TEST REPORT PREPARED BY:

Electronics Test Centre
MPB Technologies Inc.
Unit 100
302 Legget Drive
Kanata Ontario K2K 1Y5

MPBT Report No.: I4R2231 **Customer No.: 713813**

Test Report for Emissions: FCC Pt 15.231 (1996) Class 2 Permissive Change Testing of the Instantel Infant Tag

FCCID: ISEIFT

Test Personnel: D. Raynes

Prepared for:

Instantel
362 Terry Fox Drive
Kanata, Ontario
Canada K2K 2P5

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Client Acceptance
Authorized Signatory

24 March 2000
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Lab Supervisor Electromagnetic Services
Electromagnetics Division
Authorized Signatory

Industry Industrie Canada Canada

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1.0 INTRODUCTION

1.1 SCOPE

The purpose of this report is to present the findings and results of compliance testing performed, for a Class 2 Permissive Change under FCC Part 15.231 (1996).

1.2 APPLICANT

This test report has been prepared for Instantel, located in Kanata, Ontario, Canada.

1.3 APPLICABILITY

All test procedures, limits, and results defined in this document apply to the Instantel Infant Tag unit, which shall be referred to herein as the Equipment Under Test (EUT).
The results contained in this report relate only to the item tested.
This report does not imply product endorsement by NVLAP or the Canadian or US governments.

1.4 TEST SAMPLE DESCRIPTION

The test sample, provided for testing was a Instantel Infant Tag.

Product Type:	Battery powered microprocessor controlled transmitter
Serial Number:	N/A
Model Number	PIC16LC558
Cables	N/A
Power Requirements:	3VDC lithium 'button' cell
Peripheral Equipment:	Detects signals from Instantel 'Portal Exciter'

The Infant Tag is used as part of the Instantel Infant Protection System designed to ensure that infants in hospital maternity wards are not abducted.

The Infant Tag product modifications that Instantel is making consist exclusively of changes to firmware (programmed into the Tag microcontroller). No mechanical or electrical hardware changes of any kind (including the transmitter circuitry) are being made to the product.

The following three changes to the timing of transmitted messages are planned:
In the former design, regular, supervisory messages were transmitted (at a power below 1500 microvolts/m including duty cycle factor) once every 45 seconds. In the new design, these supervisory messages will be transmitted every 10.2 +/- 0.1 seconds.

In the former design, the duration of regular, supervisory messages was measured and reported to be 7.54 ms. In the new design, the duration of regular, supervisory messages will increase by 0.488+/- 0.003 microseconds (to 8.03 ms).

In the former design, the Infant Tag signals an Infant abduction attempt (life threatening) by promptly transmitting 16 messages. The duration of each message is 9.25 ms. The spacing between each of the 16 messages is 210 ms. In the new design, the duration of each message will increase by 0.732 +/- 4 ms (to 9.98 ms).

1.5 GENERAL TEST CONDITIONS AND ASSUMPTIONS

The EUT was setup and exercised using the configurations, modes of operation and arrangements defined in this report only. All inputs and outputs to and from other equipment associated with the EUT were adequately simulated.

Where relevant, the EUT was only tested using the monitoring methods and test criteria defined in this report.

All testing, unless otherwise noted, was performed under the following environmental conditions:

Temperature:	17 to 23 °C
Humidity:	45 to 75 %
Barometric Pressure:	68 to 106 kPa

1.6 SCOPE OF TESTING

Tests were performed in accordance with FCC Part 15.231 (1996).

1.6.1 VARIATIONS IN TEST METHODS

Duty cycle measurements of the test sample for the original application were taken by probing the internal circuitry directly. For the tests reported in this document, the Test sample was strapped to a small antenna, and the RF output pulses were recorded with a digital oscilloscope and a spectrum analyzer.

Since the output oscillator has an appreciable turn-on time, the output pulses are shorter in duration than the internal signals. While measuring the internal signals would have presented a worst-case condition, the actual RF output was chosen for measurement as being more realistic.

1.6.2 TEST SAMPLE MODIFICATIONS

The only change to the EUT is the use of different pulse width and timing. This change is implemented in firmware. No hardware changes were made. Therefore the examination of the Infant Tag was limited to observing the timing, duration, and occupied bandwidth of the output pulses.

