TRADER' SERVICE SHEET

258

G.E.C. A.C. ALL-WAVE 5

BC3850 AND BC3850L

THERE are two models of the G.E.C. A.C. All-Wave 5 receiver—the BC3850 and the BC3850L. The former is for mains of 190-250 V, 40-100 C/S, while the latter is for 110-130 and 210-230 V, 40-100 C/S.

The receiver is a 4-valve (plus rectifier) 3-band superhet with a short-wave range of 16-50 metres, and includes provision for connecting an extension speaker.

This *Service Sheet* was prepared on a BC3850 model.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets, **A1** via small condenser **C1** and **A2** direct, to coupling condenser **C2**, S.W. coupling coil **L1**, M.W. and L.W. coupling condenser **C3** and thus to single-tuned circuits **L2** (S.W.), plus **L3** (M.W.), plus **L4** (L.W.), tuned by **C27**.

First valve (**V1, Osram X42**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L5** (S.W.), plus **L6** (M.W.), plus **L7** (L.W.), are tuned by **C28**; parallel trimming by **C29** (S.W.), **C30** (M.W.) and **C7, C31** (L.W.); series tracking by **C8** (S.W.), **C6, C33** (M.W.) and **C32** (L.W.). Anode reaction by coil **L8** (S.W.) and condenser **C9** (M.W. and L.W.).

Second valve, a variable-mu R.F. pentode (**V2, Osram W42**), operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C34, L9, L10, C35** and **C36, L11, L12, C37**.

Intermediate frequency 456KC/S.

Diode second detector is part of double diode triode valve (**V3, Osram DH42**). Audio frequency component in rectified output is developed across load resistance **R13** and passed via A.F. coupling condenser **C14** and manual volume control **R12** to C.G. of triode section. I.F. filtering by **R11, C15** and **C16.**

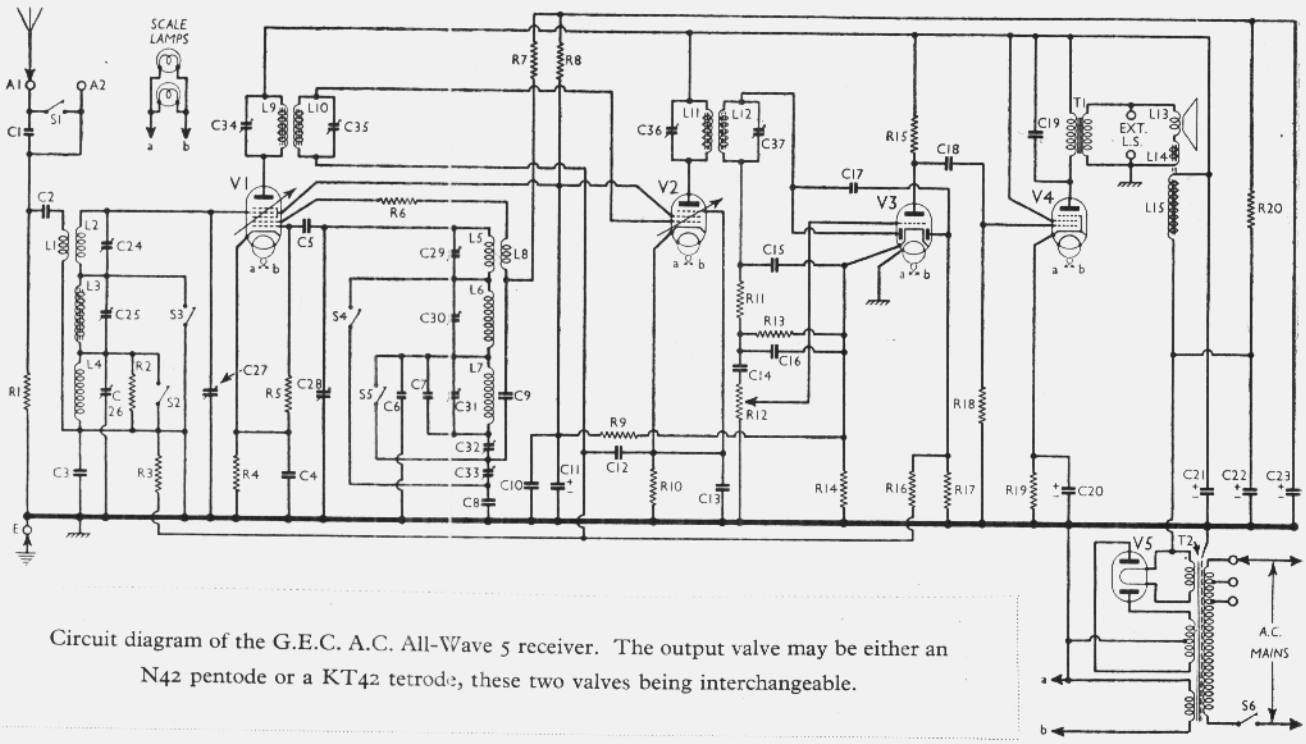
Second diode of **V3,** fed from **L12** via **C17,** provides D.C. potential which is developed across load resistance **R17** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves (I.F. valve only on S.W.), giving automatic volume control. Delay voltage obtained by drop across **V3** bias resistance **R14.**

