

# SERVICE ENGINEER

## PYE MODEL T20 PORTABLE FIVE A.C. SUPERHET

**CIRCUIT.**—A five-valve including rectifier portable receiver operating on A.C. mains and covering the medium and long wave ranges.

A tuned frame aerial supplies signals to V1, an H.F. pentode; in the event of an external aerial and earth being used, these are inductively coupled by means of a single turn of wire to the frame aerial, which is electrostatically screened to minimise pick-up of mains interference.

Coupling to V2, the frequency changer, is by a choke fed circuit using iron cored coils.

The output of V2 is passed through an air cored I.F. transformer, tuned to 127 kc. to V3, an H.F. pentode, and then through a second I.F. transformer to the diode portion of V4, a double diode output pentode.

After rectification the signal passes to the pentode portion *via* a resistance and capacity stage incorporating the volume control.

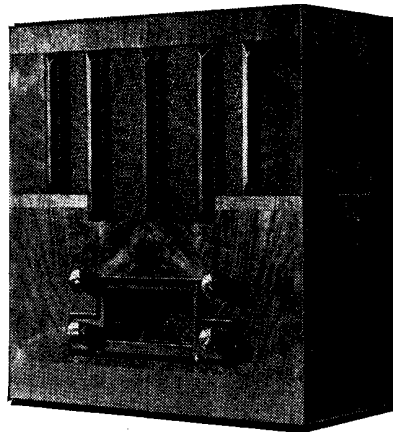
Sensitivity is controlled by varying the bias to the cathode of V1. This is done by switching into circuit an extra biasing resistance.

The tuning indicator is connected in the anode lead of V2 and is operated by the variation in anode current to this valve.

One diode of V4 is used as a demodulator and by means of a small bias applied to it supplies the interstation quieting. The other diode is used to supply A.V.C. bias to the preceding valves in the orthodox manner. Tone is controlled by C34 and R2.

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

**Special Notes.**—The dial lamps are rated at 6.2 volts .3 amp. To remove them first take out V1, V3 and V4. Two knurled nuts will then be seen, one on either side of the dial assembly. Undo



Pye Radio's Model T20 is a trans-portable A.C. superhet using five valves including the rectifier. It incorporates a tuned frame aerial.

### VALVE READINGS

No signal. Volume and sensitivity at maximum. 200 volts. A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	AC/VP1 Met. (7)	anode ...	225	4
		screen ...	165	1.4
		control ...	175	5.1
2	AC/TP Met. (9)	anode ...	235	1.5
		screen ...	105	1.9
		osc. anode ...	230	7.5
3	AC/VP1 Met. (7)	anode ...	225	1.5
		screen ...	230	7.5
		control ...	255	35.
4	AC2/Pen/DD Mazda.	anode ...	255	35.
		screen ...	280	6.9
5	Ever Ready A11B (4)	filament ...	400	—

these and then the dial lamp holder can be pulled out far enough to unscrew the bulbs.

To replace the tuning indicator, which is a G.E.C. Tuneon, turn the cabinet on its side, and remove the false bottom. The knurled nut fixing the indicator holder will then be seen.

The external speaker is connected on the secondary of the output transformer and should have a voice coil resistance of about 3 ohms.

In some models the resistance R8 and switch S3 are replaced by a potentiometer of 2,000 ohms. The resistance strip is connected in place of R8 and the slider goes to the junction of R7 and the resistance strip.

**Exposing Chassis.**—To get at the underside of the chassis there is no need to take it out of the cabinet. Simply turn the cabinet on its side and remove the false bottom, which is secured by wood screws.

Should it be found necessary to remove the chassis, the procedure is as follows:—Disconnect the frame aerial from the terminals (the correct positions for reconnections will be found on the top chassis diagram) and remove the four knobs from the front of the cabinet (spring clips).