2. ABBREVIATIONS

E -Field - Electric Field

N/T -Not Tested

N/A -Not Applicable

RE -Radiated Emissions

3.0 MEASUREMENT UNCERTAINTY

The following measurement uncertainty with 95% confidence level was calculated using the methods defined in NAMAS document NIS81: May 1994.

- For Radiated E-Field Emissions

  Frequency = $\pm$ $1x10^{-3}$ MHz

  Amplitude = $\pm$ 4.01 dB

TEST SET UP
The photographs show the set up for each test.

4.0 TEST CONCLUSION

The EUT was subjected to the following tests. Compliance is designated by a **PASS** or **FAIL**.

TEST CASE	TEST TYPE	SPEC	PARA	TEST SAMPLE	MOD. STATE	CONFIGURATION	RESULT
2.10	Radiated Emissions	FCC Part 15.231	E	Instantel Infant Tag	Firmware MODS	normal use	**PASS**

STATEMENT OF COMPLIANCE

The Instantel Infant Tag referred to in this report was found to comply with the requirements as stated above.

4.1 OCCUPIED BANDWIDTH

Test Summary	
Test Lab: MPB Technologies Inc. Ottawa Test Personnel: D. Raynes Test Date: 23 March 2000	Product: Instantel Infant Tag

FCC Part 15.231 (1996)

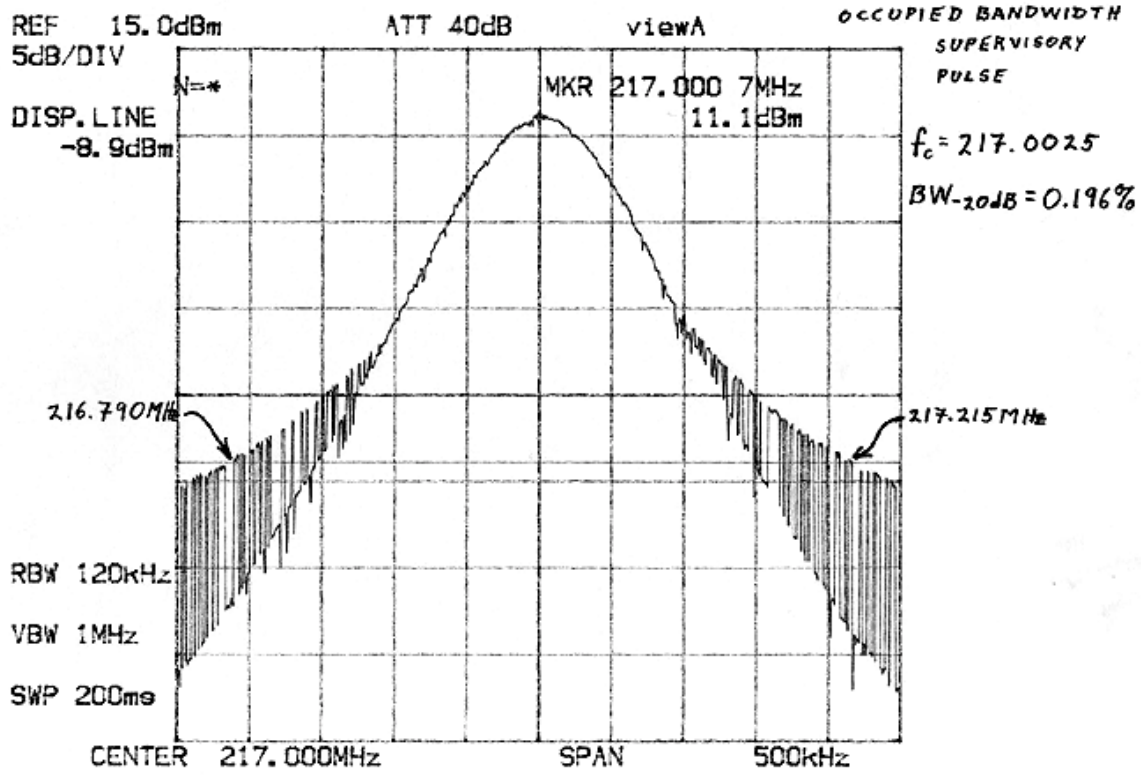
The occupied bandwidth of the EUT RF output signal shall not exceed 0.25% of the center frequency of that signal.

