

MEASUREMENT / TECHNICAL REPORT

PERSONAL COMPUTER AND PERIPHERALS

for

OKI Ltd

Optional Serial / Memory Interface
for the
OKIpage 10i Printer.

MEASUREMENT / TECHNICAL REPORT
OKI Optional Serial / Memory Interface.
FCC ID: NTS00025302YA
23 February 1998

This report concerns : <i>(check one)</i> Original grant <input checked="" type="checkbox"/> YES <input type="checkbox"/> Class II change <input type="checkbox"/> * Class B verification <input type="checkbox"/> * Class A verification <input type="checkbox"/> * Class I change <input type="checkbox"/>	
Equipment type : EXPANSION CARD FOR PRINTER.	
Request issue of grant : <i>(check one)</i> <input checked="" type="checkbox"/> YES Immediately upon completion of review <input type="checkbox"/> Defer grant per 47 CFR 0.457(d)(ii) until _____ date _____ Company Name agrees to notify the Commission by _____ date _____ of the intended date of the product so that the grant can be issued on that date	
Confidentiality of grant: <input type="checkbox"/> Application requests the existence of this grant to be kept confidential until _____ date _____. The announcement of this product before this date via freedom of information would be detrimental to Company Name, and therefore must be considered a business secret. Public announcement of this product will not be made prior to this date. <i>(Max 60 days after grant issued)</i>	
Limits used: <i>(check one)</i> CISPR 22 _____ Part 15 _____ YES _____	
Measurement procedure used in ANSI C63.4-1992 unless another is specified. Other test procedure : _____	
Application for Certification prepared by: David T Hambley EMC Test Centre Maxwell Building, Donibristle Industrial Park, Dunfermline, Fife. UK. KY11 5LB Tel: 44 01383 822131 ext 3131 Fax: 44 01383 825396 email: david.hambley@gecm.com	Applicant for this device Robert White OKI (UK) Ltd 3 Castlecary Road, Wardpark North, Cumbernauld, UK. G68 0DA. Tel: 44 01236 50 2736 Fax: 44 01236 50 2787 email: robert.white@mailhost.okiuk.co.uk

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1. GENERAL INFORMATION

1.1 Product Description

The Serial/ Memory Interface (SMIF) PCB (Part No. 00025302) is a customer plug in option PCB for the Okipage 10i Printer. The SMIF PCB adds an RS232C Serial Interface (300bps to 19200bps) plus two 72 pin SIMM sockets for the customer to upgrade memory capacity of their printer using separately available SIMM cards.

SIMM1 accepts DRAM SIMM up to 32MB

SIMM2 accepts either Flash-ROM SIMM or Mask-ROM SIMM up to 8MB.

1.2 Related Submittal(s)/Grant(s)

Okipage 10i : B2KEN2905A

1.3 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system (including inserted cards, which have grants) are :

Model Number (Serial Number)	FCC ID	Description	Cable Description	Length (metre)	Connectors
Okipage 10i	B2KEN2905A	Printer	Unshielded power cord	1.7	IEC 320
Serial / Memory Interface (1)	NTS00025302 YA	Option card	Shielded serial cable	7	D Type
EZbook Active Matrix Color (2)	HLOID03	Laptop PC	None		
PA 1000 (3)	None	AC adaptor	Unshielded power & dc cord	1.7	5mm Coaxial
Okipage 6e (4)	None	Printer	Shielded parallel cable	1.7	D Type

- (1) EUT submitted for grant.
- (2) Representative support equipment.
- (3) Cords permanently attached to the adaptor.
- (4) Representative support equipment 230Vac supply, European market only.

1.4 Test Methodology

Radiated emission testing was performed according to the procedures in ANSI C63.4-1991. Refer to report 4215 / 1600 / A / TR (Attachment A).

1.5 Test Facility

The EMC Test Centre, GEC Marconi Avionics, is a registered test facility with the Federal Communications Commission (FCC). The appropriate FCC reference number is 31040/SIT 13000B3, Dated 13 May 1994 and reconfirmed 22 July 1997.

1.6 Reference Rules Sections

Not applicable.

2. PRODUCT LABELING

The FCC ID label is based on "DONPRINT" Info-mark 316T material with a 0.025 S-10 acrylic adhesive. This material has UL 969 & CSA-C22.2 approvals for adhesive labels. The label affixed to the component side of the SMIF adjacent to SIMM2 socket thus being readily visible for inspection when the SMIF is unpackaged..

Figure 2.1 FCC ID Label (full size)

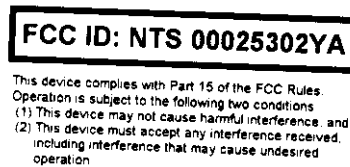


Figure 2.2 Location of label on EUT

As per Original Document.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The EUT was configured in as real life a configuration as possible. The operational mode selected for test was realised by a PC driven application which continuously exercised the print function. This configuration is considered the most emissive state.

3.2 Video Mode Justification

The system was tested in the default 80 x 25 text mode and in the highest resolution graphics mode of 1024 x 768. Since the default text mode was found to be worst case, this mode was used to collect the included data.

3.3 EUT Exercise Software

The EUT exercise program used during radiated testing was designed to simulate the printer in its intended environment. The software was programmed into the hard disk of the laptop PC. The function of the program was such that when executed the letter 'H' was continuously transmitted serially from the laptop's serial port to the Serial / Memory Interface via an Interface cable.

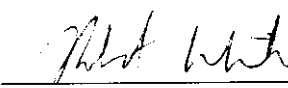
The Printer was setup to enable the printing of 'H' continuously on paper so as to determine any data corruption during tests.

3.4 Special Accessories

None required.

3.5 Equipment Modifications

None required.

Application Signature  Date 29/5/98

Type/Printed Name Robert White Position: Assisant manager
hardware engineering.

3.6 Configuration of Testing System

Refer to test report 4215 / 1600 / A / 2/ TR Page D1.

4. BLOCK DIAGRAM(S) OF EQUIPMENT

Figure 4.1 Block Diagram of SMIF

As per original document

5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS

Refer to test report 4215 / 1600 / A / 2 / TR
Pages C1 to C3. (conducted measurements)
Page C4. (radiated measurements)

6. CONDUCTED EMISSION DATA

6.1 Test Procedure

Refer to test report 4215 / 1600 / A / 2 / TR Page 9.

6.2 Test Data

Judgment: Passed by 7.1 dB

Refer to test report 4215 / 1600 / A / 2 / TR Page A1 to A3

7. RADIATED EMISSION DATA

7.1 Test Procedure

Refer to test report 4215 / 1600 / A / 2 / TR Page 9 & 10.

7.2 Test Data

Judgment: Passed by 4.3 dB

Refer to test report 4215 / 1600 / A / 2 / TR Page B1

7.3 Field strength calculation

The Rhode & Schwarz receiver automatically applies antenna factors and cable correction by means of firmware. The results reported in 4215 / 1600 / A / 2 / TR are therefore corrected values. For information a sample calculation on the highest recorded emission is shown below.

$$F_s = V_r + AF + CI$$

Where	F _s = Field strength	dBuV/m
	V _r = Receiver voltage	dBuV
	AF = Antenna Factor	dB/m
	CI = Antenna cable loss	dB

$$F_s = 25.7 + 11.3 + 2.2 = 39.2 \text{ dBuV/m}$$

8. PHOTOS OF TESTED EUT

Figure 8.1 SMIF PC Board, Component Side
Figure 8.2 SMIF PC Board, Foil Side.

Figure 8.1 SMIF PC Board, Component Side

As per original document

Figure 8.2 SMIF PC Board, Foil Side

As per original document

Attachment A: Test report 4215/1600/A/ 2 / TR.

Attachment B: User Manual / Production Data Sheet.

Note. This is a standard data sheet that covers 3 different option cards.



EMC TEST REPORT

ON

OKI Ltd.

**Optional Serial/Memory Interface
for the
OKIpage 10i Printer**



GEC-MARCONI AVIONICS LIMITED
EMC TEST CENTRE
DONIBRISTLE INDUSTRIAL PARK
DUNFERMLINE FIFE KY11 5LB
TEL. 01383 822131 Ext.3315 FAX 01383 825396
E.MAIL EMC.FIFE@GECM.COM



Serial Number:- 452



Issued to :- Mr R. White, OKI Ltd., 3 Castlecary Road, Wardpark North, Cumbernauld, G68 0BN	Order No :- PN00248
---	----------------------------

**ELECTROMAGNETIC
COMPATIBILITY
TEST REPORT**
on

Optional Serial/Memory Interface
for the
OKIpage 10i Printer

Report No :- 4215 / 1600 / A / 2 / TR

Date :- 25th May 1998

Prepared by :-  W. Duff	Approved Signatory :-  D.T. Hambley
--	---

IT IS CERTIFIED THAT THE TESTS DETAILED IN THIS REPORT HAVE BEEN CARRIED OUT AS SPECIFIED WITH THE RESULTS SHOWN TO THE REQUIREMENTS OF THE CONTRACT.

