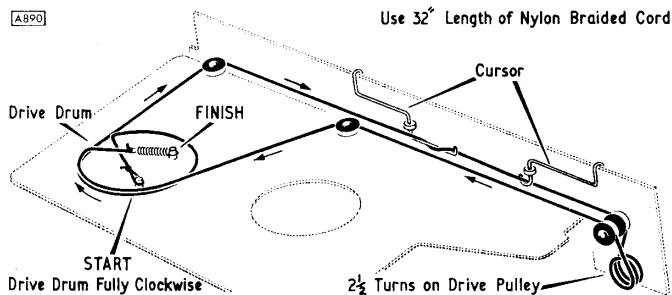


ACCESS FOR SERVICE

Slide open battery cover, then disconnect and take out batteries. Complete access to the printed board may be gained by removing the cabinet back cover which is retained by three countersunk screws in the cabinet base.

For access to the drive cord and the copper side of the printed board, pull off control knobs and unsolder lead on telescopic aerial. Take out five screws and washers securing printed board, then unsolder leads on loudspeaker tag panel. The printed board may then be lifted out without further disconnection.



SERVICING NOTES

To check oscillator operation, use an oscilloscope to measure the peak-to-peak voltage across R10, and compare with the voltage indicated in the Circuit Diagram for a correctly functioning oscillator. An alternative method is to connect a DC voltmeter across R10. If the oscillator is working properly, the voltage should drop slightly when the oscillator section of the tuning gang is short-circuited.

To avoid the risk of short-circuiting resistor R34, in series with the negative supply line, all earthed output connections of test equipment should be suitably isolated from the receiver chassis.

The tuning gang is of special construction and no attempt should be made to clean or repair it. A faulty gang under guarantee should be returned to the nearest Service Depot.

Printed Board Tag Connections

1. To SKT1 'live' contact.
2. To telescopic aerial.
3. To SKT1 'earth' tag.
4. To C17.
5. To L7.
6. To S4A contact 2.
7. To L7.
8. To S4A contact 5.
9. To S4A contact 4.
10. To frame of loudspeaker.
11. To C55.
12. To J1 contact 'c', and C63.
13. To J1 contact 'a'.
14. To C20, C23 and S3a contact 1.
15. To C6 and upper connection of L2.
16. To C6 and lower connection of L2.
17. To C10 and upper connection of L4.
18. To C10 and lower connection of L4.
19. To C31 and S3A contact 4.
20. To C63.

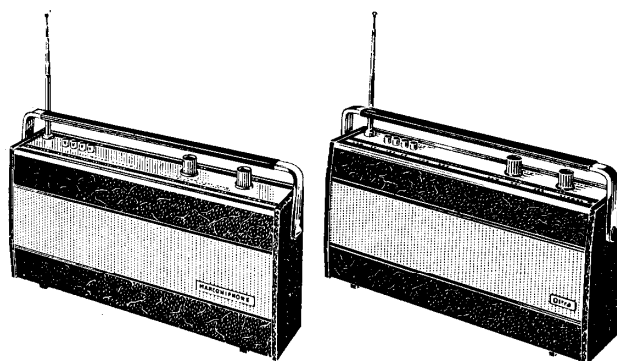
BRC



service manual

Price: One Shilling and Sixpence

MARCONIPHONE 4138 & ULTRA 6142



SPECIFICATION

Batteries: Two 9v. Drydex DT7, Ever Ready PP7, Vidor VT7 or equivalents.

Waveranges:

Medium Wave: 190-566 metres (1579-530 Kc/s)
 Bandsread: 185-216 metres (1621-1389 Kc/s)
 Long Wave: 1120-2025 metres (268-148 Kc/s)
 VHF/FM: 87.7-101 Mc/s

Aerials:

MW and LW: 6 3/8" long x 3/8" dia. ferrite rod.
 VHF: 8-section telescopic aerial.

External Sockets: Car aerial or VHF aerial. Earphone (15Ω minimum) or tape recorder socket.

Loudspeaker: 5" round, 35 ohm impedance, PM moving coil.

Power Output: 600mW.

The manufacturers reserve the right to vary specifications or use alternative materials as may be deemed necessary or desirable at any time.

