TEST REPORT FOR

FCC PART 15 COMPLIANCE

For HydroPoint Data Systems inc.

Prepared by
Daniel C. Swann
June 17, 2004

HydroPoint Data Systems
WeatherTRAK ET plus Irrigation Controller

FCC Part 15 Receiver

FCC ID Q4LWT008

GEL Report File HydroPoint 01-2004

GLEN ELLEN LABORATORIES
1876 London Ranch Road
Glen Ellen, CA 95442

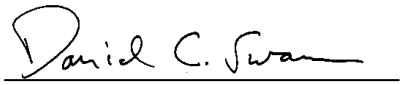
MEASUREMENT/TECHNICAL REPORT

HydroPoint Data Systems inc.

FCC ID Q4LWT008

This report concerns:	An Original Grant
Equipment type:	FCC Part 15 receiver
Deferred grant requested:	no
Transition rules per 15.37:	no

Report prepared by: Daniel C. Swann
Glen Ellen Laboratories
1876 London Ranch Road
Glen Ellen, CA 95442
(707) 996-8533
(707) 996-2803 fax
dan@glenellenlabs.com

Measurements Certified by: Daniel C. Swann 

Date 06/17/04

GEL Report File: HydroPoint 01-2004

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1 GENERAL INFORMATION

1.1 Product Description

The HydroPoint Data Systems WeatherTRAK ET plus irrigation controller is receiver/controller to receive weather information from a pager signal and control irrigation solenoid valves.

The unit receives pager signals between 928 and 932 MHz through either an internal antenna on the PC board, or an external antenna, Antenex TRA8903P 890-960MHz Helical with a 12 inch coax cable, utilizing a TNC connector on the bottom of the case. The antenna choice is made with the front panel controls.

The product has connections for 12 control circuits, a master valve control circuit, and a sensor input connection.

See the User Manual attachment for a description of the available controls on the EUT.

The product is powered by a 120 VAC, with an 8 foot unshielded power cord.

The internal construction is one 4 layer receiver-decoder-control PC board, and one passive 2 layer wire connection board with lightening protection devices and terminal strip connection blocks for the external connection wires.

The housing parts consist of a external case, with a front door, an additional hinged cover with the receiver-decoder-control PC board mounted on it, and a cover over the back of the receiver-decoder-control PC board. All of these housing parts for the product are nonconductive plastic.

1.2 Related Submittal or Grant

There are no related submittals or grants.

1.3 Tested System Details

EUT

HydroPoint Data Systems WeatherTRAK ET plus irrigation controller , Serial Number 007158.

Made by:

HydroPoint Data Systems inc.
1726 Corporate Circle
Petaluma, CA 94954

The circuit uses two clock frequencies of 9.8304 and 16.000 MHz. See the Block Diagram for more information.

1.4 Test Methodology

The radiated tests were performed in accordance with the ANSI C63.4-1992 standard. See Figure 3.1 and the photographs for details of the test setup. Radiated testing was performed at an antenna to EUT distance of 3 meters.

Radiated measurements were made from 30 MHz to 5 GHz, as specified in Part 15.33.

For conducted measurements, the LISN's (50 uH Artificial Mains Networks) were placed on, and grounded to, the turntable surface.

1.5 Test Facility

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 C63.4-1992. 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 November 3, 2002, submitted to the FCC, and accepted in a letter dated November 8, 2002 (Registration Number 90613.)

Test equipment used included:

1. Hewlett Packard 8591EM spectrum analyzer, cal due 04-10-05.
2. Sonoma Instruments 317 preamplifier, 10 kHz to 2.5 GHz, cal due 04-14-05.
3. GEL BIC9414 biconical antenna, 30 MHz to 300 MHz, cal due 05-24-05.
4. GEL LPA-3 log periodic antenna, 275 MHz to 2 GHz, cal due 05-24-05.
5. Hewlett Packard 8566B opt L24 spectrum analyzer, cal due 04-15-05.
6. ETS Horn Antenna, 1 GHz to 18 GHz, cal due 09-24-04.
7. GEL AP2-10 preamplifier, 1 GHz to 10 GHz, cal due 09-20-04.
8. EMCO LISN, model number 3825/2, cal due 05-23-05.

