"TRADER" SERVICE SHEET

862

DULCI MSU4

THE Dulci MSU4 is a compact two-band receiver using three valves (plus the rectifier) in a reflex circuit. It is designed for A.C. or D.C. mains of 200-250 V. The waveband ranges are S.W. (13.6-50 m) and M.W. (200-550 m).

Release date and original price: May 1947, £13 13*s*, *reduced April* 1948 *to* £11 11*s*. *Tax extra.*

CIRCUIT DESCRIPTION

Aerial input is capacitatively coupled by **C3** on S.W., and inductively coupled by **L1** on M.W., to single-tuned circuits **L2, C32** (S.W.) and **L3, C32** (M.W.) which precede a triode-hexode valve (**V1, Brimar 12K8GT**) operating as frequency changer with electron coupling.

Triode oscillator anode coils **L5** (S.W.) and **L6** (M.W.) are tuned by **C36**. Parallel trimming by **C35** (S.W. and **C34** (M.W.); series tracking by **C10** (S.W.) and **C11, C33** (M.W.).

Second valve **(V2, Brimar metal 12CS)** is a double diode variable mu R.F. pentode. The pentode section operates in a reflex circuit, first as an I.F. amplifier with tuned transformer couplings, and then as an A.F. amplifier.

Intermediate frequency 480 kc/s.

One diode section of **V2** provides A.F. output, which is developed across manual volume control **R7** and passed, via **C14** and I.F. stopper **R6**, back to the pentode section control grid.

Second diode of **V2**, fed from **L10** via **C20**, provides D.C. potential, which is developed across **R10, R11, R12** in series and fed back through decoupling circuits as G.B. to F.C. (except on S.W.) and I.F. valves, giving A.V.C.

Amplified A.F. voltages are developed across **R9** in **V2** anode circuit, which is by-passed from the point of view of I.F. by **C21,** and passed via **C22** and **R14** to C.G. of beam tetrode output valve **(V3, Brimar 35L6GT).** Negative feed-back in the output stage is provided by **C25** and **R13.**

When the receiver is operated from A.C. mains, H.T. current is supplied by I.H.C. half-wave rectifying valve (**V4, Brimar 35Z4GT**), which, with D.C. mains, behaves as a low resistance. Smoothing by resistor **R17** and electrolytic capacitors **C27, C28.**

COMPONENTS AND VALUES

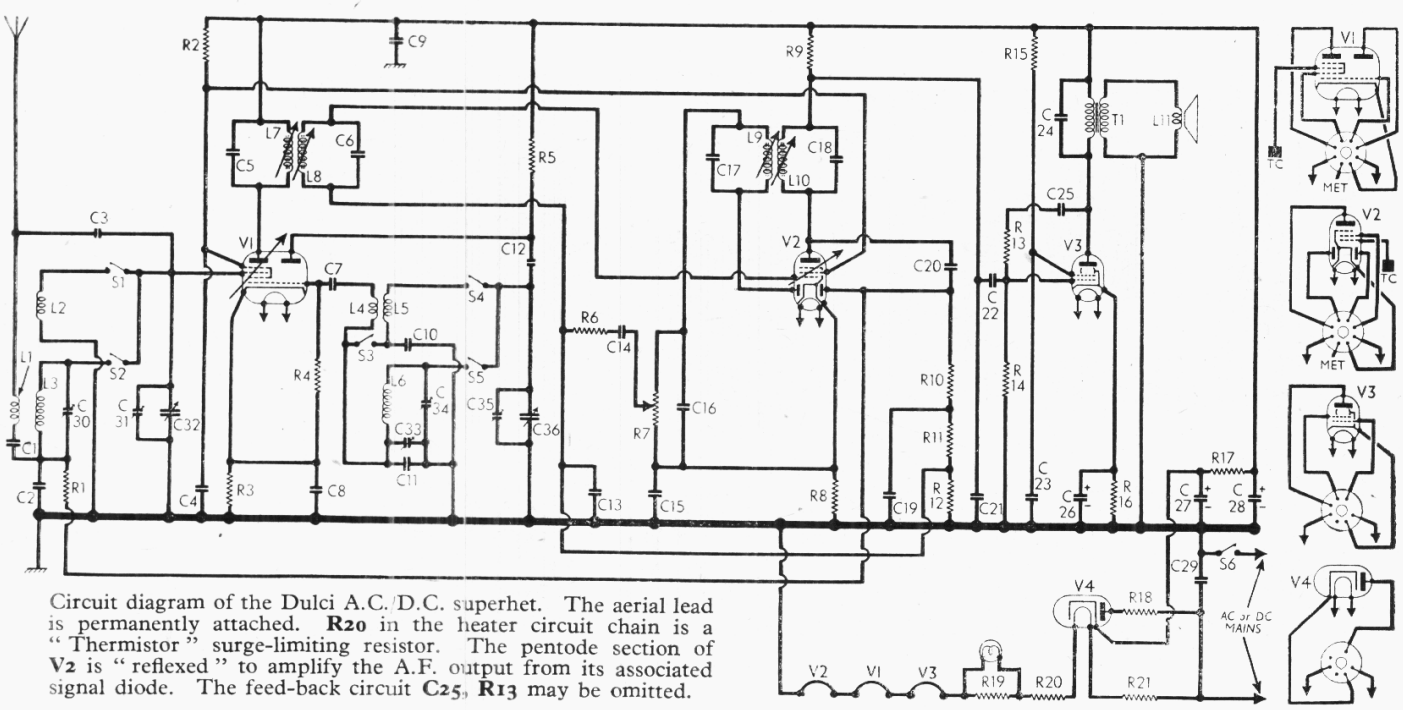
	RESISTORS	Values (ohms)	Locations
R1	A.V.C. decoup. ...	1,000,000	H7
R2	S.G.'s H.T. feed ...	15,000	I8
R3	V1 fixed G.B. ...	220	J8
R4	V1 osc. C.G. ...	47,000	J8
R5	Osc. H.T. feed ...	27,000	J8
R6	I.F. stopper ...	100,000	I5
R7	Volume control ...	500,000	G5
R8	V2 fixed G.B. ...	220	I8
R9	V2 pent. anode load	18,000	G7
R10	A.V.C. diode load resistors ...	1,000,000	H7
R11		1,500,000	H6
R12		1,000,000	I6
R13	Feed-back limiter...	1,000,000	G8
R14	V3 C.G. resistor ...	220,000	G7
R15	V3 S.G. H.T. feed...	47,000	F7
R16	V3 G.B. resistor ...	220	G7
R17	H.T. smoothing ...	2,000	C3
R18	V4 surge limiter ...	100	E8
R19	Scale lamp shunt ...	200	D4
R20	Thermistor* ...	200	B4
R21	Heater ballast† ...	620	F8

