CONFIDENTIAL.

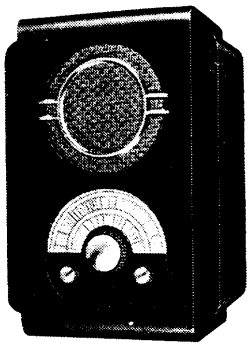
SERVICE MANUAL

Price 6d.

For the Information of Ekco Registered Dealers only.

NOT TO BE COPIED.

EKCO



MODEL UAW78

UNIVERSAL ALL-WAVE RECEIVER

GENERAL DESCRIPTION.

Model UAW78 is a five valve (including rectifier) superheterodyne for operation on 200/250 volt D.C. or 200/250 volt 40—80 cycle A.C. mains.

The wavebands covered are 200/560, 900/2,000 and 16/50 metres (18—5.7 megacycles).

Iron cores are used in the I.F. transformers and in the medium and long wave aerial and oscillator circuits. On these two wavebands negative feed-back is introduced from the anode to the grid circuit of the output valve and greatly improves quality of reproduction by practically cancelling harmonic distortion. It is cut out on the short waveband by operation of the wavechange switch.

Sockets for an extension speaker are provided, together with a screw switch for silencing the set speaker.

Consumption: A.C. 70 watts; D.C. 65 watts.

Intermediate Frequency: 460 kc/s.

Specified valves:

V1—Frequency-changer, **Mullard TH21C** (triode-hexode).
V2—I.F. amplifier, **Mullard VP13C** or **Ekco VPU1** (variable-mu H.F. pentode).
V3—Combined demodulator, A.V.C. and 1st L.F. amplifier, **Mullard TDD13C** (double-diode-triode).
V4—Output valve, **Mullard Pen36C** (L.F. pentode).
V5—Rectifier, **Mullard URIC** (half-wave rectifier).

CIRCUIT DETAILS.

Aerial section. If an ordinary aerial is connected to "A" socket, the aerial circuit is completed on M.W. and L.W. bands through the S.W. coil L2.

If a dipole aerial is connected to sockets "A" and "DA," the two halves lead to the ends of the S.W. aerial coil L2 on the S.W. band, and, through L2, via the wavechange switch, to the "top" ends of L4 or L6. (M.W. and L.W. aerial coils). On these two wavebands, therefore, the dipole acts as an ordinary "T" aerial.

A filter comprised of a Litz-wound iron-cored coil (L1) and condenser (C10) is connected across the aerial circuit to bypass 460 kc. signals which might otherwise break through the M.W. or L.W. preselector circuits to cause interference. The filter is inoperative on the S.W. band.

The wavechange switch is of the wafer type, and short-circuits the unused sections of the various coils by means of metal plates. (Untuned oscillator anode coils L11, L13 are short-circuited in the orthodox manner.) A stud on the rotor section of the switch selects the appropriate grid coil left un-shorted by the metal plate.

Frequency-changer, I.F. amplifier and demodulator sections. Input from the grid coil (L3, L5, or L7) is applied between grid and cathode of the hexode portion of V1, and mixed with the oscillations injected from the triode section to form a 460 kc. signal in the primary of the 1st I.F. transformer. This signal is amplified by V2 and demodulated by a diode of V3. A proportion is fed from the primary of the 2nd I.F. transformer to the other diode of V3 for A.V.C. purposes. A.V.C. is applied to V1 and V2.

L.F. section. The L.F. component developed across R14 is applied via volume control VR1 to the triode section of V3, amplified and passed to V4 grid through resistance R18. A reversed L.F. signal is developed across R18 on the medium and long wavebands by feed-back from a third winding on the output transformer T1. The latter is mounted on the receiver chassis and incorporates the speaker switch in its secondary circuit.

Rectifier section. H.T. is provided by half-wave rectification and smoothed by condensers C35, C36 and L.F. choke L18. The latter carries (a) half amp. fuse to protect the smoothing condensers against damage due to a short-circuit in the rectifier and (b) resistance R24 to protect the rectifier should the receiver be switched off and immediately on again after a period of use. A fuse is also incorporated in each side of the mains lead.

Mains-borne H.F. interference is suppressed by the filter coils L19, L20, and it should be noted that in no circumstances should an earth connection be made direct to the chassis, otherwise these coils will be damaged.

