

EMISSIONS TEST REPORT

Report Number: 3143149BOX-005

Project Number: 3143149

Testing performed on the

Pedometer

Model: M597

To

FCC Part 15 Subpart C 15.209

For

Timex Corporation

Test Performed by:
Intertek – ETL SEMKO
70 Codman Hill Road
Boxborough, MA 01719

Test Authorized by:
Timex Corporation
555 Christian Road PO Box 310
Middlebury, CT 06762

Prepared by:



Nicholas Abbondante

Date: 01/30/2008

Reviewed by:



Michael F. Murphy

Date: 01/31/2008

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1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company: Timex Corporation
 555 Christian Road PO Box 310
 Middlebury, CT 06762
Contact: Mr. John Davino
Telephone: 203-346-4340
Fax: 203-346-7146
Email: jdavino@timex.corp

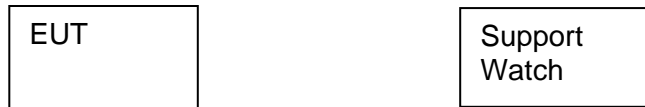
1.2 Equipment Under Test

Equipment Type: Pedometer
Model Number(s): M597
Serial number(s): 17B
Manufacturer: Timex Corporation
EUT receive date: 01/15/2008
EUT received condition: Prototype in Good Condition
Test start date: 01/24/2008
Test end date: 01/29/2008

1.3 Test Plan Reference: Tested according to the standards listed and ANSI C63.4:2004.

1.4 Test Configuration

1.4.1 Block Diagram



1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
None				

1.4.3. Support Equipment:

Name: Timex Watch
Model No.: IronMan Triathlon
Serial No.: N/L

1.5 Mode(s) of Operation:

The EUT was configured to transmit in a repetitive fashion. It was activated from a fresh 3V battery during testing, except for the frequency stability test during which a DC power supply was used. Radiated emissions testing was performed in three orthogonal axes.

2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 15 Subpart C 15.247		
SUB-TEST	TEST PARAMETER	COMMENT
RF Output Power and Spurious Emissions Below 30 MHz FCC 15.205, 15.209	Emissions must be below the 15.209 limits	Pass
AC Line-Conducted Emissions FCC 15.207	Emissions must be below the 15.207 limits	N/A*
Occupied Bandwidth	There is no bandwidth requirement.	Pass
Spurious Emissions Above 30 MHz FCC 15.205, 15.209	Emissions must be below the 15.209 limits	Pass

* - Not Applicable; EUT does not have an AC cable

Notes: The EUT transmits as 137.5 and 141.0 kHz.

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project No.</u>	<u>Project Handler</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
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3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V
 AF = 7.4 dB/m
 CF = 1.6 dB
 AG = 29.0 dB
 FS = 32 dB μ V/m

$$\text{Level in } \mu\text{V/m} = [10(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where NF = Net Reading in dB μ V

- RF = Reading from receiver in dB μ V
- LF = LISN Correction Factor in dB
- CF = Cable Correction Factor in dB
- AF = Attenuator Loss Factor in dB

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where UF = Net Reading in } \mu\text{V}$$

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 254 \mu\text{V/m}$$

3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty ($k = 2$) for radiated emissions from 30 to 1000 MHz has been determined to be:

± 3.5 dB at 10m, ± 3.8 dB at 3m

The expanded uncertainty ($k = 2$) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 2.6 dB

The expanded uncertainty ($k = 2$) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 3.2 for ISN and voltage probe measurements

± 3.1 for current probe measurements

3.2 Site Description

Test Site(s): 2 and EMC

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

The EMC Lab has two Semi-anechoic Chambers and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference groundplanes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Test Results: Pass

Test Standard: FCC Part 15 Subpart C

Test: RF Output Power and Spurious Emissions Below 30 MHz

Performance Criterion:

Measurement Frequency (MHz)	Field strength (microvolts/meter)	distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30

Test Environment:

