THE PYE "S" RECEIVER

Notes on circuit design

THE Pye " S " is an A.C. mains operated superheterodyne.

It has six receiving valves, a variable Mu screened grid H.F., a screened grid first detector, a triode oscillator, a variable Mu screened grid I.F., a power grid second detector followed by a pentode output valve.

The " signal frequency " tuning system consists of a preselector band pass filter preceding the variable Mu screened grid valve, which in turn is coupled to the screened grid first detector by a resistance fed tuned grid circuit. These three tuned circuits are employed to minimise second channel interference and are adequate for the purpose.

A four-section gang condenser is employed. The fourth section tunes the oscillator circuit, which consists of a tuned grid coil and an anode coil wound with resistance wire. In series with the oscillator tuning condenser are " padding " condensers with their associated trimmers, adjusted to ensure the correct alignment of the circuit with those preceding it.

Referring to the circuit diagram, C14 is the long wave " padding " condenser, and is in the circuit permanently. C15 is the second " padding " condenser, and is in parallel with C14 on short waves.

The oscillator valve is coupled to the first detector valve by means of their common cathode circuit. The first detector valve (V2) is coupled to the variable mu I.F. valve (V4) by means of an I.F. transformer, this valve being coupled in turn to the power grid second detector (V5) by a second I.F. transformer. Both I.F. transformers are tuned to a frequency of 114 kilocycles (2,631.5 metres).

A low-frequency " band pass " transformer circuit couples the detector valve to the pentode output valve (V6) the anode of the latter being transformer-coupled to the low-impedance voice coil of the energised loud-speaker. The transformer primary is shunted by a compensating circuit.

Controls

Apart from the selector and mains switches, there are only two controls, the tuning control (on the right) operating the four-gang condenser, and the volume control. The latter control operates two ganged potentiometers. One section (R2) adjusts the bias on the variable mu screened grid valves (V1 and V4), and simultaneously shunts the aerial tap on the input stage of the preselector, thus providing adequate control for radio.

The other section (R12) controls the volume when a pick-up is used and is brought into operation when the selector switch is in the " Gram " position.

The three-way " Selector " switch adjusts the receiver for use on long or medium waves, or for use with a gramophone pick-up. When the switch is in the latter position the switches S2 and S3 short circuit the grid circuit of the H.F. valve and the anode coil of the oscillator respectively.

The switch S5 connects the pick-up and its volume control to the grid of the second detector valve, and thus automatically applies negative bias to the grid of this valve.

THE PYE "S" RECEIVER

Sheet No : S 1

Issued 8th December, 1932

Notes on circuit design

General servicing

Servicing the "S" receiver

When suitable apparatus is available, the condition of the valves should be checked in accordance with their published characteristics, or a set of valves known to be satisfactory should be fitted.

The voltages and currents given in Table I on sheet S2 should be obtained with valves of standard characteristics. The voltages should be measured between the chassis and the points mentioned. Two voltages (*a*) and (*b*) are given, the former with the volume control in the maximum position, and the latter with the volume control in the minimum position.

These readings should be within ± 10 per cent. of the stated value providing first-grade instruments are used and providing the smoothed D.C. output of the power unit is :

(*a*) 267 volts.
(*b*) 285 volts.

(See notes on testing power pack.)

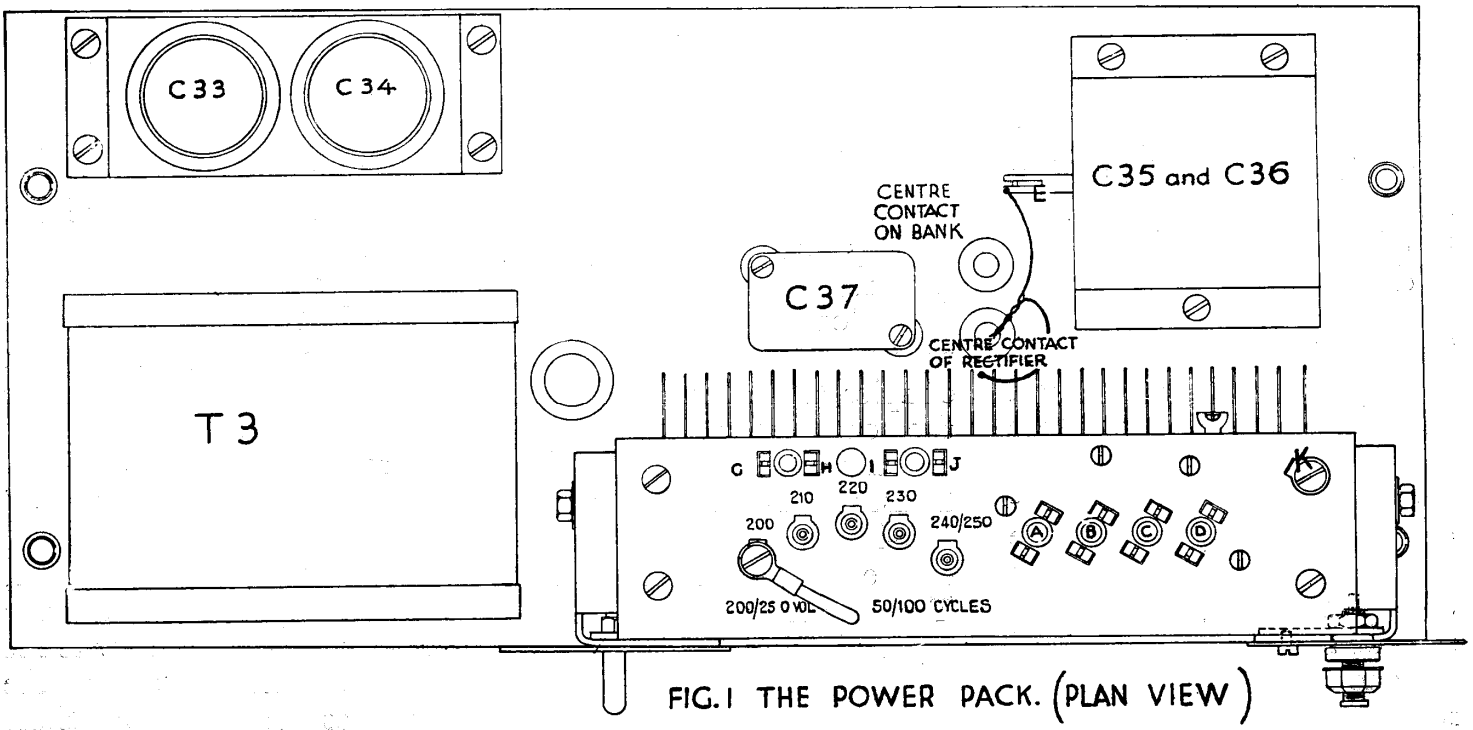


FIG. 1 THE POWER PACK. (PLAN VIEW)

OPERATING CONDITIONS OF THE VALVES

TABLE I.

Operating conditions of the valves in the "S" receiver.

NOTE.—These voltages are measured from the chassis. If a "testing set" measuring from the "Cathode pin" is used, the grid-bias voltage readings must be deducted from those given here. The two readings given in some cases are (a) with volume control in maximum position, (b) with volume control in minimum position.

Variable Mu screened grid H.F. valve. V1.	Screened grid first detector valve. V2.	Oscillator valve V3.
Mazda AC. S1. V.M.	**Mazda AC. SG.**	**Mazda AC. HL.**
Anode volts (a) 139 volts (b) 285 volts Anode current (a) 4½ m.a. (b) 0 m.a. Screen volts (a) 73 volts (b) 142 volts Screen current (a) 1¾ m.a. (b) 0 m.a. Cathode volts (a) 2½ volts (b) 48 volts	Volume control at maximum Anode volts 200 volts Anode current 2¾ m.a. Screen volts 73 volts Screen current 1 m.a. Cathode volts 3½ volts	Volume control at maximum Anode volts, 111 volts rising to 134 at bottom of short-wave band. Anode current, 3½ m.a. falling to 2¾ m.a. at bottom of short-wave band. Cathode volts, 3½ volts
Variable Mu screened grid I.F. valve, V4.	**Second detector valve V5.**	**Pentode output valve V6.**
Mazda AC. S1. VM.	**Mazda AC. HL.**	**Mazda AC. Pen.**
Anode volts (a) 200 volts (b) 228 volts Anode current (a) 5½ m.a. (b) 0 m.a. Screen volts (a) 73 volts (b) 142 volts Screen current (a) 1¾ m.a. (b) 0 m.a. Cathode volts (a) 2½ volts (b) 48 volts	*Radio* Volume control at maximum Anode volts No signal ·96 volts Output valve loaded 110 volts Anode current No signal 5¼ m.a. Output valve loaded 4½ m.a. Cathode volts No signal 2¼ volts Output valve loaded 2 volts *Gram* With volume control at max. Anode volts 127 volts Anode current 3¾ m.a. Cathode volts 2 volts	Volume control at maximum Anode volts 246 volts Anode current 30 m.a. Auxiliary grid volts 201 volts Auxiliary grid current 4½ m.a. Cathode volts 10 volts

If the tests made under Table I show that the valves are being operated under incorrect conditions, the components in the associated anode, grid and cathode circuits should be checked (see Table II below) the valves being compared with those given on Sheet S1.

TABLE II.

Circuit		Associated components.
Variable Mu screened grid H.F. valve (V1)	Anode circuit	R4, C7.
	Screen circuit	R1, R10, R11, C6, C23.
	Grid circuit	Preselector. (L1, L2, Switches and Condensers.)
	Cathode circuit	R2, R3, C5.
Screened grid first detector valve (V2)	Anode circuit	R11, I.F. Transformer, T4, C20, C23.
	Screen circuit	R8, R9, R11, C23, C19.
	Grid circuit	S4, L4, C7, C10, C11.
	Cathode circuit	L5, R7, C18.
Oscillator valve (V3)	Anode circuit	L3, S3, R5, R11, C9, C23.
	Grid circuit	L3, S3, S4, C8, C12, C13, C14, C15, C16, C17, C40, R6.
	Cathode circuit	L5, R7, C18.
Variable mu screened grid I.F. valve (V4)	Anode circuit	I.F. transformer, T5, C22, R11, C23.
	Screen circuit	R1, R10, R11, C6, C23.
	Grid circuit	I.F. transformer, T4, C21.
	Cathode circuit	R2, R3, C5.
Second Detector valve (V5)	Anode circuit	L6, R11, R16, R18, C23, C27, C28, C29, C30.
	Grid circuit	T5, C25, C24, R12, R15, S5.
	Cathode circuit	R13, C26.
Pentode output valve (V6)	Anode circuit	T1, R19, C31.
	Auxiliary grid circuit	R11, C23.
	Grid circuit	T2.
	Cathode circuit	R17, C32.

Servicing the "S" Receiver

(*continued*)

THE PYE "S" RECEIVER

Sheet No : S 3

Issued 8th December, 1932

Servicing the "S" receiver

(*continued*)

H.T. current consumption

Connect a milliameter in series with the power pack contact D in Fig. 1, (Sheet S1) and the two red leads (one to the receiver chassis and one to the speaker). Normally a reading of 63 milliamps. should be obtained.

This reading should be considered in conjunction with the smoothed D.C. reading, referring to TableIII.

TABLE III. Smoothed D.C. voltage and H.T. current indications.

If High voltage	*and*	High current	Check power pack voltages
„ High voltage	„	Low current	Examine receiver for open circuit
„ Low voltage	„	High current	Examine receiver for short circuit
„ Low voltage	„	Low current	Check power pack voltages

Checking the power pack

Measure the mains voltage with an A.C. voltmeter and adjust the receiver to the correct voltage tap. The mains supply is transformed to 4.1 volts R.M.S. for the valve heaters and pilot lamp, also 208 volts R.M.S. for H.T.

Full wave rectification is performed by a Westinghouse metal rectifier in a voltage doubler circuit.

Two 7 mfd. electrolytic condensers and the field-winding of the speaker comprise the smoothing circuit.

The *heater voltage* should be measured with an A.C. meter between the two power pack contacts indicated (A and B, Fig. 1). The reading obtained should be 4.1 volts R.M.S.

The H.T. secondary output should be measured with an A.C. meter between the centre contact on the 8 mfd. condenser bank (C35 and C36) and the centre vane of the metal rectifier (E and F, F1 and G1 Fig. 1). The condenser contact will be found accessible if an insulated prod is inserted between the power pack contact strip and the metal rectifier. A reading of 208 volts R.M.S. should be obtained.

The rectifier voltage is measured with a high resistance D.C. voltmeter between the receiver chassis and the power pack contact (C in Fig. 1). This voltage should be from (*a*) 351, to (*b*) 364 volts. (See Table 1).

The smoothed D.C. voltage output of the power pack is measured between the receiver chassis and the power pack contact (D, in Fig. 1) a voltage of from (*a*) 267 to (*b*) 285 volts being normal. (See Table 1).

