Engineering and Testing for EMC and Safety Compliance

APPLICATION FOR FCC CLASS B CERTIFICATION

SCANNING RECEIVER

Vertex Standard Co., Ltd.
4-8-8, Nakameguro
Meguro-ku, Tokyo 153-8644
Japan

MODEL: VR-120
FCC ID: K66VR-120

December 11, 2000

This report concerns (check one): Original Grant: X **Class II Change:** **Equipment Type: Scanning Receiver**
Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)? Yes: No: X **If yes, defer until:** _____ ***Date*** **Company name agrees to notify the Commission by: _____(date) of the intended date of announcement of the product so that the grant can be issued on that date.**
Transition Rules Request per 15.37? Yes: No: X **If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision..**

REPORT PREPARED BY:

EMI Technician: E. Szrajer

Rhein Tech Laboratories, Inc.

Document Number: 2000470

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APPENDIX LISTING

1.0 GENERAL INFORMATION

The following Application for FCC Type Certification of a Scanning Receiver is prepared on behalf of Vertex Standard in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions rules and regulations and Industry Canada RSS-210. The Equipment Under Test (EUT) was the VR-120, FCC ID: K66VR-120. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the three-meter, open field; test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. The FCC accepts Rhein Tech Laboratories, Inc. as a facility available to do measurement work for others on a contractual basis.

1.1 STANDARDS REFERENCED

STANDARDS REFERENCED FOR THIS REPORT	
FCC RULES AND REGULATION	PART 2 SUBPART J
FCC RULES AND REGULATION	PART 15 §15.109
FCC RULES AND REGULATION	PART 15 §15.111
FCC RULES AND REGULATION	PART 15 § 15.121
ANSI	C63.4:1992
INDUSTRY CANADA	RSS-210

1.2 BASIC INFORMATION ON THE EUT

FREQUENCY RANGE MHZ	OUTPUT POWER (W)	FREQUENCY TOLERANCE	EMISSION DESIGNATOR
0.1-1300	N/A	N/A	N/A

1.3 MODIFICATIONS

No modifications were made to the EUT during testing.

1.4 RELATED SUBMITTAL(S)/GRANT(S)

This is an original certification submission.

1.5 TEST METHODOLOGY

Radiated testing was performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.6 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 SYSTEM TEST CONFIGURATION

2.1 JUSTIFICATION

To complete the test configuration required by the FCC, the receiver was connected to an external antenna, which receives a signal from a signal generator output. With the antenna installed, the receiver indicator was used to determine optimal reception. The EUT's IF, local oscillators, and crystal oscillators and harmonics of each were investigated. All modes were investigated and tested including standby mode and scanning mode. The final radiated data was taken with the EUT locked to a set frequency.

2.2 EXERCISING THE EUT

The EUT was exercised using a Hewlett Packard Signal Generator to generate a continuous wave frequency, which was received by and activated the EUT receiver portion under test.

