V310, V310C & V310D

V310, V310C & V310D

MURPHY SERVICE MANUAL

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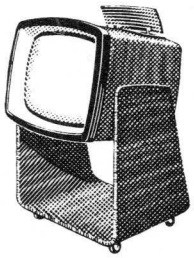
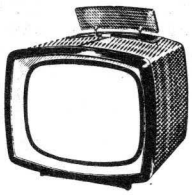
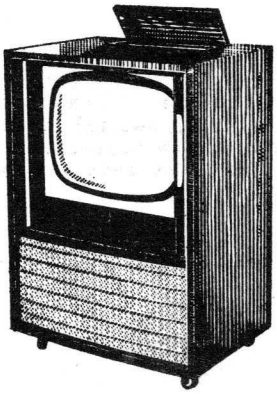
THE V310, V310C & V310D TELEVISION RECEIVERS



V310C



V310



V310D

SPECIFICATION

MAINS SUPPLY:		200-250 volts, 50 c/s a.c., or 200-250 volts d.c.
CONSUMPTION:		160 watts, average
AERIAL INPUT IMPEDANCE:		75 ohms, unbalanced
FREQUENCY RANGE:		Band I and Band III
INTERMEDIATE FREQUENCY:	Vision:	34.65 Mc/s
	Sound:	38.15 Mc/s
VALVES:		One 30L1, one 30C1, four 30F5, two 6D2, two 30FL1, one 6/30L2, one 30P16 (PL82) or 30P12, one 30P4, one U191, one U26
CATHODE RAY TUBE:		CRM172
FUSES:	F1:	2A plain cartridge
	F2:	500mA, Mag-Nickel cartridge
LOUDSPEAKER:	V310, V310C:	Elliptical, 6 in. by 4 in. permanent magnet; 3 ohms impedance
	V310D:	8 in. diameter; permanent magnet; 3 ohms impedance
OVERALL DIMENSIONS:	V310:	17 in. high, 19 in. wide, 21 in. deep
	V310C:	31 in. high, 21 in. wide, 23 in. deep
	V310D:	33 in. high, 22½ in. wide, 21 in. deep
WEIGHT:	V310:	50 lb.
	V310C:	60 lb.
	V310D:	93 lb.
RELEASED:	V310:	February, 1957
	V310C:	April, 1957
	V310D:	July, 1957
PRICE:	V310:	Standard - £51 15s. 6d. plus P.T.
	V310:	Light Wood - £52 2s. 11d. plus P.T.
	V310C:	£60 6s. 10d. plus P.T.
	V310D:	£74 9s. 11d. plus P.T.

INSTALLATION

The aerial system. Connect the aerial to the receiver with 75Ω coaxial cable. Use a cross-over unit if two separate aerials are required. Earth the receiver by means of the upper socket on the aerial escutcheon if time-base radiation is suspected or if local interfering signals are being received.

RECEIVER ADJUSTMENTS

The following checks and adjustments must be made in the Customer's house, without regard to any previous adjustment made elsewhere.

Mains voltage adjustment

A.C. MAINS 200 TO 250V, AND D.C. MAINS 220V TO 250V ONLY.

1. Loosen the small locking knob in the centre of the mains adjustment dial at the rear of the receiver.
2. Rotate the dial so that the desired voltage is against the arrow engraved on the panel.
3. Gently press the dial against the panel, ensuring that the two pips on its underside locate in the holes in the panel.
4. Whilst still maintaining the pressure, tighten up the locking knob.

NOTE: Wherever possible, arrange the mains plug connections so that the chassis is at the mains neutral potential.

D.C. MAINS 200V AND 210V ONLY.

1. Use the procedure described above, but first set the dial to the 220V d.c. position, and correct the polarity of the mains connections if necessary. Then rotate the dial to the 200V or 210V d.c. position as required.

The above procedure is necessary because the rectifier (MR1) is out of circuit on these taps, and the fuse (F1) could easily "blow".

V310 and V310C On-Off Switch. The on-off switch is operated automatically by a spring loaded mechanism when the release button at the top of the cabinet is pressed.

Initial test. Check that the receiver is operating, but do not leave the BRIGHTNESS control turned up if it is suspected that the ion trap magnet is not in its correct position.

Sensitivity adjustment. Connect the aerial and, for optimum signal to noise ratio, proceed as follows:

(a) Set the STATION SELECTOR to the appropriate position, i.e. B.B.C. or I.T.A., and turn the volume control to maximum (fully clockwise).

(b) Adjust the local oscillator core through the hole next to the STATION SELECTOR knob using (early sets) a small screwdriver, or (later sets) the plastic trimming tool supplied. Exert sufficient pressure on the tool for it to engage with the oscillator core and then rotate the core for maximum sound output.

(c) With the CONTRAST control at minimum (anti-clockwise) adjust the appropriate SENSITIVITY control so that the picture is only just synchronising. It will be necessary to increase the brightness so that this can be readily ascertained.

(d) Set the black level of the picture by means of the BRIGHTNESS control and adjust the CONTRAST control to give a correctly contrasted picture.

In areas of high signal strength, if cross modulation (picture on sound, sound on picture, or heterodyne patterns) occurs, repeat this procedure with the CONTRAST control at approximately half travel instead of fully anti-clockwise, check afterwards that adequate picture brilliance is obtained with the CONTRAST control turned fully clockwise.

NOTE: If the signal is so strong on one channel that it is impossible to adjust the SENSITIVITY control so that the picture is just synchronizing, or if cross modulation is still present, a turret attenuator should be fitted; see page 26.

MAINTENANCE ADJUSTMENTS

To enable the performance to be kept at its best, the adjustments described in the following three sections must be checked and corrected where necessary whenever the receiver is overhauled or repaired. These adjustments should not be necessary on installation.

1. PICTURE ADJUSTMENTS

The procedure is normal but the following points should be noted:

Tilted picture. The cabinet must be removed from the chassis for this adjustment. The scan assembly is locked in position and adjusted by the hexagonal headed brass screw at the top of the housing.

Picture position. This is adjusted by the black insulated lever projecting from the rear of the focus assembly, and through the back of the cabinet. Unscrew the lever by about one turn and then move it as required to centre the picture. Tighten after use.

Line linearity. With the slider at the top of its travel, i.e. nearest the coil, move the slider down slowly until the equidistant vertical divisions of the picture or test pattern are as near to equal as possible. It should be noted that the correct position for the slider should be near the top; any other position will give reduced line amplitude.

2. MECHANICAL ADJUSTMENTS

Read the preliminary note above

Focus unit position. When a new c.r.t. is fitted, it may be necessary to reposition the focus unit. To do this, slacken the four screws visible through the slots in the side of the large supporting cylinder, and slide the assembly backwards or forwards until the distance between the c.r.t. grid plane and the plate at the rear of the focus unit is approximately 3/4 in. (see Fig. 1) with the focus adjustment fully clockwise. If the distance is much less, the scanning spot will be large; if it is appreciably greater, uneven focus over the picture area will result.

Before retightening the screws, make sure that the back plate is at right angles to the c.r.t. neck. Finally, check the adjustment of the ion trap magnet, as described in "Electrical Adjustments" below.

With the focus knob in the position of optimum focus, the fixing lugs for the knob should be more than 3/4 in. from either end of their maximum travel, as measured around the outside of the cylindrical housing. If the lug is closer to the end of its travel, when the h.t. and e.h.t. voltages are normal, and the unit is correctly positioned, the focus unit may be suspected of having an incorrect flux density.

3. ELECTRICAL ADJUSTMENTS

Read the preliminary note above

Ion trap. To assist in adjusting the ion trap magnet it should be roughly positioned on the neck of the c.r.t. so that the paint spot is towards the rear of the receiver and the two grooves in the rim are approximately 90 degrees anti-clockwise from the c.r.t. e.h.t. connector, looking from the rear of the receiver.

To prevent damage to the c.r.t. when adjusting the position of the magnet, the cathode current must not be allowed to exceed about 10μA, and the following procedure should be used.

1. Remove the focus adjusting knob.
2. Connect a meter having a full scale deflection of 1mA or less, across R153 (220

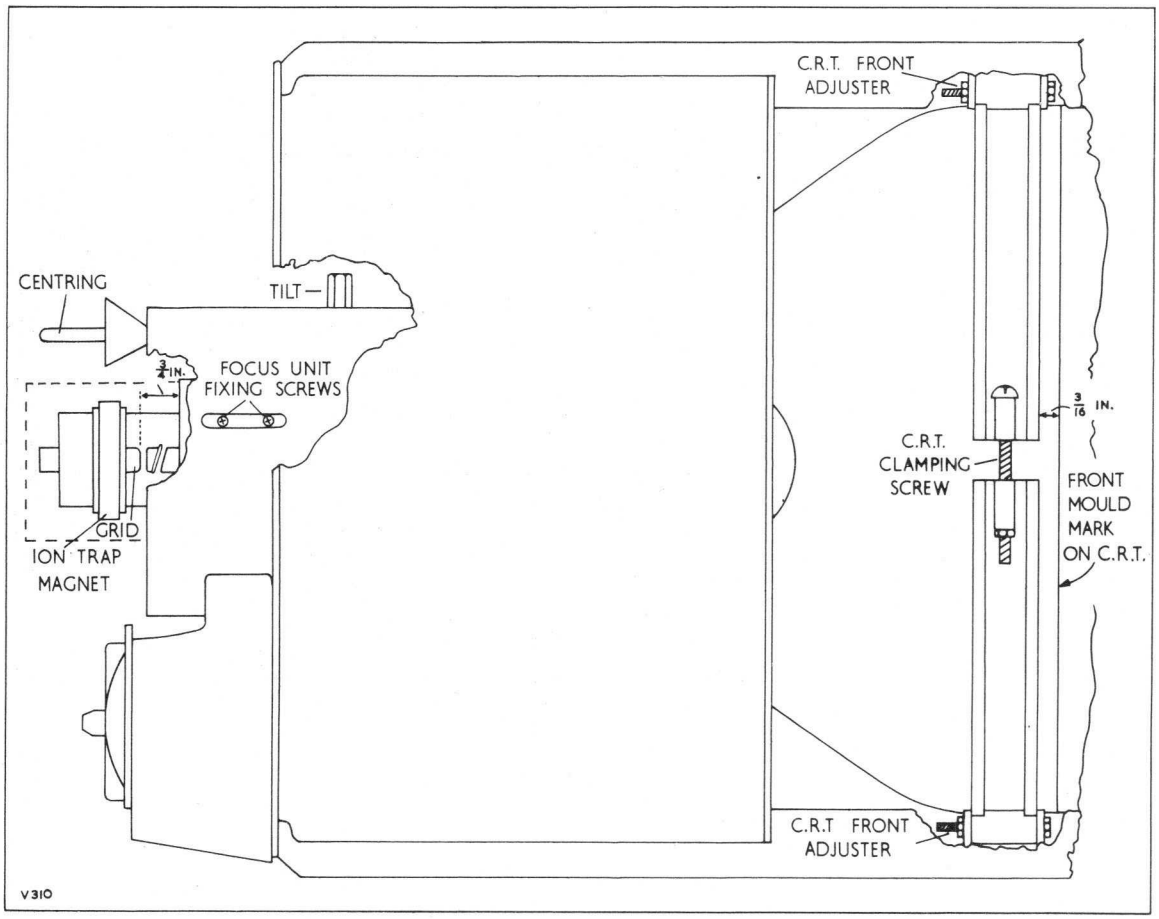


Fig. 1. Side view of the receiver.

KΩ) on the c.r.t. base connector (+ve. lead to pin 11).

3. Turn the BRIGHTNESS control to minimum (fully anti-clockwise).
4. Switch the receiver "On" and allow a few minutes for it to warm up.
5. Rotate the BRIGHTNESS control until the meter reading is about 10μA.
6. Position the ion trap magnet so that its forward edge is just behind the c.r.t. grid plane. Slowly rotate the magnet for maximum screen brightness.
7. Keep the magnet at right angles to the neck of the c.r.t. and move it slightly backwards and forwards to find the position at which maximum screen brightness is produced.
8. Make a final check of the magnet position with the CONTRAST and BRIGHTNESS controls adjusted to give a normal viewing picture.

Receiver oscillator. There is no Fine Tuner on this receiver and the appropriate oscillator core must be adjusted on each channel. **If more than one peak is obtained,** select the one which occurs when the core is first entering the coil former. To make this adjustment proceed as follows:

1. Set the VOLUME control to maximum (clockwise).
2. EARLY SETS. Insert a small screwdriver in the hole to the right of the STATION SELECTOR knob and adjust for maximum sound. To do this, it will be necessary to exert a slight pressure on the screwdriver and press the oscillator core driver down for a distance of about 3/4 in. Gentle rotation will cause the driver to engage with the slot in the coil core, which can now be tuned for maximum sound output.
   LATER SETS. Insert the long plastic trimming tool (Driver, Part No. 77219 supplied to all dealers) into the hole to the right of the Station Selector knob, press it gently downwards and rotate it a little until it engages with the oscillator coil core, and then adjust the core for maximum sound output. Remember to partially withdraw the tool before turning the Station Selector to another position.

MECHANICAL NOTES

Removing the c.r.t. Lay the receiver on its face and remove the cabinet from the chassis. Remove the focus knob, the c.r.t. base connector, the ion trap magnet and the c.r.t. anode connector. Detach the moulded frame with the mask and safety glass, and then return the chassis to its normal upright position. Slacken the two c.r.t. clamping screws and ease the c.r.t. out of the chassis; in some cases it may be necessary to slacken the four screws which secure the c.r.t. clamping ring to the chassis stays.

Refitting the c.r.t. Fit the c.r.t. into the chassis, ensuring that the anode connector is on the same side as the line output transformer, then proceed as follows.

NEW C.R.TS. Slacken the four screws which secure the c.r.t. clamping ring to the chassis stays, and tighten the c.r.t. clamping ring, checking that the distance between the front edge of the c.r.t. clamping ring cushion and the front "mould" mark on the c.r.t. is 3/16 in. Lay the moulded frame, with the mask and safety glass, on a flat surface, and place the receiver over it, so that the c.r.t. fits into the mask; replace the four fixing screws which secure the frame to the chassis stays. Then move the c.r.t. as required to position it squarely in the mask, so that it makes a dust tight seal and tighten the four screws securing the clamping ring to the chassis stays. Refit the e.h.t. connector, the ion trap magnet, and the c.r.t. base connector.

ORIGINAL C.R.T. Tighten the c.r.t. clamping ring checking that the distance between the front edge of the c.r.t. clamping ring cushion and the front "mould" mark on the c.r.t. is 3/16 in. Lay the frame, with its mask and safety glass on a flat surface, and place the receiver over it, so that the c.r.t. and rubber mask form a dust tight seal. Replace the four frame fixing screws. Refit the e.h.t. connector, the ion trap magnet, and the c.r.t. base connector.

