EMISSIONS TEST REPORT

Report Number: 3148183BOX-001
Project Number: 3148183

Testing performed on the

Endec

Model: 3644
FCC ID: V2W3644

To

CFR47 Telecommunications
Part 11 "Emergency Alert System (EAS)" Subpart B
Part 15 Subpart B "Unintentional Radiators"

For

Sage Alerting Systems Inc.

Test Performed by:	Test Authorized by:
Intertek – ETL SEMKO	Sage Alerting Systems Inc.
70 Codman Hill Road	800 Westchester Avenue Suite 641 North
Boxborough, MA 01719	Rye Brook, NY 10573

Prepared by: _____ Date: 04/09/2008
Nicholas Abbondante

Reviewed by: _____ Date: 04/10/08
Jeff Goulet

1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company:	Sage Alerting Systems Inc. 800 Westchester Avenue Suite 641 North Rye Brook, NY 10573
Contact:	Mr. Harold Price
Telephone:	412-835-2994
Fax:	412-833-9482
Email:	hprice@sagealertingsystems.com

1.2 Equipment Under Test

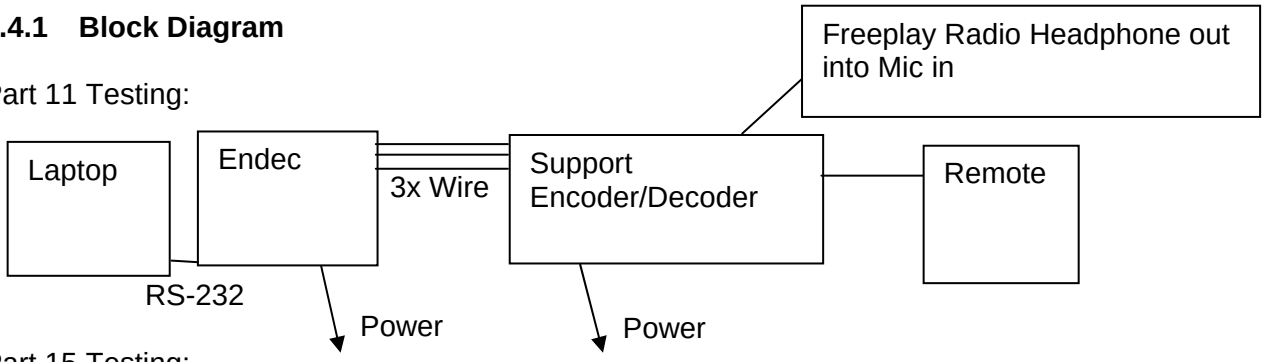
Equipment Type:	Endec
Model Number(s):	3644
Serial number(s):	1, 2
EUT receive date:	04/02/2008
EUT received condition:	Prototypes in Good Condition
Test start date:	04/02/2008
Test end date:	04/09/2008

1.3 Test Plan Reference: Tested according to the standards listed and ANSI C63.4:2003

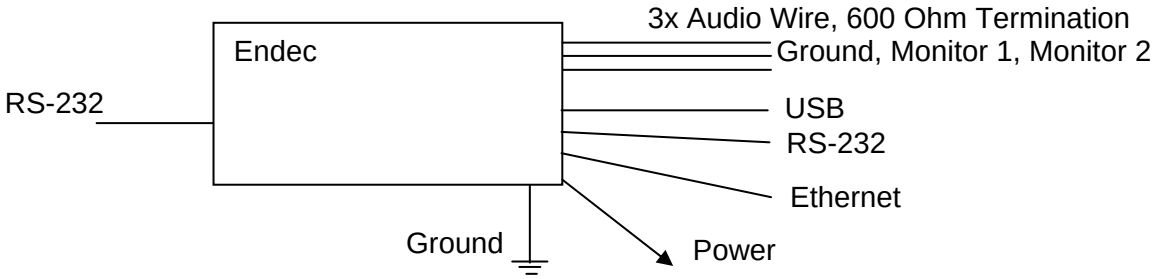
1.4 Test Configuration

1.4.1 Block Diagram

Part 11 Testing:



Part 15 Testing:



1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
Ground	None	Wire	1.0	1
Audio, Ground	Braid	Wire/Drain Wire, 600 Ohm Term.	1.2	1
Audio, Monitor 1	Braid	Wire/Drain Wire, 600 Ohm Term.	1.2	1
Audio, Monitor 2	Braid	Wire/Drain Wire, 600 Ohm Term.	1.2	1
XLR Cable, Main/Alert Out	Braid	Metal/360 Balanced XLR	1.85	1
USB	Braid	Metal/360 USB	3.0	1
Ethernet	None	Plastic RJ-45	2.9	1
RS-232, COM1	Braid	Metal/360 DB9	1.8	1
RS-232, COM2	Braid	Metal/360 DB9	2.9	1
AC Mains	None	Plastic	1.8	1
DC Mains	None	Metal/Jack	1.8	1

Cable description pertains to Part 15 testing

1.4.3. Support Equipment:

Name: Sage Endec
Model No.: 1822
Serial No.: D6602

Name: Sage Endec Remote
Model No.: RC-1
Serial No.: 6279783

Name: CUI Inc. AC/DC Power Supply
Model No.: 3A-621DN19
Serial No.: N/L

Name: Radio
Model No.: Freeplay
Serial No.: SFD 00 034 590

Name: Laptop
Model No.: N/A
Serial No.: N/A

1.5 Mode(s) of Operation:

The EUT was being fed 19V DC by the EUT AC/DC power supply, which was powered from 120V/60Hz AC power, except during the voltage variation test.

1.6 Modifications required for compliance:

A Wurth Elektronik ferrite #74271131 was placed in a single pass configuration located at the EUT, on both the front panel RS-232 cable and on the rear panel USB cable. The EUT was grounded during testing from the ground lug to the ground plane.

2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 11 Subpart B & FCC Part 15 Subpart B		
SUB-TEST	**TEST PARAMETER**	**COMMENT**
EAS Protocol FCC 11.31	The EAS protocol must meet the protocol requirements of 11.31. See Test Details for a detailed list of requirements.	Pass
EAS Encoder FCC 11.32	The EAS encoder must meet the operational requirements of 11.32. See Test Details for a detailed list of requirements.	Pass
EAS Decoder FCC 11.33	The EAS decoder must meet the operational requirements of 11.33. See Test Details for a detailed list of requirements.	Pass
Radiated Emissions FCC 15.109	Emissions must be below the 15.109 Class A limits	Pass
AC Line-Conducted Emissions FCC 15.107	Emissions must be below the 15.107 Class A limits	Pass

REVISION SUMMARY – The following changes have been made to this Report:

Date	Project No.	Project Handler	Page(s)	Item	Description of Change

3.0 Sample Calculations

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.

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
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

Level in μV/m = [10(32 dBμV/m)/20] = 39.8 μV/m

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(48.1\ dB\mu V / 20)}$ = 254 μV/m

3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.
The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be:

±3.5 dB at 10m, ±3.8 dB at 3m

The expanded uncertainty (k = 2) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

±2.6 dB

The expanded uncertainty (k = 2) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

±3.2 for ISN and voltage probe measurements
±3.1 for current probe measurements

3.2 Site Description

Test Site(s): EMC, Littleton, and Site 2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

The EMC Lab has two Semi-anechoic Chambers and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference groundplanes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Test Results: Pass

Test Standard: FCC Part 11 Subpart B

Test: EAS Protocol

Performance Criterion: See Test Details

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	21	Humidity (%):	25	Pressure (hPa):	1006
Pretest Verification Performed		N/A		Equipment under Test:		Endec	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		1	

Test Equipment Used:

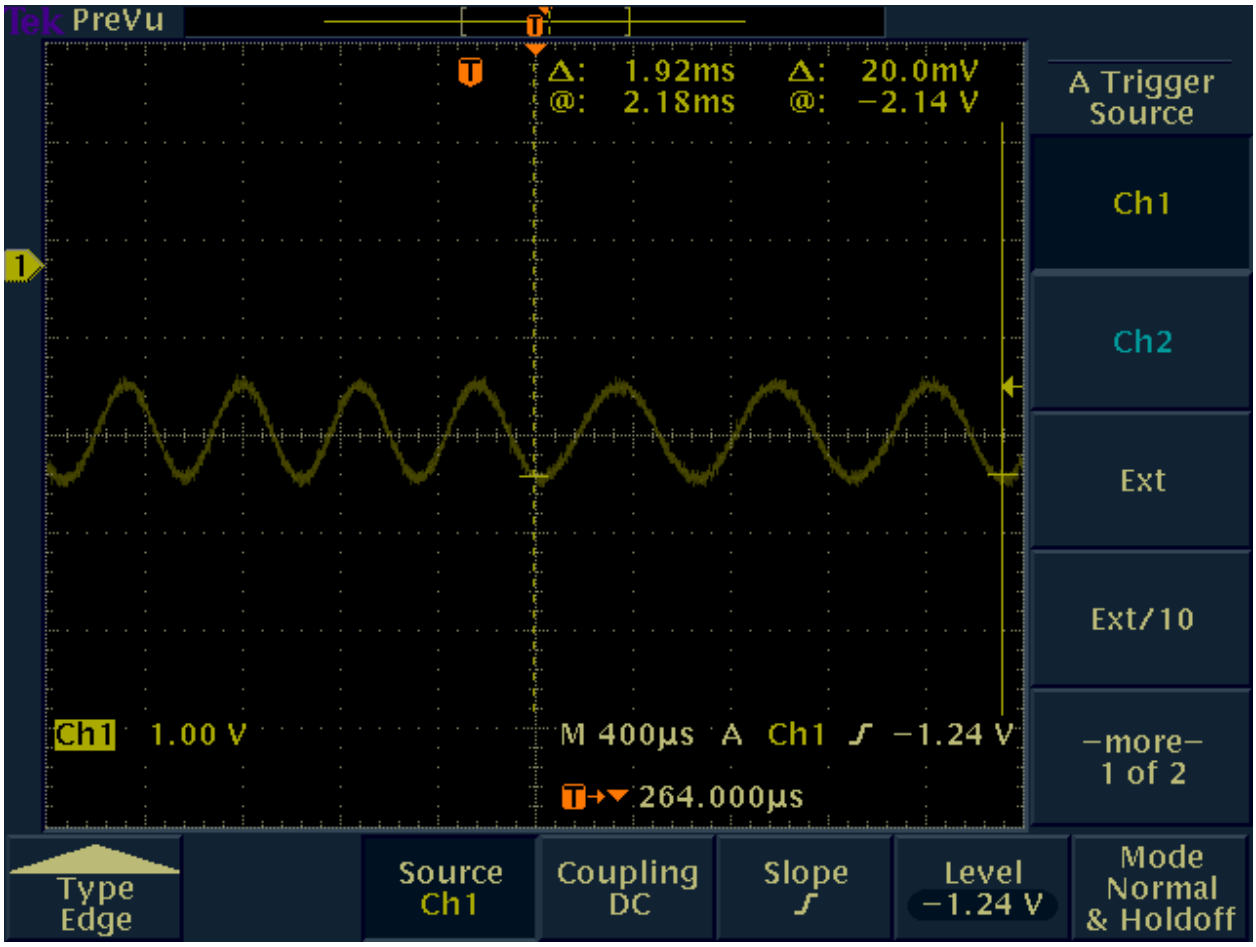
TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR3	05/20/2008
2	Oscilloscope, Digital Storage	Tektronix	TDS3052	B014809	03/21/2009
3	RF Communications Test Set	Hewlett Packard	8920B	US36141447	03/27/2009

Test Details:

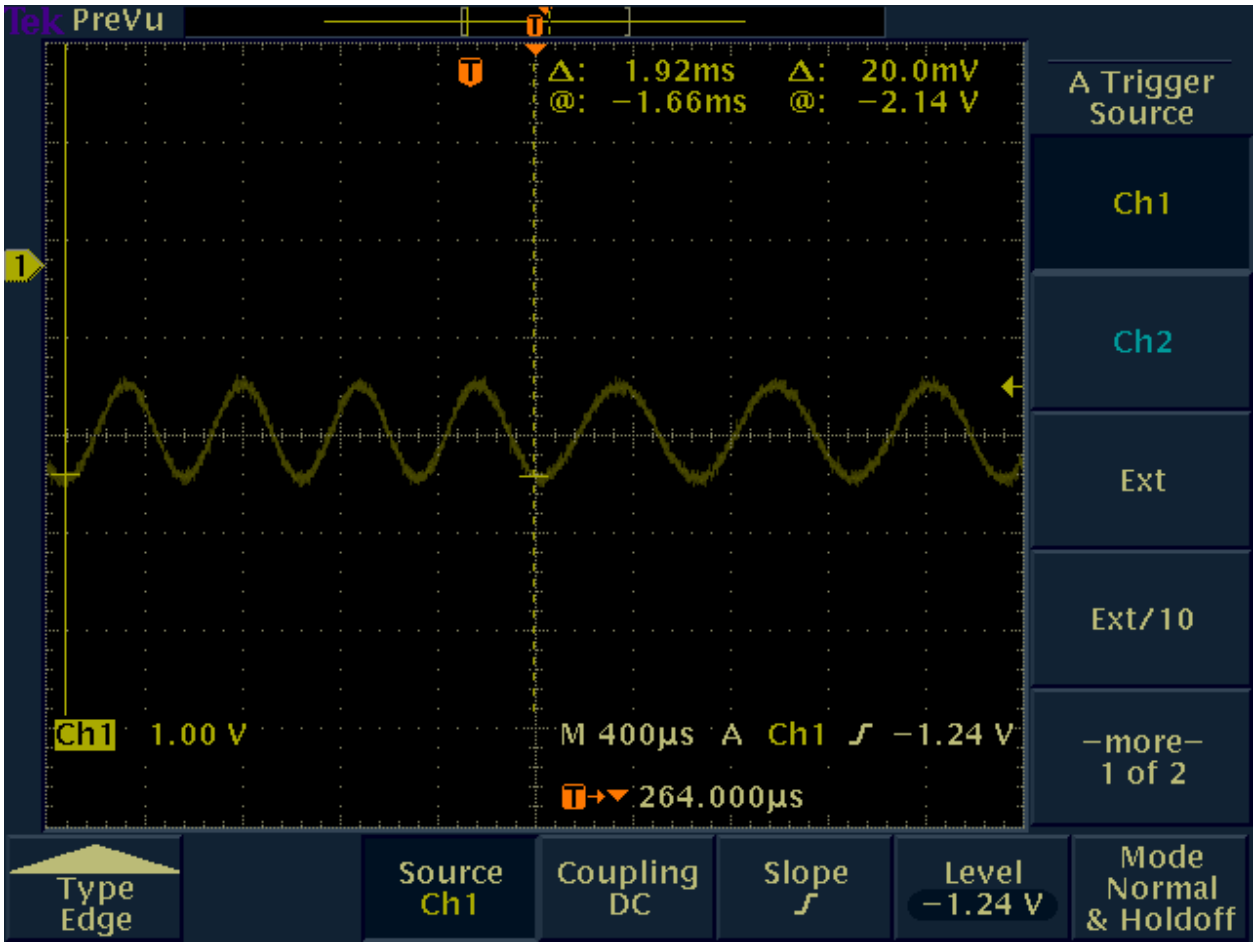
11.31(a)(1): The Preamble and EAS Codes must use Audio Frequency Shift Keying at a rate of 520.83 bits per second to transmit the codes. Mark frequency is 2083.3 Hz and space frequency is 1562.5 Hz. Mark and space time must be 1.92 milliseconds. Characters are ASCII seven bit
characters as defined in ANSI X3.4-1977 ending with an eighth null bit (either 0 or 1) to constitute a full eight-bit byte.

The line out and ground outputs were connected to the audio input of the HP 8920B RF Communications Test Set. The AF analyzer was used to measure the data tones. A tone was measured at 1562.49 Hz and at 2083.24 Hz, which are within the required ±0.5 Hz.

The same outputs were then connected to the input of the TDS 3052 oscilloscope, and plots of the bit length at each frequency were recorded.



1562.5 Hz Bit Length: 1.92 ms



2083.25Hz Bit Length: 1.92ms

11.31(a)(2): The Attention Signal must be made up of the fundamental frequencies of 853 and 960 Hz. The two tones must be transmitted simultaneously. The Attention Signal must be transmitted after the EAS header codes.

The line out and ground outputs were connected to the audio input of the HP 8920B RF Communications Test Set. The AF analyzer was used to measure the attention tones. A tone was measured at 853.02 Hz and at 959.95 Hz, which are within the required ±0.5 Hz.

11.31(a)(3): The message may be audio, video or text.

The message produced by the Endec is audio.

11.31(b): The ASCII dash and plus symbols are required and may not be used for any other purpose. FM or TV call signs must use a slash ASCII character number 47 (/) in lieu of a dash.

