Supplement to The Wireless & Electrical Trader, August 23, 1947

"TRADER" SERVICE SHEET

826

ROBERTS P5A PORTABLE A.C. SUPERHET

THE chassis and frame aerials of the Roberts **P5A** portable can be removed as a single unit, the speaker leads being long enough to permit normal service work. The receiver is a 4-valve (plus rectifier) 3-band superhet designed for A.C. mains of 200-250 V.

Release date and original price: April, 1946; *£16 16s plus £3 12s 3d purchase tax.*

CIRCUIT DESCRIPTION

Input from frame aerial windings **L1** (M.W.) and **L1, L2** (L.W.) is tuned by **C27.** For S.W. operation only, provision is made for the connection of an external aerial, which is coupled by capacitor **C1** to the single-tuned circuit **L3, C27.**

First valve **(V1, Mullard metallized ECH 35)** is a triode-hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L4** (S.W.), **L5** (M.W.) and **L6** (L.W.) are tuned by **C28.** Parallel trimming by **C29** (S.W.), **C30** (M.W.) and **C31** (L.W.); series tracking by **C9** (S.W.), **C32** (M.W.) and **C33** (L.W.). Reaction coupling by anode coils **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.).

Second valve **(V2, Mullard metallized EF39)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C5, L10, L11, C6** and **C13, L12, L13, C14.** All

(continued col. 1 overleaf)

