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ENGINEERING TEST REPORT
FOR
APLLICATION of
GRANT of CERTIFICATION

FOR

CFR 47, PART 15C - INTENTIONAL RADIATORS
Paragraph 15.247
Spread Spectrum Frequency Hopping Module

For

DIGITAL MONITORING PRODUCTS, INC.
2500 North Partnership Boulevard
Springfield, MO 65802-6310
Terry Shelton,

DATA TRANSMITTER
Model: PC 0088 wireless
Frequency 902-928 MHz
FCC ID#: CCK PC0088

Test Date: July 26, 2004

Certifying Engineer: Scot D Rogers

Scot D. Rogers
ROGERS LABS, INC.
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FORWARD:

The following is submitted for consideration in obtaining a Grant of Certification for a frequency hopping spread spectrum intentional radiator operating under CFR Paragraph 15.247.

Name of Applicant:

DIGITAL MONITORING PRODUCTS, INC.
2500 North Partnership Boulevard
Springfield, MO 65802-6310

Model: PC 0088 wireless transceiver.

FCC I.D.: CCK PC0088.

Frequency Range: 902-928 MHz.

Operating Power: 0.010 W (3 meter effective radiated measurement).

1) Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Code of Federal Regulations, dated October 1, 2003, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and applicable parts of paragraph 15, Part 15C Paragraph 15.247 the following is submitted:

b) Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI 63.4-1992 Document FCC, documents DA00-1407 and DA00-705 and/or TIA/EIA 603-1.

2.1033(b) Application for Certification

(1) Manufacturer: DIGITAL MONITORING PRODUCTS, INC.
2500 North Partnership Boulevard
Springfield, MO 65802-6310

(2) Identification: Model: PC 0088 wireless
FCC I.D.: CCK PC0088

(3) Instruction Book:

Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions:

Refer to Exhibit of Operational Description.

(5) Block Diagram with Frequencies:

Refer to Exhibit of Operational Description.

(6) Report of Measurements:

Report of measurements follows in this Report.

(7) Photographs: Construction, Component Placement, etc.:

Refer to Exhibit for photographs of equipment.

(8) No Peripheral Equipment was Necessary.

(9) Transition Provisions of 15.37 are not being requested.

(10) Frequency hopping Spread Spectrum transmitters:

Compliance with 15.247(a)(1) and the receiver bandwidth requirement are demonstrated in this report and exhibits.

(11) Not Applicable. The EUT is not a scanning receiver.

(12) Not Applicable. The EUT does not operate in the 59 – 64 GHz frequency band.

2) Equipment Tested

Equipment	Model	FCC I.D.#
EUT	PC 0088 wireless	CCK PC0088

3) Equipment Function and Testing Procedures

The EUT is a 902-928 MHz radio transmitter used to transmit alarm contact conditions for use in an alarm panel installation. The PC 0088 wireless transmitter is a wireless link used for transmitting information from one remote sensor location to the alarm control panel. The unit is marketed for use to incorporate a wireless link in an alarm system solution. For testing purposes the transceiver was mounted in sensors (models, 116x Smoke detector and 112x PIR) and operated through all functional modes. The unit operates from internal 3 volt batteries and has no provision to connect to utility power. For testing purposes, new 3 volt batteries, supplied by the manufacturer, were used to power the units. The device utilizes a permanently connected antenna system with no provision for user replacement. The unit has no provision to connect to external auxiliary equipment.

4) Equipment and Cable Configurations

Conducted Emission Test Procedure

The unit typically operates from internal 3 volt batteries and has no provision to connect to utility power. Therefore no AC line conducted emissions testing was performed. For testing purposes, new 3 volt batteries were used to power the units.

Radiated Emission Test Procedure:

The EUT was placed on a rotating 1 x 1.5-meter wooden platform, 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was taken using a spectrum analyzer. Refer to photographs in the exhibits for EUT placement.

5) List of Test Equipment

A Hewlett Packard 8591EM Spectrum Analyzer was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to the appendix for a complete list of test equipment.

HP 8591 EM ANALYZER SETTINGS		
CONDUCTED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
9 kHz	30 kHz	Peak / Quasi Peak
RADIATED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
120 kHz	300 kHz	Peak / Quasi Peak
HP 8562A ANALYZER SETTINGS		
RBW	VIDEO BW	DETECTOR FUNCTION
100 kHz	100 kHz	PEAK
1 MHz	1 MHz	Peak / Average

EQUIPMENT MFG.	MODEL	CAL. DATES	DUE.
LISN Comp. Design	FCC-LISN-2-MOD.CD	10/03	10/04
Antenna ARA	BCD-235-B	10/03	10/04
Antenna EMCO	3147	10/03	10/04
Antenna EMCO	3143	5/04	5/05
AnalyzerHP	8591EM	5/04	5/05
AnalyzerHP	8562A	2/04	2/05

6) Units of Measurements

Conducted EMI: Data is in dBµV; dB referenced to one microvolt.

Radiated EMI: Data is in dBµV/m; dB/m referenced to one microvolt per meter.

7) Test Site Locations

Conducted EMI: The AC power line conducted emissions tests were performed in a shielded screen room located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Radiated EMI: The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Site Approval: Refer to Appendix for FCC Site Approval Letter, Reference # 90910.

8) SUBPART B – UNINTENTIONAL RADIATORS

Conducted EMI

The units typically operate from internal 3 volt batteries and have no provision to connect to utility power. Therefore no AC line conducted emissions testing was performed. For testing purposes, new 3 volt batteries were used to power the units.

