

FCC CFR47 Part 11 Subpart B TEST REPORT

Report Number: 100786212BOX-001a
Project Number: G100786212

Report Issue Date: 06/28/2012

Product Designation: CAP Capable Universal Intermediary Device/Encoder, Model: EMnet Broadcaster Station Package

Standards: CFR47 FCC Part 11 "Emergency Alert Systems (EAS)" Subpart B Sections 11.31 "EAS Protocol" and 11.32 "EAS Encoder" for a CAP Capable Universal Intermediary Device with Encoder Capability

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719

Client:
Communications Laboratories Inc.
750 North Drive
Melbourne FL 32934

Report prepared by Reviewer



Nicholas Abbondante/Staff Engineer

Report reviewed by



Michael F. Murphy / Sr. Staff Engineer, EMC

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	
4	Description of Equipment Under Test	
5	System Setup and Method	
6	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
7	EAS Encoder FCC 11.32 – The EAS encoder must meet the operational requirements of 11.32	Pass
8	Revision History	

3 Client Information

This EUT was tested at the request of:

Company: Communications Laboratories Inc. dBa ComLabs
750 North Drive
Melbourne, FL 32934

Contact: Mr. Roland Lussier

Telephone: (321)489-9898

Fax: (321)489-9899

Email: r.lussier@comlabs.com

4 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
CAP Capable Universal Intermediary Device/Encoder	Communications Laboratories Inc.	EMnet Broadcaster Station Package	R03311117

Receive Date:	06/13/2012 to 06/25/2012
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)

CAP Capable Universal Intermediary Device/Encoder for the Emergency Alert System

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
120V	8A	60Hz	Single

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	11.32(b), (c), and (d) – The EUT was operating normally in a CAP input, SAME output Encoder loop with the Encoder output sent to a Sage EAS Endec for decoding.
2	All other tests – The EUT was operating in normal operation and the control software was used to generate the required calibration tones and EAS protocol signals.

5 System Setup and Method

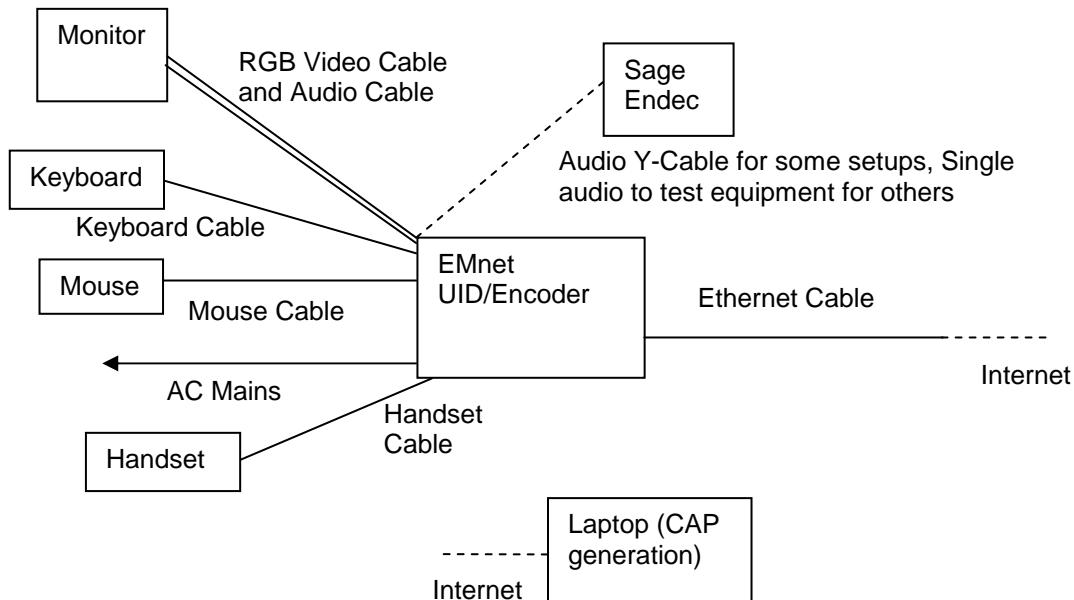
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	AC Mains	1.8	None	None	AC Mains
2	Mouse Cable	1.8	None	None	Mouse
3	Keyboard Cable	1.5	None	None	Keyboard
4	DB25 RGB Video Cable	1.5	Braid/Foil	None	Monitor
5	Audio Cable to Monitor	1.5	None	None	Monitor
6	Audio Cable to Sage Endec	0.65	None	None	Sage Endec
7	Ethernet Cable	15.0	None	None	Network drop
8	Handset Cable	1.5	Braid/Foil	None	Handset

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Sage Endec FCC ID: MAX1822	Sage Alert Systems	1811	12906
Laptop Latitude E4310	Dell	P05G	7N28TM1
Handset	Communications Laboratories Inc.	420	N/L

5.1 Method:

Configuration and testing as required by CFR47 FCC Part 11 and the Fifth Report and Order, FCC 12-7, EB Docket No. 04-296, Released: January 10, 2012, specifically paragraphs 165-180.

5.2 EUT Block Diagram:



6 EAS Protocol

6.1 Method

Tests are performed in accordance with FCC Part 11.31

TEST SITE: EMC Lab

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 ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

The AMAP Building and Lab includes general lab space that can be used for testing where a shielded/enclosed environment is not required.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61A	08/17/2011	08/17/2012
AGL002'	1GHz 4CH O'Scope	Agilent Technologies	DSO6104A	MY44008115	07/12/2011	07/12/2012

Software Utilized:

Name	Manufacturer	Version
None		

6.3 Results:

The sample tested was found to comply.

6.4 Setup Photographs:



EMnet Setup with Support Encoder/Decoder and Laptop



Test Equipment

6.5 Data:

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.*

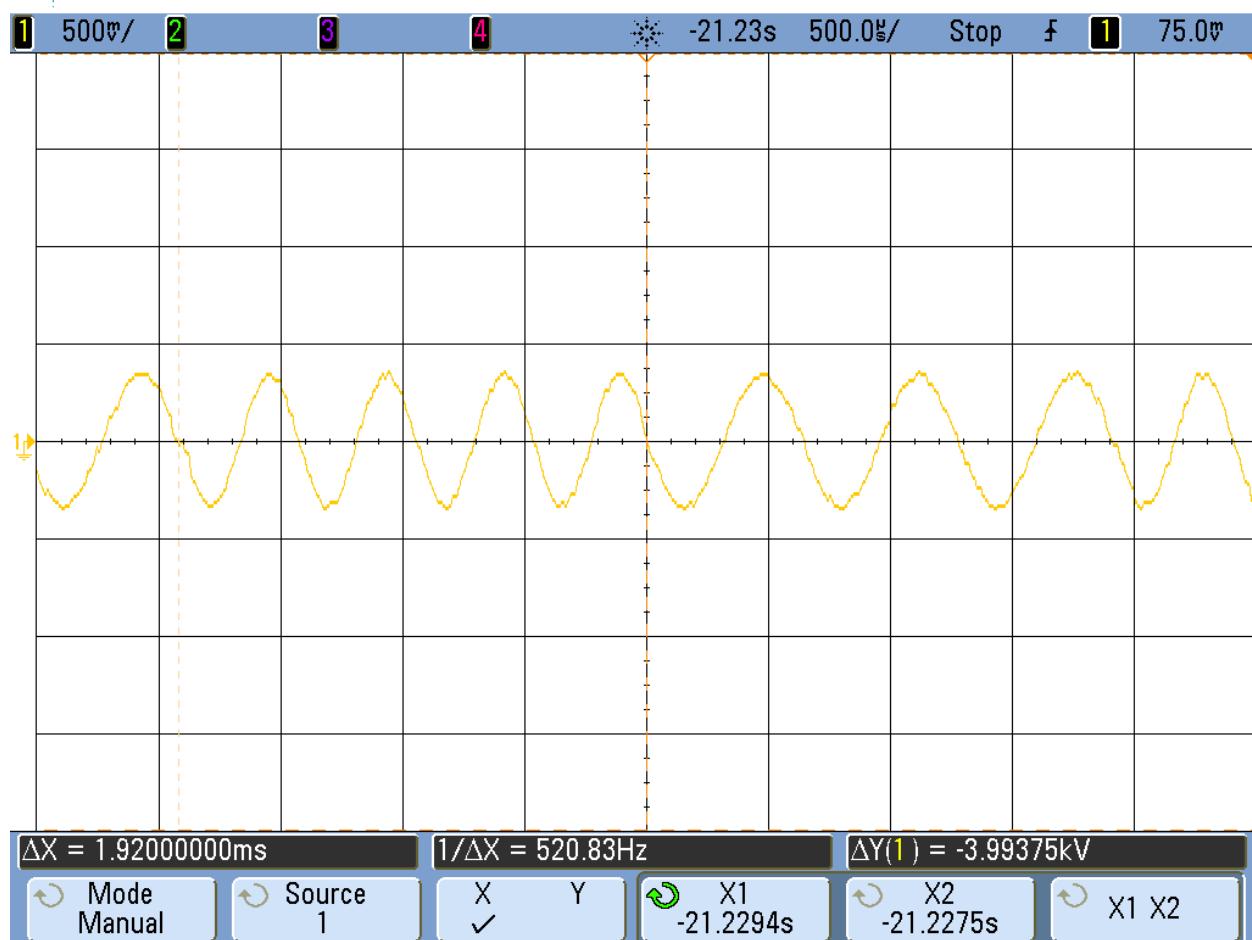
The Motherboard line output of the EMnet was connected to the input of the oscilloscope and plots of the bit length at each frequency were recorded.

