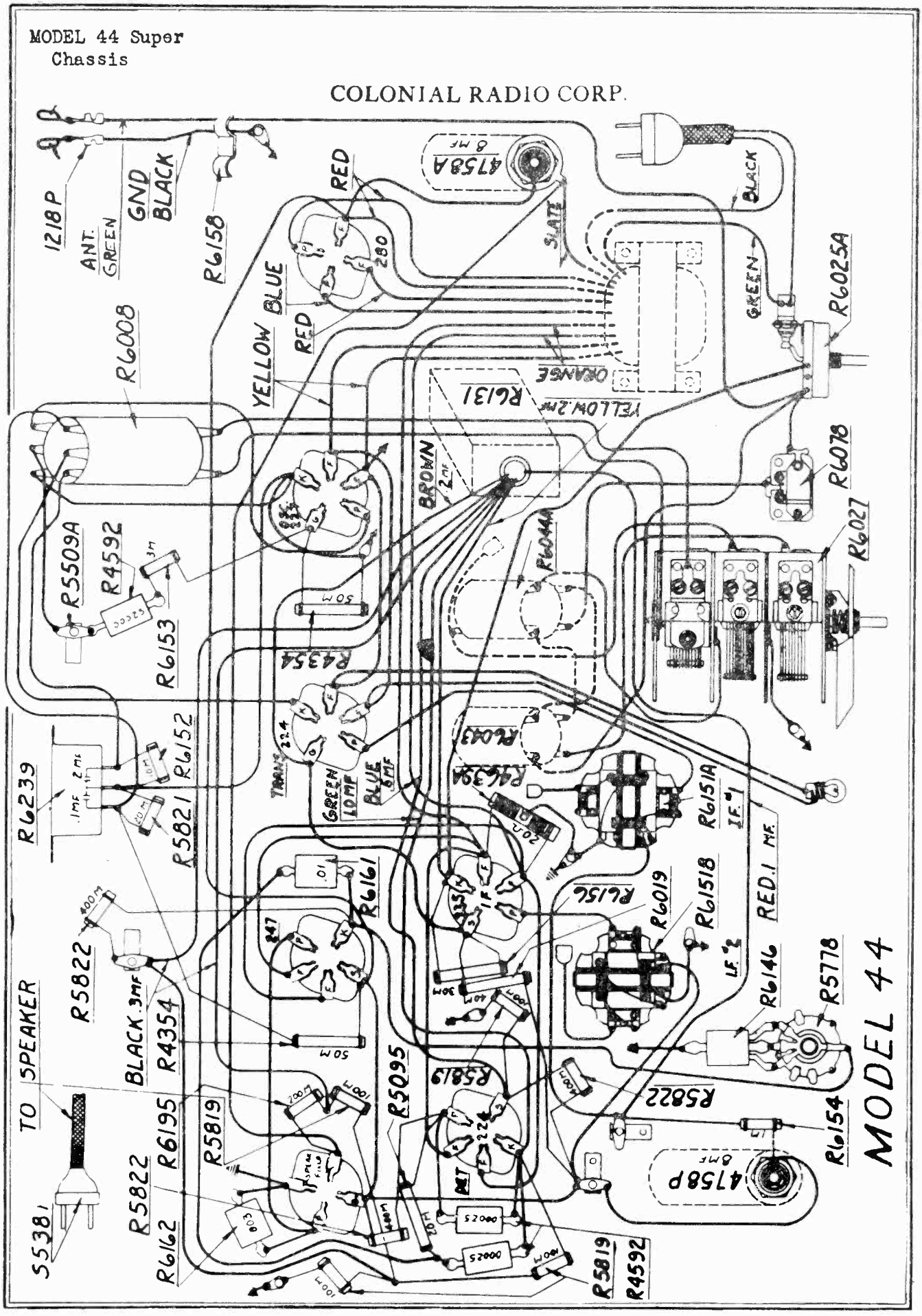
TONE CONTROL CONDENSER
R 5777

LEAD DETAILS OF POWER & AUDIO TRANSFORMER, FILTER, TONE CONTROL & ELECTROLYTIC CONDENSERS, PRIMARY & SECONDARY R.F. COILS.

MODEL 42

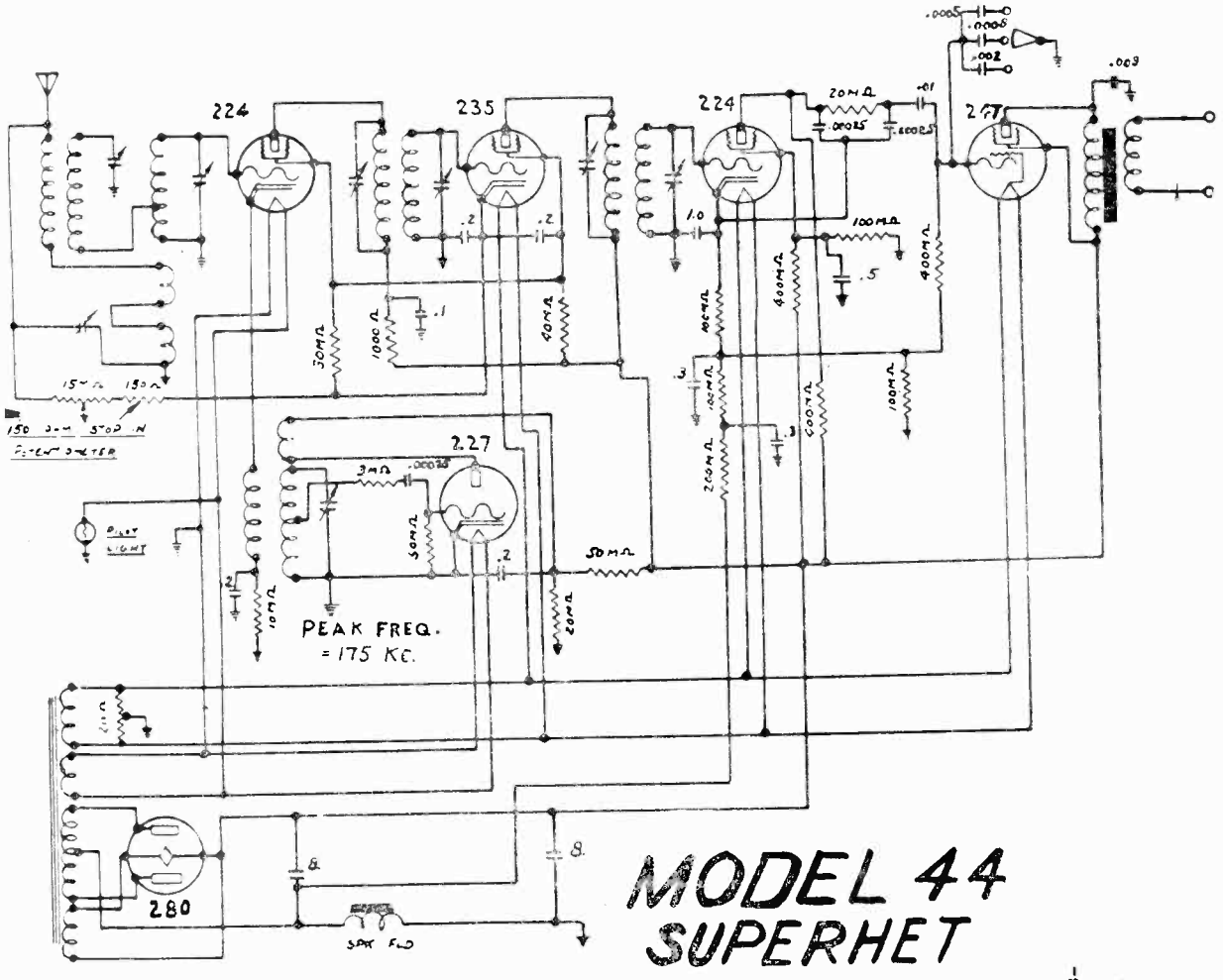
FOR ADDITIONAL DATA (RESISTOR COLOR CODE) SEE PAGE 208-B-16

MODEL 44 Super
Chassis



MODEL 44 Super.
Schematic
Voltage

COLONIAL RADIO CORP.



60 Cycle
Line Voltage - 115

Total Watts - 66

	Tran.	Osc.	I.F.	Det.	247	280AC	280DC
Plate Voltage DC	230	40	240	120	240	350	370
Screen Voltage DC	80		80	40	245		
Heater Voltage AC	2.4	2.4	2.4	2.4	2.4	4.8	
Control Grid Voltage DC	10		1.5-30	4	15		
Speaker Field Voltage	125 volts						
Total Plate Current	.050 amperes						

25 Cycle
Line Voltage- 115

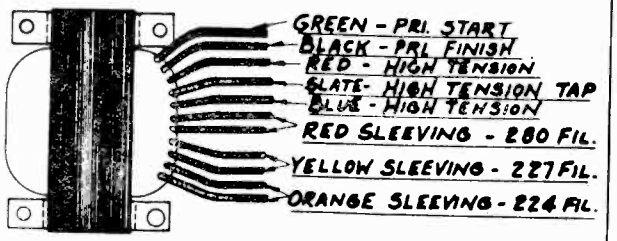
Total Watts - 70

	Tran.	Osc.	I.F.	Det.	247	280AC	280DC
Plate Voltage DC	235	45	240	125	235	345	360
Screen Voltage DC	80		80	40	240		
Heater Voltage AC	2.5	2.5	2.35	2.35	2.35	4.75	
Control Grid Voltage DC	10		1.5-30	4	15		
Speaker Field Voltage	120 volts						
Total Plate Current	.050 amperes						

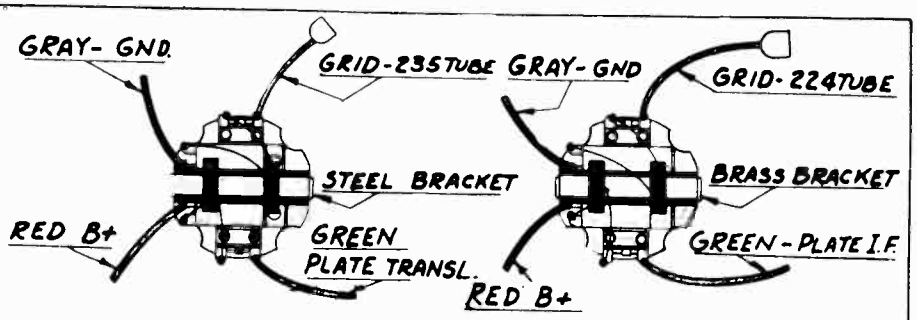
Note: Control grid volts are measured from cathode to ground or cathode to heater. 247 grid voltage from grid to ground or filament.

The 25 cycle models of this receiver are identical in electrical characteristics to the 60 cycle models.

Note-The term Tran. (translator) refers to what is commonly called the first detector. IF transformer aligning screws are accessible through two holes in the base under each IF transformer. A variation voltage of about 20 percent can be allowed for in the voltage chart.

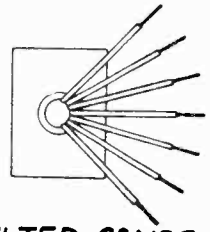


POWER TRANSFORMER
60 CYCLE R6160
25 CYCLE R 6085



R6151A R6151B

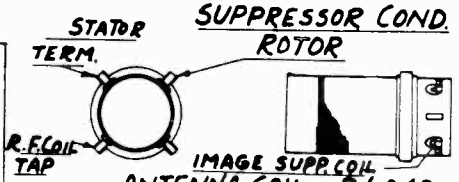
ASSEM I.F. TRANS. AND I.F. TUNING CONDENSERS



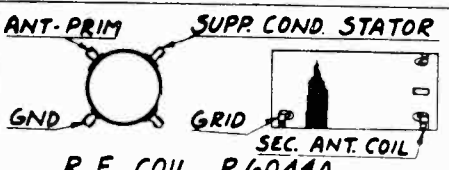
- LEAD - CODE

RED .1 MF. 1 MΩ RESISTOR
BLUE .5 MF. DET. SCREEN
GREEN 1.0 MF. DET. CATH.
BLACK .3 MF. CT. 200 MΩ RE.
BLACK .3 MF. END 200 MΩ RE.
BROWN .2 MF. IF & TR. SCREEN
YELLOW .2 MF. IF CATH.
CAN - COMMON

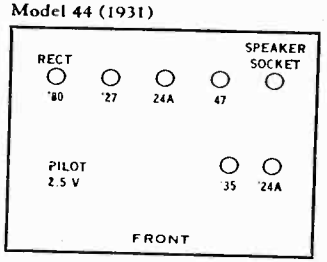
FILTER CONDENSER
R6131

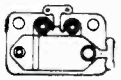


ANTENNA COIL R6043

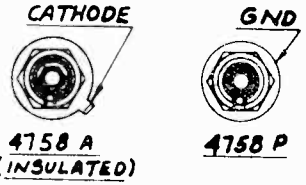


R. F. COIL R6044A

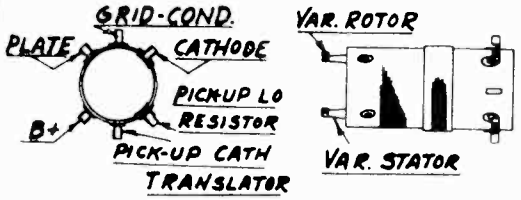




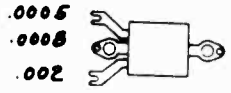
SUPPRESSOR COND. R6218



ELECTROLYTIC CONDENSERS



OSCILLATOR COIL R6008



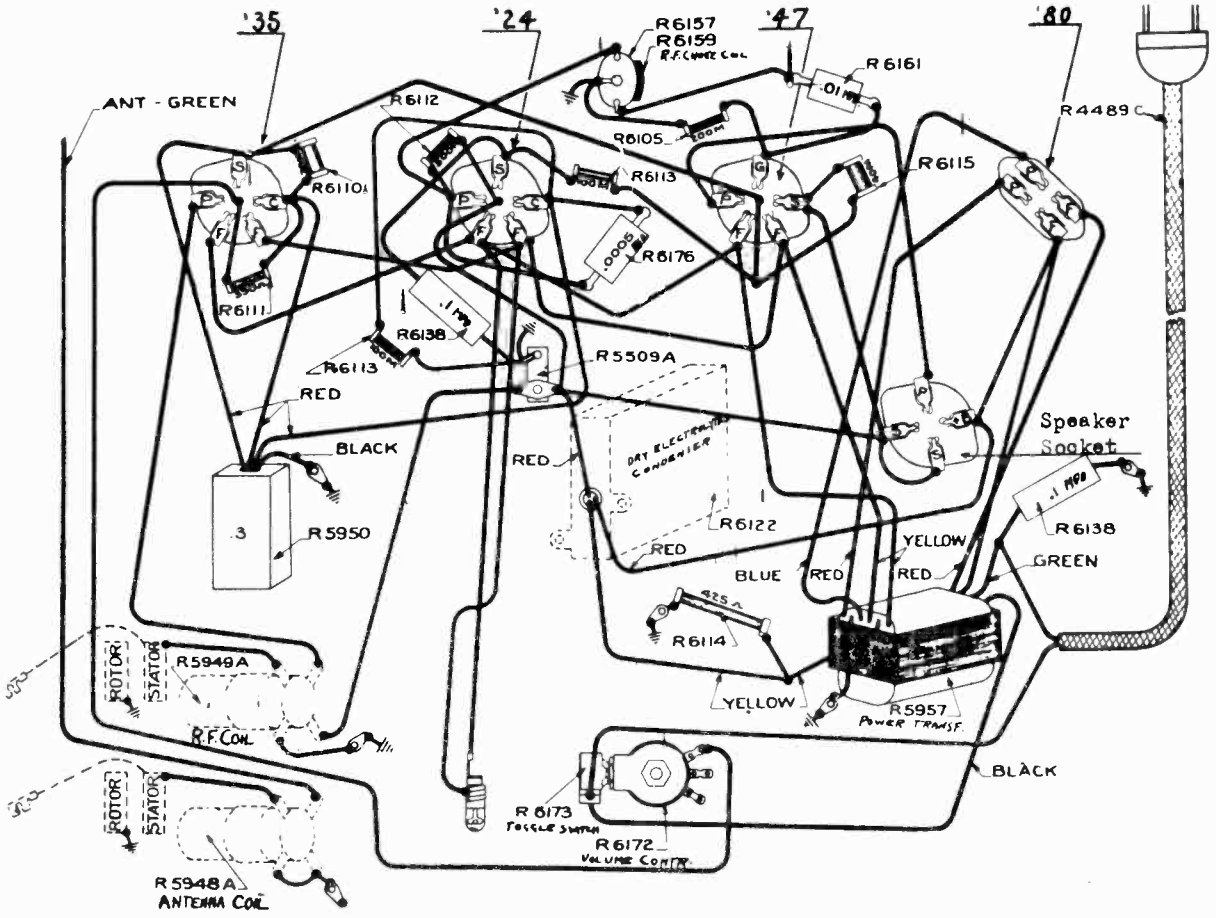
TONE CONTROL
CONDENSER R6146

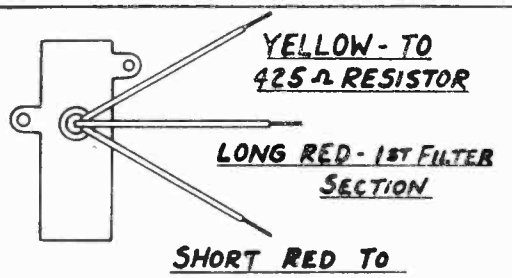
LEAD DETAILS OF POWER TRANSFORMER - I.F. TRANS. - I.F. TUNING COND - FILTER. TONE CONTROL ELECTROLYTIC & SUPPRESSOR CONDENSERS. R.F. - ANT & OSCILLATOR COILS

MODEL-44

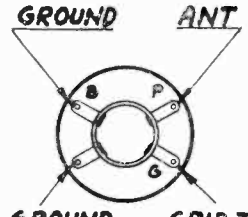
MODEL 46 Midget
Chassis
Parts Coding

COLONIAL RADIO CORP.

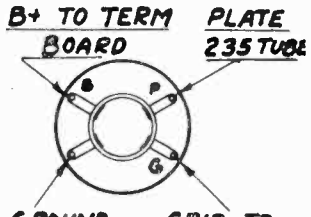




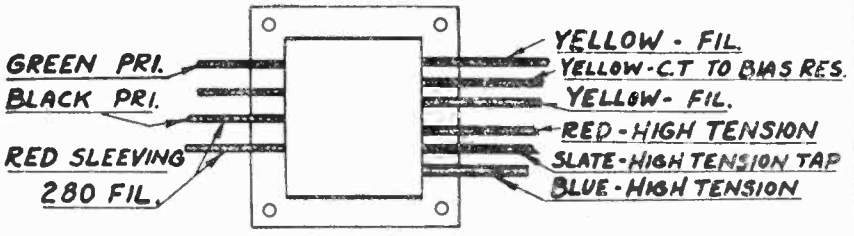
DRY ELECTROLYTIC COND
R6122



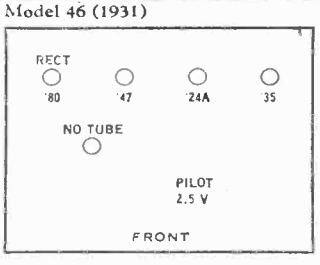
ANT COIL R5948A



R.F. COIL R 5949A

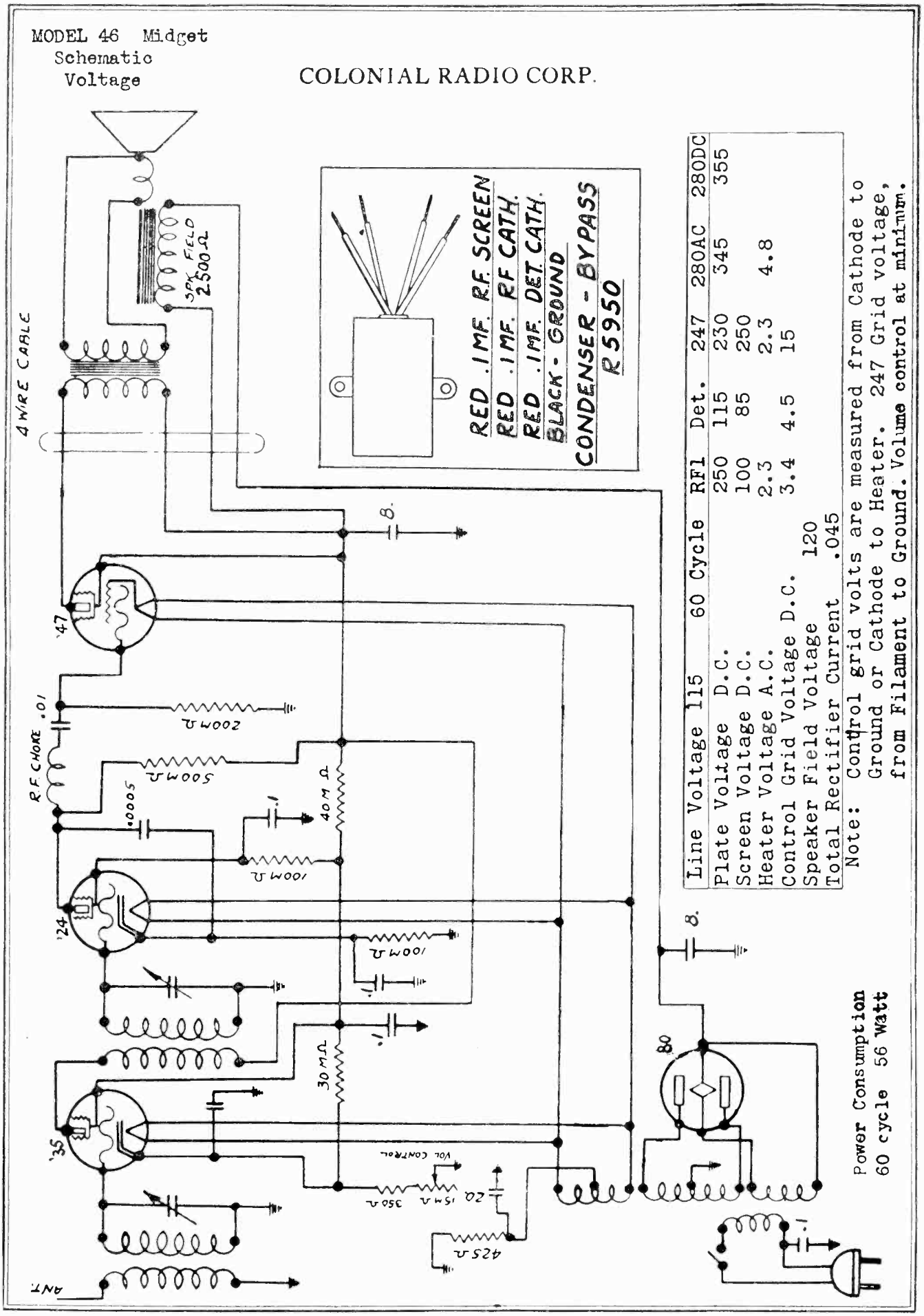


POWER TRANSFORMER
60 CYCLE R 5957



MODEL 46 Midget
Schematic
Voltage

COLONIAL RADIO CORP.



