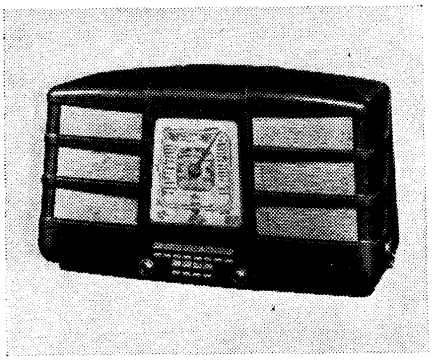
Supplement to The Wireless & Electrical Trader, June 3, 1939

"TRADER" SERVICE SHEET

407

G.E.C. BC4050

BC4054 AND BC4058



The G.E.C. BC4050 table receiver.

PRESS-BUTTON tuning of the mechanical type for eight stations, and press-button wavechange and off switching, are incorporated in the G.E.C. BC4050 4-valve (plus rectifier) AC 3-band superhet. It is suitable for 190-250 V, 40-100 C/S mains, has a short-wave range of 16·5-50 m, and provision for a pick-up and extension speaker.

An identical chassis is fitted in the BC4054 console, and a slightly modified one in the BC4058 radiogram, the differences being explained under "Radiogram Modifications."

The BC4050L, BC4054L and BC4058L are the corresponding low-voltage models, which are for mains of 110-130 V and 210-230 V. The differences in these models are given at the end of "General Notes."

Both radiograms are for 40-60 C/S mains only.

This *Service Sheet* was prepared on a BC4050.

Release date : BC4050, March, 1939.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets, **A1** via small series condenser **C1** on SW and MW only, and **A2** direct, to coupling condensers **C2, C3** and coupling coils **L1** (SW), **L2** (MW) and **L3** (LW) to single-tuned circuits comprising coils **L4** (SW), plus **L5** (MW), plus **L6** (LW) tuned by **C40.**

First valve (**V1, Osram X41**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L7** (SW), plus **L8** (MW), plus **L9** (LW) are tuned by **C41**; parallel trimming by **C42** (SW), **C43** (MW) and **C9, C44** (LW); series tracking by **C11** (SW), **C10, C46** (MW) and **C45** (LW). Reaction by direct coupling via **C12** on MW and LW, and **L10** (SW).

Second valve (**V2, Osram KTW61**) is a variable-mu RF tetrode operating as intermediate frequency amplifier, with tuned-primary tuned-secondary iron-cored transformer couplings **C47, L11, L12, C48** and **C49, L13, L14, C50.**

Intermediate frequency 456 KC/S.

Diode second detector is part of double diode triode valve (**V3, Osram DH63**). Audio frequency component in rectifier output is developed across load resistances **R16** and **R17,** that across **R17** being passed via AF coupling condenser **C20,** manual volume control **R19,** further coupling condenser **C21** and CG resistance **R20** to CG of triode section, which operates as AF amplifier. IF filtering by **C16, R15, C17** in diode circuit and **C26** in triode anode circuit. Tone correction by **C19, R18, C25.** Provision for gramophone pick-up across **R19.**

Second diode of **V3,** fed from **V2** anode via **C24,** provides DC potential which is developed across load resistance **R25** and fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control. Delay voltage is obtained from drop along resistances **R21, R22** in cathode circuit on MW and LW, while on SW, when **S6** closes, it is obtained from the drop across **R21** alone.

