MURPHY A36

Six-valve, plus rectifier and magic-eye tuning indicator, three-waveband superhet with separate SW section and reflex HF and LF amplifier stage. Suitable for operation on AC mains 100–125v or 200–250v, 50–100 cycles. Released 1937, by Murphy Radio, Ltd., Welwyn Garden City, Herts.

Circuit.—One of the interesting features of this model is the unusual SW section employing its own ganged tuning condenser (VC4, VC5, VC6) HF amplifier V5, and frequency changer V6.

The SW signals are converted into one of about 300m and are then passed to the input circuit of the broadcast section of the receiver. They proceed through this as would any normal MW signal. V5 is reflexed and operates as a SW HF amplifier and as an LF amplifier between V3 and V4. To simplify this review we will deal first with the MW and LW section of the receiver.

The aerial is fed to the coupling windings L1 and L2 of the bandpass filter which has inductive coupling by L5 and L6. C1 and L9 is the image suppressor circuit.

The bandpass secondary circuit feeds the control grid of V1, a triode-pentode frequency-changer, the control grid having full AVC applied from the double-diode demodulator V3. V1's AVC circuit is decoupled by R28 and C2. Standing bias for the pentode section is derived from R2, decoupled by C3.

Cathode coupling is employed for the oscillator section, L10 and L11 being the cathode coils, R1 and C4 the grid leak and condenser. The anode of the oscillator section of V1 is fed via the tuned oscillator coils L12, L13 from the HT line with R3 as the voltage dropper. R4 is the voltage dropper for the screen and anode of the pentode section of V1.

V1 is coupled to V2, pentode IF amplifier, by the IF transformer comprising L14 and L15. AVC is provided from the AVC network via the decoupling components R8 and C10. Standing bias is provided by R6 decoupled by C9.

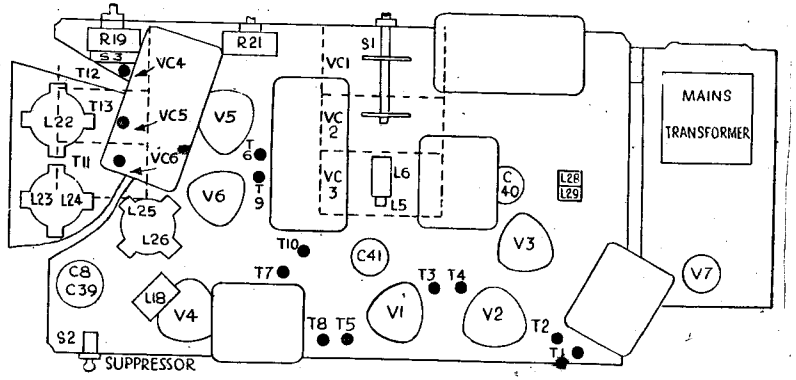
A second IF transformer L16, L17 couples V2 to the double-diode V3. The AVC diode is fed from L16 via C15, the diode load being the resistance network R14, R15 and R16.

