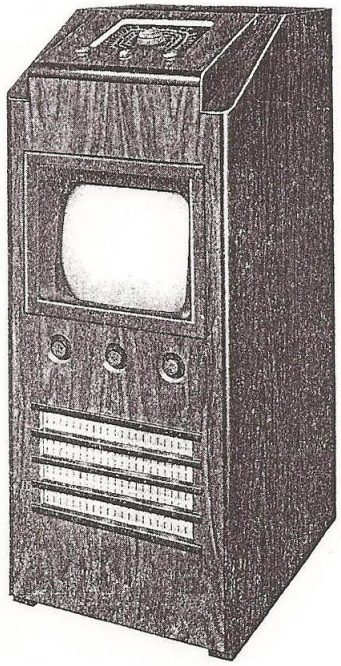


MANUAL OF INSTALLATION
AND SERVICE HINTS

COSSOR
TELEVISION
Models 1210 & 1210a

THE 1210 AND 1210A CIRCUIT DESCRIBED

MODEL 1210 AND 1210A

The compiling of service hints for a Television Receiver must necessarily take a somewhat different form from that adopted in our Radio service manuals, since it is thought that some difficulty may well arise in interpreting the function of a particular part of a Television circuit owing to the apparent complexity of certain sections when viewed from radio standards. The following brief description of the circuit is therefore included and may be regarded as an essential part of the service data.

THE THREE DECKS

The receiver is divided into three separate decks, one forming a pure radio receiver covering three wavebands and television sound, the vision deck which includes the vision frequency amplifier, the line and frame time bases and the cathode ray tube, and lastly the power pack, which supplies high and low tension current for both decks and incorporates the output stage. It is convenient to deal with each separately, commencing with the power pack. Model 1210A differs from 1210 inasmuch as it has an amplifier fitted in the lower compartment, and it is therefore convenient to deal with model 1210 as a single entity and describe the amplifier separately.

1210 POWER PACK

The circuit diagram of the power pack is shown on page 17, from which it may be seen that it includes three rectifier valves and the sound output valve, the Cossor 2 X.P. The 43 I.U. supplies the high tension for the sound chassis and utilises a perfectly normal circuit. The other section of the power pack uses a new type of Cossor indirectly heated rectifier valve, the 45 I.U., which supplies the vision deck with the exception of the actual high voltage supply to the gun of the cathode ray tube which is fed by the high voltage rectifier S.U. 2150.

THE CIRCUIT

The circuit of the 45 I.U. is perfectly conventional, while the circuit of the S.U. 2150 is conventional as an E.H.T. power pack and owing to the very small current drawn, smoothing is accomplished by a resistance, a permanent load being placed across the cathode/anode circuit of the valve consisting of three 8 megohm resistances in series. Should replacement become necessary at any time, care should be taken to replace with three resistances of the appropriate value, as an incorrect distribution of potential is likely to result in a form of arc taking place. Particular attention is drawn to the resistance R6, which is shunted by the variable resistance R10, which forms the focus control situated in the front of the receiver, the manipulation of which will result in a small change in the applied gun voltage. It may be noted that a complete open circuit in the focus control will not interrupt the picture, but will merely render the control inoperative.

SOUND DECK

Model 1210 is intended for operation on 50 cycle A.C. Mains only, but nevertheless the sound deck uses valves of a type normally associated with universal working. This arrangement is adopted in order to reduce the current drawn from the heaters in order to restrict the field of the somewhat lengthy heater leads which come up from the power pack. The first two stages of the deck are otherwise conventional with the exception of the additional waveband for vision sound. It should be noted that this waveband does not

incorporate compensation for tracking error, and consequently it is only operative on the television sound frequency and " dead " for the remaining portion of the scale.

VARIABLE BAND WIDTH

Reference to the circuit diagram page 5 will show that the secondary of the first intermediate frequency transformer is tapped into the centre of a coil an equal distance between two leads which are led to a two-position switch which is ganged to the tone control. This arrangement provides a choice of two band widths on short, medium and long waves, the two-position switch reversing the sense of the coupling and either increasing or decreasing the coupling between the main and primary and secondary coils.

TELEVISION SOUND

When in the Television position, switch S4 brings the additional section of the coupling coil into circuit and still further widens the band width, a similar arrangement being adopted for the second intermediate frequency transformer. By this means the band width is relatively wide when the deck is switched for vision sound, giving not only the wide response necessary to take advantage of the high quality transmission but allowing a margin to permit a reasonable amount of the frequency drift which occurs at such high frequencies.

VISION DECK

The first stage in the vision deck takes the form of a radio frequency amplifier, which is coupled by means of the tuned grid method to the frequency changer, Cossor 4 T.H.A. It should be noted that this coil, in common with the others similarly shown transfixed by an arrow, are pre-tuned by adjustment to inductance, the actual capacity of the circuit taking the form of strays and the inter-electrode capacity of the valve. The frequency changer is a triode hexode, the oscillator working on a frequency of 39 megacycles. The intermediate frequency coupling takes the form of a tuned anode which once again is pre-tuned by variation of inductance.

THE I.F. AMPLIFIER

Two stages of intermediate frequency amplification are used, employing respectively the 4 T.S.P. and 4 T.P.B., which are similar valves excepting that in the former case the anode is connected to the top cap and the latter has the grid connected to the top cap. Reference to the valve sequence will show that the first four valves are alternatively top anode connection and top grid connection, making possible coupling without long leads. The D.D.L.4 functions as a full wave detector, and is provided with a relatively low load R.35, which is necessary to avoid undue cutting of the higher frequencies brought about by the shunt grid cathode capacity of the next valve.

THE VISION OUTPUT STAGE

The 41 M.P.T. acts as a vision output stage, or as it is now sometimes called, the video stage. The anode load comprises resistances R.36 and R.37 and a small top lift choke, the latter being included to accentuate the higher frequencies. It will be noted that only part of the anode load, i.e. R.37 and the choke, is used to modulate the cathode ray tube resistance R.36 being included to make possible the use of a diode to reduce certain types of interference. The spotter (sometimes called the inverter) consists of the D.D.L.4 with anodes strapped together, forming a single diode in conjunction with a circuit that has the effect of reducing the fun current in the cathode ray tube when the input *exceeds* the value appropriate for maximum white, thus an interference impulse that is several times the amplitude of the normal signal will modulate the spot in the direction of black instead of permitting it to de-focus and cause a large white spot which would otherwise occur.

THE BRIGHTNESS CONTROL

It will be noted that from a D.C. point of view the grid of the cathode ray tube is held at substantially anode potential, bias being effected by varying the potential on the cathode by manipulation of the variable resistance R.51, which is fitted on the front of the receiver and referred to as the brightness control. The rest of the valves may be regarded as the scanning equipment and comprise two valves in the frame time base and two valves in the line time base and the 4 T.S.A., a double anode pentode as synch separator. The action of the two time bases is somewhat different and must therefore be dealt with separately.

THE FRAME TIME BASE

V.9 is the frame discharge valve and V.10 the frame amplifier valve. R.6 and R.52 together form the charging resistance, the former being variable and placed at the back of the chassis and labelled " Frame Amplitude." C.2 is the charging condenser. The discharge valve is biased by virtue of the charge held in C.44 set up by the potential drop across R.3 and R.53 due to grid current. Under normal conditions the grid potential is such that anode current cannot flow but the charge in C.44 leaks away through R.3 and R.53 until such time that the valve will pass current. In practice R.53, which is situated at the back of the chassis and labelled " Frame Synchronism," is adjusted so that the valve would start to pass current after a slightly longer interval than the time taken by one frame of a Television picture.

THE SYNC SEPARATOR

As will be seen later, the actual moment when the discharge valve commences to pass current is determined by the received signal. Reference to the diagram will show that as the charging condenser C.2 charges up through the charging resistances it will drive the grid of the frame amplifier in a positive direction and increase the anode current of the valve and consequently increase the current in the high impedance frame coils, which achieves the purpose of deflecting the spot from the top to the bottom of the picture.

The synch separator valve 4 T.S.A. is biased to approximately cut-off and will not therefore pass any appreciable current unless its grid is driven in the positive direction, which occurs on the action of both line and frame impulse transmitted by Alexandra Palace. One anode of this valve (the right-hand in the diagram) is connected to the primary of a three winding transformer. The primary current winding is shunted by a condenser C.43 so that the change is inappreciable on the short synchronising impulse, but considerable on the relatively long frame impulse.

Providing that R.53, the frame synchronism control, is correctly set, the frame impulse transmitted by Alexandra Palace will occur when the frame discharge valve is nearly ready to pass current. As may be seen from the diagram, the primary of the transformer is coupled to the secondary which is connected between the grid and the cathode of the discharge valve, and the transformer is so connected that an increase of anode current in the 4.T.S.A. will drive the grid of the discharge valve in the positive direction and the valve will commence to discharge the condenser C.2. The anode current must necessarily pass through the tertiary winding of the transformer, which is so connected that it induces a voltage across the secondary and drives the grid of the discharge valve in the positive direction, which increases the anode current, which turn still further drives the grid in a positive direction with the result that the discharging of C.2 is speeded up so that discharge is accomplished well within the time allowed for fly back.

THE LINE TIME BASE

The triode V.11 is the discharge valve, while R.54 and R.12 form a charging resistance and C.7 is the charging condenser. As C.7 charges the grid of the line amplifier, V.12 is driven in the positive direction and the anode current increases. An Output Transformer is used in the anode circuit to feed the low impedance line deflector coil. This is shunted by the resistance of R.46 in all models, but in certain models there is a condenser C.47 in series with the resistance. When discharge commences, the anode of V.12 is driven in the positive direction and a positive voltage is fed back to the grid of the discharge valve which will speed up discharge. The actual moment of discharge is determined by a change in current of the anode circuit of V.8. The line sync transformer is so connected that the grid of V.11 is driven in the positive driection.

GENERAL NOTES—INSTALLATION & INITIAL ADJUSTMENT

SWITCHING ON AND OFF

It is intended that the receiver should be switched on and off by means of the brightness control and the volume control. The practice of switching both chassis off and on by means of a wall switch should *not* be indulged in, as the combined surge current of the two chassis will often blow the fuse.

FUSE

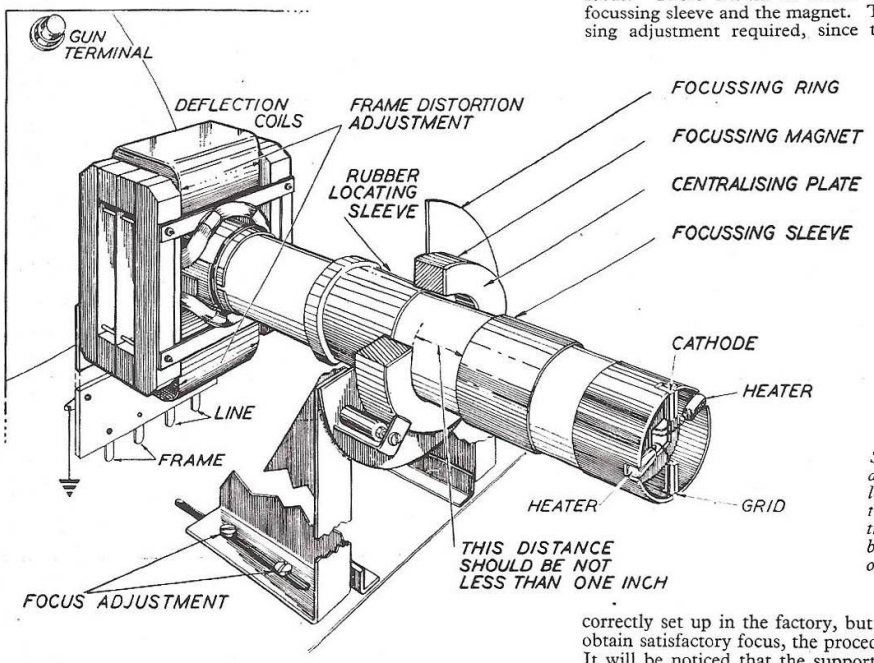
Should the entire receiver, i.e. sound chassis and vision chassis be inoperative, examine the fuse to see whether it has blown. This fuse is situated on the power chassis. Should replacement be necessary use a 2 amp. cartridge type fuse of similar dimensions.

