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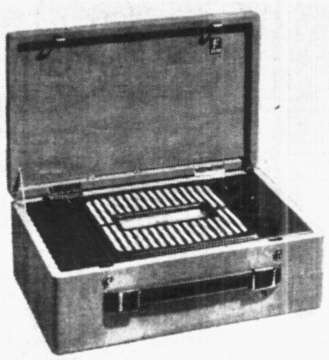
"TRADER" SERVICE SHEET

1048

FERRANTI 815

All-dry Battery Portable



AN all-dry superhet portable of the suit-case type, the Ferranti 815, is fitted with an "on-off" switch operated automatically by opening and closing the lid of the case. It employs four valves and covers two wavebands of 187-550 m and 1,000-2,000 m.

Release date and original price: May 1951; £11 0s 7d without batteries. Purchase tax extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input on L.W. by **L1** and **C22** to heptode valve **(V1, Mullard DK91)** which operates as frequency changer with electron coupling. For M.W. operation, **S1** closes and shunts **L2** across **L1.**

Oscillator grid coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C23.** Parallel trimming by **C24** (M.W.) and **C24, C25** (L.W.); series tracking by **C6** (M.W.) and **C6, C7** (L.W.). Oscillator anode is inductively coupled for reaction on M.W. by **L5** and capacitatively coupled on L.W. by the common impedance of **C7.**

Second valve **(V2, Mullard DF91)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C2, L6, L7, C3** and **C10, L8, L9, C11.**

Intermediate frequency 470 kc/s.

Diode signal detector is part of diode pentode valve **(V3, Mullard DAF91).** Audio frequency component in rectified output is developed across volume control **R7,** which acts as diode load, and is passed via **C14** to control grid of pentode section, which operates as A.F. amplifier. I.F. filtering by **C12, R5, C13.** D.C. potential developed across **R7** is fed back as bias via decoupling circuit **R6, C1** to **V1** and **V2** grid circuits, giving A.G.C.

Resistance-capacitance coupling by **R9, C15** and **R12** between **V3** pentode and control grid of pentode output valve **(V4, Mullard DL94).** Tone correction by use of two negative feed-back paths, the first, via **C17,** being between **V4** anode and **V3** anode; and the second, via **C18, R13,** and **R14,** being between **T1** secondary and the grid circuit of **V3.** Bias for **V4** is obtained from the voltage drop across **R11.**

DISMANTLING

Removing Chassis.—Remove battery compartment cover (two knurled head screws);
remove control knobs (recessed grub screws) and unplug battery leads;
remove four plated countersunk screws from corners of speaker grille, and withdraw metal escutcheon and card carrying speaker grille fabric;
remove four 4BA bolts now revealed holding corners of chassis to cabinet;
remove frame aerial cover from the carrying

