

**REPORT OF
TEST DATA FOR
FOR PNI**

Prepared by
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August 26, 2002

Alpha and Traveler Radar Detectors

GEL File PNI 01-2002

GLEN ELLEN LABORATORIES

1876 London Ranch Road
Glen Ellen, CA 95442

TABLE OF CONTENTS

1. Test Methodology
2. Description of Test Facility, including information on calibration as presented in Glen Ellen Laboratories FCC, CISPR and Bellcore test reports.
3. Photographs of test configuration, including front and rear views of tested configuration of both units.
3. Radiated Emissions Data
 - 3.1 Unintentional Radiated Emissions, Traveler, 12 Volt power, in band 11.7 to 12.2 GHz
 - 3.2 Unintentional Radiated Emissions, Traveler, battery power, in band 11.7 to 12.2 GHz
 - 3.2 Unintentional Radiated Emissions, Alpha, in band 11.7 to 12.2 GHz
 - 3.3 Field Strength Calculation for Radiated Emissions
- 4.0 Photographs of Tested Units

1. Test Methodology

The radiated tests were performed in accordance with the procedures specified by ANSI C63.4-2001. Compliance with applicable standards was determined by comparing the measured results with respect to the limits specified in rulemaking FCC 02-211.

Measurements were made at 1 meter distance, as allowed by 47CFR Section 15.31(f)(1). The limit for the 1 meter measurement was calculated using an inverse linear distance extrapolation faction (20 dB/decade),

$$\text{Limit 1 meter} = \text{Limit 3 meters} + 20 \cdot \text{LOG}(3/1)$$

or

$$\text{Limit 1 meter} = \text{Limit 3 meters} + 9.5 \text{ dB}$$

The test procedure used was the following:

1) Determine the frequency of the peak emission:

Start Frequency	11.7 GHz
Stop Frequency	12.2 GHz
RBW	Equal to or greater than 1 MHz
VBW	Equal to or greater than 1 MHz
Detector Function	Peak

Maximize the emissions with regards to device orientation, antenna polarization, and antenna height. Sweep the band using Max Hold for a minimum of 2 minutes. Record this frequency for measuring the peak emission. In addition record the frequency of other spurious emissions noted.

2) Determine the peak level of the emission:

Center Frequency	Set to the frequency determined in Step 1
RBW	Equal to or greater than 1 MHz
VBW	Equal to or greater than 1 MHz
Detector Function	Peak

Measure the value of the peak emission using Max Hold for a minimum of 2 minutes. This can be done at zero span or a frequency span where the analyzer does not show a "Measurement Uncalibrated" message. Record the peak value. If the peak measurement is compliant with the average limit an average measurement is not necessary. If the peak value exceeds the average limit by less than 20 dB proceed to Step 3.

3) Determine the average level of the emission:

Center Frequency	Set to the frequency determined in Step 1
Span	Zero
RBW	Equal to or greater than 1 MHz
VBW	Equal to or greater than 10 Hz
Detector Function	Peak

This measurement uses video averaging and must be done in Linear mode. The analyzer Reference Level will have to be adjusted so that a signal is clearly visible on the screen. Measure the value of the emission using Max Hold for a minimum of 2 minutes. Record this as the average value.

Step 2 and Step 3 was repeated for other spurious emissions within the band.

2. Description of Test Facility, including information on calibration as presented in Glen Ellen Laboratories FCC, CISPR and Belcore test reports.

The Glen Ellen Laboratories open field test site complies with the requirements specified by VDE 0876/9.78, VDE 0877 Part 1/11.81, VDE 0877 Part 2/2.85, CISPR 16, CISPR 22, and ANSI C63.4-2001. The test site closely follows the theoretical normalized site attenuation specifications for both horizontal and vertical polarizations. The site has been fully described in a report dated September 30, 1999, submitted to the FCC, and accepted in a letter dated December 15, 1999 (Registration Number 90613.)

