

**MARCONIPHONE
880, 881
H.M.V. 1200, 1600**

Six-valve, plus rectifier and tuning indicator, three band A.C. superhet with motor push-button tuning and automatic frequency control. Marketed by Marconiphone Co., Ltd., and "His Master's Voice."

Circuit.—This receiver incorporates automatic push-button tuning and wave-change switching operated by two motors. Automatic frequency control compensates for motor tuning errors.

Transformers for each band couple the aerial to V1, a radio-frequency amplifier. Tapped tuned anode coils feed V2, the frequency-changer. This has straightforward tuned grid oscillator circuits, with adjustable permeability-tuned coils on M.W. and L.W. Ignored I.F. coils link V3, the I.F. amplifier, and V5, a conventional double-diode-tube for demodulation, A.V.C., and L.F. amplification.

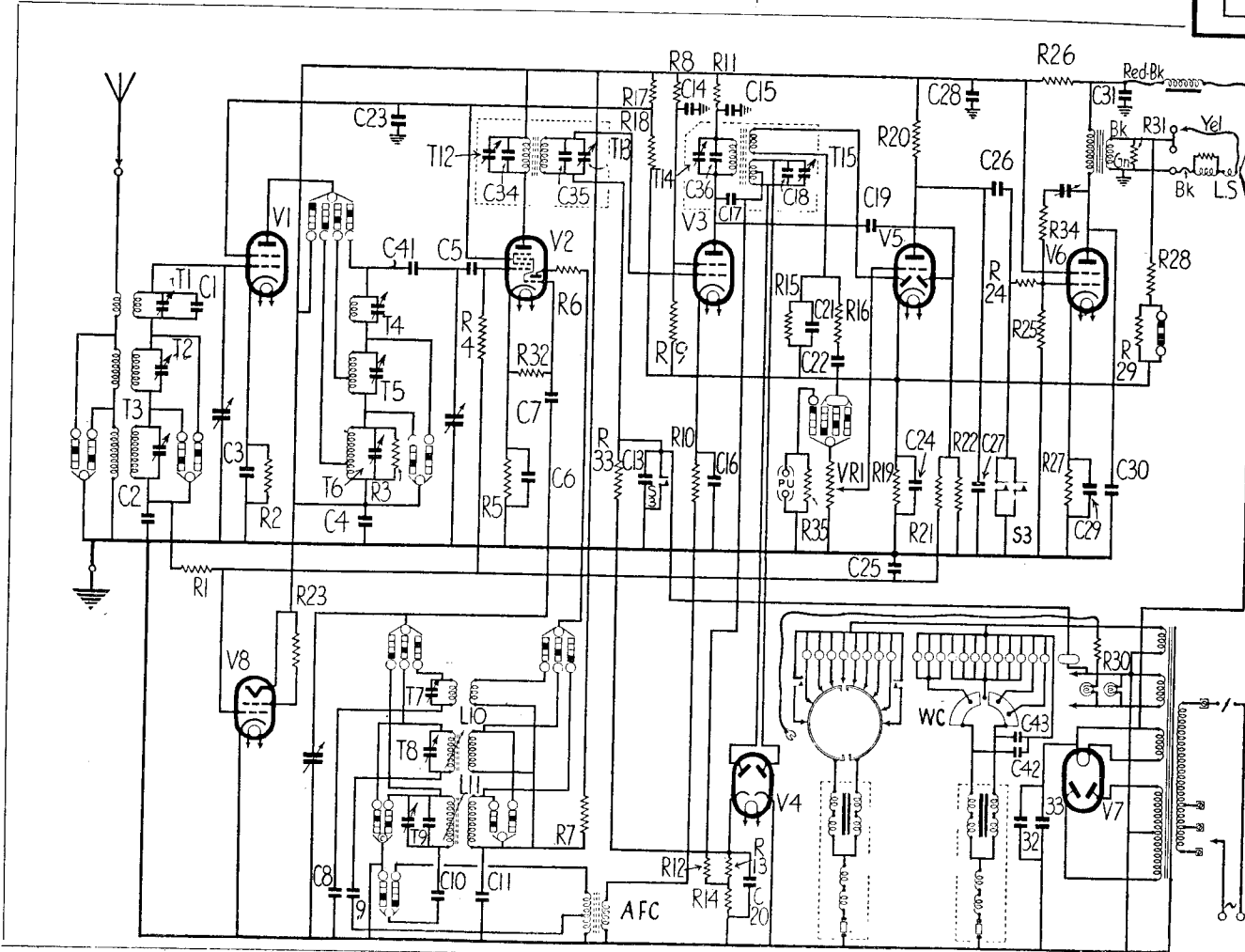
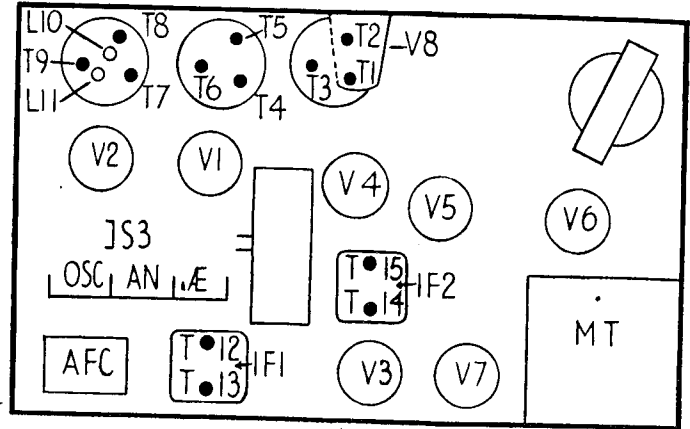
A third, centre-tapped winding on the second I.F. transformer energises V4, a double-diode