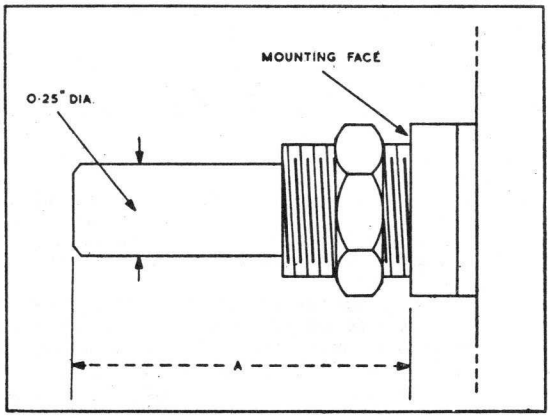


Fig. 2.

Removing the line output transformer. Take off V15 polythene anode connector and the top connectors of V13 and V14. Remove V15 and detach its holder complete with mounting panel by removing the single 4BA screw and nut. Unsolder the YELLOW lead from the transformer, and then the 8 remaining leads from the transformer, noting their points of connection. Remove the line output transformer clamp.

The control escutcheon. If the control escutcheon is to be replaced, care must be taken when fitting it, to make sure that the centre line which is visible at the rear of the moulding coincides with the centre line at the top of the fibre back of the cabinet.

The c.r.t. frame. In the event of the thread in a brass insert at a corner of the moulded frame becoming damaged, use a self tapping screw, type PK6Y by 3/8 in. P.R.H. Part No. 103903, in the alternative hole provided.

The top controls. The following information is given to assist in the choice, from existing stocks, of suitable replacements for the variable controls at the top of the receiver.

In Fig. 2, the dimension "A" refers to the overall spindle length and is measured from the end of the spindle to the mounting face, i.e. the face of the control which makes contact with the receiver control panel.

CONTROL	DIM. "A"	LAW	RESISTANCE
Brightness (R64)	1 in.	Lin.	100KΩ
Contrast (R28) V310, V310C	1 13/16 in.	Lin.	100KΩ
Contrast (R28) V310D only	1 in.	Lin.	100KΩ
Volume (R96) V310, V310C	1 in.	Rev. log.	250KΩ
Volume, On-Off (R96) V310D only	1 13/16 in.	Log.	250KΩ with d.p. switch

Removing the voltage selector knob. Unscrew the small locking knob and remove the circlip

which is now visible. Unsolder the ORANGE lead from the contact nearest the centre on the underside of the voltage selector panel. Withdraw the dial (knob, printed), complete with its contacts, away from the spindle. To refit, reverse the above procedure.

Removing the focus unit. Withdraw the chassis from the cabinet. Then remove the focus knob, the c.r.t. base connector and the ion trap magnet. Slacken the four focus unit fixing screws (two pairs) which are accessible through the two slots in the upper half of the scan coils housing and withdraw the focus unit complete with the Centring control mechanism.

Removing the scan coils assembly. Withdraw the c.r.t. from the chassis. Then remove the scan coils assembly locking screw at the top of the cylindrical housing, slacken the three brass screws and disengage the mounting ring from the slots in the housing. The scan coils assembly can now be withdrawn and the leads disconnected.

THE TUNER UNIT

The "stray" capacitance of the components and wiring forms a large part of the tuning capacitance across the aerial, r.f.t. and oscillator coils. Every effort must therefore be made, when replacing components or wiring, to ensure that the lengths of the leads and the positions of the components follow the original as closely as possible. Take care also with the "dressing" of leads and fit sleeving wherever necessary to avoid short circuits across tags, particularly on the valve holders.

IMPORTANT. It must be clearly understood that any repair, or the replacement of any component, makes the realignment of any unit essential. Any attempt to carry out work on the unit, without subsequent realignment, can only lead to a deterioration of the performance, particularly on Band III.

To remove the osc. core driver (early sets only, see Modifications). Turn the Station Selector to a position in which there are no coils, remove V6, and then remove the top end of the driver from the plastic guide by pressing it downwards through the wide end of the slot in the slotted arm (**stop for driver, 74786**). Withdraw the lower end of the driver from the guide on the tuner unit, taking care not to lose the brass sleeve (**eyelet, split 4774**). Do not attempt to move the guide on the tuner unit; this has been carefully assembled in the factory so that the driver will always engage with the coil cores.

To remove the tuner unit. Record the lead positions and then proceed in the following manner:

1. Disconnect the six leads and the resistor from the tags on the outer side of the receiver chassis and the tuner unit.
2. Disconnect the wire from the lead-through capacitor at the end of the unit, and the coaxial lead from the aerial escutcheon. **Do not disconnect any of these leads from within the tuner unit.**
3. Unscrew the switch wafer and withdraw it from the end of the unit; on early sets, remove the osc. core driver as described above.
4. Remove the three fixing screws on the outer side of the receiver chassis and withdraw the unit. Take care not to mislay the link from the Station Selector shaft which becomes disengaged when the tuner unit is removed.

NOTE. When refitting the tuner unit, ensure that the switch wafer and rotor are correctly positioned at the end of the unit. This can be checked by observing that the appropriate Sensitivity control, i.e. B.B.C. or I.T.A., is switched into circuit at the corresponding settings of the Station Selector knob.

Identifying the coil strips. The aerial coil strips have four contacts and are shorter than the oscillator coil strips which have six contacts. According to the frequency channels for which they are intended, the coil strips are marked with spots of coloured paint using the resistor colour code, i.e. BROWN for Channel 1, RED for Channel 2 etc. Channel 10 coils however, will have CH10 printed on the coil strip.

An additional GREEN code spot is added, so that the coils for the V310 series can be identified from those of earlier receivers.

Removing a coil strip. Press back the holding spring and carefully lift out the coil strip by gripping, between the thumb and forefinger, the end remote from the spring.

Fitting a coil strip. Press back the holding spring and fit the coil strip by pressing its slotted end against the holding spring and then guiding its other end into the slot at the middle of the turret.

Turret locating mechanism. To adjust the mechanism while the tuner unit is still in position on the receiver chassis, proceed as follows:

1. Remove the c.r.t. from the chassis as described on page 5 .
2. Remove the side screens from the tuner unit, and loosen the screw holding the locating spring (it will be necessary to remove certain valves to gain access to these screws).
3. With the locating roller correctly located in a groove on the turret, slowly turn the turret until the coil contacts are in the middle of the fixed contacts, and then re-tighten the locating spring fixing screw.
4. Turn the turret to all its other positions

to confirm that the location is satisfactory, and then replace the side screens, valves, and c.r.t.

Lead-through capacitors. If a lead-through capacitor has to be replaced, the faulty one can be removed by applying heat to the metal screen immediately around the capacitor body. When the solder is sufficiently soft, withdraw the capacitor from the metal screen, from the same side as the soldered connection to the metal screen.

Trimming capacitors. If a trimmer screw has been accidentally unscrewed fully, or if a trimmer body has to be replaced, the refitting should be carried out as follows:

Thread the trimmer nut on to the trimmer screw, with the convex side of the nut towards the head of the trimmer screw, and engage the screw in the threaded trimmer body. Press the trimmer body against the chassis, making sure that the square end of the trimmer locates with the square hole in the chassis, and turn the trimmer screw until about half of its length is engaged in the trimmer body. While still holding the trimmer body against the chassis, prevent the screw from turning and rotate the nut until it presses tightly against the chassis. While still preventing the screw from turning, increase the pressure of the nut on the screw by rotating the nut one half-turn more in a clockwise direction. The correct degree of pressure is now applied to prevent the trimmer screw from turning when subjected to vibration.

Lubrication. During the course of assembly, the contacts and Station Selector (turret) mechanism on the tuner unit are lubricated. The contacts on the coil strips are smeared with petroleum jelly (Vaseline) and the locator roller and the spindle assembly are treated with a medium-bodied grease.

When servicing the tuner unit, it may be necessary to replenish this lubrication, particularly on the coil-strip contacts which will, no doubt, have been handled and the petroleum jelly thereby removed.

Cleaning the contacts. The indiscriminate application of any of the proprietary brands of switch-cleaning fluid is strongly deprecated. If the cleaning of any of the contacts is necessary, a local application of the cleaner - with a small brush - should be all that is required. Afterwards, a smear of petroleum jelly must be applied to those contacts which have been cleaned.

V310D RECEIVERS

Mains On/Off Switch. This switch is ganged with the volume control in the conventional manner, the top flap on the cabinet serving only as a protective cover for the controls.

C.r.t. position. With the chassis correctly located in the cabinet the corners of the c.r.t. should be just flush with the wooden frame in the cabinet. Ensure that the dust tight seal is in its correct position.

Removing the safety glass. First remove the chassis from the cabinet. Remove the rubber "stops" at the rear of each lower channel and slide back each door to the maximum. Take out the three screws holding the wooden retaining strip at the upper edge of the front of the safety glass and remove the strip. Remove the glass, by lifting its lower edge clear from the retaining groove.

Removing a door (Tambour) or handle. Remove the safety glass, and the c.r.t. surround complete. The handles can then be removed by unscrewing the four fixing screws. Slide out the doors towards the rear, coiling them in the space available. The doors may be replaced in a similar manner.

If the receiver is to remain in use temporarily without the doors, these can be removed without disturbing the safety glass or c.r.t. surround simply by taking out the two rear "stops" and easing the handles through the gap at each side of the front of the cabinet. This process cannot easily be reversed, however.

CIRCUIT DESCRIPTION

This is a superheterodyne type of receiver designed for the reception of any two channels in Band I and any two channels in Band III. It has r.f., frequency changer and 1st i.f. circuits that are common to both the sound and vision signals; channel selection is by means of a four position rotary coil turret

The r.f. stages. A double triode cascode amplifier is employed, followed by a triode pentode frequency changer stage. Since the r.f. coils are adjusted to within very close limits during manufacture, the circuits are aligned by adjusting the residual capacitances at a single Band III frequency; the alignment then holds for all channels in both bands. A Fine Tuner is not fitted to this receiver, and therefore, the oscillator coils must be carefully tuned on installation. A sound i.f. rejector (L10/C10), which is in circuit on all channels, is included in the tuner unit.

The vision i.f. stages. The first i.f. amp-

lifier after the frequency changer, is common to both sound and vision signals. The Contrast control is in the grid-cathode circuit of this valve, and the sound i.f. signal is taken from the anode. Another stage of vision i.f. amplification follows, and feeds the vision detector. There are three rejectors in the vision i.f. amplifier; L13/C41, L14/C46 (own sound i.f. rejectors), and L15/C50 (adjacent sound i.f. rejector).

The vision detector and video stages. One half of a double diode valve (V5) is used for detection, and the rectified signal is fed via the i.f. stopping choke (L18) and the grid compensating choke (L19) to the grid of the video amplifier valve (V6). The cathode circuit of this valve includes a 3.5 Mc/s rejector circuit (L20, C53) to remove the beat pattern caused by any sound carrier which might pass the i.f. rejectors; fixed video response correction is also provided by C54. The output from the anode of V6 is fed to the vision interference limiter, the cathode of the c.r.t. via a series compensating choke (L21), and the synchronizing signal separator circuit.

The synchronizing signal circuits. The video signal from V6 anode is applied to the control grid of a conventional sync. separator (V7a) which suppresses the picture modulation, so that a "negative going" sync. pulse waveform appears across the anode resistor (R71). The pulse voltage is taken to V13 in the line time-base and, after differentiation by C63 and R79, to the grid of the frame "sync". separator (V7b). A further output is taken to the cathode of V7b via R77, to keep the valve biased back during the picture period. The initial frame pulse charges C66 in V7b anode circuit, so that subsequent pulses are reduced in amplitude. The result is an initial frame synchronizing pulse of high amplitude and having a steep leading edge, with the remaining pulses markedly reduced. These pulses are fed to the main charging capacitor (C93). D.C. for V7b is obtained from V12 cathode circuit.

The line output stage. A single valve waveform generator and amplifier is used. Its mode of operation is conventional except for the method of increasing the output efficiency. This is achieved in the following manner.

During the "flyback" period a large negative potential is developed in the screen grid winding of T3. This voltage pulse is integrated and fed to the control grid of the line output valve (V13) and holds the valve inoperative for approximately the first third of each line scanning period.

Scanning is obtained during this period by arranging that the efficiency diode (V14) conducts and allows the energy contained in the scan coils to drive a current via V14 into C109. The direction of this current is such as to supply the initial part of the total scan.

Frame time-base. This consists of a multivibrator followed by a pentode output valve. A secondary circuit on the output transformer supplies a suitable wave-form for frame flyback suppression, which is applied to the first anode of the c.r.t.

Power supply. A conventional a.c./d.c. power supply circuit is used, and the valve heaters are arranged in a single 0.3 Amp. series chain. On the lower d.c. steps of the mains adjustment switch, the rectifier is removed from the circuit to avoid an unnecessary loss of h.t. voltage. At the same time, the reservoir capacitor is disconnected from the circuit so that there is less surge current to "blow" the mains fuse; see "Installation" on page 2 .

VOLTAGE READINGS

General. The voltage readings given in the circuit diagrams and chassis layout diagrams are representative only, and will differ slightly from one set to another.

Procedure for measuring the voltages. To obtain voltage readings corresponding to those quoted in the circuit and chassis layout diagrams, proceed as follows:

1. Adjust the mains adjustment switch, if necessary, to suit the mains input at the time of measurement. See "Installation" on page 2 .
2. Adjust the receiver to give a normal picture on a B.B.C. channel.
3. Measure the voltages, using a 20,000Ω/V meter. If a 20,000Ω/V meter is not available, a 500Ω/V meter can be used; those readings which were found to differ appreciably from the figures on the diagrams, when using such a meter, are given in Table 1.
4. Ascertain whether the variable controls are having the correct effect on the voltages which they influence; follow the procedure outlined in Table 2.

E.h.t. voltage. This was taken with an electrostatic voltmeter. A 10V d.c. meter having a sensitivity of 20,000Ω/V, with a suitable multiplier such as the AVO 25,000V Multiplier Type 8, can be used.
NOTE: The BRIGHTNESS control must be turned to zero brightness when taking this reading.

Vision and sound i.f. circuits. If instability is experienced when measuring the anode voltages, connect the meter instead to the

h.t. +ve end of the i.f.t. primary winding.

Strong and weak signal conditions. Where valve electrode voltages are affected by the magnitude of the signal, two are quoted in the diagrams and prefixed by the letter W for weak (100μV) and S for strong (10mV).

TABLE 1

Readings which differ from those given on the circuit and layout diagrams, when taken with a 500Ω/V meter.

