

## Test Report

# DECCALIAN Model 90 Radiogram with notes on the Deccalion Table Radiogram

# R 21

### GENERAL

The Deccalion Model 90 is a high fidelity console radiogramophone fitted with a 6-valve 3-waveband radio chassis and a Garrard RC 70 record changer. Although similar in appearance to Deccalion Models 91 and 92, besides being equipped only for 78 r.p.m. records, Model 90 uses a somewhat different circuit arrangement. The same chassis was used in the Deccalion table radiogram, which, however, had only a limited production. The table radiogram is dealt with under a separate heading.

Wavebands covered are: 13-50, 190-550, and 1000-2000 metres. The circuit includes a separate triode gramophone pre-amplifier to enable the use of a Decca lightweight magnetic pick-up. External aerial and earth are required, and Model 90 is made only for use on 200-250 volts A.C. 40-60 c/s. Current consumption is: Radio, 60 watts; Gramophone, 90 watts.

Model 90 is priced at £67 4s. including purchase tax, and is made by Decca Radio & Television, 1-3 Brixton Road, London, S.W.9.

### CIRCUIT

Aerial input via coupling condenser C2 and S1 to coupling coils L1 (S.W.) and L2 (M. and L.W.) C3 provides additional top coupling on Long and Medium waves, and C4 is shunted across L2 on Long waves only to prevent Medium wave break-through. L11 and C1, in parallel with the aerial coupling coils, form a resonant circuit at the intermediate frequency and thus act as an I.F. rejector. On Gram. the aerial input is taken down to earth.

The first tuned circuit consists of L3, C5 and C8 on Short waves; L3 and L4, C6 and C8, on Medium waves; and L3, L4, L5, C7, C8 on Long waves. Signal voltages appearing across C8 are applied via C9 to the hexode grid of V1 (ECH35 or 6K8G) which is a frequency-changer using the triode section as a tuned-anode oscillator. On Short waves the oscillator feed-back coupling is by means of L6 and L7, but on Medium and Long waves the respective tuning coils, in conjunction with their associated padders, provide sufficient anti-phase voltage to maintain oscillations at correct frequency. R4 and R6 are included to improve oscillator stability. C10 is provided to neutralise oscillator voltages which might otherwise reach the frequency-changer control grid. V1 has no

standing bias, but is A.V.C. controlled. An intermediate-frequency transformer using capacity trimmers and tuned to 465 Kc/s conveys the output from V1 hexode to the grid of the intermediate-frequency amplifier V2, which is an R.F. pentode, 6U7G. This valve is also A.V.C. controlled, and its output is fed to the second intermediate-frequency transformer, I.F.T. 2. The secondary winding of this has a tapping which helps to reduce the damping effect on the circuit produced by the detector and A.V.C. diodes. V3, a 6Q7G double-diode-triode, has one diode used for signal rectification, and the other for the supply of A.V.C. voltages. R10 is the detector load resistor, and A.F. voltages developed across this component are fed, via the I.F. filter R9/C27 and the coupling condenser C28, to the volume control, R14. R13 is the A.V.C. load resistor, and R12, C21 and R2 are A.V.C. filter components. The amplified output of V3 is taken to the grid of V4, the output tetrode (6V6G), and from the anode circuit of this valve the A.F. signal is fed to an 8-in. permanent magnet speaker.

Tone control is provided by the series circuit R24/C37 from the anode side of the output transformer primary to chassis. R22 is an anode stopper. H.T. is supplied by a full-wave rectifier, V6 (5Z4G), and the smoothing circuit comprises a choke, L10, and three electrolytic condensers, two of which have a common positive terminal.

On gramophone the output from the pick-up is switched to the grid of an L63 triode (V5), which has a bass-lift circuit consisting of R17, R18 and C33 in its input to match the amplifier to *ffrr* recordings. The output of V5 is taken by way of the coupling condenser C32 to S5, and thence to the top of the volume control. Three stages of pick-up amplification are therefore provided.

### CIRCUIT ALIGNMENT

Using a modulated signal generator, it is recommended that an output meter be connected across the extension speaker sockets.

