Radiola

SERVICE INSTRUCTIONS

Amalgamated Wireless (Australasia) Ltd.

47 YORK STREET, SYDNEY
167-9 QUEEN STREET, MELBOURNE
WELLINGTON, N.Z.

Service as an Aid to Sales

Service goes hand in hand with sales. The well informed Radiola dealer renders service at the time of sale in affording information as to proper installation and upkeep. Subsequent service and repair may be required by reason of wear and tear and mishandling.

Obviously this service can best be rendered at point of contact, and therefore dealers who are properly equipped with a knowledge of the design and operation of Radiolas occupy a favourable position to render efficient service.

To assist in promoting this phase of the dealer's business, the A.W.A. Service Section has prepared this booklet containing information which has been compiled from experience with Radiola Dealers' Service problems. It is hoped that these notes will prove a practical help in servicing Radiolas.

To simplify reference, the notes have been divided into six sections, as follows:

1. General information contained in which is data common to all types of 1932 Radiolas.
2. General description and testing schedule—Radiola 55B.
3. ,, ,, ,, ,, ,, —Radiola 55E.
4. ,, ,, ,, ,, ,, —Duoforte 55E.
5. ,, ,, ,, ,, ,, —Radiola Junior.
6. ,, ,, ,, ,, ,, —A.W.A. Dynamic Speakers.

General Information

METHODICAL FAULT LOCATION ESSENTIAL.

From a very careful survey it has been found that a very large percentage of faults reported on first installations are due to either the accessories used or to mistakes in installation. There is no doubt that a great deal of unnecessary work will be eliminated when servicing if the investigation is carried out in the following order:

1. Test the accessory equipment, such as valves and batteries.
2. Check the installation, seeing that—
   The valves are firmly inserted in the sockets.
   The grid connectors grip the valve caps of the screen grid valves firmly.
   The aerial, earth (if used), power supply or batteries and loudspeaker are properly connected.
3. Remove the chassis from the cabinet for voltage tests at the valve contacts, and further systematic fault location.

EQUIPMENT DATA

VALVES.

Valves are inherently fragile and should be handled with care. Sometimes due to rough usage the internal elements become short circuited, and in such a state are liable to cause serious trouble, even to the extent of causing permanent injury to the Radiola.

It is often found that valve prongs become dirty, causing bad contact in the socket. The prongs should be cleaned with a piece of sandpaper. Also it is sometimes found that excessive solder is left on the ends of the valve prongs. This should be cleaned off with a knife or a file.

In inserting valves in the Radiola, care should be taken that a valve of low filament voltage is not inserted in the socket of a valve of higher filament voltage.

If there is the least suspicion that valves are faulty, they should be tested in a reliable valve tester. If it is impossible to have them thoroughly tested with the proper equipment, the valves should be tested out for performance in a Radiola which is known to be working satisfactorily.

BATTERIES.

The "A" battery should be kept well charged. The battery solution should never be allowed to fall below the top of the plates. Only distilled water should be used to replenish the solution. After charging, carefully wipe any traces of solution from off the battery container, and keep the terminals and connecting strip free from corrosion.

The specific gravity of the electrolyte should be checked carefully with a hydrometer, and unless otherwise specified by the manufacturers, the specific gravity at full charge should be 1250 to 1275.

The terminal voltage test on an "A" battery is not a reliable indication of the state of the battery unless it is taken when the full valve filament load is being taken from the battery, and after at least 30 minutes run at that load.

Exhausted "B" batteries may be the cause of distortion, noisy operation, or uncontrollable oscillation. "B" batteries should be tested with a high resistance D.C. voltmeter, preferably when supplying the full plate current to the Radiola—i.e., when operating a Radiola which is known to be working satisfactorily. Forty-five volt "B" batteries should be replaced when their voltage drops to thirty or thirty-five volts.

VOLTAGE TESTS.

Voltage tests should be made using equipment known to be in good condition.

Remove the chassis from the cabinet, insert the valves and loudspeaker and turn the chassis upside-down. All the valve contacts will now be easily accessible for voltage measurements. Switch the Radiola "on" for operation, turn the selector dial to 550 on the scale and the volume control to maximum. Should the receiver oscillate, turn back the volume control slightly.

With electrically operated receivers care should be taken to see that the valves have been allowed to reach their working temperature before making measurements.

Plate, screen grid and grid bias voltages in the case of both A.C. and D.C. receivers should be measured with a high resistance voltmeter, i.e., a meter having a resistance of at least 600 ohms per volt. Filament voltages for the D.C. Radiola should be measured with a D.C. low reading voltmeter, and the filament voltages for the A.C. Radiola on a low voltage A.C. meter.

The values given under the preliminary voltage test for each Model Radiola must be considered as an average value, and a reading approximating that shown should be taken as an indication that the Radiola is working satisfactorily. The reason for this—especially in the case of the electrically operated Radiola—is that meters having different resistances throw a different load on the circuit being tested, and accordingly give different readings. Also in the case of the A.C. set any variation in the line voltage will make an appreciable difference to these readings, and cause them to vary considerably from the values given. It is advisable when making voltage tests on an A.C. Radiola to also measure the line voltage with a reliable A.C. Voltmeter.

CONTINUITY TESTS.

In the continuity tests for each type of Radiola is given a testing schedule which is reasonably complete and which should cover the general faults met in servicing that particular Radiola. However, agents will place themselves in a better position to service Radiolas if, instead of looking upon this as a complete schedule, they consider it rather as a guide to the method. If a study of the testing schedule is made in conjunction with the circuit diagram, the reason for each continuity test will be understood, and further subsidiary continuity tests will be able to be originated, which will be very helpful in localising faults.

Continuity tests should be made with an A.W.A. Radio Service Tester or with a low reading D.C. Voltmeter in series with a 4.5 volt dry cell. See Fig. 1.

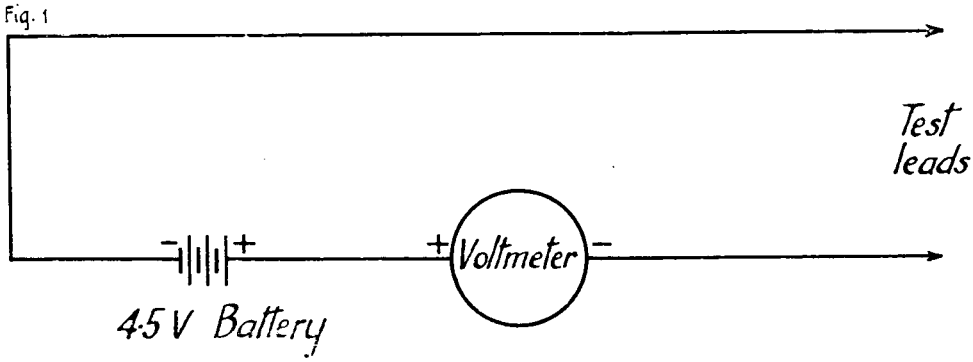


Fig. 1.—Continuity Tester.

Remember, when making continuity tests, a deflection on the meter denotes a closed circuit, and no deflection denotes an open circuit. Circuits whose resistances are high will not give deflections as great as those having low resistances. For instance, the deflection obtained across the secondary of an audio transformer will be less than the deflection obtained across the primary. Further, the deflection obtained across the primary of an audio frequency transformer will be less than the deflection obtained across the primary of a radio frequency transformer.

MODULATED OSCILLATOR.

A suitable modulated oscillator for "lining up" gang condensers is shown together with the receiver and valve voltmeter, in Fig. 2. The oscillator will cover the wave-range of approximately 200 to 560 metres. The grid condenser and leak modulate the output, the note being dependent on the value of the grid leak. In addition to the use of "lining up" condensers, the oscillator will be found useful for general testing of Radiolas.

VALVE VOLTMETER.

The valve voltmeter referred to in a later section can be made up according to the circuit shown in Fig. 2.

CHASSIS INSPECTION.

When inspecting the chassis, take particular care not to disarrange the wiring. Each wire—especially in the radio frequency circuits—has a definite relation to other wires, and if this arrangement is altered to any extent it is quite possible that uncontrollable oscillation will be the result when operating the Radiola.

UNCONTROLLABLE OSCILLATION.

Sometimes a Radiola may oscillate when the volume control is at the maximum volume position. Turning the volume control in an anti-clockwise direction will eliminate the oscillation, and give quite satisfactory volume. If this does not control the oscillation there is probably a fault in the volume control circuit.

Fig.2.

