WIRELESS SET NO A510

FIELD AND BASE WORK

CONTENTS

LIST OF FIGURES

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INTRODUCTION

1. The Wireless Set A510 is to be dismantled only under conditions applicable to the repair of sealed equipments. Pending the publication of a new instruction detailing techniques covering this subject, TELS X 571 and X 572 will be used as a guide.

2. Miniature equipments are as robust as their larger counterparts and therefore no special precautions are necessary for their general handling. Their repair, however, requires techniques differing from those normally used, particularly with regard to the [redacted]

3. To avoid overheating the body of a component while soldering, it is necessary to prevent heat from the soldering iron reaching the component.

4. This can be partially achieved by the use of a miniature iron (to minimise heat transfer by radiation) and by reducing the time of application. Another method of preventing damage to the component is by the employment of a thermal shunt which is a device offering an alternative heat path and is interposed between the body of the component and the joint to be soldered.

Lubricants

5. LG 320 will be used to pack the spindle glands on the front panel and all bearings lightly oiled with OM 13.

REMOVAL AND REPLACEMENT OF ASSEMBLIES OR COMPONENTS

Receiver

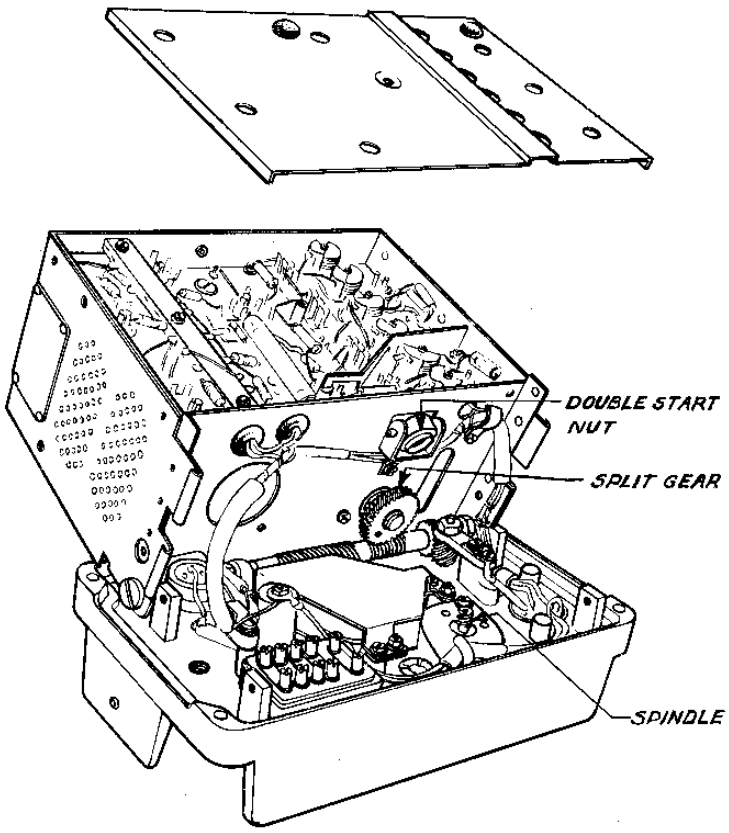
Front Panel Assembly (Fig. 1)

6. *Removal* -

(a) Remove top cover and silica gel containers from chassis.

(b) Remove four 6BA screws holding the front panel to the chassis assembly.

(c) Turn "Frequency" knob fully anti-clockwise (until spindle disengages from double start nut) and ease lower edge of front panel away from chassis. Do NOT use force. If difficulty is experienced proceed as follows:-
Remove the screw from the centre of the "FREQUENCY BAND" knob. Lift the knob until it can be rotated anti-clockwise over the top of the stop. Slight anti-clockwise rotation will free the spindle completely from the double start nut and allow the lower edge of the front panel to come away from the chassis.



Receiver chassis showing hinged front panel.

FIG. 1 - FRONT PANEL ASSEMBLY

(d) Remove clamps holding the cables to the assemblies and unsolder all leads connecting the chassis assembly to the 17 pt. connector, headset socket, pilot lamp and volume control.

(e) Remove hinge screw from volume control end of chassis assembly and slide the chassis assembly off the worm drive shaft bearing screw.

7. *Replacement* -

(a) Each section of the split gear on the variable capacitor shaft has a 1/16 in. diameter hole. Rotate the rear section until the holes coincide and retain this position by inserting a piece of 16 SWG wire.

(b) Slide chassis assembly on to worm drive shaft bearing screw, engage worm drive and replace hinge screw in volume control end of chassis assembly.

(c) Resolder wires removed and replace clamps.

(d) Remove 16 SWG wire from split gear, close front panel assembly and enter "Frequency Band" spindle in double start nut on end of "Frequency Band" switch making certain that spindle is in correct start.

(e) The correct position is when the index pin locates in the holes in the clicker plate for both positions of the switch.

(f) Replace 6BA screws to hold front panel assembly to the chassis assembly.

8. After replacing front panel assembly it will be necessary to check variable capacitor setting and ensure that with the "Frequency" knob turned fully clockwise the capacitor plates are in full mesh. Make sure the plates are exactly in full mesh, not beyond. To adjust loosen the two grub screws on the variable capacitor split gear, hold knob fully clockwise and move capacitor rotor plates to full mesh. Re-tighten the grub screws. Replace the top cover and silica gel containers and unit is ready to replace in case.

Main Drive Assembly (Fig. 2)

9. *Removal* -

(a) Remove the front panel assembly.

(b) Loosen off lock nut and bearing screw at stop end of worm drive shaft. The shaft is now free to lift out.

(c) Remove two screws and lift off bearing plate main drive spindle.

(d) Remove "Frequency" knob and withdraw pin through spindle. The main drive spindle may then be lifted out.

(e) Remove locking plate and 'C' washer.

(f) Remove the dial scale assembly by removing three screws.

10. *Replacement* -

(a) Replace 'C' washer and locking plate.

(b) Replace main drive spindle and bearing plate.

(c) Place pin through spindle and replace knob.

(d) Load split gear on worm drive shaft one tooth.

(e) Replace worm drive shaft so that the loaded split gear meshes with the gear on the main drive spindle.

(f) Tighten the bearing screw and adjust so that no lateral movement of shaft is possible, but not so tight that extra loading is applied to worm.

(g) Tighten lock nut.

(h) Load the dial gear, and replace the assembly so that the dial setting mark at the L.F. end is opposite the pointer when the drive is against the stops in the clockwise position.

(j) Turn the dial scale to the H.F. end and note the distance between the pointer and the setting mark.

(k) Re-adjust the dial scale if necessary, until the pointer is equi-distant from the setting marks at each end of the dial traverse.

(l) The worm drive shaft bearing screws provide a means for making slight adjustments. The need for adjustment in excess of 1/16 in. indicates that a mistake has been made in re-assembly.

(m) Replace the front panel assembly and adjust the variable capacitor as previously explained.

NOTE: As stated in the above instructions the dial scale assembly is removed whenever the worm drive shaft is removed. This procedure is followed in order to simplify re-assembly.

Lock Spindle Assembly (Fig. 2)

