TB7100 base station

Specifications Manual

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Contents

Preface **5**
Scope of Manual 5
Associated Documentation 5
Publication Record 5

1 System Specifications **7**
1.1 General 9
Power Supply 9
AC Power Consumption 9
DC Power Consumption (at 13.8 VDC) 9
Power Consumption Band A4, 25 W 10
Power Consumption Band B1, 25 W 10
Power Consumption Band B1, 50 W 10
Power Consumption Band C0, 25 W 10
Power Consumption Band D1, 25 W 11
Power Consumption Band G2, 40 W 11
Power Consumption Band H5, 25 W 11
Power Consumption Band H5, 40 W 11
Power Consumption Band H6, 25 W 12
Power Consumption Band H7, 40 W 12
Transmitting into 5:1 VSWR 12
Channel Data 13
Environmental 13
Physical 14
Isolation 14
1.2 Compliance 15
RF Compliance 15
EMC Compliance 15
Environmental Compliance 15
Safety Compliance 15
1.3 System Interface 16
General 16

2 Receiver Specifications **19**
Receiver RF Section 21
Receiver Audio Section - Gating Operation 23
Receiver Audio Section - General 24
Receiver Audio Section - CTCSS 25

3 Transmitter Specifications **27**
Transmitter RF Section 29
Transmitter Audio Section - Modulation Characteristics 32
Transmitter Audio Section - CTCSS 33

Preface

Scope of Manual

Welcome to the TB7100 Specifications Manual. This manual provides general, performance and physical specifications for the TB7100 base station.

Associated Documentation

The following associated documentation is available for this product:

- MBB-00001-**xx** TB7100 Installation and Operation Manual
- MBB-00003-**xx** TB7100 Installation Guide
- MBB-00005-**xx** TB7100 Service Manual

The characters **xx** represent the issue number of the documentation.

All available documentation is provided on the CD (406-00047-**xx**) supplied with the base station. Updates may also be published on the Tait support website.

Technical notes are published from time to time to describe applications for Tait products, to provide technical details not included in manuals, and to offer solutions for any problems that arise.

Publication Record

Issue	Publication Date	Description
1	May 2005	First Release
2	December 2005	Internal AC power supply, A4 and D1 bands added.
3	March 2006	General updates, and G2 band added.
4	August 2006	General updates, and C0 band added.

1 System Specifications

This section provides specifications pertaining to the TB7100 base station. You will find the specifications for receiver and transmitter modules in separate chapters in this manual.

Important The software release notes list known issues or limitations of the base station that may vary from the specifications published in this document. Please refer to the current software release notes for any variations to the specifications in this document.

The performance figures given in these specifications are applicable to the TB7100 base station. These performance figures are minimum figures, unless otherwise indicated (typical), for equipment operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltage (12VDC).

Where applicable, the test methods used to obtain these figures are those described in the ANSI/TIA-603-B-2002 and ETSI-EN specifications. This equipment is compatible with F3E and G3E emissions. You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait Electronics Limited.

Identifying the TB7100 Base Station

You can identify the model and hardware configuration of a base station by referring to the product code printed on labels on the rear of the tray. The meaning of each character in the product code is explained in the table below.

Note This explanation of the TB7100 base station product codes is not intended to suggest that any combination of features is necessarily available in any one TB7100 base station. Consult your nearest Tait Dealer or Customer Service Organisation for more information regarding the availability of specific models and options.

Product Code	Description
TBB**xx**xx-xxx	Receive frequency band: A4 = 66 to 88MHz B1 = 136 to 174MHz C0 = 174 to 225MHz D1 = 216 to 266MHz G2 = 350 to 400MHz H5 = 400 to 470MHz H6 = 450 to 530MHz H7 = 450 to 520MHz
TBBxx**xx**-xxx	Transmit frequency band: A4 = 66 to 88MHz B1 = 136 to 174MHz C0 = 174 to 225MHz D1 = 216 to 266MHz G2 = 350 to 400MHz H5 = 400 to 470MHz H6 = 450 to 530MHz H7 = 450 to 520MHz
TBBxxxx-**x**xx	Other compliance attributes: A = 25W, level-1 digital architecture B = 35W to 50W, level-1 digital architecture C = 25W, level-2 digital architecture D = 35W to 50W, level-2 digital architecture E = 25W, level-3 digital architecture F = 35W to 50W, level-3 digital architecture
TBBxxxx-x**x**x	Power options: 0 = DC only 1 = AC 115V (preset at factory) 2 = AC 230V (preset at factory)
TBBxxxx-xx**x**	AC power cable: 1 = Australia/New Zealand 2 = United Kingdom 3 = Europe 4 = USA

