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- Q.** Why do you not just give your manuals away, as so many do via the internet these days?
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Despite the above, we will be making copies of essential technical information (circuit diagram, parts list, layout) freely available to all via our website from late 2004 onwards. This will be done to try and encourage and enable the maintenance of our remaining stock of vintage electronic equipment.

Guidance on using this electronic document

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You need to view this document with Acrobat Reader **version 5.0** or later. It is possible that the document might open with an earlier version of the Acrobat Reader (thus allowing you to get this far!), but is also likely that some pages will not be shown correctly. You can upgrade your Acrobat Reader by direct download from the internet at <http://www.adobe.com/products/acrobat/readermain.html> or going to <http://www.adobe.com/> and navigating from there.

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You should note first that virtually all original documents are in double-sided format, i.e. printed on both sides of the paper. Accordingly, our copies are similarly double-sided., and the best results are obtained if the document is printed double-sided. You can print out on one side only, but you will find that you get a number of blank sheets (which can just be removed and reused), and where margins vary in width between left-hand and right-hand pages, there is a danger of the text disappearing into the binding of your printed copy.

This document is of fairly simple format in that it can be made to print out using an A4 format printer (this is the common paper size available in UK and Europe, which measures 29.7cm by 21.0cm). By "simple" I mean that there are no large diagrams on fold out sheets, which will require multiple A4 pages to print out at full size.

Original document sizes do vary a lot – from the small manuals, which approximate to A5 size (21.0 x 14.8 cm) up to the now obsolete foolscap size (21.6 x 33.0 cm). US documents tend to use their "letter" size paper (21.6 x 27.9 cm). All these sizes can be printed on A4 paper by simply getting Acrobat to shrink or enlarge the pages as necessary. This is done as follows:

1. Select "File – Print" or click on the printer icon. This will bring up the print dialog box.
2. Select the correct printer if necessary.
3. Select the pages you want to print – even if you want to print all of the document, you will probably not want to print this notice and help page, so start the printing at page 3.
4. In the "Page Handling" area, next to "Page Scaling", select "Fit to paper". The press "OK"

Printing the document on an US Letter format printer

Since A4 and US Letter sizes are similar, it is expected that this document should print satisfactorily on the latter format paper. This has not been tested however, and is not guaranteed. Follow the steps as for A4 printing, and make doubly sure that "Fit to paper" is selected (step 4).

Any other problems?

Please get in touch with me at archivist@vmarsmanuals.co.uk.

Richard Hankins, VMARS Archivist, Summer 2004

R E S T R I C T E D

ELECTRICAL AND MECHANICAL
ENGINEERING REGULATIONS
(By Command of the Defence Council)

TELECOMMUNICATIONS
E 748

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RECEIVER, RADIO, EDDYSTONE, 730/4

TECHNICAL HANDBOOK - INSPECTION STANDARDS

Note: This Issue 2, Pages 1-9, supersedes Issue 1, Pages 1-5, dated 16 Mar 62. Para 1, 2, and 4.d., Table 1, Items 2 (page 2), 2 (page 3), and 3 and 5 (page 4), have been amended.

INTRODUCTION

1. a. This regulation details the inspection standards to be observed during field inspection, and after field, intermediate, or base repair. Departure from these standards is not permitted unless authorized by the Chief Inspector, Headquarters, Technical Group REME.
- b. Equipment must be sentenced in accordance with the latest relevant D.C.I.

REFERENCES

2. EMERs Tels: A 304 Equipment wire for use in field and base repair.
A 619 EMER specification for inspection standards.
A 760 Repainting of electronic equipment.
A 779 General standard for the overhaul of electronic equipment (base standard).
A 851 Recording of modifications.

