

MEASUREMENT/TECHNICAL REPORT

Company - Model: Abacus Controls Inc.
The Abacus Remote 1
FCC ID: OZ7REMPIA
April 20, 2000

Description: This is a report to support a request for an original grant of equipment authorization.

Equipment Type: Low Power Communications Device Transmitter (DXX)

Report prepared for: Abacus Controls Inc.
192 Old Westford Road
Chelmsford, MA 01824
Phone: (978) 256-6211
Fax: (978) 256-6211

Report prepared by: Chad A. Bell
Curtis-Straus LLC
527 Great Road
Littleton, MA 01460
Phone: 978-486-8880
FAX: 978-486-8828

Table of Contents

LETTER OF AGENCY	3
INTRODUCTION.....	4
EXHIBIT 1:.....	5
1.0 STATEMENT OF CONFORMITY	5
EXHIBIT 2.....	6
2.0 GENERAL DESCRIPTION	6
2.1 <i>Product Description</i>	6
2.2 <i>Related Submittal(s) Grants</i>	6
2.3 <i>Test Methodology</i>	6
2.4 <i>Test Facility</i>	6
2.5 <i>Test Equipment Used</i>	7
EXHIBIT 3.....	9
3.0 MEASUREMENT RESULTS	9
3.1 <i>Operating Frequency</i>	9
3.2 <i>Electric Field Strength Radiation Measurements</i>	9
3.3 <i>Emissions Plots:</i>	10

Letter of Agency



192 Old Westford Road
Chelmsford, MA 01824
800.218.2801

Agent Authorization

April 16, 2000

I, President of Abacus Controls, Inc., do hereby authorize, until further notice, Curtis-Straus LLC, of 527 Great Road, Littleton, MA 01460, to act on our behalf in dealings before the Federal Communications Commission with respect to all matters relating to equipment authorizations under 47 CFR. This authorization includes, but is not limited to, the signing of Form 731.

I certify that no party (as defined in 47 CFR 1.2002) to this application, including myself, is subject to a denial of federal benefits, that include FCC benefits, pursuant to section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C., 853A.

Certified By:

A handwritten signature in black ink, appearing to read "Nathan A. Lavoie".

Nathan A. Lavoie
President
April 16, 2000

Introduction

This report is an application for Certification of a Transmitter operating pursuant to Part 15.249 of the FCC Rules, Code of Federal Regulations 47. The model number covered by this report is the A series. This report is designed to demonstrate the compliance of this device with the requirements outlined in Part 15 of CFR 47 using the methods outlined in Part 2 of CFR 47. The current revision date, October 1, 1998, of each Part has been used for technical requirements.

The confidential information and descriptions included in this application are detailed descriptions of the products, block diagrams, component specifications, and schematic diagrams. We hereby respectfully request under the provision of section 0.457d of the code that the documents listed below be held confidential.

Exhibit 6.1: Technical Descriptions and Block Diagrams

Exhibit 6.2: Schematics

Exhibit 6.3: Bill of Materials

Abacus Controls Inc. is requesting that the Technical Descriptions, Block Diagrams, Schematics and Bill of Materials be kept confidential in the FCC application because of the proprietary design developed by Abacus Controls Inc. that is unique to the industry.

EXHIBIT 1:

1.0 *Statement of Conformity*

The Abacus Controls Inc. A series Remote 1 has been found to conform with the following parts of the 47 CFR as detailed below:

Part 2	Part 15	Comments
	15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
	15.203	The antenna is built into the board and there is no external antenna connection.
	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.207	The unit is battery powered without the capability of being recharged or operated from the AC mains.
	15.249(a)	The unit complies with the field strength limits of the 15.249(a) table including the 20dB peak restriction of 15.35(b) and 15.249(d).
	15.249(c)	The unit complies with the field strength limits of the 15.209(a) table.