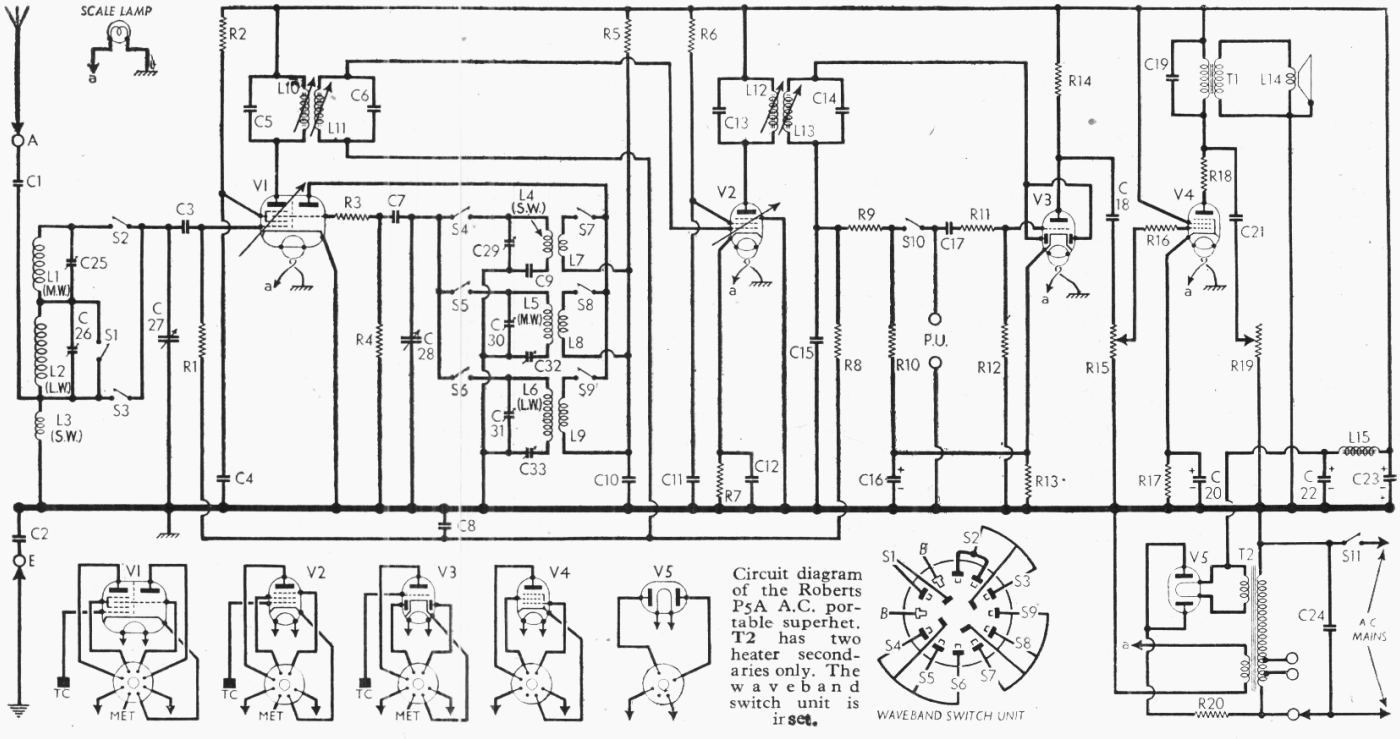
COMPONENTS AND VALUES

	CAPACITORS	Values (μF)
C1	Aerial series	0·00005
C2	Earth isolator	0·0001
C3	V1 hex. C.G. capacitor	0·0005
C4	V1 S.G. decoupling	0·1
C5	1st I.F. transformer fixed tuning capacitors	0·0001
C6		0·0001
C7	V1 osc. C.G. capacitor	0·0001
C8	A.V.C. line decoupling	0·1
C9	Osc. circ. S.W. tracker	0·005
C10	V1 osc. anode decoupling	0·1
C11	V2 S.G. decoupling	0·1
C12	V2 cathode by-pass	0·1
C13	2nd I.F. transformer fixed tuning capacitors	0·0001
C14		0·0001
C15	I.F. by-pass capacitor	0·0001
C16*	V3 cathode by-pass	20·0
C17	A.F. coupling to V3 triode	0·01
C18	A.F. coupling to V4 C.G.	0·01
C19	Fixed tone corrector	0·001
C20*	V4 cathode by-pass	20·0
C21	Part variable tone control	0·05
C22*	H.T. smoothing capacitors	16·0
C23*		16·0
C24	Mains R.F. by-pass	0·01
C25‡	Aerial circ. M.W. trimmer	—
C26‡	Aerial circ. L.W. trimmer	—
C27†	Aerial circuit tuning	—
C28†	Oscillator circuit tuning	—
C29‡	Osc. circ. S.W. trimmer	—
C30‡	Osc. circ. M.W. trimmer	—
C31‡	Osc. circ. L.W. trimmer	—
C32‡	Osc. circ. M.W. tracker	—
C33‡	Osc. circ. L.W. tracker	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)
R1	V1 hex. C.G. resistor	2,000,000
R2	V1 S.G. H.T. feed	68,000
R3	V1 osc. C.G. stabiliser	100
R4	V1 osc. C.G. resistor	56,000
R5	V1 osc. anode decoupling	20,000
R6	V2 S.G. H.T. feed	56,000
R7	V2 fixed G.B. resistor	220
R8	A.V.C. line decoupling	1,000,000
R9	I.F. stopper	100,000
R10	V3 diode load	560,000
R11	I.F. stopper	100,000
R12	V3 triode C.G. resistor	2,000,000
R13	V3 G.B. resistor	1,000
R14	V3 triode anode load	56,000
R15	Manual volume control	250,000
R16	V4 C.G. stopper	56,000
R17	V4 G.B. resistor	160
R18	V4 anode stopper	100
R19	Variable tone control	50,000
R20	V5 anode surge limiter	100

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Frame aerial windings	1·7
L2		20·0
L3	Aerial S.W. tuning coil	Very low
L4	Osc. S.W. tuning coil	Very low
L5	Osc. M.W. tuning coil	1·7
L6	Osc. L.W. tuning coil	13·8
L7	Osc. S.W. reaction coil	0·2
L8	Osc. M.W. reaction coil	5·5
L9	Osc. L.W. reaction coil	10·2
L10	1st I.F. trans. Pri.	13·0
L11	1st I.F. trans. Sec.	13·0
L12	2nd I.F. trans. Pri.	13·0
L13	2nd I.F. trans. Sec.	13·0
L14	Speaker speech coil	2·5
L15	H.T. smoothing choke	350·0
T1	Output trans. Pri.	500·0
	Output trans. Sec.	0·25
T2	Mains trans. Pri., total	85·0
	Mains trans. Heater sec.	0·1
	Mains trans. Rect. heat sec.	0·1
S1-S9	Waveband switches	—
S10	Gram P.U. switch	—
S11	Mains switch, ganged R15	—



Circuit diagram of the Roberts P5A A.C. portable superhet. T2 has two heater secondaries only. The waveband switch unit is in set.

