90 90

MURPHY RADIO SERVICE INSTRUCTIONS

MAINS SUPPLY:	A90:	200-250 volts (50-100 cycles).
	D90:	200-250 volts D.C. or A.C. (25-100 cycles).
WAVE RANGES:		16.7-50 metres. 190-550 metres. 970-2000 metres.
INTERMEDIATE FREQUENCY:		465 kc/s.
VALVES:	A90:	Mazda TH41, VP41, HL41DD, PEN45, UU6.
	D90:	Mazda TH233, VP133, HL133DD, PEN383, U403.
PILOT LAMPS:	A90:	6.2 volt 0.3 amp. globular clear.
	D90:	3.5 volt 0.15 amp. globular clear.
SPEECH COIL IMPEDANCE:		3 ohms.
TOTAL WEIGHT:	A90:	Table 32 lbs. R.G. 64 lbs.
	D90:	Table 26 lbs. R.G. 62 lbs.
CONSUMPTION:	A90:	Table 55 watts.
	D90:	Table 70 watts.
CABINET DIMENSIONS:		Table $17\frac{1}{2}'' \times 16\frac{1}{4}'' \times 9\frac{3}{4}''$ R.G. $36\frac{1}{2}'' \times 22'' \times 15''$.

ISSUED BY
MURPHY RADIO LTD, WELWYN GARDEN CITY
TELEPHONE: WELWYN GARDEN 800

Trimming

ALTHOUGH the trimming of this receiver is critical it should remain very constant in normal use, and unless a fault develops in any of the tuned circuits necessitating the replacement of a component, only very small readjustments need be made from time to time to maintain the optimum performance of the receiver.

APPARATUS REQUIRED

The following equipment is required for carrying out trimming adjustments:

1. *Service Oscillator*, with modulated output; accurately calibrated scales on I.F., L.W., M.W., and S.W. ranges.

2. *Output Meter*. A rectifier type A.C. voltmeter with a range of 0 to 3 or 0 to 5 volts is suitable for this purpose.

3. *Trimming Screwdriver*.

4. *Damping Unit*, for I.F. trimming, consisting of a 0.1 condenser and a 20,000 ohms (¼ watt) resistor wired in series, with a crocodile clip at each end for connecting to the receiver.

THE I.F. CIRCUITS—TUNED TO 465 KC/S.

Unless an oscilloscope is used for the adjustment, 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 to be obtained.

The I.F. circuits are tuned by variable inductances, and the following procedure should be adopted for making the adjustment:

1. Connect the oscillator, tuned to 465 Kc/s., between V2 control grid (square 7C test pt. 53) and chassis. Connect the output meter across the L.S. terminals.

2. Connect the damping unit between V2 anode (square 19N test pt. 54) and chassis, and adjust L21 (square 5C) for maximum reading in the output meter.

3. Connect the damping unit between V3 diode anode (square 16N test pt. 62) and chassis, and adjust L19 (square 5B) for maximum reading in the output meter.

4. Connect the service oscillator to V1 control grid (square 9D test pt. 17) and the damping unit between V1 hexode anode (square 23L test pt. 20) and chassis. Adjust L18 (square 9C) for maximum gain.

5. Connect the damping unit between V2 control grid (square 7C test pt. 53) and adjust L17 (square 9B) for maximum gain.

THE I.F. FILTER—TUNE TO 465 KC/S.

This filter is adjusted to give minimum signal at 465 Kc/s. and the adjustment can be judged more accurately by ear than with an output meter.

1. Connect the service oscillator, tuned to 465 Kc/s., to the aerial and earth terminals of the receiver.

2. Reduce the output from the oscillator until the signal is only just audible.

3. Adjust L1 (square 22N) until the signal is at minimum.

R.F. AND OSCILLATOR CIRCUITS

The R.F. and oscillator circuits have trimming condensers in addition to variable inductances. The condensers are trimmed at the low (wavelength) end of the band and the inductances are adjusted to correct any tracking errors at the top end of the band. In practice it will be found that the inductances very rarely require adjustment. The medium-wave band in this receiver must be adjusted first.

M.W. BAND

1. Connect the service oscillator between the aerial and earth terminals, and the output meter to the L.S. terminals. Tune the oscillator and the receiver to 230 metres.

2. Adjust C23 (square 5L) to correct any

calibration errors and C7 (square 10F) for maximum gain.

3. Tune the receiver and the oscillator to 500 metres and adjust L13 (square 6J) and L6 (square 6M) to correct any errors in alignment. If these inductances are varied appreciably it will be necessary to realign the condensers at the bottom end of the band.

L.W. BAND

1. Connect the service oscillator to the aerial and earth terminals, and the output meter to the L.S. terminals. Tune the oscillator and the receiver to exactly 1000 metres. Adjust C26 (square 5K) to correct any calibration errors.

2. Tune the oscillator and the receiver to exactly 1900 metres, and adjust L16 (square 5J) to correct any tracking errors. Adjust L8 (square 5M) for maximum gain. A large adjustment of the coil cores will necessitate a further adjustment of C26.

S.W. BAND

Extreme accuracy is necessary on the short-wave 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 to see that the waveband coverage is correct.

1. Connect the service oscillator to the aerial and earth terminals, and the output meter to the L.S. terminals. Tune the oscillator and the receiver to exactly 17 metres. Adjust C19 (square 7K) to correct any calibration errors, and C2 (square 7L) for maximum gain.

