

22 November 2000

TEST REPORT

Salcom 11-67 POCSAG Paging Transmitter

tested for compliance with the

Code of Federal Regulations (CFR) 47

Part 90 –Private Land Mobile Services

for

Sea Air and Land Communications Ltd

This Test Report is issued with the authority of:

Andrew Cutler - General Manager

EMC Technologies (NZ) Ltd

Test Report No 00912.2

Report date: 22 November 2000

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1. CLIENT INFORMATION

Company Name	Sea Air and Land Communications Ltd
Address	120 St Asaph Street PO Box 22-621
City	Christchurch
Country	New Zealand
Contact	Kelvin Barnsdale

2. DESCRIPTION OF TEST SAMPLE

Brand Name	Salcom
Model Number	11-67
Product	POCSAG Paging Transmitter
Manufacturer	Sea Air and Land Communications Ltd
Country of Origin	New Zealand
Serial Number	Not serialised
FCC ID	Not marked

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3. SUMMARY OF TEST RESULTS

Testing was carried out in accordance with the test methods defined in 47 CFR Part 2 and 90. Listed below are the relevant Part 2 test methods and the limits defined in Part 90.

<u>CLAUSE</u>	<u>TEST PERFORMED</u>	<u>RESULT</u>
2.1041	Measurement procedures	Noted
2.1046	RF power output	Noted
2.1049	Occupied bandwidth	Noted
2.1051	Spurious emissions at antenna terminals	Noted
2.1057	Frequency spectrum to be investigated	Noted
90.217	Exemption from technical standards	Complies

4. ARTICLES SUBMITTED

1 x Salcom 11-67 POCSAG Paging Transmitter.

This transmitter is a handheld unit which has the following functions:

- Red LED transmit indicator
- 4 red transmit buttons labelled 1 to 4
 - button 1: modified to continuous transmit an alphanumeric message.
 - buttons 2 –4: momentary paging messages.

The transmitter has an integral antenna.

The sample supplied for testing however was fitted with an external antenna connection in order to make testing easier.

5. TEST SAMPLE DESCRIPTION

The sample tested is a POCSAG paging transmitter with the following specifications:

Rated Transmitter Output Power

18.0 dBm +/- 2 dB (40 mW – 100 mW)

Test frequency

160.5125 MHz

Frequency Range

140.0 – 162.0 MHz

Emission Type

POCSAG paging modulation.

Power Supply

9 Vdc internal battery.

Antenna

Internal tuned loop.

6. Test Conditions

Standard Temperature and Humidity

Temperature: +25°C ± 4° maintained.

Relative Humidity: 60% ± 10% observed.

Standard Test Power Source

Internal 9 Vdc battery.

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7. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The test sample was selected by the client.

The report relates only to the sample tested.

This report does not contain corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported, or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested with the variations statistical basis. I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.

Andrew Cutler
General Manager
EMC Technologies NZ Ltd

8. TRANSMITTER TEST RESULTS

Transmitter spurious emissions

This transmitter has been tested in accordance with the requirements of 47 CFR Section 90.217 – Exemption from technical standards.

- are exempt from the technical requirements set out in this subpart but must instead comply with the following.

In order for this section to apply the following needs to be demonstrated:

- The frequency of operation could be used at stations licensed below 800 MHz on any frequency listed in Subpart B and C of 47 CFR Part 90.

This transmitter can operate in the band 140 – 162 MHz and for the purposes of testing has been configured to operate on 160.5125 MHz.

Subpart B and C provide a number of frequencies where this device could operate in the Public Safety Pool and the Industrial/Business Radio Pool

- The output power of the transmitter does not exceed 120 mW.

The manufacturer's specification gives an output power range between 40 – 100 mW.

In order to test this device an antenna terminal has been provided.

Conducted power measurements have been carried out which show a power of level of 18.7 dBm which equates to 74.1 mW.

18.7 dBm falls within the manufacturers specification of 18.0 dBm +/- 2 dB.

- 90.217 (a) states that for equipment designed to operate with a 25 kHz channel bandwidth any emission appearing on a frequency more than 40 kHz from the assigned frequency shall be attenuated by at least 30 dB below the unmodulated carrier.

The client advises that the equipment is designed to operate with a 25 kHz channel bandwidth.

The transmitter cannot be operated with an un-modulated carrier so all measurements have been made with reference to the modulated carrier.

The assigned frequency as advised by the client is 160.5125 MHz.

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Measurements have been made in the laboratory using a spectrum analyser to observed the emissions close to the carrier. See the attached plot.

Conducted measurements have been made away from the carrier as detailed below.

Frequency: 160.5125 MHz

Harmonic emissions

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
160.5125	18.7	20.8	2.1
321.0250	-36.3	-11.3	25.0
481.5375	-41.7	-11.3	30.4
642.0500	-54.9	-11.3	43.6
802.5625	-52.4	-11.3	41.1
963.0750	-48.7	-11.3	37.4
1123.5875	-43.4	-11.3	32.1
1284.1000	-41.5	-11.3	30.2
1444.6125	-41.4	-11.3	30.1
1605.1250	-46.7	-11.3	35.4

Other emissions detected.

Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
53.50	-38.0	-11.3	26.7
107.013	-37.5	-11.3	26.2

No “Other emissions” less than –40.0 dB have been reported.

“Other emissions” were observed every 53.5 MHz approximately.

No emissions were detected over 2 GHz.

Testing was carried out in the laboratory with the spectrum analyser with a resolution bandwidth of 100 kHz and frequency span of 5 MHz at each frequency.

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The transmitter was tested by operating button 4 for a continuous alpha numeric message with the device being orientated for the worst case emission level.

Limit

Part 90.217 defines the following limits.

- Transmitter power shall not exceed 120 mW = 20.8 dBm.

The maximum radiated power was measured at 18.7 dBm.

- On any frequency removed by 40 kHz from the assigned frequency any emission shall be 30 dB below the unmodulated carrier.

Modulated carrier maximum is 18.7 dBm.

All emissions are therefore required to be below -11.3 dBm.

Result: Complies with a 2.1 dB margin at 160.5125 MHz.

Measurement Uncertainty: ± 1.2 dB

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9. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial #	Asset
Rubidium Oscillator	Ball Efratom	FRS – C	4287	
Spectrum Analyzer	Hewlett Packard	8566B		3771/3772

10. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was updated on February 11th, 2000.

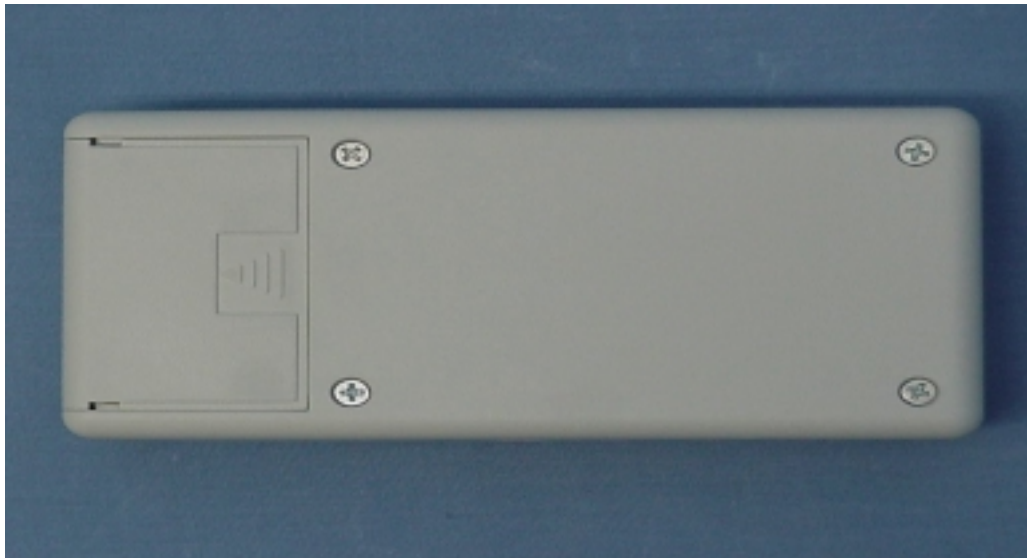
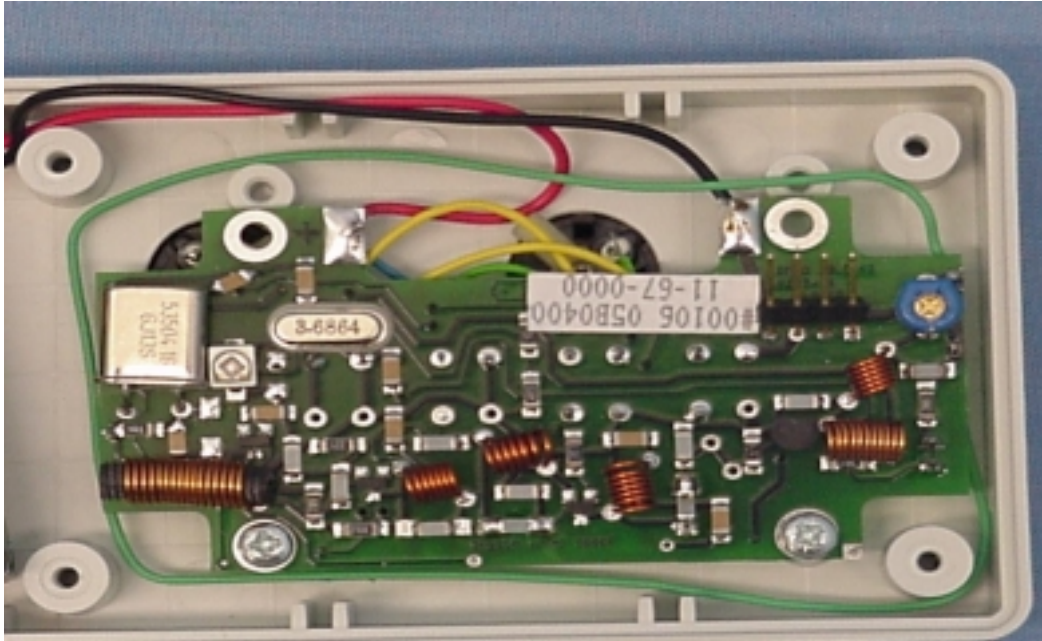
All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (TELARC) Accreditation to the New Zealand Code of Laboratory Management Practice incorporating ISO Guide 25: 1990 and ISO 9002: 1994.