Environmental Conditions During Testing:	Ambient (°C): 21	Humidity (%): 23	Pressure (hPa): 1050
Pretest Verification Performed	Yes	Equipment under Test:	M597 Pedometer
Test Engineer(s):	Nicholas Abbondante	EUT Serial Number:	17B

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	LOOP ANTENNA	Empire	LG-105	61	05/02/2008
3	ANTENNA, LOOP, 150 kHz - 30 MHz	Empire	LP-105A	127	09/21/2008
4	EMI Receiver with 85420E RF Filter Section S/N 3705A00230 On Loan from Littleton	Hewlett Packard	8542E	3906A00273	02/16/2008
5	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	09/17/2008

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Results:

Special Radiated Emissions

Company: Timex Corporation Antenna & Cables: SHF Bands: N, LF, HF, SHF
 Model #: M597 Antenna: Loop1 05-02-08 1m E.txt Loop1 05-02-08 1m H.txt
 Serial #: 17B Cable(s): S2 3M FLR 9-17-08.txt NONE.
 Engineers: Nicholas Abbondante Location: Site 2 Barometer: BAR2
 Project #: 3143149 Date(s): 01/24/08
 Standard: FCC Part 15 Subpart C 15.209 Temp/Humidity/Pressure: 21c 23% 1050mB
 Receiver: HP 8542E (145-092) Limit Distance (m): 3
 PreAmp: NONE Test Distance (m): 3
 PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 9-150 kHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
PK	V	0.1375	25.8	48.4	0.0	0.0	0.0	74.2	104.8	-30.6	200/300Hz
PK	V	0.1410	25.0	48.4	0.0	0.0	0.0	73.4	104.6	-31.2	200/300Hz

Special Radiated Emissions

Company: Timex Corporation Antenna & Cables: LF Bands: N, LF, HF, SHF
 Model #: M597 Antenna: EMP2_E-Field_09-21-08.txt EMP2_H-Field_09-21-08.txt
 Serial #: 17B Cable(s): S2 3M FLR 9-17-08.txt NONE.
 Engineers: Nicholas Abbondante Location: Site 2 Barometer: BAR2
 Project #: 3143149 Date(s): 01/24/08
 Standard: FCC Part 15 Subpart C 15.209 Temp/Humidity/Pressure: 21c 23% 1050mB
 Receiver: HP 8542E (145-092) Limit Distance (m): 3
 PreAmp: NONE Test Distance (m): 3
 PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 150 kHz - 30 MHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	0.2750	-12.1	59.4	0.0	0.0	0.0	47.3	98.8	-51.5	9/30 kHz
QP	V	0.4125	-15.3	59.4	0.0	0.0	0.0	44.1	95.3	-51.2	9/30 kHz
QP	V	0.5500	-0.9	59.4	0.0	0.0	0.0	58.5	72.8	-14.3	9/30 kHz
QP	V	0.6875	-4.5	59.4	0.0	0.0	0.0	54.9	70.9	-16.0	9/30 kHz
QP	V	0.9625	-0.7	59.4	0.0	0.0	0.0	58.7	67.9	-9.3	9/30 kHz
QP	V	1.1000	-12.2	59.4	0.0	0.0	0.0	47.2	66.8	-19.6	9/30 kHz
QP	V	1.2375	-5.7	59.4	0.0	0.0	0.0	53.7	65.8	-12.1	9/30 kHz
QP	V	1.3750	-4.3	59.4	0.0	0.0	0.0	55.1	64.8	-9.8	9/30 kHz
QP	V	0.2820	-12.4	59.4	0.0	0.0	0.0	47.0	98.6	-51.6	9/30 kHz
QP	V	0.4230	-13.5	59.4	0.0	0.0	0.0	45.9	95.1	-49.2	9/30 kHz
QP	V	0.5640	-10.6	59.4	0.0	0.0	0.0	48.8	72.6	-23.8	9/30 kHz
QP	V	0.7050	-15.1	59.4	0.0	0.0	0.0	44.3	70.6	-26.4	9/30 kHz
QP	V	1.2690	-9.4	59.4	0.0	0.0	0.0	50.0	65.5	-15.6	9/30 kHz
QP	V	1.4100	-10.4	59.4	0.0	0.0	0.0	49.0	64.6	-15.6	9/30 kHz

Notes: The limit has been extrapolated to the 3 meter test distance using a 40 dB/decade scaling factor. This was done in order to demonstrate that the spurious emissions do not exceed the level of the fundamental emissions.