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. Refer to figures one through four for plots of the radiated emissions spectrum taken in a screen room. The highest radiated emission was then re-maximized at the OATS location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the OATS at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Broadband Biconical from 30 to 200 MHz, Biconilog from 30 to 1000 MHz, Log Periodic from 200 MHz to 5 GHz and or, pyramidal horns and mixers from 4 GHz to 10 GHz, notch filters and appropriate amplifiers were utilized.

Sample Calculations:

RFS = Radiated Field Strength
dBµV/m @ 3m = dBµV + A.F. - Amplifier Gain
dBµV/m @ 3m = 30.3 + 11.6 - 30
= 11.9

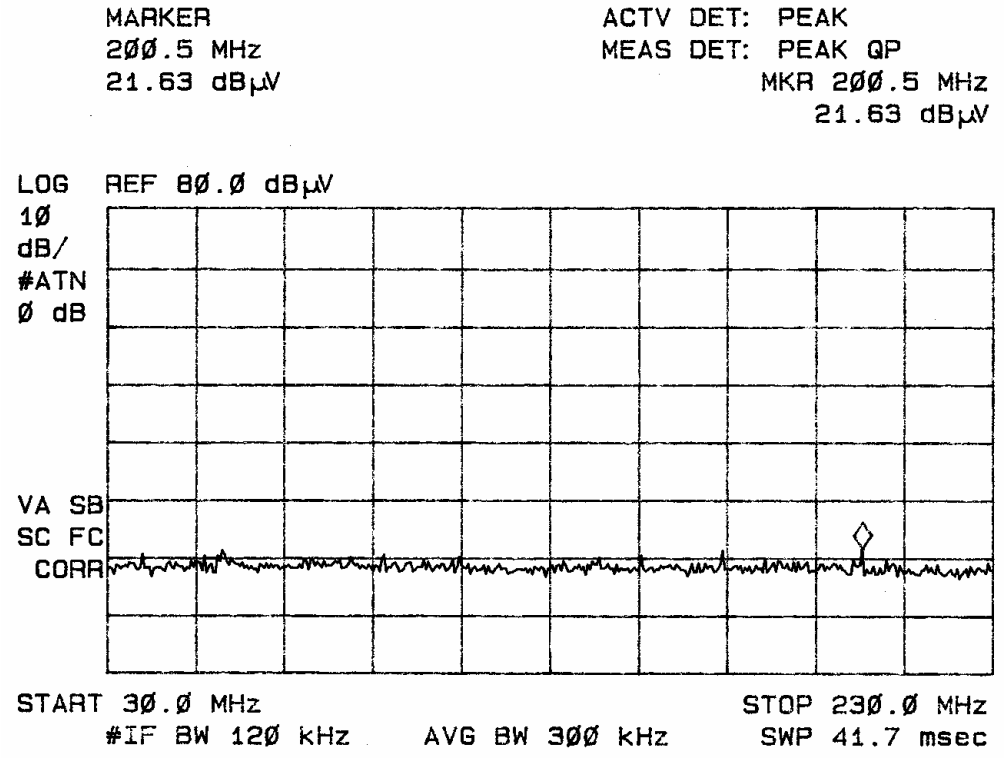

Figure one Radiated Emissions taken at 1 meter in screen room.

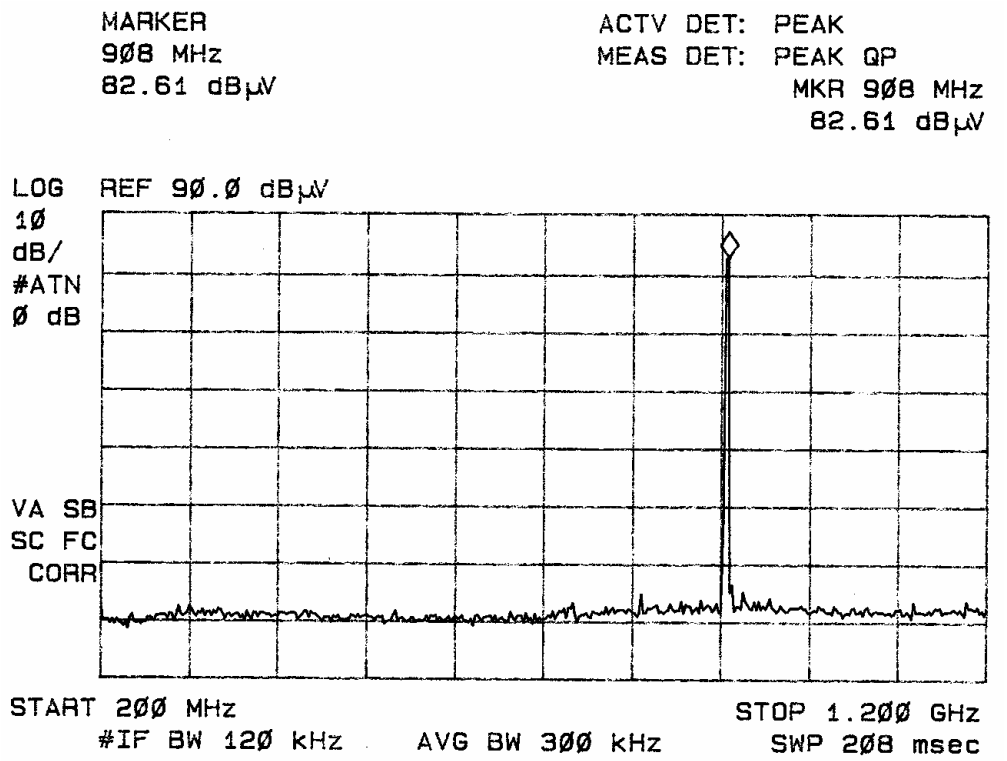

Figure two Radiated Emissions taken at 1 meter in screen room.

