TWIN SUPERVOX BY McMICHAEL (Cont.)

waves, gramophone and also providing tone control by switching an extra .01 mfd. condenser (22) into the tone compensating circuit.

The bias potentiometer in the H.T.— lead consists of R14 and R15. The potentiometer, R16, is connected only across R15.

Only one L.S. field is used for smoothing: the other forms part of the potentiometer supplying the auxiliary grid of the pentode and the screen potentiometer of the H.F. valves.

Quick Tests.—Between terminals on left hand (looking from back) of speaker, transformer and chassis, counting from outside :—

1.	H.T. unsmoothed ...	370 volts.
2.	V4 anode	235 volts.
3 and 4	... ...	Speech winding.
5.	H.T.+ smoothed ...	252 volts.

Note that the 1,500 ohm field coil is between 1 and 5. Output transformer primary is between 2 and 5.

Removing Chassis.—Remove tuning knob and V.C. knob (grub screw). Remove switch lever by undoing the screw in the centre and pulling lever off.

Remove six screws round the sides and four from underneath the felt pads at the corners. The best method of doing this appears to be by laying the set on its back and, when the screws are out, lifting the cabinet from the chassis.

General Notes.—The lay-out is simple, and switch contacts are easily reached.

The condensers under the resistance panel are :—Three next V1, beginning from baseplate, C19, C10, C8. The other three, in same order, are C15, C12 and C11.

An L.F. coupling unit, consisting of R10, R11, C17 and the auto-coupled transformer, is mounted next V4.

The aerial condensers, C2 and C3, are adjusted for maximum efficiency, and are sealed as their values affect the tuning of the first band-pass coil.

Replacing Chassis.—Lay the chassis into the cabinet and slide it forward till the spindles appear behind the holes in the front of cabinet. If any difficulty is experienced in getting them through, remove one or more of the centring plates and replace after the chassis is in position.

Replace the ten screws underneath, and replace the knobs and switch lever.

ULTRA "TIGER" MAINS SUPERHET

Circuit.—The combined first detector oscillator, AC/SG (V1) is preceded by a bandpass aerial tuner. An aperiodic aerial coil is connected to the slider of a potentiometer between aerial and earth, and, in conjunction with a variable resistance in the cathode lead of the I.F. valve with which it is ganged, forms the volume control.

Cathode injection is employed, and the anode is coupled to the next valve by a bandpass I.F. transformer (frequency 456 kc.).

The I.F. valve, AC/SG.VM, (V2) is coupled to the second detector by a second bandpass intermediate transformer. To obtain the necessary current through the biasing resistance to give adequate control of volume an additional 50,000 ohm resistance (two 100,000 ohms resistances in parallel) is connected between H.T.+ and cathode.

An anode-bend second detector, AC/SG

(*Continued on next page.*)

