Pye 815 Vision Receiver

Eighteen valve, television and vision-sound receiver with 7½ by 6in. picture, in table cabinet, suitable for 200-250 volt, 50-60 cycle AC supplies, price 30 gns.

CIRCUIT DESCRIPTION

THE vision channel operates at the fundamental frequency and terminates in a full-wave demodulator which operates the tube directly without the use of a video stage.

The input circuit is condenser tuned and feeds the grid of V1, which is fully decoupled, even to the extent of a heater choke. Transformer coupling follows, the primary winding having a tapping from which the input to the sound channel is taken.

Both V2 and V3 are transformer coupled, the windings being permeability tuned. V4 has a special transformer with a centre-tapped secondary feeding the demodulator stage. Gain on all the amplifiers is controlled by varying the bias on the suppressor grids.

For full-wave demodulation use is made of two separate diodes, V5 and V6, which have a common load feeding the input of the tube.

Sound Channel

The sound channel bears a marked similarity to the vision unit V7 and V8 are amplifiers coupled by trimmer-tuned transformers. The second amplifier, V8, works into a single diode, V9, which is D.C. coupled to a pentode AF amplifier V10.

Gain is pre-controlled by varying the suppressor bias and manually regulated by an ordinary volume control on the grid of the output valve. A normal resistance capacity coupling is used between V10 and V11, the output pentode.

Scanning Unit

The scanning unit uses hard time-base generators and power amplifiers. The line scan is obtained from V14, an HF pentode used as a conventional blocking oscillator with a large-power amplifier, V15. The line coils are fed from this through a transformer with a correction circuit on the secondary winding.

On the frame side, use is made of a special combination valve, V18, which is a triode and hexode in the same bulb. The triode works as a blocking oscillator and the hexode as the amplifier. Coupling to the frame coils is again by a transformer.

Line and frame speeds are controlled by varying the grid resistances of the oscillators. The outputs are varied by altering the cathode bias resisters of the amplifiers.

For synchronising use is made of separate valves for the line and frame—V16 and V17, respectively. These valves have independent bias controls which determine the operation point. The valves are arranged to operate as filters and the separated pulses are applied to the blocking oscillator circuits.

Brilliance is controlled by varying the tube bias, obtained from a potentiometer on the HT circuit. This source of supply also provides the voltage for the first anode, the standard tube used is a Mullard MW22/1, which has a special hexode assembly requiring about 250 volts on the first anode.

Power Supplies.

All the power supplies are derived from a power pack having two valves, one an EHT rectifier, V12, and the other, V13, a heavy-current low-voltage rectifier.

The EHT output is smoothed by a single condenser which has a bleeder resistance. The main power supply has the smoothing chokes in the negative lead, this circuit also including the focusing coil. The voltage drop across the chokes is used for feeding the potentiometers employed for the bias or gain controls of the vision and sound channels.

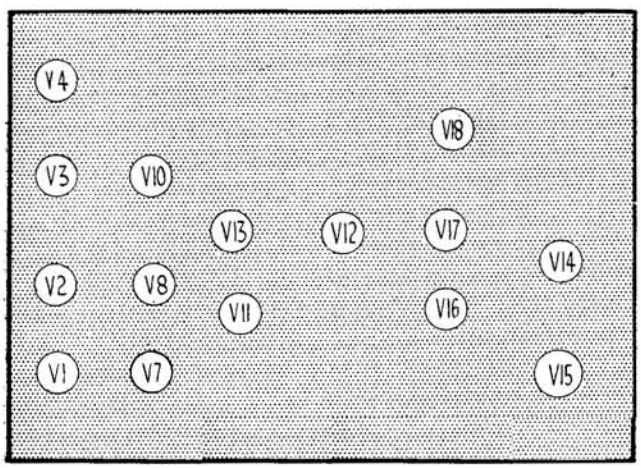
VALVE READINGS

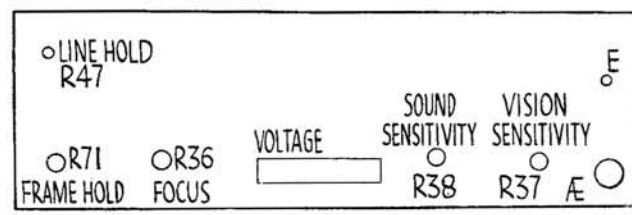
Valve.	Type.	Anode.	Screen.	Cathode
1	EF6	160	162	2.8
2	EF6	162	162	2.8
3	EF6	162	162	2.8
4	EF6	235	235	4.3
5	T6D	Diode only	—	—
6	T6D	Diode only	—	—
7	EF6	162	162	2.8
8	EF6	162	162	2.8
9	T6D	Diode only	—	—
10	EF6	45	38	—
11	EL3	230	225	5.7
12	HV R2 (*All Mullard*)	—	—	—
13	UU4 (*Mazda*)	353 AC	—	380
14	EF6 (*Mullard*)	25	310	—
15	AC6PEN (*Mazda*)	300	190	18
16	EF6 (*Mulard*)	90	30	13
17	EF6 (*Mullard*)	90	30	13
18	6153/T (*Mullard*)	280	290	18
		80 Triode		

CONSTRUCTIONAL FEATURES

THIS receiver is likely to present difficulties as it is built on very scientific lines with assemblies close to the valve electrodes. As a result many small networks and valve sockets are inaccessible.

