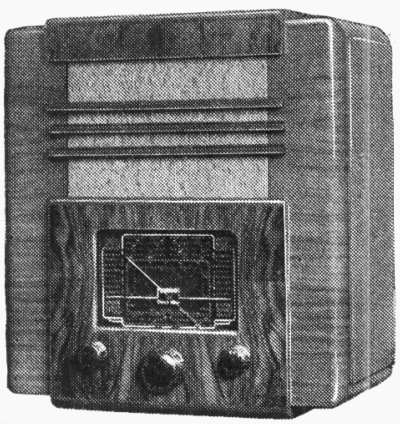
Supplement to The Wireless & Electrical Trader, April 22, 1939

"TRADER" SERVICE SHEET

398

FERRANTI 49B AND 48B SUPERHETS



The Ferranti 49B battery superhet. The 48B has the same chassis, but the cabinet is a moulded one.

BOTH the Ferranti 49B and the 48B use identical chassis, but the 49B has a walnut cabinet, and the 48B a moulded cabinet. The 49B has a single speed tuning control, and the 48B a 2-speed control.

Both receivers are 3-band battery models, the SW range covering 19-51 m. The circuit is that of a simple superhet, with an FC2A frequency changer, a VP2 IF amplifier, a TDD2A double diode triode, and a KT2 beam tetrode output valve.

Release date for both models, September, 1938.

CIRCUIT DESCRIPTION

Aerial input on MW and LW is via coupling coils **L1, L2** and condenser **C1** to mixed coupled band-pass filter. Primary coils **L3, L4** are tuned by **C19**; secondaries **L8, L9** by **C23.** Coupling by **L6** (MW), tapping on **L9** (LW) and **C2.** On SW, input in via coupling coil **L5** to single tuned circuit **L7, C23.**

First valve (**V1, Mullard metallised FC2A**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L10** (SW), **L11** (MW) and **L12** (LW) are tuned by **C24**; parallel trimming by **C25** (SW), **C26** (MW) and **C6, C27** (LW); series tracking by **C5, C29** (MW) and **C4, C28** (LW). Reaction by coils **L13** (SW), **L14** (MW) and **L15** (LW).

Second valve (**V2, Mullard metallised VP2**) is a variable RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C30, L16, L17, C31** and **C32, L18, L19, C33.**

Intermediate frequency 125 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mullard metallised TDD2A**). Audio frequency component in rectified output is developed across load resistance **R7** and passed via AF coupling condenser **C14** and manual volume control **R8** to CG of triode section, which operates as AF amplifier. IF filtering by **C11, R6, C12.** Provision for connection of a gramophone pick-up by terminals across **R8**; radio is then muted by disconnecting from the top terminal the flying link **X** joining **C14** to **R8.**