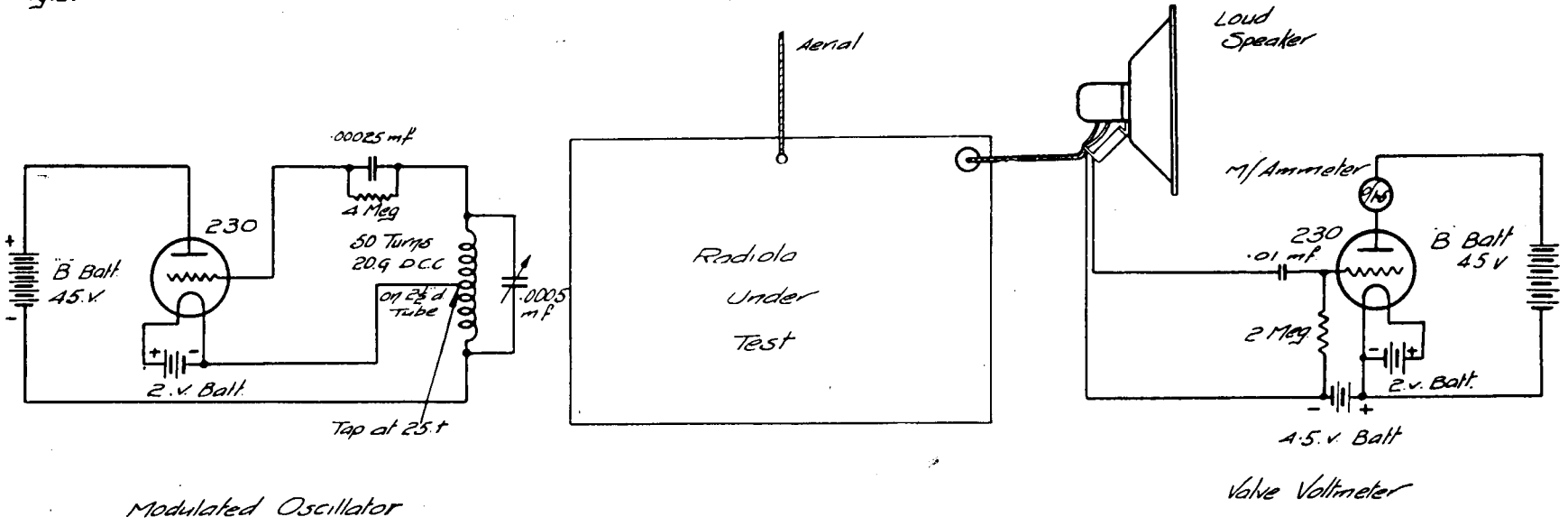


Fig. 2.—Modulated Oscillator and Valve Voltmeter.

FAULTY VOLUME CONTROL.

A loose volume control contact may cause noisy or intermittent operation and should be remedied. If the contact arm is loose, the remedy is to bend it slightly, so that it makes firm contact against the resistance strip. To do this remove the volume control from the chassis and unsolder the leads. Take the spindle out, bend the contact slightly and replace.

FAULTY BY-PASS CONDENSER.

The indication of a fault in these condensers (.01, .0004 and .0002 mfd.) located in the audio frequency amplifier is an intermittent crackling in the loudspeaker reproducton. Any suspicious condenser should have one end disconnected from the circuit and a test made across the condenser with a pair of phones in series with a 90 volt battery. If a sizzling or crackling is heard in the phones the condenser should be replaced.

Note: These by-pass condensers should not be confused with the by-pass condenser units used in the radio frequency amplifier.

LINING UP GANG CONDENSERS.

The gang condensers are adjusted to line up correctly before leaving the factory and should not be interfered with unless it is certain that the condensers have been shifted from their original position. To carry out "lining up" accurately it is necessary to have a modulated oscillator and a valve voltmeter to measure the output.

Particulars of the modulated oscillator and valve voltmeter are given in previous sub-sections.

To "line up" the condensers proceed as follows:

1. Remove the Radiola from the cabinet as described in a later sub-section. See that the moving plates are central with respect to the fixed plates for the "all in" position and also see that they "track" centrally when rotated. If any condenser is damaged or is badly out of setting, the condenser unit should be removed from the chassis and the back shield removed. The plates should then be adjusted by eye and the condenser unit reassembled and replaced.

2. Connect up the Radiola for normal operation and place the oscillator near by. Connect the valve voltmeter across the primary of the loudspeaker transformer.

3. Turn the selector to read 200 and adjust the oscillator to give a note in the loudspeaker and a reading on the valve voltmeter.

4. Adjust the coupling between the oscillator and the Radiola until a suitable deflection is obtained on the valve voltmeter by moving the oscillator towards or away from the Radiola.

5. Adjust the "trimmer" condensers by turning the adjusting screws (and aerial trimmer knob) until a maximum reading is obtained on the milliameter. Probably it will be found necessary to adjust each trimmer three or four times to obtain the correct alignment. The screwdriver used should contain a minimum of metal with an insulated handle.

Note: These trimmer condensers are used primarily for adjusting the minimum capacity of the tuned circuits—i.e., when the variable condensers are set in the "all out" position, and should not be used for adjusting the capacity at any other condenser setting.

6. Turn the station-selector to about 270 metres on the scale and adjust the oscillator to give a note in the loudspeaker. Using an ebonite stick shaped like a pencil, bend the outside moving plates of each condenser in turn in or out. If an adjustment to any plate increases the reading, give that plate a permanent "set" so that the maximum reading is obtained. It will probably be necessary to go over each condenser three or four times and possibly adjust the turning knob or oscillator before correct alignment at this wavelength is obtained.

7. Repeat this procedure at about 350 to 500 metres.

8. To attain accurate alignment it may be necessary to repeat this procedure once or twice.

HUM IN A.C. RADIOLAS.

Loose connections are a frequent cause of hum in A.C. Radiolas. Should any part of the Radiola be disconnected, when reconnecting care should be taken to see that all electrical connections depending on nuts and screws are tight.

Very often hum is caused by dirty contact on the valve filament prongs of the detector and audio stages. Working the valve up and down in the socket will generally remove this trouble.

Sometimes hum can be reduced by reversing the plug in the power socket.

Often hum is due to defective electrical installations such as inefficiently earthed conduits, defective power switches and power points.

LINE VOLTAGE IN A.C. RADIOLAS.

The primary of the power transformer of the all-electric Radiolas is tapped to make provision for operating the Radiola on line voltages either above or below 230 volts.

Very often the voltage of a supply system is a good deal lower or higher than that which is accepted as its rated voltage. Therefore, it is good practice to test or have tested the voltage at the point where the Radiola is installed. Then see the line fuse is placed in the correct clips.

Radiolas intended for use in areas serviced with power other than 200-260 volts 50-60 cycles are supplied with special transformers.

REPAIRS TO POWER UNIT.

Replacement of chassis components is a reasonably straightforward job, but in the case of the Power Unit, apart from wiring faults, it is not advisable to endeavour to carry out repairs. If a fault is definitely located in a transformer, that section of the power unit should be removed from the chassis and returned to the Company for repairs. A new transformer may be fitted to the chassis by a competent service man. If a fault cannot be definitely located in a Radiola the complete chassis should be returned to the Company for investigation.

Defective electrolytic condensers must be replaced as a whole.

RETURNING CHASSIS.

When returning a chassis to the Company, pack in a case with a solid base. Drill four holes corresponding to those in the bottom of the cabinet, and bolt the chassis rigidly to the bottom of the case with the "holding down" bolts provided with the set.

RADIOLA INSTRUMENT NUMBER FOR REFERENCE.

When communicating with the Company in connection with Radiolas, make a point of giving the Radiola Instrument Number. The procedure will simplify investigation by the Company's Service Department.

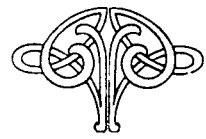
REMOVING RADIOLAS FROM CABINETS.

With the Radiola standing in the normal upright position remove valves.

Pull the knobs off the controls.

Remove the nuts and bolts, holding the chassis in the cabinet.

Remove the chassis from the cabinet by sliding back and lifting out.



Radiola 55B

Model C90

GENERAL DESCRIPTION.

The A.W.A. Radiola 55B is a seven valve screen grid tuned radio frequency battery operated receiver, utilising an efficiently shielded three stage screen grid radio frequency amplifier, a detector and a "Class B" two stage audio amplifier.

The radio frequency transformers and condensers are efficiently shielded and each stage is provided with an individual by-pass condenser unit. This allows a highly efficient radio frequency amplifier to operate satisfactorily.

The aerial condenser is fitted with an adjustable "lining-up" trimmer condenser so that the receiver may be lined up to suit the aerial used.

The volume control regulates the input grid voltage to the detector valve by reducing the amplification in the radio frequency stages. As will be seen from the circuit, this control is in the form of a grid bias potentiometer.

