"TRADER" SERVICE SHEET
925

G.E.C. BC5050/55

A.C. and A.C./D.C. Superhets

TWO 4-valve (plus rectifier) 3-band G.E.C. superhets are covered in this *Service Sheet* : the BC5050 which is designed to operate only from A.C. mains of 190-250 V, 40-100 c/s; and the BC5055, which operates from A.C. or D.C. mains of 200-250 V, 25-100 c/s. A low-voltage version of the A.C. model, the BC5050L, covers 100-240 V A.C. mains. The BC5054 and BC5054L are console versions of the BC5050 and BC5050L respectively. The waveband ranges are 16.5-50 m, 192-550 m, and 1,000-2,000 m.

Our circuit diagram is based on the A.C. model, but except for the mains input circuit, the H.T. feed and cathode circuit, and a few minor points elsewhere, the two models are similar. The differences in the A.C./D.C. model are indicated in our circuit diagram by broken lines. Except where it is obvious that these replace solid lines in the A.C. diagram, the circuit drawn in solid lines is applicable to both models.

Elsewhere, also, our information is based on the A.C. model, but unless some remark is made as to a difference it applies equally to the A.C./D.C. model.

Release dates and original prices: BC5050 and BC5050L, May 1949, £17 17*s.*; *BC5054 and BC5054L, July* 1949, £25 4*s.*; *BC5055, May* 1949, £18 7*s.* 6*d.* *Purchase tax extra.*

CIRCUIT DESCRIPTION

Aerial input is inductively coupled by **L1** (S.W.), and capacitatively "bottom" coupled by **C1** (M.W. and L.W.), to single-tuned circuits **L2, C29** (S.W.), **L3, C29** (M.W.) and **L3, L4, C29** (L.W.), which precede a triode hexode valve **(V1, Osram Metallized X61M)** operating as frequency changer with internal coupling. In the A.C./D.C. version isolating capacitors **C38, C39** and an R.F. choke **L14** are included in the aerial coupling circuit.

Triode oscillator grid coils **L5** (S.W.), **L6** (M.W.), and **L6, L7** (L.W.) are tuned by **C30.** Parallel trimming by **C31** (S.W.), **C32** (M.W.), and **C33** (L.W.), series tracking by **C9** (S.W.), **C8** (M.W.), and **C7, C8** (L.W.). Capacitative reaction coupling is provided by the common impedance of trackers **C8, C9** on all wavebands, with additional coupling by **L8** on S.W.

