Accredited Since 1993

QUALIFICATION TEST REPORT

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EMISSIONS -FCC Part 15

Test Report Number: 000929 133 Date of Issue: 11-10-00

Model No: World Wireless 902-928 MHz Date of Test Article Receipt: 10-05-00
Lennovator Hand Held Transceiver

Type of product: Information Technology Equipment

Manufacturer: Len Gordon Company

Address: 7215 Bermuda Road

Las Vegas, Nevada 89119

Test Results: [X] Complies [ ] Does Not Comply

Michael E. Mussler

_____Lab Director
(NVLAP Signatory)

William Stirce

_____Compliance Engineer

Accredited by NIST NVLAP for FCC Part 15

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Criterion Technology reports apply only to the specific Equipment Under Test (EUT) sample(s) tested under the test conditions described in this report. If the manufacturer intends to use this report as a document demonstrating compliance of this model, additional models of this product must have electrical and mechanical characteristics identical to the device tested for this report. Criterion Technology shall have no liability for any deductions, inferences, or generalizations drawn by the client or others from Criterion Technology issued reports.

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Compliance with the appropriate governmental standards is the responsibility of the manufacturer.
Any questions regarding this report should be directed to:

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NVLAP Note: Criterion Technology is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for the specific scope of accreditation under Lab Code 100396-0. Test methods included in Lab Code 100396-0 are:

1. 12/CIS22 - IEC/CISPR22:1993
2. 12/CIS22a - IEC/CISPR22:1993, Amendment 1:1995 & Amendment 2:1996
3. 12/CIS22b - CNS13438:1997
4. 12/F01 - FCC Method - 47 Part 15 - Digital Devices
5. 12/F01a - Conducted Emissions, Power Lines, 450 kHz to 30 MHz
6. 12/F01b - Radiated Emissions
7. 12/T51 - AS/NZS 3548

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All Criterion Technology instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 9001, ISO Guide 25, ANSI/NCSL Z540-I-1994 and are traceable to national standards.

Table of Contents

Section 1 Executive Summary 5

Section 2 Emissions Test Standards 7

Part 2.1 FCC Part 15 Subpart B - Radiated Emissions 8

Part 2.2 FCC Part 15 Subpart C –Intentional Radiated Fields (15.231(b)) 9

Section 3 Test Setup Photographs 11

Part 3.1 Radiated Emissions Setup - Front View 12

Part 3.2 Radiated Emissions Setup - End View 13

Part 3.3 Radiated Emissions - Side View 14

Section 4 Original Test Data / Plots 15

Part 4.1 Radiated Emissions Data for Subpart B (Unintentional Radiator) 16

Part 4.2 Radiated Emissions Plot, 30 MHz to 1000 MHz 17

Part 4.3 Radiated Emissions Data for Subpart C, 1000 MHz to 10,000 MHz 18

Part 4.4 Transmitted Pulse Characteristics 19

Part 4.5 Occupied Bandwidth 21

Section 5 Equipment Calibration Information 23

Section 6 Product Information Forms 25

Section 1 Executive Summary

The test article was in compliance with all the test standards listed below.

FCC Part 15 Subpart A	
FCC Part 15 Subpart B	**Radiated Emissions**
FCC Part 15 Subpart C	**Intentional Radiators**

All test methods were performed in accordance with the standards listed above.

Section 2 Emissions Test Standards

The emissions tests were performed according to following standards:

FCC Part 15, Subpart B	[ ] Class A	[X] Class B
FCC Part 15, Subpart C		

Part 2.1 FCC Part 15 Subpart B - Radiated Emissions

Measurement of *radiated emissions* (*electric field*) in the frequency range of 30 MHz-1000 MHz were tested in a horizontal and vertical polarization as indicated below:

Environmental conditions of the lab:

Date of Test: 10-5-00

Temperature: 70 °F

Rel. Humidity: 34%

Test Voltage: 9 V DC

Test location:
[X] Criterion Technology Open Area Test Site
[ ] Pre-Scan In Semi-Anechoic Chamber
[ ] In Situ

Test distance: (antenna to EUT)

[ ]1 meter	[ ]Preliminary Measurement	[ ]Final Measurement
[ ]3 meters	[ ]Preliminary Measurement	[ ]Final Measurement
[X]10 meters	[X]Preliminary Measurement	[X]Final Measurement
[ ]30 meters	[ ]Preliminary Measurement	[ ]Final Measurement