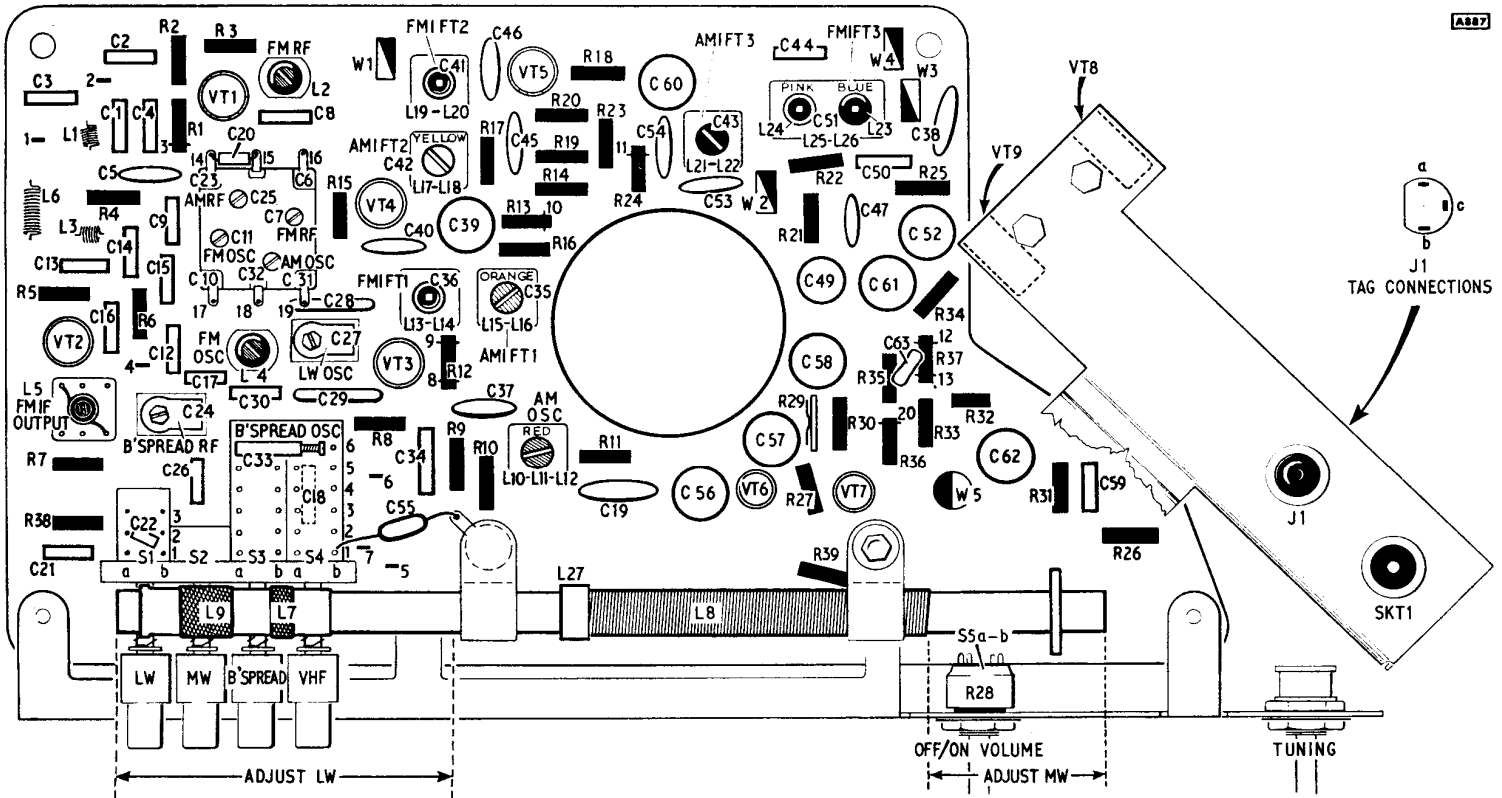
BRITISH RADIO CORPORATION LIMITED

SERVICE DEPOTS

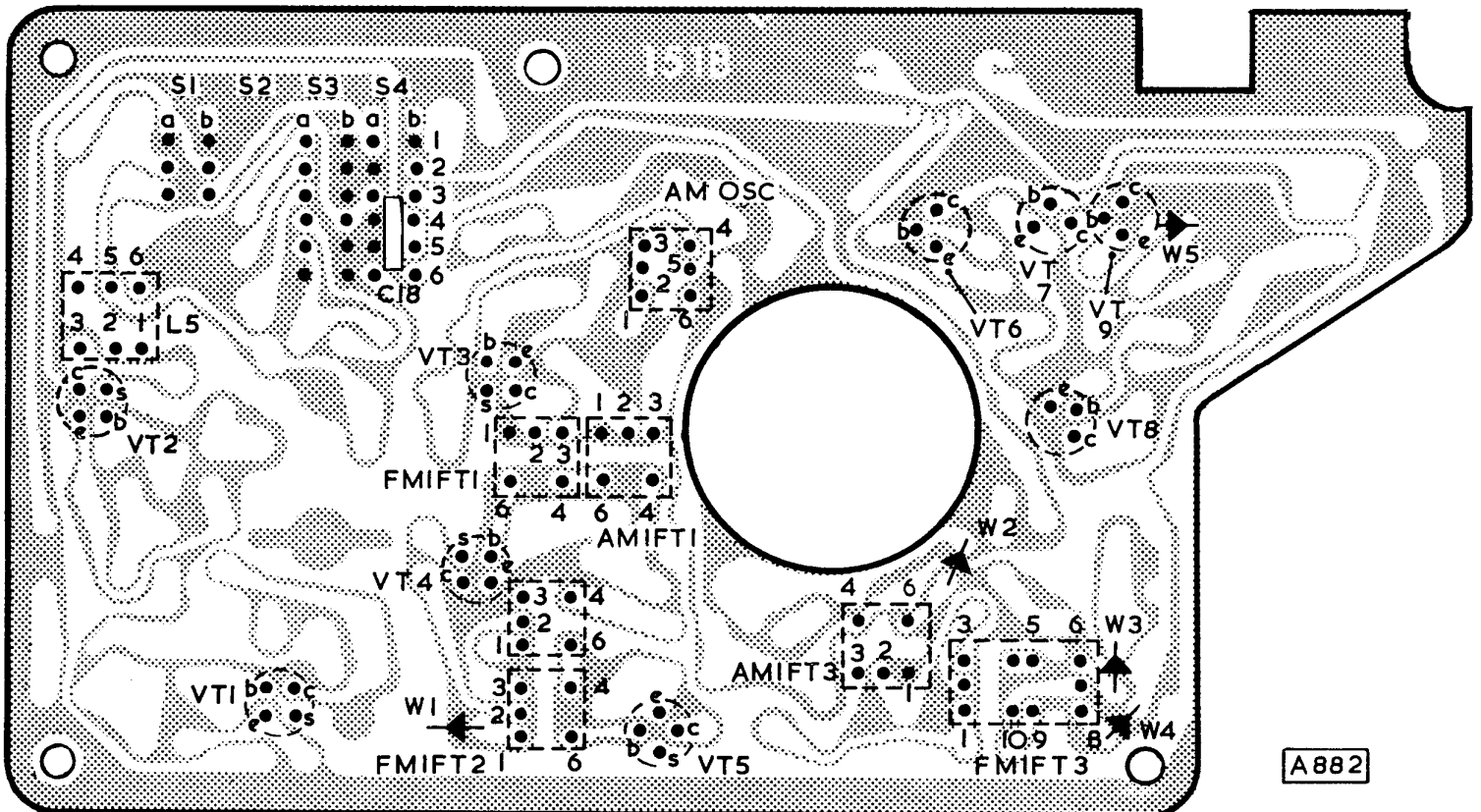
LONDON: Eley's Estate, Angel Road, N.18. Tel. 01-807 3060
 Ansafone Spares Ordering Service: Tel. 01-807 6332