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11. PHOTOGRAPH(S)



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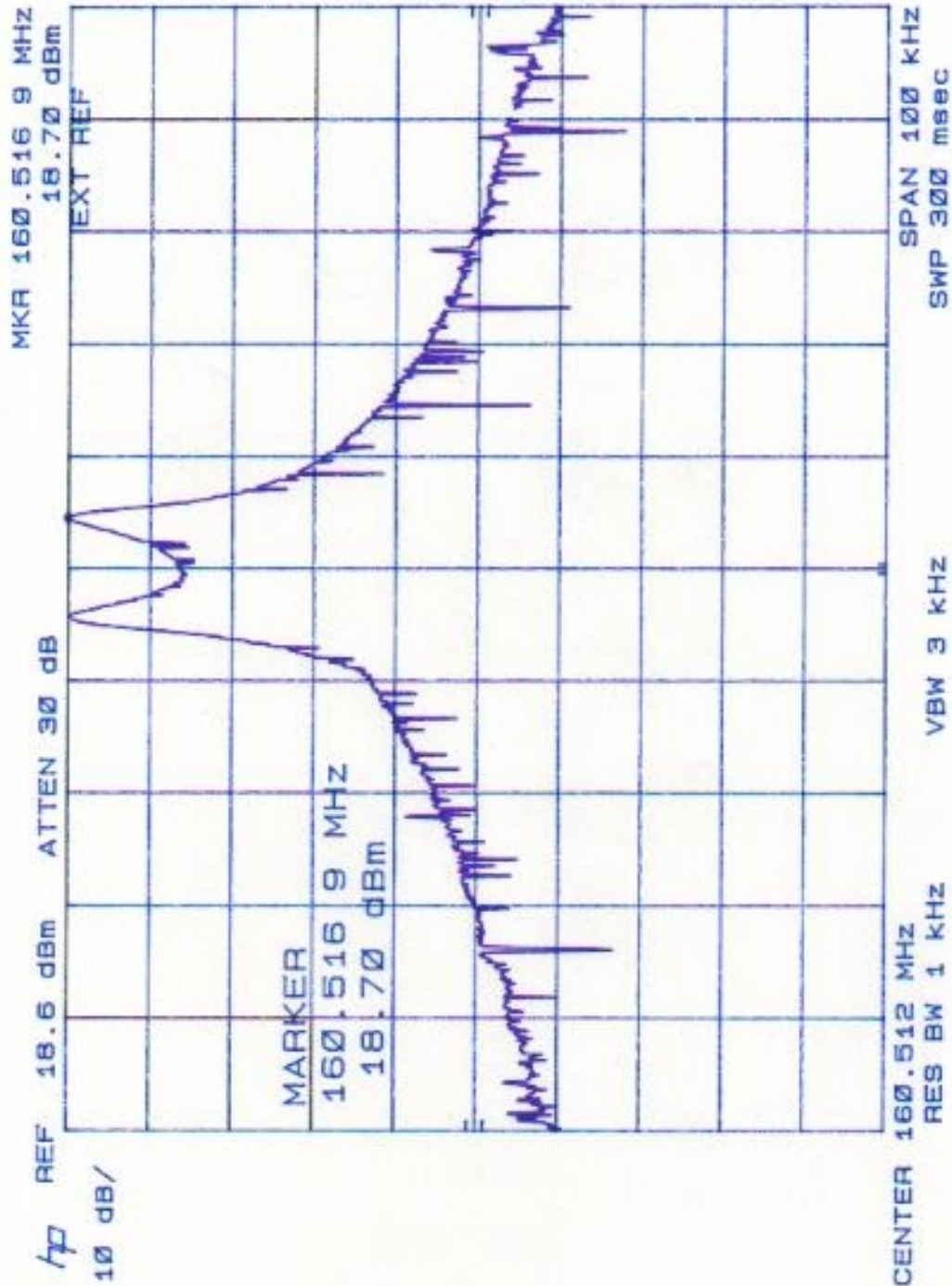
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Appendix A: Spectrum plot



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