

TITLE: PLI Evaluation Report (RFI) - **FCC ID: PMR5372X**  
DRAWING: 162680  
BY: Lee Pulver and Zane Traub

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Issued: 10 May 2001  
Approved: Lee Pulver

This drawing consists of pages issued or re-issued on dates shown in the following list.  
Italic underlined words indicate content changes or additions on revised pages.

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1 - 49	10 May 2001

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Pulver Laboratories Inc. (PLI) File Number: 5372

Pulver Laboratories Inc. (PLI) Project Number: C1031

Product Names: EUT ) Programmable Audio-Video Appliance  
(EUT = Equipment Under Test)

Model Numbers: PAVA-1

Serial Numbers: PLI537201

Applicant: JAGTEC  
96 Shereen Place  
Campbell, California 95008  
Telephone: 408.378.5846  
Facsimile: 408.378.5846  
E-mail: egperreault@earthlink.net

Location Certified: JAGTEC  
96 Shereen Place  
Campbell, California 95008  
Telephone: 408.378.5846  
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E-mail: egperreault@earthlink.net

Manufacturing Location: JAGTEC  
96 Shereen Place  
Campbell, California 95008  
Telephone: 408.378.5846  
Facsimile: 408.378.5846  
E-mail: egperreault@earthlink.net

Pulver Laboratories Inc. (PLI) Control Number: 5372X

### **Equipment Category**

- Information Technology Equipment including Electrical Business Equipment
- Low Voltage Video Products without Video Display

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## **Evaluated to the Following Standards**

### **PLI Certification.**

**Certified by Pulver Laboratories Inc. to comply with the following standards.**

#### **FCC Verification.**

#### **Federal Communications Commission (FCC, USA)**

Category Classification: Class B - Residential

- American National Standards Institute C63.4-1992 entitled Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- Federal Communications Commission Rules and Regulations located in the Code of Federal Regulations, Title 47, Part 2 entitled Frequency Allocations and Radio Treaty Matters; General Rules and Regulations; and Part 15 entitled Radio Frequency Devices, February 2001 Edition.

#### **ICAN Verification.**

#### **Industry Canada (ICAN)**

Category Classification: Class B - Residential

- Canadian Standards Association (CSA) C108.8-M1983 entitled Electromagnetic Emissions for Data Processing Equipment and Electronic Office Machines.
- Canadian Standards Association (CSA) CAN3-C108.3.1-M84 entitled Limits and Measurement Methods of Electromagnetic Noise from AC Power Systems.
- Industry Canada (ICAN) Interference-Causing Equipment Standard ICES-003, Issue 1, June 1991, entitled "Digital Apparatus".
- Industry Canada (ICAN) Radio Interference Regulation amendment dated 15 September 1988 (Radio Act Registration SOR/88-475); 3862 01 Data Processing Equipment.

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**CE Certification mark.**

**International Community**

Category Classification: Class B - Residential

- EN55022 / CISPR 22 entitled Limits and methods of measurement of radio disturbance characteristics of information technology equipment, 1995 Edition.
- EN55022 / CISPR 22 entitled Limits and methods of measurement of radio disturbance characteristics of information technology equipment, 1998 Edition.

**Referenced Test Standards**

- EN55011 entitled Specification for Limits and methods of measurement of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment. 15 Sept 1998.
- EN55014 entitled Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus, 1993 Edition.
- EN55022 / CISPR 22 entitled Limits and methods of measurement of radio disturbance characteristics of information technology equipment, First Edition 1985.

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## 1.0 Engineering Considerations

### 1.1 General Engineering Considerations

1.1.1 This report deals with conformance to the:

- Code of Federal Regulations, 47 CFR, Part 2 and Part 15, revised February 2001;
- American National Standards Institute standard number C63.4-1992 entitled Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz;
- EN55022 / CISPR 22 entitled Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Second Edition 1993, with amendment A1, May 1995 Edition.

1.1.2 To assist the Federal Communications Commission in the continuing education of applicants and grantees, Pulver Laboratories has advised JAGTEC to review a copy of the Rules and Regulations located in the Code of Federal Regulations, Title 47, Part 2 entitled Frequency Allocations and Radio Treaty Matters; General Rules and Regulations; and Part 15 entitled Radio Frequency Devices, issued 28 February 2001.

1.1.3 The manufacturer has a contractual obligation to Pulver Laboratories to incorporate into production all modifications photographed and outlined in this report with associated documentation.

1.1.4 The Pulver Laboratories Certificate of Conformance issued with this report allows the manufacturer to ship and sell product using the Pulver Laboratories Product Certification Label. This label can only be used if the manufacturer allows Pulver Laboratories to conduct a Follow Up Service at the manufacturing facilities and conduct an Electromagnetic Interference test of the finished product every six months.

1.1.5 This report also deals with conformance to Radio Frequency Interference Suppression of High Frequency Equipment for Industrial, Scientific, and Medical (ISM) and similar purposes for Canada and the countries listed in the Pulver Laboratories Certificate of Conformance associated with this report.

## 1.2 Specific Engineering Considerations

1.2.1 Interconnecting low voltage computer cables lengths:

Description	Length (feet)	Length (meters)
Serial (shielded):EUT to Laptop (x1)	6.00	1.83
RCA: EUT to Television (x2)	4.75	1.45
RCA: EUT to VCR (x3)	4.75	1.45
RCA: EUT to Camcorder (x2)	4.75	1.45

1.2.2 I / O Cables coiled and wrapped to maximum lengths of 30 to 40 cm, at least 40 cm from ground plane as recommended by ANSI 63.4-1992.

1.2.3 The RJ-45 port on the rear EUT panel only used during production to adjust firmware.

1.2.4 There is **one** possible Equipment Under Test (Programmable Audio-Video Appliance, PAVA-1) input power configuration:

1.2.4.1 One external wall adapter supplies the EUT with voltage.

1.2.5 The EUT can be operated in **three** possible configurations. The most severe test program utilizes the computer to activate each one of the ports. For this immediate report, and for the public, the only configuration available to the public with fully functional software is comprised of the EUT without the computer attached. Software for this port is not yet available. As soon as it becomes available, additional tests will confirm continued compliance to FCC Rules and Regulations.

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#### 1.2.5.1 **Test Configuration #1:**

As indicated above, the PAVA-1 can operate alone or as a PC peripheral device. For the purposes of FCC testing, the most severe test program is comprised of the CPU continuously polling all the PAVA-1 sensors and transferring the data through the PAVA-1 RS-232 port to a computer that displays the results.

The PAVA-1 will typically be used without a computer. Initial sales will also be based on no computer connection. Hence, this is a stand alone device, which does not connect directly to a TV.

Most of the inherent firmware applications do not activate all sensors simultaneously or in sequence. With the diagnostic program running through the computer, all sensors could be activated. This would hypothetically create the maximum RF or at least enable the RF characteristics of all sensors. Therefore, this FCC test configuration was determined to be the most aggressive implementation of the technology and therefore the worst-case operating condition.

Specific hardware configuration:

The Programmable Audio-Video Appliance connected to a Laptop Computer, Television, Video Cassette Recorder (VCR), and Camcorder. The inputs switched electronically between the VCR and the Camcorder. The output was directed to the Television.