VALVE	ELECTRODE VOLTAGE		
	ANODE	GRID 2	CATHODE
V2		pin 3: 94	
V5b			pin 5: 138
V6	pin 7: 138	pin 8: 170	
V7a	pin 6: 75	pin 7: 17	
V7b	pin 1: No useful reading		pin 3: 1.6
V11b	pin 6: No useful reading		
V16 (c.r.t.)	pin 10: 103		pin 11: 95

TABLE 2

Voltages measured whilst receiving a television transmission (including sound) and with all the controls, excepting the one concerned, adjusted as for a normal picture. The figures in brackets were taken with a 500Ω/V meter.

VALVE	CONTROL SETTINGS	ELECTRODE VOLTAGE			
		ANODE	GRID 1	GRID 2	CATHODE
V3	(a) Contrast minimum	205	205	0	4.8 (4.3)
	(b) Contrast maximum	194	200	35 (29)	38
V5	(a) Vision Int. Limiter anti-clockwise	24 (20)			
	(b) Vision Int. Limiter clockwise	146 (140)			
V11b	(a) Frame Amp. anti-clockwise	5.7 (Nil)			
	(b) Frame Amp. clockwise	10.5 (Nil)			
	(a) Frame Hold anti-clockwise	14 (Nil)		-25 (Nil)	
	(b) Frame Hold clockwise	4 (Nil)		-12 (Nil)	
V12	(a) Frame Lin. anti-clockwise	193	204		25
	(b) Frame Lin. clockwise	170	194		19
V16 (c.r.t.)	(a) Brightness minimum			24	
	(b) Brightness maximum			162 (154)	

MODIFICATIONS

All the electrical changes given in this section are included in the circuit and layout diagrams and the following notes should be examined in conjunction with the diagrams

if an unmodified receiver is being serviced. These changes need not be incorporated in an early receiver, unless experience indicates that it is desirable.

Frame output valve. In some receivers, V12 was a 30P16 pentode valve. It was used at the valve manufacturers request. To accommodate this valve, R119 was 1.8MΩ, R129 was 8.2KΩ, R156 was 147Ω, and C94 was rated at 50V working. At intermediate stages R156 had several values (see "Heater dropping resistor" below). Some later sets with 30P12 frame output valves, have R119 as 1.8MΩ, and/or R129 as 82KΩ, and/or R156 as 147Ω.

Heater dropping resistor (R156). This resistor was changed three times. For replacement purposes two values only will be available, 160Ω for sets with a 30P12 frame output valve, and 147Ω for sets with a 30P16 (PL82) frame output valve. The type number of the frame output valve should be checked before ordering a replacement mains resistor. Early sets with a 30P16 frame output valve had a resistor (R155) in parallel with R156, mounted between pins 4 and 7 on V14 holder. This shunt resistor should be removed when a replacement mains resistor is fitted. The value of the shunt was dependent on the value of R156, and was as follows:

R156	R155
168Ω	1.5KΩ, 20%, 1.5W, Part No.26943
155Ω	2.2KΩ, 20%, 1.5W, Part No.26975
160Ω	2.2KΩ, 20%, 1.5W, Part No.26975

Sound gain. In early receivers, R90 was 1KΩ and C78 was 22pF. Also, C75 and R86 were not present, the junction L23/C72 being connected to chassis. The changes were made to increase sound output and provide sound a.g.c.

Hum on sound, V310, V310C only. In some early receivers, the position of V9 and L26 in the heater chain was different, and R93 was 1MΩ. The changes were made to reduce the possibility of hum on sound caused by V9. The changes in the heater chain were as follows: V8 pin 5 was connected to V9 pin 3; L26 was connected to V1 pin 5, and V2 pin 4 was connected to V16 (c.r.t.) pin 12. Decoupling capacitors, remained connected to the same valve pins.

Coil cores. In early receivers, the coil cores were of the standed slotted type. It is possible, with a short trimming tool, to adjust all the cores without removing the c.r.t. See also "Trimming tool" on page 11.

Frame drift, V310, V310C only. When the W4 rectifier (MR2) was fitted in early sets, it was found that the line time-base was influencing the frame time-base causing frame drift. C105 was added to minimize this effect.

Line drift. In earlier receivers, MR2 was a Westinghouse 39K2 selenium rectifier (coded BLUE), C107 was 33pF, R76 was 8.2KΩ, R74 was 27KΩ, R134 was 2.2MΩ, R135 was 3.9KΩ and C106 was connected to the junction R135/R142/screen winding on T3 (t.p.212). Also, a resistor, R136 (470KΩ) was connected from the junction R138/R140/C106 (t.p.209) to the chassis. These components were changed to reduce the possibility of line drift. However, if the receiver is fully modified (this can easily be verified by checking that C106, 82pF, is not connected to the lower tag on the Line Hold control, R142) and line drift persists, follow the procedure below:

1. Disconnect one end of MR2 and allow it to cool for about 10 minutes. Then check that its back resistance is at least 1MΩ (the reading obtained may be misleading if the rectifier has not cooled down sufficiently). Use a 20,000Ω/V meter having a 15V internal battery on the high resistance range, e.g. Avo Model 8, and connect the -ve lead to the end coded RED on the rectifier. Reconnect MR2 if satisfactory.
2. Replace V13 with a 30P4 valve coded SE above the word "Mazda".

The above procedure should be followed each time V13 has to be changed to overcome line drift.

The oscillator core driver. To overcome certain difficulties (sticking, etc.) experienced with the spring loaded driver fitted in early receivers for adjustment of the oscillator coil core, this driver has been replaced in later receivers by a Polythene tube which serves as a guide for the insertion of a separate driver.

A kit of parts (Part No. 77515) with instructions for making this change to an early receiver is available from Murphy Radio Ltd, Service Department. The separate Driver (Part No. 77219), which is a long plastic trimming tool, has been supplied to dealers for general use with these receivers; this tool is not a part of the equipment of each receiver.

CIRCUIT ALIGNMENT

General note. Avoid touching the coil cores and tuner unit trimming capacitors unless there is unmistakable evidence that retrimming is necessary. It is essential to appreciate that the movement of a lead or component within the tuner unit may seriously upset the performance, particularly on Band III.

Warming up. The receiver must be allowed to warm up for ten to fifteen minutes before commencing alignment.

Control settings. All controls must be set for maximum gain, i.e. CONTRAST, SENSITIVITY and VOLUME clockwise, VISION INTERFERENCE

LIMITER anti-clockwise. The STATION SELECTOR must be set in a B.B.C. (Band I) position unless otherwise stated.

Damping units. When aligning some i.f. and r.f. transformers, it is necessary to damp the primary circuit while adjusting the secondary, and vice versa, as indicated in the Circuit Alignment Table on page 12. The damping units are as follows:
DAMPING UNIT "A": 470Ω resistor in series with a miniature 1000pF capacitor.
DAMPING UNIT "B": 220Ω resistor with special connectors. A complete unit (Part No. 69919) is supplied by Murphy Radio Ltd, Service Department, and it should be modified as shown in Fig. 4. The damping unit should be connected as shown in Fig. 4, and great care must be taken to avoid damaging the contacts on the tuner unit assembly. If the damping unit is placed across the wrong contacts, a valve and resistor may be seriously damaged.

Trimming tool. To enable trimming adjustments to be made from outside the chassis, special coil cores are fitted. To adjust these cores, a hexagon headed trimming tool (Part No. 75191) is available from Murphy Radio Ltd., Service Department, price 1/- at the time of going to press. On some early sets standard type cores were fitted, see Modifications on page 8.

In addition, on later receivers, a long plastic trimming tool (**Driver**, Part No. 77219, already supplied to dealers for general use with these receivers) is required for adjusting the oscillator coil core.

Signal Generator. Connect a signal generator, having an output impedance of 80Ω, to the points indicated in the Circuit Alignment Table on page 12. Switch the modulation "On" with a depth of 30 per cent, for all adjustments.

Output meters. The following instruments will be required:
SOUND. A 3V a.c. meter in parallel with a loudspeaker or a 3Ω dummy load, connected between the chassis and the insulated pin at the bottom rear of the receiver chassis.
VISION. Connect a crystal type a.c. meter between the cathode of the c.r.t. (pin 11) and chassis. Use a 20,000Ω/V meter (such as the Avo Model 8, the Taylor Models 88A or 77A, or the Weston Model E772 type 5), a suitable rectifier, and a blocking capacitor, connected as shown in Fig. 3. The recommended types of rectifier are as follows: S.T. & C. type M1 (Part No. 58528) or type Q 62 (Part No. 58532). Alternatively, an oscilloscope connected between the c.r.t. cathode and chassis can be used. If there is any trace of instability, connect a 10KΩ resistor at the c.r.t. end of the oscilloscope lead.

Maximum output. Adjust the signal generator attenuators so that the receiver output does not exceed the following:
SOUND: 200 mW, or 0.8V across the loudspeaker speech coil or 3Ω dummy load.
VISION: 5V d.c. at the c.r.t. cathode, as measured by the indicator described above, or 10V peak-to peak on an oscilloscope screen.

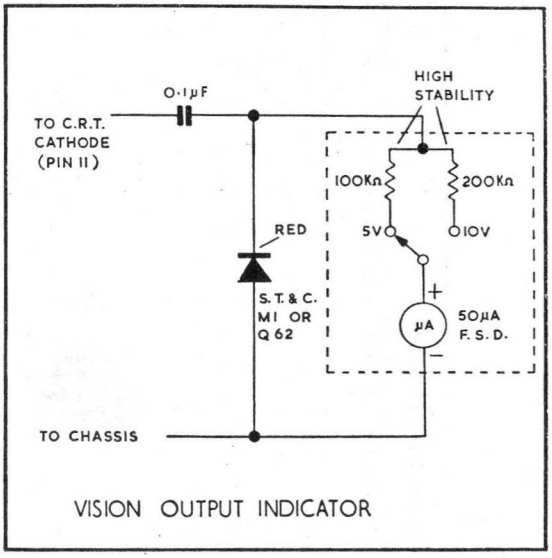


Fig. 3. The dotted rectangle represents the multi-range meter.

Core positions. If two peaks are obtainable with the coil cores, the correct one is that which occurs with the core nearer to the end of the coil former.

I.f. rejectors. Do not increase the signal input much over 2 mV when finally aligning these circuits; if possible, increase the sensitivity of the vision output meter.

Tuner unit. Before aligning the r.f. circuits, remove the screening covers.

Although the Circuit Alignment Table gives Band III frequencies for aligning the r.f.t. trimmers (C16 and C17), if a signal generator capable of providing these frequencies is not available, alignment can be carried out in Band I.

CHANNEL	TUNING CAPACITORS	
	C4	C16/C17
1	41.5 Mc/s	
2	48.25 Mc/s	
3	53.25 Mc/s	
4	59 Mc/s	
5	64 Mc/s	
8		188 Mc/s
9		193 Mc/s
10		198 Mc/s

CIRCUIT ALIGNMENT TABLE

CIRCUIT	SIG. GEN. SETTING	SIG. GEN. TO	DAMPING UNIT CONNECTION	ADJUSTMENTS AND REMARKS	OUTPUT
Adjacent sound i.f. rej.	33.15 Mc/s	V3 pin 2	No damping	1. **Switch to Band I** and tune L15 (top of can)	Min. vision
3rd own sound i.f. rej.	38.15 Mc/s	V3 pin 2	No damping	2. Tune L14 (bottom of can)	Min. vision
2nd own sound i.f. rej.	38.15 Mc/s	V3 pin 2	No damping	3. Tune L13	Min. vision
Sound i.f.t.	38.15 Mc/s	V3 pin 2	No damping	4. Tune L25 (sec., top of can) 5. Tune L24 (pri., bottom of can)	Max. sound
Sound take-off coil	38.15 Mc/s	V3 pin 2	No damping	6. Tune L23	Max. sound
Final vision i.f.t.	35.8 Mc/s	Insulated terminal	"A" to V4 pin 7	7. Tune L17 (sec., top of can)	Max. vision
			"A" to V5 pin 7	8. Tune L16 (pri., bottom of can)	Max. vision
2nd i.f.t.	36.25 Mc/s	Insulated terminal	"A" to V3 pin 7	9. Tune L12 (sec., top of can)	Max. vision
			"A" to V4 pin 2	10. Tune L11 (pri., bottom of can)	Max. vision
1st i.f.t.	36.5 Mc/s	Insulated terminal	"A" to V3 pin 2	11. Tune L8 (pri., bottom of can)	Max. vision
			"A" to V2 pin 6	12. Tune L9 (sec., top of can)	Max. vision
Final vision i.f.t.	-	-	-	Repeat adjustment 8	-
1st own sound i.f. rej.	38.15 Mc/s	Ae. socket	No damping	13. Tune C10 (tuner unit)	Min. sound
Tuner unit. See "Tuner unit" on page 11	Band III sound	Ae. socket	No damping	14. **Switch to Band III** and tune L6 (osc.)	Max. sound
	See table on page 11 for Band III	Ae. socket	"B" across pri.	15. Tune C17 (sec., chassis outerside)	Max. vision
			"B" across sec.	16. Tune C16 (pri., chassis outerside)	Max. vision
	Band I sound	Ae. socket	No damping	17. **Switch to Band I** and tune L6 (osc.)	Max. sound
	See table on page 11 for Band I	Ae. socket	No damping	18. Tune C4 (ae., chassis outerside) Tune for **max. vision** on Ch.4 and Ch.5	Max. sound
	-	-	-	Re-tune L6 (osc.) accurately on local transmissions	Max. sound