(*Continued on page* 38.)





While the receiver, scanning unit and power supply sections of the Pye 815 each form individual sub-chassis, we give on the left an "assembled" diagram which will aid identification of the valves. The smaller diagram above identifies the controls at the back of the receiver.

Constructional Features

(*Continued from page* 36.)

The receiver and scan sections are separate units carried on a main chassis on which the power pack and tube unit is built. These units are held by four bolts and the units are, therefore, more or less readily removable.

In the event of a major breakdown involving investigation under working conditions it would appear necessary to remove the unit concerned and re-connect it when out of the main chassis frame so that the working conditions can be checked over.

The manufacturer's data does not agree in some points with the chassis which we examined, and particularly in respect of the time base pre-set controls. In our chassis they are carried on a separate assembly as shown in the drawings.

Heater Chokes

The valve heaters are supplied through chokes. These are formed by spiral turns of connecting wire covered in sleeving. In the event of repairs being made, on no account should these leads be pulled out or shortened.

To remove any of the valves it is necessary to push them up from the bottom of the holders. For this purpose it will be seen that the holders have been provided with a large hole in the base through which a rod may be inserted.

Some difficulty may be experienced in locating many of the resistors. This is due to the fact that a great number of them are of small rating and the dimensions are equally minute, enabling them to be slipped inside small diameter sleeving.

It should be noted that if the set is ganged by means of a meter on the output of the vision channel, that used may be an ordinary DC type. The resistance, however, must be of the order of 1,000 ohms per volt, and a suitable full-scale deflection would be about 50 volts. If the meter has a lower resistance it will affect the load on the vision channel and upset the ganging.

Chassis Removal

First pull off the two control knobs on the front of the cabinet and remove the two screws holding the top of the framework inside the cabinet. Next release the four retaining bolts from the bottom of the cabinet. The chassis can then be withdrawn.

To remove the tube it is necessary to slide out the protective glass plate. This is slipped out of the clips by pressing against the rubber mask. It is important to keep the plate in line with the clips as it is pushed out. The mask can then be taken away.

The socket should next be pulled off the tube and the tube pushed gently forward. At the same time it is necessary to ease the rubber rings along the neck and take care not to damage the scan coils. To refit the tube the whole process is reversed.

Cathode-ray Tube

The standard C.-R. tube in this receiver is the Mullard MW/22/1. Normal operating voltages are: First anode, 150 volts;

(*Continued on page* 40.)

