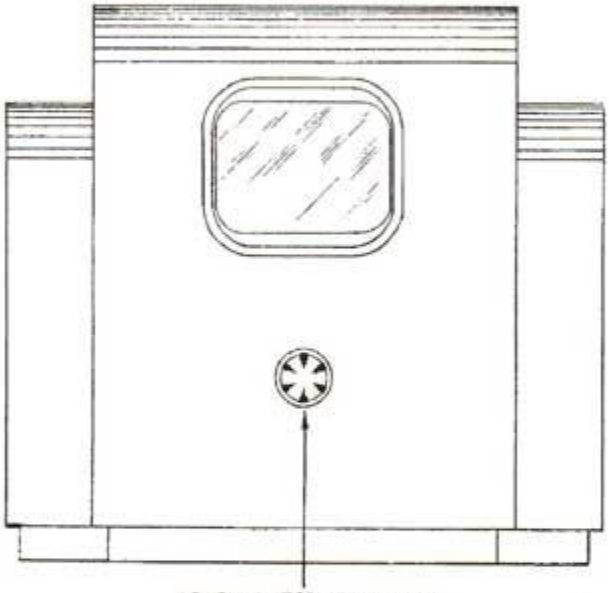
SERVICE NOTES—Model 817

Issued
November, 1938

THE PYE MODEL 817 TELEVISION RECEIVER



Power Consumption: 110 watts.
Picture Size: 4" × 3⅜".

CONTENTS

SUMMARY OF OPERATION

The following summary is intended mainly as a brief reminder of the essential functions of the various controls and circuits.

It follows the path of the signal step by step from the aerial to the cathode ray tube screen and the loudspeaker.

The Technical Specification given elsewhere in these notes gives a full and detailed description of the operation of each unit.

VISION

1. Vision signal picked up by dipole aerial and fed into the control grid circuit of the first R.F. pentode (V1) in the Vision Channel.
2. The vision signal is amplified throughout three T.R.F. stages with inductive coupling. The gain of the first two T.R.F. stages is controlled by the potentiometer R10 (vision sensitivity control), which varies the negative voltage applied to the suppressor grids of the valves V1 and V2.
3. The output from V3 is fed to a full wave rectification or detector circuit, incorporating two diodes, and from this rectification circuit the output is fed to both the control grid of the C.R. tube, for varying the intensity of the electron beam, and the line and frame synch. separator valve V11, for line and frame time base synchronisation.
4. The line and frame synch. separator valve V11 filters the line and frame synchronising pulses from the Vision Channel output applied to its control grid circuit. Line synchronising pulses are derived from the anode of this valve, while the frame pulses are derived from the suppressor grid. The line pulses are fed by capacity coupling to the oscillatory circuit of the line time base thus synchronising the line time base with the transmitter. The frame pulses are fed from the suppressor grid of V11 via inductive coupling to the oscillator circuit in the frame time base, thus synchronising the frame time base to the transmitter. Both the line and frame synch. separator circuits are controlled by potentiometer R27 (line and frame synch. separator bias control).
5. A dual purpose valve V12 is fitted in the Line Time Base. The triode section of the valve functions as a blocking oscillator and produces saw tooth oscillations of line frequency. These saw tooth oscillations are amplified by the tetrode section of the valve and are fed via T2 to the line scan deflector coils L22 and L23. Line frequency is controlled by means of the variable resistor R38 (line hold control) whilst amplitude control is obtained by means of the potentiometer R31 (line amplitude control). Line linearity control is obtained from the compensating circuit R57 and C55.
6. The Frame Time Base operates in a similar manner to the Line Time Base. The valve fitted is a triode hexode (V13) the triode section of the valve functions as a blocking oscillator producing saw tooth oscillations of frame frequency, whilst the hexode portion of the valve amplifies these saw tooth oscillations. The amplified oscillations are then fed via T4 to the frame scan deflector coils L21 and L24. Frame frequency is controlled by the potentiometer R45 (frame hold control) whilst the amplitude of the saw tooth voltages is controlled by the semi variable resistor R50 (frame amplitude control).
7. The electron beam in the cathode ray tube, which is liberated by the action of the tube heater in raising the temperature of the cathode and accelerated by the high voltages imposed on the anodes of the tube, produces television pictures, the light and shade of which is controlled by the vision channel output fed to the cathode ray tube modulator and the building up of which is controlled by the magnetic field induced in the deflector coil circuits by the outputs from the line and frame time bases. The general level of picture brilliancy can be adjusted by means of the potentiometer R60 (Brightness control), which varies the cathode volts on the tube. Focussing control is obtained by varying the adjustment of the potentiometer R66 (focus control), which varies the current through the coil L27 and so varies the magnetic field produced by the coil.

SOUND

1. The sound signal is picked up by the dipole aerial and fed into the control grid circuit of the first R.F. pentode in the Sound Channel V6.
2. The sound signal is amplified throughout two T.R.F. stages with band pass coupling and is then fed via a diode detector valve V8 to the sound output lead which in turn should be plugged into the pick-up sockets of an ordinary radio receiver. The gain of the first two valves in the sound channel is controlled by the potentiometer R21 (sound sensitivity control).

POWER

All power necessary for the operation of the television receiver is supplied from one mains transformer. The H.T. supply for the time base, vision and sound channels and C.R. Tube is obtained from one indirectly heated rectifier V10, whilst the E.H.T. for the C.R. Tube is obtained from another indirectly heated rectifier V9.

TECHNICAL SPECIFICATION

In this Technical Specification the path of the television signal from the aerial input terminal to the Cathode Ray tube is followed and a detailed explanation is given concerning the functions of the various units necessary for the reproduction of television pictures).

VISION CHANNEL (V1, V2, V3, V4 and V5).

In this unit three R.F. pentodes are employed in tuned R.F. stages and two diodes in a full wave rectification or detector circuit. Coupling between the first and second valve is of the " single humped " type, whilst the coupling employed in the next two stages is of the band pass type. The band width is limited to approximately 2½ megacycles thus enabling a high stage gain to be employed. The gain of the first two stages in this unit is controlled by applying a variable negative voltage from the potentiometer R10 (vision sensitivity control) to the suppressor grids of the first two valves. The vision signal from the aerial input terminal is fed via the aerial coupling coil L1 to the control grid of the first valve. It is then amplified throughout three stages and finally it is fed to the full wave rectification or detector circuit. The D.C. output from the detector stage is then fed to the modulator of the cathode ray tube and also to the control grid circuit of the line and frame synch. separator valve (V11) in the time base.

TIME BASE (V11, V12, V13).

The time base can be considered as three separate units :—

(*a*) The synchronising stage which is employed to deliver synch. pulses, free from any picture or " noise " content, to the line and frame time bases.

(*b*) The line time base from which is derived an ample linear saw tooth current sufficient to scan the cathode ray tube screen at 10,125 pulses per second in the horizontal direction.

(*c*) The frame time base from which is derived an ample linear saw tooth current sufficient to scan the cathode ray tube screen at 50 pulses per second, in a vertical direction.

(*a*) SYNCHRONISING STAGE (V11).

The valve fitted in this stage is an R.F. pentode and its purpose is to separate the line and frame synch. pulses from the picture content and any "noise " content which may be present in the signal obtained from the vision channel. In effect it filters the line and frame synch. pulses from the signal applied to its control grid circuit and feeds these pulses to the line and frame time bases respectively, in order to synchronise the oscillator circuits with the transmitter.

The potentiometer R27 (line and frame synch. separator bias control) controls the cathode bias potential applied to the valve, the control being set so that this potential ensures that when the output from the vision channel is applied to the control grid of the valve, only the voltage change generated by the synch. pulses is allowed to take effect over the effective part of the anode current—control grid voltage characteristic curve of the valve; whilst at the same time only the voltage change generated by the synch. pulses is allowed to take effect over the effective part of the suppressor grid current—control grid voltage characteristic curve of the valve. In this way the voltages generated by the picture content of the signal and the voltages generated by any " noise " which may be present, do not increase the voltage developed across the load resistors R23 and R22 in the anode circuit of the valve and R28 and R29 in the suppressor grid circuit of the valve. Line pulses are fed via the condenser C36 to the secondary winding of the oscillatory transformer T1 which is in the control grid circuit of the triode portion of the valve employed in the line time base ; whilst frame pulses are fed via a condenser and resistance (C38 and R34) to a tertiary winding of the oscillatory transformer T3 in the frame time base.

(*b*) LINE TIME BASE (V12).

In this unit, a dual purpose valve is employed, this valve being a triode tetrode. The triode section of the valve is employed in a blocking oscillator type circuit and its function is to produce a saw tooth voltage of 10,125 pulses per second. The operation of this blocking oscillator is as follows : The transformer T1 is part of an oscillatory circuit between the anode and the control grid of the triode portion of the valve. The oscillations take place at a much higher frequency than the fundamental saw tooth frequency generated by the whole blocking oscillator circuit. The current passing through the primary of the transformer T1 induces a voltage in its secondary. This voltage charges the condenser C43 and builds up a negative voltage on the control grid. As this negative voltage increases there will come a time when the voltage on the control grid is of such a value that it completely blocks the valve and allows the charge condenser C42 to build up a voltage. Whilst this is taking place the negative charge on the control grid is draining through resistances R35, R36, R37 and R38 and as this draining occurs, eventually the negative voltage built up on the control grid is reduced to a value where the triode section of the valve becomes conductive and allows the condenser C42 to discharge through the valve.

The frequency or speed of the saw tooth voltages is varied by means of the potentiometer R38 (line hold control) in the control grid circuit of the triode portion of the valve. By varying the resistance in this circuit one can control the drain of the negative charge built up on the control grid by

means of the blocking oscillator circuit, and consequently one can control the speed of the saw tooth output obtained. The blocking oscillator circuit is synchronised, as previously explained, by feeding the output from the line synch. separator circuit via the condenser C36 to the secondary winding of the oscillator transformer T1. Saw tooth oscillations produced by the triode portion of the dual purpose valve fitted in the line time base are amplified by the tetrode section of the valve, and then fed via T2 to the line scan deflector coils L22 and L23, thus producing the electro magnetic field for the horizontal scan. The amplitude of the horizontal scan is controlled by the potentiometer R31 (line amplitude control) which varies the voltage applied to the charge circuit of the blocking oscillator. A resistance capacity circuit across the secondary winding of T2 provides a compensation circuit to obtain a linear scan. This circuit consists of C55 and R57 (line linearity control).

(*c*) FRAME TIME BASE (V13).

