VIEW MASTER

CONSTRUCTOR'S

TELEVISION RECEIVER

Home construction 12-valve television receiver employing a 9- or 12-in. magnetically focussed cathode ray tube and flyback EHT supply. Suitable for 200 to 250 volts AC. Designed by W. I. Flack, FTS. Packets containing constructional plans are available to sell at 5s. from wholesalers at the usual discount.

This chart is intended to help retailers give any assistance needed by constructors and provide service required in the future.

THE View Master is built in two sections, the smaller containing the vision receiver, sync. separator and sound receiver, whilst the main chassis houses the two time-bases, HT and EHT supply and CRT assembly.

The receiver uses a TRF circuit with permeability tuned inductances. The first RF amplifier V1 is common to both vision and sound channels. The vision channel operates on the upper sideband of the carrier. Frame and line time-bases use thyratrons. EHT is obtained by rectifying the line time-base flyback voltages.

Aerial input circuit is designed for a 72 ohm twin feeder. Signal is fed to aerial coupling coil L1, the centre tap of which is earthed to chassis by R1, C1.

Vision channel consists of RF amplifiers V1 to V3 aligned to give a substantially flat response from 45 mc/s to 48 mc/s, signal rectifier V4A, and video output valve V5. L2 the grid coil of V1 is tuned to 44.5 mc/s and damped by R2 to provide a wide bandwidth to accept both sound and vision frequencies.

Gain of V1 is controlled by R5, the contrast control, in the cathode. R8 introduces negative feedback in cathode circuit to minimise change in input resistance and capacitance of V1, due to adjustment of R5, which would upset the bandwidth of the input circuit L1, L2. V1 is bandpass coupled by L3, L4 to V2, which in turn is bandpass coupled by L5, L6 to V3. Sound rejection is given by C6, L11, C20 tuned to 41.5 mc/s. Output of V3 is then bandpass coupled by L7, L8 to vision rectifier V4A. R9, R13, R14, R18 give damping on coils to maintain bandwidth of 3mc/s, whilst L9 in the cathode of V4A is a 2½-3mc/s peaking coil.

Rectified signal developed across R19 is directly coupled to g1 of video output valve V5. To obtain maximum gain from V5 the grid is provided with a negative bias which is developed across R70, C55 in the negative HT lead to chassis. L10 in anode of V5 is a tunable 3 mc/s peaking coil.

Output from V5 is DC—AC coupled by R23, R24, C19 to cathode of CRT. Potential divider R23, R24 is necessary to prevent cathode of CRT becoming too positive and in addition as sync signal is taken from anode V5 the ratio of sync to video signal is increased giving stable time base locking.

Vision interference limiter.—MR5 with C52 are connected in series between grid and cathode of CRT. C52 charges up through MR5 to a potential equal to peak white. When a negative going interference pulse appears then MR5 immediately conducts and in doing so effectively forms a low resistance in series with C52 across grid and cathode of CRT thus reducing the amplitude of interference pulse.

To prevent excessive streaking when using spot suppressor circuit, a 0.1mF capacitator may be connected from CRT grid to earth.

