

*FCC PART 15, SUBPART B AND C*  
*TEST METHOD: ANSI C63.4-1992*

*for*

TELEMETRY TRANSMITTER

Model: 90305

Prepared for

SENSOR DEVELOPMENTS, INC.  
PO BOX 290  
LAKE ORION, MICHIGAN 48361-0290

COMPATIBLE ELECTRONICS INC.  
114 OLINDA DRIVE  
BREA, CALIFORNIA 92823  
(714) 579-0500

DATE: JUNE 23, 1999

	REPORT BODY	APPENDICES				TOTAL
		A	B	C	D	
PAGES	15	2	2	6	9	34

This report shall not be reproduced except in full, without the written approval of Compatible Electronics.



## TABLE OF CONTENTS

Section / Title	PAGE
<b>GENERAL REPORT SUMMARY</b>	<b>4</b>
<b>SUMMARY OF TEST RESULTS</b>	<b>4</b>
<b>1. PURPOSE</b>	<b>5</b>
<b>2. ADMINISTRATIVE DATA</b>	<b>6</b>
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
<b>3. APPLICABLE DOCUMENTS</b>	<b>7</b>
<b>4. Description of Test Configuration</b>	<b>8</b>
4.1 Description of Test Configuration - EMI	8
4.1.1 Cable Construction and Termination	9
<b>5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT</b>	<b>10</b>
5.1 EUT and Accessory List	10
5.2 EMI Test Equipment	11
<b>6. TEST SITE DESCRIPTION</b>	<b>12</b>
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
<b>7. Test Procedures</b>	<b>13</b>
7.1 Radiated Emissions (Spurious and Harmonics) Test	13
7.2 Band Edge Plots of the Low and High Channels	14
<b>8. CONCLUSIONS</b>	<b>15</b>



## LIST OF APPENDICES

APPENDIX	TITLE
A	Modifications to the EUT
B	Additional Models Covered Under This Report
C	Diagrams, Charts and Photos <ul style="list-style-type: none"> <li>• Test Setup Diagrams</li> <li>• Radiated Emissions Photos</li> <li>• Antenna and Effective Gain Factors</li> </ul>
D	Data Sheets

## LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Plot Map And Layout of Test Site



## GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: Telemetry Transmitter  
 Model: 90305  
 S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: Sensor Developments, Inc.  
 PO Box 290  
 Lake Orion, Michigan 48361-0290

Test Date: May 14, 1999

Test Specifications: EMI requirements  
 FCC Title 47, Part 15 Subpart C, Sections 15.205 and 15.249

Test Procedure: ANSI C63.4: 1992

Test Deviations: The test procedure was not deviated from during the testing.

## SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz - 30 MHz	This test was not performed because the EUT runs off one 9V battery only and cannot be powered by any device that runs off of the AC public mains.
2	Radiated RF Emissions, 10 kHz - 4200 MHz	Complies with the limits of FCC Title 47, Part 15, Subpart B and Subpart C, sections 15.205 and 15.249



**1.****PURPOSE**

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Telemetry Transmitter Model: 90305. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart B and Subpart C, sections 15.205 and 15.249.



## 2. ADMINISTRATIVE DATA

## 2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

## 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

## 2.3 Cognizant Personnel

Sensor Developments, Inc.

Rick West      Engineer

Compatible Electronics Inc.  
Kyle Fujimoto Test Engineer  
Kirit Ramani Test Engineer  
Scott McCutchen Lab Manager

### 24 Date Test Sample was Received

The test sample was received on May 13, 1999.

## 2.5 Disposition of the Test Sample

The test sample was returned to Sensor Developments, Inc. on May 14, 1999.

## 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network



**3.****APPLICABLE DOCUMENTS**

The following documents are referenced or used in the preparation of this EMI Test Report.

<b>SPEC</b>	<b>TITLE</b>
FCC Title 47, Subpart C.	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
ANSI C63.4 1992	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
FCC Title 47, Subpart B.	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators



## 4. DESCRIPTION OF TEST CONFIGURATION

### 4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The Telemetry Transmitter Model: 90305 (EUT) was connected to the strain gage sensor via its +Excitation, +Signal, - Signal, and -Excitation pins. The EUT is powered by a 9 volt battery. The EUT was tested in three different orthogonal axis and tested for the low, middle, and high channels. The EUT was continuously transmitting. The antenna and connector on the PCB have a reverse SMA connector.

The final radiated data was taken in the mode above. Please see Appendix D for the data sheets.



#### 4.1.1 **Cable Construction and Termination**

Cable 1 This is a 1 meter unshielded cable connecting the strain gage sensor to the EUT. It has a 4 pin terminal block at the EUT end and is hard wired into the strain gage sensor.

Cable 2 This is a 3 inch unshielded cable connecting the 9 volt battery to the EUT. It has a 9 volt battery connector at the 9 volt battery end and is hard wired into the EUT.



