3.0 SYSTEM TEST CONFIGURATION

3.1 JUSTIFICATION

The EUT was configured for testing in a typical fashion (as a customer would normally use it) by attaching it to a host PC. This PC had all of its ports connected to external peripherals.

3.2 EUT EXERCISE SOFTWARE

The EUT exercise program used during radiated and conducted testing has been designed to exercise the various system components in a manner similar to a typical use. The software, contained on the hard disk drive, sequentially exercises each system component. 1) an H prints on the monitor, 2) an H prints on the printer 3) an H is sent to serial ports, 4) a file is read from the floppy diskette, 5) a file is read from the hard drive and any other hard drive present, 6) a file is read from the CD-ROM drive. In cases that implement the use of Universal Serial Bus (USB) ports, a looped batch program is initiated to render a continuous flow of data through the USB ports. The complete cycle takes less than one second and is repeated continually. Systems that utilize network cards are connected to a server and are configured to transmit and receive packets of data continuously. As the keyboard and mouse are strictly input devices, no data was transmitted to them during test. They are, however, continuously scanned for data input activity.

3.3 SPECIAL ACCESSORIES

The end user is advised that he/she should use the same type of cables as those mentioned in Table 1 of this test report.

APPENDIX A:

BLOCK DIAGRAM OF KD-1911 19" MONITOR

Please see following pages.

5.0 CONDUCTED EMISSION DATA

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the average limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively.

TABLE 2: CONDUCTED EMISSIONS: 1024 X 768 @ 85 HZ

L1

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	EN55022 / CISPR22 QP LIMIT (dBuV)	EN55022 / CISPR22 QP MARGIN (dBuV)	EN55022 / CISPR22 AV LIMIT (dBuV)	EN55022 / CISPR22 AV MARGIN (dBuV)
0.206	Qp	44.3	0.3	44.6	63.4	-18.8	53.4	-8.8
0.206	Av	40.8	0.3	41.1	63.4	-22.3	53.4	-12.3
0.275	Pk	43.8	0.3	44.1	61.0	-16.9	51.0	-6.9
0.963	Pk	30.2	0.5	30.7	56.0	-25.3	46.0	-15.3
15.729	Pk	25.5	2.7	28.2	60.0	-31.8	50.0	-21.8
21.431	Pk	29.2	2.7	31.9	60.0	-28.1	50.0	-18.1
25.877	Pk	26.6	3.4	30.0	60.0	-30.0	50.0	-20.0

L2

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	EN55022 / CISPR22 QP LIMIT (dBuV)	EN55022 / CISPR22 QP MARGIN (dBuV)	EN55022 / CISPR22 AV LIMIT (dBuV)	EN55022 / CISPR22 AV MARGIN (dBuV)
0.206	Qp	44.3	0.3	44.6	63.4	-18.8	53.4	-8.8
0.206	Av	40.8	0.3	41.1	63.4	-22.3	53.4	-12.3
0.343	Pk	39.2	0.4	39.6	59.1	-19.5	49.1	-9.5
0.964	Pk	30.3	0.4	30.7	56.0	-25.3	46.0	-15.3
21.566	Pk	30.1	2.5	32.6	60.0	-27.4	50.0	-17.4
23.627	Pk	34.0	3.0	37.0	60.0	-23.0	50.0	-13.0
25.884	Pk	26.7	3.1	29.8	60.0	-30.2	50.0	-20.2

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: Elizabeth Szrajer   Date: March 1, 1999

Typed/Printed Name: Elizabeth Szrajer

TABLE 3: CONDUCTED EMISSIONS: 1280 X 1024 @ 85 HZ

L1

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	EN55022 / CISPR22 QP LIMIT (dBuV)	EN55022 / CISPR22 QP MARGIN (dBuV)	EN55022 / CISPR22 AV LIMIT (dBuV)	EN55022 / CISPR22 AV MARGIN (dBuV)
0.181	Qp	61.2	0.4	61.6	64.4	-2.8	54.4	7.2
0.183	Av	48.6	0.4	49.0	64.3	-15.3	54.3	-5.3
0.275	Pk	34.3	0.3	34.6	61.0	-26.4	51.0	-16.4
0.366	Pk	44.1	0.3	44.4	58.6	-14.2	48.6	-4.2
0.458	Pk	35.7	0.3	36.0	56.7	-20.7	46.7	-10.7
21.466	Pk	31.3	2.7	34.0	60.0	-26.0	50.0	-16.0
25.767	Pk	26.6	3.4	30.0	60.0	-30.0	50.0	-20.0

