Supplement to Wireless & Electrical Trader, August 16, 1952

"TRADER" SERVICE SHEET

1056

FERRANTI 115

THE Ferranti 115 is provided with a heater transformer, but is otherwise designed on the lines of an A.C./D.C. receiver. It is a 4-valve (plus rectifier) 3-band superhet operating from A.C. mains only of 200-250 V, 50-100 c/s. The waveband ranges are 16-50 m, 190-570 m and 1,000-2,000 m. There is an export model 115U which is the same in general as the Home model, but it has tappings for 105-115 V, 120-135 V and 200-225 V mains and is fitted with a 1 A fuse.

Release date and original price: July 1951 £16 9s 2d plus purchase tax.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L2** (S.W.), **L3** (M.W.) or **L4** (L.W.) to single tuned circuits **L5, C36** (S.W.), **L6, C36** (M.W.) and **L7, C36** (L.W.), which precede triode hexode valve **(V1, Mullard ECH42)** operating as frequency changer with internal coupling. I.F. filtering by **L1, C2.**

Oscillator grid coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.) are tuned by **C37.** Trimming by **C38** (S.W.), **C39** (M.W.) and **C11, C40** (L.W.); series tracking by **C12** (S.W.), **C13** (M.W.) and **C14** (L.W.).

Second valve **(V2, Mullard EF41)** is a variable mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C6, L14, L15, C7** and **C17, L16, L17, C18.** **Intermediate frequency 470 kc/s.**

Diode signal detector is part of double diode triode valve **(V3, Mullard EBC41).** Audio frequency component in rectified output is developed across diode load **R9** and passed via **C23,** volume control **R10** and **C24** to grid of triode section. I.F. filtering by **C19, R8, C20.** Provision is made for the connection of a gramophone pick-up across **C23, R10** via **S20** which closes in the gram position of the waveband control.

Second diode of **V3** is fed via **C21** from **V2** anode, and the resulting D.C. potential developed across load resistor **R15** is fed back as bias to **V1** and **V2** giving automatic gain control.

Resistance-capacitance coupling by **R13, C25** and **R16** between **V3** triode anode and pentode output valve **(V4, Mullard EL41).** Variable tone control in grid circuit by **R16, R17, C26, C27.** Negative feed-back, developed across **R22,** provides fixed tone correction.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Mullard EZ40)** whose anodes are connected together via surge limiting resistors **R20, R21,** to form a half-wave rectifier. Smoothing by **R23, R24** and electrolytic capacitors **C29, C30, C31.**

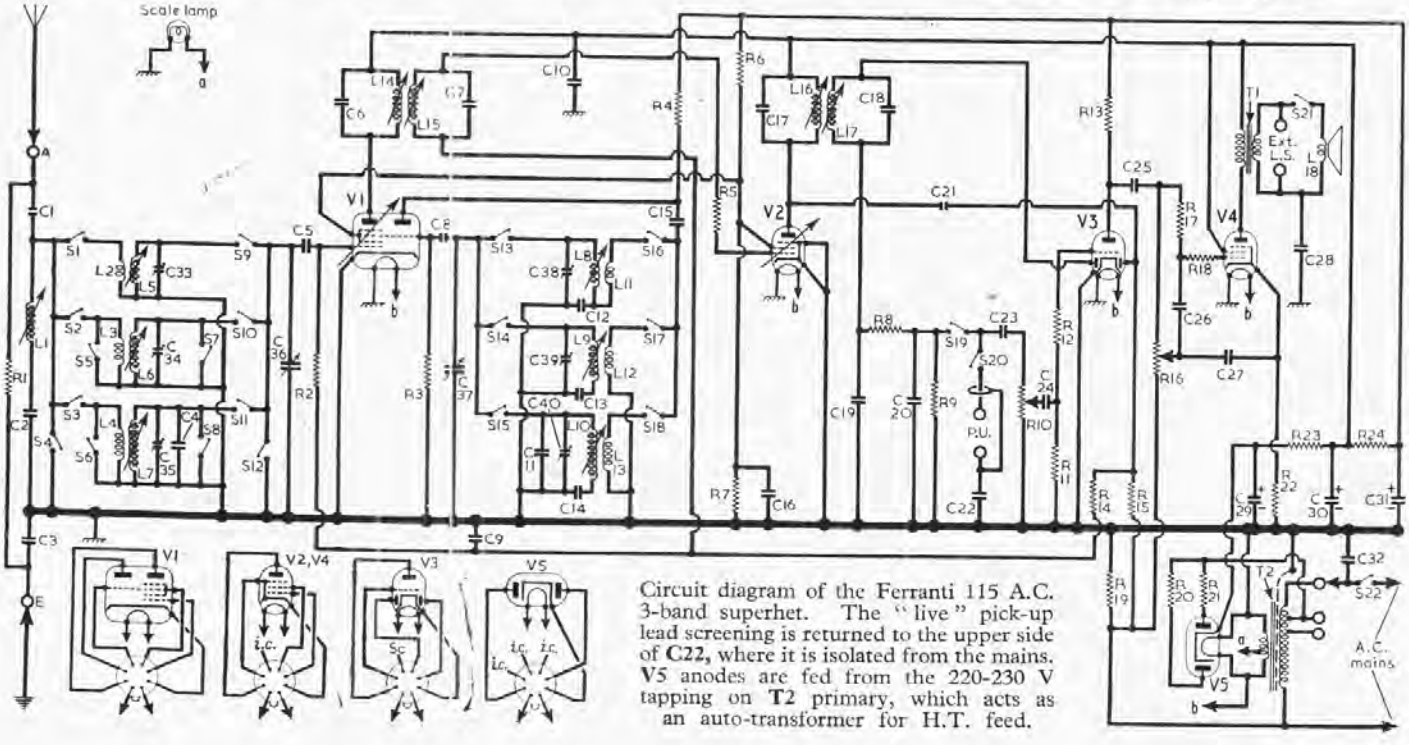
Heater transformer **T2** supplies the heaters of all the valves, including **V5,** from a single secondary winding. The scale lamp is connected to tapping a.

COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	Aerial shunt	33kΩ	F5
R2	V1 C.G.	1MΩ	F4
R3	V1 osc. C.G.	47kΩ	F5
R4	Osc. anode feed	22kΩ	F4
R5	V2 C.G. stopper	3·3kΩ	F5
R6	S.G. potential divider	22kΩ	F4
R7		27kΩ	F4
R8	I.F. stopper	100kΩ	E5
R9	Signal diode load	470kΩ	E4
R10	Volume control	1MΩ	E3
R11	V3 C.G.	22MΩ	E4
R12	V3 C.G. stopper	4·7kΩ	E5
R13	V3 anode load	220kΩ	D4
R14	A.G.C. decoupling	1MΩ	E4
R15	A.G.C. diode load	1MΩ	E4
R16	Tone control	500kΩ	D3
R17	Part tone control	220kΩ	D4
R18	V4 C.G. stopper	100kΩ	D4
R19	Common G.B.	33Ω	E4
R20	V5 surge limiters	60Ω	C2
R21		60Ω	C2
R22	V4 G.B.	120Ω	D4
R23	H.T. smoothing	470Ω	B1
R24		1·5kΩ	D4

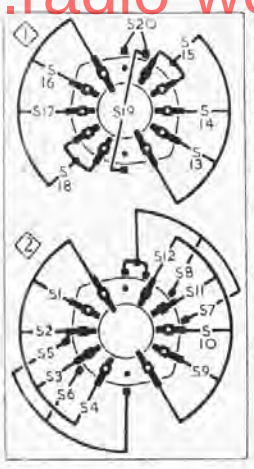
	CAPACITORS	Values	Locations
C1	Aerial series	0·001μF	F5
C2	I.F. filter tune	30pF	F5
C3	Chassis isolator	0·02μF	F5
C4	L.W. aerial trim.	100pF	F5
C5	V1 C.G.	200pF	G5
C6	1st I.F. trans. tuning	100pF	B2
C7		100pF	B2
C8	V1 osc. C.G.	50pF	A2
C9	A.G.C. decoupling	0·1μF	E4
C10	H.T. by-pass	0·1μF	E4
C11	L.W. osc. trim.	150pF	F3
C12	S.W. osc. tracker	0·004μF	F3
C13	M.W. osc. tracker	520pF	G4
C14	L.W. osc. tracker	200pF	G3
C15	Osc. anode coup.	200pF	F5
C16	S.G. decoupling	0·1μF	E4
C17	2nd I.F. trans. tuning	100pF	B2
C18		300pF	B2
C19	I.F. by-passes	100pF	E5
C20		100pF	E5
C21	A.G.C. coupling	50pF	E5
C22	P.U. isolator	0·02μF	E4
C23	A.F. couplers	0·01μF	E3
C24		0·01μF	E4
C25		0·005μF	D4
C26	Part tone control	0·002μF	D4
C27		200pF	D4
C28	Ext. L.S. isolator	0·02μF	E5
C29*	H.T. smoothing	32μF	B1
C30*		32μF	B1
C31*		16μF	B1
C32	Mains R.F. by-pass	0·02μF	E3
C33‡	S.W. aerial trim.	50pF	B2
C34‡	M.W. aerial trim.	50pF	A2
C35‡	L.W. aerial trim.	50pF	A2
C36†	Aerial tuning	—	A1
C37†	Oscillator tuning	—	A1
C38‡	S.W. osc. trim.	50pF	B1
C39‡	M.W. osc. trim.	50pF	B1
C40‡	L.W. osc. trim.	50pF	B1

