G.E.C. BATTERY A.W. QPP FOUR

The G.E.C. Battery All-wave QPP Four, catalogue number BC3856, is a four-valve superhet with QPP output.

CIRCUIT.—The aerial input is direct to a coupling condenser or *via* a series condenser to a set of tuned aerial coils coupling to the grid of V1, the frequency changer. Here, the signal is converted to the I.F. and passed *via* an I.F. transformer to the grid of V2. This is an H.F. pentode forming the I.F. amplifier.

A further I.F. transformer couples V2 to the demodulating diode of V3, a double-diode triode. The other diode, fed by a coupling condenser, provides a D.C. potential for A.V.C. The manual volume control is in the coupling arrangements to the grid of the triode section of V3.

V3 is coupled by a parallel-fed transformer to the output valve V4. This is a twin pentode valve operating on the quiescent push-pull system. Pentode compensator condensers are connected across the two half-primaries of the speaker transformer.

Battery power consists of a type BB376 135-volt H.T. battery, a BB9 9-volt grid bias unit and a BC230 2-volt 60-a.h. accumulator. These are all G.E.C. products.

Chassis Removal.—Remove the control knobs from the front (spring fixing) and take off the back of the cabinet (spring clips). Remove all batteries and the two bracing battens from the back.

Remove the four chassis securing bolts and washers from the base and the two wood screws holding the dial assembly to the top (inside) of the cabinet.

If the top of the dial is pulled down a little so as to clear the top, the chassis can be withdrawn to the extent of the speaker leads. If the leads to the speaker are unsoldered : the black is connected to the left tag and also to the speaker frame, and the white lead is connected to the right-hand tag.

Special Notes.—Two sockets at the rear of the chassis enable the aerial to be connected either direct or, if whistles are heard on the medium waves, *via* a series aerial condenser.

Two terminals at the rear of the chassis are for connecting an external speaker. This should be of the permanent magnet type and the speech coil connected to the external L.S. sockets.

The two dial lights are Osram bulbs rated at 2 volts .6 amp. with M.E.S. bases. To economise in L.T. current they are operated by a spring-release switch that automatically switches off when the pressure is removed.

A fuse bulb in the H.T. negative return lead is located on the chassis deck behind the rubber accumulator stand. This is an Osram bulb rated 3.5 volt .15 amp., with an M.E.S. base.

The battery leads are connected with reference to colours. The pink goes to G.B.+, yellow to —7½ volts G.B., white to H.T. negative and red to H.T. positive. The blue lead will vary with the grade of the QPP valve as marked on the bulb. Grades V, W and X require 111, 120 and 126 volts respectively.

VALVE READINGS

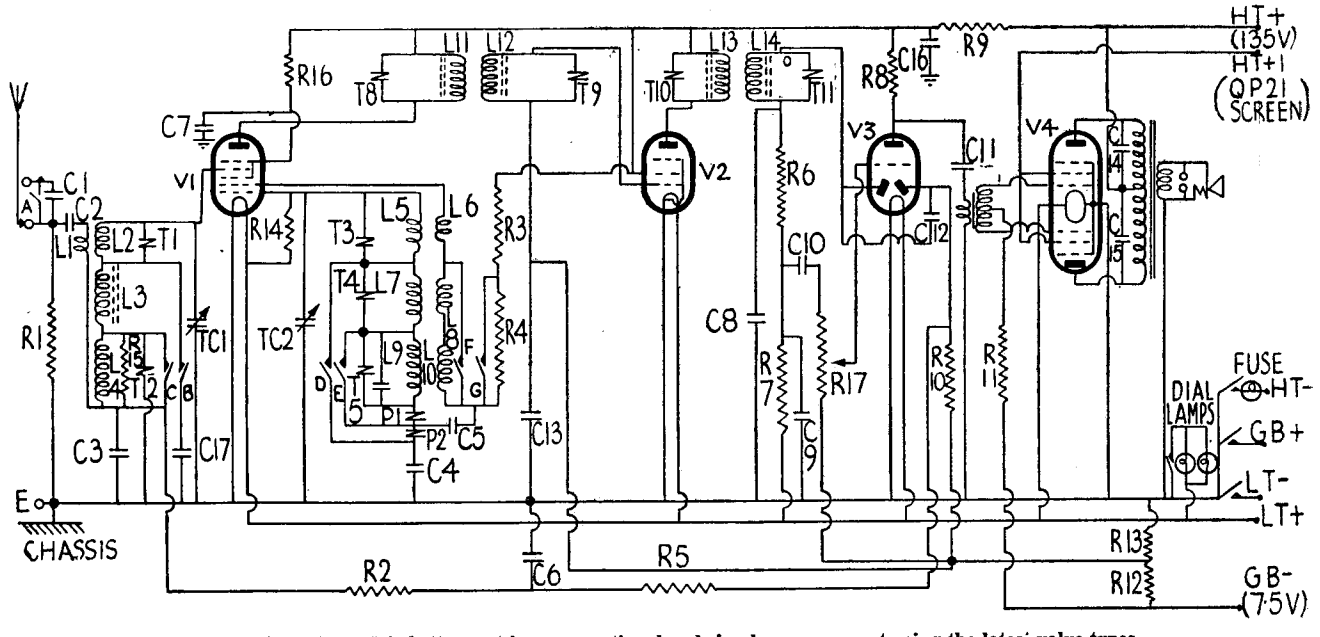
No signal. Volume maximum. M.W. min. cap. New batteries.