2. Tune the receiver and the oscillator to exactly 42 metres and adjust L11 (square 7J) and L3 (square 7M) to take up any tracking errors. If these inductances are varied appreciably, readjust the condensers at the bottom end of the band.

Notes

The condenser C12 has been removed from its original position, and is now connected directly between the screen tag (test point 17) on V1 valve holder, and the earth tag on the end of the component rack. This modification is to prevent instability that may occur if the wiring is slightly disarranged, or all of the push-buttons are out.

On the early models only three trimming condensers were fitted to the front panel, and the arrangements were as follows:

C19 was located on C8b.

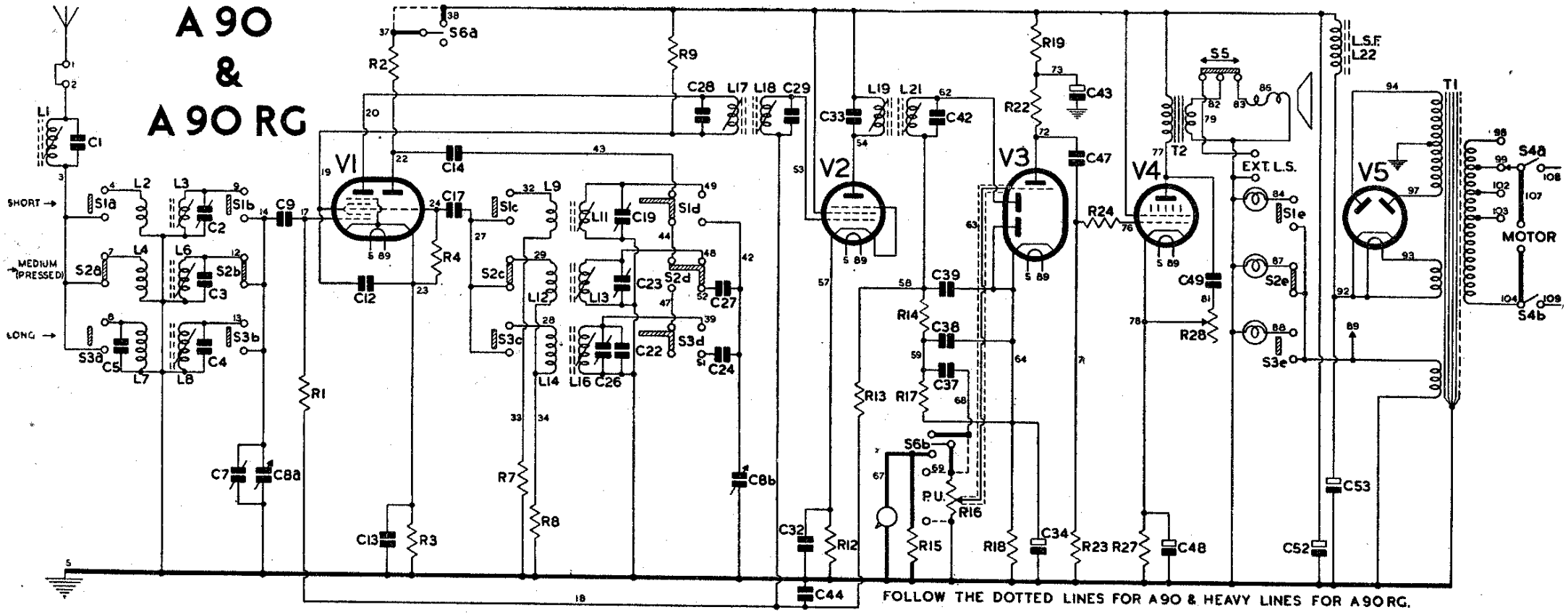
C2 was located in the place of C7.

C23 was located in the place of C19.

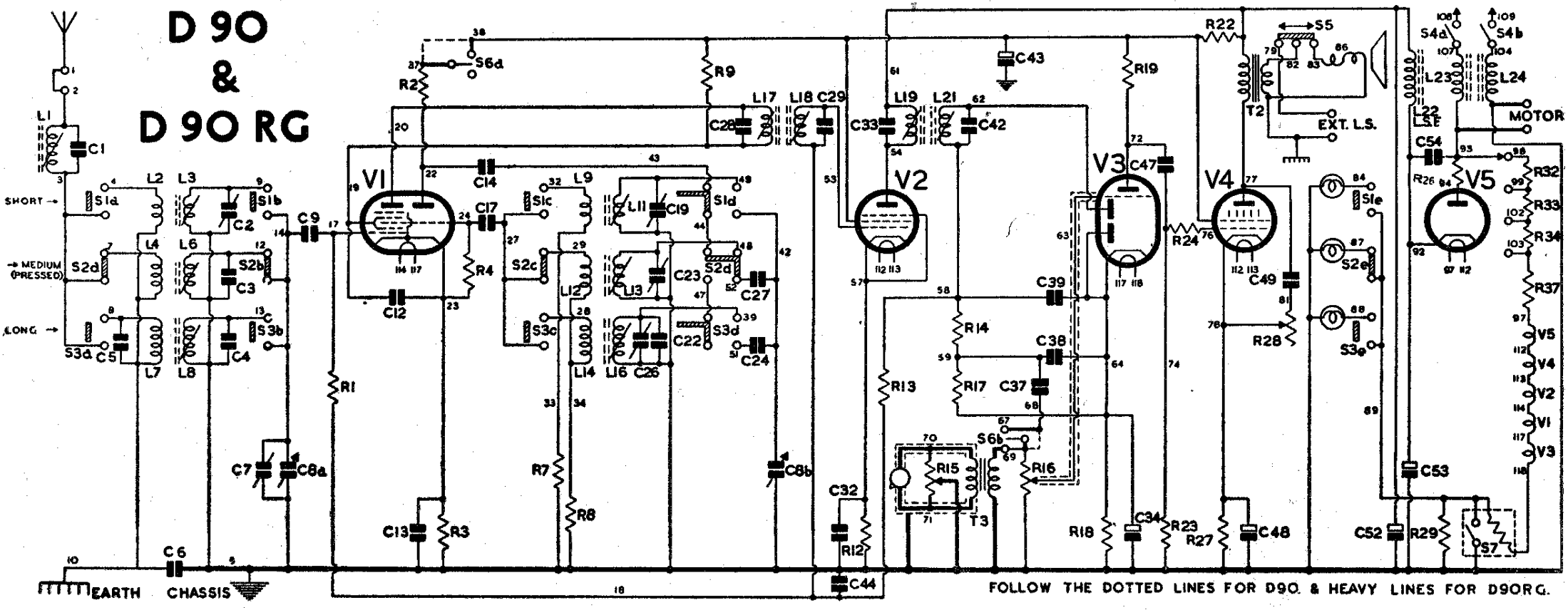
C7 was located in the place of C2.