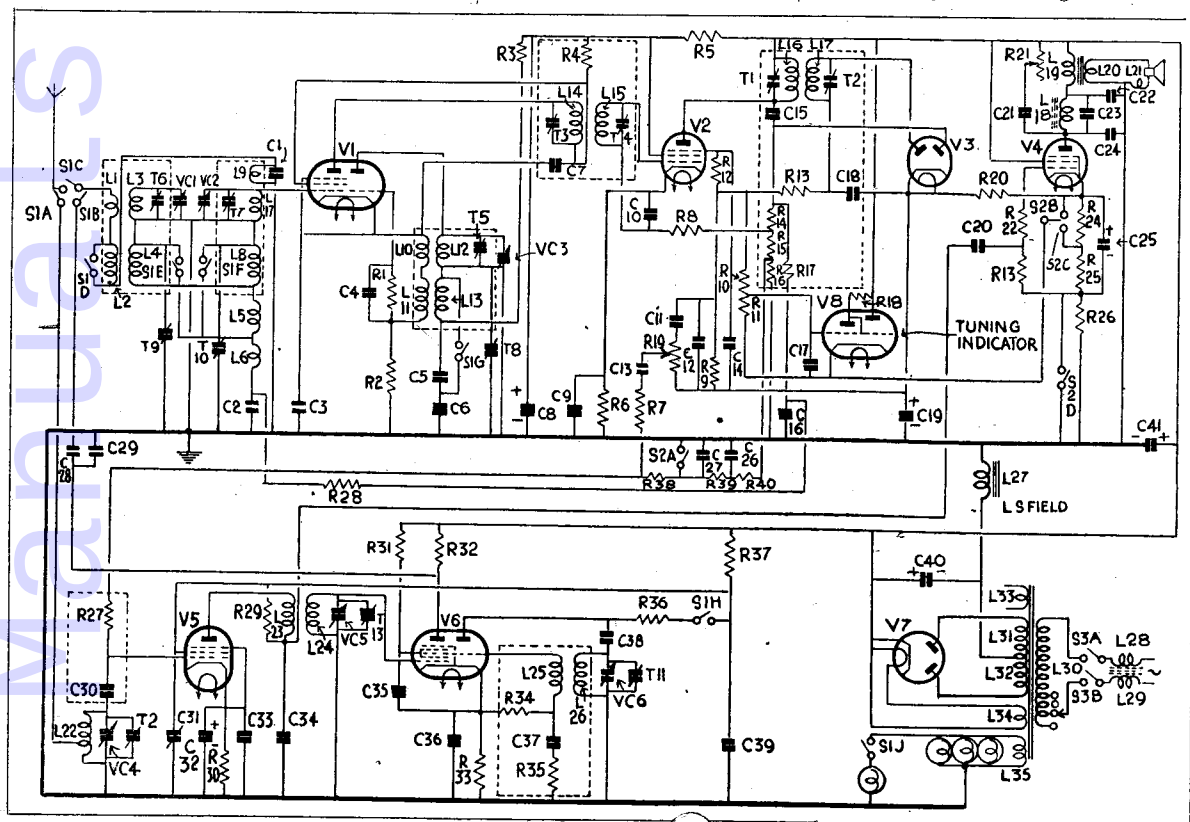
The signal diode of V3 is fed from L17, the diode load is R9. R13 and C18 form an IF filter and the LF signal is passed via C11 to the volume control R19, HF by-passed by C12, and from thence via R27 HF grid stopper, to the grid of V5.

The tuning indicator control grid is fed from the junction of R10, R11 through which flows a portion of the steady current due to the received signal.

Reverting to V5, the LF signal is developed across R29 in the anode circuit and passed by C20 to the grid circuit of the output pentode V4. R22 is a grid stopper and R23 is the grid-to-cathode resistance of V4. Standing bias for V4 is provided by R24, R25 decoupled by C25.

A whistle filter comprising L18, C23 and C24 is incorporated in the anode circuit of V4 which is coupled to the 2 ohm loudspeaker by L19, L20.





RESISTANCES

R	Ohms	R	Ohms
1	50,000	21	50,000
2	500	22	5,000
3	100,000	23	100,000
4	5,000	24	100
5	3,000	25	40
6	300	26	320
7	1 meg	27	100,000
8	1 meg	28	5,000
9	600,000	29	15,000
10	4 meg	30	600
11	2 meg	31	25,000
12	1.3 meg	32	5,000
13	100,000	33	200
14	800,000	34	20,000
15	500,000	35	25
16	300,000	36	30,000
17	2 meg	37	2,000
18	1 meg	38	200,000
19	1 meg	39	500,000
20	5,000	40	500,000

CONDENSERS

C	Mfd	C	Mfd
1	.0095	22	.002
2	.1	23	.0003
3	.00035	24	.0003
4	.0005	25	75
5	.001	26	.1
6	.05	27	.1
7	.01	28	.005
8	.8	29	.0001
9	.1	30	.0001
10	.05	31	.025
11	.01	32	25
12	.0002	33	.025
13	.005	34	.001
14	.05	35	.025
15	.00005	36	.01
16	.01	37	.00005
17	.05	38	.0001
18	.0001	39	8
19	10	40	8
20	.05	41	8
	.04		

The HT supply circuit comprises the usual arrangement of full-wave rectifier V7 with the speaker field L27 in the negative HT feed with C40 and C41 as the smoothing capacities. The mains input is filtered by the HF chokes L28 and L29.

