

Test Report Prepared By:

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

MPBT Report No.: I4-R-1835

Customer No.: 710860

**Test Report for FCC Part 15.231:1996
Testing of the Instantel Infant Tag**

Test Personnel: D.Raynes

Prepared for:

Instantel
362 Terry Fox Drive
Kanata, ON K2K 2P5

July 6, 1998
I4-R-1835

Client Acceptance
Authorized Signatory

Daniele Zanette
Laboratory Supervisor
Electromagnetics Measurement Facility
Authorized Signatory

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APPENDICES

Appendix A:	Instantel Infant Tag
Appendix B:	Test Report Data Sheets
Appendix C:	Test Equipment Report
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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, against FCC Part 15.231:1996.

1.2 APPLICANT

This test report has been prepared for:

Instantel Inc.
362 Terry Fox Drive
Kanata, ON K2K 2P5

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(s) 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 by Instantel Inc., was an Infant Tag.

Product Type: Battery powered microprocessor controlled RF transmitter

Serial Number:

Model Number: PIC16LC558

Cables: N/A

Power Requirements: Battery Powered 3 Volt 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.

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 CFR 47 FCC Part 15.231 1996.

1.6.1 VARIATIONS IN TEST METHODS

There were no variations from the test procedures outlined above.

1.6.2 TEST SAMPLE MODIFICATIONS

There were no equipment modifications during test performance.

2.0 TEST CONCLUSION

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

The following table summarizes the test results and details the tests performed in terms of the specification and class or level applied, the unique test sample identification, and the EUT modification state, the mode of operation, configuration and cable arrangement (if applicable).

Summary Chart

Test Case	Test Type	Specification	Class/ Level	Test Sample	Mod. State	Config.	ENG. / QUAL.	Result
2.1	Radiated Emissions	CFR 47 FCC Part 15.231 1996	norm: 231e abdu: 231b	Infant Tag	None	Normal	Qual.	PASS
2.2	Conducted Emissions	CFR 47 FCC Part 15/18: 1996	N/A	N/A	None	N/A	N/A	Not Tested

Test Results are traceable to NIST and NRC

MARGINAL MEASUREMENTS

Marginal measurements were not recorded during testing. Observations are recorded on the attached test report data sheets and noted on the individual test summary.

MEASUREMENT UNCERTAINTY

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

For Radiated E-Field Emissions

Frequency $= \pm 1 \times 10^{-3}$ MHz

Amplitude $= \pm 4.01$ dB

For Conducted Emissions

Frequency $= \pm 1 \times 10^{-3}$ MHz

Amplitude $= \pm 3.25$ dB

TEST SET UP

The photographs in Appendix D show the set up with maximized emission levels for each test.

2.1 RADIATED EMISSIONS

Test Summary	
Test Lab: Electronics Test Centre, Kanata	Product: Instantel Infant Tag
Test Personnel: D.Raynes	
Test Date: July 6, 1998	

Test Description		
Objectives/Criteria	Specifications	
The Radiated E-Field emissions proliferated by a system or sub-system, measured at a distance of 3m from the EUT, shall not exceed the limits for FCC Part 15.231 specifications as stated. Emission levels should meet the requirements with a margin of 6dB.	FCC Part 15:1996 30 MHz to 1 GHz Measurement Distance 3 m Radiated Emissions Limits dBμV/m	
	Frequency	Fundamental
	Spurious	
	40.66-40.70	60 40
	70-130	54.0 34.0
	130-174	54.0-63.5 34.0-43.5
	174-260	63.5 43.5
	260-470	63.5-74.0 43.5-54.0
	>470	74.0 54.0
Using a CISPR Quasi-Peak Adapter		

Test Result	
PASS	
Comments	
Vertical: 217 MHz 33.6 dB μ V/m (313°) 217 MHz 12.4 dB μ V/m (262°) 79.99 MHz 14.7 dB μ V/m 160 MHz 14.5 dB μ V/m 179.97 MHz 10.0 dB μ V/m 109.97 MHz 9.0 dB μ V/m	Horizontal: 217 MHz 49.2 dB μ V/m (201°) 217 MHz 47.7 dB μ V/m (358°) 109.97 MHz 15.7 dB μ V/m 169.96 MHz 13.9 dB μ V/m 129.99 MHz 9.9 dB μ V/m 159.96 MHz 9.2 dB μ V/m
Refer to Test Report Data sheets in appendix B	
ANSI C63.4 1992 Duty Cycle Calculation: Total Data Train Duration $\div$ 100 ms Duty Cycle = 7.54 ms $\div$ 100 ms Duty Cycle = 0.0754 (refer to scope plots in data appendix) Average Detector Field Strength = Duty Cycle x Peak Detector Measured Value μV/m (Avg) = Duty Cycle x μV/m (Pk) All emissions in both normal and abduction modes are well below the 15.231e field strength limits . The above statement applies to part 15.231b by default.	
Refer to oscillographs in Appendix B for EUT transmission modes.	

2.2 BANDWIDTH

Test Summary	
Test Lab: Electronics Test Centre, Kanata Test Personnel: D.Raynes Test Date: July 6, 1998	Product: Instantel Infant Tag

Test Description	
Objectives/Criteria	Specifications
The bandwidth of the EUT shall not exceed specified limits.	FCC Part 15 .231 1996 70 MHz - 900 MHz Bandwidth must be less than 0.25% of centre frequency

Test Result
PASS
Comments
Refer to Data Plots in Appendix

3.0 TEST FACILITY

3.1 LOCATION

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

3.2 GROUNDING PLAN

The EUT was located on a wooden table 80 cm above the ground plane. The EUT was grounded according to the Clients specifications.

