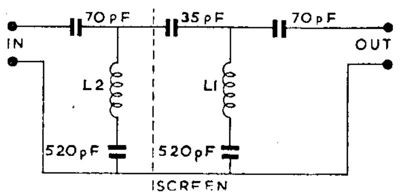
HINTS FROM THE SERVICE CASEBOOK

INTERFERENCE FROM AMATEURS

HERRINGBONE pattern covers screen, sometimes unlocking picture and making viewing impossible. Caused by interference from amateur transmitters or diathermy equipment operating on 27mc/s. This trouble is not necessarily the fault of the transmitting station for it can often be proved that there is no harmonic radiation within the television band. Such an effect is most common with superhet receivers where the second channel image frequency is around 29mc/s. or in sets where the sound IF is around 7mc/s. Receivers having vision IF of 13mc/s are also prone to direct interference from the amateur 20 metre (14mc/s) band.

The first step is to make sure that no appreciable harmonic interference is being radiated by the "suspect station." This can be checked on a TRF



L1, L2=7 TURNS. 16 SWG ON 3/8" DIA. 3/4" IN LENGTH

set. Next, fit a high pass filter to the input of the receiver (as shown) if it is known that the transmitting station is within an authorised band.

The unit should be fully screened and if possible be strapped on to the back of the television receiver, so that the output socket of the filter is as close to the receiver input as possible. A screen should divide the two sections of the filter as shown in the diagram.

Similar interference can be caused by all-wave receivers.

If it is known that severe interference is caused by amateur transmissions within the area, the licensee of the station should be made aware of the fact so that immediate co-operation is possible. If the location of the station is not known, the GPO should be consulted. Do not be too hasty in blaming the transmitting station, as some earlier television receivers were not designed to overcome severe second channel interference.—K.W.K.

LOW HEATER-CATHODE INSULATION

DARK bands across screen. This fault is usually limited to the RF detector and video stages, and can be cured successfully only by replacing valves in turn. When the time bases are locked, the bands will appear stationary. Unlocked, they will move vertically.

PYE D18T and B18T

A FAIRLY common fault with these models was that a gradual decrease of picture width occurred during the programme with an alteration of the focus. Tests were carried out and the trouble in each case was found to be R48A, 820,000 ohm anode resistor of the line oscillator valve, increasing in value. Replacement completely cured the fault.—M.J.

MURPHY V116

THE set came in for intermittent picture size and on test was found to work satisfactorily until suddenly the picture size would decrease and the focus alter. Test carried out revealed that when the picture size decreased the main HT voltage decreased.

Normally this fault is caused by one of the fuses in the anode circuit of V17 (UU8) being open circuit. However, in this case the fuses were OK and so C69 32mF reservoir condenser was next suspect. When a condenser was temporarily connected across it made no difference but if the condenser was connected between the chassis and the HT line the set became normal.

Careful examination revealed that the negative terminal of the condenser went to chassis via a solder tag under one of the mains transformer fixing nuts and this tag was not making a sound connection.—M.J.

DON'T FORGET TO LOOK

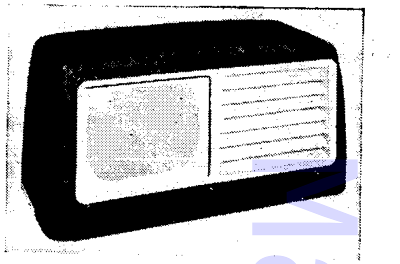
MOST tips published deal with faulty components but one must keep a sharp lookout for other troubles which may perhaps be more elusive. Three such cases are :—

1. A Pye B16T started slipping diagonally and this eventually became a permanent fault. After checking all parts which might have bearing on the fault I did what I should have done first—stopped to give a very close visual inspection. I found a blob of solder nearly bridging two anchor points on a connecting strip. Removal cured the fault.

2. A Pye 18T was intermittently faulty on vision and sound and sometimes the sound would go altogether. As soon as the chassis was disturbed the fault would clear itself for perhaps a week or more. Finally, close inspection cured the trouble by revealing that the end wire of the sound output valve's cathode resistor was turned towards the next pin, which was earthed. There was so little clearance that a short sometimes occurred.

3. On a Murphy V116 the sync. went haywire. The source of trouble proved to be a 25mF capacitor which is across the fixed and variable resistors comprising the line and frame holds. Careful investigation finally revealed that any slight movement caused the positive connection to short to the can of the capacitor and thence to chassis via the clip.—J.A.R.

GEC BT1091A, BT1091B



Twenty-one valve superheterodyne television receiver with a 9in. CRT giving a 7½ by 6in. picture. For 200 to 250V 50c/s AC. Walnut finished moulded cabinet with cream escutcheon. Made by The General Electric Co., Ltd., Magnet House, Kingsway, London, WC2.

