

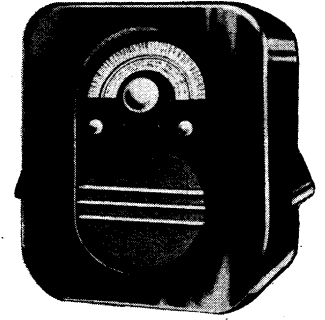
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EKCO SERVICE INFORMATION



MODEL ACT96
TRANSPORTABLE RECEIVER

DESCRIPTION OF CIRCUIT

The signal picked up by the frame aerial L1 or L2 is applied through C9 to the Radio Frequency amplifier valve V1, a seven pin metallised **Mazda AC/VP1**, amplified and passed via R.F. transformer L4-7 to the modulator section of the frequency changer valve V2, a seven pin metallised **Mullard FC4**.

This valve "mixes" the incoming signal with the oscillations produced in its triode section by coupling L8, L9 with L10 and L11, with the result that a beat of 130 Kc. is passed on via I.F. transformer L12, L13 to the I.F. valve V3, a metallised seven pin **Mazda AC/VP1**.

The amplified I.F. signal in the anode circuit of V3 is applied through the second I.F. transformer L14, L15 to the demodulator diode of V4, a metallised **Mullard 2D4A**, with the result that across R15 a L.F. voltage is built up and applied via C20 and Volume Control VR2 to the L.F. amplifier valve V5, a metallised five pin **Mullard 354V**.

The amplified L.F. signal is then passed through C31 to the output valve V6, a seven pin **Mullard Pen. 4VA**. *No other type should be used.*

An output transformer mounted on the chassis of the receiver feeds the loudspeaker, and it will be noticed that a small volume of sound will still be audible even with the volume control at minimum. This is due to the presence of C30, which results in the bass notes being progressively emphasised as VR2 is turned anti-clockwise, with the result that a pleasing balance of tone is maintained at the minimum volume position. A further feature is the provision for silencing the loudspeaker by means of a screw at the back of the receiver, but it is important to note that this screw should only be unscrewed when another loudspeaker without transformer and of 2-3 ohms impedance is connected across "Ext. L.S." sockets.

High tension is by a full wave indirectly heated rectifier valve **Mullard IW3** (alternative Mazda UU3). A directly heated type should *not* be used, otherwise there is risk of breakdown of the electrolytic condenser block consisting of two 8 mfd. and one 2 mfd. sections which, in conjunction with the loudspeaker field winding, provides adequate smoothing.

An interesting point is that the instrument has been so designed that *the receiver chassis may be tilted up and away from the mains unit chassis*, thus exposing the underside of the former and greatly facilitating service adjustments.

AUTOMATIC VOLUME CONTROL.

The I.F. input applied through the small condenser C15 to the A.V.C. diode of V4 is rectified, thus developing a voltage across R12 and R8 comprising the A.V.C. load. The voltage across these resistances is applied through R21 as a negative bias to the grid of V3, and that across R8 as a negative bias through R2 and R4 respectively to the grids of V1 and V2. The amplification of these three valves is accordingly reduced, and as the bias varies with the strength of the received signal the sensitivity of the receiver is automatically controlled, thereby counteracting fading of distant stations to a large degree.

STATION PRE-SELECTOR AND AUTOMATIC NOISE SUPPRESSOR.

This control serves two purposes:—

(1) To suppress the rush of background noises which would otherwise be heard when the receiver is tuned to a point between two transmissions, and caused by the Automatic Volume Control raising its sensitivity to maximum.

(2) To allow reception, at will, of :—

(a) All stations within the range of the receiver.

(b) Only those transmissions which are of sufficient strength to give reliable programme value.

(c) Only the very strongest transmissions.

The demodulator diode of V4 is connected through L15, R14 and R15 to chassis, and the cathode through R13 to the junction of R10 and R11. When VR1 is turned to maximum, i.e., "Strong" position fourteen volts are developed across it and applied as a negative bias to the demodulator diode. Accordingly, any signal passed on by the I.F. valve which is not strong enough to overcome this bias, cannot be rectified by the demodulator diode and will, therefore, not be heard.

It will be appreciated that if the knob is left at the "Medium" or "Strong" positions with the receiver tuned to a transmission which, while strong, is subject to fading, the noise suppression circuits will possibly completely suppress the station during periods of fade. Should complaints be made by customers of apparent intermittent operation on the medium wave band, it is therefore advisable to emphasize that the knob should preferably be set at the "All Stations" position at all times except when actually tuning.

It should be pointed out that this inter-station noise suppressor cannot suppress heterodyne whistles or side band splash caused by inter-action of stations too close together in wavelength, neither can it eliminate the various noises caused by local electrical machinery which may interfere with reception of distant transmissions. It is, however, of material assistance in *selecting* those programmes which may be relied upon to be reasonably free from such noises.

TO REMOVE CHASSIS FROM CABINET

(1) Remove control knobs by loosening grub screws.

(2) Remove the four screws sunk into the base of the cabinet and the three turntable fixing screws.

