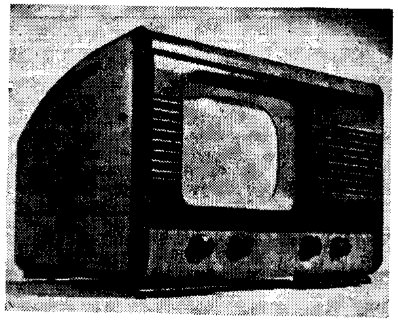
BAIRD PORTABLE TV RECEIVER



Fifteen-valve AC-DC television receiver fitted with 9-in. cathode-ray tube, giving a 7¼ by 5¼-in. picture. Mains input lead is used as aerial, but socket is provided for an external aerial when desired. Suitable for 200-250V AC and DC mains. Housed in figured walnut veneered table cabinet. Made by Scophony-Baird, Ltd., Wembley, Middlesex.

THE receiver employs a superhet circuit with an RF tuned input stage and separate sound and vision IF channels. Permeability tuned inductances are used throughout. EHT is obtained from line flyback voltage. Receiver is assembled on a 14½ by 12-in. chassis. Mains consumption is 100 to 125W.

Aerial.—The permanently attached aerial is formed by inserting VHF chokes L1, L2 in each mains input at a distance of half a wavelength from the receiver. The live section of the aerial thus formed is fed through primary coil L4 of RFT1 to anodes of HT rectifier V9, etc. The earth side of aerial mains lead is fed through secondary coil L5 of RFT1 to receiver chassis. C1 is an RF bypass capacitor. Sockets, which are connected to an auxiliary coupling coil L3 of RFT1, are fitted to enable the receiver to be used with an external television aerial system.

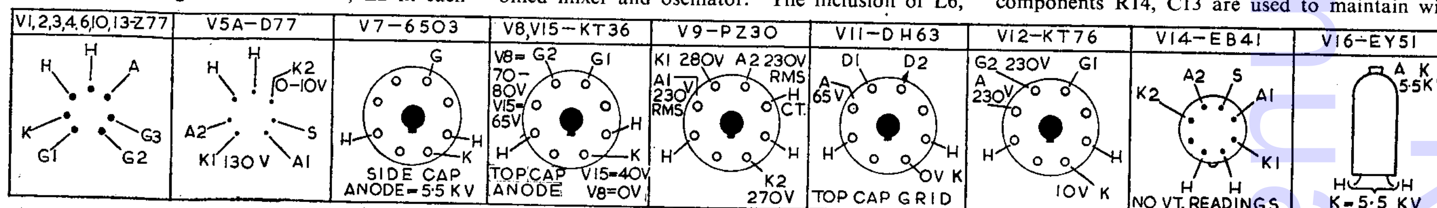
RFT1, which is tuned to 45 mc/s, couples the aerial signal to RF amplifier V1. RFT2, tuned to 45 mc/s, couples V1 to mixer and oscillator V2. RFT1, damped by the aerial load, and RFT2, damped by R4, provide a wide bandwidth to cover both sound and vision frequencies.