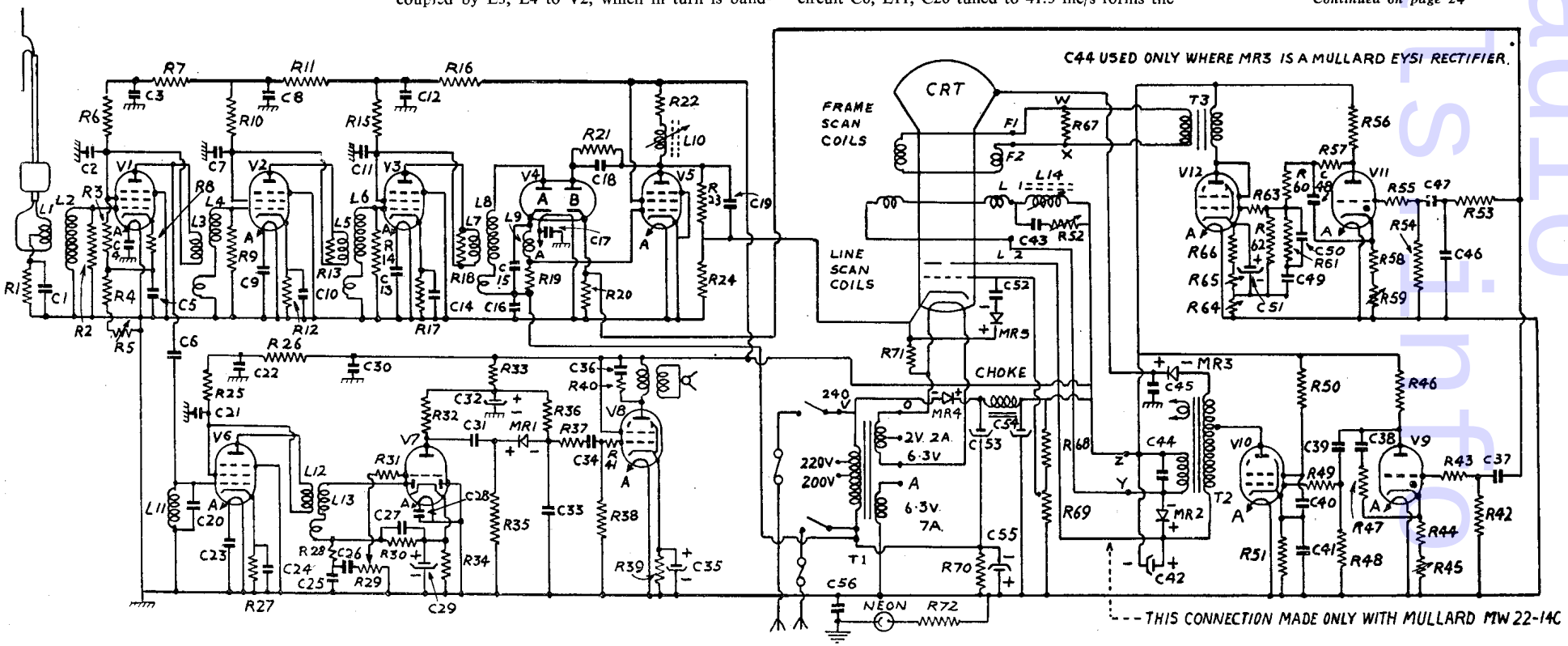
Sound channel. The vision sound rejector circuit C6, L11, C20 tuned to 41.5 mc/s forms the input circuit to g1 of sound RF amplifier V6, the output of which is bandpass coupled by L12, L13 to one diode V7 for rectification. Rectified signal is fed through filter R28, C25 to volume control R29 and thence through stopper resistor R31 to grid of triode section of V7 for amplification. Audio signal at anode V7 is fed through interference limiter MR1 to beam tetrode output valve V8, the output of which is fed to the special television model loudspeaker.

Sound interference limiter. MR1 is maintained in a state of conduction by means of positive potential derived from HT line through R33, R36. The time constant of R36, C33 is such that the charge on C33 will follow the audio signal which will pass on through R37, C34 to grid of output valve V8. When a high frequency (short duration) interference pulse appears however, MR1 is cut off due to comparatively long time constant of R36, C33 and the interfering pulse is removed from the audio signal. This type of interference limiter is only effective on narrow steep sloped pulses such as are generated by car ignition.

Sync. separator.—The video signal from anode of output valve V5 is fed through R21, C18 to diode anode V4B. The time constant of R21, C18 is such that V4B is biased so that it will only conduct on the positive sync pulses which are developed across cathode load resistor R20.

Line trigger pulses are developed by differentiating circuit C37, R42 which sharpens the waveform due to its short time constant. Resultant

