

EMC Technologies (NZ) Ltd

Test Report No **80219.1**
Report date: 9th June 2008

TEST REPORT

SIMOCO SRM9000X8 / MACOM MAKT-8SNXX M3300

UHF Mobile Transceiver

tested to the

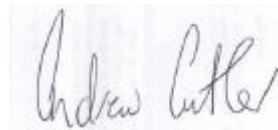
Code of Federal Regulations (CFR) 47

Part 90 –Private Land Mobile Services

Part 15 – Radio Frequency Device

for

TMC Radio Pty Ltd



This Test Report is issued with the authority of:

Andrew Cutler - General Manager



All tests reported
herein have been
performed in accordance
with the laboratory's
scope of accreditation

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1. CLIENT INFORMATION

Company Name TMC Radio Pty Ltd
Address 1270 Ferntree Gully Road
Scoresby
City Victoria, 3179
Country Australia
Contact Mr Robert Stowell

2. DESCRIPTION OF TEST SAMPLE

Brand Name SIMOCO / MACOM
Model Number SRM9000X8 / MAKT-8SNXX M3300
Product UHF Mobile Transceiver
Manufacturer TMC Radio Pty Ltd
Designed in Australia
Manufactured in Taiwan
Serial Number AXX8X08082F6H
FCC ID STZSRM9000X8

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3. COMPLIANCE STATEMENT & RESULT SUMMARY

The **SIMOCO SRM9000X8 / MACOM MAKT-8SNXX M3300 UHF Mobile Transceiver** complies with the limits defined in 47CFR 15, 47 CFR Part 90 and 47 CFR Part 2 when tested in-accordance with the test methods described in 47 CFR Part 2.

<u>CLAUSE</u>	<u>TEST PERFORMED</u>	<u>RESULT</u>
90.203	Certification required	Complies
2.1046	RF power output	Noted
90.205	Power and antenna height limits	Complies
2.1047	Modulation Characteristics	
2.1047(a)	Low pass filter response	Complies
2.1047(b)	Modulation limiting characteristics	Complies
90.211(a)	Modulation characteristics	Complies
2.1049	Occupied bandwidth	Noted
2.202	Bandwidths	Noted
90.207	Types of emissions	Complies
90.209	Bandwidth limitations	Complies
90.210	Emission masks	Complies
2.1051	Spurious emissions at antenna terminals	Complies
2.1053	Field strength of spurious radiation	Complies
2.1055	Frequency stability	Noted
90.213	Frequency stability	Complies
90.214	Transient frequency behaviour	*Not applicable
15.109	Radiated emission limits	Complies
15.111	Antenna conducted power measurement	Complies

*Transmitter does not operate in the 150-174 MHz or 421 to 512 MHz bands

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4. TEST SAMPLE DESCRIPTION

The sample tested has the following specifications:

Rated Transmitter Output Power

27.5 Watts (44.4 dBm)

Transmitter frequency range

806 to 824 MHz (TX only) and 851 to 869 MHz (Tx and RX Only)

Test frequencies

Chl	Frequency MHz	Power Watts	Channel information
1	815.525	27.5	C4FM
2	862.525	27.5	C4FM
3	807.525	27.5	Analogue
4	862.525	27.5	Analogue
5	852.525	27.5	Rx only
6	867.525	27.5	RX only

FCC Bands

Part 90:

806 to 809 MHz 12.5 kHz Channel Spacing

851 to 854 MHz 12.5 kHz Channel Spacing

809 to 824 MHz 25.0 kHz Channel Spacing

854 to 859 MHz 25.0 kHz Channel Spacing

Emission Designators / Modes of operation

16k0F3E - 25kHz, Analogue.

8k10F1E - C4FM, 12.5 kHz.

Power Supply

DC voltage supply. Typically 13.8 Vdc battery supply

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The client has requested testing on frequencies at 25.0 kHz channel spacing to accommodate both old and new users within the NPSPAC frequency range.

F3E Analogue transmitter testing has been performed at 25kHz channel spacing.

C4FM transmitter testing has been performed at 12.5 kHz channel spacing

It is our understanding the NPSPAC channels have provision for 12.5 kHz offset channel operation, which is why the new FCC band plan is a 12.5 kHz raster.

An authorised bandwidth of 20.0 kHz applies to both the 12.5 and 25 kHz channel spacing frequency ranges.

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5. TEST CONDITIONS

Standard Temperature and Humidity

Temperature Range: +18°C to 30°C
Relative Humidity Range: 20% to 75%

Standard Test Power Source

Standard Test Voltage: 13.8 Vdc.

Extreme Temperature

High Temperature: + 50°C maintained.
Low Temperature: - 30 °C maintained.

Extreme Test Voltages

Low Voltage: 10.8 Vdc
High Voltage: 15.6 Vdc

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6. ATTESTATION

The **SIMOCO SRM9000TU / MACOM M3300 UHF Mobile Transceiver** complies with the Code of Federal Regulations (CFR) 47 Part 90 –Private Land Mobile Services, and 47 Part 15 – Radio Frequency Devices.

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

The client selected the test sample.

The report relates only to the sample tested.

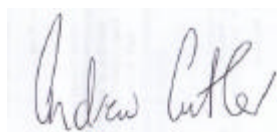
This report does not contain corrections or erasures.

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.

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

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7. TEST RESULTS

Certification required

Certification of this device is sought for transmissions using 12.5 kHz and 25.0 kHz channel spacing.

25 kHz and 12.5 kHz channel bandwidth certification is sought for this transmitter under section 90.203(j)(3) as:

- certification has been sought after February 14, 1997 and before January 1, 2011.
- the equipment meets the spectrum efficiency standard of one voice channel per 12.5 kHz of channel bandwidth

Result: Complies.

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RF power output

Measurements were carried out at the RF output terminals of the transmitter using a 30 dB power attenuator and a 50 ohm dummy load.

Measurements were carried out when the transmitter was not being modulated.

Measurements were made with the input voltage set to 13.8 Vdc and when varied +/- 15%.

Testing was carried out at maximum power output.

Frequency	Voltage (Vdc)	Rated (dBm)	Measured (dBm)
807.525	13.8	44.4	43.3
862.525	13.8	44.4	43.3

Frequency	Voltage (Vdc)	Rated (dBm)	Measured (dBm)
807.525	10.8	44.4	42.4
862.525	13.8	44.4	43.5

Limits:

Clause 90.205(j) of Part 90 specifies (j) 764-776 MHz, 794-824 MHz, 851-869 MHz, 896-901 MHz and 935-940 MHz. Power and height limitations are specified in Sec. 90.635.

Result: Complies

Measurement Uncertainty: ± 0.5 dB

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Modulation Characteristics

This transmitter is capable of producing analogue speech and digital speech modulations.

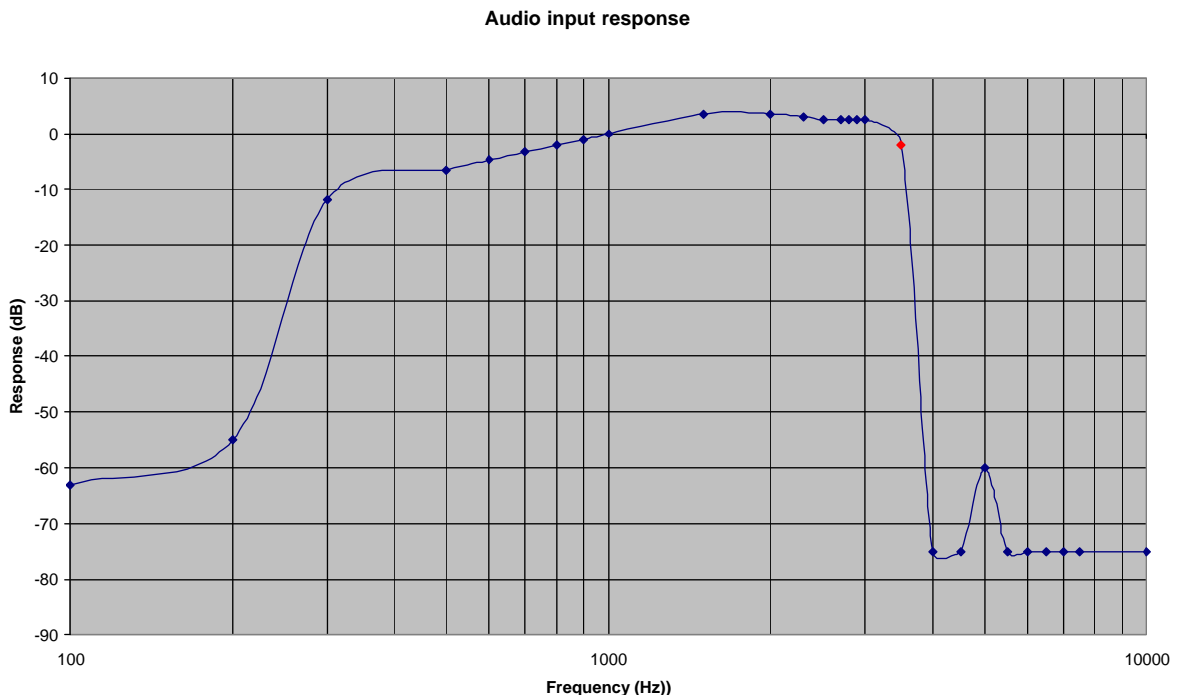
(a) Frequency response of the audio frequency low pass filter between 100 Hz and 15 kHz.

