GEC 3446

Six-valve, two waveband superhet battery receiver with internal aerial. Provision is made for pick-up and external loudspeaker, with a silencing switch for the internal speaker. Made by the General Electric Co., Ltd., Kingsway, London, WC2.

Circuit.—Signals from the aerial are fed via C1 to the coupling coils L1 and L2 of the band-pass filter. The primaries and secondaries of the band-pass unit are inductively coupled by a small coil and capacitively coupled through C4. The MW coils are L1, L3 and L5, and the LW coils L2, L4 and L6. The band-pass filter is tuned by VC1 and VC2 sections of the triple-ganged condenser. Control of volume is effected by the variable resistance R1, which shunts the coupling coils L1 and L2, and is also in the grid to filament circuit of the variable-mu valve, V3, the IF amplifier.

The signals from across VC2 are fed to the grid of V1, which is a screened grid first detector. Mixing is effected by means of the coupling coils L11 and L12 in the filament circuit of the valve.

The filament circuit continues via the image suppression and filter coils L13, L14 and L15 to the LT negative and positive supply points. LT negative is earth.

The oscillator stage comprises the separate triode V2 with tuned grid coils L8 (MW) and L9 (LW), with L10 the reaction winding in the anode circuit. The anode of V2 is fed from the HT1 lead through R9 with the HF by-pass condenser C7. C6 provides additional coupling by virtue of it being a common impedance in the grid circuit and the HF anode circuit via C7.

As previously stated, the oscillator signals are fed into the electron stream of V1 by coupling coils L11 and L12, and resultant IF signal is coupled from V1 anode circuit to V3 by the first IF transformer comprising L16, T4 and L17, T3.

V3 is the variable-mu screen grid IF amplifier, and is coupled to the second detector triode V4 by a second IF transformer L18, T2 and L19, T1. A certain amount of reaction is introduced by the trimmer T13, which couples the anode circuit to a portion of L19, which has a tapping connecting it to the biasing network, comprising R10 and R11. This biasing circuit also supplies bias to V1 via the decoupling components R8, C8.

The grid circuit of V4 incorporates a pick-up jack; when the pick-up is in circuit, the valve obtains the correct bias for LF amplification by the jack contacts opening up the radio circuit and joining the piek-up to the GB1 battery connection.

V4 is resistance capacity coupled to the driver triode V5 by means of R4 and C12. R5, C9 and C11 comprise the HF filter, while L11 and the trimmer T11 form an acceptor circuit for minimising heterodyne whistles. R3 and C10 are decoupling components for V4 anode circuit. R13 is a grid stopper for V5, while R12 is the grid to filament resistance via the GB2 bias battery connection.

The driver transformer L20, L21 transfers the signals to the Class B double-output valve V6. A variable tone control is provided by C13 and the variable resistance R6 connected across the two grids of V6. The valve is biased by the centre tap of the secondary winding L21 being taken to the GB3 battery connection.

The PM loudspeaker is coupled to the anode circuit of the ouput valve by the coupling transformer L22 and L23, both sections of the primary being by-passed by the condensers C14 and C15.

The external loudspeaker sockets are arranged for a high impedance speaker as they are connected across the primary of the output transformer through HT current blocking condensers C16 and C17. The internal speaker may be silenced by the muting switch, which places the load R14 across the secondary of the output transformer to safeguard the output valve should no external speaker be connected.

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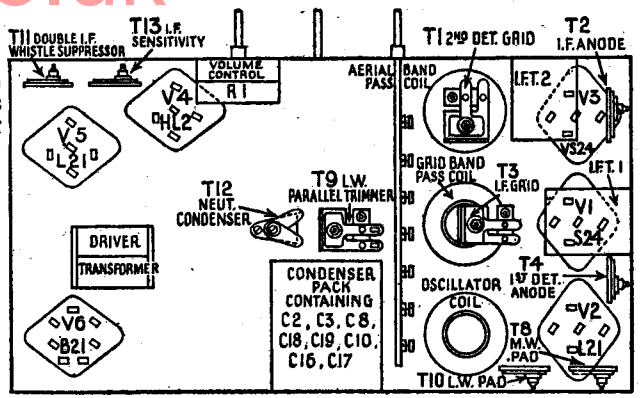