The operation of this unit is similar to the operation of the line time base. A dual purpose valve (V13) is employed. This valve is a triode hexode, the operaion of the triode section being similar to the operation of the triode section of the valve fitted in the line time base. The oscillatory circuit consists of T3 primary and secondary, C48, R45, R47 and R48 ; the charge circuit consists of C52, R51 and R54, the speed of the saw tooth voltages generated being controlled by the potentiometer R45 (frame hold control). The saw tooth wave form generated by the blocking oscillator circuit is fed to the control grid of the hexode section of the valve, where it is amplified and then fed via transformer T4 to the deflector coils L21 and L24, to produce the electro magnetic field for the vertical scan. The amplitude of the vertical scan is controlled by means of the semi variable resistor R50 (frame amplitude control) in the cathode circuit of the valve and thus a control is obtained free from frequency variation.

The blocking oscillator circuit is synchronised by means of the frame synch. pulses which are fed to the tertiary winding of T3.

TUBE UNIT

The pulsating D.C. output from the vision channel is fed to the modulator of the cathode ray tube. This tube is a Hivac type T5M and it is electro magnetically focussed and scanned. By varying the adjustment of the potentiometer R66 (focus control) the current through L27 (focus coil) is varied, thus altering the magnetic field around the coil. There is a gap in the magnetic circuit which surrounds the coil and this gap confines the focussing field to the correct position in the tube. The heater of the tube is energised from a* 2.1 volt winding on the mains transformer. This heater raises the temperature of the cathode in the tube and as the temperature rises a stream of electrons is liberated. This stream of electrons is accelerated by the voltages on the anodes of the tube and it also varies in intensity as the positive voltage on the modulator is varied by the output from the vision channel. The basic control of the intensity of the stream is obtained from the resistance circuit R59 and R60. R60 is a variable potentiometer (brightness control). The line scanning and frame scanning of the tube, i.e. deflection of the electron beam in the horizontal and vertical directions, is obtained as explained in the notes on the line and frame time bases.

Thus we have the output from the vision channel controlling the horizontal and vertical scanning of the tube and the intensity of the electron beam, the whole combining to produce television pictures on the tube screen.

*** A number of 817 Television Receivers are fitted with Mullard C.R. tubes having a 6·3 volt heater energised from the 6·3 volt winding on the mains transformer.**

SOUND

SOUND CHANNEL (V6, V7 and V8).

The sound channel is built on the same chassis as the vision channel. The T.R.F. method of reception is employed, high efficiency coils and trimming condensers providing a band width of approximately 100 kcs. with a sharp 'cut off' on either side. The valves employed in the first two stages are R.F. Pentodes. The sound input signal is fed via the aerial coupling coil L14 to the control grid of the first R.F. Pentode in the sound channel and is then amplified throughout two stages. The gain of these two stages is controlled by applying a negative voltage to the suppressor grids of the valves. This negative voltage is obtained from the potentiometer R21 (sound sensitivity control).

The anode of the second T.R.F. stage is transformer coupled to the cathode of a diode detector valve and the A.F. Output from this valve is fed via a condenser (C30) to the sound output socket.

POWER UNIT

The Power Unit supplies from one mains transformer all the power necessary for the complete operation of the television receiver. The H.T. supply for the Time Base, Vision and Sound channels and Cathode Ray Tube is obtained from one indirectly heated rectifier (V10), whilst the E.H.T. for the 2nd anode of the tube is obtained from another indirectly heated rectifier (V9).

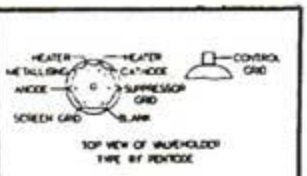
The smoothing of the H.T. supply is in the negative lead ; this is arranged primarily in order to obtain negative voltages for controlling the R.F. gain of the vision and sound channels.

CIRCUIT ANALYSIS.

The following conditions must be observed before any voltages or currents are measured :—

1. ' No signal ' condition on receiver.
2. Vision and sound sensitivity controls in fully clockwise position.
3. Line and Frame Synch. Sep. bias control in fully clockwise position.
4. Line and Frame Hold controls adjusted for correct Line and Frame Scan speeds.
5. Line Linearity control adjusted for correct Line Scan linearity.
6. Line and Frame Amplitude controls adjusted for correct Line and Frame Scan amplitudes.
7. Voltages measured from chassis with a 1,000 ohms per volt meter with the exception of the C.R. tube and anode voltage which is measured with an electrostatic voltmeter.

	Component No.	Valve	Circuit	Voltage	Current	Associated Components
Vision Channel	86116	(V1) R.F. Pentode Mullard EF6 clear	Anode	135 volts	7.5 m.a.	R1, L3, C5.
			Screen	135 volts	2.5 m.a.	R1, C5.
			Suppressor Grid	—	—	R3, R9, R10, C7, C13.
			Control Grid	—	—	L1, C1 and screened lead.
			Cathode	1.0 volts	10.0 m.a.	R2, C6.
			Heater	6.3 volts	—	L2, C3.
	86116	(V2) R.F. Pentode Mullard EF6 clear	Anode	135 volts	7.5 m.a.	R4, L6, C9.
			Screen	135 volts	2.5 m.a.	R4, C9.
			Suppressor Grid	—	—	R6, R9, R10, C11, C13.
			Control Grid	—	—	L4, C7.
			Cathode	1.0 volts	10.0 m.a.	R5, C10.
			Heater	6.3 volts	—	L5, C8.
	86116	(V3) R.F. Pentode Mullard EF6 clear	Anode	260 volts	9.4 m.a.	R7, L9, C14.
			Screen	260 volts	3.1 m.a.	R7, C14.
			Control Grid	—	—	L7, C11.
			Cathode	5.0 volts	12.5 m.a.	R8, C15.
			Heater	6.3 volts	—	L8, C12.
	86118	(V4 & V5) Diode Detector Mullard T6D clear	Anode	—	—	L10, L11, L12, C2, C14.
			Cathode	—	—	L13, R11, R58.
			Heater	6.3 volts	—	C16.
Sound Channel	86116	(V6) R.F. Pentode Mullard EF6 clear	Anode	135 volts	7.5 m.a.	R12, L16, C21, C19.
			Screen	135 volts	2.5 m.a.	R12, C21.
			Suppressor Grid	—	—	R14, R18, R21, C23, C26.
			Control Grid	—	—	L14, C17 and screened lead.
			Cathode	1.0 volts	10.0 m.a.	R13, C22.
			Heater	6.3 volts	—	L15, C20.
	86116	(V7) R.F. Pentode Mullard EF6 clear	Anode	135 volts	7.5 m.a.	R15, L18, C27.
			Screen	135 volts	2.5 m.a.	R15, C27.
			Suppressor Grid	—	—	R17, R18, R21, C26, C29.
			Control Grid	—	—	L17, C18.
			Cathode	1.0 volts	10.0 m.a.	R16, C28.
			Heater	6.3 volts	—	C24.
	86118	(V8) Diode Detector Mullard T6D clear	Anode	—	—	R19, R20, L20, C30, C31.
			Cathode	—	—	L19, C25.
			Heater	6.3 volts	—	
Power Unit	86055	(V9) H.V. Rectifier Mullard HVR2 clear	Anode	—	—	E.H.T. winding on mains transformer.
			Cathode	The cathode voltage is given as the C.R. Tube 2nd anode voltage.	—	R66, R67, R68, C56.
	86004	(V10) H.T. Rectifier Mullard IW3 clear	Each Anode	343 volts	—	Wiring on mains transformer.
			Cathode	320 volts (H.T. line)	—	R59, R60, R61, R62, R63, R64, R65, L25, L26, C57, C58, C59, C60.
Time Base	86116	(V11) R.F. Pentode Mullard EF6 clear	Anode	27.5 volts	—	R22, R23, R30, R31, R32, C34, C36, C40.
			Screen	30 volts	0.8 m.a.	R30, R31, R32, R25, R26, R27, C35, C40.
			Suppressor Grid	27.5 volts	—	R28, R29, R30, R31, R32, C37, C38, C40.
			Control Grid	—	—	Input circuit from Vision channel.
			Cathode	15 volts	0.8 m.a.	R27, C33.
			Heater	6.3 volts	—	R24.
	86164	(V12) Triode-Tetrode Hivac AC/TZ clear	Anode (Triode)	100 volts	0.8 m.a.	R31, R39, Primary T1, C24, C46.
			Control Grid (Triode)	—	—	R36, R37, R38, C43.
			Anode	250 volts	43 m.a.	R40, Primary T2, C45.
			Screen	230 volts	7.2 m.a.	R44, C47.
			Control Grid	—	—	R43.
			Cathode	20 volts	51 m.a.	R41, R42, C44.
			Heater	6.3 volts	—	
	86117	(V13) Triode-Hexode Mullard 6153/T clear	Anode (Triode)	150 volts	2.9 m.a.	R54, primary T3, C51, C52.
			Control Grid (Triode)	—	—	R45, R47, R48, C48.
			Anode	280 volts	9.5 m.a.	R52, primary T4. C50, C53, C54.
			Screen	280 volts		
			Control Grid	—	—	R53, C51.
			Cathode	25 volts	—	R34, R46, R49, R50, C49.
			Heater	6.3 volts	—	
Tube Unit	75252	Hivac T5M	1st Anode	165 volts max.	—	R62, R63.
			2nd Anode	3,600 volts	—	Mains transformer E.H.T. winding.
			Cathode	0'—120 volts	—	R59, R60, R61.