**I.F. circuits.** After switching on, allow a few minutes for the valves to warm up. Set the signal generator to 465 Kc/s, and feed in a signal directly to the grid (top cap) of V2. Adjust C25 and C24 for maximum output. Short out the oscillator section of the gang condenser (furthest from chassis). Transfer signal generator output to



grid (top cap) of V1, and adjust C12 and C11 for maximum output.

**Wavetrap.** Without altering frequency, transfer generator output to the aerial socket of the receiver, using a dummy aerial. Remove oscillator short-circuit and switch to M.W. Adjust slug of L11 (above aerial socket) for *minimum* deflection.

**R.F. circuits.** Set tuning control so that pointer is at the extreme (550) mark on the scale when gang is fully closed. If required, the pointer should be moved along the tuning cord to ensure that this is so.

**M.W.** Set signal generator to 1500 Kc/s. Tune receiver to 200 metres and adjust C19 and C6 for maximum.

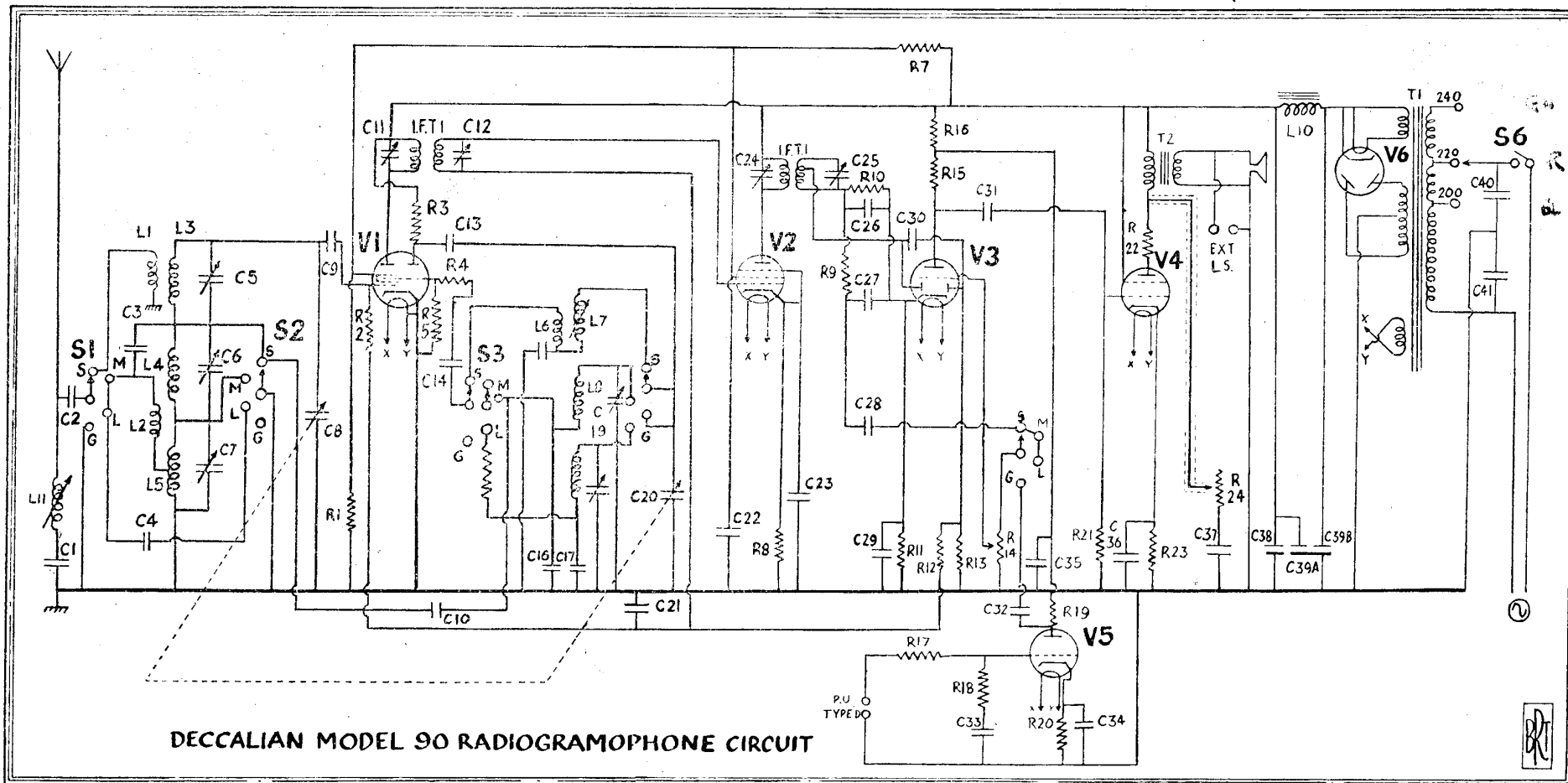
**L.W.** Set generator to 250 Kc/s and receiver to 1200 metres. Adjust C18 and C7 for maximum.

