'TRADER' SERVICE SHEET

242

FERRANTI 1137 AND 837

COVERING a short-wave range of 16·7-53 metres, the Ferranti 1137 is a 4-valve (plus rectifier) A.C. 3-band superhet suitable for mains of 200-270 V, 40-100 C/S, and has provision for using an extension speaker.

An identical chassis is used in the 837 receiver, the differences being that the 837 is not fitted with the Magnascopic tuning dial and is housed in a moulded cabinet instead of a wooden one. This *Service Sheet* was prepared on one of the 1137 models.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L3** (S.W.), **L4** (M.W.) and **L5** (L.W.) to single tuned circuits **L6, C29** (S.W.), **L7, C29** (M.W.) and **L8, C29** (L.W.). I.F. filter **L1, C27** is connected across aerial input circuit. Image filter **L2, C28** is in circuit on L.W. only.

First valve (**V1, Ferranti metallised VHT4**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L9** (S.W.), **L10** (M.W.) and **L11** (L.W.) are tuned by **C31**; parallel trimming by **C32** (S.W.), **C33** (M.W.) and **C8, C34** (L.W.); series tracking by **C7** (fixed, S.W.), **C35** (M.W.) and **C9, C36** (L.W.); anode reaction by coils **L12** (S.W.) and **L13, L14** (M.W. and L.W.)

