EXHIBIT 2

Test Report

Sentrol Incorporated

FCC Part 15 Application
For
Certification
(Low Power Transmitter)

Single and Dual Button Pendant Transmitters
Models: 4010 and 4011

FCC ID: A794010

March 16, 1999

Report prepared by:

Greg A. Thompson
Intertek Testing Services
4317-A Park Drive, NW
Norcross, GA 30093
Phone: 770-925-2444
FAX: 770-925-7294
E-mail: gthompson@itsqs.com

SUMMARY OF CONTENTS

LIST OF EXHIBITS

EXHIBIT 1:	Operational Description / Letter of Agency
EXHIBIT 2:	Test Report
EXHIBIT 3:	ID Label & Location
EXHIBIT 4:	Block Diagram
EXHIBIT 5:	User Manual
EXHIBIT 6:	Test Setup Photographs
EXHIBIT 7:	External Photographs
EXHIBIT 8:	Internal Photographs
EXHIBIT 9:	Schematics

TABLE OF CONTENTS

1.0 General Description

1.1 Product Description

The Sentrol Model 4010 Single Button and 4011 Dual Button Pendant Transmitter is designed to be used with Sentrol 4000 Wireless System having a receiver with Revision J or later software. They are designed as a portable, unsupervised transmitter. They are intended to function in applications where the user will be within the installer verified operating range of the overall system.

The 4010 is provided with a replaceable 3 volt CR2032 Lithium battery, necklace and an operational belt clip. The model 4010 Pendant Transmitter contains one button that must be pressed and held for a minimum of 1.5 seconds to activate.

Once the transmitter is activated, it will transmit twice (2 sets of 8 Alarm messages). The red LED will blink once as the first transmission occurs and then ten seconds later as the second transmission occurs.

The 4011 is provided with a replaceable 3 volt CR2032 Lithium battery, necklace and an operational belt clip. The model 4011 Pendant Transmitter contains two buttons that must be held simultaneously to activate.

Once activated, the pendant continuously repeats the alarm (4 alarms messages every 4 seconds) until it is reset by depressing the RESET plunger switch on the back of the unit.

Both the 4010 and 4011are intended to be used as a Panic/Holdup alarm, or other similar emergency signaling functions.

1.2 Related Submittals

There is a related submittal for this application. A related filing has been made for the receiver associated with this transmitter. The receiver is the model 4000 series.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in Open Area Test Sites. The procedures for maximizing emissions as described in this report were followed. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The North site is located at 4317-A Park Drive in Norcross, Georgia. The site consists of a wooden enclosed structure with a steel ground plane. The site meets the characteristics of ANSI C63.4: 1992 and is on file with the FCC. Please reference the site filing number: 3140/SIT 1300F2, dated April 26, 1996. This Facility is accredited by NAVLAB program (NVLAB Code: 100409-0). For measurements a remotely controlled flush mounted metal top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan from one to four meters in height. The site enclosure is constructed of non-conductive materials.

1.5 Test Equipment List

The following test equipment was used during testing:

Type	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	HP8595E	3249A00243
Spectrum Analyzer	Hewlett Packard	HP8566	2134A01032
Preamplifier	Compliance Design	P950	EMC-0001
Preamplifier	Compliance Design	P950	EMC-0002
Preamplifier	Compliance Design	P1000	EMI-P10GHz
Preamplifier	Hewlett Packard	HP8447D	2237109
Horn Antenna	EMCO	3115	9208-3919
Horn Antenna	EMCO	3116	9310-2222
Loop Antenna	EMCO	6507	9204-1283
Tuned Dipole Ant.	Compliance Design	Roberts A100	423
Tuned Dipole Ant.	Compliance Design	Roberts A100	727
Biconical Antennas	Compliance Design	B1000	367, 406, 434
Biconical Antennas	Compliance Design	B1000	685, 454, 725
Biconical Antennas	Compliance Design	B1000	525, 536, 511
Antenna Mast	EMCO	M100	Mast 01

2.0 System Test Configuration

2.1 Justification

The transmitter was configured for testing in a typical fashion. During testing, the device was mounted to a cardboard box, which enabled the engineer to maximize emissions through placement in its three orthogonal axes.