**5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT****5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
TELEMETRY TRANSMITTER (EUT)	SENSOR DEVELOPMENTS, INC.	90305	N/A	<b>NF690305</b>
STRAIN GAGE SENSOR	SENSOR DEVELOPMENTS, INC.	N/	N/A	N/A



## 5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566B	3638A08784	Nov. 16, 1998	Nov. 16, 1999
Preamplifier	Com Power	PA-102	1017	Feb. 16, 1998	Feb. 16, 1999
Quasi-Peak Adapter	Hewlett Packard	85650A	3303A01688	June 23, 1998	June 23, 1999
Biconical Antenna	Com Power	AB-100	1548	Oct. 15, 1998	Oct. 15, 1999
Log Periodic Antenna	Com Power	AL-100	1117	Oct. 15, 1998	Oct. 15, 1999
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	HP98561A	2522A05178	N/A	N/A
Printer	Hewlett Packard	2225A	2925S33268	N/A	N/A
Plotter	Hewlett Packard	7440A	8726K38417	N/A	N/A
Microwave Preamplifier	Hewlett Packard	8449B	3008A008766	Jan. 30, 1999	Jan. 30, 2000
Horn Antenna	Antenna Research	DRG-118/A	1053	Dec. 8, 1995	N/A
Loop Antenna	Com-Power	AL-130	25309	Feb. 5, 1999	Feb. 5, 2000



## 6. TEST SITE DESCRIPTION

### 6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

### 6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.



## 7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

### 7.1

#### Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Hewlett Packard Microwave Preamplifier Model: 8449B was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets. The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 9.3 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data.



## 7.2 Band Edge Plots of the Low and High Channels

Spectral plots of both the low and high channels were taken of the EUT to show that the emissions at the band edges (902 and 928 MHz) were attenuated by at least 50 dB below the level of the fundamental or to the general radiated emissions limits in FCC Title 47, Subpart C, section 15.209, whichever is the lesser attenuation.



## 8. CONCLUSIONS

The Telemetry Transmitter Model: 90305 meets all of the specification limits defined in FCC Title 47, Part 15, Subpart B and Subpart C, sections 15.205 and 15.249.



**APPENDIX A**

***MODIFICATIONS TO THE EUT***



## MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.249 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

No modifications were made to the EUT.



**APPENDIX B**

***ADDITIONAL MODELS COVERED  
UNDER THIS REPORT***



## ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Telemetry Transmitter  
Model: 90305  
S/N: N/A

There were no additional models covered under this report.



