
REPORT ON THE

FCC Emissions Testing of a Scanmail 10K, Mail Room Security Scanner

Report No BO609144/3

April 2002

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1 Status

OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specifications.
MANUFACTURING DESCRIPTION	Mail Room Security Scanner
MANUFACTURER	DDi Technologies Ltd.
UK AGENT	Scanna MSC Ltd
MANUFACTURERS MODEL NUMBER	Scanmail 10K
EUT SERIAL NUMBER	091238
DRAWING NUMBER	13015
SOFTWARE ISSUE	SCAN V1.3
BUILD STATUS	MK1 UL Approved
TEST SPECIFICATION NUMBER	FCC Part 15, Subpart C; 1999
REGISTRATION NUMBER	BO609144/3
QUANTITY OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Unclassified
INCOMING RELEASE SERIAL NUMBER DATE	Build State Declaration BO609144/1 22 nd January 2002
DISPOSAL REFERENCE NUMBER DATE	Packing Note 51214 7 th March 2002
ORDER NUMBER DATE	1964 11 th January 2002
START OF TEST FINISH OF TEST	17 th January 2002 6 th March 2002
TEST ENGINEERS	R A Bennett
RELATED DOCUMENTS	ANSI C63.4 1988. Methods of Measurements of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 10kHz to 1GHz.

2 Brief Summary Of Results

Table 2 below shows a brief summary of the results obtained.

Specification and Section Number	Test	Modification State	Result
FCC Part 15 Subpart C	Radiated Emissions 9kHz - 1000MHz Enclosure Port	0	Pass
FCC Part 15 Subpart C	Conducted Emissions 0.45MHz to 30MHz	0	Pass

Table 2

3 EUT Modification Chronology

Table 3 below details modifications necessary in order for the EUT to pass the relevant tests applied.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As Supplied by Manufacturer	Not Applicable	Not Applicable

Table 3

4 System Configuration During EMC Testing

The Equipment Under Test (EUT) was functioning correctly during all testing. The EUT was installed within the test area and configured for testing as shown in Figures 1 and 2 for Radiated Emissions, and Figure 3 for Conducted Emissions. During testing, the EUT was operating in its normal scanning mode.

The highest clock frequency generated or used within this product was declared by the client to be 500kHz.