Component values

Resistance to be within ± 10 per cent. of stated value.

Band pass unit L1, L2.

L.W. coil, 18 ohms (each section).

M.W. coil 3¼ ohms. (each section).

Anode coil L4.

L.W. coil (including M.W.) 43 ohms.

M.W. coil 4 ohms.

Oscillator coil L3.

L.W. coil (including M.W.) 25 ohms.

M.W. coil, 3¾ ohms.

Anode coil, 225 ohms.

L5, 2¼ ohms.

L6, 220 ohms.

T1, Primary 650 ohms, Secondary ¼ ohm.

T2, Primary, 720 ohms, Secondary, 4,200 ohms.

T4 and T5, I.F. transformers

Primary 110 ohms.

Secondary 110 ohms.

Loud-speaker field, 1,330 ohms.

Loud-speaker speech coil, 1.5 ohms.

THE PYE "S" RECEIVER

Sheet No. : S 4

Issued 8th December, 1932

Removal from the cabinet

Removal of "S" receiver from the cabinet

FIRSTLY remove the control knobs, unsolder the leads between the chassis and the power pack. Remove the power pack and then the receiver chassis as indicated below.

Removal of the control knobs

Remove the control knobs. A direct pull is all that is necessary to remove the tuning and volume control knobs. If difficulty is experienced in pulling off the knobs, two lengths of string should be knotted behind the control knob, their ends being brought to the front of the knob at opposite sides. A sharp direct pull will remove the knob. (See Fig. 2). When a control knob has to be replaced, the "V" shaped spring should be placed in position on the "serrated face" of the spindle recess, the ends of the concave face of the spring resting on the serrations. It will be seen that the control spindle is "D" shaped, and the flat portion of the spindle should fit next to the flat surface in the recess (see Fig. 3).

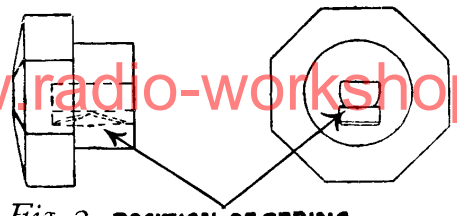


Fig. 3 POSITION OF SPRING ON THE SERRATED SURFACE

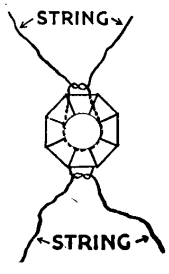


Fig. 2

Removing control knobs from Pye "S" Receiver

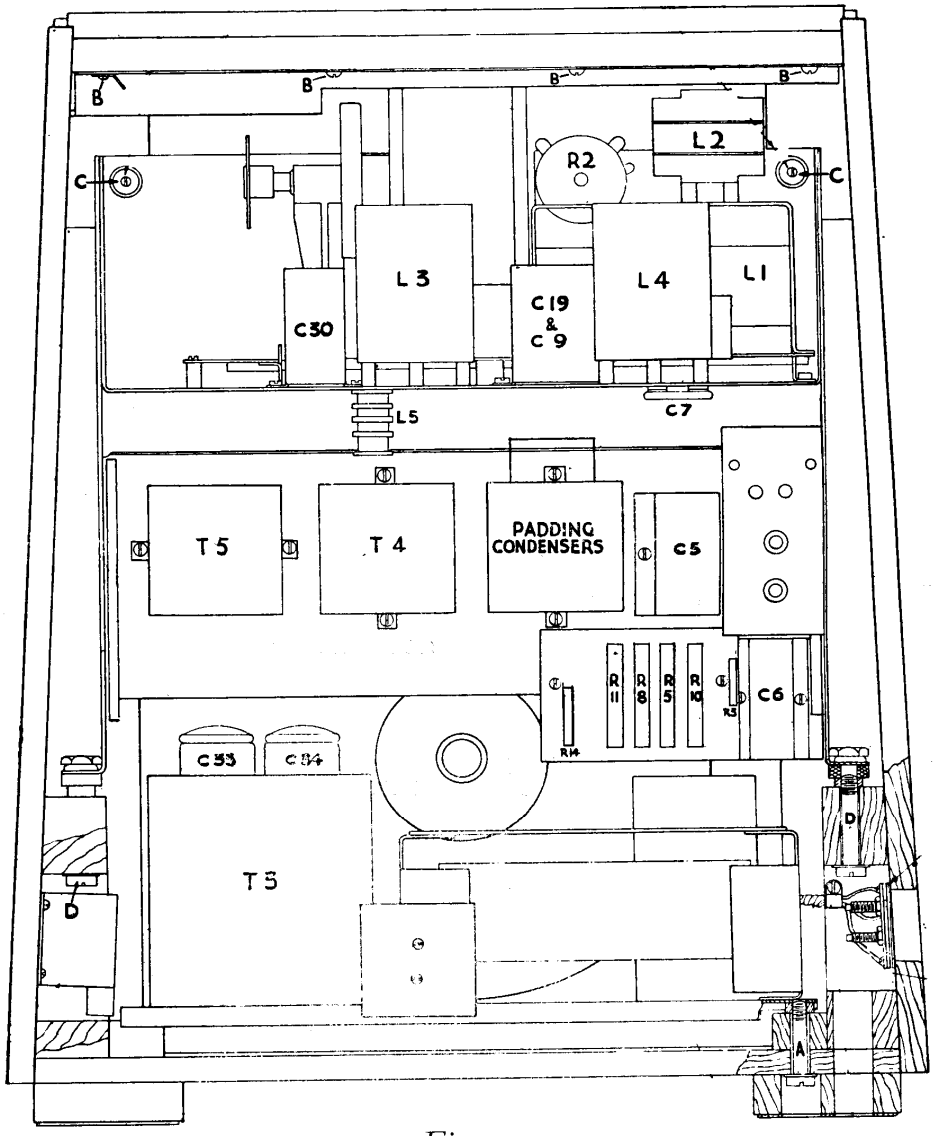


Fig. 4

Rear view with door removed.

Removal of power pack

Unsolder the following leads from the power pack contacts, after having affixed suitable indications to ensure correct replacement. (See Fig. 1).

(1) Lead to tag K.
(2) Black heater lead to tag B.
(3) Lead to tag A.
(4) Two leads (one red lead from speaker) to tag D.
(5) Black speaker lead to tag C.
(6) Two mains switch leads to tags G and J.

Place the cabinet face downwards on a piece of baize or other soft material to avoid damaging the polish.

Remove the four cheese-head screws which hold the power pack to the base of the cabinet (A in Fig. 4). The power pack can now be withdrawn.

Removal of chassis

Unsolder a lead from the chassis to the speaker transformer (second contact from the left). Remove the valve screen held to the top of cabinet by 4 round-head wood screws (B in Fig. 4). Remove the two round-head steel fixing screws from the top corners of the chassis (C in Fig. 4), care being taken that the rubber bushes are not displaced.

The four cheese-head screws holding the base of the chassis to the cabinet (D in Fig. 4) should be removed by inserting a screw driver through the holes provided in the base of the cabinet.

Stand the cabinet upright and withdraw the chassis.

To balance the tuned circuit

The four tuned circuits in the " S " receiver consist of a two-stage band pass circuit, a tuned anode coupling circuit and a tuned grid oscillator circuit.

Important

The four coils and the four-gang condenser with their associated " trimmer " and " padding " condensers are accurately adjusted on specially constructed apparatus and sealed when the receiver is manufactured. The I.F. transformers are similarly sealed. These seals should never be broken unless :

(1) All voltages, currents, and components have been checked and found up to standard.

(2) The efficiency of the receiver has been found to be below standard for selectivity or sensitivity when compared with other standard models.

(3) If accurate equipment is available for ready re-adjustment.

This equipment for adjusting the signal frequency and oscillator circuits, and for checking the oscillator alignment, is a modulated wavemeter accurately calibrated from 200-560 metres and from 900-2,200 metres.

For adjusting the I.F. transformers a modulated oscillator accurately set to 114 kilocycles will be required. Service departments with the necessary equipment for these adjustments may obtain an additional Service sheet giving the procedure, on application to the Service Department, Cambridge.

www.radio-workshop.co.uk

To adjust the dial drive and calibrated drum

To adjust the dial drive

The calibrated dial and condenser drive unit is coupled to the ganged condenser by sprocket wheels and a spring tensioned chain. It is essential that the chain drive is just tight. If it is too loose backlash will be observed, while if it is too tight vibrations in sympathy with the speaker will be noticed. To adjust the tension of the chain, release the three cheese-head bolts (A in Fig. 5), slide the dial unit so that the chain is just at tension and tighten up the three fixing bolts.

A fine adjustment can be effected by releasing the two screws (C in Fig. 5), holding the visor escutcheon plate, the latter being moved up or down to a position so that the drum and indicator correspond to the wave-length to which the receiver is tuned.

To adjust the calibrated drum

Release the fixing screw holding the sprocket wheel to the condenser spindle (B in Fig. 5), place the ganged condenser rotor vanes fully in mesh. This is most important, care being taken that both ends of the rotor vanes are flush with the stator vanes, then rotate the dial to the stop at the highest wave length reading. Refix the sprocket wheel to the condenser spindle by tightening the fixing screw.

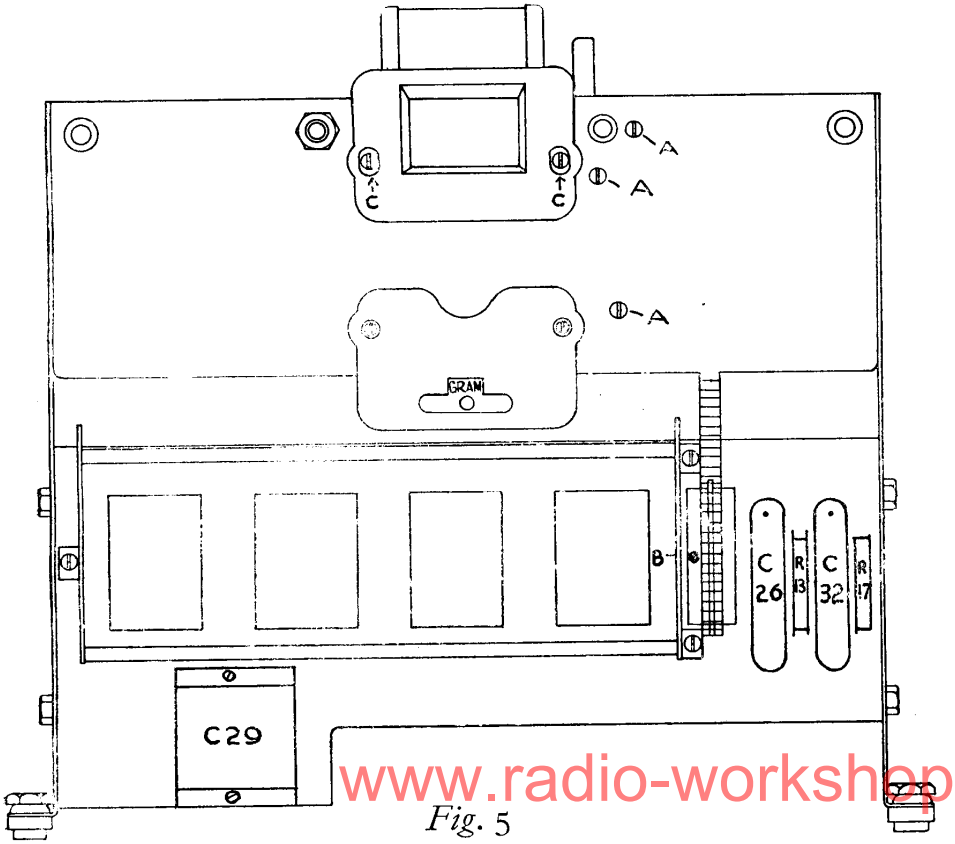


Fig. 5

THE PYE "S" RECEIVER

Sheet No. : S 5

Issued 8th December, 1932

To adjust the dial drive

To replace the mains transformer

Remove the power pack from the cabinet as instructed. Unsolder the six primary leads and the four secondary leads. (See Fig. 6). These are soldered to the contacts which are accessible from the base of the power pack.

Bend up the six fixing tags with a screw-driver and remove the transformer from the chassis.

Hum

The pilot lamp and resistance R14 form a fixed potentiometer across the valve heater circuit—the cathode circuit being connected to the junction of the two.

It is therefore important not only that the receiver should not be operated without a bulb in the pilot lamp holder but also the bulb should be of the correct type.

A standard flash bulb of the 4 volt .3 amp. type is suitable.

Neglect of this precaution will most certainly cause hum.

Testing 7 mfd. TCC. electrolytic condensers for leakage

Disconnect, in turn, the 7 mfd. condensers from the circuit and, observing the polarity of the one being tested, charge with a D.C. potential of 120 volts from an H.T. battery. Insert in series with the condenser and battery a milliameter and a resistance of 10,000 ohms., the milliameter registering the leakage current while the resistance will avoid damage to the meter if a short-circuited condenser is tested. The resistance should be shorted with a switch when taking the final reading. After about one minute the condenser should be fully charged and a steady leakage current not exceeding 5 m.a. is allowable. If a larger leakage current is registered the condenser should be replaced.

