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TEST: FCC 47 CFR 1.1310 Maximum Permissible Exposure

ENVIRONMENTAL ASSESSMENT

On the TMAB14-K500 Mobile Transceiver S/N: 19176196

In accordance with

ANSI/IEEE Std C95.1, 1999

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

DATE:	8 February 2006	
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Summary of Results:

762.0125 MHz:

Antenna Gain	Antenna Position	Measurement Position	Result
2.15 dBi	Roof	External: Side	**COMPLIES**
2.15 dBi	Trunk	External: Rear Side	**COMPLIES**
2.15 dBi	Trunk	External: Rear Corner	**COMPLIES**
2.15 dBi	Trunk	External: Centre rear	**COMPLIES**
5.65 dBi	Roof	External: Side	**COMPLIES**
5.65 dBi	Trunk	External: Rear Side	**COMPLIES**
5.65 dBi	Trunk	External: Rear Corner	**COMPLIES**
5.65 dBi	Trunk	External: Centre rear	**COMPLIES**
2.15 dBi	Roof	Internal: Front Seat	**COMPLIES**
2.15 dBi	Roof	Internal: Back Seat	**COMPLIES**
2.15 dBi	Trunk	Internal: Front Seat	**COMPLIES**
2.15 dBi	Trunk	Internal: Back Seat	**COMPLIES**
5.65 dBi	Roof	Internal: Front Seat	**COMPLIES**
5.65 dBi	Roof	Internal: Back Seat	**COMPLIES**
5.65 dBi	Trunk	Internal: Front Seat	**COMPLIES**
5.65 dBi	Trunk	Internal: Back Seat	**COMPLIES**

806.0125 MHz:

Antenna Gain	Antenna Position	Measurement Position	Result
2.15 dBi	Roof	External: Side	**COMPLIES**
2.15 dBi	Trunk	External: Rear Side	**COMPLIES**
2.15 dBi	Trunk	External: Rear Corner	**COMPLIES**
2.15 dBi	Trunk	External: Centre rear	**COMPLIES**
5.65 dBi	Roof	External: Side	**COMPLIES**
5.65 dBi	Trunk	External: Rear Side	**COMPLIES**
5.65 dBi	Trunk	External: Rear Corner	**COMPLIES**
5.65 dBi	Trunk	External: Centre rear	**COMPLIES**
2.15 dBi	Roof	Internal: Front Seat	**COMPLIES**
2.15 dBi	Roof	Internal: Back Seat	**COMPLIES**
2.15 dBi	Trunk	Internal: Front Seat	**COMPLIES**
2.15 dBi	Trunk	Internal: Back Seat	**COMPLIES**
5.65 dBi	Roof	Internal: Front Seat	**COMPLIES**
5.65 dBi	Roof	Internal: Back Seat	**COMPLIES**
5.65 dBi	Trunk	Internal: Front Seat	**COMPLIES**
5.65 dBi	Trunk	Internal: Back Seat	**COMPLIES**

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 distance from the antenna: 90 cm

Limit:

Occupational/Controlled Exposure:

30 - 300 MHz: 1.0 mW/cm^2
300 – 1500 MHz f/300 mW/cm^2

for test frequency of 762.0125MHz = 2.54 mW/cm^2

for test frequency of 806.0125MHz = 2.69 mW/cm^2

General population/Uncontrolled Exposure:

30 - 300 MHz: 0.2 mW/cm^2
300 – 1500 MHz f/1500 mW/cm^2

for test frequency of 762.0125MHz = 0.508 mW/cm^2

for test frequency of 806.0125MHz = 0.537 mW/cm^2

Recommended Antennas:

Antenna Type: Monopole (λ/4 antenna)

Antenna Gain: 2.15 dBi

Antenna Type: Monopole (Collinear antenna)

Antenna Gain: 5.65 dBi

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

Test Results:

NAME OF TEST: TRANSMITTER OUTPUT POWER (CONDUCTED)

TEST CONDITIONS: Ambient Temperature 22 ^{o}C
Relative Humidity 35 %

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:	762.0125	MHz
Manufacturer's Rated Output Power	30	Watts
Supply Voltage, motor idling, transmitting.	13.21	Volts
Measured Output Power	29.2	Watts
Measurement Uncertainty (dB)	± 0.5	dB

Transmit Frequency:	806.0125	MHz
Manufacturer's Rated Output Power	35	Watts
Supply Voltage, motor idling, transmitting.	13.21	Volts
Measured Output Power	35.8	Watts
Measurement Uncertainty (dB)	± 0.5	dB

Maximum Transmit Power is set in the factory within a margin of +2 / -1 watt. This setting is not adjustable by the user. The MPE results are scaled to simulate results with a 50% duty cycle and transmit powers of 32 watts (762.0125 MHz) and 37 watts (806.0125 MHz) to allow for the factory power set margins.

