EMC Test Report

for the

Mineoro

Long Range Metal Detector

Model: FG80

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Project Engineer: J. A. Jones

Approval Signatory

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1.0 OVERVIEW

1.1 Introduction

The Equipment Under Test (EUT), as described within this document, was submitted for EMC testing as agreed with the customer.

1.2 Objective

The purpose of the test was to measure and report the EUT against limits and methods of the emissions and immunity standards, as requested for and listed in section **2.0 Test Summary**.

1.3 Product Modifications

None.

1.4 Conclusion

The EUT met the emission and immunity requirements of the tests defined in section **2.0 Test Summary**.

This report relates to the sample tested and may not represent the entire population.

2.0 TEST SUMMARY

2.1 Summary

The EUT was tested to the EN 61326:1997 including amendments A1:1998, A2:2001 & A3:2003† standard for electrical equipment for measurement control and laboratory use.

The EUT was classified as being suitable for **non-continuous operation** and the appropriate immunity performance criteria were applied accordingly from the standard.

The EUT met the test requirements of the following standards:

Type	Description	General Standard	Referenced Standard
Emissions	Radiated disturbance	EN 61326:1997 / A3:2003†	CISPR 22:1997, Class B
Immunity (Annex C)	Electrostatic discharge		EN 61000-4-2:1995
	Radiated RF interference		EN 61000-4-3:1996

The uncertainty budget for each test has been included to support a level of confidence of approximately 95%.

† Amendment A3:2003 to EN 61326 is not currently included in the UKAS Accreditation Schedule for Hursley EMC Services.

2.2 Test Deviations

Not all sections of EN 61326 have been applied.

2.3 EMC Test Lab Reference

Hursley EMC Services file: 06J326.

3.0 EQUIPMENT & TEST DETAILS

3.1 General

EUT:	Long Range Metal Detector Model: FG80 Serial number: 35.003
Sample build:	Production
Manufacturer:	Mineoro Rod. SC434 Cx Postal 01-Arcias dn Paltiocintia 88495.000 Garopotia SC Brazil
Manufacturer contact:	Serhan Capar ☎ 07743350724
Date EUT received:	17th August 2006
Test dates:	17th & 18th August 2006
EMC measurement site(s):	Hursley EMC Services Limited • Unit 16, Brickfield Lane, Chandlers Ford, Hampshire • Hursley Park, Winchester, Hampshire

3.2 EUT Description

The EUT is a machine that is moved over the ground or a surface to discover if there is metal there.

3.3 EUT Test Exerciser

The EUT was switched on to continuously mode.

3.4 EUT Test Configuration

Please refer to section **6.0 Photo Log** for typical test set-up.

3.5 Environmental Test Conditions

Temperature	24º Celsius
Relative Humidity	49%
Atmospheric Pressure	1008 millibars

3.6 EMC Test Equipment

#ID	Manufacturer	Type	Serial Nø	Description	Calibration status
003	Rohde Schwarz	ESH-3	872994/027	Test receiver (9kHz-30MHz)	Calibrated
007	HP	8568B	2729A01016	Spectrum analyser	Calibrated
013	Chase	CB/6121A	1012 yel	Bilog antenna	Internal
132	HP	8447D	2944A07094	30-1000MHz pre-amp	Calibrated
120	Kalmus	7250LC-CE	8672-1	RF Power amp & pulse opt.	Internal
145	Bird	4421/4022	4624/0103	Power meter & probe (145a)	Calibrated
157	Haefely Trench	PESD 3000	H907013	30kV ESD gun	Calibrated

Note: 'Calibrated' means that the instrument is certified with a UKAS or traceable calibration certificate.
'Internal' denotes regular internal calibration against HEMCS procedures.

4.0 EMISSION RESULTS

4.1 Radiated Disturbance

4.1.1 Data

A profile scan was taken at a distance of three metres on eight azimuths of the EUT in both the vertical and horizontal polarities of the antenna in a semi-anechoic chamber.

Using the data obtained from the chamber profile-scan as an engineering guide, the EUT was then transferred onto the turntable in the open area test site. The antenna was positioned at a distance of ten metres from the periphery of the EUT. Radiated emissions were then systematically maximised by revolving the EUT and adjusting the antenna in polarity and height. The highest emissions are presented here.