"discriminator" which produces a voltage across R13-14, this being positive or negative according to whether an "off-tune" signal is above or below true I.F.

The voltage is applied as bias to V3 and controls its anode current. This passes through the polarising winding of the A.F.C. unit, which is designed so that a change in current alters the inductance of the tapped winding. This is included in the M.W. and L.W. oscillator tuned circuits, and its change in value alters the oscillator frequency so that the I.F. is put "on tune." A contact, S.M.L. in the circuit, shorts out the A.F.C. on manual. S3, on the end of the tuning motor, mutes the set and also shorts the A.F.C. during motor dialling.

V6 is an output tetrode with negative feedback tone control by variable condenser and V7 a full-wave rectifier. V8 is a tuning indicator controlled from the A.V.C. line.

WAVEBANDS: 16.5-51, 195-560, 750-2,000 metres. Pilot lamps, 6.3v., .25 amp. Provision for P.U. and 5-ohm extension speaker.



A motor-tuned receiver, this model includes automatic frequency correction provided by V4, a discriminator valve. By shifting the oscillator frequency, this puts the I.F. in tune.

MODELS 881 (MARCONIPHONE) AND 1,600 (H.M.V.) radiogram models.—In these, the I.F. amplifier (V3) is used as a first amplifying stage for the pick-up. The gramophone push-button has extra wired contacts to effect this change. The L.F. load resistance is R11. Decoupling is by a further resistance of 7,000 ohms, and the coupling condenser, .0015 mfd. A revised hum neutralised light weight pick-up (28800A) is fitted, working in conjunction with a special matching unit.

MOTOR TUNING
Two reversible-type 20-volt motors are used. Buttons 1-6 are for M.W., and 7 and 8 are L.W. Both motors have thermal overload switches (S4 and 6) and muting switches (S3 and 5) operated by the end thrust. S7 is the cruiser control, and the contactors must be kept at the ends of the slides.

