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TEST: FCC 47 CFR 1.1310 Maximum Permissible Exposure

**ENVIRONMENTAL ASSESSMENT**

On the TMAB22-D100 Mobile Transceiver S/N: 190015645

In accordance with

ANSI/IEEE Std C95.1, 1999

OET Bulletin 65 97-01 and Supplement C (Edition 01-01)

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DATE: August 2004

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## Summary of Results:

Antenna Gain	Antenna Position	Measurement Position	Result
2.15 dBi	Roof	External: Side	<b>COMPLIES</b>
2.15 dBi	Trunk	External: Rear Side	<b>COMPLIES</b>
2.15 dBi	Trunk	External: Rear Corner	<b>COMPLIES</b>
2.15 dBi	Trunk	External: Centre rear	<b>COMPLIES</b>
5.15 dBi	Roof	External: Side	<b>COMPLIES</b>
5.15 dBi	Trunk	External: Rear Side	<b>COMPLIES</b>
5.15 dBi	Trunk	External: Rear Corner	<b>COMPLIES</b>
5.15 dBi	Trunk	External: Centre rear	<b>COMPLIES</b>
2.15 dBi	Roof	Internal: Front Seat	<b>COMPLIES</b>
2.15 dBi	Roof	Internal: Back Seat	<b>COMPLIES</b>
2.15 dBi	Trunk	Internal: Front Seat	<b>COMPLIES</b>
2.15 dBi	Trunk	Internal: Back Seat	<b>COMPLIES</b>
5.15 dBi	Roof	Internal: Front Seat	<b>COMPLIES</b>
5.15 dBi	Roof	Internal: Back Seat	<b>COMPLIES</b>
5.15 dBi	Trunk	Internal: Front Seat	<b>COMPLIES</b>
5.15 dBi	Trunk	Internal: Back Seat	<b>COMPLIES</b>

See Appendix A for details of the measurement positions.

## Operating and Exposure conditions:

Operating Conditions: Mobile transmitter using vehicle mounted antennas only

Exposure conditions: Occupational/Controlled Exposure (operator).  
General Population/Uncontrolled (passengers and bystanders)

Safe Distance:

Recommended Minimum lateral safe distances from the antenna: 90 cm

## Limit:

### Occupational/Controlled Exposure:

30 - 300 MHz: 1.0 mW/cm<sup>2</sup>

### General population/Uncontrolled Exposure:

30 - 300 MHz: 0.2 mW/cm<sup>2</sup>

## Recommended Antennas:

Antenna Type: Monopole ( $\lambda/4$  antenna)

Antenna Gain: 2.15 dBi

Antenna Type: Monopole ( $5\lambda/8$  antenna)

Antenna Gain: 5.15 dBi

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## Measurement Guidance:

### 2) Mobile PTT – Parts 80, 90

- a) §2.1033(c)(3) requires device operating and installation instructions to be submitted during equipment certification; instructions should include the minimum separation distance and other constraints required for the device and its antenna(s) to meet MPE limits
- b) Per definition of a mobile device a minimum separation distance of 20 cm is required
- i) Antenna installation conditions should maintain the estimated minimum MPE separation distance

ii) A separation distance based on MPE evaluation (measurement or computer modeling) that is smaller than the estimated MPE distance may be used if it is applicable for the antenna installation conditions

c) Basic RF exposure instructions are requested for devices that meet general population exposure requirements, as part of the §2.1033(c)(3) required operating instructions; RF exposure training instructions and labeling info are requested for devices that satisfy occupational exposure requirements

Federal Communications Commission OET Laboratory Division  
 March 18, 2004

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## Test Results:

NAME OF TEST: TRANSMITTER OUTPUT POWER (CONDUCTED)

TEST CONDITIONS: Ambient Temperature 22.5 °C  
 Relative Humidity 59 %

SPECIFICATION: FCC 47 CFR 2.1046

GUIDE: TIA/EIA-603 2.2.1

### MEASUREMENT PROCEDURE:

1. The Equipment Under Test (EUT) was connected to an RF Power meter using a coaxial attenuator with an impedance of 50 Ohms.
2. The unmodulated output power was measured.

