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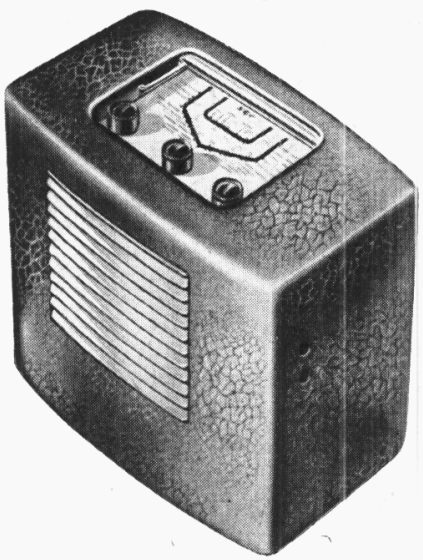
"TRADER" SERVICE SHEET 471

G.E.C. BC4141

ALL-DRY BATTERY S/H PORTABLE



THE G.E.C. BC4141 receiver is a 4-valve battery superhet portable, operating from dry 1.5 V LT and 90 V HT supplies. The MW and LW bands are covered, and there is provision for the use of an external aerial and earth, if desired. Two separate frame aerials, one for each band, are fitted.

Release date: April, 1940.

CIRCUIT DESCRIPTION

Tuned frame aerial input from independent MW and LW frames **L1** (MW) and **L2** (LW), tuned by **C14**, to heptode valve **(V1, Osram X 14)**, which operates as frequency changer with electronic coupling.

Provision is made also for the connection of an external aerial via the small series condenser **C2** directly to **V1** pentode section control grid, and for an earth connection.

V1 oscillator control grid coils **L3** (MW), plus **L4** (LW), are tuned by **C17**; parallel trimming by **C18** (MW) and **C19** (LW); series tracking by **C16, C3** in high potential end of circuit (MW) and **C20** (LW). The control grid resistance **R3** and condenser **C4** are connected in the low potential end of the circuit.

Reaction coupling by anode coils **L5** (MW), plus **L6** (LW), via damping resistance **R2.**

Second valve **(V2, Osram Z14)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C21, L7, L8, C22** and **C23, L9, L10, C24.** The transformer coils are iron-cored, but alignment is carried out by adjusting the trimmer condensers, which are variable.

Intermediate frequency 456 KC/S.

Diode second detector is part of single diode triode valve **(V3, Osram HD14).** Audio frequency component in rectified output is developed across load resistance **R8** and passed via audio frequency coupling condenser **C8** and manual volume control **R9** to CG of triode section, which operates as audio frequency amplifier.

IF filtering by **C7, R7** in diode circuit, and **C9** in triode anode circuit. GB for triode section is obtained from drop along the filament.

DC potential developed across **R7** and **R8** also appears across **R5** and **R6.** It is tapped off at their junction and fed back through decoupling circuits as GB to frequency changer and IF valves, giving automatic volume control. No delay voltage is employed.

Resistance-capacity coupling by **R10, C10** and **R11,** via grid stopper **R12,** between **V3** triode and pentode output valve **(V4, Osram N14).** Fixed tone correction in anode circuit by **C11.**

Grid bias voltage for **V4** is obtained automatically from drop along resistance **R13** in the negative high tension lead to chassis.

