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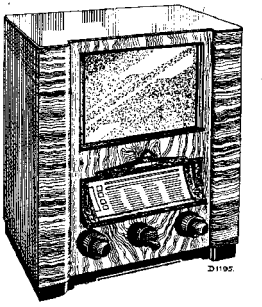
PHILIPS
SERVICE MANUAL

SUPERHETERODYNE ALL WAVE MULTI-INDUCTANCE RECEIVER.

For A.C. Mains
100-250 volts.

Type 575 A



The receiver is designed for the following wavelengths:

I. Ultra-short-wave band (16—50 metres).
II. Medium-wave band (200—570 metres).
III. Long-wave band (750—2,000 metres).

On the front of the instrument there are situated: A dual control on the left, a single control in the centre, and another dual control on the right. They control the following parts of the receiver:

Left control, small knob = mains switch and volume control.
Left control, large knob = selectivity and tone control.
Centre control = wave bands and gramophone.
Right control, small knob = tuning.
Right control, large knob = noise suppressor.

The position of the wave band switch automatically moves the pointer on the left and, therefore, indicates the wave band to which the receiver is adjusted.

The tuning indicator situated immediately above the dial facilitates the accuracy of tuning.

At the back of the instrument, at the extreme left lower corner, there is fitted a round black moulded switch. When it is pulled out and pushed in so that the arrow on the knob is in line with the letter B, the instrument is adjusted for reception on the mains aerial. When it is adjusted so that the arrow is in line with letter A the outside aerial is in use, provided the latter is fitted in its appropriate socket.

At the top centre is a switch for cutting out the internal loudspeaker. It is in the "out" position when placed to "0."

A safety contact is provided on the removable back so that when the latter is removed the receiver is electrically dead. The receiver is suitable for A.C. mains only for the voltages 103—260 (see page 8 for adjustments).

Description of Circuit.

The H.F. and oscillator circuits of this receiver can be divided into three sections. Each wave band is tuned by separate coils. When the ultra-short wave band is in use the coil S32 is switched in the aerial circuit. This coil is inductively coupled to the coil S33 which, together with C8, C26, forms a tuned circuit which is trimmed by C54. The signal from this circuit is passed to the control grid of L1 (VP4B). The amplified signal from the anode of L1 is passed to the coil S34, which is inductively coupled to the

coil S35 which is tuned by the condenser C9, together with its trimming condenser C55. This voltage is passed via R27 and C32 to the fourth (control grid) of L2 (FC4).

The first grid of this valve has a tuned circuit, S36, C10 which is trimmed by C56. The second grid of this valve has the coil S37 connected to it and the two circuits form the oscillator circuit.

The cathode, together with the first and second grids, constitute the triode portion of the valve. The pentode portion is that to which is connected the tuned circuit between L1 and L2 previously described. The difference between the two frequencies in these two circuits is so arranged that it is 115 K.C., and is passed to the anode of valve L2.

The coil S24 is the primary winding of the I.F. transformer, and it is tuned to the signal of 115 K.C. by the condenser C20.

When the medium-wave band is in use the coil S8 is switched in circuit and this is inductively coupled to S9 which, together with C8 and the trimmer C12, form the tuned grid circuit to L1 on this wave band. In the anode circuit is connected S14, which is coupled to S15 tuned by C9 and the trimmer C15, the latter circuit being connected to the control grid of L2.

The oscillator circuit for the medium-wave band consists of S20, C10 and the trimmer C18, C33 and C65. The anode circuit is coupled to the latter circuit by S21 and constitutes the oscillator circuit for the medium waveband. The frequency difference between the two circuits described above is again 115 K.C.

For the long waveband the AE coil S10, to which is inductively coupled the coil S11, and condenser C8 and trimmer C13 are in use. The anode coil is S16, and this is inductively coupled to S17, which is tuned by C9 and the trimmer C16. This circuit is connected to the control (fourth) grid of the frequency changer valve.

The oscillator circuit for the long-wave band comprise the grid circuit to which is connected S22, C10 and the trimmer C19 in parallel with C44, C66 and C34, together with the anode coil S23, to which it is coupled.

The condensers C18 and C19 and C56 are the parallel padding condensers, and C33, C34, C65 and C66 are the series padding condensers.

On the medium and ultra-short-wave band is the condenser C25, which is in parallel with R8 across the aerial coils to reduce the influence of various types of aerials on the tuning of the first circuit so as to avoid resonance effects and thereby ensures a constant sensitivity.

R27 is connected in the grid circuit to avoid self-oscillation on the higher frequencies when the ultra-short-wave band is in use.

As previously described the intermediate frequency is the same, i.e., 115 K.C. for all wave bands. The circuit to which this frequency is tuned comprises S24, C20, S25, C21, S26, S39, C22, S27, S38, C23. These four circuits are accurately tuned to this frequency.

The first I.F. transformer is so arranged that there is a variable coupling between the two coils. This coupling is controlled on the front of the cabinet by the large left-hand knob, and when the coils are loosely coupled the band width is at its maximum. When the coupling is tight the band width is at a minimum, consequently both the quality and selectivity can be controlled over a band width of 10—20 K.C. A filter circuit comprising S31 and C49 is connected in the aerial circuit to prevent interference.

Detection is obtained by the first diode portion of the double-diode-triode, which is connected to S27, and the low frequency component is passed via the anode circuit of L4, S38, R12, C60, R14, C59 (R18, R31, R42) cathode.

The voltage across R14, C59, R18, R31, R42 is led via C39, R38 to the control grid triode portion of L4 (TDD4).

The resistances and condensers R12, C60, R40, C58, are tone corrector circuits. The first emphasising to increase the higher notes and the latter to preserve the lower tones.

When the volume control is reduced under ordinary conditions the lower tones tend to become attenuated, consequently, by coupling the condenser C59 in series with R14, the higher notes are preserved.

Visual Tuning Indicator.

The tuning indicator is shown at M1 on the diagram and indicates the anode current passing through L1 (VP4B) and L2 (FC4).

When a powerful signal is received and the anode current is reduced by reason of the operation of the A.V.C. circuits, provided the receiver is accurately tuned, these anode currents are at their minimum, and consequently a minimum deflection is obtained.

Q.A.V.C.

This part of the circuit consists of two distinct circuits. Silent tuning, or noise suppression, is operated by the large right-hand knob on the front of the instrument.

