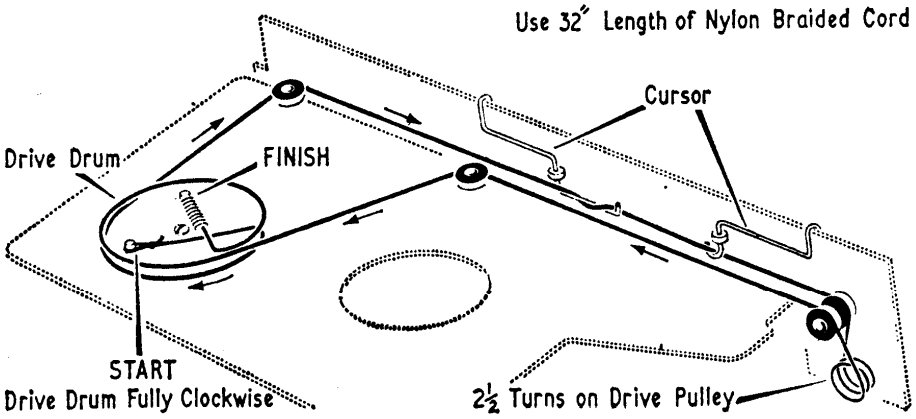
MARCONIPHONE Model 4159

General Description: Portable radio receiver with 600mW output. Aerials: ferrite rod for M.W. and L.W., telescopic rod for S.W. Battery: two 9V (PP7). Loudspeaker: round, 35Ω. Sockets: car aerial and earphone or tape (15Ω minimum).

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



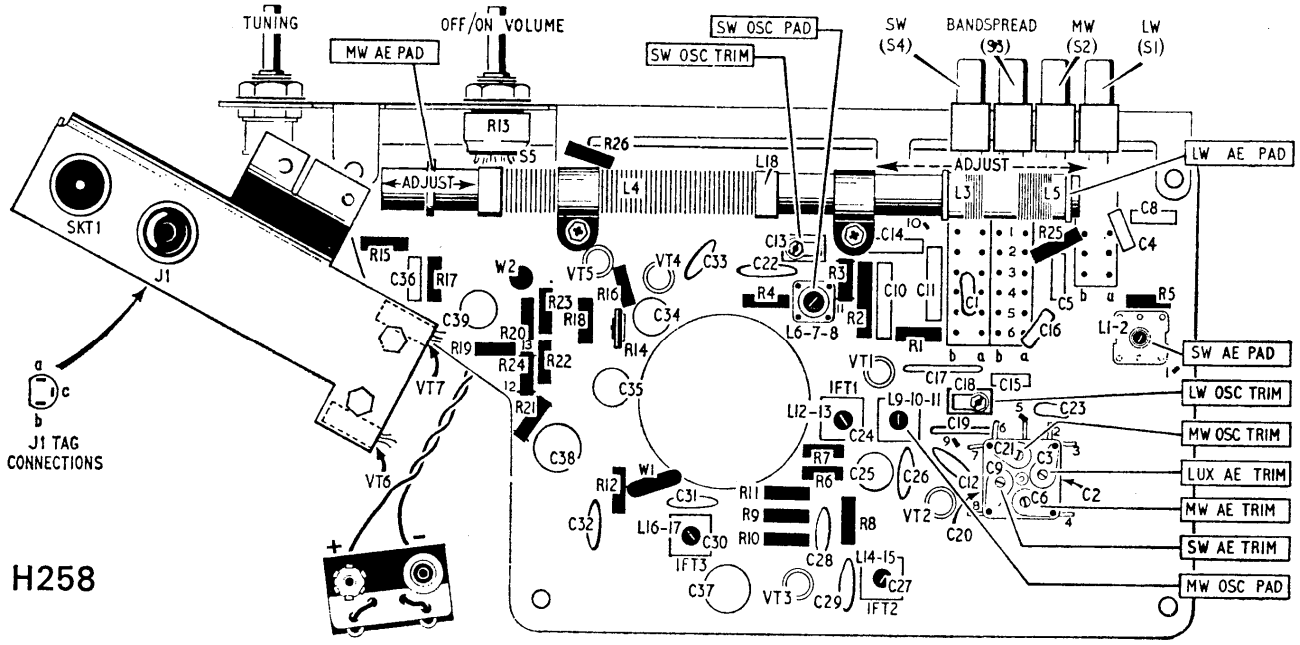
(H259) Drive Cord —Model 4159

H259

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.

