

TRADER SERVICE SHEETS

RECEIVER SERIES (NUMBER NINETEEN)

ULTRA MODEL 22

A.C. SUPERHET

THE Ultra Model 22 is a superhet of advanced design, the A.C. model having three valves (two of them multiple types) and a rectifier. It was the first set to embody the triode-pentode frequency changer valve. This service sheet deals with the table model A.C. receiver, but an A.C. radiogram and corresponding D.C. models are also available.

Much of the information given below is applicable to the A.C. radiogram, but the provision for gramophone reproduction has involved certain modifications and additions to the circuit to enable the connection and switching of the pick-up to be accomplished. There is no provision for pick-up in the table model.

CIRCUIT DESCRIPTION

Aerial input by way of aperiodic coupling coils L1, L2 to inductively coupled band-pass filter. Primary L3, L4 tuned by C21; secondary L6, L7 tuned by C23; coupling coil L5. First valve (V1, Mazda metallised AC/TP) is a triode-pentode functioning as frequency-changer with cathode injection. Triode section forms separate oscillator with anode coils L9, L10 tuned by C25, and coupling coil L8 in common cathode circuit. One variable-mu pentode intermediate frequency amplifier (V2, Mazda metallised AC/VP1) with tuned-primary tuned-secondary transformer couplings L11, L12 and L13, L14. I.F. 456 KC/S. Diode second detector forming part of

double diode pentode (V3, Mazda AC2/Pen DD). Second diode provides voltage which is developed across R10 and R11 and fed back as G.B. to frequency-changer and I.F. valves, thus giving automatic volume control. Delay voltage obtained from resistances R13 and R14 in cathode circuit. Output from rectifier diode is fed to control grid of pentode section by way of manual volume control R12 and coupling condenser C10. Tone compensation by means of condensers C12 and C14 and resistance R18. Two-point tone control by switch S6 and additional condenser C13.

H.T. supplied by I.H.C. full-wave rectifying valve (V4, Mazda UU60/250). Smoothing by speaker field L17 and electrolytic condensers C15, C16. Mains disturbance suppression by buffer condensers C17, C18.

DISMANTLING THE SET

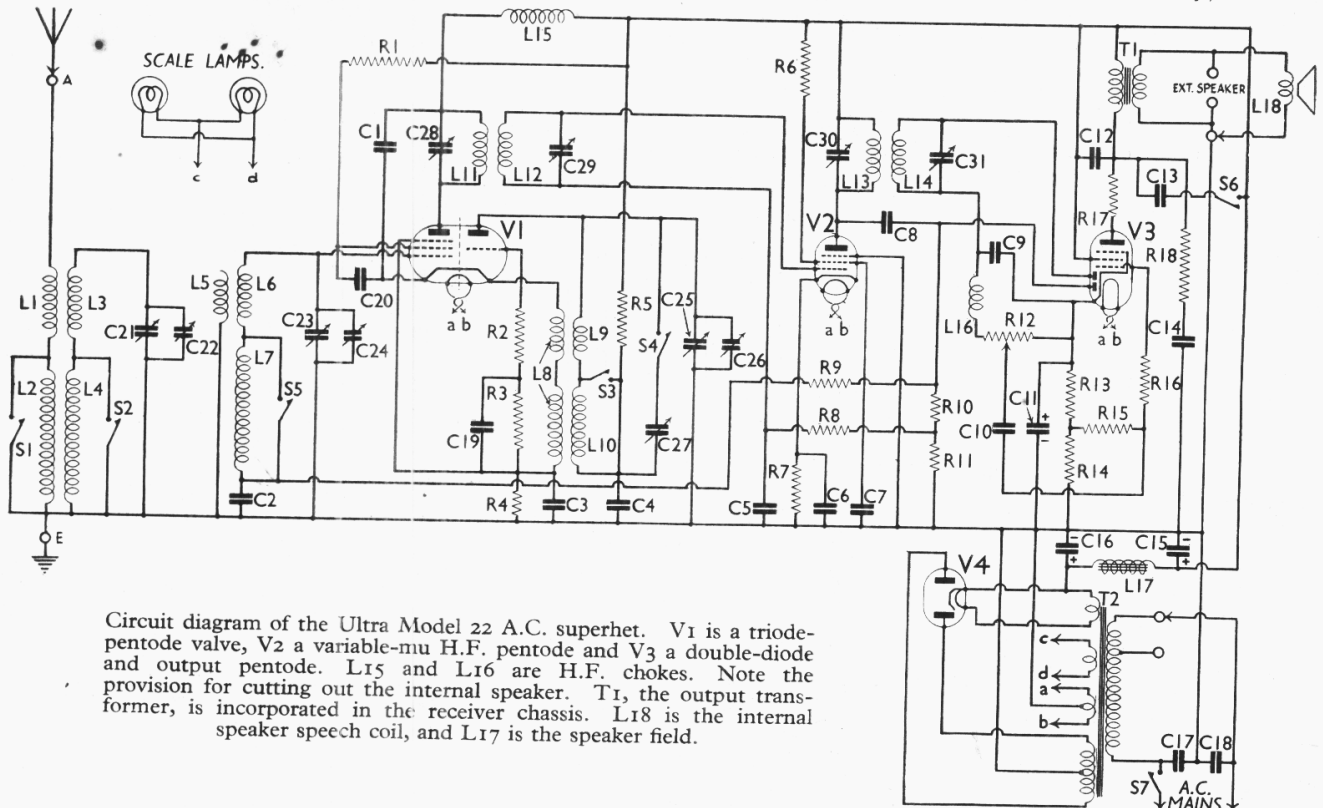
Removing Chassis.—Remove back of set. Remove control knobs (grub screws). Remove wooden strip from inside of top