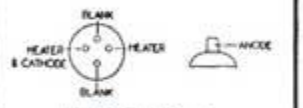


TOP VIEW OF VALVEHOLDER TYPE B7 PENTODE

Fig. 1

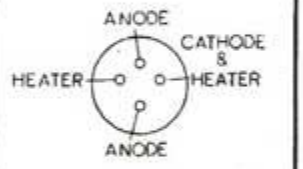
TOP VIEW OF VALVEHOLDER TYPE DIODE

Fig. 2



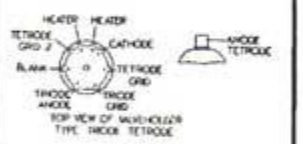
TOP VIEW OF VALVEHOLDER TYPE HIGH VOLTAGE RECTIFIER

Fig. 3



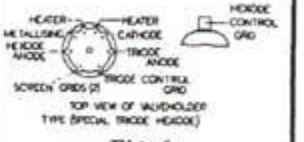
V
TOP SIDE OF VALVE HOLDER IH RECTIFIER

Fig. 4



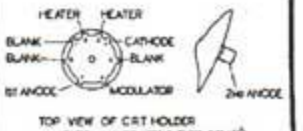
TOP VIEW OF VALVEHOLDER TYPE TRIODE TETRODE

Fig. 5



TOP VIEW OF VALVEHOLDER TYPE (SPECIAL TRIODE HEXODE)

Fig. 6



TOP VIEW OF CRT HOLDER TYPE MW22-16 & TYPE MW31-74

Fig. 7

INDUCTANCES AND TRANSFORMERS

	Circuit indication	Specification	Location Fig.	Component No.
Vision Channel	L1	T.R.F. Aerial Coil (No. 1)	8	78202
	L2	Heater Choke	9	
	L3	T.R.F. Primary Coil (No. 10)	9	78215
	L4	T.R.F. Secondary Coil	9	
	L5	Heater Choke	8	
	L6	T.R.F. Primary Coil (No. 4)	8	78205
	L7	T.R.F. Secondary Coil (No. 3)	8	78204
	L8	Heater Choke	9	
	L9	T.R.F. Primary Coil (No. 11)	9	78216
	L10	T.R.F. Link Coupling Coil		
	L11	T.R.F. Secondary Coil (No. 6)	9	78207
	L12	T.R.F. Secondary Coil		
	L13	R.F. Choke	8	79406
	L14	T.R.F. Coupling Coi (No. 7)	8	78208
Sound Channel	L15	Heater Choke	9	
	L16	T.R.F. Primary Coil (No 8)	9	78209
	L17	T.R.F. Secondary Coil (No. 9)	9	78210
	L18	T.R.F. Primary Coil (No. 12)	8	78217
	L19	T.R.F. Secondary Coil		
	L20	Diode Choke	8	wound on 71914Q
Tube Unit	L21	Frame Scan Deflecting Coil (3.35 ohms)	14 on	SA74192
	L22	Line Scan Deflecting Coil (4.3 ohms)	14 on	SA74192
	L23	Line Scan Deflecting Coil (4.3 ohms)	14 on	SA74192
	L24	Frame Scan Deflecting Coil (3.35 ohms)	14 on	SA74192
Power Unit	L25	Smoothing Choke (92 ohms)	13	79050
	L26	Smoothing Choke (92 ohms)	13	79050
	L27	Focus Coil (150 ohms)	12	78417
	T5	Mains Transformer (Prim. 15.36 ohms. H.T. 191.1 ohms. E.H.T. 11020 ohms	13	77428
Time Base	T1	Line Oscillator Transformer (Prim. 316 ohms. Sec. 38 ohms)	11	77425
	T2	Line Output Transformer (Prim. 132 ohms. Sec. 6.7 ohms)	10	77427
	T3	Frame Oscillator Transformer (Prim. 240 ohms Sec. 3220 ohms Syn. 3500 ohms	10	77424
	T4	Frame Output Transformer (Prim. 925 ohms Sec. 5.4 ohms)	10	77426

N.B. Resistances given for inductances and transformers are approximate only and those below 1 ohm are omitted.

RESISTANCES

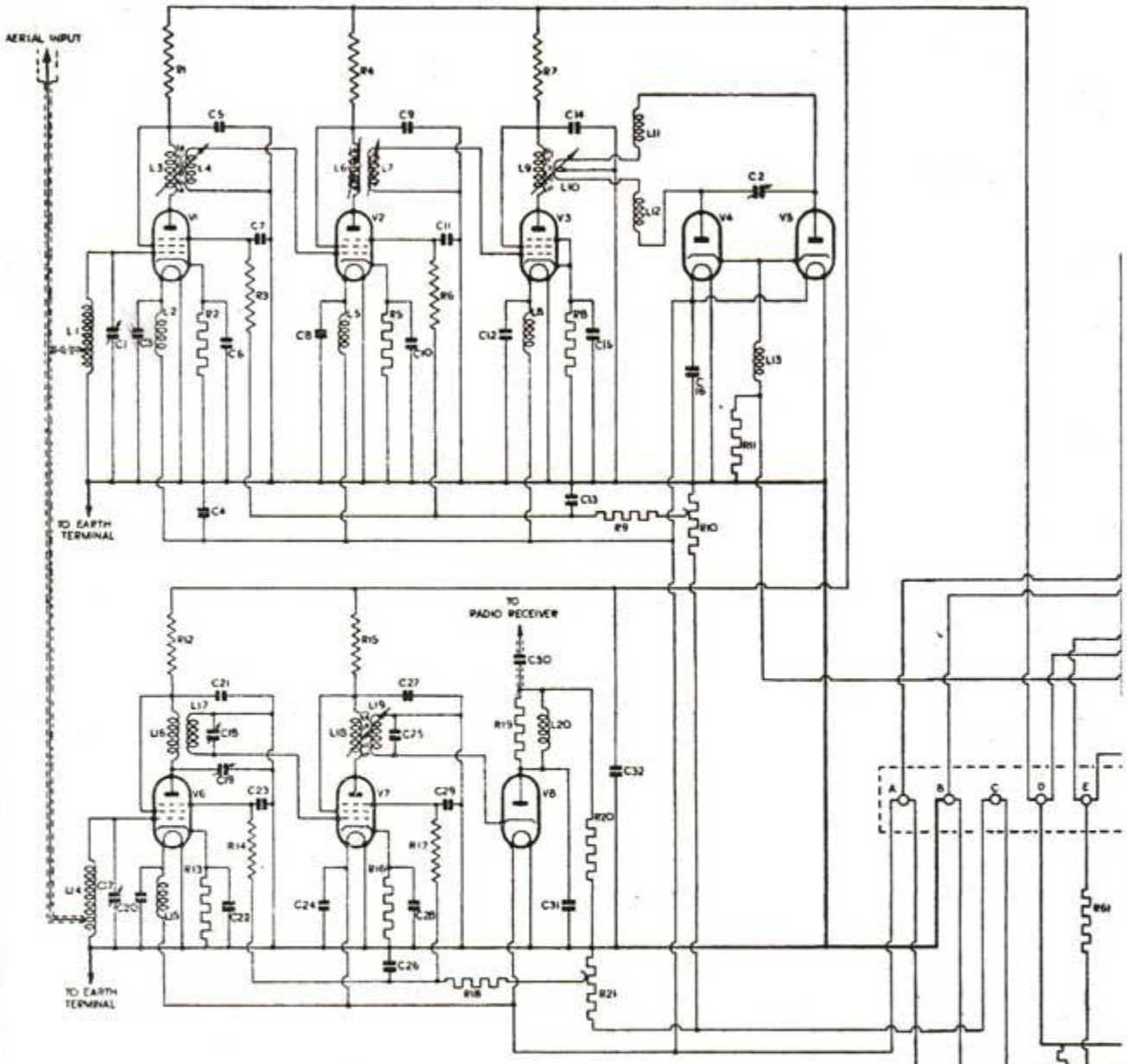
	Circuit indication	Specification ohms	watts	Colour Code Body	Tip	Dot	± Tolerance	Location	Component No.
Vision Channel	R1	18,000	1½	Brown	Grey	Orange	10%	9	72418N
	R2	100	1/10	Brown	Black	Brown	10%	9	70038
	R3	2,500	½	Red	Green	Red	10%	9	72417N
	R4	18,000	1½	Brown	Grey	Orange	10%	8	72418N
	R5	100	1/10	Brown	Black	Brown	10%	8	70038
	R6	2,500	½	Red	Green	Red	10%	8	72417N
	R7	5,000	0.8	Green	Black	Red	10%	9	72424N
	R8	400	1/10	Yellow	Black	Brown	10%	9	70042
	R9	500,000	1/10	Green	Black	Yellow	10%	9	70046
	R10	50,000	Potentiometer (Vis. Sens. Control)					8	81082
	R11	10,000	½	Brown	Black	Orange	10%	8	71923
	R12	18,000	1½	Brown	Grey	Orange	10%	9	72418N
Sound Channel	R13	100	1/10	Brown	Black	Brown	10%	9	70038
	R14	2,500	½	Red	Green	Red	10%	9	72417N
	R15	18,000	1½	Brown	Grey	Orange	10%	8	72418N
	R16	100	1/10	Brown	Black	Brown	10%	8	70038
	R17	2,500	½	Red	Green	Red	10%	8	72417N
	R18	500,000	1/10	Green	Black	Yellow	10%	9	70046
	R19	1,000 ohms		Brown	Black	Red	10%	8	71914Q
	R20	100,000	1/10	Brown	Black	Yellow	10%	8	70050
	R21	50,000	Potentiometer (Snd. Sens. Control)					8	81082
	R22	50,000	1/10	Green	Black	Orange	10%	11	70045
	R23	250,000	1/10	Red	Green	Yellow	10%	11	70051
	R24	16	½	Brown	Blue	Black	10%	11	71807
	R25	10,000	½	Brown	Black	Orange	5%	11	72391
	R26	4,000	½	Yellow	Black	Red	5%	11	72342
	R27	2,500	Potentiometer (Line and Frame Synch. Bias)					10	81090
	R28	150,000	1/10	Brown	Green	Yellow	10%	11	70065
	R29	150,000	1/10	Brown	Green	Yellow	10%	11	70065
	R30	5,000	½	Green	Black	Red	5%	11	72083
	R31	25,000	Potentiometer (Line Amplitude)					10	81002
	R32	10,000	½	Brown	Black	Orange	10%	11	71923
	R33	1,000	1/10	Brown	Black	Red	5%	11	70063
	R34	25,000	1/10	Red	Green	Orange	10%	11	70048
	R35	15,000	1/10	Brown	Green	Orange	10%	11	70044
	R36	65,000	1/10	Blue	Green	Orange	5%	11	70062
	R37	25,000	1/10	Red	Green	Orange	10%	10	70048
	R38	50,000	Potentiometer (Line Hold)					10	81091
	R39	250,000	½	Red	Green	Yellow	5%	11	72339
	R40	800	2	Grey	Black	Brown	10%	11	72426
	R41	300	½	Orange	Black	Brown	5%	11	71800
	R42	100	½	Brown	Black	Brown	5%	11	72338
	R43	1 megohm	1/10	Brown	Black	Green	10%	11	70060
	R44	10,000	1	Brown	Black	Orange	10%	11	72009
	R45	100,000	Potentiometer (Frame Hold)					10	81084
	R46	25,000	1/10	Red	Green	Orange	10%	10	70048
	R47	150,000	1/10	Brown	Green	Yellow	10%	11	70065
	R48	25,000	1/10	Red	Green	Orange	10%	10	70048
	R49	1,000	1/10	Brown	Black	Red	5%	11	70063
	R50	5,000	Semi Variable Potentiometer (Frame Amplitude)					10	81145
	R51	150,000	1/10	Brown	Green	Yellow	5%	11	70053
	R52	2,500	½	Red	Green	Red	10%	11	71921
	R53	2 megohms	1/10	Red	Black	Green	10%	10	70055
	R54	2,000	1/10	Red	Black	Red	5%	11	70057
	R55	15,000	½	Brown	Green	Orange	5%	11	72337
	R56	150,000	1/10	Brown	Green	Yellow	10%	11	70065
	R57	3,000	Potentiometer (Line Linearity)					10	81144
Time Base	R58	100,000	1/10	Brown	Black	Yellow	10%	12	70050
	R59	50,000	2	Green	Black	Orange	10%	13	72323
	R60	20,000	Potentiometer (Brightness Control)					13	81178
	R61	2,500	1/10	Red	Green	Red	10%	13	70064
	R62	50,000	½	Green	Black	Orange	10%	13	71971
	R63	50,000	½	Green	Black	Orange	10%	13	71971
	R64								
Tube Unit	R65	5,000	1/10	Green	Black	Red	10%	13	70047
	R66	2,500	Potentiometer (Focus Control)					12	81090
	R67	5,000	1	Green	Black	Red	10%	12	71941
	R68	501 megohms		Green	Black	Blue	10%	13	72332