Second valve (**V2, Ferranti metallised VPT4**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C37, L15, L16, C38** and **C39, L17, L18, C40**.

Intermediate frequency 450 KC/S.

Diode second detector is part of double diode pentode output valve (**V3, Ferranti PT4D**). Audio frequency component in rectified output is developed across load resistance **R9** and passed via A.F. coupling condenser **C16** and manual volume control **R8** to C.G. of pentode section. I.F. filtering by **R7, C17** and **C18.** Fixed tone correction in anode circuit by R.C. filter **C20, C21** and **R12.** Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1.**

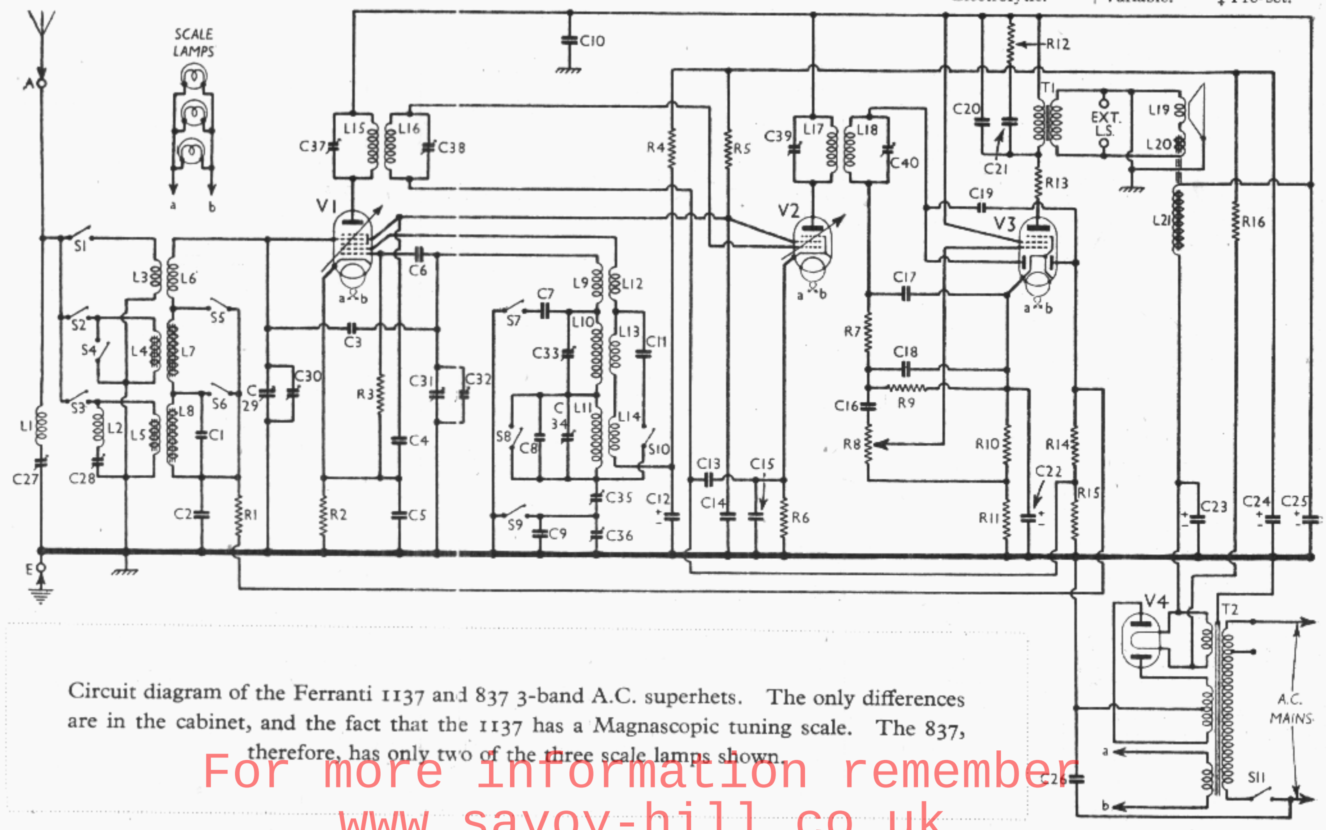
Second diode of **V3,** fed from **L18** via **C19**, provides D.C. potentials which are developed across load resistances **R14, R15** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop across resistances **R10, R11** in cathode circuit of **V3.**

