FCC
TYPE ACCEPTANCE

TEST/MEASUREMENT REPORT

Product Name: Extend-A-Page
VHF Transmitter

Model: Extend-A-Page

Applicant/Manufacturer: EAGLE WIRELESS INTERNATIONAL, INC.
101 Courageous Drive
League City, Texas 77573

Tested By Request of: Eagle Wireless International, Inc.

Testing Laboratory:
Wayne Langston, Inc.
P.O. Box 1377, League City, Texas 77574-1377
Tel: 281-337-6785; Fax: 281-337-7217; email: langstoninc@msn.com

Test Results**:**
I certify that I am the technically qualified person responsible for preparation of the technical information contained in this application, and that it is complete and accurate to the best of my knowledge.

Tested By:  Date: July 9, 2004
Wayne P. Langston

THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY NVLAP OR ANY AGENCY OF THE U.S. GOVERNMENT

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1. INTRODUCTION

The following data has been taken in support of an Application for Type Certificate for the Eagle Wireless International Extend-A-Page VHF Exciter (FCC ID: LOK150-TX-UHS-2) in accordance with Part 90 of the Federal Communications Rules and Regulations. The equipment under test (EUT) is a VHF Exciter which operates between 150 - 174 MHz. This particular unit performs digital and analog modulation, and is tested as such. Bands 150 – 174 MHz are covered under Part 90.205 abd evaluation of the ERP must be done at the time of installation with a power amplifier. This unit is not to be used without that power amplifier.

1.1 Test Facility:

Noted and Complies.

This test site is located adjacent to the building in League City, Texas, 77573. All equipment is calibrated and traceable to NIST. Calibration period is 1 year. Wayne Langston, Inc. has received NVLAP Accreditation, Certificate No. 200021-0.

1.2 Test Samples:

A representative sample of the Equipment Under Test (EUT), was tested and the test results for this sample provided are located in Appendix.

1.3 Test Results:

The results from this testing apply only to the sample that was tested. The findings do not make any suggestions about how the product is to be used nor does Wayne Langston, Incorporated make any recommendations regarding the product's usage.

2. INFORMATION REQUIRED FOR TYPE ACDEPTANCE PER PART 2

Paragraphs

2.1033(a) A completed FCC Form 731 is included with this application.

2.1033(c) Other than part 15 or 18.

2.1033(1) Applicant/Vendor/Manufacturer:
Eagle Wireless International
101 Courageous Drive
League City, Texas 77573

2.1033(2) This equipment is identified as the Extend-A-Page VHF Transmitters

FCC ID: LOK150-TX-UHS-2

2.1033(3) Installation manual is not available to the user.

2.1033(4) Designator 11K0F1D, 11K0F3E.

2.1033(5) 150-174 MHz frequency range

2.1033(6) 350 Mw .

2.1033(7)) The maximum power is listed in table 1. The eut is intended to be an exciter only and a power amplifier is required at the time of final station licensing.

2.1033(8) Should be supplied by the PA.

2.1033(9) All tune-up procedures are made at the factory. There are no power adjustments made during the installation of the equipment.

2.1033(10) Complete circuit diagram is attached to this application.

2.1033(11) FCC label drawing and label placements are attachment to the report.

2.1033(12) Photographs are attachments to the report

2.1033(13) N/A

2.1033(14) The data required by Paragraph 2.1046 through 2.1057 are included with this report.

3, MEASUREMENT REQUIREMENTS (Paragraphs 2.985 et.seq)

This section contains the results of measurements taken to demonstrate compliance with the pre-conditions defined in the Commission's Rules, Part 90, Subpart I, for transmitters used in the Business Radio Service. Data are presented in tabular and/or graphical form. Measurement procedures are described within the text of each reported test. All bandwidth measurements were made using ± 2.4 KHz deviation .

