DATE: 24 March 2010

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I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

BioControl Medical (B.C.M.) Ltd.

Equipment under test:

Programming Wand

5320

Written by: _____

D. Shidlowsky, Documentation

Approved by: _____

A. Sharabi, Test Engineer

Approved by: _____

I. Raz, EMC Laboratory Manager

Measurement/Technical Report for

BioControl Medical (B.C.M.) Ltd.

Programming Wand

FCC ID: W250020

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	
Equipment type:	Part 15 Low Power Transmitter Below 1705 kHz	

Limits used:
47CFR15 Section 15.201; 209

Measurement procedure used is ANSI C63.4-2003.

Application for Certification
prepared by:
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Applicant for this device:
(different from "prepared by")
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1. General Information

1.1 Administrative Information

Manufacturer:	BioControl Medical (B.C.M.) Ltd.
Manufacturer's Address:	3 Geron St. P.O.B. 2713 Yahud 56100 Israel Tel: +972-3-632-2126 Fax: +972-3-632-2125
Manufacturer's Representative:	Nir Schain Mark Fichman
Equipment Under Test (E.U.T):	Programming Wand
Equipment Model No.:	5320
Equipment Serial No.:	003
Date of Receipt of E.U.T:	07.12.09
Start of Test:	07.12.09
End of Test:	15.12.09
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	See Section 2

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.
7. Nemko (Norway), Authorization No. ELA 207.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The communication wand is used in conjunction with the Cardiofit Implantable Stimulator(CIS) to non-invasively set and adjust the stimulation parameters (through wireless communication) of the CIS.
The communication wand is a part of the 5300 programmer, which is comprised of a laptop, a communication wand, and a printer.
The communication wand and the printer are connected to the laptop through USB ports.

The laptop is an IBM ThinkPad model T40, running dedicated CardioFit programming software on a Windows XP OS

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 3, 2009.
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

The uncertainty for this test is ±2 dB.

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). The communication set was connected to 5300 programmer laptop USB port. In a normal configuration, for testing purpose, the communication wand was put into two exercise modes. In the first exercise mode the communication wand produces CW. In the second exercise mode 010101b is transmitted using ASK modulation to produce approximately 50% duty cycle.

2.2 EUT Exercise Software

No exercise software was needed, since the firmware has a special test mode for the FCC testing.

2.3 Special Accessories

No special accessories were needed to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order o achieve compliance.

2.5 Configuration of Tested System

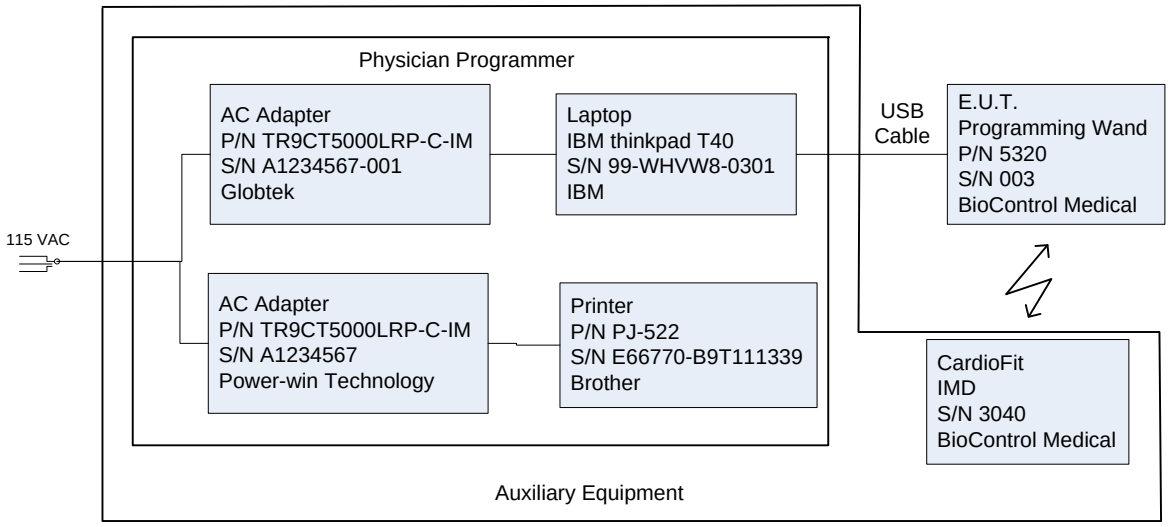

Figure 1. Configuration of Tested System

3. Test Setup Photos

Figure 2. Conducted Emission test Setup

Figure 3. Radiated Emission test Setup

4. Conducted Emission Data

4.1 Test Specification

F.C.C., Part 15, Subpart C

4.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via a 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Measured Data

JUDGEMENT: Passed by 3.9 dB

The margin between the emission levels and the specification limit was, in the worst case, 13.2 dB for the phase line at 9.78 MHz and 3.9 dB for the neutral line at 0.45 MHz.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 4* to *Figure 7*.