### MEASUREMENT RESULTS:

Transmit Frequency:	219.1	MHz
Manufacturer's Rated Output Power	25	Watts
Supply Voltage, motor idling, transmitting.	14.06	Volts
Measured Output Power	27.1	Watts
Measurement Uncertainty (dB)	± 0.5	dB

Maximum Transmit Power is set in the factory to 26 watts +2 / -1 watt. This setting is not adjustable by the user. The MPE results are scaled to simulate results from a 28 watt carrier with a 50% duty cycle.

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NAME OF TEST: ENVIRONMENTAL ASSESSMENT

SPECIFICATION: FCC 47 CFR 1.1310

### Measurement Method:

Field strength measurements were performed for two antenna positions on a representative vehicle (Honda Accord 2001 LXI four door sedan, dimensions 185.5 long, 71.5 wide and 57.1 inches high ). See Appendix A for details.

External Field strength readings were recorded at four positions 20 cms from the car body, to represent the closest position for a bystander. Measurements were taken at 20 cm intervals vertically over a height of 2 metres.

Internal field strength readings were recorded in the front and back seat locations in the areas where the highest field strength is found.

Measurements were made in an area 40cm wide representing the head and upper and lower torso.

Spatial averaging is carried out to determine the MPE result (IEEE C95.1 3.29).

**Roof mounted antenna:**

1. Position A: 90 degrees to side of car, 20 cms from the body, on a line intersecting the roof antenna position.

**Trunk mounted antenna:**

2. Position B: 90 degrees to side of car, 20 cms from the body, on a line intersecting the trunk antenna position.
3. Position C: Rear of car, 20 cms from the body, on a line intersecting the trunk antenna position and the rear corner of the car.
4. Position D: 90 degrees to rear of car, 20 cms from the bumper, on a line intersecting the trunk antenna position..

**Calculations of average power** (sum of results/number of results):

External to vehicle:

Test Distance metres	$\lambda/4$ antenna				$5\lambda/8$ antenna			
Units	Power Density, mW/cm <sup>2</sup>							
Probe Height metres	Position							
	A	B	C	D	A	B	C	D
0.2	0.006	0.029	0.023	0.004	0.002	0.007	0.009	0.001
0.4	0.007	0.081	0.059	0.240	0.003	0.016	0.020	0.025
0.6	0.008	0.105	0.073	0.032	0.003	0.015	0.016	0.011
0.8	0.012	0.089	0.076	0.105	0.010	0.016	0.012	0.022
1.0	0.026	0.105	0.092	0.170	0.021	0.030	0.018	0.046
1.2	0.043	0.131	0.106	0.218	0.033	0.035	0.028	0.138
1.4	0.046	0.126	0.097	0.224	0.040	0.042	0.040	0.235
1.6	0.076	0.097	0.075	0.158	0.043	0.049	0.059	0.241
1.8	0.094	0.077	0.053	0.076	0.063	0.057	0.072	0.292
2.0	0.090	0.050	0.036	0.033	0.078	0.049	0.073	0.309
Average	0.041	0.089	0.069	0.126	0.030	0.032	0.035	0.132

MPE Inside Vehicle:

Roof mounted Antenna		
Internal, Front Seat	$\lambda/4$ antenna	$5\lambda/8$ antenna
Units	Power Density, mW/cm <sup>2</sup>	
Head	0.031	0.023
Upper torso	0.040	0.032
Lower torso	0.077	0.055
Average	0.049	0.037

Roof Mounted Antenna		
Internal, Back Seat	$\lambda/4$ antenna	$5\lambda/8$ antenna
Units	Power Density, mW/cm <sup>2</sup>	
Head	0.033	0.018
Upper torso	0.034	0.030
Lower torso	0.042	0.021
Average	0.036	0.023

Trunk Mounted Antenna		
Internal, Front Seat	$\lambda/4$ antenna	$5\lambda/8$ antenna
Units	Power Density, mW/cm <sup>2</sup>	
Head	0.028	0.009
Upper torso	0.036	0.011
Lower torso	0.036	0.009
Average	0.033	0.010