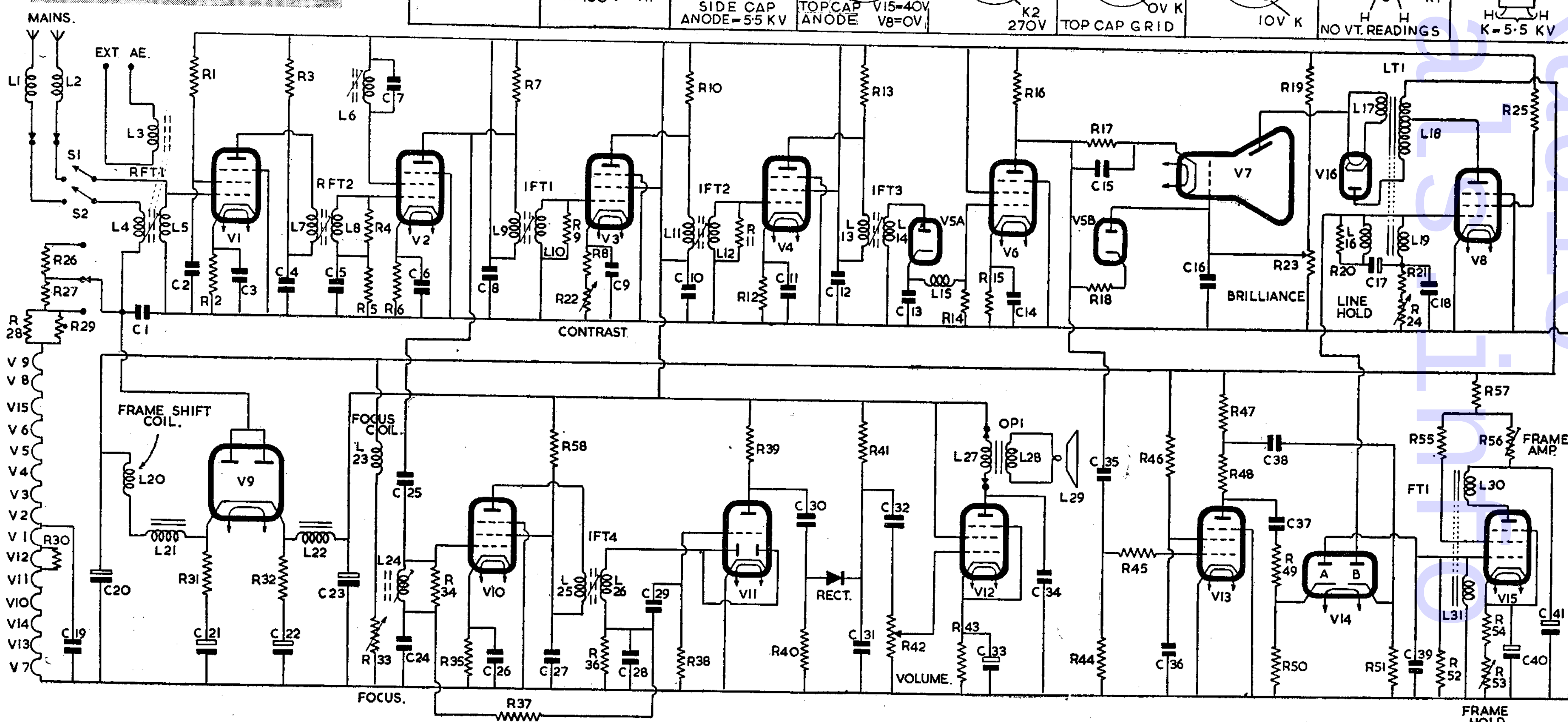
Frequency changer.—V2 is operated as a combined mixer and oscillator. The inclusion of L6, C7 in the screen circuit causes V2 to oscillate at a frequency of 32.4 mc/s. The resultant IF of 12.6 mc/s is developed across primary L9 of IFT1 in the anode circuit.

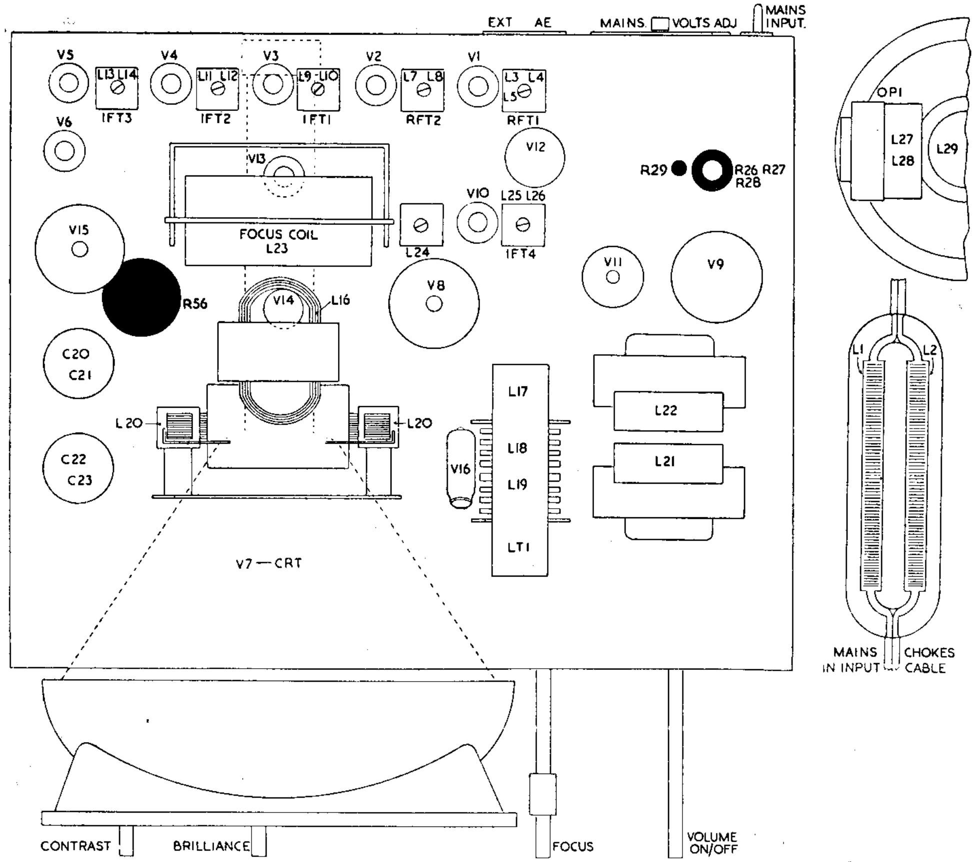
Vision channel consists of two transformer-coupled IF stages V3, V4 operating at 12.6 mc/s, diode rectifier V5A, video output amplifier V6, and diode interference limiter V5B.