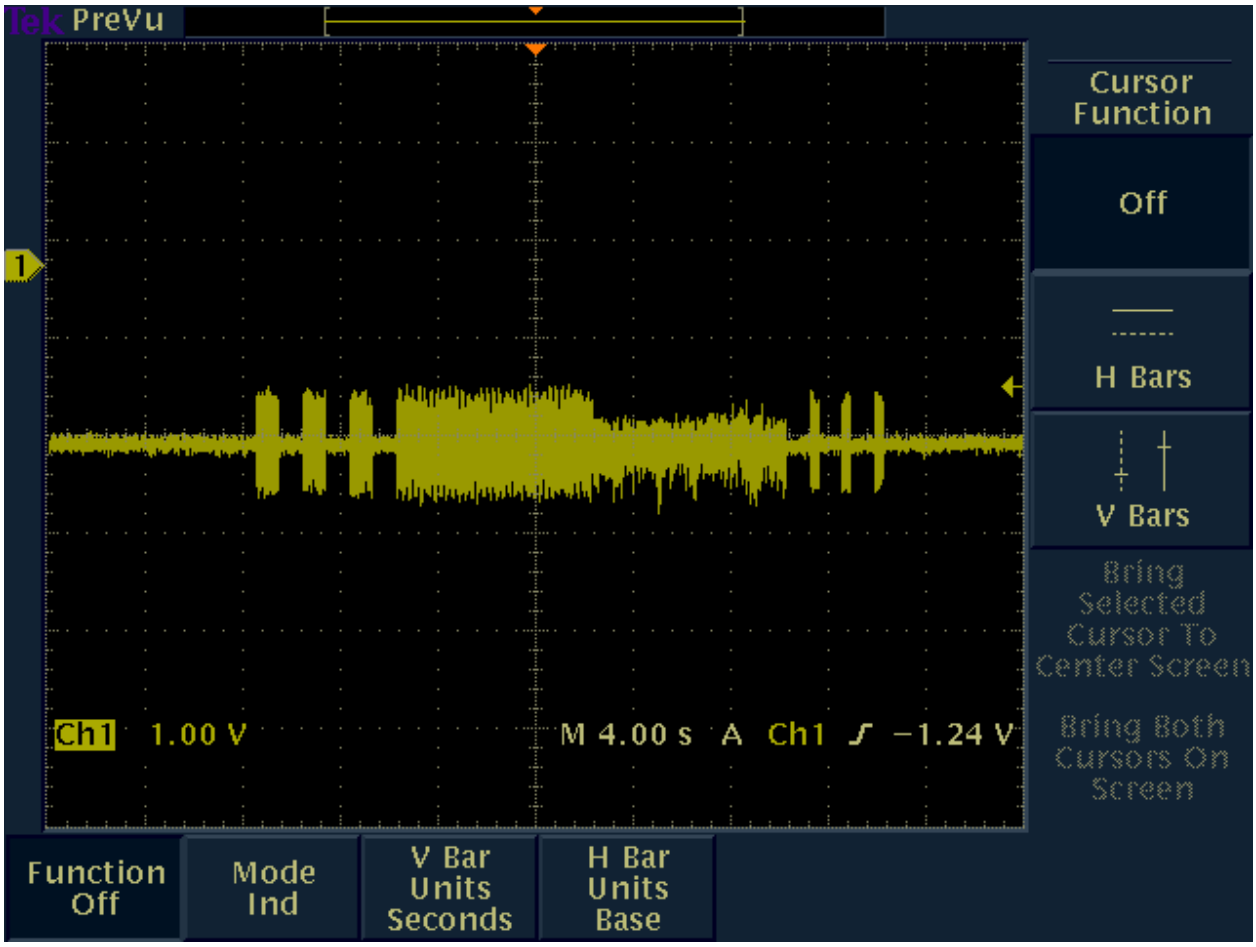
The dash and plus symbols appear in the EAS message at the appropriate locations and it was verified that the user is unable to enter a dash into the call sign input. The allowed inputs are A-Z, 0-9, /, (,), and space. See the 11.31(c) section below for an actual EAS code that was sent.

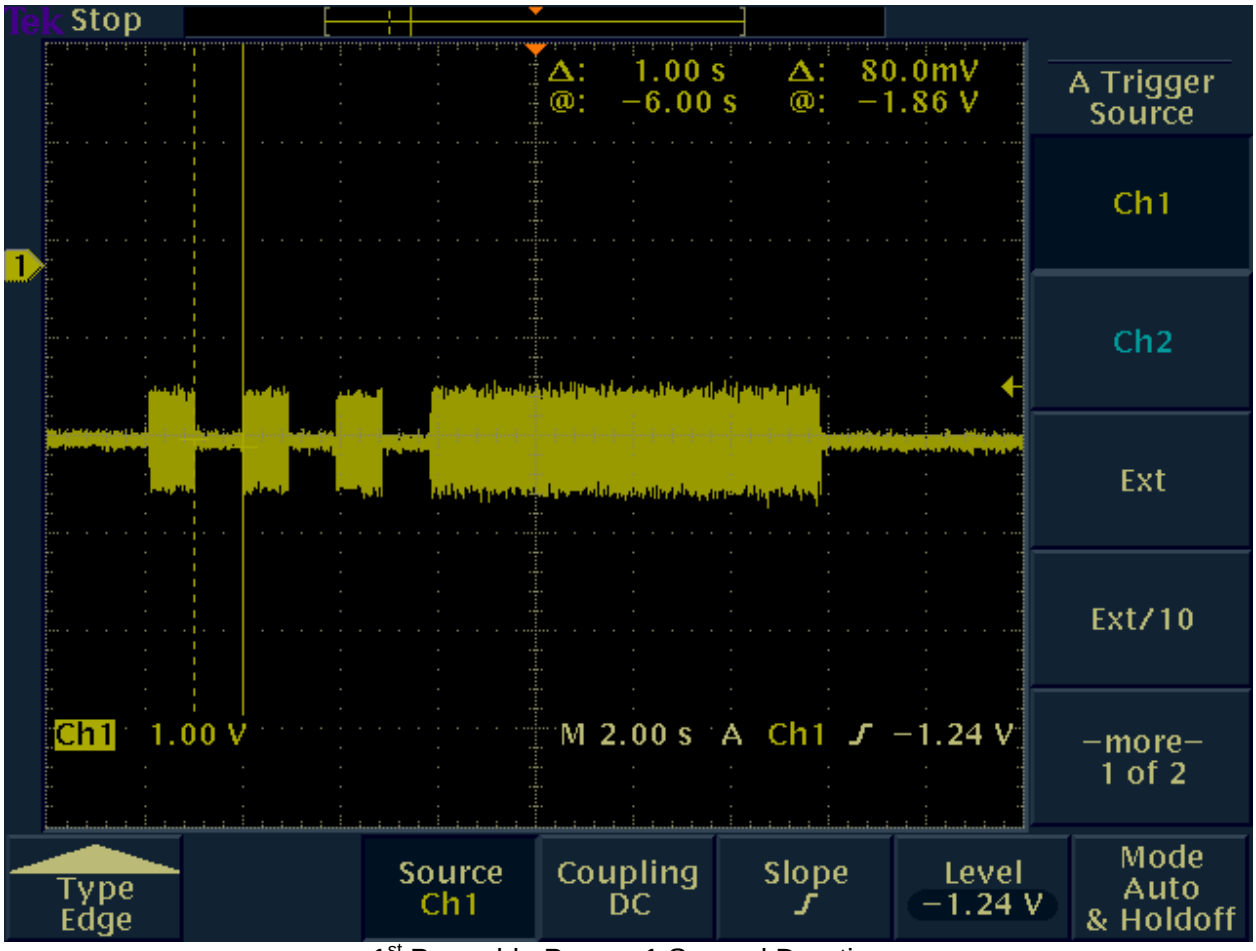
11.31(c): The EAS protocol, including any codes, must not be amended, extended or abridged without FCC authorization. The EAS protocol and message format are specified in the following representation.

[PREAMBLE]ZCZC-ORG-EEE-PSSCCC+TTTT-JJJHHMM-LLLLLLLL-(one second pause)
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC+TTTT-JJJHHMM-LLLLLLLL-(one second pause)
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC+TTTT-JJJHHMM-LLLLLLLL-(at least a one second pause)
(transmission of 8 to 25 seconds of Attention Signal)
(transmission of audio, video or text messages)
(at least a one second pause)
[PREAMBLE]NNNN (one second pause)
[PREAMBLE]NNNN (one second pause)
[PREAMBLE]NNNN (at least one second pause)

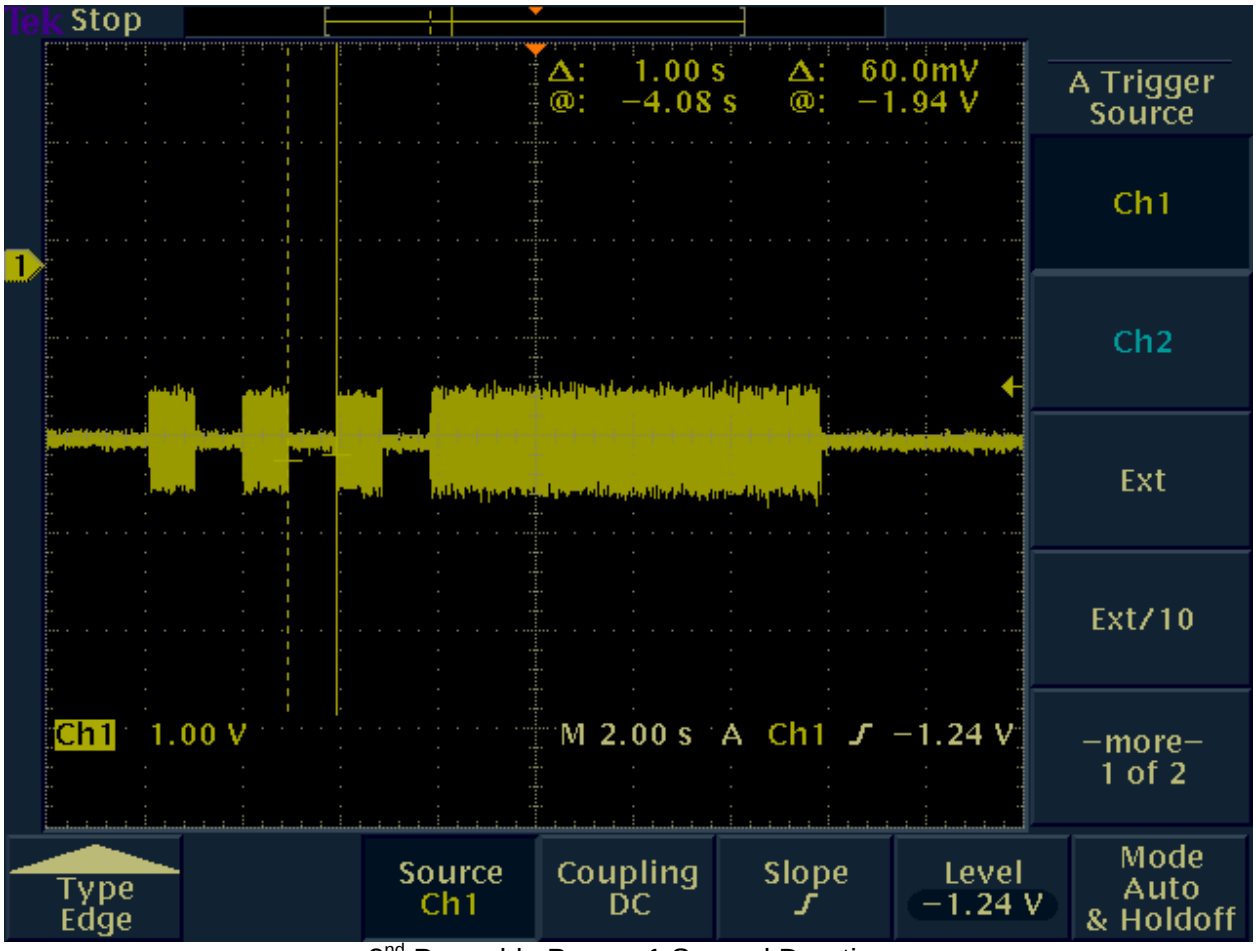
Actual EAS Code sent during test:
«««««««««««««««««««ZCZC-EAS-RWT-042003+0100-0931940-SAGENEW -
«««««««««««««««««««ZCZC-EAS-RWT-042003+0100-0931940-SAGENEW -
«««««««««««««««««««ZCZC-EAS-RWT-042003+0100-0931940-SAGENEW -
«««««««««««««««««««NNNN
«««««««««««««««««««NNNN
«««««««««««««««««««NNNN

« is the hexadecimal AB character. The message was sent on 4/2/08 (day 93 Julian) at 3:40 pm in EST with daylight savings time in effect, which puts the UTC time at 19:40. The EAS code sent was a Regular Weekly Test (RWT) originating from another EAS system.

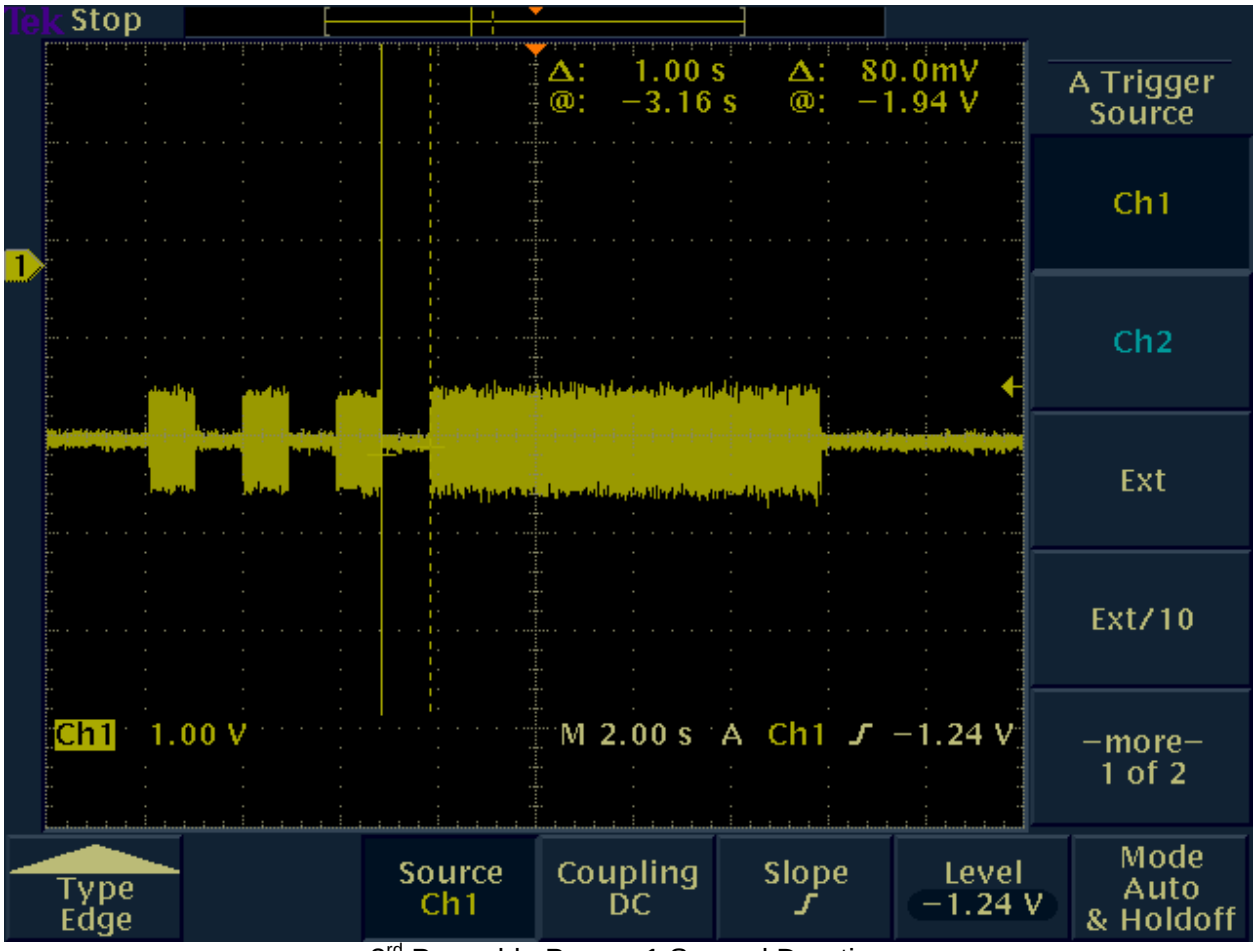

Tek PreVu
Cursor Function
Off
H Bars
V Bars
Bring Selected Cursor To Center Screen
Bring Both Cursors On Screen
Ch1 1.00 V
M 4.00 s A Ch1 ƒ −1.24 V
Function Off
Mode Ind
V Bar Units Seconds
H Bar Units Base
EAS Message