Testing 25 mfd. electrolytic condensers for leakages

Disconnect, in turn, the condenser to be tested from the circuit and charge with a D.C. potential of 25 volts from the H.T. battery, care being taken that the positive and negative terminals of the condenser are connected to corresponding battery terminals. A milliameter should be inserted in series with the battery and condenser, and after the condenser is fully charged a leakage current should be registered not exceeding 1 m.a. If a larger leakage current is obtained the condenser should be replaced. To avoid damage to the meter a resistance of 2,000 ohms. can be connected in series with the meter, an error of 8 per cent. will be introduced but can be allowed for.

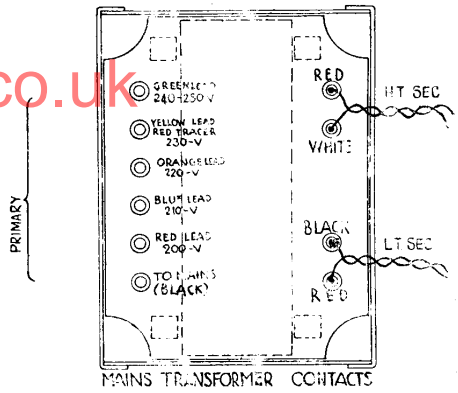


Fig. 6

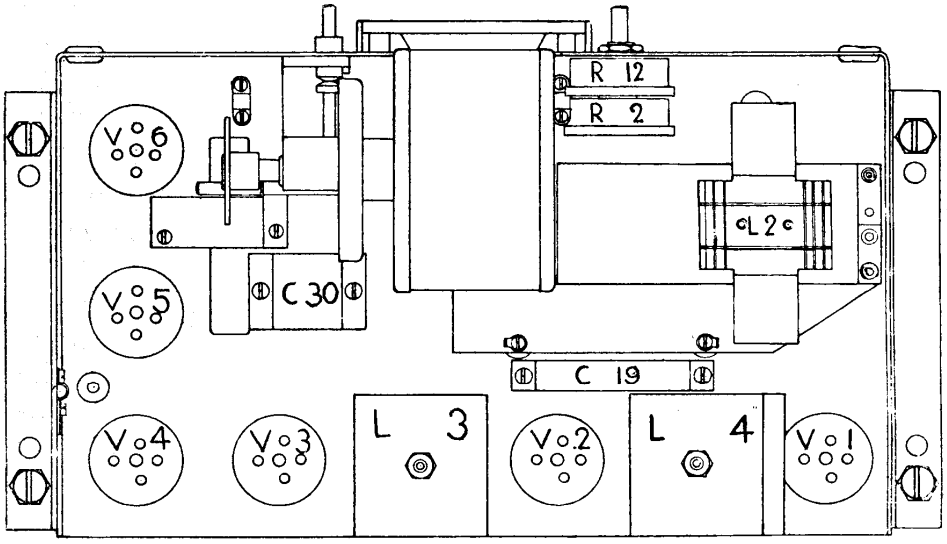


Fig. 7. Plan view of chassis.

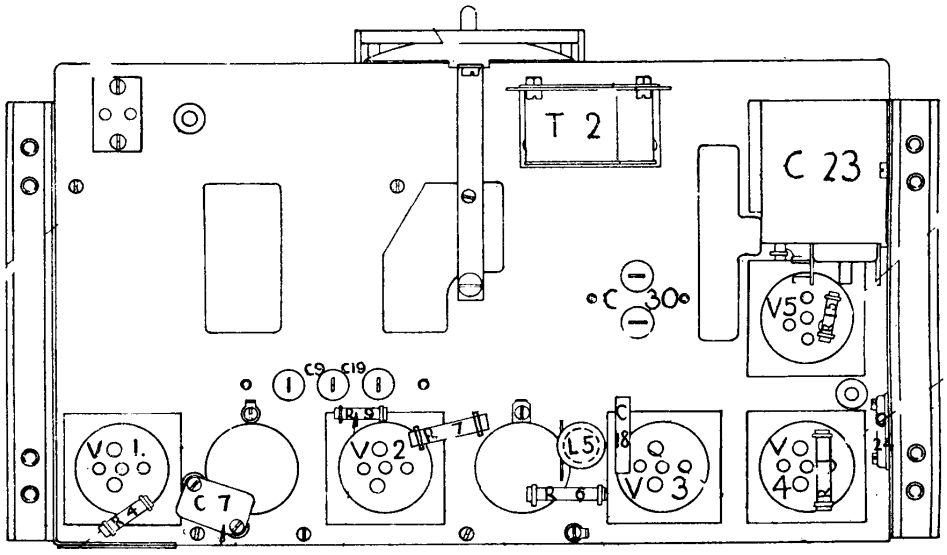


Fig. 8. Underside view of chassis.

Fitting an extra loud-speaker

THE PYE "S" RECEIVER

Sheet No.: S 6

Issued 8th December, 1932

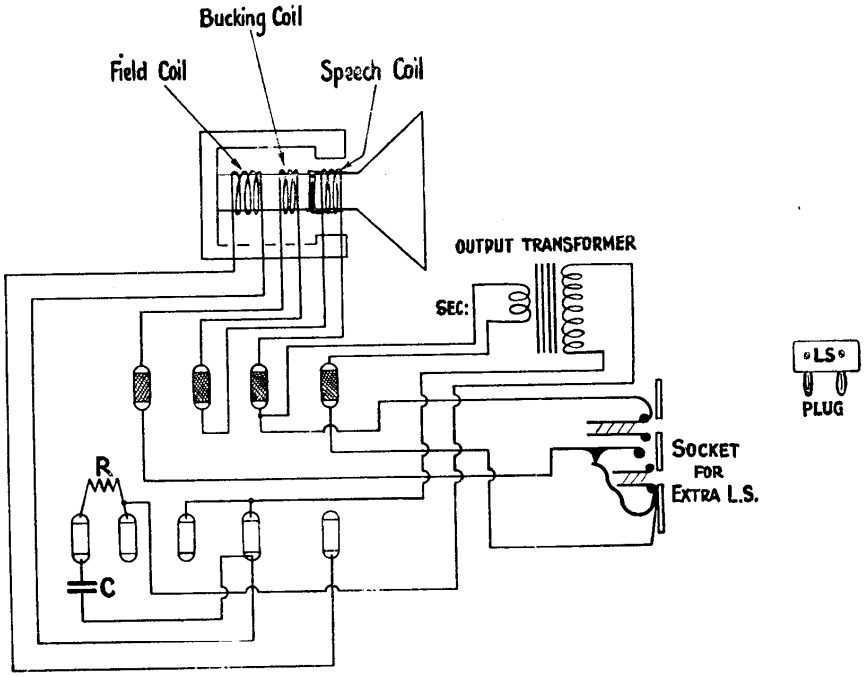
Fitting an extra loud-speaker

LEADS from the output transformer secondary and the speaker voice coil are connected to a jack switch with the sockets for an extra speaker. The extra speaker plug operates the jack switch allowing the internal or extra speaker to be operated either together or separately.

The extra speaker should be of the permanent magnet moving coil type, with a voice coil impedance of between 1.5 and 2.5 ohms. *An additional transformer may not be used as the voice coil is arranged in parallel with the internal transformer secondary.* The new Pye Moving Coil Speaker without a transformer is designed for operation from the "G" and "S". This model sells at £4 5s. od. or at £4 15s. od. with universal transformer. The latter model may not be used with the "S" or "G" Receiver.

Diagram of Connections for Moving Coil Loud Speaker to be used with external speaker switch.

Connections arranged direct to low impedance Secondary of 1½ to 2½ ohms resistance.



- Output Transformer Primary Tags
- Output Transformer Secondary Tags
- R = Tone Corrector Resistance.
- C = Tone Corrector Capacity.

Figure 9

Values of resistances & capacities

R1 .. 12,500 ohms.
R2 8,000 ohms. volume control (Radio).
R3 .. 90 ohms.
R4 .. 28,000 ohms.
R5 .. 25,000 ohms.
R6 .. 2,000 ohms.
R7 .. 500 ohms.
R8 .. 28,000 ohms.
R9 .. 21,000 ohms.
R10 .. 13,500 ohms.
R11 .. 2,000 ohms.
R12 10,000 ohms. volume control (Gram).
R13 .. 500 ohms.
R14 .. 7.5 ohms.
R15 .. .25M. ohms.
R16 .. 10,000 ohms.
R17 .. 325 ohms.
R18 .. 10,000 ohms.
R19 .. 10,000 ohms.

C1, C2, C3, C4, C41, C42, band pass preselector unit, tuning condensers and associated sealed trimmers.

C10, C11, First detector grid circuit tuning condenser and trimmer.

C8, C12, C13, C14, C15, C16, C17, C40, tuning condenser and associated sealed trimmers and padding condensers for the oscillator.

C20, C21 : Sealed condensers of I.F. transformer T4.

C22, C25 : Sealed condensers of I.F. transformer T5.

C5 : 2 mfd.
C6 : 1 mfd.
C7 : .0001 mfd.
C9 : .25 mfd.
C18 : .01 mfd.
C19 : .25 mfd.
C23 : 3 mfd.

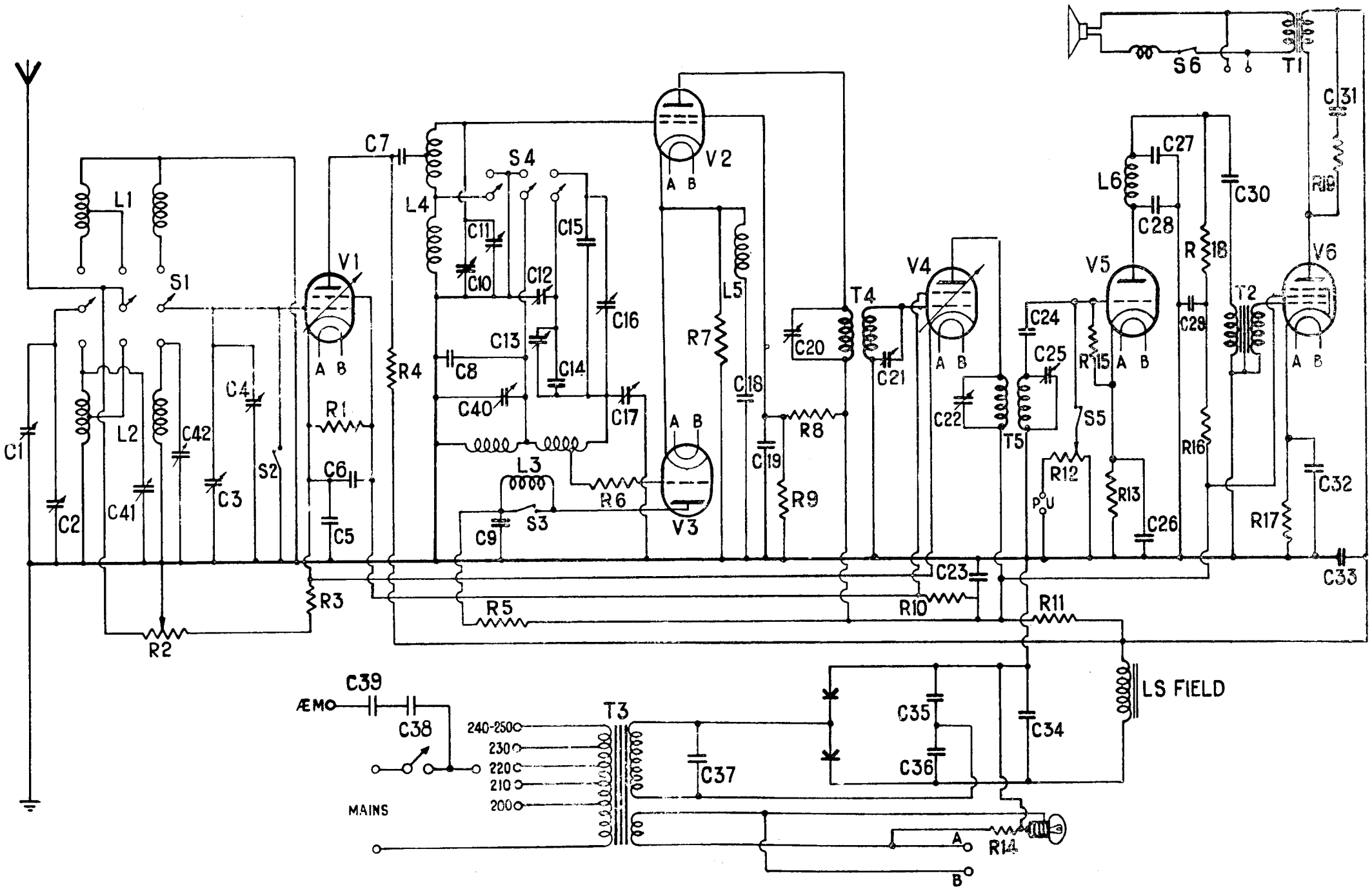
THE PYE "S" RECEIVER

Sheet No. : S 7

Issued 8th December, 1932

Values of resistances and capacities Circuit diagram

C24 : .0001 mfd.
C26 : 25 mfd. electrolytic.
C27 : .001 mfd.
C28 : .002 mfd.
C29 : 2 mfd.
C30 : .5 mfd.
C31 : .01 mfd.
C32 : 25 mfd. electrolytic.
C33 : 7 mfd. electrolytic.
C34 : 7 mfd. electrolytic.
C35 : 4 mfd.
C36 : 4 mfd.
C37 : .002 mfd.
C38 : .002 mfd.
C39 : .002 mfd.



