



EMC Technologies (NZ) Ltd  
PO Box 68-307  
Newton, Auckland  
New Zealand  
Phone 09 360 0862  
Fax 09 360 0861  
E-Mail Address: aucklab@ihug.co.nz  
Web Site: www.emctech.com.au

## **TEST REPORT**

**Conrad Meier Fish Harvester OD-010048**  
**Kontiki Remote Control Transmitter**

*tested to*

**47 Code of Federal Regulations**

**Part 15 - Radio Frequency Devices**

**Subpart C – Intentional Radiators**

*including*

**Section 15.247 - Operation in the band 900 – 928 MHz**

*for*

**Brand Developers Ltd**

This Test Report is issued with the authority of:



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

**Andrew Cutler - General Manager**

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## 1. STATEMENT OF COMPLIANCE

The **Conrad Meier Fish Harvester OD-010048 Kontiki Remote Control Transmitter** complies with FCC Part 15 Subpart C including Section 15.247 as an Intentional Radiator when the methods as described in ANSI C63.4 - 2003 and those defined in FCC KDB 558074 D01 v03r02.

## 2. RESULTS SUMMARY

The results of testing carried out between May and August 2014 are detailed below:

| Clause | Parameter                             | Result   |
|--------|---------------------------------------|--|
| 15.201 | Equipment authorisation requirement   | Certification required.  |
| 15.203 | Antenna requirement                   | Complies.  |
| 15.204 | External PA and antenna modifications | Noted.   |
| 15.205 | Restricted bands of operation         | Complies.  |
| 15.207 | Conducted limits                      | Not applicable. Device is powered using internal DC batteries. |
| 15.209 | Radiated emission limits              | Complies.  |
| 15.247 |                                       |  |
| (a)(2) | Minimum bandwidth                     | Complies   |
| (b)(3) | Peak output power                     | Complies   |
| (b)(4) | Antenna gain less than 6 dBi          | Complies   |
| (c)    | Operation with directional antenna    | Not applicable   |
| (d)    | Out of band emissions                 | Complies   |
| (e)    | Power spectral density                | Complies   |
| (f)    | Hybrid systems                        | Not applicable   |
| (g)    | Use of all channels                   | Not applicable   |
| (h)    | Intelligent frequency hopping         | Not applicable   |
| (i)    | Radio frequency hazards               | Complies   |

### **3. INTRODUCTION**

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 contains no corrections.**

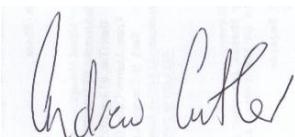
Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

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

## 4. CLIENT INFORMATION

**Company Name** Brand Developers Ltd

**Address** 519 – 521 Lake Road  
Takapuna

**City** Auckland 0622

**Country** New Zealand.

**Contact** Mr Mikael Stewart

## 5. DESCRIPTION OF TEST SYSTEM

**Brand Name** Conrad Meier Fish Harvester

**Model Number** OD-010048

**Product** Remote Control Transmitter

**Manufacturer** Brand Developers Ltd

**Country of Origin** New Zealand / China

**Serial Number** Not serialised

**FCC ID** 2ADCE-FH-REM

The device that was tested is a handheld remote control transceiver.

This device is used to control a powered Kontiki floatation device.

A Kontiki device is a fishing device that allows a long line, containing many hooks, to be taken several hundred meters from the shore line.

The device has the following specifications:

**FCC Band:** 900 MHz – 928 MHz

**Test Frequency:** 924.5000 MHz

**Rated Power:** 50 mW (+17 dBm)

**Modulation Type:** Digital Modulation - Wideband FSK

**Antenna Type:** Internal whip antenna

**Power Supply:** 2 x 1.5 Vdc batteries

## 6. RESULTS

### Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart C.

### Methods and Procedures

The following measurement methods and procedures have been applied:

- ANSI C63.4 – 2003
- FCC KDB 558074 D01 v03r02

### Section 15.201: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device.

### Section 15.203: Antenna requirement

An internal permanently fixed antenna is used.

**Result:** Complies.

### Section 15.204: External radio frequency power amplifiers and antenna modifications

An external power amplifier is provided for use with this transmitter.

Suitable warning will be placed in the user manual regarding the modification of the device.

**Result:** Complies.

### Section 15.205: Restricted bands of operation

The device tested transmits on a single frequency of 924.5 using digital modulation.

Section 15.247 allows this between 900 – 928 MHz

**Result:** Complies.

## Section 15.209 – Radiated emissions

As this device contains digital devices that operate using frequencies below 30 MHz, low frequency measurements were attempted between 9 kHz – 30 MHz at the open area test site over a distance of 10 metres using a loop antenna the centre of which was 1 metre above the ground.

Details of the general test set up are provided in the photograph section of this report.

The general limits described in 15.209 have been applied with the 300 metre and 30 metre limits being extrapolated by a factor of 40 dB per decade as allowed for in section 15.31(d)(2).

Between 9 – 90 kHz and between 110 – 490 kHz an Average detector and a Peak detector were used.

Where a peak detector was used the limit was increased by +20 dB.

Between 90 kHz and 110 kHz band between 490 kHz and 30 MHz a Quasi Peak detector was used.

No emissions were detected on these frequencies of interest and no other emissions were detected from this device over the range of 9 kHz – 30 MHz

**Result:** Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests                     $(9 \text{ kHz} - 30 \text{ MHz}) \pm 4.8 \text{ dB}$

