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2. Select the correct printer if necessary.
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Please get in touch with me at archivist@vmarsmanuals.co.uk.

Richard Hankins, VMARS Archivist, Summer 2004

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STATION, RADIO, A510

TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

This EMER must be read in conjunction with
Tels F 562 Part 2 which contains figures
and tables to which reference is made.

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INTRODUCTION

(Fig 1)

1. The Station radio, A510 is an amplitude modulated transmitter-receiver with crystal-controlled transmitter, intended for operation by long range infantry patrols. It is designed primarily as a one-man pack station. The transmitter and receiver are separate sealed units carried in two special web pouches which take the place of the standard basic pouches.

2. The equipment covers a frequency range of 2Mc/s to 10Mc/s. On the receiver this is split into two bands, 2Mc/s to 4.5Mc/s and 4.5Mc/s to 10Mc/s. Facilities are provided for either voice or c.w. working.

3. The following aerials are supplied with the station:-

- 8 ft vertical rod and rod tuner
- End-fed wire and counterpoise earth
- Dipole

4. The 8 ft rod aerial, and associated rod tuner, are used when the set is employed in the man-pack, mobile vehicle or ground station roles and the end-fed wire and dipole aerials for ground stations only.

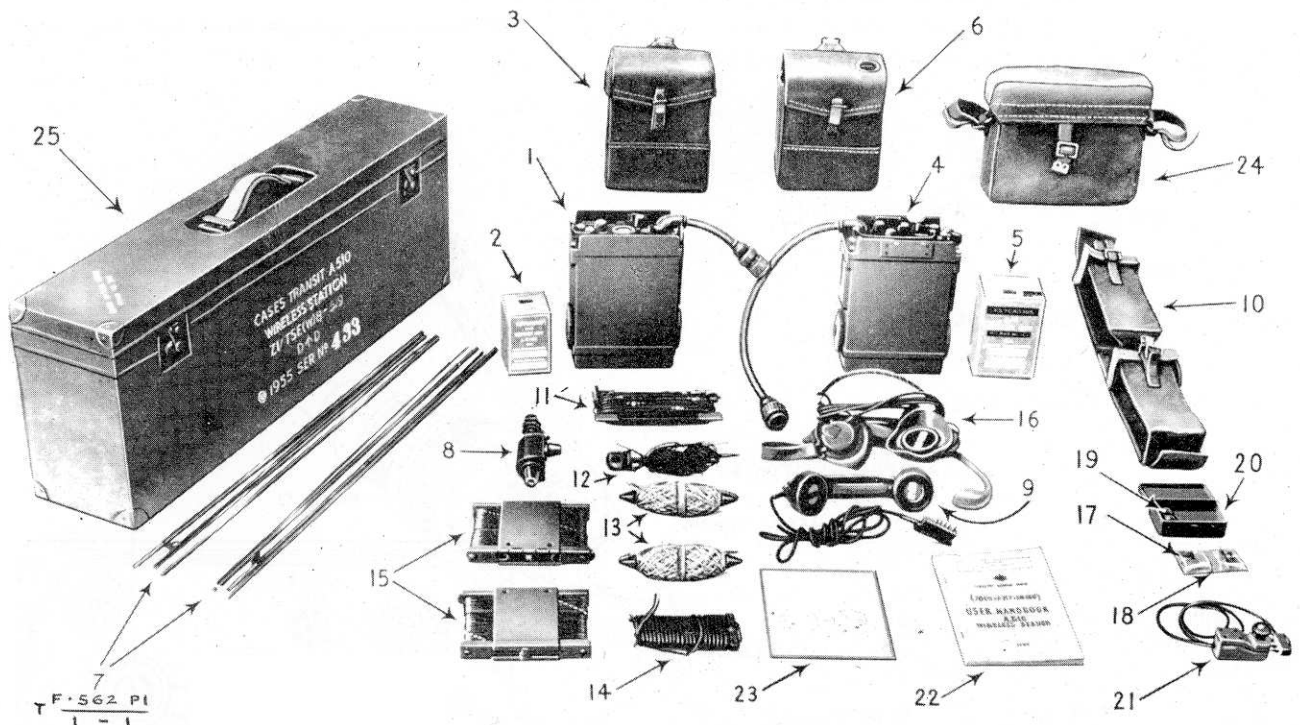


Fig 1 - Complete station

<u>Item</u>		<u>Item</u>	
1	Receiver A510	14	Feeders, dipole
2	Batteries, dry, 1.t., 1.5V	15	Aerials, dipole, lightweight, 66 ft
3	Pouches, receiver, A510	16	Microphone receiver head-gear assembly, SI, light-weight
4	Transmitter A510	17	Crystal units, style OE
5	Batteries, dry, h.t./bias, 90/7.5V	18	Pouches, style D, crystal units
6	Pouches, transmitter, A510	19	Lamps, pilot, 1.5V, GEC, type 112
7	Aerials, flexible, 8 ft (Aust)	20	Cases, spares, A510
8	Rod tuner	21	Keys, telegraph, light-weight, (Aust), No 1
9	Telephones, hand, SI, No 4A (Aust)	22	User Handbook, A510 Station, radio
10	Cases, carrying, flexible aerial	23	Charts, instruction, A510
11	Aerials, adjustable, 130 ft	24	Satchels, signals, No 1 or Satchels, signals, No 1 Mk 1/1
12	Counterpoise assembly	25	Cases, transit, A510
13	Cords, aerial, weighted		

CONSTRUCTION

5. The transmitter and receiver are housed in light, die-cast aluminium alloy cases which are secured to the panels by nuts and bolts located at the corners of each unit. A swivel carrying handle is attached to each panel.

6. The batteries are carried in separate compartments held in place by two locking wheels situated at the sides of each unit. The 1.5V l.t. battery is in the base of the receiver and the combined +90/-7.5V battery is in the base of the sender. The 1.5V l.t. and 90V h.t. supplies are common to each unit, interconnections between the units being via a 12-core cable and 17-pin plug and socket, which include other circuit connections.

7. Neoprene rubber gaskets between panel and case and battery compartment and case ensure watertight sealing of each unit. The dial illuminating lamps and the crystals are also in separate sealed compartments.

