Radiola

SERVICE INSTRUCTIONS

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Service 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 seven sections, as follows:—

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 the valves.
2. Check the installation, seeing that—
   The valves are firmly inserted in the sockets.
   The grid connections do not touch the valve screens.
   The aerial, earth, power supply 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 sand-paper. 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-five or forty volts.

"C" batteries may also cause distortion, noisy operation or uncontrollable oscillation. The voltage should be tested with a high resistance D.C. voltmeter, and a battery whose voltage is not equal to the rated value should be looked upon with suspicion.

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.

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 Radiolas—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

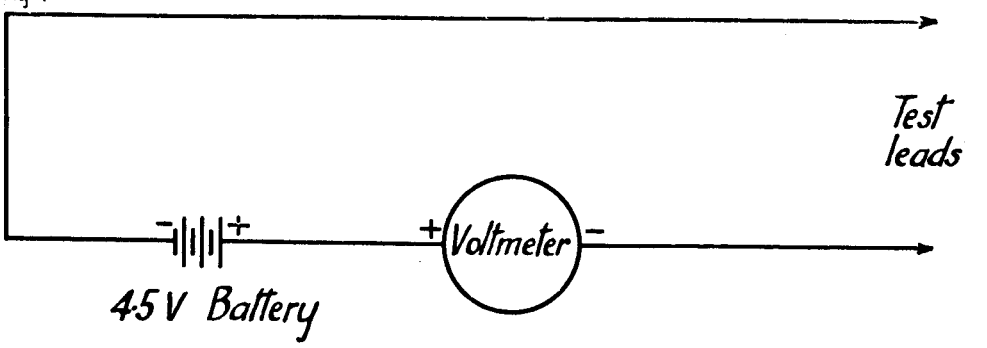

Fig. 1—Continuity Tester.

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.

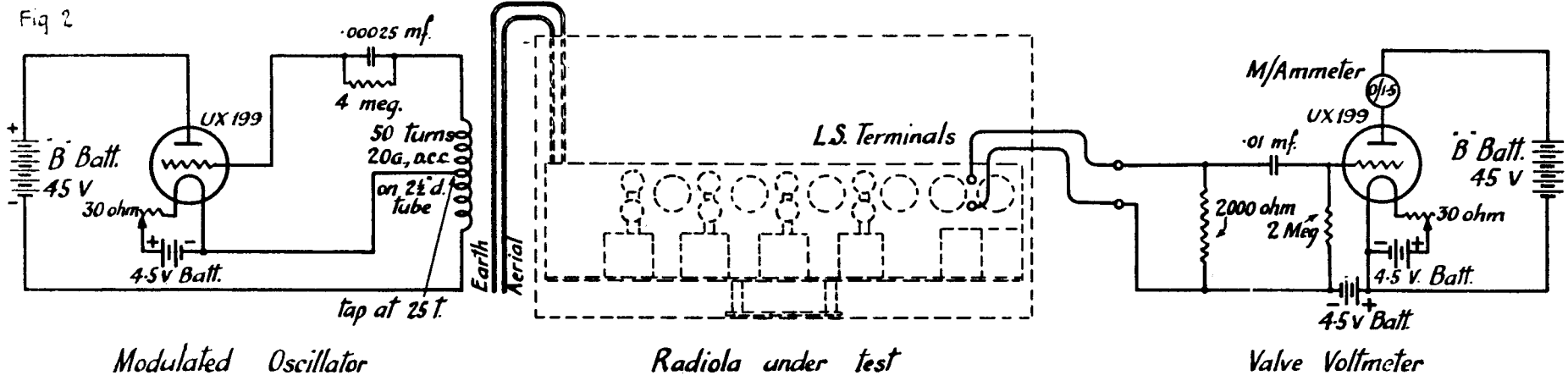

Fig. 2—Modulated Oscillator and Valve Voltmeter.

CHASSIS INSPECTION.

When inspecting the chassis, take particular care not to disarrange the wiring. Each wire—especially those 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 very often eliminate the oscillation, and give quite satisfactory volume. If this does not control the oscillation, try changing the detector valve, and as a further remedy in the case of an electrically operated Radiola, check the line voltage to see that the valves are not receiving excessive filament voltage.

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 screws holding the volume control to the chassis and unsolder the leads. Take the contact arm off, bend it slightly and replace.

BEARINGS BINDING IN VARIABLE CONDENSERS, SELECTOR DRIVES AND VOLUME CONTROL.

By certain improvements in condenser mountings, driving bands and selector drive, the possibility of trouble from these parts has been greatly reduced. Should the movement be stiff or noisy lubricate with a good grade of oil. Take particular care that the oil does not run down on the selector drive friction wheel, for if this should happen it will probably lead to slipping.

FAULTY BYPASS CONDENSER.

The indication of a fault in these small condensers (.01, .0005 and .0002 m.f.d.) located in the audio frequency amplifier is an intermittent crackling in the loudspeaker reproduction. 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 bypass condensers should not be confused with the bypass 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 (similar to the type incorporated in the A.W.A. Radio Service Tester) 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. If any condenser has been damaged or is badly out of setting, it should be removed from the condenser panel by unsoldering the wires connected to it, and removing the three screws holding it to the front panel. The condenser can then be adjusted by eye and replaced.

2. Connect up the Radiola for normal operation and couple the oscillator to it by placing the oscillator near the earth lead of the instrument.

3. Turn the selector to read 550 on the dial. Loosen the binding screws in the driving drums and set all the condensers to the "All in" position and tighten the binding screws.

4. Turn the selector to read 200 and adjust the oscillator to give a note in the loud speaker.

5. Replace the loud speaker by a valve voltmeter and adjust the coupling between the oscillator and Radiola until a suitable deflection is obtained on the milliammeter.

6. Adjust the trimmer condensers by turning the adjusting screws until a maximum reading is obtained on the milliammeter. Probably it will be

found necessary to adjust each trimmer three or four times to obtain the correct alignment.

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.

7. Turn the station selector to read 500 on the scale and adjust the oscillator to give a signal in the receiver. Loosen the binding screws and tune each condenser separately by fitting a small knob on each of the outer condensers. Suitable knobs are available from the Company at 1/- per set of three.
8. Tighten the binding screws and turn the condensers to the "All in" position. The condensers should not vary more than one degree mechanically.
9. Should any condenser be out of line mechanically reset it and return to 500 and line it up by bending the outside plate opposite from the trimmer.
10. A check on the "Lining up" may be made at other points on the scale by a similar procedure.

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.

Replacing the UY224 detector valve may also eliminate the cause of the hum.

LINE VOLTAGE A.C. RADIOLAS.

The primary of the power transformer of the All Electric Radiolas has four taps to make provision for operating the Radiola on line voltages of 200 volts, 220 volts, 240 and 260 volts. If the Radiola is installed on a supply circuit of 240 volts, and it is found that the operation is not satisfactory, an increase of signals will be obtained by moving the selector arm to the 220 volt contact. **However, agents are warned not to do this, for it has the effect of increasing the voltage on the filaments, which will shorten the life of the valves.** 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 being installed. Then turn the voltage selector arm to the contact whose marking is the next above the voltmeter reading. Special care should be taken on 40 cycle supply to see that the tapping used is above the line voltage, otherwise excessive heating may occur in the power unit.

EARTH CONNECTION.

Permanent earthing conductors should be of stranded copper of cross-section not less than 7/22 covered with 600 megohm grade insulation within 6ft. of the receiving set. In no case should an A.C. Duoforte or Radiola be installed without a permanent earthing conductor, for when an efficient earth is connected, if the insulation in the Power Unit breaks down to frame, the fuse in the circuit will "blow" and automatically cut off the supply, thereby safeguarding the operator against shock.