## Section 15.247(a)(2) - Minimum bandwidth

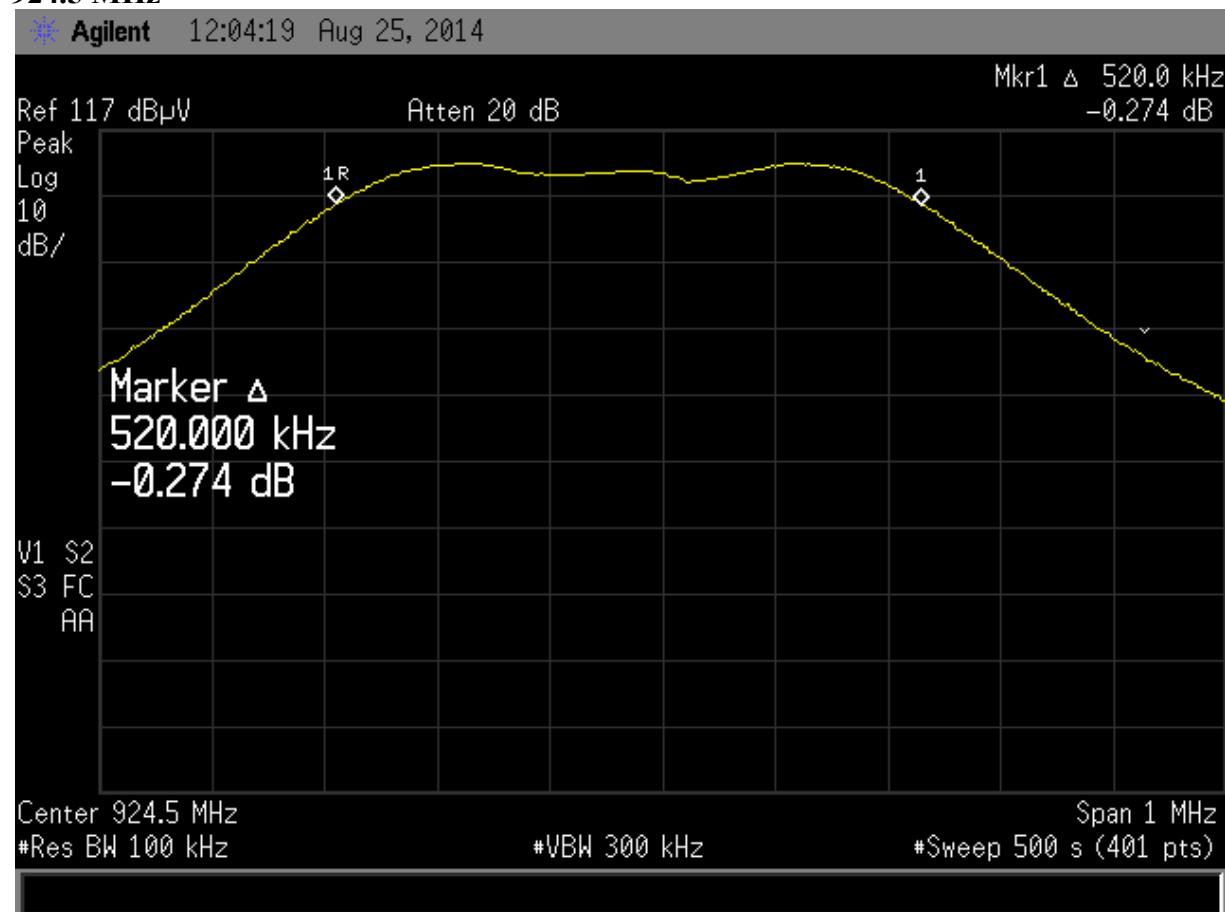
Digital devices operating in the 900 - 928 MHz band are required to have a minimum 6 dB bandwidth of 500 kHz.

Testing was carried out using Spectrum Analyser using a 1 MHz span with a resolution bandwidth of 100 kHz and a video bandwidth of 300 kHz.

The results are summarised as follows:

| Frequency<br>(MHz) | Bandwidth<br>(kHz) |
|--------------------|--------------------|
| 924.500            | 520.000            |

### 924.5 MHz



**Result:** Complies

### Section 15.247(b)(3)– Peak output power

As the device does not have an antenna port radiated measurements were carried out at the test site.

The device being placed in the centre of the test table at a height of 80 cm above the ground plane.

Testing was carried out on 924.5 MHz using both vertical and horizontal polarisations when the transmitter was placed in the X (standing up right), Y (laying flat) and Z (on its side) planes as it is a portable device.

| Plane | Frequency<br>(MHz) | Field<br>Strength<br>(dB $\mu$ V/m) | Radiated<br>Power<br>(dBm) | Limit<br>(dBm) | Antenna<br>Polarisation | Margin<br>(dB) |
|-------|--------------------|-------------------------------------|----------------------------|----------------|-------------------------|----------------|
| X     | 924.500            | 102.6                               | 7.4                        | 30.0           | Vertical                | 22.6           |
| X     | 924.500            | 91.7                                | -3.5                       | 30.0           | Horizontal              | 33.5           |
| Y     | 924.500            | 94.0                                | -1.2                       | 30.0           | Vertical                | 31.2           |
| Y     | 924.500            | 102.3                               | 7.1                        | 30.0           | Horizontal              | 22.9           |
| Z     | 924.500            | 93.6                                | -1.6                       | 30.0           | Vertical                | 31.6           |
| Z     | 924.500            | 104.8                               | 9.6                        | 30.0           | Horizontal              | 20.4           |

Measurements were made using a peak detector with a 1 MHz bandwidth.

The radiated power level in dBm was determined by formula from the field strength using the formula Field strength (V/m) = (square root of (30 x transmitter power (watts))) / distance (metres)

A power level of +9.6 dBm equates to 9.1 mW or 0.0091 W.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Orere Point, Auckland.