Test instruments: (see Section 5 for calibration information)
[X] Hewlett-Packard Spectrum Analyzer, Model 8566B
[X] Hewlett-Packard Quasi Peak Adapter, Model 85650A
[ ] Hewlett-Packard Tracking Generator, Model 85645A
[ ] Rohde and Schwarz Receiver, Model ESHS-30
[X] Rohde and Schwarz Receiver, Model ESVS-30
[ ] EMCO BiConnical Antenna, Model 3108
[ ] EMCO Log Periodic Antenna, Model 3146
[X] Chase BiLog Antenna, Model 1121
[X] Mini Circuits Pre-Amp #2
[X] Veratech Pre-Amp #3
[X] Antenna Research Assoc. Horn Antenna, Model DRG118/A

Test accessories:

Test Results of Radiated Emissions: 30 MHz - 1000 MHz

Test Status: [X] PASS [ ] FAIL

Minimum margin to limit: >25 dB at 30 to 1000 MHz*

Exceeded limit by: _____ dB at _____ MHz

Remarks: Reference Section 4 for Data Sheets
*Aside from the fundamental of the transmitter, there were no emissions measured above the noise floor of the test system.

Part 2.2 FCC Part 15 Subpart C –Intentional Radiated Fields (15.231(b))

Measurement of *radiated emissions* (*electric field*) in the frequency range of 30 MHz-1000 MHz were tested in a horizontal and vertical polarization as indicated below:

Environmental conditions of the lab:

Date of Test: 10-5-00

Temperature: 70°F

Rel. Humidity: 34%

Test Voltage: 120 V, 60 Hz

Test location:
[X] Criterion Technology Open Area Test Site
[ ] Pre-Scan In Semi-Anechoic Chamber
[ ] In Situ

Test distance: (antenna to EUT)

[ ]1 meter	[ ]Preliminary Measurement	[ ]Final Measurement
[X]3 meters	[X]Preliminary Measurement	[X]Final Measurement
[X]10 meters	[X]Preliminary Measurement	[X]Final Measurement
[ ]30 meters	[ ]Preliminary Measurement	[ ]Final Measurement

Test instruments: (see Section 7 for calibration information)
[X] Hewlett-Packard Spectrum Analyzer, Model 8566B
[X] Hewlett-Packard Quasi Peak Adapter, Model 85650A
[ ] Hewlett-Packard Tracking Generator, Model 85645A
[ ] Rohde and Schwarz Receiver, Model, ESHS-30
[X] Rohde and Schwarz Receiver, Model ESVS-30
[X] Chase BiLog Antenna, Model 1121
[ ] Antenna Research, Model 1181A (sn: 1056)
[X] Amp3 and High Freq. Cable Set
[X] Mini Circuits Pre-Amp, Amp 2
[ ] EMCO Loop Antenna, Model 6502

Test accessories:

Test Results of Radiated Emissions: 30 MHz - 1000 MHz

Test Status: [X] PASS [ ] FAIL

Minimum margin to limit: 2.31 dB at 916.5 MHz

Exceeded limit by: ____ dB at ____ MHz

Remarks: Reference Section 4 for Data Sheets

The EUT was tested in three different orientations: the plane of the unit was positioned parallel with the x-y, x-z, and y-z planes. The emissions from the EUT were maximized in each orientation for worse case.

The EUT was modified as follows to meet the emissions specification limit:

Transmit Antenna trimmed to 36mm
Receive Antenna trimmed to 36 mm

Section 3 Test Setup Photographs

Part 3.1 Radiated Emissions Setup - Front View

Part 3.2 Radiated Emissions Setup - End View

Part 3.3 Radiated Emissions - Side View

Section 4 Original Test Data / Plots

Radiated Emissions

Part 4.1 Radiated Emissions Data for Subpart B (Unintentional Radiator)

Notes:

The third column below contains alpha characters which pertain to the type of measurements made. The following are the definitions for those characters: q = Quasi Peak, m = Maximized (cable, rotation and antenna height), s = scanned but no data taken, and a = average. For the first character in column four, a '-' indicates that value is below the limit while an '*' indicates that value is above the limit

If the list is sorted using "I-sort", then quasi-peak and average levels are weighted higher than peak levels and are moved to the front of the scan list.