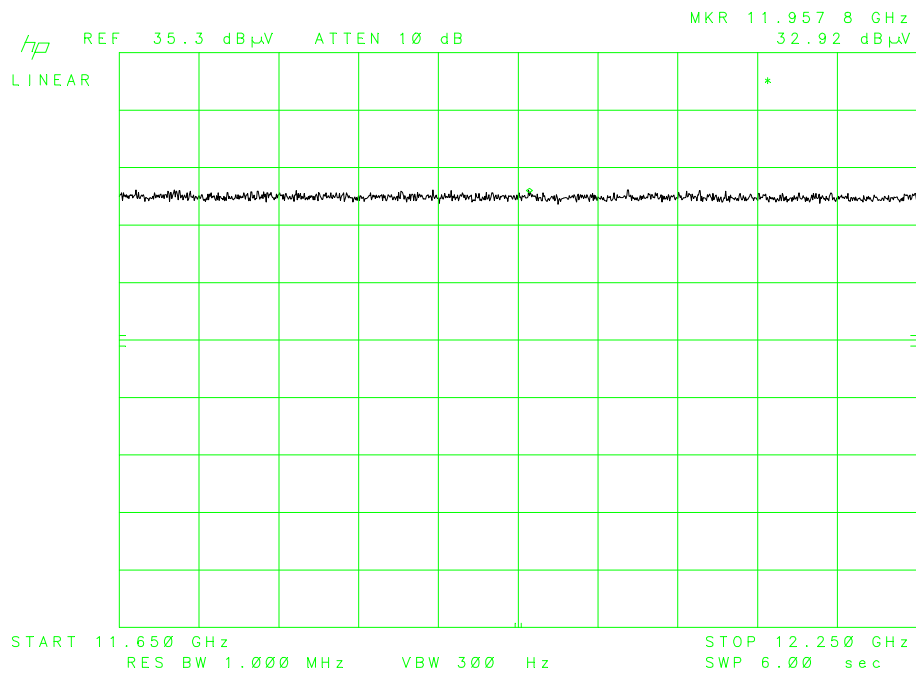
The facility is located near the town of Glen Ellen, California, at the street address of 1876 London Ranch Road. The site is at approximately 175 meters altitude on the East side of Sonoma Mountain, at the coordinates of 38 degrees 22 minutes North Latitude and 122 degrees 32 minutes West Longitude. The site sits north of a ridge approximately 100 meters higher in elevation and 1000 meters to the South, which attenuates VHF and above frequencies from the San Francisco Bay area 60 kilometers to the South. The open field test site consists of a 10 by 20 meter area of galvanized hardware cloth placed on top of a flat asphalt surface located in an open meadow. All seams of adjacent widths of hardware cloth are soldered together. The metal turntable top surface is flush with the ground plane. All metal objects other than the groundscreen/flush turntable are located a considerable distance further than the standard 10-meter CISPR measurement ellipse.

Test Equipment List

Test equipment used included:

1. Hewlett Packard 8591EM spectrum analyzer, cal due 06-20-03.
2. Hewlett Packard 8566 opt L24 spectrum analyzer, cal due 06-20-03.
3. GEL AP2-10 preamplifier, 2 GHz to 10 GHz, cal due 7-20-03.
4. ETS Horn Antenna, 1 GHz to 18 GHz, cal due 7-29-03.

3.1 Unintentional Radiated Emissions, Traveler, 12 Volt power, in band 11.7 to 12.2 GHz



Test Personnel:

Tester Signature Daniel C. Swann Date August 26, 2002

Tester Name Daniel C. Swann

3.1 Unintentional Radiated Emissions, Traveler, 12 Volt power, in band 11.7 to 12.2 GHz (continued)

Frequency MHz	1 meter Corrected Measured Amplitude dBuV	Horn Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	1 meter FCC Limit dBuV/m 20 dB added	FCC Margin dB	3 meter Field Strength uV/m
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Vertical Polarization

20 dB Peak Level Check

Traveler 2, with 12 Volt power car adapter

11709.000	44.2	39.5	1.2	16.4	68.4	83.5	-15.1	832.8
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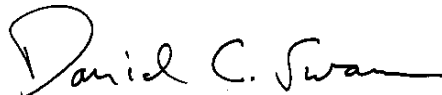
Frequency MHz	1 meter Corrected Measured Amplitude dBuV	Horn Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	1 meter FCC Limit dBuV/m	FCC Margin dB	corrected 3 meter Field Strength uV/m
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Vertical Polarization

