

WIRELESS SET A 510

TECHNICAL HANDBOOK - GENERAL DESCRIPTION

GENERAL

1. The wireless set A 510 is a crystal controlled, low power, light-weight transmitter-receiver principally intended for operation by long range infantry patrols. It is designed primarily as a one man-pack station. The transmitter and the receiver are separate hermetically sealed units carried in two special web pouches which take the place of the standard basic pouches.
2. The equipment covers a frequency range from 2Mc/s to 10Mc/s in two bands and provides facilities for either voice or CW working.
3. An 8 ft. rod aerial (with associated rod tuner) is used when the set is employed in the man-pack role. An end fed wire and dipole aerial are provided for ground station installation.
4. Communication distances will vary according to conditions and terrain, typical figures for open country are as follows:-

GROUND WAVES	VOICE	U.W.
Rod aerial to rod aerial (man-pack or vehicle installation)	2 miles	4 miles
Rod aerial to rod aerial (ground station)	3 "	6 "
Wire aerial to wire aerial	6 "	12 "
SKY WAVES		
Suitable frequency and aerial	40 "	120 "

5. The set operates from dry batteries which provide 90 volts H.T., -7.5 volts P.A. grid bias and 1.5 volts L.T. The normal life of the battery is approximately 14 hours for continuous operation with a ratio of 1 hour send to 5 hours receive.

6. For a complete station layout refer Fig. 1001.

MECHANICAL DESCRIPTION

7. The receiver and transmitter are separate units housed in light, cast aluminium alloy cases which are secured to the panels by hexagon nuts located at the corners of each unit. A swivel carrying handle is attached to each panel.
8. The 1.5 volt L.T. battery is carried in a separate compartment, located at the base of the receiver case and the 90/-7.5 volt battery is similarly housed at the base of the transmitter case. Access to each battery compartment is obtained by two locking wheels situated at the sides of each unit. The 1.5V L.T. and 90V H.T. potentials are common to each unit, interconnection between each is provided by a 12 core cable and 17 pin plug and socket.
9. Neoprene rubber gaskets between panel and case, and battery compartment and case ensure watertight sealing of each unit. The dial illumination lamps and crystals are also in separate sealed compartments.
10. The aerial mounting situated on the transmitter panel is a polarized bayonet type plug which matches the socket of the rod aerial tuner. A spring loaded terminal in the centre of the aerial plug ensures rigid mounting of the rod aerial tuner, in addition it functions as the wire aerial termination.
11. The earth terminal is situated on the flange of the transmitter panel near the aerial tuning meter and consists of a leaf spring which on being depressed reveals an aperture for insertion of the earth lead.

12. The 8 ft. rod aerial tuner is a variable inductance housed in a sealed diecast case, and a calibrated frequency dial is ganged to the tuning knob. The calibration of this dial is approximately correct only when the 8 ft. rod aerial is used and when the aerial is correctly tuned a locking lever is provided to lock the tuning knob. The unit is attached to the transmitter by a polarized bayonet plug and socket above which is a ball and socket joint to allow movement of the rod aerial and tuner.

13. A mounting plate for the W.T. key is attached to the side of the transmitter panel. The controls and panel mountings of transmitter and receiver are shown in Fig. 1.

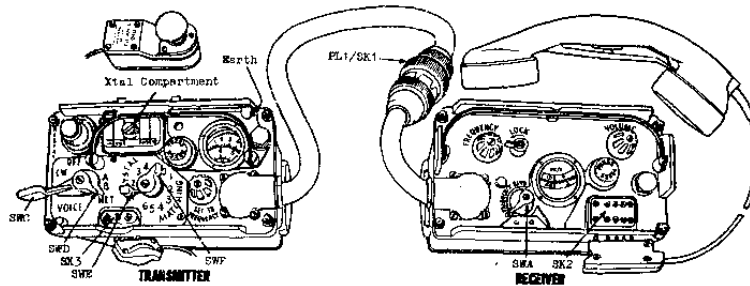


FIG. 1

BRIEF ELECTRICAL DESCRIPTION

Receiver (Fig. 2)

14. The receiver is a reflexed superheterodyne, employing 5 valves

- V1 Tuned RF amplifier
- V2 Mixer
- V3 1st IF amplifier
- V4 2nd IF amplifier and reflex audio amplifier
- V5 Heterodyne oscillator and diode detector

15. The heterodyne oscillator is employed on C.W. reception and when netting. When receiving C.W. signals the heterodyne oscillator signal, beats with the interrupted I.F. signal to produce an audible tone at the receiver earpieces. When netting the receiver relies on the transmitter crystal oscillator for its netting signal. This signal through inter-wiring capacity is coupled to the receiver input. The resultant receiver I.F. signal beats with the heterodyne oscillator signal; zero beat at the receiver earpieces indicating correct tuning of the receiver to the netting signal.

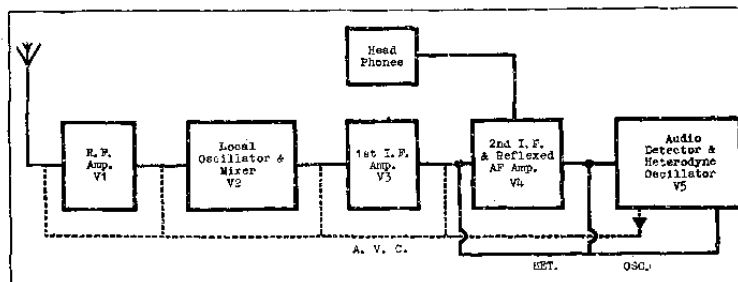


FIG. 2

Transmitter (Figs. 3 and 4)

16. The transmitter employs 4 valves

V6 Modulator or C.W. sidetone oscillator
V7 Crystal oscillator
V8 & V9 Power amplifier

17. On C.W. operation, V6 is an audio oscillator which provides the side tone 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.

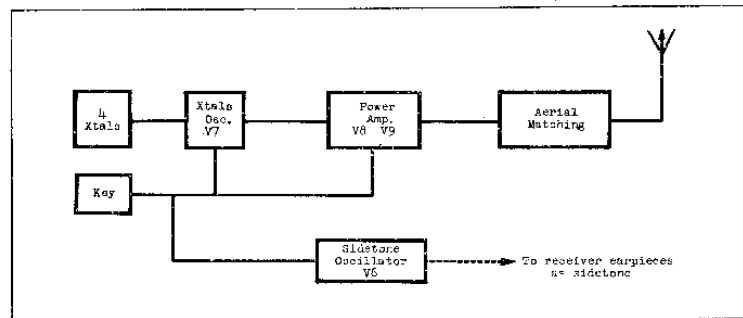


FIG. 3

18. On voice transmission V6 functions as an AF amplifier, supplying the modulating signal to the power amplifier grids. Portion of the modulated signal is used as side-tone to monitor the transmitter output.

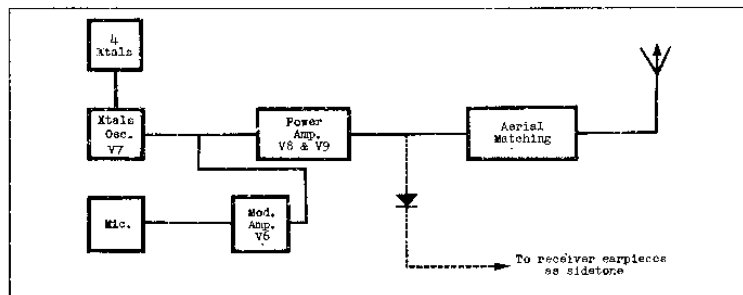


FIG. 4

TECHNICAL DESCRIPTION

RECEIVER

The R.F. Amplifier (Fig. 5)

19. Valve V1 operates as a tuned R.F. amplifier on both the high and low frequency bands. The signal input is fed to the grid circuit by L2/L1 on the low band, and L2/L3 on the high band. These transformers match the low impedance aeriials to the grid of V1.