The detector is of the anode bend power type, which allows the high gain radio frequency amplifier to deliver a strong signal to the audio amplifier without distortion and with the maximum of sensitivity and selectivity.

The audio amplifier utilises the highly efficient "Class B" circuit which allows relatively high audio output from small general purpose valves without excessive B battery consumption.

The first audio stage operates in the usual manner, its output being fed into the grid circuit of the pushpull stage. The output stage is of the pushpull type, in which the tubes are biased to substantially plate current cutoff.

The arrangement is such that the output stage may deliver substantially four times the output that would be obtained with the same tubes operated in the usual circuit. The system is very economical due to there being but a small amount of residual plate current flowing in the output stage. Current is drawn only when a modulated signal is being received.

The Radiola 55B may also be used for Electric Phonograph reproduction. The pickup is introduced into the grid circuit of the detector valve. During radio reception the pickup jacks are short circuited.

The plate and bias battery circuits incorporate some new features. Four 45 volt "B" batteries are required. The plate supply for all valves is 157½ volts, using three and a half batteries. The other 22½ volt section is used for bias.

The bias circuits consist of four potential dividers. The one for the radio frequency is variable, incorporating the volume control. The detector, first audio and pushpull bias circuits each use independent potential dividers to give the requisite bias. It has been so arranged that the current drain on bias section of the "B" battery equals the average plate current drain of the Radiola.

The A.W.A. Permanent Magnet Dynamic Speaker, fitted with a plug and cord, includes a transformer specially designed for "Class B" Amplifiers using 230 valves.

Fig. 3 shows the schematic circuit diagram of the Radiola 55B.

FAULT LOCATION.

1. **EQUIPMENT TESTS.**—Carry out equipment tests on all valves and batteries. See Equipment Tests in General Information Section. Check very carefully the battery connections.

2. **PRELIMINARY VOLTAGE TEST.**—After removing the chassis from the cabinet, make the following voltage tests across the valve sockets with all the valves in position and with the loudspeaker connected. No reading points to a fault in the Radiola. Fig. 4 shows the relative positions of the valve contacts, the valves being shown in their correct sequence looking down on the upturned chassis from the back of the Radiola.

Valve	Measure across	Approx. Voltage with Vol. Control in Max. Position
No. 1, 2 & 3 R.F. Amplifiers	+F & −F	2 Volts
	P & −F	155 Volts
	S.G. & −F	75 Volts
	†G & −F	3 Volts
No. 4 Detector	+F & −F	2 Volts
	P & −F	150 Volts
No. 5 First Audio	+F & −F	2 Volts
	P & −F	150 Volts
	†G & −F	—*
No. 6 & 7 Second Audio ..	+F & −F	2 Volts
	P & −F	150 Volts
	†G & −F	15 Volts

*Owing to high resistance in circuit this reading is of little value.
†Meter should deflect in normal direction when the + lead of the meter is connected to the −F contact.

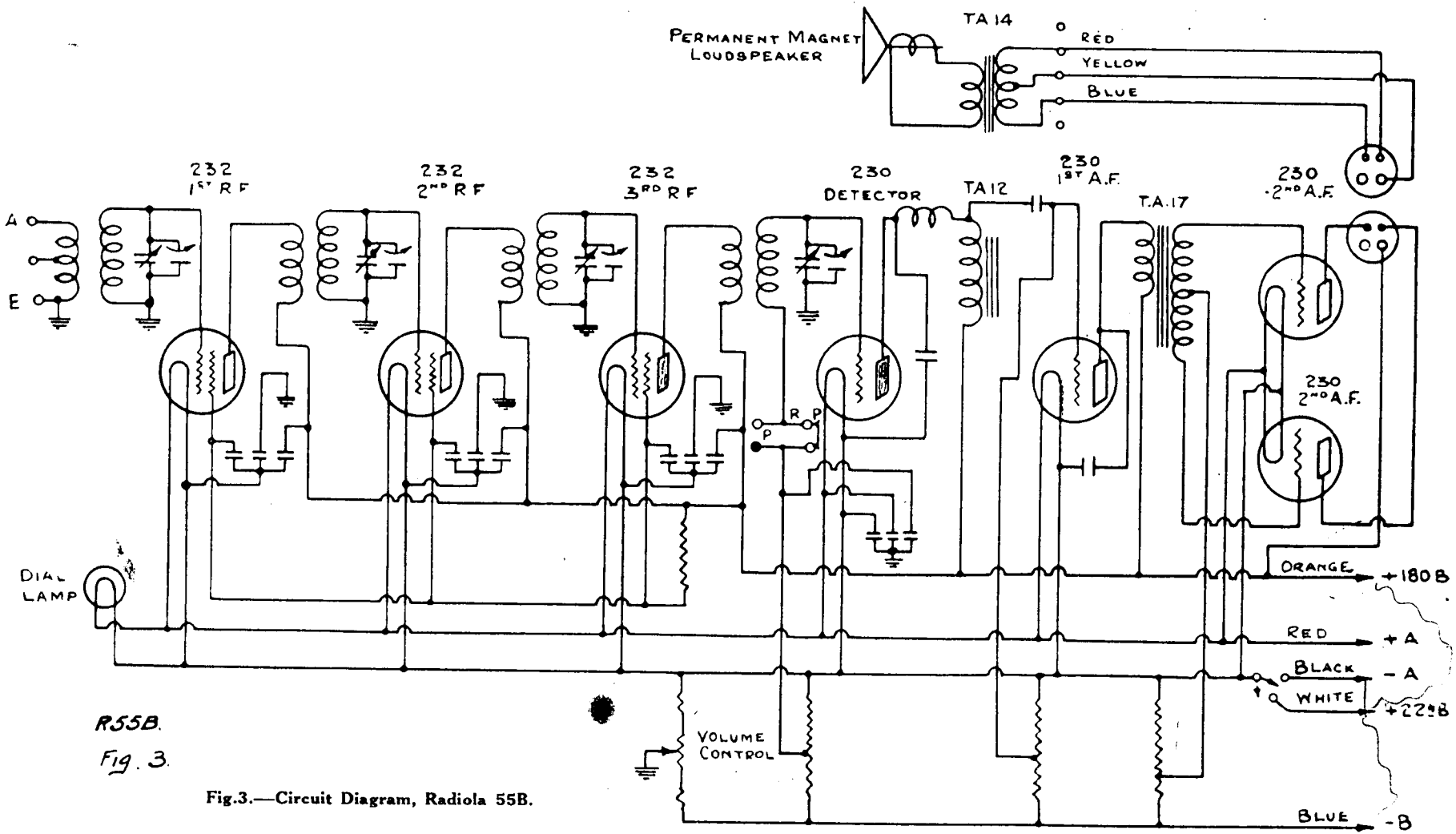


Fig.3.—Circuit Diagram, Radiola 55B.

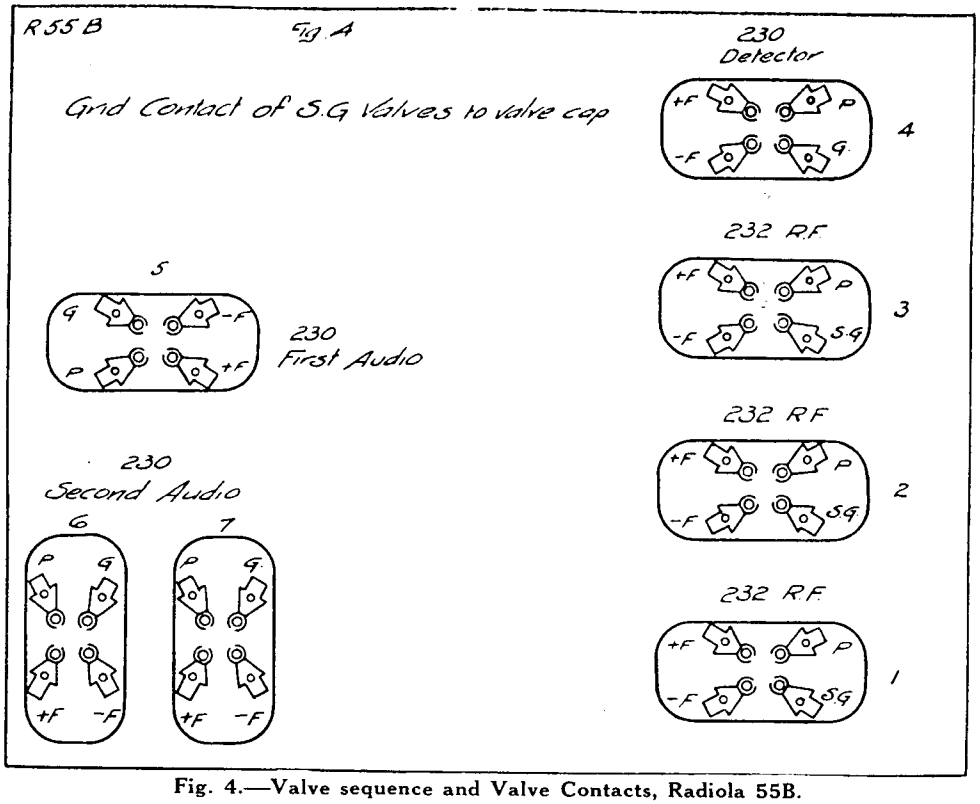


Fig. 4.—Valve sequence and Valve Contacts, Radiola 55B.

