Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1
Telephone (416) 246-1116, Fax (416) 246-1020

Authorized by: Professional Engineers Ontario

Engineering & Administrative

CERTIFICATED UL 102NCA

Testing For FCC Submissions/Verifications

Approved Test Facility

Qualified SP Facility

TEST REPORT

REPORT DATE:	20 November 2001		REPORT NO: 21415D
CONTENTS:	See Table of Contents		
SUBMITTOR:	Mandolyn Electronic Technology Inc. 250 Shields Court, Unit 10B Markham, Ontario L3R 9W7		
SUBJECT:	Model No: **WS44X**		
	FCC ID: PLJW44X		
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: 433MHz Receiver Module: **C3, 2.7pF capacitor was changed to 3.9pF.**		
		Approved by:	Robert G. Marshall, P. Eng.
Tested by:	Edward Chang	Date:	NOV 21/01

TECHNICAL REPORT - FCC 2.1033(b)

Applicant

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

FCC Identifier

PLJW44X

Manufacturer

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

TABLE OF CONTENTS

EXHIBIT D

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

"Report of Measurements"

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:	PLJW44X
MODEL NUMBERS:	WS44X
SERIAL NO.:	Not Marked

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

TECHNICIAN:
Ed Chang

Robert G. Marshall, P. Eng.

Date: Nov 21/01

EXHIBIT D(2)

TEST FACILITY AND EQUIPMENT LIST

FACILITIES

Radiated — 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)	46 dBμV/M	@ 1300.02 MHz	(x)	( )
Transmitter			N/A	
SPURIOUS RADIATION LEVELS	[EXHIBIT D(3)-4]			
Receiver: 15.231(b)	44.92 dBμV/M @ 3 Meters	410.7 MHz	(x)	( )
Transmitter:			N/A	
LINE CONDUCTED RADIATION				
Receiver:			N/A	
Transmitter:			N/A	

SPURIOUS RADIATED EMISSIONS

RESULTS

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

Model WS44X:

Receiver: **Maximum field strength of 44.92 dBμV/M at 410.70 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 cohere 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.

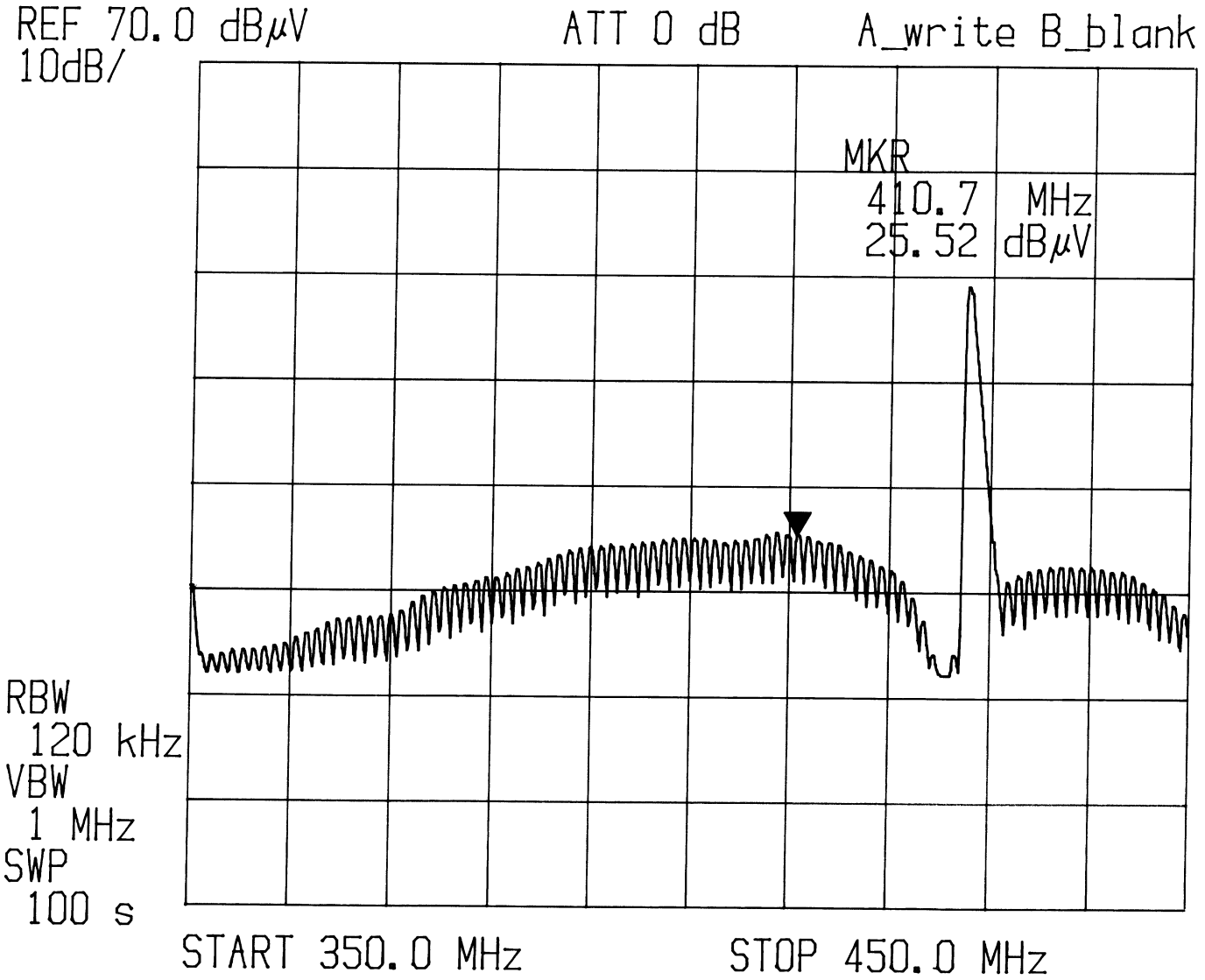
For each of the above conditions, the turntable was rotated through 360 degrees, while the receiving antenna, at three (3) meters from the EUT, was varied in height from 1 to 4 meters, to find the maximum signal strength. The measured level was converted to a field strength using the antenna correction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

FIELD STRENGTH OF EMISSIONS

Test Data:

Model WS44X

Emission Frequency MHZ	Meter Reading @3m dBμV/M	Antenna	Cable and ACF dB	Field Strength dBμV/M	FCC Limit dBμV/M	Margin dB	Detector & BW KHz
410.70	25.52	LP H	19.40	44.92	46	-1.08	QP 120
439.40	21.50	LP H	19.10	40.6	46	-5.40	QP 120
440.00	22.50	LP H	19.10	41.6	46	-4.40	QP 120
798.80	9.50	LP V	28.60	38.10	46	-7.90	QP 120
845.90	10.50	LP V	28.10	38.60	46	-7.40	QP 120
1300.02	10.00	LP V	36.00	46.00	54	-8.00	PK 1000


REF 70.0 dBμV
10dB/
ATT 0 dB
A_write B_blank
MKR
410.7 MHz
25.52 dBμV
RBW
120 kHz
VBW
1 MHz
SWP
100 s
START 350.0 MHz
STOP 450.0 MHz