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### 1.3 Product Description and Intended Use

- 1.3.1 Programmable Audio-Video Appliance, PAVA-1 is an Application Specific electronic device designed to address a wide range of audio, video, and control applications. The PAVA-1 or Programmable Audio Video Appliance. Generation 1 firmware can be both upgraded and reconfigured into any number of security or home control products.
- 1.3.2 Programmable Audio-Video Appliance PAVA-1 uses a unique set of sensors to analyze the audio-video signal. When the programmed sensor conditions are detected, PAVA-1 responds by switching or manipulating the inputted television signal. In addition to acting on the information contained in the input signal, PAVA-1 can record and retransmit any remote control signal. The remote control signals can be sent on demand or automatically as part of a response to information contained in the input television signal.

**1.4 List of Photographs Contained in this Report and Submitted Separately as Application Attachments:**

**FIGURE 1:** PLI Photograph Number 011113 illustrates the rear view of the Equipment Under Test with all peripherals attached. The "open field" radiated and the "screen room" conducted Radio Frequency Interference / Electromagnetic Interference test programs utilized this equipment and cable configuration.

**FIGURE 2:** PLI Photograph Number 011125 illustrates the left rear oblique view of the Equipment Under Test with all peripherals attached in the "screened room" conducted Electromagnetic Interference test configuration.

**FIGURE 3:** PLI Photograph Number 011120 illustrates the top view of the EUT with the top cover removed showing the component side of the Printed Circuit Assembly, JAGTEC Serial Number A/W 200001 Rev. 3.

**FIGURE 4:** PLI Photograph Number 011122 illustrates the circuit side of the EUT Mother Board Printed Circuit Assembly number A/W 200001 Rev. 3.

**FIGURE 5:** PLI Photograph Number 011124A illustrates the rear view of the EUT.

**FIGURE 6:** PLI Photograph Number 011123A illustrates the front view of the EUT.

**1.5** Equipment used during measurements calibrated according to internationally acceptable laboratory procedures. Calibration data along with Certificates of conformance and traceability are on file at the testing facility. Each calibrated equipment item is individually labeled with date calibrated; due date for next calibration; initials of person who calibrated the equipment; and the name of the organization that performed the calibration service.

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Equipment Type	Manufacturer	Model Number	Frequency Range
Spectrum Analyzer	Hewlett Packard	8568A	100 Hz - 1.5 GHz
Quasi-peak	Hewlett Packard	85650A	10 kHz - 1.00 GHz
Biconical Antenna	EMCO	3109	30 - 200 MHz
Log Periodic Antenna	EMCO	3146	200 - 1000 MHz
Magnetic Loop Antenna	Electro-Metrics	ALR-25M	10 kHz 30 MHz
Oscilloscope Camera	Tektronix	C-5C	
Amplifier	Hewlett Packard	8447D Option 010	0.1 - 1300 MHz
Attenuator	Narda	757C (35797)	3 dB (DC - 12.4 GHz)
Attenuator	Narda	757C (36808)	6 dB (DC - 12.4 GHz)
Attenuator	Narda	757C (40604)	10 dB (DC - 12.4 GHz)
Attenuator	Narda	757C (40998)	20 dB (DC - 12.4 GHz)
Close Field Antenna	Electro-Metrics	EFP-25	
Oscilloscope	Tektronix	2445	up to 150 MHz

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Equipment Type	Manufacturer	Model Number	Frequency Range
Capacitor/ Inductor Z Meter	Sencore	1 picofarad to 200,000 microfarads 1 micro Henry to 10 Henries	
L.I.S.N	Solar Electronics Co.	8012-50-R-24 BNC	50 - 60 Hz
Equipment Testing Turn Table	EMCO	1061-06	
Antenna Positioning Tower	EMCO	1050	
Radio Interference Receiver	PRD Electronics Inc.	R-1040/URM-85	(two complete systems)
Antenna Coupler	PRD Electronics Inc.	Cu-893/URM-85	80 - 220 MHz
Antenna Tripod	PRD Electronics Inc.	MT-2459/URM-85	
Frequency Converter	Empire Devices Products Corp.	CV-1102/URM-85	20 - 220 MHz
Frequency Converter	PRD Electronics Inc.	CV-1104A/URM-85	400 - 1000 MHz
Frequency Converter	PRD Electronics Inc.	CV-1101A/URM-85	0.15 30 MHz
Frequency Converter	PRD Electronics Inc.	CV-1103/URM-85	200 - 400 MHz

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Equipment Type	Manufacturer	Model Number	Frequency Range
Frequency Converter	PRD Electronics Inc.	CV-1102A/URM-85	20 - 220 MHz
Antenna Coupler (two systems)	PRD Electronics Inc.	CU-890/URM-85	0.15 30 MHz
Loop Antenna (two systems)	PRD Electronics Inc.	AT-1026/URM-85	0.15 30 MHz
Frequency Comb Generator	Hewlett Packard	8406A	20 - 1200 MHz
Tunable Band Pass Filter	K & L Microwave Inc.	5BT-95/190-5/B	95 - 195 MHz
Tunable Band Pass Filter	K & L Microwave Inc.	5BT-48/95-5/B	50 - 95 MHz
High Pass Filter	Solar Electronics Co.	7801-5.0	5 kHz
Absorbing Clamp	Schaffner EMC Inc.	MDS-21	30 - 1000 MHz
Line Probe	EMCO	3701	
Antenna Set	EMCO	3121C	30 - 1000 MHz
L.I.S.N	Solar Electronics Co.	8328-50-TS-50-N	
Frequency Generator		TS-418B/U	400 - 1000 MHz
Frequency Generator		TS-510A/U	10 - 420 MHz

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Equipment Type	Manufacturer	Model Number	Frequency Range
Antenna Set	Electro-Metrics	TDA-25	30 - 200 MHz
Antenna Set	Electro-Metrics	TDS-25-1	200 - 500 MHz
Antenna Set	Electro-Metrics	TDS-25-2	500 - 1000 MHz
Antenna (two sets)	PRD Electronics Inc.	AT-1030/URM-85	400 - 1000 MHz
Coupler Antenna	PRD Electronics Inc.	CU-895/URM-85	20 - 1000 MHz
Electronic Field Probe	PRD Electronics Inc.	MX-3411/URM-85	0.15 - 1000 MHz
Fixed Attenuator	PRD Electronics Inc.	CN-721/URM-85	0.15 - 1000 MHz
Magnetic Field Probe	PRD Electronics Inc.	MX-3412/URM-85	20 - 1000 MHz
Coupler	PRD Electronics Inc.	CU-896/URM-85	20 - 1000 MHz
Coupler	PRD Electronics Inc.	CU-897/URM-85	20 - 1000 MHz
Ground Rod	PRD Electronics Inc.	GP-117/URM-85	
Coupler Antenna	PRD Electronics Inc.	CU-894/URM-85	200 - 400 MHz
Reflector Antenna	PRD Electronics Inc.	AT-1027/URM-85	0.15 30 MHz

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Equipment Type	Manufacturer	Model Number	Frequency Range
Cable Assembly Set	PRD Electronics Inc.	MX-3410/URM-85	
Cord Assembly	PRD Electronics Inc.	CX-4305/U	
Mega Cycle Tape	Disston Carlson	TM6625-351-12-8	17 - 1000 MHz
Antenna Discone	Empire Devices Products Corp.	AS-1158/URM-85	Broad Band
Headset	Empire Devices Products Corp.	H-113/U	
Mast Sections	Empire Devices Products Corp.	AB-21/GR	
Antenna Tripod			
EMI Line Filter	Stanford Applied Engineering	D30B	50 - 60 Hz 3 phase
Digital Power Meter	Fluke and Phillips	FLUKE 39	
Multimeter	Fluke and Phillips	FLUKE 87 True RMS	
Feed Through Caps	Solar Electronics Co.	6512-106 R 10 microfarad capacitors	275V RMS, 60 Hz
Multimeter	Beckman Industrial Corp.	Circuitmate DM15B	250V RMS, 400 Hz
RMS Multimeter	Beckman Industrial Corp.	Tech 310	