Noise suppression is effected by

Continued on opposite page

VALVE READINGS

Taken with no signal input and NS off.

V	Type	Electrode	Volts
1	AC/TP	Anode	150
		Screen	150
		Cathode	4
		Osc. anode	75
2	AC/VP2	Anode	220
		Screen	185
		Anode	3
3	V914	Cathode	8
4	AC/2Pen.	Anode	200
		Screen	220
		Cathode	8
5	AC/VP2	Anode	127
		Screen	200
		Cathode	3
6	AC/TH1	Anode	190
		Screen	88
		Cathode	3
		Osc. anode	63
7	UU4	Cathode	220
8	AC/ME	Anode	220
		Anode	32

WINDINGS

L	Ohms	L	Ohms
1	1.2	19	300
2	9	20	.25
3	4	21	2
4	12	22	—
5	3	23	—
6	.2	24	—
7	4	25	—
8	12	26	—
9	.1	27	1,300
10	2.5	28	3
11		29	3
12	3.5	30	27 (total)
13	8	31	230
14	40	32	250
15	40	33	—
16	40	34	—
17	40	35	—
18	360		

DE WALD 414

Three-valve, plus rectifier, TRF two waveband AC/DC American midget receiver. Mains voltage range depends on type of line cord fitted. Each instrument is labelled with this information.

Circuit.—No provision for an outside aerial or earth is made. For an aerial, a reel of brown wire is provided at the rear of the chassis and this is intended to be stretched round the floor of the room. An outdoor extension may be joined to the wire for additional range, if required. The chassis is "live" and a direct earth must not be connected.

The aerial input is taken through C1 to the aperiodic coupling coil L1. A shunt path for the aerial input is via R1, the volume control, to chassis. R1 is also the cathode bias resistance for the HF pentode V1, so that the aerial circuit is shunted and the valve desensitised to a degree depending upon the amount of resistance in circuit between chassis and aerial.

L1 is coupled to L2, the MW grid coil, and L3 the LW coil, the latter having its own trimmer T4.

V1 is coupled to V2, a triode demodulator, by an HF transformer with aperiodic primary L4. L5 and L6 are the MW and LW grid coils and leaky-grid rectification is by R2 and C3.

Resistance capacity coupling transfers the LF signal from V2 to V3, R3 and C5 being the components concerned. C4 is the anode to chassis HF by-pass for V2.

R4 is the grid resistance for V3, the output pentode, which is biased by R5 and transformer coupled to the PM speaker. C6 is the pentode tone corrector. R6 is the voltage dropping resistance for the screens and anodes of all valves except V3, whose anode is taken to the maximum HT supply of the half-wave rectifier V4. R6 also acts as a smoothing component in conjunction with the large capacity coupling condensers C7, C8.

The mains input circuit is of conventional type, all valve heaters being in series with the mains dropping resistance incorporated in the line cord R8, R9. The valve heaters take .15A so that for the values of the resistances in the line cord of the particular model reviewed, the instrument may be worked from a 230v mains supply. The total volts dropped by R7, R8 and R9 is 114v and the total valve heater voltage is 120.2 (V1, V2, 12.6v each; V3, 50v; V4, 45v.)

HT is taken from R9 after a voltage drop of 72.7 which on 230v mains leaves approximately 157v for the HT line.

The pilot lamp is fed from a 7.5v tap on the rectifier heater. C9 is the mains filter condenser and S1 is the on-off switch which is ganged with the volume control R1.

GANGING

MW Band.—Switch set to MW and volume control to maximum. Inject a signal of about 200m, keeping the input low and adjust T1 and T2 in that order for maximum output.