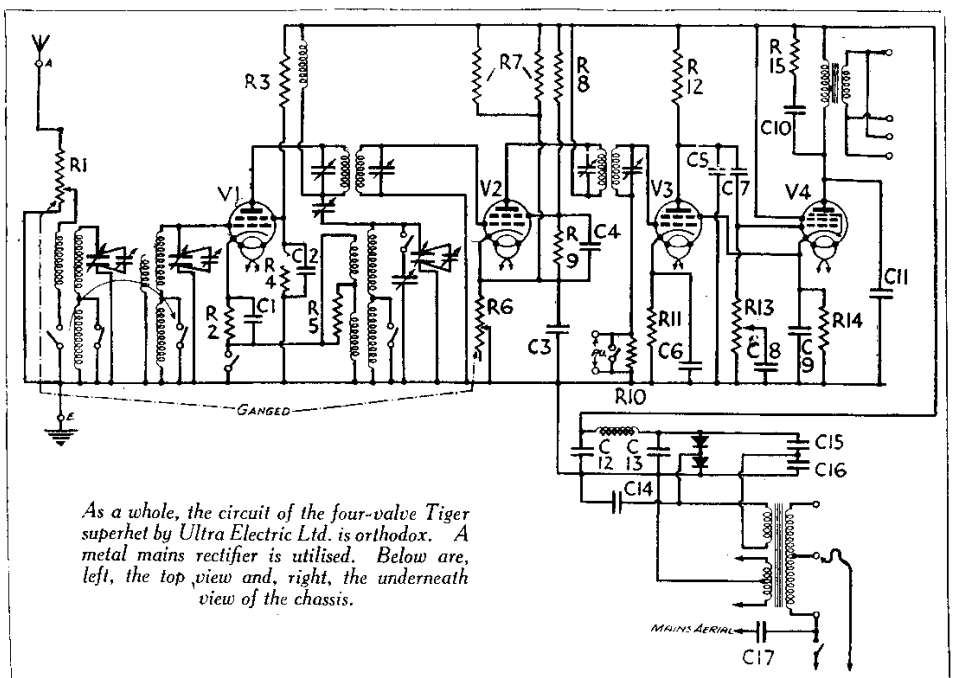
CONDENSERS

C.	Purpose.	Mfd.
1	Across biassing resistance V 1 ...	.01
2	Screen decoupling V 1	.1
3	V 2 cathode	.1
4	V 2 screen	.1
5	V 3 anode by-pass	.0001
6	V 3 cathode	25 (el)
7	V 3–V 4, L.F. coupling	.01
8	Tone control, grid V 4	.002
9	V 4 cathode	25 (el)
10	Pentode compensating anode V 4	.01
11	V 4, anode stabiliser	.001
12	HT smoothing	8 (el)
13	HT smoothing	8 (el)
14	HF by-pass in rectifier circuit ...	.01
15	Voltage doubling circuit ...	4
16		4
17	Mains aerial	.0001

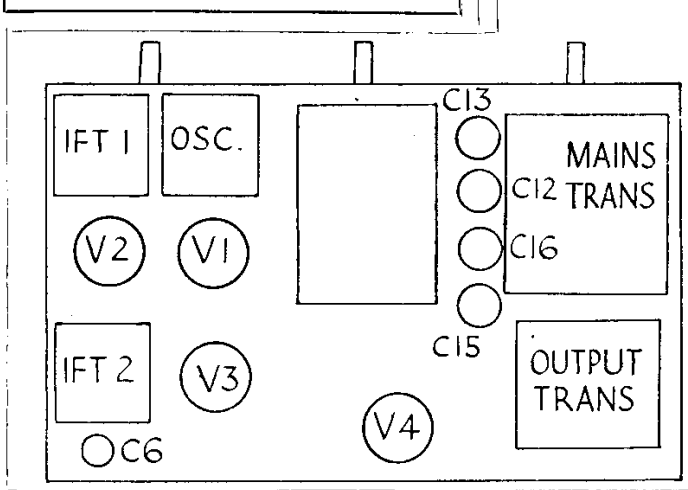
RESISTANCES

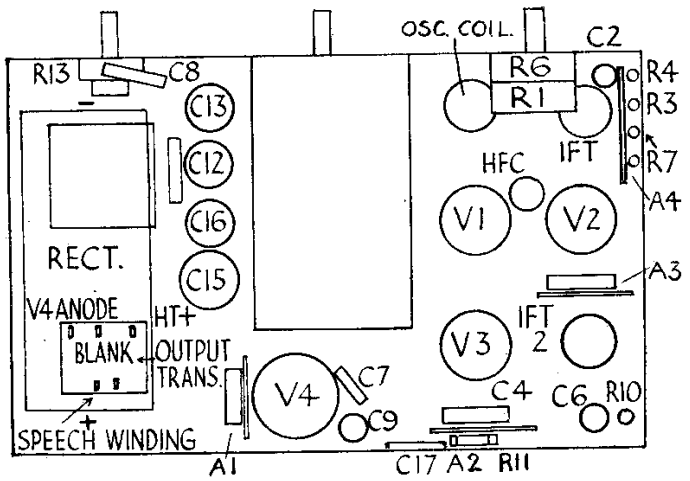
R.	Purpose.	Ohms.
1	Potentiometer in aerial lead (part of VC)	50,000
2	V 1 cathode bias	2,000
3	Top of V 1 screen ptr.	80,000
4	Lower part of V 1 screen ptr. ...	17,500
5	Across cathode oscillator coupling V 1	2,000
6	V 2 cathode bias (part of V.C. ganged with R1)	10,075
7	Increasing current through R 6	50,000*
8	Top part of V 2 screen ptr. ...	40,000
9	Lower part of V 2 screen ptr. ...	25,000
10	Across P.V. terminals (low potential end of IFT 2 secondary)	100,000
11	V 3 cathode bias	15,000
12	V 3 anode coupling	1 meg.
13	V 4 grid leak (ptr.)	.5 meg.
14	V 4 cathode bias	400
15	Tone compensating anode V 4 ...	15,000

* Two 100,000 ohm resistances in parallel.



