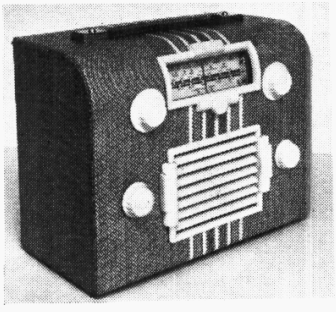
"TRADER" SERVICE SHEET

929

CHAMPION "SKYMASTER"

A.C./D.C./Battery Superhet



OF very simple design and very compact construction, the Champion "Skymaster" is a 2-band portable superhet using four all-dry battery valves in a series circuit to operate from A.C. or D.C. mains of 200-230 V or from self-contained batteries. The mains voltage range can be increased to 260 V as explained under "General Notes."

Release date and original price: May, 1949; £13, including batteries. Purchase tax extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, C24** (M.W.) or **L1, L2, C24** (L.W.) precedes a heptode valve **(V1, Mullard DK91)** operating as frequency changer with electron coupling.

Oscillator grid coils **L3** (M.W.) or **L4** (L.W.) are tuned by **C27.** Parallel trimming by **C26** (M.W.) and **C28** (L.W.); series tracking by **C7** (M.W.) and **C8** (L.W.). Inductive reaction coupling by **L5** (M.W.) and **L6** (L.W.).

Second valve **(V2, Mullard DF91)** is a variable-m R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C3, L7, L8, C4,** and **C10, L9, L10, C11,** in which the tuning capacitors are fixed and alignment adjustments are effected by varying the positions of the iron-dust cores.

Intermediate frequency 465 Kc/s.

Diode second detector is part of single diode pentode valve **(V3, Mullard DAF91).** Audio

(Continued col. 1 overleaf)

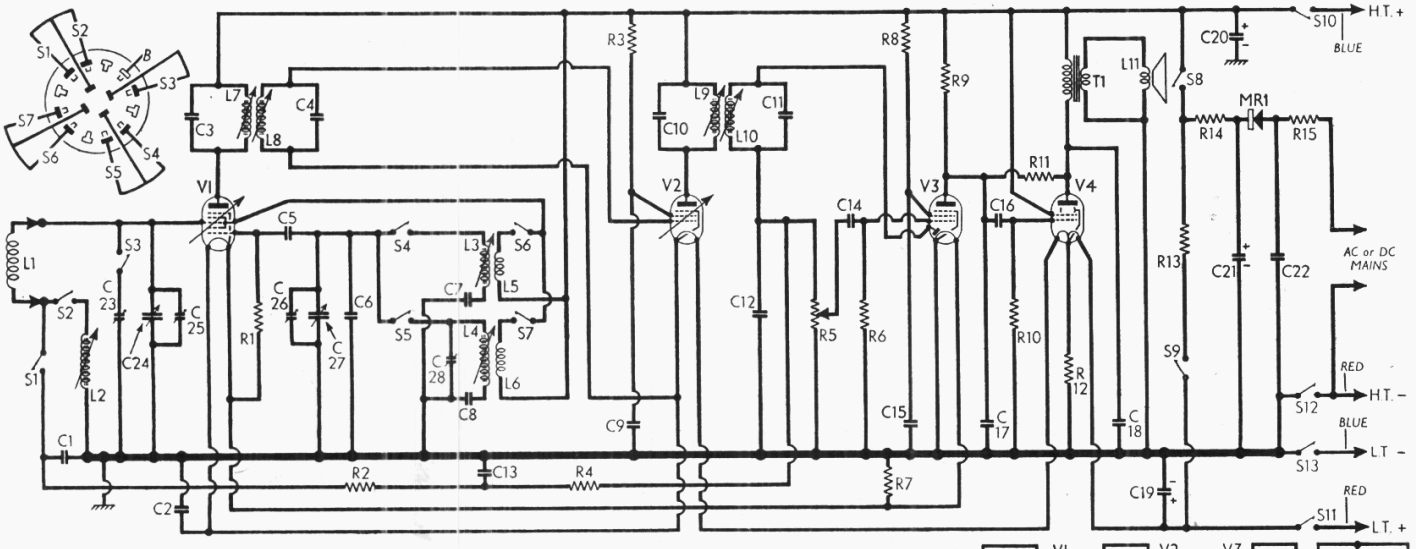
COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Locations
C1	A.G.C. decoup. ...	0·1	A2
C2	R.F. by-pass ...	0·1	A2
C3	1st I.F. transformer	0·0001	B1
C4	tuning	0·0001	B1
C5	V1 osc. C.G. ...	0·0001	A2
C6	Oscillator trim. ...	0·000015	A2
C7	Osc. M.W. track ...	0·0006	A3
C8	Osc. L.W. track ...	0·0001	A3
C9	V2 S.G. decoup. ...	0·1	C2
C10	2nd I.F. trans-	0·0001	C1
C11	former tuning ...	0·0001	C1
C12	I.F. by-pass ...	0·0001	D1
C13	I.F. by-pass ...	0·1	B2
C14	A.F. coupling ...	0·005	D2
C15	V3 S.G. decoup. ...	0·1	D2
C16	A.F. coupling ...	0·01	D2
C17	I.F. by-pass ...	0·0001	D2
C18	Tone corrector ...	0·005	D2
C19*	L.T. smoothing ...	50·0	D3
C20*	H.T. smoothing	32·0	F3
C21*		32·0	F2
C22	Mains by-pass ...	0·01	F3
C23‡	L.W. aerial trim ...	0·00005	A2
C24†	Aerial tuning ...	0·000375	A1
C25‡	Aerial trimmer ...	0·000015	A1
C26‡	Osc. trimmer ...	0·000015	A1
C27†	Osc. tuning ...	0·000375	A1
C28‡	Osc. L.W. trim ...	0·00005	B3

