NUMBER FIFTY - FOUR

'TRADER' SERVICE SHEETS

G.E.C. "FIDELITY FIVE"

A.C. TABLE AND RADIOGRAM MODELS

THE G.E.C. Fidelity Five series of A.C. receivers and radiograms is made in several models. The table models are BC3050 (190/250V, 40/100 c.p.s.); BC3650L (110/130 and 210/230V, 40/100 c.p.s.); BC3651 (190/250V, 25/100 c.p.s.) The ordinary radiograms are BC3658 (190/250V, 40/60 c.p.s.) and BC3658L (100/130 and 210/230 V, 40/60 c.p.s.). The two corresponding record changer models are BC3659 and BC3659L.

Our circuit diagram is based on the radiogram models, but, except that one or two components are omitted, the table models are similar. The chassis pictures are of the table model used in preparing this sheet.

CIRCUIT DESCRIPTION

Aerial input to coils L1, L2 which are coupled to primary of inductively-coupled band-pass filter. Primary L4, L5 tuned by C28; secondary L7, L8 tuned by C30; coupling coil L6. First valve (V1, Osram MX40) is a heptode operating as frequency-changer with electron coupling. Oscillator grid coils L9, L10 tuned by C32; tracking by C3, C35 (L.W.) and C4, C36 (M.W.); oscillator anode coil L11. Image rejection by coil L3 in V1 cathode circuit.

Second valve, a variable-mu H.F.

Intermediate frequency 125 KC/S.

Tuneon neon tuning indicator in anode feed circuit to **V2**.

Diode second detector forms part of double diode triode (V3. Osram MHD4) which also provides a form of amplified delayed automatic volume control and audio-frequency amplification. The audiofrequency component in the output from the rectifier diode is developed across load resistance R18 and passed directly to the triode section control grid by way of I.F. stopper R17. G.B. for radio amplification is obtained from the D.C. potential present across R18 by reason of the carrier wave of a transmitter; on gramophone the necessary voltage is provided by cathode resistance **R22**. Resistances **R35** and **R36**, also in cathode circuit, provide the high cathode to earth potential required for amplified delayed A.V.C. in conjunction with the second diode of **V3**, its load resistance R24, and potential divider R30, R31, R32, R33 and R34 across speaker field winding L20 in H.T. negative line. In addition to maximum sensitivity and high fidelity positions, the muting-fidelity control has three muting positions, giving increasing degrees of inter-station noise suppression. These are obtained by means of increases in the A.V.C. delay and V1

and **V2** fixed G.B. voltages brought about by switches **S14**, **S15** and **S16**.

I.F. by-passing in **V3** grid circuit by filter **L16**, **C10**, and in anode circuit by condenser **C14**. Adjustable filter **L17**, **C42**, eliminates heterodyne whistles.

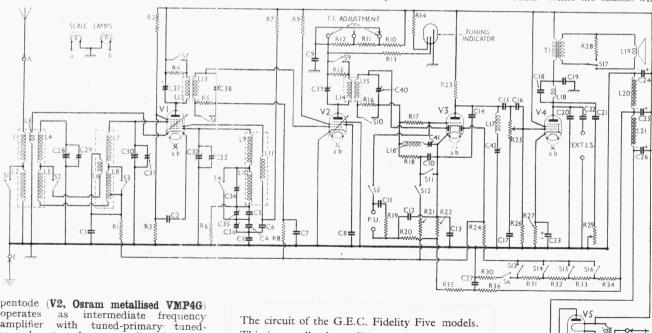
Resistance-capacity coupling by R23, C15, and volume control R25 to output pentode (V4 Osram Catkin MPT4). Tone compensation by special filter L18, C18, condensers C19, C20, and variable R.C. circuit R29, C21. Coupling to external high-resistance speaker by condenser C22. Switch S17 cuts out speech coil of internal speaker and connects artificial load R28.

H.T. current is supplied by full-wave rectifying valve (V5, Osram U12). Smoothing by speaker field winding L20, extra choke L21, and electrolytic condensers C24, C25, C26.

