

"TRADER" SERVICE SHEET
1171

G.E.C. BC7443

A.C. 3-band 3-speed autoradiogram

CIRCUIT DESCRIPTION

EMPLYING built-in frame aerials for M.W. and L.W. reception, the G.E.C. BC7443 is a 4-valve (plus rectifier 3-band table autoradiogram designed to operate from A.C. mains of 190-250 V, 50 c/s, although with alternative motor pulleys it can be operated from 40 c/s or 60 c/s mains. The gramophone unit is a Garrard 3-speed automatic record changer RC110 employing a turn-over type crystal pick-up head. The waveband ranges are 13-50 m, 186-572 m and 1,000-2,000 m.

Instructions for replacing the pick-up styli and for making service adjustments to the record changer are given overleaf under "Gramophone Unit."

Release date and original price: August 1954, £31 os 1d. Purchase tax extra.

Tuned frame aerial input by **L3, C27** (M.W.) and **L3, L4, C27** (L.W.). For S.W. reception an external aerial is necessary and is coupled via **L1** to aerial tuning circuit **L2, C27**. An external aerial may also be used on M.W. and L.W., when it is coupled to the tuned circuits, via **L1** and the common impedance of **C1**. **R1** shunts the **A** and **E** sockets to by-pass modulation hum voltages.

First valve (**V1, Osram X79**) is a triode hexode operating as frequency changer with internal coupling. Oscillator grid coils **L5** (S.W.) and **L6** (M.W. and L.W.) are tuned by **C28**. Parallel trimming by **C29** (M.W.) and **C9, C29** (L.W.); series tracking by **C10** (M.W. and L.W.). Reaction coupling by **L7** (S.W.), across the common impedance of **C10** (M.W.), and via **L8** and **C10** (L.W.). Oscillator stabilization by **R5**.

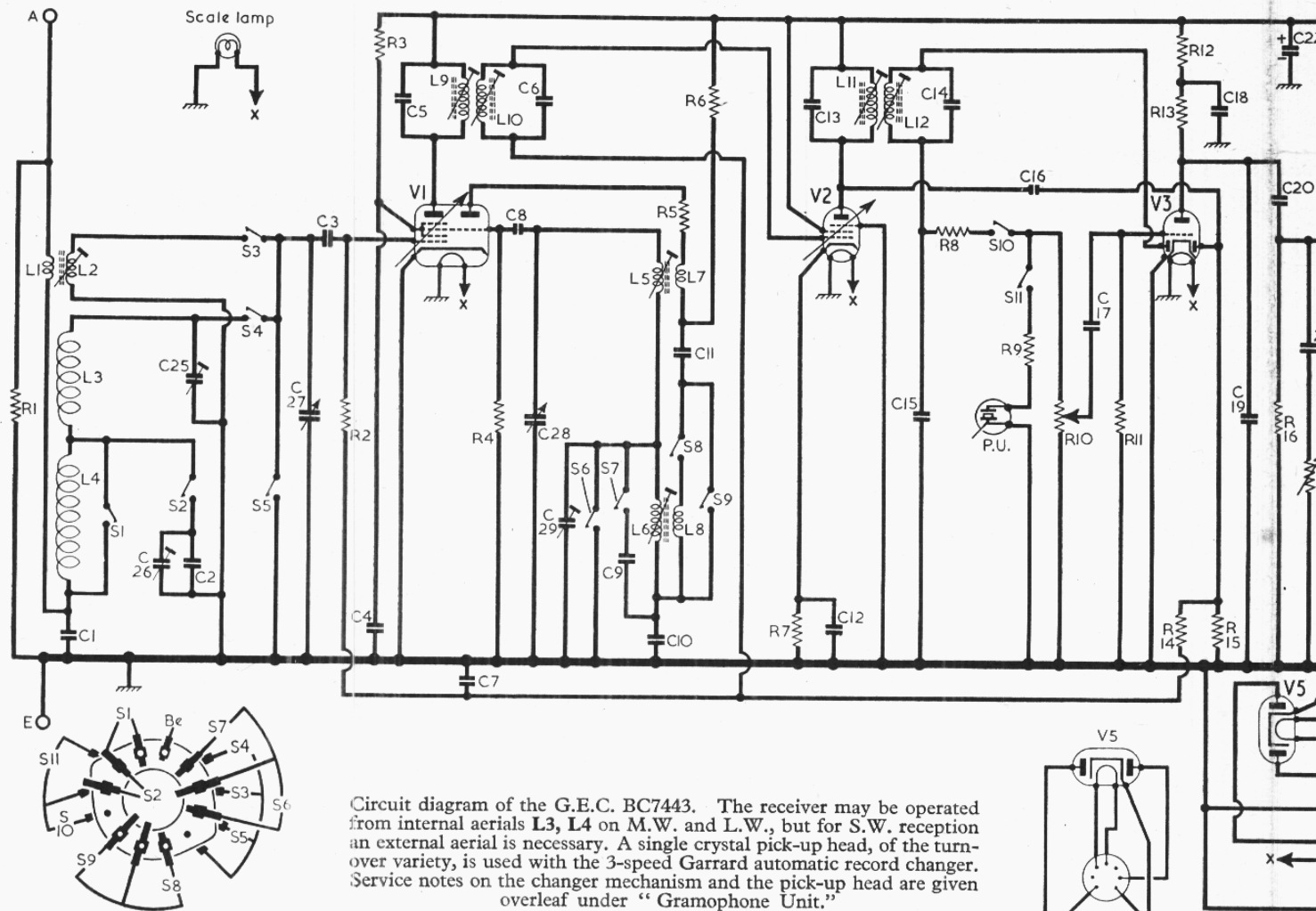
Second valve (**V2, Osram W77**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C5, L9, L10, C6** and **C13, L11, L12, C14**.