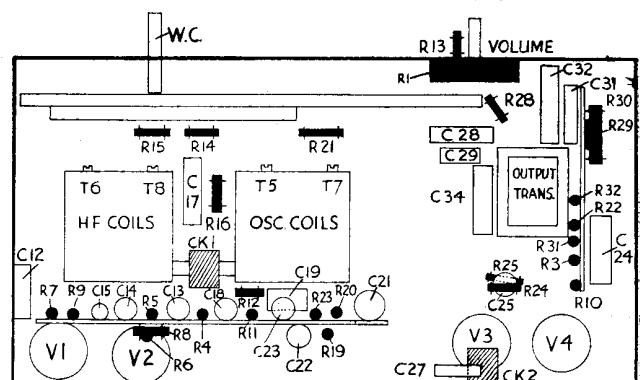
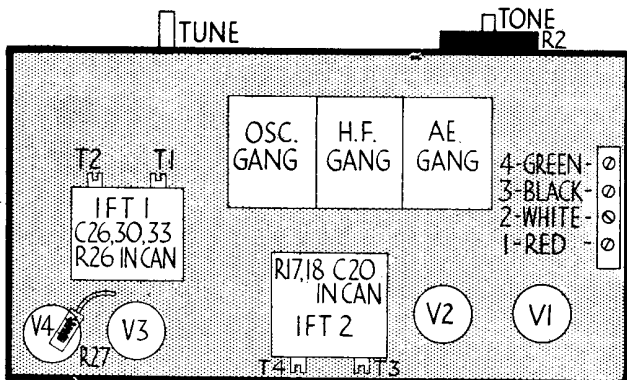
Free the speaker field leads from the terminal plate on the speaker chassis—the red lead goes to the left-hand terminal—and next withdraw the seven-pin plug connecting the receiver chassis to the power pack.

When the four bolts have been removed from underneath the cabinet, the chassis may be completely removed.

### ALIGNMENT NOTES

All adjustments should be made with the volume and sensitivity controls at maximum—i.e., turned fully clockwise and with the chassis out of the cabinet.

(Continued on page 54; Circuit on opposite page.)

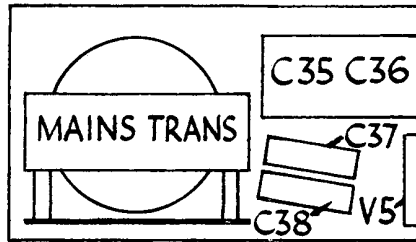
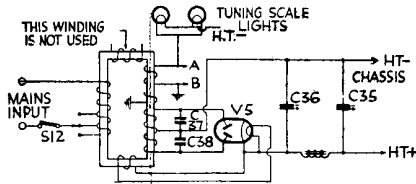


Layout diagrams of the chassis of the Pye T20. Left, the "tinted" one, is the top view; right is the underside view.

# PYE MODEL T20 A.C. SUPERHET — Circuit and Component Values

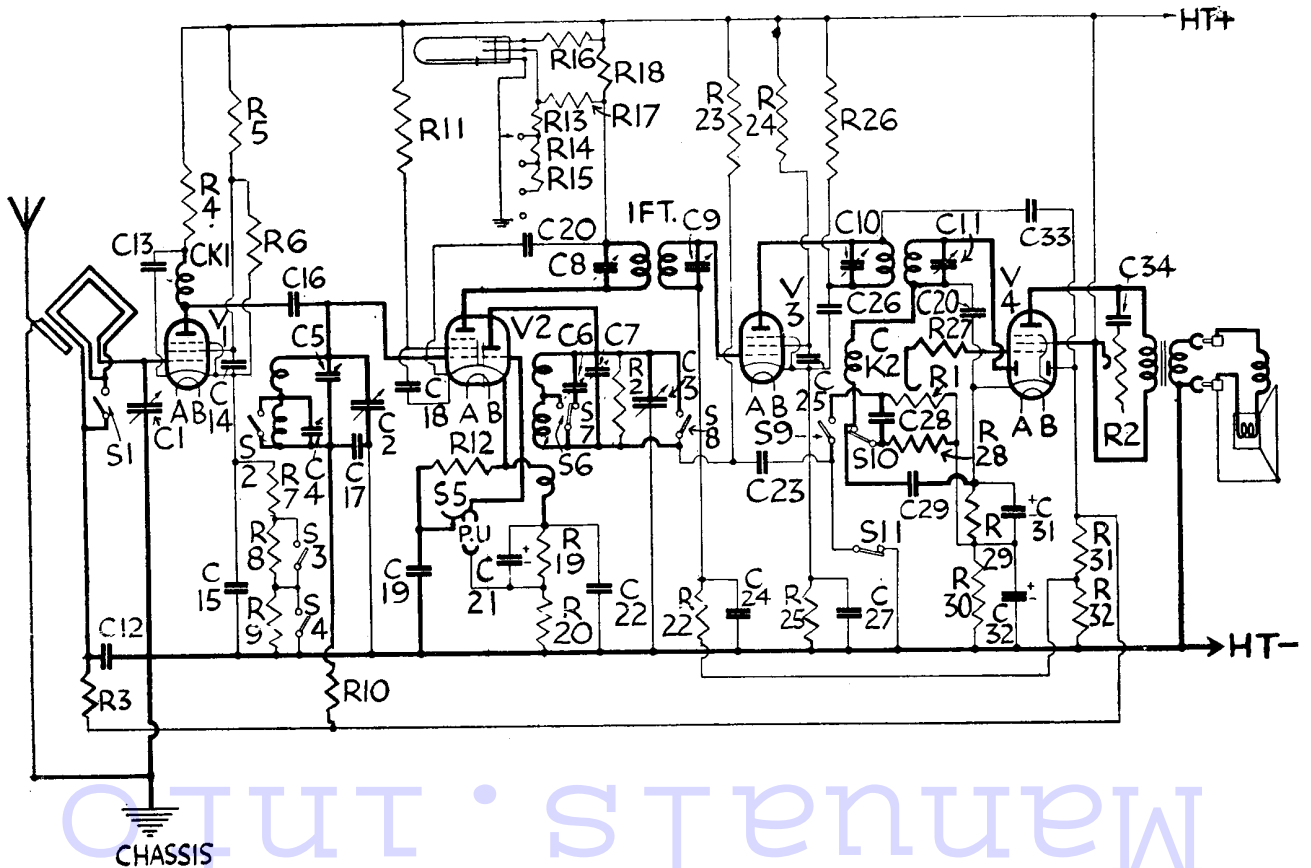
Condenser and resistance values and circuits of the Pye T20 are given here. The alignment notes are continued from page 52 to page 54.

