

FCC CERTIFICATION TEST REPORT

for

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FCC ID: PB8P4432-150

January 26, 2001

WLL PROJECT #: 5569X

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FCC CERTIFICATION TEST REPORT

for

FCC ID: PB8P4432-150

1.0 Introduction

This report has been prepared on behalf of Dassault A.T. to support the attached Application for Equipment Authorization. The test and application are submitted for a Frequency Hopping Spread Spectrum Transmitter under Part 15.247 of the FCC Rules and Regulations. The Equipment Under Test was the Dassault A.T. *ARTEMA Base Charging/Docking Station*, M/N: P4432-150.

All measurements herein were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

All measurements are performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

All results reported herein relate only to the equipment tested. The measurement uncertainty of the data contained herein is ± 2.3 dB. Refer to Appendix A for Statement of Measurement Uncertainty. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government.

1.1 Summary

The Dassault A.T. *ARTEMA Base Charging/Docking Station* complies with the requirements for a Frequency Hopping Spread Spectrum Transmitter under Part 15.247 of the FCC Rules and Regulations.

2.0 Description of Equipment Under Test (EUT)

The Dassault A.T. *ARTEMA Base Charging/Docking Station* (EUT) is an AC powered charging /docking station for use with the Dassault A.T. *ARTEMA US Portables* Electronic Fund Transfer/Point of Sale terminals (FCC ID: PB8P4432-050). The radio located in the base is a Frequency Hopping Spread Spectrum transmitter operating in the 902 – 928 MHz frequency band. This radio is identical to the FHSS radio used in the *ARTEMA US Portables* (FCC ID: PB8P4432-050). The desktop mountable EUT is used for remote communications with the portable terminals, charging spare batteries and docking/charging the portable units.

3.0 Test Configuration

To complete the test configuration required by the FCC, the transmitter was tested as a desktop orientation as in normal use. Cables were connected to the I/O ports during testing.

3.1 Testing Algorithm

The transmitter was configured to continuously transmit during testing. The unit was fixed (hopping disabled) to the Low Channel, Middle Channel and High Channel during the emissions testing. The unit was tested with and without a portable being docked on the charger base.

Worst case emissions are recorded in the data tables.

3.2 Radiated Emissions Testing

The EUT was placed on an 80 cm high 1 x 1.5 meters non-conductive motorized turntable for radiated testing on a 3 meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Biconical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. The measurement bandwidth on the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. For measurements above 1 GHz, the measurement bandwidth was set to 1MHz.

3.2.1 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Table 1. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dBμV to obtain the Radiated Electric Field in dBμV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Voltage:	VdBμV
Composite Antenna Factor:	AFcdB/m
Electric Field:	$EdBμV/m = VdBμV + AFcdB/m$
To convert to linear units:	$EμV/m = \text{antilog}(EdBμV/m/20)$

Average and peak data for all the three channels tested are located in Tables 1a, 1b and 1c.

Table 1a: FCC 15.247 3M Radiated Emissions Data

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

Low Channel: 903.8 MHz
 Restricted Band Measurements
 QP Measurements < 1 GHz
 Average Measurements > 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height m	(QP/AVG) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
239.50	V	135.00	1.0	16.5	14.3	30.8	34.7	200.0	-15.2	
239.50	H	135.00	1.0	20.6	14.3	34.9	55.6	200.0	-11.1	
248.83	V	180.00	1.0	12.1	14.4	26.5	21.1	200.0	-19.5	
248.83	H	90.00	1.0	20.8	14.4	35.2	57.4	200.0	-10.8	
258.05	V	180.00	1.0	13.6	14.7	28.3	26.0	200.0	-17.7	
258.05	H	90.00	1.0	23.4	14.7	38.1	80.2	200.0	-7.9	
276.45	V	90.00	2.0	18.3	15.3	33.6	47.9	200.0	-12.4	
276.45	H	90.00	1.5	26.1	15.3	41.4	117.6	200.0	-4.6	
322.55	V	45.00	2.5	12.8	16.7	29.5	29.9	200.0	-16.5	
322.55	H	90.00	1.0	23.2	16.7	39.9	98.9	200.0	-6.1	
329.73	V	0.00	2.0	12.3	16.9	29.2	28.8	200.0	-16.8	
329.73	H	90.00	1.0	23.6	16.9	40.5	105.9	200.0	-5.5	
405.50	V	180.00	2.0	11.9	18.8	30.7	34.2	200.0	-15.4	
405.50	H	90.00	1.0	20.6	18.8	39.4	93.0	200.0	-6.7	
2711.34	V	180.00	1.0	48.7	-4.9	43.8	155.0	500.0	-10.2	
2711.34	H	225.00	1.0	42.2	-4.9	37.3	73.3	500.0	-16.7	
3615.29	V	180.00	1.0	41.3	-3.7	37.6	76.1	500.0	-16.4	
3615.29	H	180.00	1.0	39.8	-3.7	36.1	63.8	500.0	-17.9	
4518.85	V	135.00	1.0	48.0	-2.8	45.2	182.2	500.0	-8.8	
4518.85	H	180.00	1.0	43.2	-2.8	40.4	104.9	500.0	-13.6	
5422.67	V	225.00	1.0	42.3	-2.0	40.3	103.5	500.0	-13.7	
5422.67	H	225.00	1.0	42.5	-2.0	40.5	105.5	500.0	-13.5	
8134.20	V	0.00	1.0	38.8	2.2	41.0	112.2	500.0	-13.0	Amb
8134.20	H	0.00	1.0	39.2	2.2	41.4	117.5	500.0	-12.6	Amb
9037.52	V	0.00	1.0	40.6	2.2	42.8	138.8	500.0	-11.1	Amb
9037.52	H	0.00	1.0	40.5	2.2	42.7	137.2	500.0	-11.2	Amb