NOTE:- When operating with a high impedance aerial with the "A-B-Net" switch in the "A" position, the receiver aerial coil is excited through SWD1 and SWD2 from the junction of L11 and L12, in the transmitter tank circuit, via C126, SWC3, SWD2 and

SWC4. Thus, when a high impedance aerial is used for receiving, this high impedance is transformed down to a low impedance by the transmitter tank circuit before being fed to L2 in the receiver. When a low impedance aerial is used with the "A-B-Net" switch in the "B" position, the receiver aerial coil L2 is excited direct from the aerial through SWD1, SWF2, C102, SWC3, SWD2 and SWC4.

C36 improves the image ratio at the higher frequencies. On low frequency band the grid tuned circuit consists of L1, C4 and trimmer C1. On the high frequency band the grid tuned circuit consists of L3, C4 and trimmer C2. The grid coupling capacitor is C5, and R1 serves as the grid leak resistor. AVC voltage is applied to the grid through R1 via the AVC filter R7 and C12.

The anode load consists of the tuned circuit, L5, C7 and trimmer C8 on the low frequency band, and on the high frequency band, L4, C7 and trimmer C9.

Anode to high tension decoupling is provided by C10 and R6. The main receiver H.T. is supplied via SWC6 and pin B of SK1.

Screen grid potential for V1 and V3 is obtained from a common decoupling network R2 and C6.

To prevent absorption from the working coils the unused grid and anode tuning coils and associated trimmers are short circuited through their respective switches SWA1 and SWA4.

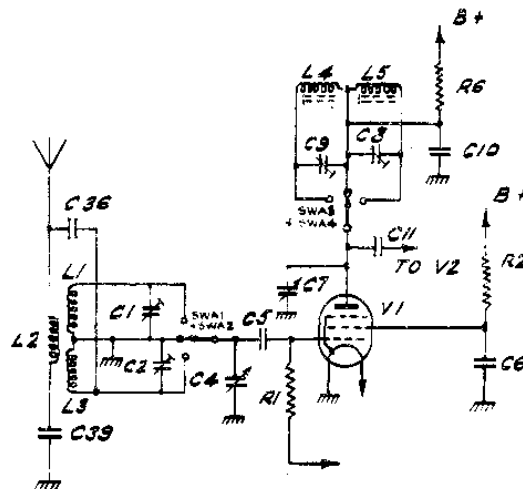


FIG. 5 - SIMPLIFIED RECEIVER
R.F. STAGE

The Mixer Stage (Fig. 6)

20. Valve V2 functions as a local oscillator and a mixer in a frequency changing stage.

Oscillator section - The oscillator of each frequency band employs a tuned grid inductively coupled anode circuit.

BLUE BAND 2-4.5Mc/s

Oscillator, low frequency band - Oscillator fundamental frequency = 2.455-4.955Mc/s
(Sig freq + 455 kc/s)

The oscillator low band components and their functions are set out below.

Grid Circuit	Purpose	Plate Circuit	Purpose
C13	Main tuning (gang)		
C16	Temperature compensation capacitor		
C21	Trimmer for aligning high frequency end of band	L6	Plate to grid feedback coil
C15	Padder		
C17	Grid coupling capacitor		
L7	Main tuning coil with powdered iron slug for adjustment at low end of band	R9	Plate decoupling resistor
R5	Grid leak bias resistor		

ORANGE BAND, 4.5-10Mc/s

Oscillator, high frequency ~ Oscillator fundamental frequency $\times$ 2.478-5.228Mc/s
band $\frac{1}{2}$ (Sig freq + 455 kc/s)

On the high frequency band the second harmonic of the fundamental oscillator frequency heterodynes with the signal frequency to produce the IF frequency. The oscillator high band components and their functions are set out below.

Grid Circuit	Purpose	Plate Circuit	Purpose
C13	Main tuning (gang)		
C16	Temperature compensation capacitor		
C20	Trimmer for aligning high frequency end of band	L8	Plate to grid feedback coil
C14	Padder		
C17	Grid coupling capacitor		
L9	Main tuning coil with powdered iron slug for adjustment at low end of band	R8	Plate decoupling resistor
R5	Grid leak bias resistor		

The Mixer Section

21. The signal from the anode of the R.F. amplifier V1 is fed to the mixer control grid by C11. A.G.C. bias is applied to this grid through R4 and the A.G.C. filter R7 and C12.

The anode load for V2 consists of the primary of TR1 (1st I.F. transformer) and C18 which is tuned to 455 kc/s (the intermediate frequency) by means of an iron dust core. Anode voltage is obtained via the primary of TR1 and the oscillator anode H.T. supply.

The screen grid of the mixer also functions as the oscillator anode. The operating voltage is supplied via R9 or R8 and the feedback coil L6 or L8, depending upon the frequency band in use.

The filament of V2 is decoupled from the L.T. supply line by L13 and C3 to reduce interstage regeneration.

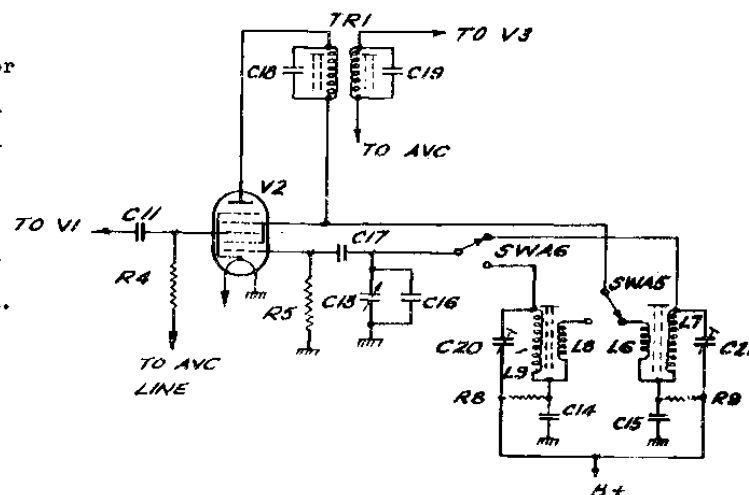


FIG. 6 - SIMPLIFIED RECEIVER MIXER

The First I.F. Stage (Fig. 7)

22. Valve V3 functions as a tuned intermediate frequency amplifier, with both grid and plate circuits tuned to the 455 kc/s intermediate frequency.

The control grid is fed from the tuned secondary of TR1 with A.G.C. bias applied via filter network R7 and C12.

The screen grid is connected in parallel with that of V1, and is thus fed through R2 with C6 as the screen bypass.

The anode tuned circuit consists of TR2 primary and C23. The H.T. supply is applied to the anode via the primary of TR2 and C22 eliminates possibility of R.F. feedback to associated circuitry via the H.T. line. Filament decoupling is also provided for this stage by L13 and C3.