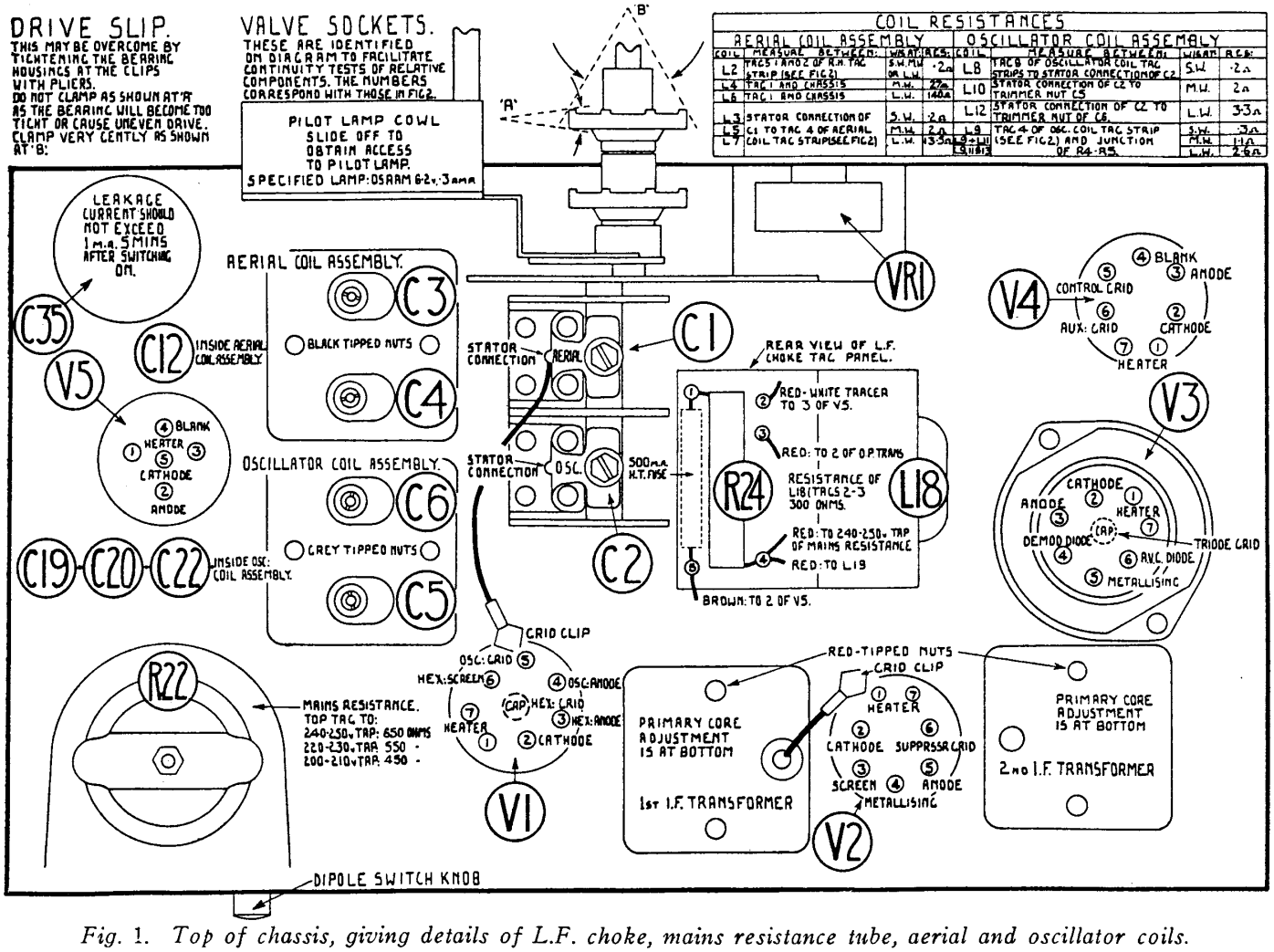


Fig. 1. Top of chassis, giving details of L.F. choke, mains resistance tube, aerial and oscillator coils.