The first anode of the diode portion of the valve TDD4, which forms the detector, is negative with respect to the cathode, due to the difference in voltage that occurs owing to the voltage developed across R15 by the cathode current and also across R4, which is connected in the cathode circuits of L4 (TDD4) and L1 (VP4B). These resistances are decoupled by the electrolytic condensers C4 and C51. These predetermined voltages on the detector anode prevent the rectification of signals which have a lower voltage than that of the predetermined voltage. When the receiver is tuned to a station the voltage will, in general, be of a higher voltage than the predetermined voltage and, therefore, this signal is rectified. When, however, the modulated signal has not a higher voltage than the predetermined voltage this signal is suppressed or a certain distortion may occur.

In order to neutralise this distortion it is possible to do so by taking a positive voltage from the potentiometer circuit R42, R31, R32, R19, to the detector plate. The position of the contact arm on R31 (controlled by the right-hand knob on the front) also enables a variable positive potential to be applied, so that it is possible to entirely suppress the larger proportion of station noise when tuning through the scale. When the desired station has been selected R31 can then be turned to its minimum suppression point.

On the second anode of the double-diode-triode a voltage is passed via the condenser C40, which is connected to the anode of L3. After rectification a direct current is formed across the cathode circuit

R15, R4, R20 and R37. The voltage formed by this across R20 and R37, with R16, is decoupled by C53 and provides an extra negative voltage to L1 via R9. Since the negative voltage provided by R4 is somewhat high, the resistances forming the potentiometer R3 and R35 provide a neutralising positive voltage to L1.

A part of this voltage is also passed to the fourth grid of L2 via R36, R9, R16 and R37, and is also compensated by the resistance R41 in the cathode circuit of L2 (FC4).

The low frequency voltage on the volume control R14 is passed to the grid of L4 (TDD4) via the condenser C39 and resistance R38. The anode of this valve is coupled to the grid of L5 (ACO.44) via the resistance capacity coupling R22, C43, R23, R24. C38 is a by-pass condenser for high frequencies. The anode of the output valve is coupled to an output transformer S28, S29 and, in addition, is connected to additional external sockets for an extra loudspeaker.

The grid bias voltage for the valve L5 is developed across the resistance R7, which is decoupled by the electrolytic condenser C3.

The anode voltage for the grid 2 of the frequency changer (i.e., oscillator portion), is taken directly from the filament of the rectifier and is decoupled by R21 and C50. This method is adopted so that the voltage is as constant as possible.

TRIMMING THE RECEIVER.

If any part of the tuned circuits, i.e., coils, variable condensers or trimming condensers, are repaired or replaced, it will be necessary to re-trim that part of the circuit or circuits affected.

The same will apply if the sensitivity or selectivity has diminished in any way.

The apparatus required for these adjustments are as follows :

1. A service oscillator having wave bands covering the receiver, similar to Philips' Service Signal Generator GM. 2880 (see fig. 1). Prices and particulars upon application from the Service Dept.

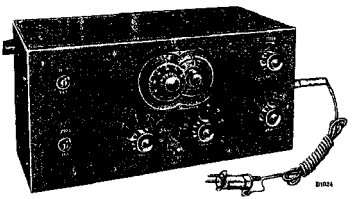


Fig. 1.

2. An artificial aerial of 14—200 $\mu\mu$F. (This is part of Type GM. 2880.)
3. An output indicator, i.e., triode voltmeter connected in parallel with the loudspeaker. The output indicator in the testing apparatus, Type 4256 (fig. 2) is, of course, quite suitable. An adaptation box for connecting meters (GN.2295) can also be supplied.
4. An insulated screwdriver which should have the metal parts as well insulated as possible.
5. An auxiliary dial, Code No. 09.991.300.

Intermediate frequency trimming.

1. A modulated signal of 115 K.C. is passed via a condenser of 0.1 μF to the fourth grid of L2.
2. Place the switch to gramophone.
3. The first two points of the first segment are shorted. This is the junction of C4, R15, Cathode L4, R14, R18 and C59.
4. Turn the volume control to maximum. If the signal is too strong reduce the oscillator signal and not the volume control. It is advisable to work with a weak signal.
5. Adjust the coupling of the selectivity control to maximum.
6. Connect across C20 and C23 a resistance of 30,000 ohms.
7. Trim with C22 and C21 for maximum output.
8. Remove the resistances and connect them across C21 and C22. Trim with C23 and then C20 for maximum output.
9. Repeat the operation under 6.
10. Repeat the operation under 7.

Trimming the Aerial Filter.

1. Place wave-change switch to long-wave.
2. Adjust the coupling of the selectivity control to minimum.
3. Connect a modulated signal of 115 K.C. via the artificial aerial to the aerial socket.
4. Turn volume control and tuning condenser to maximum.
5. Trim C49 until output indicator shows a minimum deflection. Increase signals and again trim C49 for minimum deflection. Repeat if necessary.

Trimming the H.F. circuits.

1. Clean trimmers C12, C15, and C18 if necessary and adjust approximately as follows :
   C12.—Adjust the tube 5mm. below the upper part of the isolantite tube.
   C15.—Adjust the tube 7 mm. below the upper part of the isolantite tube.
   C18.—Adjust the tube 3mm. above the upper part of the isolantite tube.
2. Adjust the wave band switch to medium wave, earth chassis, short circuit the two sections of the switch referred to under I.F. trimming, turn to maximum on volume control and turn the selectivity control to minimum.
3. Place oscillator out of action by shorting C31 to the wave-change switch.
4. Connect an auxiliary receiver, described below, via a condenser of 25 $\mu\mu$F to the anode of L2 (FC4), and connect output meter to the auxiliary receiver.
5. Connect the auxiliary dial.
6. Place a modulated signal of 214 metres (1402 K.C.) via the artificial aerial to the aerial socket. Adjust the pointer to 214 metres. Trim for maximum deflection with C12 and C15.
7. Remove the connection to the auxiliary receiver and short circuit connection of the oscillator. Connect the output meter to the receiver under test.
8. Trim with oscillator trimmer C18 for maximum output. The first signal from the minimum end of the scale is the correct one.
9. Short-circuit the oscillator and connect the auxiliary receiver. Connect output meter to auxiliary receiver.
10. Place a modulated signal of 500 metres (600 K.C.) to the aerial socket and tune in signal on this wavelength.
11. Remove auxiliary receiver and the short-circuit connections and connect output meter to receiver under test. Trim with C65.
12. Connect a signal of 214 metres again to the aerial socket and tune exactly. Re-trim C18 for maximum output.
13. Connect a signal of 500 metres again to the aerial socket, tune with the aid of the auxiliary receiver. Afterwards disconnect the auxiliary apparatus and re-trim for maximum output with C65.