of cabinet holding speaker against front of cabinet (2 wood screws). Remove four screws from underside of base of cabinet holding chassis in position. Chassis and speaker can now be withdrawn.

Removing Speaker.—This is held to vertical metal plate by four screws and nuts. If it becomes necessary to remove speaker, first remove chassis from cabinet, and untie gauze dust bag. Unsolder the four leads connecting to the terminal strip. Then remove nuts and bolts with their lock-nuts and washers. When re-connecting speaker, the wires are connected to the tags as follows: Left-hand tag, red; 2nd from left, black and white; 3rd from left, black and white; 4th from left, blank; right-hand tag, green and black.

The tags are connected to the speaker as follows: Extreme left and right, field coil L17; 2nd and 4th from left, speech coil L18; 3rd and 4th from left, hum bucking coil.

(Continued overleaf)



Circuit diagram of the Ultra Model 22 A.C. superhet. V1 is a triode-pentode valve, V2 a variable-mu H.F. pentode and V3 a double-diode and output pentode. L15 and L16 are H.F. chokes. Note the provision for cutting out the internal speaker. T1, the output transformer, is incorporated in the receiver chassis. L18 is the internal speaker speech coil, and L17 is the speaker field.

ULTRA MODEL 22 SUPERHET
(cont'd)

COMPONENTS AND VALUES

Condensers		Values (μ F)
C1	V1 pent. anode decoupling ..	0.1
C2	V1 pent. cont. grid decoupling ..	0.05
C3	V1 cathode by-pass ..	0.5
C4	V1 osc. anode decoupling ..	0.1
C5	V2 cont. grid decoupling ..	0.05
C6	V2 cathode by-pass ..	0.1
C7	V2 aux. grid by-pass ..	0.5
C8	A.V.C. diode coupling ..	0.0002
C9	Rect. H.F. filter ..	0.0002
C10	L.F. coupling to V3 ..	0.01
C11	V3 cathode by-pass ..	50.0
C12	Tone control condensers	0.001
C13		0.01
C14		0.01
C15	H.T. smoothing, electrolytics	16.0
C16		8.0
C17	Mains interference suppressors	0.01
C18		0.01
C19	V1 osc. coupling ..	0.0002
C20	V1 pent. aux. grid by-pass ..	0.1
C21	Band-pass pri. tuning ..	—
C22	Band-pass pri. trimmer, pre-set	—
C23	Band-pass sec. tuning ..	—
C24	Band-pass sec. trimmer, pre-set	—
C25	Oscillator tuning ..	—
C26	Oscillator trimmer, pre-set	—
C27	Oscillator L.W. padder, pre-set	—
C28	1st I.F. trans. pri. tuning ..	—
C29	1st I.F. trans. sec. tuning ..	—
C30	2nd I.F. trans. pri. tuning ..	—
C31	2nd I.F. trans. sec. tuning ..	—