CONTINUITY TESTS.

After making the above tests, if it is found necessary, make the following continuity tests:

Test between	Correct effect	Incorrect effect caused by
+B180 (Orange) Battery lead and P contact Valves 1, 2 and 3.	Closed circuit	Broken connection or open circuit primary of Radio Frequency Transformer.
+B180 (Orange) Battery lead and P contact of Valve 4.	Closed circuit	Broken connection or open circuit of Audio Frequency Choke T112 or TA12.
+B180 (Orange) Battery lead and P Contact of Valve 5.	Closed circuit	Broken connection or open circuit of Primary of Audio Frequency Transformer T117 or TA17.
+B180 (Orange) Battery lead and P contacts of Valves 6 and 7 (Loudspeaker connected).	Closed circuit	Broken connection or open circuits loud speaker cable or primary loudspeaker Transformer.
+A Clip (red) Battery lead and +F contacts of each valve in turn.	Closed circuit	Broken connection.
−A Clip (black) battery lead and −F contacts of each valve in turn (battery switch closed).	Closed circuit	Broken connection.
−A Clip (black) battery lead and earth (rotate volume control).	Closed circuit of varying resistance	Broken connection or open circuit wire wound resistor or volume control.
−B Clip (blue) battery lead and earth (rotate volume control).	Closed circuit of varying resistance	Broken connection or open circuit wire wound resistor or volume control.
−B Clip (blue) battery lead and grid contacts of valves 6 and 7 in turn.	Closed circuit	Broken connection or open circuit wire wound resistor or open circuit secondary audio transformer T117 or TA17.
−A Clip (black) battery lead and grid contacts of valves 6 and 7 in turn.	Closed circuit	Broken connection or open circuit wire wound resistor or open circuit secondary audio transformer T117 or TA17.
+B180 (orange lead) and chassis frame.	Open Circuit	Short circuit in wiring or breakdown in insulation or by-pass condenser.
Aerial terminal and frame.	Closed circuit except a few earlier deliveries	Open circuit aerial coil.

Radiola 55E

Model C89

200-260 Volts	50-60 Cycles
220-270 Volts	40-60 Cycles
100-130 Volts	50-100 Cycles

GENERAL DESCRIPTION

The Radiola 55E is an electrically operated single control screen grid tuned radio frequency receiver, consisting of three stages of radio frequency amplification, a screen grid linear power detector and a resistance-coupled pentode output stage.

The aerial is capacity-coupled to the first radio frequency tuning coil. An adjustable "lining up" trimmer condenser is provided to allow the aerial stage to be brought into resonance with the other radio frequency stages when the aerial is connected. The grid circuits of the screen grid valves are tuned by a four-gang condenser unit.

The coupling between the plate of each screen grid valve and the grid circuit of the next valve represents a new development which ensures that excellent and uniform selectivity, sensitivity and fidelity are secured throughout the broadcast band. The plate circuit of each radio frequency valve contains a high impedance coil to match that valve. This coil is located in the grid coil of the next valve, so that inductive coupling is a minimum. A capacity at one end of the grid coil is connected to the plate of the preceding valve and provides coupling between the circuits. The plate coils resonate at about 850 metres and thus improve the sensitivity on the longer wavelengths while the capacity coupling is more sensitive at shorter wavelengths. A combination of the two gives about equal gain throughout the tuning range.

The radio frequency circuits are efficiently shielded and provided with individual by-pass condenser units mounted under the chassis. These features minimise "feedback" and help to provide an efficient and stable radio frequency amplifier.

The volume control is a rheostat in the grid bias circuit of the radio frequency variable mu valves. The action of the volume control is to control the radio frequency input to the detector valve without distortion or cross-modulation.

The screened grid linear power detector is very efficient with respect to sensitivity and selectivity, and gives high output without overload distortion, which ensures high quality reproduction and general performance. The audio stage consists of a resistance-coupled 247 pentode.

The power unit of the Radiola 55E consists of a power transformer, a smoothing resistor, two electrolytic condensers and the loudspeaker field coil. The loudspeaker is connected to the receiver chassis by a four-pin plug and cable.

The plate supply for all valves is taken from the maximum "smoothed" voltage across the second electrolytic smoothing condenser. The screened grid voltage is taken from a potential divider of carborundum resistors.

A fixed resistor and the volume control rheostat are connected in series between the cathodes of the radio frequency valves and the negative of the supply. The voltage drop due to the return of the plate current of the valves and the circuit of the screened grid potential divider is used for grid bias of the radio frequency valves.

The detector is biased by the return of the plate current through a carborundum resistor.

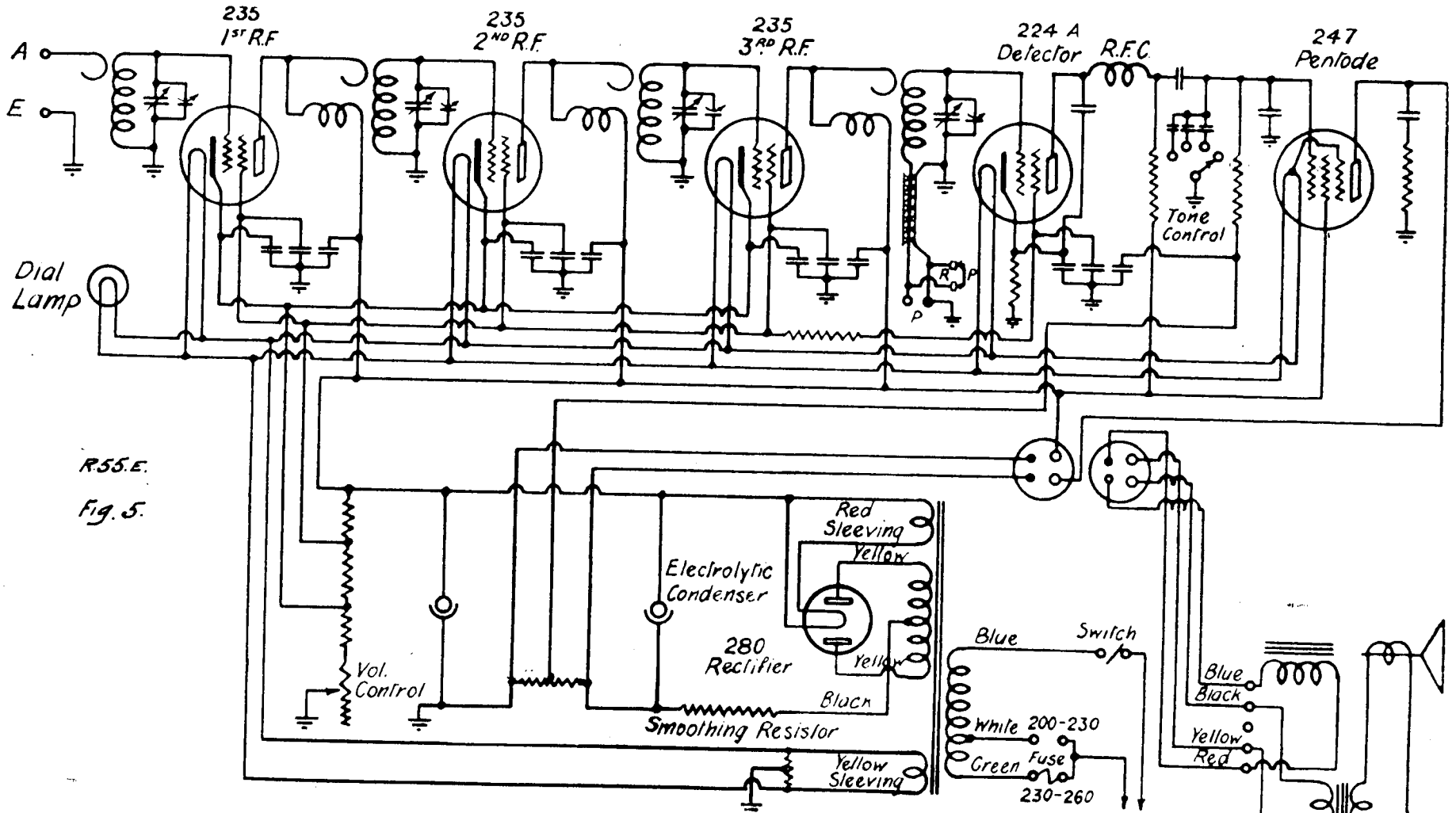


Fig. 5.—Circuit Diagram, Radiola 55E.

