
TELEVISION SERVICE SHEET.

Before connecting the television receiver to the mains the back should be removed and the valve packing and transit screws taken out. Do not fail to remove the packing from inside the tall cans of the T.R.F. unit, and be sure that the valves and cans are properly seated and the clamping bar securely replaced.

Transit screws are provided on the sound all-wave radio unit, and these must be removed together with the wooden blocks so released.

Fit heat coil and fuse (and tubular motor board lamp on autogram), which will be found packed separately. Set the voltage adjustment screw to the correct range and finally check that all valves are firmly seated and that the top connexions are properly made. Replace the back, connect aerial, earth and mains, and switch on (with Brightness control fully anti-clockwise).

Pre-set adjustments.

The pre-set adjustments (form, focus, height and width) should now be checked. Start with the focus adjustment as follows:—

- (1) Disconnect aerial and turn Sensitivity to minimum. Line hold fully anti-clockwise and height adjustment fully clockwise.
- (2) Adjust the Frame hold to steady the lines, which should now be well spaced.
- (3) Keeping the brightness low, adjust the focus screw carefully so that the lines are bright and crisp.

Now re-connect the aerial and adjust height so that a picture can be tuned in. The width and height should be set so that only a very small amount of the picture is cut, and so that the correct picture proportion (5 wide to 4 high) is preserved. If the picture tilts (i.e., is not square with the mask) the scanning coils round the neck of the tube should be adjusted. To do this it is necessary to remove the back to gain access to the cathode ray tube.

WARNING.—To avoid the risk of shock whilst making internal adjustments to the receiver with mains on, we advise the use of rubber gloves. When the back is removed a spring loaded shorting bar which projects from the power pack automatically earths the high voltage supply line. It is therefore essential that if the instrument is operated with the back removed this shorting bar must first be depressed and wedged into the position it would assume if the back were on; otherwise the high voltage rectifier may be damaged or the heat coil will blow.

To straighten the picture carefully turn the scanning coils and yoke assembly round the neck of the tube. Avoid touching the high voltage connexion on the side of the tube.

Finally adjust the "form" screw. This adjustment should be adjusted so that detail at the left-hand side of the picture has the correct proportions, and so that a bright white line down the edge is avoided.

AERIAL.

Any of the Television aerials supplied by E.M.I. Service, Ltd., are suitable for these receivers, and if erected in accordance with the directions supplied with the aerial, should provide a good picture. The only point which may need attention is ensuring that the correct amount of signal is supplied to the receiver.

The setting of the sensitivity control can be taken as a good indicator on this point. The correct working position (i.e., slightly more advanced than the point where interlacing takes place, which is indicated by a slight upward movement of the entire picture) should be about half-way between minimum and maximum.

If the correct working point is nearer to maximum hardly enough signal is being received. This necessitates putting the aerial higher, using a better lead-in cable, or in premises remote from roads used by much traffic, and where there is little likelihood of bad interference, conditions may be improved by increasing the "Hold strength." To do this switch off the receiver, remove the back and turn the short spindle projecting from the synchronising unit in a clockwise direction to its maximum. Replace the back and the picture should now hold at about half way on the sensitivity control.

If too much signal is being received (normal position of sensitivity control nearer to minimum) attenuation must be employed, or possibly a different lead-in cable introducing slightly more loss might be employed.

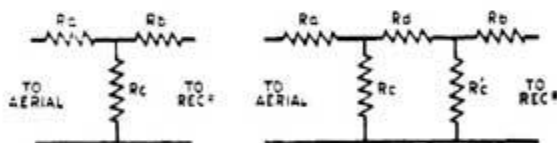
Note.—Only a cable of the correct impedance, however, must be used. The concentric lead-covered cable supplied by E.M.I. Service, for instance, can be used, but do not attempt to use twisted flex or any wire the impedance of which is unknown.

Attenuation is done by inserting a network of resistances, designed so that the impedance and frequency characteristic of the feeder are unaffected; they are most conveniently fitted inside the metal junction box. The table below and the diagram give values and circuit for various degrees of attenuation. The amount of attenuation required must be determined experimentally, some idea of how much should be gained from the position of the sensitivity control and the proximity of the transmitter.

TABLE OF RESISTANCE VALUES FOR ATTENUATOR PADS.

Increasing amount of attenuation	R _a ohms	R _b ohms	R _c ohms	R _c ¹ ohms	R _d ohms
1	27	27	104	—	—
2	42	42	55	—	—
3	48	48	42	—	—
4	38	38	42	42	76
5	42	42	55	55	84

The resistance used must be non-inductive, and can be of the $\frac{1}{4}$ or $\frac{1}{2}$ watt rating. As the values quoted above are not standard the resistance must be selected from standard values by measuring with a reliable ohmmeter. A tolerance of plus or minus 10 per cent. can be allowed on the above, e.g. 27 ohms nominal may be anything between 24.3 and 29.7 ohms.



Address all enquiries and orders for spare parts to:—

E · M · I SERVICE LIMITED,

Sheraton Works,

Hayes, Middlesex.

Telephone:
Southall 2468

Telegraphic Address:
Service Hayes, Middlesex

The Company reserves the right to make any modifications without notice

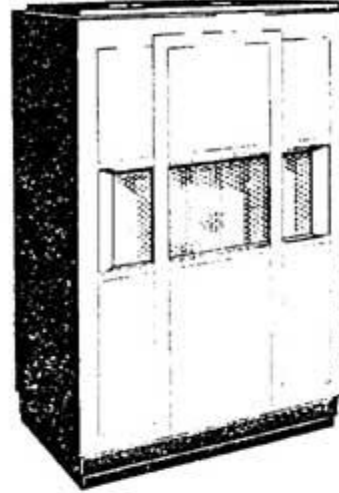
MARCONIPHONE

MODEL 701



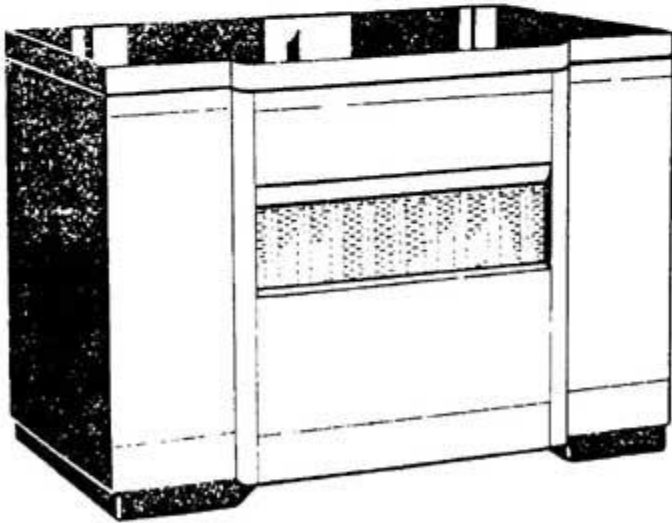
CONSOLE RADIO TELEVISION

MODEL 702



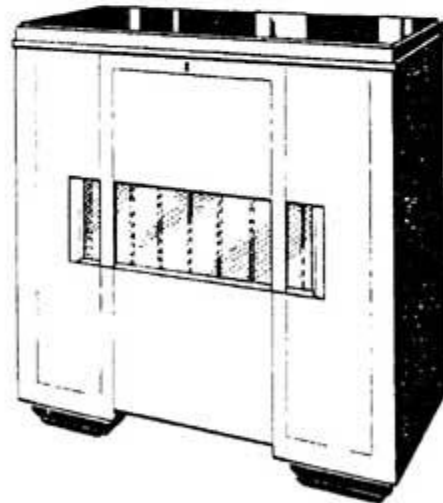
CONSOLE TELEVISION

MODEL 703

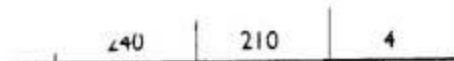


CONSOLE TELEVISION AUTO-RADIOGRAM

MODEL 705



CONSOLE RADIO TELEVISION



AERIAL AND CABLE

Any of the Extension Aerials supplied by the I.M.A. Sales & Service Limited are suitable for use with these receivers, and if erected in accordance with the directions supplied with the aerial, should provide a good picture. The only point which may need attention is that the correct amount of signal is supplied to the receiver. The setting of the Sensitivity Control can be taken as a good indication on this point. The correct working condition (i.e., slightly more advanced than the point where interfering takes place, which is indicated by a slight upward movement of the entire picture), should be about half-way between minimum and maximum. If the correct working point is nearer to maximum hardly enough signal is being received. This necessitates putting the aerial higher, using a better lead-in cable or in premises remote from roads used by much traffic, and where there is little likelihood of R.F. interference, conditions may be improved by increasing the sync. by means of Sync. Control. To do this, switch off the receiver, remove the back panel, and the short spindle projecting from

the Sync. Unit in a clockwise direction to its maximum. Replace the back and picture should now hold at about half-way of the Sensitivity Control.

If too much signal is being received (normal position of the Sensitivity Control nearer to minimum), an attenuator should be employed.

NOTE.—Only a cable of correct impedance must be used, attempt should not be made to use any cable the impedance of which is unknown.

Attenuation is effected by inserting a network of resistors, designed so that the impedance and frequency characteristics of the feeder cables are unaffected; they are more conveniently fixed inside a metal junction box. The table below and the diagrams give values and circuits for various degrees of attenuation. The amount of attenuation required must be determined experimentally. Some idea may, however, be gained from the position of the Sensitivity Control and the proximity of the transmitter.

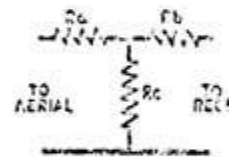
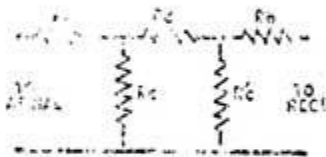


TABLE OF RESISTANCE VALUES FOR ATTENUATOR PADS.

Increasing amount of attenuation	Ra ohms	Rb ohms	Rc ohms	Rc' ohms	Rd ohms
1	27	27	104	—	—
2	42	42	55	—	—
3	42	42	42	—	—
4	38	38	42	42	76
5	42	42	55	55	84

INITIAL ADJUSTMENTS

Adjustment of Pre-set Controls

To re-set the pre-set controls, switch on with the Brightness Control fully anti-clockwise and proceed as follows:—

1. Disconnect aerial and turn Sensitivity to minimum, Line Hold fully anti-clockwise and Height Control fully clockwise.

2. Adjust the Frame Hold to steady the lines, which should now be well spaced.

3. Keeping the Brightness low, adjust the Focus Control carefully so that the lines are bright and crisp.

Now re-connect the aerial and adjust the height so that a picture can be obtained. The width and height should be set so that only a very small amount of the picture is cut, and so that the correct picture proportion is preserved. (This can successfully be carried out on B.B.C. television tuning signal.) If the picture tilts (i.e., not square within the mask) the scanning coils should be adjusted.

WARNING.—To avoid the risk of shock whilst making internal adjustments to the receiver with the mains on, we advise the use of rubber gloves. When the back is removed a spring-loaded shorting bar which projects from the power pack automatically shorts the high voltage supply line to chassis. It is therefore essential that if the instrument is operated with the back removed this shorting bar must first be depressed, and wedged into the position it would assume if the back was in position, otherwise the high voltage rectifier may be damaged or the heat coil will blow.

To straighten the picture, carefully turn the scanning coil and yoke assembly round the neck of the tube. Avoid touching the high voltage connection on the side of the tube.

Finally, adjust the Form Control. This should be adjusted so that detail at the left-hand side of the picture has the correct proportions, and so that a bright white line down the edge is avoided.

VALVE VOLTAGES

The following table indicates the approximate voltage readings obtained on each valve. It should be noted that the voltages depend on the setting of the various controls, a reading outside the range does not necessarily indicate a fault within the circuit. Variation of $\pm 25\%$ may be anticipated between models.

Valves	Anode Volts	Screen Volts	Cathode Volts
T.R.F. Unit			
V1 (MSP4)	230	68	0.75
V2 (MSP4)	230	75	0.8
V3 (MSP4)	230	100	1.6
V4 (MSP4)	215	130	1.8
V5 (MSP4)	200	160	2.7
V6 (MSP41)	210	220	4.6
Sync. Unit			
V1 (MSP4)	60	65	8.1
V2 (D42)	60	—	62
V3 (MS4B)	—	140	—
V4 (N41)	122	165	3.9
V5 (MSP4)	130	65	8.1
V6 (MS4B)	10	140	—
V7 (N41)	260	210	4.7
Power Unit			
V1 (U12)	340 A.C.	—	320
* V2 (U12)	340 A.C.	—	320

* One U14 on some models

The voltages were measured with a meter having a resistance of 500 ohms-per-volt, with exception of E.H.T. voltages for which an electro-static voltmeter was employed. It must be anticipated that with a meter connected in certain circuits instability may occur.