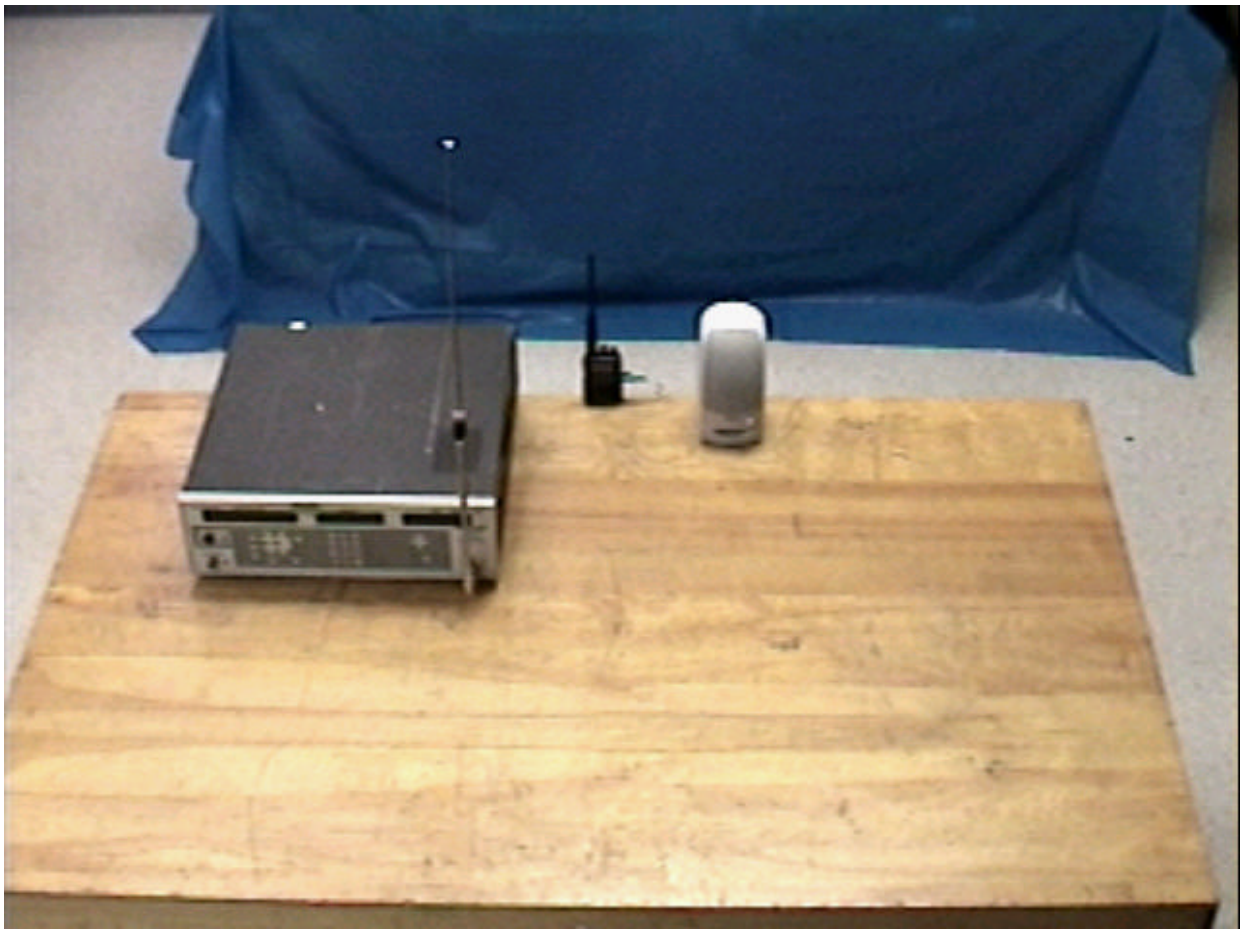
2.3 TEST SYSTEM DETAILS

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

EXTERNAL PERIPHERALS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
COMMUNICATIONS RECEIVER (EUT)	**VERTEX STANDARD CORPORATION LTD.**	**VR-120**	**0M000102**	**N/A**		**012771**
ANTENNA (EUT)	**VERTEX STANDARD CORPORATION LTD.**	**7" WHIP ANTENNA**	**N/A**	**N/A**		**012772**
SIGNAL GENERATOR	WAVETEK	3510	5372160	N/A	UNSHIELDED POWER	900935
SPEAKER	BOSTON ACOUSTICS	BA265	0000143	N/A	UNSHIELDED I/O UNSHIELDED POWER	011996

2.4 TEST SYSTEM CONFIGURATION PHOTOGRAPH



2.5 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
ANTENNA	ATM	WR08	08443-6	ATM
MIXER	OLESON	M08HW	F80814-1	OLESON
MIXER	OLESON	M05HW	G80814-1	OLESON
DIPLEXER	OLESON	M05HW	G80814-1	OLESON
MIXER	HEWLETT PACKARD	11970U	2332A01110	ACUCAL
MIXER	HEWLETT PACKARD	11970V	2521A00512	TELOGY
MIXER	HEWLETT PACKARD	11970W	2521A00710	TELOGY
ANTENNA	ATM	WR15	15-443-6	ATM
ANTENNA	ATM	WR10	10-443-6	ATM
ANTENNA	ATM	WR05	05-443-6	ATM
SWEEP GENERATOR	HEWLETT PACKARD	83752A	3610A00866	HEWLETT PACKARD

2.6 TEST METHODOLOGY

CONDUCTED EMISSIONS MEASUREMENTS

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 (EUT 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.

RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, 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 approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, and EMCO log periodic and biconical antenna. In order to gain sensitivity, a New Circuits ZHL-4240W preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

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.