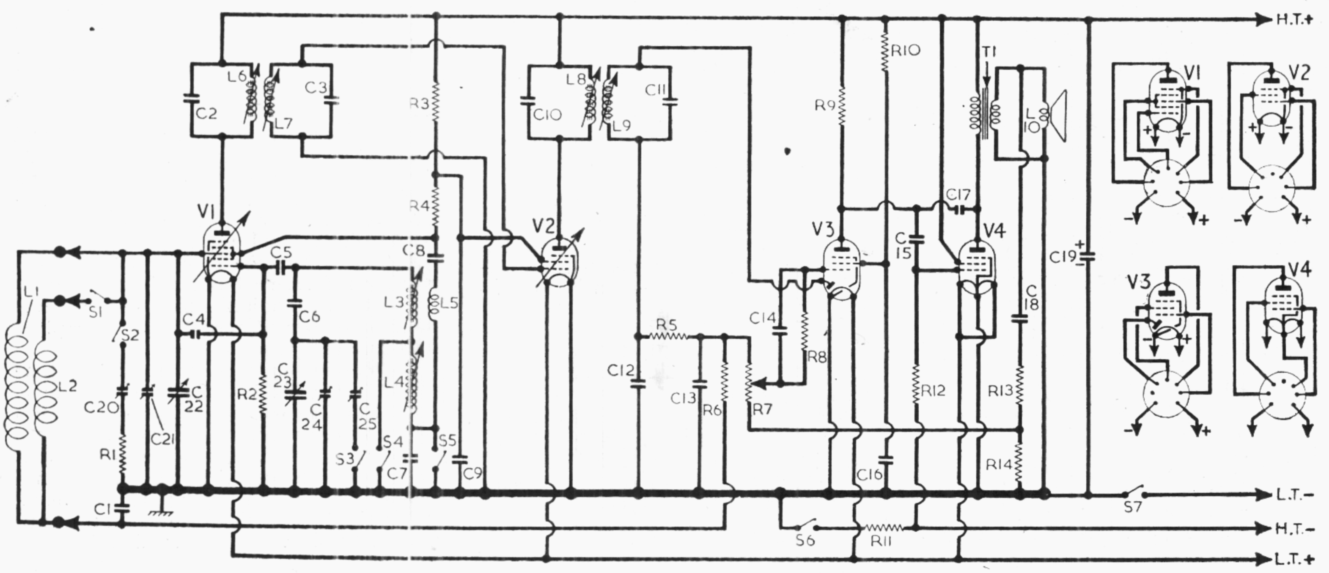
(Continued col. 1 overleaf)

COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	L.W. aerial damp...	33Ω	B2
R2	V1 osc. C.G. ...	100kΩ	D5
R3	S.G. H.T. feed ...	18kΩ	C5
R4	Osc. anode load ...	8·2kΩ	D5
R5	I.F. stopper ...	47kΩ	C4
R6	A.G.C. decoupling	2·2MΩ	C3
R7	Volume control ...	500kΩ	B2
R8	V3 C.G.	4·7MΩ	C5
R9	V3 anode load ...	1MΩ	C4
R10	V3 S.G. feed ...	3·9MΩ	C5
R11	V4 G.B.	560Ω	C4
R12	V4 C.G.	2.2MΩ	C5
R13	} Negative feed-back {	10kΩ	C3
R14		2·2kΩ	B1

	CAPACITORS	Values	Locations
C1	A.G.C. decoupling	0·05μF	C4
C2	} 1st I.F. trans. tuning {	100pF	D4
C3		100pF	D4
C4	Osc. neutralizing ...	3pF	D5
C5	V1 osc. C.G. ...	100pF	E5
C6	} Oscillator trackers {	550pF	E5
C7		200pF	D4
C8	Osc. anode coup. ...	200pF	E5
C9	S.G. decoupling ...	0·05μF	C5
C10	} 2nd I.F. trans. ... {	100pF	D4
C11	tuning	180pF	D4
C12	} I.F. by-passes ... {	100pF	C4
C13		100pF	C4
C14	} A.F. coupling ... {	0·005μF	C4
C15		0·005μF	C5
C16	V3 S.G. decoup. ...	0·05μF	C4
C17	} Negative feed-back {	15pF	C5
C18		0·05μF	C3
C19*	H.T. resevoir ...	2·0μF	C4
C20‡	L.W. aerial trim. ...	200pF	B2
C21‡	M.W. aerial trim....	21·5pF	E4
C22†	Aerial tuning ...	523pF	E4
C23†	Oscillator tuning ...	523pF	E4
C24‡	M.W. osc. trim. ...	60pF	A2
C25‡	L.W. osc. trim. ...	120pF	A2

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Ferranti 815 portable superhet. For M.W. operation the M.W. frame **L2** is shunted across the L.W. one **L1.**