H.T. current is supplied by directly heated full-wave rectifying valve (**V4, Ferranti R4**). Smoothing by speaker field **L21** and dry electrolytic condensers **C23, C24,** and **C25.** R.F. filtering in H.T. circuit by **C10.** R.F. mains filtering by **C26.**

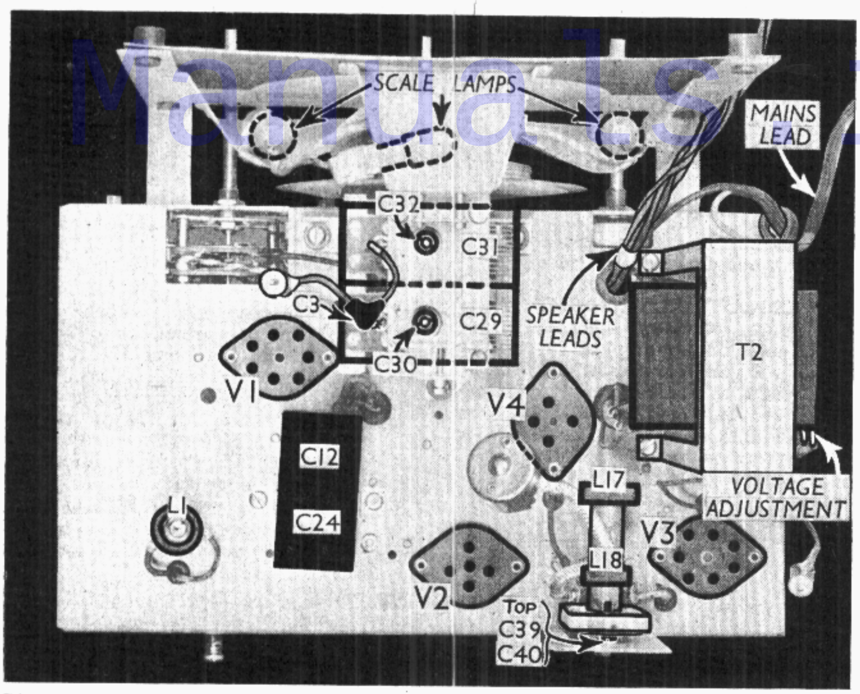
COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Aerial circuit L.W. trimmer ..	0·00006
C2	V1 tetrode C.G. decoupling ..	0·05
C3	V1 tet. to osc. C.G.'s neut. condenser	Very low
C4	V1 S.G. to cathode shunt	0·0005
C5	V1 cathode by-pass	0·05
C6	V1 osc. C.G. condenser ..	0·0001
C7	Osc. circuit S.W. tracker ..	0·004
C8	Osc. circuit L.W. fixed trimmer	0·00006
C9	Osc. circuit L.W. fixed tracker	0·00018
C10	V1, V2 anodes R.F. by-pass	0·1
C11	Oscillator S.W. reaction by-pass	0·001
C12*	V1 osc. anode decoupling ..	4·0
C13	V2 C.G. decoupling	0·05
C14	V1, V2 S.G.'s decoupling ..	0·1
C15	V2 cathode by-pass	0·1
C16	A.F. coupling to V3 pentode..	0·01
C17	I.F. by-passes ..	0·00015
C18	I.F. by-passes ..	0·00015
C19	V3 A.V.C. diode coupling ..	0·00005
C20	Parts of fixed tone correction filter	0·002
C21	Parts of fixed tone correction filter	0·05
C22*	V3 cathode by-pass	25·0
C23*	H.T. smoothing ..	8·0
C24*	H.T. smoothing ..	4·0
C25*	H.T. smoothing ..	8·0
C26	Mains R.F. by-pass	0·002
C27‡	Aerial circ. I.F. filter tuning	—
C28‡	Image filter tuning	—
C29†	Aerial circuit tuning	—
C30‡	Aerial circuit M.W. trimmer	—
C31†	Oscillator circuit tuning ..	—
C32‡	Oscillator circuit S.W. trimmer	—
C33‡	Oscillator circuit M.W. trimmer	—
C34‡	Oscillator circuit L.W. trimmer	—
C35‡	Oscillator circuit M.W. tracker	—
C36‡	Oscillator circuit L.W. tracker	—
C37‡	1st I.F. trans. pri. tuning ..	—
C38‡	1st I.F. trans. sec. tuning ..	—
C39‡	2nd I.F. trans. pri. tuning ..	—
C40‡	2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Ferranti 1137 and 837 3-band A.C. superhets. The only differences are in the cabinet, and the fact that the 1137 has a Magnascopic tuning scale. The 837, therefore, has only two of the three scale lamps shown.



Plan view of the chassis. **C3** is formed of twisted wires. The I.F. transformer **L17 L18** is unscreened.

	RESISTANCES	Values (ohms)
R1	V1 tetrode C.G. decoupling ..	1,000,000
R2	V1 fixed G.B. resistance ..	200
R3	V1 osc. C.G. resistance ..	50,000
R4	V1 osc. anode decoupling ..	10,000
R5	V1, V2 S.G.'s H.T. feed resistance	25,000
R6	V2 fixed G.B. resistance ..	300
R7	I.F. stopper	100,000
R8	Manual volume control ..	1,000,000
R9	V3 signal diode load	500,000
R10	} V3 G.B. and A.V.C. delay {	140
R11	} voltage resistances ..	600
R12	Part tone correction filter ..	10,000
R13	V3 anode circuit stabiliser ..	140
R14	} V3 A.V.C. diode load resis- {	4,000,000
R15	} tances	1,000,000
R16	V1 osc. anode and V1, V2 S.G.'s H.T. feed	10,000