TEST PERSONNEL:

Tester Signature: _____ Date: 07.04.10

Typed/Printed Name: A. Sharabi

Conducted Emission

E.U.T Description	Programming Wand
Type	5320
Serial Number:	003

Specification:	F.C.C., Part 15, Subpart C
Lead:	Phase
Detectors:	Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.583046	35.0	32.6	-23.4	30.6	-15.4	0.0
2	1.879785	31.8	29.8	-26.2	28.4	-17.6	0.0
3	2.849551	38.3	33.1	-22.9	27.2	-18.8	0.0
4	9.783553	44.6	40.9	-19.1	36.8	-13.2	0.0
5	11.078507	44.1	40.7	-19.3	36.7	-13.3	0.0
6	24.739635	34.7	30.5	-29.5	24.1	-25.9	0.0

Figure 4. Detectors: Peak, Quasi-peak, AVERAGE .

Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	Programming Wand
Type	5320
Serial Number:	003

Specification:	F.C.C., Part 15, Subpart C
Lead:	Phase
Detectors:	Peak, Quasi-peak, Average

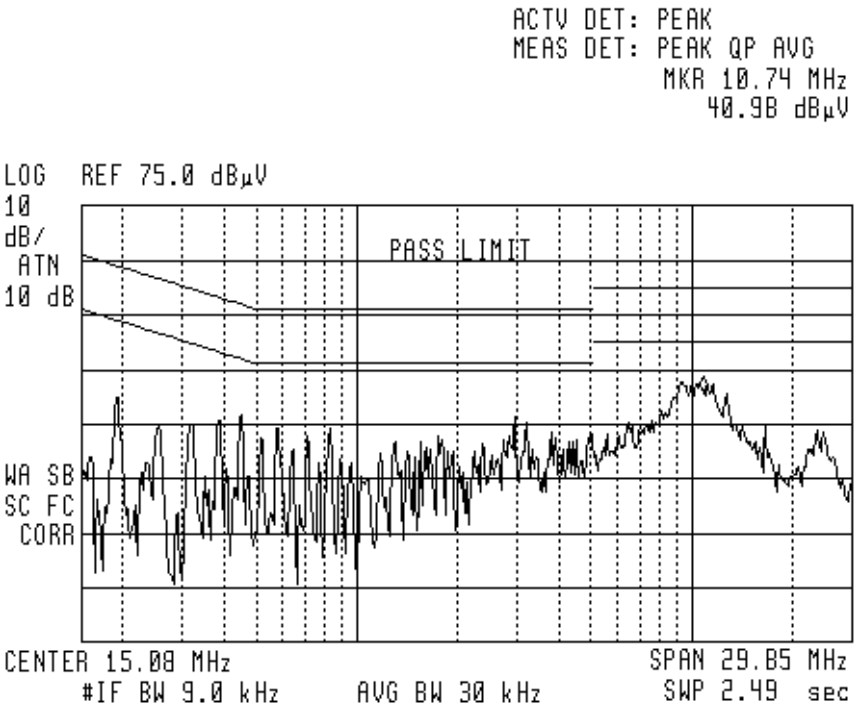

Figure 5. Detectors: Peak, Quasi-peak, Average

Conducted Emission

E.U.T Description	Programming Wand
Type	5320
Serial Number:	003

Specification:	F.C.C., Part 15, Subpart C
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.194481	43.5	41.9	-21.9	38.0	-15.9	0.0
2	0.454026	45.7	45.3	-11.6	43.0	-3.9	0.0
3	1.814391	38.7	36.5	-19.5	35.0	-11.0	0.0
4	2.870499	37.7	33.5	-22.5	29.0	-17.0	0.0
5	10.300328	45.9	42.5	-17.5	38.7	-11.3	0.0
6	24.819365	34.1	29.3	-30.7	23.6	-26.4	0.0

Figure 6. Detectors: Peak, Quasi-peak, AVERAGE

Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	Programming Wand
Type	5320
Serial Number:	003

Specification:	F.C.C., Part 15, Subpart C
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

