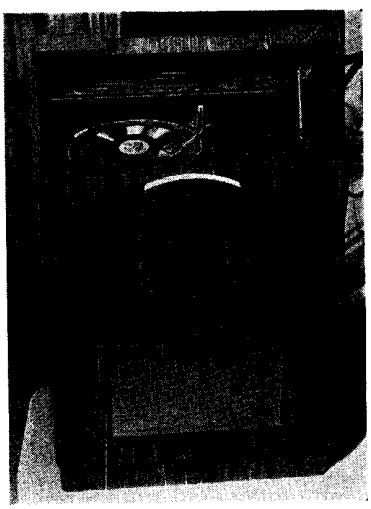
SERVICE ENGINEER

ULTRA MODEL 96 SUPERHET A.C. RADIOGRAM

Circuit.—A three-valve A.C. superhet radiogram covering the usual medium and long wave bands.

Aerial circuit consists of a band-pass filter incorporating a small coupling coil on medium waves, one end being open. V1 is a triode pentode frequency changer.

Coupling to V2, an H.F. pentode, is through an air-cored I.F. transformer (456 kc.), the output of this valve then passes to the double diode portion of V3, a double diode output pentode, through a second I.F. transformer, and after demodulation to the grid of the pentode via the volume control.



An arc tuning scale on the front of the cabinet is a distinguishing feature of the Ultra Model 96 A.C. superhet radiogram. The Model 97 universal model is similar in appearance.

A.V.C. bias is applied to V1 and V2 from one diode of V3 in the orthodox manner.

Mains equipment consists of the transformer, full-wave rectifier, electrolytic condensers and the speaker field.

Special Notes.—The dial lamp is rated at 4.5 volts .3 amps; the holder is clipped into a slot in the dial pointer.

External speaker is connected on the low-resistance side of the output trans-

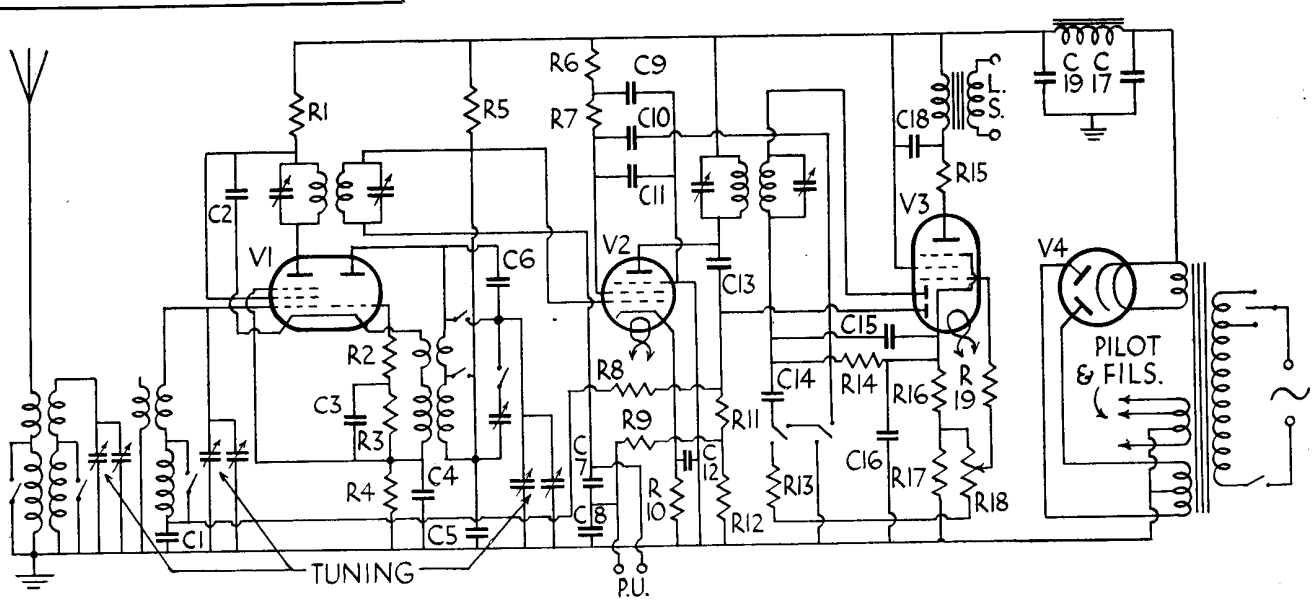
(*Continued on next page.*)

