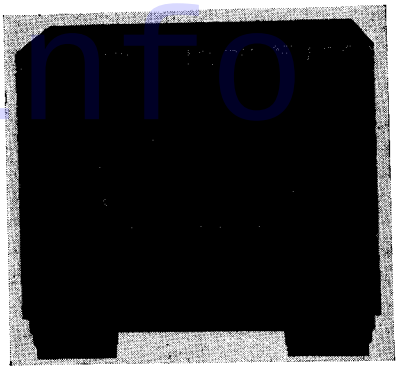
MARCONIPHONE 871 FOUR-BAND SIX



The Marconiphone 871 radiogram incorporates a five valve, plus rectifier, motor-tuned set and an auto record changer. The radio chassis is also used in the 853 table model.

CIRCUIT.—Use is made of four single-tuned input circuits without coupling windings. These circuits, selected by the first switch, are applied to the grid of V1 through a coupling condenser and return resistance by which the A.V.C. voltage is obtained. The aerial is connected directly across the tuned circuits through a very small isolating condenser.

Radio frequency amplification is carried out by what is, in effect, a tuned anode circuit with a tapping point for the anode on the medium and long bands.

Coupling to V2, the mixing valve, is again through a small condenser and grid-return resistance. Mixing is carried out by a triode hexode, the anode circuit of which contains the primary winding of the first intermediate transformer. The oscillator section is conventional.

Intermediate amplification is carried out by V3, A.V.C. control again being provided. I.F.T.2 leads to the demodulating diode of V4. This valve is a combined double diode triode and has the other diode arranged for A.V.C. A delay voltage is obtained from a tapping on a potentiometer network across the common bias resistance.

The demodulation diode is taken to the volume control through an isolating condenser. Bias for the triode section is derived from an ordinary cathode resistor.

The amplified signals from V4 are passed on through a standard resistance coupling network to V5, an output tetrode. This derives its bias from the common bias potentiometer—which takes the form of the speaker field winding. Negative feedback is provided by a variable condenser between the anode and grid of V5, and forms the tone control.

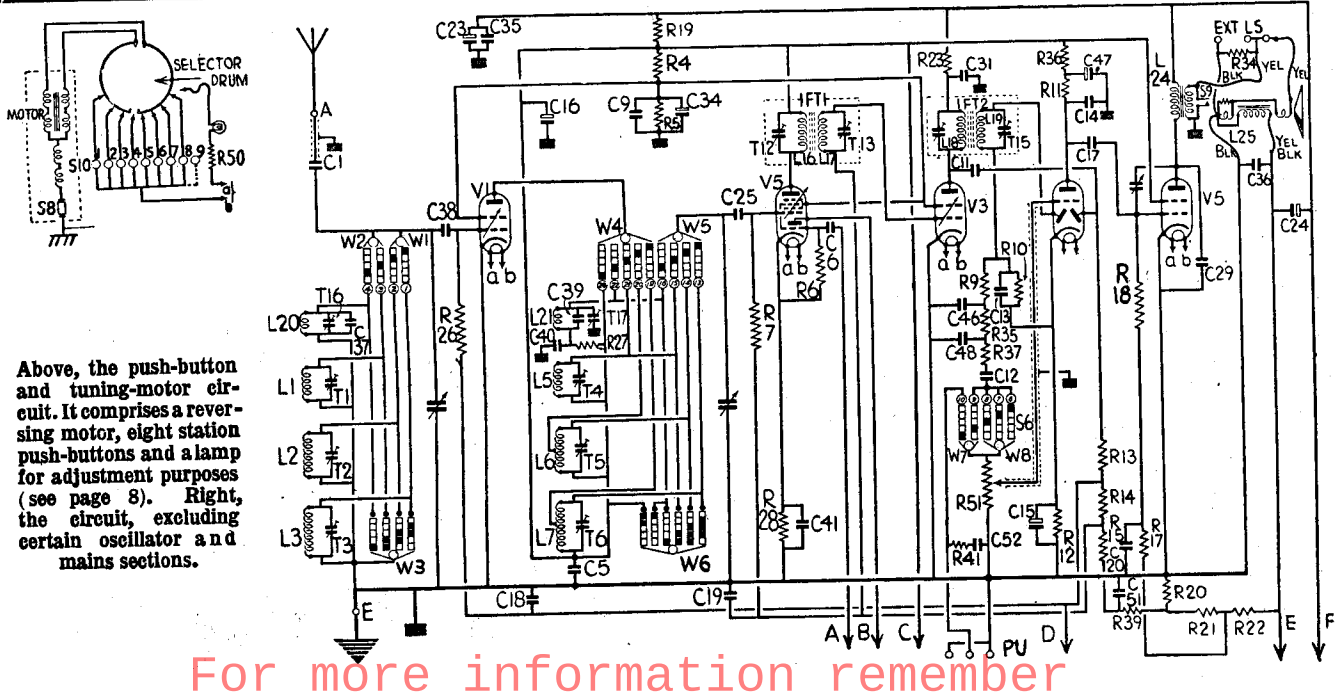
Power supply is obtained from a transformer and rectifying valve, V6, arranged for full-wave working, the speaker field coil being used for smoothing. The field is in the negative lead, and, as already mentioned, in conjunction with fixed resistances, forms the main bias potentiometer.

VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
	(All Marconi)			
1	KTW63 ..	Anode ..	210	7
		Screen ..	95	1.5
	X65 ..	Anode ..	210	1.7
		Screen ..	95	4
		Osc. anode	103	3
3	KTW63	Anode ..	150	8.5
		Screen ..	95	1.7
4	DH63 ..	Anode ..	103	1.1
5	KT63 ..	Anode ..	230	23
		Screen ..	210	4.5
6	U50 ..	Heater ..	245	
Tuning indicator.	Y63			
Pilot lamps.	Osram ..	Filament. .	6.3	300

CONDENSERS

C.	Purpose.	Mfds.	C.	Purpose.	Mfds.
1	Aerial series	.0000075	29	V5 anode shunt	.0023
5	V1 anode H.F. decoupling ..	.1	30	V2 osc. anode decoupling ..	4
6	V2 osc. grid	.0001	31	V3 anode decoupling	.05
7	S.W.1 osc. fixed padder ..	.0023	34	V1, V2, V3 screen decoupling	4
8	M.W. osc. fixed padder ..	.00035	35	H.T. line H.F. by-pass ..	.015
9	V1, V2, V3 screen H.F. bypass	.1	36	Bias pot. shunt	.05
10	V2 osc. anode H.F.decoupling	.005	37	S.W.2 input fixed trimmer ..	.00003
11	A.V.C. coupling	.000075	38	V1 grid coupling	.000035
12	L.F. coupling	.01	39	S.W.2 H.F. fixed trimmer ..	.000015
13	Demodulating diode shunt ..	.00005	40	S.W.2 H.F. decoupling ..	.01
14	V4 anode shunt	.00035	41	V2 cathode bias shunt ..	.1
15	V4 cathode bias shunt ..	25	42	S.W.1 osc. fixed trimmer ..	.000005
16	V1 anode decoupling	4	43	S.W.2 fixed padder	.005
17	L.F. coupling	.05	44	L.W. osc. fixed padder ..	.00015
18	V1 A.V.C. decoupling ..	.05	45	S.W.2 osc. coupling	.0023
19	V3 A.V.C. decoupling ..	.23	46	H.F. by-pass	.00005
20	V5 bias decoupling	.23	47	V4 anode decoupling	2
23	H.T. line shunt	4	48	H.F. by-pass	.00005
24	H.T. smoothing	8	49	M.W. osc. fixed trimmer ..	.000015
25	V2 grid coupling	.00035	51	A.V.C. delay bias decoupling	.21
27	L.W. osc. fixed trimmer ..	.000035	52	Pick-up shunt	.02



Above, the push-button and tuning-motor circuit. It comprises a reversing motor, eight station push-buttons and a lamp for adjustment purposes (see page 8). Right, the circuit, excluding certain oscillator and mains sections.

A C.-R. tuning indicator is connected to the A.V.C. line.

The tuning motor circuits form an entirely separate device controlled by a number of buttons and a drum ring. It is not associated with any particular controlling circuits for frequency stabilising. Details of the motor tuning will be found under the Press Button notes on page iv.

Chassis Removal.—For minor adjustments the chassis may be removed from the cabinet without disconnecting the leads to the speaker and push-button switch. Removal up to this stage is accomplished by taking off the back of the cabinet and withdrawing the operating control knobs, which are held by grub screws. After removing the four fixing bolts the chassis can be withdrawn.