CORRECT FEEDER (Very Important)

It is absolutely essential that Cossor 80 ohm twin downlead* be used with this receiver and also with other Cossor models ; the use of any concentric downlead, or twin wire having an impedance different from 80 ohms, will result in very serious loss of efficiency. Use of incorrect feed may result in any or all of the following troubles :—

(1) Weak sound.
(2) Failure to hold picture synch.
(3) Difficulty in avoiding " fly back " lines.
(4) Abnormal " motor car " interference.

* Previously referred to as 75 Ω



Side view of the cathode ray tube assembly ; this illustration shows the low capacity base which now replace the 7-pin type shown elsewhere in this manual. The 7-pin base may be seen on page 15. Connections are on pages 10 and 11.

WARNING

Additional care should be taken to avoid the possibility of electric shock. On any television receiver there are points that are several thousand volts above earth. In addition to the more obvious points in Model 1210 it should be noted that the top terminal of the 42 M.P.T. line amplifying valve) is some 2,500 volts (A.C.) above earth.
When handling the C.R.O. tube it should be remembered that the bulb is subjected to considerable air pressure and that the neck can easily be snapped off if knocked.

INSTALLATION

When delivered, the neck of the cathode ray tube is supported by a rubber strip fixed by thumb-screws to the tube support. Remove the band and screws, *care being taken that the tube does not drop down and hit the support.* Place the split rubber ring on the neck of the tube with the thick end towards the front of the set. Next, push the magnet assembly (which is packed separately) on to the neck of the tube, with the large end plate foremost. The magnet assembly is fixed to the tube support by the thumb-screws previously removed. Note that the earthing wire from the deflector coils must be clamped immediately under the *head* of the left hand thumb-screw as viewed from the back of the set.

THE FOCUSSING SLEEVE

Next slide on the focussing sleeve (which is the iron tube with velvet lining), and finally push on the base contacts.

CONNECTIONS

Check that the high-voltage connector is securely pushed on the terminal on the bulb of the cathode ray tube, and that the deflector coil plug is pushed home into its socket on the chassis beaneath ; set the mains voltage correctly on the power unit, as shown on page 4.

FOCUS ADJUSTMENT (Read Carefully)

Plug into the mains, turn the focussing control on the front of the set to the middle of its range, and switch on. Allow about a quarter of a minute to elapse and then turn up the brightness. A scanning pattern will be seen on the screen, probably out of focus. At this juncture, a mirror set up in front of the set will be helpful in order to be able to see the screen while working at the back of the set. Slide the focussing sleeve along the neck of the tube until the picture is in focus. There should be about 1″ of glass showing between the focussing sleeve and the magnet. This will normally be all the focussing adjustment required, since the receiver has previously been correctly set up in the factory, but in the event of not being able to obtain satisfactory focus, the procedure is as follows :—
It will be noticed that the support for the cathode ray tube, which also carries the magnet, is capable of adjustment backwards and forwards by slacking the screws which hold it down to the chassis. The best focus is now obtained by thus moving the focussing magnet, and also sliding the focussing sleeve, aiming to keep the distance between the two somewhere between 1″ and 1½″. Having done this, clamp down the tube support to the chassis. *It is important that this support should be square with the back edge of the chassis.* Push the split rubber ring well into the front magnet plate in order to grip and centralize the cathode ray tube.

As a general rule if focus improves by sliding the sleeve nearer the magnet and outside of the tolerance previously laid down, it may be assumed that the magnet is too near the deflector coils and should be re-set on the vision deck adjustment. Conversely, if the sleeve has to be nearer the end of the Tube before the focal point is reached then the magnet is too far from the deflector coils.

INITIAL ADJUSTMENTS

The controls on the back of the set are as follows. Reading from right to left as viewed from the back they are: Line Synchronism Line Linearity, Frame Synchronism, Frame Amplitude and Spotter for interference elimination. See Modifications (2), page 18.

LINE SYNCHRONISM.
The line synchronism control should be set in the centre of the arc over which synchronism holds.

LINE LINEARITY.
The line linearity knob regulates the velocity of scanning over the left-hand half of the picture, and adjustment of this is best made when a stationary tuning signal or lettering is being transmitted. Mis-adjustment of this control either stretches or cramps the left-hand side of the picture.

FRAME SYNCHRONISM.
The frame synchronism control should be turned anti-clockwise, and then turned slowly clockwise, until the picture locks. A further turn of a degree or two ensures a good hold.

LINE AMPLITUDE.
The width of the picture is adjusted by changing the clip in resistance on top of the vision chassis. Normally the correct value will be from 4,000 ohms to 8,000 ohms. Values below 4,000 ohms *must not be used*. See Modifications (2), page 18.

FRAME AMPLITUDE.
The frame amplitude control is provided to regulate the height of the picture.

SPOTTER
Except in localities prone to motor car ignition interference, the spotter knob is always turned fully anti-clockwise. Where this trouble is experienced, however, it may be minimised by slowly turning the knob clockwise until the high lights on the picture began to lose brilliancy. Then turn back just sufficiently to bring back the original brightness. This is the correct setting. It will now be found that the white spots due to interference will be turned grey or black and be much less noticeable.

PICTURE POSITION ALIGNMENT.
The picture can be squared up by rotating the deflector coil unit on the neck of the tube, taking care to see that the coils are pushed well forward against the glass shoulder of the tube.
Any shifting of the picture that is necessary is accomplished by loosening the three screws which clamp the magnet assembly together, and sliding the rear magnet plate gently over the face of the magnet. The picture shift is roughly at right angles to the movement of the plate, which, while somewhat confusing at first, is quickly mastered. When correctly centred, screw up the clamps securely.

MAINS VOLTAGE ADJUSTMENTS

Use tapping	200	for Mains voltages between					200–217
,,	,,	220	,,	,,	,,	,,	218–235
,,	,,	240	,,	,,	,,	,,	236–250

THE SOUND CHASSIS

1. VALVES

V1—Cossor 202 V.P. Met. 7-pin. Top cap anode.
V2—Cossor 202 S.T.H., Met. 7-pin. Top cap modulator grid.
V3—Cossor 202 V.P.B., Met. 7-pin. Top cap grid.
V4—Cossor 202 D.D.T., Met. 7-pin. Top cap grid.

2. DIAL LIGHTS

The dial lights are 6·5 v. ·3 a. M.E.S. type. To remove for replacement purposes, rotate the rubber grommets until the projections are in line with the slots in the dial frame, and then pull out.

3. TO REMOVE SOUND CHASSIS

(1) Loosen the grub screw in the volume switch and tone knobs on top of cabinet and slide off the spindles.

(2)* carefully remove cathode ray tube and stand in a safe place—remember that the neck is the weakest part. To remove tube it is first necessary to remove ring magnet assembly and un-plug coil assembly and gun lead. If it has not been removed when installed, it will also be necessary to remove the webbing sling.

(3) Remove two wood screws that hold the dial reflector to the top of the cabinet—this is important.

(4) Remove dipole lead and un-plug multi-way lead from power pack.

(5) Remove the two square nuts that hold the chassis support taking care to hold the chassis with the other hand; lift out chassis by lowering slightly.

*NOTE.—Many service engineers will prefer to leave the tube in position, and take due care not to drop any of the chassis fixings on to it.

FAULTS AND THEIR POSSIBLE CAUSES

4. CHECK THESE POINTS FIRST

(1) That the mains supply point is live.
(2) That the mains lead shows continuity when the mains switch is on.
(3) That the mains voltage adjustment is correctly set.
(4) That the multi-way plug is in the socket and making good contact.
(5) That the twin aerial lead is in good order.
(6) That the valves are up to standard and making good contact in the holders.

5. HEATER VOLTAGE INCORRECT

Test valve heaters for continuity, examine the six-pin plug and socket for poor contact, inspect heater wiring for high resistance joints Check mains transformer voltage adjustment for correct setting.

6. H.T. VOLTAGE INCORRECT

See notes in Power Pack section.

7. VOLTAGE AND CURRENT

The voltage and current readings given below were taken with a popular test set, but as the resistance of the meter has a considerable effect upon the voltage measurements, these are only approximate. The receiver was tuned to 320 metres, and the chassis was taken as negative for the voltage readings.

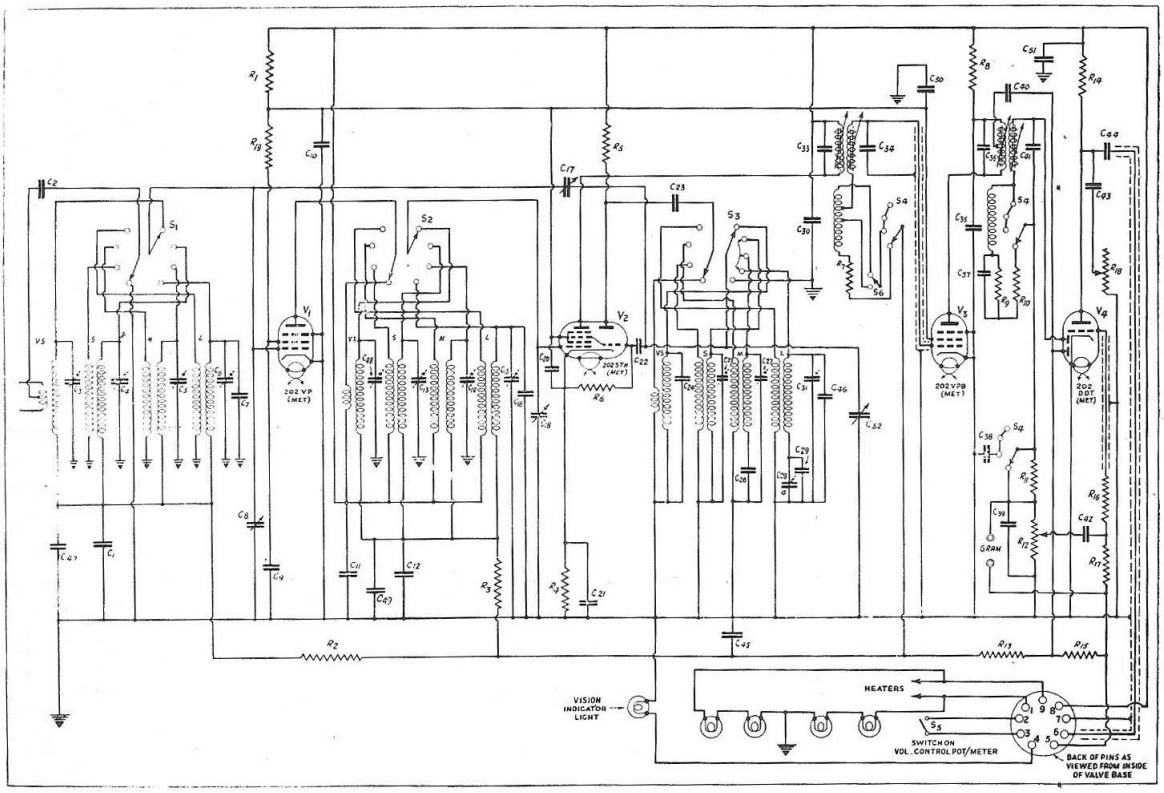
Valve	Anode Volts	Anode Curr.	Screen Volts	Screen Curr.	Osc. Anode Volts	Osc. Anode Curr.
202 V.P.	280	6·5	145	2	—	—
202 S.T.H.	280	3	155	5	70	7·0
202 V.P.B.	245	6	155	2	—	—
202 D.D.T.	167	2·5	Total H.T. voltage 280 (measured H.T. rail to chassis).			

8. VOLTAGES TO V4 INCORRECT

ANODE: Test R14 for correct value, C43, C44 for short circuit. Check grid circuit.
GRID: Test R5 *in power pack* for correct value, R16, R17 for continuity, pin No. 5 on plug and socket for poor contact, C40, C42 for short circuit.

