

Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1

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Authorized by:
Professional Engineers
Ontario

Engineering &
Administrative

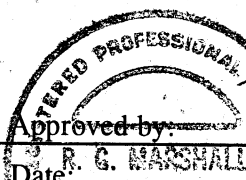
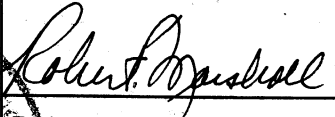


Testing For FCC
Submissions/Verifications

Approved Test Facility



TEST REPORT

REPORT DATE:	17 January 2002	REPORT NO:	21458D
CONTENTS:	See Table of Contents		
SUBMITTOR:	Waterloo Controls Inc. 111 Golf Course Road Conestogo, Ontario N0B 1N0 CANADA		
SUBJECT:	Model No:	T0111	
	FCC ID:	P55-T0111	
TEST SPECIFICATION:	FCC 47 CFR Part 15, Sections 15.109, 15.249 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	21 November 2001	DATE TESTED:	21, 23 November 2001
RESULTS:	Equipment tested complies with referenced specification.		
			
Tested by:	Edward Chang	Approved by:	Robert G. Marshall, P. Eng.
		Date:	Jan 29/02
THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF MARSTECH LIMITED. This report was prepared by Marstech Limited for the account of the "Submittor". The material in it reflects Marstech's judgement in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Marstech accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.			

TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Waterloo Controls Inc.
111 Golf Course Road
Conestogo, Ontario
N0B 1N0 CANADA

FCC Identifier

P55-T0111

Manufacturer

Same as Applicant

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EXHIBIT D

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

"Report of Measurements"

EXHIBIT D(1)

DEVICE MEASURED

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

APPLICANT: Waterloo Controls Inc.
111 Golf Course Road
Conestogo, Ontario
N0B 1N0 CANADA

MANUFACTURER: same as Applicant

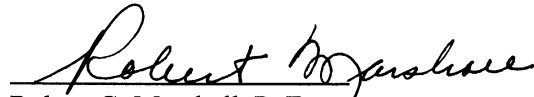
FCC IDENTIFIER: P55-T0111

MODEL NUMBER: T0111

SERIAL NO.: Not Marked

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

TECHNICIAN:
Edward Chang


Robert G. Marshall, P. Eng.

Date: Jan 29/02

EXHIBIT D(2)

TEST FACILITY AND EQUIPMENT LIST

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.

ADDITIONAL TEST EQUIPMENT LIST

- 1 Spectrum Analyzer: HP 8591EM, S/N 3639A00995, Calibrated April 2001
- 2 Spectrum Analyzer: ANRITSU 2601A, S/N MT64544, Calibrated May 2001
- 3 Spectrum Analyzer: IFR AN940, S/N 635001039, Calibrated March 2001
- 4 Preamp: HP 8449B, S/N 3008A00378, Calibrated August 2001
- 5 Horn Antenna: Q-PAR 6878/24, S/N 1721, 1.5-18GHz.
- 6 Line Impedance Stabilization Network.: Marstech, Cal. July 2001

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD. 21046

September 20, 2000

Registration Number: 90578

Electrohome Electronics Ltd.
809 Wellington St. N.
Kitchener, Ontario N2G 4J6
Canada

Attention: Gerry Gallagher

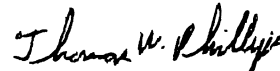
Re: Measurement facility located at Roseville
3 meter-site
Date of Listing: September 20, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,



Thomas W Phillips
Electronics Engineer

SUMMARY OF RESULTS

COMPLIANCE

(yes) (no)

FIELD STRENGTH OF THE CARRIER FREQUENCY

Transmitter: 15.249

92.70 dB μ V/M @ 3 Meters @ 903.37 MHz Limit: 94 dB μ V/M

(x) ()

BANDWIDTH

Transmitter: 2.202 **433 KHz**

(x) ()

TRANSMITTER BAND RESTRICTIONS

The limit for spurious emissions is the general limit of **54 dB μ V/M** for restricted bands.

The highest spurious emissions found was **53.17 dB μ V/M** at **4606.85 MHz**.

(x) ()

SPURIOUS RADIATED EMISSIONS

Page 1 of 2

RESULTS

The maximum field strength of the carrier while transmitting was:

Transceiver: Maximum field strength of 92.70 dB μ V/M at 903.37 MHz.

TEST CONDITIONS

Equipment Positioning:

Transceiver: Vertical

Antenna Polarization: Vertical

Measurement Bandwidth: 120KHz

Supply Voltage:

Transceiver: 8.4V Ni-MH Batteries

METHODS OF MEASUREMENT

Transceiver:

The transceiver was placed on a one meter high non-metallic turntable. The EUT was an unmodified sample, as supplied by the manufacturer. All emissions were measured and recorded.