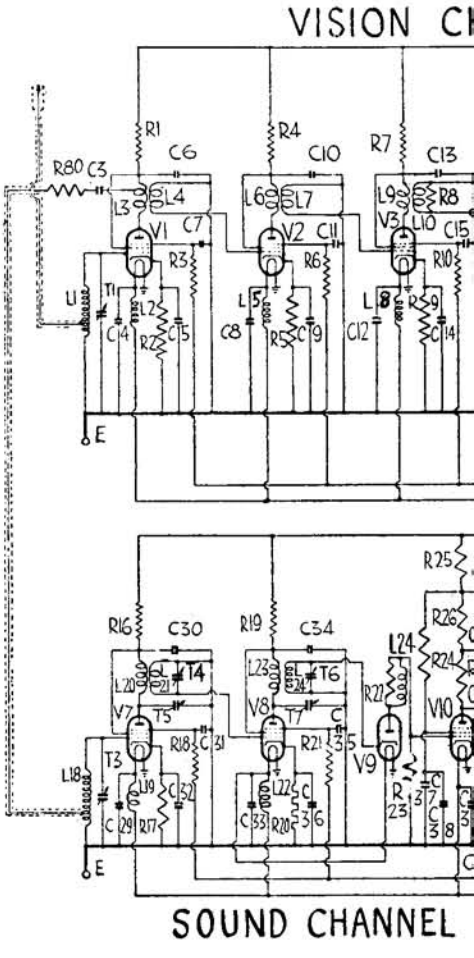
CIRCUIT DIAGRAM AND COMPONENT

RESISTANCES

		Ohms.
1	V1 feed decouple	18,000
2	V1 cathode bias	400
3	V1 suppressor decouple	2,500
4	V2 feed decouple	18,000
5	V2 cathode bias	400
6	V2 suppressor decouple	2,500
7	V3 feed decouple	18,000
8	V3 sec. couple shunt	15,000
9	V3 cathode bias	400
10	V3 suppressor decouple	2,500
11	V4 anode decouple	250
12	V4 anode decouple	5,000
13	V4 cathode bias	300
14	Vision gain decouple	500,000
15	Diode load	5,000
16	V7 anode decouple	18,000
17	V7 cathode bias	400
18	V7 suppressor decouple	2,500
19	V8 feed decouple	18,000
20	V8 cathode bias	400
21	V8 suppressor decouple	2,500
22	V9 filter shunt	1,000
23	V9 diode load	50,000
24	V10 screen decouple	50,000
25	V10 anode decouple	100,000
26	V10 anode load	10,000
27	V10 HF filter	1,000
28	Sound gain decouple	500,000
29	Sound volume control	250,000
30	V11 grid stopper	1,000
31	Tone correction	10,000
32	V11 anode decouple	1,000
33	V11 cathode bias	150
34	V11 screen decouple	5,000
35	Focus network (part)	10
36	Focus control	20,000
37	Vision sensitivity	50,000
38	Sound sensitivity	50,000
39	Tube cathode resistor	5,000
40	Tube bias pot. (part)	50,000
41	Brightness control	20,000
42	Tube bias pot. (part)	5,000
43	Focus pot. (part)	500
44	Gain control pot. (part)	10.000
45	EHT bleeder	50 meg.
46	V14 grid leak	50,000
47	Line hold	100,000
48	V14 anode load	250,000
49	Line fly back resistor	200
50	V15 screen decouple	10,000
51	V15 cathode resistor (part)	100
52	Line amplitude	500
53	V15 grid leak	500,000
54	V16 grid filter	100,000
55	V17 grid filter	100,000
56	V16 anode load (part)	50,000
57	V16 anode load (part)	50,000
58	Synch. bias pot. (part)	30,000
59	Synch. bias pot. (part)	25,000
60	Synch. bias pot. (part)	4,500
61	Line synch. bias control	5,000
62	Frame synch. bias control	5,000
63	Synch. bias pot. (part)	500
64	V17 anode load (part)	50,000
65	V17 anode load (part)	250,000
66	Frame synch. shunt	100,000
67	Frame feed back	50,000
68	V18 triode anode feed	400,000
69	Frame correction	500
70	Frame linearity	1,000
71	Frame hold	100,000
72	V18 triode grid leak	150,000
73	V18 cathode resistor	500
74	Frame amplitude	1,000
75	V18 hexode feed	1,000
76	V18 hexode grid leak	2 meg.
77	Fly back suppressor	100,000
78	Line linearity	3,000
79	Tube grid stopper	25,000
80	Sound input filter	50
81	V18 cathode bias (part)	400

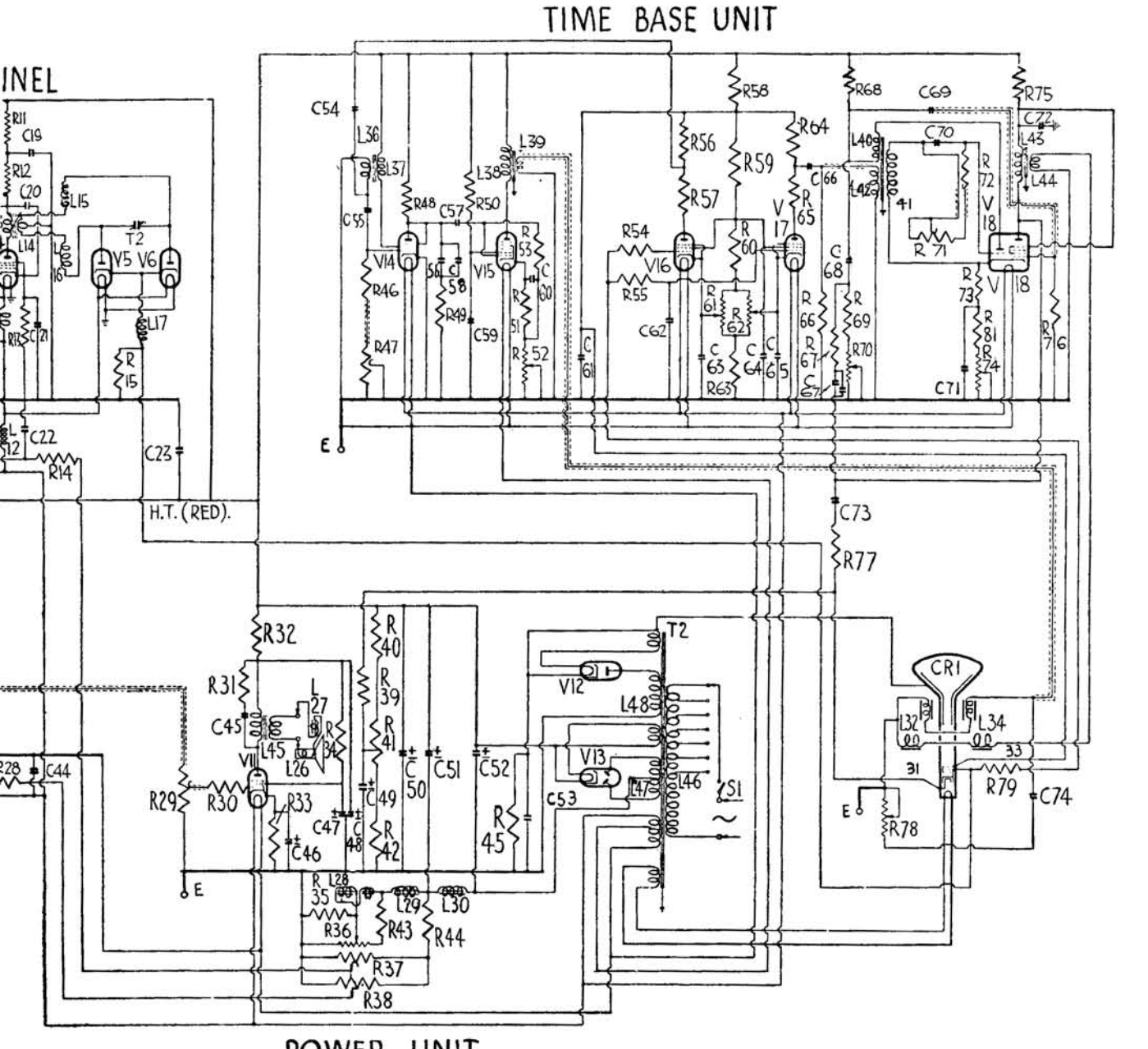
CONDENSERS

		Mfds.
3	Vision channel couple	.0005
4	V1 heater decouple	.0005
5	V1 cathode decouple	.0005
6	V1 feed decouple	.0005
7	V1 suppressor decouple	.0005
8	V2 heater decouple	.0005
9	V2 cathode decouple	.0005
10	V2 feed decouple	.0005
11	V2 suppressor decouple	.0005



