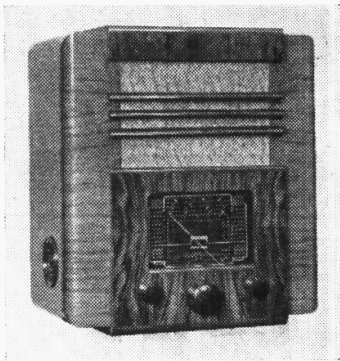


'TRADER' SERVICE SHEET

344

FERRANTI 513AM AND 512AM



The Ferranti 513AM receiver.

SUITABLE for mains of 200-260 V (any periodicity in the case of AC), the Ferranti 513AM is a 4-valve (plus rectifier) AC/DC 3-band superhet covering a short-wave range of 16.7-52 m. An identical chassis is fitted in the 512 AM receiver but this has a moulded cabinet and no tone control.

This *Service Sheet* was prepared on a 513 AM but the differences in the 512 AM are explained at the end of "General Notes."

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L3** (SW), **L4** (MW) and **L5** (LW) to single tuned circuits comprising **L6** (SW),

plus **L7** (MW), plus **L8** (LW), tuned by **C34**. Tuned circuit **L1**, **C32** forms an IF filter across aerial circuit while **L2**, **C33**, across LW aerial input only, is an image filter.

First valve (**V1**, Mullard metallised **FC13C**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L9** (SW), plus **L10** (MW), plus **L11** (LW), are tuned by **C36**; parallel trimming by **C37** (SW), **C38** (MW) and **C9**, **C39** (LW); series tracking by **C8** (SW), **C40** (MW) and **C10**, **C41** (LW). Reaction by coils **L12** (SW), **L13** (MW) and **L14** (LW).

Second valve (**V2**, Mazda metallised **VP1321**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C42**, **L15**, **L16**, **C43** and **C44**, **L17**, **L18**, **C45**.

Intermediate frequency 450KC/S.

Diode second detector is part of double diode triode valve (**V3**, Mullard metallised **TDD13C**). Audio frequency component in rectified output is developed across load resistance **R10** and passed via AF coupling condenser **C16** and manual volume control **R9** to CG of triode section, which operates as AF amplifier. IF filtering by **C17**, **C18**, **C20** and **R8**. Variable tone control by **C22**, **R15** in anode circuit.

Second diode of **V3**, fed from **L18** via **C19**, provides DC potentials which are

developed across load resistance **R14** and fed back through decoupling circuit as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop along **R11** in cathode lead to chassis.

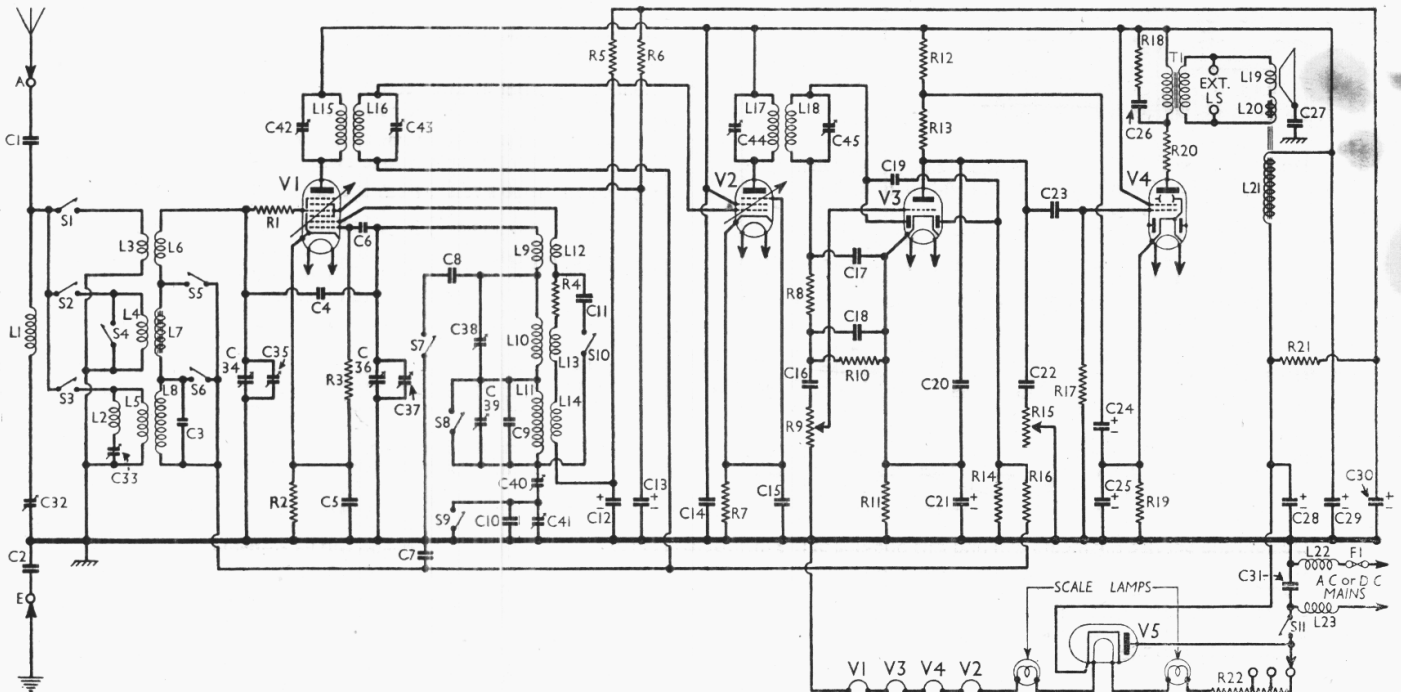
Resistance capacity coupling by **R13**, **C23**, **R17** between **V3** triode and double diode beam tetrode output valve (**V4**, Mazda PenDD4021), the two diodes being unused and their connection pins left blank. Fixed tone correction by RC filter **R18**, **C26** in anode circuit. Provision for connection of low impedance speaker across secondary of internal speaker input transformer **T1**.