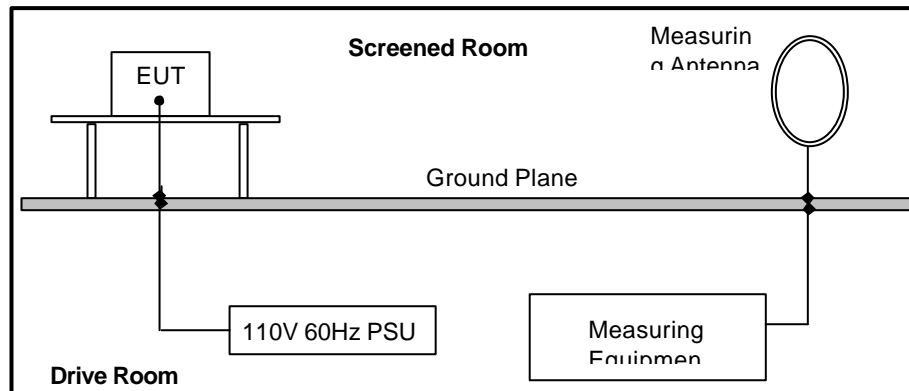


Figure 1: Radiated Emissions – 9kHz to 30MHz

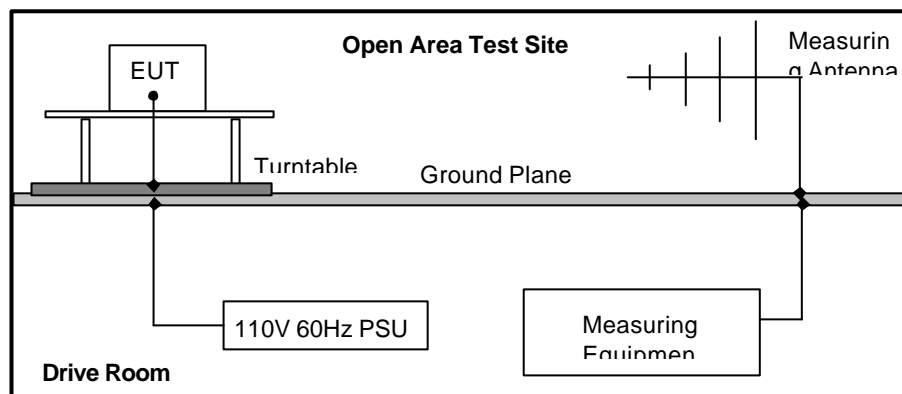


Figure 2: Radiated Emissions – 30MHz to 1000MHz

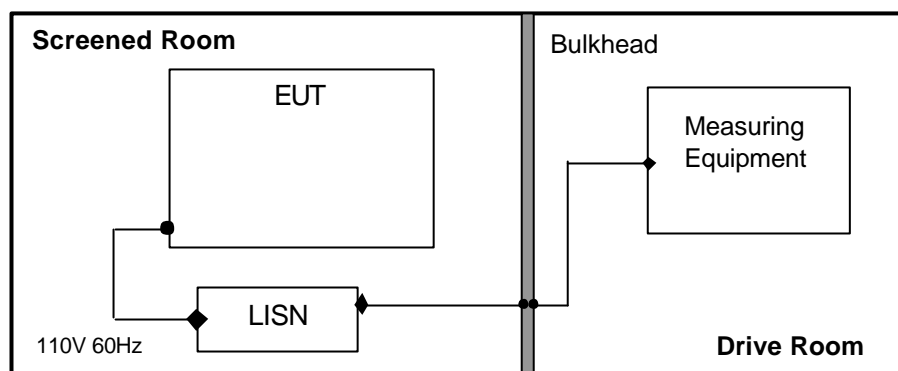


Figure 3: Conducted Emissions

5 Radiated Emissions – 9kHz to 1000MHz

5.1 Enclosure Port, 9kHz to 30MHz - Test Procedure

The EUT was configured for testing as described in section 4 and set up on the Open Field Site. Scans of the EUT profile were taken from 9kHz to 30MHz with the loop antenna positioned 10m from the EUT. However, due to the number and high level of ambient's present on the Open Field Site, the confirmed emission measurements had to be performed in the anechoic chamber.

The confirmed EUT emissions have been measured at 3m and extrapolated to 300m using the extrapolation factor of 40dB/decade as given in FCC Part 15, Subpart A, 15-31(2).

The Radiated emission measurements were made using a Rohde and Schwarz ESH 3 Test Receiver and a Rohde and Schwarz HFH2 - Z2 Loop Antenna.

The climatic conditions recorded at the time of this test were: -

Temperature:- 16.2°C Relative Humidity:- 48.9%rh Atmospheric Pressure:- 990HPa

The test was performed in accordance with FCC Part 15 Subpart C; 1999.

5.2 Enclosure Port, 9kHz to 30MHz - Test Results

Equipment Designation: Intentional Radiator.

The EUT met the Class B requirements of FCC Part 15 Subpart C, Paragraph 15.209 (a) for Radiated Emissions, when configured at modification state 0, for the test applied.

The levels of the highest emissions were measured in accordance with the specification, i.e. emissions from 9kHz to 500kHz were measured using an Average Detector, and from 500kHz to 30MHz using a Quasi-Peak Detector, and these are presented in Table 5.2 below.

Frequency MHz	Level at 3m dBµV/m	Extrapolated to 300m dBµV/m	Margin dB	Limit at 300m dBµV/m
0.1149	78.3	-1.7	22.6	20.9
0.2209	48.1	-31.9	42.8	10.9

Table 5.2

The margin between the specification requirements and all other measured emissions was 42.8dB or more below the specification limit.

Procedure

Test Performed in accordance with ANSI C63.4; 1992.

Performed by



R A Bennett, Senior EMC Engineer.

5.3 Enclosure Port, 30MHz to 1000MHz - Test Procedure

A preliminary profile of the Radiated Disturbances was obtained first by measuring and recording the levels of ambient emissions present on the Open Field Site. The EUT was then placed on the remotely controlled turntable and configured for testing. With the EUT operating, the emissions were re-measured. The measurements were made at a 3-metre distance in both horizontal and vertical polarisation's with the turntable positioned at 0°, 90°, 180° and 270° with respect to the measurement antenna. EUT emissions were identified by comparing the emission profile with the ambient measurements made earlier. This characterisation produced a list of the highest emissions, their approximate bearing and associated antenna polarisation.