**S.W.** Set generator to 6 Mc/s, tune receiver to 50 metres, and adjust core of L7 for maximum. Alter signal generator frequency to 15 Mc/s, tune receiver to 20 metres, and adjust C5 (air-cored trimmer below chassis) for maximum.

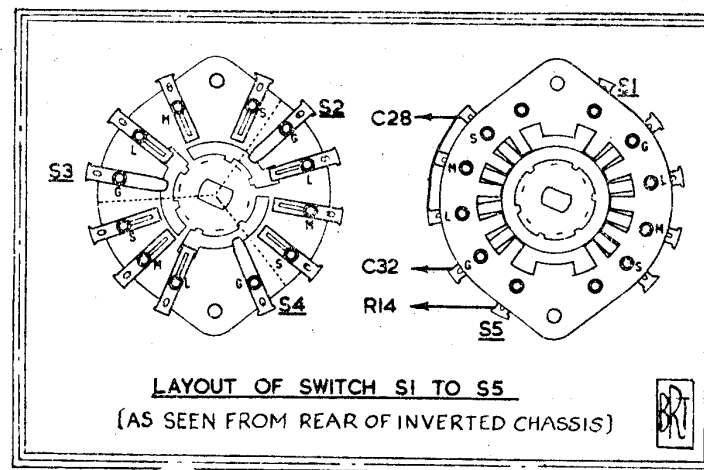
Padding on M.W. and L.W. is fixed, and the alignment is now complete. It is advisable to repeat the above operations in the same order if the circuits are found to be very much out of line.