Traveler 2, with 12 Volt power car adapter

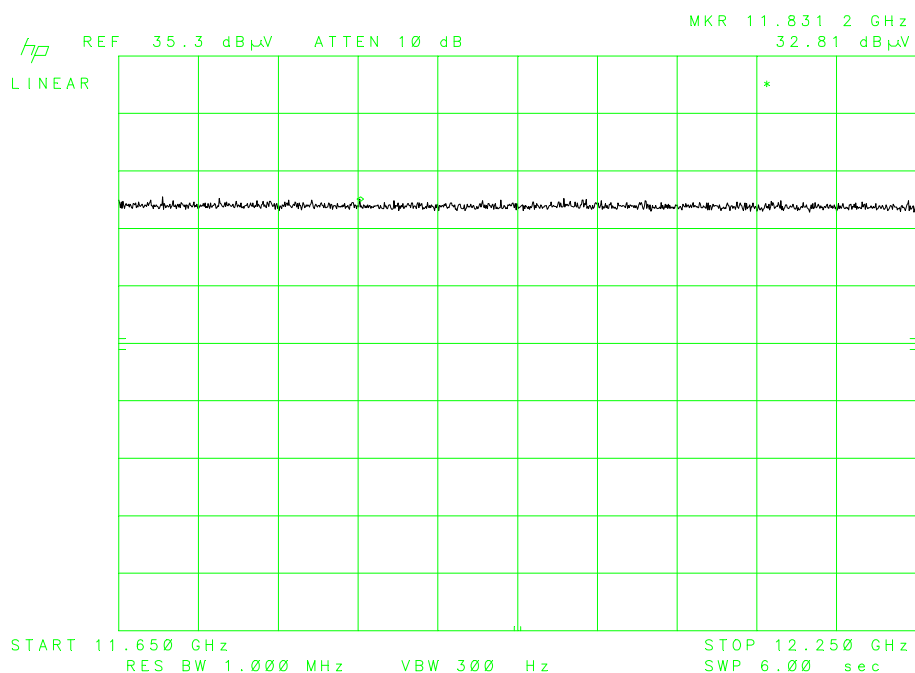
11957.000	32.9	39.5	1.2	16.4	57.2	63.5	-6.3	242.1
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Test Personnel:

Tester Signature  Date August 26, 2002

Tester Name Daniel C. Swann

3.2 Unintentional Radiated Emissions, Traveler, battery power, in band 11.7 to 12.2 GHz



Test Personnel:

Tester Signature Daniel C. Swann Date August 26, 2002

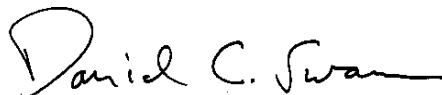
Tester Name Daniel C. Swann

3.2 Unintentional Radiated Emissions, Traveler, battery power, in band 11.7 to 12.2 GHz (continued)

Frequency MHz	1 meter Corrected Measured Amplitude dBuV	Horn Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	1 meter FCC Limit dBuV/m 20 dB added	FCC Margin dB	3 meter Field Strength uV/m
Vertical Polarization								
20 dB Peak Level Check								
Traveler 2, with battery								
11950.000	44.5	39.5	1.2	16.4	68.7	83.5	-14.8	915.3