Resistance-capacity coupling by **R15, C18** and **R18** between **V3** triode and pentode or tetrode output valve (**V4, Osram N42** or **KT42**). Fixed tone correction in anode circuit by condenser **C19.** Provision for connection of low impedance external speaker across secondary of output transformer **T1.**

H.T. current is supplied by full-wave rectifying valve (**V5, Osram U12**). Smoothing by speaker field **L15** and three dry electrolytic condensers **C21, C22** and **C23.**

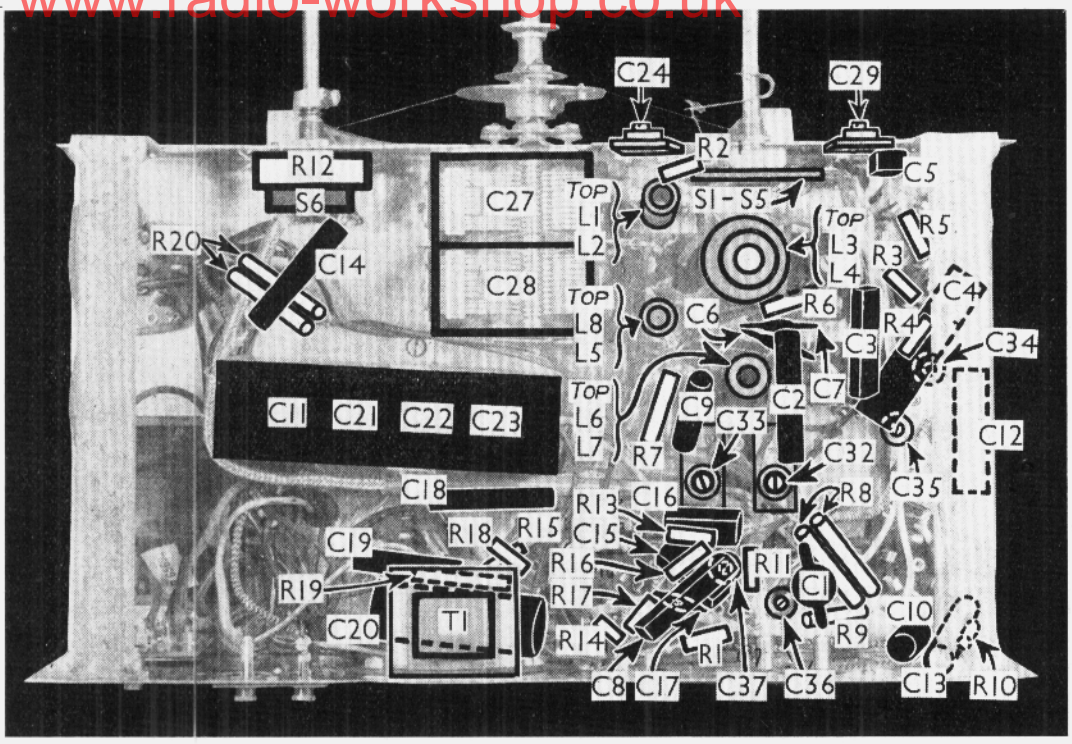
COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	A1 socket series condenser ..	0·00002
C2	Aerial coupling condenser ..	0·005
C3	M.W. and L.W. aerial coupling	0·003
C4	V1 cathode by-pass	0·1
C5	V1 osc. C.G. condenser ..	0·0001
C6	Osc. circuit M.W. fixed tracker	0·00002
C7	Osc. circuit L.W. fixed trimmer	0·00002
C8	Osc. circuit S.W. fixed tracker	0·004
C9	Osc. anode M.W. and L.W. coupling	0·005
C10	V1, V2 S.G.'s R.F. by-pass ..	0·05
C11*	V1, V2 S.G.'s decoupling ..	3·0
C12	V2 C.G. decoupling	0·05
C13	V2 cathode by-pass	0·1
C14	A.F. coupling to V3 triode ..	0·005
C15	I.F. by-passes ..	0·0003
C16		0·0001
C17	Coupling to V3 A.V.C. diode..	0·00002
C18	V3 triode to V4 A.F. coupling	0·02
C19	Fixed tone corrector	0·005
C20*	V4 cathode by-pass	35·0
C21*	H.T. smoothing ..	7·0
C22*		7·0
C23*		7·0
C24‡	Aerial circuit S.W. trimmer ..	—
C25‡	Aerial circuit M.W. trimmer ..	—
C26‡	Aerial circuit L.W. trimmer ..	—
C27†	Aerial circuit tuning	—
C28†	Oscillator circuit tuning ..	—