EXHIBIT 2

2.0 *General Description*

2.1 Product Description

The Abacus remote1 is a remote control unit for the Abacus Controller. The system is used to control and service irrigation systems in residential and commercial environments.

Unit Tested

Model Number: A Series

Serial Number: FCC 01

2.2 Related Submittal(s) Grants

There are no other approvals required for this device.

2.3 Test Methodology

Radiated emission testing was performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance of 3 meters below 1 GHz, and at a distance of 3 meter(s) above 1 GHz. The actual test distance used is noted in the test data sheets. The device's performance was investigated to 10GHz.

All other performance tests were made in accordance with the procedures outlined in Part 15 of CFR 47 with the expansion noted below. The applicable sections provided under Part 15 are provided in the measurement section of this report, Exhibit 3.

2.4 Test Facility

Curtis-Straus LLC

All testing was performed at Curtis-Straus (NVLAP Lab Code: 200057-0). The open area test site used to collect the radiated data is located at 527 Great Road, Littleton, MA 01460. Site "F" was used. This test facility have been fully described in a report submitted to your office, and a letter from your office dated February 28, 1997 verified receipt of the report and confirmed compliance of the site. Please reference your file # 31040/SIT 1300F2 should you have any questions regarding the test site construction.

2.5 Test Equipment Used

SPECTRUM ANALYZERS					
X	Analyzer	Model No.	Company	Serial No.	Calibration Due
X	BLUE 9kHz-1.8GHz	8591E	HP	3223A00227	02-SEP-2000
X	YELLOW 9kHz-2.9GHz	8594E	HP	3523A01958	20-OCT-2000
X	GREEN 9kHz-26.5GHz	8593E	HP	3829A03618	04-OCT-2000

LISNs					
X	LISN	Model No.	Company	Serial No.	Calibration Due
X	YELLOW-BLACK 9kHz-30MHz	8012-50-R-24-BNC	Solar	984735	26-OCT-2000

OPEN AREA TEST SITES (OATS)					
X	Site	FCC Code	IC Code	VCCI Code	Calibration Due
X	F Florida	90527	IC 2762-F	R-468/ C-480	04-JUN-2000

ANTENNAS					
X	Antenna	Model No.	Company	Serial No.	Calibration Due
X	GREEN Bilog: 30MHz-2GHz	CBL6112B	Chase	2435	14-JUL-2000
X	YELLOW Horn: 1-18GHz	3115	EMCO (Telygo Rental)	9608-4898	14-APR-2001

PREAMPLIFIERS					
X	Preamplifier	Model No.	Company	Serial No.	Calibration Due
X	BLUE-BLACK 0.01-2000MHz	ZFL-1000-LN	MiniCircuits/ C-S	n/a	19-OCT-2000
X	WHITE 2-18GHz	SMC-12A	MITEQ	426643	19-OCT-2000

METEOROLOGICAL METERS					
X	Meter	Model No.	Company	Serial No.	Calibration Due
X	TEMPERATURE /HUMIDITY GAUGE	TH300	Dickson	9044101	27-MAR-2001
X	ATMOSPHERIC PRESSURE GAUGE	BA928	Oregon Scientific	C3166-1	14-JUL-2000

TRACEABLE CLOCKS					
X	Clock	Model No.	Company	Serial No.	Calibration Due
X	5003	5003	Control Company	99026940	16-NOV-2000

Unless otherwise noted the calibration interval is one year. All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

