# EMC Technologies (NZ) Ltd

Test Report No **50822.1 FCC**
Report date: 30 August 2005

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# TEST REPORT

## Lomak LO1 Keyboard and Mouse Emulator including Head Pointer and Hand Pointer with Internal Battery Chargers

*tested to*

## 47 Code of Federal Regulations

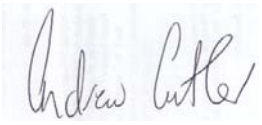
## Part 15 - Radio Frequency Devices

## Subparts A + B

*for*

## Lomak International Ltd

This Test Report is issued with the authority of:



**Andrew Cutler - General Manager**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## 1. STATEMENT OF COMPLIANCE

The **Lomak LO1 Keyboard and Mouse Emulator including Head Pointer and Hand Pointer with Internal Battery Chargers** comply with FCC Part 15 Subparts A and B - as Class B devices when the methods, as described in ANSI C63.4 - 2003, are applied.

## 2. RESULTS SUMMARY

The results from testing are summarised in the following table:

| Parameter | Result |
|---|---|
| Conducted emissions<br>0.15 - 30 MHz | Complies with a margin of 9.86 dB at 0.677500 MHz (Average). |
| Radiated Emissions<br>30 - 1000 MHz | Complies with a margin of 5.1 dB at 400.600 MHz (Vertical). |

## 3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

**The client selected the test sample.**

**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** | Lomak International Ltd |
| **Address** | PO Box 137 341<br>Parnell |
| **City** | Auckland |
| **Country** | New Zealand |
| **Contact** | Mr Chris Mulcare |

# 5. DESCRIPTION OF TEST SAMPLE

| | |
|---|---|
| **Brand Name** | Lomak |
| **Model Number** | LO1 |
| **Product** | Keyboard and Mouse Emulator |
| **Manufacturer** | Tru-Test Limited |
| **Country of Origin** | New Zealand |
| **Serial Number** | 150805-152H1-K24 |

Also included, and tested, with this system were:

- Lomak head pointer with internal battery charger
- Lomak hand pointer with internal battery charger

# 6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with FCC Part 15 Subparts A and B as a Class B computing device peripheral.

Methods and Procedures

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

## 6.1 Conducted emissions test set up

Conducted emission testing was carried out over the frequency range of 150 kHz to 30 MHz.

Testing for conducted emissions was carried out at the laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room.

The device was placed 0.8 m away from the artificial mains terminal network on the emissions test table which is 1 m x 1.5 m, and is 0.8 m above the screened room floor which acts as the horizontal ground plane and is 0.4 m away from the screened room wall which acts as the vertical ground plane.

Testing was carried out while the laser pointers were being charged.

The client states that they will not be supplying AC plug packs with the devices so testing has been carried out using representative 110 Vac power supplies.

Testing was carried out on the laptop power supply when the keyboard was attached.

Measurement uncertainty with a confidence interval of 95% is:
- Conducted emission tests (0.15 - 30 MHz) ± 2.2 dB

## 6.2 Radiated Emissions Test Set-up

Radiated emissions testing was carried out over the frequency range of 30.0 to 1000 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand (Note: Site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 1992).

The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made with the antenna located at a 3 m horizontal distance from the boundary of the device under test.

Testing was carried out in the various modes in which the device operated. Any external cables were orientated for the worst-case emissions level.

Testing was carried out by manually scanning between 30 MHz and 1000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

Between 30-1000 MHz a Quasi Peak detector was used with a bandwidth of 120 kHz.