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, choke or condenser unit, that section of the power unit should be removed from the chassis and returned to the Company for repairs. A new component 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.

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. This 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 34E

Model C77

190-270 Volts, 50-60 Cycles.

190-250 Volts, 40 Cycles.

GENERAL DESCRIPTION.

The Radiola 34E is an electrically operated single control screen grid receiver, consisting of one stage of screened grid radio frequency amplification, a screened grid linear power detector, and one stage of audio amplification.

The aerial coil has been divided into four equal sections, tappings being brought out from these points. In the standard arrangement A1 terminal (green wire) is connected to the first section (smallest inductance), and the A2 terminal (orange wire) is connected to the 4th section (largest inductance). 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 by removing the two holding down screws from underneath the chassis, and change either or both the green and orange wires to the two vacant terminals located between these wires on the top of the coil. The terminal nearest the green wire is the 2nd tapping and the one nearest the orange wire is the 3rd tapping.

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 bypass condenser units mounted under the chassis. These features minimise "feed back" and provide an efficient and stable radio frequency amplifier.

The plates of the first tuning condenser are specially shaped to compensate for the detuning effect of the aerial on the first tuned circuit. The aerial compensator (a small vernier condenser connected in parallel with the first tuned circuit) takes care of wide variations in aerial capacity and enables the first tuned circuit to be brought into resonance with the other circuit.

The volume control is a potentiometer which varies the voltage on the screening grid of the radio frequency amplifying valve and thus controls the radio frequency input to the detector valve.

The screened grid linear power detector is very efficient with respect to sensitivity and selectivity, and gives a high output without overload distortion, which ensures high quality reproduction and general performance.

The audio stage consists of a UX245 power valve choke coupled with a specially designed high inductance A.W.A. "Ideal" choke, together with a coupling condenser and a grid resistor.

An A.W.A. Moving Coil Loudspeaker is an integral part of the Radiola 34E. The field of the speaker functions as a choke in the smoothing system, and the transformer on the Loudspeaker is connected in the plate circuit of the power valve. The Loudspeaker is connected to the Radiola by a four pin plug and cable.

Note.—The Loudspeaker supplied with the Radiola 34E has a field coil resistance of 2,500 ohms and is not intended to be used with any other Radiola.

The power unit consists of a transformer of liberal design, rated at 70 watts, with three separate secondary windings; a condenser unit, the loudspeaker field and an A.W.A. Ideal Choke.

The first two secondary windings of the Power Transformer supply the plates and filament of the Rectifying Valve. The third secondary windings light the remaining valves and the pilot lamp.

The plate supply for the UX245 valve is smoothed by two condensers and the loudspeaker field. The valve is biased by the voltage drop due to the return of the plate current to the negative of the rectifier through a wirewound resistor connected between the centre of the filament and chassis frame.

The plate supply for the Radio and Detector Valves is further smoothed by an A.W.A. Ideal Choke and Condenser.

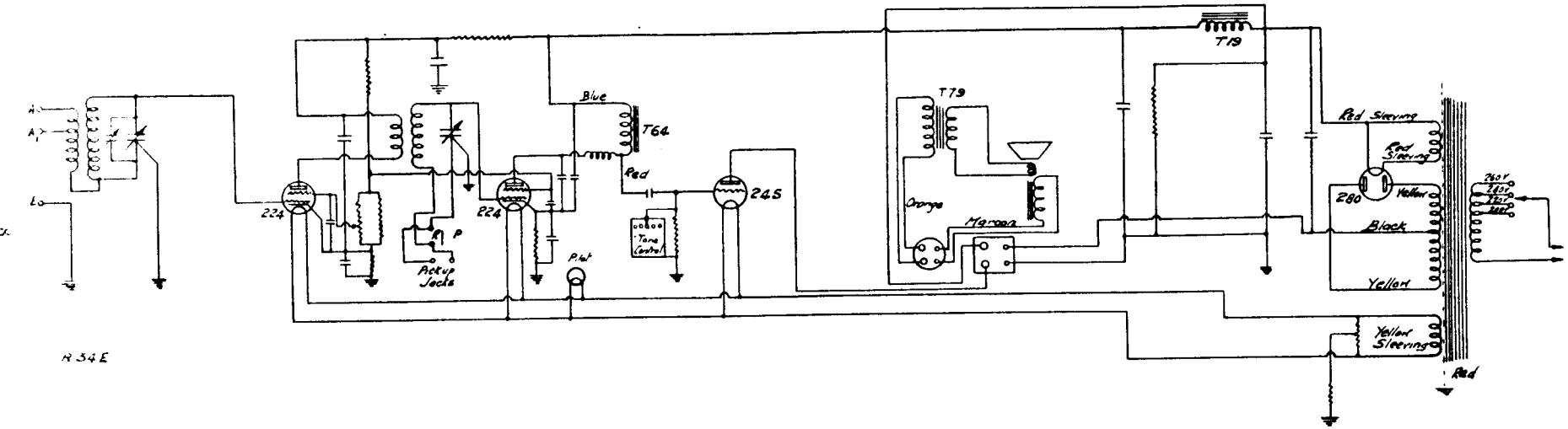

Fig. 3. Circuit Diagram—Radiola 34E.

The Detector Valve utilises the whole of this available voltage. The bias is provided by means of a carborundum rod type of resistor connected from the cathode of the valve and the chassis frame.

The voltage for the plate supply of the Radio Frequency Amplifying Valve is reduced after smoothing by another carborundum resistor. A third resistor is used to drop the voltage for the screen grid supply of the Detector Valve.

From this point is connected the volume control, which in turn connects to the cathode of the Radio Frequency Screened Grid Valve. The Radio Frequency Bias Resistor is connected from the cathode of the valve to the negative of the supply or the chassis frame.

As the Radiola 34E has only one stage of audio amplification, the detector is used as an audio frequency amplifier for phonograph reproduction. For use as a phonograph the "pick-up" is introduced in the grid circuit of the detector valve. During Radio reception the pick-up jacks are short circuited by the "R-P." switch.

A circuit diagram of the Radiola 34E is given in Fig. 3.

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. 4 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	Approximate voltage Volume control at maximum
No. 1 Rectifier	F1 & F2	4.9V A.C.
	P1 & P2	790 A.C.
No. 2 R.F. Amplifier	F1 & F2	2.35V A.C.
	P & C	160V D.C.
	SG & C	72V D.C.
	Chassis Frame & C	1.5V D.C.
No. 3 Detector	F1 & F2	2.35V A.C.
	P & C	200V D.C.
	SG & C	68V D.C.
	Chassis Frame & C	7V D.C.
No. 4 Audio	F1 & F2	2.35V A.C.
	P & F	205V D.C.
	Chassis Frame & C	40V D.C.

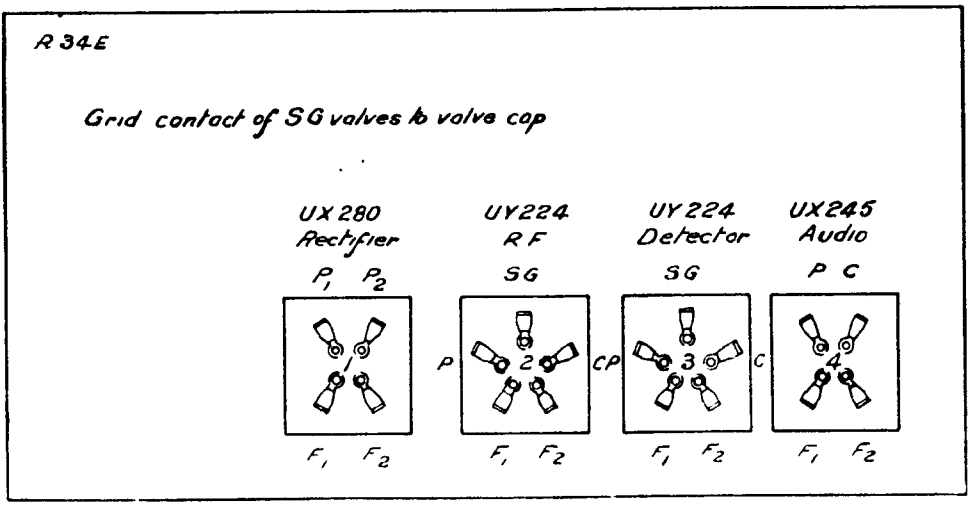

Fig. 4. Valve Sequence and position of Valve Contacts, Radiola 34E.