EXHIBIT 3

3.0 Measurement Results

3.1 Operating Frequency

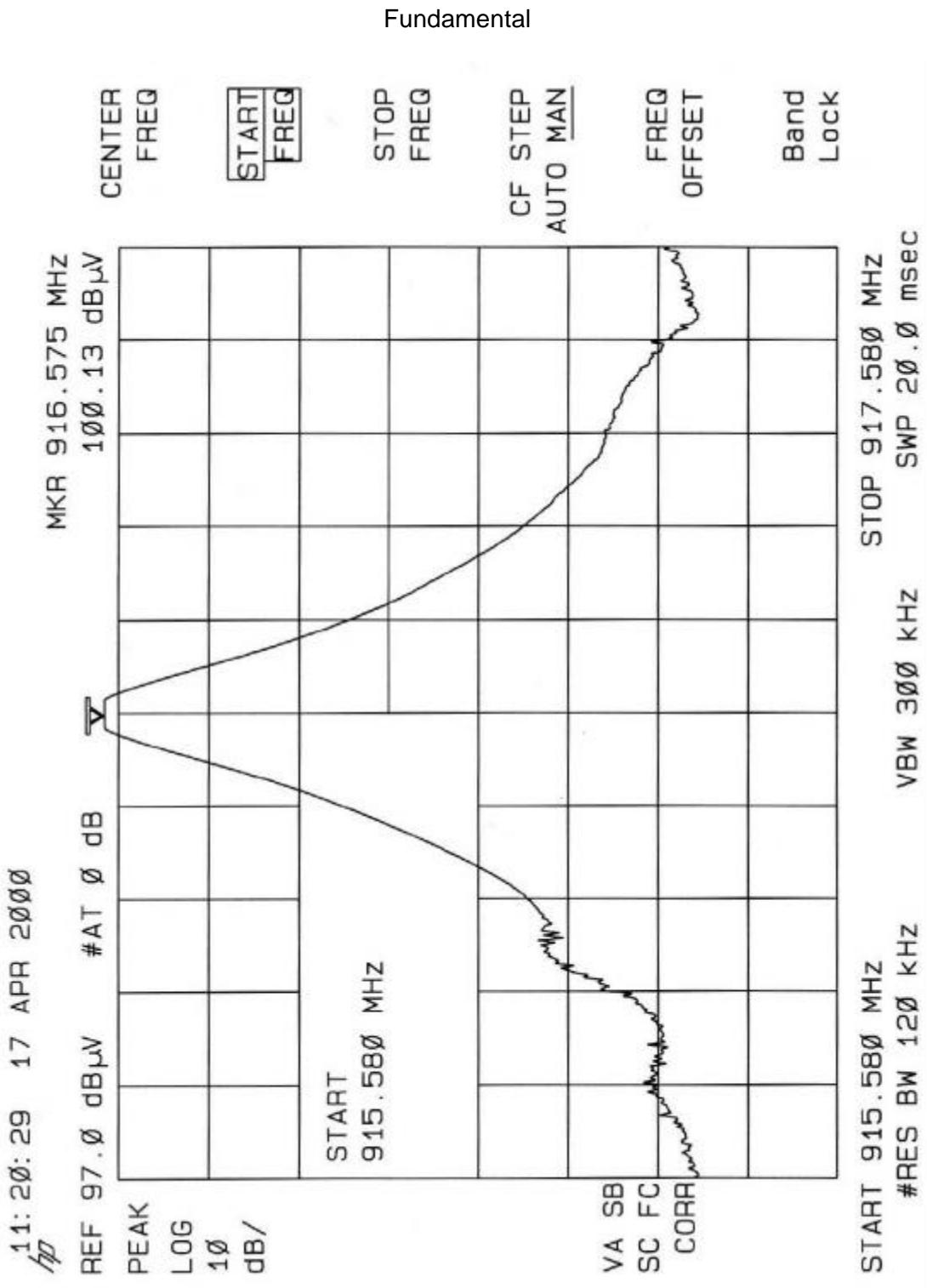
This device operates at 916.5 MHz.