CONDENSERS

	Circuit indication	Specification	Location Fig.	Component No.
Vision Channel	C1	Aerial Coil Trimmer	8	80106
	C2	T.R.F. Coil Secondary Trimmer	9	80106
	C3	500 pF. Mica Condenser	9	66095D
	C4	500 pF Mica Condenser	9	66095D
	C5	500 pF Mica Condenser	9	66095D
	C6	500 pF Mica Condenser	9	66095D
	C7	500 pF Mica Condenser	9	66095D
	C8	500 pF Mica Condenser	8	66095D
	C9	500 pF Mica Condenser	8	66095D
	C10	500 pF Mica Condenser	8	66095D
	C11	500 pF Mica Condenser	8	66095D
	C12	500 pF Mica Condenser	9	66095D
	C13	0.1 mfd. Tub. Paper Cond. 350 v. D.C. wkg.	9	68020N
	C14	500 pF Mica Condenser	9	66095D
	C15	500 pF Mica Condenser	9	66095D
	C16	500 pF Mica Condenser	9	66095D
	C17	Coupling Coil Trimmer	8	80106
	C18	T.R.F. Secondary Coil Trimmer	9	80106
	C19	T.R.F. Primary Coil Trimmer	9	80106
Sound Channel	C20	500 pF Mica Condenser	9	66095D
	C21	500 pF Mica Condenser	9	66095D
	C22	500 pF Mica Condenser	9	66095D
	C23	500 pF Mica Condenser	9	66095D
	C24	500 pF Mica Condenser	8	66095D
	C25	5 mmfd. ± 5% Ceramic Condenser	8	71267
	C26	0.1 mfd. Tub. Paper Cond. 350 v. D.C. wkg.	9	68020N
	C27	500 pF Mica Condenser	8	66095D
	C28	500 pF Mica Condenser	8	66095D
	C29	500 pF Mica Condenser	8	66095D
	C30	0.1 mfd. Tub. Paper Cond. 350 v. D.C. wkg.	8	68020N
	C31	100 mmfd. Mica Condenser	8	66096
	C32	.002 mfd. Mica Condenser	9	66045T
Time Base	C33	50 mfd. Tubular Electric 12 v. D.C. wkg.	11	67005
	C34	20 mmfd. Mica Condenser	11	66006
	C35	20 mfd. Tubular Electrolytic 30 v. D.C. wkg.	11	67008
	C36	500 pF Mica Condenser	11	66076
	C37	200 pF Mica Condenser	11	66040
	C38	.01 mfd. Tub. Paper Cond. 450 v. D.C. wkg.	11	68005
	C39	.01 mfd. Tub. Paper Cond. 450 v. D.C. wkg.	11	68005
	C40	8 mfd. Tub. Electrolytic Cond. 150 v. D.C. wkg.	11	67011
	C41	2 mfd. Tub. Electrolytic Cond. 350 v. D.C. wkg.	11	67012
	C42	.002 mfd. ± 5% Mica Condenser	11	66984
	C43	200 pF ±5% Mica Condenser	11	66038
	C44	20 mfd. Tub. Electrolytic 30 v. D.C. wkg.	11	67008
	C45	0.1 mfd. Tub. Paper Cond. 350 v. D.C. wkg.	11	68020
	C46	0.01 mfd. Tub. Paper Cond. 450 v. D.C. wkg.	11	68005
	C47	0.1 mfd. Tub. Paper Cond. 350 v. D.C. wkg.	11	68020
	C48	0.05 mfd. ±5% Tub. Paper Cond. 350 v. D.C. wkg.	11	68027
	C49	20 mfd. Tub. Electrolytic Cond. 30 v. D.C. wkg.	11	67008
	C50	2 mfd. Tub. Electrolytic Cond. 350 v. D.C. wkg.	11	67012
	C51	.25 mfd. Tub. Paper Cond. 350 v. D.C. wkg.	11	68012
	C52	.25 mfd. ±5% Tub. Paper Cond. 350 v. D.C. wkg.	11	68111
	C53	.25 mfd. ±5% Tub. Paper Cond. 350 v. D.C. wkg.	11	68111
	C54	.01 mfd. Tub. Paper Cond. 450 v. D.C. wkg.	11	68005
	C55	.0045 mfd. Mica Condenser	10	66048T
	C56	0.25 mfd. Tub. Paper Cond. 4000 v. D.C. wkg.	13	68044
Tube Unit	C57	16 mfd.		
	C58	16 mfd. Block Electrolytic Condenser 350 v.		
	C59	16 mfd. D.C. wkg.	12	67113
	C60	20 mfd. Tub. Electrolytic Cond. 30 v. D.C. working	13	67008

VISION & SOUND UNIT

VISION CHANNEL



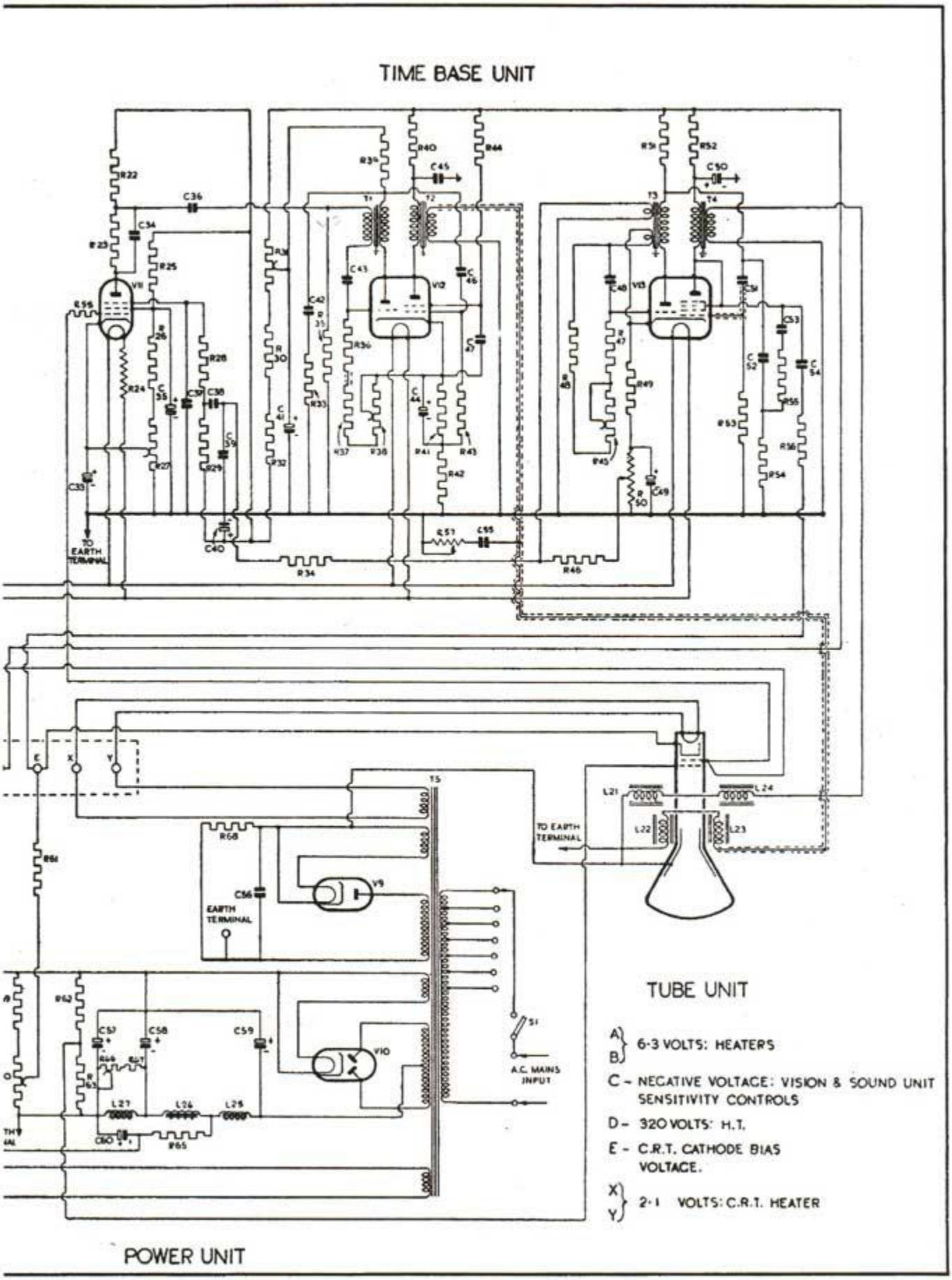
SOUND CHANNEL

WIREWOUND RESISTANCES SHOWN THUS ~~~~
ALL OTHERS ARE COMPOSITE
SCREENED LEADS CONNECTED TO CHASSIS

R60 INTEGRAL WITH S1

LENGTHS OF LEADS ARE DIAGRAMMATIC ONLY

CIRCUIT DIAGRAM


TIME BASE UNIT
TO EARTH TERMINAL
EARTH TERMINAL
TO EARTH TERMINAL
A.C. MAINS INPUT
TUBE UNIT
A) 6·3 VOLTS: HEATERS
B)
C - NEGATIVE VOLTAGE: VISION & SOUND UNIT SENSITIVITY CONTROLS
D - 320 VOLTS: H.T.
E - C.R.T. CATHODE BIAS VOLTAGE.
X) 2·1 VOLTS: C.R.T. HEATER
Y)
POWER UNIT