**Result:** Complies.

**Measurement Uncertainty:**  $\pm 4.1$  dB

## Section 15.247 (d) – Out of band emissions

### Band edge measurements:

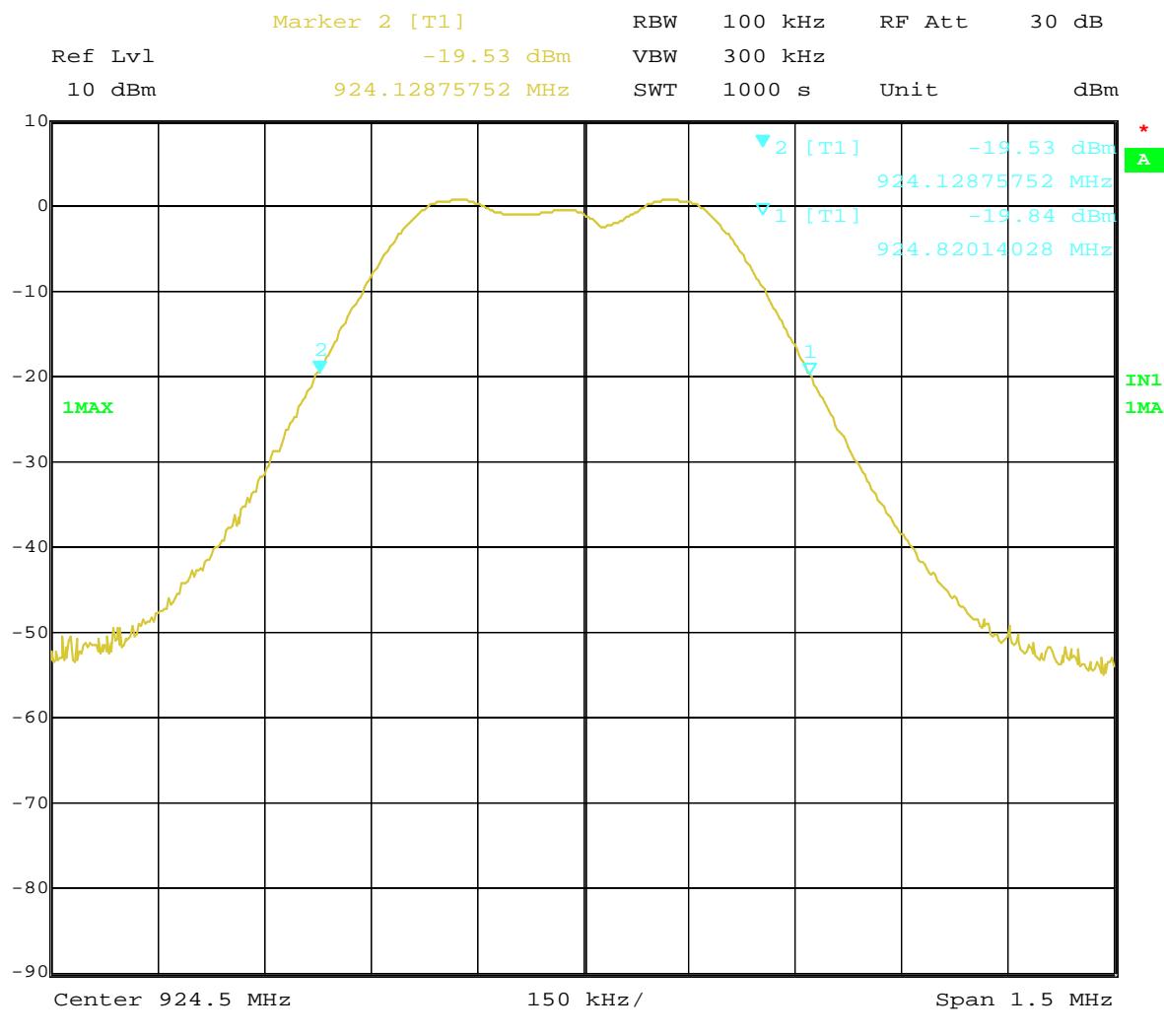
Relative measurements were carried out to determine the -20 dB band-edge points when measured using a peak detector with a bandwidth of 100 kHz.

Below is a plot of the -20 dB band edge points when the device was transmitting on 924.500 MHz

The band edge points were determined to be 924.126 MHz and 924.620 MHz.

The device is required to remain within the band of 902 - 928 MHz.

### 924.500 MHz



**Result:** Complies.

**Measurement Uncertainty:**  $\pm 1.1$  dB

## **Spurious emissions and restricted band radiated emission measurements**

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Driving Creek, Orere Point, Auckland.

Radiated emission measurements were carried out with the limits as per section 15.209 applied when these emissions fell within the restricted bands.

All other emissions are required to meet a limit of -20 dBc with relation to the highest in band emission.

The highest emission observed was on 924.500 MHz using vertical polarisation with a level of 110.1 dB $\mu$ V/m recorded being recorded when a 100 kHz bandwidth peak detector was used

The transmitter was placed on the test table top which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were attempted at 3 metres from the device with no emission being detected.

Measurements below 1000 MHz were made using a Quasi Peak Detector with a bandwidth of 120 kHz.

Measurements above 1000 MHz were made using an average detector with a bandwidth of 1.0 MHz and also a peak detector with a bandwidth of 1.0 MHz.

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 with an automated antenna tower.

All emissions were measured in both vertical and horizontal antenna polarisations.

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

Level (dB $\mu$ V/m) = Receiver Reading (dB $\mu$ V) + Antenna Factor (dB/m) + Coax Loss (dB) – Amplifier Gain (dB)

**Result:** Complies

**Measurement uncertainty:**  $\pm 4.1$  dB

Transmitting on 924.500 MHz

| Frequency<br>(MHz) | Vertical<br>(dBuV/m) | Horizontal<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna    | Detector |
|--------------------|----------------------|------------------------|-------------------|----------------|------------|----------|
| 1849.000           | 57.8                 | 61.5                   | 84.8              | 23.3           | Horizontal | Peak     |
|                    |                      |                        |                   |                |            |          |
| 2773.500           | 59.2                 | 59.6                   | 74.0              | 14.4           | Horizontal | Peak     |
| 2773.500           | 45.1                 | 45.2                   | 54.0              | 8.8            | Horizontal | Average  |
|                    |                      |                        |                   |                |            |          |
| 3698.000           | < 53.0               | 53.0                   | 74.0              | > 21.0         | Vert/Hort  | Peak     |
| 3698.000           | < 38.0               | 38.0                   | 54.0              | > 16.0         | Vert/Hort  | Average  |
|                    |                      |                        |                   |                |            |          |
| 4622.500           | < 54.0               | 54.0                   | 74.0              | > 20.0         | Vert/Hort  | Peak     |
| 4622.500           | < 41.0               | 41.0                   | 54.0              | > 13.0         | Vert/Hort  | Average  |
|                    |                      |                        |                   |                |            |          |
| 5547.000           | 57.0                 | 64.1                   | 84.8              | > 20.7         | Horizontal | Peak     |
|                    |                      |                        |                   |                |            |          |
| 6471.500           | < 60.0               | 60.0                   | 84.8              | > 24.8         | Vert/Hort  | Peak     |
|                    |                      |                        |                   |                |            |          |
| 7396.000           | < 54.0               | 54.0                   | 74.0              | > 20.0         | Vert/Hort  | Peak     |
| 7396.000           | < 41.0               | 41.0                   | 54.0              | > 13.0         | Vert/Hort  | Average  |
|                    |                      |                        |                   |                |            |          |
| 8320.500           | < 55.0               | 55.0                   | 74.0              | > 19.0         | Vert/Hort  | Peak     |
| 8320.500           | < 42.0               | 42.0                   | 54.0              | > 12.0         | Vert/Hort  | Average  |
|                    |                      |                        |                   |                |            |          |
| 9245.000           | < 56.0               | 56.0                   | 74.0              | > 18.0         | Vert/Hort  | Peak     |
| 9245.000           | < 43.0               | 43.0                   | 54.0              | > 11.0         | Vert/Hort  | Average  |

No other spurious emissions were observed except for the harmonic emissions observed above.

## Section 15.247(e) – Power Spectral Density

As the device does not have an antenna port the Power Spectral Density was determined using radiated emission measurements that were made at the test site as detailed below

| Frequency (MHz) | Level (dB $\mu$ V/m) | Level (dBm) | Limit (dBm) | Antenna    | Margin (dB) |
|-----------------|----------------------|-------------|-------------|------------|-------------|
| 924.6411        | 94.4                 | -0.8        | 8.0         | Vertical   | 8.8         |
| 924.6430        | 97.3                 | 2.1         | 8.0         | Horizontal | 5.9         |

Measurements were made in the Z plane as this plane gave the highest peak output power.