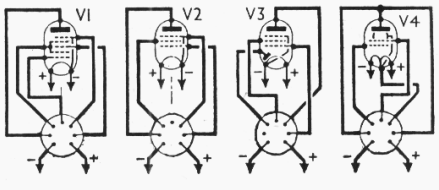
* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)	Locations
R1	V1 Osc. C.G. ...	100,000	B2
R2	A.G.C. decoup. ...	470,000	A2
R3	V2 S.G. H.T. feed...	4,700	C2
R4	I.F. stopper ...	2,400,000	C2
R5	Volume control ...	1,000,000	D1
R6	V3 C.G. resistor ...	6,800,000	D2
R7	Filament ballast ...	240	B2
R8	V3 S.G. H.T. feed...	2,400,000	C2
R9	V3 Pent. load ...	470,000	D2
R10	V4 C.G. resistor ...	1,000,000	D2
R11	F.B. coupling ...	2,400,000	D2
R12	Filament ballast ...	1,500	E2
R13	Fil. dropper ...	1,400	C2
R14	Smoothing res. ...	2,500	C2
R15	Mains dropper ...	150	C2

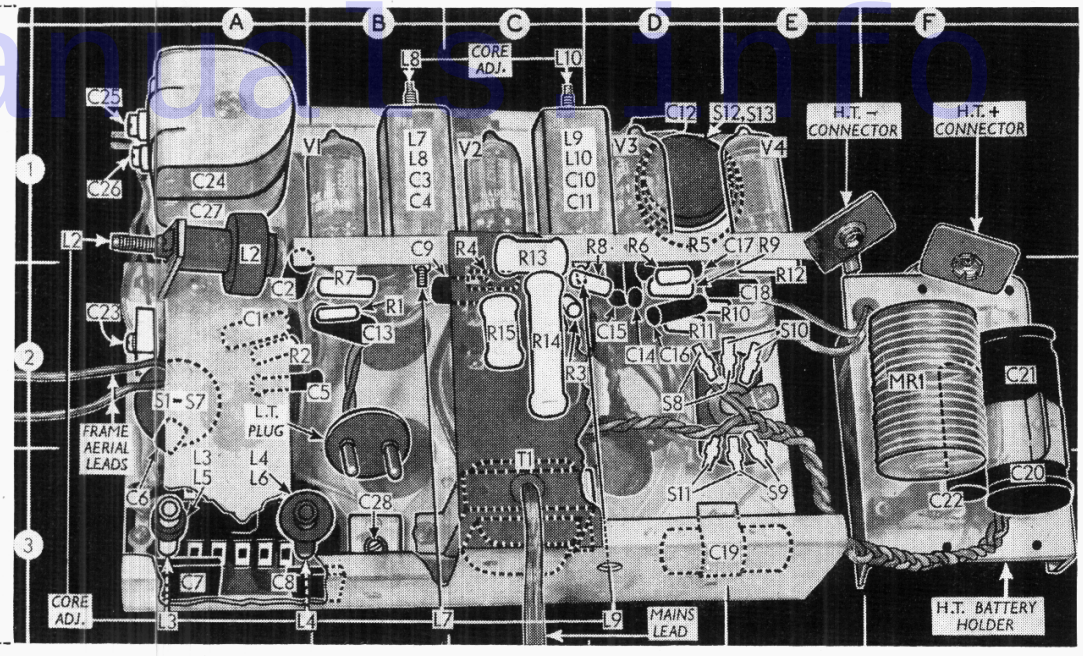
	OTHER COMPONENTS	Approx. values (ohms)	Locations
L1	Frame aerial ...	0·5	—
L2	L.W. aerial coil ...	8·0	A1
L3	Osc. M.W. tuning...	1·0	A3
L4	Osc. L.W. tuning...	4·0	A3
L5	Osc. M.W. coup. ...	0·9	A3
L6	Osc. L.W. coup. ...	2·6	A3
L7	1st I.F. trans. Pri.	11·0	B1
L8	1st I.F. trans. Sec.	11·0	B1
L9	2nd I.F. trans. Pri.	11·0	C1
L10	2nd I.F. trans. Sec.	11·0	C1
L11	Speech coil ...	2·0	—
T1	Output trans' Pri.	280·0	C3
	Output trans' Sec.	0·5	
S1–S7	W/band switches ...	—	A2
S8–S11	Mains/Battery sw.'s	—	D3
S12, S13	Common supply sw.'s ganged R5	—	D1



