APPLICATION FOR FCC CLASS B CERTIFICATION

SCANNING RECEIVER

ALINCO, Inc.
438 Amapola Ave.
Suite 130
Torrance, CA 90501

MODEL: DJ-V5T
FCC ID: EUGDJ-V5T
Serial Number:

February 19, 1999

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: K. Franck Schuppius
Administrative Writer: Melissa Fleming

Rhein Tech Laboratories, Inc.

Document Number: 990087

TABLE OF CONTENTS

APPENDIX LISTING

FIGURE INDEX

TABLE INDEX

1.0 GENERAL INFORMATION

The following Application for FCC Type Certification of a Scanning Receiver is prepared on behalf of ALINCO, Inc. in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the ALINCO, Inc., model number DJ-V5T, FCC ID: EUGDJ-V5T. Furthermore, a Class B DOC test and report for the digital portion of the EUT has been prepared and is on file. 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 and conducted 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.

1.2 RELATED SUBMITTAL(S)/GRANT(S)

N/A. This is an original submission for original submission for Certification.

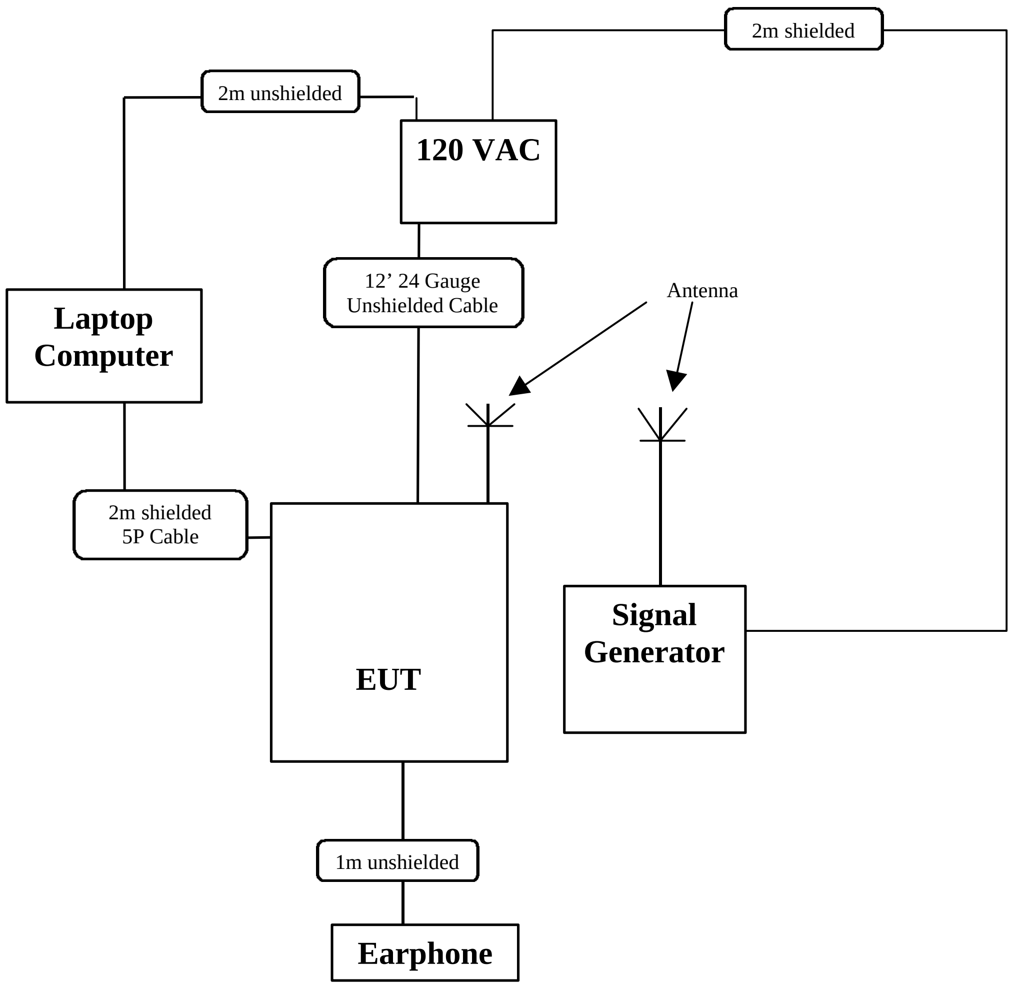
1.3 TEST SYSTEM DETAILS

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
POWER SUPPLY (EUT)	**ALINCO**	**A31220**	**EDC-93**	**N/A**	**12' UNSHIELDED POWER 24 GUAGE CABLE**	**010275**
BATTERY NI-CD (EUT)	**ALINCO**	**#1**	**EBP-45N**	**N/A**	**N/A**	**010276**
SCANNING RECEIVER (EUT)	**ALINCO**	**DJ-V5T**	**T000490**	**EUGDJ-V5T**	**UNSHIELDED I/O; POWER UNSHIELDED; AUDIO UNSHIELDED; AUXILIARY SERVICE PORT SHIELDED**	**010278**
SIGNAL GENERATOR	HEWLETT PACKARD	8660C	1947A02956	N/A	SHIELDED POWER	900059
NOTEBOOK COMPUTER	INTERGRAPH COMPUTER SYSTEMS	6200AD	N6UD723203406	N/A	SHIELDED POWER	900825
EARPHONE	RADIO SHACK	N/A	N/A	N/A	UNSHIELDED I/O	999999

1.4 CONFIGURATION OF TESTED SYSTEM



1.5 TEST METHODOLOGY

Both conducted and radiated testing were 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 dated June 24, 1996, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 STATEMENT FROM THE MANUFACTURER IN SUPPORT OF FCC SECTION 15.121

ALINCO®
ALINCO U.S.A. ALINCO BRANCH

438 Amapola Ave., Suite 130 • Torrance, California 90501
