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FOR USE OF
SERVICE DEALERS ONLY

SERVICE MANUAL

FOR RECEIVER TYPE

MULLARD X- **44 A** -34

PHILIPS 462A-34

(PHILIPS GRAM 862 A-34)

For use on Alternating Current Mains

GENERAL

This super-heterodyne receiver is equipped with:

7 tuned circuits
Bandpass-filter pre-selection,
Filter for interference at the intermediate frequency, A.V.C.,
Continuously variable tone control,
Permanent magnet m.c. loudspeaker type 9636,
Terminals for expension speaker having low impedance speech coil,
Terminals for pick-up,
Tapping plate with automatic voltage indication on back plate, for voltages 103—253 Volts A.C. and safety contact.

Wave ranges 13·5— 40 m
40 —125 m
199 —580 m

Nett weight approx. 9.85 kg (incl. valves).

Dimensions: Height 32.5 cm = $12^{5}/_{8}$"
width 50.5 cm = $19^{7}/_{8}$"
depth 18 cm = $7^{1}/_{8}$"

Operation: at the extreme left: tone control,
at the extreme right: waverange switch.

Frontpanel: left: volume control and mains switch,
right: tuning.

DESCRIPTION OF THE CIRCUIT

I.F. filter circuit: S5, C19; acts as short circuit across aerial and earth for I.F. signals.

R.F. pre-selection:

199-580 m

Aerial coil S10 inductively coupled to 1st bandfilter coil (S11), trimmer C9, tuning condenser C3. C48 capacitive aerial coupling.
2nd bandfilter coil S13, trimmer C53, tuning condenser C4.
Bandfilter coupling S12, C21, (C22, R2).

40-125 m

Aerial coil S8 inductively coupled to S9, trimmer C10, tuning condenser C4.

13.5-40 m.

Aerial coil S6, inductively coupled to S7, tuning condenser C4, capacitive aerial coupling C49.

Frequency changer

L1; R35 prevents parasitic oscillation; R8 is the grid leak, R7 prevents unwanted oscillations.

Oscillator circuit

199-580 m

S18 inductively coupled to S19, trimmer C13, padding cond. C25, C14,, tuning cond. C5.

40-125 m

S16 inductively coupled to S17, trimmer C12, padding C24, tuning cond. C5.

13.5-40 m

S14 inductively coupled to S15, tuning cond. C5, trimmer C11.

I.F. section (475 kc/s).
1st bandfilter S20, S21, S22, C15, C30, C16, C31. i.f. pentode L2.
2nd bandfilter: S23, S24, S25, S26, C17, C34, C18, C35.

Detector circuit

1st diode L3, S26, S24, R18, R19 (volume control, also on pickup), cathode, C37.

A.V.C.

The d.c. voltage, developped across R18, R19 by detection of the I.F. voltage, is applied through R16, R17, R12, R15 to the control grids of L1 and L2.

A.F. section

A.F. valve L3.
Volume control, also on gram. pickup: R19; tone control, also on pickup: R28, R29,C45.
Coupling condenser: C36.
Grid leak: R20, R37, R31.
Grid bias: R4, (R3, C38).
Coupling between L3 and L4: R23, R25, C43.
Resistance to prevent parasitic oscillation: R24.
Speaker transformer: S27, S28.
Output valve L4.
Tone compensation for treble and bass: R30, C50; C41, R22.

Supply

Mains transformer: S1, S2, S3, S4.
Ripple condenser: C52.
Rectifier valve: L5.
Smoothing filter: C1, C2, R4, R5.
Anode decoupling L1: R11, C27.
Screen grid decoupling L1, R9, C28.
Screen grid decoupling L2: R14, R13, C33.
Grid bias L1: R6, C26.
„ „ L2: R4.
„ „ L3: R4, R37, R20, R31.
„ „ L4: R4.

TRIMMING INSTRUCTIONS

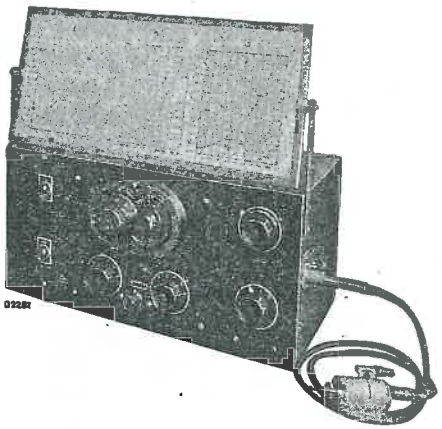


Fig. 1

The tuned circuits are provided with trimming condensers so that the sensitivity and selectivity may be adjusted to maximum values.
If the receiver is completely out of balance, the sequence of the following trimming instructions must be carefully adhered to.

