MURPHY
A90

Four-valve, plus rectifier, three-waveband superhet for operation from AC mains. A90 is a table model, A90C a console model, and A90RG a radiogram. Suitable for operation from 200–250v, 50–100 cycle mains supply. Marketed by Murphy Radio, Ltd., Welwyn Garden City, Herts.

THE aerial input is fed *via* two strapped sockets. Where necessary the shorting strap may be removed and a series rejector wavetrap suitable for any interfering station connected to the two sockets. From here the input is taken to an IF rejector filter L1, C1A, and thence *via* switches to the primary coils L2 (SW), L4 (MW), and L6 (LW) of the aerial transformers. The secondaries L3, L5, and L7 are of the variable iron dust core type and are connected *via* switches to the HF section VC1 of the twin ganged condenser.

Signals are fed *via* blocking condenser C4 to the grid of the triode heptode frequency changer V1. This valve is AVC controlled and has a cathode biasing resistance R3 decoupled by C6.

The oscillator section incorporates the grid condenser and leak C7, R4, and grid reaction coils L8 (SW), L10 (MW), and L12 (LW). The tuned secondaries which have variable iron dust cores are fed with HF from the anode of the oscillator section *via* C8, VC2 being the oscillator section of the tuning condenser.

In the radiogram model the HT supply circuit to the oscillator section is broken by switch contacts S6A when this switch is in the gram position.

A variable iron dust core IF transformer L14, L15 couples the IF output from V1 to the grid of the IF amplifier pentode V2, which is connected to the AVC line and permanently biased by cathode resistance R8 decoupled by C14.

A second variable iron dust core IF transformer L16, L17 hands on the signal to one of the diodes of the double diode triode valve V3, the second diode of which is not used and is connected to cathode.

C18, R10, and C19 comprise the IF filter circuit, whilst R11 is the LF load resistance across which is developed the LF signal which is applied *via* C20 to the volume control R13 and thence to the control grid of V3.

In the table model the pick-up sockets are connected across the volume control, but in the radiogram version the pick-up is connected across R12 and then *via* switch contacts S6B to the volume control.

The AVC is taken from the DC potential across the load resistance network and is fed *via* the decoupling components R9, C15, and R1 to the grids of V1 and V2.

V3 is cathode biased by R14 decoupled by C21 and the LF signal is resistance capacity coupled *via* R16, C23, and grid leak R17 to the grid of the pentode output valve V4, which has a grid stopper R18 in the grid circuit.

The output valve is cathode biased by R19, decoupled by C24 and a variable tone control comprising R20 and C25 is connected between anode and cathode.

An output transformer L18, L19 couples the output from V4 to the low impedance energised moving coil loudspeaker, of which L20 is the hum bucking coil, L21 the speech coil, and L22 the field winding.

VALVE READINGS

V	*Type*	*Electrode*	*Volts*	*Mas*
1	TH41	Anode	116	2.7
	Mazda	Screen	116	6.3
		Osc anode	65	3.3
		Cathode	4	—
2	VP41	Anode	197	7.6
	Mazda	Screen	198	1.7
		Cathode	4	—
3	HL41DD	Anode	85	1.9
	Mazda	Cathode	1.3	—
4	PEN45	Anode	188	29
	Mazda	Screen	198	5.8
		Cathode	7	—
5	UU6	Cathode	360	—
	Mazda	—	—	—

Pilot Lamps, 6.2 v, .3 amp, M.E.S.
Voltages taken on 240 v mains with a 1,000 o-p-v meter.

Extra loudspeaker sockets are provided across the secondary winding of L19 with a switch S5 for selecting either one or both speakers.

The HT supply is derived from a fullwave rectifier V5 and smoothing is effected by L22, C26, and C27.

GANGING

IF Circuits.—Unless an oscillograph is used for alignment, it is essential to damp one of each pair of tuned circuits while the other is being adjusted, otherwise an uneven "double-humped" resonance curve is likely.

Connect the service oscillator, tuned to 465 kcs, between V2 control grid and chassis and connect an output meter across the LS.