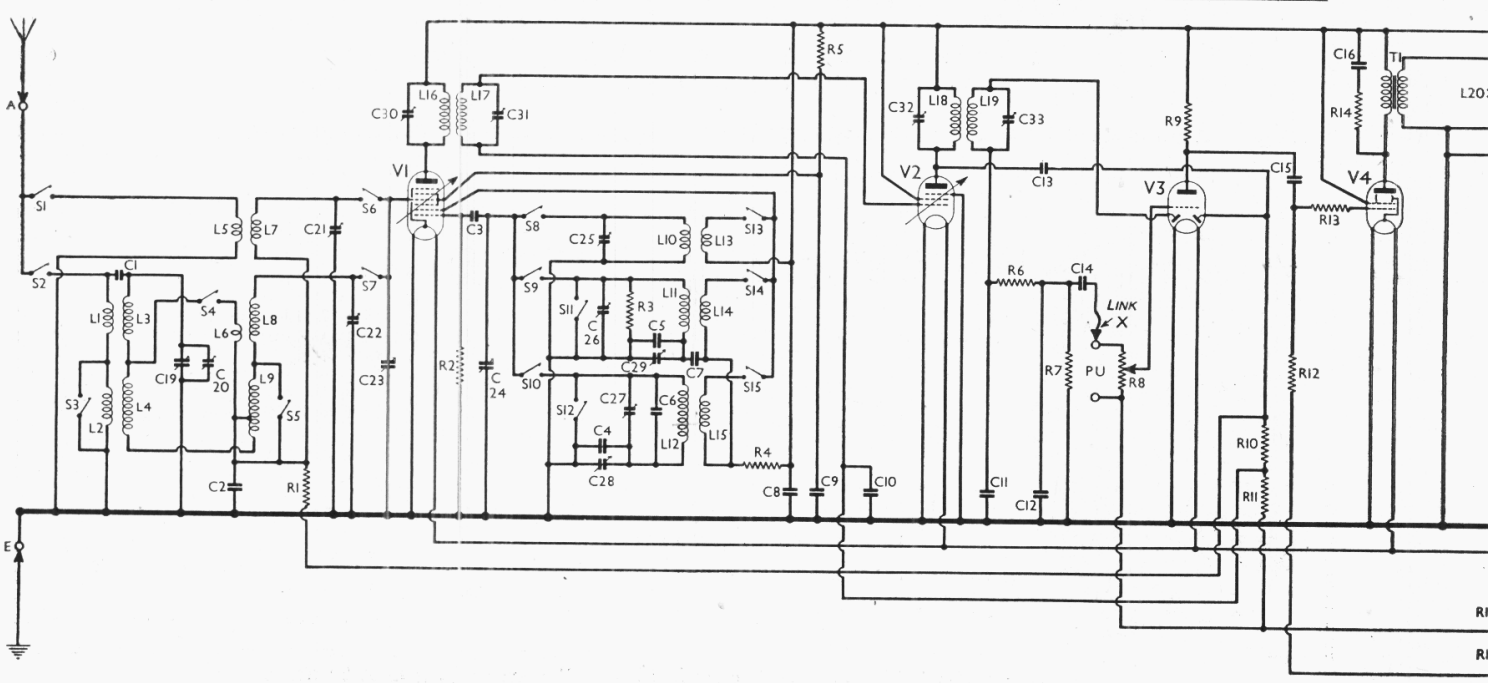
Second diode of **V3,** fed from **V2** anode via **C13,** provides DC potentials which are developed across load resistances **R10** and **R11** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

Resistance-capacity coupling by **R9, C15** and **R12,** via stopper resistance **R13,** between **V3** triode and beam tetrode output valve (**V4, Osram KT2**). Fixed tone correction by filter **C16, R14** in anode circuit.

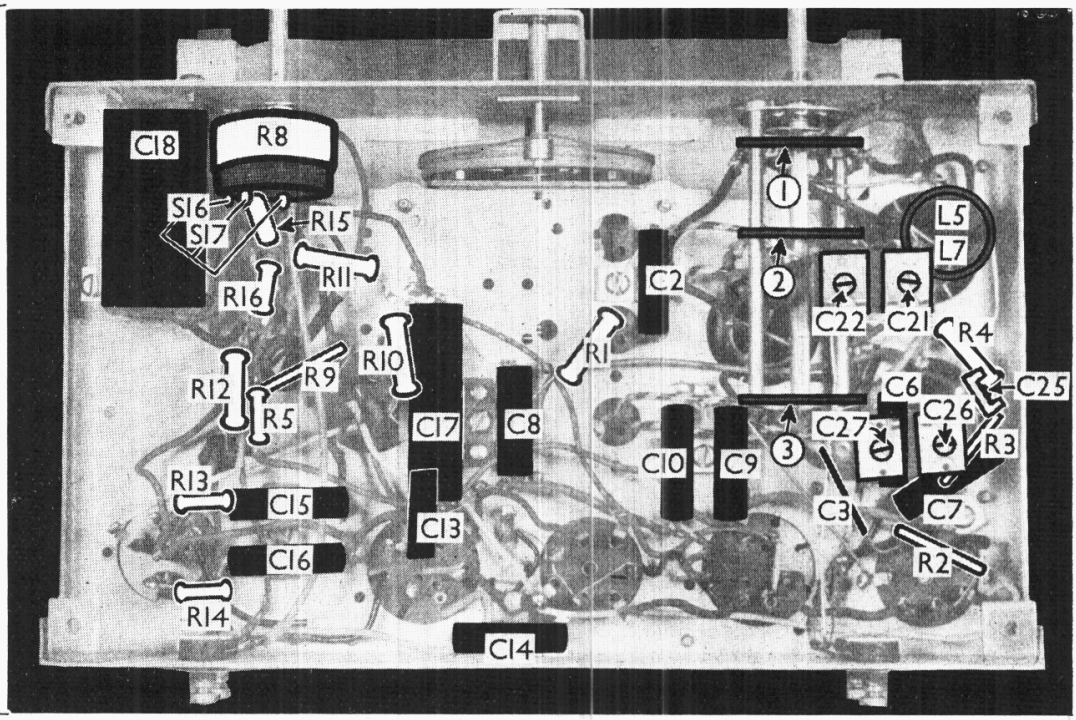
Fixed GB for **V1** and **V2,** AVC delay and GB for V3 triode and V4 are obtained automatically from drop along resistances **R15** and **R16,** which form a potential divider in the negative HT lead to chassis.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 pentode CG decoupling ..	1,000,000
R2	V1 osc. CG resistance ..	50,000
R3	Osc. circuit MW damping ..	40,000
R4	Oscillator MW and LW reaction damping	30,000
R5	V1 SG HT feed resistance ..	100,000
R6	IF stopper	100,000
R7	V3 signal diode load	1,000,000
R8	Manual volume control ..	1,000,000
R9	V3 triode anode load	50,000
R10	V3 AVC diode load resistances	1,000,000
R11		1,000,000
R12	V4 CG resistance	1,000,000
R13	V4 CG stopper	100,000
R14	Part of fixed tone corrector ..	25,000
R15	Auto GB and AVC delay resistances	140
R16		250