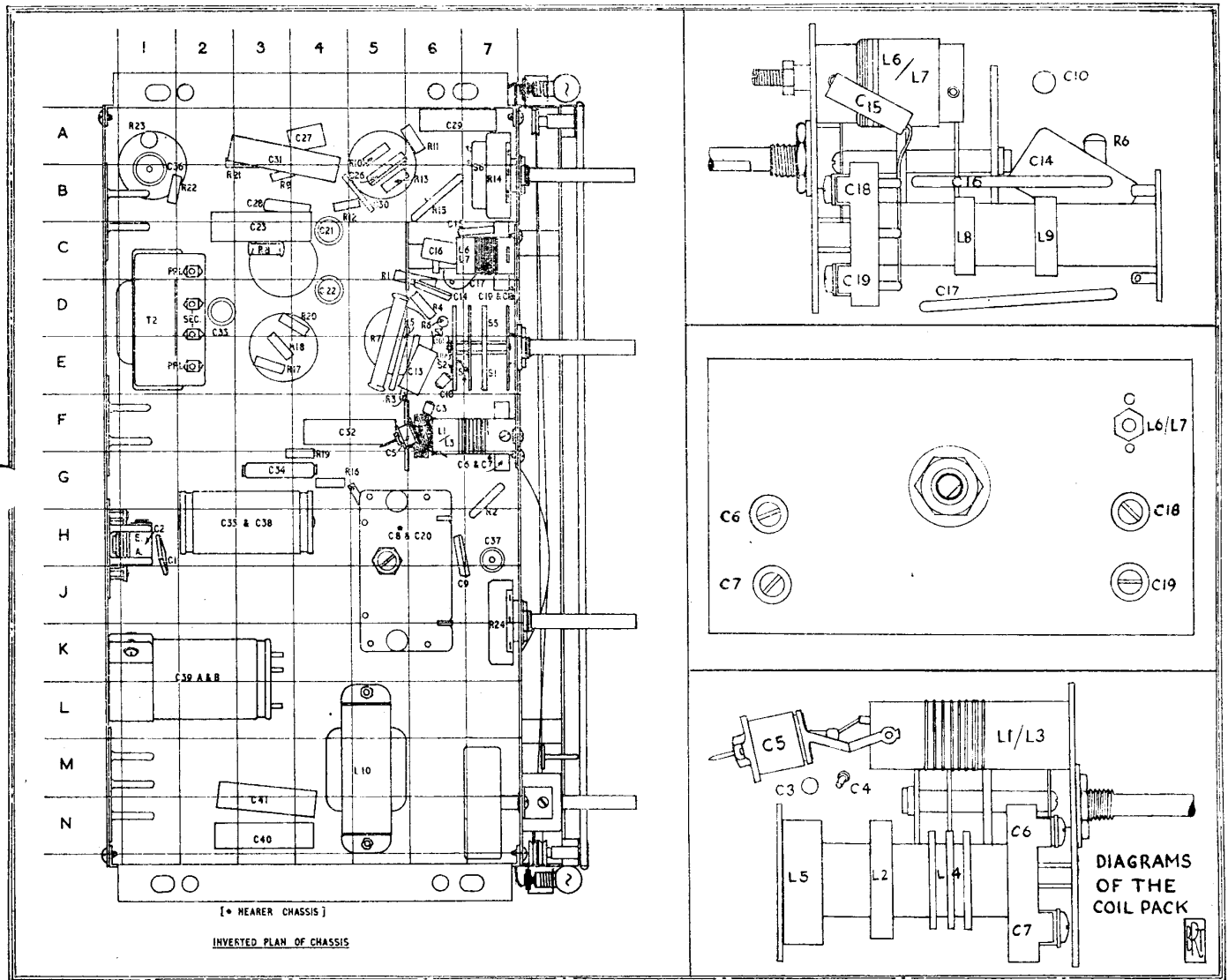
### TABLE RADIOGRAM

Although its circuit is identical with the Model 90, the table version differs



RESISTANCE READINGS			
Component	Resistance	Component	Resistance
L1 ... ..	0.5 ohms	I.F.T.1 Primary ... ..	5.5 ohms
L2 ... ..	14 ohms	Secondary ... ..	5.5 ohms
L3 ... ..	Negligible	I.F.T.2 Primary ... ..	5.5 ohms
L4 ... ..	2.5 ohms	Diode portion of	
L5 ... ..	14.5 ohms	Secondary ... ..	3 ohms
L6 ... ..	0.5 ohms	T.2 Primary ... ..	400 ohms
L7 ... ..	Negligible	Secondary ... ..	Negligible
L8 ... ..	2.5 ohms	T.1 Full H.T.	
L9 ... ..	6 ohms	Secondary ... ..	340 ohms
L10 ... ..	275 ohms	Primary ... ..	22 ohms +
L11 ... ..	7.5 ohms		3.5 ohms +
			4 ohms





**COMPONENTS LIST**

Circuit Ref.	Location	Value
<b>RESISTORS</b>		
R1	C5	35 K ohms/20%
R2	G7	1 Megohm/2%
R3	F5	47 K ohms/2%
R4	D6	200 ohms/10%
R5	E5	50 K ohms/2%
R6	D6	10 K ohms/20%
R7	E5	39 K ohms/10%
R8	C3	330 ohms/20%
R9	B3	100 K ohms/10%
R10	A5	100 K ohms/10%
R11	A6	3.2 K ohms/5%
R12	B4	470 K ohms/20%
R13	B5	1.5 Megohms/20%
R14	B7	0.5 Megohms (variable)
R15	B6	220 K ohms/10%
R16	G4	68 K ohms/20%
R17	E3	100 K ohms/10%
R18	E3	10 K ohms/20%
R19	G4	100 K ohms/10%
R20	D4	680 ohms/20%
R21	B2	470 K ohms/10%
R22	B1	100 ohms/20%

