

EMC Technologies (NZ) Ltd

Test Report No 71217.1

Report date: 31 January 2008

TEST REPORT

Kahne KR2001 Transceiver

tested to

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart B – Unintentional Radiators

Subpart C – Intentional Radiators

for

Kahne Ltd



This Test Report is issued with the authority of:

Andrew Cutler - General Manager



EMC Technologies (NZ) Ltd

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1. STATEMENT OF COMPLIANCE

The **Kahne KR2001 Transceiver** complies with FCC Part 15 Subpart B as an Unintentional Radiator and Subpart C as an Intentional Radiator when the methods, as described in ANSI 63.4 - 2003, are applied.

2. RESULTS SUMMARY

Receiver

Clause	Parameter	Result
15.101	Equipment authorisation requirement.	Certification or Declaration of Conformity required for receivers.
15.103	Exempted devices.	Not applicable as the device is a receiver and is not a digital device.
15.107	Conducted limits	Complies.
15.109	Radiated emission limits	Complies.
15.111	Antenna power conduction limit for receivers.	Not applicable. The antenna is permanently attached to the receiver.

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Transmitter

Clause	Parameter	Result
15.201	Equipment authorisation requirement.	Certification required.
15.203	Antenna requirement	Complies. Antenna is permanently attached.
15.204	External PA and antenna modifications	Not applicable. No external devices.
15.205	Restricted bands of operation	Complies. Device transmits periodically on 433.9500 MHz.
15.207	Conducted limits	Complies.
15.209	Radiated emission limits.	Complies.
15.231(a)	General requirements	Not applicable. Device operates periodically therefore 15.231(e) will apply.
15.231(b)	Field strength of emissions	See 15.231(e). Device sends short duration data messages.
15.231(c)	Bandwidth	Complies.
15.231(d)	Temperature tests	Not applicable. Device operates at 433.950 MHz
15.231(e)	Field strength of emissions	Complies.
15.231(e)	Silent period	Complies

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3. INTRODUCTION

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

The test sample was selected by the client.

This report relates only to the sample tested.

This report contains no 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.

4. CLIENT INFORMATION

Company Name	Kahne Ltd
Address	109 Valley Road Mount Eden
City	Auckland
Country	New Zealand
Contact	Mr Michael Eivers

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5. DESCRIPTION OF TEST SAMPLE

Brand Name	Kahne
Model Number	KR2001
Product	Transceiver
Manufacturer	Kahne Ltd
Country of Origin	New Zealand
Serial Number	1207001
FCC ID	WO7KR200008
Ancillary Equipment	ASUS A3F Laptop Computer SN# 65N0AG003012

The primary function of this device is to receive data periodically on 433.9500 MHz from transmitters located on animals (BOSPAC transmitters) and from transmitters implanted inside animals (BOLUS transmitters).

The device is internally powered using the USB port of a computer.

The antenna is permanently attached to the transceiver at board level.

The device can also transmit.

This function is only used for the initial set up of BOSPAC and BOLUS transmitters and would be limited to a maximum transmission time of 52 ms with a gap of at least 10 seconds.

This is achieved when the mouse is clicked which sends set up data to the BOSPAC or BOLUS where a minimum gap of 10 seconds is allowed for in the installation software.

For testing purposes the transmitter operated for 1 second with a 50% duty cycle.

Frequency Shift Keying (FSK) modulation is used.

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6. METHODS AND PROCEDURES

Legislation

The limits contained within 47 CFR Part 15 Subpart A, B and C were applied to this device.

Methods and Procedures

The measurement methods and procedures as described in ANSI C63.4 - 2003 were used.

7. RESULTS

Section 15.207: Conducted limits

Conducted emission testing has been carried out as the device is powered indirectly using the USB power on a computer that would normally be powered at 110 Vac.

Testing has been carried out using a representative 110 Vac AC adaptor.

Testing was carried out over the frequency range of 150 kHz to 30 MHz at the Laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room.

Measurements on both the phase and neutral lines were made using either a Quasi Peak or an Average detector with a 9 kHz bandwidth.

The supplied conducted emission plot is a combined plot showing the worst case of the Peak, Quasi Peak and Average levels for both phase and neutral.

Result: Complies with a 3.0 dB margin at 195.0 kHz (Quasi Peak).

Measurement uncertainty with a confidence interval of 95% is:

- Mains terminal tests (0.15 - 30 MHz) ± 2.2 dB

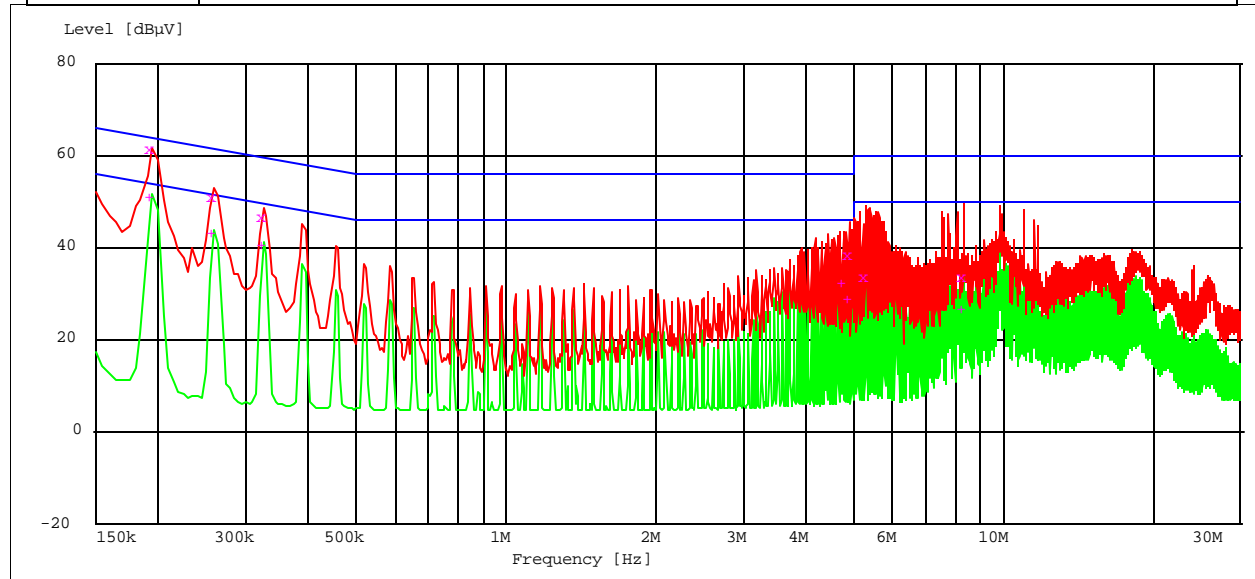
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Conducted emissions

