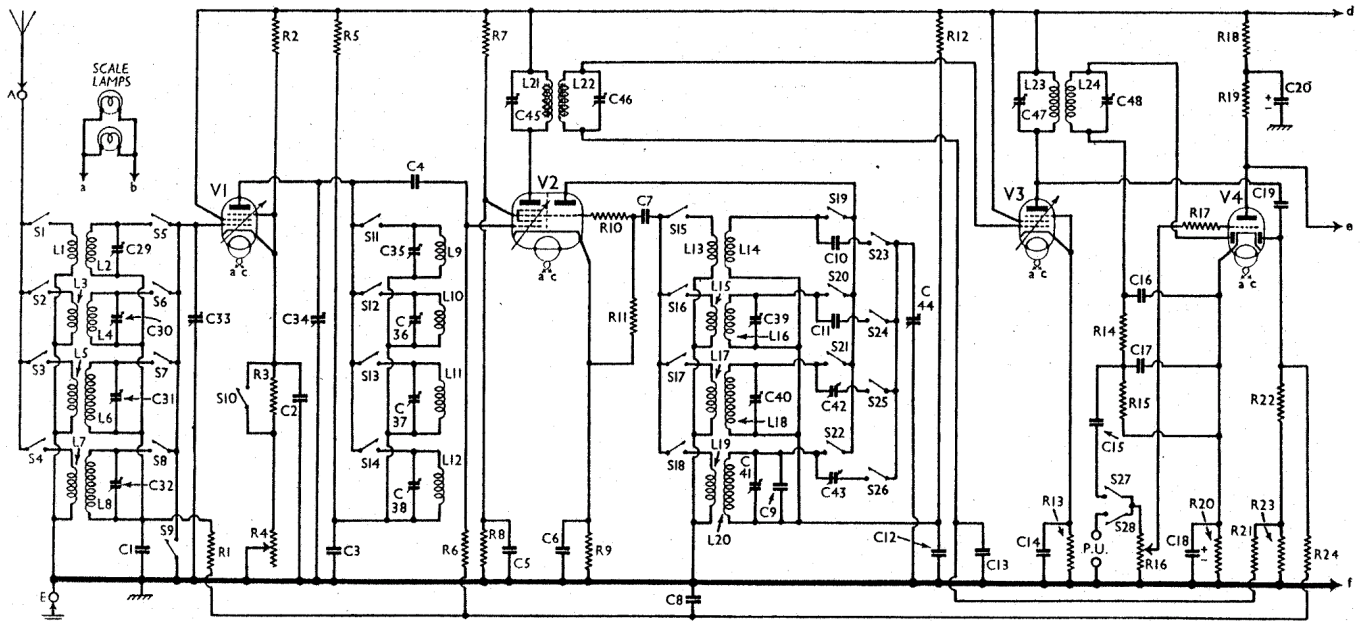


ULTRA - 47



Circuit diagram of the Ultra 47 A.C. superhet. An R.F. amplifier is used in front of the triode-hexode frequency changer.

COMPONENTS AND VALUES

RESISTANCES	Values (ohms)
R1	V1 C.G. decoupling .. 100,000
R2	Parts of V1 G.B. potentiometer .. 100,000
R3	meter .. 1,000
R4	Sensitivity control, part V1 .. 10,000
R5	G.B. pot. (variable) .. 10,000
R6	V1 anode decoupling .. 10,000
R7	V2 hexode C.G. resistance .. 1,000,000
R8	V2 hexode S.G. pot. .. 50,000
R9	V2 fixed G.B. .. 165
R10	V2 osc. harmonic suppressor .. 60
R11	V2 osc. C.G. resistance .. 50,000
R12	V2 osc. anode decoupling .. 25,000
R13	V3 fixed G.B. .. 165
R14	I.F. stopper .. 500,000
R15	V4 signal diode load resistance .. 500,000
R16	Manual vol. control .. 1,000,000
R17	V4 triode C.G. I.F. stopper .. 10,000
R18	V4 triode anode decoupling .. 50,000
R19	V4 triode anode load .. 25,000
R20	V4 G.B. resistance .. 2,000
R21	V3 C.G. decoupling .. 1,000,000
R22	V3 A.V.C. diode load resistance .. 250,000
R23	ance .. 750,000
R24	V1, V2 A.V.C. line decoupling .. 1,000,000
R25	Part of var. tone cont. circuit, V5 C.G. res. .. 50,000
R26	Part of fixed tone corrector .. 15,000
R27	V5 C.G. R.F. stopper .. 1,000
R28	V5 G.B. resistance .. 138
R29	V5 anode circuit stabiliser .. 60