The alignment of IFT1, IFT2, IFT3, together with damping resistors R9, R10 give a bandwidth of approximately 5 mc/s. Sound signal rejection is given by the tuned coil L24 in the grid input of sound IF amplifier V10.

Rectified signal appearing across R14 is direct coupled to grid of video frequency amplifier V6. Direct coupling is used to preserve the DC characteristic of the signal. Low value diode load components R14, C13 are used to maintain wide







CAPACITORS

C	Capacity	Type
1 ...	.01	Tubular 300V AC
2,3,4,6	1000pF	Tub. Ceramic
5 ...	500pF	Mica
7 ...	47pF	Silver Mica
8-12	.01	Tubular 500V
13 ...	10pF	Ceramic
14 ...	1000pF	Mica
15 ...	.1	Tubular 350V
16 ...	.01	Tubular 350
17 ...	50	Electrolytic 12V
18 ...	.5	Tubular 350V
19 ...	500pF	Mica
20 ...	100	Electrolytic 350V
21 ...	60	Electrolytic 350V
22 ...	60	Electrolytic 350V
23 ...	100	Electrolytic 350V
24 ...	.01	Tubular 350V
25 ...	5pF	Ceramic
26 ...	.01	Tubular 500V
27 ...	.01	Tubular 500V
28 ...	47pF	Silver Mica
29 ...	.01	Tubular 500V
30 ...	.01	Tubular 500V
31 ...	100pF	Silver Mica
32 ...	.01	Tubular 500V
33 ...	50	Electrolytic 12V
34 ...	.01	Tubular 500V
35-38	.1	Tubular 350V
39 ...	.005	Tubular 1000V
40 ...	8	Electrolytic 150V
41 ...	8	Electrolytic 350V

RESISTORS

R	Ohms	Watts
1	4.7K	¼
2	150	¼
3	470	¼
4	10K	¼
5	22K	¼
6	150	¼
7	4.7K	¼
8	150	¼
9	4.7K	¼
10	4.7K	¼
11	4.7K	¼
12	150	¼
13	4.7K	¼
14	4.7K	¼
15	220	¼
16	4.7K	½
17	100K	¼
18	470	¼
19	10K	½
20	10K	10
21	2K	1
22	10K	W.W. Potr.
23	50K	W.W. Potr.
24	1K	W.W. Potr.
25	5K	7
26	66	Tapped Mains Dropped Resistor
27	66	Tapped Mains Dropped Resistor
28	200	Tapped Mains Dropped Resistor
29	Thermistor	
30	100	2
31	100	3