Table 1a (Cont'd.): FCC 15.247 3M Radiated Emissions Data

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

Low Channel: 903.8 MHz
Peak Measurements Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height m	(Peak) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
1807.49	V	135.00	1.0	59.1	-7.1	52.0	396.1	5000.0	-22.0	
1807.49	H	180.00	1.0	58.8	-7.1	51.7	382.6	5000.0	-22.3	
2711.34	V	180.00	1.0	56.5	-4.9	51.6	380.4	5000.0	-22.4	
2711.34	H	225.00	1.0	53.8	-4.9	48.9	278.8	5000.0	-25.1	
3615.10	V	180.00	1.0	54.0	-3.7	50.3	327.1	5000.0	-23.7	
3615.10	H	180.00	1.0	53.0	-3.7	49.3	291.5	5000.0	-24.7	
4518.85	V	135.00	1.0	56.2	-2.8	53.4	468.4	5000.0	-20.6	
4518.85	H	180.00	1.0	54.3	-2.8	51.5	376.4	5000.0	-22.5	
5422.67	V	135.00	1.0	53.7	-2.0	51.7	383.1	5000.0	-22.3	
5422.67	H	225.00	1.0	53.6	-2.0	51.6	378.7	5000.0	-22.4	
6326.60	V	0.00	1.0	50.8	-0.3	50.5	335.6	5000.0	-23.5	Amb
6326.60	H	0.00	1.0	52.1	-0.3	51.8	389.8	5000.0	-22.2	Amb
7230.52	V	0.00	1.0	52.7	2.2	54.9	555.9	5000.0	-19.1	Amb
7230.52	H	0.00	1.0	52.7	2.2	54.9	555.9	5000.0	-19.1	Amb
8134.20	V	0.00	1.0	51.1	2.2	53.3	462.4	5000.0	-20.7	Amb
8134.20	H	0.00	1.0	51.5	2.2	53.7	484.2	5000.0	-20.3	Amb
9037.52	V	0.00	1.0	53.1	2.2	55.3	585.3	5000.0	-18.6	Amb
9037.52	H	0.00	1.0	52.8	2.2	55.0	565.4	5000.0	-18.9	Amb

Table 1b: FCC 15.247 3M Radiated Emissions Data

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

Mid Channel: 907.4 MHz

Restricted Band Measurements

QP Measurements < 1 GHz; Average Measurements > 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height	(QP/AVG)	dB/m	dBuV/m	uV/m	uV/m	dB	
239.50	H	135.00	1.0	18.9	14.3	33.2	45.8	200.0	-12.8	
239.60	V	135.00	1.0	16.7	14.3	31.0	35.5	200.0	-15.0	
248.83	V	180.00	1.0	11.8	14.4	26.2	20.4	200.0	-19.8	
248.83	H	90.00	1.0	17.8	14.4	32.2	40.6	200.0	-13.8	
258.05	V	180.00	1.0	13.6	14.7	28.3	26.0	200.0	-17.7	
258.05	H	270.00	1.0	20.5	14.7	35.2	57.5	200.0	-10.8	
276.45	V	90.00	2.0	18.3	15.3	33.6	47.9	200.0	-12.4	
276.45	H	135.00	1.5	25.8	15.3	41.1	113.6	200.0	-4.9	
322.55	V	45.00	2.5	12.8	16.7	29.5	29.9	200.0	-16.5	
322.55	H	90.00	1.0	20.6	16.7	37.3	73.3	200.0	-8.7	
329.73	V	0.00	2.0	12.3	16.9	29.2	28.8	200.0	-16.8	
329.73	H	90.00	1.0	21.0	16.9	37.9	78.5	200.0	-8.1	
405.50	H	90.00	1.0	20.6	18.8	39.4	93.0	200.0	-6.7	
2722.00	H	270.00	1.0	41.2	-4.9	36.3	65.5	500.0	-17.7	
2722.00	V	135.00	1.0	44.8	-4.9	39.9	99.1	500.0	-14.1	
3629.33	H	0.00	1.0	40.6	-3.7	36.9	70.1	500.0	-17.1	Amb
3629.33	V	180.00	1.0	40.8	-3.7	37.1	71.7	500.0	-16.9	
4536.63	H	180.00	1.0	40.8	-2.8	38.1	80.0	500.0	-15.9	
4536.63	V	180.00	1.0	46.3	-2.8	43.5	150.1	500.0	-10.5	
5444.46	H	225.00	1.0	40.7	-2.0	38.7	85.9	500.0	-15.3	
5444.46	V	180.00	1.0	41.3	-2.0	39.3	92.1	500.0	-14.7	
7256.87	H	0.00	1.0	40.5	2.2	42.7	136.5	500.0	-11.3	Amb
7256.87	V	0.00	1.0	40.5	2.2	42.7	136.5	500.0	-11.3	Amb
8166.85	H	0.00	1.0	38.5	2.2	40.7	108.4	500.0	-13.3	Amb
8166.85	V	0.00	1.0	38.5	2.2	40.7	108.4	500.0	-13.3	Amb
9074.20	H	0.00	1.0	40.3	2.3	42.6	134.8	500.0	-11.4	Amb
9074.20	V	0.00	1.0	40.3	2.3	42.6	134.8	500.0	-11.4	Amb