Measurements were made using a test distance of 3 metres using a spectrum analyser in peak hold with a 3 kHz bandwidth.

The radiated power level in dBm was determined by formula from the field strength using the formula Field strength (V/m) = (square root of (30 x transmitter power (watts))) / distance (metres)

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Orere Point, Auckland.

**Result:** Complies.

**Measurement Uncertainty:**  $\pm 4.1$  dB

## **Section 15.247(i) – Radio Frequency Hazard Information**

As per Section 15.247 (i) spread spectrum transmitters operating in the 900 – 928 MHz band are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

In accordance with Section 1.1310 this device would be classed as a portable device and therefore Section 2.1093 will apply.

Section 2.1093 requires SAR measurements to be carried out as the device is portable.

A SAR evaluation has been carried out in accordance with KDB Publication 447498 D01 General RF Exposure Guidance v05r02 dated February 7, 2014.

Clause 4.3.1 1 has been applied to this device as the power output is very low.

A worst case scenario has been applied to this device with the application of the 1-g SAR limits even though the device will most likely be held in the hand where the 10-g SAR limits could be applied.

At 924.500 MHz the transmitter continuous peak output power was determined to be +9.6 dBm or 9.1 mW EIRP

The highest frequency in use is 924.5 MHz or 0.9245 GHz.

A 5 mm safe distance has been applied

The 1-g SAR safe distance was calculated as follows:

$$1\text{-g SAR} = (P \text{ (mW)} / x \text{ (mm)}) * (\sqrt{f \text{ (GHz)}})$$

$$1\text{-g SAR} = (31 \text{ mW} / 5 \text{ mm}) * \sqrt{0.9245 \text{ GHz}} = 1.8$$

The 1-g SAR threshold level, for distances < 50 mm, is  $\leq 3.0$ .

The device will therefore meet the requirements of Section 2.1093 without any further testing by falling below the 1-g SAR threshold level.

**Result:** Complies.

## 7. TEST EQUIPMENT USED

| Instrument        | Manufacturer    | Model      | Serial No  | Asset Ref | Cal Due      | Interval |
|-------------------|-----------------|------------|------------|-----------|--------------|----------|
| Aerial Controller | EMCO            | 1090       | 9112-1062  | RFS 3710  | Not applic   | -        |
| Aerial Mast       | EMCO            | 1070-1     | 9203-1661  | RFS 3708  | Not applic   | -        |
| Biconical Antenna | Schwarzbeck     | BBA 9106   | -          | RFS 3612  | 7 Feb 2015   | 1 year   |
| Horn Antenna      | EMCO            | 3115       | 9511-4629  | E1526     | 14 June 2017 | 3 year   |
| Horn Antenna      | EMCO            | 3116       | 92035      | -         | 10 May 2016  | 3 year   |
| Log Periodic      | Schwarzbeck     | VUSLP 9111 | 9111-228   | 3785      | 7 Feb 2015   | 1 year   |
| Receiver          | R & S           | ESIB 40    | 100171     | R-27-1    | 29 Jan 2015  | 1 year   |
| Spectrum Analyser | Hewlett Packard | E7405A     | US39150142 | 3771      | 7 July 2015  | 1 year   |
| Turntable         | EMCO            | 1080-1-2.1 | 9109-1578  | RFS 3709  | Not applic   | -        |
| VHF Balun         | Schwarzbeck     | VHA 9103   | -          | RFS 3603  | 7 Feb 2015   | 1 year   |
| Loop Antenna      | EMCO            | 6502       | 9003-2485  | 3798      | 14 Jul 2017  | 3 year   |

At the time of testing all test equipment was within calibration

## 8. 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 last updated in June 2014.

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.

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.

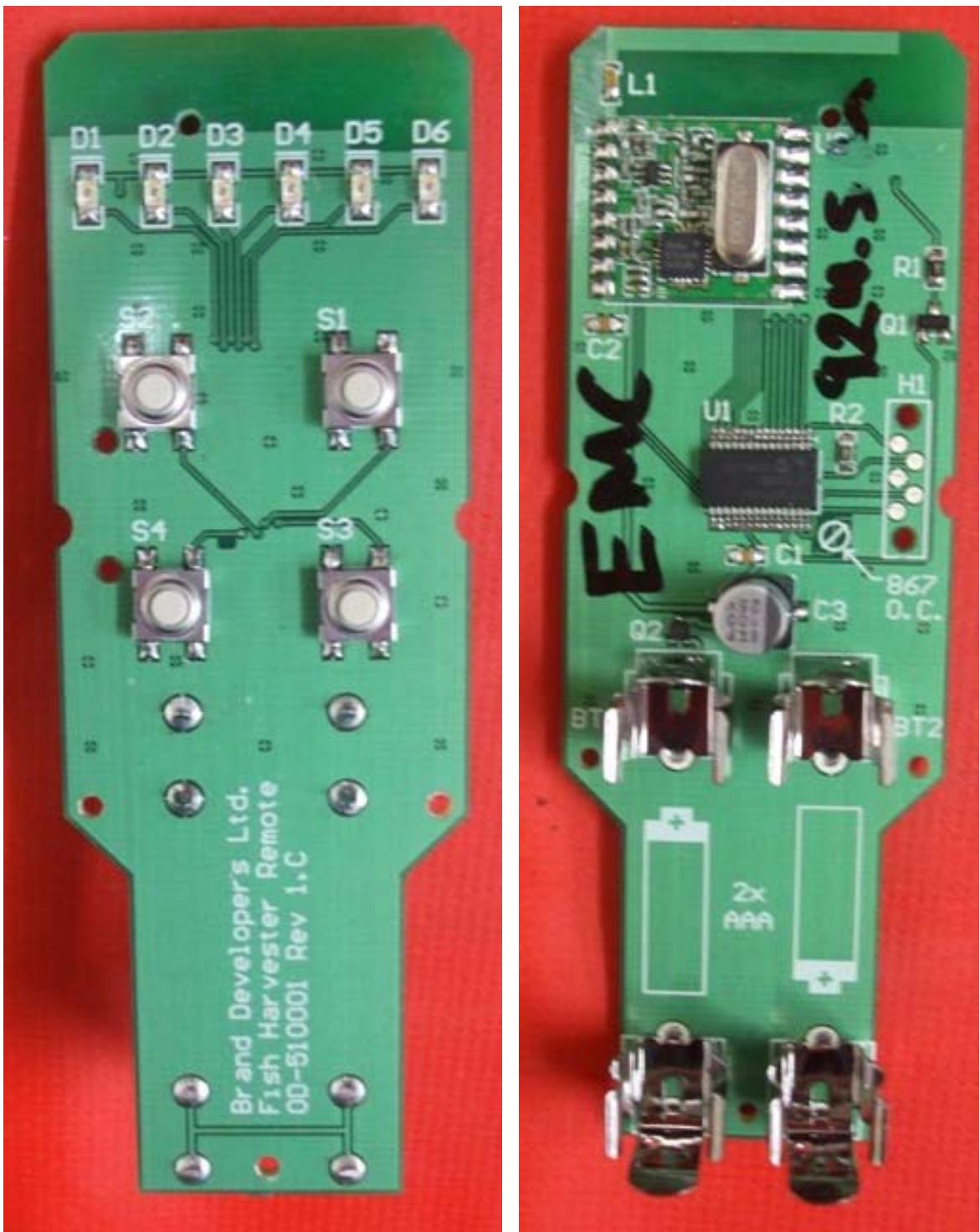
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied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