9. VOLTAGES TO V3 INCORRECT

ANODE: Test R8 for correct value, C35, C40, C50 for short circuit. Check screen circuit.
SCREEN: Test R1 for correct value, C9, C10, C20, C50 for short circuit. Check grid circuit.
GRID: Test R5 *in power pack* for correct value, secondary of 1st I.F.T., R13, R15 for continuity, pin No. 5 on plug and socket for poor contact.



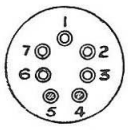
CIRCUIT OF THE 1210 SOUND CHASSIS

Condenser.	Description.
C8, C18, C32	3-gang Variable
C1	·05 mfd. tubular
C2	·0005 mfd. mica
C3	U.S.W. Aerial Trimmer
C4	S.W. Aerial Trimmer
C5	M.W. Aerial Trimmer
C6	L.W. Aerial Trimmer
C7	15 m.mfd. mica
C9	·001 mfd. mica
C10	·1 mfd. tubular
C11	·05 mfd. tubular
C12	·05 mfd. tubular
C13	S.W. H.F. Trimmer
C14	M.W. H.F. Trimmer
C15	L.W. H.F. Trimmer
C16	15 m.mfd. mica
C17	2 parallel wires on gang
C20	·001 mfd. mica
C21	·1 mfd. tubular
C22	·0001 mfd. mica
C23	·0002 mfd. mica
C24	55 m.mfd. mica
C25	S.W. Osc. Trimmer

Condenser.	Description.
C26	570 m.mfd. mica
C27	M.W. Osc. Trimmer
C28	L.W. Osc. Padder
C29	120 m.mfd. mica
C30	·1 mfd. tubular
C31	L.W. Osc. Trimmer
C33, C34	225 m. mfd. in I.F.T.1
C35	·1 mfd. tubular
C36	60 m.mfd. mica in I.F.T.2
C37	·002 mfd. mica in I.F.T.2
C38	50 m.mfd. mica
C39	20 m.mfd. mica
C40	50 m.mfd. mica
C41	65 m.mfd. mica in I.F.T.2
C42	·01 mfd. tubular
C43	·02 mfd. tubular
C44	·01 mfd. tubular
C45	·05 mfd. tubular
C46	40 m.mfd. mica
C47	·001 mfd. mica
C48	U.S.W. R.F. Trimmer
C49	·001 mfd. mica
C50	·01 mfd. mica
C51	·0005 mfd. mica.

Resistance	Ohms	Megohms	Watts
R1	15,000	·5	1·3
R2		·5	·5
R3		·5	·5
R4	300		·5
R5	30,000		1
R6	25,000		·5
R7	130		·5
R8	5,000		·5
R9	20,000		·5
R10	400		·5
R11		·5	·5
R12		·5 (Volume control)	·5
R13		2	·5
R14	50,000		·5
R15		1	·5
R16	50,000		·5
R17		2	·5
R18	100,000 (Tone control)		·5
R19	5,000		

The base connections are shown alongside, as seen when the valve *holder* is viewed from the *under side.*



VALVE	PIN NO. 1	2	3	4	5	6	7
202 VP	Met.	Grid	Sup. Grid	Heater	Heater	Cath.	Aux. Grid
202 STH	Tri. A.	Tri. G.	Screen	Heater	Heater	Cath.	Hex. Anode
202 VPB	Met.	Anode	Sup. Grid	Heater	Heater	Cath.	Aux. Grid
202 DDT	Diode	Met.	Diode	Heater	Heater	Cath.	Anode

NOTE.—All top cap grid except 202 VP, which is top cap anode.

10. VOLTAGES TO V2 INCORRECT

ANODE : Test primary of 1st I.F.T. for continuity, check screen, cathode, grid and oscillator anode circuits.

SCREEN : Test R1 for correct value, C9 ,C10 C20, C50 for short circuit. Check grid cathode and oscillator anode circuits.

GRID : Test appropriate coil and wave-change switch contact for continuity. Pin No. 5 on plug and socket for poor contact.

CATHODE : Test R3, R4, R13, R15 and R5 *in power pack* for correct value, C21 for short circuit. Test valve for heater to cathode insulation.

OSCILLATOR ANODE : Test R5 for correct value, C22, C23 for short circuit.

NOTE.—The triode section of the valve should be oscillating when readings are taken, and this can be verified by short circuiting R6 or C32, which should cause an increase in anode current. If there is no change, test the appropriate oscillator coils and wave-change switch contacts for continuity, C22, C23 for open circuit or low capacity.

11. VOLTAGES TO V1 INCORRECT

ANODE : Test appropriate coil and wave-change switch contact for continuity. Check screen and grid circuits.

SCREEN : Test R1 and R19 for correct value, C9, C10, C20, C50 for short circuit. Note that the screens of V2 and V3 are also connected to R1, and the operating conditions of V2 and V3 should be checked.

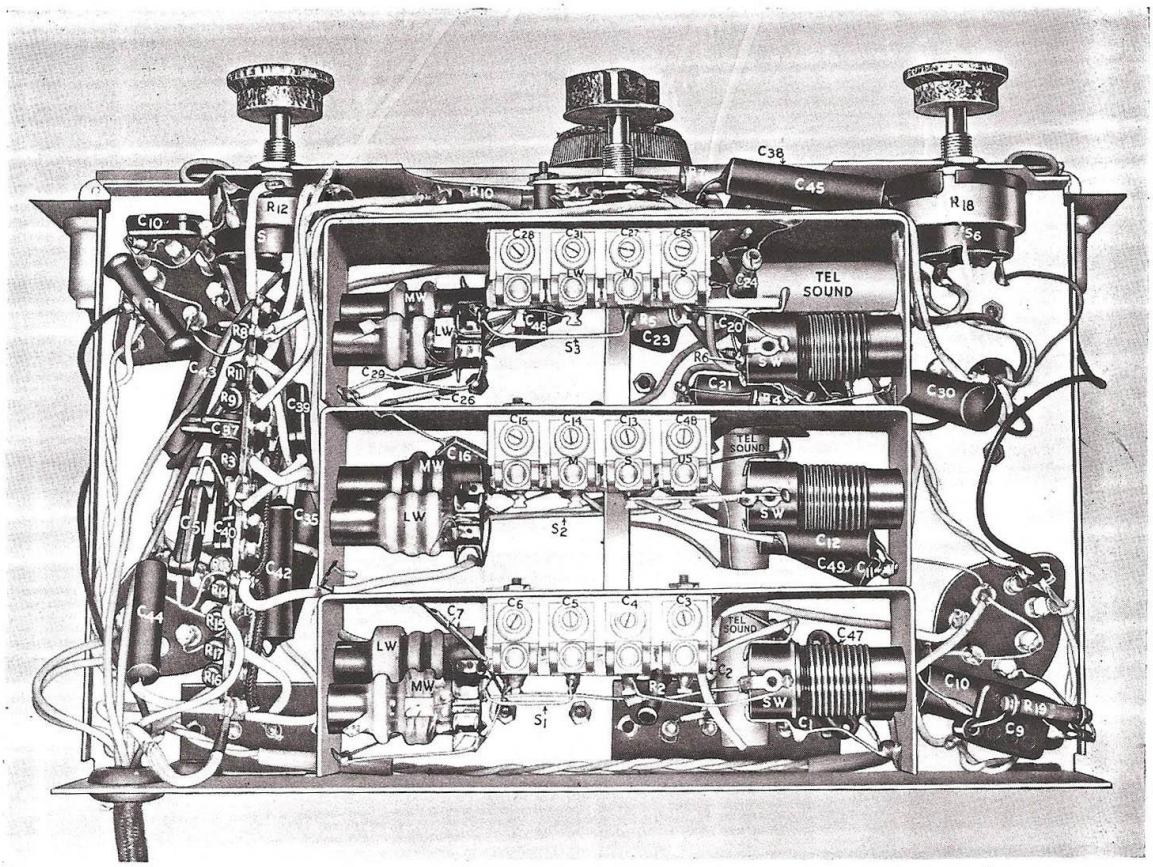
GRID : Test R2, R13, R15 and R5 *in power pack*, appropriate coil and wave-change switch contact for continuity, pin No. 5 on the plug and socket for poor contact.

RESISTANCE READINGS

	Wave Band	Primary	Secondary
Aerial Coil	*V.S.	Very low	Very low
" "	S.W.	1 Ω	Very low
" "	M.W.	16 Ω	2·7 Ω
" "	L.W.	115 Ω	36 Ω
Radio freq. amplifier coil	V.S.	Very low	Very low
" " " "	S.W.	·5 Ω	Very low
" " " "	M.W.	5 Ω	2·7 Ω
" " " "	L.W.	13 Ω	31 Ω
Oscillator Coil	V.S.	Very low	Very low
" "	S.W.	·5 Ω	Very low
" "	M.W.	1·7 Ω	3·6 Ω
" "	L.W.	3·2 Ω	9·4 Ω
1st I.F. Transformer	—	3·5 Ω	3·5 Ω
2nd I.F. Transformer	—	18 Ω	3·5 Ω
1st I.F. Transformer Coupling Coil ..		Total end to end 1 Ω	

* Note : V.S. = Television Sound Frequency.

THE SOUND CHASSIS : UNDERSIDE VIEW



NOTE :- For Condenser C10 (next to R1) read C50.

12. HUM

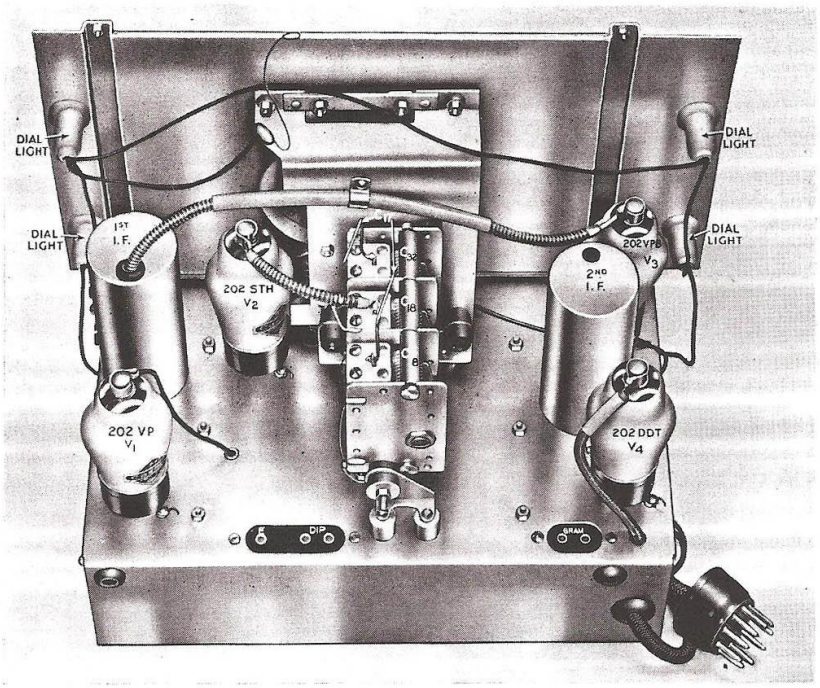
Test each half of the centre tap resistance across the filament of the 2 X.P. (in power pack) and check the centre tap of the heater winding for continuity, heater wiring for short circuit to chassis, C1 and C2 *in the power pack* for open circuit, C3 *in the power pack* for short circuit, L.S. field coil and hum bucking coil for short circuited turns. For modulation hum, test the valves for heater to cathode insulation, C11, C30 and C51 for open circuit, low voltage mains transformer for disconnected electrostatic screen.

13. NOISE

External interference is the most likely cause of this trouble. Electrical machinery, trams, loose connections in house wiring, poor aerial insulation, loose mains plug, may cause noises. If the noise is much less when the aerial and earth are disconnected, the receiver is probably not at fault. If the noise continues, test all valves or substitute with others known to be in good order, inspect all wiring for dry joints and defective insulation, valve holders, switches plugs and sockets for poor contacts.