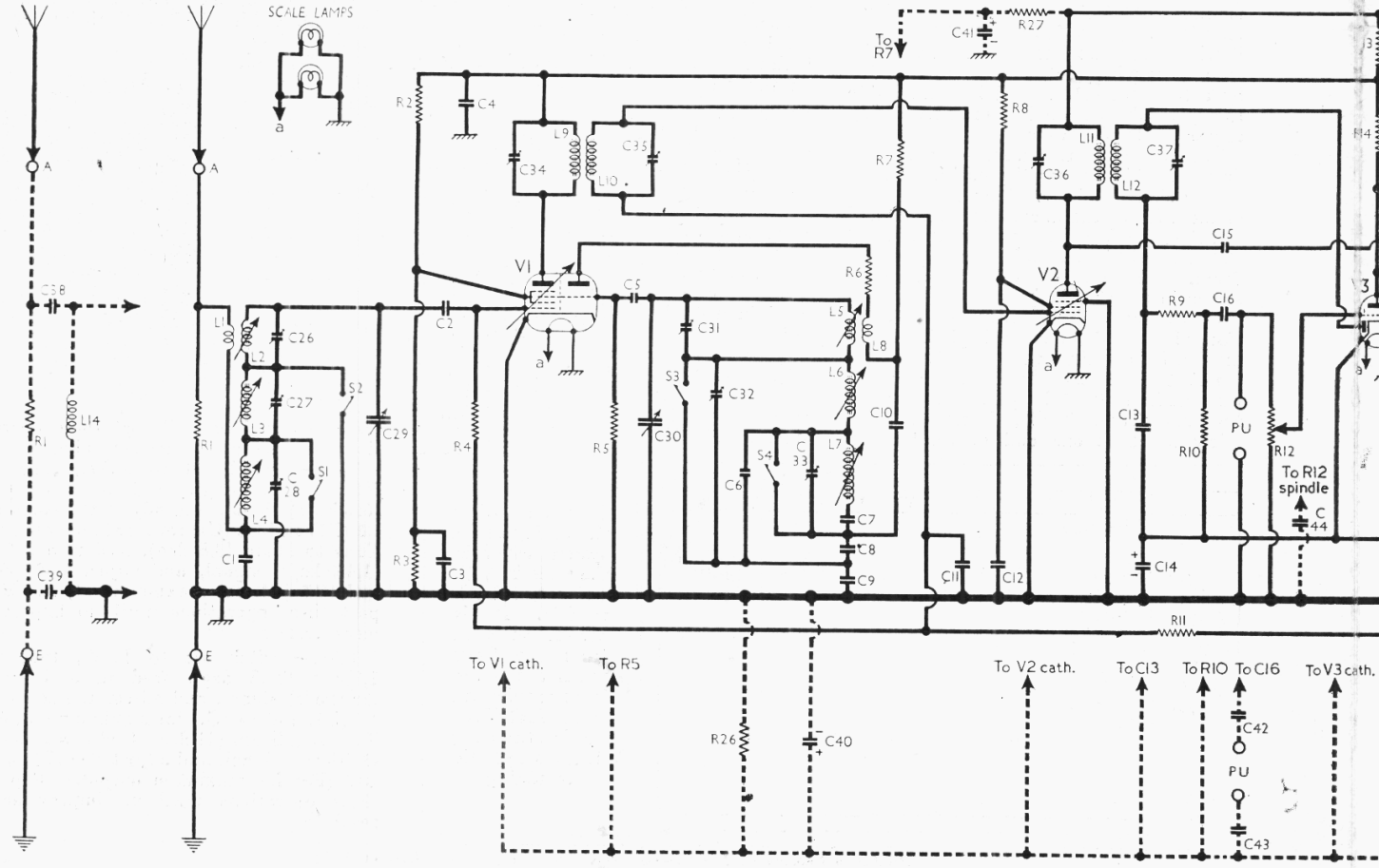
Second valve **(V2, Osram W61** or **KTW61)** is a variable-mu R.F. pentode operating as I.F. amplifier with tuned transformer couplings **C34, L9, L10, C35,** and **C36, L11, L12, C37.**

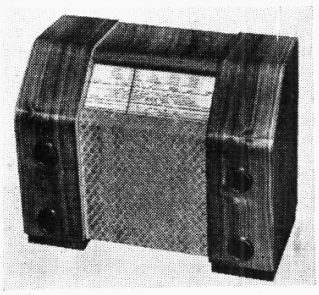
Intermediate Frequency 456 kc/s.

Diode second detector is part of double diode triode valve **(V3, Osram DH63).** Audio frequency component in rectified output is developed across load resistor **R10** and passed via A.F. coupling capacitor **C16** and manual volume control **R12** to grid of triode section, which operates as A.F. amplifier.

Second diode of **V3,** fed from **V2** anode via **C15,** provides D.C. potential which is developed across load resistor **R16** and fed back through decoupling circuit **R11, C11** as G.B. to F.C. and I.F. valves, giving automatic gain control.

Resistance-capacitance coupling by **R14, C19, R19,** via grid stopper **R20,** between **V3** triode and beam tetrode output valve **(V4, Osram KT61)** (or **KT33C** in A.C./D.C. version). **R17, C21** provide fixed treble "cut" on all wavebands; while bass attenuation on M.W. and L.W. only is introduced by **C20, R18.** Fixed tone correction in **V4** anode by **C23,** and variable tone correction by **C22, R21.**





The appearance of the table models

H.T. current is supplied by full-wave rectifying valve **(V5, Osram U50).** Smoothing by **R25** and electrolytic capacitors **C24, C25,** residual hum being neutralized by passing the receiver H.T. current through a portion of **T1** primary winding. H.T. circuit R.F. filtering by **C4.** Fixed G.B. for **V1, V2** and part of the A.G.C. delay voltage is developed across **R24** in the H.T. negative lead to chassis.