3.0 RADIATED EMISSION DATA

TABLE 1: Radiated Emissions: (Channel set at 30.0 MHz)

(Temperature: 52°F, Humidity: 55%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	60	1.0	36.4	-21.6	14.8	40.0	-25.2
64.970	Qp	H	330	4.0	38.8	-23.3	15.5	40.0	-24.5
175.956	Qp	V	10	1.0	34.0	-17.2	16.8	43.5	-26.7
278.450	Qp	H	210	4.0	35.8	-13.5	22.3	46.0	-23.7
556.900	Qp	V	190	1.0	38.1	-5.7	32.4	46.0	-13.6
835.350	Qp	V	185	1.0	24.7	-3.8	20.9	46.0	-25.1

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature: Elizabeth Szrajer Date: November 30, 2000

Typed/Printed Name: E. Szrajer

TABLE 2: Radiated Emissions: (Channel set at 95.0 MHz)

(Temperature: 52°F, Humidity: 55%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	45	1.0	37.8	-21.6	16.2	40.0	-23.8
64.970	Qp	H	315	4.0	39.8	-23.3	16.5	40.0	-23.5
175.956	Qp	V	275	1.0	33.9	-17.2	16.7	43.5	-26.8
184.820	Qp	V	305	1.0	32.8	-17.6	15.2	43.5	-28.3
343.450	Qp	H	170	1.8	37.0	-11.7	25.3	46.0	-20.7
686.900	Qp	V	90	1.0	28.7	-5.6	23.1	46.0	-22.9

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature: Elizabeth Szrajer Date: November 30, 2000

Typed/Printed Name: E. Szrajer

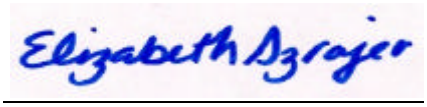
TABLE 3: Radiated Emissions: (Channel set at 160.0 MHz)

(Temperature: 51°F, Humidity: 55%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	325	1.0	36.9	-21.6	15.3	40.0	-24.7
64.970	Qp	H	155	4.0	39.8	-23.3	16.5	40.0	-23.5
175.956	Qp	V	0	1.0	32.6	-17.2	15.4	43.5	-28.1
184.820	Qp	V	210	1.0	32.3	-17.6	14.7	43.5	-28.8
408.450	Qp	V	195	1.0	38.4	-9.6	28.8	46.0	-17.2
816.900	Qp	H	170	1.0	23.8	-2.9	20.9	46.0	-25.1

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: November 30, 2000

Typed/Printed Name: E. Szrajer

TABLE 4: Radiated Emissions: (Channel set at 265.0 MHz)

(Temperature: 51°F, Humidity: 55%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	315	1.0	37.3	-21.6	15.7	40.0	-24.3
64.970	Qp	H	295	4.0	37.9	-23.3	14.6	40.0	-25.4
131.995	Qp	H	180	4.0	30.3	-16.1	14.2	43.5	-29.3
175.956	Qp	V	345	1.0	34.3	-17.2	17.1	43.5	-26.4
184.820	Qp	V	205	1.0	31.7	-17.6	14.1	43.5	-29.4
513.450	Qp	V	255	1.0	44.3	-7.8	36.5	46.0	-9.5

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

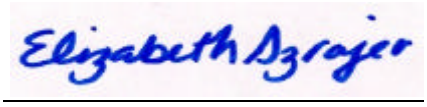
Signature:  Date: November 30, 2000

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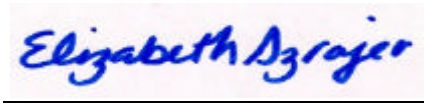
TABLE 5: Radiated Emissions: (Channel set at 370.0 MHz)

(Temperature: 48°F, Humidity: 56%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	315	1.0	36.2	-21.6	14.6	40.0	-25.4
64.970	Qp	H	100	4.0	38.4	-23.3	15.1	40.0	-24.9
131.995	Qp	H	210	4.0	30.4	-16.1	14.3	43.5	-29.2
175.956	Qp	V	300	1.0	33.8	-17.2	16.6	43.5	-26.9
184.820	Qp	V	130	1.0	32.4	-17.6	14.8	43.5	-28.7
618.450	Qp	V	190	1.0	32.1	-5.3	26.8	46.0	-19.2

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: November 30, 2000

Typed/Printed Name: E. Szrajer

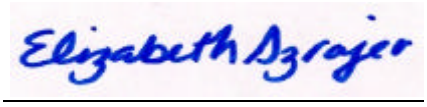
TABLE 6: Radiated Emissions: (Channel set at 445.0 MHz)