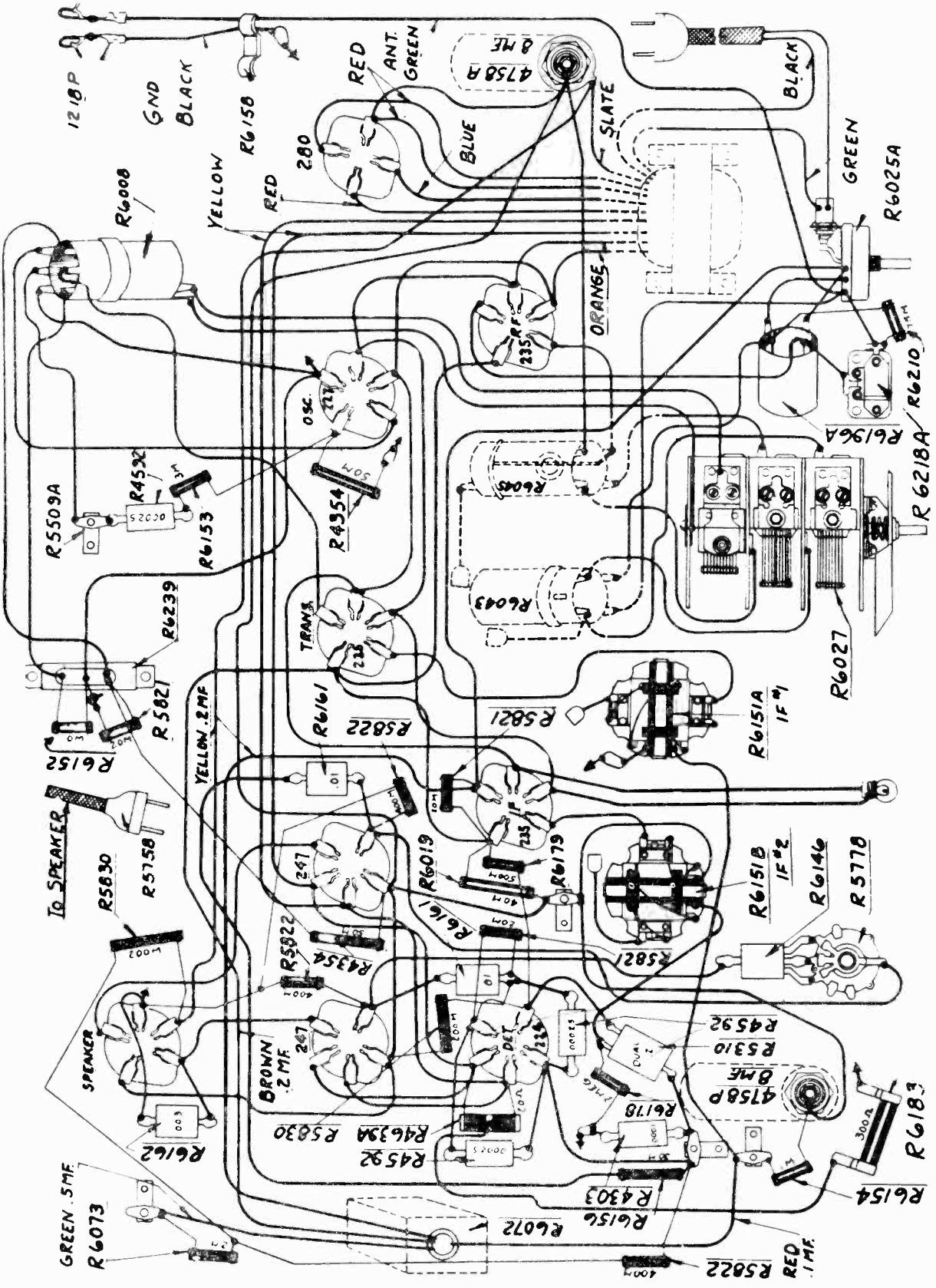
Line Voltage 115	60 Cycle	RF1	Det.	247	280AC	280DC
Plate Voltage D.C.		250	115	230	345	355
Screen Voltage D.C.		100	85	250		
Heater Voltage A.C.		2.3		2.3	4.8	
Control Grid Voltage D.C.		3.4	4.5	15		
Speaker Field Voltage	120					
Total Rectifier Current	.045					

Note: Control grid volts are measured from Cathode to Ground or Cathode to Heater. 247 Grid voltage, from Filament to Ground. Volume control at minimum.

Power Consumption
60 cycle 56 Watt

MODEL 47
Chassis

COLONIAL RADIO CORP.



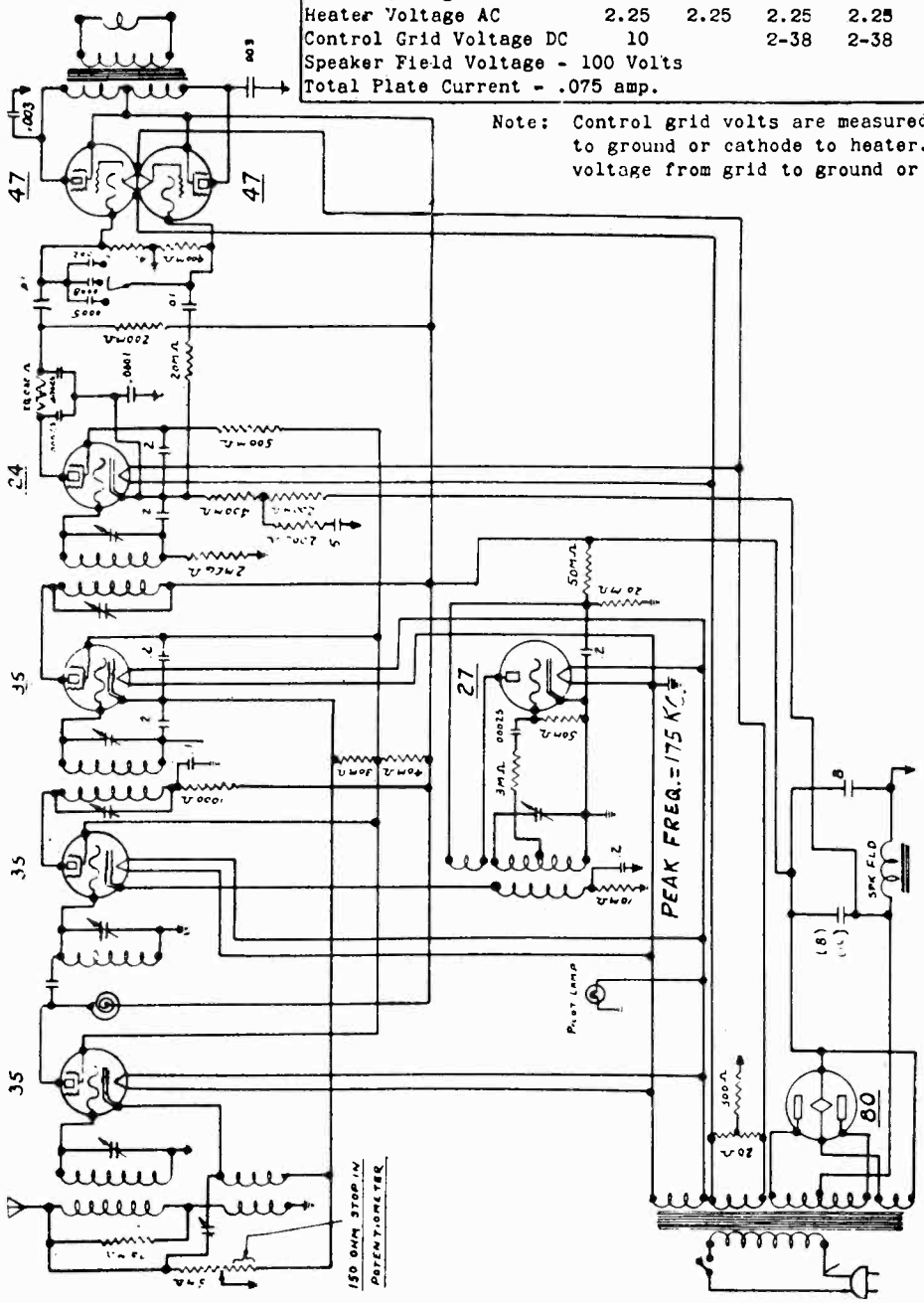
MODEL 47,48 Super
Schematic
Voltage

COLONIAL RADIO CORP.

60 Cycle Total Watts - 80 Line Voltage - 115	Tran.	Osc.	I.F.	R.F.	Det.	2-247	280AC	280DC
Plate Voltage DC	230	40	240	240	160	235	240	350
Screen Voltage DC	65		65	65	20	240		
Heater Voltage AC	2.44	2.44	2.44	2.44	2.44	2.45	4.85	
Control Grid Voltage DC	10		1.7-40	1.7-40	20	16		
Speaker Field Voltage 110 Volts.								
Total Plate Current 1075 amp.								

25 Cycle Total Watts - 85 Line Voltage - 115	Tran.	Osc.	I.F.	R.F.	Det.	2-247	280AC	280DC
Plate Voltage DC	220	40	230	230	160	225	325	340
Screen Voltage DC	70		70	70	25	230		
Heater Voltage AC	2.25	2.25	2.25	2.25	2.45	2.45	4.7	
Control Grid Voltage DC	10		2-38	2-38	20	15		
Speaker Field Voltage - 100 Volts								
Total Plate Current - .075 amp.								

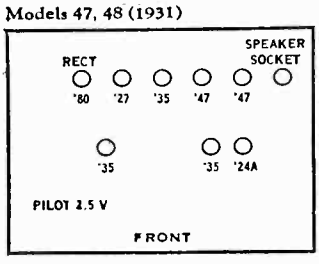
Note: Control grid volts are measured from cathode to ground or cathode to heater. 247 grid voltage from grid to ground or filament.



MODELS 47-48 SUPERHET.

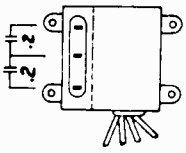
NOTE-In this set the hum across the field coil is used to buck out hum set up in the tube circuits. Causes of hum can be traced to defective detector or output tubes. (interchange output tubes) Shorted condenser or open resistors in hum filter circuit. The hum filter circuits consists of a 2000 ohm resistor and a 0.5 condenser in the grid bias resistor circuit. This connects from the cathode of the detector to the negative side of the speaker field. Other causes of hum are Reversed speaker field, open or shorted condensers in detector circuit, open or grounded 20 ohm center tapped resistor, defective tone control, defective speaker or a defective electrolytic condenser.

Models 47, 48 (1931)



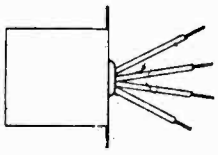
MODEL 47, 48
Parts Coding

COLONIAL RADIO CORP.



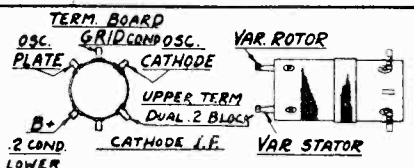
-LEAD CODE-
RED .1MF 1MΩ RESISTOR I.F
BROWN .2MF SCREEN I.F.
YELLOW .2MF CATHODE I.F.
GREEN .5-2MΩ RESISTOR
CAN - COMMON

FILTER CONDENSER
R6081
MODEL 48

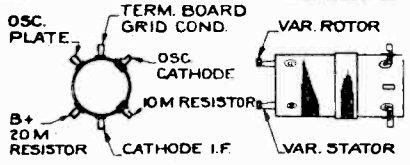


LEAD CODE
RED-.1MF 1MΩ RESISTOR I.F
BROWN-.2MF SCREEN I.F
YELLOW-.2MF CATHODE I.F
GREEN-.5MF 2MΩ RESISTOR

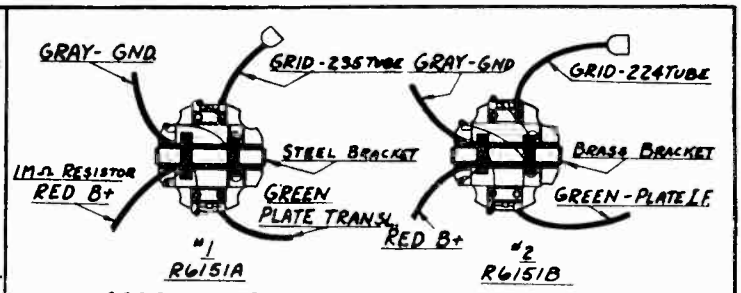
FILTER CONDENSER - R6072
MODEL 47



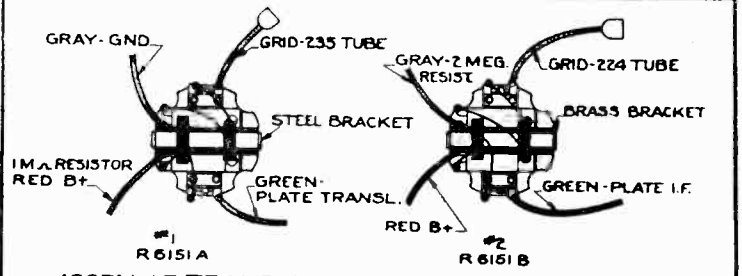
OSCILLATOR COIL R6008
MODEL 48



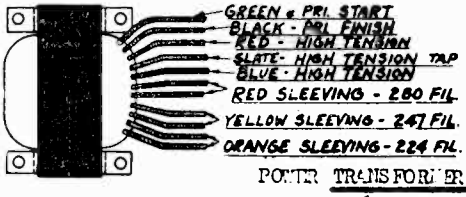
OSCILLATOR COIL R6008
MODEL 47



ASSEM I.F. TRANS. AND IF TUNING CONDENSERS
MODEL 48

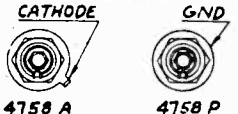


ASSEM. I.F. TRANS. & I.F. TUNING CONDENSERS
MODEL 47

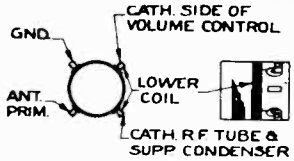


POWER TRANSFORMER

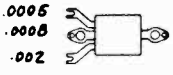
Model	48	60 cyc.	- R6085
		25 "	- R6181
Model	47	60 "	- R6080A
		25 "	- R6185A