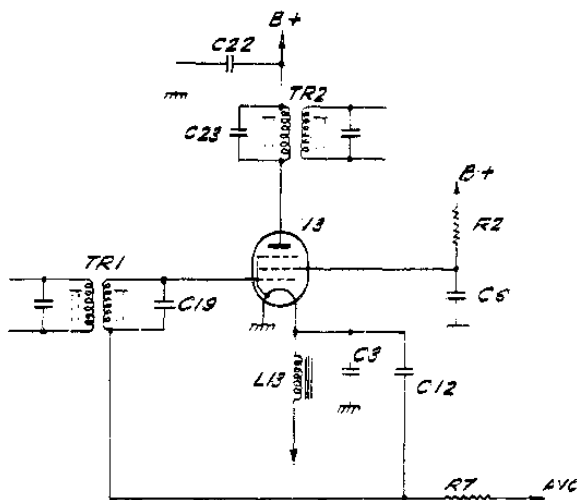


FIG. 7 - RECEIVER 1ST I.F. STAGE

Second I.F. and Reflex Audio Amplifier (Fig. 8)

Valve V4 serves the dual purpose of a tuned I.F. amplifier and a reflexed audio amplifier.

The I.F. Section

23. The anode intermediate frequency tuned circuit consists of the primary of TR3 and C30. High tension voltage is obtained via the primary of TR4 (the audio output transformer).

The screen grid supply voltage is obtained via the R.F. and A.F. decoupling network R13 and C29.

The grid tuned circuit consists of the tuned secondary of TR2. In order to apply A.G.C. to the grid of V4, which has both the I.F. and audio frequency voltages applied to it, a separate A.G.C. feed is required. To accomplish this two series-connected high impedance resistors R15 and R14 are connected in parallel with the main A.G.C. line, and the portion of A.G.C. voltage developed across R14, along with the audio voltage coupled from RV1 through C28, are applied to the control grid via the I.F. decoupling network R12 and C25. Condenser C25 maintains the secondary of TR2 at R.F. earth potential. C27 is the I.F. bypass.

The Audio Section

24. The output from the tuned secondary of TR3 is rectified by the diode section of V5. This rectified output is developed across the I.F. filter R17, C32 and C38 to RV1, the diode load and audio volume control. A portion of the audio voltage developed across RV1 is fed by the coupling capacitor C28 and the I.F. filter R12 and C25 to the secondary of TR2 and hence to the grid of V4. This audio voltage is amplified by V4 whose audio anode load consists of TR4 primary. Therefore the audio signal component appears across the primary of TR4, hence from the secondary of TR4 to the receiver earpieces via SK2. To reduce excessive audio peaks across the primary of TR4 it is coupled through C26 to a limiting circuit. This limiter consists of rectifier MR1 which is biased to a predetermined value by the voltage divider R10 and R11.

For signal or noise peaks exceeding the bias on MR1, the limiter rectifier cond-

ucts and effectively short circuits the primary of TR4 during the duration of the peak.

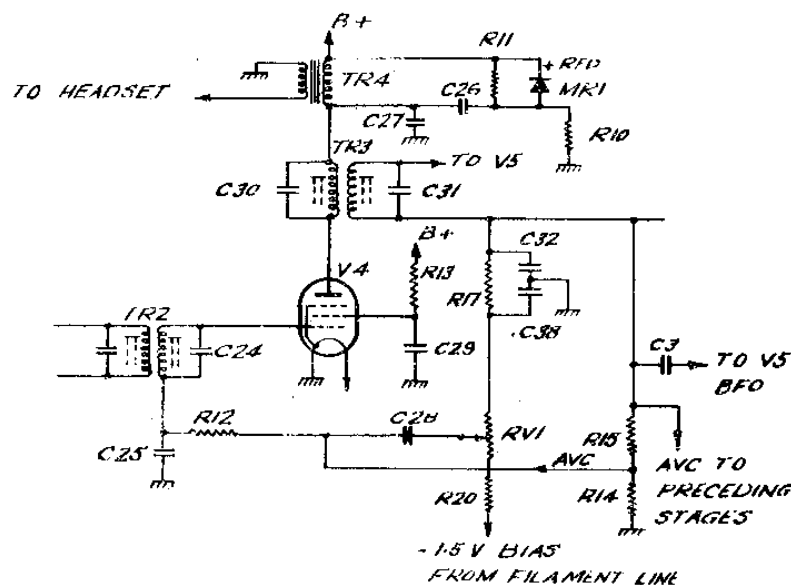


FIG. 8 - RECEIVER 2ND I.F. & REFLEXED AUDIO STAGE

Heterodyne Oscillator (Fig. 9)

25. This stage is used on C.W. receiving or on netting functions.

When receiving with the key plugged into the transmitter, the oscillator H.T. voltage is supplied via SWC6, pin B of PL1, pin H of PL1, SWC6, SK3 and the "jumper" lead in the key, R117, pin J of PL1 and anode decoupling network R19 and C37.

When netting, the oscillator H.T. is supplied via SWC6 in the "R" position, and SWD1 in the "NET" position. The oscillator is a series fed, triode connected Hartley circuit, stable operation being ensured by returning R18 to the anode. Additional grid current resulting from the alternating grid voltage automatically biases the stage to its operating condition. The fundamental oscillator frequency is half the I.F. frequency. The second harmonic of this frequency is fed via the voltage divider network C40, C41, R21 through C42 to the grid of the 2nd I.F. amplifier V4, and also via C34 to the diode circuit where in each case mixing of the received signal and the heterodyne oscillator signal occurs. This results in an audible tone at the receiver earpieces for C.W. reception. When netting

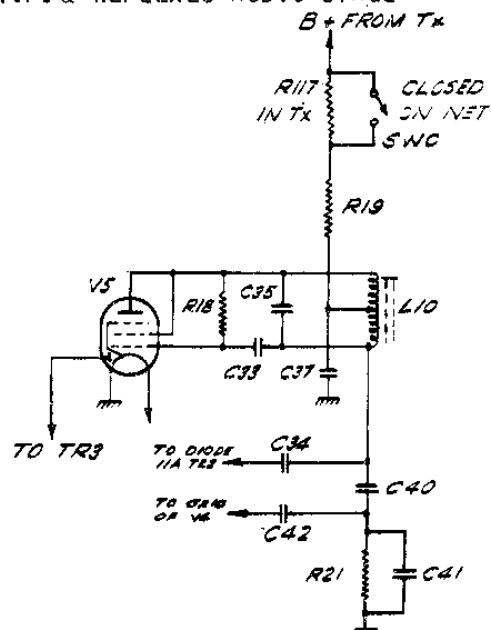


FIG 9 - RECEIVER HETERODYNE OSCILLATOR

the receiver is tuned to zero beat with the heterodyne oscillator signal.

TRANSMITTER

The Crystal Oscillator V7 (Fig. 10)

26. Valve V7 is connected as a triode in a crystal oscillator circuit. Any one of the four crystals inserted in the crystal sockets of the transmitter may be selected by switch SWE.

The plate to grid circuit consists of C113 (the D.C. blocking capacitor), and the selected crystal. The grid to earth capacitor C107, in series with the plate to earth wiring and electrode capacities, builds up the capacity across the crystal to 30pF (Fig. 11). Automatic bias is obtained by grid current flowing through R101.

Anode voltage is obtained through plate load R105 and the R.F. output (drive voltage) is coupled to the P.A. stage via C104.

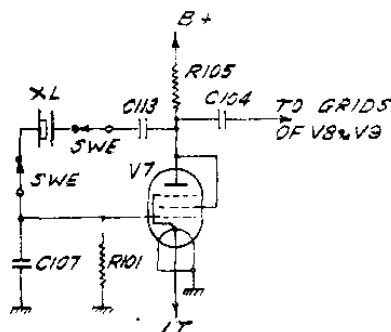


FIG. 10 - TRANSMITTER
CRYSTAL OSCILLATOR

The Power Amplifier V8 and V9 (Fig. 12)

27. The power amplifier consists of V8 and V9 connected in parallel.

Tuning of the anode tank circuit is accomplished by varying L11 and C106 which are ganged together to give a constant L/C ratio tuned circuit. The anode H.T. supply is obtained via the R.F. choke L12 and the screen voltage supply is obtained directly from the H.T. line.

