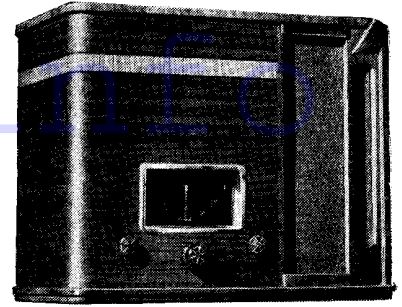


# ULTRA 48 ALL-WAVE A.C. SUPERHET



The Ultra model 48 is an A.C. superhet using four valves and rectifier. It operates on short, medium and long wave-bands.

**CIRCUIT.**—An inductively coupled H.F. transformer couples the aerial to the grid of V1, an H.F. pentode, on medium and long waves. On short waves a single tuned coil is used, the aerial being connected to a tap on it.

A single tuned circuit and capacity coupling by means of C6 provide the coupling to the triode-hexode frequency changer, V2. Tuning is in the anode circuit of V1.

An I.F. transformer, tuned to 456 kc., couples the frequency changer to V3, an H.F. pentode. The output of this passes

full-wave indirectly heated rectifier, electrolytic condensers and the speaker field.

**Special Notes.**—The dial lights are rated at 4.5 volt .3 amp. and are fixed by the usual spring clips into tubes on either side of the dial.

Sockets on the back of the chassis provide connections for an external speaker, which should have a speech coil impedance of from 2 to 4 ohms. The internal speaker may be silenced by disconnecting the wander plug on the flying lead from its socket near the internal speaker terminals.

We are informed by the manufacturers that in order to remove a possible cause of breakdown, the pentode compensating condenser, C20, is connected between the anode of V4 and H.T.+ in later models of this receiver, instead of between the anode and earth, as shown on the circuit diagram.

Sets received for service should have this alteration carried out; the easiest way to do this is to unsolder the earthed side

of the condenser and connect it to the screen grid socket of the valve holder. The alteration is shown in dotted lines on the theoretical circuit diagram.

**Removing Chassis.**—Remove the control knobs from the front of the cabinet (grub screws), turn the set upon one side with the speaker uppermost, and remove four chassis fixing bolts.

The chassis may then be removed

## QUICK TESTS

Quick tests are available on this receiver on the terminal strip on the back of the speaker. Volts measured between this and the chassis should be:—

- Black lead, 250 volts, smoothed H.T.
- Green lead, 0v., speech coil.
- Yellow lead, 0v., speech coil.
- Red lead, 335 v., unsmoothed H.T.

through a second I.F. transformer to the diode section of V4, a double diode output pentode.

One diode of this valve is used for demodulation, the rectified output passing through a resistance and capacity stage incorporating the volume control to the grid of the pentode section.

The other diode of V4 is coupled to the anode of V3, through a small fixed condenser, C14, and is used to supply A.V.C. bias to the preceding valve in the orthodox manner.

A sensitivity switch is provided on the back of the chassis. This varies the cathode bias on V1 and V2 by putting a resistance, R4, in parallel with part of the cathode bias resistance which is formed by R2 and R3. On short waves R3 and R4 are both shorted out.

The amplified output of V4 is fed to the moving-coil speaker via a matching transformer.