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 terminals 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. ideal smoothing choke, carborundum resistor or primary R.F. transformer.
Filament contact rectifier valve and plate of detector valve	Closed Circuit.	Broken connections. open circuit ideal smoothing choke, audio choke or R.F. choke coil.
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.
Filament of audio valve and frame	Closed Circuit.	Open circuit bias resistor.
Plates of rectifier valve and frame (loudspeaker connected)	Closed Circuit.	Open circuit field coil, loudspeaker cable or power transformer secondary
Plate of detector valve and grid of audio valve	Open Circuit.	Broken down coupling condenser.
Power lead contacts	Closed Circuit.	Open circuit primary or voltage regulator switch not making contact.
Power lead or 200-220-240-260 contacts and chassis frame	Open Circuit.	Breakdown of primary or connections to frame.

Radiola 45E

Model C 79

190-270 Volts, 50-60 Cycles.

190-250 Volts, 40 Cycles.

GENERAL DESCRIPTION.

The Radiola 45E is an electrically operated single control screened grid receiver, consisting of two stages or screened grid radio frequency amplification, a screened grid linear power detector, and one stage of audio amplification.

The grid circuits of the screened grid radio frequency stages and detector are tuned by a three gang condenser unit. The circuits are efficiently shielded, and provided with individual bypass condenser units mounted under the chassis. These features minimise "feed back" and provide an efficient and stable radio frequency amplifier.

By using a high gain radio frequency amplifier, together with a screened grid linear power detector, a large audio input to the power valve is provided, together with good selectivity and fidelity.

The audio stage consists of a UX245 power valve choke coupled with a specially designed high inductance "Ideal" choke, together with a coupling condenser and a grid resistor.

As the Radiola 45E has only one stage of audio amplification, the detector is used as an audio frequency amplifier for phonograph reproduction. For use as a phonograph the "pick-up" is introduced in the grid circuit of the detector valve, and the bias resistor is paralleled with a second resistor to give the correct bias for operation as an audio amplifier. During Radio reception the pick-up jacks are short circuited and the second bias resistor open circuited by the "R-P." switch.

The volume control is an A.W.A. wire wound potentiometer which varies the voltage on the screening grids of the radio frequency amplifying valves and thus controls the radio frequency input to the detector valve.

The Radiola 45E is fitted with a Local-Distance switch in the aerial circuit to reduce the input to the receiver when listening to strong local stations.

The Radiola 45E is specially designed to make provision for the alternate use of either a magnetic or an A.W.A. Moving Coil loudspeaker. The chassis includes a moving coil speaker step down transformer, a magnetic loudspeaker coupling condenser, and a moving coil speaker field supply compensating resistor. When using a magnetic speaker, or a dynamic speaker with an independently excited field, connection is made to the loudspeaker pin jacks on the Radiola chassis.

A.W.A. "Moving Coil" loudspeakers are fitted with a 4 pin plug and cable which connects to the power unit by inserting in the UX socket provided on the back of the chassis. The field winding of the loudspeaker is connected across the "grid" and "plate" pins and the "Moving Coil" of the speaker across the filament pins.

A field compensating resistor is provided in the power unit which automatically comes into operation when the 4 pin plug is removed. This resistor is equivalent to the resistance of the field winding of the loudspeaker, and provides artificial loading when a magnetic or a self excited dynamic speaker is connected to the loudspeaker jacks on the chassis.

The "Moving Coil" loudspeaker used with the Radiola 45E must have a field coil resistance of 7,500 ohms. The A.W.A. M.C. loudspeaker supplied with Radiola 34E is not suitable for use with the Radiola 45E.

The power unit section of the Radiola 45E occupies the rear half of the chassis.

One container houses the power transformer rated at approximately 80 watts and carries three separate secondary windings. The first two windings supply the plates and filament of the UX280 rectifying valve and the third lights the filaments of the remaining valves.

When the "Moving Coil" loudspeaker (7,500 ohms) is being excited from the power unit it is connected directly across the rectifier.

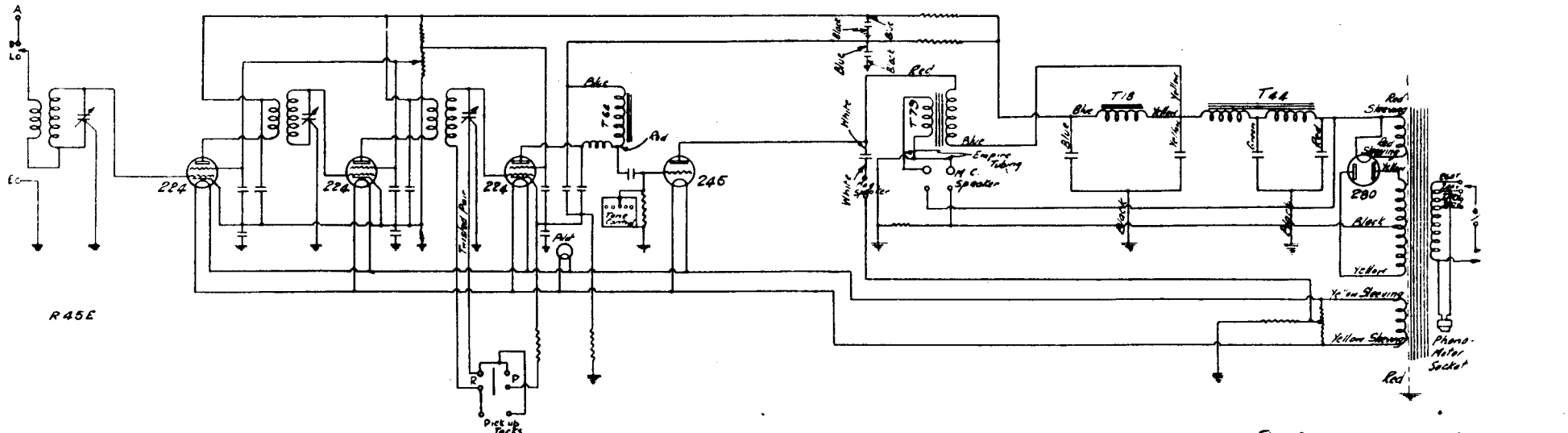

Fig. 5. Circuit Diagram—Radiola 45E.

The smoothing unit is located in the second container.

The plate supply for the UX245 power valve is smoothed by a suitable choke and associated condensers. The plate supply for the radio and detector valves is further smoothed with another choke and set of condensers.

Also the radio and detector plate supplies are decoupled with carborundum resistors and bypass condensers. From the +B of the Radio frequency valves is connected another resistor in series with the volume control which connects to the cathode of the R.F. valves.

The grid bias for the power valve is arranged by connecting a resistor between the centre of the filament mid tapped resistor and the negative of the B supply or chassis frame. The voltage drop in this resistor gives the requisite grid bias.

The Radio frequency valves and the detector valve are similarly biased.

The circuit diagram of the Radiola 45E is given in Fig. 5.

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.