Circuit diagram of the G.E.C. A.C. All-Wave 5 receiver. The output valve may be either an N42 pentode or a KT42 tetrode, these two valves being interchangeable.

Under-chassis view. The I.F. trimmers, **C34-C37**, are beneath their respective coil units. Resistances **R8** and **R20** each consist of two resistors in parallel. A diagram of the **S1-S5** switch unit is on page VIII.



CONDENSERS (*Continued*)		Values (μF)
C29‡	Osc. circuit S.W. trimmer ..	—
C30‡	Osc. circuit M.W. trimmer ..	—
C31‡	Osc. circuit L.W. trimmer ..	—
C32‡	Osc. circuit L.W. tracker ..	—
C33‡	Osc. circuit M.W. tracker ..	—
C34‡	1st I.F. trans. pri. tuning ..	—
C35‡	1st I.F. trans. sec. tuning ..	—
C36‡	2nd I.F. trans. pri. tuning ..	—
C37‡	2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

RESISTANCES		Values (ohms)
R1	Aerial circuit shunt	9,900
R2	Aerial L.W. coil damping ..	440,000
R3	V1 hex. C.G. decoupling ..	440,000
R4	V1 fixed G.B. resistance ..	300
R5	V1 osc. C.G. resistance ..	99,000
R6	V1 osc. anode circuit stabiliser	150
R7	V1 osc. anode H.T. feed ..	9,900
R8	V1, V2 S.G.'s H.T. potential divider	11,000*
R9		15,000
R10	V2 fixed G.B. resistance ..	400
R11	I.F. stopper	55,000
R12	Manual volume control ..	1,000,000
R13	V3 signal diode load	440,000
R14	V3 G.B. resistance	400
R15	V3 triode anode load	220,000
R16	A.V.C. line decoupling ..	440,000
R17	V3 A.V.C. diode load ..	440,000
R18	V4 C.G. resistance	440,000
R19	V4 G.B. resistance	400
R20	V1 osc. anode and V1, V2 S.G. H.T. feed	11,000*

* Two 22,000 Ω resistances connected in parallel.

OTHER COMPONENTS			Approx. Values (ohms)
L1	Aerial S.W. coupling coil ..		0·035
L2	Aerial S.W. tuning coil ..		0·2
L3	Aerial M.W. tuning coil ..		2·25
L4	Aerial L.W. tuning coil ..		17·5
L5	Oscillator S.W. tuning coil ..		0·05
L6	Oscillator M.W. tuning coil ..		2·8
L7	Oscillator L.W. tuning coil ..		14·4
L8	Osc. anode S.W. reaction ..		0·5
L9	1st I.F. trans.	Pri. ..	8·0
L10		Sec. ..	8·0
L11	2nd I.F. trans.	Pri. ..	4·5
L12		Sec. ..	4·5
L13	Speaker speech coil		2·1
L14	Hum neutralising coil. . ..		0·04
L15	Speaker field coil		1,250·0
T1	Output trans.	Pri. ..	850·0
		Sec. ..	0·32
T2	Mains trans.	Pri., total ..	41·5
		Heater sec. ..	0·075
		Rect. heat. sec. ..	0·13
		H.T. sec., total ..	580·0
S1-S5	Waveband switches ..		—
S6	Mains switch, ganged R12 ..		—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three control knobs (pull off) and the wooden strip across the back of the cabinet (two round-head screws). Now remove the two round-head wood screws holding the scale assembly to the top of the cabinet and the four bolts (with washers and rubber washers) holding the chassis to the bottom of the cabinet.