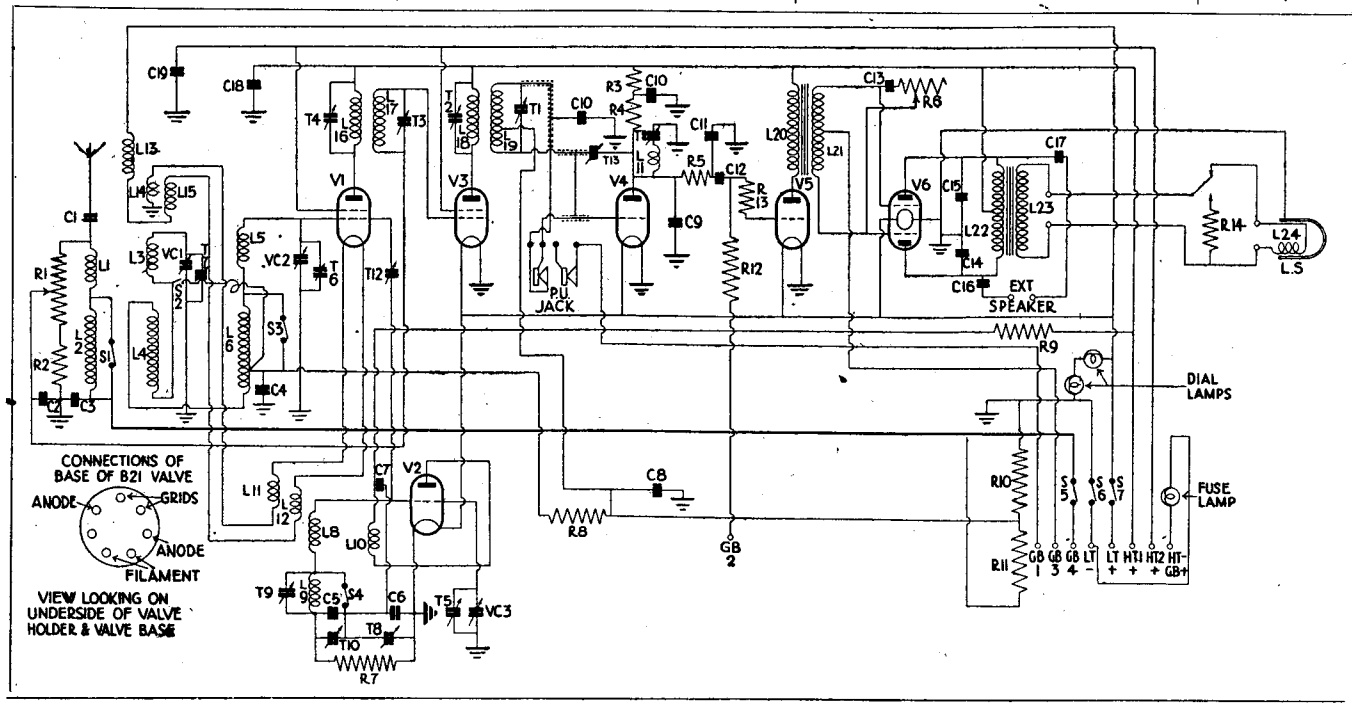
View of the GEC chassis identifying the trimmers and the valve and coil positions. T5, T6, and T7 are on the gang across VC3, VC2 and VC1 respectively.

VALVE READINGS

With vol. control at minimum, no signal tuned in.

V	Type	Electrode	Volts	Ma
1	S24	Anode	125	.5
		Screen	55	—
2	L21	Anode	75	2.5
3	VS24	Anode	125	*
		Screen	55	—
4	HL2	Anode	55	.2
5	L21	Anode	125	2.5
		Each		
6	B21	Anode	125	1

Pilot lamps, 3.5 v, .15 amp. MES.
* 2.5 ma with vol. control at max.



Separate triode oscillator with a screen-grid mixer characterise the 3446. The second detector triode is followed by V5, a driver for Class B output.