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

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

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

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

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (30 - 1000 MHz) ± 4.1 dB

# 7. TEST EQUIPMENT USED

| Instrument | Manufacturer | Model | Serial No | Asset Ref |
|---|---|---|---|---|
| Aerial Controller | EMCO | 1090 | 9112-1062 | RFS 3710 |
| Aerial Mast | EMCO | 1070-1 | 9203-1661 | RFS 3708 |
| Artificial Mains Network | EMCO | 3825/2 | - | 3774 |
| Biconical Antenna | Schwarzbeck | BBA 9106 | - | RFS 3612 |
| Log Periodic Antenna | Schwarzbeck | VUSLP 9111 | 9111-228 | 3785 |
| Measurement Receiver | Rohde & Schwarz | ESHS 10 | 828404/005 | RFS 3728 |
| Measurement Receiver | Rohde & Schwarz | ESCS 30 | 847124/020 | E1595 |
| Software | Rohde & Schwarz | ESKI 140 | - | - |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 |
| VHF Balun Antenna | Schwarzbeck | VHA 9103 | - | RFS 3603 |

# 8. 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 17th, 2004.

The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

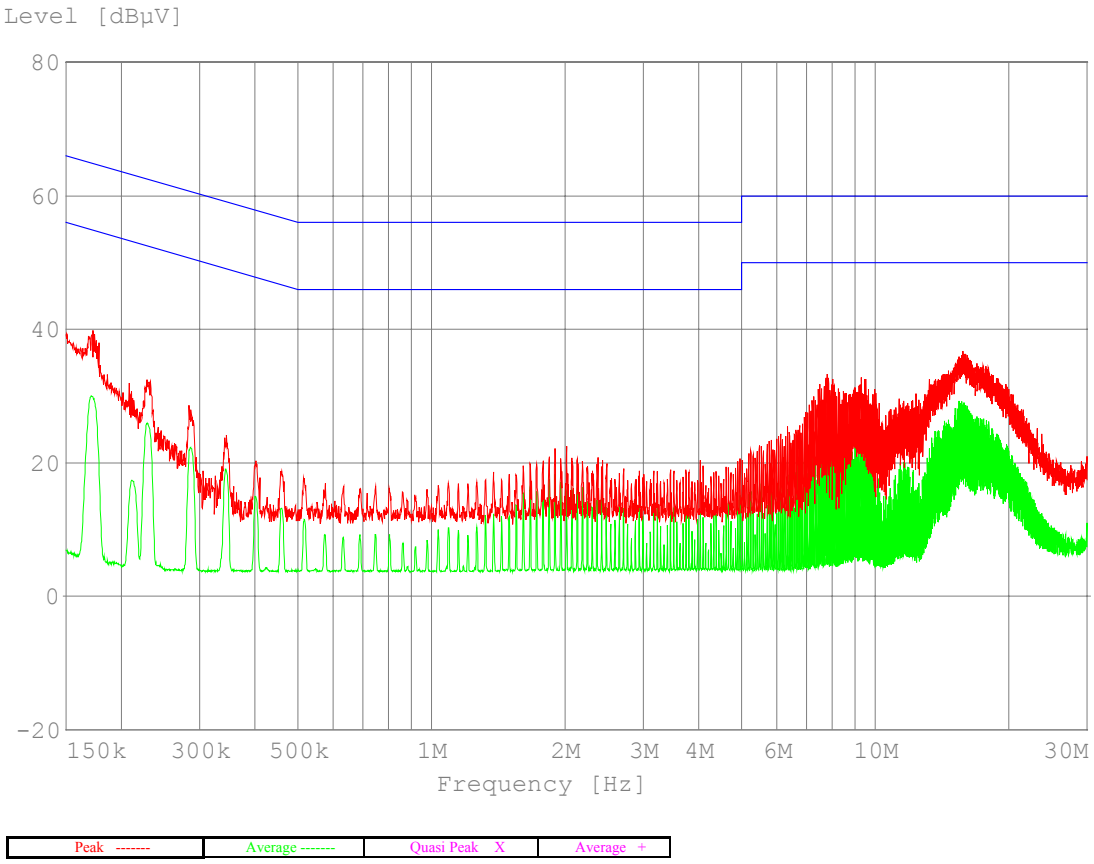
All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

## 8. RESULTS

**Conducted emissions**

| | |
|---|---|
| **Comments:** | Device tested when attached to a laptop computer that was powered at 110 Vac. |