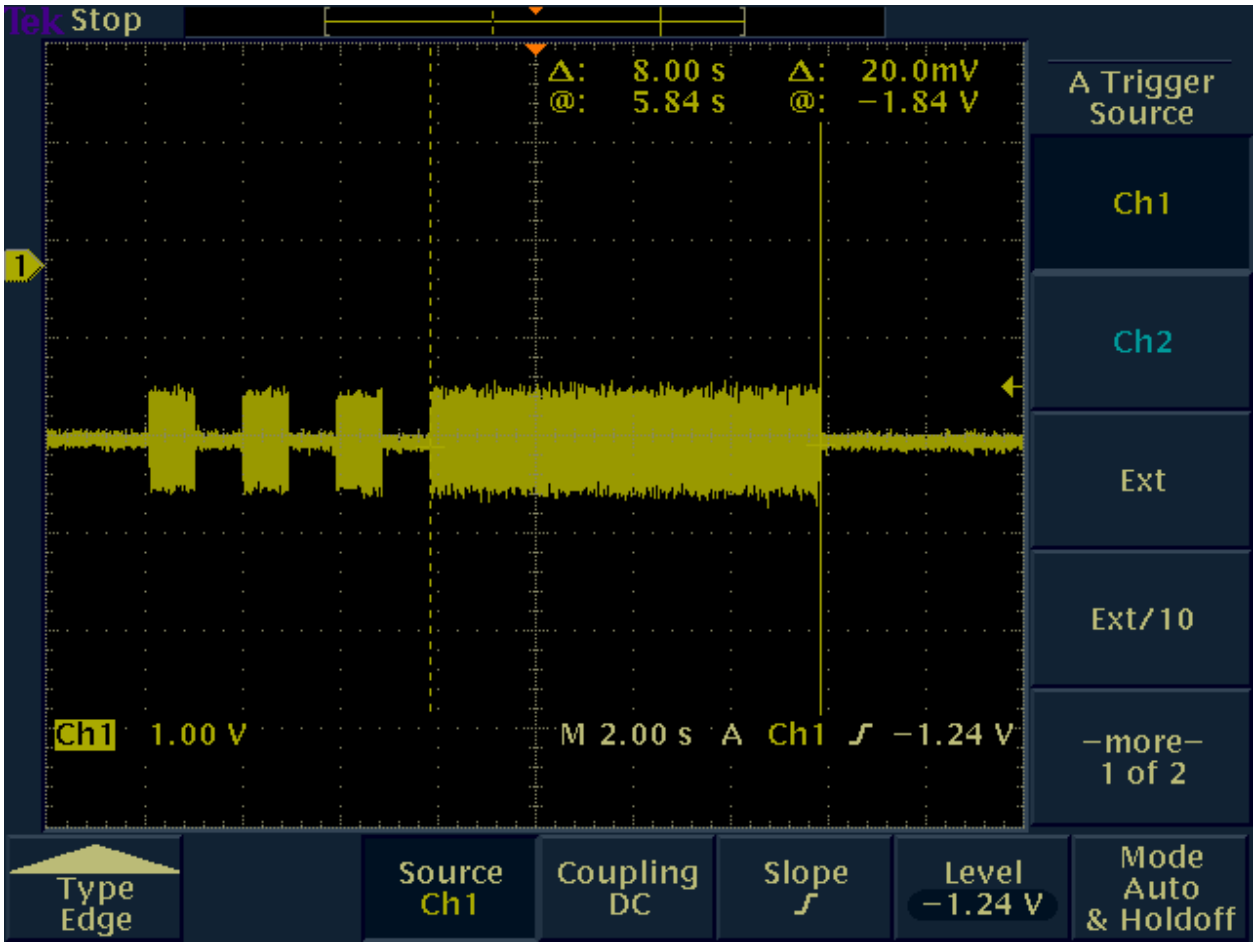
1st Preamble Pause: 1 Second Duration



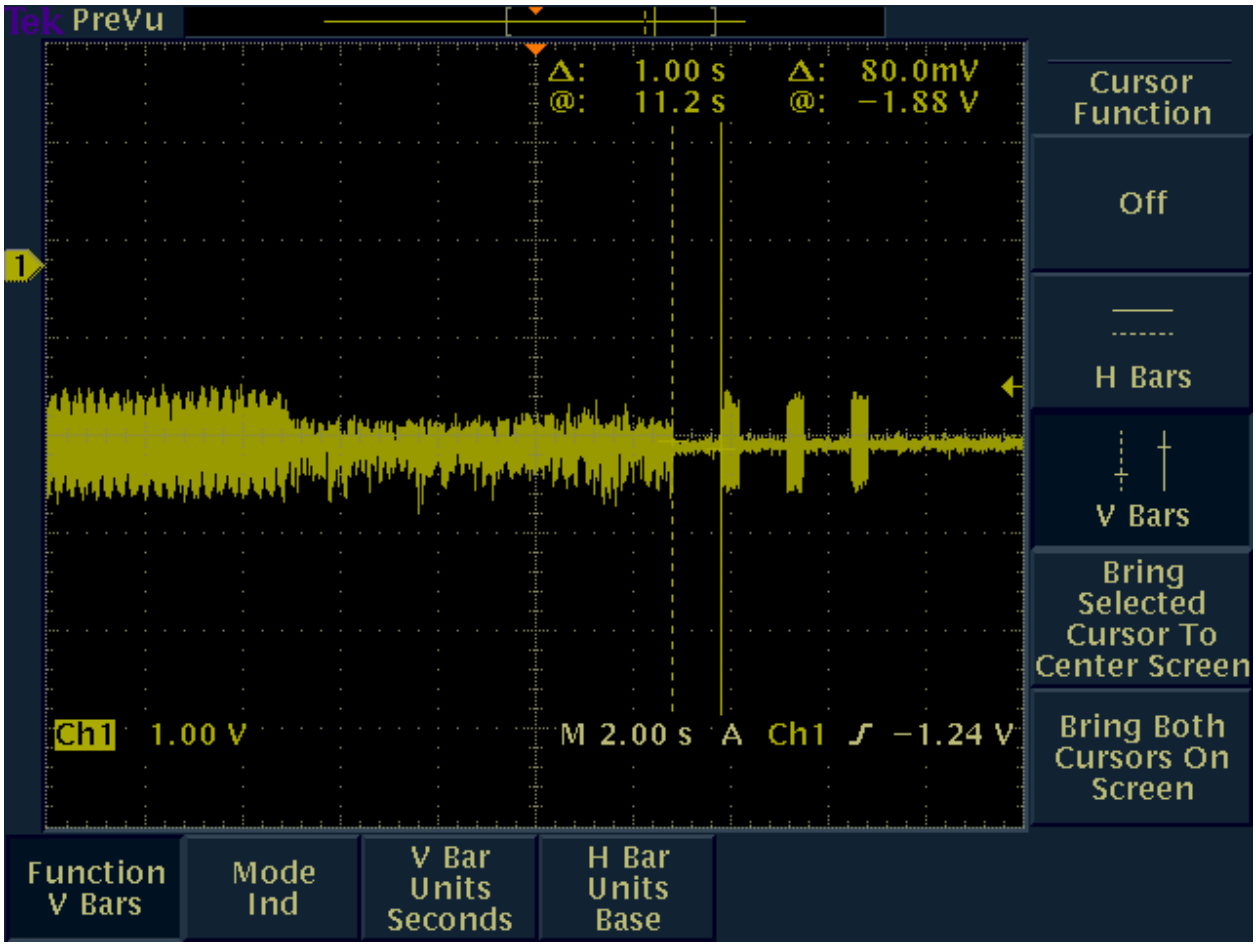
2nd Preamble Pause: 1 Second Duration



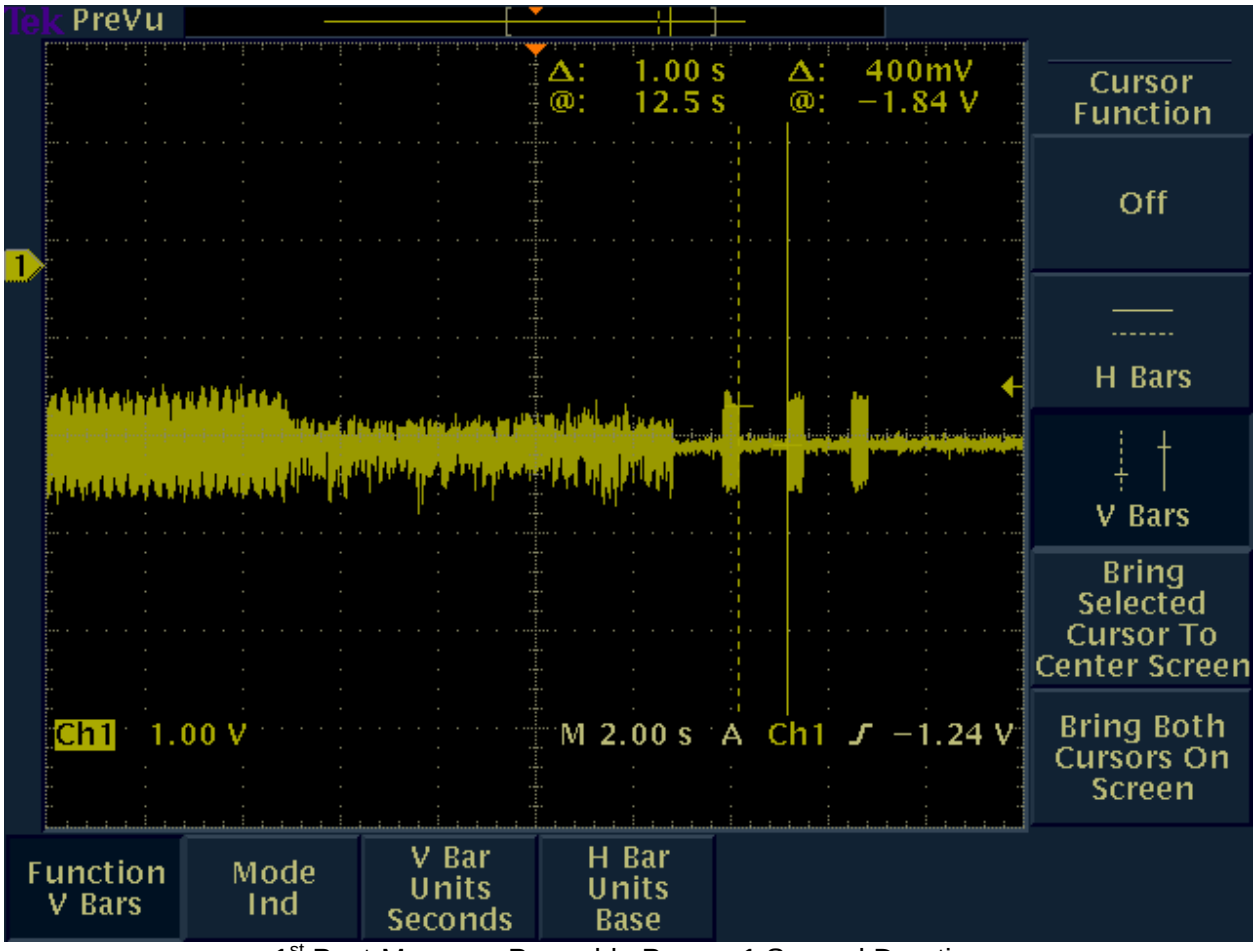
3rd Preamble Pause: 1 Second Duration



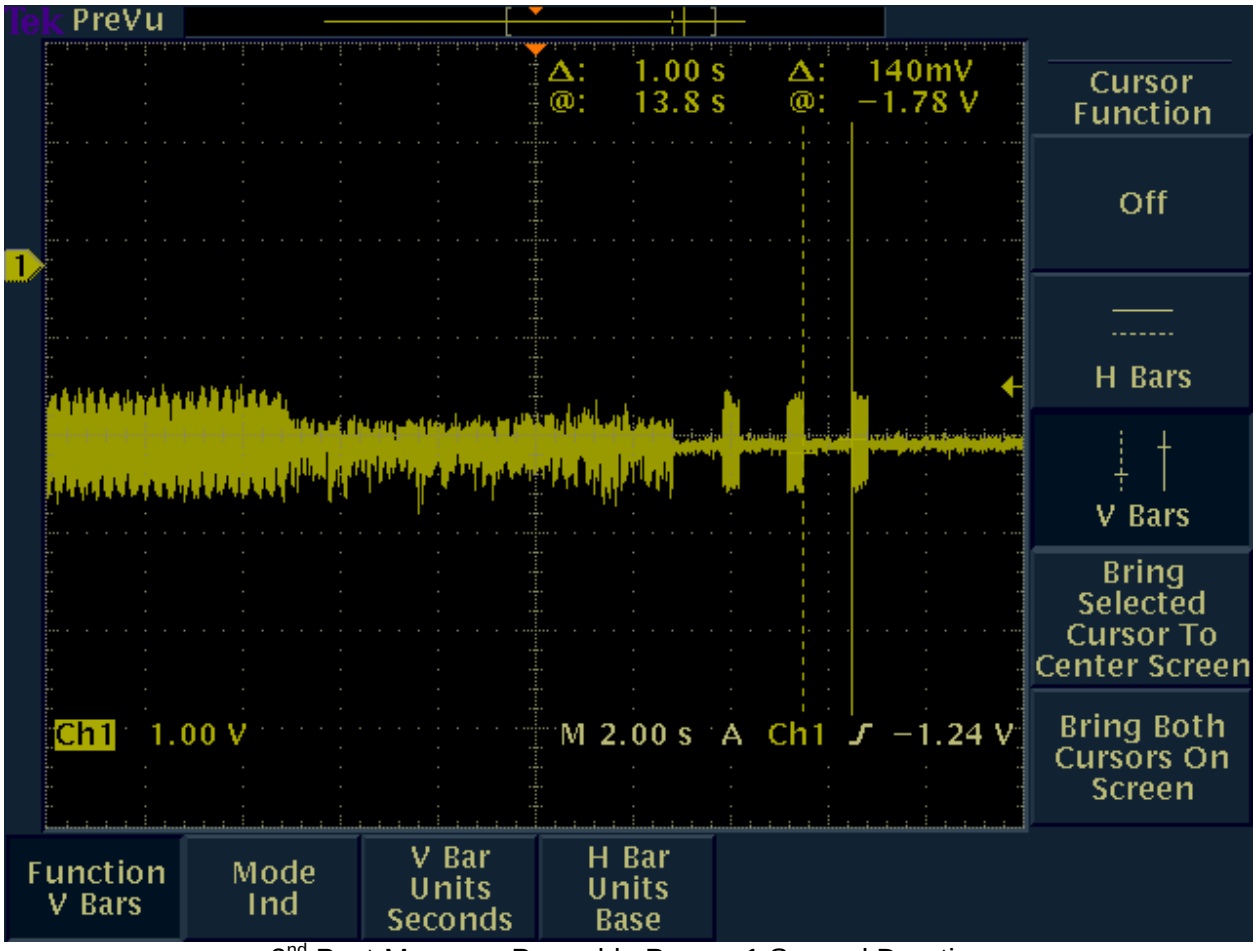
Attention Signal Duration: 8 Seconds Duration