11. Remove 'C' washer from lock spindle shaft and the spindle may be withdrawn.

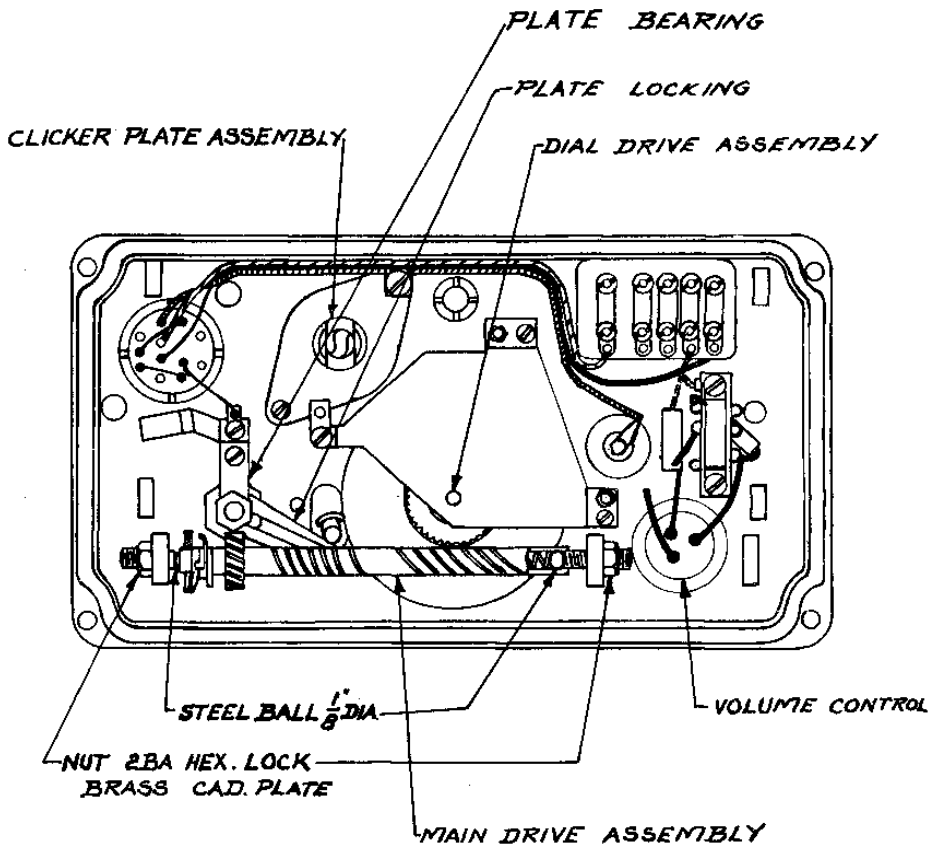


FIG. 2 - FRONT PANEL SHOWING MAIN DRIVE ASSEMBLY

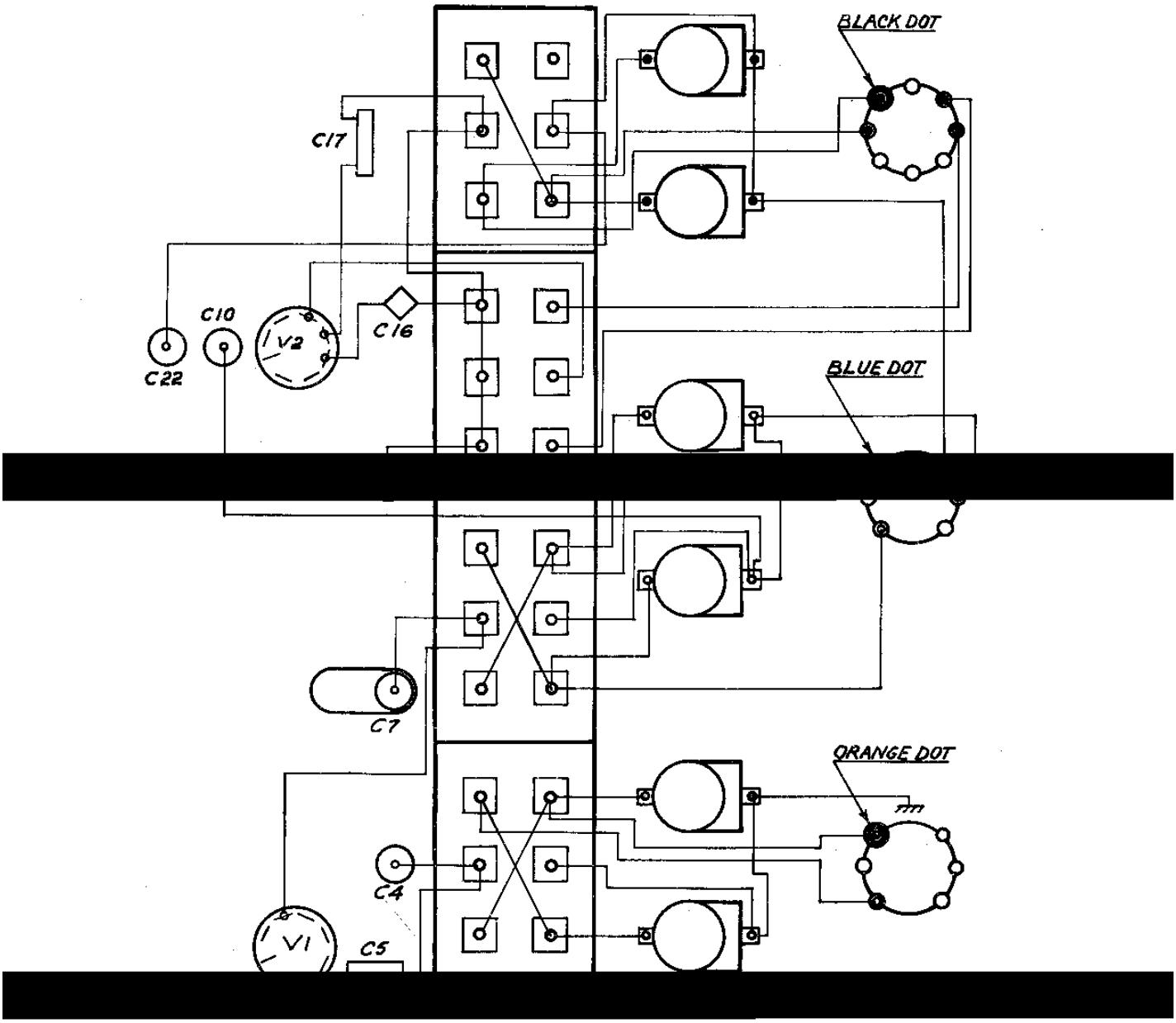


FIG. 3 - WAVE CHANGE SWITCH WIRING

Dial Scale

12. *Removal* -

(a) Remove the front panel assembly.

(b) Remove the dial scale assembly by removing three screws.

13. *Replacement* -

See "Main Drive" instructions.

NOTE:- The removal and replacement of the dial scale assembly can be achieved without removing any other parts of the drive mechanism.

Wave Change Switch (Fig. 3)

14. *Removal* -

(a) Carry out removal instructions for "Front panel assembly" up to the stage where the lower edge of the front panel has been eased away from the chassis.

(b) Remove the double start nut by unscrewing the two pivot screws.

(c) Replace the front panel assembly.

(d) Unsolder leads and components and remove trimmers and partition.

(e) Remove four screws holding switch to chassis.

(f) Lift switch from the back and slide out.

15. *Replacement* -

Reverse the removal instructions making use of the wave change switch wiring diagram, Fig. 3.

IF Transformers, Heterodyne Oscillator, Aerial, RF and Oscillator Coils

16. Unsolder leads and remove 8BA nuts holding components to chassis.

Capacitor Variable

17.(a) Remove the top cover from the chassis assembly.

(b) Remove the output transformer assembly by unscrewing three 8BA screws and easing the locating pin from capacitor end plate.

(c) Unsolder all leads to the capacitor.

(d) Open the front panel (see instruction for the removal of the "Front Panel Assembly") and remove split gear from the end of the variable capacitor shaft.

(e) Remove three 6BA screws holding the front of the capacitor to the bulkhead. The capacitor is now free to slide out.

(f) When replacing the split gear, load the gear as directed in the "Front Panel Assembly" instructions, and make sure that both sections of the gear mesh with the main drive shaft.

17 Point Cable Connector

18.(a) Remove four 4BA screws from the cable connector cover and lift the cover.

(b) Unsolder all leads on the connector.

(c) When re-soldering leads, follow the colour code as shown in circuit diagram.

Phone and Microphone Socket

19.(a) Open the front panel (see instructions for the removal of "Front Panel Assembly").
(b) Remove nuts and links.
(c) Remove insulator and withdraw socket from the front of the front panel.

Transmitter

Tuning Coil (Fig. 4)

20. *Removal* -

(a) Remove 'C' washer from intermediate gear shaft, and remove gear.
(b) Remove 2 screws holding the coil to the tuning unit assembly.
(c) Unsolder the leads on coil and gently withdraw.

21. *Replacement* -

(a) Replace coil and resolder leads.
(b) Turn "SET TO FREQUENCY" knob fully anti-clockwise and set the variable capacitor plates to full mesh - NOT beyond. (Note that with the intermediate gear removed it is possible to set the plates beyond full mesh).
(c) Load the variable capacitor and intermediate gears one tooth and hold by means of wire in holes provided.
(d) Replace intermediate gear and 'C' washer.

Silica Gel (Fig. 4)

22. Remove 2 screws holding retainer to tuning unit assembly.

RF Choke (Fig. 4)

23.(a) Remove 5 screws holding silica gel and support plate to tuning unit assembly.
(b) Remove bracket over rear end of choke and screw through top end of choke.
(c) Unsolder 2 leads from choke and withdraw.

Meter (Fig. 4)

24.(a) Remove silica gel retainer and tuning unit support plate.
(b) Remove 2 screws through tuning unit and meter mounting bracket and 1 screw through bracket and front panel.
(c) Meter on bracket will lift out. Unsolder leads. Meter is held to bracket by 4 screws.

Panel Assembly (complete with R107, R111, R112 and MR6)

25. Remove meter. Unsolder lead to variable capacitor. Remove the panel by unscrewing 2 nuts holding panel to side plate.

Panel Assembly (complete with C102, C103, C109, C110, C128, R103, R104, R106, R115, R116 and MR5)

26. Remove valve retainer and 2 screws holding panel assembly to partition. Unsolder leads and remove panel assembly.

Tuning Unit Assembly (Fig. 4)

27. *Removal* -

(a) Remove the valve retainer.
(b) Remove battery connection bracket.
(c) Remove meter.

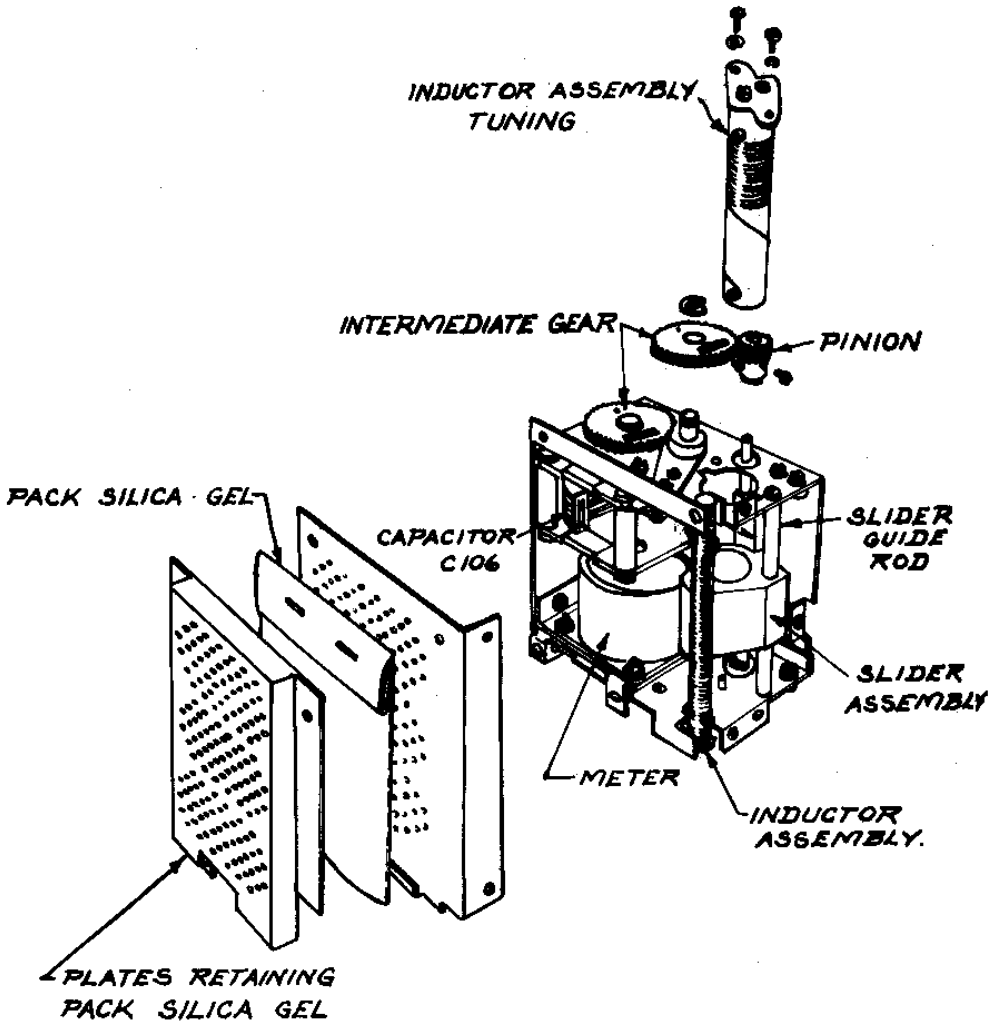


FIG. 4 - TRANSMITTER TUNING ASSEMBLY

(d) Remove 2 nuts holding the resistor and rectifier panel assembly to tuning unit.

(e) Remove screw and unsolder lead on panel mounting C126.

(f) Unsolder lead to variable capacitor.

(g) Unsolder two leads connecting pins 2 and 3 of valve V9 to the tuning assembly.

(h) Remove knob and pin from tuning spindle.

(j) Remove 2 screws holding unit to the partition, 3 screws holding it to the front panel, one screw to valve sub-chassis and unsolder earthed end of C108. The assembly can now be withdrawn.

Alignment of Slider

28.(a) Place a piece of 16 SWG wire through the holes in the intermediate gear to retain the loading and then remove the tuning spindle gear.

(b) Remove the tuning spindle by turning clockwise until it is free of slider.

(c) Ensure that the slider runs freely on its guide rods. Note that there are four stop rings on the tuning spindle.

The stop ring nearest the tuning knob has one external tooth, and an internal tooth which engages with the teeth on the tuning spindle. The second and third stop rings are identical. Each has one external tooth which points towards the tuning knob when the stop ring is correctly placed on the tuning spindle. The fourth (i.e. the rearmost) stop ring has two diametrically opposite external teeth.

(d) Remove the 'C' washer and the first stop ring. With the second, third and fourth stop rings correctly positioned, replace the tuning spindle. The tuning spindle bearing plates are adjustable to ensure that the tuning spindle is parallel to the slider guide rods, but should NOT normally be touched since the original factory adjustment, barring accidents, will last the life of the set.

(e) Replace the tuning spindle gear after making sure that the slider is positioned so as to cover all the turns of the tuning coil, and that the variable capacitor plates are set to the minimum capacity position. (Note that it is possible to go beyond the minimum capacity position. In the correct position the straight edges of the rotor plates are parallel with the corresponding edges of the stator).

(f) With the slider still covering all the turns of the coil, move the rear stop ring fully clockwise against the fixed stop, and each successive stop ring fully clockwise so that its stop is against the stop of the adjacent ring.