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<b>Equipment Type</b>	<b>Manufacturer</b>	<b>Model Number</b>
Multimeter	Fluke and Phillips	FLUKE 85
RMS Multimeter	Fluke and Phillips	FLUKE 87
ELF Field Monitor	Walker Magnetic Group	ELF 50D
RMS Multimeter	Fluke and Phillips	FLUKE 87

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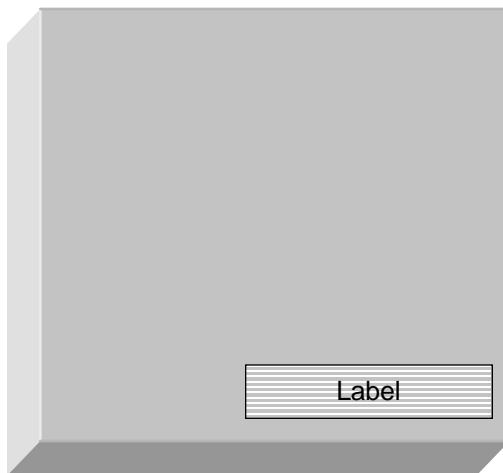
## 2.0 **Mandatory Labeling and Operators' Manual Information and Shipping Documents**

### 2.1 **FCC Label**

Illustration 1.0 on the next page illustrates the actual FCC label (three times the actual size) with the appropriate wording. Note the letters "EMI" on the label that abbreviate "Electromagnetic Interference". Organizations like the Federal Communications Commission and their respective limits are listed on the label.

Also, notice the letters "NRTL", which abbreviate "Nationally Recognized Testing Laboratory" as recommended by OSHA and the National Electrical Code for the United States. For Pulver Laboratories product Certification labels used for safety Certification, the phrase "SAFETY" appears on the label. Safety Certifying organizations like Pulver Laboratories are listed on the label adjacent to the testing standards used during equipment evaluation.

A rough sketch of the label location is shown below.



Top, Rear Panel of EUT

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**Illustration 1.0**  
{three times the size of actual FCC Label}



JAGTEC

**FCC ID: PMR5372X**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. This Product Certified to meet the Standards in the categories listed on this label by

PLI Pulver Laboratories NRTL  
Control Number 5372X

Information Technology Equipment  
Low Voltage Video Products  
EMI: FCC Part 15 Class B;  
ICAN ICES-003 Class B; EN55022 Class B

## 2.2 Operators' Manual Information

2.2.1 The following information is inserted directly into the equipment user instruction manual to meet the requirements of product safety and Radio Frequency Interference (RFI) rules and regulations.

**CAUTION** - Connections between peripherals of the computer equipment must be made with low voltage shielded computer data cables.

**WARNING** - A non-shielded power cord may be used to connect AC power to every component and peripheral of the system.

**WARNING** - Use only the JAGTEC specified wall adapter for this product. This JAGTEC wall adapter enhances the system performance and increases the product safety features.

2.3 **FCC User Information** - The following statements are placed in the front of the operators' manual so that the user of the EUT is aware of its interference potential. Additional information about corrective measures may also be provided to the user at the manufacturer's option.

**For a Class B Digital Device or Peripheral**

**FCC NOTICE  
INFORMATION FOR THE USER**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- 1) Reorient or relocate the receiving antenna.
- 2) Increase the separation between the equipment and receiver.
- 3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- 4) Consult the dealer of an experienced radio/TV technician for help.

The user may find the following publication prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems" (Stock Number 004-000-00345-4).

Available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone 202-512-1800).

**FCC WARNING**

Changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules could void the user's authority to operate the equipment.

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**For a Class B or Class 2 Digital Device**

**CE NOTICE**  
**INFORMATION FOR THE USER**

This equipment has been tested and found to comply with the limits for a Class B or Class 2 digital device, pursuant to EN 55022 Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The user may find the following publication prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems"  
(Stock Number 004-000-00345-4).

Available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone 202-512-1800).

**WARNING**

Changes or modifications not expressly approved by the party responsible for compliance to EN 55022 Rules could void the user's authority to operate the equipment.

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2.4 **Industry Canada** - The ICAN statements that follow this paragraph (Illustration 2.0) shall be provided along with the Pulver Laboratories Certificate of Conformance (in this report) in the first pages of the operators' manual and be placed with the shipping documents accompanying each product.

### **Illustration 2.0**

#### **ICAN Class B Digital Equipment**

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

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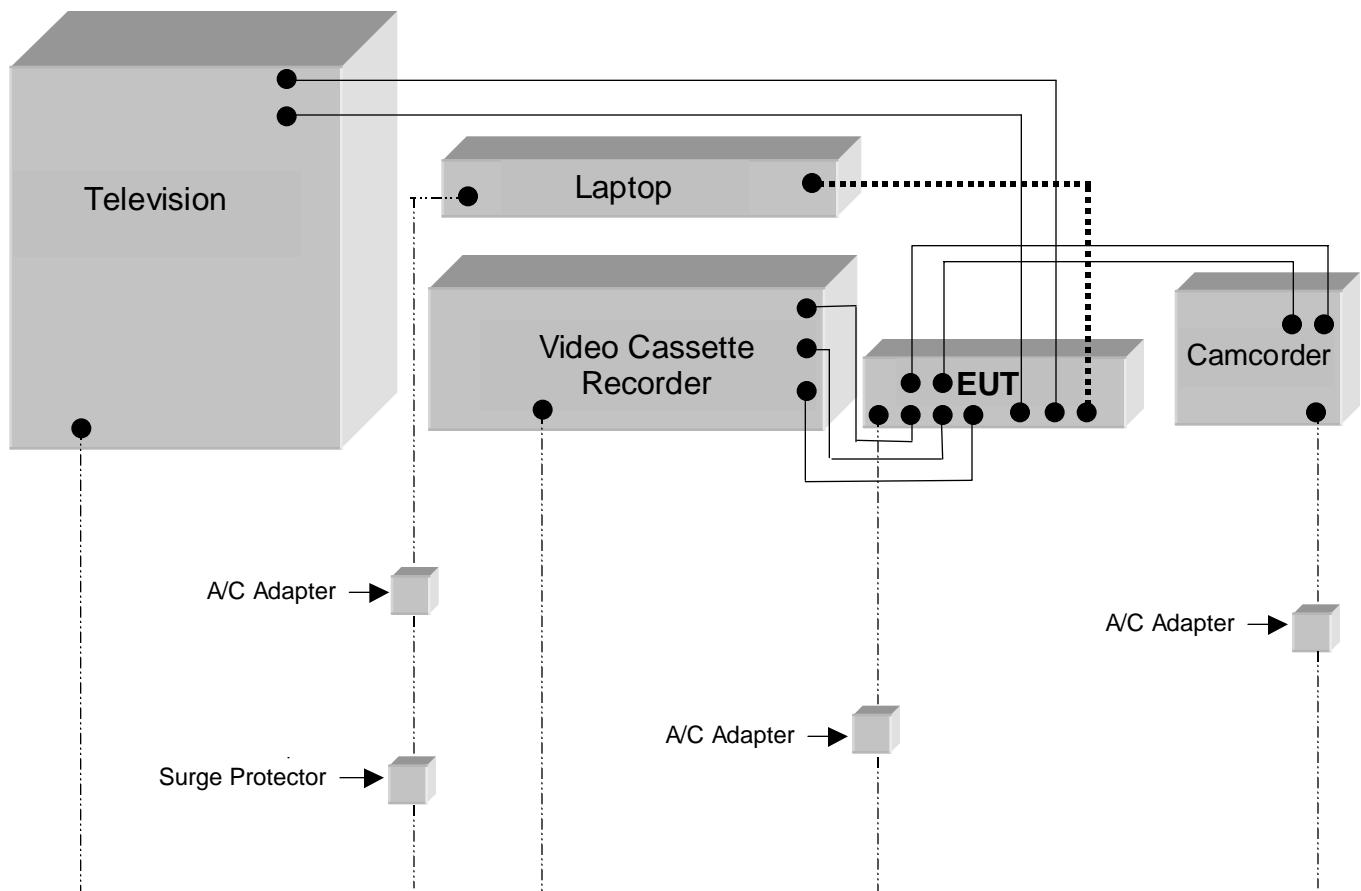
**Block Diagram of Equipment Under Test (EUT)  
Showing Clock Oscillators and Frequencies of Operation**

