

RECEPTION SETS AR88D AND AR88LFTECHNICAL HANDBOOK - UNIT REPAIRS

SWITCHING ON INSTRUCTIONS

Power requirements

1. The receivers can be operated from the following A.C. or D.C. supplies.

A.C. : AR88D; 100-165V or 190-260V, 50-60c/s., 100VA.
AR88LF; 115 or 230V, 25-60c/s., 100VA.

D.C.; Both sets; L.T.: 6V at 4A.
H.T.: 250-300V at 90mA.

A.C. mains operation

2. Set the voltage selector switch SW25, which is located on the rear of the chassis, to supply voltage. Check that the shorting plug is inserted in SK1 and that the following pins are shorted together; pin 1 to pin 2, pin 3 to pin 4.

Battery or vibrator operation

3. Remove the shorting plug from the socket SK1 and insert an octal plug. Feed L.T. and H.T. D.C. supplies to the following plug pins:-

L.T. to pin 4.
L.T.- to pin 5.
H.T.- to pin 6.
H.T. to pin 7.

As the OFF-TRANS. switch, SW24, breaks only the A.C. primary circuit of TR1 in the OFF position, separate on/off switches must be used in each D.C. supply line. On no account must the negative lines of the two supplies be commoned as this will short-circuit the valve biasing networks.

Aerial input connections

4. Where a 200 Ω balanced transmission line is used, connect the line across terminal A and the centre terminal of the aerial terminal board, TBL. Remove the shorting link to the earthed terminal G. In addition to the shorting link some receivers have an internal connection between the centre terminal and terminal G. This must also be removed.
5. Where a single-wire aerial is used, connect the aerial to terminal A and the earth lead to terminal G. Replace the shorting link between G and the centre terminal.

Output connections

6. For loudspeaker operation connect the speaker across the 2.5 Ω output terminals on the rear of the chassis. For headphone operation, plug the phone plug in the jack located on the front panel. Low impedance headphones should be used for the AR88LF; high impedance headphones for the AR88D. When a loudspeaker is not used on the AR88D, the phone plug must be pushed fully home.

7. For line output, connect the line to the line terminals at the rear of the chassis. The AR881F is designed to feed a 20Ω unbalanced line, while the AR88D is designed to feed a 600Ω balanced or unbalanced line.

Tuning

8. Table 1 gives the tuning procedure for both receivers.

Operation	Control	Action
1	OFF-TRANS switch	Set to REC. MOD. or REC. C.W.
2	RANGE switch	Set to desired frequency range
3	A.F. GAIN	Set to mid-position
4	R.F. GAIN	Set to full gain
5	SELECTIVITY switch	Set to required position
6	TUNING CONTROL	Tune in station
▼	ANT. ADJ.	Adjust for maximum signal
8	A.F. GAIN	Re-set to desired volume
9	R.F. GAIN	Re-set as required to suit noise level, retard on strong C.W. signals
10	B.F.O. ADJ.	If receiving C.W. set to desired signal pitch
11	MAN. - A.V.C. switch	Set to suit signal conditions
12	NOISE LIMITER	Set for best reception
13	H.F. TONE	Adjust as required

NOTE: The TUNING CONTROL may be locked by turning clockwise the small knurled screw located beneath the control

MAINTENANCE

Table 1 - Tuning procedure

9. The following tasks will be carried out periodically and an entry made in the unit maintenance log. (see Fig. 1).

Weekly tasks

10. Examine the condition of all external leads, power cables and connections etc. and repair or renew where necessary.

11. Remove the set from its case and carefully brush off any dirt which may have accumulated in the case or on the chassis. Do not disturb any wiring or alignment adjustments. Check over the chassis for loose fixing screws and loose connections. Ensure that all valves are firmly seated in their sockets.

TYPE OF EQUIPMENT ...Reception.set.4R88D.....								Army Form B2661	
SERIAL NO. OF EQUIPMENT009008.....									
NOTE - Unit tasks are detailed in Working Instructions									
UNIT MAINTENANCE LOG								UNIT MAINTENANCE LOG	
DATE (week ending)	1 DAY	2 DAY	3 DAY	4 DAY	5 DAY	6 DAY	7 DAY	INITIAL	DATE
This section to be completed by user.									
								NOTE: UNIT TASKS ARE DETAILED IN RELEVANT E.M.E.R.	
								INITIAL	DATE

Fig. 1 - Specimen A.F. B2661 (front)

REPAIR RECORD (e.g. VALVE REPLACEMENTS, MAJOR REPAIRS, R.E.M.E. INSPECTIONS etc.)	
DATE	REMARKS
3.5.52	R38 open circuit, replaced.
19.5.52	V5 replaced, cathode-heater short.
27.5.52	Contacts of RANGE switch cleared.
27.5.52	New R.F. gain control, RV3, fitted.
<p><u>Note:</u> 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.</p>	

Fig. 2 - Specimen A.F. B 2661 (back)

Check the mechanical action of each control and ensure that all knobs are firmly fixed on their spindles. If any knobs required adjustment use the wrench mounted in a spring holder on the right-hand side of the chassis.

