Transmitter Certification

Test Report

FCC ID: UP3PC50

FCC Rule Part: CFR 47 Part 15.209

ACS Report Number: 06-0407-15C

Applicant: LATHEM TIME CORP.
Equipment Type: Time & Attendance Terminal
Model(s): PC50

Test Begin Date: October 18, 2006
Test End Date: October 20, 2006

Report Issue Date: October 31, 2006

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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ACS, Inc.

This report contains 13 pages

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1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15, Subpart C of the FCC's Code of Federal Regulations.

1.2 Product Description

1.2.1 General

Lathem's PC50 Time & Attendance Terminal is connected to the customer's Host Computer via a USB Interface, from which it normally derives its power. The PC50 includes a LCD Character Display, LED Indicators, *125kHz Proximity Badge Reader*, an Audio Speaker and a 2-Port USB down-stream Hub as main components. When connected to the Host, Firmware is down-loaded into the Terminal.

The PC50 Terminal is intended for installation into business (office, industrial) environments.

Users will present their Prox Badge within range of the internal Reader. The Badge Number will be read, and transmitted to the Host (running Lathem's PayClock Software) via the USB Interface. The Host will send to the Terminal Text, Audio and Indicator messages to provide transaction acknowledgement to the User.

Manufacturer Information:
LATHEM TIME CORP.
200 SELIG DRIVE SW
ATLANTA, GA 30336

1.2.2 Technical Specifications

Power:
Input Power: 5.0vDC @ 500mA(max) through USB Interface
Alt. Power: 5.0vDC @ 2.0Amps (from optional external Power Adapter)

Radio Emissions:
Unintentional: 12.0MHz, 11.0592Mhz, 4.0Mhz (fundamental),
Intentional: 125kHz Continuous (Prox Reader)
Antenna: Internal, Loop Coil type;

Features:
4x20 LCD Character Display
Audio Output for playing recorded speech, tones
Proximity Badge Reader
2-Port USB Hub
Tri-Color LED Indicators
ABS Plastic Enclosure, meeting UL 94V2 flammability requirements
USB Cable, 5m (15ft), Shielded

1.3 Test Methodology and Considerations

The EUT contains a 125kHz proximity badge reader and is therefore subject to the emission requirements of CFR 47 Part 15.209. According to Part 15.33(a)(4) the frequency range investigated for this device shall be 125kHz-1000MHz. This frequency range meets both the intentional and unintentional radiator frequency range requirements. Considering the emission limits of Part 15.209 and Part 15.109(a) are equivalent and the radiated emissions were measured with both the 125kHz proximity reader and digital device operating simultaneously all emissions from both the unintentional and intentional radiators are reported in Section 7.3.

1.4 EUT Modifications

For compliance a Steward 28A2736-0A2 snap on ferrite was added to the USB cable where the USB cable connects to the EUT. Detailed photographs are included below.