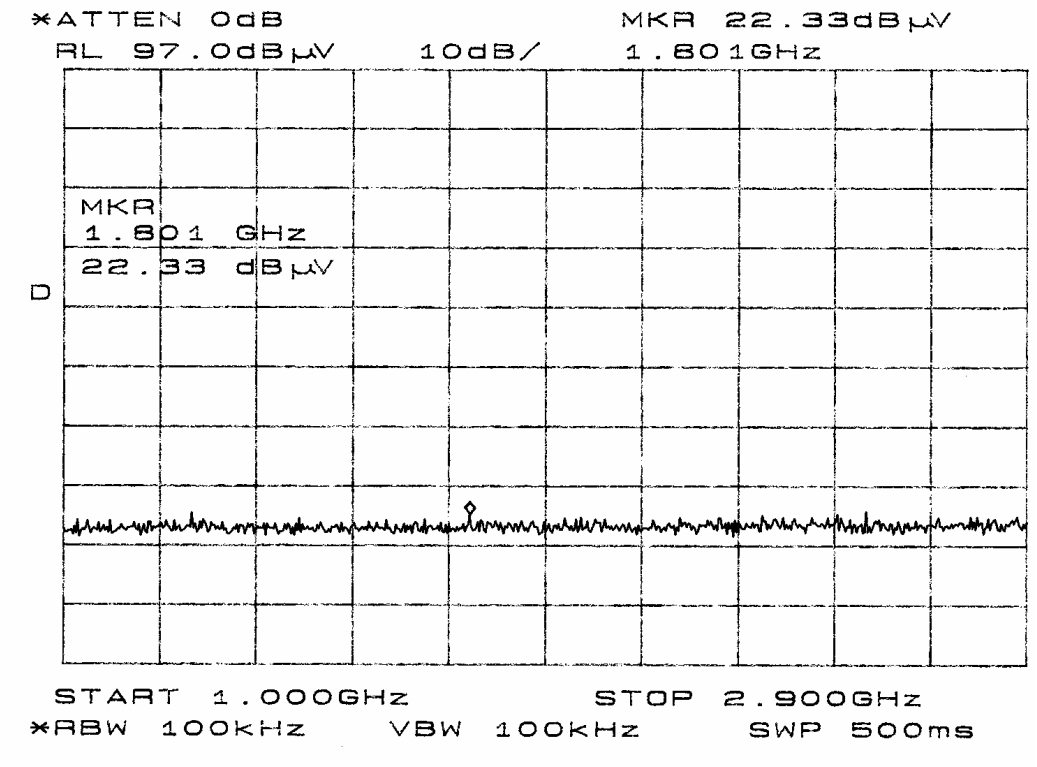

Figure three Radiated Emissions taken at 1 meter in screen room.

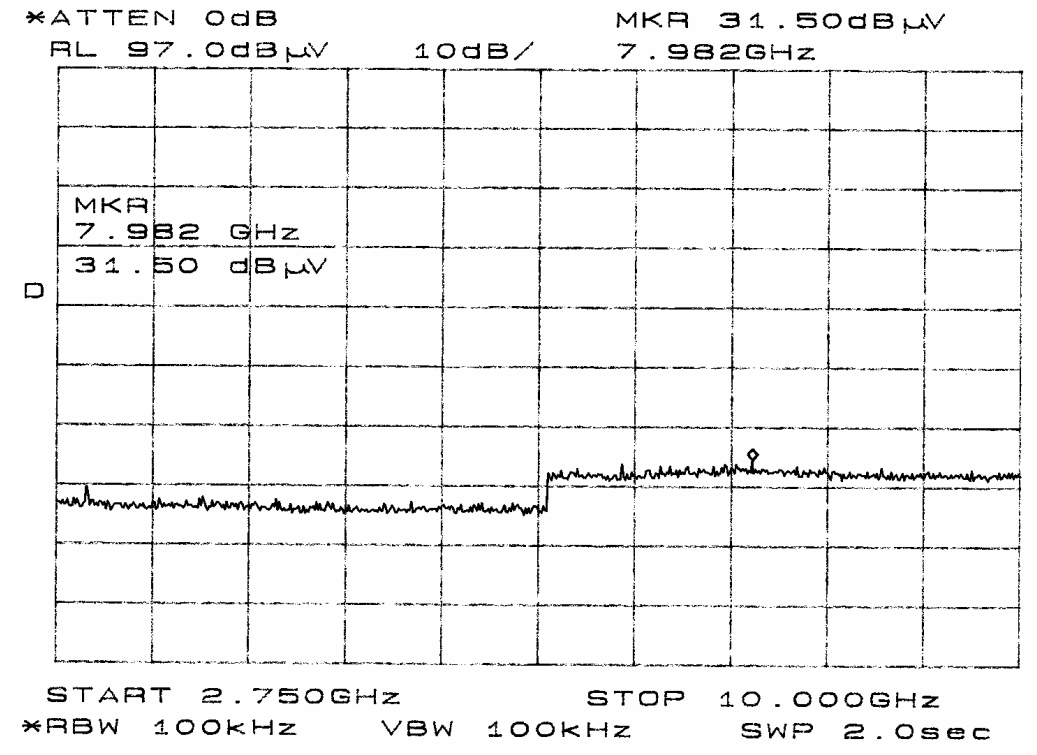

Figure four Radiated Emissions taken at 1 meter in screen room.

Data: General Radiated Emissions from EUT (Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
198.8	30.3	30.6	11.6	30	11.9	12.2	43.5

Other emissions present had amplitudes at least20 dB below the limit.

Summary of Results for Conducted Emissions

The unit typically operates from internal 3 volt batteries and has no provision to connect to utility power. For testing purposes, new 3 volt batteries were used to power the unit. Therefore no AC line conducted emissions testing was performed. The conducted emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices.

Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices. The EUT had a 31.3 dB minimum margin below the quasi-peak limit. Other emissions were present with amplitudes at least 20 dB below the limit.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the CISPR 22 or FCC Part 15B CLASS B emissions standards. There were no deviations or exceptions to the specifications.

9) Subpart C - Intentional Radiators

As per CFR Part 15, Subpart C, paragraph 15.247 the following information is submitted.

15.203 Antenna Requirements

The unit is produced with a permanently attached antenna and has no provision for user service, replacement, or antenna modification. The requirements of 15.203 are fulfilled and there are no deviations or exceptions to the specification.

15.205 Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at a distance of three meters at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were checked at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. No other significant emission was observed which fell into the restricted bands of operation.

Sample Calculations:
RFS (dBµV/m @ 3m) = FSM(dBµV) + A.F.(dB) - Gain(dB)
= 23.8 +35.5 -22.5
= 36.8

Data: Emissions in Restricted Bands (116x Smoke Detector)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
2709.0	23.8	24.1	35.5	22.5	36.8	37.1	54.0
2745.0	24.5	24.5	35.3	22.5	37.3	37.3	54.0
2781.0	23.3	23.6	35.5	22.5	36.3	36.6	54.0
3612.0	24.5	24.5	39.8	22.5	41.8	41.8	54.0
3660.0	24.8	25.0	39.8	22.5	42.1	42.3	54.0
3708.0	24.1	24.8	39.8	22.5	41.4	42.1	54.0
4515.0	24.3	24.3	44.3	22.5	46.1	46.1	54.0
4575.0	24.5	24.3	44.2	22.5	46.2	46.0	54.0
4635.0	23.8	23.5	44.0	22.5	45.3	45.0	54.0

Data: Emissions in Restricted Bands (112x PIR)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
2709.0	29.8	36.1	35.5	22.2	42.8	49.1	54.0
2745.0	24.5	31.6	35.3	22.5	37.3	44.4	54.0
2781.0	23.7	32.5	35.5	22.5	36.7	45.5	54.0
3612.0	28.8	27.0	39.8	22.5	46.1	44.3	54.0
3660.0	25.3	25.5	39.8	22.5	42.6	42.8	54.0
3708.0	23.0	24.8	39.8	22.5	40.3	42.1	54.0
4515.0	24.8	24.6	44.3	22.5	46.6	46.4	54.0
4575.0	23.8	24.8	44.2	22.5	45.5	46.5	54.0
4635.0	24.1	24.0	44.0	22.5	45.6	45.5	54.0

Summary of Results for Radiated Emissions in Restricted Bands:

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 4.9 dB minimum margin below the limits. Both average and peak amplitudes were checked for compliance with the regulations. No other emissions where found in the restricted frequency bands. Other emissions were present with amplitudes at least 10 dB below the FCC Limits.

15.209 Radiated Emissions Limits; General Requirements

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Emissions were checked in the screen room from 30 to 10,000 MHz and plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. The highest radiated emission was then re-maximized at this location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open area test site at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Broadband Biconical from 30 MHz to 200 MHz, Biconilog from 30

MHz to 1000 MHz, Log Periodic from 200 MHz to 5 GHz, and/or Pyramidal Horns from 4 GHz to 10 GHz.

Sample Calculations:

RFS = Radiated Field Strength

dBµV/m @ 3m = dBµV + A.F. - Amplifier Gain

dBµV/m @ 3m = 30.3 + 11.6 - 30

= 11.9

Data: General Radiated Emissions from EUT (Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
198.8	30.3	30.6	11.6	30	11.9	12.2	43.5

Other emissions present had amplitudes at least 10 dB below the limit.

Summary of Results for Radiated Emissions:

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 31.3 dB minimum margin below the limits. Other emissions were present with amplitudes at least 20 dB below the FCC Limits.

15.247 Operation in the Band 902-928 MHz

The power output was measured at the open area test site at a three-meter distance. Data was taken per Paragraph 2.1046(a) and 15.247. The 902 and 928 MHz band edges are protected due to the 902.4 – 927.6 MHz channels used for frequency of operation. Refer to figures five through nine showing plots taken of the EUT performance displaying compliance with the specifications.

(a)(1)(i) The EUT is a frequency hopping spread spectrum intentional radiator utilizing at least 50 hopping channels. The 20-dB bandwidth of 290 kHz meets the requirement of less than 500 kHz wide with the average time of occupancy on any frequency not greater than 0.4 seconds within a twenty-second-time period. Figure 5 shows the dwell time of occupancy of 33 mS. The pseudo random lookup table goes through the 53 channels taking a calculated 1.75 seconds (53 x 33 mS = 1.749 S). The table will repeat after completion of one full cycle thus allowing the channel to be occupied 11.429 times in any twenty second period (20/1.75). This allows a channel to be occupied 377 mS in any twenty second time interval.

Information showing compliance for time of occupancy and hopping sequence are displayed below.

