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.

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

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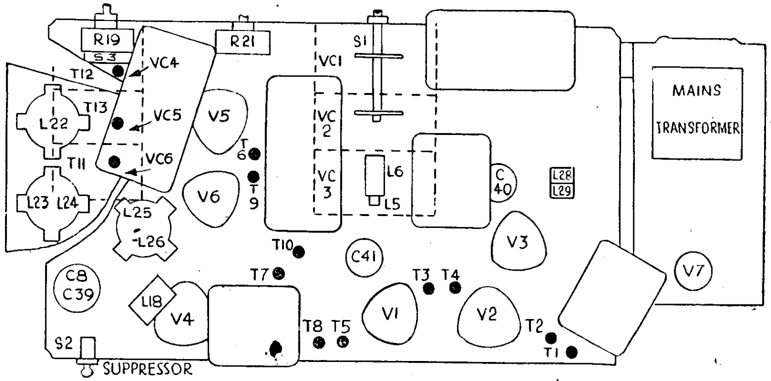

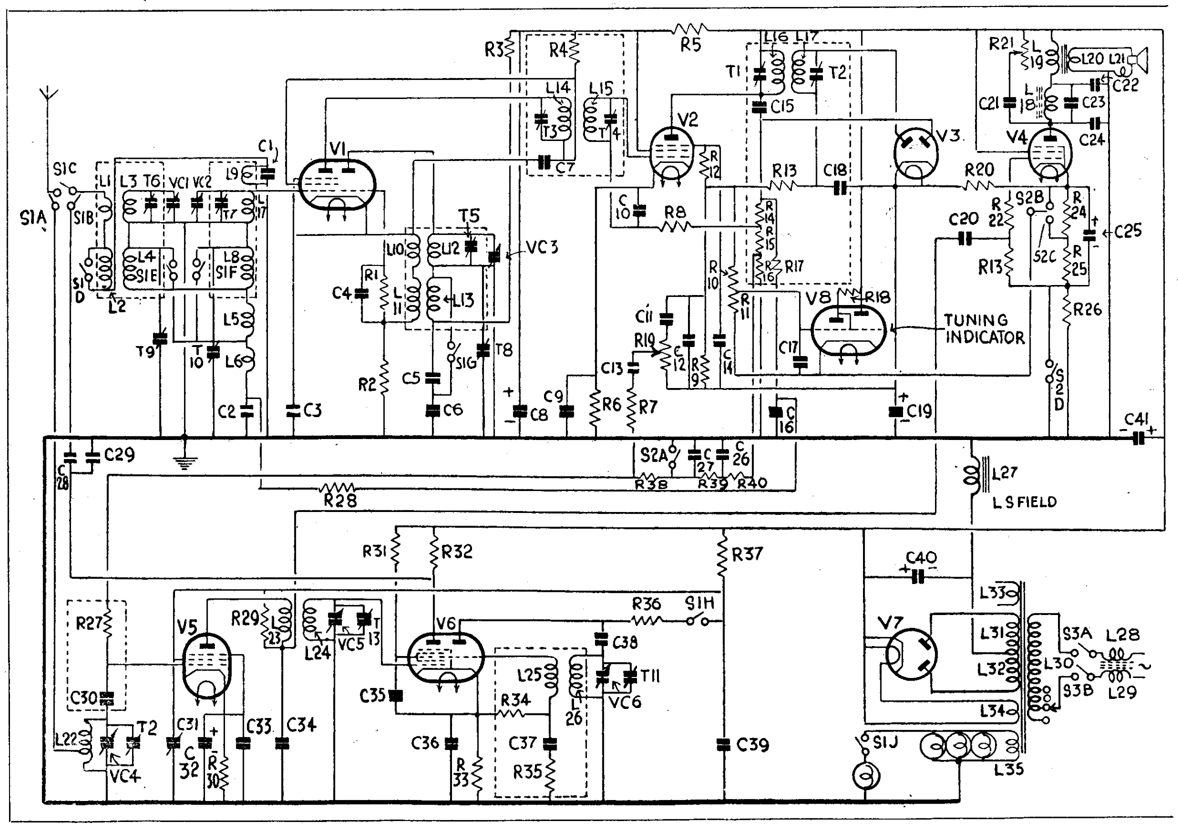

RESISTANCES

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	.0005	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
21	.04		

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	Ancde	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		

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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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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.