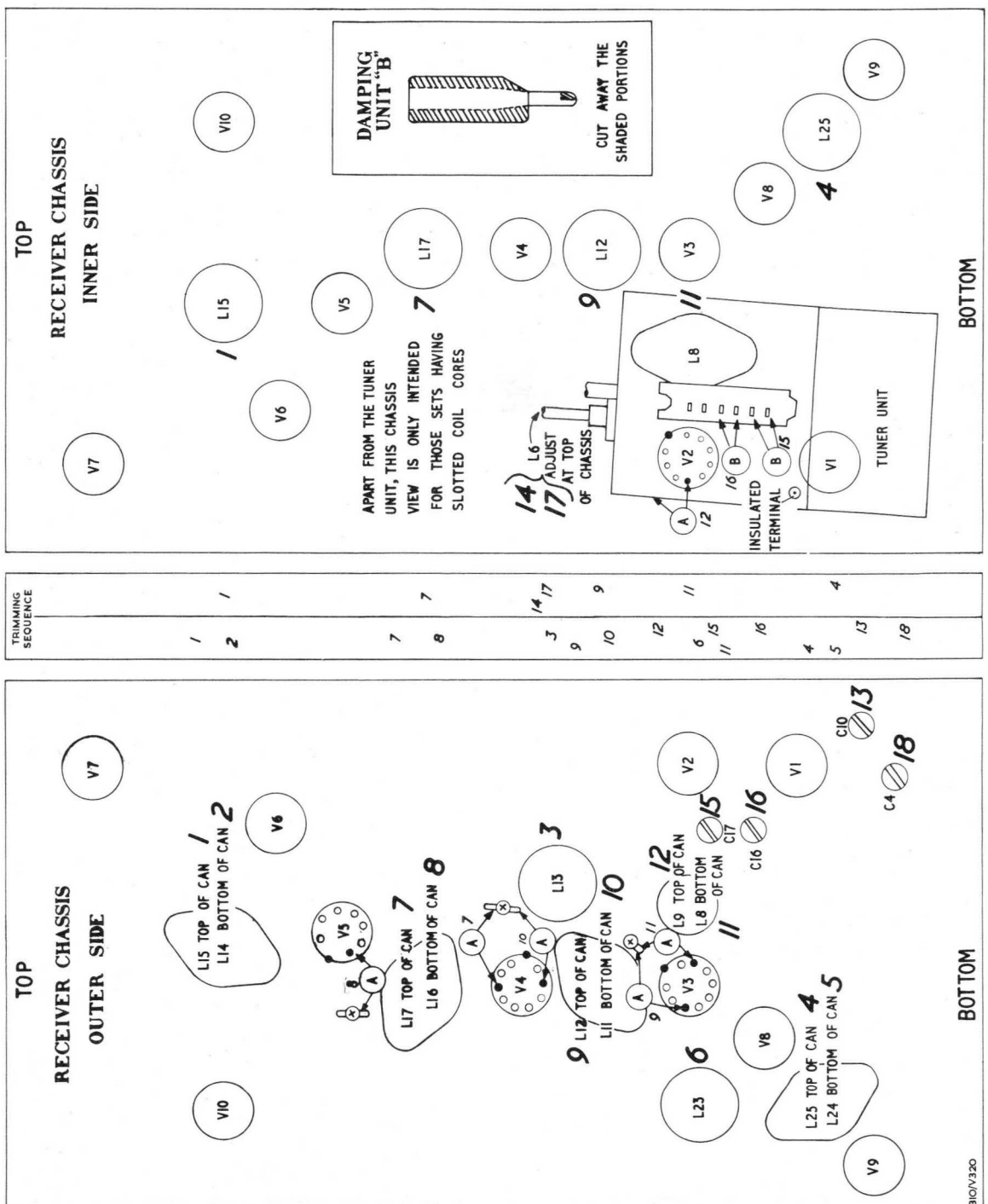


Fig. 4. The coil positions and damping unit connections.

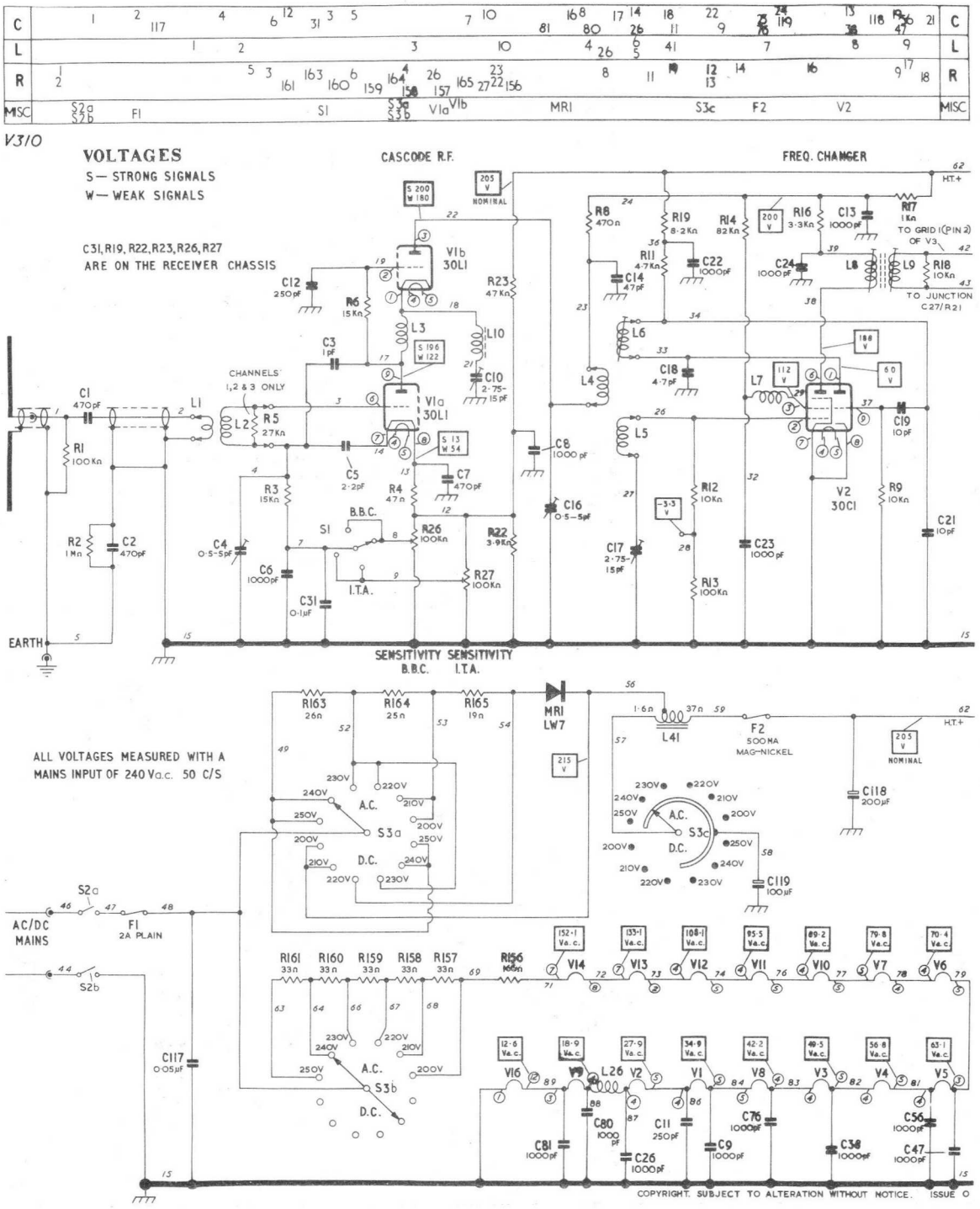


Fig. 5. Tuner unit and power supply circuit diagrams. See page 16 for the main circuit diagram. Also see "Voltage Readings" on page 8.

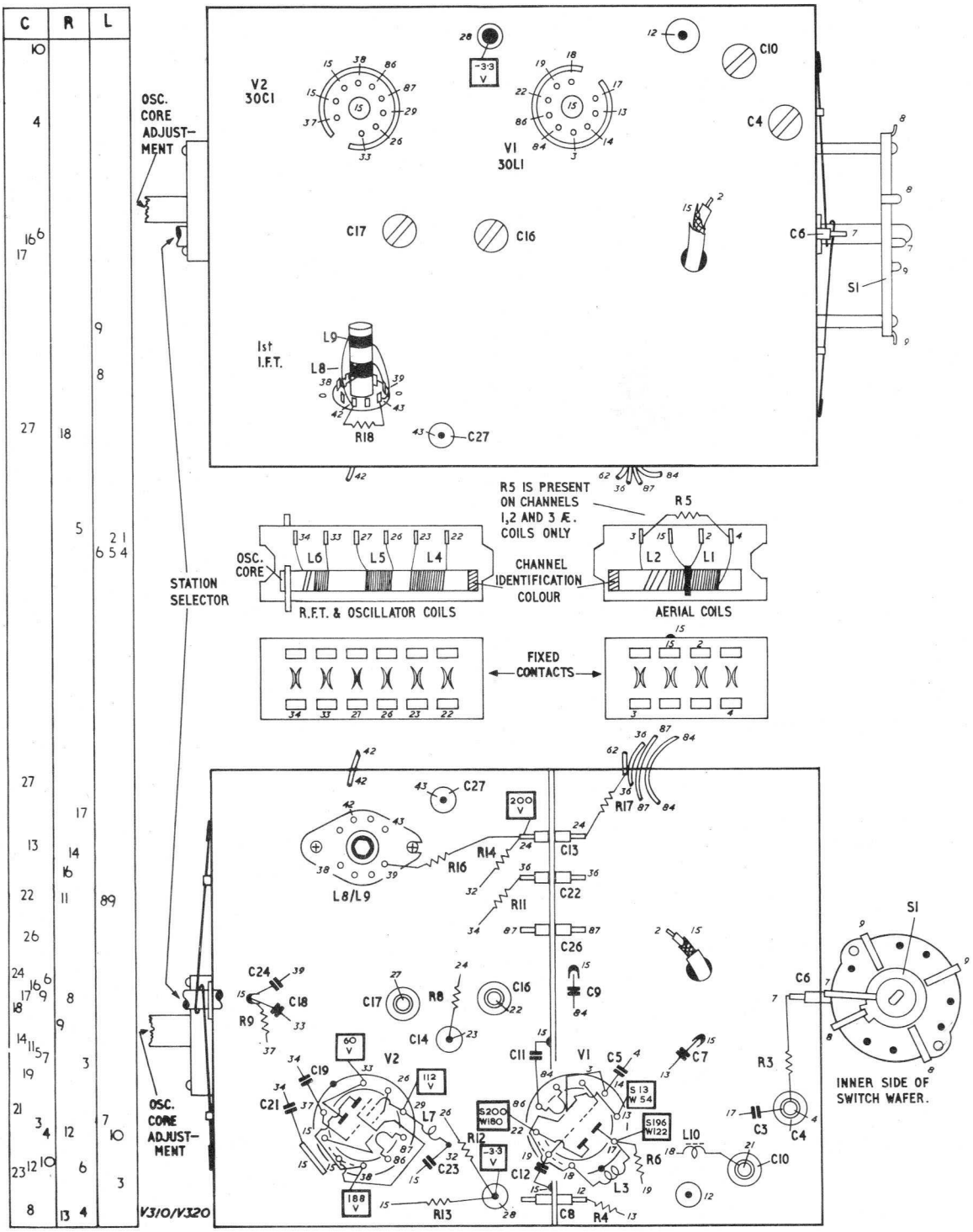


Fig. 6. Details of tuner unit chassis.

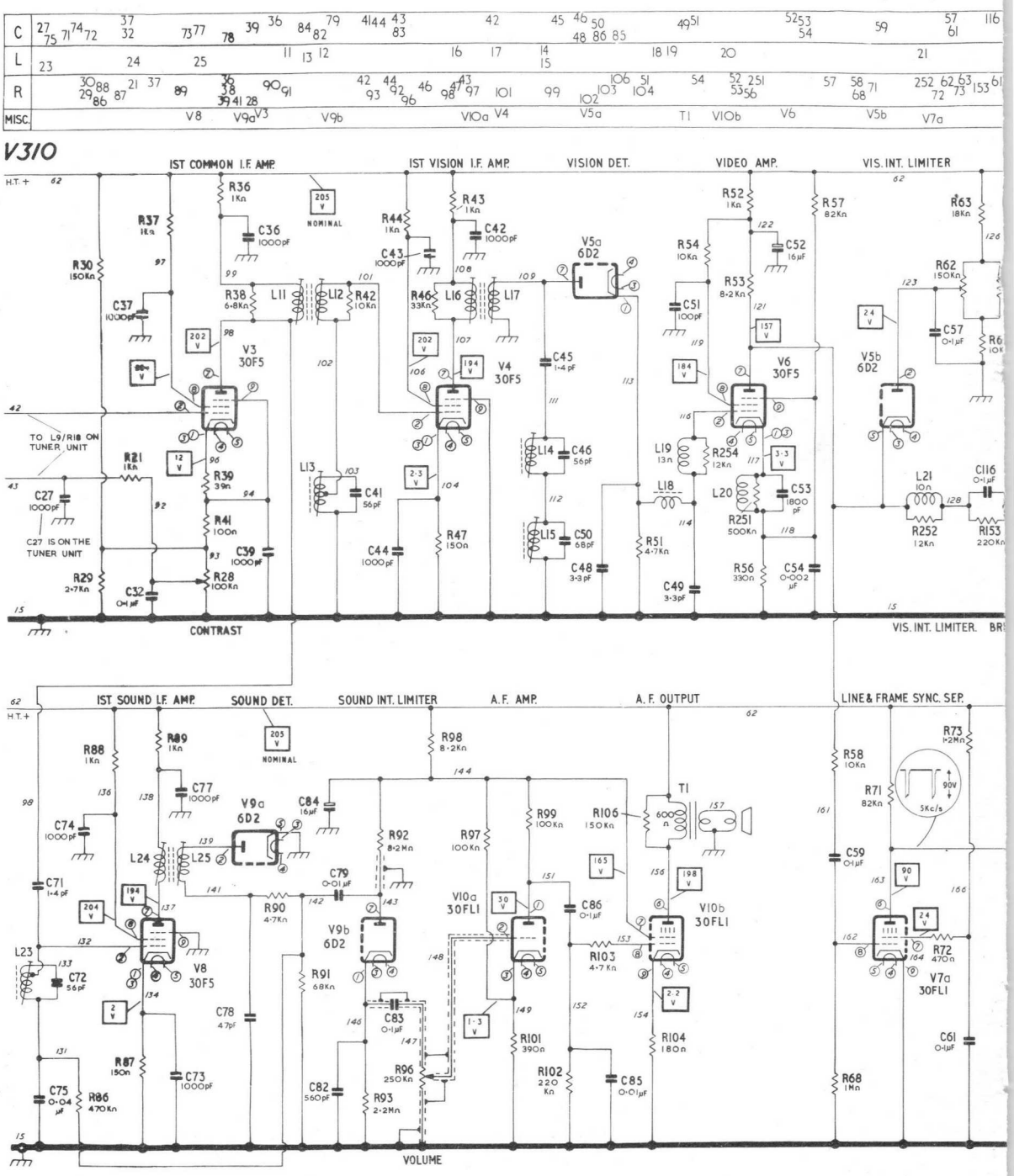


Fig. 7. The main circuit diagram, excluding the tuner unit and power supply sections which are shown on page 14. The voltage conditions, together with additional readings are given on page 8.

