FCC CERTIFICATION TEST REPORT

for

Ness Security Products
4/167 Prospect Highway
Seven Hills NSW, NC 2147
Australia

FCC ID: O2K-MK304

May 24, 2000

WLL PROJECT #: 5731X

WASHINGTON LABORATORIES, LTD.

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STATEMENT OF QUALIFICATIONS

for

Chad M. Beattie

Washington Laboratories, Ltd.

I am a NARTE-Accredited EMC Test Laboratory Engineer with an Associates in Electronic Systems Technology. I have nine years of electronics experience, the last five years being directly involved in EMI testing. I am qualified to perform EMC testing to the methods described in this test report. The measurements taken within this report are accurate within my ability to perform the tests and within the tolerance of the measuring instrumentation.

By: 

Chad M. Beattie
Compliance Engineer

Date: May 23, 2000

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1.0 Introduction

This report has been prepared on behalf of Ness Security Systems to support the attached Application for Equipment Authorization. The test and application are submitted for a Periodic Intentional Radiator under Part 15.231 of the FCC Rules and Regulations. The Equipment Under Test was the Key Fob Transmitter.

All measurements herein were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and field Strength Instrumentation. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

All measurements are performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

All results reported herein relate only to the equipment tested. The measurement uncertainty of the data contained herein is ±2.3 dB. Refer to Appendix A for Statement of Measurement Uncertainty. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government.

1.1 Summary

The Ness Security Systems Key Fob Transmitter complies with the limits for a Periodic Intentional Radiator under Part 15.231 of the FCC Rules and Regulations.

2.0 Description of Equipment Under Test (EUT)

The Ness Security Systems Key Fob Transmitter (EUT) is part of a home security alarm system and used to arm and disarm a security alarm system. The low-power transmitter operates at 303.85 MHz. This unit is used in conjunction with the Ness Security Systems Security Guard 3, FCC ID: O2K-SG3-304 (concurrent application). The unit is powered via a 2016 Lithium battery.

2.1 On-board Oscillators

The Ness Security Systems Key Fob Transmitter contains a 4MHz oscillator and a 303.85 SAW oscillator.

3.0 Test Configuration

To complete the test configuration required by the FCC, the transmitter was tested in all three orthogonal planes. All testing was performed with a fresh battery installed in the unit.

3.1 Testing Algorithm

The transmitter was modified, for testing purposes only, to continuously transmit a modulated carrier wave. The system was tested in all three orthogonal planes.

Worst case emissions are recorded in the data tables.

3.2 Radiated Emissions Testing

The EUT was placed on an 80 cm high 1 x 1.5 meters non-conductive motorized turntable for radiated testing on a 3 meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Biconilog and horn broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to peak. For emissions below 1 GHz, the measurement bandwidth on the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. For emissions above 1 GHz, the measurement bandwidth on the spectrum analyzer system was set to at least 1 MHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

3.2.1 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Table 1. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dbµV to obtain the Radiated Electric Field in dBµV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Voltage: VdBµV

Composite Antenna Factor: AFcdB/m

Electric Field: EdBµV/m = VdBµV + AFcdB/m

To convert to linear units: EµV/m = antilog (EdBµV/m/20)

Data is recorded in Table 1.

Table 1: FCC 15.231 3M Radiated Emissions Data

CLIENT: Ness Security Systems
MODEL NO: Key Fob TX
FCC ID#: O2K-MK304
DATE: 28 Feb 00
BY: Chad M. Beattie
JOB #: 5731x