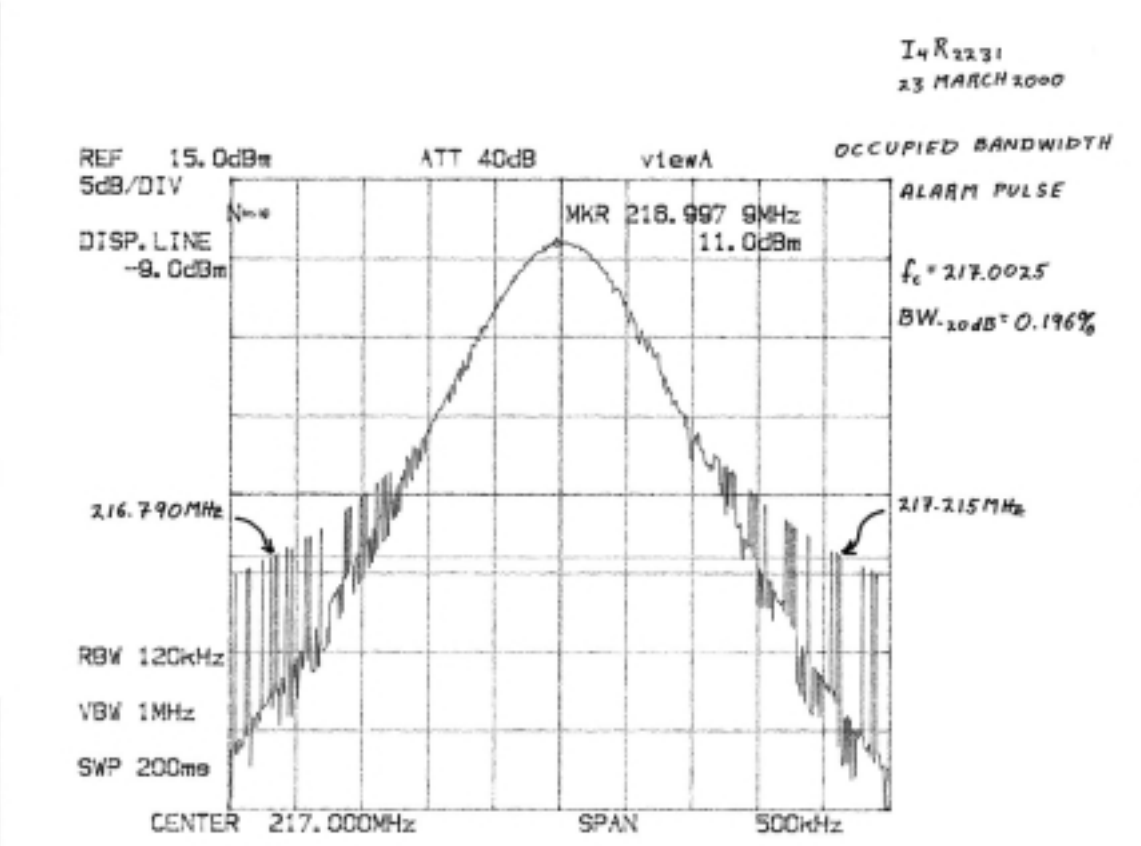
This is calculated based on the frequencies above and below the center frequency, whose amplitude is observed to be -20 dB from the peak amplitude of the EUT output.