When the receiver is used with AC mains, HT current is supplied by half-wave rectifying valve (**V5**, Mazda U4020) which on DC mains behaves as a low resistance. Smoothing is effected by speaker field **L21** and large capacity dry electrolytic condensers **C28**, **C29** and **C30**. HT circuit RF filtering by **C14**.

Valve heaters are connected in series, together with scale lamps and ballast resistance, across mains input. Filter circuit comprising chokes **L22**, **L23** and condenser **C31** suppresses mains-borne interference, while fuse **F1** affords protection to mains input circuit in case of short-circuit.

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet,



Circuit diagram of the Ferranti 513AM AC/DC superhet. The 512AM is similar, the differences being explained on page VIII.

Radio

Continued overleaf

the table (col. 3) are those measured in our receiver when it was operating on AC on the mains resistance. The receiver was tuned to the lowest wavelength on the medium band and the volume control Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating on AC on the mains resistance. The receiver was tuned to the lowest wavelength on the medium band and the volume control

Scale Lamps.—These are two Eveready MES types, rated at 6.2 V, 0.3 A. They are connected in series with the heater supply, one on either side of V5. External Speaker.—Two sockets are provided on the internal speaker for a tubular former beneath the chassis, while the first IF transformer, L15, L16 and L17, are on the chassis deck, as are also the filter chokes L22, L23, L28 and L9-L14 are on two long tubular formers beneath the chassis, L11, and the second IF transformer L17, L18, are on the chassis deck, as are also the filter chokes L22, L23, L28.

Coils.—All the coils, including those with the volume control R9, are unshielded. S11 is the QMB mains switch, ganged with the volume control R9.

S11 is the QMB mains switch, ganged with the volume control R9. dash indicates open, and C closed. starting from fully anti-clockwise. A detail in the diagrams on page VIII.

The table (page VIII) gives the switch positions for the three control settings, below the chassis, which are indicated in our under-chassis view, and shown in detail in the diagrams on page VIII.

switches, ganged in two rotary units below the chassis, which are indicated in our under-chassis view, and shown in detail in the diagrams on page VIII.

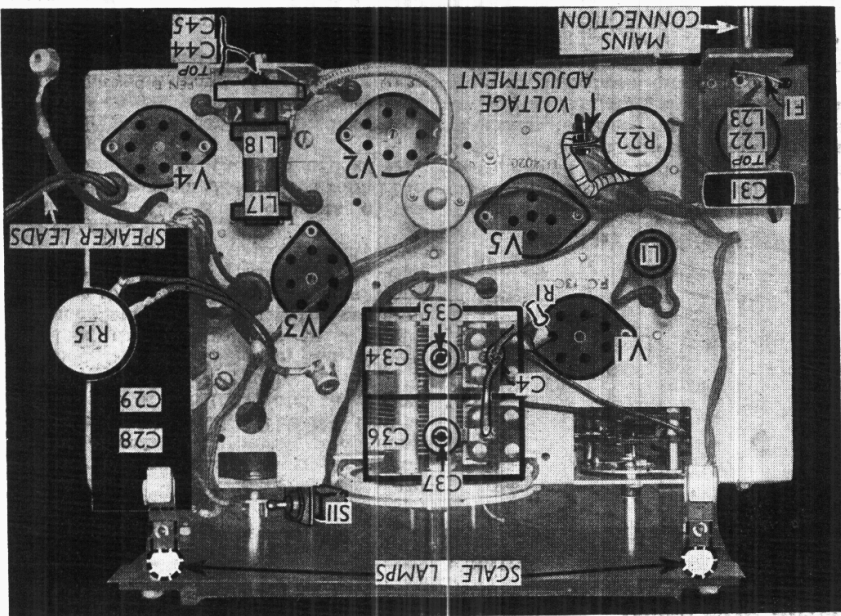
GENERAL NOTES

† Cathode to chassis, 228 V, DC.