LW Band.—Switch receiver to LW and inject a signal of about 1,000m. Adjust T3 and T4 for maximum output.

RESISTANCES

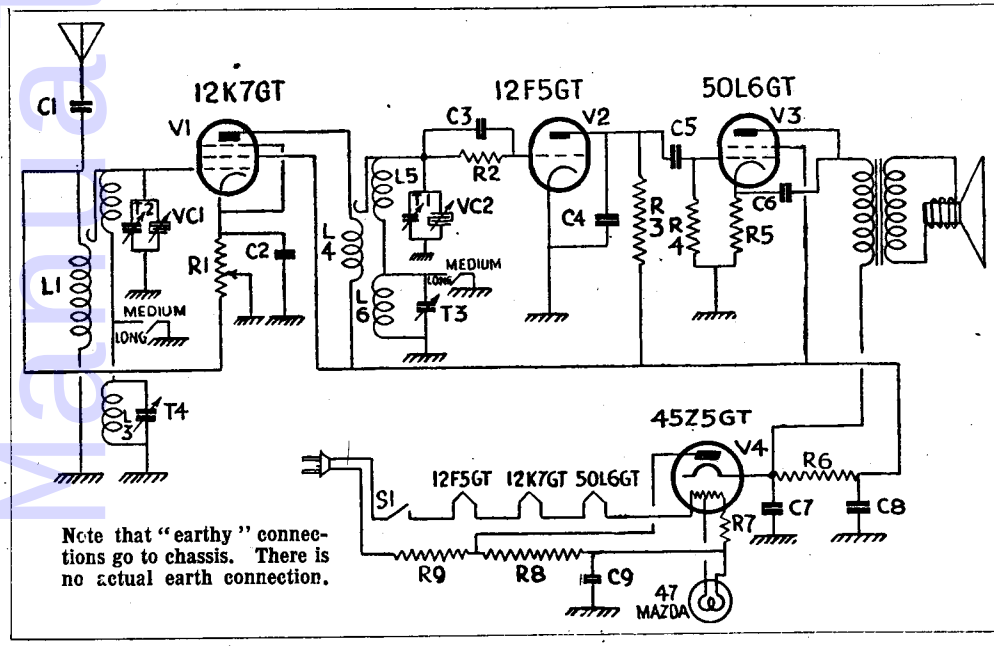
R			Ohms	R			Ohms
1	..	..	25 meg.	6	..	..	2,000
2	..	..	5 meg.	7	..	..	75
3	..	..	1 meg.	8	..	..	200
4	..	..	1 meg.	9	..	..	485
5	..	..	150				

WINDINGS

L			Ohms	L			Ohms
1	..	..	36	4	..	..	55
2	..	..	4	5	..	..	4
3	..	..	25	6	..	..	30

CONDENSERS

C			Mfd
1	..	..	.001
2	..	..	.01
3	..	..	.005
4	..	..	.0001
5	..	..	.01
6	..	..	.02
7	..	..	16
8	..	..	16
9	..	..	.02



Note that "earthy" connections go to chassis. There is no actual earth connection.

A typical American TRF midget receiver, the 414 employs .15 amp valves. The voltage of each heater is shown by the type number.

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Continued from opposite page

applying a paralysing voltage to the signal diode from V4 cathode circuit. To prevent distortion on strong well modulated signals due to this excessive bias, the latter is neutralised to a certain extent by the application of a voltage derived from R12 and R9 which comprise a diode load, the suppressor grid of V2 being the diode. Only strong signals across R12 and R9 will provide sufficient voltage to release the bias on V3. Local "noise" and weak stations are suppressed.

The suppressor circuit is controlled by switch S2, particularly the contacts S2d which control the action of the resistance R26 in the cathode circuit of V4.

With the switch closed, *i.e.*, with no noise suppression, there is a voltage of about 5 between V4 cathode and earth. This voltage is also the AVC delay and suppression voltage, which being very low allows a small LF signal to develop across the diode load.

The LF signal developed across the diode load is attenuated by R7 and R38 and passed to the reflex valve V5.

