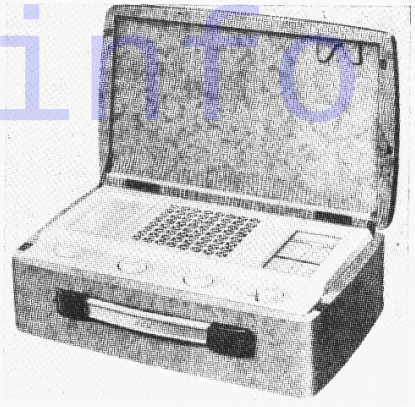
"TRADER" SERVICE SHEET
1086

G.E.C. BC4444

All-dry Battery and Mains Portable



DESIGNED to operate from A.C. or D.C. mains of 200-250 V or self-contained dry batteries, the G.E.C. BC4444 is a 4-valve (plus metal rectifier) 2-band portable superhet covering the waveband ranges of 187.5-550 m and 1,000-2,000 m. A special device prevents the lid from being closed unless the power control knob is in the "off" position.

Release date and original price: October 1952, £13 19s 6d without batteries. Purchase tax extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input by **L1, C29** (M.W.) and **L1, L2, C29** (L.W.) to heptode valve **(V1, Osram X18)** which operates as frequency changer with internal coupling.

Oscillator grid coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C30.** Parallel trimming by **C31** (M.W.) and **C8, C31** (L.W.); series tracking by **C6** (M.W.) and **C6, C7** (L.W.) Inductive reaction coupling from oscillator anode by **L5** (M.W.) and **L6** (L.W.).

Second valve **(V2, Osram W17)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C3, L7, L8, C4** and **C12, L9, L10, C13.** **Intermediate frequency 470 kc/s.**

Diode signal defector is part of diode pentode valve **(V3, Osram ZD17).** Audio frequency component in rectified output is developed across volume control **R9,** which acts as diode load, and is passed via **C17** to control grid of **V3** pentode section, which operates as A.F. amplifier. I.F. filtering by **C15, R8** and **C19.** D.C. potential developed across **R8, R9** is fed back as bias to **V1** and **V2,** giving automatic gain control.

Resistance-capacitance coupling by **R12, C20** and **R13,** between **V3** pentode and pentode output valve **(V4, Osram N18).** Tone correction by **C21** in anode circuit, and by negative feed-back via **R14** between the anodes of **V4** and **V3** pentode section.

For battery operation, the filaments are connected in series, and power supplies are carried by switches **S5 (B), S6 (B), S9 (B), S12 (B)** and **S13 (B)** which close in the battery positions of the waveband switch control, as indicated by the suffix **(B).** In the "off" and mains positions of the control these switches open.

For mains operation, **S7 (M), S8 (M), S10 (M)** and **S11 (M)** close. In the battery positions of the waveband switch control these switches all open, but only **S10 (M)** and **S11 (M),** which form a Q.M.B. unit ganged to the control, open in the "off" position.

H.T. current on mains is supplied by half-wave metal rectifier **(MR1,** two **SenTerCel RM2** units in series). Smoothing by **R18, R19** and electrolytic capacitors **C23, C24** and **C25.** Section **a** of **R19** protects **MR1** from current surges. Filament voltage is tapped off from **R20** in H.T. potential divider **R19, R20,** the filaments being connected in series as before. Filament smoothing by **C22.**

Grid bias is obtained from the filament voltage-drop, grid circuits being returned to appropriate points in the filament chain. Extra grid bias for **V4** is obtained on battery operation from the voltage dropped across **R15** in the H.T. negative lead to chassis. On mains operation extra grid bias is obtained by inserting **R16** to make the filament of **V4** more positive with respect to chassis. **R4** and **R17** are shunts to by-pass the H.T. current past the filaments.