The following keys help to better understand the data:

TT: Turntable position in degrees

Hght: Height of antenna in centimeters

Az: Azimuth, V = Vertical, H= Horizontal

Criterion Technology — Thu Oct 05 12:06:55 2000
EUT: World Wireless 902-928MHz Hand Held Transceiver
Manufacturer: Len Gordon Co.
Tester: ws — Special ID: 000929_133
EUT Level: pre-production unit
EUT Information: EUT on tabletop
Test information: Normal Operation, 10M, 9VDC battery, FCC Part 15.249 Class B

Table 1: Scan List, sorted by margin to limit FCCB10, -10.0dB filter

Freq, MHz	Value	Sts	FCCB10	TT	Hght	Az	Comment
916.4950	88.81	p	64.07	277	101	H	xmit frequency

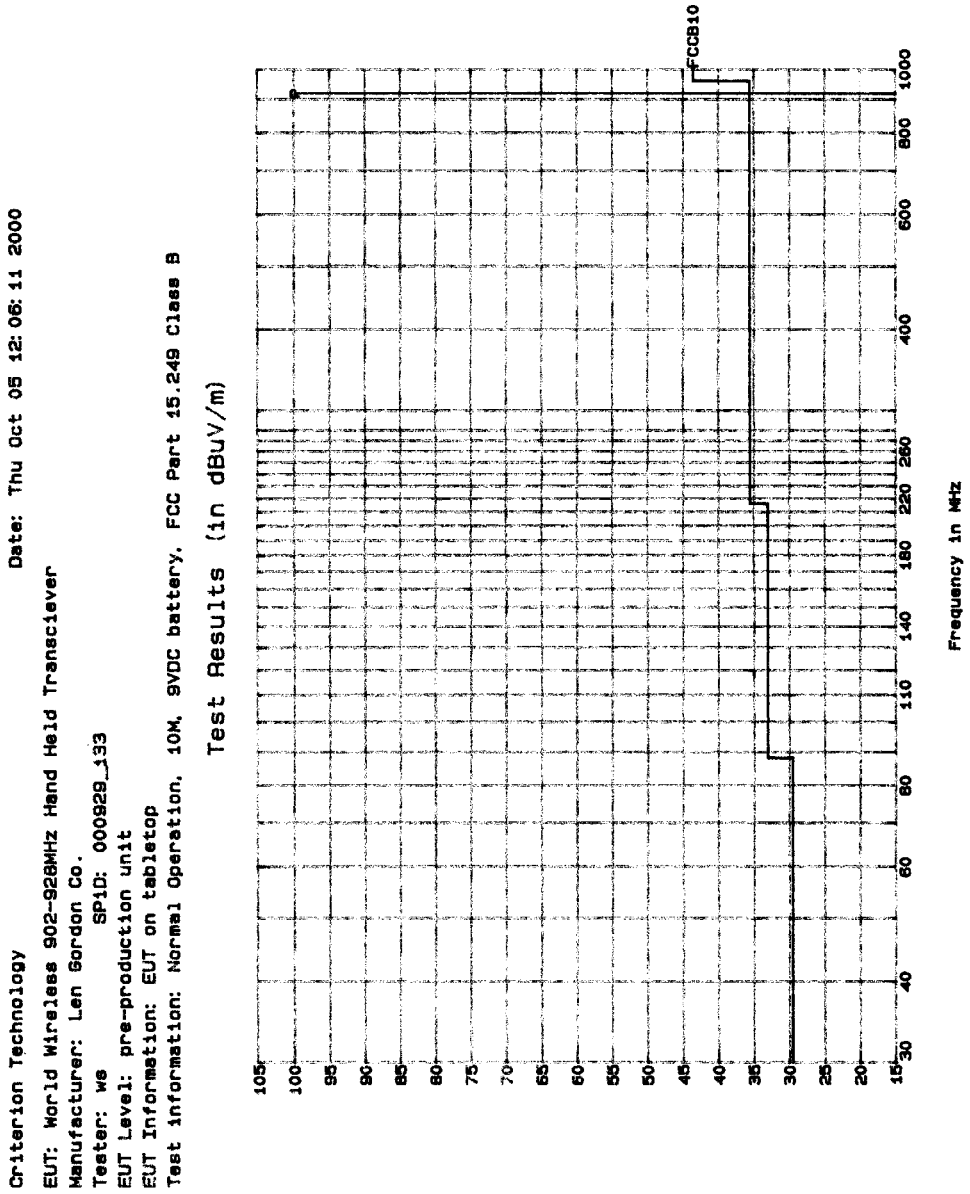
Table 2: Scan List for FCCB10, sorted by Frequency, -10.0dB filter