12. Reassemble the set and check that reception is possible on all six bands. Test the operation of each control on a suitable transmission.

Monthly tasks

13. Remove the set from its case and remove the large and small covers on the ganged tuning capacitors. Carefully clean the chassis, using a hand blower if available. Avoid bending any of the capacitor vanes or altering any of the alignment adjustments.

14. Remove the two cover plates on the R.F. and oscillator sections and clean the underneath of the chassis using a hand blower if available. Be careful not to alter any of the alignment adjustments or the position of the wiring and components.
15. Examine the set for loose connections and fixing bolts. Check the action of all controls and examine the contacts of all switches. Where the contacts require cleaning make up a 10% solution of Lanoline in Trichlorethylene or Benzine, thiophene free, crystallizable (HA 12345). The solution should be applied to the contacts with a fine brush taking care not to allow excess fluid to flow over the insulation. After cleaning wipe off any excess fluid.
16. Check that the tuning drive mechanism operates smoothly and that the dials and ganged capacitor couplings are secure. Apply a small amount of light grease, such as Grease, LG-280 (R.A.S.C. supply) to the small drive pinions.
17. Check that, with the tuning capacitor vanes fully meshed, the numerical scales on both the tuning dials read zero.
18. Reassemble the receiver and check that normal reception is possible on all six bands. Test the operation of each control on a suitable transmission.
19. Report any discrepancies.

FAULT-FINDING

20. Table 2 lists the voltages and resistances measured to chassis at principal points in the receiver. These figures are intended to serve as a guide and will vary from set to set due to circuit tolerances.

Table 2 - Typical receiver voltage and resistance figures

Conditions of test

- 1 No. R.F. input
- 2 R.F. GAIN set to full gain
- 3 MAN. - A.V.C. switch set to MAN.
- 4 OFF-TRANS. switch set to REC. C.W.
- 5 RANGE switch set to range 1
- 6 All measurements made with Avometer, universal, 46-range Mk. 1. (or 50-range)
- 7 Anode and screen voltages measured on D.C. 400V range
- 8 Cathode voltages measured on D.C. 10V range
- 9 Resistance measurements made on most suitable ohms range with set switched off

Valve	Electrode	Pin No.	D.C. voltage to chassis		Resistance to chassis	
			AR88D	AR88LF	AR88D	AR88LF
V1	Anode	8	240V	230V	-	-
	Screen	6	140V	125V	-	-
	Grid	4	-1.2V*	-1.2V*	2.5MΩ	2.5MΩ
V2	Anode	8	240V	230V	-	-
	Screen	6	140V	125V	-	-
	Grid	4	-1.2V*	-1.2V*	1.5MΩ	1.5MΩ
V3	Anode	3	110V	110V	-	-
	Grid	5	-	-	56kΩ	100kΩ

Table 2 - (contd.)

Valve	Electrode	Pin No.	D.C. voltage to chassis		Resistance to chassis	
			AR88D	AR88LF	AR88D	AR88LF
V4	Anode	3	240V	230V	-	-
	Screen	4	50V	50V	-	-
	Osc. grid	5	-	-	100k Ω	100k Ω
	Cathode	6	2V	2V	560 Ω	560 Ω
	Grid	8	-	-	13 Ω	333 Ω
V5	Anode	8	240V	230V	-	-
	Screen	6	150V	150V	-	-
	Cathode	5	0.8V	0.6V	100 Ω	100 Ω
	Grid	4	-1.2V*	-1.2V*	1M Ω	1M Ω
V6	Anode	8	240V	230V	-	-
	Screen	6	150V	150V	-	-
	Cathode	5	0.5V	1.3V	180 Ω	47 Ω
	Grid	4	-1.2V*	-1.2V*	1M Ω	1M Ω
V7	Anode	8	240V	230V	-	-
	Screen	6	150V	150V	-	-
	Cathode	5	3V	3V	390 Ω	390 Ω
	Grid	4	-	-	2.2M Ω	2.2M Ω
V8	Anode A	5	-	-	100k Ω	100k Ω
	Anode B	3	-1.2V*	-1.2V*	450k Ω	450k Ω
	Cathode B	4	-1.2V*	-1.2V*	450k Ω	450k Ω
V9	Anode A	5	-	-	750k Ω	750k Ω
	Cathode A	8	-	-	1.25M Ω	1.25M Ω
	Anode B	3	-	-	33k Ω	33k Ω
	Cathode B	4	-	-	1.25M Ω	1.25M Ω
V10	Anode	8	40V	40V	-	-
	Screen	6	30V	30V	-	-
	Cathode	5	0.1V	0.1V	100 Ω	100 Ω
	Grid	4	-	-	3.2M Ω	3.2M Ω
V11	Anode	3	260V	250V	-	-
	Screen	4	245V	235V	-	-
	Grid	5	-	-	330k Ω	330k Ω
V12	Anode	3	30V	30V	-	-
	Grid	5	-	-	120k Ω	120k Ω
V13	Anode	5	150V	150V	-	-
V14	Cathode	2	320V	305V	-	-