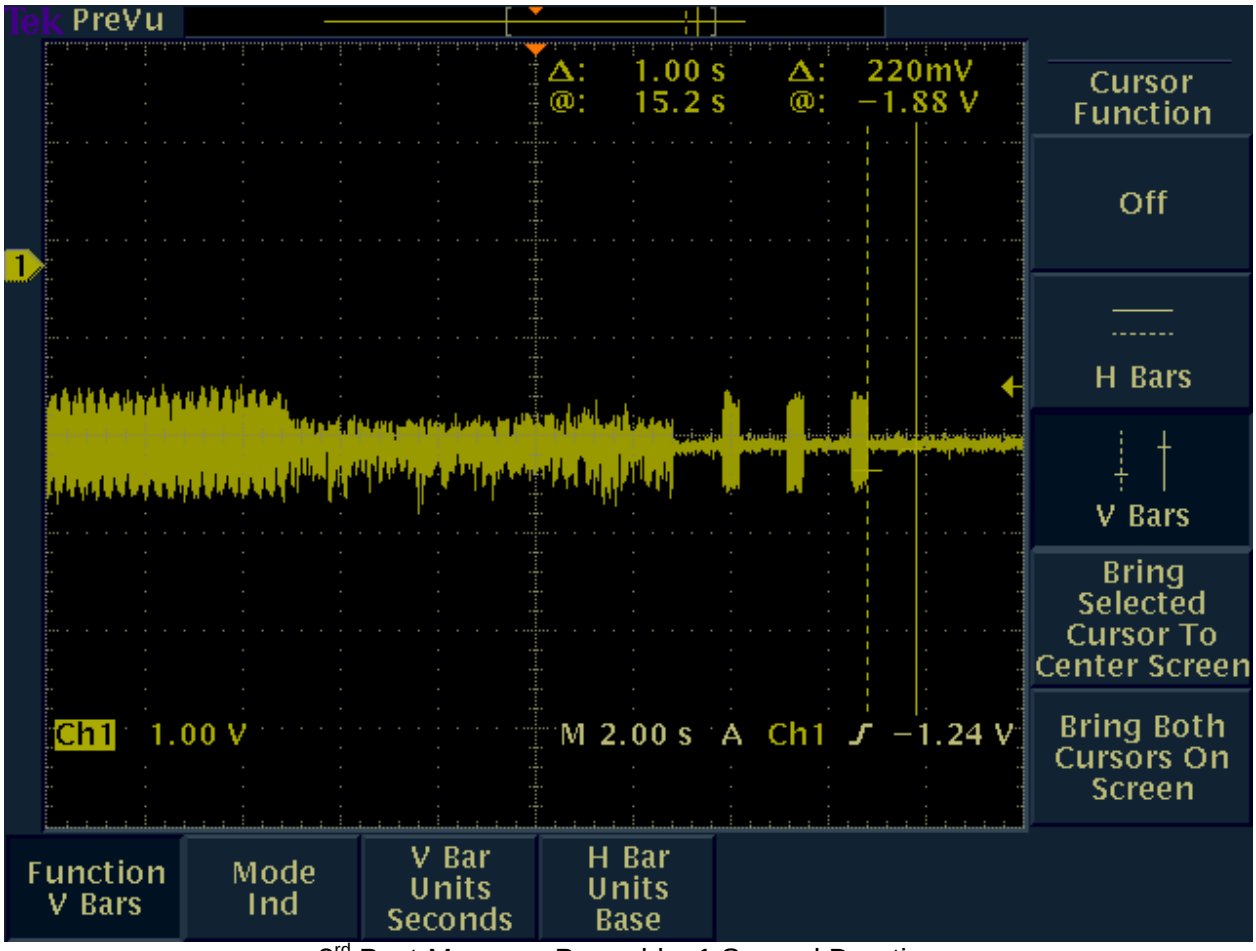
Post-Message Pause: 1 Second Duration



1st Post-Message Preamble Pause: 1 Second Duration

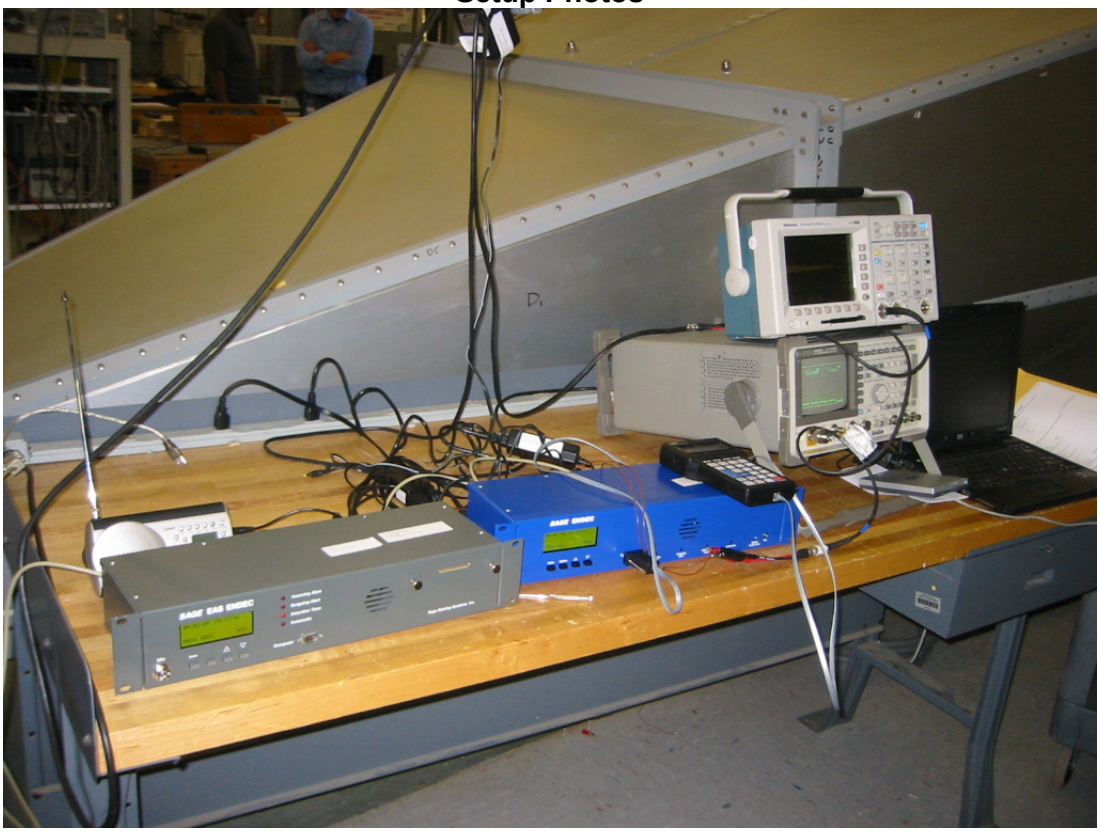


2nd Post-Message Preamble Pause: 1 Second Duration



3rd Post-Message Preamble: 1 Second Duration

Setup Photos



Test Results: Pass

Test Standard: FCC Part 11 Subpart B

Test: EAS Encoder

Performance Criterion: See Test Details

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	21/21	Humidity (%):	25/23	Pressure (hPa):	1006/1020
Pretest Verification Performed		N/A		Equipment under Test:		Endec	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		1	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR3	05/20/2008
2	RF Communications Test Set	Hewlett Packard	8920B	US36141447	03/27/2009
3	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	11/26/2008
4	Variac, 0-140V	Powerstat	3PN126	N/L	Verified
5	Digital Multimeter	Meterman	15XP	050505984	09/18/2008
6	Istropic Field Probe	Amplifier Research	FP2000	15398	11/16/2008
7	Antenna, Log Periodic, 80 - 1000MHz	Amplifier Research	AT1080	15259	Verified
8	Isotropic Field Monitor	Amplifier Research	FM2000	16839	Verified
9	Generator, Signal	Hewlett Packard	8648C	3847A05291	03/04/2009
10	AMPLIFIER; 1kW; 10kHz-200MHz	Kalmus	137C/1-60-105-002	8044-1	Verified
11	E-FIELD Generator	Amplifier Research	AT3000	19824	Verified
12	Temperature/Humidity Chamber	Envirotronics	SH27C	08015563-S-11264	03/18/2009

Test Details:
11.32(a) EAS Encoders must at a minimum be capable of encoding the EAS protocol described in Sec. 11.31 and providing the EAS code transmission requirements described in Sec. 11.51.

11.32(a)(1): Encoder programming. Access to encoder programming shall be protected by a lock or other security measures and be configured so that authorized personnel can readily select and program the EAS Encoder with Originator, Event and Location codes for either manual or automatic operation.

A password is required in order to change any programming, settings, or to initiate any EAS transmissions.

11.32(a)(2) Inputs. The encoder shall have two inputs, one for audio messages and one for data messages (RS-232C with standard protocol and 1200 baud rate).

As indicated by Sage Alerting Systems Inc., the Endec has 6 DB9 RS-232C serial ports that are user selectable as data inputs. The baud rate is user programmable from 1200 to 9600 Baud. There are 8 audio inputs (6 monitor inputs, 1 microphone input, and 1 encoder input).

11.32(a)(3) Outputs. The encoder shall have two outputs, one audio port and one data port (RS-232C with standard protocol and 1200 baud rate).

As indicated by Sage Alerting Systems Inc., the Endec has 6 DB9 RS-232C serial ports that are user selectable as data outputs. The baud rate is user programmable from 1200 to 9600 Baud. There are two analog audio outputs (1 line out and 1 balanced XLR output) as well as 1 digital audio output.

11.32(a)(4) Calibration. EAS Encoders must provide a means to comply with the modulation levels required in Sec. 11.51(f).

The Endec allows the user to independently adjust the levels of the data mark and space tones as well as the attention signal tones in order to obtain the required modulation levels.

11.32(a)(5) Day-Hour-Minute and Identification Stamps. The encoder shall affix the JJJHHMM and LLLLLLLL codes automatically to all initial messages.

As seen in the EAS Protocol test section, the timestamp and identification codes are affixed to the EAS messages.

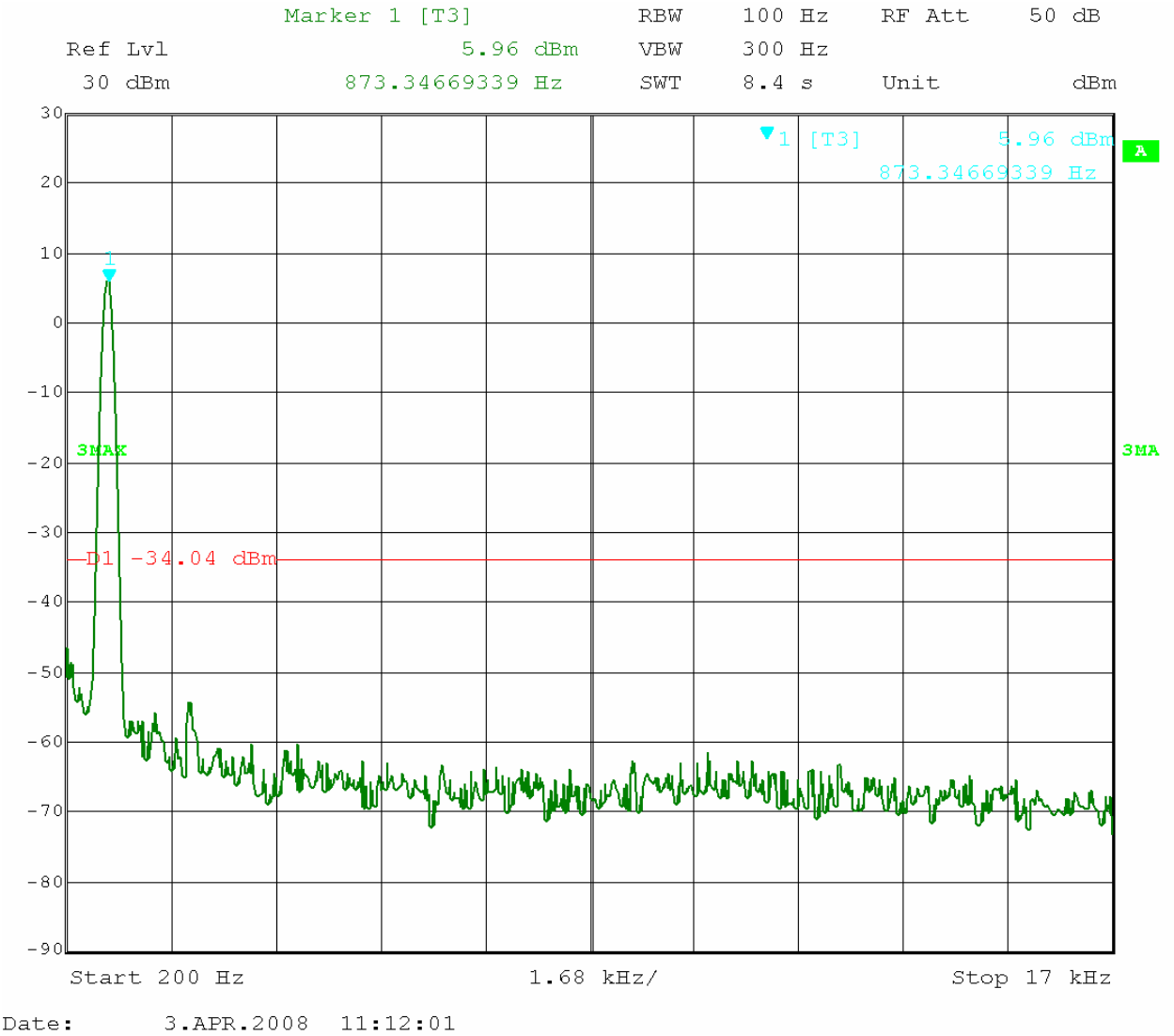
11.32(a)(6) Program Data Retention. Program data and codes shall be retained even with the power removed.

Programmed data and codes were retained through a power cycle, including complete removal of the power cable.

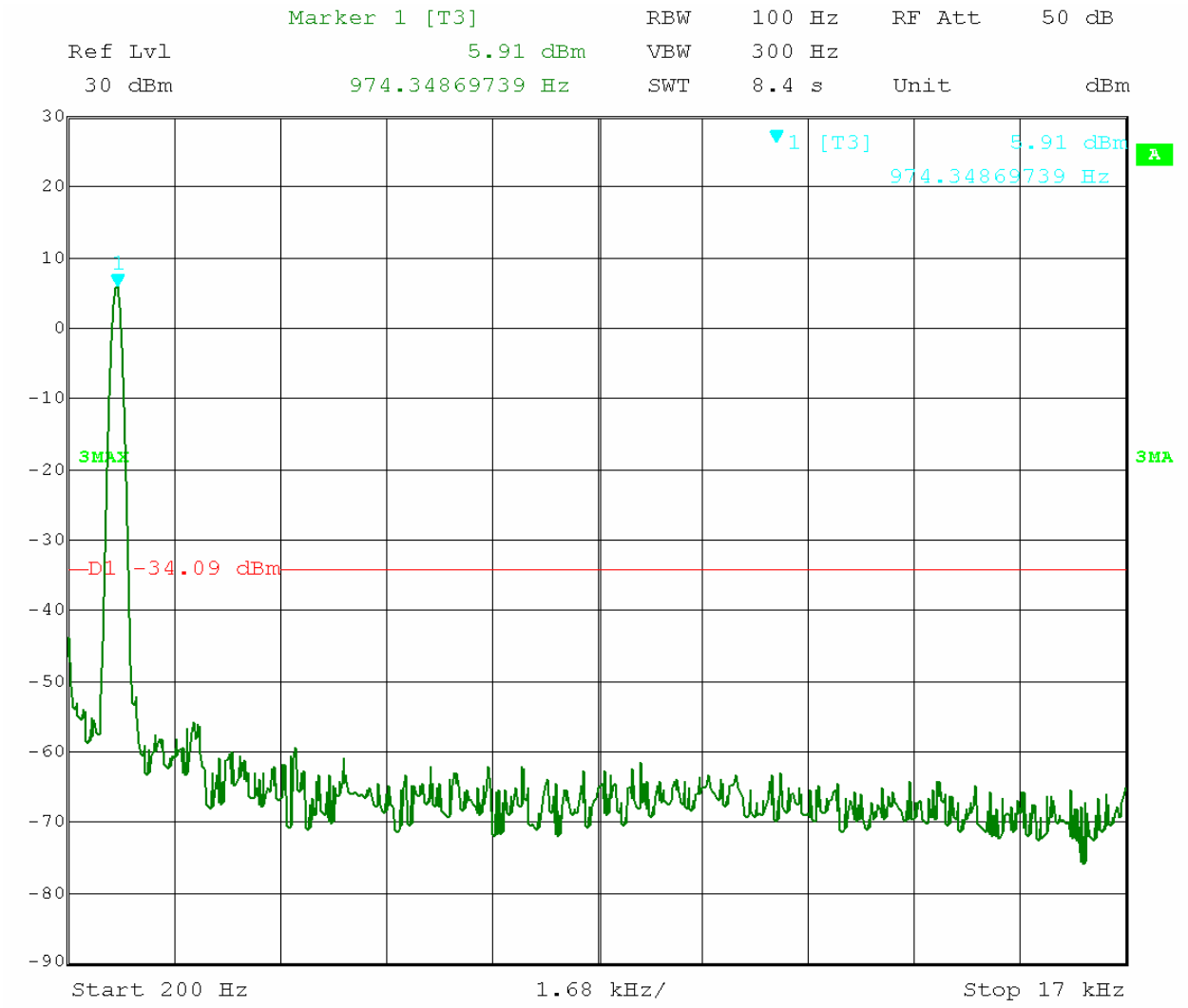
11.32(a)(7) Indicator. An aural or visible means that it activated when the Preamble is sent and deactivated at the End of Message code.

A front panel LED labeled “Outgoing Alert” lit during EAS transmission and deactivated upon cessation of transmission. Additionally, a user-selectable relay opened and closed in sync with the LED, allowing a user to add an audio alarm if desired.

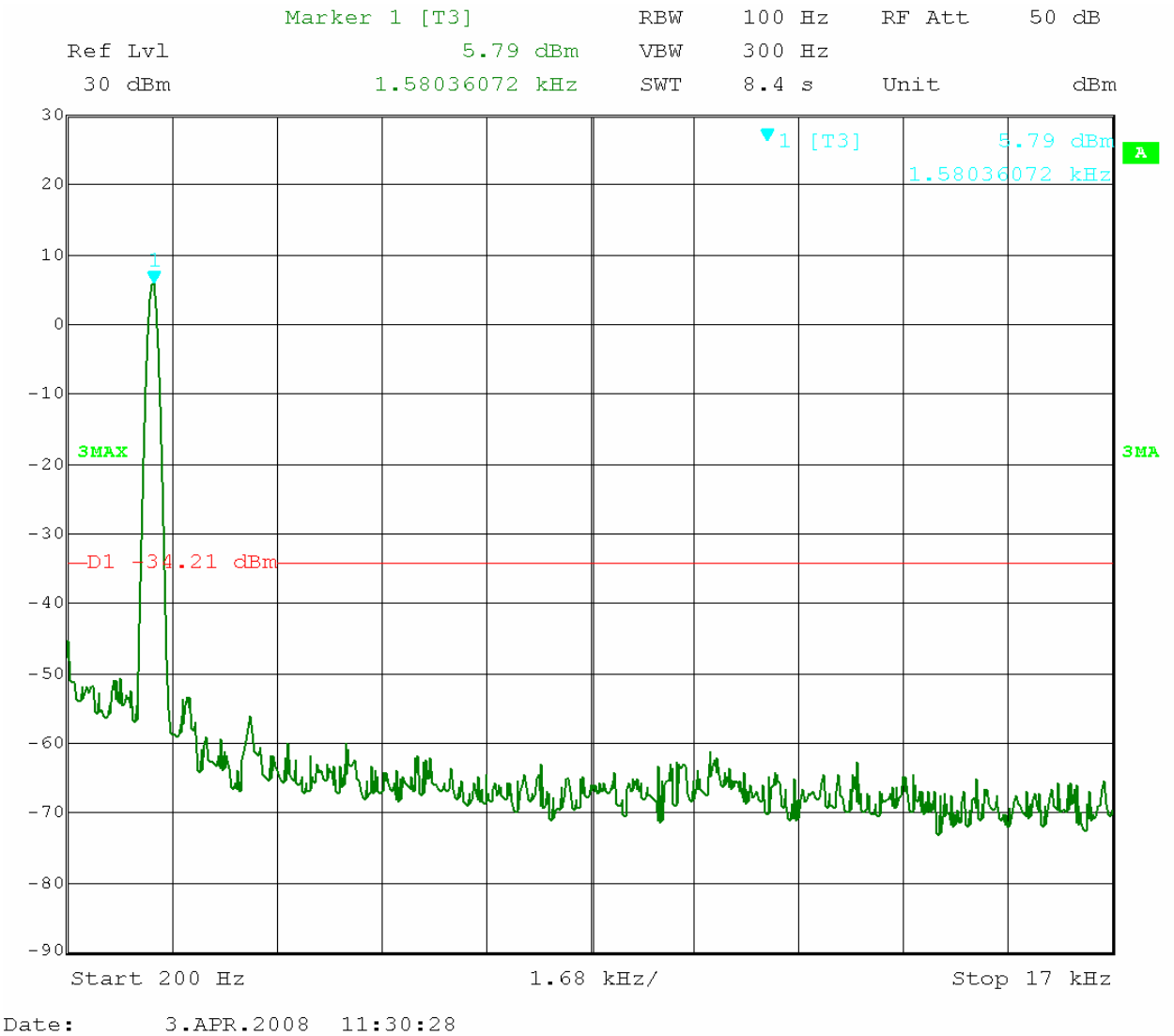
11.32(a)(8) Spurious Response. All frequency components outside 200 to 4000 Hz shall be attenuated by 40 dB or more with respect to the output levels of the mark or space frequencies.