The speaker can be withdrawn by removing the four fixing screws and disconnecting the leads between the chassis and also the extra speaker channel. The colour code is as follows : Tag No. 2 yellow, tag No. 3 black, tag No. 1 yellow and black.

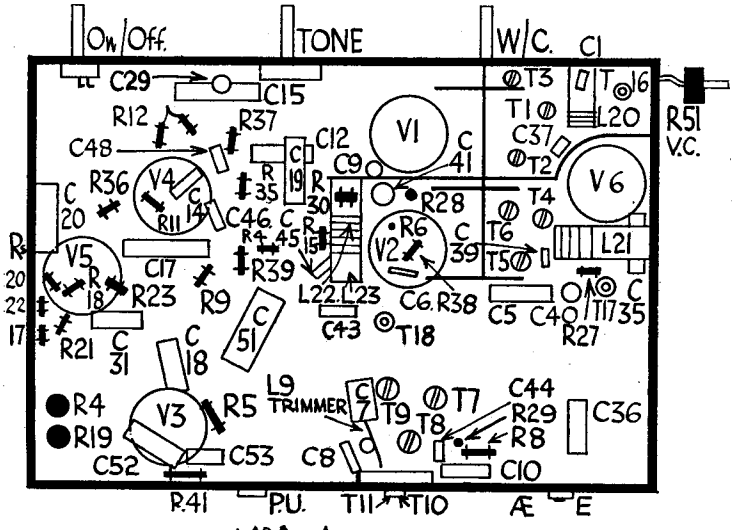
If it is necessary completely to remove the entire chassis the push-button switch must be released by withdrawing the three screws, and the wiring between the speaker, motor, pick-up and aerial and earth sockets must also be disconnected. There are four fixing bolts which secure the chassis board, and when these are released the chassis on the board can be withdrawn through the top of the cabinet.

The record changing mechanism cannot be withdrawn until the left hand lid stay is detached. It may also be necessary, if it is desired to withdraw the auto-record

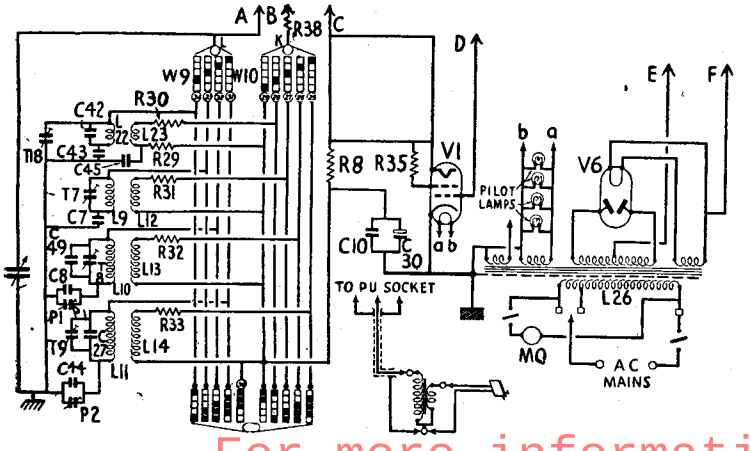
(*Chassis Removal Notes continued on page* 16. *Push-button and alignment notes on page* 8.)

