G.E.C. 8-VALVE SUPERHET CHASSIS

G.E.C. 8-valve chassis as employed in models: Table, BC3480 and 3480L; Console, BC3484 and 3484L; Radiogram, BC3488 and 3488L. (L denotes provision for 110/130 volts in addition to 210/230 volts.)

Circuit.—The H.F. valve, VMS4, cannister Catkin (V1), is preceded by an aerial tuner with a special H.F. and I.F. filter. Coupling to the first detector is by tuned secondary H.F. transformer. Bias is partly fixed and partly A.V.C.

The first detector, VMS4, cannister Catkin (V2) works as an anode bend detector, and injection of the oscillator frequency is directly to the grid coil from a separate oscillator valve. Bias is also partly fixed and partly A.V.C.

The oscillator valve, ML4, clear, (V3) operates with the tuned oscillator coil in the grid and the reaction coil in series with the anode lead.

The I.F. valve, VMP4, met., (7-pin) (V4) is preceded and followed by band-pass I.F. transformers (I.F. frequency 125 k.c.). The I.F. for the A.V.C. anode of the diode is taken through a condenser from the anode of V3 and the I.F. for rectification from a tapping on the secondary of 1FT2.

Bias for this valve is obtained from a potentiometer across the L.S. field. The centre part of the potentiometer, R32, is short circuited for "gram" to increase the bias and prevent I.F. amplification. This increase also applies to V1 and V2.

A double diode-triode second detector and L.F. amplifier valve, MHD4, (V5) provides A.V.C. and the L.F. which is fed through an L.F. coupling condenser, C11, to the volume control potentiometer. The grid lead from the slider has a condenser, C13, included to prevent the D.C. from reaching the grid. Bias for this valve is obtained from the potential developed across the "muting" valve.

The muting valve (V6) in an MH4.

The output pentode, MPT4, Catkin (7-pin), (V7) has a grid stabiliser and is tone compensated by a small fixed condenser and by

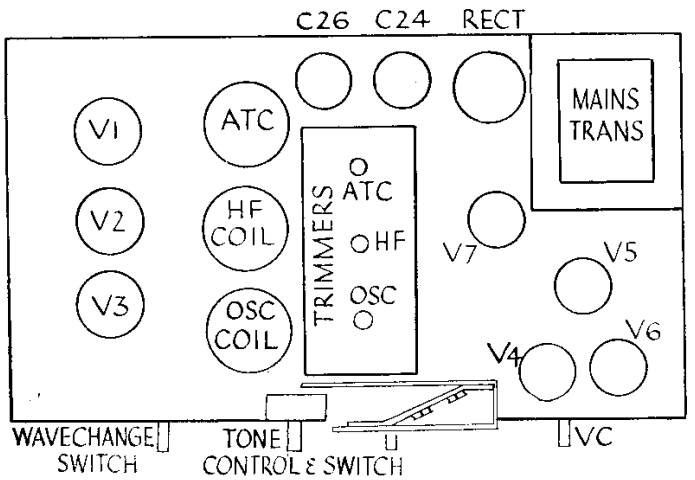
VALVE READINGS

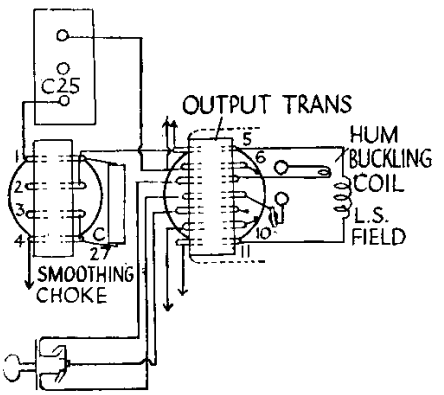
Aerial disconnected, noise suppressor fully anti-clockwise.