C.R. Tube	A1 1150	A2 5000	Acc./A 210	Cathode 9-29
Valve	Anode Volts	Screen Volts	Cathode Volts	
Radio Unit				
V1 (VMP4G)	L & M 245 SI & S2 210 TV —	L & M 15 SI & S2 65 TV —	L & M 0.1 SI & S2 1 TV —	
	Mx. Osc.			
V2 (X41)	250 80	40	0.7	
V3 (VMP4G)	250	65	1.1	
V4 (MHD4)	90	—	1.5	
V5 (N41)	210	250	4.5	
V6 (U12)	350 A.C.	—	370	
Sound Unit	Mx. Osc.			
V1 (X41)	240 100	100	3	
V2 (VMP4G)	250	60	1.5	
V3 (MHD4)	125	—	1.5	
V4 (N41) or (KT41)	240	210	4	

Heat Coils

The original heat coils used on these models were Part No. 16705A (brown), .6 amp. This was found to be too high a rating to give protection. Replace these with Part No. 16705F or Part No. 11882N (blue), .35 amp.

H.T. Fuses—Models 901, 702, 902A

Correct H.T. fuse for use on these models is Part No. 19850A Yellow Spot, this has a rating of 500 mA and blows at 1,000 mA.

Models 703, 900, 902, 701, 705

The correct fuse is Part No. 19850B Brown Spot, and this has a rating of 250 mA and blows at 500 mA.

Average Current Consumption (Vision Unit)

Model 900			
Model 902	}	...	140 mA.
Model 701			
Model 705			
Model 703	150 mA.
Model 902A	190 mA.
Model 702	200 mA.

T.R.F. Unit Coaxial Input Lead

To renew T.R.F. Unit Coaxial Lead, proceed as follows:—

1. Remove the original lead and fit a coaxial socket Part No. 39807D by drilling two 8BA holes on the chassis to comply with socket extensions

and secure this by two bolts Part No. 200080H, two nuts Part No. 200408 and two S.P. Washers Part No. 201808.

2. Terminate the same length of coaxial cable Part No. T1050 as the original lead, with two plugs Part No. SS2976A.

3. Plug this into the new coaxial socket. Note: The aerial outlet socket should be modified to comply with the new coaxial plug.

All Wave Radio Unit Pointer Drive Cord

To renew Pointer Drive Cord proceed as follows:—

1. Leave the gang capacitor to maximum and the pointer to the right side of the scale.

2. Wax the cord and tie one end of this to the right eyelet of the pointer.

3. Carry the cord round the right-hand pulley and pass it over the front portion of the drive mechanism.

4. Make six turns anti-clockwise and pass the cord through the slot of the mechanism, continue in the same direction for one turn.

5. Pass the cord round the spring-loaded pulley and then through left-hand eyelet of the pointer.

6. Push the pulley towards the drive mechanism and pull the cord end and tie in a knot.

7. Seal both knots.

ALIGNMENT

Vision Unit

Set the Sensitivity and Contrast Control to maximum and Brightness Control to minimum and leave other controls at normal operating positions.

Allow both the Generator and Receiver to reach a settled temperature before commencing alignment. Use a Signal Generator of known accuracy.

Connect a D.C. 0-5 volt 20,000 ohms-per-volt meter between chassis and slider of VR9.

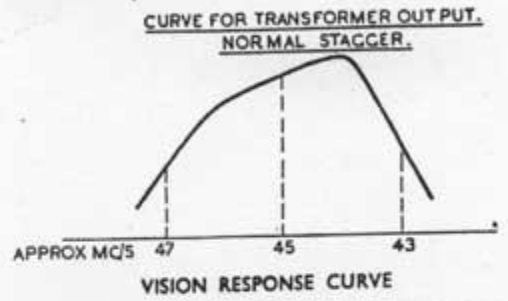
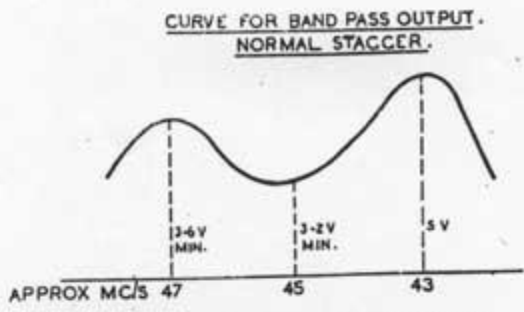
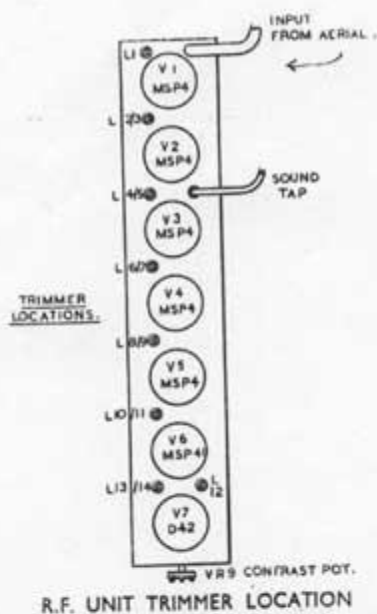
Inject an unmodulated signal via coaxial connector to the receiver, set Signal Generator to the required frequencies as indicated below and adjust the appropriate trimmers for maximum reading on the output meter.

NOTE.—All instruments should be aligned on frequencies given under NORMAL unless the engineer is otherwise instructed. The other stagers are for instruments in areas of very high, poor, and very poor, field strength.

Inductors	Wide	Normal	Narrow	Extra Narrow
	Mc/s	Mc/s	Mc/s	Mc/s
L1	45	45	43.75	43.75
L2/3	43.25	43.75	43.75	43.75
L4/5	43.25	43.75	43.75	43.75
L6/7	46.75	46.25	45.75	45.25
L8/9	46.75	46.25	45.75	45.25
L10/11	43.25	43.75	43.75	43.75
L12*	46.25	46.25	46.25	46.25
L13/14	43.25	43.25	43.25	43.25
Sensitivity	.2 mV	60 mV	25 mV	15 mV

*Fully unscrew L13/14 trimmer before trimming L12.

Repeat operation for trimmers L1 to L10/L11.



On a few models the band pass coils have been removed and a transformer fitted in place of them (see Extra Wide Band Stagger), in this case set the Generator to 45 Mc/s and adjust the inductor trimmers of the transformer for maximum reading on the output meter. The sensitivity of the receiver for normal tuning now is greater than with the band pass.

EXTRA WIDE BAND STAGGER

This Stagger is applied to models where band pass coils have been replaced by an R.F. Transformer to obtain a better definition. It is only fitted in special cases such as in areas of high field strength.

Fitting Instructions & Alignment

1. Remove L13/14 and L12 and also the screen between them. Remove C36.
2. Fit new transformer Part No. SPS3784 in place of L12 and connect the leads as shown in the diagram. Keep the leads as short as possible and solder the earth lead directly to the chassis lug which has the other earth leads soldered to it.
3. Remove R26 which is in the second stage can.
4. Fit 15,000 ohms 1/2-W resistor between grid of V6 and chassis (this resistor must be of the insulated type).
5. Realign as follows:—

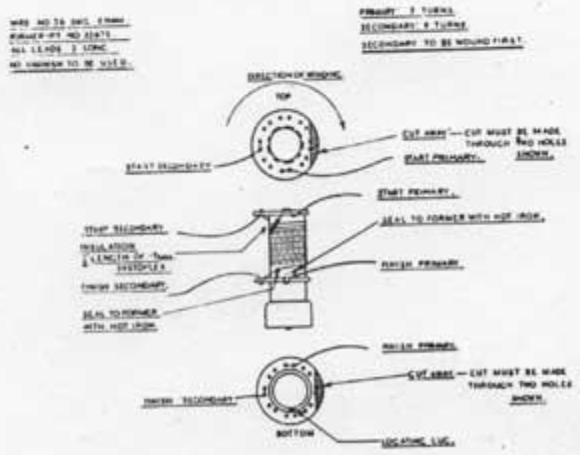
Inductors	Frequency Mc/s
L1	45
L2/3	43

L4/5	43
L6/7	47
L8/9	47
L10/11	43
Transformer	45

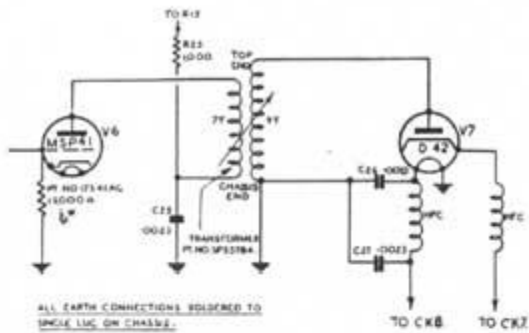
The appropriate sensitivity for this stagger is 250-500- μ V for 5V output at 45 Mc/s.

Material Required

Qty.	Description	Part No.
1	Transformer	SPS3784
1	Resistor 15,000 ohms 1/2-W	33363DV



R.F.T. DATA FOR EXTRA WIDE BAND STAGGER



R.F. TRANSFORMER CONNECTIONS

ALL WAVE RADIO UNIT

I.F. Alignment

Check that C104 has been replaced with a negative co-efficient capacitor $15 \mu\text{F } 10\%$ (Part No. 32229A) and that it is wired up exactly as shown in the trimmer location diagram, also ensure that TC38 and 37 is replaced by new type Part No. SPS5693.

Set bass and treble to minimum and maximum cut respectively, switch waveband to medium and volume control to maximum, set gang capacitors to half way.

Short out the fixed and moving vanes of VC3. See that screen is on V1 and 3.

Connect oscillator to top grid cap of V2 (X41) and chassis, leave grid lead connected. Connect output meter (high resistance voltmeter) across speech coil.

Allow both receiver and oscillator to reach a settled temperature. Set oscillator to 460 kc/s.

Use an insulated trimmer screwdriver.

Adjust trimmers TC32, TC33, TC35 and TC36, in that order for maximum output, and repeat the operations in the same order for optimum gain.

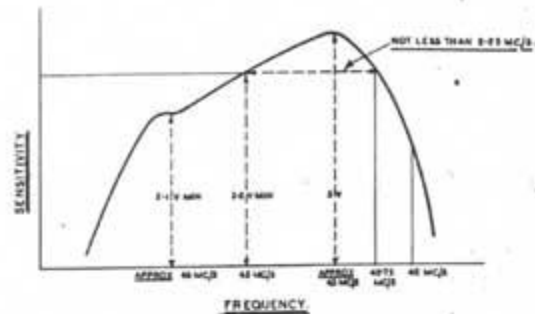
Set waveband switch to T leaving all other controls as described.

Set oscillator to 430 kc/s and adjust TC8 for maximum output.

H.F. Alignment

Remove shorting link from VC3, leave all controls as described, adjust wavelength pointer to over-run scale equally at both ends. Connect oscillator across aerial and earth terminal using a dummy aerial.

The calibration mark "17 metres" on S2 range is used as a ganging point. Where directed to set receiver to ganging point, see that the pointer



EXTRA WIDE BAND STAGGER
VISION RESPONSE CURVE

registers accurately on this calibration mark. The waveband switch must however, be set to the appropriate ranges (L, M, S1 or S2, etc.).

LONG WAVE "L"

Adjust receiver to ganging point and oscillator to 390 kc/s (770 metres) and adjust trimmer TC22 for maximum output.

Set oscillator to 380 kc/s (790 metres) and adjust TC9 and TC1 for maximum output, at the same time "rocking" the ganged capacitors.

Set oscillator to 176 kc/s (1700 metres), tune in signal on receiver and adjust trimmer TC21 for maximum irrespective of receiver calibration, at the same time rocking the ganged capacitors.

Repeat operations in the same order.

NOTE.—It may be necessary to decrease V2 gain by temporarily including an additional 2,000 ohm resistor in the cathode circuit in order to make the receiver stable whilst ganging.

MEDIUM WAVE "M"

Adjust receiver to ganging point and oscillator to 1560 kc/s (192 metres) and adjust TC23 carefully for maximum.

Set oscillator to 1460 kc/s (205 metres), tune in signal on receiver and adjust TC10, TC2 for maximum output.

Set oscillator to 600 kc/s (500 metres), tune in signal on receiver, adjust TC25 for maximum, irrespective of receiver calibration, at the same time "rocking" the ganged capacitors.

Repeat operations in the same order.

SHORT WAVE "S1"

Set the generator to 6.4 Mc/s (47 metres), receiver to ganging point, and adjust trimmer TC26 for maximum output.

Set oscillator to 6 Mc/s (50 metres), tune in signal and adjust TC11 and TC3 for maximum output, at the same time "rocking" the ganged capacitors.

Repeat operations in the same order.

SHORT WAVE "52"

Set oscillator to 17.6 Mc/s (17 metres), receiver to ganging point, and adjust TC28 for maximum output. There are two resonance points for TC28, and it is essential to select that which requires the less capacity.