(3) Remove the two screws holding the receiver chassis to the inside face of the front of the cabinet. These screws are immediately above the top surface of receiver chassis. It will be necessary to remove the FC4 valve to gain access to the left hand screw.

(4) The chassis assembly, complete with frame aerials, may now be withdrawn from cabinet.

TO TILT RECEIVER CHASSIS

(1) Remove the pair of screws at each lower corner of the front face of the receiver chassis, taking care to retain the insulating washers.

(2) Unsolder from the screw at bottom front corner of L.W. frame aerial the short lead from tag panel on base of mains unit chassis.

(3) The receiver chassis can now be swung back on its two rearmost supports, and the underside exposed for test purposes by removing the screen normally held in position by a screw at each of its four corners.

IMPORTANT.—When replacing the screws mentioned in (1) it is *essential* that the insulating washers be correctly inserted. If due care is not taken in this connection, instability above 400 metres will probably be encountered. (See "Possible Faults" section under "Instability.")

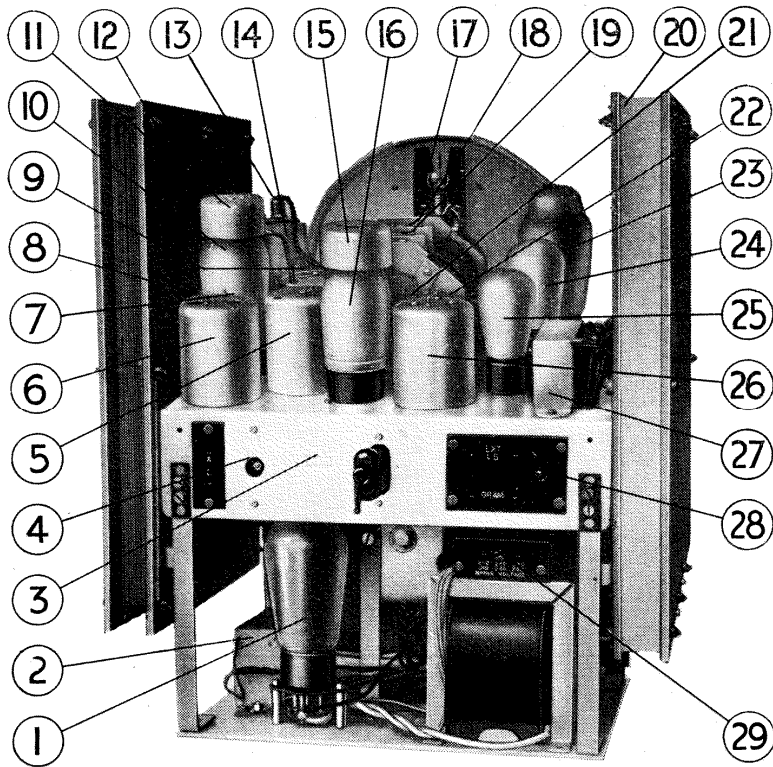
RESISTANCE READINGS

M.W. frame aerial (L1) total	2 ohms	Mains transformer (consumption 70 watts).	
" " " tap to chassis5 ohms	Primary. To 200/210 volt tap	31 ohms
L.W. " " (L2) total	28 ohms	" " 220/230 "	35 ohms
" " " tap to chassis	6 ohms	" " 240/250 "	39 ohms
M.W. suppression choke (L3)	45 ohms	Secondary (total)	690 ohms
Output transformer (primary)	750 ohms		
" " (secondary)3 ohms		
Loudspeaker field	2,300 ohms		

(Voltage drop across field 160 volts)

NOTE.—Reading from the rear of the receiver chassis, the primary of the output transformer is connected to the first and fourth soldering tags, and the secondary to the second and third. To measure the resistance of the secondary, connect ohmmeter to "Ext. L.S." sockets, and temporarily unscrew loudspeaker silencing screw.

Chassis



1. Rectifier valve (V7).
2. Electrolytic condenser block (C24, 28, 29).
3. Serial number.
4. L.W. tracking condenser (C8).
5. Oscillator coil (L8-11).
6. 1st I.F. transformer (L12, 13).
7. Secondary trimmer (C5).
8. Primary trimmer (C4).
9. R.F. transformer (L4-7).
10. Frequency changer valve (V2).
11. Grid cap screen.
12. M.W. frame aerial (L1).
13. Anode cap.
14. H.F. valve (V1).
15. Anode cap screen.
16. I.F. valve (V3).
17. Frame aerial section (C1).
18. R.F. transformer section (C2).
19. Oscillator section (C3).
20. L.W. frame aerial (L2).
21. Primary trimmer (C6).
22. Secondary trimmer (C3).
23. Output valve (V6).
24. L.F. valve (V5).
25. Double diode valve (V4).
26. 2nd I.F. transformer (L14, 15).
27. Output transformer (T1).
28. L.S. silencing screw.
29. Mains tapping screw.

RE-ALIGNING AND RE-GANGING

RE-ALIGNING (*Milliammeter method*).