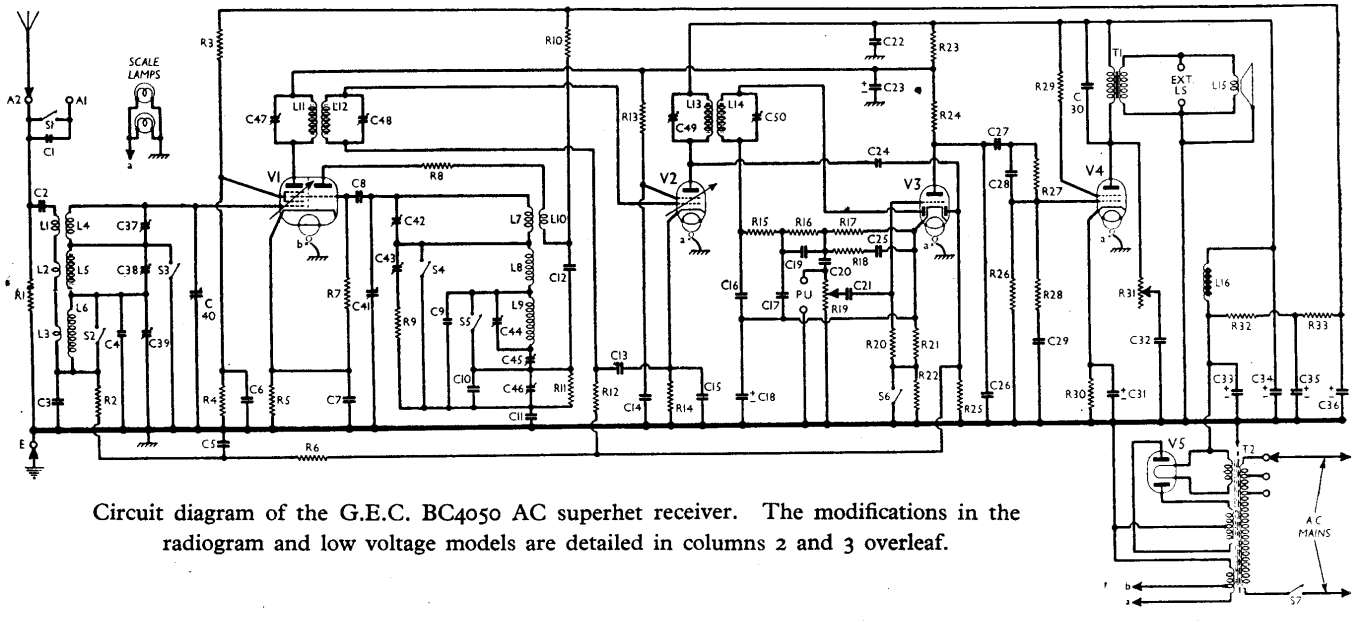
Resistance-capacity coupling by **R24, C27** and **R26** between **V3** triode section and tetrode output valve (**V4, Osram KT61**). Fixed tone correction by filter circuit **C28, R27, R28** and **C29** in grid circuit and **C30** in anode circuit. Variable tone control by **R31, C32** in anode circuit. Provision for connection of low impedance external speaker across secondary of output transformer **T1.**

HT current is supplied by full-wave rectifying valve (**V5, Osram U50**). Smoothing by iron-cored choke **L16** and dry electrolytic condensers **C33, C34, C35** and **C36.**

DISMANTLING THE SET

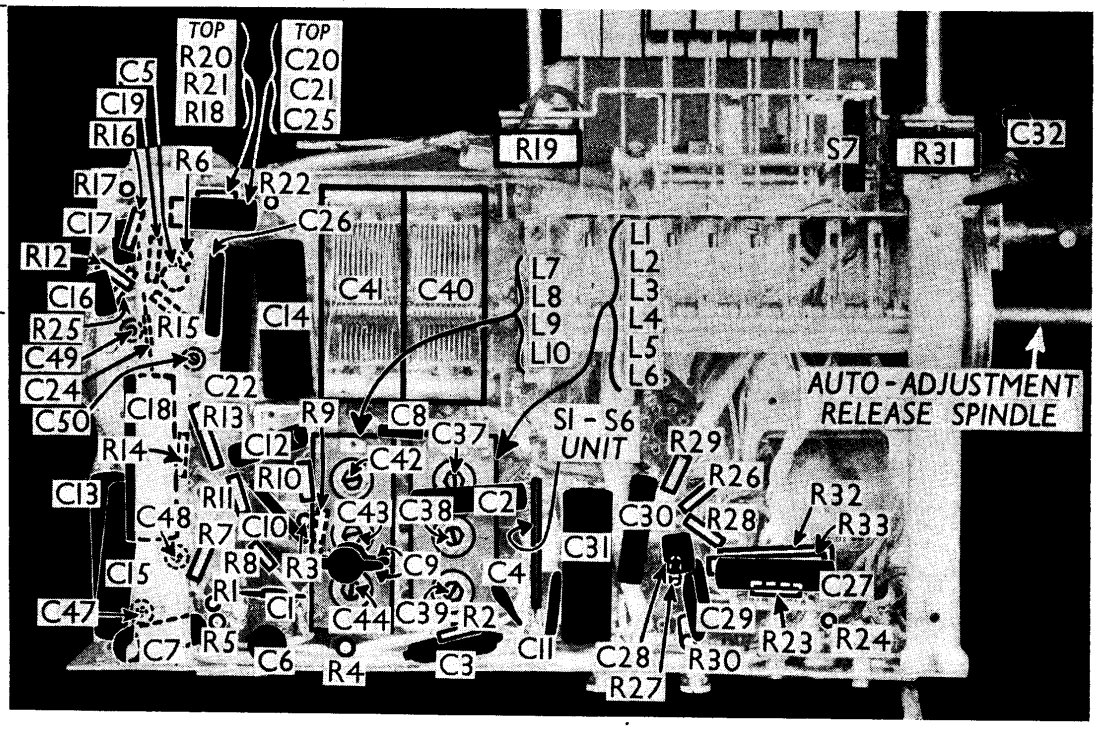
Removing Chassis.—The cabinet is fitted with a detachable bottom, upon removal of which (eight counter-sunk head wood screws) access may be gained to some of the components beneath the chassis. The chassis itself is mounted on three wooden battens : a long one which runs right across the rear of the cabinet, and two short ones, which are interchangeable, at the front. The sub-baffle, which carries the scale assembly, scale lamps and the speaker, is mounted on brackets fixed to the two front battens.