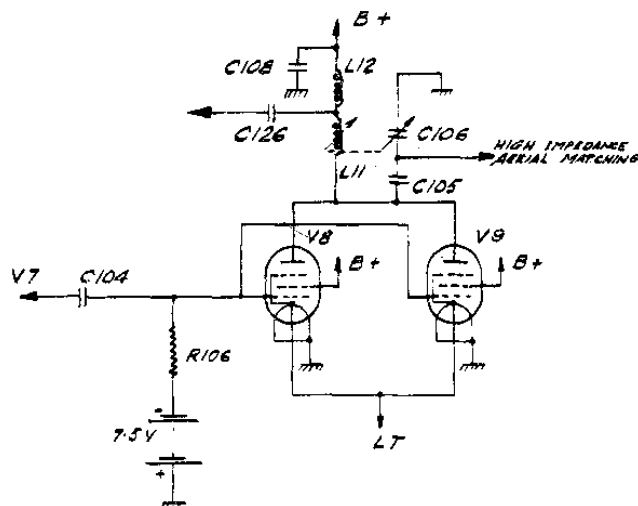


FIG. 12 - TRANSMITTER POWER AMPLIFIER -
AERIAL COUPLING AND METERING CIRCUITS
OMITTED

Bias for P.A. Stage

28. NOTES:-1. The normal R.F. drive voltage from the crystal oscillator is approximately 12 volts R.M.S. (17 volts peak).
2. With the transmitter operating in either the voice or C.W. condition, a standing bias voltage of -7.5 volts is applied to the P.A. grids from the bias battery.

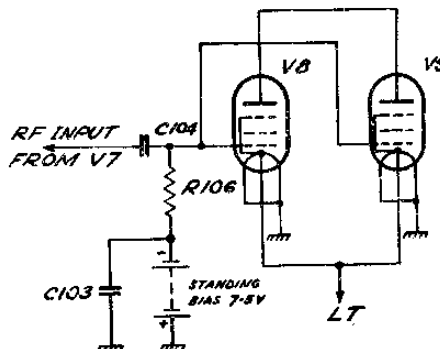


FIG. 13 - SIMPLIFIED CIRCUIT OF
P.A. BIAS CIRCUIT - C.W.

Control Switch
Position

C.W. (Fig. 13)

With normal R.F. drive voltage of 17 volts peak to the grids of the P.A., the bias is increased to -16 volts due to automatic bias being developed across grid leak R106. Therefore the total bias of -16V is the sum of the standing bias and automatic bias.

VOICE

(Fig. 14)

In the unmodulated condition a bias voltage in addition to the standing -7.5V bias is produced by the action of the R.F. drive voltage on MR5 and associated circuitry such that the operating bias approaches -22 volts.

Referring to the simplified diagram Fig. 14b it will be seen that with a positive going signal applied to CA₄ from the R.F. generator, a movement of electrons will take place in the circuit as CA₄ charges. The rectifier MR5 presents a virtual short circuit across R106 and most of the instantaneous flow will be through R104, MR5. During the succeeding negative going half cycle, the movement of electrons will be in the opposite direction, MR5 now offers a very high resistance in comparison with R106 so that the main flow is through R106. In practice this current is approximately .32mA (mean value) and 16 volts is developed across the 47Kohms resistor R106.

With sufficient modulating voltage applied to the P.A. grids to produce 100% modulation, an additional bias of approximately -3 volts is added to the existing -22V bias, and so the bias voltage approaches -25V. This increase in bias is produced by positive grid voltage swing on modulation peaks.

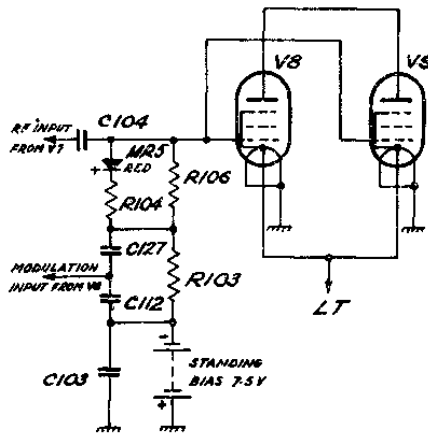


FIG. 14A - SIMPLIFIED CIRCUIT
OF P.A. BIAS CIRCUIT - VOICE

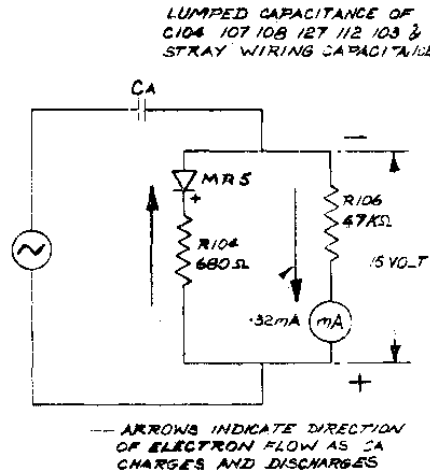


FIG. 14B - SIMPLIFIED CIRCUIT
OF P.A. BIAS CIRCUIT - VOICE

AERIAL MATCHING

General

29. As the power amplifier does not operate satisfactorily with anything but a resistive load of approximately 2,000 ohms, aerials must be matched to the power amplifier. This is accomplished by using the "A-B NET" and the "MATCHING" switches or the rod tuner, as set out below.

High Impedance Aerial Matching (Fig. 15)

30. Position "A" of the A-B NET switch is used for matching the high impedance aerial. In this position the aerial is effectively placed in parallel with the anode tuned circuit as shown in Fig. 16. R.F. power is taken from the junction of L11 and C106 since C105 only functions as R.F. coupling and H.T. D.C. blocking to the tuning condenser and aerial.

Half wave end fed long wire aerial

31. When operating with the end fed long wire aerial (Table "A" on the aerial bobbin) this high impedance half wave aerial appears to the P.A. tuning circuit as a combination of resistance and inductance. Therefore to resonate this aerial as close as possible, the seven position "MATCHING" switch SWF1 is used to place either an open circuit or one of the six condensers C114-C119 in parallel with the aerial impedance. The entire tuned circuit is then accurately resonated by retuning the P.A. tuning circuit slightly. This ensures an optimum resistive load for the power amplifier and maximum radiation from the aerial.

NOTE:- Using the "B" table on the aerial bobbin, the end fed long wire aerial is used as a quarter-wave low impedance aerial. Under these conditions aerial matching is accomplished as detailed in the low impedance aerial case.