In the A.C./D.C. version, H.T. current is supplied by I.H.C. half-wave rectifying valve **(V5, Osram U31),** which with D.C. mains behaves as a low resistance, and the valve heaters, together with scale lamps, **Barretter type 304,** and mains R.F. filter chokes **L15, L16** are connected in series across mains input.

The rest of the circuit remains unchanged in the A.C./D.C. version, apart from the fact that **R7** is fed from **C25** via a decoupling circuit **C41, R27,** and that as **R24** is omitted, fixed G.B. for **V1, V2, V3** and the A.G.C. delay voltage is obtained from the drop across **R26** in the common cathode circuit of **V1, V2, V3,** to chassis. The scale assembly is "earthed" via **C44,** the connecting leads from **T1** to earth and to speaker chassis are omitted, and isolating capacitors **C42, C43** are included in the pick-up input leads.

VALVE ANALYSIS

Valve voltages and currents given in the tables below are those measured in our receivers when they were operating on A.C. mains of 230 V. The receivers were tuned to the lowest wavelength on the M.W. band, and the volume controls were at maximum, but there was no signal input.

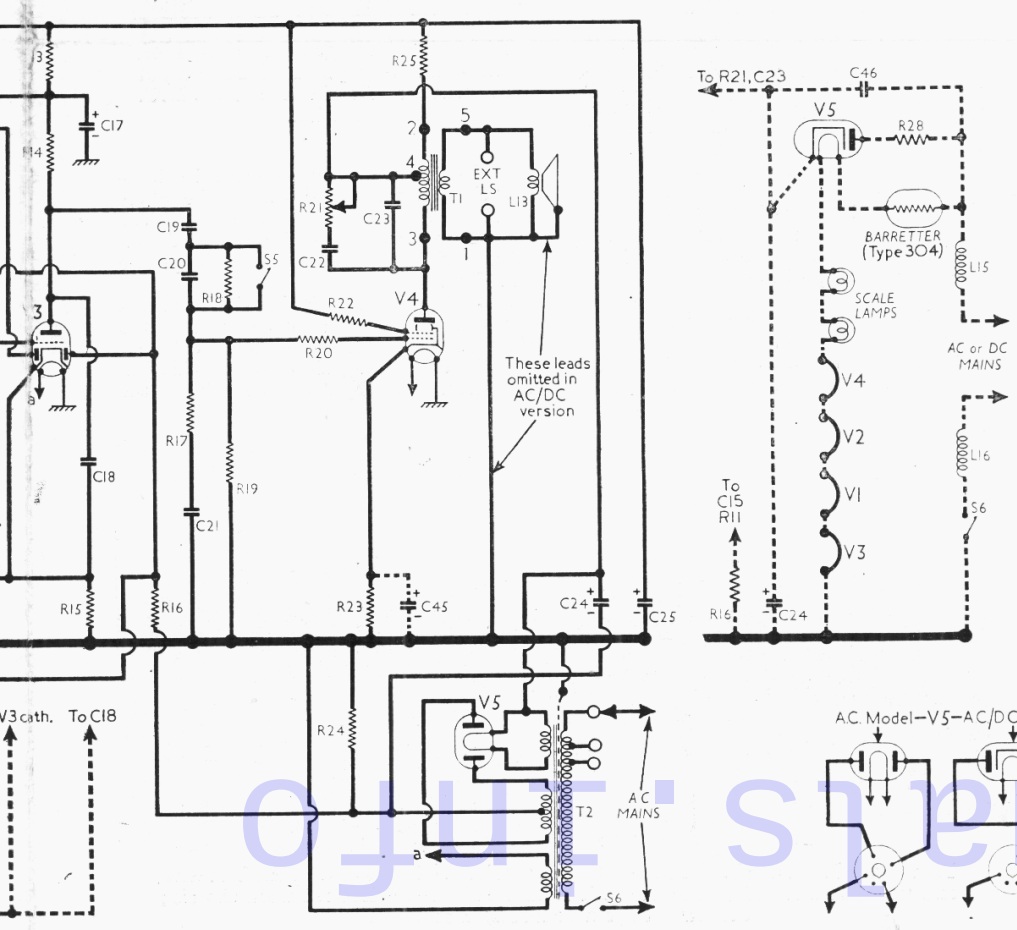
Voltages were measured on the 400 V scale of a model 7 Avometer, except where otherwise stated, chassis being the common negative connection.