Test Result: **PASS**

Supervisory Mode:	**Alarm Mode:**
f_L = 216.790 MHz	f_L = 216.790 MHz
f_H = 217.215 MHz	f_H = 217.215 MHz
$\therefore f_C$ = 217.0025 MHz	$\therefore f_C$ = 217.0025 MHz
BW_{-20dB} = 0.425 MHz $\Rightarrow$ **0.196%**	BW_{-20dB} = 0.425 MHz $\Rightarrow$ **0.196%**

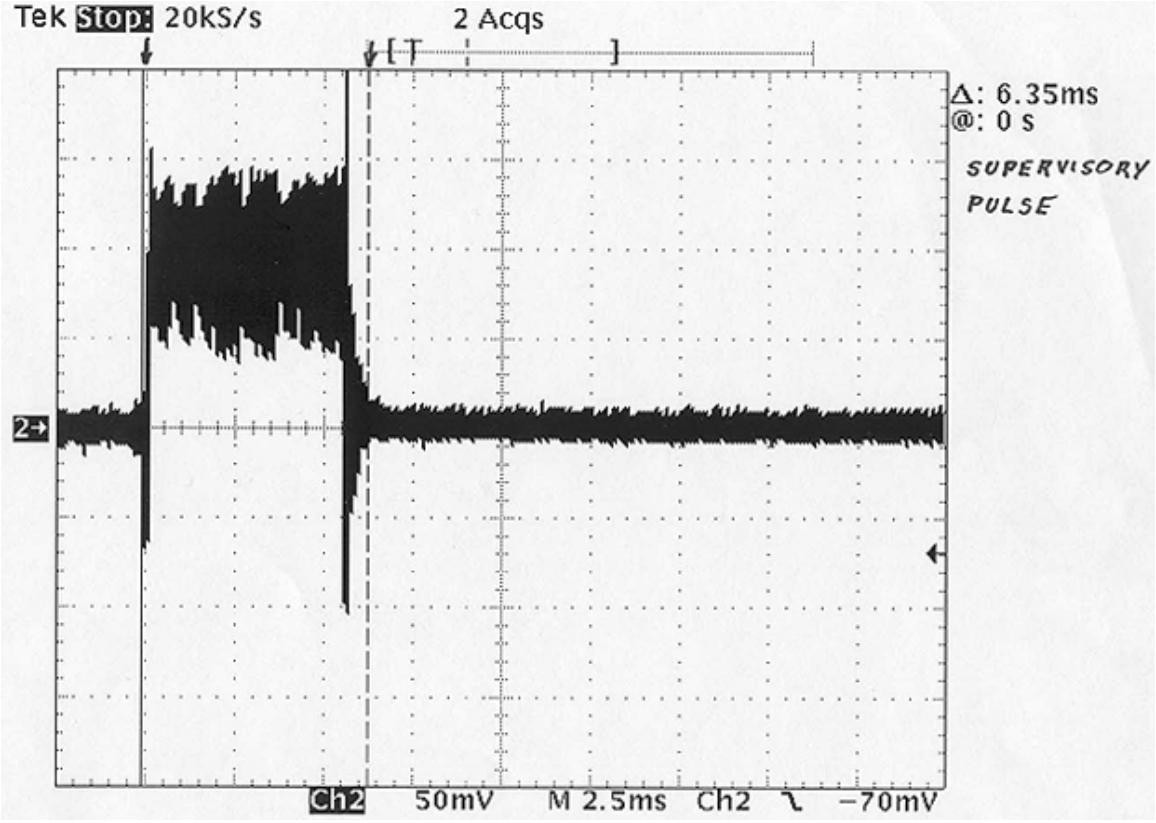
Refer to following Test Data for more detail