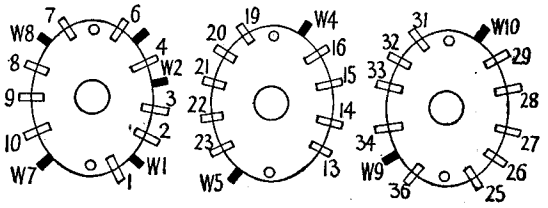
RESISTANCES

R.	Purpose.	Ohms.	R.	Purpose.	Ohms.
4	H.T. pot. (part)	10,000	25	T.I. feed	1 meg.
5	H.T. pot. (part)	23,000	26	V1 grid return	500,000
6	V2 osc. grid leak	100,000	27	S.W.2 H.F. decoupling	1,000
7	V2 grid return	500,000	28	V2 cathode bias	150
8	V2 osc. anode decoupling	35,000	29	S.W.2 het. voltage control	150
9	H.F. filter	50,000	30	S.W.2 het. voltage control	50
10	V4 demodulating diode load	250,000	31	S.W.1 het. voltage control	350
11	V4 anode load	50,000	32	M.W. het. voltage control	500
12	V4 cathode bias	750	33	L.W. het. voltage control	1,000
13	A.V.C. diode load (part)	500,000	34	Speaker shunt	30
14	A.V.C. diode load (part)	500,000	35	H.F. filter	50,000
15	A.V.C. diode load (part)	500,000	36	V4 anode decoupling	23,000
17	V5 bias decoupling	350,000	37	H.F. filter	50,000
18	V5 grid-leak	150,000	38	V2 osc. anode regeneration control	75
19	H.T. pot. (part)	1,000	39	A.V.C. delay bias decoupling	100,000
20	Bias pot. (part)	1,000	41	Pick-up shunt	50,000
21	Bias pot (part)	7,500	50	Lamp circuit load	15
22	Bias pot. (part)	50,000	51	Volume control	2 meg.
23	V3 anode decoupling	10,000			



Left, under chassis layout diagram identifying most of the components. The top "deck" layout is on page 8.





Above, the three switch banks with the one nearer the "click" plate on the left. Contacts are numbered as in the circuit. In the circuit, the small squares indicate, from top to bottom, LW, MW, SW1, SW2 and Gram. Left, the remainder of the circuit which has had to be separated from the main part (on opposite page) for presentation reasons.

Marconi 871 on Test

MODEL 871.—For A.C. mains, 195-225 volts, 50-60 cycles. Price 39 gns.

DESCRIPTION. — Five-valve, plus rectifier, four-band, motor and manually tuned automatic radiogram.

FEATURES. — Large full-vision illuminated scale, calibrated in names and wavelengths on all bands and with band indicator. Inset scale and tuning indicator. Controls for switching, volume, range, tuning and tone. Sockets for extension speaker. Auto record mechanism plays 12-in. or 10-in. records. Provision for manual or motor control tuning with eight press buttons.

LOADING.—100 watts (with record changer).

Sensitivity and Selectivity

SHORT WAVES (13-30 and 30-90 metres).—Very good selectivity and excellent gain with well regulated A.V.C. No drift trouble and easy handling.

MEDIUM WAVES (195-570 metres). —Excellent gain and selectivity, with local station spread on adjacent channels only, and a clean background.

LONG WAVES (725-2,000 metres).—Similar performance to medium waves. Very slight side splash on Deutschlandsender.

Push-button Operation.

During our tests the push-button tuning worked perfectly. It is easy to adjust and should give no trouble.

Acoustic Output

Ample volume for a large room, with very nicely balanced output and excellent low note radiation, together with clean, crisp attack. Tone control is well balanced and not too vigorous.

Push-button Adjustments of Marconiphone 871 Four-band A.C. Six

PROVISION is made for the selection of eight stations by press buttons. These control a motor which drives the main tuning condenser. The stopping position of the motor is controlled by contact bands, which are mounted on a drum, and adjustable contacts which are locked in the desired positions.

The tuning motor is operated from the A.C. mains and is provided with a pair of muting contacts so that when it is in operation the noise due to tuning through a number of stations is cut out.

The accuracy with which the stations will be tuned in depends largely on the care exercised in setting the contacts. A local lamp circuit is provided to enable the correct position for a contact to be found.

A useful method of checking the settings is to press the manual button and, with the lamp lead clipped on to the contact under test, turn the tuner, noting if the lamp lights symmetrically on the two sides of the station—i.e., at an equal distance on either side of the true tuning position.

If it is desired to alter the adjustment so that other stations may be received, proceed as follows :—