* Measured at the slider of RV3, R.F. GAIN control

21 Table 3 gives fault-finding information.

Table 3 - Fault finding procedure

Symptom	Possible fault	Action
1. Set dead	(a) Faulty connections to power source	(1) Check power leads and power supply
	(b) No L.T. or H.T. voltage on valves	A.C. working:- (1) Check A.C. voltage at tags 8 and 1 of SK1 (2) Measure voltage across primary of TR1. If no volts check SW24 and SW25, or FS1 (AR88LF only) D.C. working:- (1) Check D.C. voltages at SK1 (see para. 3)
2. Set dead, dial lamps light up but V13, neon stabilizer, does not strike	(a) No H.T. voltage on valves	A.C. working:- (1) Measure D.C. voltage at pins 3 and 4 of V11 and pin 5 of V13 (see Table 2) (2) If no volts check wiring and voltages of TR1 and V14 (3) If voltage at pin 3 of V11 only, check L49 and wiring of SW23 (4) If no volts or low volts at pin 5 of V13, check R30 D.C. working:- (1) As in A.C. working (2) Check D.C. voltages and wiring of SK1 (3) As in A.C. working (4) As in A.C. working
3. Set dead, dial lamps do not light, but V13 strikes	(a) No L.T. voltage on valves	A.C. working:- (1) Check voltage between tag 4 of SK1 and earth (2) Measure voltage across L.T. winding of TR1. If no volts replace TR1

Table 3 - (contd.)

Symptom	Possible fault	Action
3 (contd)		D.C. working:- (1) Check voltage between tag 4 of SK1 and earth
4. Set dead but L.T. and H.T. voltages are present	(a) Wrong output connections or faulty loudspeaker	(1) Check output connections and test loudspeaker
	(b) Fault in A.F. stages	(1) Test A.F. stages as follows:- Short cut R37, V10 grid-bias decoupler, and measure A.F. voltage output across speaker. This should be 1.5V R.M.S. (2) If A.F. stage not working, check windings of TR2 and measure voltage and resistances at pins of V10 and V11 (see Table 2) Test V10 and V11 by substituting known good valves
5. No signals but noise present	(a) Fault in local oscillator stage V3	(1) Test local oscillator as follows:- Measure D.C. voltage across R12, this should be 3 to 3.5V. Switch range switch to neutral point between bands. Voltage should rise to 6 to 6.5V. Check on all ranges. (2) If oscillator not working, measure voltages and resistances at pins of V3 (see Table 2). Test V3 by substituting a known good valve
	(b) Fault in R.F. stages	(1) Check reception on each band. Measure voltages and resistances at pins of V1, V2 and V4. Test valves by substituting known good ones

Table 3 - (contd.)

Symptom	Possible fault	Action
5 (contd)	(c) Fault in I.F. or detector stages	(1) Check reception in all selectivity positions. Measure voltages and resistances at pins of V5 to V9. Test valves by substituting known good ones
6. Low sensitivity	(a) Primary tapping of TR1 at wrong voltage setting (b) Any one of faults 4(a), 4(b), 5(a), 5(b) or 5(c)	(1) Adjust SW25 (1) Take action as detailed
7. Weak signals with distortion	(a) Fault in A.F. stages	(1) Test as in 4(b)
8. Intermittent weak signals, or crackling noises	(a) Dirty contacts in switches SW1-16, SW17-20 or SW21-22 (b) Any one of faults 4(a), 4(b), 5(a), 5(b) or 5(c) (c) Bad contact in RV1, RV2, RV3, or RV4 (d) Faulty aerial system	(1) Clean as detailed in para. 15 (1) Take action as detailed (1) Replace faulty control (1) Short-circuit the aerial terminals. If noise ceases, inspect and repair aerial system
9. Continuous hum	(a) Fault in H.T. smoothing circuits (b) Any one of faults 4(a), 4(b), 5(a), 5(b) or 5(c)	(1) Measure resistances of L49 and L50. These should be 400Ω (disconnect before measuring) Test C96, C97 and C98 by substituting known good capacitors (1) Take action as detailed
10. No signals on REC. C.W.	(a) B.F.O. off tune or exactly at I.F.	(1) Adjust B.F.O. ADJ.

Table 3 - (contd.)

Symptom	Possible fault	Action
10 (contd)	(b) B.F.O. not oscillating	<p>(1) Test B.F.O. as follows:-</p> <p>Measure D.C. voltage across terminals C and D of TR10 (R29), (C is positive); this should be 16V. Short grid of V12 (pin 5) to earth, voltage should rise to 22V</p> <p>(2) If the oscillator is not working, measure voltages and resistances at pins of V12. Test V12 by substituting a known good valve</p> <p>(3) Replace TR10</p>

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