BIRMINGHAM: 24 Sheepcote Street, 15. Tel. Midland 5291

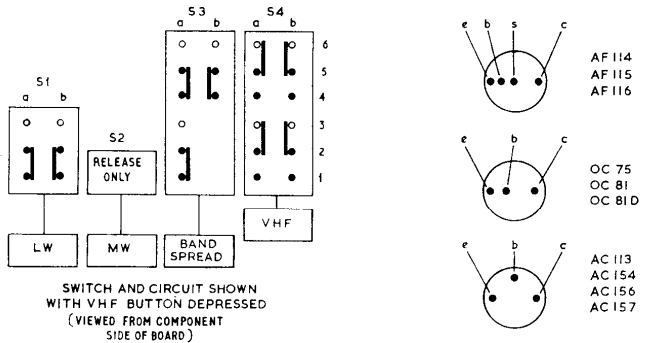
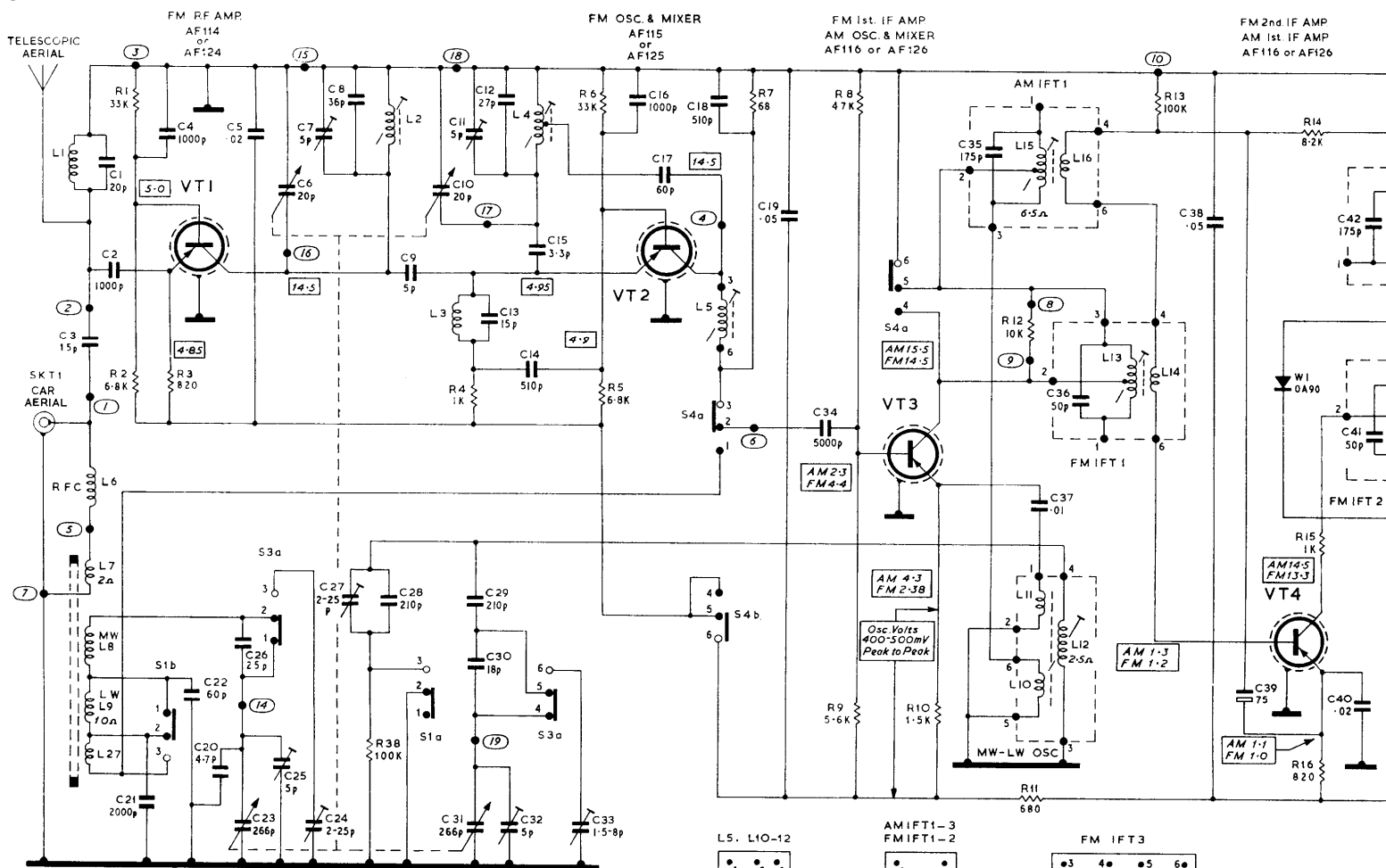
GLASGOW: 160/162 Battlefield Road, S.2. Tel. Langside 9251/2/3/4



Component Location Diagram



Copper Side of Printed Board (showing transistor and coil connections)



CIRCUIT NOTES

FM Operation

The signal is applied via the coupling capacitor C2 from the VHF/FM tuned circuit L1/C1.

