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TRANSMITTER-RECEIVER, RADIO, A41

TECHNICAL HANDBOOK - INSPECTION STANDARDS

INTRODUCTION

1. This regulation details the inspection standards to be observed during field inspection and after field or base repair.
2. Departure from these standards will not be permitted unless authorized by War Office or DEME of the overseas theatre concerned.
3. This regulation is divided into the following:-
 - (a) Field inspection schedule

This schedule details the test equipment required, the general and mechanical standards and the test methods to be used during field inspection or after field repair.
 - (b) Field inspection record

This record is for use as a field examiner's form. All necessary standards for field inspection are listed with sufficient text to act as an aide memoire.
 - (c) Base inspection schedule

This schedule details the additional test equipment required; the general and mechanical standards; and the test methods to be used during and/or after base overhaul.
 - (d) Base inspection record

This record is for use as a base examiner's form. All necessary standards for final inspection are listed with sufficient text to act as an aide memoire.

References

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|----|------------------|---|
| 4. | EMERs Tels A 619 | EMER specifications for inspection standards - telecommunications equipment |
| | Tels A 779 | General standard for the overhaul of electronic equipment |
| | Tels A 760 | Repainting of electronic equipment |
| | Tels F 480-489 | Transmitter-receiver, radio, A41 |
| | Tels M 150-159 | Kits, testing, vehicle and manpack radio sets |
| | Tels M 630-639 | Apparatus, seal testing |

FIELD INSPECTION SCHEDULE

5. Using the limits quoted in the record form as the standard, examiners should classify the equipment in accordance with the latest ACI. When an equipment is serviceable but barely satisfies the minimum standard the symbol '0' should be used to indicate that the equipment must be kept under observation with the facilities available to the unit concerned. If facilities are not available to the unit the equipment may have to be downgraded. In other borderline cases, and particularly where quantitative measurements are not given in the record form, the final assessment must be based on the examiner's experience and judgement using this regulation as a guide.

Test equipment

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

General condition

7. (a) The equipment will be inspected for general cleanliness and will be free from moisture and fungoid growth.
- (b) The set and battery case shall be free from dents and be sealed correctly.
- (c) All front panel components will be securely mounted. Battery plug and lead to be free from cracks and distorted pins.
- (d) Paintwork will be inspected for cracking, chipping or flaking. Where patch painting has been carried out uniformity of colour need not be considered.
- (e) Station spares and accessories will be complete and serviceable.
- (f) All outstanding modifications will be recorded.

Table 1 - Test equipment required

Preferred instrument		Suitable alternative	
Part No	Designation	Part No	Designation
ZD 02674	Signal generator No 12	ZD 00391	Signal generator No 1, Mk 3
ZD 04302	Signal generator No 18	WD 3941	Signal generator No 13
NIV	Multi-range test meter (20,000 Ω /V)	ZD 00252	Instrument, testing, Avo- meter, 8S, 28-range
Z4/6625-99- 913-8618	Oscilloscope, set CT 436	Z4/10S/831	Oscilloscope, type 13A
ZD 0661	Wattmeter, absorption, a.f., No 1	ZD 0063	Meter, output, power, No 3, Mk 2
ZD 00747	Wattmeter, absorption, h.f., No 2	-	-
ZD 00657	Voltmeter, valve, No 3	ZD 00617	Instrument, testing, elec- tronic, multi-range, No 1
NIV	Audio frequency oscillator (under development)	ZD 00198	Oscillator, b.f., No 8
ZD 00193	Test set, deviation, f.m., No 2	-	-
NIV	Frequency meter, r.f., portable (under development)	ZC 1411	Frequency meter SCR 211
Z4/6625-99- 942-4825	Ovens, drying, Tels, 240V a.c.	-	-
ZD 02172	Tester, valve, CT 160	ZD 00286	Tester, valve, Avo, No 3 or No 1, Mk 2
WC 53340	Apparatus, seal testing	-	-
NIV	Multi-range test meter (1,000 Ω /V)	ZD 00207	Instrument, testing, Avo- meter, universal, 50-range, No 2
NIV	Power pack, radio, manpack (to be developed)	-	Power pack for TR 31 (modified see Tels F 364)
ZD 03985	Kits, testing, vehicle and manpack radio sets (see Tels M 152)	-	-

FIELD INSPECTION RECORD

8. All tests quoted using test equipment connected via Kits, testing, vehicle and manpack radio sets as detailed in Fig 1 Tels F 484.