14. INSTABILITY

Check all earth connections, coil cans and gang condenser for poor contact to chassis ; verify that the switches are in good condition. Check all decoupling condensers for open circuit, and a quick way to do this is to use a ·1 mfd. tubular type with a clip on the end of each lead which can be connected across each condenser in turn while the receiver is operating. If the trouble cannot be located by the means outlined above, the ganging may be checked as described below in paragraph 18.



TOP VIEW OF THE SOUND CHASSIS

15. WEAK SIGNALS

Test the appropriate coils, switch contacts and feeder for continuity, C2, C22, C23, C44 for open circuit or low capacity, each section of the gang condenser for short circuit, verify that the triode section of the frequency changer is oscillating by noting a change in anode current when R6 or C32 is short circuited. See that the gram plug is not short circuited or connected to a gramophone pick-up. The H.F. stage can be rapidly tested by temporarily placing the aerial on the top cap of V2, top cap of V1, fixed plates of C8, and receiver side of C2 in that order, which should produce a small increase in signal strength at each point.

16. A.V.C. CIRCUITS

The I.F. signal is fed from the tapping on the primary of the 2nd I.F.T. through the coupling condenser C40 to the A.V.C. diode on V4. The delay voltage is developed across R5 *in the power pack* and the load resistance is R15. Decoupling is provided by R13, C45 for V3, R3, C12 and C49 for V2, R2, C1 and C47 for V1. The A.V.C. voltage should reduce the anode current of V1, V2, V3 when a fairly strong station is tuned in. Another method of checking the operation of A.V.C. is to tune in a fairly weak station and then short circuit C1, C12, C45 in turn, which should increase the anode current and volume. If there is no change, test C40 for open circuit, A.V.C. diode to grid of V1, V2, V3 for continuity, C1, C12, C45, C47 and C49 for short circuit, and inspect the wiring and R2, R3, R13, R15 for short circuit to chassis.

17. VARIABLE SELECTIVITY

The selectivity on S.W., M.W., L.W. can be adjusted by means of a switch operated by the tone control knob. When the knob is turned fully clockwise, the additional turns which aid the coupling between the primary and secondary winding of the 1st I.F.T. are in circuit, and give a wide band response curve with reduced selectivity. When the knob is turned anti-clockwise, the turns in circuit oppose the coupling, giving a narrow band with maximum selectivity. When switched to vision sound, an extra section of the coupling is in circuit which still further widens the response, while both overcoupling and damping are introduced into the 2nd I.F.T. circuit for the same purpose ; this arrangement gives the wide response necessary for the excellent quality available on the vision sound frequency and offsets the effect of drift.

18. GANGING

TEST FREQUENCIES.

I.F.—465 kcs.
S.W. Trim—18 mcs. (16·7 metres.) Pad—Shaped oscillator vanes
M.W. Trim—1,400 kcs. (214 metres). Pad—Fixed condenser.
L.W. Osc. trim—232 kcs. (1,309 metres). Pad—160 kcs. (1,875 metres). Aerial and H.F. trim—250 kcs. (1,200 metres).

Do not attempt any adjustment to the ganging unless an accurately calibrated oscillator is available.

I.F. CIRCUITS.

Soften the wax securing the iron cores in I.F. transformers by applying a warm screwdriver to the slots, which will enable the cores to be screwed in or out as required for adjustment. Switch the receiver to the M.W. position, turn the tone control knob anti-clockwise until the switch operates to give minimum band width and set the volume control at minimum unless an output meter is to be used.

The Cossor Ganging Oscillator and Oscilloscope are recommended for obtaining a visual indication of the correct shape of response curve. The input terminal of the Oscilloscope should be connected to the " gram " socket, which is joined to the junction between R11 and R12. Tune the Oscillator to 465 kcs. and connect it to the top cap of V2. Adjust the iron cores in the following order : secondary of 2nd I.F.T., primary of 2nd I.F.T., secondary of 1st I.F.T., primary of 1st I.F.T., for maximum signal and a symmetrical shape of response curve. The oscillator input to the receiver should be reduced as the circuits come into line to minimise the effect of A.V.C. Finally turn tone knob fully clockwise and make, if absolutely necessary, a small adjustment to produce a symmetrical response curve.

AERIAL AND H.F. CIRCUITS.

M.W.

Tune the oscillator to 1,400 kcs. (214 metres) and connect it to the aerial socket. Set the pointer on the receiver dial to 214 metres and adjust C27, C14, C5, in that order, for maximum output. Padding is provided by C26 which is fixed and therefore no adjustment is necessary.

L.W.

Switch receiver to L.W. position, leaving dial set as above, and tune oscillator to 232 kcs. (1,309 metres). Adjust C31 for maximum output. Set oscillator to 250 kcs. (1,200 metres) and tune in signal on receiver. Adjust C15 and C6. Set the oscillator to 160 kcs. (1,875 metres), tune in the signal on receiver and adjust the padder C28 whilst rocking the tuning knob until the maximum output is obtained. This will upset the trimming adjustments and for the best results the whole process should be repeated, commencing with setting the dial to 877 kcs.

S.W.

Switch receiver to S.W., set pointer to 18 mcs. (16·7 metres) and tune oscillator to 18 mcs. Adjust C25, *using the frequency on the high side of the signal given by the lower value of trimmer setting*, then adjust C13 and C4. No padding adjustment is necessary as the vanes of the oscillator section of the gang condenser are specially shaped to give correct tracking.

V.S.

Switch receiver to V and tune in 41·5 mcs. signal for maximum response by means of manual tuning control. Next adjust C48 and C3 (in that order) for maximum response. The 41·5 mcs. signal is best obtained from the Alexandra Palace transmission using preferably the tuning note. This course is advocated as many ganging oscillators cannot reach this frequency or are unsatisfactory when they do so.

THE AMPLIFIER

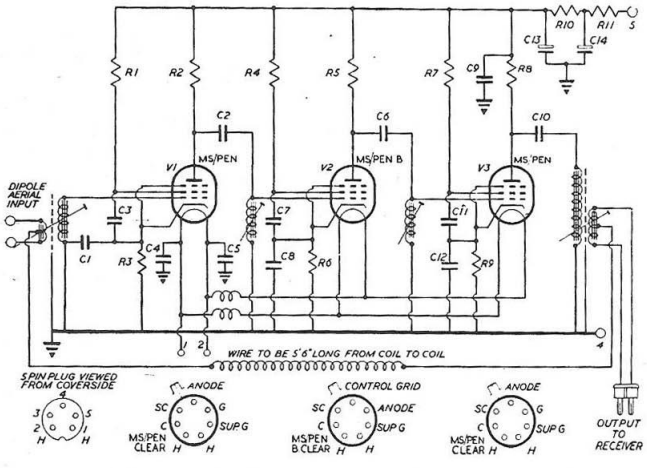
The amplifier is a separate entity and when attached to Model 1210 the whole comprises Model 1210A. It is fitted in the lower compartment beside the power pack and derives its power through a multiway lead, the plug on which is inserted in the socket provided for that purpose at the side of the power pack. It is highly desirable that when a 1210A is required, it should be ordered as such, as when supplied complete, the amplifier and main chassis are ganged as a single entity. The fitting of an amplifier obtained separately may possibly result in instability.

WEAK SOUND

The amplifier is normally trimmed to favour the vision frequency but in those districts where sound is the greater problem, the amplifier may be slightly re-trimmed to increase the efficiency on sound, although this must necessarily be attended by some loss of sensitivity on vision, which is of course unimportant if there is sufficient control in hand on the contrast control. Proceed as follows: Unseal the four trimmers—there are three on the side and one on the end—and turn each in turn a few *degrees* in a clockwise direction, carefully noting the sound volume obtained after each series of adjustments. Do not continue this procedure beyond the point where it is absolutely necessary, as if these trimmers are screwed in too far, picture definition is lost and/or instability occurs.

FAULTS

As can be seen from the circuit diagram, the amplifier is extremely simple and any fault should be speedily revealed by testing the several resistances and condensers for correct value and the coils for continuity. If anode current to any valve is low, test the appropriate screen condenser for leak.



Circuit diagram of amplifier which is used in Model 1210a only

Resistance	Ohms	Watts
R1	500	¼
R2	5,000	1
R3	300	⅛
R4	500	¼
R5	3,500	1
R6	300	⅛
R7	500	¼
R8	5,000	1
R9	300	⅛
R10	4,000	5
R11	5,000	5

Condenser	Mfd.	M.Mfd.
C1	·001	
C2		50
C3	·001	
C4	·001	
C5	·001	
C6		50
C7	·001	
C8	·001	
C9	·001	
C10		50
C11	·001	
C12	·001	
C13	8 (elec.)	
C14	8 (elec.)	

THE VISION CHASSIS

1. VALVES

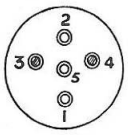
Valve	Type	Remarks
V1	4 T.S.P.	7-pin. Top cap anode
V2	4 T.H.A.	7-pin. Top cap modulator grid
V3	4 T.S.P.	7-pin. Top cap anode
V4	4 T.P.B.	7-pin. Top cap grid
V5	D.D.L.4	5-pin. No top cap
V6	41 M.P.T.	7-pin. Top cap anode
V7	D.D.L.4	5-pin. No top cap
V8	4 T.S.A.	7-pin Met. Top cap " line " anode
V9	41 M.T.L.	5-pin Met. No top cap
V10	41 M.P.T.	7-pin. Top cap anode
V11	41 M.T.L.	5-pin. Met. No top cap
V12	*42 M.P.T.	7-pin. Top cap anode

* NOTE.—The anode of this valve is some 2,500 v. A.C. above earth potential when time base is working. The valve used in this position must have been flashed, which is denoted by the letter " F" stamped on the label.

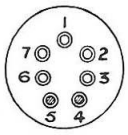
2. BASE CONNECTIONS

VALVE	PIN NUMBER 1	2	3	4	5	6	7
7-pin types.							
4 THA*	Os. Anode	Os. Grid	Screen	Heater	Heater	Cath.	Hex.Anode
4 TSP†	—	Grid	Sup. Grid	Heater	Heater	Cath.	Screen
4TPB*	—	Anode	Sup. Grid	Heater	Heater	Cath.	Screen
41 MPT†	—	Grid	Sup. Grid	Heater	Heater	Cath.	Screen
4TSA††	Met.	Grid	Screen	Heater	Heater	Cath.	Anode
42 MPT†	—	Grid	Sup. Grid	Heater	Heater	Cath.	Screen
5-pin types.							
DDL 4	Anode	Anode	Heater	Heater	Cath.	{ Numbers refer to 5-pin diagram below.	
41 MTL	Anode	Grid	Heater	Heater	Cath.		

*Top cap grid. †Top cap anode. ††Top cap anode (line).



The base connections, as seen when the valve *holder* is viewed from the *underside*.



VISION CHASSIS, Voltage and Current Readings.

Valve	Anode Voltage	Anode Current	Screen Voltage	Purpose
V1 4 T.S.P.	130 v.	12 m.a.	170	R.F. Amp.
V2 4 T.H.A.	270	2 m.a.	181	F/C
V3 4 T.S.P.	*264 v.	*1 m.a.	258	1st I.F.
V4 4 T.P.B.	220 v.	12 m.a.	243	2nd I.F.
V5 D.D.L. 4	—	—	—	Det.
V6 41 M.P.T.	97 v.	37 m.a.	170	Video Amp.
V7 D.D.L.	—	—	—	Spotter
V8 4 T.S.A.	370 v.	Very Small	Very Small	Sync. Sep
V9 41 M.T.L.	**175 v.	†	—	Frame Dis.
V10 41 M.P.T.	**227	†	280	Frame Amp.
V11 41 M.T.L.	**1·9	†	—	Line Dis.
V12 42 M.P.T.	**320	†	270	Line Amp.