Intermediate frequency 470 kc/s.

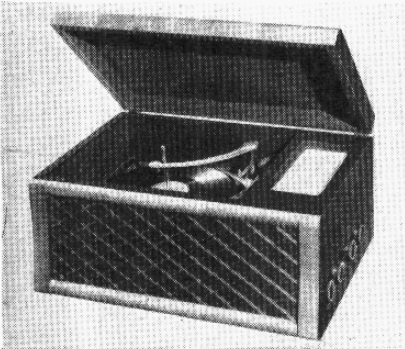
Diode signal detector is part of double diode triode valve (**V3, Osram DH77**). Audio frequency component in its rectified output is developed across volume control **R10**, which acts as diode load, and passed via **C17** to triode section.

Second diode of **V3** is fed from **V2** anode via **C16**, and the resulting D.C. potential developed across **R15** is fed back as bias to **V1** and **V2** giving automatic gain control.

Resistance-capacitance coupling by **R13, C20** and **R16** between **V3** and pentode output valve (**V4, Osram N78**). Tone correction in anode circuit by **C24**, and in cathode circuit by the negative feed-back



Circuit diagram of the G.E.C. BC7443. The receiver may be operated from internal aerials **L3, L4** on M.W. and L.W., but for S.W. reception an external aerial is necessary. A single crystal pick-up head, of the turn-over variety, is used with the 3-speed Garrard automatic record changer. Service notes on the changer mechanism and the pick-up head are given overleaf under "Gramophone Unit."



Appearance of the G.E.C. BC7443

voltage developed across **R20**. Provision is made for the connection of a low-impedance external speaker across **T1** secondary winding.

H.T. current is supplied by full-wave I.H.C. rectifying valve (**V5, Osram U78**). Smoothing by **R18** and electrolytic capacitors **C22, C23**. Residual hum is neutralized by passing H.T. current through section **a** of the output transformer primary winding.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information, and were measured with the receiver operating from 230 V A.C. mains. The receiver was tuned to the lowest wavelength end of M.W., but there was no signal input.

Voltages were measured on the 15 V and 750 V ranges of a 1,000 ohms-per-volt meter, chassis being the negative connection in every case.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 X79	202 90	0.9 3.3	40	1.7	—
V2 W77	202	5.0	202	1.5	3
V3 DH77	65	0.6	—	—	—
V4 N78	260	23.5	202	3.5	4
V5 U78	261*	—	—	—	280†

*A.C. reading, each anode. †Cathode current 40 mA.

shown in detail beneath the circuit (below) where it is viewed from the rear of an inverted chassis. In the switch table (below) a dash indicates open and **C** closed.