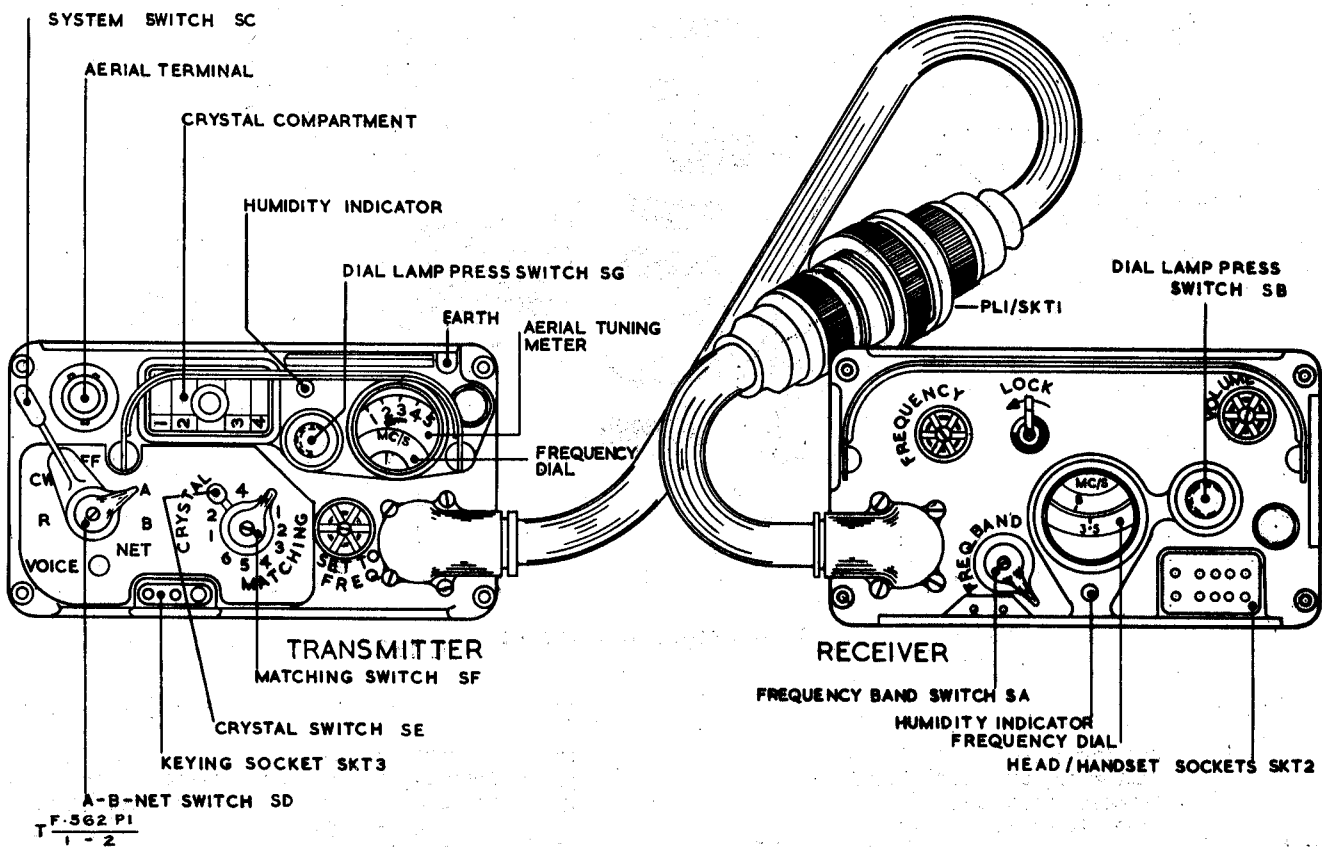


Fig 2 - Front panel layout

FRONT PANEL ASSEMBLIES/CONTROLS
(Fig 2)

Receiver

8. The controls etc on the front panel of the receiver are as follows:-

FREQUENCY	This control tunes the receiver. The frequency is indicated on the dial. Blue band 2Mc/s to 4.5Mc/s and orange band 4.5Mc/s to 10Mc/s.
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LOCK	Rotating this lever 90° anti-clockwise locks the tuning control.
VOLUME	This control sets the a.f. output level.
Head/handset sockets (SKT2)	The handset and/or receiver headgear can be plugged into these as required.
Frequency dial	This indicates the frequency selected by the FREQUENCY control
FREQ. BAND switch (SA)	This switch selects the frequency band in use.
Dial lamp press switch (SB)	The rubber cap covers the press switch and the lamp. The switch assembly unscrews in order to replace the lamp.
Seal test	The hexagon-headed screw on the right of the panel seals the leak test entry.
H umidity indicator	This is normally blue but turns pink if moisture has leaked into the receiver.

Transmitter

9. The controls etc on the front panel and elsewhere on transmitter are as follows:-

Aerial terminal	When depressed, the spring-loaded button exposes holes in the aerial terminal into which the leads from dipole or end-fed aerials can be inserted. The aerial terminal is fitted with three radial pins which form a polarised bayonet plug. This engages with the socket on the rod tuner to form a rigid mounting for the rod aerial.
System switch (SC)	This 4-position switch is marked OFF-CW-R-VOICE. When switching from R to VOICE, pressure on the lever knob must be maintained during speech. When pressure is released a strong spring moves the lever knob back to R (ie to receive).
A-B-NET switch (SD)	This is concentric with the system switch. The three positions A, B and NET are used respectively for:- (a) Matching high impedance aerials (b) Matching low impedance aerials (c) Tuning the receiver to the transmitter frequency when netting.
Crystal compartment	This can hold four miniature crystals. A removable cover protects and seals the socket and crystals. Spaces are provided on the cover for pencil marking the respective frequencies of the crystals.

CRYSTAL (SE)	This switch selects the required crystal.
MATCHING (SF)	This switch, used only for matching long wire aeri-als, is concentric with the CRYSTAL switch. It must be on zero for dipole or rod aeri-als.
SET TO FREQ	This control tunes the power amplifier. The fre- quency dial is visible through the aerial tuning meter window. This is calibrated from 2Mc/s to 10Mc/s in 0.5Mc/s steps.
Humidity indicator	This is normally blue but turns pink when moisture is present.
Dial lamp press switch (SG)	The rubber cap covers the press switch and the lamp. The switch assembly unscrews in order to replace the lamp.
Seal test	The hexagon-headed screw on the right of the panel seals the leak test entry.
Aerial tuning meter	This indicates optimum anode loading of the power amplifier circuit when sending and the 'on load' condition of the h.t. and l.t. batteries.
Earth connection	Depression of the lever marked EARTH PRESS on the rear panel flange exposes a hole through which the earth lead can be inserted.
Key mounting	The c.w. key is fitted by engaging it with the clips on the mounting plate fitted to the rear panel flange.
Keying socket (SKT3)	This takes the 3-pin plug on the key lead.

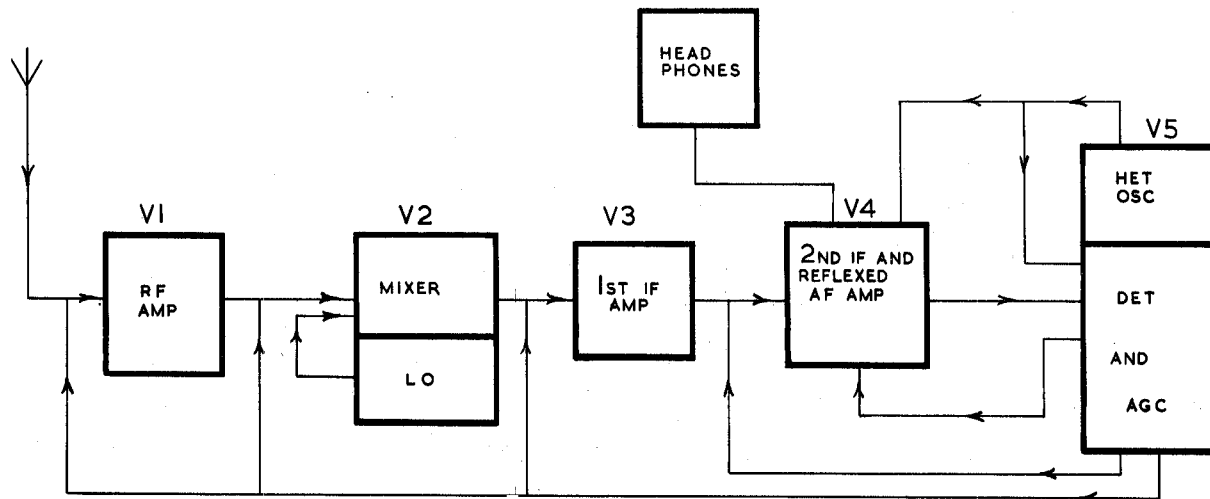
BRIEF TECHNICAL DESCRIPTION
(Fig 3)