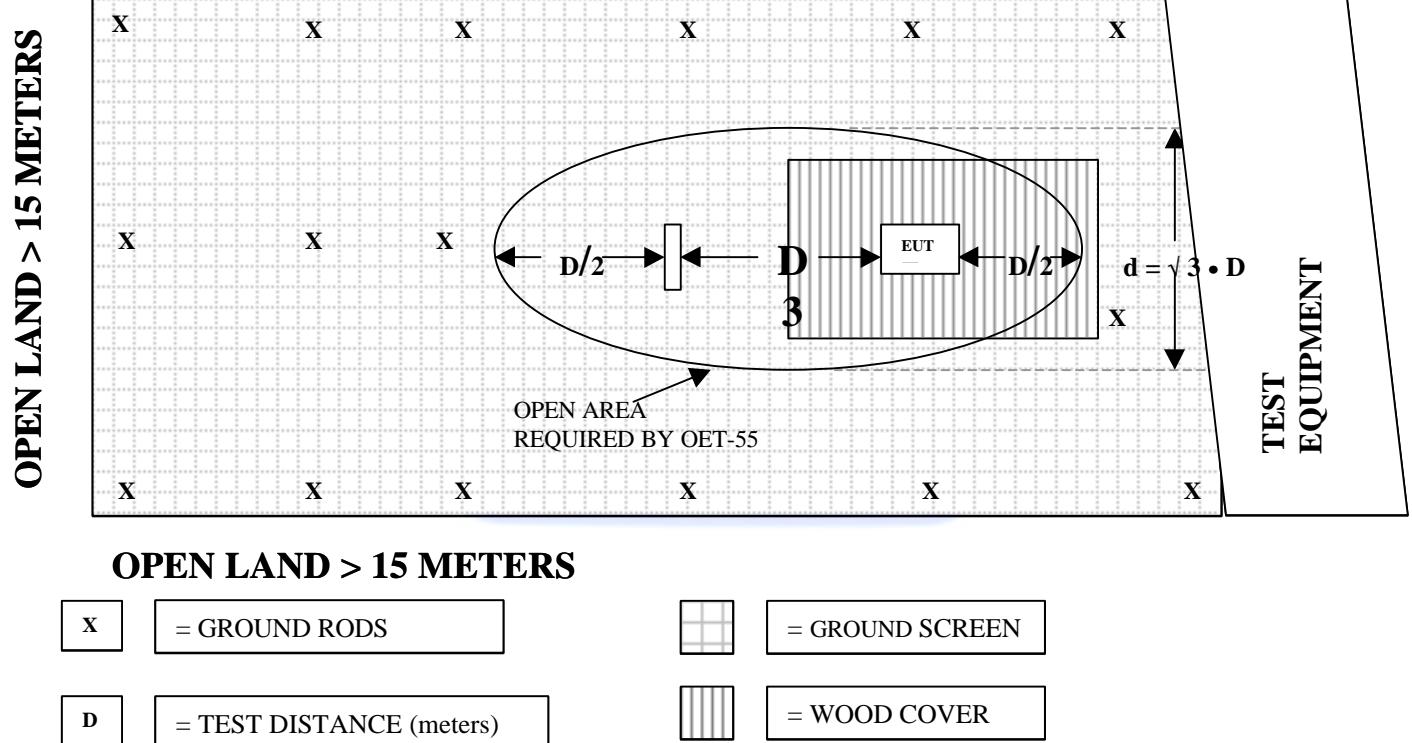
**APPENDIX C**

***DIAGRAMS, CHARTS AND PHOTOS***



## FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE

## **OPEN LAND > 15 METERS**



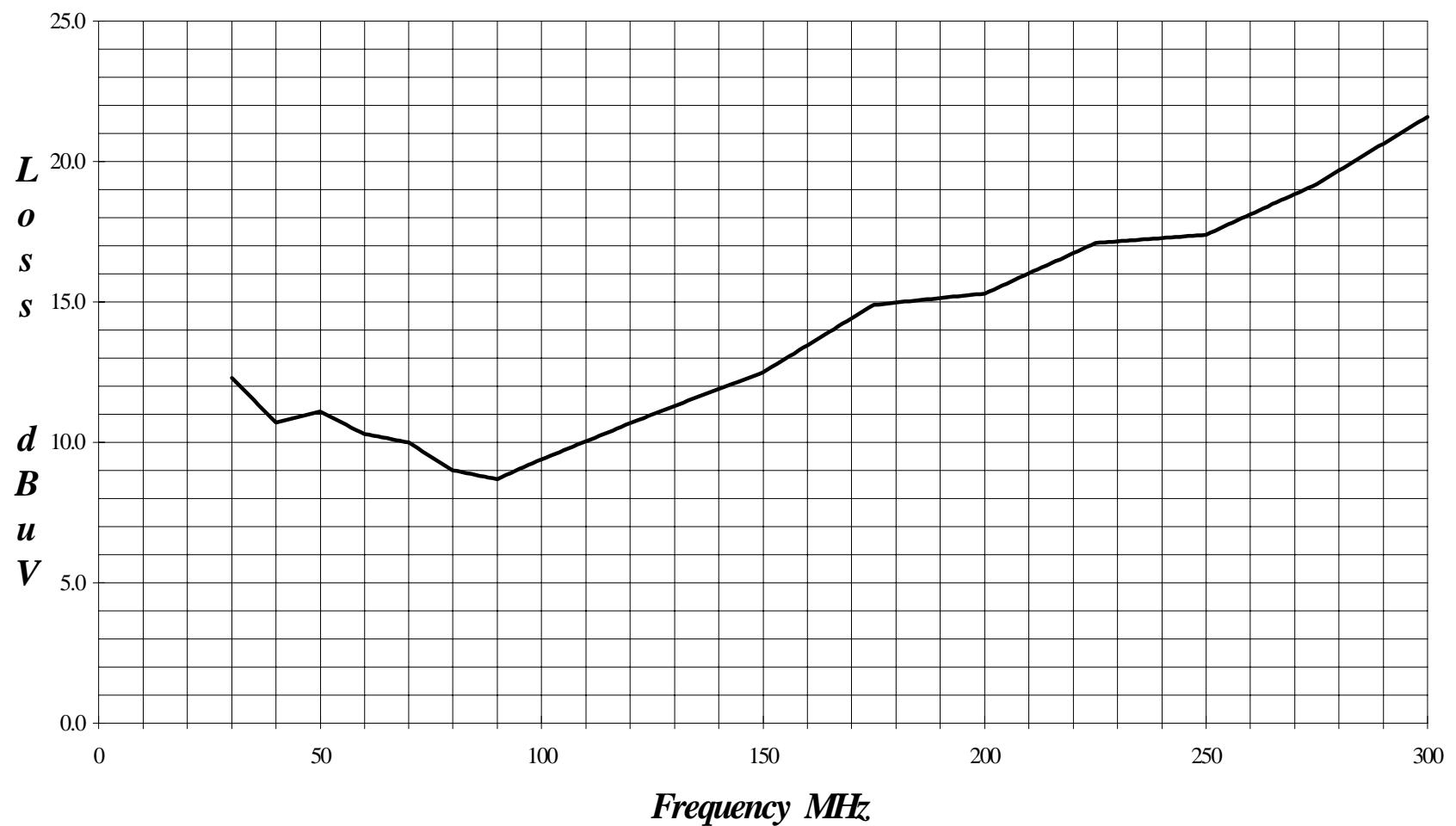


SENSOR DEVELOPMENTS, INC.  
TELEMETRY TRANSMITTER  
MODEL: 90305  
FCC SUBPART C - RADIATED EMISSIONS – 5-14-99

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**

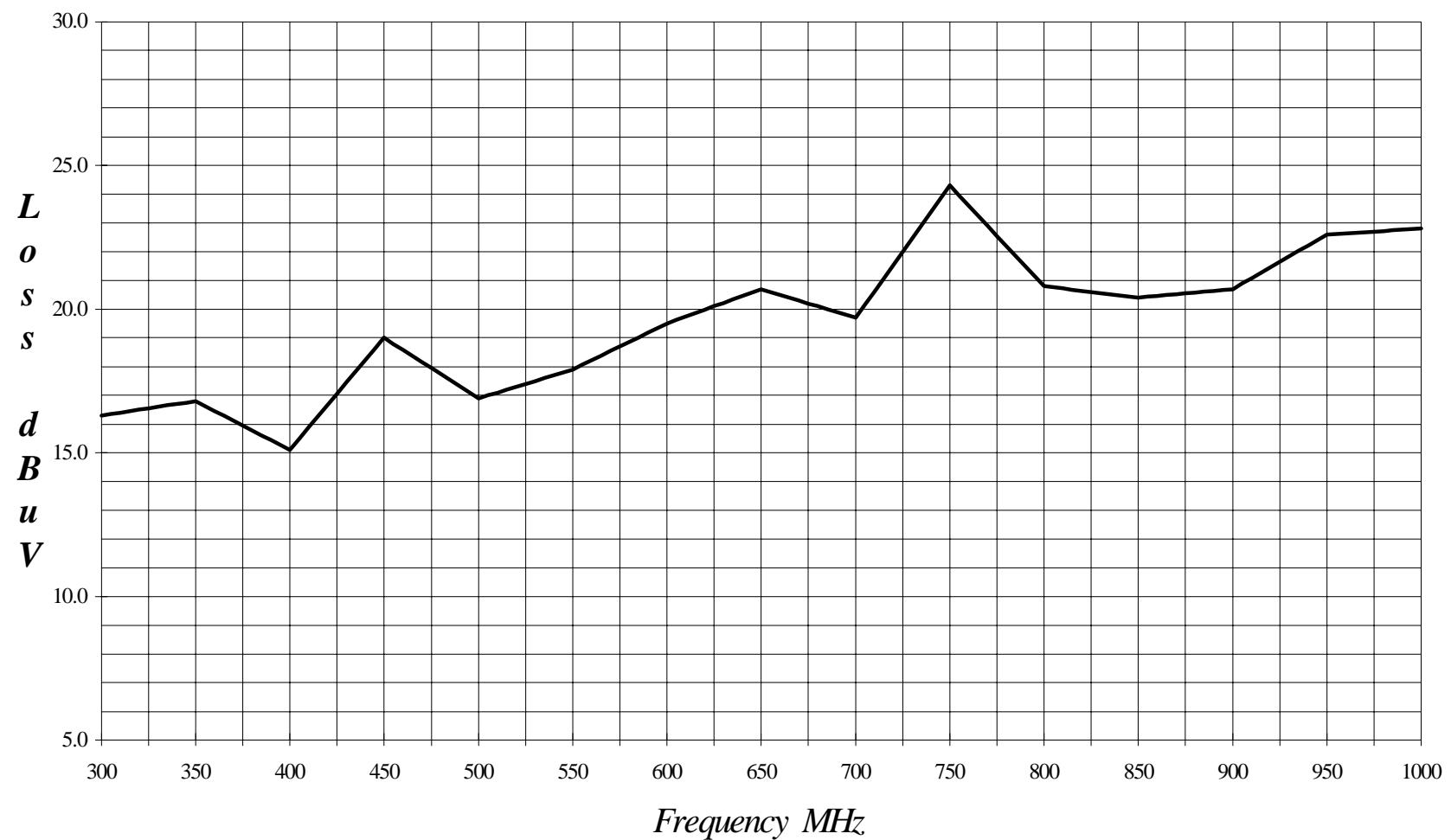


***LAB 'D' BICONICAL ANTENNA AB-100 S/N 01548***

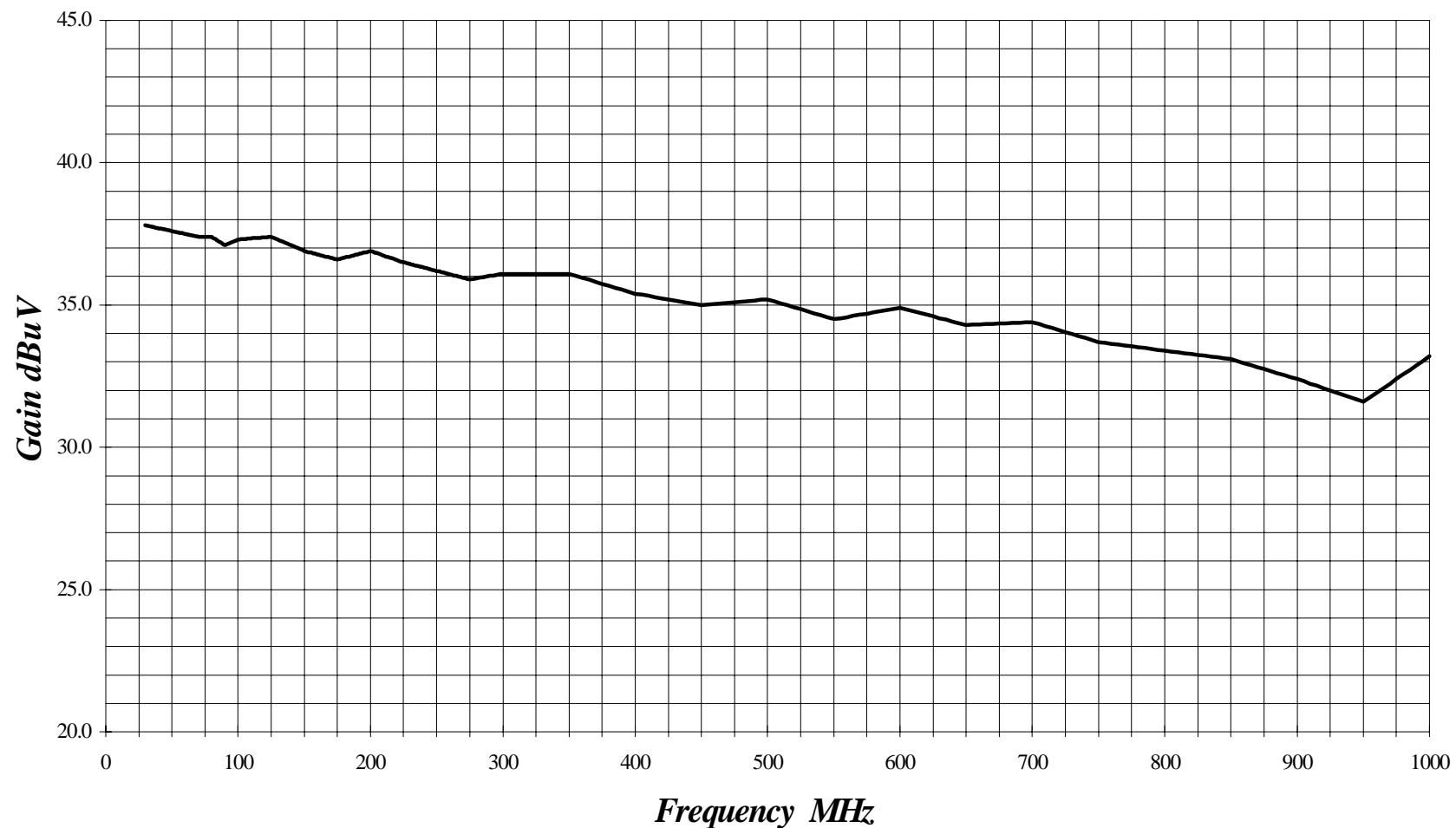


*Cal: 10/15/98*

***LAB 'D' LOG PERIODIC ANTENNA AL-100 S/N 01117***



**PREAMPLIFIER EFFECTIVE GAIN AT 3 METERS PA-102 S/N: 1017**



HEWLETT PACKARD 8449B  
MICROWAVE PREAMPLIFIER

S/N: 3008A008766

CALIBRATION DATE: JANUARY 30, 1999

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	36.9	9.5	34.3
1.1	36.3	10.0	33.7
1.2	36.4	10.5	34.1
1.3	36.2	11.0	33.7
1.4	36.3	11.5	34.0
1.5	35.7	12.0	33.9
1.6	35.9	12.5	34.4
1.7	35.7	13.0	32.9
1.8	35.6	13.5	31.6
1.9	35.5	14.0	31.8
