

Exhibit 2/B

MIST Freedom II-C

Wireless Point of Sale Device

FCC ID: O3JF2NRM6832C1

**Spurious Measurement Report**

(With Test Setup Photographs)



# Assessment of Compliance

for

Measurement of Field Strength of Spurious Radiation in  
Accordance with the FCC Rules & Regulations Part 2.1053

## MIST Freedom II-C Wireless Point of Sale Terminal

MIST Inc.



JUNE 2000

MISB-FREEDOM II NOVATEL CDPD-3441

51 Spectrum Way Nepean ON K2R 1E6  
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## Engineering Report

**Subject:** Measurement of: Field Strength of Spurious Radiation in Accordance with the FCC Rules & Regulations Part 2.1053

**FCC ID:** O3JF2NRM6832C1

**Equipment:** Wireless Point of Sale Terminal

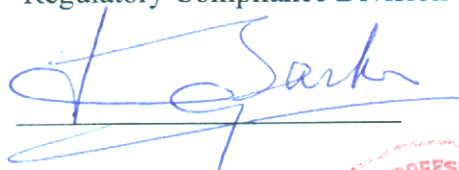
**Model:** MIST Freedom II-C

**Client:** MIST Inc  
703 Evans Avenue, Suite 500  
Toronto, Ontario, M9C 5E9  
Canada  
Tel: (416) 621-1911, Fax: (416) 621-8875

**Project #:** MISB – FREEDOM II NOVATEL CDPD - 3441

**Prepared By:** APREL Laboratories,  
Regulatory Compliance Division

**Approved by:** \_\_\_\_\_

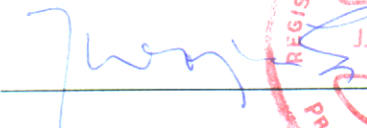


**Date:** \_\_\_\_\_

June 22, 2000

**Jay Sarkar**  
Technical Director, Standards & Certification

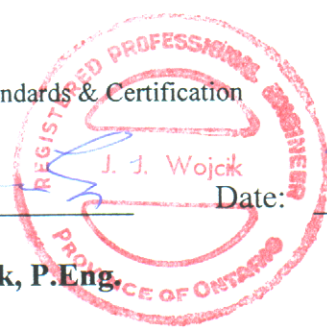
**Released by:** \_\_\_\_\_



**Date:** \_\_\_\_\_

June 22/2000

**Dr. Jack J. Wojcik, P.Eng.**



**FCC ID:** O3JF2NRM6832C1  
**Applicant:** MIST Inc.  
**Equipment:** Wireless Point of Sale Terminal  
**Model:** MIST Freedom II-C  
**Standard:** FCC Rules and Regulations Part 2.1053

### **ENGINEERING SUMMARY**

This report contains the results of Field Strength of Spurious radiation measurement performed on a MIST Freedom II-C Wireless Point of Sale Terminal operating with a Novatel Expedite (NRM-6832) modem. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1053. The product was evaluated for Spurious Emissions when it was set at the maximum power level.

## Summary of the Results

Test Description	Page No.	Test Set-up Figure No.	Results Summary
Field Strength of Spurious Radiation Ref. Paragraph 2.1053	8	1	<b>Passed</b>

## INTRODUCTION

### General

This report describes the results of the Field Strength of Spurious Radiation measurement conducted on a MIST Wireless Point of Sale Terminal, model MIST Freedom II-C operating with a built-in Novatel Expedite (NRM-6832) modem.

### Test Facility

The tests were performed for MIST Inc. by APREL Laboratories at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates an (3m and 10m) Open Area Test Site (OATS). The measurement facility is calibrated in accordance with ANSI C63.4-1992.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria per ANSI C63.4-1992 is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations. ***APREL's registration number is 90416***

APREL is accredited by Standard Council of Canada, under PALCAN program (ISO Guide 25). APREL is also accredited by Industry Canada (formerly DOC) and recognised by the Federal Communications Commissions (FCC).

### Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts 2.1053 and the appropriate limits.

### Test Equipment

The test equipment used during the evaluation is listed in Appendix A with calibration due dates.

### Environmental Conditions

Measurements were conducted in open area test site.