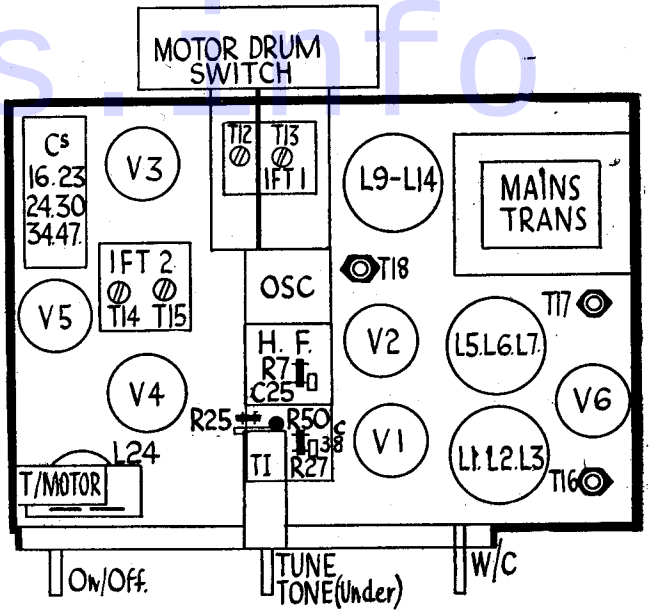
Any newly selected station must take the button of an existing station in approximately the same position of the pointer. Press the manual button and tune the receiver exactly to the station required.

The push buttons are numbered from left to right looking at the front, and corresponding numbers will be found on the contact pin leads at the rear. At the top of the cabinet is a clip holding a lead attached to the lamp above the contact pins. Remove the lead from this clip and insert the tag, on the end of the lead, into the spring of the contact pin corresponding to the number of the push buttons to be changed. The lamp should then light.

Taking care not to disturb the positions of any of the other contact pins, slide the contact pin selected towards the white dot on the drum edge (the pin should not be very far from the white dot) until the lamp goes out. Move the pin very slightly to the left and right to ensure that it is finally set half-way between the points at which the lamp lights.

Remove the tag from the contact pin and return it to its clip. Re-label the button with its new station name and check the setting by pressing the button concerned.

If the station sounds shrill, the setting is not quite accurate. The manual button should be pressed, the station tuned in by the visual tuning indicator and the position of the contact pin checked again.



The top of chassis layout diagram for the 871 radiogram and 853 table model. The auto tuning arrangements do not involve any special radio circuits.

WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	.1	S.W.1	Aerial gang and chassis.
2	5.6	M.W.	Aerial gang and chassis.
3	16	L.W.	Aerial gang and chassis.
5	.1	S.W.1	H.F. gang and chassis.
6	5.5	M.W.	H.F. gang and chassis.
7	16	L.W.	H.F. gang and chassis.
9	Very low.	S.W.1	W9 and C7.
10	5.2	M.W.	W9 and P1.
11	5.5	L.W.	W9 and P2.
12	350	S.W.1	W10 and C10+R8.
13	500	M.W.	W10 and C10+R8.
14	1,000	L.W.	W10 and C10+R8.
16	4	—	V2 anode and C16+R4.
17	4	—	V3 grid and C19+R15.
18	4	—	V3 anode and C31+R23.
19	4	—	V9 demodulating diode and C13+R10.
20	Very low.	—	Aerial gang and chassis.
21	Very low.	S.W.2	On tags W2 and C10+R27
22	Very low.	S.W.2	W9 and C42+C43.
23	200	S.W.2	W10 and C10+R8.
24	450	—	On tags.
25	1,600	—	On tags.
26	18	—	Mains plug.

Circuit Alignment Notes

I.F. Circuits.—Connect output meter to receiver, switch to long waves, short circuit oscillator section of ganged condenser and connect signal generator to grid of V2 through a 0.1 mfd. condenser, leaving the existing grid connection intact.

Inject 465 kcs.

Adjust T12, T13, T14, and T15 in this order for maximum output, subsequently checking the adjustment in the same order. Reduce the input as the circuits come into line, so that the receiver is always operated below the A.V.C. point.

Before aligning any of the signal circuits check the dial position by seeing that the pointer registers with the small mark just below the long wave calibration at the right hand end of the scale.

Long Waves.—Switch the receiver to L.W., set the tuning condenser to minimum, and tune set and oscillator to 725 metres. Adjust T9 for maximum output. Tune set and oscillator to 850 metres and adjust T3 and T6 for maximum.

Set oscillator to 1,900 metres and tune in on the receiver. Adjust P2 for maximum, at the same time rocking the ganged condenser.

Recheck the setting of T9 at 725 metres.

Medium Waves.—Adjust the set to M.W., tuning the gang to minimum and the signal generator to 195 metres. Adjust T8 for maximum.

Tune set and oscillator to 210 metres and adjust T2 and T5 for maximum.

Set the generator to 530 metres and tune in the signal on the receiver. Adjust P1 for maximum output, at the same time rocking the ganged condenser.

