TB7100 base station

Specifications Manual

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Tait Contact Information

Tait Radio Communications

Corporate Head Office
New Zealand

Tait Electronics Ltd
P.O. Box 1645
Christchurch
New Zealand
E-mail: info@taitworld.com
Website: http://www.taitworld.com

Technical Support:
E-mail: support@taitworld.com
Website: http://support.taitworld.com

Tait North America

Regional Head Office - United States of America
Tait North America Inc.
E-mail: usa@taitworld.com

Canada
Tait North America Inc.
E-mail: canada@taitworld.com

Latin America

Tait Latin America
E-mail: latinamerica@taitworld.com

Tait Europe

Regional Head Office - United Kingdom
Tait Europe Ltd
E-mail: teusales@tait.co.uk

http:// www.taitworld.com

Tait North Asia

Regional Head Office - Hong Kong
Tait Mobile Radio (Hong Kong) Ltd
E-mail: hongkong@taitworld.com

Beijing
Tait Mobile Radio (Hong Kong) Ltd
E-mail: beijing@taitworld.com

Tait South Asia

Regional Head Office - Singapore
Tait Electronics (Far East) Pte Ltd
E-mail: singapore@taitworld.com

Thailand
Tait Mobile Radio Ltd
E-mail: thailand@taitworld.com

Oceania

New Zealand
Tait Communications Ltd
E-mail: headoffice@tcl.tait.co.nz

Australia
Tait Electronics (Aust) Pty Ltd
E-mail: australia@taitworld.com

Note: For the addresses and phone numbers of the above regional offices refer to the Tait-World website.

Contents

Preface

Scope of Manual

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

Enquiries and Comments

If you have any enquiries regarding this manual, or any comments, suggestions and notifications of errors, please contact Technical Support (refer to "Tait Contact Information" on page 2).

Updates of Manual and Equipment

In the interests of improving the performance, reliability or servicing of the equipment, Tait Electronics Limited reserves the right to update the equipment or this manual or both without prior notice.

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Associated Documentation

MBB-00001-01 TB7100 Installation and Operation Manual.

MBB-00003-01 TB7100 Installation Guide.

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

1 System Specifications

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

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 (12 VDC).

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**cd**e	cd = frequency band A4 = 66-88MHz (Later release) B1 = 136-174MHz C0 = 174-225MHz (Later release) D1 = 216-266MHz (Later release) H5 = 400-470MHz H6 = 450-530MHz H7 = 450-520MHz
TBBcd**e**	e = other compliance attributes A= 25W, level 1 digital architecture B= 35W-50W C= 25W, level 2 digital architecture D= 35W-50W, level 2 digital architecture E= 25W, level 3 digital architecture F= 35W-50W, level 3 digital architecture

Example:

TBBB1A = TB7100, 136MHz-174MHz, 25W, Level 1 digital architecture.

1.1 General

Supply

Supply Voltage

Operating Voltage	10.5 VDC to 16 VDC
Standard Test Voltage	12 VDC
Polarity	negative earth only
Fuse	20 A blade fuse

Power Consumption @ 13.8 VDC

System Condition	25 W		40 W		50 W	
	Current (Amps)	Power (watts)	Current (Amps)	Power (watts)	Current (Amps)	Power (watts)
Transmitting into VSWR = 5: 1	8.1	112	10.9	150	12.4	171
Receive only with 2 watts 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

Power Consumption Band B1, 25 W*

*Transmitting into 50 Ω load

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

Power Consumption Band B1, 50 W*

*Transmitting into 50 Ω load

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

Power Consumption Band H5, 25 W*

*Transmitting into 50 Ω load

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

Power Consumption Band H5, 40 W*

*Transmitting into 50 Ω load

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

Power Consumption Band H6, 25 W*

*Transmitting into 50 Ω load

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

Power Consumption Band H7, 40 W*

*Transmitting into 50 Ω load

RF Power Setting (watts)	Current (Amps)	DC Power (watts)
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 (Amps)	DC Power (watts)
25 W	8.1	112
40 W	10.9	150
50 W	12.4	171

