


REPORT OF MEASUREMENTS
PART 15C (15.249) - INTENTIONAL RADIATOR

DEVICE: TRANSMITTER
MODEL NUMBER: PATB1
MANUFACTURER: OMNEX CONTROLS SYSTEMS INC
ADDRESS: #74 - 1833 COAST MERIDIAN ROAD
COQUITLAM BRITISH COLUMBIA
CANADA V3C 6G5

THE DATA CONTAINED IN THIS REPORT WAS COLLECTED
ON 17 NOVEMBER 2000 AND COMPILED BY:


for Harvey McHodas (President/CEO)
PAUL G. SLAVENS
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WORK ORDER: 9115hr

1. GENERAL	3
1.1 PURPOSE.....	3
1.2 MANUFACTURER	3
1.3 TEST LOCATION.....	3
1.4 TEST PERSONNEL	3
2. TEST RESULTS SUMMARY.....	4
3. DESCRIPTION OF EQUIPMENT AND PERIPHERALS.....	5
3.1 EQUIPMENT UNDER TEST (EUT).....	5
3.2 EUT PERIPHERALS	5
3.3 DESCRIPTION OF INTERFACE CABLES.....	5
3.4 MODE OF OPERATION DURING TESTS	5
3.5 MODIFICATIONS REQUIRED FOR COMPLIANCE.....	5
4. ANTENNA REQUIREMENT	6
4.1 REGULATION.....	6
4.2 RESULT.....	6
5. CONDUCTED EMISSIONS TESTS.....	7
5.1 PURPOSE.....	7
5.2 TEST RESULTS.....	7
6. RADIATED EMISSIONS.....	8
6.1 TEST EQUIPMENT	8
6.2 REGULATION.....	9
6.3 TEST PROCEDURES	10
6.4 TEST RESULTS.....	10
7. OCCUPIED BANDWIDTH AND BAND EDGE COMPLIANCE	12
7.1 REGULATION:.....	12
7.1.1 SECTION 15.215(B) AND (C).....	12
7.1.2 SECTION 15.249 (D)	12
7.2 TEST EQUIPMENT	13
7.3 PURPOSE.....	13
7.4 OCCUPIED (-20 dB) BANDWIDTH TEST RESULTS	13
8. MISCELLANEOUS COMMENTS AND NOTES.....	14
9. LIST OF ATTACHMENTS	14

1. General

1.1 Purpose

The purpose of this report is to show compliance to the FCC regulations for narrow band unlicensed devices operating under section 15.249 of the Code of Federal Regulations title 47.

1.2 Manufacturer

Company Name: Omnex Controls Systems Inc
Contact: Martin Steenblok
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City/Province: Coquitlam British Columbia
Country/Postal Code: Canada V3C 6G5
Telephone: 604 944-9247
Fax: 604 944-9267
E-mail: martin@omnexcontrols.com
Web: www.omnexcontrols.com

1.3 Test location

Company: Acme Testing Inc.
Street Address: 2002 Valley Highway
Mailing Address: PO Box 3
City/State/Zip: Acme WA 98220-0003
Laboratory: Test Site 1
Telephone: 888 226-3837
Fax: 360 595-2722
E-mail: acmetest@acmetesting.com
Web: www.acmetesting.com

1.4 Test Personnel

Paul G. Slavens, Chief EMC Engineer
Daniel B. Staton, EMC Technician

2. Test Results Summary

Summary of Test Results

<u>Requirement</u>	<u>CFR Section</u>	<u>Test Result</u>
Conducted Emissions < 48.0 dBuV	15.207	*
Radiated Emissions	15.249	PASS
Occupied Bandwidth	15.249	PASS

* Not applicable, the EUT is battery powered.

The signed original of this report, supplied to the client, represents the only “official” copy. Retention of any additional copies (electronic or non-electronic media) is at Acme Testing’s discretion to meet internal requirements only. The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the “Correction Factor” documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedure ANSI C63.4 - 1992 and all applicable Public Notices received prior to the date of testing. All emissions from the device were found to be within the limits outlined in this report. Acme Testing assumes responsibility only for the accuracy and completeness of this data as it pertains to the sample tested.


