SUPPLEMENTARY REPORT NUMBER 1985MPE FCC ID: CASTMAD1A

TEST: FCC 47 CFR 1.1310 Maximum Permissible Exposure

ENVIRONMENTAL ASSESSMENT

On the TMAB12-D100 Mobile Transceiver S/N: 19005533

In accordance with

ANSI/IEEE Std C95.1, 1999
OET Bulletin 65 97-01

DATE: February 2004

PREPARED BY: M. Ludwig _____
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REPORT ON :

Type Approval Testing of the TMAB12-D100 (Serial No 19005533)
in accordance with:

ANSI/IEEE Std C95.1, 1999
OET Bulletin 65 97-01

Report No 1985MPE

FCC ID: CASTMAD1A

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S. A. Crompton

Compliance Laboratory Manager

Date :

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Copy No:

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Operating and Exposure conditions:

Operating Conditions: Mobile transmitter using vehicle mounted antennas only

Exposure conditions: Occupational/Controlled Exposure.

Minimum Safe Distance calculations:

$R = (P G / 4 \pi S)^{1/2}$

Where S = power density in mW per cm^2
P = net power input to the antenna in mW
R = distance from the antenna in cm
G = linear gain of antenna relative to an isotropic radiator

Antenna Type: Monopole (λ/4 whip)

Antenna Gain: 2.15 dBi

Transmitter Power: 28.4 Watts

Limit: 30 - 300 MHz: 1.0 mW/cm^2

Power gain product: 28400 x 1.64 = 46576 mW

Minimum safe distance: $(46576 / 4\pi \times 1.0)^{1/2}$ = 61 cm

Antenna Type: Monopole (5λ/8 whip)

Antenna Gain: 5.15 dBi

Transmitter Power: 28.4 Watts

Limit: 30 - 300 MHz: 1.0 mW/cm^2

Power gain product: 28400 x 3.27 = 92868 mW

Minimum safe distance: $(92868 / 4\pi \times 1.0)^{1/2}$ = 86 cm

Test Results:

NAME OF TEST: TRANSMITTER OUTPUT POWER (CONDUCTED)

TEST CONDITIONS:

Ambient Temperature	23°C
Relative Humidity	49 %
Standard Voltage	13.8V DC

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:

Frequency: 219.1 MHz	Manufacturer's Rated Output Power: 25 W nominal
POWER (W)	28.4
Measurement Uncertainty (dB)	+0.63, -0.68

NAME OF TEST: ENVIRONMENTAL ASSESSMENT

TEST CONDITIONS:

Ambient Temperature	23°C
Relative Humidity	49%
Standard Voltage	13.8V DC

SPECIFICATION: FCC 47 CFR 1.1310

GUIDE: ANSI/IEEE Std C95.1, 1999, OET Bulletin 65 97-01

Test Method:
The antenna is mounted on a metallic ground-plane which is placed on a non metallic turntable 1.35 m high and clear of nearby objects. Peak power density readings are taken at 0.2m vertical increments using a calibrated isotropic probe at the calculated safe distance from the antenna. The measurement equipment is operated remotely using fibre optics to reduce field perturbations.

Test Distance metres	0.61 m (distance for λ/4 whip)	0.86 m (distance for 5λ/8 whip)
	Power Density, mW/cm^2	Power Density, mW/cm^2
Probe Height metres	Result for 28.4W TX power.	Result for 28.4W TX power.
0.2	0.053	0.006
0.4	0.037	0.020
0.6	0.090	0.046
0.8	0.292	0.074
1.0	0.463	0.109
1.2	0.605	0.132
1.4	0.756	0.205
1.6	0.774	0.297
1.8	0.553	0.359
2.0	0.326	0.465

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

Test Distance, m	0.61 m (distance for λ/4 whip)	0.86 m (distance for 5λ/8 whip)
Body part	Average Power Density, mW/cm^2	Average Power Density, mW/cm^2
Whole Body Probe Height 0.2 to 2.0m	0.197	0.086
Upper Body Probe Height 1.0 to 2.0m	0.248	0.112
Lower Body Probe Height 0.2 to 0.8m	0.059	0.018

Limit, Occupational/Controlled Exposure:

30 - 300 MHz: 1.0 mW/cm^2

Test Equipment Used:

Power Head:	HP11722A	s/n 2320A00688
Modulation An.:	HP8901B (OPT 002)	s/n 3704A05837
Isotropic Probe	Holaday HI-422	s/n 95661
Antenna Mast	Tait	
Turntable	Tait	