The method of trimming the long-wave section is exactly the same, and the normal position of the trimmers are as follows :

C13.—Bush flush with isolantite tube.
C16.—Push down 3mm.
C19.—Push down 10 mm.

The instrument under test should be trimmed at 800 metres (375 K.C.) and 1,900 metres (158 K.C.). When trimming the ultra-short-waves the following methods should be used.

1. Clean the trimmers if necessary and see that they are approximately adjusted as follows :
   C54.—Pushed down 7 m.m.
   C55.—Pushed down 7 m.m.
   C56.—Pushed down 3 m.m.
2. Place a modulated signal of 18 metres (16,671 K.C.) via the ultra-short-wave artificial aerial to the aerial socket.
3. Connect the auxiliary receiver, short-circuit the oscillator and place output meter to the auxiliary receiver.
4. Tune to 18 metres on the auxiliary dial and trim with C54 and C55 for maximum output.
5. Remove the oscillator short-circuit and the auxiliary receiver ; connect output meter to receiver under test and trim C56 for maximum output.

Description of auxiliary receiver.

The auxiliary receiver can be similar to the Type 580A, 584A or a low frequency amplifier.
If sufficient amplification is not obtained when using the 580A, 584A or similar receiver, the resistance in series with the coupling condenser between the output valve and the preceding valve can be short-circuited.
The input to the auxiliary receiver can be connected to the gramophone pick-up sockets.

Calibration.

The auxiliary dial, Code No. 09.991.300 previously referred to can be used.
The procedure is as follows :

1. Earth chassis, connect output meter, pass a signal of 350 metres to the aerial sockets and tune receiver.
2. Loosen the adjusting screws on the variable condenser drum drive.
   Turn the tuning condenser knob until the pointer shows 350 metres. Secure the screws.
3. Repeat the operation on 214 metres and 570 metres. If the pointer is not showing correctly note the readings.
4. If necessary, loosen the adjusting screws and vary the drum dial by means of a screwdriver between the hub of the condenser drive and the disc, moving the latter in the direction of the arrow.

214 metres.	570 metres.	Adjust drum as follows.
Too low.	Too low.	↑
Too high.	Too high.	↓
Too high.	Too low.	→
Too low.	Too high.	←
Slightly high.	Slightly low.	→
Slightly low.	Slightly high.	←
Slightly high.	Slightly high.	→
Slightly low.	Slightly low.	←

5. Re-tighten adjusting screws. Tune exactly to 350 metres and make sure that the needle—which can be adjusted by the screw—is correctly adjusted to 350 metres. Check at 214 and 570 metres. Also check the long-wave section and ultra-short-wave section.

HOW TO TRACE FAULTS.

Fault finding will be considerably facilitated by the use of efficient testing apparatus. Attention is drawn to Philips' Universal Measuring Test Board (fig. 2)

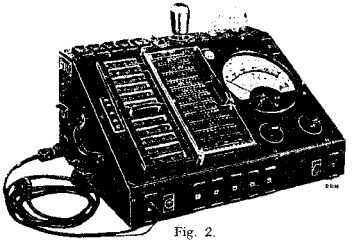


Fig. 2.

which enables both A.C. and D.C. voltages and currents and capacities and resistances to be measured over a large number of ranges. Particulars and prices can be obtained from the Service Dept., Mitcham Junction, Surrey.

1. The following data is as complete as possible, but some of the cases may not occur in practice.
2. This list cannot be complete as there may be compound faults.
3. In general, it may be said that the majority of faults are due to short-circuits in the bare wires or to open or short-circuits in one of the component parts. These are indicated as R. or C. shorted or open-circuit as the case may be.
4. Always carry out, first of all, test measurements so as to find the cause of the fault.

The method of procedure is as follows :

I. Always carefully check all contacts connected to the removable back, mains switch, loudspeaker switch and the filaments of the valves. If the valves burn normally, this indicates that the safety contacts, mains switch and filaments of the valves are in order (subject to the possibility that the filament of one of the valves may be short-circuited).

II. If the valves appear to be operating satisfactorily and no output is obtained from the receiver, it is desirable to replace the valves with good ones. If there is still no output, test from the pick-up side of the receiver. If it is found to operate satisfactorily proceed from V. onwards, but if unsatisfactory test as shown in III and IV. A high voltage pick-up should be used for satisfactory results.

III. **Voltage across C2 abnormal.**

1. Check mains on-off switch and voltage change over adjustments and wiring.
2. Open or short-circuit in mains transformer. (Test secondary voltage.)
3. L6 defective.
4. C1 short-circuited ; C50 short-circuited. If voltage on C1 is high, then check.
5. S5 open-circuited.
6. C29 short-circuited. (M1 will overheat.)
7. Short-circuit in I.F. circuits.
8. Short-circuit in loudspeaker windings, or R22 shorted.

L6 has abnormal voltage and current.

1. S28, R7 open-circuited ; no anode current.
2. R23, R24 open-circuited.
3. C3, C43 short-circuited. Anode current too high.
4. Bad contact in valve holder.

L4 has abnormal current and voltage.

1. R22, R15, R4 open-circuited ; no anode current.
2. C62 short-circuited.
3. C4, C51, C5 short-circuited ; anode current too high.
4. R16 open-circuited.
5. Bad contact in valve holder.

L4 and L5 have normal voltages and currents, but no gramophone reproduction.

1. Bad contact in switch.
2. Screened leads shorting.
3. R14, C39, C43, C28 open-circuited.
4. C45 short-circuited.
5. Fault in loudspeaker or loudspeaker transformer.

IV. **Gramophone reproduction satisfactory, but no reception from aerial socket.**

L3 has abnormal voltages and currents.

1. M1, S26, R6 open-circuited. No anode current.
2. C7 short-circuited. Anode current too high.
3. S25 open-circuited.
4. R1, R2 open-circuited.
5. Bad contact in valve holder.

L2 has abnormal voltages and currents.

1. R5, R41, S24 open-circuited, no anode current.
2. C6 short-circuited ; anode current too high.
3. R26, R27 open-circuited.
4. R21, S37, S21, S23 open-circuited ; C35 short-circuited. No voltage on second grid.
5. R34, open-circuited, C30 short-circuited. No screened grid voltage.
6. R11 open-circuited.
7. C31 short-circuited.
8. Bad contact in valve holder.