1.1 General

Power Supply

Supply Voltage

AC Operating Voltage	195VAC to 264VAC or 99VAC to 135VAC via voltage selector switch
DC Operating Voltage	10.5VDC to 16VDC
Standard Test Voltage	12VDC
Polarity	negative earth only
Fuse	20A blade fuse

AC Power Consumption

System Condition	115V AC		230V AC	
	Power (W)	Power (VA)	Power (W)	Power (VA)
Transmit 50W VHF	210	270	210	280
Transmit 40W UHF	180	230	180	240
Transmit 25W	145	190	145	200
Receive only with 2W into speaker	25	40	25	65
Receive with no RF signal	15	25	15	50

DC Power Consumption (at 13.8VDC)

System Condition	25W		40W		50W	
	Current (A)	Power (W)	Current (A)	Power (W)	Current (A)	Power (W)
Transmitting into VSWR = 5:1	8.1	112	10.9	150	12.4	171
Receive only with 2W into speaker	0.54	7.45	0.54	7.45	0.54	7.45
Receive RF signal with no audio	0.38	5.24	0.38	5.24	0.38	5.24
Receive with no RF signal	0.28	3.86	0.28	3.86	0.28	3.86
Receive with no RF signal, economy mode, 800 ms cycling	0.14	1.93	0.14	1.93	0.14	1.93

Power Consumption Band A4, 25W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	Power (W)
26	4.8	67
12	3.0	42
5	2.2	31
1	1.3	18

Power Consumption Band B1, 25W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	Power (W)
26	5.7	79
12	3.9	54
5	2.8	39
1	1.7	23

Power Consumption Band B1, 50W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	DC Power (W)
52	9.9	137
26	6.8	94
15	5.4	75
10	4.6	63

Power Consumption Band C0, 25W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	DC Power (W)
26	5.0	69
12	3.5	48
5	2.5	34
1	1.4	19

Power Consumption Band D1, 25W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	Power (W)
26	4.6	64
12	3.1	43
5	2.2	31
1	1.3	18

Power Consumption Band G2, 40W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	Power (W)
42	8.6	119
21	6.1	84
15	5.5	76
10	4.4	61

Power Consumption Band H5, 25W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	DC Power (W)
26	6.3	87
12	4.3	59
5	3.1	43
1	1.9	26

Power Consumption Band H5, 40W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	DC Power (W)
42	8.2	113
21	5.6	77
15	4.9	68
10	4.1	57

Power Consumption Band H6, 25W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	DC Power (W)
26	6.5	90
12	4.4	61
5	3.1	43
1	1.9	26

Power Consumption Band H7, 40 W

(transmitting into 50Ω load)

RF Power Setting (W)	Current (A)	DC Power (W)
42	8.2	113
21	5.6	77
15	4.9	68
10	4.1	57

Transmitting into 5:1 VSWR

(worst case phase and frequency)

Power Option	Current (A)	DC Power (W)
25W	8.1	112
40W	10.9	150
50W	12.4	171

Channel Data

System Types	talk through repeater line-controlled base data repeater
Frequency Range	
25W	A4: 66MHz to 88MHz (VHF)
25W or 50W	B1: 136MHz to 174MHz (VHF)
25W	C0: 174MHz to 225MHz (VHF)
25W	D1: 216MHz to 266MHz (VHF)
40W	G2: 350MHz to 400MHz (UHF)
25W or 40W	H5: 400MHz to 470MHz (UHF)
25W	H6: 450MHz to 530MHz (UHF)
40W	H7: 450MHz to 520MHz (UHF)
Number of Channels	100
Channel Spacing	
Narrow Bandwidth	12.5kHz
Mid Bandwidth	20kHz
Wide Bandwidth	25kHz
Frequency Increment	6.25kHz 5.00kHz
Frequency Stability	±1.5ppm

Environmental

Operating Temperature Range	
25W base station	–30°C to +60°C (–22°F to +140°F) ambient temperature*
50W base station	–30°C to +50°C (–22°F to +122°F) ambient temperature*
	*ambient temperature is defined as the temperature of the air at the intake to the cooling fan
Cooling	forced air over heatsink via fans mounted in tray
Fan Temperature Threshold Range*	+40°C to +80°C
*Internally adjusted via potentiometer	