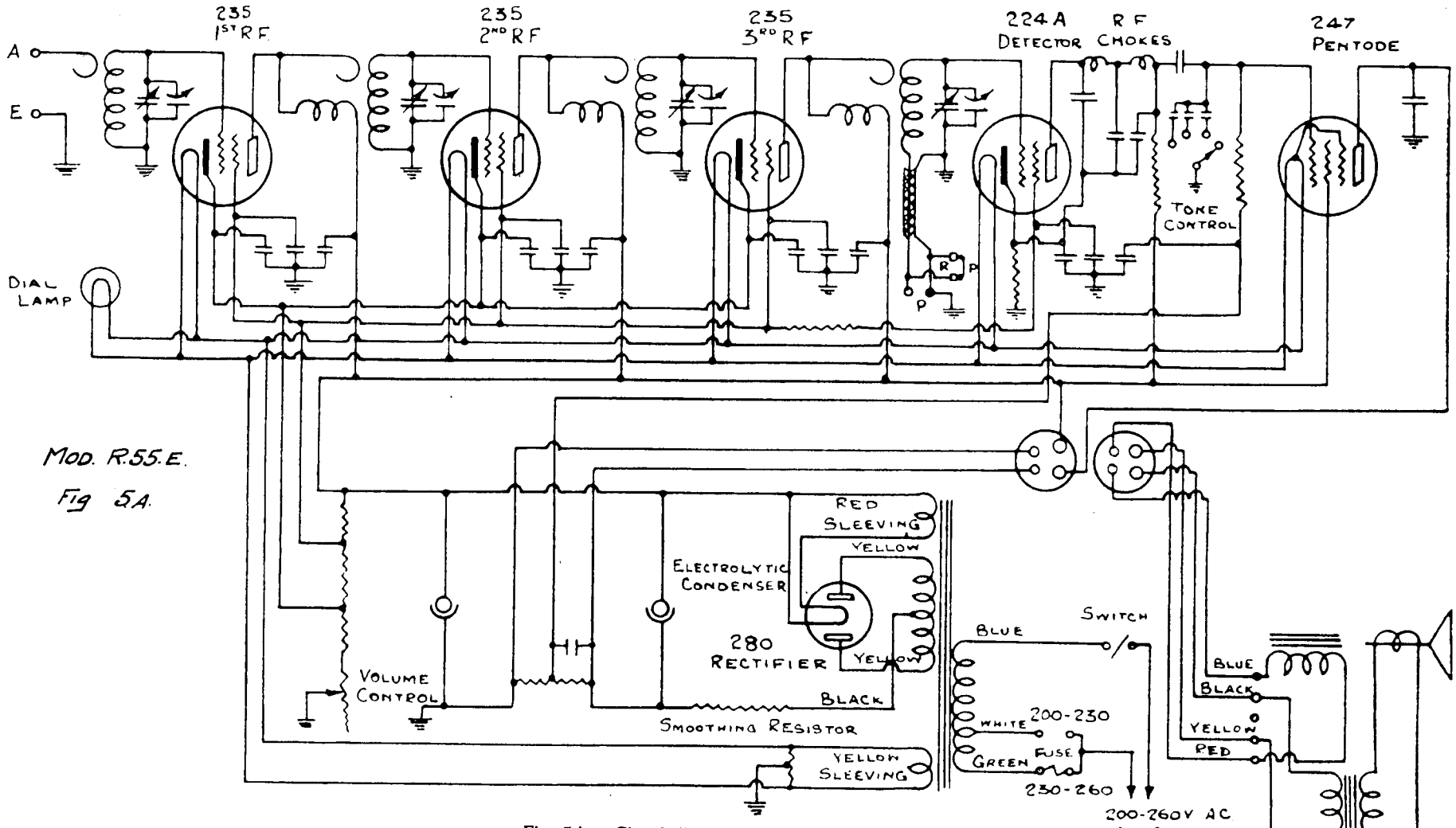


Fig. 5A.—Circuit Diagram, Modified 55E.

The pentode is biased by utilising a section of the voltage drop in the field coil. The correct voltage is tapped off a potential divider of two carborundum resistors.

For electric phonograph reproduction the pickup is introduced in the grid circuit of the detector valve. For radio reproduction the pickup terminals are short circuited.

The schematic circuit diagram of the Radiola 55E is given in Fig. 5.

Fig. 5A covers a modification introduced to improve the tone control range.

FAULT LOCATION

1. **EQUIPMENT TESTS.** Carry out equipment tests on all valves. See Equipment Tests in General Information Section.

2. **VOLTAGE TEST.** After removing the chassis from the cabinet, make the following voltage tests across the valve sockets with all the valves in position and with the loudspeaker connected and the chassis turned upside down. Fig. 6 shows the relative position of the valve contacts, the valves being shown in their correct sequence looking down on the upturned chassis from the back of the Radiola.
No reading or a greatly varying reading points to a fault in the Radiola.

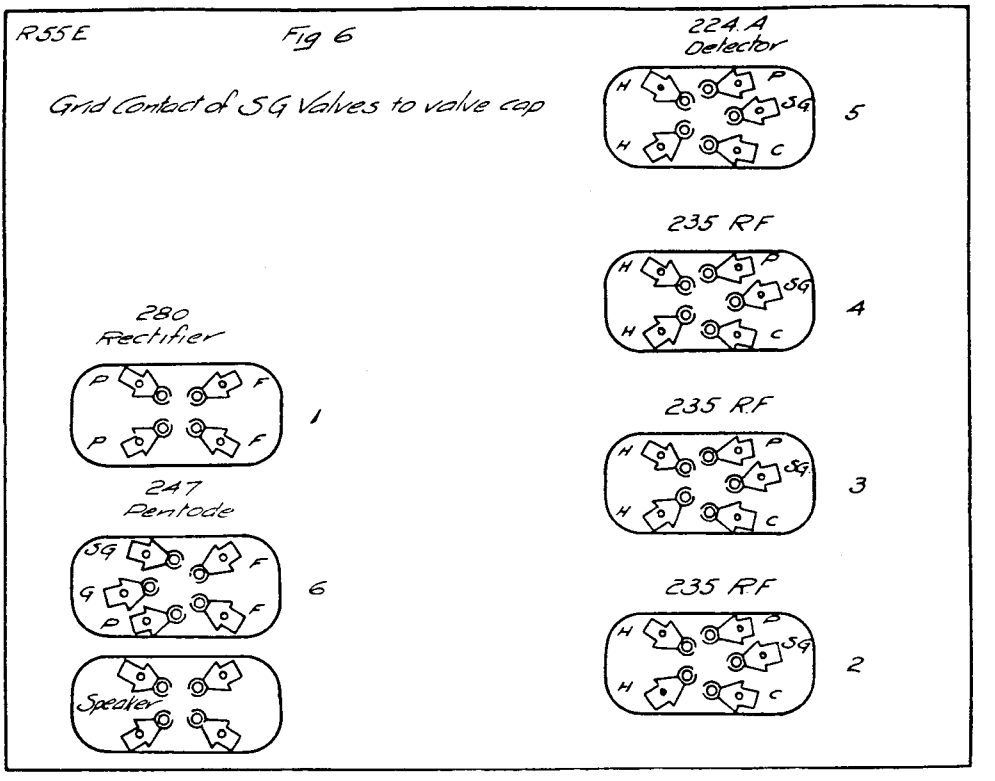


Fig. 6.—Valve sequence and Valve Contacts, Radiola 55E.

Valve	Measure Across	Vol. Control on Max. Original 55E.	Approx. Voltage Modified 55E.
No. 1 Rectifier	F & F	5v. A.C.	5v. A.C.
	P & P	850v. A.C.	850v. A.C.
Nos. 2, 3 and 4 R.F. Amplifiers	H & H	2.4v. A.C.	2.4v. A.C.
	P & C	200v. D.C.	225v. D.C.
	SG & C	65v. D.C.	75v. D.C.
	Chassis & C	2.7v. D.C.	3v. D.C.
No. 5 Detector	H & H	2.4v. A.C.	2.4v. A.C.
	P & C	105v. D.C.	115v. D.C.
	SG & C	45v. D.C.	55v. D.C.
	Chassis & C	5v. D.C.	6v. D.C.
No. 6 Pentode	F & F	2.4v. A.C.	2.4v. A.C.
	P & F	190v. D.C.	215v. D.C.
	SG & F	200v. D.C.	225v. D.C.