Connect a damping unit comprising a .1 mfd condenser and a 20,000 ohm resistance in series between V2 anode and chassis and adjust L17 for maximum.

Connect the damping unit between V3 diode and chassis, and adjust L16.

Connect the service oscillator to V1 control grid and the damping unit between V1 hexode anode and chassis. Adjust L15.

Connect the damping unit between V2 control grid and chassis and adjust L14 for maximum gain.

IF Filter..—This filter is adjusted to give minimum signal at 465 kcs and the

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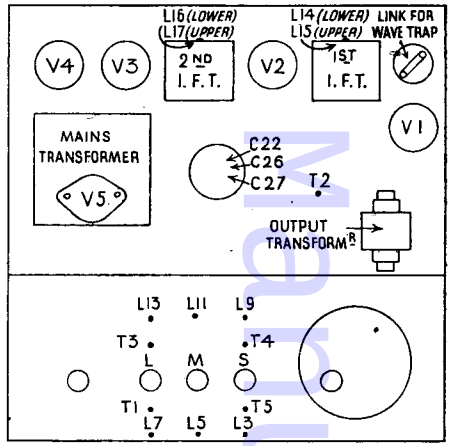
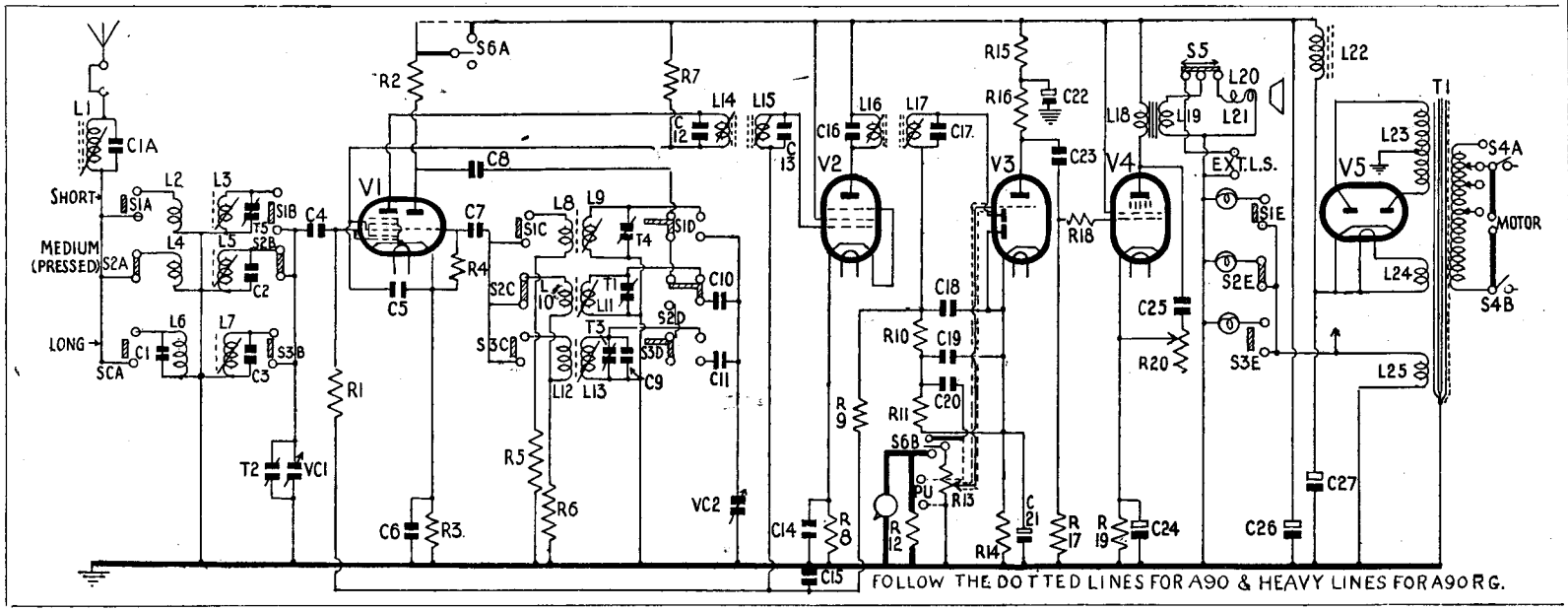


The chassis of the AC model, showing trimmer positions. The same diagram applies to the DC version as regards trimming and general layout.