2.0	35.4	14.5	31.9
2.5	35.6	15.0	32.2
3.0	35.2	15.5	32.8
3.5	35.2	16.0	32.4
4.0	34.3	16.5	32.1
4.5	34.1	17.0	32.3
5.0	34.3	17.5	30.3
5.5	33.0	18.0	31.5
6.0	34.1	18.5	31.2
6.5	34.5	19.0	32.2
7.0	34.3	19.5	32.0
7.5	33.9	20.0	32.0
8.0	34.5	20.5	33.2
8.5	34.5	21.0	30.9
9.0	34.4	22.0	32.1



## E-FIELD ANTENNA FACTOR CALIBRATION

$$E(\text{dB V/m}) = V_o(\text{dB V}) + AFE(\text{dB/m})$$

Model number : DRG-118/A

Frequency GHz	AFE dB/m	Gain dBi
1	22.3	8.0
2	26.7	9.5
3	29.7	10.1
4	29.5	12.8
5	32.3	12.0
6	32.4	13.4
7	36.1	11.0
8	37.4	10.9
9	36.8	12.5
10	39.5	10.7
11	39.6	11.5
12	39.8	12.0
13	39.7	12.8
14	41.8	11.3
15	41.9	11.9
16	38.1	16.3
17	41.0	13.9
18	46.5	8.9

Serial number : 1053  
Job number : 96-092  
Remarks : 3 meter calibration  
Standards : LPD-118/A, TE-1000

Temperature : 72° F  
Humidity : 56 %  
Traceability : A01887  
Date : December 08, 1995

Calibrated By

# Com-Power Corporation

(949) 587-9800

## Antenna Calibration

Antenna Type:	Loop Antenna	
Model:	AL-130	