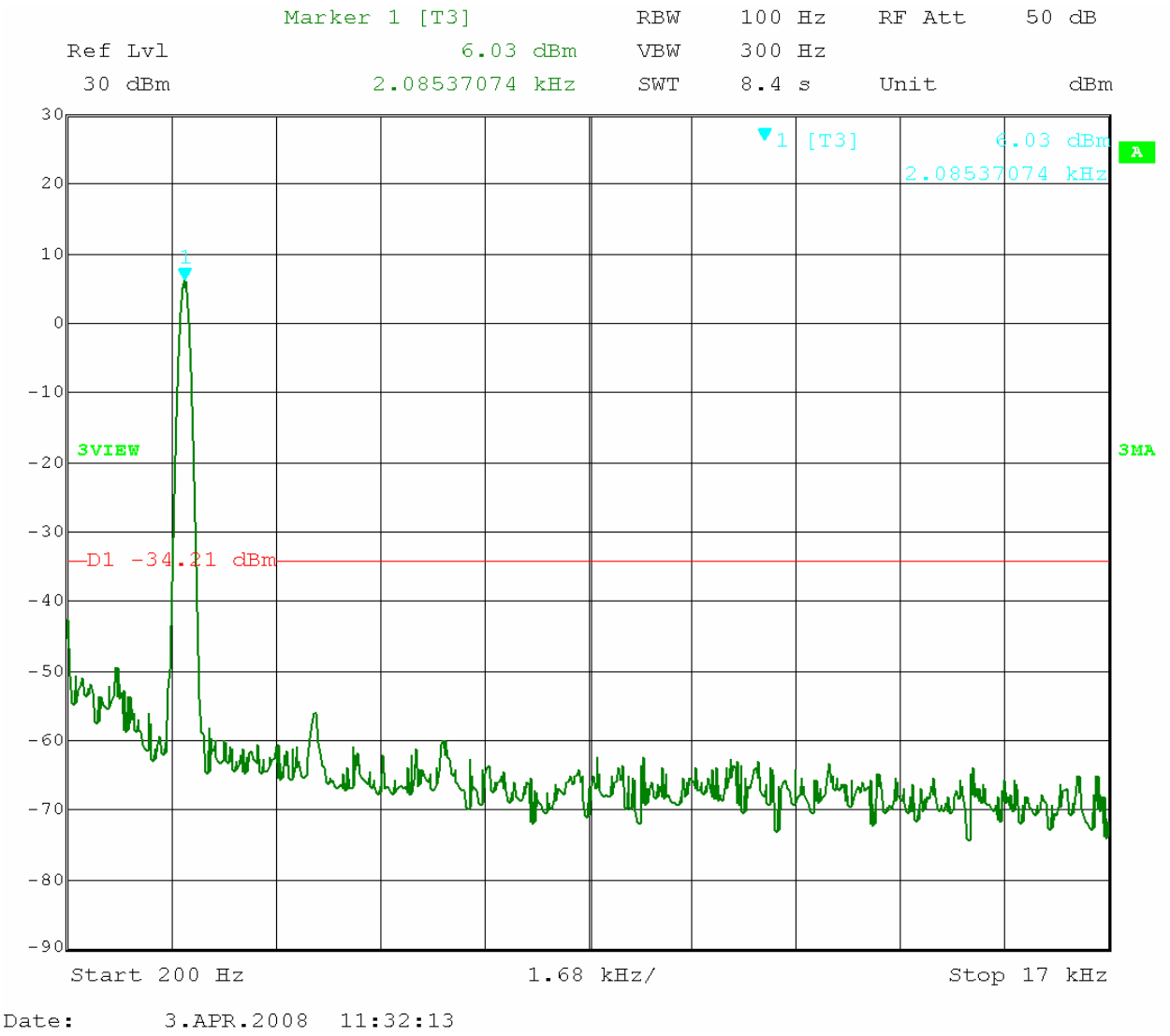
Audio Hi Output, 853 Hz Attention Tone



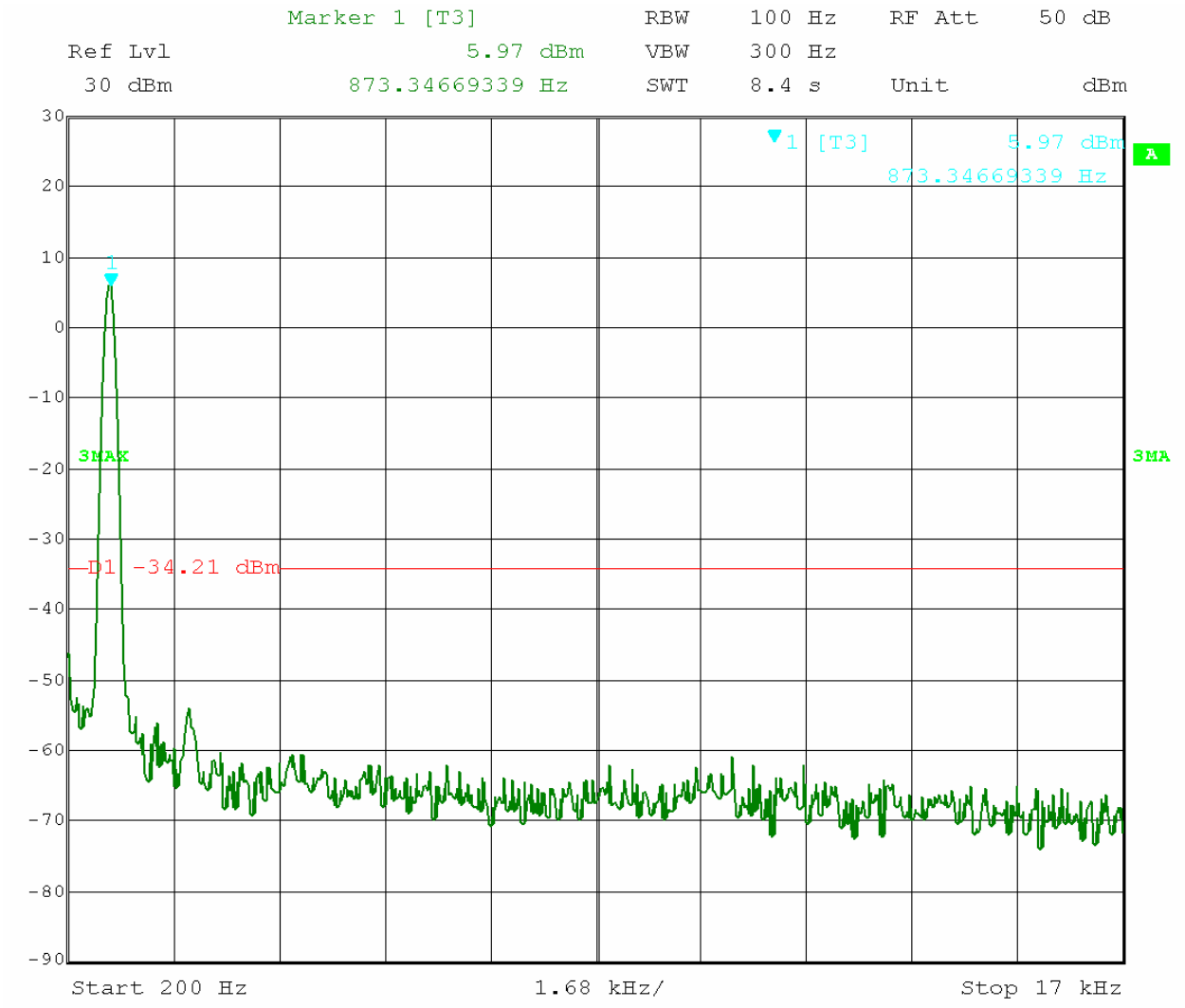
Audio Hi Output, 960 Hz Attention Tone



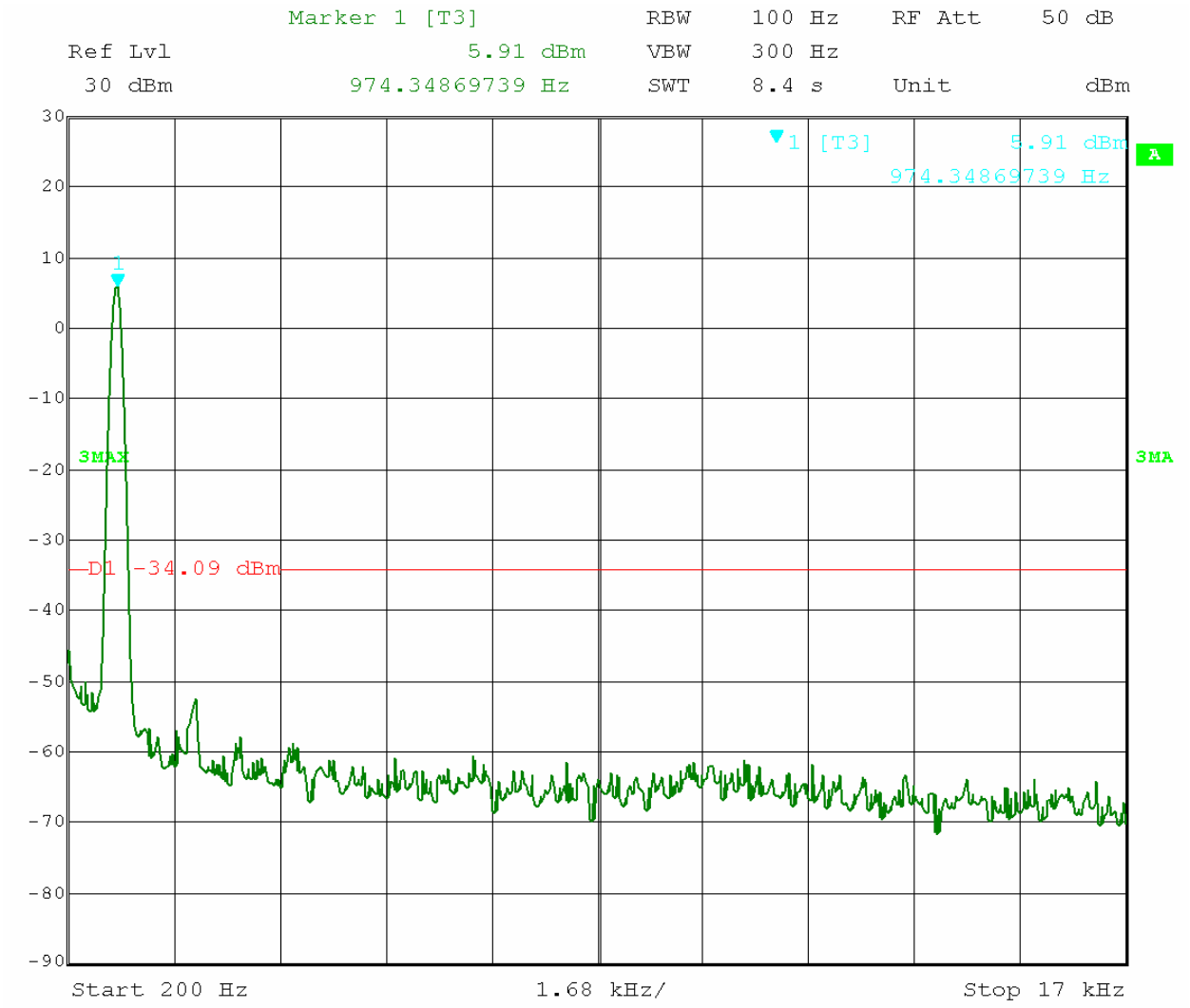
Audio Hi Output, 1562.5 Hz Data Tone



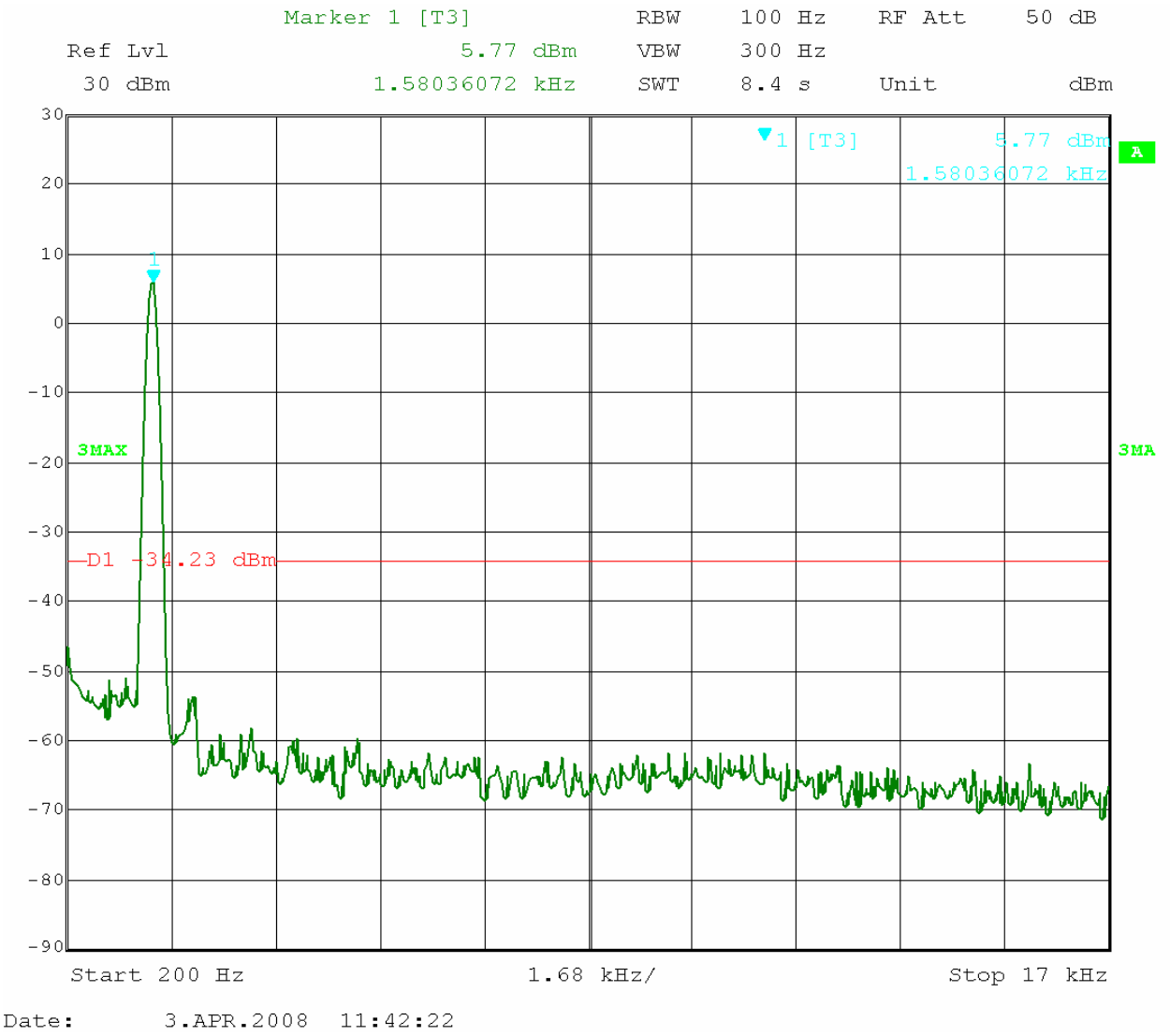
Audio Hi Output, 2083.25 Hz Data Tone



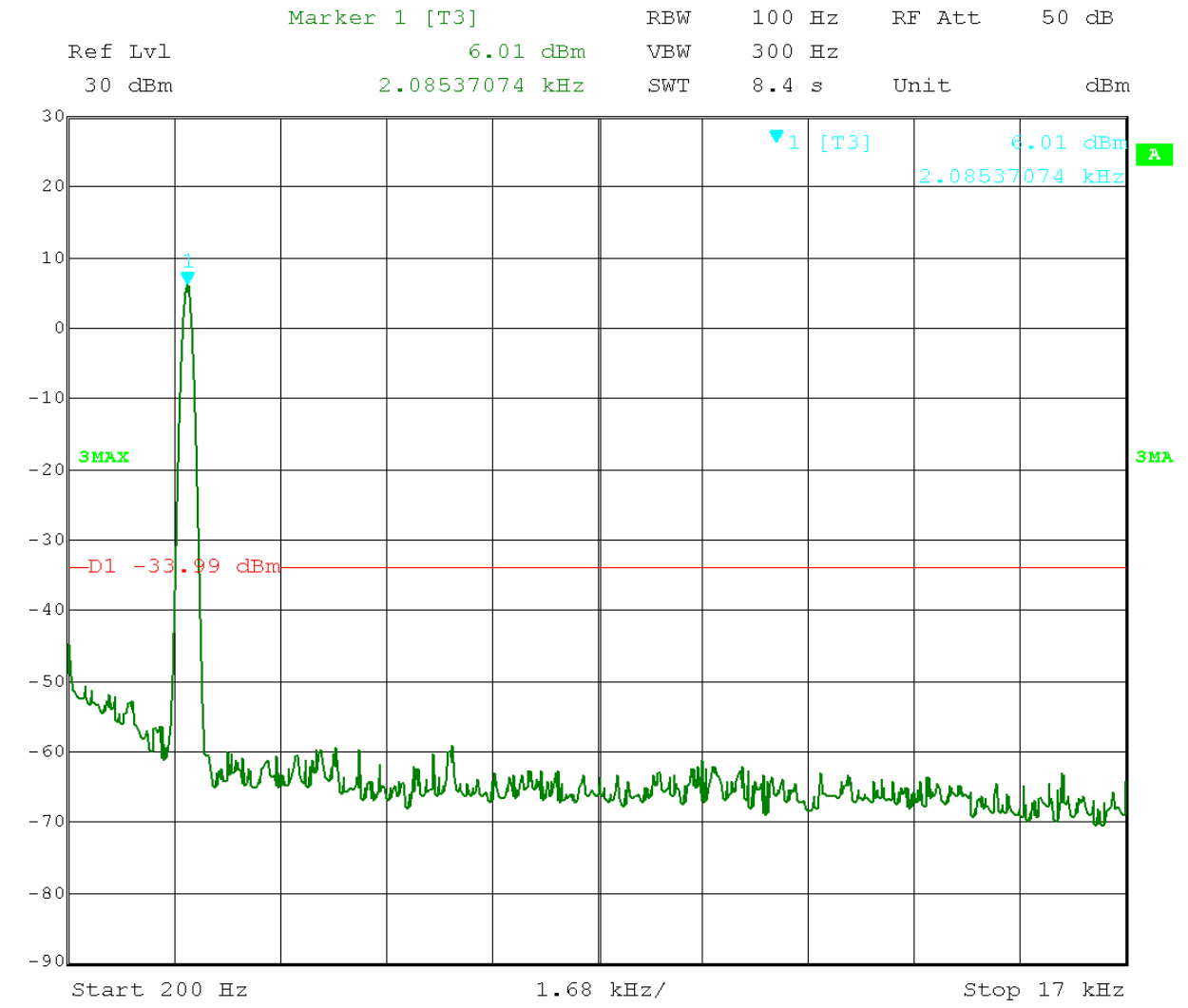
Audio Lo Output, 853 Hz Attention Tone



Audio Lo Output, 960 Hz Attention Tone



Audio Lo Output, 1562.5 Hz Data Tone



Audio Lo Output, 2083.25 Hz Data Tone

11.32(a)(9) Attention Signal generator. The encoder must provide an attention signal that complies with the following: (i) Tone Frequencies. The audio tones shall have fundamental frequencies of 853 and 960 Hz and not vary over 0.5 Hz.