R	Ohms	Watts
32	100	3
33	10K W.W. Potr. or 5K Potr. + 5K Resistor	
33a	5K	½
34	100K	¼
35	150	¼
36	47K	¼
37	470K	¼
38	10M	¼
39	470K	¼
40	1M	¼
41	2.2M	¼
42	500K	Potr. with DPDT Switch
43	470	¼
44	2.2M	¼
45	22K	¼
46	47K	½
47	22K	½
48	22K	½
49	47K	¼
50	470K	¼
51	47K	¼
52	220K	¼
53	2K	W.W. Potr.
54	2.5K	½
55	47K	½
56	10K	W.W. Potr.
57	10K	½W Not Fitted
58	4.7K	½

INDUCTORS

L	Ohms
1	Mains Lead .5
2	Chokes .5
3	Very Low
4	Very Low
5	Very Low
6	Very Low
7	Very Low
8	Very Low
9	1
10	.5
11	1
12	.5
13	.75
14	.75
15	9
16	20
17	.25
18	190
19	15
20	9
21	300
22	300
23	8,600
24	.5
25	2.5
26	2.5
27	350
28	Very Low
29	2.5
30	3,250
31	750

BAIRD PORTABLE TELEVISOR—*Continued*

frequency response. Video signal appearing at anode V6 is coupled through R17, C15, to cathode of CRT.

V5B, which is connected between grid of CRT and anode V6, is an interference limiter. Its cathode, being connected to anode V6, is normally more positive than its anode, which is connected to the CRT grid, and hence it is non-conducting. In addition, R17, C15 in the CRT cathode provide a delay voltage approximately equal to average video signal. When a larger amplitude interference pulse appears at anode V6, the delay bias is exceeded and V5B conducts and drives the CRT grid negative, thus reducing intensity of interference on the picture.

Sound channel.—IF signal at anode of frequency changer V2 is loosely capacity coupled by C25 to L24, tuned to 9.1 mc/s, in the grid of sound IF amplifier valve V10. L24 acts as a sound rejector for the vision frequency. R34 is a damping resistor to maintain bandwidth of input circuit. AVC provided by DC component of rectified signal is applied to g1 of V10.

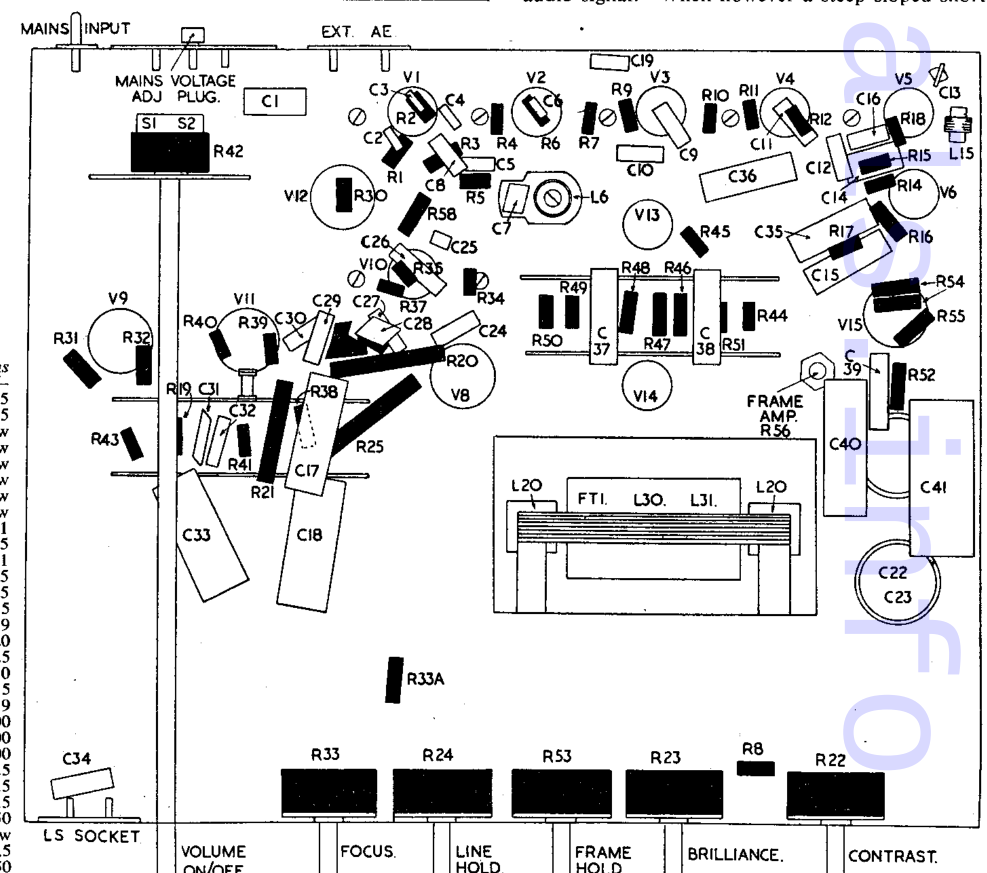
IF signal from V10 is transformer coupled by IFT4 to the strapped diodes of V11 for rectification, and then resistance-capacity coupled to triode section of the same valve for further amplification before being applied via noise limiter rectifier to sound output amplifier V12.