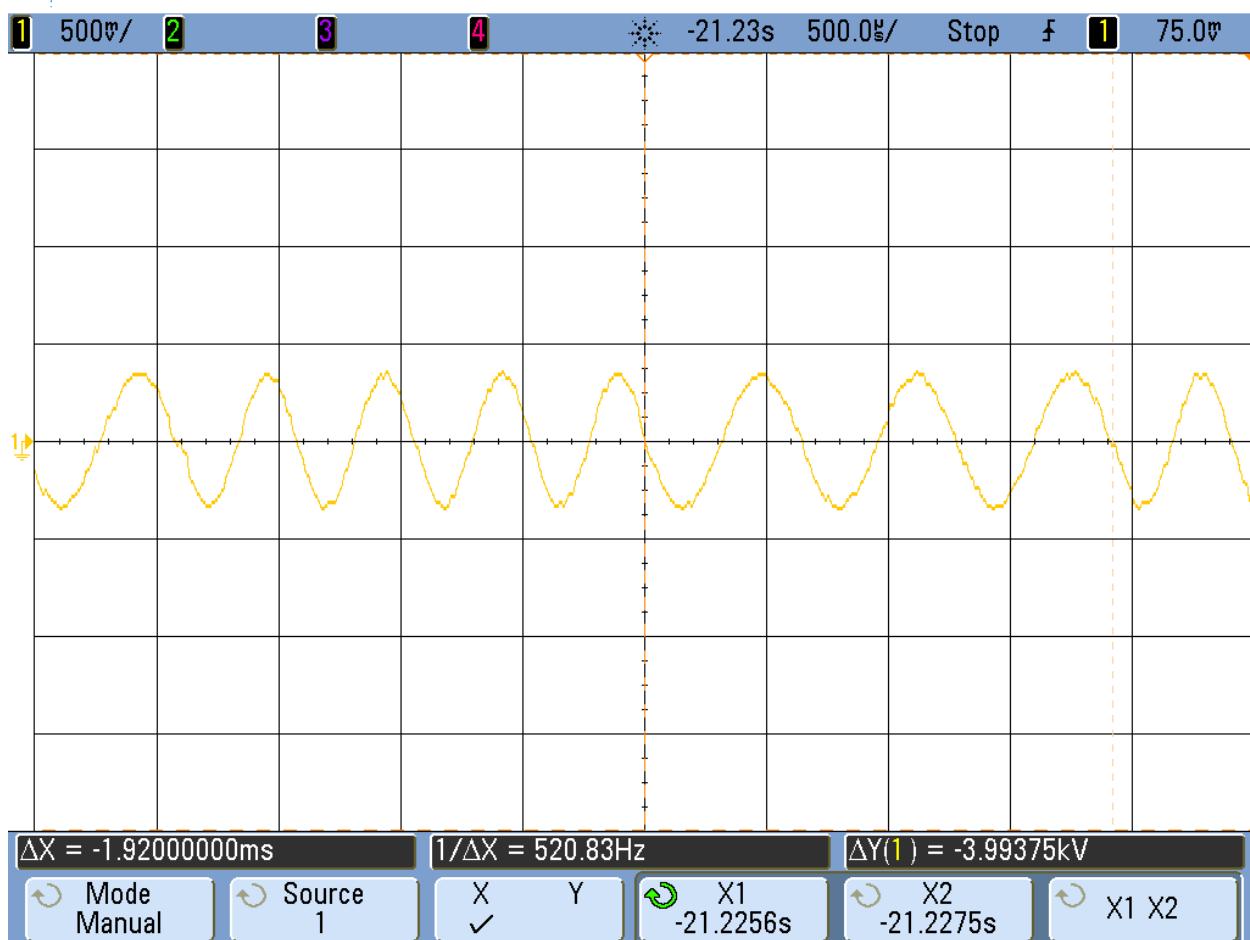
Mark Frequency (2083.3Hz) bit length – 1.92ms



Agilent Technologies

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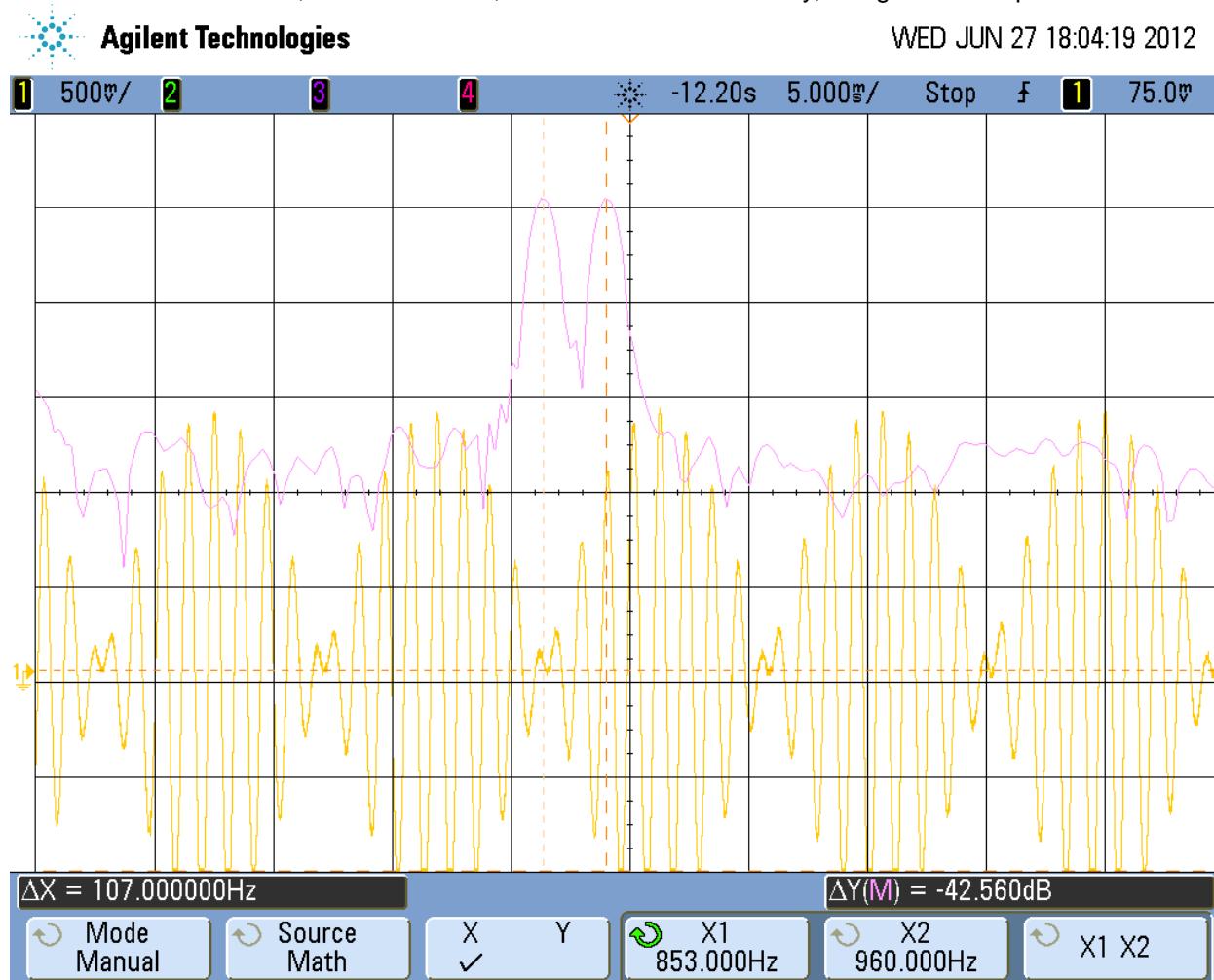




11.31(a)(2): The Attention Signal must be made up of the fundamental frequencies of 853 and 960 Hz. The two tones must be transmitted simultaneously. The Attention Signal must be transmitted after the EAS header codes.

The line output of the EMnet was connected to the input of the oscilloscope and plots of the bit length at each frequency were recorded.

The two tones, 853 and 960 Hz, transmitted simultaneously, using Oscilloscope FFT



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

The message produced by the EMnet is audio.

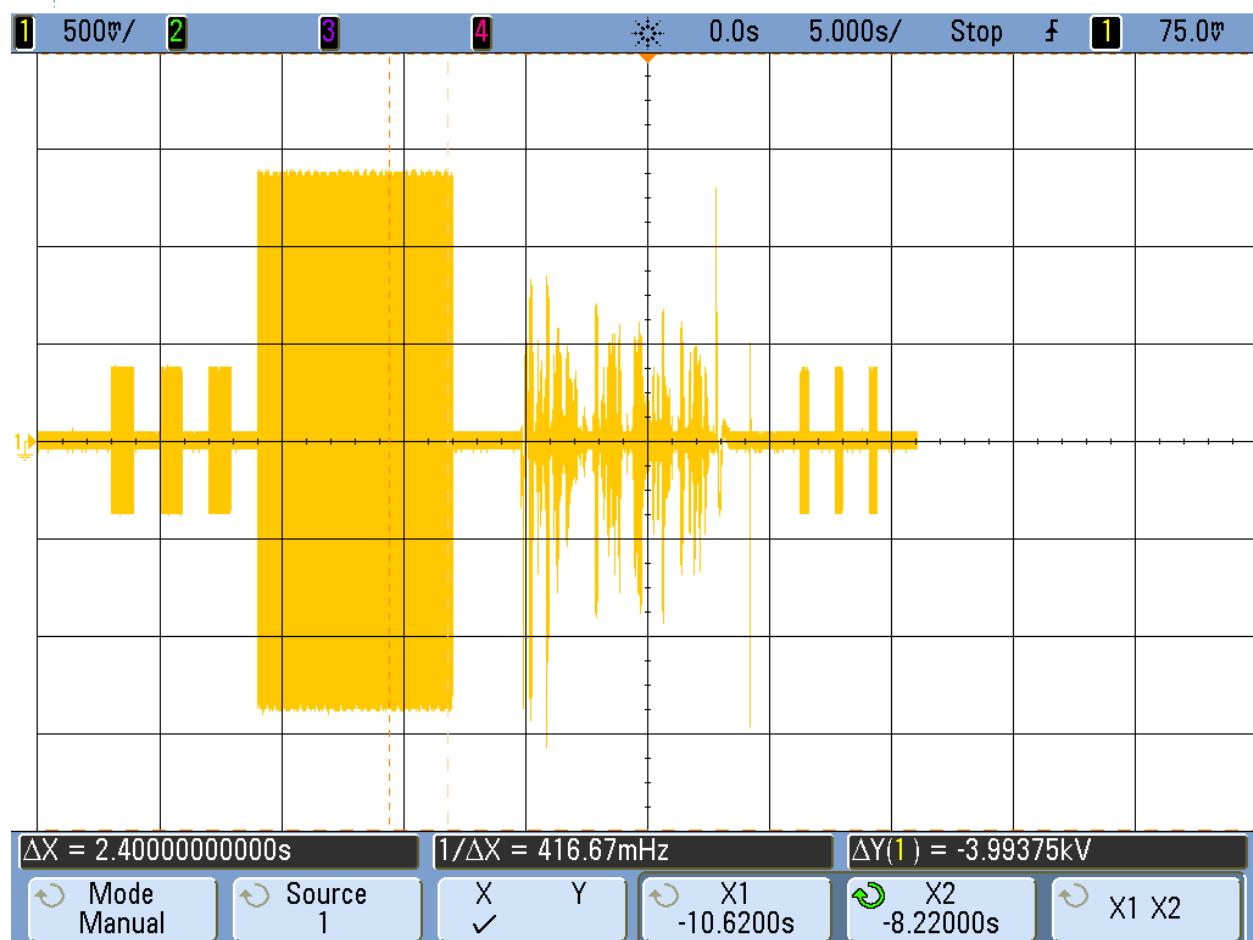
11.31(b): *The ASCII dash and plus symbols are required and may not be used for any other purpose. FM or TV call signs must use a slash ASCII character number 47 (/) in lieu of a dash.*