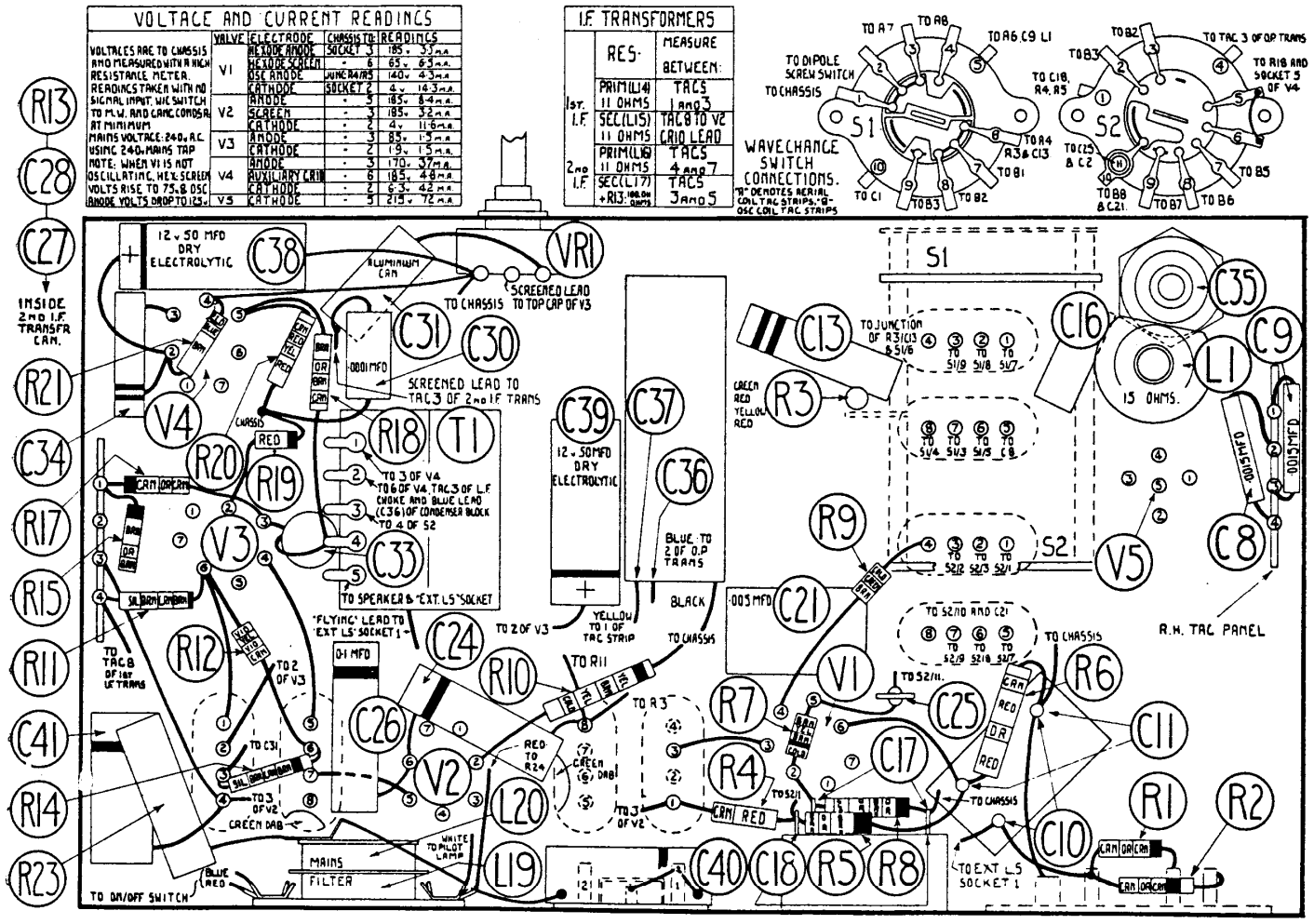


Fig. 2. Underside of chassis. Details include: connections of wavechange switch, aerial and oscillator coils, mains filter, voltage and current readings, and connections and resistances of I.F. transformers.