Receiver

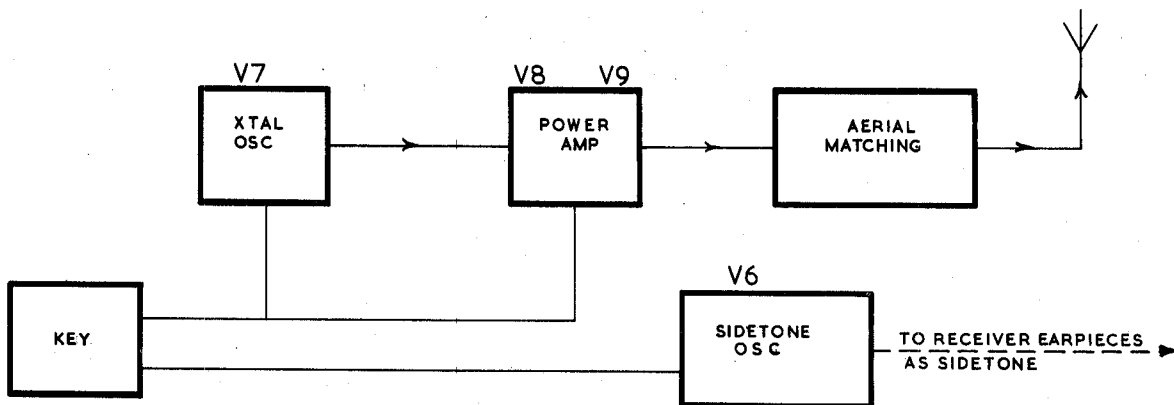
10. The receiver is a reflexed single superheterodyne employing five valves:-

- V1, tuned r.f. amplifier
- V2, frequency changer
- V3, 1st i.f. amplifier
- V4, 2nd i.f. amplifier and reflexed audio amplifier
- V5, heterodyne oscillator and diode detector.

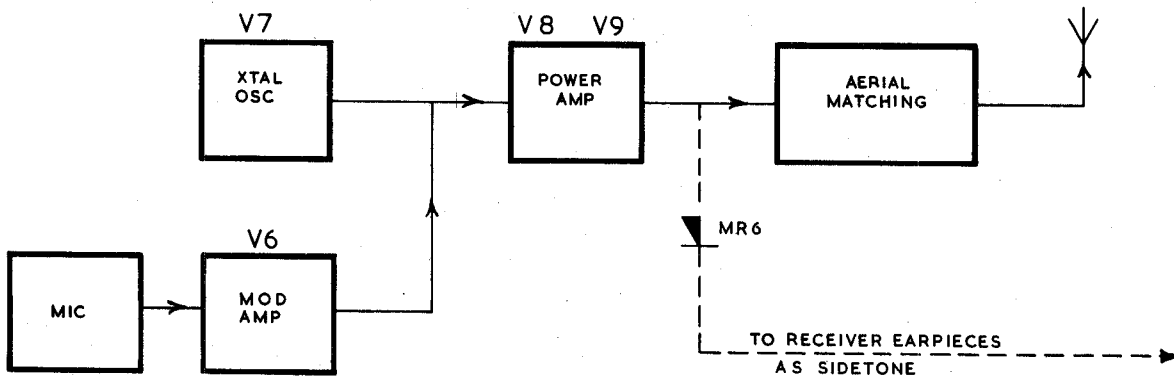
11. The heterodyne oscillator is employed on c.w. reception and for netting. When netting, the transmitter crystal oscillator provides a signal which is coupled, through inter-wiring capacitance, to the receiver aerial coil, ie no outside station is required.



RECEIVER



TRANSMITTER - CW WORKING



TRANSMITTER - VOICE WORKING

T F-562 P1
1-3

Fig 3 - Complete block diagrams

Transmitter

12. The transmitter employs four valves:-

- V6, modulator/c.w. sidetone oscillator
- V7, crystal oscillator
- V8 and V9 (in parallel), power amplifier

13. On c.w. operation, V6 is an audio oscillator which provides the sidetone for monitoring the c.w. signal. The crystal oscillator V7, supplies the r.f. drive to the class C power amplifier and the output from the p.a. anode tank circuit is coupled to the aerial via an impedance matching network.

14. On voice transmission, V6 functions as an a.f. amplifier, supplying the modulating signal to the p.a. grids. A portion of the modulated p.a. signal is rectified to provide sidetone to monitor the transmitter output.

Power supplies

15. The set operates from dry batteries which provide 90V h.t., 7.5V negative p.a. grid bias and 1.5V l.t. The normal life of the batteries is approximately 14 hr for continuous operation with a send/receiver ratio of 1:5. Provision is made to check the 'on load' voltages of the h.t. and l.t. batteries.

DETAILED TECHNICAL DESCRIPTION

Aerials

End-fed aerial
 (Fig 2501)

16. The aerial consists of eight leads of differing lengths which are joined by the hooks and eyes provided. This alters the effective length of the aerial. The actual sections to be linked for operation on various frequencies are given on the aerial bobbin and in Table 1. The unused lengths of aerial wire remain wound on the bobbin. Frequency range A is for half-wave aerials and B is for quarter-wave aerials and it should be noted that range A gives better communication.

Frequency Range (Mc/s)		No of links made	Link to set
A	B		
9.3 - 10.0	6.2 - 7.2	-	1st
8.1 - 9.3	5.5 - 6.2	1	2nd
6.8 - 8.1	4.2 - 5.5	2	3rd
5.6 - 6.8	3.7 - 4.2	3	4th
4.7 - 5.6	3.1 - 3.7	4	5th
3.8 - 4.7	2.65 - 3.1	5	6th
3.4 - 3.8	2.2 - 2.65	6	7th
2.7 - 3.4	1.85 - 2.2	7	8th

Table 1 - End-fed aerial connections

17. The fixed end of the aerial is slung from a tree or other suitable support by means of a cord which is attached to the insulator on the aerial wire. The direction should be such that the aerial wire is at right angles to a line joining the two stations and as nearly vertical as possible.

18. The aerial is connected to the set by the orange wire provided on the bobbin. The counterpoise earth spike is driven into the ground through a hole in the aerial bobbin. The green wire from this spike is connected to the earth terminal on the sender and the remaining four black wires spread out in the form of a cross.