HARRY L. HOKES (PRESIDENT/CEO)
for Paul G. Slavens
Chief EMC Engineer

31 MARCH 2003
Date of Issuance

3. Description of Equipment and Peripherals

3.1 Equipment Under Test (EUT)

Device: Transmitter
Model Number: PATB1
FCC ID: None
Power: 4 "C" Batteries
Grounding: None
Antenna Distance: 3 meters
Size of EUT: 15.7 cm x 7 cm x 8.5 cm

3.2 EUT Peripherals

Not applicable, the EUT is a stand-alone device.

3.3 Description of Interface Cables

EUT/Unterminated (3 Conductor Wire)

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	3.5 m (Coiled)	No

EUT/Unterminated (7 each)

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	Yes	No	0.2 m	No

ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

3.4 Mode of Operation During Tests

The EUT was exercised in transmit mode at the following frequencies, 903.37 MHz, 912.37 MHz, and 921.37 MHz.

3.5 Modifications Required for Compliance

The EUT required the following modifications during testing to bring the product into compliance:

1. Wrapped Electrical tape around the transmitter board, leaving the clock crystal exposed, and encased the transmitter board with copper tape. Copper tape was making contact with the clock crystal case.
2. Connected copper -taped case around transmitter board to the main PCB ground plane.
3. Wrapped electrical tape around the main PCB, and encased the main PCB with copper tape. (Note: The copper tape encasing the main PCB was connected to the copper tape encasing the transmitter board).

4. Antenna requirement

4.1 Regulation

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

4.2 Result

The EUT used a Reverse-Polarity SMA (RP-SMA) connector.

5. Conducted Emissions Tests

Test Requirement: FCC CFR47, Part 15C, 15.207

Test Procedure: ANSI C63.4:1992

5.1 Purpose

The purpose of this test is to evaluate the level of conducted noise the EUT imposes on the AC mains.

5.2 Test Results

Not applicable, the EUT was battery powered.

6. Radiated Emissions

Test Requirement: FCC CFR47, Part 15C, 15.249

Test Procedure: ANSI C63.4: 1992

Date of Test: 17 November 2000

Laboratory: Test Site #2 (Acme, WA)

6.1 Test Equipment

- ⇒ Spectrum Analyzer (blue): Hewlett-Packard 8567A, Serial Number 2410A00168, Calibrated: 17 March 2000, Calibration due Date: 17 March 2001
- ⇒ RF Preselector (blue): Hewlett-Packard 85685A, Serial Number 2648A-00519, Calibrated: 17 March 2000, Calibration due Date: 17 March 2001
- ⇒ Quasi Peak Adapter (blue): Hewlett-Packard 85650A, Serial Number 624158, Calibrated: 17 February 2000, Calibration due Date: 17 February 2001
- ⇒ 2 GHz to 10 GHz Low Noise Preamplifier: Milliwave 593-2898, Serial Number 2494, Calibrated: 5 May 2000, Calibration Due Date: 5 May 2001
- ⇒ Broadband Biconical Antenna (30 MHz to 200 MHz): EMCO 3110, Serial Number 1180, Calibrated: 28 December 1999, Calibration Due Date: 28 December 2000
- ⇒ Broadband Log Periodic Antenna (200 MHz to 1000 MHz): EMCO 3146, Serial Number 2853, Calibrated: 28 December 1999, Calibration due Date: 28 December 2000
- ⇒ Double Ridge Guide Horn Antenna: EMCO 3115, Serial Number 9807-5534, Calibrated: 30 December 1999, Calibration Due Date: 30 December 2000
- ⇒ Open Area Test Site #2, Normalized Site Attenuation Calibrated 20 June 2000, Calibration Due 20 June 2001

6.2 Regulation

(a) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

(b) Field strength limits are specified at a distance of 3 meters.

(c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

(d) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

(e) Parties considering the manufacture, importation, marketing or operation of equipment under this section should also note the requirement in Section 15.37(d).