On these models, the S.W. Band should be re-aligned first.

A 90 & A 90 RG


L1
C1
SHORT →
S1a
L2
L3
S1b
C2
C9
MEDIUM (PRESSED)
S2a
L4
L6
S2b
C3
LONG →
S3a
C5
L7
L8
S3b
C4
R1
C7
C8a
V1
C12
C14
R2
S6a
R4
C17
S1c
L9
S2c
L12
S3c
L14
L16 C26
L11
C19
S1d
C23
S2d
C27
L13
C22
S3d
C24
C8b
R7
R8
C13
R3
R9
C28
L17
L18
C29
V2
C32
R12
C33
L19
L21
C42
R19
C43
R22
C47
V3
R24
V4
T2
S5
EXT. L.S.
S1e
S2e
S3e
C49
R28
C39
R14
C38
C37
R13
R17
S6b
P.U.
R16
R15
C34
R18
R23
R27
C48
C52
C53
L.S.F.
L22
V5
T1
S4a
MOTOR
S4b
C44
FOLLOW THE DOTTED LINES FOR A90 & HEAVY LINES FOR A90RG.

D 90 & D 90 RG


L1
C1
SHORT →
S1a
L2
L3
S1b
C2
C9
L4
L6
→ MEDIUM (PRESSED)
S2d
S2b
C3
LONG →
S3a
C5
L7
L8
C4
S3b
C7
C8a
C6
EARTH
CHASSIS
R1
V1
S6a
R2
R9
L17
L18
C29
C28
C14
C17
R4
C12
S1c
L9
S2c
L12
S3c
L14
L16
C26
L11
C19
S1d
C23
S2d
C27
L13
C22
S3d
C24
C8b
C13
R3
R7
R8
C32
R12
C44
L19
L21
C33
C42
V2
C43
R19
V3
C47
R22
S5
T2
EXT. L.S.
V4
R24
C49
R28
C39
R14
C38
R13
R17
C37
S6b
R15
R16
T3
R18
C34
R23
R27
C48
S1e
S2e
S3e
L23
L24
S4a
S4b
MOTOR
C54
R26
V5
R32
R33
R34
R37
C53
C52
R29
S7
FOLLOW THE DOTTED LINES FOR D90. & HEAVY LINES FOR D90RG.

