WIRELESS SET BURNDEPT BE 201

TECHNICAL HANDBOOK - UNIT REPAIRS

SUBJECT INDEX

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SETTING-UP

1. Remove the front covers of the sender-receiver and the power supply unit. Place the power supply unit on the right-hand side of the sender-receiver and connect the two units together by means of the 6-point connector provided. Connect the power supply unit to the battery by means of the twin connector. If the station is static attach the aerial assembly to any convenient vertical pole or tree and connect the aerial termination to the sender-receiver with the 27 ft. coaxial feeder. If the station is vehicle mounted, erect the $\frac{1}{4}$ wave vertical aerial on the vehicle and connect it to the sender-receiver with the Connector, coaxial, No. 11.

FLOAT CHARGE

2. Switch the MAIN SWITCH on and observe the meter reading. If the voltage falls below 10.8V the battery must be 'float charged'. Connect the battery terminals to the charging set using heavy duty twin cable and set the FLOAT CHARGE switch to FLOAT CHARGE. Take care to observe the correct polarity, i.e., the positive terminal of the charging set must be connected to the positive terminal of the battery. If the meter reading remains below 13.5V the FLOAT CHARGE switch must be set to NORMAL. During the float charging period the supply voltage must be carefully observed. If it rises above 13.5V the FLOAT CHARGE switch must be re-set to FLOAT CHARGE. When the wireless set is not in use the battery may be charged using the Connector, twin, No. 273.

SENDER TUNING

3. Set the sender CHANNEL SELECTION switch to the desired channel. Allow 30 sec. for the valve heaters to warm up, and operate the microphone pressel switch. Adjust SENDER TUNE to the channel frequency and set AE TRIM and DRIVE ADJUST for maximum brightness of the SENDER TUNE indicator lamp. Speak into the microphone and check that sidetone is heard in the headset. Note also that the brightness of the indicator lamp increases.

RECEIVER TUNING

4. Release the microphone pressel switch and set the receiver CHANNEL SELECTION to the same channel as that of the sender. With the RECEIVER GAIN fully clockwise adjust the RECEIVER TUNE to the channel frequency. When the receiver is accurately tuned an increase in background noise is evident. Lock both SENDER and RECEIVER TUNE controls. The set is now ready for operation.

CHANGING CRYSTALS

5. To change crystals in the sender-receiver, remove the small panel at the rear of the case. Two groups of four crystals are seen marked A, B, C and D. The left-hand set is in the receiver circuit and the right-hand set in the sender.

Note: If a crystal from one group is changed, the corresponding one in the other group must also be changed.

6. To calculate the frequency of the sender crystal required to produce an output at a given signal frequency, divide the latter by 18. For example, an output frequency of 100Mc/s requires a crystal frequency of $\frac{100}{18}$ = 5.555Mc/s.

To calculate the receiver crystal frequency from the required signal frequency, subtract the I.F. frequency from the signal frequency and divide the remainder by 18. For example:-

Signal frequency (Mc/s)	100
I.F. (Mc/s)	9.72
	90.28
Required crystal frequency	$\frac{90.28}{18}$ = 5.016Mc/s

Thus for the set to be operated on a channel frequency of 100Mc/s the sender crystal frequency must be 5.555Mc/s and the receiver crystal frequency 5.016Mc/s.

MAINTENANCE

7. In addition to the daily and weekly maintenance tasks detailed in the working instructions, the following tasks should be carried out monthly and an entry made in the unit maintenance log (see Table 4).

Sender-receiver

8. Remove the sender-receiver chassis from the case and carefully brush out any dust that may have accumulated. Check over for loose connections and fixing bolts, taking great care not to disturb the physical position or the dimensions of the R.F. coils, decoupling capacitors and wiring. Check that all valves are firmly seated in their holders. Valves must not be removed unless necessary. When replacing valves,

great care must be taken to ensure that the keyways and/or pins are correctly positioned before pushing the valves home. The screw retainers of valves V2 - V5 must be lightly greased.

9. Check that the slow-motion dials operate smoothly. If necessary, a little light oil may be applied to the drive bearings. Check the operation of the send-receive relay RLA1. Examine the aerial change-over contacts and the contacts of the sender and receiver CHANNEL SELECTION switches. Should the contacts require cleaning a 10%,solution of Lanoline in trichlorethylene or benzine, thiophene free, crystallizable (HA 12345) may be made up for local use. Care should be taken not to allow excess fluid to flow over the switch insulation as this may lead to insulation troubles. After cleaning wipe away any excess fluid.

Power supply unit

10. Remove the power supply unit from the case and clean the interior. Check for loose connections and fixing bolts, particularly those holding down the two rotary transformers. Examine the brushes to ensure that they are making firm contact with the commutators and are not unduly worn. With a clean soft rag carefully clean the commutators and wipe away any accumulation of carbon dust around the brush holders. Do not use any abrasive on the commutators. Run up both rotary transformers and report if any excessive sparking occurs. Do not touch the transformers when they are running as the hands may be badly cut by the cooling fans.