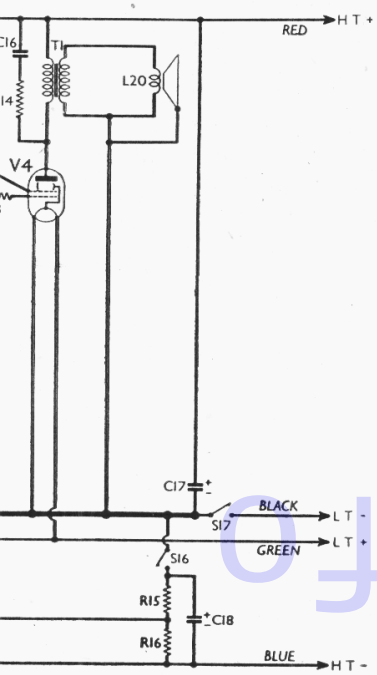
Under-chassis view. **S16, S17** are the battery circuit switches. Diagrams of the three wave-change switch units are in col. 3 overleaf. Note the five trimmers situated at the right-hand end of the chassis.



CONDENSERS		Values (μF)
C1	Aerial MW coupling	0·00002
C2	Band-pass coupling	0·05
C3	V1 osc. CG condenser	0·00006
C4	Osc. circ. LW fixed tracker	0·0005
C5	Osc. circ. MW fixed tracker	0·0037
C6	Osc. cir. LW fixed trimmer	0·00003
C7	Oscillator MW coupling	0·01
C8	HT circuit RF by-pass	0·1
C9	V1 SG decoupling	0·1
C10	V2 CG decoupling	0·05
C11, C12	RF by-pass condensers	0·0001, 0·00015
C13	Coupling to V3 AVC diode	0·00006
C14	AF coupling to V3 triode	0·02

CONDENSERS (*Continued*)		Values (μF)
C15	V3 triode to V4 AF coupling	0·01
C16	Part of fixed tone corrector	0·002
C17*	HT reservoir condenser	2·0
C18*	Auto GB by-pass	200·0
C19†	Band-pass pri. tuning	0·0005
C20‡	Band-pass pri. MW trimmer	—
C21‡	Aerial circ. SW trimmer	—
C22‡	Band-pass sec. MW trimmer	—
C23†	Aerial SW and band-pass sec. tuning	0·0005
C24†	Oscillator circuit tuning	0·0005
C25‡	Osc. circuit SW trimmer	—
C26‡	Osc. circuit MW trimmer	—
C27‡	Osc. circuit LW trimmer	—
C28‡	Osc. circuit LW tracker	0·0002
C29‡	Osc. circuit MW tracker	0·0002
C30‡	1st IF trans. pri. tuning	—
C31‡	1st IF trans. sec. tuning	—
C32‡	2nd IF trans. pri. tuning	—
C33‡	2nd IF trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Ferranti 49B and 48B battery 3-band superhets. The link **X**, normally connected as shown, mutes radio when disconnected for pick-up reproduction.