CONDENSERS		
C.	Purpose.	Mfd.
12	V1 A.V.C. decoupling	.5
13	V1 anode decoupling	.1
14	V1 screen decoupling	.1
15	V1 cathode bias shunt	.1
16	V1-V2 H.F. coupling	.000025
17	V2 A.V.C. decoupling	.1
18	V2 screen decoupling	.1
19	V2 osc. grid	.0002
20	V2 anode decoupling	.1
21	Pick-up decoupling	.25
22	V1 cathode bias shunt	.1
23	V2 osc. anode decoupling	.1
24	V3 A.V.C. decoupling	.1
25	V3 screen decoupling	.1
26	V3 anode decoupling	.1
27	V3 cathode bias shunt	.1
28	L.F. coupling	.1
29	H.F. filter	.0002
30	H.F. filter	.0001
31	V4 cathode bias shunt	.50
32	V4 cathode bias shunt	.20
33	A.V.C. diode coupling	.0002
34	Tone correction	.025
35	H.T. smoothing	16
36	H.T. smoothing	8
37	V5 anode by-pass	.001
38	V5 anode by-pass	.001



(Above)—Top, the circuit, and bottom, the layout of the Pye T20's power pack.

RESISTANCES		
R.	Purpose.	Ohms.
1	Volume control	250,000
2	Tone control	25,000
3	V1 A.V.C. decoupling	510,000
4	V1 anode decoupling	10,000
5	V1 screen decoupling pot.	15,000
6	V1 screen decoupling pot.	30,000
7	V1 cathode bias	300
8	Sensitivity control	2,000
9	V1 cathode bias	800
10	V2 A.V.C. decoupling	510,000
11	V2 screen decoupling	25,000
12	V2 osc. grid leak	110,000
13	Tuning indicator adjuster	259,000
14	Tuning indicator adjuster	150,000
15	Tuning indicator adjuster	500,000
16	Tuning indicator tickler feed	2.1 meg.
17	Tuning indicator anode feed	100,000
18	V2 anode decoupling	18,000
19	V2 cathode bias	250
20	V2 cathode bias	750
21	V2 osc. circuit shunt	40,000
22	V3 A.V.C. decoupling	510,000
23	V2 osc. anode decoupling	100,000
25	V3 screen decoupling	25,000
26	V3 cathode bias	500
26	V3 anode decoupling	5,000
27	V4 grid stopper	26,000
28	V4 demodulator diode load	260,000
29	V4 cathode bias	140
30	V4 cathode bias	750
31	V4 A.V.C. diode load (part)	510,000
32	V4 A.V.C. diode load (part)	260,000



The circuit of the receiving side of the Pye T20. The circuit of the power pack is given separately above. Connections between the two may easily be made out.

# PYE MODEL T20 PORTABLE A.C. SUPERHET

(Continued from page 52.)