(g) Replace the first stop ring so that its stop is bearing against that of the second stop ring. Retain the first stop ring in position by replacing the 'C' washer.

(h) Set the dial mechanism to 10 Mc/s.

(j) Before replacing the tuning unit assembly ensure that when the tuning spindle has been turned fully clockwise

(i) the slider covers all the turns on the tuning coil
(ii) the dial reading is 10 Mc/s
(iii) the variable capacitor is set to minimum capacity.

(k) When the tuning spindle has been turned fully anti-clockwise

(i) all the turns on the tuning coil are visible
(ii) the dial reading is less than 2 Mc/s
(iii) the variable capacitor is set to maximum capacity - NOT beyond.

Transformer

29. *Removal* -

(a) Remove valve retainer and valves.

(b) Unsolder all leads to transformer.

(c) Remove 4 screws which mount transformer to partition.

Key Socket

30. Remove 3 nuts and lugs and withdraw socket from front panel.

Valve Sub-Chassis

31.(a) Remove valve retainer and valves.

(b) Unsolder 4 leads from bakelite termination panel.

(c) Unsolder earthed end of C108.

(d) Unsolder two leads connecting pins 2 and 3 of valve V9 to the tuning assembly.

(e) Unsolder the long lead from pin 4 of valve V7 and withdraw this lead through the grommet in the partition.

(f) Unsolder at the function switch the six remaining leads passing through the grommet, noting their position and colour coding for future reference when replacing.

(g) Remove battery connector bracket.

(h) Remove 2 screws holding sub-chassis to end plate.

Switch Assemblies

Preliminary

32.(a) Unsolder R108 from end plate.

(b) Remove valve retainer and end plate.

(c) Remove all valves.

(d) Unsolder earthed end of C108.

(e) Unsolder the leads connecting pins 3 and 4 of valve V9 to tuning unit.

(f) Remove battery connector bracket.

(g) Remove screw holding valve sub-chassis to side plate of tuning unit.

(h) Remove 2 screws holding partition to side plate.

(j) Turn function switch knobs to 'R' and 'B' positions.

(k) Remove split pin and washers from rear spindle of function switch.

(l) Partly withdraw spindle from front of switch to enable spring and balls to be removed.

(m) Completely withdraw spindle, maintaining the switch knobs in the same position relative to one another to avoid damaging the switch wafers.

(n) Taking care not to unsolder any of the leads of the wiring loom connecting the function switch to the front panel terminal block, unsolder all leads necessary to separate as a single unit from the rest of the transmitter, the valve sub-chassis, function switch and the partition complete with its mounted components. Note the colour code and position of all wires removed for future reference when replacing.

(o) Remove the two rubber sleeves from studs on the matching switch.

33. The transmitter should now consist of two large assemblies joined only by the wiring loom. Both switch assemblies are now accessible.

Function Switch Assembly

34. When replacing function switch assemblies:-

(a) Remove the old switch assembly from the partition by removing two 6BA nuts and unsoldering all leads necessary.

(b) Let the old switch suspend by its wiring loom from the front panel.

(c) Place the new switch assembly in position and resolder all leads except the ends of all wires in the loom remote from the switch.

(d) Carry out all the above preliminary instructions in reverse order.

35. Before replacing the function switch spindle ensure that all the switch sections are set so that the view through the hole in the front panel is as shown in Fig. 5. When easing the spindle back into position, hold the knobs in such a way that they will occupy the positions R and B when the spindle is fully home. This ensures that the front and rear portions of the spindle are in alignment and will thus pass through the switch without damage to any of the switch wafers.

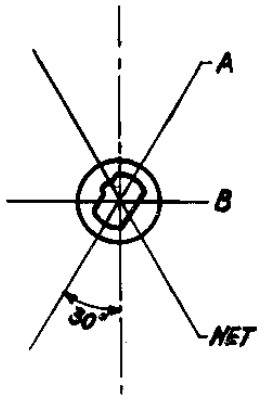


FIG. 5 - A-B-NET SWITCH

Remove the tuning unit assembly (see para 20). Unsolder the old wiring loom from the front panel terminal block. Solder the new wiring loom in its place.

Crystal and Matching Switch Assembly

36. *Removal* -

(a) Remove panel assembly complete with MR6 etc. (see para 18).
(b) Remove all necessary leads from switch wafers.

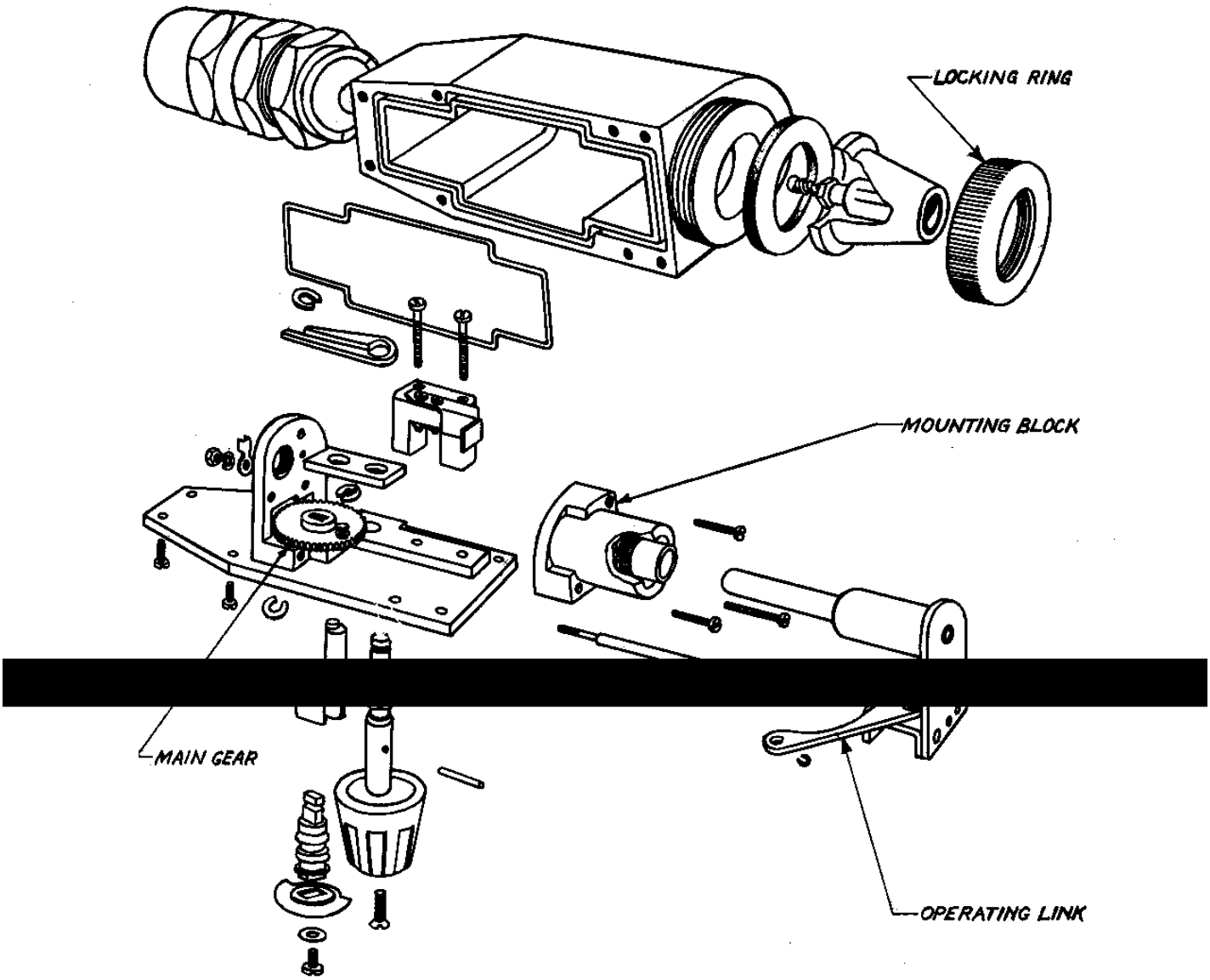


FIG. 6 - INDUCTORS TUNING 8 FT. FLEXIBLE AERIAL

(c) Turn the crystal and matching knobs to '4' and '0' respectively.

(d) Before removing split pin from 'Matching' Switch Spindle note carefully the position of:-

(i) all washers on the spindle
(ii) the rotating centre piece of each switch section
(iii) both clicker plate assemblies and their "stops".

(e) Remove 2 screws holding the switch mount plate to front panel and carefully withdraw the switch assembly.

37. *Replacement* -

When replacing, check the mechanical operation of the switch before doing any soldering.

Inductor, Tuning, 8 ft. Flexible Aerial (Fig. 6)

Preliminary

38.(a) Remove locking ring, rubber gasket and insulator.

(b) Remove 8 8BA screws holding front plate to the main body and withdraw front plate.

NOTE:- When re-assembling, it is important to carry out the above instructions in reverse order if damage to the contacts is to be avoided.

Main Gear

39.(a) Remove knob and locating pin.

(b) Remove spring which retains operating link to main gear.

(c) Remove 2 8BA screws holding contact bracket to contact bracket insulator.

(d) Carefully lever operating link from pin on main gear.

(e) Slide the tuning rod assembly from the support rod.

(f) Unsolder lead from the solder tag.

(g) Remove 3 screws holding the mounting block to the front panel extension and withdraw mounting block.

(h) Remove circlip from main gear spindle.

(j) Gently lever under dial and remove main gear spindle. The main gear will then be free to remove.

Tuning Spindle Assembly

40.(a) Remove main gear.

(b) Remove 'C' washer from tuning spindle and withdraw spindle.

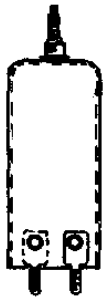
Locking Plate

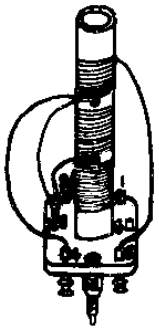
41. Remove 'C' washer from tuning spindle. With locking device unlocked gently pull knob until locking plate is free to lift out.