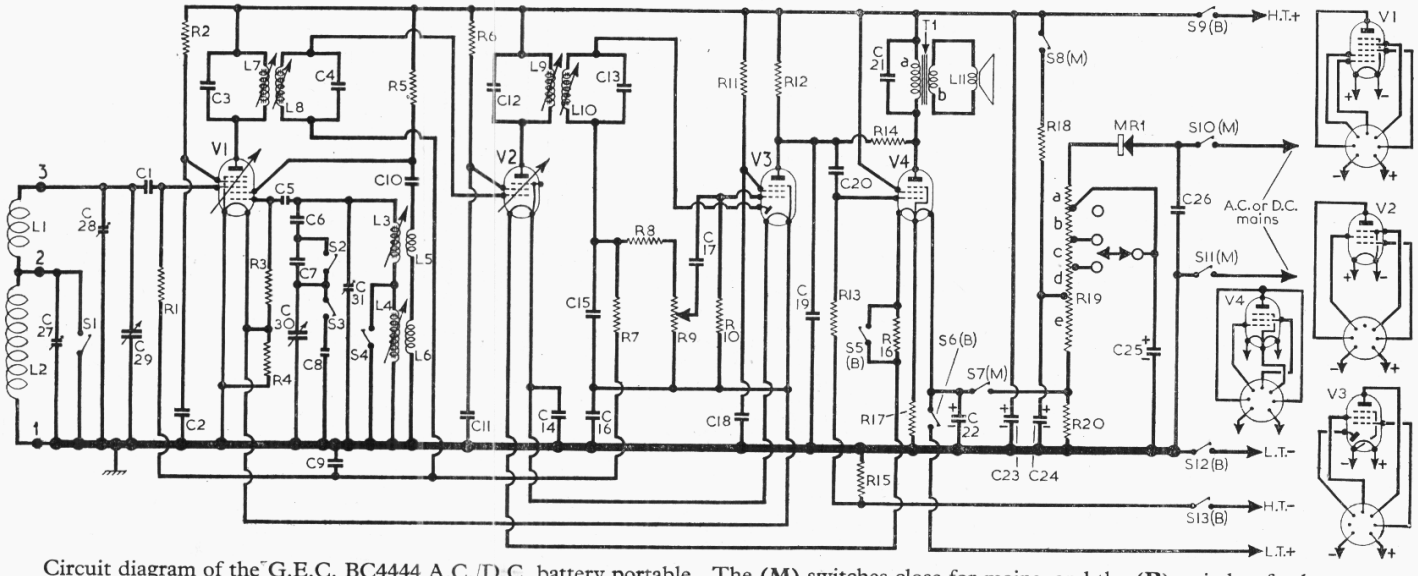
COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	V1 C.G.	1MΩ	F4
R2	V1 S.G. feed ...	470kΩ	F4
R3	V1 osc. C.G. ...	100kΩ	F4
R4	V1 fil. shunt ...	220Ω	E3
R5	Osc. anode feed ...	8·2kΩ	F3
R6	V2 S.G. feed ...	47kΩ	F3
R7	A.G.C. decoupling	1MΩ	F4
R8	I.F. stopper ...	68kΩ	E4
R9	Volume control ...	1MΩ	D3
R10	V3 C.G.	6·8MΩ	D3
R11	V3 S.G. feed ...	6·8MΩ	E3
R12	V3 anode load ...	1MΩ	D4
R13	V4 C.G.	2·2MΩ	D4
R14	Neg. feed-back ...	10MΩ	D4
R15	V4 G.B. resistors ...	180Ω	D3
R16	V4 G.B. resistors ...	33Ω	E4
R17	Filament shunt ...	1·5kΩ	D4
R18	H.T. smoothing ...	1·5kΩ	F3
R19	Fil. H.T. pot.	*4,435Ω	B1
R20	Fil. H.T. pot. divider ...	2·7kΩ	G4

* Tapped at 285Ω + 560Ω + 500Ω + 870Ω + 2,220Ω from MR1.

	CAPACITORS	Values	Locations
C1	V1 C.G.	200pF	A2
C2	V1 S.G. decoupling	0·04μF	G4
C3	1st I.F. trans tuning ...	120pF	B2
C4	1st I.F. trans tuning ...	120pF	B2
C5	V1 osc. C.G. ...	47pF	F4
C6	M.W. osc. tracker	680pF	G3
C7	L.W. osc. tracker	320pF	F3
C8	L.W. osc. trim. ...	56pF	G3
C9	A.G.C. decoupling	0·04μF	F4
C10	Osc. anode coupling	0·005μF	F4
C11	V2 S.G. decoupling	0·04μF	E3
C12	2nd I.F. trans. tuning ...	120pF	B2
C13	2nd I.F. trans. tuning ...	120pF	B2
C14	V2 fil. by-pass ...	0·1μF	E4
C15	I.F. by-pass ...	100pF	E4
C16	V3 fil. by-pass ...	0·04μF	E3
C17	A.F. coupling ...	0·04μF	D3
C18	V3 S.G. decoupling	0·04μF	D3
C19	I.F. by-pass ...	500pF	D3
C20	A.F. coupling ...	0·005μF	D4
C21	Tone correction ...	0·002μF	E4
C22*	Filament smoothing	250μF	B2
C23*	H.T. smoothing ...	32μF	B2
C24*	H.T. smoothing ...	16μF	B2
C25*	H.T. smoothing ...	32μF	B2
C26	Mains R.F. by-pass	0·01μF	F4
C27‡	L.W. aerial trim.	—	A2
C28‡	M.W. aerial trim.	—	A2
C29†	Aerial tuning ...	—	A1
C30†	Oscillator tuning	—	A2
C31‡	M.W. osc. trim. ...	—	A2