DISMANTLING THE SET

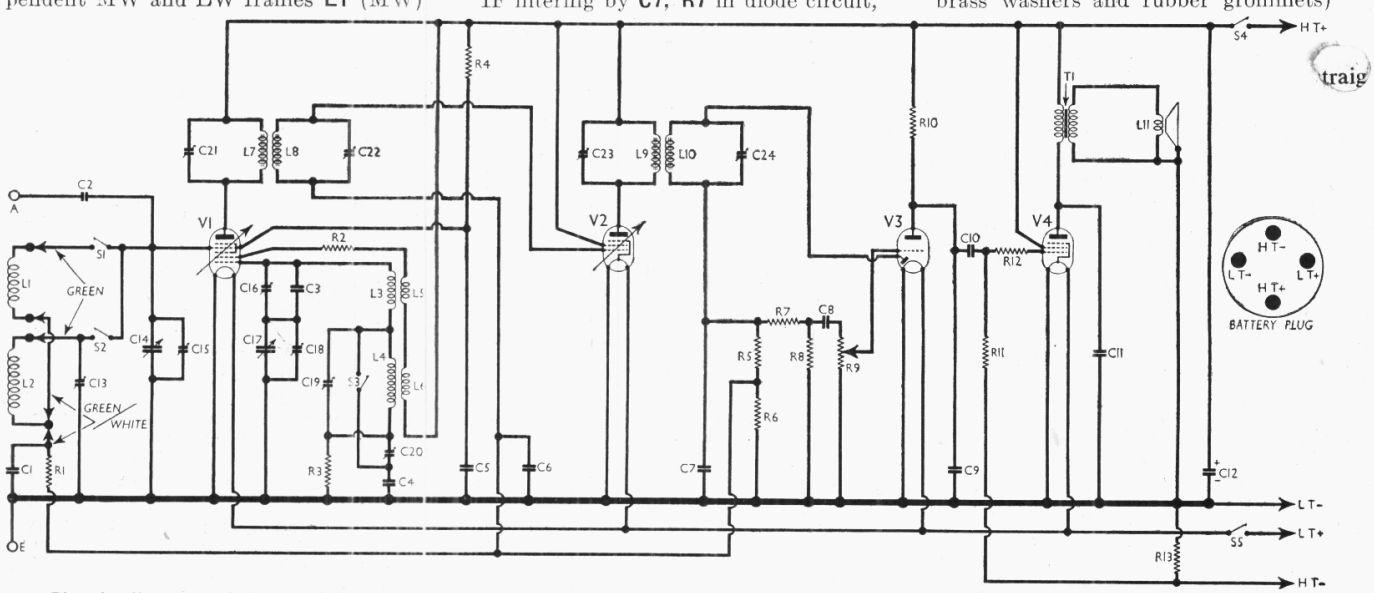
Removing Chassis.—After removing the detachable cover, unsolder the upper (green) lead from the front (LW) frame aerial connecting panel, the three leads from the tags on the rear (MW) frame aerial connecting panel and the leads from the external aerial and earth sockets;

remove the three control knobs (pull-off);

remove the two set-screws (with washers and lock-washers) securing the MW frame assembly to the rear chassis member, and lift away the assembly;

centre the scale pointer in the mid-point of the scales (shown by "V" marks);

remove the two set-screws (with large brass washers and rubber grommets)



Circuit diagram of the G.E.C. BC4141 all-dry battery superhet portable. A diagram of the battery plug, looking at the free ends of the pins, is inset on the right. The frame aerial connections are indicated and colour coded. Note the unusual position of the MW trackers **C3, C16**

holding the ends of the rear chassis member to the uprights of the wooden supporting structure when, if the chassis is drawn slightly rearward, it can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unsolder from the connecting strip on the output transformer the three leads connecting it to chassis.

When replacing, connect the speaker leads as follows, numbering the tags on the right-hand side of the connecting strip from front to rear of the receiver:

1, metal braiding emerging from the large yellow sleeving, together with one black lead from the transformer casing and another from the upper speech coil tag and speaker frame;
2, red braided lead from chassis;
3, blank;
4, orange braided lead emerging from large yellow sleeving;
5, white lead from lower speech coil tag on speaker.

When fitting the chassis, see that the scale pointer is at the centre of its travel, and take care that the rubber grommets in the small lugs on the front edge of the chassis engage properly with the supporting pegs projecting from the sub-baffle.

Connect the black lead from chassis to the earth (lower) socket on the side of the wooden structure, and the wire end of **C2** (attached to **V1** top cap) to the external aerial (upper) socket;

connect the green lead from the trimmer panel to the upper tag on the LW frame connecting panel;

connect the green/white lead coming from beneath the chassis, and one coming from the lower tag on the LW frame panel, to the lower tag on the MW frame connecting panel; and the green lead from the wavechange switch to the upper tag.