- (1) Connect a 0-10 milliammeter across VR1, which should be turned to maximum.
- (2) Apply a 130 Kc. output from a service oscillator to aerial and earth sockets.
- (3) Set wave-change switch to L.W. and turn tuning condenser to about 1,900 metres.
- (4) Adjust trimmers in following order for minimum deflection of milliammeter:—
 - (a) 1st I.F. primary (C4).
 - (b) 2nd I.F. primary (C6).
 - (c) 1st I.F. secondary (C5).

- (5) Adjust 2nd I.F. secondary trimmer (C7) for maximum deflection of milliammeter.

NOTE.—Never use a stronger service oscillator signal than necessary.

RE-GANGING (*Milliammeter method*).

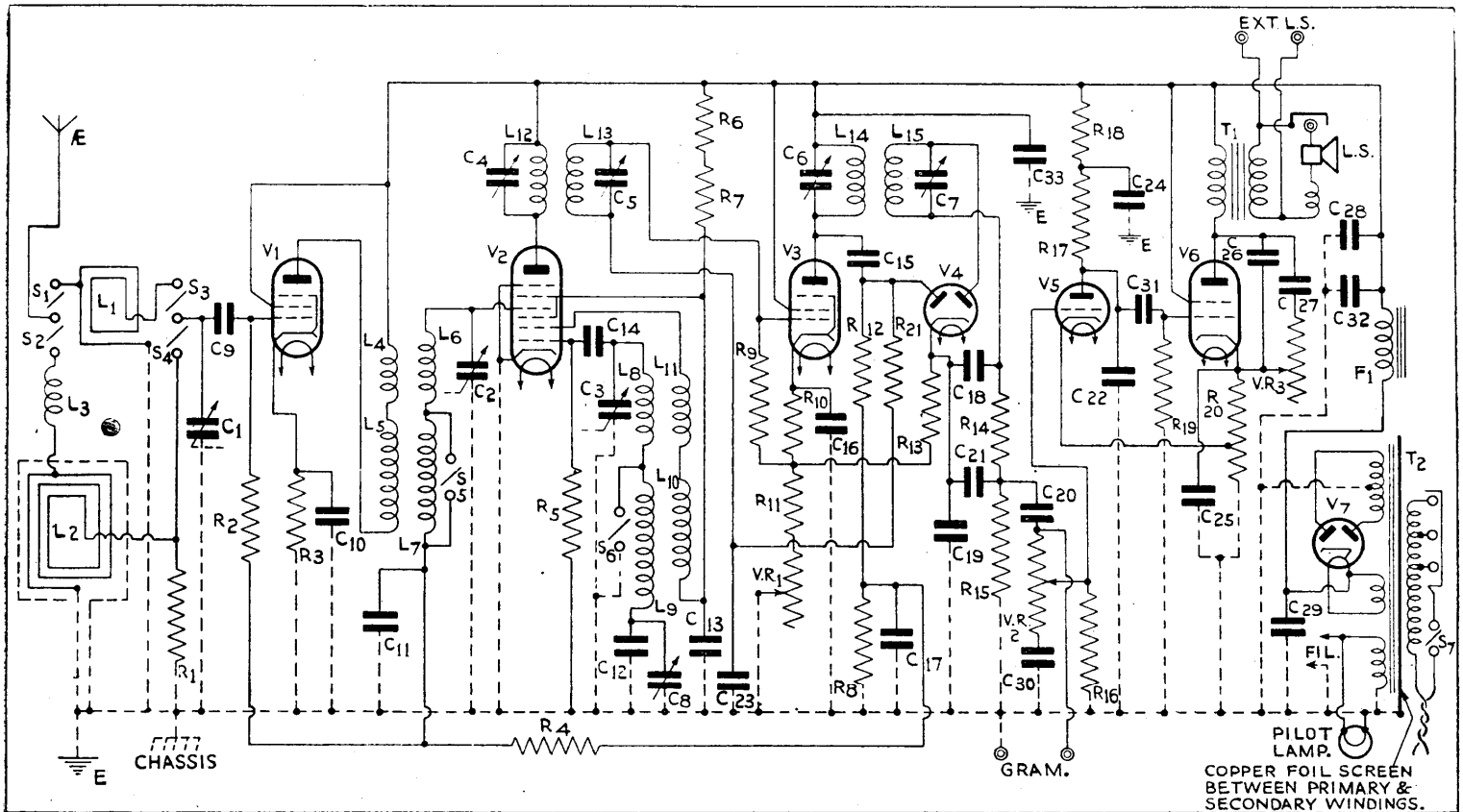
- (1) With milliammeter connected as above apply output of 1,500 Kc. (200 metres) from service oscillator to aerial and earth sockets of receiver.
- (2) Set wave-change switch to M.W. and turn tuning condenser to the 200 metre mark.
- (3) Adjust oscillator trimmer (C3) to obtain minimum deflection on milliammeter.
- (4) Swing tuning condenser to 250 metres and set service oscillator at 1,200 Kc. (250 metres).
- (5) Adjust trimmers of C2 and C1 sections of ganged condenser to obtain minimum deflection of milliammeter.
- (6) Switch to Long Waves and check accuracy of calibration on a 176.5 Kc. signal (1,700 metres) from oscillator. If out, correct by adjusting Long Wave tracking condenser (C8), meanwhile “rocking” the tuning condenser slightly.