The circuit diagram with vision, sound, time base and power sections distinctly grouped. The receiver sections work at signal frequencies. A full description is on page 36

Condensers (continued)		
12	V3 heater decouple	.0005
13	V3 cathode decouple	.0005
14	V3 feed decouple	.0005
15	V3 suppressor decouple	.0005
16	Heater line decouple	.0005
17	V4 heater decouple	.0005
18	V4 heater decouple	.0005
19	V4 feed decouple	.002
20	V4 screen and anode decouple	.002
21	V4 cathode decouple	.0005
22	Vision bias decouple	.1
23	HT line bypass.	.002
29	V7 heater decouple	.0005
30	V7 feed decouple	.0005
31	V7 suppressor decouple	.0005
32	V7 cathode decouple	.0005
33	V8 heater decouple	.0005
34	V8 feed decouple	.0005
35	V8 suppressor decouple	.0005



Condensers (continued)			
36	V8 cathode decouple		.0005
37	V10 screen decouple		.1
38	V10 screen bypass		.0005
39	V10 heater decouple		.0005
40	V10 anode decouple		2
41	AF couple		.1
42	HF filter		.0005
43	Sound gain decouple		.1
44	Heater line decouple		.0005
45	Tone correction		.01
46	V11 cathode decouple		50
47	V11 screen decouple		8
48	V11 anode decouple		16
49	Tube bias decouple		8
50	HT smoothing		30
51	HT smoothing		30
52	HT smoothing		16
53	EHT smoothing		.25
54	Line synch. couple		.01

Condensers (continued)			
55	V14 grid		.0005
56	Line charge condenser (part)		.001
57	Line couple		.01
58	Line charge condenser (part)		.002
59	V15 screen decouple		.25
60	V15 cathode decouple		20
61	First anode and synch. pot. (part) decouple		8
62	Frame synch. filter		.0012
63	V16 cathode decouple		20
64	V16 and V17 screen decouple		8
65	V17 cathode decouple		20
66	Frame synch. couple		.0005
67	Frame feed back		025
68	Frame charge condenser		.25
69	Frame couple		.25
70	Frame generator grid		.05
71	V18 cathode decouple		50
72	V18 anode decouple		8

Condensers (continued)			
73	Frame flyback		.01
74	Line linearity		.012
75	Shunt with C67		.01

WINDINGS

L.	Ohms.	L.	Ohms.
28	125	39	7
29	150	40	240
30	92	41	3,220
31	3.5	42	3,500
32	4.5	43	1,086
33	3.5	44	1
34	4.5	45	727
36	316	46	8
37	38	47	176
38	270	48	9,872

Tube Details

(*Continued from page* 38.)

second anode, 5,000 volts; cathode (according to position of brightness control), 100-28 volts.

A number of receivers, however, are fitted with Mullard tubes type MW/22/2. These have a 6.3-volt heater and therefore the current is derived from the 6.3-volt winding on the mains transformer. A tube which is fitted with a 6.3-volt heater will either have a red dot painted on the connection base or the connection base will be coloured red.

If one of the above tubes is at any time fitted to a receiver in which an MW/22/1 4-volt heater tube was previously incorporated, the heater supply leads must be connected to the 6.3-volt heater tags.

On a number of receivers the second anode voltage has been reduced to 4,500 volts. The resistance of the EHT winding on the mains transformer is 8,800 ohms in such cases.

A number of receivers are fitted with a modified focus coil and focus control circuit.

In this case the focus coil (L28) is a single winding with a DC resistance of 60 ohms. R35 is omitted and the end of the coil is connected direct to the chassis.

The focus control potentiometer (R36) is 1,000 ohms. R43 is a 1-watt resistance of 100 ohms.