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

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

Calculations of average power for 762.0125 MHz (sum of results/number of results):

External to vehicle:

Test Distance metres	λ/4 antenna				Collinear antenna			
Units	Power Density, mW/cm^2							
Probe Height metres	Position							
	A	B	C	D	A	B	C	D
0.2	0.001	0.008	0.008	0.021	0.005	0.030	0.014	0.012
0.4	0.001	0.014	0.011	0.030	0.015	0.071	0.037	0.010
0.6	0.003	0.018	0.025	0.037	0.029	0.064	0.066	0.118
0.8	0.012	0.039	0.030	0.092	0.049	0.146	0.181	0.273
1.0	0.016	0.132	0.048	0.337	0.056	0.254	0.259	0.468
1.2	0.023	0.181	0.096	0.545	0.173	0.056	0.064	0.110
1.4	0.075	0.228	0.098	0.430	0.162	0.090	0.079	0.406
1.6	0.153	0.200	0.070	0.200	0.094	0.220	0.156	0.349
1.8	0.164	0.145	0.058	0.044	0.043	0.176	0.107	0.052
2.0	0.125	0.052	0.056	0.026	0.203	0.089	0.050	0.016
Average	0.057	0.102	0.050	0.176	0.083	0.120	0.101	0.181

MPE Inside Vehicle:

Roof mounted Antenna		
Internal, Front Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.001	0.106
Upper torso	0.008	0.074
Lower torso	0.006	0.062
Average	0.005	0.081

Roof Mounted Antenna		
Internal, Back Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.010	0.005
Upper torso	0.021	0.052
Lower torso	0.003	0.025
Average	0.011	0.027

Trunk Mounted Antenna		
Internal, Front Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.055	0.015
Upper torso	0.071	0.030
Lower torso	0.036	0.016
Average	0.054	0.020

Trunk Mounted Antenna		
Internal, Back Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.100	0.112
Upper torso	0.063	0.077
Lower torso	0.037	0.247
Average	0.066	0.145

Calculations of average power for 806.0125 MHz (sum of results/number of results):

External to vehicle:

Test Distance metres	λ/4 antenna				Collinear antenna			
Units	Power Density, mW/cm^2							
Probe Height metres	Position							
	A	B	C	D	A	B	C	D
0.2	0.001	0.005	0.006	0.021	0.001	0.007	0.004	0.011
0.4	0.003	0.012	0.015	0.023	0.007	0.014	0.008	0.019
0.6	0.002	0.019	0.013	0.041	0.008	0.013	0.035	0.004
0.8	0.009	0.011	0.076	0.080	0.013	0.055	0.055	0.032
1.0	0.014	0.033	0.104	0.274	0.023	0.095	0.162	0.349
1.2	0.022	0.088	0.167	0.450	0.037	0.161	0.421	0.752
1.4	0.064	0.158	0.182	0.496	0.134	0.181	0.388	0.354
1.6	0.152	0.131	0.138	0.338	0.307	0.079	0.159	0.102
1.8	0.161	0.098	0.058	0.152	0.212	0.037	0.078	0.092
2.0	0.110	0.070	0.025	0.023	0.049	0.020	0.042	0.061
Average	0.054	0.063	0.078	0.190	0.079	0.066	0.135	0.178

MPE Inside Vehicle:

Roof mounted Antenna		
Internal, Front Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.008	0.010
Upper torso	0.003	0.005
Lower torso	0.003	0.006
Average	0.005	0.007

Roof Mounted Antenna		
Internal, Back Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.008	0.012
Upper torso	0.008	0.011
Lower torso	0.015	0.003
Average	0.010	0.009

Trunk Mounted Antenna		
Internal, Front Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.041	0.075
Upper torso	0.036	0.099
Lower torso	0.021	0.053
Average	0.033	0.076

Trunk Mounted Antenna		
Internal, Back Seat	λ/4 antenna	Collinear antenna
Units	Power Density, mW/cm^2	
Head	0.141	0.182
Upper torso	0.070	0.101
Lower torso	0.062	0.080
Average	0.091	0.121

Measurement Uncertainty:

Field Probe: ± 1 dB

Test Equipment Used:

Equipment	**Type**	**Model No**	**Serial Number**	**Tait ID**	**Calibration Due**
Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	1/11/2007
Isotropic Field Probe	Holaday HI-422	HI-422	95661	E3630	17/06/2008
Antenna Mast	Tait Electronics Ltd	-	-		-
Power Supply	Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	16/10/2007
RF Attenuator	Weinschel	Model 1	BL9950	E4080	28/11/2007

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 antenna mounted either centrally on the roof with a gain of 2.15dBi or 5.65 dBi, or centrally mounted on the trunk with a gain of 5.65dBi. 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.