Freq. MHz	Polarity H/V	Azimuth Degree	Antenna Height m	SA Level (Peak) dBuV	Duty Cycle Correction dB	AFc dB/m	E-Field dBuV/m	E-Field uV/m	Limit uV/m	Margin dB
303.83	V	270.00	2.0	52.7	-14.0	16.2	54.9	556.0	5577.4	-20.0
303.83	H	315.00	1.4	58.5	-14.0	16.2	60.7	1079.2	5577.4	-14.3
607.70	V	90.00	2.0	21.8	-14.0	23.6	31.4	37.3	557.7	-23.5
607.70	H	315.00	1.2	24.4	-14.0	23.6	34.0	50.4	557.7	-20.9
911.50	V	90.00	2.5	13.4	-14.0	28.3	27.7	24.2	557.7	-27.3
911.50	H	180.00	1.1	17.6	-14.0	28.3	31.9	39.2	557.7	-23.1
1215.33	V	0.00	1.0	66.1	-14.0	-10.9	41.2	114.3	500.0	-12.8
1215.33	H	225.00	1.0	64.6	-14.0	-10.9	39.7	96.2	500.0	-14.3
1519.17	V	225.00	1.0	67.7	-14.0	-8.8	44.9	175.7	500.0	-9.1
1519.17	H	225.00	1.0	65.2	-14.0	-8.8	42.4	131.8	500.0	-11.6
1823.00	V	135.00	1.0	65.1	-14.0	-7.1	44.0	159.2	557.7	-10.9
1823.00	H	225.00	1.0	65.3	-14.0	-7.1	44.2	162.9	557.7	-10.7
2126.83	V	270.00	1.0	57.7	-14.0	-5.9	37.8	77.7	557.7	-17.1
2126.83	H	90.00	1.0	51.2	-14.0	-5.9	31.3	36.7	557.7	-23.6
2430.66	V	270.00	1.0	67.5	-14.0	-5.3	48.2	255.7	557.7	-6.8
2430.66	H	225.00	1.0	62.7	-14.0	-5.3	43.4	147.1	557.7	-11.6
2734.50	V	225.00	1.0	62.1	-14.0	-4.9	43.2	145.2	500.0	-10.7
2734.50	H	225.00	1.0	55.3	-14.0	-4.9	36.4	66.4	500.0	-17.5
3038.33	V	270.00	1.0	50.0	-14.0	-4.4	31.6	37.9	557.7	-23.4
3038.33	H	225.00	1.0	48.6	-14.0	-4.4	30.2	32.3	557.7	-24.8

Table 2: System Under Test

FCC ID: O2K-MK304

EUT: Ness Security Systems Key Fob Transmitter

FCC ID: O2K-MK304

Table 3: Interface Cables Used

The Key Fob Transmitter is battery powered and is a stand-alone device. Therefore, no power or interface cables were required.

Table 4: Measurement Equipment Used

The following equipment is used to perform measurements:

Hewlett-Packard Spectrum Analyzer: HP8564E

Hewlett-Packard Spectrum Analyzer: HP8568B

Hewlett-Packard Spectrum Analyzer: HP8593A

Hewlett-Packard Quasi-Peak Adapter: HP85650A

Hewlett-Packard Preselector: HP85685A

Hewlett-Packard Preamplifier: HP8449B

Antenna Research Associates, Inc. Biconical Log Periodic Antenna: LPB-2520A

Antenna Research Associates, Inc. Horn Antenna: DRG-118/A

Solar 50 Ω/50 µH Line Impedance Stabilization Network: 8012-50-R-24-BNC

Solar 50 Ω/50 µH Line Impedance Stabilization Network: 8028-50-TS-24-BNC

AH Systems, Inc. Portable Antenna Mast: AMS-4

AH Systems, Inc. Motorized Turntable

EXHIBIT 1

DUTY CYCLE CALCULATIONS

The following page shows a spectrum analyzer plot of the transmitter coding. The following calculations show the worst case 100 ms duty cycle correction used for calculating the average level of the carrier, harmonics, and emissions.

The period of the each code group is 57.8 ms.

ON TIME PER 100 ms/Code group:

(1 x 360 us) + (56 x 200 us) = 11.56 ms ON TIME PER Code Group Period

= 11.56 ms / 57.8 ms = 0.2
= 20 % DUTY CYCLE
= 14 dB for Duty Cycle Correction Factor