To remove the chassis, remove the three control knobs, the six cheese-head bolts (with washers and lock-washers) holding the battens to the lower edges



Circuit diagram of the G.E.C. BC4050 AC superhet receiver. The modifications in the radiogram and low voltage models are detailed in columns 2 and 3 overleaf.

BVWS Trader Sheet CD-Rom



Under - chassis view. The positions of the tuning coils are approximately beneath their respective trimmers in the two tuning units.

of the cabinet, and the three cheese-head bolts (with large square washers and lock-washers) holding the sub-baffle to the front of the cabinet, when the whole assembly can be withdrawn in one unit from the cabinet. To reach the components beneath the chassis, it is still necessary to remove the detachable bottom, which is screwed to the three battens referred to above.

To gain full access to the components beneath the chassis, it is necessary to remove the three battens. First remove the scale pointer by unscrewing its threaded spindle from the hexagon boss into which it is screwed, and the brass wood screw (with brass washer) holding the pointer drive bracket to the back of the sub-baffle, then unsolder the speaker leads and slip the scale lamps from their brackets. Now remove the four chassis bolts (with large metal and rubber washers) holding the battens to the cross-members beneath the chassis, when the rear batten, and the sub-baffle with the front battens and speaker attached to it, can be separated from the chassis.

When replacing, see that two large rubber washers are fitted to each of the four chassis bolts, one going on either side of the batten, and connect the white speaker lead to the right-hand tag on the speaker, and the black lead to the left-hand tag, and to the earthing tag on the speaker frame.

Removing Speaker.—Unsolder the two leads from the connecting panel and remove the four cheese-head bolts (with washers and lock-washers) holding it to the sub-baffle. *When replacing*, the connecting panel should be at the top and the leads connected as outlined above.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial circuit shunt	9,900
R2	V1 hexode CG decoupling	99,000
R3	V1 SG HT feed potential divider resistances	6,600
R4		15,000
R5	V1 fixed GB resistance	200
R6	AVC line decoupling	2,000,000
R7	V1 osc. CG resistance	99,000
R8	V1 osc. anode stabiliser	300
R9	Osc. circuit MW and LW damping	75
R10	V1 osc. anode HT feed	8,800
R11	Part V1 osc. anode coupling	5,500
R12	V2 CG decoupling	2,000,000
R13	V2 SG HT feed resistance	77,000
R14	V2 fixed GB resistance	300
R15	IF stopper	55,000
R16	V3 signal diode load resistances	330,000
R17		150,000
R18	Part of fixed tone corrector	99,000
R19	Manual volume control	1,000,000
R20	V3 triode CG resistance	2,000,000
R21	V3 triode GB and AVC delay resistances	3,300
R22		44,000
R23	V3 triode anode decoupling	6,600
R24	V3 triode anode load	220,000
R25	AVC diode load	440,000
R26	V4 CG resistance	330,000
R27	Parts of tone correcting circuit	220,000
R28		150,000
R29	V4 SG stabiliser	75
R30	V4 GB resistance	90
R31	Variable tone control	55,000
R32	V1 osc. anode and SG HT feed resistances	7,700
R33		7,700