Channel Data

System Types	talk through repeater line controlled base data repeater
Frequency Range	
25 or 50 watts	B1 136 MHz to 174 MHz (VHF)
25 or 40 watts	H5 400 MHz to 470 MHz (UHF)
25 watts	H6 450 MHz to 530 MHz (UHF)
40 watts	H7 450 MHz to 520 MHz (UHF)
Number of Channels	100
Channel Spacing	
Narrow Bandwidth	12.5 kHz
Mid Bandwidth	20 kHz
Wide Bandwidt	25 kHz
Frequency Increment	6.25 kHz 5.00 kHz
Frequency Stability	± 1.5 ppm

Environmental

Operating Temperature Range	– 30°C to + 60°C (– 22°F to + 140°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 dual fans mounted in tray
Fan Temperature Threshold Range*	+40°C to +80°C
*Internally adjusted via potentiometer	

Physical

Dimensions	
Height	43.5 mm (1U)
Width	436 mm (482.6 mm with 19 in rack mounting bracket)
Depth	400mm (excluding connectors)
Weight*	
25W Base Station*	6 kg (13.23 lb.)
With Duplexer Fitted	7 Kg (15.43 lb.)
*No duplexer or AC supply	
Finish	powdercoated in black texture (to Tait specification A4M4029)
MTBF	≥ 20,000 hours (estimated)
Connectors	
RF Input	N-type female (removed if duplexer fitted)
RF Output	N-type female
13.8 VDC Input	2 way, 25A terminal block
System Interface	25 pin D-range
Serial Interface	9 pin D-range
Microphone/ Programming	RJ45 8 way
Display	2 digit 7 segment LCD

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 ≥ 40 dB

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	1 k Ω
Output Level Range	offset 600 mV, then 25 mV/dB from –120 to –50 dBm
Accuracy	±300 mV
Response Time	≤ 10 ms
RF Input Range	– 115 dBm to – 50 dBm
Rx Gate Output	
Low Voltage Level	< 0.4 V
High Voltage Level	< 30 V
Low Level Sink Current	< 250 mA
High Level Leakage Current	< 100 μA
Activated:	
Open collector, active low Sink up to 250mA	valid carrier received via RF input
Deactivated:	
Floating	no carrier received via RF input
Protection	33 V zener to ground
Tx Key Input	
Low Input Voltage	≤ 2 V (TXKEY = activated)
High Input Voltage	≥ 5 V (TXKEY = de-activated)
Input Hysteresis	≅ 3 V
Input Resistance	≥ 10 kΩ
Maximum External Pull-up Voltage	≤ 20 V
Internal Pull-up Voltage	9 V (via 10 kΩ)
Tx Relay Output	
Typical On Voltage	< 0.4 V
Maximum On Input Current	≥ 250 mA
Maximum Off Voltage	< 30 V
System Relay output	
Internal Bias	none
Drive	open collector active low Z
Peak load current	Sink up to 250 mA
Resistance	35 Ω max
Protection	33 V zener to ground
Digital Output	
High	≥3.1 V (no load)
Low	<0.6 V (10mA sink)
Internal Bias	pull up to 3.3 V via 33 kΩ
Protection	RC, diode clamps to 3.3 V and ground
Digital Input	
High Threshold	≥2.0 V (deactivated)
Low Threshold	≤0.8 V (activated)
Internal Bias	pull up to 3.3 V via 33 kΩ
Low Level Output Current	<100 mA
Protection	RC, diode clamps to 3.3 V and ground

General (Continued)

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

2 Receiver Specifications

This chapter provides specifications pertaining to the receiver module.

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 (12 VDC).

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)	12.5 kHz	± 2.5 k Hz	7.5 kHz
Mid Bandwidth (MB)	20 kHz	± 4 kHz	12 kHz
Wide Bandwidth (WB)	25 kHz	± 5.0 kHz	15.0 kHz

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

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 3 = 25 W 5 = 40/50 W
XMADab-**cd**ee	cd denotes frequency band A4 = 66 MHz to 88 MHz (Later release) B1 = 136 MHz to 174 MHz C0 = 174 MHz to 225 MHz (Later release) D1 = 216 MHz to 266 MHz (Later release) H5 = 400 MHz to 470 MHz H6 = 450 MHz to 530 MHz H7 = 450 MHz to 520MHz
XMADab-cd**ee**	ee denotes radio options 02 = transmitter 03 = receiver