Set oscillator to 16.85 Mc/s (17.8 metres), tune in signal and adjust TC12 and TC4 for maximum output, at the same time "rocking" the ganged capacitors. The adjustment of TC12 must be carried out very carefully, constantly re-adjusting the ganged capacitors in order to obtain an absolute maximum reading.

Repeat operations in the same order.

TELEVISION SOUND "T"

Disconnect oscillator and output meter, connect receiver to television aerial and adjust the controls* to receive a picture.

Adjust ganged capacitors so that wave-length pointer is in the middle of "television" calibration mark.

Adjust TC37 for maximum output. There are two resonance points for TC37 and it is essential to select

the one that does not interfere with the picture. This will be the one involving maximum capacity.

Adjust L31 for maximum output.

A fair amount of frequency drift is inevitable on this model but it should not drift off the Television Calibration mark. If the drift is excessive an extra negative co-efficient capacitor may be fitted in parallel with the existing one and TC37 readjusted.

SOUND UNIT 901, 702

Check that a 15 $\mu\mu\text{F}$ negative co-efficient capacitor (Part No. 32229A) has been inserted in the circuit exactly as shown in the trimmer location diagram.

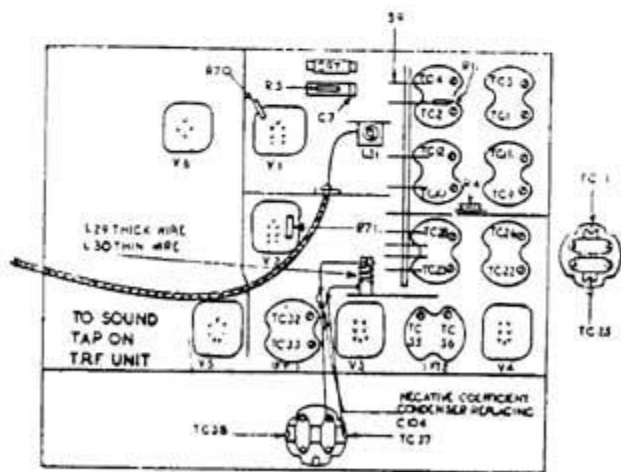
I.F. Alignment

Remove sound chassis from cabinet and connect leads to power unit and also connect any other power leads which have been disconnected so that the voltages remain normal. Connect loudspeaker with extension leads to output transformer.

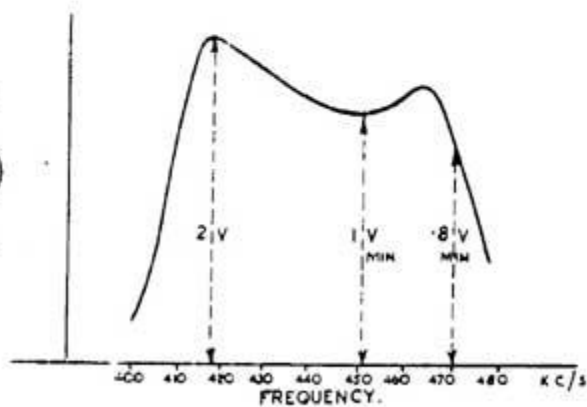
Short oscillator grid coil L1 (this is the thicker wire), remove grid clip of the mixer valve X41 and turn the Volume Control to maximum (clockwise).

Connect signal generator across grid cap of mixer valve and chassis, keep leads as short as possible, and allow both receiver and generator to reach a settled temperature.

If signal generator has a built-in series capacitor the mixer grid cap must be shorted to chassis by a .5 Megohm resistor.



ALL WAVE RADIO UNIT TRIMMER LOCATION

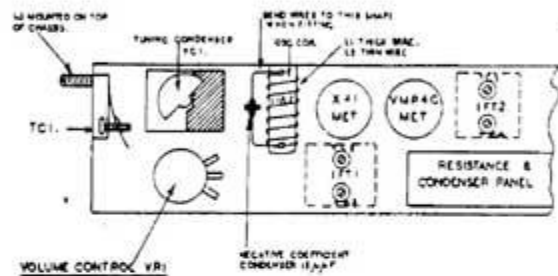


TELEVISION SOUND I.F. RESPONSE

Set signal generator to 1.5 Mc/s, adjust TC5, TC4, TC3 and TC2 for maximum reading on the output meter across the speech coil, using an insulated trimmer screwdriver and repeat the operations in the same order.

H.F. Alignment

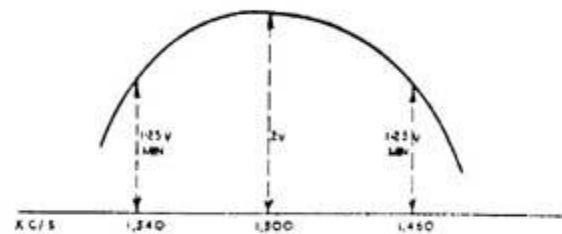
Replace sound unit in the cabinet, connect the receiver to aerial, adjust the controls to receive a



SOUND UNIT, POSITION OF TRIMMERS

picture, and adjust tuning capacitor VCI to half position, trim TC1 to the peak which does not affect the picture.

Adjust L3 for maximum output. A slight amount of tuning drift is inevitable but if tuning drift is excessive, an extra negative co-efficient capacitor may be fitted in parallel with the existing one and adjust TC1 for maximum output.



SOUND UNIT RESPONSE CURVE

ADDITIONS

Push-About Coil Assembly

This assembly is used as a Picture Centring Device and mounted on the neck of C.R. Tube as shown in the diagram.

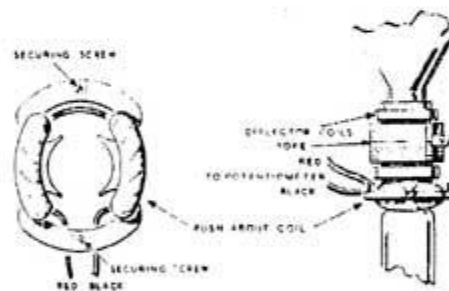
Material Required

Qty.	Description	Part No.
1	Push-About Coil Assembly	26690A
1	Potentiometer 5,000 ohms	23690AE
1	Resistor 68,000 ohms	33369DZ
1	Bracket (used on Models 901, 702, 703 only)	SPS4155
2	6B.A. 1/4-inch Bolts (ditto)	11230 or 200068K

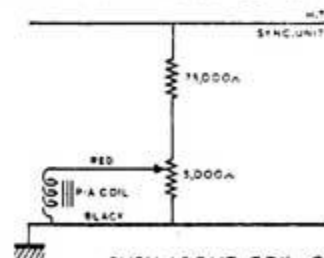
Fitting Instructions

Position the Push Coil Assembly round the neck of the tube just below the deflector coils, as per diagram. The securing screws should only be tightened sufficient to allow the assembly to be moved around the neck of the tube without undue pressure.

Fit the potentiometer (all models except 901, 702, 703) in the underside of the combined T.R.F.



PUSH-ABOUT AND DEFLECTOR COILS



PUSH-ABOUT COIL CIRCUIT

and sync. chassis where a suitable fixing hole is already available.

In Models 703, 901, 702, mount the potentiometer on the bracket supplied and secure the bracket to the sync. chassis by bolting it to the two screws

securing one end of the large capacitor block.

Wire the circuit in accordance with the circuit diagram and suspend the fixed resistor in the wiring. A convenient point for the H.T. positive connection is the R tag on the H.T. and L.T. power supply panel. This panel is situated at the lower end of the combined T.R.F. and sync. chassis. The black lead of the push coil should be joined to the earth tag on the deflector coil connection panel.

Operation

The direction of deflection or "push" is controlled by the position of the coil assembly. To obtain the required direction, rotate the assembly round the neck of the tube. Rubber gloves should be worn when carrying out this operation.

The amount of deflection or "push" is controlled by the adjustment of the potentiometer which, once set, will require only occasional re-adjustment.

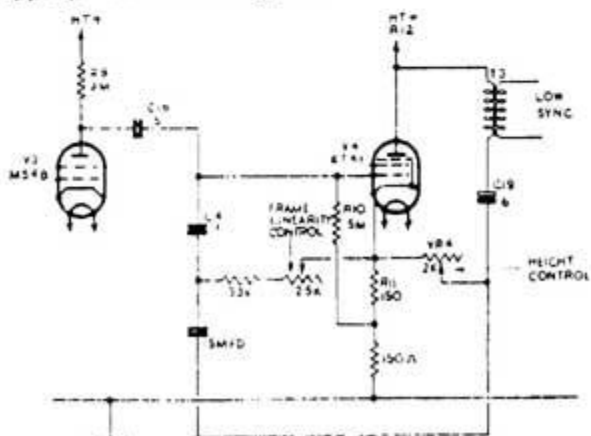
Frame Linearity Control

A slight amount of frame crushing at the lower end of the picture is standard but in special cases only, frame linearity control can be added provided that the Frame circuits have been thoroughly investigated.

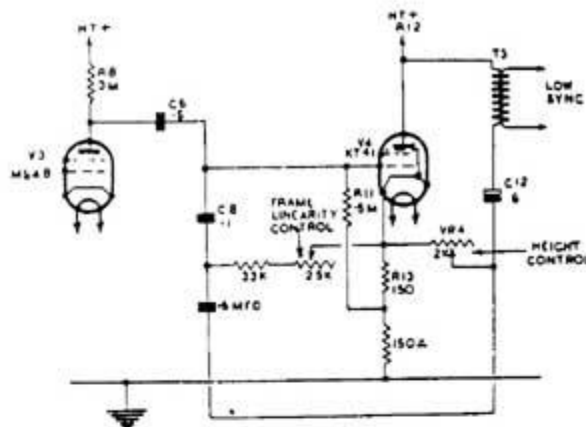
Materials Required

Qty.	Description	Part No.
1	25,000 ohm Potentiometer	26390D
1	33,000 ohm I-W Resistor	33377DX
1	150 ohm I-W Resistor	33370DH
1	5 μ F Capacitor	36355L
1	Bracket (Models 901, 702, 703 only)	SPS4155
2	6B.A. $\frac{1}{2}$ -inch screws (ditto)	11230 or 200068K

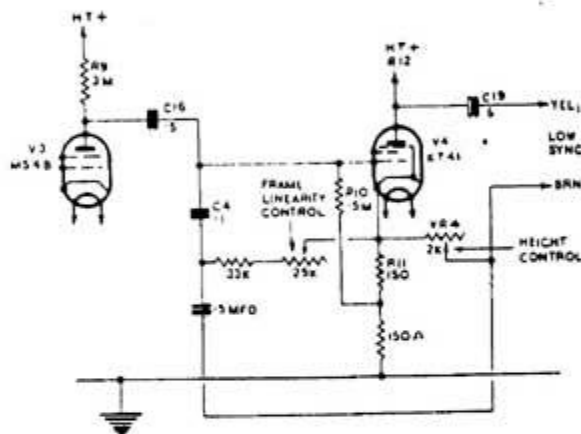
Remove C10 from Models 901, 702, and C18 from all other models, modify according to the appropriate circuit diagrams.



CIRCUIT DIAGRAM FOR ADDITION TO MODELS 900, 902, 701, 705



CIRCUIT DIAGRAM FOR ADDITION TO MODELS 901, 702, 703



CIRCUIT DIAGRAM FOR ADDITION TO MODEL 902A

Picture Interference Phase Reverser

This unit is, in effect, inserted in series with the grid circuit of the cathode ray tube, and is mounted beneath the sync. chassis except in Models 702 and 901, where it is screwed to the side of the cabinet under the lower end of T.R.F. unit. The limiting control is in all cases mounted on the back of the cabinet for convenience.

Fitting Instructions

Bolt the unit to the underside of the sync. chassis or screw it to the side of the cabinet under the T.R.F. unit. In some cases fixing holes are already provided in the lower side of the sync. unit.

Connect the two flexible brown leads of the unit to the heater tags of the nearest valveholder in the sync. chassis. In Models 702 and 901 the valveholders are inaccessible but the heater supply from the power unit is taken to two tags in the lower end of the T.R.F. chassis which may conveniently be used for these connections.

Join the flexible red lead of the unit to the H.T. positive tag of the sync. chassis—this tag is situated in the lower end of the chassis and connected direct to the power unit. In the Models 702 and 901 the H.T. positive tag is similarly situated and connected in the lower end of the T.R.F. chassis near the heater supply tags.