Real Time Clock Oscillator 18 MHz	Crystal Oscillator 32.768 KHz
--------------------------------------	----------------------------------

**Use this diagram to simplify locating the oscillators  
in the accompanying schematics.**

### Equipment Under Test Orientation and Configuration

#### Zero Degrees



----- To 120VAC Mains  
\_\_\_\_\_ RCA Cables  
..... Nine Pin Serial I/O Cable

#### 180 Degrees

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### 3.0 Radiated Electromagnetic Interference (EMI) - Test Configuration

- 3.1 PLI placed the Equipment Under Test (EUT) on an 80 centimeter high table located on a 12.70 millimeter (0.5 inch) thick, 1.83 meter (6.00 foot) diameter, remote controlled steel turntable positioned 3.00 meters away from a receiving antenna assembly. This steel gear driven turntable has a 2400 pound capacity. The grounded turntable top surface is flush with a grounded screen consisting of 6.35 millimeter (0.25 inch) squares forming a wire mesh. The automated 4.00 meter mast and antenna assembly connects to an RF amplifier attached to a spectrum analyzer with quasi-peak adapter.
- 3.2 The Equipment Under Test (EUT) was operated at its specified load condition for which it was designed. After 30 minutes of continuous operation the EUT reached normal operating temperature. Recorded EMI data in this report was accumulated during the normal load and operating temperature of the EUT.
- 3.3 The EUT and system configuration follows:
  - a. EUT connected to the Camcorder via two RCA cables.
  - b. EUT connected to the Television via two RCA cables.
  - c. EUT connected to the Video Cassette Recorder via three RCA cables.
  - d. EUT connected to the Laptop Computer via one 9-pin serial I/O cable.
  - e. The RJ-45 port inactive since this port use to program firmware during a production environment. Never used by customer
  - f. One of the two audio input ports inactive. Both ports switched, but only one made active by the system: either one can be active, but not both.
  - g. One of the two audio output ports inactive. Both ports switched, but only one made active by the system: either one can be active, but not both.
  - h. The Television and the Video Cassette Recorder were connected directly to 120VAC mains and powered on.
  - i. The Camcorder was connected to 120VAC mains through an AC/DC wall adapter and powered on.
  - j. The Laptop Computer was connected to 120VAC mains through an AC/DC wall adapter and surge protector and powered on. The Windows operating system loaded automatically.

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- k. The EUT was powered on by connecting it to 120VAC mains power through an AC/DC wall adapter.
- l. After the Windows operating system finished loading, the "FCC Diagnostics" icon was selected from the desktop of the Laptop Computer. This began the communication between the EUT and the laptop that controlled the selection of the input device for the EUT.
- m. The EUT continued to switch inputs from the Video Cassette Recorder and the Camcorder and output the data to the Television.

The following equipment list defines the system configuration:

EUT	:Programmable Audio-Video Appliance
Model Number	:PAVA-1
Serial Number	:PLI537201
FCC ID Number	:PMR5372X
Manufacturer	:JAGTEC
Product	:AC/DC Adapter (Programmable Audio-Video Appliance)
Model Number	:AD-1250
Serial Number	:412-1252
FCC ID Number	:None
Manufacturer	:Mouser
Product	:Video Cassette Recorder
Model Number	:VR645HF
Serial Number	:849370589
FCC ID Number	:C5F7NF0005
Manufacturer	:RCA
Product	:Trinitron Color Television
Model Number	:KV19TR20
Serial Number	:8265809
FCC ID Number	:None
Manufacturer	:SONY Corporation
Product	:Camcorder 6-48mm, 1:1.8
Model Number	:/N°DE Modèle C6805
Serial Number	:145510878
FCC ID Number	:None
Manufacturer	:General Electric

Product	:AC/DC Adapter (Camcorder)
Model Number	:/N°DE Modèle 1CUA146C
Serial Number	:KIIWAI0865
FCC ID Number	:None
Manufacturer	:General Electric
Product	:Laptop Computer
Model Number	:Inspiron 7000 (PPI)
Serial Number	:PN5833E-Rev.-A02
FCC ID Number	:DOC Authorized
Manufacturer	:Dell Corporation
Product	:AC/DC Adapter (Laptop Computer)
Type:	:ADP-70BB
Model Number	:PA-4 P/N 1243C
Serial Number	:DP/N 0001143C Rev. A01
FCC ID Number	:None
Manufacturer	:Dell Corporation
Product	:Surge Protector (Laptop Computer)
Model Number	:PNOTEPRO
Serial Number	:(S) 298120204702
FCC ID Number	:None
Manufacturer	:APC

3.4 The Equipment Under Test was evaluated per the American National Standards Institute standard number C63.4-1992 entitled Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. To maximize Electromagnetic Interference signal strength, PLI rotated the System Under Test 360 degrees and then adjusted the receiving antenna height until the maximum signal appeared on the spectrum analyzer. The input/output interface cables between units of the system were always positioned to yield maximum field strength.

#### 4.0 Radiated EMI – Results

- 4.1 The investigated frequency spectrum revealed radiated EMI signals. The highest interference in the horizontal polarization occurred when the front of the unit was facing 180 degrees clockwise with respect to the antenna. The highest interference in the vertical polarization occurred when the front of the unit was facing 180 degrees clockwise with respect to the antenna.
- 4.2 The "ACF" (Antenna Correction Factor) shown in the test data in this report includes compensation for the antenna factor; cable attenuation; the series RF attenuator; the RF amplifier; and pre-selector system losses. The spectrum analyzer data is shown as quasi-peak amplitudes.
- 4.3 The test facility is FCC registered; the procedures are CISPR registered, ICAN registered, VCCI registered, VDE approved, and BZT approved.