CONTENTS

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Section 6	Test Results	9

Appendices

A - Test Results, Conducted Emissions Test

B - Test Results, Radiated Emissions Test

C - Photographs of EUT cabling

D - EUT Configuration

**SECTION 1
INTRODUCTION**

1.1. General.

This report contains the results of EMC tests performed on the Optional Serial/Memory Interface for the OKIpage 10i Printer (herein called the equipment under test [EUT]) received at the EMC Test Centre on the 21st. May 1998 and tested on the 21st. May 1998.

This report is a supplement to report No. 4215 / 1600 / A / TR.

The tests were carried out in the EMC Test Centre, GEC Marconi Avionics, Donibristle, Dunfermline.

This report is written assuming the reader is familiar with the terms used in the field of EMC.

1.2. Reason for Supplement

This supplement was produced to include the results of additional EMC tests which were carried out on the EUT after publication of report No. 4215 / 1600 / A / TR & 4215 / 1600 / A / 1 / TR.

1.3. Client.

The tests were performed for

OKI Ltd.
3 Castlecary Road,
Wardpark North,
Cumbernauld,
G68 0BN

Contact name : Mr. R. White.

1.4. Equipment Under Test (EUT).

The EUT consisted of :-

	type no.	serial no.
Optional Serial/Memory Interface	None	008

hosted by :- Printer	OKIpage 10i	None
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with the following interconnecting cables:-

Cable 1	Serial Interface Cable, Multicore, screened.
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The rationale for selection of the EUT was as follows :-

The EUT was configured in as real life a configuration as possible. The operational mode selected for test was realised by a PC driven application which continuously exercised the print function.

This configuration is considered to be the most emissive state.

1.5. EUT Support Equipment.

The EUT support equipment consisted of :-

	type no.	serial no.
Laptop PC	Ezbook Active Matrix Color	167206
AC Adapter	PA-1000	A9526624
Accessory printer	OKIPAGE 6e	None

Note: Accessory printer was used to provide a device connected to the laptop PC parallel port. Not part of EUT

1.6 NAMAS Accreditation

Opinions and interpretations expressed herein are outside the scope of NAMAS Accreditation.

1.7. Abnormalities/Departures from Standard Conditions

None.

1.8. FCC Registration

The EMC Test Centre, GEC Marconi Avionics, is a registered test facility with the Federal Communications Commission (FCC). The appropriate FCC reference number is 31040/SIT 13000B3, Dated 13 May 1994 and reconfirmed 22 July 1997.

SECTION 2
SPECIFICATIONS, LIST OF TESTS and TEST RESULTS SUMMARY

2.1 Specifications and Related Documents

The relevant EMC specifications are;

47CFR (1995) Unintentional Radiators; Conducted and Radiated Emission Limits.
Part 15, Sub Part B.

47CFR (1995) refers to the following specification :-

ANSI C63-4 (1992) Methods of Measurements of Radio Noise Emissions from Low Voltage
Electrical and Electronic Equipment in the Range 9kHz to 40GHz.

2.2 List of Tests

The following is the list of tests which were required for compliance with the above specifications;

Conducted Emission Test 450kHz to 30MHz, power lines class B limits applying
Radiated Emission Test 30MHz to 1000MHz class B limits applying

The sequence of testing is described in Section 6 of this report.

2.3 Summary of Test Results

The following is a brief summary of the test results. Detailed data are contained in Section 6 of this report.

2.3.1 Conducted Emission (Power Lines) Test, 450kHz to 30MHz

The live power line under test complied with the relevant specification limit by a margin of 7.1 dB @ 25.26 MHz (quasi peak)

The neutral power line under test complied with the relevant specification limit by a margin of 7.8 dB @ 25.26 MHz (quasi peak)

2.3.2 Radiated Emission Test, 30MHz to 1000MHz

The EUT and its associated cabling complied with the relevant specification limit by a margin of 4.3 dB @ 125.9932 MHz

2.3.3 EUT Submitted

It should be noted that these results apply only to the particular EUT submitted, in the configuration used and in the mode of operation tested.

**SECTION 3
TEST EQUIPMENT USED**

3.1 Test Equipment

	<u>Serial No.</u>	<u>Last Cal.</u>	<u>Next Cal.</u>
1. <u>Receivers</u>			
1.01 Rohde & Schwarz ESVS20	827131/006	21/10/97	21/07/98
1.02 Hewlett Packard 8574A:			
8568B Spectrum Analyser	3217A05565	07/01/97	07/10/98
85662A Display	3144A20662	07/01/97	07/10/98
85685A RF Pre-selector	3146A01322	08/01/98	08/10/98
85650A Quasi-Peak Adapter	3145A01606	09/01/98	09/10/98
2. <u>Aerials</u>			
2.01 EMCO Biconical 3110	1462	27/11/97	27/11/98
2.02 EMCO Log Periodic 3146	3243	25/11/97	25/11/98
3. <u>LISNS</u>			
3.01 Rohde & Schwarz ESH3-Z5	827729/004	14/02/97	14/08/98
3.02 Rohde & Schwarz ESH3-Z5	827729/005	01/04/98	01/10/98

**SECTION 4
TEST CONDITIONS**

4.1 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	15 - 35 degrees C
Humidity range	25 - 75%
Pressure	860-1060 mbar

4.2 Test Areas

The Conducted Emission tests were performed in a screened room (SR1) with dimensions of 6m x 5m x 3m. Adjoining the test chamber is a control room of dimensions 2.5m x 5m x 3m where the EMC test equipment was situated.

The Radiated Emission tests were performed initially in the screened room detailed above (SR1) to obtain a pre-compliance emission profile and then transferred to a 3m Open Area Test Site (OATS) for the formal test measurement.

4.3 EUT Power

The 110V 60Hz EUT power was produced by the Elgar 1751 AC power source

SECTION 5
TEST SAMPLE OPERATION AND MONITORING

Sketches of the EUT Configuration are contained in Appendix D.

5.1 EUT Configuration, as defined by the client

During the EMC tests the EUT was configured as follows:-

Laptop PC serial port connected to host printer, parallel port connected to accessory printer

5.2 Modes Of Operation, as defined by the client

During all EMC tests the EUT was configured as follows:-

Laptop PC running print file HSS.BAT, printing H's

5.3 EUT Monitoring, as defined by the client

During the EMC tests the EUT was monitored as follows:-

No monitoring required

SECTION 6 TEST RESULTS

Photographs of the EUT cabling are contained in Appendix C.

6.1 Conducted Emissions Test (Power Lines), 450kHz to 30MHz

This test was applied to the EUT's 110V 60Hz Live and Neutral lines. The EUT was configured in the screened room on a 80cm high table which was positioned 40cm from the room wall. The EUT was then powered from the 110V 60Hz mains supply via a Line Impedance Stabilisation Network. The PC and accessory printer were powered via a second line impedance stabilising network.

Investigative testing was initially performed during which the EUT was exercised in all its modes to determine the worst case emission profile. A swept receiver system was used for the investigative testing to ensure that cyclic emissions were not overlooked and to determine the dwell time that would be necessary for the final compliance measurement.

6.1.1 110V 60Hz Live line

A test measurement was made over the specified frequency range using Peak detection mode.

As Peak emissions exceeding the Quasi Peak specification limits were recorded, further measurements were required to be made using Quasi Peak detection. All emissions were found compliant by a margin of ≥ 7.1 dB

6.1.2 110V 60Hz Neutral line

A test measurement was made over the specified frequency range using Peak detection mode.

As Peak emissions exceeding the Quasi Peak specification limits were recorded, further measurements were required to be made using Quasi Peak detection. All emissions were found compliant by a margin of ≥ 7.8 dB.

A graphical presentation of the above results is contained in Appendix A of this Test Report.

6.2 Radiated Emissions Test, 30MHz to 1000MHz

6.2.1 Pre-compliance Measurement

The EUT was configured in the test room on a 80cm high table and powered from the 110V 60Hz mains supply.

The measurement was performed with an antenna to EUT separation distance of 3m. The pre-compliance measurement was used to obtain a Radiated Emission profile thus allowing the OATS measurements to be performed without the danger of overlooking any potential non-compliant emissions. This measurement was performed using peak detection.

The layout of the EUT cabling was adjusted to give maximum emissions, and fixed in this "worst case" position for all subsequent radiated emissions testing.