Freq, MHz	Value	Sts	FCCB10	TT	Hght	Az	Comment
916.4950	88.81	p	64.07	277	101	H	xmit frequency

Table 3: Complete Scan List Sorted by Frequency

Freq, MHz	I-val	Final	Sts	TT	Hght	Az	Time	Comment
916.4950	81.80	88.81	p	277	101	H	Thu Oct 05 11:47:54 2000	xmit frequency

Part 4.2 Radiated Emissions Plot, 30 MHz to 1000 MHz



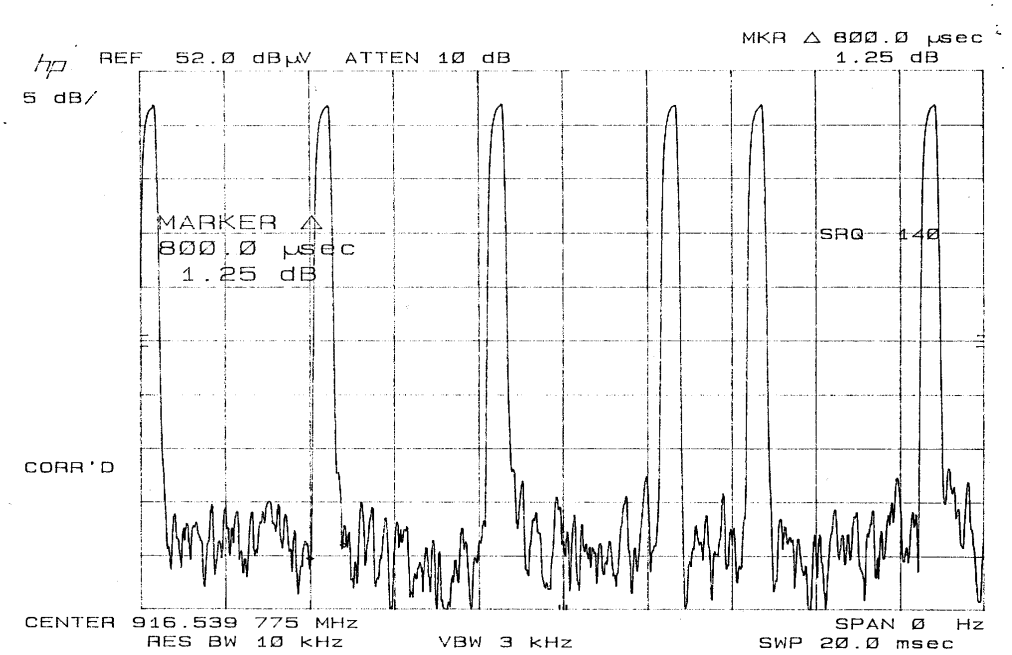
Part 4.3 Radiated Emissions Data for Subpart C, 1000 MHz to 10,000 MHz