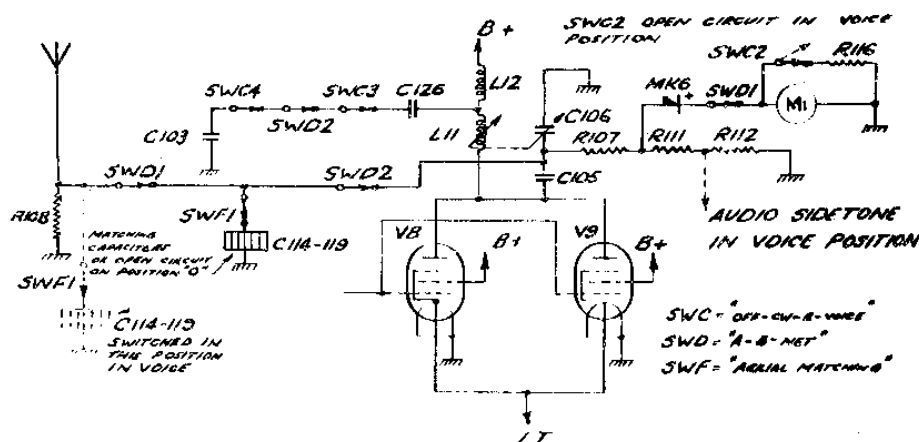


FIG. 15 - SIMPLIFIED CIRCUIT OF P.A. STAGE WHEN OPERATING ON C.W. IN POSITION "A" USING LONG WIRE END FED AERIAL

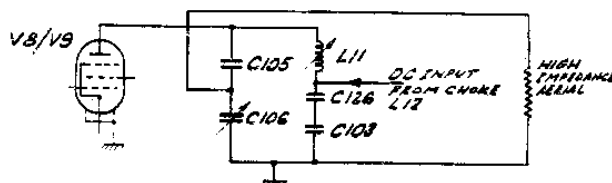


FIG. 16 - SIMPLIFIED DIAGRAM FOR POSITION "A" ON THE "A-B-NET" SWITCH

Low Impedance Aerial Matching (Fig. 17)

32. Position "B" of the A-B Net switch is used to match the low impedance aeriels to the P.A. tuning circuit and so are connected at the junction of L11 and L12 to become a component of the anode tuning circuit as shown in Fig. 18. The entire tuned circuit then becomes a suitable high impedance load for the P.A. when resonant.

Quarter Wave End Fed Long Wire Aerial

33. This aerial, when used in accordance with Table "B" on the aerial bobbin, is a quarter wave low impedance aerial. Aerial matching switch SWF2 is used to place either a direct connection or one of the six matching condensers, C120-C125 in series with the aerial to resonate as close as possible any inductive component of the aerial impedance which will be present at certain frequencies and aerial lengths. Retuning the P.A. tuned circuit will compensate for any capacitance change required to ensure optimum resistive loading of the power amplifier.

Dipole Aerial

34. The horizontal dipole is nearly a resistive, low impedance aerial; hence the aerial matching switch SWF2 is used in position "O" and the fine tuning necessary is accomplished by retuning the P.A. tuned circuit.

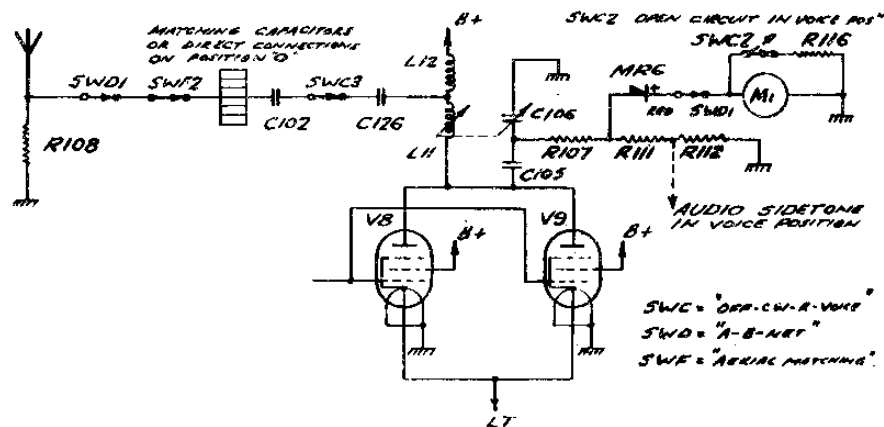


FIG. 17 - SIMPLIFIED CIRCUIT OF P.A. STAGE WHEN OPERATING "C.W." IN POSITION "B" I.E. WITH WHIP OR DIPOLE AERIALS (ALSO END FED LONG WIRE AERIAL WHEN THIS AERIAL IS SET UP ACCORDING TO TABLE "B" ON THE AERIAL BOBBIN)

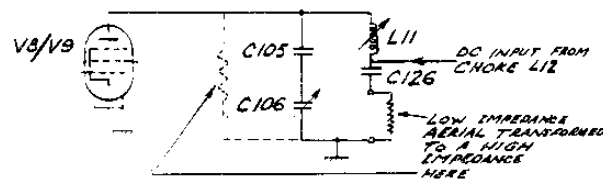


FIG. 18 - SIMPLIFIED DIAGRAM FOR POSITION "B" ON THE "A-B-NET" SWITCH

Rod Aerial

35. When the set is carried on a man the 8 ft. rod aerial appears to the transmitter aerial terminal as shown in Fig.19.

The rod tuner (a variable inductance) is inserted in series with the rod aerial to resonate the 20pF capacitance of the rod aerial, then the aerial appears as in Fig. 20. When the rod tuner is tuned for maximum aerial meter reading, the rod tuner and rod appear to the transmitter as a low impedance resistive aerial (Fig. 21). Here the aerial matching switch SWF2 is always used in position "O", so giving a direct connection from C102 to the aerial terminal.

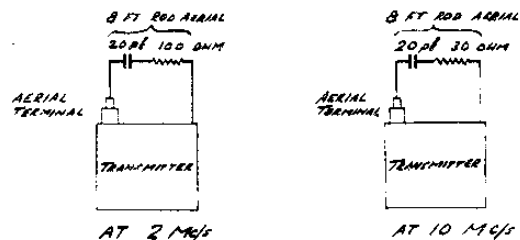


FIG. 19

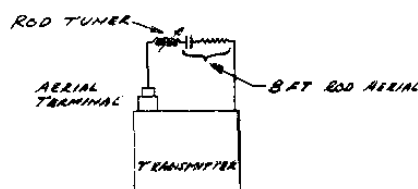


FIG. 20

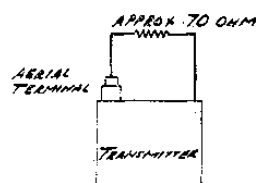


FIG. 21

The Rod Tuner

36. This is a variable inductance which is mounted in series with the 8 ft. rod aerial. Its purpose is to improve the matching of the aerial to the transmitter, thus increasing the radiated power.

The unit consists of a fixed coil surrounded by a fixed cylindrical ferrite shell and a long core, to one end of which is fixed an aluminium shell. In the other end of the core is a ferrite slug. Maximum inductance is obtained by moving the aluminium shield out of the coil and sliding the ferrite slug into the coil. Minimum inductance is obtained by sliding the ferrite core out of the coil and moving the cylindrical aluminium shell between the outside of the coil and the ferrite outer shell. This movement is obtained by means of a simple crank driven by a gear and pinion.

To provide protection the unit is mounted in a sealed diecast case. The frequency scale provided is approximately correct only when used with the 8 ft. rod aerial.

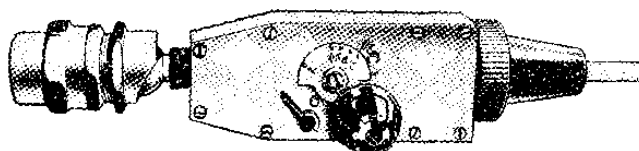


FIG. 22

METERING

R.F. Output (Fig. 17)

37. An indication of optimum anode tank tuning is provided by the panel meter connected across the output of the power amplifier. The meter circuit consists of the voltage divider R107, R111, R112, the rectifier MR6, and the meter M1. To reduce the sensitivity of the meter when operating on C.W., it is shunted by R116.

Voltage Supplies (Figs. 23 and 24)

38. To enable the operator to check the condition of the internal batteries, provis-

ion has been made to measure the on load voltage of the H.T. and L.T. batteries. No provision has been made to check the condition of the bias battery, which has sufficient capacity to remain in good condition long after the H.T. battery, which is mounted in the same pack, has expired.

