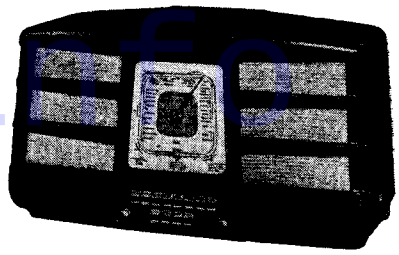
G.E.C. 4050 Push-button AC Five



Four valve, plus rectifier, three waveband table superhet with manual and mechanical push-button tuning, suitable for 190-250 volt, 40-100 cycle AC supplies (Cat. No. BC 4050), price 10 gns. BC 4050L for 110-130, 210-230 volt, 40-100 cycles, 10s. 6d. extra

CIRCUIT OUTLINE

IN this set the input circuits are not of the selected type. All the coils are in series, the unwanted ones being shorted out. The coils are returned to earth through a condenser to the top of which the aerial circuit is coupled through a small condenser fed from a resistive impedance. An extra inductive coupling is also provided.

These coils work into the input of V1, a triode hexode with a conventional oscillator circuit. The switching, again, is of the shorting type.

Use is made of permeability tuned IF transformers, the first being in the anode circuit of V1 and working into the grid of V2, an HF tetrode with AVC.

A further IFT leads to the diode of V3, a double diode triode. The second diode is used for AVC. The triode section derives its input from the volume control which is connected through a special filter to the signal diode load.

Resistance coupling connects V3 to V4 through a frequency compensated filter. The output valve, V4, is a tetrode which feeds the output transformer direct without feedback. Tone is controlled on the anode of this valve.

Power is obtained from a full-wave rectifier, V5, and a conventional smoothing system employing a choke and condensers.

CONSTRUCTIONAL FEATURES

THERE is nothing likely to give any trouble in identification or in service. Attention, however, is drawn to one or two somewhat unusual features. The series connected tuning circuits with shorting switches have already been mentioned in the circuit description and are also dealt with in wavechange switch notes.

It should be noted that a separate HT supply is used for the screen and oscillator anode of V1. This is taken from the unsmoothed HT line through a special resistance condenser network consisting of R6 and R7 with C7 and C13.

The resistance coupling network includes resistance capacity filters. The function of these is to lift the upper and lower registers with a view to improving the quality of reproduction, particularly when the volume is partly reduced.

Particular attention is drawn to the special ganging instructions which include the disconnection of the oscillator section and substitution of an external tuning condenser.

In carrying out the total feed or Power Test it must be remembered that the screen current and oscillator anode currents of the first valve, amounting to 6.6 ma., do not flow through the smoothing choke.

Wavechange Switches.

Particular attention must be given to the switching in this set as it is of an unorthodox type. The switch diagrams are not suitable for our usual method of presentation.

The switching is carried out by a single wafer with a rotor carrying a number of contacts in the form of double-ended studs which co-operate with springy leaf contacts held on either side of the wafer ring.

In the diagram the switch points are numbered so as to correspond with the circuit indications. The switch is very accessible and there should be no difficulty in locating and identifying the various elements.

VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
	All Osram.			
1	X41 ..	Anode ..	220'	2.2
		Screen ..	70	3.8
		Osc. anode ..	100	2.8
2	KTW61 ..	Anode ..	250	7.2
		Screen ..	60	2.1
3	DH63 ..	Anode ..	82	0.44
4	KT61 ..	Anode ..	232	38.0
		Screen ..	250	8.0
5	U50 ..	Heater. .	290	—
Pilot lamps	..	Osram ..	6.5	300

As the switch diagram does not show the function of the various contacts the operation is indicated in the following table (C representing closed and O open) :—

Switch Position	A	B	C	D	E	F
Long	C	O	O	O	O	O
Medium	O	C	C	C	C	C
Short	O	O	C	O	C	O

Chassis Removal.

Most normal service work can be carried out by removing the inspection panel from the bottom of the set. The chassis is carried in a skeleton bakelite cabinet by means of a wood sub-assembly. For removal it is preferable to extract the chassis and sub-assembly as a whole.