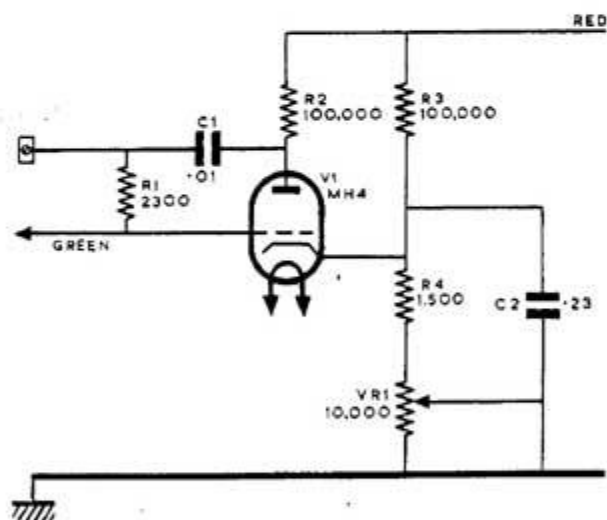
Disconnect the green lead which joins the T.R.F. chassis to the cathode ray tube grid at the chassis end, and reconnect it to the one and only terminal on the unit. Then join the flexible green lead of the unit to the chassis tag from which the grid lead has just been disconnected.

In the Models 702 and 901 where the unit is screwed to the inside of the cabinet, an earthing wire must be joined between the frames of the unit and the T.R.F. chassis—this wire may be connected

under one of the fixing screws on the unit and to an earth tag or under a fixing bolt on the T.R.F. chassis. In instruments where the unit frame is bolted to the underside of the sync.-chassis no earthing wire is necessary as the unit frame is automatically earthed by contact with the chassis frame.

Mount the limiting control on the back of the cabinet near the top for convenience—and fix in position with four wood screws.

Switch on the instrument and test the results by adjusting the limiting control. The correct setting for the control is that which just "blacks out" the effects of the electrical interference experienced. If the control is adjusted too near maximum, the whole picture will appear negative, that is, black will appear white and vice versa.



PICTURE INTERFERENCE PHASE
REVERSER CIRCUIT

MODIFICATIONS TO EARLY MODELS

MODELS 900, 901, 701, 702

Later production of the above models incorporated a number of important modifications, and it is essential that these modifications should be fitted to all early production models.

Copies of the original circuit diagram which are now obsolete are included to assist engineers. These circuits must be modified to conform to the latest circuits.

A.C. D.C. Working

The output circuit of the T.R.F. Unit is altered from D.C. to A.C./D.C. working. Same alteration is made to the Brightness Control to compensate for this as follows.

Models 901, 702, T.R.F. Unit

Remove R19 (1,000 ohms $\frac{1}{2}$ -W) and fit C38 (.23 mfd) in place of it, fit R34 (.5 Megohms $\frac{1}{2}$ -W) in parallel with this capacitor, and R35 (.5 Megohms $\frac{1}{2}$ -W) between green terminal and chassis.

Models 901, 702 Sync. Unit

Disconnect the leads from the outer tags of VR1 leaving the slider lead connected and fit R32 (5,000 ohms 1-W) between these two leads. Fit R33 (75,000 ohms 1-W) between one outer tag of VR1 and H.T. . , and R34 (2,500 ohms $\frac{1}{2}$ -W) between the other outer tag and chassis. Carefully re-adjust Sync. Pot. (VR2).

Model 900 Sync. Unit

Disconnect wire from back of green terminal (to grid of C.R. Tube) and insert C26 (.23 mfd), fit R30 (.5 Megohms $\frac{1}{2}$ W) in parallel with this capacitor, and R36 (.5 Megohms $\frac{1}{2}$ W) between green terminal and chassis.

Model 701 Sync. Unit

Remove R30 (1,000 ohms $\frac{1}{2}$ -W) and fit C25 (.23 mfd) in place of it, fit R30 (.5 Megohms $\frac{1}{2}$ -W) in parallel with this capacitor, and R36 (.5 Megohms $\frac{1}{2}$ -W) between green terminal and chassis.

Models 900, 701 Sync. Unit

Disconnect the leads from the outer tags of VR2 leaving the slider lead connected, and fit R37 (5,000 ohms 1-W) between these two leads. Fit R38 (75,000 ohms 1-W) between one outer tag of VR2 and H.T. . , and R39 (2,500 ohms $\frac{1}{2}$ -W) between the other outer tag and chassis.

Carefully readjust Sync. Pot. (VR1).

Materials Required

Qty.	Description	Part No.
1	.23 μ F	36355K
2	.5 Megohms	33360PJ*
1	5,000 ohms	33363KS
1	75,000 ohms	33363HD
1	2,500 ohms	33360NN

The above parts are the substitute of the original components which are now obsolete, therefore some trouble may be experienced with the control of Brightness. If this happens the size of two resistors on either side of the Brightness control may be slightly altered, e.g., if the resistor of E.H.T. side is made larger, the one on the chassis side may be made smaller and vice versa.

N.B.—When switching on the Receiver with the Brightness control at zero under no circumstances must a bright spot appear on the centre of the tube.

E.H.T. Pot. and Focus Resistor Network

The wattage of the E.H.T. potentiometer resistor network has been increased by reducing the value of the individual resistors, and the total resistance is returned to approximately its original value by adding an additional resistor. The focus network is altered to maintain a ratio of 5:1 between the volts on A2 and A1.

Models 901, 702 Power Unit

Replace R1, R2, R3, R4, R5 and R6 (.6 Megohms 1-W) with .5 Megohms 1-W resistors, add R12, .5 Megohms 1-W resistor, between R1 and E.H.T. + line. Replace R10 (1 Megohm $\frac{1}{2}$ -W) with R10 and R13, .5 Megohms 1-W resistors. Make sure these resistors are at least $\frac{1}{4}$ -inch away from the chassis.

Models 901, 702 Sync. Unit

Replace R30 (.5 Megohms 1-W) with .6 Megohms 1-W resistor. Replace R31 (.5 Megohms 1-W) with .35 Megohms 1-W resistor.

Models 900, 701 Tube Unit

Replace R1, R2, R3, R4, R5 and R6 (.6 Megohms 1-W) with .5 Megohms 1-W resistors, add R12, .5 Megohms 1-W resistor, between R6, and junction of R7 and lead to black terminal. Replace R10 (.2 Megohms $\frac{1}{2}$ -W) with .2 Megohms 1-W resistor.

Make sure these resistors are at least $\frac{1}{4}$ -inch away from the chassis.

Models 900, 701 Sync. Unit

Replace R31 (.5 Megohms 1-W) with .6 Megohms 1-W resistor. Replace R32 (.5 Megohms 1-W) with .35 Megohms 1-W resistor.

The above parts are the substitute of the original components which are now obsolete, therefore some trouble may be experienced with the focusing. If the focus control should be only adjustable on one side, the two resistors in series with this control should be altered so that the focussing takes place with the Focus Control slider approximately in the middle.

240 25 Switch and V8

This switch and associated components were fitted to enable the receiver to operate on transmissions using 240 lines at 25 frames as well as 405 lines at 50 frames. This is now obsolete, and both switch and components should be removed.

The 240-25 system did not send any line sync. pulses during the frame sync. pulse, and the line oscillator tended to wander off frequency during this period with consequent "hooking" at the top of the picture. V8 was fitted to maintain the line sync. pulses during the frame sync. pulse. This valve is now obsolete, and both V8 and its associated components should be removed.

Models 901, 702 Sync. Unit

Remove S1 together with bracket and associated wiring. Remove R7 (.35 Megohms $\frac{1}{2}$ -W) and connect slider of VR3 to chassis. Remove C7 (.1 mfd). Remove R23 (40,000 ohms $\frac{1}{2}$ -W) and connect slider of VR5 to chassis. Remove C18 (.00065 mfd). Remove V8 (MH4), C15 (.1 mfd) and R19 (2 Megohms $\frac{1}{2}$ -W).

Fit new Pre-set Control Escutcheon, Part No. 23722A.

Models 900, 701 Sync. Unit

Remove S1 together with bracket and associated wiring. Remove R27 (.35 Megohms $\frac{1}{2}$ -W) and connect slider of VR3 to chassis. Remove C3 (.1 mfd). Remove R28 (40,000 ohms $\frac{1}{2}$ -W) and connect slider of VR5 to chassis. Remove C11 (.00065 mfd). Remove V8 (MH4), C8 (.1 mfd) and R22 (2 Megohms $\frac{1}{2}$ -W).

Fit new Pre-set Control Escutcheon, Part No. 23722.

Long Resistor Panel—Models 901, 702 Sync. Unit

This is the resistor panel which is nearest to the side panel. On early models this panel was bolted to the metal chassis with only a thin sheet of paxolin in between, and the insulation proved to be insufficient. This panel must, therefore, be raised off the chassis by fitting an insulated collet to each of the securing screws between the panel and the chassis. Longer screws will be required. On later models this panel was raised off the chassis with Hank bushes.

Material Required

Qty.	Description	Part No.
8	Collets	15265
8	Screws	11221

Line Sync. Output Transformer and Choke—Models 901, 702, 900, 701 Sync. Unit

The Line Sync. Output Transformer (T4) and Anode Choke (CK1) are to be insulated from the chassis with insulated collets and washers. This prevents the windings from arcing to earth; also it reduces the capacity and improves the Line Sync. waveform. On some 701 models, where the output valve (V7) is an MPT4, CK1 is omitted.

Materials Required

Qty.	Description	Part No.
4	Screws	11221
4	Insulating Washers	17362
4	Insulating Collets	15265
4	S.P. Washers	3166
4	Nuts	11628

Frame Output Valve

The wattage of the Frame Output Valve (V4-N41) anode and screen feed resistors has been increased.

Models 901, 702 Sync. Unit

Replace R10 (35,000 ohms 1-W) with 23,000 ohms 1-W resistor (Part No. 33363DW).

Models 900, 701 Sync. Unit

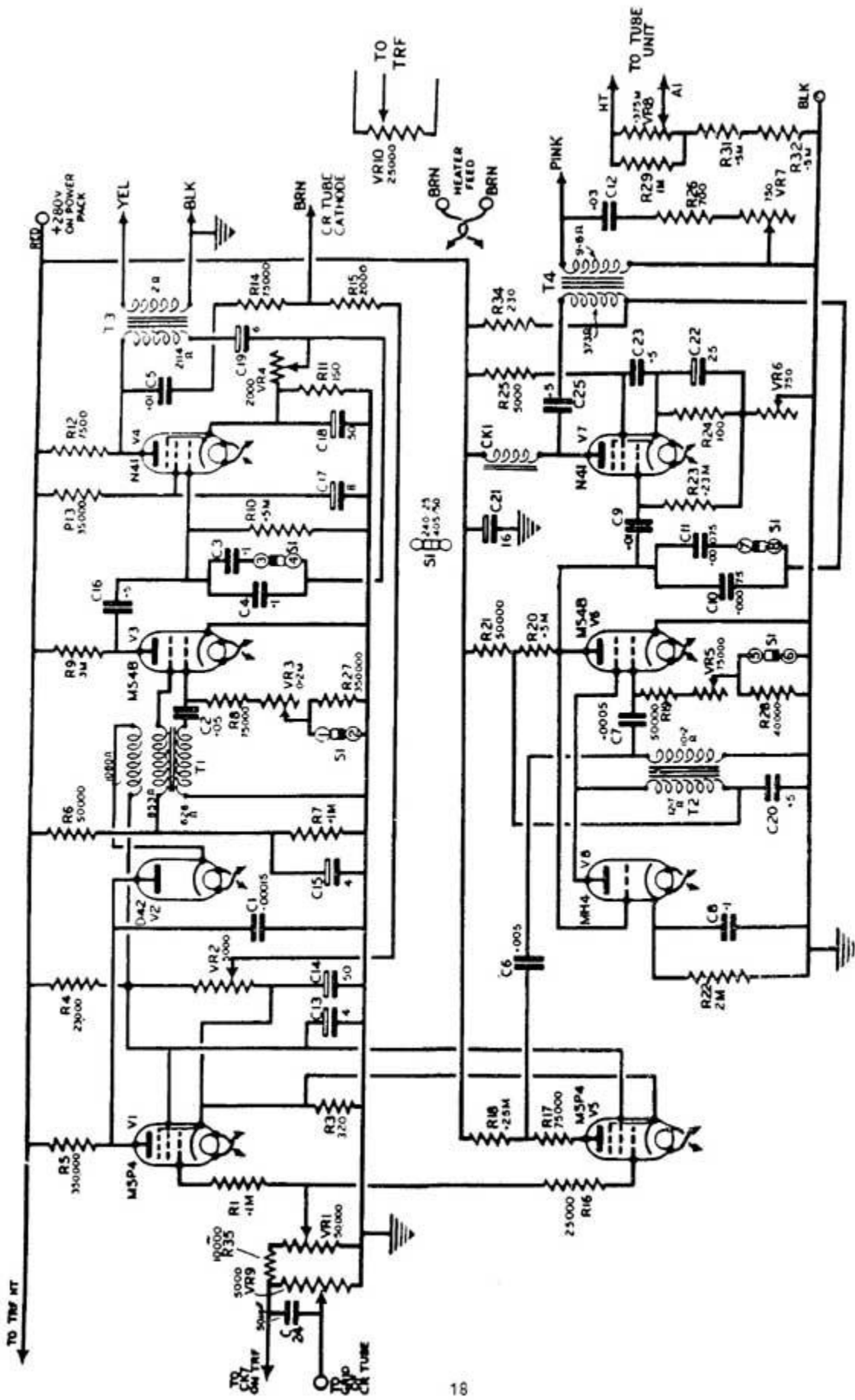
Replace R13 (35,000 ohms 1-W) with 23,000 ohms 1-W resistor (Part No. 33363DW).