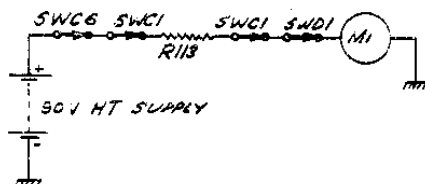


FIG. 23 - SIMPLIFIED H.T. METER-
ING CIRCUIT SWITCH POSITIONS
VOICE AND NET

C.W. Operation

39. C.W. operation is obtained by keying the main high tension supply through SWC6, SWC1 and SK3 to the anodes and screen grids of V7, V8 and V9, and the screen grid of V6.

To enable an operator to monitor his keyed transmission, an artificial keying side tone is generated by V6 (Fig. 25) which operates as a parallel fed audio Colpitts Oscillator in the frequency range 550-1,000 cycles per second.

C.W. Audio Sidetone Oscillator (Fig. 24)

40. The grid to anode tuned circuit of this oscillator consists of TR5 secondary, C128 and C109, with C127 functioning as the anode coupling. The audio output from the oscillator is applied to the receiver earpieces via coupling condenser C110.

The anode supply voltage is obtained via the anode load R109 and the screen grid supply voltage via the A.F. and R.F. decoupling network R110, C101 and C129. This screen grid voltage is switched by the operation of the key, thus the audio oscillator signal is synchronised with the transmitted R.F. carrier. Automatic bias is developed across grid leak resistor R115.

Voice Modulation (Fig. 26)

41. The audio drive for V6 is obtained from a carbon microphone excited from the 1.5 volt filament battery. The alternating voltage produced in the primary of TR5 is inductively coupled to its secondary which is connected directly to the grid circuit of V6.

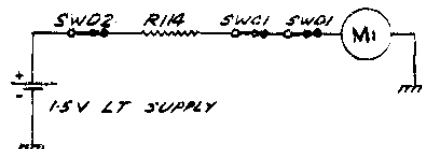


FIG. 24 - SIMPLIFIED L.T. METER-
ING CIRCUIT SWITCH POSITIONS
C.W. AND NET

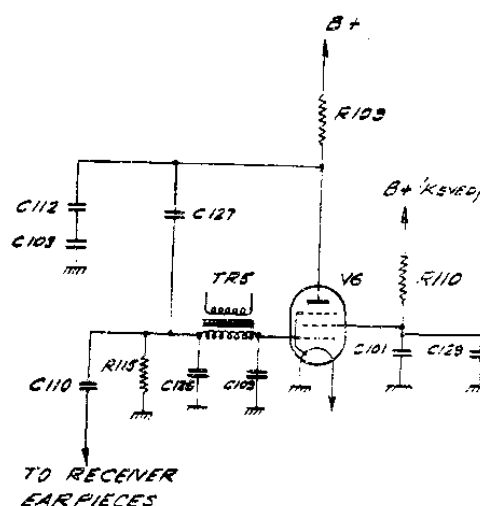


FIG. 25 - TRANSMITTER V6 IN C.W.
CONDITION (AUDIO SIDE-TONE OSCILLATOR)

The audio voltage developed at the anode load resistor R109 is applied via the coupling capacitor C127, R106 to the grids of the power amplifier V8 and V9. This audio voltage modulates the grid bias of the power amplifier. Condenser C112 functions as a high A.F. bypass.

To enable an operator to monitor his voice transmission, MR6 rectifies portion of the modulated R.F. carrier output which is developed across the voltage divider network R107, R111 and R112, and applied from R112 through SWC2 to the receiver earpiece as sidetone.

Netting (Fig. 27)

42. When operating with the "Control Switch" on "R" and the "A-B-NET" switch on "NET", the master oscillator V7 is the only portion of the transmitter which operates, since it is the only stage to receive filament supply voltage which is obtained via SK1/PL4 pin "C" SWD2 and SWC4.

High tension voltage is fed from the transmitter H.T. line via SWD1 in the "NET" position and pin "J" of PL1/SK1 to the heterodyne oscillator in the receiver.

The crystal frequency is picked up by the wiring in the transmitter through stray capacity coupling with the oscillator circuit. This signal is fed via lead "A" of the inter-connecting cable to the receiver aerial coil. The receiver mixer then changes the crystal frequency to an intermediate frequency; this signal then beats with the heterodyne oscillator frequency to produce zero beat when the receiver is correctly tuned. The following precautions are taken in order that the receiver will not be overloaded by the crystal netting signal and also to safeguard against false netting signals:-

- (i) C103 in the transmitter bypasses most of the signal on lead "A".
- (ii) The P.A. tank circuit is earthed at the junction of C105 and C106 through SWD2. Also, the aerial terminal is earthed via SWD1 to prevent signals from other stations being received and producing false netting signals.

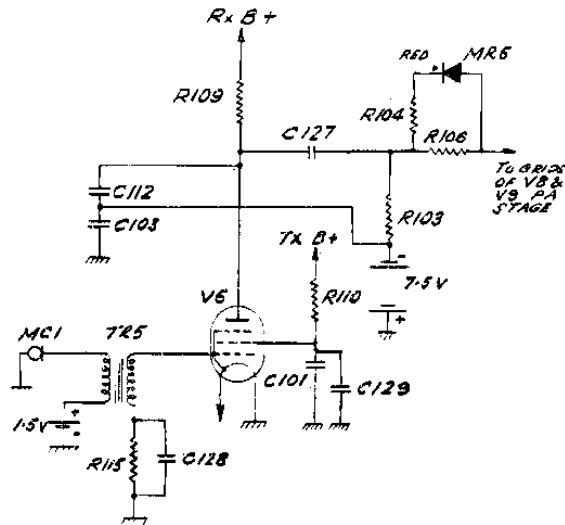


FIG. 26 - TRANSMITTER V6 IN VOICE MODULATION CONDITION

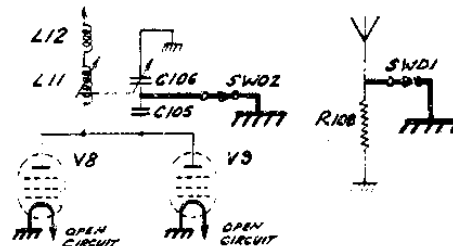


FIG. 27 - SIMPLIFIED DIAGRAM OF OUTPUT STAGE (V8 & V9) IN "NET" CONDITION

NOTE:- The next page is Page 1001.

