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 AGENCY

Testing For FCC Submissions/Verifications

Approved Test Facility

Qualified SP 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: Date:	Robert G. Marshall, P. Eng. 29 Jan 29/02

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

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:	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

Thomas W Phillips
Electronics Engineer

FCC ID: P55-T0111
Marstech Report No. 21458D
EXHIBIT D(2)-3

SUMMARY OF RESULTS

	COMPLIANCE (yes)	(no)
FIELD STRENGTH OF THE CARRIER FREQUENCY		
Transmitter: 15.249		
92.70 dBμV/M @ 3 Meters @ **903.37 MHz** Limit: 94 dBμV/M	(x)	( )
BANDWIDTH		
Transmitter: 2.202 **433 KHz**	(x)	( )
TRANSMITTER BAND RESTRICTIONS		
The limit for spurious emissions is the general limit of **54 dBμV/M** for restricted bands.		
The highest spurious emissions found was **53.17 dBμV/M** at **4606.85 MHz**.	(x)	( )

SPURIOUS RADIATED EMISSIONS

RESULTS

The maximum field strength of the carrier while transmitting was:

Transceiver: Maximum field strength of 92.70 dBμV/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

[Part 15.249]

Test Data:

Transceiver Model T0111

Emission Frequency MHZ	Meter Reading @3m dBμV	Antenna	Cable and ACF dB	Field Strength dBμV/M	FCC Limit dBμV/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	---						

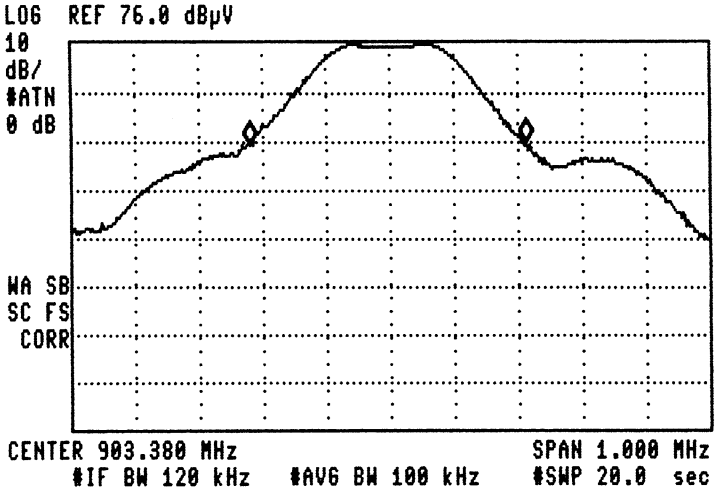
BANDWIDTH

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

SWEEPTIME
20.0 sec

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



15:58:49 NOV 21, 2001

SWEEPTIME
20.0 sec

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