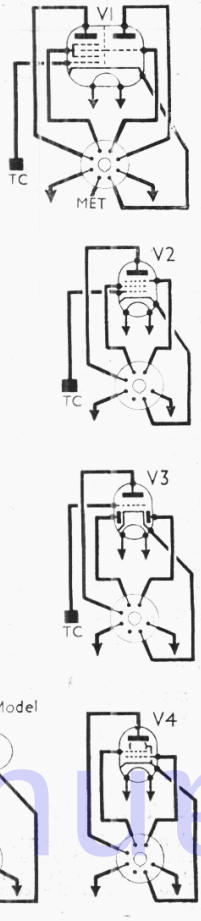
Valve	Anode (V)	Anode (mA)	Screen V	Screen mA	Cath. V
A.C. Model				—	
V1 X61M	146	2·4	64	2·6	—
	Oscillator				
	74	3·0			
V2 W61	201	4·7	53	1·7	—
V3 DH63	70	0·6	—	—	1·0§
V4 KT61	253	35·0	201	5·7	3·7§
V5 U50	265†	—	—	—	279
A.C./D.C. Model					
V1 X61M	106	1·3	50	1·9	1·3§
	Oscillator				
	87	3·4			
V2 W61	144	4·9	45	1·6	1·3§
V3 DH63	70	0·2	—	—	1·3§
V4 KT33C	185	56·0	144	8·1	7·4§
V5 U31	214†	—	—	—	196

† A.C. § 10V meter range.

COMPONENTS AND VALUES

Resistors	A.C. Values (ohms)	A.C. Locations	A.C./D.C. Values (ohms)	A.C./D.C. Locations
R1	10,000	F5	1,000,000	F5
R2	15,000	F5	15,000	F5
R3	22,000	E5	22,000	E5
R4	1,000,000	F5	1,000,000	F5
R5	100,000	E5	100,000	E5
R6	390	E5	390	E5
R7	22,000	F4	6,800	F4
R8	56,000	H5	39,000	H5
R9	56,000	H5	56,000	J5
R10	470,000	J5	470,000	J5
R11	1,000,000	H5	1,000,000	H5
R12	1,000,000	D1	1,000,000	D1
R13	4,700	K4	4,700	K4
R14	100,000	K5	100,000	J5
R15	2,200	J4	—	—
R16	470,000	J5	470,000	J5
R17	150,000	L4	150,000	L4
R18	680,000	L4	680,000	L4
R19	330,000	L4	330,000	L3
R20	10,000	K3	10,000	K3
R21	55,000	M3	55,000	M3
R22	100	K3	100	K3
R23	91	K4	—120	L5
R24	39	M3		—
R25	3,300	K4	2,200	K4
R26	—	—	100	F5
R27	—	—	6,800	J3
R28	—	—	180	L5





Circuit diagram of the G.E.C. 5050/55 series. The complete circuit of the A.C. model is drawn in solid lines, and where differences occur in the A.C./D.C. model they are indicated by broken lines. In the A.C./D.C. version, the aerial circuit is isolated from the chassis and **V1, V2** and **V3** have a common cathode line; the scale assembly, carrying the controls is isolated from chassis but coupled to it by **C44.** The numbers **1-5** on the output transformer are repeated in our under-chassis view overleaf.