CONDENSERS

C	Mfd
1	.001
2	.25
3	.25
4	.05
5	.0003
6	.0011
7	.001
8	.25
9	.0002
10	.25
11	.0002
12	.005
13	.02
14	.003
15	.003
16	.25
17	.25
18	.25
19	.25

RESISTANCES

R	Ohms	R	Ohms
1	10,000	8	99,000
2	1,000	9	20,000
3	44,000	10	300
4	200,000	11	600
5	99,000	12	1 meg
6	50,000	13	200,000
7	99,000	14	8

TRANSFORMER WINDINGS

L	Ohms	L	Ohms
20	500	23	4
21	220	24 (Speech Coil)	3
22	800		

BATTERY LEADS

Designation	Colour	Volts
HT + 1	Red	+ 141
HT + 2	Light Blue	+ 72
±	Dark Blue	—HT + GB
Grid —1	Yellow	—1.5
Grid —2	Orange	—4.5
Grid —3	Brown	—6
Grid —4	Green	—9
LT +	White	2
LT—	Black	2

HMV 531, 553

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speech coil, which has a DC resistance of 11 ohms.

The other pair of pink sockets is for an external loudspeaker which should have a similar DC speech coil resistance.

The HT supply is obtained from the full wave rectifier, V10, the output from which is taken through CK4 which is tapped to ensure maximum smoothing at the standard mains frequency with C24 and C25. The HT circuit from CK4 is taken via the two red sockets on the amplifier chassis which feed the field winding (2,000 ohms) of the loudspeaker. This connection is made by a twin flex with two red plugs. After passing through the field winding the HT circuit continues to CK3 with its condensers C26 and C27 and thence to the HT positive terminal on the terminal panel of the amplifier. The connections between this terminal panel and the cable to the radio chassis are shown in the circuit diagram.

Fuses are incorporated in each mains lead and in one of the motor leads.

In the model 553 a resistance of 15,000 ohms is connected from HT to earth to compensate for the load of the radio chassis.

As previously stated, the models are suitable for mains voltages from 100 to 160, and 200 to 260. Adjustment is made by inserting two leads in a terminal strip at the front of the mains transformer, but the motor coils must be paralleled on the 100 to 160v. range and connected in series on the 200 to 260v. range.

GANGING

IF Circuits.—Connect milliammeter in place of link across terminals 4 and 5, switch to medium waves, volume control at maximum, tuning about halfway, oscillator valve out. Couple output from test oscillator to anode of mixer valve, V3 (MS4 Met).

Set test oscillator to 125.2 kc. Adjust all IF trimmers to peak. Note change in detector anode current, as shown on meter, caused by switching test oscillator on and off.

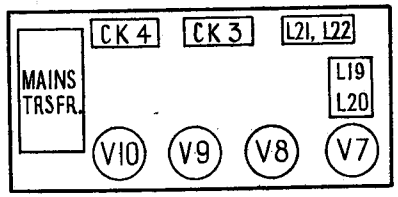
Increase capacity of T5 by screwing in clockwise direction so that the *change* in current is reduced by 18 per cent. Repeat with T3.