2.1046 Power Output

The following power measurements were made at 150, and 174 MHZ. The test setup is as follows:

EUT----------Power Meter ----------50µ/500 watt load
50 dB pad ----------8567

The amplifier's RF output power was measured using a Boonton Model 42B Micro watt meter. External attenuation was added to prevent overloading the equipment. The input of the micro watt meter presented a resistive load of 50 ohms to the amplifier which precisely matched the exciters output characteristics. The meter measured an output power of -25.8 DBM. This level was the 50 DB pad of the Boonton Meter plus the 1.2 DB coax loss equates to the +25.8DBM level or 350 MW. This is in compliance with the manufacturers stated output of

400MW.

2.1047 Noted.

The modulation characteristics of the equipment is described in the attached documents. The digital and analog characteristics are described herein. See attached.

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2.1049 Occupied Bandwidth

2.1049 Occupied Bandwidth /emissions mask

2.1051 Conducted Disturbance Emission

2.1051 Spurious emissions

Disturbance emissions at the antenna terminals were measured using the test configuration illustrated below. External attenuation was added as necessary to prevent overloading the spectrum analyzer. The emission spectrum was examined up to the tenth harmonic of the carrier.

Every emission not recorded was more than 20 dB below the limit. The emission

Test Setup

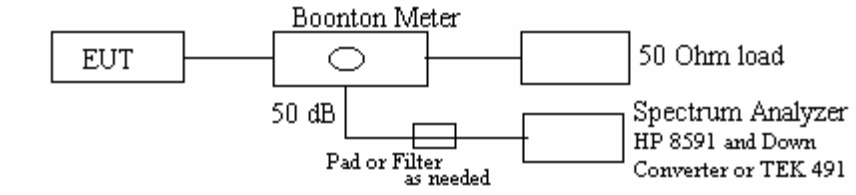


Table 1

Power Level: +26.0 dbm or 400 MW

Frequency: 150 MHz

Carrier at: +26.0 dbm

Frequency (MHz)	Emission Level (dBc)	Limit for (dBc)	Comments
304.9	-89.3	-39.	
609.9	-89.7	-39.	
762.8	-87.3	-39.	
1208.8	-80.3	-39.	
1702.50	-80.0	-39.	
3404	-87.0	-39.	

Emission Levels preceded by a "<" indicate frequencies which were found to be below the spectrum analyzer's noise as indicated.

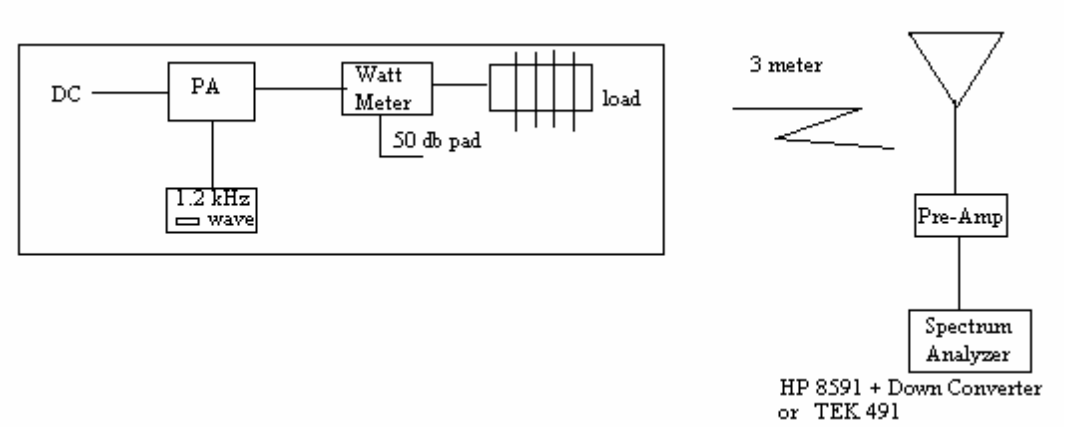
2.1053 Field Strength of Spurious Radiated, per TIA 2.2.12

Field strength measurements of radiated spurious emissions were made on a three-meter range maintained by Wayne Langston, Incorporated, at the League City, Texas facility. Complete description and measurement data have been placed on file with the Commission. The equipment was scanned for radiated emissions in a Semi Anechoic Chamber prior to open-field testing.

