1.0 General Description

1.1 Product Description

The wireless smoke detector is based on the 500 series smoke detector with the RF transmitter module attached. This includes both photoelectric and heat heads, with fixed and rate of rise heat detection in order to meet the needs of the security fire alarm system market.
The detector is powered by two 3 Volts 2/3A lithium batteries which also supply the RF. module.
The detector is a self-restoring device with a sounder which may be actuated when the detector is in alarm mode. The sounder may be silenced by pushing the TEST button.
The 4300/560 mounting ring fits inside of the individual heads. The detector electronic architecture is micro controlled based.
The 4300/560 series includes automatic sensitivity checks to verify that the unit is within its specified sensitivity limits. If the sensitivity changes due to dust and dirt the detector will automatically compensate by adjusting its sensitivity accordingly. However, the maximum adjustment allowed is 0.1%/ft. Every 24 hours up to a maximum adjustment of 0.5%/ft. With respect to the original sensitivity set in manufacturing. Once the maximum sensitivity adjustment is reached, the detector's sensitivity will visually notify the customer by extinguishing a red LED and If enabled, will transmit a trouble condition to the panel. In addition, the sensitivity of the detector can be read at any time by initiating test mode and correlating the LED blinks displayed, to a given sensitivity.

4310S	(4310S-AMH)(4340S-AMH) smoke with sounder and cleanme UL217
4310SLT	smoke with sounder and dual fixed/rate of rise heats & low temperature output and cleanme UL217
4310SLH	isolated heat UL217
4310ST	4310S with 135 degree fixed rate of rise
4318S	smoke with sounder and cleanme ULC
4318SLT	4310SLT ULC
4330	smoke with cleanme and base tamper UL268
4330S	smoke with sounder, cleanme and base tamper UL268
4330SLT	smoke with sounder, base tamper, fixed/rate of rise heats, low temperature output, & cleanme UL268
4330SLT-M	smoke with sounder, tilt tamper & base tamper, fixed/rate of rise heats, low temperature output, & cleanme UL268
4338SLT	smoke with sounder, tilt tamper & base tamper, fixed/rate of rise heats, low temperature output, & cleanme ULC

1.2 Related Submittals / Grants

There is a related submittal for this application. A related filing has been made for the receiver associated with this transmitter. The receiver FCC ID is A794720.

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. For each scan, the procedure for maximizing emissions described in Section 8.3 of 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. For measurements a remotely controlled flush mount 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 meter 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
EMI Receiver	Hewlett Packard	8546A	3410A00173
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	Compliance Design	M100	Mast 01
Antenna Mast	Compliance Design	M100	Mast 02

EXHIBIT 2

SYSTEM TEST CONFIGURATION

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 two new, fully charged Duracell 123A 3V battery.

2.2 EUT Exercising Software

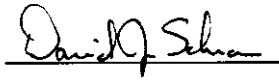
There was no special software to exercise the device. Once activated, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.

2.3 Special Accessories

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

Confirmed by:

David J. Schramm
EMI Technical Supervisor
Intertek Testing Services
Agent for Sentrol, Inc.


Signature

8/6/98
Date

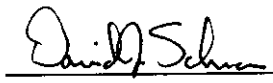
2.4 Equipment Modification

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

No Modifications were installed by Intertek Testing Services

Confirmed by:

David J. Schramm
EMI Technical Supervisor
Intertek Testing Services
Agent for Sentrol, Inc.


Signature

8/6/98
Date

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

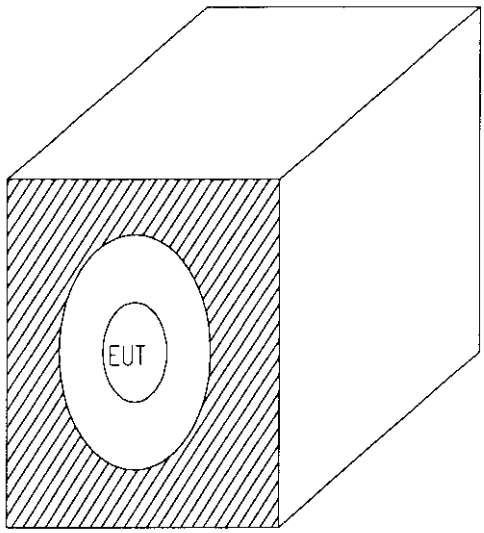


EXHIBIT 3

EMISSION RESULTS

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
CF = 1.6 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBμV/m