	CONDENSERS	Values (μF)
C1	A1 series condenser	0·00002
C2	Aerial coupling condensers	0·005
C3		0·003
C4	Aerial circ. LW fixed trimmer	0·00002
C5	AVC line decoupling	0·005
C6	V1 SG decoupling	0·05
C7	V1 cathode by-pass	0·1
C8	V1 osc. CG condenser	0·0001
C9	Osc. circuit LW fixed trimmer	0·00004§
C10	Osc. circuit MW fixed tracker	0·0001
C11	Osc. circuit SW tracker	0·00395
C12	V1 osc. anode coupling	0·005
C13	V2 CG decoupling	0·1
C14	V2 SG decoupling	0·1
C15	V2 cathode by-pass	0·1
C16	IF by-pass condensers	0·0003
C17		0·0001
C18*	V3 cathode by-pass	30·0
C19	Part of fixed tone corrector	0·0002
C20	AF coupling condensers to V3 triode	0·02
C21		0·01
C22	HT circuit RF by-pass	0·05
C23*	V1, V3 anodes and V2 SG decoupling	3·0
C24	Coupling to V3 AVC diode	0·00002
C25	Part of fixed tone corrector	0·01
C26	V3 triode anode IF by-pass	0·001
C27	V3 triode to V4 AF coupling	0·02
C28	Parts of tone correcting circuit	0·0005
C29		0·0015
C30	Fixed tone corrector	0·005
C31*	V4 cathode by-pass	30·0
C32	Part of variable tone control	0·05

	CONDENSERS (*Continued*)	Values (μF)
C33*	HT smoothing condensers	14·0
C34*		7·0
C35*		7·0
C36*		3·0
C37‡	Aerial circuit SW trimmer	—
C38‡	Aerial circuit MW trimmer	—
C39‡	Aerial circuit LW trimmer	—
C40†	Aerial circuit tuning	—
C41†	Oscillator circuit tuning	—
C42‡	Osc. circuit SW trimmer	—
C43‡	Osc. circuit MW trimmer	—
C44‡	Osc. circuit LW trimmer	—
C45‡	Osc. circuit LW tracker	—
C46‡	Osc. circuit MW tracker	—
C47‡	1st IF trans. pri. tuning	—
C48‡	1st IF trans. sec. tuning	—
C49‡	2nd IF trans. pri. tuning	—
C50‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set
§ Made up of two in parallel.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW coupling coil	0·3
L2	Aerial MW small coupling coil	Very low
L3	Aerial LW small coupling coil	Very low
L4	Aerial SW tuning coil	0·08
L5	Aerial MW tuning coil	2·0
L6	Aerial LW tuning coil	22·0
L7	Osc. circuit SW tuning coil	0·07
L8	Osc. circuit MW tuning coil	2·7
L9	Osc. circuit LW tuning coil	8·0
L10	Oscillator SW reaction	0·4
L11	1st IF trans. Pri.	7·0
L12	1st IF trans. Sec.	7·0
L13	2nd IF trans. Pri.	4·0
L14	2nd IF trans. Sec.	4·0
L15	Speaker speech coil	2·0
L16	HT smoothing choke	650·0
T1	Output trans. Pri.	450·0
	Output trans. Sec.	0·4
T2	Mains trans. Pri., total	32·6
	Mains trans. Heater sec., total	0·15
	Mains trans. Rect. heat. sec.	0·19
	Mains trans. HT sec., total	375·0
S1-S6	Waveband switches	—
S7	Mains switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table overleaf are those measured in our receiver when it was operating on mains of 228 V, using the 210-230 V tapping on the mains transformer. The

BVWS Trader Sheet CD-Rom

407 G.E.C. BC4050, BC4054 AND BC4058

Supplement to The Wireless & Electrical Trader, June 3, 1939

receiver was tuned to the lowest wavelength on the MW band and the 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.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X41	233 (Oscillator)	2·9	80	3·3
	100	3·3		
V2 KTW61	270	7·8	60	2·2
V3 DH63	90	0·5	—	—
V4 KT61	250	41·0	270	8·2
V5 U50	310†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S6** are the waveband switches, in a single rotary unit beneath the chassis, operated through a link by three of the four press-buttons in the lower row. It is indicated in our underchassis view, and shown in detail in the diagram in col. 3. The table (col. 2) gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the spindle. A dash indicates *open*, and **C**, *closed*.