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial circuit I.F. filter coil ..	21·0
L2	Image filter coil	5·75
L3	Aerial S.W. coupling coil ..	1·25
L4	Aerial M.W. coupling coil ..	22·0
L5	Aerial L.W. coupling coil ..	60·0
L6	Aerial circuit S.W. tuning coil	Very low
L7	Aerial circuit M.W. tuning coil	2·25
L8	Aerial circuit L.W. tuning coil	11·0
L9	Oscillator circuit S.W. tuning coil	0·05
L10	Oscillator circuit M.W. tuning coil	5·0
L11	Oscillator circuit L.W. tuning coil	8·5
L12	Oscillator anode S.W. reaction	0·5
L13	Oscillator anode M.W. reaction }	
L14	Oscillator anode L.W. reaction }	4·0
L15	} 1st I.F. trans. { Pri. ..	9·0
L16	Sec. ..	12·0
L17	} 2nd I..F trans. { Pri. ..	12·0
L18	Sec. ..	9·0
L19	Speaker speech coil	4·0
L20	Hum neutralising coil	0·25
L21	Speaker field coil	2,000·0
T1	Speaker input trans. { Pri. ..	200·0
	Sec. ..	0·3
T2	Mains trans. { Pri. total ..	33·0
	Heater sec. ..	0·1
	Rect. heat. sec. ..	0·15
	H.T. sec. total ..	350·0
S1-S10	Waveband switches	—
S11	Mains switch, ganged R8 ..	—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three control knobs (pull off) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. Now free the speaker leads from the rubber band holding them to the mains transformer, when the chassis can be withdrawn to the extent of these leads, which should be sufficient for normal purposes.

When replacing, note that the knob with the red, green and white dots goes on the right-hand spindle.

To free the chassis entirely, unsolder the speaker leads and *when replacing* connect them as follows, numbering the tags from left to right: 1, blue; 2, green; 3, red; 4, black.

Removing Speaker.—Should it be necessary to remove the speaker from the cabinet, remove the nuts and spring washers from the four bolts holding it to the sub-baffle and *when replacing*, see that the transformer is at the top.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, with the receiver adjusted for 200-240 V. The set was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VHT4*	260	2·3	90	3·3
V2 VPT4	260	5·5	90	2·7
V3 PT4D	250	31·0	260	6·3
V4 R4	335†	—	—	—

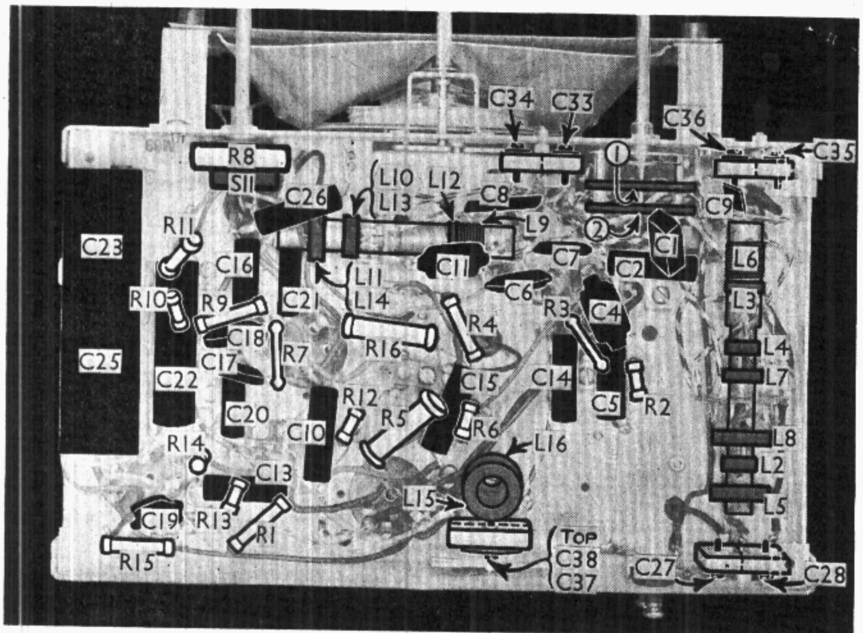
* Oscillator anode (G2) 170 V, 6·0 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S10** are the waveband switches, ganged in two rotary units beneath the chassis, which are indicated in our under-chassis view, and shown in detail in the diagram on page VIII.

