

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
CERTIFICATION TO FCC PART 15 REQUIREMENTS**

*for*

**INTENTIONAL RADIATOR**

**315 MHz TRANSMITTER FOR BICYCLE LIGHTING SYSTEM**

**MODEL NO: 491-3210**

**FCC ID NO: OXX-SBC499**

**REPORT NO: 00U0080**

**ISSUE DATE: MARCH 02, 2000**

*Prepared for*

**SPECIALIZED BICYCLE COMPONENTS INC.  
15130 CONCORD CIRCLE  
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*Prepared by*

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*d.b.a.*

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<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
1. VERIFICATION OF COMPLIANCE .....	1
2. Product Description.....	2
3. Test Facility.....	2
4. Measurement Standards .....	2
5. Test Methodology.....	2
6. Measurement Equipment Used .....	2
7. POWERLINE RFI LIMIT .....	3
8. RADIATED EMISSION LIMITS .....	3
9. SYSTEM TEST CONFIGURATION.....	4
10. Test Procedure.....	5
11. Equipment Modifications.....	6
12. TEST RESULT .....	7
12.1 Maximum Modulation Percentage (M%) .....	7
12.2 The Emissions Bandwidth.....	7

#### TEST DATA

- Maximum Modulation Percentage Plot
- Emission Bandwidth Plot
- Radiated Emission Worksheet for Peak Measurement
- Radiated Emission Worksheet for Average Measurement

**1. VERIFICATION OF COMPLIANCE**

COMPANY NAME : SPECIALIZED BICYCLE COMPONENTS INC.  
 15130 CONCORD CIRCLE  
 MORGAN HILL, CA 95037 USA

CONTACT PERSON : MARK SIMINOFF / PRODUCT DEVELOPER

TELEPHONE NO. : 408-779-6229-2379

EUT DESCRIPTION : 315 MHz TRANSMITTER FOR BICYCLE LIGHTING  
 SYSTEM

FCC ID: OXX-SBC499

DATE TESTED: MARCH 02, 2000

REPORT NUMBER: 00U0080

TYPE OF EQUIPMENT	(INTENTIONAL RADIATOR)
EQUIPMENT TYPE	315 MHz TRANSMITTER
MEASUREMENT PROCEDURE	ANSI C63.4 / 1992
LIMIT TYPE	CERTIFICATION
FCC RULE	CFR 47, PART 15

The above equipment was tested by Compliance Engineering Services, Inc. for compliance with the requirements set forth in CFR 47, PART 15. This said equipment in the configuration described in this report shows that maximum emission levels emanating from equipment are within the compliance requirements.

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T. N. COKENIAS / ENGINEERING DIRECTOR  
 COMPLIANCE ENGINEERING SERVICES, INC.

## 2. Product Description

Fundamental Frequency	<b>315MHz</b>
Power Source	<b>6V Battery</b>
Transmitting Time	<b>Periodic <math>\leq</math> 5 seconds</b>
Associated Receiver	<b>MODEL: 491-3210, FCC DoC</b>

## 3. Test Facility

The 3/10/30 meter open area test site and conducted measurement facility used to collect the radiated data is located at 561F Monterey Road, Morgan Hill, California, U.S.A. A detailed description of the test facility was submitted to the Commission on May 27,1994.

## 4. Measurement Standards

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/1992.

## 5. Test Methodology

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 KHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (CFR 47 Section 15.33)

## 6. Measurement Equipment Used

Manufacturer	Model Number	Description	Cal Due Date
H.P.	8568A	Spectrum Analyzer (100Hz – 1.5GHz)	02/01
H.P.	8566B	Spectrum Analyzer (100Hz – 22GHz)	09/00
EMCO	3146	Antenna (200-1000 MHz)	10/00
H.P.	8447D	Preamplifier (0.1 - 1300 MHz)	09/00
EMCO	3115	Antenna(1 - 18GHZ)	11/00
H.P.	8449B	Preamplifier (1-26.5GHZ)	03/00

**7. POWERLINE RFI LIMIT**

CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHZ TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	6Vdc

**8. RADIATED EMISSION LIMITS**

GENERAL REQUIREMENTS	SECTION 15.209.
RESTRICTED BANDS OF OPERATION	SECTION 15.205
PERIODIC OPERATION IN THE BAND 40.66 -40.70 MHz AND ABOVE 70 MHz.	SECTION 15.231