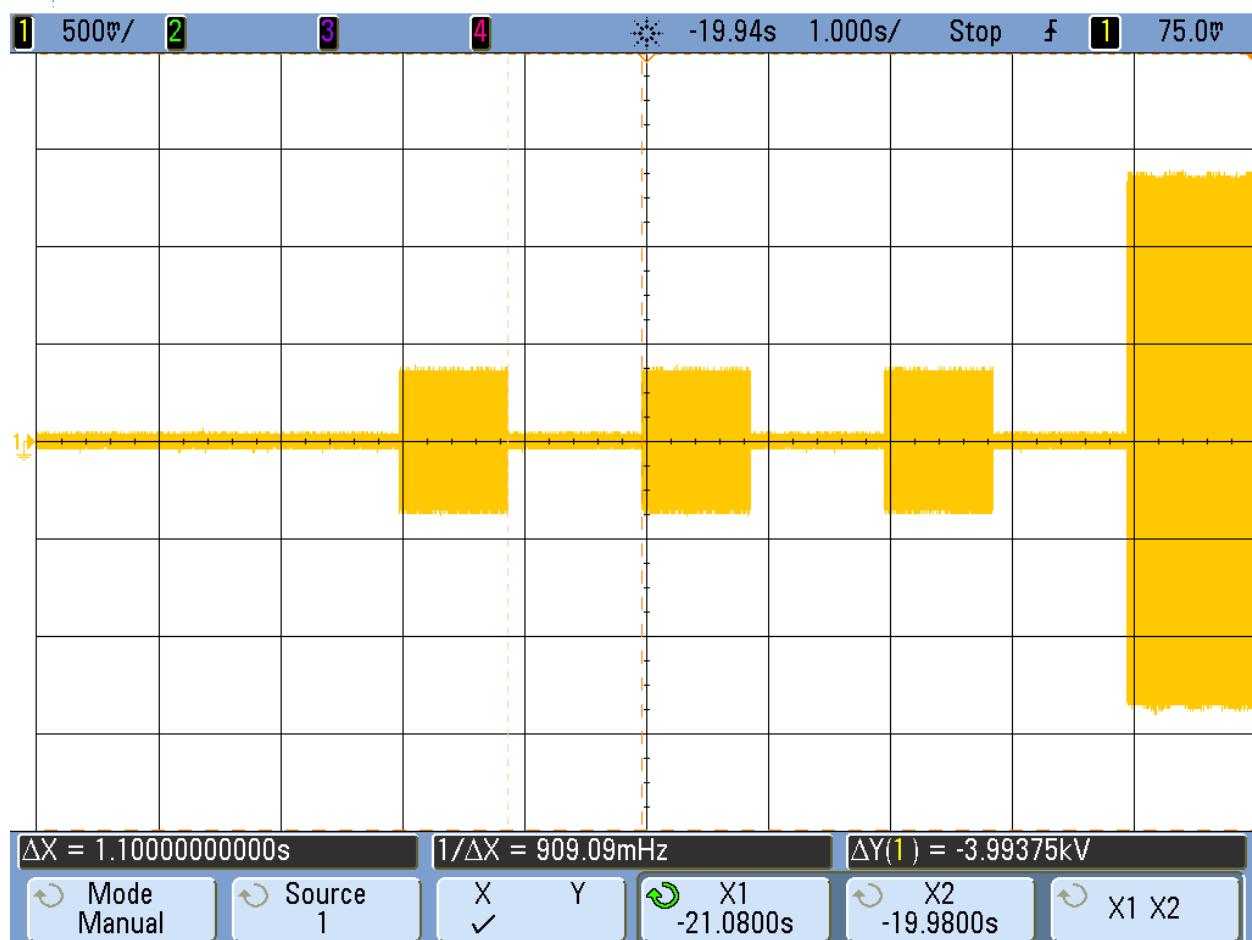
The dash and plus symbols appear in the EAS message at the appropriate locations and it was verified during testing that the user is unable to enter a dash into the call sign input. The allowed inputs are A-Z, 0-9, /, and space.

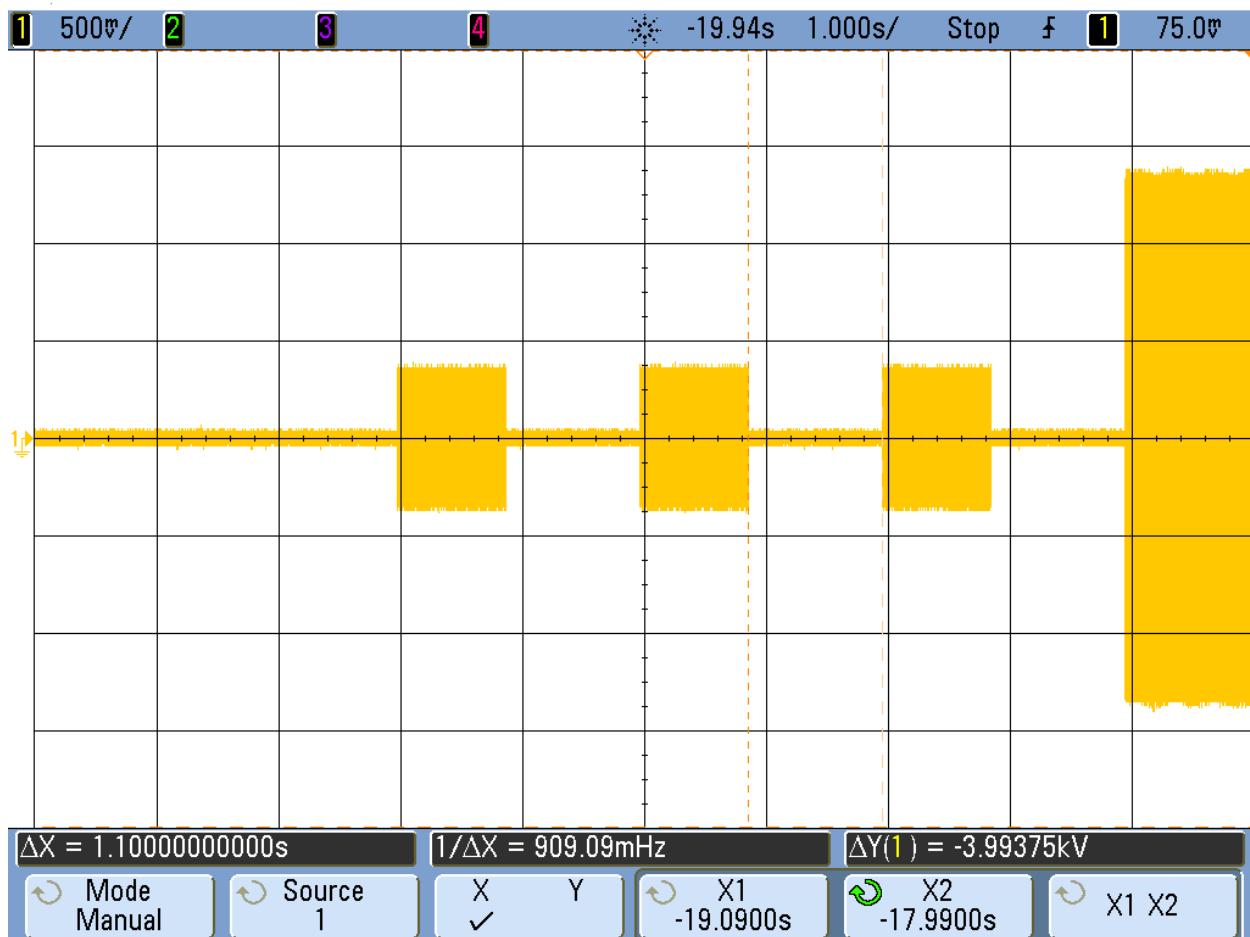
11.31(c): *The EAS protocol, including any codes, must not be amended, extended or abridged without FCC authorization. The EAS protocol and message format are specified in the following representation.*