OP1 in the anode circuit of V12 feeds signal to a 5-in. PM speaker L29. Volume control is by R42 in the grid of V12.

The noise limiter circuit uses a Westector and the rectifier is normally maintained conducting due to the positive potential from R41. The time constant of R41, C31 is such that voltage across C31 will change in accordance with frequency of audio signal. When however a steep sloped short

Z77 VOLTAGE READINGS

	ANODE	SCREEN G2	CATHODE
V1–Z77	230V	230V	1.5V
V2–Z77	230V	230V	1.5V
V3–Z77	230V	230V	1.5–3.5V
V4–Z77	230V	230V	1.5V
V6–Z77	130V	230V	2.5V
V10–Z77	230V	230V	.5–1.5V
V13–Z77	220V	220V	O.V



BAIRD PORTABLE TELEVISOR—*Continued*

duration interference pulse appears at anode of V11, the charge on C31 is unable to follow and on the positive swing the rectifier will cease to conduct, thus removing the interfering pulse.

Sync. separator.—Sync. pulses are taken from anode of video amplifier V6 and fed by C35 to grid of sync separator valve V13. The positive sync. pulses drive V13 into grid current and so produce steady negative bias across R44. The negative going video signal drives its grid beyond cut off and only the positive sync. pulses are produced in the anode.

Frame trigger pulses are developed across integrating circuit C37, R49, R50, and are fed through V14A to grid of frame oscillator V15.

Frame scan oscillator is a power tetrode V15 operated as a grid blocking oscillator with anode to grid transformer back coupling. Frequency-determining components are R52, C39.

Line trigger pulses are developed by differentiating circuit R47, C38, R51 and are fed through V14B to grid of line oscillator V8. Control of frequency is given by R53 which varies the cathode potential of V15. Amplitude is controlled by adjustment of HT voltage to anode by means of R56. The frame transformer FT1 laminations are extended to form frame deflecting pole pieces on either side of neck of CRT. To counteract the effect of DC flowing in L30, frame shift coils L20 are placed on the pole pieces. Energising current for these coils is obtained by connecting them in series with one of the HT supplies.

Line scan oscillator is also a power tetrode V8 operated as a grid blocking oscillator with anode to grid transformer back coupling. Frequency of oscillation is determined by the time constant of R21, R24, C18. R24 is made variable to give control of frequency. Line deflection coil L16, damped by R20, is fed from grid circuit through DC isolating capacitor C17.

EHT supply for anode of CRT is obtained by rectifying the surge voltage generated across primary L18 of line transformer LT1 when V8 is cut off. L18 is used as an auto-transformer to step up the flyback voltage. Filament current of rectifier V16 is obtained from an auxiliary winding L17 on transformer. EHT voltage is fed direct to anode of CRT. Capacity between inner and outer metallic coatings of CRT is used to give smoothing.

HT supplies.—A double half-wave rectifier V9 with its anodes strapped and fed direct from the input mains is used to provide two separate HT supplies. Choke capacity smoothing is given by L21, L22, C20, C21, C22, C23. One half of rectifier provides HT for focus coil, sync. separator and scan oscillator valves, whilst other half feeds RF, sound and vision IF stages. In some receivers the focus coil current may be obtained from the HT supply for RF section.

Heaters of V1 to V15 are series connected and obtain their current of .3A from the mains through tapped dropper resistor formed by R26, R27 and thermal operates surge limiter resistor R29. V12 which has a .16A heater is shunted by R30. C19 is a heater bypass capacitor.