Comments:	Device tested when powered at 110 Vac while transmitting and receiving continuously for a period of 2 seconds with a 50% duty cycle
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Peak -----	Average -----	Quasi Peak X	Average +
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Quasi-Peak Measurements

Frequency MHz	Level dBmV	Limit dBmV	Margin dB	Phase	Rechecks dBmV
0.195000	60.80	63.8	3.0	N	58.0
0.260000	50.60	61.4	10.8	N	
0.325000	46.00	59.5	13.5	L1	
4.910000	38.10	56.0	17.9	L1	
5.300000	33.40	60.0	26.6	L1	
8.330000	33.30	60.0	26.7	L1	

Average Measurements

Frequency MHz	Level dBmV	Limit dBmV	Margin dB	Phase	Rechecks dBmV
0.195000	50.40	53.8	3.4	N	
0.260000	42.60	51.4	8.8	N	
0.325000	40.30	49.5	9.2	N	
4.780000	31.70	46.0	14.3	L1	
4.910000	28.20	46.0	17.8	L1	
8.330000	26.40	50.0	23.6	L1	

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Section 15.109: Receiver radiated emissions

Device tested continuously when receiving data from the Bolas transmitter on 433.950 MHz.

Details of the measurement set up are described in the results for Section 15.231(e).

Intermediated frequency = 150 kHz

Frequency MHz	Vertical dBuV/m	Hort dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
Local Oscillator						
433.7900	29.8	26.2	46.0	16.2	Vertical	Quasi Peak
867.5800	36.1	30.3	46.0	9.9	Vertical	Quasi Peak
Other emissions						
33.190	32.8		40.0	7.2	Vertical	Quasi Peak
36.000	31.6		40.0	8.4	Vertical	Quasi Peak
65.318	26.5		40.0	13.5	Vertical	Quasi Peak
80.000	27.0		40.0	13.0	Vertical	Quasi Peak
85.900	31.4		40.0	8.6	Vertical	Quasi Peak
114.530	24.4		43.5	19.1	Vertical	Quasi Peak
128.848	23.4		43.5	20.1	Vertical	Quasi Peak
143.166	32.6		46.0	13.4	Vertical	Quasi Peak
240.000	39.7		46.0	6.3	Vertical	Quasi Peak

All other emissions observed had a margin greater than 20 dB below the limit when measurements were attempted up to 4338 MHz in either horizontal or vertical antenna polarisations.

Result: Complies with a 6.3 dB margin (Vertical) at 240 MHz.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 4500 MHz) ± 4.1 dB

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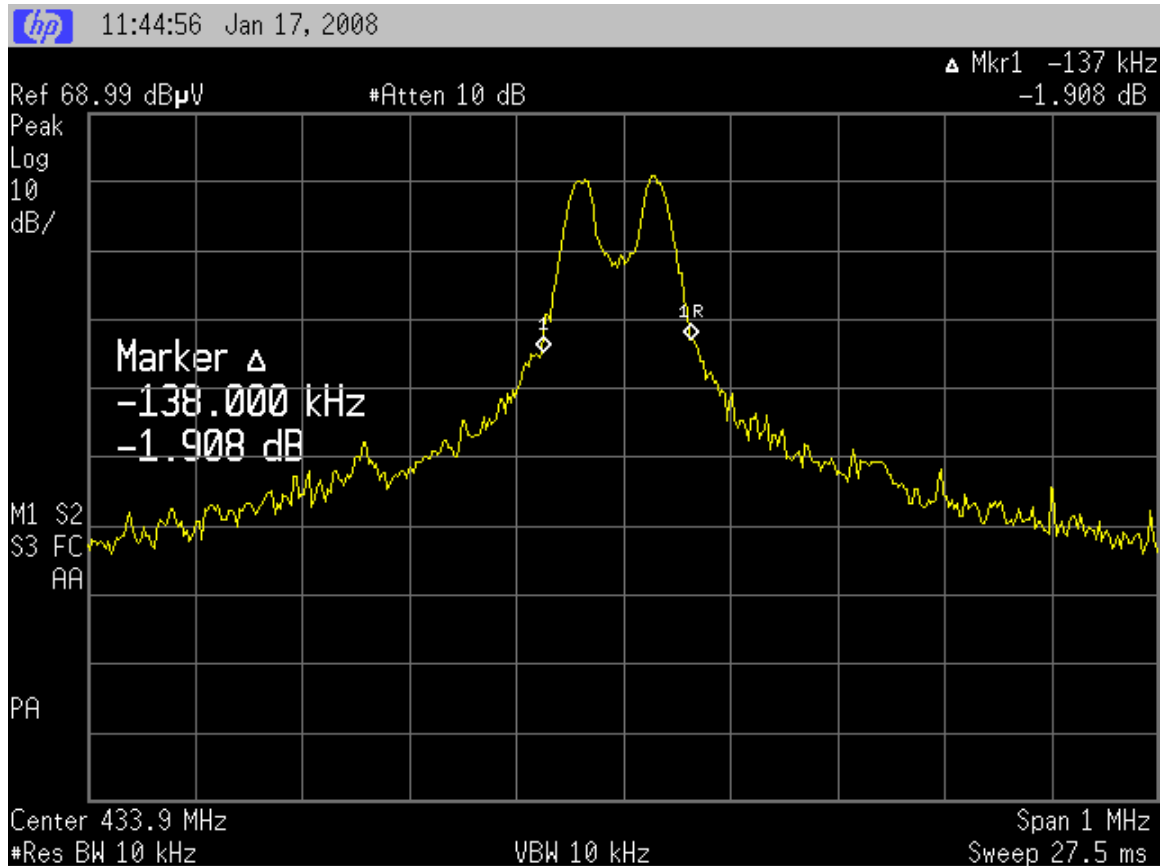
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Section 15.205: Restricted bands of operation.