Valve	Measure across	Volume control on maximum Approximate voltage
No. 1 Rectifier	F1 & F2	4.9V A.C.
	P1 & P2	700V A.C.
Nos. 2 and 3 R.F. Amplifiers	F1 & F2	2.30V A.C.
	P & C	165V D.C.
	SG & C	75V D.C.
	Chassis & C	1.5V D.C.
No. 4 Detector	F1 & F2	2.30V A.C.
	P & C	220V D.C.
	SG & C	70V D.C.
	Chassis & C	7V D.C.
No. 5 Audio	F1 & F2	2.3V A.C.
	P & F	235V D.C.
	Chassis & C	50V D.C.

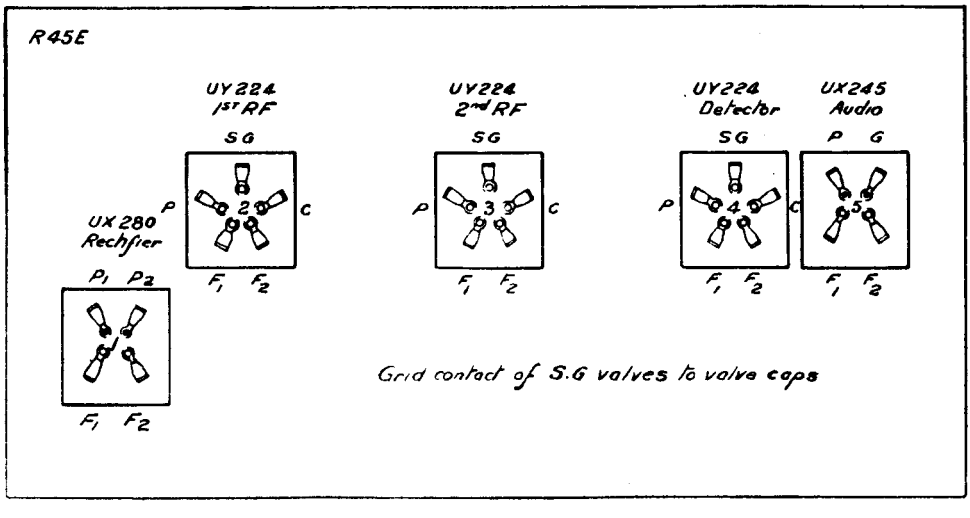

Fig. 6. Valve Sequence and Position of Valve Contacts, Radiola 45E.

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 .. L-D Switch Local	Open Circuit.	Short circuit in wiring or defective switch.
L-D Switch Distance	Closed Circuit.	Broken connection or open circuit aerial coil.
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 smoothing chokes, carborundum resistor or primary of R.F. transformer.
Filament contact of rectifier valve and plate of detector valve	Closed Circuit. (high resistance).	Broken connection, open circuit in smoothing chokes, carborundum resistor, audio choke or R.F. choke coil.
Filament contact of rectifier valve and plate of audio valve	Closed Circuit	Broken connection, open circuit in smoothing choke or primary of output transformer.
Cathode of R.F. valve and frame ..	Closed Circuit.	Broken connection or open circuit bias resistor.
Filament of audio valve and frame	Closed Circuit.	Broken connection or open circuit bias resistor.
Plate of rectifier valve and frame ..	Closed Circuit.	Broken connection, open circuit in transformer secondary or loudspeaker compensating resistor.
Plate of detector valve and grid of audio valve	Open Circuit.	Broken down coupling condenser.
Power lead contacts (with voltage regulator switch on a contact) ..	Closed Circuit.	Broken connection or open circuit power transformer primary.
Power lead or 200-220-240-260 contacts and chassis frame	Open Circuit.	Breakdown of primary or connections to frame.
Screened grid contacts to cathode contacts of R.F. valves	Closed Circuit.	Broken connection or open circuit volume control.

Duoforte 45E

The Duoforte 45E is a combined Radiola and Phonograph designed for use as a broadcast receiver and for the electrical reproduction of recorded music.

The chassis is identical with that of the Radiola 45E. The electric phonograph consists of a record turntable driven by an induction type motor, and an electric pickup together with speed and volume controls.

For information regarding the servicing of a Duoforte 45E chassis, refer to the section of these notes covering the Radiola 45E.

In the event of trouble with the phonograph section of the instrument, the following circuits should be examined and tested.

Pickup Winding.

Pickup Leads.

Volume Control.

Primary Winding of the Audio Transformer.

Secondary Winding of the Audio Transformer.

The phonograph input cable to the chassis.

The windings and power cord of the electric motor.

Radiola 45B
Model C78

GENERAL DESCRIPTION.

The A.W.A. Radiola 45B is a four valve screened grid battery operated receiver, utilizing an efficiently shielded two stage screened grid radio frequency amplifier, a detector and one stage of audio frequency amplification.

The instrument is provided with an aerial compensating condenser, which allows for accurate tuning of the aerial circuit over a wide variation of aerial sizes.

The radio frequency transformers and condensers are efficiently shielded, thus minimising feed back. Each stage utilizes a bypass condenser unit, ensuring efficient operation of the screened grid valves.

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 filament resistance in the radio frequency valves.

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 P215 Power Valve is coupled by a special high inductance A.W.A. Ideal Audio Choke, together with a suitable coupling condenser and grid resistor.

For Phonograph reproduction the "Pickup" is introduced in the grid circuit of the detector valve. During Radio reception the pickup jacks are shortcircuited by the "R-P" Switch.

Fig. 8 shows the schematic circuit diagram of the Radiola 45B.

FAULT LOCATION.

1. EQUIPMENT TEST.

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 loud speaker connected. No reading points to a fault in the Radiola. Fig. 7 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	Approximate voltage
Nos. 1 & 2 R.F. Amplifiers..	$+F_1$ & $-F_2$	2 volts with volume control in maximum position
	P & —A	135 Volts
	S.G. & —A	67.5 Volts
	*G & —A	3 Volts
No. 3 Detector	$+F_1$ & $-F_2$	2 Volts
	P & —A	85 Volts
	S.G. & —A	45 Volts
	G & —A	3 Volts
No. 4 Audio	$+F_1$ & $-F_2$	2 Volts
	P & —A	120 Volts
	*Orange Lead & —A	7.5 Volts

*Meter should deflect in normal direction when the + lead of the meter is connected to the —A contact.

Grid contact of S.G. Valves to Valve Cap.

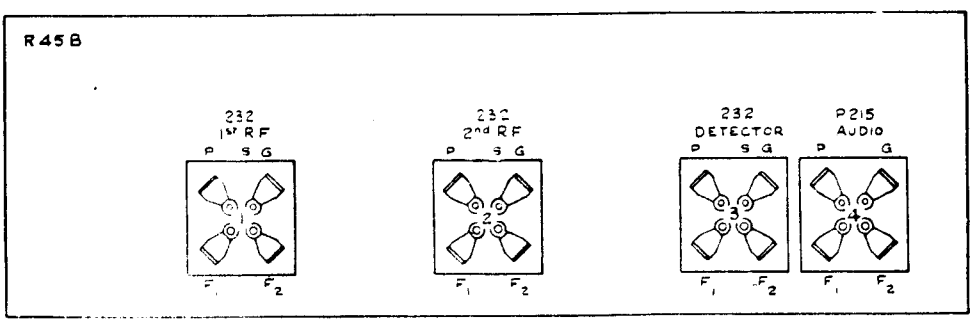

Fig. 7.—Valve sequence and positions of Valve Contacts, Radiola 45B.