Physical

Dimensions	
Height	43.5mm (1U)
Width	436mm (482.6mm with 19" rack mounting bracket)
Depth	400mm (excluding connectors)
Weight*	
25W and 50W Base Station*	6kg (13.23lb.)
With Duplexer Fitted**	7kg (15.43lb.)
With AC Supply***	7kg (15.43lb.)
Finish	powder-coated in black texture (to Tait specification A4M4029)
MTBF	≥50,000 hours (estimated)
Connectors	
RF Input	N-type female (removed if duplexer fitted)
RF Output	N-type female
13.8VDC Input	2-way, 25A terminal block
System Interface	25-pin D-range
Serial Interface	9-pin D-range
Microphone/ Programming	8-way RJ45
AC Mains Input	IEC connector
Display	2-digit 7-segment LCD

*No duplexer or AC supply
**No AC supply
*** No duplexer

Isolation

Coaxial Changeover Relay Isolation	when the base station is used in simplex mode using a single antenna with a coaxial changeover relay, the isolation of this relay must be ≥ 40dB

1.2 Compliance

RF Compliance	Specification
Europe	EN 300 086-2
Europe	EN 300 113-2
Australia and New Zealand	AS4295
FCC USA	CFR 47 Part:15, 22 and 90
Industry Canada	RSS-119
Hong Kong	HKTA 1002
Hong Kong	HKTA 1004
Singapore	IDA TS101
Singapore	IDA TS107

EMC Compliance	Specification
Emissions	EN 301 489
FCC USA	CFR 47 Part:15

Environmental Compliance	Specification
Humidity	IEC60068-2-30 (Damp Heat)
Vibration	MIL-Std-810F 514.5
Shock	MIL-Std-810F 516.5

Safety Compliance	Specification
Safety	BS EN 60950-1 ANSI/UL Std. 60950 CAN/CSA-C22.2 No. 60950-00 AS/NZS 60950 and ACATS001

1.3 System Interface

General

RSSI Output

Output Impedance	1kΩ
Output Level Range	offset 600mV, then 25mV/dB from –120dBm to –50dBm
Accuracy	±300mV
Response Time	≤10ms
RF Input Range	–115dBm to –50dBm

Rx Gate Output

Low Voltage Level	<0.4V
High Voltage Level	<30V
Low Level Sink Current	<250mA
High Level Leakage Current	<100µA
Activated:	
Open collector, active low Sink up to 250mA	valid carrier received via RF input
Deactivated:	
Floating	no carrier received via RF input
Protection	33V zener to ground

Tx Key Input

Low Input Voltage	≤2V (TXKEY = activated)
High Input Voltage	≥5V (TXKEY = de-activated)
Input Hysteresis	≅3V
Input Resistance	≥10kΩ
Maximum External Pull-up Voltage	≤20V
Internal Pull-up Voltage	9V (via 10kΩ)

Tx Relay Output

Typical On Voltage	< 0.4V
Maximum On Input Current	≥ 250mA
Maximum Off Voltage	< 30V

System Relay output

Internal Bias	none
Drive	open collector active low Z
Peak load current	Sink up to 250mA
Resistance	35Ω max
Protection	33V zener to ground

Digital Output

High	≥3.1V (no load)
Low	<0.6V (10mA sink)
Internal Bias	pull up to 3.3V via 33kΩ
Protection	RC, diode clamps to 3.3V and ground

Digital Input

High Threshold	≥2.0V (deactivated)
Low Threshold	≤0.8V (activated)
Internal Bias	pull up to 3.3V via 33kΩ
Low-level Output Current	<100 mA
Protection	RC, diode clamps to 3.3V and ground

General (Continued)