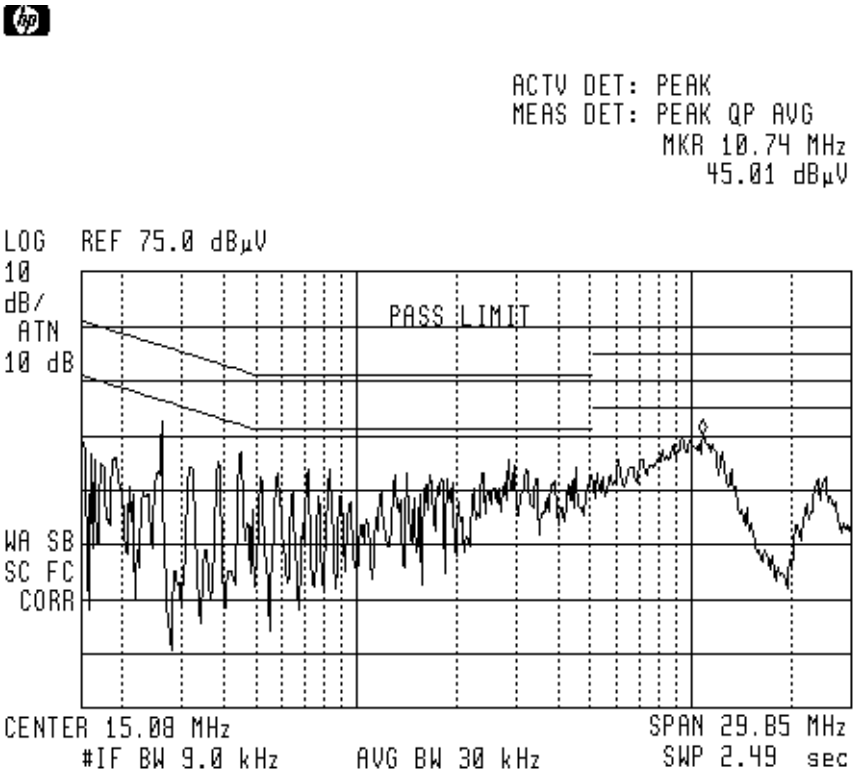

Figure 7 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

4.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2009	1 Year
LISN	Fischer	FCC-LISN-2A	128	March 3, 2009	1 Year
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1Year
RF Filter Section	HP	85420E	3705A00248	November 10, 2009	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

5. Field Strength of Fundamental

5.1 Test Specification

F.C.C., Part 15, Subpart C, Section 15.209

5.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

The E.U.T. was placed on a non-conductive table, 0.8 meters above the O.A.T.S. ground plane.
The EMI receiver was set to the E.U.T. Fundamental Frequency.
The distance between the E.U.T. and test antenna was 3 meters.

The turntable and antenna were adjusted for maximum level reading on the EMI receiver. The loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter.

5.3 Measured Data

JUDGEMENT: Passed by 28.35 dB

The EUT met the FCC Part 15, Subpart C, Section 15.209 specification requirements.

The details of the highest emissions are given in Figure 9.

TEST PERSONNEL:

Tester Signature: _____ Date: 07.04.10

Typed/Printed Name: A. Sharabi

Field Strength of Fundamental

E.U.T Description	Programming Wand
Type	5320
Serial Number:	003

Specification: F.C.C., Part 15, Subpart C, 15.209

Test Distance: 3 meters Detector: Peak

Freq.	Peak Reading	Average Factor	AVG Result	AVG Specification	Margin
(kHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
27	90.62	0	90.62	118.97	-28.35

Figure 8. Field Strength of Fundamental. Antenna Polarization: HORIZONTAL/VERTICAL. Detector: Peak

Notes:

1. Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. “Peak Reading” (dBµV/m) included the “Correction Factors”.
3. “Correction Factors” (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. “Average Factor = 20 log (1)= 0 dB (according to 15.209(d))
5. “Average Result” (dBµV/m)=Peak Reading dBµV/m)+Average factor (dB)