Serial Number:	25309	
Calibration Date:	4/13/99	
Frequency MHz	Magnetic dB/m	Electric dB/m
0.01	-40.6	10.9
0.02	-41.5	10.0
0.03	-39.9	11.6
0.04	-40.2	11.3
0.05	-41.5	10.0
0.06	-41.1	10.4
0.07	-41.3	10.2
0.08	-41.6	9.9
0.09	-41.7	9.8
0.1	-41.7	9.8
0.2	-44.0	7.5
0.3	-41.6	9.9
0.4	-41.6	9.9
0.5	-41.7	9.8
0.6	-41.5	10.0
0.7	-41.4	10.1
0.8	-41.5	10.0
0.9	-41.6	9.9
1	-41.2	10.3
2	-40.5	11.0
3	-40.8	10.7
4	-41.0	10.5
5	-40.5	11.0
6	-40.5	11.0
7	-40.7	10.8
8	-40.8	10.7
9	-40.1	11.4
10	-40.4	11.1
12	-41.0	10.5
14	-42.1	9.4
15	-42.3	9.2
16	-42.7	8.8
18	-41.0	10.5
20	-41.1	10.4
25	-43.4	8.1
30	-45.3	6.2

Trans. Antenna Height  
Receiving Antenna Height

2 meter  
2 meter

**APPENDIX D**

***DATA SHEETS***





**COMPATIBLE  
ELECTRONICS**

**RADIATED EMISSIONS (FCC SUBPART C, SECTION 15.249)**

COMPANY	SENSOR DEVELOPMENTS, INC.				DATE	5/14/99
EUT	TELEMETRY TRANSMITTER				ANTENNAS	HORN
MODEL	90305				POLARIZATION	SEE BELOW
S/N	PROTOTYPE				TEST DISTANCE	13 METERS
EUT MODE	LOW, MEDIUM, AND HIGH CHANNELS				LAB	B