L1 has abnormal currents and voltages.

1. R4, R10, S34, S14, S16 open-circuited. Bad contact in switch ; no anode current.
2. C5, C51 short-circuited ; anode current too high.
3. R18, R20, R37, R16, R9 open-circuited or bad contact in switch.

L1, L2 and L3 have normal currents and voltages.

If a signal of 115 K.C. is passed to the control grid of L3 via the normal artificial aerial and no output is obtained :

1. C22, C23, short-circuited.
2. S26, S39, S27, S38, R12 open-circuited.
3. C37 short-circuited.

If a signal of 115 K.C. is passed to the control grid of L2 and no output is obtained with the switch at long-wave and tuned to 2,000 metres :

1. C20, C21 short-circuited.

If an H.F. signal is passed to this grid and no reception is obtained but can be obtained with an I.F. signal, then the fault will be in the oscillator circuit. When the oscillator fails to operate connect a fixed condenser of approximately 1,000 $\mu\mu$F from the grid 1 of the frequency changer valve (FC4) to earth. A rise of current should then be measured at grid 2 of the valve. If the oscillator is found defective the following faults may have occurred.

1. C10 short-circuited.
2. C18, C19, C56 trimmers shorted.
3. S36, S20, S22 open-circuited.

If it is desired to check the oscillator for the correct frequency, tests can be made as follows :

(a) Connect the aerial socket of an auxiliary receiver via a condenser of 22 $\mu\mu$F to the anode circuit of L2. Tune the auxiliary receiver to 350 metres.

(b) Tune the receiver to be tested until the oscillator is heard in the loudspeaker of the auxiliary receiver at maximum. If the receiver under test tunes at 404 metres = 742 K.C., i.e., 350 metres = 857 K.C. — 115 K.C. = 742 K.C., then the oscillator frequency is correct. If there is a large difference then it is certain there is a defect, i.e., C33, C65 shorted or C18, C33, C65 open-circuited.

The long-wave and ultra-short-wave sections can be tested in a similar manner. If a signal can be heard when an H.F. signal is placed on the control grid of L2, but cannot be heard when placed on the control grid of L1 or the aerial socket, then check the following :

1. S35, S15, S17 open-circuited.
2. C55, C15, C16 or C9 short-circuited.
3. C32 open-circuited. Medium and long-wave : C46 open-circuited.
4. C54, C12, C13 or C8 short-circuited.
5. C26 open-circuited.
6. S8, S9, S10, S11, S32 or C53 open-circuited.
7. Medium and long-wave C25 short-circuited.
8. Bad contact wave-change switch.

V. **Reception from gramophone pick-up sockets and aerial sockets, but quality not satisfactory. Weak reception.**

1. Voltages and currents not correct.
2. C26, C46, C32, R27, C43, R24 open-circuited.
3. C26, C46, C37, C45 short-circuited.
4. Receiver is out of balance.
5. Fault in loudspeaker or associated transformer.

Distortion.

1. One of the valves has grid current, for instance, C3 or C4 shorted.
2. One of the grid resistances open-circuited, i.e., R26 or R23, or similar resistance.
3. Fault in the loudspeaker or transformer.

A.V.C. not operating satisfactorily.

1. C40, open-circuited.
2. Short-circuit or open-circuit in resistances, R9, R16, R20, R37.
3. C51, C52 short or open-circuited.

Hum.

1. Half wave rectification ; one half of S2 open-circuited.
2. Defective contact in L6 valve-holder.
3. C7 short-circuited.
4. C1, C2, C5 open-circuited.
5. One of the L.F. decoupling condensers open-circuited.
6. One of the earth connections loose.

Crackling.

1. Bad contact in aerial or earth sockets.
2. Intermittent short-circuit between wires.
3. Defective contact in a soldered joint.
4. Defective contact in switch, valve holder, or volume control.
5. Wiring screens intermittent to screening plates or wires.

Self oscillation.

1. C6, C7, C27, C29, C30, C35, C36, C53, C52 open-circuited.
2. Lead to suppressor grid L1 open-circuited.

Other possible faults.

1. Selectivity control not operating over the complete band-width. Defective adjustment in " Bowden " cable.
2. Sensitivity not constant over the whole of the wave band. Defective padding condensers, oscillator trimmers out of adjustment, open or short-circuited.
3. Reproduction shrill. R12 open circuited.
4. Noise suppressor not operating. C59 short-circuited.
5. No signals or distortion. R44, or R32 open-circuited.
6. Weak reproduction ; R35 or R36 open-circuited.
7. " Resonance " microphony, probably due to inter-action between chassis and cabinet. Loose screw, etc., or similar material. The chassis should be amounted in the cabinet on rubber washers, provided. If microphony still persists after attention, as above, it may be necessary to replace the variable condenser.

Cabinet Resonance.

This is probably due to a loose component, such as valve caps, springs, strips or washers. When the vibrating part is found, secure it firmly.

Dismantling and repair.

Measurements and small repairs inside the chassis can, in many cases, be made by simply removing the sub-base underneath the cabinet. Care should be taken to place the cabinet on a piece of felt beforehand in order to avoid damage.

Where large repairs are to be effected it is desirable to use a chassis holder such as shown in the tool list on page 15.

This type of chassis holder is so arranged that it is possible to turn it round in any desired position by means of the adjusting wheel. It is suitable for any size chassis.

When repairing receivers the following points should be noted:

1. Always keep the wiring and screening plates in their original position.
2. Make sure that the spacing of the wiring is in the same position.
3. All lock washers, insulating material, etc., should be placed in their original positions.
4. Rivets can, if necessary, be replaced by screws and nuts.
5. Moving parts should be lubricated with a little pure vaseline.
6. Solder as quickly as possible so that components are not overheated.
7. When soldering compound condensers, it must be done at least 1 c.m. away from the compound to avoid overheating of the material. All compounded condensers should suspend free from all wiring adjacent to them.
8. Care should be taken that variable condenser brackets, pulleys, etc., are not strained, otherwise the condenser will become "out of track."

Driving band and spring.

Too much pressure should not be applied to the driving spring, otherwise it will become strained. On the other hand, it should not be too loose because backlash will occur.

