MEASUREMENT AND TECHNICAL REPORT

ZEVEX INTERNATIONAL
4314 South Zevex Park Lane
Salt Lake City, UT 84123-7881

DATE: 18 September 2003

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	Wireless Tracker System	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: **Defer until:**	No: X
Company Name **agrees to notify the Commission by:** **of the intended date of announcement of the product so that the grant can be issued on that date.**	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*

(*) FCC Part 15, Paragraph(s) **15.249(a) / RSS210 Paragraph 6.2.2(m2); 6.1.1(c)**

Report Prepared by:

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1.0 GENERAL INFORMATION

1.1 Product Description

Company: ZEVEX International, Inc.

Address: 4314 ZEVEX Park Lane

Salt Lake City, UT

84123

Contact: Susan Schmidt Position: Director of Quality and Regulatory Affairs

Phone: 801-264-1001 ext. 109 Fax: 801-264-1051

E-mail Address: Susan.Schmidt@ZEVEX.com

General Equipment Description

EUT Description: Device used to assist in determination of muscle strength and range of motion in the physical evaluation of a patient.

EUT Name: Wireless Tracker System (WTS)

Model No.: 23710-001 Serial No.: TBD

Product Options: N/A

Configurations to be tested: Required

EUT Specifications and Requirements

Length: Handheld Width: Height: Weight:

Power Requirements

Voltage: 1.2 VDC (If battery powered, make sure battery life is sufficient to complete testing.)

Other: AAA NiMH Battery

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Typical Installation and/or Operating Environment

Office/Clinic

EUT Power Cable: N/A

EUT Interface Ports and Cables

Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
USB 1.1	☐	☒	1	☐	☐	N/A					☒	☐

EUT Software.

Revision Level: 1

Description: Code developed for testing. The EUT software was developed to provide continuous receive or continuous transmit modes to support testing. The software is based upon the software that will be fielded with the product. The test software design causes the EUT to respond and act as a fielded device with exception of placing the EUT in an infinite loop, cycling through normal operational cycles until power is removed. Transmitted data is representative simulated data being sent at operational data rates. In addition, to support EU testing, the software can enable the transmitter to transmit a continuous wave, unmodulated signal on either the low or high channel.

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EUT Operating Modes to be Tested

1. The Receiver will be connected to the Support Equipment, consisting of software running on a laptop. Four accessories, if required, will be able to communicate with the Receiver: an encoder type accessory (Mini Inclinometer), a switch type of accessory (Footswitch), a strain gauge type of accessory (Manual Muscle Tester), and a potentiometer type of accessory (RangeTrack). The accessories will be active and transmitting information. The information transmitted by the accessories will be displayed on the Support Equipment monitor.

2. Continuous receive mode. (completed)

3. Continuous US/Canadian transmit mode – EUT to respond and act as fielded device with exception of placing the EUT in an infinite loop, cycling through normal operational cycles until power is removed. (completed)
4. Continuous EU transmit mode – EUT to respond and act as a fielded device with exception of placing the EUT in an infinite loop, cycling through normal operational cycles until power is removed. (completed)
5. CW, unmodulated transmit on EU low channel to support EU testing. (completed)
6. CW, unmodulated transmit on EU high channel to support EU testing. (completed)

EUT System Components

Description	Model #	Serial #	FCC ID #
Mini Inclinometer	23711-001		
Manual Muscle Tester (MMT)	23712-001		
Footswitch	23720-001		
RangeTrack	23717-001		
RF Receiver	23052-001		

Support Equipment

Description	*Model #*	*Serial #*	*FCC ID #*
Laptop			
Support Software			

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
20 MHz		Accessory (Instrument Transceiver, IT)	RF Transceiver Oscillator
4 MHz		Accessory (IT)	MCU Oscillator
10.7 MHz		Accessory (IT)	Intermediate Frequency
24 MHz		Receiver	USB Controller Oscillator
8 MHz		Receiver	MCU Oscillator
20 MHz		Receiver	RF Transceiver Oscillator
10.7 MHz		Receiver	Intermediate Frequency

Power Supply: N/A

Power Line Filters: N/A

Critical EMI Components (Capacitors, ferrites, etc.): None

EMC Critical Detail : N/A. No Critical EMI Components

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1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the following tests.

TEST	FCC CFR 47#	PASS/FAIL
Radiated Emissions	15.249(a) / RSS210 Para. 6.2.2(m2)	Pass
Bandwidth	RSS 6.1.1(c)	Pass

Tests were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983.