CONTINUITY TESTS.

If necessary, make the following continuity tests with some form of reliable continuity tester. Tests made across the points shown in Column 1 should give the effect shown in Column 2. If this effect is not obtained, Column 3 gives the probable cause of the fault.

Test between	Correct effect	Incorrect effect caused by
Aerial terminal and chassis frame.	Open Circuit	Short circuit in wiring.
Fixed plates of condensers and chassis frame (R-P switch on R).	Closed Circuit	Broken connection or open circuit secondary of R.F. transformer.
Filament contact of rectifier valve and plate of R.F. valves.	Closed Circuit	Broken connection or open circuit in primary of R.F. transformer.
Filament contact of rectifier valve and plate of audio valve (Loudspeaker connected).	Closed Circuit	Broken connection, open circuit in primary of output transformer or Loudspeaker cable.
Cathode of R.F. valve and frame.	Closed Circuit	Broken connection or open circuit bias resistor or volume control.
Filament of audio valve and frame.	Closed Circuit	Broken connection or open circuit mid tapped filament resistor.
Plate of rectifier valve and frame (loudspeaker connected).	Closed Circuit	Broken connection, open circuit in power transformer secondary or loudspeaker winding or smoothing resistor.
Plate of detector valve and grid of audio valve.	Open Circuit	Broken down coupling condenser.
Power lead contacts (with power switch on).	Closed Circuit	Broken connection or open circuit power transformer primary or fuse blown.
Power lead or fuse contacts and chassis frame.	Open Circuit	Breakdown of power transformer primary or connections to frame.
Screened grid contacts to cathode contacts of R.F. valves.	Closed Circuit	Broken connection or open circuit carborundum resistor.

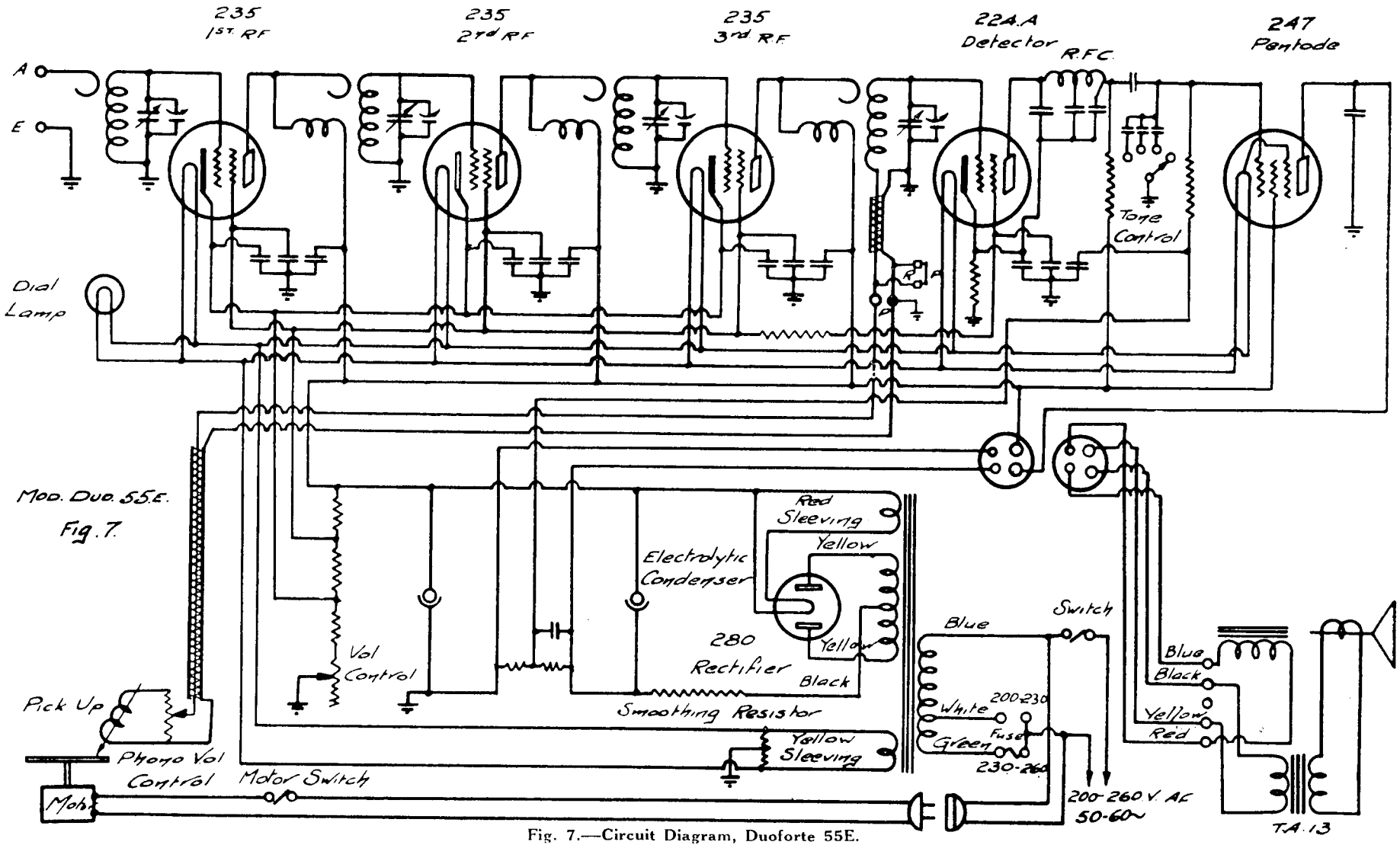


Fig. 7.—Circuit Diagram, Duoforte 55E.

Radiola Junior

Models C87 and C92

200-260 volts. 50-60 cycles.
220-270 volts. 40-60 cycles.
100-130 volts. 50-100 cycles.

GENERAL DESCRIPTION.

The Radiola Junior is an electrically operated single control screen grid receiver consisting of one stage of radio frequency amplification, a screen grid linear power detector, and one stage of pentode audio amplification.

The aerial coil has been tapped. In the standard arrangement the A (aerial) terminal is connected to the full winding. This arrangement will give satisfaction in most installations, but if difficulties are met in suiting particular conditions of selectivity or sensitivity or both, a rearrangement of connections may satisfy the requirements. To make the change-over, remove the aerial coil screen underneath the chassis, and change the orange wire to the vacant terminal located on the top of the coil.

If the suggested rearrangement of coupling outlined above does not give satisfactory performance, varying the length of aerial to suit the particular conditions may give the desired results.

The grid circuits of the screened grid radio frequency stage and detector are tuned by a two gang condenser unit. The circuits are efficiently shielded, and provided with individual by-pass condenser units mounted under the chassis. These features minimise "feedback" and provide an efficient and stable radio frequency amplifier.

The aerial condenser has been fitted with an adjustable "lining up" trimmer condenser, so that the receiver may be lined up to suit the aerial used with the Radiola.

The volume control is a variable rheostat in the grid bias circuit of the radio frequency variable mu screened grid valve controlling the radio frequency input to the detector valve. The detector and audio stages and power unit arrangements of the Radiola Junior are practically identical with that of the Radiola 55E.