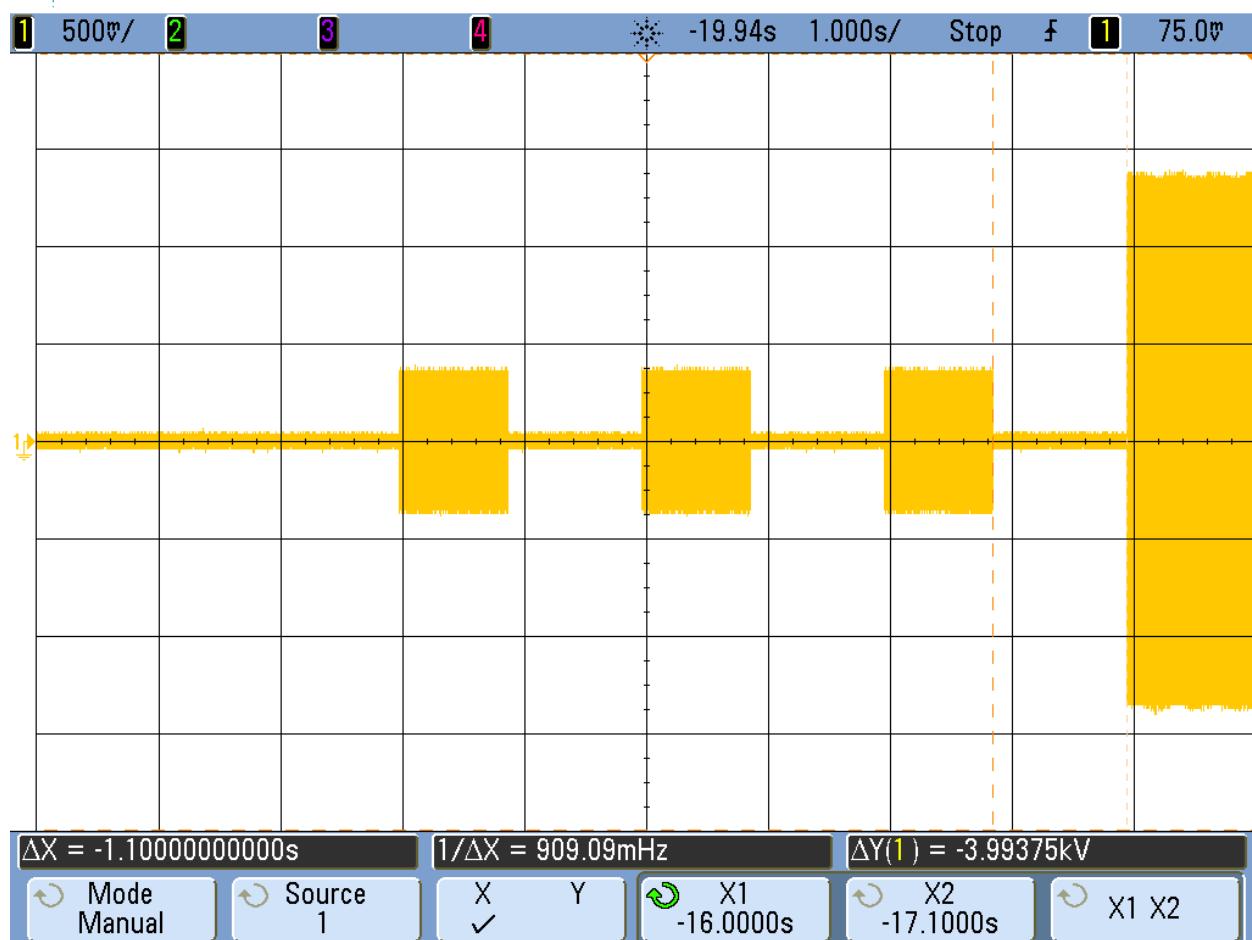
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC+TTTT-JJJHHMM-LLLLLLLL-(one second pause)
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC+TTTT-JJJHHMM-LLLLLLLL-(one second pause)
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC+TTTT-JJJHHMM-LLLLLLLL-(at least a one second pause)
(transmission of 8 seconds of Attention Signal)
(transmission of audio, video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

It was verified during test that EAS protocol and message format were in compliance with the requirement above.