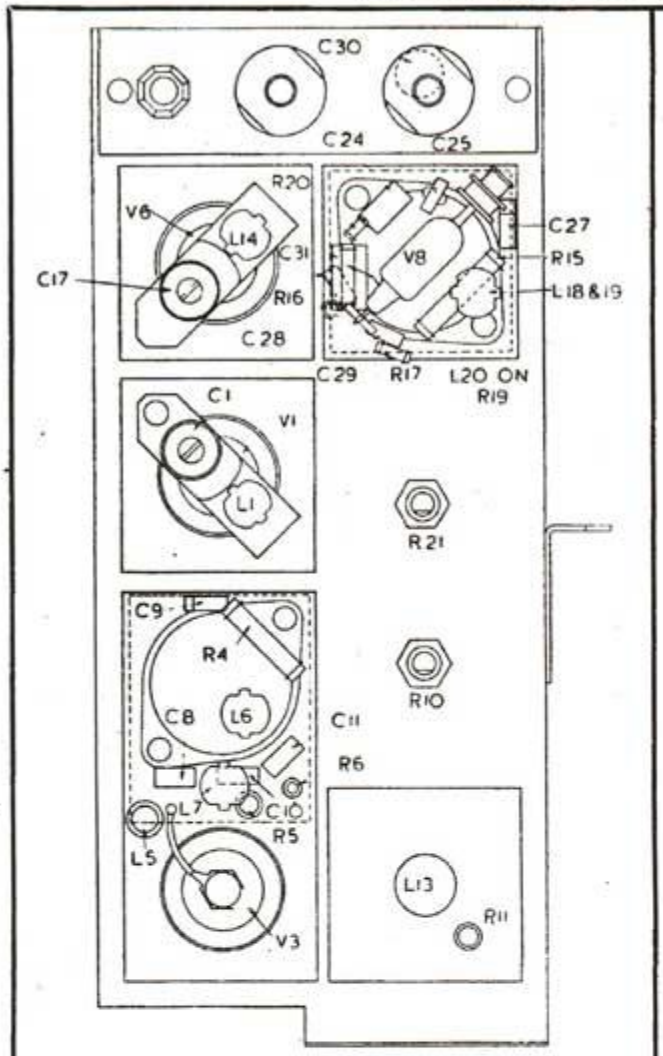


Fig. 8

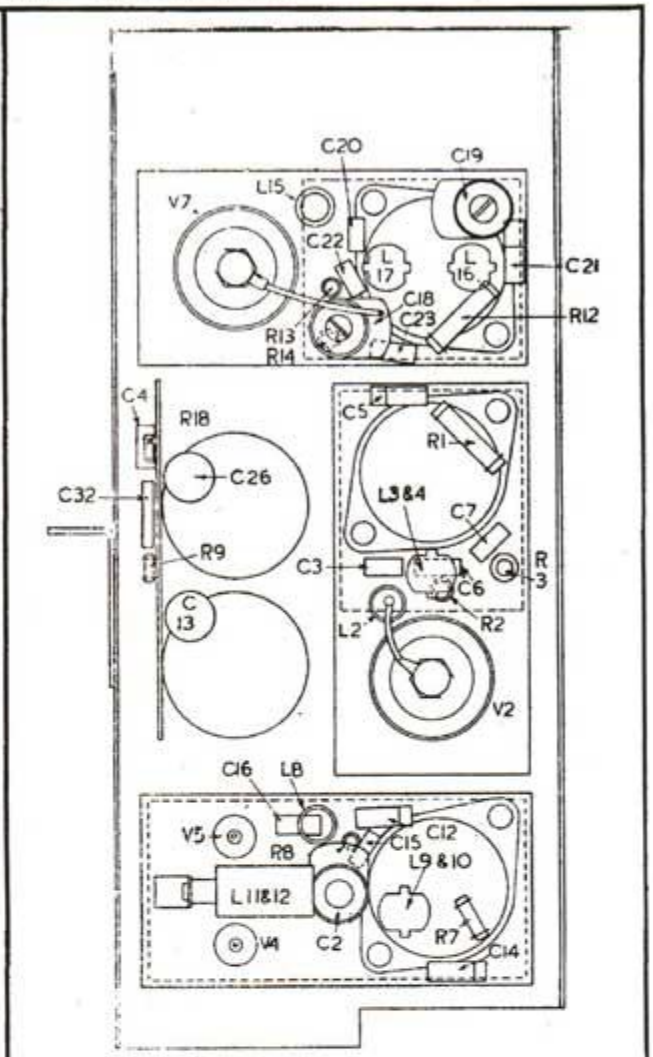


Fig. 9

POSSIBLE FAULTS AND THEIR CAUSES.

The data given below covers the type of fault which may develop in the 817 Vision and Sound Channels and which cannot be detected by the ordinary voltage and current analysis.

Faults	Causes
No vision output.	Diode output choke (L13) disconnected, or o/c.
No vision or sound.	Faulty connection in aerial circuit.
No sound.	Screened output lead to P.U. sockets on radio receiver faulty.
High lights flat (very " contrasting " picture).	Vision sensitivity control advanced too far.
Instability on vision at max. setting of sensitivity control.	T6D faulty causing half wave detection (reradiated R.F. is then considerably increased).
Instability on sound at max. setting of sensitivity control.	Apart from faulty decoupling condensers or dry joints, which may cause instability, it may be present owing to a particularly high slope EF6 in V6 and/or V7 positions. (This is not considered a disadvantage as it is only necessary slightly to reduce the sensitivity control setting to cure the trouble).
General	
Weak results, no results, noisy results or microphony.	These faults may be caused by faulty EF6 valves and should be easily located by the usual methods. However, when any or all of the valves in the sound channel are changed it will usually be necessary to retrim. This can be carried out on the A.P. sound transmission. The vision channel, having a much flatter response, is little affected by valve changing. If misalignment is suspected, retrimming of the vision channel should only be done where the correct apparatus is available.

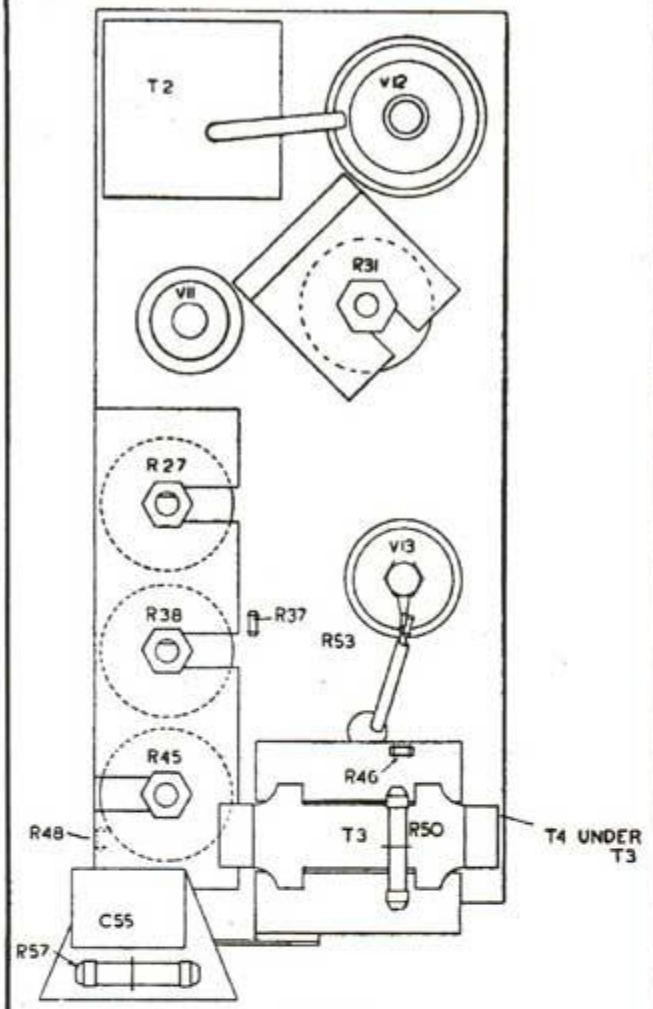


Fig. 10

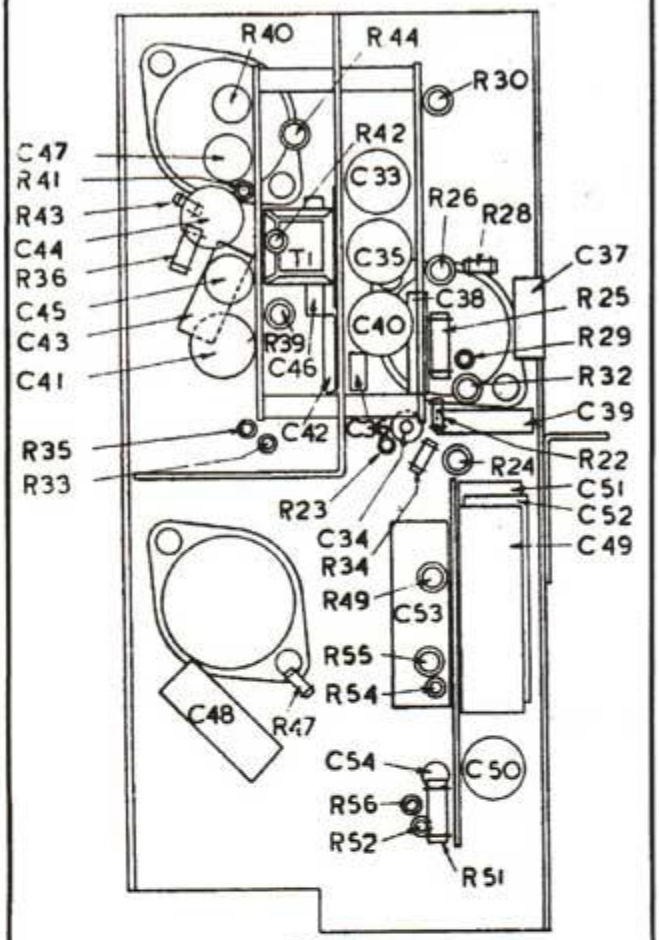


Fig. 11

POSSIBLE FAULTS AND THEIR CAUSES.

The data given below covers the type of fault which may develop in the 817 Time Base and which cannot be detected by the ordinary voltage and current analysis.