Quasi-Peak Measurements

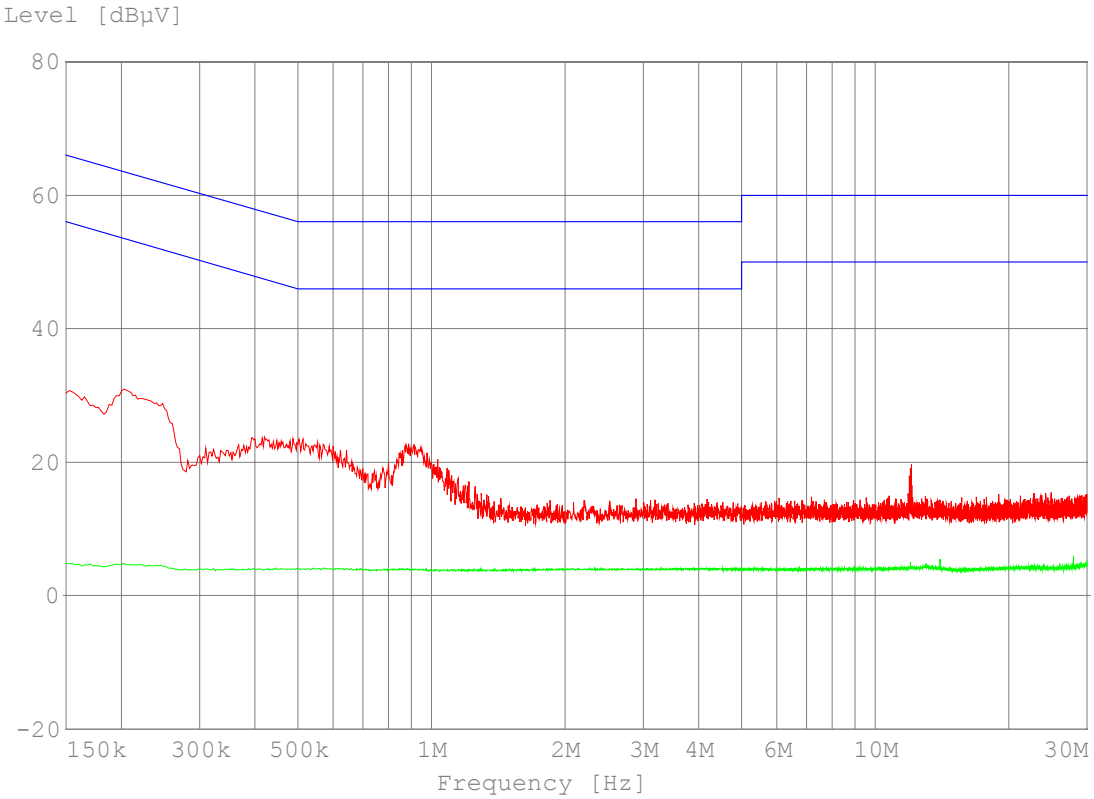
| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Exceed | Phase | Rechecks dBµV |
|---|---|---|---|---|---|---|
| No measurements made | | | | | | |

Average Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Exceed | Phase | Rechecks dBµV |
|---|---|---|---|---|---|---|
| No measurements made | | | | | | |

## Conducted emissions

| | |
|---|---|
| **Comments:** | Test carried out using a representative 110 Vac – 6 Vdc / 300mA charger attached to the hand laser pointer. |