THE superhet circuit has an RF input stage and separate sound and vision IF channels. Capacity-tuned, air-cored coils are used. The circuit is of transformer-fed AC type although EHT is obtained from line flyback. Model BT1091A is for the London frequencies and model BT1091B, described below, has provision for either London or Birmingham frequencies.

Aerial input (for 60-ohm coaxial feeder) is to primary L1, T1 of aerial coupling transformer. Secondary L2 feeds RF amplifier V1. T1A and L2A are incorporated so that input stage can be altered to cover Birmingham frequencies.

Gain of V1 is controlled by R5 (Sensitivity) in its cathode. Network R2, R3, R4 applies the cathode bias in correct proportions to g1 and g3 of V1 so that variation of gain by R5 does not alter the effective damping and tuning.

V1 is bandpass coupled to mixer V3. L3, L4A when linked in circuit across L3A, L4 tune coupling transformer to Birmingham.

Oscillator consists of triode V2. L6 is tuned by T2, C5, C5A to give an oscillator frequency of 31.5mc/s approximately. When C5A is uncoupled the frequency of oscillator is increased to 48.25mc/s for Birmingham operation.

Oscillator output is coupled by L5 to grid of V3 where it mixes with the RF input. Resultant intermediate frequencies of 13.5mc/s (vision) and 10mc/s (sound) are developed across L7.

Vision channel consists of transformer-coupled IF amplifiers V4, V5, aligned to operate on lower sideband of carrier, signal rectifier V6A, and video amplifier V7 with interference limiter V6B.

R21 in V4 cathode is Contrast control. Cathode bias is potentially divided by R19, R20 to maintain constant damping.

L12, C23, T4 in V5 cathode form a sound rejector. Rectified signal from V6A is directly coupled through filter L14, C25, C26 to video amplifier V7. V7 is directly coupled to cathode of V8, the CRT.

Interference limiter.—V6B shunted across grid-cathode circuit of CRT is biased-back by voltage developed across R41 so that it only conducts on signals greater than "peak white"—hence interference pulses are attenuated.

Sound channel.—L9, C11, T3, inductively coupled to L7 in anode of V3, feed sound signal to sound IF amplifier V12. V12 is transformer coupled to diode section of V13. The rectified signal is amplified by the triode section, fed through noise suppressor (V14A, V14B) and applied to output amplifier V15. Audio output is fed into a 6½in. PM speaker.

Noise suppressor.—V14A rectifies the signal applied to its cathode and develops a negative potential across C49 almost equal in value to the peak level of the signal. This voltage biases V14B anode so that signal fed to anode via R58, C47, C48 is insufficient to cause it to conduct. When a short-duration, large-amplitude interference pulse appears the anode, bias for V14B developed on C49 is not affected, because of long-time constant of R62, C49, but anode of V14B is driven more negative and V14B conducts, applying a large degree of negative feedback to grid of V13. Cathode of V14B is provided with a standing bias from cathode circuit of V13 through R54.

Sync. separator.—Signal at V7 anode is fed by C35 to V9. Positive sync. pulses drive V9 into grid current and so produce a steady negative bias across R44. The negative video signal drives grid beyond cut-off and only the positive sync. pulses are produced in the anode.

Frame trigger pulses, developed across integrating circuit R82, C65, are fed to V21.

Frame scan is provided by a multi-vibrator type oscillator formed by V20, V21. C61 charges through R83, R86, and produces a positive going potential which is applied by R90 to g1 of V21. The potential appearing across R86 forms a cathode bias to maintain V20 cut-off during the scan time.

When potential across C61 is sufficiently high V20 conducts and discharges C61. The rapid discharge of C61 through V20 produces a steep negative-going voltage at anode of V20 which, fed by R90 to V21, in turn develops a steep positive voltage at V21 anode. This represents the scan flyback. The positive going potential at anode V21, being applied by R91, C63, to grid of V20, accelerates the discharge of C61.

When C61 is fully discharged, V20 is cut off and charging and scanning stroke commences.

Scan frequency is controlled by R86, **Vertical Hold** control. R89, R90, C64, together with **Vertical Form** control R93, give waveform correction. R92 the **Height** control by varying the degree of negative feedback regulates anode current of V21 and hence amplitude.

FT1 in V21 anode circuit feeds scanning waveform to frame deflector coils L31, L32 on the neck of CRT.

Line trigger pulses are fed by C53 to an inverter valve V16 after which they are applied through C55 to grid of V18.

Line scan is provided by another multi-vibrator type oscillator. C59 charges through R78, R80 and produces an almost linear rising potential at V19 grid. The increasing current through L24 of LT1 provides the scanning stroke, which is applied by secondary L26 to line deflector coils L27, L28.