Resistances		Values (ohms)
R1	V1 aux. grid H.T. feed ..	25,000
R2	V1 harmonic suppressor ..	1,000
R3	V1 triode grid resistance ..	50,000
R4	V1 fixed G.B. resistance ..	480
R5	V1 osc. anode decoupling ..	80,000
R6	V2 aux. grid H.T. feed ..	30,000
R7	V2 fixed G.B. resistance ..	165
R8	V2 cont. grid decoupling ..	1,000,000
R9	V1 cont. grid decoupling ..	1,000,000
R10	A.V.C. diode load ..	250,000
R11		750,000
R12	Manual volume control ..	500,000
R13	V3 G.B. and A.V.C. delay voltage resistances ..	138
R14		138
R15	V3 grid resistance ..	1,000,000
R16	V3 grid H.F. stopper ..	1,000
R17	V3 anode circuit stabiliser ..	60
R18	Tone comp. resistance ..	15,000

Other Components		Values (ohms)
L1	Aerial coupling coils ..	1.5
L2		48.5
L3		4.7
L4	Band-pass primary coils	11.3
L5		1.3
L6	Band-pass secondary coils	4.7
L7		11.3
L8	Oscillator coupling coil ..	1.2
L9	Oscillator tuning coils ..	8.5
L10		4.0
L11	1st I.F. transformer ..	Pri. 5.6
L12		Sec. 5.6
L13	2nd I.F. transformer ..	Pri. 5.6
L14		Sec. 5.6
L15	H.F. choke ..	55.0
L16	Rect. diode H.F. choke ..	500.0
L17	Speaker field ..	1500.0
L18	Speaker speech coil ..	4.7
T1	Speaker input trans. ..	Pri. 400.0
		Sec. 0.25
	Mains trans. ..	Pri. total 31.0
		Heater sec. 0.12
		Lamp sec. 0.3
		Rect. L.T. sec. 0.16
		H.T. sec. 660.0
S1-S5	Waveband switches, ganged ..	—
S6	Tone control switch ..	—
S7	Mains switch (ganged R12) ..	—

VALVE ANALYSIS

All the voltage readings given below were measured with a high resistance voltmeter from the points indicated to chassis. No aerial or earth was connected. Current measurements were made with the meter inserted in the low H.F. potential ends of the circuits where necessary to avoid instability.

Valve	Anode Volts	Anode Current	Screen Volts	Screen Current
V1 AC/TP* ..	274	8.0	200	2.5
V2 AC/VP† ..	274	9.0	195	2.5
V3 AC2/PenDD ..	260	31.0	274	6.0
V4 UU60/250 ..	330†	—	—	—

*Osc. anode (triode), 110 V 1.5 mA. †Each anode, A.C.

GENERAL NOTES

Switches.—S1-S5 are the ganged wave-change switches, mounted in a single unit under the chassis. They, and the signal frequency coils L1-L7, are covered with a rectangular screen, which has been removed in our under-chassis view.

Switches S1, S2, S3 and S5 are closed on the M.W. band, and open on the L.W. band. S4 is open on the M.W. band and closed on the L.W. band.

It is an easy matter to clean or re-set the contacts should this become necessary.

S6 is the Q.M.B. tone control switch, at the rear of the chassis. S7 is the mains switch ganged with the manual volume control R12.

Coils.—The signal frequency coils, with the switches, are enclosed in a

screening box below the chassis. There are three coil units above the chassis, containing the two I.F. transformers L11, L12 and L13, L14, and the oscillator coils L8, L9, L10. The various trimmers are reached through holes in the tops of the screening cans.