RESISTANCES

R.	Purpose.	Ohms.
1	V1 anode decoupling... ...	7,000
2	V1 osc. grid network (part)	1,000
3	V1 osc. grid network (part)	50,000
4	V1 cathode bias	480
5	V1 osc. anode decoupling ...	80,000
6	V2 screen decoupling... ...	15,000
7	V2 screen load	7,000
8	V1 A.V.C. decoupling ...	1 meg.
9	V2 A.V.C. decoupling ...	1 meg.
10	V2 cathode bias	30
11	A.V.C. diode load part ...	250,000
12	A.V.C. diode load part ...	750,000
13	Series coupling	10,000
14	Demod. diode load	500,000
15	V3 anode stabiliser	60
16	V3 cathode bias potr. ...	138
17	V3 cathode bias potr. ...	138
18	Volume control	1 meg.
19	V3 series grid	1,000

CONDENSERS

C.	Purpose.	Mfd.
1	V1 A.V.C. decoupling ...	.05
2	V1 screen and anode decoupling	.1
3	V1 osc. grid network part ...	.0002
4	V1 cathode bias shunt ...	.5
5	V1 osc. anode decoupling ...	.1
6	Long wave padding	.0003
7	Pick-up by-pass	.0002
8	V2 A.V.C. decoupling ...	.05
9	V2 screen decoupling ...	2
10	Gramophone coupling ...	.1
11	By-pass...	.002
12	V2 cathode bias shunt ...	.1
13	A.V.C. diode feed	.0002
14	L.F. coupling	.01
15	H.F. filter	.0002
16	V3 cathode bias shunt ...	50
17	H.T. smoothing	8
18	Pentode compensating ...	.01
19	H.T. smoothing	16



A three-valve plus rectifier superhet circuit is used in the Model 96, the third valve combining the duties of second detector, A.V.C. valve and output pentode. On records V2 becomes the first amplifier, the output of which is taken from the screen lead via C10. Switches connect C10 to the volume control which feeds V3 and cut out the radio input.

ULTRA MODEL 96 A.C. RADIOGRAM (Continued)

former and should be of low-speech coil impedance.

The pick-up is permanently connected in the grid return lead of the first I.F. transformer and is shunted by C7.

Removing Chassis.—Remove the three knobs from the front of the cabinet (grub screws) and three chassis fixing bolts from underneath the shelf; unsolder the leads from the terminal strip on the speaker. Reconnection is as follows, starting on the right: (1) Black lead; (2) blank; (3) green lead; (4) yellow lead; (5) red lead.

Then remove the mains lead to the gramophone motor, the pick-up leads and the earth link, all secured by means of nuts. The chassis can then be completely removed from the cabinet; the leads to the speaker must, however, be reconnected, as the field forms part of the smoothing equipment.

To remove the gramophone assembly, unscrew the eight screws from around the edge of the motor plate and it will then be free.

ALIGNMENT NOTES

I.F. Circuits.—Connect a modulated oscillator tuned to 465 kc. to the grid of V1 and earth through a small fixed condenser, and an output meter across the external speaker terminals. Adjust T1, T2, T3 and T4, for maximum reading on output meter.

Medium Waves.—Inject a signal of 200 metres through a dummy aerial to the aerial and earth terminals, and tune in the signal and trim T5, T6 and T7 for maximum reading on output meter. Repeat at 500 metres and again at 350 for check.

Long Waves.—Tune oscillator and receiver to 1,000 metres and adjust T8 for maximum reading on the output meter.

QUICK TESTS

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

Black lead, 260v., smoothed H.T.
Red lead, 365 v., unsmoothed H.T.

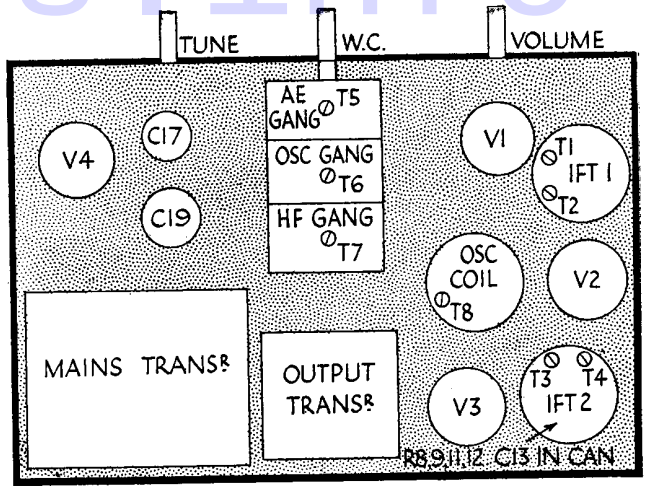
VALVE READINGS

No signal. Volume maximum. 200v. A.C mains.

