

REPORT NUMBER 2007MPE      FCC ID: CASTMAB1C

## 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

## Mobile Transceiver Type TMAB1C

( TMAB22-B100 S/N: 19006577)

In accordance with

ANSI/IEEE Std C95.1, 1999

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

DATE: May 2004

PREPARED BY: H. Newton

## Test Technician

CHECKED & APPROVED BY: SA Crompton

Laboratory Manager

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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 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 mW/cm<sup>2</sup>

### General population/Uncontrolled Exposure:

30 - 300 MHz: 0.2 mW/cm<sup>2</sup>  
300 – 1500 MHz: F/1500 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 modelling) 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 labelling 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 22.5 °C  
Relative Humidity 51 %

SPECIFICATION: FCC 47 CFR 2.1046

GUIDE: TIA/EIA-603 2.2.1

### MEASUREMENT PROCEDURE:

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

### MEASUREMENT RESULTS:

|                                             |        |       |
|---------------------------------------------|--------|-------|
| Transmit Frequency:                         | 157.65 | MHz   |
| Manufacturer's Rated Output Power           | 25     | Watts |
| Supply Voltage, motor idling, transmitting. | 13.8   | Volts |
| Measured Output Power                       | 28.0   | 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 cm's 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 cm's from the body, on a line intersecting the roof antenna position.

**Trunk mounted antenna:**

2. Position B: 90 degrees to side of car, 20 cm's from the body, on a line intersecting the trunk antenna position.
3. Position C: Rear of car, 20 cm's 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 cm's from the bumper, on a line intersecting the trunk antenna position.

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

External to vehicle:

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                  | 0.005                             | 0.029 | 0.027 | 0.063 | 0.004                | 0.010 | 0.009 | 0.025 |
| 0.4                  | 0.010                             | 0.062 | 0.053 | 0.324 | 0.004                | 0.016 | 0.014 | 0.132 |
| 0.6                  | 0.009                             | 0.099 | 0.081 | 0.057 | 0.002                | 0.020 | 0.018 | 0.030 |
| 0.8                  | 0.023                             | 0.139 | 0.108 | 0.039 | 0.002                | 0.015 | 0.014 | 0.025 |
| 1.0                  | 0.042                             | 0.163 | 0.150 | 0.167 | 0.015                | 0.009 | 0.013 | 0.077 |
| 1.2                  | 0.072                             | 0.178 | 0.156 | 0.223 | 0.017                | 0.010 | 0.017 | 0.151 |
| 1.4                  | 0.097                             | 0.157 | 0.144 | 0.214 | 0.034                | 0.023 | 0.035 | 0.245 |
| 1.6                  | 0.109                             | 0.125 | 0.114 | 0.156 | 0.044                | 0.045 | 0.058 | 0.279 |
| 1.8                  | 0.097                             | 0.091 | 0.092 | 0.088 | 0.062                | 0.068 | 0.077 | 0.216 |
| 2.0                  | 0.078                             | 0.064 | 0.062 | 0.054 | 0.078                | 0.078 | 0.090 | 0.181 |
| Average              | 0.054                             | 0.110 | 0.099 | 0.138 | 0.026                | 0.029 | 0.034 | 0.136 |

## 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                 | 0.033                             | 0.012                |
| Upper torso          | 0.067                             | 0.021                |
| Lower torso          | 0.104                             | 0.024                |
| Average              | 0.068                             | 0.019                |

| Roof Mounted Antenna |                                   |                      |
|----------------------|-----------------------------------|----------------------|
| Internal, Back Seat  | $\lambda/4$ antenna               | $5\lambda/8$ antenna |
| Units                | Power Density, mW/cm <sup>2</sup> |                      |
| Head                 | 0.171                             | 0.042                |
| Upper torso          | 0.047                             | 0.015                |
| Lower torso          | 0.039                             | 0.013                |
| Average              | 0.086                             | 0.023                |

| Trunk Mounted Antenna |                                   |                      |
|-----------------------|-----------------------------------|----------------------|
| Internal, Front Seat  | $\lambda/4$ antenna               | $5\lambda/8$ antenna |
| Units                 | Power Density, mW/cm <sup>2</sup> |                      |
| Head                  | 0.177                             | 0.013                |
| Upper torso           | 0.049                             | 0.005                |
| Lower torso           | 0.059                             | 0.005                |
| Average               | 0.095                             | 0.008                |

| Trunk Mounted Antenna |                                   |                      |
|-----------------------|-----------------------------------|----------------------|
| Internal, Back Seat   | $\lambda/4$ antenna               | $5\lambda/8$ antenna |
| Units                 | Power Density, mW/cm <sup>2</sup> |                      |
| Head                  | 0.276                             | 0.041                |
| Upper torso           | 0.146                             | 0.014                |
| Lower torso           | 0.073                             | 0.006                |
| Average               | 0.165                             | 0.020                |

**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 | Holaday 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 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 authorised 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 O