The table on page VIII gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

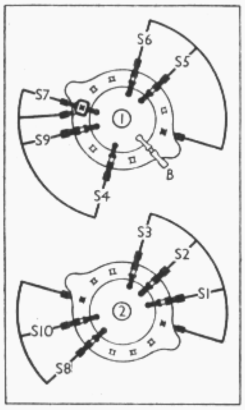
Continued overleaf



Under-chassis view. The coils are individually identified. There are two switch units, shown in detail on page VIII.

FERRANTI 1137—*Continued*

Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	—	—	C
S5	C	—	—
S6	C	C	—
S7	C	—	—
S8	C	C	—
S9	C	C	—
S10	C	—	—



Switch diagrams, looking from the rear of the underside of the chassis.

S11 is the Q.M.B. mains switch, ganged with the volume control **R8**.

Coils.—All the coils, including those of the I.F. transformers are unscreened. **L1,** and the second I.F. transformer **L17, L18,** are on the chassis deck.

L2-L8 and **L9-L14** are on two long tubular formers beneath the chassis, while the first I.F. transformer, **L15, L16** is also beneath the chassis. All these coils are indicated in our under-chassis view.

Scale Lamps.—The two ordinary scale lamps are Ever Ready M.E.S. types rated at 6·2 V, 0·3 A. In the 1137 they are clear, and in the 837 they are sprayed white.

The 1137 also uses an extra bulb in the Magnascopic dial. This is a special Ever Ready M.E.S. type, with a tubular bulb, rated at 6·2 V, 0·3 A.

External Speaker.—Two terminals are provided on the internal speaker for a low resistance (about 4 O) external speaker, such as the Ferranti M7.

Condensers C12, C24.—These are two 4 μF dry electrolytics in a single carton on the chassis deck, having a common negative (black) lead. The red lead to the junction of **R4** and **L14** is the positive of **C12**, while the red lead to the junction of **R4, R5** and **R16** is the positive of **C24.**

Condensers C23, C25.—These are two 8 μF dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The red lead to **V4** valve-holder is the positive of **C23**, and the red lead to **V3** valve-holder the positive of **C25**.

Condenser C3.—This consists of an insulated wire from **C31** twisted round the lead from **C29** to the top cap of **V1,** and taped up.

Voltage Adjustment.—Two tags on the right-hand side of **T2** are provided for this. The red lead from the mains cord should be soldered to the upper tag for 200/240 V mains, and to the lower tag for 240/270 V mains.

Trimmers.—All the trimmers are adjustable either from the front or the back of the chassis.

Chassis Divergencies.—**C26** in the makers' diagram is connected to the **T2** side of **S11**, while **R16** goes to the same side of **V4** filament as the bottom of **L21.** We show the connections as in our chassis.

C1 in some chassis may be located between the side of the chassis and the coils **L2, L5, L8,** and not near the second switch unit, as in our under-chassis view.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator between the grid (top cap) of **V1** and the frame of the gang condenser. Switch the set on, and turn volume control to maximum. Feed in a 450 KC/S signal, and adjust **C40, C39, C38** and **C37** in that order for maximum output.

R.F. and Oscillator Stages.—**S.W.**—Connect signal generator via a S.W. dummy aerial to **A** and **E** terminals. Switch set to S.W., feed in an 18 MC/S (16·7 m.) signal, turn gang to minimum, and adjust **C32** for maximum output. The correct peak is that produced with the lower trimmer capacity.

M.W.—Use a standard dummy aerial. Switch set to M.W., and keeping gang at minimum, feed in a 200 m. signal and adjust **C33** for maximum output, choosing the peak requiring the lower capacity.