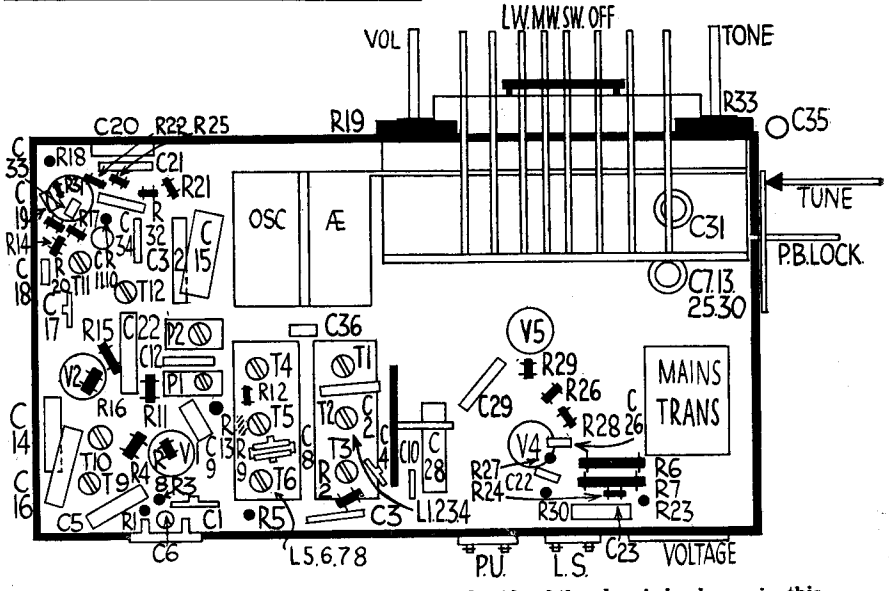
To do this remove the two knobs from the front, which are of the pull-off type. Then release the tuning drive shaft from its coupling inside the case and withdraw the shaft from the coupling. The wood baffle-board assembly is held by three clamps which must be removed. Then release the bolts holding the wood sub-assembly.

BUTTON ADJUSTMENT

THE setting up operation of the press-button mechanism is very simple. First of all release the locking screws by inserting a screw-driver through the hole in the side of the case. The screw will be found at the end of the shaft extension. This frees the control action on each button.

Tune the desired station accurately by

(*Continued on page* 6.)



The arrangement of components on the underside of the chassis is shown in this diagram. The layout for the top is on page 6.

10-MINUTE FAULT-FINDER G.E.C. 4050

Power Test.—Object of this test is to make sure main HT and output circuits are correct.

Voltages : V5 cathode, 290; HT line, 250.

Resistance : L14, 650 ohms.

Feed through choke = 290 − 250 ÷ 650 = 61 m.a.

Output Stage, V4.

Inject 2 volts AF between V4 grid and chassis. If defective, check :—

Voltages : anode, 232; screen, 250.

Resistances : anode—HT, 450; screen—HT, 75; grid—chassis, 330,000 ohms.

AF Stage, V3.

Inject 0.5 volt AF between V3 grid and chassis. If defective, check :—

Voltage : V3 anode, 82.

Resistances : V3 anode—HT, 226,000; grid—chassis, 2.04 meg.

Demodulation.

Inject 456 kcs. V2 anode and trim T12 and T11. If defective, check :—

Resistances : L11, 4; L12, 4; V3 signal diode—chassis, 582,000 ohms.

IF Stage, V2.

Inject 456 kcs. V2 grid. If defective, check :—

Voltages : anode, 250; screen, 60.

Resistances : screen—HT, 83,000; grid—chassis, 2.44 meg.

Mixer Section, V1.

Inject 456 kcs. signal V1 anode. Trim T9 and T10. If defective, check :—

Resistance : L9, 7 ohms.

Inject 456 kcs. signal V1 grid. If defective, check :—

Voltages : anode, 220; screen, 70.

Resistances : anode—HT, 6,000; screen—chassis, 15,000.

Oscillator Section.