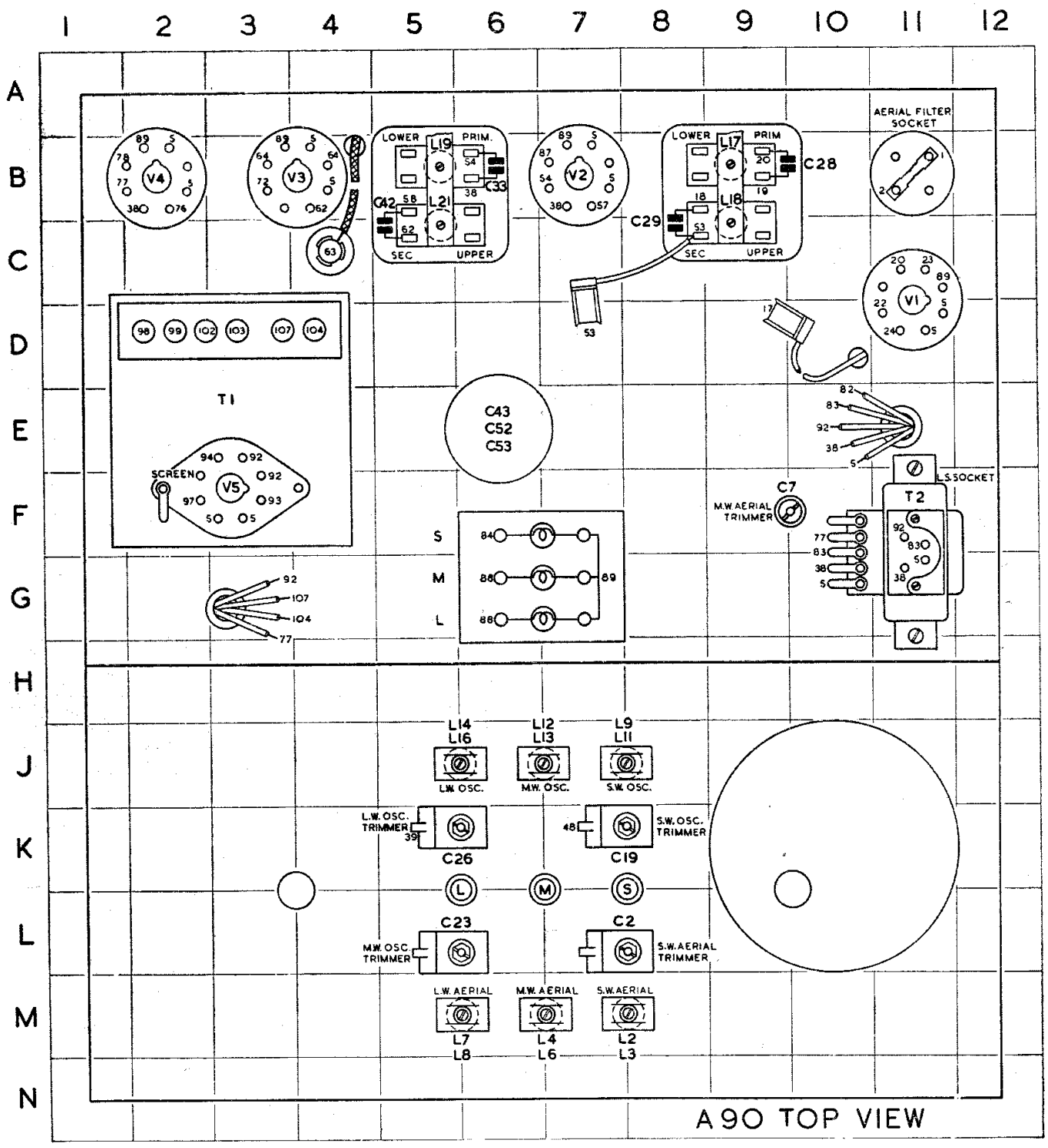
A90 TABLE OF COMPONENTS D90

Code	Value	Test	Pts	Square
C1	500 p.f.	2	3	22 P
C2	5–35 p.f.	5	9	7 L
C3	10 p.f.	5	12	19 B
C4	85 p.f.	5	13	17 B
C5	500 p.f.	5	8	17 B
C6	D ·01 Mf.	5	10	23 N
C7	5–35 p.f.	5	14	9 F
C8a	Gang	5	14	22 E
C8b	Gang	5	42	22 D
C9	500 p.f.	14	17	21 L
C12	·05 Mf.	19	23	20 L
C13	·05 Mf.	5	23	21 L
C14	100 p.f.	22	43	22 M
C17	200 p.f.	24	27	23 K
C19	5–35 p.f.	5	48	8 K
C22	260 p.f.	5	39	17 F
[illegible]	5–35 p.f.	5	48	5 L
C24	414 p.f.	42	51	18 D
C26	5–35 p.f.	5	39	6 K
C27	700 p.f.	42	52	19 D
C28	139 p.f.	19	20	9 B
C29	150 p.f.	18	53	8 C
C32	·025 Mf.	5	57	19 L
C33	A 139 p.f.	38	54	6 B
C34	50 Mf. 12v.	5	64	16 L
C37	·01 Mf.	T 59	69	17 K
		RG 59	68	15 N
C38	100 p.f.	59	64	16 L
C39	100 p.f.	58	64	16 M
C42	150 p.f.	58	62	5 C
C43	A 8 Mf.	73	5	18 J
	D 16 Mf.	38	5	
C44	·05 Mf.	5	18	17 L
C47	·01 Mf.	72	74	15 L
C48	50 Mf. 12v.	5	78	14 L
C49	A ·04 Mf.	77	81	14 L
	D ·1 Mf.	77	81	
C52	A 8 Mf.	5	38	18 J
	D 16 Mf.	5	61	
C53	16 Mf.	5	92	18 K