NOTE.—After disconnecting oscillator and before removing milliammeter check up adjustment of the frame aerial trimmer (C1) when the receiver is tuned (preferably in daylight) to a transmission at the lower end of the Medium Wave band.

OUTPUT METER METHOD.

Re-aligning and re-ganging may also be carried out with a suitable output meter connected across the external L.S. sockets. (Remember that these are connected to the *secondary* of the output transformer.) The procedure to be adopted is exactly the same as for the milliammeter method except that all I.F. and ganged condenser trimmers are adjusted for *maximum* reading on the output meter.

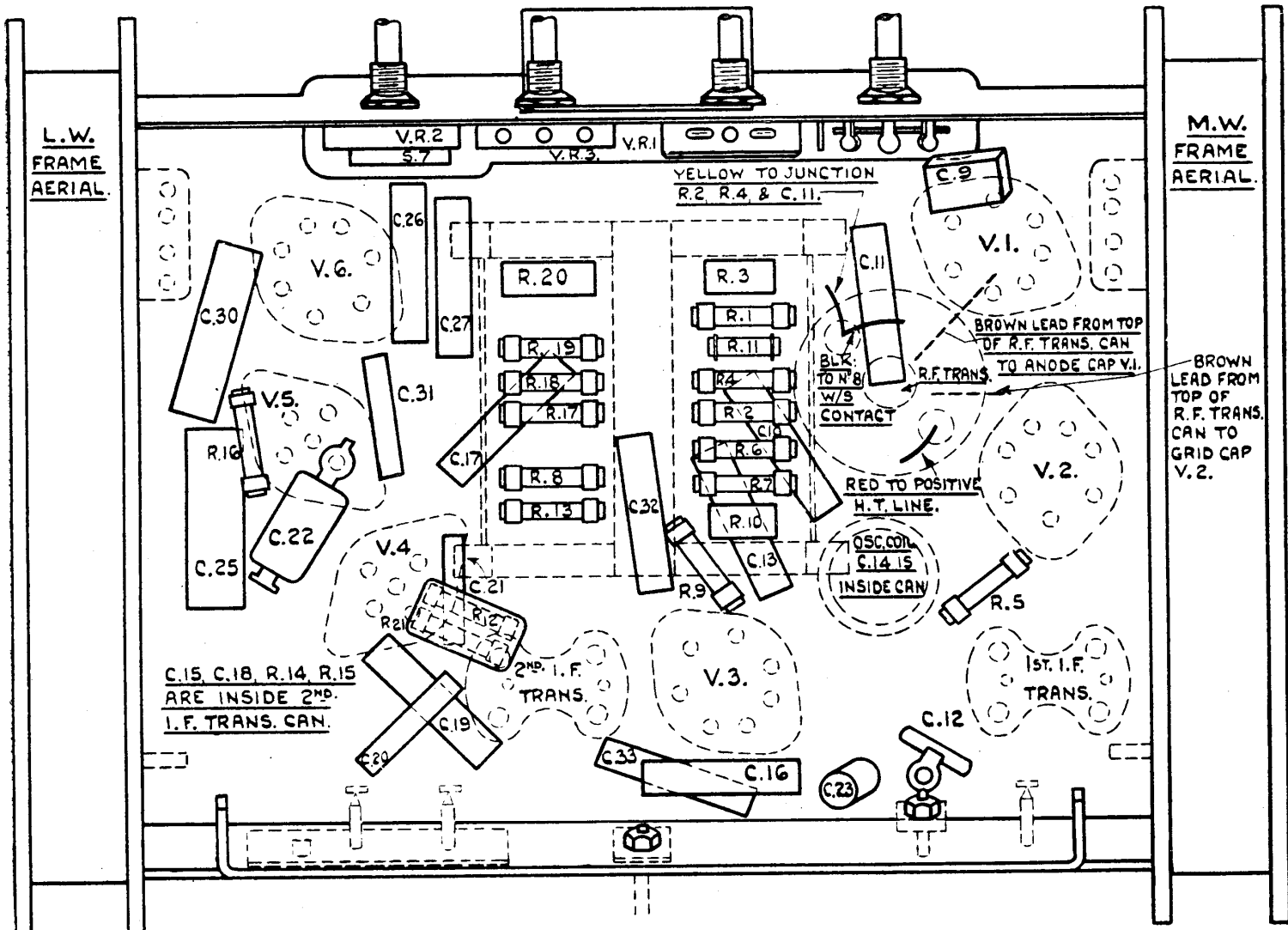
ACT96 CIRCUIT DIAGRAM



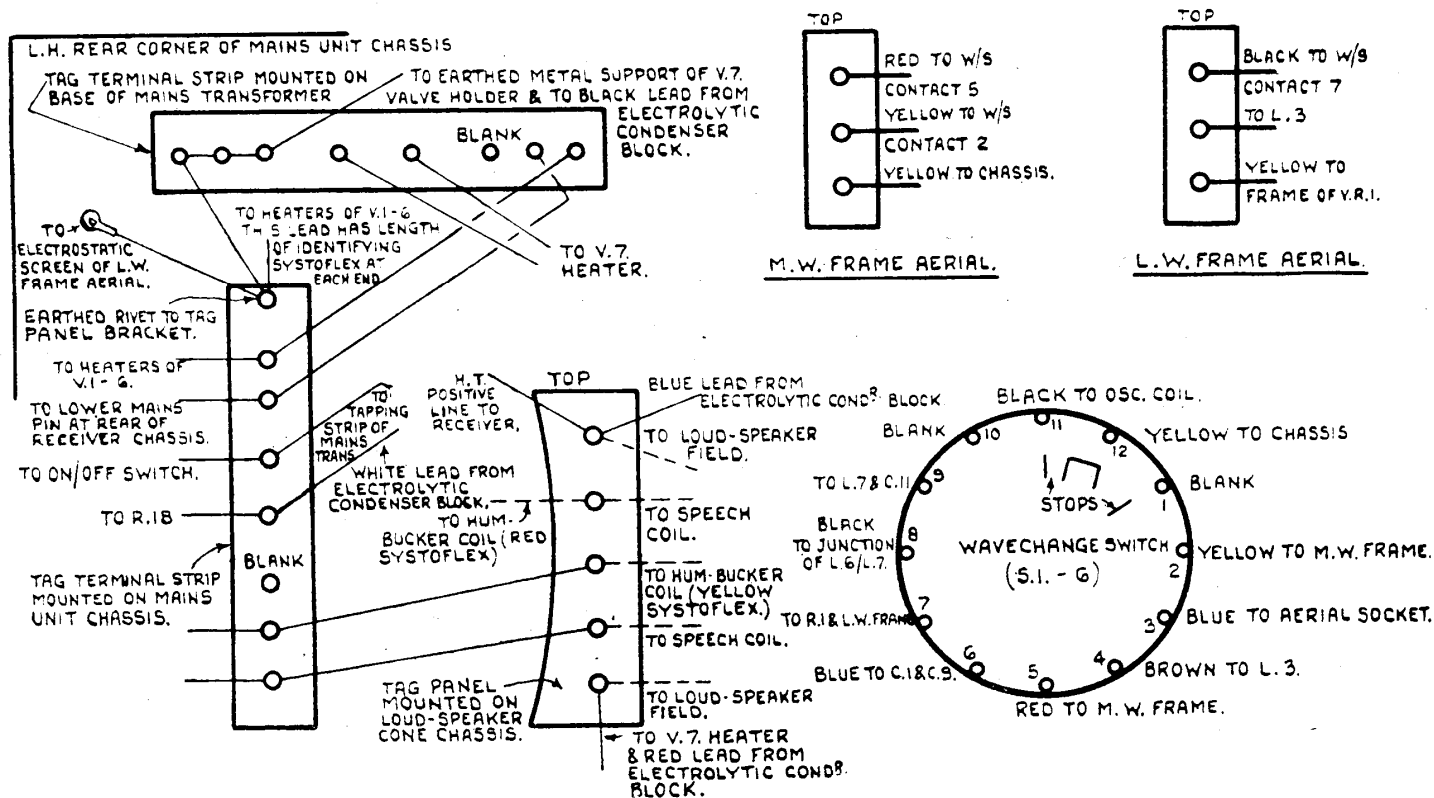
CIRCUIT KEY AND PRICE LIST.

Ref.	Description.	Part No.	Retail Price.	Ref.	Description.	Part No.	Retail Price.
L1	M.W. frame aerial	DP765	10/-	C24, 28, 29	2 x 8 x 8mfd. electrolytic condenser	B5207	7/6
L2	L.W. " "	DP764	12/6	C25	50 mfd. electrolytic condenser	A5814	3/6
L3	M.W. suppression choke	DP741	1/3	C26	.0025 mfd. condenser	A3684	9d.