V18 is cut off during the scan time by the negative charge on C57, which is produced as a result of grid current due to the high positive potential set up across L27, L28, during the previous flyback period. When potential on C59 is sufficiently high V18 conducts and discharges C59. The negative going potential at V18 anode is coupled by C58 to g1 of V19 and thus V19 is rapidly cut off.

Due to the positive potential set up across L27, L28 the grid of V18 is driven heavily positive—thus accelerating discharge of C59 and providing a negative bias on C57 sufficient to maintain V18 non-conducting during the scanning stroke.

Continued overleaf

R77, Horizontal Hold, regulates the discharge rate of C57, which alters the time V18 remains cut off. Width of scan is controlled by R85 which adjusts the negative feedback to V19 input. R73 by adjusting the effective damping across secondary L26 of line transformer gives control of **Horizontal Linearity.**

EHT of 5.5kV is obtained by rectifying by V17 the surge voltage generated across overwound primary L24 of line transformer. Auxiliary secondary L25 provides filament current for V17. Inner and outer conductive coatings on CRT form the EHT reservoir capacitor.

HT of approximately 350V is provided by directly heated rectifiers V10, V11, coupled in a full-wave circuit. L34, C69, C70 give choke-capacity smoothing.

Focus coil is inserted in negative HT return lead to chassis. R94 gives control of focus coil current and C67 provides decoupling.

Heaters of V1-V7, V9, V12, V13, V15, V16, and V18-V21 obtain their current from secondary L39 of mains input transformer MT1. CRT heater is fed from L38. Sound channel noise suppressor diodes V14A, V14B are provided with a separate centre-tapped secondary L37 to minimise hum in audio circuit. Rectifier heaters obtain their current from L35.

CRT is a 9in. triode giving a 7½ by 6in. picture. It is electromagnetically focused by L33 in conjunction with R94. R38 prevents high voltage developing between heater and cathode. Picture brilliance is controlled by R42 which varies grid potential.

ALIGNMENT INSTRUCTIONS

The shape of the vision receiver response is regulated to a large degree by the settings of T3 and T4 and is adjusted at the factory with the help of a frequency-modulated oscillator (wobbulator). As such instruments are not in general use, an alternative alignment procedure is given which in consequence will appear complicated, and it is therefore strongly recommended that the method be attempted only when the settings of T3 and T4 are known to have been disturbed, and not as part of a standard fault-finding or checking routine.

For normal maintenance it is anticipated that the only adjustments required will be checks on the setting of the oscillator trimmer and two methods of doing this are given below. Of these methods it must be stressed that completely satisfactory results will only be achieved by using the first which demands the use of a signal generator, and the alternative method must only be employed where such an instrument is not available.

Note.—Adjustment of the oscillator trimmer introduces sound interference on vision on either side of the current null point, together with a failure of sync. in one direction and low definition in the other.

Alignment Check

Recommended Method

Set Contrast and Sensitivity to maximum, and Brightness and Volume to minimum. Connect a 0-1V meter across diode load R32. Connect signal generator to aerial terminals and tune to 41.5mc/s (London) or 58.25mc/s (Birmingham) and set accurately to the sound frequency by beating with the transmission. Adjust output for appreciable reading on the meter.

Adjust T2 for minimum reading.

Tune the generator to 43.5mc/s (London) or 60.25mc/ (Birmingham) and reduce output.

Adjust T1 (L) or T1A (B) for maximum.

Alternative Method

Set receiver up on a transmission, ensuring that possibility of sound-on-vision due to mis-setting of Sensitivity control does not arise.

Slip the line sync. by adjustment of Horizontal Hold until the sync. pulses appear as a dark band down the centre of the picture ; sound-on-vision will then appear as a pulling of the edge of this band.