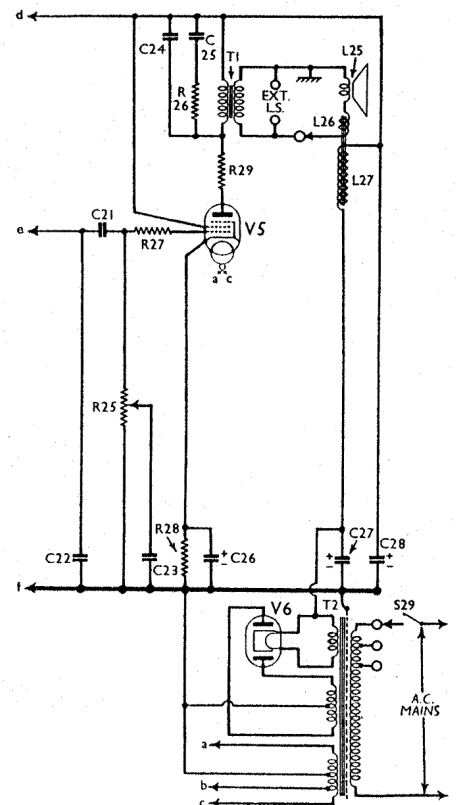
CONDENSERS	Values (μF)
C1	V1 C.G. decoupling .. 0.05
C2	V1 cathode by-pass .. 0.1
C3	V1 anode decoupling .. 0.1
C4	R.F. coupling to V2 hexode .. 0.0001
C5	V2 S.G. decoupling .. 0.1
C6	V2 cathode by-pass .. 0.1
C7	V2 osc. C.G. condenser .. 0.0001
C8	V1, V2 A.V.C. line decoupling .. 0.05
C9	Osc. L.W. fixed trimmer .. 0.0001
C10	Osc. circuit S.W.1 tracker .. 0.0037
C11	Osc. circuit S.W.2 tracker .. 0.00165
C12	V2 osc. anode decoupling .. 0.1
C13	V3 C.G. decoupling .. 0.05
C14	V3 cathode by-pass .. 0.1
C15	A.F. coupling to V4 triode .. 0.01
C16	I.F. stoppers .. 0.0001
C17	.. 0.0001
C18*	V4 cathode by-pass .. 50.0
C19	Coupling to V4 A.V.C. diode .. 0.0002
C20*	V4 triode anode decoupling .. 2.0
C21	A.F. coupling to V5 .. 0.1
C22	V4 triode anode I.F. by-pass .. 0.0002
C23	Part of variable T.C. circuit .. 0.02
C24	Part of fixed tone corrector .. 0.001
C25*	.. 0.01
C26*	V5 cathode by-pass .. 50.0
C27*	H.T. smoothing .. 8.0
C28*	.. 32.0
C29†	Aerial circuit S.W.1 trimmer .. —
C30†	Aerial circuit S.W.2 trimmer .. —
C31†	Aerial circuit M.W. trimmer .. —
C32†	Aerial circuit L.W. trimmer .. —
C33†	Aerial circuit tuning .. —
C34†	V1 anode circuit tuning .. —
C35†	V1 anode circuit S.W.1 trimmer .. —
C36†	V1 anode circuit S.W.2 trimmer .. —
C37†	V1 anode circuit M.W. trimmer .. —
C38†	V1 anode circuit L.W. trimmer .. —
C39†	Osc. circuit S.W.2 trimmer .. —
C40†	Osc. circuit M.W. trimmer .. —