Opto-coupler Input	
Control Current	>±9mA to 11.8mA
Control Voltage	>±10V
Control Voltage*	<±60V
*with active current regulator	
Opto-coupler Output	
Peak Voltage	±100V
Resistance (On)	35Ω
Peak Load Current	±120mA
Line Output - Balanced	
Output Level Range	–20dBm to +3dBm
Output Impedance	600Ω
Maximum Output Level	+8dBm at 100% system deviation, output level distortion ≥5%
Return Loss ≥20dB	
Distortion*	
De-emphasised	≤ 2%
Flat	≤ 4% (NB)
*at –70dBm signal level	≤ 2% (WB)
Adjustable via rear panel potentiometer for 60% system deviation	
Line Output - Unbalanced	
Output Impedance	220Ω
Output Level Range	220mV peak to peak to 3V peak to peak DC blocked into 10kΩ
Adjustable via rear panel potentiometer for 60% system deviation	
Line Input - Balanced	transformer isolated
Input Level Range*	–20dBm to +6dBm (path, Tap R4) –16dBm to –4dBm (path, AUX MIC, used for trunking) 600Ω balanced
Impedance	≥20dB
Return Loss	
*60% modulation at 1kHz	
Adjustable via rear panel potentiometer for 60% system deviation	
Line Input - Unbalanced	
Input Level Range	220mV peak to peak to 3V peak to peak DC blocked
Impedance	>10kΩ
*60% modulation at 1kHz	
Adjustable via rear panel potentiometer for 60% system deviation	

2 Receiver Specifications

This section provides specifications pertaining to the receiver module.

Important The software release notes list known issues or limitations of the base station that may vary from the specifications published in this document. Please refer to the current software release notes for any variations to the specifications in this document.

The performance figures given in these specifications are applicable only to the receiver module operating as an integral part of a TB7100 base station. These performance figures are minimum figures, unless otherwise indicated (e.g. "typical"), for equipment operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltage (12VDC).

Where applicable, the test methods used to obtain these figures are those described in the ANSI/TIA-603-B-2002 and ETSI-EN specifications. This equipment is compatible with F3E and G3E emissions. You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait Electronics Limited.

Bandwidth

The terms "narrow bandwidth", "mid bandwidth" and "wide bandwidth" used in this chapter are defined in the following table.

	Channel Spacing	Modulation 100% Deviation	Receiver IF Bandwidth
Narrow Bandwidth (NB)	12.5kHz	± 2.5kHz	7.5kHz
Mid Bandwidth (MB)	20kHz	± 4kHz	12kHz
Wide Bandwidth (WB)	25kHz	± 5.0kHz	15.0kHz

Sensitivity and distortion figures are stated for standard operating conditions which includes audio de-emphasis. Note that the sensitivity, distortion and signal-to-noise figures will be degraded when flat audio is selected.

Identifying the Receiver Module

You can identify the model and hardware configuration of a receiver module by referring to the product code printed on a label on the top of the module. The meaning of each character in the product code is explained in the table below.

Note This explanation of receiver product codes is not intended to suggest that any combination of features is necessarily available in any one Receiver. Consult your nearest Tait Dealer or Customer Service Organisation for more information regarding the availability of specific models and options.

Product Code	Description
XMAD**a**b-cdee	**a** denotes digital architecture 1 = EP1C6/5402 2 = EP1C12/5409 3 = EP1C12/5509
XMADa**b**-cdee	**b** denotes power 2 = 25W 3 = 25W trigger-based 4 = 40W/50W 5 = 40W/50W trigger-based
XMADab-**cd**ee	**cd** denotes frequency band A4 = 66MHz to 88MHz B1 = 136MHz to 174MHz C0 = 174MHz to 225MHz D1 = 216MHz to 266MHz G2 = 350MHz to 400MHz H5 = 400MHz to 470MHz H6 = 450MHz to 530MHz H7 = 450MHz to 520MHz
XMADab-cd**ee**	**ee** denotes radio options 02 = transmitter 03 = receiver

Receiver RF Section

Frequency Bands	
A4 Band	66MHz to 88MHz
B1 Band	136MHz to 174MHz
C0 Band	174MHz to 225MHz
D1 Band	216MHz to 266MHz
G2 Band	350MHz to 400MHz
H5 Band	400MHz to 470MHz
H6 Band	450MHz to 530MHz
H7 Band	450MHz to 520MHz
Frequency Increments	
H Band*	5kHz and 6.25kHz
*Channel offsets of half these values can be programmed	
Switching Range	continuous over full frequency range
Input Load Impedance	50Ω nominal (VSWR <2:1)
RF Input Protection	no degradation after 5 minutes exposure to on-channel signals at +27dBm (2.2V)
Frequency Stability	±1.5ppm –30°C to +60°C (–22°F to +140°F)
RSSI	–115dBm to –50dBm 0.5V to 2.5V, approx. 25mV/dB
Sensitivity[1,2]	
12dB$_{SINAD}$ NBFM, MBFM, WBFM	
Max RF level	–115dBm
Typical RF level	–116dBm
20dB$_{SINAD}$ NBFM, MBFM, WBFM[3]	
Max RF level	–112dBm
Typical RF level	–114dBm
BER≤ 5%, NB FFSK, MB FFSK, WB FFSK	
Max RF level	–115dBm
Typical RF level	–116dBm
BER≤1%, NB THSD, MB THSD and WB THSD	
Max RF level	–110dBm
Typical RF level	–112dBm

[1] At 25°C,750µs de-emphasis, 2dB degradation at extremes of operational temperature range and frequency band

[2] For the D1 band these figures are approximately 3db better.

