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## **Environmental Assessment**

for

**Mobiles/Fixed Base Station**

for

**FCC ID: FRWRT-5000A**

Model:RT-5000A

to

**Federal Communications Commission**

**47 CFR 1.1310 (MPE)**

Radiofrequency Radiation Exposure Limits

**Date Of Report:** May 25, 2006

### **On the Behalf of the Applicant:**

Wulfsberg Electronics Division

### **At the Request of:**

Wulfsberg Electronics Division  
6400 Wilkinson Drive  
Prescott, AZ 86301-6164

Attention of:

Main: (928) 708-1550; Fax: (928) 541-7627  
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Supervised By:

David E. Lee, FCC/IC Compliance Manager

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) **Test Report (Supplemental)**

b) Laboratory: M. Flom Associates, Inc.  
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107  
(Canada: IC 2044) Chandler, AZ 85225

c) Report Number: d0650025

d) Client: Wulfsberg Electronics Division  
6400 Wilkinson Drive  
Prescott, AZ 86301-6164

e) Identification: RT-5000A  
FCC ID: FRWRT-5000A  
Description: VHF/UHF Tactical Transceiver

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: May 25, 2006  
EUT Received: Apr 8, 2006

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:



David E. Lee, FCC/IC Compliance Manager

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

## Identification of the Equipment Under Test (EUT)

### Name and Address of Applicant:

Wulfsberg Electronics Division  
6400 Wilkinson Drive  
Prescott, AZ 86301-6164

### Manufacturer:

Wulfsberg Electronics Division  
6400 Wilkinson Drive  
Prescott, AZ 86301-6164

### FCC ID:

FRWRT-5000A

### Model Number:

RT-5000A

### Description:

VHF/UHF Tactical Transceiver

### Type of Emission:

16K0F3E, 11K0F3E, 20K0F1E, 8K10F1E,  
8K10F1D, 6K00A3E

### Frequency Range, MHz:

29.700 – 940.000

### Power Rating, Watts:

10.0 / 1.0 FM  
15.0 / 7.5 AM

☐ Switchable

☐ Variable

☐ N/A

### Modulation:

☐ AMPS  
☐ TDMA  
☐ CDMA  
☒ OTHER

### Antenna:

☐ Helical  
☐ Monopole  
☒ Whip  
☒ Other

**Note:** For RF Safety test antenna gain taken at the upper range of expected gain (i.e. 0 dBd) and RF Power set to highest nominal power across all channels.

## **Standard Test Conditions and Engineering Practices**

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2003, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.

<b>Name of Test:</b>	Environmental Assessment
<b>Specification:</b>	FCC: 47 CFR 1.1310
<b>Measurement Guide:</b>	ANSI/IEEE C95.1 1992
<b>Test Equipment:</b>	Maximum Permissible Exposure (MPE) measurement system, consisting of: AR FP6001 Field Monitor Kit Probe Monitor Software Suite running on PC
<b>Measurement Procedure:</b>	<ol style="list-style-type: none"><li>1. The following measurements were performed with a Narda probe using ANSI/IEEE C95.1 as a guide.</li><li>2. Prior to making any measurements, the measurements system was calibrated in accordance with the manufacturer's procedures.</li><li>3. The EUT's radiating element (antenna) was placed on a 1 m tall table for ease of testing. For equipment normally operated on a metal surface, a ground plane was used.</li><li>4. The remaining equipment necessary to operate the EUT was maintained at a distance from the measurement arrangement suitable to minimize interference with the measurements.</li><li>5. The minimum safe distance was calculated from the formula Power Density = <math>EIRP / 4\pi R^2</math> (Peak Watts/m<sup>2</sup>). The calculation is shown with the measurement data.</li><li>6. With the EUT operating at maximum power, a search was initiated for worst case emissions with the probe raised and lowered over a range of 0.2 to 2 meters in height and over a horizontal plane of 0° to 360°.</li><li>7. Average values were calculated for the whole body (0.2-2.0m), lower body (0.2-0.8m) and upper body (1.0-2.0m).</li></ol>
<b>Results:</b>	Attached.

**Test Setup:**

**Maximum Permissible Exposure (MPE)**



**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 40.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                     ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz: Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 10.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 1.0  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 10.0  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 0.89

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.00005
	1.8	0.00006
	1.6	0.00039
	1.4	0.00303
	1.2	0.01859
	1.0	0.05557
	0.8	0.34004
	0.6	0.18345
	0.4	0.02993
	0.2	0.01658

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.06477  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.14250  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.01295



**Supervised By:** David E. Lee, FCC/IC Compliance Manager



**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 128.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                             ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 15.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 1.0  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 10.0  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 1.33

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.00255
	1.8	0.00530
	1.6	0.00914
	1.4	0.02295
	1.2	0.09205
	1.0	0.21054
	0.8	0.29033
	0.6	0.07945
	0.4	0.02879
	0.2	0.04497

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.07861  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.11089  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.05709



**Supervised By:** David E. Lee, FCC/IC Compliance Manager

**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 158.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                     ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz: Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 10.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 1.0  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 10.0  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 0.89