The emissions were then formally measured using a Quasi-Peak Detector which met the CISPR requirements. The readings were maximised by adjusting the antenna height, polarisation and turntable azimuth, in accordance with the specification. The details of these highest emissions were then recorded in the Job Logbook.

The Radiated Disturbance measurements were made using a Rohde and Schwarz ESVP Test Receiver.

The confirmed EUT emissions have been measured at 3m.

The climatic conditions recorded at the time of this test were: -

Temperature:- 16.2°C Relative Humidity:- 48.9%rh Atmospheric Pressure:- 990HPa

The test was performed in accordance with FCC Part 15 Subpart C; 1999.

5.4 Enclosure Port, 30MHz to 1000MHz - Test Results

Equipment Designation: Intentional Radiator.

The EUT met the Class B requirements of FCC Part 15 Subpart C Paragraph 15.209 (a) for Radiated Emissions, when configured at modification state 0, for the test applied.

There were no emissions attributable to the EUT detected above the measurement equipment noise floor, which was at least 10dB below the specification limit, and therefore no table of results is presented.

Procedure

Test Performed in accordance with ANSI C63.4; 1992.

Performed by



R A Bennett, Senior EMC Engineer.

6 Conducted Emissions 0.45MHz to 30MHz

6.1 AC Power Port - Test Procedure

All Conducted Emission Measurements were undertaken within the Characterisation Chamber. Conducted Emissions measurements were undertaken on the Live and Neutral Lines.

The emissions were formally measured using a Quasi-Peak Detector which meets the CISPR requirements.

The Conducted Emissions measurements were made using a Rohde & Schwarz ESH-3 Test Receiver and ESH3 - Z5 LISN.

The climatic conditions recorded at the time of this test were: -

Temperature – 18.3°C Relative Humidity – 50.1%rh Atmospheric Pressure - 997HPa

The test was performed in accordance with FCC Part 15 Subpart C; 1999.

6.2 AC Power Port - Test Results

6.2.1 Live Line

Equipment Designation: Intentional Radiator

The EUT met the Class B requirements of FCC Part 15, Subpart C, Paragraph 15.207 (a) for Conducted Emissions on the Live Line, when configured at modification state 0, for the test applied.

A search was made of the frequency spectrum from 0.45MHz to 30MHz. The levels of the six highest emissions were measured in accordance with the specification and these are presented in Table 6.2.1 below.

Frequency MHz	Quasi-Peak Level		Margin dBμV	Specification Limit	
	dBμV	μV		dBμV	μV
22.203	19.6	9.6	28.4	48.0	250.0
22.383	20.0	10.0	28.0	48.0	250.0
22.455	20.3	10.4	27.7	48.0	250.0
22.500	20.0	10.0	28.0	48.0	250.0
22.536	20.3	10.4	27.7	48.0	250.0
22.698	19.7	9.7	28.3	48.0	250.0

Table 6.2.1

The margin between the specification requirements and all other emissions was 28.4dB or more below the specified Quasi-Peak limit, when measured with a Quasi-Peak detector.

Procedure

Test performed in accordance with ANSI C63.4; 1992.

Performed by



R A Bennett, Senior EMC Engineer.

6.2.2 Neutral Line

Equipment Designation: Intentional Radiator

The EUT met the Class B requirements of FCC Part 15, Subpart C, Paragraph 15.207 (a) for Conducted Emissions on the Neutral Line when configured at modification state 0, for the test applied.

A search was made of the frequency spectrum from 0.45MHz to 30MHz. The levels of the six highest emissions were measured in accordance with the specification and these are presented in Table 6.2.2 below.

Frequency MHz	Quasi-Peak Level		Margin dBμV	Specification Limit	
	dBμV	μV		dBμV	μV
22.167	19.6	9.6	28.4	48.0	250.0
22.302	19.9	9.9	28.1	48.0	250.0
22.347	19.9	9.9	28.1	48.0	250.0
22.365	20.3	10.4	27.7	48.0	250.0
22.419	20.0	10.0	28.0	48.0	250.0
22.455	20.0	10.0	28.0	48.0	250.0

Table 6.2.2

The margin between the specification requirements and all other emissions was 28.4dB or more below the specified Quasi-Peak limit, when measured with a Quasi-Peak detector.

Procedure

Test performed in accordance with ANSI C63.4; 1992.

Performed by



R A Bennett, Senior EMC Engineer.