The collector of VT2 is loaded by L5 and tuned by C17. C17 also provides coupling into the oscillator tuned circuit (L4, C10, C11 and C12). C15 provides feedback into the emitter and L3 and C14 form a 10.7 Mc/s FM IF rejector with C13 acting as an input phase corrector at oscillator frequencies. The 10.7 Mc/s IF output developed across L5 is fed via S4A, contacts 2 and 3 and C34 to the base of VT3 which operates as an IF amplifier.

AM Operation

Medium and Long wave windings on the ferrite rod aerial are selected by switch S1B and coupled by C34 into the base

of VT3 via S4A, contacts 1 and 2. VT3 operates as an AM oscillator and mixer and VT1 and VT2 are rendered inoperative when S4B disconnects their emitter and bias voltages from the battery positive rail.

Complementary Power Output Stage

PNP and NPN type transistors are used in conjunction with a stabilizing diode to provide a transformerless power output stage giving an audio output of 600 mW.

The audio signal developed across volume control R28 is applied via coupling capacitor C36 to the base of audio amplifier VT6. The amplified signal appearing at the collector of VT6 is directly coupled to the base of driver transistor VT7. The output from VT7 simultaneously drives the bases of both output transistors VT8 and VT9. During positive half-cycles of the signal, NPN transistor (VT9) conducts, resulting in a fall in collector/emitter voltage of VT9. During negative half-cycles of the signal PNP transistor (VT8) conducts, resulting in an increase in

CIRCUIT DIAGRAM. Figures in red are shown against inductors where the

FM 2nd IF AMP
AM 1st IF AMP
AF116 or AF126

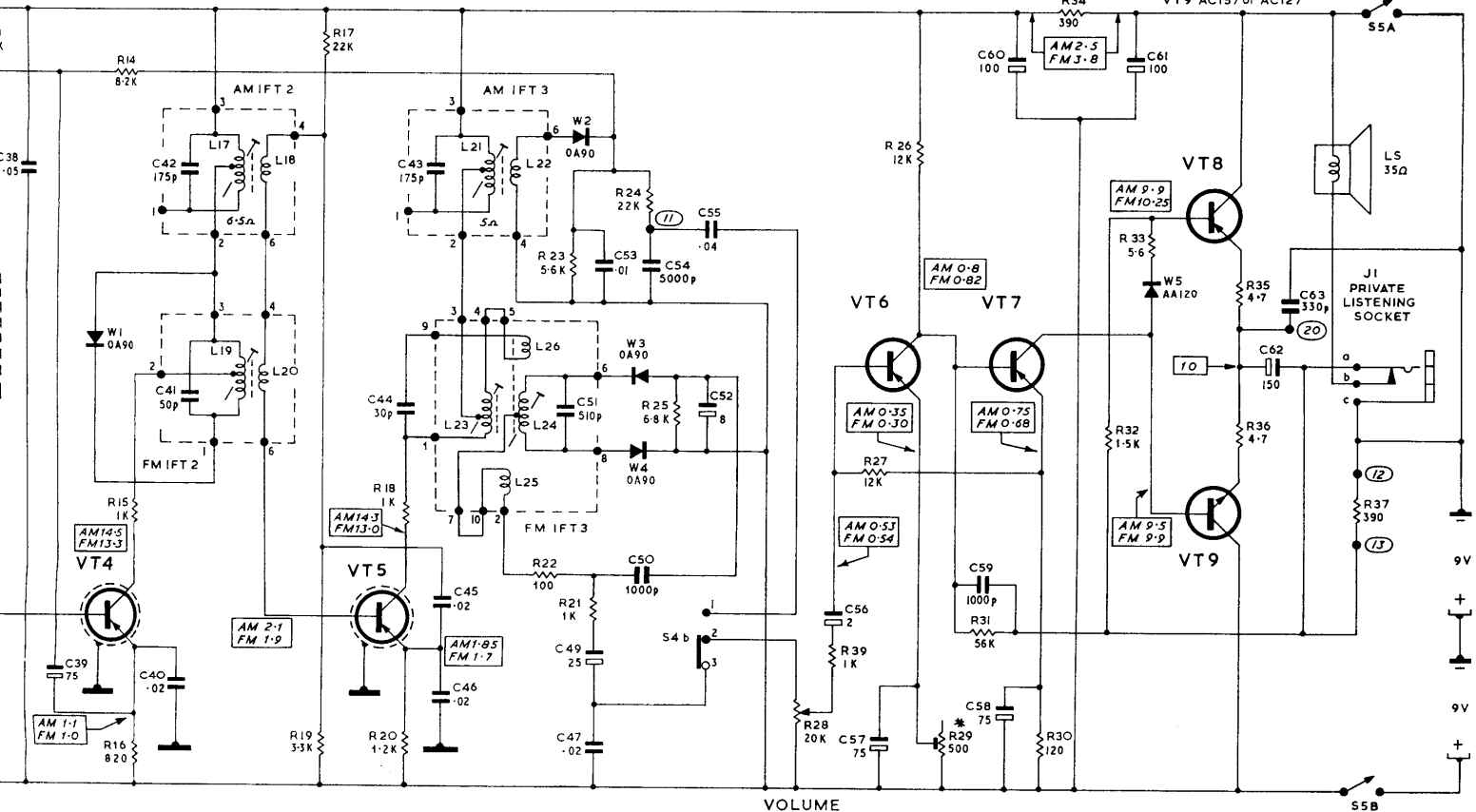
FM 3rd IF AMP
AM 2nd IF AMP
AF116 or AF126

W2 AM DETECTOR
W3 } FM RATIO DETECTOR
W4 }

AUDIO AMP
AC156 or OC75

AUDIO DRIVER
AC113 or OC81D

COMPLEMENTARY POWER OUTPUT
STAGE (PUSH-PULL)
VT8 AC154 or OC81
VT9 AC157 or AC127



NOTE:- ALL VOLTAGES MEASURED WITH A 20000 OHMS/VOLT METER WITH RESPECT TO THE POSITIVE LINE EXCEPT WHERE OTHERWISE STATED. VOLTAGES SHOWN AGAINST VT1-2-3 MEASURED WITH RESPECT TO 54B SIDE OF R11 (680Ω) WITH RECEIVER SWITCH TO FM.