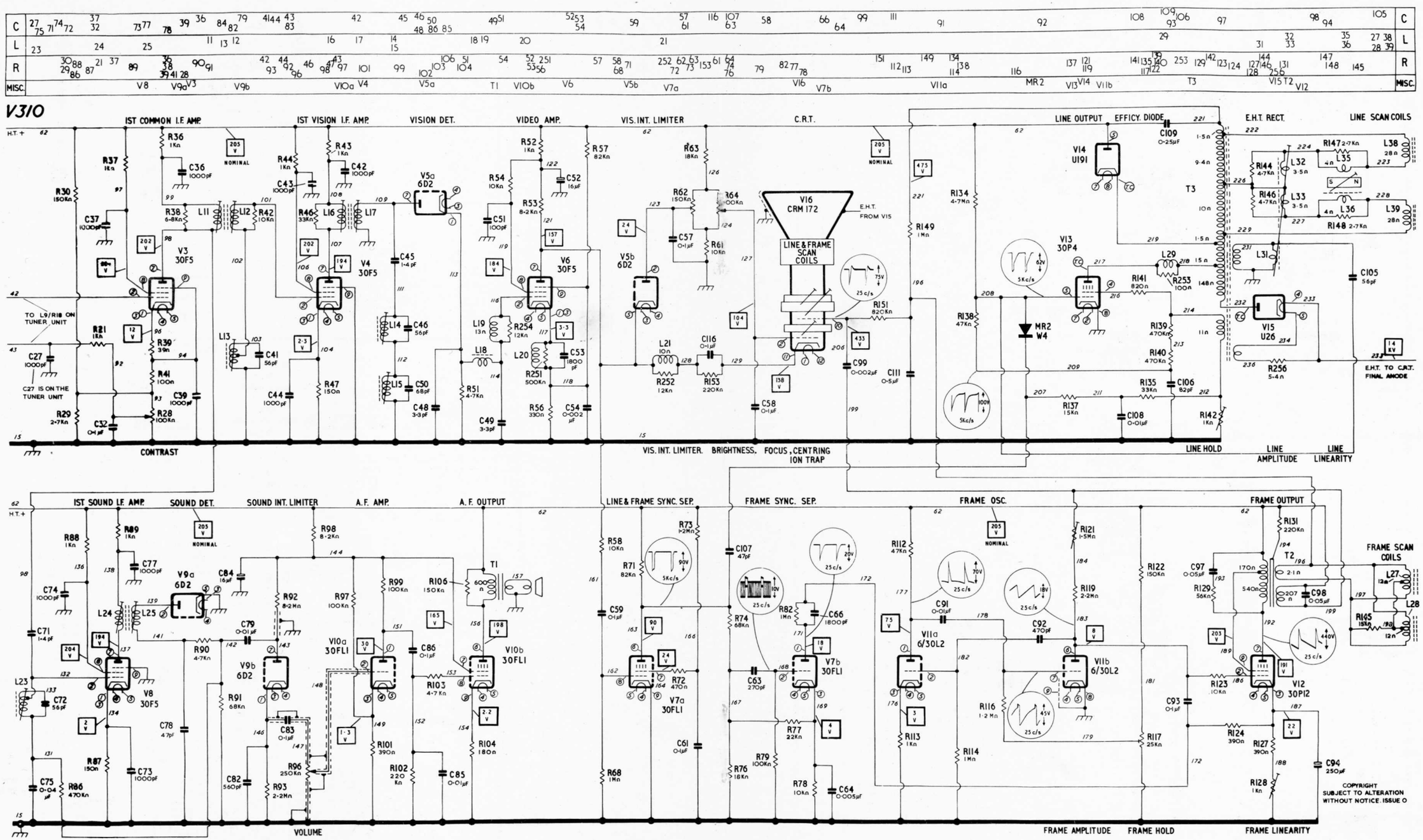
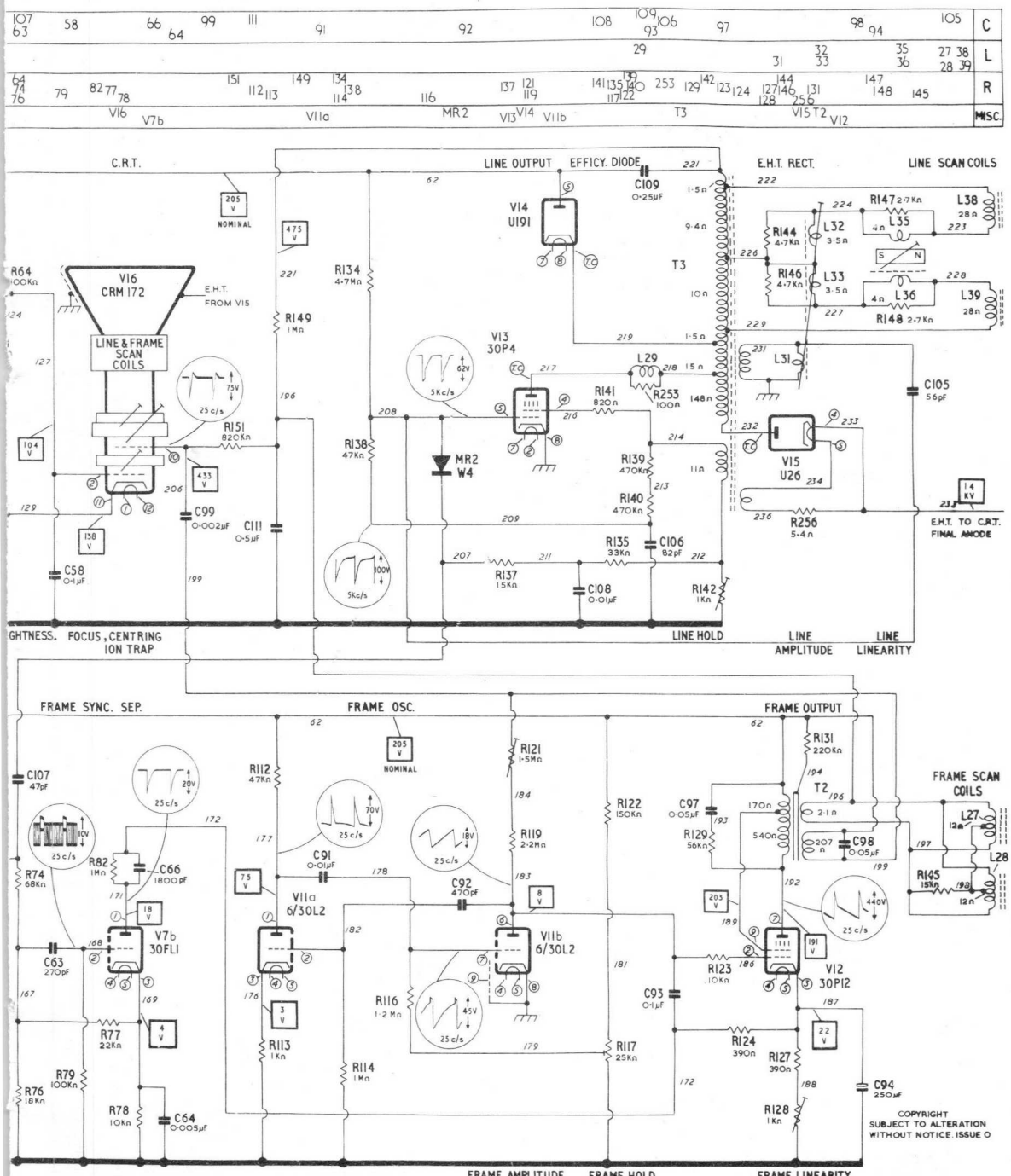


Fig. 7. The main circuit diagram, excluding the tuner unit and power supply sections which are shown on page 14. The voltage conditions, together with additional readings are given on page 8.

The frequencies under the oscilloscope traces refer to the oscilloscope time-base. Component terminals and connecting leads are identified by test point (t.p.) numbers which correspond with those appearing on the chassis diagrams.



The frequencies under the oscilloscope traces refer to the oscilloscope time-base. Component terminals and connecting leads are identified by test point (t.p.) numbers which correspond with those appearing on the chassis diagrams.

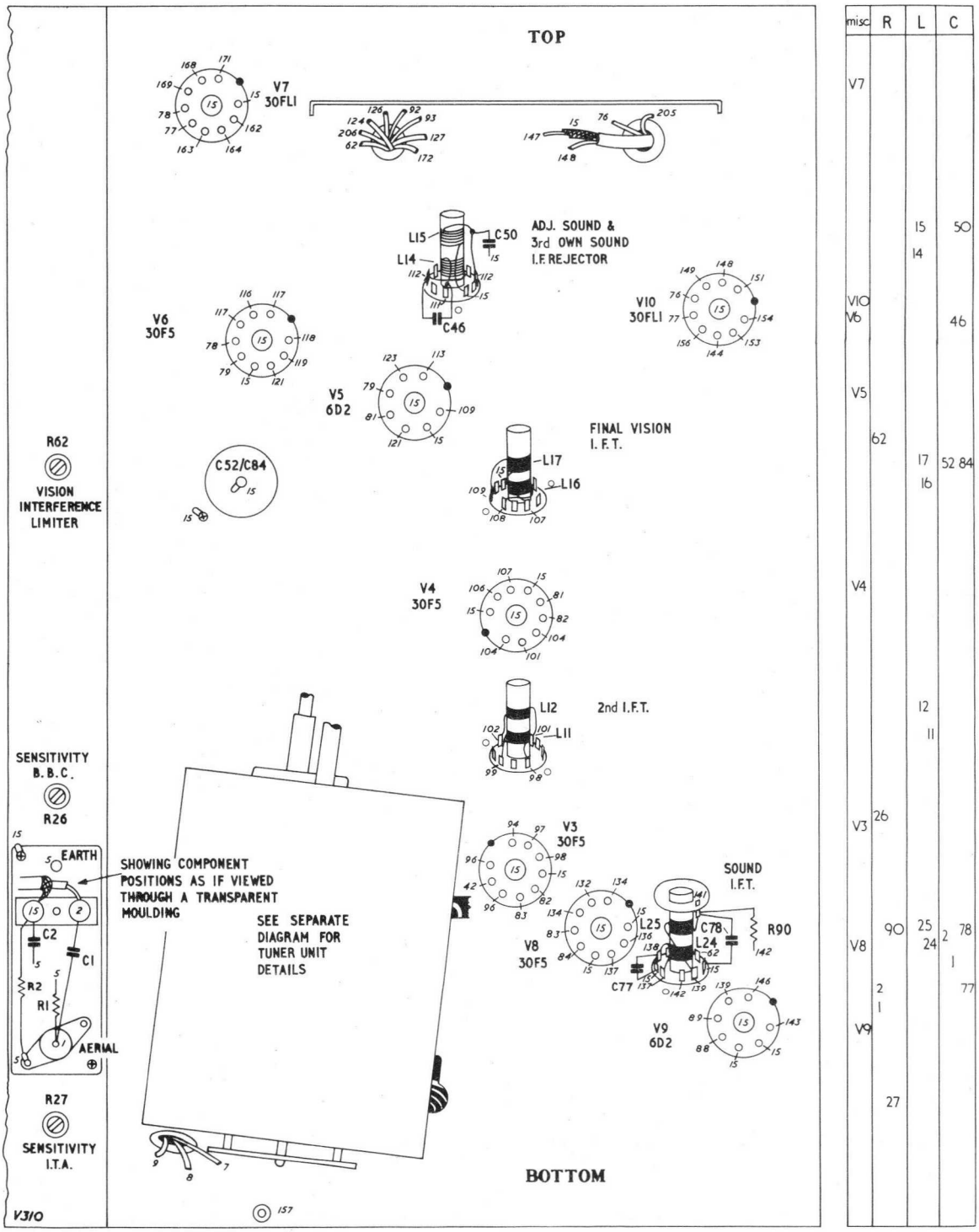


Fig. 8. The inner side of the receiver chassis. See page 15 for details of the tuner chassis.

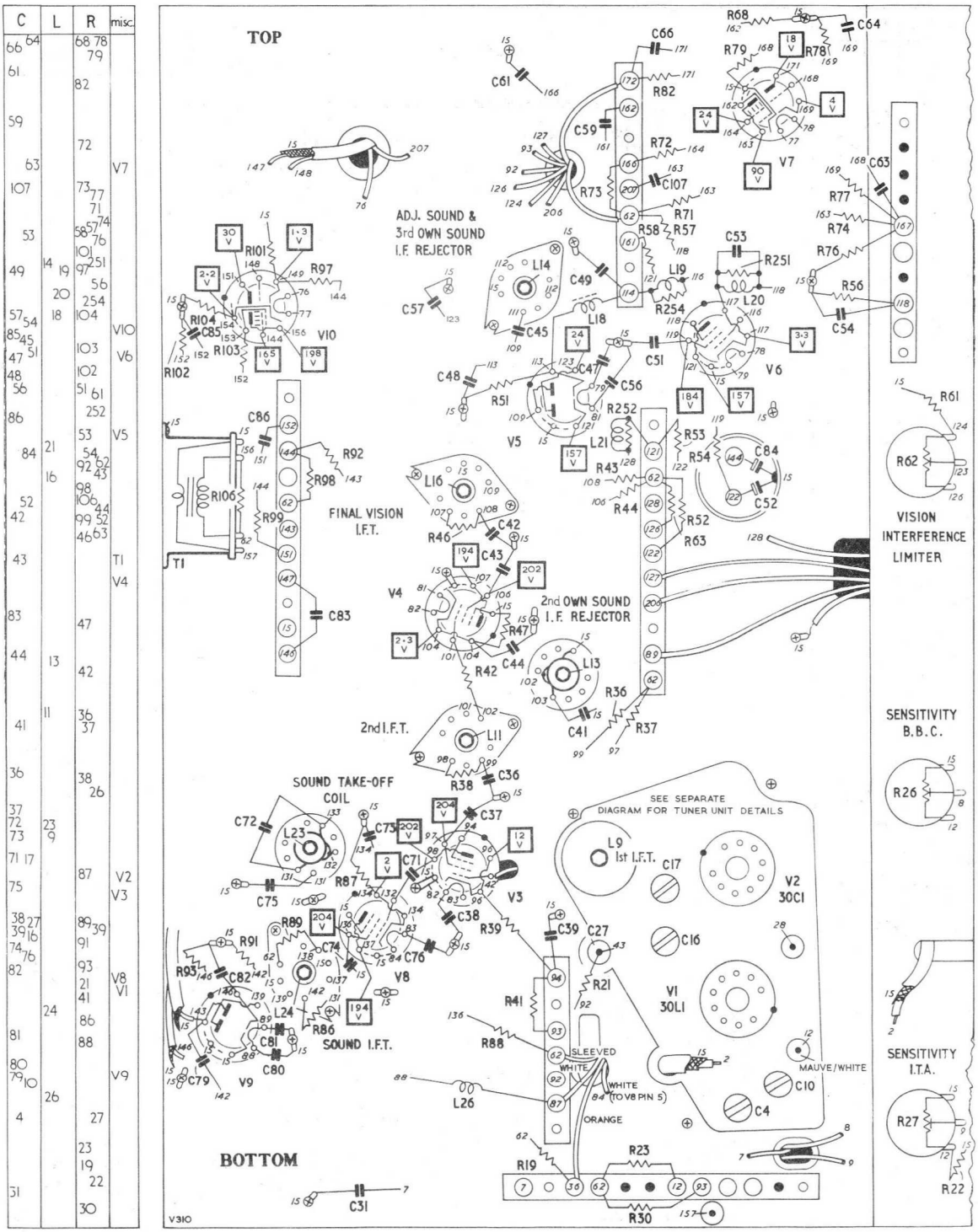


Fig. 9. The outer side of the receiver chassis. See page 15 for details of the tuner chassis.