S7 is the QMB mains switch, operated by the fourth press-button of the lower row. **S7** opens when its button is pressed, but closes when any of the waveband buttons is pressed.

Coils.—**L1-L6** and **L7-L10** are in two unscreened units beneath the chassis.

The IF transformers **L11, L12** and **L13, L14** are in two screened units on the chassis deck, their trimmers being at their bases, and adjustable from beneath the chassis. **L16** is the smoothing choke, mounted on the chassis deck.

Scale Lamps.—These are two Osram MES types, with 10 mm diameter bulbs, rated at 6·5 V, 0·3 A.

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

Condensers C23, C34, C35, C36.—These are four dry electrolytics (450 V peak) in a single tubular metal-cased unit on the chassis deck, having a common negative (black) lead. The yellow lead to **R23, R24** is the positive of **C23** (3μF); the yellow lead to **R33** is the positive of **C36** (3μF); the red lead to **R23** is the positive of **C34** (7μF); the red lead to **R32** is the positive of **C35** (7μF).

Condenser C33.—This 14 μF dry electrolytic is in a separate metal-cased tubular unit on the chassis deck.

Condenser C9.—This fixed trimmer comprises two 0·00002 μF types in parallel.

T2 Heater Secondary.—Note that this gives 6·3 V from **a** to chassis for the heaters of **V2-V4**, and 4 V from tapping **b** to chassis for the heater of **V1**.

Models BC4050L, 4054L and **4058L.**—The only difference in the low voltage models is in the mains transformer primary winding, which has a resistance of 26·3 O total, instead of 32·6 O.

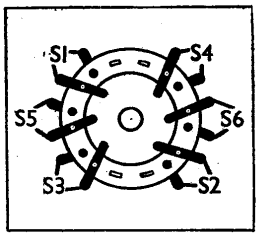
RADIOGRAM MODIFICATIONS

In the 4058 models, the pick-up is connected permanently, one side to chassis and the other via a 22,000 O resistance to the top pick-up terminal. A 33,000 O resistor is connected from the top pick-up terminal to chassis.

TABLE AND DIAGRAM OF THE SWITCH UNIT

Switch	LW	SW	MW
S1	C	—	—
S2	—	C	C
S3	—	C	—
S4	—	C	—
S5	—	C	C
S6	—	C	—

Diagram of the **S1-S6** switch unit seen from one end of the underside of the chassis.



The " off " button becomes the radiogram control, which switches **V2** screen to chassis, and alters the range switch to SW.

The volume control **R19** is moved to a new position and combined with the QMB on-off switch **S7**, while a 2-position bass control occupies the position of the volume control shown in our illustrations.

AUTO-TUNING UNIT

The mechanical automatic tuning unit incorporated in this receiver is of the type which converts a direct movement of the press-button into a rotary movement of the gang condenser by means of internally toothed forks and toothed wheels.

A full description of the construction and action, with illustrations, was given in *Radio Maintenance* for May 28, 1938, and in the *ABC of Automatic Tuning* on pages 3 and 4.

Each press-button can be set to tune to any point on the scale in the following manner. Operate the manual tuning control until the pointer is fully anti-clockwise. With a screwdriver, slacken the locking screw (at the side of the cabinet near the tuning control) by one complete turn. Switch the receiver to the correct waveband, and tune in the required station manually. Holding the manual control fully "in," depress the required button to its fullest extent, without jarring, and without allowing the manual control to move. Release the button, and also the manual control. Proceed similarly for each new station required, then rotate the manual control until the pointer is fully clockwise, and tighten up the locking screw. Check the press-button settings.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to LW and turn gang to maximum. Turn volume control to maximum. Connect signal generator via a 0·1 μF condenser to grid (top cap) of **V1** and chassis. Leave existing top cap connection in place.