Removing Speaker.—First remove the chassis as detailed above;

unsolder the speech coil leads from the tags on the output transformer;

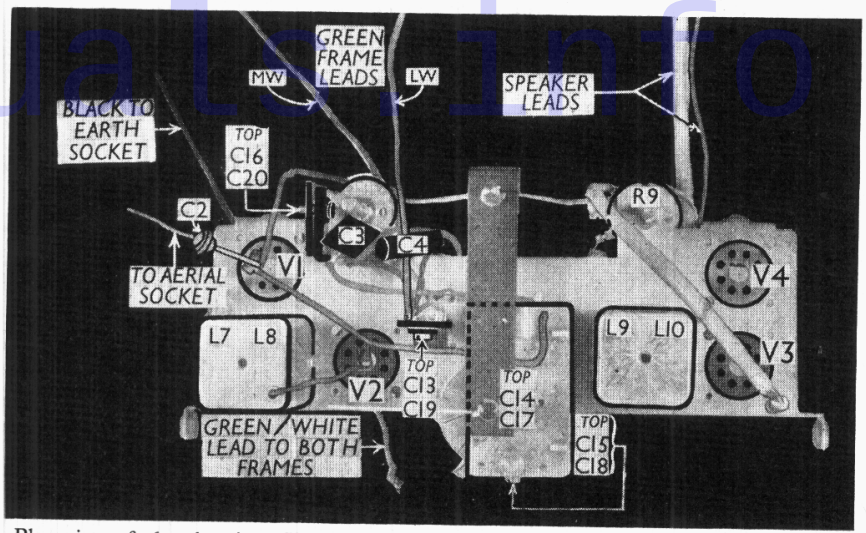
remove the four set-screws (with washers and lock-washers) holding the speaker to the sub-baffle.

When replacing, the speech coil tags should be on the right.

Connect the black speech coil lead to the tag on the output transformer nearest the front of the receiver, and the white lead to the tag nearest the rear.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 pentode CG decoupling...	220,000
R2	Oscillator reaction damping	3,300
R3	V1 osc. CG resistance ...	99,000
R4	V1 SG HT feed	66,000
R5	AVC feed resistances ...	2,000,000
R6		2,000,000
R7	IF stopper	66,000
R8	V3 diode load resistance ...	440,000
R9	Manual volume control ...	1,000,000
R10	V3 triode anode load... ...	1,000,000
R11	V4 CG resistance	2,000,000
R12	V4 grid stopper	66,000
R13	V4 auto GB resistance ...	800



Plan view of the chassis. The various external leads are coded. The six aerial and oscillator trimmers are indicated. Note the small external aerial coupling condenser **C2.**

	CONDENSERS	Values (μF)
C1	V1 pentode CG decoupling	0·05
C2	External aerial series ...	0·00001
C3	Osc. circ. MW fixed tracker	0·0003
C4	V1 osc. CG condenser ...	0·005
C5	V1 SG decoupling	0·05
C6	V2 CG decoupling	0·01
C7	IF by-pass	0·0001
C8	AF coupling to V3 triode ...	0·005
C9	IF by-pass	0·0001
C10	V3 triode to V4 AF coupling	0·005
C11	Fixed tone corrector ...	0·005
C12*	HT reservoir condenser ...	2·0
C13‡	Frame aerial LW trimmer	—
C14†	Frame aerial tuning ...	—
C15‡	Frame aerial MW trimmer	—
C16‡	Osc. circuit MW tracker ...	—
C17†	Oscillator circuit tuning ...	—
C18‡	Osc. circuit MW trimmer ...	—
C19‡	Osc. circuit LW trimmer ...	—
C20‡	Osc. circuit LW tracker ...	—
C21‡	1st IF trans. pri. tuning ...	—
C22‡	1st IF trans. sec. tuning ...	—
C23‡	2nd IF trans. pri. tuning ...	—
C24‡	2nd IF trans. sec. tuning ...	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Frame aerial windings ...	0·7
L2		37·0
L3	Osc. circuit MW tuning coil	2·6
L4	Osc. circuit LW tuning coil	5·5
L5	Oscillator MW reaction ...	2·0
L6	Oscillator LW reaction ...	3·0
L7	1st IF trans. Pri.... ...	7·0
L8	Sec.... ...	7·0
L9	2nd IF trans. Pri. ...	7·0
L10	Sec. ...	7·0
L11	Speaker speech coil	2·0
T1	Output trans. Pri. ...	470·0
	Sec. ...	0·17
S1-S3	Waveband switches ...	—
S4	HT circuit switch	—
S5	LT circuit switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table (next col.) were measured in our receiver when it was operating with a new battery, the HT section of which was reading 96 V on load. The receiver was tuned to the lowest wavelength on the MW band and the volume control was at maximum, but there was no signal input as the MW frame leads were short circuited.