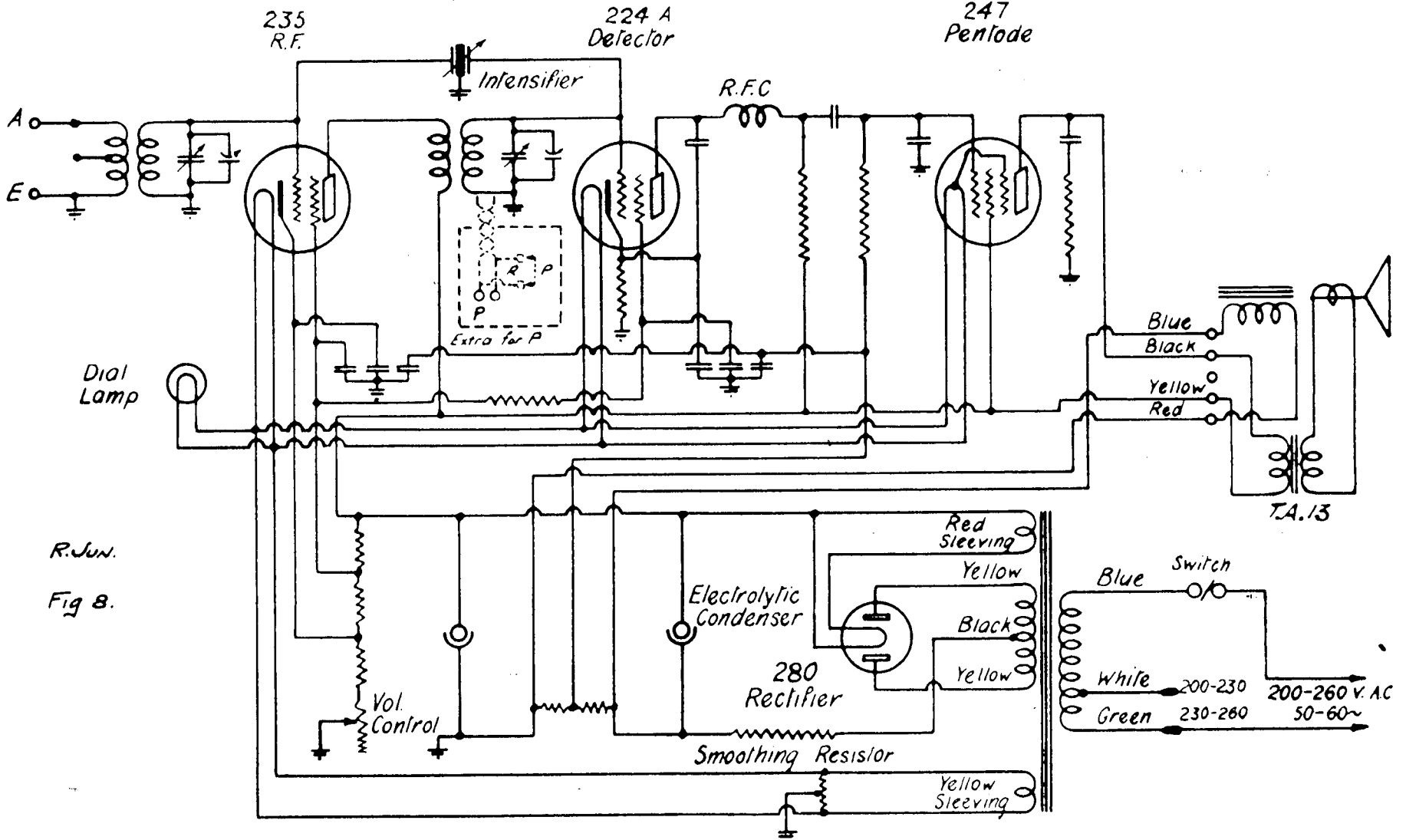
A circuit diagram of the Radiola Junior is given in Fig. 8. Fig. 8A covers a modification introduced to provide for voltage regulaton and Phonograph Reproduction.

FAULT LOCATION

1. **EQUIPMENT TEST.**—Carry out equipment tests on valves. See Equipment Test in the General Information Section.
2. **VOLTAGE TEST.**—After removing the chassis from the cabinet with all the valves in position and with the loudspeaker connected, turn the chassis over. Fig. 9 shows the relative positions of the valve contacts with the chassis turned over, looking from the back of the Radiola.

No reading or incorrect reading points to a fault in the Radiola, which should then be subjected to Continuity Tests in an endeavour to locate the fault.

Valve	Measure Across	Vol. Control on Max. Original Junior.	Approx. Voltage Modified Junior.
No. 1 Rectifier	F & F	5v. A.C.	5v. A.C.
	P & P	850v. A.C.	850v. A.C.
No. 2 R.F. Amplifier	H & H	2.4v. A.C.	2.4v. A.C.
	P & C	210v. D.C.	225v. D.C.
	SG & C	70v. D.C.	75v. D.C.
	Chassis Frame & C	2v. D.C.	2.5v. D.C.
No. 3 Detector	H & H	2.4v. A.C.	2.4v. A.C.
	P & C	110v. D.C.	120v. D.C.
	SG & C	50v. D.C.	60v. D.C.
	Chassis Frame & C	5v. D.C.	6v. D.C.
No. 4 Pentode	F & F	2.4v. A.C.	2.4v. A.C.
	P & F	195v. D.C.	210v. D.C.
	SG & F	210v. D.C.	225v. D.C.


235
R.F.
224 A
Detector
247
Pentode
Intensifier
R.F.C
A
E
Extra for P
Dial
Lamp
Blue
Black
Yellow
Red
T.A.13
Red
Sleeving
Yellow
Electrolytic
Condenser
Blue
Switch
Black
280
Rectifier
Yellow
White
200-230
200-260 V. A.C
Green
230-260
50-60~
Vol.
Control
Smoothing Resistor
Yellow
Sleeving

R. JUN.

Fig 8.

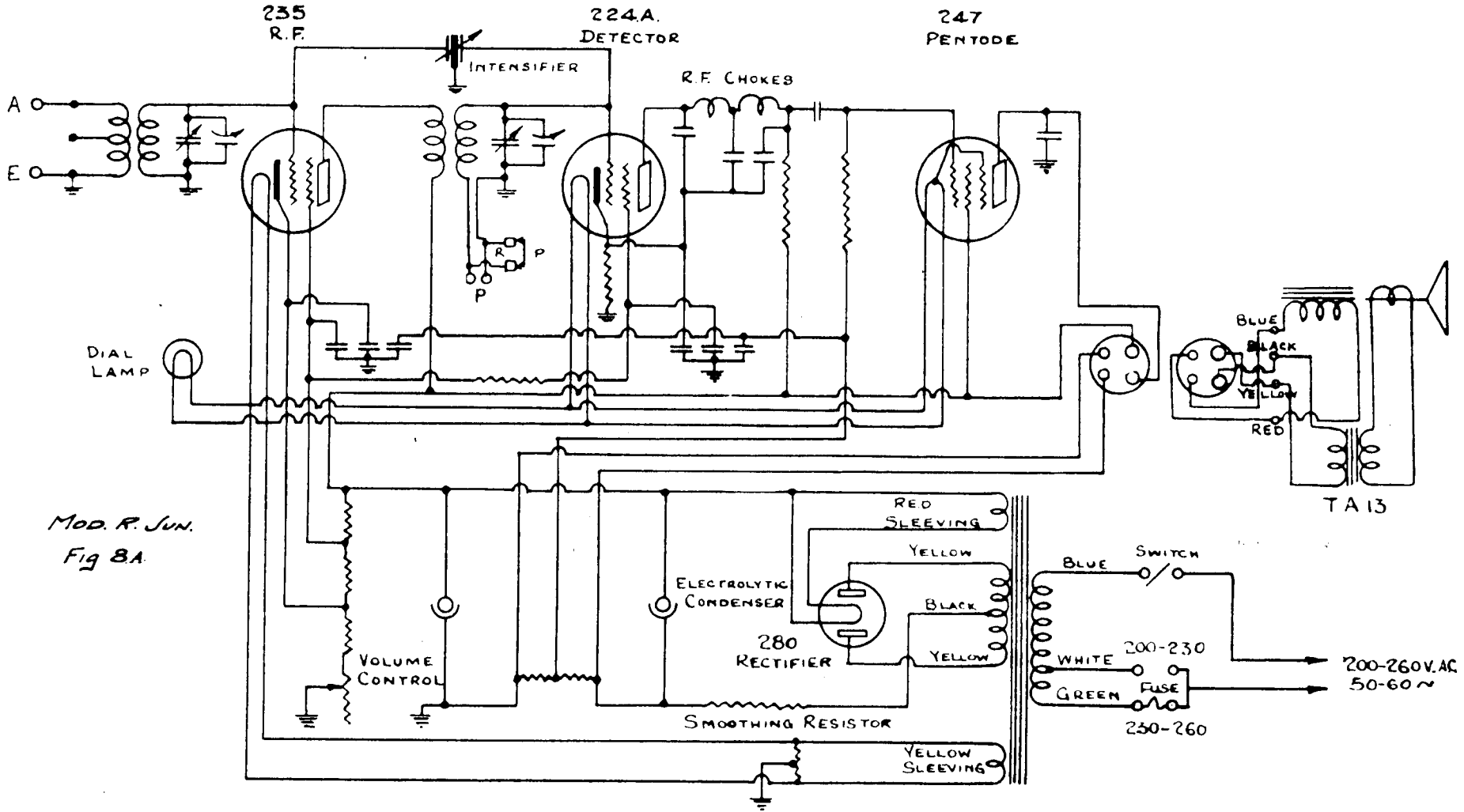


Fig. 8A.—Circuit Diagram, Modified Radiola Junior.