The chassis may now be withdrawn to the extent of the speaker leads, which should be sufficient for normal purposes. *When replacing*, do not forget to replace the rubber washers between the chassis and the bottom of the cabinet.

To free the chassis entirely, unsolder the speaker leads, and *when replacing*, connect them as follows, numbering the tags on the speaker terminal panel from left to right :—1, white/red ; 2, black and black lead to speaker frame ; 3, no external connection ; 4, white ; 5, red.

Removing Speaker.—Remove the four screws (with washers and spring washers) holding the sub-baffle to the front of the cabinet. To remove the speaker from the sub-baffle, remove the nuts, spring washers and washers from the four screws holding it to the sub-baffle. The nuts may be removed more easily by first heating the screws with a soldering iron to soften the sealing compound. *When replacing*, see that the chamfered edge of the sub-baffle and the terminal panel on the speaker are at the top.

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X42*	270	2·4	75	3·0
V2 W42	270	4·8	75	1·3
V3 DH42	115	0·5	—	—
V4 N42	245	29·0	270	4·3
V5 U12	310†	—	—	—

* Oscillator anode (G2) 130 V, 3·5 mA.
† Each anode, A.C.

Valve voltages and currents given in the table above are those measured in our receiver when it was operating on mains of 235 V, using the 230-250 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the

Continued overleaf

G.E.C.—*Continued*

volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

If, as in our case, **V2** should become unstable when measurements are being made in its anode and screen circuits, it can be stabilised by connecting a non-inductive condenser of about 0·1 μF from the grid (top cap) to chassis.

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, in a single rotary unit beneath the chassis, which is indicated in our under-chassis view. It is shown in detail in the diagram in col. 2, where it is seen looking from the rear of the underside of the chassis.

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

Switch	S.W.	M.W.	L.W.
S1	—	—	C
S2	C	C	—
S3	C	—	—
S4	C	—	—
S5	C	C	—

S6 is the Q.M.B. mains switch, ganged with the volume control **R12.**

Coils.—**L1, L2**; **L3, L4**; **L5, L8** and **L6, L7** are in four unscreened units beneath the chassis, wound on tubular formers, and shown in our under-chassis view. In the **L1, L2** and **L5, L8** units the thick wire windings are **L2** and **L5.**

The I.F. transformers **L9, L10** and **L11, L12** are in two screened units on the chassis deck. Note that the trimmers are not at the tops of the cans, but beneath them, and are adjustable from the underside of the chassis.

Scale Lamps.—These are two Osram M.E.S. types, with tubular bulbs, rated at 6·2 V, 0.3 A.

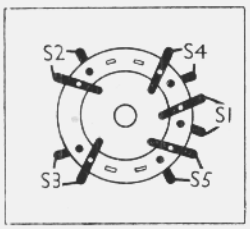
External Speaker.—Two terminals are provided at the rear of the chassis for a low impedance (2-4 Ω) external speaker.

Condensers C11, C21, C22, C23.—These are four dry electrolytics in a single carton beneath the chassis. The black lead is the common negative, and the yellow the positive of **C11** (3μF). The red lead next to the yellow is the positive of **C23** (7μF), the middle red lead the positive of **C22** (7μF), and the lowest red lead (nearest chassis deck) is the positive of **C21** (7μF).

Resistances R8, R20.—These each consist of two 22,000 Ω resistors connected in parallel to give a value of 11,000 Ω.

V2 Suppressor.—This is shown by the makers as being connected to chassis, but in our case it goes to cathode of **V2.**

Model BC3850L.—In the case of the low voltage model the primary of **T2** has a resistance of 26·4 Ω total, not 41·5 Ω as in the standard model.



Switch diagram, looking from the rear of the underside of the chassis.

Trimmers.—The trimmers for the I.F. transformers are reached from the underside of the chassis, and are beneath their respective coil units. The S.W. trimmers **C24** and **C29** are reached from the front of the chassis. The remaining six trimmers and trackers are adjustable through holes in the chassis deck, and are shown in our plan chassis view.

Wiring Code.—The receiver is wired in accordance with the colour code given in detail on page 1 of *Radio Maintenance* dated September 11, 1937.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W. and turn gang to maximum. Turn volume control to maximum. Short-circuit **C28** by connecting stator to chassis. Connect signal generator via a 0·1 μF condenser to grid (top cap) of **V1** (leaving existing connection attached) and chassis.