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
+B135 (Maroon) battery lead and P contact, valve 4.	Closed circuit.	Broken connection or open circuit in loudspeaker or its connections.
+B135 (Maroon) battery lead and P contacts, valves 1 and 2 in turn.	Closed circuit.	Broken lead or open circuit in primary of R.F. Transformer.
+135 battery lead and frame.	Open circuit.	Short to frame in wiring or in a R.F. bypass condenser unit.
+90 (green) battery lead and P contact, No. 3 valve.	Closed circuit.	Broken lead or open circuit in R.F. Choke or Audio Choke.
+B90 battery lead and frame.	Open circuit.	Short to frame in wiring or short to case in audio choke.
+B67.5 (white) battery lead and S.G. contact, valves 1 and 2.	Closed circuit.	Broken connection.
+B67.5 battery lead and chassis frame.	Open circuit.	Short to frame in wiring or a bypass condenser unit.
+B45 (blue) battery lead and S.G. contact, valve 3.	Closed circuit.	Broken connection.
+B45 battery lead and chassis frame.	Open circuit.	Short to frame in wiring or a bypass condenser unit.
+A (red) battery lead and $+F_1$ contact, each valve in turn (switch closed).	Closed circuit.	Broken connection or open circuit volume control.
—A (black) battery lead and $-F_2$ contact, each valve in turn.	Closed circuit.	Broken connection.
—C3 (yellow) battery lead and G contacts in valves 1, 2 & 3 in turn.	Closed circuit.	Broken connection or open circuit in secondary of R.F. transformer.
Aerial terminal and frame.	Closed circuit.	Open circuit in primary of first R.F. coil.
Plate contact, valve 3 and Grid Contact, valve 4.	Open circuit.	Broken down coupling condenser.

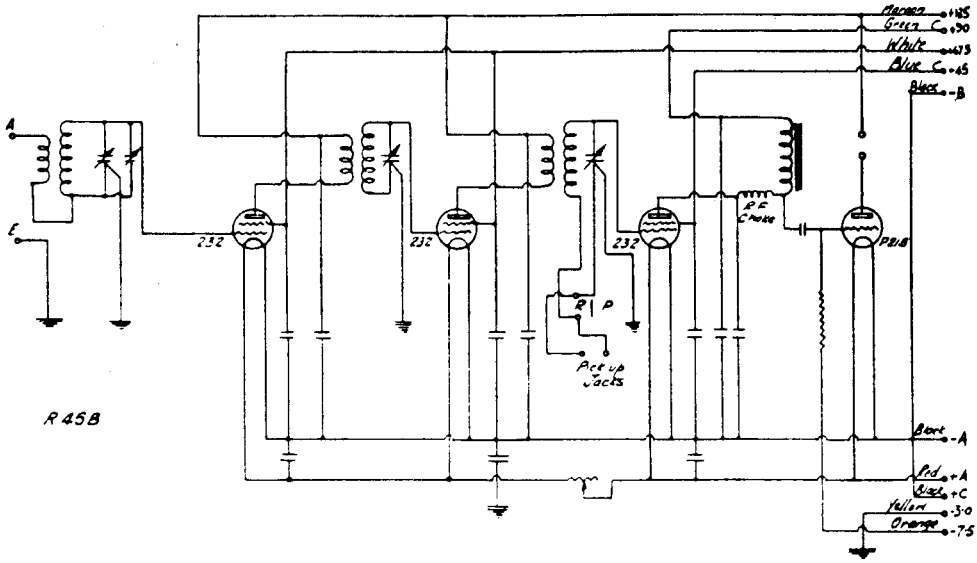

Fig. 8.—Circuit Diagram—Radiola 45B.

DUOFORTE 90E

Model C81

190-270 Volts, 50-60 Cycles.

190-250 Volts, 40 Cycles.

The A.W.A. Duoforte 90E is an electrically operated combined Radiola and Phonograph. The Radiola is a single control screened grid receiver employing three stages of screened grid radio frequency amplification, a screened grid linear power detector, and two stages of audio amplification; the power stage being "push-pull." The change-over from Radiola to Phonograph is carried out by the operation of the "P-R" Switch on the front of the instrument.

The Electric Phonograph consists of a record turntable driven by a noiseless induction motor, and a high grade electric pick-up, together with speed and volume controls.

This instrument gives a maximum of sensitivity, selectivity, and fidelity, and is suitable for the most exacting requirements. A "Local Distance" switch is fitted in the aerial circuit for reducing the pick-up from the aerial when listening to a strong local station.

The grid circuits of the three screened grid radio frequency stages and the screened grid detector stage are tuned by a four condenser gang control. The Radio frequency circuits are efficiently shielded to prevent feed back and any tendency to produce self-oscillation.

The Volume control is in the form of a potentiometer, arranged to control the voltage on the screening grids of the radio frequency amplifying valves to regulate the input to the detector.

The detector is of the screened grid linear power type. The UY227 first audio stage is coupled to the detector with a special A.W.A. high inductance primary audio transformer. The secondary of this transformer is tapped to operate as an auto transformer for the phonograph "pick-up" input.

The "P-R" switch closes the plate supply circuit of the detector valve and open circuits the pick-up input when switched to "R." When switched to "P" the plate supply to the detector is open circuited and the "pick-up" input is closed. A high inductance Ideal Choke is introduced in the plate circuit of the first Audio Valve. The "push-pull" power stage is coupled to the first audio stage by a condenser and a special A.W.A. Ideal Transformer using a special magnetic material to give a very high primary inductance.

The power unit section of the Duoforte 90E occupies the rear half of the Chassis. One section of the power unit houses the power transformer of liberal design, rated at approximately 90 watts, and carries three separate secondary windings. The first two supply the plates and filament of the UX280 rectifying valve, and the third lights the filaments of the remaining valves.

A second container houses the smoothing chokes, and the condensers and the audio output transformer are located in the third container.

The A.W.A. Moving Coil Loudspeaker (7500 ohms) is excited by connecting the field directly across the rectifier. The plate supply for the push-pull valves is smoothed by a suitable choke and associated condensers.

The plate supply for the remaining valves is further smoothed by another choke and bank of condensers. The plate supplies for the radio, detector and first audio stages are decoupled with carborundum resistors and bypass condensers.

The circuit diagram of the Duoforte 90E is given in Fig. 9.

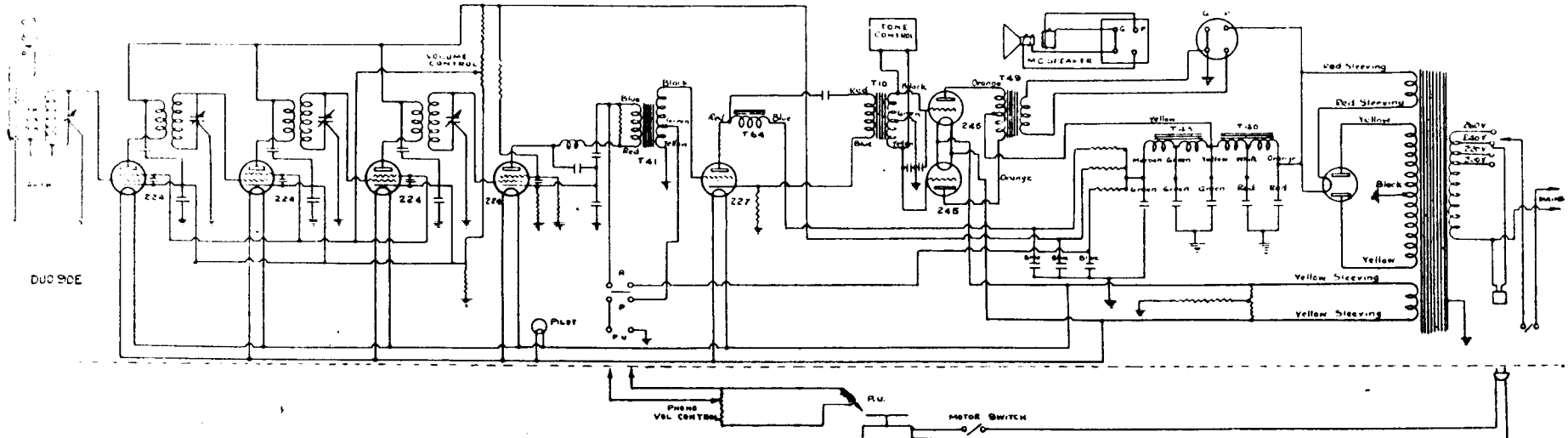

Fig. 9.—Circuit Diagram—Duoforte 90E.