CIRCUIT DESCRIPTION—*continued*

the tuning capacitors are fixed, and alignment is effected by varying the positions of the iron-dust cores.

Intermediate frequency 467 kc/s.

Diode second detector is part of double diode triode valve **(V3, Mullard metallized EBC33)**, the diode sections of which are strapped in parallel. Audio frequency component in rectified output is developed across load resistor **R10**, and passed via A.F. coupling capacitor **C17**, I.F. stopper **R11** and C.G. resistor **R12** to control grid of triode section.

Resistance-capacitance coupling by **R14, C18** and the manual volume control **R15**, via grid stopper **R16**, between **V3** triode and pentode output valve **(V4, Mullard EL33)**.

H.T. current is supplied by half-wave rectifying valve **(V5, Mullard AZ31)** whose anodes are strapped in parallel and fed from the 250V tapping on the primary of the heater transformer **T2**, via surge limiter **R20**.

Smoothing by iron cored choke **L15** and electrolytic capacitors **C22, C23.** Mains R.F. filtering by **C24.**

The heaters of **V1, V2, V3** and **V4,** together with the scale lamp, are fed from one secondary winding on **T2,** while the other one supplies **V5** heater only.

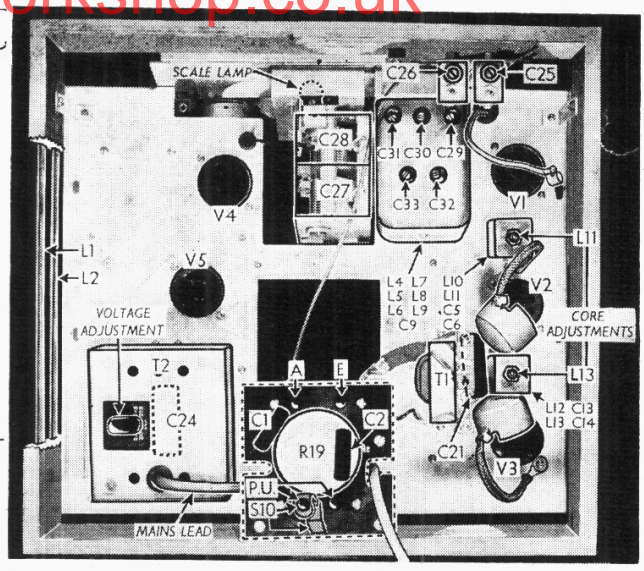
GENERAL NOTES

Switches.—**S1-S9** are the waveband switches in a rotary unit mounted on the control panel. The unit is indicated in our front view of the chassis, and shown in detail in the diagram inset beneath the circuit diagram overleaf; where it is drawn as seen from the bottom of a chassis which is lying on its back, looking along the large tag board. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control. A dash indicates open, and **C** closed.

Switch	S.W.	M.W.	L.W.
S1	—	C	—
S2	—	C	C
S3	C	—	—
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C

Scale Lamp.—This is an Osram lamp, with an M.E.S. base and a small clear spherical bulb, rated at 6.5 V, 0.3 A.

Gramophone Pick-up.—Two sockets are fitted on the small input panel at the rear of the chassis for the connection of a gramophone pick-up, **S10** being associated with one of them to mute radio upon the insertion of the special plug provided. Users should be warned that the pick-up used and its leads must be adequately insulated as the sockets are at mains potential.



Rear view of the chassis. **C24** is inside the mains transformer **T2** housing. A dotted outline shows the position of the small central panel, **R19** and the other components behind it being shown directly through it.

DISMANTLING THE SET

The chassis and frame aerial may be removed as a complete assembly, when access may be gained to all components. Care should be exercised to avoid damage to the frame aerial windings.

Removing Assembly.—Remove the four cheese-head screws from the left- and right-hand sides of the chassis, close to the metal flanges; slide out the assembly, bottom edge first to enable the control knobs to clear the escutcheon, to the extent of the speaker leads, which is sufficient for most purposes.

To free the assembly entirely, unsolder the two leads from the panel on the speaker.

When replacing, connect the red speaker lead to the left-hand tag on the connecting panel, and the black lead to the right-hand tag.

Removing Speaker.—Remove the four 4BA nuts securing the speaker to the carrying case.