Type of Test	Radiated Electromagnetic Interference
Specification	FCC, ICAN, and EN55022 Class B
Date Data Collected	14 Mar 2001
Detection Technique	Spectrum Analyzer with Quasi-peak Adapter
Resolution Bandwidth	100 kHz
Video Bandwidth	100 kHz
Antennas	30 to 200 MHz High Field Biconical 200 to 1000 MHz Log-Periodic

**Test Configuration #1**

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	EN Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
<b>Horizontal</b>					
36.00	20.80	-8.66	12.14	40.46	-28.32
40.03	29.50	-8.94	20.56	40.46	-19.90
49.88	25.40	-10.11	15.29	40.46	-25.17
54.00	26.20	-10.38	15.82	40.46	-24.64
72.00	24.50	-12.56	11.94	40.46	-28.52
85.85	27.40	-14.26	13.14	40.46	-27.32
126.00	28.90	-9.58	19.32	40.46	-21.14
140.03	26.10	-10.00	16.10	40.46	-24.36
141.63	29.00	-9.89	19.11	40.46	-21.35
144.03	30.90	-9.74	21.16	40.46	-19.30
160.05	22.90	-7.13	15.77	40.46	-24.69
162.00	23.50	-7.73	15.77	40.46	-24.69
171.85	28.60	-9.58	19.02	40.46	-21.44
180.00	29.30	-6.96	22.34	40.46	-18.12
197.18	25.10	-10.69	14.41	40.46	-26.05
216.00	36.40	-10.28	26.12	40.46	-14.34
225.60	36.00	-9.66	26.34	40.46	-14.12
229.10	34.60	-9.44	25.16	40.46	-15.30
238.40	34.80	-8.83	25.97	47.46	-21.49
246.63	29.80	-8.30	21.50	47.46	-25.96
247.93	32.20	-8.22	23.98	47.46	-23.48
252.00	34.10	-7.93	26.17	47.46	-21.29
253.40	30.50	-7.82	22.68	47.46	-24.78
257.45	40.80	-7.52	33.28	47.46	-14.18
270.00	29.80	-6.57	23.23	47.46	-24.23
276.53	35.90	-6.07	29.83	47.46	-17.63
288.00	33.60	-5.72	27.88	47.46	-19.58

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**Test Configuration #1 - Continued**

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	EN Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
<b>Horizontal</b>					
300.00	31.20	-5.59	25.61	47.46	-21.85
306.00	27.70	-5.67	22.03	47.46	-25.43
314.65	28.70	-5.80	22.90	47.46	-24.56
324.20	25.70	-5.93	19.77	47.46	-27.69
333.25	29.50	-6.06	23.44	47.46	-24.02
333.73	33.80	-6.06	27.74	47.46	-19.72
334.78	25.50	-6.08	19.42	47.46	-28.04
336.08	24.70	-6.10	18.60	47.46	-28.86
342.00	20.40	-6.18	14.22	47.46	-33.24
343.28	33.20	-6.20	27.00	47.46	-20.46
352.80	30.80	-6.11	24.69	47.46	-22.77
360.00	21.80	-5.65	16.15	47.46	-31.31
362.33	34.50	-5.50	29.00	47.46	-18.46
372.28	26.50	-4.87	21.63	47.46	-25.83
381.40	27.40	-4.28	23.12	47.46	-24.34
386.58	26.10	-3.95	22.15	47.46	-25.31
390.93	23.80	-3.67	20.13	47.46	-27.33
396.00	20.10	-3.35	16.75	47.46	-30.71
398.55	26.00	-3.18	22.82	47.46	-24.64
400.48	27.10	-3.08	24.02	47.46	-23.44
414.00	20.30	-2.73	17.57	47.46	-29.89
429.08	24.50	-2.34	22.16	47.46	-25.30
432.00	21.60	-2.27	19.33	47.46	-28.13
438.63	23.70	-2.10	21.60	47.46	-25.86
448.13	27.40	-1.85	25.55	47.46	-21.91
450.00	27.20	-1.80	25.40	47.46	-22.06
467.98	22.90	-1.59	21.31	47.46	-26.15

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### Test Configuration #1 - Continued

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	EN Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Horizontal					
486.00	20.10	-1.38	18.72	47.46	-28.74
540.00	21.20	-1.05	20.15	47.46	-27.31
576.00	20.30	-0.78	19.52	47.46	-27.94
589.78	26.20	-0.67	25.53	47.46	-21.93
594.00	20.50	-0.63	19.87	47.46	-27.59
612.00	20.60	-0.60	20.00	47.46	-27.46
648.00	20.40	-0.68	19.72	47.46	-27.74
666.00	20.70	0.16	20.86	47.46	-26.60
684.00	20.20	1.10	21.30	47.46	-26.16
738.00	20.10	1.30	21.40	47.46	-26.06
867.68	25.30	4.24	29.54	47.46	-17.92
946.53	27.40	5.80	33.20	47.46	-14.26
990.00	20.10	7.37	27.47	47.46	-19.99
999.73	20.50	7.73	28.23	47.46	-19.23

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**Test Configuration #1**

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	EN Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Vertical					
36.00	30.10	-8.52	21.58	40.46	-18.88
42.95	37.70	-8.66	29.04	40.46	-11.42
49.85	36.30	-8.80	27.50	40.46	-12.96
54.00	32.20	-9.20	23.00	40.46	-17.46
60.03	29.60	-9.80	19.80	40.46	-20.66
72.00	33.90	-10.16	23.74	40.46	-16.72
76.30	35.40	-9.86	25.54	40.46	-14.92
85.83	38.40	-9.37	29.03	40.46	-11.43
112.90	39.40	-8.18	31.22	40.46	-9.24
126.00	24.90	-7.59	17.31	40.46	-23.15
129.95	31.70	-7.39	24.31	40.46	-16.15
141.58	31.10	-6.89	24.21	40.46	-16.25
143.03	32.80	-6.79	26.01	40.46	-14.45
144.00	35.80	-6.72	29.08	40.46	-11.38
160.63	37.50	-5.16	32.34	40.46	-8.12
162.00	32.00	-5.07	26.93	40.46	-13.53
171.60	35.90	-4.52	31.38	40.46	-9.08
180.00	27.20	-4.30	22.90	40.46	-17.56
184.63	30.00	-4.30	25.70	40.46	-14.76
197.48	22.50	-4.30	18.20	40.46	-22.26
214.80	24.00	-3.88	20.12	40.46	-20.34
216.00	23.90	-3.84	20.06	40.46	-20.40
219.33	29.80	-3.75	26.05	40.46	-14.41
220.63	38.80	-3.72	35.08	40.46	-5.38
234.03	22.60	-3.47	19.13	47.46	-28.33
239.58	25.70	-3.36	22.34	47.46	-25.12
243.43	26.40	-3.29	23.11	47.46	-24.35

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**Test Configuration #1 - Continued**

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	EN Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Vertical					
246.40	25.20	-3.24	21.96	47.46	-25.50
247.93	30.70	-3.21	27.49	47.46	-19.97
252.70	22.80	-3.11	19.69	47.46	-27.77
257.45	46.10	-3.00	43.10	47.46	-4.36
270.00	25.80	-2.72	23.08	47.46	-24.38
272.05	24.90	-2.68	22.22	47.46	-25.24
276.53	40.20	-2.58	37.62	47.46	-9.84
286.05	34.80	-2.33	32.47	47.46	-14.99
288.05	20.80	-2.27	18.53	47.46	-28.93
293.15	28.70	-2.13	26.57	47.46	-20.89
295.58	26.30	-2.06	24.24	47.46	-23.22
297.03	22.50	-2.02	20.48	47.46	-26.98
306.00	24.50	-1.82	22.68	47.46	-24.78
310.25	25.60	-1.73	23.87	47.46	-23.59
314.68	38.10	-1.64	36.46	47.46	-11.00
324.20	35.80	-1.44	34.36	47.46	-13.10
325.73	30.30	-1.41	28.89	47.46	-18.57
333.23	25.90	-1.26	24.64	47.46	-22.82
333.73	36.60	-1.25	35.35	47.46	-12.11
343.25	38.30	-1.05	37.25	47.46	-10.21
352.78	30.00	-0.85	29.15	47.46	-18.31
360.00	23.50	-0.70	22.80	47.46	-24.66
362.33	35.60	-0.65	34.95	47.46	-12.51
371.85	30.20	-0.46	29.74	47.46	-17.72
378.00	20.80	-0.33	20.47	47.46	-26.99
381.43	25.80	-0.26	25.54	47.46	-21.92