Circuit Ref.	Location	Value
R23	A1	270 ohms/20%
R24	K7	50 K ohms (variable)
<b>CONDENSERS</b>		
C1	H1	60 pF/5%
C2	H1	150 pF/5%
C3	F6	4 pF
C4	F6	47 pF
C5	F5	3-30 pF
C6	G7	3-50 pF
C7	G7	220 pF (variable)
C8	H5	483 pF
C9	J6	100 pF
C10	E6	4 pF
C11	—	220 pF (variable)
C12	—	220 pF (variable)
C13	E6	60 pF
C14	D6	500 pF
C15	C6	.005 uF
C16	C6	515 pF/1%
C17	D7	275 pF/1%
C18	D7	3-50 pF

Circuit Ref.	Location	Value
C19	D7	3-50 pF
C20	H5	483 pF
C21	C4	0.1 uF
C22	D4	0.1 uF
C23	C3	0.25 uF
C24	—	220 pF/variable
C25	—	220 pF/variable
C26	B5	150 pF/5%
C27	A4	150 pF/5%
C28	B3	.01 uF
C29	A6	25 uF
C30	B5	60 pF/5%
C31	A3	0.1 uF
C32	F4	0.1 uF
C33	D2	.05 uF
C34	G3	20 uF
C35	H2	12 uF
C36	B1	25 uF
C37	H7	.05 uF
C38	H2	12 uF
C39	K1	8 + 16 uF
C40	N3	.005 uF
C41	N3	.005 uF

in respect of speaker and gramophone unit. The speaker is a 6-in. P.M. type mounted at one end of the chassis and placed to one side of the cabinet. The gramophone unit is a Plessey single-record player with finger-controlled operating levers. It is fitted with a Decca *ffrr* type D pick-up having a bayonet-plug fitting. The motor is a synchronous induction type with self-aligning bearings. It requires little attention apart from an occasional few drops of light oil in the bearing cups and into the idler pulley bearings.

**Dismantling.** Most under-chassis servicing can be carried out by inverting the cabinet and removing the detachable base. If it is required to dismantle the instrument the following sequence should be followed:—

Remove the pick-up plugs from the chassis, and unscrew the eight wood-screws securing the motor board. Lift

the motor board sufficiently to disconnect the mains lead from its two-way connector. The motor unit may now be lifted clear.

To remove the chassis, first remove the motor board as above. Then take off the four push-on control knobs, take out all wander plugs from rear of chassis, and unscrew the four screws holding the chassis to the bottom of the cabinet. The chassis may be lifted from the cabinet without removing the speaker, but as this is held in by two screws only, it is usually more convenient to remove it.

When replacing, care should be exercised in fitting in the radio chassis, as the glass tuning scale may be easily broken by being pressed against the front of the cabinet. To replace the speaker, drop its lower rim into the slot provided and secure it with the two screws. It should be noted that the red pick-up plug goes to the right of the twin socket.

The pick-up used in the table gram. has a hum-bucking coil connected in series with the metal braiding of the pick-up lead. This coil is set at the factory to give minimum hum, and is usually at an angle of about 45 degrees to the motor board.

Mains voltage adjustment is carried out in the table version by moving a soldered tap to the appropriate input connection. The leads are colour-coded as follows:—

- Blue ... 200-210 volts
- Red ... 210-230 volts
- Green ... 230-250 volts

The motor lead, which goes to the same tag panel should not be altered.

is supplied normally for use on 200-250 volts A.C. 50 c.p.s. If required to be used on 40 or 60 cycles, a different motor pulley should be ordered from The Garrard Engineering Co., Ltd., Okus Road, Swindon, Wilts.

The pick-up head is the Decca magnetic type D, which has an impedance of 4,200 ohms at 1,000 c.p.s. and an R.M.S. output of 180 mv. It is fitted with a replaceable sapphire stylus and armature.

**Long-playing attachment.** The pick-up input circuit is suitable to a magnetic pick-up having the same general characteristics as the 78 r.p.m. head. It is necessary, however, to incorporate different bass compensation for long-playing recordings, and details of this may be obtained from the manufacturers of the instrument.

**DISMANTLING**

**Removal of chassis.** Pull off control knobs, and remove aerial, earth, pick-up, and external speaker plugs. Remove cleats holding power and speaker leads. The power lead to the motor need not be disconnected if repairs are carried out close to the cabinet. If it is desired to lift the radio chassis clear, the motor connections may be reached by removing the turntable. The speaker and power leads should then be disconnected.