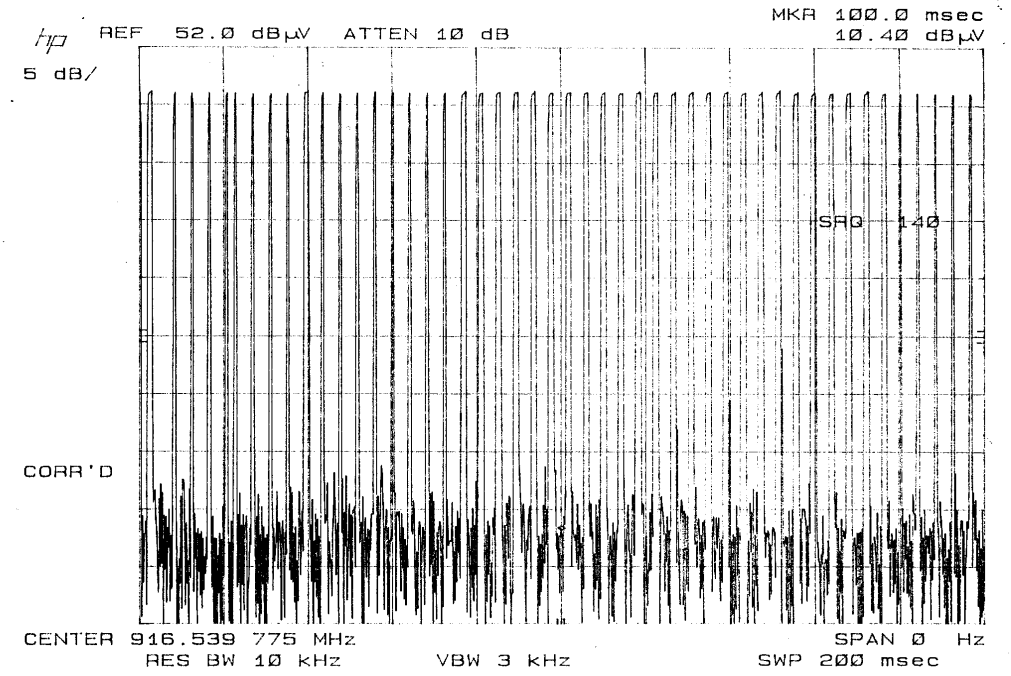
Len Gordon
Hand Held Transceiver Serial: Prepoduction Unit
Date: 10-12-00
Operator: TOM

freq (MHz)	I Val dBuV	Factor dB/m	Fval dBuV/m	Avg dBuV/m	Spec dBuV/m	TT Deg	Hgt M	Pol V/H	Orientation
916.5534	81.80	7.01	88.81	68.81	71.48	277	101	H	Laying
1833.1663	44.60	-2.92	41.68	21.68	61.94	271	1	H	Standing
2749.7524	37.00	1.20	38.20	18.20	53.98	161	1	H	Standing
3666.3330	48.00	2.41	50.41	30.41	53.98	283	1.06	V	Laying
4582.8520	22.30	4.65	26.95	6.95	53.98			Noise Floor	
5499.2858	32.70	8.65	41.35	21.35	61.94	182	167	V	Standing
6415.8700	22.45	9.35	31.80	11.80	61.94			Noise Floor	
7332.4100	21.45	12.74	34.19	14.19	53.98			Noise Floor	
8248.9530	21.95	12.32	34.27	14.27	53.98			Noise Floor	
9165.4960	21.00	14.84	35.84	15.84	53.98			Noise Floor	

*All Spec. Limits based on 3 meter distance from EUT except for the fundamental at 916.5534 MHz. The fundamental was measured at a distance of 10 meters and the specification limit was adjusted accordingly.

Part 4.4 Transmitted Pulse Characteristics





Duty Cycle Calculation:

Total Number of Pulses in 100 mSec. Window = 24

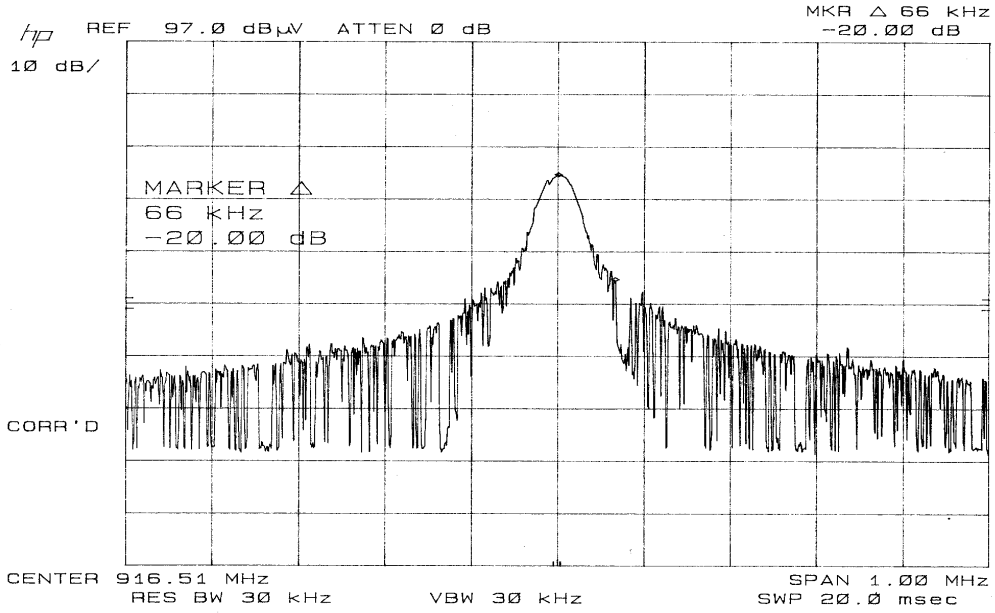
Pulse Width = 400 uSec (measured at half voltage points)