Capacitors	A.C. Values (μF)	A.C. Locations	A.C./D.C. Values (μF)	A.C./D.C. Locations
C1	0·00395	G3	0·00395	G3
C2	0·0001	F4	0·0001	F4
C3	0·05	E5	0·05	E5
C4	0·05	H5	0·05	J4
C5	0·0001	E5	0·000047	E5
C6	0·000039	E3	0·000039	E3
C7	0·00027	E4	0·00027	E4
C8	0·00043	E4	0·00043	E4
C9	0·00395	F3	0·00395	F3
C10	0·005	E4	0·005	E4
C11	0·05	G5	0·05	G5
C12	0·05	H5	0·05	H5
C13	0·0003	J5	0·0003	J5
C14*	25·0	J4	—	—
C15	0·000022	H5	0·000022	H5
C16	0·02	J5	0·02	H5
C17*	4·0	H4	4·0	H4
C18	0·0005	J5	0·0005	J5
C19	0·02	K5	0·02	K5
C20	0·0002	K4	0·0002	K4
C21	0·0015	L4	0·0015	L4
C22	0·05	L3	0·1	L3
C23	0·002	J4	0·01	J3
C24*	16·0	L3	24·0	L3
C25*	20·0	H4	32·0	L5
C26‡	0·00003	F4	0·00003	F4
C27‡	0·00003	F4	0·00003	F4
C28‡	0·00008	F3	0·00008	F3
C29†	0·00045	D1	0·00045	D1
C30†	0·00045	D1	0·00045	D1
C31‡	0·00003	F4	0·00003	F4
C32‡	0·00003	F4	0·00003	F4
C33‡	0·00008	F3	0·00008	F3
C34‡	0·00013	D2	0·00013	D2
C35‡	0·00013	D2	0·00013	D2
C36‡	0·000425	C2	0·000425	C2
C37‡	0·000425	C2	0·000425	C2
C38	—	—	0·001	G5
C39	—	—	0·02	F5
C40*	—	—	25·0	J4
C41*	—	—	8·0	H3
C42	—	—	0·01	J5
C43	—	—	0·01	J5
C44	—	—	0·001	D1
C45*	—	—	25·0	J4
C46	—	—	0·01	L5

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Aerial S.W. coup.	Very low	G4
L2	Aerial tuning coils	Very low	G4
L3	Aerial tuning coils	2·0	G4
L4	Aerial tuning coils	15·0	G3
L5	Osc. tuning coils	0·1	E4
L6	Osc. tuning coils	2·3	E4
L7	Osc. tuning coils	6·0	E3
L8	Osc. S.W. react.	Very low	E4
L9	1st I.F. trans. Pri.	5·0	D2
L10	1st I.F. trans. Sec.	5·0	D2
L11	2nd I.F. trans. Pri.	3·5	C2
L12	2nd I.F. trans. Sec.	3·5	C2
L13	Speech coil	2·2	—
T1	Output trans. Pri., 3-4	510·0	J4
	Output trans. Pri., 4-2	17·5	J4
	Output trans. Sec.	0·4	J4
T2	Mains-trans. Pri., total	27·0	A2
	Mains-trans. Heat. sec., Rect. heat. sec.	0·2	A2
	Mains-trans. H.T. sec., total	295·0	A2
S1-S5	W/band switches	—	E3
S6	Mains sw., g'd R21	—	M3
	In A.C./D.C. Model Only	—	—
L14	Aerial shunt	48·0	F4
L15	Mains R.F. filter chokes	2·2	M4
L16	Mains R.F. filter chokes	2·2	M4
T1	Output Trans. Pri., 3-4	150·0	J4
	Output Trans. Pri., 4-2	15·2	J4
	Output Trans. Sec.	0·5	J4

DISMANTLING THE SET

The cabinet is fitted with a detachable bottom cover, held in place by four wood screws with plain washers, and removal of this cover permits access to be gained to most of the components beneath the chassis.

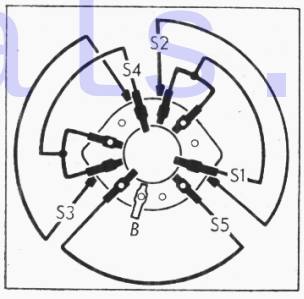


Diagram of the waveband switch unit, as seen when viewed from the rear of an inverted chassis.