6 VALVE A.C. MAINS SUPERHETERODYNE. TYPE "S".

Circuit Diagram.

SYSTEMATIC TROUBLE TRACKING IN THE "S" RECEIVER WITH THE PYE UNIVERSAL TESTER

THE PYE "S"

Sheet No.: S.8.

Issued June 1st, 1933.

Systematic Trouble Tracking with Pye Universal Tester.

GENERAL Sheet 6 gives the basic instructions for the use of the Pye Universal Tester and General Sheet 7 elaborates these instructions, explaining in detail the various tests the instrument is capable of giving. After making these it will be seen that all tests normally required by a service man can be made with this instrument. It will be obvious, however, that a *systematic method* of test will be necessary if a *quick and accurate* diagnosis is to be made. The tables below give a systematic procedure for testing the "S" receiver.

At first they may appear very complicated, but upon examination it will be seen that even an inexperienced assistant can, with their help, trace faults quickly. A few trial tests will prove this to be the case.

By means of the Pye Universal Tester it is possible to locate the fault in a receiver *without removing the chassis from the cabinet.*

The following test procedure is divided into two sections.

(1) Preliminary check of external accessories and connections, similar to that suggested in "Simplified Service Chart".

(2) Systematic order of tests for the receiver in tabular form.

This table gives full details of the tests and correct readings in Columns 1 and 2. Possible incorrect readings are given in Column 3, and suggestions for the possible causes of trouble in Column 4. The last column gives a means of checking the first diagnosis—to discover which component is causing trouble.

The receiver tests are commenced by checking the power pack voltages, then each valve is removed in turn and placed into the holder on the tester panel. The plug attached to the tester multiple cable is inserted in the receiver in place of the valve and this will enable the operating conditions of these valves to be conveniently measured, by means of the switching circuits in the Universal Tester.

The procedure will be found to be quite straightforward and simple, but as a guide we give here a detailed description of the tests applied to the pentode valve after all preceding checks have been made, and valves known to be satisfactory have been fitted to the receiver.

Testing the pentode valve circuit

Remove the pentode valve from the receiver and place this in the holder on the tester panel. Connect the blue lead from the multiple cable to the auxiliary grid terminal of the valve.

Remove the adaptor from the end of the multiple cable plug, and then place the latter into the receiver pentode valve-holder. Connect the auxiliary grid supply lead to the side terminal of the plug. Remove the screw adaptor from the multiple cable plug terminal and screw on to the auxiliary grid terminal of the valve so that the Belling Lee connector can be used. Now proceed as follows:

To test anode volts

Place switch 1 to TRI, this position is normally for triode valves; for tests, however, the pentode is included in this class. Switch 2 should be placed to V, switch 3 to Anode mA., and switch 7 to 1,000.

Place the black test lead plug in the negative socket of the voltmeter terminals, and the red test lead plug in the 500 volt range voltmeter socket.

Put the black test prod in the test hole marked H, and the red test prod in the test hole marked A. These

" test holes " are seen around the tester valve-holder.

The anode voltage of this valve should read approximately 246 volts with the volume control at its maximum position.

To test the anode current

Place switch 7 at 50, switch 1 at TR1, switch 2 at 1, and switch 3 at Anode mA. (Note: Switch 7 must be operated first.) The meter will now read on the 50 milliamp. scale and this reading should be in the region of 30 milliamps.

To test the auxiliary grid (screen) volts

The tester is connected as for measuring anode volts, the black prod in the test hole marked H, and the red prod on the auxiliary grid terminal.

This reading should be approximately 200 volts.

To test the auxiliary grid (screen) current

Place switch 7 to 10, then switch 1 to S.G., 2 to 1, and 3 to Anode mA. The reading on the 10 milliamp. scale should be approximately 4.5 milliamps.

To test the pentode cathode volts

The tester is connected as for measuring anode volts. The black test lead plug is in the negative voltage socket, and the red test lead plug in the 50 volt range socket. Put the red test prod in the test hole marked H. The reading should be normally 10 volts.

For an illustration let us assume that a high anode voltage reading is obtained, say about 260 volts. The normal reading here should be 246 volts.

In column 4 of the table the " suggested possible faults " for a high reading are given, namely—the primary of the speaker transformer short-circuited or the resistance R17 open-circuited.

In the last column against each " possible fault " is a check to confirm or locate the faulty component.

We will proceed with the check for the speaker transformer primary short-circuited namely, to measure the resistance between the anode socket of the pentode valve holder and the contact D. (See Fig. 1, Sheet S1.)

To measure this resistance switch off the receiver and disconnect the mains supply. Arrange the tester as an ohmmeter in accordance with Sheet General 7. Place one test prod on the pentode valve-holder anode socket and the other on the contact marked D in Fig. 1, Sheet S1.

The tester will now indicate whether the transformer primary is short-circuited or of the correct resistance. We will assume that the correct reading of 650 ohms is obtained and will, therefore, proceed to check the other possible fault.

To check R17 open-circuited, make tests 4 and 7. Readings (a) and (c), respectively, will confirm. Reconnect the mains supply, switch the receiver on, and make the tests as previously described.

Let us assume that Test 4 gives a very low reading and that Test 7 gives a high reading. This confirms that the resistance R17 is open-circuited.

A further test can be made to confirm the above, namely, to measure the resistance between the cathode socket of the pentode valve-holder and the chassis.

To check this resistance, switch off the receiver and disconnect the mains supply. Arrange the tester as an ohmmeter in accordance with Sheet General 7. Place one test prod in the pentode valve cathode socket and the other on the chassis.

If the resistance R1 is open-circuited a very high resistance reading will be obtained instead of the correct reading of 325 ohms.

To check the components for either resistance or insulation the tester should be arranged as indicated for resistance measurements (see General Sheets 6, Table 3, and General 7).

The receiver should be switched off and the power supply, whether mains or batteries, disconnected.

Disconnect one side of the component from the circuit, then place the test prods one on either side of the component.

If a resistance is being determined, read the value off the meter and compare with the correct value in Service Notes.

Condensers are tested in the same way, but the meter should rise momentarily, and then return to zero. If the prods are reversed the same effect should be observed. If the condenser is electrolytic (C26, C32, C33, C34), the correct polarity must be observed. See notes on testing these, Sheet S5.

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Systematic Tests and Tables

SYSTEMATIC TESTS

The object of these Service Notes is to show the methods of checking an "S" receiver to discover the cause of any trouble which may be experienced. These tests being carried out *without removing the chassis from the cabinet*.

First of all the external accessories and connections, as mentioned in the Simplified Service Chart, should be carefully checked in the following order :—

(*a*) See that the power supply is satisfactory.

(*b*) Ensure that the receiver is properly connected to the power supply and that the accessories, flex plug and sockets are making good contact.

(*c*) Check the valves accurately. If this is inconvenient try a set of valves of the same type, which are known to be satisfactory. Sheet General 11 refers to valve testing.

(*d*) Manipulate the controls. If the set is giving any sort of result tune to a known station and while doing so inspect the operation of moving parts, referring to Service Notes when necessary, *re* the part concerned, also look out for obvious symptoms of trouble, such as microphony, mains noises, incorrect tuning, etc.

(*e*) If necessary compare with another receiver of the same type. This is always advisable when in doubt, but it must be understood that such comparisons must be made with instruments side by side, and under exactly the same conditions, *i.e.*, operating voltage, condition of valves, etc.

(*f*) If the fault is not located by the above tests, use the set analyser, referring to the following table, which continues the systematic check.

Note.—The current and voltage readings given in the table are normal when valves of average characteristics are fitted. Allowing for valve variations the readings obtained should be within + or — 10 per cent.

Systematic Tests on "S" Receiver

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Issued June 1st, 1933.

Circuit Tests

Abbreviations :—

o/c - - open circuited

s/c - - short circuited

v/c - - volume control

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 1. Rectifier D.C. output Tester switch 2 at V *Leads* Black lead plug in — volts Red lead plug in 500 volts *Prods* Black prod on chassis Red prod on contact C, Fig. 1, Sheet S1	With the v/c. at— Max., 351 volts Min., 364 volts	(a) No reading	C34 s/c. C37 s/c Primary or secondary windings of the mains transformer o/c	Withdraw the power base and check the condensers Disconnect the mains supply and check the continuity of the windings
		(b) Very low reading	C35 or C36 s/c	Disconnect the mains supply and check the insulation of the condensers
		(c) Low reading 250 volts approx.	C33 s/c C23 s/c	Make test 2, reading (a) will confirm Make test 5, reading (b) will confirm
		(d) Low reading 300 volts approx.	C32 s/c C29 s/c	Make test 4, see reading (c) Make test 8, see reading (a)
		(e) High reading 500 volts approx.	L.S. field o/c R11 o/c	Make test 2, reading (a) will confirm Make test 5, reading (a) will confirm
Test 2. Smoothed D.C. voltage The tester connected as for test 1 The red prod is transferred to the contact D, Fig. 1, Sheet S1	With the v/c. at— Max., 267 volts Min., 285 volts	(a) No reading	C33 s/c L.S. field o/c	See test 1, reading (c). The condenser is checked for leakage as instructed on Sheet S5 Check continuity of speaker as Test 2, reading (d)
		(b) Low reading 150 volts approx.	C23 s/c	See test 2, reading (c). Check the insulation of the condenser
		(c) Low reading 180 volts approx.	C32 s/c C29 s/c C6 s/c	If test 4 gives reading (c) make test 7, reading (a) will confirm Make test 8, see reading (b) Make test 15, reading (c) will confirm
		(d) High reading	L.S. field s/c	Disconnect the mains supply, measure the resistance between the contacts C and D, Fig.1, Sheet S1. The normal reading is 1,330 ohms.
Test 3. Pentode valve anode voltage Connect the tester in accordance with table on Sheet General 8 *Tester switches* 1 at TR1 ; 2 at V ; 3 at Anode mA. ; 7 at 1000	With the v/c. at max., 246 volts	(a) No reading	Primary speaker transformer o/c	Make test 6, reading (c) will confirm The pentode auxiliary grid will become red hot
		(b) Low reading	C32 s/c	If test 4 gives reading (c), make test 7, reading (a) will confirm
		(c) High reading	Primary speaker transformer s/c	Disconnect the mains supply and measure the resistance between the anode socket of the pentode valve-holder, and the contact D, Fig. 1, Sheet S1. The reading should be 650 ohms

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 3 cont. Tester leads Black lead plug in — volts Red lead plug in 500 volts Black prod in test hole H Red prod in test hole A			R17 o/c	Make tests 4 and 7, readings (a) and (c) will confirm
Test 4. Pentode valve anode current Tester as for test 3 *Switches* 1 at TR1; 2 at I; 3 at Anode mA.; 7 at 50	30 mA. with v/c. at max.	(a) Very low reading (b) Low reading (c) High reading	R17 o/c R17 high resistance C32 s/c	See test 3, reading (c). Make test 7, reading (c) will confirm Measure the resistance of R17 See tests 1, 2 and 3, readings (d), (c) and (b), respectively. Test the leakage of the condenser, see Sheet S5
Test 5. Pentode valve auxiliary grid volts Tester switches and leads as for test 3 Black prod in test hole H Red prod on terminal on side of valve	201 volts with the v/c. at max.	(a) No reading (b) Low reading (c) High reading	C23 s/c R11 o/c C29 s/c R11 s/c C32 s/c	See test 2, reading (b), check the insulation of the condenser See test 1, reading (e). Measure the resistance between the contact D, Fig. 1, Sheet S1 and the pentode auxiliary grid lead. If R11 is o/c an open-circuit will be indicated. Normally a reading of 2,000 ohms should be obtained Make test 8, reading (b) will confirm Measure the resistance between the contact D, Fig. 1, Sheet S1, and the pentode auxiliary grid lead. If R11 is s/c a short-circuit will be indicated. Normally a reading of 2,000 ohms should be obtained. Make test 7, reading (a) will confirm
Test 6. Pentode valve auxiliary grid current Tester as for test 3 Switches. 1 at S.G.; 2 at I; 3 at Anode mA.; 7 at 10	4.5 mA. with the v/c. at max.	(a) No reading (b) Low reading (c) High reading	C23 s/c. R11 o/c. R17 o/c R17 high resistance Primary T1 o/c	See tests 4 and 5, readings (a) See test 4, reading (b). Measure the resistance of R17, normally a reading of 325 ohms should be obtained See test 3, reading (a). Measure the resistance between the contact D, Fig. 1, Sheet S1 and the pentode anode socket. If the primary of T1 is o/c an open-circuit will be indicated. Normally a reading of 650 ohms should be obtained
Test 7. Pentode valve Cathode volts Tester and switches as for test 3 Black lead plug in — volts Black prod in test hole H Red prod in test hole C	10 volts with the v/c. at max.	(a) No reading (b) Low reading	C32 s/c R17 low resistance. C23 leaking R17 o/c	See tests 3, 4 and 5, readings (b), (c) and (c) respectively. Check the condenser in accordance with Sheet S5 Measure the resistance between the cathode socket of the valve-holder and the chassis. The reading should normally be approximately 325 ohms. A low reading will indicate either R17 low resistance, or C32 leaking, and a high reading will indicate R17 o/c. If an unsatisfactory reading is obtained, check each component separately