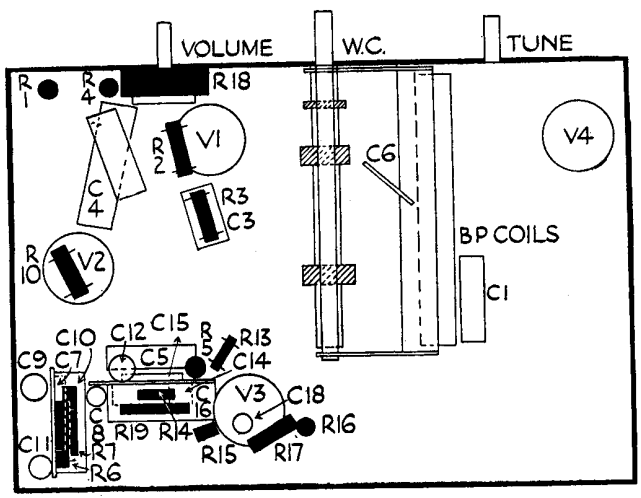
V.	Type.	Electrode.	Volts.	Ma.
1	AC/TP Met. (9)	anode ...	185	6
		screen ...	185	1.7
		osc. anode	80	2.2
2	AC/VP1Met. (7)	anode ...	230	17
		screen ...	225	5
3	AC2/Pen.DD(7)	anode ...	235	33
		screen ...	245	7
4	UU3 (4) ... All Mazda	filament	365	—

THE high-frequency type of neon sign, generally used in windows and where high voltages would be dangerous, sometimes introduce an interference component into the mains. A remedy can often be effected by putting a small earthed metal band round the tube. The band is moved along the tube until the interference is minimised.

On the right is the top-of-chassis layout diagram of the Ultra radiogram. The diagram is "tinted" to distinguish it from the layout showing the design of the underside of the chassis.



This drawing identifies the components mounted inside the chassis. To facilitate tracing parts, resistors are in solid black and condensers in outline.



ALIGNMENT NOTES FOR G.E.C. SET

DETAILS are available of the recommended alignment procedures for the G.E.C. models T.R.F.3, reviewed on page 57 of volume 1.

(i) Check that tuning pointer indicates zero mark on the scale with the gang condenser at minimum capacity. If necessary, the pointer may be adjusted after removing the chassis by turning the pointer clip round bodily on the spindle.

(ii) Select a station of known wavelength between 200 and 250 metres that for a reasonable signal to be obtained requires the setting of the volume control well towards the max. position, and the reaction condenser well towards the point of oscillation. Set the tuning pointer to this wavelength and adjust the trimmers for maximum response. If the set should oscillate as the circuits come into alignment, reduce reaction slightly and retrim.

(iii) Set tuning pointer to approximately the middle of the medium wave-band, and set the reaction control to minimum. Adjust C10, the reaction trimmer, until the receiver is just oscillating, and then turn back one complete turn. Check for freedom from oscillation over both wavebands, and seal trimmer.

Operation (ii) should be preferably carried out with a calibrated modulated oscillator at 1,400 kc. (214 metres).

A modification has been made in the T.R.F.3 and the condenser C9 shown in the circuit on page 57 of volume 1 of the MANUAL is not used.

The circuit description described the coupling between the H.F. and detector valves as inductive and capacitative. This, in conjunction with the drawing of the circuit, might be taken to indicate an H.F. transformer coupling. Actually, a switched H.F. choke is used in the anode circuit of the H.F. valve, and this feeds a simple tuned-grid circuit through a condenser.

Two errors occurred in the resistance table. R8 is "V2 anode coupling" and R9 and R10 are part of the bias potentiometer for V1 and V3.

The chassis, it will be found, is held by only three fixing bolts, whereas our review stated there were four.