Pseudorandom hopping sequence
The system uses 61 hop channels. They are evenly spaced between 902.9729 MHz and 927.0271 MHz. They are listed, in order, below:

0	903.3257	18	911.4079	36	919.4901
1	903.7747	19	911.8569	37	919.9391
2	904.2237	20	912.3059	38	920.3881
3	904.6727	21	912.7549	39	920.8372
4	905.1217	22	913.2040	40	921.2862
5	905.5707	23	913.6530	41	921.7352
6	906.0198	24	914.1020	42	922.1842
7	906.4688	25	914.5510	43	922.6332
8	906.9178	26	915.0000	44	923.0822
9	907.3668	27	915.4490	45	923.5312
10	907.8158	28	915.8980	46	923.9802
11	908.2648	29	916.3470	47	924.4293
12	908.7138	30	916.7960	48	924.8783
13	909.1628	31	917.2451	49	925.3273
14	909.6119	32	917.6941	50	925.7763
15	910.0609	33	918.1431	51	926.2253
16	910.5099	34	918.5921	52	926.6743
17	910.9589	35	919.0411		

The order is determined by cycling through the numbers 0-60 in order, and generating a channel number to use with the following equation:

Channel # = Hop XOR (Hop * 8) AND 0x3F
If Channel > 52, try again

Where Hop is the sequence 0,1,2,3,4,5,6,7,8,9,10,11…51,52,0,1…

This generates the channel numbers 0, 9, 18, 27, 36, 45, 6, 7, 8, 1, 26, 19…

A complete cycle is as follows:

0	903.3257	2	904.2237	4	905.1217
9	907.3668	11	908.2648	13	909.1628
18	911.4079	52	926.6743	22	913.204
27	915.449	21	912.7549	31	917.2451
36	919.4901	38	920.3881	40	921.2862
45	923.5312	47	924.4293	33	918.1431
6	906.0198	24	914.102	42	922.1842
7	906.4688	17	910.9589	51	926.2253
8	906.9178	10	907.8158	12	908.7138
1	903.7747	3	904.6727	5	905.5707
26	915	28	915.898	30	916.796
19	911.8569	29	916.347	23	913.653
44	923.0822	46	923.9802	48	924.8783
37	919.9391	39	920.8372	49	925.3273
14	909.6119	32	917.6941	34	918.5921
15	910.0609	41	921.7352	43	922.6332
16	910.5099	50	925.7763	20	912.3059
25	914.551	35	919.0411		

Multiple system coexistence

For multiple systems to coexist properly, each system within range of another is assigned a unique number between 1 and 52. That number is multiplied by the hop sequence is modified by multiplying each hop number by a system number (1-52) and using that value modulo 61 as the hop number. For example, rather than hopping 0,1,2,3,4, a system with a system number of 3 would use hop sequence 0,3,6,9,12…, which would lead to the channel sequence 0, 27, 6, 1, 44…

This allows up to 52 systems to coexist because of the unique hopping sequence of each.

(b) The maximum peak output power of the unit was measured at the OATS at a distance of three meters. Figure 6 shows relative level output of transmitter taken at a distance of three meters in a screen room. The amplitudes of each emission and spurious emission were measured at a distance of 3 meters from the FSM antenna at the OATS. The amplitude of each emission was maximized by varying the FSM antenna height, polarization, and by rotating the turntable. A Biconilog Antenna was used for measuring emissions from 30 to 1000 MHz, Log Periodic Antenna for 200 to 5000 MHz, and Pyramidal Horn Antennas from 4 GHz to 10 GHz. Emissions were measured in dBµV/m at three-meters.

Sample calculation.

dBµv/m@ 3m = FSM + A.F. – Amplifier gain stage
= 69.0 + 23.2 – 2.5
= 94.7

(c) The band edges are protected due to the frequency of operation of the EUT. Figure 9 shows band edge protection and fifty-three hopping channels of the EUT.

(g) The unit employs 53 hopping channels with a defined packet length regardless of the message sent. This forces the unit to occupy a channel for 33 mS each time the system runs through the lookup table.

(h) The unit does not incorporate any intelligence in avoiding other systems in operation. It selects the channel from the pseudo random lookup table sequentially and runs the entire table before starting over. This complies with the requirements of this section.

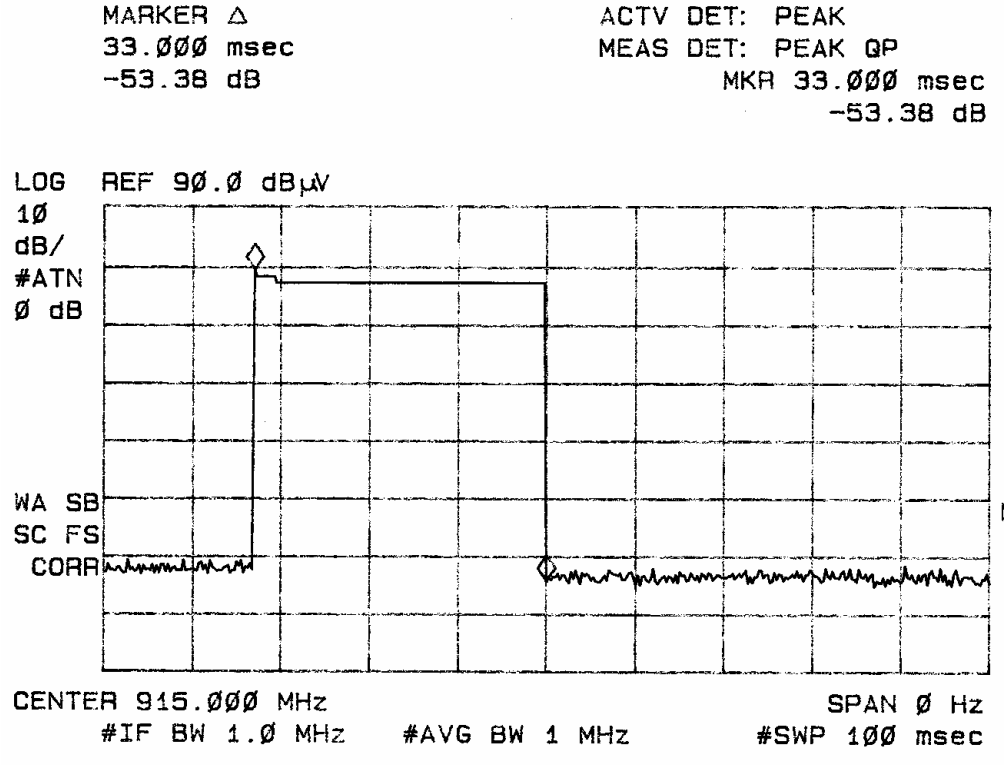

Figure five Dwell Time of Occupancy.

