SUNBEAM "22" A.C.-D.C. SUPERHET (Cont.)

hand (looking from the back) terminal on the L.S. transformer panel.

Voltages between this terminal (1) and the

voltages between this terminar (1) and the remainder are:

(2) H.T. smoothed, 208 volts.

(3) Zero.

(4) V3 anode, 195 volts.

(5) H.T. unsmoothed, 230 volts.

(2) and (4) are primary of output transference. former.

(3) and (5) are L.S. field.

Removing Chassis.—To test V3 it is necessary to remove the chassis.

Undo the control knobs (grub screw), unscrew the wave-change switch lever and remove the three holding screws from below.

R.	Purpose.	Ohms.	
1	V1 grid leak	2 meg.	
2	Voltage dropping to V1 aux. grid	.25 meg.	
3	Decoupling A.V.C. to V2	1 meg.	
1 2 3 4 5 6 7 8 9	V2 cathode bias	700	
5	Var. volume control	.25 meg	
6	H.F. stopper	50,000	
7	V3 grid leak	1 meg.	
8	V3 cathode bias	140	
9	Voltage drop to heater supply	520	
10	Voltage adjustment	150	
	L.S. field	10,000	
	Primary of L.S. transformer	500	
	Smoothing choke.	500	

General Notes .- The terminal strip on the smoothing choke has five tags shown in the lay-out diagram. The connections are:—

A, V1 aux. grid.
B, H.T.+ smoothed.
C, H.T.+ unsmoothed.

D, I.F.T.1 secondary.

I.F.T.2 secondary.

R3 is connected between D and F.

In handling this set, take care that the trimming condensers are not damaged.

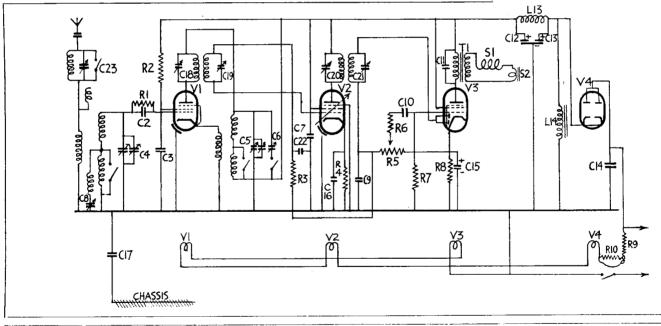
Switch contacts are of the wiping type, and if these have to be cleaned the best method is to rotate the switch, wiping each end stud as it is revealed.

Replacing Chassis.—Replace the valves first, and then lay chassis inside cabinet. Replace holding screws, knobs and switch.

Purpose.	Mfd.
 V1 grid reservoir	.00025
V1 aux. grid by-pass	.1
V2 aux. grid by-pass	.1
Diode reservoir	.001
L.F. coupling to V3 grid	.006
Tone compensating V3 anode	.01
H.T. smoothing	4 el.
H.T. smoothing	8 el.
Mains by-pass	.1
V3 cathode by-pass	5 el
V2 cathode by-pass	.1
Between common neg.and chassis	.01
Decoupling A.V.C. to V2	.1



Below is the three-valve plus rectifier super-heterodyne circuit utilised in the "22". Actually there are five stages.



TELSEN SIX-V ALVE *SUPERHET*

Circuit.—The H.F. valve, AC/VP1 met. (V1) is preceded by a tuned secondary aerial transformer, which is iron cored. Bias is controlled from the full A.V.C. line and is limited by a cathode resistance. Coupling to the next valve is by a second iron-cored H.F.

transformer, and tuning indication is effected by a meter in series with the anode lead. The combined detector-oscillator valve, AC/TP met. (V2), is an H.F. pentode-triode and uses cathode injection. The coupling circuit is typical for this valve and includes a harmonic stopper (R7) in the grid circuit

of the oscillator section.

This valve is also capable of superimposing the output from a gramophone pick-up on the I.F.

Coupling to the next valve is by band-pass I.F. transformer (I.F. 110 K.C.), and bias is by A.V.C. and cathode resistance.

The I.F. valve, AC/VP1 met. (V3), is

biased from a point of lower A.V.C. potential and by cathode resistance. It is followed by

a second I.F. transformer.

A V914 (V4) high-voltage double-diode without a triode element is the detector. The A.V.C. diode is fed through a condenser from the anode of V3, and potentials are obtained from a load potentiometer consisting of R13, R14 and R15.

The L.F. diode anode is coupled to the output valve by a potentiometer volume control which forms the load, a condenser and a grid

The output pentode, A.C.2 Pen (V5), has an H.F. stopper in the grid circuit. A tone compensating condenser is connected between grid and cathode, as well as a condenser between anode and cathode. Bias is obtained from a potentiometer (R23 and R24) in the cathode lead, the grid return being taken to the tapping. The full voltage drop across R23 and R24 is the delay bias on the A.V.C. diode.

Mains equipment consists of transformer, full-wave R3 rectifier, with the L.S. field in the positive H.T. lead for smoothing with two 8-mfd. condensers.