Continued on page 24



CAPACITORS

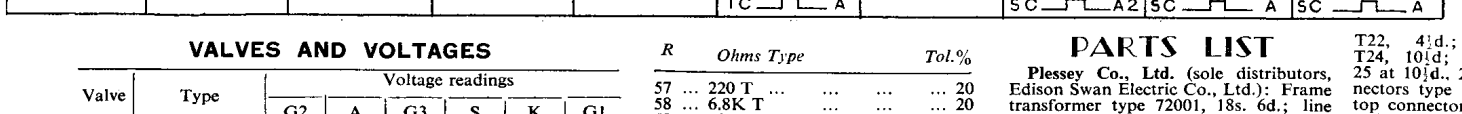
C	Capacity	Type
1	...	.001 CP119W Metalmite
2	...	500pF CM30 Micadisc
3	...	500pF CM30 Micadisc
4	...	500pF CM30 Micadisc
5	...	500pF CM30 Micadisc
6	...	2pF SCP4 Ceramic Rod
7	...	500pF CM30 Micadisc
8	...	500pF CM30 Micadisc
9	...	500pF CM30 Micadisc
10	...	500pF CM30 Micadisc
11	...	500pF CM30 Micadisc
12	...	500pF CM30 Micadisc
13	...	500pF CM30 Micadisc
14	...	500pF CM30 Micadisc
15	...	10pF SCT1 Ceramic Tube
16	...	500pF CM30 Micadisc
17	...	500pF CM30 Micadisc
18	...	.1 CP36H Metalmite
19	...	300pF CM20N Moulded Mica
20	...	10pF SCT1 Ceramic Tube
21	...	500pF CM30 Micadisc
22	...	500pF CM30 Micadisc
23	...	500pF CM30 Micadisc
24	...	500pF CM30 Micadisc
25	...	.001 CM20N Moulded Mica
26	...	.02 CP33N Metalmite
27	...	47pF SCT1 Ceramic Tube
28	...	500pF CM30 Micadisc
29	...	20 CE30B Picopack
30	...	500pF CM30 Micadisc
31	...	.02 CP33N Metalmite
32	...	1 CE30N Picopack
33	...	500pF CM20N Moulded Mica
34	...	.02 CP33N Metalmite
35	...	20 CE30B Picopack
36	...	.005 CP32S Metalmite
37	...	47pF SCT1 Ceramic Tube
38	...	.005 CP32S Metalmite
39	...	.01 CP33S Metalmite
40	...	.1 CP37N Metalmite
41	...	.1 CP36H Metalmite
42	...	2 CE30G Picopack
43	...	.01 CP33S Metalmite
44	...	220pF SCT3 Ceramic
45	...	.001 CP55QO Cathodray
46	...	.002 CP30S Metalmite
47	...	.01 CP33S Metalmite
48	...	.25 CP48N Metalpack
49	...	.015 CP33N Metalmite
50	...	.001 CM20N Moulded Mica
51	...	250 CE10DA Lectropack
52	...	.1 CP36H Metalmite
53	...	100 CE10LE Lectropack
54	...	100 CE10LE Lectropack
55	...	2500 CE25AA Lectropack
56	...	.025 647 Buffer Type

All Capacitors supplied by T.C.C.

RESISTORS

R	Ohms Type	Tol. %
1	2.2M T...	20
2	10K T	20
3	220K	20
4	220 T	20
5	5K Potr. CLR4089/22	—
6	4.7K T	20
7	1K T	20
8	33 T	20
9	22K T	20
10	2.2K T	20
11	1K T	20
12	220 T	20
13	33K T	20
14	22K T	20
15	2.2K T	20
16	1K T	20
17	220 T	20
18	33K T	20
19	5.6K T	20
20	22K T	20
21	3.3M T	20
22	12K R / 12 K R	10
23	5.6K T	20
24	27K R	20
25	4.7K T	20
26	1K T	20
27	220 T	20
28	5.6K T	20
29	250K Potr. Q	—
30	100K T	20
31	220 T	20
32	220K T	20
33	100K T	20
34	2.2K T...	20
35	470K T	10
36	2.2M T...	20
37	33K T	20
38	470K T	10
39	180 T	20
40	1K T	20
41	330 T	20
42	22K T	20
43	2.2K T	20
44	1K T	20
45	2.5K Potr. CLR 901	—
46	100K T	20
47	330 T	20
48	470K T...	10
49	330 T	20
50	2.2K R	20
51	100 R	20
52	2K Potr. CLR901	—
53	47K T	20
54	33K T	20
55	10K T	20
56	270K T	20
57	220 T	20
58	6.8K T	20
59	10K Potr. CLR901	—
60	470K T	10
61	470K T	10
62	470K T	10
63	330 T	20
64	250 Potr. CLR901	—
65	5K Potr. CLR901	—
66	2.2K T	20
67	470 T	20
68	68K T	20
69	100K Potr. Q	—
70	15 R	10
71	100K T	20
72	470K T	10

Resistors R5, R45, R52, R59, R64, R65, are supplied by Colvern. All the remainder are supplied by Morganite.