The transmitter has a centre frequency of approximately 433.9500 MHz.

This falls between the restricted bands of 399.9 - 410 MHz and 608 – 614 MHz.



Result: Complies.

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Section 15.231(a) General requirements

This transmitter operates periodically and therefore paragraph (e) of this section has been applied

Section 15.231(b) Field strength of emissions

This transmitter operates periodically and therefore paragraph (e) of this section has been applied

However the following points should be noted

- (1) Field strength of emissions have been made at a distance of 3 metres
- (2) Quasi Peak measurements have been made below 1 GHz and Average and Peak measurements have been made above 1 GHz. Pulse limiting as per Section 15.35(c) has not been applied as pulse modulation is not used.
- (3) Spurious emissions have measured using a Quasi Peak detector below 1 GHz and an Average and Peak detector above 1 GHz with the limits as per section 15.231(e) being applied

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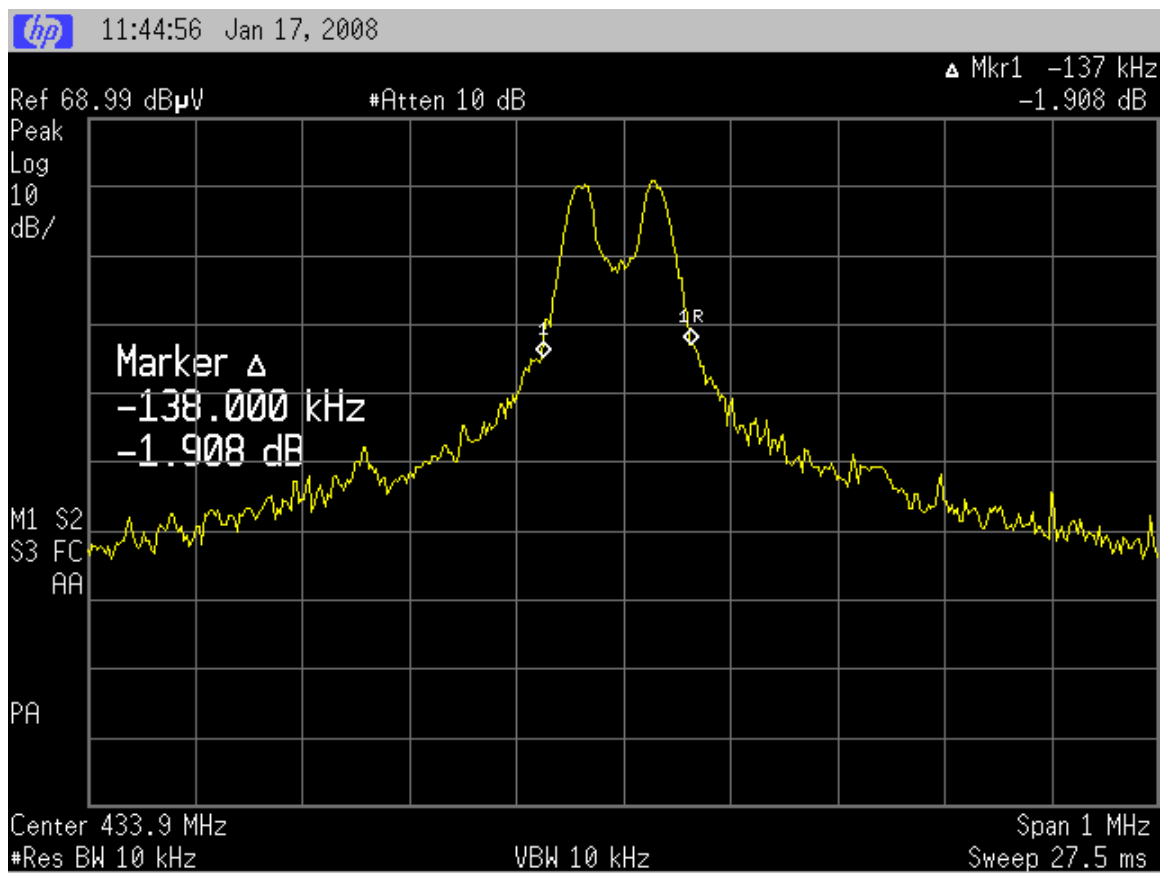
Section 15.231(c) Bandwidth.

The bandwidth of the emission should not be greater than 0.25% of the centre frequency at the –20 dB points.

Centre frequency = 433.950 MHz.

0.25% of 433.950 MHz is 1.085 MHz.

The plot below shows a bandwidth of 138.000 kHz at the –20 dB points.