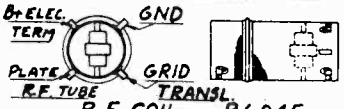
ELECTROLYTIC CONDENSERS



SUPPRESSOR COIL R6196A

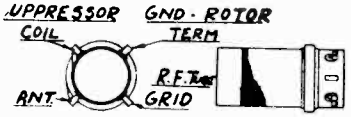


TONE CONTROL
CONDENSER R6146



R.F. COIL R6045

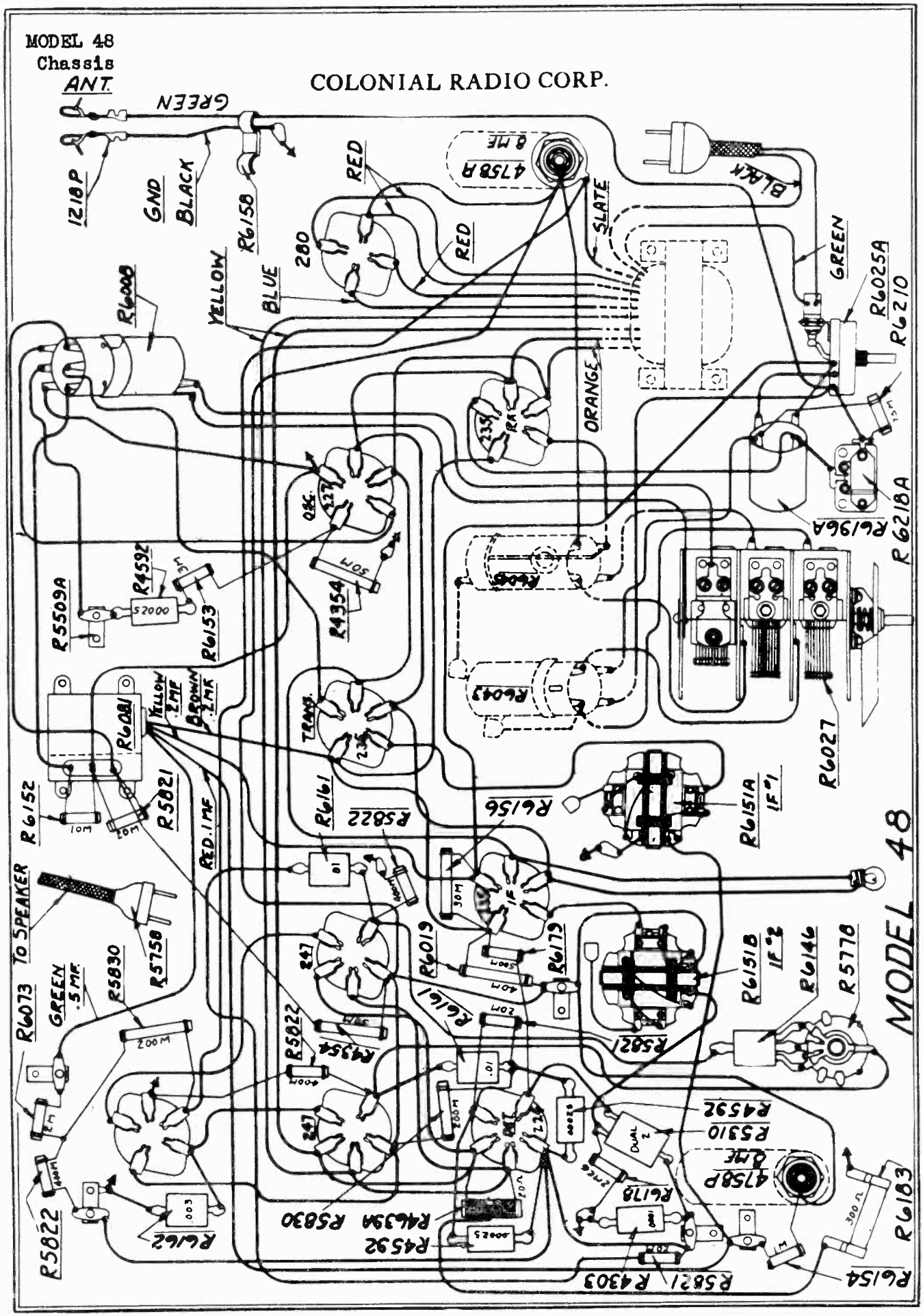
SUPPRESSOR COND R6218



ANTENNA COIL R6043

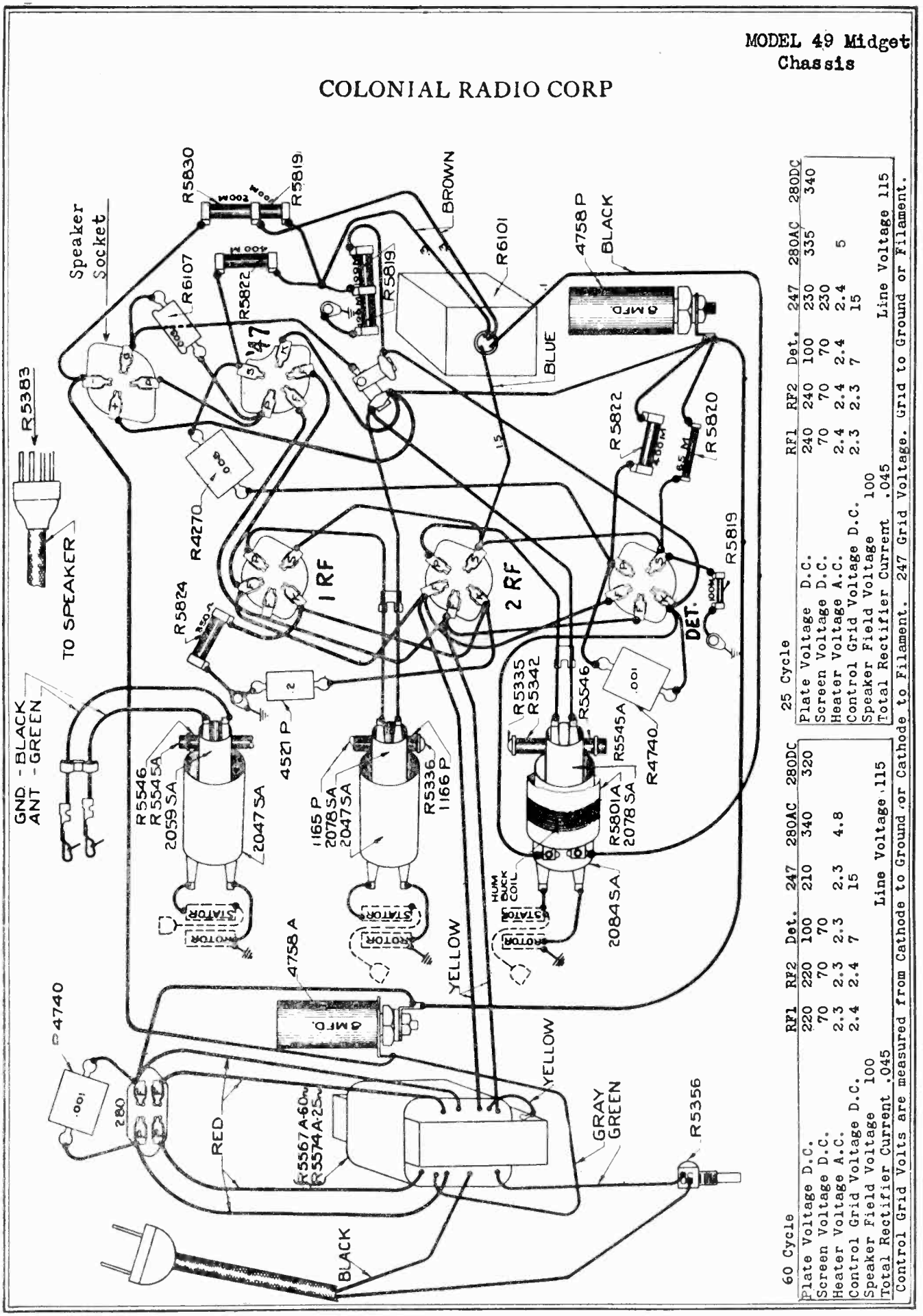
MODELS 47 & 48

MODELS 47 AND 48



MODEL 49 Midget
Chassis

COLONIAL RADIO CORP



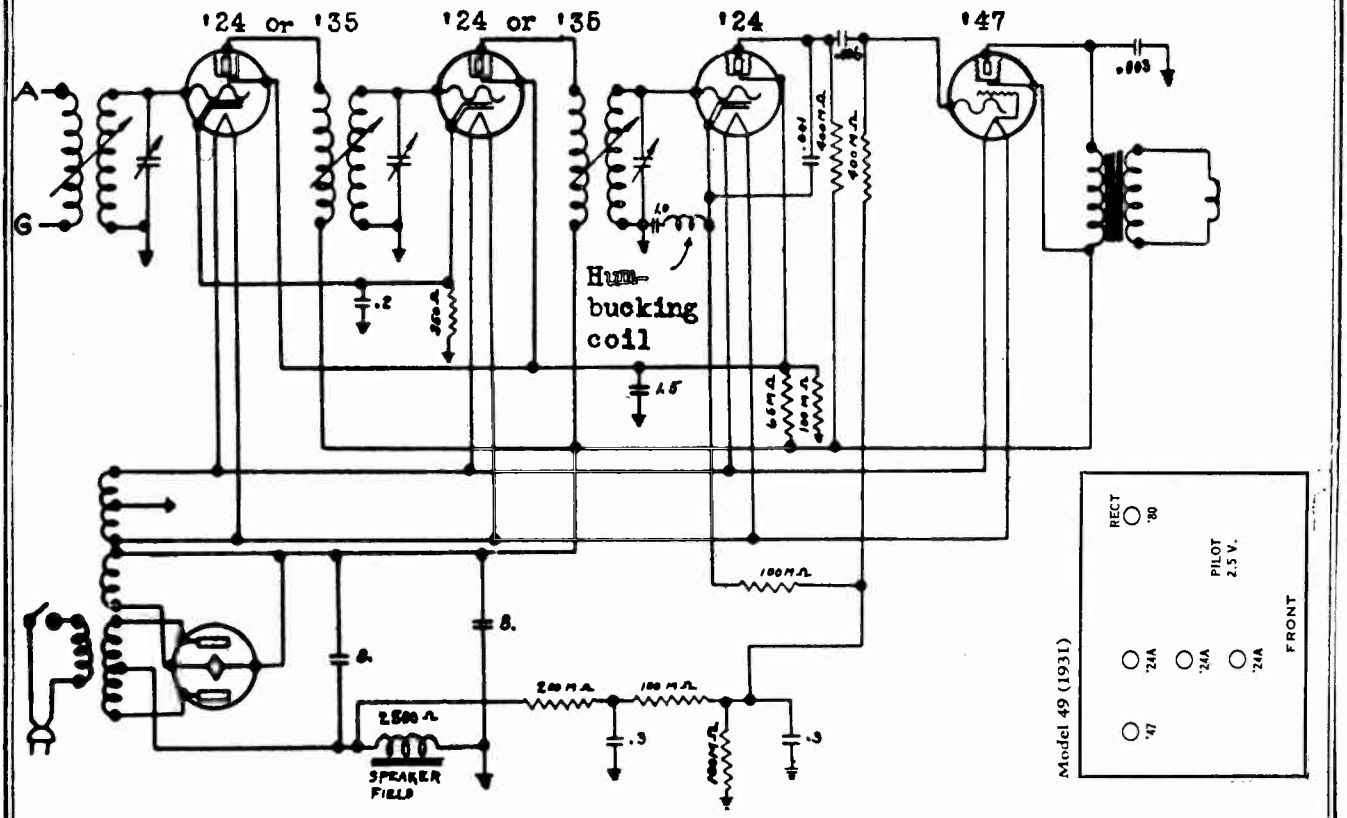
60 Cycle	RF1	RF2	Det.	247	280AC	280DC
Plate Voltage D.C.	220	220	100	210	340	320
Screen Voltage D.C.	70	70	70			
Heater Voltage A.C.	2.3	2.3	2.3	2.3	4.8	
Control Grid Voltage D.C.	2.4	2.4	7	15		
Speaker Field Voltage 100				Line Voltage 115		
Total Rectifier Current .045						

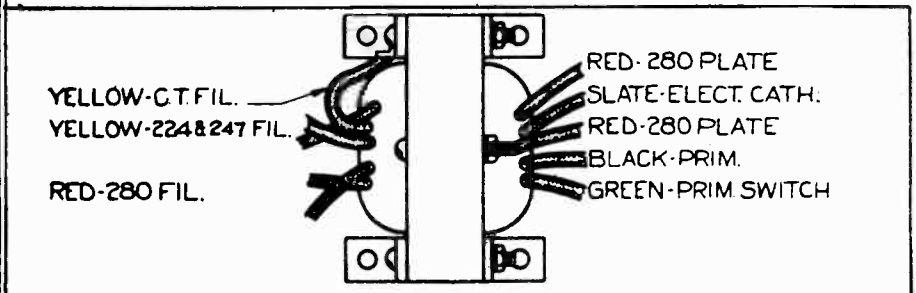
25 Cycle	RF1	RF2	Det.	247	280AC	280DC
Plate Voltage D.C.	240	240	100	230	335	340
Screen Voltage D.C.	70	70	70	230		
Heater Voltage A.C.	2.4	2.4	2.4	2.4	5	
Control Grid Voltage D.C.	2.3	2.3	7	15		
Speaker Field Voltage 100				Line Voltage 115		
Total Rectifier Current .045						

Control Grid Volts are measured from Cathode to Ground or Cathode to Filament. 247 Grid Voltage. Grid to Ground or Filament.

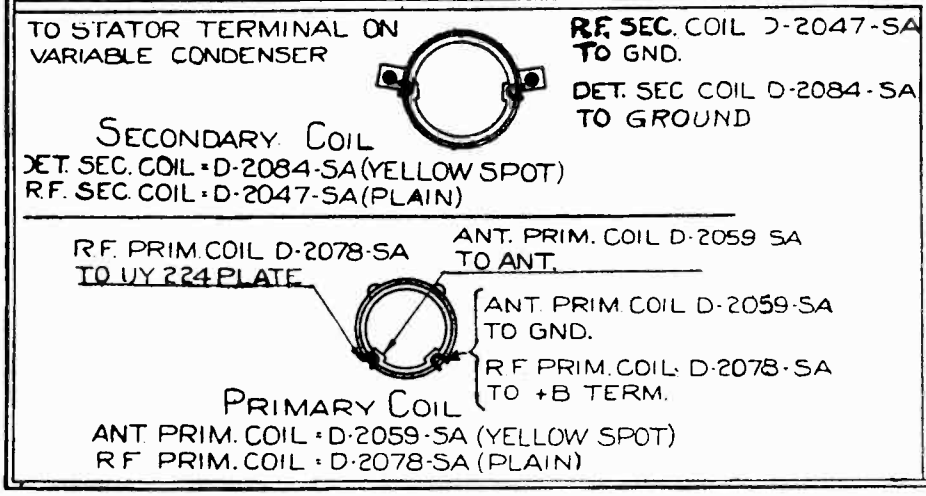
MODEL 49 Midget
Schematic
Parts Coding

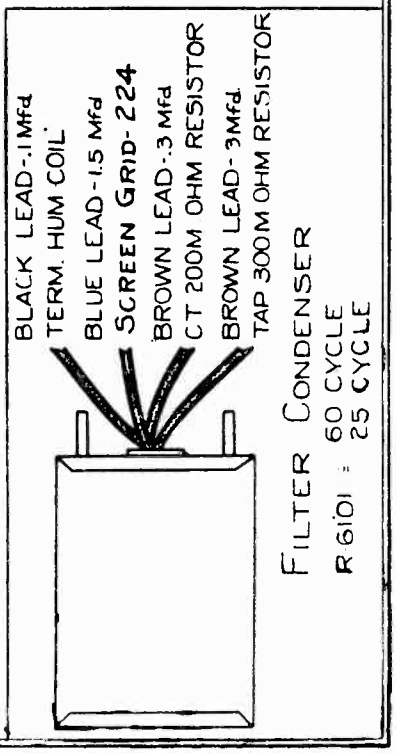
COLONIAL RADIO CORP.





POWER TRANSFORMER
R 5567A · 60~ R 5574A · 25~

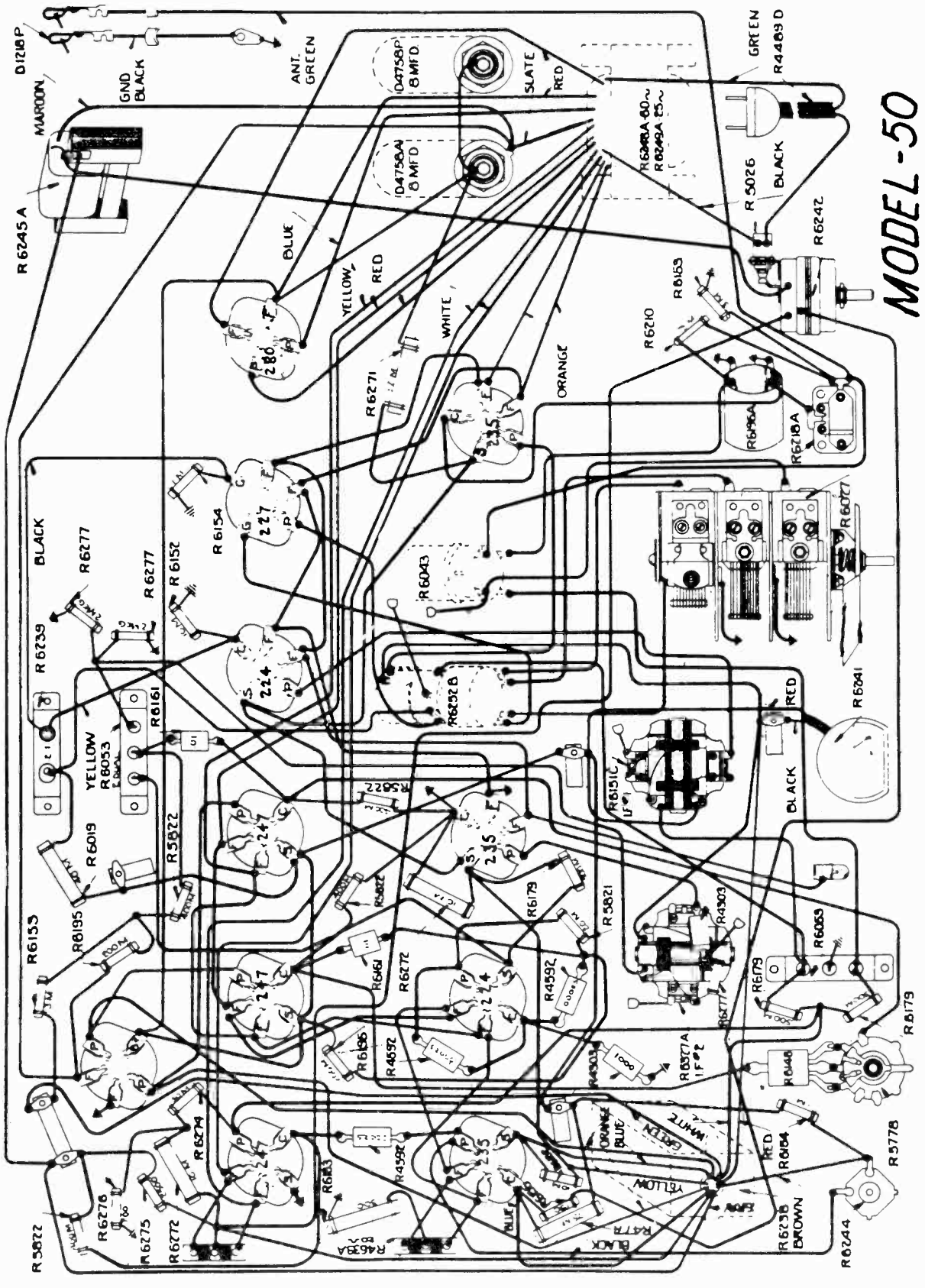




FILTER CONDENSER
R 6101 = 60 CYCLE
25 CYCLE

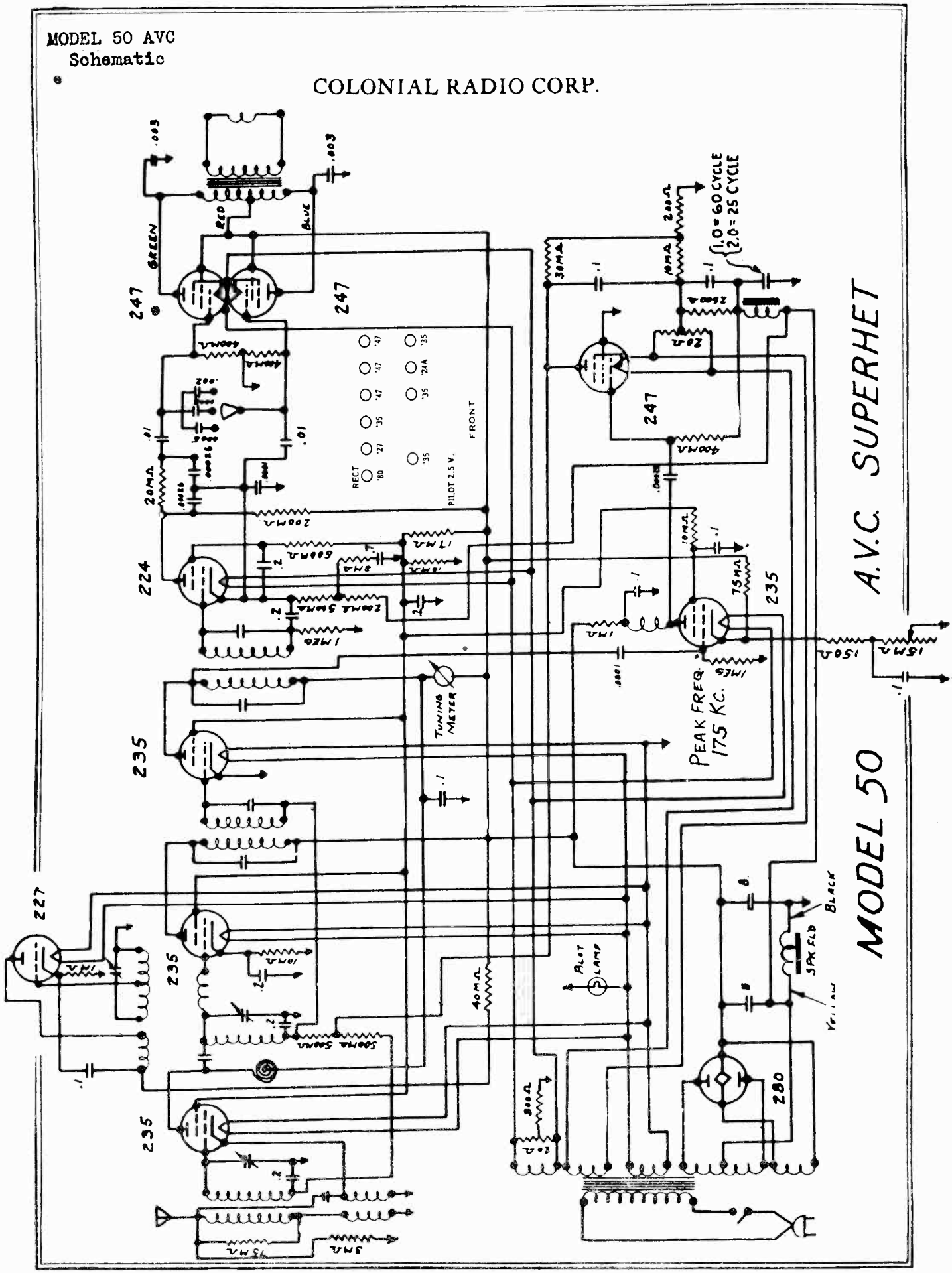
MODEL 50 AVC
Chassis

COLONIAL RADIO CORP



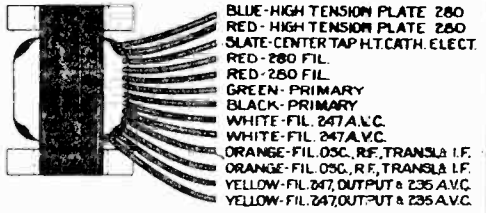
MODEL 50 AVC
Schematic

COLONIAL RADIO CORP.

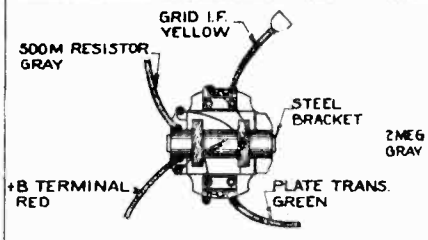


MODEL 50 AVC
Voltage
Parts Coding

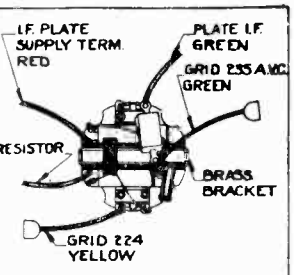
COLONIAL RADIO CORP.



POWER TRANSFORMER
R 6248 A - 60 ~
R 6248 A - 25 ~

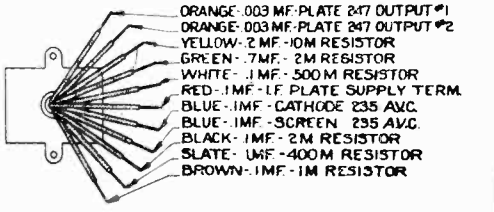


#1
R 6151 C

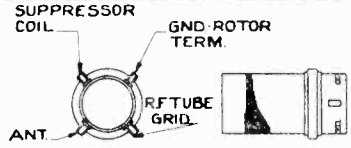


#2
R 8327 A

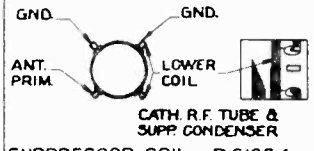
ASSEM I.F. TRANS & I.F. TUNING CONDENSERS



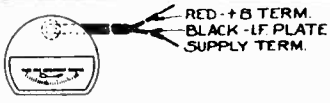
FILTER CONDENSER-R6238



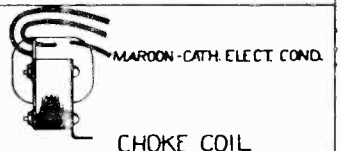
ANTENNA COIL R6043



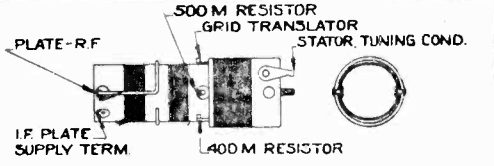
SUPPRESSOR COIL R6196A



TUNING METER
R 6241



CHOKE COIL
R 6245A



TRANSLATOR COIL R6252 B

4758 A
(INSULATED)

4758 P

ELECTROLYTIC CONDENSERS

FILTER CONDENSER
R 6239

LEAD DETAILS OF POWER TRANSFORMER-I.F. TRANS.-I.F. TUNING COND.-FILTER COND.-ELECTROLYTIC COND.-ANTENNA, SUPPRESSOR, TRANSLATOR AND CHOKE COILS - TUNING METER.

MODEL 1430 - 60 CYCLE
Line Voltage 115
Total Watts 100

	Trans	Osc.	IF	RF	Det	#1 247 Output	#2 247 Output	AVC Amp 235	AVC 247	280 AC	280 DC
Plate Voltage	230	20	230	230	160	230	230	230		340	340
Screen Voltage	70		70	70	25	230	230	70	100		
Grid Voltage	var		var.	var.	20	15	15	var.	18		
Filament Voltage	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4.85		

Speaker Field Voltage - 110
Total Plate Current - 80 ma.