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Circuit Tests

(*Continued*)

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 8. Second detector valve anode volts Tester, switches, and leads as for test 3 Black prod in test hole H Red prod in test hole A	96 volts with the v/c. at max. on radio	(a) No reading	R16, R18, L6 o/c	Measure the resistance between anode socket of second detector valve and auxiliary grid connection of the pentode. If this is not 20,000 ohms, test individual parts
			C27 or C28 s/c	Test the insulation of these condensers
	127 volts with the switch at gram. position	(b) Low reading	C29 s/c	See test 5, reading (b). Check the insulation to confirm
			C26 s/c	Make test 10, reading (a) will confirm
			C30 s/c	Check the insulation
			R16, R18 high resistance	Measure the resistance between anode socket of second detector valve-holder and the auxiliary grid lead of the pentode. If this is not 20,000 ohms, test individual parts
		(c) High reading	R16, R18 s/c	
			Gram. switch not opening	Anode volts remain at 127 volts with switch in long or medium wave position. Examine switch
Test 9. Second detector valve anode current Tester and switches as for test 4	5.25 mA. on radio 3.75 mA. with switch at gram.	(a) No reading (b) Low reading (c) High reading	Any change in current would effect voltage and the same possible faults apply	See test 8
Test 10. Second detector valve cathode volts Tester switches as for test 3 Black lead plug in — volts Red lead plug in 10 volts Black prod in test hole H Red prod in test hole C	2.25 volts on radio. 2 volts with the switch at gram.	(a) No reading	C26 s/c R13 low resistance, C26 leaking R13 o/c	Measure the resistance between the second detector cathode socket and the chassis. If it is not approximately 500 ohms, measure the resistance of R13 and test the electrolytic condenser in accordance with instructions given on Sheet S5

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 11. *I.F. amplifier valve anode volts* Tester connected in accordance with Sheet General 8 Switches. 1 at SG; 2 at V; 3 at Anode mA.; 7 at 1,000 Black lead plug in — volts Red lead plug in 500 volts Black prod in test hole H Red prod on anode terminal of valve	200 volts with the v/c. in the max. position, and 228 volts at min.	(a) No reading	Primary intermediate transformer, T5 o/c	Make test 14, reading (c) will confirm
		(c) High reading	C6 s/c	Make test 12, see reading (a)
			R10 s/c	Make test 13, reading (a) will confirm
Test 12. *I.F. valve anode current* Tester as for test 11 Switches. 1 at SG; 2 at I; 3 at Anode mA.; 7 at 10	5.5 mA. at the max. position of v/c. and o at min. position	(a) No reading	C6 s/c	If test 13 gives reading (b) make test 15, reading (c) will confirm
			R10 o/c	Make test 13, see reading (a)
		(b) High reading	R1 o/c	Make test 15, reading (b) will confirm
			C5 s/c	Make test 15, reading (a) will confirm
Test 13. *I.F. valve screen volts* Tester leads and switches as for test 11 Black prod in test hole H Red prod in test hole A	73 volts at the max. position of the v/c. and 142 volts at min.	(a) No reading	R10 o/c	See tests 11 and 12, readings (c) and (a). Confirm by measuring the resistance between the I.F. valve-holder anode socket and the pentode auxiliary grid lead. A reading of 13,500 ohms is normal. If R10 is o/c an open-circuit will be indicated
		(b) Reading low varies from 5-80 volts with v/c.	C6 s/c	See tests 11 and 12, readings (c) and (a) respectively Make test 15, reading (c) will confirm
		(c) High reading	R1 o/c	See test 12, reading (c). Make test 15, reading (b) will confirm
			R10 s/c	Make test 15, reading (d) will confirm
Test 14. *I.F. valve screen current* Tester as for test 11 Switches. 1 at TRI; 2 at I; 3 at Anode mA.; 7 at 10	1.75 mA. at the max. position of the v/c., and o at the min. position	(a) No reading	C6 s/c	See tests 11, 12 and 13, readings (c), (a) and (b) respectively. See test 15, reading (c) will confirm
		(c) High reading	Primary T5 o/c	See test 11, reading (a). Measure the resistance between the anode socket of the I.F. valve-holder and the pentode auxiliary grid lead. If the primary of T5 is o/c, an open-circuit will be indicated. Normally a reading of 110 ohms should be obtained

Systematic Tests on "S" Receiver

(*Continued*)

Circuit Tests

(*Continued*)

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 15. I.F. valve cathode volts Tester and switches as for test 11 Black lead plug in — volts Red lead plug in 200 volts Black prod in test hole H Red prod in test hole C	2.5 volts at the Max. position of the v/c., and 48 volts at min.	(a) No reading	C5 s/c	See test 12, reading (c). Test the insulation of the condenser
		(b) Low reading	R1 o/c	Confirms tests 12 and 13, readings (c) and (c). Measure the resistance of R1. This should be 12,500 ohms
		(c) High reading varies from 5–80 volts with v/c.	C6 s/c	Confirms tests 11, 12 and 13, readings (c), (a) and (b) respectively. Check the insulation of the condenser
		(d) High reading	R10 s/c	See test 13, reading (c)
		(e) No variation with v/c.	R3 o/c. R2 o/c. Slider not making contact	Measure the resistance between the I.F. valve-holder cathode socket and the chassis. This should vary between 90 and 8,090 ohms, as the volume control is turned from maximum to minimum
Test 16. Oscillator valve anode volts Tester connected in accordance with Sheet General 8 Switches. 1 at TR1; 2 at V; 3 at Anode mA.; 7 at 1000 Black lead plug in — volts Red lead plug in 200 volts Black prod in test hole H Red prod in test hole A	111 volts possibly rising to 134 volts as dial is turned from top to bottom of the medium wave band. v/c. at the Max. position	(a) No reading	C9 s/c R5 o/c. L3 o/c	Check the insulation of the condenser Measure the resistance between the anode socket of the valve-holder and the pentode auxiliary grid lead. If this is not 25,225 ohms check the individual resistances of R5 and L3
		(b) Low reading	R5 high resistance C18 s/c	Make test 17 if reading (c) is obtained, make test 18, reading (a) will confirm
		(c) High reading	R7 o/c R5 s/c	Make test 18, reading (c) will confirm Measure the resistance between the anode socket of the oscillator valve-holder and the pentode auxiliary grid lead. A reading of 225 ohms would indicate that R5 is short-circuited. Normally a reading of 25,225 ohms should be obtained
		(d) Does not vary with tuning	S3 not opening when selector switch is on either long or medium waves	Examine the switch. This should be open in both long and medium positions and closed when the switch is at gram.

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 17. *Oscillator valve anode current* Tester as for test 16 Switches. 1 at TR1 ; 2 at I ; 3 at Anode mA. ; 7 at 10	3.5 mA. possibly falling to 2.75 mA. at bottom of medium wave band. v/c. at max.	(a) No reading	C9 s/c. R5 o/c. L3 o/c R7 o/c	See test 16, reading (a)
		(c) High reading	C18 s/c	See test 16, reading (c). Make test 18, reading (c) will confirm Make test 18, reading (a) will confirm
Test 18. *Oscillator valve cathode volts* Tester and switches as for test 16 Black lead plug in — volts Red lead plug in 10 volts Black prod in test hole H Red prod in test hole C	3.5 volts at the max. position of the v/c.	(a) No reading	C18 s/c	Confirms tests 16 and 17, readings (b) and (c) respectively. Check the insulation of the condenser
		(b) Low reading	R5 high resistance or o/c. Primary of transformer T4 o/c. C19 s/c. R8 o/c	See test 16, readings (a) and (b)
			R7 o/c	Make tests 19 and 20, see readings (a) and (c)
		(c) High reading approx. 7 volts	R7 o/c	See tests 16 and 17, readings (c) and (c). Check the resistance between the cathode socket of the oscillator valve-holder and the receiver chassis. The normal reading should be approximately 500 ohms. If R7 is o/c the reading will be very high
Test 19. *First detector valve anode volts* Tester connected in accordance with Sheet General 8 Switches. 1 at SG ; 2 at V ; 3 at Anode mA. ; 7 at 1000 Black lead plug in — volts Red lead plug in 500 volts Black prod in test hole H Red prod on the anode terminal of the valve	200 volts at the max. position of the v/c.	(a) No reading	Primary T4 o/c R8 o/c R7 o/c	Make test 22, reading (c) will confirm Make test 21, see reading (a) See test 20, reading (a)
		(c) High reading		
Test 20. *First detector valve anode current* Tester as for test 19 Switches. 1 at SG ; 2 at I ; 3 at Anode mA. ; 7 at 10	2.75 mA. with the v/c. at max.	(a) No reading	C19 s/c. R8 o/c R7 o/c	Make test 21, see reading (a) See test 18, reading (c)
		(b) Low reading	R8 high resistance	Make test 21, see reading (b)
		(c) High reading	C18 s/c	See test 18, reading (a)

Systematic Tests on "S" Receiver

(Continued.)

Circuit Tests

(Continued.)

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 21. First detector valve screen volts Tester switches as for test 19 Red lead plug in 200 volts Black lead plug in — volts Red prod in A Black prod in H	73 volts with the v/c. at Max.	(a) No reading	C19 s/c	If test 20 gives reading (a) check the insulation of the condenser
			R8 o/c	See tests 19 and 20, readings (c) and (a) respectively. Measure the resistance between the screen socket of the first detector valve-holder and the pentode auxiliary grid connection. A reading of 28,000 ohms is correct
		(b) Low reading	R8 high resistance	
		(c) High reading	R9 o/c	Disconnect one side of R8. Measure the resistance between the screen socket and the chassis. A reading of 21,000 ohms will indicate R9 is in order
Test 22. First detector screen current Tester as for test 19 Switches. 1 at TRI; 2 at 1; 3 at Anode mA.; 7 at 10	1 mA. with the v/c. at Max.	(a) No reading	Possible faults are the same as for tests 20 and 21, reading (a)	
		(c) High reading	Primary T4 o/c	Confirms test 19, reading (a). Measure the resistance between the first detector anode lead and the pentode auxiliary grid lead. If the primary of T4 is o/c, an open-circuit will be indicated. Normally a reading of 110 ohms should be obtained
Test 23. First detector valve cathode volts Tester and switches as for test 19 Black lead plug in — volts. Red lead plug in 10 volts Black prod in test hole H Red prod in test hole C	3.5 volts with the v/c. at Max.		The first detector cathode is connected in parallel with the oscillator valve cathode, therefore, the readings and possible faults will be the same as for test 18	See test 18

Test	Correct reading	Reading obtained	Possible faults	Alternate tests as cross checks to confirm or locate the faulty component
Test 24. H.F. valve anode volts Tester switches, leads, and prods as for test 11	139 volts at the Max. position of v/c. and 285 volts at min.	(a) No reading (b) Low reading (c) High reading	R4 o/c C7 s/c C5 s/c R4 s/c C6 s/c. R10 s/c R10 o/c	Make test 27, reading (c) will confirm Check the insulation of the condenser. See test 15, reading (a) will confirm Measure the resistance between contact D (Sheet S1, Fig. 1) and the H.F. valve anode lead. A reading of 28,000 ohms is correct See test 15, readings (c) and (d) See test 13, reading (a)
Test 25. H.F. valve anode current Tester and switches as for test 12	4.5 mA. at the Max. position of the v/c., and o at the min. position	(a) No reading (b) Low reading (c) High reading	R10 o/c C6 s/c. R10 s/c R4 high resistance R1 o/c C5 s/c	See test 13, reading (a) See test 15, readings (c) and (d) Measure the resistance between contact D (Sheet S1, Fig. 1) and the H.F. valve anode lead. A reading of 28,000 ohms is correct See test 13, reading (c) will confirm See test 15, reading (a) will confirm
Test 26. H.F. valve screen volts Tester, switches, leads and prods as for test 13	73 volts at the Max. position of the v/c., and 142 volts at the min.	(a) No reading (b) Low reading (c) High reading	The high frequency valve screen is connected in parallel with the intermediate frequency valve screen, therefore, the readings and possible faults will be the same as for test 13	See test 13
Test 27. H.F. valve screen current Tester and switches as for test 14	1.75 mA. at the Max. position of the v/c., and o at min.	(a) No reading (c) High reading	C6 s/c R4 o/c	See test 13, reading (b) will confirm See test 24, reading (a). Measure the resistance between the power pack contact D, Fig. 1, Sheet S1, and the H.F. valve anode lead. If R4 is o/c an open-circuit will be indicated. Normally a reading of 28,000 ohms will be obtained
Test 28. H.F. valve cathode volts Tester, switches, leads and prods as for test 15	2.5 volts to 48 volts. The v/c. rotated from Max. to min.	(a) No reading (b) Low reading (c) High reading varies from 5–80 volts with v/c. (d) High reading (e) No variation with v/c.	The high frequency valve cathode is connected in parallel with the intermediate frequency valve cathode. Therefore the readings and possible faults will be the same as for test 15	See test 15

If these tests fail to show the fault the components which would have no effect upon the readings should be tested.