7 Emission Testing Instrumentation

Instrument	Manufacturer	EMC No	Cal Date
Computer	Siemens Nixdorf	PCD-3b	N/A
Test Receiver	Rohde and Schwarz ESVP	1807	26 Jun 02
Test Receiver	Rohde and Schwarz ESH3	2840	26 Nov 02
Spectrum Monitor	Rohde and Schwarz EZM	1811	N/A
LISN	Rohde and Schwarz ESH3-Z5	2568	5 Jun 02
Bilog Antenna	Chase CBL6111B	2451	17 Oct 02
Magnetic Loop Antenna	Rohde and Schwarz HFH2 - Z2	1311	9 Jun 02
Open Area Test Site	Assessment Services OATS 2	2280	24 Nov 02
Thermohydrograph	Rotronic - A1 Hygromer	3801	22 Apr 02
HPA Monitor	Diplex	1932	N/A
Power Supply	California Instruments 60Hz 110 VAC	1251	N/A

8 System Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems, in accordance with the recommendations of NIS 81 Edition 1, May 1994 are: -

For Radiated Emissions Measurements using the ESH3 Test Receiver and Magnetic Loop Antenna: -

Frequency $\pm 15\text{ppm} + 50\text{Hz}$

Amplitude $\pm 1.7\text{dB}$

For Radiated Emissions, Quasi-Peak Measurements using the ESVP Test Receiver and Bilog Antenna: -

Frequency $\pm 5\text{ppm} + 500\text{Hz}$

Amplitude $\pm 4.1\text{dB}$

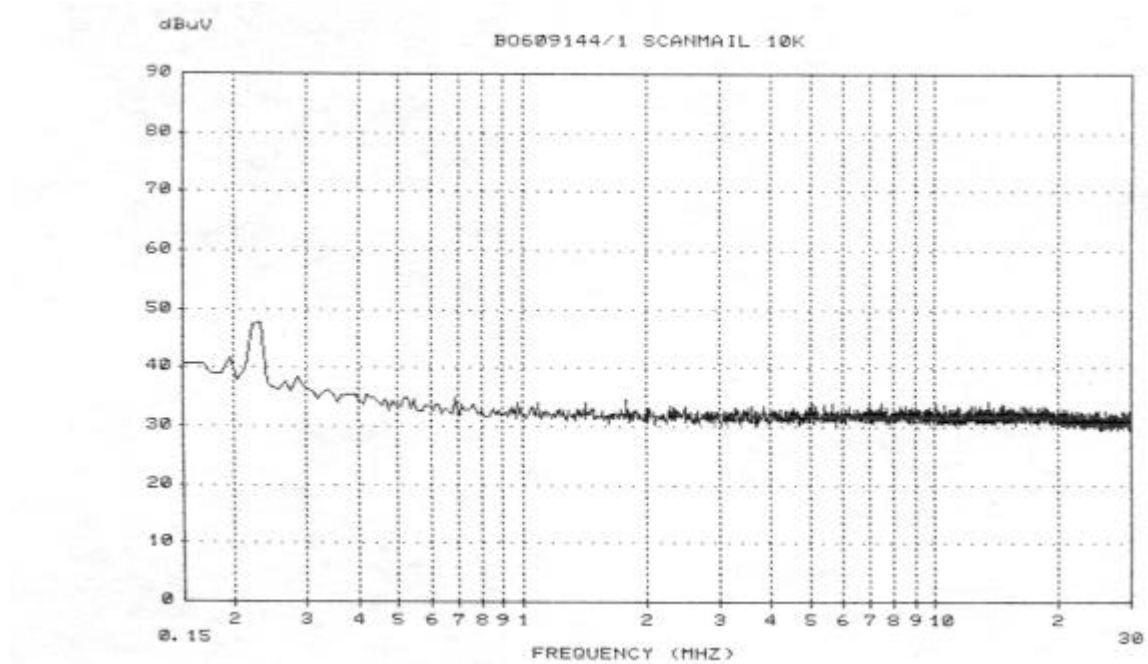
For Quasi-Peak Conducted Emissions measurements using Rohde & Schwarz ESH-3 Test Receiver:-