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.

RADIATED EMISSION RESULTS

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[Part 15.249]

Test Data:**Transceiver Model T0111**

Emission Frequency MHZ	Meter Reading @3m dB μ V	Antenna	Cable and ACF dB	Field Strength dB μ V/M	FCC Limit dB μ V/M	Margin dB	Detector & BW KHz
903.37	59.50	RT4 V	33.20	92.70	94	-1.30	PK 100
1806.74	18.00	Horn V	33.21	51.21	54	-2.79	PK 1000
2710.11	15.03	Horn V	33.89	48.92	54	-5.08	PK 1000
3613.48	13.36	Horn V	35.39	48.75	54	-5.25	PK 1000
4516.85	15.70	Horn H	37.18	52.88	54	-1.12	PK 1000
5420.22	11.70	Horn H	39.25	50.95	54	-3.05	PK 1000
6323.59	---						
8130.33	---						
912.37	57.80	RT4 V	33.29	91.09	94	-2.91	PK 100
1824.74	16.00	Horn V	33.12	49.12	54	-4.88	PK 1000
2737.11	17.05	Horn V	33.92	50.98	54	-3.02	PK 1000
3649.48	12.36	Horn V	35.45	47.81	54	-6.19	PK 1000
4561.85	15.50	Horn H	37.25	52.75	54	-1.25	PK 1000
5474.22	10.62	Horn H	39.36	49.98	54	-4.02	PK 1000
6386.59	---						
921.37	56.00	RT4 V	33.35	89.35	94	-4.65	PK 100
1842.74	14.00	Horn V	33.08	47.08	54	-6.92	PK 1000
2764.11	16.03	Horn V	34.03	50.06	54	-3.94	PK 1000
3685.48	11.42	Horn V	35.50	46.92	54	-7.08	PK 1000
4606.85	15.72	Horn H	37.45	53.17	54	-0.83	PK 1000
5528.22	---						

BANDWIDTH

The 20 dB bandwidth was measured at **433KHz**, which is less than 0.25% of 904 MHz = 2260 KHz.

15:53:07 NOV 21, 2001

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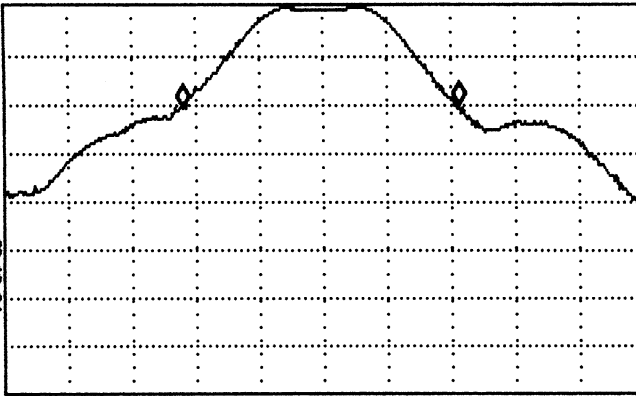
SWEPTIME
20.0 sec

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRA 433 kHz
.55 dB

LOG REF 76.0 dB μ V

10
dB/
#ATN
0 dB

WA SB
SC FS
CORR



CENTER 903.380 MHz SPAN 1.000 MHz
#IF BW 120 kHz #AVG BW 100 kHz #SWP 20.0 sec

15:58:49 NOV 21, 2001

/p

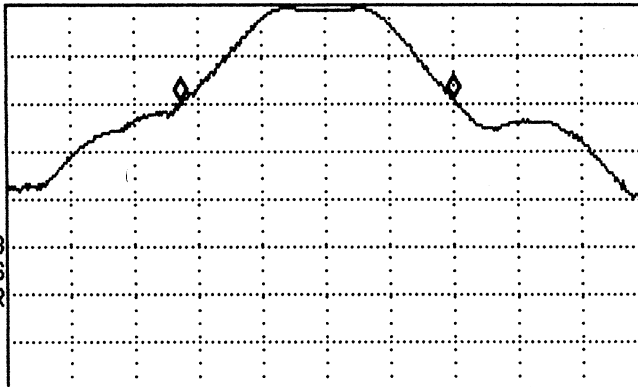
SWEPTIME
20.0 sec

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRA 428 kHz
.99 dB

LOG REF 74.0 dB μ V

10
dB/
#ATN
0 dB

WA SB
SC FS
CORR



CENTER 921.385 MHz SPAN 1.000 MHz
#IF BW 120 kHz #AVG BW 100 kHz #SWP 20.0 sec