FAULT LOCATION.

1. EQUIPMENT TESTS.

Carry out equipment tests on valves. See equipment test in the General Information Section.

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. 10 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.	Approximate voltage. Volume control at maximum.
No. 1 Rectifier	F1 and F2	5 volts A.C.
	P1 and P2	690 volts A.C.
Nos. 2, 3, and 4 R.F. Amplifiers	F1 and F2	2.35 volts A.C.
	P and C	175 volts D.C.
	SG and C	75 volts D.C.
	G and C	1.5 volts D.C.
No. 5 Detector	F1 and F2	2.35 volts A.C.
	P and C	170 volts D.C.
	SG and C	75 volts D.C.
	G and C	8 volts D.C.
No. 6 1st Audio	F1 and F2	2.35 volts A.C.
	P and C	145 volts D.C.
	G and C	10 volts D.C.
Nos. 7 and 8 2nd Audio ..	F1 and F2	2.35 volts A.C.
	P and F	240 volts D.C.
	G and F	45 volts D.C.

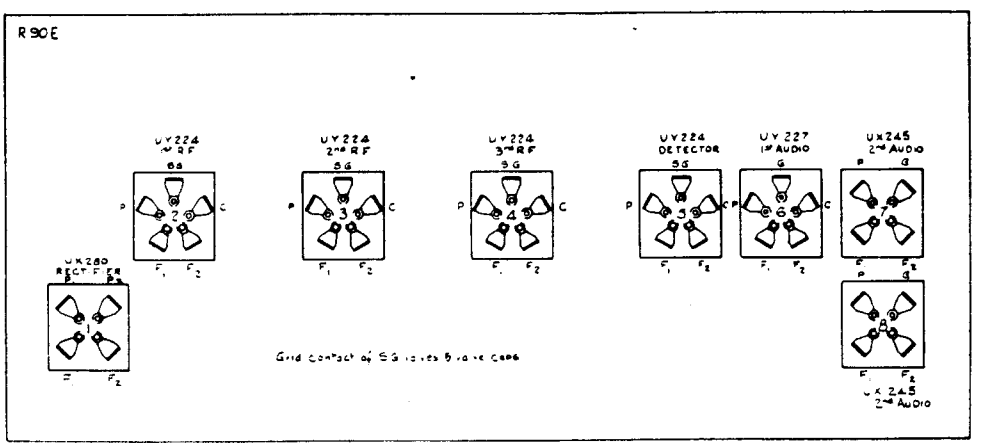

Fig. 10 Valve Sequence and Position of Valve Contacts Duoforte 90E.

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 L-D Switch, Local	Open Circuit.	Short circuit in wiring or defective switch.
L-D Switch, Distant	Closed Circuit.	Open circuit in wiring or aerial coil or defective switch.
Filament of Rectifier and Plates of Push-Pull Valves	Closed Circuit.	Broken connection or open circuit first smoothing choke or primary of output transformer.
Filament of Rectifier and Plates of Radio Valves	Closed Circuit.	Broken connection or open circuit smoothing chokes or primary of R.F. transformer or carborundum resistor.
Grid Connectors of Screened Grid Valves and Chassis Frame	Closed Circuit.	Broken connection or open circuit secondary of R.F. transformer.
Grid of first audio valve and chassis frame	Closed Circuit.	Broken connection or open circuit secondary of first audio transformer.
Grids of push-pull valves and chassis frame	Closed Circuit.	Broken connection or open circuit secondary of second audio transformer.
Plates of rectifier valve and chassis frame	Closed Circuit.	Open circuit secondary of power transformer.
Contacts of power lead with power switch closed and voltage selector switch on a contact	Closed Circuit.	Open circuit power cord or primary of power transformer.
Power lead and chassis frame	Open Circuit.	Breakdown in insulation of power transformer.
Pickup jacks with "P-R" switch to R with input lead disconnected	Open Circuit.	Defective switch.
Pickup jacks with "P-R" switch to P	Closed Circuit.	Broken connection or open circuit in section of secondary of audio transformer.
Pickup leads from motor board	Closed Circuit.	Open circuit pickup winding and volume control.
Contacts on motor connecting power plug with motor switch closed	Closed Circuit.	Open circuit in motor winding.

Radiola 80B

Model C82

GENERAL DESCRIPTION.

The A.W.A. Radiola 80B is a six valve screened grid battery operated receiver, utilizing an efficiently shielded three stage screened grid radio frequency amplifier, a detector and a two stage transformer coupled audio frequency amplifier.

The plates of the first tuning condenser are specially shaped to compensate for the detuning effect of the aerial on the first tuned circuit. The aerial compensator (a small vernier condenser connected in parallel with the first tuned circuit) takes care of wide variations in aerial capacity and enables the first tuned circuit to be brought into resonance with the other three circuits.

The Radio frequency transformers and condensers are efficiently shielded, thus minimising feed back. Each stage uses a bypass condenser unit allowing the most efficient operation of the screened grid valves.

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 filament resistance in the radio frequency valves.

The detector is of the leaky grid type with the grid return connected through the grid leak to + A.

A.W.A. Ideal Transformers are used in the audio frequency amplifier, which, together with the Marconi P215 power valve in the last stage, ensures fidelity of reproduction at ample volume.

In the Radiola 80B a plate voltage for the power valve of 135 volts at the correct bias, is provided for as standard equipment. A plate voltage of 135 volts is required for satisfactory operation of 232 screened grid valves.

The outstanding features of the Radiola 80B are simplicity of operation, super sensitivity, and high undistorted output.

Fig. 11 shows the schematic circuit diagram of the Radiola 80B.

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.

Before removing the chassis from the cabinet make the following voltage tests across the valve sockets with all the valves in position and with the loud speaker connected. No reading points to a fault in the Radiola. Fig. 12 shows the relative positions of the valve contacts, the valves being shown in their correct sequence looking down on the chassis top from the front of the Radiola. It will be necessary to use some form of adapter to measure these voltages. See the first section of the 1930 Service Notes describing a suitable adapter.

Valve Nos. 1, 2 & 3 R.F. Amplifiers	Measure across +F & —F	Approximate voltage 2 volts with volume control in maximum position
	P & —A	135 Volts
	S.G. & —A	67.5 Volts
	*G & —A	3 Volts
No. 4 Detector	+F & —F	2 Volts
	P & —A	67.5 Volts
No. 5 1st Audio	+F & —F	2 Volts
	P & —A	88 Volts
	*G & —A	3 Volts
No. 6 2nd Audio.	+F & —F	2 Volts
	P & —A	125 Volts
	*G & —A	10.5 Volts

*Meter should deflect in normal direction when the + lead of the meter is connected to the —A contact.