[3] Psophometric weighting

Receiver RF Section (Continued)

Ultimate Signal-to-Noise Ratio*	
NBFM	36dB
MBFM	38dB
WBFM	40dB
*Max RF level –47dBm (EIA)	

Selectivity	ETS 136MHz to 174MHz	ETS 175MHz to 530MHz
Narrow Bandwidth	68dB	68dB
Mid Bandwidth	75dB	73dB
Wide Bandwidth	80dB	75dB

Signal Displacement Bandwidth	>40% of the rated system deviation (EIA 603B)
Spurious Response Attenuation	≥73dB (ETSI) *AGC switched off in H band Receiver
Intermodulation 3rd order immunity*	D1 band: >67dB (ETSI) All other bands: >70dB (ETSI)
*Unwanted signals spaced at least 25kHz and 50kHz away	
Blocking Rejection (Blocking Ratio)	
1 to 10MHz	≥84dB (ETSI)
Co-channel Rejection	
Narrow Bandwidth	–12dB
Mid Bandwidth	–8dB
Wide Bandwidth	–8dB
Amplitude Characteristic*	≤3dB (ETSI)
*RF Input Level –107dBm to –13dBm	
Radiated Spurious Emissions	
Transmit	
Radiated	<–36dBm EIRP to 1GHz <–30dBm 1GHz to 4GHz
Standby	
Conducted	<–57dBm 9kHz to 1GHz <–47dBm 1GHz to 12.75GHz
Radiated	<–57dBm EIRP to 1GHz <–47dBm EIRP 1GHz to 4GHz
Transmit and Operating extremes*	<–30dBm 9kHz to 2.9GHz
*(AS4295)	

Receiver Audio Section - Gating Operation

Gating Settings

Country	8 dB_{SINAD}
City	12 dB_{SINAD}
Hard	20 dB_{SINAD}

SINAD Gating

Opening Level	8 dB to 20 dB_{SINAD}
Accuracy	±2 dB (at extremes)
Opening Point SINAD Variation with Receiver Bandwidth	Hard 3 dB_{SINAD}, City 2 dB_{SINAD}, Country 2 dB_{SINAD}
RF Hysteresis	
RF Hysteresis Variation at Extremes	2 dB_{RF} (min.)
Modulation Desense No Carrier Offset	2 dB_{RF} (min.)
Nominal	70% (min.) full scale deviation
Variation at Extremes	65% (min.) full scale deviation
Modulation Desense with Carrier Offset (NB 1.5 kHz, MB 2.0 kHz, WB 2.5 kHz)	
Nominal	70% (min.) full scale deviation
Variation at Extremes	65% (min.) full scale deviation
Adjacent Channel Selectivity	mute operates as in absence of adjacent channel signal
Susceptibility to Broadband Noise	30 dB_{RF} (min.)
Variation at Extremes	25 dB_{RF} (min.)
EIA-603 Opening Time[1]	60 ms (max.)
Variation at Extremes	75 ms (max.)
Noise Mute Opening Time[2]	20 ms (max.)
Variation at Extremes	25 ms (max.)
EIA-603 Closing Time	must not close

[1] EIA times refer to the audio paths

[2] Noise mute opening times refer to the receiver gate signal

RSSI Gating (RSSI Mute)

Attack Time	<2.5 ms (from no signal to the country threshold)
Decay Time	<2.5 ms (from –50 dBm to no signal)
Settings	Country –115 dBm, City –113 dBm, Hard –107 dBm

Receiver Inhibit

High Level Threshold	≥2.0 V (Deactivated)
Low Level Threshold	≤0.8 V (Activated)
Internal Bias	pull up to 3.3 V via 4.7 kΩ
Protection	RC, diode clamps to 3.3 V and ground

Rx Gate Relay Output

Internal Bias	none
Drive	opto-isolated, active low Z
Peak Load Current	±120 mA
Resistance	35 Ω max
Protection	30 V zener