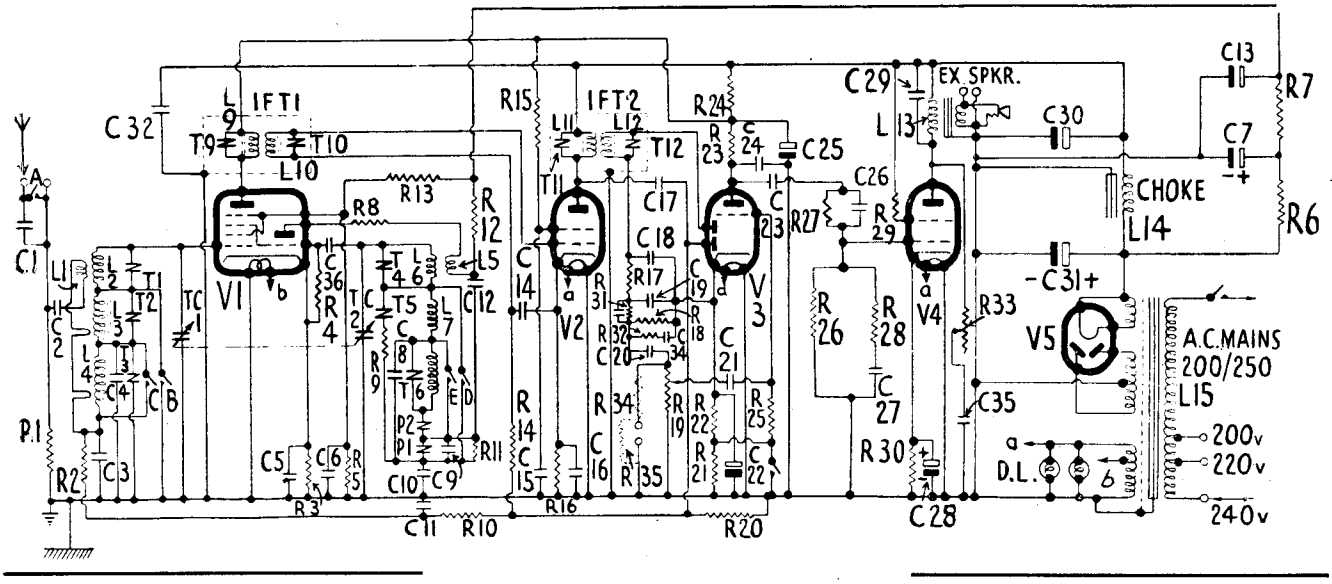
Voltage : osc. anode, 100.

Resistances : osc. anode—HT, 8,300; osc. grid—chassis, 99,000 ohms.

Signal Tests.

If no signals are obtained, tune in local station and inject that frequency plus 456 kcs.

If still no signals, check pre-selector circuits and switching.

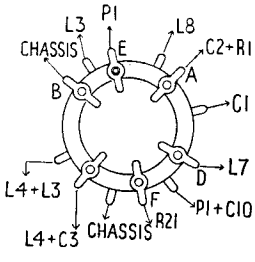


WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	0.3	—	C3+R2 and C2.
2	0.1	SW	V1 grid and earth.
3	2.0	MW	V1 grid and C3 and R2
4	22.0	LW	V1 grid and C3+R2
5	0.4	—	C12+R12 and R8
6	0.1	SW	C36 and C9+R11
7	2.7	MW	C36 and C9+R11 (top)
8	1.0	LW	C36 and T7+T6.
9	7.0	—	R23+R24 and V1 anode.
10	7.0	—	V2 grid and C14+R14.
11	4.0	—	V2 anode and H.T.+
12	4.0	—	V1 signal diode and C18+R17
13	450	—	V4 anode and H.T.+
14	650	—	V5 heater and H.T.+
15	26.7	—	Mains plug.

RESISTANCES

		Ohms.
1	Aerial input	9,900
2	V1 AVC decouple	99,000
3	V1 cathode bias	200
4	Osc. grid leak	99,000
5	V1 screen pot. (part)	15,000
6	Sub-H.T. line volt drop	7,000
7	Sub-H.T. line decouple	7,700
8	Osc. anode control	300
9	Het. volt control	75
10	AVC decouple	2 meg.
11	Het. volt control	5,500
12	Osc. anode load	8,000



Above, the circuit, which is reasonably straightforward and left, the switch (see Switch Notes on opposite page).

Resistances (continued)

13	V1 screen pot. (part)	6,600
14	V2 AVC decouple	2 meg.
15	V2 screen feed	77,000
16	V2 cathode bias	300
17	H.F. filter	55,000
18	Signal diode load (part)	150,000
19	Volume control	1 meg.
20	AVC diode load	440,000
21	V3 cathode bias (part)	44,000
22	V3 cathode bias (part)	3,300
23	V3 anode load	220,000
24	V3 anode decouple	6,000
25	V3 grid leak	2 meg.
26	V4 grid leak	330,000
27	Tone filters	220,000
28	Tone filter	150,000
29	V4 screen stabiliser	75
30	V4 cathode bias	90
31	Signal diode load (part)	330,000
32	Diode tone filter	99,000
33	Tone controls	55,000