Valve.	Type.	Electrode.	Volts.	M.A.
1	*VMS4 Cat. Can.	anode	250	2/3
		screen	80	—
2	*VMS4 Cat. Can.	anode	250	1/1.5
		screen	80	—
3	ML4 ...	anode	150	10
4	VMP4 Met ...	anode	250	5/6
	(7 pin) ...	aux.gd.	150	—
5	MHD4 clear ...	Triode	190	1
	(7 pin)	anode		
6	MH4 Cat. ...	anode	—	—
7	MPT4 Cat. ...	anode	240	32
		aux. gd.	250	—

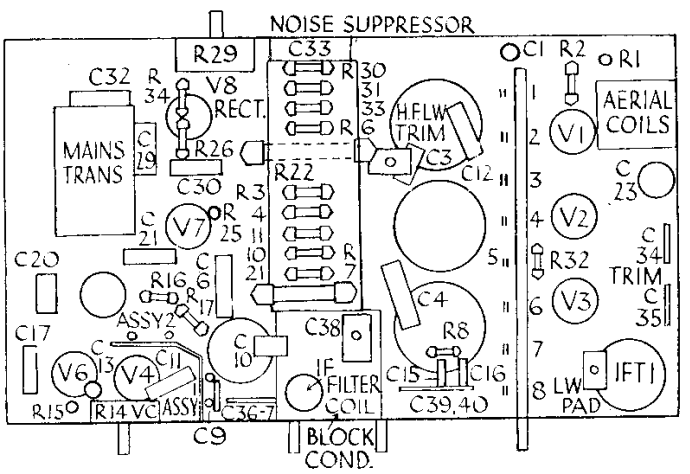
*Cat. = Catkin. Can. = Cannistered.

This is the console form of the 8-valve superhet receiver made by the General Electric Co., Ltd. The same chassis is also used in table and radiogram models.

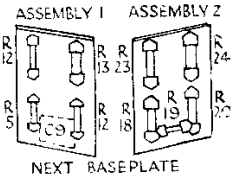




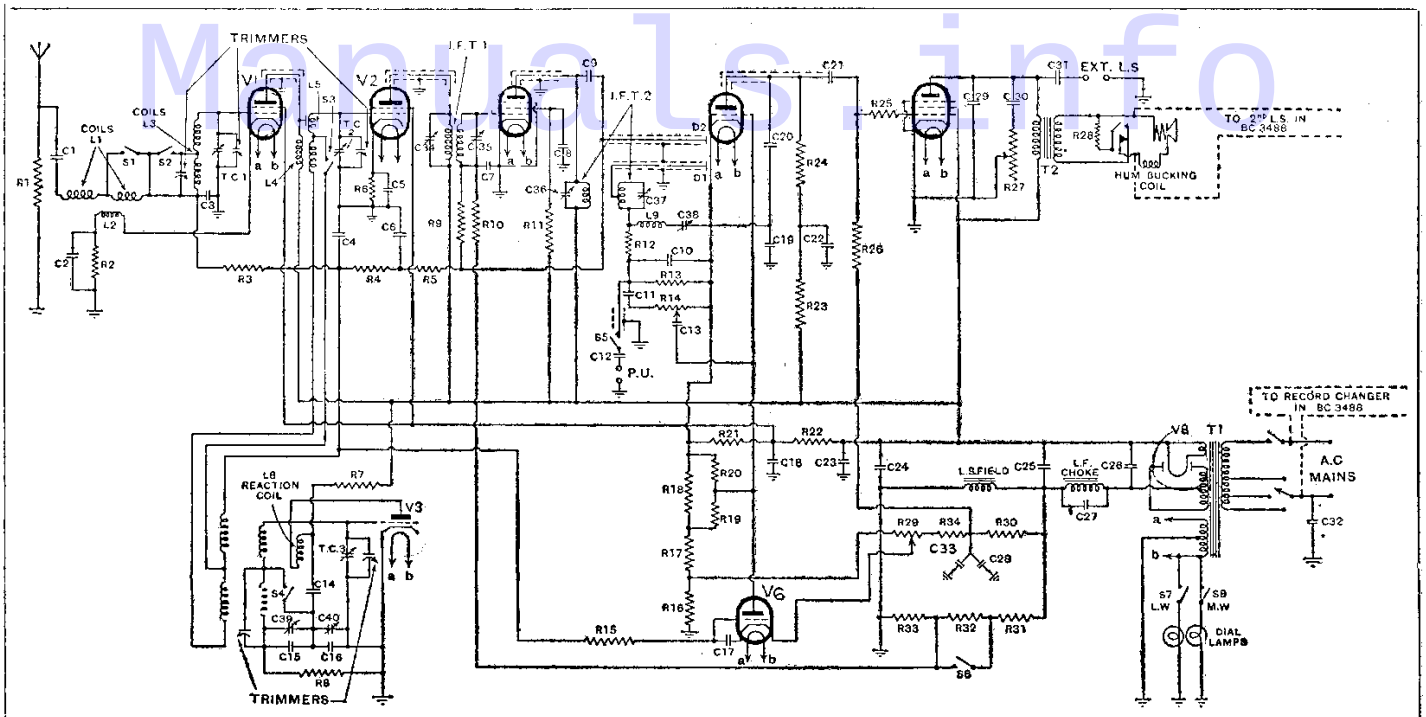
Top left, is the plan view of the G.E.C. 8-valve chassis. The diagram above gives the connections to the smoothing choke and output transformer and is referred to under General Notes. All the numbers are not given, but they run consecutively.