This measurement was carried out using an audio signal generator and an audio modulation analyser.

At 1 kHz an audio signal was applied which was used as a 0 dB response reference.

The frequency of the input signal was then varied and the output response noted. This measurement was carried out from 100 Hz to 5000 Hz as required by Part 2 with further measurements carried out in order to show the full range of this filter.

The 3 dB roll off point was found to be 3500 Hz (note the red point on the below graph indicates the 3 dB roll off point).



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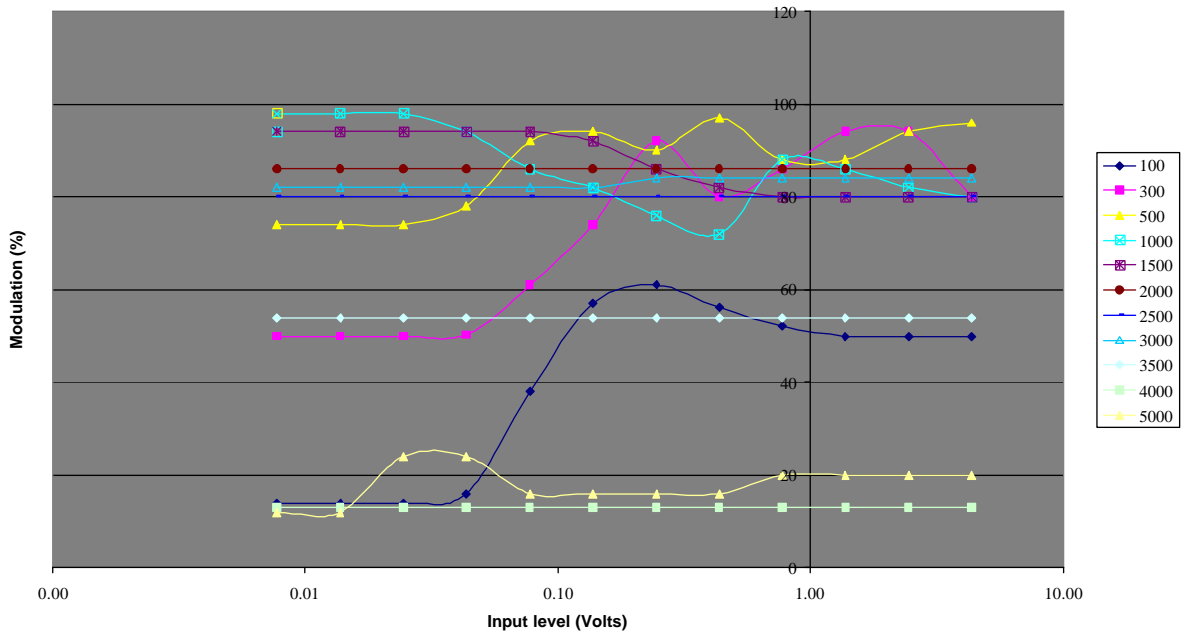
(b) A family of curves showing the percentage of modulation versus the modulation input voltage.

Measurements were made between 100 Hz to 5 kHz.

At each frequency the input voltage was slowly increased with the resulting frequency deviation of the transmitter being recorded.

This deviation was then converted to a modulation percentage where 5 kHz deviation is 100% for 25 kHz channels.

Modulation limiting (25 kHz channel spacing transmitter)



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(d) A curve or equivalent data that shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Digital modulation as detailed below is also used with this transmitter.

The types of modulation used are:

12.5 kHz C4FM digital modulation is used for digital telephony (F1E).

Limit:

Part 90.211 – Modulation requirements states the transmitter must meet the emission requirements of 90.210. Refer to the Occupied Bandwidth measurements in this report.

Result: Complies

Measurement Uncertainty: $\pm 1\%$.

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Part 90.207 – Emission types:

The following emission types are used:

- F3E: Frequency modulation with analogue speech.
- F1E: Digital telephony using C4FM.

Part 90.209 – Bandwidth limitations:

Analogue Modulation

The authorised bandwidth is taken to be the necessary bandwidth.

Using the formulas contained in Part 2.202 the necessary bandwidth calculation for 25 kHz channel spacing is:

$$B_n = 2 \times D + 2 \times M$$

Where D = maximum measured deviation: 4.90 kHz

Where M = maximum measured modulation frequency: 3500 Hz

$$B_n = \underline{16.8 \text{ kHz}}$$

This is confirmed in the emission designation of 16k0f3E as declared by the client.

Digital Modification

$$B_n = 2 \times D + 2 \times M$$

Where D = 2.837 kHz (High deviation bit pattern)

Where M = 1.2 kHz

$$B_n = \underline{8.1 \text{ kHz}}$$

This is conferred in the emission designation of 8k10F1E as declared by the client.

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Digital Modulation

This transmitter can also transmit digital telephony and data using F1E.

Using the tables in Part 2.202 – Bandwidth, bandwidth for F1E emissions could not be determined easily.

Therefore the occupied bandwidth has been measured and compared against the occupied bandwidth declared by the client.

Measurements have been made of each modulation type using a spectrum analyser operating in peak hold mode and a 30 dB attenuator.

Initially power measurements are made using a resolution bandwidth of 120 kHz.

This level is used as a reference level on the spectrum analyser.

The resolution bandwidth is then changed to 100 Hz and the reference level minus 23 dB (99%) absolute bandwidth points determined

The F1E bandwidth has been measured using the above described method.

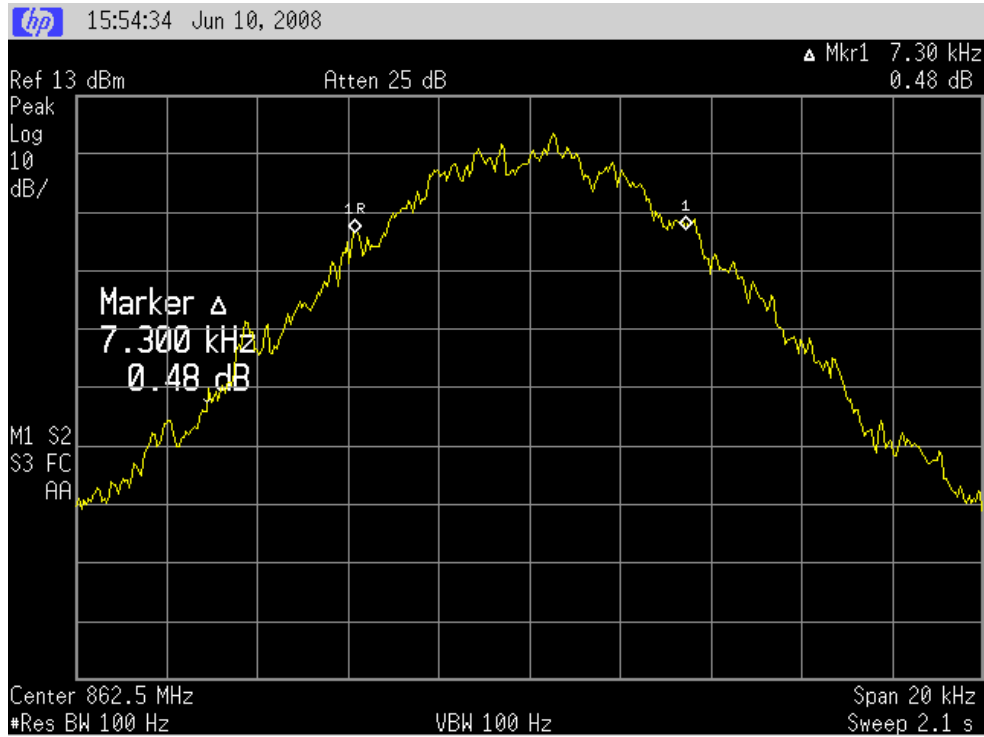
Emission	Channel	Measured	Designation
F1E	12.5 kHz	7300 kHz	8k10F1E

Result: Complies

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F1E Measured bandwidth :



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Occupied Bandwidth

The spectrum masks are defined in:

Section 90.210(b) – Mask B has been applied as the transmitter can operate in the bands 806 to 809 MHz, 851 to 854 MHz, 809 to 824 and 854 to 869 MHz using an authorised bandwidth of 20.0 kHz as per Section 90.209(b)(5).

Section 90.210(g) – Mask G has been applied as the transmitter can operate in the bands 806 to 809 MHz, 851 to 854 MHz, for equipment without audio low pass filter, as per Section 90.210.

Section 90.210(h) – Mask H has been applied as the transmitter can operate in the bands 809 to 824 and 854 to 869 MHz for equipment without audio low pass filter, as per Section 90.210.

Section 210 Applicable Emission Masks table, note 3, equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of Section 90.691.

Section 90.691(a) Mask has been applied as the transmitter can operate in the bands 806 to 809 MHz, 851 to 854 MHz, 809 to 824 and 854 to 869 MHz

The reference level for the following emission mask measurements has been determined using a resolution bandwidth of 120 kHz with the transmitter modulated.

All measurements have been made with a 30 dB attenuator being placed between the transmitter and the spectrum analyser. Measurements were made in peak hold mode.

When operating in F3E mode a 2500 Hz tone, which was found to be the frequency of maximum response, that was applied at a level 16 dB higher than that required to achieve 50% modulation.