Result: Complies.

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Section 15.231(e) Field strength of emissions

Radiated emissions testing was carried out over the frequency range of 30 MHz to 4340 MHz as the transmitter operates on 433.950 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand. This site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 2003.

The device was placed on the fibreglass test table that has a dielectric constant near 1 which is a total of 0.8 m above the test site ground plane with testing carried out over a distance of 3 metres.

As the device is fixed, testing was carried out in a single orthogonal polarity.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations, where appropriate.

The emission level was determined in field strength by taking the following into consideration:

Level (dBuV/m) = Receiver Reading (dBuV) + Antenna Factor (dB) + Coax Loss (dB)

The average limit as described in Section 15.231(e) has been applied as follows:

Fundamental 260 – 470 MHz = $16.6667 \times 433.950 \text{ MHz} - 2833.3333 = 4399.1812 \text{ uV/m}$.

This is then convert to dBuV/m using $20 \times \log(4399.1812) = 72.9 \text{ dBuV/m}$

The quasi peak / average spurious emission limit is 20 dB below the fundamental emission level at 52.9 dBuV/m with the peak spurious emission limit being 72.9 dBuV/m.

General emission measurements were also made over the range of 30 – 4350 MHz with the limits as described in Part 15, section 15.209 being applied however the only emissions observed were the receiver emissions that have previously been described and the transmitter fundamental emission and the harmonic emissions which are recorded below.

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Fundamental emission

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
433.950	70.1	66.5	72.9	2.8	Vertical	Quasi Peak

Result: Complies with a 2.8 dB margin.

Measurement falls within the window of uncertainty for this test method.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 4500 MHz) \pm 4.1 dB

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Spurious emissions

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
867.900	37.2	31.5	52.9	15.7	Vertical	Quasi Peak
1301.850	39.7	32.4	52.9	13.2	Vertical	Average
1301.850	48.8	44.8	72.9	24.1	Vertical	Peak
1735.800	41.1	33.0	52.9	11.8	Vertical	Average
1735.800	49.4	45.0	72.9	23.5	Vertical	Peak
2169.750	45.1	39.0	52.9	7.8	Vertical	Average
2169.750	54.3	49.0	72.9	18.6	Vertical	Peak
2603.700	< 41	< 41	52.9	-	Vertical	Average
2603.700	< 54	< 54	72.9	-	Vertical	Peak
3037.650	< 39	< 39	52.9	-	Vertical	Average
3037.650	< 45	< 45	72.9	-	Vertical	Peak
3471.600	< 43	< 43	52.9	-	Vertical	Average
3471.600	< 48	< 48	72.9	-	Vertical	Peak
3905.550	< 45	< 45	52.9	-	Vertical	Average
3905.550	< 51	< 51	72.9	-	Vertical	Peak
4339.550	< 45	< 45	52.9	-	Vertical	Average
4339.550	< 51	< 51	72.9	-	Vertical	Peak

Result: Complies with a 7.8 dB margin at 2169.750 MHz when measured in average (vertical).

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 4500 MHz) \pm 4.1 dB

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Section 15.231(e) Timing of transmissions

The device can also transmit.

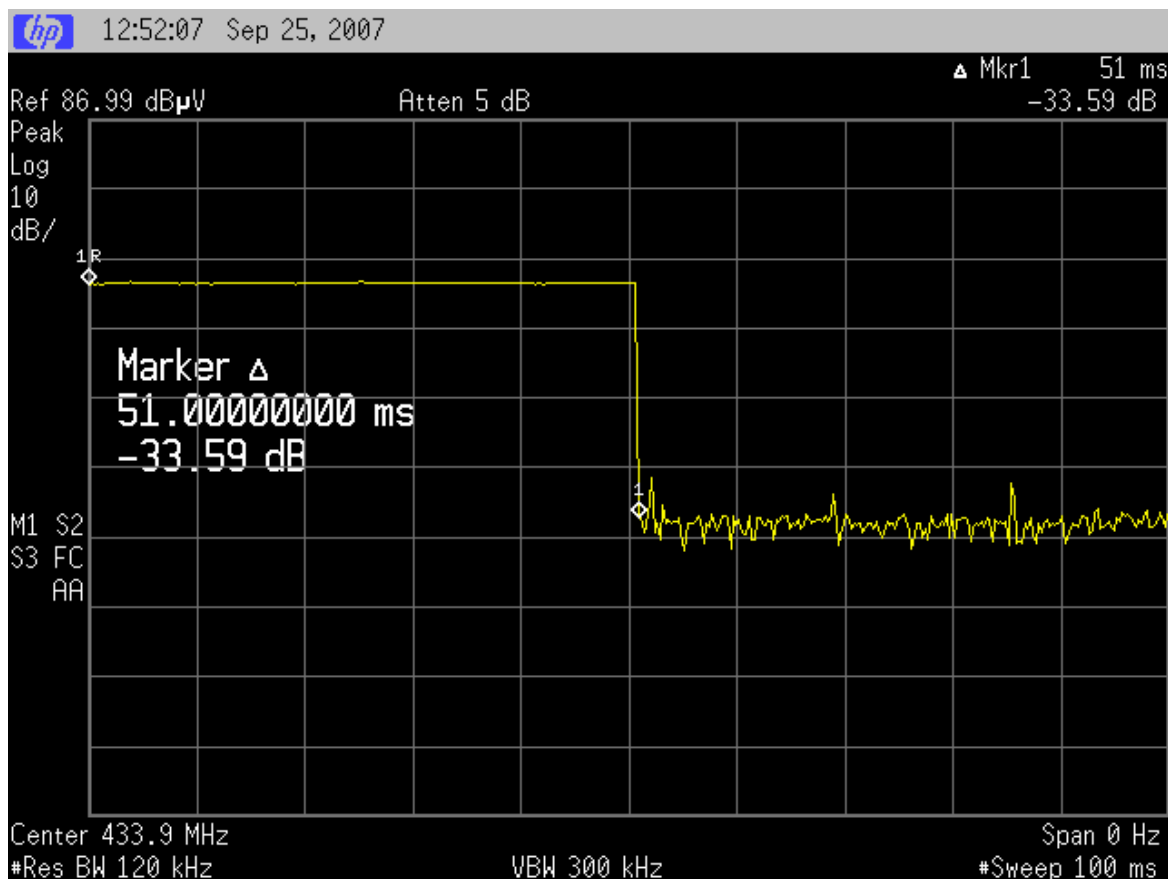
This function is only used for the initial set up of BOSPAC and BOLUS transmitters and would be limited to a maximum transmission time of 51 ms with a gap of at least 10 seconds.