TRANSFORMER AND INDUCTANCE DATA

Inductor and Screen Assembly, Aerial (Figs. 7, 8 and 9)

42. Identification colour dot orange.





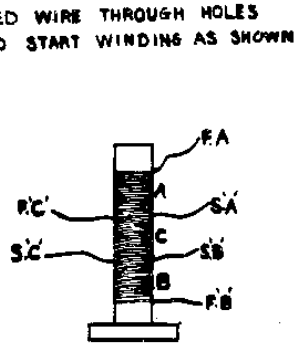


FIG. 7 - INDUCTOR AND SCREEN ASSEMBLY AERIAL

FIG. 8 - INDUCTOR AND SCREEN ASSEMBLY AERIAL

FIG. 9 - INDUCTOR AND SCREEN ASSEMBLY AERIAL

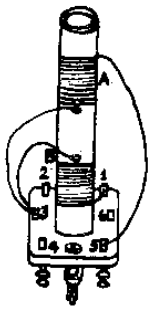
Primary:- L2 pins 2 and 4
(C) 17 turns 27 B & S enamel DC resistance less than 1 ohm

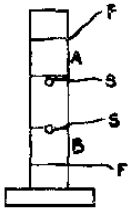
Secondary:- L1 (2-4.5 Mc/s) pins 3 and 5
(A) 64 turns 36 B & S enamel DC resistance 35 ohms

" L3 (4.5-10 Mc/s) pins 1 and 3
(B) 29 turns 30 B & S enamel DC resistance less than 1 ohm

Inductor and Screen Assembly RF (Figs. 10 and 11) -

43. Identification colour dot blue.





FEED WIRE THROUGH
HOLES AND START WINDING
AS SHOWN

FIG. 10 - INDUCTOR AND SCREEN ASSEMBLY, RF

FIG. 11 - INDUCTOR AND SCREEN ASSEMBLY, RF

L4:- (4.5-10 Mc/s) pins 1 and 3
(B) 29 turns 30 B & S enamel DC resistance less than 1 ohm
L5:- (2-4.5 Mc/s) pins 3 and 5
(A) 64 turns 36 B & S enamel DC resistance 3.5 ohms

Inductor and Can Assembly, Oscillator (Figs. 12 and 13)

44. Identification colour dot black.

L6 :- (2-4.5 Mc/s) primary
pins 4 and 5
10 turns of 38 B & S
enamel, wound over L7
DC resistance 1 ohm

L7 :- (2-4.5 Mc/s) secondary
pins 5 and 8
52 turns of 36 B & S
enamel DC resistance
2.3 ohms

L8 :- (4.5-10 Mc/s) primary
pins 3 and 6
15 turns 38 B & S
enamel, wound over L9
DC resistance 1 ohm

L9 :- (4.5-10 Mc/s) secondary
pins 1 and 6
52 turns 36 B & S
enamel DC resistance
2.3 ohms

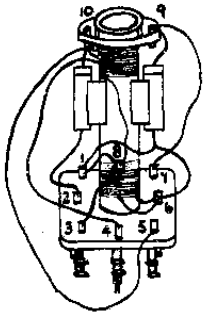


FIG. 12 - INDUCTOR AND SCREEN ASSY, OSCILLATOR

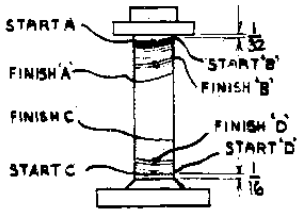


FIG. 13 - INDUCTOR AND SCREEN ASSEMBLY, OSCILLATOR

Inductor and Screen Assembly, Heterodyne Oscillator (Figs. 14 and 15)

45. Identification colour dot green.

L10 :- Pins 1 and 5 centre tap pin 2
350 turns in 2 pies 5/44 B & S
litz
DC resistance 25 ohms

Inductor, 60uH

46. L13 :- 40 turns 31 B & S enamel,
close wound
DC resistance less than 1
ohm

Transformer and Bracket Assemblies, Output

47. TR4 :- Primary :- 4,500 turns 42
B & S enamel
DC resistance 1,000 ohms

Secondary :- 184 turns 42
B & S enamel
DC resistance 15 ohms

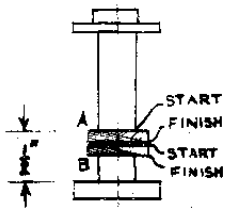


FIG. 14 - INDUCTOR AND SCREEN ASSY, HETERODYNE OSCILLATOR

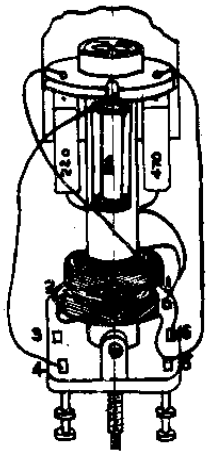


FIG. 15 - INDUCTOR AND SCREEN ASSY HETERODYNE OSCILLATOR

Transformer and Screen Assemblies, IF (Figs. 16 and 17)

48. Identification colour dot red.

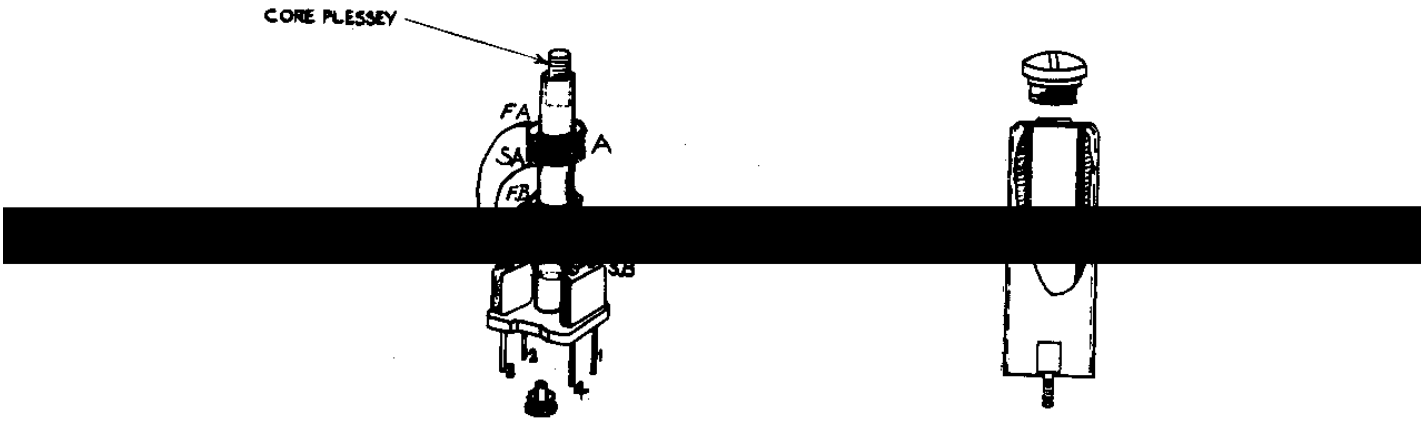


FIG. 16 - TRANSFORMER AND SCREEN ASSEMBLIES, IF

FIG. 17 - TRANSFORMER AND SCREEN ASSEMBLIES, IF

TR 1, TR 2, TR 3

Primary :- 270 turns in two pies 5/44 B & S litz

Secondary :- 270 " " " " " " "

DC resistance of windings 16 ohms ± 10%.

FAULT FINDING

Receiver

49. When testing a receiver make certain that batteries are in good condition and use a known good sender in conjunction. Where set does not meet the specification figures laid down, first try known good valve in the socket concerned.

Table 1 on page 17 shows typical receiver voltages that can be expected. These should be regarded as a guide only.

TABLE 1 - TYPICAL RECEIVER VOLTAGES AND FAULT FINDING

Test Point		Avo 500 ohms per volt		Volt-ohmyst	If Low Check	If High Check
		Range	Reading Volts	Reading Volts		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
V1	Pin 2 Anode	100	82	86	C10 leaking. R6 increased resistance. Voltage at point Pin 3, V1 high B+ low SWA3 bad contact V1 faulty C7 shorting.	Voltage at point Pin 3, V1 low voltage at point Pin 2, TR3 high Voltage at point Pin 7, V1 low V1 faulty R6 low.
	Pin 3 Screen	100	65	75	V1 or V3 faulty or faults Pin 2, V1 or Pin 2, V3, C6 leaking, R2 increased resistance Voltage at Pin 2, TR3 positive C7 shorting.	V1 or V3 faulty, R2 low.
	Pin 7 Fil	10	1.45	1.45	Dry joint faulty connecting cable.	B+ line shorting to A+.
V2	Pin 2 Anode	100	50	60	V2 faulty, R8 or R9 increased in value, C15 or 14 leaking, TR1 faulty, Voltage at Pin 2, TR3 incorrect, C13 shorting, C16 shorting, L6, 7, 8, 9 faulty, C17 low capacity.	V2 faulty, R8 or R9 low, C20 or C21 shorting, L6, 7, 8, 9 faulty, Voltage Pin 7, V2 low.
	Pin 3 Screen	100	50	60	As for Pin 2, V2.	As for Pin 2, V2.
	Pin 7 Fil	10	1.4	1.4	V2 and/or V3 faulty, L13 faulty, C3 leaking.	V2 and/or V3 faulty, B+ leak to A+.
	Pin 4 Osc Grid	10	-2.0	-14	V2 faulty. As for Pin 2, V2.	V2 faulty. As for Pin 2, V2.
V3	Pin 2	100	88	89	V3 faulty. Voltage at B+ low, TR2 faulty.	
	Pin 3	100	65	75	V1 or V3 faulty. Faults as Pin 2, V1 Pin 3, V1 and Pin 2, V3.	V1 or V3 faulty. Faults as Pin 2, V1 Pin 3,V1 and Pin 2, V3.
	Pin 7	10	1.4	1.4	As for Pin 7, V2.	As for Pin 7, V2.
V4	Pin 2	100	83	86	V4 faulty, TR3 faulty, TR4 faulty. Voltage at B+ low, C27 leaking R13 low resistance.	
	Pin 3	100	55	65	V4 faulty, C29 leaking R13 high. Faults on Pin 2, V4. Voltage on B+ incorrect. Voltage on Pin 2, TR3 incorrect.	V4 faulty, R13 low. Voltage on Pin 2, TR3 incorrect.
	Pin 7	10	1.45	1.45	As for Pin 7, V1.	As for Pin 7, V1.

TABLE 1 (CONTD)

Test Point	Avo 500 ohms per volt		Volt-ohmyst	Tune Receiver to no input signal	If Low Check	If High Check
	Range	Reading Volts	Reading Volts			
(1) (2)	(3)	(4)	(5)	(6)	(7)	(8)
V5 Pins 4 or 5	100	12	30	C.W.	V5 faulty, R28 low, C33 leaking, L10 faulty, C34 leaking, R19 high, R117 high (in sender, on C.W. receive only), C37 leaking. Faulty connecting cable.	V5 faulty, R18 high, R19 low, R117 low (in sender, on C.W. receive only). Voltage at Pin 7, V5 low.
	100	36	60	NET		
Pin 6	10	0	-1.5	C.W.	As per Pins 4, 5, V5.	As per Pins 4, 5, V5.
	10	0	-6.0	NET		
Pin 7	10	1.45	1.45		As for Pin 7, V1.	As for Pin 7, V1.
TR3 Pin 2	10	-1.4	-9.0	NET	As for Pins 4, 5, 6, 7, V5. C34 open circuit. TR1, 3 faulty. C11, 12 leaking also C32, C38.	As for Pins 4, 5, V5.
	10	0	-2.0	C.W.		
	Slight indication only when meter on 100 volt range.					
Junction of R14, R15	10	0	-2.0	NET	Volts at Pin 2, TR3 incorrect, R15 high, R14 low, V4 faulty, C25 leaking, TR2 faulty.	Volts at Pin 2, TR3 incorrect, R15 low, R14 high V4 faulty, C28 leaking, TR2 faulty.
	10	0	-0.5	C.W.		
Junction of R10, R11	100	24	65		MR1 faulty, R11 high, R10 low.	MR1 faulty, R11 low, R10 high, C26 leaking.
Aerial Coil Pin 2	10	-7.5	-7.5		Faulty connecting cable. Faulty L2, C39 short circuit.	B+ leak to Pin 2, L2.
B+	100	89	89		Shorts on B+ line.	
A+	10	1.45	1.46			
Bias	10	-7.6	-7.6			

50. Before commencing tests ensure that batteries are in good condition. If voltages are incorrect, first try known good valve in the socket concerned.