When S2d is opened the AVC delay voltage rises to about 15 providing a larger signal to the grid of V5. A second effect is to produce an anti-phase feedback into the grid circuit of the output valve due to R26, and this effectively reduces the gain of the output valve by the amount of the increase in LF signal applied to V5. Thus there is no large change in output but only the effect of the suppression voltage on the diode.

R20 and C19 are LF decoupling components which prevent attenuation of bass due to the anti-phase feedback. Other contacts on the noise suppression switch are S2a and S2b. The first pair of contacts allows an AVC voltage across R16 to be applied to V5 while the contacts S2b alter the standing bias on the tuning indicator triode to accommodate the change of voltage across R11.

SW Section.—On SW the aerial is switched to L22 and coupled by C30 to the grid of the SW pentode amplifier, V5, which is biased by R30, decoupled by C32 (LF) and C33 (HF). A small amount of AVC is applied via the filter network R39, R40, C26, C27 from the junction of R15, R16.

Tuned secondary HF transformer coupling is employed to couple V5 to the SW frequency-changer V6. The primary of the HF transformer is L23 and, as previously stated, is HT fed via R29 which is the LF coupling resistance for the reflex action of V5. C34 is the HF bypass of R29. R37 is the voltage dropper for the anode and screen of V5, the screen being decoupled by C31, the anode by C39.

The secondary of the HF transformer L24 is tuned and the signal passed direct to the control grid of the frequency changer V6.

The oscillator section of V6 comprises a tuned anode circuit L26, VC6 with grid coil coupling L25. Switch contacts S1b break the oscillator anode circuit on MW and LW. The IF output of V6 has a frequency of 1,000 kc (300m) and is fed by C28 as a broadcast signal to the aerial circuit of the MW and LW section of the receiver where it is again frequency-changed by V1 and passed through the circuits already described. C29 is a loading capacity for L1 to compensate for the aerial load.

The SW condenser gang moves in steps, each step being the mid-point of a SW band. Tuning over the band is effected by the broadcast condenser gang which thus alters the SW intermediate frequency. As the SW oscillator frequency remains constant, to produce a different IF, the input signal must be different and thus the band is covered.

GANGING

IF Circuits.—Switch to LW, tune to 2,000m and advance the volume control to maximum. Connect a service oscillator to the control grid of V2 and chassis via a dummy aerial. Inject a signal of 119 kc keeping signal below AVC voltage.

Adjust T1 and T2 for maximum reading on output meter; repeat for final adjustment.

Transfer signal input to the pentode control grid of V1 and chassis. Adjust T3 and T4 for maximum output and repeat.

MW Band.—Switch to MW and with the normal aerial and earth connected to the receiver, adjust the pointer to the wavelength of a broadcast transmission as near to 220m position as possible.

Adjust T5 for maximum signal strength as shown by the tuning indicator. Without touching the tuning control, replace the aerial and earth with the dummy aerial of the service oscillator. Tune the service oscillator to obtain maximum signal from the receiver ignoring the actual calibration.

Adjust T6 and T7 for maximum output, and repeat for final adjustment.

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KOLSTER-BRANDES 810

Three - valve, three - waveband battery bandpass TRF receiver with volume and sensitivity (reaction) controls. Sockets are provided for pickup and extra loudspeaker. Marketed by Kolster-Brandes, Ltd., Sidcup, Kent.

Circuit.—The aerial input is coupled to the bandpass coil assembly by L2 and L4, which are permanently in circuit. L2 is the medium and long wave primary, and L4 is the SW primary winding. The aerial connection may be taken either direct via socket A1 or through a resistance R1 for the reception of strong transmissions.

L6 and L7 are the MW and LW grid coils of the bandpass filter unit which has a bottom capacity coupling C1. There is no bandpass coupling on SW, the aerial coil L4 being coupled directly to the SW grid coil L5, both of these coils being on a former separate from the other windings.