Tune to 228 m. on scale, inject a 228 m. signal, and adjust **C30** for maximum output.

Tune to 500 m. on scale, inject a 500 m. signal, and adjust **C35** for maximum output, rocking the gang slightly for optimum results. Repeat the M.W. adjustments.

L.W.—Switch set to L.W., feed in a 1,128 m. signal, tune to 1,128 m. on the scale, and adjust **C34** for maximum output, rocking the gang for optimum results. Feed in an 1,818 m. signal, tune to 1,818 m. on scale, and adjust **C36** for maximum output, again rocking the gang. Any adjustment of **C34** affects **C36** and vice versa, so continue adjusting these alternately until no further improvement in output is obtained.

Image Filter.—Keep set switched to L.W., feed in a 261 m. signal, tune in the image at about 1,200 m. and adjust **C28** for *minimum* output.

I.F. Filter.—Feed in a 450 KC/S signal, switch set to M.W., and turn gang to maximum. Adjust **C27** for *minimum* output.

MAINTENANCE PROBLEMS

Transformer Breakdowns—A Reply

M. BRITTAIN (July 31, *Trader*) criticises my contention that recent crops of transformer breakdown are due to humid climate, and hastens to claim that it is due to acid fumes.

Perhaps he will agree that the presence of acid fumes cannot be the cause of the trouble when the L.T. accumulator is kept well away from the set (as it was in the case referred to in my contribution of July 3). Also, I have had several extension speakers where the output transformers have broken down in recent months. These are out of range of any acid fumes whatever. When sent to the makers and impregnated with paraffin wax, they stand up to work without further trouble.

This spring (which was exceptionally damp) I had several output transformers in mains sets which broke down ; this ,too, would exclude the acid fume theory. A reliable repair should be the aim of servicemen, and the best treatment I have so far met to guard against damp is an immersion of the windings in liquid paraffin wax, which in every case has stood the test of time.—W. O. MAY, EUGLE.

—And a New Query

I AM prompted by your correspondents M. Brittain and R. Bell, who are of opposite opinions on the transformer problem, to set a further teaser regarding corrosion.

I have noticed for a good many years and in widely varying localities that the grid sockets in the valveholders of Pye Q receivers are nearly always corroded, while all the other sockets are free from any deposit whatsoever.

On several occasions I have reached the verge of insanity in attempting to prove the various theories I have on the phenomenon. Is it due to the process of manufacture ? Is it due to chemical reaction of acid fumes ? (If so, why do not all the sockets corrode ?) Can anybody suggest a cause ? In any case I would be pleased to hear from any engineer who can show me a dozen Pye Q models without corroded rims on the grid sockets.

Mr. Brittain's contention regarding transformer failure could be verified, or disproved, if a few of us collect details of sets with this trouble over a few months. It should be ascertained whether the set is used with the accumulator inside or outside the cabinet.

I would dare to launch the opinion that the grid corrosion and transformer trouble are closely allied.

* * *

I would like to add a tip which I have proved to be without fail, time and again. The Marconi 262, and many other models of this make, with similar 4-position switches, develop trouble in this component.

A sure and certain cure is to tilt inwards the outer rows of contacts by slacking off the strip retaining screws and inserting small pieces of flat celluloid (about $\frac{1}{32}$ in. thick) between the outer contact strips and their metal supports. On re-tightening the screws the outer contacts will be held closer in to the inner contacts and in any position the switch will be positive.

This stunt saves no end of time, and is safer and more lasting than bending in each of the outer contacts separately with a switch tool.—H. G. REDDIN, HEREFORD.

Printed in Great Britain as a supplement to *The Wireless & Electrical Trader* for the proprietors and publishers, *The Trader Publishing Co., Ltd.,* Dorset House, Stamford Street, London, S.E.1, by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9. Every Saturday.