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

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San Diego, CA 92121-2912
Phone: 858 546 3999
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The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Test Setup Photos Exhibit.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Test Setup Photos Exhibit.

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3.0 RADIATED EMISSIONS 15.249(a) / RSS210 Paragraph 6.2.2(m2)

3.1 EQUIPMENT

Test Conditions: RADIATED EMISSIONS

The RADIATED EMISSIONS measurements were performed at the San Diego Testing Facility:

☐ **- Test not applicable**

■ - Roof (Small Open Area Test Site)
(Date of listing July 27, 2001. Site Verification Valid for 3 years from listing.)

Testing was performed at a test distance of:

■ - 3 meters

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
3146	244	Antenna, Log Periodic Dipole	EMCO	1063	07/04
HP8566B	6488	Spectrum Analyzer	Hewlett Packard	2618A02913	12/03
3115	251	Horn Antenna	Electro Mechanics Co	2595	12/03
AMF-5D-010180-35-10P	719	PreAmp 40 dB	TUV PS	--	NCR*
CBL6111	460	Bi-Log	Chase Electronics	1291	NCR*

Remarks: One year calibration cycle for all test equipment and sites. (*) No Calibration Required.

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3.2 DATA

REPORT No: SC303571	TESTER: Alan Laudani	SPEC:	FCC 15.209(a) RSS 210
CUSTOMER: ZEVEX International		TEST DIST:	3 Meters
E U T:	Wireless Tracker System	TEST SITE:	Roof
EUT MODE:	Receive w/o saw filter	BICONICAL:	N/A
DATE:	Aug. 29, 2003	LOG:	244
NOTES:	Limit < 1000 : 2 nW, >1000 : 20 nW	OTHER:	251

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
903.20	18.1	9.6	20.1	15.1	22.72	**42.8**	**37.8**	66	46	-23.2	-8.2		1	noise floor
1806.40	43.2	32.3	43.7	32.4	-8.16	**35.5**	**24.2**	74	54	-38.5	-29.8		1	noise floor
2709.60	45.1	33.9	44.6	33.9	-3.79	**41.3**	**30.1**	74	54	-32.7	-23.9		1	noise floor
3612.80	53	33.9	45.2	33.8	-0.68	**52.3**	**33.2**	74	54	-21.7	-20.8		1	noise floor
4516.00	44.5	34.1	45.5	34.1	-0.56	**44.9**	**33.5**	74	54	-29.1	-20.5		1	noise floor

REPORT No: SC303571 TESTER: Alan Laudani SPEC: FCC 47 Part 15.249(a)