L4-7	H.F. transformer	SA105	5/-	C27	.02 " " "	A5381	1/-
L8-11	Osc. coil	SA107	6/6	C30	.25 " " "	A5220	9d.
L12-13	1st I.F. transformer	SA85	5/6	R1, 5, 17	50,000 ohms resistance	A3263	9d.
L14-15	2nd I.F. " "	SA117	5/6	R2, 4, 8, 16, 21	500,000 " " "	A3263	9d.
S1-6	Wave-change switch	B5360	2/6	R3, 10	300 " " "	A4881	9d.
C1-3	Ganged condenser	D5361	18/6	R6, 7	10,000 " " "	A3263	9d.
C4-5	1st I.F. trimmers	SA85	—	R9, 12, 19	250,000 " " "	A3263	9d.
C6-7	2nd I.F. " "	SA89	—	R11	75 " " "	A4705	9d.
C8	L.W. tracking condenser	DP494	1/-	R13	2,000 " " "	A3263	9d.
C9	.0001 mfd. condenser	A3840	9d.	R14, 15	100,000 " " "	A4444	9d.
C10, 11, 13, 16, 17, 19, 32, 33,	.1 " " "	A3844	9d.	R18	9,000 " " "	A3253	9d.
C12	.0007 " " "	A3839	9d.	R20	325 + 75 " " "	A5201	9d.
C14	.001 " " "	A3841	9d.	VR1	2,000 ohms variable noise suppressor	B5358	4/6
C15	15 c.m. " " "	A5422	1/-	VR2	250,000 ohms volume control	B5357	7/6
C18, 21	.0003 mfd. " " "	A3842	9d.	VR3	60,000 ohms variable tone control	B5359	4/6
C20, 31	.01 " " "	A3846	9d.				
C22	.001 " " "	A3842	9d.				
C23	.02 " " "	A4147	9d.				