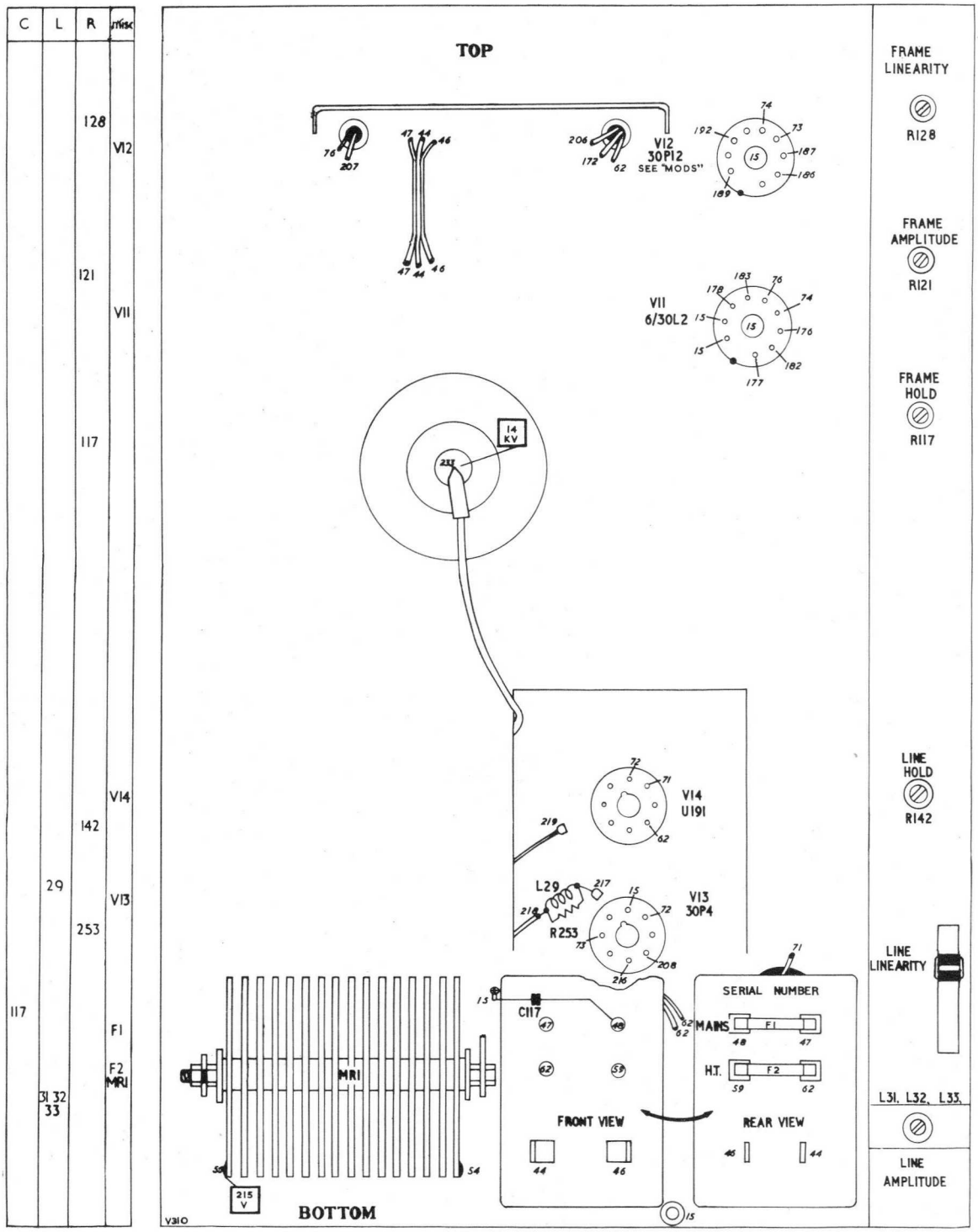
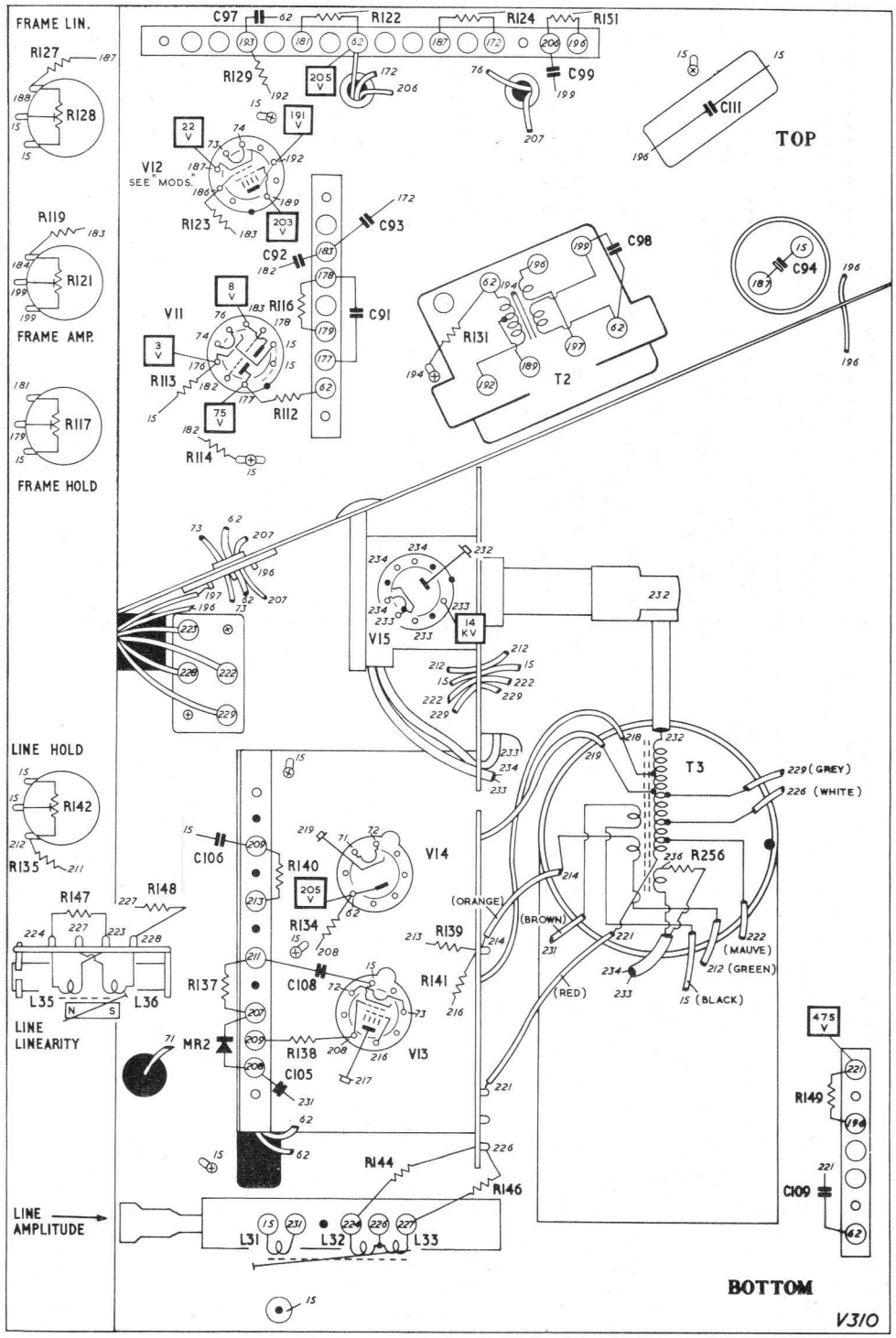


Fig. 10. The inner side of the time-base chassis.



misc.	R	L	C
	122 124 127 151 129		97 99
	128		111
V12			
	119 123		93 98 92
	121 116		94
V11			91
	131		
T2	113		
	112		
	117		
	114		
V15			
T3			
	142		
V14	135 256 140 148 147 134 139 141		106
	137	35 36	108
MR2 V13	138		105
	149		
	144		
	146		109
		31 32 33	

Fig. 11. The outer side of the time-base chassis.

FAULT FINDING TABLE

The following table is given as a guide so that the faults and circuits involved may be related without undue loss of time.

Faults affecting both sound and vision

SYMPTOM OF FAULT		LOCATION OF FAULT	
GENERAL	PARTICULAR	GENERAL	PARTICULAR
No sound or vision	Blank screen and sound receiver apparently "dead".	Power supply circuits	F1, F2, L41 o/c. C118, C119 s/c. Valve heater o/c. Mains voltage adjuster o/c.
	Raster is obtainable. Sound receiver is apparently "live".	Ae., r.f. & frequency changer stages	STATION SELECTOR or SENSITIVITY control incorrectly adjusted. Ae. plug or socket o/c. Osc. and/or r.f.ts. mistuned. V1 or V2 defective or poor connections.
Intermittent sound and vision	Picture and sound affected together.	Power supply circuits	Mains plug intermittent. Mains voltage adjuster intermittent.
	As above, raster not affected.	Ae., r.f. & frequency changer stages	Ae. plug and socket intermittent. V1 or V2 intermittent or poor connections.
Weak sound and vision	Raster present.	Ae., r.f. & frequency changer stages	Osc. and/or r.f.ts. mistuned. V1 or V2 defective or poor connections. Decoupling capacitors o/c. See "The tuner unit" on page 6

Faults affecting sound only

No sound	Picture unaffected.	Sound receiver	V8, V9 or V10 defective or poor connections. Loudspeaker contacts in cabinet and/or on the chassis, high resistance.
Weak sound	Picture unaffected.	Frequency changer	Oscillator slightly mistuned.
		Sound receiver	I.f.t. and/or sound take-off coil mistuned. V8, V9 or V10 defective, or poor connections. Decoupling capacitors o/c.
Intermittent sound	Picture unaffected.	Sound receiver	V8, V9 or V10 defective or poor connections. Loudspeaker contacts in the cabinet and/or on the chassis, high resistance.

Faults affecting vision only

Horizontal bands on picture	Bands of varying width and shading.	Local oscillator	Check tuning; see page 4.
		Vision i.f. stages	I.f.ts. and/or sound rejectors mistuned. External interference.
		Vision receiver and time-base circuits	Microphonic valves, c.r.t., or components.
Heterodyne patterns	Vertical or diagonal bands stationary or drifting.	R.f. stages	Excessive signal input; fit attenuator (see page 26). Positive feed-back; check decoupling. External interference; add filter.
		I.f. stages	Positive feed-back; check decoupling.
Poor picture	Insufficient contrast.	Vision receiver	I.f.ts. mistuned. V4, V5, V6 defective or poor connections. C42, C43, C44 o/c.
	Poor definition.		I.f.ts. mistuned. C116 o/c.
	Loss of "highlights" or partly negative picture	C.r.t.	Low emission.
Picture off centre	Brightness normal.	Picture centring	PICTURE CENTRING control requires adjustment.
	Reduced brightness.	Ion trap	Ion trap magnet requires adjustment.
Picture slipping	Neither line nor frame hold.	"Sync." separator stage	V7 defective. C61 s/c. C59 o/c or "leaky". C54 o/c.
	Weak or no line hold.		C107 o/c or s/c.
		Line time-base	C108 s/c or o/c. MR2 defective.
	Weak or no frame hold.	Frame "sync." separator stage	C63, C64, C66 o/c or s/c. V7b defective.

SYMPTOM OF FAULT		LOCATION OF FAULT	
GENERAL	PARTICULAR	GENERAL	PARTICULAR
Distorted picture	Non-linearity at top of picture with reduced height.	Frame time-base	T2 s/c turns, C98 s/c.
	Reduced height with cramping at bottom of picture.		C94 o/c.
	Reduced height (trapezium distortion).	Scan coils	L27 or L28 o/c.
	Reduced width at either top or bottom.		L38 or L39 o/c.
	Vertical line(s) at right side of picture.	Line time-base	V13 defective.
	Line tearing in horizontal bands.		V13 defective.
	Distorted in patches only.	C.r.t. and mask	Electrostatic charges or dampness.
White screen	Both time-bases operating.	Video stage	C.r.t. underbiased. C.r.t. defective (heater/cathode s/c or "leak"). V6 low emission. C54 s/c.
No picture	Raster present.	Vision receiver	V3, V4, or V6 defective. L21 o/c.
Shadows	At top r.h. corner of raster.	C.r.t. and scan coils	Check ion trap adjustment, tightness of c.r.t. against scan coils.
No raster	No e.h.t.; time-base stopped.	Line time-base	L31 s/c.
	No e.h.t.; time-base running.	Line output stage	V15 defective. T3 o/c. C109 o/c or s/c.
	Both time-bases running and e.h.t. present.	C.r.t. and video stage	C.r.t. overbiased. C58 s/c. Ion trap requires adjustment. 1st anode circuit o/c. C.r.t. defective.