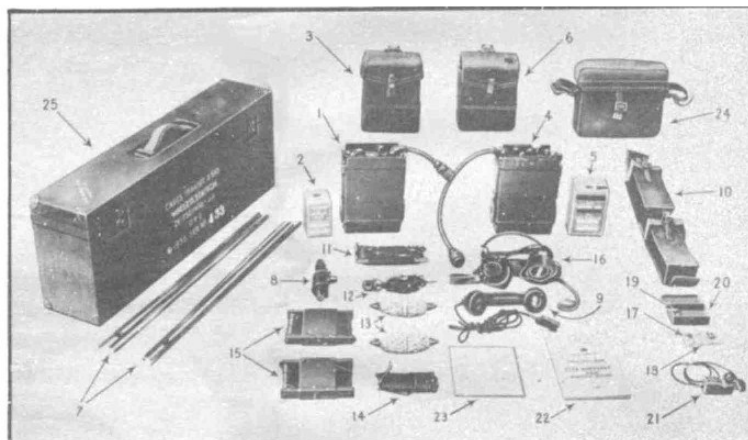


FIG. 1001

Item No	Nomenclature	Item No	Nomenclature
1	Receiver, A 510	13	Cords, aerial, weighted
2	Batteries, dry, LT 1.5V	14	Feeders, aerial, 70 ohms
3	Pouches, receiver, A 510	15	Aerials, lightweight, 66 ft.
4	Transmitter, A 510	16	Microphone receiver headgear assemblies, S1 lightweight
5	Batteries, dry, HT/bias 90/7.5V	17	Crystal units, style OE
6	Pouches, transmitter A 510	18	Pouches, style D, crystal units
7	Aerials, flexible, 8 ft. (Aust)	19	Lamps, pilot, 1.5V, GEC type 112
8	Inductors assemblies aerial	20	Cases, spares, A 510
9	Telephones, hand, S1, No 4A (Aust)	21	Keys, telegraph, lightweight, (Aust), No 1
10	Cases, carrying, flexible aerial	22	User Handbook, A 510 Wireless Station
11	Aerials, adjustable, 130 ft.	23	Charts, Instruction, A 510
12	Counterpoise assemblies	24	Satchels, signals, No 1 or Satchels, signals, No 1, Mk 1/1
		25	Cases, transit, A 510

TRANSMITTER CIRCUIT CODE

SYMBOL	DESCRIPTION
RESISTORS	
R112	470 OHMS.
R101,117	220 K OHMS.
R102	NOT USED.
R103,110, 115	470 K OHMS.
R104	680 OHMS.
R105,111	3.9 K OHMS.
R106	47 K OHMS.
R107	15 K OHMS.
R108	100 K OHMS.
R109	150 K OHMS.
R113	360 K OHMS.
R114	5.6 K OHMS.
R116	150 OHMS.
CAPACITORS	
C101,105,109,113,129	0.005 μ F.
C102,103,108,110,126,127	0.01 μ F.
C104,112,128	0.001 μ F.
C106	10-225 PF.
C107,116	33 PF.
C114	15 PF.
C115	22 PF.
C117	57 PF.
C118	82 PF.
C119	150 PF.
C120	800 PF.
C121	470 PF.
C122	300 PF.
C123	180 PF.
C124	100 PF.
C125	68 PF.
TRANSFORMERS	
TR5	MIC. TRANSFORMER.

SYMBOL	DESCRIPTION
INDUCTORS	
L11	PA TUNING COIL 2
L12	R.F. CHOKE
SWITCHES	
SWC1-6	FUNCTION SWITCH
SWE	4 POSITION XTAL
SWD1-2	3 POS. A-B-NET
SWF1-2	7 POS. AER MATCH
SWG	PILOT LAMP SWITCH
VALVES	
V6	CV-785 MOD. AUDIO
V7	CV-807 CRYSTAL
V8,9	CV-807 IN PARALLEL
METERS	
M1	TUNING INDICATOR & H.T. VOLTAGE CH
PLUGS	
PL1	17 POINT CABLE CO
PL3	H.T. BATTERY PLUG
SOCKETS	
SK3	3 POINT KEY SOCK
RECTIFIERS	
MRS,6	GERMANIUM CV-
CRYSTALS	
XL1	CRYSTAL DE
XL2	CRYSTAL DE
XL3	CRYSTAL DE
XL4	CRYSTAL DE
LAMPS	
LP2	PILOT LAMP

RECEIVER CIRCUIT CODE

SYMBOL	DESCRIPTION
RESISTORS	
R1,4,10	470 K OHMS.
R2,8,9,20,21	10 K OHMS.
R3	NOT USED.
R5	100 K OHMS.
R6	1500 OHMS.
R7,14	2.2 M OHMS.
R11	150 K OHMS.
R12,17,19	47 K OHMS.
R13	18 K OHMS.
R15,18	6.8 M OHMS.
RVI	1.0 M OHMS.
CAPACITORS	
C1,8,21	3-30PF. VARIABLE 2-4.5 MC/S
C2,9,20	3-30PF. VARIABLE 4.5-10 MC/S
C3	0.4 μ F.
C4,7,13	10-225 PF.
C5,11,17,32,33	100 PF.
C6,10,12,22,26,29,37	0.1 μ F.
C16,40,41	12 PF.
C18,19,23,24,30,31	150 PF.
C14	0.0018 μ F.
C15	900 PF.
C25,27,35,38	470 PF.
C28	0.005 μ F.
C34	220 PF.
C36	5 PF.
C39	0.01 μ F.
C42	4.7 PF.
INDUCTORS	
L1	AERIAL TUNING 2-4.5 MC/S
L2	AERIAL COUPLING 2-10 MC/S
L3	AERIAL TUNING 4.5-10 MC/S
L4	ANODE TUNING 4.5-10 MC/S

SYMBOL	DESCRIPTION
INDUCTORS (CONTD.)	
LS	ANODE TUNING 2-4
LC	OSC. SCREEN COUPLING
L7	OSC. GRID TUNING 2
L8	OSC. SCREEN COUPLING
L9	OSC. GRID TUNING 4
L10	HET. OSC. TUNING
L13	FILAMENT CHOKE
TRANSFORMERS	
TR1	1 ST I.F. TRANSFORM
TR2	2 ND I.F. TRANSFORM
TR3	3 RD I.F. TRANSFORM
TR4	OUTPUT TRANSFORM
SWITCHES	
SWA	8 POLE, 2WAY BAND
SWB	PILOT LAMP SWITCH
VALVES	
V1	CV-785 R.F. AMP.
V2	CV-782 CONVERT
V3	CV-785 I.F. AMP
V4	CV-785 REFLEX AUDIO A
V5	CV-784 DEMODULI HETRODYNE OSC
PLUGS	
PL2	L.T. BATTERY PLUG
SOCKETS	
SK1	17 POINT CABLE CONN
SK2	DUAL 5PT. PHONE/MI
RECTIFIERS	
MRI	GERMANIUM CV-4
LAMPS	
LPI	PILOT LAMP

ION

10142/5

SWITCH
SW.
ING SW
H.

OSC
OSC.
- P.A.

- L.T.
CK.

CONNECTOR

NET.

148

ION

5 MC/S
2-4.5 MC/S
-4.5 MC/S
4.5-10 MC/S
1-10 MC/S

ER.
ER.
ER.
MER.