The measured signal levels at some of the above frequencies failed to comply with the specification limit under screened room measurement conditions.

6.2.2 OATS Measurement

The EUT was then installed in the Open Area Test Site (OATS) on a 80cm high table, powered from the 110V 60Hz mains supply and measurements performed at an antenna to EUT separation distance of 3m.

The frequencies at which the measured level in the screened room (pre-compliance measurement) were greater than -6dB of the limit line were measured individually using a manually tuned receiver in accordance with ANSI C63.4-1992.

The signal levels at these frequencies were found to comply with the specification limit by a margin of ≥ 4.3 dB.

During characterisation of the EUT, emissions were detected at frequencies 668.5750 MHz & 200.5850 MHz . However, during formal measurements on the OATS these emissions were masked by the presence of ambient signals.

These emissions were found to be within the uncertainty of measurement range , therefore the formula of EN55022 clause 11.4 was used. Calculated amplitudes for EUT emissions were found to be outside the uncertainty of measurement range.

Results sheets for the compliance test are contained in Appendix B of this test report.

Commercial In Confidence

Report Number: 4216 / 1600 / A / 2 / TR
Date: 25th MAY 1998

Tested by .W.DUFF.....

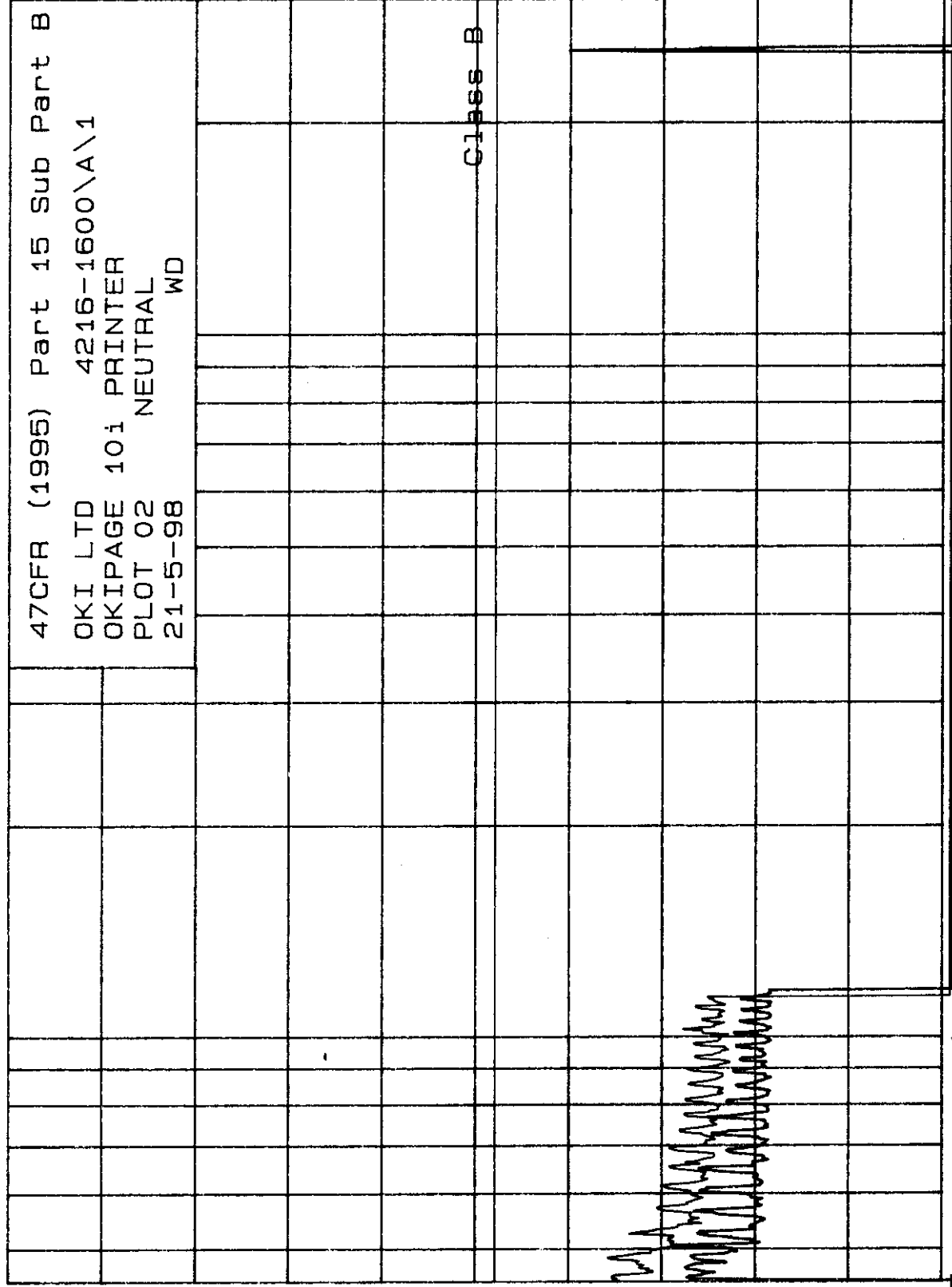
Appendix A

MAINS CONDUCTED EMISSIONS PLOTS

EMC TEST CENTRE, DONIBRISTLE
EMISSION LEVEL [dBuV]

21 May 1998 11: 17: 00
QUASI-PEAK AVERAGE

47CFR (1995) Part 15 Sub Part B
OKI LTD 4216-1600\A\1
OKIPAGE 101 PRINTER
PLOT 02 NEUTRAL
21-5-98 WD

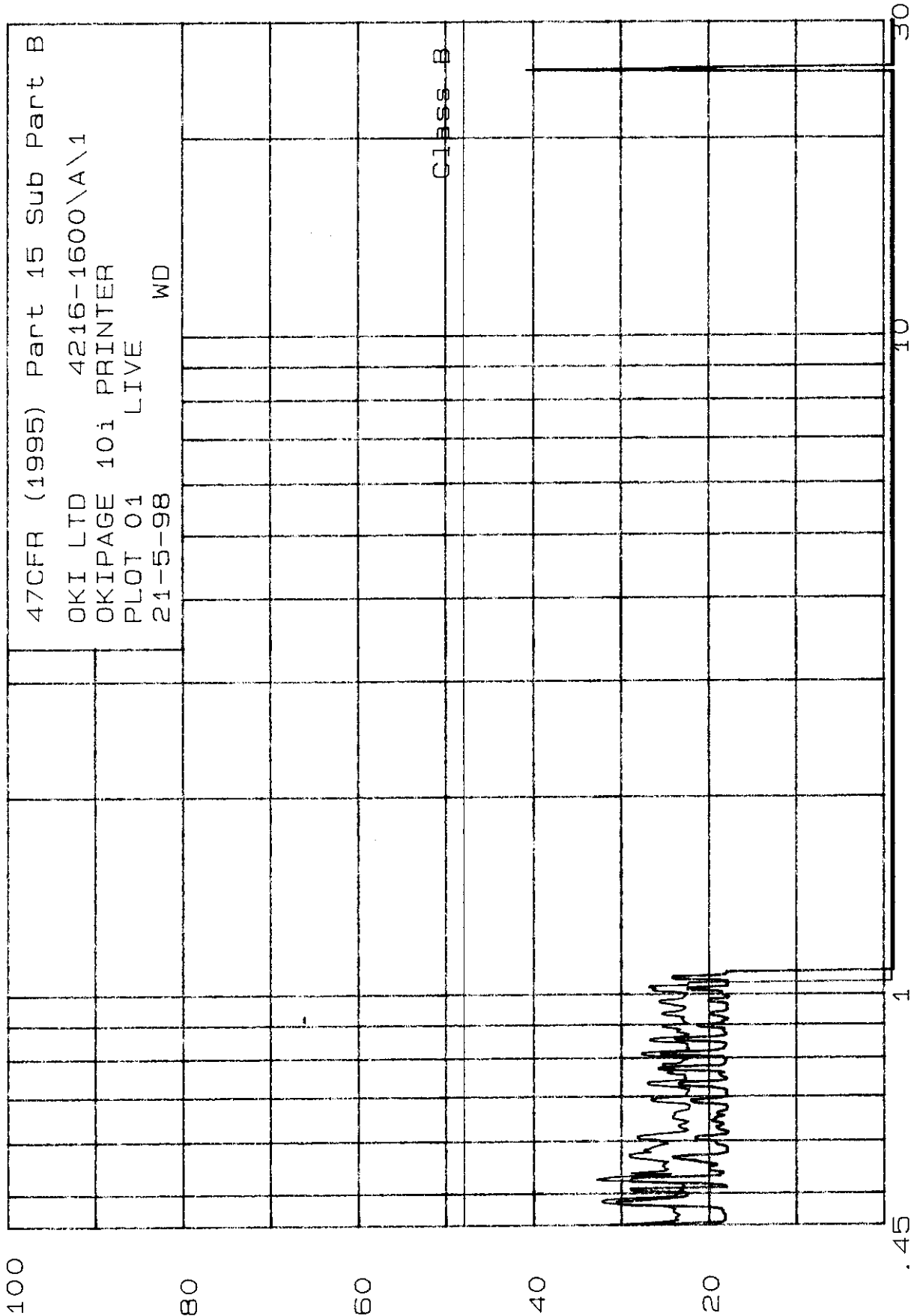


100
80
60
40
20
0.45 1 10 30

FREQUENCY [MHz]

EMC TEST CENTRE, DONIBRISTLE
EMISSION LEVEL [dBuV] 21 May 1998 11:02:00
QUASI-PEAK AVERAGE

47CFR (1995) Part 15 Sub Part B
OKI LTD 4216-1600\A\1
OKIPAGE 10i PRINTER
PLOT 01 LIVE
21-5-98 WD



FREQUENCY [MHZ]

Tested by .W.DUFF.....