6.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that sits on a flush mounted metal turntable. Floor standing equipment is placed directly on the flush mounted metal turntable. The EUT is connected to its associated peripherals with any excess I/O cabling bundled to approximately 1 meter.

Preview tests are performed to determine the “worst case” mode of operation. With the EUT operating in “worst case” mode, emissions from the unit are maximized by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions.

Radiated Emissions Test Characteristics

Frequency range	30 MHz – 10,000 MHz
Test distance	3 m
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1000 MHz) 1 MHz (1000 MHz – 10,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

6.4 Test Results

LOW CHANNEL PRODUCT EMISSIONS

No	EMISSION	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM dB	MODE		HGT cm	AZM deg		
1	903.351	94.0	83.9	-10.1	PK	V	116	93	26.6	
2	1806.44	74.0	51.1	-22.9	PK	V	222	192	28.0	
3	1806.52	54.0	44.4	-9.6	AVG	V	222	192	28.0	
4	2709.87	74.0	51.8	-22.2	PK	V	133	354	2.6	
5	2709.98	54.0	47.2	-6.8	AVG	V	133	354	2.6	
6	3613.26	74.0	49.5	-24.5	PK	V	112	188	6.4	
7	3613.29	54.0	39.0	-15.0	AVG	V	112	188	6.4	
8	4516.66	74.0	49.1	-24.9	PK	V	100	316	6.5	
9	4516.78	54.0	38.7	-15.3	AVG	V	100	316	6.5	

**MIDDLE CHANNEL
PRODUCT EMISSIONS**

No	EMISSION	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM	MODE		HGT cm	AZM deg		
1	912.357	94.0	83.7	-10.3	PK	V	100	245	26.7	
2	1824.47	74.0	54.9	-19.1	PK	V	217	198	31.9	
3	1824.58	54.0	47.7	-6.3	AVG	V	217	198	31.9	
4	2736.97	74.0	50.8	-23.2	PK	V	129	352	2.7	
5	2737.01	54.0	46.0	-8.0	AVG	V	129	352	2.7	
6	3649.31	74.0	48.5	-25.5	PK	V	112	183	6.4	
7	3649.43	54.0	37.7	-16.3	AVG	V	112	183	6.4	
8	4561.75	74.0	49.9	-24.1	PK	V	128	313	6.7	
9	4561.83	54.0	39.4	-14.6	AVG	V	128	313	6.7	

**HIGH CHANNEL
PRODUCT EMISSIONS**

No	EMISSION	SPEC LIMIT	MEASUREMENTS			POL	SITE		CORR FACTOR	comments
	FREQUENCY MHz		ABS	dLIM	MODE		HGT cm	AZM deg		
1	921.363	94.0	82.6	-11.4	PK	V	124	270	26.9	
2	1842.52	74.0	55.5	-18.5	PK	V	205	192	31.9	
3	1842.58	54.0	49.3	-4.7	AVG	V	205	192	31.9	
4	2763.86	74.0	50.1	-23.9	PK	V	130	352	2.9	
5	2763.95	54.0	44.8	-9.2	AVG	V	130	352	2.9	
6	3685.31	54.0	48.8	-5.2	PK	V	112	189	6.3	
7	3685.44	74.0	38.2	-35.8	AVG	V	112	189	6.3	
8	4606.74	54.0	50.9	-3.1	PK	V	141	312	6.9	
9	4606.83	74.0	40.2	-33.8	AVG	V	141	312	6.9	

7. Occupied Bandwidth and Band Edge Compliance

Test Requirement: FCC Ruls: 47 CFR Part 15, Subpart C, Sections 15.215(b) and (c), 15.249 (d)

Test Procedure: ANSI C63.4 - 1992

Date of Test: 17 November 2000

Laboratory: Test Site #1 (Acme, WA)

7.1 Regulation:

7.1.1 Section 15.215(b) and (c)

Section 15.215 Additional provisions of the general radiated emission limitations