Models 901, 702, 900, 701 Sync. Unit

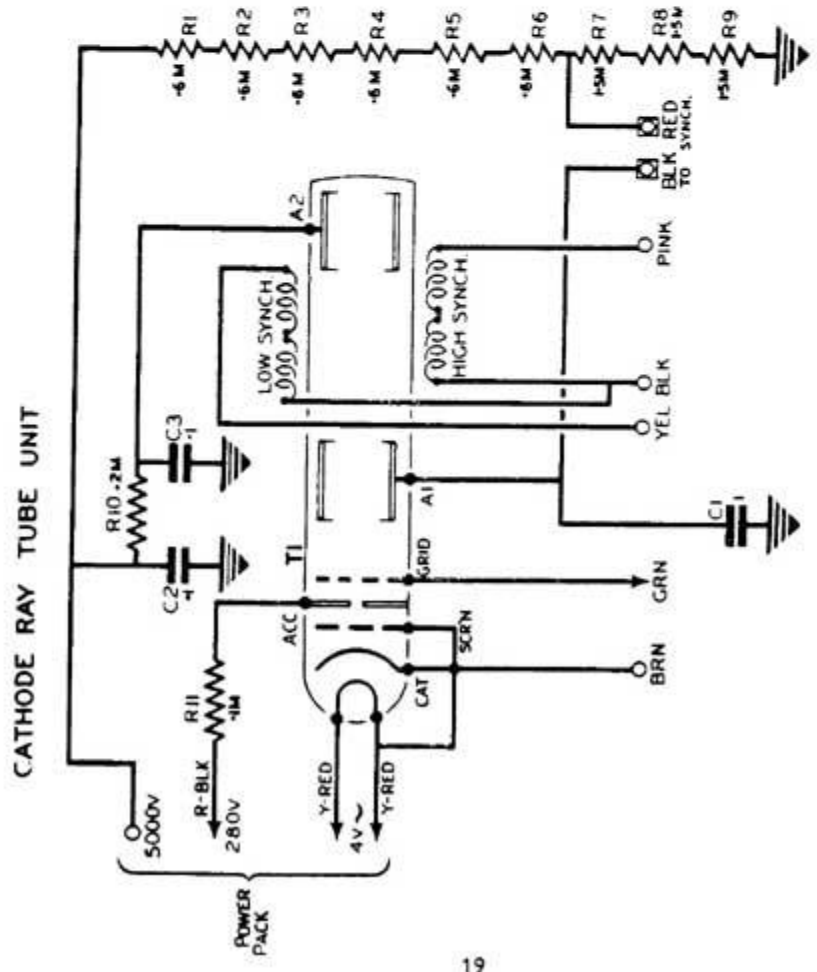
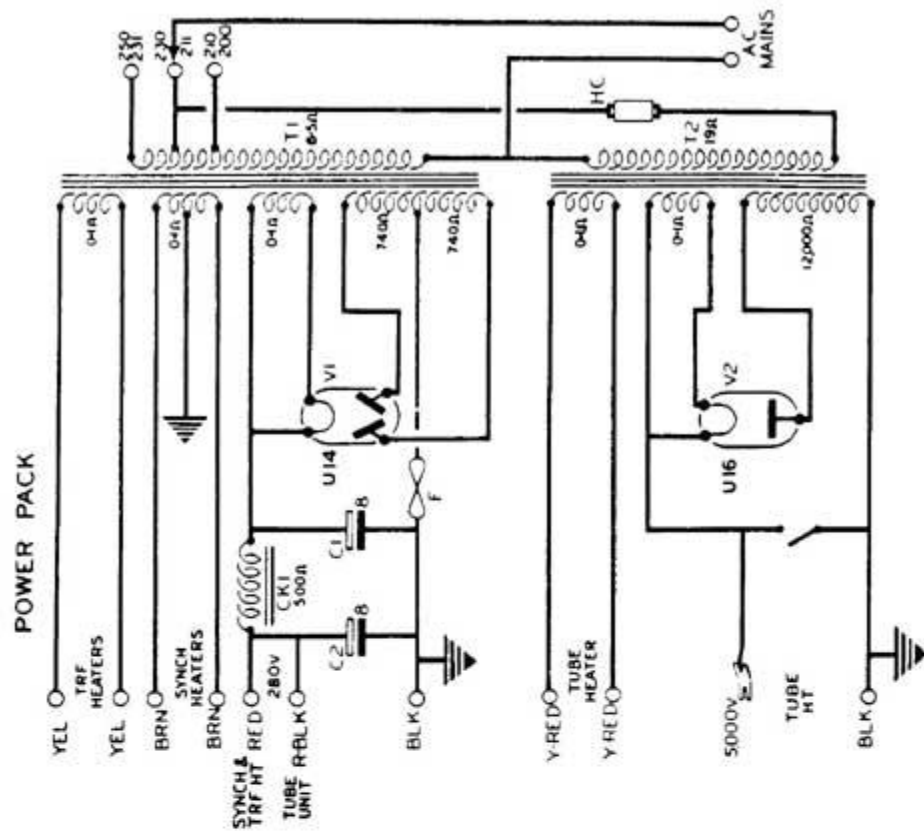
Replace R12 (7,500 ohms 2-W) with 7,500 ohms 4-W resistor (Part No. 124037GG).

Materials Required

Qty.	Description	Part No.
1	23,000 ohms 1W	33363DW
1	7,500 ohms 4W	124037GG



900, (& SOME 701) OBSOLETE SYNC. UNIT CIRCUIT DIAGRAM



900, 701, OBSOLETE POWER & C.R.T. UNIT CIRCUIT DIAGRAM

OTHER MODIFICATIONS

Mains Switch Modifications (All Wave Radio Unit—900, 705, 701)

In models incorporating Radio Units, in the absence of the correct type of switch to replace S22, the whole sequence of the mains switch has been modified.

Materials Required

Qty.	Description	Part No.
1	Switch Cam	26352B
1	Knob	For Part No.
1	Switch Plate,	see Diagram
4	Grub Screws	202041F

Fitting Instructions

Remove disc type of cam and replace with lever type. Remove both switches and file away locating pins in brackets: substitute faulty switch by correct replacement and refit switches in new position, using a switch plate under the nut on the *inside* of the bracket. Extend the lead to the dipole switch as necessary, fit knob engraved to suit new positions.

Modulation Hum on All Wave Radio Unit

Where modulation hum is encountered on this chassis, the fitting of a .0023 mfd capacitor, Part No. 22005K, across C67 will remove it.

This capacitor must be connected between the top of C90, and the earth tag immediately below on the chassis, otherwise the modulation hum will not be cleared.

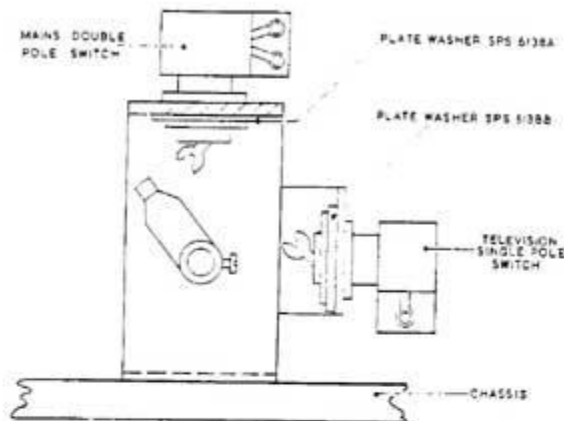
Microphony and Oscillator Drift on Television Sound

In some instances it has been found that microphony is severe at T.V. frequencies and it has been traced, in many cases, to the actual wiring of the oscillator circuit.

If the Negative Co-efficient Capacitor which replaced C104 is fitted high up on these wires it tends to break up the mechanical resonance and prevent microphony (see location of trimmers diagram).

The variation of capacity of TC37 due to heat is very great when the capacitor is adjusted nearly to maximum capacity, and this causes considerable oscillator drift.

This may be improved by fitting an extra Negative Co-efficient capacitor in parallel with the existing one, so that the normal position of TC37 is near minimum capacity, where the effect of heat on the capacity is considerably less.



MODIFIED MAIN SWITCH DIAGRAM

Materials Required

15 mmfd $\pm 10\%$, Negative Co-efficient Capacitor, Part No. 32229A.

Cabinet Microphony—Models 900, 902, 902a, 701, 703, 705

Where cabinet microphony is experienced on the above models, a cure can be effected by reducing C83 value to .01 mfd, Part No. 33613AT.

1500 Kc/s Interference—Models 901, 702

A cure can be effected by re-aligning the I.F. stages of the sound unit to 1.65 Mc/s.

Radio Unit-Selectivity

The following modification has been carried out in some models to improve selectivity and also to eliminate cross modulation and heterodyne whistles.

Remove the wire connecting the rotor of S9 contact Q to C103 and connect contact Q to chassis.

Remove R72 .23 Megohms and connect screen supply (red and black wire) from R73 direct to screen socket on V1.

Connect 10,000 ohms resistor $\frac{1}{2}$ -W between contact B (S9) and the previously unused contact next to it, and a 50,000 ohm resistor $\frac{1}{2}$ -W between this latter contact and the other unused contact (i.e., next to contact Q).

Remove R3 100 ohms from earth end of C7 and connect it to the bridged contacts B, C, D.

Remove R1 and R4 and replace them with short lengths of wire taking care to leave wiring undisturbed.

Re-align the receiver completely.

Crackle and Intermittent TV Sound—All Models Except 901, 702

This is caused by arcing between the lower plates of TC37 and TC38 on all wave radio unit due to an accumulation of dust particles. On some models this arcing has a sound effect not unlike excessive background hiss, on others as a definite crackle.

The only satisfactory cure is to replace these trimmers by a new type Part No. SPS5693.

Mains Hum

In cases of very bad hum, where all usual efforts to completely clear are unsuccessful, the following may be tried:—

Add a 5,000 ohm 1-W resistor in series with the N41 screen and 2 μ F capacitor between screen and chassis (all wave radio unit).

Re-buck loudspeaker.

T.R.F. Coil Formers

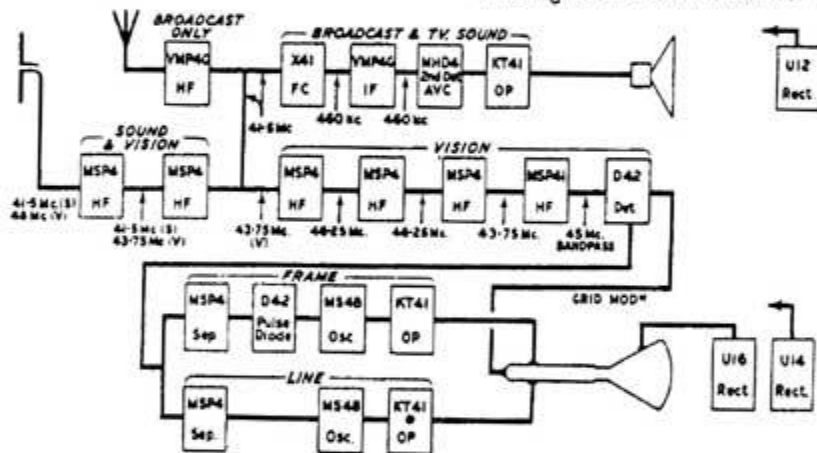
The H.F. transformers used on T.R.F. unit of earlier production were made of dull black or transparent trolitol formers. These two types of former are now obsolete and are replaced by quartz loaded type of former and have a slightly shiny black appearance.

Should any of the first type of former be found with loose turns, all transformers in the model must be replaced. It is not permissible to mix the various types of former.

The trolitol formers need not be changed, unless they are faulty (mainly cracked base). If, however, a faulty one is found it must be replaced with another trolitol type, if available. Otherwise all coils must be replaced with the quartz loaded type.

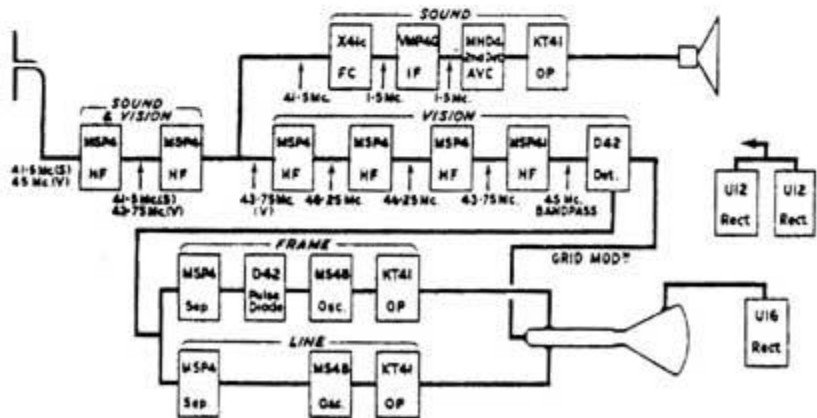
Model 703 Mains Transformer

As one side of the sync. heaters are earthed, when replacing T1 mains transformer to Part No. 25950B, disconnect the centre tap of the sync. L.T. winding from the transformer frame.