Appendix D

EUT CONFIGURATION

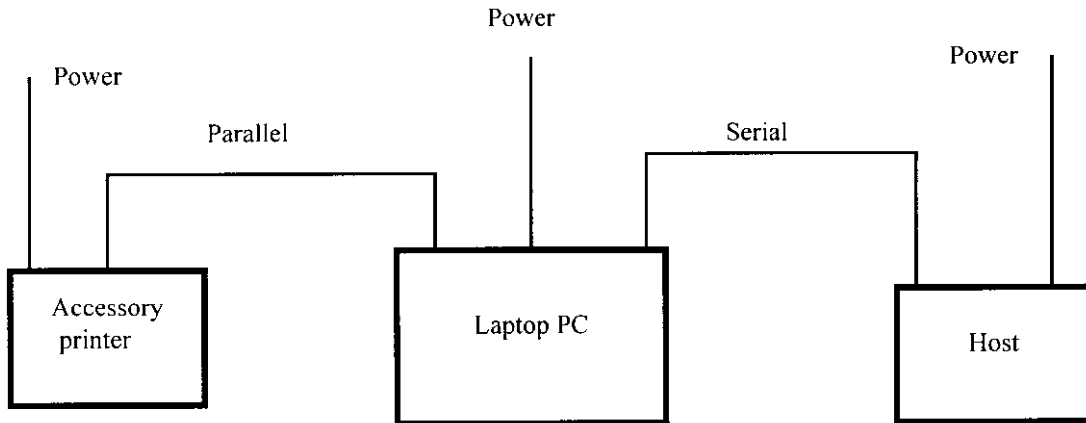


Fig 1. Block diagram

OKI

Oki (UK) Limited

3 Castlecary Road, Wardpark North,
Cumbernauld, Scotland G68 0DA.

Telephone: 011 44 (0)1236 50 2736

Facsimile: 011 44 (0)1236 50 2787

e-mail: robert.white@mailhost.okiuk.co.uk

FAX SHEET

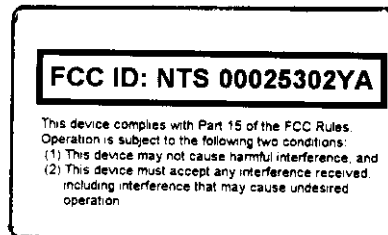
Fax To: Rich Fabina
Company: Federal Communications Commission
From: Robert White
Date: 22nd May 1998
Page: 2 Pages
Subject: Approval Application for NTS 00025302YA (Ref No. 541)

MAY 21 5 37 PM '98
FCC LABORATORY
OFF

Dear Rich,

With reference to your Fax dated 19th May (Ref. No. 541),

1. Please find attached a faxed copy of a new label. I will send an actual sample for your attention.



2. Regarding Item number 2

Please find attached a copy of the technical rationale from David Hambley, Principal Engineer of GEC Marconi Avionics EMC Test Site which suggests that the second peripheral, which is attached via the parallel port may indeed not be required.

I will look forward to your comments on this matter.

Best Regards,
Robert White

Optional Serial / Memory Interface for OKIpage 10i printer.

Technical rationale for test configuration.

FCC ID NTS00025302YA

Summary.

The Equipment under test (EUT) is a printed circuit card (pc card) which is specific to the OKI page 10i laser printer. The printer is therefore a host into which a peripheral (the pc card) is connected. The laptop computer is merely accessory equipment to facilitate the test. The parallel port of the accessory equipment has no association to the function of the EUT and there is no cable connection between them. ANSI C63.4 does not cover this configuration of equipment.

Detailed rationale.

The EUT consists of an optional pc card intended to be fitted into an OKIpage 10i laser printer.

The EUT is a peripheral device in accordance with the definition of ANSI C63.4 section 3.1.

The OKIpage 10i printer is a host in accordance with the definition of ANSI C63.4 section 3.1.

The Laptop personal computer(PC) is accessory equipment in accordance with ANSI C63.4 section 6.1.2.

The configuration was determined to represent "*that typically marketed to the end user*" and the test was "*performed using the best judgement of the test engineer in consultation with the design engineering staff*" in accordance with ANSI C63.4 section 6.2. It is accepted that this was "*reported in the test report*" only to a limited degree.

It is accepted that the EUT , host and accessory equipment are Information Technology Equipment (ITE) as defined in ANSI C63.4 section 3.1 Thus section 11 takes precedence over other parts of the document.

The host is not a CPU or a PC and section 11.1.1 does not cover other host types. The EUT therefore cannot be tested in accordance with the rules.

Furthermore section 11.1.2 states that "*any peripheral being tested separately shall be tested with appropriate host equipment*". The OKIpage 10i printer is the actual host and not "*typical of actual usage*". The host is not a PC and section 11.1.2 does not cover other host types. The EUT therefore again cannot be tested in accordance with the rules.

Section 11 states that "*If a particular EUT cannot be tested in accordance with these rules, it is permissible to test the EUT in a manner dictated by good engineering judgement*" The configuration used was defined in accordance with this statement. It is accepted that the "*deviations from the prescribed procedure shall be described and fully justified as outlined in 1.2 and 10.1.9.*" were not fully reported.

D.T. Hambley. Principal Engineer.