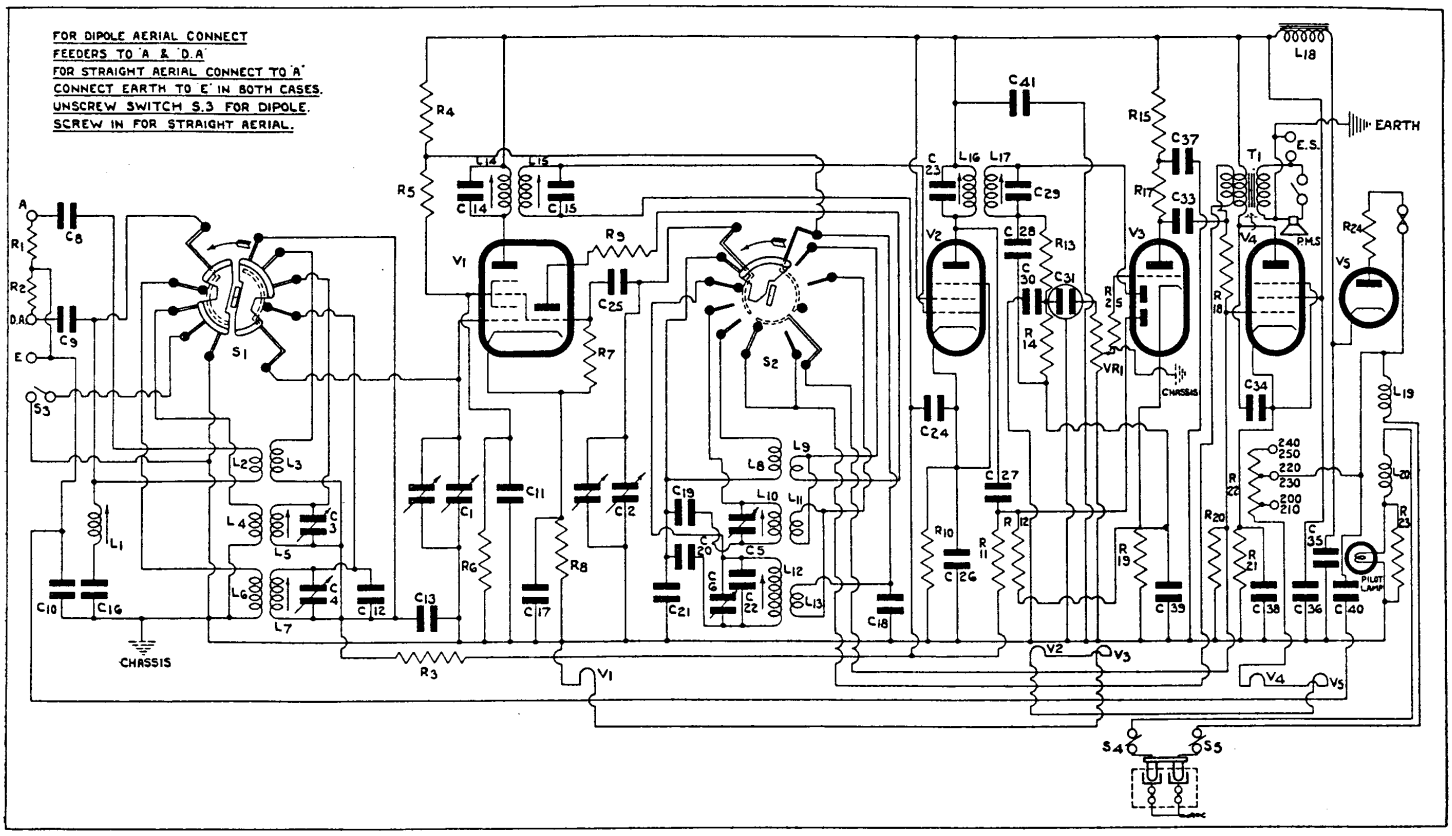


Fig. 3. Circuit diagram of UAW78.

CIRCUIT KEY AND PRICE LIST.

Ref.	Description.	Part No.	Price.
L1	I.F. filter	DP1294	2/6
L2	S.W. Pri.		
L3	S.W. Sec.		
L4	M.W. Pri.		
L5	M.W. Sec. } Aer. coil assembly	SA190	8/6
L6	L.W. Pri.		
L7	L.W. Sec.		
L8	S.W. Sec.		
L9	S.W. Pri.		
L10	M.W. Sec.		
L11	M.W. Pri. } Osc. coil assembly	SA191	12/-
L12	L.W. Sec.		
L13	L.W. Pri.		
L14 Pri. L15 Sec.	1st I.F. trans.	SA188	8/6
L16 Pri. L17 Sec.	2nd I.F. trans.	SA189	8/6
L18	L.F. choke	SA193	6/-
L19 L20	Mains filter assembly	SA73	3/-
C1	Aer. section } Gang (less drive)	D6900	11/6
C2	Osc. section }		
C3	Aer. M.W. trimmer } (inside	—	—
C4	Aer. L.W. trimmer } aerial coil)		
C5	Osc. M.W. trimmer } (inside	—	—
C6	Osc. L.W. trimmer } osc. coil)		
C8	.0015 mfd.	A5274	1/-
C9	.0015 „	A5274	1/-
C10	.1 „ }	C6908	1/9
C11	.1 „ }		