Frequency $\pm 15\text{ppm} + 50\text{Hz}$

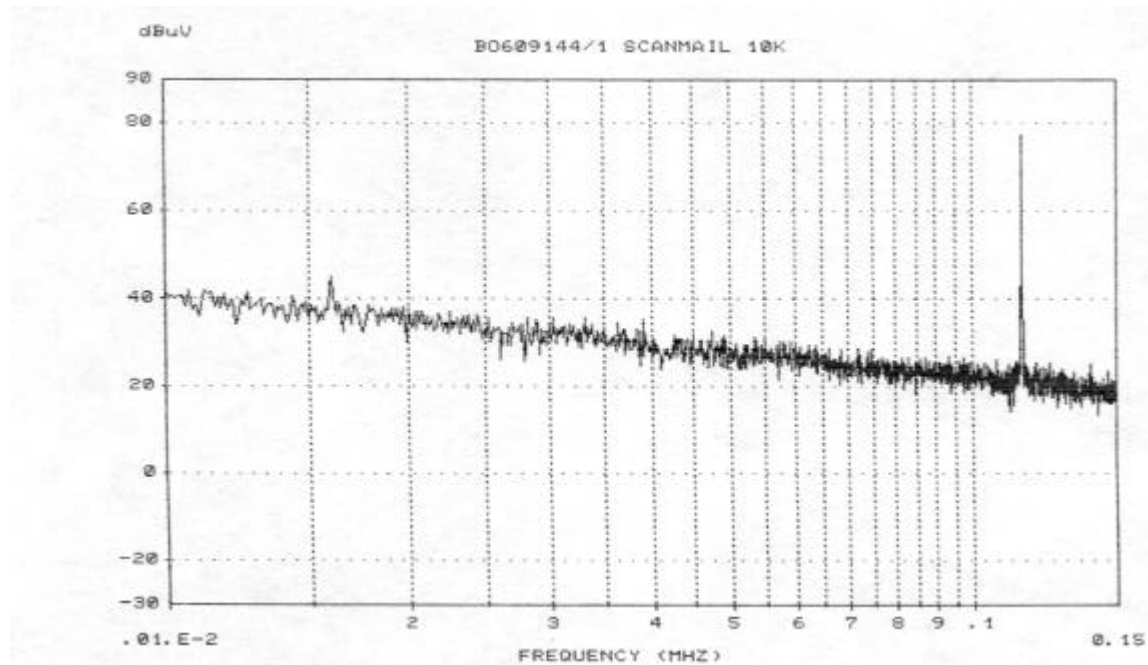
Amplitude $\pm 2.9\text{dB}$

9 Radiated Emissions

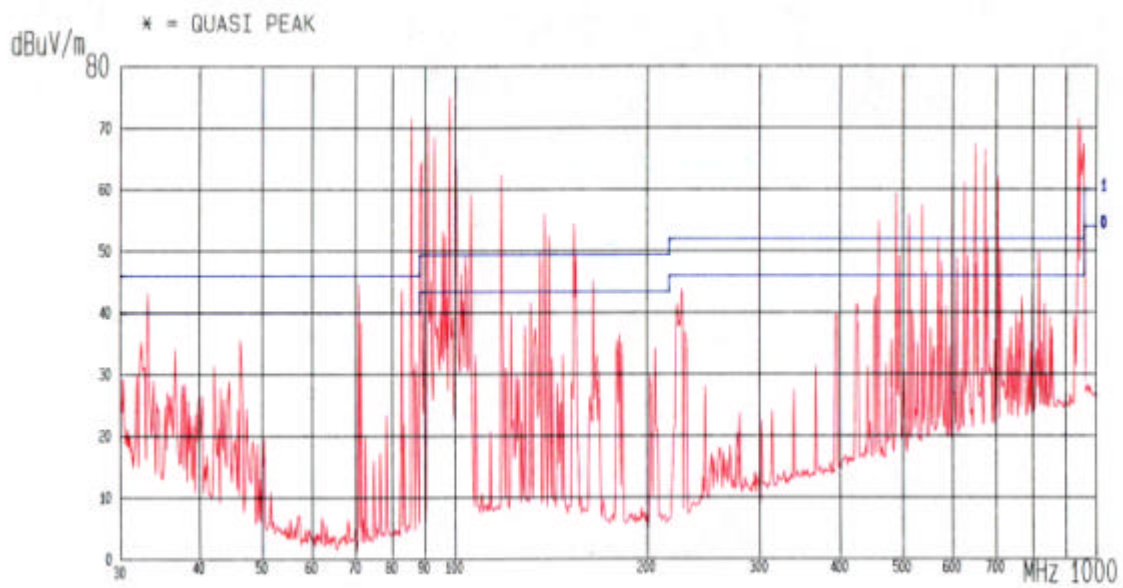
9.1 9kHz to 150kHz, Emissions Profile



9.2 150kHz to 30MHz, Emissions Profile

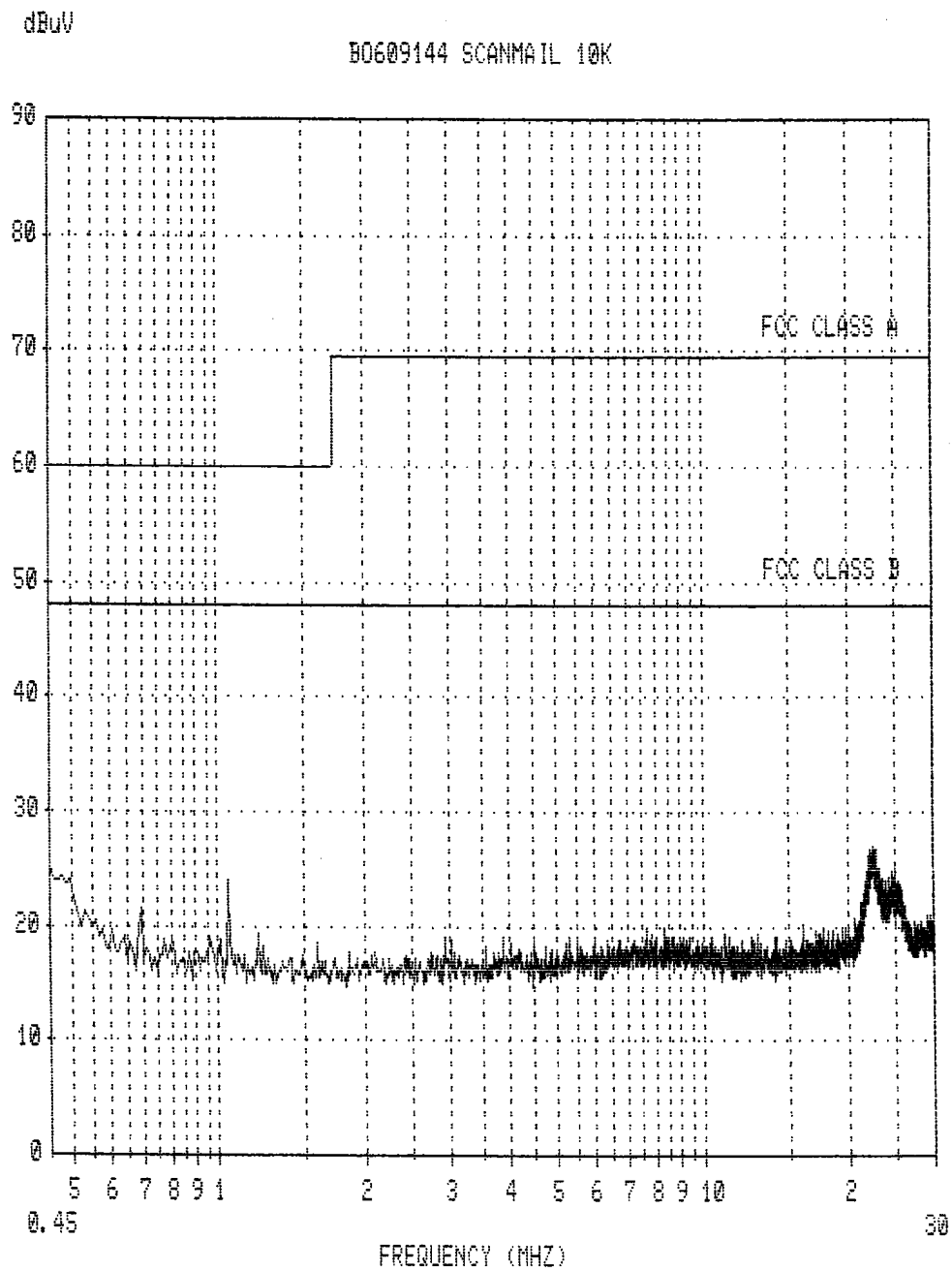


9.3 30MHz to 1000MHz, Emissions Profile

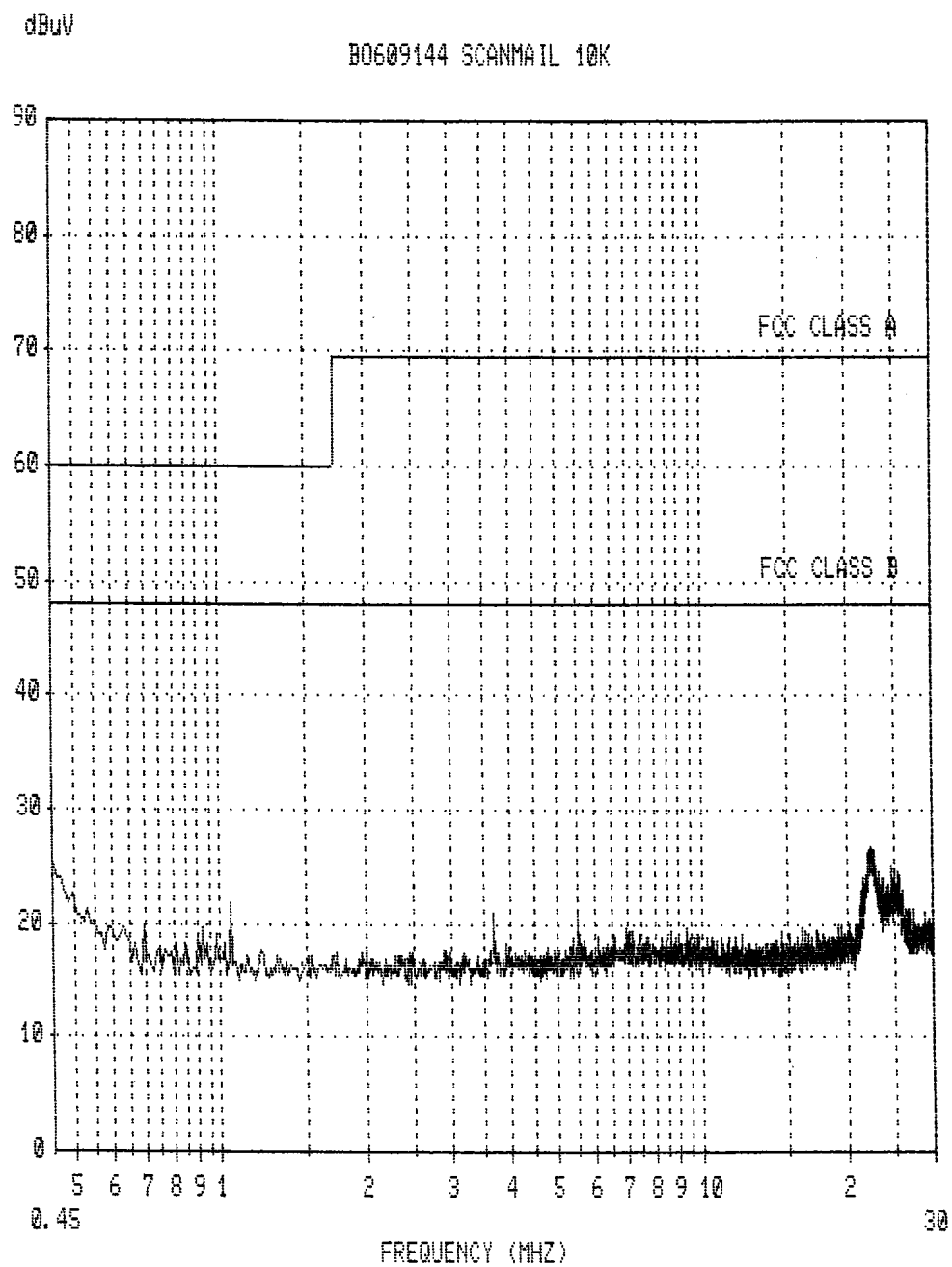