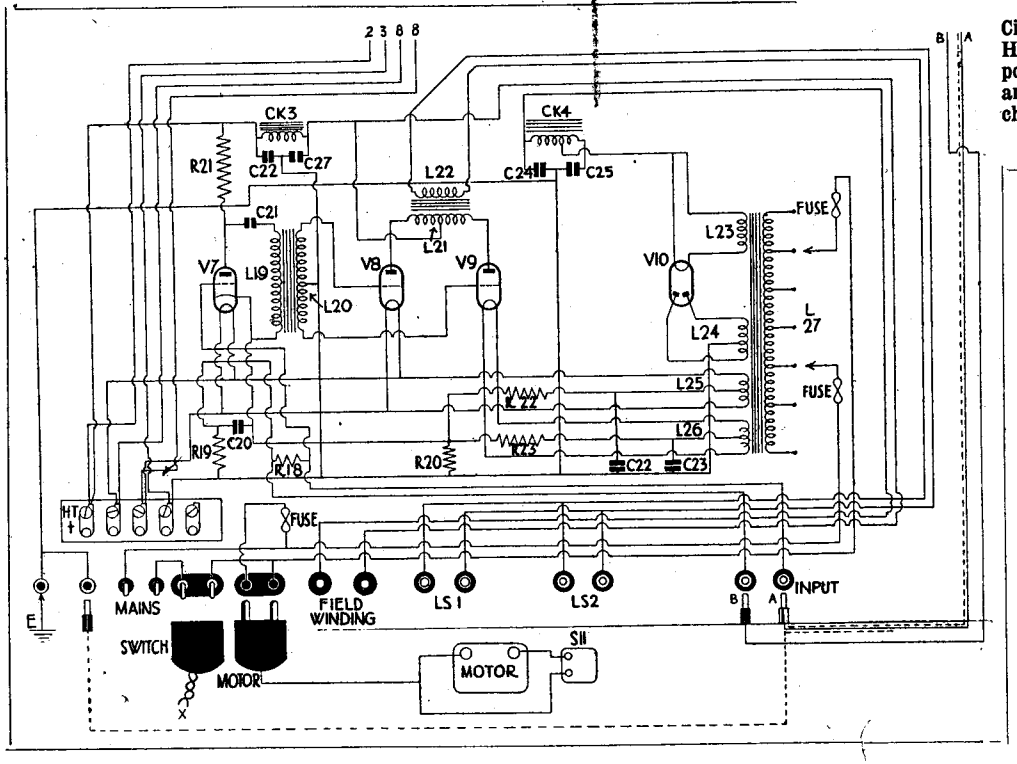
MW Band.—Inject a signal of about 220m. and adjust T9, T8, T7 and T10 for maximum output. Adjust T11 for maximum output on a signal of about 450m.

LW Band.—There are no adjustments for the LW band.

CONDENSERS

C		Mfd	C		Mfd
1	..	6 mmfd	15	.. ..	.0024
2	..	.00072	16	.. ..	2
3	..	.002	17	.. ..	1
4	..	.5	18	.. ..	.1
5	..	.1	19	.. ..	.001
6	..	150 mmfd	20	.. ..	.1
7	..	150 mmfd	21	.. ..	.2
8	..	150 mmfd	22	.. ..	6
9	..	150 mmfd	23	.. ..	6
10	..	.1	24	.. ..	4
11	..	150 mmfd	25	.. ..	2
12	..	150 mmfd	26	.. ..	2
13	..	.1	27	.. ..	2
14	..	1			





Circuit of the HMV output and power chassis, and (above) the chassis layout diagram.

WINDINGS

L		Ohms
1	..	38
2	..	5
3	..	5
4	..	16
5	..	19
6	..	19
7	..	5
8	..	4.2
9	..	.9
10	..	19
11	..	10
12	..	2.9
13	..	39
14	..	39
15	..	39
16	..	39
17	..	39
18	..	39
19	..	1,250
20	..	10,000
21	..	700
22	..	1.25
23	..	.2
24	..	200 + 150
25	..	.1
26	..	.2
27	..	6.3 total
CK1		43
CK2	..	85
CK3		4,000
CK4		340 + 23

GEC 3446

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The negative HT supply is taken via the fuse lamp, which takes the form of a 3.5 v .15 amp. flash lamp bulb. HT decoupling is effected by C18 and C19.

GANGING

IF Circuits.—Set range switch to LW and tuning control to maximum capacity setting of gang condenser. Set volume control to maximum.

Remove oscillator valve (V2) and connect modulated oscillator to the top connection of the front section of gang condenser.

Connect output meter across primary of output transformer (tags to which the orange flexible leads are connected) or to the external speaker sockets. If a multiple meter is used, set this to the 100 v or 120 v AC range.

Tune modulated oscillator to 125 kc and adjust its attenuator to give about 20 v reading on the output meter.

Adjust T1, T2, T3, T4 in that order to give a maximum peak reading on the output meter, progressively reducing the oscillator output by means of the attenuator to maintain the output meter reading at about 20 v.

Insert oscillator valve.

MW Band.—Check that at each extreme of travel; the pointer is equidistant from the outer scale fixing rivets.

Connect service oscillator to aerial and earth sockets via dummy aerial.

Set tuning condenser so that pointer indicates 214 metres.