Should a fault develop in the block condenser indicated in the under-chassis layout on the right, it is easier and safer to substitute a tubular condenser suspended in the wiring for the faulty section.



The two assemblies of resistances indicated in the general under-chassis layout diagram on the right are given in detail in the drawing above.



A muting valve (V6) is one of the most interesting features of this circuit diagram of the General Electric Co.'s eight-valve super-heterodyne receiver.

(*Continued from previous page.*)

a larger one in series with a variable resistance forming a tone control.

As usual in recent G.E.C. sets, a make-before-break switch is used to render optional the use of the internal speaker when an external L.S. is employed. At the same time it connects an artificial load-resistance across the output to prevent damage to the valve. Bias is from a potentiometer across the L.S. field.

Mains equipment consists of transformer with H.F. by-pass condenser between one side of the mains and chassis, full-wave, U14, rectifier, and both smoothing choke and the L.S. field in the negative lead in conjunction with the necessary smoothing condensers.

To further obviate hum the choke is tuned by the condenser C27 to form a hum trap.

Special Notes.—The muting valve controls both the H.F., I.F. and L.F. sections of the set and any trouble in it may seriously affect both radio and gramophone reproduction but, as the set will function as a straight A.V.C. superhet with the valve removed, the first precaution when servicing is to remove the muting valve (V6).

CONDENSERS

C.	Purpose.	Mfd.
1	Aerial series	.01
2*	V1 cathode	.1
3	V1 grid decoupling	.004
4	A.V.C. decoupling	.04
5*	V. cathode	.1
6	A.V.C. decoupling	.01
7*	V4 grid decoupling	.1
8*	V4 aux. grid decoupling	.1
9	IF coupling to A.V.C. anode	.0001
10	HF by-pass	.0001
11	LF coupling to V.C. ptr.	.02
12	Series with P.U.	.02
13	LF coupling to V5 grid	.02
14	V3 anode decoupling	.001
15	Series tracking for osc. (fixed part)	.0003
16	Series tracking for osc. (fixed part)	.00095
17	Decoupling V6 grid	.02
18*	Decoupling V1 screen	.25
19*	V5 cathode	.5
20	V5 anode by-pass	.0002
21	LF coupling V5 to V7	.01
22*	V5 anode decoupling	.25
23	Decoupling HT+ lead	.1
24	HT smoothing	8 el.
25	HT smoothing	1.75
26	HT smoothing	8 el.
27	Across smoothing choke	.17
28*	Decoupling bias to V7 (two in parallel C33)	.2
29	Fixed tone compensation anode V7	.002
30	Part of tone control circuit	.04
31*	Filter to ex. L.S.	.25
32	H.F. by-pass from mains	.02
33	Parallel to C 28	.25
34	Trim. IFT 1 primary	—
35	Trim. IFT 1 secondary	- -
36	Trim. IFT 2 primary	—
37	Trim. IFT 2 secondary	- -
38	Trim. IF filter	—
39	LW tracking on osc.	- -
40	MW tracking on osc.	—