10 Conducted Emissions Plots

10.1 Live Line



10.2 Neutral Line



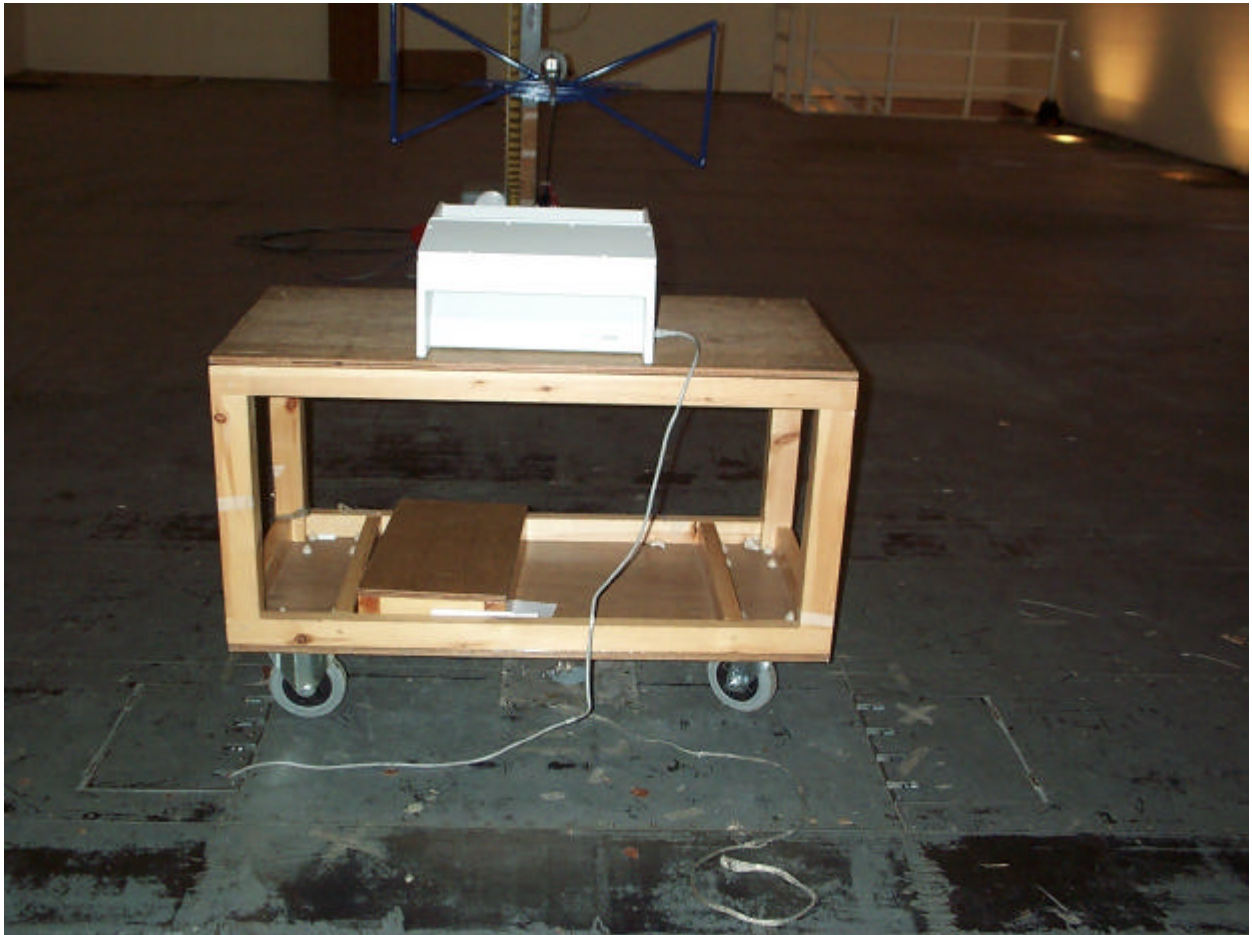
11 Test Configuration Photographs

11.1 Radiated Electric Field Emissions, 9kHz to 30MHz



Photograph of the Radiated Electric Field Emissions Configuration, 9kHz to 30MHz

11.2 Radiated Electric Field Emissions, 30MHz to 1000MHz



Photograph of the Radiated Electric Field Emissions Configuration. 30MHz to 1000MHz

11.3 Conducted Emissions, 0.45MHz to 30MHz.



Photograph of the Conducted Emissions Configuration

12 FCC Compliance Letter

FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD. 21046

September 08, 2000

Registration Number: 90986

BABT Product Service
Snitterfield Road
Bearley, Stratford-upon-Avon
Warwickshire CV37 0EX
United Kingdom
Attention: Jensen Adams

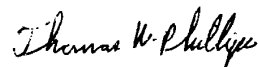
Re: Measurement facility located at Bearley
3 & 10 meter site
Date of Listing: September 08, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,



Thomas W Phillips
Electronics Engineer

13 Copyright / Disclaimers



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