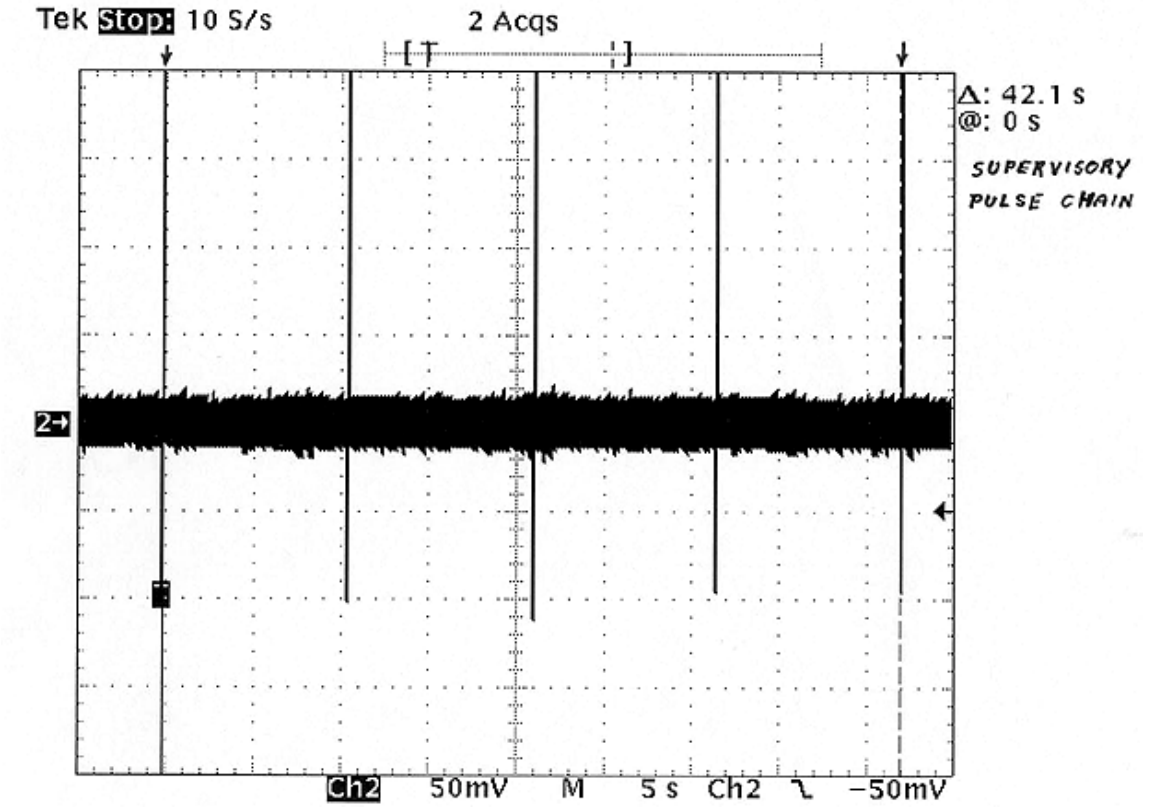


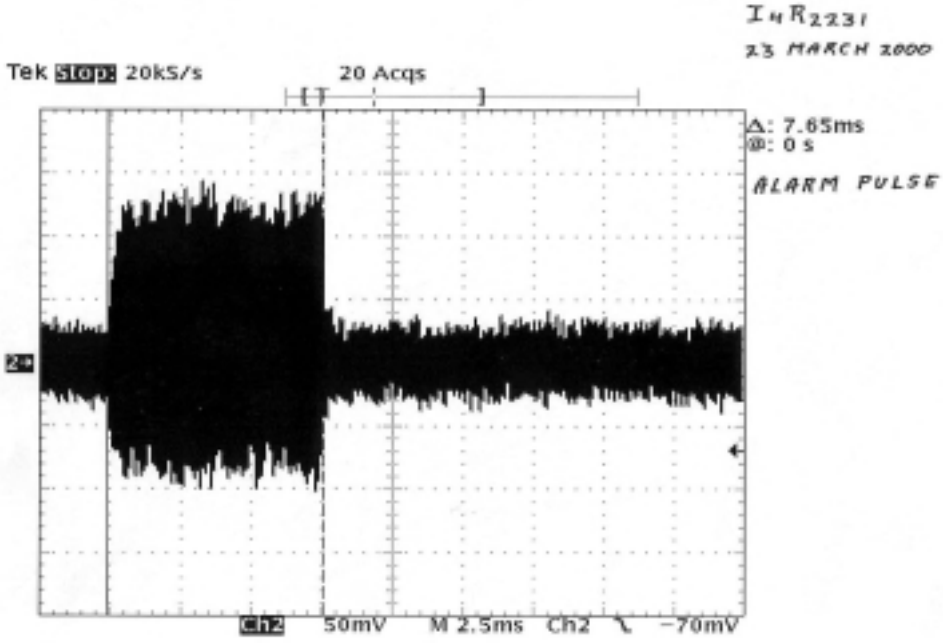


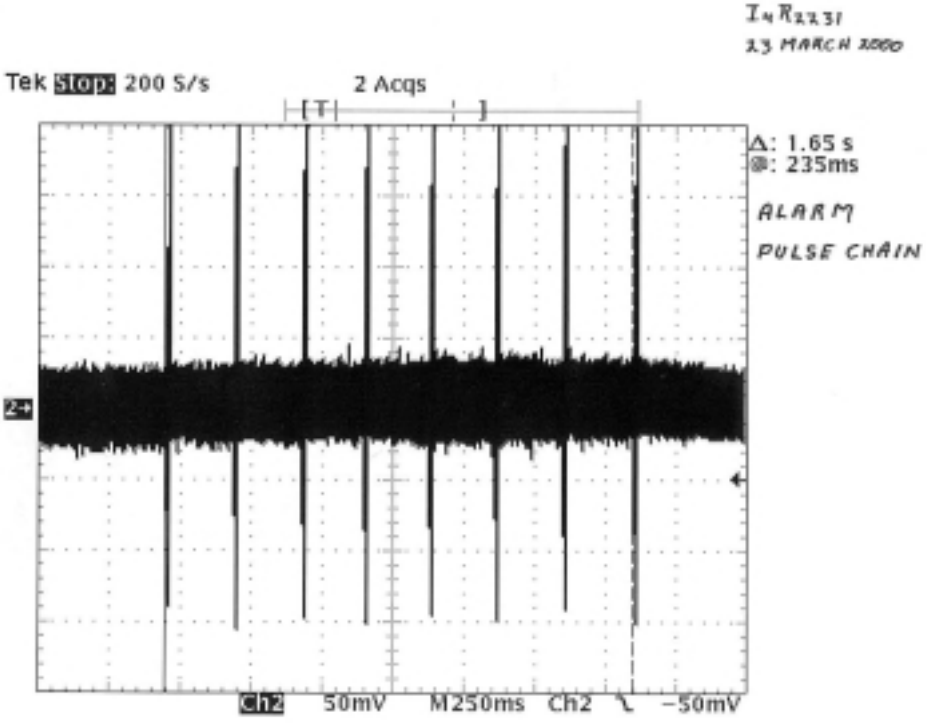
4.2 FIELD STRENGTH CORRECTION FOR DUTY CYCLE

Test Summary	
Test Lab: MPB Technologies Inc. Ottawa Test Personnel: D. Raynes Test Date: 23 March 2000	Product: Instantel Infant Tag
FCC Part 15.231 (1996) Corrected Value = Peak Measurement + (20 x $\log_{10}$ (Data Pulsewidth / Period)) Note: correction cannot be < -20 dB	
Test Result: **PASS**	
Supervisory Mode: Data Pulsewidth = 6.35 ms Period = 10.525 sec Peak Measurement = 51.7 dBµV/m ∴Corrected Value = **31.7 dBµV/m**	**Alarm Mode:** Data Pulsewidth = 7.65 ms Period = 0.2357 sec Peak Measurement = 51.7 dBµV/m ∴Corrected Value = **31.7 dBµV/m**
Refer to following Test Data for more detail	









5.0 TEST FACILITY

5.1 LOCATION

The EUT was tested for Electromagnetic Compatibility at the Electronics Test Centre, located in Kanata, Ontario, Canada.