2 FCC Statement in User Manual

The following statement appears in a prominent location in the text of the user manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
--Reorient or relocate the receiving antenna.
--Increase the separation between the equipment and receiver.
--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

The EUT was tested in accordance with the standard ANSI C63.4-1992, and 47 CFR Part 15.

3.2 EUT Exercise Equipment and Software

The unit was tested in the Run mode, in the condition of receiving a signal from a remote pager service. Seven foot long un-terminated wires were connected to valve positions 1 through 5 of the terminal block to simulate connection to passive solenoid valves.

3.3 Special Accessories

No special accessories were used.

3.4 Equipment Modifications

No equipment modifications were made.

3.5 Configuration of Tested System

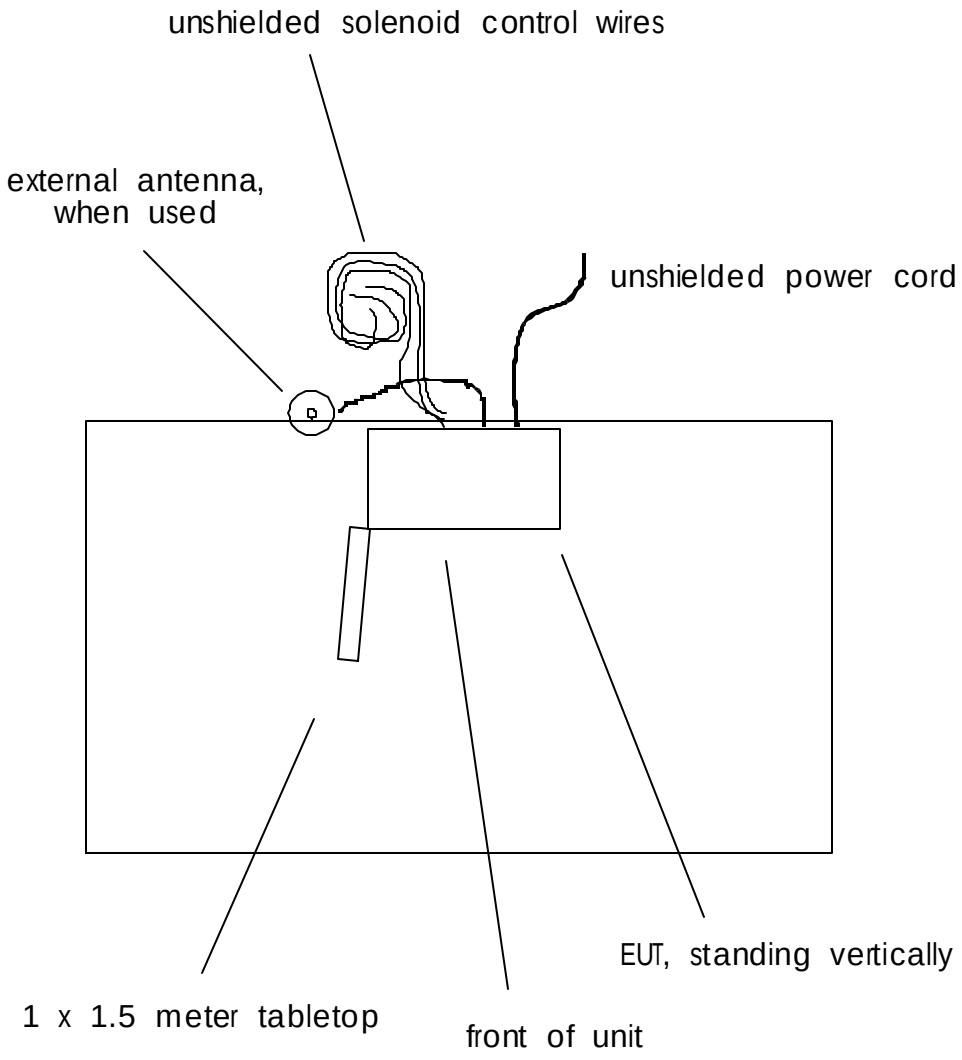
The system was configured with the unit on a stand on the tabletop surface, with the power cord and solenoid wires draped over the rear edge of the tabletop to the turntable surface. The power cord was connected to a LISN filtered 120VAC outlet on the turntable surface. Black duct tape and non-conductive spacers were used to hold the unit in an upright position. The EUT was tested with the internal antenna, and again with the external antenna with the supplied 1 foot coax cable.