Table 1b (Cont'd.): FCC 15.247 3M Radiated Emissions Data

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

**Mid Channel: 907.4 MHz
 Peak Measurements Above 1 GHz**

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height m	(Peak) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
1814.80	H	0.00	1.0	61.2	-7.1	54.1	506.7	5000.0	-19.9	
1814.80	V	135.00	1.0	58.2	-7.1	51.1	358.7	5000.0	-22.9	
2723.00	H	270.00	1.0	52.8	-4.9	47.9	249.0	5000.0	-26.1	
2723.00	V	180.00	1.0	54.5	-4.9	49.6	302.8	5000.0	-24.4	
3629.87	H	0.00	1.0	52.0	-3.7	48.3	260.3	5000.0	-25.7	Amb
3629.87	V	180.00	1.0	53.3	-3.7	49.6	302.3	5000.0	-24.4	
4536.63	H	180.00	1.0	52.8	-2.8	50.1	318.4	5000.0	-23.9	
4536.63	V	180.00	1.0	55.3	-2.8	52.5	423.1	5000.0	-21.5	
5444.46	H	225.00	1.0	52.7	-2.0	50.7	340.9	5000.0	-23.3	
5444.46	V	180.00	1.0	53.2	-2.0	51.2	362.3	5000.0	-22.8	
6353.07	H	0.00	1.0	51.5	-0.2	51.3	368.1	5000.0	-22.7	Amb
6353.07	V	0.00	1.0	51.5	-0.2	51.3	368.1	5000.0	-22.7	Amb
7259.07	H	0.00	1.0	52.2	2.2	54.4	524.8	5000.0	-19.6	Amb
7259.07	V	0.00	1.0	52.2	2.2	54.4	524.8	5000.0	-19.6	Amb
8164.25	H	0.00	1.0	50.5	2.2	52.7	431.5	5000.0	-21.3	Amb
8164.25	V	0.00	1.0	50.5	2.2	52.7	431.5	5000.0	-21.3	Amb
9074.15	H	0.00	1.0	52.5	2.3	54.8	549.2	5000.0	-19.2	Amb
9074.15	V	0.00	1.0	52.5	2.3	54.8	549.2	5000.0	-19.2	Amb

Table 1c: FCC 15.247 3M Radiated Emissions Data

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

High Channel: 911.15 MHz
 Restricted Band Measurements
 QP Measurements < 1 GHz
 Average Measurements > 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height m	(QP/AVG) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
239.50	H	135.00	1.0	18.9	14.3	33.2	45.8	200.0	-12.8	
239.60	V	135.00	1.0	16.7	14.3	31.0	35.5	200.0	-15.0	
248.83	V	180.00	1.0	11.8	14.4	26.2	20.4	200.0	-19.8	
248.83	H	90.00	1.0	17.8	14.4	32.2	40.6	200.0	-13.8	
258.05	V	180.00	1.0	13.6	14.7	28.3	26.0	200.0	-17.7	
258.05	H	270.00	1.0	20.5	14.7	35.2	57.5	200.0	-10.8	
276.45	V	90.00	2.0	18.3	15.3	33.6	47.9	200.0	-12.4	
276.45	H	135.00	1.5	25.8	15.3	41.1	113.6	200.0	-4.9	
322.55	V	45.00	2.5	12.8	16.7	29.5	29.9	200.0	-16.5	
322.55	H	90.00	1.0	20.6	16.7	37.3	73.3	200.0	-8.7	
329.73	V	0.00	2.0	12.3	16.9	29.2	28.8	200.0	-16.8	
329.73	H	90.00	1.0	21.0	16.9	37.9	78.5	200.0	-8.1	
405.50	H	90.00	1.0	20.6	18.8	39.4	93.0	200.0	-6.7	
2733.45	H	270.00	1.0	41.2	-4.9	36.3	65.6	500.0	-17.6	
2733.45	V	270.00	1.0	46.2	-4.9	41.3	116.7	500.0	-12.6	
3644.96	H	180.00	1.0	40.5	-3.7	36.8	69.4	500.0	-17.2	
3644.96	V	180.00	1.0	41.2	-3.7	37.5	75.2	500.0	-16.5	
4555.51	H	180.00	1.0	41.0	-2.8	38.2	81.7	500.0	-15.7	
4555.51	V	180.00	1.0	43.8	-2.8	41.0	112.8	500.0	-12.9	
7290.15	H	0.00	1.0	40.5	2.2	42.7	136.5	500.0	-11.3	Amb
7290.15	V	0.00	1.0	41.0	2.2	43.2	144.5	500.0	-10.8	Amb
8200.25	H	0.00	1.0	38.8	2.2	41.0	112.2	500.0	-13.0	Amb
8200.25	V	0.00	1.0	40.8	2.2	43.0	141.7	500.0	-10.9	Amb
9110.70	H	0.00	1.0	40.2	2.3	42.5	134.0	500.0	-11.4	Amb
9110.70	V	0.00	1.0	40.5	2.3	42.8	138.7	500.0	-11.1	Amb