Switches	Gram	S.W.	M.W.	L.W.
S1	—	—	C	—
S2	—	—	—	C
S3	—	C	—	—
S4	—	—	C	C
S5	C	—	—	—
S6	—	C	—	—
S7	—	—	—	—
S8	—	—	—	C
S9	C	C	C	C
S10	C	C	C	C
S11	C	—	—	—

Drive Cord Replacement.—About five feet of nylon braided glass yarn is required for a new drive. It should be run as indicated in the sketch at the foot of columns 1 and 2 overleaf, starting with the gang at minimum capacitance.

Scale Lamp.—This is a small clear spherical bulb with an M.E.S. base, and is rated at 6.5 V, 0.3 A.

Modifications.—The following changes in component values may be found in some receivers: **R1**, 10 kΩ; **R13**, 150 kΩ; **R15**, 470 kΩ; **R19**, 10 kΩ; **C8**, 40 pF; **C11**, 0.004 μF; **C16**, 47 pF or 56 pF.

GENERAL NOTES

Switches.—S1-S11 are the waveband and radio/gram change-over switches, ganged in a single rotary unit beneath the chassis. The unit is indicated in our underside illustration of the chassis, and

COMPONENTS AND VALUES

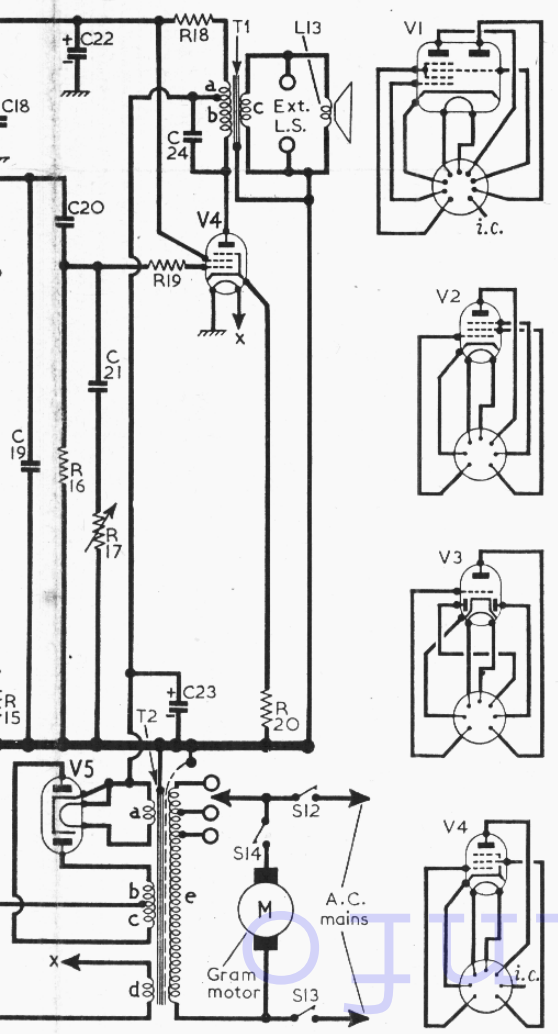
CAPACITORS		Values	Locations
C1‡	Aerial coupling ...	3,950pF	D3
C2§	L.W. aerial trim. ...	140pF	D2
C3	V1 C.G. ...	100pF	E2
C4	V1 S.G. decoupling ...	0.05μF	E2
C5	1st I.F. trans. ...	120pF	B1
C6	tuning ...	120pF	B1
C7	A.G.C. decoupling ...	0.04μF	E3
C8	V1 osc. C.G. ...	47pF	D3
C9§	L.W. osc. trim. ...	420pF	D2
C10††	Osc. tracker ...	420pF	D3
C11	Osc. reaction coup. ...	0.003μF	E2
C12	V2 cathode by-pass ...	0.04μF	E3
C13	2nd I.F. trans. ...	120pF	B1
C14	tuning ...	120pF	B1
C15	I.F. by-pass ...	300pF	F3
C16	A.G.C. coupling ...	47pF	F3
C17	A.F. coupling ...	0.01μF	F3
C18	V3 H.T. decoupling ...	0.25μF	G3
C19	I.F. by-pass ...	500pF	F3
C20	A.F. couplin. ...	0.05μF	F3
C21	Part tone control ...	0.005μF	F2
C22*	H.T. smoothing	32μF	G2
C23*		16μF	G2
C24	Tone correction ...	0.002μF	F2
C25†	M.W. aerial trim. ...	—	D2
C26†	L.W. aerial trim. ...	—	D2
C27†	Aerial tuning ...	—	C1
C28†	Oscillator tuning ...	—	C1
C29†	M.W. osc. trim. ...	—	D3