VALVES AND VOLTAGES

Valve	Type	Voltage readings G2	A	G3	S	K	G1
V1	EF50 or 63SPT	188	188	—	—	1.9 to 5.0	—
V2	EF50 or 63SPT	214	214	—	—	2	—
V3	EF50 or 63SPT	233	233	—	—	1.8	—
V4	EB91 or 6D2 D77 6AL5	—	—	—	—	—	—
V5	EF50 or 63SPT	285	180	—	—	0	—
V6	EF50 or 63SPT	218	218	—	—	2.1	—
V7	EBC33 or DH63 OM4	—	63	—	—	1.2	—
V8	EL33 or KT61 6P25	285	280	—	—	6.5	—
V9	6K25	—	62	—	—	5	—
V10*	6P28	238	—	—	—	7.7	—
V11	6K25	—	62	—	—	5.6	—
V12†	6P25 or KT61	263	263	—	—	52	—
CRT.	MW22—14 C	(A) 320	6.3kV	—	—	152	130
	CRM91	—	6.3kV	—	—	152	130
	GEC6504						

* Voltage at MR2—, 285V; MR2+, 323V.
† Voltage across C51, 48V. Voltage at MR4, 289V. Voltage across smoothing choke, 4V. Bias across R70, 2.6V.

PARTS LIST

Plessey Co., Ltd. (sole distributors, Edison Swan Electric Co., Ltd.): Frame transformer type 72001, 18s. 6d.; line transformer type 72000, 21s. 3d.; width control type 72002, 8s. 9d.; scanning coil type 72003, 25s. 6d.; focus magnet type 72004 (Mazda or GEC), type 72005 (Mullard), 19s. 6d.; boost choke type 72006, 5s.; pair of CR tube supporting brackets type 72007, 14s.

Whiteley Electrical Radio Co., Ltd.: Sound/vision chassis type VM100 (complete with 8 valve holders, 4 screens, insulating bushes and screws), 22s. 6d.; power pack/time base chassis type VM102 (complete with 4 valve holders, screws, rubber insulating bushes), 22s. 6d.; supporting brackets for above VM101, 5s.; heater transformer type VM103, 35s.; main choke type VM104, 12s. 6d.; special Stentorian speaker type VM105, 27s.6d.

Westinghouse Brake & Signal Co., Ltd.: 5 metal rectifiers (types 14D36, 14A86, WX3, WX6, 36EHT100), 62s. 6d.

A. F. Bulgin & Co., Ltd.: DP/ST switch type Q257/1, 4s. 3d.; plug and socket type P420/P421, 2s. 6d.; 1 3-way tag strip type T17, 4½d.; 3 3-way tag strips type T19 at 4½d., 1s. 1½d.; 1 5-way tag strip T22, 4½d.; 1 7-way tag strip T24, 10½d; 3 7-way tag strips type 25 at 10½d., 2s. 7½d.; 2 valve top connectors type P96 at 1½d., 3d.; 1 valve top connector type P41, 1½d.

General Electric Co., Ltd.: Neon indicator lamp type G, 2s. 9d.

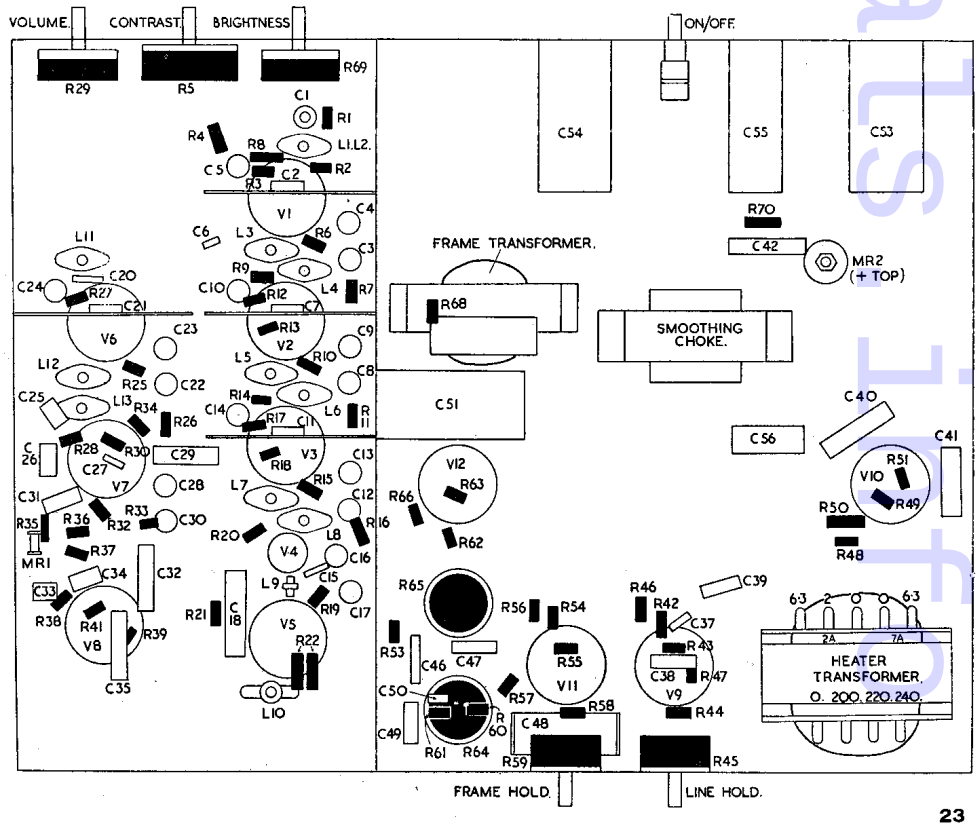
Belling & Lee, Ltd.: Mains connector unit type No. L707 (less fuses), 7s. 6d.