TABLE 2 - TYPICAL CURRENT DRAIN

Conditions	*LT mA*	*HT mA*
CW "A" or "B"	500 ± 10%	<40 mA
"R" and NET	340 ± 10%	<15 mA
VOICE & "A" or "B"	500 ± 10%	<20 mA

TABLE 3 - TYPICAL ELECTRODE VOLTAGES, TRANSMITTER

Test Point		*Avo 500 ohms per volt*		*Voltohmyst*	
		Range	*Volts*	*Range*	*Volts*
V6	Pin 2 plate	100	12	150	42
	Pin 3 screen	100	8	150	25
	Pin 6 grid	10	0	5	-2
	Pin 7 filament	10	1.45	1.5	1.45
V7	Pin 2 plate	100	55	150	63
	Pin 3 screen	100	55	150	63
	Pin 4 grid	10	-0.5	15	-13
	Pin 1 filament	10	1.45	1.5	1.45
V8	Pin 2 plate	100	85	150	85
and	Pin 3 screen	100	85	150	85
V9	Pin 4 grid	10	-4	50	-16
	Pin 1 filament	10	1.45	1.5	1.45

Conditions of Test when Voltages read

The transmitter tuned to 2 Mc/s, and matched to 2,000 ohms and 75 ohms using A and B positions respectively.

Battery voltages :- HT 89 volts
LT 1.5 volts
Bias 7.5 volts

Transmitter switched to C.W. and key closed.

TABLE 4 - TRANSMITTER FAULT FINDING

1. MASTER OSCILLATOR V7

Symptom	*Check*	*Remarks*
No DC volts at pins 2, 3 and 6	1. HT supply 2. C108 3. R105 4. SWC6 5. SWC1	HT supply approximately 90 volts. May be shorted. May be open.
Low DC voltage at pins 2, 3 and 6	1. HT supply 2. C108 3. R105 4. SWC6 5. SWC1	HT supply approximately 90 volts. May be shorted. May be high.
High DC voltage at pins 2, 3 and 6	1. HT supply 2. R105 3. V7	HT supply approximately 90 volts. May be low. " " "
No volts pin 5	1. LT supply 2. LP2 and SWG 3. SWC4	LT supply approximately 1.5 volts. May be shorted.

TABLE 4 (CONTD)

Symptom	*Check*	*Remarks*
1. MASTER OSCILLATOR V7 (contd)		
Low volts pin 5	1. LT supply 2. SWC4	LT supply approximately 1.5V.
No oscillation	1. V7 2. Crystal 3. SWE 4. R101 5. C107	Replace with good valve. If crystal is broken check C113 for leakage before replacing crystal. May be dirty or open circuit. Check for open circuit. Check for short circuit.
Low output	1. V7 2. Crystal 3. R101 4. C107	Replace with good valve. Replace. Leaky.
2. POWER AMPLIFIER STAGE V8 and V9 IN PARALLEL		
No DC volts at pin 2	1. HT supply 2. L11 3. L12 4. C108 5. SWC6	HT supply approximately 90V. Open. Open. Shorted. Broken lead or dirty contact.
Low DC volts at pin 2	1. HT supply 2. SWC6 3. C105	HT supply approximately 90V. Dirty. Leaky or shorted.
No DC volts at pin 3	1. HT supply 2. C108	HT supply approximately 90V. Shorted.
Low DC volts at pin 3	1. HT supply 2. SWC6	HT supply approximately 90V. Dirty.
No DC volts at pin 5	1. LT supply 2. LP2 and SWG 3. SWC3	LT supply approximately 1.5V. Shorted to panel.
Low DC volts at pin 5	1. LT supply 2. SWC3	LT supply approximately 1.5V.
No RF output at aerial	1. Both V8 and V9 2. C106 3. R108 4. SWF2 (aerial matching switch) 5. SWD	Both may be unserviceable. Shorted. Shorted on front panel. Open due to dirty contact etc.
Low RF output	1. V8 and V9 2. R108 3. C104	Either may be unserviceable. Low. Leaky. If shorting HT will appear at grid pins 4.
RF output but no indication on meter	1. MR6 2. R107 3. R116 4. M1	Open or shorted. Open. Shorted. Open. Check by reading battery voltage.

TABLE 4 (CONTD)

Symptom	Check	Remarks
3. MODULATOR STAGE V6		
No DC volts at pin 2	1. HT supply 2. R109 3. C112	HT supply approximately 90V. Open. Shorted.
Low DC volts at pin 2	1. HT supply 2. R109 3. C111 4. C127	HT supply approximately 90V. High. Leaky. Leaky.
No DC volts at pin 3	1. HT supply 2. R110	HT supply approximately 90V. Open.
Low DC volts at pin 3	1. HT supply 2. R110 3. C101 4. C108	HT supply approximately 90V. High. Leaky. Leaky.
No DC volts at pin 7	1. LT supply 2. TR5 (primary)	LT supply approximately 1.5V. Short to earth.
Low DC volts at pin 7	1. LT supply 2. Microphone 3. TR5 (Primary)	LT supply approximately 1.5V. Shorted. Partial short to earth.
4. SIDETONE CHECKS		
(1) CW SIDETONE		
No oscillation in CW condition with key closed	1. V6 2. TR5 Secondary 3. C109 4. C128 5. R115 6. C127 7. C110 8. SWC5 pin 9	 Leaky. Leaky. Shorted or open. Leaky. Leaky. May be open circuit.
(2) VOICE SIDETONE		
No sidetone when operating on voice	1. MR6 2. SWC2 3. R111 4. R112	Shorted or open. Open. Open. Shorted.
5. MODULATION CHECKS		
Low DC volts at pin 4 V8/V9 with "control" switch in "off" position	1. Bias battery 2. R106	Measure volts with Multimeter or DC V.T.V.M. Bias volts - 7.5. Open.
Incorrect DC volts at pin 4 V8/V9 with "control" switch in CW position	1. Check V7	Measure volts with DC V.T.V.M. Bias volts - 16.
Incorrect DC volts at pin 4 V8/V9 with "control" switch in "Voice" position and no modulation	 1. C104 2. MR5 3. R103 4. C112	Measure volts with DC V.T.V.M. Bias volts - 22. Leaky. Check - short or open. Open circuit. Leaky.
Incorrect DC volts at pin 4 V8/V9 When carrier 100% modulated, audio between 300 c/s and 3 kc/s	1. Check V6 2. C112	Measure volts with DC V.T.V.M. Bias volts - 25 volts. May be earthing pin 9 of SWC5.

TEST ALIGNMENT PROCEDURE

Test Equipment Required

51.

ZDA 0076	FREQUENCY METER SETS, SCR 211 (Aust)
ZDA 0061	SIGNAL GENERATORS, (Aust), No 1, Mk 3
ZDA 0003	OSCILLATORS, Beat Frequency, (Aust), No 1, Mk 2
	or
AWA/3A57150	OSCILLATORS, RC, AWA Type 3A57150, 20 c/s to 200 kc/s
ZDA 0284	MILLIVOLT METERS, DC, Philips, GM 6010
ZDA/AWA/A56010	MULTIMETERS, Electronic (Voltohmyst)
Z4/AWA/2R56020	PROBES, Crystal Diode, AWA Type 2R56020
WY 2439	INSTRUMENTS, Testing, Avometer Universal, 46 Range, Mk 1, Cased
ZDA 0314	OSCILLOGRAPHS, CR, Dumont 5 in. 274A
	or
Z4/ZDA 0262	OSCILLOSCOPES, Miniature, 1 3/4 in., Belclere
ZD 00661	WATTMETERS, absorption, AF, No 1
ZDA 0362	RESISTANCES, WW Spool NI, 3W, 75 ohms, ±1%
ZDA 0363	RESISTANCES, WW Spool NI, 3W, 2,000 ohms, ±1%

General

52. It is essential that the Wireless Set A510, being a hermetically sealed equipment, should be in a thoroughly dry condition when returned to its case after repair and alignment. After rectifying any faults in the set, the chassis and case will be dried in an oven, allowed to cool and then aligned in a dry atmosphere. IMMEDIATELY after final trimming, the set should be returned to its case, together with fresh desiccators. The effectiveness of the sealing should then be tested in accordance with para 82.

Receiver

General

53. Realignment of the receiver may be found necessary after the replacement or repair of certain components, but under no circumstances shall the tuned circuit adjustments be interfered with unless suitable equipment is readily available. Sealed adjustments must be resealed on completion of any alignment in accordance with TELS A 410.

The oscillator is intended to operate at a frequency higher than that of the incoming signal. It is possible, by maladjustment of trimmers and/or slugs, to receive signals with the oscillator frequency less than that of the desired signal. Correct operation can be checked as follows:-

Tune receiver to signal generator signal.
Leaving receiver tuning untouched, increase generator frequency by about 910 kc/s, increase generator level to a high value, and tune generator about this new frequency (original signal + 910 kc/s) until received. If a signal can be obtained, and receiver is obviously less sensitive at the new frequency, oscillator has been correctly aligned. If it is necessary to reduce generator frequency by 910 kc/s from original, the receiver oscillator is operating on the low side of the signal frequency, and should be readjusted. (Reduce trimmer and/or unscrew core).

Some inter-action always exists between the frequency changer input grid and its oscillator circuit. The effect of this is that any adjustment of the RF trimmers or cores results in some change of oscillator frequency. When RF trimmer adjustments are being made therefore it is desirable to ensure that the generator frequency is that giving maximum output by rocking generator or receiver tuning dial during alignment.

54. In the following tests receiver controls shall be set as follows unless otherwise stated:-

(a) Volume control at maximum (fully clockwise).

(b) Function switch (SWC) set at "R" (receive).

(c) A-B Net switch (SWD) set at "B".

(d) Aerial matching switch (SWF2) set at "O".

IF Alignment (Fig. 18)

NOTE:- When carrying out the following, receiver output is not to exceed 200uW.

55.(a) Set the frequency output of the signal generator to 455 kc/s with 400 c/s modulation to a depth of 30%.

(b) Connect the active output lead of the signal generator in series with a 0.1ufd condenser to the control grid (pin 6) of the mixer V2 and the earth lead to chassis.

(c) Set the receiver band switch to the low (blue) frequency band and tune to 2Mc/s.

(d) Connect the wattmeter to the secondary of the output transformer (terminals 4 and 5 of SK2) with its impedance set at 100 ohms. A suitable electronic voltmeter may be used in place of the wattmeter by bridging terminals 4 and 5 of SK2 with a 100 ohm resistor and measuring the voltage across it.

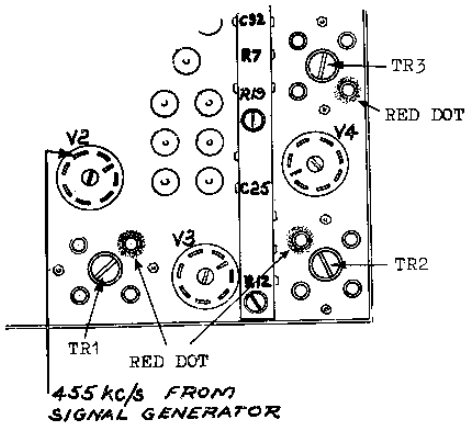


FIG. 18 - IF ALIGNMENT POINTS

(e) Vary the frequency output of the signal generator until maximum output is indicated on the wattmeter, this should be within 1 kc/s of 455 kc/s.

(f) If within this frequency tolerance, check sensitivity. If not within this tolerance, proceed as follows.

(g) Remove IF transformer adjustment sealing screws.

(h) Commencing at the third IF transformer, peak the secondary and then the primary of each transformer to 455 kc/s.

(j) Recheck IF channel as set out above until no further improvement.

(k) The IF sensitivity should be such that for an output of 200uW the signal generator output should not exceed 50uV.

(l) Replace sealing screws using new "O" rings.

Heterodyne Oscillator Alignment

56.(a) Plug the receiver headgear into socket SK2 and the key into socket SK3 (do not depress).