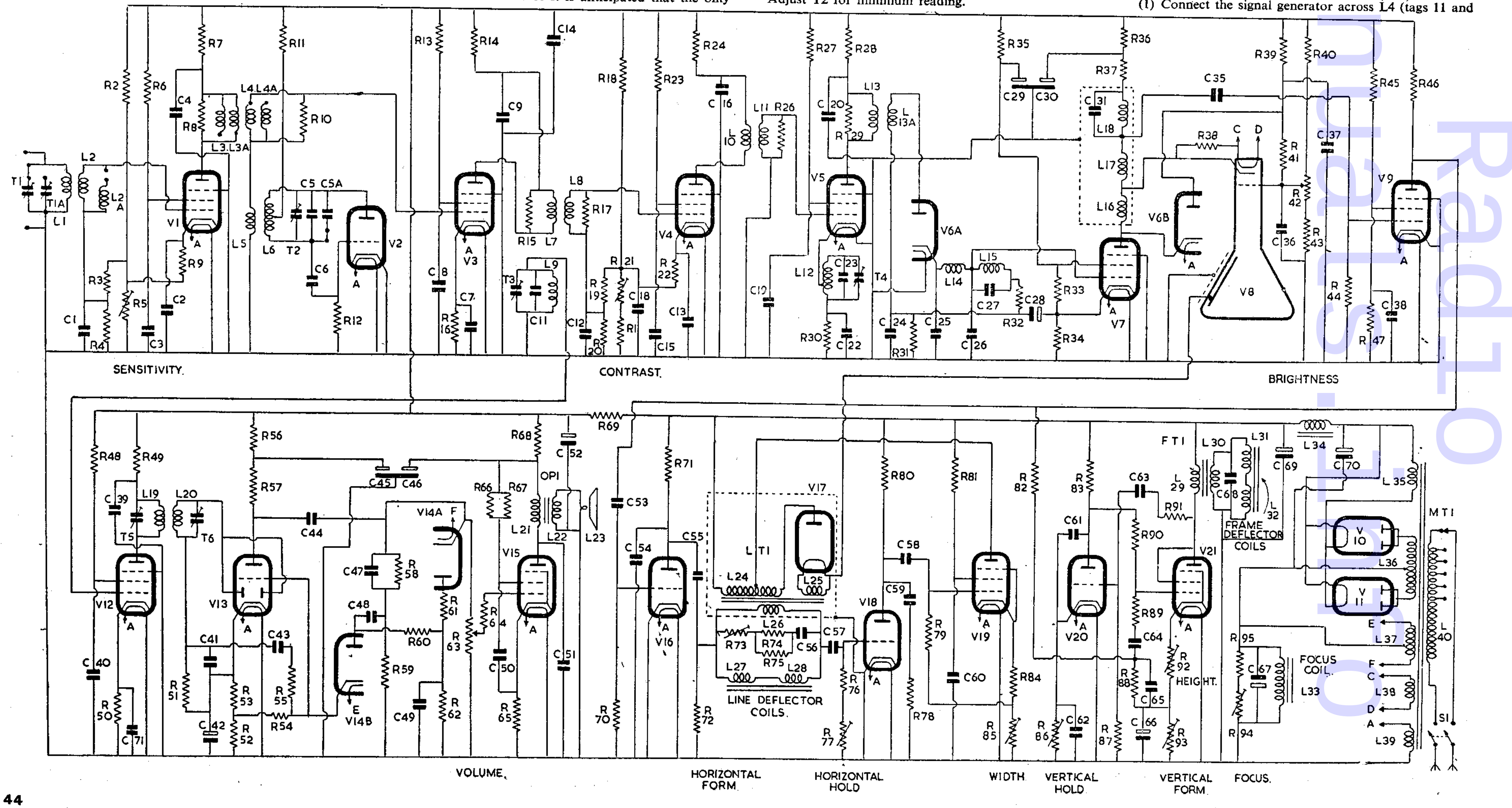
Adjust T2 for minimum sound-on-vision.

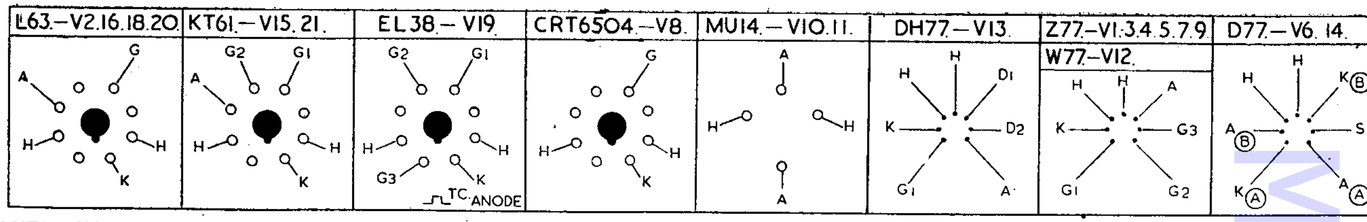
Re-set Horizontal Hold, for sync. and adjust T1 (L or T1A (B) for best definition.

Complete re-Alignment

Connect a 0-1V meter across the diode load R32 and a 0-100V AC meter across sound output transformer primary Set Contrast and Sensitivity to maximum ; Brightness and Volume to minimum. Remove V2 (L63).