| Peak ------- | Average ------- | Quasi Peak X | Average + |
|---|---|---|---|

Quasi-Peak Measurements

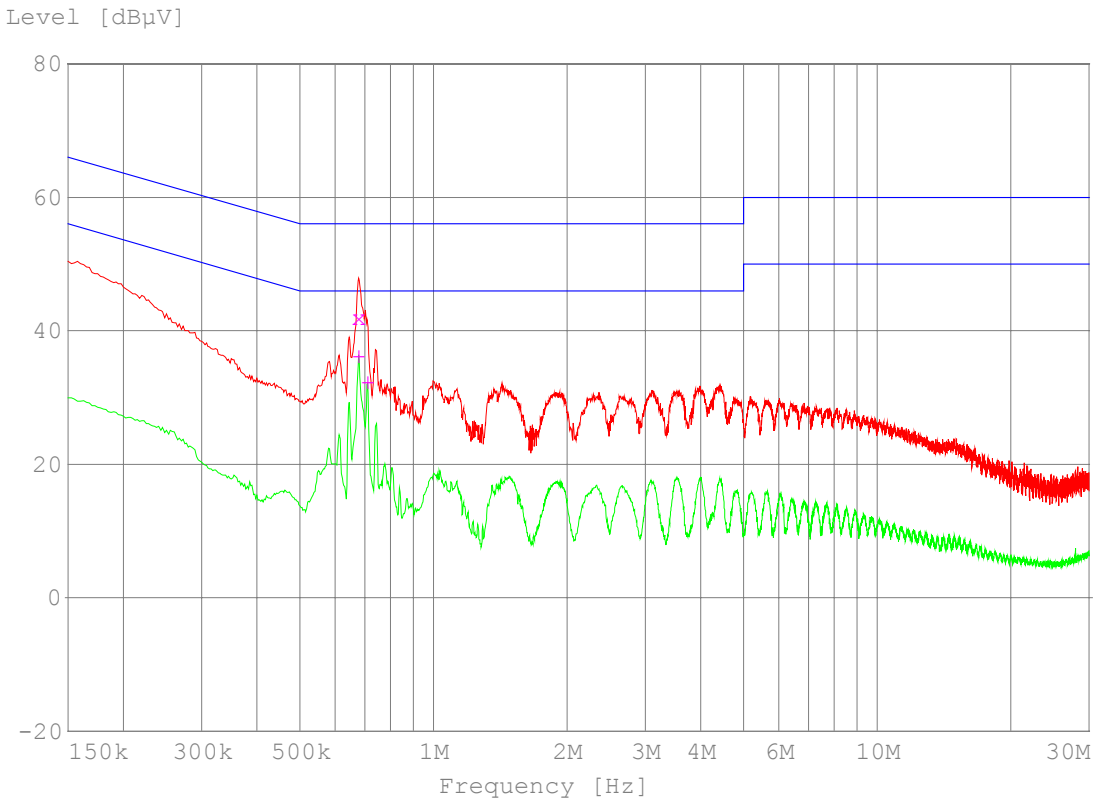
| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Exceed | Phase | Rechecks dBµV |
|---|---|---|---|---|---|---|
| No results recorded | | | | | | |

Average Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Exceed | Phase | Rechecks dBµV |
|---|---|---|---|---|---|---|
| No results recorded | | | | | | |

## Conducted emissions

| | |
|---|---|
| **Comments:** | Test carried out at using a representative 110 Vac – 9 Vdc / 180 mA AC adaptor powering the LOMAK laser head set pointer. |




Quasi-Peak Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Exceed | Phase | Rechecks dBµV |
|---|---|---|---|---|---|---|
| 0.677500 | 42.04 | 56.00 | 13.96 | | N | |

Average Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Exceed | Phase | Rechecks dBµV |
|---|---|---|---|---|---|---|
| 0.677500 | 36.14 | 46.00 | 9.86 | | L1 | |
| 0.710000 | 32.20 | 46.00 | 13.80 | | L1 | |