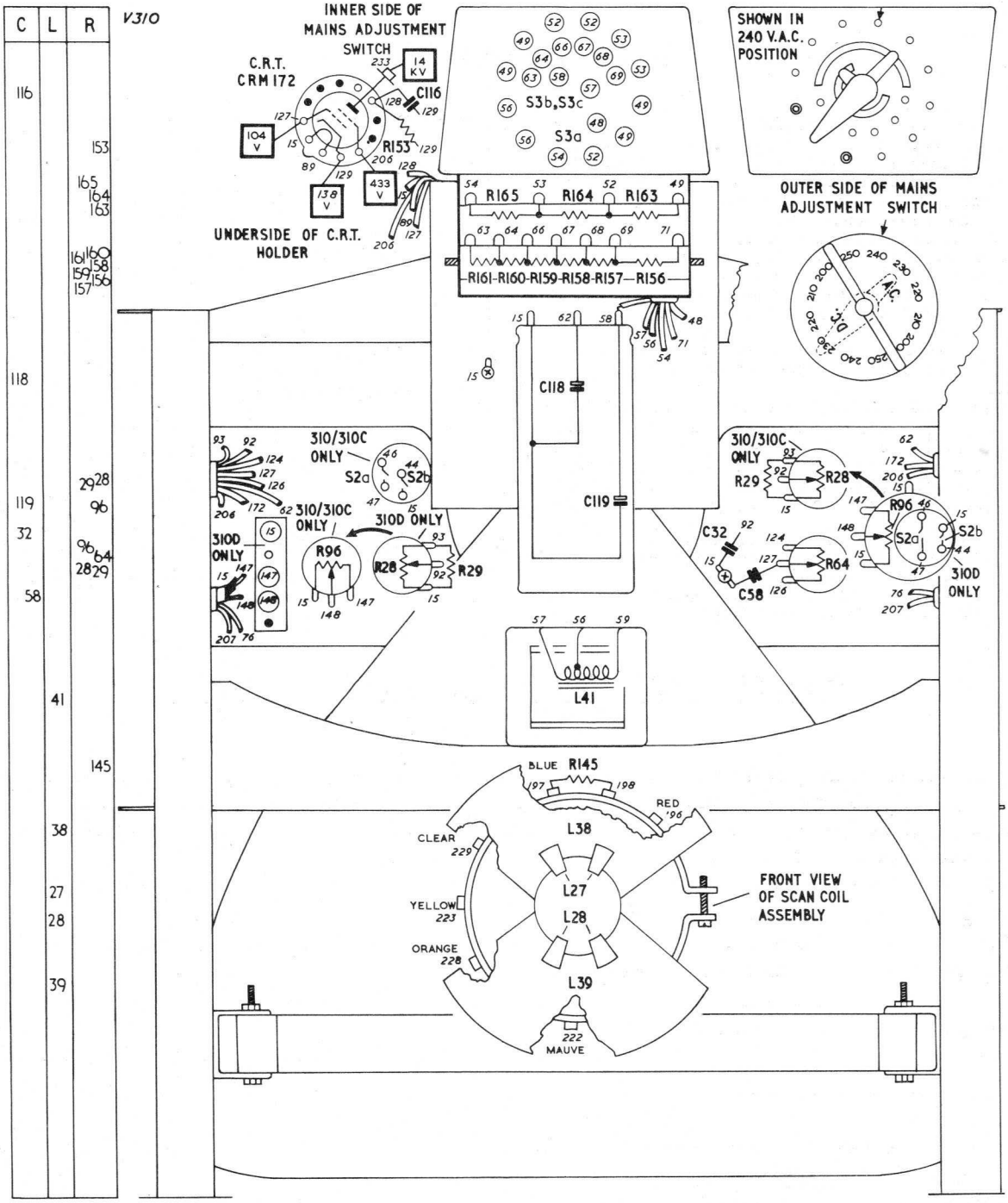


Fig. 12. Bottom view of the receiver.

ATTENUATORS

In areas of high signal strength it may be found necessary to fit an aerial attenuator. Since Band I and Band III signals often differ widely in strength, it is sometimes preferable to attenuate the signals separately in the tuner unit. This can be done very conveniently by means of special attenuators which replace the existing aerial coil strips in the turret (see instructions on page 6). A choice of three as shown in Fig. 13, are available from Murphy Radio Ltd, Service Department.

The attenuation figures refer to Band I only; on Band III the attenuation will be less.

The indications that an attenuator is necessary will be heterodyne patterns, sound on picture, or sync. on sound.

An attenuator may be considered desirable for matching the levels of the different signals, but the following points should be checked:

1. That the different signals are at full field strength (i.e. not temporary transmitters, or on low power).
2. That the signal is not attenuated so much that noisy reception results.

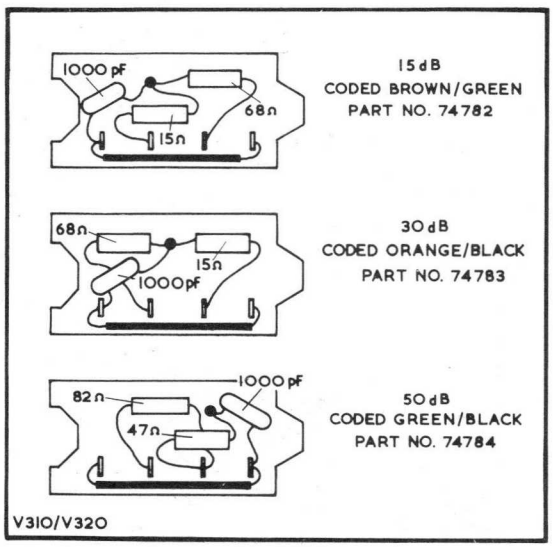


Fig. 13.

PARTS LIST (Electrical Components)

The d.c. resistance quoted for each coil and transformer winding is an average figure and should be used as a general guide only; it is omitted where the value is less than one ohm. In the part numbers for the ae. coils and r.f.t./osc. coils, the last two figures refer to the channel numbers. The following abbreviations are used in the table below:

cer.	—	ceramic	V d.c.	—	d.c. voltage rating
p.s.m.	—	protected silvered mica	V a.c.	—	a.c. voltage rating
tub.	—	paper tubular	-ve	—	negative temperature coefficient
i.s. tub.	—	insulated sealed paper tubular (metal cased)	W	—	wattage rating
			w.w.	—	wire wound
m. tub.	—	metallized paper tubular	lin.	—	linear law
elec.	—	electrolytic	rev. log.	—	reverse log. law

PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS	PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS
60824	C1	470pF	20%, cer., 1,300V a.c., isolator	66706	C5	2.2pF	±0.25pF, cer., 750V d.c.
60824	C2	470pF	20%, cer., 1,300V a.c., isolator	63294	C6	1,000pF	+80% -20%, cer., 500V d.c., lead through
66697	C3	1pF	±0.25pF, cer., 750V d.c.	54083	C7	470pF	20%, cer., 500V d.c.
63321	C4	0.5-5pF	Trimmer, ae.	63294	C8	1,000pF	+80% -20%, cer., 500V d.c., lead through

PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS
68463	C9	1,000pF	+50% -25%, cer., 500V d.c.
63320	C10	2.75-15pF	Trimmer, i.f. rejector
66201	C11	250pF	+80% -20%, cer., 500V d.c.
66201	C12	250pF	+80% -20%, cer., 500V d.c.
63294	C13	1,000pF	+80% -20%, cer., 500V d.c., lead through
70017	C14	47pF	10%, cer., -ve., 500V d.c., stand off
63321	C16	0.5-5pF	Trimmer, r.f.t. pri.
63320	C17	2.75-15pF	Trimmer, r.f.t. sec.
47071	C18	4.7pF	±0.25pF, cer., 500V d.c.
67329	C19	10pF	±0.5pF, cer., -ve., 750V d.c.
67144	C21	10pF	±0.5pF, cer., 750V d.c.
63294	C22	1,000pF	+80% -20%, cer., 500V d.c., lead through
68463	C23	1,000pF	+50% -25%, cer., 500V d.c.
68463	C24	1,000pF	+50% -25%, cer., 500V d.c.
63294	C26	1,000pF	+80% -20%, cer., 500V d.c., lead through
63294	C27	1,000pF	+80% -20%, cer., 500V d.c., lead through
41404	C31	0.1μF	20%, tub., 350V d.c.
41404	C32	0.1μF	20%, tub., 350V d.c.
68463	C36	1,000pF	+50% -25%, cer., 500V d.c.
68463	C37	1,000pF	+50% -25%, cer., 500V d.c.
68463	C38	1,000pF	+50% -25%, cer., 500V d.c.
68463	C39	1,000pF	+50% -25%, cer., 500V d.c.
28357	C41	56pF	5%, p.s.m., 350V d.c.
68463	C42	1,000pF	+50% -25%, cer., 500V d.c.
68463	C43	1,000pF	+50% -25%, cer., 500V d.c.
68463	C44	1,000pF	+50% -25%, cer., 500V d.c.
66670	C45	1.4pF	±0.1pF, cer., 750V d.c.
28357	C46	56pF	5%, p.s.m., 350V d.c.
68463	C47	1,000pF	+50% -25%, cer., 500V d.c.
66710	C48	3.3pF	±0.25pF, cer., 750V d.c.
66710	C49	3.3pF	±0.25pF, cer., 750V d.c.
28358	C50	68pF	5%, p.s.m., 350V d.c.
67505	C51	100pF	10%, cer., -ve., 750V d.c.
56159	C52	16μF	+50% -20%, elec., 275V d.c., with C84
28291	C53	1,800pF	2%, p.s.m., 350V d.c.
49452	C54	0.002μF	10%, m.tub., 350V d.c.
68463	C56	1,000pF	+50% -25%, cer., 500V d.c.
41404	C57	0.1μF	20%, tub., 350V d.c.
41404	C58	0.1μF	20%, tub., 350V d.c.
51557	C59	0.1μF	20%, tub., 350V d.c.
41404	C61	0.1μF	20%, tub., 350V d.c.
67510	C63	270pF	10%, cer., -ve., 750V d.c.
49456	C64	0.005μF	25%, m.tub., 150V d.c.
54090	C66	1,800pF	20%, cer., 500V d.c.
66670	C71	1.4pF	±0.1pF, cer., 750V d.c.
28357	C72	56pF	5%, p.s.m., 350V d.c.
68463	C73	1,000pF	+50% -25%, cer., 500V d.c.
68463	C74	1,000pF	+50% -25%, cer., 500V d.c.
49454	C75	0.04μF	25%, m.tub., 150V d.c.
68463	C76	1,000pF	+50% -25%, cer., 500V d.c.
68463	C77	1,000pF	+50% -25%, cer., 500V d.c.
67501	C78	47pF	10%, cer., -ve., 750V d.c.
49453	C79	0.01μF	25%, m.tub., 350V d.c.
68463	C80	1,000pF	+50% -25%, cer., 500V d.c.
68463	C81	1,000pF	+50% -25%, cer., 500V d.c.
66186	C82	560pF	10%, cer., 500V d.c.
49441	C83	0.1μF	25%, m.tub., 150V d.c.
56159	C84	16μF	+50% -20%, elec., 275V d.c., with C52
49447	C85	0.01μF	25%, m.tub., 150V d.c.
51557	C86	0.1μF	20%, tub., 350V d.c.
51763	C91	0.01μF	10%, i.s.tub., 350V d.c.
67513	C92	470pF	10%, cer., 750V d.c.
51557	C93	0.1μF	20%, tub., 350V d.c.
56190	C94	250μF	+100% -20%, elec., 50V d.c.
51563	C97	0.05μF	10%, tub., 350V d.c.
51563	C98	0.05μF	10%, tub., 350V d.c.
49452	C99	0.002μF	10%, m.tub., 350V d.c.
67502	C105	56pF	10%, cer., -ve., 750V d.c.
28179	C106	82pF	5%, p.s.m., 350V d.c.
28162	C107	47pF	5%, p.s.m., 350V d.c.
41410	C108	0.01μF	25%, tub., 500V d.c.
41414	C109	0.25μF	20%, tub., 500V d.c.
51566	C111	0.5μF	20%, tub., 500V d.c.
51547	C116	0.1μF	20%, tub., 200V d.c.
41424	C117	0.05μF	20%, tub., 750V d.c.
74918	C118	200μF	+50% -20%, elec., 350V d.c.
	C119	100μF	
27277	R1	100KΩ	20%, 0.75W
27469	R2	1MΩ	20%, 0.75W
25381	R3	15KΩ	10%, 0.6W
24421	R4	47Ω	10%, 0.6W
25477	R5	27KΩ	10%, 0.6W, Ch.1, 2 and 3 only
27118	R6	15KΩ	20%, 0.5W
26821	R8	470Ω	20%, 0.6W
27077	R9	10KΩ	20%, 0.6W
25197	R11	4.7KΩ	10%, 0.75W
27077	R12	10KΩ	20%, 0.6W
27269	R13	100KΩ	20%, 0.6W
25669	R14	82KΩ	10%, 0.6W
26981	R16	3.3KΩ	20%, 0.6W
26885	R17	1KΩ	20%, 0.6W
25317	R18	10KΩ	10%, 0.6W
25311	R19	8.2KΩ	10%, 1.5W
26885	R21	1KΩ	20%, 0.6W
25165	R22	3.9KΩ	10%, 0.75W
27231	R23	47KΩ	20%, 1.5W
57966	R26	100KΩ	Band I Sensitivity control, lin.
57966	R27	100KΩ	Band III Sensitivity control, lin.
68554	R28	100KΩ	Contrast control, lin.
25093	R29	2.7KΩ	10%, 0.6W
25765	R30	150KΩ	10%, 0.6W
26885	R36	1KΩ	20%, 0.6W
26885	R37	1KΩ	20%, 0.6W
25253	R38	6.8KΩ	10%, 0.6W
24389	R39	39Ω	10%, 0.6W
24549	R41	100Ω	10%, 0.6W
25317	R42	10KΩ	10%, 0.6W
26885	R43	1KΩ	20%, 0.6W
26885	R44	1KΩ	20%, 0.6W
25509	R46	33KΩ	10%, 0.6W
24613	R47	150Ω	10%, 0.6W
25189	R51	4.7KΩ	10%, 0.6W