CONDENSERS

C	*Mfds*	*C*	*Mfds*
1 ..	.0005	14 ..	.025
1A ..	.0005	15 ..	.05
2 ..	10 mmfd	16 ..	139 mmfd
3 ..	85 mmfd	17 ..	150 mmfd
4 ..	.0005	18 ..	.0001
5 ..	.05	19 ..	.0001
6 ..	.05	20 ..	.01
7 ..	.0002	21 ..	50
8 ..	.0001	22 ..	8
9 ..	.00026	23 ..	.01
10 ..	.0007	24 ..	50
11 ..	414 mmfd	25 ..	.04
12 ..	139 mmfd	26 ..	8
13 ..	150 mmfd	27 ..	16

RESISTANCES

R	*Ohms*	*R*	*Ohms*
1 ..	1 meg	11 ..	470,000
2 ..	33,000	12* ..	12,000
3 ..	330	13 ..	1 meg
4 ..	22,000	14 ..	680
5 ..	47	15 ..	10,000
6 ..	470	16 ..	47,000
7 ..	9,100	17 ..	470,000
8 ..	470	18 ..	47,000
9 ..	2.2 meg	19 ..	200
10 ..	100,000	20 ..	50,000

* A90RG only.

WINDINGS

L	*Ohms*	*L*	*Ohms*
1 ..	2.5	14 ..	5.5
2 ..	.2	15 ..	5.5
3 ..	.05	16 ..	5.5
4 ..	.7	17 ..	5.5
5 ..	2.25	18 ..	290
6 ..	25	19 ..	.6
7 ..	15	20 ..	.1
8 ..	.2	21 ..	2.5
9 ..	.05	22 ..	2,300
10 ..	.8	23 ..	.215+230
11 ..	1.25	24 ..	.15
12 ..	.9	25 ..	.05
13 ..	1.7	26 ..	22 (total)

Pick-up on RG Model, 2,000 ohms.

MURPHY D90

Four-valve, plus rectifier, three-wave-band superhet for operation from AC or DC mains, 200–250v, 25–100 cycles. Marketed by Murphy Radio, Ltd., Welwyn Garden City, Herts.

THE D90 and D90RG models are practically similar in all respects to the A90 and A90RG models described on the opposite page. The accompanying circuit diagram shows the differences which occur in the pick-up input circuit and the valve heater network.

A low impedance pick-up of only 10 ohms DC resistance is connected across the primary of a step-up isolating transformer L25, L26. The secondary is connected through the radiogram switch to the radio volume control R13.

The HT supply circuit employs a half-wave rectifier with a current limiter R27 in the anode circuit. The mains input has dust cored HF chokes L23, L24 for HF filtering.

The heater circuit employs the usual arrangement of mains dropping resistance R23—R26 with the valve heaters in series and incorporates a thermal-delay switch S7 which short circuits R22 after a lapse of a short period.

GANGING

The alignment of all circuits is as given in the review of the AC models. The usual precautions being taken, of course, to isolate the service oscillator from the chassis which may be "live" on certain mains supplies.

VALVE READINGS

V	Type	Electrode	Volts
1	TH233	Anode	120
	Mazda	Osc anode	72
		Screen	120
		Cathode	4
2	VP133	Anode	185
	Mazda	Screen	160
		Cathode	3.75
3	HL133DD	Anode	72
	Mazda	Cathode	1.4
4	PEN383	Anode	172
	Mazda	Screen	160
		Cathode	9
5	U403	Cathode	255
	Mazda		

Pilot Lamps, 3.5 v, .15 amp.
Readings taken with 1,000 o-p-v meter on 240 v AC mains.