For conducted emissions, additional LISN's were placed on, and grounded to, the turntable surface.

This condition put the EUT in the highest emissions state.

See Figure 3.1 and the test setup photographs attachment for the configuration of the tested system.

Figure 3.1 Configuration of Tested System

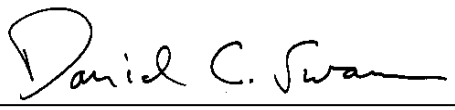


4 CONDUCTED EMISSIONS DATA

The following data lists the significant emissions frequencies, measured quasi-peak levels and FCC Class B margins, using 9 kHz RBW at 6 dB. Average measurements were not required since all the margins were over 10 dB. The internal antenna was used for these measurements since it was determined that the antenna did not affect conducted measurements. These measurements were made on June 16, 2004, by Daniel Swann and Mike Marian.

Frequency MHz	Measured Amplitude dBuV	Corrected Measured Amplitude dBuV	FCC B QP Limit dBuV	FCC B QP Margin dB
Line				
0.150	38.0	48.1	66.0	-17.9
1.925	24.7	35.0	56.0	-21.0
6.251	17.6	28.3	60.0	-31.7
6.956	21.5	32.2	60.0	-27.8
12.496	12.9	24.1	60.0	-35.9
17.949	19.0	30.4	60.0	-29.6
23.550	24.8	36.4	60.0	-23.6
27.486	24.0	35.7	60.0	-24.3
Neutral				
0.150	31.5	41.6	66.0	-24.4
6.250	15.5	26.3	60.0	-33.7
10.966	18.3	29.5	60.0	-30.5
12.496	16.9	28.1	60.0	-31.9
17.949	16.2	27.6	60.0	-32.4
23.550	21.1	32.7	60.0	-27.3
27.486	19.8	31.5	60.0	-28.5

Test Personnel:

Tester Signature  Date 06/17/04

Tester Name Daniel C. Swann

5 RADIATED EMISSIONS DATA

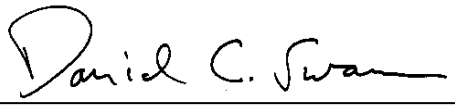
5.1 Data

The following data lists the significant emissions frequencies, measured signal levels and FCC Class B margins. Measurements below 1 GHz were made in an 120 kHz RBW at 6 dB and a quasi-peak detector, and measurements above 1 GHz were made using an 1 MHz RBW and an average detector. These measurements were made on June 16, 2004, by Daniel Swann and Mike Marian.

Clock freq 9.8304, 16.000 MHz

Frequency MHz	Measured Amplitude dBuV	Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	FCC B 3 m Limit dBuV/m	FCC B 3 m Margin dB
Measurements made with the EUT internal antenna							
Vertical Polarization							
58.982	37.6	8.4	2.1	38.5	9.6	40.0	-30.4
80.006	41.0	6.7	2.4	38.6	11.5	40.0	-28.5
112.014	37.3	12.3	2.7	38.6	13.7	43.5	-29.8
128.014	32.9	14.1	2.8	38.5	11.3	43.5	-32.2
144.017	35.7	14.8	2.9	38.5	14.9	43.5	-28.6
929.318	25.3	24.3	7.5	38.4	18.7	46.0	-27.3
1858.635	31.6	25.6	0.1	18.8	38.5	54.0	-15.5
2787.952	26.9	28.9	0.3	19.0	37.1	54.0	-16.9
3717.269	25.8	31.8	0.4	19.0	39.0	54.0	-15.0
4646.586	27.0	32.8	0.5	18.7	41.6	54.0	-12.4

Test Personnel:

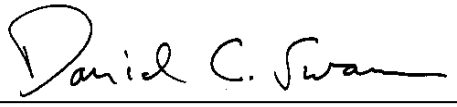
Tester Signature  Date 06/17/04

Tester Name Daniel C. Swann

5.1 Data (continued)

Frequency MHz	Measured Amplitude dBuV	Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	FCC B 3 m Limit dBuV/m	FCC B 3 m Margin dB
Measurements made with the EUT internal antenna							
Horizontal Polarization							
58.982	34.4	8.4	2.1	38.5	6.4	40.0	-33.6
80.013	33.0	6.7	2.4	38.6	3.6	40.0	-36.4
112.013	32.7	12.3	2.7	38.6	9.1	43.5	-34.4
128.017	32.7	14.1	2.8	38.5	11.1	43.5	-32.4
144.022	30.2	14.8	2.9	38.5	9.4	43.5	-34.1
929.318	23.3	24.3	7.5	38.4	16.7	46.0	-29.3
1858.635	30.1	25.6	0.1	18.8	37.0	54.0	-17.0
2787.952	28.5	28.9	0.3	19.0	38.7	54.0	-15.3
3717.269	26.1	31.8	0.4	19.0	39.3	54.0	-14.7
4646.586	27.4	32.8	0.5	18.7	42.0	54.0	-12.0

Test Personnel:

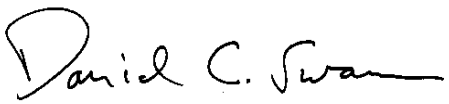
Tester Signature  Date 06/17/04

Tester Name Daniel C. Swann

5.1 Data (continued)

Frequency MHz	Measured Amplitude dBuV	Antenna Factor dB/m	Cable Loss dB	Amplifier Gain dB	Field Strength dBuV/m	FCC B 3 m Limit dBuV/m	FCC B 3 m Margin dB
Measurements made with the EUT external antenna							
Vertical Polarization							
	35.8	8.4	2.1	38.5	7.9	40.0	-32.1
80.000	40.9	6.7	2.4	38.6	11.4	40.0	-28.6
112.013	40.4	12.3	2.7	38.6	16.8	43.5	-26.7
128.017	37.6	14.1	2.8	38.5	16.0	43.5	-27.5
144.022	38.9	14.8	2.9	38.5	18.2	43.5	-25.3
145.234	40.8	14.8	2.9	38.5	20.0	43.5	-23.5
929.317	31.2	24.3	7.5	38.4	24.6	46.0	-21.4
1858.635	32.7	25.6	0.1	18.8	39.6	54.0	-14.4
2787.952	25.9	28.9	0.3	19.0	36.1	54.0	-17.9
3717.269	23.8	31.8	0.4	19.0	37.0	54.0	-17.0
4646.586	27.5	32.8	0.5	18.7	42.1	54.0	-11.9
Horizontal Polarization							
58.982	35.1	8.4	2.1	38.5	7.1	40.0	-32.9
80.000	37.3	6.7	2.4	38.6	7.8	40.0	-32.2
112.013	37.0	12.3	2.7	38.6	13.4	43.5	-30.1
128.017	35.5	14.1	2.8	38.5	13.9	43.5	-29.6
144.022	35.5	14.8	2.9	38.5	14.7	43.5	-28.8
929.317	29.9	24.3	7.5	38.4	23.3	46.0	-22.7
1858.635	34.2	25.6	0.1	18.8	41.1	54.0	-12.9
2787.952	24.9	28.9	0.3	19.0	35.1	54.0	-18.9
3717.269	25.7	31.8	0.4	19.0	38.9	54.0	-15.1
4646.586	28.1	32.8	0.5	18.7	42.7	54.0	-11.3

Test Personnel:

Tester Signature  Date 06/17/04

Tester Name Daniel C. Swann

5.2 Field Strength Calculations

The field strength was calculated from the following formula:

FS = MEASURED SIGNAL + AF + CF - 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 (uV/m) = antilog[10] FS (dBuV/m)

For example, for the internal antenna configuration, at 128.017 MHz in horizontal polarization a quasi-peak reading of 32.7 dBuV was measured. The antenna factor is 14.1 dB, the cable loss is 2.8 dB, and the pre-amplifier gain is 38.5 dB.

FS (dBuV/m) = 32.7 + 14.1 + 2.8 - 38.5

FS (dBuV/m) = 11.1 dBuV/m

FCC B 3 meter limit = 43.5 dBuV/m

FCC B 3 meter margin = - 32.4 dB