

# Marstech Limited

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Authorized by:  
Professional Engineers  
Ontario

Engineering &  
Administrative

CERTIFIED  
UL  
AGENCY

Testing For FCC  
Submissions/Verifications

Approved Test Facility

Classified  
S1  
Priority

## TEST REPORT

REPORT DATE: 20 November 2001 REPORT NO: 21416D

CONTENTS:	See Table of Contents		
SUBMITTOR:	Mandolyn Electronic Technology Inc. 250 Shields Court, Unit 10B Markham, Ontario L3R 9W7		
SUBJECT:	Model No: <b>WS10</b>		
	FCC ID: <b>PLJWS10</b>		
TEST SPECIFICATION:	47 CFR Part 15 Subpart "C" Unintentional Radiators Sections: 15.205, 15.231(b) & (c) NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	19 October 2001	DATE TESTED:	06, 16 November 2001
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS:	Alterations required in compliance with referenced specification: <u>433MHz Receiver Module</u> : <u>C3, 2.7pF capacitor was changed to 3.9nF.</u>		
Tested by:	Edward Chang	Approved by:	Robert G. Marshall, P. Eng.

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TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Mandolyn Electronic Technology Inc.  
250 Shields Court, Unit 10B  
Markham, Ontario  
L3R 9W7

FCC Identifier

PLJWS10

Manufacturer

W. H. Mandolyn International Ltd.  
Yen Yang Industrial City  
Zhang Mu Tou Zhen  
Dongguan, China

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EXHIBIT D

[FCC Ref. 2.1033(b)(6)]

"Report of Measurements"

**MARSTECH LIMITED**

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**EXHIBIT D(1)**

**DEVICE MEASURED**

[FCC Ref. 2.1033(b)(6)]

**APPLICANT:** Mandolyn Electronic Technology Inc.  
250 Shields Court, Unit 10B  
Markham, Ontario  
L3R 9W7

**MANUFACTURER:** W. H. Mandolyn International Ltd.  
Yen Yang Industrial City  
Zhang Mu Tou Zhen  
Dongguan, China

**FCC IDENTIFIER:** PLJWS10

**MODEL NUMBERS:** WS10

**SERIAL NO.:** Not Marked

Marstech Limited  
11 Kelfield Street  
Etobicoke, Ontario  
M9W 5A1 CANADA

**TECHNICIAN:**  
Ed Chang

Robert Marshall  
Robert G. Marshall, P. Eng.

Date: Dec 31/01

EXHIBIT D(2)

TEST FACILITY AND EQUIPMENT LIST

FACILITIES

Radiated †@050X ANSI C63.4 (FCC OET/55) open field 3 metre test range. This test range is protected from the cold and moisture by a non-conductive enclosure.

EQUIPMENT

Anritsu 2601A Spectrum Analyzer  
Advantest R3261A Spectrum Analyzer  
Hewlett-Packard RF generator # 8640 B with an 002 doubler  
A.H. Systems biconical antenna; ..... 20 MHz to 330 MHz  
A.H. Systems log periodic antenna; ..... 300 MHz to 1.8 GHz  
Eaton dipole antennas; T1, T2, T3 ..... 25 MHz to 1.0 GHz  
Roberts dipole antennas; T1, T2, T3 & T4 25 MHz to 1.0 GHz  
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz

NOTE:

The Anritsu 2601A Spectrum Analyzer and the Advantest R3261A Spectrum Analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada. (NRC) This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three metre test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

**SUMMARY OF RESULTS**

COMPLIANCE

(yes) (no)

**FIELD STRENGTH OF THE CARRIER FREQUENCY**

Receiver: 15.231(b) @ 3 Meters N/A  
Transmitter N/A

**BANDWIDTH**

Receiver: 15.231(c) N/A  
Transmitter N/A

**TRANSMITTER BAND RESTRICTIONS**

Receiver: 15.205(a) N/A  
Transmitter N/A

**SPURIOUS RADIATION LEVELS [EXHIBIT D(3)-4]**

Receiver: 15.231(b) 41.37 dB $\mu$ V/M @ 3 Meters 421.4 MHz (x) ( )  
Transmitter: N/A

**LINE CONDUCTED RADIATION**

Receiver: N/A  
Transmitter: N/A

## SPURIOUS RADIATED EMISSIONS

Page 1 of 2

### RESULTS

The maximum field strength of any spurious emission or harmonic while receiving was:

Model WS10:

Receiver: **Maximum field strength of 41.37 dB $\mu$ V/M at 421.4 MHz.**

### TEST CONDITIONS

Equipment Positioning:

Receiver: Laying on its back  
Transmitter: N/A

Antenna Polarization: Horizontal

Measurement Bandwidth: 120KHz

Supply Voltage:

Transmitter: N/A  
Receiver: Two "AA" batteries

### METHODS OF MEASUREMENT

Receiver:

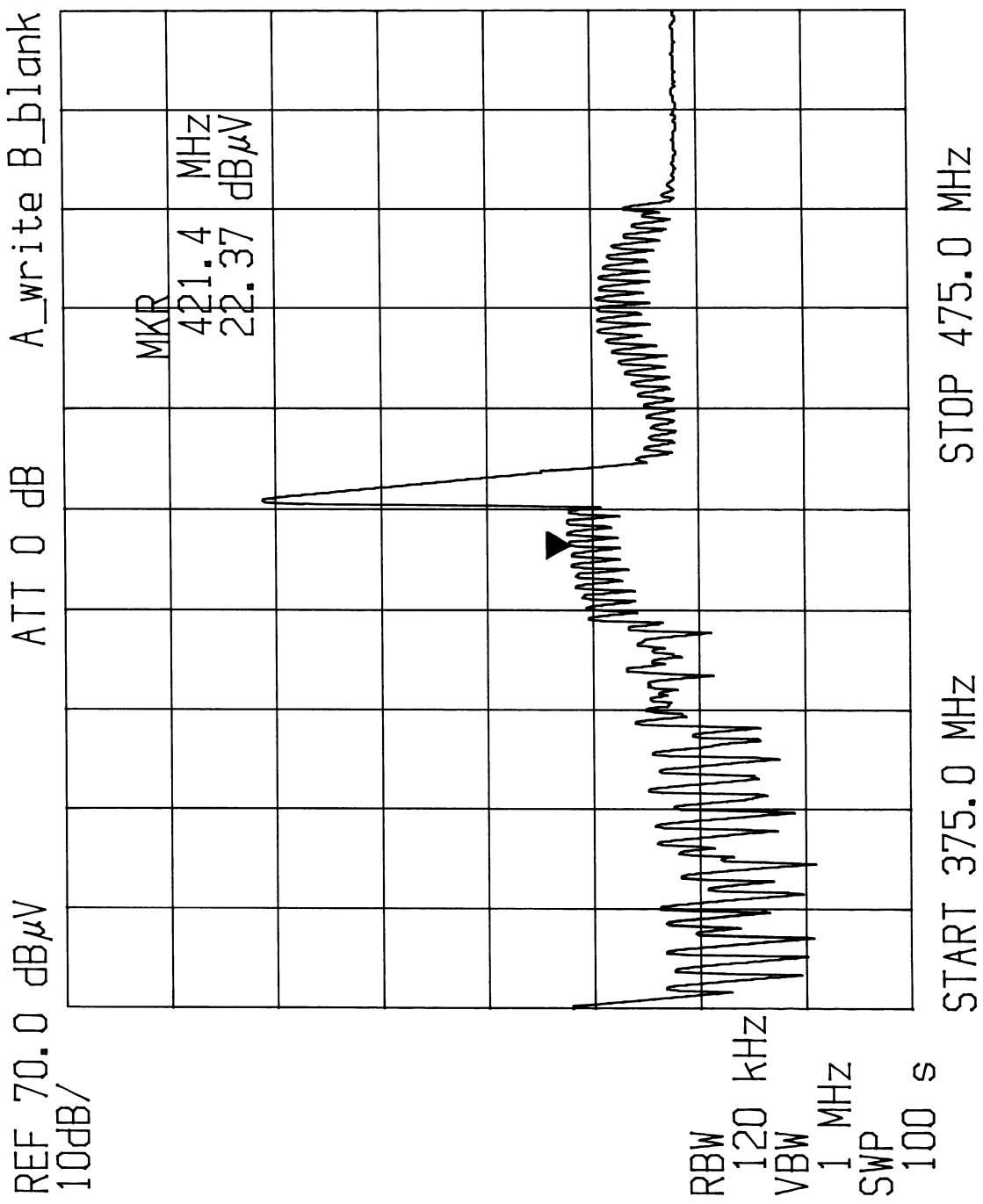
The EUT was placed on a one meter high non-metallic turntable. The EUT was unmodified sample, as supplied by the manufacturer. Power was supplied via a 120 VAC cable fed upward through the centre of a turntable. The EUT was set in the receive mode, and the entire spectrum up to 2,000vMHz was searched for spurious emissions. All emissions were measured and recorded.

The receive frequency was measured using an external unmodulated ambient RF carrier signal, tuned across the wideband of the receiver noise. The unmodulated carrier was emanating from an antenna in the proximity of the receiver. Care was taken so as not to overload the receiver, however the carrier level was varied in amplitude and frequency to obtain the highest level of spurious emissions from the receiver. This external signal was set to cause receiver "quieting" or to cohore the superregenerative receiver and cause single discrete noise components to appear. At this point, the largest emission or single frequency component within this band was measured and recorded.

For each of the above conditions, the turntable was rotated through 360 degrees, while the receiving antenna, at three (3) meters from the EUT, was varied in height from 1 to 4 meters, to find the maximum signal strength. The measured level was converted to a field strength using the antenna correction factors and cable losses.

**FIELD STRENGTH OF EMISSIONS**Page 2 of 2**Test Data:****Model WS10**

Emission Frequency MHz	Meter Reading @3m dB $\mu$ V/M	Antenna	Cable and ACF dB	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin dB	Detector & BW KHz
410.40	22.37	LP H	19.00	41.37	46	-4.63	QP 120
446.00	19.00	LP H	19.00	38.00	46	-8.00	QP 120
800.70	10.00	LP H	28.70	38.70	46	-7.30	QP 120
811.10	10.30	LP H	28.60	38.90	46	-7.10	QP 120
1292.10	9.00	LP V	36.00	45.00	54	-9.10	PK 1000



FCC ID: PLJWS10  
Marstech Report No. 21416D  
EXHIBIT D(3)-4