CONDENSERS

		Mfds.
1	Aerial series	.00002
2	Aerial coupling	.005
3	V1 AVC decouple	.003
4	LW aerial fixed trimmer	.00002
5	V1 cathode shunt	.1
6	V1 screen decouple	.05
7	HT line decouple	7
8	LW osc. fixed trimmer	.00004
9	MW fixed padder	.0001
10	SW fixed padder	.00395
11	AVC decouple	.005
12	Osc. anode couple	.005
13	Sub-H.T. line decouple	3
14	V2 AVC decouple	.1
15	V2 screen decouple	.1
16	V2 cathode shunt	.1
17	AVC couple	.00002
18	HF filter	.0003
19	HF filter	.0003
20	LF coupling	.02
21	LF coupling	.01
22	V3 cathode shunt	30
23	LF coupling	.02
24	V3 anode shunt	.001
25	V3 anode decouple	3
26	Tone filters	.0005
27	V4 grid tone filter	.0015
28	V4 cathode shunt	30
29	V4 anode shunt	.005
30	H.T. smoothing	7
31	H.T. smoothing	14
32	H.T. line shunt	.05
33	Diode load shunt	.0002
34	Tone filters	.01
35	Tone controls	.05
36	Osc. anode	.0001

RGD Motor-tuned 722

(Continued from page 2.)

control the HF circuits and the oscillator coils respectively.

CONSTRUCTIONAL FEATURES

EVERYTHING is perfectly orthodox and calls for no particular comment.

A rather unusual feature, perhaps, is the crossing from one side of the chassis to the other in the valve sequence, followed by a return to the output valve which is mounted next to the first valve. This point should be borne in mind when making routine valve test measurements, as otherwise it is easy to mistake the valve positions.

It should be noted that the fidelity position is governed not only by the coupling of the first transformer, but also the damping of the *MW* HF coil. The switching also provides for the connection of a further shunt condenser on the anode circuit of V4.

In this chassis a special switch is provided for reducing the bass output on speech by means of a smaller coupling condenser.

Provision is made for aerial and earth connections, external speaker and pick-up. There is also a multiple socket for the remote control plug board and provision for silencing by switching the internal and external speakers.

Chassis Removal.

All the knobs are held by self-tapping screws which bite into the split control shafts. It is preferable to remove the screws from the knobs as this allows them to be withdrawn quite easily.

The chassis is held in the cabinet by means of bolts and T nuts. The speaker connection is made by a multiple plug and socket. It is necessary, however, to dismantle the press-button assembly if it is desired to separate the chassis from the cabinet. The method is as follows :—

First release the knurled-headed bolts at the corners of the escutcheon. If no tool is available for this purpose, they can be released by gently tapping the end of a small screwdriver, the blade of which is placed in the knurling. Hold the end of the blade so that it cannot slip out of the knurling and scratch the cabinet. Then remove the two bolts holding the switch button unit.

Alignment

IF Circuits (Frequency 465 kcs.)

Connect an output meter to the set and the generator to the grid of V2 and inject a signal of 465 kcs., using a low value below the AVC level.

The transformers are permeability tuned and are brought to resonance by slight adjustment of the cores in the normal manner.

Short Waves (16.5-50 metres.)

Connect generator through the dummy aerial to the set terminals and tune set and generator to 16.5 metres and adjust T1, T2 and T3 for maximum in that order.

Check the alignment at 50 metres.

Medium Waves (195-550 metres.)

Tune set and generator to 200 metres and adjust T4, T5 and T6 for maximum in that order.

Tune set and generator to 550 metres and adjust P1 for maximum, simultaneously rocking the gang.

Repeat the sequence of operations until no improvement results.

Long Waves (800-2,000 metres.)

Tune set and generator to 857 metres, and adjust T7, T8 and T9 for maximum.

Tune set and generator to 2,000 metres and adjust P2, simultaneously rocking the gang.

Repeat the sequence of operations until no improvement results.

Automatic Tuning

TUNE in the desired station manually. Remove the red plug from its socket at the back of the chassis. Remove the white plug from the contact socket and replace it by the black plug from socket at back of chassis. This will cause the setting lamp to light.

Slacken the knurled locking screw on the contact and slide it round the track until the lamp is extinguished. Then lock up the contact making sure the springy arm lies correctly on the disc, and return the plugs to their previous positions.

The contacts are identified in relation to their respective push-buttons by colour coded leads which are as follows. (The buttons are numbered from left to right, the first and last, however, operating remote control and manual tuning, do not have contacts and are, therefore, omitted from the series.)