Recheck the setting of T8 at 195 metres.

Short Waves.—Switch the receiver to S.W.1 and adjust the ganged condenser to minimum, tuning the generator to 30 metres. Adjust T7 for maximum output.

Tune the set and oscillator to 32 metres and adjust T1 and T4 for maximum.

Tune oscillator to 86 metres, tune in the signal and adjust the wire loop adjoining T7 to coil tags for maximum output, at the same time rocking the ganged condenser.

This is not necessary unless L9 has been replaced or wiring disarranged. The adjustment is obtained by opening out or pinching together the loop.

Switch to S.W.2 band. The trimmers on this band are of the push-pull type. To adjust them the hexagonal locking nut must be slackened and the plug can be moved up with a piece of bent wire.

With the gang at minimum, tune oscillator to 13 metres, and adjust T18 for maximum.

Tune set and oscillator to 14 metres and adjust T16 and T17 for maximum, at the same time rocking the gang.

Set the oscillator to 30 metres and tune in on the receiver and adjust the loop of L22 for maximum output, at the same time rocking the gang. This is only necessary if L22 has been replaced or the wiring disarranged.

Replacement Condensers

Exact replacement condensers for the 871-853 chassis are available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. For the block containing Cs 24, 16, 23, 30, 34 and 47, there is unit 4218, 13s. 6d., and for C15, unit 2918, 1s. 9d.

Ever Ready 5101 Battery P.B.

(*Continued from page* 15)

independent of each other, and any adjustment to the trimmers or padders of any one band does not influence other bands.

Long Waves.—See that the pointer registers with the 180 deg. line on the scale with the gang at maximum capacity. Set the long-wave padder, P2, approximately three quarters in.

Set the pointer against the 1,200-metre mark on the scale. Apply a modulated signal of 1,200 metres to the A. and E. sockets. Adjust the long-wave oscillator trimmer, T10, to receive this signal. Then adjust T11 and T12 to give maximum output.

Set the pointer to the 1,700-metre mark on the scale and apply a signal of 1,700 metres. Adjust P2 for maximum.

Readjust T10, T11 and T12 at 1,200 metres.

Check again at 1,700 metres and see that the pointer is at the 1,700-metre mark. If it is not, make slight adjustment to P2.

Medium Waves.—See that the pointer registers with the 180 deg. line on the scale with the gang at maximum capacity. Set P1 two-thirds in.

Set the pointer against the 214-metre mark on the scale and apply a 214-metre signal to the A. and E. sockets. Adjust T7, then T8 and T9 for maximum.

Set the pointer and oscillator to 500 metres and adjust P1 for maximum.

Readjust at 214 metres. Check again at 500 metres and see that the pointer is at the 500-metre mark. If it is not, make a slight adjustment to P1.

Short Waves.—See that the pointer registers with the 180 deg. line with the gang at maximum capacity. Set the pointer against the 15-mcs. mark on the scale.

Screw T5 in fully. Apply a 15-mcs. signal to the A. and E. sockets and slowly unscrew T5 until this signal is heard. Care should be taken that the right peak is selected. Two peaks will be found on this trimmer; the correct one is the one with the trimmer at the higher capacity, that is the first one heard when unscrewing the trimmer.

Having selected the correct peak, adjust T6 for maximum.

Apply a signal of 7.5 mcs. and tune the receiver to this signal. Adjust the top turn of the S.W. oscillator coil (L.7) and the gang simultaneously to give maximum.

Reset the pointer to the 15-mcs. mark and readjust T5 and T4 to give maximum output.

Push-Button Adjustment

The wavelength of each of the 7 push buttons is adjustable within certain limits by means of the pairs of trimmers. These may be reached by removing the small panel from the right-hand side of the receiver.

The adjustment range of each button, as shown on the trimmer board, is as follows :—

Button 1	... ...	200- 300 m.
,, 2	... ...	200- 300 m.
,, 3	... ...	290- 445 m.
,, 4	... ...	350- 480 m.
,, 5	... ...	470- 535 m.
,, 6	... ...	850-1,460 m.
,, 7	... ...	1,300-1,665 m.
,, 8	... ...	on-off switch.

To receive a certain wavelength on a push button, apply that signal to the A. and E. sockets of the receiver. With the appropriate button pressed, adjust the corresponding oscillator trimmer, which is on the left of the panel, till the signal is heard. Then adjust the aerial trimmer.