L2

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	EN55022 / CISPR22 QP LIMIT (dBuV)	EN55022 / CISPR22 QP MARGIN (dBuV)	EN55022 / CISPR22 AV LIMIT (dBuV)	EN55022 / CISPR22 AV MARGIN (dBuV)
0.179	Qp	60.5	0.4	60.9	64.5	-3.6	54.5	6.4
0.179	Av	43.6	0.4	44.0	64.5	-20.5	54.5	-10.5
0.275	Pk	46.5	0.3	46.8	61.0	-14.2	51.0	-4.2
0.365	Pk	42.9	0.4	43.3	58.6	-15.3	48.6	-5.3
1.006	Pk	34.5	0.5	35.0	56.0	-21.0	46.0	-11.0
21.560	Pk	31.4	2.5	33.9	60.0	-26.1	50.0	-16.1
26.582	Pk	33.1	3.2	36.3	60.0	-23.7	50.0	-13.7

(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: [signature] Date: March 1, 1999

Typed/Printed Name: Elizabeth Szrajer

TABLE 4: CONDUCTED EMISSIONS: 1600 X 1200 @ 75 HZ

L1

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	EN55022 / CISPR22 QP LIMIT (dBuV)	EN55022 / CISPR22 QP MARGIN (dBuV)	EN55022 / CISPR22 AV LIMIT (dBuV)	EN55022 / CISPR22 AV MARGIN (dBuV)
0.182	Qp	62.0	0.4	62.4	64.4	-2.0	54.4	8.0
0.188	Av	44.9	0.4	45.3	64.1	-18.8	54.1	-8.8
0.281	Pk	31.5	0.3	31.8	60.8	-29.0	50.8	-19.0
0.377	Pk	35.5	0.3	35.8	58.3	-22.5	48.3	-12.5
20.570	Pk	27.9	2.8	30.7	60.0	-29.3	50.0	-19.3
21.505	Pk	29.5	2.7	32.2	60.0	-27.8	50.0	-17.8
25.738	Pk	26.1	3.4	29.5	60.0	-30.5	50.0	-20.5

L2

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	EN55022 / CISPR22 QP LIMIT (dBuV)	EN55022 / CISPR22 QP MARGIN (dBuV)	EN55022 / CISPR22 AV LIMIT (dBuV)	EN55022 / CISPR22 AV MARGIN (dBuV)
0.187	Qp	61.4	0.4	61.8	64.2	-2.4	54.2	7.6
0.187	Av	48.1	0.4	48.5	64.2	-15.7	54.2	-5.7
0.282	Pk	27.7	0.3	28.0	60.8	-32.8	50.8	-22.8
0.376	Qp	41.4	0.4	41.8	58.4	-16.6	48.4	-6.6
0.376	Av	33.1	0.4	33.5	58.4	-24.9	48.4	-14.9
0.565	Pk	23.2	0.4	23.6	56.0	-32.4	46.0	-22.4
20.197	Pk	28.7	2.8	31.5	60.0	-28.5	50.0	-18.5
21.476	Pk	29.2	2.5	31.7	60.0	-28.3	50.0	-18.3

(1) Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: Elizabeth Szrajer

Date: March 1, 1999

Typed/Printed Name: Elizabeth Szrajer

6.0 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph 6.1.

TABLE 5: RADIATED EMISSIONS: 1024 X 768 @ 85 HZ

(Temperature: 62°F, Humidity: 54%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	EN55022/ CISPR22 LIMIT (dBuV/m)	EN55022/ CISPR22 MARGIN (dBuV/m)
189.025	V	38.3	-12.3	26.0	30.0	-4.0
204.765	V	37.2	-12.3	24.9	30.0	-5.1
212.645	V	30.5	-11.2	19.3	30.0	-10.7
228.395	V	31.3	-9.8	21.5	30.0	-8.5
283.620	V	31.4	-8.3	23.1	37.0	-13.9
322.930	V	32.2	-6.1	26.1	37.0	-10.9

TABLE 6: RADIATED EMISSIONS (1280 X 1024 @ 85 HZ)

(Temperature: 62°F, Humidity: 54%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	EN55022/ CISPR22 LIMIT (dBuV/m)	EN55022/ CISPR22 MARGIN (dBuV/m)
159.316	V	33.4	-14.1	19.3	30.0	-10.7
185.900	H	38.5	-12.5	26.0	30.0	-4.0
199.144	V	36.7	- 12.3	24.4	30.0	-5.6
225.724	V	33.8	-10.3	23.5	30.0	-6.5
252.314	V	33.8	-8.6	25.2	37.0	-11.8
318.644	V	33.8	-6.2	27.6	37.0	-9.4