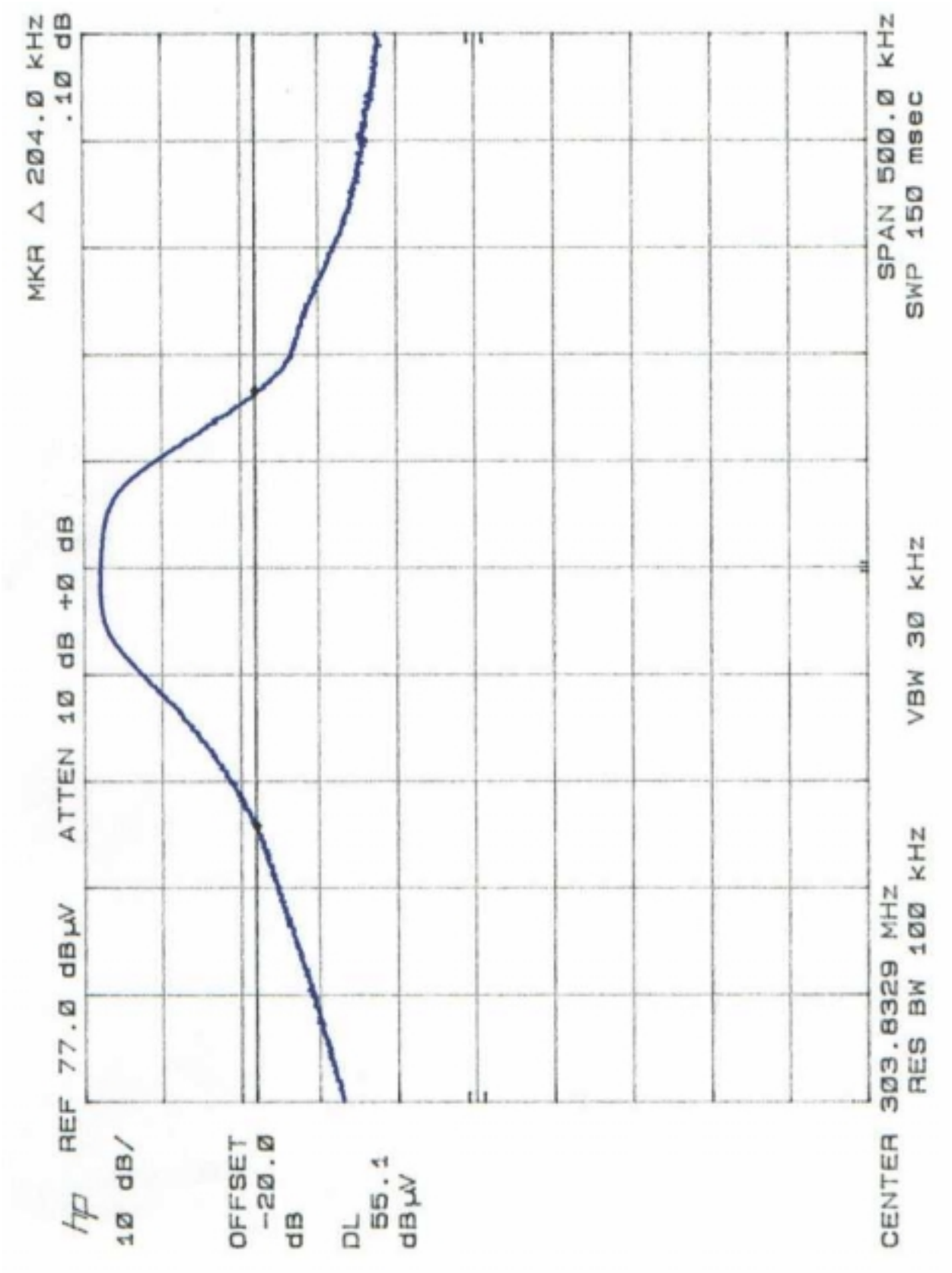

MKR Δ 204.0 kHz
.10 dB
REF 77.0 dBµV
ATTEN 10 dB +0 dB
10 dB/
OFFSET
-20.0
dB
DL
55.1
dBµV
SPAN 500.0 kHz
SWP 150 msec
CENTER 303.8329 MHz
RES BW 100 kHz
VBW 30 kHz