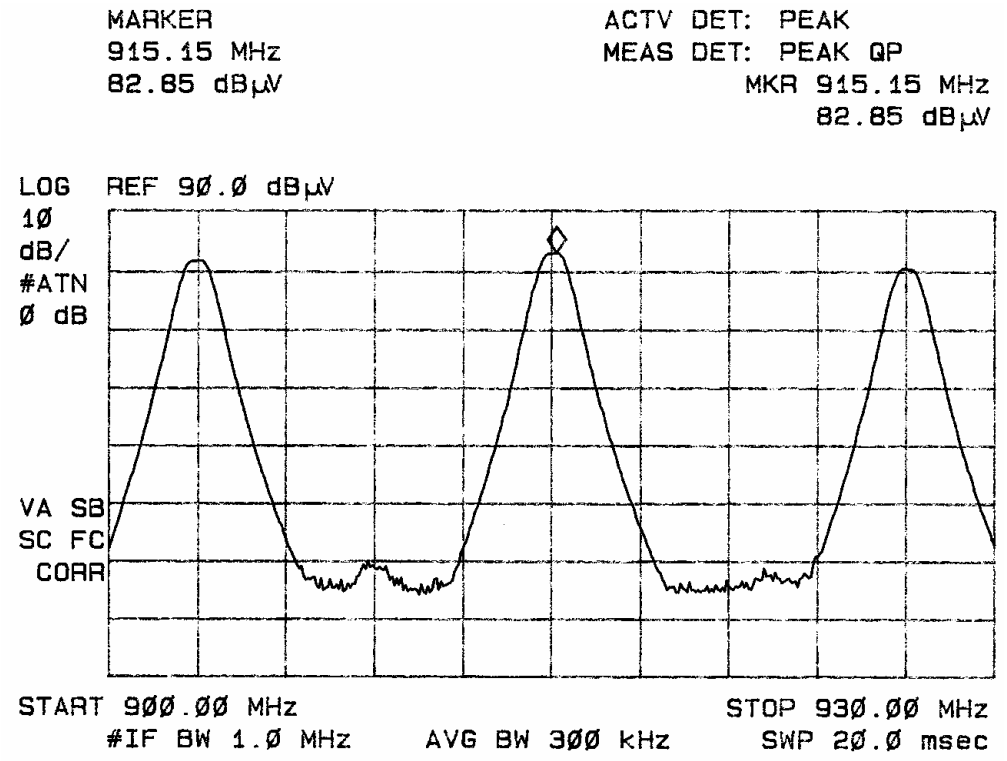

Figure six Maximum Power output across band (taken in screen room at 3 meters).

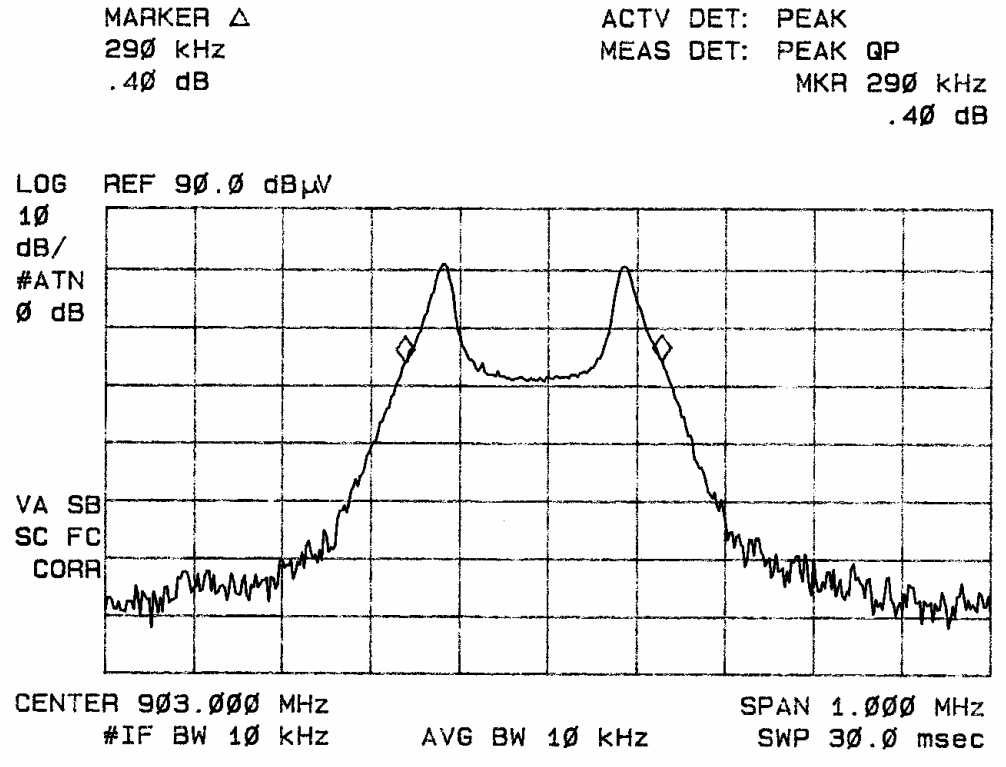

Figure seven 20-dB bandwidth.