Note. The bottom plate with the three chassis must be removed from the cabinet.
See sheet G 1.

Auxiliary apparatus

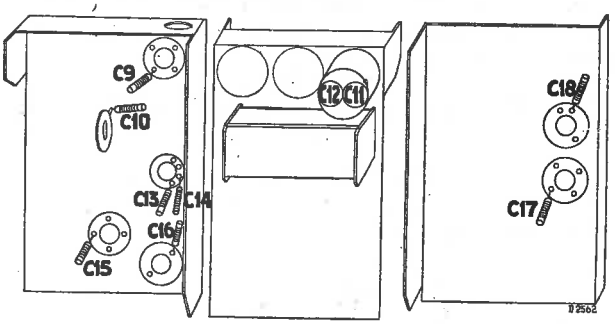
1. Oscillator type GM 2880F with artificial aerial
2. Output indicator, e.g. Universel Test-board type 4256 or 7629.
3. 15° jig.
4. Insulated trimming screwdriver
5. Insulated trimming key, 6 mm.
6. 32.000 μμF condenser, and 0.1 μF condenser.
7. Trimming transformer.
8. Aperiodic amplifier GM 2404.

Wire trimmers

Some of the trimmers in this receiver are of a different type to the usual, being constructed of a tube of insulating material with a sprayed layer of metal on the inside and covered on the outside with a winding of copper wire. The capacity is adjusted by removing turns of wire.
In trimming, turns are removed until the output indicator which has reached maximum value, drops back slightly. A couple of turns are then replaced and the surplus wire clipped off. The winding is held in place with wax.

Trimming

N.B. 1. Before commencing trimming, melt off the wax on the trimmers concerned by means of a hot soldering iron. After trimming re-melt the wax and allow to harden.
2. **The volume control must be left at maximum value:** output must be varied by means of the service oscillator only.
3. Use only the valves belonging to the receiver. If the octode becomes defective during trimming, the R.F. and oscillator circuits must be re-trimmed to the new octode.
4. Before trimming, wire trimmers must be replaced by new ones.
5. Connect the output indicator to the extension speaker sockets via trimming transformator.
6. The receiver must be properly earthed.



R.F. chassis bottom view. R.F. chassis top view. A.F. chassis bottom view.

Fig. 2

I.F. Filters

1. Connect condenser of 0.1 μF across the first grid of L1 and its cathode, switch over to medium wave band.
2. Apply a signal of 475 kc/s to the fourth grid of L1 through a condenser of 32.000 μμF, connect the output meter to the sockets of the second loudspeaker.
3. Adjust C18, C17, C16 and C15 in the sequence given for maximum output.

I.F. interference filter:

1. Switch the set to medium wave band and turn the tuning condenser to its maximum capacity.
2. Apply a modulated signal of 475 kc/s to the aerial socket.
2. Adjust the core of S5 until minimum output is obtained. (The adjustmentscrew of S5, not shown in fig. 2, is accessible just above the aerial socket).

H.F. oscillator circuits:
13.5-40 m

1. Apply a signal of 20.5 Mc/s through a resistance of 400 Ohms (artificial aerial: red point).
2. Fit the 15° gauge (fig. 3) and turn the tuning

condenser towards its minimum capacity until it stops.