Tag Connections:

1. To tag 8 and S4A contact 6.
2. To S4A contact 5 and C23.
3. To S3A contact 3.
4. To S3A contact 1.
5. To C23.
6. To S4B contact 2.
7. To S3B contact 4.
8. To tag 1.
9. To S4B contact 4.
10. To L3.
11. To S4B contact 5.
12. To J1 contact "c".
13. To J1 contact "a".



(H258) Component Locations—Model 4159

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 transistor 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 the 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.

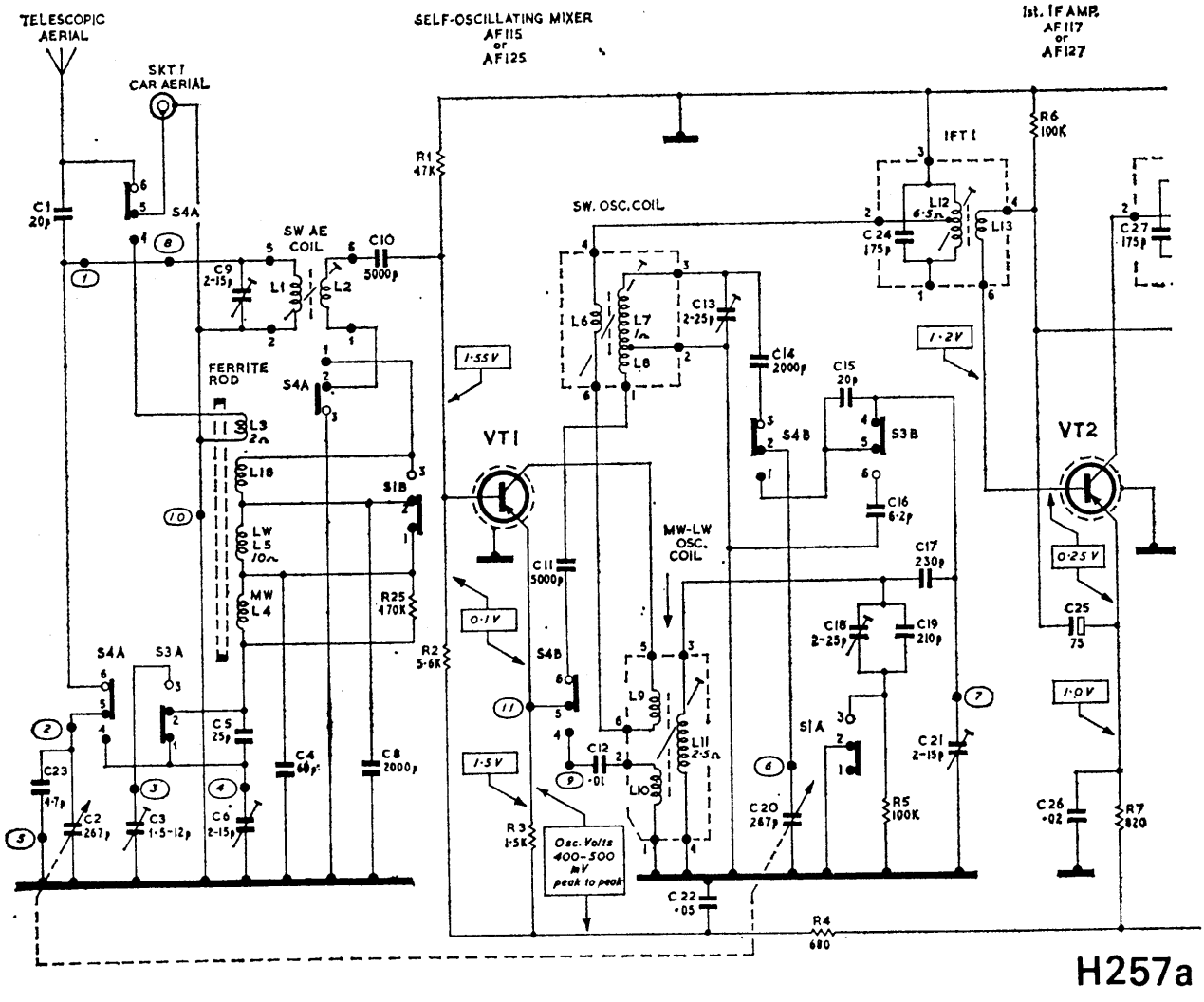
Balance Adjustment: Output transistors VT6 and VT7 are series connected across the 18V battery supply, and to ensure a balanced supply voltage to each an adjustment R14 is incorporated in emitter circuit of VT4. Adjustment of this resistor sets emitter potential and hence collector potential of VT4. It will, therefore, determine the base potential of driver VT5 which is directly coupled to VT4. This bias decides collector potential of VT5 which in turn controls base voltages of VT6 and VT7. Correct balance is obtained when potential of VT6/VT7 emitter junction is 10V with respect to positive line. The discrepancy from half-battery voltage is due to the emitter bias