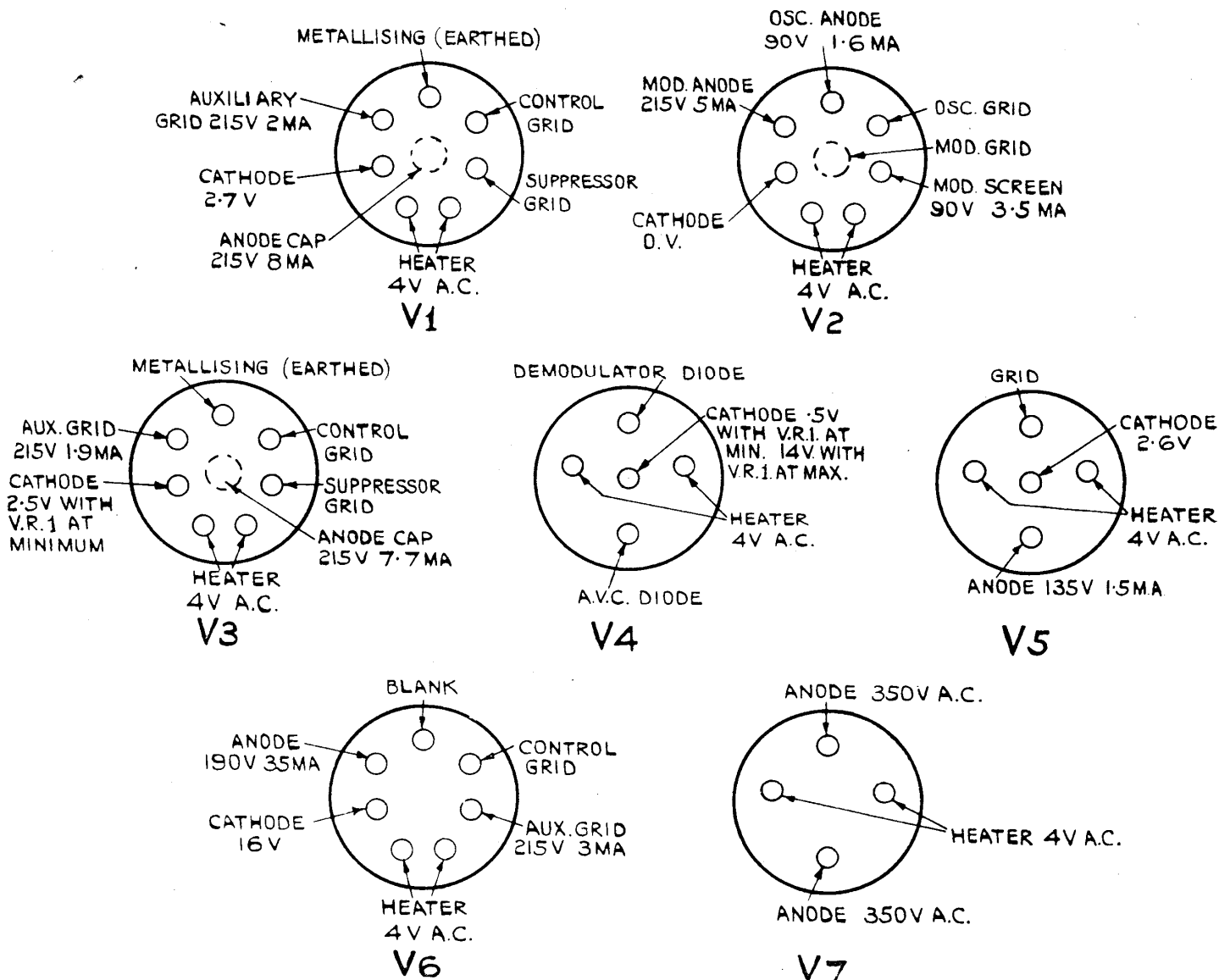
These prices are subject to alteration without notice.



Underside view of receiver chassis.



Diagrams of connections to wave-change switch, tag terminal panels on loudspeaker, base of mains transformer, base of mains unit chassis, and on medium and long wave frame aeriels.