The device was powered from one new, fully charged Lithium CR2032 3V battery.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once activated, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Equipment Modification

Any modifications installed previous to testing by Sentrol, Inc. will be incorporated in each production model sold/leased in the United States.

There were no modifications installed by Intertek Testing Services.

2.5 Support Equipment List and Description

The information for all equipment, plus descriptions of all cables used in the tested system are:

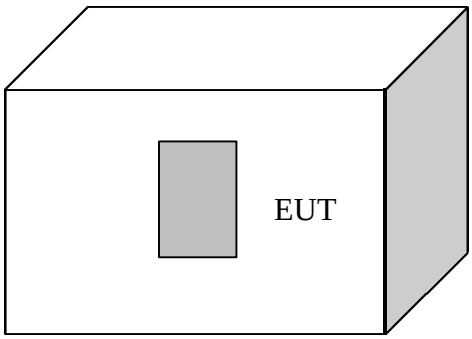
None

Cables:

None

2.6 Test Configuration Block Diagram

Figure 2.6 Configuration of Tested System



3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables the emissions are included.

3.1 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:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF
Where FS = Field Strength in dBµV/m
RR = RA - AG in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB RR = 23.0 dBµV
CF = 1.6 dB LF = 9.0 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBµV/m

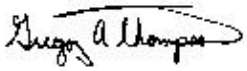
Level in µV/m = Common Antilogarithm [(32 dBµ/V/m)/20] = 39.8 µV/m

3.2 Radiated Emission Test Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 21.7 dB

Readings under 1GHz are Peak
Readings over 1GHz are Peak

Test Personnel: 

Gregory A. Thompson, Project Engineer

Date: *3/16/99*

Company: Sentrol Moose
Model: 4011
Job No.: J99-006455
Date: 03/06/99
Standard: FCC15
Class: B Group: None
Notes: 0

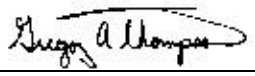
Tested by: Greg A. Thompson
Location: Norcross
Detector: HP 8566
Antenna: chase245
PreAmp: cdi2-1g
Cable(s): cable1 cable2
Distance: 3
Signature:

Ant. Pol. x-y-z	Frequency (MHz)	Peak Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-amp Factor (dB)	Average Factor (dB)	Net dBuV/m	Limit dBuV/m	Margin (dB)
x	391.870	26.1	15.3	5.1	16.1	20.0	10.4	60.3	-49.9
y	391.870	25.1	15.3	5.1	16.1	20.0	9.4	60.3	-50.9
z	391.870	25.1	15.3	5.1	16.1	20.0	9.4	60.3	-50.9
x	404.930	39.4	15.7	5.2	16.1	20.0	24.3	46.0	-21.7
y	404.930	37.3	15.7	5.2	16.1	20.0	22.2	46.0	-23.8
z	404.930	33.1	15.7	5.2	16.1	20.0	18.0	46.0	-28.0
x	418.000	68.5	16.2	5.4	16.1	20.0	54.0	80.3	-26.3
y	418.000	68.1	16.2	5.4	16.1	20.0	53.6	80.3	-26.7
z	418.000	64.5	16.2	5.4	16.1	20.0	50.0	80.3	-30.3
x	431.060	41.9	16.4	5.4	16.1	20.0	27.6	60.3	-32.7
y	431.060	38.6	16.4	5.4	16.1	20.0	24.3	60.3	-36.0
z	431.060	34.9	16.4	5.4	16.1	20.0	20.6	60.3	-39.7
x	444.120	27.6	16.6	5.5	16.1	20.0	13.6	60.3	-46.7
y	444.120	25.2	16.6	5.5	16.1	20.0	11.2	60.3	-49.1
z	444.120	25.0	16.6	5.5	16.1	20.0	11.0	60.3	-49.3
x	836.000	30.9	20.0	8.0	16.3	20.0	22.6	60.3	-37.7
y	836.000	29.1	20.0	8.0	16.3	20.0	20.8	60.3	-39.5
z	836.000	25.9	20.0	8.0	16.3	20.0	17.6	60.3	-42.7
x	1254.000	51.4	26.3	1.0	27.4	20.0	31.3	60.3	-29.0
y	1254.000	47.0	26.3	1.0	27.4	20.0	26.9	60.3	-33.4
z	1254.000	49.7	26.3	1.0	27.4	20.0	29.6	60.3	-30.7
x	1672.000	43.4	27.9	1.3	27.1	20.0	25.5	54.0	-28.5
y	1672.000	39.3	27.9	1.3	27.1	20.0	21.4	54.0	-32.6
z	1672.000	38.6	27.9	1.3	27.1	20.0	20.7	54.0	-33.3
x	2090.000	39.8	29.8	1.7	26.8	20.0	24.5	60.3	-35.8
y	2090.000	42.7	29.8	1.7	26.8	20.0	27.4	60.3	-32.9
z	2090.000	38.1	29.8	1.7	26.8	20.0	22.8	60.3	-37.5
x	2508.000	29.8	30.6	2.0	26.6	20.0	15.8	60.3	-44.5
y	2508.000	29.8	30.6	2.0	26.6	20.0	15.8	60.3	-44.5
z	2508.000	29.8	30.6	2.0	26.6	20.0	15.8	60.3	-44.5
x	2926.000	29.4	32.6	2.0	26.7	20.0	17.3	60.3	-43.0
y	2926.000	29.4	32.6	2.0	26.7	20.0	17.3	60.3	-43.0
z	2926.000	29.4	32.6	2.0	26.7	20.0	17.3	60.3	-43.0
x	3344.000	28.2	32.8	2.0	26.7	20.0	16.3	54.0	-37.7
y	3344.000	28.2	32.8	2.0	26.7	20.0	16.3	54.0	-37.7
z	3344.000	28.2	32.8	2.0	26.7	20.0	16.3	54.0	-37.7
x	3762.000	27.9	34.0	2.0	26.3	20.0	17.6	54.0	-36.4
y	3762.000	27.9	34.0	2.0	26.3	20.0	17.6	54.0	-36.4
z	3762.000	27.9	34.0	2.0	26.3	20.0	17.6	54.0	-36.4
x	4180.000	27.7	34.8	2.0	26.0	20.0	18.5	54.0	-35.5
y	4180.000	27.7	34.8	2.0	26.0	20.0	18.5	54.0	-35.5
z	4180.000	27.7	34.8	2.0	26.0	20.0	18.5	54.0	-35.5