Faults	Causes
(*a*) **Line Scan Generator.**	
(i) No output.	(*a*) Faulty deflector coils (L22 and/or L23). (*b*) Output transformer (T2) o/c or s/c. (*c*) Oscillator transformer (T1) o/c or s/c.
(ii) Non linear scan.	(*a*) Faulty output or oscillator transformer. (*b*) Compensation circuit (C55 and R57) faulty or R57 set incorrectly.
(iii) Speed incorrect.	(*a*) Fualty AC/TZ. (*b*) Faulty oscillator transformer. (*c*) Oscillator grid condenser (C43) faulty.
(iv) Low output.	Decoupling condenser (C45 and/or C47) o/c.
(*b*) **Frame Scan Generator.**	
(i) No output	(*a*) Faulty deflector coils (L21 and/or L24). (*b*) Output transformer (T4) o/c or s/c. (*c*) Oscillator transformer (T3) o/c or s/c.
(ii) Non linear scan.	(*a*) Faulty output or oscillator transformer. (*b*) Bias condenser (C49) o/c.
(iii) Speed incorrect.	(*a*) Oscillator transformer faulty. (*b*) Faulty 6153T. (*c*) Oscillator grid condenser (C48) faulty.
(iv) Low output	Bias condenser (C49) o/c.
(v) Diagonal " fly-back " lines in bottom half of raster.	" Fly-back " suppression circuit (C54 and R56) faulty or lead to connecting tag " E " on Power Unit disconnected.

(c) **Synchronising Stage.**		
(i) No output.	(a)	Grid cap off.
	(b)	No H.T. to potentiometer strip (R25, R26, R27, R30, R31, R32)
(ii) No output to line generator		Feed condenser (C36) o/c.
(iii) No output to frame generator.		Feed condenser (C38) o/c.
(iv) Poor separation (i.e picture and/or "noise" content of signal affecting synchronization).	(a)	Faulty EF6.,
	(b)	Decoupling (C35, C40) or filter (C34, C37, C39) condenser o/c.
(v) Ragged vertical edge on scan.	(a)	Synch. separator bias control (R27) set incorrectly.
	(b)	Line speed control set incorrectly (R38).
(vi) Picture unsteady in vertical direction.	(a)	Synch. separator bias control (R27) set incorrectly.
	(b)	Filter circuit faulty (C37, C39).
	(c)	Frame speed control set incorrectly (R45).

POWER UNIT

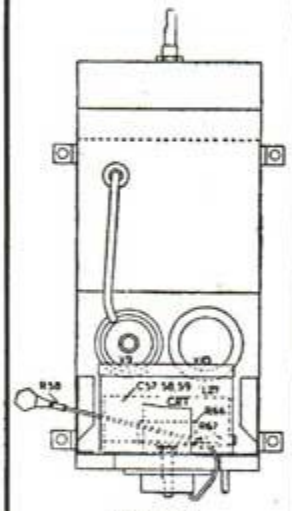
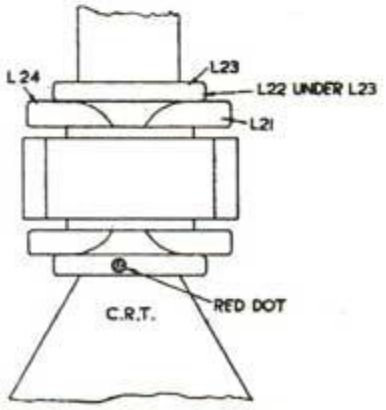


Fig. 12

Fig. 13



Deflector Coil Assembly
Fig. 14

POSSIBLE FAULTS AND THEIR CAUSES

The data given below covers the type of fault which may develop in the 817 Power Unit and which cannot be detected by the ordinary voltage and current analysis.

Faults	Causes
(1) No or low E.H.T.	(a) Broken down smoothing condenser (C56) indicated by blue glow in rectifying valve (V9). Liable to lead to burnt out E.H.T. winding on mains transformer.
	(b) Defective rectifying valve. Indicated by A.C. volts on plate but no D.C. across condenser.
	(c) Disconnected or o/c E.H.T. winding. Indicated by no A.C. to plate of rectifier.
(2) No or low H.T.	(a) Faulty rectifier (V10), indicated by A.C. volts on plate but no D.C. across condenser (C59).
	(b) Faulty smoothing condenser (C57, C58, C59), indicated by low H.T. volts, blue glow in rectifier and hum on sound.
	(c) Disconnected or o/c H.T. winding, indicated by no volts between earth and one or both anodes of rectifier.
(3) Continuous breakdown of rectifiers.	As for 1 (a) or 2 (b)
(4) Hum on sound.	As for 2 (b).
(5) Hum on raster.	As for 2 (b) or E.H.T. smoothing condenser disconnected or faulty.
(6) Erratic Brightness Control	(a) Defective brightness control potentiometer (R60).
	(b) Earth connection to brightness control disconnected.
	(c) Defective C.R. tube.
(7) No light on C.R. Tube screen	(a) No E.H.T.
	(b) No H.T.
	(c) Defective tube.

TRIMMING DATA

VISION CHANNEL

The trimmers and coils in the 817 Television Receiver are accurately adjusted on special apparatus when the receiver is manufactured and no re-adjustments should be made unless :—

1. All voltages, currents, components and valves have been checked and found to be up to standard.
2. The efficiency of the receiver has been found to be below standard when compared with other standard models.
3. Accurate equipment is available for their re-adjustment.

All adjustments should be made with :—

1. Vision and sound sensitivity controls in the fully clockwise position.
*2. Line and frame hold controls adjusted for correct line and frame scan speeds. (These controls should be adjusted when the Television Receiver is receiving the television transmission or alternatively they can be adjusted with the aid of a Signal Generator such as the Pye De-Luxe Trimeasy).
*3. Line linearity control adjusted for correct line scan linearity.
*4. Line and frame amplitude controls adjusted for correct line and frame scan amplitude.
5. Volume control on the radio receiver turned to the fully clockwise position and the wave range switch to the ' gram ' position.
6. A D.C. Volt Meter connected across the output of the vision channel (between the green lead to the Cathode Ray Tube and the chassis). This D.C. Volt Meter should have a D.C. resistance of not less than 50,000 ohms. If a Volt Meter of lower resistance is used the vision channel loading will be upset. The Volt Meter should also have a full scale deflection such that 10 volt readings can be easily obtained. An Analyser having a 1 milliamp. range can be used for this purpose. Simply connect a 50,000 ohm resistance in series with the meter ; this gives a meter with a D.C. resistance of 50,000 ohms and a full scale deflection of 50 volts.
7. An Output Meter connected in parallel with the speech coil of the loudspeaker in the radio receiver.

* See Time Base Unit instructions.

N.B. A special trimming tool such as the Pye Ivory Trimming Tool should be used for adjusting the iron cores inside the coils and the condensers of the vision channel. **It is important to note that an ordinary screwdriver cannot be used for this purpose.**

The Signal Generator which is to be used for trimming should be checked for frequency accuracy. The easiest method of doing this is to beat it with the signal from Alexandra Palace, but before proceeding as outlined below **it is important that the generator be switched on and allowed to warm up for approximately half an hour.** This is necessary in order to ensure frequency stability when the generator is operating at frequencies of the order of 45 megacycles.

Switch on a television receiver and ensure that the vision and sound transmissions are being received. Connect a length of wire (about a foot) to the ' live ' side of the generator output cable, turn the attenuator to maximum and place the wire close to the vision channel. Remove the sound output lead from the television receiver to the radio receiver and connect the green vision channel output lead via a 0.1 mfd. condenser to the ' live ' pick-up socket. (Do not remove the green lead from the C.R. tube connector). The earth terminal of the radio receiver should be connected to the earth terminal of the television receiver.

The generator can now be checked for frequency accuracy. Set the frequency control to the supposed 45 megacycle position and carefully adjust it ; as the correct frequency is approached a high frequency whistle will be heard in the loudspeaker and this whistle will decrease in pitch as the 45 megacycle frequency is approached ; when the generator is adjusted exactly to 45 megacycles no note should be audible, i.e. " zero beat " is obtained, but if this point is passed a note will again be heard which will increase in pitch as the generator frequency differs from the 45 megacycle Alexandra Palace transmitter frequency.

A method which differs slightly from that outlined above is to connect a pair of headphones between the pin on the C.R. tube connector to which is connected the green vision channel output lead and the chassis. The beat note will then be heard in the headphones.

The reading obtained on the generator when " zero beat " is obtained should, if different to that already given by the manufacturers of the generator, be noted and allowed for at any frequencies used when aligning the vision channel.

N.B. Before proceeding with the alignment of the vision channel the condenser must be removed. If the headphone method has been employed the headphones must of course be removed. Also remove the length of wire from the generator output cable.

The unmodulated output from the signal generator should be fed to the television receiver screened aerial connector, the live wire being connected to the centre portion of the connector, whilst the screening should be connected to the outer portion. The output should be attenuated so that the D.C. volt meter reading is always approximately 10 volts.

IT IS IMPORTANT THAT THE IMPEDANCE AT THE RECEIVER END OF THE LINE FROM THE GENERATOR TO THE RECEIVER IS APPROXIMATELY 100 OHMS. WHEN USING SIGNAL GENERATORS WHICH WHEN MEASURED AT THE ATTENUATOR HAVE AN OUTPUT IMPEDANCE OF 25—150 OHMS, IT IS SUFFICIENT TO FEED THE OUTPUT FROM THE GENERATOR TO THE VISION CHANNEL INPUT VIA 2 FT. OF CONCENTRIC R.F. CABLE (THE TYPE OF CABLE USED AS A TRANSMISSION LINE FROM A TELEVISION AERIAL IS ADMIRABLE FOR THIS PURPOSE). THE PYE 1939 MODEL DE-LUXE TRIMEASY FALLS WITHIN THIS CATEGORY.

WHEN USING SIGNAL GENERATORS HAVING AN IMPEDANCE GREATER THAN 150 OHMS, SPECIAL CONSIDERATIONS ARE NECESSARY AND THE MANUFACTURERS OF THE GENERATOR SHOULD BE CONSULTED.

To facilitate the reading of the frequency—dial reading graphs supplied with the Pye 1939 model Trimeasy and other similar types of Signal Generators, at the high frequencies required for Television Trimming, the slope of the curve should be calculated.

To do this :—

(*a*) Beat the Generator output with the Vision transmission from Alexandra Palace as explained previously in these notes, observe the dial reading and note the correct 45 megacycle position on the Graph curve.

(*b*) Note on the Graph curve the correct 30 megacycle position.

(*c*) By means of the formula given below the slope of the curve can be calculated :—

$$\text{Slope of curve} = \frac{\text{Dial reading for 30 megacycles} - \text{Dial reading for 45 megacycles.}}{\text{45 megacycles} - \text{30 megacycles.}}$$

This gives the slope of the 6-17 metre curve as being approximately 1.6.

That is to say for 1 megacycle variation at frequencies between 50 and 30 megacycles the large pointer on the Trimeasy dial should be moved through 1.6 large divisions or 16 small divisions.