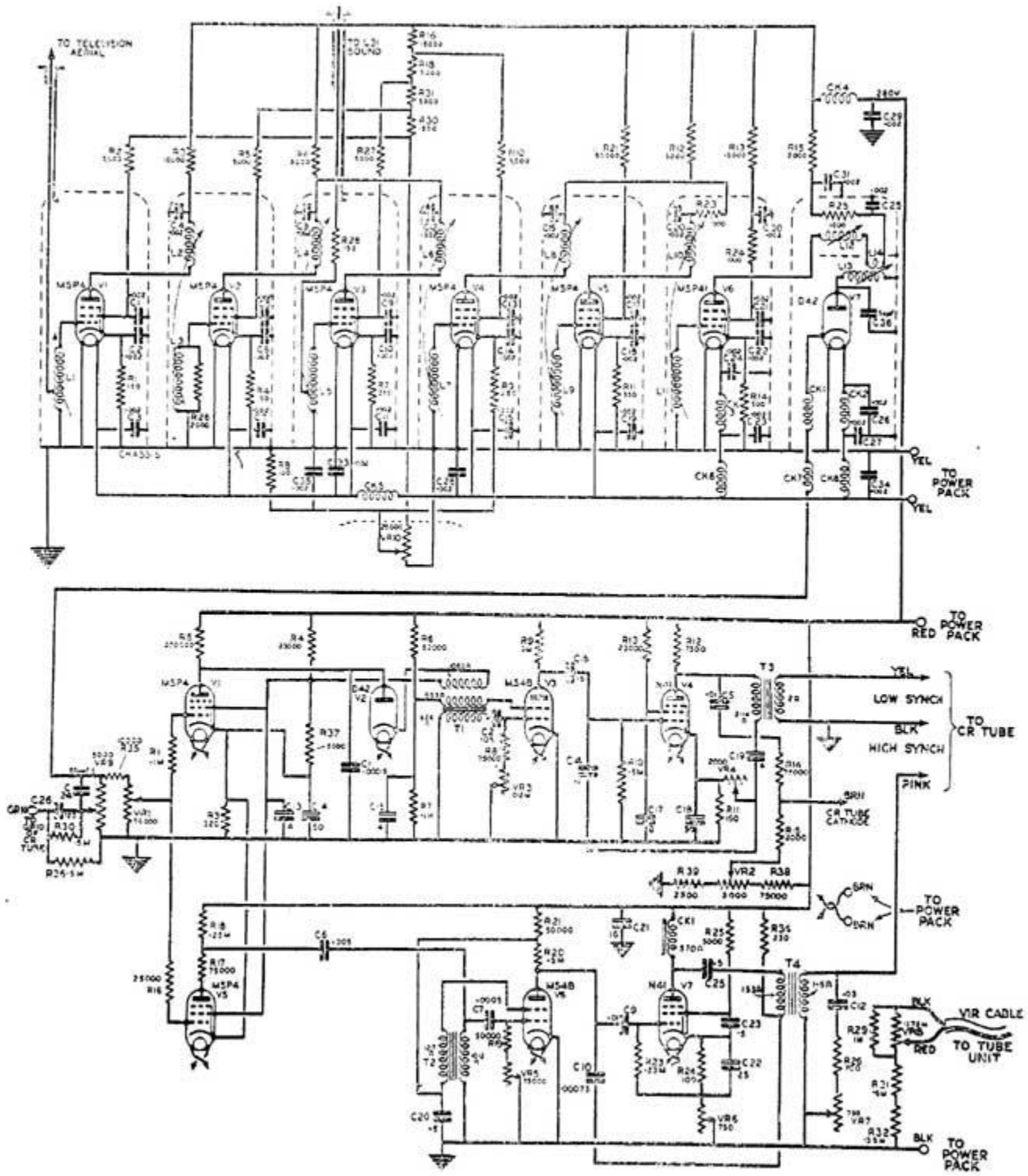


* ON SOME 701 MODELS THIS VALVE IS MPT4

INTERCONNECTIONS DIAGRAM ALL MODELS EXCEPT 901, 702

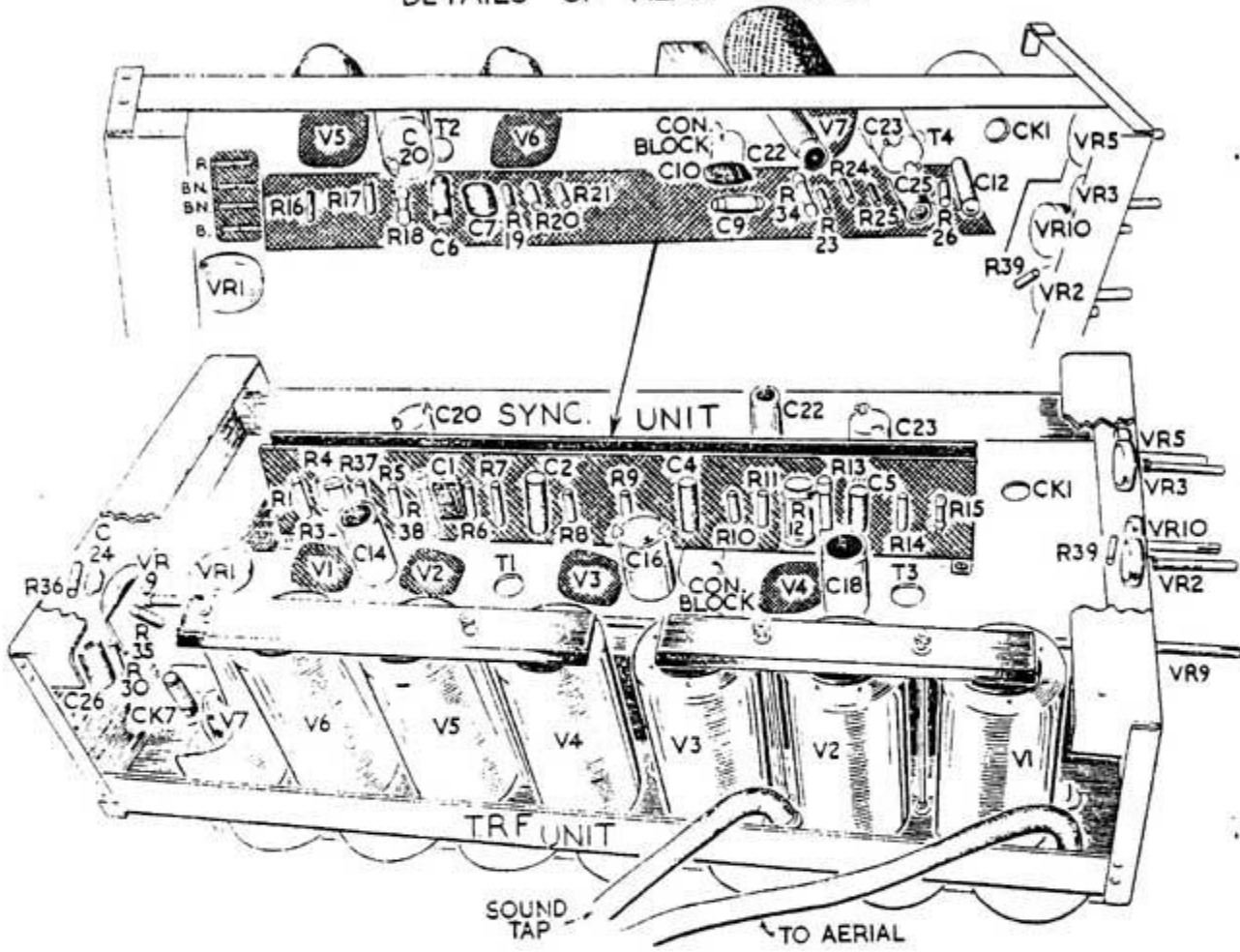


901, 702 INTERCONNECTIONS DIAGRAM

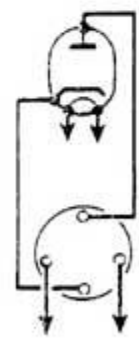


900, 902, 705 SYNC. AND R.F. UNIT CIRCUIT DIAGRAM

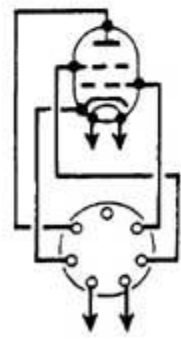
DETAILS OF REAR PANEL