Pulse Train Duration (including blanking intervals) > 100 mSec

Duty Cycle = $\frac{24 * 0.4}{100}$ = 0.096 = 9.6%

Average Power Correction Factor = 20 * Log (0.096) = - 20.35 dB
maximum correction allowed = -20 dB

Part 4.5 Occupied Bandwidth



Bandwidth at 20 dB points: 2 x 66 kHz = 132 KHz

Maximum bandwidth allowed above 900 MHz = 0.5% of Fundamental Frequency: 0.005 x 916.5 MHz = 4.5825 MHz

EUT meets bandwidth requirements

Section 5 Equipment Calibration Information

Criterion Technology Equipment Calibration List: Updated 10/10/00

Manufacturer	Name/Description	Model Number	Serial Number	Cal. Due
Abbeon	Thermometer & Hygrometer	HTAB169B	001	12-23-00
Antenna Research Associates	1-18 GHz Horn	DRG118/A	1056	Verify
Antenna Research Associates	1-18 GHz Horn	DRG118/A	1057	4-29-01
Chase	Bilog 30 - 1000 MHz	CB6111	1121	5-16-01
Dickson	Temperature/ RH Recorder	THDX	5300245	2-19-01
Digitech	Digital Thermometer	5810	93712063	12-27-00
Doric	Digital Thermometer & Recorder	205	21594	12-22-00
EMCO	Active Loop	6502	2626	In Calibration
EMCO	BiConnical 30-200 MHz	3108	2343	5-15-01
EMCO	Dipole	3121C	722	Verify
EMCO	Log Periodic 200 - 1000 MHz	3146	2763	5-16-01
EMCO	Log Periodic 200 - 1000 MHz	3146	3096	5-16-01
FCC	Current Probe	F-33-2	None	In Calibration
Fluke	Digital Multimeter	87	60800598	12-17-00
Hewlett Packard	Preselector	HP 9445B		3-27-01
Hewlett Packard	Tracking Generator	HP85645A	3210A00124	6-13-01
Hewlett Packard	Quasi Peak Adapter	HP 85650A	2521A00733	7-6-01
Hewlett Packard	Spectrum Analyzer	HP 8566B	2403A07322	7-6-01
Hewlett Packard	Spectrum Analyzer	HP 8566B	2421A00527	7-6-01
Hewlett Packard	Spectrum Analyzer	HP 8591A	2919A00220	1-24-01
Le Croy	Digital Storage Oscilloscope	9450	2141	4-20-01
Microwave Instrumentation Technologies	18-26.5 GHz Horn	12A-18	115300	In Calibration
Mini Circuits	Preamp (AMP2)			5-16-01
Rohde/Schwarz	HF Receiver	ESHS-30	82600/011	8-30-01
Rohde/Schwarz	LISN	ESH2-Z5	828739-001	8-29-01
Rohde/Schwarz	VHF/UHF Receiver	ESVS-30	8634221014	5-25-01
Solar	50 uH LISN	8612-50-TS-100N	967621	In Calibration
Solar	50 uH LISN	8612-50-TS-100N	967622	In Calibration