Button.	Lead.	Tracer.	Button.	Lead.	Tracer.
(1)	Black	White	(5)	White	Green
(2)	Blue	Green	(6)	White	Blue
(3)	White	Black	(7)	Black	Red
(4)	White	Red	(8)	Red	Black

Replacement Condensers

EXACT replacement electrolytic condensers for the R.G.D. model 722 are available from A. H. Hunt, Ltd., of Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18

For C37 there is unit list number 1922A, price 4s. 6d., and for C38, unit 2530A, 6s. 6d. For C39 there is unit 1079, 2s. 3d., and for C36, unit 4286, price 4s. 6d.

G.E.C. 4050 Push-button Five

(Continued from page 4.)

the ordinary tuning knob at the side. When it is accurately tuned depress the button on which it is desired the station shall appear to its fullest extent. Then relock the shaft screw.

Test the accuracy of the adjustment by operating the press-button.

If there is any slight error the adjustment operation must be repeated.

Alignment

IF Circuits (Frequency 456 kcs.).

Tune set to maximum on LW and tone to brilliant. Short oscillator gang and connect generator to V1 grid through a .1 mfd. condenser with output meter connected to the speaker terminals.

Adjust T12, T11, T10 and T9, using a low input always below the AVC value.

Medium Waves (192 to 550 metres).

Connect the generator through a dummy aerial to the input of the set and tune set and generator to 1,400 kcs. (214 metres) and adjust T2 and T5 for maximum

In order to adjust the padder condenser, unsolder the wire from the side of the oscillator gang and substitute an external tuning condenser between this lead and chassis. Inject from the generator a frequency of 600 kcs. (500 metres) and simultaneously adjust the external tuning condenser and the set tuning control for maximum.

Then resolder the lead to the oscillator gang, and without altering the tuning position adjust P1 until the same maximum output is obtained.

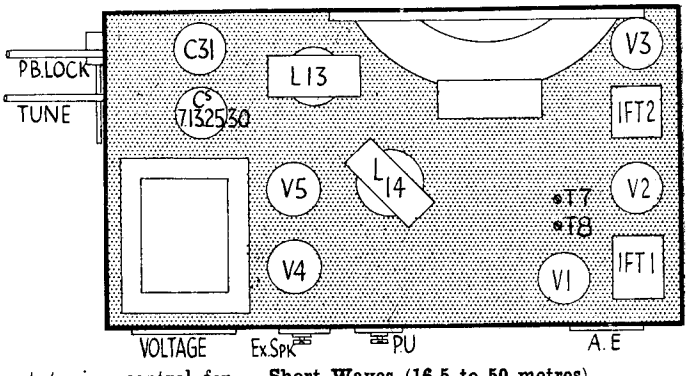
Then re-check the trimming at 1,400 kcs.

Long Waves (1,000 to 2,000 metres).

Tune set and generator to 300 kcs. (1,000 metres) and adjust T3 and T6 for maximum.

Then adjust the padding at 165 kcs. (1,818 metres) using an identical process with that for the medium band, finally adjusting P2 after re-connecting the oscillator gang.

Re-check the trimming at 300 kcs.



Top "deck" layout diagram showing valve and two trimmer positions. Underside layout is on page 4.

Short Waves (16.5 to 50 metres).

Tune set and generator to 18 mcs. (16.7 metres) and adjust T4 and T1 for maximum using the lowest capacity on T4 which gives a peak.

If pulling is experienced, slightly rock the gang.

Replacement Condensers.

EXACT replacement electrolytic condensers for the G.E.C. model 4050 are available from A. H. Hunt, Ltd., Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18.

For the unit containing Cs 7, 30, 13, and 25, there is type 1,529, list price 9s. 6d.; for C31, unit 2,516A, 6s., and for C22, unit 4,033, price 2s.

GEC 4050

Four-valve, plus rectifier, three waveband superhet with manual and mechanical push-button tuning. The following models incorporate the chassis dealt with in this review :—

BC 4050 (*table model*) : 190–250*v*, 40–100 *cycles.*

*BC*4050*L* (*table model*) : 110–130 *and* 210–230*v*, 40–100 *cycles.*

*BC*4054 (*console*) : 190–250*v*, 40–100 *cycles.*

*BC*4054*L* (*console*) : 110–130 *and* 210–230*v*, 40–100 *cycles.*

*BC*4058 (*radiogram*) : 190–250*v*, 40–60 *cycles.*

*BC*4058*L* (*radiogram*) : 110–130 *and* 210–230*v*, 40–60 *cycles.*

Marketed by General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

THE aerial input may be connected either direct or through a selectivity condenser C1 to the coupling condenser C2, and coupling coil L1 (SW), and small coupling windings associated with their respective tuning coils L2, L3 and L4. These are tuned by the VC1 section of the ganged condenser and the signal is fed direct to the control grid of the triode-hexode frequency changer V1, which is AVC controlled. Permanent bias is derived from the cathode resistance R3 decoupled by C5.