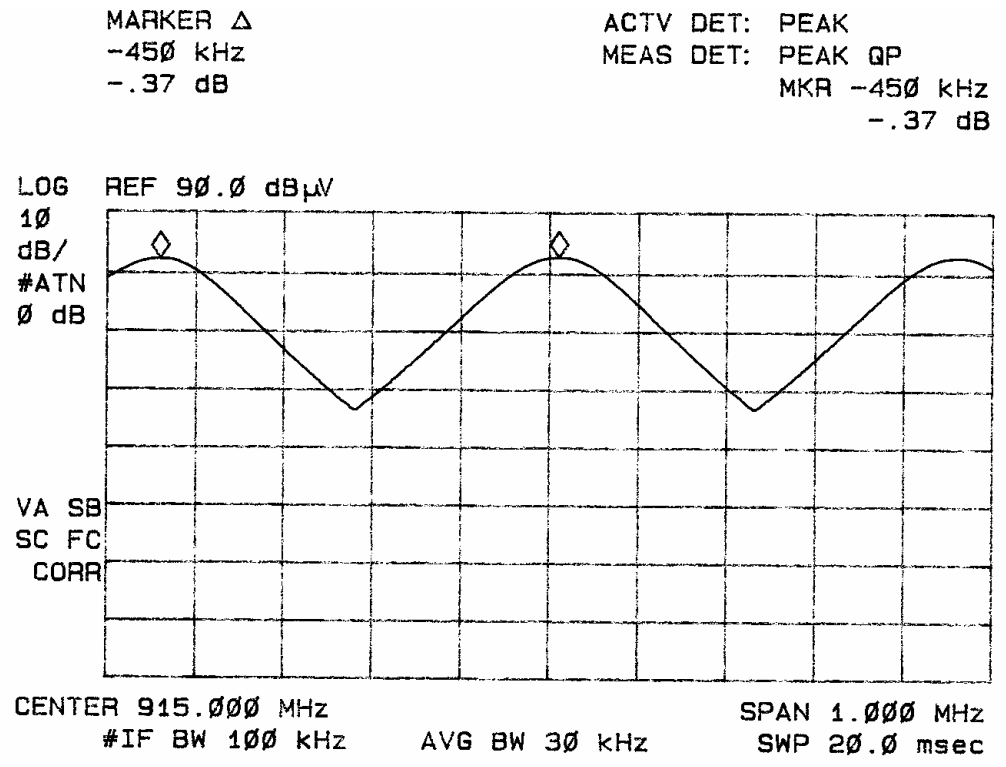

Figure eight Channel Spacing.

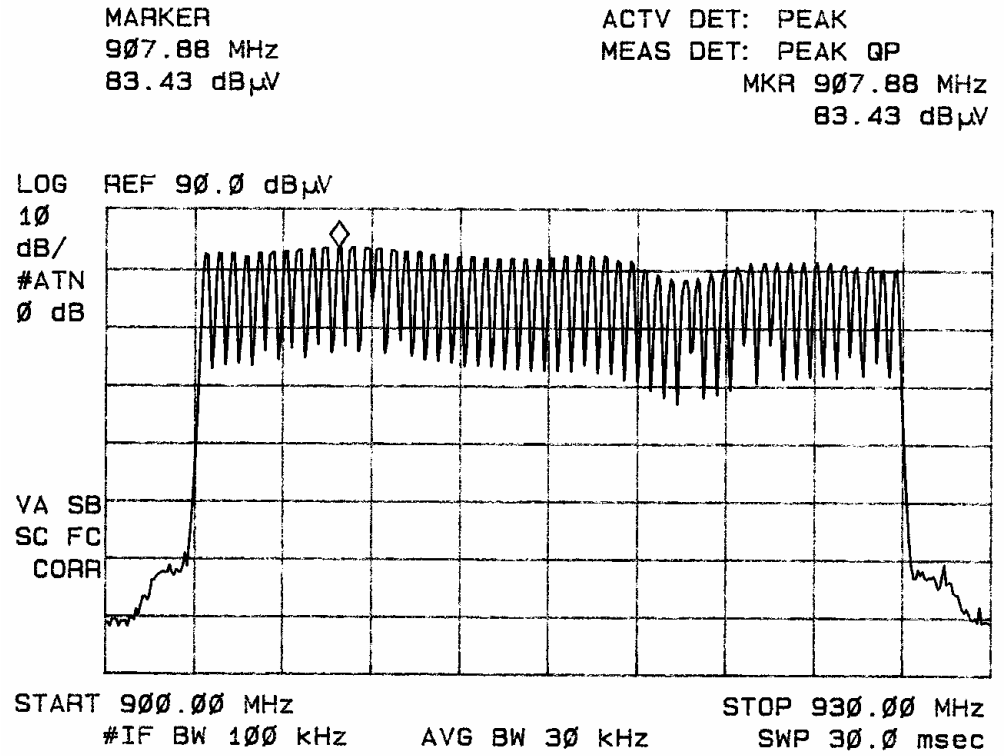

Figure nine plot showing 53 hopping channels, (at least 50 hopping channels required).

Data: Radiated Emissions from EUT (116x Smoke Detector)

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
903.0	81.2	74.0	25.7	0	106.9	99.7	
1806.0	23.6	24.6	29.7	22.5	30.8	31.8	54.0
2709.0	23.8	24.1	35.5	22.5	36.8	37.1	54.0
3612.0	24.5	24.5	39.8	22.5	41.8	41.8	54.0
4515.0	24.3	24.3	44.3	22.5	46.1	46.1	54.0
915.0	80.5	73.3	26.3	0	106.8	99.6	
1830.0	25.5	24.0	39.7	22.5	32.7	31.2	54.0
2745.0	24.5	24.5	35.3	22.5	37.3	37.3	54.0
3660.0	24.8	25.0	39.8	22.5	42.1	42.3	54.0
4575.0	24.5	24.3	44.2	22.5	46.2	46.0	54.0
927.0	79.7	73.3	26.6	0	106.3	99.9	
1854.0	23.8	23.6	29.6	22.5	30.9	30.7	54.0
2781.0	23.3	23.6	35.5	22.5	36.3	36.6	54.0
3708.0	24.1	24.8	39.8	22.5	41.4	42.1	54.0
4635.0	23.8	23.5	44.0	22.5	45.3	45.0	54.0