PART NO.	CIRCUIT NO.	VALUE	TOLERANCE AND REMARKS
26885	R52	1KΩ	20%, 0.6W
25311	R53	8.2KΩ	10%, 1.5W
25325	R54	10KΩ	10%, 0.75W
24741	R56	330Ω	10%, 0.6W
25677	R57	82KΩ	10%, 0.75W
27077	R58	10KΩ	20%, 0.6W
25317	R61	10KΩ	10%, 0.6W
57964	R62	150KΩ	Vision Int. Limiter, lin.
25413	R63	18KΩ	10%, 0.6W
52843	R64	100KΩ	Brightness control, lin.
27461	R68	1MΩ	20%, 0.6W
25669	R71	82KΩ	10%, 0.6W
26821	R72	470Ω	20%, 0.6W
26117	R73	1.2MΩ	10%, 0.6W
25637	R74	68KΩ	10%, 0.6W
25413	R76	18KΩ	10%, 0.6W
25445	R77	22KΩ	10%, 0.6W
25317	R78	10KΩ	10%, 0.6W
25701	R79	100KΩ	10%, 0.6W
27461	R82	1MΩ	20%, 0.6W
26821	R86	470KΩ	20%, 0.6W
24613	R87	150Ω	10%, 0.6W
26885	R88	1KΩ	20%, 0.6W
26885	R89	1KΩ	20%, 0.6W
27013	R90	4.7KΩ	20%, 0.6W
25637	R91	68KΩ	10%, 0.6W
26437	R92	8.2MΩ	10%, 0.6W
26213	R93	2.2MΩ	10%, 0.6W
68553	R96	250KΩ	Volume control, rev. log., V310, V310C
68561	R96	250KΩ	Volume control, log., with S2, V310D
27269	R97	100KΩ	20%, 0.6W
25285	R98	8.2KΩ	10%, 0.6W
25701	R99	100KΩ	10%, 0.6W
24773	R101	390Ω	10%, 0.6W
27333	R102	220KΩ	20%, 0.6W
27013	R103	4.7KΩ	20%, 0.6W
24645	R104	180Ω	10%, 0.6W
27309	R106	150KΩ	20%, 0.75W
25573	R112	47KΩ	10%, 0.6W
26885	R113	1KΩ	20%, 0.6W
26085	R114	1MΩ	10%, 0.6W
26117	R116	1.2MΩ	10%, 0.6W
57967	R117	25KΩ	Frame Hold control, lin.
26181	R119	1.8MΩ	10%, 0.6W
57969	R121	1.5MΩ	Frame Amp. control, lin.
25765	R122	150KΩ	10%, 0.6W
27077	R123	10KΩ	20%, 0.6W
24773	R124	390Ω	10%, 0.6W
24773	R127	390Ω	10%, 0.6W
63721	R128	1KΩ	Frame linearity control, lin., w.w.
25669	R129	82KΩ	10%, 0.6W
27333	R131	220KΩ	20%, 0.6W
26341	R134	4.7MΩ	10%, 0.6W
25509	R135	33KΩ	10%, 0.6W
25381	R137	15KΩ	10%, 0.6W
27205	R138	47KΩ	20%, 0.6W
27405	R139	470KΩ	20%, 0.75W
27405	R140	470KΩ	20%, 0.75W
24927	R141	820Ω	10%, 1.5W
63721	R142	1KΩ	Line Hold control, lin.
27039	R144	4.7KΩ	20%, 1.5W
27109	R145	15KΩ	20%, 0.6W
27039	R146	4.7KΩ	20%, 1.5W
25101	R147	2.7KΩ	10%, 0.75W
25101	R148	2.7KΩ	10%, 0.75W
26085	R149	1MΩ	10%, 0.6W
26053	R151	820KΩ	10%, 0.6W
25829	R153	220KΩ	10%, 0.6W
68782	R156	147Ω	5%, w.w.
	R157	33Ω	
	R158	33Ω	
	R159	33Ω	
	R160	33Ω	
	R161	33Ω	
68774	R163	26Ω	5%, w.w.
	R164	25Ω	
	R165	19Ω	
-	R251	500KΩ	+∞ -0, 0.75W, with L20
-	R252	12KΩ	10%, 0.6W, with L21
-	R253	100Ω	20%, 0.75W, with L29
-	R254	12KΩ	10%, 0.6W, with L19
-	R256	5.4Ω	w.w., with T3

PART NO.	CIRCUIT NO.	RESISTANCE (D.C.)	REMARKS
73401 to 73413	L1	-	Pri. ae. coils, Ch. 1.
	L2	-	Sec. to Ch. 13.
73275	L3	-	Cascode choke
72901 to 72913	L4	-	Coupling r.f.t. & osc.
	L5	-	Grid coils, Ch. 1
	L6	-	Anode to Ch. 13
72882	L7	-	V2 screen choke
72883	L8	-	Pri. 1st i.f.t.
	L9	-	Sec.
74385	L10	-	1st own sound i.f. rej.
72941	L11	-	Pri. 2nd i.f.t.
	L12	-	Sec.
72884	L13	-	2nd own sound i.f. rej.
73379	L14	-	3rd own sound i.f. rej.
	L15	-	Adj. sound i.f. rej.
72886	L16	-	Pri. final vision
	L17	-	Sec. i.f.t.
72889	L18	-	I.f. stopping choke
72916	L19	13Ω	Compensating choke, with R254
72895	L20	-	Cathode rejector, 3.5 Mc/s, with R251
72890	L21	10Ω	Compensating choke, with R252
72887	L23	-	Sound take-off coil
72888	L24	-	Pri. sound i.f.t.
	L25	-	Sec.
64391	L26	-	Heater choke
74130	L27	12Ω	Frame scan coils, with L38/L39
	L28	12Ω	
74136	L29	-	Choke, anti-parasite, with R253
72893	L31	-	Line Amp. control
	L32	3.5Ω	
	L33	3.5Ω	
74170	L35	40	Line Lin. control (coil & bracket)
	L36	4Ω	
74130	L38	28Ω	Line scan coils, with L27/L28
	L39	28Ω	
72578	L41	1.6-37Ω	H.t. smoothing choke
74699	T1	600Ω	Pri. Sound o.t.
		-	Sec.
72891	T2	710Ω total	Pri. Frame o.t.
		210Ω total	Sec.
72892	T3	186Ω total	Pri.
		-	Htr. wndg. Line o.t.
		-	L31. wndg.
		11Ω	V13 screen wndg.

PARTS LIST (Mechanical Components)

This list contains only those parts which are not included in the Electrical Parts List; items such as self-tapping screws, bolts and nuts, etc., may be obtained from Murphy Radio Ltd, Service Department. When more than one item is used per receiver, the quantity is given in brackets after the description.

PART NO.	TITLE	DESCRIPTION AND REMARKS
74782	Attenuator, 15 dB	coded BROWN/GREEN
74783	Attenuator, 30 dB	coded ORANGE/BLACK
74784	Attenuator, 50 dB	coded GREEN/BLACK
75211	Back, lower	for cabinet, V310D
75364	Back, upper	cover for rear of cabinet, V310D
73395	Bracket, support	for MR1
68333	Bung	for Earth socket on cabinet back
75217	Button, release	for control cover, on top of cabinet, V310, V310C
73523	Cabinet	V310 (please specify light or dark)
74110	Cabinet	V310C
75195	Cabinet	V310D
65962	Can (2)	for V1 and V2
73389	Cap, polythene	for V15 anode clip
74109	Castor, (4)	for cabinet, V310C V310D
75806	Channel extrusion	for tambour, top r.h. or bottom l.h., V310D
75807	Channel extrusion	for tambour, top l.h. or bottom r.h., V310D
68279	Circlip	for voltage selector
73391	Clamp	for T3
75125	Clamp for chassis (2)	for retaining chassis in cabinet, V310D
73856	Clip, "anode", anti-corona (3)	for V13, V14 and V15
73514	Cleat, plastic (6)	for loudspeaker leads in cabinet, V310, V310C
1871/2	Compound	for coil cores
74389	Connecting block, l/h	loudspeaker contact in cabinet, V310, V310C
74390	Connecting block, r/h	loudspeaker contact in cabinet, V310, V310C
76144	Connecting block, l/h	for loudspeaker in cabinet, V310D
76145	Connecting block, r/h	for loudspeaker in cabinet, V310D
73923	Contact, pressure	for Voltage Selector
72858	Core, brass	for Band I osc. coil only
72859	Core, brass	for Band III osc. coil only
74662	Core, iron dust (10)	for L8/L9, L11/L12, L16/L17, L14/L15, L24/L25
74664	Core, iron dust (2)	for L13, L23
74178	Core, assembly	for Line Amplitude control
65901	Cover	on tuner unit, with hole for screw
68820	Cover	with handle and captive screw on tuner unit
74155	Cover, Neoprene	for On/Off switch
74054	Cover, plastic	for V15 holder
75143	Cradle assembly	for cabinet, V310C
73584	Cushion (2)	rubber, around c.r.t. clamp
69919	Damping unit "B"	for r.f. alignment
74836	Driver for core	spring loaded for adjusting osc. coil core in early sets
77219	Driver	long plastic trimming tool for osc. coil core in later sets
73878	Escutcheon	for controls and loudspeaker, V310, V310C
74165	Escutcheon, aerial	complete with capacitors and resistors
15633	Eyelet (2)	inside grommet (42844)
4774	Eyelet, split	at lower end of osc. driver (early sets)
1827/14	Fabric	for loudspeaker baffle, V310D
68211	Felt, pad (4)	feet for cabinet, V310
73316	Filter, aerial	for i.f. interference complete
72897	Focus unit	
72860	Frame, 17 in.	escutcheon around front of c.r.t., V310, V310C
75197	Frame, wooden	escutcheon around front of c.r.t., V310D
33205	Fuse, F1	2A. plain cartridge
52123	Fuse, F2	500mA. Mag-Nickel cartridge
76135	Gear, driven (2)	on top control spindles
75118	Glass, safety	for front of c.r.t., V310D
72881	Glass, safety	for front of c.r.t., V310, V310C
42844	Grommet (2)	for mounting V12
73279	Guide for driver	funnel shaped, on top control panel
73284	Guide, for driver	for spring loaded osc. core driver, on tuner unit (early sets)
77131	Guide, for driver	for separate osc. core driver on tuner unit (later sets)

PART NO.	TITLE	DESCRIPTION AND REMARKS
75646	Handle (2)	for tambour (door), V310D
73325	Hinge, l.h.	for lid covering top controls, V310, V310C
73326	Hinge, r.h.	for lid covering top controls, V310, V310C
57009	Insulator for can (3)	inside the cans of L8/L9, L14/L15, L24/L25
65059	Insulator, feed through (4)	with **nail** (73707)
73655	Knob, dome	for Focus control
72736	Knob, keyed	for Line Amplitude control
75602	Knob, lever	for On/Off Volume control, V310D
74095	Knob, lever	for Station Selector
74217	Knob, lever	for Contrast control, V310, V310C
75413	Knob, locking	with insert, for voltage selector
72849	Knob, skirt (2)	for top controls, with moulded gear
75641	Knob, printed	for voltage selector, with contacts
72920	Label	for cabinet back
73354	Lead, e.h.t.	complete with fittings
73937	Lid and cover	on cabinet top, over main controls, V310, V310C
73555	Link for turret	on Station Selector spindle
74391	Link assembly	on r.h. hinge of lid, V310, V310C
64379	Loudspeaker	8 in. diameter, V310D
68153	Loudspeaker	6 in. by 4 in. elliptical, V310, V310C
74169	Magnet	with moulded cleat, for Line Linearity control
75106	Magnet, ion trap	coded red spot
72917	Mains lead	with plastic window and socket
72862	Mask, 17 in.	for c.r.t.,V310, V310C
73707	Nail, furnishing (4)	with **insulator** (65059)
76683	Nut for control	for fixing Contrast control, V310, V310C, or On/Off Volume control, V310D
63078	Nut (4)	for securing C4, C10, C16, C17
62416	Nut, "U" type (2)	for fixing **back** (75364), V310D
73358	Panel	for cabinet back, V310
73362	Panel	for cabinet back, V310C
73364	Panel	for cabinet back, V310D
74175	Panel, fuse	with fuseholders and bracket
74174	Panel, voltage selector	with supports and contacts
75208	Panel, wooden	escutcheon around controls, V310D
49368	Plug, co-axial	for aerial feeder connection to receiver
74176	Plug, mains	with panel, for mains connection on chassis
15264	Push-on-fix	for retaining **guide** (73279)
55230	Rectifier MR1	S.T. & C., type LW7
58531	Rectifier MR2	Westinghouse, type W4
65868	Roller, locating	at centre of tuner unit
63079	Screw (4)	for adjusting C4, C10, C16, C17
10412	Screw, grub, 2BA, 3/8 in.	for Contrast control knob, V310, V310C or On/Off Volume control knob, V310D
74423	Screw, grub, 2BA, 3/8 in. (pointed)	for Station Selector knob
64993	Screw, 1/4 in. Whit. (2)	for chassis fixing in cabinet, V310, V310C
60689	Screw, locking	at top of scan coils
395557	Screw, OBA, 3/4 in. (2)	for chassis fixing in cabinet, V310D
102401	Screw, wood, No.6 1/2 in. (4)	for fixing **back** (75211), V310D
454761	Screw, wood, No.8, 1 1/4 in. (2)	for fixing **back** (75364), V310D
76102	Seal, dust	around c.r.t. behind frame, V310D
73557	Shaft for turret control	extension spindle for Station Selector
74239	Shaft and plates assembly	rotor for tuner unit
74094	Shield	Tygan, for loudspeaker, V310, V310C
65911	Sleeve, knurled	for Picture Centring lever
68014	Sleeve, 2 3/4 in.	for Picture Centring lever
49367	Socket, aerial	for aerial feeder connection on receiver
14778	Spacer (2)	between tuner unit and **switch** (72376)
14687	Spacer (2)	between fuse panel and mains plug
72844	Spring	for button release, V310, V310C
73396	Spring, earthing	for top of c.r.t.
72852	Spring for lever l.h.	on lid hinge near Contrast and Brightness controls, V310, V310C
73735	Spring for switch	for On/Off switch, V310, V310C
65867	Spring, indexing	with **roller** (65868) at centre of tuner unit
65896	Spring, retaining (2)	at either end of tuner unit
63476	Spring, retaining (2)	for **gear** (76135)
74786	Stop for driver	at top of osc. coil core driver
72856	Surround for knob	around Contrast and Brightness knobs, V310, V310C
72857	Surround for knob	around Volume and Station Selector knobs, V310, V310C
74172	Switch, On-Off	with bracket and slider, V310, V310C
72376	Switch, wafer	on rear of tuner unit, for switching Sensitivity controls
-	Tambour (2)	door, complete with handle, V310D

PART NO.	TITLE	DESCRIPTION AND REMARKS
74030	Trim, plastic	at top of cabinet, V310, V310C
75191	Trimming tool	hexagonal headed for coil cores
77132	Tube, polythene, 6m.m. int. dia., 5 7/8 in. long	for guiding osc. core driver in later sets
74788	Tuner unit	less valves
73705	Valveholder, B9A (2)	Ceramic for V3 and V8
59142	Valveholder, B9A (6)	for V4, V6, V7, V10, V11 and V12
62529	Valveholder, B7G (2)	for V5, V9
58107	Valveholder, I.O.	for V14
5687	Valveholder, I.O.	for V13
74158	Valveholder, special	for V15, with panel
60807	Valveholder, c.r.t.	for V16
68958	Valveholder, B9A	for V2
65961	Valveholder, B9A	for V1
58636	Washer, bakelite (2)	between knob lever and knob skirt, for main controls
34606	Washer, insulating (2)	for fixing V12 holder
58570	Washer, insulating, 3/8 in. dia., (4)	for T2 mounting
34603	Washer, insulating, 1/2 in. dia., (8)	for T2 mounting
74988	Washer, black (2)	for screw (64993), V310, V310C
14943	Washer (2)	for screw (454761), V310D
491703	Washer, 4BA, Large (4)	for screw (102401), V310D

CONTENTS

DIAGRAMS

V310, V310C
& V310D