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	L.W. frame aerial...	16·0	—
L2	M.W. frame aerial	1·3	—
L3	Oscillator tuning coils ...	2·0	A2
L4		4·5	A2
L5	Osc. reaction ...	1·0	A2
L6	1st I.F. trans. Pri.	7·5	D4
L7	Sec.	7·5	D4
L8	2nd I.F. trans. Pri.	7·5	D4
L9	Sec.	5·5	D4
L10	Speech coil ...	2·3	—
T1	O.P. trans. Pri. ...	650·0	C3
	Sec. ...	0·6	
S1-S5	Waveband switches	—	D5
S6, S7	Battery switches ...	—	—

Dismantling—*continued*

case lid, unsolder the black leads from the three frame aerial tags, and withdraw chassis. *When replacing*, the frame aerial lead from **C1, R6** should go to the top tag, the lead from pin 6 of **V1** to the middle tag, and the remaining lead to the lower tag.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information and are average figures obtained from a number of receivers operating from new batteries and tuned to the highest wavelength end of M.W.

Voltage readings were measured on the 100 V range of a Model 7 Avometer, chassis being the negative connection. The voltage measured across **R11**, using the 10 V range, was 5.2 V. When the oscillator section of **V1** stops working the screen grid voltage drops by 3.5 V.

Valve	Anode V	Anode mA	Screen V	Screen mA
V1 DK91	81	0·4	33·0	1·2
V2 DF91	81	2·6	45·0	0·9
V3 DAF91	3	0·065	0·8	0·018
V4 DL94	77	4·3	81·0	0·8

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, ganged in a single rotary unit beneath the chassis. This unit is indicated in our underside view of the chassis, and is shown in detail in the diagram inset beside our under-chassis view below, where it is drawn as seen in the same position again. **S1, S4** and **S5** close for M.W. operation (control knob anti-clockwise); **S2** and **S3** close for L.W.

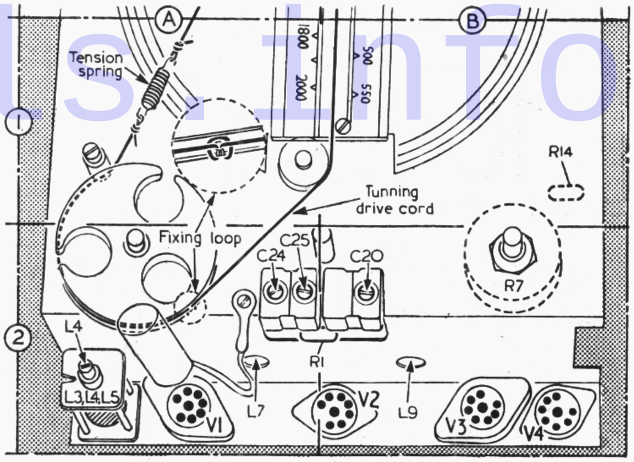
S6, S7 are the battery switches. They consist of a pair of contacts between which an earthed contactor moves, touching them to close the switches. The contactor is spring-loaded, and is pushed off the contacts by the lid when the lid is closed. Thus the receiver is switched on automatically when the lid is raised.

Batteries.—The L.T. unit is rated at 1.5 V, and the H.T. unit at 90 V. Types recommended by the makers are: L.T., Ever Ready, "Alldry 35," Drydex H1184 or Vidor L5040; H.T., Ever Ready "Batrymax" B126, Drydex "Drymax" 526 or Vidor L5512. The normal consumption is 250 mA L.T., and 10 mA H.T.

Drive Cord Replacement.—About 20 inches of high-grade flax fishing line, plaited and waxed, is required for a new tuning drive cord, which should be run as shown in our plan view of the chassis. Part of the chassis is cut off in our illustration to save space, and part of the tuning scale is cut off with it, but the drive system is quite simple, and sufficient of it is seen to indicate the course it takes.

The end loops are hooked on to the tension spring, but before running the cord a point near one end is folded and looped through the drive drum, as shown in the drawing, to make a fixing loop. The final position of this loop should be 4.5in from the tension spring.