Average factor based on a 10ms on time within a 100ms period.
Emco3115, HP8449 with 10attn, and cables 8 used above 1GHz.

3.3 Line Conducted Emission Test Data

Note: Line Conducted Emission testing was not required for this device since it is battery powered and does not connect to the AC Mains.

Test Personnel: 

Gregory A. Thompson, Project Engineer

Date: *3/16/99*

4.0 Transmitter Information

This miscellaneous information includes details of the test procedures, measured bandwidth, and calculation of factors such as pulse desensitization and averaging factor.

4.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under FCC Part 15 rules.

The transmitting equipment under test (EUT) is attached to a cardboard box and placed on a wooden table approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The cardboard box is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode or average mode (see attached data table). If peak measurements are taken for comparison with the average limit, they are corrected by measuring the duty cycle of the equipment under test and subtracting the corresponding average factor in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.3.

The frequency range scanned is from the lowest radio frequency signal generated, but not lower then 9kz in the device up to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 450 KHz to 30 MHz.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Measurements were made as described in ANSI C63.4: 1992.

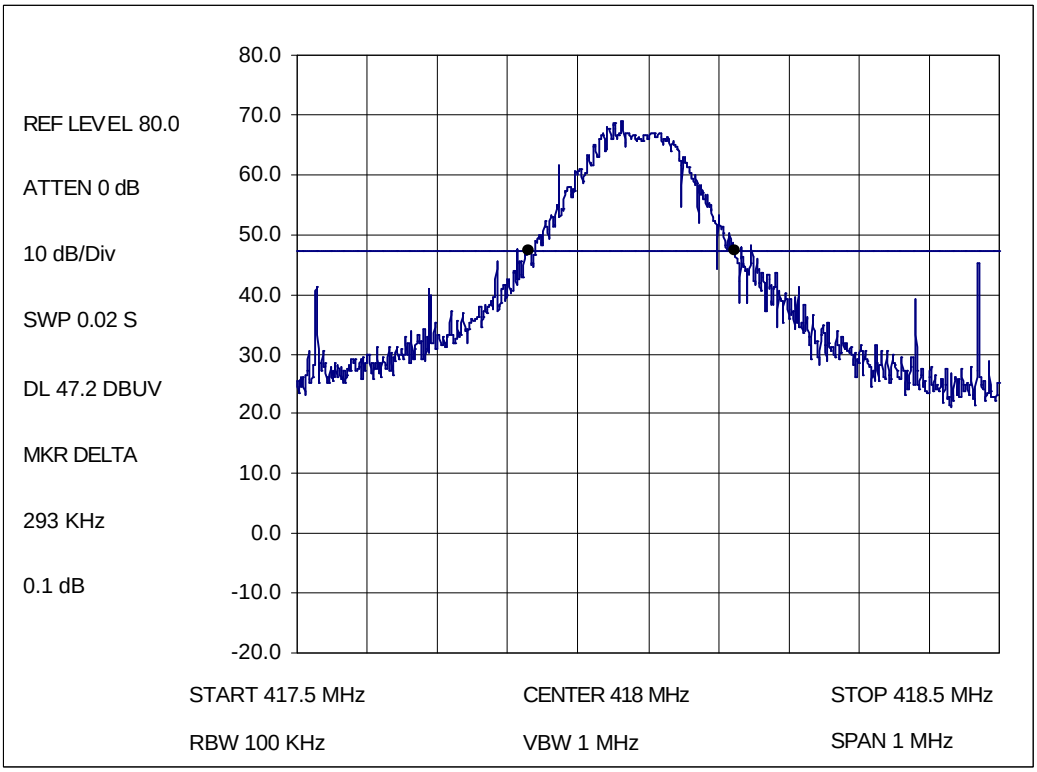
The resolution bandwidth used for measurement of radiated signal strength was 100 KHz or greater below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor readings in the forbidden bands and above 1 GHz, signals may be acquired at a distance of one meter or less. All measurements are taken at three meters unless otherwise noted on the data tables.

Frequency Stability is not specified for this device.

4.2 Measured Bandwidth

The plot on this page shows the fundamental emission when modulated with a worst-case bit sequence. From the plot, the bandwidth is observed to be **293 kHz,** at 20 dBc. The bandwidth limit is **1,045 kHz**. The unit meets the FCC Part 15 bandwidth requirements.



4.3 Calculation of Average Factor

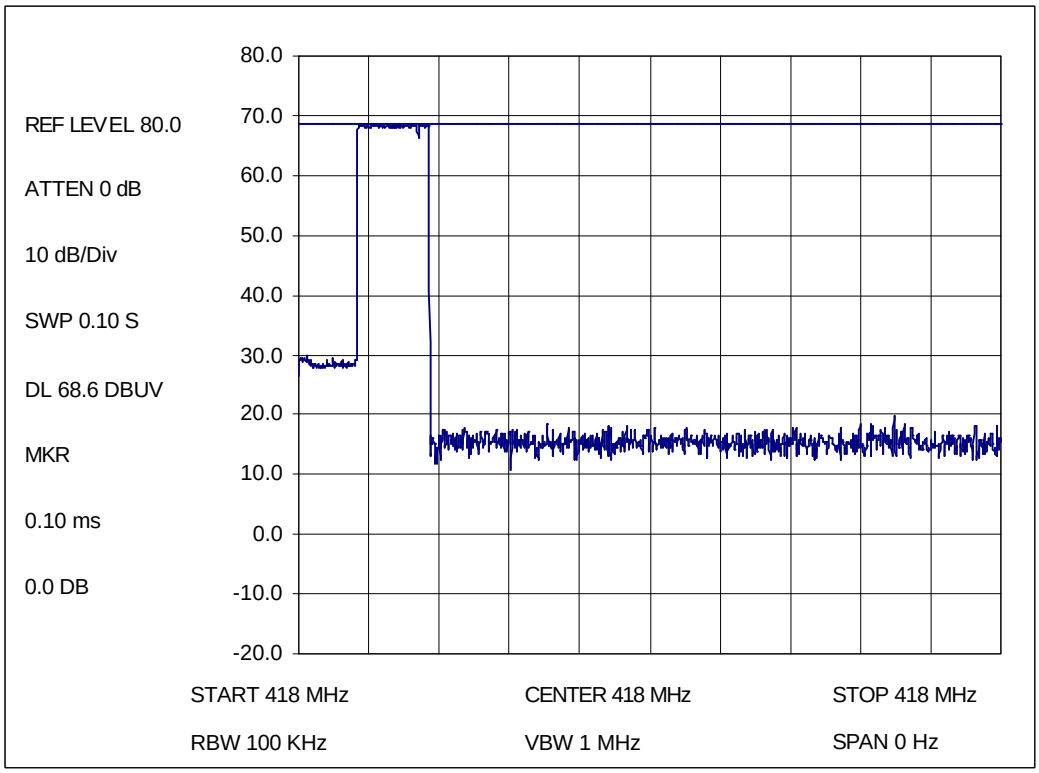
Averaging factor in dB = 20 log (duty cycle)