Dipole aerial

19. Flexible leads wound on the two dipole cases are unwound, according to the proposed operating frequency referring to the table given on each case. Red markers on the wire are spaced at one foot intervals. These figures are also given in Table 2. The unwound ends are connected to the dipole feeder which connects the dipole to the aerial and EARTH terminals on the transmitter panel.

Frequency (Mc/s)	*Length of wire (ft)	Frequency (Mc/s)	*Length of wire (ft)	Frequency (Mc/s)	*Length of wire (ft)
3.3	67	5.3	40.1/2	7.3	28.1/2
3.5	63	5.5	38.1/2	7.5	27.1/2
3.7	59.1/2	5.7	37	7.9	26.1/2
3.9	56.1/2	5.9	35.1/2	8.2	25.1/2
4.1	53.1/2	6.1	34.1/2	8.5	24.1/2
4.3	51	6.3	33.1/2	8.8	23.1/2
4.5	48.1/2	6.5	32.1/2	9.1	22.1/2
4.7	46.1/2	6.7	31.1/2	9.4	21.1/2
4.9	44.1/2	6.9	30.1/2	9.9	20.1/2
5.1	42.1/2	7.1	29.1/2	10.4	19.1/2

***Note:** Length of wire given is length of wire off the reel.

Table 2 - Dipole aerial lengths

20. The dipole, chiefly used for sky waves, may be inclined, hoisted at one end only, or slung horizontally between two trees or masts, in which position it is more efficient. The inclined dipole is anchored at the lower end by the counterpoise earth spike and is insulated from the ground.

Rod aerial

21. The 8 ft rod aerial consists of four mating sections. These are threaded onto a nylon cord which prevents the loss of any section. This aerial is plugged into the socket on the rod tuner.

22. When operating below 3Mc/s, the range of the rod aerial may be approximately doubled by the use of a 16 ft length of wire attached to the top section and hoisted to a vertical position.

Rod tuner

23. This is, in effect, a variable inductor, placed in series with the rod aerial. The ball and socket joint allows the rod aerial to take up the most suitable position in relation to the transmitter. It is secured to the aerial terminal by a polarised bayonet socket.

Aerial matching

General

24. As a resistive load of approximately $2k\Omega$ is required to obtain maximum output from the p.a. stage the aerials must be properly matched to this stage. This matching is accomplished by using the A and B positions of the A-B-NET switch (SD), the MATCHING switch (SF) and/or the rod tuner.

High impedance aerials

25. A half wave end-fed long wire aerial has a high impedance. When used it is matched with the A-B-NET switch in the A position and the MATCHING switch SF1F. Position A on the A-B-NET switch effectively places the aerial in parallel with the p.a. tuning circuit. To this circuit, the aerial appears as a combination of resistance and inductance. Closer matching is achieved by use of the MATCHING switch. This switch offers an open circuit in position 0, and in positions 1 to 6 places a capacitor (C114 to C119) in parallel with the aerial impedance. The entire tuned circuit is accurately resonated by slight resetting of C106 and L11 (SET TO FREQ).

26. The signal path from the aerial when receiving is via SD1Fb, SD1Bb, C105, L11, C126, SD1Bc, SC2Ba and interconnecting lead A to the receiver aerial coil L2.

Low impedance aerials

27. In position B of the A-B-NET switch, low impedance aerials are connected via C102 and C126 to the junction of L11 and L12. The low impedance is thus transformed to a high impedance. Closer matching is achieved by MATCHING switch SF1B which, in position 0 connects the aerial directly to C102. Positions 1 to 6 place a capacitor (C120 to C125) in series with the aerial. Optimum resistive loading of the p.a. is achieved by slight re-adjustment of the p.a. tuning (SET TO FREQ).

28. The signal path from the aerial when receiving is via SD1Fb, SF1B and associated network, C102, SC2Fa, SD1Bc, SC2Ba and lead A to L2 in the receiver.

29. (a) Aerials which have a low impedance are:-

- Quarter wave, end-fed long wire
- Dipole
- 8 ft rod

(b) The MATCHING switch requires to be set to position 0 when the dipole or rod aerial and rod tuner are used. The dipole is nearly resistive and the rod aerial and the rod tuner together form a resistive aerial.

30. The rod tuner is used to improve matching of the rod aerial. It consists of a fixed coil inside a fixed cylindrical ferrite shell. A sliding tube passes through the coil. To one end is fixed tubular aluminium shell and in the other end is inserted a ferrite slug. This is so arranged that when the aluminium shell is enveloping the coil, the ferrite slug is clear of the coil, giving minimum inductance. Conversely when the ferrite slug is inside the coil, the aluminium shell is clear of the coil giving maximum inductance. A simple crank mechanism, operated by the tuning control knob, moves the tube backwards and forwards inside the coil.

31. For protection, the unit is mounted in a sealed die-cast case. The frequency scale provided is approximately correct only when used with the 8 ft rod aerial.

Receiver

R.F. amplifier, V1
(Fig 2504)

32. This stage uses a variable- μ h.f. pentode. The input signal is taken from the aerial matching network in the transmitter (see para 26 and 28) and fed by lead A to L2, the common primary of the coils L1 and L3 in the receiver.

33. The r.f. coils are L1 (tuned by C4 and trimmed by C1 on the low band - blue, 2Mc/s to 4.5Mc/s) and L3 (tuned by C4 and trimmed by C2 on the high band - orange, 4.5Mc/s to 10Mc/s). C4 is one section of the three-gang tuning capacitor and C5 is the grid coupling capacitor. A.G.C. is applied via the grid leak R1 and a.g.c. filter R7 and C12.

34. The anode load consists of L5 (tuned by C7 and trimmed by C8 on the low band) or L4 (tuned by C7 and trimmed by C9 on the high band). C7 is one section of the three-gang tuning capacitor.

35. The band switches SA1 and SA4 short-circuit the unused grid and anode tuning components.

36. Lead B interconnects the h.t. supply. Anode decoupling is provided by R6 and C10. Common screen decoupling for V1 and V3 is provided by R2 and C6.

37. C36 provides a degree of 'top' coupling between L2 and L3. This gives improved response at the higher frequencies with an improvement in selectivity.

Frequency changer, V2
(Fig 2504)

38. The signal from the r.f. amplifier is fed through C11 to the grid of V2, a pentagrid converter. A.G.C. bias is applied to the signal grid through grid leak R4 and a.g.c. filter R7 and C12. I.F. regeneration is restricted by filament decoupling network L13 and C3.

39. The local oscillator tuning coils are L7 (tuned by C13 and trimmed by C21 on the low band) and L9 (tuned by C13 and trimmed by C20 on the high band). Padding on the low band is by C15 and on the high band by C14. C13 is one section of the three-gang tuning capacitor and is temperature-compensated by C16. L6 (low band) and L8 (high band) are the anode-to-grid feedback coils. C17 is the grid coupling capacitor and R5 is the grid bias resistor. When working on the high band, the

switch SA7 short-circuits C21, the low band oscillator trimmer. This effectively damps the low band oscillator circuit and renders it inoperative. H.T. is fed to the oscillator 'anode' (screen grid of V2) via the 10k Ω resistors R8 or R9 and the oscillator feedback coils.