3.3 POWER

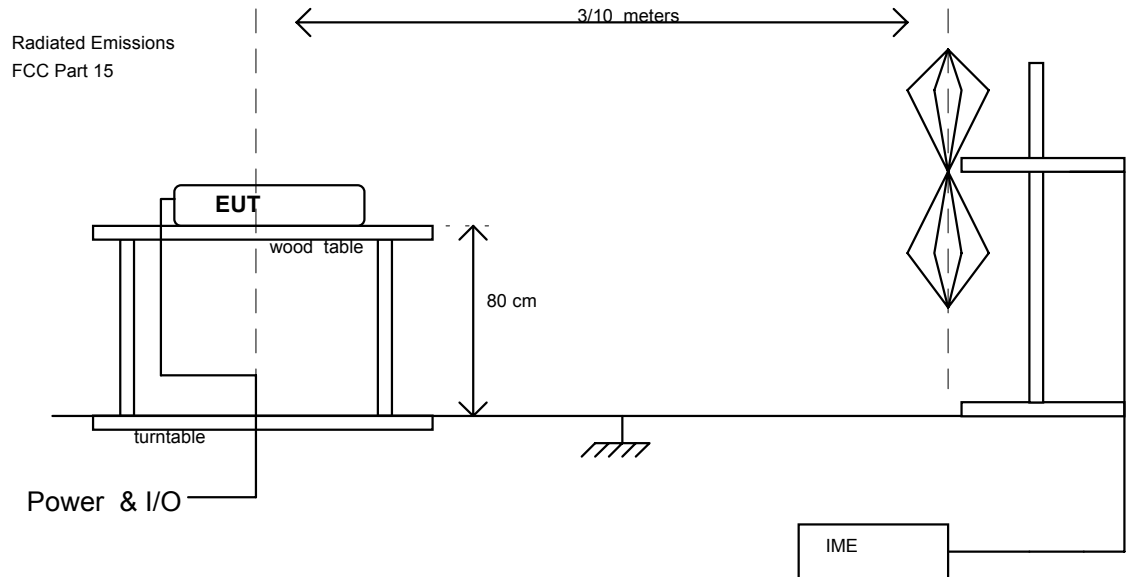
AC power was supplied via a CORCOM RFI feed through, 60 Ampere wall mounted filter. Bonding to hydro ground is via one inch grounding braid straps.

3.4 EMISSIONS PROFILE

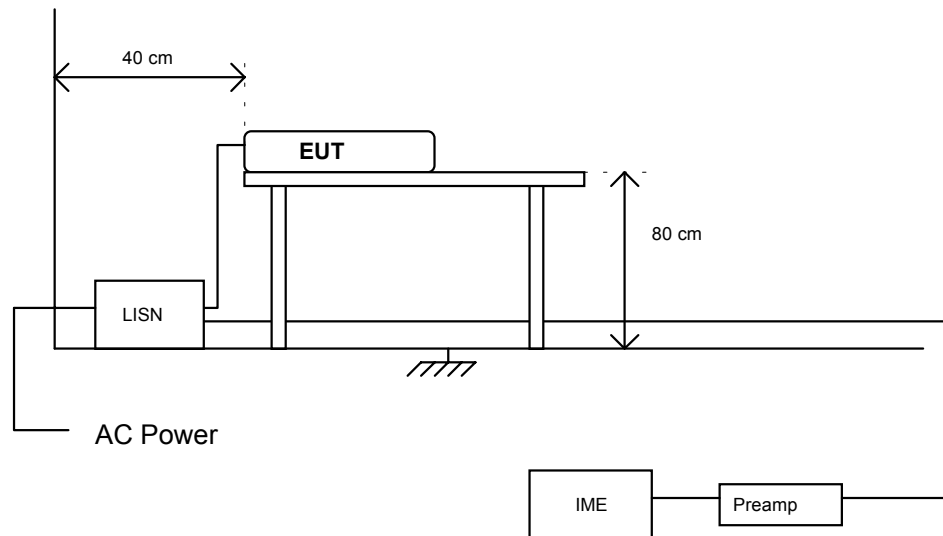
Ambient conducted and radiated electromagnetic emission profiles were generated throughout the tests and are included in the Test Report Data sheets.

3.5 TEST CONFIGURATION

The following diagrams illustrate the configuration of the EUT test and measurement equipment used for FCC Radiated and Conducted Emissions Testing.