Receiver Audio Section - Gating Operation (Continued)

Tone on Idle	
Frequency	1.3kHz to 2.5kHz adjustable via internal potentiometer
Level*	–14dB to +3dB relative to the nominal line output level
Activation	Internal jumper settings

* Adjusting nominal line level shall not alter the relative level of the tone

Receiver Audio Section - General

Outputs Available	speaker output via user interface balanced and unbalanced line outputs via system interface board (see "System Interface" on page 16)
Frequency Response	flat or de-emphasised (750µs) on balanced output flat on unbalanced output
De-emphasised Response	
Bandwidth	300Hz to 2.55kHz (NB) 300Hz to 2.8kHz (MB) 300Hz to 3kHz (WB)
Response	within ±3dB of a –6dB / octave de-emphasis curve (ref. 1kHz)

Flat Response	Balanced Audio	Unbalanced Audio
Bandwidth	300Hz to 2.55kHz (NB) 300Hz to 2.8kHz (MB) 300Hz to 3kHz (WB)	300Hz to 2.55kHz (NB) 300Hz to 2.8kHz (MB)* 300Hz to 3kHz (WB)
Response	within ±3dB of output level at 1kHz	within ±3dB of output level at 1kHz

Bulk Delay	
Receiver*	
Audio Tap Out R2	≤2.5ms
Audio Tap Out R4	≤7.5ms
Talk Through Repeater**	≤20ms

*from antenna to audio output

**from antenna input to antenna output

Group Delay / Variation*	
Receiver	≤ 10µs peak to peak 300Hz to 3.4kHz (WB) ≤ 10µs peak to peak 300Hz to 2.25kHz (NB)
Talk Through Repeater	≤ 50µs peak to peak 300Hz to 3.4kHz (WB) ≤ 50µs peak to peak 300Hz to 2.25kHz (NB)

*at –70dBm, 60% deviation flat full band response, applies to balanced and un balanced audio and is at Tap in T12 and Tap out R2

Receiver Audio Section - General (Continued)

Speaker Output
(via User Interface)

Power	4W maximum
Speaker Impedance	16Ω nominal
Distortion*	≤3% total harmonic distortion at 1kHz, 0.35W, 16Ω
Signal to Noise Ratio**	≥35dB
Mute Ratio**	>60dB

* at –70dBm signal level, de-emphasis selected

** WRT 60% system deviation at 50% rated speaker output power setting

Line Output - Balanced

Output Level Range	-20dBm to +6dBm
Output Impedance	600Ω
Distortion (@ -70dBm in, de-emphasized, 1kHz tone, 60% modulation)	< 3%

Hum and Noise:

Narrow Bandwidth	>40dBm
Mid Bandwidth	>41dBm
Wide Bandwidth	>43dBm

Receiver Audio Section - CTCSS

Tone Detect

Tone Squelch Opening	4dB$_{SINAD}$ (typical)
Response Time	220ms open and close (typical)

3 Transmitter Specifications

This section provides specifications pertaining to the transmitter module.

Important The software release notes list known issues or limitations of the base station that may vary from the specifications published in this document. Please refer to the current software release notes for any variations to the specifications in this document.

The performance figures given in these specifications are applicable only to the transmitter module operating as an integral part of a TB7100 base station. These performance figures are minimum figures, unless otherwise indicated (typical), for equipment operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltage (12VDC).

Where applicable, the test methods used to obtain these figures are those described in the ANSI/TIA-603-B-2002 and ETSI-EN specifications. This equipment is compatible with F3E and G3E emissions. You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait Electronics Limited.

Bandwidth

The terms "narrow bandwidth", "mid bandwidth" and "wide bandwidth" used in this chapter are defined in the following table.

	Channel Spacing	**Modulation 100% Deviation**
Narrow Bandwidth (NB)	12.5kHz	± 2.5kHz
Mid Bandwidth (MB)	20kHz	± 4kHz
Wide Bandwidth (WB)	25kHz	± 5.0kHz

Identifying the Transmitter Module

You can identify the model and hardware configuration of a transmitter module by referring to the product code printed on labels on the top of the module. The meaning of each character in the product code is explained in the table below.

Note This explanation of transmitter product codes is not intended to suggest that any combination of features is necessarily available in any one transmitter. Consult your nearest Tait Dealer or Customer Service Organisation for more information regarding the availability of specific models and options.