The 12.5 kHz transmitter has an authorised bandwidth of 20 kHz applied and the 25 kHz transmitter has an authorised bandwidth of 20 kHz applied

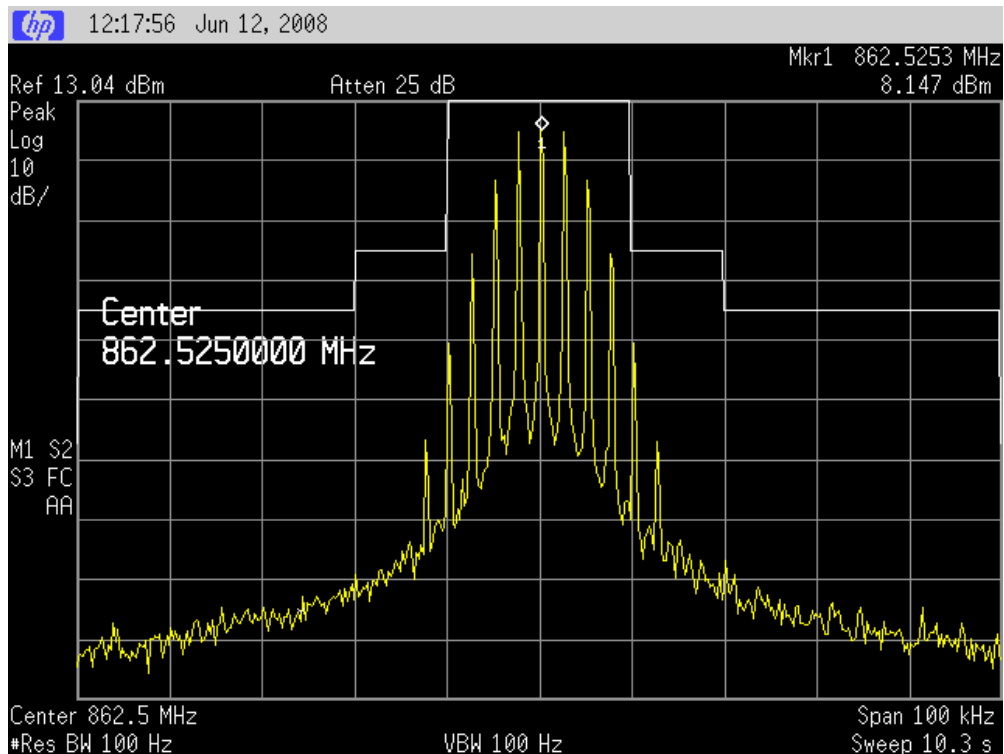
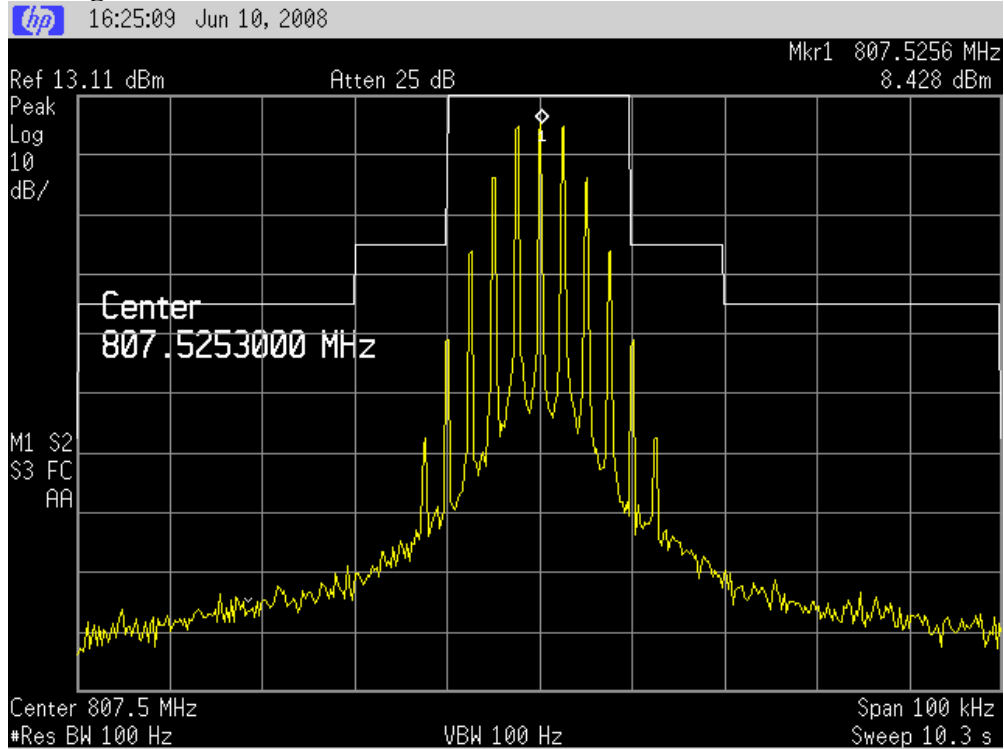
For the F1E mode the transmitter was modulated uses modulation sources internal to the transmitter as supplied by the client.

Result: Complies

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Analogue - Mask B



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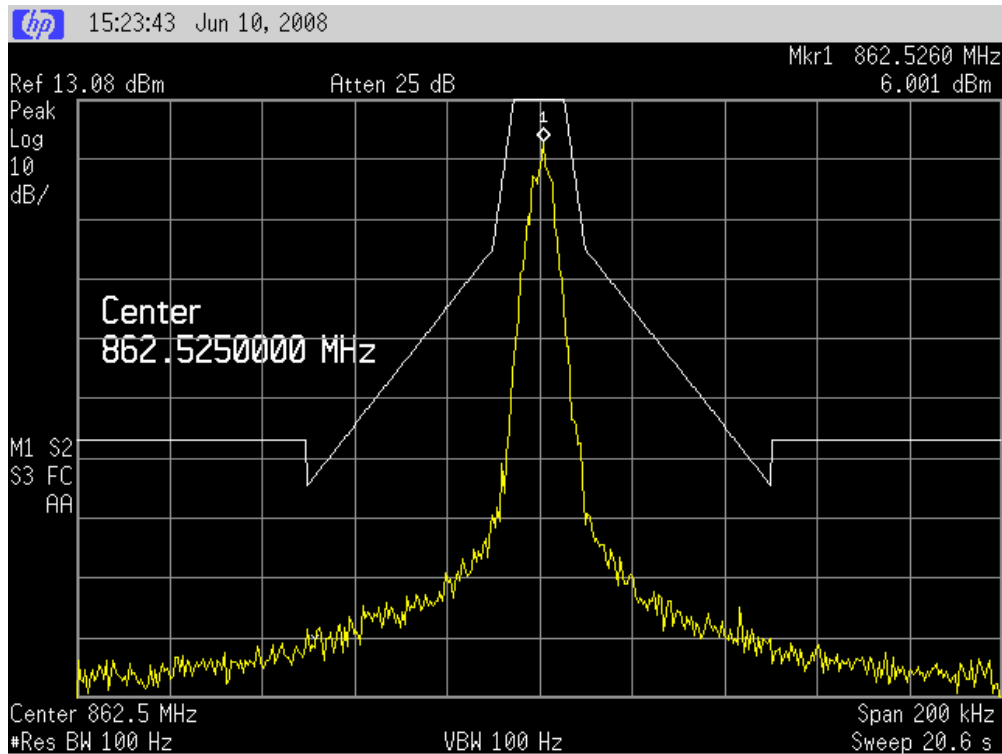
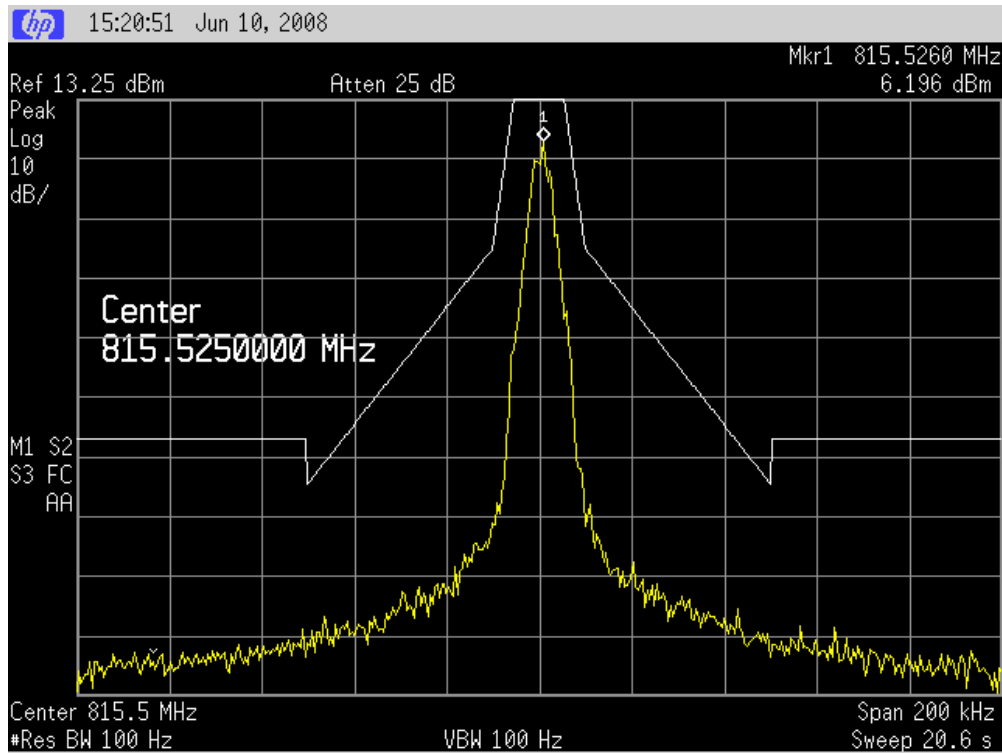
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F1E – Emission Mask G