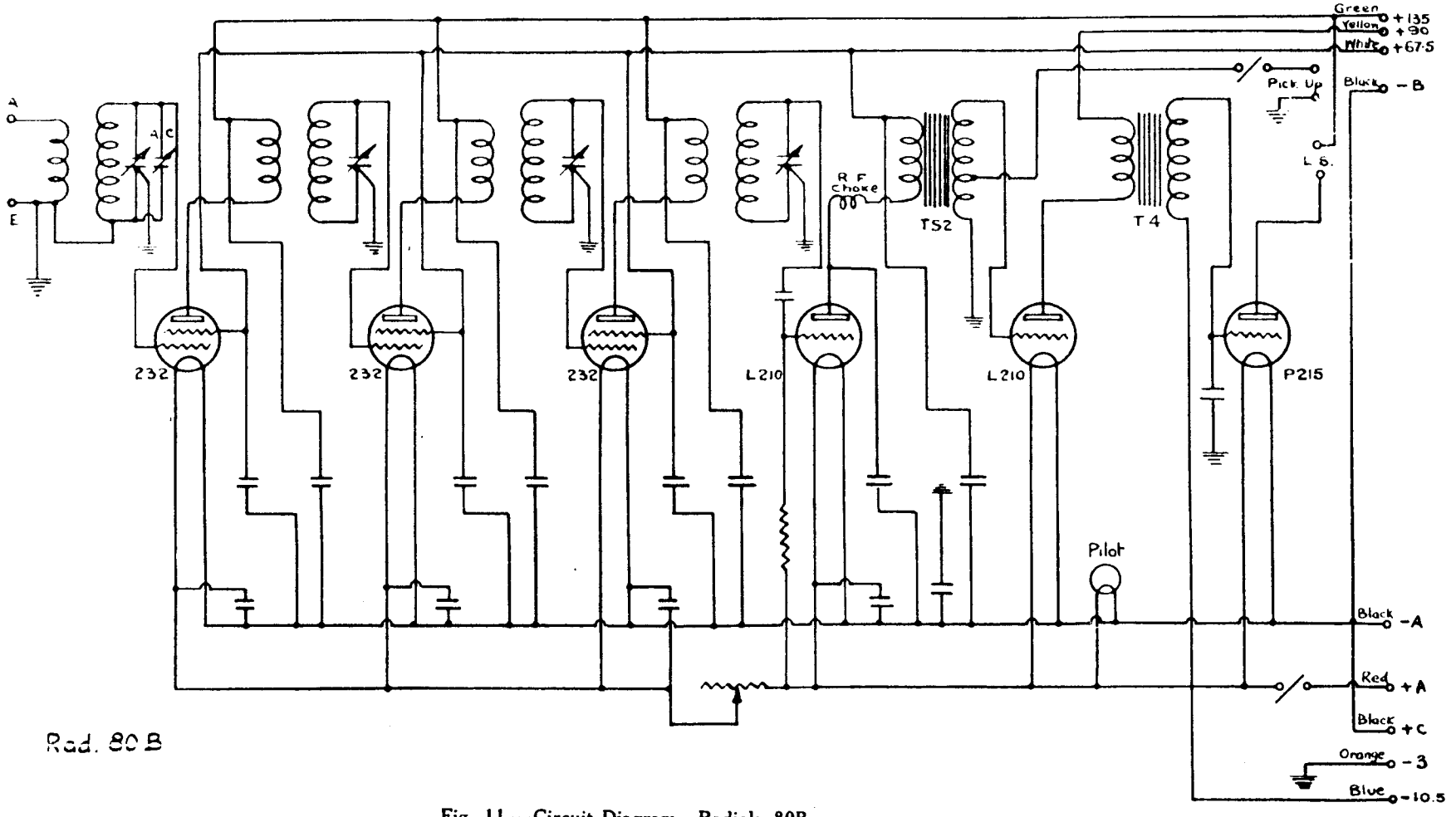

Fig. 11.—Circuit Diagram—Radiola 80B.

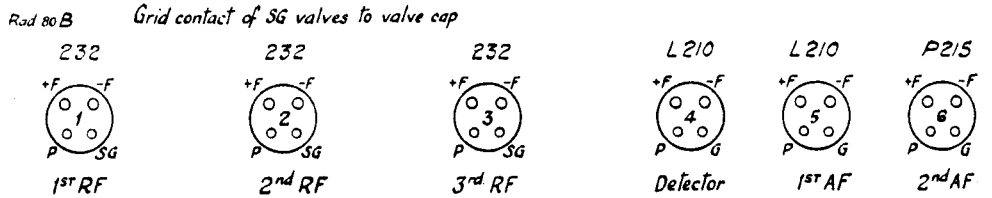

Fig. 12.—Valve sequence and position of valve contacts, Radiola 80B.

CONTINUITY TESTS.

After making the above tests if it is found necessary to remove the chassis from the cabinet proceed as outlined in the first section under the heading of "Removing Radiolas from Cabinets." Tests made across the points 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
+B135 (green) battery lead and P contact, valve 6.	Closed circuit.	Broken connection or open circuit in loudspeaker or its connections.
+B135 (green) battery lead and P contacts, valves 1, 2 and 3 in turn.	Closed circuit.	Broken lead or open circuit in primary of R.F. transformer.
+135 battery lead and frame.	Open circuit.	Short to frame in wiring or in a R.F. by-pass condenser unit.
+90 (yellow) battery lead and P contact, No. 5 valve.	Closed circuit.	Broken lead or open circuit in primary of 1st audio transformer.
+B90 battery lead and frame.	Open circuit.	Short to frame in wiring or short to case in primary of 2nd audio transformer.
+B67.5 (white) battery lead and P contact, valve 4, S.G. contact valves 1, 2, & 3.	Closed circuit.	Broken connection or open circuit in primary of 1st audio transformer, or radio frequency choke coil.
+B67.5 battery lead and chassis frame.	Open circuit.	Short to frame in wiring or short to case in primary of 1st audio transformer, or a by-pass condenser unit.
+A (red) battery lead and +F contact, each valve in turn (switch closed).	Closed circuit.	Broken connection or open circuit volume control.
—A (black) battery lead and —F contact, each valve in turn.	Closed circuit.	Broken connection.
—C3 (orange) battery lead and G contacts in valves 1, 2, & 3 in turn.	Closed circuit.	Broken connection or open circuit in secondary of R.F. transformer.
—C3 battery lead and G contact, valve 5.	Closed circuit.	Broken connection or open circuit in secondary of 1st audio transformer.
—C10.5 (blue) battery lead and G contact, valve 6.	Closed circuit.	Broken connection or open circuit in secondary of 2nd audio transformer.
Aerial terminal and frame.	Closed circuit.	Open circuit in primary of first R.F. coil.

Radiola Phonograph Unit

Model D26

The Radiola Phonograph Unit is a small, easily movable instrument, which, when used with any standard Radiola, provides the additional equipment necessary for the Electrical reproduction of recorded music.

The Unit includes an electric Pickup with volume control, a spring operated motor, record turntable and connecting cable.

The schematic circuit diagram of the Radiola Phonograph Unit is given in Fig. 13.

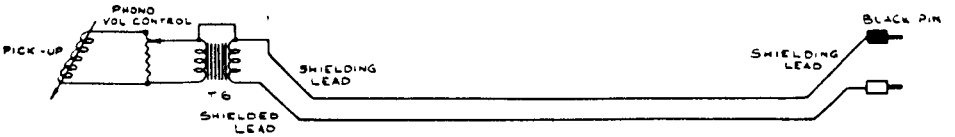

Fig. 13.—Schematic circuit diagram of Radiola Phonograph Unit.

In case of fault, the following circuits should be examined and tested.

Pickup Windings.

Pickup Leads.

Volume Control.

Primary Winding of Transformer.

Secondary Winding of Transformer.

Connecting Cable.

The long connecting cable for the Pickup lead is of special shielded construction. The grid circuit lead is shielded to prevent pickup of A.C. hum from the Main Leads of an A.C. Radiola.

If the cable pins are reversed in the pin jacks the pickup of hum will be audible in the loudspeaker.

A.W.A. Moving Coil Loudspeakers

Models D24 and D25

A.W.A. Moving Coil Loudspeakers are manufactured in two models. The difference is confined to mechanical construction; the electrical and acoustical performances being practically identical.

Field coils are wound to the standard resistances of 7,500 ohms or 2,500 ohms (D.C. resistance). Other special windings are supplied to order.