MS4B (MET.)
MSP4

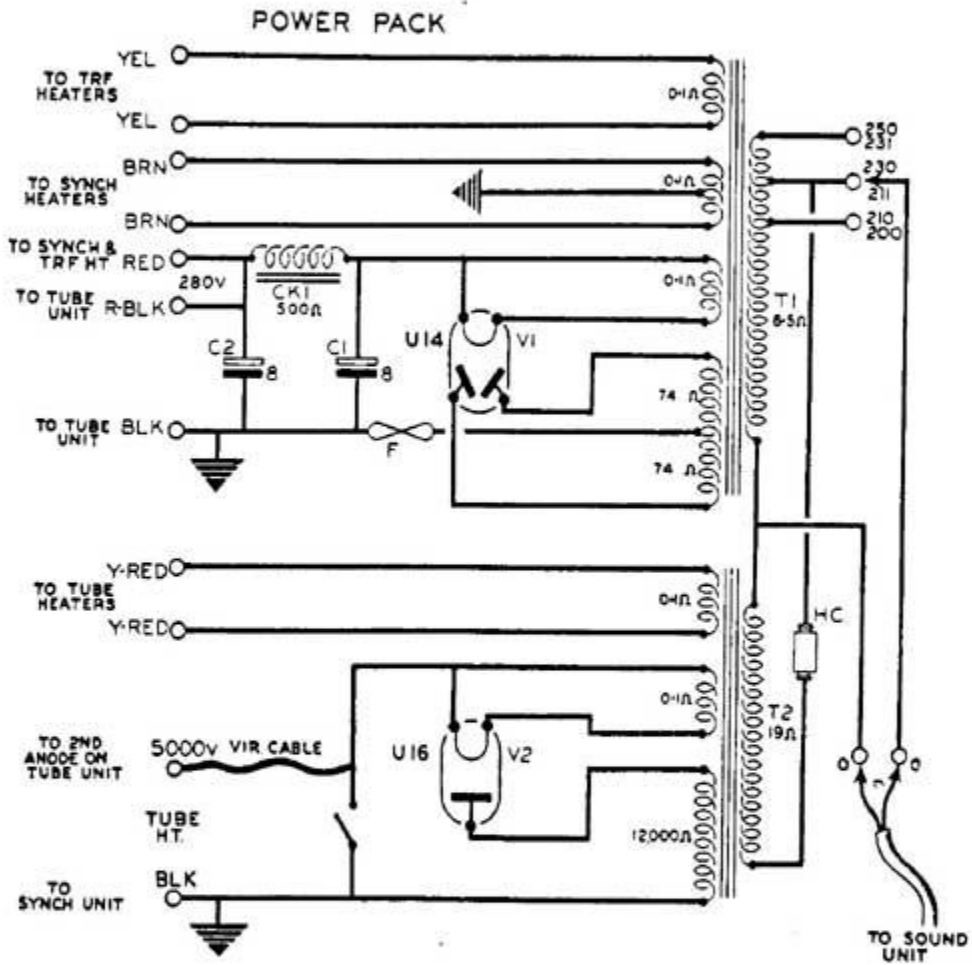


D42

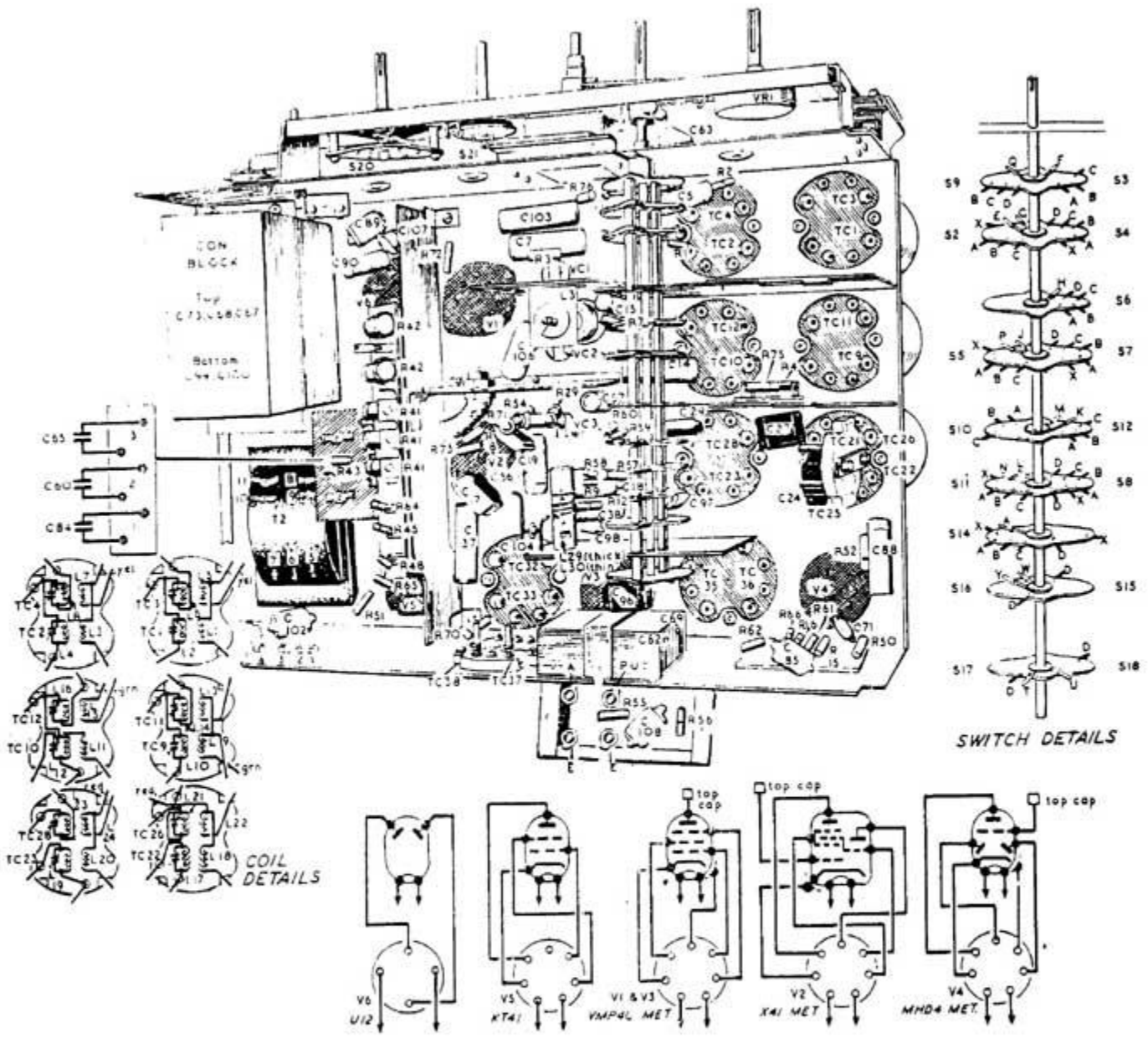


KT41
OR N41

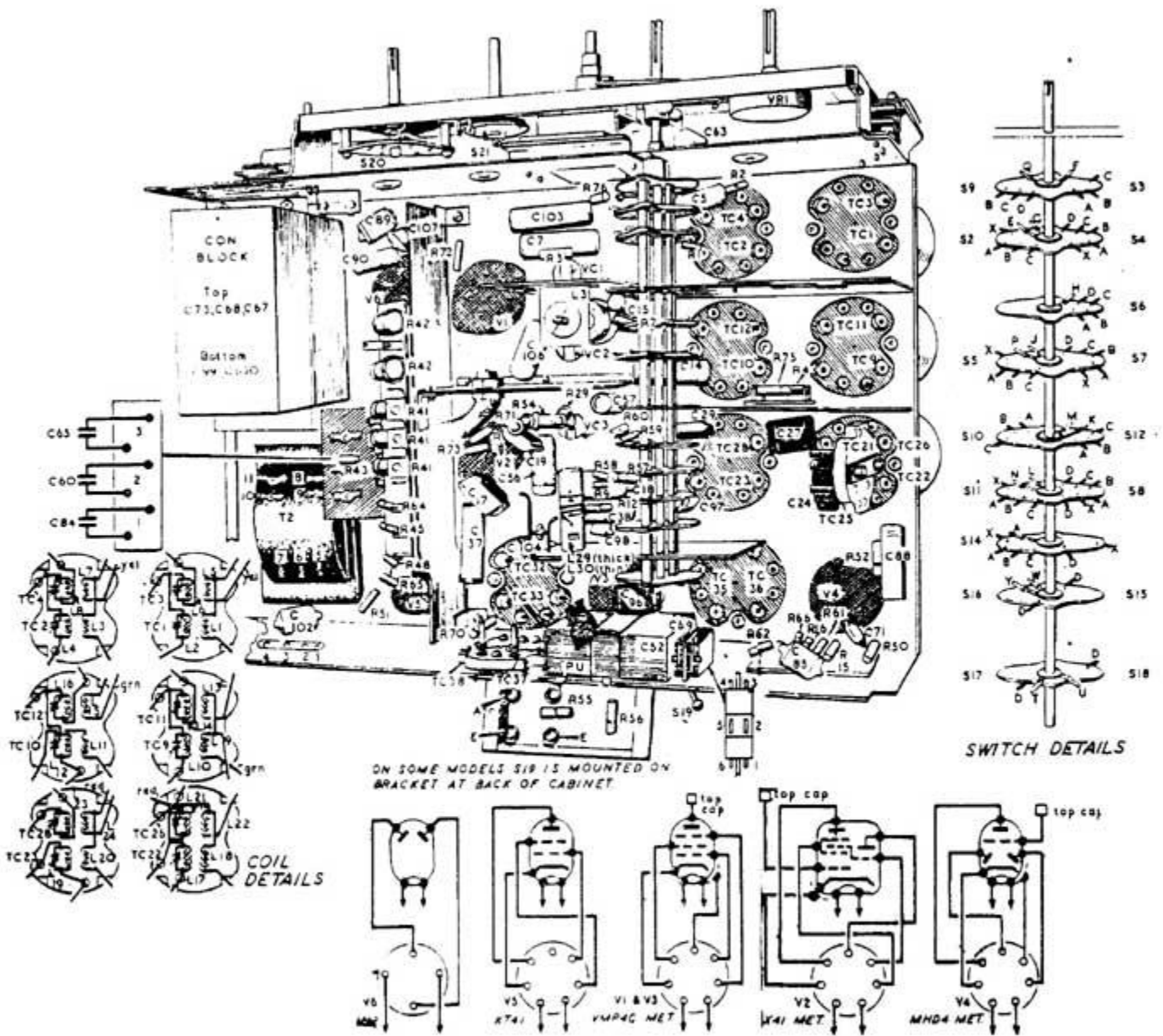
900, 902, 705 SYNC AND R.F. UNIT REAR VIEW



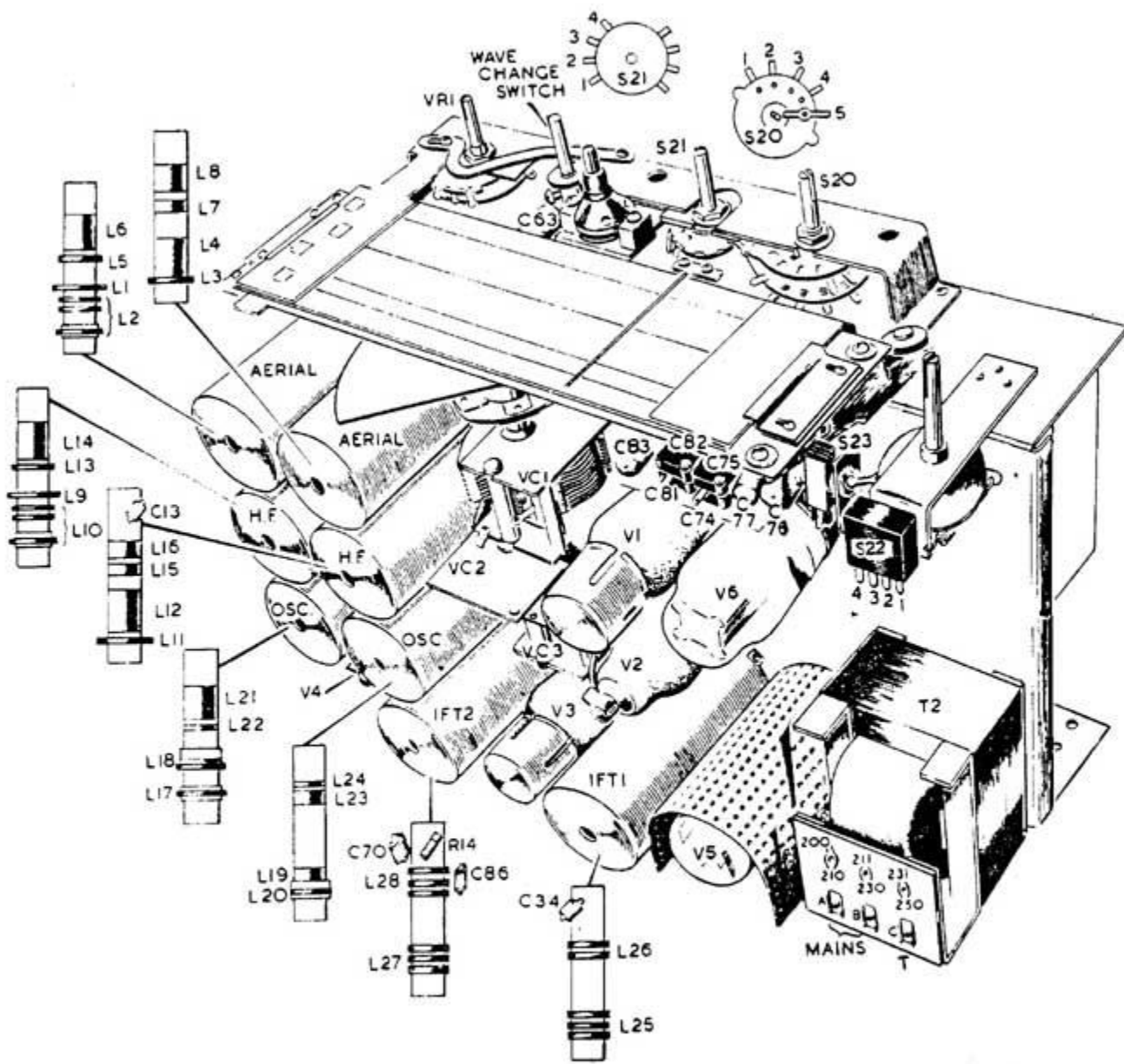
900, 902, 701, 705 POWER UNIT CIRCUIT DIAGRAM



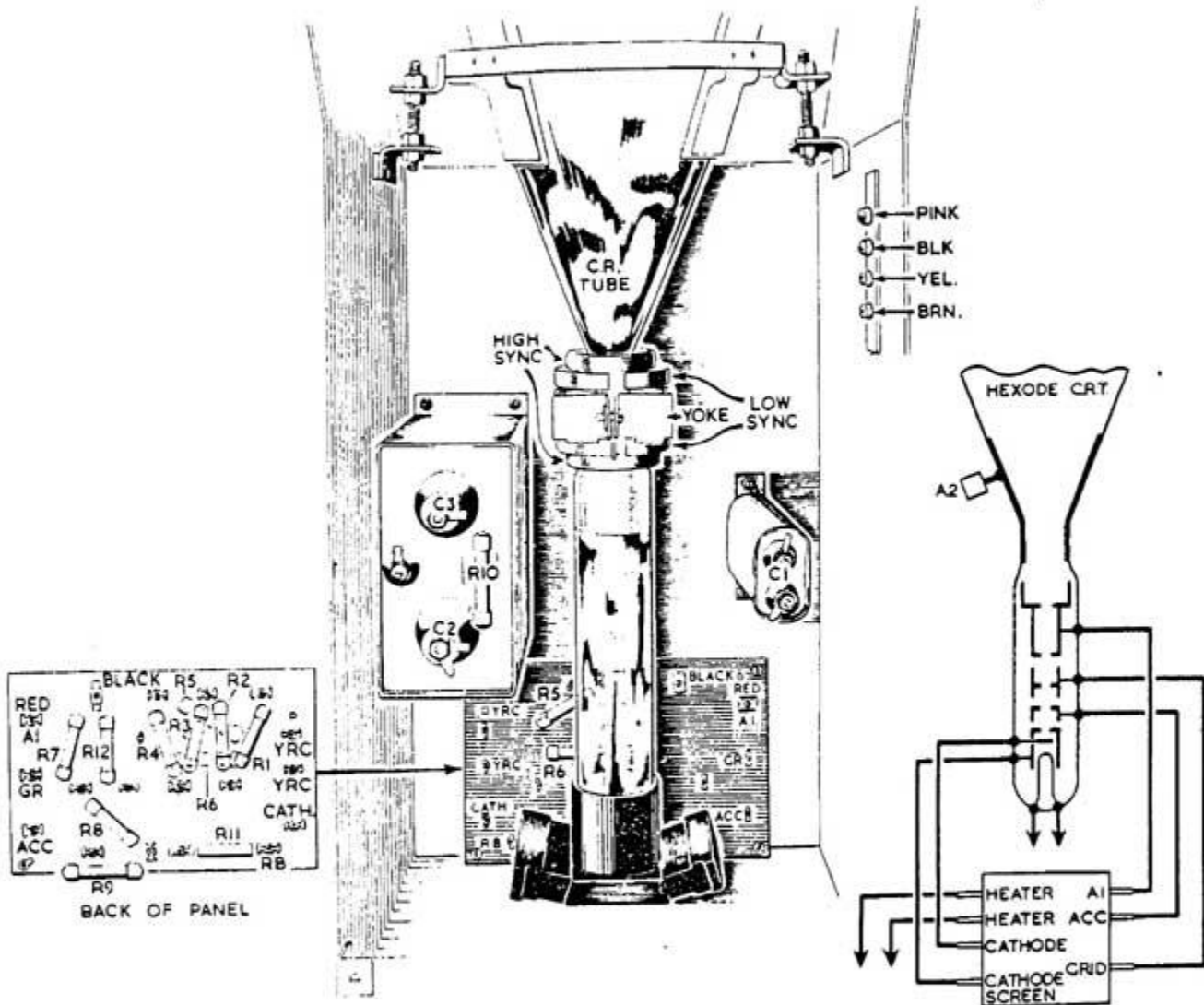
902. 703 ALL WAVE RADIO UNIT UNDERSIDE VIEW