RR = 23.0 dBμV
LF = 9.0 dB

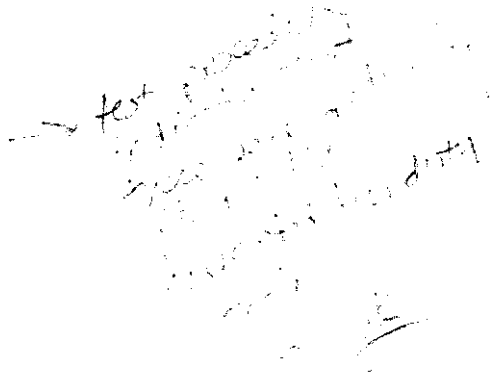
Level in μV/m = Common Antilogarithm [(32 dBμ/V/m)/20] = 39.8 μV/m

3.3 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 2.7 dB

*Readings under 1GHz are quasi-peak
Readings over 1GHz are Average



Test Personnel: _____

Gregory A. Thompson, Project Engineer

Date: 7-30-98

Radiated Emissions / Interference
Table: 1

Company: Sentrol Moose
Model: 4300 Series

Notes: Initial Results

Date: 05/18/98
Tested by: Greg A. Thompson
Test Distance: 3
Job Number: J98-9001

Standard: FCC Part 15
Intentional Radiators Fundamental and Spurious Emissions

Frequency (MHz)	x Reading (dBuV)	y Reading (dBuV)	z Reading (dBuV)	Antenna Factor (dB)	Cable Factor (dB)	Pre-amp Factor (dB)	Average Factor (dB)*	Net (dBuV/m)	Limit (dBuV/m)	Margin (dB)
391.930	48.3	42.7	43.8	15.7	2.9	16.4	13.3	50.5	60.3	-9.8
418.060	71.2	68.1	61.3	16.7	3.0	0.0	13.3	77.6	80.3	-2.7
444.170	36.1	31.4	20.7	16.5	3.2	16.2	13.3	39.6	60.3	-20.7
836.120	35.5	40.0	31.7	21.0	4.7	16.6	13.3	44.6	60.3	-15.7
1254.110	27.5	24.1	19.7	26.3	1.6	0.0	13.3	42.1	60.3	-18.2
1672.170	21.7	25.3	24.7	27.5	1.8	0.0	13.3	41.4	54.0	-12.6
2090.230	34.9	33.4	39.5	29.0	2.0	23.2	13.3	34.0	60.3	-26.3
2508.290	38.2	35.9	41.8	30.5	2.2	23.4	13.3	37.8	60.3	-22.5
2926.350	31.1	40.7	41.1	31.5	2.4	23.4	13.3	38.3	60.3	-22.0
3344.400	25.4	23.7	26.3	32.4	2.7	23.3	13.3	24.7	60.3	-35.6
3762.400	23.4	21.9	22.7	33.4	2.9	23.2	13.3	23.1	54.0	-30.9
4180.500	22.7	22.4	22.2	34.1	3.1	23.8	13.3	22.8	54.0	-31.2

* Average based on a 21.7 mS on time in a 100mS period.

3.4 Line Conducted Configuration Photograph

Worst Case Line Conducted Emissions

Front View

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3.4 Line Conducted Configuration Photograph (cont.)