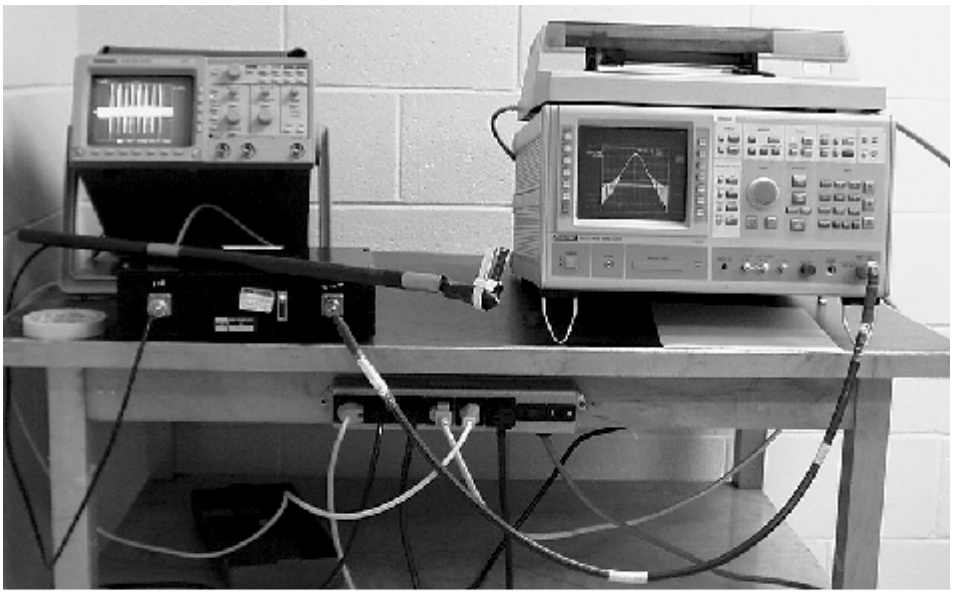
5.2 GROUNDING PLAN

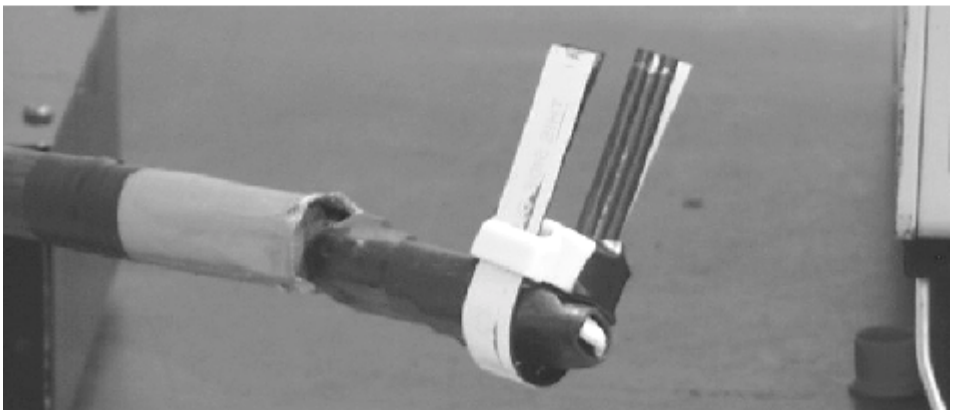
The EUT was located on a wooden table 80 cm above the ground.

5.3 POWER

EUT power was supplied by an internal battery.

5.5 TEST CONFIGURATION





6.0 Test Equipment

Asset	Characteristics	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date
4281	Biconilog Antenna	Antenna Research	LPB-2520/A	1048	Dec 30, 1999	Dec 30, 2000
4989	Spectrum Analyzer	Hewlett Packard	8566B/462	2747A05263	Dec 30, 1999	Dec 30, 2000
4990	Quasi Peak Adapter	Hewlett Packard	85650A	2521A00815	Dec 30, 1999	Dec 30, 2000
4529	Mast/Antenna Control	Electro-Mechanics	1050C	1086	Monitored	Monitored
4861	Turn Table Control	Sunol	5C98V		Monitored	Monitored
5076	Software	Underwriters Laboratories	V2.05	MC106399NK07147	Monitored	Monitored
002345	Field Probe Set	Amplifier Research	FP 2000	12439	Jul 30, 1999	Jul 30, 2000
002831	Spectrum Analyzer	Advantest	R4136	71220067	Dec 29, 1999	Dec 29, 2000
002430	Bi-directional Coupler	Werlatone	03414	4341	Feb 4, 2000	Feb 4, 2001
003736	Signal Generator	Marconi Instruments	2022A	119062	Jul 21, 1999	Jul 21, 2000
2319	DRG Horn Antenna	Electrometrics	RGA60	2966	Jan 03, 1999	Dec 30, 2000
2366	Pre-amplifier	Miteq	AFS44-01-00220045-8P44	327221	Sep 03, 1999	Jul 31, 2000