CONDENSERS (Continued)	Values (μF)
C41†	Osc. circuit L.W. trimmer .. —
C42†	Osc. circuit M.W. tracker .. —
C43†	Osc. circuit L.W. tracker .. —
C44†	Osc. circuit tuning .. —
C45†	1st I.F. trans. pri. tuning .. —
C46†	1st I.F. trans. sec. tuning .. —
C47†	2nd I.F. trans. pri. tuning .. —
C48†	2nd I.F. trans. sec. tuning .. —

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial S.W.1 coupling coil .. 0.5
L2	Aerial S.W.1 tuning coil .. 0.02
L3	Aerial S.W.2 coupling coil .. 2.5
L4	Aerial S.W.2 tuning coil .. 0.1
L5	Aerial M.W. coupling coil .. 12.0
L6	Aerial M.W. tuning coil .. 4.0
L7	Aerial L.W. coupling coil .. 82.0
L8	Aerial L.W. tuning coil .. 11.5
L9	V1 anode S.W.1 tuning coil .. 0.02
L10	V1 anode S.W.2 tuning coil .. 0.1
L11	V1 anode M.W. tuning coil .. 4.0
L12	V1 anode L.W. tuning coil .. 11.5
L13	Osc. S.W.1 grid coil .. 0.2
L14	Osc. anode S.W.1 tuning coil .. 0.02
L15	Osc. S.W.2 grid coil .. 0.3
L16	Osc. anode S.W.2 tuning coil .. 0.1
L17	Osc. M.W. grid coil .. 0.7
L18	Osc. anode M.W. tuning coil .. 3.2
L19	Osc. L.W. grid coil .. 1.0
L20	Osc. anode L.W. tuning coil .. 5.5
L21	1st I.F. trans. Primary .. 5.6
L22	Secondary .. 5.6
L23	2nd I.F. trans. Primary .. 5.6
L24	Secondary .. 5.6
L25	Speaker speech coil .. 4.6
L26	Hum neutralising coil .. 0.1
L27	Speaker field coil .. 930.0
T1	Speaker input trans. Pri. 410.0
	former Sec. 0.16
T2	Mains trans. Pri. total 25.5
	Heater sec. 0.04
	Rect. heat. sec. 0.06
	(H.T. sec. total 600.0
S1-S2†	Wavechange switches .. —
S27†	Radio-gram switches .. —
S28†	.. —
S29	Mains switch, ganged R25 .. —

Intermediate frequency 456 KC/S.



ULTRA 47 (suite)

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 230-250 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band, and both the volume and sensitivity controls were at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V ₁ AC/VP ₁ ..	210	3.7	260	0.8
V ₂ X ₄₁ * ..	260	0.9	70	2.3
V ₃ AC/VP ₁ ..	260	12.0	260	3.5
V ₄ AC/HL/DD ..	118	1.4	—	—
V ₅ AC/2Pen. ..	240	35.0	260	7.6
V ₆ 6U ₃ ..	310†	—	—	—

* Oscillator anode 105 V, 3.4 mA.

† Each anode, A.C.

GENERAL NOTES

Switches.—S₁-S₂₈ are the waveband and pick-up switches, ganged in four rotary units situated inside the coil and switch assembly. The units are indicated in our side-chassis view, and are shown in detail in the diagrams in column 3, where they are seen looking at the side of the chassis, in the directions indicated by the arrows in the side-chassis view.

The table (col. 3) gives the switch positions for the five control settings, starting from fully anti-clockwise. O indicates open, and C closed.

S₂₉ is the Q.M.B. mains switch, ganged with the tone control, R₂₅.

Coils.—All the R.F. and oscillator coils are in a screened and partitioned unit, fitted at the right of the

chassis. A side view of this unit, with the metal cover plate removed, is given. In this view all the coils are identified. They are on twelve tubular formers, singly or in pairs, and all except the L₁₃, L₁₄ unit have a trimmer mounted at the end of the unit. The switch units are also included in the coil assembly, together with a number of other associated components.

The I.F. transformers, L₂₁, L₂₂ and L₂₃, L₂₄ are in two screened units on the chassis deck, with their trimmers. Note that the second transformer contains also R₂₁-R₂₄ and C₁₉.