When measurements were being made, care was necessary to see that the screen of the valve under test was in position and earthed, as otherwise readings were liable to be influenced.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X14	89	0·5	36	0·7
	Oscillator			
	85	1·5		
V2 Z14	89	1·0	89	0·2
V3 HD14	14	0·02	—	—
V4 N14	86	5·6	89	1·3

GENERAL NOTES

Switches.—S1-S3 are the waveband switches, and **S4, S5** the battery circuit switches, in a single rotary unit beneath the chassis. This is indicated in our under-chassis view, and shown in detail in the diagram overleaf, which is drawn looking at the underside of the chassis. The table overleaf gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control spindle.

Coils.—L1 and **L2** are the separate frame aerial windings, on either side of the chassis. **L3-L6** are in a tubular unscreened unit beneath the chassis. The IF transformers **L7, L8** and **L9, L10** are in two screened units on the chassis deck, with their associated trimmers, adjusted by screws reached from beneath the chassis.

Pre-set Condensers.—Apart from the four trimmers for the IF units reached from beneath the chassis, the remaining pre-set condensers are above the chassis. Two are on the gang condenser, two on a vertical panel close to it, and two on another vertical panel close to the switch unit.

Condenser C2.—This is shown in our plan chassis view. Its free end is normally connected to the external aerial socket; the other end goes to **V1** top cap connector.

Battery Plug.—A diagram of this, looking at the free ends of the pins, is inset on the right of the circuit diagram. The connections to the plug are colour coded as follows: LT negative, black; LT positive, red; HT negative, white; HT positive, blue.

Battery.—The battery is a combined 1.5 V LT and 90 V HT dry battery, GEC Blue Label, No. BB. 395. It is fitted with a socket to take the battery plug.

SWITCH TABLE

Switch	Off	MW	LW
S1	—	C	—
S2	—	—	C
S3	—	C	—
S4	—	C	C
S5	—	C	C

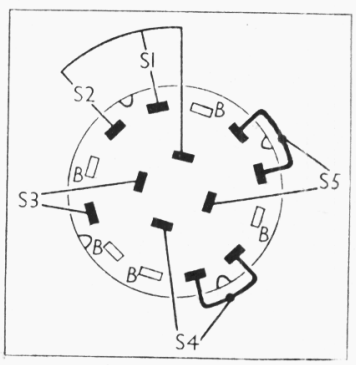
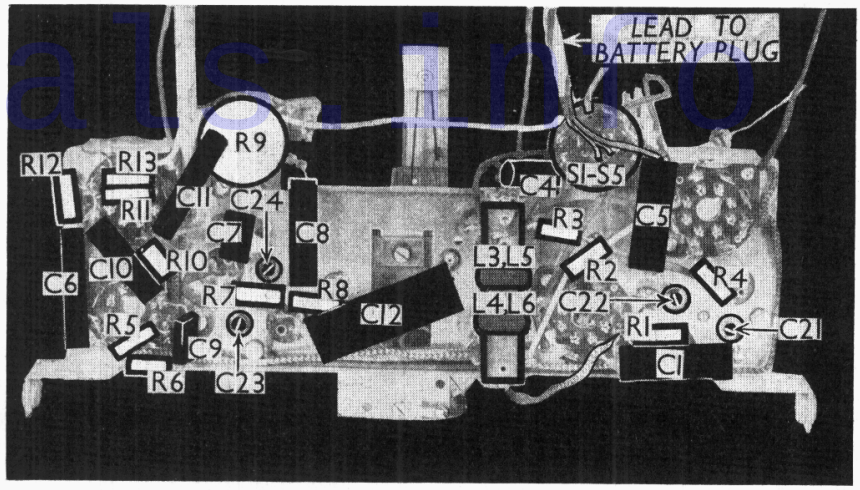


Diagram of the switch unit, looking at the underside of the chassis.