Worst Case Line Conducted Emissions

Rear View

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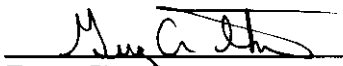
3.5 Line Conducted Emission Test Data

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:



Tester Signature

Gregory A. Thompson / Project Engineer

Typed/Printed Name

7-30-98

Date

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

EXHIBIT 8

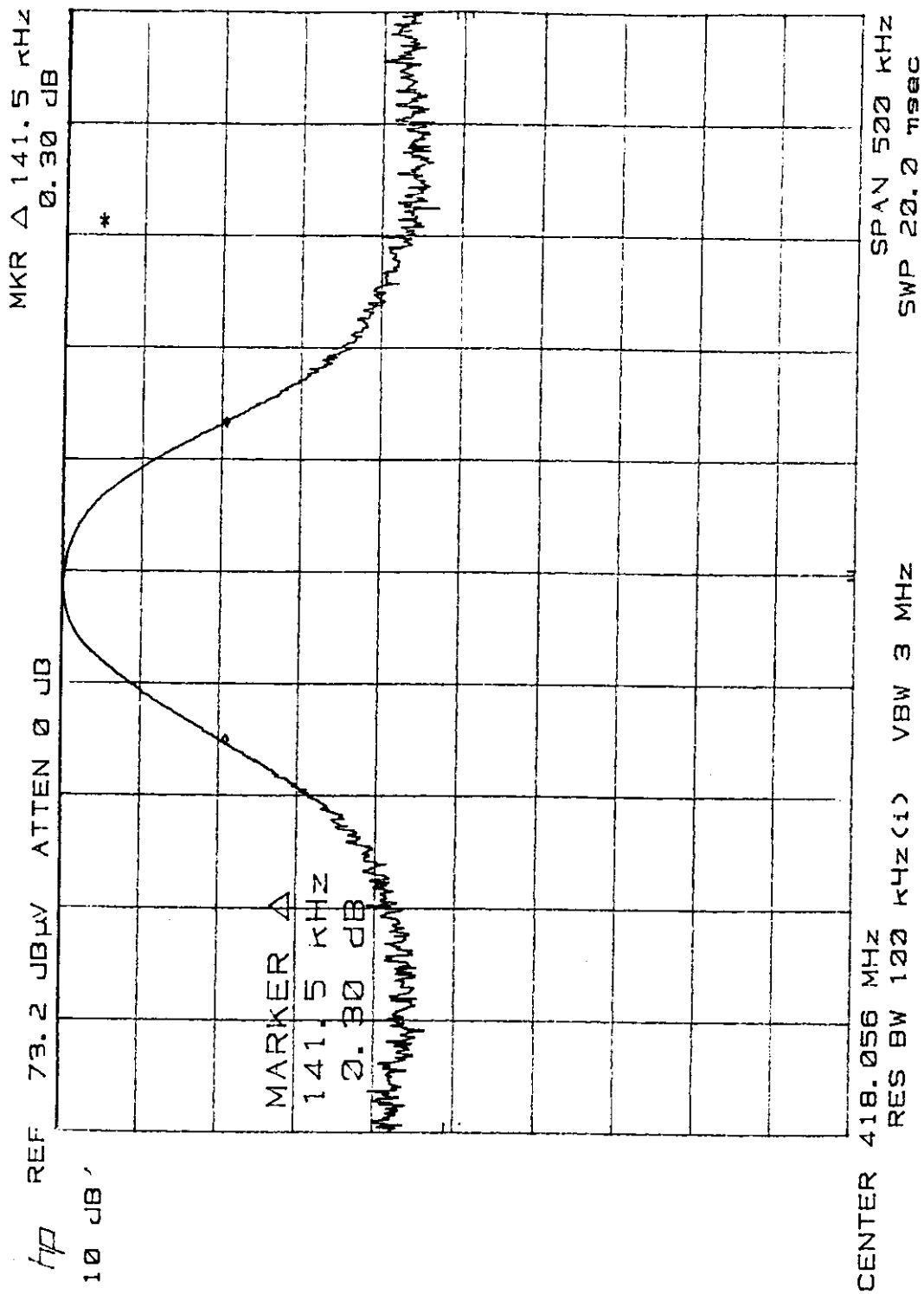
MISCELLANEOUS INFORMATION

8.0 Miscellaneous Information

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

8.1 Measured Bandwidth

The plot on the following page shows the fundamental emission when modulated with a worst-case bit sequence. From the plot, the bandwidth is observed to be **141.5 kHz,** at 20 dBc. The bandwidth limit is **1,045 kHz**. The unit meets the FCC Part 15 bandwidth requirements.