(Temperature: 48°F, Humidity: 56%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	45	1.0	34.5	-21.6	12.9	40.0	-27.1
64.970	Qp	H	265	4.0	38.5	-23.3	15.2	40.0	-24.8
131.995	Qp	H	190	4.0	30.7	-16.1	14.6	43.5	-28.9
175.956	Qp	V	90	1.0	34.7	-17.2	17.5	43.5	-26.0
184.820	Qp	V	285	1.0	32.8	-17.6	15.2	43.5	-28.3
693.450	Qp	V	175	1.0	33.2	-5.4	27.8	46.0	-18.2

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: November 30, 2000

Typed/Printed Name: E. Szrajer

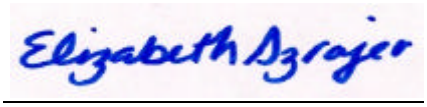
TABLE 7: Radiated Emissions: (Channel set at 520.0 MHz)

(Temperature: 47°F, Humidity: 56%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	170	1.0	36.2	-21.6	14.6	40.0	-25.4
64.970	Qp	H	235	4.0	36.5	-23.3	13.2	40.0	-26.8
131.995	Qp	H	25	4.0	32.2	-16.1	16.1	43.5	-27.4
175.956	Qp	V	210	1.0	33.1	-17.2	15.9	43.5	-27.6
184.820	Qp	V	185	1.0	31.0	-17.6	13.4	43.5	-30.1
768.450	Qp	V	110	1.0	27.9	-3.8	24.1	46.0	-21.9

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: November 30, 2000

Typed/Printed Name: E. Szrajer

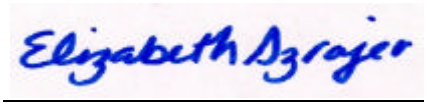
TABLE 8: Radiated Emissions: (Channel set at 740.0 MHz)

(Temperature: 47°F, Humidity: 58%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	H	25	4.0	31.1	-19.9	11.2	40.0	-28.8
64.970	Qp	H	115	4.0	39.0	-23.3	15.7	40.0	-24.3
131.995	Qp	H	0	4.0	30.9	-16.1	14.8	43.5	-28.7
175.956	Qp	V	90	1.0	33.0	-17.2	15.8	43.5	-27.7
184.820	Qp	V	295	1.0	31.2	-17.6	13.6	43.5	-29.9
491.550	Qp	V	260	1.0	42.9	-8.1	34.8	46.0	-11.2

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: November 30, 2000

Typed/Printed Name: E. Szrajer

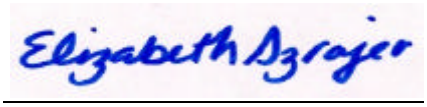
TABLE 9: Radiated Emissions: (Channel set at 960.0 MHz)

(Temperature: 45°F, Humidity: 59%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
49.950	Qp	V	95	1.0	36.0	-21.6	14.4	40.0	-25.6
64.893	Qp	V	205	1.0	40.3	-23.4	16.9	40.0	-23.1
131.961	Qp	H	0	4.0	30.2	-16.1	14.1	43.5	-29.4
175.956	Qp	V	110	1.0	33.2	-17.2	16.0	43.5	-27.5
184.773	Qp	V	265	1.0	29.8	-17.6	12.2	43.5	-31.3
711.550	Qp	V	180	1.0	31.8	-4.7	27.1	46.0	-18.9

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: November 30, 2000

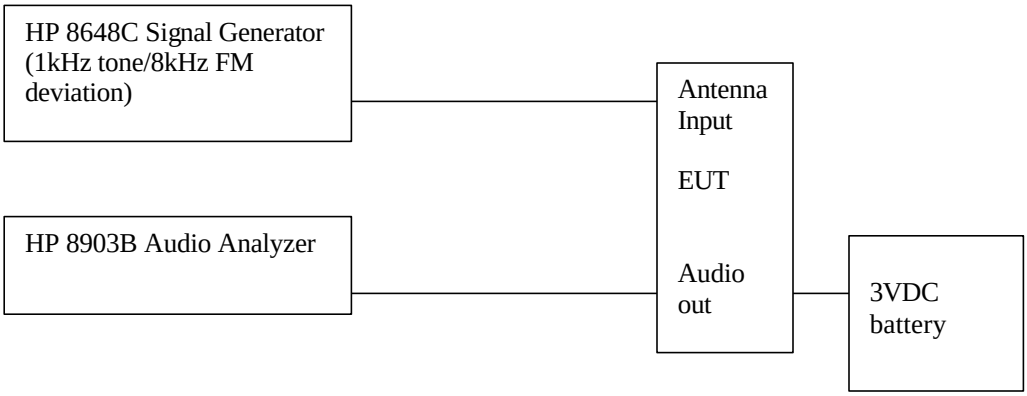
Typed/Printed Name: E. Szrajer

3.1 38dB Rejection Test

A signal generator was connected to the receiver under test, and the output of the receiver was connected to an audio analyzer.