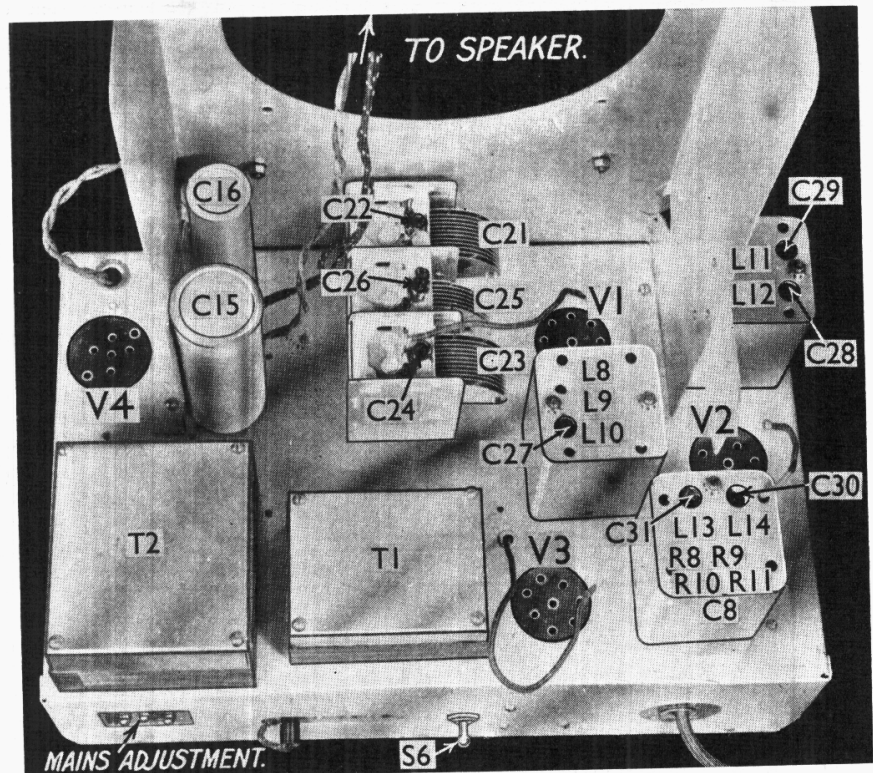
If a coil becomes faulty it will probably be best to remove and replace the whole unit, as it is a little difficult (though not impossible) to remove the cans and leave the coils in position. The coil leads are colour coded, and notes should be taken of the connections before removing.

In the case of the second I.F. transformer unit (nearest the back of the chassis), this also incorporates C8, and R8, R9, R10, R11. If the screening can is removed, the resistances are easily identified as follows. There are three arranged vertically, R9, R10 and R11, and the colour coding will identify these. The remaining one, R8, is mounted horizontally at the bottom of the coil unit.

In the case of the I.F. transformer units, the primaries are the upper coils, and the secondaries the lower ones, looking at the coils as they are mounted on the chassis.

External Speaker.—The external speaker sockets are across the secondary of the output transformer T1, and a low resistance speaker must therefore be used for extension work. The type recommended by Ultra is the Ultra "Imp" P.M.M.C. model, type S.

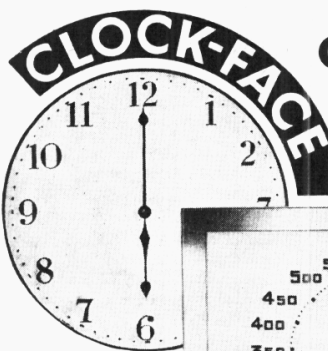
There is provision for cutting out the internal speaker by withdrawing a plug, if desired.



Plan view of the chassis. The speaker has been removed from the vertical panel for clarity. Note that the coil unit L13, L14 also contains a fixed condenser and four resistances. The pilot lights are hidden in this illustration. V1 has a 9-socket valve-holder.

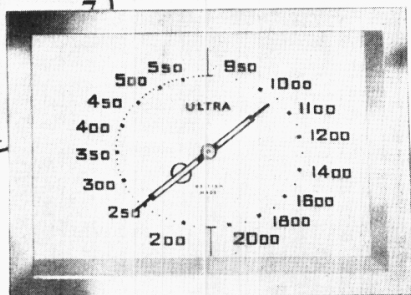
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