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 operation. 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 moving coil.

If the Loudspeaker includes an Audio Transformer, look for open or short circuit in the primary or secondary windings.

If weak signals are experienced, check the following:—

Failure of source of excitation of field.

Defective leads or connections to field coil.

Open circuit or short circuit in 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. 14. Insert three cardboard strips about the thickness of a visiting card 1½ inches by ½ 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.

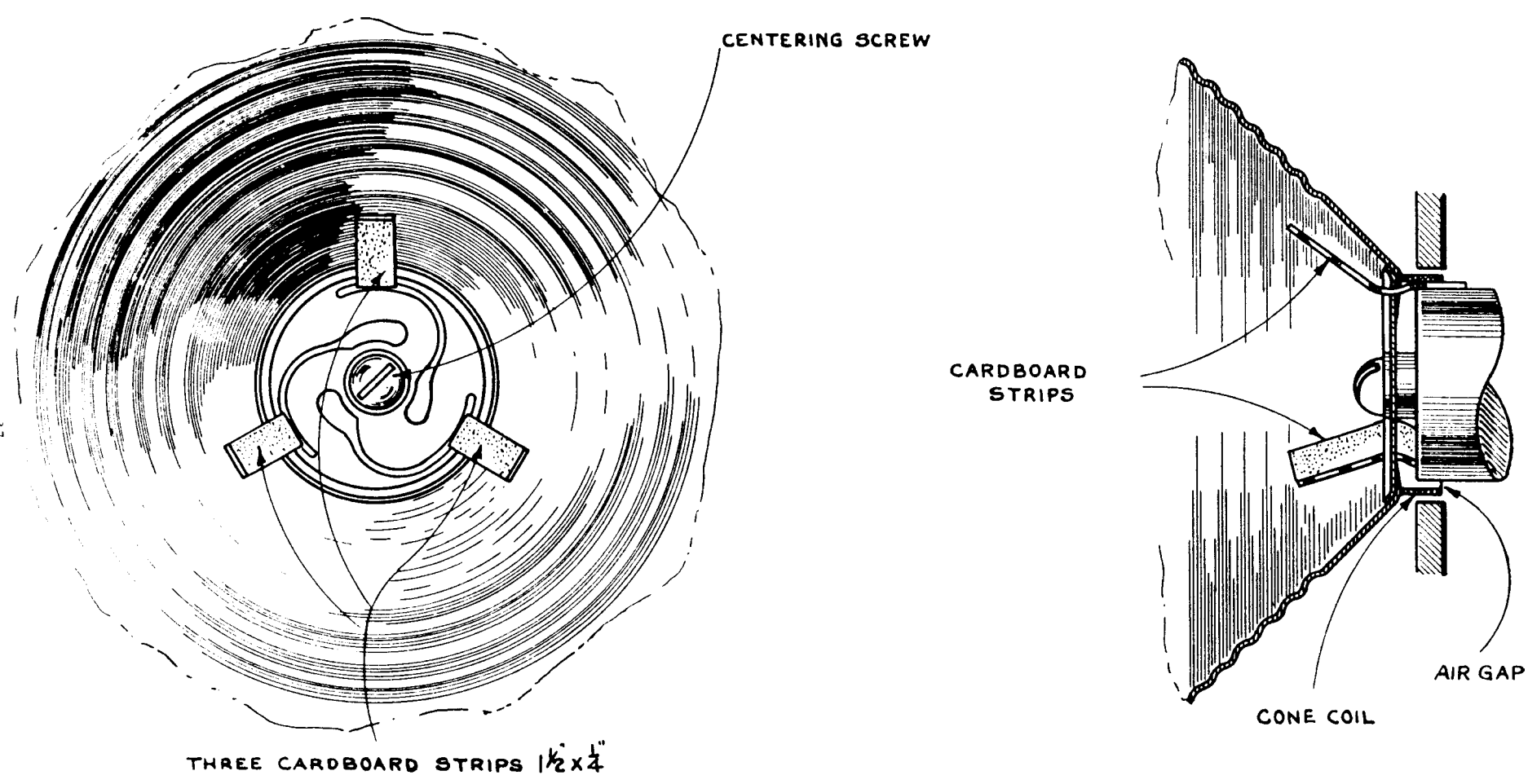

Fig. 14.—Method of centring Moving Coil of A.W.A. Loudspeaker.

RADIOLA 34E

[WITH PENTODE]

Model C84

190-270 Volts, 50-60 Cycles.

190-250 Volts, 40 Cycles.

GENERAL DESCRIPTION.

Radiola 34E Model C84 differs from Model C77 by the inclusion of a 247 Pentode in place of a 245 power valve. The section of these notes covering Model C77 describes the Radio Frequency and detector stages, which remain unaltered.

The inclusion of a 247 Pentode requires:—

Change in Audio Valve Socket.

Change in Audio Bias Resistor.

Change in Loudspeaker Audio Transformer.

Addition of Audio Frequency Compensating Filter.

The schematic circuit diagram of the Radiola 34E with Pentode is given in Fig. 15.

VOLTAGE TESTS.

Referring to Fig. 4, the voltages at the valve contacts from Valves 1, 2 and 3 will remain unaltered. Approximate voltages for the 247 Pentode are given in the table below.

VALVE	Measure Across	Approximate Voltage Volume Control at Maximum
No. 4 .... Pentode	F1 and F2	2.35 V. A.C.
	P and F	230 V. D.C.
	SG and F	235 V. D.C.
	Chassis frame and F	15 V. D.C.

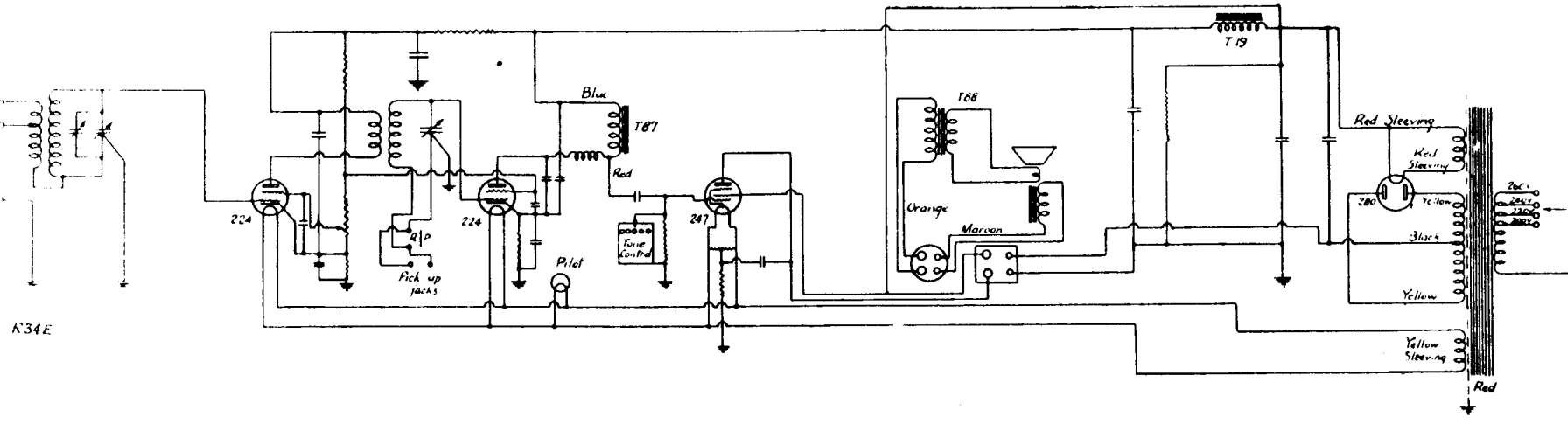

Fig. 15.—Circuit Diagram Radiola 34E (with Pentode).