As a whole, the circuit of the four-valve Tiger superhet by Ultra Electric Ltd. is orthodox. A metal mains rectifier is utilised. Below are, left, the top view and, right, the underneath view of the chassis.





ULTRA TIGER MAINS SUPERHET (Cont.)

(V3) has the pick-up connections across a resistance at the low potential end of the secondary of the second L.F. transformer. A high value of anode coupling resistance is used and the filter to the output valve is by a .01 condenser.

The output pentode, AC/Pen, has a variable tone control in its grid circuit. This consists of a .002 mfd. condenser connected between chassis and the slider of the potentiometer grid leak. Tone compensation is by a resistance and capacity in series across the primary of the output transformer. A stabilising condenser is connected directly between the anode and chassis.

Mains equipment consists of a transformer and a full-wave, voltage-doubler metal rectifier with the speaker field in the positive H.T. lead. Two 8 mfd. electrolytic condensers are used for smoothing.

Special Notes.—Extra speaker must be of the low impedance type.

The screen potential for the second detector (V3) is taken from the cathode of the output valve (V4), which is 15 volts positive with relation to the chassis.

Quick Tests.—Between the following terminals on L.S. and chassis :—

Top (H.T. unsmoothed), 340 volts.

Bottom (H.T. smoothed), 270 volts.

Between container of rear (insulated) electrolytic condenser and chassis, 170 volts. This represents half the rectified voltage.

Removing Chassis. — Remove knobs (grub screw), undo three screws underneath, and lift chassis out. Speaker leads are sufficiently long to allow examination.

General Notes.—The layout of this chassis is fairly straightforward. The majority of the small components are mounted on small assembly panels, which we have numbered A1, A2, A3 and A4.

A1, beside V4 valveholder, carries (in order from the base plate) C11, R15, C10 and R14.

A2, behind V3, side next valve, C5, C4; side next back panel, R12, R8, R9 and R11.

A3, behind V2, R2, C1, R5 and C3.

A4, details are given in the diagram.

If a component on one of these requires replacement the two holding screws should be removed and the assembly eased out. The screws are of the self-threading type.

The casing of C15 is insulated from the chassis, and this bush must be replaced if a new condenser has to be fitted.

Replacing Chassis.—Lay the screening tray in the bottom of the cabinet with the insulating strip to the metal rectifier end and lay the chassis on top of it. (The base of the chassis actually rests *inside* the lip of the tray.)

Replace the three screws underneath and the knobs.

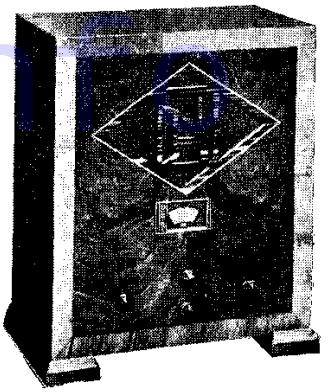
VALVE READINGS
V.C. Max.

Valve.	Type.	Electrode.	Volts.	M.A.
V 1 ...	AC/SG ...	anode ...	250	See note
		screen ...	33	
V 2 ...	AC/SGVM ...	anode ...	250	
		screen ...	62	
V 3 ...	AC/SG ...	anode ...	*	
		screen ...	15**	
V 4 ...	AC/Pen ...	anode ...	235	30
		aux. grid ...	252	5.5

* Anode bend detector with high anode coupling resistance. Only very approximate readings can be taken.

** This represents the bias on V 4.

Note the inclusion of m.a. meter leads in series with the valve anode leads causes instability and precludes the taking of current readings under ordinary circumstances.



The Tiger four-valve plus rectifier superhet made by Ultra Electric Ltd.

PORTADYNE RADIO'S P.B.5 PORTABLE

Circuit.—The H.F. valve, PM12A (V1), is preceded by a conventional frame aerial in which the long-wave section is short-circuited when the medium wave is in use. The circuit has a "local-distance" switch which connects a condenser of small value in series with the grid condenser and at the same time connects a balancing condenser across the H.F. tuning condenser. The anode of the valve is coupled to the tuned grid of the next valve by a choke-condenser filter.

The detector valve, PM2DX (V2) has its grid leak taken to a tapping on a potentiometer across the filament supply to provide bias for the most sensitive operating condition of the valve. Swinging coil reaction is used and the anode H.T. circuit is decoupled. Coupling to the first L.F. valve is by parallel-fed transformer.