- Temperature: 20 °C ± 2
- Relative Humidity: 30 - 50 %
- Air Pressure: 101 kPa ± 3

## FCC SUBMISSION INFORMATION

**FCC ID:** O3JF2NRM6832C1

**Equipment:** Wireless Point of Sale Terminal

**Model:** MIST Freedom II-C

**For:** Certification

**Applicant:** MIST Inc.  
703 Evans Avenue, Suite 5000  
Toronto, Ontario, M9C 5E9  
Canada  
Tel: (416) 621-1911, Fax: (416) 621-8875

**Manufacturer:** MIST Inc.  
1101 46e Avenue  
Lachine, Montreal, H8T 3C5  
Canada  
Tel: (514) 639-6511, Fax: (514) 639-8875

**Evaluated by:** APREL Laboratories  
51 Spectrum Way  
Nepean, Ontario  
Canada K2R 1E6

## MANUFACTURER'S DATA

**Equipment Type:** Wireless Point of Sale Terminal

**Model:** MIST Inc.

**Reference:** FCC Rules and Regulations Parts 2 and Part 22 (H)

**Manufacturer:** MIST Inc.

**Power Source:** 7.2 VDC Battery

**Development Stage of Unit:** Production

## GENERAL SPECIFICATIONS

1. Frequency Range: 824 to 849 MHz (Transmitter)
2. Rated Transmitted Output Power: 0.347 W
3. Frequency Tolerance:  $\pm 2.5$  PPM
4. Type of Modulation: GMSK
5. Emission Designators(See 47 CFR § 2.201 and §2.202): 28K8FXW
6. Antenna Impedance: 50 Ohms



**TEST RESULTS**

**FOR**

**Field Strength of Spurious Radiation  
Of  
Wireless Point of Sale Terminal  
MIST Freedom II-C with a Novatel  
Expedite (NRM) modem**

**MIST Inc.**

**Test:**            **Field Strength of Spurious Radiation**

**Ref.:**            **FCC Part 22 subpart H, Paragraph 22.917(e) and Part 2.1053**

**Criteria:**        On any frequency twice or more than twice the fundamental frequency of the mobile, the mean power of spurious emissions shall be attenuated below the power of the unmodulated carrier by at least  $43 + 10 \log (P)$  dB.

This was calculated to be 84.6 dB $\mu$ V/m at 3 meters.

**Set-up:**         See Figure No. 7.

**Method of Measurement:**

The final measurements were taken at APREL Laboratory's open area test site (OATS) measurement facility. This open area test site is calibrated to ANSI C63.4 document and a description of the measurement facility is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations. (FCC File No.: 90416).

The mobile was configured to operate at maximum power with appropriate modulation. The mobile was keyed on three different channels in the frequency range 824 MHz to 849 MHz.

Prior to final measurements in the OATS, preliminary radiated spurious emissions were scanned in a shielded enclosure at a distance of 1 m using a broadband Discone antenna and horn antenna in order to determine the characteristic frequencies of the field strength of spurious emissions. Based on this information, measurements were performed in the OATS at these characteristic frequencies using calibrated antennas.

Prior to measurement of the Spurious and harmonic signals, field strength of the carrier frequency was measured in the OATS for reference purposes. All field strength measurements were made with spectrum analyzer and the appropriate calibrated antenna for the frequency range of 9 kHz up to 10<sup>th</sup> harmonics of the transmit frequency (See equipment list for the calibrated antenna used).

The equipment under test was placed on a turntable positioned 3 meters away from the calibrated receiving antenna, which in turn was connected to the spectrum analyzer. For

each identified frequency, the received signal was maximised by the positioning of the turntable and the height of the antenna. The process was repeated for both horizontal and vertical polarization.

Information submitted includes the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antenna.

Measurements given in the spurious emissions test result tables contain: analyzer reading, correction factor, and final reading. The final field strength level are derived from the analyzer measurement and the correction factor (antenna factor and cable loss) as shown in the following example:

#### Sample Calculation

##### A. Spectrum analyzer reading (Direct measurement)

At 1648.080 MHz a spurious level of 6.6 dBμV @ 3 meters is measured.  
(See Table 1, 2<sup>nd</sup> harmonic)

##### B. Correction factor (antenna factor and cable loss)

Cable loss: 2.0 dB  
Antenna factor: 31.2 dB  
Total Correction Factor: 2.0 + 31.2 = 33.2 dB/m

##### C. Final Reading (Field Strength of spurious emission)

C=A+B  
C= 6.6 dBμV + 33.2 dB  
C= 33.8 dBμV/m @ 3 meters

##### D. The criteria level.

The field intensity which would be produced by the transmitter carrier operating into a half-wave dipole antenna (gain of 1.64), at a distance of 3 m was calculated using the following formula:

$$\text{Field Strength of carrier (dB}\mu\text{V/m)} = 10\log_{10}\left(\frac{\text{PtG}}{4\pi r^2}\right) + 146 \text{ dB}$$

