

# **TIMCO**ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: [sid@timcoengr.com](mailto:sid@timcoengr.com)



## Test Report

Product Name: 27 MHz WIRELESS R/C TOY TRANSMITTER

FCC ID: OKP51610

Applicant:

**WOW WEE LIMITED  
ENERGY PLAZA, SUITE 301A-C  
92 GRANVILLE ROAD  
TST EAST, HONG KONG**

**Date Receipt: FEBRUARY 21, 2003**

**Date Tested: MARCH 3, 2003**

APPLICANT: WOW WEE LIMITED  
FCC ID: OKP51610  
REPORT #: W/WOW\_OKP\251HT3\251HT3TestReport.doc

COVER SHEET

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## EMC Equipment List

|   | DEVICE                                              | MFGR            | MODEL         | SERNO                    | CAL/CHAR<br>DATE   | DUE DATE<br>or STATUS |
|---|-----------------------------------------------------|-----------------|---------------|--------------------------|--------------------|-----------------------|
| X | 3-Meter<br>OATS                                     | TEI             | N/A           | N/A                      | Listed<br>12/22/99 | 12/22/02              |
|   | 3/10-Meter<br>OATS                                  | TEI             | N/A           | N/A                      | Listed<br>3/26/01  | 3/26/04               |
|   | Receiver, Beige Tower<br>Spectrum Analyzer<br>(Tan) | HP              | 8566B Opt 462 | 3138A07786<br>3144A20661 | CAL<br>8/31/01     | 8/31/03               |
|   | RF Preselector<br>(Tan)                             | HP              | 85685A        | 3221A01400               | CAL<br>8/31/01     | 8/31/03               |
|   | Quasi-Peak Adapter<br>(Tan)                         | HP              | 85650A        | 3303A01690               | CAL<br>8/31/01     | 8/31/03               |
| X | Receiver, Blue Tower<br>Spectrum Analyzer<br>(Blue) | HP              | 8568B         | 2928A04729               | CHAR<br>10/22/01   | 10/22/03              |
| X | RF Preselector<br>(Blue)                            | HP              | 85685A        | 2848A18049<br>2926A00983 | CHAR<br>10/22/01   | 10/22/03              |
| X | Quasi-Peak Adapter<br>(Blue)                        | HP              | 85650A        | 2811A01279               | CHAR<br>10/22/01   | 10/22/03              |
| X | Biconnical Antenna                                  | Electro-Metrics | BIA-25        | 1171                     | CAL<br>4/26/01     | 4/26/03               |
|   | Biconnical Antenna                                  | Eaton           | 94455-1       | 1096                     | CAL<br>10/1/01     | 10/1/03               |
|   | Biconnical Antenna                                  | Eaton           | 94455-1       | 1057                     | CHAR<br>3/15/00    | 3/15/02               |
|   | BiconiLog Antenna                                   | EMCO            | 3143          | 9409-1043                |                    |                       |
| X | Log-Periodic<br>Antenna                             | Electro-Metrics | LPA-25        | 1122                     | CAL<br>10/2/01     | 10/2/03               |
|   | Log-Periodic<br>Antenna                             | Electro-Metrics | EM-6950       | 632                      | CHAR<br>10/15/01   | 10/15/03              |
|   | Log-Periodic<br>Antenna                             | Electro-Metrics | LPA-30        | 409                      | CHAR<br>10/16/01   | 10/16/03              |
|   | Dipole Antenna<br>Kit                               | Electro-Metrics | TDA-30/1-4    | 152                      | CAL<br>3/21/01     | 3/21/04               |
|   | Dipole Antenna<br>Kit                               | Electro-Metrics | TDA-30/1-4    | 153                      | CHAR<br>11/24/00   | 11/24/03              |
|   | Double-Ridged Horn<br>Antenna                       | Electro-Metrics | RGA -180      | 2319                     | CAL<br>12/19/01    | 12/19/03              |
|   | Horn Antenna                                        | Electro-Metrics | EM-6961       | 6246                     | CAL<br>3/21/01     | 3/21/03               |
|   | Horn Antenna                                        | ATM             | 19-443-6R     | None                     | No Cal<br>Required |                       |