9. In the following table paragraph numbers refer to Tels F 484.

10. Unless otherwise stated the following tests shall be carried out with normal voltage.

Table 2 - Field inspection record

Item	Test	Specification limits			Result
		min	max	unit	
1	Cleanliness, freedom from moisture, dust, corrosion and fungoid growth	-	-	-	
2	Front panel component battery lead and plug	-	-	-	
3	Set and battery case	-	-	-	
4	Paintwork	-	-	-	
5	Station spares and accessories	-	-	-	
6	Modification	-	-	-	
7	<u>Power consumption</u> (para 27)				
	Receive 1.4V	-	0.47	A	
	Send 1.4V	-	0.47	A	
	Receive 65V	-	22	mA	
	Send 65V	-	19	mA	
	Receive 130V	-	-	-	
	Send 130V	-	44	mA	
	Receive -5.6V	-	-	-	
	Send -5.6V	-	0.38	mA	
8	<u>Sensitivity</u> (para 29)				
	Normal voltage: Input 1.25µV 54Mc/s deviated 15kc/s at 1Kc/s modulation frequency. Tune set for maximum a.c. on v.v. and note reading. Switch off modulation and note reading on v.v. The ratio of the readings shall be	20	-	dB	
	Repeat at 39Mc/s				
	Low voltage: Repeat above at low voltage, the ratio of the readings shall be	15	-	dB	

Table 2 - (cont)

Item	Test	Specification limits			Result
		min	max	unit	
9	<p><u>Limiting</u> (para 31)</p> <p>Input 54Mc/s deviated 15kc/s at 1kc/s modulation frequency, varied from 3μV to 1mV. Change in a.f. output shall be Repeat at 39Mc/s</p>	-	2.5	dB	
10	<p><u>Frequency setting error</u> (para 32)</p> <p>Inject 54Mc/s c.w. 25μV signal, tune set to 54Mc/s and set cursor accurately to 54Mc/s calibration mark. Detune set five times in each direction. Set calibration mark to cursor. The difference shall be Repeat at 39 and 47Mc/s</p> <p>Alternative method to avoid unsealing equipment: Gain control to max, switch to CAL, plug in headset, tune for zero beat at 53.85 Mc/s. Set cursor accurately to 53.85 calibration mark. Switch off CAL and detune five times in each direction and set calibration mark to cursor. Switch to CAL beat, note shall be audible Repeat at 40.85 and 38.7Mc/s</p>	-	± 10	kc/s	
11	<p><u>Tuning dial lock</u> (para 33)</p> <p>Input 54Mc/s c.w., 25μV. Tune set accurately to 54Mc/s, operate lock. The change in frequency shall be Repeat at 39 and 47Mc/s</p> <p>Alternative method to avoid unsealing equipment: Set gain to max, switch to CAL, plug in headsets. Tune set for zero beat note at 53.85Mc/s, lock dial and note change in beat note Repeat at 40.85 and 38.7Mc/s</p>	-	3	kc/s	
12	<p><u>Calibration error</u> (para 34)</p> <p>With the dial corrected at the lowest calibration mark. The error shall be When the tuning dial is set to the highest frequency</p> <p>Alternative method to avoid unsealing equipment, see Tels F 483 para 4</p>	-	± 30	kc/s	
13	<p><u>A.F. power output</u> (para 36)</p> <p>Normal voltage: Input 10μV 54Mc/s modulation 15kc/s at 1kc/s a.f. output shall be</p> <p>Low voltage: Input 5μV 54Mc/s modulation 15kc/s at 1kc/s a.f. output shall be</p>	5	-	mW	
		1.5	-	mW	

Table 2 - (cont)