Frequency MHz	Peak Reading (dBuV)	Average or Quasi-Peak (dBuV)	Antenna Height (meters)	Antenna Polar. (V or H)	EUT Channel	EUT Axis (X,Y,Z)	EUT Azimuth (degrees)	Distance Factor	Antenna Factor	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta Spec Limit (dB)	Comments
4516.50	50.8	46.1	1.0	H	LOW	X	180	0.0	32.3	8.4	34.1	52.7	-1.3	54.0
4516.50	49.3	45.2	1.0	H	LOW	Y	90	0.0	32.3	8.4	34.1	51.8	-2.2	54.0
4516.50	45.7	41.3	1.0	H	LOW	Z	0	0.0	32.3	8.4	34.1	47.9	-6.1	54.0
4576.75	49.7	46.3	1.0	H	MED.	X	90	0.0	32.3	8.4	34.1	52.9	-1.1	54.0
4576.75	47.2	43.4	1.0	H	MED.	Y	270	0.0	32.3	8.4	34.1	50.0	-4	54.0
4576.75	47.2	41.9	1.5	H	MED.	Z	270	0.0	32.3	8.4	34.1	48.5	-5.5	54.0
4606.35	47.1	38.4	1.0	H	HIGH	X	180	0.0	32.3	8.4	34.1	45.0	-9	54.0
4606.35	45.5	36.8	1.5	H	HIGH	Y	270	0.0	32.3	8.4	34.1	43.4	-10.6	54.0
4606.35	47.0	38.3	1.5	H	HIGH	Z	270	0.0	32.3	8.4	34.1	44.9	-9.1	54.0
4516.50	50.2	46.1	1.0	V	LOW	X	90	0.0	32.3	8.4	34.1	52.7	-1.3	54.0
4516.50	47.6	42.5	1.0	V	LOW	Y	90	0.0	32.3	8.4	34.1	49.1	-4.9	54.0
4516.50	46.6	41.9	1.5	V	LOW	Z	270	0.0	32.3	8.4	34.1	48.5	-5.5	54.0
4576.75	49.7	45.3	1.0	V	MED.	X	180	0.0	32.3	8.4	34.1	51.9	-2.1	54.0
4576.75	46.8	43.4	1.5	V	MED.	Y	90	0.0	32.3	8.4	34.1	50.0	-4	54.0
4576.75	50.4	46.7	1.5	V	MED.	Z	180	0.0	32.3	8.4	34.1	53.3	-0.7	54.0
4606.35	48.4	43.2	1.0	V	HIGH	X	90	0.0	32.3	8.4	34.1	49.8	-4.2	54.0
4606.35	46.9	41.7	1.0	V	HIGH	Y	180	0.0	32.3	8.4	34.1	48.3	-5.7	54.0
4606.35	48.9	43.2	2.0	V	HIGH	Z	270	0.0	32.3	8.4	34.1	49.8	-4.2	54.0

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

\*\*\* BELOW 1 GHz. QUASI-PEAK MEASUREMENT IS EMPLOYED. ABOVE 1 GHz, AVERAGE MEASUREMENT IS EMPLOYED



**COMPATIBLE  
ELECTRONICS**

**RADIATED EMISSIONS (FCC SUBPART C, SECTION 15.249)**

COMPANY	SENSOR DEVELOPMENTS				DATE	36294
EUT	TELEMETRY TRANSMITTER				ANTENNAS	LOG PERIODIC
MODEL	90305				POLARIZATION	VERTICAL AND HORIZONTAL
S/N	PROTOTYPE				TEST DISTANCE	13 METERS
EUT MODE	LOW, MEDIUM, AND HIGH CHANNELS				LAB	B

Frequency MHz	Peak Reading (dBuV)	Average or Quasi-Peak (dBuV)	Antenna Height (meters)	Antenna Polar. (V or H)	EUT Channel	EUT Axis (X,Y,Z)	EUT Azimuth (degrees)	Distance Factor (dB)	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
903.30	56.3	1.0	H	LOW	X	180	0.0	21.6	3.0	0.0	80.9	-13.1	94.0		
903.30	63.9	1.0	H	LOW	Y	90	0.0	21.6	3.0	0.0	88.5	-5.5	94.0		
903.30	61.1	1.0	H	LOW	Z	0	0.0	21.6	3.0	0.0	85.7	-8.3	94.0		
915.35	56.3	1.0	H	MED.	X	90	0.0	21.6	3.0	0.0	80.9	-13.1	94.0		
915.35	60.5	1.0	H	MED.	Y	270	0.0	21.6	3.0	0.0	85.1	-8.9	94.0		
915.35	59.0	1.5	H	MED.	Z	270	0.0	21.6	3.0	0.0	83.6	-10.4	94.0		
921.27	55.5	1.0	H	HIGH	X	180	0.0	21.6	3.0	0.0	80.1	-13.9	94.0		
921.27	49.6	1.5	H	HIGH	Y	270	0.0	21.6	3.0	0.0	74.2	-19.8	94.0		
921.27	52.2	1.5	H	HIGH	Z	270	0.0	21.6	3.0	0.0	76.8	-17.2	94.0		
903.30	63.8	1.0	V	LOW	X	90	0.0	21.6	3.0	0.0	88.4	-5.6	94.0		
903.30	59.2	1.0	V	LOW	Y	90	0.0	21.6	3.0	0.0	83.8	-10.2	94.0		
903.30	54.8	1.5	V	LOW	Z	270	0.0	21.6	3.0	0.0	79.4	-14.6	94.0		
915.35	60.7	1.0	V	MED.	X	180	0.0	21.6	3.0	0.0	85.3	-8.7	94.0		
915.35	56.2	1.5	V	MED.	Y	90	0.0	21.6	3.0	0.0	80.8	-13.2	94.0		
915.35	55.3	1.5	V	MED.	Z	180	0.0	21.6	3.0	0.0	79.9	-14.1	94.0		
921.27	60.2	1.5	V	HIGH	X	90	0.0	21.6	3.0	0.0	84.8	-9.2	94.0		
921.27	57.2	1.0	V	HIGH	Y	180	0.0	21.6	3.0	0.0	81.8	-12.2	94.0		
921.27	48.4	1.0	V	HIGH	Z	270	0.0	21.6	3.0	0.0	73.0	-21	94.0		