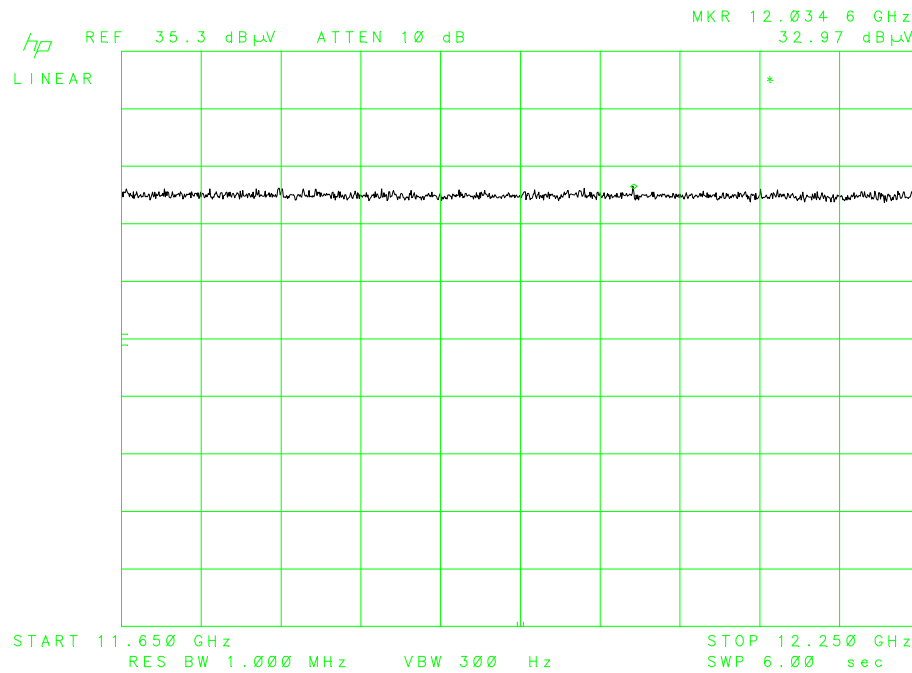
Frequency MHz	1 meter Corrected Measured Amplitude dBuV	Horn Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	1 meter FCC Limit dBuV/m	FCC Margin dB	corrected 3 meter Field Strength uV/m
Vertical Polarization								
Traveler 2, with battery								
11831.000	32.8	39.5	1.2	16.4	57.1	63.5	-6.4	239.1

Test Personnel:

Tester Signature  Date August 26, 2002

Tester Name Daniel C. Swann

3.2 Unintentional Radiated Emissions, Alpha, in band 11.7 to 12.2 GHz



Test Personnel:

Tester Signature Daniel C. Swann Date August 26, 2002

Tester Name Daniel C. Swann

3.2 Unintentional Radiated Emissions, Alpha, in band 11.7 to 12.2 GHz (continued)

Frequency MHz	1 meter Corrected Measured Amplitude dBuV	Horn Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	1 meter FCC Limit dBuV/m 20 dB added	FCC Margin dB	3 meter Field Strength uV/m
Vertical Polarization								
20 dB Peak Level Check								
Alpha								
12120.000	44.1	39.5	1.2	16.4	68.3	83.5	-15.2	823.3

Frequency MHz	1 meter Corrected Measured Amplitude dBuV	Horn Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	1 meter FCC Limit dBuV/m	FCC Margin dB	corrected 3 meter Field Strength uV/m
Vertical Polarization								
Alpha								
12034.000	33.0	39.5	1.2	16.4	57.2	63.5	-6.3	243.5

Test Personnel:

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3.6 Field Strength Calculation for Radiated Emissions

The field strength was calculated from the following formula:

$$FS = \text{MEASURED SIGNAL} + AF + CF - \text{GAIN}$$

Where FS = field strength, in dBuV/m

MEASURED SIGNAL = Spectrum Analyzer signal amplitude

AF = antenna factor

CF = cable attenuation factor

GAIN = pre-amplifier gain

$$FS (\mu\text{V/m}) = \text{antilog}[10] FS (\text{dBuV/m})$$

For example, for the Traveler 2, with 12 Volt power car adapter, at 11957 MHz, in vertical polarization, an average reading of 32.9 dBuV was measured. The antenna factor is 39.5 dB, the cable loss is 1.2 dB, and the pre-amplifier gain is 16.4 dB.

$$FS (\text{dBuV/m}) = 32.9 + 39.5 + 1.2 - 16.4$$

$$FS (\text{dBuV/m}) = 57.2 \text{ dBuV/m}$$

$$1 \text{ meter FCC limit} = 63.5 \text{ dBuV/m}$$

$$1 \text{ meter FCC margin} = - 6.3 \text{ dB}$$