The insulation of the gang condenser should be checked, and if necessary the tuned circuits rebalanced in accordance with Sheet S4.

Check the insulation and resistance of the intervalve transformer windings.

Replacing the volume control in the "S" receiver with combined volume and tone control.

THE PYE "S"

Sheet No.: S.14.

Issued 26th June, 1933

Replacing the volume control in "S" receiver with a combined volume and tone-control.

THE combined volume and tone control unit, together with a .0003 mfd. condenser, fibre spacing pieces and fixing bolts, is supplied at a cost of 6s. 6d. net.

The volume control section is the same as that originally fitted to the "S" receiver; the tone control is operated by means of a push-pull action of the volume control knob, which opens and closes a switch, this connects a .0003 mfd. condenser between the grid of the pentode valve and the chassis.

Procedure

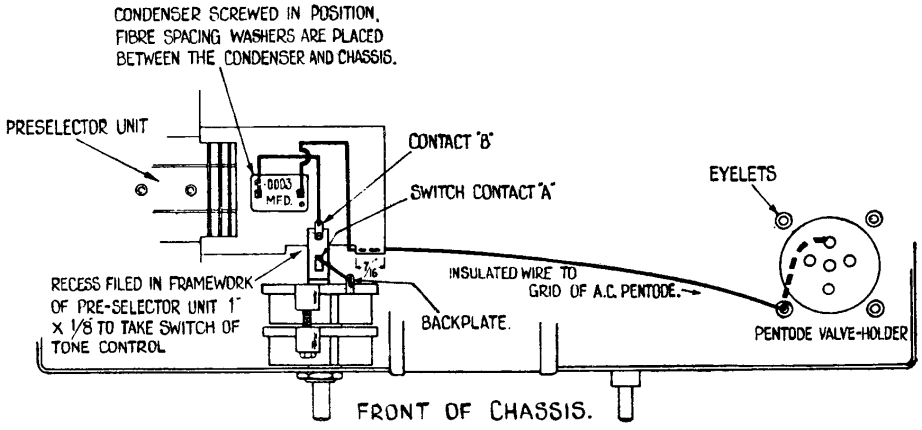
Remove the chassis from the cabinet as instructed on Service Sheet S4. Disconnect and remove the volume control fitted to the receiver, after having affixed suitable indications to the leads, to ensure that they are correctly replaced on the new control.

File a recess in the chassis of the preselector unit as shown in Fig. 1, care being taken to see that the coil windings are not damaged and that the filings do not drop into the receiver. A piece of cloth can be used to protect the windings and also catch the filings.

The .0003 mfd. condenser is mounted in the position shown in Fig. 1 on the chassis of the preselector unit, two fibre spacing pieces are placed between the condenser and the chassis. When drilling the two fixing screw holes in the preselector chassis, take particular care that the drill does not foul the preselector coils.

Fix the new combined control unit in position with the switch contacts uppermost; wire up both the volume control sections as originally.

Join the switch contact (A in Fig. 1) to the back-plate of the volume control unit, and the contact (B in Fig. 1) to one side of the .0003 mfd. condenser. From the other condenser contact take a wire and solder to the grid contact of the pentode valve-holder. This lead passes through one of the eyelets fixing the pentode valve-holder to the chassis.



PLAN

EXTRA WIRING ONLY SHOWN

Fig. 1.

The Pye "S" Receiver

Sheet No: S 15

Issued 8th March, 1934

Adjusting the Tuned Circuits

Adjusting the tuned circuits

The three signal frequency circuits consist of a two-stage pre-selector band pass circuit and a tuned grid coupling circuit. The coils and condensers are accurately matched when the receiver is manufactured. Provision is made accurately to balance these circuits by adjustable trimmer condensers (C1, C4, C11, Fig. 1) shunting each of the three circuits.

Note. If it intended to re-adjust the I.F. transformer this must be done *before* the tuned circuits are balanced.

To balance the tuned "signal frequency" circuits.

These adjustments should be undertaken only if accurately calibrated modulated oscillators are available.

The three signal frequency circuits must be adjusted first —to do this proceed as follows :

Remove the second detector valve (V5) from its socket and remove the anode plug from the first detector (V2). Then with a short length of flex connect the anode of V2 to the anode socket of the holder for V5.

Then with the calibrated drum set to register the minimum wavelength and the selector switch on medium waves apply a modulated signal of 204.7 metres. The signal should be applied through a dummy aerial to simulate operating conditions. The trimmer condensers C1, C4 and C11 (Fig. 1) should then be carefully adjusted to give a maximum L.F. output from the set.

N.B. An output meter should be used for this purpose.

Replace the second detector valve and the anode lead to the first detector.

A very much smaller signal should now be applied and the wavelength changed to 205 metres. The trimmer C17 (Fig. 2) should be adjusted to give a maximum L.F. output from the set.

Note. C17 is *not* the trimmer mounted on the four-gang condenser but is mounted on the padding condenser (see Fig. 2). The adjusting screw is on the left-hand side of this trimmer and is adjusted through a hole in the aluminium mounting plate.

Long waves.

Remove the second detector valve and connect up its anode socket to the first detector as for short waves. Set the calibrated drum to register 1,000 metres and apply a modulated signal of this wavelength. Adjust the two trimmers C41 and C42 on the long wave pre-selector coils to give maximum output as before. Replace V5 and the anode lead to V2, then adjust the trimmer C40 on the four-gang condenser (see Fig. 1) to give a maximum output once more.

After adjustments have been made, a blob of secotine or similar adhesive should be dropped on to each adjusting nut.

Important. When adjusting C17 and C40 it is essential that a very small signal only is applied in order to avoid overloading the L.F. stages. A signal of from 1 to 10 microvolts should be found suitable.

To check the tracking of the oscillator.

Having adjusted the set as instructed above, the tracking may be checked as follows :

Apply a modulated signal of 350 metres and tune in on set. Convert the set to a three valve arrangement by removing V5, etc., as before, and without altering the position of the tuning dial change the wavelength of the applied signal so that a maximum output is obtained. The required change should not be more than 2 metres.

Note. In all these adjustments a much stronger signal should be applied when using the three valve arrangement than when operating the receiver normally.

The procedure described above should be carried out at :—

(*a*) 550 metres where the required change may be up to 6 metres.

(*b*) 1,400 metres where the change may be up to 40 metres.

(*c*) 2,000 metres where the change may be up to 75 metres.

On the long waves it will sometimes be found that "double hump" tuning is experienced when operating the receiver in the three valve arrangement, in these cases the "dip" of the "double hump" should be taken as the tuning point when checking the tracking.

Should this test show that the tracking is in error, the receiver must be returned to Cambridge.

Adjusting the I.F. transformers.

Important. This should be undertaken only if a really accurate source of modulated supersonic frequency is available. The frequency required being 114 kilocycles.

The following adjustments should be made with all valves in position. A resistance of 50,000 ohms, another of 100,000 ohms, a 1 mfd. condenser, and an output meter will be required.

The four adjusting screws of the I.F. transformer are sealed with secotine and these seals must be broken before adjustments can be commenced. If necessary the I.F. transformer covers may be removed, by undoing the fixing nuts. The covers must be on when the adjustments are made, and should not be removed afterwards.

The resistance and condenser are connected in series, one side of the condenser connected to the receiver chassis. The free end of the resistance is to be connected by means of flex and a clip to the grid socket of the I.F. valve (V4).

The 114 kilocycle frequency should be applied at the grid of the first detector valve (V2) via a condenser of .002. The connection to this grid should be temporarily removed and a grid leak of 100,000 ohms connected from grid to chassis. The condenser C20 (Fig. 2) must now be adjusted to give a maximum L.F. output on the meter. Remove the resistor from the grid of V4 and clip on to the anode of the first detector (V2).

Having done this the adjusting screw of the condenser C21 (Fig. 2) must be rotated for maximum output again.

The resistor and 1 mfd. condenser should now be permanently disconnected.

The condensers C22 and C25 (see Fig. 2) should now be similarly adjusted in turn, having done which, the adjustment of the I.F. transformer is completed and the grid connections of V2 may be replaced.