* Electrolytic. † Variable. ‡ Pre-set



Circuit diagram of the G.E.C. BC4444 A.C./D.C. battery portable. The **(M)** switches close for mains, and the **(B)** switches for battery.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	M.W. frame aerial	0·5	—
L2	L.W. frame aerial	3·0	—
L3	Oscillator tuning coils	2·6	F4
L4		5·0	G4
L5	Oscillator reaction coils	2·2	F4
L6		2·0	G4
L7	1st I.F. trans. Pri.	10·0	B2
L8	Sec.	10·0	B2
L9	2nd I.F. trans. Pri.	10·0	B2
L10	Sec.	10·0	B2
L11	Speech coil	2·6	B1
T1	O.P. trans. a	800·0	E3
	b	—	
S1-S4	Waveband switches	—	G3
S5(B)-S13(B)	Power switches	—	G3

GENERAL NOTES

Switches.—**S1-S4** are the waveband switches, and **S5(B)-S11(M), S13(B)** are the mains/battery change-over and on-off switches, ganged in three rotary units beneath the chassis deck. These are indicated in our sub-deck illustration, and the two wafer-type units are shown in detail in the diagrams inset beside the rear chassis view. The third unit is the double-pole Q.M.B. mains switch unit.

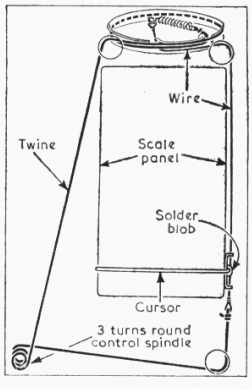
The table below them gives the switch positions for the five control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

Batteries.—Those recommended by the makers are: L.T., G.E.C. BB408, rated at 7.5 V; H.T., G.E.C. BB526, rated at 90 V. A standard 3-pin plug is provided for the H.T. battery, and a standard 2-pin plug for the L.T.

A wooden block in the lid of the carrying case, shaped to fit over the waveband control knob when it is in the "off" position, prevents the lid from being closed while switched on.

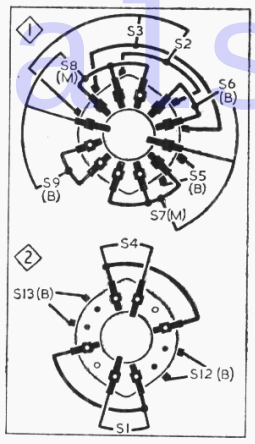
Valve Retainer.—A specially shaped card of compressed fibre is fitted over the top of valves **V2** and **V4** to hold them in position. It is slipped over the **L9, L10** I.F. coil can, which is situated between the two valves, and a thick elastic binder holds it in place.

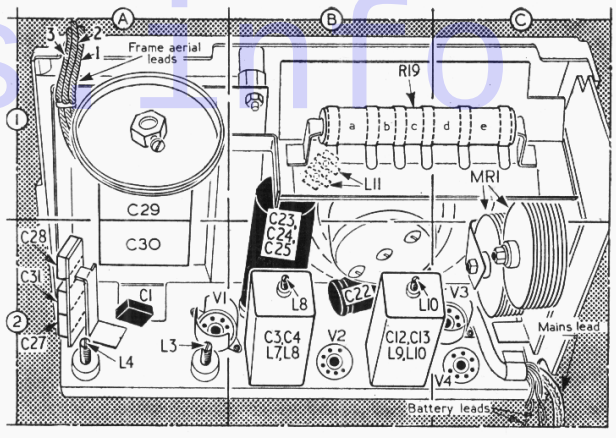
Drive Cord Replacement.—Two separate cords are used in the gang drive, one made of fine stranded steel wire, and the other of high quality flax twine, thoroughly waxed. They should be made up in advance and fitted as a complete cord, as shown in the accompanying sketch, where the system is drawn as seen from the front, after removing the plastic escutcheon (3 4BA nuts, with washers) with the gang at minimum capacitance.



Sketch showing the tuning drive system as seen from the front of the scale, after removing the large plastic escutcheon, with the gang at minimum. The cord is part wire and part twine.

The wire is made up by making a loop at each end, soldering the joins before cutting, so that the overall length is 8⅜in. The twine is tied at one end to one of the wire loops, and at the other end to the tension spring, so that the overall length of the twine is 22½in. The wire passes through slots in the cursor carriage, and after adjusting its position approximately as described under "Circuit Alignment," the solder blob should be touched with an iron to fix it.





Switch unit diagrams (above, left) with their associated table (below) and a half-rear view of the chassis (above, right), showing the deck upon which the valves are mounted.