MKR Δ 141.5 kHz
0.30 dB
SPAN 500 kHz
SWP 20.2 msec
REF 73.2 dBμV
ATTEN 0 dB
10 dB/
MARKER Δ
141.5 kHz
2.30 dB
CENTER 418.056 MHz
RES BW 100 kHz(i)
VBW 3 MHz

8.2 Calculation of Average Factor

Example of Average Factor

Averaging factor in dB = 20 log (duty cycle)

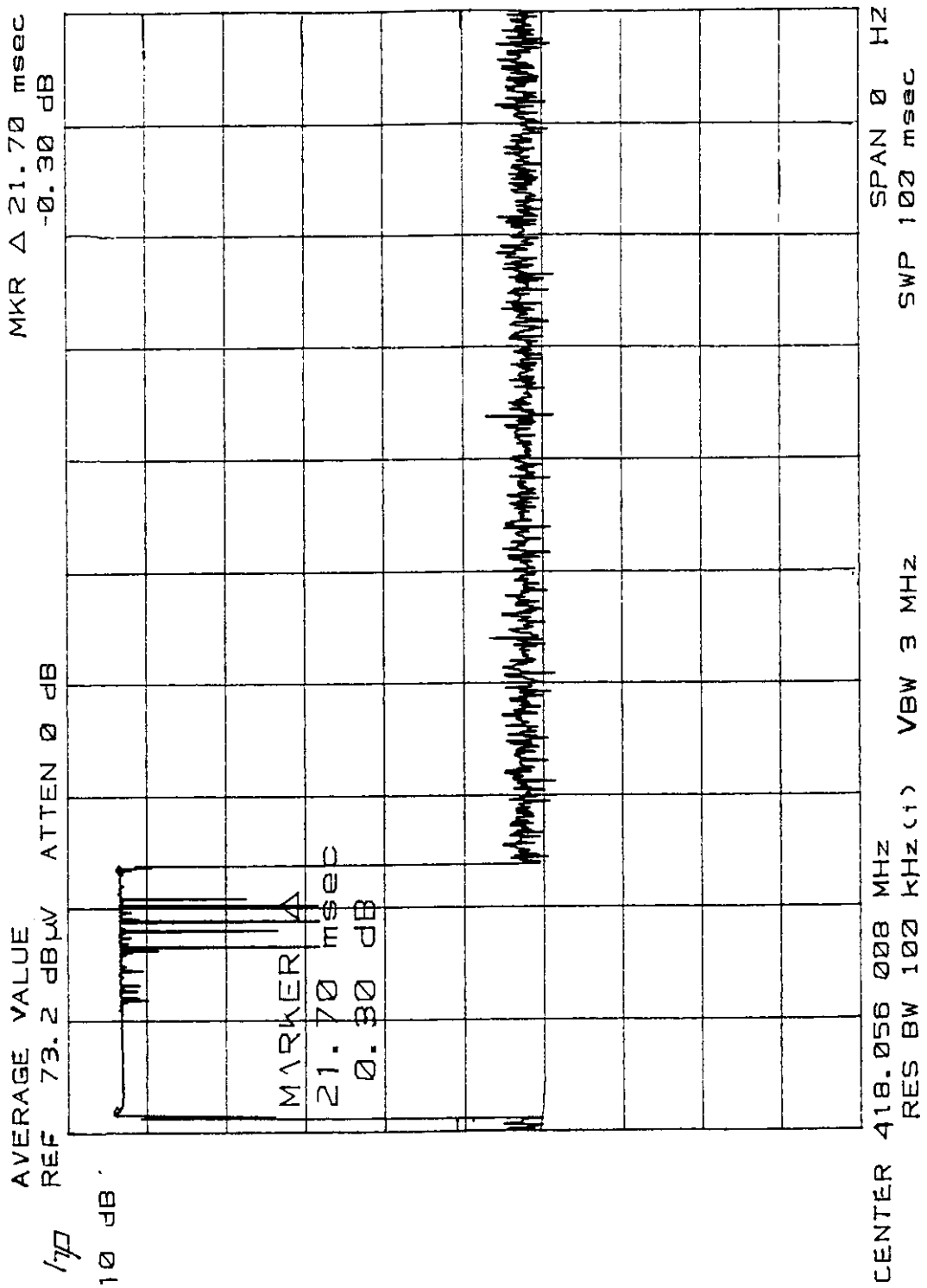
The specification for output field strengths in accordance with FCC Part 15 specifies measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the 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 21.7 msec. was observed. A plot of the worst-case duty cycle as observed during testing is included on the following page.