CONDENSERS*

C	Mfds.
1	.. 10 mmfds.
2	.. .023
3	.. .05
4	.. .05
5	.. 50 mmfds.
6	.. .05
7	.. 75 mmfds.
8	.. .0035
9	.. 455 mmfds.
10	.. 195 mmfds.
11	.. .023
12	.. 50 mmfds.
13	.. .05
14	.. 8
15	.. .05
16	.. .05
17	.. .0001
18	.. 150 mmfds.
19	.. 50 mmfds.
20	.. .001
21	.. 75 mmfds.
22	.. .0035
23	.. .05
24	.. .23
25	.. .05
26	.. .023
27	.. 150 mmfds.
28	.. 8
29	.. 25
30	.. .005
31	.. 8
32	.. .023
33	.. 12
34	.. 75 mmfds.
35	.. 75 mmfds.
36	.. 120 mmfds.
41	.. .05
42	.. .1
43	.. .1

To change a button setting, the set is tuned manually to the required station and a suitable M. or L.W. button and contactor selected. The contactor is then moved to the centre of the insulated station on the disc. If push-button stations sound off-tune (the A.F.C. is not "pulling" stations in tune), tune manually to station about 300 m., touch another button so that M.W. button is released and all buttons are up, adjust T15 with non-metallic screwdriver for minimum shadow in tuning indicator. A.F.C. should then hold over 4 vernier degrees on M.W. and 8 on L.W. If not, realign whole set.

GANGING
I.F. AND DISCRIMINATOR CIRCUITS.—Tune to L.W. max., volume max. Release all buttons. Inject at V3 grid, with grid lead removed. Fully unscrew T15, inject at 465 Kc., adjust T14 for max. Measure volts between V3 cathode and chassis. Inject I.F. to green-yellow "stations in tune" and adjust T15 for same volt reading. Replace V3 grid lead, inject at V2 grid, switch to L.W., adjust T12, 13 and 14. Check T15 by releasing L.W. button and noting output does not change. M.W. BAND.—With gang at max., pointer must be $\frac{1}{8}$ in. beyond 560 m. Adjust T8 at 195 m., T2 and T5 at 225 m. Pad with L10 at 530 m., rocking gang. L.W. BAND.—Trim with T9 at 750 m., and T3 and T6 at 850 m. Pad with L11 at 1,900 m. Readjust T3 and T6 at 1,400 m., and finally repeat M.W. padding. S.W. BAND.—Trim with T7 at 16.5 m., and T1 and T4 at 18 m.

Value Readings and Resistances Tables, Col. 5, opposite page

EKCO PB510, C511

PB515, RG516

PB510 and C511 are table and console models of a four-valve, plus rectifier, three waveband, motor-tuned push-button A.C. superhet. PB515 and RG516 are table and radiogram models of a basically similar chassis with a tuning indicator and push-pull output. Made by E. K. Cole, Ltd., Southend-on-Sea.

Circuit.—On S.W. the aerial is transformer coupled to V1, the frequency-changer, through iron-cored coils. On M.W. and L.W. inductively coupled band-pass coils are employed. The oscillator section of V1 is conventional with coupled anode reaction coils; M. and L.W. coils are iron cored. R5 and R6 are in series with the S.W. and M.W. reaction coils.

There are individual trimmers across each tuned coil on all three wavebands. There is no padding condenser on S.W. On the other two bands fixed padding condensers are used.

Permeability-tuned I.F. transformers link V2, the I.F. amplifier, and V3, the double-diode triode. R11 is a damping resistance across the secondary of I.F.1

The A.V.C. diode is fed from V2. anode through C15. A.V.C. arrangements are absolutely straightforward. The demodulation diode circuit is also very simple, consisting only of R21, R20 between the I.F.2 secondary and cathode, with C17, C18 in shunt across these resistors.

Tone control and negative feed-back arrangements complicate the grid circuit of the triode section of V3.* The volume control is in the grid circuit in the usual way. The top end is fed from the diode load through C19. Between the two, however, are R23 and C20 in parallel, forming a top boost. The side of C19, remote from the diode load, is also taken to the live pick-up terminal and to the pick-up switch. From the same point C21 feeds the tone control.

Inverse feed-back is obtained by a third winding on the output transformer and is applied via R27 to the bottom of the tone control. Across bottom to slider of tone control are R28 and C25

CIRCUIT DIAGRAM

E. K. COLE, Ltd., do not permit us to publish the circuit diagram of this receiver. The material on this page, however, has been specially prepared so that few difficulties should arise on this account.

The circuit description is particularly detailed and the component tables give the purposes as well as the valves, and are grouped stage-by-stage.

in shunt. The slider also picks up the bottom of the volume control and a resistance, R17, from this point goes to chassis. A switch can connect R27 to chassis.

