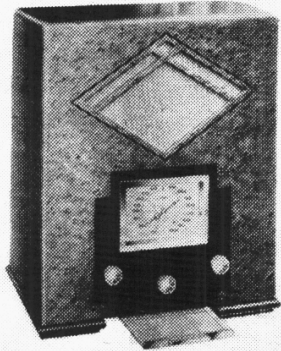


"TRADER" SERVICE SHEET

569

ULTRA 22

BATTERY SUPERHET



THE Ultra 22 Battery receiver is a 4-valve, 2-band superhet, with a quiescent push-pull output stage. A separate battery lead is provided for connection of the scale lamps to the accumulator.

Release date: 1935.

CIRCUIT DESCRIPTION

Aerial input via variable potentiometer **R1** and coupling coils **L1, L2** to inductively coupled band-pass filter. Primary coils **L3, L4** are tuned by **C15**; secondaries **L6, L7** by **C17**. **L5** loads **L6** to balance the load of **L1** on **L3**.

First valve (**V1, Mazda metallised TP22**) is a triode-pentode operating as frequency changer with cathode injection. Oscillator anode coils **L10, L11** are tuned by **C20**. Parallel trimming by **C21** (MW) and **C19** (LW); tracking by

specially shaped vanes of tuning condenser **C20**. Oscillator coupling by coils **L8, L9** between anode and filament circuits. Control grid circuit is held down at RF to chassis potential.

Second valve (**V2, Mazda metallised VP215**) is a variable- μ RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings.

Intermediate frequency 456 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mazda metallised L21DD**). Audio frequency component in rectified output is developed across AF manual volume control **R9** (ganged with **R1**) which also operates as load resistance, and passed via AF coupling condenser **C10** to CG of triode section.

IF filtering by choke **L17** and by-pass condensers **C8, C11**.

Second diode of **V3**, fed from **V2** anode via **C9**, provides DC potentials which are developed across load resistances **R12, R13** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

Parallel-fed transformer coupling by **R11, C12** and **T1** between **V3** triode and double pentode QPP output valve (**V4, Mazda QP240**). Fixed tone correction by **R18, C13** between anodes. Provision for connection of low-impedance external speaker, while internal speaker may be muted.

GB voltages and AVC delay are obtained from tappings in the GB section of the HT battery, and **R14** discharges this section at approximately the same rate as the HT section.

VALVE ANALYSIS

Valve voltages and currents given in the table have been computed from manufacturers' information. Tests should be made with the receiver operating, but with no signal input. Voltages should be measured with a 1,000 ohms-per-volt meter.

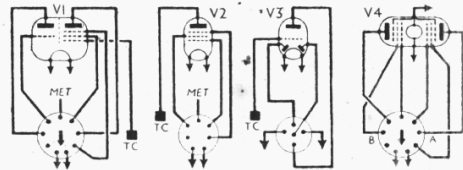
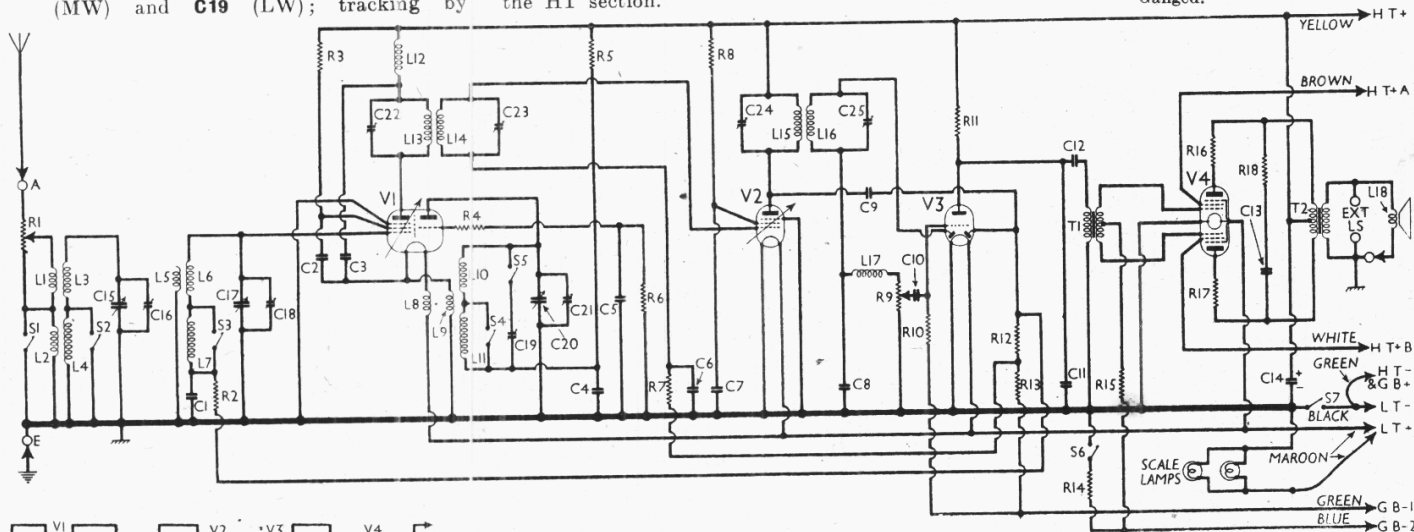
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP22	120	1.1	48	0.3
	Oscillator			
V2 VP215	115	1.0	65	0.3
	120	1.1		
V3 L21DD	95	3.5	*	—
V4 QP240	118†	1.3†	*	0.3†