Radiated Emissions Setup Photos



Radiated Emissions Setup Photos



Radiated Emissions Setup Photos



Radiated Emissions Setup Photos



Test Results: Pass

Test Standard: FCC Part 15 Subpart C

Test: Occupied Bandwidth

Performance Criterion: There is no limit on bandwidth.

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	21	Humidity (%):	23	Pressure (hPa):	1050
Pretest Verification Performed	Yes		Equipment under Test:	M597 Pedometer		
Test Engineer(s):	Nicholas Abbondante		EUT Serial Number:	17B		

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	EMI Receiver with 85420E RF Filter Section S/N 3705A00230 On Loan from Littleton	Hewlett Packard	8542E	3906A00273	02/16/2008
3	LOOP ANTENNA	Empire	LG-105	61	05/02/2008
4	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	09/17/2008

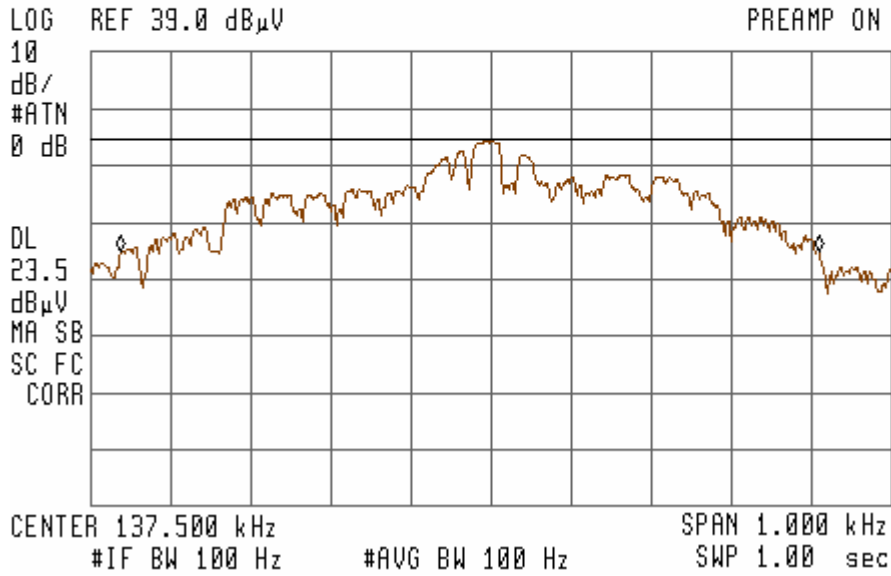
Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Results:

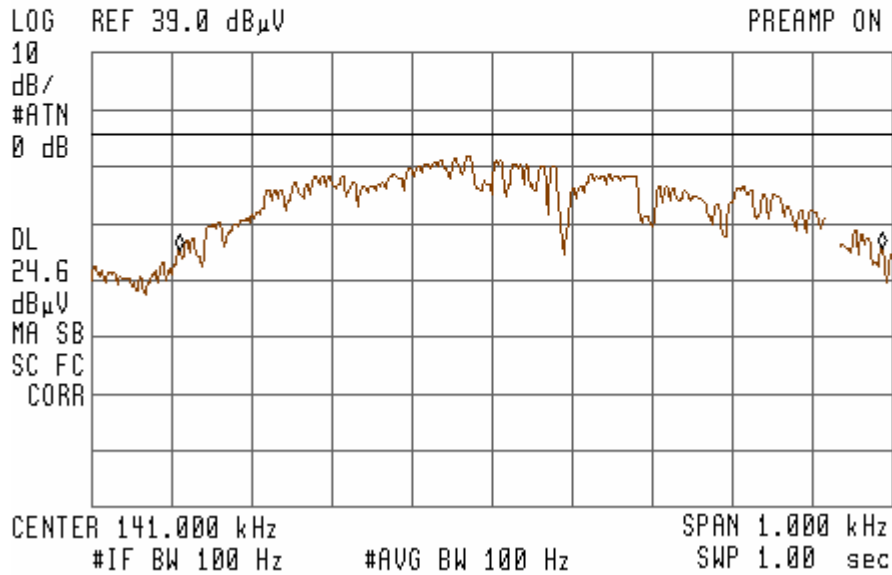
16:41:00 JAN 24, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ 872 Hz
 .23 dB



16:27:03 JAN 24, 2008

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR Δ 878 Hz
 .18 dB



Notes: Notes: The 20 dB bandwidth is referenced to the full power of the emission when measured with a bandwidth larger than the bandwidth of the emission. The bandwidth was 872 Hz at 137.5 kHz and 878 Hz at 141 kHz.

Test Results: Pass

Test Standard: FCC Part 15 Subpart C

Test: Spurious Emissions Above 30 MHz

Performance Criterion: Emissions must be below 15.209 limits:

Measurement Frequency (MHz)	Field strength (microvolts/meter)	distance (meters)
30-88.....	100	3
88-216.....	150	3
216-960.....	200	3
Above 960.....	500	3

Test Environment:

Environmental Conditions During Testing:	Ambient (°C): 20	Humidity (%): 24	Pressure (hPa): 1050
Pretest Verification Performed	Yes	Equipment under Test:	M597 Pedometer
Test Engineer(s):	Nicholas Abbondante	EUT Serial Number:	17B

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	05/20/2008
2	ANTENNA	EMCO	3142	9711-1223	02/06/2008
3	10 Meter in floor cable for site 2	ITS	RG214B/U	S2 10M FLR	09/17/2008
4	EMI Receiver with 85420E RF Filter Section S/N 3705A00230 On Loan from Littleton	Hewlett Packard	8542E	3906A00273	02/16/2008