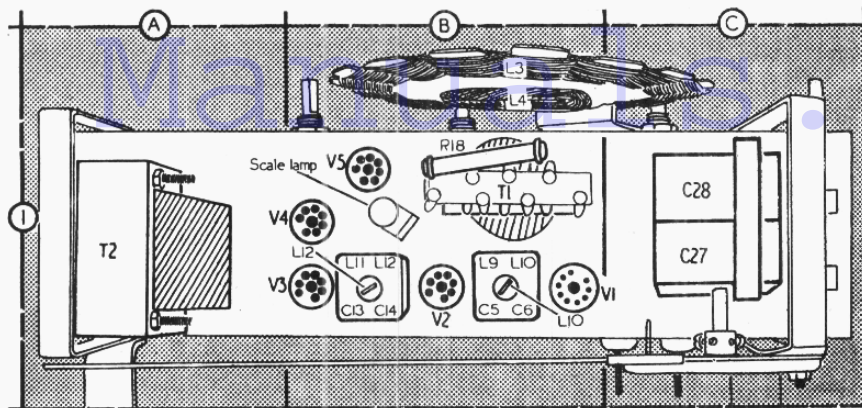
* Electrolytic. † Variable. ‡ Pre-set. †† Tolerance ± 4%. § Tolerance ± 1%. ††† Tolerance ± 2%.

RESISTORS		Values	Locations
R1	Mod. hum shunt ...	8.2kΩ	D3
R2	V1 C.G. ...	1MΩ	E3
R3	V1 S.G. feed ...	100kΩ	E3
R4	V1 osc. C.G. ...	100kΩ	E3
R5	Osc. stabilizer ...	470Ω	E3
R6	Osc. anode feed ...	33kΩ	E3
R7	V2 G.B. ...	470Ω	E3
R8	I.F. stopper ...	100kΩ	F3
R9	P.U. tone corrector ...	390kΩ	D2
R10	Volume control ...	1MΩ	F2
R11	V3 C.G. ...	10MΩ	F3
R12	V3 anode decoup. ...	56kΩ	G3
R13	V3 anode load ...	220kΩ	F3
R14	A.G.C. decoupling ...	1MΩ	F3
R15	A.G.C. diode load ...	390kΩ	F3
R16	V4 C.G. ...	270kΩ	F2
R17	Tone control ...	0.5MΩ	E2
R18	H.T. smoothing ...	4.7kΩ	B1
R19	C.G. stopper ...	15kΩ	F3
R20	V4 G.B. ...	150Ω	F3

OTHER COMPONENTS		Approx. values (ohms)	Locations
L1	S.W. aerial coup. ...	—	D3
L2	S.W. aerial tuning ...	—	D3
L3	M.W. frame aerial ...	1.0	B1
L4	L.W. frame aerial ...	17.0	B1
L5	Oscillator tuning coils ...	—	E3
L6		3.5	D3
L7	Oscillator reaction coils ...	—	E3
L8		1.4	D3
L9	1st I.F. trans. { Pri. ...	9.0	B1
L10		9.0	B1
L11	2nd I.F. trans. { Pri. ...	10.0	B1
L12		10.0	B1
L13	Speech coil ...	2.5	—
T1	O.P. trans. { a ...	70.0	B1
		910.0	
		—	
T2	Mains trans. { a ...	400.0	A1
		400.0	
		—	
		35.0	
S1-S11	Waveband switches	—	D2
S12	Mains sw., g'd R10	—	F2
S13		—	
S14		Gram motor switch	