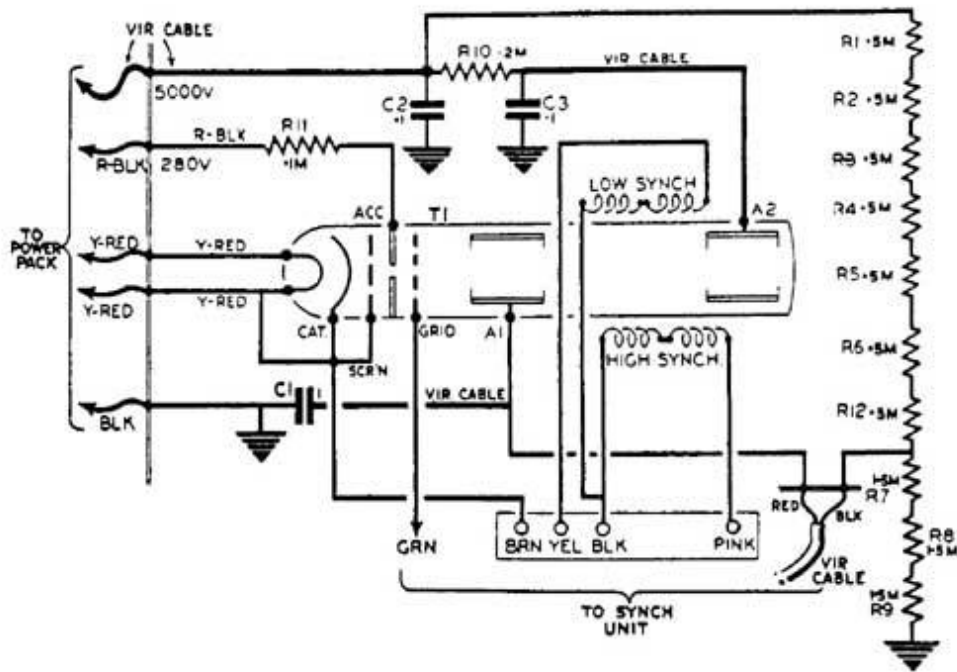
900, 701, 705. ALL WAVE RADIO UNIT UNDERSIDE VIEW



900, 701, 705 ALL WAVE RADIO UNIT TOPSIDE VIEW

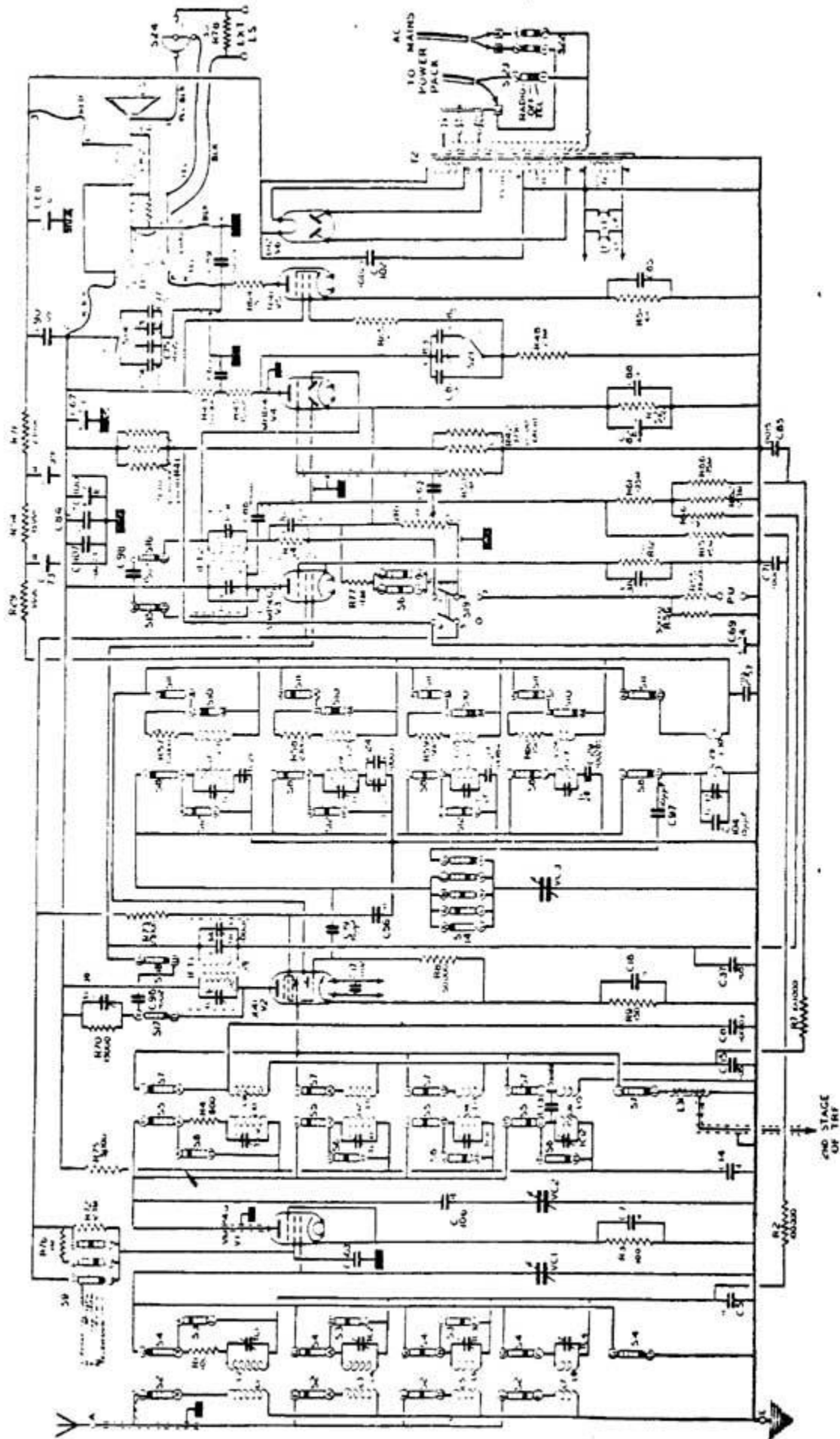


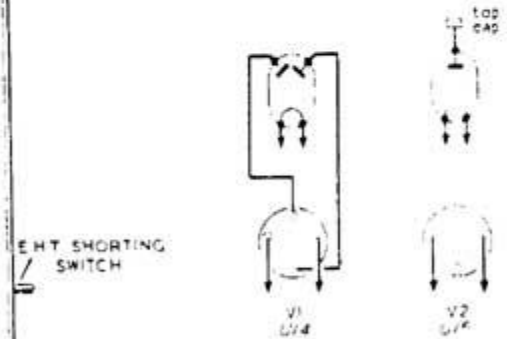
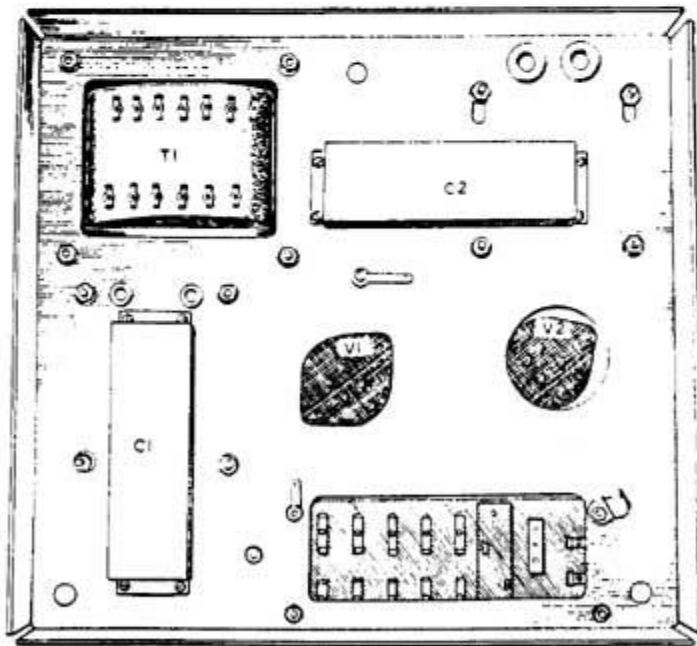
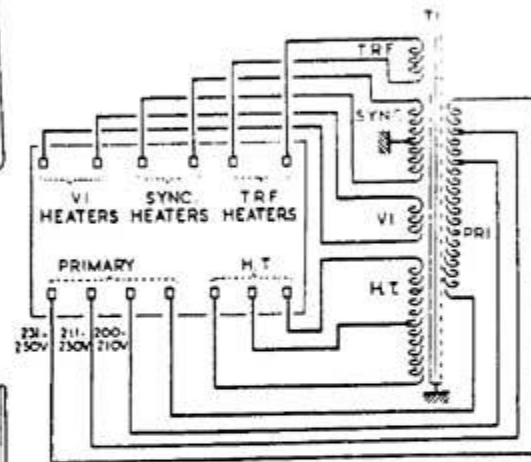
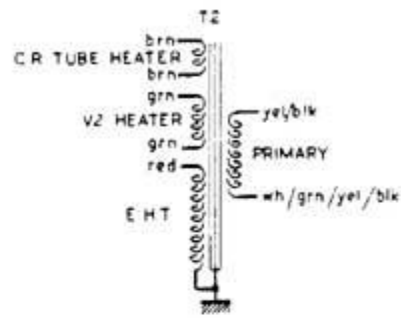
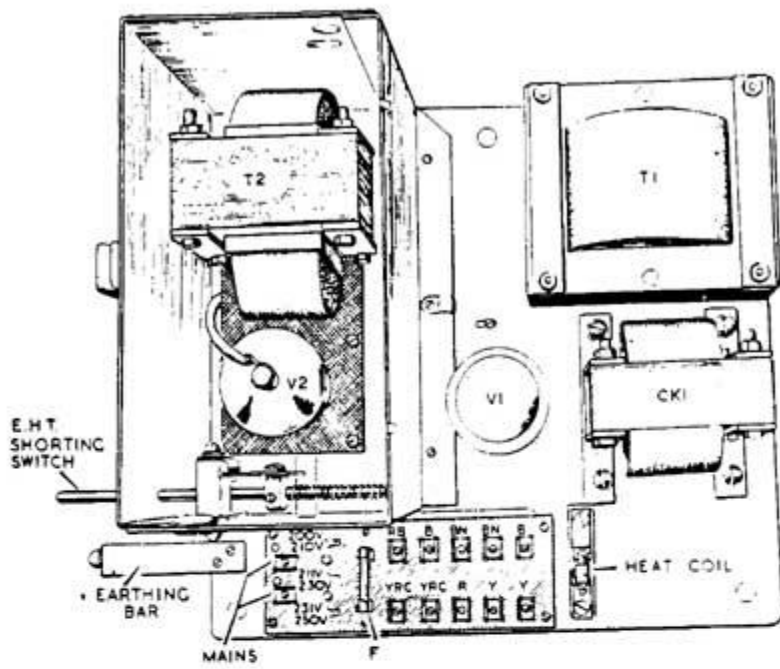
900, 902, 701, 705 C.R.T. UNIT



900, 902, 701, 705 C.R.T. UNIT CIRCUIT DIAGRAM

MODELS 900, 701, 705





900, 902, 701, 705 POWER UNIT