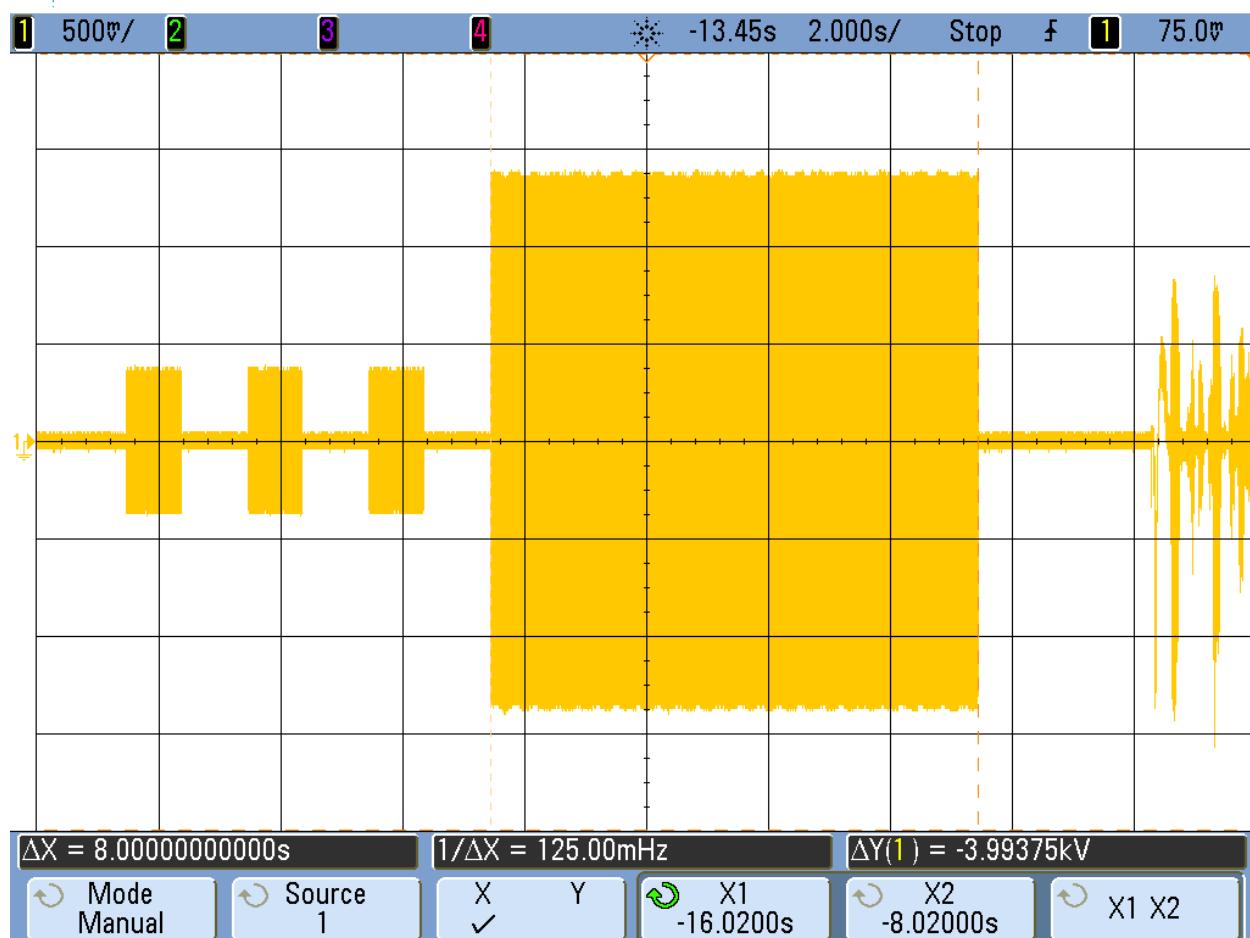


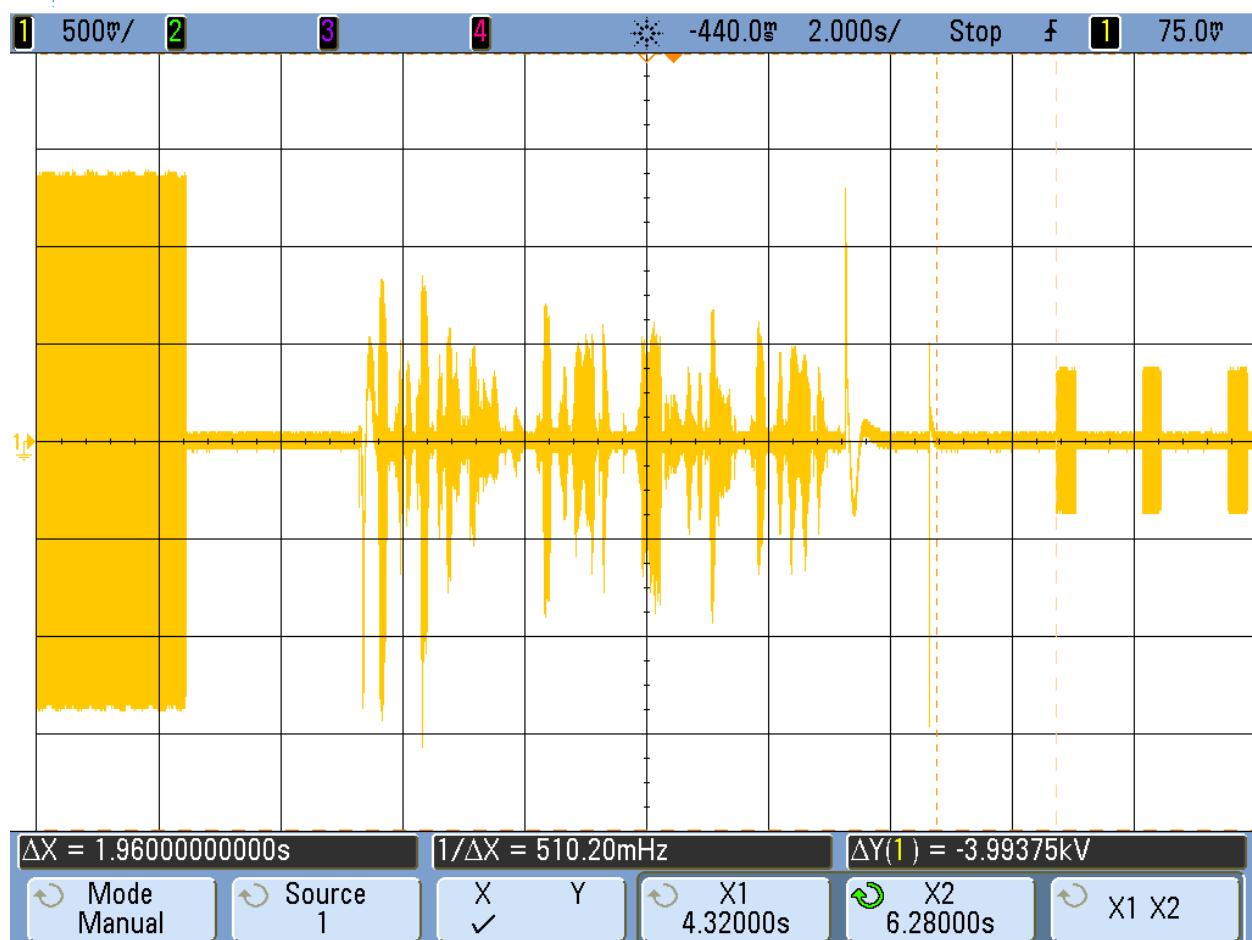
Attention Signal Duration

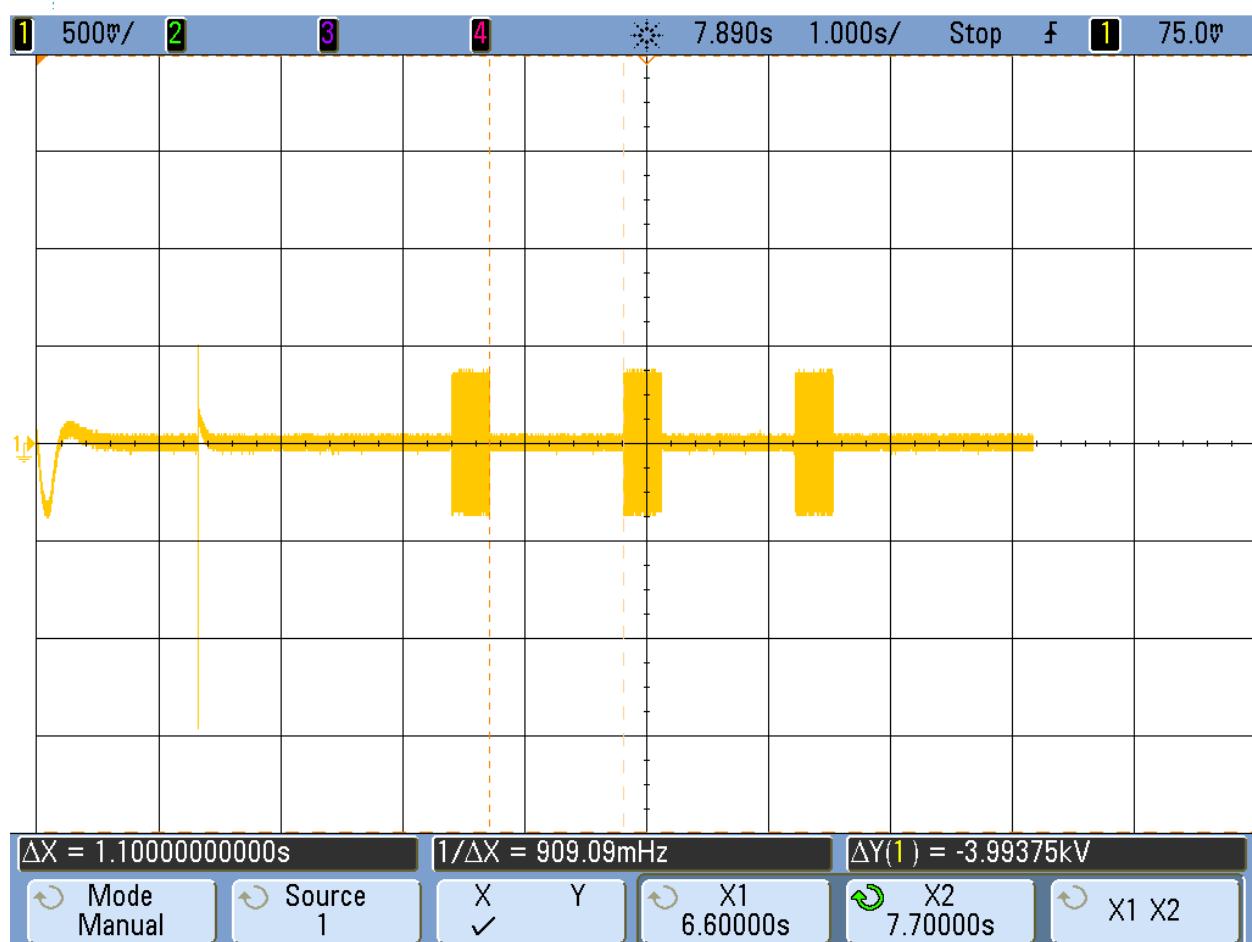


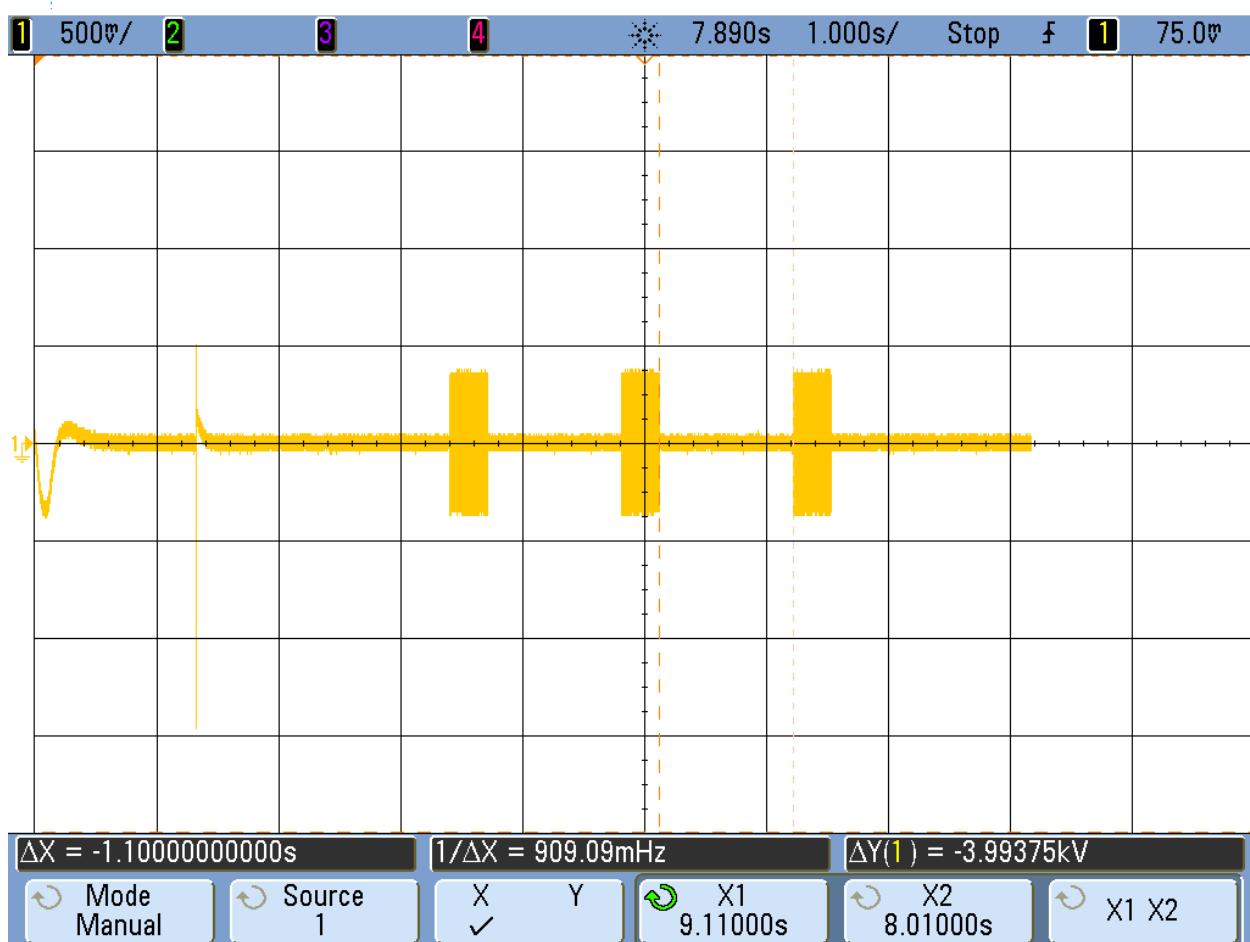
Agilent Technologies

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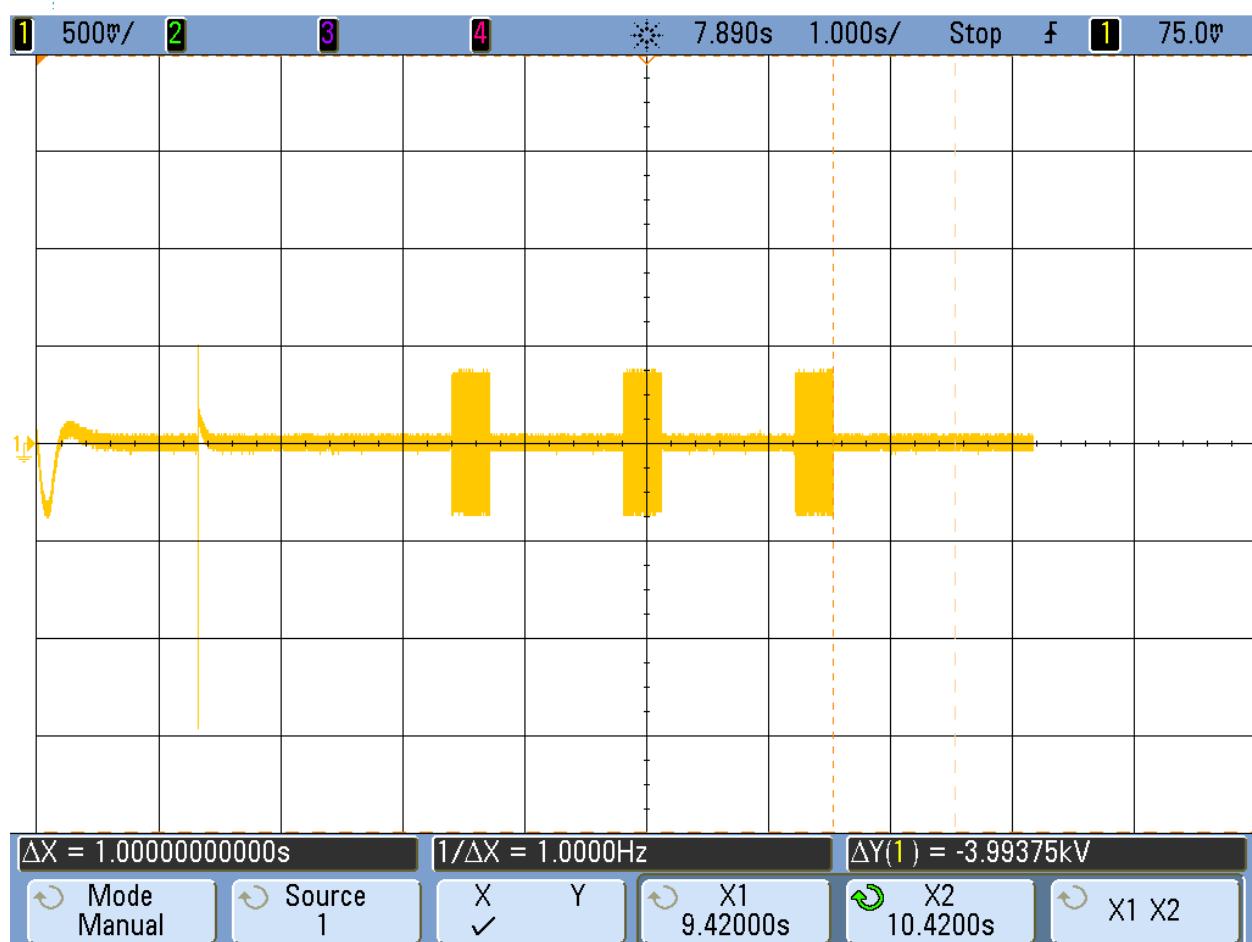
 $\Delta X = -1.100000000000s$ $1/\Delta X = 909.09\text{mHz}$ $\Delta Y(1) = -3.99375\text{kV}$ Mode
ManualSource
1