Wright & Weaire, Ltd.: complete set of 10 iron-cored coils, 20s.; RF choke type L9, 2s.

Colvern, Ltd.: 1 5K variable resistance type CLR 4089/22, 5s. 6d.; 1 2K type CLR 901, 2s. 9d.; 1 2.5K type, 2s. 9d.; 1 5K type, 2s. 9d.; 1 10K type, 2s. 9d.; 1 250 ohm type, 2s. 9d.

Morganite Resistors (sole distributors, Edison Swan Electric Co., Ltd.): see Table, total 35s. 11d.

The Telegraph Condenser Co., Ltd.: Complete kit of 55 capacitors with necessary fixing clips, packed as a kit and retailed at special price, £6 15s.



VIEW MASTER

Continued from page 22

pulses are fed through grid stopper R43 to grid of line scan oscillator V9.

Frame trigger pulses are developed by the intergrating circuit R53, C46, the time constant of which is comparatively long so that only the longer duration frame pulses build up the charge on C46. Resultant pulses are fed by C47 through grid stopper R55 to grid of frame scan oscillator V11.

Line time-base is generated by thyratron V9 together with network R46, C38, R47, R44, R45. The time-base capacitor C38 charges up through R46 and is discharged rapidly by V9, when it strikes, due to positive sync. pulse on its grid. R45 by varying the effective cathode bias of V9 gives a fine control of time-base frequency. R47 provides wave-form correction.

Line amplifier.—The saw-tooth waveform developed on C38 is fed by C39 through R49 to grid of beam tetrode amplifier V10 in the anode of which is the primary of line output transformer T2. Secondary of T2 feeds scanning wave-form through width control L14 to line deflector coils on CRT. R52 with C43, which are connected across L14, give control of linearity at commencement of line.

L14 is a small coil with an inductance variable between .5 and 2.5 mH by movement of its iron core. Adjustment of inductance will alter its series impedance and hence the scanning current, giving control of width of line waveform.

Frame time-base.—Frame scan is generated by thyratron V11 together with network R56, R57 C48, R58, R59 and operates in a similar manner to the line time-base circuit. R59 gives control of frequency and R57 is to limit V10 discharge current.

Frame amplifier.—The saw-tooth waveform developed on C48 is direct coupled by R60, R63 to grid of beam tetrode amplifier V12.

R60, R61, C49, C50 constitute a waveform correction circuit to compensate for the deficiencies of the frame output transformer T3 in the anode circuit. R65 by varying the cathode bias gives control of linearity whilst R64 by varying the amount of negative feedback gives frame amplitude or height control. Secondary of T3 feeds output to frame deflector coils on the CRT. R67 is fitted to prevent coupling with the line deflector coils.

Efficiency diode.—When line amplifier V10 is cut off at commencement of flyback period large shock oscillations are set up in primary of line transformer T2. These are rectified by MR2 and a charge of approximately 40 volts is built up on C42 which being in series with HT line feed to anode V10 provides an additional 40 volts HT giving increased deflection power during the scanning stroke.

EHT of 6.3 KV is obtained by rectifying by MR3 the surge voltages set up across the over-wound primary of line transformer T2 when V10 is cut off. An auxiliary secondary winding is provided on T2 to supply the filament current for an EY51 type rectifier which is sometimes fitted in place of MR3. C45 gives EHT smoothing.