The line out and ground outputs were connected to the hi audio input of the HP 8920B RF Communications Test Set. The AF analyzer was used to measure the attention tones. A tone was measured at 853.02 Hz and at 959.95 Hz, which are within the required ±0.5 Hz.

11.32(a)(9)(ii) Harmonic Distortion. The total harmonic distortion of each of the audio tones may not exceed 5% at the encoder output terminals.

Audio Output power from the balanced XLR output was measured at the audio input to the HP 8920B RF Communications Test Set. The lo input was referenced to the hi input with a 600 Ohm impedance. The audio notch filter was set to the tone frequency and distortion was measured using the instrument distortion function.

853 Hz: 0.0%
960 Hz: 0.0%
1562.5 Hz: 0.1%
2083.25 Hz: 0.1%

11.32(a)(9)(iii) Minimum Level of Output. The encoder shall have an output level capability of at least +8 dBm into a 600 Ohm load impedance at each audio tone. A means shall be provided to permit individual activation of the two tones for calibration of associated systems.

Audio Output power from the balanced XLR output was measured at the audio input to the HP 8920B RF Communications Test Set. The lo input was referenced to the hi input with a 600 Ohm impedance.

Attention Tone Setting: 115 (this setting affects both attention tones)

853 Hz Output Power Setting: 100, with an upper limit of 128
8920B Balanced Input: 8.57 dBm

960 Hz Output Power Setting: 111, with an upper limit of 128
8920B Balanced Input: 8.51 dBm

Data Tone Setting: 73 (this setting affects both data tones)

1562.5 Hz Output Power Setting: 52, with an upper limit of 128
8920B Balanced Input: 8.54 dBm

2083.25 Hz Output Power Setting: 70, with an upper limit of 128
8920B Balanced Input: 8.61 dBm

11.32(a)(9)(iv) Time Period for Transmission of Tones. The encoder shall have timing circuitry that automatically generates the two tones simultaneously for a time period of not less than 8 nor longer than 25 seconds. NOTE: Prior to July 1, 1995, the Attention Signal must be at least 20 and not more than 25 seconds.

See the EAS Protocol section of the report for a plot of the length of the attention signal, which is 8 seconds.

11.32(a)(9)(v) Inadvertent activation. The switch used for initiating the automatic generation of the simultaneous tones shall be protected to prevent accidental operation.

The tone generation command is located in a submenu of the software, so it cannot be inadvertently activated mechanically, and it is password protected to prevent unauthorized use and to prevent accidental selection of the command.

11.32(a)(9)(vi) Indicator Display. The encoder shall be provided with a visual and/or aural indicator which clearly shows that the Attention Signal is activated.

The Endec generates the attention signal audio tones which are used in the EAS message and are also output through the device speaker when the attention signal is activated.

11.32(b) Operating Temperature and Humidity. Encoders shall have the ability to operate with the above specifications within an ambient temperature range of 0 to +50 degrees C and a range of relative humidity of up to 95%.

The Endec was tested at 0 degrees Celsius and 95% humidity, 20 degrees Celsius and 95% humidity, and 50 degrees Celsius and 95% humidity. In all cases, an EAS message was sent by the Endec and was successfully decoded by the support decoder.

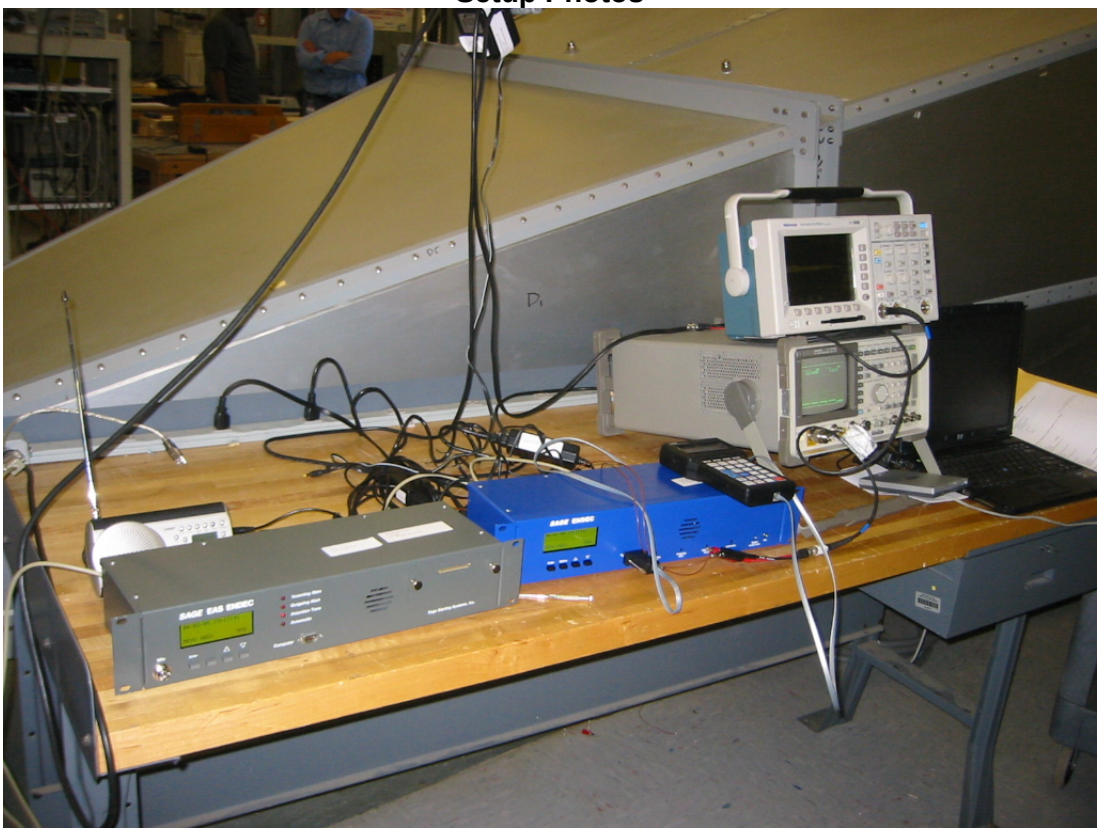
11.32(c) Primary Supply Voltage Variation. Encoders shall be capable of complying with the requirements of this section during a variation in primary supply voltage of 85 percent to 115 percent of its rated value.

The Endec is rated at 120V/60Hz AC, therefore it was operated at 102V and 138V AC. At both voltages, an EAS message was sent by the EUT and was successfully decoded by the support decoder.

11.32(d) Testing Encoder Units. Encoders not covered by Sec. 11.34(e) of this part shall be tested in a 10 V/m minimum RF field at an AM broadcast frequency and a 0.5 V/m minimum RF field at an FM or TV broadcast frequency to simulate actual working conditions.

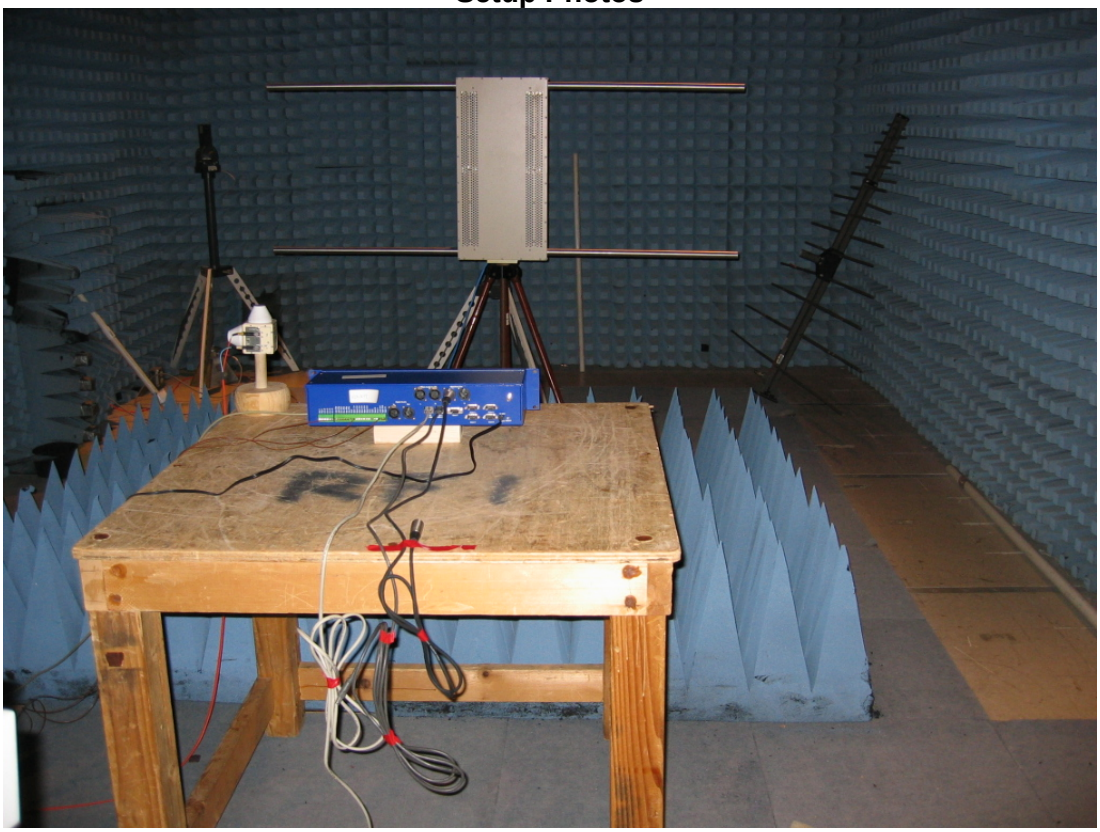
The Endec was tested on the front, back, right and left sides at 1 MHz 0.5 V/m and at 108 MHz 10 V/m, vertical and horizontal polarity. An EAS message was sent by the EUT and was successfully decoded by the support decoder.

Setup Photos



General Tests

Setup Photos



11.32(d) AM Frequency

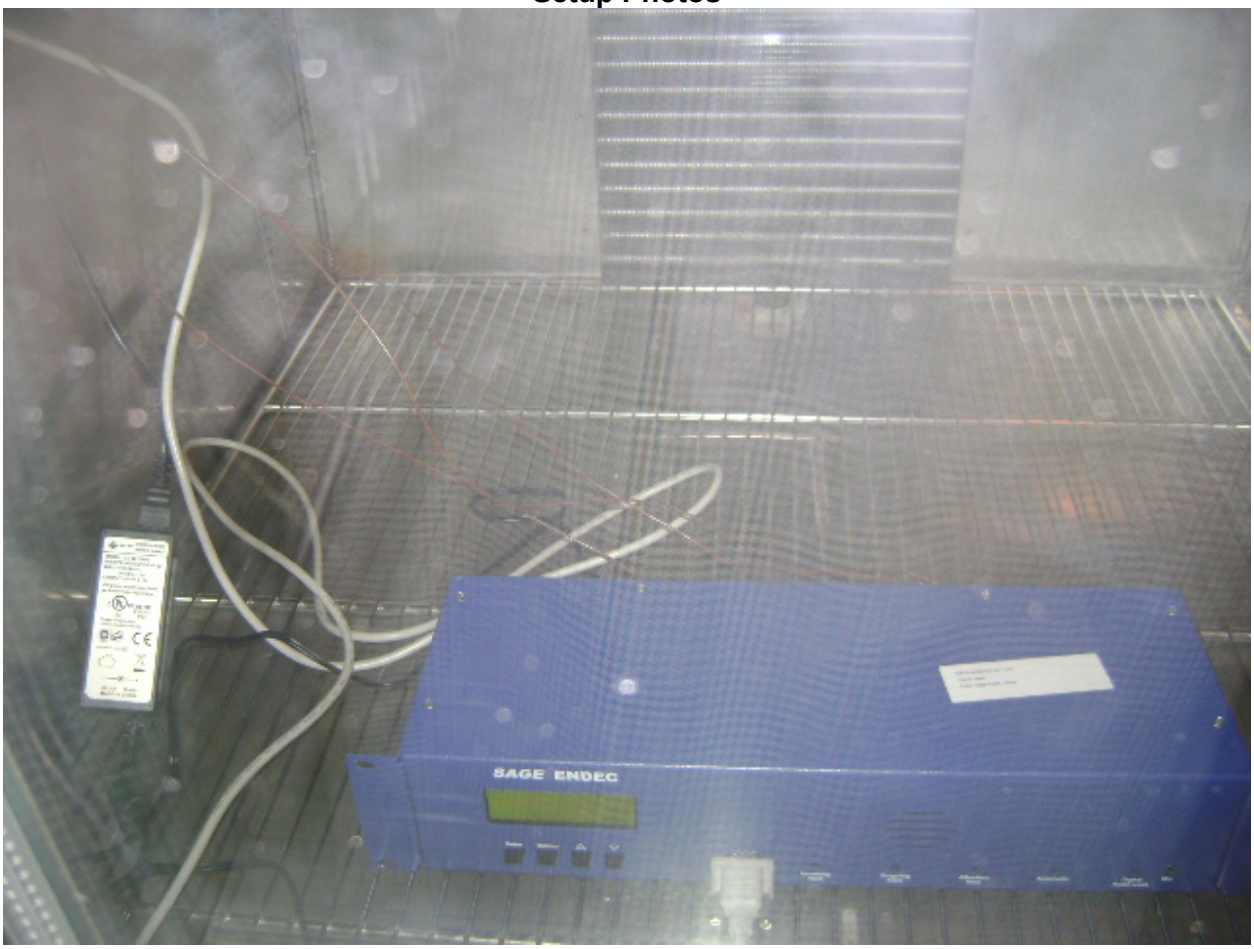
Setup Photos

11.32(d) FM Frequency

Setup Photos

11.32(b)

Setup Photos



11.32(b)

Test Results: Pass

Test Standard: FCC Part 11 Subpart B

Test: EAS Decoder

Performance Criterion: See Test Details

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	21	Humidity (%):	23	Pressure (hPa):	1020
Pretest Verification Performed		Yes		Equipment under Test:		Endec	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		1	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR3	05/20/2008
2	Variac, 0-140V	Powerstat	3PN126	N/L	Verified
3	Digital Multimeter	Meterman	15XP	050505984	09/18/2008
4	Istropic Field Probe	Amplifier Research	FP2000	15398	11/16/2008
5	Antenna, Log Periodic, 80 - 1000MHz	Amplifier Research	AT1080	15259	Verified
6	Isotropic Field Monitor	Amplifier Research	FM2000	16839	Verified
7	Generator, Signal	Hewlett Packard	8648C	3847A05291	03/04/2009
8	AMPLIFIER; 1kW; 10kHz-200MHz	Kalmus	137C/1-60-105-002	8044-1	Verified
9	E-FIELD Generator	Amplifier Research	AT3000	19824	Verified
10	Temperature/Humidity Chamber	Envirotronics	SH27C	08015563-S-11264	03/18/2009
11	GENERATOR, SYNTHESIZED/FUNCTION	Hewlett Packard	3325A	1748A03543	03/05/2009
12	GENERATOR, SYNTHESIZED/FUNCTION	Hewlett Packard	3325A	1748A16579	10/29/2008
13	Splitter/Combiner	Mini Circuits	ZFRSC-2050	none	Verified

Test Details:

11.33(a)(1) Inputs. Decoders must have the capability to receive at least 2 audio inputs from EAS monitoring assignments, and one data input (RS-232C with standard protocol and 1200 baud rate). The data input may be used to monitor other communications modes such as Radio Broadcast Data System (RBDS), NWR, satellite, public switched telephone network, or any other source that uses the EAS protocol.

As indicated by Sage Alerting Systems Inc., the Endec has 6 DB9 RS-232C serial ports that are user selectable as data inputs. The baud rate is user programmable from 1200 to 9600 Baud. There are 8 audio inputs (6 monitor inputs, 1 microphone input, and 1 encoder input).

11.33(a)(2) Valid codes. There must be a means to determine if valid EAS header codes are received and to determine if preselected header codes are received.

The Endec utilizes user-definable filters which can be used to preselect headers for specific actions upon receipt, such as relaying or not relaying an EAS alert based on geographical location and alert type. The Endec validates all alerts against the allowed list of header codes before applying the filters.

11.33(a)(3) Storage. Decoders must provide the means to:
11.33(a)(3)(i) Record and store, either internally or externally, at least two minutes of audio or text messages. A decoder manufactured without an internal means to record and store audio or text must be equipped with a means (such as an audio or digital jack connection) to couple to an
external recording and storing device.

A Required Monthly Test (RMT) was sent by the support Encoder, with 2 minutes of 2 kHz audio in the body of the message. The Endec stored and replayed the 2 kHz audio upon receipt of the RMT and when it relayed the RMT.

11.33(a)(3)(ii) Store at least ten preselected event and originator header codes, in addition to the seven mandatory event/originator codes for tests and national activations, and store any preselected location codes for comparison with incoming header codes. A non-preselected header code that is manually transmitted must be stored for comparison with later incoming header codes. The header codes of the last ten received valid messages which still have valid time periods must be stored for comparison with the incoming valid header codes for later messages. These last received header codes will be deleted from storage as their valid time periods expire.

The filters are capable of storing approximately 128 pre-selected event and originator header codes, as well as at least 47 mandatory event/originator codes. Sage Alerting Systems attests that the Endec stores the last ten valid header codes that have not expired for comparison with incoming codes, and that a new valid incoming code replaces the oldest stored code. It was observed that a valid incoming code that is the same as one of the ten stored valid header codes is marked as a duplicate.

11.33(a)(4) Display and logging. A visual message shall be developed from any valid header codes for tests and national activations and any preselected header codes received. The message shall include the Originator, Event, Location, the valid time period of the message and the local time the message was transmitted. The message shall be in the primary language of the EAS Participant and be fully displayed on the decoder and readable in normal light and darkness. All existing and new models of EAS decoders manufactured after August 1, 2003 must provide a means to permit the selective display and logging of EAS messages containing header codes for state and local EAS events. Effective May 16, 2002, analog radio and television broadcast stations, analog cable systems and wireless cable systems may upgrade their decoders on an optional basis to include a selective display and logging capability for EAS messages containing header codes for state and local events. EAS Participants that install or replace their decoders after February 1, 2004 must install decoders that provide a means to permit the selective display and logging of EAS messages containing header codes for state and local EAS events.