## 9. PHOTOGRAPHS

### External Photos

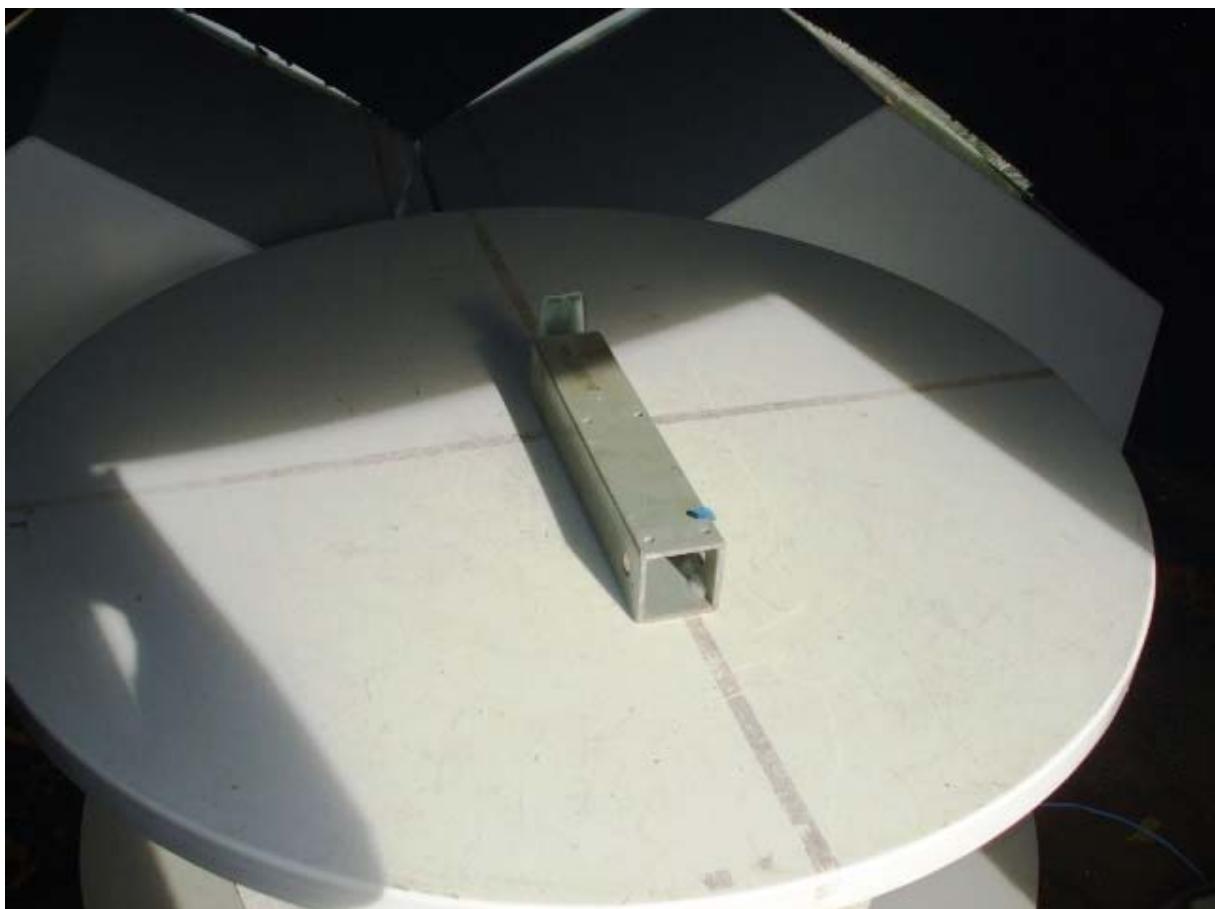
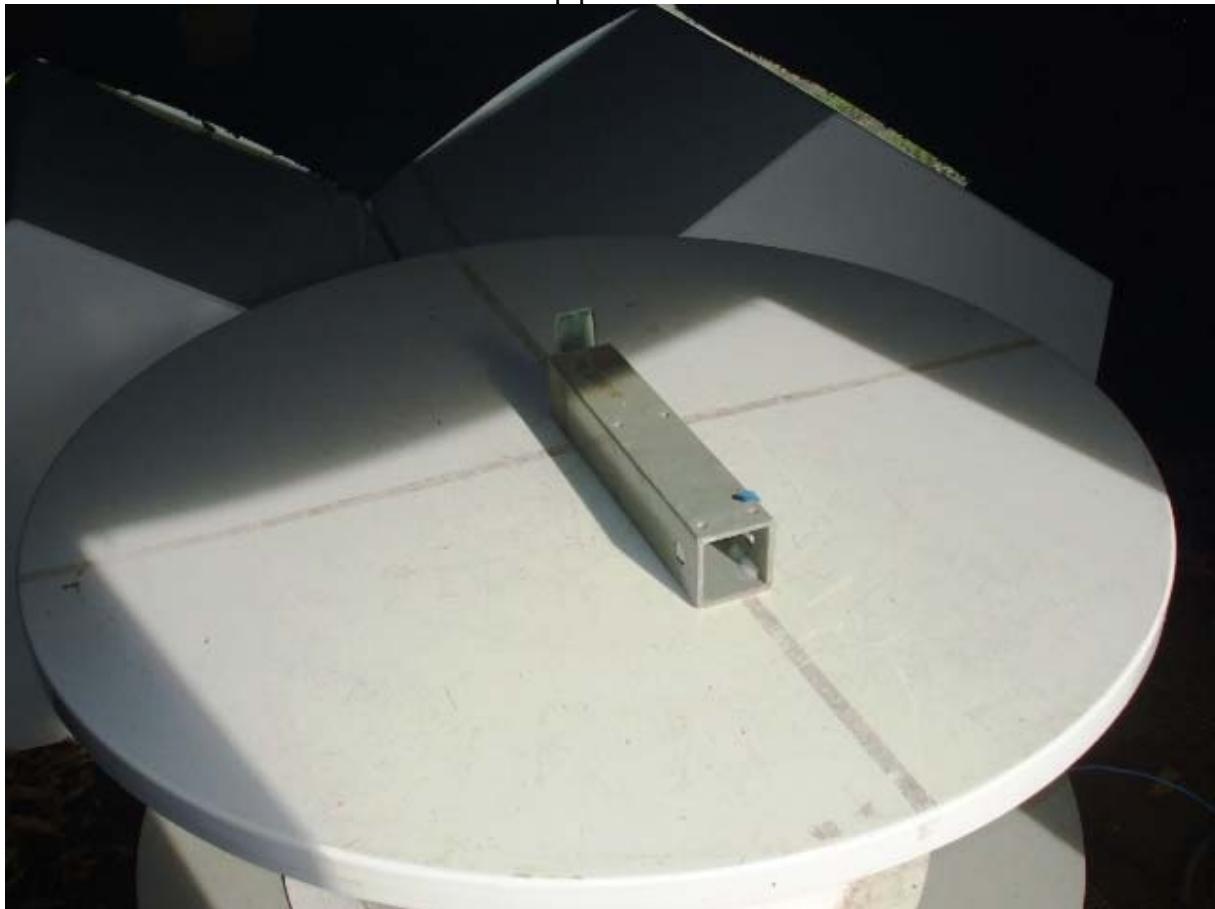