Circuit diagram of the Champion "Skymaster" A.C./D.C./Battery superhet. **L1** is the frame aerial winding, and **L2** the L.W. loading coil. For mains operation **S8** and **S9** close; for battery operation, **S10** and **S11** close. **S12** and **S13** are the mains and battery on/off switches. **MR1** is a metal rectifier. **R12** shunts the series filament circuit to by-pass the output valve H.T. current.



Supplement to The Wireless & Electrical Trader, October 15, 1949



Rear view of the chassis, inclined to show the underside of the valve platform. The mains power unit on the right has been unfixed and turned over on its leads to reveal the components behind it. When in its normal position, its reverse side acts as a holder for the H.T. battery. Access to **L9** trimmer is obtained through a hole in the base of the chassis; **L3** and **L4** should be adjusted from the *front* of the chassis.

Circuit Description—*continued*

frequency component in rectified output is developed across manual volume control **R5**, which is also the diode load resistor, and passed via A.F. coupling capacitor **C14** and C.G. resistor **R6** to C.G. of pentode section, which operates as A.F. amplifier. I.F. filtering by **C12, R4, C13** in diode circuit and by **C17** in pentode anode circuit.

D.C. potential developed across **R5** is tapped off and fed back through a decoupling circuit as G.B. to F.C. valve only, giving automatic volume control on M.W. only.

Resistance-capacitance coupling by **R9, C16, R10** between **V3** pentode and pentode output valve **(V4, Brimar 3S4),** whose twin filament sections are wired in series together with the filaments of the other valves. Fixed tone correction in anode of **V4** by **C18.**

G.B. potential for **V4** is obtained by placing its filament at the positive end of the chain. Negative feed-back is obtained from the coupling between **V3** and **V4** anodes via **R11. R12** shunts the filament circuit to by-pass H.T. current, as does also **R7.**

For battery operation, **S10, S11** close and **S8, S9** open, whereas for mains operation these positions are simply reversed. The on/off switches **S12, S13** operate together for mains or battery power supplies. When operating on mains power, the output from the metal rectifier **(MR1, Brimar SB3)** developed across **C21** is applied directly to the H.T. circuit and via **R13** to the series filament circuit, where smoothing is provided by the large capacitance of **C19.**

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws), and the three rubber seals, on the underside of the carrying case, covering the chassis fixing screws;

remove these three self-tapping screws, when the complete chassis and speaker may be withdrawn as a single unit;

it may sometimes be necessary to remove or loosen the bolts holding the carrying handle, as these bolts, in our receiver, fouled the top of the tuning scale when the chassis was withdrawn;

unsolder the frame aerial leads after sliding up the rubber sleeves;

if it is desired to remove the frame aerial, slacken the carrying handle screws and turn the paxolin strips on the inside roof of the cabinet to free the aerial, which can then be lifted out.