DISMANTLING THE SET

Removing Chassis.—Before removing back, withdraw small knob from tone control (pull off) and screw from Tuneon adjustment panel, both at back. Back can then be freed. Remove the four control knobs from front and withdraw Tuneon from clips above tuning dial escutcheon. Remove four bolts holding chassis, heads on underside of cabinet. Chassis can then be withdrawn sufficiently for normal repairs.

To remove chassis entirely, unsolder the three leads on the speaker input transformer and the long orange lead from filter circuit. While the chassis will



pentode (V2, Osram metallised VMP4G) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings L12, L13 and L14, L15. When the muting and fidelity control is set to "high fidelity," switches \$7.510 open and connect in circuit damping resistances R4, R5 and R15, R16.

The circuit of the G.E.C. Fidelity Five models. This is actually the radiogram circuit, but the table model is similar, except for slight omissions in the pick-up circuit, and the exclusion of S6,

R30 being permanently joined to R31.

A.C. MAINS

T2

S18

now be free, the tone control, speaker switch and filter circuit will remain in the cabinet. When replacing, the colour code shown in our illustration of the rear of the speaker should be followed.

Removing Speaker.—The speaker is held to the cabinet front by three bolts with ornamental heads. When removing them take care not to scratch the cabinet. If it is desired to remove the speaker entirely, the leads to the tone control, switch and filter circuit will have to be unsoldered or the components unscrewed from their fixings. The latter is probably the easier.

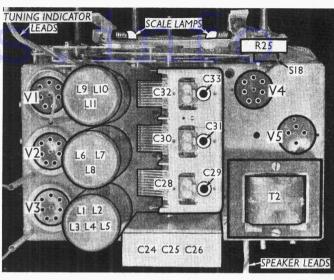
COMPONENTS AND VALUES

	Resistances	Values (ohms)
Rı	Vi cont. grid decoupling	
R ₂		99,000
R ₃	VI S.G.'s pot. divider	50,000
R ₄	}	30,000
R5	rst I.F. trans. damping	990
R6	VI osc. grid resistance	990
R ₇	VI osc. anode decoupling	99,000
R8	V1 osc. anode decoupling V2 cont. grid decoupling	44,000
Ro	V2 Cont. grid decoupling V2 S.G. H.T. feed	99,000
Rio	v2 S.G. H.1. leed	77,000
RII		15,000
R12	Neon tuning indicator feed	5,500
R13	resistances	5,500
		20,000
R14	3	1,000,000
R15 R16	2nd I.F. trans. damping	990
	,	990
R17 R18	V ₃ triode grid I.F. stopper	99,000
	V3 rectifier diode load	440,000
R19*	Part of pick-up shunt circuit	22,000
R20*	Gram pick-up decoupling	220,000
R21	Part of muting circuit	220,000
R22	V ₃ G.B. resistance (gram. only)	990
R23	V ₃ anode resistance	77,000
R24	V ₃ A.V.C. diode load	440,000
R25	Manual volume control	500,000
R26	V4 grid resistance	330,000
R27	V ₄ G.B. resistance	300
R28	Artificial output load	8
R29	Variable tone control	50,000
R30	(5,000
R31	Potential divider across	1,500
R32	speaker field winding	3,000
R_{33}	speaker neid winding	4,000
R34		99,000
R35	Amplified A.V.C. circuit	20,000
R36	\(\) voltage-dropping resistances \(\)	33,000

* Not in our chassis.

	$_{(\mu \mathrm{F})}^{\mathrm{Values}}$	
Cı	Vi cont. grid decoupling	0.02
C2	Vi S.G.'s by-pass	0.05
C3	Osc. L.W. tracker, fixed	0.0002
C4	Osc. M.W. tracker, fixed	0.00123
C5	Osc. grid condenser	0.002
C6	Vr osc. anode decoupling	0.1
C7	V2 cont. grid decoupling	0.02
C8	V2 S.G. by-pass	0.02
C9	V2 anode decoupling	0.25
Cio	Part of muting circuit	0.1
CII†	Part of pick-up shunt circuit	0.002
C12†	Pick-up circuit decoupling	0.02
C13	V ₃ cathode by-pass	0.5
C14	V ₃ anode I.F. by-pass	0.0002
C15	L.F. coupling to V_4	0.03
C16	Manual volume control shunt	0.0003
C17	R25 blocking condenser	0.02
C18		0.00061
C19	Parts of V₄ anode filter circuit ⟨	0.003
C20		0.003
C21×	Tone control condenser	0.02
C22	Coupling to ext. speaker	0.5
C23*	V ₄ cathode by-pass	50.0
C24*		6.0
C25*	>H.T. smoothing	6.0
C26*]	6.0
C27	Part of amp. A.V.C. circuit.	0.5
C28	Band-pass primary tuning	
C29‡	Band-pass primary trimmer	-
C30	Band-pass secondary tuning	
C31‡	Band-pass secondary trimmer	
C32	Oscillator tuning	