(1) Connect the signal generator across L4 (tags 11 and





CAPACITORS

C	Capacity	Type
1	.005	Tubular 500V
2	.005	Tubular 500V
3	.005	Tubular 500V
4	.005	Tubular 500V
5	8.2pF	Tubular Ceramic
5A	30pF	Silver Mica
6	47pF	Silver Mica
7	.01	Tubular 350V
8	.01	Tubular 350V
9	.01	Tubular 350V
10	No Capacitor	
11	33pF	Tubular Ceramic
12	.01	Tubular 350V
13	.01	Tubular 350V
14	.05	Tubular 350V
15	.01	Tubular 350V
16	.01	Tubular 350V
17	No Capacitor	
18	.01	Tubular 350V
19	.01	Tubular 350V
20	.01	Tubular 350V
21	No Capacitor	
22	.01	Tubular 350V
23	22pF	Silver Mica
24	.05	Tubular 350V
25	10pF	Tubular Ceramic
26	10pF	Tubular Ceramic
27	10pF	Tubular Ceramic
28	25	Electrolytic 25V
29	4	Electrolytic 450V
30	8	Electrolytic 450V
31	10pF	Tubular Ceramic
32, 33, 34	No Capacitors	
35	.1	Tubular 350V
36	.1	Tubular 350V
37	.5	Tubular 350V
38	1	Tubular 250V
39	.05	Tubular 350V
40	.05	Tubular 350V
41	15pF	Tubular Ceramic
42	25	Electrolytic 25V
43	.02	Tubular 350V
44	.05	Tubular 350V
45	4	Electrolytic 350V
46	8	Electrolytic 350V
47	100pF	Mica
48	500pF	Mica
49	.01	Tubular 350V
50	.25	Tubular 350V
51	.01	Tubular 350V
52	16	Electrolytic 450V
53	100pF	Mica
54	.001	Tubular 1000V
55	.005	Tubular 500V
56	.02	Tubular 500V
57	47pF	Tubular Ceramic
58	500pF	Mica
59	.001	Mica
60	.05	Tubular 350V
61	.05	Tubular 500V
62	.1	Tubular 350V
63	.005	Tubular 1000V
64	.05	Tubular 500V
65	.01	Tubular 350V
66	32	Electrolytic 150V
67	50	Electrolytic 50V
68	.05	Tubular 500V
69	32	Electrolytic 450V
70	16	Electrolytic 450V
71	.01	Tubular 500V

RESISTORS

R	Ohms	Watts
1	3.3K	½
2	47K	2
3	1K	¼
4	27K	½
5	20K	—
6	22K	¼
7	4.7K	1
8	15K	¼
9	150	¼
10	22K	¼
11	47K	2
12	100K	¼
13	47K	½
14	15K	½
15	15K	¼
16	680	¼
17	8.2K	¼
18	47K	2
19	1K	¼
20	27K	¼
21	22K Potentiometer	
22	150	¼
23	22K	½
24	8.2K	1
25	No resistor	
26	6.8K	¼
27	22K	¼
28	8.2K	1
29	6.8K	¼
30	150	¼
31	1.5K	¼
32	3.9K	½
33	47K	1
34	330	½
35	10K	1
36	4.7K	1
37	3.9K	1
38	100K	¼
39	150K	¼
40	56K	¼
41	22K or 47K	¼
42	250K Potentiometer	
43	100K	½
44	1M	¼
45	100K	1
46	47K	½
47	12K	¼
48	47K	½
49	10K	1
50	270	¼
51	47K	¼
52	680	¼
53	1K	¼
54	330K	¼
55	100K	¼
56	47K	½
57	47K	½
58	100K	¼
59	680K	¼
60	1M	¼
61	1M	¼
62	10M	½
63	500K Potentiometer (with switch)	
64	10K	¼
65	100	½
66	47K	½
67	47K	½
68	680	2
69	330	7
70	22K	¼
71	33K	2
72	10K	¼
73	500 WW Potr.	
74	2.5K	7
75	2.5K	7
76	270K	¼
77	250K Potentiometer	
78	5.1K	½
79	680K	½
80	470K	½
81	3.9K	2
82	470K	¼
83	1.5M	½
84	130	2
85	500 WW Potr.	
86	100K Potentiometer	
87	68K	¼
88	10K	¼
89	100K	¼
90	220K	¼
91	100K	¼
92	1K WW Potr.	
93	10K WW Potr.	
94	500 WW Potr.	
95	330	2