****All readings are quasi-peak unless, stated otherwise. See Appendix B for Radiated Test Methodology.***

TEST PERSONNEL:

Signature: ______________ Date: March 4, 1999

Typed/Printed Name: K. Franck Schuppius

TABLE 7: RADIATED EMISSIONS (1600 X 1200 @ 75 HZ)

(Temperature: 62°F, Humidity: 54%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	EN55022/ CISPR22 LIMIT (dBuV/m)	EN55022/ CISPR22 MARGIN (dBuV/m)
154.436	V	36.7	-14.4	22.3	30.0	-7.7
171.620	V	34.5	-13.1	21.4	30.0	-8.6
205.893	V	39	-12.2	26.8	30.0	-3.2
240.192	V	36.3	-8.9	27.4	37.0	-9.6
274.579	V	34.9	-7.3	27.6	37.0	-9.4
308.902	V	34.2	-6.7	27.5	37.0	-9.5
360.364	V	31.7	-5.2	26.5	37.0	-10.5

****All readings are quasi-peak unless, stated otherwise. See Appendix B for Radiated Test Methodology.***

TEST PERSONNEL:

Signature: ______________ Date: March 4, 1999

Typed/Printed Name: K. Franck Schuppius

6.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)$$

FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(dB/m) = -PG(dB) + AF(dB/m) + CL(dB)$$

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

7.0 PHOTOS OF EUT

APPENDIX A: Emissions Equipment List

DESCRIPTION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. LAB
Amplifier	Hewlett Packard	11975A	2304A00348	TEST EQUITY
Amplifier (S/A 1)	Rhein Tech	PR-1040	00001	RTL
Amplifier (S/A 2)	Rhein Tech	RTL2	900723	RTL
Amplifier (S/A 3)	Rhein Tech	8447F	2944A03783	RTL
Amplifier (S/A 4)	Rhein Tech	8447D	2727A05397	RTL
Biconical/Log Antenna 1	Antenna Research	LPB-2520	1037	LIBERTY LABS
Biconical/Log Antenna 2	Antenna Research	LPB-2520	1036	LIBERTY LABS
Field Site Source	EMCO	4610	9604-1313	RTL
Filter (Room 1)	Solar	8130	947305	RTL
Filter (Room 2)	Solar	8130	947306	RTL
Harmonic Mixer 1	Hewlett Packard	11970K	2332A00563	TELOGY
Harmonic Mixer 2	Hewlett Packard	11970A	2332A01199	TELOGY
Horn Antenna 1	EMCO	3160-10	9606-1033	EMCO
Horn Antenna 2	EMCO	3160-9	9605-1051	EMCO
Horn Antenna 3	EMCO	3160-7	9605-1054	EMCO
Horn Antenna 4	EMCO	3160-8	9605-1044	EMCO
Horn Antenna 5	EMCO	3160-03	9508-1024	EMCO
LISN (Room 1/L1)	Solar	7225-1	900727	ACUCAL
LISN (Room 1/L2)	Solar	7225-1	900726	ACUCAL
LISN (Room 2/L1)	Solar	7225-1	900078	ACUCAL
LISN (Room 2/L2)	Solar	7225-1	900077	ACUCAL
Pre-Amplifier	Hewlett Packard	8449B OPT	3008A00505	TELOGY
Quasi-Peak Adapter (S/A 1)	Hewlett Packard	85650A	3145A01599	ACUCAL
Quasi-Peak Adapter (S/A 2)	Hewlett Packard	85650A	2811A01276	ACUCAL
Quasi-Peak Adapter (S/A 3)	Hewlett Packard	85650A	2521A00473	ACUCAL
Quasi-Peak Adapter (S/A 4)	Hewlett Packard	85650A	2521A01032	ACUCAL
RF Preselector (S/A 1)	Hewlett Packard	85685A	3146A01309	ACUCAL
Signal Generator (HP)	Hewlett Packard	8660C	1947A02956	ACUCAL
Signal Generator (Wavetek)	Wavetek	3510B	4952044	ACUCAL
Spectrum Analyzer 1	Hewlett Packard	8566B	3138A07771	ACUCAL
Spectrum Analyzer 2	Hewlett Packard	8567A	2841A00614	ACUCAL
Spectrum Analyzer 4	Hewlett Packard	8567A	2727A00535	ACUCAL
Tunable Dipole	EMCO	3121	274	LIBERTY LABS

APPENDIX B: Conducted and Radiated Test Methodology

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

Before final measurements of radiated emissions were made on the open-field three/ten meter range; the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When any clock exceeds 108 MHz, the EUT was tested between 1 to 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

APPENDIX C:

USER'S MANUAL