Data: Radiated Emissions from EUT (112x PIR)

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
903.0	783.2	72.2	25.7	0	103.9	97.9	
1806.0	24.3	24.1	29.7	22.5	31.5	31.3	54.0
2709.0	29.8	36.1	35.5	22.5	42.8	49.1	54.0
3612.0	28.8	27.0	39.8	22.5	46.1	44.3	54.0
4515.0	24.8	24.6	44.3	22.5	46.6	46.4	54.0
915.0	77.4	70.5	26.3	0	103.7	96.8	
1830.0	23.8	23.8	29.7	22.5	31.0	31.0	54.0
2745.0	24.5	31.6	35.3	22.5	37.3	44.4	54.0
3660.0	25.3	25.5	39.8	22.5	42.6	42.8	54.0
4575.0	23.8	24.8	44.2	22.5	45.5	46.5	54.0
927.0	77.7	72.8	26.6	0	104.3	99.4	
1854.0	23.3	23.1	29.6	22.5	30.4	30.2	54.0
2781.0	23.7	32.5	35.5	22.5	36.7	45.5	54.0
3708.0	23.0	24.8	39.8	22.5	40.3	42.1	54.0
4635.0	24.1	24.0	44.0	22.5	45.6	45.5	54.0

Data: Antenna Substitution Method

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV/m	dBµV/m	dBm	dBm
903.0	81.2	74.0	9.0	10.0
915.0	80.5	73.3	8.4	9.3
927.0	79.7	73.3	7.7	8.8
903.0	78.2	72.2	6.2	8.2
915.0	77.4	70.5	5.5	6.4
927.0	77.7	72.8	5.8	8.8

Summary of Results for Radiated Emissions of Intentional Radiator

The EUT had the highest emission of 106.9 dBmV/m at 3 meters at the fundamental frequency of operation. The EUT had a worst-case of 4.9 dB margin below the limit for the harmonic emissions. The radiated emissions for the EUT meet the requirements for FCC Part 15.247 Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the FCC Limits. The specifications of 15.247 were met; there are no deviations or exceptions to the requirements.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the FCC Part 15C emissions standards. There were no deviations to the specifications.

APPENDIX

Model: PC 0088 wireless DATA TRANSMITTER

1. Test Equipment List
2. Rogers Qualifications
3. FCC Site Approval Letter

TEST EQUIPMENT LIST FOR ROGERS LABS, INC.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

List of Test Equipment:	Calibration Date:
Scope: Tektronix 2230	2/04
Wattmeter: Bird 43 with Load Bird 8085	2/04
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/04
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/04
R.F. Generator: HP 606A	2/04
R.F. Generator: HP 8614A	2/04
R.F. Generator: HP 8640B	2/04
Spectrum Analyzer: HP 8562A,	2/04
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W	
HP Adapters: 11518, 11519, 11520	
Spectrum Analyzer: HP 8591 EM	5/04
Frequency Counter: Leader LDC 825	2/04
Antenna: EMCO Biconilog Model: 3143	5/04
Antenna: EMCO Log Periodic Model: 3147	10/03
Antenna: Antenna Research Biconical Model: BCD 235	10/03
Antenna: EMCO Dipole Set 3121C	2/04
Antenna: C.D. B-101	2/04
Antenna: Solar 9229-1 and 9230-1	2/04
Antenna: EMCO 6509	2/04
Audio Oscillator: H.P. 201CD	2/04
R.F. Power Amp 65W Model: 470-A-1010	2/04
R.F. Power Amp 50W M185 - 10-501	2/04
R.F. PreAmp CPPA - 102	2/04
LISN 50 µHy/50 ohm/0.1 µf	10/03
LISN Compliance Eng. 240/20	2/04
Peavey Power Amp Model: IPS 801	2/04
Power Amp A.R. Model: 10W 1010M7	2/04
Power Amp EIN Model: A301	2/04
ELGAR Model: 1751	2/04
ELGAR Model: TG 704A-3D	2/04
ESD Test Set 2010i	2/04
Fast Transient Burst Generator Model: EFT/B-101	2/04
Current Probe: Singer CP-105	2/04
Current Probe: Solar 9108 – 1N	2/04
Field Intensity Meter: EFM - 018	2/04
KEYTEK Ecat Surge Generator	2/04
Shielded Room 5 M x 3 M x 3.0 M (101 dB Integrity)	
5/20/2004	

QUALIFICATIONS

Of

SCOT D. ROGERS, ENGINEER

ROGERS LABS, INC.

Mr. Rogers has approximately 16 years experience in the field of electronics. Six years working in the automated controls industry and 6 years working with the design, development and testing of radio communications and electronic equipment.

POSITIONS HELD:

Systems Engineer:	A/C Controls Mfg. Co., Inc. 6 Years
Electrical Engineer:	Rogers Consulting Labs, Inc. 5 Years
Electrical Engineer:	Rogers Labs, Inc. Current

EDUCATIONAL BACKGROUND:

1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.

2) Bachelor of Science Degree in Business Administration
Kansas State University.

3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot D Rogers

Scot D. Rogers

July 26, 2004
Date

1/11/03

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

August 15, 2003

Registration Number: 90910

Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053

Attention: Scot Rogers

Re: Measurement facility located at Louisburg
3 & 10 meter site
Date of Renewal: August 15, 2003

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Ms. Phyllis Parrish
Information Technician