HEADWATERS

NEW PRODUCTS FOR WORLD MARKETS

INITIAL APPLICATION
RF THERMOMETER

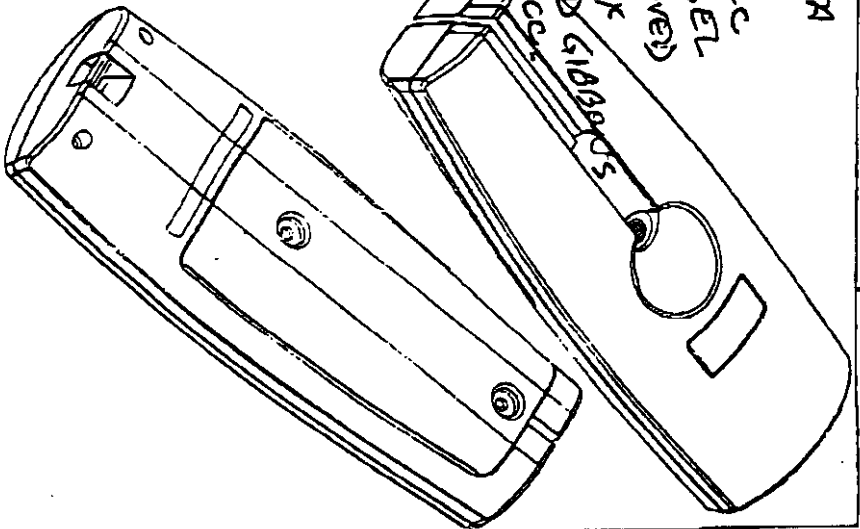
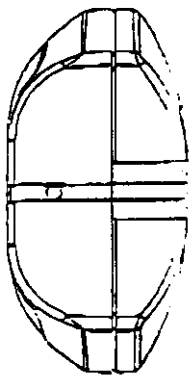
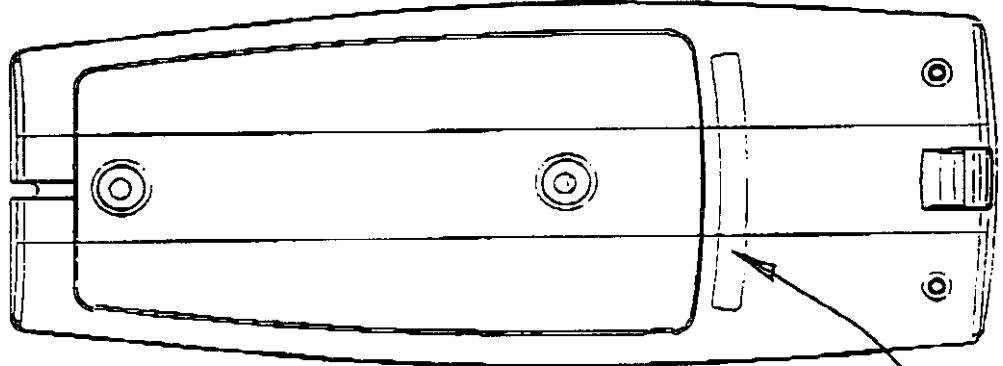
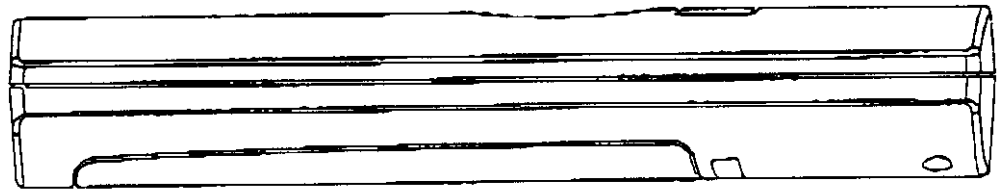
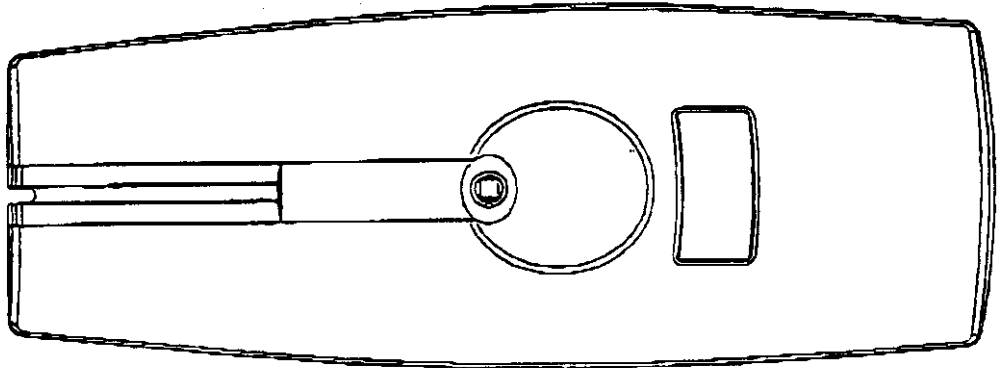
TITLE
TRANSMITTER T-100

CHK'D
KB

DATE
MAY 26, 97

DWG. NO.
ASSEMBLY A10011

SCALE
1:1



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FEDERAL COMMUNICATIONS COMMISSION
Equipment Authorization Division, Applications Processing Branch
7435 Oakland Mills Road, Columbia, MD 21046
Telephone: (301) 725-1585, Facsimile: (301) 344-2050

Date: May 19, 1998 02:22 pm

From: Rich Fabina Extension: 220

To: Robert White

Organization: OKI (UK) Limited

Telephone: 01144 1236 502736 Facsimile: 01144 1236 502787

This cover sheet is page 1 of 1. Please direct inquiries to the sender at the above extension.

Reference FCC ID: NTS00025302YA

Applicant: Oki (UK) Limited

The response to our request for additional information dated May 12, 1998, was incomplete. Please respond to all unanswered items within 60 days of the date of the original request.

Failure to provide the requested information with this time period may result in application dismissal pursuant to section 2.917(c) and forfeiture of the filing fee pursuant to section 1.1106.

Items number 2 and 4 were not answered.

Regarding item 2, please read the attached requirements for testing of a personal computer peripheral from Section 11.2 of ANSI C63.4-1992 (C63.4). This device is a personal computer peripheral that requires Certification by the Commission. As such, it must be tested in accordance with C63.4. Item 4 of Section 11.2 of C63.4 requires two external peripherals in the test system as shown in the attached Figure 9(c), also from C63.4. Your photos and attached test configuration (Appendix C) only show one external peripheral. Retesting is necessary.

Regarding item 4, the copy of the label submitted by fax is too small and dark to read. Please submit another label.

Replies to this letter MUST contain the Reference Number: 541

11.2 Tabletop Systems. Follow the general guidelines in 6.2.1 for placement of the EUT, placement of the peripherals, and placement and manipulation of interface cables for testing tabletop ITE systems.

For a personal computer or a peripheral intended to be used with a personal computer, the minimum system consists of the following devices grouped and tested together:

- (1) Personal computer
- (2) Keyboard
- (3) Video display unit
- (4) An external peripheral for each of two different types of available I/O protocols, e.g., serial, parallel, etc.
- (5) If the EUT has a dedicated port for a special-purpose device, e.g., a mouse, joystick, or external disk drive, that device shall be part of the minimum system.

NOTE: Items (1), (2), and/or (3) may, in some systems, be assembled in the same chassis. In no instance may items (1), (2), or (3) or joystick controls, satisfy the requirements of item (4).

Figures 9(a) through 9(d) and 11 show the recommended equipment and cable configurations that are described in 6.2.1 and 11.2 through 11.2.4.

11.2.1 Placement of Host. For tabletop hosts, the host shall be centered laterally on the tabletop and its rear shall be flush with the rear of the table.

11.2.2 Placement of Monitors and Keyboards. The monitor should be placed on top of the host, centered and flush with the front of the host. The keyboard shall be positioned in front of the monitor, centered on the monitor, and flush with the front edge of the tabletop surface.

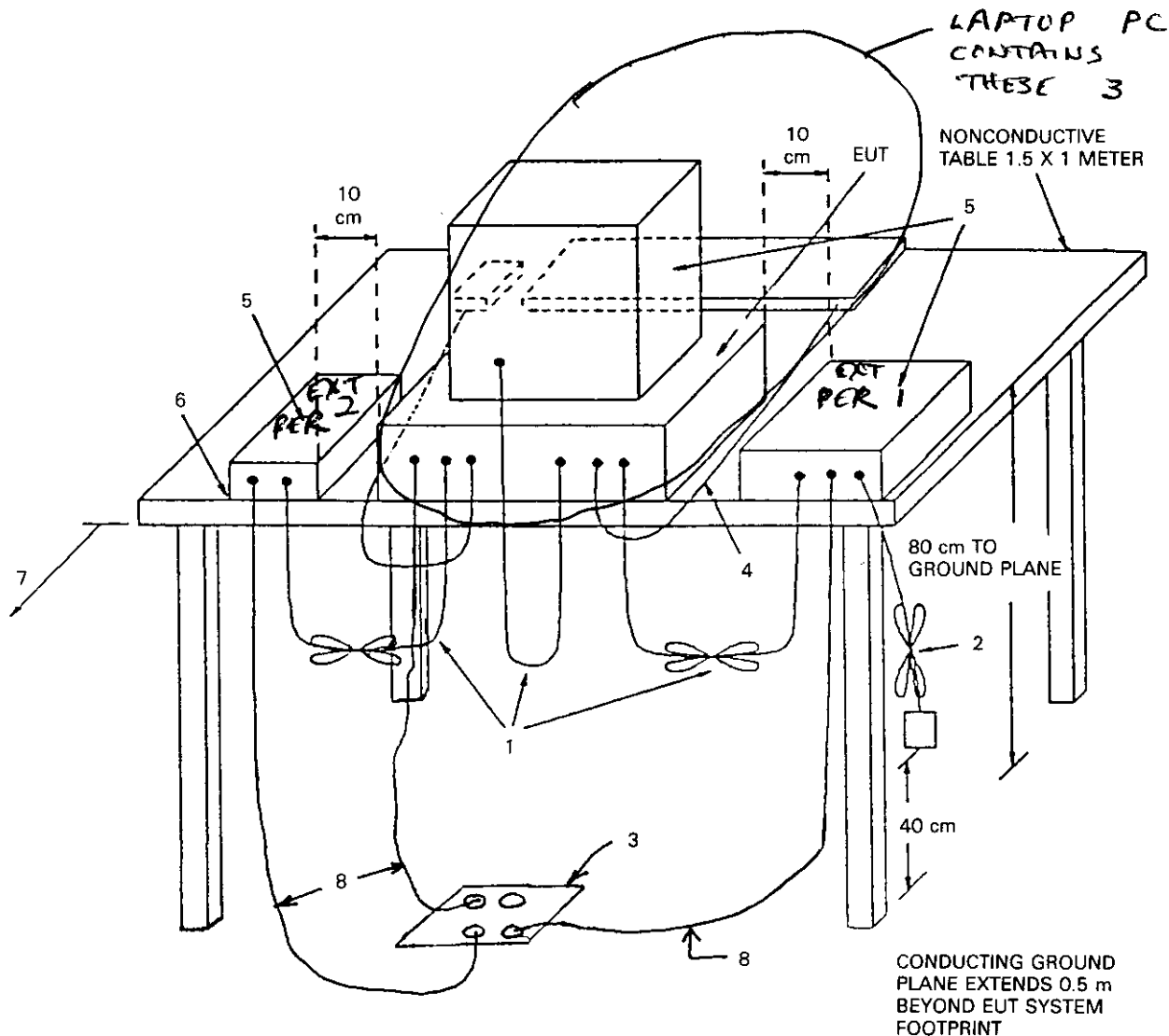
11.2.3 Placement of External Peripherals. External peripherals that are part of a tabletop system shall be placed in a single configuration to either side of the host with a 10 cm separation. If more than two external peripherals are present, a typical configuration should be chosen that maintains 10 cm spacing between all equipment cabinets. A mouse or joystick shall be positioned 10 cm to the right of the keyboard (see Fig 11).