TEST EQUIPMENT

3. The specification figures are based on measurements made with the preferred test equipment detailed in Table 1.

Part No	Designation
Z4/6625-99-102-8077	Signal generator set No 12/2
Z4/6625-99-103-6633	Signal generator No 18, Mk 2, CT402, equipment
Z4/6625-99-949-0510	Wattmeter, absorption, a.f., No 1, CT44, equipment
Z4/6625-99-105-7049	Multimeter set CT498A
Z1/SIGS/US/SIGS/ 6625-00-568-9999	Frequency meter
Z4/6625-99-949-0470	Voltmeter, valve, No 3, CT208, equipment
Z4/ZD 00198	Oscillator, beat frequency, No 8, equipment
Z4/6625-99-102-6694	Oscilloscope set, CT436, with probe

Table 1 - Test equipment

CONDITIONS OF TEST

4. a. The mains input voltage will be 230V at 50c/s.
- b. The signal generator's impedance will be 75Ω.
- c. The a.f. wattmeter will be terminated in 600Ω when connected to the receiver 600Ω output.
- d. The b.f.o. No 8 will be connected to the PU terminals via a 100kΩ resistor when checking the a.f. response.
- e. All testing should be carried out in an effectively screened cage.

FIELD INSPECTION RECORD

5. In the following particulars paragraph numbers refer to Tels E 744.

Item	Test	Specification limits			Result
		Min	Max	Units	
1	<u>General condition</u>				
	a. Rust, damp, corrosion, dust	-	-	-	
	b. Paintwork free from cracks	-	-	-	
	c. Inscriptions legible	-	-	-	
	d. Metal case and panel	-	-	-	
	e. Switches and controls	-	-	-	

Item	Test	Specification limits			Result
		Min	Max	Units	
	f. Screws, bolts, nuts, fasteners, etc	-	-	-	
	g. Mod and Misc instructions	-	-	-	
2	<u>A.F. response</u> (para 49) Connect b.f.o. No 8 via 100k Ω resistor to the P.U. terminals of the receiver. Connect a.f. wattmeter (600 Ω 2W) to the 600 Ω output and adjust A.F. GAIN to maximum. Set SELECTIVITY switch to BROAD, NOISE LIMITER switched OFF. Adjust b.f.o. output to give 1W at 1kc/s. Response should be in accordance with the following:- 1kc/s 100c/s-300c/s 300c/s-7kc/s 7kc/s-10kc/s	0 -5 -1 -3	0 0 +1 0	dB dB dB dB	
3	<u>I.F. output</u> (para 46) Signal generator input to receiver at 10 μ V modulated 30% at 300c/s. Measure output at I.F. plug with valve voltmeter	100	-	mV	
4	<u>A.V.C. response</u> (para 44) Set receiver controls as detailed. Signal generator as in item 3; a.f. wattmeter (600 Ω , 200mW) connected to output. Adjust a.f. gain for 50mW output. Switch on a.v.c. Increase r.f. input by 80dB. The a.f. output should not increase by more than the following at various SELECTIVITY positions:- Narrow 2nd intermediate 1st intermediate Broad	- - - -	+10 +12 +14 +20	dB dB dB dB	

Item	Test	Specification limits			Result
		Min	Max	Units	
5	<u>Signal/noise ratio (voice) (para 41)</u> Set the receiver controls as detailed. Connect signal generator with 75Ω termination to receiver input. Output of generator 10μV modulated 30% at 300c/s and tuned to receiver. Wattmeter set to 600Ω, 200mW. Reduce the a.f. gain until a.f. output is 50mW. Switch off signal generator modulation. The output must fall by at least 15dB at the following frequencies:- a. Range 1: 30Mc/s 20Mc/s 12.3Mc/s b. Range 2: 12.5Mc/s 8.5Mc/s 5.3Mc/s c. Range 3: 5.7Mc/s 3.8Mc/s 2.5Mc/s d. Range 4: 2.5Mc/s 1.7Mc/s 1.15Mc/s e. Range 5: 1.1Mc/s 0.75Mc/s 0.5Mc/s	-15	-	dB	
6	<u>Signal/noise ratio (c.w.) (para 42)</u> Set the receiver controls as detailed and with signal generator and wattmeter connected as in item 5. Adjust signal generator r.f. attenuator to 2μV unmodulated output. Plug in earphones and tune signal generator to receiver. Adjust b.f.o. for output of approx 1kc/s. Adjust receiver a.f. output to give 50mW indication on wattmeter. Switch off carrier; the wattmeter indication shall fall by at least 15dB. Repeat for the same frequencies as detailed in (a) - (e) of item 5	-15	-	dB	

BASE INSPECTION RECORD

6. The specification figures quoted are based on measurements made using the test equipment detailed in Tels E 744. The paragraph numbers quoted also refer to Tels E 744.