Product Code	Description
XMAD**a**b-cdee	**a** denotes digital architecture 1 = EP1C6/5402 2 = EP1C12/5409 3 = EP1C12/5509
XMADa**b**-cdee	**b** denotes power 2 = 25W 3 = 25W trigger-based 4 = 40W/50W 5 = 40W/50W trigger-based
XMADab-**cd**ee	**cd** denotes frequency band A4 = 66MHz to 88MHz B1 = 136MHz to 174MHz C0 = 174MHz to 225MHz D1 = 216MHz to 266MHz G2 = 350MHz to 400MHz H5 = 400MHz to 470MHz H6 = 450MHz to 530MHz H7 = 450MHz to 520MHz
XMADab-cd**ee**	**ee** denotes radio options 02 = transmitter 03 = receiver

Transmitter RF Section

Frequency Bands

A4 Band	66MHz to 88MHz
B1 Band	136MHz to 174MHz
C0 Band	174MHz to 225MHz
D1 Band	216MHz to 226MHz
G2 Band	350 MHz to 400 MHz
H5 Band	400MHz to 470MHz
H6 Band	450MHz to 530MHz
H7 Band	450MHz to 520MHz

Output Power*

Low Power Option		
Rated Power	25W	
Range of Adjustment	1W to25 W	
Level 1 Very Low	1W	
Level 2 Low	5W	
Level 3 Medium	12W	
Level 4 High	26W	
High Power Option	VHF	UHF
	50W	40W
Rated Power	10W to 50W	10W to 40W
Range of Adjustment	10W	10W
Level 1 Very Low	15W	15W
Level 2 Low	26W	21W
Level 3 Medium	52W	42W
Level 4 High		

*Variation under environmental extreme +2dB, –3dB
Variation under VSWR not exceeding 1.6:1 ±1dB
Variation across the RF frequency band ±1dB

Output Power Accuracy* ±0.5dB into a 50Ω load

*within normal operating voltages and temperatures

Duty Cycle 100% at maximum rated output power* at +60°C (+140°F) ambient temperature, for low power option
100% at maximum rated output power* at +50°C (+122°F) ambient temperature, for high power option
*measured directly on TB7100 RF output

Output Load Impedance 50Ω nominal (VSWR <2:1)

Mismatch Capability

Ruggedness	open and short circuit load at any phase angle for one hour
Stability	5:1 load VSWR at all phase angles

Transmitter RF Section (Continued)

Frequency Range	
25W	A4: 66MHz to 88MHz (VHF)
25W or 50W	B1: 136MHz to 174MHz (VHF)
25W	C0: 174MHz to 225MHz (VHF)
25W	D1: 216MHz to 226MHz (VHF)
40W	G2: 350MHz to 400MHz (UHF)
25W or 40W	H5: 400MHz to 470MHz (UHF)
25W	H6: 450MHz to 530MHz (UHF)
40W	H7: 450MHz to 520MHz (UHF)
Protection	Refer to www.support.taitworld.com
Number of Channels	100
Channel Spacing	
NB	12.5kHz
MB	20kHz
WB	25kHz
Modulation Scheme*	
Analogue NBFM	– –, 11K0F3E, 11kHz
Analogue MBFM	– –, 14K0F3E, 14kHz
Analogue WBFM	– –, 16K0F3E, 16kHz
CP4GFSK	12kbps, 12K0F1D, 12kHz
CP4GFSK	19.2kbps, 19K6F1D, 19.6kHz
NB FFSK	1.2kbps, 7K2F2D, 7.2kHz
MB FFSK	1.2kbps, 9K36F2D, 9.36kHz
WB FFSK	1.2kbps, 10K8F2D, 10.8kHz
* Raw Data Rate, Emission Designator, Bandwidth	
Frequency Increments	
H Bands*	5kHz and 6.25kHz
*Channel offsets of half these values can be programmed	
Frequency Accuracy	±1.5ppm –30°C to +60°C (–22°F to +140°F)
Adjacent Channel Power	
Steady State (Full Deviation)	
Narrow Bandwidth	<–60dBc (ETS 300 086, EIA)
Mid and Wide Bandwidth	<–70dBc (ETS 300 086, EIA)
Transient (Unmodulated)	
Narrow Bandwidth	<–50dBc (ETS 300 113)
Mid and Wide Bandwidth	<–60dBc (ETS 300 113)
Wideband Noise*	
±1MHz	<–100dBc
**no modulation, measured from centre frequency, measured in 15kHz bandwidth	