Phone: 310/618-8616 Fax: 310/618-8758

February 26, 1999

Re: EUG DJ-V5T Cellular Exclusion

To Whom It May Concern,

In accordance with F.C.C. Rules and Regulations, Part 15.121, Alinco model number EUGDJ-V5T Transceivers will have the following CPU installed in all U.S. version units that will display the "T" identifier at the end of the model number.

CPU Parts Number: Manufacturer's code M38267M8L234GP (Alinco's code XA0624)

This CPU has been specially designed to exclude the U.S. cellular telephone band. This CPU can not be manipulated in any way, whether by software or hardware, to enhance or modify the band plan of the EUGDJ-V5T to receive the U.S. cellular bands per F.C.C. Rules and Regulations (15.121).

Once the CPU is burned with this restricted protocol at the CPU manufacturer's factory, there is no way to change the data without destroying the CPU.

Sincerely,

Katsumi Nakata, Branch Manager
U.S.A. Alinco Branch

4.0 SYSTEM TEST CONFIGURATION

The EUT was configured for testing by connecting a monopole test antenna to a signal generator. The signal generator provided an indirect coupling of the transceivers input signal. One lower, middle and upper frequency within the band listed below were entered on the signal generator with the RF amplitude output set at –60dBm. The audio input port of EUT was connected to a microphone. An Alinco AC adaptor was connected to the DC power jack. The EUT was set in the AC charging unit during the test. The auxiliary service port was connected via a serial cable to the laptop computer's auxiliary serial port.

TABLE 1: CHANNEL FREQUENCY

RECEIVER BANDS	*FREQUENCY (MHz)*	
76MHz to 174MHz	Lower	76
	Middle	125
	Upper	174
174MHz to 520MHz	Lower	174
	Middle	347
	Upper	520
520MHz to 824MHz	Lower	520
	Middle	672
	Upper	824
850MHz to 869MHz	Lower	850
	Middle	859.5
	Upper	869
895MHz to 1000MHz	Lower	895
	Middle	947.5
	Upper	1000

4.1 JUSTIFICATION

The EUT was tested as a scanning receiver per FCC rules and regulations. The FCC does not regulate the transmitter section of the Transceiver, since it is an Amateur transceiver and its operating frequency falls under the amateur band.