Internal Photos



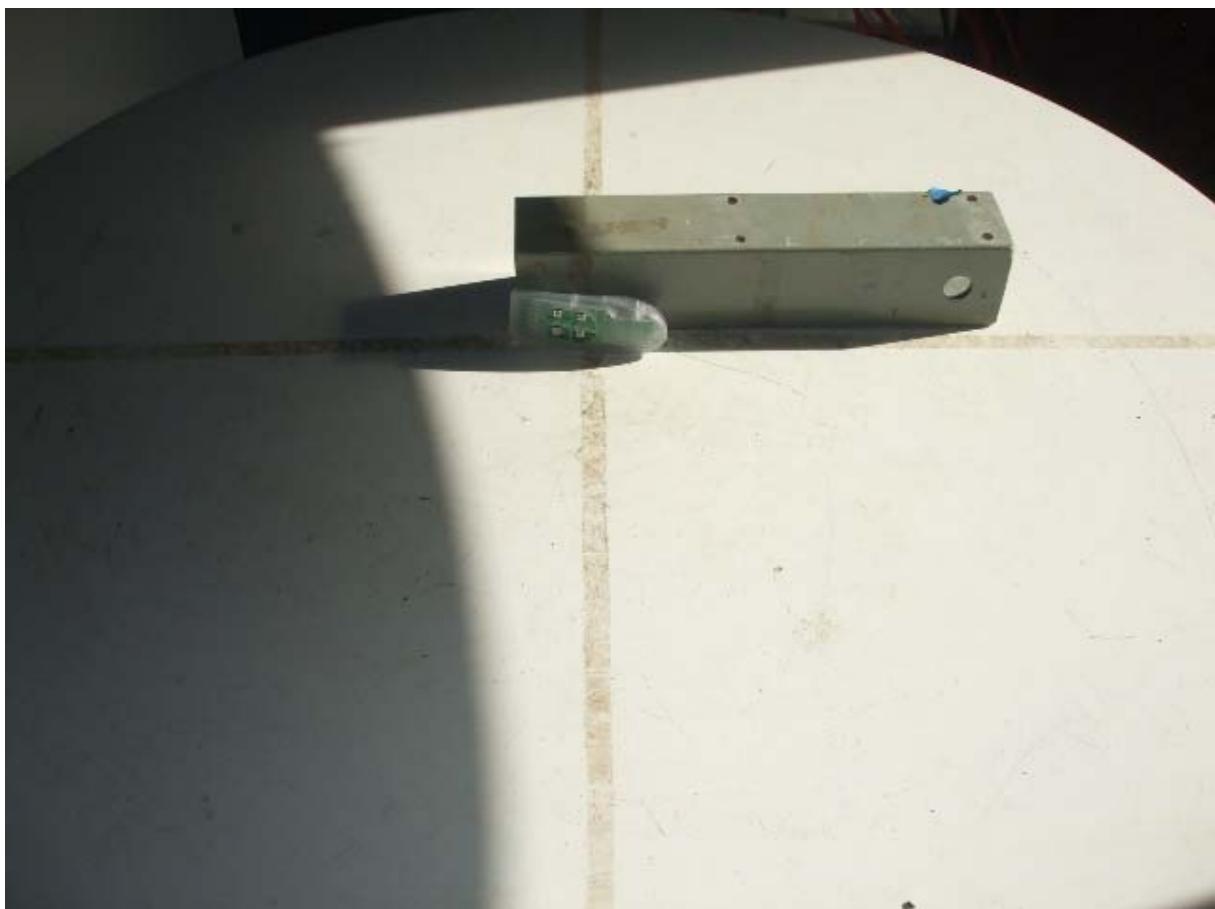
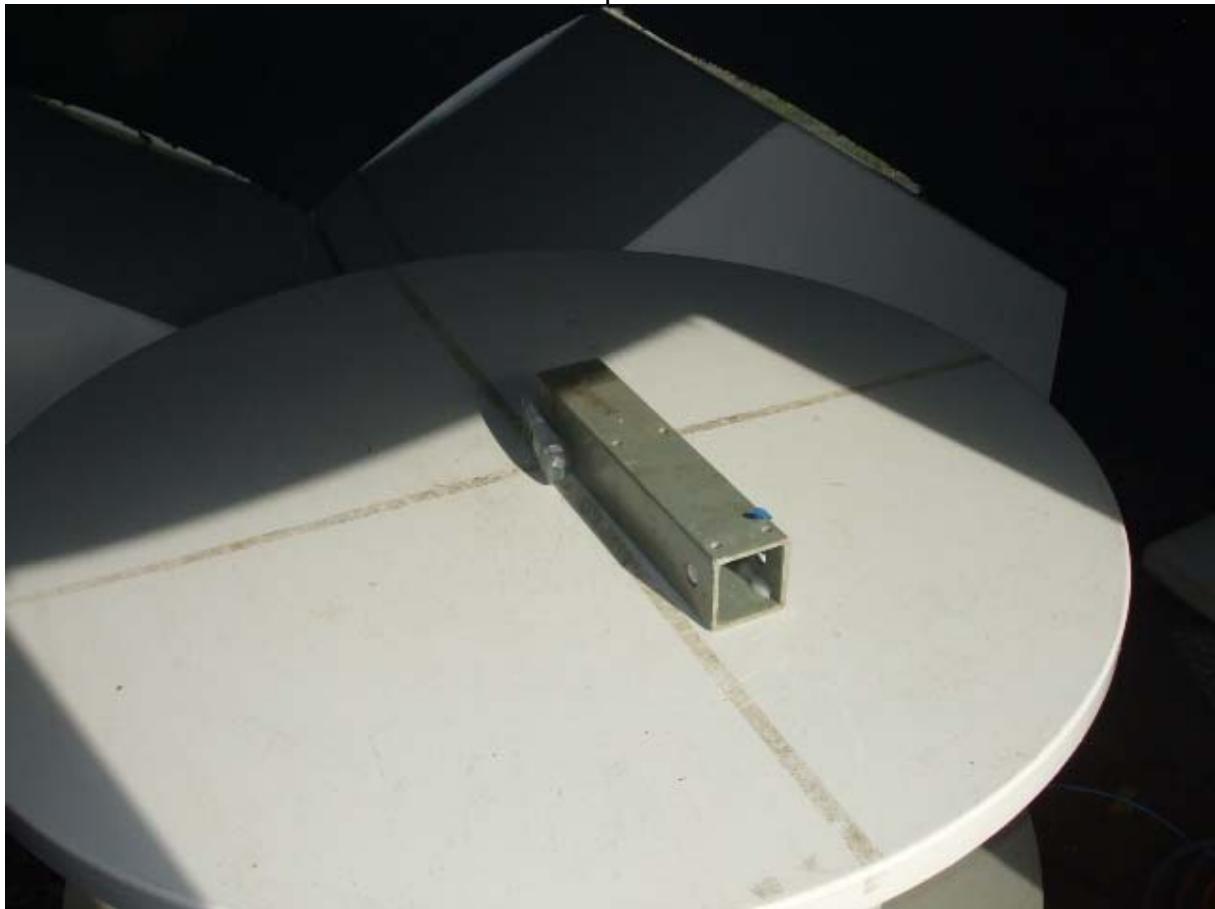