Under-chassis view. The switch unit is shown in detail in col. 1. Note the adjusting screws of the four IF trimmers, **C21—C24.**

CIRCUIT ALIGNMENT

IF Stages.—For IF alignment use a short ebonite screwdriver, about 1¾ in. long, and have the set fully assembled except for the cover and battery. Switch set to LW, turn gang to maximum and volume control to maximum. Connect signal generator via a 0.001μF condenser to control grid (top cap) of **V1,** leaving existing connection in place, and to chassis. Feed in a 456 KC/S signal, and adjust **C24, C23, C22** and **C21** (all beneath chassis) in turn for maximum output.

RF and Oscillator Stages.—Before aligning these stages the battery must be placed in its normal operating position. With gang at maximum, pointer should be over the high wavelength ends of the scales. If a special coil is not available for coupling the signal generator to the frame aerials, connect generator to external **A** and **E** sockets.

MW.—Switch set to MW, tune to 214m on scale (green spot), feed in a 214m (1,400 KC/S) signal, and adjust **C18,** then **C15,** for maximum output.

Feed in a 500m (600 KC/S) sign tune it in, and adjust **C16** for maximu output, while rocking the gang for optimum results.

LW.—Switch set to LW, tune to 1,000m on scale, feed in a 1,000m (300 KC/S) signal, and adjust **C19,** then **C13,** for maximum output. Feed in a 1,818m (165 KC/S) signal, tune it in (red dot on scale), and adjust **C20** for maximum output, while rocking the gang for optimum results.

Finally, remove signal generator, switch set to MW, receive a weak station at lower wavelength end of scale, and re-adjust **C15** if necessary for maximum output. Switch to LW, tune in a weak station at lower wavelength end of scale, and re-adjust **C13** if necessary for maximum output.

BOOKS ON TELEVISION AND SERVICING

ALTHOUGH the war has put a stop to television in this country from the practical point of view, there is nothing to prevent those who are interested in equipping themselves with knowledge for the future from studying the subject as far as it has progressed here, and keeping an eye on technical developments in America.

The publication of a new manual entitled *Television Receiving Equipment,* by Iliffe and Sons, Ltd., of Dorset House, Stamford St., S.E.1, is of interest to all who wish to bring their knowledge of television reception up to the point it had reached when the service was suspended.

Written by W. T. Cocking, A.M.I.E.E., who is well known for his many contributions on radio and television subjects to *The Wireless World,* the manual comprises 298 pages, with numerous diagrams and photographs. Throughout, the subject matter is in a practical, readable style. The book is largely non-mathematical, but use is often made of formulæ to show how various component values are derived. In fact, a feature of the book is the way in which practical values are given for various parts of the receiver wherever possible.

The author, after dealing with general principles, and with the television signal, devotes considerable space to the cathode ray tube, tube supplies, and electrostatic and electromagnetic deflection. Saw-tooth oscillators are also covered in detail.

The various sections of the receiver then come under review, starting with vision frequency amplification, then IF amplification, RF amplification, frequency changing, detection, sync separation, and sound reception.

The chapter on sync separation, an important feature of any receiver which is to work satisfactorily, is extremely informative, and explains fully the various methods of performing this operation, and of obtaining DC restoration.

The television aerial occupies another chapter, and following this is one on the complete receiver. *The Wireless World* Magnetic Television Receiver is taken as an example of a superhet type, and folded circuit diagrams are inset. In addition, a circuit of a "straig vision receiver is included, with component values.

The final chapters, on faults and their remedies and television servicing, do not go into great detail, and one feels that the author may intend to deal with this aspect of television in a later volume, possibly as a companion to his well-known *Wireless Servicing Manual.*

All radio engineers who wish to keep their television knowledge fresh, ready for the day when the service is resumed, will find this book one of the best they can read. It is priced at 7s. 6d. (7s. 10d. postage paid). W. E. M.

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A FIFTH edition of W. T. Cocking's popular *Wireless Servicing Manual* has just been issued by Iliffe and Sons, Ltd., Dorset House, Stamford Street, S.E.1, at 5s. (5s. 5d. postage paid). The manual embodies all the features of earlier editions, but in addition there is a new chapter on the use of cathode ray test gear for radio and television receiver servicing.