voltage developed across R18 which determines limit of negative signal excursion before bottoming of VT5 takes place.

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

The audio signal developed across volume control R13 is applied via coupling capacitor C33 to the base of audio amplifier transistor VT4. The amplified signal appearing at the collector of VT4. is directly coupled to the base of driver transistor VT5. The output from VT5 simultaneously drives the bases of both output transistors VT6 and VT7. During positive half-cycles of the signal, NPN transistor (VT7) conducts, resulting in a fall in collector/emitter voltage of VT7. During negative half-cycles of the signal PNP transistor (VT6) conducts, resulting in an increase in collector/emitter voltage of VT7. The loudspeaker is fed via C39 and J1.

VT5 collector load R19 is returned to "live" side of the loudspeaker and, as this point is coupled to the emitters of VT6 and VT7 through C39, the input



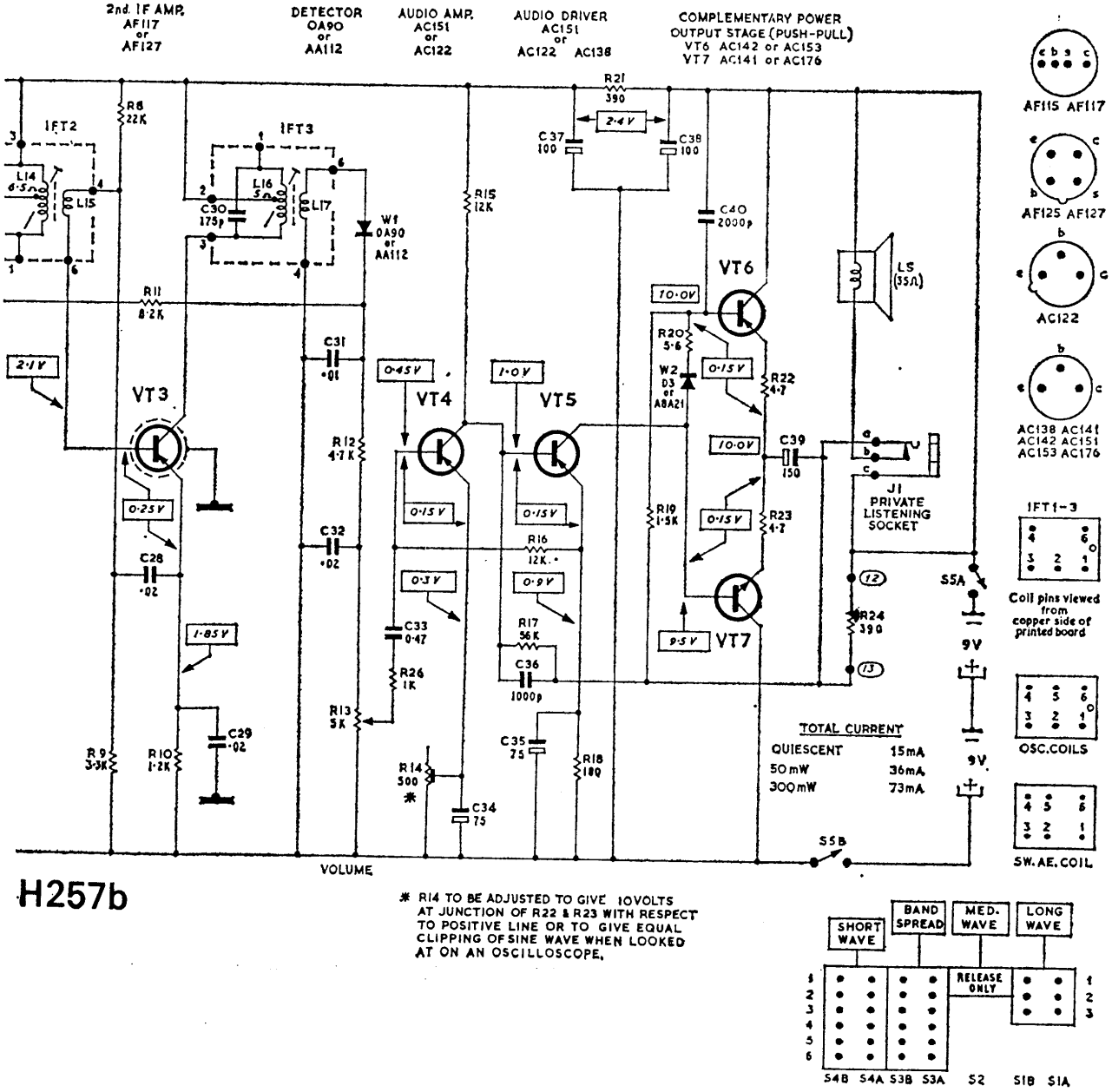
Circuit Diagram Notes: Figures in rectangles indicate voltages measured with a 20,000 ohm/volt meter between positive line of each transistor and point shown, except where otherwise indicated. D.C. resistance readings are shown against inductors where these are 1Ω or greater. Ringed figures show printed board tag connection points.