4.2 EXERCISING THE EUT

During testing the EUT and the generator were tuned to each of the frequencies listed below and the output level of the signal generator was set to allow for maximum signal strength reception on the EUT (from -60dBm to -70dBm depending on the tuned frequency under test). The frequency was entered by the keypad on the scanning receiver. When the scanning receiver was locked on to a signal radiating from the generator and its test antenna a busy sign was displayed on the scanning receiver's LCD display. The EUT was configured for testing to represent a worst case scenario. During testing the data was transferred between the EUT, receiver and the computer in order to determine worst case emissions. The channels representing each of the five bands that were scanned are as follows (MHz): 76, 125, 174, 347, 520, 672, 824, 850, 859.5, 869, 895, 947.5, and 1000.

4.3 SPECIAL ACCESSORIES

All interface cables used for compliance testing are unshielded except the auxiliary serial port that was shielded. ALINCO, Inc. provided the auxiliary serial port cable.

4.4 MODE OF OPERATION

All interface cables used for compliance testing are unshielded except the auxiliary serial port that was shielded. ALINCO, Inc. provided the auxiliary serial port cable.

4.5 CONFORMANCE STATEMENT

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were 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: March 5, 1999

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

NVLAP *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:

SCHEMATICS OF DJ-V5T

6.0 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 450 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively. All five frequency bands were investigated and tested for conducted emissions. The EUT was exercised during testing in the 3 aforementioned modes. It was determined that the conducted emission profile within the frequency bands were the same, therefore only one conducted emission data is presented for each frequency band.

TABLE 2: CONDUCTED EMISSIONS: (VHF BAND 76-174 MHZ)

Neutral Side (L1)

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dBuV)	CORRECTED EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.453	Pk	41.2	0.5	41.7	48.0	-6.3
0.676	Pk	36.5	0.5	37.0	48.0	-11.0
3.936	Pk	25.2	1.3	26.5	48.0	-21.5
7.000	Pk	27.0	1.8	28.8	48.0	-19.2
18.376	Pk	26.2	3.1	29.3	48.0	-18.7
23.100	Pk	30.1	2.9	33.0	48.0	-15.0
Hot Side (L2)						
0.452	Pk	41.6	0.4	42.0	48.0	-6.0
0.654	Pk	36.4	0.5	36.9	48.0	-11.1
1.032	Pk	25.0	0.6	25.6	48.0	-22.4
3.645	Pk	23.5	1.2	24.7	48.0	-23.3
18.376	Pk	26.2	3.1	29.3	48.0	-18.7
22.750	Pk	29.6	3.0	32.6	48.0	-15.4

Input frequency = 125 MHz
(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: ________________________ **Date:** 2/17/99

Typed/Printed Name: K. Franck Schuppius

TABLE 3: CONDUCTED EMISSIONS: (UHF BAND 174-520 MHZ)

Neutral Side (L1)

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dBuV)	CORRECTED EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.452	Pk	41.3	0.5	41.8	48.0	-6.2
0.661	Pk	37.0	0.5	37.5	48.0	-10.5
3.986	Pk	23.6	1.3	24.9	48.0	-23.1
4.953	Pk	22.1	1.6	23.7	48.0	24.3
6.314	Pk	25.5	1.7	27.2	48.0	-20.8
23.209	Pk	30.3	2.9	33.2	48.0	-14.8

Hot Side (L2)