Scale Lamps.—These are two Osram M.E.S. types rated at 4.5 V, 0.3 A, and wired in parallel across one end and a tapping on the heater winding of T₂.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (2-4 Ω) external speaker. A plug and socket device permits the internal speaker speech coil circuit to be broken, muting this speaker.

Condenser C₂₈.—This was a 32 μF type in our chassis, but may be 16 μF in earlier models.

Trackers C₁₀, C₁₁.—These each consist of two fixed condensers in parallel in our chassis.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator via a dummy aerial to A and E sockets. Turn sensitivity, volume and tone controls to maximum, fully clockwise. Switch set to M.W., and turn gang condenser to maximum. Feed in a 456 KC/S signal, and adjust C₄₈, C₄₇, C₄₆ and C₄₅ in turn for maximum output, keeping the input low.

R.F. and Oscillator Stages.—When gang is at maximum, the pointer should cover the vertical scale marks.

Switch set to M.W., feed in a 220 m. signal, and tune to 220 m. on scale. Adjust C₄₀, then C₃₁ and C₃₇ for maximum output. Feed in a 500 m. signal, tune it in, and adjust C₄₂, rocking the gang for optimum results. Repeat the 220 m. adjustments.

Switch set to L.W., feed in a 1,000 m. signal, and tune to 1,000 m. on scale. Adjust C₄₁, then C₃₂ and C₃₈ for maximum output. Feed in a 1,700 m. signal, tune it in, and adjust C₄₃, rocking the gang for optimum results. Repeat the 1,000 m. adjustments.

Switch set to S.W.2, feed in a 30 m. signal, and tune it in. Adjust C₃₉ in conjunction with tuning control

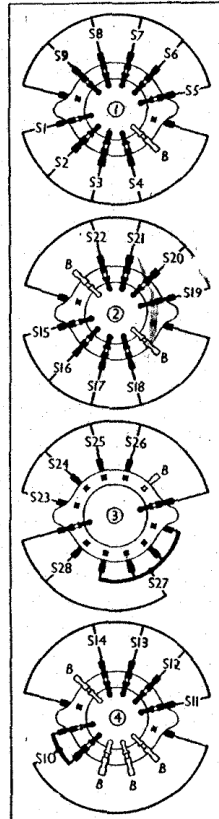
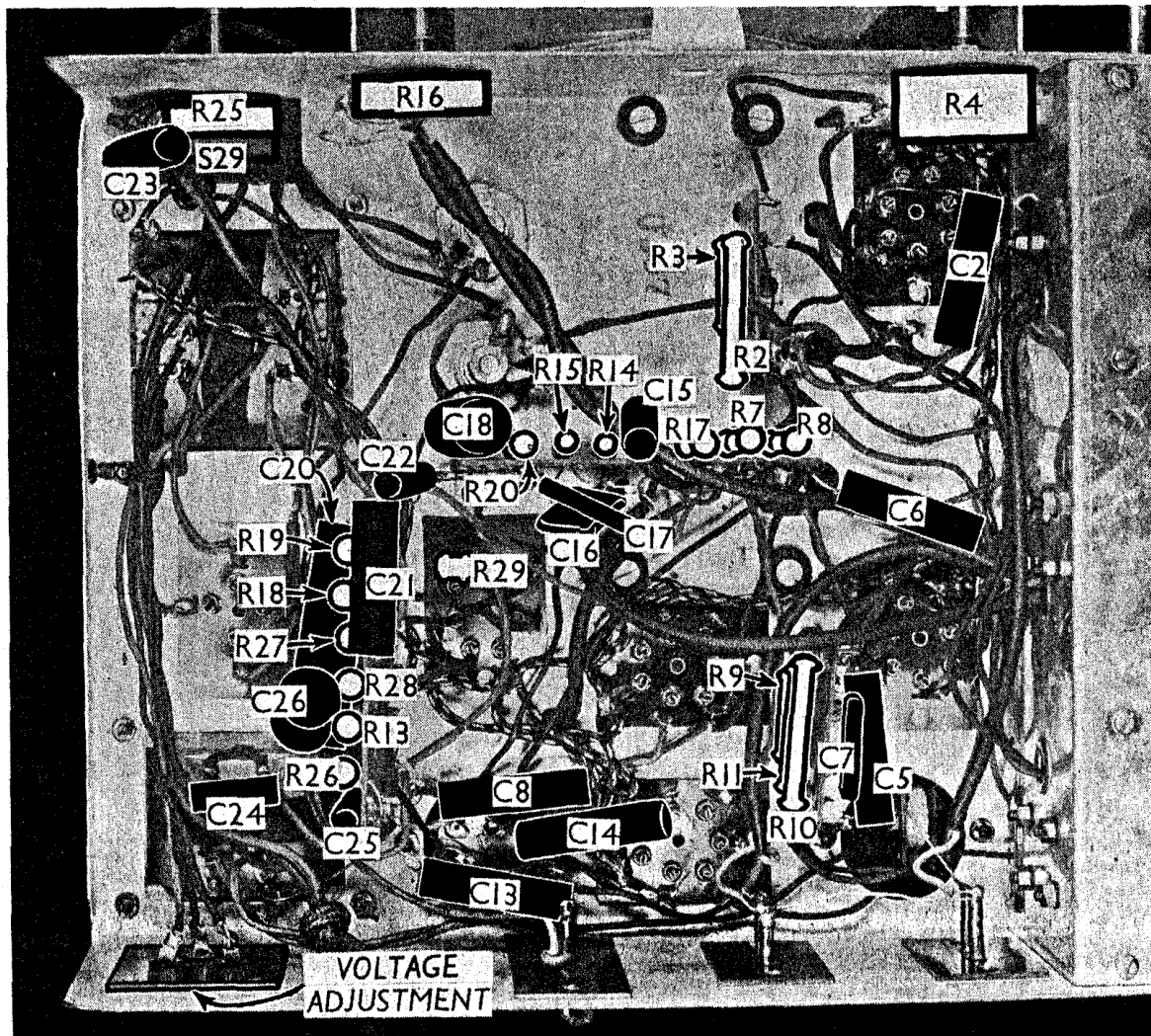
until optimum results are obtained, at the correct scale indication. Now adjust C₃₀ and C₃₆ for maximum output. The correct peak for C₃₉ is that with the trimmer furthest unscrewed. This position should result in a second tuning point at 33 m. on the scale when the 30 m. input voltage is increased.