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

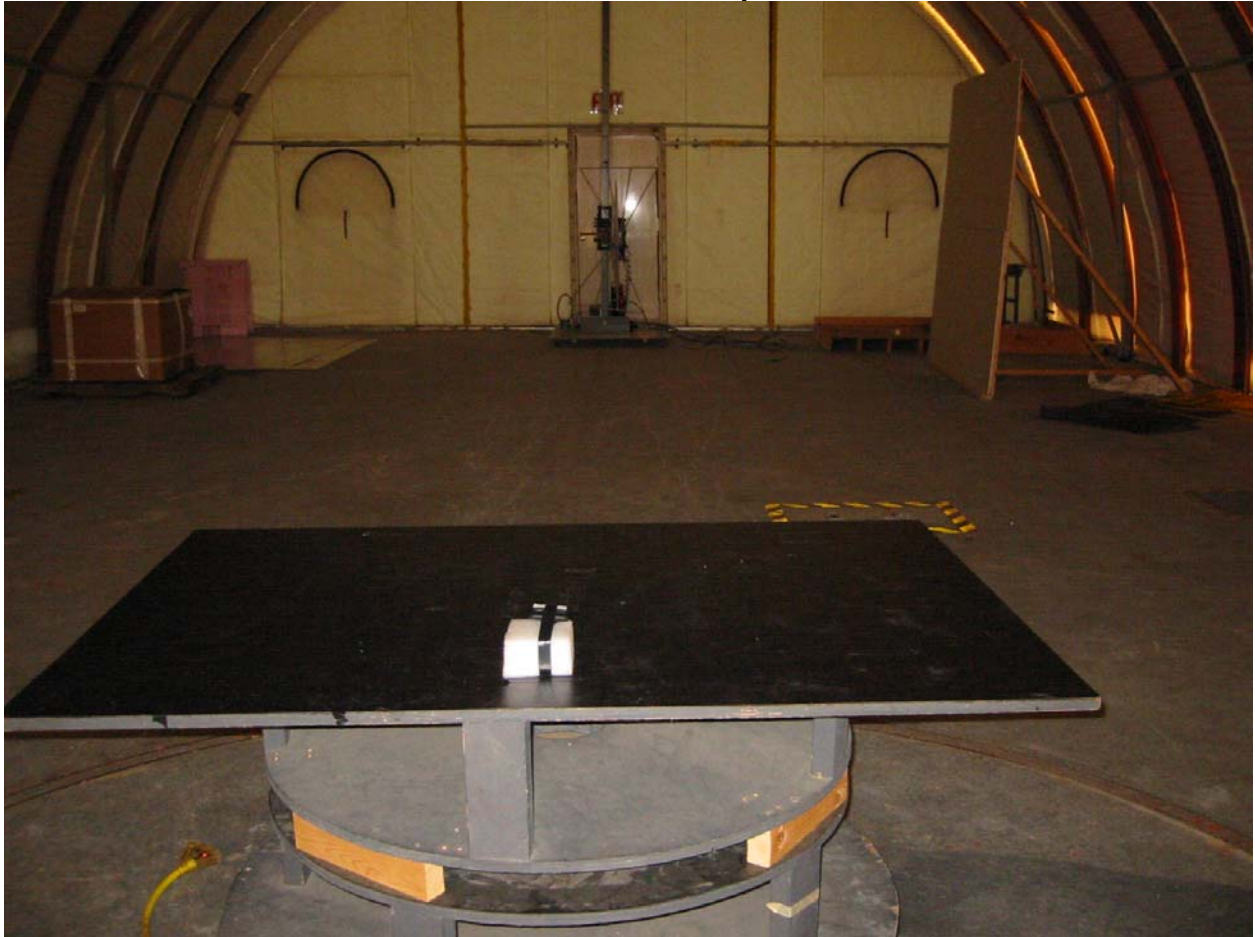
Test Results:

Radiated Emissions

Company: Timex Corporation Antenna & Cables: N Bands: N, LF, HF, SHF
 Model #: M597 Antenna: LOG2 02-06-08 V10.txt LOG2 02-06-08 H10.txt
 Serial #: 17B Cable(s): S2 10M FLR 9-17-08.txt NONE.
 Engineers: Nicholas Abbondante Location: Site 2 Barometer: BAR2
 Project #: 3143149 Date(s): 01/25/08
 Standard: FCC Part 15 Subpart C 15.209 Temp/Humidity/Pressure: 20c 24% 1050mB
 Receiver: HP 8542E (145-092) Limit Distance (m): 3
 PreAmp: NONE Test Distance (m): 10
 PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 30-1000 MHz
 Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	
QP	V	63.300	4.1	6.9	1.2	0.0	-10.5	22.7	40.0	-17.3	120/300 kHz	FCC
QP	V	170.400	-4.3	9.3	2.1	0.0	-10.5	17.5	43.5	-26.0	120/300 kHz	RB
QP	V	354.800	-4.2	15.5	3.2	0.0	-10.5	24.9	46.0	-21.1	120/300 kHz	
QP	V	493.000	-4.1	18.4	3.8	0.0	-10.5	28.6	46.0	-17.4	120/300 kHz	
QP	V	812.000	-5.2	22.4	5.2	0.0	-10.5	32.9	46.0	-13.1	120/300 kHz	
QP	V	984.800	-5.2	24.2	5.8	0.0	-10.5	35.3	54.0	-18.7	120/300 kHz	RB

Radiated Emissions Setup Photos



Radiated Emissions Setup Photos