† Line cord. * Cold resistance 5,000–6,000 Ω.

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial M.W. coup.	17·0	B3
L2	Aerial tuning coils ...	Very low	A3
L3		4·2	B3
L4	Osc. S.W. reaction	0·4	I6
L5	Oscillator tuning coils ...	Very low	I6
L6		5·0	I7
L7	1st I.F. trans. Pri. ...	12·5	B1
L8	trans. Sec. ...	12·5	B1
L9	2nd I.F. trans. Pri. ...	12·5	B3
L10	trans. Sec. ...	12·5	B3
L11	Speech coil ...	2·6	D1
T1	Speaker trans. Pri. ...	570·0	D3
	trans. Sec. ...	0·5	D3
S1–S5	W/band switches ...	—	J5
S6	Mains sw, g'd R7 ...	—	G5

	CAPACITORS	Values (μF)	Locations
C1	Aerial isolator ...	0·001	B2
C2	A.V.C. decoup. ...	0·1	J6
C3	Aerial S.W. coup.	0·00001	A2
C4	S.G.'s decoup. ...	0·1	J7
C5	1st I.F. trans. tuning ...	0·0001	B1
C6		0·0001	B1
C7	V1 osc. C.G. ...	0·0001	J7
C8	V1 cath. by-pass ...	0·01	J7
C9	H.T. R.F. by-pass	0·001	J8
C10	S.W. tracker ...	0·004	I6
C11	M.W. tracker ...	0·00035	J6
C12	Osc. anode coup. ...	0·000025	J6
C13	V2 C.G. decoup. ...	0·00025	H6
C14	A.F. coupling ...	0·01	I5
C15	V2 cath. by-pass ...	0·01	H7
C16	I.F. by-pass ...	0·0001	I7
C17	2nd I.F. trans. tuning ...	0·0001	B3
C18		0·0001	B3
C19	A.V.C. decoup. ...	0·01	H7
C20	A.V.C. coupling ...	0·0001	H8
C21	I.F. by-pass ...	0·002	G6
C22	A.F. coupling ...	0·01	G7
C23	V3 S.G. decoup. ...	0·25	D2
C24	Tone corrector ...	0·01	D2
C25	F.-B. coupling ...	0·01	G8
C26*	V3 cath. by-pass ...	50·0	F7
C27*	H.T. smoothing capacitors ...	16·0	F5
C28*		24·0	F5
C29	R.F. by-pass ...	0·01	E7
C30‡	Aerial M.W. trim.	0·00005	B1
C31‡	Aerial S.W. trim....	—	A2
C32†	Aerial tuning ...	—	A2
C33‡	Osc. M.W. tracker	0·00022	J6
C34‡	Osc. M.W. trim. ...	0·00011	J6
C35‡	Osc. S.W. trim. ...	—	A3
C36	Oscillator tuning...	—	A3