40. The fundamental frequency of the local oscillator for the low frequency band is signal frequency plus intermediate frequency (s.f. + i.f.). That for the high frequency band is 1/2 (s.f. + i.f.) the second harmonic of which heterodynes with the signal frequency to produce the 455ko/s i.f. used in this receiver.

41. The primary of TR1 (1st i.f. transformer) is permeability tuned and, with C18, forms the anode load of V2. H.T. for the anode of V2 is obtained via the oscillator circuit and the primary of TR1.

1st i.f. amplifier, V3

42. This uses a vari- μ h.f. pentode. The i.f. output at 455ko/s from the frequency changer is fed to the control grid of V3. A.G.C. is applied from the a.g.c. line via the filter network R7 and C12 to the grid of V3 via the secondary of TR1. The amplified i.f. signal appears across the primary of TR2. H.T. is applied to the anode via TR2 primary.

2nd i.f. and reflexed a.f. amplifier, V4
(Fig 2504)

43. V4, a vari- μ h.f. pentode, functions as an i.f. amplifier and a reflexed a.f. amplifier. The i.f. signal appearing across the primary of TR2 is fed via the secondary of TR2 to the control grid of V4. The amplified i.f. signal appears across the primary of TR3. This signal is applied to the diode anode of V5. The full a.g.c. voltage is developed across the two high impedance resistors R15 and R14 in series and this voltage is applied to the grids of V1 and V2. A reduced a.g.c. voltage developed across R14 only is applied to the grid of V4. The a.f. component of the signal is fed through the r.f. filter R17, C38 and C32 and appears across the variable resistor RV1 which is the diode load and audio VOLUME control. The bottom end of RV1 is returned to the positive filament line. This puts a delay bias of 1.5V on the diode anode. The audio signal is fed through C28 and R12 to the grid of V4. C25 maintains the secondary of TR2 at r.f. earth potential.

44. In the anode circuit of V4 is the primary of the audio transformer TR4 in series with the primary of TR3. The amplified audio signal appears across the primary of TR4 and is fed via the secondary of TR4 to the receiver headgear. C27 is an i.f. filter.

45. Across the primary of TR4 is the rectifier MR1 fed via the capacitor C26. The rectifier is biased by a potential taken from the junction of R10 and R11 which are connected as a potential divider across the h.t. supply. MR1 is normally in the non-conducting state but the arrival of a signal of sufficient amplitude, such as a noise peak, will overcome the bias on the rectifier and cause it to conduct, effectively short-circuiting the primary of TR4. Thus it functions as a noise limiter.

46. The screen grid supply is obtained via resistor R13, decoupled by C29. The anode supply is obtained via the primaries of TR4 and TR3 in series.

Heterodyne oscillator and diode detector, V5
(Fig 2504.)

47. The pentode section of the diode-pentode valve V5 is triode connected in a series-fed Hartley oscillator used on c.w. reception, or netting functions. The diode section demodulates the i.f. signals as described in para 48.

48. When receiving, with the key plugged into the transmitter, the oscillator h.t. voltage is supplied via SC3Ba, leads B and H to and from the receiver respectively, SC3Bc, the jumper lead in the key across pins 1 and 2 of SKT3, R117, lead J and anode decoupling network R19 and C37.

49. When netting, the h.t. path is the same, except that SKT3 and R117 are bypassed by SD1Fa in the NET position.

50. The positive grid return results in a small instantaneous grid current flow through R18 to ensure immediate oscillation. Additional grid current resulting from the alternating grid voltage automatically biases the stage to its operating condition.

51. The fundamental oscillator frequency is half the i.f., the second harmonic of this frequency being used. This is fed via C42 to the grid of V4 from the voltage divider network C40, C41 and R21. The signal is also applied via C34 to the diode circuit, to mix with the received signal. An audible tone is thus produced at the receiver earpieces for c.w. reception. When netting, the receiver is tuned to zero beat with the heterodyne oscillator signal.

Transmitter

Crystal oscillator, V7
(Fig 4)

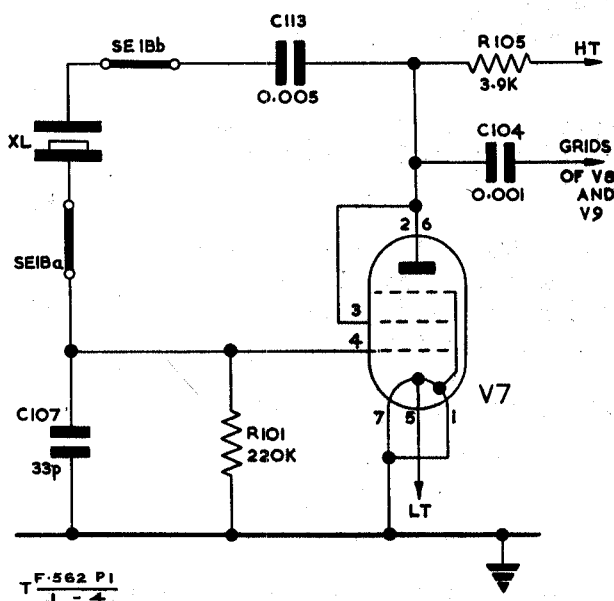


Fig 4 - Transmitter crystal oscillator

52. V7, a power amplifier pentode, is triode-connected in a Pierce crystal oscillator circuit, any one of the four crystals being selected by switch SE.

53. The anode-to-grid circuit consists of the capacitor C113 and the selected crystal. The grid-to-earth capacitor C107, in series with the anode-to-earth wiring and inter-electrode capacitances, causes the capacitance across the crystal to amount to 30pF. Grid current flowing through R101 provides automatic bias. Anode voltage is applied through SC1Fa (and, when on CW, through SKT3) and the anode load R105. C104 couples the r.f. output to the p.a. stage. The drive voltage is normally 12V r.m.s. (ie 17V peak).

Power amplifier, V8 and V9
(Fig 5 and 6)

54. This stage consists of two power amplifier pentodes connected in parallel, forming a grid modulated class C amplifier.