RESISTANCES

R.	Purpose.	Ohms.
1	Across aerial input	5,500
2	V1 cathode bias	500
3	Decoupling A.V.C. to V1	99,000
4	Decoupling A.V.C. to V2	220,000
5	Decoupling A.V.C. to V1 and V2	1 meg.
6	V2 cathode bias	1,000
7	Decoupling V3 anode	9,900
8	Grid return of V3	99,000
9	Decoupling A.V.C. to V4	1 meg.
10	Fixed bias lead to V4	1 meg.
11	Decoupling V4 aux. grid	88,000
12	HF stopper from rectifier anode	220,000
13	Diode load	1 meg.
14	V.C. across AC output of diode	.5 meg.
15	Decoupling bias to V6	1 meg.
16	—	500
17	—	4,000
18	Developing potentials in noise suppression circuit	700
19	—	5 meg.
20	—	2 meg.
21	Part of V1 and V2 screen ftr.	3,000
22	Part of V1 and V2 screen ftr.	18,000
23	V5 anode decoupling	55,000
24	V5 anode L.F. coupling	55,000
25	Grid stabiliser V7	220,000
26	V7 grid leak	330,000
27	Var. tone control	50,000
28	Artificial load for use with ex. L.S.	8
29	Noise suppression control	10,000
30	Part of bias ftr. for V7	42,000
31	Part of bias ftr. for V4	99,000
32	Part of bias ftr. for V4	1 meg.
33	Part of bias ftr. for V4	33,000
34	Part of bias ftr. for V7	2,000
—	L.S. field	1,300
- -	Output transformer primaries, B.C. 3480/84	300
- -	Output transformer primaries, B.C. 3488	420
—	L.F. choke	400

If the set then works properly a new MH4 should be fitted.

Quick Tests.—Between terminals on speaker transformer and chassis (counting from the top and beginning at 5, see diagram): (5) mains side of choke, 110 volt neg., (6) H.T.+smoothed, 260 volts+.

(10) V7 anode, 240 volts+.

Removing Chassis.—(Table and Console models) Pull off knobs. Remove four screws from underneath. Release L.S. cable from cleat.

Radiogram.—Undo two woodscrews from mains terminal block. Release leads from

(*Continued on next page.*)

How to Test the Output Stage

(*Continued from page 75.*)

whole set any serious loss of emission will result in increased voltages being applied to the remainder of the valves and impaired (low) power.

As it can be taken for granted that the valve is operated in the correct manner in the set, any diminution of the anode current reading of more than ten per cent. indicates that the valve is losing its emission.

General Condition of Set Revealed

To this extent the readings given in "Quick Tests" and "Valve Readings" give a sure indication of the condition of the set, and particularly of the output valve. Comparison of the readings obtained with those given should reveal in which part or parts of the set the trouble lies.

To express it briefly:—

A low anode current reading with a high voltage reading usually means that the valve is seriously losing emission.

A high anode current with a low anode voltage reading usually means that the valve has either an open grid circuit or is being operated with zero bias.

G.E.C. EIGHT-VALVE CHASSIS (Cont.)

cleats. Withdraw six leads from under side of chassis and L.S. plug.

Unsolder the maroon lead from above A. and E. terminal block. Pull off knobs and remove eight screws round the sides (not the rose headed ones).

Lift panel out complete with chassis and then release panel by undoing the six rose headed screws.