X

Y

X1
9.11000sX2
8.01000s

X1 X2



Test Personnel: Nicholas Abbondante
 Supervising/Reviewing
 Engineer:
 (Where Applicable) N/A
 Product Standard: CFR47 FCC Part 11
 Input Voltage: 120V/60Hz
 Pretest Verification w/
 Ambient Signals or
 BB Source: N/A

Test Date: 06/26-27/2012

Ambient Temperature: 21, 21 °C
 Relative Humidity: 55, 54 %
 Atmospheric Pressure: 993, 995 mbars

Deviations, Additions, or Exclusions: None

7 EAS Encoder

7.1 Method

Tests are performed in accordance with FCC Part 11.32.

TEST SITE: EMC Lab

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 ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

The AMAP Building and Lab includes general lab space that can be used for testing where a shielded/enclosed environment is not required.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61 A	08/17/2011	08/17/2012
HEW64'	RF Communications Test Set	Hewlett Packard	8920B	US36141447	06/07/2011	06/07/2013
ROS001'	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	02/10/2012	02/10/2013
MET1'	Digital Multimeter	Meterman	15XP	050407785	04/13/2012	04/13/2013
147-300'	variable transformer	Staco Energy	3PN1520B	none	VBU	Verified
AGL002'	1GHz 4CH O'Scope	Agilent Technologies	DSO6104A	MY44008115	07/12/2011	07/12/2012
				08015563S11		
148012'	Temp/Humidity Chamber	Envirotronics	SH27C	263	10/05/2011	10/05/2012
147027'	E Field Generator	Amplifier Research	At3000	25919	VBU	Verified
HEW63'	Generator, Signal	Hewlett Packard	8648C	3847A05291	01/23/2012	01/23/2013
KAL02'	AMPLIFIER; 1kW; 10kHz-200MHz	Kalmus	137C/1-60-105-002	8044-1	VBU	Verified
NAR004'	Electric Field Probe 100kHz-3Ghz	NARDA	EMC-20	T-0033	11/09/2011	11/09/2012
AMP32'	Antenna, Log Periodic, 80 - 1000MHz	Amplifier Research	AT1080	19465	VBU	Verified

Software Utilized:

Name	Manufacturer	Version
None		

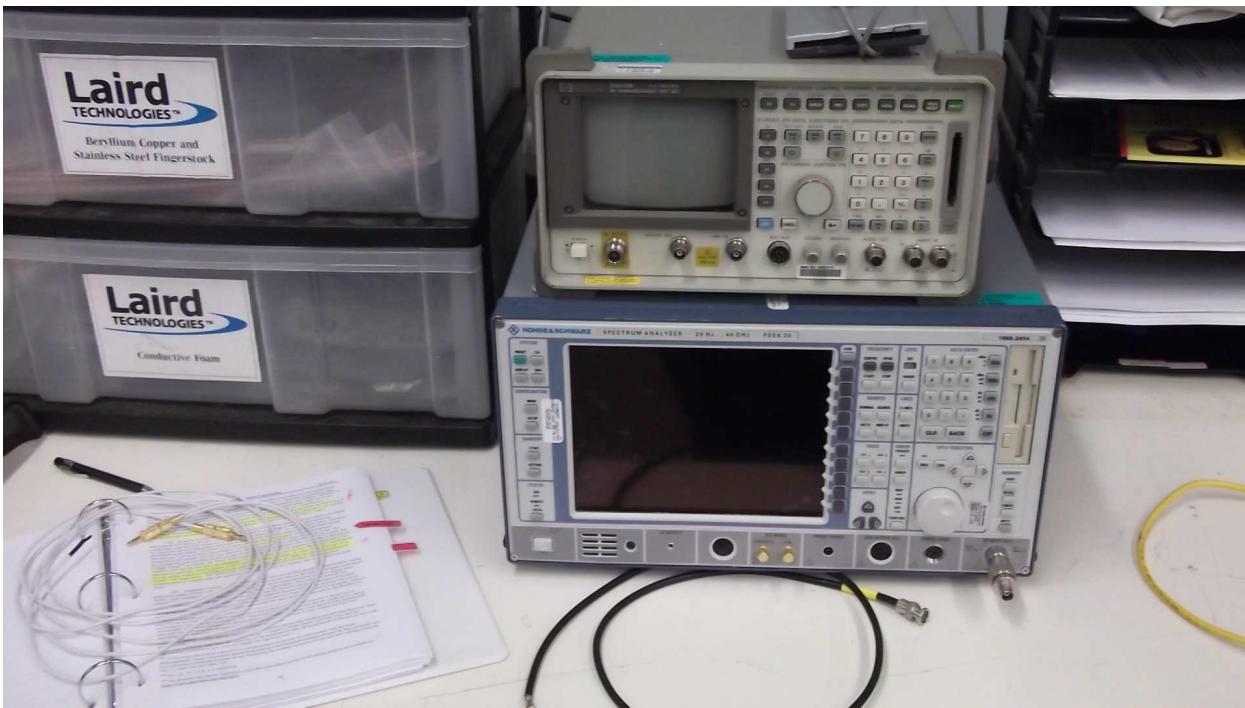
7.3 Results:

The sample tested was found to Comply.

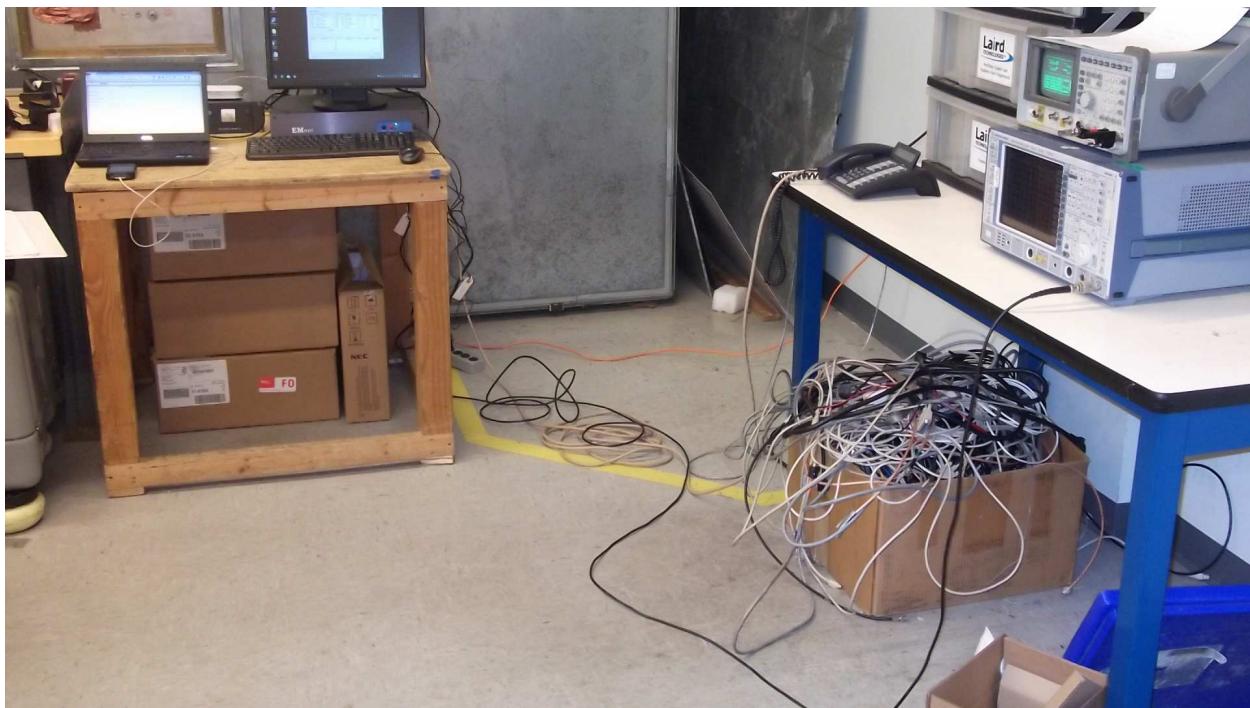
7.4 Setup Photographs:



EMnet Setup with Support Encoder/Decoder and Laptop



Test Equipment



Tone Testing



Temperature and Humidity Chamber



Setup inside Temperature and Humidity Chamber



1 MHz AM RF Immunity 10 V/m



108 MHz FM RF Immunity 0.5 V/m

7.5 Plots/Data:

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 dialog box asking for an administrator password appears when you try to log into the system control GUI.