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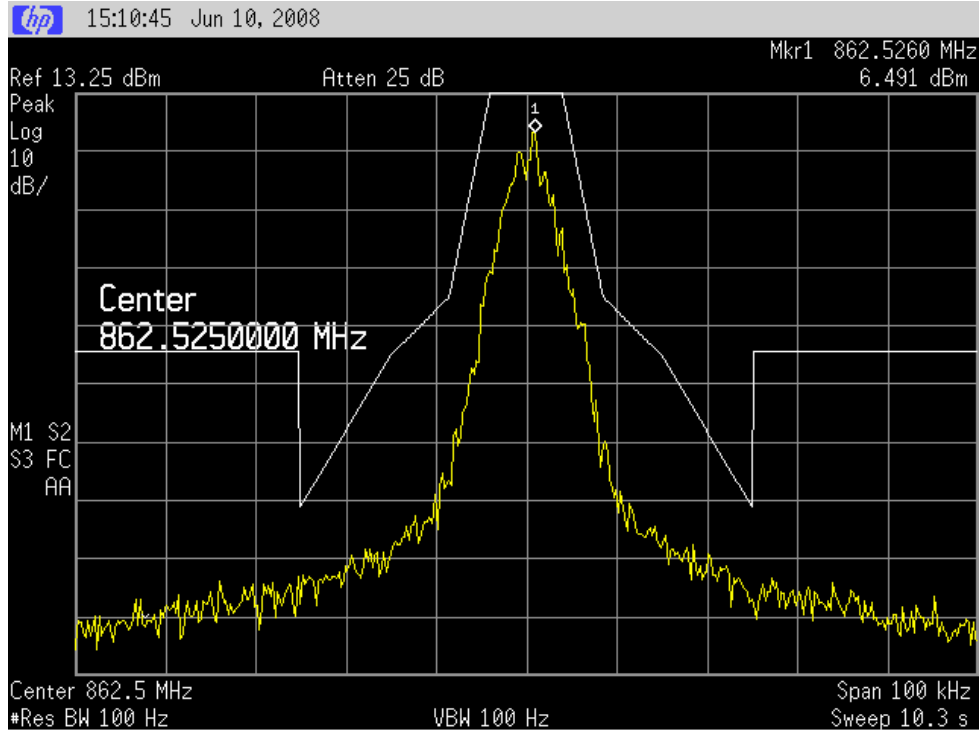
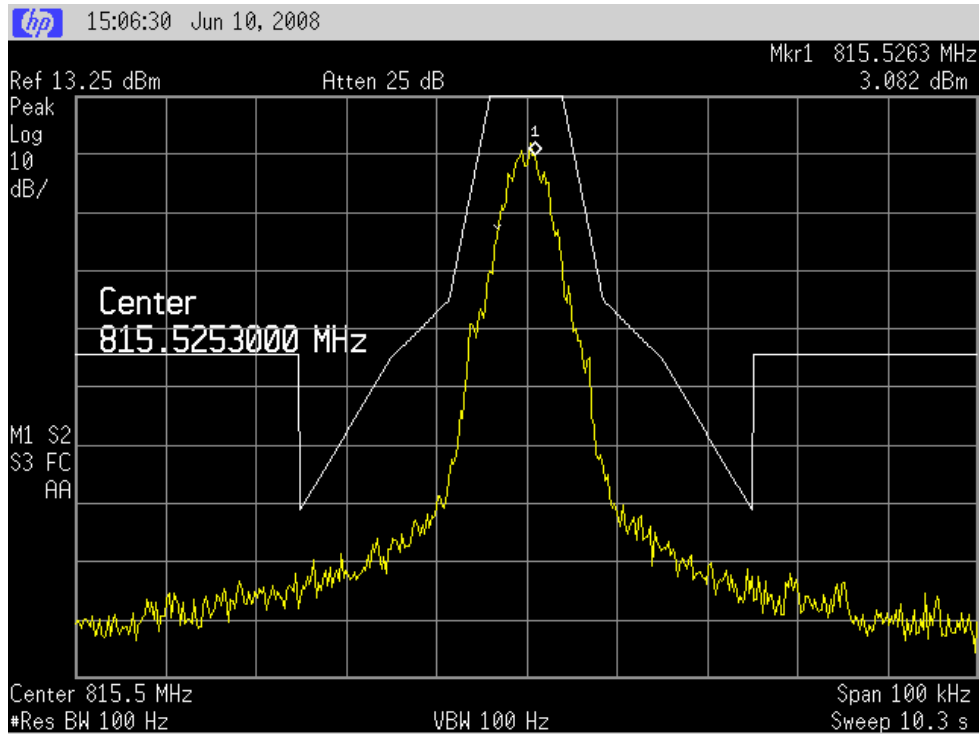
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F1E Emission Mask H



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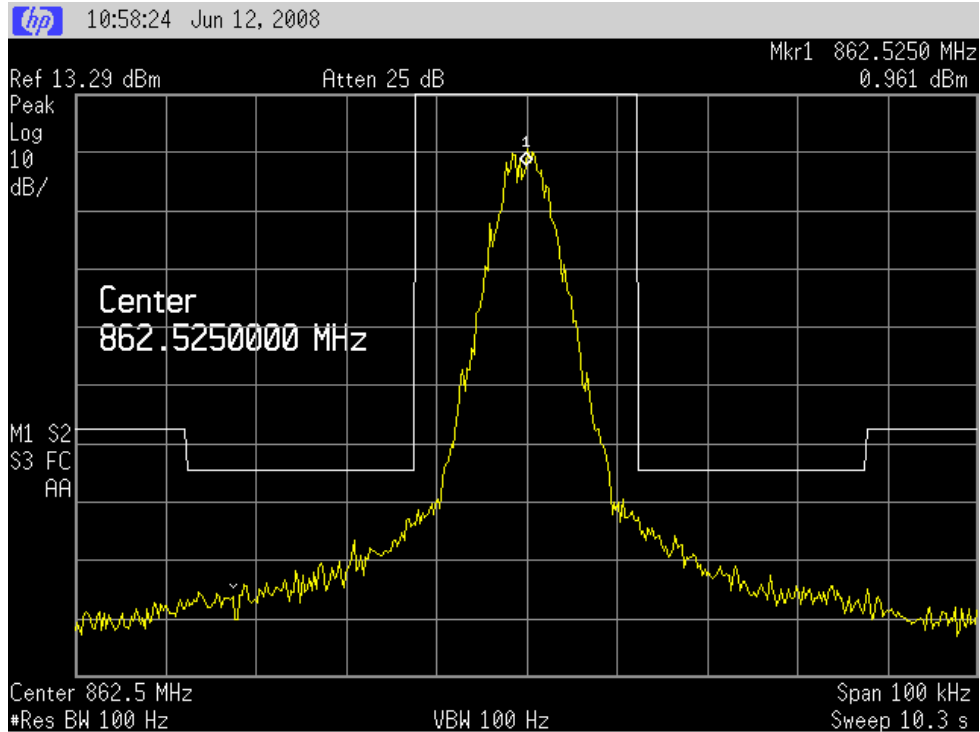
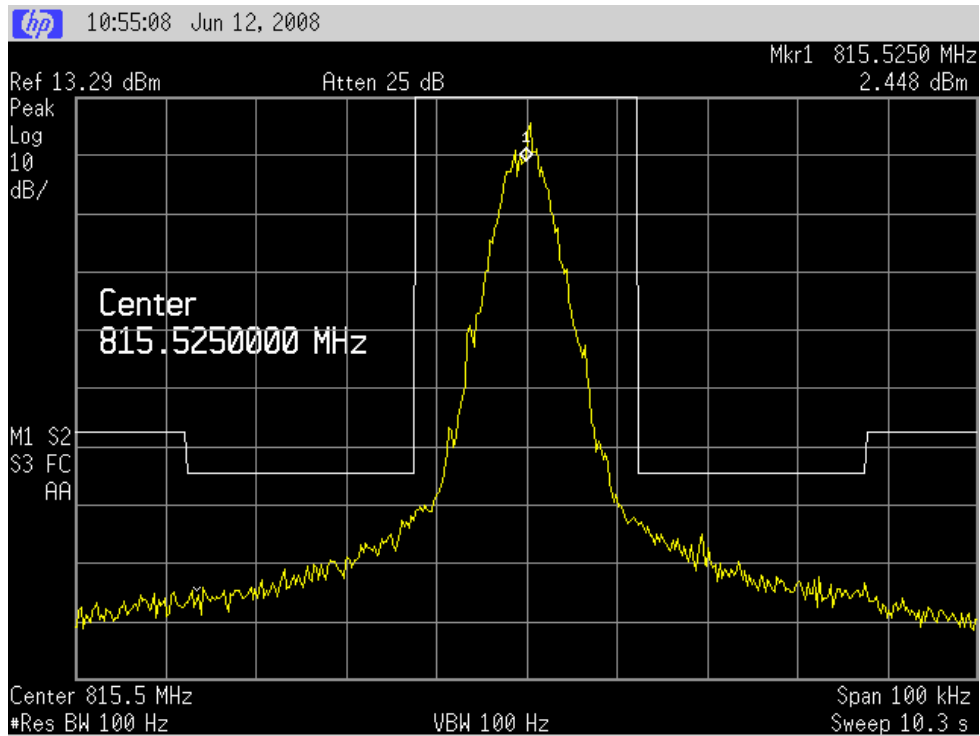
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F1E EA Emission Mask