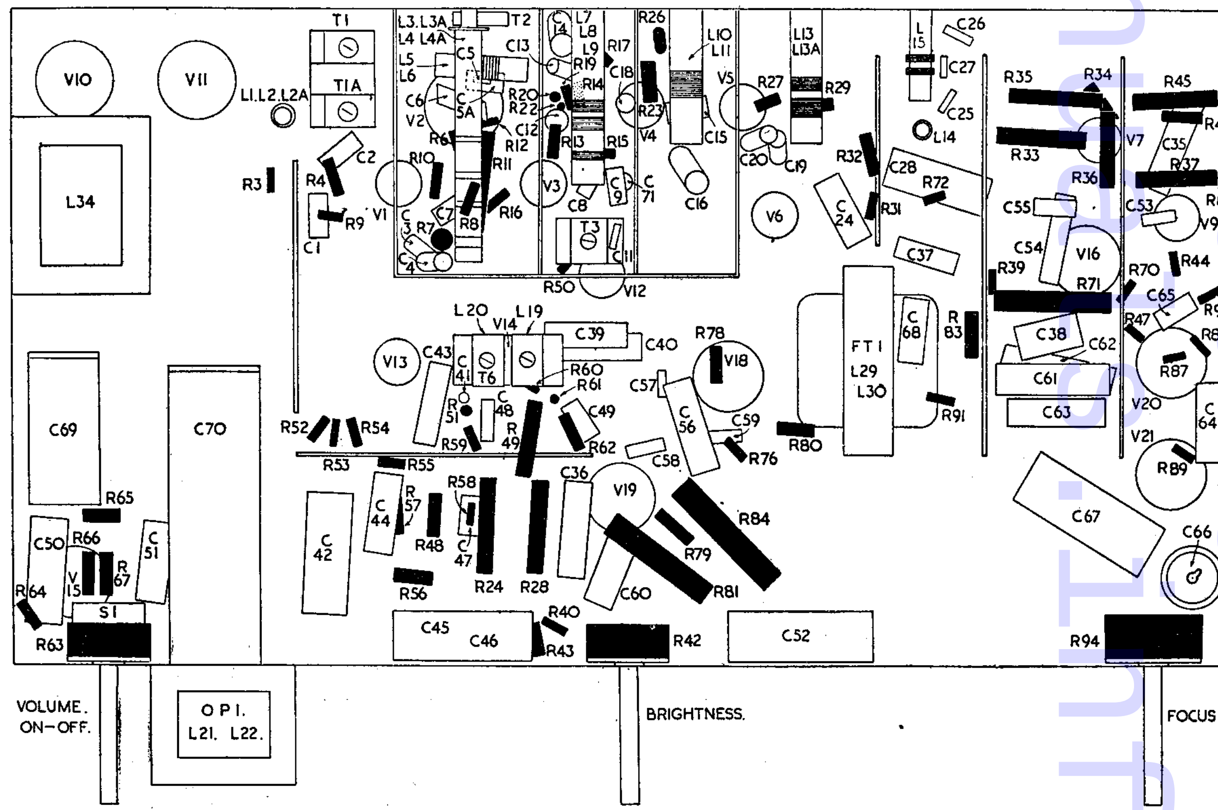
INDUCTORS

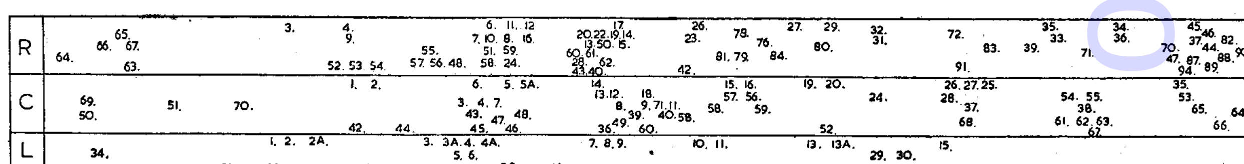
L	Ohms
1–6	Very low
7	2.5
8	2
9	1
10	3.25
11	1.5
12	Very low
13, 13A	2.5
14	7
15	3.25
16, 17	7.5
18	3.5
19, 20	1.25
21	500
22	.5
23	2.5
24	250 total
25	Very low
26	3
27, 28	9
29	2,000
30	6.5
31, 32	27.5
33	200
34	100
35	Very low
36	75 total
37–39	Very low
41	6 total