The best method of adjustment is as follows: The pressure screw of the spring is turned until there is no slip; it should then be turned back one-quarter of a turn.

Electrolytic condensers C1, C2, C50.

If it is required to replace these it is desirable to use a box spanner, shown in fig. 3.

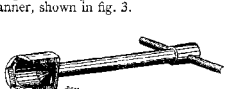


Fig. 3

Electrolytic condensers C3, C4, C51.

These are dry electrolytic condensers and are polarised. One end has a red band and is the positive end. Care should be observed when replacing. This positive point is indicated in the small line in the main diagram.

The position of the various coil boxes can be obtained from the resistance of the coils shown on page 11. The identity of the coils on the top of the chassis can be obtained from the figures which appear on the screened cans. These figures refer to the last figures of the code numbers. The variable coupling I.F. coil is shown in the main diagram with an arrow cutting through both coils.

Voltage change-over plate.

This is effected by releasing the centre screw and turning the insulated disc to the appropriate voltage.

Care should be taken to ensure that the bare wires behind the panel are not shorted when making this adjustment, otherwise the mains transformer will overheat.

"Bowden" Cable.

If this is replaced care should be taken that there is no kink in the cable, otherwise the correct coupling will not be obtained.

The coil should move over a distance of 7 m.m.

Wave band switch.

When a rotor part of the switch is required the contacts, if necessary, can be refixed by the aid of a special pair of pliers (see tool list).

When a new stator is required the part with 12 contact springs can be used and those not required can be removed.

Resistances.

These components should not touch other parts so as to avoid damage by heat or mechanical damage.

The resistances which form R1 must be fixed as far away as possible from C36 and C41.

REMOVING AND REPAIRING THE LOUDSPEAKER. Code No. 28.951.190, Type 4283.

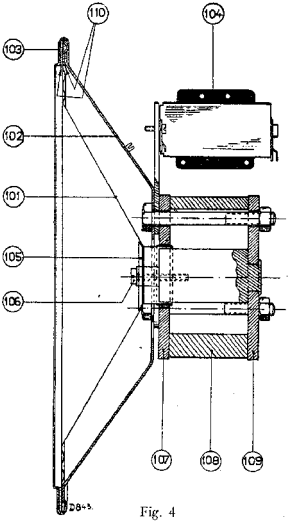


Fig. 4

The loudspeaker can be removed by unsoldering the lead to the speaker switch and output transformer, and loosening the screening clamps.

Important points to be considered when repairing.

1. See that the repair is carried out with good tools on a table or bench (not an iron one) free from dust or filings.
2. Under no circumstances may the front and back plates (fig. 4, item 107 and 109) be removed from the magnet, as this would impair its magnetism (as would also be the case when working on an iron bench).
3. Replace the cover of the loudspeaker immediately after the repair has been carried out.

Centring the cone.

Loosen the centring screw (item 106); place four distance pieces of 0.2 m.m. thickness (Code No. 09.990.840) through the perforations of the spider into the air-gap. Refix the centring screw and withdraw the distance pieces. No sound should now be heard when the cone is carefully moved up and down (fig. 5).

Fig. 5.

Changing the cone.

Unsolder the connections from the transformer, cut through the clamping ring (item 103), and loosen the centring screw. An air-gap, when dirty, should be cleaned with a piece of strong material (e.g., brass, pertinax, etc.) wrapped in wadding that has been moistened with alcohol. Any iron particles should be removed from the air-gap by means of a steel plate-spring. The new cone is to be centred as indicated above and fixed with a special service clamping ring (Code No. 28.445.821).

Commence by bending the tags at four points positioned at angles of 90° from each other; the distance-pieces are not to be taken from the air-gap until all the tags have been bent. The flexible leads of the transformer are to be fixed at the right length (if too taut they will impede movement; if too slack they will touch the cone and cause rustling).

Changing the cone-holder.

A gauge is required of the type shown in fig. 6 (Code No. 09.991.022). Remove the cone and place the gauge in the air-gap. Now mark out the internal circumference of the cone-holder as well as possible on the front plate (item 107), unscrew the nuts of the three bolts and stand the loudspeaker on the back plate (bearing in mind point 2). When mounting, do not withdraw the gauge, fig. 6, from the air-gap until the three draw-bolts have been securely tightened.

Fig. 6.

A gauge will also be required if the cone is no longer accurately centred in the aperture of the front plate.

Faults.

Before commencing a repair, try a different loudspeaker and transformer in order to make sure the fault is not to be found in the receiver.

No sound.

There is an open or short-circuit in the speech coil or output transformer. Measure up with an ohmmeter; the resistances are stated on the folder at the back of the manual.

Sound weak and/or distorted.

The coil has become jammed in the air-gap (test as shown in fig. 5) or there is a partial short in the windings of the speech coil or transformer.

Rustling and resonance.

This may be caused by loose particles (possibly also from the cabinet) or by some hindrance in the movement of the cone, e.g., connections too taut or too slack, dirt in air-gap or distortion of the speech coil. The glued joint may also be loose at one part, or the cone may be torn.

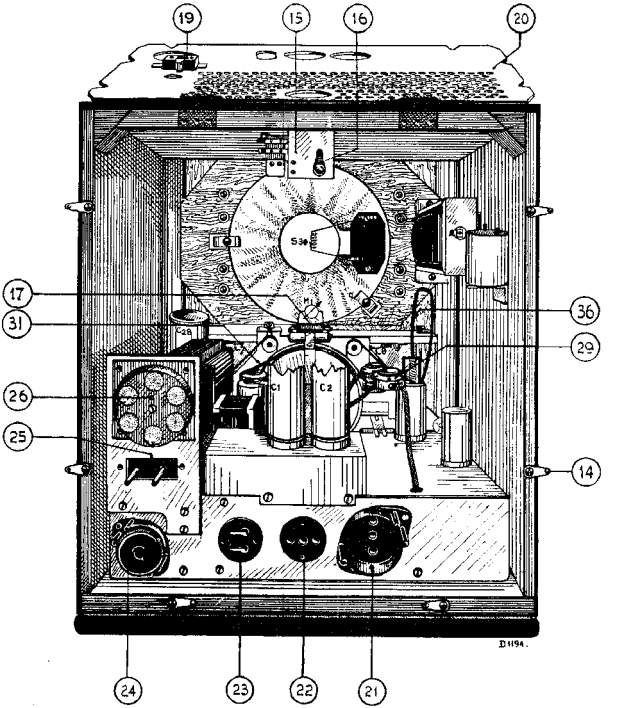


Fig. 7

	L1 (VP4B)	L2 (FC4)	L3 (VP4B)	L4 (TDD4)	L5 (ACO44)	
Va	176	190	235	95	235	Volts.
Vg'	190	g3—5· = 68 g2 = 93	205	—	—	Volts.
–Vg	13.5	3.5	3.6	d1 = 21 d2 = 5.5 2.5	28	Volts.
Ia	5.9	1.72	7.8	0.85	48	mA.
Ig'	2.42	g2=2.8 g3—5 = 2.5	—	—	—	mA.
Voltage across C1 = 300 Volts. Voltage across C2 = 280 Volts.						