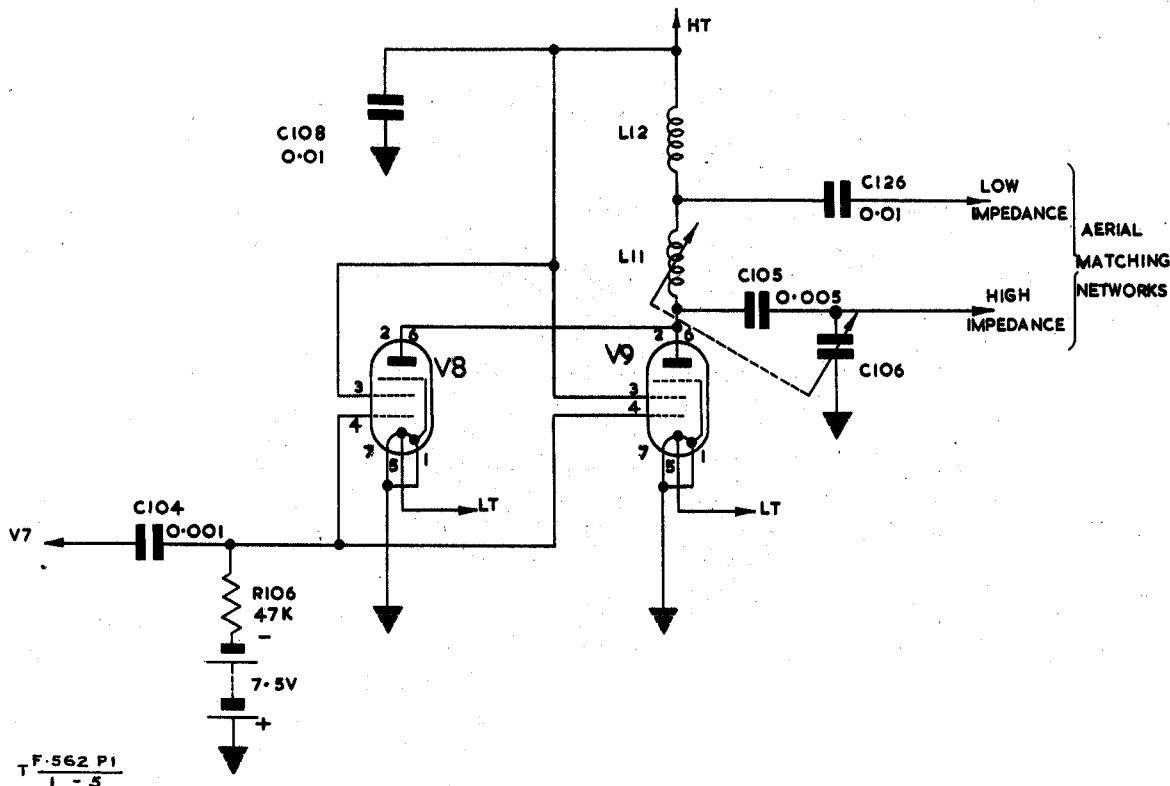


Fig 5 - Transmitter power amplifier

55. The anode tank circuit is tuned by varying L11 and C105 which are ganged together to give a constant L/C ratio tuned circuit. Full h.t. voltage is applied to the screen grids of V8 and V9 and to the anodes via L12 (the r.f. choke) and L11. Capacitor C105 provides d.c. blocking and r.f. coupling to the anode tuning capacitor.

56. When on CW with normal r.f. drive to the p.a. grids, the automatic bias of -8.5V developed across grid leak R106 is added to the standing bias of -7.5V from the bias battery. Thus the total bias becomes -16V.

57. With the system switch in the VOICE position, the action of the r.f. drive voltage, in the unmodulated condition, on MR5 and associated circuit components increases the operating bias to nearly -22V. 100% modulation increases this by approximately -3V by positive grid voltage swing on modulation peaks.

58. R108 between the aerial terminal and earth is an electro-static charge by-pass resistor.

Modulator, V6
(Figs 7 and 8)

59. V6 is a vari- μ h.f. pentode. When on VOICE it amplifies signals from the carbon microphone which are then fed via C127, SC3Fa and R106 to the control grid of the power amplifier. When on CW it is connected as a self-excited, parallel-fed Colpitts a.f. oscillator. Frequencies above 3kc/s are by-passed to earth by C112.

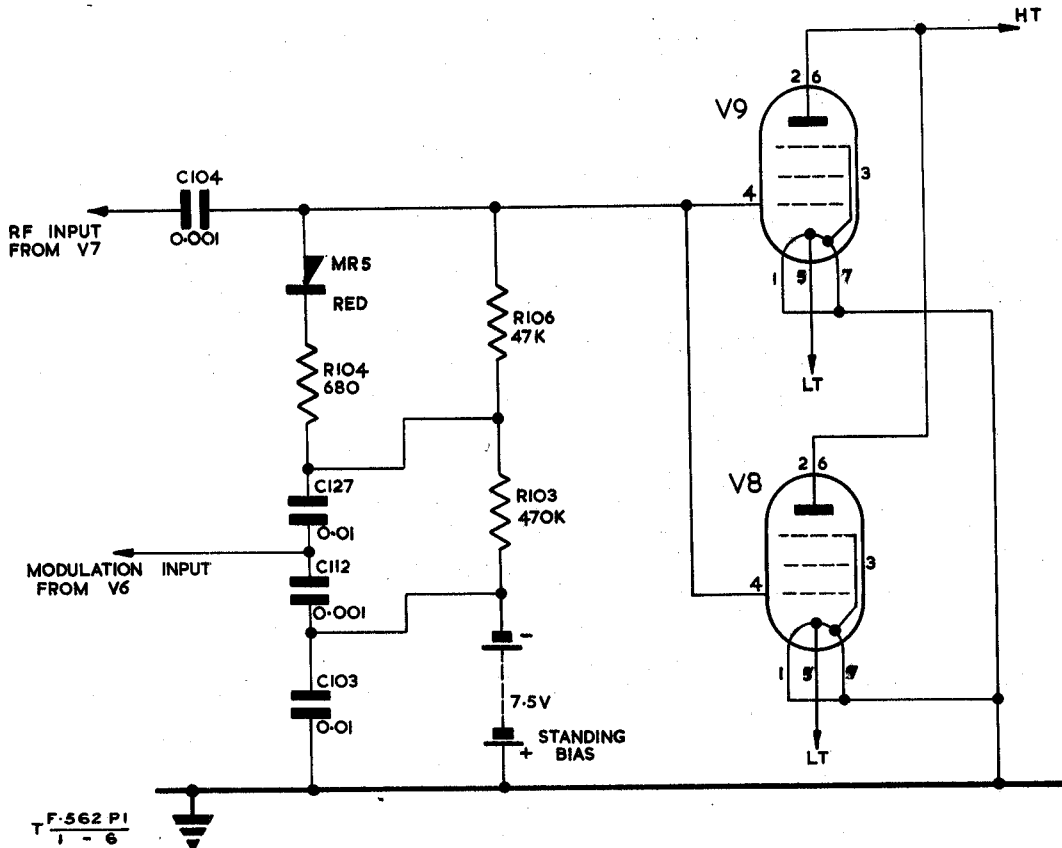


Fig 6 - Transmitter p.a. - simplified bias circuit on VOICE

60. The microphone, energised by the 1.5V battery, is series connected via SC1Fc and interconnecting leads C and E to the microphone transformer TR5. This transformer provides a signal gain of approximately 30dB. V6 gives a further gain of approximately 28dB.

61. H.T. voltage is applied to the anode via R109 and to the screen via R110. A.F. and r.f. decoupling is provided by C101 and C129. Automatic bias is developed across the grid resistor R115.

62. In order to monitor voice transmission, MR6 rectifies a portion of the modulated r.f. carrier output which is developed across the voltage divider R107, R111 and R112 and applied from the junction of R111 and R112 through SC1Ba and lead F to the receiver earpieces as sidetone.