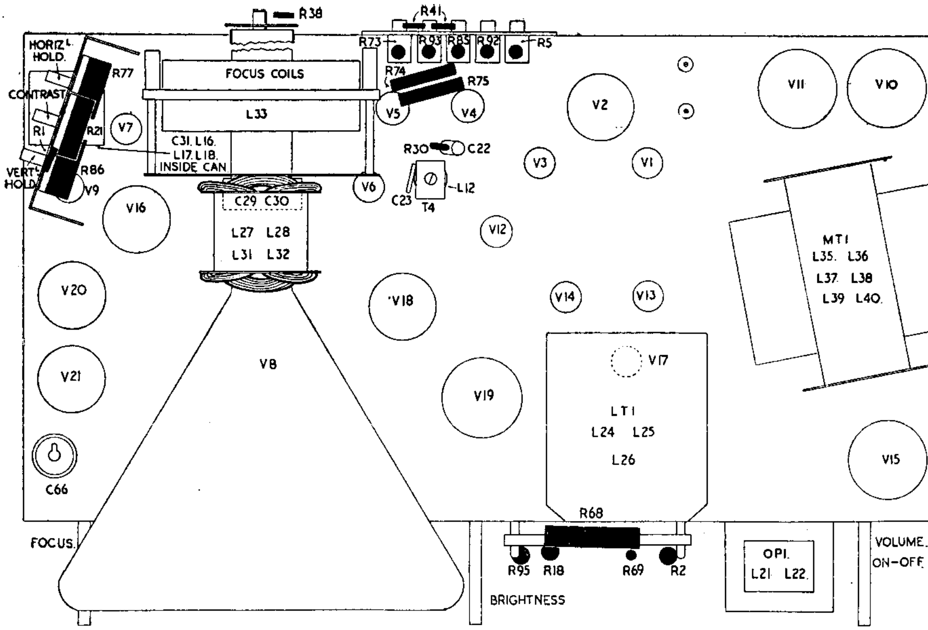
VALVES AND VOLTAGE READINGS

Valve	Type	G2	A	K
V1	Z77	240	250	0–80
V2	L63	—	120	0
V3	Z77	250	230	3
V4	Z77	260	270	0–80
V5	Z77	250	220	1
V6	D77	—	—	(B) 280
V7	Z77	240	280	2.5
*V8	6504	—	6.5kV	280
V9	Z77	30	260	0
V10	MU14	—	356	398
V11	MU14	—	356	398
V12	W77	210	240	2.8
V13	DH77	—	150	2.2
V14	D77	—	—	—
V15	KT61	180	275	3
V16	L63	—	90	0
V17	U37	—	—	6.5kV
V18	L63	—	55	0
V19	EL38	260	—	10–45
V20	L63	—	35	—
†V21	KT61	320	320	30–110

*G1= 120–245V. †G1 = 35V.
Total HT current= 225mA.
Rectified HT voltage= 398V.
Smoothed HT voltage= 348V.
Voltage across focus coil= 21-26V.







12 on HF transformer) and tune to 9.8mc/s. Adjust T4 and T3 for minimum vision output.

(2) Reduce signal generator output and turn Volume to maximum. Adjust T6, T5 for maximum sound.

(3) Turn Volume to minimum, increase output of generator and re-adjust T3 for minimum vision output.

Replace V2, connect generator to aerial input. Tune generator to 41.5mc/s (L) or 58.25mc/s (B) and set accurately to sound frequency by beating with transmission.

(4) Adjust T2 for minimum vision output.

(5) Tune generator to 43.5mc/s (L) or 60.25mc/s (B) and adjust T1 (L) or T1A (B) for maximum vision output.

The receiver is now aligned, and its overall response must be checked as follows :—

With the generator connected to aerial input, tune through the vision range and note the frequency at which maximum output results. Adjust the generator output for full scale reading of vision output meter.

Tune through the vision range again, and note meter readings at 42, 44 and 45mc/s (L) or 58.75, 60.75 and 61.75 mc/s (B) or at the points immediately adjacent to these frequencies if peaks exist there.

Output at 42(58.75)mc/s should be within 20 per cent. of that at 44(60.75)mc/s, and the output at 45(61.75)mc/s should be not more than 60 per cent. and not less than 20 per cent. of that at 44(60.75)mc/s. If the output at 42(58.75) mc/s is below the limit stated, the procedure should be repeated with the frequency of step (1) reduced to 9.7mc/s and further repeats with frequency descending in 0.1mc/s steps should be carried out until the desired condition is produced.

If the response at 42(58.75)mc/s is greater than the limit stated, then the procedure should be repeated with the frequency of step (1) increased to 9.9mc/s and further repeats with ascending orders of frequency in 0.1mc/s steps should be carried out.

The most satisfactory response shape would show equal output at 42(58.75) and 44(60.75)mc/s.

BT1091A Divergencies

Model BT1091A differs as follows :—

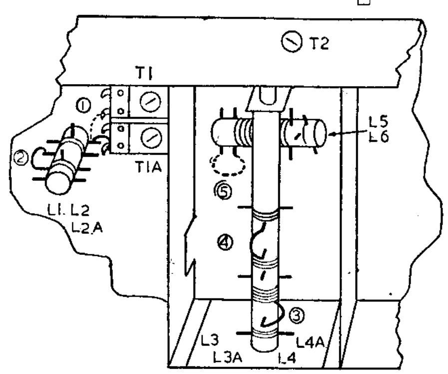
T1A, L2A, L3, L4A, C5A are not fitted.

L7, L10, L13 are resistance capacity fed instead of in series with valve anode circuit.

L13A omitted.

L16, L17 provided with filter capacitors to chassis.

L12, C23, T4 inserted on earthy side of cathode circuit.



LINKS ① AND ⑤ REQUIRED FOR LONDON

LINKS ②·③ AND ④ REQUIRED FOR BIRMINGHAM

Layout of components differs slightly—in particular L12, C23, T4 are mounted under chassis.

BT1091A Alignment

Sound IF Channel (10mc/s)

Remove V2. Tune signal generator to 10mc/s, and connect to grid of V3 through an 0.1mF isolating capacitor.

Adjust T6, T5, T3 in sequence for maximum.

Connect vision output meter across R32 and increase generator output until a reading is obtained. Adjust T4 for minimum output meter. Replace V2.