3. Connect the aperiodic amplifier GM 2404 to the anode of L1 through a condenser of 25 μμF.

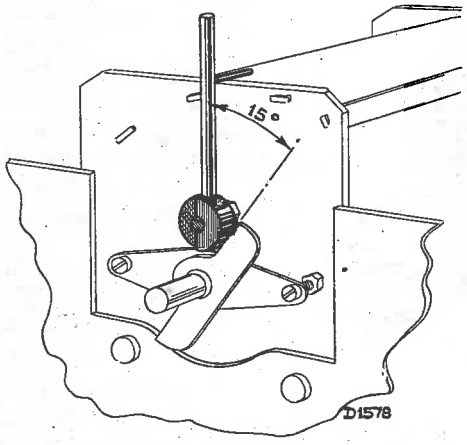


Fig. 3

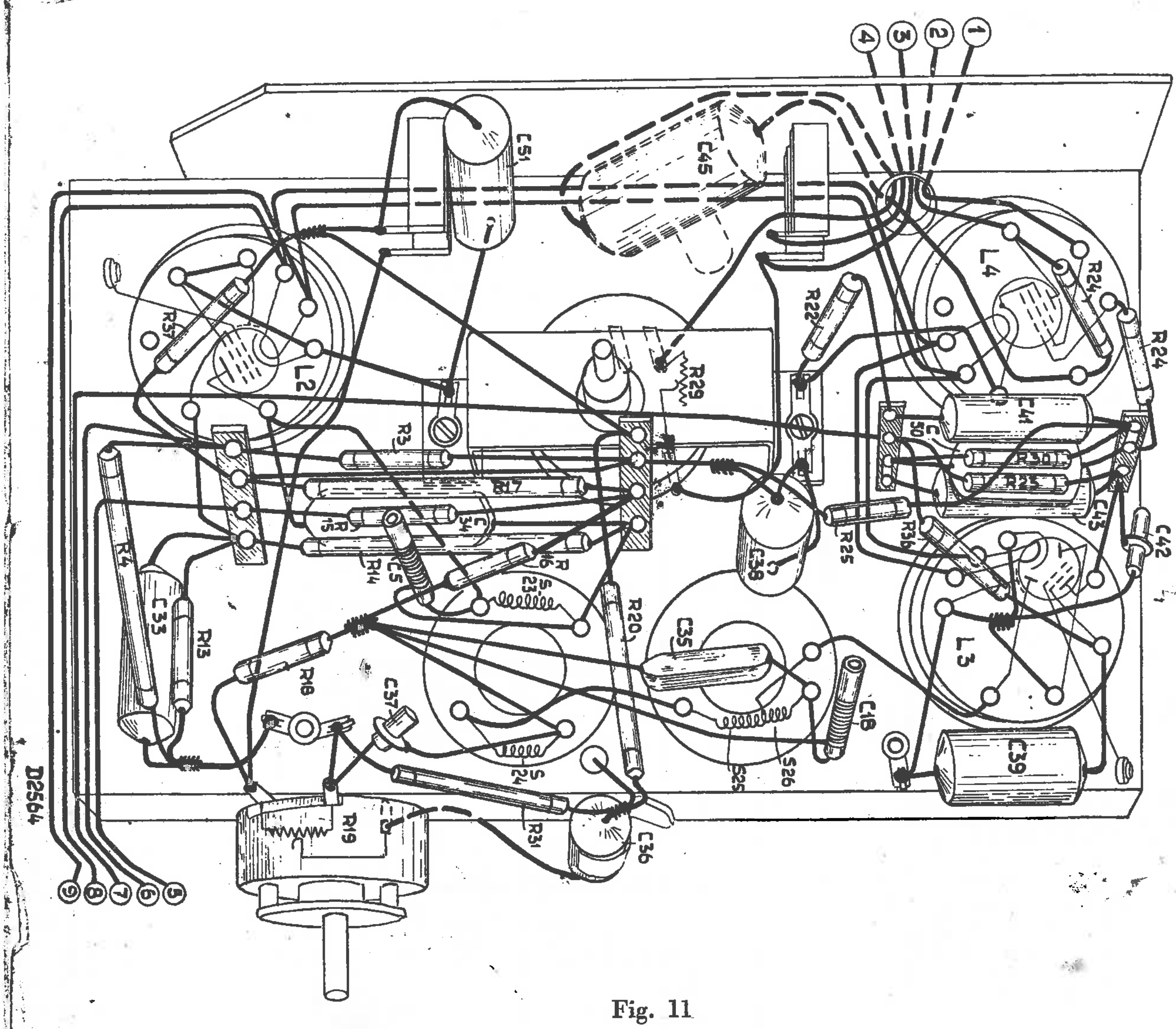
4. Adjust C10 for maximum output.
5. Remove the GM 2404, the condenser of 0.1 μF across the second grid and cathode of L1 and adjust C11 for maximum output.
6. Adjust C10 once again. (Without using the GM 2404).