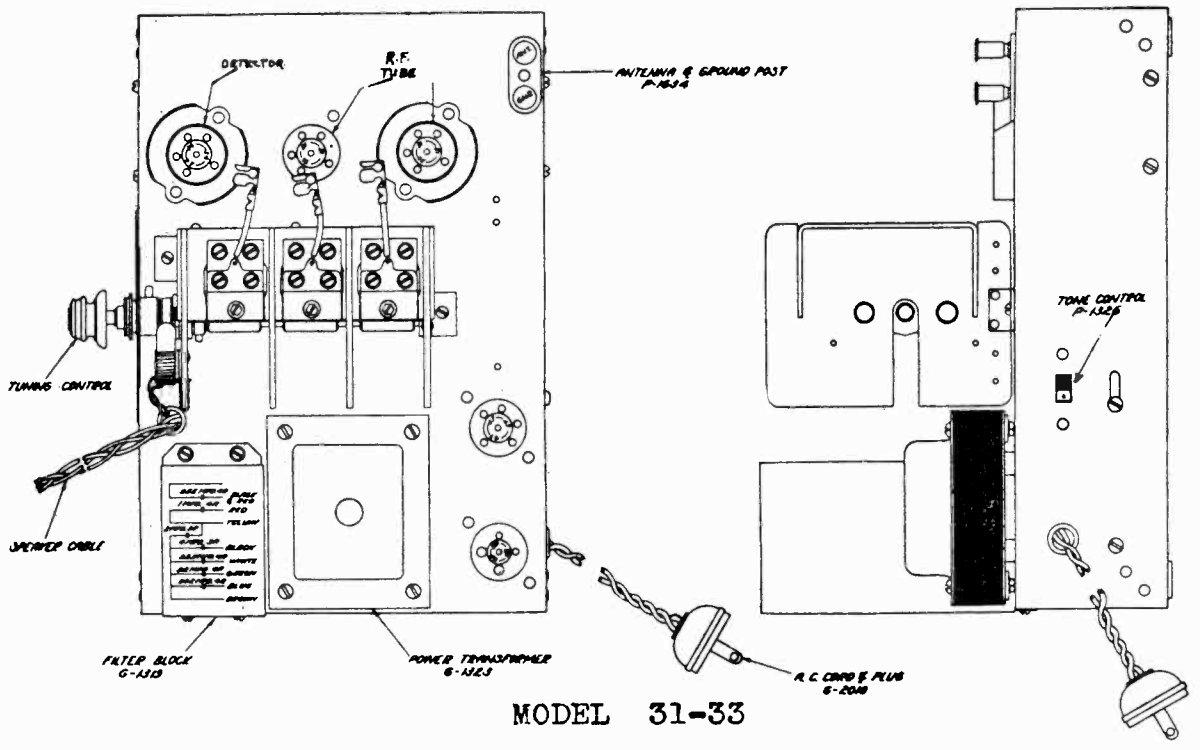
Note: All voltages measured with a 1000 ohm per volt meter, 250 volt scale, with volume level control at maximum. 247 output grid voltages were measured from filament to ground, and translator grid from cathode to ground. Grid voltages on the RF and IF will be variable when the set is operating. AVC plate voltages will be the grid voltages on RF IF and translator tubes.

Notes-Causes of no signals can be traced to some of the following reasons. Grid clips shorted to tops of tube shields. Open or shorted condensers. Unsoldered leads. Solder under tube socket terminals. Defective tubes. Oscillator not working. Open image suppressor coil. Defective speaker or shorted tone control connection. Poor quality can be traced to defective output or detector tubes. Set not tuned properly. A poor 235 in the IF, RF or translator sockets will give poor quality and unsatisfactory volume control. Shorted or open grid coupling condenser in the audio circuit, or open resistors in the audio circuits will also contribute to poor quality. Oscillation can be traced to defective tubes, grid leads of detector and IF too close, or an open condenser in the plate circuit of the translator.

MODEL-50

COLUMBIA PHONOGRAPH COMPANY

MODEL 31,33
Layout
Notes



MODEL 31-33

MODEL 40 CONTINUITY TEST TABLES

(Using 10-volt scale 1,000 ohms per volt: meter with 6-volt battery)

Circuit Tested	From	To	Reading	Your Reading
Ant. coil pri.	Ant. post	Ground	6.	
Ant. coil sec.	Grid 1st tube	Ground	6.	
1st R. F. Plate ckt.	Plate of tube	Brown lead of filter pack	6.	
1st R. F. Screen ckt.	Screen prong	Center lead, Voltage divider	6.	
1st R. F. Cathode ckt.	Cath. prong	Center tap Volume Control "ON"	6.	
2nd R. F. Grid ckt.	Grid Clip	Ground	6.	
2nd R. F. Plate ckt.	Plate prong	Brown lead of filter pack	6.	
2nd R. F. Screen ckt.	Screen prong	Center tap Voltage divider	6.	
2nd R. F. Cathode ckt.	Cathode prong	Center tap Volume Control "ON"	6.	
Det. Grid ckt.	Gird Clip	Ground	6.	
Det. Plate ckt.	Plate prong	Brown lead of filter pack	6.	
Det. Screen ckt.	Screen prong	Center Voltage divider	6.	
Det. Cathode ckt.	Cathode prong	Ground	1.4	
P. Z. cont. grid	Grid prong	Sec output trans. black lead	(slight deflection)	
P. Z. space chg. grid ckt.	S. C. Grid Prong	Brown lead of filter pack	6.	
P. Z. Plate ckt.	Plate prong	Brown lead of filter pack	5.7	
Output Sec.	One side	Other side	5.9	
Pri Power Trans.	Across A. C. Plug	Switch on	5.9	
Hi volts Sec.	Across 280 plate prongs		5.6	
Speaker field	Red wire	Green Wire	5.4	
Speaker voice coil	Green wire	Black	6	
Filter Choke	Across red leads		5.6	
Voltage divider	Ground	Brown lead of filter pack	2.2	

RESISTANCE TABLE MODEL 40

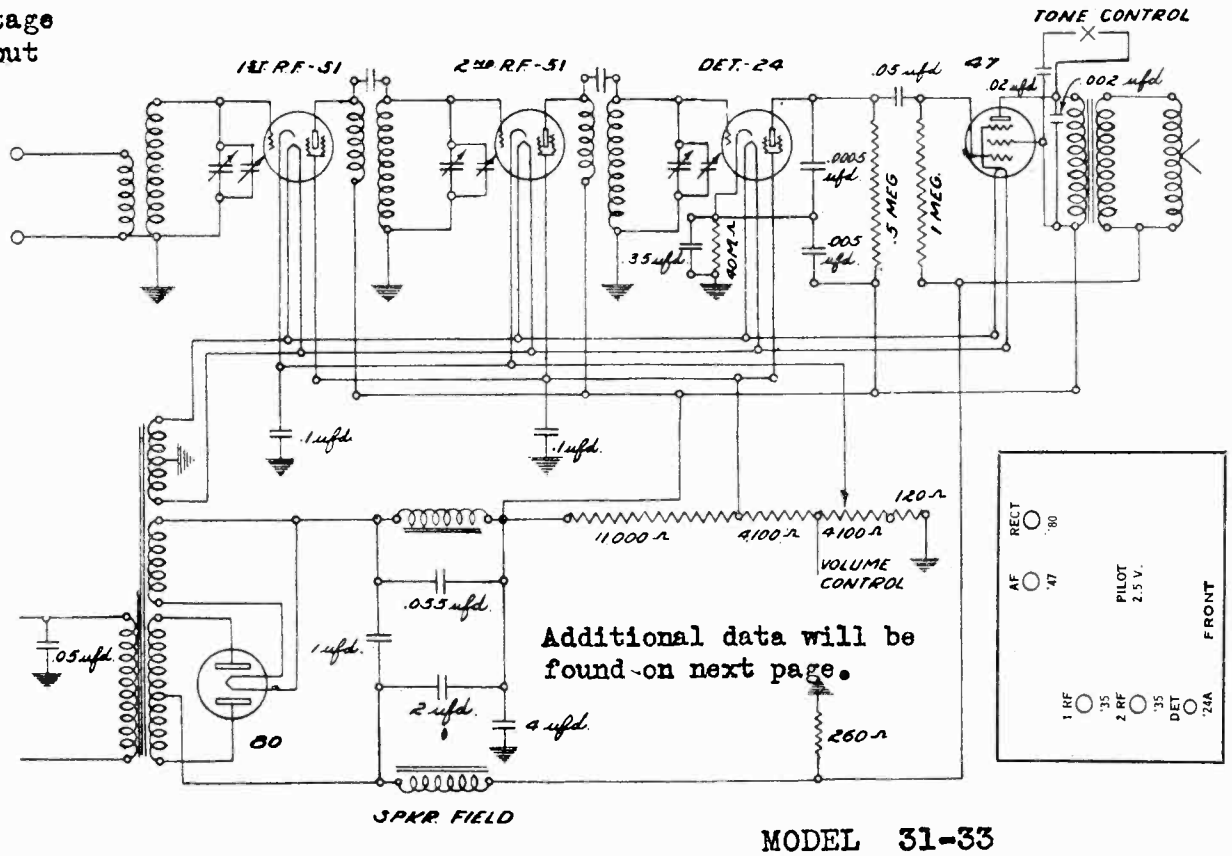
(Using 10-volt range meter 1,000 ohms per volt and 6-volt battery)

Item	Color Code*	From	To	Reading	Your Reading	Resistance in Ohms
Det. Cath. Resistor	Yel. Blk. Or.	Det. Cath.	Gnd.	1.3		40,000
Pent. Grid Resistor	Br. Blk. Green	Pent Grid	Sphr. Field	Slight Deflection		1,000,000
Wire Wound	Black	Voice Coil Black	Gnd.	5.9		260
Voltage Divider. Short End	Black	Volume Cont. Green Lead	S. G. Ckt.	4.2		4,100
Voltage Divider. Long End	Black	Plate	S. G. Ckt.	3.		11,000
Det. Plate Resistor	Gr. Blk. Yellow	Det. Plate	Pent. Space Chg. Grid	.1		500,000
Vol. Control "on"		Gnd.	R. F. Cathode	4.2		4,100

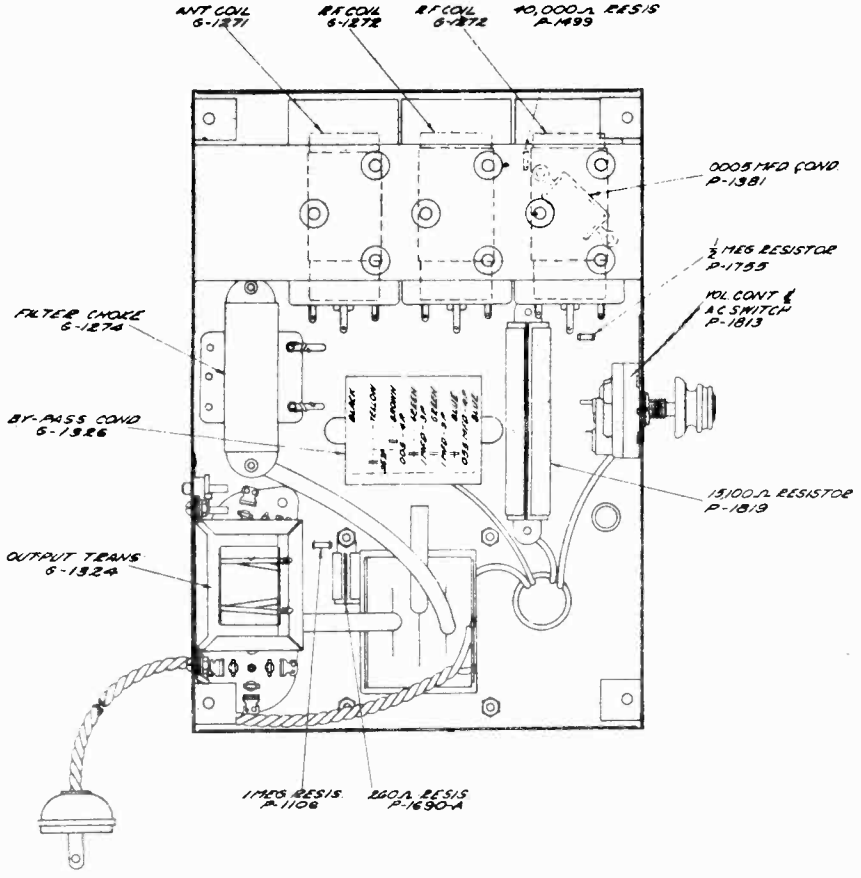
*Color code: read body color first, tip second and dot last.

MODEL 31,33
Schematic
Voltage
Layout

COLUMBIA PHONOGRAPH COMPANY



MODEL 31-33



VOLTAGE ANALYSIS

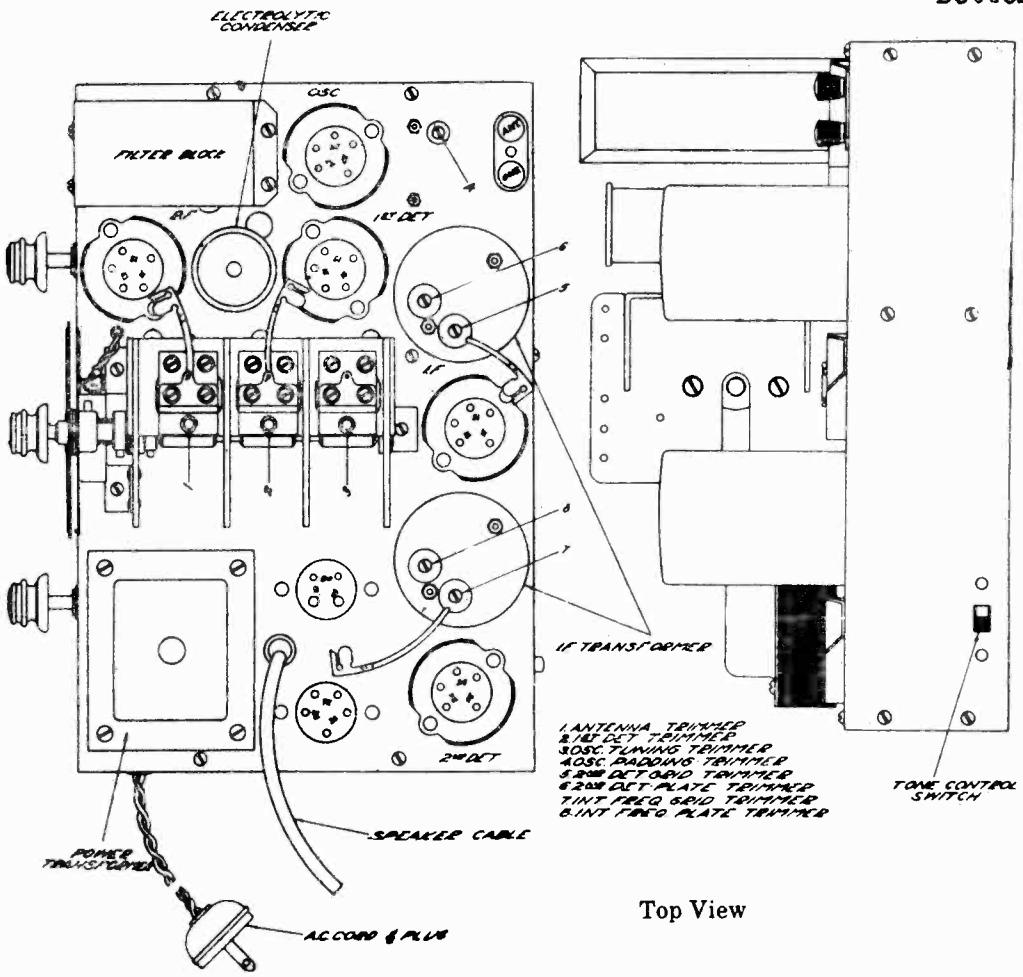
READINGS TAKEN WITH WESTON MODEL 565 ANALYZER

No.	Stage	Type Tube	Fil. Volts	Plate Volts	Cont. Grid Volts	Cath. Volts	S. G. Volts	Ip. Normal
1	1st R. F.	C. L. 51	2.1	225	2.1	2	75	5
2	2nd R. F.	C. L. 51	2.1	230	2.2	2	75	4.5
3	Det.	C. L. 24	2.1	160*	7	7.5	75	.02
4	Output	C. L. 47	2.1	215	5*	0	225	26.5
5	Rect.	C. L. 80	4.8	280				†30

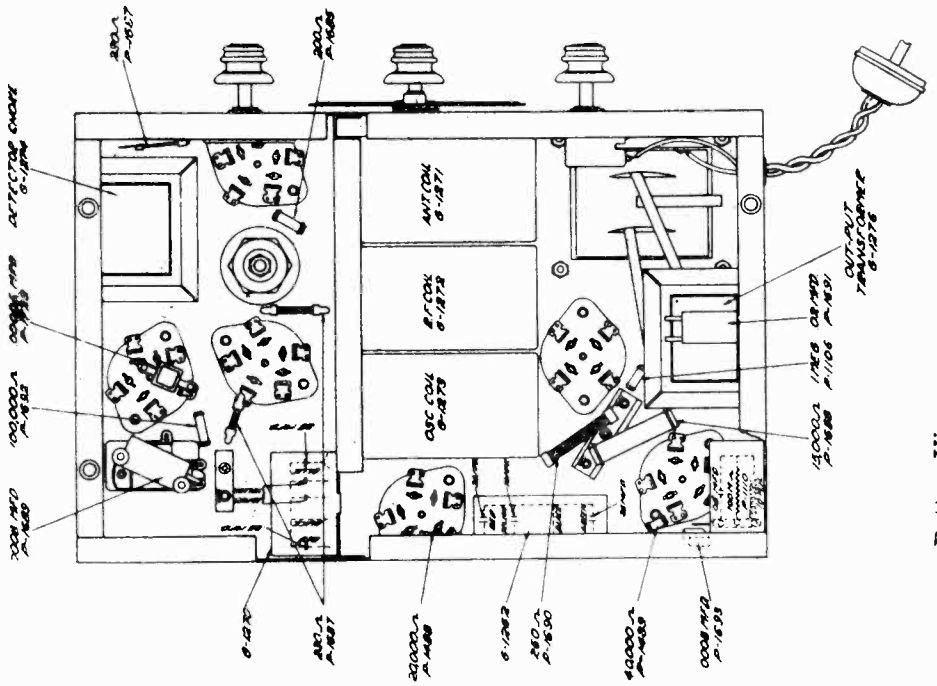
*Reading dependent upon resistance of meter.
†Reading taken for one anode only: 60 milliamperes would be about correct.
Volume control position full. Line voltage 115—60 cycle.

COLUMBIA PHONOGRAPH COMPANY

MODEL 32,34
Top View
Bottom View



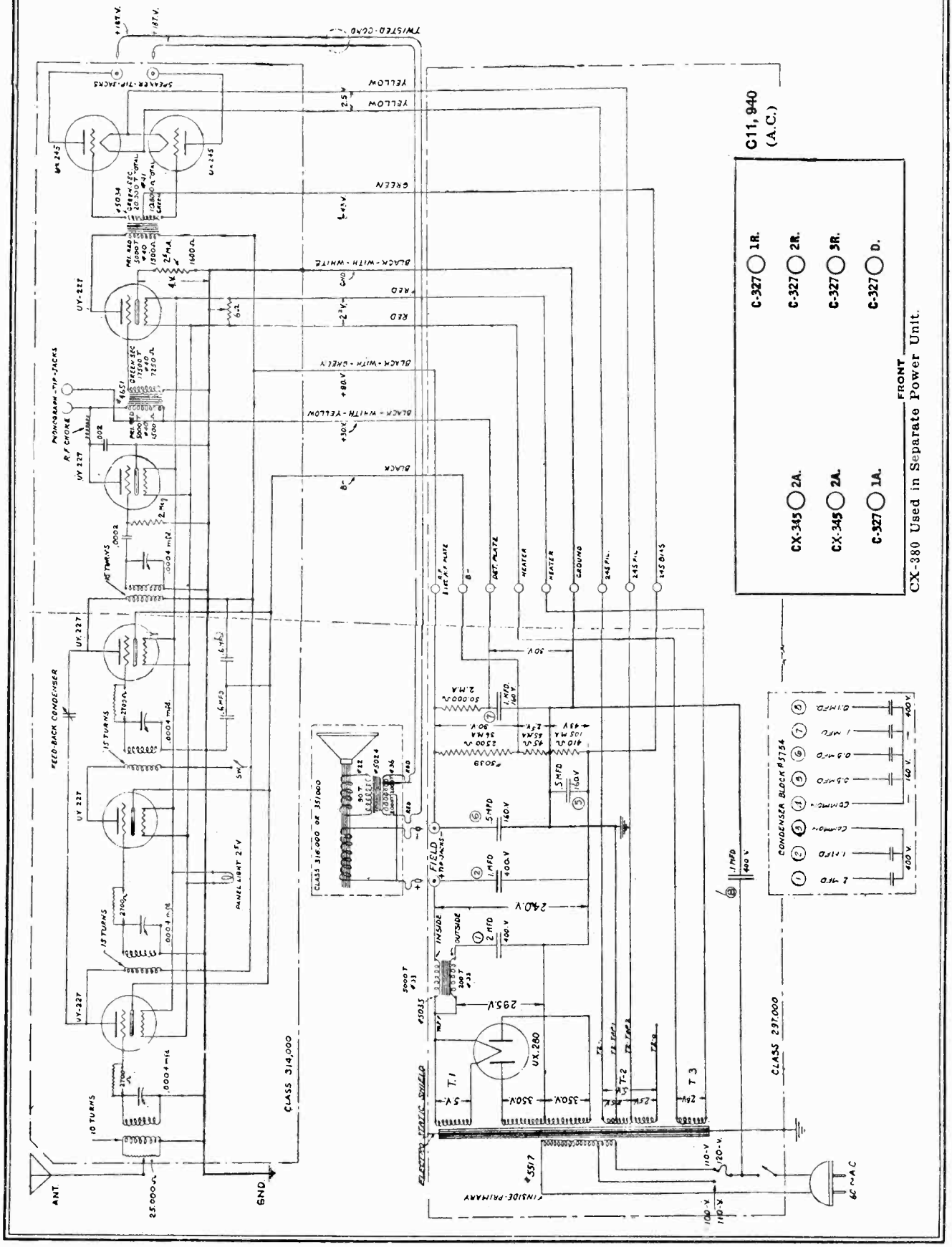
Top View



Bottom View

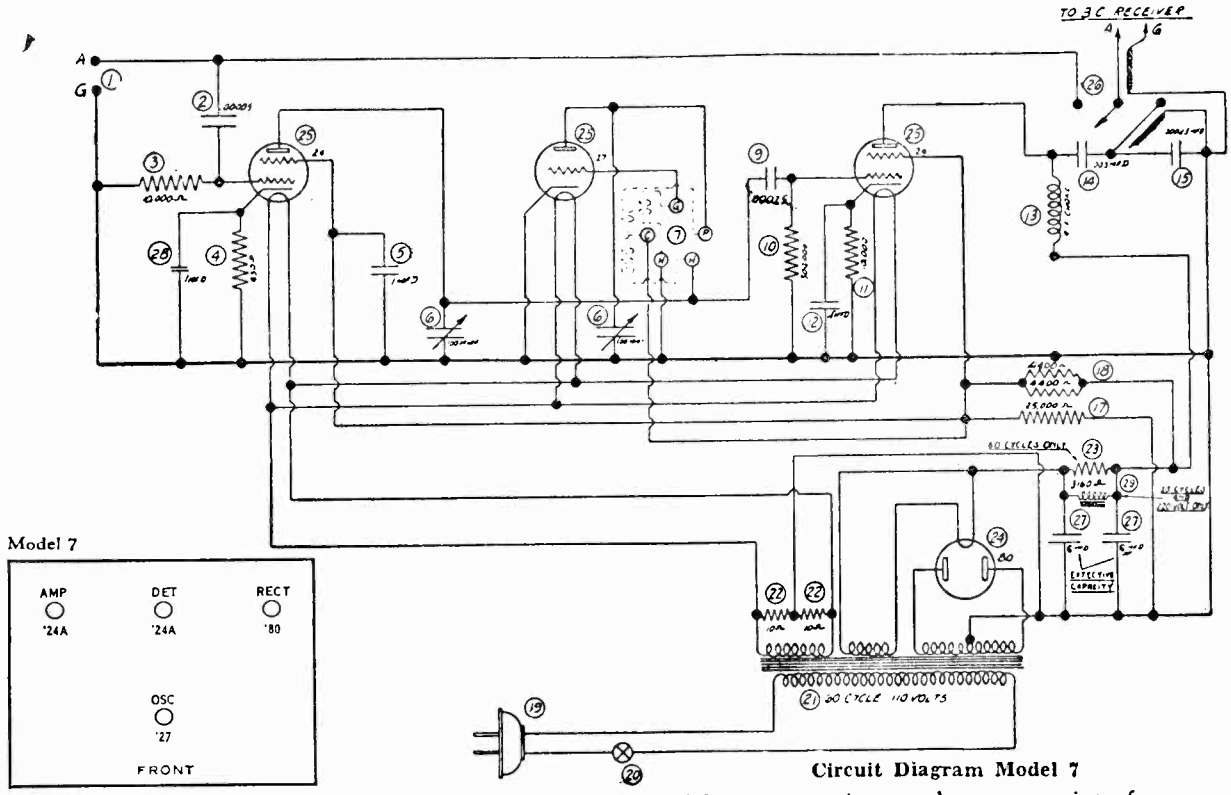
MODEL 940
Schematic
Socket

COLUMBIA PHONOGRAPH COMPANY



CROSLEY RADIO CORP.