Pt is transmitter power, 0.347 Watts (ERP)  
 G is gain, 1.64  
 r is distance, 3 meters

Field Strength of carrier (dBµV/m) =

$$10 \log_{10} \left( \frac{(0.347 \text{ W})(1.64)}{4\pi(3 \text{ m})^2} \right) + 146 \text{ dB}$$

Field Strength of carrier = 123.0 dBµV/m

$$D = \text{Field Strength of carrier} - (43 + (10 \log P))$$

$$D = 123.0 \text{ dB}\mu\text{V/m} - (43 + (10 \log 0.347))$$

$$D = 84.6 \text{ dB}\mu\text{V/m} @ 3 \text{ meters}$$

Criteria (reference) level at 3 meters from 0.347 Watts into half-wave dipole antenna is 84.6 dBµV/m

E = Margin (spurious emission below the reference level)

$$E = D - C$$

$$E = 84.6 \text{ dB}\mu\text{V/m} - 39.8 \text{ dB}\mu\text{V/m}$$

$$E = 44.8 \text{ dB}$$

The above calculation is shown for AMPS

**Results: PASSED.** See Tables 1 and 2.

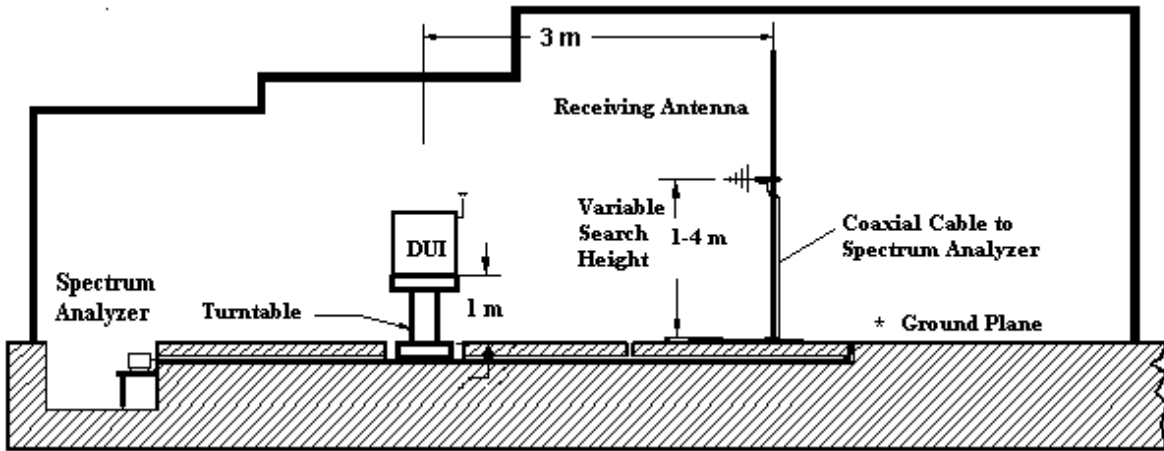


Figure 1.a Test set up for the Field Strength of Spurious Radiation Measurement in OATS  
(Not to scale)



Fig. 1.b APREL's OATS (Open Area Test Site)

Table 1  
 Field Strength of Spurious Radiation  
 Transmitter Frequency Range: 820 – 850 MHz  
 Antenna Polarization: Vertical  
**Resolution Bandwidth:**  
 10 kHz (below 1 GHz)  
 100 kHz (above 1 GHz)

Channel No.	Frequency (MHz)	Measured Level (dB $\mu$ V)	Correction Factor (dB/m)	Field Strength (dB $\mu$ V/m)	Criteria Level (dB $\mu$ V/m)	Margin (dB)
		"A"	"B"	"C"	"D"	"E"
991	1648.080 (2 <sup>nd</sup> harmonic)	6.6	33.2	39.8	84.6	44.8
383	1672.980 (2 <sup>nd</sup> harmonic)	7.9	33.4	41.3	84.6	43.3
799	1697.940 (2 <sup>nd</sup> harmonic)	7.1	33.6	40.7	84.6	43.9

Test Performed by: Kathleen Powner

Date: June 22, 2000

**Table 2**  
**Field Strength of Spurious Radiation**  
 Transmitter Frequency Range: 820 - 850 MHz  
 Antenna Polarization: Horizontal  
**Resolution Bandwidth:**  
 10 kHz (below 1 GHz)  
 100 kHz (above 1 GHz)