63. When on CW, V6 is connected as a Colpitts oscillator, the secondary of TR5 and the capacitors C109 and C128 forming the tuned circuit. C127 is the anode-to-grid coupling capacitor. When the key is pressed, voltage is applied to the screen of V6 and the resulting signal (550 to 1000c/s) is applied via C110 to the receiver earpieces. The operator is thus able to monitor the c.w. output.

C.W. operation

64. With the system switch at CW and the key plugged into SKT3, pressing the key causes h.t. to be applied to the anodes and screens of V8 and V9, the anode of V7 and the screen of V6.

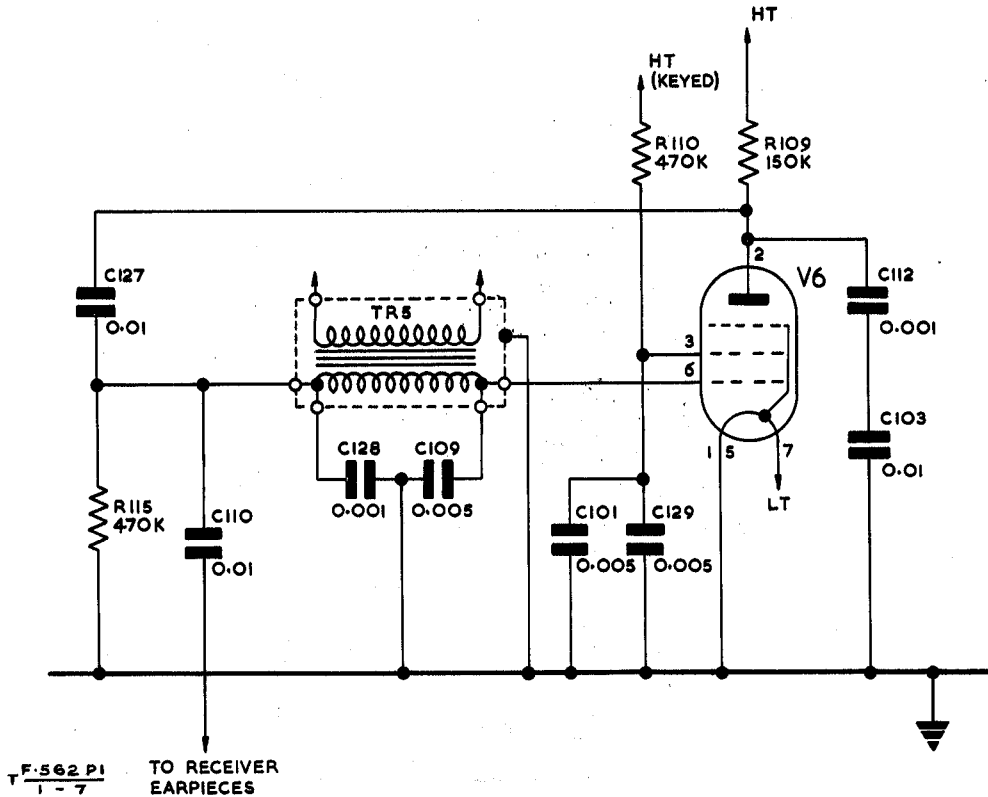


Fig 7 - V6 as sidetone oscillator on send CW

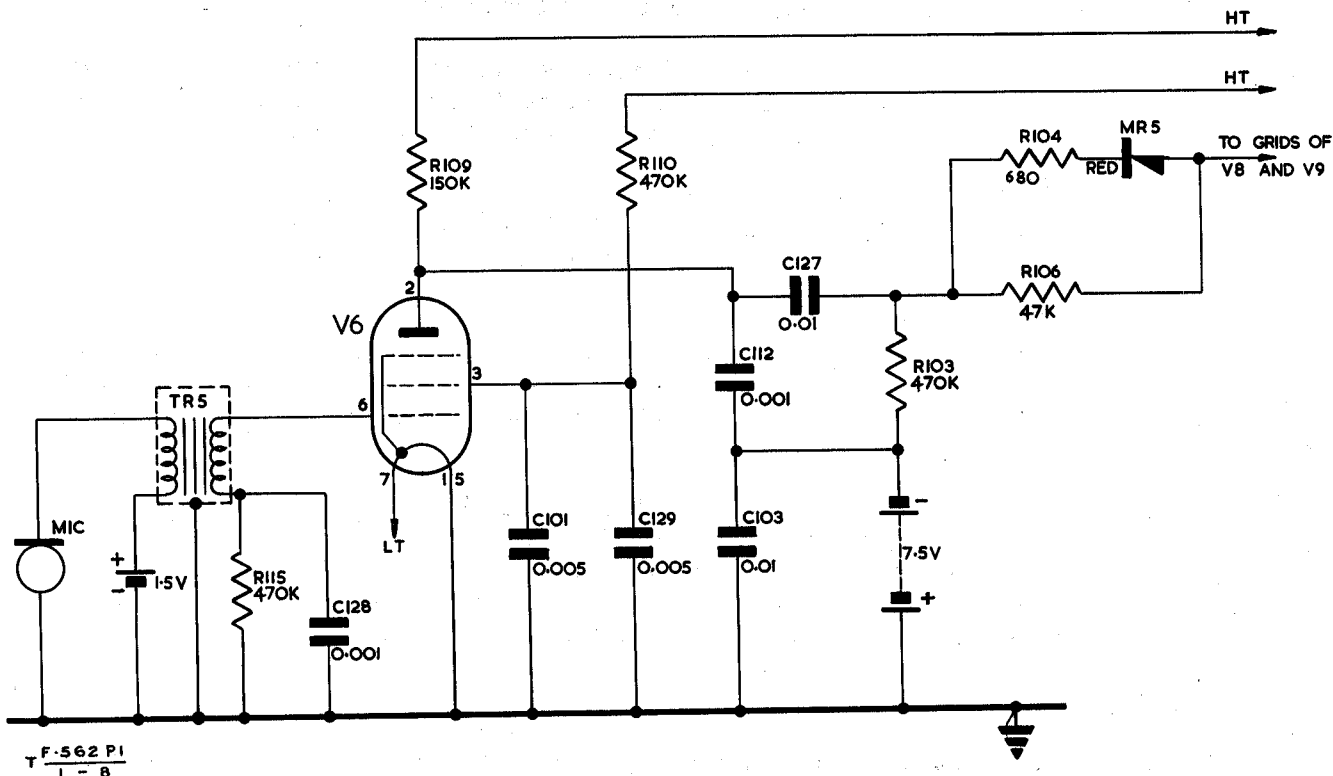


Fig 8 - V6 as modulator on send VOICE

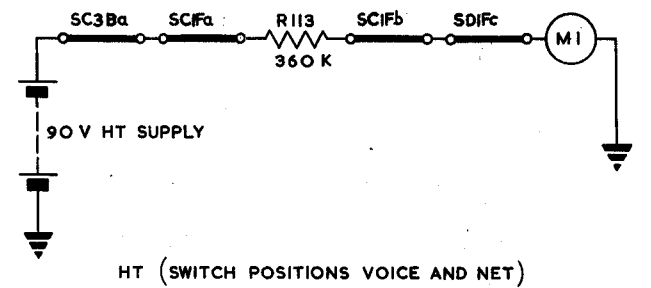
Netting

65. When operating with the system switch in the R position and the A-B-NET switch at NET, the master oscillator V7 is the only valva in the transmitter receiving filament current. This is derived via interconnecting lead C, SD1Ba and SC2Bc.
66. H.T. is fed from the transmitter h.t. line via leads B and H, SC3Bc, SD1Fa and lead J to the heterodyne oscillator in the receiver.
67. The signal from the crystal oscillator is picked up on lead A by stray capacitance coupling and is fed to the receiver aerial coil. In the frequency changer stage, this signal is mixed with the local oscillator signal to produce the i.f. signal of 455kc/s. This beats with the signal from the heterodyne oscillator to produce an audible tone. The receiver is correctly tuned to the crystal oscillator frequency when zero beat is obtained in the receiver earpieces.
68. To prevent overloading of the receiver by the netting signals and to eliminate false netting signals, C103 in the transmitter by-passes the greater part of the signal on lead A to earth, the junction of C105 and C106 in the p.a. anode circuit also being earthed. The aerial is earthed by SD1Fb. This prevents false netting signals being picked up from external sources.

Metering

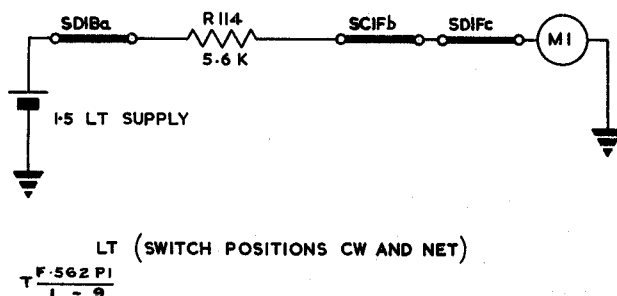
R.F. output