Table 1c (Cont'd.): FCC 15.247 3M Radiated Emissions Data

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

High Channel: 911.15 MHz
Peak Measurements Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height m	(Peak) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
1822.23	H	180.00	1.0	61.0	-7.1	53.9	497.4	5000.0	-20.0	
1822.23	V	135.00	1.0	57.6	-7.1	50.5	336.3	5000.0	-23.4	
2733.45	H	270.00	1.0	54.2	-4.9	49.3	293.1	5000.0	-24.6	
2733.45	V	180.00	1.0	56.1	-4.9	51.2	364.7	5000.0	-22.7	
3644.96	H	180.00	1.0	52.5	-3.7	48.8	276.3	5000.0	-25.2	
3644.96	V	180.00	1.0	53.2	-3.7	49.5	299.4	5000.0	-24.5	
4555.51	H	180.00	1.0	53.0	-2.8	50.2	325.3	5000.0	-23.7	
4555.51	V	180.00	1.0	54.2	-2.8	51.4	373.5	5000.0	-22.5	
5466.61	H	225.00	1.0	52.8	-2.0	50.8	346.7	5000.0	-23.2	
5466.61	V	180.00	1.0	53.0	-2.0	51.0	354.8	5000.0	-23.0	
6377.51	H	0.00	1.0	53.2	-0.1	53.1	452.7	5000.0	-20.9	Amb
6377.51	V	0.00	1.0	51.8	-0.1	51.7	385.3	5000.0	-22.3	Amb
7290.15	H	0.00	1.0	53.0	2.2	55.2	575.4	5000.0	-18.8	Amb
7290.15	V	0.00	1.0	53.3	2.2	55.5	595.7	5000.0	-18.5	Amb
8200.25	H	0.00	1.0	51.0	2.2	53.2	457.1	5000.0	-20.8	Amb
8200.25	V	0.00	1.0	53.2	2.2	55.4	588.8	5000.0	-18.6	Amb
9110.70	H	0.00	1.0	52.2	2.3	54.5	533.4	5000.0	-19.4	Amb
9110.70	V	0.00	1.0	53.5	2.3	55.8	619.5	5000.0	-18.1	Amb

3.4 RF Antenna Conducted Spurious Emissions Testing

At the time of testing the antenna was permanently attached on the EUT and therefore the alternate radiated test method was used for the Conducted Spurious Emissions Testing. The EUT was setup as per Section 3.3 of this report, except the spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 1 MHz. The amplitude of the EUT carrier was measured to determine the emissions limit (20dB below the carrier frequency amplitude). All of the emissions outside the allocated frequency band of 902 MHz to 928 MHz were scanned up to the 10th harmonic. At each frequency, an external attenuator or filter was used to confirm that the signal was not overloading the spectrum analyzer input.

Data for the three channels tested are recorded in Tables 2a, 2b and 2c.

Table 2a: FCC RF Radiated Spurious Emissions Data
 Alternate Method to Confirm Compliance with Section 15.247(c)

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

Low Channel: 903.8 MHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height	(Peak 100 kHz)						
			m	dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
903.80	H	225.00	1.0	78.3	28.1	106.4	209657.4	N/A	N/A	
903.78	V	0.00	1.5	77.5	28.1	105.6	191202.4	N/A	N/A	
1807.49	V	135.00	1.0	57.4	-7.1	50.3	325.7	20965.7	-36.2	
1807.49	H	180.00	1.0	57.6	-7.1	50.5	333.3	20965.7	-36.0	
2711.34	V	180.00	1.0	54.3	-4.9	49.4	295.3	20965.7	-37.0	
2711.34	H	225.00	1.0	50.9	-4.9	46.0	199.7	20965.7	-40.4	
3615.10	V	180.00	1.0	51.4	-3.7	47.7	242.4	20965.7	-38.7	
3615.10	H	180.00	1.0	50.7	-3.7	47.0	223.7	20965.7	-39.4	
4518.85	V	135.00	1.0	53.6	-2.8	50.8	347.3	20965.7	-35.6	
4518.85	H	180.00	1.0	52.3	-2.8	49.5	299.0	20965.7	-36.9	
5422.67	V	135.00	1.0	50.2	-2.0	48.2	256.0	20965.7	-38.3	
5422.67	H	225.00	1.0	50.9	-2.0	48.9	277.5	20965.7	-37.6	
6326.60	V	0.00	1.0	48.3	-0.3	48.0	251.7	20965.7	-38.4	Amb
6326.60	H	0.00	1.0	49.2	-0.3	48.9	279.1	20965.7	-37.5	Amb
7230.52	V	0.00	1.0	50.4	2.2	52.6	426.6	20965.7	-33.8	Amb
7230.52	H	0.00	1.0	50.7	2.2	52.9	441.6	20965.7	-33.5	Amb
8134.20	V	0.00	1.0	47.8	2.2	50.0	316.2	20965.7	-36.4	Amb
8134.20	H	0.00	1.0	48.5	2.2	50.7	342.8	20965.7	-35.7	Amb
9037.52	V	0.00	1.0	49.7	2.2	51.9	395.7	20965.7	-34.5	Amb
9037.52	H	0.00	1.0	50.0	2.2	52.2	409.6	20965.7	-34.2	Amb