* According to code letter. † Each section.

COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	Input control*	2,000
R2	V1 pent. CG decoupling...	1,000,000
R3	V1 SG HT feed ...	200,000
R4	V1 osc. grid stopper ...	1,000
R5	V1 osc. anode HT feed ...	2,000
R6	V1 osc. CG resistance ...	250,000
R7	V2 CG decoupling ...	1,000,000
R8	V2 SG HT feed ...	100,000
R9	Manual volume control,*	
	V3 signal diode load ...	500,000
R10	V3 triode CG resistance ...	2,000,000
R11	V3 triode anode load ...	25,000
R12	V3 AVC diode load re-	250,000
R13	sistances ...	750,000
R14	GB battery shunt ...	900
R15	V4 CG's decoupling ...	150,000
R16	V4 anode stoppers ...	60
R17		60
R18	Part tone corrector ...	30,000

* Ganged.



Circuit diagram of the Ultra 22 battery superhet. The HT— lead is attached to the LT— lead, a single lead from the receiver serving for both. The HT tappings for HT + A and B are given under "Battery leads" overleaf.

CONDENSERS		Values (μF)
C1	V1 pent. CG decoupling	0.05
C2	V1 SG decoupling	0.1
C3	V1 pent. anode decoupling	0.1
C4	V1 osc. anode decoupling	0.1
C5	V1 osc. CG condenser	0.0003
C6	V2 CG decoupling	0.05
C7	V2 SG decoupling	0.1
C8	IF by-pass	0.0001
C9	Coupling to V3 AVC diode	0.0002
C10	AF coupling to V3 triode	0.01
C11	IF by-pass	0.0001
C12	AF coupling to T1	0.15
C13	Part tone corrector	0.004
C14*	HT reservoir condenser	24.0
C15†	Band-pass pri. tuning	—
C16†	B-P pri. MW trimmer	—
C17†	Band-pass sec. tuning	—
C18†	B-P sec. MW trimmer	—
C19†	Osc. circ. LW trimmer	—
C20†	Oscillator circuit tuning	—
C21†	Osc. circ. MW trimmer	—
C22†	1st IF trans. pri. tuning	—
C23†	1st IF trans. sec. tuning	—
C24†	2nd IF trans. pri. tuning	—
C25†	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial MW coupling coil	1.5
L2	Aerial LW coupling coil	48.5
L3	Band-pass primary coils	4.7
L4	L6 loading coil	11.3
L5	Band-pass secondary coils	1.3
L6	coils	4.7
L7	coils	11.3
L8	Oscillator reaction coils	Very low
L9	Osc. circ. MW tuning	8.5
L10	Osc. circ. LW tuning	4.0
L11	V1 pent. anode decoupling	55.0
L12	1st IF trans. { Pri. ...	5.6
L13	Sec. ...	5.6
L14	2nd IF trans. { Pri. ...	5.6
L15	Sec. ...	5.6
L16	IF filter choke	500.0
L17	Speaker speech coil	4.7
L18	Intervalve { Pri. ...	290.0
T1	trans. ... { Sec., total ...	2,480.0
T2	Output trans. { Pri., total ...	510.0
T2	Sec. ...	0.23
S1-S5	Waveband switches	—
S6	GB circuit switch	—
S7	LT circuit switch	—

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws); remove the four cheese-head screws (with large metal washers) holding the chassis to the bottom of the cabinet; remove the battery shelf (four countersunk-head wood screws). Chassis may now be withdrawn to the extent of the speaker leads.