(b) Increase output of signal generator to maximum, switch off modulation and tune core of L10 to obtain zero beat.

(c) Remove the key and receiver headgear from their respective sockets.

Calibration and RF Alignment

57. Connect the signal generator modulated to depth of 30%, between the aerial terminal and chassis with the 75 ohm resistor in series with the aerial connection; the wattmeter connected as for IF alignment.

Low Frequency Band (Blue)

58.(a) Set the signal generator and receiver frequency dials to 2.2 Mc/s.

(b) Adjust core of coil L7 for maximum output.

(c) Repeat the procedure as in (a) but at 4.5 Mc/s.

(d) Adjust trimmer C21 for maximum output.

(e) Repeat procedure (a) to (d) until dial calibration is correct.

(f) Signal generator and receiver dials to 2.2 Mc/s and adjust cores of coils L5 and L1 for maximum receiver output.

(g) Signal generator and receiver dials to 4.5 Mc/s, adjust trimmer capacitors C1 and C8 for maximum receiver output.

(h) Repeat (f) and (g) until no further increase is obtained.

High Frequency Band (orange)

59.(a) Set the signal generator and receiver frequency dials to 4.5 Mc/s.

(b) Adjust core of coil L9 for maximum output.

(c) Repeat procedure as in (a) but at a frequency of 10 Mc/s.

(d) Adjust capacitor C20 for maximum output.

(e) Repeat as in (a) to (d) until calibration is correct.

(f) Set signal generator and receiver frequency dials to 4.5 Mc/s, adjust cores of L4 and L3 for maximum receiver output.

(g) Set signal generator and receiver frequency dial to 10 Mc/s and adjust capacitors C9 and C2 for maximum receiver output.

(h) Repeat (f) and (g) until no further increase in output is obtained.

Receiver Performance

60. Check the sensitivity, second channel selectivity etc. as detailed in paras 62-75 "RAEME Specification Tests".

Transmitter

61. The only alignment necessary is the mechanical alignment of the PA anode tuning circuit. This is detailed in "Removal and Replacement of Transmitter Components" (para 28). For further transmitter test details refer to "RAEME Specification Tests" and "Functional Test".

RAEME SPECIFICATION TESTS

Receiver

62. To carry out the following receiver tests the controls should be as detailed in para 54 unless otherwise specified.

Audio Sensitivity (Fig. 19)

63.(a) Withdraw mixer V2.

(b) Connect the wattmeter AF to the secondary of the output transformer (terminals 4 and 5 of SK2) with impedance set at 100 ohms.

(c) Tune receiver to 2.0 Mc/s and switch to low frequency (blue) band.

(d) Connect a 1,000 c/s signal from the audio oscillator through a 0.5uF condenser to pin 3 of V5. An attenuator similar to that shown in Fig. 19 will be used to keep the input level at 0.2V (use Millivolt Meters DC to check). Wattmeter should read 200uW output or 0.14V across 100 ohms load.

Audio Limiting (continued from Audio Sensitivity)

64.(a) Connect the CRO across the 100 ohm load.

(b) Remove attenuator and increase input until limiter clipping is observed on the CRO pattern. This should commence when the audio output level is 2,000uW ± 4db.(ie within the range 1,260 to 5,000uW).

(c) Replace mixer valve V2.

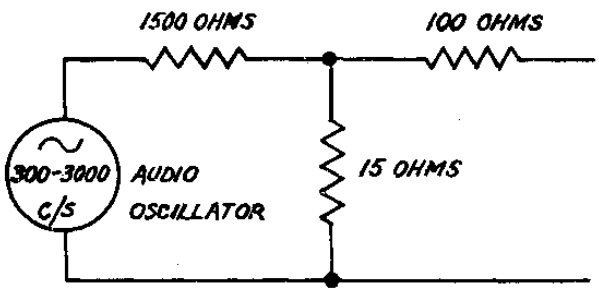


FIG. 19A - AUDIO SENSITIVITY TEST SET-UP

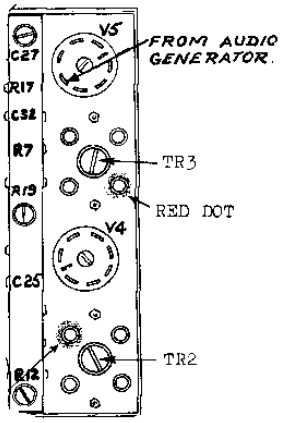


FIG. 19B - AUDIO SENSITIVITY TEST SET-UP

I.F. Sensitivity

65.(a) Set up as for I.F. alignment.

(b) For an audio output of 200uW the 455 kc/s input signal shall not exceed 50uV.

Adjacent Channel Selectivity

66.(a) Set up as for I.F. alignment to give 200uW output.

(b) Increase level by 10db.

(c) Tune signal generator each side of resonance to points where output drops to 200uW, the difference between the two points should be 7 kc/s ± 10%. The asymmetry between the two sides shall not be greater than 3.5 kc/s.

(d) Repeat operation with signal generator output 60db greater than in condition (a) above. The bandwidth should now be 23 kc/s ± 10%. The asymmetry between the two sides shall not be greater than 6 kc/s.

TABLE 5 - ADJACENT CHANNEL SELECTIVITY

db Down	*Bandwidth in kc/s*
10	6.3-7.7
60	20.7-25.3

Heterodyne Oscillator

67. The frequency of the heterodyne oscillator shall be within 1,000 c/s of the peak intermediate frequency.

NOTE:- The following tests will be carried out without removing equipment from case.

Dial Calibration

68. Low band:- ±50 kc/s at 2, 3 and 4 Mc/s.
±100 kc/s at 5, 6, 7, 8, 9 and 10 Mc/s.

R.F. Sensitivity and Signal to Noise Ratio

69. Connect the signal generator and wattmeter as for RF Alignment (para 57).

(a) Set signal generator and receiver to 2.0 Mc/s.

(b) Set signal generator output to 5uV, receiver output should be greater than 200uW (0.141 volts).

(c) Back off receiver gain to 200uW output.

(d) Switch off modulation and note residual noise as indicated by the wattmeter, this should not exceed 20uW (0.045V) or 10 db down on 200uW.

(e) Repeat tests at 4.5 Mc/s on the low band and at 5 Mc/s and 10 Mc/s on the high band.

CW Signal to Noise Ratio

70.(a) An unmodulated 5uV signal shall be applied through the dummy aerial to the set aerial terminal. The key shall be plugged in and the receiver tuned for maximum audio output.

(b) Back off receiver gain control for 200uW output.

(c) The input signal shall be switched off and the audio output shall fall by not less than 10db.

Second Channel Selectivity

71.(a) Set up as for RF alignment.

(b) Tune to frequencies shown in column 1 of the Table 6 output 200uW.

(c) Change signal generator to image frequency and increase input until output is again 200uW, the ratio between the receiver frequency in the first column and the image frequency should not be less than that shown in column 3.

TABLE 6 - SECOND CHANNEL SELECTIVITY

(1)	(2)	(3)
Receiver Frequency	*Image Frequency*	*Image Ratio*
2 Mc/s	2.91 Mc/s	1,000
4.5 Mc/s	5.41 Mc/s	200
5.0 Mc/s	5.91 Mc/s	200
10.0 Mc/s	10.91 Mc/s	60

I.F. Rejection

72.(a) The receiver tuned to 2 Mc/s low band, connect the signal generator output between aerial and earth of set with 75 ohm resistor connected in series with active lead.

(b) Tune signal generator to 2 Mc/s modulated 30% with output set to 4uV. Receiver gain control set to give 200uW output.

(c) Change signal generator frequency to 455 kc/s, the output required from signal generator to give 200uW at the receiver should be more than 40mV (better than 10,000/1).

A.G.C. Characteristic

73.(a) Tune receiver to 10 Mc/s (high band). Connect signal generator between aerial and earth of set with 75 ohm resistor in series with the active lead.

(b) The signal generator to 10 Mc/s modulated 30% with output set at 5uV. Rock tuning for maximum output at receiver.

(c) Increase output from signal generator to 50mV and adjust receiver gain control to give 200uW output.

(d) Reduce signal generator output to 10uV and the output shall not fall by more than 10db (ie, must now be greater than 20uW).

Spurious Responses

74. Tune receiver and signal generator to 2 Mc/s, output from signal generator 5uV, back off receiver gain control to give an output of 200uW. Leaving receiver tuned to 2 Mc/s, vary tuning of signal generator from 2 Mc/s to 10 Mc/s with the output level at 50mV and check for spurious responses. This test will be repeated with the receiver tuned to 4.5 Mc/s on the high band and signal generator varied from 4.5 to 10 Mc/s. The input required to produce any spurious response (except the image) shall be 70db above that at 2 Mc/s or 4.5 Mc/s respectively (ie, greater than 15mV).

Low Voltage Operation

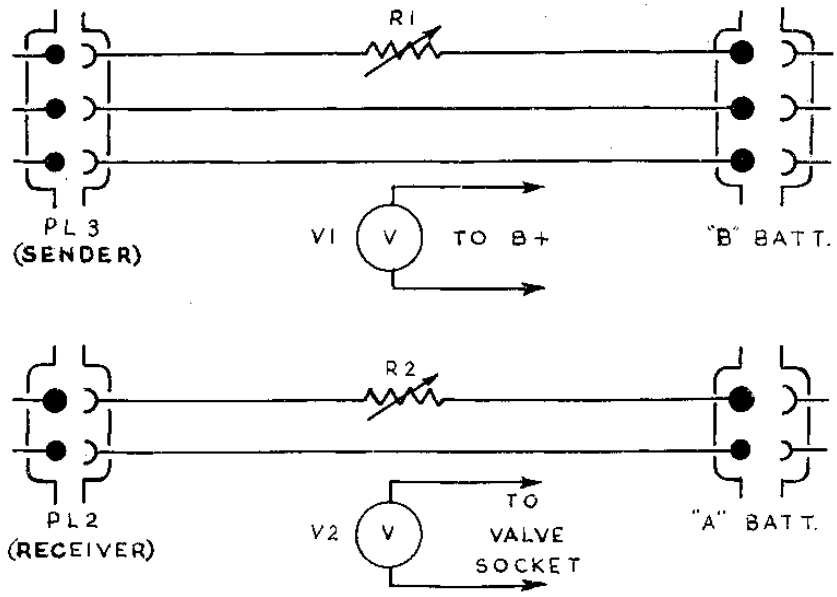
75. Essential requirement is that all oscillators will work.

(a) Connect series resistances in battery leads as shown in Fig. 20 to give 1.1V at filament and 66V HT (on load).

(b) At 5 Mc/s feed in 10uV modulated 30% at 400 c/s. 400 c/s note should be audible in phones.

(c) Check netting on both bands, there should be a clear audio tone on each side of zero beat.

(d) On CW transmit check that meter peaks and that side tone can be heard.



EQUIPMENT REQUIRED

R1 - SHOULD BE VARIABLE RESISTOR OF 3,000 OHMS TO CARRY 0.1 AMPS.

R2 - SHOULD BE VARIABLE RESISTOR OF 2.0 OHMS TO CARRY 0.65 AMPS.

V1 - VOLTMETER TO READ 66V ABOUT HALF SCALE.

V2 - VOLTMETER TO READ 1.1V ABOUT HALF SCALE.
(AVOMETER CAN BE USED FOR BOTH THESE FUNCTIONS IF SEPARATE METERS ARE NOT AVAILABLE).

FIG. 20 - LOW BATTERY VOLTAGE TEST

Netting

76. The receiver shall give a zero beat when tuned to the frequency of the transmitter and shall give a clear audio tone on either side of the zero.