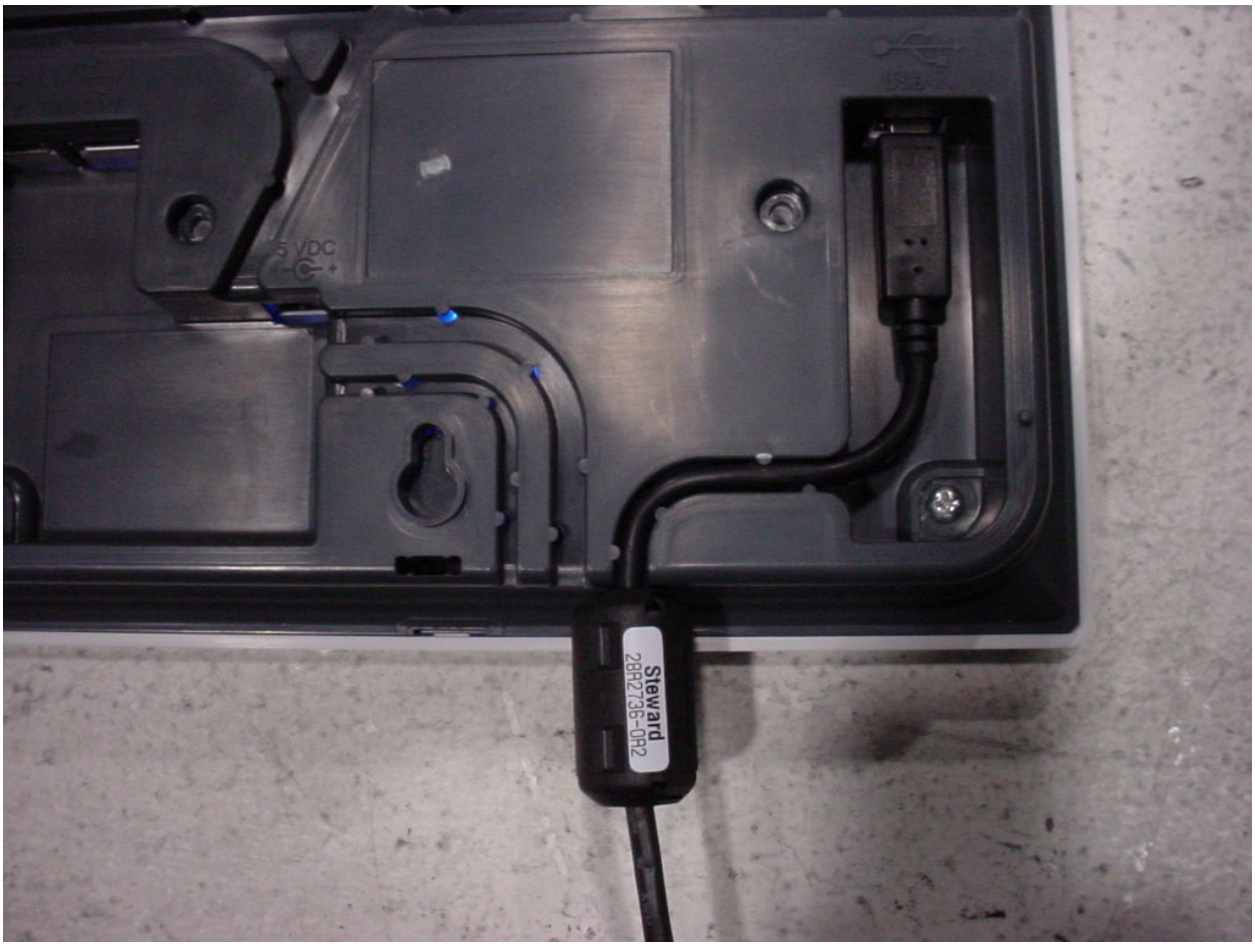

Figure 1.4.1 – EUT Modifications

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 89450
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