This is achieved when the mouse is clicked which sends set up data to the BOSPAC or BOLUS where a minimum gap of 10 seconds is allowed for in the installation software.

The FCC rules state that each transmission shall not be longer than 1 second.

The FCC rules also state that the silent period shall be at least 30 times the transmission duration but not less than 10 seconds.

The transmission has been measured to be approximately 52 mS.



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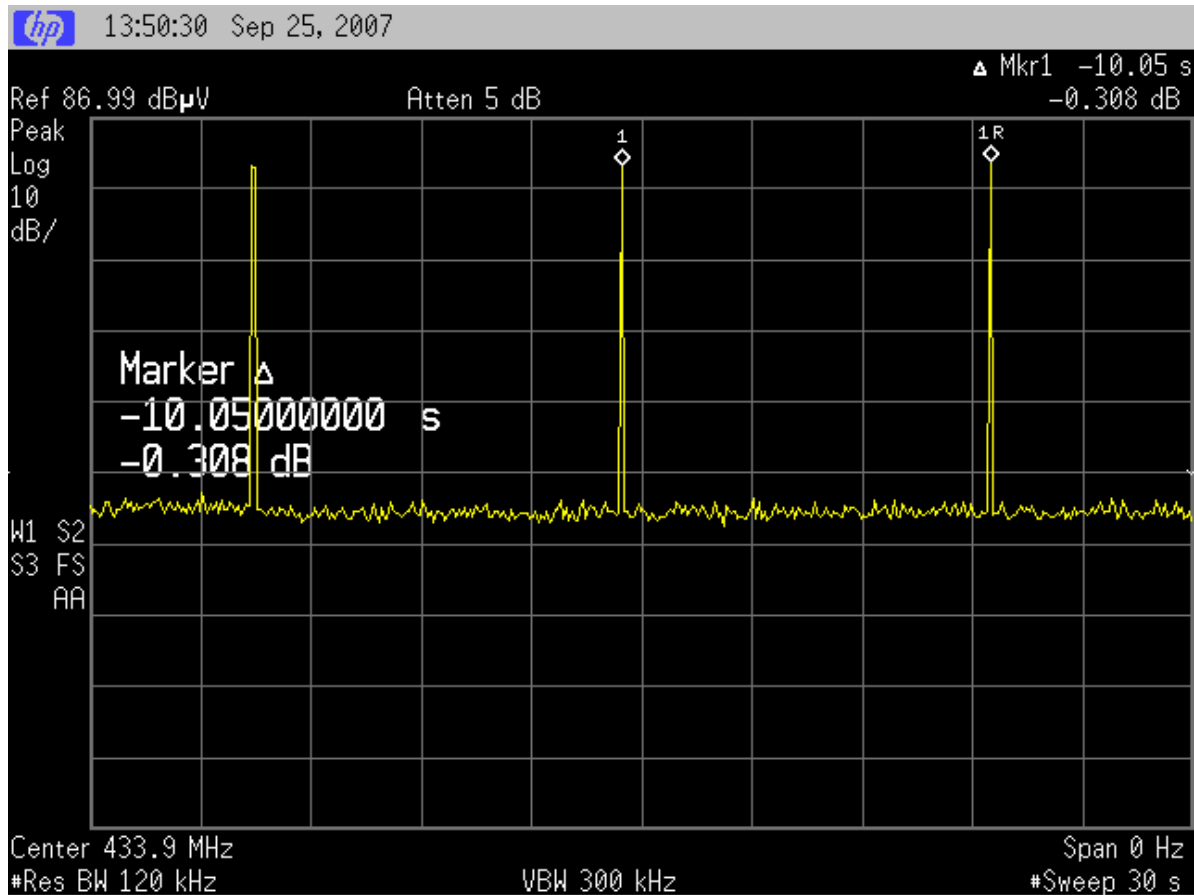
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The FCC rules also state that the silent period shall be at least 30 times the transmission duration but not less than 10 seconds.

$51 \text{ mS} \times 30 = 1.5 \text{ seconds.}$

Therefore 10 second rule has been applied.