Worst-case "ON" time per 100 msec interval (or repetition cycle) = 21.7 msec (See average plot).

Therefore, the averaging factor is found by 20 $\log_{10}$ (21.7/100) = **-13.3 dB**.


MKR Δ 21.70 msec
-0.30 dB
AVERAGE VALUE
REF 73.2 dBµV ATTEN 0 dB
10 dB
MARKER Δ
21.70 msec
0.30 dB
CENTER 418.056 008 MHz
RES BW 100 kHz(i) VBW 3 MHz
SPAN 0 Hz
SWP 100 msec

8.3 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 turntable which is four feet in diameter and approximately one meter in height above the groundplane. 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 Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz 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.

The EUT is warmed up for 15 minutes prior to the test.

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.

Conducted measurements were made as described in MP-4. Measurement Procedure MP-1 states that conducted measurements should follow the above procedure. An IF bandwidth of 10 KHz is used, and peak detection is employed.

The IF 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 in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

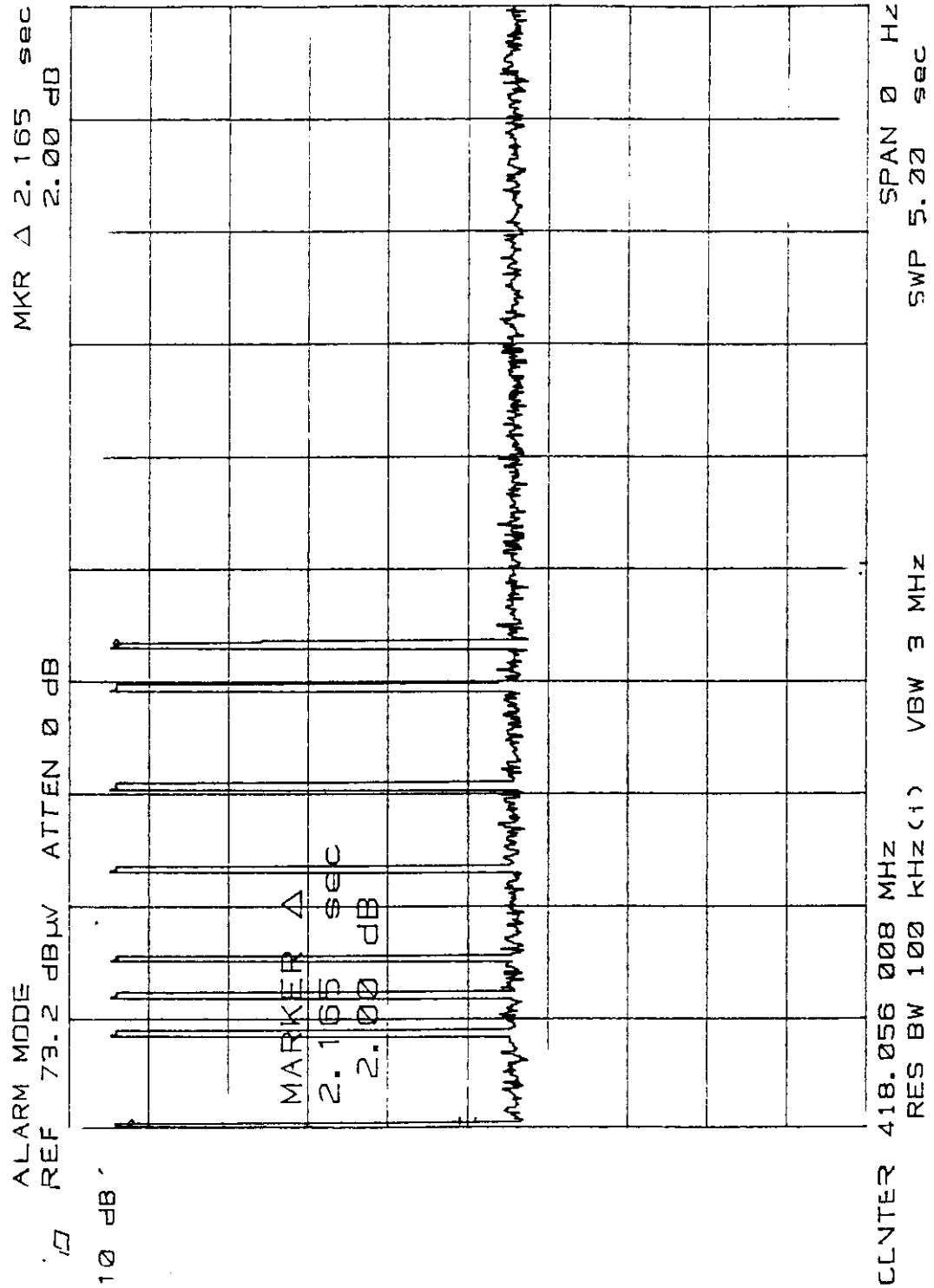
8.4 Operating Characteristics and Holdover Time