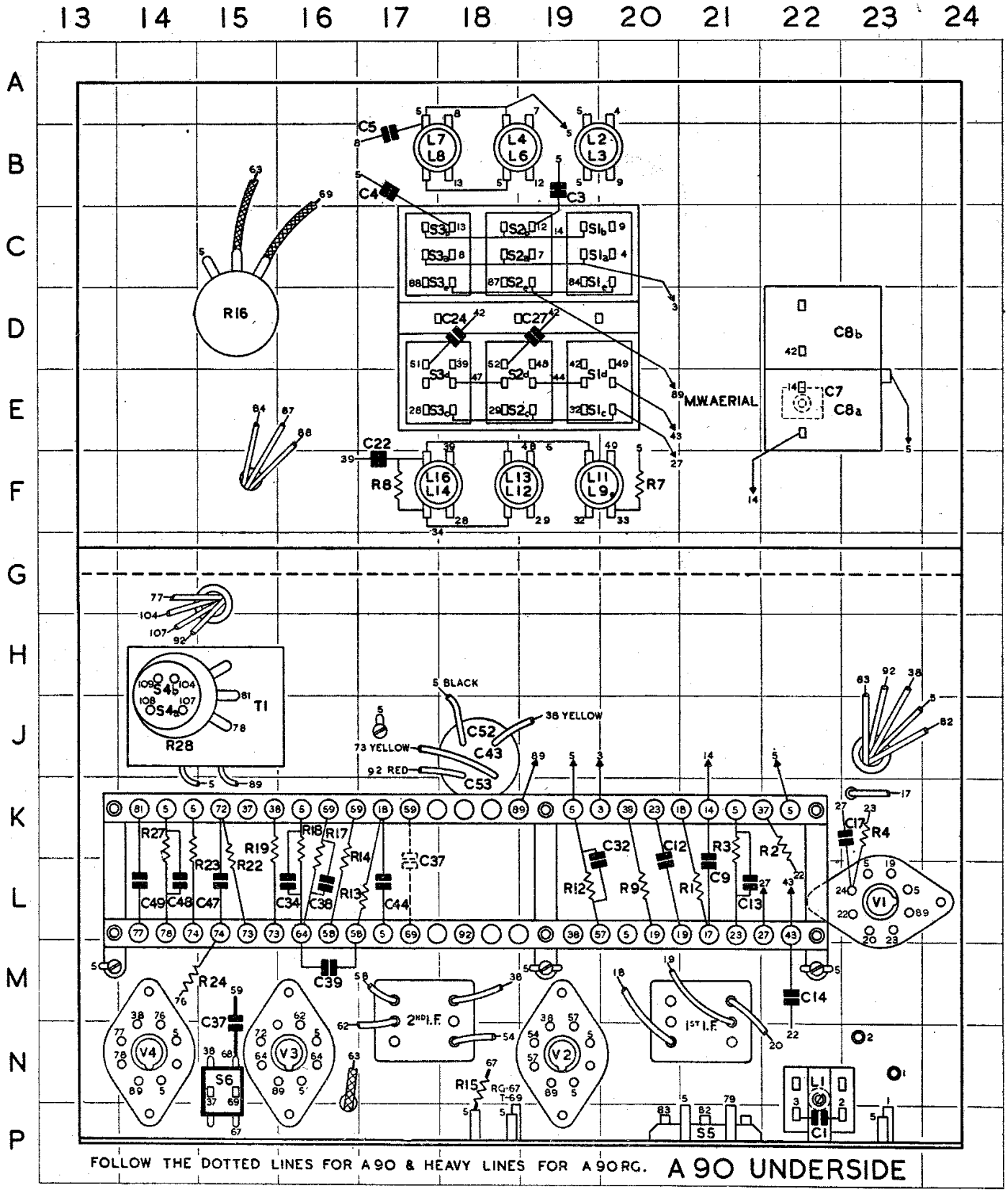
Code	Value	Test	Pts	Square
R1	1 Meg.	17	18	21 L
R2	A 33,000 1w	22	37	22 K
	D 22,000 1w	22	37	
R3	A 330	5	23	21 K
	D 390	5	23	
R4	22,000	23	24	23 K
R7	47	5	33	20 F
R8	470	5	34	17 F
R9	A 9,100 1w	19	38	20 L
	D 5,100 1w	19	38	
R12	470	5	57	19 L
R13	2·2 MΩ	18	58	17 L
R14	100,000	58	59	16 K
R15	ARG 12,000	5	67	18 N
	DRG 500	70	71	
R16	1 MΩ	5	69	15 D
R17	470,000	59	64	16 K
R18	A 680	5	64	16 K
	D 1,000	5	64	
R19	A 10,000	38	73	15 K
	D 47,000	38	72	
R21	DRG 12,000	5	69	
R22	A 47,000	72	73	15 L
	D 1,000 1w	38	61	
R23	470,000	5	74	14 K
R24	47,000	74	76	14 M
R26	D 47 2w	93	94	
R27	A 200	5	78	14 K
	D 140	5	78	
R28	A 50,000	78	81	14 H
	D 25,000	78	81	
R29	D 23 1w	5	89	
R32	D 75	98	99	
R33	D 100	99	102	
R34	D 75	102	103	
R37	D 336	103	97	

The resistor R21, omitted from the D90 diagram, is connected across the secondary of the pick-up transformer in the Radiogramophone model.

Code	Value	Test	Pts	Square
L1	2·5	2	3	22 N
L2	*	5	4	19 B
L3	*	5	9	19 B
L4	*	5	7	18 B
L6	2·25	5	12	18 B
L7	~~18~~ 25	5	8	17 B
L8	~~12·5~~ 15	5	13	17 B
L9	*	33	32	19 F
L11	*	5	49	19 F
L12	*	34	29	18 F
L13	1·25	5	48	18 F
L14	*	34	28	17 F
L16	1·7	5	39	17 F
L17	5·5	19	20	9 B
L18	5·5	18	53	9 C
L19	5·5	38	54	5 B
[illegible]	5·5	58	62	5 C
L22	A 2300	38	92	L.S.F.
	D 900	61	92	
T1 Pri.				
200–205	17	104	103	
210–220	18	104	102	
230–240	20	104	99	
250	22	104	98	3 E
HT Sec.	215	5	94	
	+230	5	97	
T2 Pri.	A 290	77	38	
	D 200	77	61	11 F
Sec.	*	5	82	
T3 Pri.	2	70	71	
Sec.	400	5	69	
P.U.	A 2000			
	D 10			
Th. Delay Switch	D 18	118	89	



Although practical diagrams of the DC chassis have not been included, the majority of components can be located by reference to the AC diagrams on these pages.



