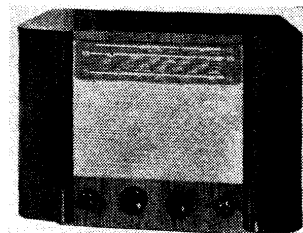


"TRADER" SERVICE SHEET  
**1056**

# FERRANTI 115



**T**HE 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 115E which is the same in general as the Home model, but it has tapings 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 EGH42) 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 C41, 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 feedback, 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.

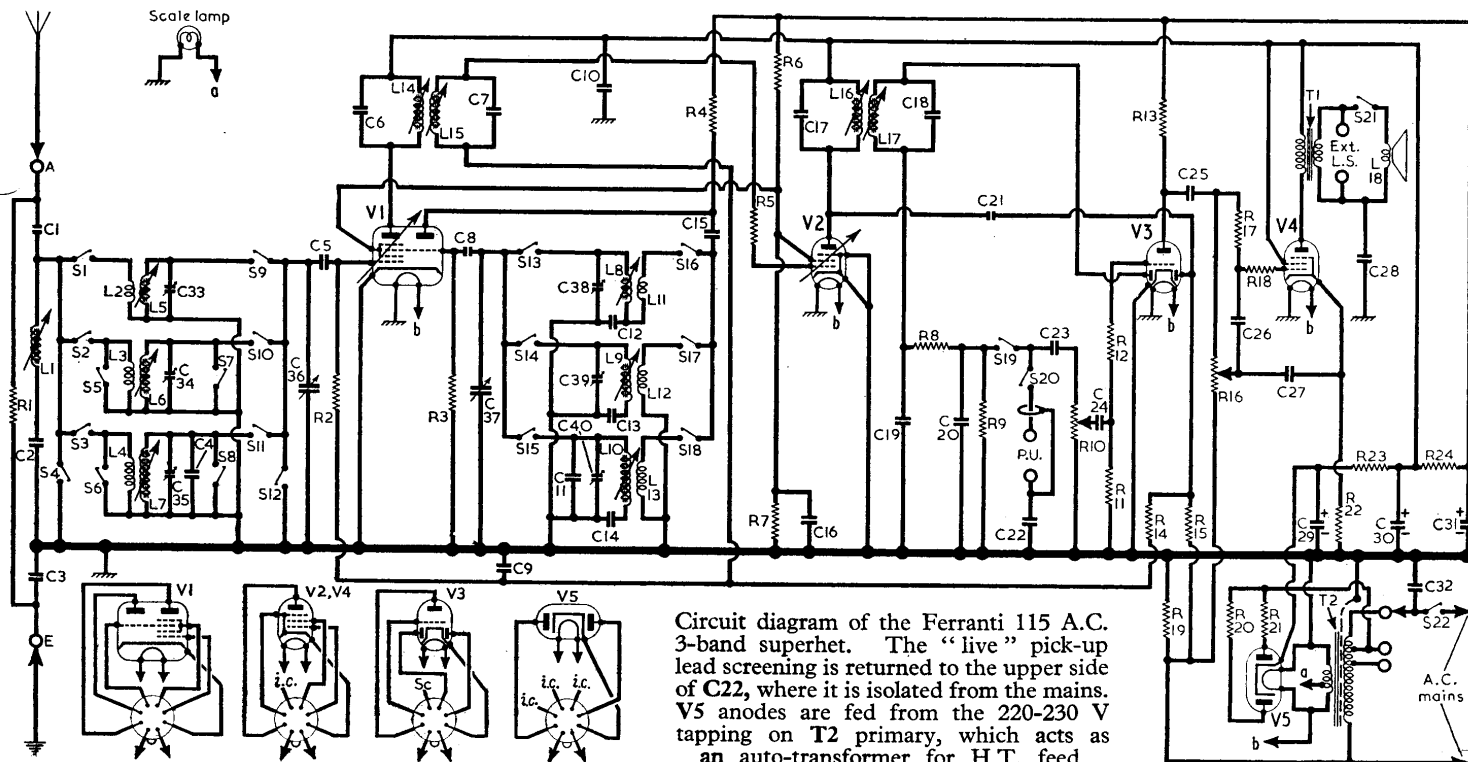
Heater transformer T2 supplies the heaters of all the valves, including V5, from a single secondary winding. The scale lamp is connected to tapping a.

**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    | 22kΩ   | F4        |
| R7        | divider           | 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        |