Feed in a 456 KC/S signal, and adjust **C34, C35, C36** and **C37** in turn for maximum output, reducing input signal strength progressively.

R.F. and Oscillator Stages.—S.W.—Check that scale is central in clips, and that pointer is straight and coincides with horizontal lines on scale when gang is at maximum.

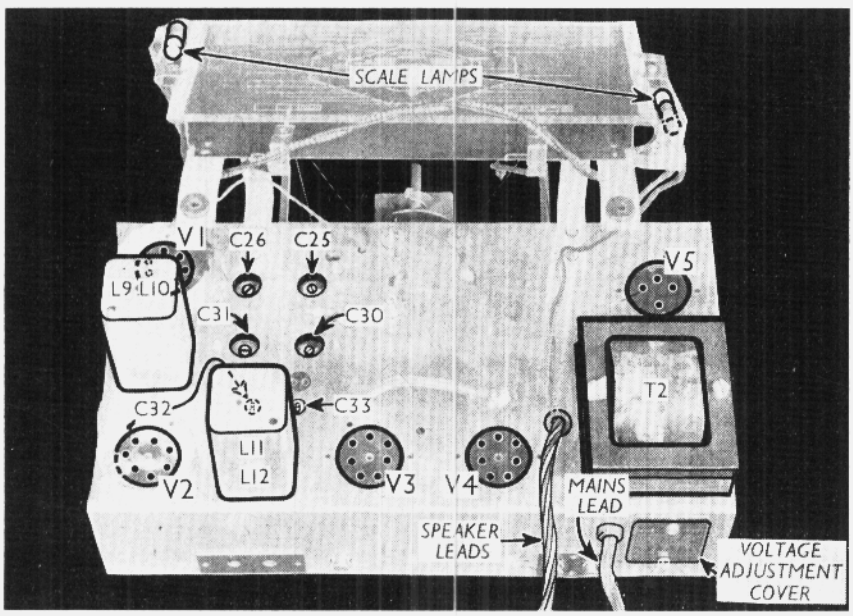
Connect signal generator via dummy aerial to **A2** socket and **E,** and feed in a 17 MC/S (17·6 m.) signal. Switch set to S.W., tune to 17·6 m. on scale and adjust **C29,** then **C24,** for maximum output. It is essential that **C29** should be adjusted to the lower capacity peak (higher frequency). If "pulling" is experienced when adjusting **C24,** rock the gang slightly to compensate for this.

M.W.—Switch set to M.W., tune to 200 m. on scale, feed in a 1,500 KC/S (200 m.) signal and adjust **C30** for maximum output, using lower capacity peak. Tune to 214 m. on scale, feed in a 1,400 KC/S (214 m.) signal and adjust **C25** for maximum output.

Disconnect **C28,** by unsoldering the lead to the stator, and connect an external variable condenser between the disconnected lead and chassis. Feed in a 600 KC/S (500 m.) signal, and adjust the external variable condenser and the receiver tuning control simultaneously for maximum output. Disconnect external condenser, re-connect **C28,** and *without altering tuning control setting,* adjust **C33** for maximum output. Repeat the 214 m. adjustments.

L.W.—Switch set to L.W., tune to 1,000 m. on scale, feed in a 300 KC/S (1,000 m.) signal, and adjust **C31** and **C26** in that order for maximum output.

Disconnect **C28** as before and connect external variable condenser. Feed in a 165 KC/S (1,818 m.) signal, and adjust external condenser and tuning control simultaneously for maximum output. Disconnect external condenser, re-connect **C28,** and, *without altering tuning control setting,* adjust **C32** for maximum output. Repeat the 1,000 m. adjustments.



View looking down on the chassis deck. Note the six trimmers and trackers. **C32** is behind the I.F. transformer unit, not inside it.

CORRECTIONS

IN the brief description of the Radiometers UVET valve tester published in the Service Equipment Buyers' Guide on page 120 of *The Trader* last week, it was inadvertently stated that the instrument gave an emission reading with strapped electrodes.

This is not correct, the valve under test operating under normal conditions, with correct voltages on all electrodes.

* * *

Under the heading of replacement valve suppliers on page 127 of *The Trader* last week we should have included the name of U.S. Radio, Ltd., 138 Southwark Street, S.E.1, who distribute American Arcturus valves in this country.

Printed in Great Britain as a supplement to *The Wireless & Electrical Trader* for the proprietors and publishers, *The Trader Publishing Co., Ltd.*, Dorset House, Stamford Street, London, S.E.1, by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9. Every Saturday.