Conducted Emissions FCC Part 15



4.0 TEST EQUIPMENT

The following equipment was utilized for this procedure. All measurement devices are calibrated annually, traceable to NIST:

4.1 RADIATED EMISSIONS

- a) Spectrum Analyzer
- b) Receiver with CISPR Quasi-peak Adapter
- c) Power Isolation Transformers
- d) Biconilog antenna (25 MHz to 2.5 GHz)
- e) Antenna mast positioner, and controller
- f) Flush-mounted turntable, and controller

4.2 CONDUCTED EMISSIONS

- a) Spectrum Analyzer
- b) Line Impedance Stabilization Network, 50 μ H
- c) CISPR Quasi-peak Adapter
- d) Power Isolation Transformer
- e) Personal Computer and EMI/EMC Software

4.3 EMI SPECTRUM ANALYZER AND RECEIVER

4.3.1 Spectrum Analyzer Range 1 of 2

Start Frequency	0.45 MHz
Stop Frequency	30 MHz
Transducer	LISN per ANSI C63.4
Quasi-Peak Bandwidth	9 kHz
Spectrum Analyzer BW	9 kHz
Video Bandwidth	100 kHz
Reference Level	100 dB μ V

Spectrum Analyzer Range 2 of 2

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Transducer	Biconilog Antenna
Quasi-Peak Bandwidth	120 kHz
Spectrum Analyzer BW	120 kHz
Video Bandwidth	1 MHz
Reference Level	100 dB μ V

4.3.2 Receiver

Transducer	Biconilog Antenna
Quasi-Peak Bandwidth	120 kHz
Measurement Window	20 dB μ V

Appendix A

Instantel Infant Tag

EUT

Description to be provided by

The CLIENT



CLIENT SAMPLE DESCRIPTION

New		Repeat	
MPBT Personnel	Date	Project/Work Order	
	July 6 / 98		
Contact	Rob McCulloch	Address	
Company	Instantel	362 Terry Fox Dr. KANATA, ON K2K 2P5	
Client Code		Phone: 592-4642 Fax: 592-4296	

Product Application		Product Category		Product Type
Military ☐	Commercial ☒	Telecom ☐	Avionics ☐	RADIO Tag
		Info Tech. ☐	Other ☒	
		Space ☐		
Product Name/Part No.		Infant Tag		
Serial Number				
Power Requirements: AC/DC, Current		BATTERY POWERED (INTERNAL)		
Operational Frequency		217 MHz		
Typical Installation Instructions or Configuration		WORN AS ANKLE Bracelet on an infant		
Ground EUT		Yes ☐ No ☐		
# Interconnecting Leads		Ø		
Internal Clock Frequency		4 MHz		
Peripheral Equipment		Detect Signals from Instantel Portal Exciter (312 MHz)		
Cables				
Functional or Self-Test Duration		~ 1 second		
Brief Functional Description		Sends RF "Supervisory Signal" every 15 secs. Sends RF "Alarm Signals" upon detection of "Portal exciter" or tampering		
Other Remarks				