General Notes.—The condensers marked with an asterisk in the table are inside the block condenser underneath the screening plate at the front of the chassis (underneath). The low potential sides of all of them are joined at chassis potential. As repairs to this condenser involve reganging the receiver they are not to be recommended.

If tests show that one of the condensers is faulty the lead should be disconnected from the component and an external condenser of equivalent capacity suspended in the wiring outside (tubular 500-volt working type).

The leads to the output transformer and smoothing choke are coded. These are (see special diagram) :—

(1) Black and orange, to C25 and (5) on output transformer.
(2) Joined to (1).
(3) and (4) Joined, grey, to set (casing of C26) H.T. −.
(5) Orange and black, to choke and chassis (R30 + 31).
(6) Red, to other side of C25 and set H.T. + to V7 aux. grid.
(7) Black, to top terminal on speaker switch.
(8) Black and red, to lowest terminal on speaker switch.
(9) Orange and black, to spindle terminal on speaker switch.
(10) Orange, to set, to V7 anode.
(11) Black, chassis earth.

It is unlikely that this section of the receiver will ever have to be rewired, but if any component requires replacement the above should facilitate connections.

Tuning Drive.—The complete unit may be removed from the chassis. First remove six larger round-headed screws from the dial. Turn the tuning spindle till the aperture on the wheel is at approximately 7 o'clock and remove the screw revealed. Slacken two grub-screws holding driving wheel to condenser spindle. Slacken lock-nut of tone control and allow control to drop in the slot, and unit can be removed.

In replacing unit, the washer under the fixing bolt must be replaced, and the tone control must be fixed in approximately the same position.

In the drive there are two cords, a short one passing one and a third times round the driving wheel and once round the drive on the tuning shaft, and a long cord passing round the driving wheel (inside) under the two pulleys on the bottom of the assembly, up through the clips on the travelling indicator, and then over the two top pulleys and back to the driving wheel.

Both cords are knotted at one end and tensioned by a spring at the other. Correct lengths of the required cord (short or long) can be obtained from the nearest G.E.C. depot. In replacing a cord, note that where the cords touch the wheel first the long cord is *behind* the short one.

Replacing Chassis.—Lay chassis inside cabinet, replace four holding screws, clip cable and press on the knobs.

In replacing the back, the two screws with "necks" fix the top of the panel.

McMICHAEL A.C. MAINS SUPERHET

Circuit.—The oscillator and first detector valve, AC/TP met. (V1) is an H.F. pentode triode, and in front of it is a special aerial coil coupled to a single-tuned aerial coil.

The oscillator coupling in this valve is not electronic as in a heptode, but is obtained by means of the coil in the cathode circuit. A resistance, R2, is connected directly in the oscillator grid circuit to prevent the development of harmonics. Bias is obtained by a cathode resistance and from the A.V.C. diode.

Coupling of the H.F. pentode section to the I.F. valve is by band-pass I.F. transformer (iron-cored), frequency 406 kc. The I.F. valve, AC/SGVM met. (V2) is biased by a cathode resistance and by the A.V.C. diode.

Coupling to the second detector is by another band-pass I.F. transformer, but the I.F. feed to the A.V.C. diode anode is taken from the high potential (AC) end of the primary and is fed through a condenser, C10.

The second detector and L.F. valve, an AC/HL/DD double-diode-triode, is used in the conventional manner. The L.F. is taken from the low H.F. potential end of the IFT2 secondary to a load resistance R15 and by-pass condenser C11 and to the first L.F. coupling condenser C12. The volume control R12 forms the grid leak of the triode section. In addition, a condenser and a variable resistance C13 and R14 are connected between the L.F. output and chassis to form a variable tone control.

The triode section is coupled to the output valve by straight resistance capacity coupling.

The output pentode, AC/Pen. (V4), uses cathode bias and is tone compensated by a condenser and a resistance and condenser in series across the primary of the output transformer.