The oscillator triode section of V1 employs a tuned grid circuit, the oscillator coils being L6 (SW), L7 (MW) and L8 (LW) tuned by VC2 section of the ganged condenser. L5 is the anode feedback coil for short waves while on MW and LW coupling is by the common impedance of C10.

The IF signal is transferred from V1 by L9 and L10 to the grid of the variable-mu HF pentode V2, which s AVC controlled. Cathode biasing is by R16 decoupled by C16.

A second IF transformer L11, L12 passes on the signal to the signal diode of the double diode triode V3. IF filtering is effected by R17, R31, C18, C19 and C33, the load resistances being R31 and R18.

C20 is the low frequency coupling condenser which passes on the signal to the volume control R19 (across which are the pick-up sockets), and thence to the grid of the triode section of V3 *via* the blocking condenser C21.

The AVC diode of V3 is fed from the anode of V2 *via* C17, the load resistance being R20. The AVC line to V1 and V2 grid circuits is decoupled by R2, R10, R14, C11, C14.

V3 is cathode biased by R22 and R21, which also provides the delay voltage for the diode circuits ; but on SW R21 is shorted.

The LF signal from V3 anode circuit is resistance-capacity coupled by R23, C23 to the grid of the output pentode V4 *via* a tone correction network R27, C26. The grid resistance for V4 is R26, which is shunted by tone correcting components R28, C27.

V4 is cathode biased by R30 decoupled by C28, and a permanent degree of pentode tone correction is effected by C29 with a variable tone control comprising R33 and C35.

The output transformer L13, L14, couples V4 to the permanent-magnet loudspeaker, of which L15 is the speech coil. Extra sockets for a low-impedance speaker are provided in parallel with L15.

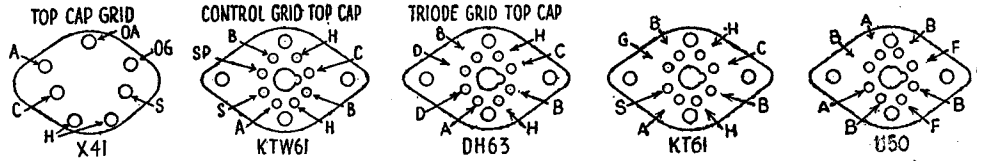
The HT circuit employs a full-wave rectifier V5 with smoothing effected by a separate choke L16 and condensers C30, C31.