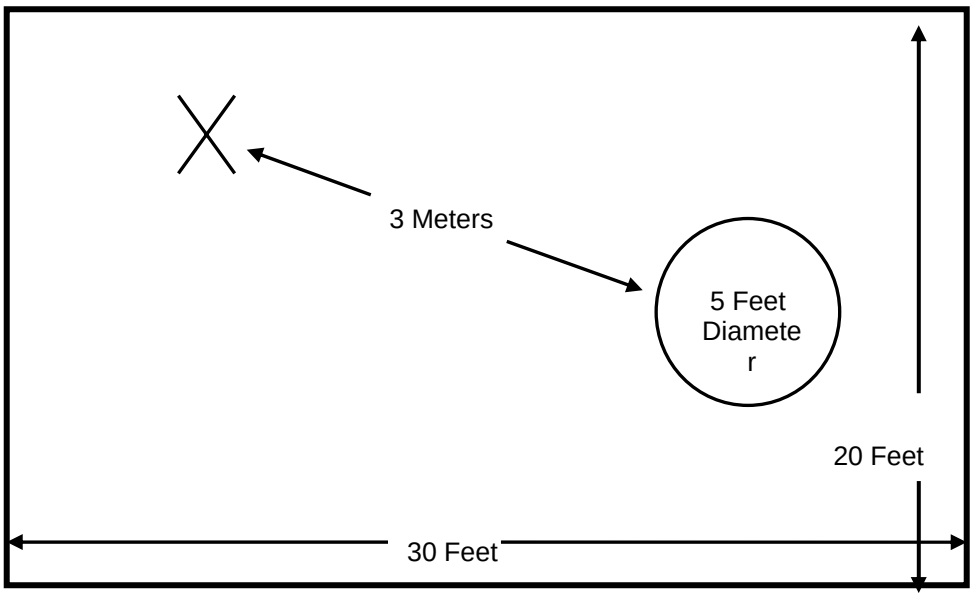

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

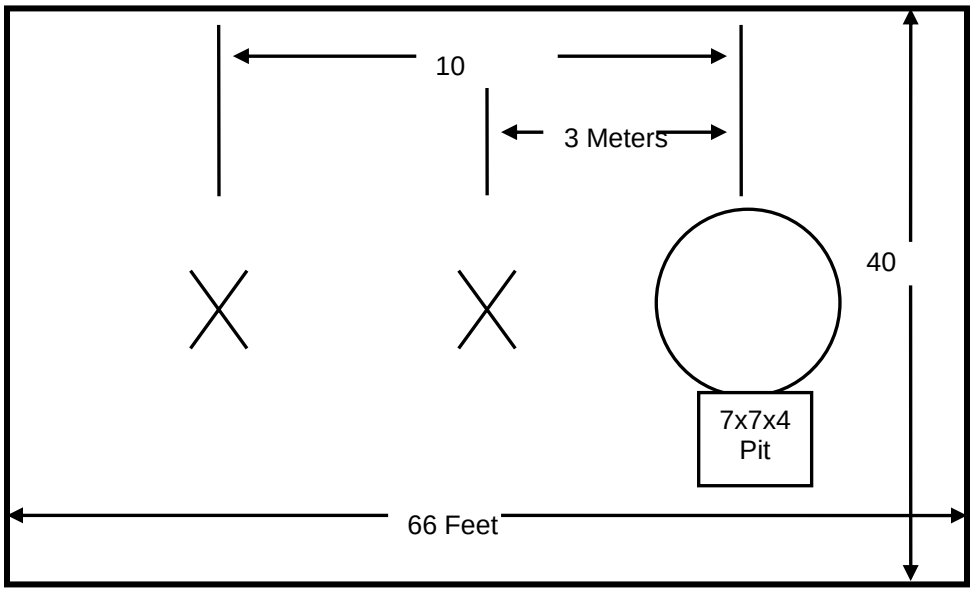

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

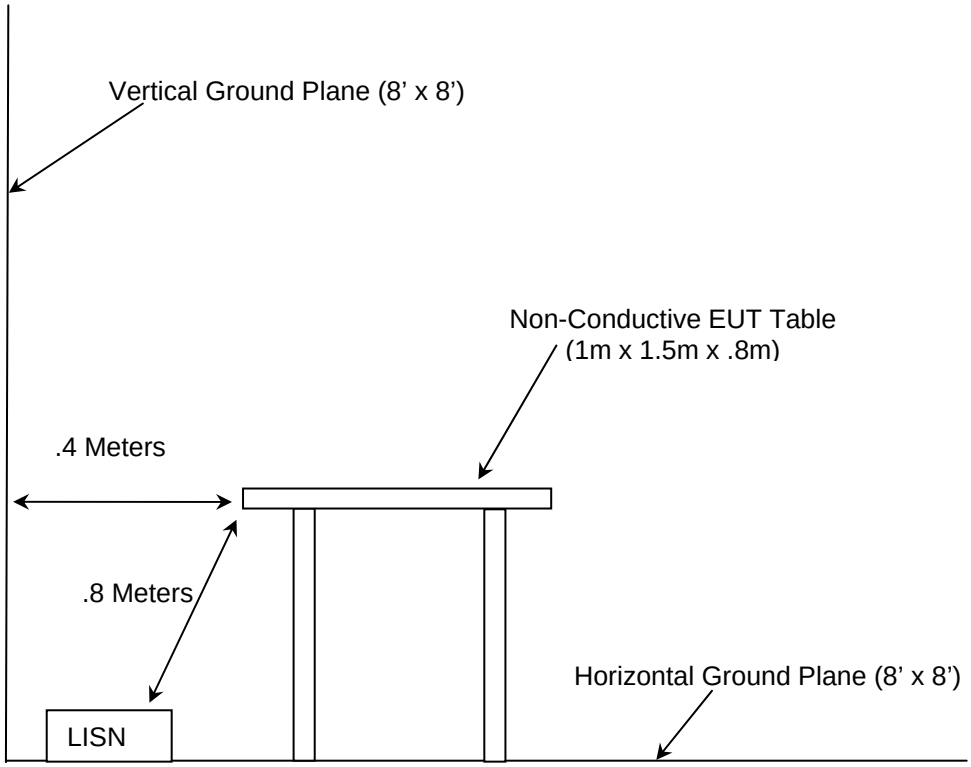

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2005
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart B & Subpart C: Radio Frequency Devices, , 2005