CONDENSERS

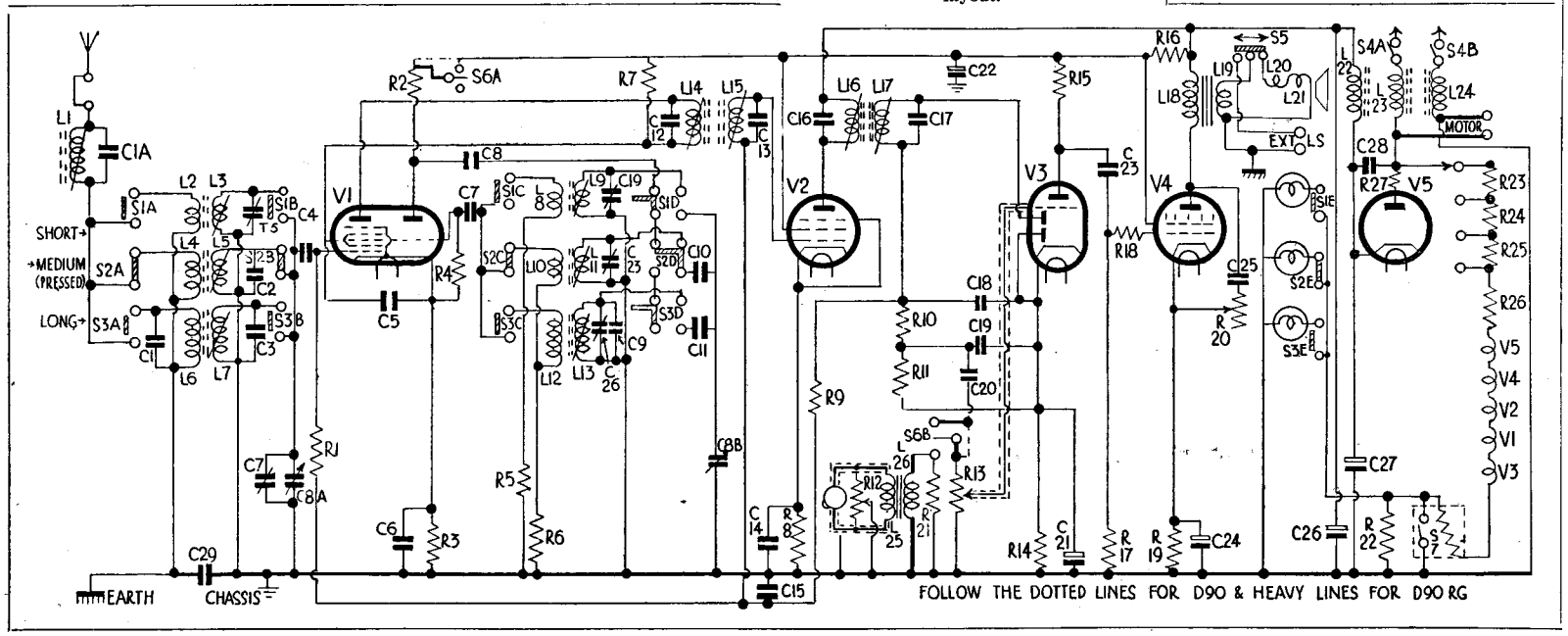
C	Mfds	C	Mfds
1	.0005	15	.05
1A	.0005	16	139 mmfd
2	10 mmfd	17	150 mmfd
3	85 mmfd	18	.0001
4	.0005	19	.0001
5	.05	20	.01
6	.05	21	50
7	.0002	22	16
8	.0001	23	.01
9	.00026	24	50
10	.0007	25	.1
11	414 mmfd	26	16
12	139 mmfd	27	16
13	150 mmfd	28	.04
14	.025	29	.01

RESISTANCES

R	Ohms	R	Ohms
1	1 meg	15	47,000
2	22,000	16	1,000
3	390	17	470,000
4	22,000	18	47,000
5	47	19	140
6	470	20	25,000
7	5,100	21*	12,000
8	470	22	23
9	2.2 meg	23	75
10	100,000	24	100
11	470,000	25	75
12*	500	26	336
13	1 meg	27	47
14	1,000		

* On RG Models only.