11. With the MAIN SWITCH on, check that the FLOAT CHARGE switch slows down the receiver rotary transformer on switching to FLOAT CHARGE. Operate the microphone pressel switch and note that the receiver rotary transformer stops while the sender starts up. Again check the action of the FLOAT CHARGE switch.

12. Examine the action of the send-receive relay RLB1 and clean the contacts, if necessary.

Battery

13. Remove all dirt and products of corrosion from the terminals of the battery and re-grease with Grease PX-7, (petrolatum soft) HA 13544.

Charging set

14. Perform tasks given in the working instructions.

General

15. When the Wireless set BE 201 is used as a vehicle mounted station, run the engine and all electrical gear of the vehicle. Check that receiver noise does not increase due to faulty bonding or screening of the ignition or other electrical gear.

16. When the maintenance instructions as detailed in paras. 7 - 15 have been carried out, set up the aerial and sender-receiver and check that normal operation is possible. Report any discrepancies.

FAULT FINDING

17. Table 1 gives average readings of receiver currents and voltages measured at principle points in the circuit. Table 2 gives average readings of sender currents and voltages. For the measurement of grid currents, numbered test points are provided on the underside of the chassis.

18. It should be noted that the heaters of the following valves are wired in series:-

V14	(sender)	and	V15	(sender)
V4	(sender)	and	V5	(sender)
V2	(sender)	and	V3	(sender)
V1	(sender)	and	V7	(receiver)
V9	(receiver)	and	V10	(receiver)
V11	(receiver)	and	V12	(receiver)
V8	(receiver)	and	V18	(receiver)
V16	(receiver)	and	V17	(receiver)

Thus a fault in the heater of any one valve will affect the operation of another.

19. Table 3 indicates some of the simpler faults which may occur, together with their probable cause.

Conditions of test

(a) No R.F. input.

(b) Receiver tuned as detailed in para. 4

(c) All measurements made with Avometer, universal, 46-range, Mk. 1 (or 50-range).

(d) Anode and screen voltages measured on D.C. 400V range.

(e) Cathode voltages measured on D.C. 10V and 100V ranges.

(f) Grid currents measured from test points to earth on D.C. 0.002A range.

(g) L.T. 12V measured on power supply unit meter.

Note: The test figures given below may vary by approximately ± 10% due to circuit tolerances

Table 1 - Receiver voltage and current test figures

Valve	Electrode	Measurement point	Voltage or current
V6	Anode	pin 5	195V
	Screen	pin 7	140V
	Cathode	pin 2	1.5V
V7	Anode	pins 1 and 5	225V
	Cathode	pin 7	11.5V
V8	Anode	pin 5	220V
	Screen	pin 7	165V
	Cathode	Pin 2	2V
V9	Anode	pin 5	220V
	Screen	pin 7	165V
	Cathode	pin 2	2V
V10	Anode	pin 5	220V
	Screen	pin 7	165V
	Cathode	pin 2	2V

Table 1 - (contd.)

Valve	Electrode	Measurement point	Voltage or current
V11	Anode	pin 7	0V
	Cathode	pin 1	2.5V
V12	Anode	pins 5 and 7	225V
	Cathode	pin 2	1V
V16	Anode	H.T. side of L21	230V
	Screen	pin 7	125V
	Grid	T.P.5	100µA
V17	Anode	H.T. side of L23	230V
	Screen	pin 7	135V
	Grid	T.P.6	70µA
V18	Anode	H.T. side of L25	230V
	Screen	pin 7	175V
	Grid	T.P.7	30µA

Conditions of test

(a) Sender tuned as in para. 3.

(b) All measurements made with Avometer, universal, 46-range, Mk. 1 (or 50-range).

(c) Anode and screen voltages measured on D.C. 400V range.

(d) Cathode voltages measured on D.C. 10V and 100V ranges.

(e) Grid currents measured from test points to earth on D.C. 0.002A range.

(f) L.T. 12V measured on power supply unit meter.

Note: The test figures given below may vary by approximately ± 10% due to circuit tolerances

Table 2- Sender voltage and current test figures

Valve	Electrode	Measurement point	Voltage or current
V1	Anode	H.T. side of L1	257V
V2	Anode	H.T. side of L2	295V
	Screen	pin 3	135V
	Grid	T.P. 4	0.7mA
V3	Anode	H.T. side of L4	295V
	Screen	pin 3	100V
	Grid	T.P. 3	1.4mA
V4	Anode	H.T. side of L6	295V
	Screen	pin 3	170V
	Grid	T.P. 2	0.8mA

Table 2 - (contd.)