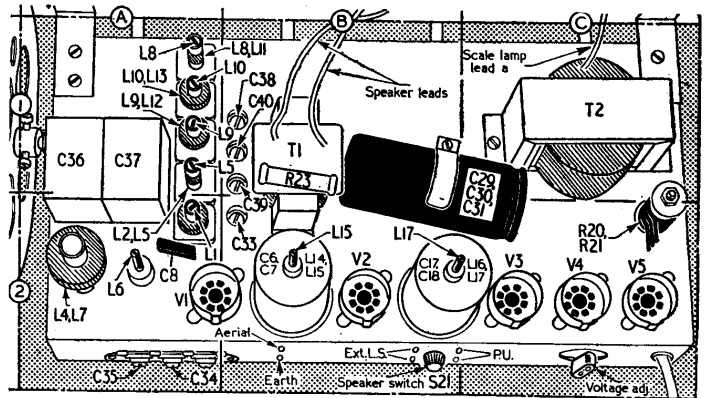
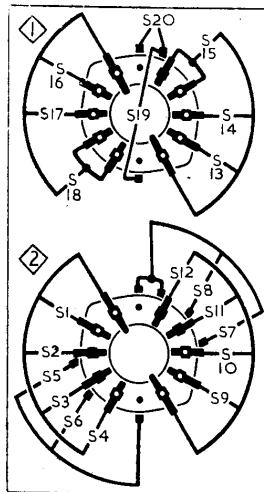
| CAPACITORS |                        | Values  | Locations |
|------------|------------------------|---------|-----------|
| C1         | Aerial series          | 0-001μF | F5        |
| C2         | I.F. filter tune       | 30pF    | F5        |
| C3         | Chassis isolator       | 0-02μF  | F5        |
| 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        | 100pF                  | E5      |           |
| C20        | I.F. by-passes         | 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        | Part tone control      | 0-005μF | D4        |
| C26        |                        | 0-002μF | D4        |
| C27        | Ext. L.S. isolator     | 200pF   | E5        |
| C28        | H.T. smoothing         | 0-02μF  | D4        |
| C29*       |                        | 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.

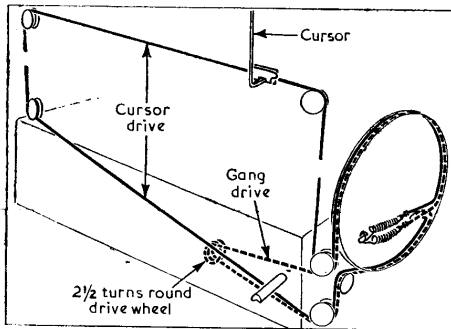
| OTHER COMPONENTS |                                | Approx. Values (ohms) | Locations       |
|------------------|--------------------------------|-----------------------|-----------------|
| L1               | I.F. filter ...                | 18-0                  | A2              |
| L2               |                                |                       | A1              |
| L3               | Aerial coupling coils          | 30-0                  | G5              |
| L4               |                                | 48-0                  | A2              |
| L5               |                                |                       | A1              |
| L6               | Aerial tuning coils            | 2-5                   | G5              |
| L7               |                                | 15-0                  | A2              |
| L8               |                                |                       | A1              |
| L9               | Oscillator tuning coils ...    | 4-0                   | A1              |
| L10              |                                | 10-0                  | A1              |
| L11              |                                |                       | A1              |
| L12              | Oscillator reaction coils ...  |                       | A1              |
| L13              |                                | 1-5                   | A1              |
| L14              | 1st I.F. trans. { Pri. ...     | 7-0                   | B2              |
| L15              |                                | 7-0                   | B2              |
| L16              | 2nd I.F. trans. { Pri. ...     | 7-0                   | B2              |
| L17              |                                | 3-5                   | B2              |
| L18              | Speech coil ...                | 3-0                   |                 |
| T1               | O.P. trans. { Pri. ...         | 450-0                 | B1              |
|                  |                                |                       | { Sec. ...      |
| T2               | Mains { Pri., total trans. ... | 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.

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

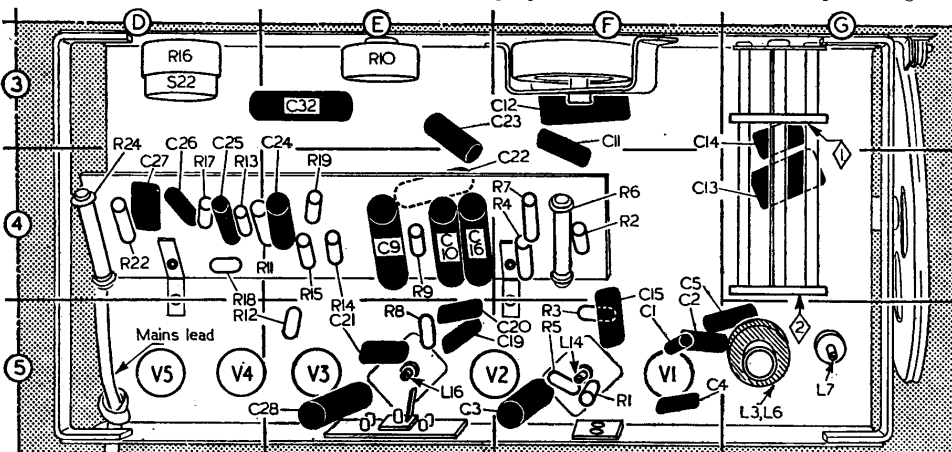


The double-cord tuning drive system, drawn as seen from the front right-hand corner.

positions for the four control settings, starting from the fully anti-clockwise 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.



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

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

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 170 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.

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  |       |
| V1 ECH42 | 230   | 2-4        | 70     | 2-3 | —     |
|          | 110   | Oscillator |        |     |       |
| 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.