* With contrast control at centre of rotation.
† Varies with charging/discharging of condenser.
** Very approximate and varies with setting of controls.

CHECK THESE POINTS FIRST

(1) That the thermal cut-out has not broken circuit (if one is fitted)
(2) That the mains voltage adjustment is correctly set.
(3) That the multi way plug is making *proper* contact in side of power pack.
(4) That the aerial system (particularly the feeder) is in good order.
(5) That the short internal feeder is in good order.
(6) That the valves are making proper contact and are in good order.
(7) That all screens fit properly.

TO REMOVE VISION CHASSIS

(1) Loosen grub-screws in " Brightness " and " Contrast " knobs and slide off spindles. (N.B.—It is not necessary to remove the " Focus " knob.)
(2) Remove the Cathode Ray Tube and stand in a safe place. Before removing the tube it is necessary to remove the complete ring magnet assembly by taking out the two screws which hold it to the bracket. It is also necessary to un-plug the deflector coil assembly from the chassis and remove the webbing brace if still in position.
(3) Next remove two nuts and bolts holding back of chassis to shelf and slide chassis out.

FAULTS AND THEIR PROBABLE CAUSE

1. NO PICTURE

In the condition of no *picture* but a *raster* on the screen, it is apparent that there is a fault in the vision amplifier, i.e. the circuit associated with V1, V2, V3, V4, V5 or V6. The feeder plug can be tried on the top of terminal of V2. If this does not produce a picture, test I.F. coils for continuity and check voltage and current to valves. If Receiver is Model 1210A there should be no reason to suspect the amplifier if vision sound is normal.

2. NO RASTER

If an Electrostatic Meter is available check voltage between gun terminal and chassis ; otherwise connect a low reading milliammeter in series with a 50 megohm resistance and connect between gun and chassis, when the deflection of about ·1 milliamps. should be registered. If gun voltage is absent or appears inadequate, make the following tests in the *power pack* : test R6 and R8 for open circuit and three resistances R7 for short circuit or low value. Test C9 and C10 for short circuit and examine the cab tyre lead. Note that the heater in the cathode ray tube is glowing.

3. NO FRAME DEFLECTION

Absence of frame deflection will give a narrow horizontal line of considerable brilliancy, and denotes that the frame time base is not working ; if possible, substitute V9 and V10. Check R3, R4, R6, R52 and R53 for open circuit. Check R60, C34, C40, C42, C44 and C45 for short circuit. Test C3 and C2 for short circuit and open circuit. Test frame coils for continuity.

4. NO HORIZONTAL DEFLECTION

This condition will appear as a narrow vertical line of considerable brilliancy, and is due to the line time base not functioning. Test line coils and line transformer primary and secondary for open circuit. Check valves V11 and V12, preferably by substitution. Test R13, R15, R54, R55, R63 and R65 for open circuit and C8 and C9 for short circuit, and C7 for open or short circuit.

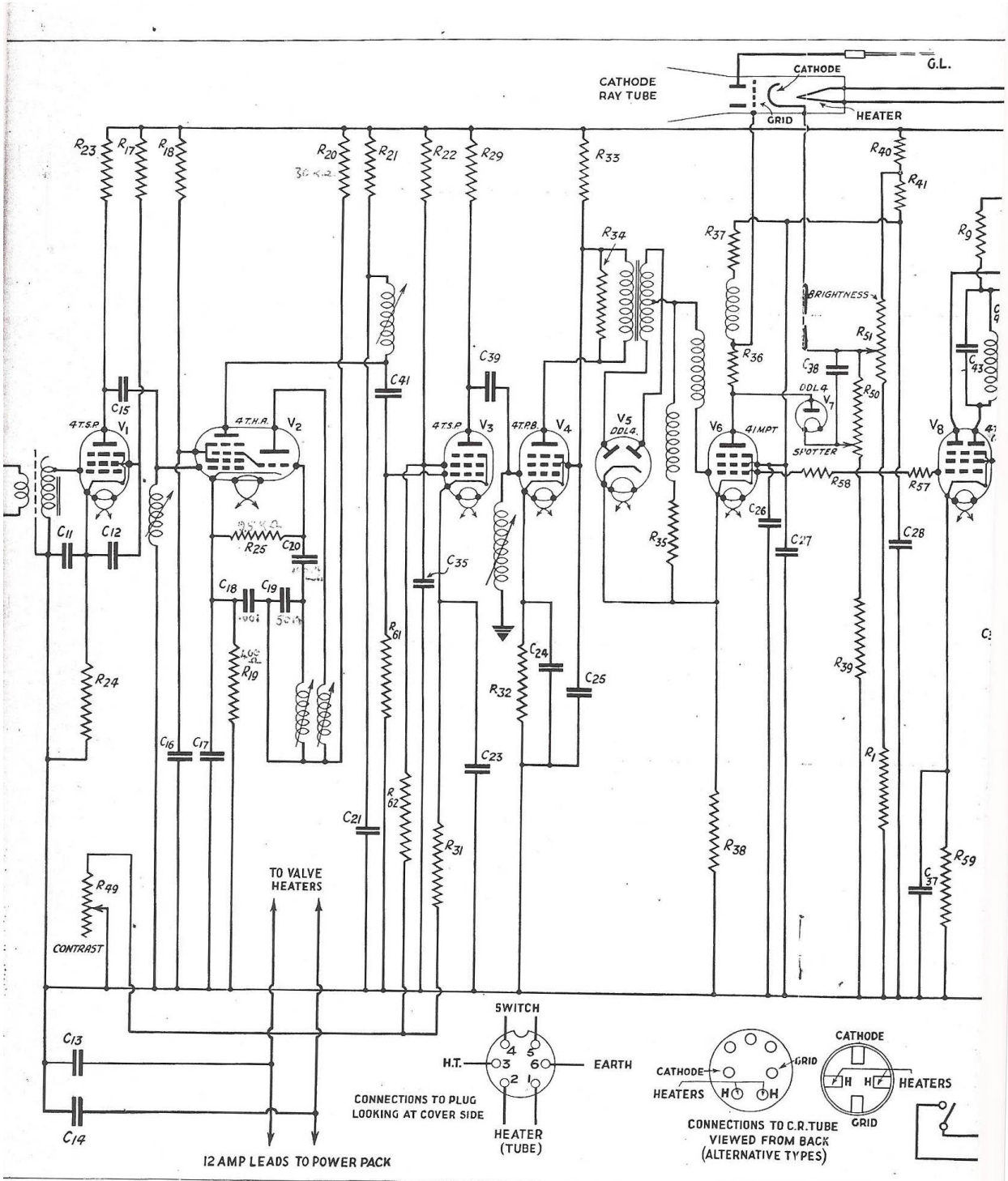
5. STATIONARY SPOT

If this condition occurs, the Receiver should be immediately switched off in an endeavour to prevent damaging the tube. This condition is caused by failure of both time bases. Check voltage between Pins 3 and 6, and if normal, check the smoothing choke for continuity and R5 for continuity. If voltage between Pins 3 and 6 is absent or inadequate, see page 18 (Power Pack).

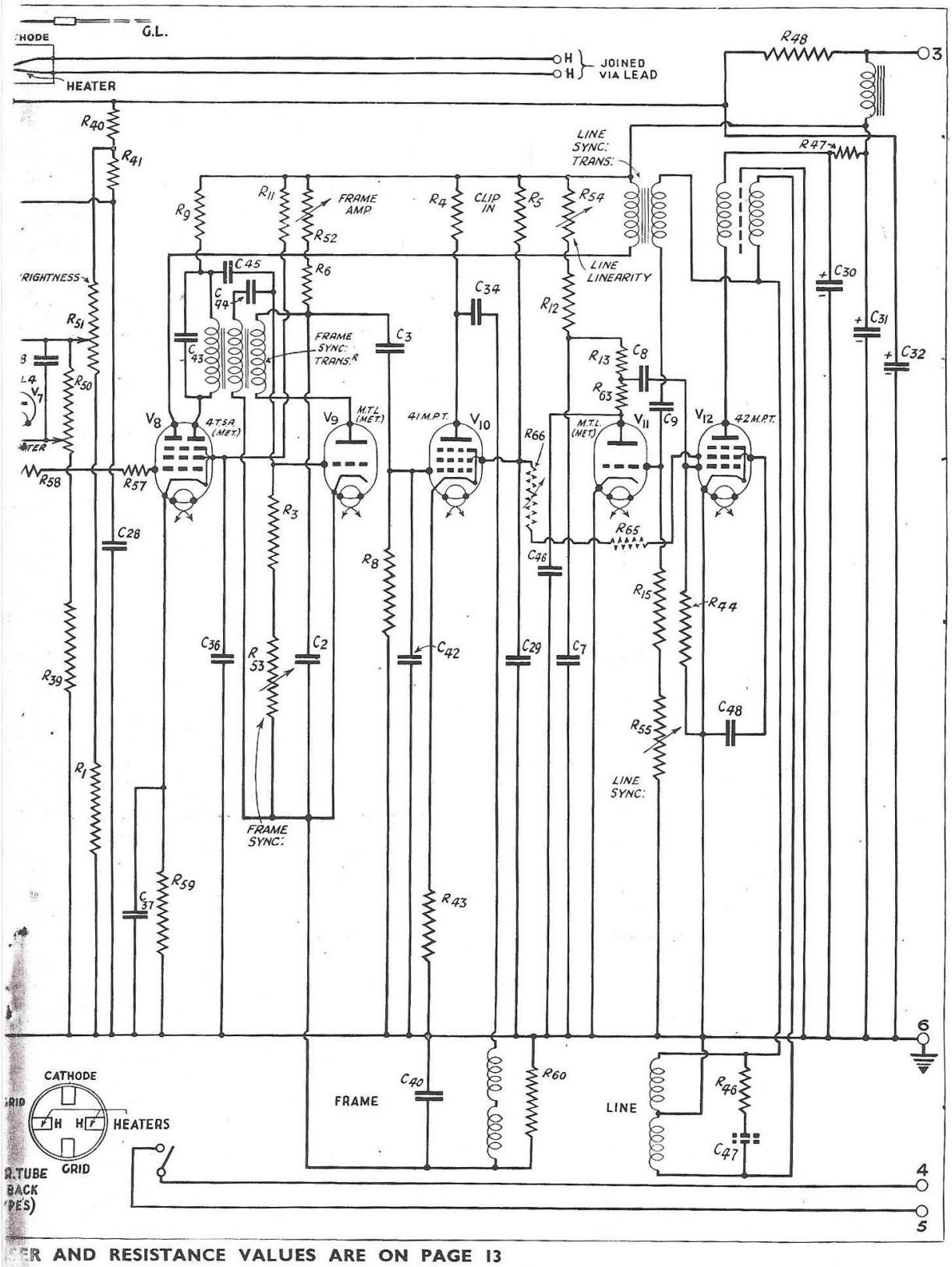
6. PICTURE TOO NARROW

A small increase in picture width can be made by decreasing the value of the clip in resistance R5 (which is on top of the vision chassis). This resistance must not be reduced below 4,000 ohms, and a decrease of each 1,000 ohms will increase the picture width by about ¼". If