Ref.	Description.	Part No.	Price.
C12	.50 mmfd.	B7213	9d.
C13	.04 mfd.	B7049	9d.
C14	80 mmfd.	B7043	9d.
C15	88 „	B7043	9d.
C16	40 „	B7223	9d.
C17	.1 mfd. }	C6909	1/9
C18	.1 „ }		
C19	620 mmfd.	B7220	9d.
C20	305 „	B7211	9d.
C21	.005 mfd.	A7293	1/-
C22	150 mmfd.	B7212	9d.
C23	77 „	B7043	9d.
C24	.04 mfd.	B7218	1/-
C25	25 mmfd.	B7222	9d.
C26	.1 mfd.	A3844	1/-
C27	15 cm.	A5422	1/-
C28	100 mmfd.	A6516	9d.
C29	88 „	B7043	9d.
C30	100 „	A6516	9d.
C31	.01 mfd.	B6800	1/-
C33	.1 „	A3844	1/-
C34	.01 „	B7071	1/-
C35	8 „	B6620	5/6
C36	24 „ }	B7219	5/6
C37	10 „ }		
C38	50 „	A5982	2/6
C39	50 „	A5982	2/6
C40	.1	A4345	9d.
C41	.1 „	B7070	9d.

Ref.	Description.	Part No.	Price.
R1	50,000 ohms	A6122	9d.
R2	50,000 „	A6122	9d.
R3	250,000 „	A6122	9d.
R4	2,500 „	A6449	9d.
R5	10,000 „	A6449	9d.
R6	25,000 „	A6445	9d.
R7	100,000 „	B7069	9d.
R8	300 „	A6444	9d.
R9	150 „	B7069	9d.
R10	400 „	A6444	9d.
R11	1 megohm	A6122	9d.
R12	750,000 ohms	A6122	9d.
R13	100,000 „	B7069	9d.
R14	1 megohm	B7069	9d.
R15	10,000 ohms	A6444	9d.
R17	50,000 „	A6444	9d.
R18	15,000 „	A6445	9d.
R19	2,000 „	A6121	9d.
R20	250,000 „	A6122	9d.
R21	160 „	A6448	1/-
R22	Mains res.	DP1092	5/6
R23	50 ohms	A6000	1/-
R24	100 „	A6000	1/-
R25	250,000 „	B7067	9d.
L.S	Speaker	D6971	25/-
VR1	Vol. control	C6906	2/6
T1	Output trans.	SA203	8/6

* *Block condenser.* † *Dry electrolytic condenser.*

Cabinet (inc. speaker fret)	Walnut	DP1362	30/-
	B & C	DP1362/1	36/6
Speaker fret	Walnut	—	1/-
	Chrom.	—	4/6
Tuning knob	Walnut	DP1360	1/6
	B & C	DP1386	2/-

W/C switch knob	Walnut	DP1380	9d.
	B & C	DP1383	1/-
Vol. control knob	Walnut	DP967	9d.
	B & C	DP1382	1/-
Cabinet back		D7216	3/-
Gang drive		—	3/6

On/off switch ...	A4167	2/-
Pilot lamp ...	P2445	9d.
Pilot lamp holder	—	1/6
Scale	C7207	3/6
Speaker baffle ...	—	9d.
Speaker silk ...	—	6d.

All prices are retail and subject to alteration without notice.

RE-GANGING AND RE-ALIGNING.

The I.F. transformers and 460 kc. filter do not incorporate variable trimmer condensers, the necessary frequency adjustment being obtained by screwing iron cores along the axes of the coils. The cores are sealed after adjustment, and it is extremely unlikely that they will require resetting after the receiver leaves the factory. Only re-align the circuits therefore, if general insensitivity, not traceable to a valve or other component, is experienced.