Channel No.	Frequency (MHz)	Measured Level (dB $\mu$ V)	Correction Factor (dB/m)	Field Strength (dB $\mu$ V/m)	Criteria Level (dB $\mu$ V/m)	Margin (dB)
		"A"	"B"	"C"	"D"	"E"
991	1648.080 (2 <sup>nd</sup> harmonic)	7.4	33.2	40.6	84.6	44.0
383	1672.980 (2 <sup>nd</sup> harmonic)	9.6	33.4	43.0	84.6	41.6
799	1697.940 (2 <sup>nd</sup> harmonic)	8.3	33.6	41.9	84.6	42.7

Test Performed by: Kulcha Pawan

Date: June 22, 2000

# **APPENDIX A**

## **List of Test Equipment**



**List of Equipment**

<b>Description</b>	<b>Range</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>APREL Asset #</b>	<b>Cal. Due Date</b>
Spectrum Analyzer	9 kHz - 3 GHz	Anritsu	MS2661C	301330	Dec 10, 2000
Spectrum Analyzer	9 kHz - 30 GHz	Anritsu	MS2667C	301436	Nov 3, 2000
Biconical Antenna	20 MHz - 200 MHz	Eaton	94455-1	100890	July 21, 2000
Log - Periodic Antenna	200 MHz -1.0 GHz	Eaton	ALP-1	100761	July 21, 2000
Horn Antenna	1 – 18 GHz	Aprel	AA – 118	100553	March 12, 2000
Anechoic Shielded Room	10 kHz - 10 GHz	APREL Inc.	–	301329	N/A
OATS	30 MHz – 1 GHz	APREL Inc.	3 m & 10 m	N/A	N/A
Mast with the Controller	1 m – 4 m	EMCO	1051 – 12	100507	N/A
Turntable with the Controller	0° - 360°	EMCO	1060 – 1.241	100506	N/A

# APPENDIX B

## Photographs



**MIST Freedom II-CDPD**



**MIST Freedom II CDPD**

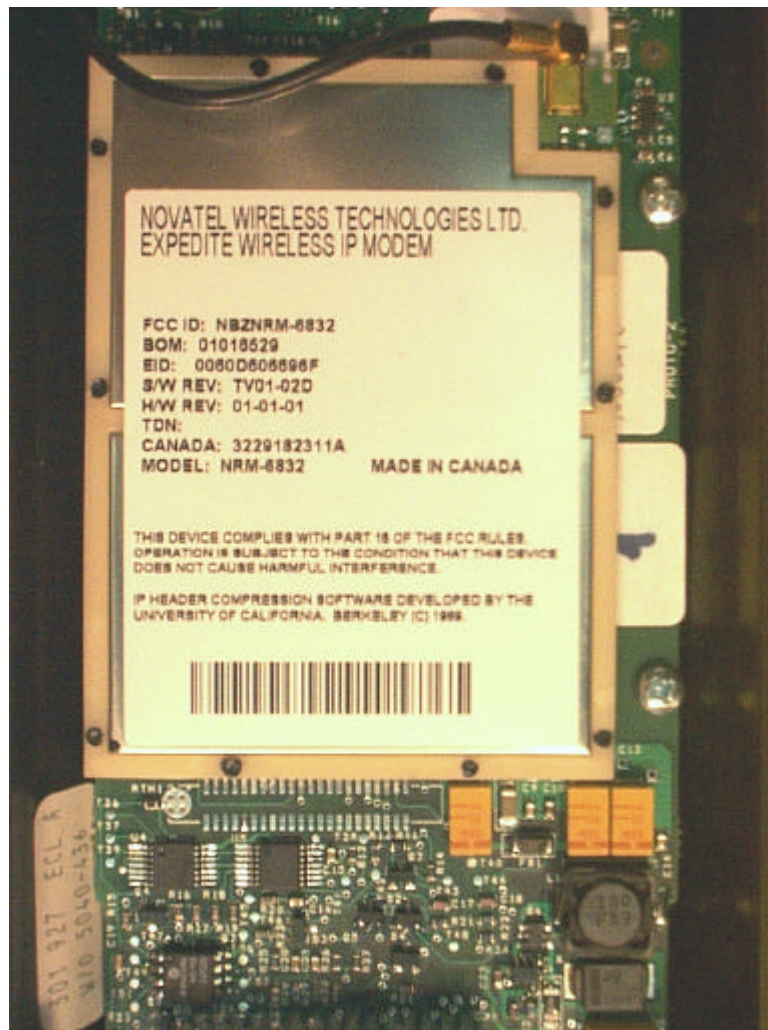


**Field Strength of Spurious Radiation measurement in OATS**



**MIST Freedom II-CDPD, Inside View**

### MIST Freedom II-CDPD, Inside View - Close Up



**MIST Freedom II-CDPD, Novatel CDPD Modem**