MODEL 7
MODEL 7-1
Converters



Model 7

Circuit Diagram Model 7

This is a chassis for attaching to any broadcast receiver in order to adapt the latter to the reception of short-wave signals. It is of the superheterodyne type, the incoming signal being converted to a frequency within the regular broadcast range by the use of an oscillator and detector (see Service Bulletin No. A-1 for an explanation of the superheterodyne receiver). After conversion to the appropriate frequency the signal is delivered to the aerial and ground terminals of the broadcast receiver.

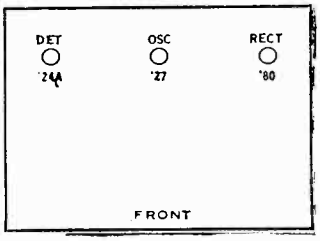
The chassis incorporates a -24 type, untuned buffer amplifier, a -27 tuned oscillator, a -24 tuned detector, and a -80 rectifier. Various frequency ranges are obtainable by the use of suitable coils, as explained in the instructions accompanying the chasses.

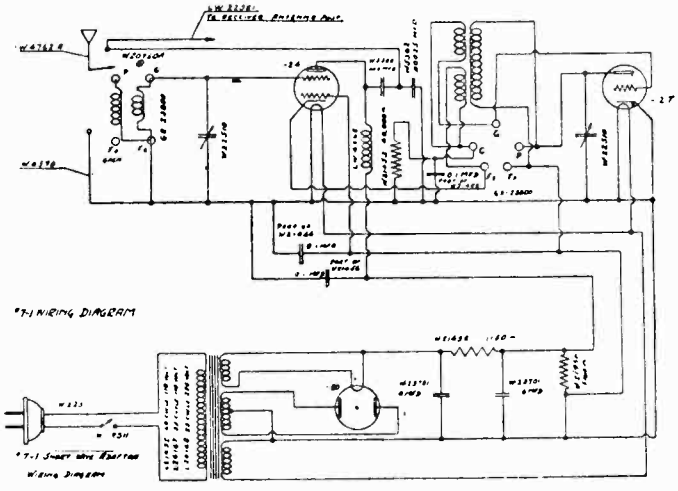
Model 7-1

Model 7-1 is a short-wave converter similar in general operation to Model 7, which has been described previously, but incorporating one less tube and having a tuned antenna circuit.

The tubes are as follows: a -24 first detector, a -27 oscillator, and a -80 rectifier.

Model 7-1

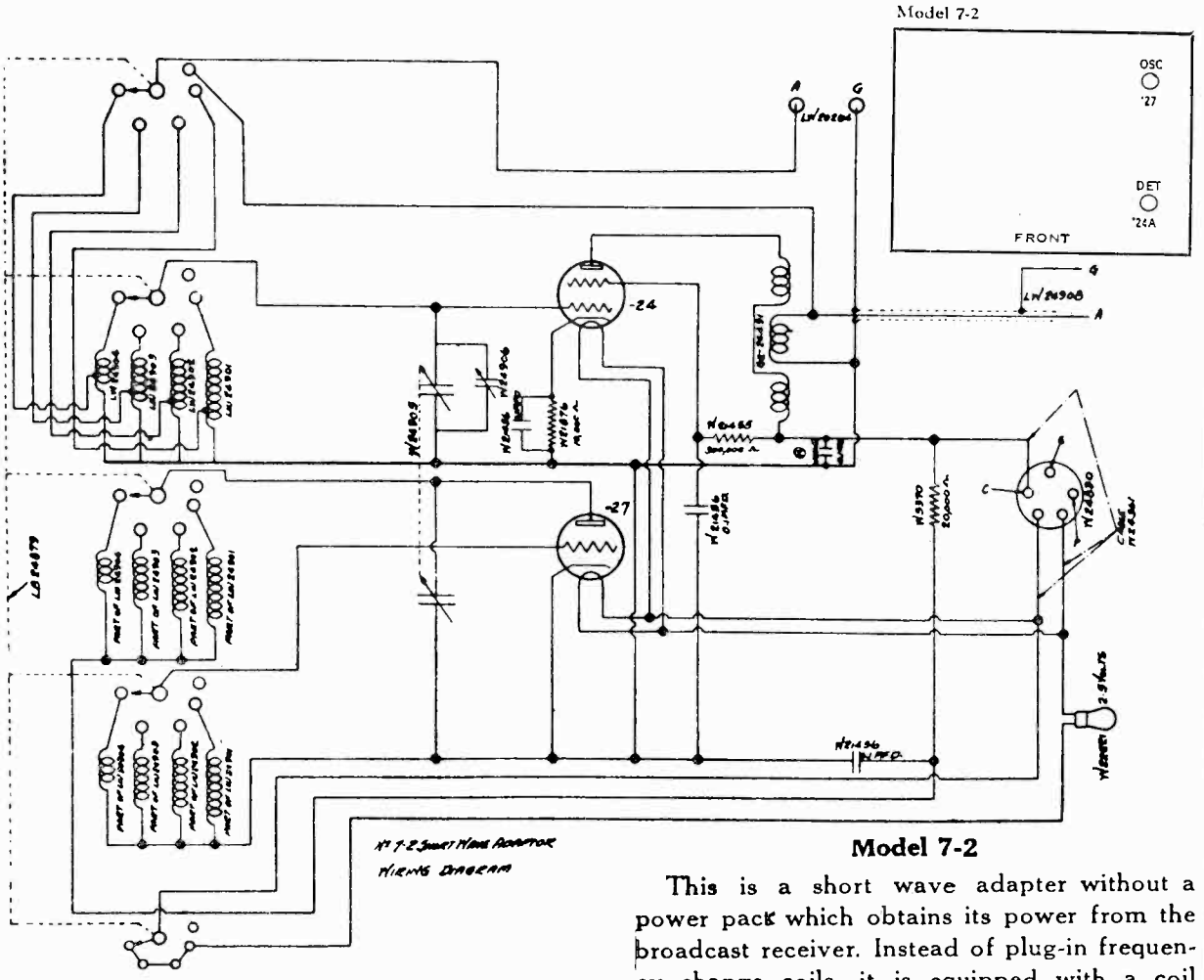




Circuit Diagram, Model 7-1

MODEL 7-2 Converter
MODEL 7-1 Voltage

CROSLEY RADIO CORP.



Circuit Diagram, Model 7-2

Model 7-2

This is a short wave adapter without a power pack which obtains its power from the broadcast receiver. Instead of plug-in frequency change coils, it is equipped with a coil changing switch, the desired frequency range being obtained by choosing the proper switch setting. There are five switch positions, four of which are for short-wave reception, and the fifth for operating the ordinary broadcast receiver.

Two tubes are used, a -27 oscillator and a -24 detector.

The adapter is for use only with receivers having pentode output tubes. On the end of the adapter power cable is a plug. One of the pentode output tubes is removed from the receiver, the adapter power cable plug is inserted in the pentode socket, and the pentode tube is inserted in the plug.

The tuning condensers are operated by a single dial.

The tube voltages depend to a certain extent upon the receiver with which the adapter is used. It is therefore not practicable to give them here.

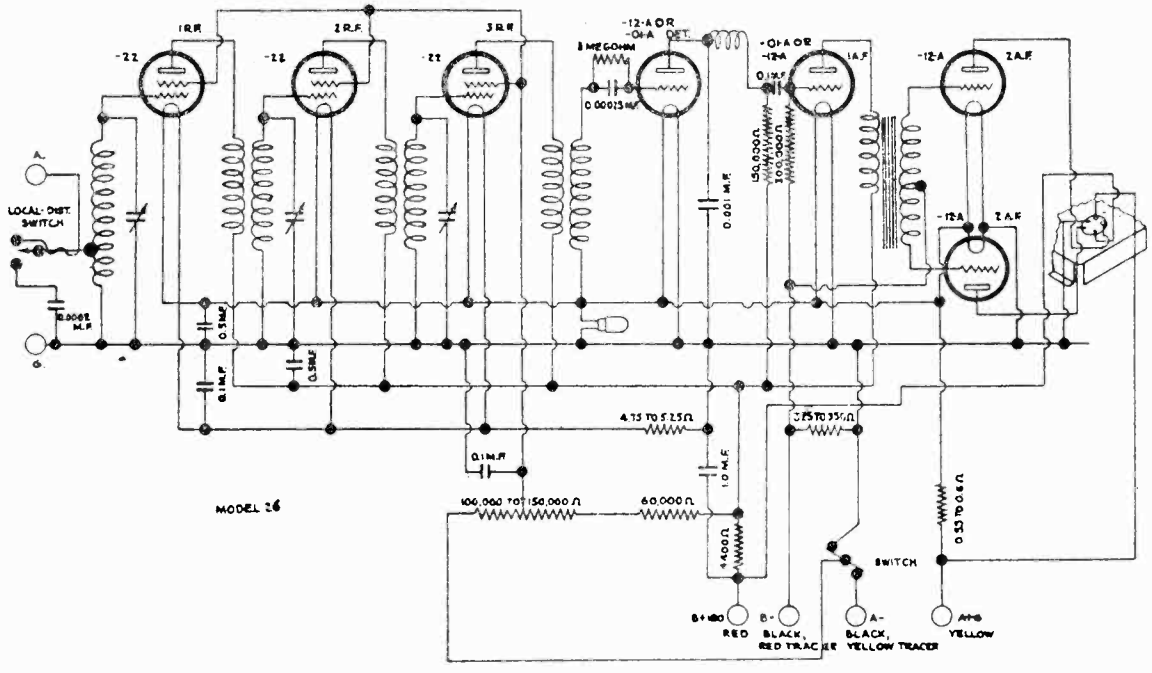
Voltage Limits, Model 7-1

The following tube voltages are the approximate values which should be obtained with tubes in place and receiver connected to a 117½ volt line, using a voltmeter of 1000 ohms resistance per volt.

Filament Voltages	
Detector and oscillator tubes	2.3 to 2.7
Rectifier tube	4.5 to 5.5
Plate Voltages	
Detector tube	150 to 190
Oscillator tube	90 to 110
Grid Voltages	
Detector tube	3 to 5
Screen-Grid Voltage	
Detector tube	85 to 105

MODEL 26
Schematic, Voltage
Parts List

CROSLEY RADIO CORP.



Qty.	Part No.	Description
1	W-4968	.5 Mfd. Fixed Condenser (2 paper)
1	W-6614	R. F. Choke
1	W-7753	.1 - .5 - .1 Mfd. Fixed Cond.
1	W-4013	1. Mfd. Fixed Condenser
1	W-20829	Mounting Strip
1	W-4924	.00025 Mfd. Fixed Condenser
1	W-5468	3 Meg. (Grid Leak) Resistor
1	W-4923	60000 Ohm Resistor (Blue, Orange Spot)
1	W-6754	.001 Mfd. Fixed Condenser
1	W-20829	Mounting Strip
1	W-7159	4400 Ohm Resistor (Yellow, Red Spot)
1	W-5735	150000 Ohm Resistor (Brown, Green, Yellow Spot)
1	W-4362	Plate Choke
1	W-6471	.1 Mfd. Fixed Condenser (2 paper)
1	W-5713	Mounting Strip
1	W-6704	300000 Ohm Resistor, (Brown, Blk., Yellow Spot)
1	W-20090	.55 to .6 Ohm Resistor
1	W-20100	350 Ohm Resistor

Filament Voltages

R. F. tubes	2.4 to 2.7
Detector, 1st Audio, and Output tubes	4.3 to 4.8

Plate Voltages

R. F. and 1st Audio tubes	120 to 130
Detector tube	110 to 120
Output tubes	150 to 160

Control Grid Voltages

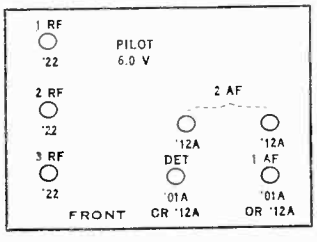
R. F. tubes	1.6 to 2.0
Detector tube	4.3 to 4.6
1st Audio and Output Tubes	4.3 to 4.6

Screen Grid Voltages

R. F. tubes	48 to 55

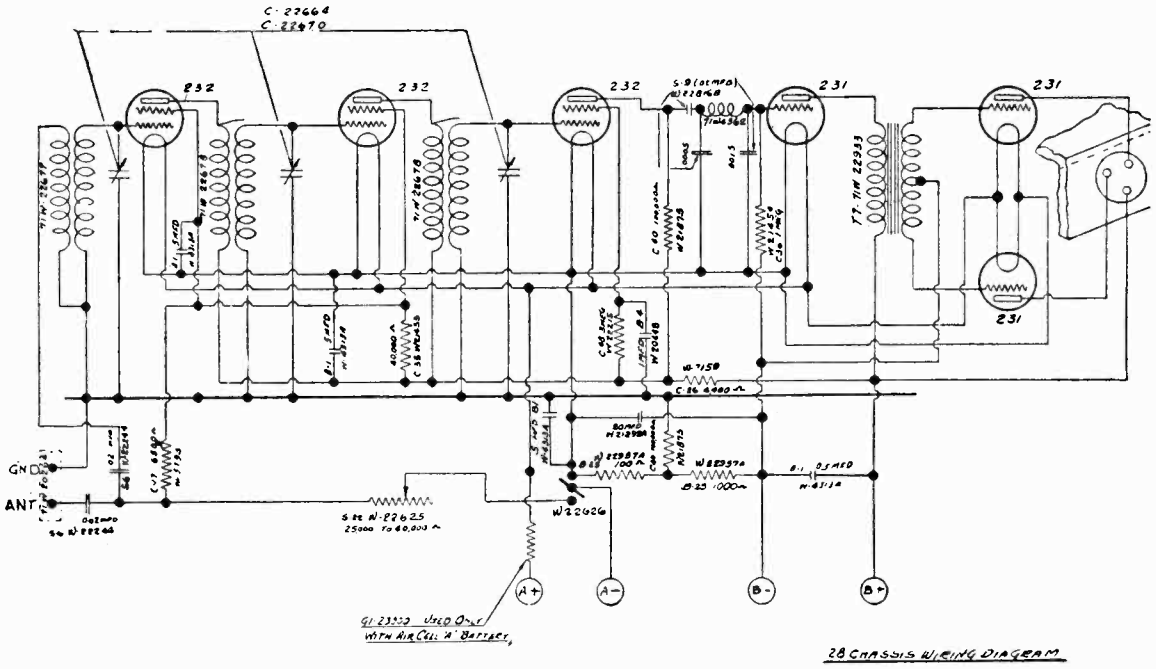
The above voltages are to be measured with the speaker connected

Models 26H, 26J, 26K



CROSLEY RADIO CORP.

MODEL 28, 27
Schematic, Voltage
Notes



—Circuit Diagram, Model 28.

Specifications

Models 27 and 28 are battery receivers identical in circuit and electrical design but differing in mechanical construction. They are six tube receivers, incorporating two -32 r. f. amplifiers, a -32 detector, a -31 intermediate audio amplifier, and -31 push-pull output tubes.

The batteries used are a 2 volt Eveready Air Cell or 2 volt storage battery, and four 45 volt "B" batteries.

Installation Notes

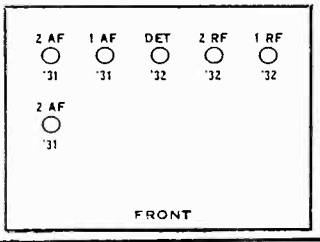
An aerial of moderate size will usually be satisfactory.

There is a battery resistor in the "A" battery cable. This should be removed if a storage battery is used instead of the 2 volt Air Cell.

The color code of the battery cable is as follows: Red lead (B+ 180 volts): to +45 terminal of fourth 45 volt "B" battery. Black lead with red tracer (B-): to minus terminal of first 45 volt "B" battery. Black lead with yellow tracer (A-): to minus terminal of Eveready Air Cell or 2 volt storage battery. Yellow lead (A+2 volts): to plus terminal of Air Cell or 2 volt storage battery.

When installing the receiver, check the tubes to see that they are inserted in their proper sockets, and make sure that the clip wires are connected to the clips of the screen grid tubes.

Model 28



Filament Voltages		
All tubes	1.8 to	2.0
Plate Voltages		
R. F. tubes	120 to	140
Detector tube	50 to	65
First A. F. tube	125 to	160
Output tubes	130 to	160
Control Grid Voltages		
R. F. and detector tubes	2 to	3.5
First A. F. and output tubes	20 to	28
Screen Grid Voltages		
R. F. tubes	55 to	70
Detector tubes	15 to	22
Plate Current		
R. F. tubes	0.0022 to	0.0025
First A. F.	0.005 to	0.0065
Output tubes	0.007 to	0.0085
Screen Grid Current		
R. F. tubes	0.00055 to	0.0007

MODEL 59 AC
Voltage, Notes
Parts List

CROSLEY RADIO CORP.

MODEL 59 AC

Voltage Limits

Filament Voltages	
All tubes but rectifier	2.3 to 2.4
Rectifier tube	4.5 to 4.9
Plate Voltages	
R. F. Amplifiers	240 to 280
Detector	160 to 190
Output	230 to 270
Rectifier (A. C voltage)	290 to 330 each plate
Screen Grid Voltages	
R F Amplifiers	55 to 65
Detector	125 to 155
Control Grid Voltages	
R F Amplifiers	2.5 to 3.5
Detector	11.0 to 13.0
Output tube	50 to 54

To be measured with speaker connected, volume control on full, and line voltage of 117½ (235 for 220 volt receivers). Measure plate and grid voltages with a high-resistance D. C. voltmeter (600 ohms or more per volt) from plate or grid tube contact to emitter contact. Use a low range A. C. meter for filament voltages.

Specifications

Model 59 is a compact, tuned radio-frequency receiver for operation from 110 volt and 220 volt A. C. house-lighting circuits. It is supplied in several cabinet styles in conjunction with Model 299 dynamic speaker.

The ends of the high-voltage secondary are connected to the plates of the rectifier tube, and the middle tap on it is connected to the negative side of the loudspeaker field ("B-"), and through one megohm and 300,000 ohm resistors to ground. The other side of the speaker field ("G") is connected to ground (chassis).

The positive plate supply circuit originates at the rectifier filament. One branch goes to the "B+" speaker terminal, whence it continues through the primary of the speaker output transformer to speaker terminal "P", and thence to the plate of the pentode tube.

A second branch of the B+ circuit goes through a 1100 ohm resistor to the screen grid of the pentode tube, and to the plates and screen grids of the other tubes. It is connected through a 300,000 ohm detector plate coupling resistor to the plate of the detector tube, through the primaries of the second and third radio-frequency transformers to the plates of the r. f. tubes, through a 100,000 ohm resistor to the screen grids of the r. f. tubes, a branch of the circuit returning to the r. f. cathodes through a 300,000 ohm resistor and through an additional resistor of 3 megohms to the screen grid of the detector tube.

The speaker field coil, in connection with two filter condensers—one (effective capacity 6 m. f.) of which is shunted across the speaker field and the other (effective capacity 12 m. f.) of which is connected from B+ to ground—acts as a filter circuit, eliminating hum.