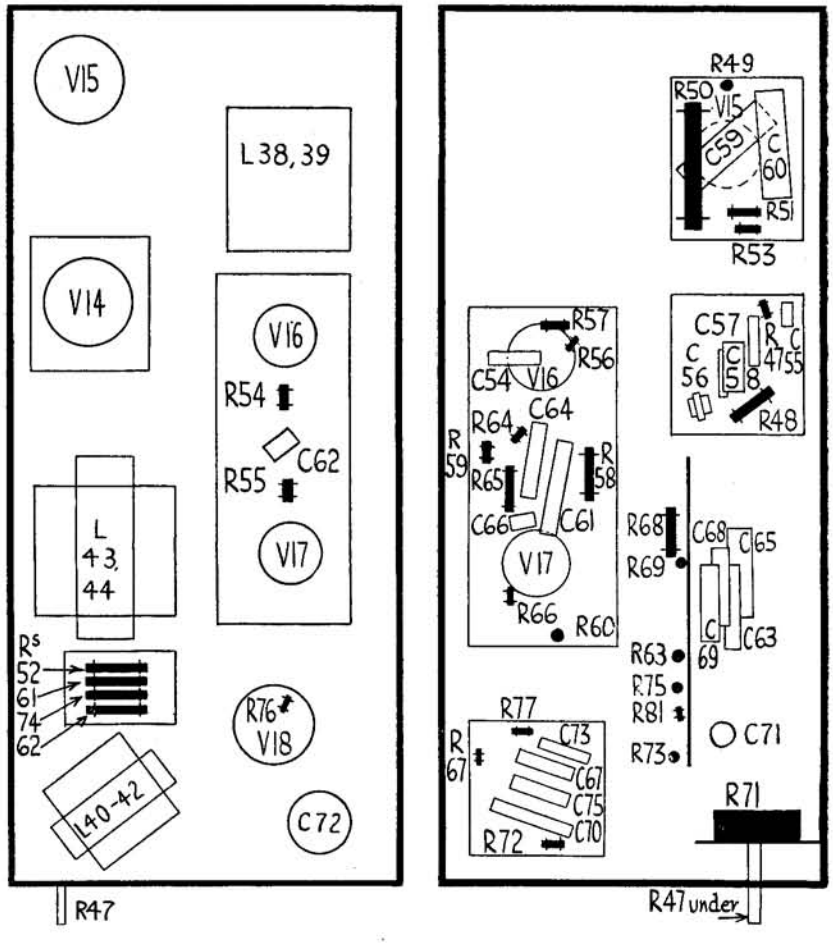
Picture Adjustment

THE set using a perfectly orthodox scanning unit there should be no difficulty in correctly adjusting the scan. The only care necessary is, as usual, with the line amplitude and line linearity.

The left-hand edge of the picture should be correctly adjusted before the width is controlled. Non-linearity of the frame will be similarly observed as an elongation at the top of the picture.

Replacement Condensers.—Exact replacement electrolytics available from A. H. Hunt, Ltd., are: for C60, 63 or 65, unit 2935, 1s. 9d.; C49, 61 or 64, 3477, 1s. 9d.; C71, 2839, 2s. 6d.; C46, 2915, 1s. 9d.; C40, 2964, 1s. 10d.; C72, 3551, 4s. 6d.; C50 or 51, 1570, 7s. 6d.; C52, 2530, 6s. 6d., and C47 and C48, 1571, 7s.

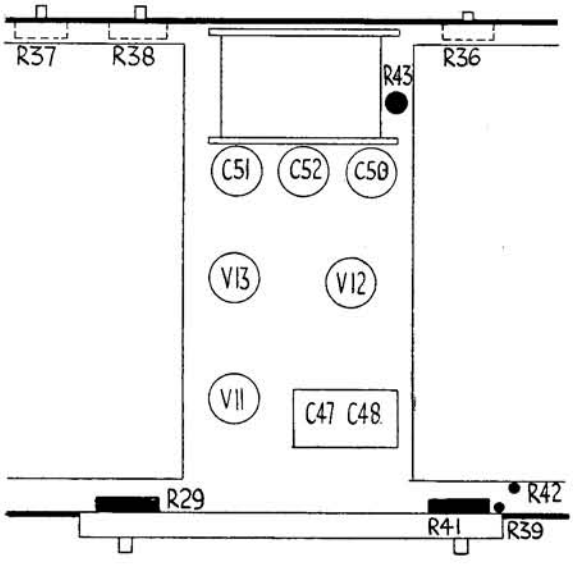
SCAN UNIT LAYOUTS

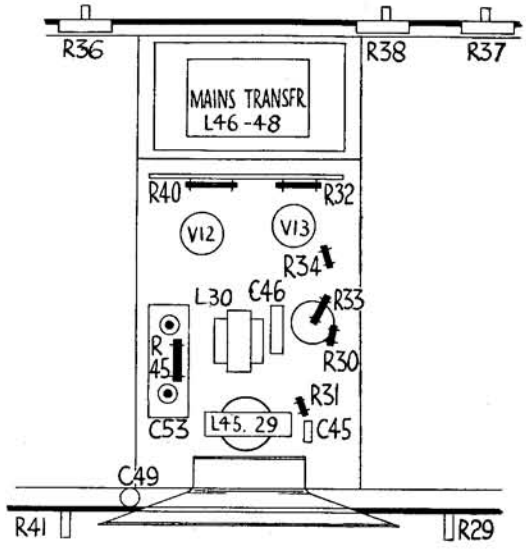


Above are diagrams identifying the components on top (left) and underneath (right) the scan or time base unit. Rapid fault finding tests for all three sections of the 815 are on page 37 of this review.

POWER UNIT LAYOUTS

Top (left) and underside views of the power unit. V12 is the high voltage rectifier and V13 feeds the rest of the set. V11 is the output valve of the sound channel.





Power Tests

Loading : 150 watts.

EHT : Voltage across R45, 5,000 or 4,500 volts.

HT line : V13 cathode, 380 volts.

VISION CHANNEL

Last Amplifier, V4

Remove EHT rectifier and connect output meter to diode load.

Inject 46.25 mcs. at V4 grid. If defective, check :—

Voltages : Anode and screen, 235; cathode, 4.3.