The voltages were taken with meters taking practically no urrent. Lower values will be, of course, arrived at with moving coil meters when resistances are in circuit. The above values were taken over a large number of receivers and, consequently, may deviate without necessarily indicating a fault.

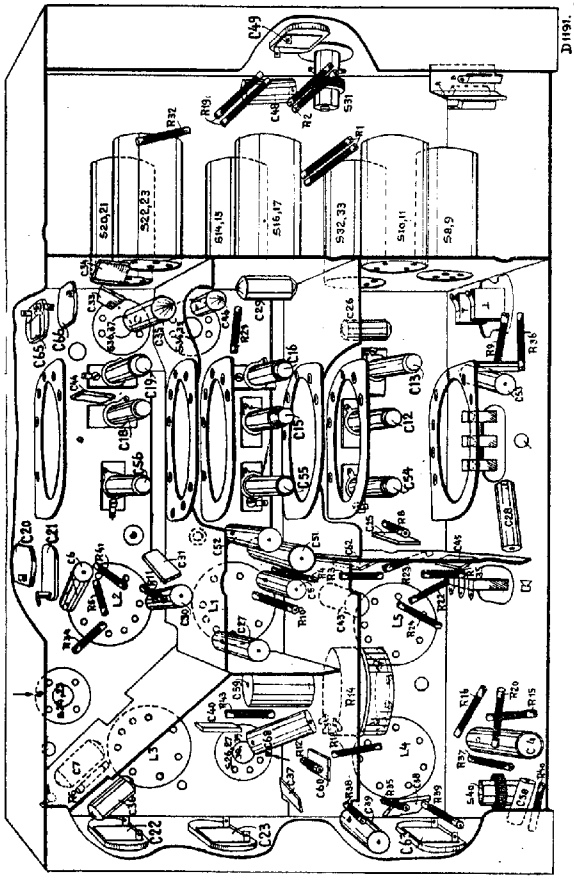


Fig. 10

COILS.

Designation.	Resistance in Ohms.	Code No.
S1	... ...	28.525.960
S2	... ...	
S3	... ...	
S4	... ...	
S5	260—320	28.550.760
S8	27... ...	28.564.120
S9	3.8 ...	
S10	125 ...	28.564.160
S11	50... ...	
S14	3.5 ...	28.564.141
S15	2.2 ...	
S16	4.4 ...	28.564.180
S17	4.8 ...	
S20	4	28.564.250
S21	3.2 ...	
S22	32... ...	28.564.260
S23	3.4 ...	
S24	140 ...	28.565.110
S25	140 ...	
S26+	...	
S39	140 ...	28.565.110
S27+	...	
S38	140 ...	
S28	240—260 ...	28.525.520
S29	0.7 ...	
S30	4.3—5.3	28.220.190
S31	135	28.561.271
S32	3... ...	28.564.010
S33	— ...	
S34	1.4 ...	28.564.211
S35	— ...	
S36	17... ...	28.564.240
S37	— ...	
S40	135	28.561.271
M1	2,000 (approx.) ...	28.820.740

VALVES.

L1	VP4B
L2	FC4
L3	VP4B
L4	TDD4
L5	ACO44
L7	8046
L8	8046
L6	1561

LIST OF SPARE PARTS, TOOLS, GAUGES, TEST GEAR, ETC.

When ordering any of these spare parts, please state :—

1. Code Number of spare part.
2. Type and serial number of receiver.
3. Description of spare parts.

Fig.	Item.	Description of Parts.	Code No.
8	1	Cabinet	25.869.660
8	3	Escutcheon (Colour 026)	23.999.333
8	5	Station scale	28.698.053
8	2	Trade mark disc	25.988.613
8	4	Celluloid cover for station scale	28.337.001
8	6	Large knob (Colour 005)	23.995.570
8	7	Small knob (Colour 005)	23.995.590
8	8	Wave band switch knob	23.995.583
8	11	Pulley assembly	28.869.500
8	12	Pointer	28.944.145
8	13	Driving band (flat strip)	28.885.720
8	10	Spring for driving band (flat strip)	28.740.050
8	9	Insulated fibre bottom plate	28.867.560
7	14	Clip for back	25.673.860
7	15	Switch for loudspeaker	08.527.420
7	16	Knob for loudspeaker (Colour III)	23.993.100
7	17	Tuning meter indicator	28.820.740
7	19	Moulded mains socket for back (Colour 111)	25.742.000
7	20	Back plate	28.396.700
7	21	Extra loudspeaker protecting plate (Colour 111)	23.992.541
7	22	Gramophone pick-up socket plate	28.884.430
7	23	Aerial-earth socket plate	28.884.420
7	24	Mains aerial switch moulding	25.868.530
7	25	Mains 2-pin plate	25.789.590
7	26	Voltage change-over insulated cover	25.868.940
11	26a	Voltage change-over contact plate	28.867.481
9	27	Valve holder with seven contacts	28.225.420
9	28	Valve holder with five contacts	28.225.410
9	29	Valve cap complete	28.854.410
11	30	Nut for electrolytic condenser	07.093.010
7	31	Spring driving band, complete	28.740.180
11	32	Pilot lampholder	28.225.110
9	33	Spindle (105 m.m. long)	28.616.284
9	34	Spindle (228 m.m. long)	28.000.750
9	35	Spindle (208 m.m. long)	28.617.150
7	36	Bowden cable for selectivity control	28.885.392
9	37	Pertinax plate for mains aerial switch	25.868.540
9	38	Socket plate for extra loudspeaker	28.884.440
9	39	Mains switch	08.529.640
9	40	Rotor with contacts	28.445.570
9	41	Split bush for rotor	25.104.180
9	42	Contact piece for rotor	25.046.592
9	43	Stator with 12 contacts	25.868.760
9	44	Lever for wave-change switch	25.866.520
9	45	Spring for wave-change switch	28.740.070
9	46	Clip for base screen	28.750.490

LIST OF SPARE PARTS, TOOLS, GAUGES, TEST GEAR, ETC.—continued.