**Radiated Emissions**

| Frequency | Level Vertical | Horizontal | Recheck | Limit | Margin | Result | Worst Case Antenna |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dBuV/m | dBuV/m | dBuV/m | dB | | |
| Mode : | Unit was placed in the centre of the test table powered using a USB port on a laptop computer. Computer was located on the ground 5 metres From the test table using a length of data cable. | | | | | | |
| 33.400 | 30.2 | | | 40.0 | 9.8 | Pass | Vertical |
| 121.000 | 29.0 | | | 43.5 | 14.5 | Pass | Vertical |
| 128.800 | 27.3 | | | 43.5 | 16.2 | Pass | Vertical |
| 133.000 | 34.8 | | | 43.5 | 8.7 | Pass | Vertical |
| 137.700 | | 30.8 | | 43.5 | 12.7 | Pass | Horizontal |
| 145.600 | 27.8 | | | 43.5 | 15.7 | Pass | Vertical |
| 151.100 | 30.1 | | | 43.5 | 13.4 | Pass | Vertical |
| 167.000 | | 32.8 | | 43.5 | 10.7 | Pass | Horizontal |
| 167.100 | 37.4 | | | 43.5 | 6.1 | Pass | Vertical |
| 169.300 | 31.3 | | | 43.5 | 12.2 | Pass | Vertical |
| 187.200 | 27.6 | | | 43.5 | 15.9 | Pass | Vertical |
| 199.600 | 32.6 | | | 43.5 | 10.9 | Pass | Vertical |
| 200.600 | 30.2 | | | 43.5 | 13.3 | Pass | Vertical |
| 220.400 | 28.3 | | | 46.0 | 17.7 | Pass | Vertical |
| 225.800 | 26.4 | | | 46.0 | 19.6 | Pass | Vertical |
| 233.600 | 31.1 | | | 46.0 | 14.9 | Pass | Vertical |
| 233.800 | 31.9 | | | 46.0 | 14.1 | Pass | Vertical |
| 234.000 | 31.2 | | | 46.0 | 14.8 | Pass | Vertical |
| 236.900 | 28.3 | | | 46.0 | 17.7 | Pass | Vertical |
| 240.050 | 29.5 | | | 46.0 | 16.5 | Pass | Vertical |
| 241.550 | 27.1 | | | 46.0 | 18.9 | Pass | Vertical |
| 244.100 | 29.5 | 31.2 | | 46.0 | 14.8 | Pass | Horizontal |
| 249.650 | 28.0 | | | 46.0 | 18.0 | Pass | Vertical |
| 261.650 | | 34.4 | | 46.0 | 11.6 | Pass | Horizontal |
| 264.800 | 29.7 | | | 46.0 | 16.3 | Pass | Vertical |
| 267.350 | | 33.1 | | 46.0 | 12.9 | Pass | Horizontal |
| 269.400 | 29.1 | | | 46.0 | 16.9 | Pass | Vertical |
| 294.200 | 27.3 | | | 46.0 | 18.7 | Pass | Vertical |
| 299.150 | 31.6 | | | 46.0 | 14.4 | Pass | Vertical |

**Radiated Emissions Continued**

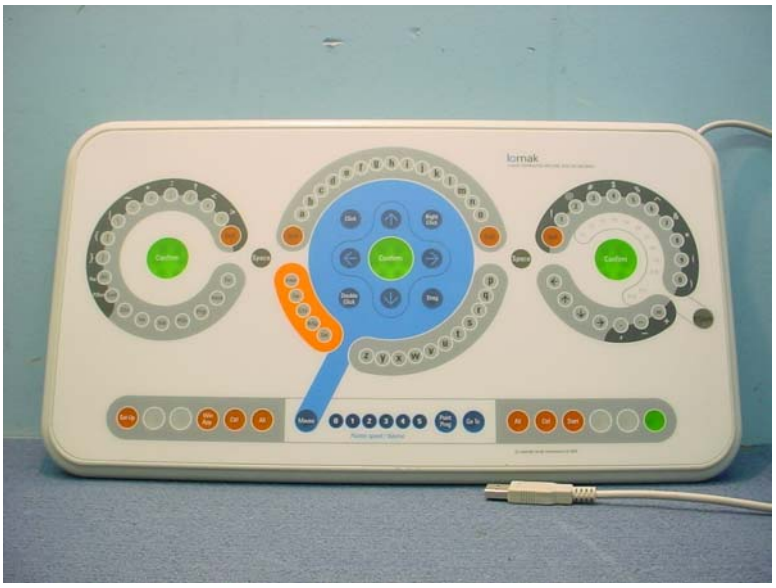
| Frequency | Level Vertical | Horizontal | Recheck | Limit | Margin | Result | Worst Case Antenna |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dBuV/m | dBuV/m | dBuV/m | dB | | |
| 300.000 | 34.3 | | | 46.0 | 11.7 | Pass | Vertical |
| 334.200 | 35.6 | 32.8 | | 46.0 | 10.4 | Pass | Vertical |
| 367.600 | 36.2 | | | 46.0 | 9.8 | Pass | Vertical |
| 400.600 | 40.9 | | | 46.0 | 5.1 | Pass | Vertical |
| 415.200 | 31.2 | | | 46.0 | 14.8 | Pass | Vertical |
| 432.000 | 34.1 | | | 46.0 | 11.9 | Pass | Vertical |
| 434.400 | | 26.3 | | 46.0 | 19.7 | Pass | Horizontal |
| 467.600 | 36.4 | | | 46.0 | 9.6 | Pass | Vertical |
| 480.000 | 33.3 | | | 46.0 | 12.7 | Pass | Vertical |