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4.0-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
☒ 25	Chase	Bi-Log Antenna	CBL6111	1043	5/30/07
☒ 78	EMCO	Loop Antenna	6502	9104-2608	1/13/07
☒ 041	ElectroMetrics	Bi-Con Antenna	BIA-25	2925	5/25/07
☒ 090	ElectroMetrics	LPA Antenna	LPA-25	1476	5/25/07
☒ 152	EMCO	LISN	3825/2	9111-1905	2/8/07
☒ 165	ACS	Conducted EMI Cable Set	RG8	165	3/07/07
☒ 73	Agilent	Pre-Amplifier	8447D	272A05624	5/18/07
☒ 1	Rohde & Schwarz	Receiver Display	804.8932.52	833771/007	3/01/07
☒ 2	Rohde & Schwarz	ESMI Receiver	1032.5640.53	839587/003	3/01/07
☒ 3	Rohde & Schwarz	Receiver Display	804.8932.52	839379/011	11/02/06
☒ 4	Rohde & Schwarz	ESMI Receiver	1032.5640.53	833827/003	11/02/06
☒ 168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	3/7/07
☒ 167	ACS	Chamber EMI Cable Set	RG6	167	1/7/07
☒ 16	ACS	Conducted Emission Cable	Cable	16	5/10/07

5.0 SUPPORT EQUIPMENT

Table 5-3: Support Equipment

Item	Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
1	Dell	Laptop PC	Dell Inspiration 5100	CN-09U806-12961-34M-2197	NA
2	Lathem Time Corp.	Time & Attendance Terminal (EUT)	PC50	P50001	UP3PC50