**I.F. Circuits.**—Short the frame aerial terminals with a piece of wire. Remove the control grid lead to V2, and in its place connect a  $\frac{1}{2}$  meg. resistance, the other end going to the chassis. Connect a .25 mfd. condenser between the oscillator anode and the chassis to stop the valve from oscillating.

While tuning the primary of either transformer, the secondary must be shunted with a 25,000 ohm resistance, and while adjusting the secondary the resistance must be connected across the primary.

Apply a modulated signal of 127 kc. to the grid of V2 via a .002 mfd. condenser, and connect an output meter across the speaker terminals.

Trim T1, T2, T3 and T4 for maximum on the output meter.

**Medium Waves.**—Remove the frame aerial shorting strip and across terminals 1 and 3, connect a .5 meg. resistance; tune the gang condenser to minimum capacity

(lowest wavelength), and apply a modulated signal of 196 metres to frame aerial terminals 1 and 3 via a .002 mfd. condenser in series with one of the leads.

Trim T5 for maximum output. If more than one peak is obtained the one nearer minimum capacity is the correct one. Now trim T6 for maximum output, and repeat the procedure at about 500 metres.

**Long Waves.**—Tune the gang condenser to minimum capacity and apply a modulated signal of 775 metres as before, and adjust T7 and T8 for maximum output.

Now inject and tune in a signal of 846 metres and readjust T7 for maximum output, the correct peak being the one nearer maximum capacity.

## SWITCH POSITIONS

Switch.	Medium waves.	Long waves.	Gramophone.
S1	Closed	Open	Open
S2	Closed	Open	Open
S4	Closed	Open	Open
S5	Closed	Closed	Open
S6	Closed	Open	Open
S7	Open	Closed	Open
S8	Open	Open	Closed
S9	Open	Open	Closed
S10	Closed	Closed	Open
S11	Closed	Closed	Open
S3	Sensitivity switch		
S12	Mains switch		

### QUICK TESTS

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

Red lead, 400 v., unsmoothed H.T.  
Black lead, 280 v., smoothed H.T.

## Output Transformers and Extensions

**G**REAT care should be taken in testing the secondary winding of an output transformer with a battery and meter. If this precaution is not taken, there is a possibility of a meter being burnt out. A moving coil output transformer with a large ratio has a secondary winding with a fractional resistance, very heavy gauge wire being used. Accordingly, if it is found necessary to test this, and such an occurrence would be very rare, the test must be made with an ammeter and a 2-volt accumulator.

When a large step down ratio is used, it is essential that the leads between the secondary and the actual moving coil are kept as short as possible, while the resistance must be low, as otherwise there is a loss of power.

When installing an extension speaker, make sure to which side of the output transformer the extension sockets of the set are connected. The majority of modern sets have them on the low-impedance side, but this is not the case with some sets a few years old.

By checking this before starting the installation a major operation on the extension speaker for the removal or addition of a transformer may be avoided.

## WESTON SMALL INSTRUMENTS

**T**O aid the service-man in making certain special measurements whilst still leaving his Analyser free for general testing, WESTON offers the following instruments combining handy size and reasonable price with high quality materials and workmanship.

### Model 564 D.C. Volt-ohmmeter

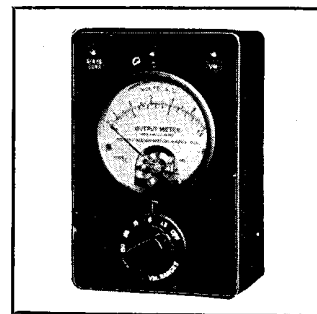
Up to 600 volts—1,000 ohms per volt on all ranges.  
Up to 1 megohm with self-contained battery, £7.17.6.

### Model 571 Constant Impedance Output Meter.

Voltage ranges 1, 5, 15, 60, 150.  
All ranges have 4,000 ohms total impedance. £7.2.6.

### Model 687 Output Meter.

1,000 ohms per volt.  
Ranges 2, 10, 50 volts. £4.3.6.



Model 571.

**WESTON**  
*Standard the World over*  
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Other well-known WESTON RADIO SERVICING INSTRUMENTS include:—Selective Analyser (Model 655) £11.16.3; Super Oscillator (Model 692) £14.19.3; Valve Voltmeter (Model 669) £18.0.0; A.C. Volt-capacity Meter (Model 664) £14.5.0. All prices net to trade.

Advt. of the Weston Electrical Instrument Co. Ltd., Kingston By-pass, Surbiton, Surrey. Elmbridge 6400.

For more information remember  
[www.savoy-hill.co.uk](http://www.savoy-hill.co.uk)