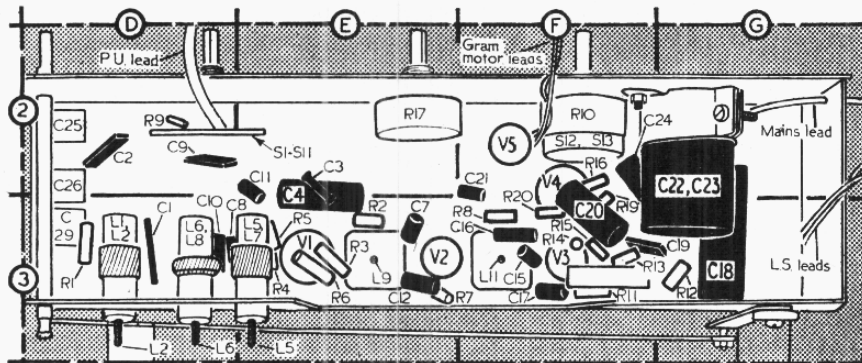
Dealers are reminded that component numbers used in the above tables may be different from those used in the manufacturers' diagram. If our component numbers are used, therefore, when ordering spares, it is advisable to mention the fact.





Plan view (above) of the chassis as seen with the tuning scale removed. The single scale lamp is located just below V5 valve holder. L3 and L4 are the frame aerials.

Under-side view of the chassis (below) showing all the R.F. and oscillator adjustments. The gram motor leads are connected to the motor terminal panel as indicated in the under-side illustration of the gramophone unit.



CIRCUIT ALIGNMENT

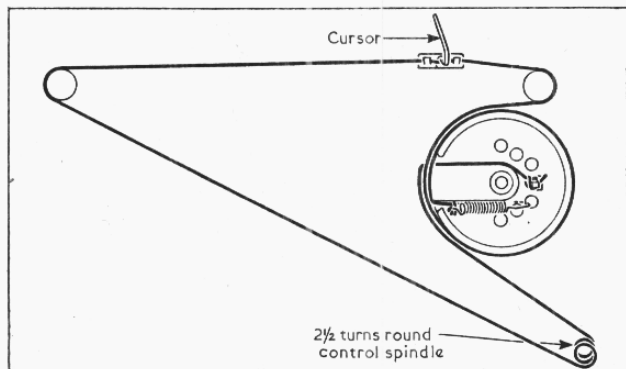
The receiver may be aligned with its chassis in position in the cabinet, access to the trimmers and core adjustments being obtained by removing the cabinet base cover.

I.F. Stages.—Switch receiver to M.W. and tune to a point at the high wavelength end of the band where there is no signal pick-up. Connect output of signal generator, via an 0.01µF capacitor in the "live" lead, to control grid (pin 1) of V2 and chassis. Feed in a 470 kc/s (638.5m) signal and adjust the cores of L12 (location reference B1) and L11 (F3) for maximum output. Transfer signal

generator live lead to control grid (pin 2) of V1 and chassis. Feeding in a 470 kc/s signal, adjust the cores of L10 (B1) and L9 (E3) for maximum output. Repeat all the preceding adjustments until no further improvement results.

R.F. and Oscillator Stages.—Check that with the gang at minimum capacitance, the cursor is horizontal and coincides with zero on the logging scale. Transfer signal generator leads, via a dummy aerial, to A and E sockets.

S.W.—Switch receiver to S.W., and tune to 50m calibration dot on scale. Feed in a 50m (6 Mc/s) signal and adjust the cores of L5 (E3) and L2 (D3) for maxi-



Sketch of the tuning drive system as seen from the rear of an upright chassis with the gang at minimum capacitance.

mum output. Repeat these adjustments.

M.W.—Switch receiver to M.W. and tune to 500m. Feed in a 500m (600 kc/s) signal and adjust the core of L6 (D3) for maximum output. Tune receiver to 200m, feed in a 200m (1,400 kc/s) signal and adjust C29 (D3) and C25 (D2) for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W. and feed in a 1,300m (230.8 kc/s) signal. Tune signal in on receiver and adjust C26 (D2) for maximum output.

GRAMOPHONE UNIT

A Garrard type RC110 3-speed automatic record changer is fitted to the BC7443, and it employs a Garrard GC2 crystal pick-up with a two-position turn-over head. Instructions for replacing the styli are given under "Pick-up Stylus."

Voltage Adjustment.—The gram motor is designed to operate between the limits of 100-130 V and 200-250 V, from 50 c/s A.C. mains supply. Alternative motor pulleys are available for operation from 40 or 60 c/s. The three pulleys can be identified from the colour of their finish as follows: Copper, 40 c/s; nickel, 50 c/s; brass, 60 c/s.