The design of the D90 models corresponds largely with that of the AC version as regards both circuit and layout.



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adjustment can be judged more accurately by ear than with an output meter.

Connect the service oscillator, tuned to 465 kcs, to the aerial and earth terminals of the receiver. Reduce the output from the oscillator until the signal is only just audible. Adjust L1 until the signal is at minimum.

MW Band.—Tune the service oscillator and the receiver to 230 metres. Adjust T1 and T2 for maximum gain.

Tune the receiver and the service oscillator to 500 metres and adjust L11 and L5 for maximum output. Readjust T1 and T2.

LW Band.—Tune the service oscillator and the receiver to exactly 1,000 metres.

WINDINGS

L	Ohms	L	Ohms
1	2.5	14	5.5
2	.2	15	5.5
3	.05	16	5.5
4	.7	17	5.5
5	2.25	18	200
6	25	19	.6
7	15	20	.1
8	.2	21	2.5
9	.05	22	900
10	.8	23	—
11	1.25	24	—
12	.9	25	2
13	1.7	26	400

Pick-up on RG Model, 10 ohms.
Th Delay Switch, 18 ohms.

Adjust T3 to correct any calibration errors.

Tune the oscillator and the receiver to exactly 1,900 metres, and adjust L13 to correct any tracking errors. Adjust L7 for maximum gain.

SW Band.—The makers emphasise that extreme accuracy is necessary on the shortwave band, and the adjustments are made in the factory with the aid of crystal controlled oscillators. If adjustments are made to the oscillator circuits with the aid of an ordinary service oscillator, the receiver should afterwards be checked under broadcast conditions.

Tune the service oscillator and the receiver to 17 metres. Adjust T4 and T5 for maximum output.

Tune the receiver and the service oscillator to 42 metres and adjust L9 and L3 to take up any tracking errors. Re-adjust T4 and T5.

Note.—Chassis in which the SW trimmers are mounted on the ganged condenser should have the SW band aligned first.

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is connected between the top ends of L1 and L2.

PU CIRCUIT—The slider of VR1 is taken to chassis through a 300 ohm resistance which is shunted by a pair of switch contacts which open on gram. This arrangement desensitises V1 to prevent radio breakthrough and takes the place of the screen grid switching which is deleted. R2 is changed from 300 ohms to 150 ohms. R4 is changed to 51,000 ohms.

V4 CATHODE CIRCUIT—A 100 ohm resistance is connected between R17 and R18, R17 being reduced to 50 ohms. R13 is taken to the junction of R17 and the added resistance, while VR2 is taken to the other end of this resistance where it joins R18.

SMOOTHING CIRCUIT—C18 is increased to 16 mfds.

GANGING

IF CIRCUITS—The manufacturers advise that a damping unit comprising a 50,000 ohm resistance and a .1 mfd condenser in series be connected across the winding of the IF transformer opposite to that which is being trimmed.

Adjust VR1 and VR2 to maximum and prevent V1 from oscillating by connecting a large capacity condenser between the oscillator anode and chassis.

Inject a 127 kcs signal into the grid (top cap) of V1 and adjust T1 for maximum output with the damping unit connected across L11. Transfer damping unit to L12 and adjust T2 for maximum output. Repeat procedure for L9 when trimming T3, and L10 when trimming T4.

MW BAND—Check calibration by adjusting gang to minimum capacity and pointer so that it coincides with mark at end of scale.

Inject a 196m signal into A1 and E sockets *via* a suitable dummy aerial and adjust T5, T6 and T7 for maximum output.

LW BAND—Switch receiver to LW and adjust pointer to 1,300m. Inject a 1,200m signal and adjust T8 for maximum output.