Feed in a 456 KC/S signal, and adjust **C47, C48, C49** and **C50** for maximum output.

RF and Oscillator Stages.—Check that the pointer is straight, and coincides with the mark at the end of the scale when the gang is at maximum. Connect signal generator via a suitable dummy aerial to the **A2** and earth sockets.

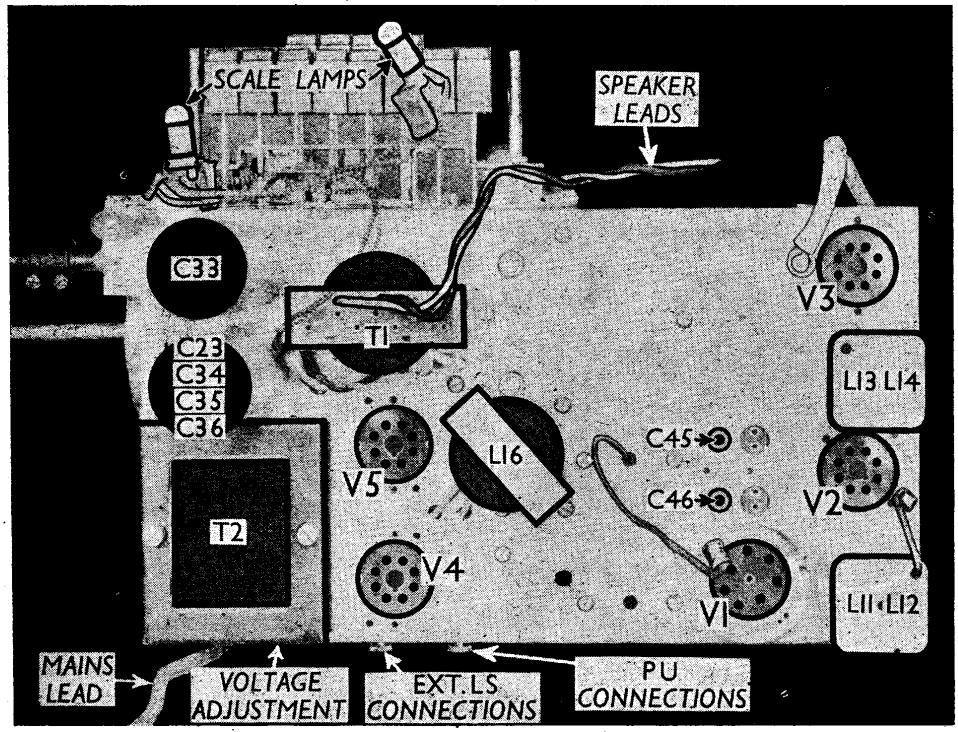
MW.—Switch set to MW, tune to 214 m on scale, feed in a 214 m (1,400 KC/S) signal, and adjust **C43,** then **C38,** for maximum output.

Disconnect **C41** by unsoldering the lead from its fixed plates, and connect an external variable condenser between the disconnected lead and chassis. Feed in a 500 m (500 KC/S) signal, and adjust external condenser and receiver tuning control together for maximum output. Disconnect external condenser and reconnect **C41.** Without altering tuning control setting, adjust **C46** for maximum output. Repeat the 214 m adjustments.

LW.—Switch set to LW, and tune to 1,000 m on scale. Feed in a 1,000 m (300 KC/S) signal, and adjust **C44,** then **C39,** for maximum output.

Disconnect **C41** as before, and connect external condenser. Feed in an 1,818 m (165 KC/S) signal, and adjust external condenser and receiver tuning control together for maximum output. Disconnect external condenser, re-connect **C41,** and without altering tuning control setting, adjust **C45** for maximum output. Repeat the 1,000 m adjustments.

SW.—Switch set to SW, tune to 16·7 m on scale, feed in a 16·7 m (18MC/S) signal (via a SW dummy aerial), and adjust **C42,** then **C37,** for maximum output. **C42** should be adjusted to the higher frequency peak (lower capacity). If "pulling" is experienced when **C37** is adjusted, rock the gang slightly to compensate for this.



Plan view of the chassis. The IF trimmer adjustments are reached from beneath the chassis.

Printed in Great Britain by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9.