HT is provided by a half-wave metal rectifier MR4 fed direct from the mains input. Choke capacity smoothing is employed. R70 decoupled by C55, in the negative HT lead to chassis, provide a 2.5V negative bias for grid of video output valve V5. Positive bias for CRT grid is taken from R69 the lower arm of a potential divider across the HT supply.

Heaters of V1 to V12 are connected in parallel and obtain their current from a 6.3V, 7A secondary on the heater transformer T1.

Heater of CRT is fed from a separate 6.3V, 2A winding on T1. R71 is fitted between cathode and one side of CRT heater to prevent any high voltage developing between cathode and heater.

Primary of T1 is tapped for inputs of 200, 220, 240V 50c/s.

Neon indicator is fitted to show when receiver chassis mains lead is connected to live side of supply. This safety device will only function when an earth lead is connected to the earth socket.

CRT is a 9-in. Mullard MW22-14C tetrode or a 9-in. Mazda CRM91, or GEC 6504 triode type. Focussing is by an adjustable permanent magnet ring. Brightness is controlled by CRT bias.

Alignment Instructions

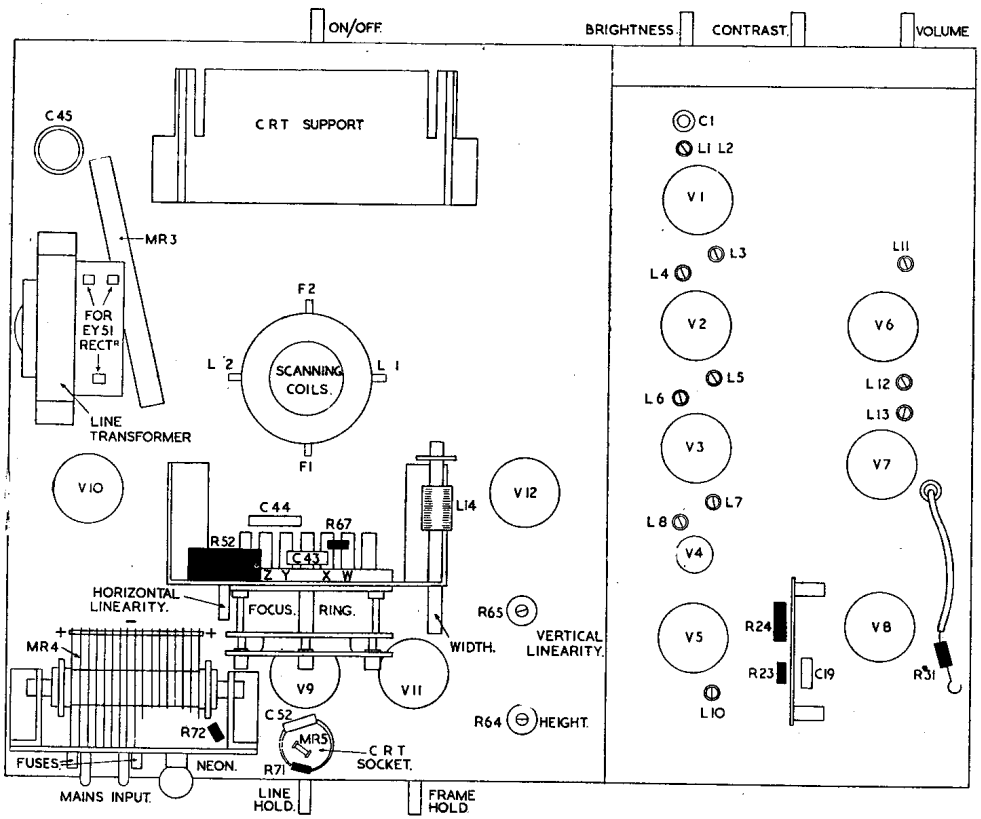
Adjust all iron cores so that they are level with top of bakelité formers. Connect output meter or oscilloscope to output of vision receiver and couple LS to sound receiver.