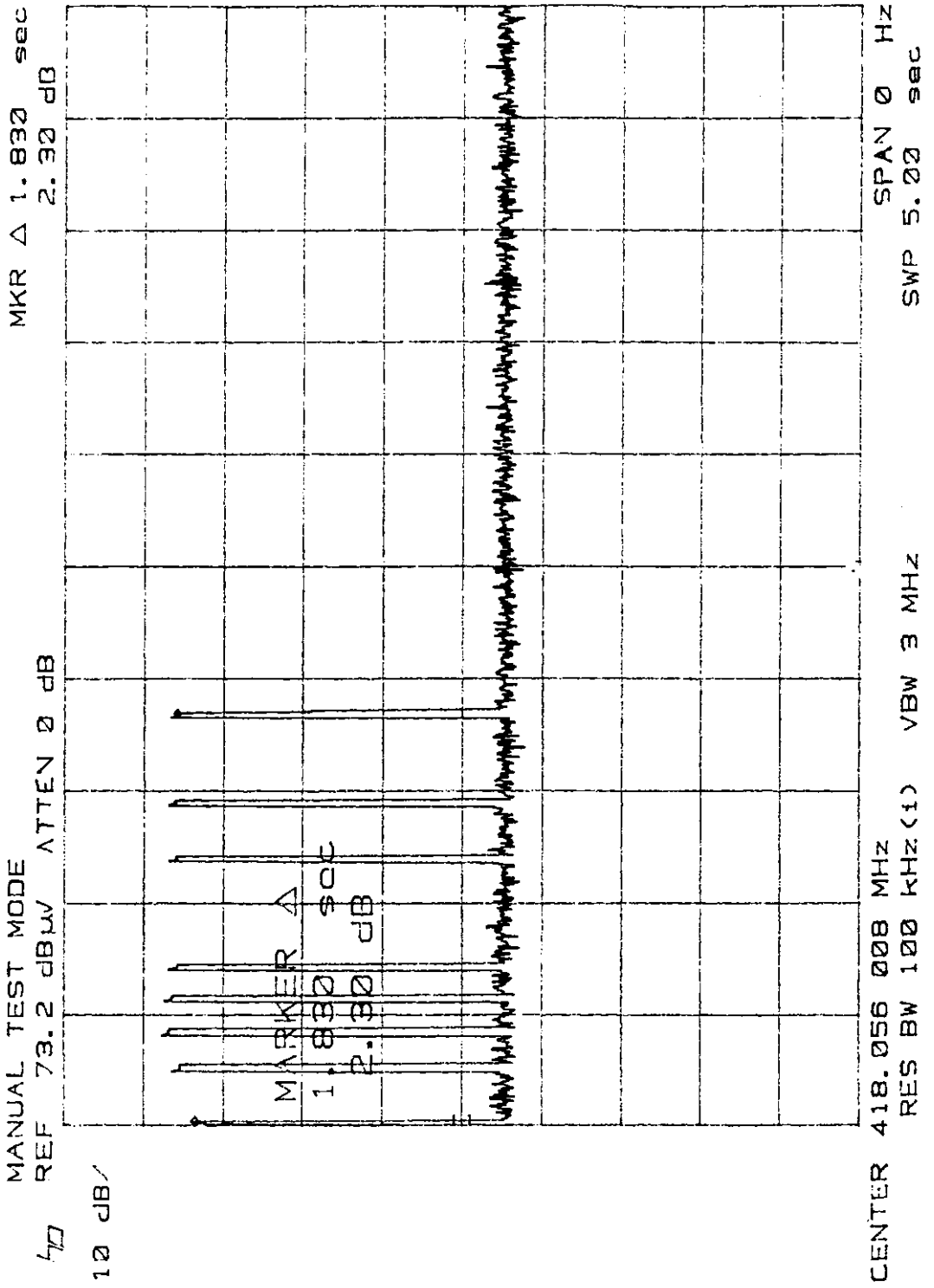
This device is designed for momentary operation and is described in Section 15.231 of the FCC Rules. This device can be activated automatically or manually.