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

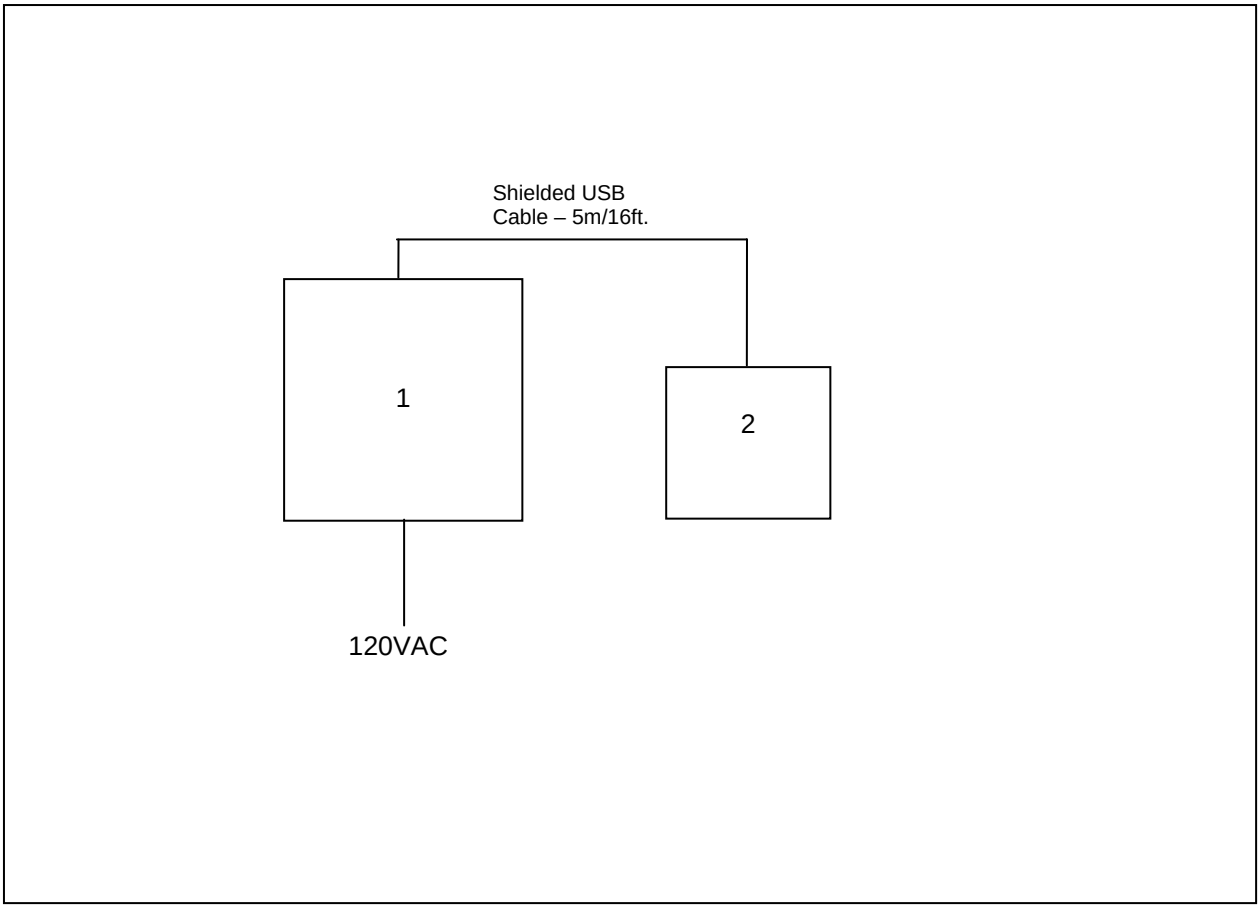

Figure 6-1: EUT Test Setup

7.0 SUMMARY OF TESTS

7.1 Power Line Conducted Emissions - FCC Section 15.207

7.1.1 Test Methodology

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.1.2 Test Results

Results of the test are shown below in and Table 7.1-1.

Table 7.1-1: Power Line Conducted Emissions

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
Line 1									
0.15	43.3	34.5	9.80	53.10	44.30	66.00	56.00	12.9	11.7
0.22	26.4	2.4	9.80	36.20	12.20	62.82	52.82	26.6	40.6
0.72	27.4	20.3	9.80	37.20	30.10	56.00	46.00	18.8	15.9
0.94	29.5	20.7	9.80	39.30	30.50	56.00	46.00	16.7	15.5
1.15	23.7	7.3	9.80	33.50	17.10	56.00	46.00	22.5	28.9
22	28.2	24.9	10.20	38.40	35.10	60.00	50.00	21.6	14.9
Line 2									
0.16	28.1	9.1	9.80	37.90	18.90	65.46	55.46	27.6	36.6
0.2	21.5	4.5	9.80	31.30	14.30	63.61	53.61	32.3	39.3
0.8	29.5	21.8	9.80	39.30	31.60	56.00	46.00	16.7	14.4
1.01	28.1	14.2	9.80	37.90	24.00	56.00	46.00	18.1	22.0
1.45	29.3	20.2	9.80	39.10	30.00	56.00	46.00	16.9	16.0
21.75	28.1	24.5	10.02	38.12	34.52	60.00	50.00	21.9	15.5

7.2 Radiated Emissions - FCC Section 15.209 (Intentional Radiators)

7.2.1 Test Methodology

Radiated emissions tests were made over the frequency range from 125kHz to 1000MHz according to Part 15.33(a)(4) and as described in Section 1.3 of this report. Measurements were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna.

For measurements below 30MHz, the EUT was rotated 360º and the loop antenna rotated about the vertical axis to maximize each emission. The magnetic loop receiving antenna was positioned with its center 1 meter above the ground. For measurements above 30MHz, the EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected.

The spectrum analyzer's resolution and video bandwidth was set to 100Hz and 300Hz respectively for frequencies below 150kHz and 9 kHz and 30 kHz respectively for frequencies above 150kHz and below 30MHz. For measurements from 30MHz – 1000MHz the spectrum analyzer's resolution and video bandwidths were set to 120kHz and 300kHz respectively. For measurements in the frequency bands 9-90 kHz and 110-490 kHz, an average detector was used. When average measurements are specified, the peak emissions were also compared to a limit corresponding to 20 dB above the maximum permitted average limit according to Part 15.35. All other emissions were measured using a Quasi-peak detector. The final measurements were then corrected by a distance correction factor, antenna correction factors, and cable loss for comparison to the limits.