The adjustment of the various dust iron cores and trimming condensers in the vision channel should then be carried out in the following order.

(*a*) Inject a signal of 45 megacycles and adjust C1 and the dust iron core of L3 and L4 for maximum output.

(*b*) Inject a signal of 44 megacycles and adjust the dust iron cores of L6 and L7 for maximum output. Then inject a signal of 46 megacycles and adjust the cores of L6 and L7 for maximum output. Finally inject a signal of 44 megacycles and adjust these cores once again for maximum output.

(*c*) Inject a signal of 44 megacycles and adjust the dust iron core of L9 and L10 and condenser C2 for maximum output. Then inject a signal of 46 megacycles and adjust C2 for maximum output. Finally inject once again a signal of 44 megacycles and re-adjust the dust iron core of L9 and L10 and the condenser C2 for maximum output.

(*d*) Finally readjust C1 for maximum picture contrast when the television receiver is receiving the Alexandra Palace transmission.

N.B. No condenser other than C1 and no dust iron core in the vision channel must be adjusted on the Alexandra Palace transmission.

It is important that the cores and trimming condensers are adjusted in the order given above in order that the correct over all response curve is obtained.

SOUND CHANNEL

The signal Generator should be checked for correct frequency calibration at the Television Sound transmission frequency (41.5 megacycles). To check the generator beat it with the sound transmission reception obtained with a television receiver and adjust the frequency until " zero-beat " is obtained.

The above can be carried out in the manner outlined for checking the Vision frequency. The sound output lead between the television receiver and the radio receiver must be connected as for normal use.

The output from the generator should be fed to the aerial connector as described in the instructions concerning the vision channel. The R.F. output from the generator should be modulated at 400 cycles, to a depth of approximately 30% and it should also be attenuated so that the reading shown on the output meter connected across the speaker speech coil is always approximately 100 milliwatts.

The trimming condensers and dust iron core in the Sound Channel should be adjusted in the following order. Inject a signal of frequency 41.5 megacycles and adjust C17, C19, C18 and the dust iron core of L18 and L19 for maximum output.

TIME BASE UNIT

All adjustments to the Time Base Unit are carried out by means of potentiometers and semi-variable potentiometers.

The correct method of adjusting the semi-variable potentiometers is given in the paragraphs dealing with Mechanical Data.

The effects of incorrect adjustment of these controls are given below :—

1. **Line Amplitude Control (R31).** Picture breadth too great or too small—control should be adjusted until breadth of picture is correct for size of mask.
2. **Frame Amplitude Control (R50) Semi-Variable Potentiometer.** Picture height too great or too small—adjust control until height of picture is correct for size of mask.
3. **Line and Frame Synch. Separator Bias Control (R27).** If this control requires adjusting the following effects will be noticed : Interference affecting the picture in the horizontal or vertical direction ; Picture unsteady and distorted in the horizontal direction, or a whitish ' ghost ' picture appearing on the left hand side of the picture. This latter effect is known as ' turn over.' Picture unsteady in the vertical direction.

IMPORTANT. BEFORE DECIDING THAT THIS CONTROL REQUIRES ADJUSTING IT IS IMPORTANT THAT THE VISION SENSITIVITY CONTROL AND THE BRIGHTNESS CONTROL ARE ADJUSTED FOR CORRECT PICTURE CONTRAST. (See 817 Instruction Book). ALSO THE LINE AND FRAME HOLD CONTROLS SHOULD BE ADJUSTED IN CONJUNCTION WITH THE SYNCH. SEPARATOR CONTROL. FOR DETAILS CONCERNING THE CORRECT ADJUSTMENT OF THE HOLD CONTROLS, PLEASE REFER TO THE 817 INSTRUCTION BOOK.

LINE LINEARITY CONTROL (SEMI-VARIABLE POTENTIOMETER).

The Line Linearity control R57 is mounted on a paxolin platform on the Time Base, and it will require adjusting when the following effects are noted :—

Elongation or cramping of part of the picture in the horizontal direction. This effect will always be noticed in the left hand half of the picture.

When checking the picture for correct line linearity it should be remembered that the amplitude will effect the linearity and vice versa. Therefore the amplitude and linearity controls should be adjusted in conjunction with each other so that when the amplitude is correct the linearity is also correct.

NOTE. The operation of the vision and sound sensitivity controls, the brightness control (i.e. the major control), the line and frame hold controls and the focus control is fully dealt with in the 817 Television Receiver Instruction Book.

MECHANICAL DATA

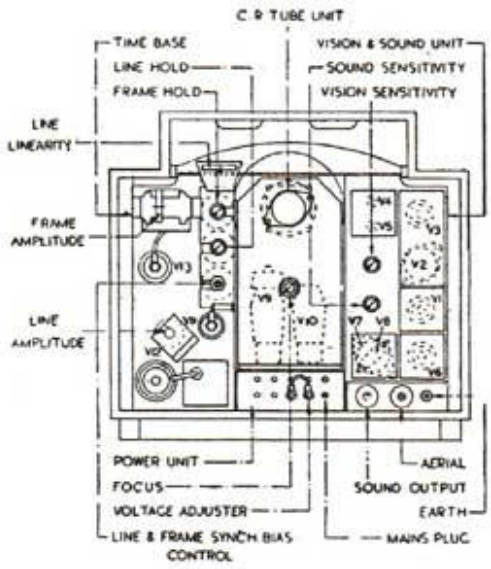


Fig. 15

WARNING. AFTER THE RECEIVER HAS BEEN SWITCHED OFF, THE LIVE TERMINAL OF THE E.H.T. SMOOTHING CONDENSER (C56) SHOULD BE SHORT CIRCUITED TO THE CHASSIS BY MEANS OF A SCREWDRIVER OR SIMILAR TOOL BEFORE ANY WORK IS CARRIED OUT ON THE RECEIVER. THIS IS NECESSARY BECAUSE THE CONDENSER HOLDS ITS CHARGE FOR A CONSIDERABLE TIME AFTER THE RECEIVER IS SWITCHED OFF.

REMOVING THE COMPLETE CHASSIS ASSEMBLY FROM THE CABINET.

Instructions concerning the removal of the chassis from the cabinet are tabulated below and should be carried out in the order given.

1. Disconnect the mains lead and the aerial input lead to the receiver.
2. Disconnect the sound output lead from the Television receiver to the radio receiver.
3. Remove the card back cover and the Brightness Control knob (this knob can be removed by means of a direct forward pull).
4. Lay the cabinet on one side (taking care to protect the polish with suitable padding) and remove the four chassis fixing bolts from the cabinet base.

The chassis can then be withdrawn from the cabinet.

ADJUSTING THE SEMI-VARIABLE RESISTANCE R50 (FRAME AMPLITUDE CONTROL) AND R57 (LINE LINEARITY CONTROL).

These resistances resemble an ordinary 4 watt resistance with the exception that they have a phosphor bronze wire loop slipped over them. By varying the position of the phosphor bronze wire, control of frame amplitude and line linearity is obtained. To move the slider on these controls, press the two prongs at the end of the loop and then the wire can be easily moved. Care must be taken to see that the sharp bend in the loop is always in contact with the bare portion of the resistance. When the slider is in the correct position, release the two prongs and the wire loop will slip tightly into position. Please note that the sliders on these controls are not 'live.'

TO FIT NEW VALVES.

All the EF6 valves in the vision and sound unit are screened by clip cans which can be easily pulled off their bases. In addition the valves are screened by tinned copper cylinders which form part of the chassis and cannot be removed ; therefore the valves must be carefully tapped out of their holders by inserting a screw driver or similar tool in the hole provided in the base of the valve holders.

The valves in the time base and the two rectifier valves on the power unit should be removed in the normal manner.

REMOVING THE CATHODE RAY TUBE.

1. The tube connector clipped on the base of the tube should be pulled clear.
2. Loosen the four 6 B.A. bolts securing the deflector coil assembly to the neck of the tube.
3. Disconnect the 2nd anode lead from the connector on the side of the tube.
4. Remove all rubber strapping and slide the neck of the tube through the holder in its mounting bracket and the focus coil at the same time working the deflector coil assembly and rubber ring down the neck of the tube until eventually the tube is free.

When fitting a new tube, reverse the operating procedure for removing the tube. For the correct positioning of the deflector coil assembly, rotate the assembly round the neck of the tube until the picture is the correct way up and square with the mask.

N.B. IT IS IMPORTANT THAT THE DEFLECTOR COIL ASSEMBLY IS KEPT WELL UP AGAINST THE FLARE OF THE TUBE.

Cases may be experienced when the picture is not in the centre of the mask. To rectify this, alter the position of the focus coil by adjusting the three screws holding the back of the focus coil can. After this adjustment has been made the focus of the raster should be checked to ensure that it is correct over the entire raster. If it is not correct or if there is any reduction in brightness at the corners of the raster with the brightness control adjusted so that the raster is just plainly visible, the focus coil should be repositioned and also the focus control potentiometer may have to be readjusted. Before checking the focus remove the aerial so that no picture is received and adjust the brightness control while checking the focus so as to ensure that the focus is correct for all degrees of brightness.

N.B. Care must be taken to ensure that the correct heater voltage is applied to the C.R. tube, if a new tube is fitted. See the Tube Unit Technical Specification.

REMOVING THE TIME BASE.

1. Disconnect the four leads from the Time Base to the connection panel on the Power Unit (Make a careful note how these leads are connected so that when reconnecting these wires no mistake is made).
2. Disconnect the mauve, yellow and black leads from the Time Base to the deflector coils.
3. Take out the two screws holding the paxolin support stay to the Time Base.
4. Remove the control grid connecting clip from the Synch. Separator valve (EF6) and take out the 4 B.A. screw from the brass rod fitted to the underside of the Power Unit.
5. Remove the two 2 B.A. nuts on the fixing bolts fitted to the mains transformer.

The Time Base can now be removed from the Power Unit.

REMOVING THE VISION AND SOUND UNIT.

1. Disconnect the green lead from the unit to the tube base connector.
2. Disconnect the four leads from the unit to the connection panel on the Power Unit (Make a careful note how these leads are connected so that when reconnecting, no mistake is made).
3. Take out the two screws holding the paxolin support stay to the unit.
4. Take out the 4 B.A. screw from the brass rod fitted to the underside of the Power Unit.
5. Remove the two 2 B.A. nuts on the fixing bolts fitted to the mains transformer.

The Vision and Sound Unit can now be removed from the Power Unit.

Care should be taken, when re-assembling the units, that the small brass spacer is in position next to the brass rod on the Power Unit.