The Endec utilizes a front display LCD panel to display incoming EAS messages. The display includes the originator, event, location, time period, and local timestamp, and is in English or Spanish. The LCD display is backlit to allow readability in dark environments. The non-active EAS message log stores the last 100 EAS messages received.

11.33(a)(5) Indicators. EAS decoders must have a distinct and separate aural or visible means to indicate when any of the following conditions occurs:
11.33(a)(5)(i) Any valid EAS header codes are received as specified in Sec. 11.33(a)(10).

The Endec has a front panel LED labeled “Incoming Alert” which lights when valid EAS header codes are received. The LCD display indicates that a message has been received, and displays any active alerts per 11.33(a)(4).

11.33(a)(5)(ii) Preprogrammed header codes, such as those selected in accordance with Sec. 11.52(d)(2) are received.

The Endec has a front panel LED labeled “Incoming Alert” which lights when preprogrammed EAS header codes are received. The LCD display indicates that a message has been received, and displays any active alerts per 11.33(a)(4).

11.33(a)(5)(iii) A signal is present at each audio input that is specified in Sec. 11.33(a)(1).

The Endec has a front panel LED labeled “Incoming Alert” which lights when preprogrammed EAS header codes are received. The LCD display indicates that a message has been received, and displays any active alerts per 11.33(a)(4).

11.33(a)(6) Program Data Retention. The program data must be retained even with power removed.

Programmed data and codes were retained through a power cycle, including complete removal of the power cable.

11.33(a)(7) Outputs. Decoders shall have the following outputs: a data port or ports (RS-232C with standard protocol and 1200 baud rate) where received valid EAS header codes and received preselected header codes are available; one audio port that is capable of monitoring each decoder audio input; and, an internal speaker to enable personnel to hear audio from each input.

As indicated by Sage Alerting Systems Inc., the Endec has 6 DB9 RS-232C serial ports that are user selectable as data outputs. The baud rate is user programmable from 1200 to 9600 Baud. There are two analog audio outputs (1 line out and 1 balanced XLR output) as well as 1 digital audio output. The Endec also contains a speaker which is used to play back audio.

11.33(a)(8) Decoder Programming. Access to decoder programming shall be protected by a lock or other security measures and be configured so that authorized personnel can readily select and program the EAS Decoder with preselected Originator, Event and Location codes for either manual or automatic operation.

The programming and all commands are password protected to prevent unauthorized or inadvertent use.

11.33(a)(9) Reset. There shall be a method to automatically or manually reset the decoder to the normal monitoring condition. Operators shall be able to select a time interval, not less than two minutes, in which the decoder would automatically reset if it received an EAS header code but not an end-of-message (EOM) code. Messages received with the EAN Event codes shall disable the reset function so that lengthy audio messages can be handled. The last message received with valid header codes shall be displayed as required by paragraph (a)(4) of this section before the decoder is reset.

The Endec automatically timed out on an EAS message that was longer than 2 minutes that was not an EAN. The Endec did not time out when an EAN was sent and the audio was allowed to extend for longer than two minutes. All valid EAS messages are automatically displayed upon receipt of the valid header codes, which occurs before the audio portion of the message is received. Therefore all valid EAS messages will be displayed on the front panel LCD display before the decoder is reset.

11.33(a)(10) Message Validity. An EAS Decoder must provide error detection and validation of the header codes of each message to ascertain if the message is valid. Header code comparisons may be accomplished through the use of a bit-by-bit compare or any other error detection and validation protocol. A header code must only be considered valid when two of the three headers match exactly. Duplicate messages must not be relayed automatically.

Incoming header codes are compared to each other and if at least two of the three header codes match each other exactly, the message is considered valid. It was observed that messages are displayed after two valid header codes are received. Messages are compared to the active EAS message log which contains the last ten valid EAS messages that have not expired, and it was observed that they are marked as duplicates if they match one of the logged EAS messages. Duplicate messages were not relayed.

11.33(a)(11) A header code with the EAN Event code specified in Sec. 11.31(c) that is received through any of the audio inputs must override all other messages.

A required monthly test was initiated and an EAN event was received during the required monthly test. The RMT was terminated gracefully with the end of message headers and the Endec initiated an override and immediately relayed the EAN.

11.33(b) Attention Signal. EAS Decoders shall have detection and activation circuitry that will demute a receiver upon detection of the two audio tones of 853 Hz and 960 Hz. To prevent false responses, decoders designed to use the two tones for receiver demuting shall comply with the following:
11.33(b)(1) Time Delay. A minimum time delay of 8 but not more than 16 seconds of tone reception shall be incorporated into the demuting or activation process to insure that the tones will be audible for a period of at least 4 seconds. After July 1, 1995, the time delay shall be 3-4 seconds.

Audio tones were fed into the Endec and after 3 seconds, the attention signal LED on the front panel lit and a relay was activated to allow an attached receiver to be demuted.

11.33(b)(2) Operation Bandwidth. The decoder circuitry shall not respond to tones which vary more than 5 Hz from each of the frequencies, 853 Hz and 960 Hz.

The Endec was supplied with tones that were 5 Hz offset from the nominal tone frequencies of 853 and 960 Hz. In every combination of tones, the Endec did not respond. When tones at the correct frequencies were supplied to the Endec at the same amplitude used for the 5 Hz offset tones, the Endec did respond as normal to an incoming attention signal.

11.33(b)(3) Reset Ability. The decoder shall have a means to manually or automatically reset the associated broadcast receiver to a muted state.

In the “Alerts” menu, there is a command called “Reset Attn” which resets the relay that mutes the incoming attention tones, so that they are no longer un-muted.

11.33(c) Decoders shall be capable of operation within the tolerances specified in this section as well as those in Sec. 11.32 (b), (c) and (d).

11.32(b) Operating Temperature and Humidity. Encoders shall have the ability to operate with the above specifications within an ambient temperature range of 0 to +50 degrees C and a range of relative humidity of up to 95%.

The Endec was tested at 0 degrees Celsius and 95% humidity, 20 degrees Celsius and 95% humidity, and 50 degrees Celsius and 95% humidity. In all cases, an EAS message was sent by the support encoder and was successfully decoded by the Endec EUT.

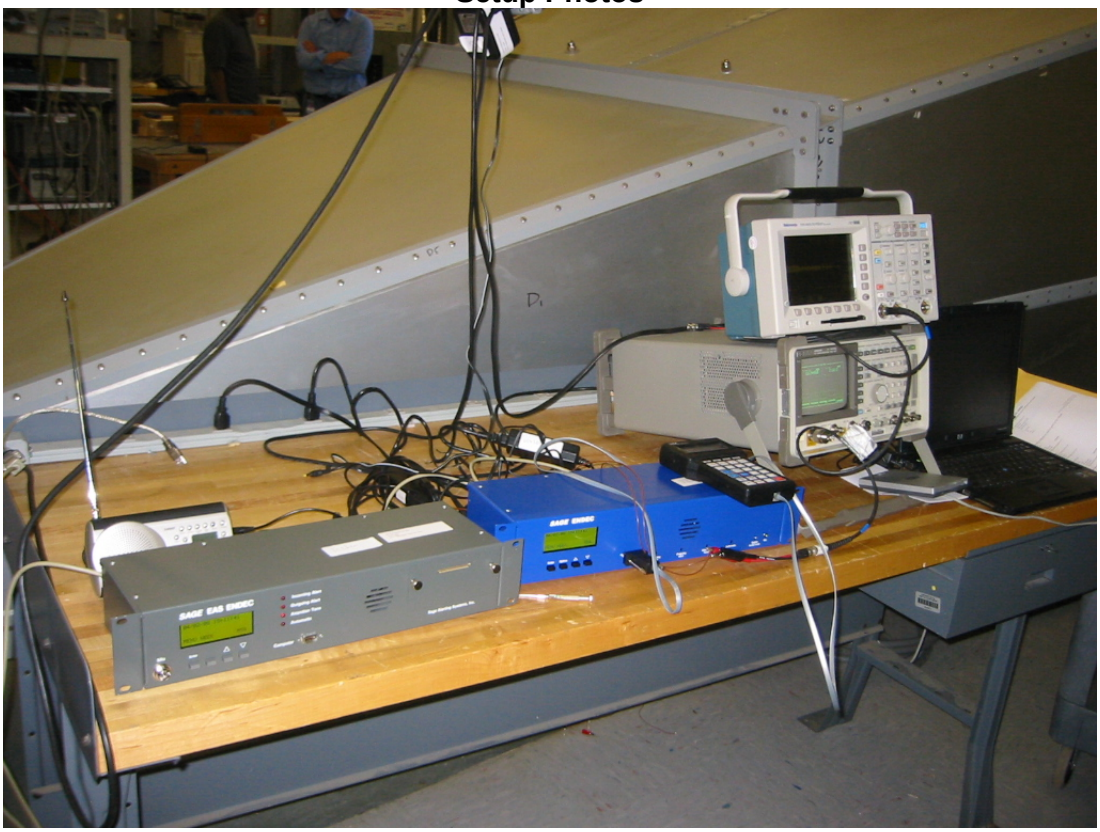
11.32(c) Primary Supply Voltage Variation. Encoders shall be capable of complying with the requirements of this section during a variation in primary supply voltage of 85 percent to 115 percent of its rated value.

The Endec is rated at 120V/60Hz AC, therefore it was operated at 102V and 138V AC. At both voltages, an EAS message was sent by the support encoder and was successfully decoded by the Endec EUT.

11.32(d) Testing Encoder Units. Encoders not covered by Sec. 11.34(e) of this part shall be tested in a 10 V/m minimum RF field at an AM broadcast frequency and a 0.5 V/m minimum RF field at an FM or TV broadcast frequency to simulate actual working conditions.

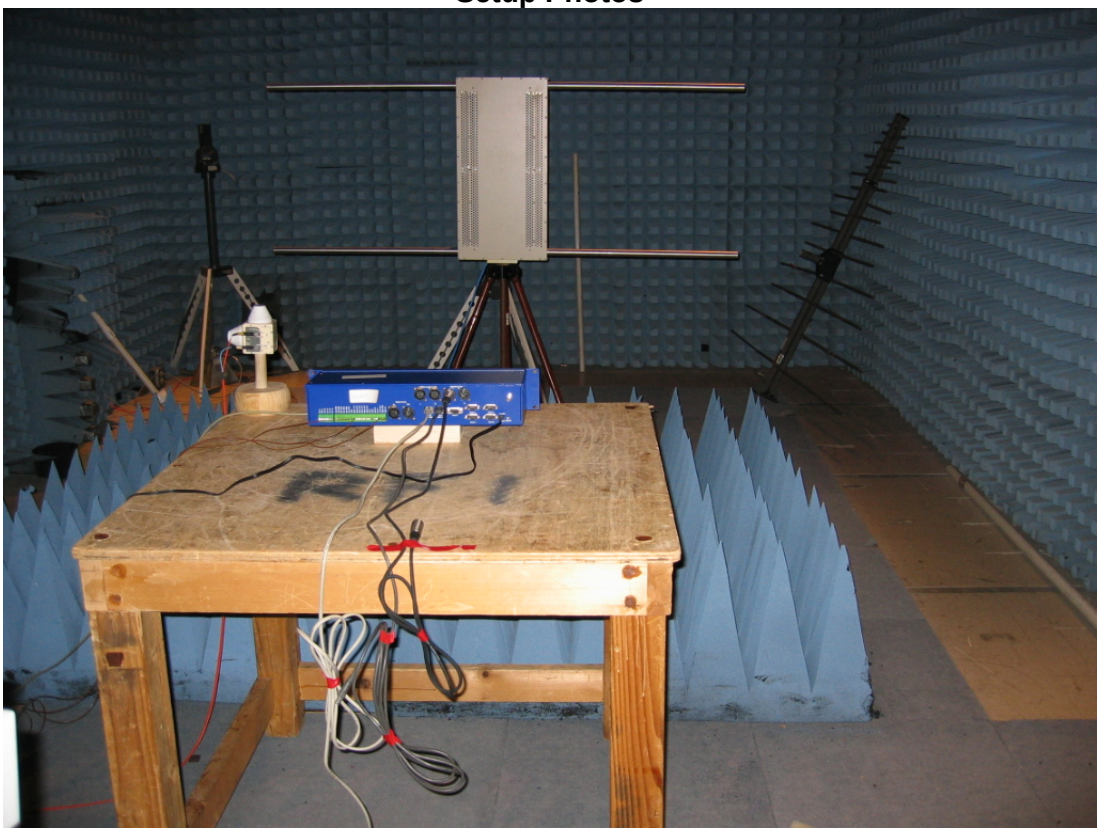
The Endec was tested on the front, back, right and left sides at 1 MHz 0.5 V/m and at 108 MHz 10 V/m, vertical and horizontal polarity. An EAS message was sent by the support encoder and was successfully decoded by the Endec EUT.

Setup Photos



General Tests

Setup Photos



11.32(d) AM Frequency

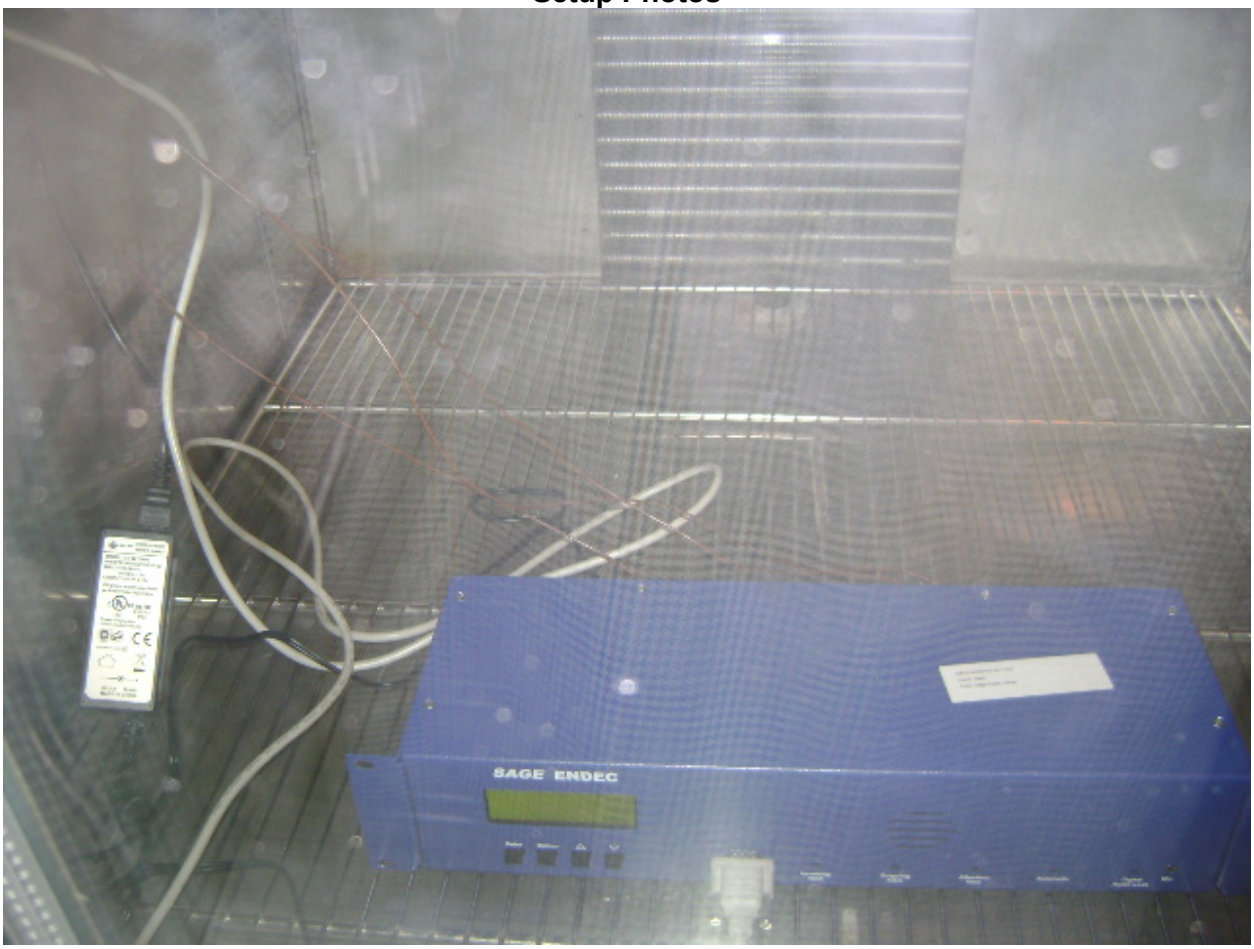
Setup Photos

11.32(d) FM Frequency

Setup Photos

11.32(b)

Setup Photos



11.32(b)

Test Results: Pass

Test Standard: FCC Part 15 Subpart B

Test: Radiated Emissions

Performance Criterion: Emissions must be below the 15.109 Class A limits

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	23	Humidity (%):	27	Pressure (hPa):	1050
Pretest Verification Performed		Yes		Equipment under Test:		Endec	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		2	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	ANTENNA	EMCO	3142	9711-1225	06/05/2008
3	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	09/17/2008
4	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	01/25/2009