Plan view of the chassis, as it can be seen in its case when the speaker grille escutcheon is removed. The valves stand on a low platform, and a screening cover is provided for **V1.** The adjustment screw for **C21** is omitted from this drawing, but its position can be seen from **C21** at E3 in the underside illustration below.



CIRCUIT ALIGNMENT

To gain access to the I.F. core adjustments the chassis should be removed from its carrying case as described under "Dismantling" and, with the frame aerial still connected, placed in a convenient position on the bench. When making adjustments to the I.F. tuning cores, care should be taken to see they are not screwed through to the second tuning position, which will result in over-coupling.

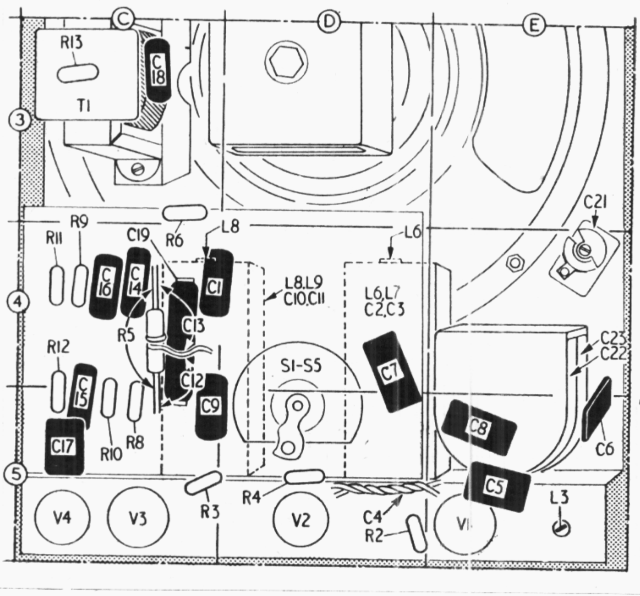
I.F. Stages.—Switch receiver to L.W. and turn gang to maximum capacitance. Connect output from signal generator, via an 0.1 μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and chassis. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L9, L8, L7** and **L6** (location references B2, D4, A2) for maximum output. Repeat these adjustments, reducing the input as the circuits come into line, until no further improvement results.

R.F. and Oscillator Stages.—The following adjustments must be carried out with the chassis in the carrying case, but with the escutcheon removed so that the trimmers and cores are accessible. In order to adjust the core of **L3,** the core of **L4** (A2) should be removed and the trimming tool can then be inserted through the coil former to engage in the top of **L3** core, and for this reason M.W. adjustments must always be followed by L.W. re-alignment.

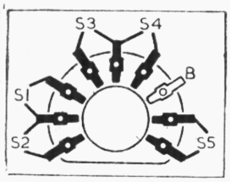
Connect the signal generator output to a loop consisting of two turns of stout copper wire approximately 10in in diameter and placed 12in behind and parallel to the receiver frame aerials. Check that with the gang at maximum capacitance the cursor coincides with the 550 m mark on the tuning scale.

M.W.—Switch receiver to M.W. and tune to 200 m, feed in a 200 m (1,500 kc/s) signal, and adjust **C24** (A2) and **C21** (A1) for maximum output. Tune receiver to 500 m, feed in a 500 m (600 kc/s) signal, and removing the core of **L4** (A2) adjust the core of **L3** (through the coil former) for maximum output. Repeat these adjustments until no further improvement results and then replace the core of **L4.**

L.W.—Switch receiver to L.W., tune to 1,000 m, feed in a 1,000 m (300 kc/s) signal and adjust **C25** (A2) and **C20** (B2) for maximum output. Tune receiver to 1,800 m, feed in a 1,800 m (167 kc/s) signal and adjust the core of **L4** (A2) while rocking the gang for optimum results. Repeat these adjustments until no further improvement results.



Underside view (left) of the chassis as seen after removing it from the case and turning it over. Below is a diagram of the waveband switch unit, seen in the same position as it is in the illustration beside it.



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