FOLLOW THE DOTTED LINES FOR A90 & HEAVY LINES FOR A90RG. **A90 UNDERSIDE**

A90 TABLE OF VOLTAGES A90

Valve	Type	Electrode	Test Point	Square	Voltage
V1	Mazda TH41	Hexode Anode Hexode Screen Triode Anode Cathode	20 19 22 23	23 L 23 L 23 L 23 L	**116** **116** **65** **4**
V2	Mazda VP41	Anode Screen Cathode	54 38 57	19 N 19 N 19 N	**197** **198** **4**
V3	Mazda HL41DD	Anode Cathode	72 64	15 N 15 N	**85** **1·3**
V4	Mazda PEN45	Anode Screen Cathode	77 38 78	14 N 14 N 14 N	**188** **198** **7**
V5	Mazda UU6	Cathode	92	3 F	**360**

D90 TABLE OF VOLTAGES D90

Valve	Type	Electrode	Test Point	Square	Voltage
V1	Mazda TH233	Hexode Anode Hexode Screen Triode Anode Cathode	20 19 22 23	23 L 23 L 23 L 23 L	**120** **120** **72** **4**
V2	Mazda VP133	Anode Screen Cathode	54 38 57	19 N 19 N 19 N	**185** **160** **3·75**
V3	Mazda HL133DD	Anode Cathode	72 64	15 N 15 N	**72** **1·4**
V4	Mazda PEN383	Anode Screen Cathode	77 38 78	14 N 14 N 14 N	**172** **160** **9**
V5	Mazda U403	Cathode	92	3 F	**255**

All Voltages are taken on A.C. Mains at 240 volts, using a 0–500, 0–50 Voltmeter, 1,000 ohms per volt. All readings are taken from Chassis.

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A90/4 & A90/13

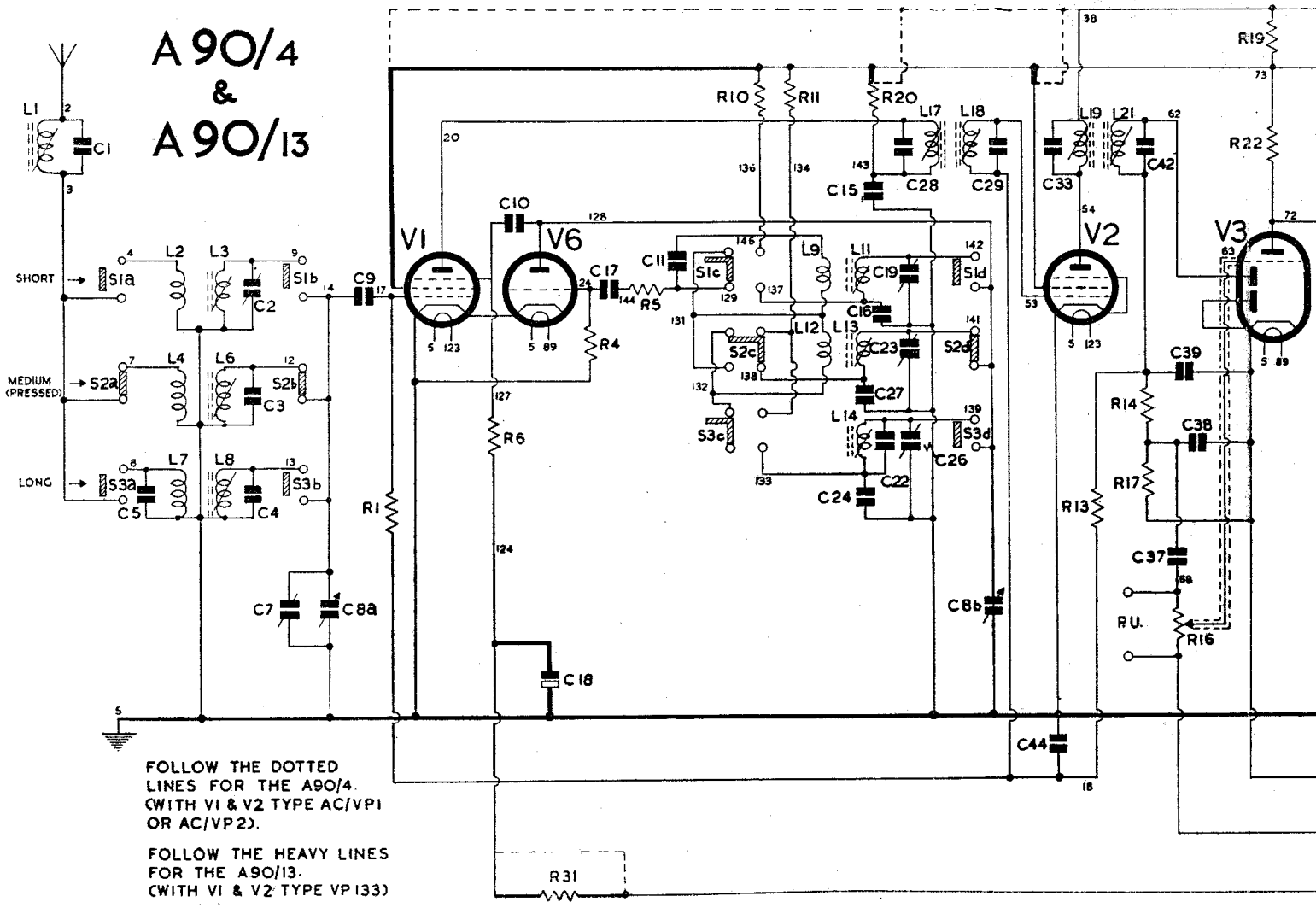
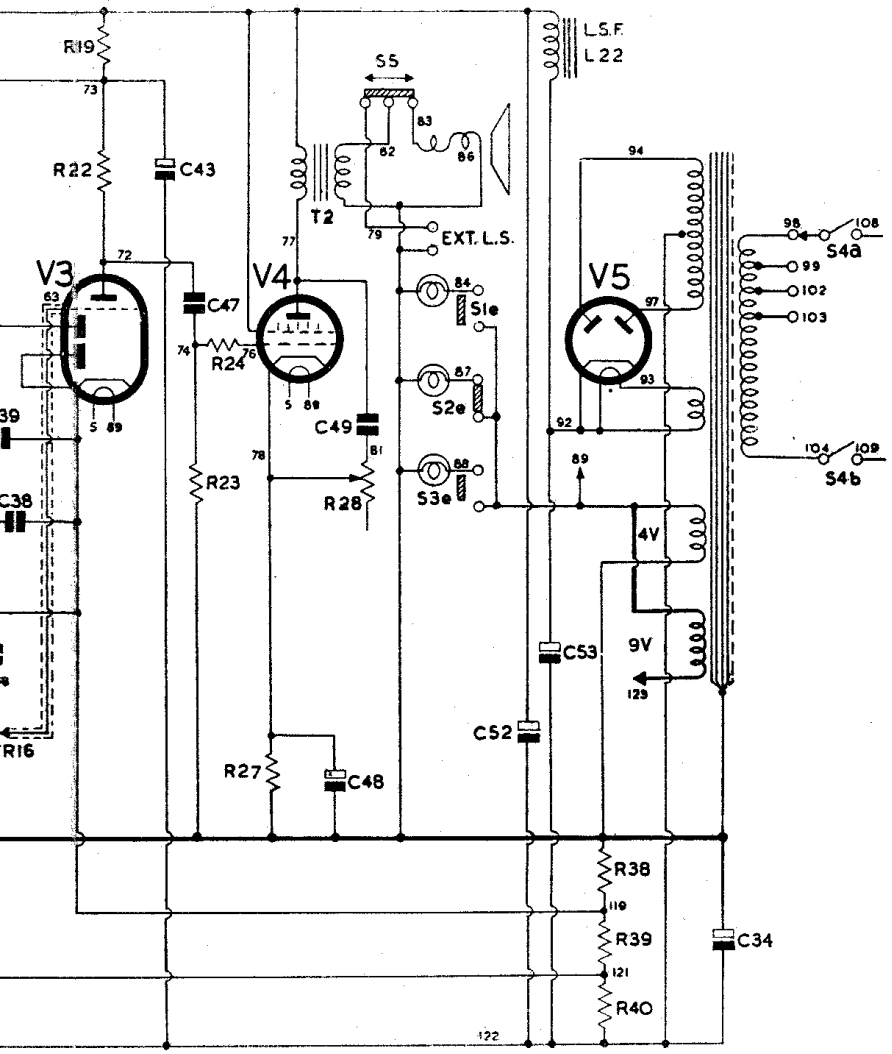