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

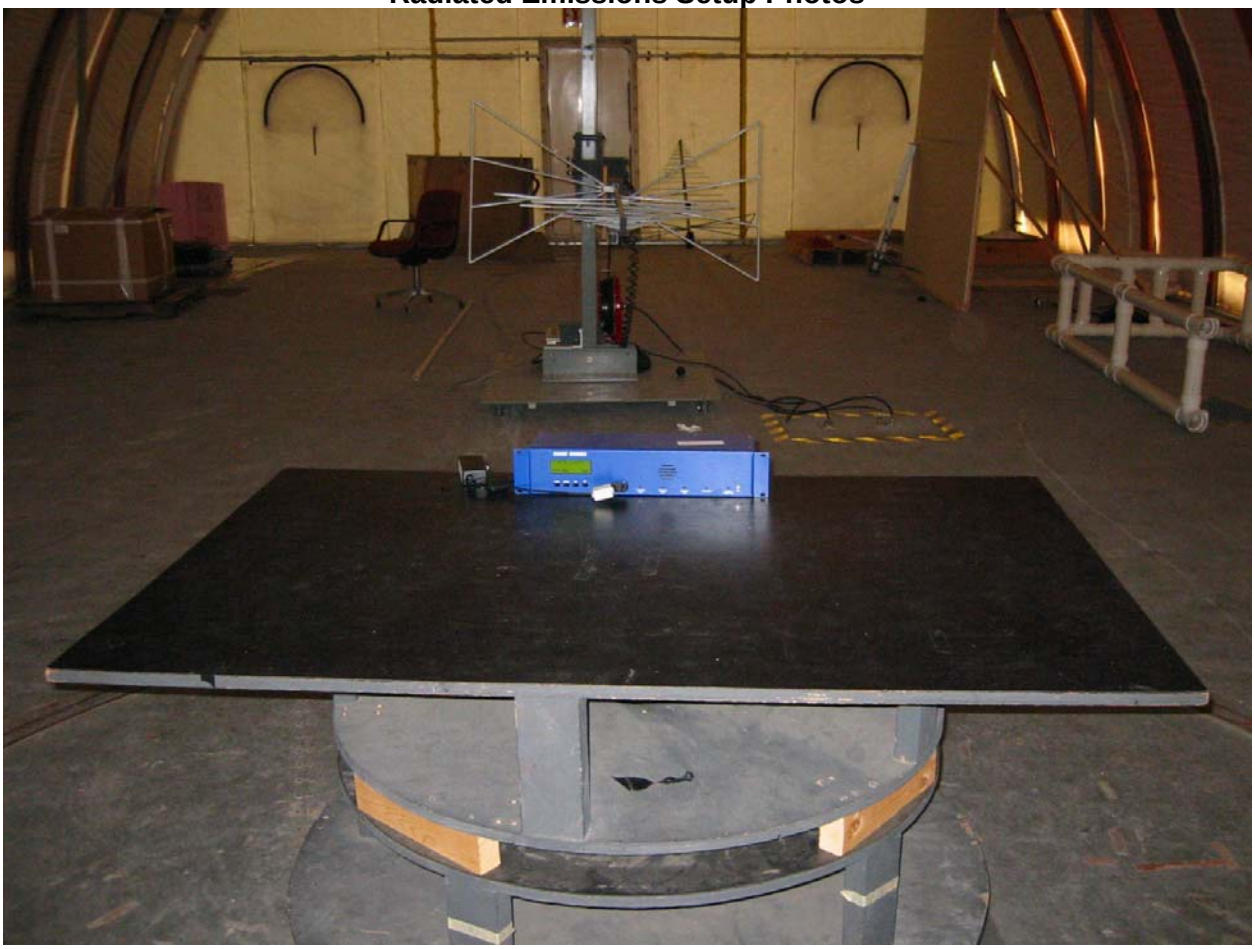
Test Results:

Special Radiated Emissions

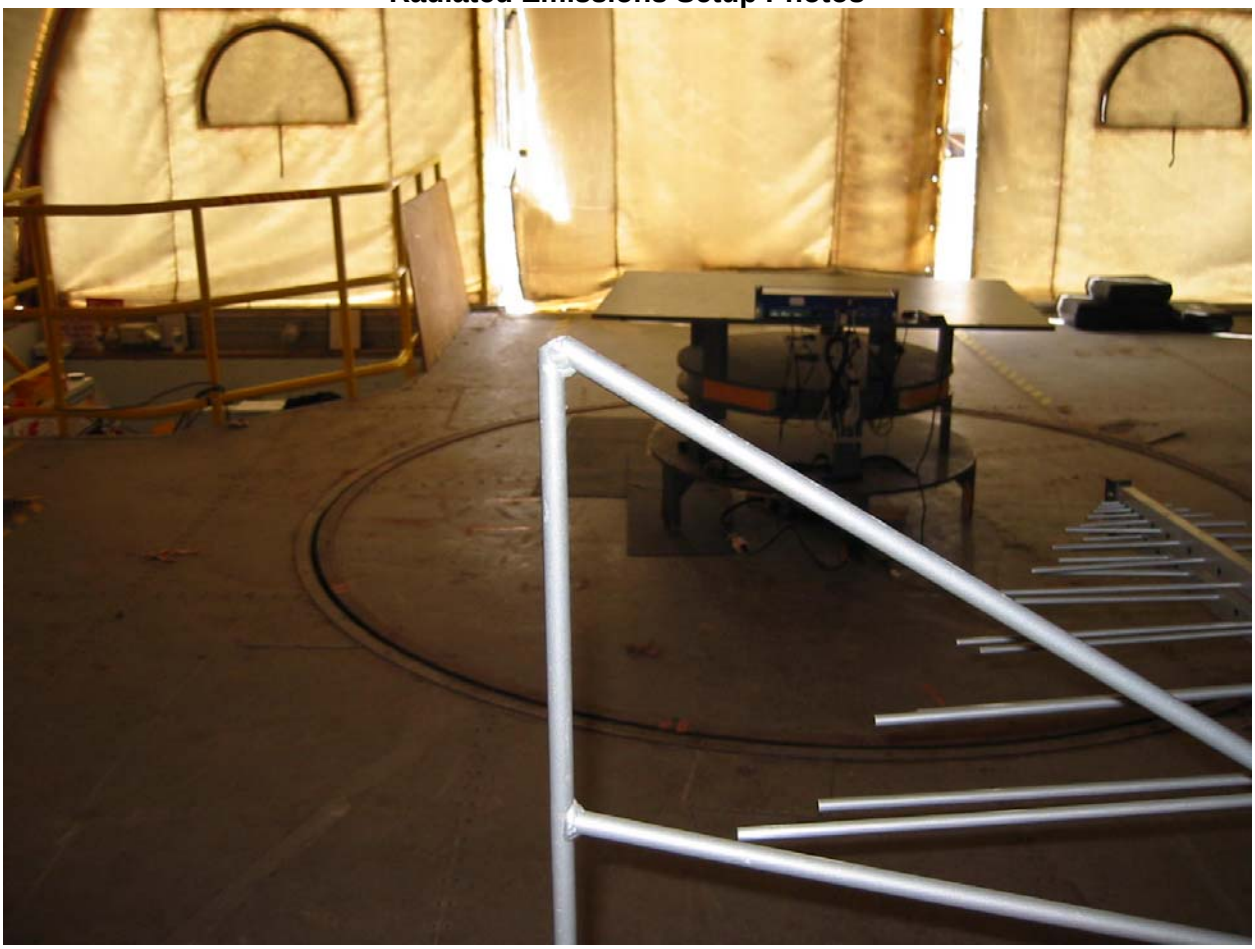
Company: Sage Alerting Systems, Inc. Antenna & Cables: N Bands: N, LF, HF, SHF
Model #: Endec Antenna: LOG4 06-05-08 V3.txt LOG4 06-05-08 H3.txt
Serial #: 2 Cable(s): S2 3M FLR 9-17-08.txt NONE.
Engineers: Nicholas Abbondante Location: Site 2 Barometer: BAR2
Project #: 3148183 Date(s): 04/08/08
Standard: FCC Part 15 Subpart B Class A Temp/Humidity/Pressure: 23c 27% 1050mB
Receiver: R&S ESCI (ROS002) Limit Distance (m): 10
PreAmp: NONE. Test Distance (m): 3
PreAmp Used? (Y or N): N Voltage/Frequency: 120V/60Hz Frequency Range: 30-1000 MHz
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC
QP	V	36.865	31.3	13.3	0.7	0.0	10.5	34.9	39.1	-4.2	120/300 kHz	
QP	V	73.728	38.4	7.5	1.0	0.0	10.5	36.4	39.1	-2.7	120/300 kHz	RB
QP	V	110.560	42.7	8.0	1.3	0.0	10.5	41.6	43.5	-1.9	120/300 kHz	RB
QP	V	122.868	31.2	6.8	1.4	0.0	10.5	28.9	43.5	-14.6	120/300 kHz	
QP	V	135.165	29.2	6.9	1.4	0.0	10.5	27.1	43.5	-16.4	120/300 kHz	RB
QP	V	147.480	32.7	8.0	1.5	0.0	10.5	31.7	43.5	-11.8	120/300 kHz	
QP	V	172.029	33.2	8.6	1.6	0.0	10.5	32.9	43.5	-10.6	120/300 kHz	RB
QP	V	184.315	36.3	9.4	1.7	0.0	10.5	36.9	43.5	-6.6	120/300 kHz	
QP	V	190.545	14.7	10.0	1.8	0.0	10.5	16.0	43.5	-27.5	120/300 kHz	
QP	H	208.900	25.6	10.7	1.9	0.0	10.5	27.7	43.5	-15.8	120/300 kHz	
QP	H	221.200	27.5	11.3	1.9	0.0	10.5	30.2	46.4	-16.2	120/300 kHz	
QP	H	225.010	9.3	11.5	1.9	0.0	10.5	12.2	46.4	-34.2	120/300 kHz	
QP	H	227.300	12.2	11.6	1.9	0.0	10.5	15.2	46.4	-31.2	120/300 kHz	
QP	H	233.500	12.6	11.8	2.0	0.0	10.5	15.9	46.4	-30.5	120/300 kHz	
QP	H	240.000	19.3	12.0	2.0	0.0	10.5	22.9	46.4	-23.5	120/300 kHz	RB
QP	V	245.800	22.1	12.6	2.0	0.0	10.5	26.3	46.4	-20.1	120/300 kHz	RB
QP	V	258.000	23.8	12.8	2.1	0.0	10.5	28.3	46.4	-18.1	120/300 kHz	RB
QP	V	264.200	19.6	12.9	2.1	0.0	10.5	24.2	46.4	-22.2	120/300 kHz	RB
QP	V	270.336	26.5	13.0	2.1	0.0	10.5	31.2	46.4	-15.2	120/300 kHz	RB
QP	H	275.000	22.0	12.9	2.1	0.0	10.5	26.5	46.4	-19.9	120/300 kHz	RB
QP	V	276.488	16.0	13.1	2.1	0.0	10.5	20.8	46.4	-25.6	120/300 kHz	RB
QP	V	282.628	24.4	13.3	2.2	0.0	10.5	29.4	46.4	-17.0	120/300 kHz	RB
QP	V	293.524	20.8	13.5	2.2	0.0	10.5	26.0	46.4	-20.4	120/300 kHz	
QP	V	294.916	19.6	13.5	2.2	0.0	10.5	24.9	46.4	-21.5	120/300 kHz	
QP	V	300.000	21.0	13.6	2.2	0.0	10.5	26.4	46.4	-20.0	120/300 kHz	
QP	H	320.000	31.6	14.6	2.3	0.0	10.5	38.1	46.4	-8.3	120/300 kHz	
QP	H	331.767	25.8	15.0	2.4	0.0	10.5	32.8	46.4	-13.6	120/300 kHz	RB
QP	H	338.800	19.4	15.3	2.4	0.0	10.5	26.6	46.4	-19.8	120/300 kHz	
QP	V	344.072	21.1	15.1	2.4	0.0	10.5	28.2	46.4	-18.2	120/300 kHz	
QP	V	356.352	21.7	15.3	2.5	0.0	10.5	29.1	46.4	-17.3	120/300 kHz	
QP	H	368.800	25.8	16.1	2.6	0.0	10.5	34.0	46.4	-12.4	120/300 kHz	
QP	H	375.000	18.0	16.2	2.6	0.0	10.5	26.3	46.4	-20.1	120/300 kHz	
QP	H	380.921	19.7	16.3	2.6	0.0	10.5	28.1	46.4	-18.3	120/300 kHz	
QP	H	400.000	23.0	16.4	2.6	0.0	10.5	31.5	46.4	-14.9	120/300 kHz	RB
QP	H	405.600	22.7	16.4	2.6	0.0	10.5	31.3	46.4	-15.1	120/300 kHz	RB
QP	H	417.792	21.4	16.3	2.7	0.0	10.5	30.0	46.4	-16.4	120/300 kHz	
QP	H	430.068	27.8	16.5	2.8	0.0	10.5	36.6	46.4	-9.8	120/300 kHz	
QP	V	454.400	17.1	17.3	2.8	0.0	10.5	26.7	46.4	-19.7	120/300 kHz	
QP	H	466.800	19.1	17.7	2.9	0.0	10.5	29.2	46.4	-17.2	120/300 kHz	
QP	H	480.000	13.8	18.0	2.9	0.0	10.5	24.2	46.4	-22.2	120/300 kHz	
QP	V	545.592	8.9	19.5	3.3	0.0	10.5	21.3	46.4	-25.1	120/300 kHz	
QP	V	589.800	12.4	19.0	3.4	0.0	10.5	24.3	46.4	-22.1	120/300 kHz	
QP	V	609.600	8.5	19.6	3.5	0.0	10.5	21.1	46.4	-25.3	120/300 kHz	RB
QP	V	626.700	9.9	19.8	3.6	0.0	10.5	22.9	46.4	-23.5	120/300 kHz	
QP	V	663.600	15.1	20.2	3.7	0.0	10.5	28.5	46.4	-17.9	120/300 kHz	
QP	V	688.200	20.6	20.4	3.9	0.0	10.5	34.4	46.4	-12.0	120/300 kHz	
QP	V	712.600	13.6	20.6	4.0	0.0	10.5	27.7	46.4	-18.7	120/300 kHz	
QP	V	737.300	21.9	20.9	3.9	0.0	10.5	36.3	46.4	-10.1	120/300 kHz	
QP	V	752.000	6.3	21.3	4.0	0.0	10.5	21.2	46.4	-25.2	120/300 kHz	
QP	V	811.000	13.9	22.0	4.2	0.0	10.5	29.7	46.4	-16.7	120/300 kHz	
QP	V	823.200	5.6	22.1	4.2	0.0	10.5	21.5	46.4	-24.9	120/300 kHz	
QP	V	835.532	12.9	22.5	4.4	0.0	10.5	29.4	46.4	-17.0	120/300 kHz	
QP	V	900.000	11.6	23.5	4.4	0.0	10.5	29.1	46.4	-17.3	120/300 kHz	
QP	H	950.200	4.1	23.5	4.8	0.0	10.5	21.9	46.4	-24.5	120/300 kHz	
QP	V	970.820	4.0	23.5	4.7	0.0	10.5	21.8	49.5	-27.7	120/300 kHz	RB
QP	H	983.000	8.5	24.3	4.7	0.0	10.5	27.0	49.5	-22.5	120/300 kHz	RB
QP	H	1000.000	7.7	24.7	4.7	0.0	10.5	26.7	49.5	-22.8	120/300 kHz	RB

Radiated Emissions Setup Photos



Radiated Emissions Setup Photos



Test Results: Pass

Test Standard: FCC Part 15 Subpart B

Test: AC Line-Conducted Emissions

Performance Criterion: Emissions must be below the 15.107 Class A limits

Test Environment:

Environmental Conditions During Testing:		Ambient (°C):	21	Humidity (%):	30	Pressure (hPa):	1050
Pretest Verification Performed		Yes		Equipment under Test:		Endec	
Test Engineer(s):	Nicholas Abbondante			EUT Serial Number:		2	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	LISN, 50uH, .01 - 50MHz, 24A	Solar Electronics	9252-50-R-24-BNC	941714	10/11/2008
3	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS24	09/18/2008
4	Cable BNC/BNC, 30'	ITS	BNC-30	CBLBNC3	03/05/2009
5	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	01/25/2009

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Results:

Conducted Emissions

Company: Sage Alerting Systems, Inc.
Model #: Endec
Serial #: 2
Engineer(s): Nicholas Abbondante
Project #: 3148183
Standard: FCC Part 15 Subpart B Class A
Barometer: BAR2

Location: Site 2
Date: 04/09/08
Temp/Humidity/Pressure: 21c 30% 1050mB

Receiver: R&S ESCI (ROS002)
Cable: CBLBNC3 03-05-09.txt
LISN 1: LISN12 [1] 10-11-08.txt
LISN 2: LISN12 [2] 10-11-08.txt
LISN 3: NONE.
LISN 4: NONE.
Attenuator: DS24 9-18-08.txt

Voltage/Frequency: 120V/60Hz
Frequency Range: 150 kHz - 30 MHz

Net is the sum of worst-case lisn, cable, & attenuator losses, and initial reading, factors are not shown
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor; Bandwidth denoted as RBW/VBW

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	QP Limit dB(uV)	Margin dB	Bandwidth
QP	0.153	25.7	19.0			47.6	79.0	-31.4	9/30 kHz
QP	0.305	20.2	17.4			42.0	79.0	-37.0	9/30 kHz
QP	0.762	15.9	14.7			37.6	73.0	-35.4	9/30 kHz
QP	1.066	19.4	17.3			41.2	73.0	-31.8	9/30 kHz
QP	13.690	3.7	3.3			26.0	73.0	-47.0	9/30 kHz
QP	24.576	11.8	11.8			34.5	73.0	-38.5	9/30 kHz

Detector Type	Frequency MHz	Reading Line 1 dB(uV)	Reading Line 2 dB(uV)	Reading Line 3 dB(uV)	Reading Line 4 dB(uV)	Net dB(uV)	Average Limit dB(uV)	Margin dB	Bandwidth
AVG	0.153	25.3	18.1			47.2	66.0	-18.8	9/30 kHz
AVG	0.305	19.9	17.1			41.7	66.0	-24.3	9/30 kHz
AVG	0.762	15.1	13.9			36.8	60.0	-23.2	9/30 kHz
AVG	1.066	18.6	16.8			40.4	60.0	-19.6	9/30 kHz
AVG	13.690	1.8	1.0			24.1	60.0	-35.9	9/30 kHz
AVG	24.576	10.1	10.0			32.8	60.0	-27.2	9/30 kHz

AC Line-Conducted Emissions Setup Photos

AC Line-Conducted Emissions Setup Photos