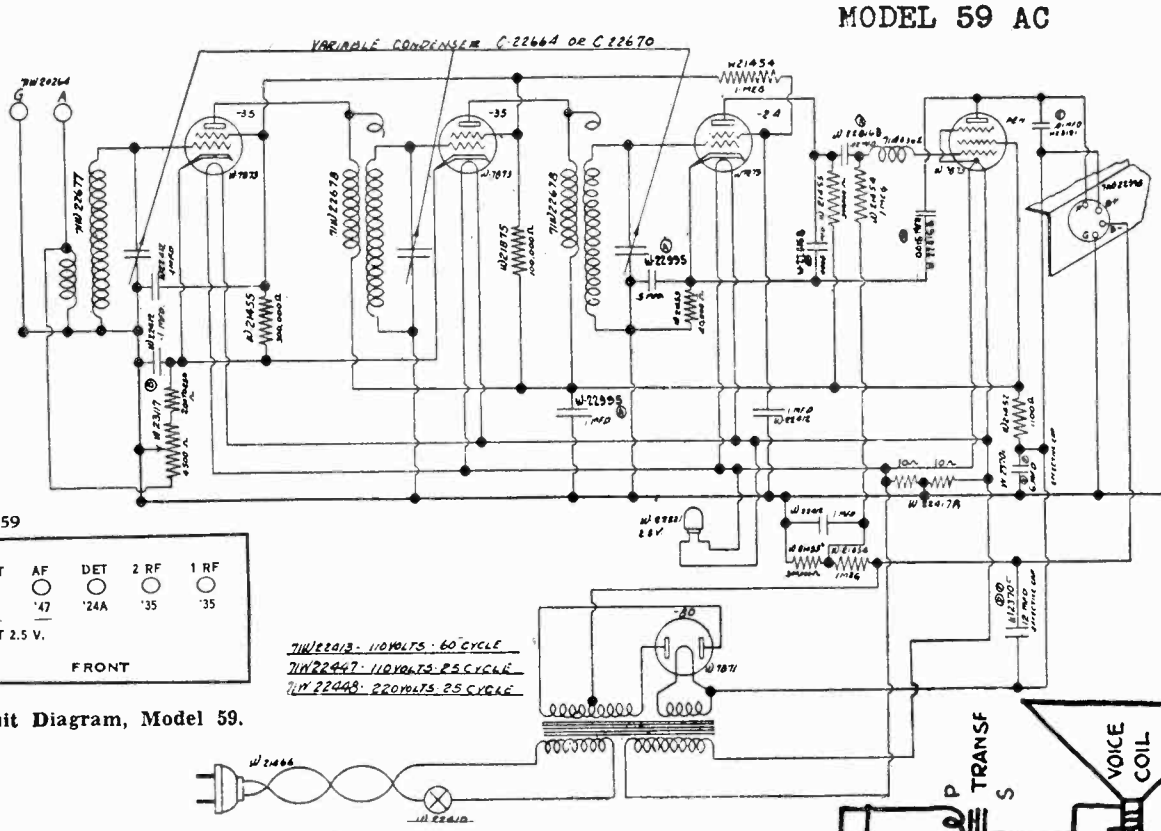
Biasing of the r. f. tubes is accomplished by the volume control resistor. Adjustment of the volume control simultaneously varies the bias of the r. f. tubes and the value of a resistor shunted across the primary of the antenna coil. A 40,000 ohm biasing resistor is used in the detector emitter circuit. Biasing of the audio tube is accomplished by returning the audio grid to the negative side of the 300,000 ohm resistor in the B- circuit, connected to chassis.

Qty.	Part No.	Description	List Price
1	D-22669A	Chassis	$ .75
4	W-7873	Socket (5 Prong)	.30
1	W-7871	Socket (4 Prong)	.25
1	W-21297	Socket Guide (280)	.10
1	W-22818	Socket Guide (Pen.)	.10
1	W-22819	Socket Guide (224)	.10
2	W-22820	Socket Guide (235)	.10
1	W-22413	Power Trans. 110 V. 60 Cy.	6.00
	W-22666	Power Trans. 110 V. 25 Cy.	6.25
	W-22667	Power Trans. 220 V. 25 Cy.	6.25
1	W-21459	Mershon Condenser 8 Mfd.	2.50
1	W-21485	Mershon Condenser Socket	.25
1	W-22689A	Mershon Condenser 12 Mfd.	3.50
1	W-23147	Insulating Washer	.05
1	W-22664	Tuning Condenser Gang	7.00
3	W-21973	Grid Connectors	.25
		CONDENSER DRIVE	
1	W-22685	Pulley	.25
1	W-22334	Drive Cord (39")	.25
1	W-22682	Idler Bracket Assem. (top)	.15
1	W-22683	Idler Br. Assem (lower)	.15
1	W-22460A	Drive Pulley Bracket	.10
1	W-22827	Drive Shaft	.30
1	W-22463	Stop Washer	.05
1	W-22828	Stop Washer	.05
1	W-22681	Idler Bracket Assem. (Ten.)	.15
1	W-22684	Spacer	.05
1	W-22464B	Spring	.05
1	W-22679	Dial Strip	.15
1	W-22329	Dial Light Bracket Assembly Less Lamp	.25
1	W-22410	Switch	.75
1	W-23117	Volume Control	1.25
1	B-22929	Tube Shield Assembly	.25
		PARTS UNDER CHASSIS	
1	W-22995	.5 - .1 Mfd. Fixed Condenser	1.00
1	W-22677	R. F. Transformer (ant)	1.50
2	W-22678	R. F. Transformer (Int.)	1.50
3	W-7558A	R. F. Coil Shields	.20
1	W-22663	Mounting Plate	.30
1	W-21452	Flexible Resistor 1100 Ohms	.25
1	W-23191	.01 Mfd. Fixed Condenser	.25
1	W-21453	Fixed Resistance 40000 Ohms	.30
2	W-21454	Fixed Resistance 1 Megohm	.30
1	W-21455	Fixed Resist. 300000 Ohms	.30
1	W-4362	R. F. Plate Choke	.50
1	W-22417	Potentiometer 10-10 Ohms	.15
1	W-22816B	.0015 - .02 - .0005 Mfd. Fixed Condenser	.75
1	W-22412	.1 - .1 - .1 - .1 Mfd. Fix. Con.	.75
1	W-21454	Fixed Resistance 1 Megohm	.30
1	W-21455	Fixed Resist. 300000 Ohms	.30
1	W-21875	Fixed Resist. 100000 Ohms	.30
1	W-21455	Fixed Resist. 300000 Ohms	.30
1	W-22395	Speaker Socket	.25
1	W-22397	Insulator	.05
1	W-20264	Terminal A & G	.30
1	W-21466A	Cable & Plug	.50

MODEL 59 AC
Schematic
Bottom View

CROSLEY RADIO CORP.

MODEL 59 AC

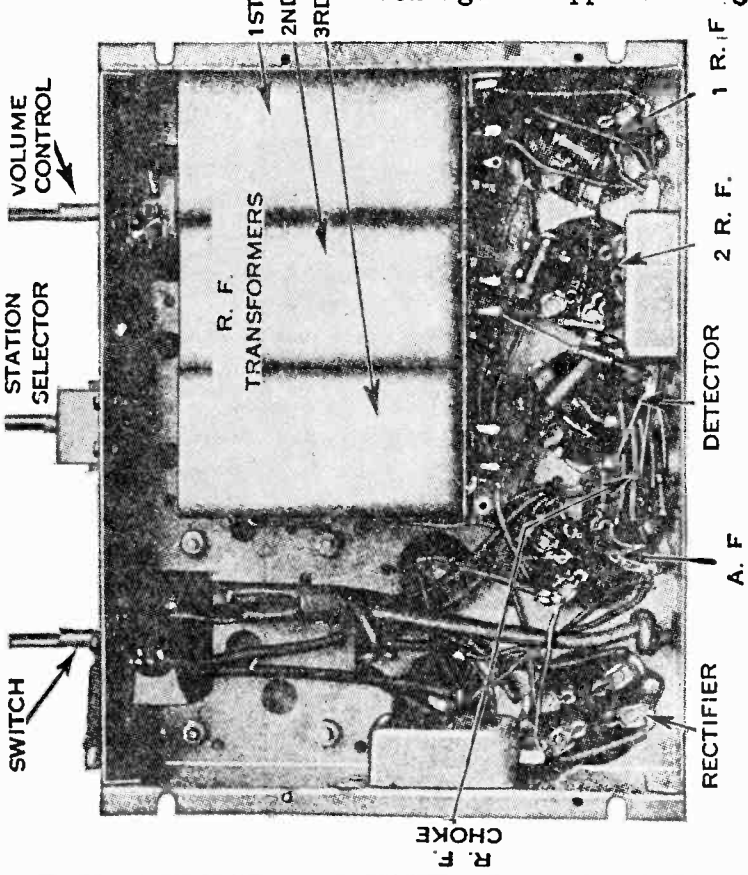


Model 59

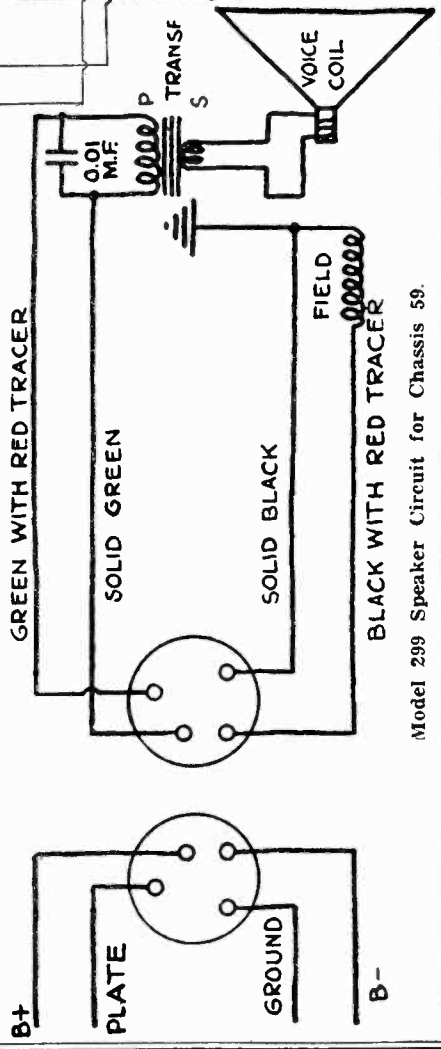
RECT '80 | AF '47 | DET '24A | 2 RF '35 | 1 RF '35
PILOT 2.5 V.
FRONT

Circuit Diagram, Model 59.

Voltage On Opposite Page



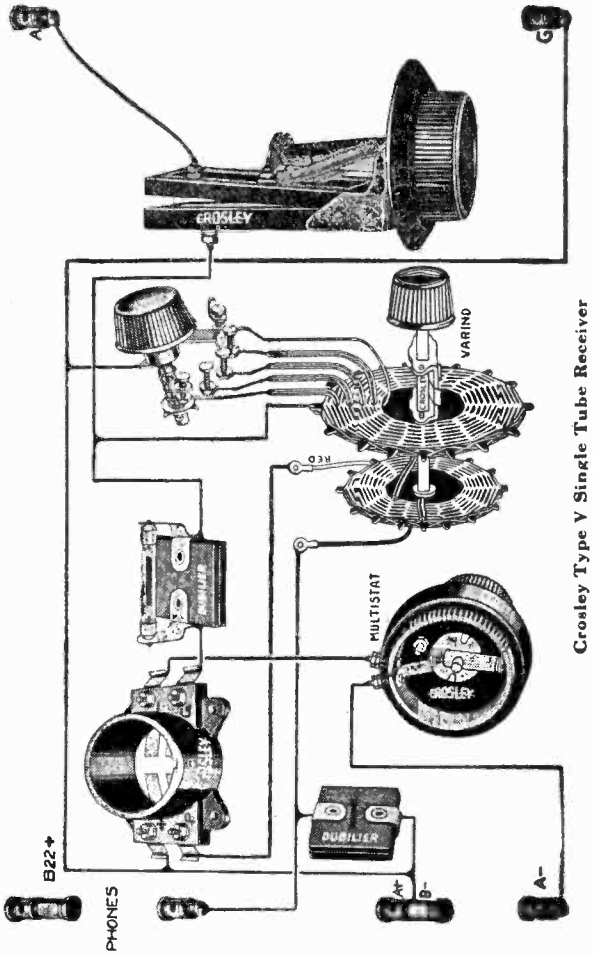
Bottom View Model 59.



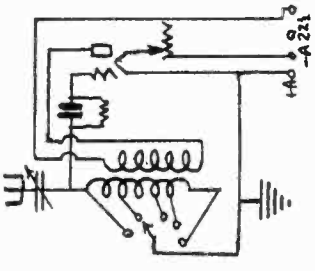
Model 299 Speaker Circuit for Chassis 59.

CROSLEY RADIO CORP.

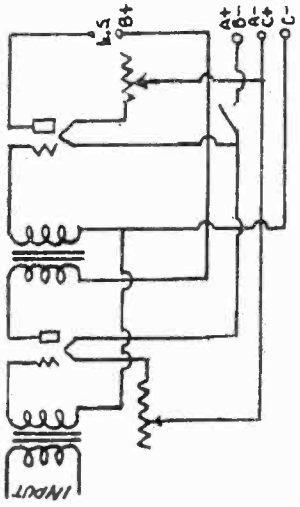
MODEL V
MODEL 2-Step A-F. Amp.
Schematic



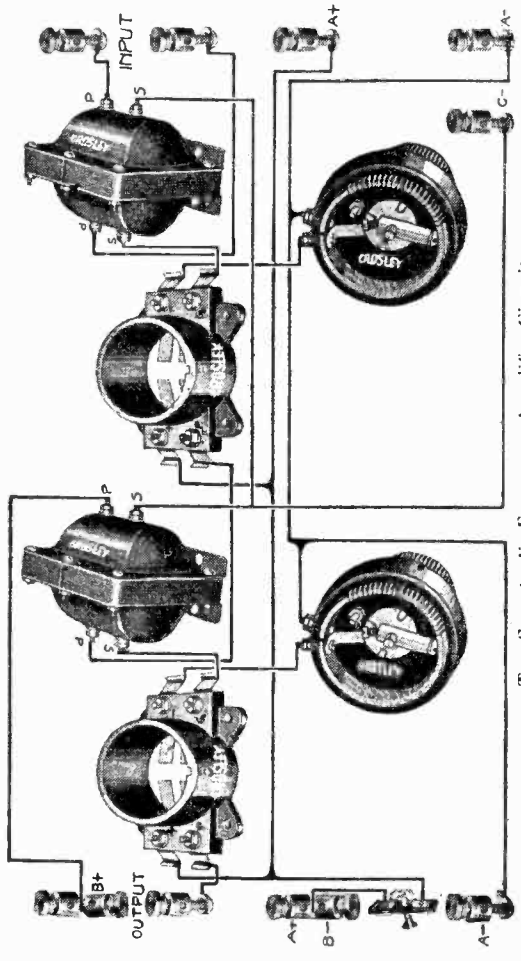
Crosley Type V Single Tube Receiver



MODEL V



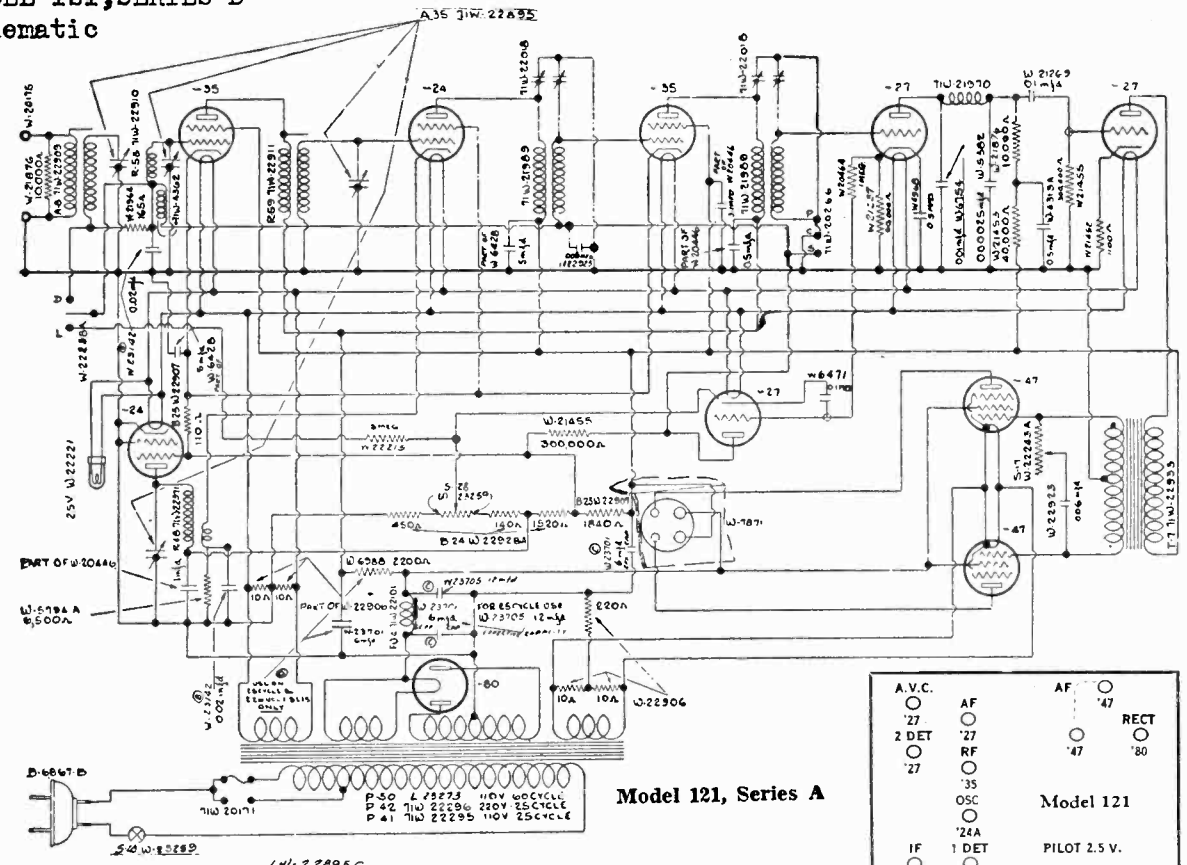
MODEL TWO-STEP A-F. AMPLIFIER



Two-Step Audio Frequency Amplifier Circuit

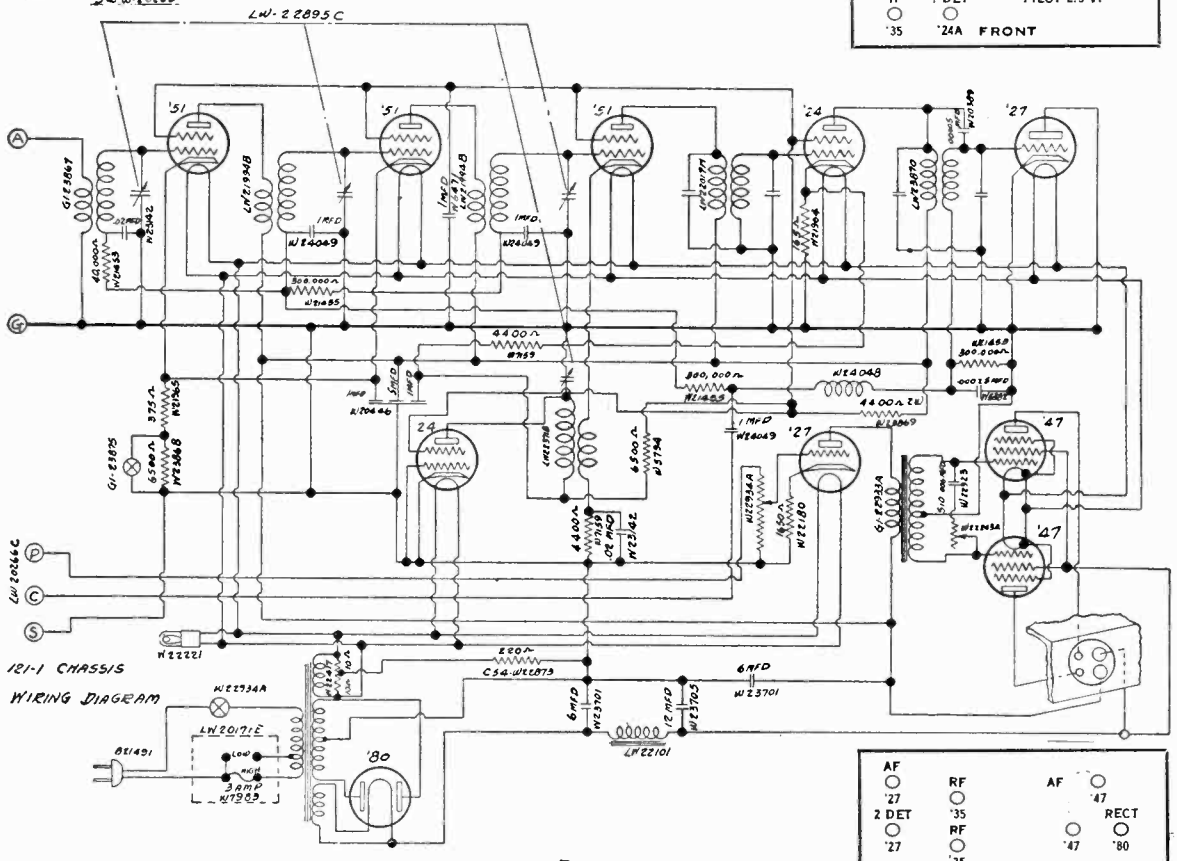
MODEL 121, SERIES A
MODEL 121, SERIES B
Schematic

CROSLEY RADIO CORP.