Removing Chassis.—Pull off the four control knobs, unclip the scale lamps, and remove the two wood screws (with plain washers) securing the top corners of the scale backing plate to the top of the cabinet;
remove the four cheese-head screws (and plain washers) from the underside of the cabinet;
slide out the chassis, lifting the rear edge while doing so to enable the scale backing plate to clear the top of the cabinet, and withdraw the chassis to the extent of the speaker leads, which is sufficient for most purposes;
to free the chassis entirely, unsolder the speaker leads.

Removing Speaker.—Remove chassis as described above, withdraw the four cheese-head screws (with one spring and one plain washer each) securing the speaker to the sub-baffle, and lift the speaker out.

When replacing, the speech coil tags should be at the bottom, and the black speaker lead must be soldered to the left-hand tag which is also connected to the speaker chassis. The white lead goes to the right-hand tag.

GENERAL NOTES

Switches.—S1-S5 are the waveband switches, ganged in a single 3-position rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram above, where it is drawn as seen when viewed from the rear of an inverted chassis.

On L.W. (control knob fully anti-clockwise) all five switches are open; in the S.W. position (control knob fully clockwise) all switches are closed; in the M.W. (central position **S1** and **S4** only are closed.

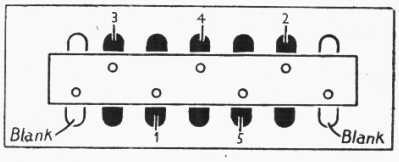
S6 is the Q.M.B. mains switch, ganged with the tone control **R21.**

Scale Lamps.—These are rated at 6.5 V, 0.3 A. They have small clear spherical bulbs and M.E.S. bases. The makers' type number for them is O.S.75, and they are the same in A.C. or A.C./D.C. versions.

Two terminals are provided at the rear of the A.C. chassis for the connection of a low impedance (about 2-4 Ω) external speaker. In the A.C./D.C. version sockets are provided instead of terminals, as in the case of the pick-up and **A** and **E** connections. In the A.C. versions the speech coil circuit is connected to chassis, but in the A.C./D.C. versions it is not.

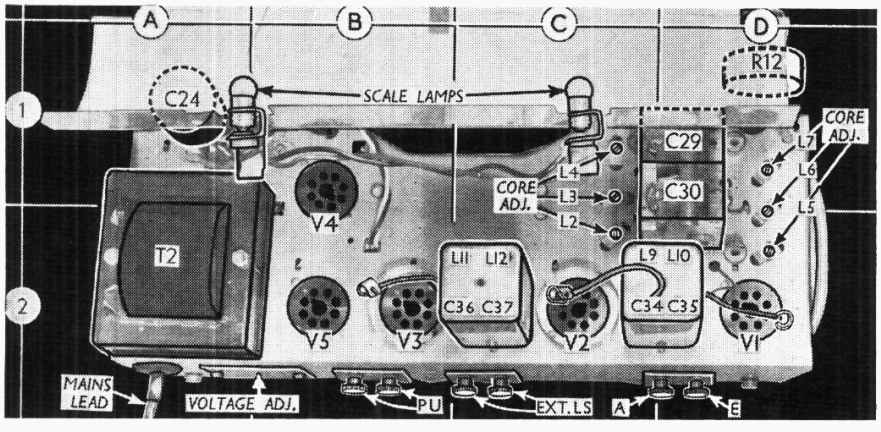
Low-voltage Models.—The BC5050L and BC5054L are special versions of the BC5050 and BC5054 employing a mains transformer whose primary is tapped at 115 V, 125 V and 220 V. The overall D.C. resistance of the winding is 26 Ω; from the fixed end to the 115 V tapping it is 10.5 Ω; and from the fixed end to the 125 V tapping it is 11.5 Ω. There is no low-voltage version of the A.C./D.C. model BC5055.

Chassis Divergencies.—C13 in our sample receivers was 0.0005 μF, but it may be 0.0003 μF in some cases. In the A.C./D.C. versions, the whole of the scale assembly is isolated from chassis. This includes the supports, which carry all the control spindles, so that **C44,** which is connected between the volume control spindle and chassis, actually ties down the whole of the scale assembly to chassis. The scale lamps are mounted in isolated holders, and the gang drum is a plastic moulding.