Resistances : Anode-HT, 5,250; cathode-chassis, 300 ohms.

Third Amplifier, V3

Inject frequency of 43.75 mcs. at V3 grid. If defective, check :—

Voltages : Anode and screen, 162; cathode, 2.8.

Resistances : Anode-HT, 18,000; cathode-chassis, 400 ohms.

Second Amplifier, V2

Inject frequency of 43.75 mcs. at V2 grid. If defective, check :—

Voltages and resistances as for V3.

First Amplifier, V1

Inject a frequency of 45 mcs. at V1 grid. If defective, check :—

Voltages and resistances as for V3.

SOUND CHANNEL

Output Stage, V11

Connect output meter to speaker transformer and inject 2 volts AF at V11 grid. If defective, check :—

Voltages : Anode, 230; screen, 225; cathode, 5.7.

Resistances : Anode-HT, 1,000; screen-HT, 6,000 ohms.

AF Stage, V10

Inject .5 volt AF at V10 grid. If defective, check :—

Voltages : Anode, 45; screen, 38; cathode, 0.

Resistances : Anode-HT, 111,000; screen-HT, 150,000; grid-chassis, 50,000.

Second Amplifier, V8

Inject a frequency of 41.5 mcs. at V8 grid. If defective, check :—

Voltages : Anode and screen, 162; cathode, 2.8.

Resistances : Anode-HT, 18,000; cathode-chassis, 400.

First Amplifier, V7

Inject a frequency of 41.mcs. at V7 grid. If defective, check :—

Voltages and resistances as at V8.

SCANNING UNIT

Line Section

Remove V14 and test V15 as an audio amplifier. Inject 5 volts AF at V15 grid and note amplified voltage at anode. If defective, check :—

Voltages : Anode, 300; screen, 190; cathode, 18.

Resistances : Grid-chassis, 500,000; anode-HT, 270; screen-HT, 10,000 ohms.

Frame Section

As the frame generator and amplifier are common, short circuit L41 and test the hexode section of V18 as audio amplifier, injecting 5 volts at hexode grid. If defective, check :—

Voltages : Anode, 280; screen, 290; cathode, 18 volts.

Resistances : Hexode anode-HT, 1,000 ohms; grid-chassis, 2 megohms.

Alignment Instructions

THE set can be trimmed with the use of either a screen picture or an output meter. If the latter is used, the EHT should be disconnected.

With the indicator means ready for use, inject at the feeder terminals a signal of 45 mcs. and adjust T1, L3 and L4 for maximum output. The dust cores in the various inductances are capable of rotation. The adjustment must be made with a non-magnetic trimming tool.

Next inject a signal of 43.75 mcs. and adjust L6 and L7. Change the frequency to 46.25 mcs. and readjust the cores. Return the frequency to 43.75 mcs. and adjust the cores once more.

Inject again a frequency of 46.25 mcs. and adjust L9 for maximum. Then inject a signal of 43.75 mcs. and adjust L10, L13 and L14 for maximum.

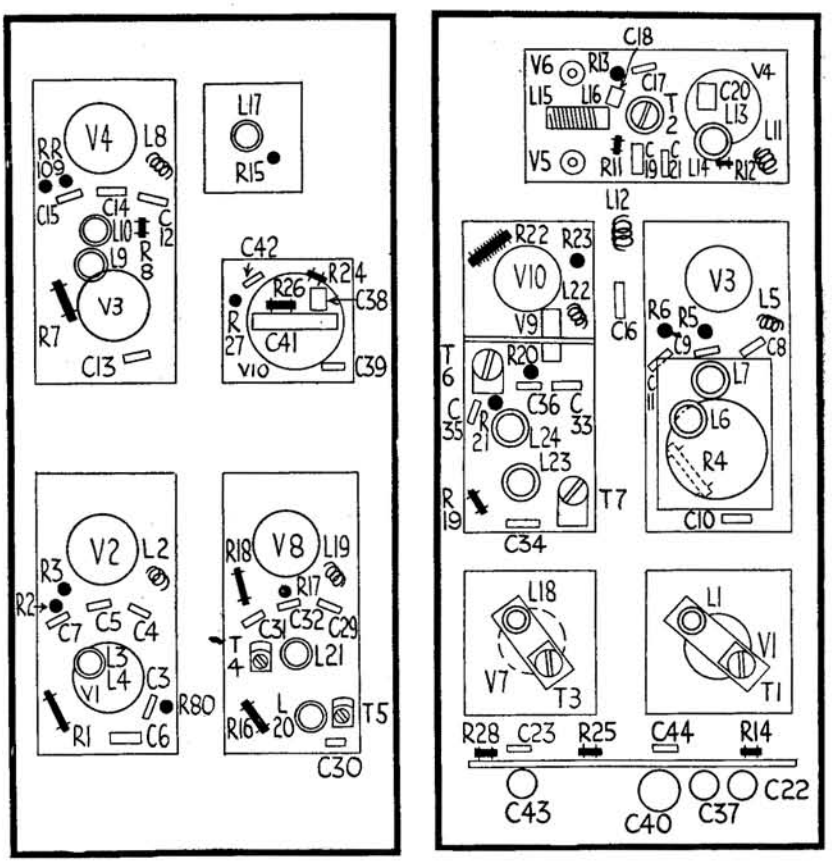
Finally, inject a signal of 46.26 mcs. and adjust T2 for maximum. The cores must be adjusted in the order stated.