## 9. SYSTEM TEST CONFIGURATION

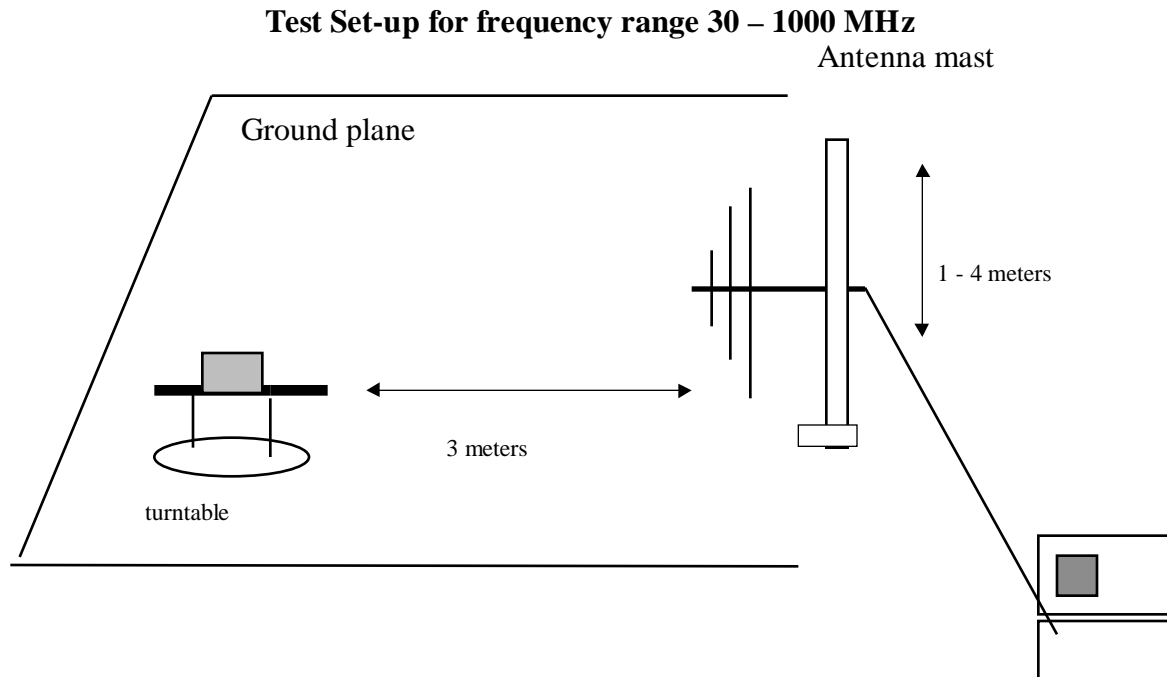
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

## 10. Test Procedure

### Radiated Emissions, 15.231(4)(b)



**Fig. 1**

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3-meters from the EUT.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

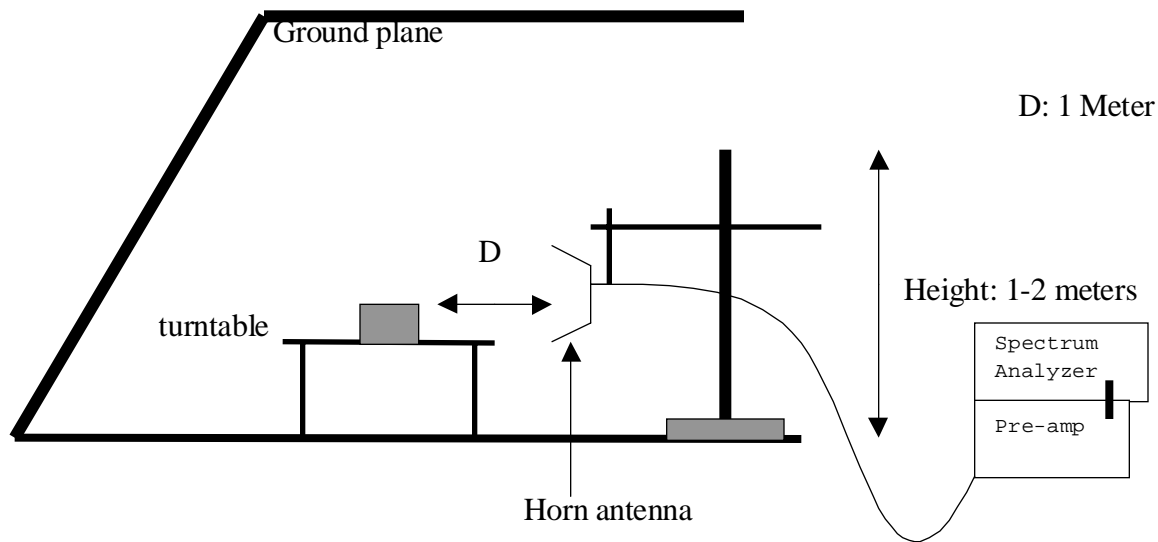
**Test set-up for measurements above 1GHz**

FIG. 2

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1-meters from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

**11. Equipment Modifications**

To achieve compliance to FCC Section 15.231 technical limits, the following change(s) were made during compliance testing:

NONE



**12. TEST RESULT**

Powerline RFI Class B	Eut	Radiated Emission Limits	Eut
SECTION 15.207		SECTION 15.209	
SECTION 15.205, 15.209, 15.221, 15.223, x 15.225 OR 15.227		SECTION 15.205	
BATTERY POWER	X	SECTION 15.231 (b)	X
		SECTION 15.231 (e)	

**12.1 Maximum Modulation Percentage (M%)**

CALCULATION:

Average Reading = Peak Reading (dBuV/m)+ 20log (Duty Cycle)

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

WHERE      1 Period                      = 32.9mS > 100mS. Use 100mS for calculation.  
                  Long pulse                      = 820uSecond = 0.82mSecond  
                  Short pulse                      = 440uSecond = 0.44mSecond  
                  No of Long pulse              = 28  
                  No of Short pulse               = 12

Duty Cycle = ( N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

Duty Cycle = ( (28x0.82)+(12x0.44))/100=0.283=28.3%

For duty cycle refer to plot #1, 2, 3.

**12.2 The Emissions Bandwidth**

The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
315 MHz	<b>139 kHz</b> (refer to plot #4)	< 315X0.25%=787.5 kHz