OTHER COMPONENTS		Approx. Values (ohms)
L1, L2	Aerial MW and LW coupling coils	18·0
L3, L4	Band-pass primary coils	70·0, 4·5, 45·0
L5	Aerial SW coupling coil	1·3
L6	Band-pass MW coupling	0·2
L7	Aerial SW tuning coil	0·05
L8, L9	Band-pass secondary coils (total)	4·5, 40·0
L10	Osc. circuit SW tuning coil	0·05
L11	Osc. circuit MW tuning coil	8·5
L12	Osc. circuit LW tuning coil	17·5
L13	Oscillator SW reaction	0·8
L14	Oscillator MW reaction	7·2
L15	Oscillator LW reaction	6·0
L16	1st IF trans. Pri.	80·0
L17	1st IF trans. Sec.	80·0
L18	2nd IF trans. Pri.	80·0
L19	2nd IF trans. Sec.	80·0
L20	Speaker speech coil	1·5
T1	Speaker input trans. Pri.	620·0
	Speaker input trans. Sec.	0·17
S1-S15	Waveband switches	—
S16	HT circuit switch ganged	—
S17	LT circuit switch R8	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three control knobs (pull-off), the battery shelf (two countersunk head wood screws) and the four bolts (with washers) holding the chassis to the bottom of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes. To free the chassis entirely, unsolder the three leads from the speaker, and *when replacing*, connect them as follows, numbering from left to right: 1, black; 2, green; 3, red.

Removing Speaker.—If it should be necessary to remove the speaker from the cabinet, unsolder the leads connecting it to the chassis, and remove the four bolts with washers holding it to the sub-baffle. *When replacing*, see that the transformer is at the top and connect the leads as described above.

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC2A	116 (Oscillator 60)	0·1 (1·75)	30·0	1·0
V2 VP2	116	0·9	116	1·1
V3 TDD2A	77	0·6	—	—
V4 KT2	112	4·5	116	1·0

Valve voltages and currents given in the table above are those measured in our receiver when it was operating with a new HT battery reading 120 V on load. The receiver was tuned to the lowest wavelength on the medium band and the

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volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

If, as in our case **V1** should become unstable when its screen current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0·1 μF from grid (top cap) to chassis.

GENERAL NOTES

Switches.—**S1-S15** are the waveband switches, ganged in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3. The table (col. 2.) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C**, closed.

S16, S17 are the QMB HT and LT circuit switches in a unit ganged with the volume control **R8.** The tags of these switches are indicated in our under-chassis view.

Coils.—**L1-L4**; **L6, L8, L9**; **L10-L15** and the IF transformers **L16, L17** and **L18, L19** are in five screened units on the chassis deck. Two of these contain certain additional components, besides the associated pre-set condensers. **L5, L7** are in a single unscreened unit beneath the chassis, indicated in our under-chassis view. **L7** is the thick wire winding.

External Speaker.—No provision is made for this, but a low impedance (2 Ω) type could be connected across the two tags on the internal speaker terminal panel to which the speech coil leads are connected.

Link X.—It will be noted that a link marked **X** joins one end of **C14** to one pick-up terminal and to the top of the volume control **R8.** This link must always be in position for radio reception, but is disconnected when a pick-up is in use, to mute radio. The position of the link is indicated in our plan chassis view.

Trimmer C20.—Note that this is the only trimmer on the gang assembly, and is associated with **C19.**

Batteries.—Recommended types are: LT, 2 V 30 AH accumulator cell, Exide CZ3.; HT, 120 V HT battery, Drydex H1006. GB is automatic.

Battery Leads and Voltages.—Black lead, black spade tag, LT negative; green lead, red spade tag, LT positive 2 V; blue lead, black plug, HT negative; red lead, red plug, HT positive 120 V.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of **V1** and chassis. Turn gang to minimum and switch set to LW. Feed in a 125 KC/S signal, and adjust **C30, C31, C32** and **C33** for maximum output. Check these settings, then remove signal generator.