Tektronix	Oscilloscope	2467B	B051203	12-20-00
Veratech	Preamp (AMP3)			2-9-01
Amplifier Research	Coupler	DC6080	19529	5-3-01
Amplifier Research	E-Field Probe	FP2000	19682	1-27-01
Amplifier Research	E-Field Probe	FP2080	20236	1-26-01
Amplifier Research	Power Amplifier	150A100A	20183	5-3-01
Amplifier Research	Power Amplifier	100W1000M1	20214	5-4-01
Amplifier Research	Power Amplifier	10S1G4	20155	5-4-01
Andrews Heliax Cable	F2-50 Low Loss Coax	F2-50	N/A	5-4-01
EMCO	BiConnical 30-200 MHz	3108	2441	5-15-01
EMCO	Horn	3115	4003	Verif. for Use
FCC	CDN	FCC-801-M3-25	9714	10-16-00
FCC	Current Probe	F-33-1	None	In Calibration
FCC	EM Clamp	F2031	309	3-17-01
Fluke	Digital Multimeter	87	66320753	12-17-00
Fluke	Digital Multimeter	87	68630334	12-17-00
Gigatronics	Power Meter	8541C	1830945	In Calibration
Gigatronics	Power Sensor	80301A-410	1831996	In Calibration
Haefely Trench	Coupling Network	IP6.2	083 957-02	9-18-01
Haefely Trench	De-coupling Network	DEC1A	080057-09	9-18-01
Haefely Trench	Dip Generator	PLINE1610	083 970-07	In Calibration
Haefely Trench	EFT Coupling Clamp	IP4A	080-011-06	9-18-01
Haefely Trench	EFT Tester	PEFT Junior	583-333-51	9-18-01
Haefely Trench	ESD Gun	PESD 1600	H605100	In Calibration
Haefely Trench	Impulse Module	PHV 30.2	083991-06	9-18-01
Haefely Trench	Power Supply	PHF555	080-419-05	2-28-01
Haefely Trench	Surge Generator	PSURGE 6.1	083 906-07	9-18-01
Haefely Trench	Surge Network	FP-SURGE 32.1	083925-05	9-18-01
Hewlett Packard	Pulse Generator	HP 8116A	2901G09493	In Calibration
Hewlett Packard	Signal Generator	HP 8648D	3642000145	4-6-01
Hewlett Packard	Spectrum Analyzer	HP 8594E	3412A01039	In Calibration
Lehman Chambers	Semi Anechoic Chamber	N/A	N/A	8-25-01
Tegam	Current Probe	925236-1	12588	In Calibration
Tektronix	Oscilloscope	2465A	B021016	12-21-00

Section 6 Product Information Forms

Note: If there are any questions regarding the information required in these forms or if yo are in doubt about what tests are required for your product, please contact us either by phone or email.

CRITERION TECHNOLOGY PRODUCT INFORMATION FORM

General Information **Date** 9-12-00

Company Name: Len Gordon Co.
Company Address: 7215 Bermuda Road
Las Vegas, NV 89119

Contacts:
Compliance Engineer: Dan Roberts Phone: (702) 361-0600 Email:
Design Engineer: Phone: Email:

Test Description
De-Bug Formal (Initial) X Formal (Re-Verification)

Market Information (Check all that Apply)
USA X Canada Euro. Union Taiwan Japan New Zealand Australia
Other

Product Information
Name Lennovator Hand Held Unit Model Number Serial Number Pre-Production
Product Dimensions: inches Weight:

Product Power Source:

Battery
Type 9 volt

AC Supply
Input Voltage Range(s)
Phases N/A Delta Wye
Current Unknown
Frequency
Manufacturer
Model Number

Topology
Linear Switching Mode Switching Frequency

Support Equipment (if used):

CPU:
Manufacturer
Model No.
Serial No.

Monitor:
Manufacturer
Model No.
Serial No.

Keyboard:

Manufacturer
Model No.
Serial No.

Mouse:

Manufacturer
Model No.
Serial No.

I/O Cables – Manufacturer, P/N, Length :

Serial Port
Parallel Port
SCSI Port
Other

Operation Software:

Name Version Number

Operating Modes: (Please Include Cycle Time)

Normal Operation

Operation Pass/Fail Criteria:

Test Type – Emissions (Please check all that apply):

Information Technology Equipment

Class A____
Class B____
Oscillator/Clock Frequencies (MHz)

Industrial, Scientific, Medical Equipment

Class A____
Class B____
Oscillator/Clock Frequencies (MHz)

Unintentional Radiator

Class A____
Class B_X__
Oscillator/Clock Frequencies (MHz)

Receiver

Type (Regen., Superhet., Direct Conv., Homodyne) Superhet
Local Oscillator Frequencies 915 MHz
Frequency Range 916.5 MHz

Intentional Radiator

Fundamental Frequency Range 916.5 MHz
Local Oscillator Frequencies 916.5 MHz
Power Output (to antenna) 10 milliwatts
Integral Antenna (Yes/No) Yes

Modulation Type (AM, CM, Pulse, Spread Spectrum) Pulse
Control Circuits (Microprocessor/Micro-controller) Microcontroller
Oscillator/Clock Frequencies (MHz) 4.0 MHz