MARCONIPHONE 234 FOUR-VALVE BATTERY SUPERHET

CIRCUIT.—A four-valve battery superhet receiver for operation on the usual medium and long wavelengths.

The input to V1 is through a single coupled tuned circuit, incorporating an image supressor; two aerial connections are provided, one of which connects a small condenser in series.

Coupling to V2 is through an air-cored I.F. transformer tuned to 456 kc. Reaction is applied to the first I.F. transformer from the second I.F. transformer by means of an adjustable condenser and coupling consisting of two pieces of twisted wire. The effect is to increase both gain and selectivity.

Coupling to V3 is through a second I.F. transformer, one diode being used to supply A.V.C. to the preceding valves in the orthodox manner.

The L.F. output of V3 is passed *via* a parallel-fed Q.P.P. transformer to the output valve V4, which is a double pentode.

High tension and grid bias are derived from a single combined battery and low tension from a 2-volt cell.

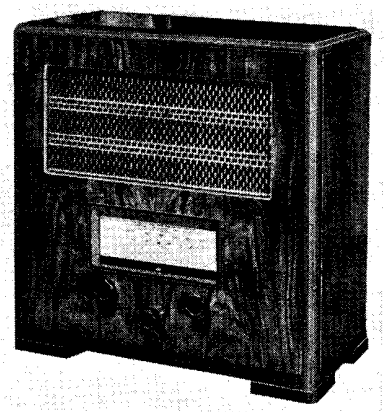
Special Notes.—The dial lamp is rated at 2 volt .1 amp. To remove it, undo the bolt in the carrier that will be found by the side of the volume control.

The external speaker is connected on the secondary of the output transformer, and should be of low speech coil impedance.

Removing Chassis.—Remove the three knobs on the front of the cabinet and the small escutcheon round the local distance switch.

Remove the four bolts from underneath the cabinet and the bolt securing the speaker to the battery platform.

Free the battery leads from the cleat, and the chassis will then slide out of the cabinet.



Alternative aerial tappings are provided on this Marconiphone Model 234 four-valve battery superhet.

ALIGNMENT NOTES

I.F. Circuits.—Connect a modulated oscillator to the grid cap of V1 through a small condenser and an output meter across the external speaker terminals.

Tune the oscillator to 456 kc., and ad-

(*Continued on opposite page.*)

RESISTANCES

R.	Purpose.	Ohms.
1	Local distance switching ...	75,000
2	V1 osc. grid leak	50,000
3	Osc. anode decoupling ...	23,000
4	A.V.C. decoupling	.5 meg.
5	A.V.C. diode load	.5 meg.
6	V3 grid leak	1 meg.
7	H.F. stopper	23,000
8	V3 anode feed	50,000
9	V3 anode decoupling ...	7,500
10	V4 grid stabiliser	.23 meg.
VR1	Volume control	.5 meg.