TABLE OF COMPONENTS

Code	Value	Code	Value	Code	Value	Code	Value	Code	Value
C1	500 p f.	C28	139 p.f.	R1	1MΩ	L1	2·5	T1 Pri.	
C2	Trimmer.	C29	150 p.f.	R4	22,000	L2	*	200-205	17
C3	10 p.f.	C33	139 p.f.	R5	50	L3	*	210-220	18
C4	85 p.f.	C34	50 12v.	R6	†	L4	*	230-240	20
C5	500 p.f.	C38	100 p.f.	R10	2,200	L6	2·25	250	22
C7	Trimmer.	C39	100 p.f.	R11	30,000	L7	25	HT Sec.	215
C8a	Var.	C42	150 p.f.	R13	2·2MΩ	L8	15		+230
C8b	Var.	C43	8	R14	100,000	L9	*	T2 Pri.	290
C9	500 p.f.	C47	·005	R17	470,000	L11	*	Sec.	*
C10	200 p.f.	C48	50 12v.	R19	4,700	L12	*	T3 Pri.	2
C11	85 p.f.	C49	·04	R20	150,000	L13	1·25	Sec.	400
C15	·002	C52	8	R22	47,000	L14	*		
C16	·025	C53	16	R23	1MΩ	L16	1·7		
C19	Trimmer.			R24	47,000	L17	5·5		
C22	260 p.f.			R27	200 ¼W	L18	5·5		
C23	Trimmer.			R28	50,000	L19	5·5		
C24	414 p.f.			R38	47	L21	5·5		
C26	Trimmer.			R39	27	L22	2300		
C27	700 p.f.			R40	150				

* Less than 1 ohm.
† 50,000 ohms in A90/4
100,000 ohms in A90/13

105/11/41



THE MODIFIED A90 RECEIVER

THE two modified circuits shown in this diagram are introduced to overcome component shortages.

The condenser values given in the table are the minima permissible for the circuits, but it may be found in some cases that larger condensers are fitted, depending on the available supplies. It is also possible that *combinations of resistances*, connected in series or parallel, may be used to obtain approximately the values quoted in the table.

In the A90/4 the common 4-volt heater winding is used for all the receiver valves, but in the A90/13, where 13-volt type H.F. pentodes are used, an extra 9-volt winding is connected in series with the existing 4-volt winding on the mains transformer to give the required 13 volts heater supply for these valves.

It will also be found that the A90/4's are wired either for the AC/VP1 or the AC/VP2, and it should be noted that although these valves have similar characteristics, the top cap on the AC/VP1 is connected to the anode, whereas on the AC/VP2 it is connected to the control grid. The two types are therefore not interchangeable unless the wiring to the anode and grid sockets of the valve-holder is also changed over.