40-125 m

1. Connect the GM 2404 to the anode of L1.
2. Shunt the condenser of 0.1 μF across the second grid and the cathode of L1.
3. Apply a signal of 7.5 Mc/s through a resistance of 400 Ohms (artificial aerial: red point).
4. Tune the set to the signal and remove the GM 2404 and the condenser of 0.1 μF.
5. Adjust C12 for maximum output.

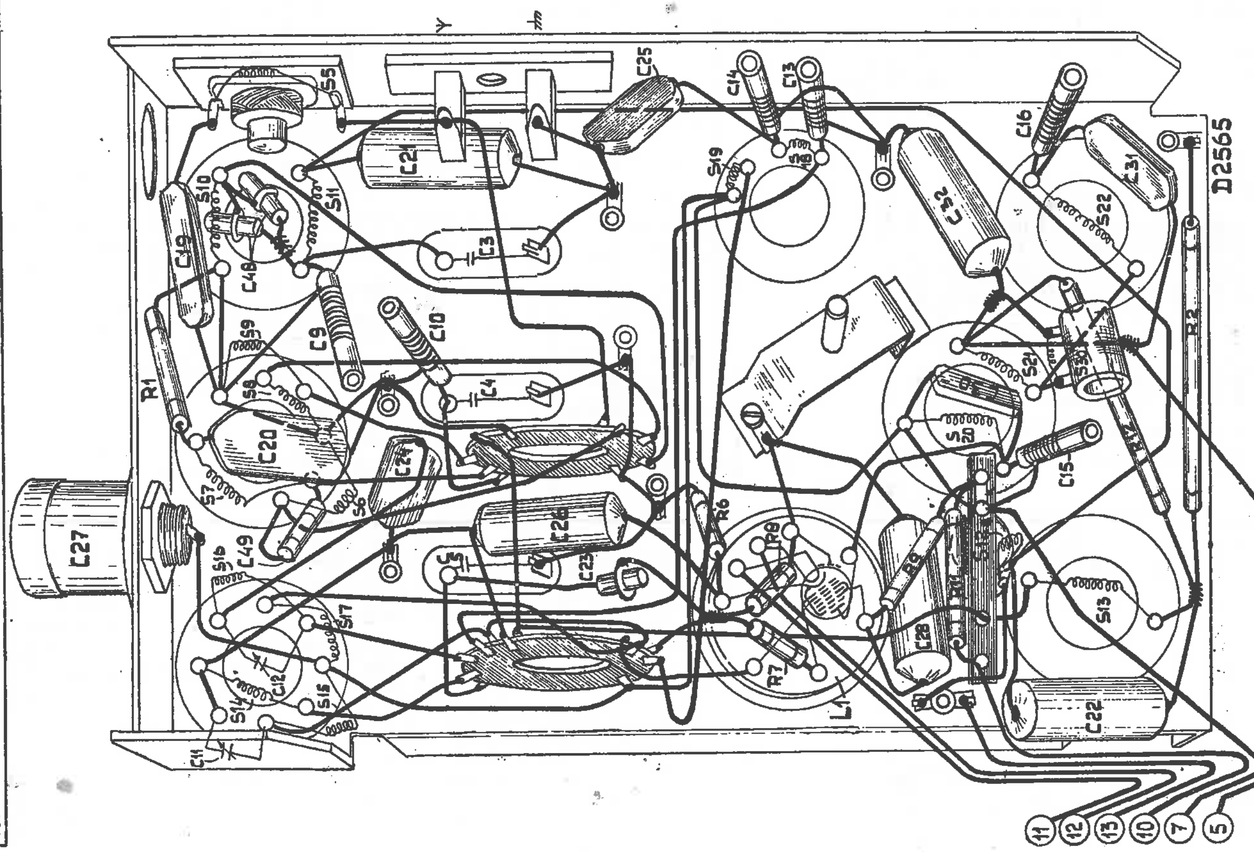
199—580 m:

1. Apply a signal of 1530 kc/s to the aerial socket through a standard artificial aerial and connect a resistance of approx. 5000 Ohms across S11.
2. Tune the set to the signal and adjust C9 for maximum output.
3. Apply a signal of 600 kc/s to the aerial socket.
4. Connect the GM 2404 to the anode of L1 and shunt the condenser of 0.1 μF across the first grid and the cathode of L1.
5. Tune the set to the 600 kc/s signal and remove the components mentioned under point 4.
6. Adjust C14 for maximum output.
7. Connect again the components mentioned under point 4 and tune the set to 1530 kc/s.
8. Remove again the components mentioned under point 7.
9. Adjust C13 for maximum output.
10. Repeat proceedings mentioned under the points 3 to 10.