11.32(a)(2) Inputs. The encoder shall have at least one input port used for audio messages and at least one input port used for data messages..

The EMnet includes 4 USB ports, 1 ethernet port, a microphone input, a line input, and a speaker output. It also includes a DVI video output and a DB25 RGB video output. All USB and Ethernet ports can be used for Audio or Data input, and the microphone and line inputs can be used for audio input.

11.32(a)(3) Outputs. The encoder shall have at least one audio output port and at least one data output port.

The EMnet includes 4 USB ports, 1 ethernet port, a microphone input, a line input, and a speaker output. It also includes a DVI video output and a DB25 RGB video output. All USB and Ethernet ports can be used for Audio or Data output, and the speaker output can be used for audio output. The DB25 RGB Video output and the DVI video output can also act as audio outputs.

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

The attention tones and the data tones have independently adjustable signal levels to allow the user to set the modulation level as necessary. There is also a master control for all tones simultaneously.

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

The EMnet was verified visually during testing that the timestamp and identification codes are affixed to the EAS messages, and it was confirmed on a message printout from the support Encoder/Decoder that the encoded timestamp and identification codes were correctly received and displayed by the support Encoder/Decoder. A Sage EAS Endec, FCC ID: MAX1822 was used as the support Encoder/Decoder.

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

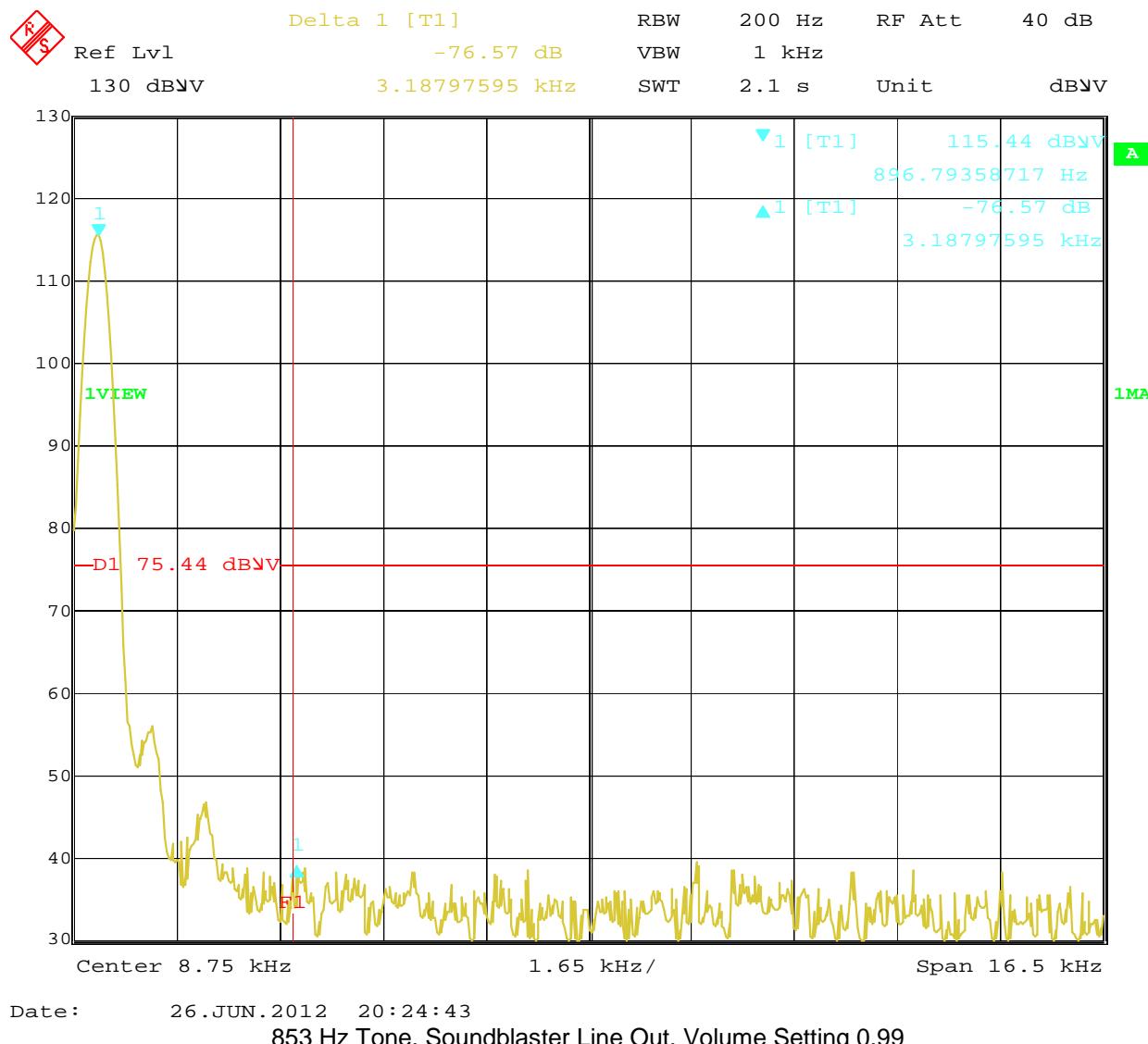
Programmed data and codes were retained through a power cycle, including complete removal of the power cable. This included improper shutdown of the windows operating system that the control software was running in on the EMnet.

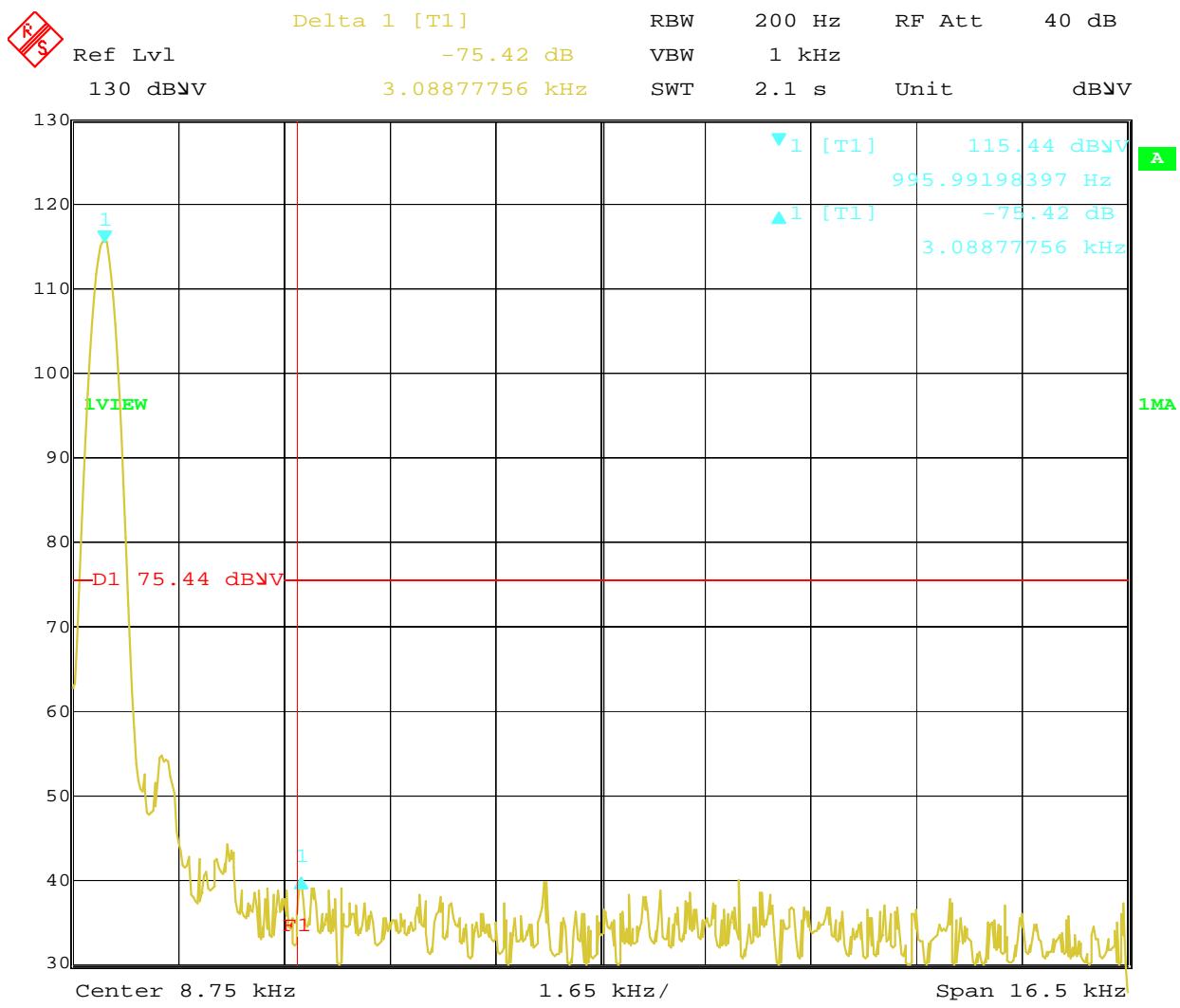
11.32(a)(7) Indicator. An aural or visible means that it activated when the Preamble is sent and deactivated at the End of Message code.

The EMnet can be set up to provide an audio indicator when the message is sent, playing back the message including alert tones and message audio as it is sent.