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### Test Configuration #1 - Continued

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	EN Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Vertical					
400.48	29.70	0.14	29.84	47.46	-17.62
404.00	30.40	0.21	30.61	47.46	-16.85
414.00	21.40	0.42	21.82	47.46	-25.64
416.03	28.60	0.46	29.06	47.46	-18.40
432.08	30.50	0.79	31.29	47.46	-16.17
450.03	29.50	1.16	30.66	47.46	-16.80
466.65	29.40	1.50	30.90	47.46	-16.56
468.00	25.80	1.53	27.33	47.46	-20.13
504.00	26.80	2.26	29.06	47.46	-18.40
577.75	30.60	3.64	34.24	47.46	-13.22
591.25	22.70	3.89	26.59	47.46	-20.87
648.00	21.10	4.94	26.04	47.46	-21.42
663.25	28.20	5.25	33.45	47.46	-14.01
695.55	24.70	5.92	30.62	47.46	-16.84
774.00	20.10	7.44	27.54	47.46	-19.92
800.00	27.90	7.98	35.88	47.46	-11.58
900.00	20.50	9.94	30.44	47.46	-17.02
933.38	20.70	10.63	31.33	47.46	-16.13
990.00	20.30	11.79	32.09	47.46	-15.37

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### Test Configuration #1

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin To Limit dB $\mu$ V/M
Horizontal					
36.00	20.80	8.66	12.14	40.00	27.86
40.03	29.50	-8.94	20.56	40.00	-19.44
49.88	25.40	-10.11	15.29	40.00	-24.71
54.00	26.20	-10.38	15.82	40.00	-24.18
72.00	24.50	-12.56	11.94	40.00	-28.06
85.85	27.40	-14.26	13.14	40.00	-26.86
126.00	28.90	-9.58	19.32	43.50	-24.18
140.03	26.10	-10.00	16.10	43.50	-27.40
141.63	29.00	-9.89	19.11	43.50	-24.39
144.03	30.90	-9.74	21.16	43.50	-22.34
160.05	22.90	-7.13	15.77	43.50	-27.73
162.00	23.50	-7.73	15.77	43.50	-27.73
171.85	28.60	-9.58	19.02	43.50	-24.48
180.00	29.30	-6.96	22.34	43.50	-21.16
197.18	25.10	-10.69	14.41	43.50	-29.09
216.00	36.40	-10.28	26.12	43.50	-17.38
225.60	36.00	-9.66	26.34	46.00	-19.66
229.10	34.60	-9.44	25.16	46.00	-20.84
238.40	34.80	-8.83	25.97	46.00	-20.03
246.63	29.80	-8.30	21.50	46.00	-24.50
247.93	32.20	-8.22	23.98	46.00	-22.02
252.00	34.10	-7.93	26.17	46.00	-19.83
253.40	30.50	-7.82	22.68	46.00	-23.32
257.45	40.80	-7.52	33.28	46.00	-12.72
270.00	29.80	-6.57	23.23	46.00	-22.77
276.53	35.90	-6.07	29.83	46.00	-16.17
288.00	33.60	-5.72	27.88	46.00	-18.12
300.00	31.20	-5.59	25.61	46.00	-20.39

### Test Configuration #1 - Continued

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Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Horizontal					
306.00	27.70	-5.67	22.03	46.00	-23.97
314.65	28.70	-5.80	22.90	46.00	-23.10
324.20	25.70	-5.93	19.77	46.00	-26.23
333.25	29.50	-6.06	23.44	46.00	-22.56
333.73	33.80	-6.06	27.74	46.00	-18.26
334.78	25.50	-6.08	19.42	46.00	-26.58
336.08	24.70	-6.10	18.60	46.00	-27.40
342.00	20.40	-6.18	14.22	46.00	-31.78
343.28	33.20	-6.20	27.00	46.00	-19.00
352.80	30.80	-6.11	24.69	46.00	-21.31
360.00	21.80	-5.65	16.15	46.00	-29.85
362.33	34.50	-5.50	29.00	46.00	-17.00
372.28	26.50	-4.87	21.63	46.00	-24.37
381.40	27.40	-4.28	23.12	46.00	-22.88
386.58	26.10	-3.95	22.15	46.00	-23.85
390.93	23.80	-3.67	20.13	46.00	-25.87
396.00	20.10	-3.35	16.75	46.00	-29.25
398.55	26.00	-3.18	22.82	46.00	-23.18
400.48	27.10	-3.08	24.02	46.00	-21.98
414.00	20.30	-2.73	17.57	46.00	-28.43
429.08	24.50	-2.34	22.16	46.00	-23.84
432.00	21.60	-2.27	19.33	46.00	-26.67
438.63	23.70	-2.10	21.60	46.00	-24.40
448.13	27.40	-1.85	25.55	46.00	-20.45
450.00	27.20	-1.80	25.40	46.00	-20.60
467.98	22.90	-1.59	21.31	46.00	-24.69

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Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Horizontal					
486.00	20.10	-1.38	18.72	46.00	-27.28
540.00	21.20	-1.05	20.15	46.00	-25.85
576.00	20.30	-0.78	19.52	46.00	-26.48
589.78	26.20	-0.67	25.53	46.00	-20.47
594.00	20.50	-0.63	19.87	46.00	-26.13
612.00	20.60	-0.60	20.00	46.00	-26.00
648.00	20.40	-0.68	19.72	46.00	-26.28
666.00	20.70	0.16	20.86	46.00	-25.14
684.00	20.20	1.10	21.30	46.00	-24.70
738.00	20.10	1.30	21.40	46.00	-24.61
867.68	25.30	4.24	29.54	46.00	-16.46
946.53	27.40	5.80	33.20	46.00	-12.80
990.00	20.10	7.37	27.47	54.00	-26.54
999.73	20.50	7.73	28.23	54.00	-25.77

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**Test Configuration #1**

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Vertical					
36.00	30.10	-8.52	21.58	40.00	-18.42
42.95	37.70	-8.66	29.04	40.00	-10.96
49.85	36.30	-8.80	27.50	40.00	-12.50
54.00	32.20	-9.20	23.00	40.00	-17.00
60.03	29.60	-9.80	19.80	40.00	-20.20
72.00	33.90	-10.16	23.74	40.00	-16.26
76.30	35.40	-9.86	25.54	40.00	-14.46
85.83	38.40	-9.37	29.03	40.00	-10.97
112.90	39.40	-8.18	31.22	43.50	-12.28
126.00	24.90	-7.59	17.31	43.50	-26.19
129.95	31.70	-7.39	24.31	43.50	-19.19
141.58	31.10	-6.89	24.21	43.50	-19.29
143.03	32.80	-6.79	26.01	43.50	-17.49
144.00	35.80	-6.72	29.08	43.50	-14.42
160.63	37.50	-5.16	32.34	43.50	-11.16
162.00	32.00	-5.07	26.93	43.50	-16.57
171.60	35.90	-4.52	31.38	43.50	-12.12
180.00	27.20	-4.30	22.90	43.50	-20.60
184.63	30.00	-4.30	25.70	43.50	-17.80
197.48	22.50	-4.30	18.20	43.50	-25.30
214.80	24.00	-3.88	20.12	43.50	-23.38
216.00	23.90	-3.84	20.06	43.50	-23.44
219.33	29.80	-3.75	26.05	46.00	-19.95
220.63	38.80	-3.72	35.08	46.00	-10.92
234.03	22.60	-3.47	19.13	46.00	-26.87
239.58	25.70	-3.36	22.34	46.00	-23.66
243.43	26.40	-3.29	23.11	46.00	-22.89