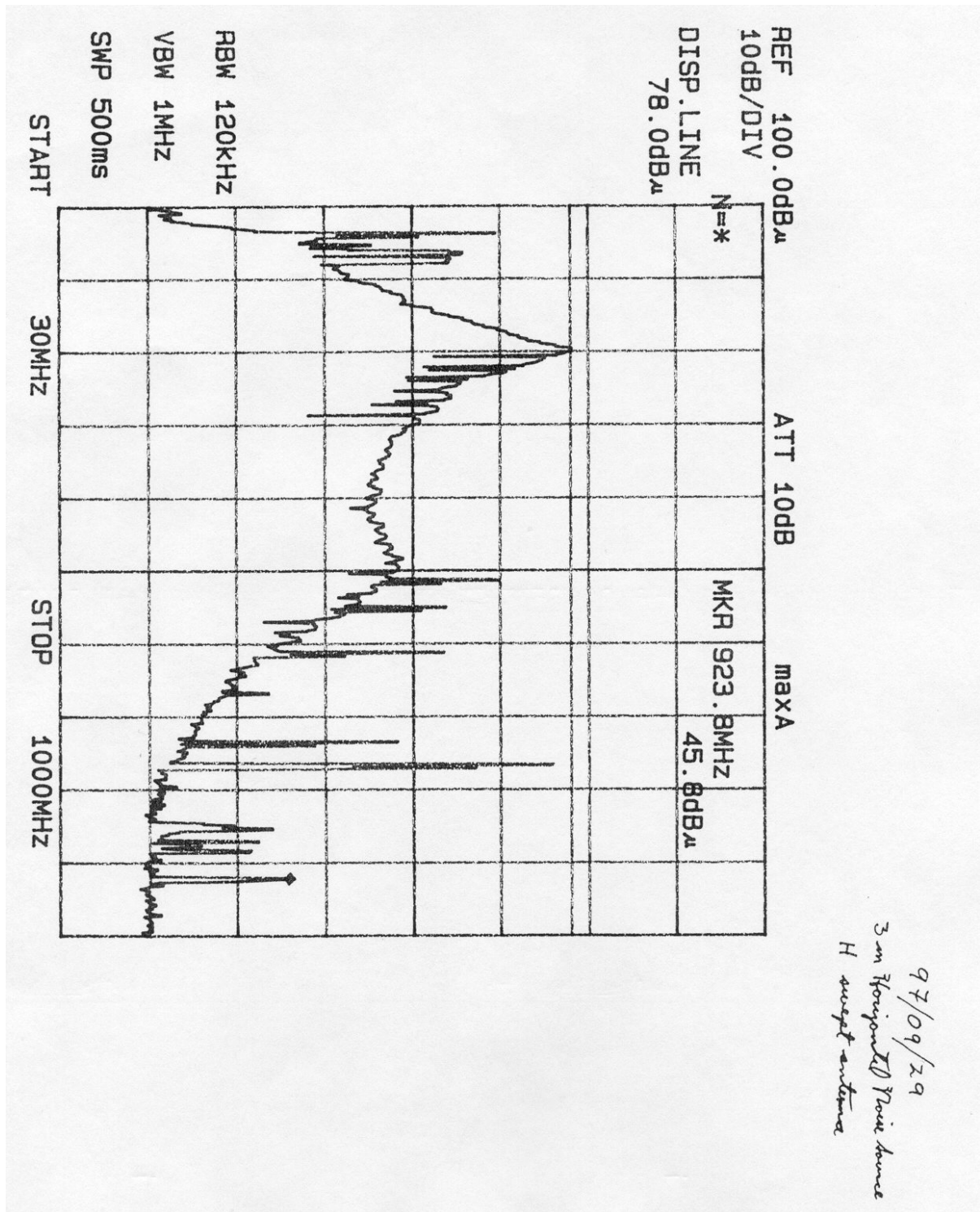
Prepared By:	ROB H ^C Culloch	Title:	ENGINEER	Date:	July 6 / 98
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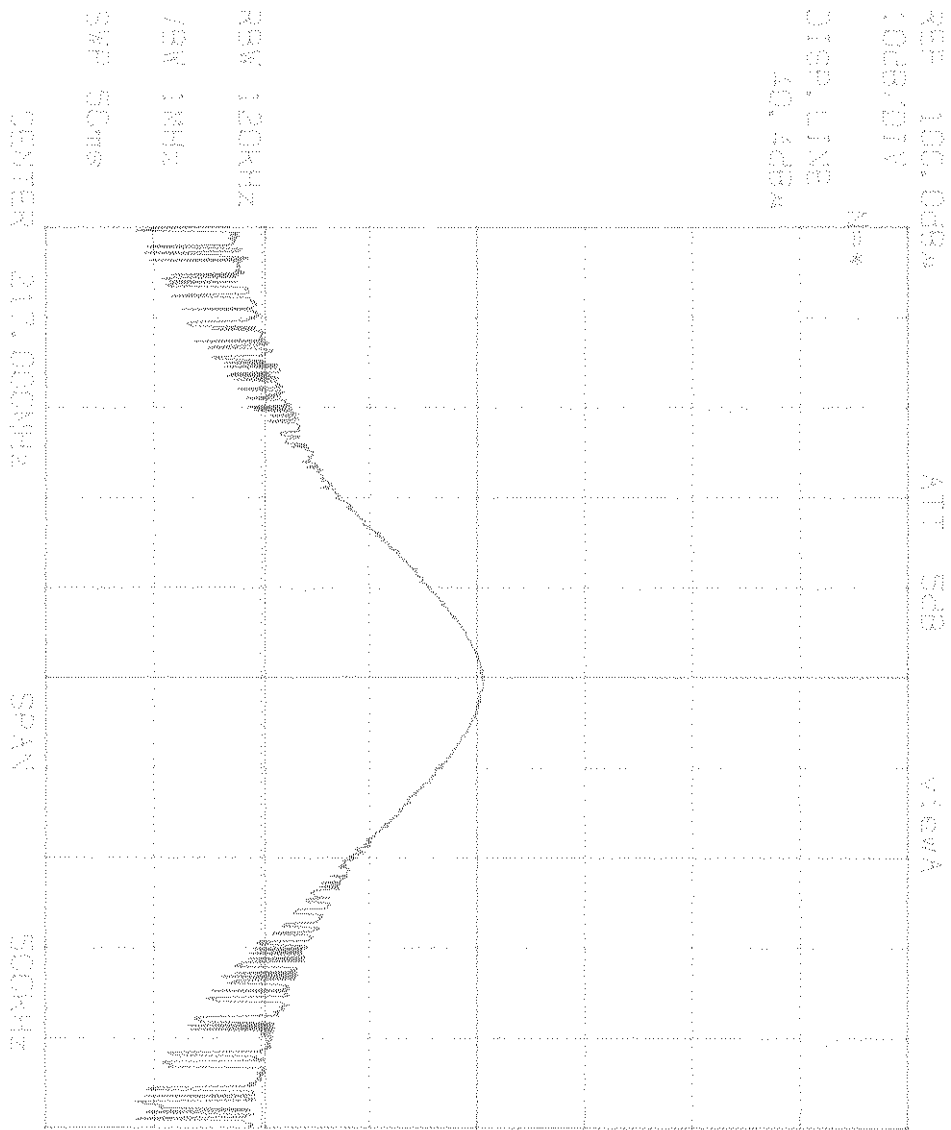
c:\winword\generic\forms\clintdes.doc