CUSTOMER: ZEVEX International TEST DIST: 3 Meters

E U T: Wireless Tracker System TEST SITE: Roof

EUT MODE: Transmit w/o saw filter BICONICAL: N/A

DATE: Aug. 29, 2003 LOG: 244

NOTES: Mode: Frequency Hopping 11 Channels OTHER: 251

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	av	HORIZONTAL (dBuv) pk	av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	av	SPEC LIMIT (dBuV/m) pk	av	MARGIN (dB) pk	av	EUT Rotation	Antenna Height	Notes
903.20	61.1	23.6	60.7	26.1	22.72	**83.8**	**48.8**	114.0	94.0	-30.2	-45.2	147	1	Channel 0
913.70	58.5	23.6	61.6	30.4	22.77	**84.4**	**53.2**	114.0	94.0	-29.6	-40.8	147	1	Channel 5
924.35	58.7	23.8	61.0	25.7	22.87	**83.9**	**48.6**	114.0	94.0	-30.1	-45.4	147	1	Channel 10
1806.4	44.1	32.3	43.1	32.3	-8.16	**35.9**	**24.1**	74	54	-38.1	-29.9		1	noise floor
1827.4	44.1	32.3	43.1	32.3	-8.01	**36.1**	**24.3**	74	54	-37.9	-29.7		1	noise floor
1848.7	44.1	32.3	43.1	32.3	-7.86	**36.2**	**24.4**	74	54	-37.8	-29.6		1	noise floor
2709.6	66.8	42	66.3	42.5	-3.79	**63.0**	**38.7**	74	54	-11	-15.3	349	1	
2741.1	66.9	41.6	66.1	42.3	-3.68	**63.2**	**38.6**	74	54	-10.8	-15.4	349	1	
2773.05	66.5	42.1	65.6	41.7	-3.57	**62.9**	**38.5**	74	54	-11.1	-15.5	349	1	
3612.8	52.2	35.5	46.9	33.7	-0.68	**51.5**	**34.8**	74	54	-22.5	-19.2	49	1	
3654.8	52.4	35.4	46.6	33.3	-0.57	**51.8**	**34.8**	74	54	-22.2	-19.2	49	1	
3697.4	53.1	35.7	47.4	34.1	-0.45	**52.7**	**35.3**	74	54	-21.3	-18.7	49	1	
4516	46.1	35	46.5	34.9	-0.56	**45.9**	**34.4**	74	54	-28.1	-19.6		1	noise floor
4568.5	46.1	35	46.5	34.9	-0.42	**46.1**	**34.6**	74	54	-27.9	-19.4		1	noise floor
4621.75	46.1	35	46.5	34.9	-0.28	**46.2**	**34.7**	74	54	-27.8	-19.3		1	noise floor
5419.2	42.6	32.1	42.1	32.1	3.72	**46.3**	**35.8**	74	54	-27.7	-18.2		1	noise floor
5482.2	42.6	32.1	42.1	32.1	4.17	**46.8**	**36.3**	74	54	-27.2	-17.7		1	noise floor
5546.1	42.6	32.1	42.1	32.1	4.43	**47.0**	**36.5**	74	54	-27	-17.5		1	noise floor
6322.4	43.8	33.1	44.2	33.1	5.51	**49.7**	**38.6**	74	54	-24.3	-15.4		1	noise floor
6395.9	43.8	33.1	44.2	33.1	5.46	**49.7**	**38.6**	74	54	-24.3	-15.4		1	noise floor
6470.45	43.8	33.1	44.2	33.1	5.42	**49.6**	**38.5**	74	54	-24.4	-15.5		1	noise floor
7225.6	42.8	31.8	43.6	31.7	7.80	**51.4**	**39.6**	74	54	-22.6	-14.4		1	noise floor
7309.6	42.8	31.8	43.6	31.7	7.98	**51.6**	**39.8**	74	54	-22.4	-14.2		1	noise floor
7394.8	42.8	31.8	43.6	31.7	8.17	**51.8**	**40.0**	74	54	-22.2	-14		1	noise floor
8128.8	45	33.8	45.4	33.8	9.18	**54.6**	**43.0**	74	54	-19.4	-11		1	noise floor
8223.3	45	33.8	45.4	33.8	9.39	**54.8**	**43.2**	74	54	-19.2	-10.8		1	noise floor
8319.15	45	33.8	45.4	33.8	9.60	**55.0**	**43.4**	74	54	-19	-10.6		1	noise floor
9032	44.5	33.3	44.3	33.4	11.01	**55.5**	**44.4**	74	54	-18.5	-9.6		1	noise floor
9137	44.5	33.3	44.3	33.4	10.72	**55.2**	**44.1**	74	54	-18.8	-9.88		1	noise floor
9243.5	44.5	33.3	44.3	33.4	10.42	**54.9**	**43.8**	74	54	-19.1	-10.2		1	noise floor

4.0 BANDWIDTH (RSS 210, Paragraph 6.1.1(c))

4.1 EQUIPMENT

The BANDWIDTH measurements were performed at the Battelle Facility, Columbus Ohio:

☐ - Test not applicable

■ - Room 3-211S

Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
E4440A	--	Spectrum Analyzer	Hewlett Packard	US40241608	09/04

Remarks: EUT Serial # IT004. Powered from a fresh Duracell PC2400 battery, 1.6 V before insertion, 1.5 V under load. Measurements made by Albert E. Weller, III, 22 September 2003. Ambient of 23° C at 50% relative humidity.