The amplifier was place on a rotating wooden test stand approximately one meter in

height. The amplifier's output was terminated with a 50 ohm dummy load. The emission spectrum was examined up to 10 Gig using a TEK 491/HP 8591 Spectrum Analyzer/ down converter and WLI log periodic antenna. A Mini Circuits broadband amplifier was used to provide approximately 20 dB gain when necessary. At each frequency, the device was rotated through 360 degrees, and the antenna was raised and lowered from one to four meters. Measurements were made using both vertically and horizontally polarized antennas. In each case, only the maximum radiation measured was recorded for this report. All emissions not reported were more than 20 dB below the specified limit. The reference level for spurious radiation's was taken at an ideal dipole excited by the rated output power according to the following relationship.

Calculation @ 3 meter measurement



The value in dbm is then determined from the antenna substitution method per TIA 603 Para. 2.2.12 using a Signal Generator and tuned dipoles to noted the receive reading.

$$E_{v/m} = \frac{\sqrt{(49.2)(.4)}}{3}$$

$$E_{v/m} = 1.4787$$

$$E_{dB} = +16 \text{ dBm}$$

Per Limits per 90.210

All emission must be 43 plus 10 log (4) or 80 decibel whichever is lesser.

For a 400MW Amplifier

43 plus 10 Log (.4)

= 43 plus –3.9

= +39.1

If the carrier is at +16 dbm at 3 meter then the limit would be +16 dbm – 39. db, or

-25.9 dbm.

Note: level = measured value + mixer/pad loss – preamp gain all other emissions were

greater than 20 db under the limit

@ 150 mhz carrier

Frequency MHz	Value	A_f	AH	Azimuth	Total	Limit
80	-97	8.7	2V	180	88.3	-23.1 dBm
80	-95	8.7	2.5H	160	-86.3	
150 off carrier	-93	15.4	1.5V	170	-77.6	Carrier coax loss

150 off carrier	-95	15.4	2.0H	140	-79.6	Carrier coax loss
175	-101	16.4	1.5V	180	-84.6	
175	-105	16.4	1.5H	160	-88.6	
200	-103	17.6	1.5H	45	-85.4	
200	-108	17.6	2.5V	45	-90.4	

All other emissions were +40 dB down from limit or greater

- at MIN floor of Spectrum Analyzer/mixer combination

2.1055 Frequency stability

Conditions of the test

The following was performed using a Thermotron environmental chamber. The temperatures were monitored by an Omega model 650 type J thermal couple meter. The thermocouples were placed adjacent to the air inlet to the exciter and in the forced air in the chamber a running comparison is made to identify any abnormalities during the test.

The exciter is oven stabilized and synthesized to obtain the specific frequency under investigation.

A description of this circuit is contained within this document.

2.1055(1)(b)

The following were taken at 150 MHz as the center frequency was set to 150 MHz

Temperature per 22.355 per table C1 1.5ppm
15 HZ max allowed
hz deviation

-30	150.000011mhz finish	+ 3
-20	150.000010 mhz	+ 2
-10	150.000007mhz	+ 1
0	150.000005mhz	+ 3
10	150.000004mhz	+ 4
20	150.000005mhz	+ 3
30	150.000007mhz	+ 1
40	150.000006 mhz	+ 2
50	150.000008 mhz	0

The following were made at 25C and 27VDC-28VDC

27VDC	150.000006mhz
28VDC	150.000005mhz
120vac	150.000005
130vac	150.000005
100vac	150.000004

The measurements were made with the power applied and the transmitter keyed.

Appendix A

Measurement Uncertainty

MEASUREMENT UNCERTAINTY

Normal distribution was assigned to uncertainties derived from multiple contributions. The standard uncertainty of a contribution to uncertainty with assumed normal distribution is found by dividing the uncertainty by the coverage factor k, appropriate to the stated level of confidence. Strictly speaking for a level of confidence of 95%, k = 1.96, we used k = 2.