3.2 Electric Field Strength Radiation Measurements

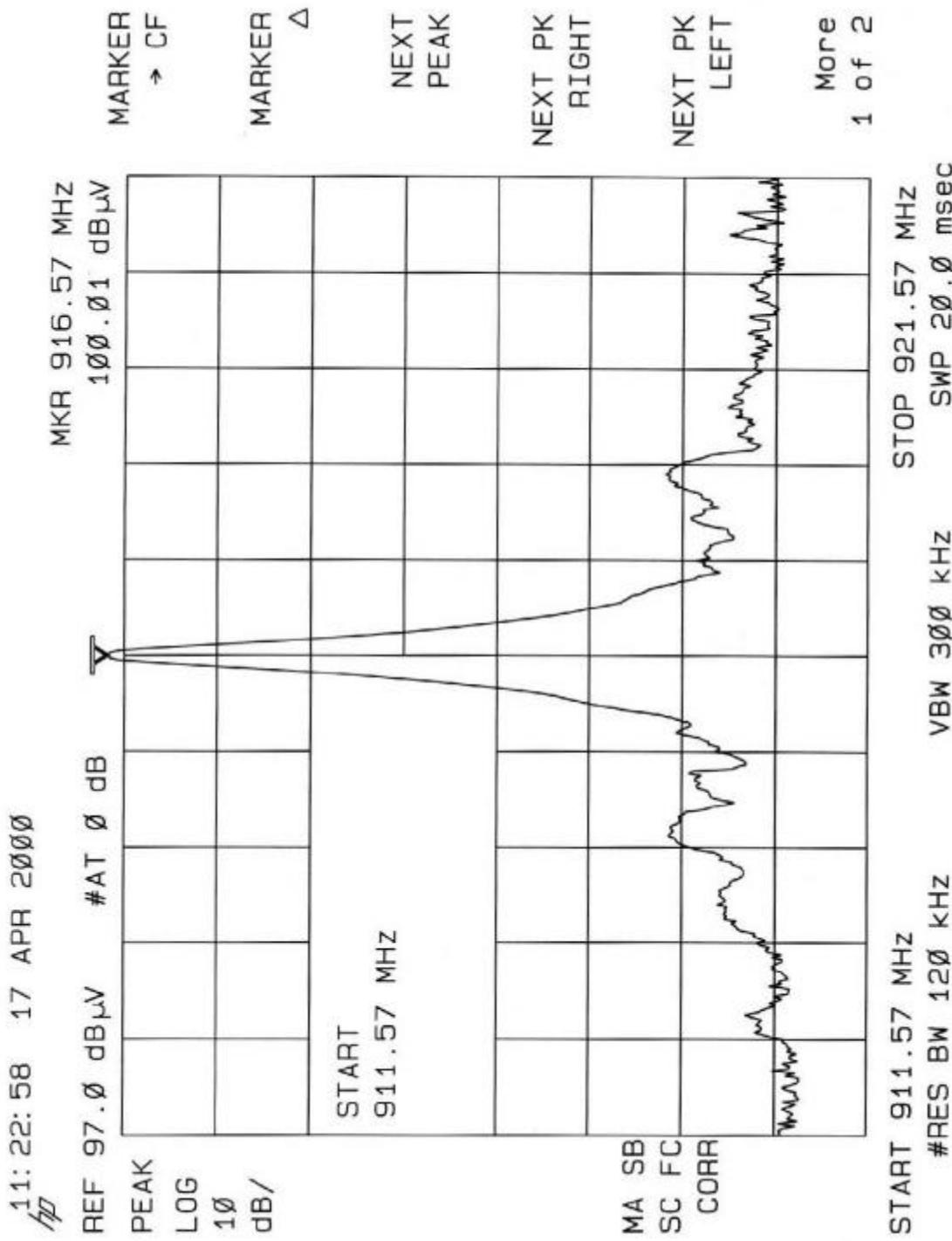
Radiated Emissions Table										Curtis-Straus LLC										
Date: 17-Apr-00		Company: Abacus Controls		Table 1																
Engineer: Chad A. Bell		EUT Desc: Remote 1		Work Order: EA0604																
Frequency Range: 30-1000Mhz										Measurement Distance: 3 m										
Notes: 916.5Mhz Fundamental and its harmonics										EUT Max Freq: 916.5Mhz										
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Duty Cycle Correction factor	Filter Impedance factor	Adjusted Reading (dB μ V/m)	FCC Class B											
									Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)									
V	916.5	100.3	23.1	20.7	4.1	16.9	0.0	85.1	94.0	-8.9	Pass									
H	1833.0	49.1	18.1	26.6	6.5	16.9	0.0	47.2	54.0	-6.8	Pass									
H	2749.5	48.4	20.0	32.4	2.4	16.9	1.0	46.3	54.0	-7.7	Pass									
H	3666.0	38.6	20.1	33.9	3.0	16.9	1.0	38.5	54.0	-15.5	Pass									
H	4582.5	34.4	20.0	36.1	3.6	16.9	1.0	37.2	54.0	-16.8	Pass									
H	5499.0	33.3	19.9	36.8	4.5	16.9	1.0	37.8	54.0	-16.2	Pass									
H	6415.5	31.9	19.1	37.2	5.0	16.9	1.0	38.1	54.0	-15.9	Pass									
NF	7332.0	33.7	18.2	39.1	6.1	16.9	1.0	43.8	54.0	-10.2	Pass									
NF	8248.5	32.4	18.1	39.1	7.0	16.9	1.0	43.5	54.0	-10.5	Pass									
NF	9165.0	31.7	18.0	40.8	8.2	16.9	1.0	45.8	54.0	-8.2	Pass									
Table Result: Pass by -6.8 dB										Worst Freq: 1833.0 MHz										
Test Site: "F"			Pre-Amp: White/Blue-Blk			Cable: 65ft RG8A/U / 12 ft RG214			Analyzer: Green			Antenna: Green/Yellow Horn								