Fig.	Item.	Description of Parts.	Code No.
		LOUDSPEAKER.	
4	102	Cone holder	28.250.431
4	110	Paper ring	28.445.390
4	103	Service clamping ring	28.445.821
		Clamp for securing loudspeaker to cabinet	25.012.210
		TEST APPARATUS, TOOLS, GAUGES, ETC.	
		Trimming tool	09.991.100
		Auxiliary dial	09.991.300
1		Service oscillator, 14—3,000 metres	09.991.260
		Combined screwdriver and spanner, insulated...	09.991.050
2		Universal measuring test apparatus	09.991.030
		Universal chassis holder	09.991.380
3		Box spanner for electrolytic condensers	09.990.760
		Pertinax distance pieces for loudspeakers	09.990.840
6		Air-gap gauge for loudspeakers	09.991.022
		Special pliers for switch rotor contacts	09.991.350

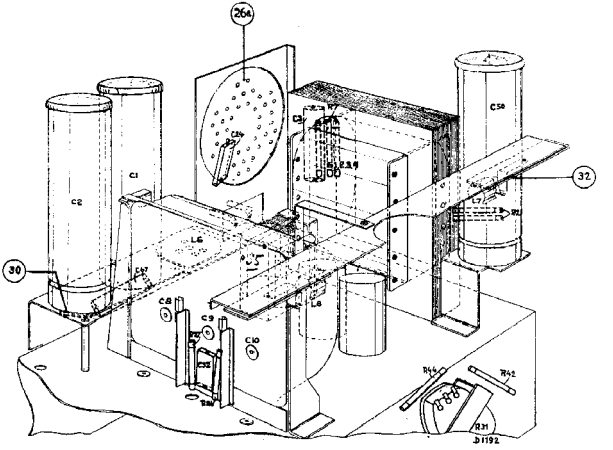


Fig. 11

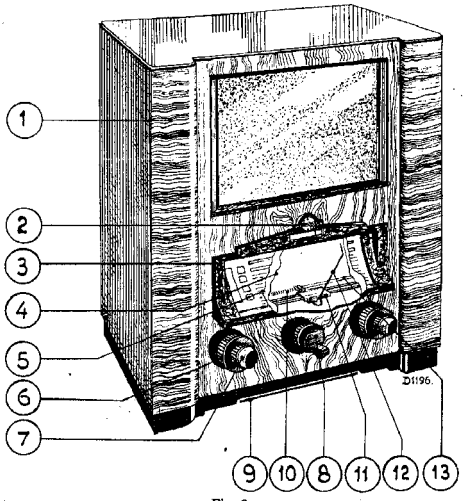

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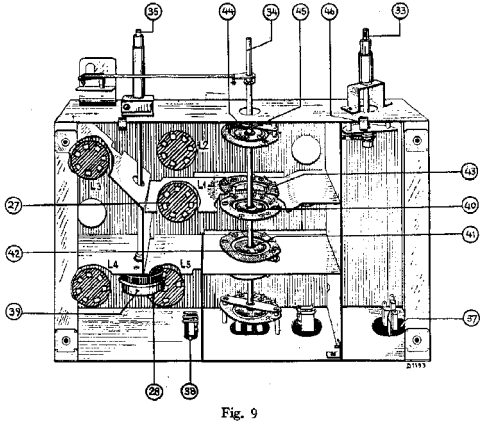
Fig. 8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D1193

Fig. 9

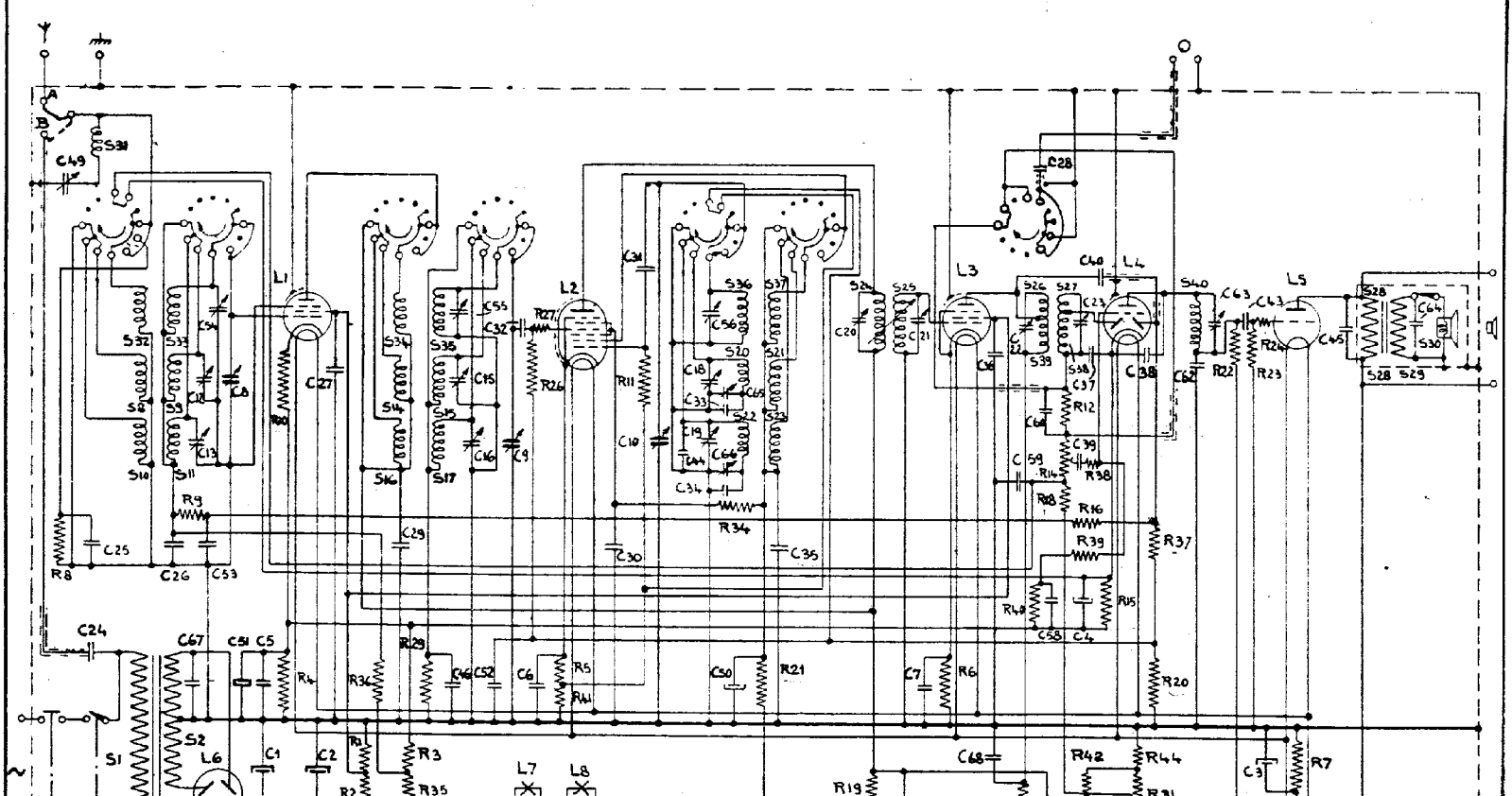
CONDENSERS.