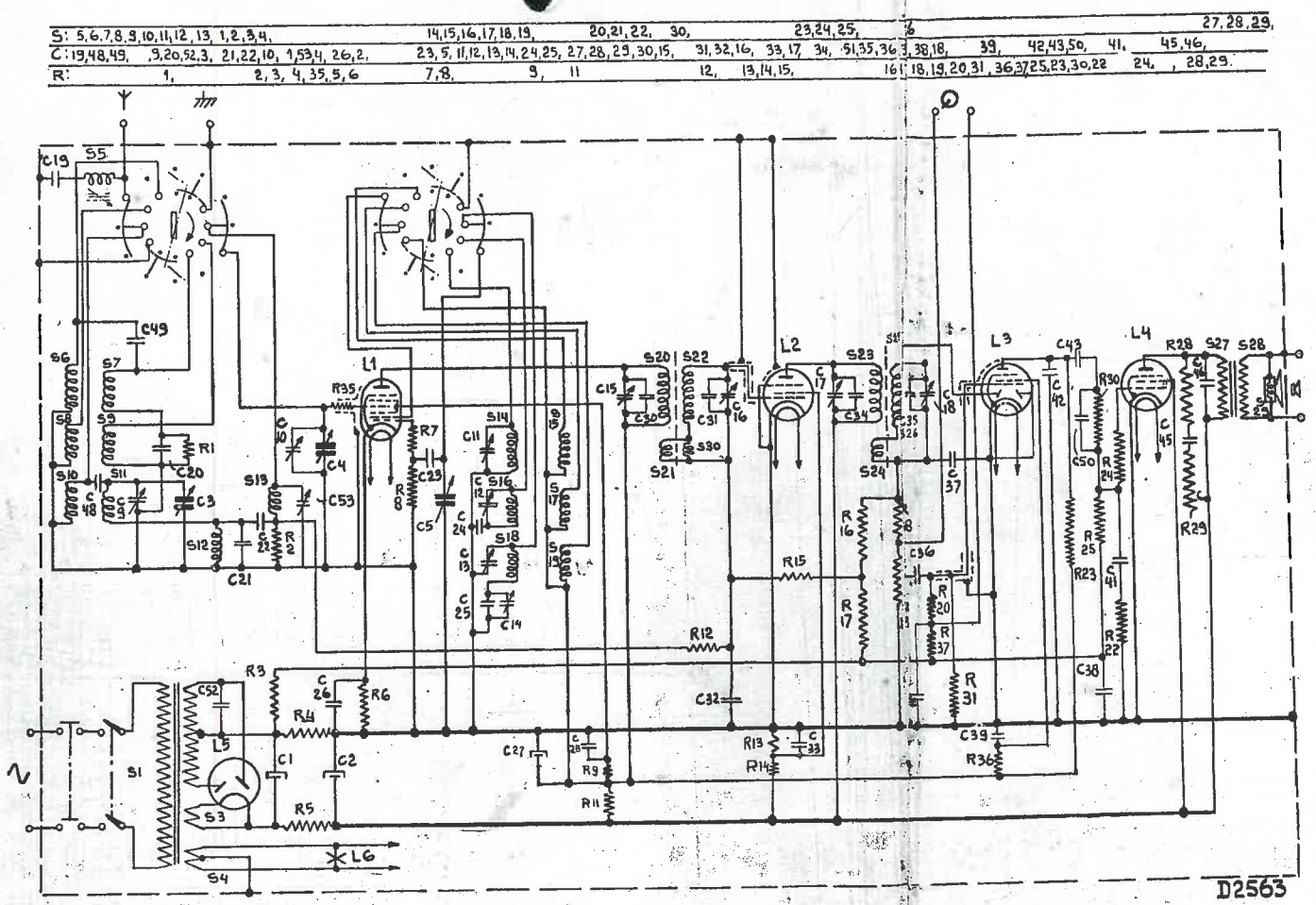
S:	23. 24 25. 26
C:	45 51 41. 34. 50 43. 42 38. 33 35. 5. 18. 39. 37. 36.
R:	28. 37 22. 24. 29. 30. 23. 3 25. 15 17. 14.16. 36. 13. 18. 20. 31. 19.