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Dulci A.C./D.C. superhet. The aerial lead is permanently attached. **R20** in the heater circuit chain is a "Thermistor" surge-limiting resistor. The pentode section of **V2** is "reflexed" to amplify the A.F. output from its associated signal diode. The feed-back circuit **C25, R13** may be omitted.

Supplement to The Wireless & Electrical Trader, May 15, 1948

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws); from the rear of the cabinet remove the two round-head screws at the bottom corners of the rear chassis member, and slide out the chassis and speaker as a single unit.

When replacing, note that the two locating pegs inside the front of the cabinet should engage with holes in the front chassis member, and that a small square of paxolin is fitted between the head of the right-hand fixing screw and the chassis, to provide insulation for one of the attached aerial carrying clips on the back cover.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on A.C. mains of 228 V. 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 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 12K8GT	158	1·0	78	4·2
	Oscillator			
	78	2·5		
V2 12C8	62	5·7	78	1·5
V3 35L6GT	143	30·0	87	1·5
V4 35Z4GT†	—	—	—	—

† Cathode to chassis, 252 V. D.C.

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, ganged in a two-position rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram in col. 2, where it is viewed from the rear of an inverted chassis. **S1, S3** and **S4** close on S.W. (knob anti-clockwise); **S2** and **S5** close on M.W.

S6 is the Q.M.B. mains switch, ganged with the volume control **R7.**

Scale Lamp.—This has an M.E.S. base, with a large clear spherical bulb, and is rated at 5V, 0.15A. It is shunted by a vitreous resistor **R19.**

Capacitors C27, C28.—These are two dry electrolytics in a Dubilier "Drilitic" type CT. The red tag is the positive of **C28** (24μF) and the yellow tag that of **C27** (16μF). Both sections are rated at 350V working, and the case forms the common negative connection. A.C. ripple is limited to 130 mA maximum.

Capacitor C3.—This provides S.W. aerial coupling, and consists of a length (about 5½in) of plastic twin cable. It runs from the **L1, L3** coil unit, round the gang, and through a grommet in the chassis deck to the waveband switch unit.

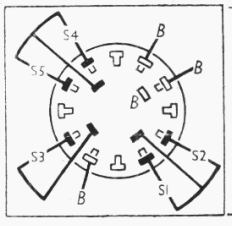


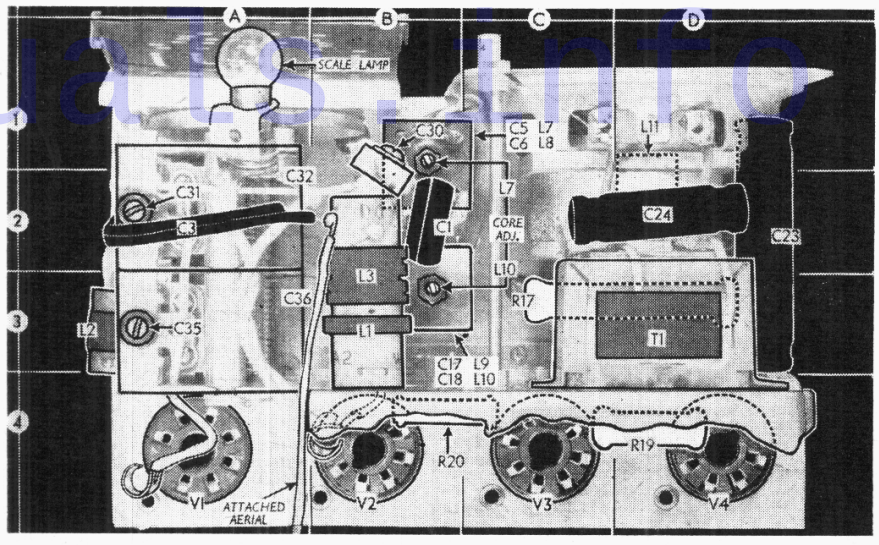
Diagram of the waveband switch unit, drawn as seen from the rear of an inverted chassis. **B** indicates blank tags.