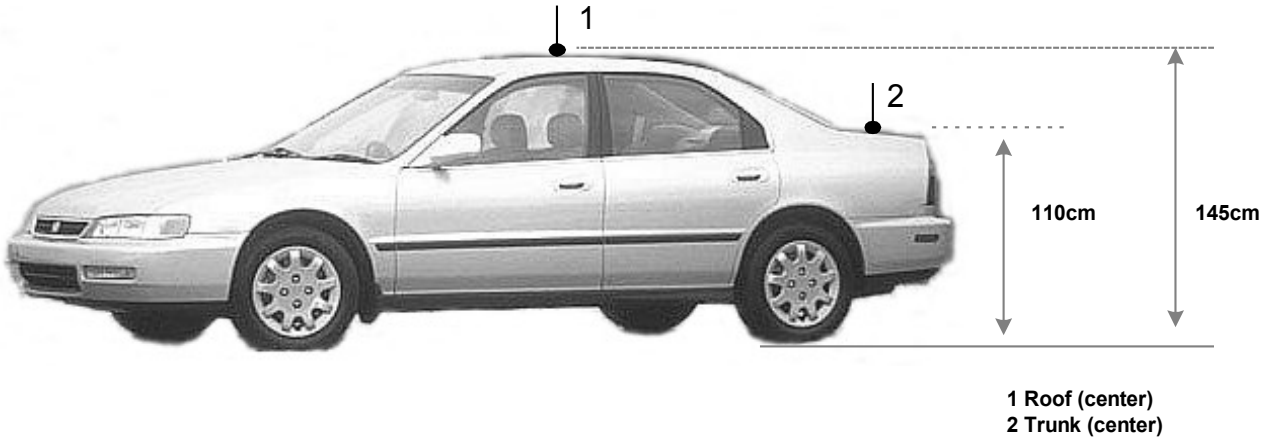
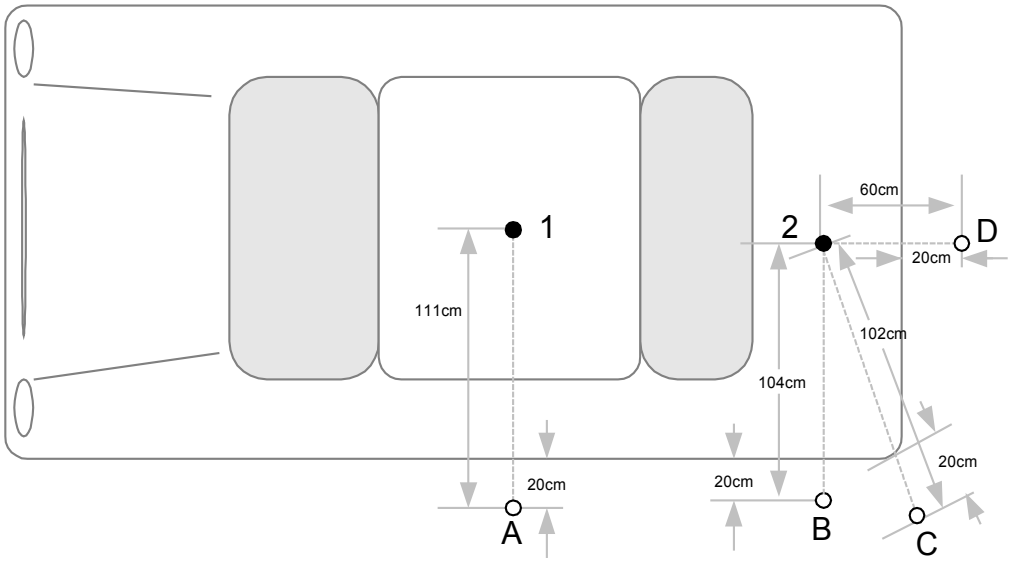
Please refer to the following website for more information on what RF energy is and how to control your exposure to assure compliance with established RF exposure limits.

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

END

Appendix A

'Antenna Location Drawing with Test Locations Identified'



External Test Positions ○