Transmitter

Setting Up

77.(a) Check that crystals are plugged in their respective positions.

(b) Connect 75 ohm dummy load from aerial to earth terminal.

(c) Couple transmitter and receiver via PL1/SK1.

(d) Ensure that batteries are connected and in good condition.

R.F. Output

Low Impedance

78. Set "A-B-NET" switch to "B", crystal switch to "1" and matching switch to "0". Connect a radio frequency valve voltmeter across the 75 ohm load.

(a) Turn control switch to "C.W.", plug in key to key socket, with key operated rotate "SET TO FREQUENCY" knob until maximum is indicated on the "AERIAL TUNE METER".

(b) Switch to "VOICE" and note voltage.

(c) Using Table 7 with value of current or voltage measured in (b), check that measured RF carrier voltage is within the limits specified in columns 6:7 or 8:9 respectively for crystal positions 1, 2, 3 and 4.

(d) The power output shall not be less than 0.5 watts when keyed for C.W. operation.

Example:-

RF output on CW is 7.57 volts, which is equal to .765 watts or 101mA in 75 ohms. Then RF carrier power on voice must be within limits:-

(i) 0.138 to 0.245 watts in 75 ohms (Wattmeter HF) or
(ii) 42.3 to 57.5mA in 75 ohms or
(iii) 3.18 to 4.32 volts in 75 ohms,

depending upon whether power, current or voltage in the 75 ohms has been measured directly.

TABLE 7 - A510 POWER OUTPUT FOR CURRENT AND VOLTAGE IN 75 OHMS

I mA	*E* Volts	C.W. Power Watts	*RT Power*		*RT Current*		*RT Voltage*	
			Min Watts	*Max Watts*	*Min mA*	*Max mA*	*Min Volts*	*Max Volts*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
81	6.14	0.500	.089	.161	34.2	46.5	2.58	3.50
82	6.15	0.504	.0905	.162	34.4	46.8	2.59	3.51
83	6.23	0.517	.093	.165	34.9	47.4	2.62	3.55
84	6.30	0.529	.094	.169	35.3	47.9	2.65	3.59
85	6.37	0.541	.098	.173	35.7	48.5	2.71	3.63
86	6.45	0.555	.100	.177	36.0	49.0	2.74	3.68
87	6.52	0.567	.102	.182	36.6	49.6	2.77	3.73
88	6.60	0.581	.105	.186	37.1	50.1	2.80	3.77
89	6.68	0.595	.108	.190	37.3	50.7	2.83	3.82
90	6.75	0.607	.110	.194	37.8	51.3	2.86	3.86
91	6.82	0.620	.112	.199	38.2	51.9	2.90	3.90

TABLE 7 (CONTD)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
92	6.90	0.635	.115	.203	38.6	52.4	2.93	3.94
93	6.97	0.649	.118	.208	39.0	53.0	2.96	3.98
94	7.05	0.663	.120	.212	39.4	53.5	3.00	4.02
95	7.12	0.676	.123	.217	39.7	54.1	3.03	4.06
96	7.20	0.691	.125	.222	40.2	54.6	3.04	4.10
97	7.28	0.705	.127	.226	40.7	55.2	3.05	4.15
98	7.35	0.720	.130	.233	41.2	55.8	3.08	4.19
99	7.43	0.735	.133	.236	41.6	56.4	3.11	4.23
100	7.5	0.750	.136	.240	42.0	56.9	3.15	4.27
101	7.57	0.765	.138	.245	42.3	57.5	3.18	4.32
102	7.65	0.780	.140	.250	42.8	58.0	3.21	4.36
103	7.72	0.795	.143	.254	43.2	58.5	3.24	4.40
104	7.80	0.811	.146	.260	43.6	59.1	3.27	4.44
105	7.87	0.827	.149	.264	44.0	59.6	3.30	4.48
106	7.95	0.843	.152	.270	44.4	60.2	3.33	4.52
107	8.03	0.859	.155	.274	44.9	60.8	3.37	4.56
108	8.10	0.875	.158	.280	45.3	61.4	3.41	4.60
109	8.17	0.891	.161	.282	45.7	61.9	3.44	4.64
110	8.25	0.907	.163	.290	46.1	61.5	3.47	4.66
111	8.32	0.924	.166	.296	46.5	63.0	3.50	4.75
112	8.40	0.941	.170	.300	47.0	63.6	3.53	4.78
113	8.47	0.959	.174	.307	47.4	64.1	3.57	4.83
114	8.54	0.975	.176	.312	48.0	64.7	3.60	4.87
115	8.62	0.991	.180	.317	48.4	65.3	3.73	4.91

High Impedance

NOTE:- This test will be carried out only at frequencies below 8 Mc/s.

79.(a) Switch off and replace 75 ohm load with 2,000 ohm load.

(b) Set control switch to C.W., crystal switch to "I" and tune transmitter to maximum output on the "AERIAL TUNE METER".

(c) Measure voltages for C.W. and voice conditions with crystal switch in positions 1, 2, 3 and 4 using Table 8.

(d) The power output shall not be less than 0.5 watts when keyed for C.W. operation.

Example:-

R.F. output on C.W. is 37.5 volts which is equal to .704 watts or 18.75mA in 2,000 ohms.
Then R.F. carrier power on voice must be within limits:-

(i) 0.149 to .284 watts in 2,000 ohms or
(ii) 8.6 to 11.92mA in 2,000 ohms or
(iii) 17.3 to 23.83 volts in 2,000 ohms.

TABLE 8 - A510 POWER OUTPUT FOR CURRENT AND VOLTAGES IN 2,000 OHM LOAD

I mA	E Volts	C.W. Power Watts	RT Power		RT Current		RT Voltage	
			Min Watts	Max Watts	Min mA	Max mA	Min Volts	Max Volts
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
15.8	31.6	.500	.106	.200	7.28	10.0	14.6	20.0
16.0	32.0	.512	.108	.207	7.3	10.14	14.7	20.35
16.25	32.5	.528	.111	.211	7.4	10.25	14.9	20.54
16.5	33.0	.545	.115	.219	7.5	10.44	15.2	20.93
16.75	33.5	.561	.118	.227	7.7	10.63	15.4	21.31
17.0	34.0	.579	.123	.233	7.8	10.77	15.7	21.59
17.25	34.5	.595	.126	.240	7.9	10.95	15.9	21.91
17.5	35.0	.614	.130	.246	8.0	11.09	16.1	22.18
17.75	35.3	.630	.133	.252	8.1	11.23	16.3	22.45
18.0	36.0	.648	.136	.261	8.8	11.40	16.5	22.85
18.25	36.5	.666	.141	.268	8.4	11.57	16.8	23.15
18.5	37.0	.685	.145	.277	8.5	11.75	17.0	23.54
18.75	37.5	.704	.149	.284	8.6	11.92	17.3	23.83
19.0	38.0	.722	.152	.292	8.7	12.08	17.4	24.17
19.25	38.5	.741	.157	.299	8.8	12.21	17.7	24.45
19.5	39.0	.761	.161	.306	9.0	12.37	17.9	24.74
19.75	39.5	.780	.166	.316	9.1	12.57	18.2	25.14
20.0	40.0	.800	.169	.320	9.2	12.65	18.4	25.30
20.25	40.5	.820	.174	.330	9.3	12.85	18.6	25.69
20.5	41	.841	.178	.338	9.4	13.00	18.9	26.00
20.75	41.5	.861	.182	.348	9.5	13.19	19.0	26.38
21	42	.881	.186	.354	9.6	13.30	19.3	26.61
21.25	42.5	.904	.191	.363	9.7	13.45	19.5	26.94
21.5	43	.925	.196	.372	9.8	13.64	19.8	27.28
21.75	43.5	.946	.200	.382	10.0	13.82	20.0	27.64
22.0	44	.969	.205	.391	10.1	13.96	20.2	27.96
22.25	44.5	.991	.210	.400	10.2	14.14	20.5	28.28
22.5	45	1.010	.214	.407	10.3	14.25	20.7	28.53

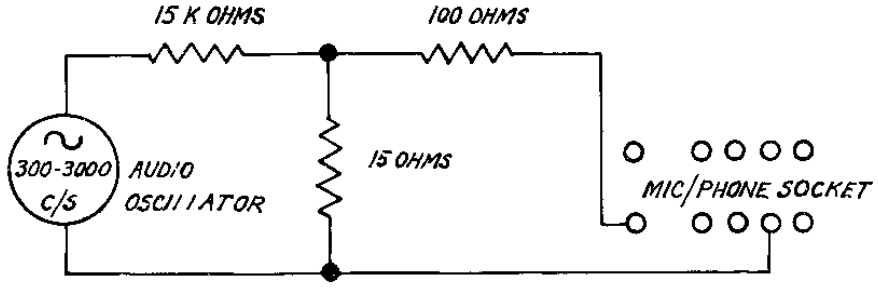


FIG. 21 - MODULATION SENSITIVITY TEST

Modulation Sensitivity (Fig. 21)

80.(a) Set up as previously but with cathode ray oscillograph in place of R.F. meter across 75 ohm load.

(b) Connect B.F.O. as in Fig. 21.

(c) Adjust output from B.F.O. to give approximately 50.80% modulated carrier pattern on cathode ray oscillograph.

(d) Vary the frequency of the B.F.O. to find the frequency at which maximum modulation depth occurs. This modulation frequency should be within limits 900 c/s to 1,500 c/s.

(e) Using this peak frequency adjust the B.F.O. to give 100% modulated carrier on the CRO, the input level must not be greater than 20mV across the 15 ohm resistor.

Meter

81.(a) *Power Output* -

The meter shall give a clear visual indication of peaking of the transmitter circuits which must not be less than 2 divisions.

(b) *Battery Conditions* -

The voltage applied to the L.T. plug required to make the meter needle lie on the left hand extremity of the red marking shall be 1.1 volts plus or minus 10%. The voltage applied to the H.T. plug required to make the needle lie on the left hand extremity of the red marking shall be 66 volts plus or minus 10%. The tests shall be conducted using the appropriate switch positions SWD to NET, SWC to CW for L.T. and SWC to VOICE for H.T.

SEAL TESTING

82. Refer to TELS X 571 and X 572.

(a) Remove screw from test seal hole and replace with test seal adaptor.

(b) Connect unit to seal tester.

(c) Evacuate air from unit under test, dry air, fill to 10 lbs./sq. in. above atmospheric pressure.

(d) Place set in water tank and check for leaks from case.

(e) If leaks are found then dismantling will be required to repair.

(f) If no leaks are found, remove set from water, blow off excess water with air blast.

(g) Remove set from air line.

(h) Place in oven at 50°C ± 5°C. Bake for 2 hours with test seal hole open.

(j) Remove set from oven and insert screw immediately into test seal hole.

(k) Check colour of humidity indicator. Correct colour is blue, pink indicates the presence of moisture inside the unit.

FUNCTIONAL TEST

83. Before packing for despatch, the set complete with all accessories will be assembled and operated to ensure that transmitter, receiver and all relevant accessories are working in a satisfactory manner. The functional test will be carried out as follows:-

(a) Connect headset or handset (both if available) to double five pin socket on receiver.

(b) Insert key in socket on sender.

(c) Insert 4 crystals and connect a 75 ohm non-inductive load between aerial and earth terminals.

(d) Connect fresh batteries to respective units.

(e) Set control switch to CW, A-B-NET switch to "B", crystal switch to "I", and matching switch to "O". With the key depressed tune the SET TO FREQUENCY knob on the transmitter to the frequency of crystal "I". The indication on the AER. TUNE meter should be better than 2 divisions.