Voltage adjustment is made by means of metal links on the voltage adjustment panel. A diagram showing the positions of these links for the two voltage ranges is inset beneath the voltage adjustment panel in the underside illustration of the gramophone unit.

For 100-130 V operation the motor current should not exceed 0.26 A, and for 200-250 V operation it should not exceed 0.13 A.

Transit Screws.—These are indicated in the plan view of the gramophone unit and should be removed before operating the instrument.

Removing Turntable.—Release the plastic disc in the centre of the turntable mat by giving it a quarter of a turn clockwise, and lift it off the turntable together with the mat. Next press-off the turntable retaining clip (not the main spindle retaining clip above it) from the record spindle. The turntable can now be removed by carefully lifting it with equal pressure on diametrically opposite sides. When replacing the turntable, the changer should be switched to the "off" position.

Lubrication.—The motor and intermediate wheel bearings are of the self-oiling type and lubrication should only be necessary after about every 1,000 hours of running. When lubricating, hold the intermediate wheel out of the way and insert a drop of fine machine oil in the top motor bearing. Carefully remove all traces of surplus oil before running. The intermediate wheel rubber, motor pulley and inside of turntable rim must be kept free of oil.

Auto-stop Mechanism.—The auto-stop mechanism is operated by the quick inward movement of the pick-up when it reaches the run-in groove near the centre of the record. The mechanism is therefore set to operate when the pick-up approaches within 2 3/8 in of the centre of the turntable. If the auto-stop fails to operate, the height of the auto-trip lever should be raised by turning the auto-stop adjusting screw (see plan illustration of

motor unit). This will enable the lever to engage the cam on the striker at the end of a record.

If the motor momentarily starts, then stops, when switching on, check that the motor switch catch lever (under-side illustration) engages with and holds the switch lever when switched on. If it does not hold the switch lever in position, the two screws on the trip link adjustment (under-side illustration) should be slackened off and the length of the trip adjusted until correct operation is obtained.

Speed Variation.—If the motor runs slow or "wow" is experienced, the turntable should be removed as described under "Removing Turntable" and the following checks made. Examine the motor pulley, intermediate wheel and inside of turntable rim for traces of oil, and if necessary wipe thoroughly with a clean cloth. Make sure that the motor pulley is in its correct position on the motor shaft. The intermediate wheel should run in the centre of its appropriate step on the motor pulley and should not foul the side of the adjacent step. If necessary the pulley can be adjusted to its correct height by slackening off the two grub screws holding it to the motor shaft and sliding it up or down the shaft.

Pick-up Dropping Position.—This is accurately pre-set at the factory. Should, however, any minor adjustment be required to accommodate abnormal records, the pick-up dropping screw (plan illustration), which is accessible through a hole in the motor plate, should be adjusted. This adjustment can only be made with the pick-up arm on its rest.

Pick-up Height.—This is controlled by the pick-up height screw in the rear end of the pick-up arm. Ten 12in 78 r.p.m. records should be placed on the turntable and the height screw adjusted so that as the pick-up returns to its rest after playing the last record, the tip of the stylus clears the record by $\frac{1}{16}$ in.

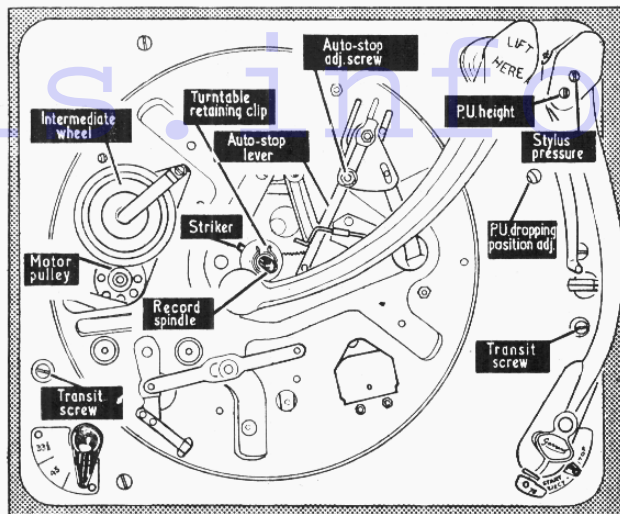
Pick-up Stylus.—The two styli used in the pick-up head are type GC2/1 (coded red) for 33 $\frac{1}{2}$ and 45 r.p.m. operation, and type GC2/3 (coded green) for 78 r.p.m. operation.