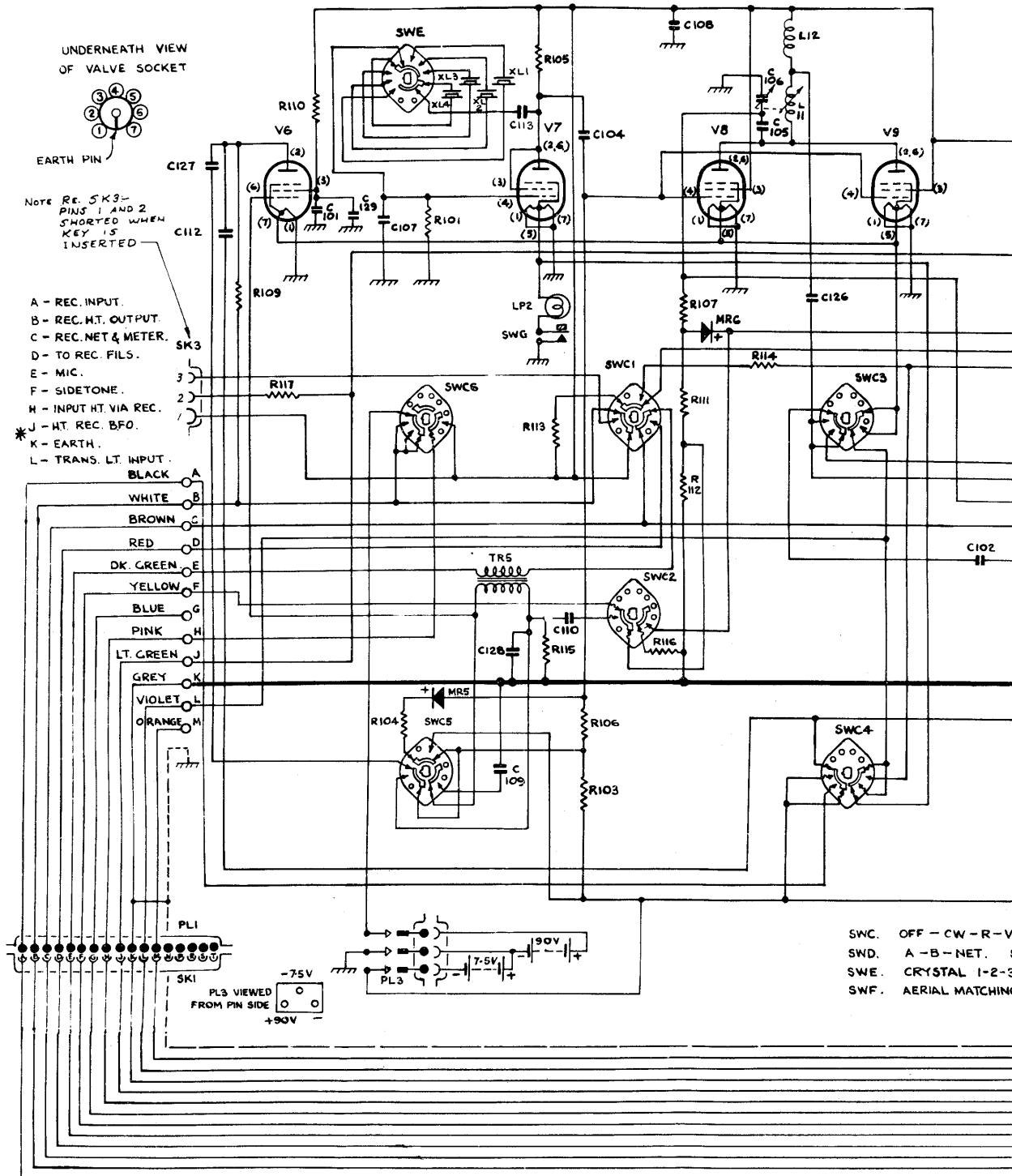
SELECTOR
1

R.

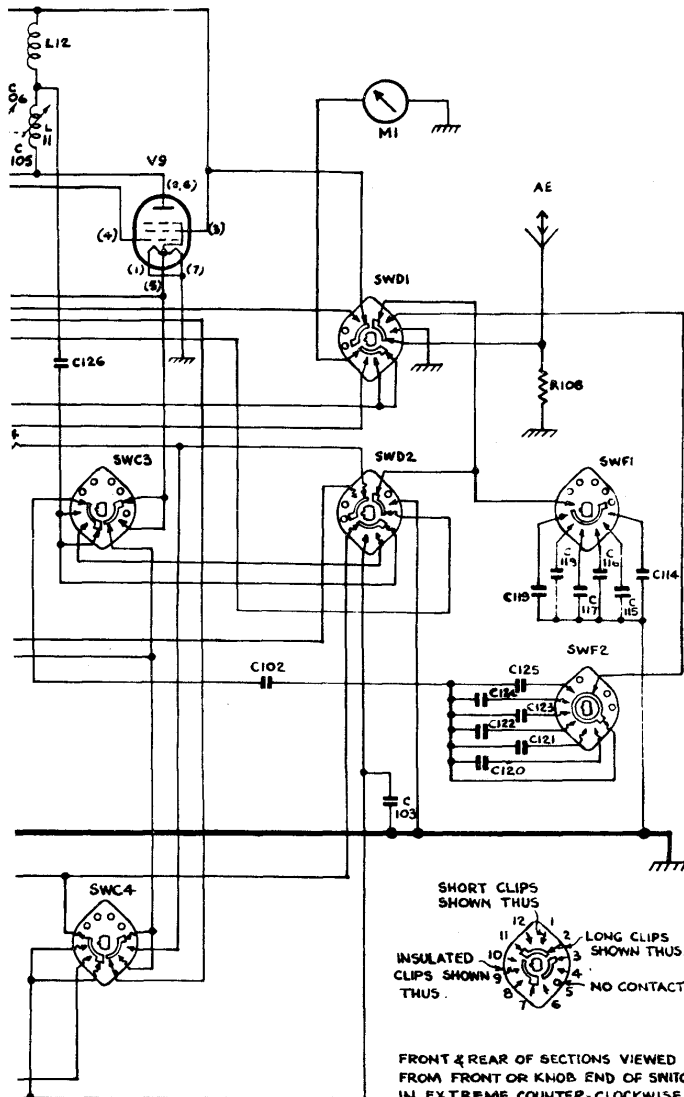
J.F.
IP.
TOR &

ECTOR.
SOCKET.

8



RESTRICTED



SWC. OFF - CW - R - VOICE. SHOWN IN "VOICE" POSITION.
 SWD. A - B - NET. SHOWN IN "A" POSITION.
 SWE. CRYSTAL 1-2-3-4, SHOWN IN "4" POSITION.
 SWF. AERIAL MATCHING. SHOWN IN "D" POSITION.

A - AERIAL IN (BLACK)
 B - HT IN (WHITE)
 C - LT. OUT (BROWN)
 D - LT. IN (RED)
 E - MIC (DK. GREEN)
 F - PHONES (YELLOW)
 H - HT. OUT (PINK)
 * J - MET HT IN (LT GREEN)
 L - LT. OUT. (VIOLET)
 K - EARTH (GREY)

* G & M - NO CONNECTION.

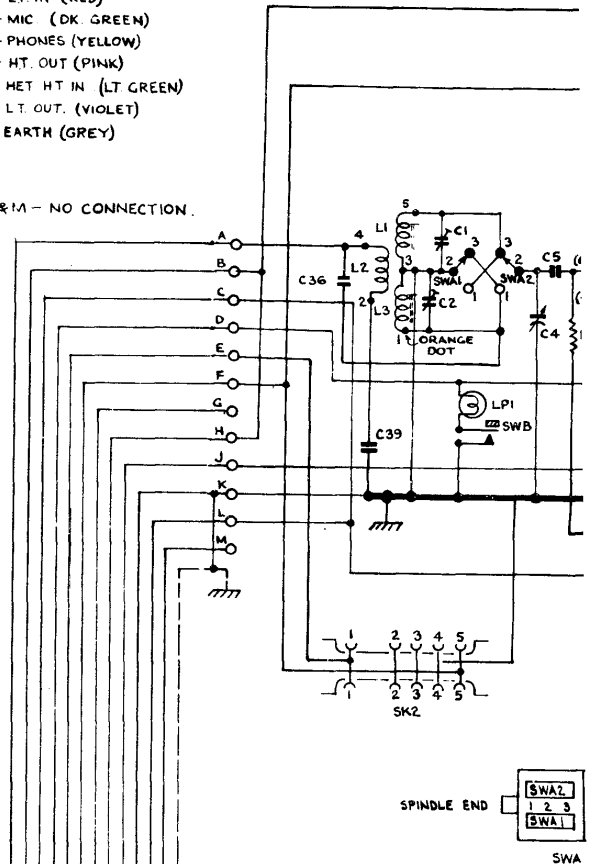


FIG. 1002

E N D
 RESTRICTED