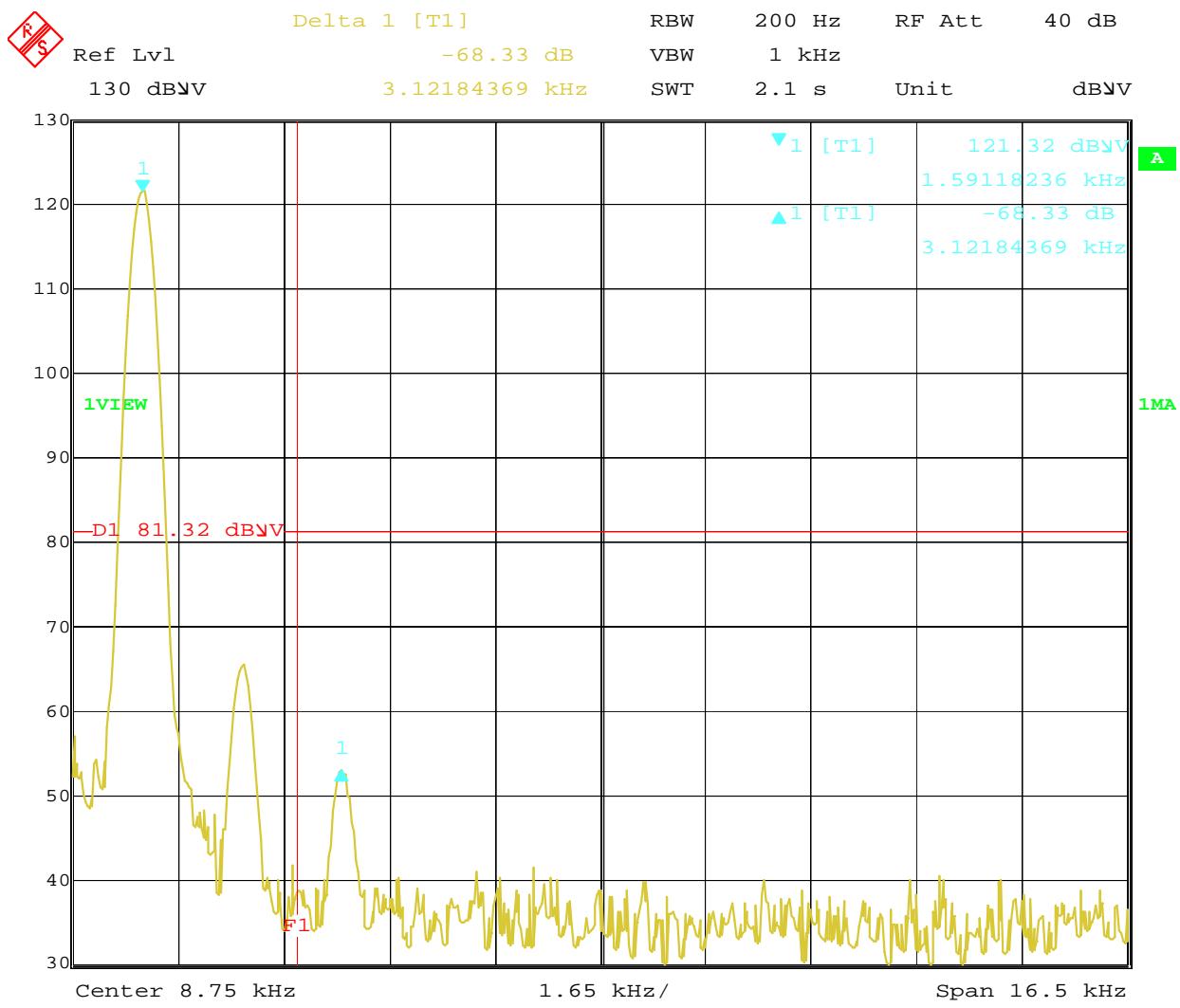
11.32(a)(8) Spurious Response. All frequency components outside 200 to 4000 Hz shall be attenuated by 40 dB or more with respect to the output levels of the mark or space frequencies.

The spurious response for the 853Hz, 960Hz, 1562.5Hz, and 2083.3Hz tones met the 40dBc requirement when operating at volume setting 0.99 on the Soundblaster Line Out.

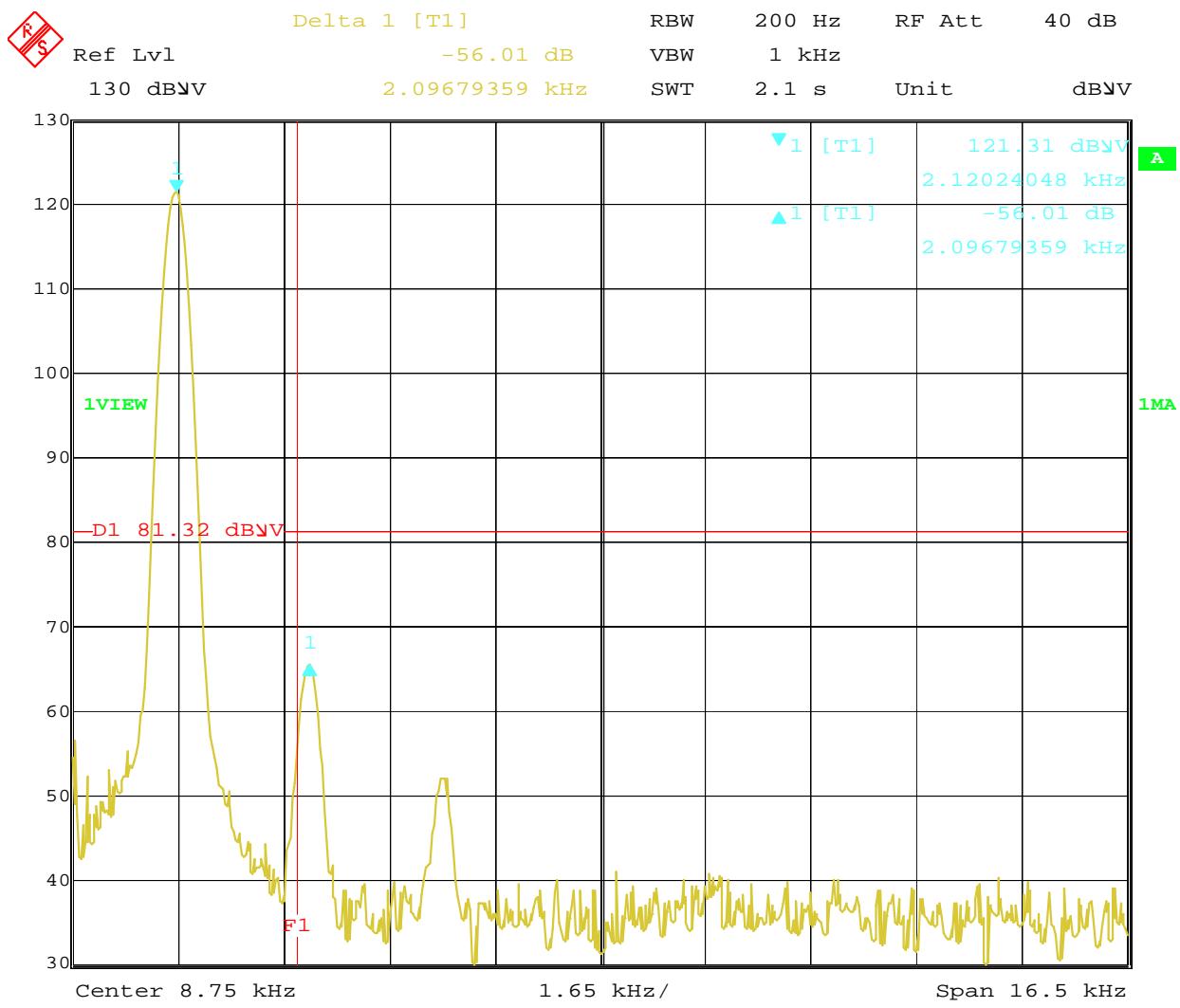




Date: 26.JUN.2012 20:25:26
 960 Hz Tone, Soundblaster Line Out, Volume Setting 0.99



Date: 26.JUN.2012 20:21:37
 1562.5 Hz Tone, Soundblaster Line Out, Volume Setting 0.99



Date: 26.JUN.2012 20:23:35
2083.3 Hz Tone, Soundblaster Line Out, Volume Setting 0.99

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.*

Soundblaster Line Output, Volume Setting 0.99:

The line out was 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 852.98 Hz and at 959.98 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 Soundblaster line output set to volume setting 0.99 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.

Soundblaster Line Output, Volume Setting 0.99:

853 Hz: 0.7%
960 Hz: 0.1%
1562.5 Hz: 0.0%
2083.3 Hz: 0.0%

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 Soundblaster line output set to volume setting 0.99 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 EUT GUI Tone Amplitude Setting Maxed for the readings below

Soundblaster Line Output, Volume Setting 0.99:

853 Hz

8920B Balanced Input: 8.35 dBm

960 Hz

8920B Balanced Input: 8.36 dBm

1562.5 Hz

8920B Balanced Input: 8.36 dBm

2083.3 Hz

8920B Balanced Input: 8.35 dBm

11.32(a)(9)(iv) *The encoder shall have timing circuitry that automatically generates the two tones simultaneously for a time period of 8 seconds.*

The attention signal is 8 seconds long.

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 EMnet can be set up to provide an audio indicator when the message is sent, playing back the message including alert tones and message audio as it is sent.

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 EMnet 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, a CAP EAS message was sent by the support laptop to the EMnet and was successfully decoded and resubmitted to the support Sage Endec 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 EMnet is rated at 120V/60Hz AC, therefore it was operated at 102V and 138V AC. At both voltages, a CAP EAS message was sent by the support laptop to the EMnet and was successfully decoded and resubmitted to the support Sage Endec 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 EMnet was tested on the front, back, right, and left sides at 108 MHz 0.5 V/m and at 1 MHz 10 V/m, vertical and horizontal polarity. A CAP EAS message was sent by the support laptop to the EMnet and was successfully decoded and resubmitted to the support Sage Endec Decoder.

Test Personnel:	<u>Nicholas Abbondante</u>	Test Date:	<u>06/25-27/2012</u>
Supervising/Reviewing Engineer:			
(Where Applicable)	<u>N/A</u>		
Product Standard:	<u>CFR47 FCC Part 11</u>		
Input Voltage:	<u>120V/60Hz</u>		
Pretest Verification w/ Ambient Signals or BB Source:	<u>N/A</u>	Ambient Temperature:	<u>21, 21, 21 °C</u>
		Relative Humidity:	<u>58, 55, 54 %</u>
		Atmospheric Pressure:	<u>994, 993, 995 mbars</u>

Deviations, Additions, or Exclusions: None

8 Revision History

Revision Level	Date	Report Number	Notes
0	06/28/2012	100786212BOX-001a	Original Issue