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FIGURES 1 AND 2

The Pye "S" Receiver

Sheet No: S 16

Issued 8th March, 1934

FIGURES 1 AND 2

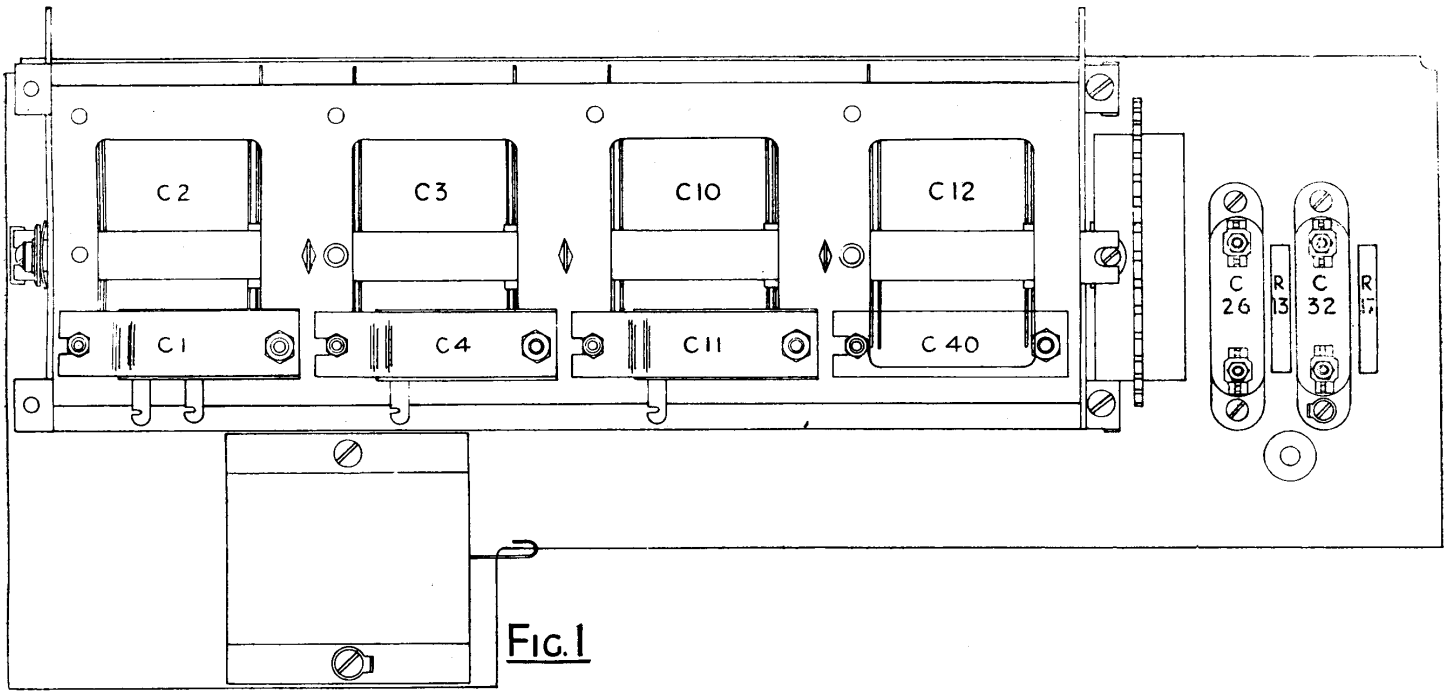


FIG. 1

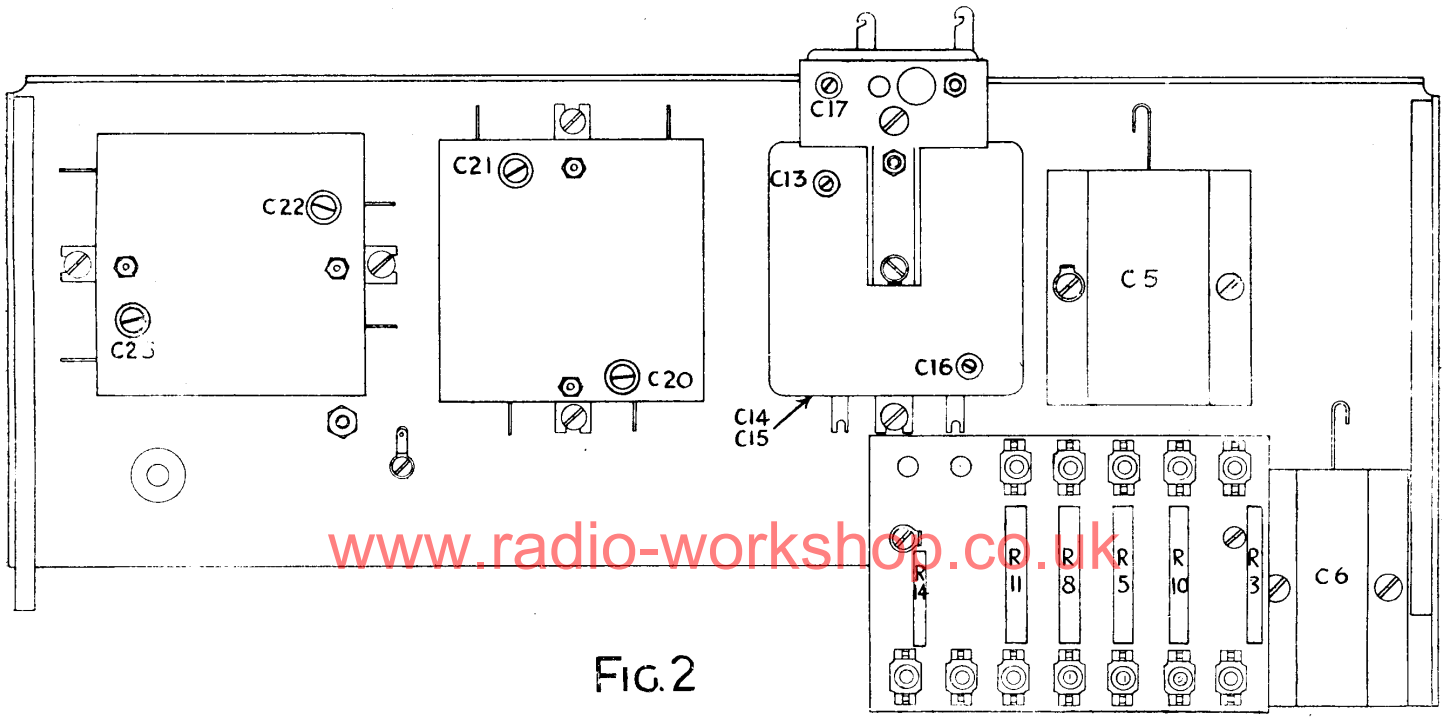


FIG. 2

RADIOGRAMOPHONES types S/RG and S/RG/Auto

THE PYE "S/RG" and S/RG/Auto

Sheet No.: S/RG 1

Issued 29th August, 1933

General Servicing and Tests

THE "S/RG" and "S/RG/Auto" radiogramophones operate on A.C. mains, and incorporate the "S" chassis. (A description of the circuit design will be found on Sheet S.1.)

Mains driven induction gramophone motors are fitted. The "Collaro" motor and pick-up unit for the "S/RG (for Service see Sheet G/RG 2) and the "Garrard" automatic record changing unit for the "S/RG/Auto" (see Sheet S/RG3).

The pick-up leads are connected to the pick-up sockets on the "S" chassis.

The loud speaker is an energised moving coil type with a low impedance "voice" coil. Provision is made to connect an extra speaker. (see sheets S6 and General 12).

Servicing the S/RG and S/RG/Auto Radiogramophones

THESE symptoms of a faulty radiogramophone usually indicate the unit in which the fault will be found.

(*a*) If radio signals are satisfactory, but the gramophone fails to function, the components associated with the gramophone unit should be tested, the chassis can in these circumstances generally be assumed to be satisfactory.

(*b*) If gramophone reproduction is satisfactory, while no radio signals can be received, check the aerial-earth system then the H.F. section of the chassis.

(*c*) If neither the radio nor gramophone is operating, first check the action of the speaker jack switch in conjunction with an external speaker, then proceed to service the radiogram in accordance with Sheets S 1—13, where full information is given, with one exception, namely, the wiring between the chassis and the power base. This information is given in Fig. 1.

IN CASES WHERE THE FAULT IS FOUND TO BE OF AN EXCEPTIONAL NATURE BEYOND THE SCOPE OF THE SERVICE ENGINEER, WE CANNOT UNDERTAKE TO SEND A SERVICE MAN TO DEAL WITH THE MATTER, AS WE DO NOT KEEP A STAFF OF SERVICE MEN FOR THIS PURPOSE.

THE UNIT OR COMPONENT IN WHICH THE TROUBLE IS LOCATED SHOULD BE REMOVED FROM THE RADIOGRAM, CAREFULLY PACKED AND RETURNED FOR REPAIR OR REPLACEMENT TO THE SERVICE DEPARTMENT, CAMBRIDGE.

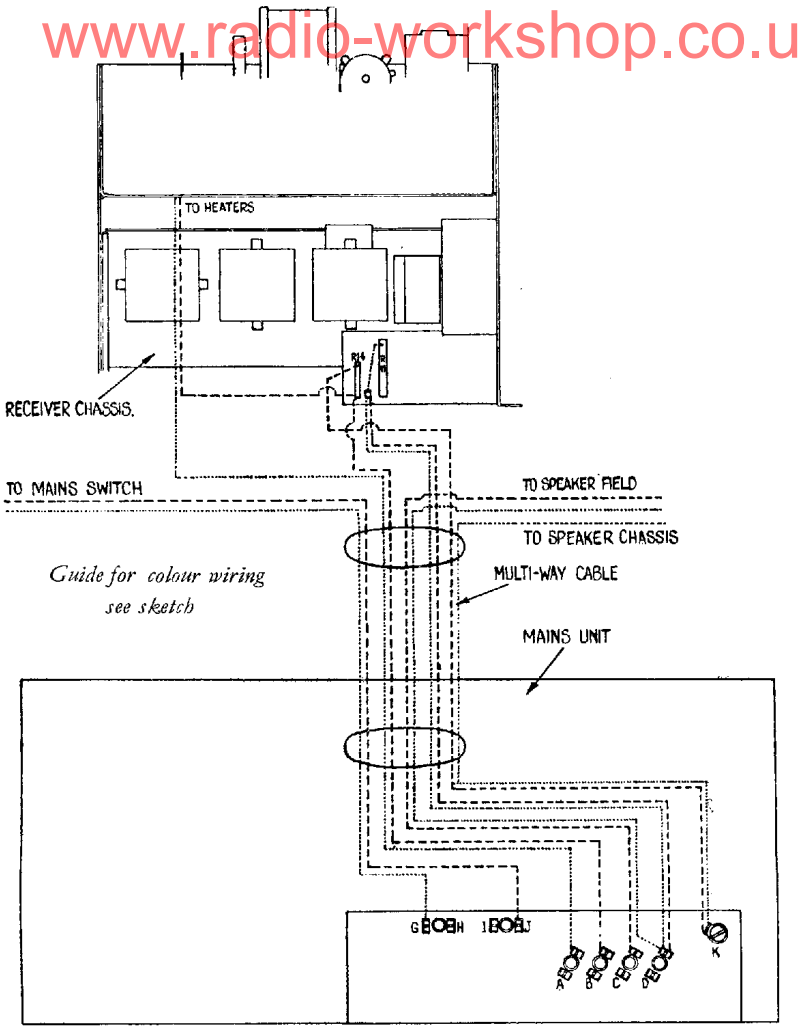


*Fig.*1

Identification of pairs of red and black rubber covered wires	Circuit connections
Black, brown or maroon braid covering	Mains switch to power pack contacts G and J
Red and black braid covering	Heater circuit to power pack contacts A and B. *Note* Red lead also connects to lower end of R14
Brown braid covering	Speaker field to power pack contacts C and D
White braid covering	From top contact of R11 to the power pack contact D
Pink braid covering	Speaker chassis to power pack contact K. Top of R 14 to power pack contact K

Removal of chassis from the cabinet

THE PYE "S/RG" and S/RG/Auto

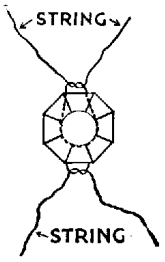
Sheet No.: S/RG 2

Issued 29th August, 1933

General Servicing Circuit Diagram

Removal of the control knobs

A DIRECT pull is all that is necessary to remove the tuning and volume control knobs. If difficulty is experienced in pulling off the knobs, two lengths of string should be knotted behind the knob, their ends being brought to the front of the knob at opposite sides, as shown in Fig. 2. A sharp direct pull will then remove the knob.



Removing control knobs from Pye "S/RG" Radiogram.

Fig. 2

When a control knob has to be replaced, the "V" shaped spring should be placed in position on the "serrated face" of the spindle recess, the ends of the concave face of the spring resting on the serrations. It will be seen that the control spindle is "D" shaped, and the flat portion of the spindle should fit next to the flat surface in the recess (see Fig. 3)

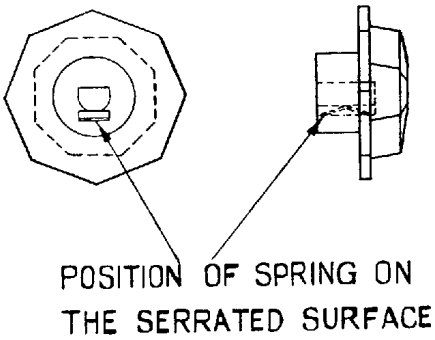


Fig. 3

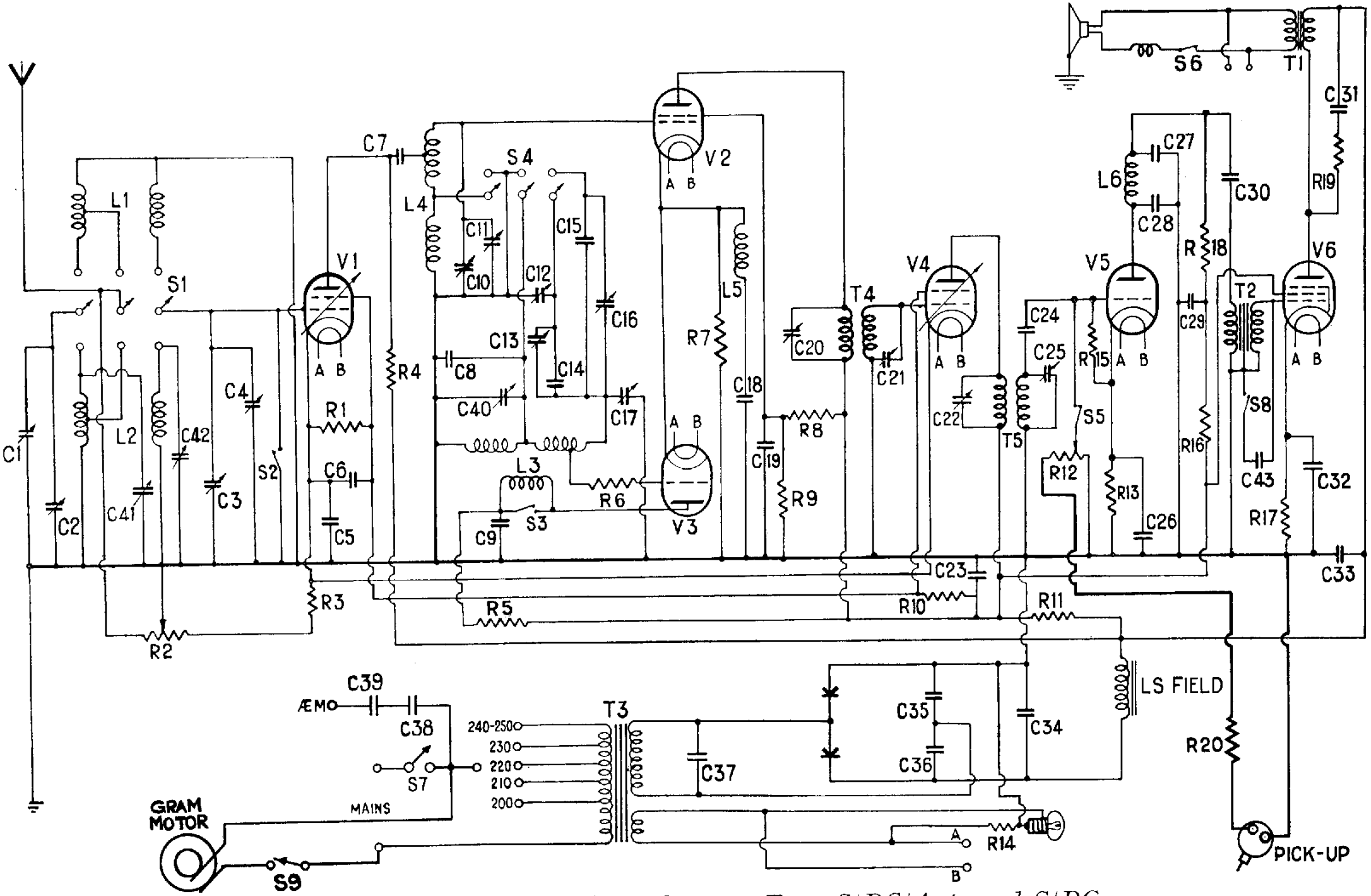
Removal of the power pack

Remove the four cheese-head screws which hold the power pack to the two cross members of the cabinet. Disconnect the multiple cable leads and withdraw the unit.