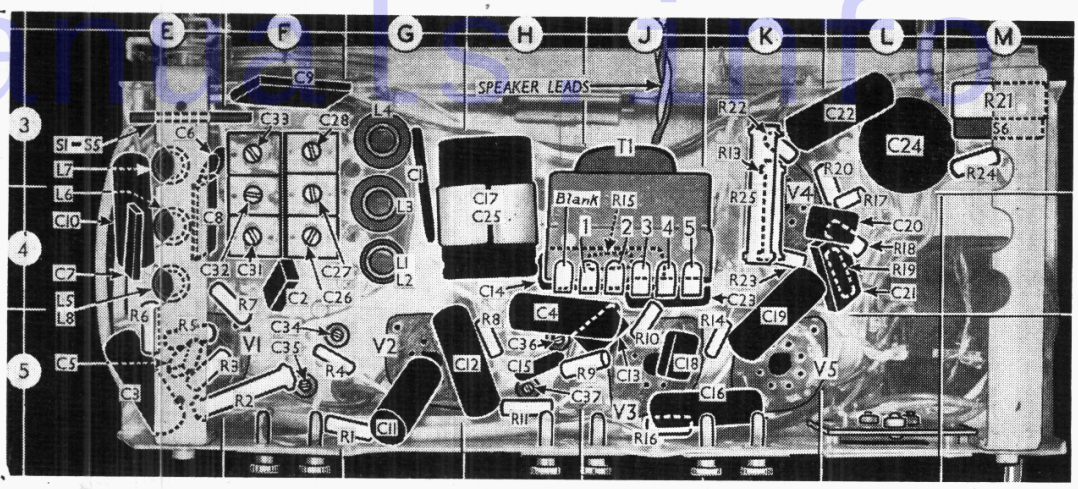


Alternative arrangement of tags on the connecting panel of the output transformer **T1** in the A.C./D.C. version.

I.F. Instability.—I.F. instability occurs sometimes as a result of coupling in the short connecting lead between **V2** holder and the chassis tag close to it. This can be remedied by disconnecting the



Plan view of the chassis. In the A.C./D.C. version **T2** is replaced by the barretter, and the scale assembly, complete with control spindles, is isolated from chassis; the scale lamps have insulated brackets.



Under-chassis view of the A.C. model. The positions of components in the A.C./D.C. version are indicated approximately by the grid references in the component tables. An alternative arrangement of the tags on the output transformer **T1** in the A.C./D.C. version is shown in the sketch in col. 3.

"earthy" lead of **C11** from pin 1 of **V2** and connecting it directly to the chassis tag beside it.

DRIVE CORD REPLACEMENT

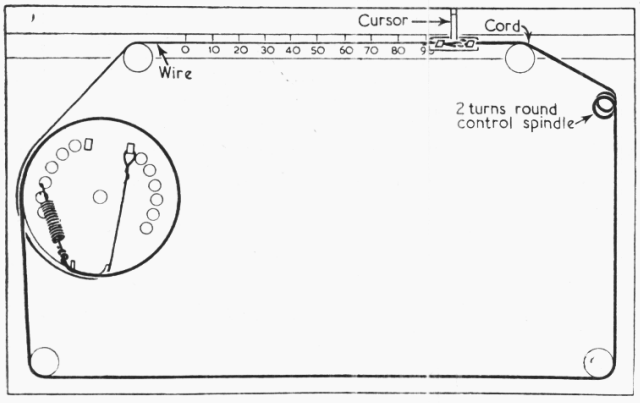
The drive cord for the tuning drive system consists of two sections, one part being a length of stranded steel wire, and one of stout twine, and it is convenient to make up the two sections and tie them together before fitting them. Suitable materials for the cord may be obtained from the G.E.C. Service Depot, Greycoat Street, Westminster, London, S.W.1.

Make up the wire with a loop of about ⅛-inch diameter at each end so that it measures 16½ inches overall. Take about four feet of the twine and tie one end of it with a non-slip knot to one end of the wire. The wire joints can easily be sealed by a touch of solder, and it is advisable to apply a dab of cellulose or some sealing compound to the twine knot.