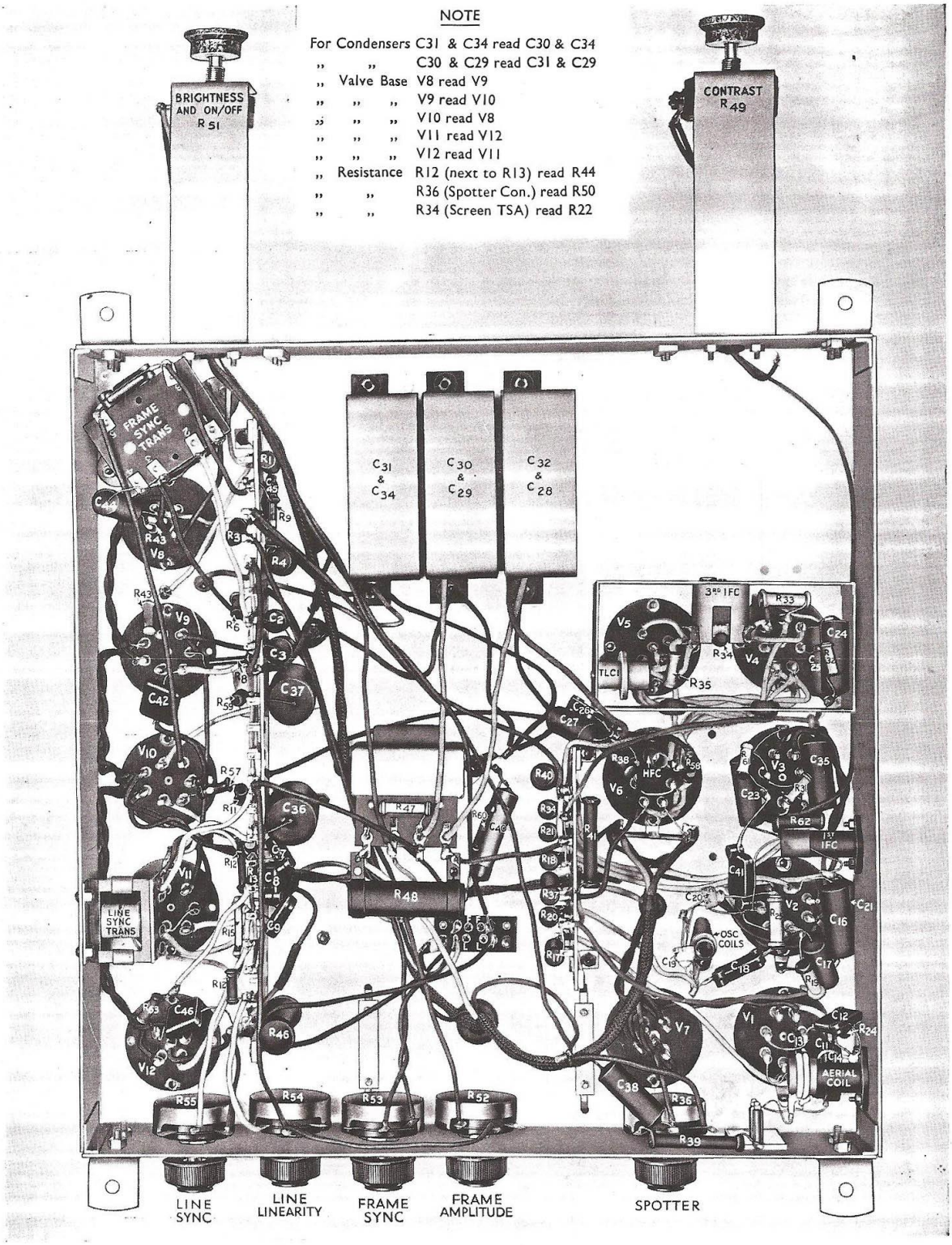
Continued on page 13



CIRCUIT DIAGRAM OF VISION CHASSIS; CONDENSER AND RESISTAN



ER AND RESISTANCE VALUES ARE ON PAGE 13



UNDERSIDE VIEW OF VISION CHASSIS : the resistance and condenser values appear on page 13

attention to this resistance fails to produce the desired width, or the picture is too narrow to correct by this means, test the line amplifier †42 M.P.T. by substitution (no other test will prove conclusive). Test H.T. voltage between Pins 3 and 6, and test R46 for correct value. In some Receivers this should be 1,100 ohms and in others 800. The original value can be determined by inspection, the body of the former being Brown and the latter Grey.

Test line transformer for shorted turns by noting if the resistance is correct.

† NOTE.—A 42 M.P.T. (flashed) should only be used in this position.

7. PICTURE TOO SHORT

The vertical dimension of the picture is controlled by a potentiometer, which normally has considerable amplitude in hand. If, however, adjustment of this control fails to produce the necessary picture height, test the frame amplifier 41 M.P.T., preferably by substitution. Test R60 for incorrect value, frame coils for shorted turns by noting if resistance is correct, also check R4 for correct value, C34 for excessive leakage. If the picture tends to be also narrow, check H.T. voltage between Pin 3 and 6 and R5 for correct value.

8. PICTURE TOO SMALL

If the picture fails to fill the mask in *both* directions, test H.T. voltage between Pins 3 and 6. This will in all probability reveal the trouble; if not, test R5 for correct value and C31 for excessive leak.

9. LINE SYNCHRONISM UNSTABLE

Check 4 T.S.A. preferably by substitution. Test the primary of the line synchronism transformer for shorted turns by noting its resistance. Test C9 for leak and R55 for faulty contact.

Continued on page 14

Resistance	Ohms	Megohms
R1	50,000	
R3	100,000	
R4	10,000	
R5	4,000–8,000 (Clip-in Pict. width)	
R6		3
R8		5
R9	15,000	
R11		10
R12		2
R13	10,000	
R15	50,000	
R17	40,000	
R18	40,000	
R19	400	
R20	30,000	
R21	10,000	
R22	15,000	
R23	10,000	
R24	200	
R25	25,000	
R29	5,000	
R31	200	
R32	200	
R33	2,000	
R34	15,000	
R35	2,000	
R36	500	
R37	1,500	
R38	150	
R39	50,000	
R40	1,500	
R41	750	
R43	350	1
R44		1
R46	**800	
R47	200	
R48	1,000	
R49	5,000 (Contrast control)	
R50	25,000 (Spotter control)	
R51	20,000 (Brightness control)	
R52		2 (Pict. height control)
R53		·1 (Frame synch. control)
R54		1 (Line linearity control)
R55	50,000 (Line synch. control)	
R57	10,000	
R58	10,000	
R59	70,000	
R60	1,000	
R61	4,000	
R62	100,000	
R63	100	
*R65	5,000	
*R66	20,000 (Line amp)	

Note.–These values refer to circuit of vision chassis on pages 10 and 11

* Fitted in certain models only. **1,000 inlater models

Condenser	Mfd.	M.Mfd.
C2	·03 tubular	
C3	·1 tubular	
C7	·002	
C8	·005	
C9	·0003 mica	
C11	·001 mica	
C12	·001 mica	
C13	·001 mica	
C14	·001 mica	
C15		50 ceramic
C16	·05 tubular	
C17	·05 tubular	
C18	·001 mica	
C19		50 ceramic
C20		100 ceramic
C21	·05 tubular	
C23	·05 tubular	
C24	·05 tubular	
C25	·05 tubular	
C26	·001 mica	
C27	·05 tubular	
C28	8 dry elec.	
C29	8 dry elec.	
C30	8 dry elec.	
C31	8 dry elec.	
C32	8 dry elec.	
C34	8 dry elec.	
C35	·05 tubular	
C36	·5 tubular	
C37	10 dry elec.	
C38	·05 tubular	
C39		50 ceramic
C40	·05 tubular	
C41	·002 mica	
C42	·0001 mica	
C43	·003 mica	
C44	·1 tubular	
C45	·001 mica	
C46	·00005 mica	
C47	·02 tubular	
C48	·05 tubular	

Note :-These values refer to circuit of vision chassis on pages 10 and 11.

VISION CHASSIS Resistance Reading

Line transformer primary	300 Ω
Line transformer secondary	3 Ω
Smoothing choke (vision chassis)	160 Ω
Line sync. transformer primary	17 Ω
Line sync. transformer secondary	17 Ω
Frame sync. transformer primary (in 41 M.T.L. anode)	375 Ω
Frame sync. transformer secondary	375 Ω
Frame sync. transformer tertiary (in 4 T.S.A. anode)	600 Ω
Choke T.L.C.1	6·5 Ω
Choke T.L.C.2	8 Ω
Choke H.F.C.	·5 Ω
Aerial coils, R.F. coupling coils, osc. coils	Very small
1st I.F. coil	1 Ω
2nd I.F. coil	1 Ω
3rd I.F. coil (coupling to detector) primary and secondary	2 Ω
Line deflector coil	10 Ω
Frame deflector coil	1000 Ω

Continued from page 13

10. FRAME SYNCHRONISM UNSTABLE

Check 4 T.S.A., preferably by substitution. Check anode circuit for continuity and R9 for correct value. (Note the anode controlling frame time base is led out to the appropriate pin on the base). Check C44 for leak and R52 and R53 for poor contact.

11. LINE AND FRAME SYNCHRONISM UNSTABLE

Such condition is almost certain to be due to failure of the 4 T.S.A. Other possible causes are short circuit of C37 and a break in the grid circuit. This trouble may be caused by the use of co-axial feeder ; always use 80 Ω twin feeder.

12. PICTURE WILL NOT FOCUS

If it is impossible to obtain sharp focus inasmuch as it is possible to turn the focus control and/or sleeve through the best point without obtaining the characteristic sharpness, check gun voltage, and if low test S.U. 2150 (in power pack), preferably by substitution, and C10 and C9 for leak. If gun voltage is normal it is probable that the C.R.O. tube is soft.

13. INTERFERENCE (white spots travel on screen)

Interference from such sources as motor cars cannot be controlled by the receiver except by careful adjustment of the Spotter Control (see note on page 4). If interference is excessive for the district check the twin down feeder and internal splitting feeder for continuity. Carefully examine plug connector on back of set and on vision and sound chassis.

NOTE.—When interference is bad due to unfavourable signal/noise ratio, a proportionate measure of relief can be obtained by raising the height and/or distance from the road of the aerial and/or using a reflector (if one is not already employed).

14. INTERFERENCE (patterns on screen)

More or less symmetrical, geometricalor recurrent patterns on the screen are due to either (*a*) sound feeding back into vision or (*b*) some external interference on a definite frequency, e.g. diathermy apparatus. In the latter case the only cure is suppression at the source, but it is sometimes possible to effect a cure by fitting a reflector type aerial and rotating to find the point of minimum interference (the desired position may or may not be in line with Alexandra Palace.)

If interference from the sound chassis is suspected, check by switching off ; if trouble stops check the internal splitting feeder for continuity and examine plug connections and attempt readjustment of C17 (sound chassis).

NOTE.—The internal splitting feeder is of exact length to prevent the sound and vision signals from entering the wrong chassis. *On no account should these be cut.*

The correct length of the feeder to vision chassis is 94 cms. and to the sound chassis 72·5 cms.

15. BLACK LINES APPARENT

If the black space between lines is too apparent the raster is failing to interlace ; carefully adjust contrast, brightness and frame synchronism controls and adjust interlacing coil by moving sideways as may be required.

NOTE.—The adjustment of this control is *very critical.*

FRAME SYNC TRANSFORMER.

Replacement transformers have numbered soldered tags and should be connected as indicated below :-

No. 1 To anode of frame 41 MTL (V9).
No. 2 Junction of R6 and C3.
No. 3 Cathode of frame 41 MTL (V9).
No 4 C44
No. 5 To 4 TSA Pin No. 7 (V8).
No. 6 Junction of R9, C43 and 45.

16. PICTURE INTERMITTENT (Raster Normal)

Partial or complete intermittent disappearance of the picture while size of raster remains normal can be due to an intermittent connection at any point between the video amplifier V6 and the junction between feeder and dipole aerial. Test valves preferably by substitution and then test for intermittent open or short circuit.

17. PICTURE INTERMITTENT (Raster not Normal)

If the picture momentarily disappears and then reappears very much smaller and then rapidly grows to fill the screen, this is due to an arc or intermittent short on the H.T. supply to the gun. Test C9 and C10 by substitution. Test the high voltage rectifier V4 by substitution and inspect the cab-tyre lead for a puncture. If a slight crack is heard coincident with the disappearance of the picture near the neck of the tube, the tube may be arcing internally. Test by substitution.

18. PICTURE TOO BRIGHT

If the picture is too bright with the brightness control at minimum, test the video amplifier V6 for low anode current. Test valve by substitution. Test C26 for leak.