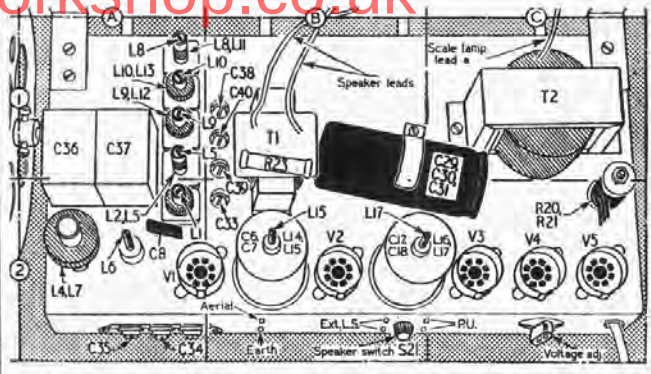
* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Ferranti 115 A.C. 3-band superhet. The "live" pick-up lead screening is returned to the upper side of **C22,** where it is isolated from the mains. **V5** anodes are fed from the 220-230 V tapping on **T2** primary, which acts as an auto-transformer for H.T. feed.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	L.F. filter	18·0	A2
L2	Aerial coupling coils	—	A1
L3		30·0	G5
L4		18·0	A2
L5	Aerial tuning coils	—	A1
L6		2·5	G5
L7		15·0	A2
L8	Oscillator tuning coils	—	A1
L9		4·0	A1
L10		10·0	A1
L11	Oscillator reaction coils	—	A1
L12		—	A1
L13		1·5	A1
L14	1st L.F. trans. {Pri.	7·0	B2
L15	{Sec.	7·0	B2
L16	2nd L.F. trans {Pri.	7·0	B2
L17	{Sec.	3·5	B2
L18	Speech coil	3·0	—
T1	O.P. trans. {Pri.	450·0	B1
	{Sec.	—	
T2	Mains trans. {Pri., total	120·0	C1
	{Htr. sec.	—	
S1-S20	Waveband switches	—	G3
S21	Speaker switch	—	B2
S22	Mains sw., g'd R16	—	D3



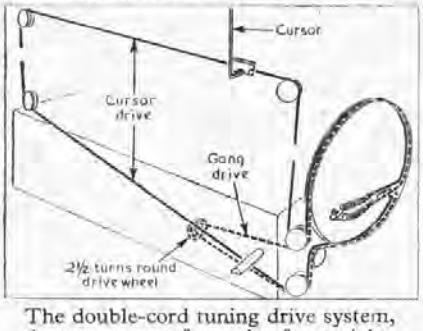


Waveband switch diagrams (left) and plan view of the chassis (above). The waveband switches are viewed from the rear of an inverted chassis, and the associated table is below them in col. 2.

Switches	S.W.	M.W.	L.W.	Gram
S1	C	—	—	—
S2	—	C	—	—
S3	—	—	C	—
S4	—	—	—	C
S5	C	—	—	—
S6	C	C	—	—
S7	C	—	—	—
S8	C	C	—	—
S9	C	—	—	—
S10	—	C	—	—
S11	—	—	C	—
S12	—	—	—	C
S13	C	—	—	—
S14	—	C	—	—
S15	—	—	C	—
S16	C	—	—	—
S17	—	C	—	—
S18	—	—	C	—
S19	C	C	C	—
S20	—	—	—	C

GENERAL NOTES

Switches.—**S1-S18** are the waveband switches, and **S19, S20** are the radio/gram change-over switches, ganged in two rotary units. These are indicated in our underside illustration of the chassis, and shown in detail in the diagrams inset beside the plan view, where they are drawn as seen from the rear of an inverted chassis. The table below them gives the switch



The double-cord tuning drive system, drawn as seen from the front right-hand corner.

positions for the four control settings, starting from the fully anticlockwise position of the control knob. A dash indicates open, and **C**, closed.

Scale Lamp.—This is rated at 6.2 V, 0.3 A and has a large clear spherical bulb and an M.E.S. base. It is connected via a blue lead from the mains transformer to a tapping on the heater secondary winding.

External speaker. Two sockets are provided at the rear of the chassis for the connection of a low impedance (2-3 Ω) external speaker.

A screw-type switch **S21** permits the internal speaker to be muted.