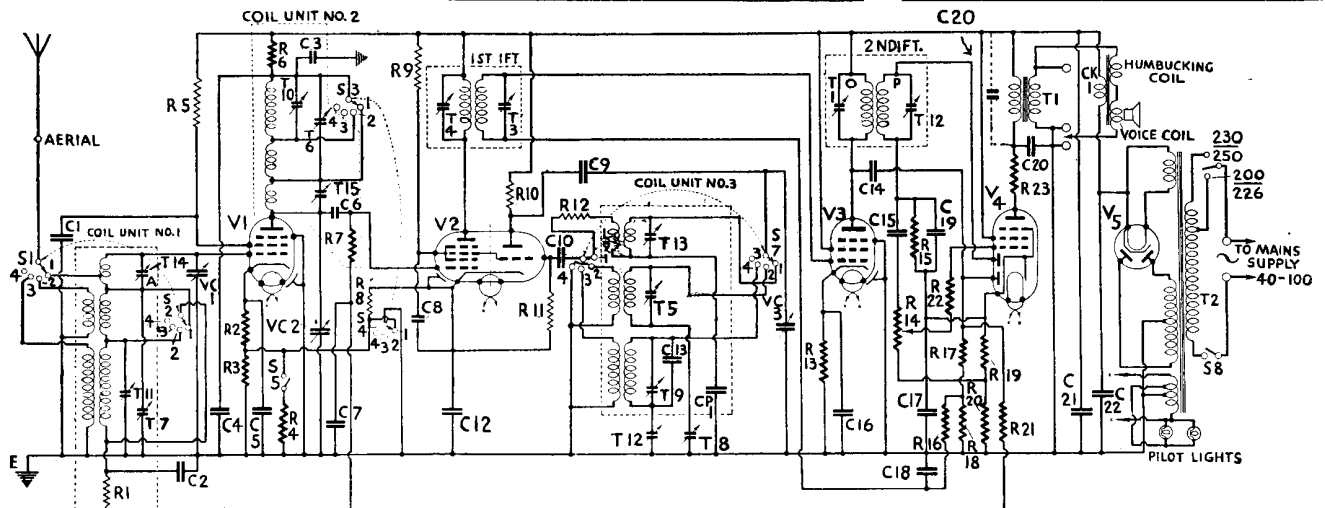
Mains equipment consists of transformer,

## CONDENSERS

C.	Purpose.	Mfds.
1	V1 screen decoupling ..	.5
2	V1 A.V.C. decoupling ..	.05
3	V1 anode decoupling (S.W.) ..	.01
4	V1 anode decoupling ..	.1
5	V1 cathode bias shunt ..	.1
6	H.F. coupling ..	.0001
7	V2 A.V.C. decoupling ..	.05
8	V2 screen decoupling ..	.1
9	V2 osc. anode coupling ..	.0001
10	V2 osc. grid ..	.0001
12	V2 cathode bias shunt ..	.5
13	Long wave osc. shunt ..	.0001
14	A.V.C. diode coupling ..	.0002
15	L.F. coupling ..	.01
16	V3 cathode bias shunt ..	.1
17	V4 cathode bias shunt ..	.50
18	V3 A.V.C. decoupling ..	.05
19	H.F. filter ..	.0002
20	Pentode compensating ..	.01
21	H.T. smoothing ..	.32
22	H.T. smoothing ..	8

## RESISTANCES

R.	Purpose.	Ohms.
1	V1 A.V.C. decoupling ..	1 meg.
2	V1 cathode bias (part) ..	138
3	V1 cathode bias (part) ..	1,000
4	Sensitivity control ..	2,000
5	V1 screen decoupling ..	30,000
6	V1 anode decoupling ..	4,000
7	V2 A.V.C. decoupling ..	1 meg.
8	V2 cathode bias ..	200
9	V2 screen decoupling ..	30,000
10	V2 osc. anode load ..	40,000
11	V2 osc. grid leak ..	25,000
12	V2 osc. grid stopper ..	60
13	V3 cathode bias ..	30
14	Volume control ..	1 meg.
15	Demodulator diode load ..	500,000
16	V3 A.V.C. decoupling ..	1 meg.
17	A.V.C. diode load (part) ..	250,000
18	A.V.C. diode load (part) ..	750,000
19	V4 cathode bias (part) ..	138
20	V4 cathode bias (part) ..	138
21	V2 A.V.C. decoupling ..	1 meg.
22	V4 grid stopper ..	1,000
23	V4 anode stabiliser ..	60
—	Speaker field ..	930



Theoretical circuit diagram of the Ultra 48. The position of C 20 is as in earlier models ; later models have it connected as shown by the dotted line (see Special Notes). The first valve is fed by an inductively coupled transformer on medium and long waves and by a single tuned circuit on short waves.

sufficiently, probably without disconnecting the speaker leads.