To trim the sound channel the injected frequency must be 41.5 mcs. This signal should be modulated in the usual manner and injected at the feeder terminals. The trimmers should be adjusted in the following order : T3, T5, T4, T7 and then T6. On no account must any alteration be made to T1 or L3 and L4.

SAFETY FIRST

After the receiver has been switched off, the terminals of the EHT smoothing condenser (C53) should be short-circuited 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.

VISION AND SOUND UNIT LAYOUTS



Top view (left) and underneath view (right) of the vision and sound channels. As the trimmers are in this section, the alignment notes are given at the side. As described in the text under Constructional Features, all the valves are not visible from above.

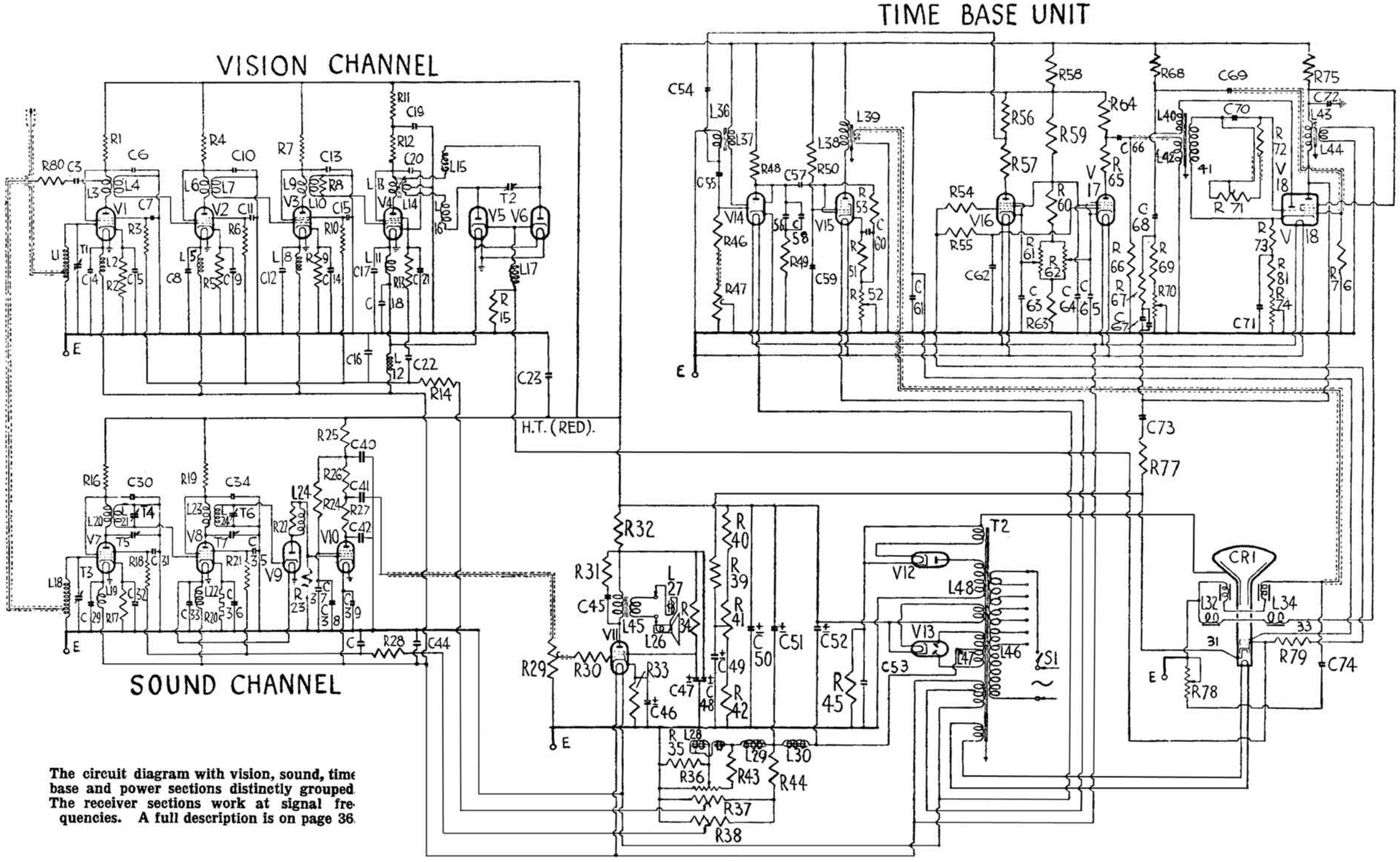
CIRCUIT DIAGRAM AND COMPONENT TABLES

RESISTANCES

		Ohms.
1	V1 feed decouple	18,000
2	V1 cathode bias. .	400
3	V1 suppressor decouple	2,500
4	V2 feed decouple	18,000
5	V2 cathode bias. .	400
6	V2 suppressor decouple	2,500
7	V3 feed decouple	18,000
8	V3 sec. couple shunt	15,000
9	V3 cathode bias. .	400
10	V3 suppressor decouple	2,500
11	V4 anode decouple	250
12	V4 anode decouple	5,000
13	V4 cathode bias. .	300
14	Vision gain decouple	500,000
15	Diode load	5,000
16	V7 anode decouple	18,000
17	V7 cathode bias. .	400
18	V7 suppressor decouple	2,500
19	V8 feed decouple	18,000
20	V8 cathode bias. .	400
21	V8 suppressor decouple	2,500
22	V9 filter shunt	1,000
23	V9 diode load	50,000
24	V10 screen decouple	50,000
25	V10 anode decouple	100,000
26	V10 anode load	10,000
27	V10 HF filter	1,000
28	Sound gain decouple	500,000
29	Sound volume control	250,000
30	V11 grid stopper	1,000
31	Tone correction	10,000
32	V11 anode decouple	1,000
33	V11 cathode bias	150
34	V11 screen decouple	5,000
35	Focus network (part)	10
36	Focus control	20,000
37	Vision sensitivity	50,000
38	Sound sensitivity	50,000
39	Tube cathode resistor	5,000
40	Tube bias pot. (part)	50,000
41	Brightness control	20,000
42	Tube bias pot. (part)	5,000
43	Focus pot. (part)	500
44	Gain control pot. (part)	10.000
45	EHT bleeder	50 meg.
46	V14 grid leak	50,000
47	Line hold	100,000
48	V14 anode load	250,000
49	Line fly back resistor	200
50	V15 screen decouple	10,000
51	V15 cathode resistor (part)	100
52	Line amplitude	500
53	V15 grid leak	500,000
54	V16 grid filter	100,000
55	V17 grid filter	100,000
56	V16 anode load (part)	50,000
57	V16 anode load (part)	50,000
58	Synch, bias pot. (part)	30,000
59	Synch. bias pot. (part)	25,000
60	Synch. bias pot. (part)	4,500
61	Line synch. bias control	5,000
62	Frame synch. bias control	5,000
63	Synch. bias pot. (part)	500
64	V17 anode load (part)	50,000