Resistors R20, R21.—These provide the ballast resistance for the heater circuit. **R21** is the line cord, located in the mains lead, and **R20** is a small "Thermistor" cartridge type with a negative temperature coefficient to prevent the usual current surge when switching on. Its cold resistance is a few thousand ohms, but it runs hot at about 150-200Ω.

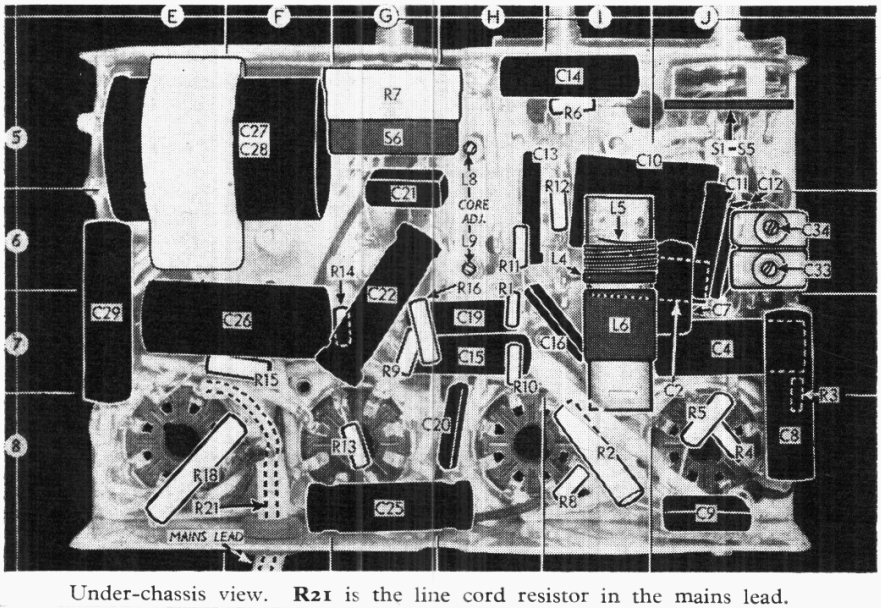
In some chassis it is replaced by a 200Ω fixed resistor, and the line cord resistance is then reduced to about 620Ω. The Thermistor can be recognized by its tinned ends and black body.

Chassis Divergencies.—In addition to the foregoing, **R2** may be 12,000Ω; **C25, R13** may be omitted, as also might **S3**; a 47,000Ω resistor may be inserted between the top of **R7** and **C16,** when **R11** would be removed from the diode load, **R10** and **R12** being joined together. **R11** would then be used to decouple the AVC line to **V2.** A few receivers were fitted with Osram valves in positions **V1** (X76M), **V3** (KT76) and **V4** (U76).

Drive Cord Replacement.—Except that the scale assembly must first be removed, cord replacement is a very simple matter and needs no explanation. Twelve inches of the usual flax fishing line leaves sufficient for tying off, making 1½ turns round the control spindle.



Plan view of the chassis. **C3** consists of a piece of plastic covered twin cable.



Under-chassis view. **R21** is the line cord resistor in the mains lead.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator, via an 0.1 μF isolating capacitor in each lead, to control grid (top cap) of **V1** and chassis. Turn gang to minimum capacitance and volume control to maximum, short-circuit **C36** (rear section of gang), and feed in a 470 kc/s (638.3 m) signal. Adjust the cores of **L7, L8, L9** and **L10** (location references B1, H5, H6, B3) for maximum output.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the pointer should be horizontal and coincident with the ends of the two scales. It may be adjusted in position by sliding the glass scale upward in its guides to expose the pointer fixing screw in the end of the gang spindle, which must be slackened to rotate the pointer.

Transfer "live" signal generator lead, via a suitable dummy aerial, to the attached aerial connecting tag on **L1, L3** (B2).

S.W.—Switch set to S.W. (knob anti-clockwise), tune to 13.96 m on scale, feed in a 13.96 m (21.5 Mc/s) signal, and adjust **C35** (A3) and **C31** (A2) for maximum output. Tune to 50 m on scale, feed in a 50 m (6 Mc/s) signal, and adjust the turns spacing of **L2** (A3) for maximum output, after warming the wax covering of the coil.

M.W.—Switch set to M.W. (knob clockwise), tune to 214.3 m on scale, feed in a 214.3 m (1,400 kc/s) signal, and adjust **C34** (J6) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust **C33** (J6) for maximum output. Tune to 300 m on scale, feed in a 300 m (1,000 kc/s) signal, and check calibration, repeating the two previous adjustments if necessary.

Finally, tune to 214.3 m on scale, feed in a 214.3 m signal, and adjust **C30** (B1) for maximum output.

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