

REPORT NUMBER 2091MPE FCC ID: CASTMAH5D

**TELTEST Laboratories**

Tait Electronics Limited

PO Box 1645

558 Wairakei Road

Christchurch

New Zealand

Phone : (64) (3) 3583399

Fax: (64) (3) 3580432

---

TEST: FCC 47 CFR 1.1310 Maximum Permissible Exposure

**ENVIRONMENTAL ASSESSMENT**

On the TMAB24-H501 Mobile Transceiver S/N: 19019124

In accordance with

ANSI/IEEE Std C95.1, 1999

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

---

DATE: August 2004

PREPARED BY: Hamish Newton \_\_\_\_\_  
Test Technician

CHECKED & APPROVED BY: SA Crompton \_\_\_\_\_  
Laboratory Manager

---

This document must not be reproduced except in full, without the written permission of the Compliance Laboratory Manager.

## TABLE OF CONTENTS

	<b>Page</b>
<b>SUMMARY OF RESULTS .....</b>	<b>3</b>
<b>OPERATING CONDITIONS AND EXPOSURE CONDITIONS .....</b>	<b>4</b>
<b>LIMITS .....</b>	<b>4</b>
<b>RECOMMENDED ANTENNAS .....</b>	<b>4</b>
<b>MEASUREMENT GUIDANCE .....</b>	<b>4</b>
<b>TEST RESULTS, TRANSMITTER POWER.....</b>	<b>5</b>
<b>TEST RESULTS, MPE.....</b>	<b>6</b>
<b>TEST EQUIPMENT LIST .....</b>	<b>7</b>
<b>INFORMATION TO BE PLACED IN MANUAL.....</b>	<b>8</b>
<b>APPENDIX 1 TEST POSITIONS DIAGRAM.....</b>	<b>9</b>

## Summary of Results:

Antenna Gain	Antenna Position	Measurement Position	Result
2.15 dBi	Roof	External: Side	<b>COMPLIES</b>
5.65 dBi	Roof	External: Side	<b>COMPLIES</b>
5.65 dBi	Trunk	External: Rear Side	<b>COMPLIES</b>
5.65 dBi	Trunk	External: Rear Corner	<b>COMPLIES</b>
5.65 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>
5.65 dBi	Roof	Internal: Front Seat	<b>COMPLIES</b>
5.65 dBi	Roof	Internal: Back Seat	<b>COMPLIES</b>
5.65 dBi	Trunk	Internal: Front Seat	<b>COMPLIES</b>
5.65 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 distance from the antenna: 90 cm

Limit:

### **Occupational/Controlled Exposure:**

30 - 300 MHz: 1.0 mW/cm<sup>2</sup>  
300 – 1500 MHz f/300

for test frequency of 463.725MHz = 1.55 mW/cm<sup>2</sup>

### **General population/Uncontrolled Exposure:**

30 - 300 MHz: 0.2 mW/cm<sup>2</sup>  
300 – 1500 MHz f/1500

for test frequency of 463.725MHz = 0.31 mW/cm<sup>2</sup>

Recommended Antennas:

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

Antenna Gain: 2.15 dBi

Antenna Type: Monopole (Collinear antenna) Antenex AB4503C

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 °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:	463.725	MHz
Manufacturer's Rated Output Power	40	Watts
Supply Voltage, motor idling, transmitting.	13.64	Volts
Measured Output Power	41.86	Watts
Measurement Uncertainty (dB)	± 0.5	dB

Maximum Transmit Power is set in the factory to 41.6 watts +2 / -1 watt. This setting is not adjustable by the user. The MPE results are scaled to simulate results from a 43.6 watt carrier with a 50% duty cycle.