RF and Oscillator Stages.—With gang at minimum, pointer should cover the 200 m mark on the scale. Connect signal generator to **A** and **E** terminals via a suitable dummy aerial.

MW.—Switch set to MW, and turn gang to minimum (200 m). Feed in 200 m (1,500 KC/S) signal, and adjust **C26** for maximum output on the correct signal. If several signals are noticed, reduce generator output until there are only two, and adjust **C26** for maximum output on the peak requiring the lesser trimmer capacity.

Feed in a 230 m (1,300 KC/S) signal, tune it in, and adjust **C22,** then **C20** (on gang) for maximum output.

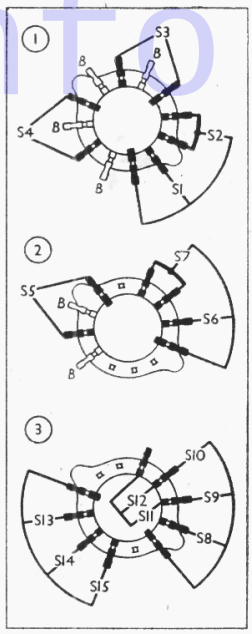
Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C29** for maximum output, while rocking the gang for optimum results. Re-check the settings of **C26, C22** and **C20.**

LW.—Switch set to **LW**, and tune to 1,100 m on scale. Feed in a 1,100 m (272 KC/S) signal, and adjust **C27** for maximum output. Feed in an 1,800 m (166·5 KC/S) signal, tune it in, and adjust **C28** for maximum output, while rocking the gang for optimum results. Re-check the setting of **C27.**

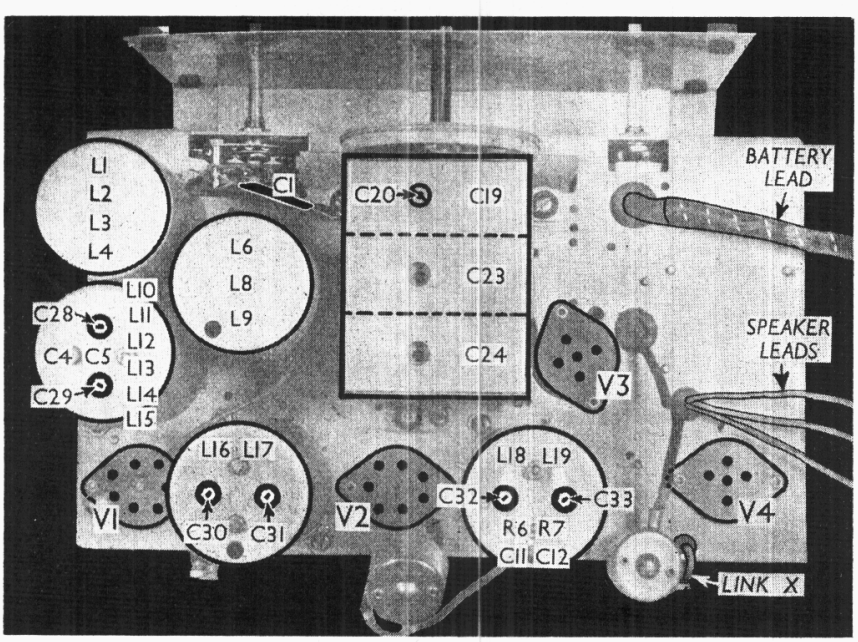
SW.—Switch set to SW, and tune to 20 m on scale. Feed in a 20 m (15 MC/S) signal, and adjust **C25** for maximum output on the peak involving the lesser trimmer capacity. Then adjust **C21** for maximum output.

TABLE AND DIAGRAMS OF SWITCH UNITS

Switch	SW	MW	LW
S1	C	—	—
S2	—	C	C
S3	—	C	—
S4	—	C	—
S5	—	C	—
S6	C	—	—
S7	—	C	C
S8	C	—	—
S9	—	C	—
S10	—	—	C
S11	C	—	—
S12	C	C	—
S13	C	—	—
S14	—	C	—
S15	—	—	C



Diagrams of the three wavechange switch units, as seen looking from the rear of the underside of the chassis.



Plan view of the chassis. Note the link **X**, which should normally be connected to the upper pick-up terminal. The gang condenser is fitted with only one trimmer, **C20,** on the front section.

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