V.	Type.	Electrode.	Volts.	Ma.
	All Osram.			
1	X22 (7) ..	Anode ..	100	1.8
		Screen ..	105	2.1
		Osc. anode	55	1.8
2	W21 (4) ..	Anode ..	100	3.1
		Screen ..	100	1.4
3	HD22 (7) ..	Anode ..	35	.6
4	QP21 (7 ..	Anode ..	130	1.6
		Screen ..	120	1.
		Anode ..	130	1.6

Circuit Alignment Notes

I.F. Circuits.—Set the receiver to medium waves and the gang to maximum capacity. Short circuit the oscillator section of the gang and turn volume control to maximum.

Connect service oscillator between the top grid cap of V1 (via a .1 mfd. condenser) and chassis, leaving the set connection



The circuit of the G.E.C. battery set is a conventional and simple arrangement using the latest valve types.

made. Connect an output meter across tags of C14.

Tune the service oscillator to 456 kc. and adjust T8, T9, T10 and T11 in that order and then in reverse order, reducing the input from the oscillator as the circuits come into line to render the A.V.C. inoperative.

Signal Circuits.—Remove short circuit from oscillator section of gang. Connect the service oscillator to A and E sockets via dummy aerial or fixed condenser.

Only feed sufficient input from the service oscillator to obtain definite peaks in the output meter so as to prevent the A.V.C. operating.

Short Waves.—Tune set and oscillator to 17.6 metres (17 mc.) and adjust T3 and T1 respectively for maximum, using the lower capacity peak.

On some receivers slight pulling is experienced when the aerial trimmer T1 is adjusted. The tuning control should be rocked slightly to compensate for this.

Medium Waves.—Disconnect the oscillator section of the gang by unsoldering its lead, and connect an external variable condenser between the disconnected lead and chassis.

Tune the receiver to 214 metres (1,400 kc.) and adjust the external variable condenser and receiver tuning control simultaneously to give a maximum reading.

Disconnect the external variable condenser and reconnect the oscillator section of the gang. Without altering the tuning control setting, adjust the trimmer T4 for maximum.

Disconnect the oscillator section and reconnect the external condenser as before.

Tune the service oscillator to 500 metres (600 kc.), and adjust the set tuning control and external condenser for maximum response.

Disconnect the variable condenser and reconnect the oscillator section of the gang, and without altering the setting of the tuning control, adjust P1 for maximum.

Repeat the 214 metres operation.

Long Waves.—Tune set and oscillator to 1,000 metres (300 kc.) and adjust T5 and T2 for maximum.

Disconnect the oscillator section and reconnect the variable condenser as before. Tune the oscillator to 1,818 metres (165 kc.) and adjust the tuning control and variable condenser simultaneously for maximum.

Disconnect the variable condenser and reconnect the oscillator section, and, without altering the tuning control, adjust P2 for maximum response.

Repeat the 1,000 metres operation to ensure correct calibration.

EMISSION AND A.V.C.

As the A.V.C. delay voltage depends on the anode current of one of the valves —almost invariably a double-diode triode —any loss of emission of this valve will reduce the delay voltage. The result will be that A.V.C. will come into operation "earlier," and the set will apparently lose sensitivity.

In a set with amplified A.V.C., loss of emission can make a set practically useless, as a large negative voltage will be applied to the grids of controlled valves.

G.E.C. QPP4 on Test

MODEL BC3856.—For battery operation and requiring a BB376, 135-volt H.T. battery, a BB9 9-volt grid bias battery and a BC230 2-volt 60-ah. accumulator. Price, 10½ gns.

DESCRIPTION. — Four-valve, battery operated superhet table model with Q.P.P. output.