Valve	Electrode	Measurement point	Voltage or current
V5	Anode	H.T. side of L8	285V
	Screen	pin 3	275V
	Grid	T.P. 1	0.7mA
V13	Anode 1	pin 1	85V
	Anode 2	pin 6	85V
	Cathodes	pins 3 and 8	1V
V14 and V15	Anode	pin 3	293V
	Screen	pin 4	295V
	Cathode	pin 8	20V

Table 3 - Possible faults and their causes

Symptom	Possible fault	Action
(1) With MAIN SWITCH on, POWER ON lamp does not light	(1) Faulty lamp (2) Battery leads open-circuit or making bad contact (3) Battery run down	(1) Replace (2) Inspect and if necessary clean terminals (3) Check voltage and recharge if necessary
(s) With MAIN SWITCH on, lamp lights but receiver rotary transformer does not start up	(1) Send-receive relay faulty (2) Internal fault in power unit	(1) Check relay and clean contacts (2) Examine wiring and rotary transformer brushes for good contact
(3) With microphone pressel switch depressed, sender rotary transformer does not start and/or receiver rotary transformer does not stop	(1) Send-receive relay RLB1 faulty (2) Snatch socket faulty (3) Faulty pressel switch (4) Internal fault in power supply unit	(1) Check operation and inspect contacts (2) Change microphone and headgear assembly to other snatch socket (3) Change microphone and headgear assembly (4) Examine wiring and rotary transformer brushes for good contact
(4) On send, SENDER TUNE lamp does not light on one channel	(1) Defective crystal (2) Faulty CHANNEL SELECTION switch	(1) Check crystal contact with holder. If necessary replace crystal (2) Check action and clean contacts

Table 3 - (contd.)

Symptom	Possible fault	Action
(5) On send, SENDER TUNE lamp does not light on any channel, with sender correctly tuned	(1) Bad lamp contact or faulty lamp (2) Send-receive relay RLA1 faulty (3) Faulty valve or valves	(1) Check and replace lamp if necessary Note: The lamps on the two units are not interchangeable (2) Check action and clean contacts if necessary (3) Check valve voltages and grid currents and replace faulty valve
(6) On send, SENDER TUNE lamp glows brilliantly or burns out	(1) Broken aerial connection	(1) Check coaxial feeder for continuity and inspect coaxial connector for good contact
(7) On send, SENDER TUNE lamp glows dimly	(1) Faulty power amplifier valve V5	(1) Check voltages and grid current. Replace valve if necessary
(8) On send, SENDER TUNE lamp lights on incorrect dial setting	(1) Crystal faulty	(1) Change crystal. If fault persists, report
(9) On send, no sidetone is audible when speaking into microphone	(1) Faulty microphone (2) Faulty snatch plug or socket (3) Faulty modulator valves	(1) Change microphone (2) Change to other snatch socket (3) Check voltages and replace faulty valve
(10) SENDER TUNE lamp does not change in brightness on speaking into microphone	(1) Modulator valves faulty	(1) Change faulty valve
(11) On receive, no signals heard in headset	(1) Send receive relay RLA1 faulty (2) Defective crystal (3) CHANNEL SECTION switch faulty (4) Valve fault	(1) Check action and clean contacts (2) Change crystal (3) Check action and clean contacts (4) Check voltages and currents. Replace faulty valve

Notes: 1. On all valve checks, first observe that all valves 'light up' (see para. 18).

2. If the actions recommended above do not clear the fault, report immediately.

Army Form B 2661

TYPE OF EQUIPMENT .....WS. BE. 201.....
SERIAL No. OF EQUIPMENT....143.....
NOTE - Unit tasks are detailed in Working Instructions

REPAIR RECORD
(e.g. VALVE REPLACEMENTS, MAJOR REPAIRS, R.E.M.E. INSPECTIONS etc.)

DATE	REMARKS
3/4/52	V1 replaced, heater open-circuit
17/4/52	SENDER TUNE lamp replaced, burnt out
17/4/52	Faulty joint in aerial feeder repaired
22/4/52	Input brushes on sender transformer renewed

UNIT MAINTENANCE LOG							
DATE (week ending)	1 DAY	2 DAY	3 DAY	4 DAY	5 DAY	6 DAY	7 DAY
This section to be completed by user							

UNIT MAINTENANCE LOG

INITIAL	DATE
	22/4/52

NOTE: UNIT TASKS ARE DETAILED IN RELEVANT E.M.E.R.

INITIAL	DATE

INITIAL	DATE

INITIAL	DATE

INITIAL	DATE

Note:- The spaces indicated by heavy black lines under days 3 and 7 are to be initialled on completion of unit weekly and monthly tasks respectively.

Table 4 - Specimen A.F.B 2661

57/Maint./4482

END