The grid coils feed V1, a variable-mu HF pentode whose gain is varied by controlling the bias applied to it. R6 is the standing bias resistance for maximum sensitivity while the volume control VR1 enables additional bias up to minus 9v to be applied to reduce the gain to a minimum. The on-off switch is ganged to the volume control.

The screen and anode circuits are decoupled by C2 and the HT supply by C7.

Tuned anode HF coupling is employed, the anode tuning condenser VC3 being ganged with the bandpass tuning condensers VC1 and VC2.

L9, L10 and L12 are the SW, MW, and LW anode coils respectively. Grid rectification is employed for the detector valve V2, C4 acting as a coupling condenser and a grid rectification condenser in conjunction with the grid leak R3.

Pickup sockets are provided across the grid circuit of V2 for use in conjunction with a high impedance pickup.

Reaction is obtained from the anode circuit of V2 by means of the HF choke L13 and the reaction windings L8 and L11. L8 is coupled to the SW anode coil L9 on one former while L11 is coupled to the MW and LW anode coils L10 and L12 on another former.

The degree of reaction is controlled by the variable condenser VC4. On MW and LW, C3 is brought into circuit as an anode to earth HF by-pass for V2.

V2 is resistance-capacity coupled by R4 and C5 to L14, an LF auto-transformer which is connected to the grid of the output pentode V3 via a grid stopper R5.

Permanent tone correction for the pentode is effected by C6 and the low impedance moving-coil speaker is coupled to the output valve via the transformer L15, L16.

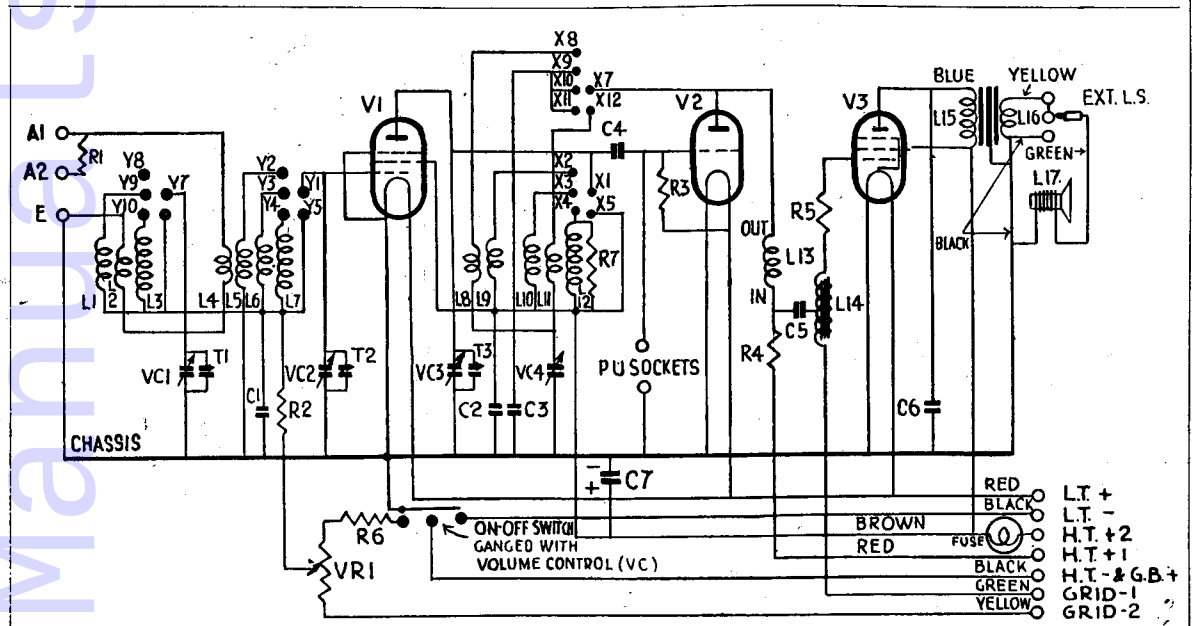
Extra loudspeaker sockets are provided and the internal loudspeaker may be silenced by unscrewing the external speaker switch on the panel fitted at the back of the cabinet. Extra speakers should have an impedance of about 3 ohms.