**Removal of motor and motor board.** Open record-player drawer and remove turntable. Disconnect motor at terminal block, and remove pick-up plugs from chassis. Take off plugs from pick-up leads, which can then be drawn through the hole at the back of the drawer. The record changer is not secured to the drawer but beds down on springs into recesses, so may be lifted clear. It should be noted that two 2BA transit bolts hold down the mechanism during moving operations, and these should never be overlooked. The speaker is held in by four 2BA nuts.

**H.T. VOLTAGE MEASUREMENTS**

(Taken with a Model 7 Avometer on 400 V. D.C. range)

Part of Circuit	Voltage
Rectifier heater to chassis ...	260
Across C38 ...	245
Anode of V4 to chassis ...	220
Across C35 ...	125
Anode of V3 to chassis ...	40
Anode of V5 to chassis ...	35
Across C22 ...	70
Oscillator anode to chassis...	65-75a
	55b

a working. b not working

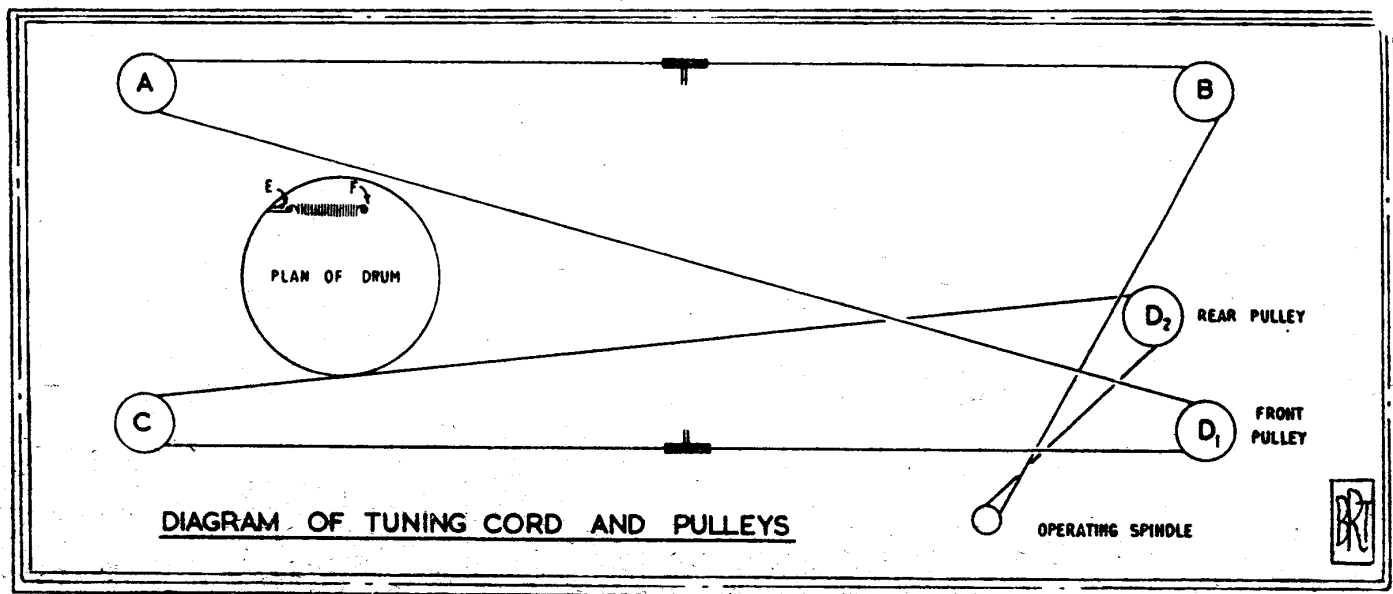
**Approximate Cathode Voltages**

(Taken with a Model 7 Avometer on 10 V. D.C. range) ...

Valve	Voltage
V2 ...	1.7
V3 ...	1
V4 ...	14.5
V5 ...	1

**MODEL 90 GRAMOPHONE EQUIPMENT**

The record changer is a Garrard RC70, with a capacity of ten 10in. or 12in. 78 r.p.m. records, not mixed. It



**DIAGRAM OF TUNING CORD AND PULLEYS**