Table 2b: FCC RF Radiated Spurious Emissions Data
 Alternate Method to Confirm Compliance with Section 15.247(c)

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

Mid Channel: 907.4 MHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height m	(Peak 100 kHz) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
907.40	H	225.00	1.0	78.4	28.2	106.6	213561.4	N/A	N/A	
907.40	V	0.00	1.5	77.0	28.2	105.2	181770.3	N/A	N/A	
1814.80	H	0.00	1.0	58.3	-7.1	51.2	362.8	21356.1	-35.4	
1814.80	V	135.00	1.0	55.9	-7.1	48.8	275.2	21356.1	-37.8	
2723.00	H	270.00	1.0	50.7	-4.9	45.8	195.5	21356.1	-40.8	
2723.00	V	180.00	1.0	51.4	-4.9	46.5	211.9	21356.1	-40.1	
3629.87	H	0.00	1.0	50.9	-3.7	47.2	229.3	21356.1	-39.4	
3629.87	V	180.00	1.0	50.3	-3.7	46.6	214.0	21356.1	-40.0	
4536.63	H	180.00	1.0	50.7	-2.8	47.9	249.1	21356.1	-38.7	
4536.63	V	180.00	1.0	52.9	-2.8	50.1	321.0	21356.1	-36.5	
5444.46	H	225.00	1.0	48.9	-2.0	46.9	220.8	21356.1	-39.7	
5444.46	V	180.00	1.0	49.5	-2.0	47.5	236.6	21356.1	-39.1	
6353.07	H	0.00	1.0	47.6	-0.2	47.4	235.0	21356.1	-39.2	Amb
6353.07	V	0.00	1.0	48.0	-0.2	47.8	246.0	21356.1	-38.8	Amb
7259.07	H	0.00	1.0	47.6	2.2	49.8	309.0	21356.1	-36.8	Amb
7259.07	V	0.00	1.0	46.9	2.2	49.1	285.1	21356.1	-37.5	Amb
8164.25	H	0.00	1.0	47.8	2.2	50.0	316.2	21356.1	-36.6	Amb
8164.25	V	0.00	1.0	47.5	2.2	49.7	305.5	21356.1	-36.9	Amb
9074.15	H	0.00	1.0	49.1	2.3	51.4	371.3	21356.1	-35.2	Amb
9074.15	V	0.00	1.0	49.1	2.3	51.4	371.3	21356.1	-35.2	Amb

Table 2c: FCC RF Radiated Spurious Emissions Data
 Alternate Method to Confirm Compliance with Section 15.247(c)

CLIENT: Dassault A.T.
 MODEL NO: Artema Base
 TYPE/PART: 15.247
 DATE: 04/18/2000
 BY: Greg Snyder
 JOB #: 5569x

High Channel: 911.2 MHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin	
MHz	H/V	Degree	Height	(Peak 100 kHz)						
			m	dBuV	dB/m	dBuV/m	uV/m	uV/m	dB	
911.15	H	225.00	1.0	77.5	28.3	105.8	193931.5	N/A	N/A	
911.15	V	0.00	1.5	77.2	28.3	105.5	187347.7	N/A	N/A	
1822.23	H	180.00	1.0	57.9	-7.1	50.8	348.1	19393.2	-34.9	
1822.23	V	135.00	1.0	55.8	-7.1	48.7	273.3	19393.2	-37.0	
2733.45	H	270.00	1.0	51.8	-4.9	46.9	222.3	19393.2	-38.8	
2733.45	V	180.00	1.0	54.0	-4.9	49.1	286.4	19393.2	-36.6	
3644.96	H	180.00	1.0	52.7	-3.7	49.0	282.7	19393.2	-36.7	
3644.96	V	180.00	1.0	50.3	-3.7	46.6	214.4	19393.2	-39.1	
4555.51	H	180.00	1.0	52.0	-2.8	49.2	289.9	19393.2	-36.5	
4555.51	V	180.00	1.0	51.9	-2.8	49.1	286.6	19393.2	-36.6	
5466.61	H	225.00	1.0	51.7	-2.0	49.7	305.4	19393.2	-36.1	
5466.61	V	180.00	1.0	50.3	-2.0	48.3	260.0	19393.2	-37.5	
6377.51	H	0.00	1.0	49.3	-0.1	49.2	288.9	19393.2	-36.5	Amb
6377.51	V	0.00	1.0	47.9	-0.1	47.8	245.9	19393.2	-37.9	Amb
7290.15	H	0.00	1.0	48.2	2.2	50.4	331.1	19393.2	-35.4	Amb
7290.15	V	0.00	1.0	49.6	2.2	51.8	389.0	19393.2	-34.0	Amb
8200.25	H	0.00	1.0	48.0	2.2	50.2	323.6	19393.2	-35.6	Amb
8200.25	V	0.00	1.0	48.2	2.2	50.4	331.1	19393.2	-35.4	Amb
9110.70	H	0.00	1.0	50.5	2.3	52.8	438.6	19393.2	-32.9	Amb
9110.70	V	0.00	1.0	50.7	2.3	53.0	448.8	19393.2	-32.7	Amb

3.5 Carrier Bandwidth Testing

The EUT antenna was removed and connected directly into the spectrum analyzer input with a short length of coaxial cable. The analyzer resolution bandwidth was set to 10 kHz and the video bandwidth was set to 30 kHz. The highest peak of the carrier was centered on the analyzer display. An external attenuator or filter was used to confirm that the transmitter input was not overloading the spectrum analyzer input. The 20dB bandwidth of the modulated carrier was measured and compared to the FCC limit of 1MHz. Spectrum analyzer plots of the bandwidths are located in Exhibit 1.