19. BRIGHTNESS INTERMITTENT

Test the video amplifier V6 by substitution. Test C26 for intermittent short circuit. Test R36, R37, R40, R41, R35 and R38 and examine the connections for a dry joint. Test the choke in the video amplifier anode circuit and the two chokes in the grid circuit for intermittent contact. (These are marked TLC1, TLC2 and HFC on page 12). It is desirable to make these tests with the spotter diode V7 withdrawn, as a fault in this circuit may cause intermittent brightness.

20. SPOTTER INTERMITTENT

Test the spotter valve V7, C38 for short circuit or leak and R50 for poor contact.

21. UNEVEN FOCUS

There are two possible causes of uneven focus. If focus is uneven so that one half the picture may be focussed with one set of adjustments and the other half with another, the trouble is probably due to the ring magnet not being at right-angles to the neck of the tube. Move either magnet support forward or backwards as may be necessary to achieve uniform focus. Movements of the order of 1/64th of an inch are usually sufficient.

If focus is uneven in patches, either the ring magnet itself or the Cathode Ray Tube may be at fault. Unless the magnet has met with some misadventure (i.e. dropped), it is unlikely to be at fault, and a fault in the Cathode Ray Tube is indicated.

22. CORNER SHADOW

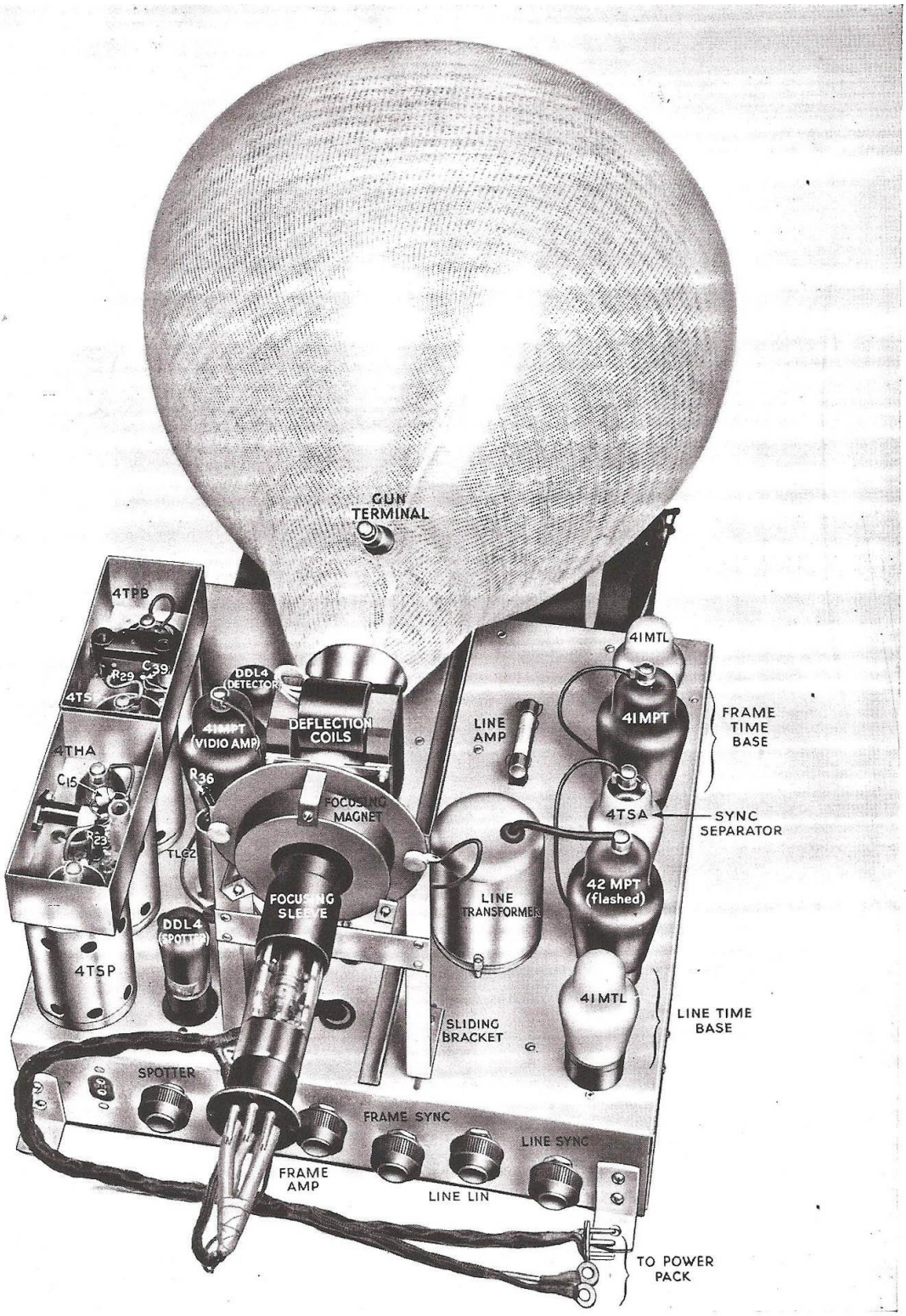
Special Note. Before attempting the procedure below, make sure that the deflection coils are pushed right up the shoulder of the tube. Well defined shadows may appear in one or more corners. This is due to a slight irregularity at the junction between neck and bulb of the Cathode Ray Tube. Shadow may be removed by rotating the Cathode Ray Tube bodily so that the affected area is outside of the field of vision ; the picture being straightened by rotating the deflection coils to the appropriate position.

23. THE PICTURE UNSATISFACTORY AT ONE POINT

If for any reason picture is unsatisfactory at one particular point, i.e. will not focus or is less brilliant than the rest of the screen, it can be obviated if the area is raletively small and near a corner by rotating the tube, as described in the paragraph above, " Corner Shadow."

24. POOR LINEARITY

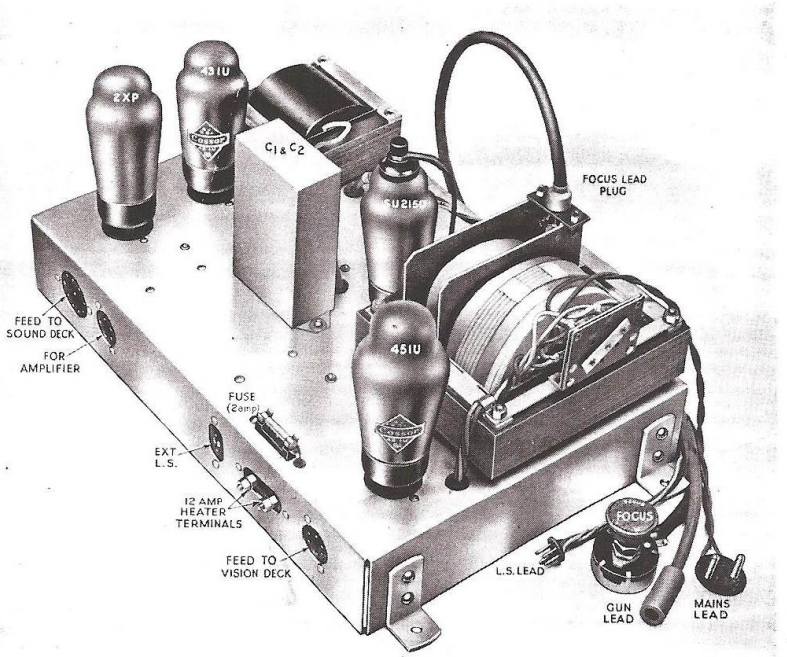
If it is impossible to correct linearity by means of the appropriate control (Line Linearity), the 42 M.P.T. (line time base amplifier) may be suspected. The only satisfactory method of test is by substitution.


GUN TERMINAL
4TPB
R29
C39
4TS
4THA
C15
R23
R36
TLG2
4TSP
DDL4 (DETECTOR)
41MPT (VIDIO AMP)
DEFLECTION COILS
FOCUSING MAGNET
FOCUSING SLEEVE
DDL4 (SPOTTER)
LINE AMP
41MTL
41MPT
FRAME TIME BASE
4TSA
SYNC SEPARATOR
42 MPT (flashed)
LINE TRANSFORMER
41MTL
LINE TIME BASE
SLIDING BRACKET
SPOTTER
FRAME SYNC
LINE SYNC
FRAME AMP
LINE LIN
TO POWER PACK

THE POWER PACK AND OUTPUT STAGE

NOTE

Resistance R6 is situated behind Focus Plug.



General view of power pack

VALVES

V1—Cossor 2 X.P. 4-pin.
V2—Cossor 43 I.U. 4-pin.
V3—Cossor 45 I.U. 4-pin.
V4—Cossor S.U. 2150 4-pin. Top cap anode.

SPECIAL NOTE

Earlier models are fitted with 4/100 B.U. Rectifier, which should be replaced by the 45 I.U. when occasion arises.

CHECK THESE POINTS FIRST

(1) See that the plugs feeding vision deck, sound deck and amplifier (if used) are firmly in their sockets.
(2) See that the fuse is intact.
(3) See that the focus lead plug is firmly in its socket on top of the high voltage Transformer.
(4) See that the 12 amp. heater terminals are screwed down *firmly*. This is important as a large current is flowing.
(5) See that the valves are firmly in their sockets and in good order.

TO REMOVE POWER PACK

The Power Pack is easily removed if the following procedure is adopted :

(1) Un-plug focus lead from top of high voltage Transformer.
(2) Disconnect leads to 12 amp. heater terminals.
(3) Remove all plugs from side of power pack.
(4) Remove mains lead plug by taking out the two fixing screws.
(5) Remove two fixing bolts holding front lugs to cabinet base.
(6) Withdraw chassis straight backwards. The front is secured by a lug which fits under a saddle which does not require to be removed.

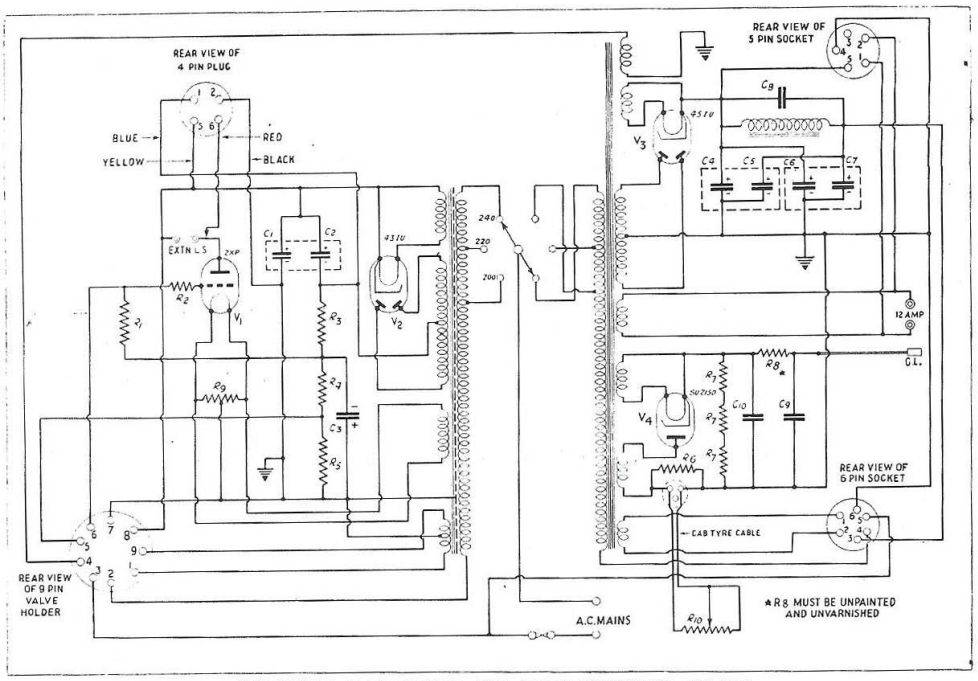
FOCUS CONTROL DOES NOT OPERATE

This paragraph refers to the focus control on the front of the receiver. See that focus plug is making good contact in its holder on top of the high voltage transformer, and that the leads are properly connected to the focus potentiometer. Test focus potentiometer for open circuit or bad contact.