* R29 SHOULD BE ADJUSTED TO GIVE EQUAL CLIPPING OF SINE WAVE WHEN LOOKED AT WITH AN OSCILLOSCOPE.

CURRENT:-
QUIESCENT AM 15 mA
FM 18 mA
50mW OUTPUT 38 mA
500mW OUTPUT 100 mA

GRAM. Figures in rectangles indicate voltages measured with a 20,000 Ω/volt meter. DC resistance readings in bold inductors where these are 0.5Ω or greater. Ringed figures indicate printed board tag connection points.

collector/emitter voltage of VT9. The loudspeaker is fed via C62.

VT7 collector load R32 is returned to the "live" side of the loudspeaker and, as this point is coupled to the emitters of VT8 and VT9 through C62, the input signal to the output stage is virtually applied between base and emitter of both VT8 and VT9.

Diode W5 is biased by VT7 collector current and acts as a variable resistance which is sensitive to voltage and temperature variations. The resistance value of W5 is small compared with R32 and the voltage developed across W5 equals the sum of the nominal output transistor (VT8 and VT9) base/emitter voltages and so determines the correct quiescent operating conditions. During low ambient temperature conditions the resistance of W5 increases thus compensating for falling current of the output transistors. This effect also takes place in the event of falling battery voltage. The diode W5 also assists thermal stability at high temperatures and opposes high current drain from the battery.

Balance Adjustment

Output transistors VT8 and VT9 are series connected across the 18V battery supply and to ensure a balanced supply voltage to each, an adjustment R29 is incorporated in the emitter circuit of VT6. Adjustment of this resistor sets emitter potential and hence collector potential of VT6. It will, therefore, determine the base potential of VT7 which is directly coupled to VT6. This bias decides collector potential of VT7 which in turn controls base voltages of VT8 and VT9. Correct balance is obtained when potential of VT8/VT9 emitter junction is 10V with respect to positive line. The discrepancy from half-battery voltage (9V) is due to the emitter bias voltage developed across R30, which determines the limit of negative signal excursion before bottoming of VT7 takes place.

An alternative method of balancing operating voltages of VT8 and VT9 is by visual observation on an oscilloscope of output waveform at maximum output, when adjustment should be made for symmetry of both waveform and clipping at high outputs.

ALIGNMENT DATA

Connect a 35 ohm output meter in place of loudspeaker, or a 20,000 ohm/volt meter set to a suitable AC range, across the internal loudspeaker terminals. With volume control set to maximum, maintain audio output at 50mW throughout alignment, except where otherwise stated.

AM ADJUSTMENTS

IF Circuits

Select MW. Inject 475 Kc/s 30 per cent amplitude modulated signal, via 0.1 μ F capacitor, across C23 (tags 14 and 15) the aerial section of the tuning gang.

Tune L21/L22, L17/L18 and L15/L16 for maximum output. Repeat until no further improvement results.

RF Circuits

Check that tuning gang is fully closed and that cursor travel is central in scale window, i.e. the gap between cursor and edge of window is equal at both ends.

MW must be aligned first. Inject AM signals (30% amplitude modulated) via a loop loosely coupled to the ferrite rod aerial. Set cursor to 500 metres (600 Kc/s), inject 600 Kc/s signal and tune L12 and L8 (slide ring along ferrite rod) for maximum output.

Set cursor to 200 metres (1500 Kc/s), inject 1500 Kc/s signal and adjust C32 and C25 for maximum output. Repeat as necessary to obtain correct calibration and maximum output.

Select LW. Set cursor to 1500 metres (200 Kc/s), inject 200 Kc/s signal and adjust C27 and L9 (slide coil along ferrite rod) for maximum output.

Luxembourg Bandsread. Switch to "Bandsread" and set cursor at 200 metres. Inject, via loop, 1500 Kc/s signal and adjust C33 and C24 for maximum output.

Note: Always check Bandsread aerial trimmer (C24) after altering C25 or the tuning ring to L8. Also after reboxing, check that Luxembourg is receivable on Bandsread push-button range: if not readjust MW oscillator trimmer C32.

VHF/FM ADJUSTMENTS

IF Circuits

Select FM. Inject 10.7 Mc/s (25 Kc/s deviation) via 0.1 μ F blocking capacitor to tag 6 on the printed circuit board.

Peak L24, L23, L19, L13 and L5 for maximum output. Increase signal level by 6db and reduce receiver volume control setting to maintain 50mW output. Switch signal generator to AM and tune L24 for minimum output (AM rejection). Switch signal generator to FM and check that FM output has not been reduced. Repeat above as necessary for maximum FM output and minimum AM output.

Note: L24 should be tuned to the outer peak, i.e. with the core protruding from the top of the can by approximately $\frac{1}{8}$ in. All other cores to be tuned to the inner peak.