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Transmitter spurious emissions at the antenna terminals

Frequency: 807.525 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
1615.050	-75.0	-20.0
2422.575	-64.0	-20.0
3230.100	-79.0	-20.0
4037.625	-55.2	-20.0
4845.150	-52.0	-20.0
5652.675	-39.4	-20.0

Frequency: 862.525 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
1725.050	77.8	-20.0
2587.575	-63.8	-20.0
3450.100	-60.8	-20.0
4312.625	-43.7	-20.0
5175.150	-33.0	-20.0
6037.675	-62.5	-20.0
6900.200	-62.1	-20.0
8625.250	-65.0	-20.0

No other emissions observed above -80.0dBm.

Limit:

Part 90.210(d) Mask D, (3) on any frequency removed from the centre of the authorised bandwidth by a displacement frequency of more than 12.5 kHz shall be attenuated by at least $50 + 10 \log (P)$ or 70 dB whichever is the lesser attenuation.

The spurious emission limit defined by Mask D has been applied as this transmitter can operate using channel spacings of 12.5 kHz.

Part 2.1051 states that emissions greater than 20 dB below the limit need not be specified.

Part 2.1057 states that the spectrum should be investigated up to the 10th harmonic if the transmitter operates below 10 GHz.

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All spurious emissions are to be attenuated by at least $50 + 10 \log (P)$.

The rated power of 27.5 watts gives a limit of -20 dBm.

No measurements were made above the 10th harmonic.

Result: Complies

Measurement Uncertainty: ± 3.3 dB

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Receiver spurious emissions at antenna terminals

Receive frequency: 862.525 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
907.525	-100.1	-57.0

All other emissions observed less than -100.0 dBm.

The receiver has an intermediate frequency of 45 MHz.

Limit:

In accordance with CFR 47 Part 15, section 15.111 the power of any emission at the antenna terminal should not exceed 2 nW (-57.0 dBm).

Result: Complies

Measurement Uncertainty: ± 3.3 dB

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Field strength of the transmitter spurious emissions

Frequency: 807.525 MHz Measurements made using the MA-9030 Control Head.

Transmit mode emissions:

Frequency (MHz)	Level (dBUV/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
1615.050	55.1	-44.0	-20.0	Vertical	24.0
1615.050	53.5	-43.0	-20.0	Horizontal	23.0
2422.575	60.9	-36.0	-20.0	Vertical	16.0
2422.575	60.0	-37.0	-20.0	Horizontal	17.0
3230.100	57.8	-39.0	-20.0	Vertical	19.0
3230.100	56.1	-41.0	-20.0	Horizontal	21.0
4037.625	67.1	-33.0	-20.0	Vertical	13.0
4037.625	67.1	-33.0	-20.0	Horizontal	13.0
4845.150	-	-	-20.0	Vertical	-
4845.150	-	-	-20.0	Horizontal	-
5652.675	59.2	-38.0	-20.0	Vertical	16.0
5652.675	56.6	-40.0	-20.0	Horizontal	18.6
6460.200	-	-	-20.0	Vertical	-
6460.200	-	-	-20.0	Horizontal	-
7267.725	-	-	-20.0	Vertical	-
7267.725	-	-	-20.0	Horizontal	-
8075.250	-	-	-20.0	Vertical	-
8075.250	-	-	-20.0	Horizontal	-

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Frequency: 862.525 MHz Measurements made using the MA-9030 Control Head.

Transmit mode emissions:

Frequency (MHz)	Level (dBUV/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
1724.050	56.1	-43.0	-20.0	Vertical	23.0
1724.050	55.1	-44.0	-20.0	Horizontal	24.0
2586.075	65.2	-34.0	-20.0	Vertical	14.0
2586.075	66.5	-33.0	-20.0	Horizontal	13.0
3448.100	64.2	-35.0	-20.0	Vertical	15.0
3448.100	60.4	-39.0	-20.0	Horizontal	19.0
4310.125	58.2	-39.0	-20.0	Vertical	19.0
4310.125	59.5	-36.0	-20.0	Horizontal	16.0
5172.150	67.7	-32.0	-20.0	Vertical	12.0
5172.150	65.0	-34.0	-20.0	Horizontal	14.0
6034.175	-	-	-20.0	Vertical	-
6034.175	-	-	-20.0	Horizontal	-
6896.200	-	-	-20.0	Vertical	-
6896.200	-	-	-20.0	Horizontal	-
7758.225	-	-	-20.0	Vertical	-
7758.225	-	-	-20.0	Horizontal	-
8620.250	-	-	-20.0	Vertical	-
8620.250	-	-	-20.0	Horizontal	-

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Frequency: 807.525 MHz Measurements made using the MA-9022 Control Head.

Transmit mode emissions:

Frequency (MHz)	Level (dBUV/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
1615.050	56.8	-40.0	-20.0	Vertical	20.0
1615.050	54.5	-43.0	-20.0	Horizontal	23.0
2422.575	65.8	-32.0	-20.0	Vertical	12.0
2422.575	62.8	-34.0	-20.0	Horizontal	14.0
3230.100	56.5	-40.0	-20.0	Vertical	20.0
3230.100	54.6	-42.0	-20.0	Horizontal	22.0
4037.625	65.9	-33.0	-20.0	Vertical	13.0
4037.625	64.4	-35.0	-20.0	Horizontal	15.0
4845.150	-	-	-20.0	Vertical	-
4845.150	-	-	-20.0	Horizontal	-
5652.675	56.7	-40.0	-20.0	Vertical	18.5
5652.675	60.5	-37.0	-20.0	Horizontal	14.7
6460.200	-	-	-20.0	Vertical	-
6460.200	-	-	-20.0	Horizontal	-
7267.725	-	-	-20.0	Vertical	-
7267.725	-	-	-20.0	Horizontal	-
8075.250	-	-	-20.0	Vertical	-
8075.250	-	-	-20.0	Horizontal	-

EMC Technologies (NZ) Ltd

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EMC Technologies (NZ) Ltd

Test Report No **80219.1**
Report date: 9th June 2008

Frequency: 862.525 MHz Measurements made using the MA-9022 Control Head.

Transmit mode emissions:

Frequency (MHz)	Level (dBUV/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
1725.053	56.7	-43.0	-20.0	Vertical	23.0
1725.053	55.1	-45.0	-20.0	Horizontal	25.0
2587.578	66.1	-33.0	-20.0	Vertical	13.0
2587.578	66.5	-33.0	-20.0	Horizontal	13.0
3450.103	64.8	-34.0	-20.0	Vertical	14.0
3450.103	60.7	-38.0	-20.0	Horizontal	18.0
4312.628	61.2	-36.0	-20.0	Vertical	16.0
4312.628	61.8	-35.0	-20.0	Horizontal	15.0
5175.153	68.7	-32.0	-20.0	Vertical	12.0
5175.153	63.6	-36.0	-20.0	Horizontal	16.0
6037.678	-	-	-20.0	Vertical	-
6037.678	-	-	-20.0	Horizontal	-
6900.203	-	-	-20.0	Vertical	-
6900.203	-	-	-20.0	Horizontal	-
7762.728	-	-	-20.0	Vertical	-
7762.728	-	-	-20.0	Horizontal	-
8625.253	-	-	-20.0	Vertical	-
8625.253	-	-	-20.0	Horizontal	-

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Standby emissions:

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Polarity	Margin (dB)
315.2625	21.8	46.0	Horizontal	24.2
326.3225	23.2	46.0	Horizontal	22.8
304.2025	20.4	46.0	Horizontal	25.6
337.3825	22.6	46.0	Horizontal	23.4

The transmitter was tested transmitting continuously into to a dummy load

Device was tested on an open area test site at a distance of 3 metres.

The power level of each emission was determined using the substitution method by replacing the transmitter with a dipole antenna that was connected to a signal generator. The signal generator output level was increased until the same field strength level was observed at each emission frequency.

The level recorded is the signal generator output level in dBm less any gains / losses due to the coax cable and the dipole antenna.

Limit:

All spurious emissions are to be attenuated by at least $50 + 10 \log (P)$.

The rated power of 25 watts gives a limit of -20 dBm.

No measurements were made above the 10th harmonic.