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

\*\*\* BELOW 1 GHz, QUASI-PEAK MEASUREMENT IS EMPLOYED, ABOVE 1 GHz, AVERAGE MEASUREMENT IS EMPLOYED



**COMPATIBLE  
ELECTRONICS**

**RADIATED EMISSIONS (FCC SUBPART C, SECTION 15.249)**

COMPANY	SENSOR DEVELOPMENTS				DATE	5/14/99
EUT	TELEMETRY TRANSMITTER				ANTENNAS	LOG AND HORN
MODEL	90305				POLARIZATION	SEE BELOW
S/N	PROTOTYPE				TEST DISTANCE	3 METERS
EUT MODE	LOW, MEDIUM AND HIGH CHANNELS				LAB	D

Frequency MHz	Peak Reading dBuV	Average or Quasi-Peak dBuV	Antenna Height (meters)	Antenna Polar. (V or H)	EUT Channel (X,Y,Z)	EUT Azimuth (degrees)	EUT Antenna Factor (dB)	Distance Antenna Factor (dB)	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading dBuV/m	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
1806.60	48.0	1.0	H	LOW	X	180	0.0	26.7	3.1	35.6	42.2	-11.8	54.0		
1806.60	47.0	1.0	H	LOW	Y	90	0.0	26.7	3.1	35.6	41.2	-12.8	54.0		
1806.60	51.8	1.0	H	LOW	Z	0	0.0	26.7	3.1	35.6	46.0	-8	54.0		
1830.70	47.0	1.0	H	MED.	X	90	0.0	26.7	3.1	35.6	41.2	-12.8	54.0		
1830.70	46.5	1.0	H	MED.	Y	270	0.0	26.7	3.1	35.6	40.7	-13.3	54.0		
1830.70	48.2	1.5	H	MED.	Z	270	0.0	26.7	3.1	35.6	42.4	-11.6	54.0		
1842.54	49.4	1.0	H	HIGH	X	180	0.0	26.7	3.1	35.6	43.6	-10.4	54.0		
1842.54	50.2	1.5	H	HIGH	Y	270	0.0	26.7	3.1	35.6	44.4	-9.6	54.0		
1842.54	48.2	1.5	H	HIGH	Z	270	0.0	26.7	3.1	35.6	42.4	-11.6	54.0		
1806.60	50.2	1.0	V	LOW	X	90	0.0	26.7	3.1	35.6	44.4	-9.6	54.0		
1806.60	50.3	1.0	V	LOW	Y	90	0.0	26.7	3.1	35.6	44.5	-9.5	54.0		
1806.60	47.6	1.5	V	LOW	Z	270	0.0	26.7	3.1	35.6	41.8	-12.2	54.0		
1830.70	51.8	1.0	V	MED.	X	180	0.0	26.7	3.1	35.6	46.0	-8	54.0		
1830.70	49.5	1.5	V	MED.	Y	90	0.0	26.7	3.1	35.6	43.7	-10.3	54.0		
1830.70	51.1	1.5	V	MED.	Z	180	0.0	26.7	3.1	35.6	45.3	-8.7	54.0		
1842.54	50.5	1.0	V	HIGH	X	90	0.0	26.7	3.1	35.6	44.7	-9.3	54.0		
1842.54	52.9	1.0	V	HIGH	Y	180	0.0	26.7	3.1	35.6	47.1	-6.9	54.0		
1842.54	51.4	1.0	V	HIGH	Z	270	0.0	26.7	3.1	35.6	45.6	-8.4	54.0		