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

TELTEST LABORATORIES Test Equipment List						
To facilitate inclusion on each page, the test equipment used is numbered and listed against the related test in the report.						
No	**Equipment Type**	**Manufacturer**	**Model Number**	**Serial No**	**Tait ID**	**Cal Due (yr-mth- day)**
1	Signal Generator	Hewlett Packard	HP8642B (Opt 001)	2512A00176	E3064	2005-02-18
2	Signal Generator	Hewlett Packard	HP8648A	3430U00344	E3579	2004-10-15
3	Signal Generator	Agilent	E4422B	GB40050320	E3788	2004-10-22
4	Signal Generator	Hewlett Packard	HP8648C	3443U00543	E3558	2005-09-11
5	Signal Generator	Rohde & Schwarz	SMY01 1062.5502.11	841736/019	E3553	2004-10-29
10						
11	Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	2441A00393	E3073	2004-08-05
12	Modulation Analyser	Rohde & Schwarz	FMA0852.8500.52	842541/001	E3554	2004-07-18
13	Audio Analyser	Hewlett Packard	HP8903A	2308A02597	E3074	2004-10-15
14	Power Head	Hewlett Packard	HP11722A	2320A00688	E3307	2004-10-15
15						
16						
20	Power Supply	Hewlett Packard	HP6032A	2441A-0041Z	E3075	2004-10-15
21	Power Supply	Rohde & Schwarz	NGS M32/10 192.0810.31	Fnr 434	E3556	2005-06-14
22	Oscilloscope	Tektronics	TDS340	B013611	E3585	2004-11-25
23						
24						
24						
25	Whirling Hygrometer	Casella	3156/82	TA004	TA004	2010-03-16
30	Directional Coupler	Hewlett Packard	HP778D-012	1144 07392	E3292	2004-08-11
31						
32	4 Port Combiner	Rohde & Schwarz	DVU4, 3W 201.4018. 03	300.971/28	E3572	2004-08-28
33	3 Port Combiner	Weinschel	1506A, 1W	LD858	E3672	2004-08-28
34						
35						
36						
37						
38						
40	Reference Dipoles	Emco	3121C DB1	9510-1164	E3559	2006-10-17
41						
42	Reference Horn Antenna	Emco	DRG3115	9512-4638	E3560	2006-09-27
43	Horn Antenna	Emco	DRG3115	2084	E3076	2006-09-27
44						
45						
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54						
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60	RF Attenuator 250W	Weinschel	45-30-34	JW663	E3386	2004-07-09
61	RF Attenuator 150W	Weinschel	40-20-33	CJ404	E3387	2004-08-11
62	RF Attenuator 150W	Weinschel	57-10-34	LB590	E3674	2004-07-09
63	RF Attenuator 150W	Weinschel	40-06-34	KV457	E3561	2004-08-11
64	RF Attenuator 50W	Weinschel	24-10-34	AZ0401	E3388	2004-08-11
65	RF Attenuator 50W	Weinschel	24-20-44	AW1266	E3562	2004-05-26
66	RF Attenuator 25W	Weinschel	33-20-33	BD5871	E3673	2004-07-09
67	RF Attenuator 150W Treva	Weinschel	40-20-33	CJ405	E3733	2004-05-29
70	RF Load 150W	Bird	8166	524	E3625	2004-10-30
71	RF Load 50W	Weinschel	F1426	BF0487	E3675	2004-08-11
72	RF Load 50W	Weinschel	F1426	AE2490	E3624	2004-07-09

73						
74	RF Termination 2W	MCL	NTRM-50	951215	E3574	2004-06-01
75	RF Termination 2W	MCL	NTRM-50	954214	E3575	2004-06-02
76	RF Termination 2W	MCL	NTRM-50	954214	E3576	2004-06-03
80	20m Coax Cable	Intelcom	RG214/U-50(Ext Cal)	CBL03	E3659	2004-09-08
81	2m Coax Cable	Intelcom	RG213/U-50 (Ext Cal)	CBL02	E3658	2004-08-11
82	3m Coax Cable BLUE)	Suhner	Sucoflex 104A	25033/4A	E3694	2004-08-11
83	1m Coax Cable (BLUE)	Suhner	Sucoflex 104A	25006/4A	E3693	2004-08-11
84	1m Coax Cable (BLUE)	Suhner	Sucoflex 104A	25005/4A	E3692	2004-07-09
85	1m Coax Cable (BLUE)	Suhner	Sucoflex 104A	25004/4A	E3691	2004-07-09
86	1m Coax Cable (BLUE)	Suhner	Sucoflex 104A	25003/4A	E3690	2004-08-11
87	Audio Analyser	Hewlett Packard	HP8903B	2818A04275	E3710	2004-11-25
88	Spectrum Analyser	Hewlett Packard	HP8562E	3821A00779	E3715	2005-01-06
89	Field Strength Meter	Holaday	HI-422	95661	E3630	2005-05-28
90	Power Supply	Hewlett Packard	HP6012B	2524A00616	E3712	2004-05-16
91	20m Coax Cable		RG214/U-50 (Ext Cal)	CBL01	E3404	2004-09-08
92						
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96						
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99						
100	Oscilloscope	Tektronics	TDS380	B017095	E3782	2004-10-16
101						
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110						
111	Modulation Analyser	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	2004-10-15
112	Signal Generator	Agilent	E4433B	US384440446	E4147	2005-05-30
113						
114	Signal Generator	Rohde & Schwarz	SML03 1090.3000.13	100597	E4050	2004-11-28
115						
116	Power Head	Hewlett Packard	HP11722A	2716A02037	1575	2004-08-08
117						
118						
119	RF Attenuator 150W Treva	Weinschel	40-20-23	MF817	E4082	2004-07-09
120						
121						
122						
123	Spectrum Analyser	Agilent	E4445A	MY42510072	E4139	2004-03-28
124						
125						
126						
127	RF Attenuator	Minicircuits	BW-N10W5	1		2004-08-28
128	RF Attenuator	Minicircuits	BW-N10W5	2		2004-08-28
129						
130						
131						