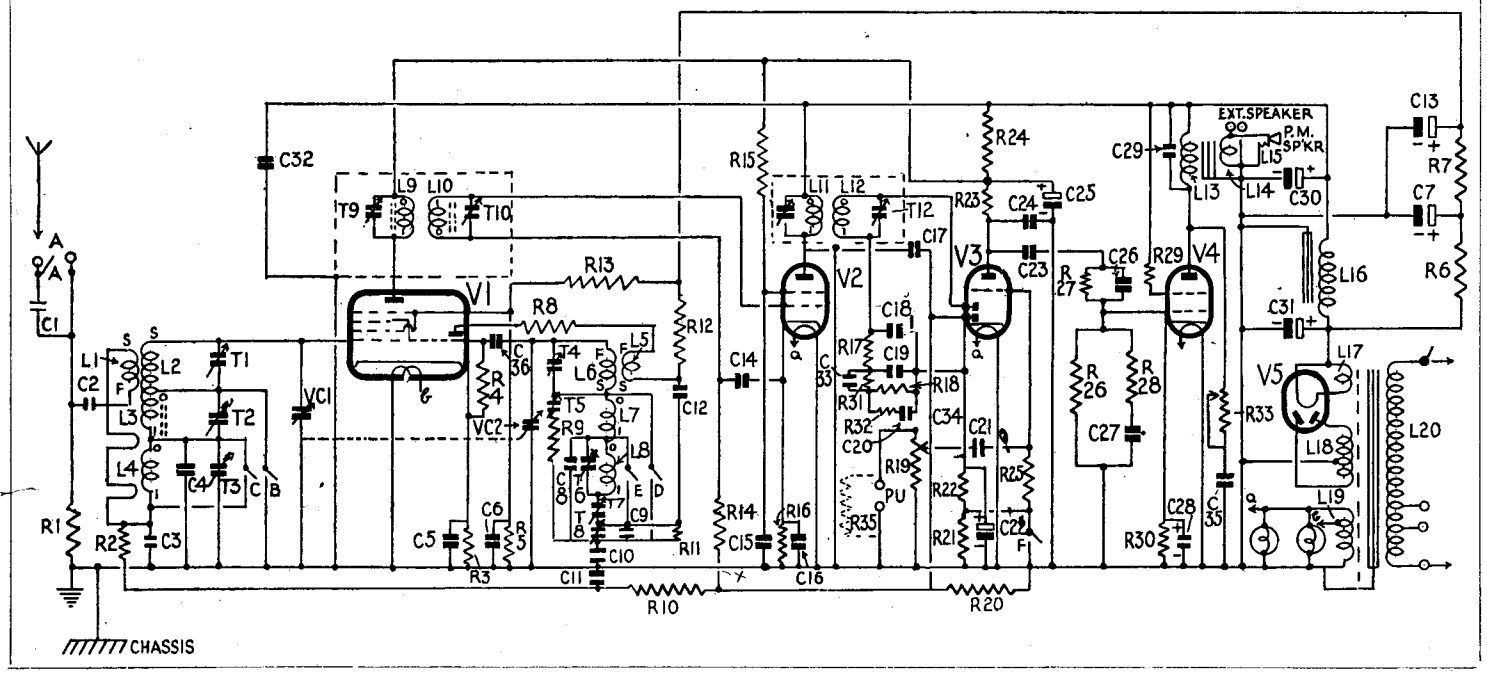
Continued overleaf

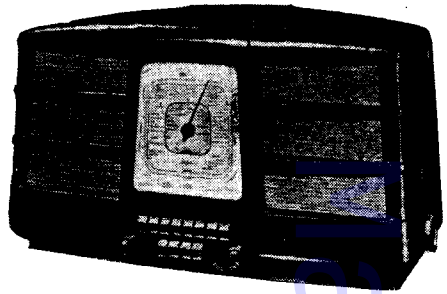
VALVE READINGS

V	*Type*	*Electrode*	*Volts*	*Mas*
1	X41	Anode	220	2.2
		Osc. anode	100	2.8
		Screen	70	3.8
2	KTW61	Anode	250	7.2
		Screen	60	2.1
3	DH63	Anode	82	.44
4	KT61	Anode	232	38
		Screen	250	8
5	U50	Anodes	320 (AC)	

Pilot Lamps, 6.5*v*, .3 amp. MES.







WINDINGS

L	*Ohms*	*L*	*Ohms*
1	.3	11	4
2	.08	12	4
3	.2	13	450
4	22	14	.4
5	.4	15	.2
6	.07	16	650
7	2.7	17	.19
8	8	18	375 (total)
9	7	19	.15
10	7	20*	32.6 (total)

* Standard —200-240v.
Other voltages—110-120v 10.5 ohms.
120-130v 11.5 ,,
210-230v 26.3 ,,

CONDENSERS

C	*Mfds*	*C*	*Mfds*
1	.00002	19	.0001
2	.005	20	.02
3	.003	21	.01
4	.00002	22	30
5	.1	23	.02
6	.05	24	.001
7	7	25	3
8	.00004	26	.0005
9	.0001	27	.0015
10	.00395	28	30
11	.005	29	.005
12	.005	30	7
13	3	31	14
14	.1	32	.05
15	.1	33	.0002
16	.1	34	.01
17	.00002	35	.05
18	.0003	36	.0001

RESISTANCES

R	*Ohms*	*R*	*Ohms*
1	9,900	19	1 meg
2	99,000	20	440,000
3	200	21	44,000
4	99,000	22	3,300
5	15,000	23	220,000
6	7,700	24	6,600
7	7,700	25	2 meg
8	300	26	330,000
9	75	27	220,000
10	2 meg	28	150,000
11	5,500	29	75
12	8,800	30	90
13	6,600	31	330,000
14	2 meg	32	99,000
15	77,000	33	55,000
16	300	34*	22,000
17	55,000	35*	33,000
18	150,000		

* Radiograms only.