65	V17 anode load (part)	250,000
66	Frame synch. shunt	100,000
67	Frame feed back	50,000
68	V18 triode anode feed	400,000
69	Frame correction	500
70	Frame linearity	1,000
71	Frame hold	100,000
72	V18 triode grid leak	150,000
73	V18 cathode resistor	500
74	Frame amplitude	1,000
75	V18 hexode feed	1,000
76	V18 hexode grid leak	2 meg.
77	Fly back suppressor	100,000
78	Line linearity	3,000
79	Tube grid stopper	25,000
80	Sound input filter	50
81	V18 cathode bias (part)	400

CONDENSERS

		Mfds.
3	Vision channel couple	.0005
4	V1 heater decouple	.0005
5	V1 cathode decouple	.0005
6	V1 feed decouple	.0005
7	V1 suppressor decouple	.0005
8	V2 heater decouple	.0005
9	V2 cathode decouple	.0005
10	V2 feed decouple	.0005
11	V2 suppressor decouple	.0005
12	V3 heater decouple	.0005
13	V3 cathode decouple	.0005
14	V3 feed decouple	.0005
15	V3 suppressor decouple	.0005
16	Heater line decouple	.0005
17	V4 heater decouple	.0005
18	V4 heater decouple	.0005
19	V4 feed decouple	.002
20	V4 screen and anode decouple	.002
21	V4 cathode decouple	.0005
22	Vision bias decouple	.1
23	HT line bypass. .	.002
29	V7 heater decouple	.0005
30	V7 feed decouple	.0005
31	V7 suppressor decouple	.0005
32	V7 cathode decouple	.0005
33	V8 heater decouple	.0005
34	V8 feed decouple	.0005
35	V8 suppressor decouple	.0005
36	V8 cathode decouple	.0005
37	V10 screen decouple	.1
38	V10 screen bypass	.0005
39	V10 heater decouple	.0005
40	V10 anode decouple	2
41	AF couple	.1
42	HF filter	.0005
43	Sound gain decouple	.1
44	Heater line decouple	.0005
45	Tone correction	.01
46	V11 cathode decouple	50
47	V11 screen decouple	8
48	V11 anode decouple	16
49	Tube bias decouple	8
50	HT smoothing	30
51	HT smoothing	30
52	HT smoothing	16
53	EHT smoothing	.25
54	Line synch. couple	.01
55	V14 grid	.0005
56	Line charge condenser (part)	.001
57	Line couple	.01
58	Line charge condenser (part)	.002
59	V15 screen decouple	.25
60	V15 cathode decouple	20
61	First anode and synch. pot. (part) decouple	8
62	Frame synch. filter	.0012
63	V16 cathode decouple	20
64	V16 and V17 screen decouple	8
65	V17 cathode decouple	20
66	Frame synch. couple	.0005
67	Frame feed back	025
68	Frame charge condenser	.25
69	Frame couple	.25
70	Frame generator grid	.05
71	V18 cathode decouple	50
72	V18 anode decouple	8
73	Frame flyback	.01
74	Line linearity	.012
75	Shunt with C67	.01



The circuit diagram with vision, sound, time base and power sections distinctly grouped. The receiver sections work at signal frequencies. A full description is on page 36.

WINDINGS

L.	Ohms.	L.	Ohms.
28	125	39	7
29	150	40	240
30	92	41	3,220
31	3.5	42	3,500
32	4.5	43	1,086
33	3.5	44	1
34	4.5	45	727
36	316	46	8
37	38	47	176
38	270	48	9,872