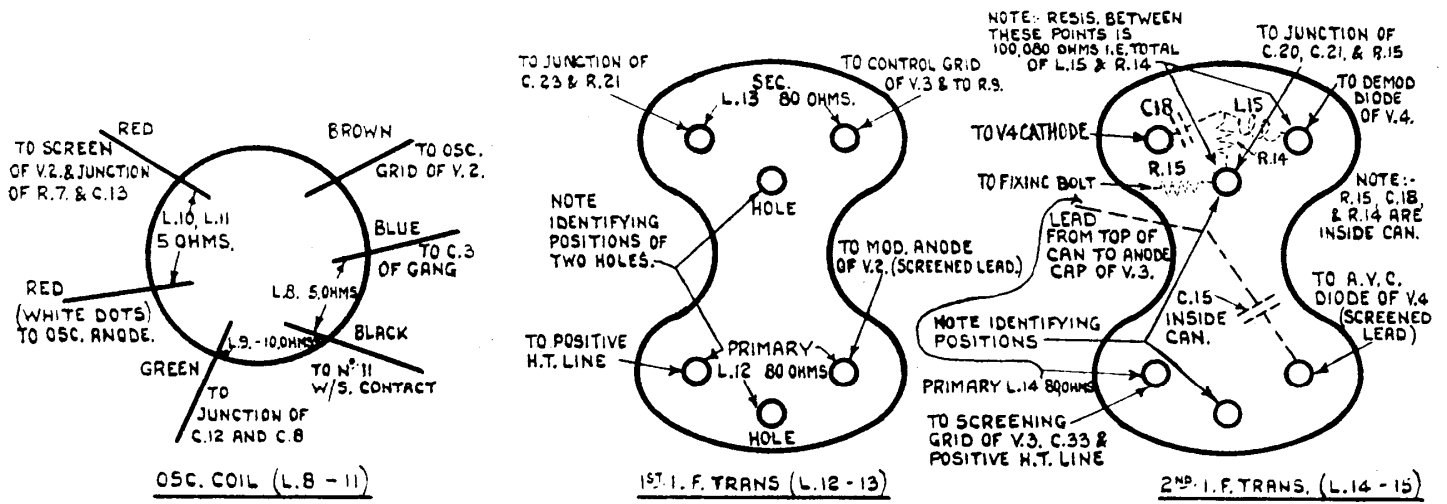


View of underside of valve-holders. Voltages shown are to chassis and measured with a meter having a resistance of 1,000 ohms per volt.

ADDITIONAL PRICES OF SPARE PARTS FOR ACT96

Part No.	Description.	Price.	Part No.	Description.	Price.
		£ s. d.			£ s. d.
DP769	Cabinet (dark walnut)	1 15 0	DP195	Mains lead (complete)	3 6
DP770	" (black)	2 2 6	A3654	Plug (red or black)	2
C3660	Knob station selector (dark walnut)	2 0	P2445	Pilot lamp	9
DP143	" " " (black)	2 6	P2108	Two-pin socket for mains lead ...	1 0
C3838	" volume control (dark walnut)	9	C5376	Scale (white or buff)	2 6
DP142	" " " (black)	1 0	C5378	Scale clamping rim	4
DP719	" tone control (dark walnut)	9	A5379	Scale clamp	2
DP719	" " " (black)	1 0	B5363	Bracket	2
B4211	" wavechange (dark walnut)	9	B5380	Scale centre bar (dark walnut) ...	1 9
B4211	" " " (black)	1 0	B5380	" " " (black)	2 6
B5543	" pre-selector (dark walnut)	9	A5121	Circular clamping plate	3
B5543	" " " (black)	1 0	P1531	Insulated screw 4 B.A. (mains tapping)	3
M51	Loudspeaker	1 10 0	P1532	Insulated screw 6 B.A. (speaker cut-out)	3
E5374	Back cover (black or brown) ...	3 0	DP558	Valve top screen	9
C5417	Turntable	4 0	A4658	" " clip	1
SA98	Output transformer (T1)	12 6			
SA111	Mains transformer (T2)	1 0 0			

These prices are subject to alteration without notice.



Connections and resistances of Oscillator Coil and I.F. Transformers.

POSSIBLE FAULTS

Abbreviations: O.C., open circuited; S.C., short circuited.

Valves Do Not Light Up.

Break in mains flex. Disconnection inside either mains plug. Mains tapping screw on transformer unscrewed. On/off switch defective or disconnected.

Valves Light Up—No Gramophone results.

Defective V5, V6, V7. R17, R18, C31 O.C. C22, C24, C26 S.C. L.S. silencing screw loose.

Gramophone Results—No Radio.

Ascertain whether V2 is oscillating by noting whether there is any change in the voltage across C13 when a wet finger is placed on the fixed plates of the oscillator section of the Ganged Condenser. No change indicates that V2 is not oscillating, which may be due to a defective V2, L8-11 O.C. C3 trimmer S.C.

V2 Oscillating—Weak or no Radio.