Should it be desired to disconnect these reconnection will be as follows (reading from left to right): 1, black lead; 2, blank; 3, green; 4, yellow; and 5, red.

### Circuit Alignment Notes

**I.F. Circuits.**—Connect a modulated oscillator to the aerial and earth terminals via a dummy aerial and place an output meter across the external speaker terminals

Inject a signal of 456 kc. and trim T1, T2, T3 and T4 for maximum output, reducing the oscillator output as the circuits come into line in order to prevent the A.V.C. from working.

**Medium Waves.**—Tune the receiver and the oscillator to 200 metres and adjust T5 and T6 for maximum.

Inject and tune in a signal of 210 metres and adjust T7 for maximum.

Tune the set and the oscillator to 500 metres, rock the gang condenser and trim T8 for maximum.

**Long Waves.**—Inject a signal of 1,000 metres and tune the receiver to 950 metres and adjust T9, T10, and T11 for maximum.

Inject and tune in a signal of 1,700 metres, rock the gang condenser and adjust T12 for maximum.

**Short Waves.**—Tune the set and the oscillator to 17.1 metres (17.55 megacycles), screw T13 right in, and then slowly unscrew it until the second peak is reached. Adjust for maximum output. Then trim T14 and T15 for maximum.

**Calibration.**—With the gang condenser at maximum capacity the pointer should coincide with the top left-hand white line of the scale.

Exact replacement condensers for the Ultra 48, made by A. H. Hunt, Ltd. of Garratt Lane, Wandsworth, London, S.W.18, are: C21, list 3058 (9s. 6d.); C22, list 3053 (6s.); C17, list 2915 (1s. 9d.).

(Continued from page 37.)

Shunt C22 with a 10,000 ohm resistance. Trim C24 for maximum reading. C23 for maximum reading. Remove the shunt.

**Medium Waves.**—Inject a signal of 208 metres via a dummy aerial to the aerial and earth terminals, and tune it in; a template is available from the manufacturers so that correct adjustment of the tuning condenser can be made.

Adjust C17, C14 and C15 for maximum reading on output meter.

If the oscillator coils are badly out of gang, use should be made of an amplifier connected to the anode of V1 via a .00025 mfd. condenser and to the chassis.

The amplifier may be the gramophone side of any reliable receiver, and care should be taken to see that the amplifier grid lead is taken to the anode of V1. The anode lead of V1 is bared, and can be reached through a hole in the chassis to the right of the valve.

Having satisfactorily connected the amplifier, the procedure is as follows: Shunt C22 with a 2,000 ohm resistance and a .1 mfd. condenser in series and inject a strong signal of 545 metres to the aerial and earth terminals.

Tune the receiver until it is heard from the amplifier, remove the amplifier, and shunt and trim C20 for maximum reading on output meter.

The above should be repeated until the best results are obtained.

## Ultra Model 48 on Test

**MODEL 48.**—Standard model for A.C. mains, 200-250 volts, 40-100 cycles. Price 13 gns.

**DESCRIPTION.**—Four-valve plus rectifier table model superhet for three wavebands.

**FEATURES.**—V-type tuning scale calibrated in wavelengths and station names. Vertical speaker opening by side of scale. Concentric tuning control. Local-distance switch on back of chassis. External speaker, but no pick-up connections. R.F. stage preceding pentode frequency changer.

**LOADING.**—80 watts.

### Sensitivity and Selectivity

**SHORT WAVES (16-54.5 metres).**—Representative selectivity and sensitivity. Tuning easy, no noticeable drift.

**MEDIUM WAVES (195-555 metres).**—Good sensitivity and reasonable selectivity. Slight overlap with local stations on average aerial. Whistles not unduly noticeable.