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|   | DEVICE                                | MFGR                           | MODEL       | SERNO      | CAL/CHAR<br>DATE | DUE DATE<br>or STATUS |
|---|---------------------------------------|--------------------------------|-------------|------------|------------------|-----------------------|
|   | Passive Loop Antenna                  | EMC Test Systems               | EMCO 6512   | 9706-1211  | CHAR<br>7/10/01  | 7/10/03               |
|   | Line Impedance<br>Stabilization . . . | Electro-Metrics                | ANS-25/2    | 2604       | CAL<br>10/9/01   | 10/9/03               |
|   | Line Impedance<br>Stabilization . . . | Electro-Metrics                | EM-7820     | 2682       | CAL<br>3/16/01   | 3/16/03               |
|   | Termaline Wattmeter                   | Bird Electronic<br>Corporation | 611         | 16405      | CAL<br>5/25/99   | 5/25/01               |
|   | Termaline Wattmeter                   | Bird Electronic<br>Corporation | 6104        | 1926       | CAL<br>12/12/01  | 12/12/03              |
|   | Oscilloscope                          | Tektronix                      | 2230        | 300572     | CHAR<br>2/1/01   | 2/1/03                |
|   | Temperature Chamber                   | Tenney Engineering             | TTRC        | 11717-7    | CHAR<br>1/22/02  | 1/22/04               |
|   | AC Voltmeter                          | HP                             | 400FL       | 2213A14499 | CAL<br>10/9/01   | 10/9/03               |
|   | AC Voltmeter                          | HP                             | 400FL       | 2213A14261 | CHAR<br>10/15/01 | 10/15/03              |
|   | AC Voltmeter                          | HP                             | 400FL       | 2213A14728 | CHAR<br>10/15/01 | 10/15/03              |
| X | Digital Multimeter                    | Fluke                          | 77          | 35053830   | CHAR<br>1/8/02   | 1/8/04                |
|   | Digital Multimeter                    | Fluke                          | 77          | 43850817   | CHAR<br>1/8/02   | 1/8/04                |
|   | Digital Multimeter                    | HP                             | E2377A      | 2927J05849 | CHAR<br>1/8/02   | 1/8/04                |
|   | Multimeter                            | Fluke                          | FLUKE-77-3  | 79510405   | CAL<br>9/26/01   | 9/26/03               |
|   | Peak Power Meter                      | HP                             | 8900C       | 2131A00545 | CHAR<br>1/26/01  | 1/26/03               |
|   | Digital Thermometer                   | Fluke                          | 2166A       | 42032      | CAL<br>1/16/02   | 1/16/04               |
|   | Thermometer                           | Traulsen                       | SK-128      |            | CHAR<br>1/22/02  | 1/22/04               |
| X | Temp/Humidity gauge                   | EXTech                         | 44577F      | E000901    | CHAR<br>1/22/02  | 1/22/04               |
|   | Frequency Counter                     | HP                             | 5352B       | 2632A00165 | CAL<br>11/28/01  | 11/28/03              |
|   | Power Sensor                          | Agilent<br>Technologies        | 84811A      | 2551A02705 | CAL<br>1/26/01   | 1/26/03               |
|   | Service Monitor                       | IFR                            | FM/AM 500A  | 5182       | CAL<br>11/22/00  | 11/22/02              |
|   | Comm. Serv. Monitor                   | IFR                            | FM/AM 1200S | 6593       | CAL<br>5/12/02   | 5/12/04               |