Switch	Battery L.W.	Battery M.W.	Off	Mains M.W.	Mains L.W.
S1 ...	—	C	—	C	—
S2 ...	—	C	—	C	—
S3 ...	C	—	—	—	C
S4 ...	—	C	—	C	—
S5 (B)	C	C	—	—	—
S6 (B)	C	C	—	—	—
S7 (M)	—	—	C	C	C
S8 (M)	—	—	C	C	C
S9 (B)	C	C	—	—	—
S10 (M)	—	—	—	C	C
S11 (M)	—	—	—	C	C
S12 (B)	C	C	—	—	—
S13 (B)	C	C	—	—	—

DISMANTLING

Removing Chassis.—Remove wood screw securing lid stay to lid, and, prising out the frame aerial cover, unsolder the three frame aerial leads;

remove battery compartment cover and unplug batteries, if fitted;

remove two 4BA cheese-head bolts with plain and lock washers from side of plastic top panel, and sliding chassis and panel to left, withdraw it from carrying case.

When replacing, connect the frame aerial connecting leads to the three tags in lid bearing the same numbers as shown in our circuit and rear chassis drawing. The tags are numbered 1-3, reading from left to right.

CIRCUIT ALIGNMENT

Remove chassis from carrying case as described under "Dismantling," and place it, standing on its voltage adjustment end, on the bench. Reconnect the frame aerial leads.

I.F. Stages.—Switch receiver to L.W. and tune to high wavelength end of band. Connect signal generator output, via an 0.1μF capacitor in each lead, to control grid (pin 6) of **V1** and chassis. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L10** (location reference B2), **L9** (E4), **L8** (B2) and **L7** (F4) for maximum output. Repeat these adjustments.

R.F. and Oscillator Stages.—Disconnect signal generator leads from receiver and lay them near the frame aerials in lid of carrying case. Check that with the gang at maximum capacitance the cursor coincides with the horizontal line at the high wavelength end of the L.W. tuning scale.

M.W.—Switch receiver to M.W., tune to calibration dot at 500 m, feed in a 500 m (600 kc/s) signal and adjust the core of **L3** (A2) for maximum output. Tune receiver to 214 m calibration dot, feed in a 214.3 m (1,400 kc/s) signal, and adjust **C31** (A2) and **C28** (A2) for maximum output. Repeat these adjustments.

L.W.—Switch receiver to L.W., tune to 1,300 m calibration dot, feed in a 1,304 m (230 kc/s) signal and adjust first the core of **L4** (A2) and then trimmer **C27** (A2) for maximum output. Repeat these adjustments. If any subsequent adjustments are made on M.W., then these must be followed by L.W. realignment.

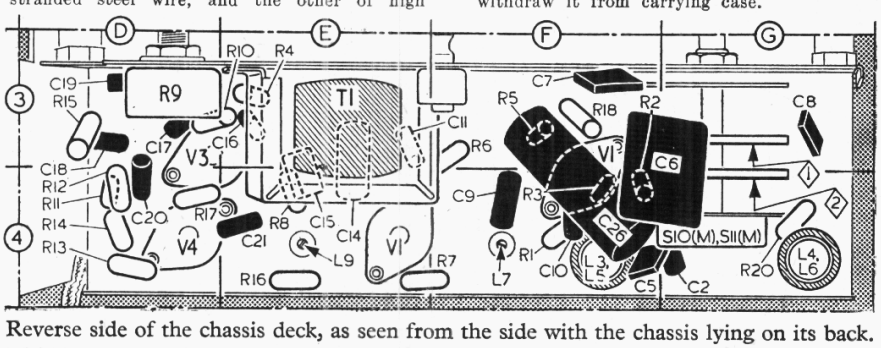
VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information and were measured with the receiver operating from A.C. mains of 230 V, the voltage adjustment being set to the appropriate tapping. The receiver was switched to M.W. and tuned to around 200 m, a point being selected where there was no signal pick-up.

Voltage readings were measured on the 750 V scale of a 1,000 ohms-per-volt meter, chassis being the negative connection. The reading at the junction of **R19** and **MR1** was 208 V. The voltage across **C25** was 194 V, across **C24** it was 116 V, across **C22** it was 8.2 V and across **R16** it was 1.7 V.

Valve		Anode V	Anode mA	Screen V	Screen mA
V1	X18 ...	95 Oscillator 70	0·55 3·0	30	0.13
V2	W17 ...	95	1·9	65	0·6
V3	ZD17 ...	27	0·052	*	0·012
V4	N18 ...	92	5·7	95	1·3

* Very low reading owing to high circuit resistance.



Reverse side of the chassis deck, as seen from the side with the chassis lying on its back.

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