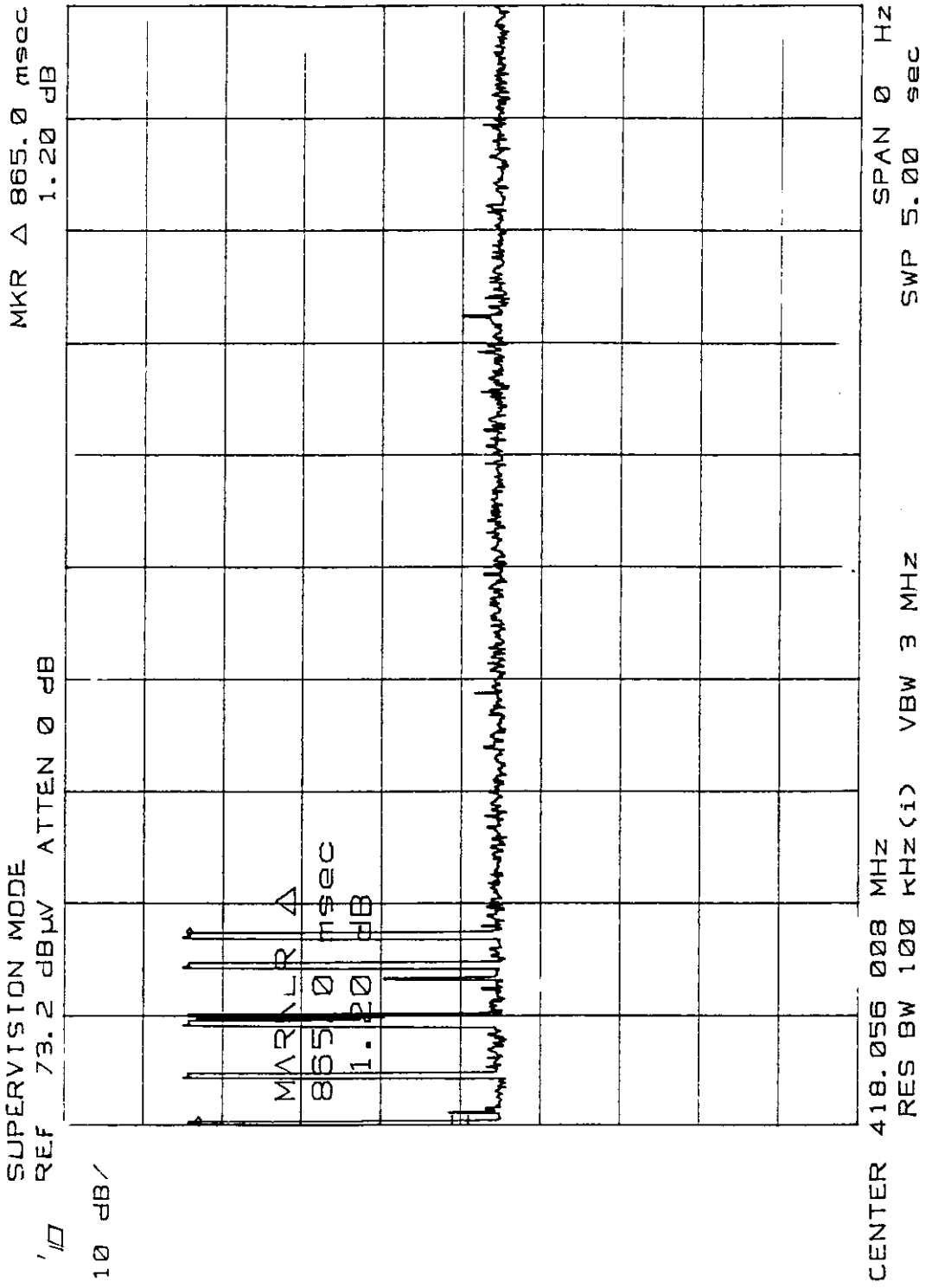
Holdover time after automatic activation is 2.165 seconds(see alarm plot). §15.231(a)(2)