Cathode ray tube is a 9-in. triode giving a 7¼ by 5¾ in. picture. It is electro-magnetically focused by L23 on the neck of the tube. R23, which varies current through L23, gives control of focus. Picture brilliance is controlled by variation of grid bias by R23. Video signals are applied to its cathode. Anode voltage is approximately 5.5kV.

Alignment procedure.—Before any adjustment is carried out, verify beyond doubt that it is alignment that is required. First check valves in vision strip and sound section (V1-V12), preferably by substitution.

For alignment, the following equipment is necessary: an oscilloscope and a wobbulated oscillator with 6 mc/s sweep at 45 mc/s, an absorption wavemeter for 30-40 mc/s and a tuning wand.

First, switch on set and allow to warm up for twenty minutes. Check for good scan and focus. Set the wavemeter to 32.4 mc/s, then place the wavemeter four to six inches away from the oscillator coil L6, and tune the oscillator coil until there is a rise in the wavemeter indicator.

With normal all-wave signal generator set to television sound frequency adjust the coils L8 and T7 for maximum sound output in the loudspeaker.

Connect wobbulator output to aerial input sockets and oscilloscope " y " amplifier input to the video valve (V6) grid. Trim the tuning cores in order shown below :—

RFT1	AE coil, top
RFT1	AE core, bottom
RFT2	RF trans., top
RFT2	RF trans., bottom
IFT1	bottom
IFT2	bottom
IFT3	bottom
IFT1	top
IFT2	top
IFT3	top

Frequencies are not given for these adjustments but the cores should be set so that the final trace is a curve approximately 5 mc/s wide and located for upper sideband reception.

The flattish top of the curve should extend just beyond 45 mc/s before dropping sharply towards 42 mc/s.

On the other side the response should be well maintained to 47 mc/s before falling slightly to 48 mc/s, dropping more sharply beyond that frequency.

INSULATION RESISTANCE OF CAPACITORS

CAPACITORS of the paper tubular type may fall off in insulation resistance, and while this may not be sufficient to cause trouble in a broadcast receiver it may do so in a television set.

Non-linearity in the frame scanning may be caused by reduced insulation resistance in a capacitor coupling the time-base valves, while unsatisfactory triggering of line scan may be caused by the coupling to the sync. separator.

A good paper tubular of 0.1mF or less has an insulation resistance above 10,000 megohms, and if the value falls to about 100 megohms trouble may start.

Insulation resistance should be measured at twice the working voltage or 500V, whichever is the lower. Instruments for such testing should be part of the television engineer's test kit. Wax dipped capacitors may lose insulation resistance when stored a few months, but the metal-cased Neoprene-sealed type is less pervious to moisture.—J.M.

VIDOR CN379
Contd. from page 17

AERIAL.—The receiver has frame aerials L1, L2, L3 with SW loop L1 tapped for connection of an external aerial. On MW range L2, L3 are connected in parallel, but for LW reception L3 only is used. S1, S2 switch the frame aerials to tuning capacitor VC1 and through C2, R2 to g3 of heptode frequency-changer V1.

L1 (SW) is trimmed by T1 and L3 (LW) by C1, T2, which are only switched in circuit across L3 by S2 when wavechange switch is in LW position. No trimmer is provided for MW aerial circuit. AVC, decoupled by R9, C25, is fed through R1, R2 to control grid of V1. Primary L10, C4, of IFT1 is in the anode circuit.

Oscillator is connected in a tuned-grid series-fed circuit. The grid coils L4 (SW), L6 (MW), L8 (LW), which are trimmed by T3, T4, T5 and padded by C8, C9, C10, respectively, are switched by S3 to tuning capacitor VC2 and coupled by C7 to oscillator grid (g1) of V1. Self bias for grid is developed on C7 with R3 as leak resistor. C6 is a neutralising capacitor.

The anode reaction coils L5 (SW), L7 (MW), L9 (LW) are switched by S4 to oscillator anode (g2, g4) of V1. HT on SW range is obtained from R5 decoupled by padder C8. On MW and LW ranges, HT is obtained from R7 decoupled by C11. R6 is SW limiter resistor.