7.2.2 Distance Correction – Part 15.31

Some radiated measurements were performed at a distance closer than the 300 and 30 meters as required according to Part 15.209. Therefore a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. The distance correction factor for limits expressed at a 30m and 300m measurement distances were determined as follows:

Distance correction factor (30m to 3m) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

Distance correction factor (300m to 3m) = 40*Log (Test Distance/300)
= 40*Log (3/300)
= - 80 dB

The limits in the test results in section 7.2.3 are corrected for the distance correction factor.

7.2.3 Test Results

Radiated emissions data is presented below in Table 7.2.3-1.

Table 7.2.3-1: Radiated Spurious Emissions

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Fundamental Frequency										
0.125	79.79	79.68	NA	10.20	89.99	89.88	125.7	105.7	35.68	15.79
Spurious Emissions										
0.375	44.45	40.81	NA	10.20	54.65	51.01	116.1	96.1	61.47	45.11
0.625		35.25	NA	10.20	---------	45.45	--------	71.7	---------	26.24
0.864		38.43	NA	10.20	---------	48.63	--------	68.9	---------	20.24
0.875		30.86	NA	10.20	---------	41.06	--------	68.8	---------	27.70
1.125		26.75	NA	10.20	---------	36.95	--------	66.6	---------	29.63
51.5		46.61	V	-23.43	---------	23.18	--------	40.0	---------	16.82
64.2		54.17	V	-19.99	---------	34.18	--------	40.0	---------	5.82
80.6		50.89	V	-13.95	---------	36.94	--------	40.0	---------	3.06
174.9		43.61	H	-9.62	---------	33.99	--------	43.5	---------	9.51
192.02		48.64	H	-8.64	---------	40.00	--------	43.5	---------	3.50
199.2		48.74	H	-13.58	---------	35.16	--------	43.5	---------	8.34
531.6		32.84	V	-3.11	---------	29.73	--------	46.0	---------	16.27
663.1		39.70	V	-2.86	---------	36.84	--------	46.0	---------	9.16
797.3		33.71	V	-0.26	---------	33.45	--------	46.0	---------	12.55
900.9		36.45	V	-1.06	---------	35.39	--------	46.0	---------	10.61
922.7		30.33	V	-0.25	---------	30.08	--------	46.0	---------	15.92
931.6		34.62	V	2.49	---------	37.11	--------	46.0	---------	8.89

Note1: Emissions not reported were below the noise floor of the measurement system.
Note2: The limit for emissions below 30MHz is adjusted by the distance correction factor shown in section 7.2.2.

7.2.4 Sample Calculation

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Distance Correction Factor (If applicable)

Example Calculation (375kHz)

PEAK:
Corrected Level: 44.45+ 10.20 = 54.65dBuV
Limit: 20*Log(2400/f(kHz))+ 20dB for Peak Limiting = 20*Log(2400/375) = 36.1dBuV/m
Corrected Limit (Distance Correction): 36.1+80 = 116.1dBuV/m
Margin: 116.1dBuV/m – 54.65dBuV = 61.5dB

AVERAGE:
Corrected Level: 40.81+ 10.2 = 51.01dBuV/m
Limit: 20*Log(2400/f(kHz)) = 20*Log(2400/375) = 16.1dBuV/m
Corrected Limit (Distance Correction): 16.1+80 = 96.1dBuV/m
Margin: 96.1dBuV/m – 51.01dBuV/m = 45.1dB

7.3 Radiated Emissions - FCC Section 15.109(Unintentional Radiators)

7.3.1 Test Methodology

The radiated emissions as applied to the unintentional radiator are provided in Section 7.2.3 as explained in Section 1.3 of this report.

8.0 CONCLUSION

In the opinion of ACS, Inc. the model PC50, manufactured by LATHEM TIME CORP., meets all the requirements of FCC Part 15 Subpart C as applicable.

End Report