Rectangular distribution means that there is equal probability of the true value lying anywhere between the prescribed limits. A rectangular distribution was assigned where a manufacturer's specification limits are used as the uncertainty.

Radiated Emissions Measurement of vertically polarized radiated field strength over the frequency range 30 MHz to 1 GHz on an open area test site at 3m and 10m includes following uncertainty:

Contribution	Probability Distribution	Uncertainty (dB)
Antenna factor calibration	Normal (k=2)	±1.0
Cable loss calibration	Normal (k=2)	±0.2
Receiver specification	Rectangular	±1.0
Antenna directivity	Rectangular	±0.1
Antenna factor variation with height	Rectangular	±2.0
Antenna factor frequency interpolation	Rectangular	±0.1
Measurement distance variation	Rectangular	±0.2
Site Imperfections	Rectangular	±1.5

Combined standard uncertainty $u_c(y)$ is

$$U_c(Y) = \pm\sqrt{\left(\frac{1.0}{2}\right)^2+\left(\frac{0.2}{2}\right)^2+\frac{1.0^2+0.1^2+2.0^2+0.2^2+1.5^2}{3}} = \pm 1.6\ \text{dB}$$

It is probable that $u_c(y) / s(q_k)>3$, where $s(q_k)$ is estimated standard deviation from a sample of n readings

$$s(q_k) = \sqrt{\frac{1}{(n-1)}\sum_{k-1}^{n}(q_k-\bar{q})^2}$$

unless the repeatability of the EUT is particularly poor, and a coverage factor of k = 2 will ensure that the level of confidence will be approximately 95%, therefore:

$U = 2\ u_c(y) = 2 \times \pm 1.6\ \text{dB} = \pm 3.2\ \text{dB}$

Notes:

1.1 Uncertainties for the antenna and cable were estimated, based on a normal probability distribution with k = 2.

1.2 The receiver uncertainty was obtained from the manufacturer's specification for which a rectangular distribution was assumed.

1.3 The antenna factor uncertainty does not take account of antenna directivity.

1.3 The antenna factor vary with height and since the height was not always the same in use as when the antenna was calibrated an additional uncertainty is added.

1.4 The uncertainty in the measurement distance is relatively small but have some

effect on the received signal strength. The increase in measurement distance as the antenna height is increased is an inevitable consequence of the test method and is therefore not considered to be a contribution to uncertainty.

1.5 Site imperfections are difficult to quantify but may Include the following contributions:

- unwanted reflections from adjacent objects.
- ground plane imperfections: reflection coefficient, flatness and edge effects.
- losses or reflections from "transparent" cabins for the EUT or site coverings.
- earth currents in antenna cables (mainly effects Biconnical antennas).

The specified limits for the difference between measured site attenuation and the theoretical value (±4 dB) were not included in total since the measurement of site attenuation includes uncertainty contributions already allowed for in this budget, such as antenna factor.

Conducted Emissions

Measurement of conducted emissions over the frequency range 9 kHz to 30 MHz includes following uncertainty:

Contribution	Probability Distribution	Uncertainty (dB)
Receiver specification	Rectangular	±1.5
LISN coupling specification	Rectangular	±1.5
Cable and input attenuator calibration	Normal (k=2)	±0.5

Combined standard uncertainty $u_c(y)$ is

$$U_c(Y) = \pm\sqrt{\frac{1.5^2 + 1.5^2}{3} + \left(\frac{0.5}{2}\right)^2} = \pm 1.2 \text{ dB}$$

As with radiated field strength uncertainty, it is probable that $u_c(y) / s(q_k)>3$ and a coverage factor of k=2 will suffice, therefore:

$$U = 2\ u_c(y) = 2 \times \pm 1.2\ dB = \pm 2.4\ dB$$

Effective Date Note: At 69 FR 17959, Apr. 6, 2004, in §90.209, paragraph (b)(6) was stayed indefinitely.