69. An indication of optimum p.a. anode tank circuit tuning is provided by the panel meter. The r.f. voltage is developed across R107, R111 and R112. The portion developed across R111 and R112 is rectified by MR6 and fed to the meter M1 via SD1Fc in position A or B. To reduce the sensitivity of the meter when operating on CW, it is shunted by R116.



Voltage supplies
(Fig 9)

70. Provision has been made to check the 'on load' voltage of the h.t. and l.t. batteries. There is no facility for checking the bias battery as this has sufficient the capacity to outlast the h.t. battery, which is mounted in the same pack.



71. (a) The red band on the meter scale shows the upper and lower h.t. and l.t. limits. The meter has a full scale deflection of 500µA.

(b) To measure h.t. the meter is connected via SD1Fc (NET), SC1Fb (VOICE), R113, SC1Fa and SC3Ba to 90V+ on the h.t. battery. Mid-scale reading on the red band represents approximately 90V.

Fig 9 - Simplified metering circuits h.t. and l.t.

- (c) To measure l.t. the meter is connected via SD1Fc (NET), SC1Fb (CW), R114, SD1Ba and lead C to 1.5V+ on the l.t. battery. Mid-scale reading on the red band represents approximately 1.5V.

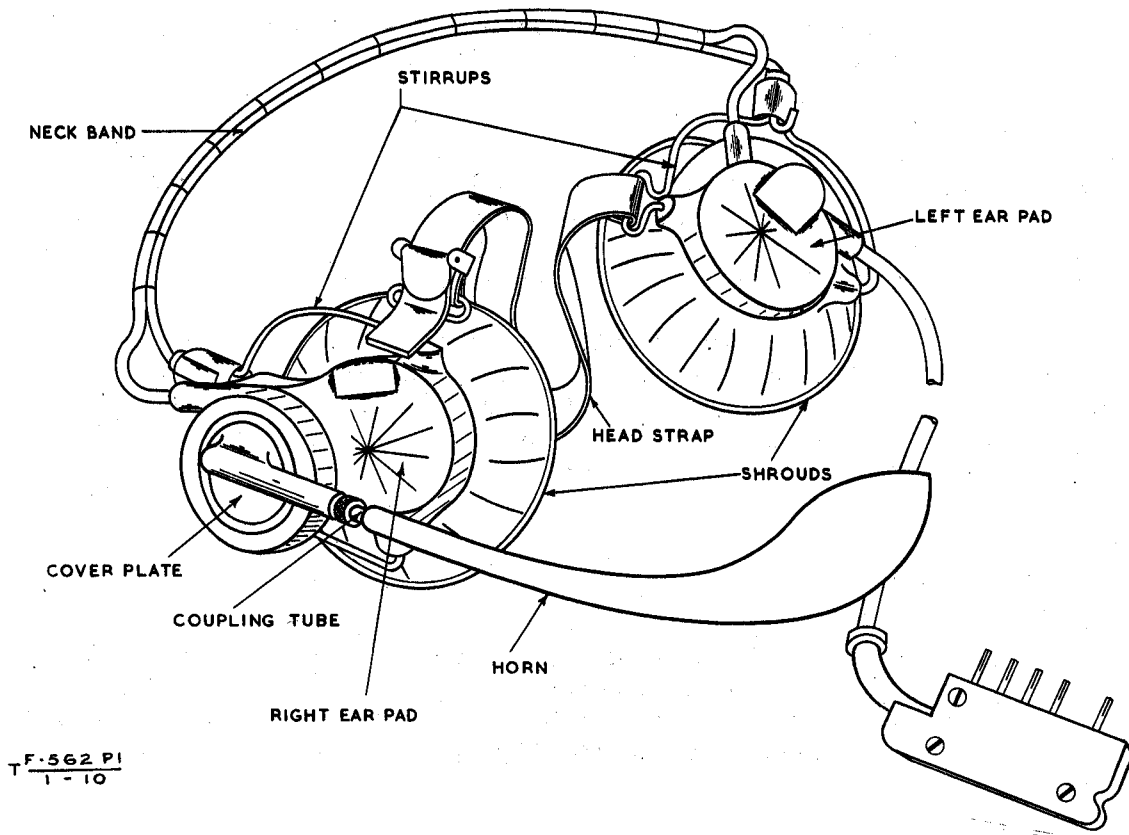


Fig 10 - Headgear assembly

Headgear assembly
(Fig 10)

72. The assembly is carried on the head by a headstrap and neckband and comprises two moving coil receiver earpieces connected in parallel and a carbon microphone. A single drop lead terminates in a 5-pin plug. The microphone and one receiver inset are contained in one earpiece which also carries the microphone horn. This is attached to a tube carried on a cover plate which is held in place by a circular rubber lip on the earpiece. The position of the horn is fully adjustable. The horn, with the cover plate, is removeable.

Hand telephone

73. This comprises a carbon microphone and moving coil receiver inset held in place by screw-on caps, with a single flexible lead terminating in a 5-pin plug. The pressel switch, a double-pole change-over switch, is mounted in the plastic moulding of the hand-set. Wires terminate on five of the switch tags but only one section of the switch is used. When operated, this section energises the carbon microphone.

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END of Part 1