Valve	Anode Current (mA)	Anode Voltage (V)	Screen Current (mA)
V1 FC3C	177	177	2.7
V2 VP121	85	2.9	—
V3 TDD3C	82	3.4	0.9
V4 PEnd-1021	155	68.0	177
V5 U1020†	—	—	13.0

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.

Plan view of the chassis. C4 is a small coupling, ganged with the volume control. S11 is



COMPONENTS AND VALUES

remove the three control knobs at the front of the cabinet (recessed grub screws) and the small knob at the side of the cabinet (pull off). Next release the tone control from the escutcheon at the side of the cabinet (nut and lock washer) and remove the four screws (with insulating washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to sufficient for normal purposes. To free the chassis entirely, unsolder the speaker leads and when replacing, connect speaker leads as follows, numbering the tags from bottom to top: 1, blue; 2, green; 3, no connection; 4, red. The black goes to the tag on the speaker frame. Removing Speaker.—Should it be desired to remove the speaker from the cabinet, remove the nuts and spring washers from the four screws holding the speaker to the sub-baffle. When replacing, see that the transformer is on the right and connect the leads as above.

RESISTANCES

Component	Value (ohms)
R1	200
R2	300
R3	50,000
R4	300
R5	20,000
R6	30,000
R7	1,000
R8	1,000
R9	1,000,000
R10	1,000,000
R11	1,000,000
R12	1,000,000
R13	20,000
R14	20,000
R15	1,000,000
R16	1,000,000
R17	250,000
R18	3,500
R19	105
R20	50
R21	10,000
R22	650*

* Tapped at 150 Ω plus 120 Ω plus 380 Ω from mains end.

CONDENSERS

Component	Value (μF)
C1	0.0005
C2	0.0005
C3	0.0005
C4	Very low
C5	0.0005
C6	0.0005
C7	0.0005
C8	0.0005
C9	0.0005
C10	0.002
C11	0.001
C12	0.001
C13	0.001
C14	0.001
C15	0.001
C16	0.001
C17	0.0015
C18	0.00015
C19	0.00015
C20	0.00015
C21	0.0003
C22	0.0003
C23	0.0003
C24	0.0003
C25	0.0003
C26	0.0003
C27	0.0003
C28	0.0003
C29	0.0003
C30	0.0003
C31	0.0003
C32	0.0003
C33	0.0003
C34	0.0003
C35	0.0003
C36	0.0003
C37	0.0003
C38	0.0003
C39	0.0003
C40	0.0003
C41	0.0003
C42	0.0003
C43	0.0003
C44	0.0003
C45	0.0003

VALVE ANALYSIS

Component	Value
L1	21.0
L2	4.0
L3	0.3
L4	23.0
L5	60.0
L6	0.035
L7	2.4
L8	25.0
L9	0.035
L10	0.035
L11	0.035
L12	0.035
L13	0.035
L14	0.035
L15	0.035
L16	0.035
L17	0.035
L18	0.035
L19	0.035
L20	0.035
L21	0.035
L22	0.035
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L25	0.035
L26	0.035
L27	0.035
L28	0.035
L29	0.035
L30	0.035
L31	0.035
L32	0.035
L33	0.035
L34	0.035
L35	0.035
L36	0.035
L37	0.035
L38	0.035
L39	0.035
L40	0.035
L41	0.035
L42	0.035
L43	0.035
L44	0.035
L45	0.035
L46	0.035
L47	0.035
L48	0.035
L49	0.035
L50	0.035
L51	0.035
L52	0.035
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L81	0.035
L82	0.035
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L87	0.035
L88	0.035
L89	0.035
L90	0.035
L91	0.035
L92	0.035
L93	0.035
L94	0.035
L95	0.035
L96	0.035
L97	0.035
L98	0.035
L99	0.035
L100	0.035

Component	Value
C66	0.001
C67	0.001
C68	0.001
C69	0.001
C70	0.001
C71	0.001
C72	0.001
C73	0.001
C74	0.001
C75	0.001
C76	0.001
C77	0.001
C78	0.001
C79	0.001
C80	0.001
C81	0.001
C82	0.001
C83	0.001
C84	0.001
C85	0.001
C86	0.001
C87	0.001
C88	0.001
C89	0.001
C90	0.001
C91	0.001
C92	0.001
C93	0.001
C94	0.001
C95	0.001
C96	0.001
C97	0.001
C98	0.001
C99	0.001
C100	0.001