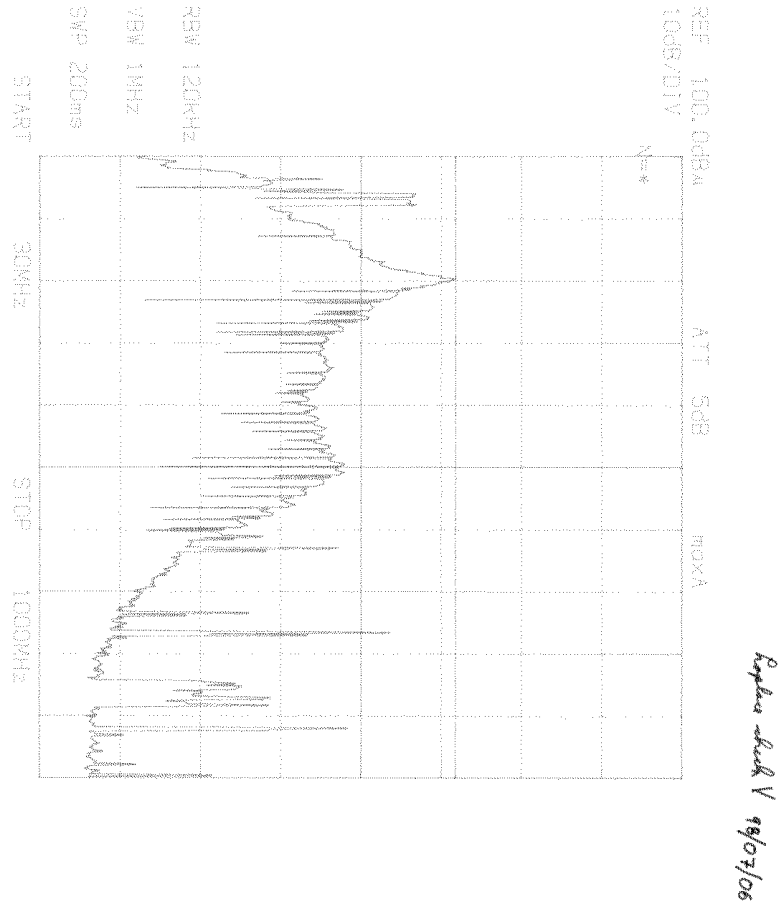
SA0013

Appendix B

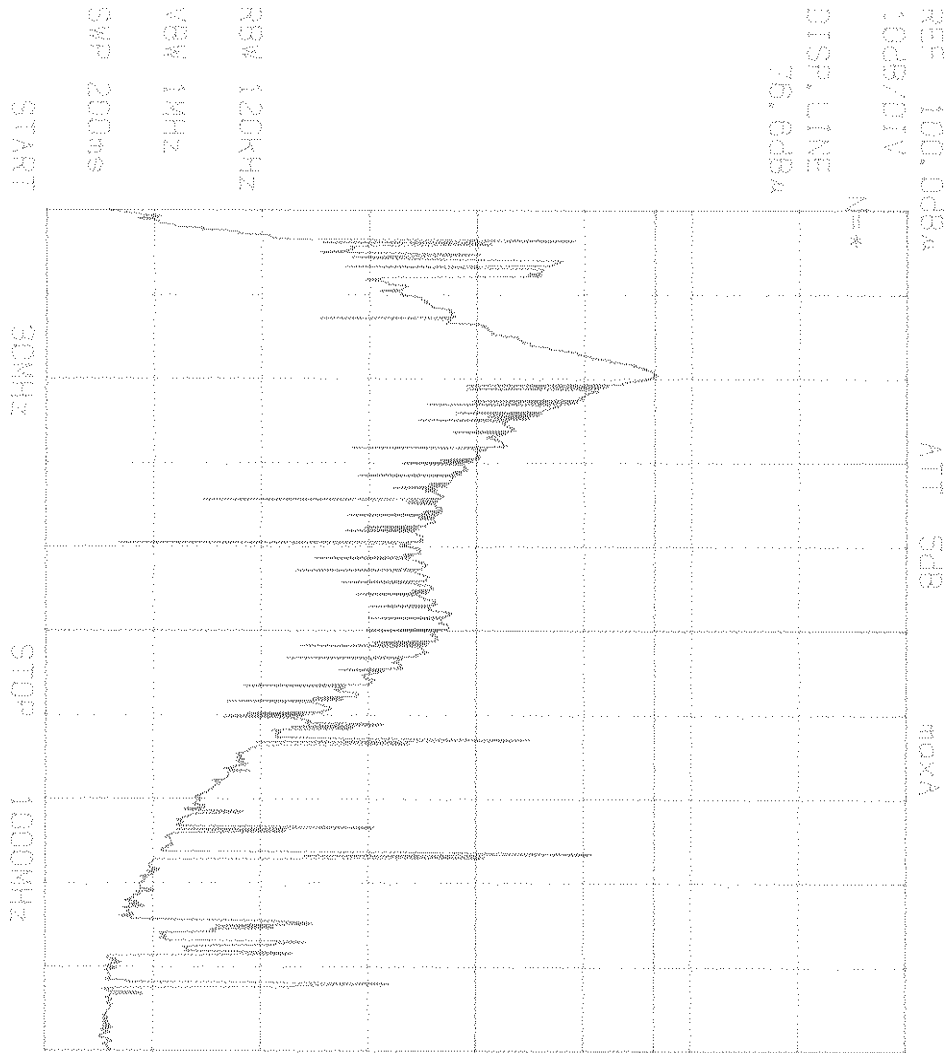
TEST REPORT DATA SHEETS







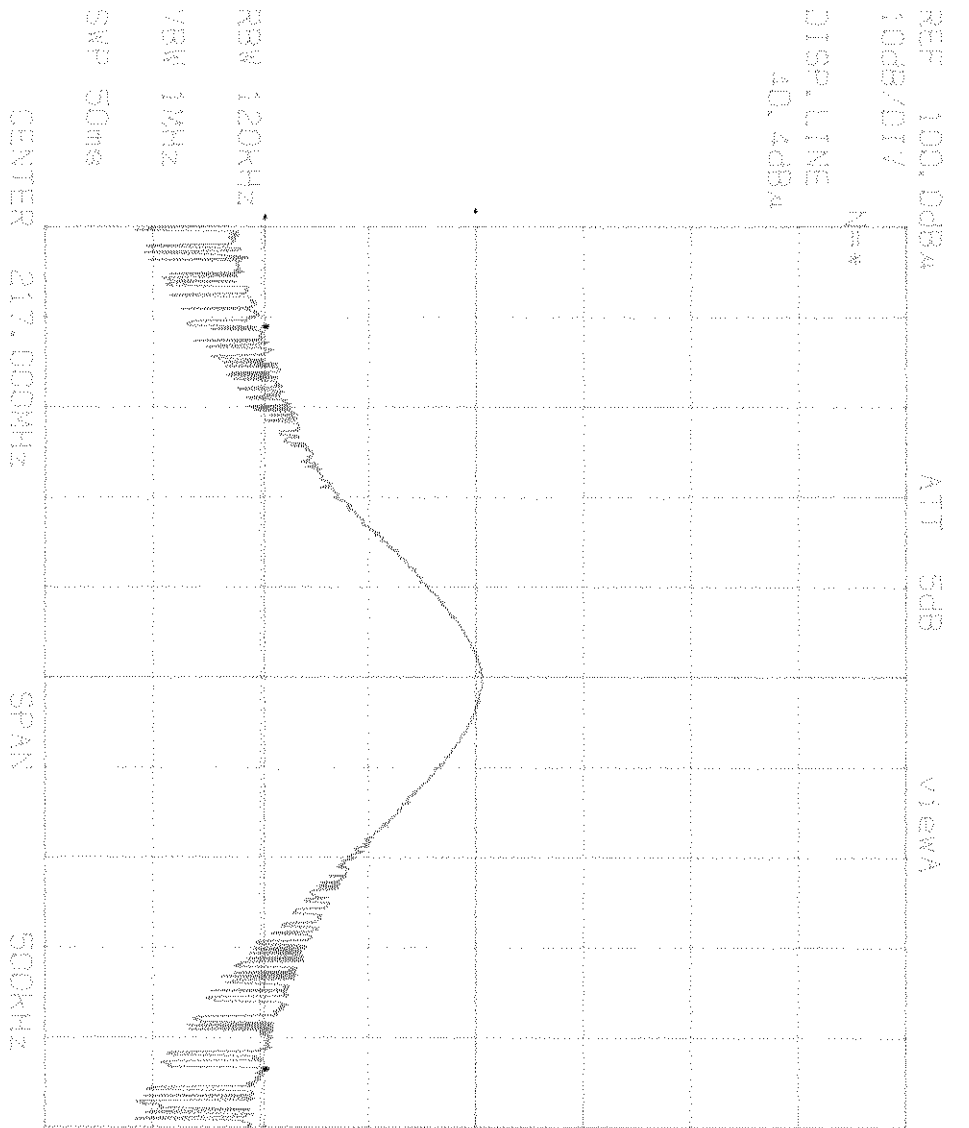
OATS Verification



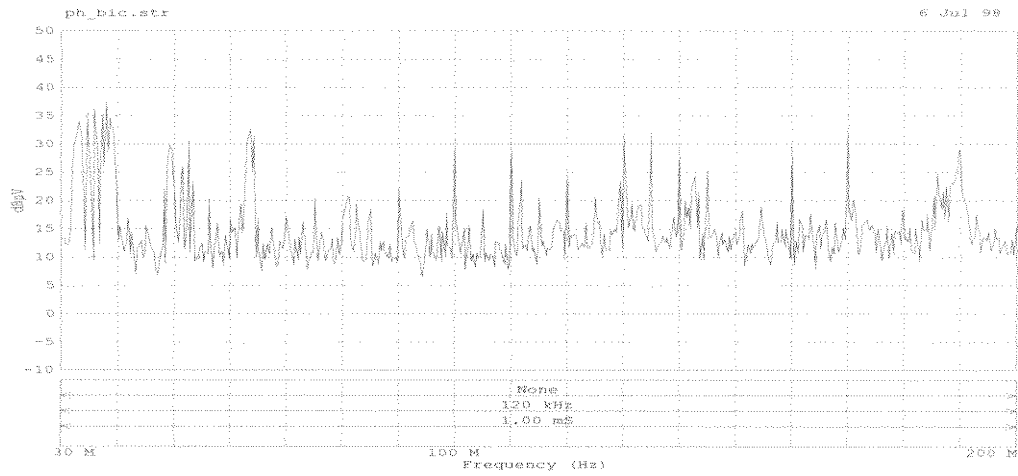
Replace with H 98/07/06

OATS Verification

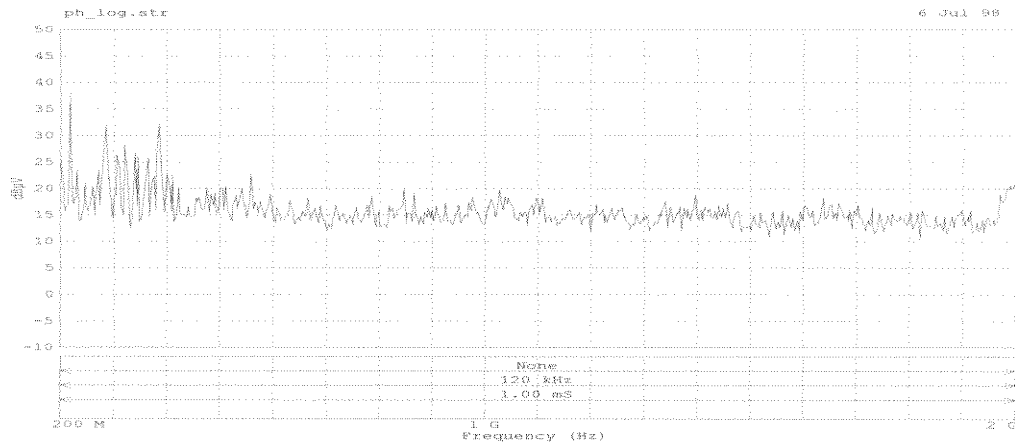
957A 60



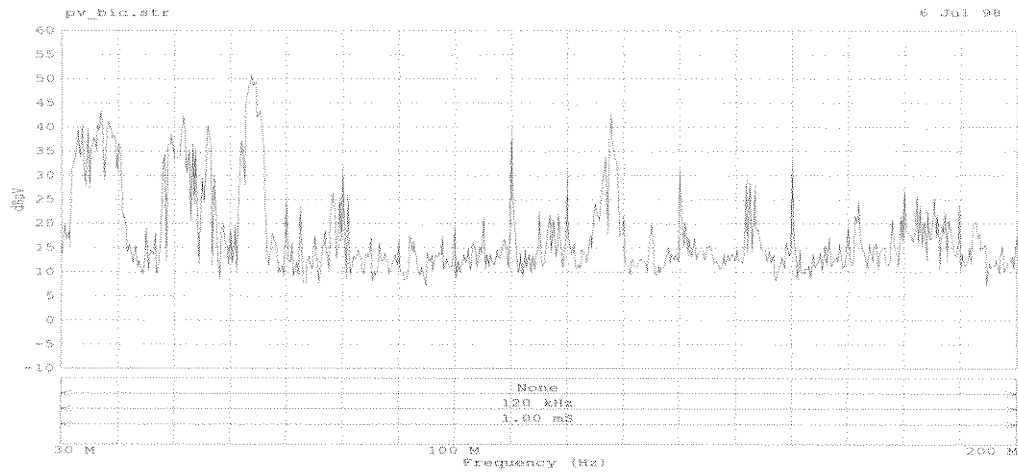
*Bandwidth
@ 217 MHz
in down mode*



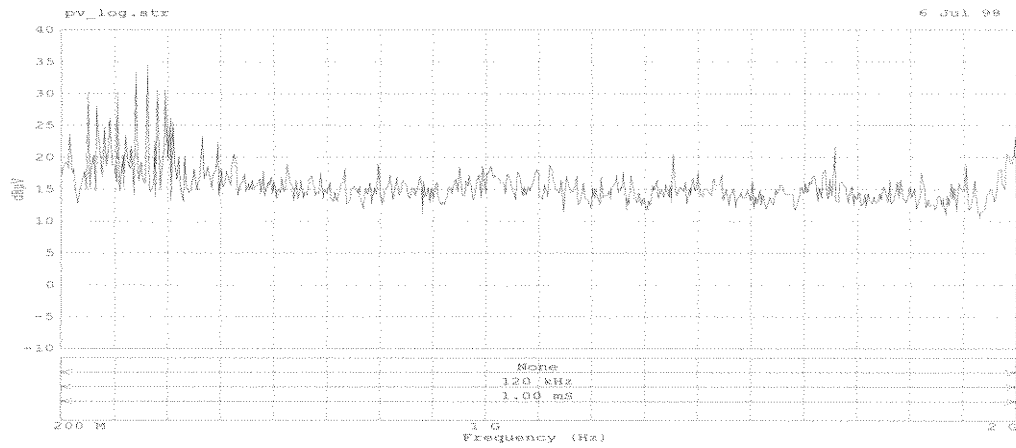
Pre Scan Horizontal Polarization



Pre Scan Horizontal Polarization



Pre Scan Vertical Polarization



Pra Scan Vertical Polarization

DATA LOG

Printed: 07/06/98 14:19