IF amplifier operates at 456 kc/s. Secondary L11, C5 of IFT1 feeds signal, and AVC voltages decoupled by R9, C25, to g1 of IF amplifier V2. R4 is grid stopper. Screen (g2) voltage is obtained from R8 decoupled by C12. Primary L12, C16 of IFT2 is in the anode circuit.

Signal rectifier.—Secondary L13, C17, of IFT2 feeds signal to diode anode of V3. R11 the volume control is the diode load and R10, C14, C15 form an IF filter.

AVC is provided by the DC component of the rectified signal and is fed by R9 to g3 of V1 and g1 of V2. C25 is decoupling capacitor.

AF amplifier.—C13 feeds rectified signal to g1 of pentode section of V3. Automatic bias for grid is developed on C13, with R13 as leak. Screen (g2) voltage is obtained from R14 decoupled by C19. R15 is the anode load and C22 anode RF bypass capacitor. Negative feedback from anode to g1 of V3 is given by C18, R12.

Output stage.—C20 feeds signal from anode V3 to g1 of pentode output valve V4. Negative bias for the grid is obtained by connecting earthy end of grid resistor R16 to bias resistor R17, which is in the HT negative lead to chassis. Bias voltage across R17 is decoupled by C23. L14 is primary of output matching transformer OP1 and C21 gives fixed tone correction. Secondary L15 of OP1 feeds into a 6½ in. PM loudspeaker L16.

HT of 90V is provided by a Vidor battery type L5039. Average total consumption is 9.5 mA. HT battery is decoupled by C3 and C24. S5, which is inserted in negative HT lead to chassis, is HT ON/OFF switch.

Filaments of V1 to V4 are connected in parallel and obtain their current of 250mA from a Vidor 1.5V heavy duty LT battery type L5050. S6, which is ganged to S5 and operated automatically when lid of receiver is opened or closed, is LT ON/OFF switch.

Chassis removal.—Remove back panel and batteries. Unsolder SW aerial connecting wire from tag on righthand side of frame and also the three leads from tag panel at top of frame. Remove the nuts from brackets on sides of frame and the nut from clamp at bottom of case. Withdraw the LW and MW frame aerial by springing the two brackets inwards, taking care not to damage aerial windings on outer side of frame.

Next remove the two nuts securing LS baffle to front of case and also the two nuts holding chassis to top of case. It is now possible to swing the complete baffle and chassis assembly backwards from the top and withdraw it from the case.

Alignment.—It is necessary to remove receiver from case. The MW and LW frame should be bolted back on the main chassis assembly and the various leads soldered to their tags. After alignment, the leads will again have to be unsoldered to re-assemble the receiver in its case.

Dial Drive.—Remove receiver from case as described. Remove the three control knobs. Undo the two nuts securing dial escutcheon to top section of chassis and lift off. Remove the two bolts holding dial nameplate in position and remove it to expose condenser drive wheel immediately below.

After renewing cord replace dial plate and check to see dial pointer is correctly positioned before fastening escutcheon on to chassis.

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune receiver to	Trim in order stated for max. output
(1) 456 kc/s to g3 of V1 via 100pF capacitor and with VC2 shorted	2000 metres	Cores L13, L12, L11, L10
(2) Check to see that with gang fully meshed dial pointer coincides with thin calibration line immediately to right of 550 metre mark.		
(3) 17.64 mc/s loosely coupled to L1	17 metres	T3, T2
(4) 6 mc/s as above ...	50 metres	Core L4. Repeat (3) and (4)
(5) 1.5 mc/s as above...	200 metres	T4. (No AE trimmer fitted)
(6) 545.45 kc/s as above	550 metres	Core L6. Repeat (5) and (6)
(7) 300 kc/s as above...	1000 metres	T5, T2
(8) 150 kc/s as above	2000 metres	Core L8. Repeat (7) and (8)

TELEPHONES FOR TELEVISION ENGINEERS

ENGINEERS concerned with the installation of television aerials should count a telephone set as part of their essential equipment. Speech communication is the only efficient way of ensuring that the engineer setting up a directional aerial, either for maximum gain or to reduce interference or images, lines it up in the best position as decided by an engineer watching the screen. At the present time Government surplus telephones are available, at a few shillings each, which are " sound powered " and need no batteries or other accessories.—J.W