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**Test Configuration #1 - Continued**

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Vertical					
246.40	25.20	-3.24	21.96	46.00	-24.04
247.93	30.70	-3.21	27.49	46.00	-18.51
252.70	22.80	-3.11	19.69	46.00	-26.31
257.45	46.10	-3.00	43.10	46.00	-2.90
270.00	25.80	-2.72	23.08	46.00	-22.92
272.05	24.90	-2.68	22.22	46.00	-23.78
276.53	40.20	-2.58	37.62	46.00	-8.38
286.05	34.80	-2.33	32.47	46.00	-13.53
288.05	20.80	-2.27	18.53	46.00	-27.47
293.15	28.70	-2.13	26.57	46.00	-19.43
295.58	26.30	-2.06	24.24	46.00	-21.76
297.03	22.50	-2.02	20.48	46.00	-25.52
306.00	24.50	-1.82	22.68	46.00	-23.32
310.25	25.60	-1.73	23.87	46.00	-22.13
314.68	38.10	-1.64	36.46	46.00	-9.54
324.20	35.80	-1.44	34.36	46.00	-11.64
325.73	30.30	-1.41	28.89	46.00	-17.11
333.23	25.90	-1.26	24.64	46.00	-21.36
333.73	36.60	-1.25	35.35	46.00	-10.65
343.25	38.30	-1.05	37.25	46.00	-8.75
352.78	30.00	-0.85	29.15	46.00	-16.85
360.00	23.50	-0.70	22.80	46.00	-23.20
362.33	35.60	-0.65	34.95	46.00	-11.05
371.85	30.20	-0.46	29.74	46.00	-16.26
378.00	20.80	-0.33	20.47	46.00	-25.53
381.43	25.80	-0.26	25.54	46.00	-20.46

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### Test Configuration #1 - Continued

Frequency MHz	EMI Data dB $\mu$ V/M	ACF	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin to Limit dB $\mu$ V/M
Vertical					
400.48	29.70	0.14	29.84	46.00	-16.16
404.00	30.40	0.21	30.61	46.00	-15.39
414.00	21.40	0.42	21.82	46.00	-24.18
416.03	28.60	0.46	29.06	46.00	-16.94
432.08	30.50	0.79	31.29	46.00	-14.71
450.03	29.50	1.16	30.66	46.00	-15.34
466.65	29.40	1.50	30.90	46.00	-15.10
468.00	25.80	1.53	27.33	46.00	-18.67
504.00	26.80	2.26	29.06	46.00	-16.94
577.75	30.60	3.64	34.24	46.00	-11.76
591.25	22.70	3.89	26.59	46.00	-19.41
648.00	21.10	4.94	26.04	46.00	-19.96
663.25	28.20	5.25	33.45	46.00	-12.55
695.55	24.70	5.92	30.62	46.00	-15.38
774.00	20.10	7.44	27.54	46.00	-18.46
800.00	27.90	7.98	35.88	46.00	-10.12
900.00	20.50	9.94	30.44	46.00	-15.56
933.38	20.70	10.63	31.33	46.00	-14.67
990.00	20.30	11.79	32.09	54.00	-21.91

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#### 4.4 Calculations and Notes Concerning Data Presentation

- 4.4.1 "ACF" means the Antenna Correction Factor for either Horizontal or Vertical antenna orientation.
- 4.4.2 "H" means Horizontal antenna orientation.
- 4.4.3 "V" means Vertical antenna orientation.
- 4.4.4 "\*" means the "Margin to Limit" Exceeds the "EN Limit" and/or Exceeds the "FCC Limit" or is within a -2 dB  $\mu$ V margin.
- 4.4.5 "A" designates an ambient signal.
- 4.4.6 "(-. -)" means the signal level as lower than the adjacent data or within the background ambients.
- 4.4.7 "EMI DATA" plus "ACF" equals "Field Strength".
- 4.4.8 "Field Strength" minus "EN Limit" and/or minus "FCC Limit" equals "Margin to Limit".
- 4.4.9 "Margin to Limit" negative numbers show Equipment Under Test "Field Strength" below the "EN Limit" and/or below the "FCC Limit". "Margin to Limit" positive numbers show Equipment Under Test "Field Strength" above the "EN Limit" and/or above the "FCC Limit".
- 4.5 The field strengths in this section were measured at 3.0 meters. None of the Electromagnetic Interference quasi-peaks are in excess of the ICAN (Industry Canada), FCC (Federal Communications Commission), and EC (European Community) Class B maximums, even when the field strength readings in the above table are reduced by 20 dB  $\mu$ V (to represent 30 meter test site measurements, since an antenna positioned at 30.0 meters receives one tenth of the field strength recorded at 3.0 meters).
- 4.6 **Conclusion** - The radiated Electromagnetic Interference of the Equipment Under Test meets the requirements for Industry Canada (ICAN), Federal Communications Commission (FCC), and the European Community (EC) Class B devices.

## 5.0 Conducted EMI - Test Configuration

- 5.1 Current input power leads of the Equipment Under Test were connected to a Line Impedance Stabilization Network (LISN), which isolate and couple the conducted interference from the power lines to a spectrum analyzer. The LISN and the Equipment Under Test were connected and positioned according to the Industry Canada and the Federal Communications Commission test recommendations. The Equipment Under Test was configured exactly as outlined in the Radiated Electromagnetic Interference Section of this report. The spectrum analyzer data is shown in the following table as quasi-peak amplitudes.
- 5.2 To increase data integrity and also meet the recommendations of the American National Standards Institute standard number C63.4-1992, all electrical devices comprising the system being tested with the Equipment Under Test were connected to the VAC mains using a second Line Impedance Stabilization Network.

## 6.0 Conducted EMI – Results

- 6.1 Investigation of the EUT revealed conducted interference levels as shown in the table below.

Type of Test	Conducted Electromagnetic Interference
Specification	FCC, ICAN, and EN55022 Class B
Date Data Collected	14 Mar 2001
Detection Technique	Spectrum Analyzer with Quasi-peak Adapter
Frequency Range	0.150 to 30.0 MHz
Resolution Bandwidth	10 kHz
Video Bandwidth	10 kHz
Line Impedance Stabilization Network	50 micro Henry; 50 ohm

**Test Configuration #1**

<b>Frequency MHz</b>	<b>Line Data dB<math>\mu</math>V</b>	<b>Neutral Data dB<math>\mu</math>V</b>	<b>EN Limit dB<math>\mu</math>V</b>	<b>Margin to Limit (Line) dB<math>\mu</math>V</b>	<b>Margin to Limit (Neutral) dB<math>\mu</math>V</b>
0.15	23.00	23.00	66.00	-43.00	-43.00
0.20	23.70	-.-	67.08	-43.38	-.-
0.45	16.00	-.-	74.29	-58.29	-.-
0.55	-.-	17.00	56.00	-.-	-39.00
1.04	15.20	14.30	56.00	-40.80	-41.70
1.50	25.80	-.-	56.00	-30.20	-.-
2.23	-.-	14.40	56.00	-.-	-41.60
3.27	14.80	-.-	56.00	-41.20	-.-
3.60	-.-	14.20	56.00	-.-	-41.80
4.55	14.60	-.-	56.00	-41.40	-.-
5.27	-.-	14.10	60.00	-.-	-45.90
6.00	-.-	14.00	60.00	-.-	-46.00
6.75	14.80	-.-	60.00	-45.20	-.-
8.90	-.-	14.00	60.00	-.-	-46.00
9.16	14.70	-.-	60.00	-45.30	-.-
10.78	-.-	14.10	60.00	-.-	-45.90
11.74	14.80	-.-	60.00	-45.20	-.-
12.37	-.-	14.40	60.00	-.-	-45.60
13.50	15.60	-.-	60.00	-44.40	-.-
14.17	-.-	17.70	60.00	-.-	-42.30
14.31	18.00	-.-	60.00	-42.00	-.-
16.42	-.-	16.00	60.00	-.-	-44.00
16.63	15.70	-.-	60.00	-44.30	-.-
18.00	17.50	17.50	60.00	-42.50	-42.50
19.18	-.-	19.10	60.00	-.-	-40.90
19.46	20.30	18.60	60.00	-39.70	-41.40
19.66	20.50	20.70	60.00	-39.50	-39.30
20.00	32.30	31.80	60.00	-27.70	-28.20