11.2.4 Placement and Manipulation of Interface Cables. Excess interface cable length will be draped over the back edge of the tabletop for tabletop equipment. If any draped cable extends closer than 40 cm to the conducting ground plane, the excess shall be bundled in the center in a serpentine fashion using 30 to 40 cm lengths to maintain the 40 cm height. If the cables cannot be bundled due to bulk, length, or stiffness, they shall be draped over the back edge of the tabletop unbundled, but in such a way that all portions of the interface cable remain at least 40 cm from the horizontal conducting ground plane, as shown in Figs 9(a) and 9(c).

The system shall be arranged in one typical equipment configuration for the test. In making any tests involving several pieces of tabletop equipment interconnected by interface cables, it is essential to recognize that the measured levels may be critically dependent upon the exact placement of the interface cables. Thus preliminary tests as specified in 7.2.3 and 8.3.1.1 should be carried out while varying cable positions in order to determine the maximum or near-maximum emission level. During manipulation, cables shall not be placed under or on top of the system test components unless such placement is required by the inherent equipment design.

If the monitor can be powered through an outlet on the host unit, it shall be tested in two ways, i.e., powered through the host, and powered separately as required during preliminary ac powerline conducted and radiated emissions testing.

11.3 Floor-Standing Equipment Configurations. Follow the general guidelines in 6.2.2 for placement of the EUT, placement of peripherals, and placement and manipulation of interface cables for testing a floor-standing ITE system.

**LEGEND:**

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.
2. I/O cables that are connected to a peripheral shall be bundled in center. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.
3. If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground plane with the receptacle flush with the ground plane.
4. Cables of hand-operated devices, such as keyboards, mice, etc., have to be placed as close as possible to the controller.
5. Non-EUT components of EUT system being tested.
6. The rear of all components of the system under test shall be located flush with the rear of the table.
7. No vertical conducting wall used.
8. Power cords drape to the floor and are routed over to receptacle.

Fig 9(c)
Test Configuration
Tabletop Equipment Radiated Emissions

Commercial In Confidence

Report Number: 4215 / 1600 / A / 1 / TR

Date : 14th May 1998.

Tested by : A. Wheelen

Appendix C

EUT CONFIGURATION

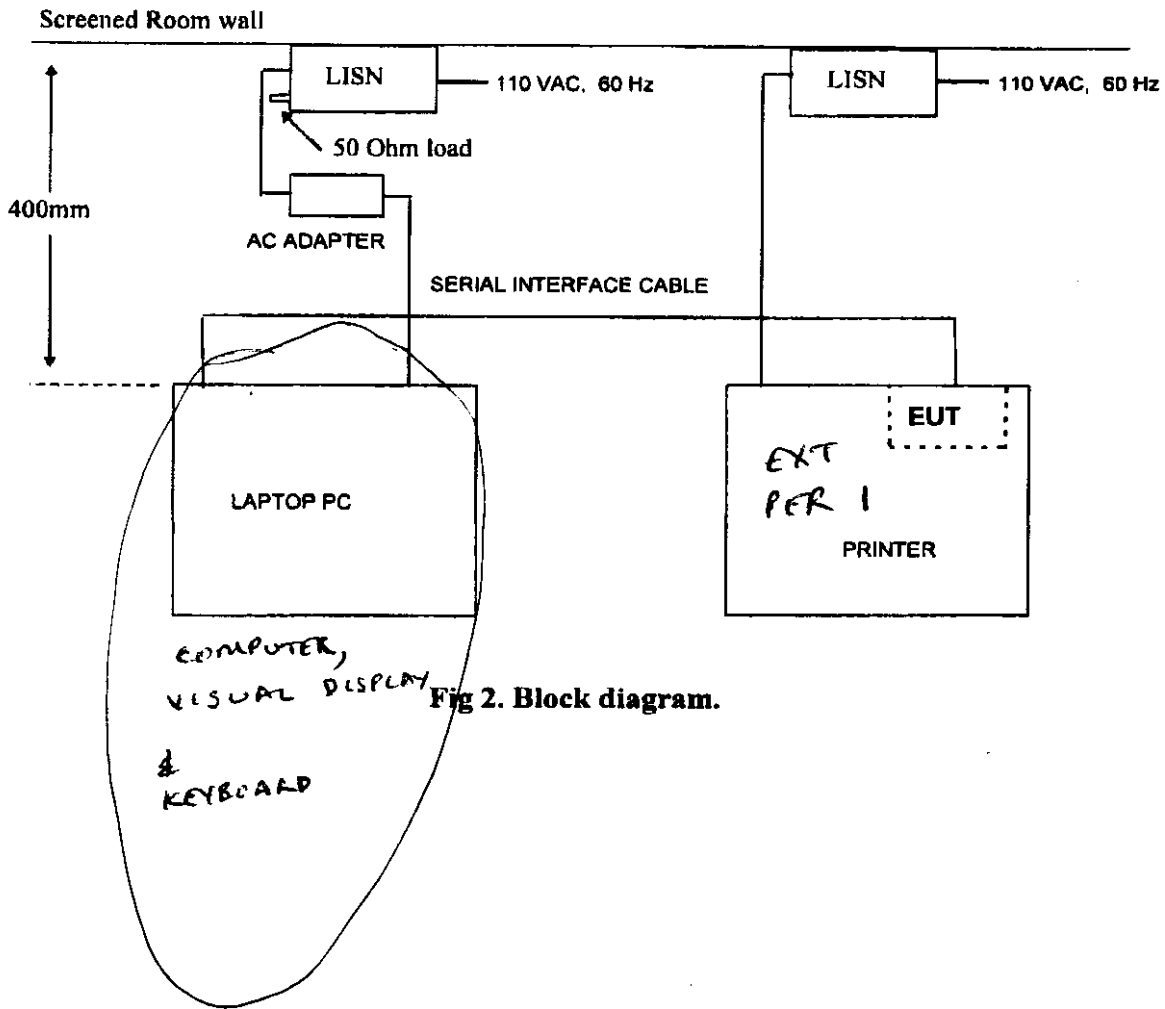


Fig 2. Block diagram.

* * * COMMUNICATION RESULT REPORT (MAY.19.1998 2:29PM) * * *

TTI CONG MAIL/OLIA FCC

FILE MODE	OPTION	ADDRESS (GROUP)	RESULT	PAGE
878	MEMORY TX	81-9011441236502787	OK	P. 4/4

REASON FOR ERROR

E-1) HANG UP OR LINE FAIL
E-3) NO ANSWER

E-2) BUSY
E-4) NO FACSIMILE CONNECTION

FEDERAL COMMUNICATIONS COMMISSION
Equipment Authorization Division, Applications Processing Branch
7435 Oakland Mills Road, Columbia, MD 21046
Telephone: (301) 725-1585, Facsimile: (301) 344-2050

Date: May 19, 1998 02:22 pmFrom: Rich Fabina Extension: 220To: Robert WhiteOrganization: OKI (UK) LimitedTelephone: 01144 1236 502736 Facsimile: 01144 1236 502787This cover sheet is page 1 of 1. Please direct inquiries to the sender at the above extension.Reference FCC ID: NTS00025302YAApplicant: Oki (UK) Limited

The response to our request for additional information dated May 12, 1998, was incomplete. Please respond to all unanswered items within 60 days of the date of the original request.

Failure to provide the requested information with this time period may result in application dismissal pursuant to section 2.917(c) and forfeiture of the filing fee pursuant to section 1.1106.

Items number 2 and 4 were not answered.