- (b) In most cases, unwanted emissions outside of the frequency bands shown in these alternative provisions must be attenuated to the emissions limits shown in Section 15.209. In no case shall the level of the unwanted emissions form an intentional radiator operation under these additional provisions exceed the field strength of the fundamental emission.
- (c) Intentional radiators operating under the alternative provisions to the general emissions limits, as contained in Sections 15.217 through 15.255 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band include the effects from frequency sweeping, frequency hopping and the other modulation techniques that may be employed as well as the frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

7.1.2 Section 15.249 (d)

Section 15.249 Operation with in the bands 902 –928 MHz, 24000 – 2483.5 MHz, 5725 – 5875 MHz and 24.0 – 24.25 GHZ

- (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

7.2 Test Equipment

- ⇒ Spectrum Analyzer (blue): Hewlett-Packard 8567A, Serial Number 2410A00168, Calibrated: 17 March 2000, Calibration due Date: 17 March 2001
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- ⇒ Quasi Peak Adapter (blue): Hewlett-Packard 85650A, Serial Number 624158, Calibrated: 17 February 2000, Calibration due Date: 17 February 2001
- ⇒ Broadband Log Periodic Antenna (red) (200 MHz to 1000 MHz): EMCO 3146, Serial Number 2853, Calibrated: 28 December 1999, Calibration due Date: 28 December 2000

7.3 Purpose

The EUT purpose of this test was to evaluate the radiated electromagnetic interference characteristics of the EUT.

7.4 Occupied (-20 dB) Bandwidth Test Results

See the plots attached

The worst case -20dB Occupied Bandwidth was 390.698 kHz, which occurred in the High Channel (i.e. at 921.37 MHz).

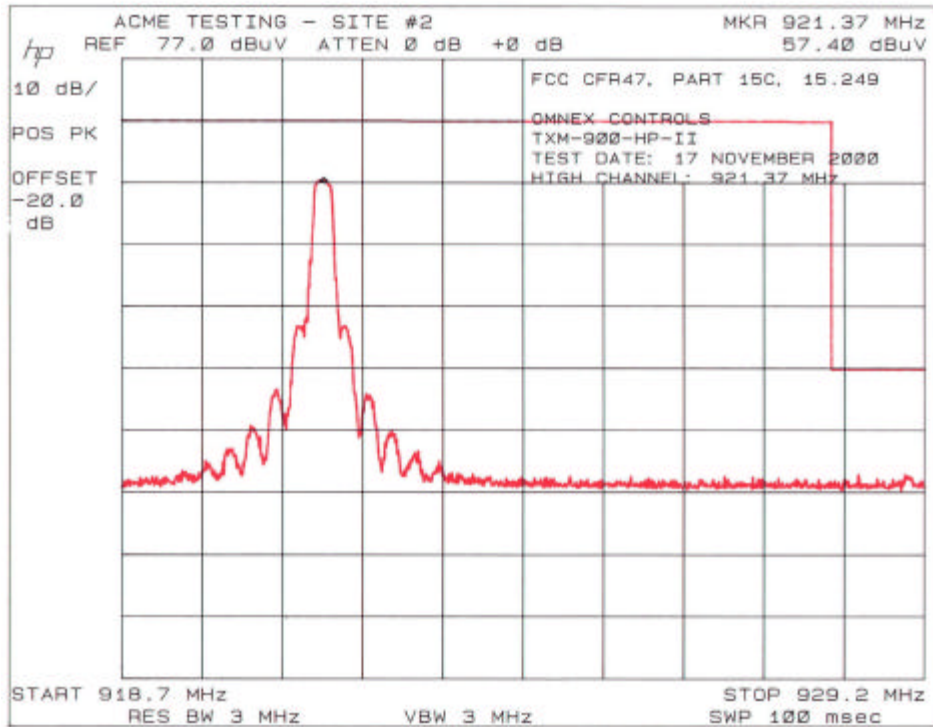
8. Miscellaneous Comments and Notes

1. None

9. List of Attachments

1. Occupied Bandwidth Plots. (2)
2. Photographs of test set-ups. (1)

High Channel 20 dB BW = 345.349 kHz



Low Channel 20 dB BW = 345.349 kHz