Emission frequency (MHz)	Antenna polarity	Measured quasi-peak value (dBµV/m)	Class B specified quasi-peak limit (dBµV/m)	Status
No peaks found within 15dB of the limit.				Pass

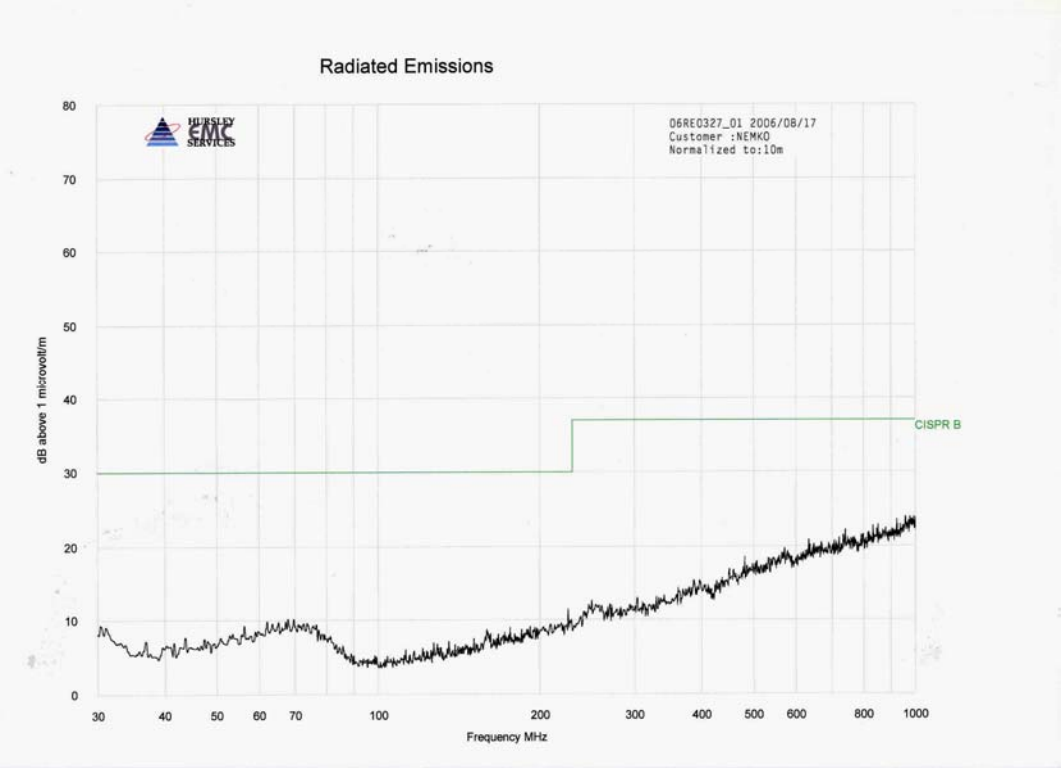
Uncertainty of measurement: +/-3.7dBµV for a 95% confidence level.

The measurements reported are the highest emissions relative to the CISPR 22 Class B limits and take into account the antenna and cable loss factors. Measurements made according to the CISPR 22 test standard and Hursley EMC Services test procedure RAD-01.

TEST ENGINEER: Julian Jones

4.1.2 Profile

Maximum peak hold trace



5.0 IMMUNITY RESULTS

5.1 Performance Criteria

General performance criteria for immunity testing are defined below:-

Criterion A	During testing normal performance within the specification limits. No EUT errors tolerated.
Criterion B	During testing, temporary degradation, or loss of function or performance which is self-recovering. EUT error 102 was tolerated under these described circumstances.
Criterion C	During testing, temporary degradation, or loss of function or performance that requires operator intervention or system reset occurs.
Criterion D	Degradation or loss of function, which is not recoverable due to damage to equipment, components, software, or to loss of data.

The test standard (EN 61326:1997) requires the "manufacturer" to produce a 'functional description and a definition of performance criteria' applicable to these EMC tests. The customer has defined "Unacceptable performance criteria" as a loss of function on performance, which requires operator intervention. In the event of an error the exerciser programme stops and the error condition is displayed on the computer monitor.

Other failure conditions are determined by interpretation using the experience of the laboratory EMC engineers.

Monitoring of EUT performance whilst under test

Radiated Immunity: Remote monitoring of the product in the anechoic chamber using a video camera focused on the computer display and a fibre optic linked video monitor situated in the control room.

All Other Tests - Visual monitoring of the computer monitor to verify correct function and status.