Regarding item 2, please read the attached requirements for testing of a personal computer peripheral from Section 11.2 of ANSI C63.4-1992 (C63.4). This device is a personal computer peripheral that requires Certification by the Commission. As such, it must be tested in accordance with C63.4. Item 4 of Section 11.2 of C63.4 requires two external peripherals in the test system as shown in the attached Figure 9(c), also from C63.4. Your photos and attached test configuration (Appendix C) only show one external peripheral. Retesting is necessary.

FILE MODE	OPTION	ADDRESS (GROUP)	RESULT	PAGE
864	MEMORY TX	81-9011441236502787	OK	P. 1/1

REASON FOR ERROR:
 E-1) HANG UP OR LINE FAIL
 E-2) BUSY
 E-3) NO ANSWER
 E-4) NO FACSIMILE CONNECTION

FEDERAL COMMUNICATIONS COMMISSION
 Equipment Authorization Division, Applications Processing Branch
 7435 Oakland Mills Road, Columbia, MD 21046
 Telephone: (301) 725-1585, Facsimile: (301) 344-2050

Date: May 12, 1998 02:43 pm
From: Rich Fabina Extension: 220
To: Robert White
Organization: OKI (UK) Limited
Telephone: 01144 1236 502736 Facsimile: 01144 1236 502787
 This cover sheet is page 1 of 1. Please direct inquiries to the sender at the above extension.

Reference FCC ID: NTS00025302YA

Applicant: OkI (UK) Limited

The items indicated below must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 60 days may result in application dismissal pursuant to Section 2.917(c) and forfeiture of the filing fee pursuant to Section 1.1106

Replies to this letter MUST contain the Reference Number: 351

1. The name of the measurement facility used for testing this device. Pursuant to Section 2.948 of the FCC Rules, this facility must have a test site description on file with the FCC Laboratory. I cannot locate either GEC-Marconi Avionics Limited or EMC Test Centre on that list. Did you register using another name? If so, what name?
2. Retest the above referenced device in the minimum test configuration specified in Section 11.2 of ANSI-C63.4-

OKI

OkI (UK) Limited

3 Castieary Road, Wardpark North,

Cumbernauld, Scotland G68 0DA.

Telephone: 011 44 (0)1236 50 2736

Facsimile: 011 44 (0)1236 50 2787

e-mail: robert.white@mailhost.okiuk.co.uk

FAX SHEET

Fax To: Rich Fabina
Company: Federal Communications Commission
From: Robert White
Date: 15th May 1998
Page: 20 Pages
Subject: Approval Application for NTS 00025302YA (Ref No. 351)

Dear Rich,

With reference to your Fax dated 12th May (Ref. No. 351),

1. Please find attached on Page 2/20 and 3/20 copies of letters provided by GEC-Marconi Avionics Limited stating that their test facility is on the Commission's list of facilities whose measurement results will be accepted in conjunction with an application.
2. As detailed in the report a laptop personal computer, incorporating the visual display unit and keyboard were used for the test along with the printer the product will be fitted into. The Application is not for a personal computer peripheral but for an optional accessory for the printer which only accepts serial data. Photographs of the test set up are in the report.
3. Please find attached a copy of the AC line conducted emission test that you requested (Page 4/20 to Page 17/20). However, I have submitted the complete EMC Test report again to avoid any possible confusion. The originals are also being sent for your attention by courier.
4. An actual sample of the FCC ID label was submitted with the report along with the original photograph of position. However, we have modified to improve the visual clarity of the statement. I have attached a copy of this page of the report and an actual sample for your perusal, Page 18/20
5. Please find attached a copy of the warning information (page 19/20) which will be supplied with the product and Installation Guide, (page 20/20).



EMC TEST REPORT

ON

OKI Ltd.

**Optional Serial/Memory Interface
for the
OKIpage 10i Printer.**

4/20

FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road
Columbia, MD 21046
Telephone: 301-725-1585 (ext-218)
Facsimile: 301-344-2050

July 22, 1997

IN REPLY REFER TO
31040/SIT
1300F2

GEC-Marconi Avionics Limited
Maxwell Building
Donibristle Industrial Park
Dunfermline, Fife KY11 5LB Scotland

Attention: Geoff Hunter

Re: Measurement facility located at above address
(3 and 10 meter site)

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 or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is published periodically and is also available on the Laboratory's Public Access Link as described in the enclosed Public Notice.

Sincerely,



Thomas W. Phillips
Electronics Engineer
Customer Service Branch

Enclosure:
PAL PN

7/26

FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road
Columbia, MD 21046
Telephone: 301-725-1585 (ext-218)
Facsimile: 301-344-2050

May 13, 1994

IN REPLY REFER TO
31040/SIT
1300B3

GEC-Marconi Avionics Limited
Maxwell Building
Donibristle Industrial Park
Dunfermline, Fife KY11 5 LB, Scotland

Attention: Geoff Hunter

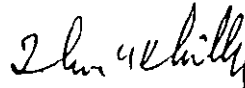
Re: Measurement facility located at above address
(3 and 10 meter site)

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 or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is published periodically and is also available on the Laboratory's Public Access Link as described in the enclosed Public Notice.

Sincerely,



Thomas W. Phillips
Electronics Engineer
Sampling and Measurements Branch

Enclosures - 2
PAL PN
NR 33573



GEC-MARCONI AVIONICS LIMITED
EMC TEST CENTRE
DONIBRISTLE INDUSTRIAL PARK
DUNFERMLINE FIFE KY11 5LB
TEL. 01383 822131 Ext.3315 FAX 01383 825396
E.MAIL EMC.FIFE@GECM.COM



Serial Number:- 449


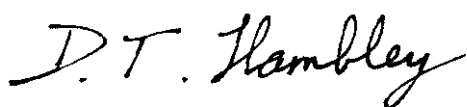
Issued to :- Mr R. White, OKI Ltd., 3 Castlecary Road, Wardpark North, Cumbernauld, G68 0BN	Order No :- PN00248
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**ELECTROMAGNETIC
COMPATIBILITY
TEST REPORT
on**

**Optional Serial/Memory Interface
for the
OKIpage 10i Printer**

Report No :- 4215 / 1600 / A / 1 TR

Date :- 14th May 1998

Prepared by :-  A. Wheelen	Approved Signatory :-  D.T. Hambley
--	--

IT IS CERTIFIED THAT THE TESTS DETAILED IN THIS REPORT HAVE BEEN CARRIED OUT AS SPECIFIED WITH THE RESULTS SHOWN TO THE REQUIREMENTS OF THE CONTRACT.

CONTENTS

	Page
Section 1 Introduction.	3
Section 2 Specifications, List of Tests and Test Results Summary.	5
Section 3 Test Equipment Used.	6
Section 4 Test Conditions.	7
Section 5 Test Sample Operation and Monitoring.	8
Section 6 Test Results.	9
 Appendices	
A - Test Results, Conducted Emissions Test.	A1
B - Sketches / Photographs of EUT cabling.	B1
C - EUT Configuration.	C1

**SECTION 1
INTRODUCTION**

1.1. General.

This report contains the results of EMC tests performed on the Optional Serial/Memory Interface for the OKIpage 10i Printer (herein called the equipment under test [EUT]) received at the EMC Test Centre on the 14th. May 1998 and tested on the 14th. May 1998.

This report is a supplement to report No. 4215 / 1600 / A / TR.

The tests were carried out in the EMC Test Centre, GEC Marconi Avionics, Donibristle, Dunfermline.

This report is written assuming the reader is familiar with the terms used in the field of EMC.

1.2. Reason for Supplement

This supplement was produced to include the results of additional EMC tests which were carried out on the EUT after publication of report No. 4215 / 1600 / A / TR.

1.3. Client.

The tests were performed for

OKI Ltd.
3 Castlecary Road,
Wardpark North,
Cumbernauld,
G68 0BN

Contact name : Mr. R. White.

1.4. Equipment Under Test (EUT).

The EUT consisted of :-

Optional Serial/Memory Interface	type no. None	serial no. 008
hosted by :- Printer	OKIpage 10i	None

with the following interconnecting cables:-

Cable 1 Serial Interface Cable, Multicore, screened.

The rationale for selection of the EUT was as follows :-

The EUT was configured in as real life a configuration as possible. The operational mode selected for test was realised by a PC driven application which continuously exercised the print function.

This configuration is considered to be the most emissive state.

1.5. EUT Support Equipment.

The EUT support equipment consisted of :-

Laptop PC	type no. Ezbook Active Matrix Color	serial no. 167206
AC Adapter	PA-1000	A9526624

1.6 NAMAS Accreditation

Opinions and interpretations expressed herein are outside the scope of NAMAS Accreditation.