Item	Test	Specification limits			Result
		min	max	unit	
14	<u>Output frequency</u> (para 37) Normal voltage: With standard input conditions for receiver, output frequency shall be within ± 4 kc/s of receive frequency Low voltage: With standard input conditions for receiver, output frequency shall be within ± 8 kc/s of receive frequency Alternative method to avoid unsealing equipment: Set gain to max, switch on CAL, plug in headset. Tune set for zero beat, note 53.85Mc/s, switch off CAL and switch to send. Check frequency against frequency meter Repeat at 40.85 and 38.7Mc/s	-	± 4	kc/s	
		-	± 8	kc/s	
15	<u>Modulation sensitivity</u> (para 39) A.F. input of 500mV at 1kc/s, the deviation shall be A.F. input of 250mV at 1kc/s, the deviation shall be	-	15	kc/s	
		5	10	kc/s	
16	<u>R.F. output</u> (para 40) Normal voltage: R.F. output meter 50 Ω connected to AUX AE socket and set tuned through frequency range, the r.f. output shall be Low voltage: Set tuned through frequency range, the r.f. output shall be	0.75	-	W	
		0.25	-	W	
17	<u>Short aerial matching circuit</u> (para 42) Using standard artificial aerial of 20pF capacitor in series with a non-inductive resistor of 33 Ω . At any frequency the r.m.s. voltage developed across the resistor and measured on an a.c. v.v. shall be	4.2	-	V	
18	<u>Long aerial matching circuit</u> (para 43) The minimum r.f. voltages across the appropriate resistor measured on an a.c. v.v. shall be:- 38Mc/s artificial aerial 46Mc/s artificial aerial 55Mc/s artificial aerial	14.5	-	V	
		15.5	-	V	
		13	-	V	
19	<u>Sealing test</u> (para 44) With an initial internal pressure of 10 lb/sq. in. the time constant of the set shall be	150	-	hr	

BASE INSPECTION SCHEDULE

11. No additional test equipment required.

General condition

12. Where applicable the general condition will conform to standards detailed in Tels A 779.

Table 3 - Base inspection record

Item	Test	Specification limits			Result
		min	max	unit	
1	Cleanliness, freedom from moisture, dust, corrosion and fungoid growth	-	-	-	
2	Set and battery case	-	-	-	
3	Sealing	-	-	-	
4	Paintwork	-	-	-	
5	Engraving	-	-	-	
6	Wiring and soldered joints	-	-	-	
7	Plugs, sockets, terminals	-	-	-	
8	Components and sub-assemblies	-	-	-	
9	Knobs, controls, battery lead and plug	-	-	-	
10	Spares and accessories	-	-	-	
11	Modifications	-	-	-	
12	<u>Power consumption (para 27)</u>				
	Receive 1.4V	-	0.47	A	
	Send 1.4V	-	0.47	A	
	Receive 65V	-	22	mA	
	Send 65V	-	19	mA	
	Receive 130V	-	-	-	
	Send 130V	-	44	mA	
	Receive -5.6V	-	-	-	
	Send -5.6V	-	0.38	A	

Table 3 - (cont)

Item	Test	Specification limits			Result
		min	max	unit	
13	<p><u>Selectivity</u> (para 28)</p> <p>Inject 1.25μV at 54Mc/s, tune set for max limiter grid voltage, note reading on v.v. Increase s.g. output by 6dB (2.5μV) and detune s.g. for original output on both sides of 54Mc/s peak. Bandwidth at 6dB shall be -</p> <p>Increase s.g. output by 60dB (1.25mV) and repeat. Bandwidth at 60dB shall be</p>	65	90	kc/s	
		-	300	kc/s	
14	<p><u>Sensitivity</u> (para 29).</p> <p>Normal voltage: Input 1.25μV 54Mc/s deviated 15kc/s at 1kc/s modulation frequency. Tune set for max a.c. on v.v. and note reading. Switch off modulation and note reading on v.v. The ratio of the readings shall be</p> <p>Repeat at 39Mc/s</p> <p>Low voltage: Repeat above at low voltage, the ratio of the readings shall be</p>	20	-	dB	
		15	-	dB	
15	<p><u>Limiting</u> (para 31)</p> <p>Input 54Mc/s deviated 15kc/s at 1kc/s modulation frequency, varied from 3μV to 1mV. Change in a.f. output shall be</p>	-	2.5	dB	
16	<p><u>Frequency setting error</u> (para 32)</p> <p>Inject 54Mc/s c.w. 25μV signal, tune set to 54Mc/s and set cursor accurately to 54Mc/s calibration mark. Detune set five times in each direction. Set calibration mark to cursor. The difference shall be</p> <p>Repeat at 39 and 47Mc/s</p>	-	± 10	kc/s	
17	<p><u>Tuning dial lock</u> (para 33)</p> <p>Input 54Mc/s c.w., 25μV. Tune set accurately to 54Mc/s, operate lock. The change in frequency shall be</p>	-	3	kc/s	
18	<p><u>Calibration error</u> (para 34)</p> <p>With the dial corrected at the lowest calibration mark. The error shall be</p> <p>When the tuning dial is set to the highest frequency</p>	-	± 30	kc/s	