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|  | DEVICE               | MFGR                | MODEL                | SERNO      | CAL/CHAR<br>DATE | DUE DATE<br>or STATUS |
|--|----------------------|---------------------|----------------------|------------|------------------|-----------------------|
|  | Signal Generator     | HP                  | 8640B                | 2308A21464 | CAL<br>11/15/01  | 11/15/03              |
|  | Modulation Analyzer  | HP                  | 8901A                | 3435A06868 | CAL<br>9/5/01    | 9/5/03                |
|  | Near Field Probe     | HP                  | HP11940A             | 2650A02748 | CHAR<br>2/1/01   | 2/1/03                |
|  | BandReject Filter    | Lorch Microwave     | 5BR4-2400/<br>60-N   | Z1         | CHAR<br>3/2/01   | 3/2/03                |
|  | BandReject Filter    | Lorch<br>Microwave  | 6BR6-2442/<br>300-N  | Z1         | CHAR<br>3/2/01   | 3/2/03                |
|  | BandReject Filter    | Lorch<br>Microwave  | 5BR4-10525/<br>900-S | Z1         | CHAR<br>3/2/01   | 3/2/03                |
|  | High Pas Filter      | Microlab            | HA-10N               |            | CHAR<br>10/4/01  | 10/4/03               |
|  | Audio Oscillator     | HP                  | 653A                 | 832-00260  | CHAR<br>3/1/01   | 3/1/03                |
|  | Frequency Counter    | HP                  | 5382A                | 1620A03535 | CHAR<br>3/2/01   | 3/2/03                |
|  | Frequency Counter    | HP                  | 5385A                | 3242A07460 | CHAR<br>12/11/01 | 12/11/03              |
|  | Preamplifier         | HP                  | 8449B-H02            | 3008A00372 | CHAR<br>3/4/01   | 3/4/03                |
|  | Amplifier            | HP                  | 11975A               | 2738A01969 | CHAR<br>3/1/01   | 3/1/03                |
|  | Egg Timer            | Unk                 |                      |            | CHAR<br>8/31/01  | 8/31/03               |
|  | Measuring Tape, 20M  | Kraftixx            | 0631-20              |            | CHAR<br>2/1/02   | 2/1/04                |
|  | Measuring Tape, 7.5M | Kraftixx            | 7.5M PROFI           |            | 2/1/02           | 2/1/04                |
|  | Coaxial Cable #51    | Insulated Wire Inc. | NPS 2251-2880        | Timco #51  | CHAR<br>1/23/02  | 1/23/04               |
|  | Coaxial Cable #64    | Semflex Inc.        | 60637                | Timco #64  | CHAR<br>1/24/02  | 1/24/04               |
|  | Coaxial Cable #65    | General Cable Co.   | E9917 RG233/U        | Timco #65  | CHAR<br>1/23/02  | 1/23/04               |
|  | Coaxial Cable #106   | Unknown             | Unknown              | Timco #106 | CHAR<br>1/23/02  | 1/23/04               |

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## TEST PROCEDURE

**GENERAL:** This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz. The ambient temperature of the UUT was 71°C with a humidity of 71%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

|            |                                        |
|------------|----------------------------------------|
| Freq (MHz) | METER READING + ACF = FS               |
| 33         | 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m |

**ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES:** The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

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**NAME OF TEST:** RADIATION INTERFERENCE

**RULES PART NO.:** 15.227

**REQUIREMENTS:** CARRIER FREQUENCY WILL NOT EXCEED 80 dBuV/m AT 3M.  
OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

|               |                                  |
|---------------|----------------------------------|
| 30 - 88 MHz   | 40.0 dBuV/M MEASURED AT 3 METERS |
| 88 - 216 MHz  | 43.5 dBuV/M                      |
| 216 - 960 MHz | 46.0 dBuV/M                      |
| ABOVE 960 MHz | 54.0 dBuV/M                      |

## TEST DATA:

| Emission<br>Frequency<br>MHz | Meter<br>Reading<br>dBuV | Ant.<br>Polarity | Coax<br>Loss<br>dB | Correction<br>Factor<br>dB | Field<br>Strength<br>dBuV/m | Margin<br>dB |
|------------------------------|--------------------------|------------------|--------------------|----------------------------|-----------------------------|--------------|
| 27.14                        | 26.0                     | H                | 0.24               | 13.99                      | 40.23                       | 39.77        |
| 27.14                        | 32.0                     | V                | 0.24               | 13.99                      | 46.23                       | 33.77        |
| 54.13                        | 13.4                     | V                | 0.80               | 11.08                      | 25.28                       | 14.72        |
| 108.41                       | 7.3                      | V                | 0.80               | 13.19                      | 21.29                       | 22.21        |
| 217.97                       | 2.6                      | V                | 1.27               | 11.36                      | 15.23                       | 30.77        |
| 271.25                       | 3.6                      | V                | 1.40               | 13.74                      | 18.74                       | 27.26        |

Test Site: 3 meter South

SAMPLE CALCULATION: FSdBuV/m = MR(dBuV) + ACFdB.