Transmitter RF Section (Continued)

Hum and Noise:	
Narrow Bandwidth	-35dBm (300Hz to 3kHz [ANSI/TIA])
Mid Bandwidth	-39dBm (300Hz to 3kHz [ANSI/TIA])
Wide Bandwidth	-41dBm (300Hz to 3kHz [ANSI/TIA])
Intermodulation	–40dBc with interfering signal at –30dBc at TB7100 base station RF output
Radiated Spurious Emissions	
Transmit - A, B, C and H Bands	<–36dBm EIRP to 1GHz <–30dBm 1GHz to 4GHz
Standby	<–57dBm EIRP to 1GHz <–47dBm 1GHz to 4GHz <–47dBm 1GHz to 12.75GHz
Conducted Spurious Emissions	
Transmit - A, B, C and H Bands	<–36dBm to 1GHz <–30dBm 1GHz to 12.75GHz
Standby	<–50dBm discrete emissions <700Hz bandwidth <–57dBm to 1GHz <–47dBm 1GHz to 12.75GHz
Voltage and Temperature Extremes*	<–30dBm 9kHz to 2.9GHz
*(AS4295)	
TXKEY Input Transmit Key Time	
Key Up	
25W to 90% full power	≤8ms
25W to mod path*	≤18ms
Key Down	
25W release to –10dBm	≤6ms
*T8 enabled	
Talk Through Repeater Transmit Key Time*	
Opening time	
Noise mute (SINAD gating applied)	≤40ms
Closing time	
Noise mute (SINAD gating applied)	≤31ms
*Receive antenna to Transmit antenna	
Microphone PTT Transmit Key Time	
Key Up	
25W to 90% full power	≤20ms
Key Down	
25W to 10% full power	≤20ms

Transmitter RF Section (Continued)

Continuous Repetitive Key Rate	24Hz maximum

Transmitter Audio Section - Modulation Characteristics

Inputs Available	microphone input via user interface balanced and unbalanced line inputs via system interface board (see "System Interface" on page 16)
Frequency Response*	flat or pre-emphasised**
*below limiting	**microphone input via control panel, balanced and unbalanced line inputs via system interface board

Microphone Input

Bandwidth	300Hz to 3kHz
Impedance	600Ω
Distortion	≤3%

*60% modulation at 1kHz

Microphone PTT

Deactivated state	V input <0.5V
Activated state	V input >2V

Line and Microphone Inputs

Pre-emphasised Response

Bandwidth	300Hz to 2.55kHz (NB) 300Hz to 3kHz (MB) 300Hz to 3kHz (WB)
Below Limiting	within ±3dB of a 6dB/octave pre-emphasis curve (ref. 1kHz)

Flat Response

	Balanced Audio	Unbalanced Audio
Bandwidth	300Hz to 2.55kHz (NB) 300Hz to 3kHz (MB) 300Hz to 3kHz (WB)	67Hz to 2.55kHz (NB) 67Hz to 3kHz (MB) 67Hz to 3kHz (WB)
Response	within ±3dB of output level at 1kHz	within ±3dB of output level at 1kHz

Limiting Deviation (Modulation Limiting)

NBFM	<±2.5kHz
MBFM	<±4.0kHz
WBFM	<±5.0kHz

Distortion*	<3%

*60% modulation at 1kHz

Transmitter Audio Section - Modulation Characteristics (Continued)

Bulk Delay

Transmitter*	
Audio Tap in T12	≤ 2.5ms
Audio Tap in T8	≤ 10ms
Talk Through Repeater**	≤ 20ms

*from audio input to antenna

**from antenna input to antenna output, –70dBm, 60% deviation for a 1kHz tone, flat response any output power

Group Delay*

Transmitter	≤ 40µs peak to peak 300Hz to 3.4kHz (WB) ≤ 40µs peak to peak 300Hz to 2.25kHz (NB)
Talk Through Repeater	≤ 50µs peak to peak 300Hz to 3.4kHz (WB) ≤ 50µs peak to peak 300Hz to 2.25kHz (NB)

*at 60% deviation flat full band response, applies to balanced and un balanced audio and is at Tap in T12 and Tap out R2

Transmitter Audio Section - CTCSS

Standard Tones	all 37 ANSI/TIA group A, B and C tones plus 13 commonly used tones
Modulation Level	adjustable
Modulated Distortion	<5%