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

\*\*\* BELOW 1 GHz, QUASI-PEAK MEASUREMENT IS EMPLOYED, ABOVE 1 GHz, AVERAGE MEASUREMENT IS EMPLOYED



**COMPATIBLE  
ELECTRONICS**

**RADIATED EMISSIONS (FCC SUBPART C, SECTION 15.249)**

COMPANY	SENSOR DEVELOPMENTS, INC.				DATE	5/14/99		
EUT	TELEMETRY TRANSMITTER				ANTENNAS	LOG AND HORN		
MODEL	90305				POLARIZATION SEE BELOW			
SN	PROTOTYPE				TEST DISTANCE 13 METERS			
B	LOW, MEDIUM, AND HIGH CHANNELS				LAB	D		
Frequency	Peak Reading (dBuV)	Average or Quasi-Peak (dBuV)	Antenna Height (meters)	Antenna Polar. (V or H)	EUT Channel (X, Y, Z)	EUT Axis (X, Y, Z)	EUT Azimuth (degrees)	EUT Distance Factor (dB)
2709.90	50.9	1.0	H	LOW	X	180	0.0	29.7
2709.90	46.8	1.0	H	LOW	Y	90	0.0	29.7
2709.90	46.2	1.0	H	LOW	Z	0	0.0	29.7
2746.05	48.9	1.0	H	MED.	X	90	0.0	29.7
2746.05	48.5	1.0	H	MED.	Y	270	0.0	29.7
2746.05	46.6	1.5	H	MED.	Z	270	0.0	29.7
2763.81	46.6	1.0	H	HIGH	X	180	0.0	29.7
2763.81	48.0	1.5	H	HIGH	Y	270	0.0	29.7
2763.81	45.7	1.5	H	HIGH	Z	270	0.0	29.7
2709.90	47.1	1.0	V	LOW	X	90	0.0	29.7
2709.90	47.6	1.0	V	LOW	Y	90	0.0	29.7
2709.90	49.0	1.5	V	LOW	Z	270	0.0	29.7
2746.05	48.6	1.0	V	MED.	X	180	0.0	29.7
2746.05	48.3	1.5	V	MED.	Y	90	0.0	29.7
2746.05	47.6	1.5	V	MED.	Z	180	0.0	29.7
2763.81	48.6	2.0	V	HIGH	X	90	0.0	29.7
2763.81	47.8	1.0	V	HIGH	Y	180	0.0	29.7
2763.81	47.6	1.0	V	HIGH	Z	270	0.0	29.7

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

\*\*\* BELOW 1 GHz, QUASI-PEAK MEASUREMENT IS EMPLOYED, ABOVE 1 GHz, AVERAGE MEASUREMENT IS EMPLOYED



**COMPATIBLE  
ELECTRONICS**

**RADIATED EMISSIONS (FCC SUBPART C, SECTION 15.249)**

<b>COMPANY</b>	SENSOR DEVELOPMENTS, INC.			<b>DATE</b>	5/14/99	
<b>EUT</b>	TELEMETRY TRANSMITTER			<b>ANTENNAS</b>	LOG AND HORN	
<b>MODEL</b>	90305			<b>POLARIZATION</b>	SEE BELOW	
<b>SN</b>	PROTOTYPE			<b>TEST DISTANCE</b>	13 METERS	
<b>EUT MODE</b>	LOW, MEDIUM, AND HIGH CHANNELS			<b>LAB</b>	D	

Frequency MHz	Peak Reading (dBuV)	Average or Quasi-Peak (dBuV)	Antenna Height (meters)	Antenna Polar. (V or H)	EUT Channel	EUT Axis (X,Y,Z)	EUT Azimuth (degrees)	EUT Antenna Factor (dB)	Distance Factor (dB)	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
3613.20	53.5	49.2	1.0	H	LOW	X	180	0.0	29.5	3.8	35.2	47.3	-6.7	54.0			
3613.20	49.0		1.0	H	LOW	Y	90	0.0	29.5	3.8	35.2	47.1	-6.9	54.0			
3613.20	46.3		1.0	H	LOW	Z	0	0.0	29.5	3.8	35.2	44.4	-9.6	54.0			
3661.40	51.0		1.0	H	MED.	X	90	0.0	29.5	3.8	35.2	49.1	-4.9	54.0			
3661.40	50.2		1.0	H	MED.	Y	270	0.0	29.5	3.8	35.2	48.3	-5.7	54.0			
3661.40	49.3		1.5	H	MED.	Z	270	0.0	29.5	3.8	35.2	47.4	-6.6	54.0			
3685.08	49.1		2.0	H	HIGH	X	180	0.0	29.5	3.8	35.2	47.2	-6.8	54.0			
3685.08	47.0		1.5	H	HIGH	Y	270	0.0	29.5	3.8	35.2	45.1	-8.9	54.0			
3685.08	50.4		1.5	H	HIGH	Z	270	0.0	29.5	3.8	35.2	48.5	-5.5	54.0			
3613.20	51.5		1.0	V	LOW	X	90	0.0	29.5	3.8	35.2	49.6	-4.4	54.0			
3613.20	47.3		1.0	V	LOW	Y	90	0.0	29.5	3.8	35.2	45.4	-8.6	54.0			
3613.20	49.6		1.5	V	LOW	Z	270	0.0	29.5	3.8	35.2	47.7	-6.3	54.0			
3661.40	49.5		1.0	V	MED.	X	180	0.0	29.5	3.8	35.2	47.6	-6.4	54.0			
3661.40	49.5		1.5	V	MED.	Y	90	0.0	29.5	3.8	35.2	47.6	-6.4	54.0			
3661.40	50.3		1.5	V	MED.	Z	180	0.0	29.5	3.8	35.2	48.4	-5.6	54.0			
3685.08	51.9		1.0	V	HIGH	X	90	0.0	29.5	3.8	35.2	50.0	-4	54.0			
3685.08	50.1		1.0	V	HIGH	Y	180	0.0	29.5	3.8	35.2	48.2	-5.8	54.0			
3685.08	50.8		1.0	V	HIGH	Z	270	0.0	29.5	3.8	35.2	48.9	-5.1	54.0			

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

\*\*\* BELOW 1 GHz, QUASI-PEAK MEASUREMENT IS EMPLOYED, ABOVE 1 GHz, AVERAGE MEASUREMENT IS EMPLOYED