Note—With care the focus potentiometer can be removed without disturbing either vision deck or power pack.

THERMAL CUT-OUT

If the voltage on gun is absent, see that the cut-out has not broken circuit. If voltage to time base is absent, test the spiral heater element for open circuit. This device was fitted to earlier receivers and is unnecessary when the Cossor 45 I.U. is used in place of the 4/100 B.U.



CIRCUIT DIAGRAM OF THE POWER PACK

Resistance	Ohms	Megohms	Watts
R1		·5	¼
R2	50,000		½
R3		·75	⅛
R4		·3	¼
R5	30,000		½
R6		1	½
R7		8 (each)	⅛
R8		·5 (Unpainted)	¼
R9	25 (Centre-tapped)		
R10		·25 (Variable)	

Condenser	Mfd.	Type
C1, C2	16+16	dry elec.
C3	10	tub. elec. (50 v.w.)
C4, C5	8+8	dry elec.
C6, C7	8+8	dry elec.
C8	·5	tub
C9	·025	tub (6000 v. working)
C10	·025	tub (6000 v. working)

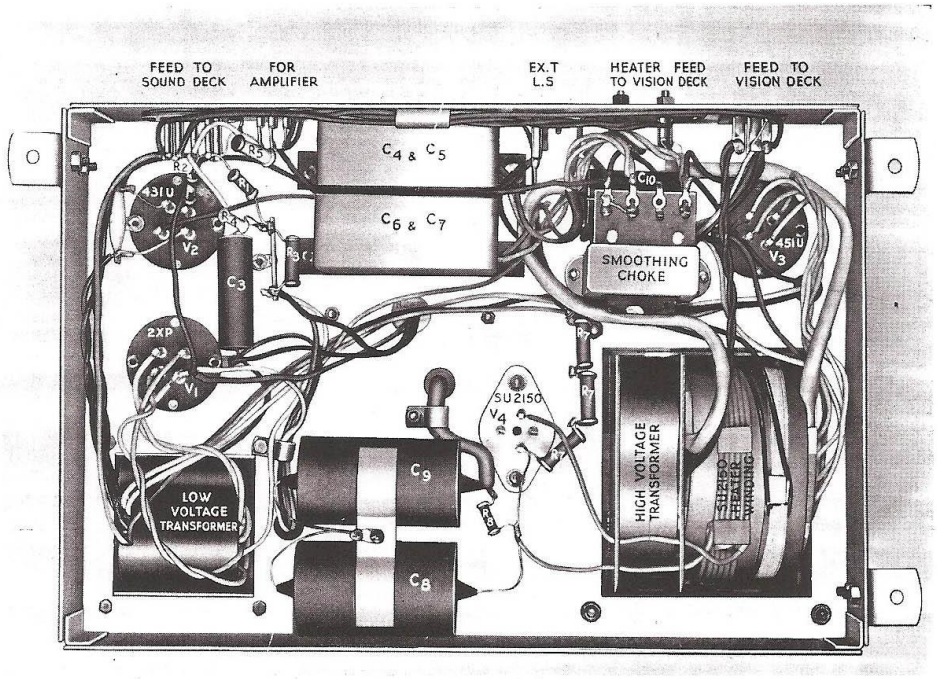
VOLTAGE CURRENT AND RESISTANCE READINGS

The voltage and current readings given below were taken with a popular test set, but as the resistance of the meter has a considerable effect upon the voltage measurements, these are only approximate.

Valve	Supplies	A.C. Volts Each Anode	D.C. Volts Unsmoothed	D.C. Volts Smoothed
43 I.U.	Sound Chassis	325	375	280
45 I.U.	Vision Chassis (except CRO gun)	390	425	390
S.U. 2150	CRO gun	4500	5800	5600

RESISTANCE READINGS

Transformer secondary feeding 43 I.U. measured from anode to anode of valve	270 Ω
Transformer secondary feeding 45 I.U., measured from anode to anode of valve	130 Ω
Transformer secondary feeding S.U. 2150, measured from anode of valve to tag on focus lead plug	4500 Ω
Transformer secondary feeding *heater* of S.U. 2150 *Note.—This winding is several thousand volts above earth!*	·2 Ω
Resistance of transformer primaries measured both in parallel with voltage adjustment as shown. 200 v. tap / 220 v. tap / 240 v. tap	5 Ω / 5·75 Ω / 6·5 Ω
The Output Stage	
2 X.P. Anode Potential	270 volts
L.S. Field Resistance	1250 Ω
L.S. Transformary Secondary Resistance (with speech coil connected)	·5 Ω



NOTE

For Valve 43.IU and Base V2 read 2.XP and V1
„ „ 2.XP „ „ V1 read 43.IU and V2
„ Condenser C10 read C8
„ „ C8 read C10

UNDERSIDE VIEW OF THE POWER PACK

H.T. TO SOUND CHASSIS INCORRECT

Test the sound rectifier V2. Test C1 and C2 for short circuit or excessive leak. Check resistances of transformer winding.

H.T. TO VISION DECK VALVES INCORRECT

Test rectifier V3. Test C4, C5, C6, C7 for short circuit or excessive leakage. Check transformer winding.

H.T. TO GUN TOO LOW

Test C9, C10 for short circuit or leak. Check the three resistances R7 for correct value.

H.T. TO GUN TOO HIGH

Test the three resistances R7 for open circuit. A break in this circuit may result in an arc between the cathode and anode inside the high voltage rectifier valve and/or across the electrodes in the cathode ray tube.

EXTENSION LOUDSPEAKER

A pair of contacts are so arranged that the internal loudspeaker is disconnected when the Ex. L.S. plug is fully inserted. A permanent magnet loudspeaker fitted with an output transformer having an impedance of 3,000 ohms should be used.

MODIFICATIONS

From time to time certain modifications have been incorporated in the receiver in the form of minor improvements or to meet circumstances or conditions that have arisen and to increase the utility of the instrument in the ever-widening field of operation. The circuits and photographs shown in this manual are prepared from a receiver manufactured during March, 1939. There are, however, one or two particular modifications which are mentioned below.

NEW LOW CAPACITY TUBE BASE

(1) The tubes are now supplied with a new low capacity 4-pin base. To fit to a receiver using the old 7-pin base, proceed as follows: Remove leads from 7-pin base one by one and label, using the drawing at the bottom of the circuit on pages 10 and 11 as a key. Solder the four miniature plugs on the end of the leads and insert in appropriate sockets of new base. **Note particularly** that the cathode lead is joined to the left hand heater lead by a short wire linking the appropriate plug.

LINE AMPLITUDE CONTROL

(2) Certain receivers are fitted with an additional control at the rear of the chassis for the purpose of adjusting line amplitude, which takes the place of the clip-in resistance that appears on the top chassis on other models. When this control is fitted, it is placed between line synchronism and line linearity, the order from right to left then being: line synch, line amplitude, line in, frame synch, frame amplitude and spotter. It is shown in a diagram on pages 10 and 11 as R66 and as a series resistance R65. (When this control is not used, R66 and R65 do not appear and the screen grid of V10 is joined direct to the screening grid of V12.

A. C. COSSOR LTD.

COSSOR HOUSE, HIGHBURY GROVE, LONDON, N.5.

Tel.: Canonbury 1234 (30 lines).

Telegrams: Amplifiers, Phone, London.

SM85A.D147.

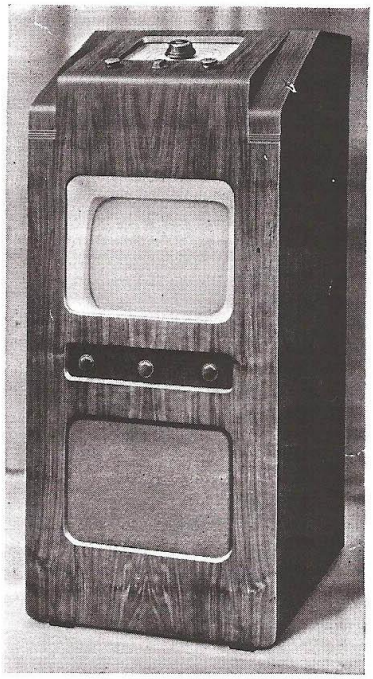
SUPPLEMENT TO

MANUAL OF INSTALLATION AND SERVICE HINTS No. SM.85A. COVERING

COSSOR

TELEVISION RECEIVERS

Models 900 & 900.A



These Models incorporate similar circuit arrangements as embodied in Cossor Models 1210 and 1210A. Minor changes are :-
The sound receiver frequency changer valve 202 STH has been changed to 203 THA. Circuit arrangement unaltered.
Output valve 2P is used in place of 2XP.
The vision receiver frequency changer valve 4 THA has been changed to 41 STH metallised. The circuit remains the same. It is necessary when making the substitution to retune the oscillator inductance, in which case the alignment procedure given below should be followed, and to adjust C17 (copper strips located across ganged condenser on radio chassis) in order to overcome any trace of sound on picture.
Variable band width switch on Tone Control is no longer fitted.
The preferred values of resistances have been incorporated, resulting in minor voltage differences to those tabulated in S.M.85A.
A line amplitude control is embodied in the vision chassis situated between the spotter and frame amplitude controls. All dotted modifications shown in Service Manual have been incorporated.
A mains supply fuse is no longer included.
On later Models the focus potentiometer has been substituted for a series of fixed resistors, the values of which are 15,000. 22,000, 33,000, 46,000, 67,000 and 82,000 making an aggregate of 265,000 ohms. Each independent resistance is brought into circuit by a multi-way switch which varies the voltage applied to the Tube in the same way as the previously used potentiometer. The arrangement of the switching in the resistance circuit is shown in the accompanying circuit diagram. This control is located in the same position as the potentiometer and is interchangeable without further modifications.
The controls at the rear of the vision chassis, reading from left to right are :- spotter, line amplitude, frame amplitude, frame sync, line linearity and line sync.
Owing to the characteristic difference in the output valve type 2P against 2 XP, three resistances have been changed in the power pack. R3 is now 220,000 ohms, R4 is 67,000 ohms, R5 is 6,700 ohms. At the junction of R3 and R4 a bias of 15 volts should be obtained.
The bleeding resistances incorporated in the E.H.T. supply R7 now comprises of four resistors of 6.8 megohms each.

VISION DECK ALIGNMENT INSTRUCTIONS.

Adjustment of the I.F. trimming should always be followed by a complete re-alignment of the aerial R.F. and Oscillator inductances.

OSCILLATOR CIRCUIT.

Inject signal to the grid of the 41 STH at 39 megacycles via a .05 mfd. condenser, and with low impedance headphones in series with the anode of the first I.F. valve V3 (4 TSP), trim inductance for maximum beat.

I.F. CIRCUIT.

Short oscillator coil by bridging C19. Insert micro-ammeter across the diode load R35, or an output meter in series with the anode lead of the Video amplifier V6 (41 MPT) at the junction of R36 and the anode of the valve.
The voltage obtained from these two points will be approximately 2 volts across the diode load and approximately 20 volts in the anode of V6. Inject a signal of 8 megacycles between the grid (top cap) of V2 (41 STH) via a .05 mfd. condenser. Tune second I.F. for maximum output. Re-set the signal generator and inject 5.75 megacycles and tune first I.F. for maximum output.
Disconnect shorting strip across C19.

R.F. CIRCUIT.

Inject 47 megacycle signal via a suitable dummy aerial through the di-pole sockets at the rear of the chassis and trim the R.F. inductance for maximum output. Re-set the signal generator and inject 45 megacycles and tune aerial inductance for maximum output.
The overall sensitivity should be such that at 41.5 megacycles it is greater than 40 dB down on that at 45 megacycles.
Owing to the unavoidable variations in the diode coil, further slight adjustments on the transmitted picture may improve the definition. Ghosts may be overcome by slight de-tuning of the I.F. and oscillator coils,
No Service Manual will be issued on these Models. It is intended, therefore, to use this Sheet in conjunction with Service Manual 85A which covers Models 1210 and 1210A.