Result: Complies

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8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	N/A
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	N/A
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	N/A
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3603	4 Feb 2008
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612	4 Feb 2008
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	4 Feb 2008
Horn Antenna	Electrometrics	RGA-60	6234	E1494	3 May 2008
Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595	30 Jan 2008
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776	6 Mar 2008
Pre Amplifier	Hewlett Packard	8349B	2644A01659	-	4 Feb 2008

9. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was updated January 2007.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with a number of accreditation bodies in various economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

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10. PHOTOGRAPHS

External view



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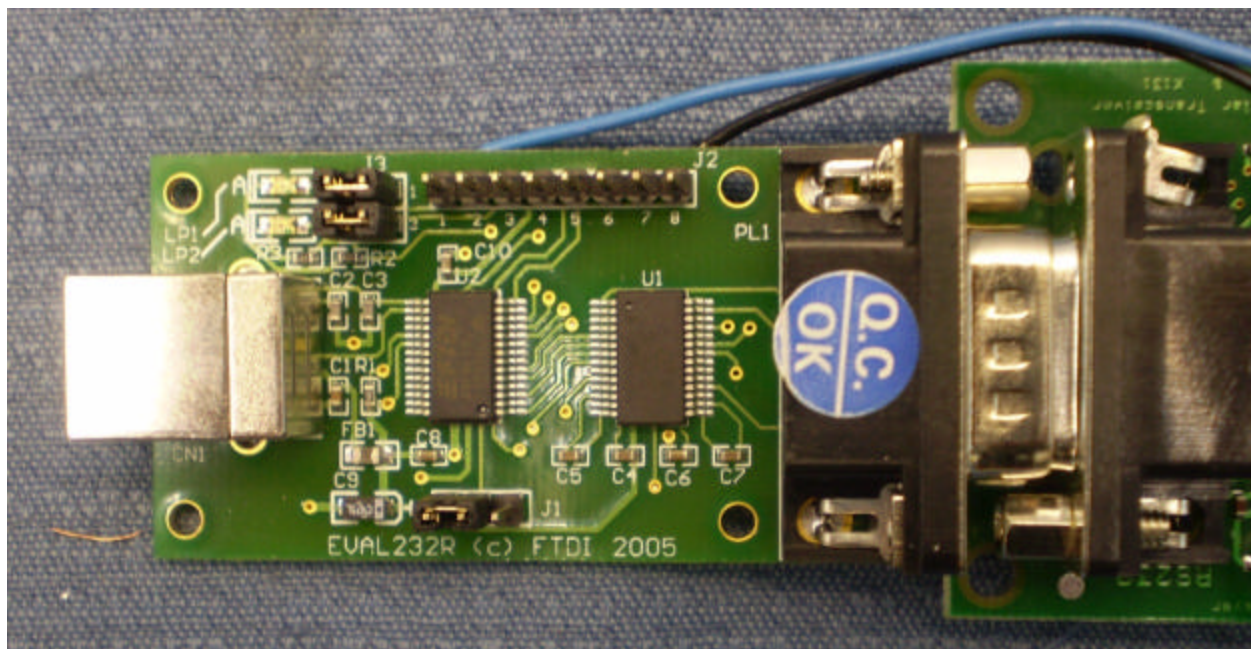
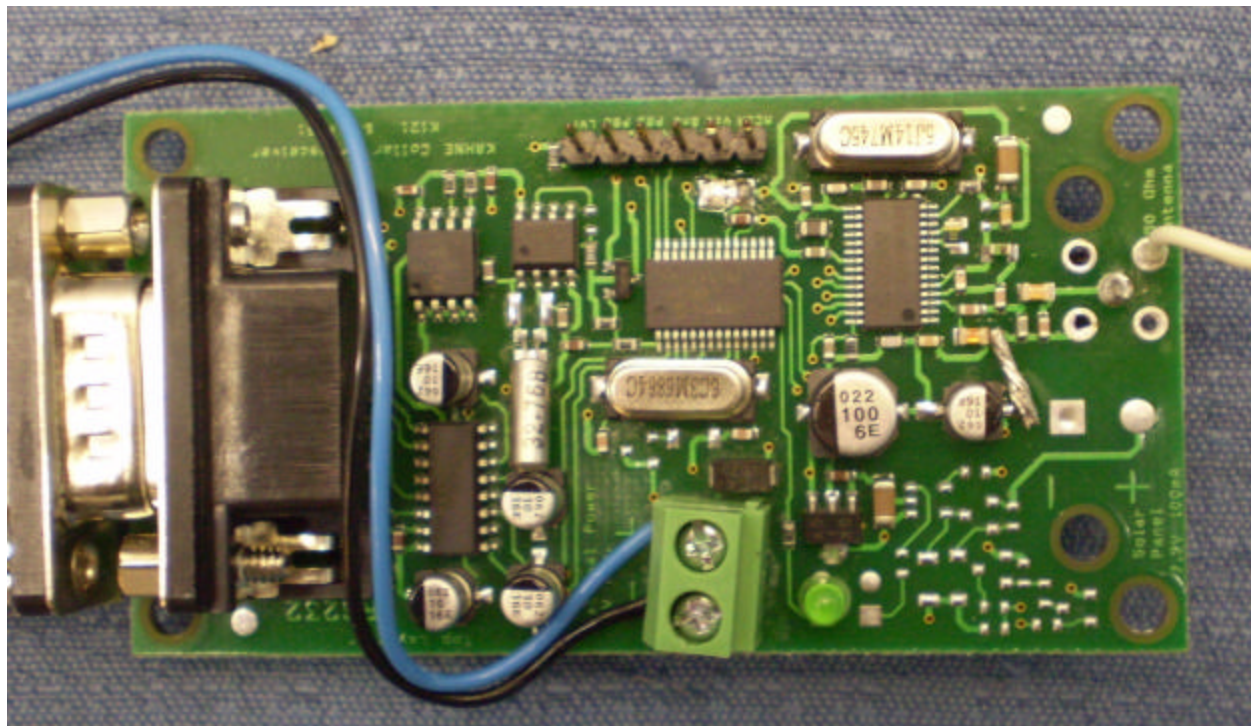
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Internal View