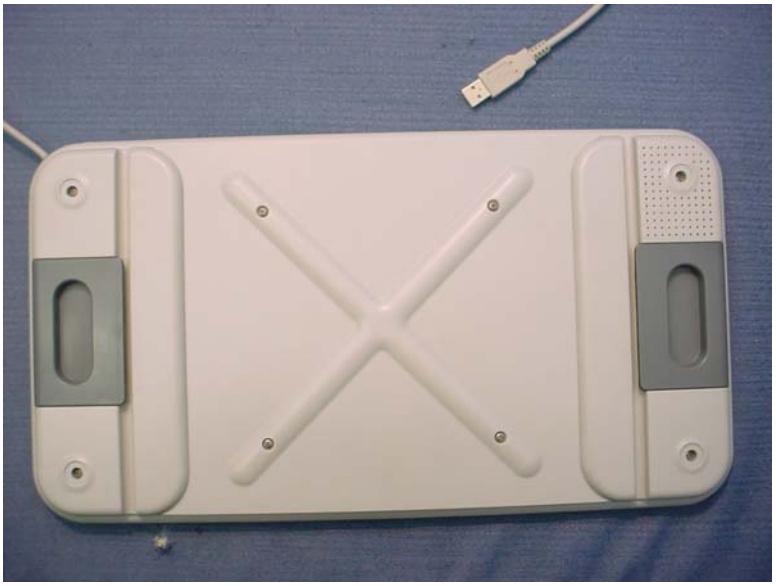
Laser pointer: No emissions detected over the range 30 – 1000 MHz in either vertical or horizontal polarisation

Head pointer: No emissions detected over the range 30 – 1000 MHz in either vertical or horizontal polarisation