Model 121, Series A

A.V.C.		AF '47	
'27	AF '27		RECT
2 DET '27	RF '35	'47	'80
OSC '24A		Model 121	
IF '35	1 DET '24A	PILOT 2.5 V.	
FRONT			



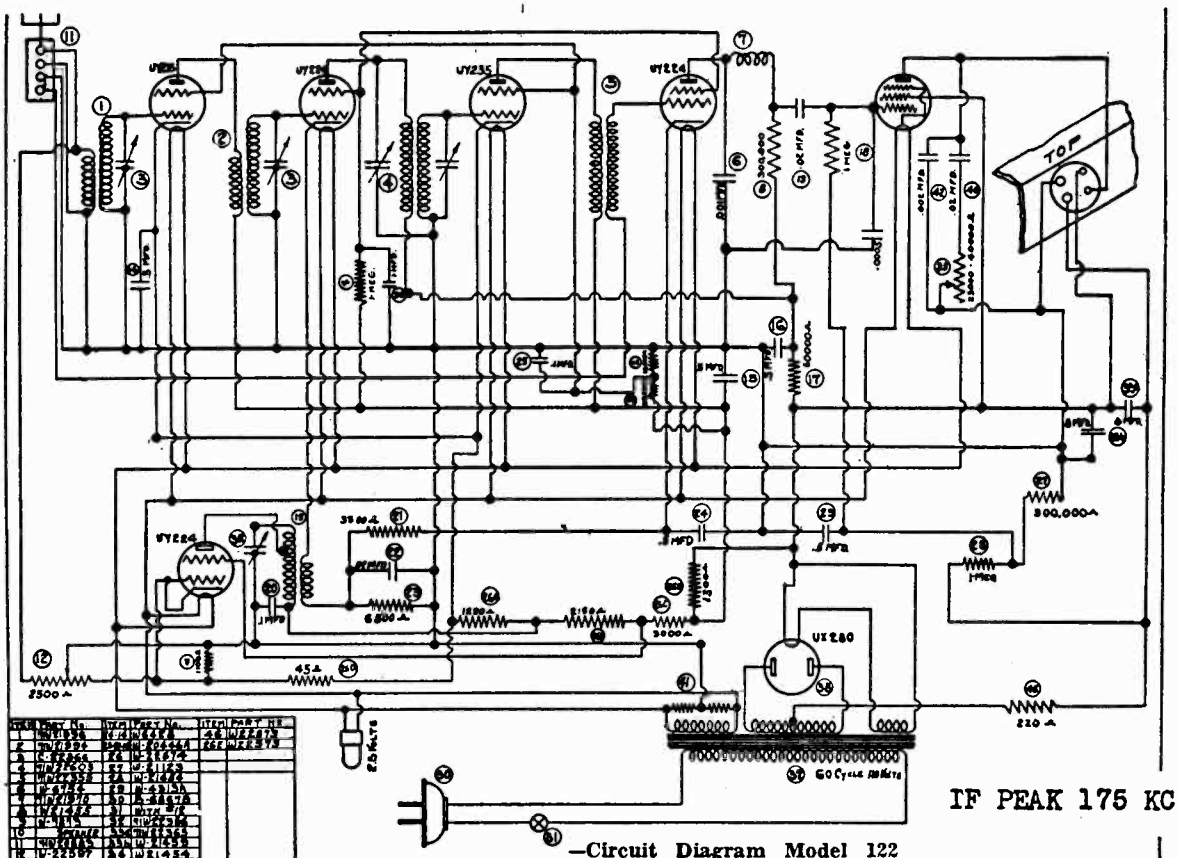
121-1 CHASSIS WIRING DIAGRAM

Circuit Diagram, Model 121, Series B

AF '27	RF '35	AF '47	
2 DET '27	RF '35		RECT
		'47	'80
	OSC '24A	Model 121-1	
IF '24A	1 DET '35	2.5 V. PILOT	
FRONT			

CROSLEY RADIO CORP

MODEL 122
Schematic, Voltage

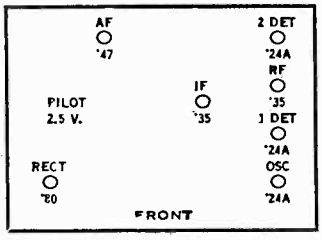


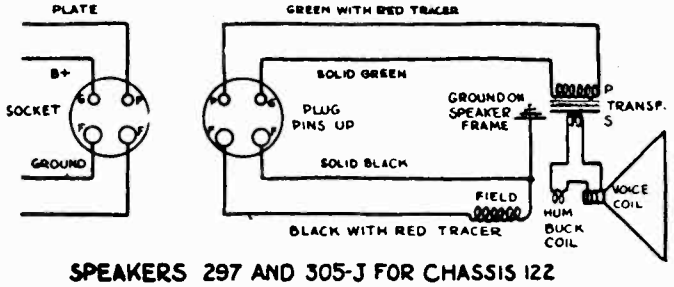
IF PEAK 175 KC

—Circuit Diagram Model 122

NOTE: Item 43 in above parts list should be No. W21876, item 44 should be No. W5370, item 26 E should be W22996

Model 122





SPEAKERS 297 AND 305-J FOR CHASSIS 122

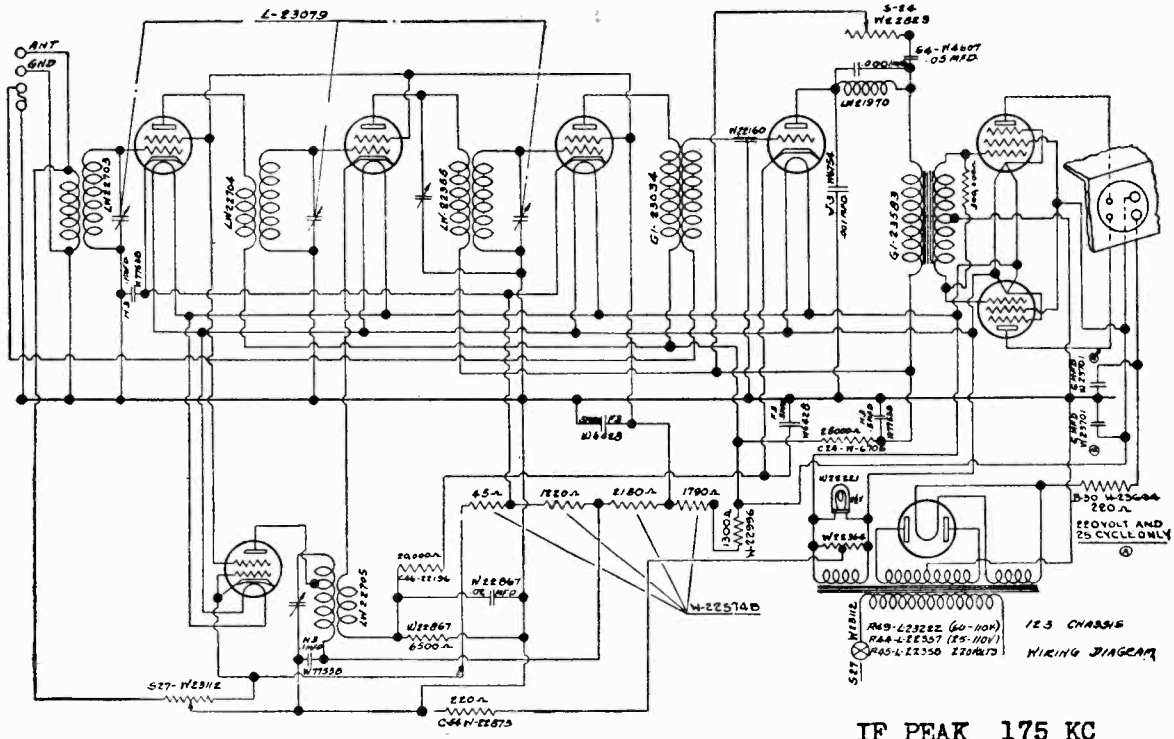
Filament Voltages	
All tubes but rectifier	2.3 to 2.5
Rectifier tube	4.6 to 5.0
Plate Voltages	
1st R. F. and Intermediate Amplifiers	170 to 200
Oscillator	28 to 38
1st Detector and 2nd Detector	185 to 215
Output	260 to 300
Rectifier (A. C. voltage)	280 to 320 each plate
Screen Grid Voltages	
1st R. F. and Intermediate Amplifiers	45 to 55
1st Detector and 2nd Detector	60 to 80
Oscillator	80 to 100
Output	260 to 300
Control Grid Voltages	
1st R. F. and Intermediate Amplifiers	1.5 to 2.5
1st Detector	6.0 to 8.0
2nd Detector	8.0 to 10.0
Output tube	18.0 to 22.0

To be measured with speaker connected, volume control on full, and line voltage of 117½ (235 for 220 volt receivers).

For Alignment, Changes and Chassis Data see next page

MODEL 123
Schematic, Voltage

CROSLEY RADIO CORP.



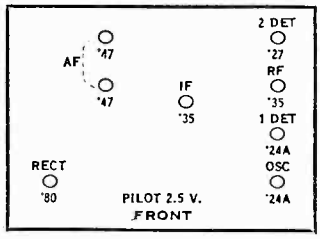
-Circuit Diagram Model 123

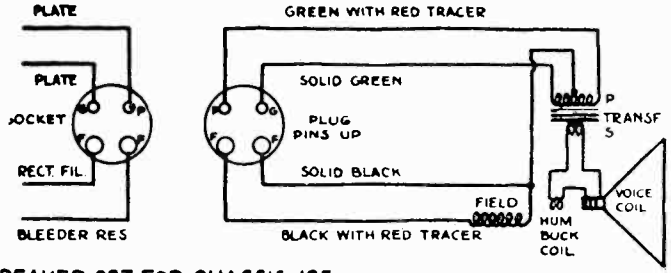
IF PEAK 175 KC

Voltage Limits

Filament Voltages	
R. F., First Detector, Oscillator and Second Detector	2.2 to 2.4
I. F. Amplifier	2.2 to 2.5
Output	2.3 to 2.6
Rectifier	4.9 to 5.3
Plate Voltages	
R. F. and I. F. Amplifiers	215 to 245
First Detector	170 to 190
Oscillator	32 to 42
Second Detector	160 to 180
Output	190 to 230
Rectifier, D. C. voltage	290 to 330
Screen Grid Voltages	
Oscillator, R. F. and I. F. Amplifiers	90 to 110
First Detector	80 to 100
Output	200 to 240
Control Grid Voltages	
R. F. and I. F. Amplifiers	1.5 to 2.5
First Detector	7 to 9
Second Detector	18 to 22
Output	13 to 16

Model 123

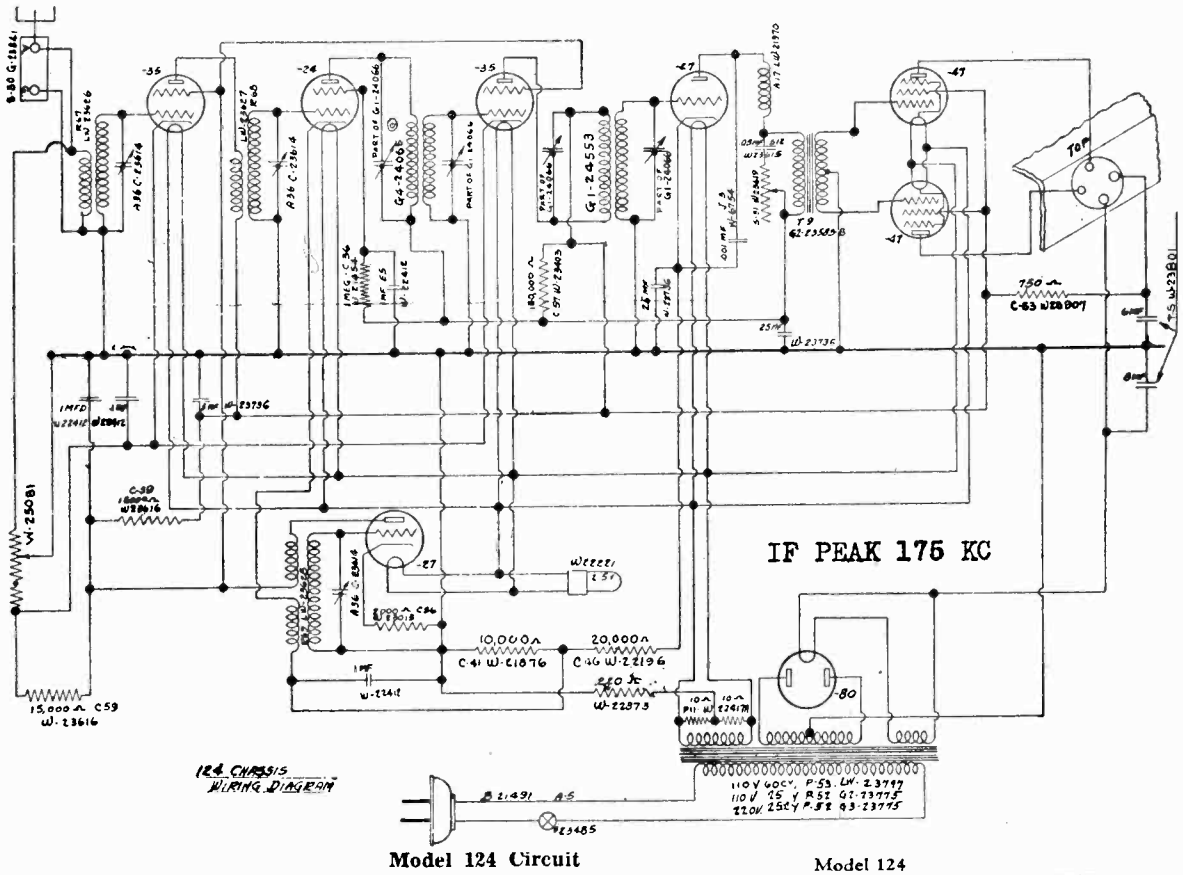




SPEAKER 287 FOR CHASSIS 123.

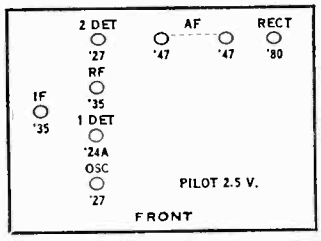
MODEL 124
Schematic
Voltage

CROSLEY RADIO CORP.



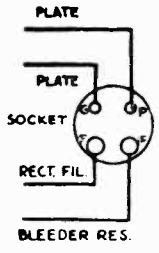
Model 124 Circuit

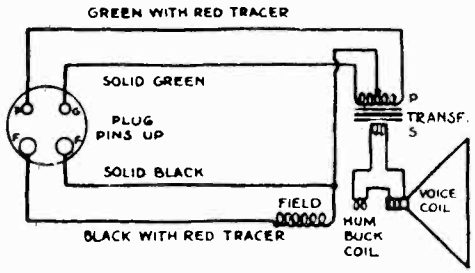
Model 124



Voltage Limits

Filament Voltages	
All tubes but rectifier	2.3 to 2.5
Rectifier	4.6 to 5.0
Plate Voltages	
R. F. and I. F. Amplifiers and Output	235 to 265
First and Second Detectors	170 to 190
Rectifier, D. C. Voltage	60 to 80
	300 to 340
Screen Grid Voltages	
R. F. and I. F. Amplifiers	80 to 100
First Detector	55 to 65
Output	230 to 270
Control Grid Voltages	
R. F. and I. F. Amplifiers	1.5 to 2.5
First Detector and Oscillator	7 to 9
Second Detector	18 to 22
Output	15 to 18



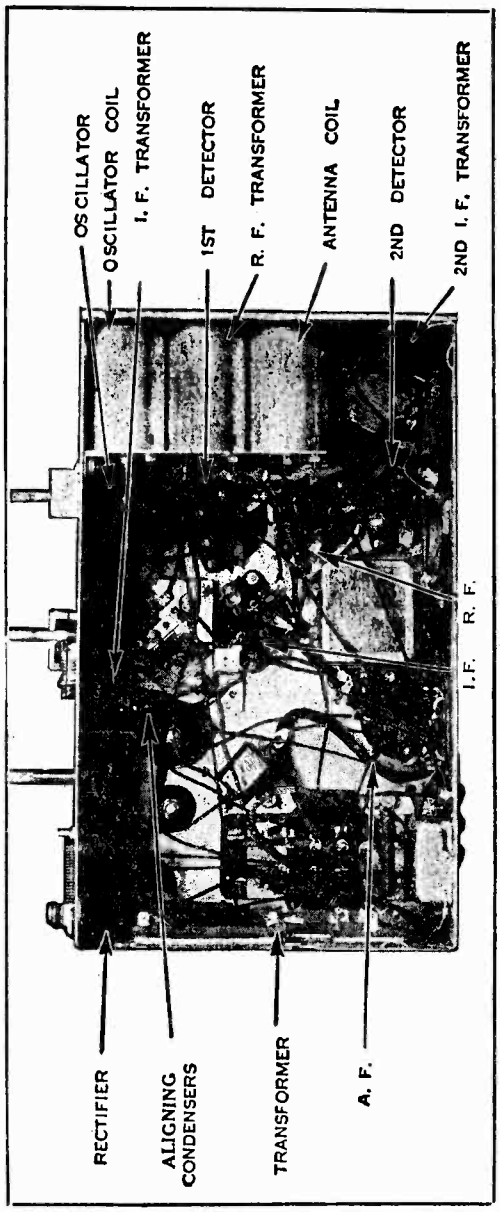


For Alignment Data refer to similar information pertaining to Model 122.

Speakers 306-J and 306-M for Chassis 124

MODELS 122,123,124
Condenser Notes

CROSLEY RADIO CORP.



Bottom View, Model 122 Chassis

Changes In Model 122

The following changes as compared with the circuit diagram shown herein will be found in some chasses.

1. The pentode grid resistor is 300,000 ohms instead of 1 megohm as shown on the diagram.

2. The volume control resistor is 650 ohms instead of 2500 ohms, as shown.

3. The 3,000 ohm resistor shown on the diagram just to the left and above the power transformer is changed to 1790 ohms.

4. The 1100 ohm resistor shunted across a portion of the volume control is deleted.

5. The 25,000 ohm resistor in the r. f. screen grid circuit is replaced by a 20,000 ohm resistor.

MODELS 122, 123, 124

Alignment of Tuning Condensers and Intermediate-Frequency Amplifier

The procedure for aligning the tuning condensers is as follows:

1. Tune to a signal between 1300 and 1400 kilocycles.

2. Turn the volume control all of the way on. If all signals within the required range are too loud, connect a 0.00025 m. f. fixed condenser between the "A" and "G" terminals, and then couple the antenna very loosely to a wire connected to the "A" terminal.

3. If, when carefully tuned to the middle of the band, the dial reading does not correspond to the frequency of the signal, but is not more than two channels off, set the dial at the correct frequency, and adjust the padding condenser on the oscillator tuning condenser (the tuning condenser nearest the front of the chassis) until the signal is loudest. Check the tuning by re-adjusting the station selector. It may not be possible to regulate the oscillator padding condenser so that the oscillator condenser is properly aligned with the exact dial setting, in which case align the padding condenser with a dial setting as close to the actual frequency as practicable.

4. After aligning the oscillator padding condenser, re-tune to a frequency between 1300 and 1400 kilocycles and carefully adjust the padding condensers on the other two tuning condensers until the signal is received with greatest volume.

Aligning Intermediate Frequency Stages

The primary and secondary circuits of the intermediate amplifier transformer must be tuned accurately to 175 kilocycles. They are aligned carefully at the factory, and no change should be necessary. In order to align them an accurately tuned local oscillator operating at 175 kilocycles is essential. The procedure is as follows:

1. A local oscillator tuned accurately to 175 kilocycles frequency is required.

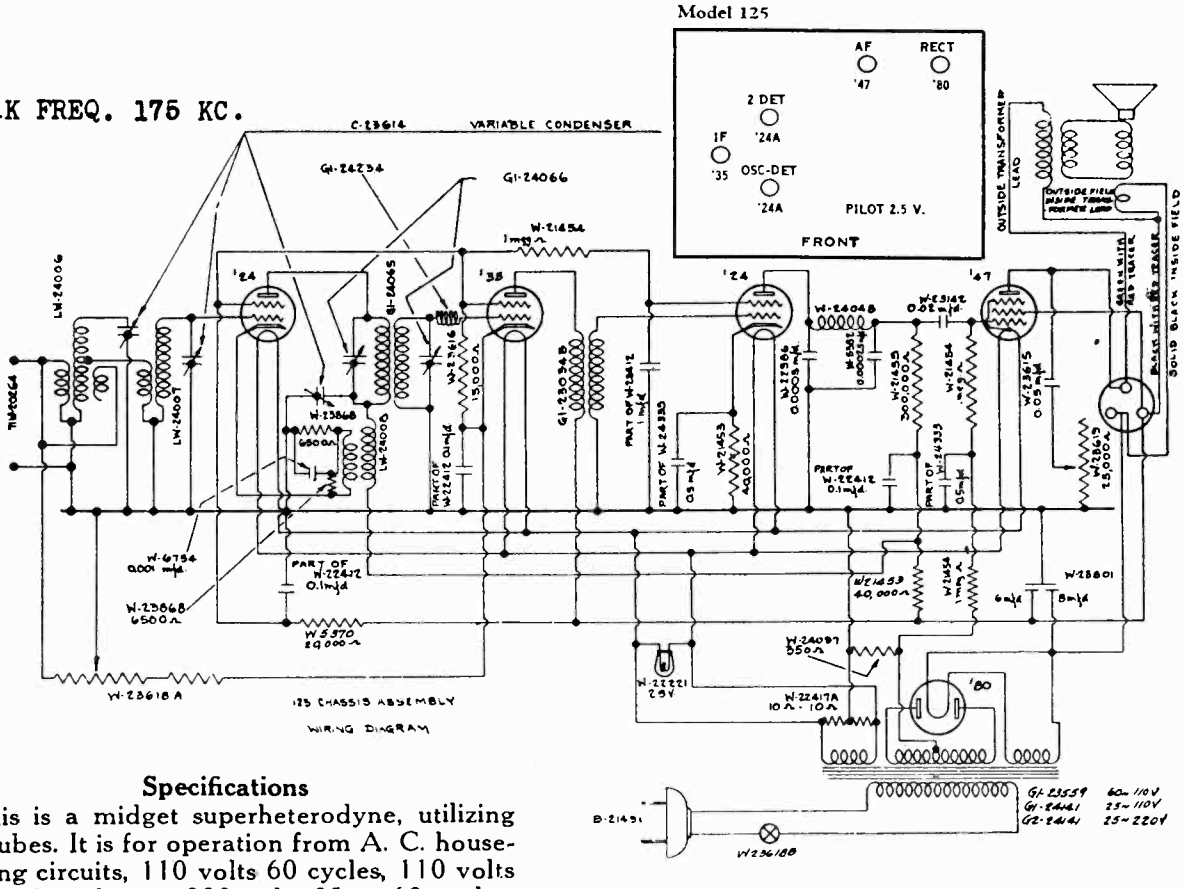
2. Remove the oscillator tube from the chassis. Remove the clip wire from the first detector tube. Connect the test oscillator output from the first detector grid to ground, and adjust the two screws at either side of the front I. F. coil for maximum reading on the output meter. Always re-align the tuning condenser after aligning the I. F. amplifier.