Result: Complies

Measurement Uncertainty: ± 4.1 dB

EMC Technologies (NZ) Ltd

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Field strength of the receiver spurious emissions

Receive Frequency: 852.525 MHz

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Polarity	Margin (dB)	Result
897.525	-	46.0	Vertical	-	Pass
897.525	-	46.0	Horizontal	-	Pass
1795.050	-	54.0	Vertical	-	Pass
1795.050	-	54.0	Vertical	-	Pass

Receive Frequency: 862.525 MHz

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Polarity	Margin (dB)	Result
907.525	-	46.0	Vertical	-	Pass
907.525	-	46.0	Horizontal	-	Pass
1815.050	-	54.0	Vertical	-	Pass
1815.050	-	54.0	Vertical	-	Pass

Device was tested on an open area test site at a distance of 3 metres while attached to a dummy load.

No emissions were detected when either microphone were used, of the receiver local oscillator.

The receiver has an intermediate frequency of 45 MHz.

Limit:

The field strength limits as per CFR 47 Part 15, section 15.109 have been applied.

Result: Complies

EMC Technologies (NZ) Ltd

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Frequency Stability

Frequency stability measurements were between - 30°C and + 50°C in 10°C increments.

At each temperature the transmitter was given a period of 30 minutes to stabilise.

The transmitter was then turned on and the frequency error measured after a period of 1 minute.

The nominal battery voltage supply was varied +/- 15%.

Nominal Frequency: 807.525 MHz

Temp.	10.8 Vdc	13.8 Vdc	15.6 Vdc
+50°C	+58.0	+63.0	+70.0
+40°C	-6.0	-7.0	-3.0
+30°C	+3.0	+9.0	+5.0
+20°C	-3.0	-1.0	-3.0
+10°C	-4.0	+1.0	+2.0
0°C	+3.0	+2.0	+4.0
-10°C	+1.0	+2.0	+3.0
-20°C	+2.0	+5.0	+2.0
-30°C	+5.0	+10.0	+14.0

Nominal Frequency: 862.525 MHz

Temp.	10.8 Vdc	13.8 Vdc	15.6 Vdc
+50°C	+86.0	+77.0	+76.0
+40°C	-10.0	-8.0	-4.0
+30°C	+6.0	+10.0	+5.0
+20°C	-1.0	-0.5	-4.0
+10°C	-1.0	+1.0	+2.0
0°C	+3.0	+1.0	-1.0
-10°C	+1.0	+1.0	+3.0
-20°C	+7.0	+5.0	+2.0
-30°C	+14.0	+19.0	+5.0

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Part 90.213 states that mobile station transmitters over two (2) watts operating between:

- 806-809 MHz are required to have a frequency tolerance of 1.5 ppm.
- 809-824 MHz are required to have a frequency tolerance of 2.5 ppm.
- 851-854 MHz are required to have a frequency tolerance of 1.5 ppm.
- 854-859 MHz are required to have a frequency tolerance of 2.5 ppm.

This transmitter operates on 852.525 MHz. $1.5 \text{ ppm} = 1.5 \times 852.525 = 1279 \text{ Hz}$.

Result: Complies

Measurement Uncertainty: $\pm 30 \text{ Hz}$

EMC Technologies (NZ) Ltd

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Radio Frequency Hazard Information

As per Section 1.1310 and Section 2.1091 certification of this transmitter is sought using the Controlled / Occupational exposure limits as detailed in OST/OET Bulletin Number 65 as a power of 27.5 watts is to be used in a mobile environment where the use of the transmitter will be employment related.

Calculations have been made using the General Public/Uncontrolled Exposure limits.

Minimum safe distances have been calculated below.

Power density, $W/m^2 = E^2/3770$

- Occupational / Controlled Exposure limit will be 2.69 mW/cm²
(f/300 = 806/ 300)

- General Population / Uncontrolled exposure limit will be 0.54 mW/cm²
(f/1500 = 806/ 1500)

The minimum distance from the antenna at which the MPE is met is calculated from the equation relating field strength in V/m, transmit power in watts, transmit antenna gain, transmitter duty cycle and separation distance in metres:

$$E, V/m = (\sqrt{30 * P * G}) / d$$

Controlled

$$E = 2.69 \text{ mW/cm}^2 = E^2/3770$$

$$E = \sqrt{1.46 * 3770}$$

$$E = 100.7 \text{ V/m}$$

Uncontrolled

$$E = 0.54 \text{ mW/cm}^2 = E^2/3770$$

$$E = \sqrt{0.54 * 3770}$$

$$E = 45.1 \text{ V/m}$$

The rated maximum transmitter power = 27.5 watts.

Transmitter operated using a quarter wave whip antenna with a gain of 2.15 dBi (1.64).

The transmitter is a push to talk device that would typically be used with a duty cycle of 50% in a 6 minute period or a 30 minute period.

Controlled

$$d = \sqrt{30 * P * G * DC} / E$$

$$d = \sqrt{30 * 27.5 * 1.64 * 0.5} / 100.7$$

$$d = 25.8 \text{ cm or } 0.258 \text{ m}$$

Uncontrolled

$$d = \sqrt{30 * 25.0 * 1.64 * 0.5} / 45.1$$

$$d = 0.577 \text{ m or } 57.7 \text{ cm}$$

Result: Complies

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Test Report No 80219.1

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8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial #	Asset
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Audio Analyzer	Hewlett Packard	8903A	2216A01713	E1146
Biconical Antenna	Schwarzbeck	BBA 9106		RFS 3612
Frequency Counter	Hewlett Packard	HP 5342A	1916A01713	E1224
Level generator	Anritsu	MG443B	M61689	E1143
Log Periodic Antenna	Schwarzbeck	VUSLP9111	9111-228	3785
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Modulation Analyzer	Rohde & Schwarz	FMA	837807/020	E1552
Modulation Analyzer	Hewlett Packard	8901B	2608A00782	E1090
Oscilloscope	Tektronics	745A	B010643	1569
Power Attenuator	Weinschel	49-20-43	GC104	E1308
Power Supply	Hewlett Packard	6032A	2743A-02859	E1069
RF Power Meter	Hewlett Packard	HP 436A	2512A22439	E1198
Rubidium Oscillator	Ball Efratom	FRS – C	4287	E1053
Selective Level Meter	Anritsu	ML422C	M35386	E1140
Signal Generator	Rohde & Schwarz	SMHU.58	838923/028	E1493
Spectrum Analyzer	Hewlett Packard	E7405A	US39150142	3776
Thermal chamber	Contherm	M180F	86025	E1129
Thermometer	DSIR	RT200	035	E1049
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
Horn antenna	Electrometrics	RGA-60	6234	E1494
Microwave Pre Amplifier	Hewlett Packard	8349B	2644A01659	-

9. 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 last updated on January 18th, 2007.

All testing has been carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

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10. PHOTOGRAPH (S)