E.R.S. Trimming Tools

AN excellent kit of 10 trimming tools is produced by E.R.S. Tools, of 1, Pine Parade, High Road, Wallisdown, Bournemouth.

The tools are contained in a strong Pegamoid roll. They comprise 3-in. vest-pocket turnscrew, 6-in. turnscrew, 8-in. turnscrew, special Ferranti tool. There are six hexagon tools as follows : 5 B.A. for Ekco, etc., 6 mm. for Philips, ¼ in. for Philco, 8 mm. for Philips, 4 B.A. for Portadyne, and 1 B.A. for Marconiphone.

The tools are constructed of best-quality ebonite and a minimum quantity of tempered steel is used for the tips. The majority are 3 in. in length, a good feature, as this size enables many jobs to be undertaken without removing the chassis from the cabinet.

Marconiphone 871 Four-band Six

(*Continued from page* 7)

changer alone, to disconnect some of the leads between the chassis and the sockets at the back. Remove the three nuts on the underside of the mechanism carriers when the complete unit can be lifted out.

If it is necessary to remove the complete motor board carrying the changer mechanism, the following procedure must be adopted :—

Set jaws to 12 in. position, depress record controller and carefully rotate turntable by hand until pick-up lands in playing position. Swing pick-up in and again rotate turntable so that record jaws occupy minimum space, but not so that pick-up swings back across turntable.

Remove jaw knob, auto switch knob, and speaker switch knob, remove turntable spindle and turntable, and unscrew the metal plate round the base of the pick-up.

Remove seven flat-headed screws securing motor board and lift the board carefully off.

Special Notes.—The receiver examined was found to adhere very closely to the nominal specification. There were, however, one or two minor differences. The cathode bias for V4, having a value of 750 ohms, was found to consist of two 1,500 ohm resistances.

Some alteration has been made to the network which is in shunt with the pick-up. The circuit shows a simple resistance and condenser connected in shunt with the pick-up transformer. Originally this had a value of 100,000 ohms and .01 mfd. The manufacturers state that the values are now 50,000 ohms and 0.2 mfd. Actually in the chassis examined the original values were found to be used in addition to a further shunt condenser of .0005 directly between the pick-up socket and earth.

Certain of the components may be difficult to locate, and it will be noticed that six of the main smoothing and decoupling condensers are in the large condenser block on the top of the chassis. In addition, the grid coupling and return resistances R7 and C25, R27 and C28 are also on the top of the chassis.

The tuning indicator feed resistance is at the back of the socket, and this is also used to carry the lamp circuit resistance for adjusting the press buttons. This resistance is a wire-wound unit, R25, having a value of 50 ohms.

Some of the resistances and condensers are also in the coil cans, and those which will not be seen are R13, R31, R32 and R33. The condensers are C11, C27 and C49.

Wave-change Switches.—The switches and the leads to them are all very accessible; the sketch shows how the contacts and wipes appear when viewed sideways with the chassis inverted.

The first wafer controls the signal input tuned circuits, W1 and W2 being joined together to provide a five-position switch. The other half of the wafer is devoted to W7 and W8, which are similarly joined and control the pick-up switching.

The next wafer carries W4 and W5, controlling the two portions of the H.F. circuit on each band. The third wafer carries W9 and W10, controlling the tuned and untuned windings of the oscillator coil.

Earthing or short-circuit wipes are provided on certain of the switches, but these are not shown in detail in the circuit or the diagram.

Working Voltage Test

WHEN testing for "point to point" resistance, an ohmmeter may give a lower reading than that expected. This may be due to electrolytic condensers whose leakage current (when set is off) is large, or where this has increased due to age. The condensers may work perfectly well when the set is operating.

In such a case the best method of testing is to use a D.C. source which has a number of variable voltage outputs, and connect this (with the proper polarity) in series with a milliameter and the circuit or component under test. Then take readings of voltage and current, and from these compute the actual resistance of the component under working conditions.

The D.C. source is made as near as possible in value to that which is normally across the circuit or component when the set is operating.

These methods may appear rather complicated for a number of tests on a receiver, but, with suitable apparatus, which is simply constructed, and a little practice, the engineer will find they take a very short time and are a very positive method of making a decision.—F.D.-L., Dublin.