Table 3 - (cont)

Item	Test	Specification limits			Result
		min	max	unit	
19	<p><u>Discriminator</u> (para 35)</p> <p>Inject 54Mc/s c.w. signal and tune set for max limiter grid voltage. Increase s.g. output for maximum voltage at limiter grid (approx 18.5V). Retune set for zero output a.f.c. discrimination. Measure i.f. frequency, it shall be 4.3Mc/s</p> <p>Detune s.g. ± 30kc/s and note output, it shall be</p> <p>and the lesser of the two voltages shall be</p> <p>Repeat at ± 15kc/s. The output shall be of the voltages at 30kc/s points</p>	-	± 3	kc/s	
		8	-	V	
		6	-	V	
		40	60	%	
20	<p><u>A.F. power output</u> (para 36)</p> <p>Normal voltage: Input 10μV 54Mc/s modulation 15kc/s at 1kc/s a.f. output shall be</p> <p>Low voltage: Input 5μV 54Mc/s modulation 15kc/s at 1kc/s a.f. output shall be</p>	5	-	mW	
		1.5	-	mW	
21	<p><u>Output frequency</u> (para 37)</p> <p>Normal voltage: With standard input conditions for receiver, output frequency shall be within ± 4kc/s of receive frequency</p> <p>Low voltage: With standard input conditions for receiver, output frequency shall be within ± 8kc/s of receive frequency</p>	-	± 4	kc/s	
		-	± 8	kc/s	
22	<p><u>A.F.C.</u> (para 38)</p> <p>Tune sender to 54Mc/s, switch off 65V. Detune:-</p> <p>(a) Transmitter frequency 500kc/s above 54Mc/s and note frequency when REC 65V is switched on</p> <p>(b) Repeat at 500kc/s below 54Mc/s and note frequency</p> <p>The difference between (a) and (b) shall be</p> <p>Low voltage: Repeat above at ± 400kc/s, the difference shall be</p>	-	10	kc/s	
		-	15	kc/s	

Table 3 - (cont)

Item	Test	Specification limits			Result
		min	max	unit	
23	<u>Modulation sensitivity</u> (para 39) A.F. input of 500mV at 1kc/s, the deviation shall be A.F. input of 250mV at 1kc/s, the deviation shall be	-	15	kc/s	
		5	10	kc/s	
24	<u>R.F. output</u> (para 40) Normal voltage: R.F. output meter 50Ω connected to AUX AE socket and set tuned through frequency range, the r.f. output shall be Low voltage: Set tuned through frequency range, the r.f. output shall be	0.75	-	W	
		0.25	-	W	
25	<u>Neutralization</u> (para 41) With aerial circuit loaded and unloaded. The difference in a.f.c. voltage shall be	-	0.2	V	
26	<u>Short aerial matching circuit</u> (para 42) Using standard artificial aerial of 20pF capacitor in series with a non-inductive resistor of 33Ω. At any frequency the r.m.s. voltage developed across the resistor and measured on an a.c. v.v. shall be	4.2	-	V	
27	<u>Long aerial matching circuit</u> (para 43) The minimum r.f. voltages across the appropriate resistor measured on an a.c. v.v. shall be:- 38Mc/s artificial aerial 46Mc/s artificial aerial 55Mc/s artificial aerial	14.5	-	V	
		15.5	-	V	
		13	-	V	
28	<u>Sealing test</u> (para 44) With an initial internal pressure of 10 lb/sq in. the time constant of the set shall be Fit new desiccator or re-activate	150	-	hr	

EME8c/1039

END