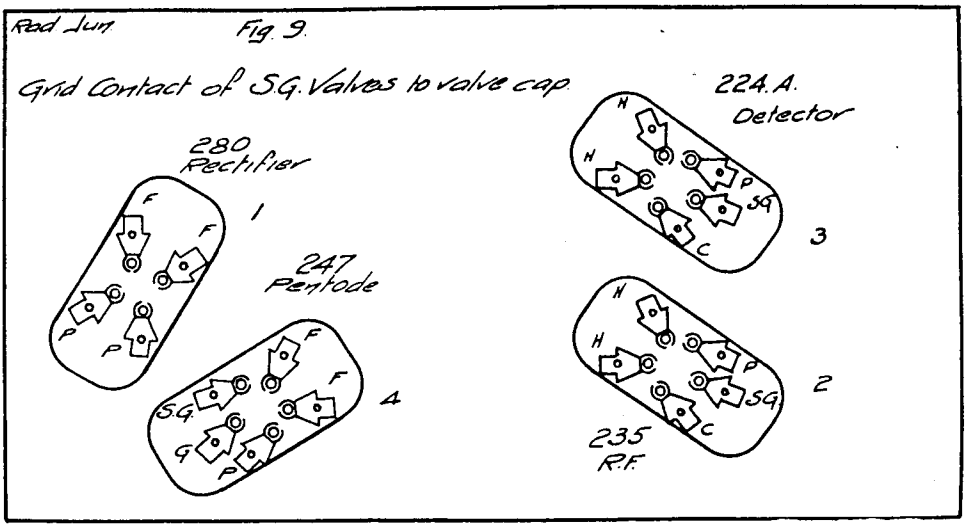


Fig. 9.—Valve sequence and Valve Contacts, Radiola Junior.

CONTINUITY TESTS.

If necessary, make the following Continuity Tests with some form of reliable continuity tester. Tests made across the points shown in Column 1 should give the effect shown in Column 2. If this effect is not obtained, Column 3 gives the probable cause of the fault.

Test between	Correct effect	Incorrect effect caused by
Aerial terminal and chassis.	Closed Circuit	Broken connection or open circuit in aerial coil.
Fixed plates of condensers and chassis frame (R-P switch to Radio).	Closed Circuit	Broken connection or open circuit secondary of R.F. transformer.
Filament contact rectifier valve and plate R.F. valve.	Closed Circuit	Broken connection or open circuit primary R.F. transformer.
Filament contact rectifier valve and plate audio valve (Loudspeaker plug inserted).	Closed Circuit	Broken connection or open circuit in loudspeaker cable or primary of audio transformer on loudspeaker.
Cathode R.F. valve and frame.	Closed Circuit	Open circuit bias resistor or volume control.
Filament of audio valve and frame.	Closed Circuit	Broken connection or open circuit mid tap filament resistor.
Plates of rectifier valve and frame (Loudspeaker connected).	Closed Circuit	Open circuit field coil, loudspeaker cable or power transformer secondary or smoothing resistor.
Plate of detector valve and grid of audio valve.	Open Circuit	Broken down coupling condenser.
Power lead contacts (power switch on).	Closed Circuit	Open circuit power transformer primary or fuse blown.
Power lead or fuse contacts and chassis frame.	Open Circuit	Breakdown of power transformer primary or connections to frame.

A.W.A. Dynamic Speakers

Models D27 and D28

A.W.A. Dynamic Speakers are manufactured in two models: D27 the electrodynamic type, and D28 the permanent magnet dynamic type.

Field coils are wound for various resistances and transformers for various input impedances as required.

When endeavouring to locate faulty reproduction, first check the Receiver or Amplifier with which the loudspeaker is being used with another loudspeaker known to be in good condition. Any distortion in the Receiver will be reproduced in the loudspeaker, and corrective remedies must be applied to the Receiver. However, if a signal of good quality and volume is being delivered by the Receiver, the Loudspeaker must be examined for the trouble experienced.

If the Receiver output is O.K. and no reproduction is delivered by the loudspeaker, look for:

Defective input connection to the Loudspeaker, in the leads or cable.

Open circuit or short circuit in primary or secondary windings of audio transformer.

Open circuit moving coil.

If weak signals are experienced, check the following:

Failure of source of excitation of field.

Defective leads or connections to field coil.

Distortion or rattle in the reproduction may be caused through:

Cone out of alignment.

Dirt or dust in the air gap of the Loudspeaker.

Damaged Cone.

To properly centre a new cone or one known to be out of centre proceed as follows:

Remove the Loudspeaker from the cabinet or baffle board.

Refer to Fig. 10. Insert three strips of thin but stiff cardboard $1\frac{1}{2}$ inches by $\frac{1}{4}$ inch in size through the centre spider of the cone into the space between the pole piece and the moving coil. This will allow the moving coil to be held central in the air gap. Tighten the centring screw and remove the three cardboard strips. The cone should now be properly assembled.

Replace the Loudspeaker in the cabinet or on a baffle board for normal use.

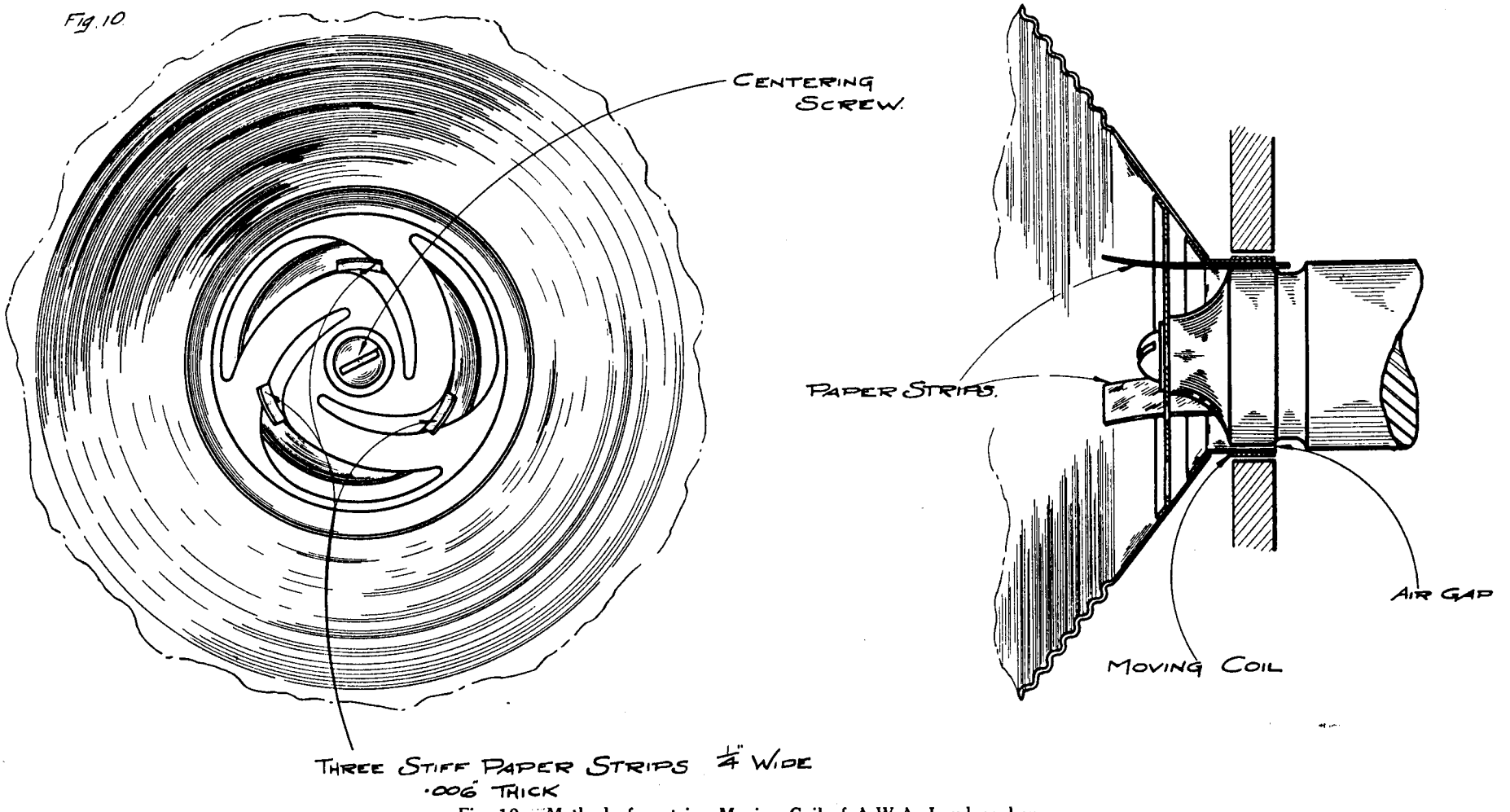


Fig. 10.—Method of centring Moving Coil of A.W.A. Loudspeaker.