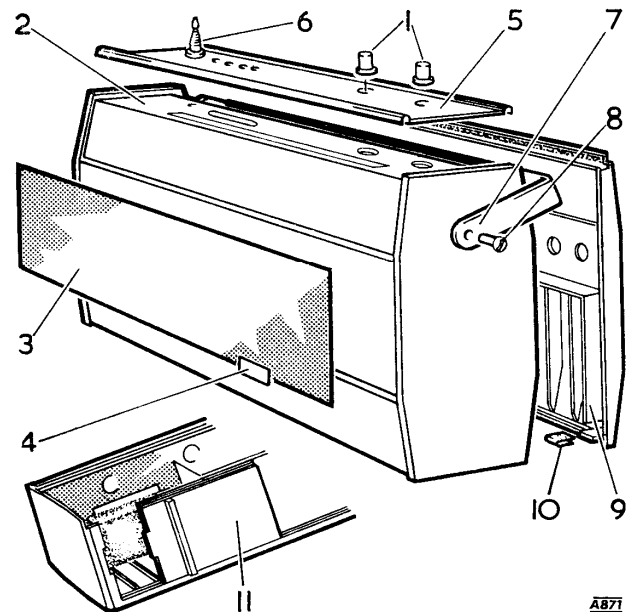
RF Circuits

Check that gang is fully closed. Unsolder lead from tag on telescopic aerial and connect the signal generator between this lead and "earth" line. Adjust tuning control to set cursor at 96 Mc/s and inject 96 Mc/s signal. Adjust C11 and C7 for maximum output. Set cursor to 88 Mc/s and inject 88 Mc/s signal. Adjust L4 and L2 for maximum output. Repeat as necessary to obtain correct alignment.

Note: While tuned to an RF signal check tuning of L5 for maximum output.

REPLACEMENT PARTS LIST

Cabinet Assembly



	4138	6142
1. Control knob (clip 3L3-100, felt washer 3L6-066) ...	3C0-141	3C0-041
2. Cabinet front including top trim and items 3, 4, 5 and 7 ...	3M4-603	3M4-523
3. Speaker grille ...	3A4-092/001	3A4-083
4. Emblem ...	8A6-023/001	3A6-028
5. Scale (gasket 3B4-161) ...	3A7-271	3A7-229
6. Telescopic aerial ...	3F0-060	3F0-060
7. Handle ...	3A9-058	3A9-058
8. Handle fixing screw (spring washer 3L6-003, plain washer WPMB00/BC, nut NFHB04, washer WSPB04, washer WPLB04) ...	3B3-086	3B3-086
9. Cabinet back (screw SZ06KP06/C) ...	3A0-128/002	3A0-128
10. Back clip ...	3L4-167	3L4-167
11. Battery door ...	3C8-069/002	3C8-069
Battery compartment division (foam pad 3P9-024)	3A3-002	3A3-002

Chassis Assembly (Both Models)

Printed circuit board ...	0V6-151
Chassis securing screw (washer WSPB04) ...	SB04TP06
Chassis securing screw (washer WSB04) ...	SB04TP20
Scale backing bracket assembly (screw SZ06HP04) ...	3M1-092
Drive cord pulley—large (spindle 0B3-081/002, spacer 0L7-004/013) ...	3C8-001
Drive cord pulley—small (spindle 0B3-081/017) ...	3C8-006
Pillar fitted to scale bracket ...	3B3-084
Tuning drive shaft (circlip 3L3-004) ...	3B3-080
Tuning drive bush (nut 3L6-009, washer WSPA06) ...	3B3-005/004
Cursor (felt washer 0F7-014/001) ...	3B5-059
Drive drum ...	3F5-004
Drive cord tension spring ...	0B5-068
Car aerial and earphone socket bracket assembly ...	3M4-525
Transistor heat sink (screw SZ06HH05) ...	3C5-002
Wavechange push-button ...	3C0-142
Ferrite rod aerial cleat ...	3L3-084
Ferrite rod aerial mounting pillar (screw SB06HP04) ...	3L7-007/005
Battery connector ...	3F6-042

HEAT SINK COMPONENTS.

Whenever transistors (sleeved or unsleeved types) are used in heat sinks it is essential for the preservation of a low thermal resistance that there should be no air-space between the outside surface of the transistors and the inside of the heat sink. In the case of small transistors in cylindrical encapsulation, this air-space must be filled by the application of a suitable heat conducting grease and the transistor pushed fully into its sink.

Although heat sink grease is applied during production it must always be reapplied by the engineer when replacing a transistor during servicing.

Heat Sink Compound DP2623, or Anti-Tracking Grease MS4, is suitable and marketed by Midland Silicones Ltd.