Mains equipment consists of transformer, Westinghouse rectifier used on the voltage doubler principle with the field coil in the positive H.T. lead for smoothing with two 8 mfd. electrolytic condensers.

Special Notes.—The suppressor grid of the H.F. pentode triode valve (V1) is connected to the high potential H.T. end of the bias resistance, not to cathode.

The full A.V.C. potential is developed across R11 and is fed back to the H.F. pentode section of V1 and to V2 through decoupling circuits.

Quick Tests.—Between terminals on speaker transformer and chassis, counting from top :—

(1) Black, H.T. unsmoothed, 365 volts.
(2) Blue, V4 anode, 232 ,,
(3) Green, H.T. smoothed, 243 ,,
(4) Red (joined to 3), 243 ,,
(1) and (4) are L.S. field.
(2) and (3) output transformer primary.

Between case of front electrolytic condenser (C20) and chassis 182 volts (half rectified voltage).

Removing Chassis.—Remove fuse from mains adjustment panel underneath and also the three holding screws. Take off control knobs (grub screw) and undo centre holding screw of switch lever. Do not lose the spring washer underneath the lever. Loosen L.S.

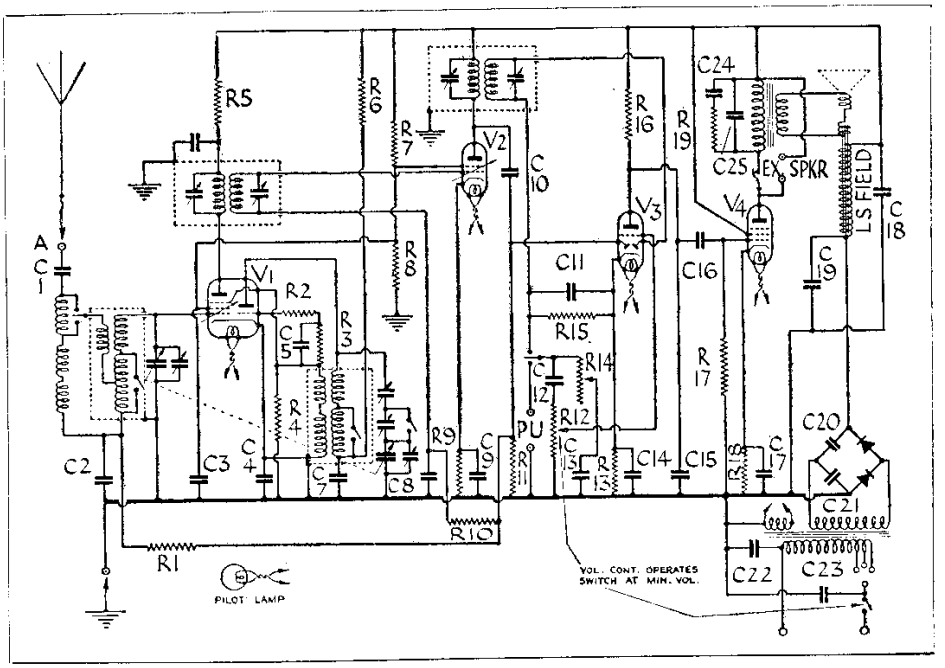
Continued on opposite page.

VALVE READINGS

No signal.

Valve.	Type.	Electrode.	Volts.	M.A.
1	AC/TP ...	anode ...	215	1.1
		aux.grid	115	—
		osc. anode	130	1.6
2	AC/SGVM ...	anode ...	242	7.7
		screen ...	115	—
3	AC/HL/DD	anode ...	100*	1.5
4	AC/Pen ...	anode ...	232	25
		aux. grid.	243	5

* A high value of anode resistance may give rise to misleading readings. In this case current is the important measurement.



A triode-pentode frequency changer is one of the novelties in the McMichael A.C. mains superhet. Another is the use of iron-dust cored coils for the band-pass I.F. tuned circuits.