1.7. Abnormalities/Departures from Standard Conditions

None.

1.8. FCC Registration

The EMC Test Centre, GEC Marconi Avionics, is a registered test facility with the Federal Communications Commission (FCC). The appropriate FCC reference number is 31040/SIT 13000B3, Dated 13 May 1994 and reconfirmed 22 July 1997.

SECTION 2
SPECIFICATIONS, LIST OF TESTS and TEST RESULTS SUMMARY**2.1. Specifications and Related Documents.**

The relevant EMC specifications are;
47CFR (1995); Part 15, Sub Part B. Unintentional Radiators; Conducted and Radiated Emission Limits.

47CFR (1995) refers to the following specification :-

ANSI C63-4 (1992) Methods of Measurements of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range 9 kHz to 40 GHz.

2.2. List of Tests.

The following is the list of tests which were required for compliance with the above specifications;

Conducted Emission Test, 0.45MHz to 30MHz

The sequence of testing is described in Section 6 of this report.

2.3. Summary of Test Results.

The following is a brief summary of the test results. Detailed data are contained in Section 6 of this report.

2.3.1. Conducted Emission Test, 0.45 MHz to 30 MHz.

The EUT and its associated cabling complied with the relevant specification limit by a margin of 10.2 dB.

2.3.2. EUT Submitted.

It should be noted that these results apply only to the particular EUT submitted, in the configuration used and in the mode of operation tested.

Report Number: 4215 / 1600 / A / 1 TR
Date : 14th May 1998.

SECTION 3
TEST EQUIPMENT USED

3.1. Test Equipment.

	<u>Serial No.</u>	<u>Last Cal.</u>	<u>Next Cal.</u>
1. <u>Receivers.</u>			
1.01 Hewlett Packard 8574A:			
8568B Spectrum Analyser	3217A05565	07/01/98	07/10/98
85662A Display	3144A20662	07/01/98	07/10/98
85685A RF Preselector	3146A01322	07/01/98	07/10/98
85650A Quasi-Peak Adapter	3145A01606	07/01/98	07/10/98
2. <u>Amplifiers.</u>			
2.01 Voltage / Frequency Converter	T034A101-01	No Cal. Required (Note 1)	
3. <u>LISN,s.</u>			
3.01 Rohde & Schwarz ESH3-Z5	827729/004	14/02/97	14/08/98
3.02 Rohde & Schwarz ESH3-Z5	827729/005	01/04/97	01/10/98
4. <u>Attenuators</u>			
4.01 Weinschel 6dB Attenuator	AX1773	22/05/97	22/05/98

Note 1. This item was used to provide 110 Vac 60 Hz power to EUT.

**SECTION 4
TEST CONDITIONS**

4.1. Test Environment.

All tests were performed under the following environmental conditions:

Temperature range	15 - 35 degrees C
Humidity range	25 - 75 %
Pressure	860-1060 mbar

4.2. Test Areas.

The Conducted Emission tests were performed in a screened room (SRI) with dimensions of 6 m x 5 m x 3 m. Adjoining the test chamber is a control room of dimensions 2.5m x 5m x 3m where the EMC test equipment was situated.

4.3. EUT Power.

The 110V 60 Hz EUT power was produced by the Voltage / Frequency Converter, T034A101-01.

SECTION 5
TEST SAMPLE OPERATION AND MONITORING

A Block Diagram of the EUT Configuration is contained in Appendix C.

5.1 EUT Configuration, as defined by the client.

During the EMC tests the EUT was configured as follows :-

The EUT was fitted with a 32 M-Byte DRAM SIMM and a Post-Script Flash SIMM.
The host was powered by 110 Vac, 60 Hz, and was serially interfaced to a Laptop PC.

5.2. Modes Of Operation, as defined by the client.

During all EMC tests the EUT was configured as follows :-

The EUT was operated via a Self Test application which continuously exercised the print function.

5.3. EUT Monitoring, as defined by the client.

During the EMC tests the EUT was monitored as follows :-

No external EUT Monitoring equipment was required.

SECTION 6 TEST RESULTS

Photographs of the EUT cabling are contained in Appendix B.

6.1. Conducted Emissions Test, 0.45 MHz to 30 MHz.

The relevant specifications were:

FCC Part 15.107(a) Class B

This test was applied to the EUT's 110V 60 Hz Live and Neutral lines. The EUT was configured in the screened room on a 80 cm high table which was positioned 40 cm from the room wall. The EUT was then powered from the 110V 60 Hz mains supply via a Line Impedance Stabilisation Network. The Supporting Laptop PC was powered from the 110V 60 Hz mains supply via a secondary Line Impedance Stabilisation Network, terminated in 50ohms.

6.1.1 110V 60 Hz Live line

A test measurement was made over the specified frequency range using Peak detection mode.

As Peak emissions were found to be approaching the Quasi Peak specification limit, further measurements were required to be made using Quasi Peak and Average detection modes.

The power line under test was then deemed to have complied with the Limits of the specification.

6.1.2 110V 60 Hz Neutral line

A test measurement was made over the specified frequency range using Peak detection mode.

As no Peak emissions were found to be approaching the Quasi Peak specification limit, no further measurements were required to be made using Quasi Peak and Average detection modes.

The power line under test was then deemed to have complied with the Limits of the specification.

Results sheets for the compliance test are contained in Appendix A of this test report.

Tested by : A. Wheelen

Report Number: 4215 / 1600 / A / 1 / TR

Date : 14th May 1998.

Appendix A

CONDUCTED EMISSIONS RESULTS

Frequency MHz	Line measured	Peak (dBuV)	QP (dBuV)	Spec. Limit (dBuV)	Diff. (dBuV)	Notes.
0.5104	Live		32.5	48.0	-15.5	
0.651	Live		27.8	48.0	-20.2	
0.7699	Live		27.0	48.0	-21.0	
0.8515	Neutral	34.2		48.0	-13.8	No QP
1.611	Neutral	33.4		48.0	-14.6	No QP
25.26	Neutral	37.8		48.0	-10.2	No QP

Comments : None

Tested by : A. Wheelen

Report Number: 4215 / 1600 / A / 1 / TR

Date : 14th May 1998.

Appendix C

EUT CONFIGURATION

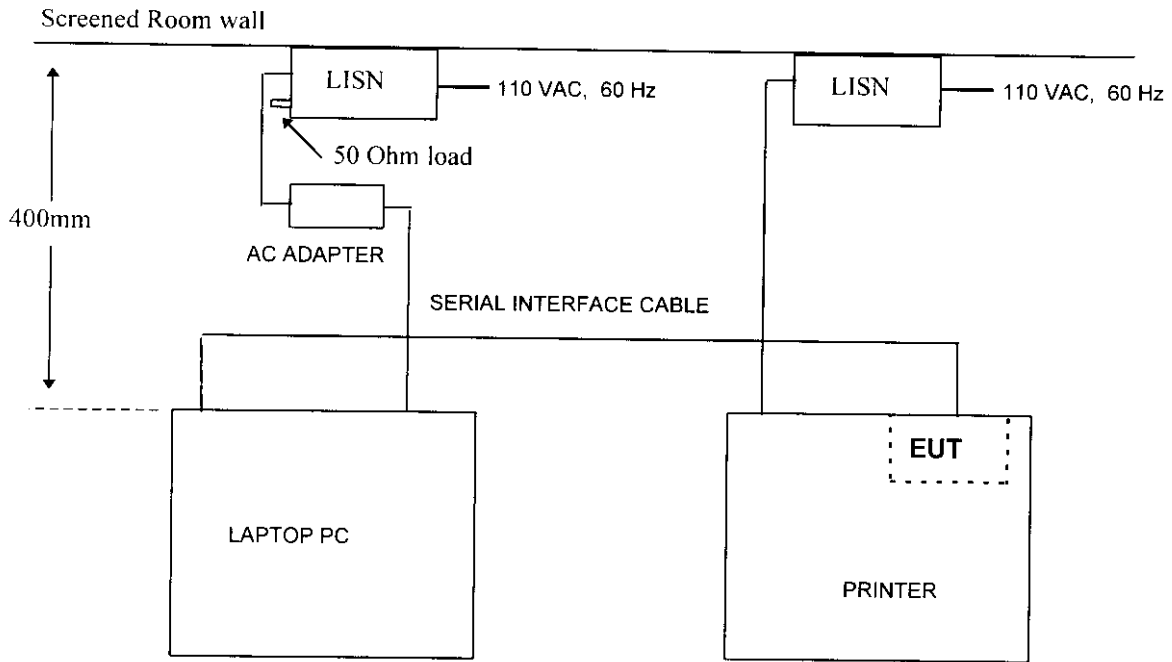


Fig 2. Block diagram.