Special Notes.—The pilot lamps can be removed by undoing the screw seen through the aperture in the bottom of the cabinet and lifting the bracket out complete.

Quick Tests .- Provided an H.F. signal is being applied to the set, the visual tuner always gives an indication as to whether or not the H.F., I.F. and detector stages are working. A defective output valve lowers the delay bias.

Voltages between the following terminals on the output transformer and chassis (no (Continued on page 156. For diagrams and component tables see opposite page.)



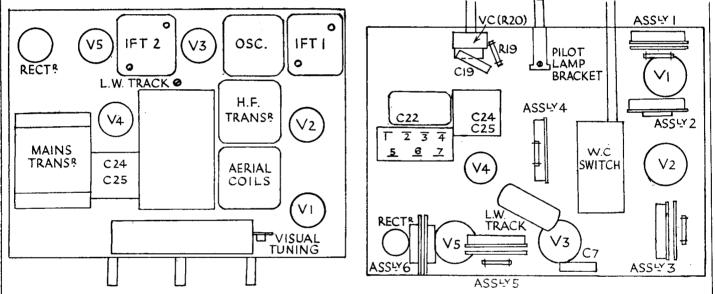
Here is one of the two forms in which Telsen Electric Ltd., marketed their six-valve mains superhet receiver.

TELSEN SIX-VALVE SUPERHET (Cont.)

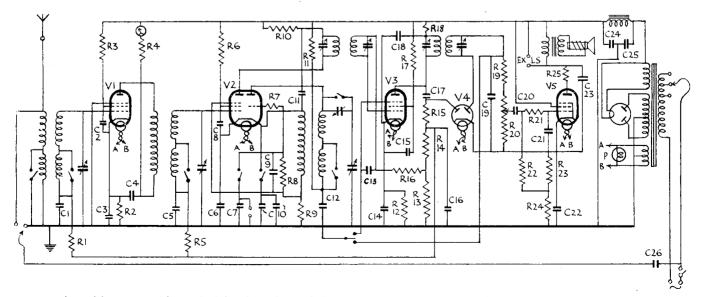
"Service Engineer"

CONDENSERS				
С.	Purpose.		Mfd.	
1	Decoupling A.V.C. to V1		.1	
2 3 4 5 6 7 8	V1 aux, grid by-pass		.1	
3	V1 cathode by-pass		.1	
4	V1 anode decoupling		.1	
5	Decoupling A.V.C. to V2		.1	
6	V2 cathode by-pass		.00085	
7	Across P.U. leads		.003	
8	V2 aux. grid by-pass		.1	
9	V2 osc. grid		.0003	
10	V2 cathode		.1 + .1	
11	V2 anode decoupling		.1	
12	V2 osc. anode decoupling		.1	
13	V3 grid decoupling		.1	
14	V3 cathode by-pass		.1	
15	V3 aux. grid by-pass		.1	
16	H.F. decoupling of A.V.C.		.0005	
17	I.F. feed to A.V.C. diode		.0001	
18	V3 anode decoupling		.1	
19	H.F. by-pass from diode	j	.0002	
20	L.F. coupling V4 to V5		.005	
21	Tone compensating V5 grid		.0002	
22	V5 cathode by-pass		2	
23	Tone compensating V5 anode		.001	
24	H.T. smoothing		8 el.	
25	H.T. smoothing		8 el.	
26	Mains aerial	!	.005	

	RESISTANCES	
R.	Purpose.	Ohms.
1	Decoupling V1 grid from A.V.C.	
	line	1 meg.
2 3	V1 cathode bias	300
3	Voltage dropping to V1 aux.	05.000
	grid	25,000
4 5	Decoupling V1 anode	10,000
Э	Decoupling V2 grid from A.V.C.	1 meg.
6	Voltage dropping to V2 aux.	1 meg.
0	grid	25,000
7	Harmonic suppressor, V2 osc.	20,000
•	grid	2,000
8	V2 osc. grid leak	50,000
9	V2 cathode bias	500
10	Decoupling V2 anode	5,000
11	Decoupling V2 osc. anode	50,000
12	V3 cathode bias	300
13	Part of A.V.C. bias ptr	1 meg.
14	Part of A.V.C. bias ptr	.5 meg.
15	Part of A.V.C. bias ptr	$.2 \mathrm{meg}$.
16	Decoupling A.V.C. to V3	1 meg.
17	Voltage dropping to V3 aux.	05 000
	grid	25,000
18	Decoupling V3 anode	5,000
19	H.F. stopper and part of diode	100.000
90	load	100,000 .5 meg.
$\frac{20}{21}$	Diode load and V.C. ptr.	200,000
$\frac{21}{22}$	H.F. stopper V5 grid V5 grid leak	.8 meg.
22	V5 cathode bias ptr	.o meg.
24	V5 cathode bias ptr	500
25	V5 anode stabiliser	150
40	1 to difford page integr	100



The top "deck" layout (left) shows little space is wasted in the Telsen receiver. Details of the assemblies shown underneath the chassis (right) are given on page 156.



A signal-frequency amplifying valve before the triede-pentode frequency changer is one of the outstanding characteristics of the Telsen receiver.