**TEST PROCEDURE:** The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

**TEST RESULTS:** THE UNIT DOES MEET THE FCC REQUIREMENTS.

**PERFORMED BY:** SID SANDERS

**DATE:** MARCH 3, 2003

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**APPLICANT:** WOW WEE LIMITED  
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**NAME OF TEST:** Occupied Bandwidth  
**RULES PART NO.:** 15.227

**REQUIREMENTS:** The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated to the general limits of 15.209.

THE GRAPH ON THE NEXT PAGE REPRESENTS THE EMISSIONS TAKEN FOR THE DEVICE.

**METHOD OF MEASUREMENT:** A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was taken. The vertical scale is set to 10 dB per division. The horizontal scale is set to 5 kHz per division.

**TEST RESULTS:** The unit DOES meet the FCC requirements.

**PERFORMED BY:** SID SANDERS

**DATE:** MARCH 3, 2003

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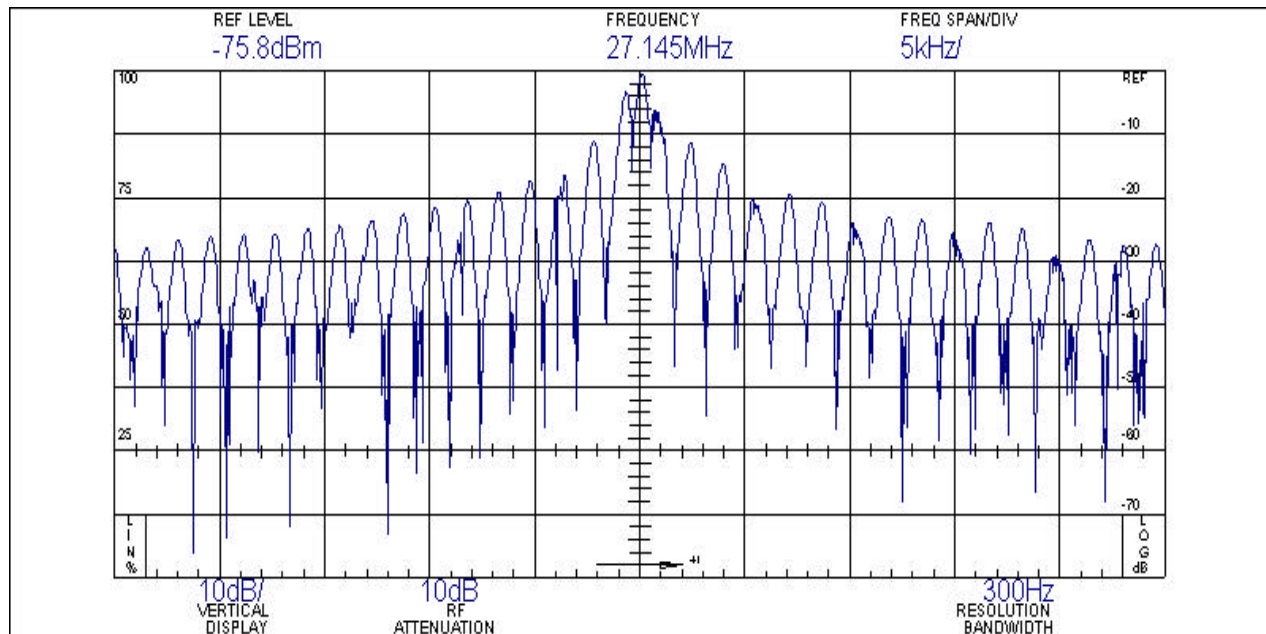
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## OCCUPIED BANDWIDTH



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