EXHIBIT 2

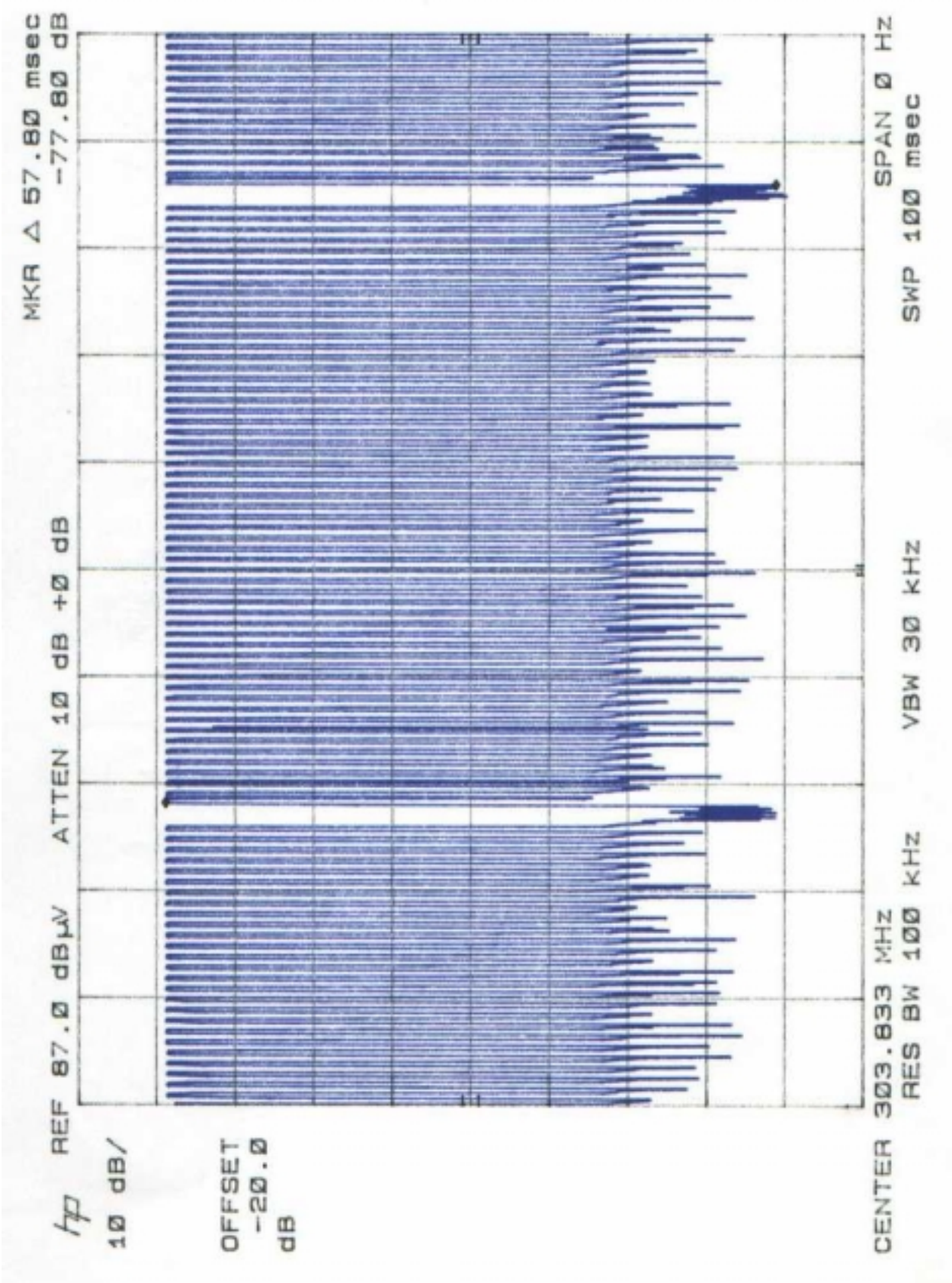
CARRIER BANDWIDTH DATA

The 20 dB modulated bandwidth shall be no wider than 0.25% of the center frequency.

Bandwidth Limit = Carrier Frequency x .0025

Bandwidth Limit = 303.833 MHz x .0025 = 759.58 kHz

Measured EUT Bandwidth = 204 kHz


MKR Δ 57.80 msec
-77.80 dB
REF 87.0 dBµV
ATTEN 10 dB +0 dB
10 dB/
OFFSET
-20.0
dB
SPAN 0 Hz
SWP 100 msec
VBW 30 kHz
CENTER 303.833 MHz
RES BW 100 kHz

Appendix A

Statement of Measurement Uncertainty

For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.