OTHER COMPONENTS

Component	Value
S11	228 V, DC
R9	Variable
R10	Variable
R11	Variable
R12	Variable
R13	Variable
R14	Variable
R15	Variable
R16	Variable
R17	Variable
R18	Variable
R19	Variable
R20	Variable
R21	Variable
R22	Variable
R23	Variable
R24	Variable
R25	Variable
R26	Variable
R27	Variable
R28	Variable
R29	Variable
R30	Variable
R31	Variable
R32	Variable
R33	Variable
R34	Variable
R35	Variable
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R37	Variable
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R82	Variable
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R84	Variable
R85	Variable
R86	Variable
R87	Variable
R88	Variable
R89	Variable
R90	Variable
R91	Variable
R92	Variable
R93	Variable
R94	Variable
R95	Variable
R96	Variable
R97	Variable
R98	Variable
R99	Variable
R100	Variable

FERRANTI 513 AM—Continued

low resistance (about 2 Ω) external speaker.

Condensers C28, C29.—These are two dry electrolytics in a single carton on the chassis deck, having a common negative (black) lead. The red lead is the positive of **C28** (8 μF) and the yellow the positive of **C29** (24 μF).

Condensers C12, C21, C25, C30.—These are four dry electrolytics in a single carton beneath the chassis, with a common negative (black) lead. The positive leads are: yellow, **C12** (2 μF); red, **C30** (4 μF); green, **C21** (6 μF); and blue, **C25** (50 μF).

Condenser C4.—This consists of an insulated wire from **C36** twisted round the lead from **C34** to the top cap of **V1**, and taped up.

Fuse F1.—This consists of a length of 40 gauge copper wire connected between one of the mains connectors and one side of **L22**. It is indicated in our plan chassis view.

Trimmers.—All the trimmers except **C35** and **C37** are adjustable either from the front or the back of the chassis.

Tone Control.—**R15** is normally fitted to the left hand side of the cabinet, but it is shown removed from this position in our plan chassis view.

Mains Voltage Adjustment.—Tappings are provided on **R22** for this purpose.

Valve V4.—A double-diode pentode is used in this position, but the diode pins are blank.

Model 512 AM Divergencies.—The only differences in this model are that it has a moulded cabinet, and is not fitted with a variable tone control, so that **C22** and **R15** are omitted.

TABLE AND DIAGRAMS OF SWITCH UNITS

SWITCH	SW	MW	LW
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	—	—	C
S5	C	—	—
S6	C	C	—
S7	C	—	—
S8	C	C	—
S9	C	C	—
S10	C	—	—

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator between the grid (top cap) of **V1** via a 0.01 μF condenser and the earth terminal. Switch the set on, and turn volume control to maximum. Feed in a 450 KC/S signal, and adjust **C42, C43, C44** and **C45** in that order for maximum output.

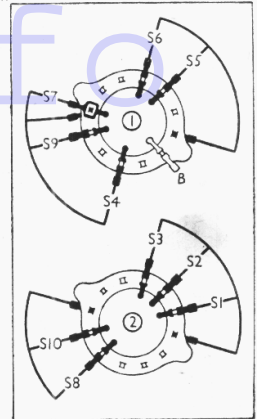
RF and Oscillator Stages.—**SW**—Connect signal generator via a SW dummy aerial to **A** and **E**. Switch set to SW, feed in an 18 MC/S (16.7 m) signal, turn gang to minimum, and adjust **C37** for maximum output. The correct peak is that produced with the lower trimmer capacity.

MW—Use a standard dummy aerial. Switch set to MW and keeping gang at minimum feed in a 200 m (1,500 KC/S) signal and adjust **C38** for maximum output, choosing the peak requiring the lower capacity.

Inject a 228 m (1,316 KC/S) signal, tune it in, and adjust **C35** for maximum output.

Tune to 500 m on scale, inject a 500 m (600 KC/S) signal, and adjust

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



C40 for maximum output, rocking the gang slightly for optimum results. Repeat the MW adjustments.

LW—Switch set to LW, feed in a 1,128 m (266 KC/S) signal, tune to 1,128 m on the scale, and adjust **C39** for maximum output, rocking the gang for optimum results. Feed in an 1,807 m (166 KC/S) signal, tune to 1,807 m on scale, and adjust **C41** for maximum output, again rocking the gang. Any adjustment of **C39** affects **C41** and vice versa, so continue adjusting these alternately until no further improvement in output is obtained.

Image Filter.—Keep set switched to LW, feed in a 261 m (1,149 KC/S) signal, tune in the image at about 1,200 m and adjust **C33** for minimum output.

IF Filter.—Feed in a 450 KC/S signal, switch set to MW and turn gang to maximum. Adjust **C32** for minimum output.

Under-chassis view. Note that most of the trimmers or trackers are reached through holes in the front or back of the chassis. All the coils are unscreened, and most are situated on two long tubular formers.