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### Test Configuration #1 - Continued

Frequency MHz	Line Data dB $\mu$ V	Neutral Data dB $\mu$ V	EN Limit dB $\mu$ V	Margin to Limit (Line) dB $\mu$ V	Margin to Limit (Neutral) dB $\mu$ V
22.48	-.-	14.70	60.00	-.-	-45.30
22.92	16.90	-.-	60.00	-43.10	-.-
23.99	23.50	-.-	60.00	-36.50	-.-
24.16	-.-	16.00	60.00	-.-	-44.00
25.15	21.30	-.-	60.00	-38.70	-.-
25.33	-.-	25.00	60.00	-.-	-35.00
26.81	-.-	20.30	60.00	-.-	-39.70
27.03	17.60	-.-	60.00	-42.40	-.-
28.20	-.-	17.50	60.00	-.-	-42.50
29.70	15.50	-.-	60.00	-44.50	-.-
30.00	-.-	20.20	60.00	-.-	-39.80

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**Test Configuration #1**

Frequency MHz	Line Data dB $\mu$ V	Neutral Data dB $\mu$ V	FCC Limit dB $\mu$ V	Margin to Limit (Line) dB $\mu$ V	Margin to Limit (Neutral) dB $\mu$ V
0.15	16.00	-.-	48.00	-32.00	-.-
0.55	-.-	17.00	48.00	-.-	-31.00
1.04	15.20	14.30	48.00	-32.80	-33.70
1.50	25.80	-.-	48.00	-22.20	-.-
2.23	-.-	14.40	48.00	-.-	-33.60
3.27	14.80	-.-	48.00	-33.20	-.-
3.60	-.-	14.20	48.00	-.-	-33.80
4.55	14.60	-.-	48.00	-33.40	-.-
5.27	-.-	14.10	48.00	-.-	-33.90
6.00	-.-	14.00	48.00	-.-	-34.00
6.75	14.80	-.-	48.00	-33.20	-.-
8.90	-.-	14.00	48.00	-.-	-34.00
9.16	14.70	-.-	48.00	-33.30	-.-
10.78	-.-	14.10	48.00	-.-	-33.90
11.74	14.80	-.-	48.00	-33.20	-.-
12.37	-.-	14.40	48.00	-.-	-33.60
13.50	15.60	-.-	48.00	-32.40	-.-
14.17	-.-	17.70	48.00	-.-	-30.30
14.31	18.00	-.-	48.00	-30.00	-.-
16.42	-.-	16.00	48.00	-.-	-32.00
16.63	15.70	-.-	48.00	-32.30	-.-
18.00	17.50	17.50	48.00	-30.50	-30.50
19.18	-.-	19.10	48.00	-.-	-28.90
19.46	20.30	18.60	48.00	-27.70	-29.40
19.66	20.50	20.70	48.00	-27.50	-27.30
20.00	32.30	31.80	48.00	-15.70	-16.20
22.48	-.-	14.70	48.00	-.-	-33.30
22.92	16.90	-.-	48.00	-31.10	-.-
23.99	23.50	-.-	48.00	-24.50	-.-

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### Test Configuration #1 - Continued

Frequency MHz	Line Data dB $\mu$ V	Neutral Data dB $\mu$ V	FCC Limit dB $\mu$ V	Margin to Limit (Line) dB $\mu$ V	Margin to Limit (Neutral) dB $\mu$ V
24.16	-.-	16.00	48.00	-.-	-32.00
25.15	21.30	-.-	48.00	-26.70	-.-
25.33	-.-	25.00	48.00	-.-	-23.00
26.81	-.-	20.30	48.00	-.-	-27.70
27.03	17.60	-.-	48.00	-30.40	-.-
28.20	-.-	17.50	48.00	-.-	-30.50
29.70	15.50	-.-	48.00	-32.50	-.-
30.00	-.-	20.20	48.00	-.-	-27.80

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## 6.2 Calculations and Notes Concerning Data Presentation

- 6.2.1 "\*" means the "Margin to Limit" Exceeds the "FCC Limit" and/or Exceeds the "EN Limit" or is within a -2 dB  $\mu$ V margin.
- 6.2.2 "(--)" means the signal level as lower than the adjacent data or within the background ambients.
- 6.2.3 "Line Data" minus "FCC Limit" and/or minus "EN Limit" equals "Margin to Limit" for the Line side of the input power cord.
- 6.2.4 "Neutral Data" minus "FCC Limit" and/or minus "EN Limit" equals "Margin to Limit" for the Neutral side of the input power cord.
- 6.2.5 "Margin to Limit" negative numbers show Equipment Under Test "Field Strength" **below** the "FCC Limit" and/or **below** the "EN Limit". "Margin to Limit" positive numbers show Equipment Under Test "Field Strength" **above** the "FCC Limit" and/or **above** the "EN Limit".
- 6.2.6 "A" means an Ambient signal.
- 6.2.7 The symbol " " adjacent to a line of conducted Electromagnetic Interference data means that the "Field Strength" was recorded directly as a quasi-peak measurement, and then reduced by 13 dB  $\mu$ V. The data obtained in quasi-peak mode was 6 dB  $\mu$ V or higher than the level of the same emission measured with the spectrum analyzer detector function set to the average mode. The emission was considered broadband, since the quasi-peak mode bandwidth setting was identical to the average mode bandwidth setting. 100 samples were recorded represented by the following equation:

$$\left( \frac{1}{n} \right) \sum_{i=1}^n X_i$$

- 6.3 **Conclusion** - The conducted Electromagnetic Interference of the Equipment Under Test meets the requirements for Industry Canada (ICAN), Federal Communications Commission (FCC), and the European Community (EC) Class B devices.
- 6.4 Graphs of PEAK conducted Electromagnetic Interference for frequency ranges on Line and Neutral are shown on the following pages.

6.4 The recorded conducted data utilized a quasi-peak measurement procedure. Hence, any differences between the graphs and the data are merely the differences between peak and quasi-peak measurements.

6.5 There are 33 AM and 56 FM radio stations in the immediate San Jose, California, area which create large ambient signals. Typical radio stations are:

- 0.810 MHz KGO
- 1.170 MHz KLOK
- 1.370 MHz KEEN
- 1.500 MHz KHTT
- 1.590 MHz KLIV

6.6 The conducted Electromagnetic Interference graphs in this report show some of the large ambient signals for several of these radio stations.

6.7 The final Electromagnetic Interference conducted test and measurement equipment configuration was evaluated to assure that Data Compression or Intermodulation Distortion did not occur due to these large ambient signals.

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**Signature Page - Last Page of Report**

**Project Coordinated by**

Signed \_\_\_\_\_  
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