Plan view of the chassis. The valve screens have been removed. C24, C25, C26 are dry electrolytics in a metal-cased block with the connecting leads passing through the chassis deck.



	Values (μF)		
C33‡	Oscillator main trimmer		
C34‡	Oscillator L.W. trimmer	'	
C35‡	Oscillator L.W. tracker		
C36‡	Oscillator M.W. tracker		
C37‡	1st I.F. trans. pri. tuning		
C38‡	1st I.F. trans. sec. tuning		
C39‡	and I.F. trans. pri. tuning		
C40‡	and I.F. trans. sec. tuning		
C41‡	Part of I.F. filter		
C42‡	Part of V ₃ anode whistle fil	ter	
	-		

† Not in our chassis * Electrolytics ‡ Pre-set condensers * May be 0.02 μ F

	Values (ohms)	
Lr L2	Aerial coupling coils {	6.0
L3	Image rejection coil	100.5
L4)	0°27 5°3
LS	Band-pass primary coils	49.3
L6	Band-pass coupling coil	0.08
L7) ' ' '	5.2
L8	Band-pass secondary coils	49.5
Lo	Constitution and and	4.3
Lio	Oscillator grid coils	27.0
LII	Oscillator anode coil	2.2
L12	rst I.F. transformer \ Pri	82.5
L ₁₃	J (Sec	82.5
L14	} 2nd I.F. transformer { Pri	82.5
L15	J Sec	82.5
L16	I.F. filter coil	38·0 °
L17	Whistle filter coil	36·o
L18	V ₄ anode filter coil	400.0
L19	Speaker speech coil	1.9
L20	Speaker field winding	1,400
L21	Extra H.T. smoothing choke	400.0
Tr	Speaker input trans. \ \frac{\text{Pri.}}{6} \cdots	300.0
	Sec	0.32
	Pri. total	41.0
T2	Mains trans. Heater sec Rect. fil. sec.	0.08
	H.T. sec.	0.13
SI-S4	Waveband switches, ganged	540.0
S5	Gram. pick-up switch	
S6*	Radio muting switch on gram.	
S7-S16	Muting and fidelity switches	
Š17	Internal speaker switch	
S18	Mains switch, ganged R25	
	, Sangon	1 + 1

* Not in our chassis.

VALVE ANALYSIS

Valve voltage and current readings given in the table below were taken with the aerial disconnected and with the muting-fidelity switch set at "normal." Voltage readings were taken with the chassis as negative, and since the voltmeter used was an electrostatic type, slightly lower readings may be obtained on other types of instruments. The figures are those given by the manufacturers.

Valve	Anode	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 MX40* V2 VMP4G V3 MHD4 V4 MPT4 V5 U12†	235 175 100 210 320†	3:0 3:5 2:0 32:0	70 65 235	1·3 2·0 6·0

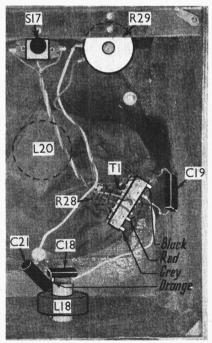
* Osc. anode (G2) 150V, 2mA. † Each anode, A.C.

GENERAL NOTES

Switches.—There are no fewer than 18 switches in this set, of which \$17 is the internal speaker switch, at the top back of the cabinet, and \$18 is the mains switch ganged with the volume control.

\$1-85 are in one unit operated by a

(Continued overleaf)



View showing speaker and associated components in situ. The colour coding of the leads from the chassis is indicated.