MODEL 125
Schematic
Voltage

CROSLEY RADIO CORP.

MODEL 125 SUPERHETERODYNE

PEAK FREQ. 175 KC.



Circuit Diagram, Model 125.

Specifications

This is a midget superheterodyne, utilizing five tubes. It is for operation from A. C. house-lighting circuits, 110 volts 60 cycles, 110 volts 25 to 50 cycles, or 220 volts 25 to 60 cycles

Instead of being coupled directly to the first tube, as in other Crosley models, the antenna-ground system is coupled to the detector-oscillator through a double tuned selector circuit. This increases the selectivity of the circuit.

The first tube acts both as a detector and oscillator. The oscillator circuit is tuned by a variable condenser—one of the three comprising the station selector gang—as shown on the diagram. The other two station selector condensers tune the grid circuit of the detector-oscillator and the pre-selector circuit.

The detector-oscillator is coupled to the intermediate frequency amplifier stage by an I. F. transformer, both primary and secondary of which are tuned to 175 kilocycles by small adjustable condensers shunted across them. These circuits must be tuned accurately to 175 kilocycles for efficient operation. A radio-frequency choke is in the grid circuit of the I. F. tube.

The timing condenser adjustments are made from the top of the chassis through the three holes in the condenser shield; the I. F. transformer adjustments through the holes at the left side of the chassis, near the front, as viewed from the front of the receiver.

Voltage Limits

The following data shows the average voltages which will be obtained when measurements are made on Model 125 Chassis using a voltmeter of 1000 ohms resistance per volt. Some of these voltages do not represent actual voltages present at the tube elements. A typical example of this is the grid voltage of the pentode tube, which is actually about 16 volts, but only shows about 1 volt when measured in this way.

Screen Grid Voltages

Pentode ..200 to 230
I. F. ..... 75 to 95
1st Det. . 75 to 95
2nd Det. 15 to 25 (250V scale), 3-8 (50V scale)

Plate Voltages

Pentode 200 to 230
I. F. .....200 to 230
1st Det. ..160 to 180
2nd Det. 75 to 90 (250V scale), 20-30 (50V scale)

Control Grid Voltages

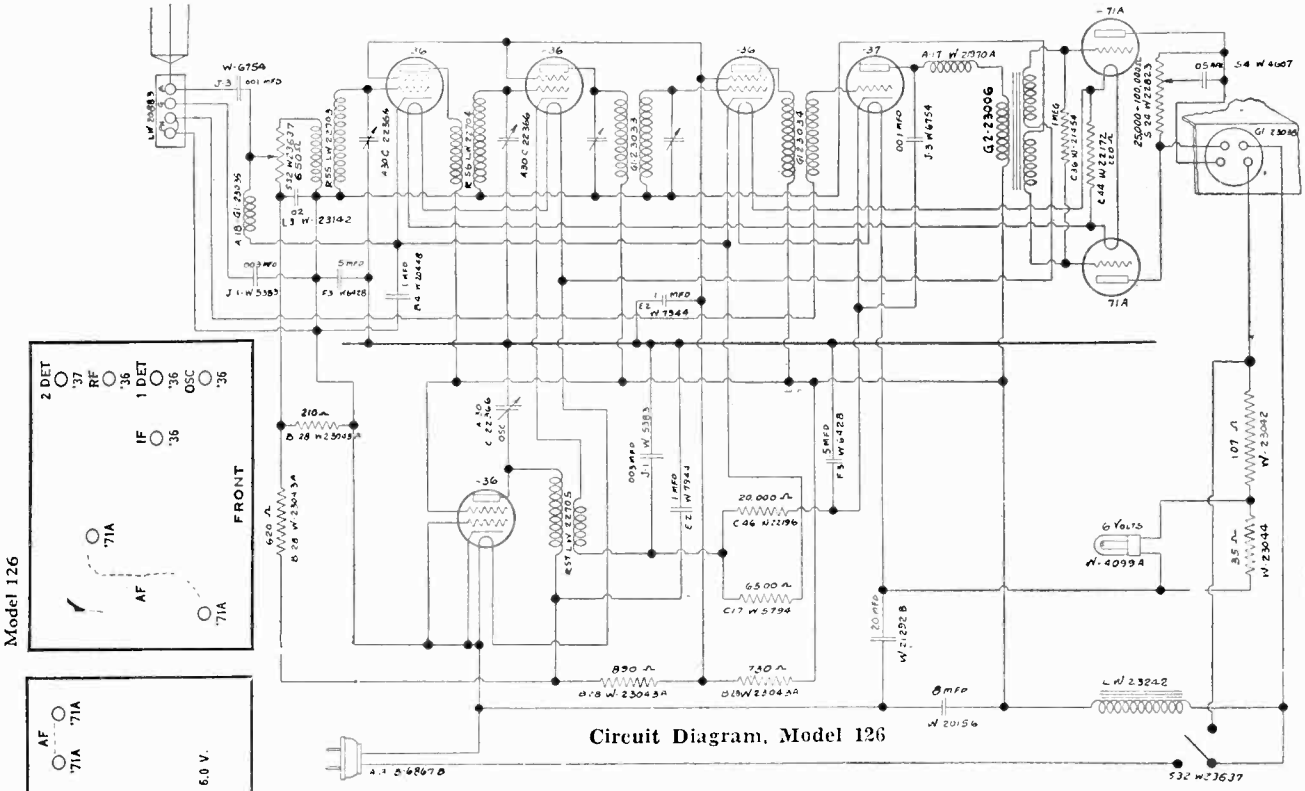
Pentode ..0.5 to 1.5
I. F. .....1.5 to 2.5 (20-30 vol. cont. off)
1st Det. ..5.5 to 7.5
2nd Det. ..4.0 to 6.0

Filament Voltages

All tubes but rectifier .....2.3 to 2.5
Rectifier tube .....4.6 to 5.0

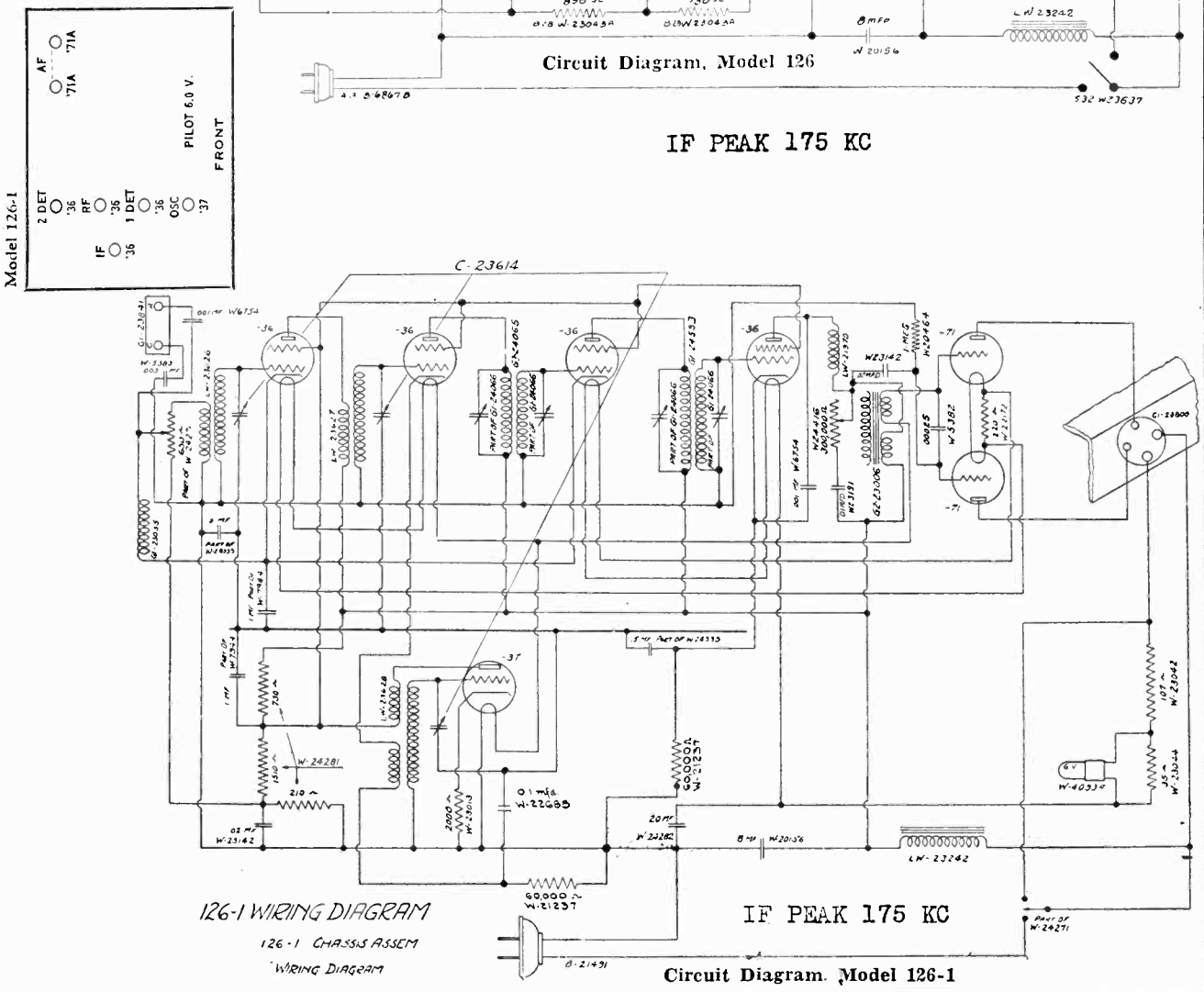
MODEL 126
MODEL 126-1
Schematic

CROSLEY RADIO CORP.



Circuit Diagram, Model 126

IF PEAK 175 KC



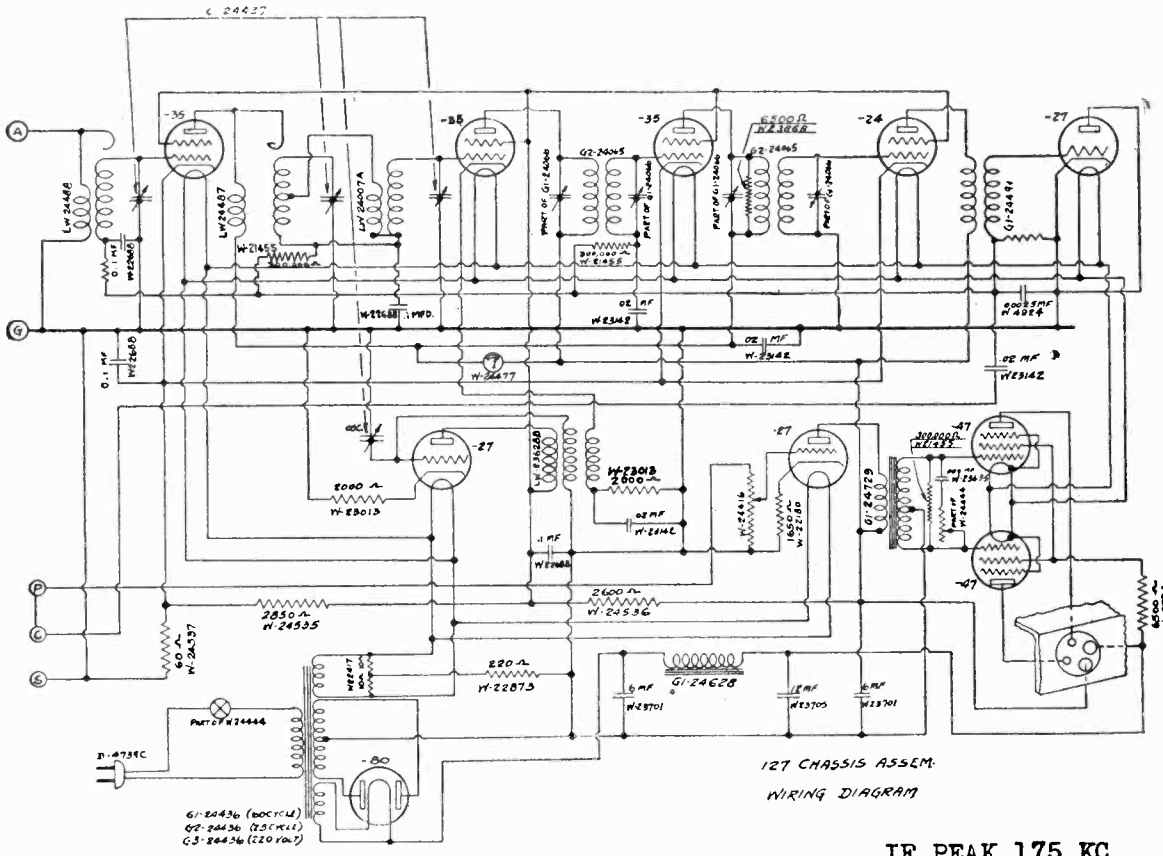
126-1 WIRING DIAGRAM
126-1 CHASSIS ASSEM
WIRING DIAGRAM

IF PEAK 175 KC

Circuit Diagram, Model 126-1

CROSLEY RADIO CORP.

MODEL 127
Schematic
Voltage
Notes



-Circuit Diagram, Model 127.

IF PEAK 175 KC

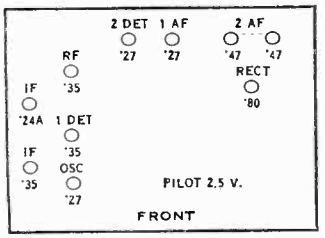
See Next Page

Voltage Limits

To be measured with tubes in place, speaker connected, and line voltage of 117½ (235 for 220 volt receivers).

Filament Voltages	
All tubes but rectifier	2.3 to 2.5
Rectifier tube	4.6 to 5.0
Plate Voltages	
All tubes but second detector and pentodes	170 to 200
Second detector	0
Pentode output tubes	270 to 300
Screen Grid Voltages	
All screen grid tubes but pentodes	75 to 95
Pentode output tubes	230 to 250
Control Grid Voltages	
R. F. and I. F. amplifiers	2.5 to 3.5
First detector	6 to 10
Oscillator	8 to 12
First A. F. amplifier	8 to 12
Pentode output tubes	14 to 18

Model 127



Hum Adjustment

With properly matched output tubes, the hum level of this chassis is very low. The audio transformer shield may be rotated, after loosening the three hold-down screws, and so adjusted that the hum is reduced to a minimum. This adjustment is made at the factory and should not have to be made in the field unless it is necessary in servicing the receiver to loosen or remove the audio transformer shield. If the receiver hums, try other tubes in the output before attempting to adjust the transformer shield.

Parts List—Model 127

Qty.	Parts No.	Description	List Price Each
1	D-24442A	Chassis	.80
1	G1-23800	Four Prong Socket (Spk.)	.15
1	G2-23800	Five Prong Socket ('24)	.15
3	G3-23800	Five Prong Socket ('27)	.15
3	G4-23800	Five Prong Socket ('35)	.15
2	G5-23800	Five Prong Socket ('47)	.15
1	G6-23800	Four Prong Socket ('80)	.15
1	G1-23629	Cond. Brkt. Assy.	.05
1	LW-20266C	Terminal Board (P. C. S.)	.15
1	LW-20264D	Terminal Board (A & G)	.10
1	G1-24393	Junction Block	.05
1	LB-24446	R. F. Coil Group Assy.	3.75
1	LW-24488	Antenna Coil Assy.	.60
1	LW-24487	Interstage Coil Assy.	.80
1	LW-23628B	Oscillator Coil Assy.	.75
1	LW-24007A	Coupling Coil Assy.	.75
4	LW-22374	Shield Assy.	.15
1	W-24447	Mounting Plate	.10
1	C-24437	Variable Condenser	5.50
2	G2-23623	Tube Connection Assy.	.05
1	W-22221	Dial Lamp	.15
1	C-24440	Bottom	.15
1	LW-23600	Light Bracket Assy.	.15
1	G1-23686	Dial Drive Assy.	.50
1	G1-24436	Power Transformer (60 Cy. 110 V.)	5.00
	G2-24436	Power Transformer (25 Cy. 110 V.)	6.50
	G3-24436	Power Transformer (25 Cy. 220 V.)	6.50
2	LW-22362	Tube Shield Assy.	.15
2	G2-24065	I. F. Coil Assy.	.60
2	G1-24066	I. F. Condenser Assy.	.30
1	G1-24491	I. F. Coil	.30
1	W-24416	Volume Control	.70
1	W-24444	Tone Control & Switch	1.00
1	B-4739C	Cable	.30
1	W-24511	Shield	.05
1	W-24477A	Panel Meter	2.00
1	G1-24628	Filter Choke Assy.	1.25
1	W-24476A	Meter Bracket	.05
1	G1-24729	A. F. Transformer	2.00
1	W-22417	(10-10) Ohms	.15
1	W-22180	1650 Ohms	.25
1	W-22873	220 Ohms	.25
1	W-24537	60 Ohms	.25
1	W-24535	2850 Ohms	.25
1	W-24536	2600 Ohms	.25
1	W-5794	6500 Ohms	.25
1	W-23868	6500 Ohms	.25
2	W-23013	2000 Ohms	.25
5	W-21455	300,000 Ohms	.25
2	W-23701	6 Mfd.	1.00
1	W-23705	12 Mfd.	1.25
1	W-4924	.00025 Mfd.	.25
1	W-23635	.006 Mfd.	.25
4	W-23142	.02 Mfd.	.25
4	W-22688	.1 Mfd.	.25
1	C-24452A	Tube & Cond. Shield	.25
1	LB-21932C	Terminaboard Assy.	.15
2	W-22300	Knob	.15
1	W-24556	Knob	.15
	LC-24484	301M Speaker (Magnavox)	8.50
	LC-229823	304J Speaker (Jensen)	10.00
	L-24461	1Q Cabinet Assembly	8.00
	L-24462	I. T. Cabinet Assembly	36.50

Type -24 Detector in Early Chasses

Earlier series of this chassis used a -24 type first detector tube. Connections were the same throughout, except in the tuned selector circuits between the R. F. and the first detector. The grid circuit of the first detector was connected directly to the chassis, instead of through the 300,000 ohm isolating resistor and 0.1 m.f. by-pass condenser shown on the diagram. The lower end of the interstage coil secondary, coupled to the R. F. plate circuit, was connected directly to the chassis, instead of to the grid circuit of the second detector as indicated here.

Alignment of Tuning Condensers and Intermediate Frequency Amplifier

To align the tuning condensers, the same procedure should be followed as outlined for Model 122, except that there are three, instead of two, condensers in addition to the oscillator condenser to be aligned.

Follow the procedure outlined in the same bulletin for aligning the intermediate amplifier transformers, adjusting all four aligning condensers, one at a time.

Hum Adjustment

With properly matched output tubes, the hum level of this chassis is very low. The audio transformer shield may be rotated, after loosening the three hold-down screws, and so adjusted that the hum is reduced to a minimum. This adjustment is made at the factory and should not have to be made in the field unless it is necessary in servicing the receiver to loosen or remove the audio transformer shield. If the receiver hums, try other tubes in the output before attempting to adjust the transformer shield.

Specifications

Model 127 is a compact, ten tube superheterodyne chassis. It is for operation from A. C. house-lighting circuits, and may be obtained for 110 volt 25 to 50 cycle, 110 volt 60 cycle, or 220 volt 25 to 60 cycle circuits.

The tubes used are as follows: a -35 or -51 radio-frequency amplifier, a-35 or -51 first detector (-24 tubes were used for the first detectors in the earlier chasses of this series, a -27 oscillator, a -35 or -51 first intermediate-frequency amplifier, a -24 second intermediate-frequency amplifier, a -27 diode second detector and automatic volume control tube, a -27 audio-frequency amplifier, two PZ or -47 pentode push-pull output tubes, and a -80 rectifier.

When installing the receiver, make sure that the tubes are in their proper sockets as shown on the connection diagram in the instructions, being particularly careful to see that the -24 and -35 or -51 tubes are not interchanged.

Three phonograph terminals, marked "P", "C", and "S", are provided for use with Crosley phonograph pick-ups. Before connecting a phonograph pick-up, cut the wire between terminals "P" and "C". If the phonograph pick-up is later disconnected, these terminals should be wired together again.

The second detector is of the diode type, and acts also as an automatic volume control tube.

The antenna coil and the interstage coil between the R. F. stage and the tuned selector circuit are connected so as to introduce a certain amount of capacity coupling as well as inductive coupling, as in previous Crosley Models.

Audio Coupling

The diode detector is resistance coupled to the first audio tube, the coupling resistor serving as a volume control. From the detector grid, the coupling circuit continues through a 0.02 m. f. coupling condenser to phonograph terminal "C", whence it continues through a strap between terminals "C" and "P", not shown in the diagram, and from terminal "P" to one end of the volume control resistor, the other end of this resistor being grounded. Since the emitter of the second detector is also grounded, this completes the detector circuit.