Fig. 11



S:	14.15. 17. 16. 13. 6. 7. 12. 8. 20. 9. 30. 21. 10. 11. 19. 18. 22. 5.
C:	22. 11. 12. 28. 23. 27. 5. 26. 49. 20. 24. 15. 30. 10. 9.4. 19. 3. 19. 48. 52. 31.21.16. 13.14.25.
R:	7. 9. 11. 6. 8. 12. 1. 2.

Fig. 12



Waverangeswitch in 199-580 m position.

Fig. 10

CONDENSERS.

Nr.	Capacity	Codenumber	Price
C1	32 µF	28.182.400	
C2	32 µF	28.182.400	
C3	11-490 µµF	28.212.190	
C4	11-490 µµF		
C5	11-490 µµF		
C9	30 µµF	28.212.060	
C10	30 µµF	28.212.060	
C11	2,5-30 µµF	See „coils"	
C12	2,5-30 µµF	See „coils"	
C13	30 µµF	28.212.060	
C14	180 µµF	28.212.080	
C15	30 µµF	28.212.060	
C16	30 µµF	28.212.060	
C17	30 µµF	28.212.060	
C18	30 µµF	28.212.060	
C19	140 µµF	28.195.680	
C20	5750 µµF	28.195.690	
C21	10000 µµF	28.201.080	
C22	0.1 µF	28.201.180	
C23	100 µµF	28.206.270	
C24	2080 µµF	28.195.240	
C25	350 µµF	28.191.390	
C26	50000 µµF	28.201.150	
C27	8 µF	28.180.090	
C28	0.1 µF	28.199.090	
C30	100 µµF	28.193.180	
C31	100 µµF	28.193.180	
C32	25000 µµF	28.201.120	
C33	50000 µµF	28.199.060	
C34	100 µµF	28.193.180	
C35	100 µµF	28.193.180	
C36	20000 µµF	28.201.110	
C37	100 µµF	28.206.270	
C38	0.1 µF	28.201.180	
C39	0.1 µF	28.199.090	
C41	3200 µµF	28.198.940	
C42	100 µµF	28.206.270	
C43	20000 µµF	28.199.020	
C45	50000 µµF	28.201.640	
C46	2000 µµF	28.201.480	
C48	12.5 µµF	28.206.350	
C49	2 µµF	28.205.880	
C50	800 µµF	28.190.220	
C51	0.1 µF	28.201.180	
C52	20000 µµF	28.201.650	
C53	30 µµF	28.212.060	

C53 is not always incorporated

RESISTANCES

Nr.	Resistance	Codenumber	Price	No.	Resistance	Codenumber	Price
R1	0,8 M. ohm	28.773.990		R17	5 M. ohm	28.771.270	
R2	2 M. ohm	28.771.230		R18	50000 ohm	28.773.870	
R3	0,32 M. ohm	28.773.950		R19	0,5 M. ohm	28.814.550	
R4	125 ohm	28.770.810		R20	2 M. ohm	28.771.230	
R5	800 ohm	28.802.620		R22	80000 ohm	28.773.890	
R6	400 ohm	28.773.660		R23	0,16 M. ohm	28.773.920	
R7	20 ohm	28.773.530		R24	1000 ohm	28.773.700	
R8	50000 ohm	28.773.870		R25	0,4 M. ohm	28.773.960	
R9	0,2 M. ohm	28.773.930		R28	100 ohm	28.773.600	
R11	20000 ohm	28.770.380		R29	50000 ohm	28.812.500	
R12	5 M. ohm	28.771.270		R30	0,2 M. ohm	28.773.930	
R13	80000 ohm	28.773.890		R31	2 M. ohm	28.771.230	
R14	64000 ohm	28.771.080		R35	20 ohm	28.773.530	
R15	0,8 M. ohm	28.773.990		R36	0,8 M. ohm	28.773.990	
R16	0,8 M. ohm	28.773.990		R37	0,8 M. ohm	28.773.990	

VALVES

L1	L2	L3	L4	L5	L6
EK2	EF5	EBF1	EL3	AZ1	8045-07

CURRENTS AND VOLTAGES

	L1	L2	L3	L4	L5	
Va	230	230	65	250	270	V=
—Vg	2,8	2,3	2,3	5	—	V=
Vg2	87	87	—	230	—	V=
Vg3-5	87	—	—	—	—	V=
ea	1,8	6,8	0,56	37	—	mA=
Ig2	2	2,6	—	4,7	—	mA=
Ig3-5	4,2	—	—	—	—	mA=

Voltage on C1: 270 Volts.
Voltage on C2: 255 Volts.