COMPONENT DETAILS

CAPACITORS

Ref.	Value	Tol.	Rating	Function	Part No.
C1	20pF	5%	750V	L1 tuning	8M53
C2	1000pF		500V	VT1 emitter coupling	4M15
C3	15pF	5%	750V	Car aerial coupling	4M28
C4	1000pF		500V	VT1 base bias decoupling	4M15
C5	0.02µF	-20 + 80%	200V	Part supply line RF bypass	7A83
C6*	20pF			FM aerial tuning	
C7*	5pF			FM aerial trimmer	
C8	36pF	2½%	750V	Part FM aerial tuning	4M25
C9	5pF	± 0.5pF	750V	VT2 emitter coupling	4M26
C10*	20pF			FM oscillator tuning	
C11*	5pF			FM oscillator trimmer	
C12	27pF	2½%	750V	Part FM osc. tuning	4M27
C13	15pF	5%		L3 tuning (10.7 Mc/s retractor)	4M28
C14	510pF	10%	500V	Part IF retractor (10.7 Mc/s)	7M81
C15	3.3pF	0.25pF		FM osc. feedback coupling	4M30
C16	1000pF		500V	VT2 base bias decoupling	4M15
C17	60pF	2½%	120V	FM oscillator tuning and FM IF tuning	4M10
C18	510pF	20%	500V	Part FM RF filter	8M54
C19	0.05µF	-20 + 80%	50V	FM RF bypass	7M84
C20	4.7pF	± 0.5pF	750V	AM bottom-end coupling	8M49
C21	2000pF	10%	350V	LW fixed aerial trimmer	7M25
C22	60pF	2½%	120V	LW fixed tuning	4M10
C23*	266pF			AM aerial tuning	
C24	2-25pF			Bandspread trimmer	3E4-015
C25*	5pF			AM aerial trimmer	
C26	25pF	2½%	750V	Bandspread aerial padding	4M11
C27	2-25pF			LW oscillator trimmer	3E4-015
C28	210pF	2%	350V	LW osc. fixed trimmer	7M60
C29	210pF	2%	350V	Part bandspread osc. trimmer	4M14
C30	18pF	± 0.5pF	750V	Part MW osc. fixed trimmer	4M31
C31*	266pF			AM oscillator tuning	
C32*	5pF			AM oscillator trimmer	
C33	1.5-8pF			Bandspread osc. trimmer	3E4-033
C34	5000pF	20%	500V	VT3 base coupling	4M18
C35	175pF			L15 tuning	
C36	50pF			L13 tuning	
C37	0.01µF	20%	50V	VT3 emitter coupling	7M82
C38	0.05µF	-20 + 80%	50V	RF bypass	7M84
C39	75µF	Elec.	9V	VT4 AGC decoupling	0E0-228/04
C40	0.02µF	-20 + 50%	50V	VT4 emitter bypass	7M83
C41	50pF			L19 tuning	
C42	175pF			L17 tuning	
C43	175pF			L21 tuning	
C44	30pF	2½%	750V	L23 tuning	4M32
C45	0.02µF	-20 + 80%	50V	VT5 base bias decoupling	7M83
C46	0.02µF	-20 + 80%	50V	VT5 emitter bypass	7M83
C47	0.02µF	-20 + 80%	50V	Part FM IF filter	7M83
C49	25µF	Elec.	25V	Audio coupling (FM)	0E0-225/01
C50	1000pF	20%	500V	Phase correction	4M15
C51	510pF			L24 tuning	
C52	8µF	Elec.	6V	Ratio detector stabilizing	0E0-222/02
C53	0.01µF	20%	50V	AGC decoupling	7M82
C54	5000pF	20%	500V	Part IF filter (AM)	2M27
C55	0.04µF	20%	250V	Audio coupling (AM)	4M33
C56	2µF	Elec.	25V	VT6 audio coupling	0E0-220/07
C57	75µF	Elec.	9V	VT6 emitter bypass	0E0-228/04
C58	75µF	Elec.	9V	VT7 emitter bypass	0E0-228/04
C59	1000pF	20%	500V	Negative feedback tone correction	4M15
C60	100µF	Elec.	25V	Supply decoupling	0E0-229/12
C61	100µF	Elec.	25V	Battery decoupling	0E0-229/12
C62	150µF	Elec.	9V	VT8/VT9 LS coupling	0E0-229/11
C63	330pF			VT8/VT9 RF bypass	8M55

* Tuning gang—Part No. 3E4-048

"Marconiphone" products are made to a standard of design and quality approved by The Marconiphone Co. Ltd., registered proprietors of the name and signature trade-marks.

INDUCTORS AND TRANSFORMERS

Ref.	Description	Part No.	
L1	FM aerial coil	3D8-002	
L2	FM RF tuning coil	3D1-059	
L3	VT2 emitter loading coil and part 10.7 Mc/s retractor	3D8-002	
L4	FM oscillator coil	3D1-058	
L5	FM IF output coil	3D0-031	
L6	RF choke	3D8-003	
L7	Car aerial coupling coil	} Ferrite rod assembly (including L27)	
L8	MW tuning coil		3F0-067
L9	LW tuning coil		
L10			
L11	AM oscillator coil	3D1-070	
L12			
L13	FM IFT1	3D0-028	
L14			
L15	AM IFT1	3D0-036	
L16			
L17	AM IFT2	3D0-037	
L18			
L19	FM IFT2	3D0-055	
L20			
L21	AM IFT3	3D0-038	
L22			
L23			
L24	FM IFT3	3D0-029	
L25			
L26			
L27	AM Aerial base coupling (with L7, L8 and L9)		