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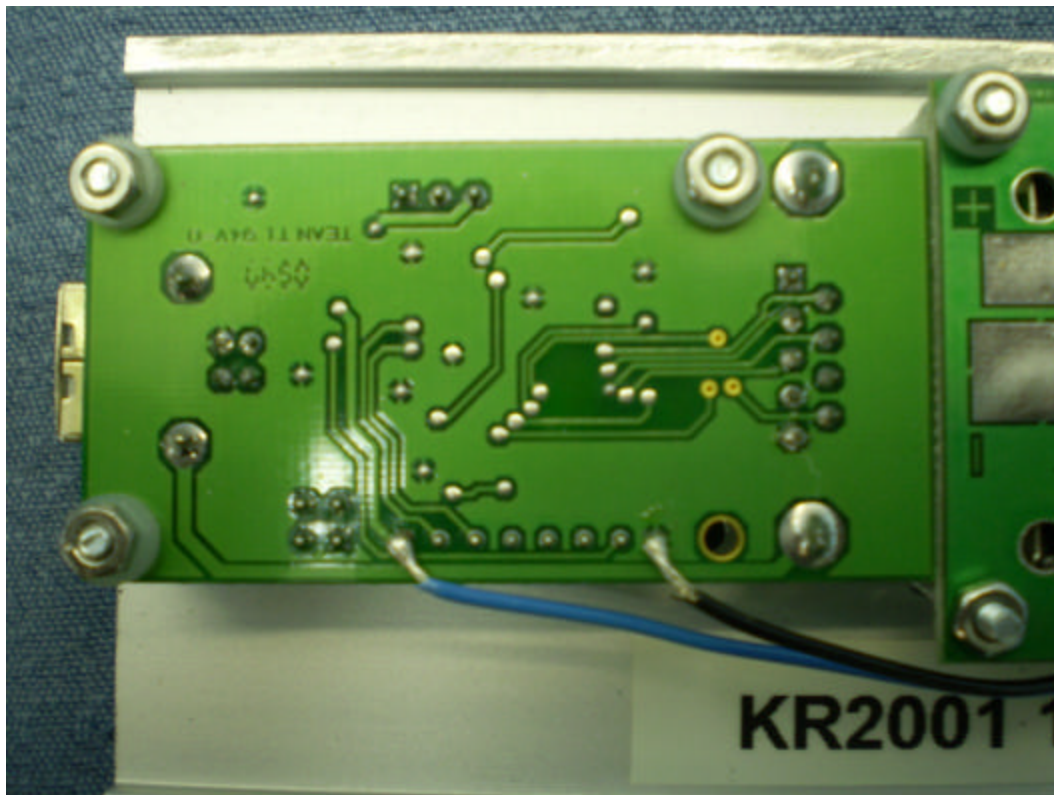
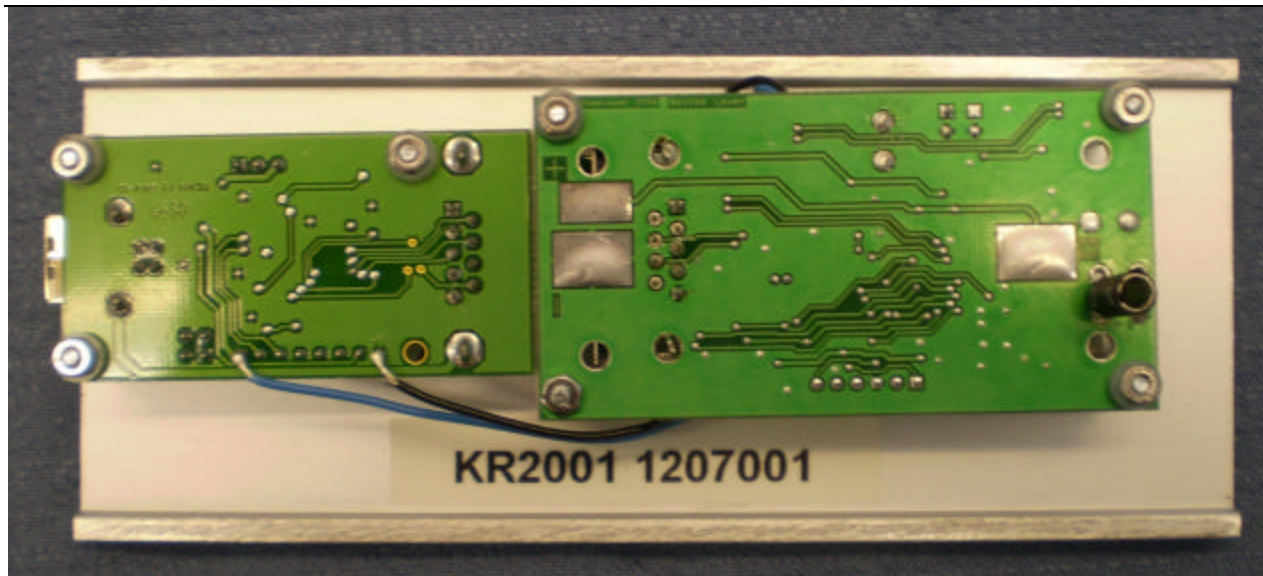
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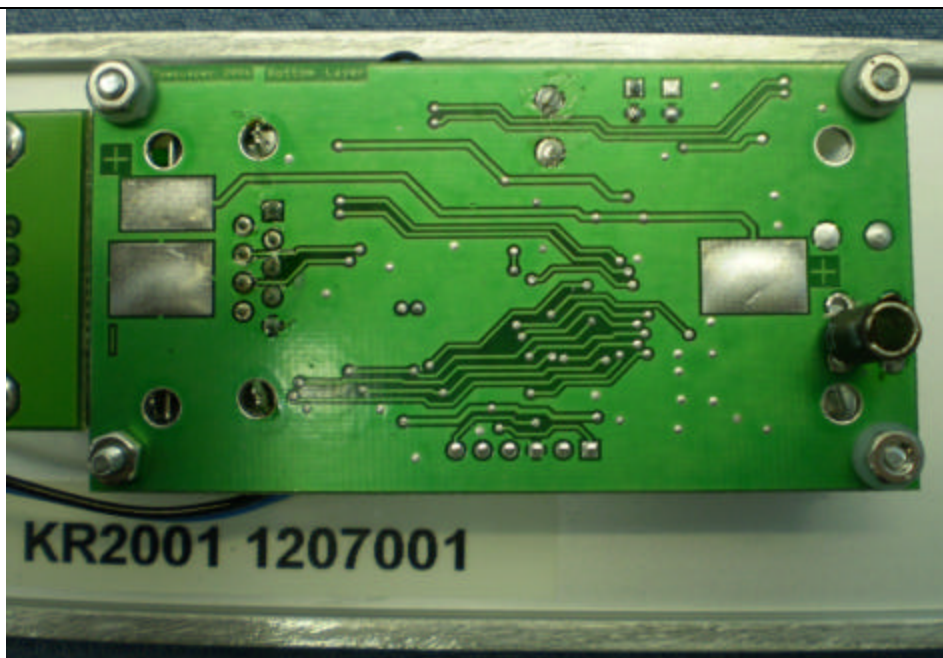
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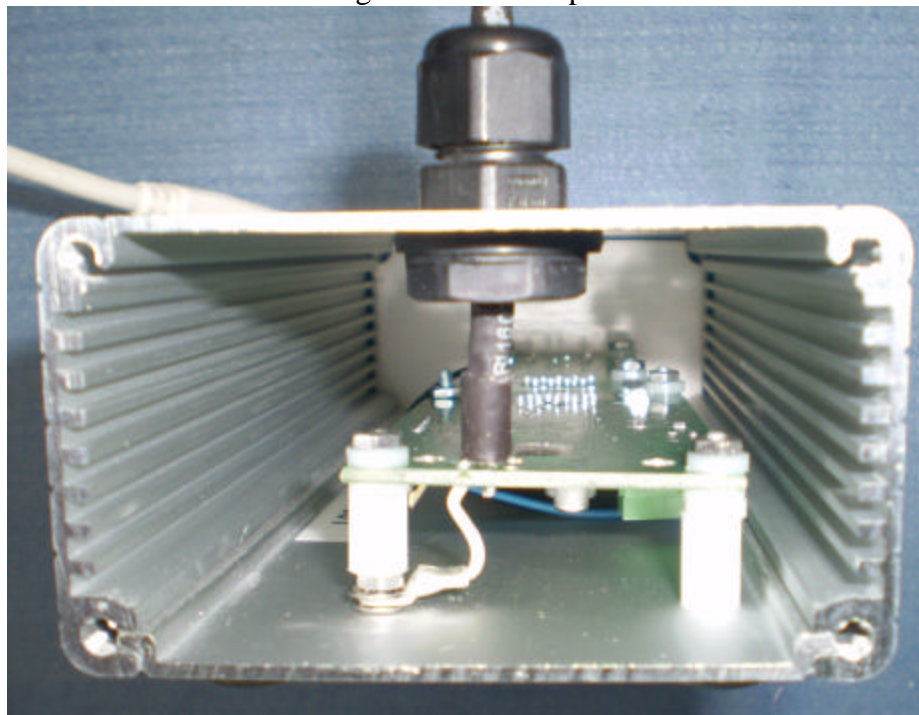
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Internal view showing antenna direct permanent connection