Holdover time after manual activation is 1.83 seconds(see manual plot). §15.231(a)(1)

Periodic supervisory transmissions are employed by this device to determine system integrity since it is used for security or safety of life applications. In accordance with §15.231(a)(3), the periodic rate of each supervisory transmission does not exceed one transmission of not more than one second duration per hour (see supervision plot)


ALARM MODE
REF 73.2 dBµV ATTEN 0 dB
10 dB/
MKR Δ 2.165 sec
2.00 dB
MARKER Δ
2.165 sec
2.00 dB
CENTER 418.056 008 MHz
RES BW 100 kHz(i) VBW 3 MHz
SPAN 0 Hz
SWP 5.20 sec


MANUAL TEST MODE
REF 73.2 dBµV ATTEN 0 dB
MKR Δ 1.830 sec
2.30 dB
10 dB/
MARKER Δ
1.830 sec
2.30 dB
CENTER 418.056 000 MHz
RES BW 100 kHz (i) VBW 3 MHz
SPAN 0 Hz
SWP 5.00 sec


SUPERVISION MODE
REF 73.2 dBµV ATTEN 0 dB
10 dB/
MKR Δ 865.0 msec
1.20 dB
MKR Δ
865.0 msec
1.20 dB
CENTER 418.056 008 MHz
RES BW 100 kHz(i) VBW 3 MHz
SPAN 0 Hz
SWP 5.00 sec

ITS Intertek Testing Services

4317-A Park Drive, NW
Norcross, GA 30093
Phone : 770-925-2444
FAX : 770-925-7294

Federal Communications Commission
c/o Mellon Bank
Three Mellon Bank
525 William Penn Way
27th Floor, Room 153-2713
Pittsburgh, PA 15251-5315
Attn: Wholesale Lockbox Shift Supervisor

RE: FCC Part 15 Application for Certification
Sentrol, Inc / Moose (FCC ID:A7943)

Dear Sir or Madam:

Enclosed please find the above-referenced Application, along with a check in the amount of $895.00 to cover the filing fees.

Please feel free to contact me with any questions.

Sincerely,

David J. Schramm
EMI Technical Supervisor

CC w/enclosures: Jeff Jacumin, Regulatory Engineer, Sentrol, Inc.