MISCELLANEOUS

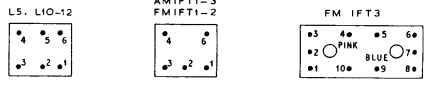
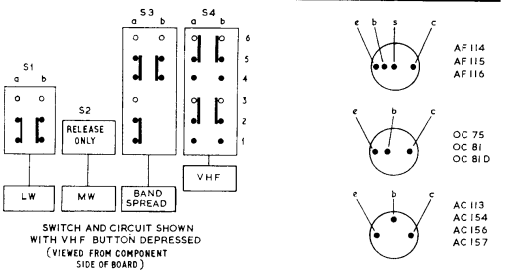
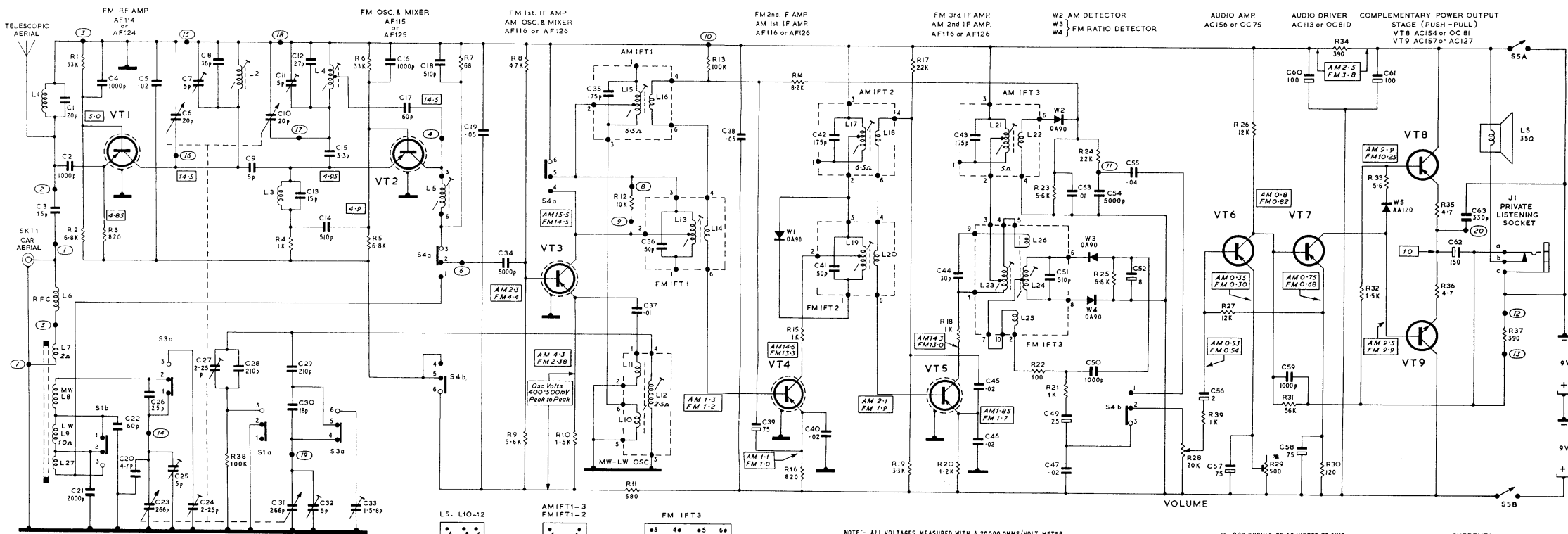
Ref.	Description	Part No.
S1-S4	Push-button switch unit	3E2-017
S5A-B	ON-OFF switch	with R28
SKT1	Car aerial socket (push-on-fix 3L2-089)	3F6-025/002
J1	Private listening socket (30/100 Ω impedance) (push-on-fix 3L2-101)	3F6-037
LS	Loudspeaker, 35 Ω impedance (clip 3L2-073) Plug	3E3-033 3F6-050/001

RESISTORS

All ¼ watt carbon ± 10% tolerance unless otherwise stated

Ref.	Value	Tol.	Rating	Function	Part No.
R1	33K Ω			VT1 base bias	8A33
R2	6.8K Ω			potential divider	8A08
R3	820 Ω			VT1 emitter stabilizing	7A40
R4	1K Ω			VT2 emitter stabilizing	1A52
R5	6.8K Ω			VT2 base bias	8A08
R6	33K Ω			potential divider	8A22
R7	68 Ω			Part FM RF filter	6A98
R8	47K Ω			VT3 base bias	7A57
R9	5.6K Ω			potential divider	1A65
R10	1.5K Ω			VT3 emitter stabilizing	8A06
R11	680 Ω			FM unit supply decoupling	3A45
R12	10K Ω			L13 damping	8A35
R13	100K Ω			VT4 base bias feed	8A26
R14	8.2K Ω			VT4 AGC feed (AM)	7A42
R15	1K Ω			VT4 limiting control	1A52
R16	820 Ω			VT4 emitter stabilizing	8A27
R17	22K Ω			Part VT5 base bias pot.	4A92
R18	1K Ω			VT5 limiting control	2A25
R19	3.3K Ω			Part VT5 base bias pot.	1B50
R20	1.2K Ω			VT5 emitter stabilizing	7A54
R21	1K Ω			Part de-emphasis network	1A52
R22	100 Ω			AM limiting	8A36
R23	5.6K Ω			AM detector load	4A57
R24	22K Ω			Part IF filter (AM)	2B53
R25	6.8K Ω			Ratio detector load	8A08
R26	12K Ω			VT6-VT7 coupling	1A94
R27	12K Ω			VT6 base bias	1A89
R28	20K Ω	Log. pot.		Volume control	3E1-051
R29	500 Ω	Preset		VT7 base bias adjustment	3E5-002/2
R30	120 Ω			VT7 emitter stabilizing	8A24
R31	56K Ω			Negative feedback	8A10
R32	1.5K Ω			VT7 collector load	1B14
R33	5.6 Ω			Bias stabilizing load	2A43
R34	390 Ω			DC dropper and decoupling	7A84
R35	4.7 Ω	± 0.5 Ω		VT8 bias stabilizing	1B77
R36	4.7 Ω	± 0.5 Ω		VT9 bias stabilizing	1B83
R37	390 Ω			Private listening socket load	7A84
R38	100K Ω			MW oscillator damping	2A27
R39	1K Ω			Part AF coupling	3A58

When ordering replacement components, please quote Model number and include the description or function given with the part number.



NOTE:- ALL VOLTAGES MEASURED WITH A 20000 OHMS/VOLT METER WITH RESPECT TO THE POSITIVE LINE EXCEPT WHERE OTHERWISE STATED. VOLTAGES SHOWN AGAINST VT1-2-3 MEASURED WITH RESPECT TO S4B SIDE OF R11 (680K) WITH RECEIVER SWITCH TO FM.

* R29 SHOULD BE ADJUSTED TO GIVE EQUAL CLIPPING OF SINE WAVE WHEN LOOKED AT WITH AN OSCILLOSCOPE.

CURRENT:-
 QUIESCENT AM 15 mA
 FM 18 mA
 50mW OUTPUT 38 mA
 500mW OUTPUT 100mA

CIRCUIT DIAGRAM. Figures in rectangles indicate voltages measured with a 20,000 Ω/volt meter. DC resistance readings are shown against inductors where these are 0.5Ω or greater. Ringed figures indicate printed board tag connection points.