A FM signal was applied to the receiver antenna input with a 1kHz tone modulated at 8 kHz deviation, and adjusted with the audio analyzer to produce a 12 dB SINAD. This was done across the receiver bands to determine a reference level. The reference level used was that with the highest sensitivity in all of the bands.

The output of the signal generator was then adjusted to a level 40 dB above the reference level established and set to a low, medium and high frequency in both the mobile and base cellular bands. (Mobile = 824.04 MHz through 848.97 MHz, Base = 881.50 MHz through 893. 97 MHz). The squelch of the receiver was then set to a minimum threshold level and scanning began from the lowest to the highest channel. Whenever the receiver stopped and "un-squelched" that frequency was noted as a response. After all the frequencies of responses were noted, the signal generator was set to measure the sensitivity at each of these response frequencies. This measurement was the reference sensitivity for the particular received frequency measured. The audio analyzer measurement was used to measure the 12 dB SINAD and that is the spurious value. The difference between the reference sensitivity and the spurious value is the rejection ratio and must be at least 38 dB.



Frequencies used on the Signal Generator were 824.04, 836.50, 848.97 MHz for the Mobile and 869.04, 881.50, 893.97 MHz for the Base.

The VR-120 unit reference level used was –61.0 dBm from the signal generator, this was determined from the highest sensitivity from 780 MHz at –101.0 dBm measurement of 12dB SINAD. The VR-120 unit was scanned from 30.0 – 960.0 MHz for all channels (manufacturers spec.). Signals that were noted as responses were checked with the signal generator off and if they still existed as a response were determined as ambient signals and removed from the response list. . There was no signal available for the 38 dB rejection test requirements.

38dB Rejection

Cellular Band (869.04- 893.97)
Date: 12/05/00
Temp: 74°F
Humidity: 33%
Model: VR-120

Table 1

Frequency Injected 869.04MHz				
Frequency Detected (MHz)	Level 12dB SINAD at 869.04MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 2

Frequency Injected 881.50MHz				
Frequency Detected (MHz)	Level 12dB SINAD at 881.50MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 3

Frequency Injected 893.97MHz				
Frequency Detected (MHz)	Level 12dB SINAD at 893.97MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

38dB Rejection

Mobile Band (824.04- 848.97)
Date: 12/05/00
Temp: 74°F
Humidity: 33%
Model: VR-120

Table 1

Frequency Injected 824.04MHz				
Frequency Detected (MHz)	Level 12dB SINAD at 824.04MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 2

Frequency Injected 836.50MHz				
Frequency Detected (MHz)	Level 12dB SINAD at 836.50MHz	Level 12dB at frequency detected	Rejection	Margin
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 3

Frequency Injected 848.97MHz				
Frequency Detected (MHz)	Level 12dB SINAD at 848.97MHz	Level 12dB at frequency detected	Rejection	Margin
352.075	-70dBm	-117.5dBm	47.5dB	-9.5dB

4.0 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
FCC RULES AND REGULATION	PART 2 SUBPART J
FCC RULES AND REGULATION	PART 15 §15.109
FCC RULES AND REGULATION	PART 15 §15.111
FCC RULES AND REGULATION	PART 15 § 15.121
ANSI	C63.4:1992
INDUSTRY CANADA	RSS-210

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described above. Modifications were not made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature: _____ Date: December 11, 2000

Typed/Printed Name: Desmond A. Fraser Position: President
(NVLAP Signatory)

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

APPENDIX A:

LABEL INFORMATION

Please see following pages

APPENDIX B:

PRODUCT DESCRIPTION

APPENDIX C:

SCHEMATICS

APPENDIX D:

BLOCK DIAGRAM OF VR-120

APPENDIX E:

EXTERNAL PHOTOS

APPENDIX F:

INTERNAL PHOTOS

APPENDIX G:

INSTRUCTION MANUAL

APPENDIX H:

TEST PICTURES

APPENDIX I:

ATTESTATION LETTER

APPENDIX J:

AGENT AUTHORIZATION LETTER