These voltages hase been measured by means of a voltmeter basing a resistance of 2000 ohms/V. Using a voltmeter with a lower resistance will give lower readings.

Furthermore the values given are an average of several measurements, so that a deviation in the actual measurement need not necessarily indicate of a fault.

PHILIPS LAMPS [N.Z.] LTD.

286-288 WAKEFIELD STREET,
[CORNER OF WAKEFIELD AND BLAIR STREETS]
WELLINGTON, C3, N.Z.

G.P.O. Box 1673

TELEGRAMS AND CABLES
"ARGENTA"
WELLINGTON.

All Communications must be addressed to the firm and not to Individuals.

INSTRUCTIONS FOR REMOVING THE CHASSIS FROM THE CABINET IN MODELS 462A AND 463A.

It has been brought to our notice that some of our dealers are having difficulty in removing the chassis from the cabinet of the above two models and we are therefore, supplying detailed instructions for carrying out this work.

1) ... Remove back cover and knobs, the latter by inserting a screw-driver through the holes provided in the base of the cabinet

2) ... Slacken the clamp screw fixing pointer to cable and also slacken the mounting screws of the right hand (from rear) pointer cable pulley. Now lift pointer cable off this pulley and keep the cable tight by means of a rubber band passed round the cable and hooked on to a "B" plug or bolt inserted into a pickup jack. This prevents the cable from coming off the condenser drive drum. Care must be taken that the cable does not chafe on the pilot lamp reflector.
In model 463a, remove the EM1 bracket before commencing operation (2).

3) ... Unsolder shielding ground leads from lugs at bottom of AF and RF chassis.

4) ... Remove clamps holding frame of speaker against the baffle and in model 462a remove woodscrew and washer from the rubber bush in the end of the RF chassis support arm.

5) ... Remove screw fixing the top of the AF chassis to the cabinet and in the 463a, those holding the top of the RF chassis.

6) ... Turn set on its face and remove the two front screws holding the wooden base to the cabinet. The one at the AF end is screwed directly into the cabinet, while the other at the RF end has a nut on its inner end. Also slacken the rear holding clamps and slide the chassis with its base-board out of the cabinet.

7) ... To operate the set out of the cabinet, one of the two types of pointer cable support should be used, but when replacing chassis, the rubber band arrangement should be reverted to.

SUPPORT FOR FREE END OF POINTER CABLE.

We have evolved two types of bracket for this purpose. Sketch and dimensions supplied. One is simply a piece of steel strip ($\frac{1}{2}$"x$\frac{1}{8}$") or similar stock, which is drilled at its lower end to take a bolt which is also passed through one of the two holes at the top of the Audio chassis and secured with a nut and washer. The pulley can be as used in the set or another made up, suggest using set part. The strip should be drilled accordingly and the pulley bolted to same.

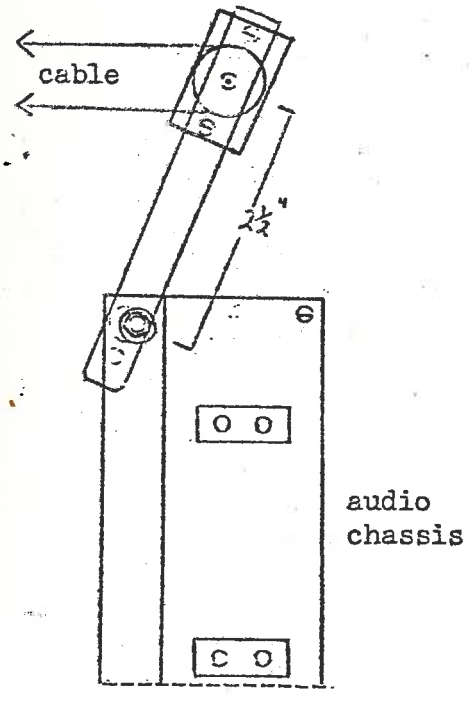
The second type of support is similar except that it is much easier installed and that it applies spring tension to the pointer cable, reducing the possibility of latter falling off when chassis is being handled.