---

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	Collinear antenna							
Units	Power Density, mW/cm <sup>2</sup>								
Probe Height metres	Position								
	A	A	B	C	D				
0.2	0.005	0.002	0.012	0.007	0.003				
0.4	0.004	0.003	0.007	0.008	0.004				
0.6	0.012	0.003	0.016	0.025	0.009				
0.8	0.023	0.006	0.035	0.037	0.023				
1.0	0.023	0.011	0.090	0.081	0.072				
1.2	0.047	0.020	0.209	0.162	0.256				
1.4	0.081	0.052	0.231	0.148	0.265				
1.6	0.142	0.129	0.144	0.077	0.142				
1.8	0.168	0.180	0.046	0.015	0.060				
2.0	0.144	0.122	0.010	0.006	0.108				
Average	0.065	0.053	0.080	0.057	0.094				

**MPE Inside Vehicle:**

Roof mounted Antenna		
Internal, Front Seat	$\lambda/4$ antenna	Collinear antenna
Units		Power Density, mW/cm <sup>2</sup>
Head	0.015	0.011
Upper torso	0.021	0.013
Lower torso	0.028	0.018
Average	0.021	0.014

Roof Mounted Antenna		
Internal, Back Seat	$\lambda/4$ antenna	Collinear antenna
Units		Power Density, mW/cm <sup>2</sup>
Head	0.049	0.027
Upper torso	0.155	0.064
Lower torso	0.106	0.046
Average	0.103	0.046

Trunk Mounted Antenna		
Internal, Front Seat	Collinear antenna	
Units		Power Density, mW/cm <sup>2</sup>
Head		0.084
Upper torso		0.127
Lower torso		0.080
Average		0.097

Trunk Mounted Antenna		
Internal, Back Seat	Collinear antenna	
Units		Power Density, mW/cm <sup>2</sup>
Head		0.287
Upper torso		0.186
Lower torso		0.170
Average		0.214

**Measurement Uncertainty:**

Field Probe:  $\pm 1$  dB

**Test Equipment Used:**

Equipment	Type	Serial Number	Calibration date	Calibration Due
RF Power Sensor	HP11722A	2320A00688	2003-10-15	2004-10-15
Modulation Analyser	HP8901B (OPT 002)	3704A05837	2003-10-15	2004-10-15
Isotropic Field Probe	Holiday HI-422	95661	2002-05-28	2005-05-28
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 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.

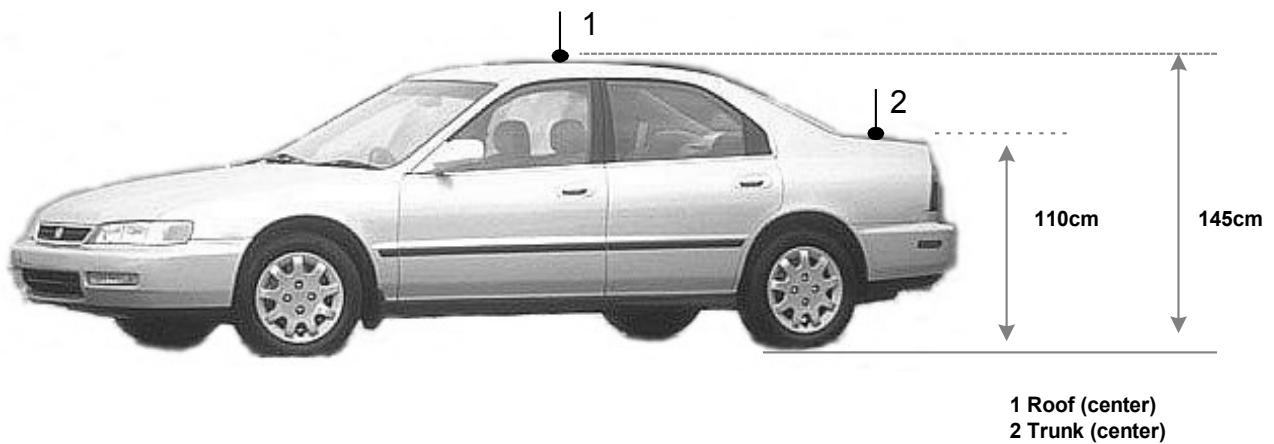
Please refer to the following website for more information on what RF energy is and how to control your exposure to assure compliance with established RF exposure limits.

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

END

## Appendix A

'Antenna Location Drawing with Test Locations Identified'



External Test Positions ○