**LONG WAVES (875-2,100 metres).**—Similar gain and selectivity capable of giving the usual stations.

### Acoustic Output.

Ample volume for an ordinary room. Slightly noticeable colouration. Tone generally pleasing.

**Long Waves.**—Inject and tune in a signal of 760 metres (using template if available). Adjust C18 for maximum response.

Connect up the amplifier as before and the shunt across C22; inject a strong signal of 1.875 metres, and tune it in. Then remove the amplifier and shunt and trim C19 for maximum reading.

**Short Waves.**—Inject and tune in a signal of 17.6 metres (using template if available), and trim C16 for maximum reading on output meter.

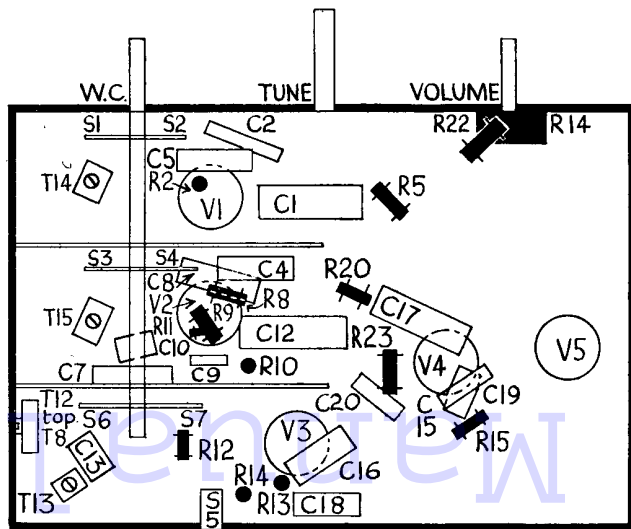
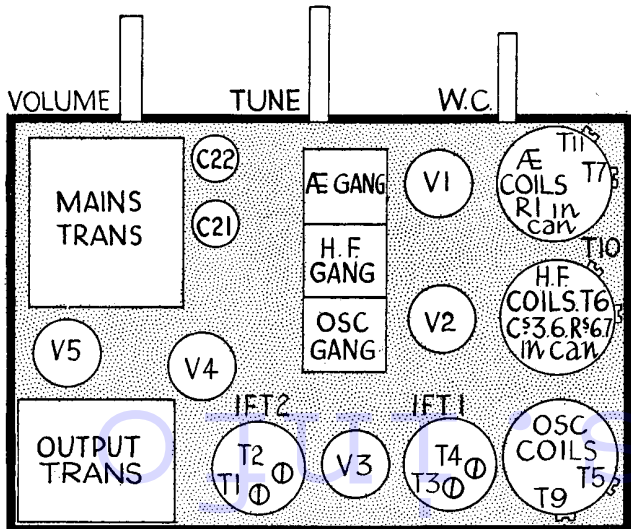
**Aerial Filter.**—Switch the receiver to long waves and tune the condenser to maximum. Apply a strong signal of 128 kc. (the intermediate frequency) and trim C15 for minimum.

**Image Filter.**—Inject a signal of 403 metres, and tune it in. Leaving the tuning condenser at this setting, inject a strong signal of 300 metres and adjust C46 for minimum.

### VALVE READINGS

No signal. Volume and selectivity controls max. 200 volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	(All Mazda) AC/VP1 met. (7)	Anode ..	225	3.1
		Screen ..	205	.55
2	AC/TH1 met. (7)	Anode ..	250	3.25
		Screen ..	170	2.1
		Osc.anode	80	5.1
3	AC/VP1 met. (7)	Anode ..	250	9.75
		Screen ..	250	7
4	AC2/Pen/DD (7)	Anode ..	240	58
		Screen ..	250	7.1
5	UU3 (4)	Filament	335	—



Layout of the chassis of Ultra's model 48. Left, the tinted diagram, is the top view; right is the underside.