5.1.1 Electrostatic Discharge

TEST METHOD	EN 61000-4-2 REFERENCING PROCEDURE: ESD-03

TEST DETAILS

Test severity, <u>contact discharge</u>	±4 kV, 10 strikes per point each polarity. Total of 200 strikes (minimum).
Test severity, <u>air discharge</u>	±8 kV, 10 strikes for each selected point
Exerciser program during test	Referencing section 3.3
Specified test criterion	Criterion 'C' (non-continuous operation)
Actual EUT performance	Criterion 'B'

RESULTS

Contact, Indirect

SPECIFIED VOLTS	REFERENCE PLANE @ 10cm	STATUS
± 4.0 kV	Horizontal; front, rear and sides	PASS
	Vertical; front	PASS

Contact, Direct to EUT

SPECIFIED VOLTS	TEST POINTS	STATUS
± 2.0 kV & ± 4.0 kV	• Not applicable	PASS

Air Discharge (Insulating, Slots & Apertures)

SPECIFIED VOLTS	TEST POINTS	STATUS
± 2.0 kV, ± 4.0 kV, ± 6.0 kV & ± 8.0 kV	• LCD and screw heads	PASS

UNCERTAINTY: It has been demonstrated that the ESD simulator met the specified requirements in the standard with at least a 95% confidence.

COMMENT: The EUT beep alarm sounded with each ESD strike but normal operation resumed upon cessation of test disturbance.

TEST ENGINEER: Julian Jones

5.1.2 Radiated RF Interference

TEST METHOD	**EN 61000-4-3** **REFERENCING PROCEDURE: RES-02**

TEST DETAILS

Test severity levels	• **3.0 V/m** • **80% amplitude modulation, 80 to 1000 MHz** • **1% Steps, 3s dwell**
Exerciser program during test	**Referencing section 3.3**
EUT performance criterion	**Criterion 'B' (non-continuous operation)**
Actual EUT performance	**Criterion 'B'**

RESULTS

TEST POINTS	ANTENNA POLARITIES	FIELD LEVEL SWEPT FREQUENCY	STATUS
Front	**Horizontal & vertical**	**3.0 V/m**	**PASS**
Side, left	**Horizontal & vertical**	**3.0 V/m**	**PASS**
Side, right	**Horizontal & vertical**	**3.0 V/m**	**PASS**
Rear	**Horizontal & vertical**	**3.0 V/m**	**PASS**

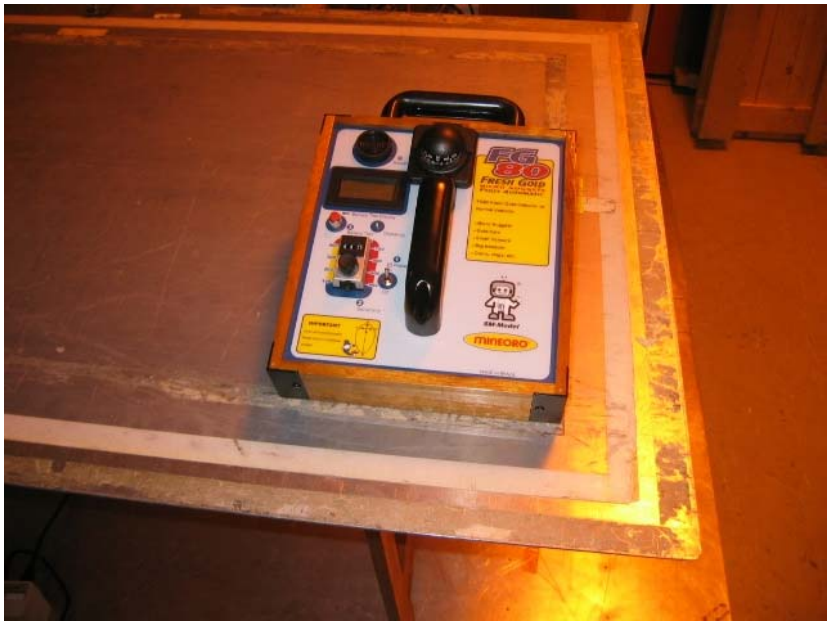
UNCERTAINTY: The test was performed at a higher level for a 95% confidence level. The field level has been applied at level higher than that specified to give a greater confidence that the EUT meets the specified level.

COMMENT: The EUT was extremely sensitive across the range of radiated RF interference but resumed normal operation, i.e. no random beep alarm sound, upon cessation of test.

TEST ENGINEER: Julian Jones

6.0 PHOTO LOG

Typical test set-up for ESD immunity:



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