The first L.F. valve, PM2DX (V3) has a tone control in the grid circuit in the form of a condenser between the grid and chassis. This is operated by a switch.

Coupling to the second L.F. valve is by another parallel-fed transformer, the primary of which has a complete tone correction filter in series with it. The anode H.T. supply to this valve is also decoupled. The next valve, PM2DX (V4) (driver) is also coupled to the output by a typical Class B transformer.

The output is a Class B B21 (V5) and is compensated for high note distortion by a condenser between one grid and earth, by a condenser between each anode and earth and by another between the anodes. The speaker is a permanent-magnet type.

Special Notes.—The screen potential for the H.F. valve is derived from the H.T. through the resistance R4, which is the decoupling resistance of the detector. When the screen voltage is approximately that of the H.T. battery the detector valve is not drawing any current.

A resistance R9 is connected across the

(*Continued on opposite page.*)

RESISTANCES

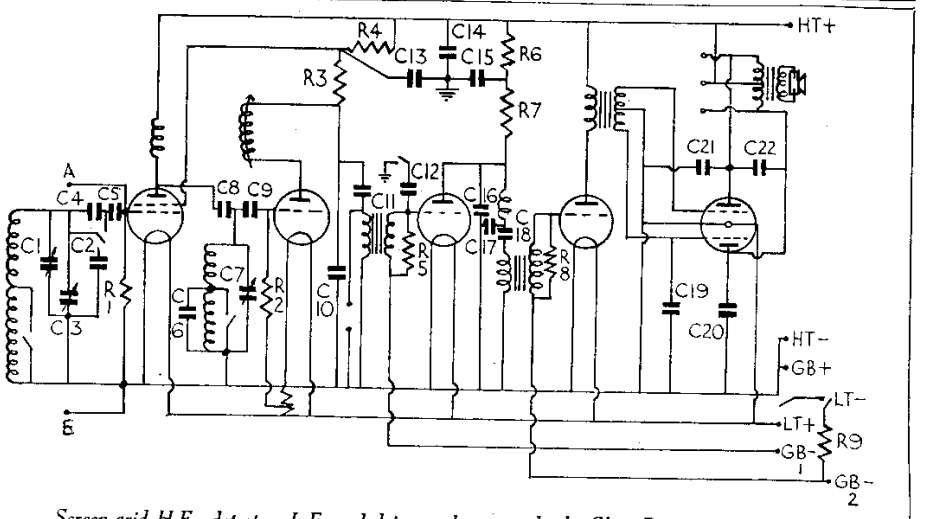
R.	Purpose.	Ohms.
1	V1 grid leak	1 meg.
2	V2 grid leak	1 meg.
3	V2 anode coupling to 1st LF trans.	30,000
4	V2 anode decoupling	50,000
5	Across secondary of 1st LF trans.	220,000
6	V3 anode decoupling	20,000
7	V3 anode coupling to 2nd LF trans.	20,000
8	Across secondary of 2nd LF trans.	220,000
9	Across GB battery	300
x	Across LW of V2 grid coil ...	250,000

CONDENSERS

C.	Purpose.	Mfd.
4	In series with C5 for local reception (twisted wire)	—
5	V1 grid condenser	.0001
6	L.W. padding condenser (twisted wire)	—
8	H.F. filter from anode V1 to grid coil of V2	.0001
9	V2 grid condenser	.0001
10	V2 anode by pass condenser ...	.002
11	LF filter to 1st LF transformer...	.1
12	Tone control in grid circuit V3	.002
13	V1 screen and V2 anode decoupling	1
14	Across HT battery	1
15	V3 anode decoupling	1
16	Part of tone correction circuit ...	.001
17	Part of tone correction circuit ...	.001
18	Filter to 2nd LF transformer ...	.1
19	Tone compensating, in one grid of V5	.01
20	Between one anode of V5 and earth	.01
21	Between other anode of V5 and earth	.002
22	Between V5 anodes	.004
x	Tone compensating in other grid	.01

VALVE READINGS

Valve	Type.	Electrode.	Volts.	m.a.
1	PM12A	anode	117	.8
		screen	55	—
2	PM2DX	anode	38	.9
3	PM2DX	anode	70	1.2
4	PM2DX	anode	118	1.9
5	B21	each anode	130	—



Screen-grid H.F., detector, L.F. and driver valves precede the Class B output valve in the Portadyne P.B.5.