V4, the output pentode, has C23 between anode and cathode, and a tone circuit consisting of C24 and a choke between anode and H.T.

The full-wave rectifier, V5, is in a conventional circuit with a smoothing choke, the speaker being a P.M. type.

Wavebands: 13-50, 190-550, 1,000-2,000 metres. Consumption, 51 watts; tuning motor, 60 watts extra. Provision for P.U. and 3-4 ohm extension speaker.

PB515 and RG516

Push-pull output pentodes, V4 and V5, replace the single output pentode, V4. They are fed by a push-pull transformer. An electronic tuning indicator, V7, is energised from the demodulation diode.

RG516 has a further push-button switch and a resistance, R34, across the P.U.

Consumption: 69 watts; tuning motor, 60 watts; gram. motor, 14 watts.

GANGING

I.F. Circuits.—Tune to L.W. maximum and adjust I.F. cores at 126.5 kc.

S.W. Band.—See that pointer is on 50 m. with gang at maximum. Adjust T1 at 14 m., using lowest capacity peak, and T2 at 15 m.

M.W. Band.—Adjust L1 (M.W. oscillator coil core) at 500 m.

Adjust T3 at 190 m. and T4 and T5 at 250 m.

Repeat all these adjustments.

L.W. Band.—Adjust L2 (L.W. oscillator coil core) at 1,700 m.

Adjust T6 at 1,000 m. and T7 and T8 at 1,300 m.

Image Rejection.—Inject strong 300 m. signal. Tune-in image at about 406.5 m. Adjust T9 for minimum.

BUTTON MECHANISM

Automatic wave-changing is obtained by using a wave-change commutator as well as a station selector commutator. All the buttons (except the on-off) have an earthed bar and two contacts. One contact links up all buttons of the same waveband (6 M.W., 2 L.W.) and also the corresponding wave button. This connection continues to a contactor on the wave-switch commutator. The remaining points of each station switch go to contactors on the station commutator.

The wave commutators continue the circuit through an electro-magnet clutch and the motor windings to the other side of the special winding on the mains transformer.

When a station button is pressed current passes through a wave commutator, energises the clutch and the motor. The clutch engages the wave-switch drive and interrupts the station commutator circuit. When the wave position is reached, current ceases, the clutch disconnects the wave drive and completes the station commutator circuit. The motor is then energised again until the station point is reached.

A tapping on the mains winding and a switch provide for a setting-up light.

BUTTON ADJUSTMENT

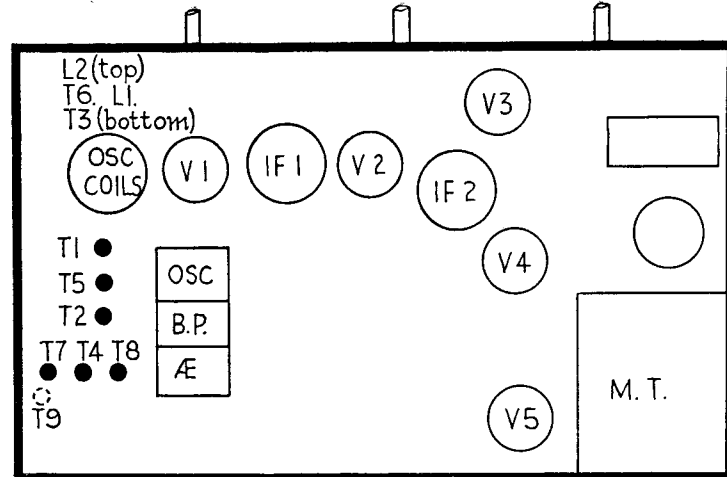
The stations on each waveband can be set in any order. Select correct waveband with M.W. or L.W. button. Move the station setting plug, at back of cabinet, from socket N, to socket S.

Depress selected station button and tune manually to required station. Move corresponding contactor on rail to bar between two small rollers and adjust till station setting lamp goes out.

Modifications.—In later models, R7=47,000, R9=510, R18=two 470,000 with V2 fed from junction, R15=3,300 and forms V1, as well as V3, anode feed.