Test Radio Frequency circuits by connecting an outside aerial to the tag at end of lead to top cap of V1. If signals now satisfactory V1 is possibly defective, L1, L2, C9 or R3 may be O.C. or C1 trimmer S.C. *If satisfactory L.W. only* L1 may be O.C. or wave-change switch contacts not "making" properly. To clean these it is advisable to withdraw the wave-change switch from chassis, and remove the rotor portion by detaching the small collar from the spindle. Contacts can then be cleaned with a little petrol, and the blades slightly bent in order to increase pressure before reassembling the switch. *If satisfactory M.W. only* L2 may be O.C. or S4 not making properly.

Weak or No Radio After Connecting Aerial to V1 Anode Lead.

L4-7 may be O.C. C2 trimmer S.C. If these are in order test I.F. circuits by applying an input of 130 Kc. from a modulated oscillator between chassis and top cap (modulator control grid) of V2. If no audible signal from loudspeaker V2, V3 or V4 may be defective, C4-7, C18, C21 S.C. L12-15, R10, R11, R14, VR1 O.C. or C20 disconnected.

MISCELLANEOUS.

Crackle. Outside interference; loose pilot light; noisy valve; connection to clip in screening cap of V2 or V3 has become loose; dry joint; valve loose in holder; internal S.C. in fixed condenser; dirty W/C switch contacts; loose L.S. silencing screw; defective resistance.

Instability. C11, C16, C23, C32, C33 may be O.C. Receiver chassis may be in metallic contact with mains unit chassis. The *only* direct connection between these two chassis should be via the heater leads. If the latter are disconnected from the tag terminal panel on the lower chassis, satisfactory insulation between the receiver and mains unit chassis should be indicated when using a suitable testing meter.

Motorboating. C25 low capacity, C24 O.C.

Distortion. Defective loudspeaker or valve, C31 leaking. C25 S.C. R19 O.C.

Volume Cannot Be Reduced By Means of Volume Control. C30 O.C.

Will Not Calibrate Correctly. S.C. turns in oscillator coil. On L.W. C8, C12 may be O.C. or S.C.

Noise Suppressor Fails to Function. Defective VR1. S.C. C16.

Excessive Suppression. Defect in circuits preceding V4 such as misadjustment of gang or I.F. trimmers causing a general decrease in sensitivity of receiver. Use of the instrument in an iron frame building or defective V1, V2 or V3 can be responsible.

Hum. S.C. turns in L.S. field. L.S. "hum-bucker" coil reversed. R19, C24, C28, C29, R16 O.C. C31 leaking. C25 S.C. V7 defective.

Microphonicity. Probably V5 has loose electrodes or ganged condenser is defective. (See that the latter is "floating" properly on its rubber buffers.)

REPLACING SCALE.

- (1) Remove chassis from cabinet as indicated on page 2.
- (2) Remove large semi-circular clamping washer by unscrewing the five small round headed screws.
- (3) Detach scale from adhesive tape round its edge.
- (4) The adhesive tape should be used for fixing the new scale, which must be so mounted that the two black marks corresponding to 195 and 570 metres (approx.) are $1\frac{1}{8}$ inches above the centres of the volume control and wavechange switch spindles respectively.

It should be noted that the shadow indicating line must coincide with the two black marks mentioned in (4) when the ganged condenser is turned to its limit in the minimum and maximum capacity positions. If the indicator is "out" to any extent, it should be adjusted by loosening the large set screw which holds the indicator assembly to the ganged condenser shaft.

TO RE-CENTRE LOUDSPEAKER.

- (1) Free the two ends of the spider by holding the fixing nuts with pliers and loosening the two cheese headed screws. The latter are readily accessible from the rear of the loudspeaker.
- (2) Space speech coil accurately from pole piece by using three strips of suitable material such as a visiting card.
- (3) Tighten the spider screws while holding the fixing nuts with pliers.
- (4) Remove spacing strips.

RETURN OF PRODUCTS

A charge will be made in respect of components or receivers returned for replacement or repair if the three-months guarantee has expired or the customer has not posted the relative application card. It is therefore advisable to ask the customer to produce the guarantee registration card before giving any undertaking that repair will involve no charge.

Delivery of products returned "Carriage Forward" will not be accepted.

When returning components always indicate the serial number of the receiver and whether it is a stock model.

In the case of all receivers returned for repair, include a carefully completed "Request for Service" form. All stock models returned must also include the instruction booklet and blank guarantee card.

Do not return component parts of complete units such as ganged condensers and loudspeakers.

The base connections and spacing of coils of the two I.F. transformers are different. When ordering replacements, therefore, it is essential to indicate which transformer is required.

Any order for replacement cabinet or knobs should indicate the colour required.

When ordering instruction booklets (for which a charge of 6d. will be made), do not fail to quote the serial number of the receiver.

FAILURE TO OBSERVE THE ABOVE WILL RESULT IN DELAY IN GIVING SERVICE.

Finally, before consigning a receiver to your nearest Ekco Service Depot (see addresses below), be quite certain that a valve or other very minor defect is not the cause of the trouble, otherwise a minimum charge of 7s. 6d. will be made for expenses in testing, handling, packing and carriage.

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

Scottish Service Depot: 27, Cadogan Street, Glasgow, C.1. Telephone: Central 5357/8.

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

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