Removal of the chassis

Remove the two round-head steel fixing screws from the top corners of the chassis (C in Fig. 4, Sheet S 4), care being taken that the rubber bushes are not displaced. The cheese head screws holding the base of the chassis to the cabinet platform are next removed.

Disconnect the leads to the speaker, pick-up and mains supply, including the mains switch. Release the cleat retaining the multiple cable, and then withdraw the chassis.



Six valve A.C. Mains Superheterodyne. Type S/RG/Auto and S/RG.

The "Garrard" Automatic Record Changing Unit as fitted to the S/RG/Auto

THIS unit is absolutely complete and fitted with a powerful, dependable, electric motor. It is mounted on an attractive rectangular metal unit plate incorporating all the controls, together with the pick-up and arm, ready for placing into the cabinet.

The record-changing unit will play automatically and consecutively, eight 10-in. or eight 12-in. records of any make with usual run-off or eccentric groove, and is not confined to one or two makes of records.

Simple operation

Operation is extremely simple and is entirely covered by the following instructions :—

To operate for 10-in records, lift and turn the three platforms to bring 10-in. mark nearest to centre of turntable and set slide on pick-up arm to show 10-in.

To operate for 12-in. records, lift and turn the three platforms to bring 12-in. mark nearest to centre of turn-table and set pick-up arm at 12 in. by pressing slide on pick-up arm, to show 12-in.

Place records, *all of the same size*, any number not exceeding eight, on platforms and turn switch knob to start.

Machine will stop automatically when last record is played.

To repeat any record, turn knob to " repeat " position. Note : The last record will not repeat automatically, but can be repeated by restarting motor. To reject any record, turn knob to " reject " position.

In the event of run-off groove, on a record not being sufficient to operate the mechanism, when the record has finished playing, the reject knob should be turned to " reject " and this will trip the mechanism and drop the next record.

To remove records after playing, withdraw centre spindle.

To play single 8-in. records

Set pick-up arm to 10-in. position. Place one 10-in. record upon turntable and place 8-in. record to be played, on top. Start up motor, allow pick-up to drop automatically upon 10-in. record, then lift pick-up by hand on to start of 8-in. record.

The automatic record-changing unit has a wide range of speed regulation, 60-90 r.p.m., so that for dance purposes, etc., the tempo can be quickened or retarded to suit all requirements.

Fitting changer

In fitting the changer care must be exercised to make certain that the unit is fitted in a reasonably level position. This can be checked by means of an ordinary spirit level placed on a record on the turntable.

Caution

Do not proceed with any adjustments to the record changing unit before *disconnecting mains voltage leads.*

The standard " Garrard " Automatic Record-Changing A.C. Unit will play on any A.C. voltage between 100-130 volts, and 200-250 volts, 50-60 cycles. (Specially wound models are, however, available for 40 cycles, 75 cycles and 80-100 cycles.)

When despatched from the " Garrard " factory the unit is set for 200-250 volt range, and when supplied in radio-gramophone form from these works it is adjusted for the range of the particular " S " chassis.

The voltage can be easily adjusted by changing over the motor terminal leads, see Fig. 4.

THE PYE S/RG/Auto

Sheet No. : S/RG 3

Issued 29th August, 1933

The "Garrard" Automatic Record Changing Unit

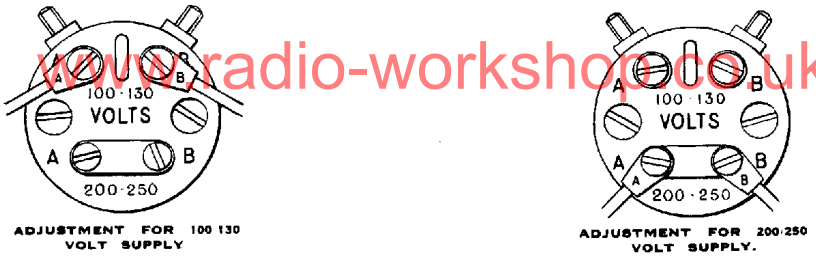


Figure 4

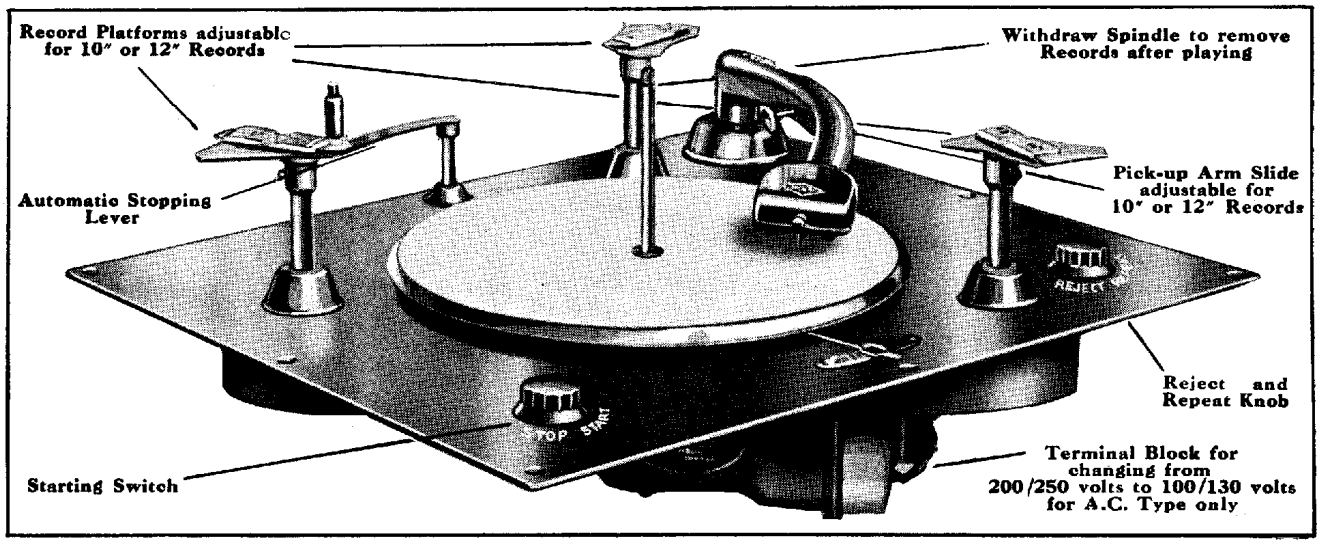


Figure 5

Pick-up arm adjustment

The pick-up arm has been finely adjusted so that the needle comes on to the 10-in. record on a $9\frac{5}{8}$-in. diameter circle and comes on to the 12-in. record on an $11\frac{5}{8}$-in. diameter circle. These dimensions have been arrived at after checking over a very wide selection of records of various makes.

There may be a few records where the playing groove starts further away from the centre and in these exceptional instances the needle would come on to the record a few grooves in, instead of on the plain part. If the changer was set for these exceptional records it would mean that the pick-up would not be lowered on to the edge of records of normal size.

Should the dropping position of the needle require adjustment, this can be done by means of the adjusting screw provided on the pick-up arm slide. Proceed as follows :—Release the inside knurled, round locking nut and adjust position of needle by turning the outside knurled nut round to suit requirements. After adjustment the inner nut should be re-tightened.

The pick-up has a D.C. resistance of 6,000 ohms. The pick-up head is arranged to swivel 180 degrees, so that needles can be quickly and easily inserted.

Long playing needles specially made for playing eight to ten records should be used. Several good brands are on the market and can be obtained from all gramophone dealers. Great care should be taken not to strain the pick-up arm, it should only be handled when it is at rest in the starting position, except as stated previously for playing 8-in. records.

The "Garrard" Automatic Record Changing Unit as fitted to the S/RG/Auto *(continued)*

On no account should the pick-up arm be handled for rejecting or repeating a record as these operations will be carried out correctly and automatically by the pick-up arm when the knob is turned to "reject" or "repeat" position.

Pick-up arm must not on any account be forced into position. Should motor have been stopped for any reason when pick-up arm is not in correct position, start up motor and immediately turn knob to "reject". This will bring pick-up back to the correct starting position.

The automatic action

The automatic record changer is brought into operation at the end of the record when the pick-up accelerates into the run-off groove. This section operating in a similar way to the "automatic stop switch" described on Sheet G/RG 3, but instead of switching off the motor, the record changing mechanism is brought into action, *via* a dog clutch.

Servicing the automatic changer unit

When trouble is experienced, first of all check the mechanical action of the parts, making sure that these are free to operate and are not binding in any position. If one of the symptoms given in the following table is experienced, pay particular attention to the suggested cause.

THE PYE S/RG/Auto

Sheet No.: S/RG 4

Issued 29th August, 1933

Servicing the "Garrard" Automatic Record Changing Unit

Symptom	Possible cause
Will not "repeat"	"Repeat" lever not engaging with record platform operating arm
Records do not drop	Record platform coupling arms, or the associated spring disconnected
Pick-up needle drops outside the recording grooves and will not run in	Radiogram not level, see also "Pick-up arm adjustment"
Record does not change when the pick-up is at the end of record	Friction coupling too light. (Make sure that the record has a normal run-off groove)
Record changes before the pick-up goes into the run-off groove, or a tapping noise is produced at each revolution of the turntable when the pick-up is nearing the centre of the record	Friction coupling too heavy. Trip lever rubber buffer worn
Record changed when pick-up is lowered on to the record	"Reject" rod jammed or the associated spring lacks sufficient tension. Dog clutch not releasing. Trip mechanism binding
Motor does not switch off at end of the last record	Automatic stopping lever not operating freely or the associated spring disconnected

Adjusting the friction coupling

After removing the turntable remove the two screws indicated A and B in Fig. 3, (see sheet G/B11.) This will free the main lever (C in Fig. 3) and the arm (D in Fig. 3) which should be moved to the right into the position shown dotted in the illustration, care being taken not to unhook the main lever from this arm. The friction adjusting screw is now accessible on the under side of the unit from the back of the cabinet. It will be seen on the underside of the arm (E in Fig. 3, see sheet G/B11).

A fraction of a turn in either direction is normally all that will be required, it being rarely necessary to exceed half a turn.

The screw is rotated in a clockwise direction to increase, or in an anti-clockwise direction to decrease the friction. Refix the main lever and arm in their original positions with the screws A and B, ensuring that the main lever is correctly hooked to the arm.

Adjusting the brake pad

With the motor switch in the " off " position the brake pad is adjusted to engage with the flange of the turntable, this adjustment is made after releasing the two holding screws on the brake lever.

Maintenance

Maintenance has been reduced to a minimum, the motor bearings being lubricated by three grease cups immediately accessible on removal of the turntable. With normal use the grease cups should be given a turn about once a month. The top and bottom main spindle bearings each contain a felt ring saturated in oil which keeps these important bearings lubricated. To re-lubricate, it is only necessary to put a few drops of " Garrard " lubricating oil down the hollow main spindle once a month and the excess oil will find its way down to replenish the bottom bearing felt ring. The felt pads in the governor regulating brake should also be kept oiled and not allowed to become dry. An oil hole is provided in the top of the motor casting in the later models, through which these pads may be adequately lubricated.

Every unit, before despatch from the factory, is thoroughly oiled and greased.

Removal of unit from cabinet

Release the clamps holding the pick-up and motor leads, remove the beading on the top inner edge of the cabinet and then the screws holding the automatic changer platform.

Cover the top front edge of the cabinet with some protecting material. Remove the turntable, take hold of the inner edge of the metal platform, lift the unit slightly, then bring forward not more than 2-in. and use the front of the cabinet as a support, while the pick-up, motor and earthing leads are disconnected. The unit is now free and can be removed.