# 10. PHOTOGRAPH (S)

Keyboard

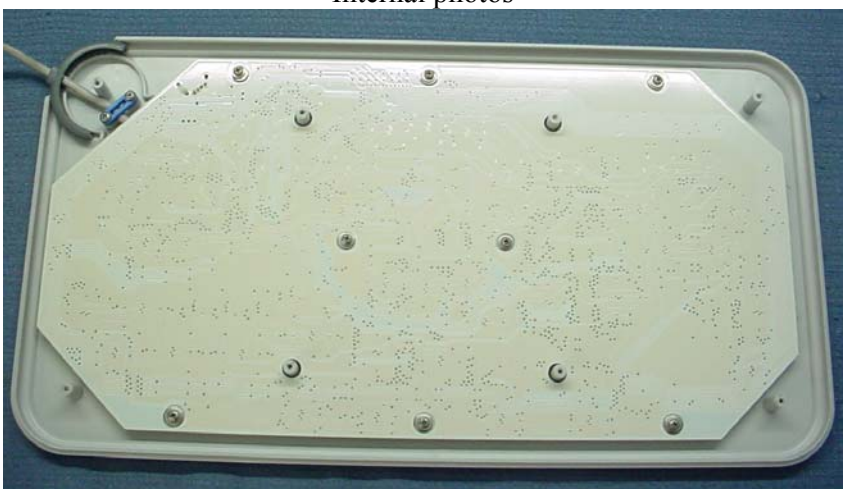


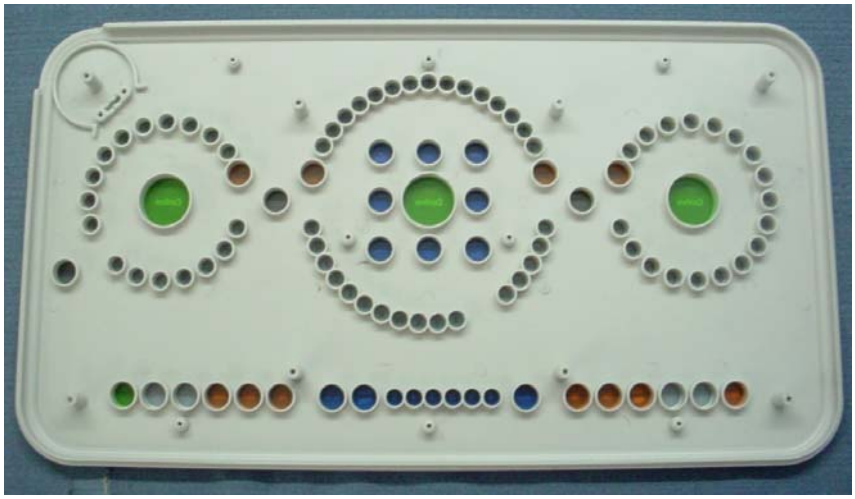


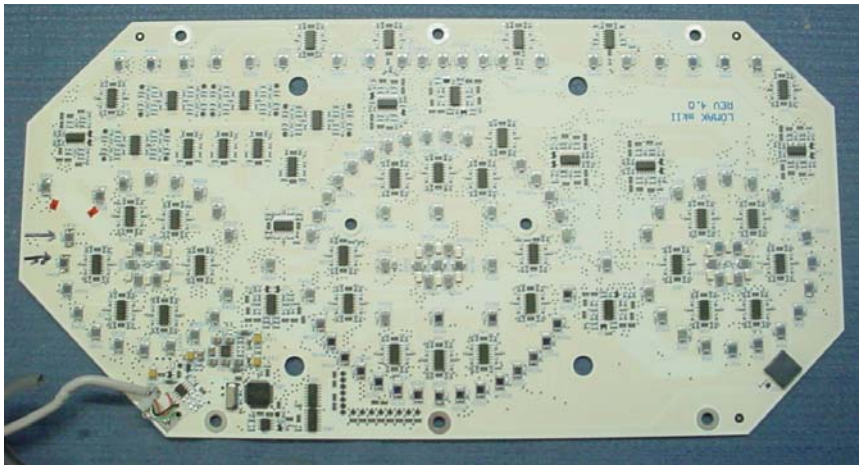
Head laser pointer

Hand laser pointer

Internal photos

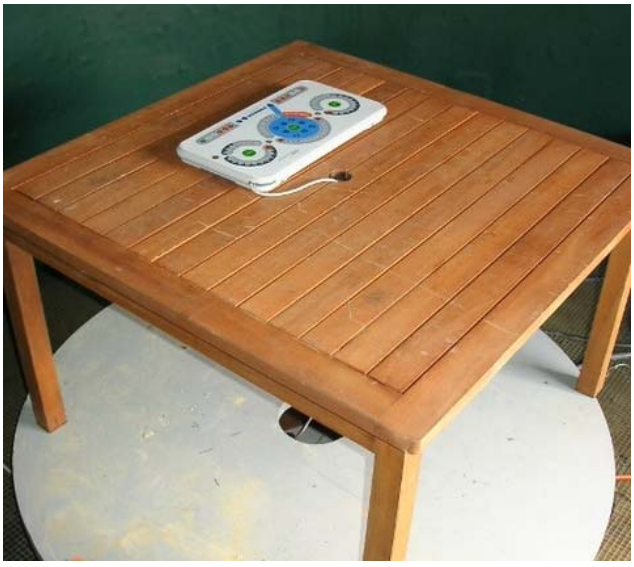






Conducted emissions test set up

Radiated emissions test set up



Ancillary equipment set up