Under-chassis view. The switches are indicated here, and are all contained in a single unit. The aerial and band-pass coils L1-L7 are mounted in the switch assembly, and are partly obscured by it. R1, R9 is a dual volume control unit.

To free chassis entirely, unsolder the two speech coil leads from the tags on the speaker. When replacing, note that middle control knob has an arrow marked on it.

Removing Speaker.—Remove the four ornamental headed screws (with nuts, washers and lock-washers) holding the speaker to the front of the cabinet.

When replacing, the connecting tags should be at the top. See that the small sub-baffle is in position before replacing the speaker unit.

GENERAL NOTES

Switches.—All the switches S1-S7 are ganged in a leaf-type unit beneath the chassis. The individual switches are indicated in our under-chassis view. S1-S4 are all closed on MW, and open on LW; S5 is open on MW and closed on LW. S6, S7 are the battery circuit switches.

Coils.—The aerial and band-pass coils L1-L7 are in two units mounted beneath the switch assembly. The oscillator coils L8-L11 and the IF transformers L13-L16 are in three screened units on the chassis deck. The RF and IF chokes L12 and L17 are mounted at the front and rear respectively beneath the chassis.

Scale lamps.—These are two Osram

MES types, rated at 3.5 V, 0.3 A. They are brought into operation by attaching the separate maroon battery lead to the positive terminal of the LT cell.

External Speaker.—Two sockets are provided at the rear of the chassis for a low-impedance (4-8 Ω) external speaker. The internal speaker can be muted by withdrawing the speaker muting plug.

Batteries.—LT, Exide CZH3 30 AH 2 V celluloid cell. HT, Siemens' Full o' Power combined 120 V HT and 9 V GB battery, type 1196.

Battery Leads.—Black lead, spade tag, LT-; maroon lead (from bunch) spade tag, LT+ 2 V. The separate maroon lead is connected to LT+ only if the scale-lamps are required to light.

Green lead, green plug (GB-1), GB-1.5 V; blue lead and plug (GB-2) GB-9 V; green lead (attached to LT-) black plug, HT- and GB+; yellow lead and plug, HT+ 120 V. The brown (HT+A) and white (HT+B) leads are from the screens of V4, and are connected according to the coding marked on the valve. Letter P indicates 90 V; Q, 96 V; R, 102 V; S, 108 V; T, 114 V. Two code letters should be given, over the letters A and B which represent the two sections of the valve, on the base of the valve.

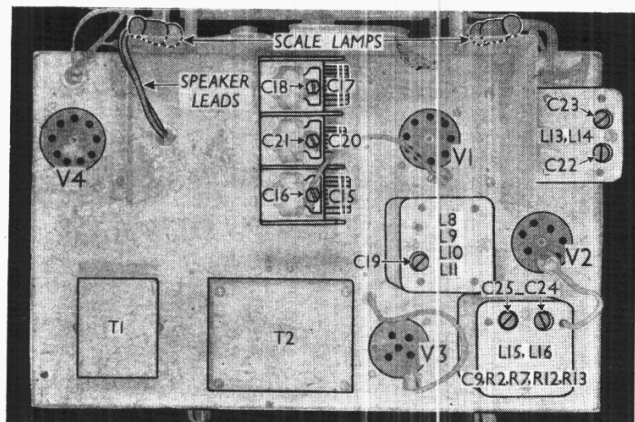
CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator via a 0.1 μF condenser to the control grid (top cap) of V1 and chassis, and turn the volume control to maximum. Feed in a 456 KC/S (657.9 m) signal, and adjust C25, C24, C22 and C23 in that order for maximum output.

RF and Oscillator Stages.—With the gang at maximum, the short hand of the pointer should cover the dot immediately left of the "12 o'clock" position on the scale. Connect signal generator via a suitable dummy aerial to A and E sockets.

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust C21, then C16, C18 for maximum output. If a heterodyne whistle is noticed just above 342 m, retrim C16 and C18 until it disappears.

LW.—Switch set to LW, tune to 1,500 m on scale, feed in a 1,500 m (200 KC/S) signal, and adjust C19 for maximum output.



Plan view of the chassis. Several small components are housed inside the second IF transformer L15, L16 unit.