0.450	Pk	42.1	0.4	42.5	48.0	-5.5
0.664	Pk	36.6	0.5	37.1	48.0	-10.9
0.879	Pk	29.0	0.6	29.6	48.0	-18.4
6.369	Pk	25.3	1.7	27.0	48.0	-21.0
8.348	Pk	26.2	2.0	28.2	48.0	-19.8
22.818	Pk	31.5	2.9	34.4	48.0	-13.6

Input frequency = 347 MHz
(1) Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: ________________________ **Date:** 2/17/99

Typed/Printed Name: K. Franck Schuppius

TABLE 4: CONDUCTED EMISSIONS: (III BAND 520-824 MHZ)

Neutral Side (L1)

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dBuV)	CORRECTED EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.452	Pk	43.2	0.5	43.7	48.0	-4.3
0.679	Pk	37.9	0.5	38.4	48.0	-9.6
0.908	Pk	29.2	0.6	29.8	48.0	-18.2
6.600	Pk	18.5	1.8	20.3	48.0	-27.7
9.957	Pk	23.2	2.0	25.2	48.0	-22.8
22.644	Pk	27.6	2.9	30.5	48.0	-17.5

Hot Side (L2)

0.451	Pk	43.3	0.4	43.7	48.0	-4.3
0.658	Pk	38.5	0.5	39.0	48.0	-9.0
1.008	Pk	28.5	0.6	29.1	48.0	-18.9
3.638	Pk	25.5	1.2	26.7	48.0	-21.3
12.620	Pk	25.3	2.3	27.6	48.0	-20.4
22.580	Pk	31.5	3.0	34.5	48.0	-13.5

Input frequency = 672 MHz

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

TEST PERSONNEL:

Signature: ________________________ **Date:** 2/17/99

Typed/Printed Name: K. Franck Schuppius

TABLE 5: CONDUCTED EMISSIONS: (IV BAND 850-869 MHZ)

Neutral Side (L1)

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dBuV)	CORRECTED EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.450	Pk	43.2	0.5	43.7	48.0	-4.3
0.666	Pk	37.6	0.5	38.1	48.0	-9.9
1.008	Pk	28.4	0.7	29.1	48.0	-18.9
8.300	Pk	17.9	1.9	19.8	48.0	-28.2
16.710	Pk	20.1	3.1	23.2	48.0	-24.8
23.400	Pk	28.4	2.9	31.3	48.0	-16.7

Hot Side (L2)

0.452	Pk	43.0	0.4	43.4	48.0	-4.6
0.669	Pk	38.2	0.5	38.7	48.0	-9.3
1.008	Pk	27.6	0.6	28.2	48.0	-19.8
4.376	Pk	25.2	1.4	26.6	48.0	-21.4
8.350	Pk	29.6	2.0	31.6	48.0	-16.4
23.600	Pk	27.7	2.9	30.6	48.0	-17.4

Input frequency = 859.5 MHz

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

TEST PERSONNEL:

Signature**:** ________________________ **Date:** 2/17/99

Typed/Printed Name: K. Franck Schuppius

TABLE 6: CONDUCTED EMISSIONS: (V BAND 895-1000 MHZ)

Neutral Side (L1)

EMISSION FREQUENCY (MHz)	TEST DETECTOR (1)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dBuV)	CORRECTED EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.451	Pk	42.7	0.5	43.2	48.0	-4.8
0.625	Pk	35.0	0.5	35.5	48.0	-12.5
0.690	Pk	36.8	0.5	37.3	48.0	-10.7
5.892	Pk	24.4	1.7	26.1	48.0	-21.9
12.312	Pk	19.0	2.2	21.2	48.0	-26.8
23.691	Pk	22.7	3.0	25.7	48.0	-22.3

Hot Side (L2)

0.452	Pk	41.8	0.4	42.2	48.0	-5.8
0.663	Pk	36.7	0.5	37.2	48.0	-10.8
1.004	Pk	25.6	0.6	26.2	48.0	-21.8
7.147	Pk	27.7	1.8	29.5	48.0	-18.5
8.055	Pk	23.7	2.0	25.7	48.0	-22.3
15.028	Pk	26.0	2.7	28.7	48.0	-19.3

Input frequency = 947.5 MHz
(1)Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: ________________________ **Date:** 2/17/99

Typed/Printed Name: K. Franck Schuppius

8.0 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 7.1.