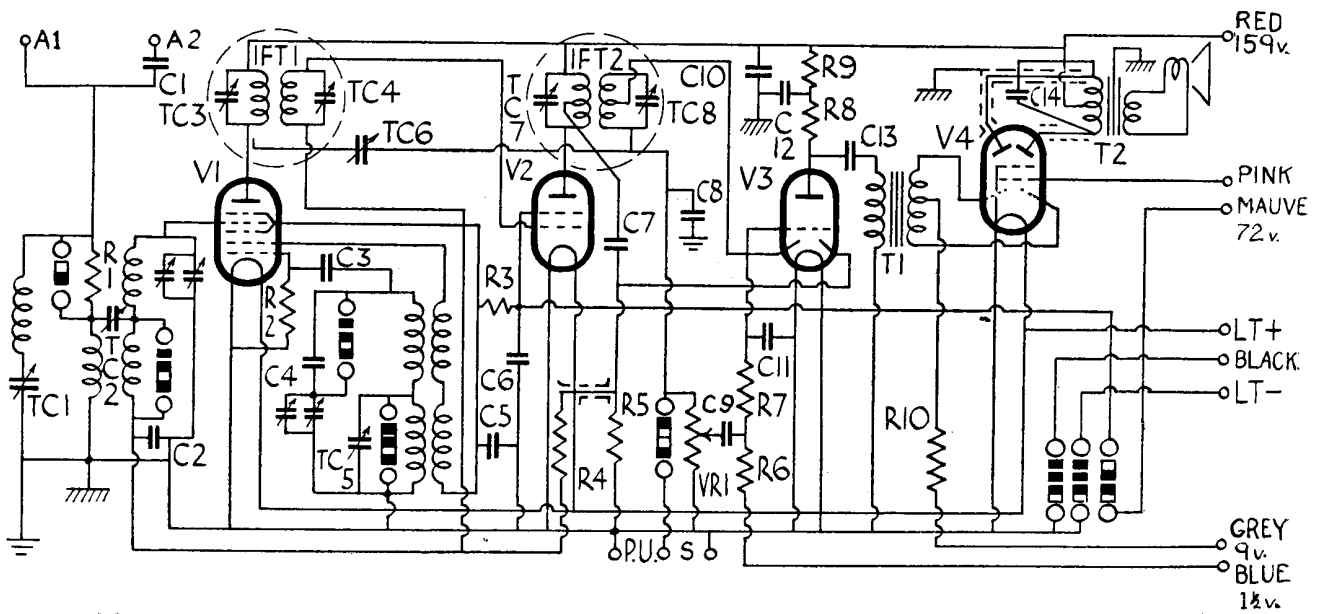
CONDENSERS

C.	Purpose.	Mfd.
1	Series aerial	.0005
2	V1 A.V.C. decoupling ...	.1
3	Oscillator grid	.00023
4	Oscillator tracking ...	.0005
5	Osc. anode decoupling ...	.1
6	V2 screen by-pass	.1
7	H.F. coupling	.00023
8	H.F. by-pass	.00023
9	L.F. coupling	.1
10	H.T. shunt	.1
11	H.F. by-pass	.0001
12	V.3 anode decoupling ...	2
13	L.F. coupling	.1
14	Tone compensating	.001

VALVE READINGS

No signal. Volume maximum. New batteries.

V.	Type.	Electrode.	Volts.	Ma.
1	All Osram X41 Met. ...	Anode ...	170	.27
		Screen ...	25	.65
	(7) ...	Osc. anode	25	.7
2	VS 24 Met. (4) ...	Anode ...	165	3.2
		Screen ...	60	.95
3	HD 21 Met. (5)	Anode ...	80	1.3
4	QP 21 (7) ...	Anode (1)	168	1.2
		Anode (2)	168	1.1
		Screen ...	140	.9



A feature of the circuit of the Marconiphone 234 is that reaction is applied to the first I.F. transformer from the second to increase gain and selectivity.

Quiescent Push-Pull

IN an ordinary amplifier the valve is worked about the mid point of its characteristic. When two valves are used in push-pull the same principle is adopted. In quiescent working, however, the valves are biased to the bottom of the straight portion of the characteristic.

On one half cycle the operating point is swept along the entire length of one characteristic, and a similar effect takes place with the other valve during the second half-cycle.

Normally, the quiescent current is negligible and the amount of current flowing during the operation is obviously proportional to the signal strength.

This system, known as Q.P.P., an abbreviation for quiescent push-pull, can be arranged with two ordinary triodes or pentodes.

To obtain sufficient grid voltage to swing the operating point over the entire characteristic, it is necessary to use a high step-up transformer—usually one with a ratio of about 10-1. This is of the centre-tapped or push-pull variety.

For a useful output direct from a detector it is usually better to use two pentodes in the output stage. To prevent distortion, these should be matched, and final adjustment should be made by means of the priming grid voltage.

So as to stabilise the circuit, a fixed resistance of 100,000 to 150,000 ohms is connected, often in the common bias lead.

A correction circuit in the form of a fixed condenser and resistance is also generally placed between the anodes to minimise peak voltages and correct over-emphasis of high notes.

A fixed resistance of about 50,000 ohms is frequently placed across the primary of the input transformer to prevent destructive surge voltages.

As the H.T. battery runs down, it is necessary to readjust the bias to prevent distortion. Sometimes a large fixed resistance is put in shunt with the grid battery so that this runs down at the same rate as the H.T. battery.

The optimum load conditions for a Q.P.P. stage are different from those of an ordinary amplifier. Accordingly, when used with a standard speaker a step-down centre-tapped matching choke is generally used. The correct ratio can be calculated from the standard formula.

(*The above is an extract from the technical section of the "Broadcaster Trade Annual."*)

MARCONIPHONE MODEL 234

(*Continued from opposite page.*)

just T1, T2 and T3 and T4 for maximum reading on the output meter.

Medium Waves.—Connect an aerial and earth to the set and loosely couple the oscillator to the aerial. Tune the receiver and the oscillator to 200 metres, and adjust T5 for maximum reading.

Tune oscillator and receiver to 230 metres and trim T6 for maximum reading on output meter.

Repeat the above at 550 metres for check.

Long Waves.—Tune the receiver and the oscillator to 1,500 metres and trim T7 for maximum reading on output meter.

Image Suppressor.—Tune the oscillator to the frequency of any strong transmission between 250 and 285 metres. Switch the receiver to long waves and inject the signal strongly to the aerial and earth terminals. Tune the signal to maximum and then adjust T8 for minimum reading on the output meter.

Inject a signal of 456 kc. to the aerial and earth terminals and adjust T9 for minimum reading.

These are the chassis layouts of the Marconiphone 234 battery superhet. On top is the plan view and below the underneath arrangement.