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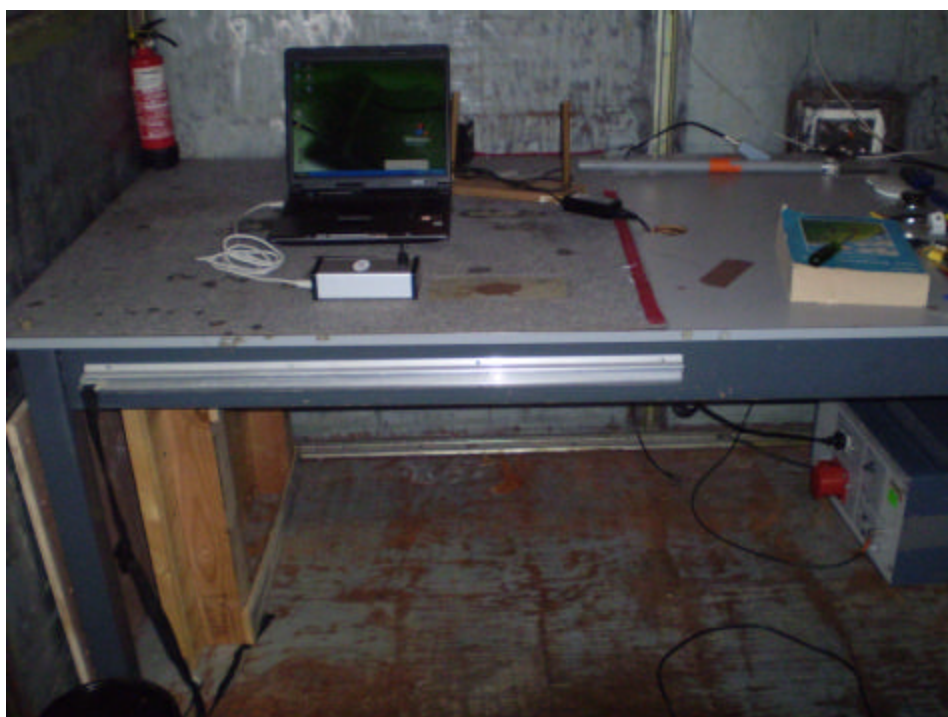
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Conducted emissions test set up



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Radiated emissions test set up photos



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