The specification for output field strengths in accordance with FCC Part 15 specifies measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero span (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

During testing, a worst-case duty cycle of 10.0 ms was observed. A plot of the worst-case duty cycle as observed during testing is included on this page.

Therefore, the averaging factor is found by 20 $\log_{10}$ (10.0/100) = **-20.0 dB**.



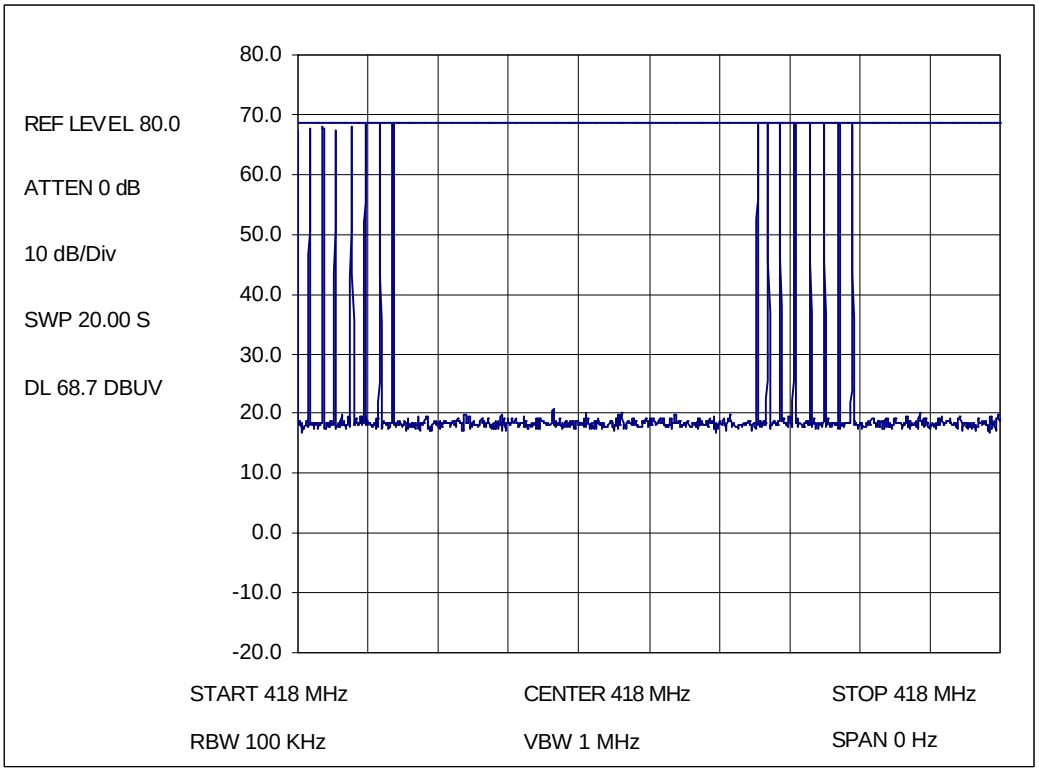
4.4 Operating Characteristics and Holdover Time

This device is designed for momentary operation and is described in Section 15.231 of the FCC Rules. This device can only be activated manually.

Both the 4010 and 4011 are employed for radio control purposes for use during emergencies involving security and safety of life. Under section 15.231 (4), the 4010 and 4011 are intended to be operated only during the pendency of the alarm condition. The following plots show the operating cycles for both the 4010 and 4011.

This device does not employ periodic supervisory transmissions.

Manual Activation 4010 20s Plot



Manual Activation 4011 10s Plot