The HT battery recommended by the makers is a Drydex H1070 (120v + 9v G.B.) connections being as shown in the chassis layout diagram.

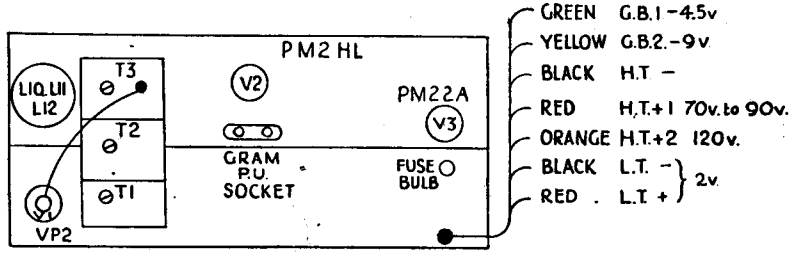
GANGING

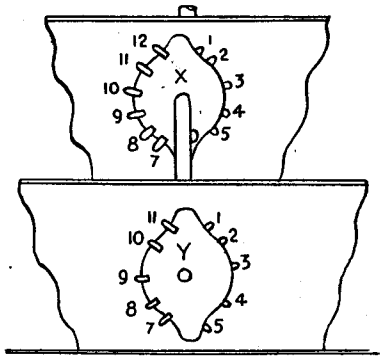
Ganging should be carried out with the reaction condenser at minimum capacity and the volume control at maximum, with the set switch to MW. A signal of 1,400 kc should be injected via a dummy aerial to the A1 socket and the tuning pointer adjusted to the 214 m spot. Trimmers T1, T2, T3 should be adjusted in that order for maximum output, repeating the adjustments after the first rough settings have been obtained.

If these adjustments are carefully carried out calibration on the SW and LW bands should be within limits.



A three-valve battery set, the Kolster-Brandes 810 employs bandpass input and a reactive triode detector. LF coupling is by parallel-fed auto-transformer.





WAVERANGE SWITCH CONTACTS		
THE CONTACTS SPECIFIED ON THE RIGHT CONNECT WHEN THE SWITCH IS IN POSITION SHOWN BELOW	X	Y
LONG WAVERANGE	1 TO 4 7 " 10 11 " 12	1 TO 4 7 " 10
MEDIUM WAVERANGE	1 TO 3 4 " 5 7 " 9 10 " 11&12	1 TO 3 4 " 5 7 " 9 10 " 11
SHORT WAVERANGE	1 TO 2 3 " 4&5 7 " 8 9 " 10&11	1 TO 2 3 " 4&5 9 " 10&11

At top is the top-of-chassis layout diagram indicating trimmer positions. The switch diagram and table enable all switching operations to be traced.

VALVE READINGS

V	Type	Electrode	Volts
1	VP2	Anode	123
		Screen	123
2	PM1HL	Anode	51
3	PM22A	Anode	121
		Screen	123
	Fuse lamp		2.5 v.

RESISTANCES

R	Ohms	R	Ohms
1	100,000	5	500,000
2	250,000	6	1,000
3	2 meg.	7	1 meg.
4	25,000	VR1	10,000

CONDENSERS

C	Mfd	C	Mfd
1	.02	5	.02
2	.1	6	.003
3	.005	7	2
4	.0001		

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LW Band.—Reconnect normal aerial and earth, switch set to LW and pointer to wavelength of known LW transmission.

Adjust T8 for maximum output as judged by tuning indicator. Tune receiver to exactly 1,000m connect the service oscillator in place of the aerial and earth and tune the service oscillator to the point giving maximum deflection on the output meter.

Adjust T9 and T10 for maximum output and repeat for final setting.

SW Band.—Switch receiver to SW, and the band selector dial to the 16m band.

Adjust tuning control to 300m (5 on the SW scale).

Inject a 17.7mc signal to the aerial and earth terminals and adjust T11, T12, T13 in that order for maximum output. Repeat adjustments for final setting.