TELSEN SIX-VALVE SUPERHET (Cont.)

signal):—Left, (1) grey with yellow and red tracer, 395 volts, H.T. unsmoothed. (2) Yellow, 250 volts, V5 anode. (3) Red, 270 volts, H.T. smoothed.

Removing Chassis.—Remove knobs (grub screw), four long screws from underneath cabinet, and slide chassis out.

General Notes.—The fact that the screen

	VALVE READINGS			
V.	Type.	Electrode.	Volts.	M.a.
1	AC/VP1 met, (7)	anode	160	.6
2	ACTP met. (9)	aux. grid anode	$\frac{200}{220}$	*
		aux, grid osc. anode	$\frac{205}{105}$	*
3	AC/VP1 met. (7)	aux. grid	$\frac{270}{200}$	1.1
5	V914 (5)	**		
5	AC 2 Pen	anode	250	42
. !		aux, grid	270	10
* '	The inclusion of mete	r leads for cu	irrent rea	adings
	uses erroneous readir		on.	•

of the sleeving to V3 anode touches the metal coating of the valve does not mean that the cathode bias resistance is short-circuited. The metal coating is actually earthed.

The resistance and condensers R18 and C18. decoupling V3 anode, may not be found in all models.

The adjustment of the L.W. tracking condenser on the oscillator can be made without removing the chassis. The screw is between I.F.T.2 and the gang condenser, and an insulated screw-driver must be used.

Mains transformer terminals (see dia gram) :-

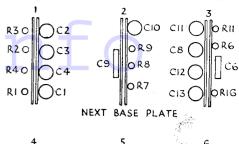
1 and 2, rectifier heater.

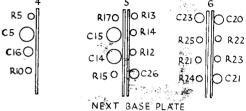
3 and 4, set heaters.

5 and 7, rectifier anodes 6, C.T. to chassis.

The only difficulty in recognising the components is likely to occur in connection with the arrangement of the condenser and resistance assemblies. The wiring is not always as straightforward as it appears to be.

Replacing Chassis.—Slide chassis into cabinet, replace holding screws and knobs





How components are arranged on the six assemblies shown in the Telsen chassis layout on page 155.

EKCOTHREE

Circuit.-The H.F. valve, MVSG has a tuned secondary aerial transformer in its grid circuit. A balanced control consisting of semi-variable and variable condensers in the aerial leads provides a selectivity and volume control. Bias is by fixed cathode resistance, and coupling to the next valve is by tuned secondary transformer.

The detector valve, 354V (V2) operates as a semi-power grid detector with reaction. Coupling to the output is by straight transformer.

The output valve, PT41 (V3) is directly heated. The grid circuit is decoupled, and tone compensation is provided by a condenser across the primary of the output transformer.

Mains equipment consists of transformer, half-wave metal rectifier with a tapped choke in the negative lead providing bias for the output valve. An artificial centre point of the heater winding is obtained by a potentiometer, which acts as a hum control.

The speaker is a permanent magnet type.

Special Notes.—The whole of the H.F. inter-valve circuits, coils and condensers, have their low potential ends connected to the cathode of V1. This causes the voltage drop across the bias resistance R2 to exist between the case of the condenser and chassis. Care

should be taken to see that measurement is obtained between them (300 ohms).

The screen potential for V1 is obtained from the low H.T. end of the decoupling resistance (R4) of the detector. As the detector loses emission the screening grid voltage automatically rises.

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

Counting from the left: (1) V1 anode, 170 volts; (2) 0 volts; (3) H.T. smoothed, 174 volts.

No. 3 reading is also obtained from the end + plate of the rectifier.

Removing Chassis.—To examine the components underneath the chassis it is necesto remove only the fibre plate on the bottom of the cabinet.

To remove the chassis and speaker com-

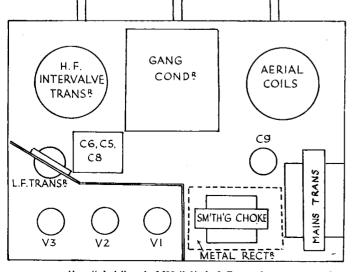
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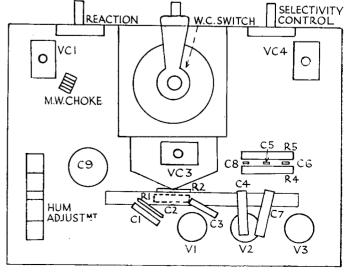
The popular M23 receiver produced by E. K. Cole, Ltd., was one of the first introduced, contained in a moulded cabinet.

VALVE READINGS				
Valve.	Type.	Electrode.	Volts.	M.A.
1	MVSG (5)		173 70	1.8
3	354V (5) PT41 (5)	anode anode aux.grid	$\frac{70}{170}$ $\frac{170}{173}$	3 15 3.25

pletely, remove the knobs (grub screw) and undo the four screws in the flange of the bakelite case. Undo the nut on the mains

(Continued on opposite page.)





Above "deck" in the M23 (left) the L.F. transformer is mounted on the valve screen. To reveal the components below, it is only necessary to