(f) Switch to VOICE and check indication on meter, this should not be less than one division.

(g) Repeat above tests (e) and (f) for crystals 2, 3 and 4.

(h) Change load to 2,000 ohms and set A-B-NET switch to "A". Repeat tests (e), (f) and (g) with this new load.

(j) Set control switch to "R" and check that receiver noise is present on both "A" and "B" settings of the A-B-NET switch.

(k) Switch to CW, operate key and check that sidetone note can be heard in phones.

(l) Switch to VOICE and check that, on whistling into the microphone, sidetone can be heard in phones.

(m) Switch to R and NET and check that set nets satisfactorily on both bands. The receiver should give a zero beat when tuned to the frequency of the transmitter crystal and a clear audio tone on both sides of the zero beat.

(n) Net as detailed in (m). Operate the dial locking device 4 times. The receiver should either remain exactly on zero beat or give a clearly audible note. If the netting signal has been lost altogether the result is unsatisfactory.

(o) Check pilot lamps under the following conditions:-

Switch Positions	*Receiver*	*Sender*	*Meter Reads*
CW and A	-	lights	
CW and B	-	lights	
CW and NET	-	lights	L.T.
R and A	lights	-	
R and B	lights	-	
R and NET	lights	lights	
VOICE and A	-	lights	
VOICE and B	-	lights	
VOICE and NET	-	lights	H.T.

(p) By making use of another Wireless Set A510 known to be in good order, establish communication over a distance of at least 100 yards; both sets to be operated with rod aerials and identical crystals, after netting both sets to the same frequency (on the low frequency band), check VOICE operation for clarity. When operating on CW the sender must be capable of sending clear morse characters at speeds up to 20 W.P.M. and free of chirp and key clicks. Voice operation will be checked for intelligibility. Repeat both checks on the high band.

NOTE:- When netting beware of "ghost" signals. They are spurious responses which will be found near the correct dial setting. "Ghost" signals are not as strong as true signals and usually have background noise whereas the true signal has none. If netted to a "ghost" signal you will NOT RECEIVE THE DISTANT STATION.

Before despatch and after functional test the colour of the humidity indicator shall be blue.

NOTE:- *The next page is Page 1001.*

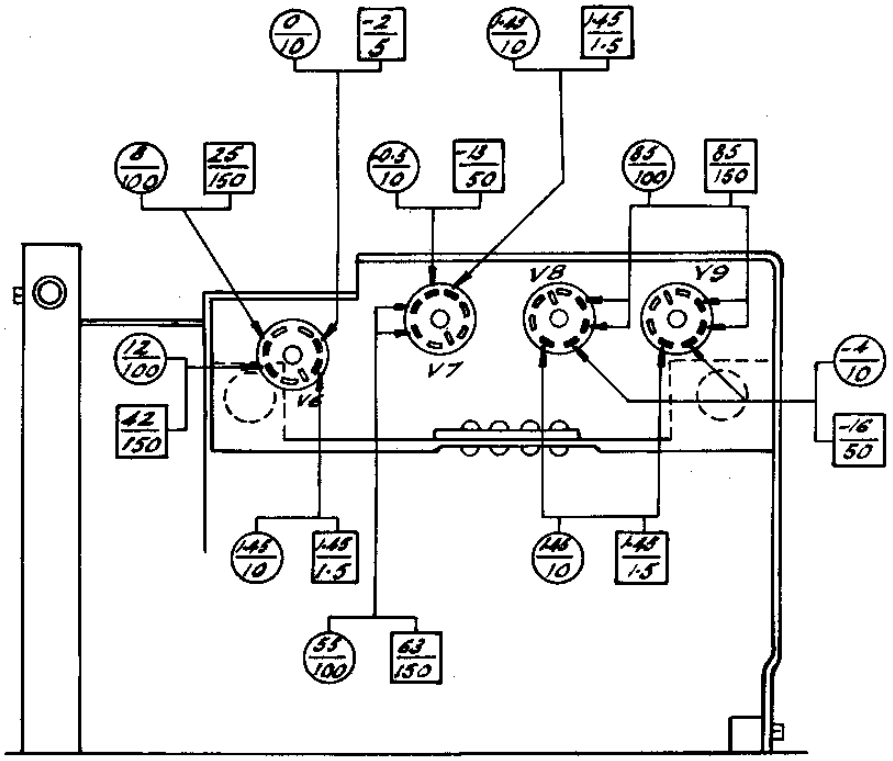


FIG. 1001 - TYPICAL TRANSMITTER VOLTAGE READINGS

LEGEND FOR VOLTAGE CHECK DIAGRAM FIGS. 1001, 1002 AND 1003

AVOMETER — 2.5/10 — DESIRED METER READING; SET METER TO THIS RANGE

VOLTOHMYST —

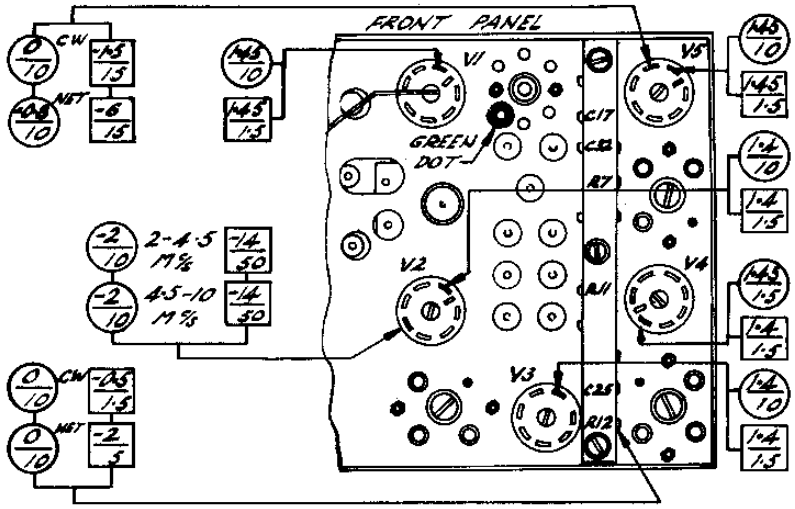


FIG. 1002 - TYPICAL RECEIVER VOLTAGE READINGS

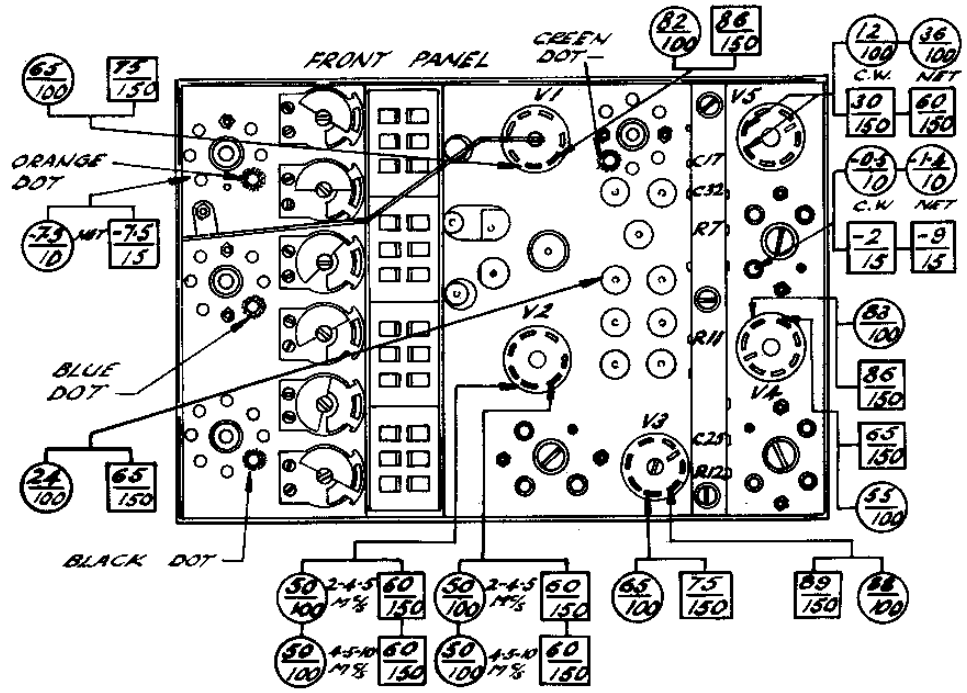


FIG. 1003 - TYPICAL RECEIVER VOLTAGE READINGS

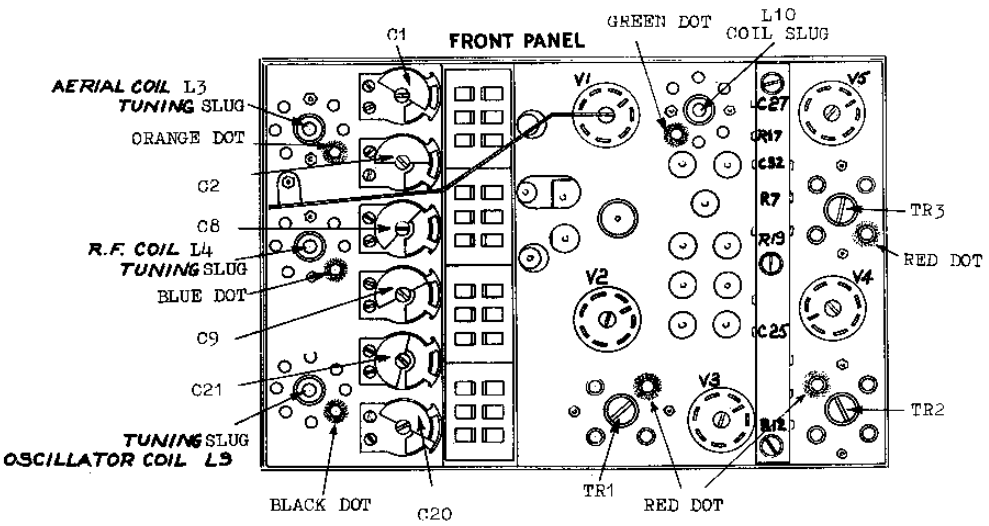


FIG. 1004 - RECEIVER ALIGNMENT POINTS

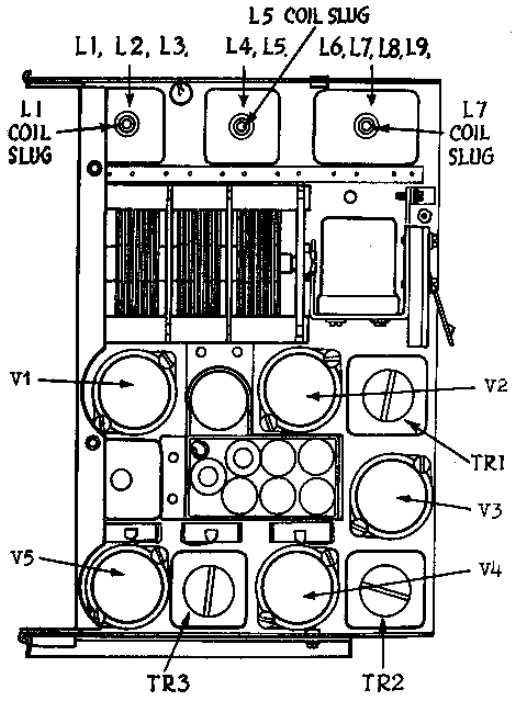


FIG. 1005 - RECEIVER ALIGNMENT POINTS

E N D