Field Strength of Fundamental

E.U.T Description	Programming Wand
Model Number	5320
Serial Number:	003

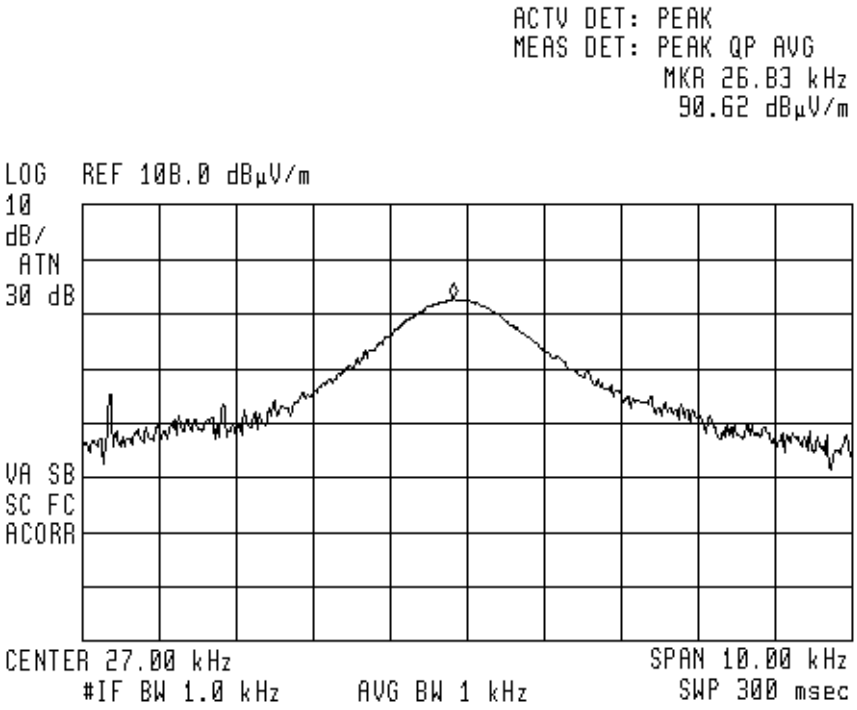

Figure 9. Field Strength of Fundamental
Detector: Peak

$$L_{im300m} = 20\log 2400/27 = 38.97 \text{ dB}\mu\text{V/m}$$

$$L_{im3m} = L_{im300m} + 40\log 300/3 = 38.97 + 80 = 118.97 \text{ dB}\mu\text{V/m}$$

5.4 Test Instrumentation Used, Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1 year
EMI Receiver Filter Section	HP	85420E	3705A00248	November 10, 2009	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2009	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A

6. Spurious Radiated Emission, 9 kHz – 30 MHz

6.1 Test Specification

9 kHz-30 MHz, FCC, Part 15, Subpart C, Section 209

6.2 Test Procedure

The E.U.T. operation mode and test set-up are as described in Section 3.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 3.1.

The frequency range 9 kHz-30 MHz was scanned.

The emissions were measured using a computerized EMI receiver complying to CISPR 16 requirements. The specification limits and applicable correction factors are loaded to the receiver via a 3.5" floppy disk.

In the frequency range 9 kHz-30MHz, the loop antenna was rotated on its vertical axis. The antenna height (center of loop) was 1 meter at a distance of 3 meters.

The E.U.T. was operated at the frequency of 27 kHz. This frequency was measured using a peak detector.

6.3 Measured Data

JUDGEMENT: Passed by 42.97 dB

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 specification.

The margin between the emission level and the specification limit is 42.97 dB in the worst case at the frequency of 133.09 MHz.

See details in *Figure 10*.

TEST PERSONNEL:

Tester Signature: _____ Date: 07.04.10

Typed/Printed Name: A. Sharabi

Radiated Emission, 9 kHz-30 MHz

E.U.T Description	Programming Wand
Type	5320
Serial Number:	003

Specification: FCC Part 15, Subpart C, Section 209

Frequency range: 9 kHz to 30 MHz

Antenna: 3 meters distance

Detectors: Peak, Average

Frequency (kHz)	**Peak Reading** (dBµV/m)	**Average Factor** (dBµV/m)	**Average Result** (dBµV/m)	**Average Specification** (dBµV/m)	**Margin** (dB)
53.00	63.07	0	63.07	113.10	-50.03
80.70	62.30	0	62.30	109.50	-47.20
107.75	53.08	0	53.08	107.00	-53.92
133.09	62.16	0	62.16	105.13	-42.97
160.68	55.35	0	55.35	103.52	-48.17

Figure 10. Radiated Emission. Detectors: Peak, Quasi-peak

Notes:

1. Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.
2. “Peak Reading” (dBµV/m) included the “Correction Factors”.
3. “Correction Factors” (dB) = Test Antenna Correction Factor(dB) + Cable Loss.
4. “Average Factor = 20 log (1)= 0 dB (according to 15.209(d))
5. “Average Result” (dBµV/m)=Peak Reading dBµV/m)+Average factor (dB)

6.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1 year
RF Section	HP	85420E	3705A00248	November 10, 2009	1 year
Active Loop Antenna	EMCO	6502	9506-2950	October 19, 2009	1 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

6.5 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS: Field Strength [dBμv/m]
RA: Receiver Amplitude [dBμv]
AF: Receiving Antenna Correction Factor [dB/m]
CF: Cable Attenuation Factor [dB]

No external pre-amplifiers are used.

7. APPENDIX A - CORRECTION FACTORS

7.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.6
30.0	0.8
40.0	0.9
50.0	1.1
60.0	1.2
70.0	1.3
80.0	1.4
90.0	1.6
100.0	1.7
150.0	2.0
200.0	2.3
250.0	2.7
300.0	3.1
350.0	3.4
400.0	3.7
450.0	4.0
500.0	4.3
600.0	4.7
700.0	5.3
800.0	5.9
900.0	6.3
1000.0	6.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.3
1400.0	7.8
1600.0	8.4
1800.0	9.1
2000.0	9.9
2300.0	11.2
2600.0	12.2
2900.0	13.0

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 27 meters.

3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

7.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

7.3 Correction factors for ACTIVE LOOP ANTENNA

Model 6502
S/N 9506-2950

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2