TELEVISION AERIAL INSTALLATION

When selecting a site for the erection of a Dipole aerial it is important that the following two points should be taken into consideration :—

1. The distance from Alexandra Palace of the site where the television receiver is intended to operate and
2. The possibility of television reception being marred by interference particularly from cars, neon lights etc.

With regard to the first point, the most important thing to consider concerning the aerial erection is the height above the ground level of the centre tap of the television aerial. For installations within the Television service area (approximately 30 miles radius around the transmitter) the centre portion of the aerial should be approximately 25 ft. above ground level, whilst for installations outside the television service area, approximately 1 ft. of aerial height above 25 ft. is necessary for every mile beyond 30 miles. That is to say, if a television receiver is operated at a distance of 40 miles from the transmitter, the height of the aerial centre tap should be approximately 35 ft. Where a high level of interference is experienced however, it may be necessary to further increase the height of the aerial centre tap.

As the distance from the transmitter increases special considerations may become necessary, but broadly speaking the general principles given above can be applied.

With regard to the second point, a compromise should be effected between the maximum signal strength and minimum interference. That is to say the normal signal strength will be at maximum when the whole aerial erection is in a plane with a line drawn from the transmitter, but if this position coincides with the position giving maximum interference level, then the aerial assembly can be rotated slightly in order to obtain the compromise mentioned above.

Therefore in choosing a site for a television aerial the nearest main road or road carrying any appreciable amount of traffic should always be regarded as the primary source of interference, and the aerial should be erected as far away as possible from such a road.

ERECTION OF AERIALS.

The instructions given below only apply to the erection of Pye Television Aerials.

Normally the Pye television aerial can be fixed in a conveninent position to a wall by means of wall fixing brackets and a pole, but where it is desired to increase the effective height of the aerial centre tap, the aerial complete with pole can be mounted on a chimney by means of special chimney fixing pieces. In the notes below we give details concerning the method of erecting these two types of aerial installations.

(*a*) FIXING THE AERIAL COMPLETE WITH POLE IN A CONVENIENT POSITION TO A WALL.

For this type of aerial erection the following parts will be required in addition to the Pye Television Aerial Kit.

1 Pole of convenient length.
2 Wall brackets.
4 3 in. × ½ in. coach bolts.
4 wall plugs.
and necessary length of concentric cable, together with a quantity of lead headed nails.

To erect this type of aerial, the instructions tabulated below should be carried out in the order given.

1. Select a suitable location for the wall brackets and mark off positions for four holes to take the wall mounting plugs. The distance between the top and bottom holes should be 2 to 3 ft.
2. The holes should then be drilled in the wall by means of a 21/32 in. jumper bit and hammer. The holes should be made if possible through the brickwork and not through the mortar. It will be found that if the jumper bit is consistently turned whilst being struck with the hammer the bit will drive more easily through the brickwork. If the bit is struck too hard it will in all probability seize. The holes should be made just deep enough to take the wall plugs.
3. Place the wall plugs in the holes. These plugs are made with one narrow end and one wide end and they should be placed in the holes narrow end first. This is important.
4. The wall brackets should then be placed in position and secured by means of the four 3 in. by ½ in. coach bolts. These bolts are screwed in the wall plugs and care must be taken to see that they are tight.
5. The aerial assembly should then be carried out according to the instructions enclosed with each television aerial kit.
6. The end of the pole should be shaped to accommodate the clamping pieces attached to the aerial cross bar.
7. Two ¼ in. clearance holes should be drilled in the end of the pole in order to accommodate the two bolts provided with the aerial kit for securing the aerial assembly to the pole. The correct positions for these holes can be ascertained by placing the aerial assembly temporarily in position at the end of the pole and marking off the hole locations.
8. The aerial assembly should then be secured firmly to the end of the pole and the aerial feeder lead attached to the pole by means of the lead headed nails provided.
9. The pole should then be hoisted into position and clamped to the wall bracket.
10. The feeder lead should then be secured to the brickwork by the lead headed nails.

(*b*) FIXING THE PYE TELEVISION AERIAL COMPLETE WITH POLE ON A CHIMNEY.

For this type of erection the following parts will be required in addition to the Pye Television Aerial kit.

1 Pole of convenient length.
1 Eaves bracket with insulator.
1 3 in. × ½ in. bolt and nut.
2 3 in. × ½ in. coach bolts and wall plugs.
36 ft. Galvanised steel wire.
6 Chimney corner pieces, small.
2 Chimney corner pieces, large, with strainer bolts and wire eyelets.
2 6 in. × ½ in. bolts and nuts.
4 Galvanised wire cleats.
2 Pole clamps.

Necessary length of concentric cable and a quantity of lead headed nails.

Instructions concerning the erection of this type of aerial are tabulated below and should be carried out in the order given.

1. First cut off two lengths of galvanised wire sufficient to go round the chimney on which it is intended to mount the aerial pole. Allow a surplus of approximately 6 inches on each length of wire to ensure that there is sufficient to pass round the chimney fittings.
2. Take one length of wire and loop one end round the wire eyelet on one of the large chimney corner pieces and secure it by means of two of the wire cleats supplied.
3. Take the wire round the chimney and loop the other end round the ring of the strainer bolt and secure it by means of two wire cleats. (This strainer bolt is part of the large chimney corner piece).
4. Mount the large chimney corner piece in position and tighten the wire round the chimney by means of the adjusting nut on the strainer bolt.
5. Take one of the smaller chimney corner pieces and slacken off just enough wire to allow this fitting to be mounted in position.
6. The same method can be adopted for fitting the two remaining small corner pieces.
7. Fit one of the pole clamps to the large chimney corner piece by means of one of the 6 in. by ½ in. bolts and nut provided. The pole clamp should not be mounted in the slot on the chimney corner piece. It should be mounted on top of the projection. This is so that the bolt can be tightened sufficiently to hold the aerial pole rigidly in position.
8. Make sure that the wire fixing the chimney fittings is tight, also that the corner pieces are all in the same place.
9. The remaining chimney fittings and pole clamp can then be mounted as per the instructions given above. The distance between the two sets of chimney fittings should be approximately 3 ft.
10. After fitting the small chimney corner pieces it is advisable to insert a piece of wire in the holes provided. These will prevent the corner pieces falling if at any time the aerial is dismantled.
11. The aerial assembly should then be carried out according to the instructions given in the leaflet included with the aerial kit.
12. The end of the pole should be shaped to accommodate the aerial clamping piece and two ¼ in. clearance holes should be drilled in this end of the pole. The correct position for the holes should be ascertained by temporarily mounting the aerial at the end of the pole.
13. The aerial should then be placed in position and clamped firmly to the end of the pole. Then the aerial feeder lead should be secured to the pole by means of the lead headed nails provided.
14. The aerial and pole should then be hoisted in position and the pole fixed securely in the clamps.
15. The aerial feeder must be secured to the brickwork by means of the lead headed nails.
16. If an eaves bracket is required this should be mounted according to the following instructions :—
    (*a*) Mark off the holes for taking the two wall plugs.
    (*b*) Make the holes with a 21/32 in. jumper bit and hammer.
    (*c*) Insert the wall plugs in the holes (these plugs must be inserted narrow end first).
    (*d*) Mount the eaves bracket and secure it by means of the two 3 in. by ½ in. coach bolts. (These bolts must be screwed tightly into the wall plugs).
    (*e*) Secure the insulator to the eaves bracket by means of the 3 in. by ½ in. bolt and nut provided.

The additional parts required for mounting the aerial as described in (*a*) and (*b*) can be obtained from Pye Limited, Cambridge. Prices are as follows :—

2 Wall brackets complete with clamps 4 3 in. × ½ in. coach bolts 4 wall plugs	£1 2*s.* 6*d.* List	36 ft. Galvanised steel wire 6 Small chimney corner pieces 2 Large chimney corner pieces with strainer bolts and wire eyelets 2 6 in. × ½ in. Bolts and nuts 4 Galvanised wire cleats 2 Pole clamps
1 Eaves bracket with Insulator 1 3 in. × ½ in. bolt and nut 2 3 in. × ½ in. coach bolts and wall plugs	7*s.* 6*d.* List	£1 10*s.* 0*d.* List

Lead headed nails		1*s.* 6*d.* per doz.
Cable	K.I.A.	10*d.* per yd.
	AS5C	2*s.* 3*d.* „ „
	Special Pye cables	7*d.* „ „

1939 TRIMEASY SIGNAL GENERATOR

The 1939 Trimeasy is specially suitable for Television Receiver adjustments. A third R.F. socket extends the attenuator range to below 1 microvolt, the complete range covering a ratio of 1,000,000 to 1. The output impedance is such that the Generator can be connected direct to the input of a Vision Channel via 2 ft. of ordinary screened lead as supplied with the instrument, the the R.F. socket connectors are of course entirely screened. The 10 kc. and 400 cycle modulation can be used for adjusting Line and Frame Hold controls when an A.P. transmission is not available.

THREE R.F. OUTPUTS.
Force—Attenuated High, calibrated in decimals of maximum and Attenuated low.

MODULATION AND A.F. OUTPUTS.
400 cycles; 10 kc.; 150 kc.; or External Modulation. Attenuated A.F. outputs 400 and 10,000 cycles.

TELEVISION RECEIVER ADJUSTMENTS.
Television wavebands are marked on the calibrated charts.

WAVE RANGES.
From 50 mcs to 100 kcs. (6–3,000 metres) in five ranges selected by switch. Fundamentals are used down to 25 mcs.

CLOCK FACE DIAL.
Effective scale length 300 ins. (5,000 divisions) for the complete range. 1 megacycle on the Television band is represented by approximately 1⅛ ins. of scale lengths so that very accurate adjustments can be obtained.

HAND CALIBRATIONS.
Each Trimeasy is individually calibrated giving it the accuracy of a laboratory test instrument.

FREQUENCY STABILITY.
Within 1% for a 30% change in H.T. voltage. Stability against attenuator setting better than 1 cycle per second for attenuator range

BATTERY SUPPLY.
2 volt unspillable accumulator and three standard 9 volt batteries.

DUMMY AERIALS.
The instrument is supplied with three entirely screened leads, and dummy aerials designed to the standards approved by the R.M.A.
Price 9 guineas (net) or Hire Purchase.

IVORY TRIMMING TOOLS

It is essential to use an entirely insulated trimming tool when adjusting dust core inductances as used in Pye Television receivers. In addition the advantages of such a tool will be readily appreciated when trimming any R.F. circuits.

Real Ivory has been chosen for the insulated blades of the Pye Ivory Trimming Tools as it was found to be far superior to other natural and synthetic materials.

Four blades are supplied, two of Ivory and two of Silver Steel. The blades which are easily interchangeable fit into the insulated handle by a direct thrust.
Price 3/8 net carriage paid.