Trunk Mounted Antenna		
Internal, Back Seat	$\lambda/4$ antenna	$5\lambda/8$ antenna
Units	Power Density, mW/cm <sup>2</sup>	
Head	0.092	0.082
Upper torso	0.107	0.054
Lower torso	0.114	0.073
Average	0.104	0.070

**Measurement Uncertainty:**

Field Probe:  $\pm 1$  dB

**Test Equipment Used:**

Equipment	Type	Serial Number	Calibration date	Calibration Due
RF Power Sensor	HP11722A	2320A00688	16-Oct-03	16-Oct-04
Modulation Analyser	HP8901B (OPT 002)	3704A05837	15-Oct-03	15-Oct-04
Isotropic Field Probe	Holaday HI-422	95661	29-May-02	29-May-05
Antenna Mast	Tait Electronics Ltd	-	-	-

## Information to be placed in User/Installation manual:

### **Warning:**

#### **Warning: RF Exposure Hazard**

To comply with FCC RF exposure limits, this product must be installed using an externally mounted antenna with either a 2.15dBi or 5.15dBi gain. This antenna must not be mounted at a location such that any person or persons can come closer than 0.9m (35 inches) to the antenna.

### **Safety Training Information:**

#### **Warning: FCC RF Exposure Limits**

This product generates RF (radio frequency) energy during transmissions. This device must be restricted to work-related use in an occupational/controlled exposure environment. The radio operator must have control of the exposure conditions and duration of all persons exposed to the antenna of this transmitter to satisfy FCC RF exposure compliance.

- This device is not approved for general population use.
- This device must only be used with authorized accessories and antennas.

The operator must ensure that the minimum safe distance of 0.9m (35 inches) between persons and the antenna is maintained during transmissions. This minimum safe distance is based on the assumption that there is a duty cycle of 50% transmit mode to stand-by or receive modes. The radio is in transmit mode when the PTT (press-to-talk) key on the microphone is pressed and the control head red LED (light emitting diode) glows.

Please refer to the following website for more information on what RF energy is and how to control your exposure to assure compliance with established RF exposure limits.

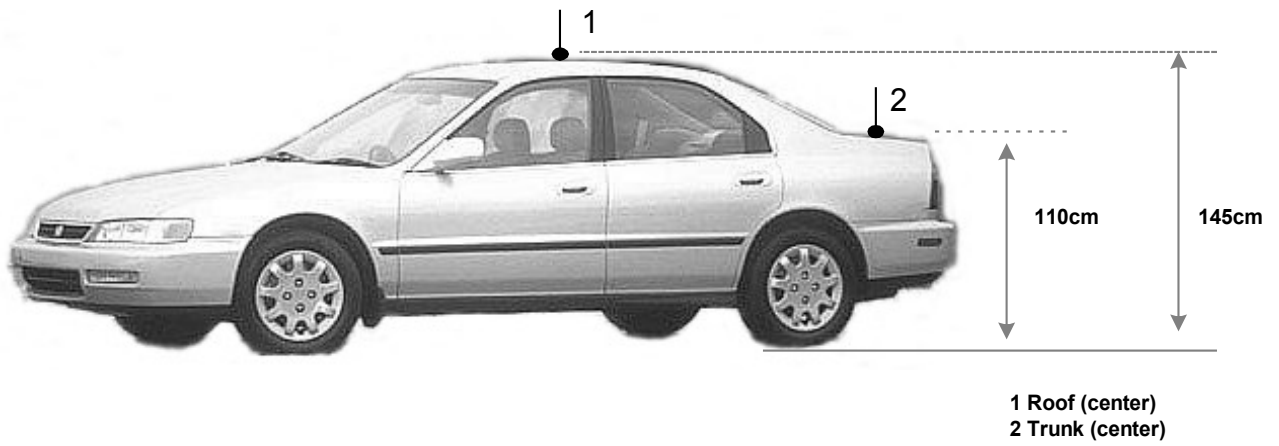
Website: <http://www.fcc.gov/oet/rfsafety/rf-faqs.html>

END



# Appendix A

'Antenna Location Drawing with Test Locations Identified'



External Test Positions ○