DataLog file: A:\I4R1835\HORIZ.DL
Measurement Units: dBm/Hz

Frequency	Bandwidth	Curr.	Peak	Avg	RMS	Width	Area	EUT	Date	Time
31.6728 MHz	120 kHz	16.5	22.0			17.0	2.06m horiz	339deg	07/06/98	13:08:01
48.9085 MHz	120 kHz	13.9	29.4			21.9	1.02m horiz	12deg	07/06/98	13:14:25
109.9700 MHz	120 kHz	12.9	38.2			34.2	2.02m horiz	282deg	07/06/98	13:18:59
119.9659 MHz	120 kHz	13.5	30.1			28.4	3.46m horiz	312deg	07/06/98	13:22:13
129.9686 MHz	120 kHz	13.3	32.4			29.9	1.06m horiz	291deg	07/06/98	13:25:00
134.9382 MHz	120 kHz	13.0	24.9			24.3	1.13m horiz	276deg	07/06/98	13:28:19
139.9628 MHz	120 kHz	11.9	29.7			27.4	1.26m horiz	254deg	07/06/98	13:31:50
159.9612 MHz	120 kHz	11.4	31.7			28.9	2.02m horiz	296deg	07/06/98	13:35:38
169.9621 MHz	120 kHz	10.8	36.4			33.4	1.83m horiz	284deg	07/06/98	13:37:36
211.0000 MHz	120 kHz	12.0	71.7			70.2	1.50m horiz	201deg	07/06/98	13:45:15
289.9725 MHz	120 kHz	14.5	31.1			28.0	1.17m horiz	115deg	07/06/98	13:55:35
319.9881 MHz	120 kHz	15.4	30.0			28.3	1.51m horiz	119deg	07/06/98	13:58:30
329.9493 MHz	120 kHz	15.5	27.6			25.5	0.99m horiz	101deg	07/06/98	14:02:19
344.9394 MHz	120 kHz	16.1	26.2			23.8	0.00m vert	0deg	07/06/98	14:03:45
394.9394 MHz	120 kHz	17.1	22.0			19.8	2.98m horiz	274deg	07/06/98	14:06:01