(H257a) CIRCUIT DIAGRAM—MODEL 4159 (PART)

signal to the output stage is virtually applied between base and emitter of both VT6 and VT7.

The diode is biased by VT5 collector current and acts as a variable resistance which is sensitive to voltage and temperature variations. The resistance value of W2 is small compared with R19 and the voltage developed across W2 equals the sum of the nominal output transistor (VT6 and VT7) base/emitter voltages and so determines the correct quiescent operating conditions. During low ambient temperature conditions the resistance of W2 increases thus compensating for falling current of the output transistors. This effect also takes place in the event of falling battery voltage. The diode W2 also assists thermal stability at high temperatures and opposes high current drain from the batteries.

Alignment (General): Remove cabinet back cover only, then connect an output meter, set to 35Ω impedance, in place of loudspeaker via jack plug connection to J1. Alternatively, connect a Model 8 Avometer (10V A.C. range across speech coil via tags 12 and 13 on printed board. Set volume control to maximum but, during alignment, adjust signal generator output level to maintain receiver output at 50mW.



(H257b) Circuit Diagram—Model 4159 (Continued)

Alignment (I.F.): Switch receiver to medium waveband and turn gang to maximum capacitance. Apply a 475 kHz (30 per cent modulated) signal, via a 0·1 μF blocking capacitor, across C2 (aerial section of gang) then adjust I.F. T3, I.F. T2 and I.F. T1 (in that order) for maximum output. Repeat until no further improvement results.

Alignment (R.F.): Inject M.W. and L.W. signals, via a loop loosely coupled to the ferrite rod aerial. On S.W. extend telescopic aerial and place signal generator lead nearby to provide a loose coupling. Check that, with tuning gang fully closed, the cursors coincide with the marker pip at right-hand end of M.W. and L.W. scales.

Waverange	*Signal Generator*	*Tune to*	*Adjust*
Medium	600kHz	500 metres	L11, L4*
Bandspread	1500kHz	200 metres	C21
Medium	1500kHz	Max. output at 200 metres	C6
Bandspread	1500kHz	200 metres	C3
Repeat as necessary for accurate calibration and maximum output.			
Long	200Kc/s	1500 metres	C18, L5†
Short	7MHz	7MHz	L7, L1
Short	16MHz	16MHz	C13, C9‡
Repeat as necessary for accurate calibration and maximum output			

* Adjust by sliding ring along ferrite rod.

† Adjust by sliding coil former along ferrite rod.

‡ "Pulling" which may occur whilst tuning C9 should be counteracted by "rocking" the gang.