Drive Cord Replacement.—There are two separate drive cords, one for the gang and one for the cursor. About four feet of nylon braided glass yarn is required for the gang drive, and about six feet for the cursor drive. They should be run as shown in the accompanying sketch, where both systems are drawn together as seen when viewed from the front right-hand corner of the chassis when the gang is at maximum capacitance. The lengths quoted allow plenty for tying off.

CIRCUIT ALIGNMENT

Remove chassis from cabinet and stand it on its mains transformer end on the bench. Check that the mains lead is connected so that the chassis is not "live."

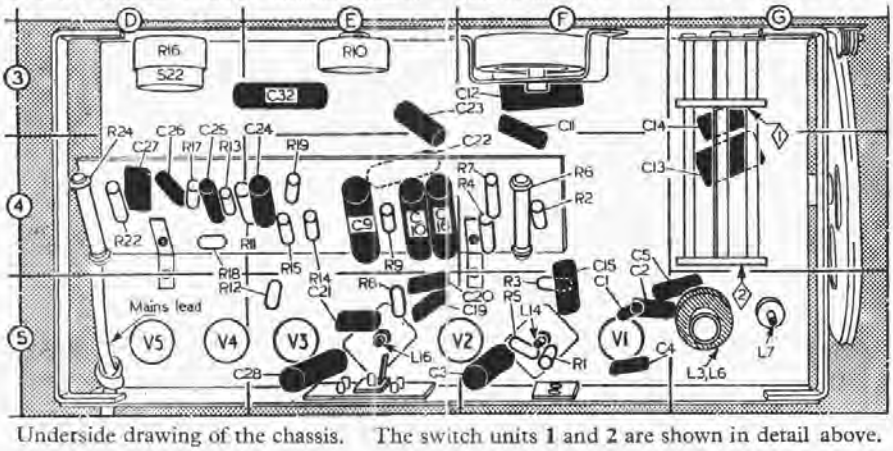
I.F. Stages.—Switch receiver to L.W., turn gang to maximum and connect output of signal generator, via an 0.1 μF capacitor, to control grid (pin 6) of **V1** and chassis. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L17, L16, L15** and **L14** (location references B2, E5, F5) for maximum output. Repeat these adjustments until no further improvement results. It should be noted that two peaks are obtainable when adjusting the cores, the correct one being with the core set further out from the coil.

R.F. and Oscillator Stages.—As the tuning scale remains fixed in the cabinet when the chassis is withdrawn, reference must be made during alignment to the substitute scale printed on the side of the tuning drive drum. The calibration frequencies on this scale are read off against the wire cursor which is bolted to the chassis. Check that with the gang at maximum capacitance this cursor coincides with the vertical line marked "LMS" on the substitute scale. Transfer signal generator leads, via a suitable dummy aerial, to **A** and **E** sockets.

M.W.—Switch receiver to M.W., tune to 600 kc/s on the substitute scale, feed in a 600 kc/s (500 m) signal and adjust the cores of **L9** (A1) and **L6** (A2) for maximum output. Tune receiver to 1,500 kc/s, feed in a 1,500 kc/s (200 m) signal and adjust **C39** (B1) and **C34** (A2) for maximum output. Repeat these adjustments. Tune receiver to highest wavelength end of scale, feed in a 470 kc/s (638.3 m) signal and adjust the core of **L1** (A2) for minimum output.

L.W.—Switch set to L.W., tune to 166.6 kc/s, feed in a 166.6 kc/s (1,800 m) signal and adjust the cores of **L10** (A1) and **L7** (G4) for maximum output. Tune receiver to 266 kc/s, feed in a 266 kc/s (1,128 m) signal and adjust **C40** (B1) and **C35** (A2) for maximum output. Repeat these operations.

S.W.—Switch receiver to S.W., tune to 6.6 Mc/s mark on substitute scale, feed in 6.67 Mc/s (45 m) and adjust the cores of **L8** (A1) and **L5** (A1) for maximum output. If two peaks are found with **L8**, adjust to the peak with the core further out. Tune receiver to 15 Mc/s, feed in a 15 Mc/s (20 m) signal and adjust **C38** (B1) and **C33** (B2) for maximum output. If two peaks are found when adjusting **C38**, it should be set to the lower capacitance peak. Repeat these adjustments.



Underside drawing of the chassis. The switch units **1** and **2** are shown in detail above.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information, and were measured under no-signal conditions. Voltage readings were measured with a Model 7 Avometer, chassis being the negative connection in every case.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 ECH42	230	2·4	70	2·3	—
	Oscillator				
	110	4·0			
V2 EF41	230	3·6	70	1·1	—
V3 EBC41	66	0·55	—	—	—
V4 EL41	216	29·0	230	4·0	4·3
V5 EZ40	220†	—	—	—	255·0

† A.C. reading.

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