To make the styli more accessible, the crystal cartridge should be removed from the pick-up arm as follows. Remove grub screw securing turn-over knob on front of pick-up; pull-off knob together with plastic collar and spring; withdraw cartridge from arm and lay on turntable mat.

Each stylus is secured to the cartridge by a metal pin, which forms an integral part of the stylus at the end remote from the sapphire. Near the sapphire end of the stylus two side flanges engage with a flexible plastic coupling element that drives the crystal. To remove the stylus, the blade of a knife should be inserted between it and the cartridge at the end nearest to the pick-up leads, and the stylus gently levered upwards, making sure that the side flanges disengage from the plastic coupler.

When inserting the new stylus, its pin should be engaged in the cartridge socket and pressed home gently, making sure

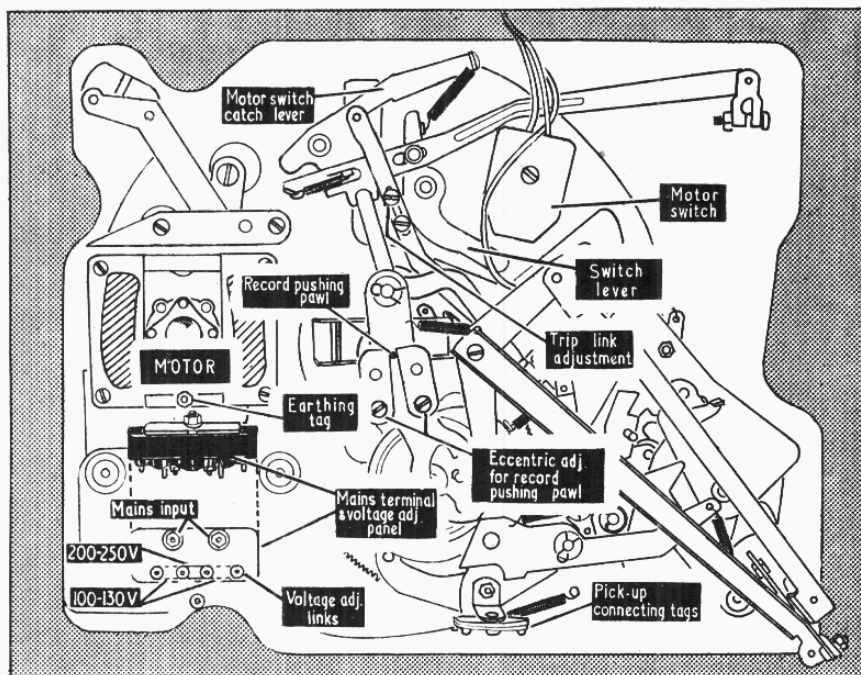
Plan view of the gramophone unit, where the various components, levers and adjusting screws referred to under "Gramophone Unit" are identified.



that the side flanges of the stylus engage squarely with the plastic coupler.

Record Dropping.—If a failure occurs in the record dropping operation that is not due to a badly warped record, then check that the record pushing pawl at the top of the turntable spindle is engaging in the record hole. The pawl is spring loaded, and after pushing a record off the spindle step it is pressed down by the records above. It then moves back into the spindle and should be ready to come forward again to push the next

record off the spindle step. By watching the operation of the record pushing pawl it can be seen whether it is operating as just described. If it is not moving back far enough into the spindle to allow the next record to move into place, the two eccentric pawl adjustment screws, shown in the under-side illustration of the changer, should be turned very slightly to move the pawl into the correct position. These adjusting screws should be finally set to allow a very small amount of play between the lower end of the pawl and the two arms of the adjustment.



Under-side view of the gramophone unit. The mains terminal and voltage adjustment panel has been re-drawn in plan form to show the mains input connections and the positions of the voltage adjustment links for 100-130V and 200-250V operation. The 200V link is shown in solid line, and the two 100V links are shown in broken line.