Vision IF Channel (13.5mc/s)

Tuning is fixed and no adjustments can be made. Bandwidth at 4dB, 10.9mc/s to 16.3mc/s.

Oscillator and RF Stages

Tune signal generator to 41.5mc/s and connect to aerial terminals. Adjust oscillator trimmer T2 for maximum reading of sound output meter.

Tune generator to 44mc/s. Note vision output meter reading. Tune to 47.5mc/s and note reading. Adjust T1 for readings to be approximately equal.

Pages from an

ENGINEER'S CASEBOOK

By W. T. G. WANDEN, *Service Manager, Leake & Hickmott, Ltd., Sidcup*

SYMPTOM : *Television sound intermittent occasionally.*

THIS set was of the 1938 "add-on" variety which coupled its AF to the PU terminals of an existing broadcast receiver.

Examination was made *in situ*, and sure enough the sound disappeared with a curious crackling sound. The vision remained at a constant level meanwhile, thus eliminating the common RF stages. Voltage and current checks showed a slight change at the reappearance of the sound, but they were too small to be of any significance. The AF side was checked and found OK.

This was getting me nowhere fast until an obvious fact sank in. Although the sound modulation disappeared, interference was breaking in as the sound went away and this indicated a change of frequency rather than fading. Coupling this with the above observations narrowed the search down to the sound channel RF coil or valve. The valve was changed with no better results and so the coil and associated components were dissected.

It was found that the coil was tuned by a semi-variable condenser of the ceramic type which used a metallic deposit forming the plates. This deposit could be seen at one terminating point, and was suspected of causing a change in capacity possibly through oxidation. The condenser, which was not marked and does not appear evaluated on the maker's diagram, was changed and the fault was cleared.

I-F CORES NEEDED EARTHING

SYMPTOM : *Violent oscillation in a radio.*

USUALLY the average superhet which suffers from IF regeneration is in need of a condenser replacement, but this was a brand-new chassis which had seen about a week's use and certainly was not suffering from old age or component deficiencies of a normal character. The fault was the familiar BFO whistle which I assumed to be caused by a common impedance or stray capacitance normally taken care of by the decoupling arrangements.

Checking did nothing to help as the values were up to specification. The IF coils were tuned by dust cores with the usual threaded brass rod moulded in. These rods were at each end of the IF can vertically and were not earthed. It was decided to earth them, and the set then behaved perfectly.

STATIC CHARGE

SYMPTOM : *Flashing in television power unit.*

A FAULT of this type sounds commonplace enough, and so when a visit was made it was expected to be a replacement session on HT or EHT components. However, no flashing took place, nor could it be induced or any damage seen. The transformer was not running hot and the condensers and rectifier checked OK.

The customer was questioned and said that no smoke or odour was noticed.

The screen was watched for possible spark traces that might be generated by the set, and it was while doing this that a flash was noticed to be reflected from the back of the cabinet. The screen display was not affected in any way so a watch was made on the power section.

Within about two minutes the EHT rectifier, which, incidentally, was mounted horizontally, appeared to flash violently giving the impression that it was about to break down. A closer inspection, however, revealed a coating of dust on the envelope and some small in-roads in the glass from the inside of the bulb at the point of contact of the snubber wire anode electrode supports.

A static charge had evidently been forming on the glass via the dust coating, which reached from cap to base and apparently formed an electrode of sorts. Judging by the electrolysed appearance of the glass at the snubber points on the bulb, the snubbers formed the other.

The glass was dusted and the trouble cleared up.

A FLOATING FUSE

SYMPTOM : *Intermittent distortion of picture.*

APART from the unusually marked non-linearity in this case, normally this type of receiver is subject to slight distortion of the line stroke due to the unusual scanning method employed. While this is not new, it is efficient and uses the blocking oscillation principle with the anode and grid coils mounted on the scanning yoke.

The difficulty is in the adjustment of linearity and amplitude of scan, neither of which is adequately provided for as regards easy adjustment. The former has a bar magnet mounted on a brass clamp vertically adjacent to the tube and which is moved about ; the latter requires an awkward sequence of tap adjustment on the scanning coils.

Having examined the scanning unit and ascertained that the magnet was not loose or the coils damaged, the HT was checked and found OK and the picture suddenly resumed normal proportions.

Things stayed put until the chassis was moved or the mains disconnected when the fault returned. The HT was checked while the set was moved about, and it was found to vary. Successive checks were made up to the rectifier cathode and thence to the AC anode supplies. Both anodes were separately fused, and it was found that one of these cartridge fuses was floating in its holder causing half-wave HT to be supplied to the set at odd intervals.

SYNC. TROUBLE

SYMPTOM : *Picture slip for the first half-hour of operation. Sound O.K.*

CONSIDERATION of the sync. components, which consist of the usual double diode separator valve and fixed resistors and capacitors, made it unlikely to be any other component than the