Item	Test	Specification limits			Result
		Min	Max	Units	
1	<u>General condition</u>				
	a. Rust, damp, and corrosion	-	-	-	
	b. Paintwork free from cracks	-	-	-	
	c. Inscriptions to be legible	-	-	-	
	d. Metal case and panel	-	-	-	
	e. Switches and controls	-	-	-	
	f. Screws, bolts, nuts, and fasteners, etc	-	-	-	
	g. Mod and Misc instructions	-	-	-	
2	<u>A.F. response (para 49)</u>				
	Connect b.f.o. No 8, tuned to 1kc/s, via 100k Ω resistor to the P.U. terminals of the receiver. Connect a.f. wattmeter (600 Ω 2W) to the 600 Ω output with receiver A.F. GAIN at maximum. Set SELECTIVITY switch to BROAD, NOISE LIMITER switched OFF. Adjust b.f.o. to give 1W on wattmeter. Response should be in accordance with the following:-				
	1kc/s	0	0	dB	
	100c/s-300c/s	-5	0	dB	
	300c/s-7kc/s	-1	+1	dB	
	7kc/s-10kc/s	-3	0	dB	
3	<u>A.F. filter response (para 50)</u>				
	Connect the equipment as detailed in para 50. Using signal generator modulated 30% at 1kc/s by external b.f.o., retune b.f.o. to give max output (fmax) with the A.F. FILTER switch at ON. Detune b.f.o. on each side of the peak until the output falls 6dB below max previously obtained. The frequencies at which this occurs will be:	fmax -50	fmax +50	c/s	
	Repeat for a reduction of 25dB below fmax output. The frequencies will be:	fmax -125	fmax +125	c/s	

Item	Test	Specification limits			Result
		Min	Max	Units	
4	<u>Receiver b.f.o. alignment</u> (para 39) Remove V4 and connect the signal generator adjusted to 450kc/s to the point 'X' shown in Fig 2504 Tels E 744. Receiver controls set as in Table 3 (Tels E 744). With the b.f.o. control at '12 o'clock' position, zero beat should be obtained.				
5	<u>I.F. amplifier bandwidth</u> (para 39 and Table 6) Connect signal generator and a.f. wattmeter as detailed in para 39. Feed in 450kc/s modulated 30% at 300c/s. Check, by means of frequency meter, that frequency of signal generator is correct ± 1.5kc/s. Determine that the bandwidth is in accordance with the following (measuring at the -30dB points):- a. <u>SELECTIVITY</u> switch Broad 9.0 - kc/s 1st intermediate 4.0 - kc/s 2nd intermediate 2.5 - kc/s Narrow 2.0 - kc/s Measuring at the -45dB points:- b. <u>SELECTIVITY</u> switch Broad - 24 kc/s 1st intermediate - 16 kc/s 2nd intermediate - 13 kc/s Narrow - 12 kc/s				
6	<u>Crystal phasing check</u> Connect valve voltmeter to R36, C72 junction. Switch <u>SELECTIVITY</u> switch to narrow and <u>PHASING</u> control to '12 o'clock' position. Adjust signal generator output to give valve voltmeter reading of 0.5V. Detune 1kc/s either side and adjust the crystal phasing control for maximum rejection. Adjust generator output to produce 0.5V again. Increase in generator output should be:	55	-	dB	

Item	Test	Specification limits			Result
		Min	Max	Units	
7	<u>I.F. output</u> (para 46) Signal generator input to receiver should be 10 μ V modulated 30% at 300c/s. Measure output at I.F. plug with valve voltmeter	100	-	mV	
8	<u>Signal/noise ratio</u> (voice) (para 41) Set the receiver controls as detailed. Connect the signal generator with 75 Ω termination to receiver input. Adjust the generator output to 10 μ V modulated 30% at 300c/s and tune to receiver. Adjust the A.F. GAIN until the a.f. output is 50mW. Switch off signal generator modulation. The output must fall by at least 15dB at the following frequencies:- a. Range 1: 30Mc/s 20Mc/s 12.3Mc/s b. Range 2: 12.5Mc/s 8.5Mc/s 5.3Mc/s c. Range 3: 5.7Mc/s 3.8Mc/s 2.5Mc/s d. Range 4: 2.5Mc/s 1.7Mc/s 1.15Mc/s e. Range 5: 1.1Mc/s 0.75Mc/s 0.5Mc/s	-15	-	dB	
9	<u>Signal/noise ratio</u> (c.w.) (para 42) Set the receiver controls as detailed. With equipment connected as in item 8. Feed a 2 μ V input unmodulated carrier, with A.F. GAIN adjusted to give 50mW output. Plug in ear-phones and adjust b.f.o. to give output at 1kc/s approximately. Switch off the carrier. The output should fall by at least 15dB. Repeat for the frequencies detailed in (a) - (e) of item 8	-15	-	dB	