GEC 4050

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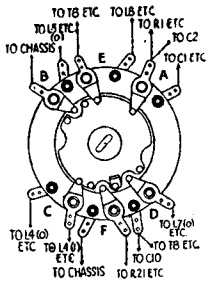
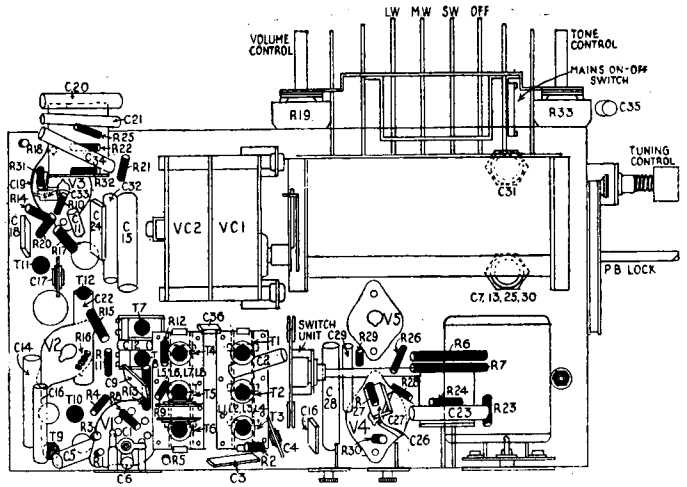
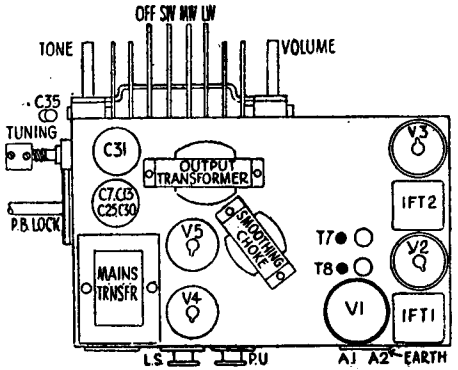


Above, rear view of the wave-change switch and, right, diagrams which identify the components and trimmers.





The screening grid and oscillator anode of V1 are supplied from the source of HT *via* smoothing components R6, R7, C7 and C13.

Radiogram Modifications.—In the radiogram models, the pick-up is connected permanently with one side to the chassis and the other *via* a resistance R34 to the top pick-up terminal. R35 is connected in parallel with the pick-up sockets.

Radio break-through is prevented by switching the screening grid of V1 to chassis and changing the wave range switch to SW.

The "On-Off" button becomes "Radiogram." R19 is replaced by a two-position bass control, and the volume control R19 is moved to another position and combined with the "On-Off" switch.

Auto Tuning Unit.—The push-button unit is of the mechanical type in which the pressing of a button rotates the gang condenser to a predetermined position. The wave-change switch unit under the chassis is operated by a link with the push-buttons.

To set the tuning press-buttons, rotate the manual tuning control until the pointer is completely anti-clockwise. Slacken the locking screw by one complete turn (screw is near the tuning control).

Switch receiver to required waveband and tune in the desired station manually; hold the manual tuning control fully "in," depress the selected button as far as possible.

Release the button and also the manual tuning.

Proceed in this manner to set each button.

Finally, rotate the manual tuning control until the pointer is completely clockwise. Tighten screw.

GANGING

IF Circuits.—Tune set to maximum on LW and tone to brilliant. Short oscillator section of gang and connect generator to V1 grid through a 0.1 mfd. condenser with output meter connected to the speaker terminals.

Inject a 456 kc signal and adjust T12, T11, T10 and T9, using an input always below the point at which AVC begins to operate.

MW Band.—Connect the generator through a dummy aerial to the input of the set, and tune set and generator to 1,400 kc (214 meters) and adjust T2 and T5 for maximum.

To adjust the padder condenser T8, unsolder the wire from the side of the oscillator gang and substitute an external tuning condenser between this lead and chassis.

Inject from the generator a frequency of 600 kc (500 metres) and simultaneously adjust the external tuning condenser and the set tuning control.

Then resolder the lead to the oscillator gang, and without altering the tuning position adjust T8.

Then recheck the trimming at 1,400 kc.

LW Band.—Tune set and generator to 300 kc (1,000 metres) and adjust T3 and T6 for maximum.

Then adjust the padding at 165 kc (1,818 metres), using an identical process with that for the medium band, finally adjusting T7 after reconnecting the oscillator gang.

Recheck the trimming at 300 kc.

SW Band.—Tune set and generator to 18 mc (16.7 metres), and adjust T4 and T1 for maximum, using the lowest capacity on T4 which gives a peak.

If "pulling" is experienced, slightly rock the gang while adjusting T4.