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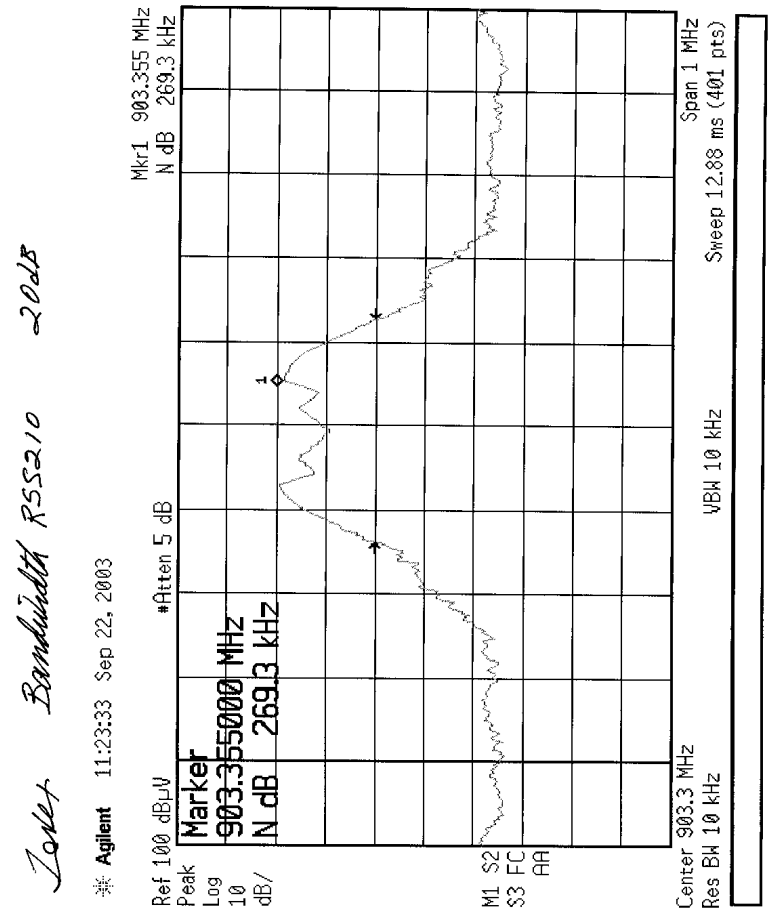
4.2 DATA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Log
10
dB/
Marker
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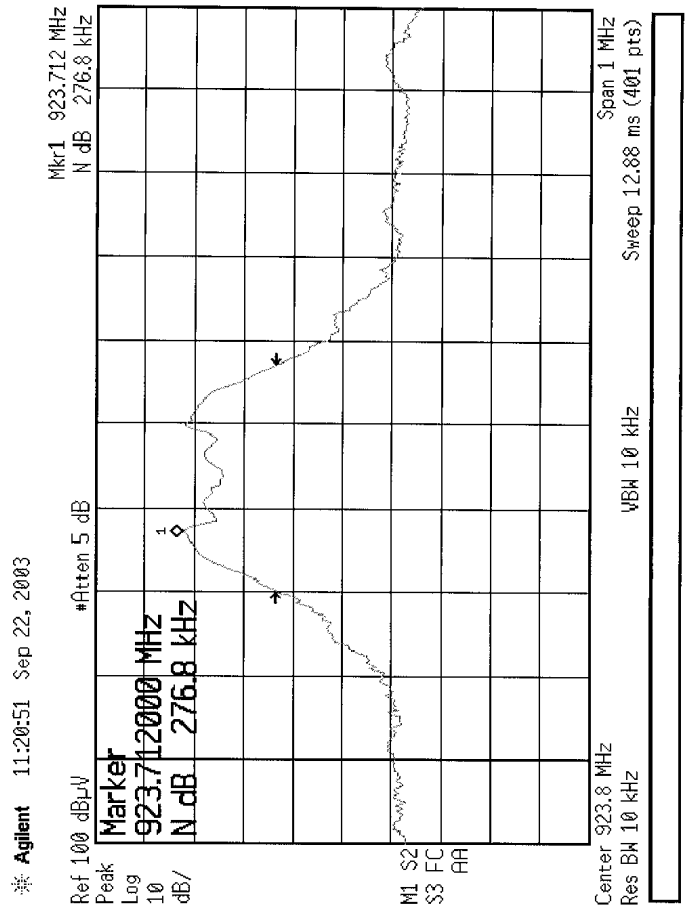
Zenley Bandwidth RSS210 20dB



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5.0 ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests were performed per CFR 47, Part 15, Paragraph(s) **15.249(a) / RSS210 Paragraphs 6.2.2(m2) & 6.1.1(c).**

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part 15, Paragraph(s) **15.249(a) / RSS210 Paragraph 6.2.2(m2) & 6.1.1(c).**

Testing Start Date: 29 August 2003

Testing End Date: 22 September 2003

- TÜV AMERICA, INC. -

Responsible Engineer:

EMC Engineer

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