Data Log

DATA LOG

Printed: 07/06/98 12:56

Data Log File: A:\I4R\I83\VERT.DL
Measurement Units: dBu/m

Frequency	Bandwidth	Corr.	Peak	Avg	RMS	Qpeak	Antenna	RTT	Date	Time
33.6391 MHz	120 kHz	16.5	18.3			15.5	2.17m vert	235deg	07/06/98	11:53:28
37.4703 MHz	120 kHz	14.9	32.2			23.8	1.35m vert	-2deg	07/06/98	12:10:11
55.1918 MHz	120 kHz	12.0	23.9			21.0	1.07m vert	278deg	07/06/98	12:12:56
63.7740 MHz	120 kHz	10.0	38.5			29.0	0.99m vert	238deg	07/06/98	12:16:15
79.9979 MHz	120 kHz	7.4	37.2			34.5	1.03m vert	245deg	07/06/98	12:18:46
109.9973 MHz	120 kHz	12.9	31.5			28.5	1.02m vert	-2deg	07/06/98	12:20:40
119.9398 MHz	120 kHz	13.5	29.8			27.4	1.00m vert	218deg	07/06/98	12:24:16
127.7385 MHz	120 kHz	13.0	27.5			24.4	1.25m vert	283deg	07/06/98	12:27:10
150.0080 MHz	120 kHz	11.4	37.0			36.0	1.00m vert	182deg	07/06/98	12:31:51
179.9721 MHz	120 kHz	10.9	32.5			29.2	1.06m vert	117deg	07/06/98	12:34:09
217.0085 MHz	120 kHz	12.0	55.2			53.1	1.34m vert	314deg	07/06/98	12:06:26
222.2034 MHz	120 kHz	12.1	20.4			18.3	0.99m vert	114deg	07/06/98	12:39:52
299.9832 MHz	120 kHz	14.9	24.9			21.3	0.99m vert	304deg	07/06/98	12:43:06
511.1117 MHz	120 kHz	18.8	25.8			20.4	1.44m vert	28deg	07/06/98	12:47:29

Data Log

Appendix C

TEST EQUIPMENT REPORT

TEST EQUIPMENT REPORT
FACILITY: Electronics Test Centre (Ottawa)

COMP /PART: FCC 15 18			Class: A B			
ENGINEER:			Date:			
UNIT No	MAKE	DESCRIPTION	MODEL#	SERIAL #	CAL	RECAL
4297	Hewlett Packard	Spectrum Analyzer	HP8566B	2816A16945/2747A05484	Jul-25-98	Jul-25-99
2436	Hewlett Packard	Quasi Peak Adapter	85650A	A208596	Jul-27-98	Jul-27-99
2881	Advantest	Spectrum Analyzer	R4136	71220067	Apr-09-98	Apr-09-99
2316	Electrometrics	Preamplifier	BPA1000	900710	Jul-27-98	Jul-27-99
2432	Ant. Research	Biconilog	LPB-2520	1021	Jan-07-98	Jan-07-99
4281	Ant. Research	Biconilog	LPB-2520/A	1048	Jan-07-09	Jan-07-99
4825	Semflex	3 Meter Cable OATS		1	Oct-22-97	Oct-22-98
4826	Semflex	10 Meter Cable OATS		1	Oct-22-97	Oct-22-98
4830	Andrews/Alpha	CE Cable Chamber 3 (2 Parts)			Jun-19-98	Jun-19-99
4828	MPBI	Open Area Test Site	Site 9		Sep-31-97	Sep-31-98
4607	Pacific	Power Supply	110E	200	Monitored	Monitored
2342	Hammond	Power Isolation Transformer	195KS	D892J	Monitored	Monitored
4821	DSI System	EMI Test Receiver	RX-200	512	Oct-10-97	Oct-10-98
4822	DSI System	Computer	P-166MMX		Oct-10-97	Oct-10-98
4503	Sunol	Turntable/Tower Controller	Count 94	022497-1	Monitored	Monitored
	Sunol	Tower			Monitored	Monitored
	Sunol	Turntable			Monitored	Monitored
		Personal Computer	486			
4269	Solar	LISN (FCC)	8012-50-R-24BNC	829038	Jul-30-98	Jul-30-99
4286	R&S	Test Receiver	ESVP	879783003	Jul-17-97	Jul-17-98
2365	Electrometrics	Pre-selector	EM2701	183	Jul-29-97	Jul-29-98
4530	Emco	Biconical Antenna	3104	3813	Jul-24-98	Jul-24-99
4512	Electrometrics	Log Periodic Antenna	LPA-25	1041	Jan-08-98	Jan-08-99

Appendix D

PHOTOGRAPHS