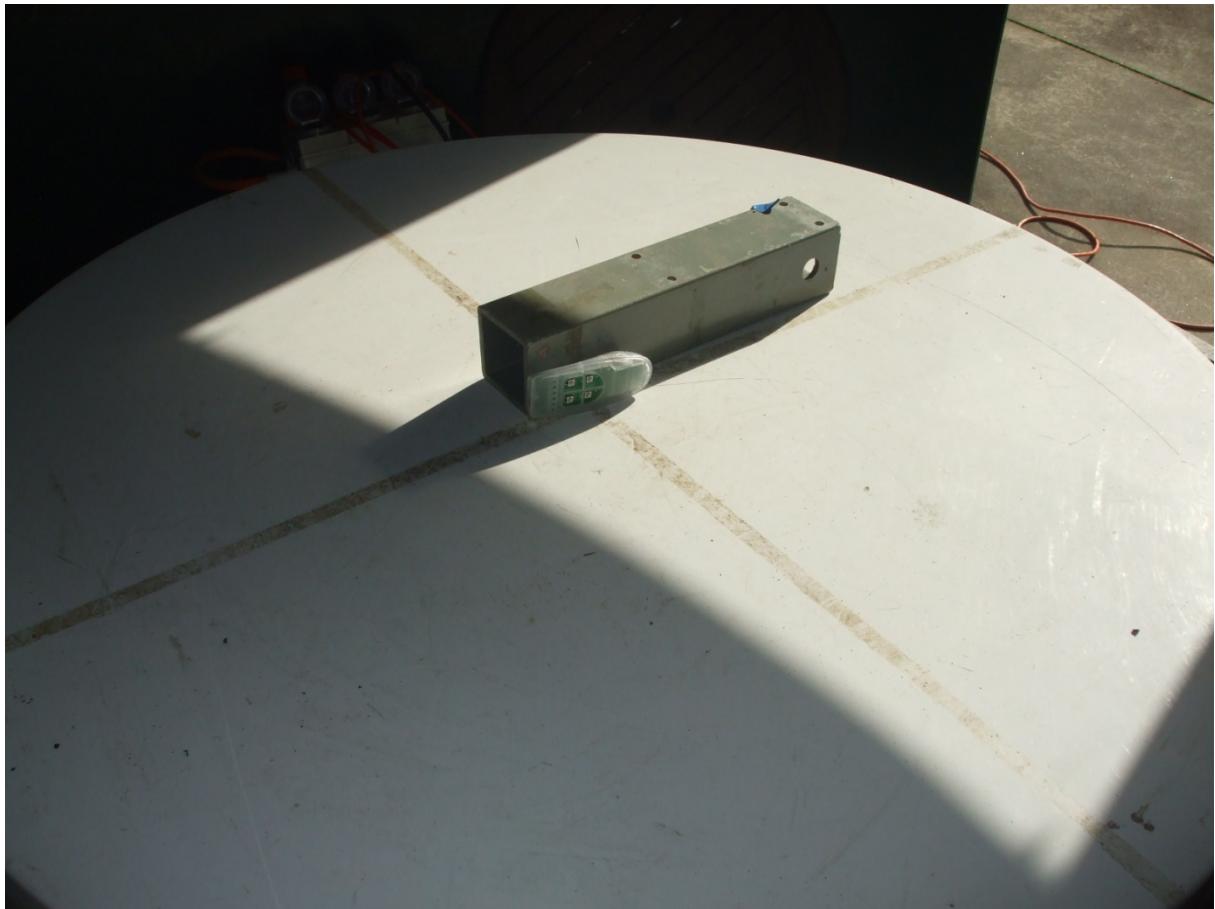
Test set up photos: X Plane



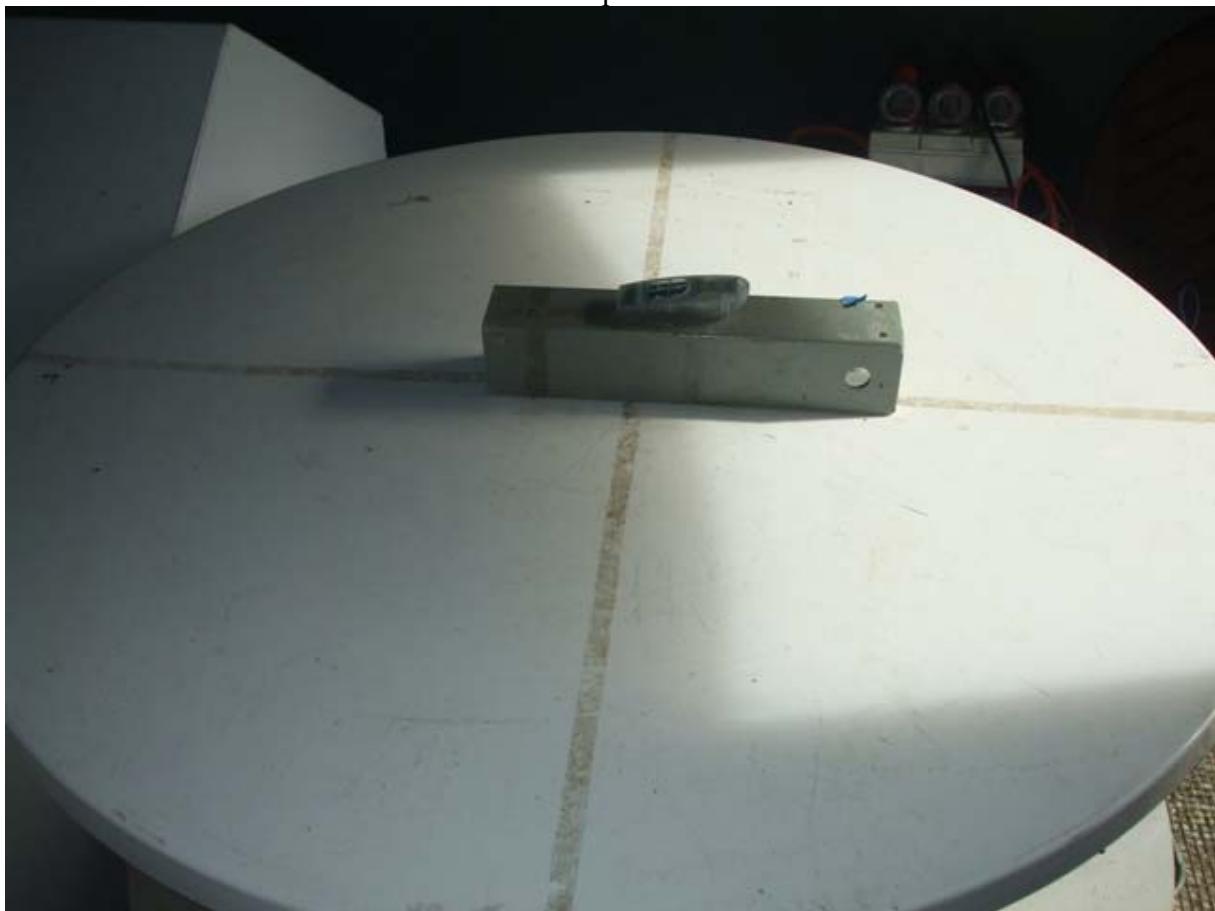


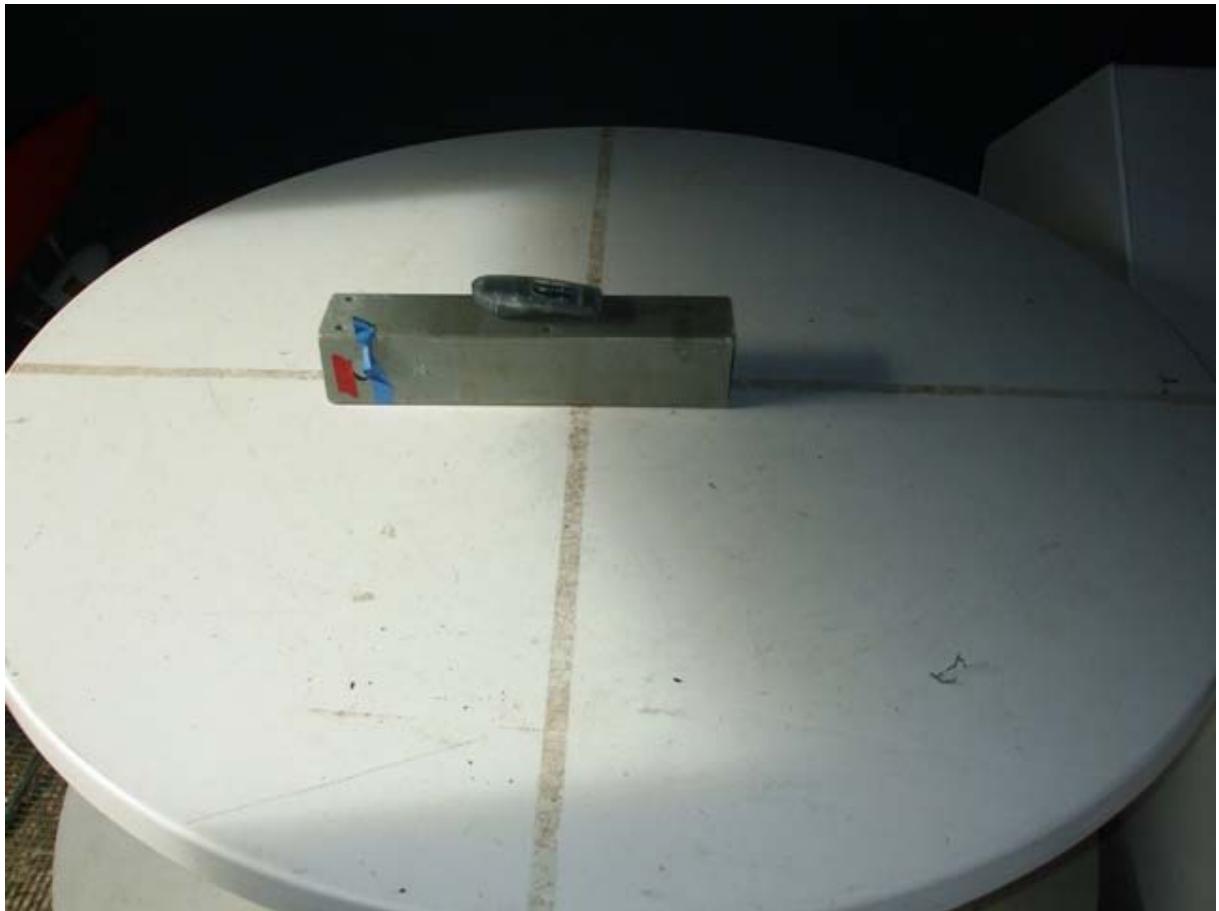
Test Set Up - Z Plane





Test Set Up - Y Plane





Radiated emissions test set up photos – Below 30 MHz



Radiated emissions test set up photos – Above 30 MHz