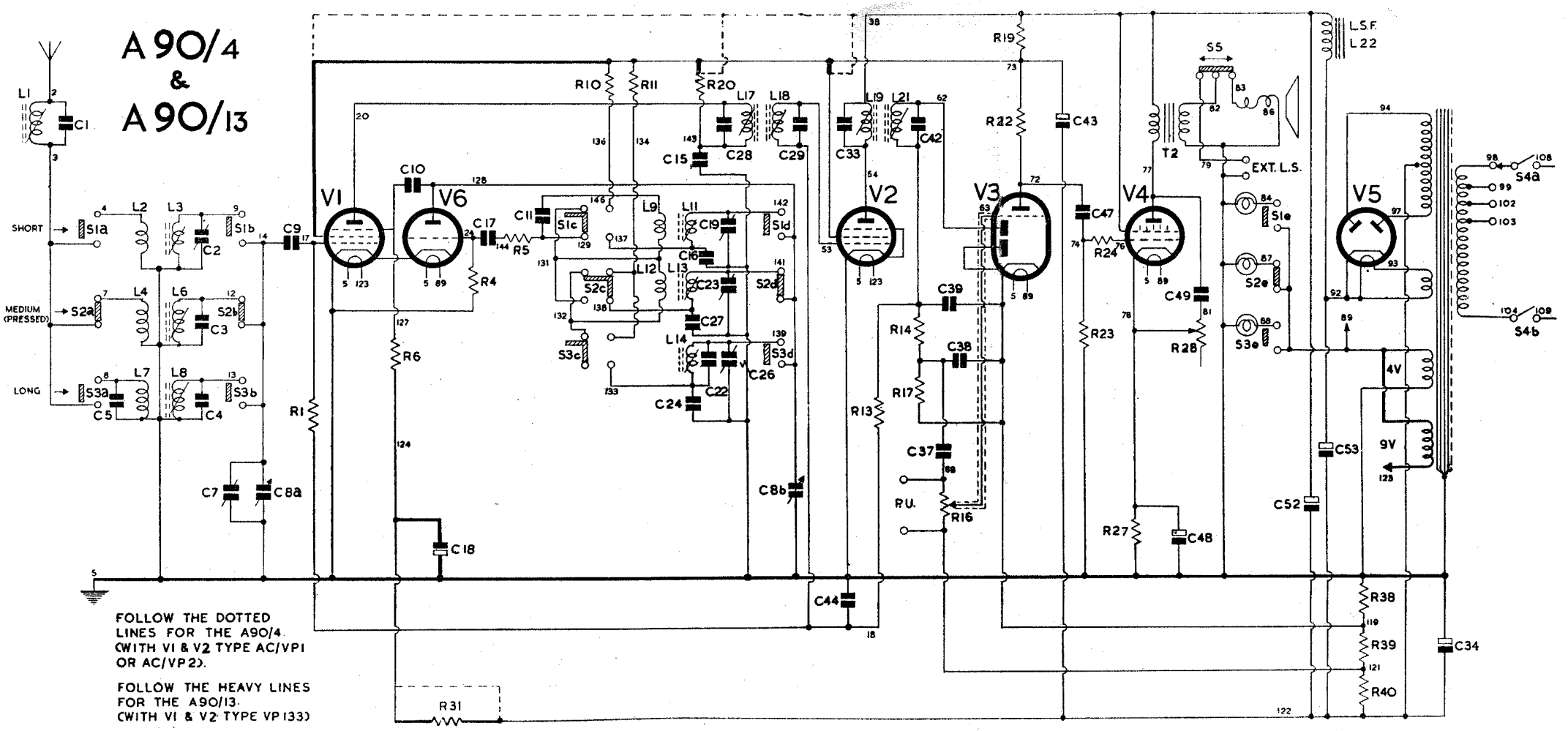
A90/4 VALVES		A90/13
V1	AC/VP1 or AC/VP2	V1 VP133
V2	AC/VP1 or AC/VP2	V2 VP133
V3	HL41DD	V3 HL41DD
V4	PEN45	V4 PEN45
V5	UU6	V5 UU6
V6	AC/HL	V6 AC/HL

MURPHY RADIO

SUPPLEMENTARY SERVICE INSTRUCTIONS

ISSUED BY MURPHY RADIO LTD., WELWYN GARDEN CITY, HERTS.

TELEPHONE: WELWYN GARDEN 800


A 90/4
&
A 90/13
L1
C1
SHORT
MEDIUM (PRESSED)
LONG
S1a
S1b
S2a
S2b
S3a
S3b
L2
L3
L4
L6
L7
L8
C2
C3
C4
C5
C7
C8a
C8b
C9
R1
V1
V6
C10
C11
C17
R5
R4
R6
C18
S1c
S2c
S3c
L9
L11
L12
L13
L14
C19
C16
C23
C27
C22
C24
C26
S1d
S2d
S3d
R10
R11
R20
L17
L18
C15
C28
C29
V2
V3
R19
R22
C43
C33
C42
L19
L21
C39
R14
C38
R17
R13
C37
R.U.
R16
C44
R31
V4
T2
S5
C47
R24
R23
C49
R28
R27
C48
EXT. L.S.
S1e
S2e
S3e
L.S.P.
L22
V5
S4a
S4b
4V
9V
C53
C52
R38
R39
R40
C34
FOLLOW THE DOTTED LINES FOR THE A90/4. (WITH V1 & V2 TYPE AC/VP1 OR AC/VP2).
FOLLOW THE HEAVY LINES FOR THE A90/13. (WITH V1 & V2 TYPE VP133)