Radiated Emissions Table										Curtis-Straus LLC										
Date: 18-Apr-00		Company: Abacus Controls Inc.		Table 2																
Engineer: Chad A. Bell		EUT Desc: Abacus Controller with Remote		Work Order: A0604																
Frequency Range: 30-1000Mhz										Measurement Distance: 3 m										
Notes: Unintentional Emissions										EUT Max Freq: 4Mhz										
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB μ V/m)	---			FCC Class B										
							Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)								
V	32.14	36.5	23.3	17.3	0.4	30.9	---	---	---	40.0	-9.1	Pass								
Vbb	33.8	38.5	23.3	16.6	0.4	32.2	---	---	---	40.0	-7.8	Pass								
V	36.17	34.8	23.3	15.4	0.4	27.3	---	---	---	40.0	-12.7	Pass								
V	40.2	41.5	23.3	13.3	0.5	32.0	---	---	---	40.0	-8.0	Pass								
Vbb	42.2	38.5	23.3	12.1	0.5	27.8	---	---	---	40.0	-12.2	Pass								
V	44.2	41.0	23.3	11.0	0.5	29.2	---	---	---	40.0	-10.8	Pass								
V	48.21	37.6	23.3	9.1	0.5	23.9	---	---	---	40.0	-16.1	Pass								
V	52.24	39.2	23.3	7.8	0.6	24.3	---	---	---	40.0	-15.7	Pass								
V	56.27	46.8	23.3	6.9	0.6	31.0	---	---	---	40.0	-9.0	Pass								
V	60.28	51.1	23.3	6.0	0.6	34.4	---	---	---	40.0	-5.6	Pass								
Vbb	61.78	53.0	23.3	6.0	0.6	36.3	---	---	---	40.0	-3.7	Pass								
V	64.28	46.5	23.3	6.0	0.6	29.8	---	---	---	40.0	-10.2	Pass								
Table Result: Pass by -3.7 dB										Worst Freq: 61.78 MHz										
Test Site: "F"			Pre-Amp: Blue-Blk			Cable: 65 ft RG8A/U			Analyzer: Yellow			Antenna: Green								

3.3 Emissions Plots:



Occupied Bandwidth Measurements



THIS PAGE INTENTIONALLY LEFT BLANK
(last page of report)