Designation.	Condensers.	Code No.
C1	32 µF	28.180.010
C2	32 µF	28.180.010
C3	16 µF	28.181.980
C4	25 µF	28.180.020
C5	50000 µµF	28.199.060
C6	50000 µµF	28.199.060
C7	50000 µµF	28.199.060
C8	8.5–465 µµF	
C9	8.5–465 µµF	28.211.090
C10	8.5–465 µµF	
C12	0–27 µµF	28.210.690
C13	0–27 µµF	28.210.690
C15	0–27 µµF	28.210.690
C16	0–27 µµF	28.210.690
C18	0–27 µµF	28.210.690
C19	0–27 µµF	28.210.690
C20	40–145 µµF	28.210.540
C21	40–145 µµF	28.210.540
C22	40–145 µµF	28.210.540
C23	40–145 µµF	28.210.540
C24	500 µµF	28.190.200
C25	80 µµF	28.190.120
C26	50000 µµF	28.199.060
C27	0.1 µF	28.199.090
C29	0.1 µF	28.199.090
C30	0.1 µF	28.199.090
C31	100 µµF	28.190.130
C32	20 µµF	28.190.060
C33	1570 µµF	28.190.500
C34	450 µµF	28.190.630
C35	0.1 µF	28.199.090
C36	0.1 µF	28.199.090
C37	160 µµF	28.190.150
C38	100 µµF	28.190.130
C39	50000 µµF	28.199.060
C40	50 µµF	28.190.100
C43	10000 µµF	28.198.990
C44	10 µµF	28.190.030
C45	500 µµF	28.190.200
C46	50000 µµF	28.199.060
C48	0.1 µF	28.199.090
C49	40–145 µµF	28.210.540
C50	32 µF	28.180.130
C51	25 µF	28.180.020
C52	50000 µµF	28.199.060
C53	50000 µµF	28.199.060
C54	0–27 µµF	28.210.690
C55	0–27 µµF	28.210.690
C56	0–27 µµF	28.210.690
C58	5000 µµF	28.198.960
C59	0.2 µF	28.199.120
C60	200 µµF	28.190.160
C62	160 µµF	28.190.150
C63	40–145 µµF	28.210.540
C64	3 µF	28.160.660
C65	2x (40–145) µµF	28.210.550
C66	40–145 µµF	28.210.540
C67	10000 µµF	28.199.940
C68	0.1 µF	28.199.090

S: 30,1,2,3,4,32,8,10,29,9,11, 34,14,16,35,15,17, 34,28,22,37,21,23, 24,25, 26,27,38,39, 40, 28,29,30.

C: 49,24,25, 54,12,8,13,26,53,51,5,1, 27,2, 29,55,15,16,46,52, 32,9,6, 30,31,18,44,66,18,33,19,34,58,35,65,66, 20,21,60,7,68,58,48,36,22,23,37,39,4, 40,38,57,59,43,62,3,63,28, 45, 64,

R: 8, 9, 10,4, 36,1,2,29,3,35, 26, 5, 41,27,11, 34,21, 6,43,40,19, 12,18,16,44,14, 31,32,15,37,42,20,22,23, 24,7, 38,39,



The resistance R45 may be shunted across M1

RESISTANCES.

Designation.	Resistances.	Code No.
R1	80000/2 Ohm	28.771.090
R2	12500/2 Ohm	28.771.010
R3	32000 Ohm	28.770.400
R4	1600 Ohm	28.770.270
R5	250 Ohm	28.770.190
R6	320 Ohm	28.770.200
R7	615 { 2000 Ohm }	28.770.930
	{ 2000 Ohm }	28.770.930
	{ 1600 Ohm } (paralleled)	28.770.920
R8	32000 Ohm	28.770.400
R9	10000 Ohm	28.770.350
R10	64 Ohm	28.770.130
R11	50000 Ohm	28.770.420
R12	0.5 M. Ohm	28.770.520
R14	0.5 M. Ohm	28.809.200
R15	3200 Ohm	28.770.300
R16	2 M. Ohm	28.770.580
R18	0.32 M. Ohm	28.770.500
R19	16000/2 Ohm	28.771.890
R20	0.64 M. Ohm	28.770.530
R21	80000/2 Ohm	28.771.090
R22	0.2 M. Ohm	28.770.480
R23	0.64 M. Ohm	28.770.530
R24	1000 Ohm	28.770.250
R26	0.2 M. Ohm	28.770.480
R27	40 Ohm	28.770.110
R29	10000 Ohm	28.770.350
R31	0.5 M. Ohm	28.810.620
R32	0.16 M. Ohm	28.771.860
R34	10000 Ohm	28.770.350
R35	0.4 M. Ohm	28.770.510
R36	5 M. Ohm	28.770.620
R37	0.64 M. Ohm	28.770.530
R38	0.5 M. Ohm	28.770.520
R39	0.25 M. Ohm	28.770.490
R40	1.6 M. Ohm	28.770.570
R41	250 Ohm	28.770.190
R42	2500 Ohm	28.771.880
R43	5000 Ohm	28.770.320
	or 2x 10000 Ohm	28.770.350
R44	5000 Ohm	28.770.320
R45	12500 Ohm	28.771.010