Item	Test	Specification limits			Result																																				
		Min	Max	Units																																					
10	<u>Image rejection</u> (para 43) Adjust the receiver controls as detailed. Connect the signal generator tuned to 30Mc/s, 10μV output modulated 30% at 300c/s to the receiver input, and a.f. wattmeter connected to receiver output (600Ω, 200W). Tune receiver and generator for max output, then reduce a.f. gain until a.f. output is 50mW. Tune the signal generator to 30.9Mc/s. Increase its output until wattmeter again reads 50mW. Increase in signal generator output must be at least 30dB. Check at the following frequencies on the other ranges:- <table><thead><tr><th></th><th>Signal frequency</th><th>Image frequency</th><th></th><th></th><th></th></tr></thead><tbody><tr><td>Range 1:</td><td>30Mc/s</td><td>30.9Mc/s</td><td>30</td><td>-</td><td>dB</td></tr><tr><td>Range 2:</td><td>12.5Mc/s</td><td>13.4Mc/s</td><td>40</td><td>-</td><td>dB</td></tr><tr><td>Range 3:</td><td>5.7Mc/s</td><td>6.6Mc/s</td><td>65</td><td>-</td><td>dB</td></tr><tr><td>Range 4:</td><td>2.4Mc/s</td><td>3.3Mc/s</td><td>80</td><td>-</td><td>dB</td></tr><tr><td>Range 5:</td><td>1.1Mc/s</td><td>2.0Mc/s</td><td>80</td><td>-</td><td>dB</td></tr></tbody></table>		Signal frequency	Image frequency				Range 1:	30Mc/s	30.9Mc/s	30	-	dB	Range 2:	12.5Mc/s	13.4Mc/s	40	-	dB	Range 3:	5.7Mc/s	6.6Mc/s	65	-	dB	Range 4:	2.4Mc/s	3.3Mc/s	80	-	dB	Range 5:	1.1Mc/s	2.0Mc/s	80	-	dB				
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11	<u>A.V.C. response</u> (para 44) Set receiver controls as detailed. Connect the signal generator and a.f. wattmeter as in item 10. Adjust the receiver a.f. output to give 50mW. Switch on a.v.c. Increase the generator r.f. output by 80dB. The a.f. output should not increase by more than 8dB. Repeat at the various SELECTIVITY switch positions as follows:- <table><tbody><tr><td>Narrow</td><td>-</td><td>8</td><td>dB</td></tr><tr><td>2nd intermediate</td><td>-</td><td>10</td><td>dB</td></tr><tr><td>1st intermediate</td><td>-</td><td>12</td><td>dB</td></tr><tr><td>Broad</td><td>-</td><td>20</td><td>dB</td></tr></tbody></table>	Narrow	-	8	dB	2nd intermediate	-	10	dB	1st intermediate	-	12	dB	Broad	-	20	dB																								
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Item	Test	Specification limits			Result
		Min	Max	Units	
12	<u>I.F. rejection (para 45)</u> Set the receiver controls as detailed. Tune the signal generator to 480kc/s modulated 30% at 300c/s with 10 μ V input. Connect the a.f. wattmeter as in item 11. Adjust the a.f. output of receiver to 50mW. Tune the signal generator to 450kc/s and adjust its output until a.f. output is again 50mW. The increase in signal generator attenuator setting should be:	50	-	dB	
13	<u>Noise limiter</u> Measure with the c.r.o. that the noise 'grass' falls in the ratio 4:1 when the noise limiter switch is operated. This test should be done with the receiver out of test cage				
14	<u>Crystal calibrator</u> Check the accuracy of the crystal calibrator by obtaining a beat note using the frequency meter adjusted to 500kc/s	4.75	5.25	kc/s	

EME/8c/1017

END