For more information remember

G.E.C. FIDELITY FIVE (Contd.)

spindle mounted from front to back of the chassis, and indicated in our underchassis view. Of these, **\$1-\$4** are the waveband switches, and **\$5** the radiogram switch. Radiogram models also contain an additional switch **\$6**, operated by the same spindle, and mounted between **\$3** and **\$4**. This switch is not seen in our chassis views.

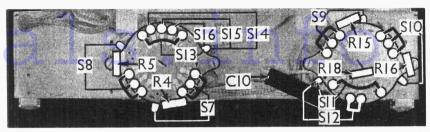
The following table gives the positions for **S1-S6**, O indicates open, and C, closed

Switch	M.W.	L.W.	Gram
Sī	C	O	0
S1 S2	C	O	0
S ₃	C	O	C
S4	C	O	C
S ₅	0	O	C
S6*	C	C	0

*Not included in table models.

87-816 perform the muting and high fidelity switching. They are in two rotary units, mounted between the front of the main chassis and an extra front plate. They can only be reached effectively by removing the front plate, which has been done in our front chassis view. This shows the various switches and the resistances associated with them.

If it is necessary to remove the front plate the procedure is as follows. Remove indicating pointer (1 screw with lock washer). Remove 2 spring clips holding glass scale plate, freeing the plate. Remove the bolt and nut holding indicator operating bracket to main switch spindle, and free the indicator mechanism, carefully noting the positions of the coil springs and other parts. Remove three



Front of chassis with plate removed to show the muting-fidelity switches and associated components.

bolts passing through the pillars holding the front plate to the main chassis. Plate can now be removed, together with parts of indicating mechanism. The two switch units are now exposed, but remain in situ.

It will be seen from our front chassis view that in some cases two or more tags are used for one pole of certain of the switches. These are clearly indicated. The switches are formed of rotating metal studs making contact between metal back plates and the fixed contacts in front.

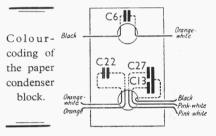
The various switch positions are indicated in the table below, where O is open, and C closed.

Switch	Norm.	Mutg.	Mutg.	Mutg.	High Fid.
\$7 \$8 \$9 \$10 \$11 \$12 \$13 \$14 \$15 \$16	C	C O C O C O O	C O C O C O O C O	C O C O C C	O C O C O O O

Condensers C6, C13, C22, C27.—These are in a single block beneath the chassis, with colour coded leads. A diagram on this page shows the various connections.

Radiogram Models.—These include the extra switch S6 and the extra resistances R19, R20. R19 may be 99,000O in autorecord changer models. The ordinary radiograms also include condenser C11.

Condenser C12.—This is shown in our



circuit, but does not occur in our chassis.

Alignment of Circuits.—The procedure adopted and described in Sheet No. 31 may be followed.

Coils—The three signal frequency and

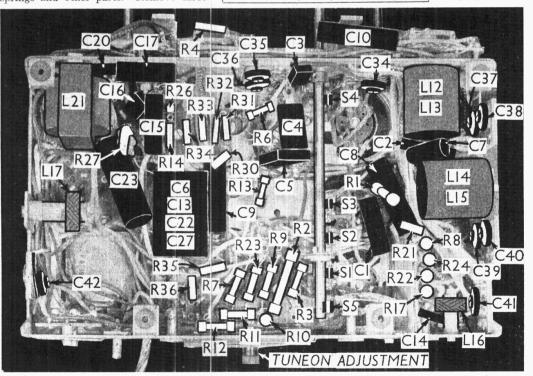
oscillator units are seen in our plan chassis view. The cans are spun on to the chassis and cannot be removed.

The two I.F. transformers are underneath the chassis, in a compartment covered by a screening plate. This has been removed in our under-chassis view. It is held by four screws and washers, of which the front one (hexagonal head) should be loosened by a spanner.

Scale Lamps.—Two Osram 12 mm. M.E.S. types, rated at 3.5V, 0.3 A, are employed.

Trimmers.— The various trimmers are operated from the sides and front of the chassis.

Condensers C24, C25, C26.—These are three $6\mu F$ dry electrolytics mounted in a single unit on top of the chassis. They have a common positive lead (red), and three separate negatives (black).



Under-chassis view of the table model. Radiograms include several additional condensers and resistances, and also S6, between S3 and S4. The screening plate over the right-hand section has been removed.