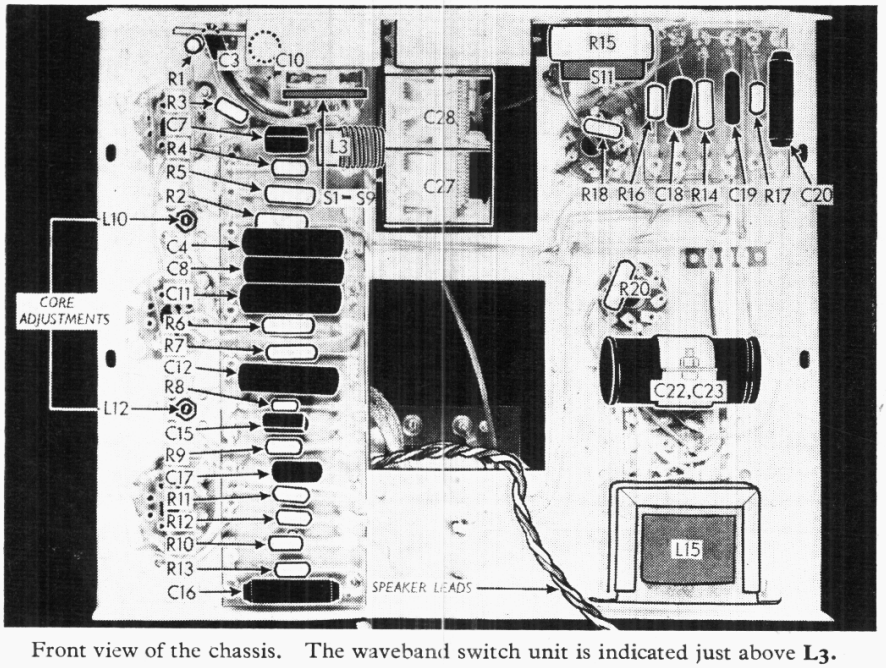
When replacing, the connecting panel should be at the bottom, and if the leads have been unsoldered they should be reconnected as previously described.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers. Their receiver was operating on mains of 237 V, using the 240-250 V tapping on the mains transformer, and was tuned to the lowest wavelength on the M.W. band, but there was no signal input. Voltages were measured on the 400 V scale of a model 7 Avometer, chassis being the negative connection.

Valve		Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1	ECH35	210	0·87	63	1·9
		Oscillator			
		124	4·6		
V2	EF39	210	6·75	73	2·1
V3	EBC33	94	1·72	—	—
V4	EL33	186	29·2	210	3·0
V5	AZ31	231†	—	—	—

† Anode to chassis, A.C.



Front view of the chassis. The waveband switch unit is indicated just above **L3.**

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator, via a 0.1 μF capacitor, in each lead, to control grid (top cap) of **V2** and chassis, leaving existing connector in position. Turn volume control to maximum, feed in a 467 Kc/s (642.4 m) signal, and adjust the cores of **L12** and **L13** for maximum output.

Transfer signal generator leads to control grid (top cap) of **V1** and chassis, again leaving existing connector in position, and adjust the cores of **L10** and **L11** for maximum output. Repeat these adjustments and reseal the core adjustment screws.

R.F. and Oscillator Stages.—With the gang at maximum the pointer should cover the horizontal lines at the high wavelength ends of the three scales. The signal generator leads should be secured to the bench, close to the assembly.

M.W.—Switch set to M.W., tune to 250 m on scale, feed in a 250 m (1,200 Kc/s) signal, and adjust **C30,** then **C25,** for maximum output. Feed in a 500 m (600 Kc/s) signal, tune it in, and adjust **C32,** while rocking the gang, for maximum output.

L.W.—Switch set to L.W., tune to 1,200 m on scale, feed in a 1,200 m (250 Kc/s) signal, and adjust **C31,** then **C26,** for maximum output. Feed in a 1,800 m (166.7 K/cs) signal, tune it in, and adjust **C33,** while rocking the gang, for maximum output.

S.W.—Switch set to S.W., and connect signal generator leads to **A** and **E** sockets via a suitable dummy aerial. Tune to 16 m on scale, feed in a 16 m (18.75 Mc/s) signal, and adjust **C29** for correct calibration, choosing the peak involving the lesser trimmer capacitance. Check calibration at 50 m (6.0 Mc/s).

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