Switch set to S.W.1, feed in a 15 m. signal and tune it in. Two tuning points, separated by about 1 metre on the scale will be noted. Adjust C₂₉ and C₃₅ until the signal of shortest wavelength is at maximum. If signs of instability are noted below 15 m., screw up C₂₉ and C₃₅ very slightly until instability ceases.

All trimmer adjustments must be made with cover plate on side of coil unit in position.

SWITCH TABLE

Switch	S.W.1	S.W.2	M.W.	L.W.	Gram.
S ₁	C	O	O	O	O
S ₂	C	C	O	O	O
S ₃	O	O	C	O	O
S ₄	O	O	O	C	O
S ₅	C	O	O	O	O
S ₆	O	C	O	O	O
S ₇	O	O	C	O	O
S ₈	O	O	O	C	O
S ₉	O	O	O	O	C
S ₁₀	C	C	O	O	O
S ₁₁	C	O	O	O	O
S ₁₂	O	C	O	O	O
S ₁₃	O	O	C	O	O
S ₁₄	O	O	O	C	O
S ₁₅	C	O	O	O	O
S ₁₆	O	C	O	O	O
S ₁₇	O	O	C	O	O
S ₁₈	O	O	O	C	O
S ₁₉	C	O	O	O	O
S ₂₀	O	C	O	O	O
S ₂₁	O	O	C	O	O
S ₂₂	O	O	O	C	O
S ₂₃	C	O	O	O	O
S ₂₄	O	C	O	O	O
S ₂₅	O	O	C	O	O
S ₂₆	O	O	O	C	O
S ₂₇	C	C	O	O	O
S ₂₈	O	O	O	O	C



Above : Switch diagrams looking in the directions of the arrows in the side-chassis view. Left : Under-chassis view.