External Views



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Internal Views



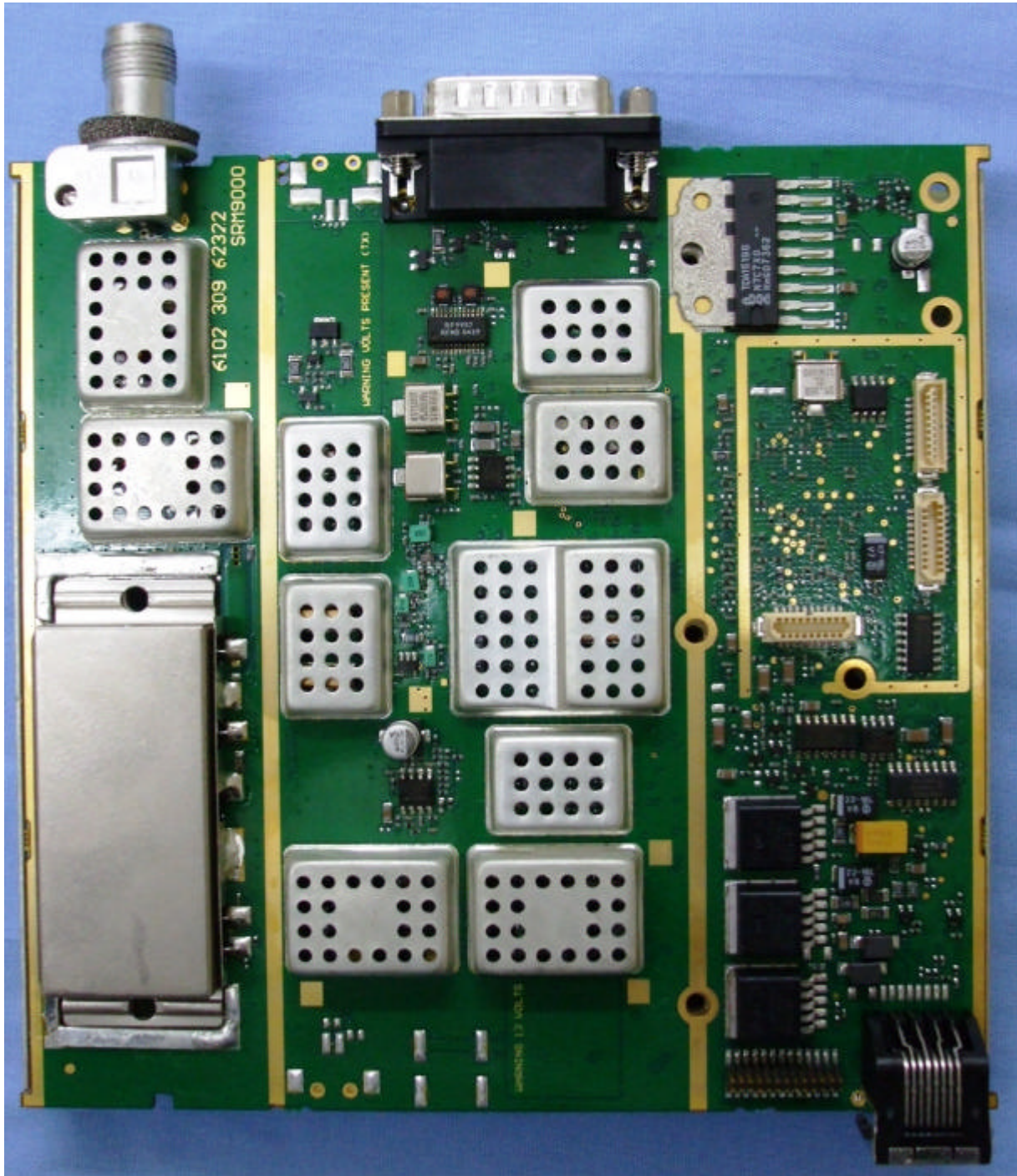
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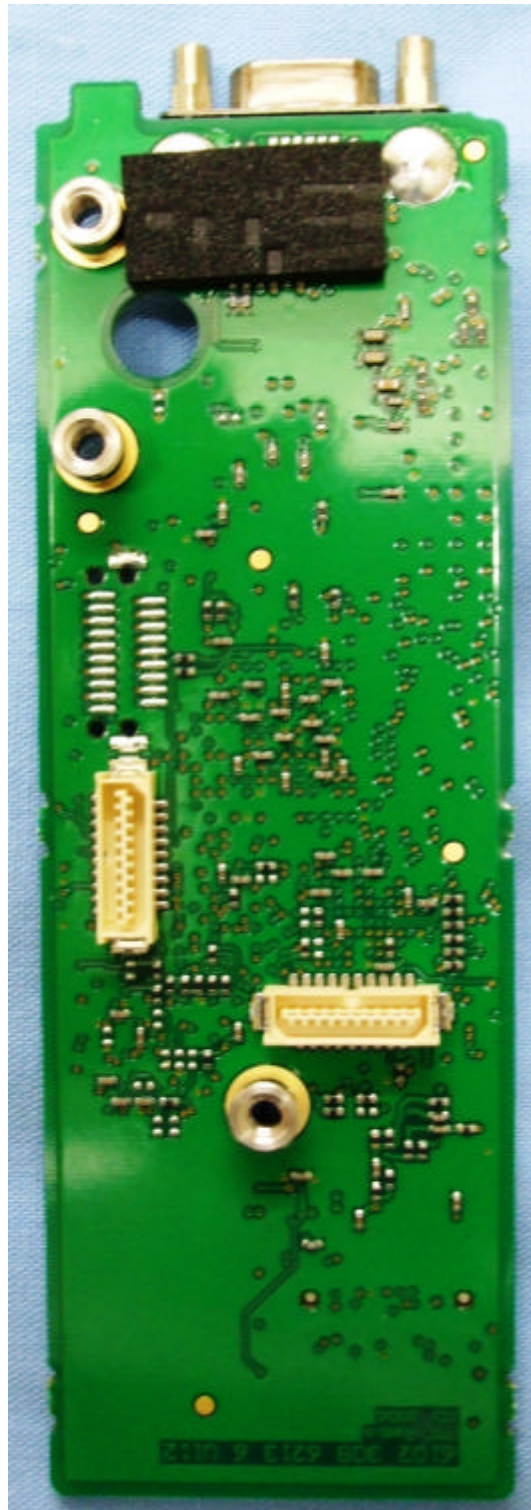
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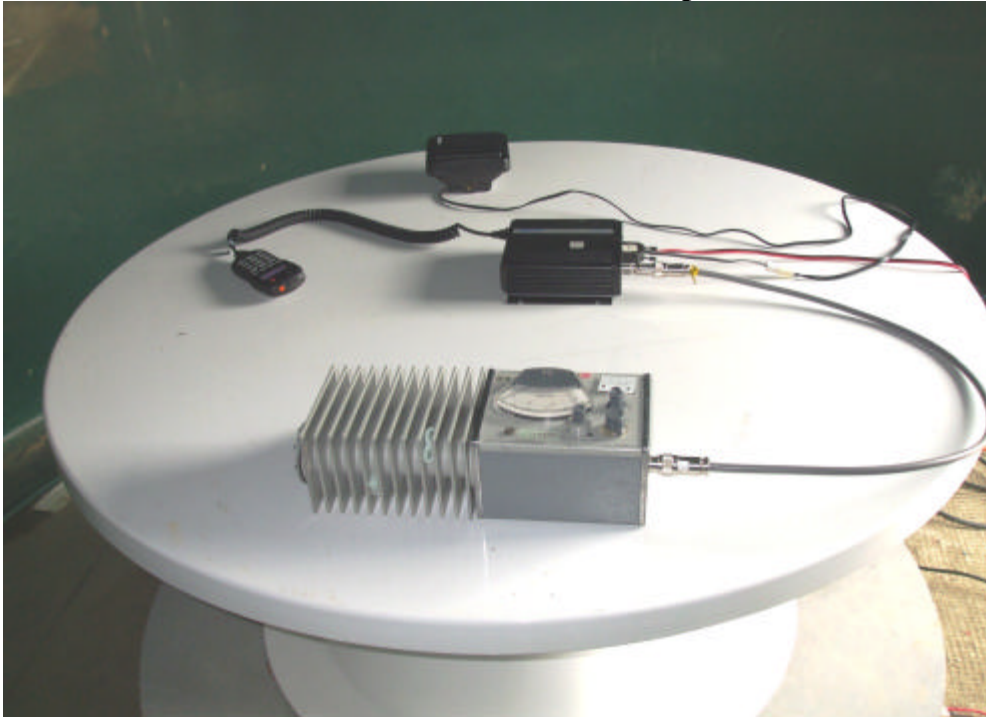
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Radiated emissions test set up