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.01139
	1.8	0.01194
	1.6	0.03421
	1.4	0.07890
	1.2	0.18679
	1.0	0.31324
	0.8	0.22644
	0.6	0.17799
	0.4	0.04320
	0.2	0.01418

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.10983  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.11545  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.10608



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**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 430.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                     ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 10.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 1.43  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 14.3  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 0.75

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.00682
	1.8	0.01204
	1.6	0.02330
	1.4	0.04380
	1.2	0.08837
	1.0	0.16099
	0.8	0.17765
	0.6	0.04233
	0.4	0.01159
	0.2	0.01912

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.05860  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.06267  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.05589



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**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 511.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                     ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 10.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 1.7  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 17.0  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 0.68

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.00252
	1.8	0.00382
	1.6	0.00763
	1.4	0.01315
	1.2	0.02775
	1.0	0.07245
	0.8	0.11629
	0.6	0.03322
	0.4	0.00641
	0.2	0.00377

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.02870  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.03992  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.02122



**Supervised By:** David E. Lee, FCC/IC Compliance Manager

**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 820.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                     ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz: Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 10.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 2.73  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 27.3  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 0.54

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.00052
	1.8	0.00048
	1.6	0.00092
	1.4	0.00142
	1.2	0.00420
	1.0	0.02656
	0.8	0.08046
	0.6	0.00550
	0.4	0.00176
	0.2	0.00143

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.01233  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.02229  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.00568



**Supervised By:** David E. Lee, FCC/IC Compliance Manager

**Name of Test:** R.F. Radiation Exposure  
**FCC Rules:** 1.1307, 1.1310, 1.1311, 2.1091  
**Description, EUT:** See page 2 of Test Report

**Test Frequency, MHz** = 937.025000  
**Antenna Gain** = 3 dBi nominal (0.85 dBd)  
**Antenna Model** AT-5000 (Manufactured by Comant)  
                             ¼ Wave \_\_\_\_\_ ? Wave \_\_\_\_\_ Other dBd \_\_\_\_\_ Other   X  

**Limits: Controlled Exposure** 0.3-3.0 MHz: Limit [mW/cm<sup>2</sup>] = 100  
 47 CFR 1.1310 3.0-30 MHz: Limit [mW/cm<sup>2</sup>] = (900/f<sup>2</sup>)  
 Table 1, (A) 30-300 MHz: Limit [mW/cm<sup>2</sup>] = 1.0  
 300-1500 MHz: Limit [mW/cm<sup>2</sup>] = f/300  
 1500-100,000 MHz: Limit [mW/cm<sup>2</sup>] = 5.0

**Pre-test** Power<sub>[W EIRP]</sub> = P<sub>[conducted]</sub> x G<sub>[antenna]</sub> = 10.0  
**Calculations** Limit<sub>[mW/cm<sup>2</sup>]</sub> = 3.12  
 Limit<sub>[W/m<sup>2</sup>]</sub> = 10 x Limit<sub>[mW/cm<sup>2</sup>]</sub> = 31.2  
 R<sub>[m]</sub> = [P<sub>[W EIRP]</sub> / (4π x Limit<sub>[W/m<sup>2</sup>]</sub>)]<sup>1/2</sup> = 0.50

Results:	Probe Height, m	Power Density, mW/cm <sup>2</sup>
at tested distance	2.0	0.00007
	1.8	0.00009
	1.6	0.00012
	1.4	0.00013
	1.2	0.00047
	1.0	0.00240
	0.8	0.00704
	0.6	0.00038
	0.4	0.00029
	0.2	0.00028

**Power Density Calculations:** The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body: Average of 0.2 to 2.0 m, mW/cm<sup>2</sup> = 0.00113  
 For lower body: Average of 0.2 to 0.8 m, mW/cm<sup>2</sup> = 0.00200  
 For upper body: Average of 1.0 to 2.0 m, mW/cm<sup>2</sup> = 0.00055



**Supervised By:** David E. Lee, FCC/IC Compliance Manager

**(The following will be placed in the Instruction Manual)**

## Mandatory Safety Instructions to Installers & Users

Use only manufacturer or dealer supplied antenna.

**Antenna Minimum Safe Distance:** 1.35m.

Antenna Gain: zero dB referenced to an isotropic antenna.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy which is below the OSHA (Occupational Safety and Health Act) limits.

**Antenna Mounting:** The antenna supplied by the manufacturer or radio dealer must not be mounted at a location such that during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna i.e. **1.35m**

To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

**Warning:** Maintain a separation distance from the antenna to a person(s) of at least **1.35m**

You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational/Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

=====

**Note: The unit is intended exclusively for aircraft installation under the control of trained aircrew who are aware of the RF Exposure hazards of all transmitters onboard. RF Exposure Warnings are displayed on the radio for the information of maintenance personnel.**

**Testimonial  
and  
Statement of Certification**

**This is to certify:**

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.



Certifying Engineer:

Sam Baum, Technical Manager