RESISTANCES

R.	Purpose	Ohms.
1	V1 cathode bias	200
2	V1 screen feed	47,000
3	V1 screen-chassis	68,000
4	V1 osc. grid leak	100,000
5	V1 osc. anode series	220
6	V1 anode on M.W.	1,000
7	V1 anode feed	56,000
8	V1 A.V.C. feed	1 meg.
9	V2 cathode bias	1,000
10	V2 screen feed	91,000
11	Across I.F.1 secondary	470,000
12	V2 A.V.C. feed	680,000
13	V3 cathode bias	1,000
14	V3 anode load	56,000
15	V3 anode feed	10,000
16	V3 grid leak (volume control)	1 meg.
17	V3 grid leak V.C.—chassis	820



R.	Purpose	Ohms.	C.	Purpose	Mfds.
18	A.V.C. diode load	1 meg.	26	Across R28	.08
19	A.V.C. feed to R8	150,000	27	H.T. smoothing	10
20	Demodulation diode load	100,000	28	H.T. smoothing	8
21	H.F. filter, series with R20	270,000	29	Shunt with C27	.1
22	Feed to V3 grid coupling condenser	56,000	30, 31	Across motor	.02
23	P.U. to V.C.	220,000			
24	Tone control	500,000			
25	V4 cathode bias	120			
26	V4 grid leak	270,000			
26	V4 grid stopper	100,000			
27	Feed-back to R24	15,000			
28	R27-R24 slider	47,000			
29	L.W. aerial coil shunt	2.2 meg.			
	L.F. choke	650			

MODELS PB515, RG516.					
32, 33	V4, V5 anode-cathode				.0025

VALVE READINGS

V	Type	Electrode	Volts	Ma.
1	ECH3	Anode	218	1.65
		Screen	65	2.2
		Osc. anode	82	2.7
		Cathode	1.4	6.6
		Heater	6.3	—
2	EF9	Anode	250	4.8
		Screen	110	1.4
		Cathode	3.3	6.2
		Heater	6.3	—
3	EBC3	Anode	100	2.2
		Cathode	2	2.2
		Heater	6.3	—
4	EL3	Anode	235	43
		Screen	250	4.8
		Cathode	5.7	4.8
		Heater	6.3	—
5	AZ1	Anodes	275 A.C.	—
		Cathode	290 D.C.	—
		Heater	4	—

CONDENSERS

C.	Purpose	Mfds.
1	M.W. aerial feed	.001
2	V1 bias shunt	.1
3	V1 screen decouple	.1
4	V1 A.V.C. decouple	.1
5	V1 osc. grid	25 mmfds.
6	M.W. fixed pad	1,505 mmfds.
7	L.W. fixed pad	425 mmfds.
8	L.W. osc. shunt	20 mmfds.
9	V1 osc. anode decouple	.1
10	V2 bias shunt	.1
11	V2 screen decouple	.1
12	V2 A.V.C. decouple	.01
13	V3 bias shunt	25
14	V3 anode decouple	4
15	A.V.C. diode feed	15 cm.
16	A.V.C. decouple	.02
17, 18	H.F. filter with R21	.0002
19	L.F. coupling to R23	.01
20	R23 shunt	.0003
21	Feed to T.C.	.0025
22	V4 bias shunt	50
23	V4 anode-cathode	.0025
24	V4 tone circuit (part)	.005
25	V4 grid feed	.1

MODELS PB515, RG516.

V	Type	Electrode	Volts	Ma.
1	ECH3	Anode	235	2
		Screen	75	2.5
		Osc. anode	70	3.6
		Cathode	1.4	8.1
2	EF9	Anode	285	4.7
		Screen	145	1.4
		Cathode	6.1	6.1
3	EBC3	Anode	110	2.5
		Cathode	2.5	2.5
4, 5	EL3	Anodes	275	33
		Screens	283	3.9
		Cathode	8	73.5
6	AZ1	Anodes	300 A.C.	—
		Cathode	330 D.C.	—
		Heater	285	—
7	EM4	Anode	285	—
	Pilot lamps, 6.3v., .35 amp.			