In order to perform the voltage and current tests it will be found necessary to remove the H.T. battery holder (as shown in the photograph) and paxolin resistance panel (self-tapping screws).

When replacing, do not omit to glue the chassis fixing screw rubber covers over the heads of the chassis fixing screws.

GENERAL NOTES

Switches.—**S1-S7** are the waveband switches, ganged in a 2-position rotary unit. This is indicated in our chassis illustration, and shown in detail in the diagram inset in the top left-hand corner of the circuit diagram, viewed in the same direction. **S1, S4** and **S6** close on M.W. (knob anti-clockwise); **S2, S3, S5** and **S7** close on L.W.

S8-S11 are the mains/battery change-over switches, ganged in a second 2-position unit. This is shown also in the chassis illustration, where the tags are identified. In the anti-clockwise position of the control knob, **S10** and **S11** close for battery operation; in the mains position these open, and **S8, S9** close.

S12 and **S13** are the Q.M.B. on/off switches, ganged together with the volume control **R5.** They both close for mains or battery operation.

Batteries.—The L.T. unit is an Ever Ready Alldry 31, rated at 7.5 V. It has a standard 2-pin L.T. connector. The H.T. unit is an Ever Ready Batrymax B101, rated at 67½ V. It fits into a flanged holder which on its reverse side carries the mains rectifier and smoothing capacitors. Its snap-on connectors are identified in our chassis illustration.

High-voltage Mains.—The receiver may be operated from mains of up to 260 V if the mains voltage dropper **R15** is increased from 150Ω to 450Ω. In either case it is rated at 5 W, as is also **R13. R14** is rated at 10 W. All three are wire-wound in cement.

Drive Cord Replacement.—Two feet of twine is required for the tuning drive cord, which is made up into a single loop about 18 inches in circumference. It is perfectly simple, making altogether half a turn round the gang drum and half a turn in the same direction round the pulley at the other end of the scale.

CIRCUIT ALIGNMENT

Before commencing these operations the chassis must be removed from the carrying case complete with frame aerial, which remains connected and must be situated in the same position relative to the chassis, as it would normally assume when in the carrying case.

I.F. Stages.—Switch set to M.W., turn gang to minimum capacitance and volume control to maximum. Switch set to battery operation and connect signal generator, via an 0.01 μF capacitor in the live lead, to control grid (pin 6) of **V1** and chassis. Feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L10, L9, L8,** and **L7** (location references C1, C2, B1, B2) for maximum output. Repeat these operations until no improvement results.

L9 may be adjusted through a hole in the bottom of the chassis, using a trimming tool with a shaft length of at least 4in. An aperture at the top of the H.T. battery holder gives visual access to the trimmer screw.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the pointer should coincide with the high wavelength ends of the two scales. It may be adjusted in position if the two grub screws on the slow motion drive are slackened. The signal generator lead should be connected to a suitable dummy aerial and secured approximately 12 inches from the frame aerial.

M.W.—With the set switched to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C26** (A1) and **C25** (A1) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust **L3** (A3) for maximum output. Repeat these operations until no improvement results.

L.W.—Switch set to L.W., tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C28** (B3) and **C23** (A2) for maximum output. Tune to 1,800 m on scale, feed in an 1,800 m (166.6 kc/s) signal, and adjust **L2** (A1) and **L4** (A3) for maximum output. Repeat these operations until no improvement results.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from a pair of new batteries. A set of readings was taken on 230 V A.C. mains, but they were almost identical. The D.C. output from the Brimar SB3 metal rectifier, measured across **C21,** was 210 V.

Access was obtained to the undersides of the valve holders by removing the H.T. battery holder and the **R13-R15** panel (self-tapping screws).

The receiver was tuned to the lowest wavelength on the M.W. band and the volume control was at maximum, but there was no signal input. Voltages were measured on the 100 V. scale of a model 7 Avometer, chassis being the negative connection.

Valve	Anode		Screen	
	V	m/A	V	m/A
V1 DK91 ...	67	1·36	67	3.0
V2 DF91... ...	67	2·8	56	1·3
V3 DAF91 ...	5	0·8	0·3	0·02
V4 3S4	63	7·8	67	1·9

Printed in England by The Cornwall Press Ltd., Paris Garden, London, S.E.1.