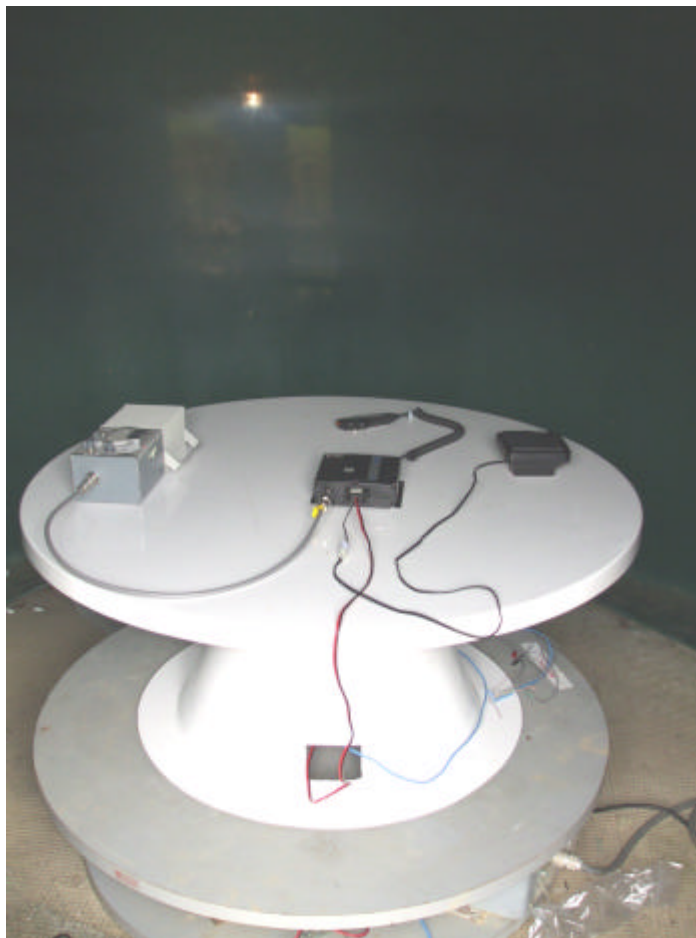
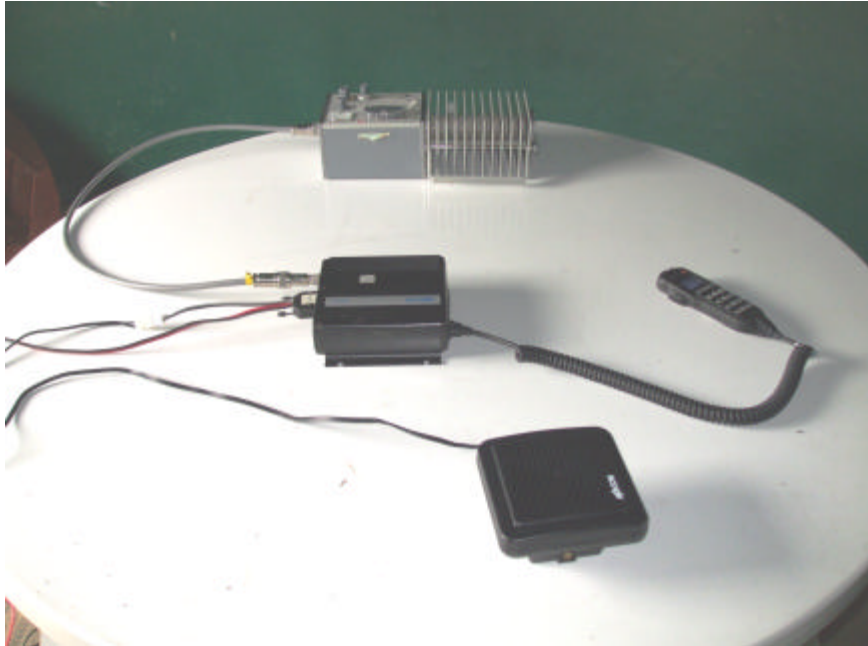
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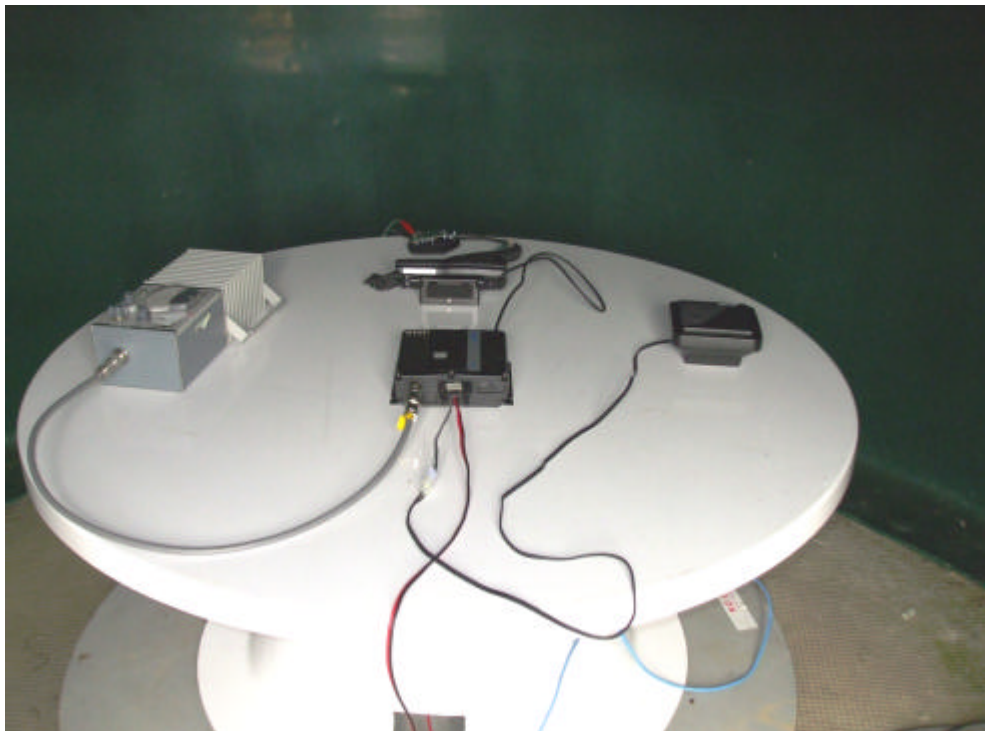
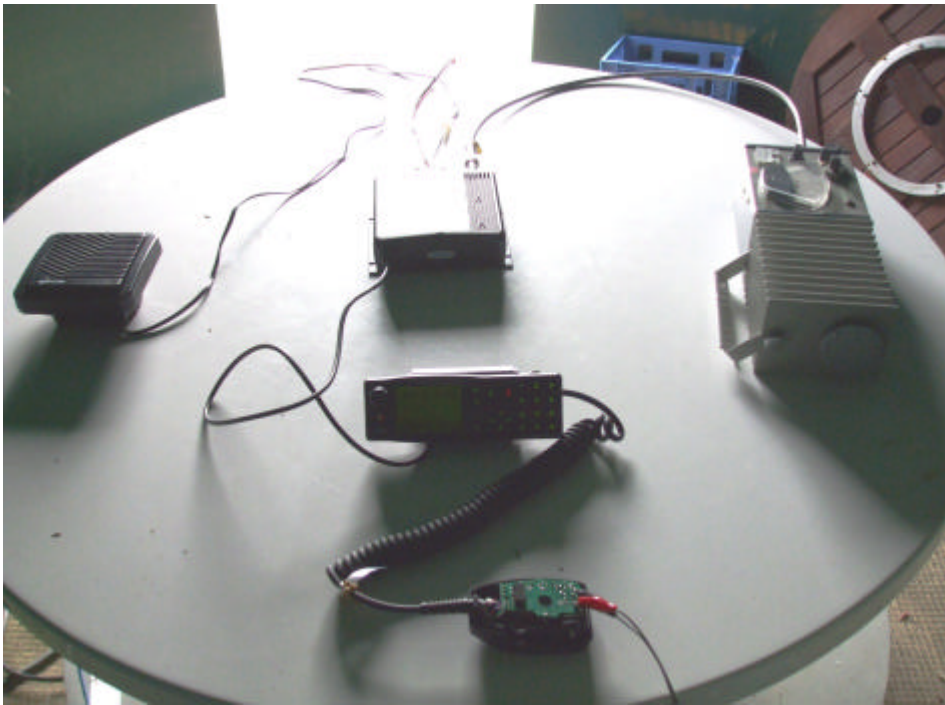
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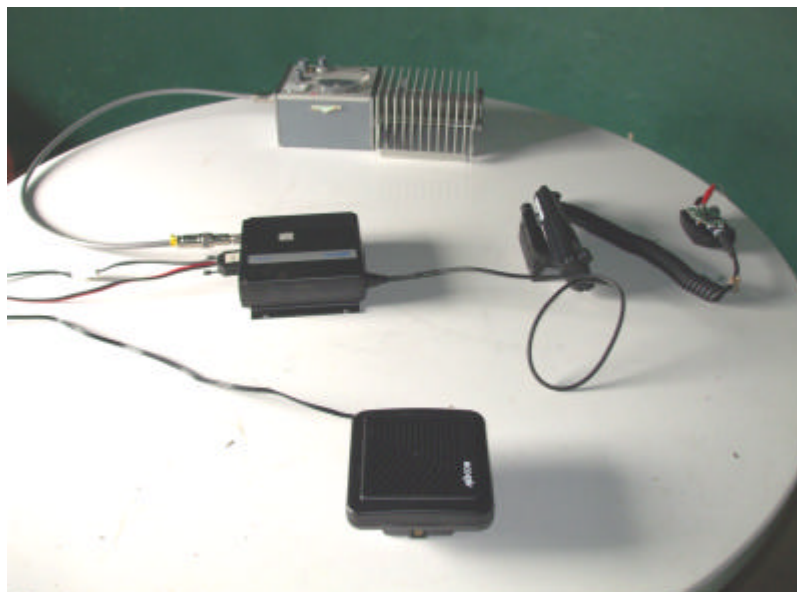
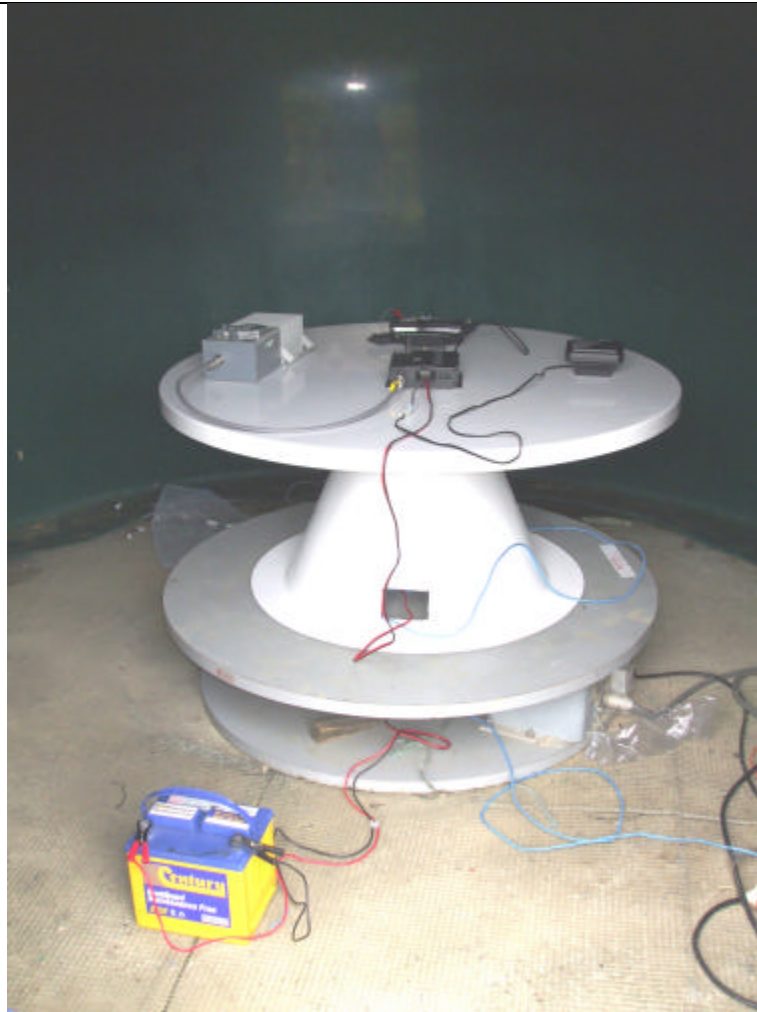
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