TABLE 7: RADIATED EMISSIONS: 76 MHZ

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
115.150	V	45	1.0	40.0	-16.8	23.2	43.5	-20.3
230.300	H	225	1.0	39.1	-16.1	23.0	46.0	-23.0
345.450	H	135	1.0	40.0	-12.0	28.0	46.0	-18.0

TABLE 8: RADIATED EMISSIONS: 125 MHZ

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
164.150	V	0	1.0	55.3	-19.7	35.6	43.5	-7.9
328.300	H	90	1.0	44.3	-13.0	31.3	46.0	-14.7
492-450	H	270	1.0	34.0	-9.0	25.0	46.0	-21.0

TABLE 9: RADIATED EMISSIONS: 174 MHZ

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
213.150	V	250	1.0	44.6	-16.7	27.9	43.5	-15.6
426.300	V	225	1.0	37.1	-9.8	27.3	46.0	-18.7
639.450	H	90	1.0	37.4	-5.4	32.0	46.0	-14.0

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

TEST PERSONNEL:

Signature**:** ________________________ **D**ate**:** February 19, 1999

Typed/Printed Name: K. Franck Schuppius

TABLE 10: RADIATED EMISSIONS: 347 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
386.150	H	170	1.0	44.3	-11.4	32.9	46.0	-13.1
772.300	V	45	1.0	41.3	-3.5	37.8	46.0	-8.2

TABLE 11: RADIATED EMISSIONS: 520 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
480.850	H	135	1.0	38.8	-9.0	29.8	46.0	-16.2

TABLE 12: RADIATED EMISSIONS: 672 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
632.850	H	80	1.0	33.4	-5.9	27.5	46.0	-18.5

TABLE 13: RADIATED EMISSIONS: 824 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
232.200	H	0	1.0	38.8	-15.9	22.9	46.0	-23.1
258.000	H	185	1.0	32.1	-15.1	17.0	46.0	-29.0
784.838	H	135	1.0	45.0	-3.5	41.5	46.0	-4.5

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

TEST PERSONNEL:

Signature**:** ________________________ **Date:** February 19, 1999

Typed/Printed Name: K. Franck Schuppius

TABLE 14: RADIATED EMISSIONS: 850 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
810.850	V	0	1.2	43.2	-2.1	41.1	46.0	-4.9

TABLE 15: RADIATED EMISSIONS: 859.5 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
820.350	H	75	1.0	42.3	-2.3	40.0	46.0	-6.0

TABLE 16: RADIATED EMISSIONS: 869 MHz

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
829.836	H	225	1.0	43.4	-2.5	40.9	46.0	-5.1

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

TEST PERSONNEL:

Signature: ____________________________ **Date:** February 19, 1999

Typed/Printed Name: K. Franck Schuppius

TABLE 17: RADIATED EMISSIONS: 895 MHZ

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
855.850	H	180	1.0	44.0	-2.7	41.3	46.0	-4.7

TABLE 18: RADIATED EMISSIONS: 869 MHZ

(Temperature: 46°F Degree, Humidity: 29%)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	TURNTABLE AZIMUTH (deg)	ANTENNA HEIGHT (m)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dB)
908.350	H	135	1.0	42.0	-1.4	40.6	46.0	-5.4

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

TEST PERSONNEL:

Signature: ________________________ **Date:** February 19, 1999

Typed/Printed Name: K. Franck Schuppius

8.1 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:

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

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

APPENDIX B: Emissions Equipment List

TABLE 19: EMISSIONS TEST EQUIPMENT

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

APPENDIX C: Conducted and Radiated 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 (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.

APPENDIX D:

USER’S MANUAL