In no circumstances should adjustment of the 460 kc. filter, H.F. or I.F. circuits be attempted unless a service oscillator and output meter are available. It is essential that the oscillator should tune to 15 mc. and be capable of adequate output, as the calibration of the three wavebands is interdependent. It is, moreover, strongly recommended that the accuracy of the oscillator on the S.W. range be checked prior to use by heterodyning various well known S.W. transmissions. (A "straight" receiver should preferably be used in this test.)

The slots in the core adjusting screws are not cut fully across the heads, and a $\frac{1}{8}$in. screwdriver is necessary for re-setting. It is essential that this screwdriver should be of insulated material, otherwise it will be difficult to set the cores accurately.

A special wax is used for sealing the cores, and this should be melted by a hot soldering iron with a $\frac{1}{4}$in. diameter copper bit. A screwdriver must not be used for loosening the wax, otherwise the cores will break away from their mountings or crack in half.

Use the minimum oscillator input (except in the case of 460 kc. filter adjustment) consistent with reliable output meter reading. The receiver volume control must be set at maximum throughout.

Re-aligning.

1. Leave chassis in cabinet and connect one lead of the service oscillator to the "E" socket. Connect the other lead through a .002 mfd. condenser to the grid cap of V1.
2. Set wavechange switch to L.W. and turn gang condenser to minimum.
3. Set oscillator to 460 kc.
4. Connect a 0—5 volt output meter to the External Speaker sockets.
5. Adjust the I.F. cores in the following order for maximum meter reading: (a) 1st I.F. primary (b) 1st I.F. secondary (c) 2nd I.F. primary (d) 2nd I.F. secondary.
6. Repeat adjustment of all four.
7. Re-seal cores.

Re-calibrating.

If the station tuning positions do not correspond with the scale markings, check that the pointer covers the black line representing 2,100 metres when the gang condenser is turned to its electrical maximum. If it does not, remove the tuning knob, loosen the fixing screw found in the front of the pointer mounting plate, and move the pointer through the desired angle.

If this point is in order, re-calibrate the receiver:

1. Leave chassis in cabinet, set wavechange switch to S.W. and turn tuning indicator to the 15 mc. mark.
2. Connect a 0—5 volt output meter to the External Speaker sockets.
3. Connect one lead from the service oscillator to the "E" socket, and the other through a non-inductive 400 ohm resistance to "A." Check that the dipole switch is closed.
4. Inject a 15 mc. signal from the service oscillator.
5. Fully unscrew oscillator gang trimmer, then screw it in slowly and check that the output peaks sharply at two settings. Adjust to that which requires less oscillator trimmer capacity.
6. Adjust aerial gang trimmer for maximum meter reading.
7. Set wavechange switch to M.W. and turn tuning indicator to the 250 metre mark.
8. Inject a 1,200 kc. (250 metre) signal from the service oscillator.
9. Fully unscrew M.W. oscillator trimmer C5, then screw it in slowly to obtain maximum meter reading.
10. Adjust M.W. aerial coil trimmer C3 for maximum meter reading.
11. Turn wavechange switch to L.W. and tuning indicator to 1,100 metres.
12. Inject a 275 kc. (1,100 metre) signal from service oscillator.
13. Adjust L.W. oscillator trimmer C6 for maximum meter reading.
14. Adjust L.W. aerial coil trimmer C4 for maximum meter reading.

Re-setting 460 kc. filter.

Incorrect adjustment of the coil L1 may be evidenced by C.W. or I.C.W. morse interference on stations at the top of the M.W. band. Break-through of spark transmissions should not be regarded as indication of incorrect adjustment.

To re-set L1:—

1. Remove wax from top end of core as described above.
2. Connect one lead of the service oscillator to "E" and the other through a .0002 mfd. condenser to "A."
3. Adjust service oscillator for maximum output at 460 kc.
4. Connect a 0—5 volt output meter to the External Speaker sockets.
5. Screw in dipole switch and tune receiver to 560 metres.
6. Adjust L1 core for minimum meter reading.

"SERVICE," E. K. COLE LTD., EKCO WORKS, SOUTHEND-ON-SEA. Telephone: Southend 49491.

Scottish Service Depot: 27, Cadogan Street, Glasgow, C.2. Telephone: Central 5357/8/9.

Manchester Service Depot: Bombay House, 59, Whitworth Street. (Goods address: 7, Bombay Street.) Telephone: Central 6711/2.

Bristol Service Depot: 14, Redcross Street. Telephone: Bristol 22269.