Adjust T5 for maximum output. If two different adjustments give a maximum the one made should be that with minimum trimmer capacity.

Adjust T6 and T7 for maximum output.

Inject and tune in a 500 m signal.

Disconnect oscillator section of tuning condenser (VC3) by removing connection from its soldering tag.

Connect external variable condenser between the disconnected lead and chassis and adjust for a maximum reading.

Adjust the receiver tuning control to also give a maximum reading.

Disconnect external variable condenser and reconnect VC3. Care should be taken not to disturb the gang condenser setting before completing the next operation.

Adjust MW padding trimmer T8 for maximum output.

Note.—Should there be an error in calibration at 500 metres, the pointer should be re-set to correct for this and the complete procedure started again from and including the adjustment of T5.

Repeat preliminary adjustments to correct the setting of the oscillator trimmer T5, which will be slightly affected by the adjustment of T8.

LW Band.—Inject a 300 kc signal and tune receiver to 1,000 metres.

Disconnect oscillator section of gang condenser VC3 as before.

Connect external variable condenser as described above and adjust to give a maximum reading.

Tune receiver to give maximum output.

Disconnect external variable condenser and reconnect VC3.

Adjust LW oscillator trimmer T9 for maximum output.

Adjust service oscillator to 165 kc, and tune receiver to 1,818 metres.

Disconnect oscillator section of gang condenser VC3 as before. Connect external variable condenser and adjust to give a maximum output.

Adjust receiver tuning control to give a maximum reading and then disconnect external variable condenser and reconnect VC3.

Adjust LW oscillator trimmer T10 for maximum output.

Repeat first adjustments above to correct the setting of T9, which will be slightly affected by the adjustment of T10.

Whistle Suppressor.

This adjustment should not be made unless there is a heterodyne whistle at about 1,200 m, when an aerial is connected.

Inject a signal of 250 kc and tune receiver to heterodyne whistle at approx. 1,200 m.

Adjust suppressor trimmer T11 for minimum volume of heterodyne whistle.

V1 Neutralising Adjustment.

The original setting of T12 neutralising condenser is for an absolute minimum capacity. If this is increased, weak signals between 200 and 300 metres will result.

V4 Sensitivity Adjustment.

Connect aerial and earth to their respective sockets on the receiver.

Tune to 300 metres approx.

Increase the capacity of IF feed back trimmer T13 until when, rotating tuning condenser, stations are received with a swish on the sidebands. The capacity should then be reduced until this effect just disappears. The intermediate amplifier is then in its most sensitive condition.

Note.—It is essential to carry out the above adjustment with an HT voltage slightly in excess of 141 volts in order to maintain stability under working conditions.

PYE QU3

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C25, C27, giving four positions for the tone control.

A permament heterodyne filter circuit is provided by L16 and C26 across the primary L17 of output transformer.

The HT supply and heater circuits follow conventional lines, the heater current being controlled by a barretter thus eliminating mains voltage adjustments. The HT circuit incorporates a half-wave rectifier valve V6, the output of which is smoothed by L20, C30 and C31. The mains are HF filtered by L21, L22, C32 and C35, and fuses are included in each mains lead.

GANGING

IF Circuits.—Inject a 465 kc signal between the control grid of V1 and the chassis, via a .002 mfd condenser.

The lead to the control grid should be removed from the valve and a .5 megohm resistance connected between the valve terminal and the chassis. Then to stop the valve oscillating a condenser of .25 mfd should be connected between the oscillator anode and chassis.

Adjust T1, T2, T3 and T4 in that order for maximum reading on output meter.

SW Band.—Switch to SW. Connect service oscillator to A and E sockets. Inject and tune in a signal of 15 megacycles and adjust T5 for maximum output.

MW Band.—Switch to MW. Inject and tune in a signal of 210 metres and adjust T6 and T7 for maximum output.

Inject and tune in a signal of 520 metres and adjust T8, after which the trimming at 210 metres should be rechecked.

LW Band.—Inject and tune in a signal of 1,800 metres and adjust T9 for maximum output.

IF Filter.—The circuit L1 and C2 may be adjusted to give minimum output from an IF signal injected into the aerial circuit.