1. Inject 41.5 mc/s to g1 of V6 and tune L12, L13, for maximum.
2. Inject 41.5 mc/s to aerial input and tune L11 for maximum.
3. Inject 45 mc/s to g1 of V3 and tune L8 for maximum.
4. Inject 48 mc/s to g1 of V3 and tune L7 for maximum.
5. Inject 45 mc/s to g1 of V2 and tune L6 for maximum.
6. Inject 48 mc/s to g1 of V2 and tune L5 for maximum.
7. Inject 45 mc/s to aerial input and tune L4 for maximum.
8. Inject 48 mc/s to aerial and tune L3 for maximum.
9. Inject 44.5 mc/s to aerial input and tune L2 for maximum.
10. Inject 41.5 mc/s to aerial input and re-tune L11 for maximum.

Repeat all the above operations but with the signal generator connected to aerial input only.

To increase sensitivity. In fringe areas gain may be increased by the following changes :—

Omit R18, R2. Change R14 to 33K, R13 to 47K, R9 to 33K, and R4 to 180.



McMICHAEL 493—*from page 21*

CIRCUIT consists of a heptode frequency-changer V1, coupled by a permeability tuned transformer to an RF pentode IF amplifier V2. A second permeability-tuned transformer couples V2 to a diode pentode signal rectifier, AVC and AF amplifier V3. Signal from V3 is resistance-capacity coupled to an output pentode V4 and fed to a 5-in. PM speaker. HT is obtained from a 90V Vidor battery type L5515 and LT from a 1.5V Vidor heavy-duty battery.

Aerial circuit consists of frame aerials L1 (MW), L4 (LW), together with loading coils L2 (MW) and L3 (LW). On LW operation, L1, L2, L3, L4 are in series and tuned by VC1. T3 is LW trimmer across L3, L4. On MW operation S1 shorts out L3, L4 leaving L1, L2 tuned by VC1 and trimmed by T1. Aerial tuned circuit is coupled direct to control grid (g3) of heptode frequency-changer V1. AVC decoupled by R1, C1, is fed through the tuned circuits to g3.

Oscillator is connected in a tuned-grid series-fed HT circuit. On LW operation L5, L7 are in series and tuned by VC2. T4, with shunt capacitor C3, is LW trimmer and C5, C6 are padders. On MW operation S3 short circuits L7, T4, C3, and S2 shorts out padder C6. This leaves L5 in circuit tuned by VC2, with T2, C2 as trimmer and C5 as padder. Oscillator tuned circuits are coupled by C7 to oscillator grid (g1) of V1.

R2, C7 provide self bias for oscillator grid. Anode reaction voltages are developed inductively across L6 (MW) and L6, L8 (LW). R6 is a damping resistor across the feedback coils, and R4 a LW series limiter resistor. S4 shorts L8, R4 on MW band.

The reaction voltages are derived from oscillator anode (g2, g4) and also through L9, the primary of IFT1, in the anode of V1. R3 functions as a voltage dropper for oscillator anode (g2, g4) and C8 as bypass capacitor for feedback.

IF amplifier operates at 465 kc/s. L10, C10, which form the secondary of IFT1, feeds signal to g1 of V2. AVC, decoupled by R5, C13, is fed through L10 to g1. Screen voltage is obtained from R7 and decoupled by C14. Primary L11, C11, of IFT2, is in the anode circuit.

Signal rectifier and AVC. Secondary L12, C12 of IFT2 feeds signal to diode of V3. R9, the volume control, is the diode load and R8, C15, C16 form an IF filter. The DC component of the rectified signal is utilised for AVC purposes and is fed through decoupling networks R1, C1 and R5, C13 to control grids of V1, V2.

AF amplifier.—C17 feeds signal from volume control R9 to grid of pentode section of V3. Negative bias for grid g1 is developed on C17 with R10 as leak resistor. Screen voltage is obtained from R11 decoupled by C18. When V3 is a ZD17, then anode load is R12 and an anode RF bypass capacitor C24 is fitted. When V3 is a DAF91, a tapped anode load R12, R13 is employed and C24 is omitted.

Output stage.—C19 feeds signal at anode V3 to grid pentode output valve V4. Negative bias is developed across R15, decoupled by C21, in the HT negative lead to chassis and is fed through grid resistor R14. C20 is a tone correction capacitor. Secondary L14 of OP1 feeds signal to a 5-in. PM speaker L15.

High tension of 90V is obtained from a Vidor type L5515 battery. C22 provides decoupling for HT battery and S5, which is ganged to the wave-change switch, breaks positive lead to receiver, R15, decoupled by C21, in the negative lead to chassis, provide automatic bias for g1 of output valve V4. Total HT consumption of receiver is approximately 14.5mA.