This is made of lighter steel strip (about $\frac{3}{8}$" or $\frac{1}{2}$"wide by 18 or 20 gauge) and instead of bolting it to the audio chassis, it is merely necessary to pass the end of a stud in same, through the hole furthest from the edge of flange on chassis. One corner of the strip is turned round the flange to hold against sideways movement, and the whole is then "set" to give the correct cable tension, which tension assists in holding the fitting in place.

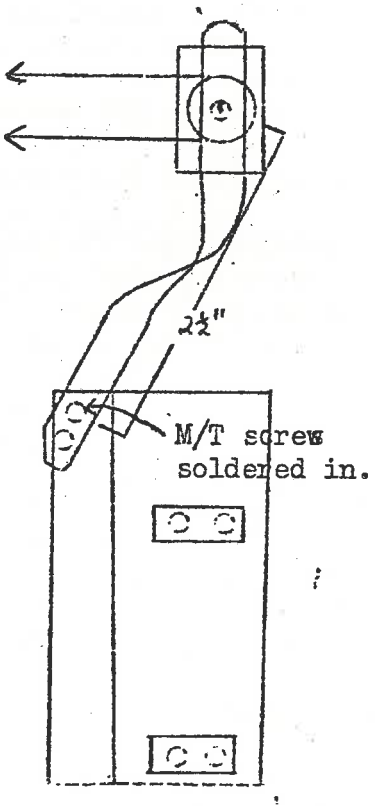
In the case of this support, a sketch of the back view is also given to give an idea as to how the lower end is bent round the chassis to hold it in place.

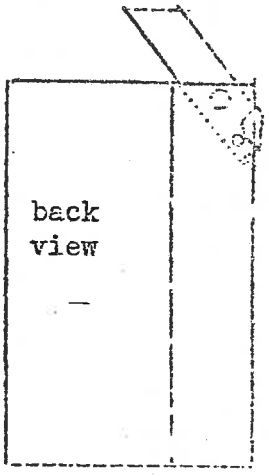
POINTER CABLE SUPPORTS FOR MOUNTING ON AUDIO CHASSIS OF 462a, 463a.

FIRST TYPE.



SECOND TYPE.





23/11/38.

SERVICE INFORMATION NO.1. 1938

Model 462a. Radioplayer

In the first release of this model some cases of "dial slip" are occurring.

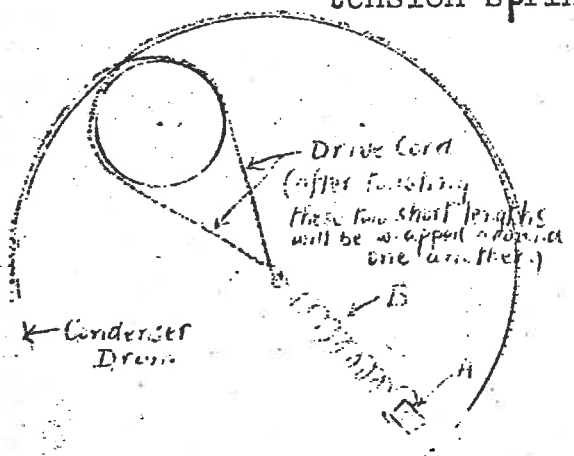
This is due to stretching of the cord drive linking the tuning control shaft to the tuning condenser drum. The trouble can be easily cured as follows:-

1) .... Remove the metal strap between the RF sub-chassis and the centre sub-chassis.

2) .... Remove the EK2 valve.

3) .... Carefully grip the end loop of the drive cord tensioning spring (marked "B" in sketch), in a pair of long nosed pliers, lift it carefully out of the anchorage slot (marked "A" in sketch), of the condenser drum, and then, (still gripping the spring) rotate the pliers half a dozen times, after which slip the end loop of the spring back into its anchorage slot.

This increases the tension of the string, the increase being indicated by an obvious extension of the coiled tension spring.



(Where dial slip occurs, it will be seen that the spring shows no extension.)