FEATURES.—Full-vision scale with name and wave calibration. Controls for combined volume and master switch. Concentric tuning control. Pilot light switch. Volume and wavechange knobs control indicators on top of wavelength scale. Extension speaker sockets.

LOADING.—H.T., 14.3 ma.; L.T., .81 amp.

Sensitivity and Selectivity

SHORT WAVES (16-50 metres).—Good gain and selectivity. Many stations identified with no difficulty in tuning, although the dial light switch was found to effect the setting.

MEDIUM WAVES (200-550 metres). —Excellent gain and selectivity with good background. Gain well maintained over entire waveband.

LONG WAVES (1,000-2,100 metres). —Excellent gain and selectivity for battery set and only a little side splash on Deutschlandsender, all other main stations being easily received.

Acoustic Output

Well balanced tone, with ample volume for an ordinary room. The attack is crisp and clean and there is very little colouration on either speech or music.

CONDENSERS

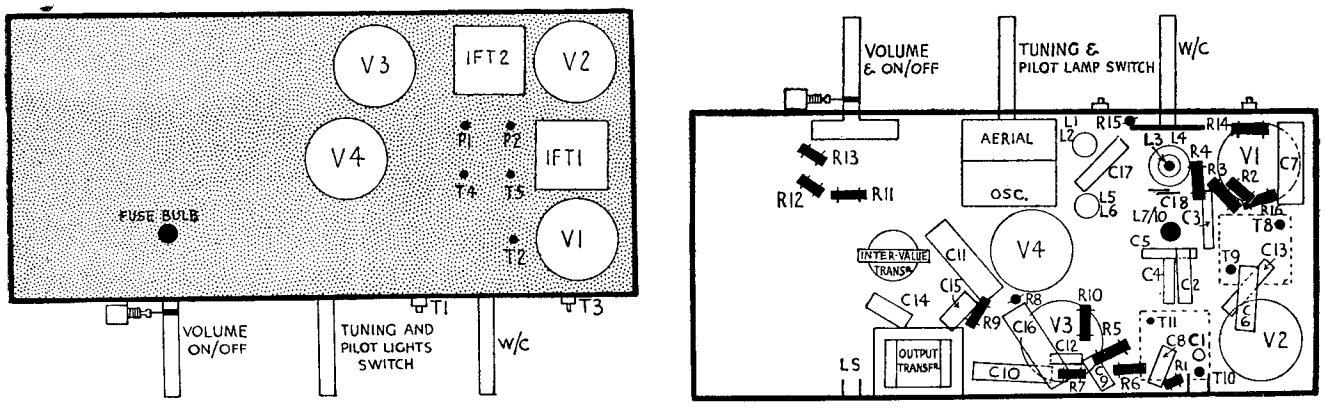
C.	Purpose.	Mfds.
1	Series aerial	.00002
2	Aerial coupling	.005
3	V1 A.V.C. decoupling (part)	.003
4	Oscillator fixed padder	.004
5	Oscillator anode decoupling.	.005
6	V1 A.V.C. decoupling (part)	.05
7	V1 screen decoupling	.25
8	H.F. bypass	.0001
9	H.F. bypass	.0001
10	L.F. coupling	.02
11	L.F. coupling	.25
12	A.V.C. diode coupling	.00005
13	V2 bias decoupling	.02
14	Pentode compensator	.001
15	Pentode compensator	.001
16	H.T. reservoir	.25
17	S.W. input return	.1
18	L.W. oscillator fixed padder	.00002

RESISTANCES

R.	Purpose.	Ohms.
1	Aerial shunt	9,900
2	V1 A.V.C. decoupling (part)	220,000
3	Oscillator anode decoupling (part).	6,600
4	Oscillator anode decoupling (part).	33,000
5	V1 A.V.C. decoupling (part)	440,000
6	H.F. stopper	55,000
7	Demodulating diode load (part).	440,000
8	V3 anode load	99,000
9	H.T. decoupling	3,300
10	A.V.C. diode load	440,000
11	V4 grid leak	99,000
12	Bias potr. (part)	500
13	Bias potr. (part)	150
14	Oscillator grid leak	99,000
15	L.W. aerial coil shunt	440,000
16	V1 screen decoupling	22,000
17	Volume control	1 meg.

WINDINGS

Winding	Ohms.	Winding.	Ohms.
L1	.2	L11	7
L2	.02	L12	7
L3	4	L13	4
L4	31	L14	4
L5	.04	T1 primary (half)	670
L6	.04	Sec. (half)	1,460
L7	2.8	Speaker trans. primary	780
L8+L10	4		
L9	13.6		



The top (left) and underside chassis layout diagrams. The trimmers are conveniently accessible from above.