The measured 20dB bandwidth was:

Low Channel: 115 kHz
Mid Channel: 118 kHz
High Channel: 122 kHz

3.6 Power Output Testing

The EUT antenna was removed and connected directly into the spectrum analyzer input with a short length of coaxial cable. The analyzer resolution and video bandwidths were set to 2 MHz and 3 MHz respectively (greater than the 20dB bandwidth). The highest peak of the carrier was centered on the analyzer display. An external attenuator or filter was used to confirm that the transmitter input was not overloading the spectrum analyzer input. The peak power in dBm was measured and compared to the FCC limit.

The measured peak power was:

Low Channel: 12.33 dBm (17.1 mW)
Mid Channel: 12.33 dBm (17.1 mW)
High Channel: 12.17 dBm (16.5 mW)

3.7 Radio Frequency Radiation Exposure

Based on the above data, the worst case RF output power of the unit occurs at the Low Channel, 903.8 MHz. According to Section 1.1310 of the FCC rules, the uncontrolled RF exposure limit for this frequency range is 0.61mW/cm². To comply with the exposure limits for this section, humans must not be too close to the transmit antenna. The following formula was used to calculate the minimum safe distance from the antenna that must be maintained during use (no time averaging was used):

$$S = (PG)/(4\pi R^2)$$

Where,

S = Power Density

P = Output Power at the Antenna Terminals in mW

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna in cm

For this device, the calculation is as follows:

$$S = \text{FCC Limit} = 0.61 \text{ mW/cm}^2$$

$$P = \text{Output Power} = 17.1 \text{ mW}$$

$$G = \text{Antenna Gain} = 0 \text{ dBi} = \text{INVLOG}(0/10) = 1$$

Therefore:

$$R = \sqrt{(17.1 \text{ mW} \times 1) \div (4 \times \pi \times 0.61)}$$

From this formula the minimum safe distance is 1.5 cm. The antenna shroud provides approximately 0.5 cm of area around the antenna. Also, as the unit is going to be used in restaurant type settings and placed out-of-site or near registers, humans will not come within 1.5 cm of the antenna.

Table 3: System Under Test

FCC ID: PB8P4432-150

EUT:	Dassault A.T. ARTEMA EFT/POS Transmitter
FCC ID:	PB8P4432-150

Table 4: Interface Cables Used

Non-shielded I/O cables were used during the testing.

Table 5: Measurement Equipment Used

The following equipment is used to perform measurements:

Hewlett-Packard Spectrum Analyzer: HP8564E

Hewlett-Packard Spectrum Analyzer: HP8568B

Hewlett-Packard Spectrum Analyzer: HP8593A

Hewlett-Packard Quasi-Peak Adapter: HP85650A

Hewlett-Packard Preselector: HP85685A

Hewlett-Packard Preamplifier: HP8449B

Antenna Research Associates, Inc. Biconical Log Periodic Antenna: LPB-2520A

Antenna Research Associates, Inc. Horn Antenna: DRG-118/A

Solar 50 Ω /50 μ H Line Impedance Stabilization Network: 8012-50-R-24-BNC

Solar 50 Ω /50 μ H Line Impedance Stabilization Network: 8028-50-TS-24-BNC

AH Systems, Inc. Portable Antenna Mast: AMS-4

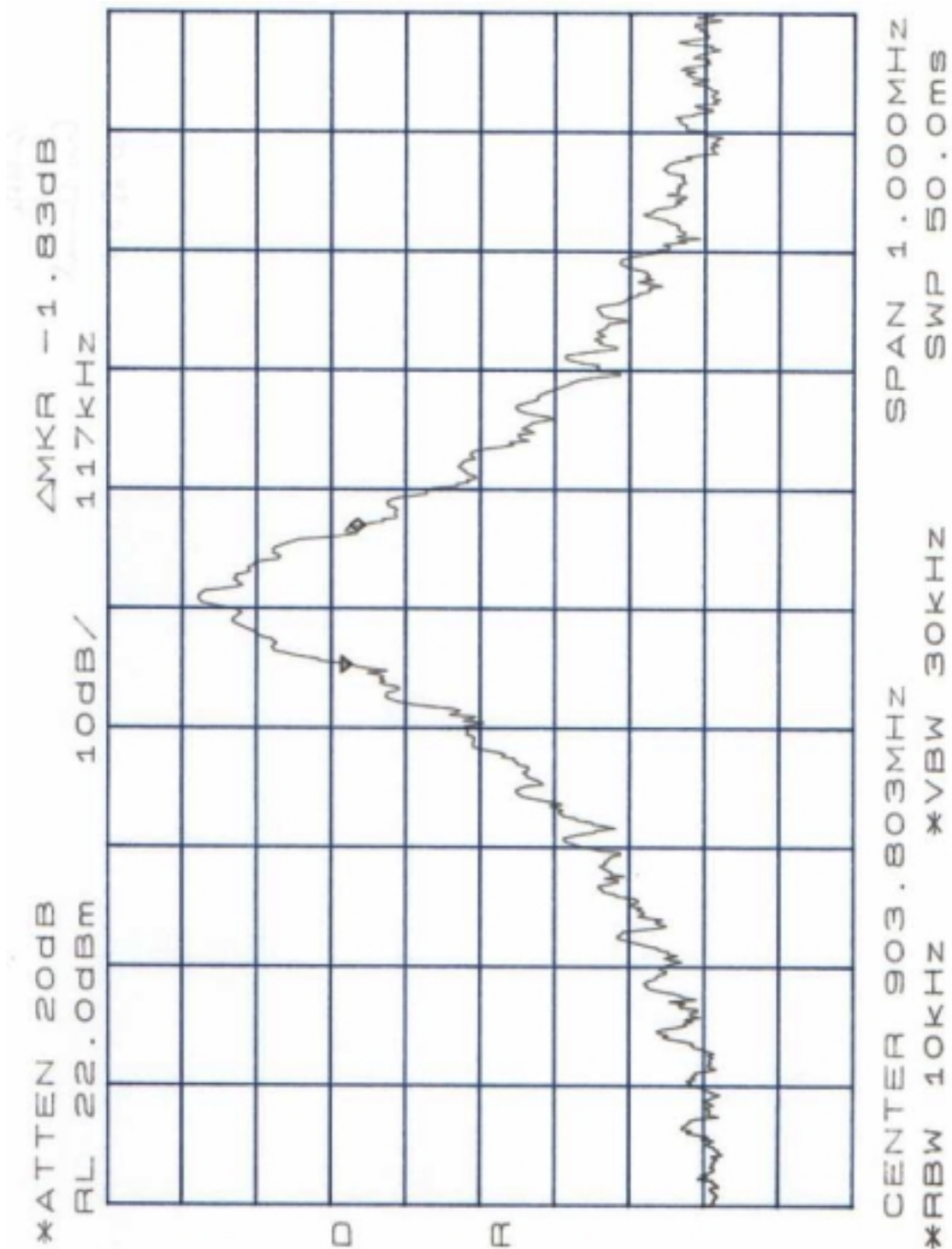
AH Systems, Inc. Motorized Turntable

RG-214 semi-rigid coaxial cable

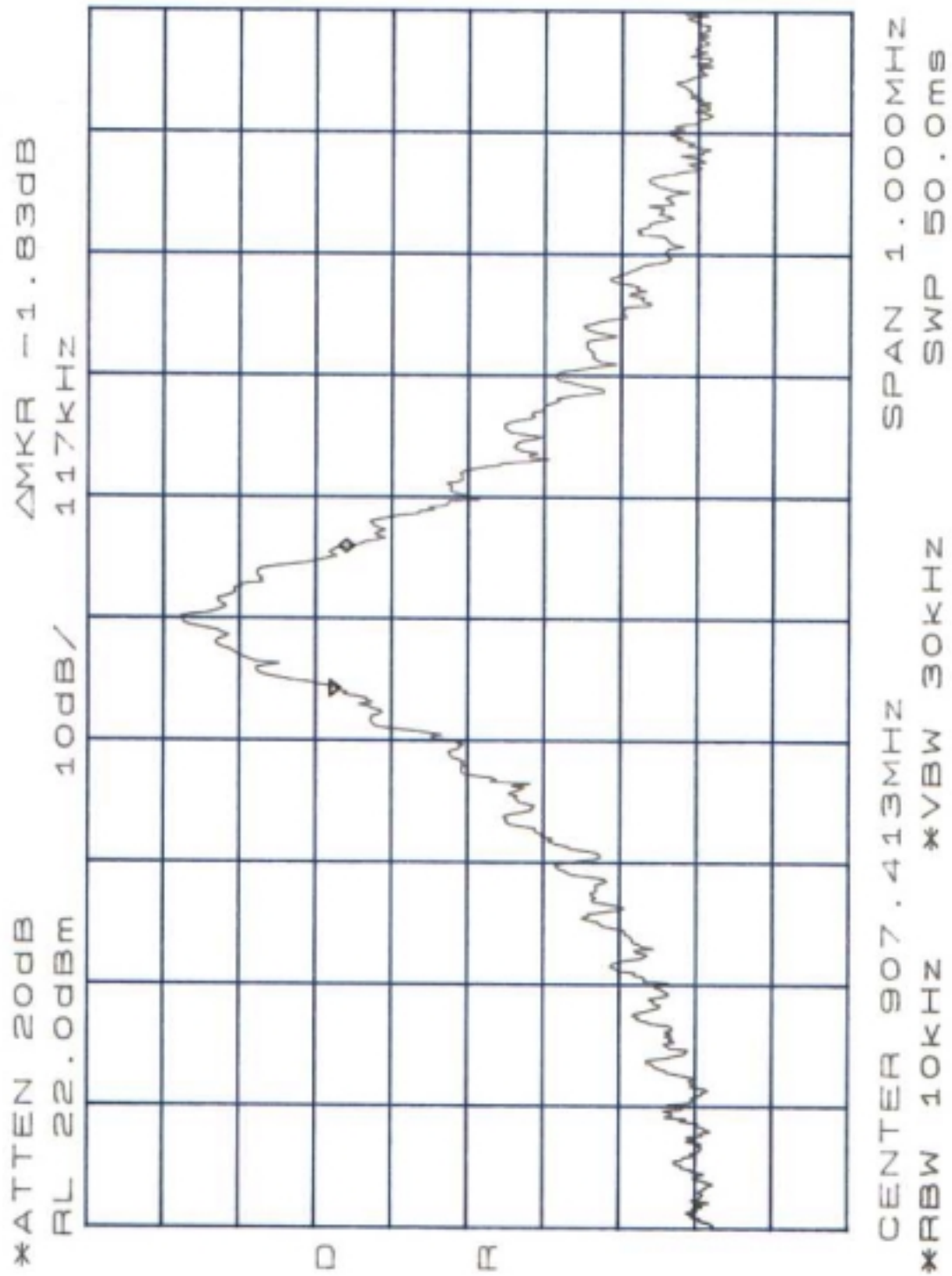
RG-223 double-shielded coaxial cable

Exhibit 1: Carrier Bandwidth Data

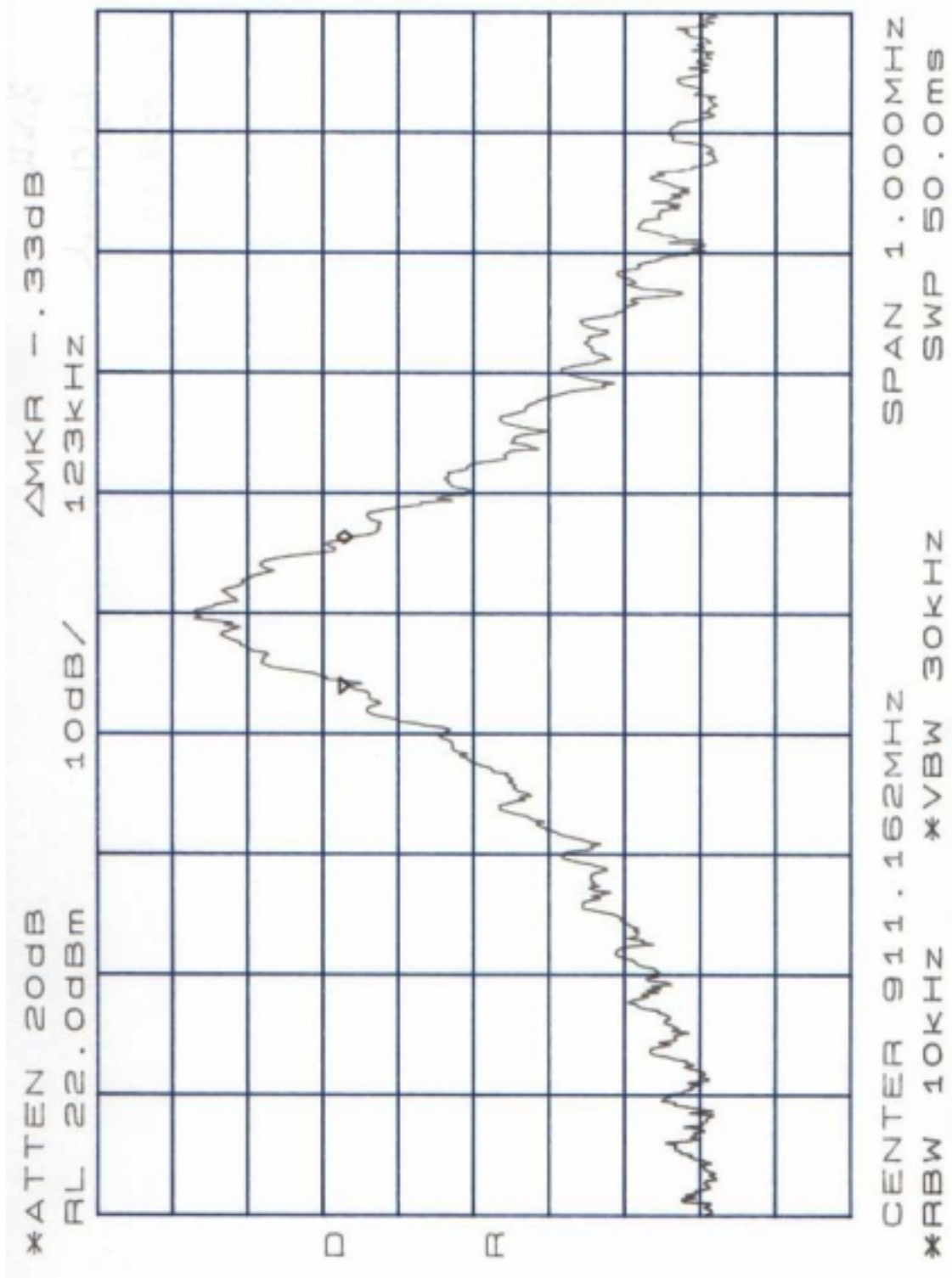
Low Channel



Mid Channel



High Channel



Appendix A

Statement of Measurement Uncertainty

For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ± 2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5 (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.