Turn the gang to maximum, when the drum should take up the position shown in our sketch below. Hook the free end of the wire to the anchor tag shown and run the wire down through the right-hand slot and clockwise half-way round the drum, then off to the cursor carriage as shown in the sketch.

Continuing with twine, make two turns clockwise round the control spindle, starting hard up against the boss at the base (so that the turns travel outwards when the spindle is turned) and so on round to the gang drum. There, tie off the twine fairly short to one end of the tension spring, hooking the other end of the spring in the appropriate hole to give the required tension.

Clamp the cord under the tags on the cursor carriage, the join between the two sections being about central. The left-hand edge of the carriage should now be level with the 90 deg mark on the alignment scale. Adjustment may be made by turning the drum on the gang spindle.



Sketch showing the tuning drive system, which is the same in A.C. and A.C./D.C. models. It is drawn as seen from the front when the gang is at maximum. In the A.C./D.C. version the gang drum is a plastic moulding.

CIRCUIT ALIGNMENT

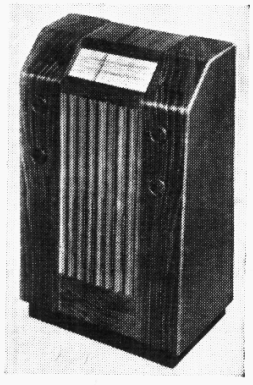
These operations may be carried out with the chassis in the cabinet, but since a calibrated scale is printed on the front of the cursor rail they are more conveniently performed with the chassis on the bench. In the following instructions both the wavelength (identified by a spot) on the glass tuning scale to which the cursor should be set, and the corresponding position of the cursor carriage in degrees, measured against the left-hand (red) side of the cursor carriage, are quoted.

I.F. Stages.—Switch set to L.W., turn gang and volume control to maximum, connect signal generator (via an 0.01 μF capacitor in the "live" lead) to control grid (top cap) of **V2** and the **E** terminal. Feed in a 456 kc/s (657.8 m) signal, and adjust **C37** and **C36** (location reference H5) for maximum output.

Transfer "live" signal generator lead and series capacitor to control grid (top cap) of **V1** and chassis, feed in a 456 kc/s signal, and adjust **C34** and **C35** (F5) for maximum output. Do not readjust **C36, C37.**

R.F. and Oscillator Stages.—With the gang at maximum capacitance the cursor should be vertical and coincident with the brown dot (90 deg.) at the high wavelength end of the L.W. scale. It may be adjusted in position by rotating the drive drum on its spindle, after slackening the two fixing screws. Transfer "live" signal generator lead to **A** terminal, via a suitable dummy aerial.

S.W.—Switch set to S.W., tune to 50 m (86 deg), feed in a 50 m (6 Mc/s) signal, and adjust the cores of **L5** (D2) and **L2** (C2) for maximum output. Tune to 16.7 m (6.5 deg), feed in a 16.7 m (18 Mc/s) signal, and adjust **C31** (F4) and, while rocking the gang, **C26** (F4) for maximum output, choosing the peak on **C31** involving the lesser capacitance. Repeat these operations until no improvement results.



The appearance of the Console Model BC5054.

M.W.—Switch set to M.W., tune to 500 m (73.5 deg), feed in a 500 m (600 kc/s) signal, and adjust the cores of **L6** (D1) and **L3** (C1) for maximum output. Tune to 214 m (8.5 deg), feed in a 214 m (1,402 kc/s) signal, and adjust **C32** (F4) and **C27** (F4) for maximum output. Repeat these operations until no improvement results.

L.W.—Switch set to L.W., tune to 1,875 m (72.5 deg), feed in a 1,875 m (160 kc/s) signal, and adjust the cores of **L7** (D1) and **L4** (C1) for maximum output. Tune to 1,000 m (11 deg), feed in a 1,000 m (300 kc/s) signal, and adjust **C33** (F3) and **C28** (F3) for maximum output. Repeat these operations until no improvement results.

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