Receiver RF Section

Frequency Bands	
A4 Band	66 MHz to 88 MHz (Later release)
B1 Band	136 MHz to 174 MHz
C0 Band	174 MHz to 225 MHz (Later release)
D1 Band	216 MHz to 226 MHz (Later release)
H5 Band	400 MHz to 470 MHz
H6 Band	450 MHz to 530 MHz
H7 Band	450 MHz to 520 MHz
Frequency Increments	
H Band*	5 kHz and 6.25 kHz
*Channel offsets of half these values can be programmed	
Switching Range	continuous over full frequency range
Input Load Impedance	50 Ω nominal (VSWR <2:1)
RF Input Protection	no degradation after 5 minutes exposure to on-channel signals at + 27 dBm (2.2 V)
Frequency Stability	± 1.5 ppm – 30°C to + 60°C (– 22°F to + 140°F)
RSSI	– 115 dBm to – 50 dBm 0.5 V to 2.5 V, approx. 25mV/dB
Sensitivity*	
12 dB $_{SINAD}$ NBFM, MBFM, WBFM	
Max RF level	–115 dBm
Typical RF level	–117 dBm
20 dB $_{SINAD}$ NBFM, MBFM, WBFM**	
Max RF level	–112 dBm
Typical RF level	–114 dBm
BER ≤ 5%, NB FFSK, MB FFSK, WB FFSK	
Max RF level	–115 dBm
Typical RF level	–117 dBm
BER ≤ 1%, NB THSD, MB THSD and WB THSD	
Max RF level	–110 dBm
Typical RF level	–112 dBm
* At 25°C,750 µs de-emphasis, 2dB degradation at extremes of operational temperature range and frequency band	
** Psophometric weighting	

Receiver RF Section (Continued)

Ultimate Signal-to-Noise Ratio*	
NBFM	40 dB
MBFM	41 dB
WBFM	43 dB
*Max RF level –47 dBm (EIA)	

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

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

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 **	60 ms (max.)
Variation at Extremes	75 ms (max.)
Noise Mute Opening Time***	20 ms (max.)
Variation at Extremes	25 ms (max.)
EIA-603 Closing Time	must not close

**EIA times refer to the audio paths

***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	1.3 kHz to 2.5 kHz adjustable via internal potentiometer
Level*	–14 dB to +3 dB 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 13)
Frequency Response	flat or de-emphasised (750 μs) on balanced output flat on unbalanced output
De-emphasised Response	
Bandwidth	300 Hz to 3 kHz (NB) 300 Hz to 2.8 kHz (MB) 300 Hz to 2.55 kHz (WB)
Response	within ±3 dB of a – 6 dB / octave de-emphasis curve (ref. 1 kHz)

Flat Response	Balanced Audio	Unbalanced Audio
Bandwidth	300 Hz to 3kHz (NB) 300 Hz to 2.8 kHz (MB) 300 Hz to 2.55 kHz (WB)	300 Hz to 3 kHz (NB) 300 Hz to 2.8 kHz (MB)* 300 Hz to 2.55 kHz (WB)
Response	within ±3 dB of a – 6 dB / octave de-emphasis curve (ref. 1 kHz)	within ±3 dB of output level at 1 kHz

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

*from antenna to audio output

**from antenna input to antenna output

Receiver Audio Section - General (Continued)

Group Delay / Variation*

Receiver	≤ 10 μs peak to peak 300 Hz to 3.4 kHz (WB) ≤ 10 μs peak to peak 300 Hz to 2.25 kHz (NB)
Talk Through Repeater	≤ 50 μs peak to peak 300 Hz to 3.4 kHz (WB) ≤ 50 μs peak to peak 300 Hz to 2.25 kHz (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

Speaker Output
(via User Interface)

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

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

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

Hum and Noise:

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

Receiver Audio Section - CTCSS

Tone Detect

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

3 Transmitter Specifications

This chapter provides specifications pertaining to the transmitter module.

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Wide Bandwidth (WB)	25 kHz	± 5.0 kHz	15.0 kHz

Identifying the Transmitter

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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.

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XMADab-cd**ee**	ee denotes radio options 02 = transmitter 03 = receiver

Transmitter RF Section

Frequency Bands

A4 Band	66 MHz to 88 MHz (Later release)
B1 Band	136 MHz to 174 MHz
C0 Band	174 MHz to 225 MHz (Later release)
D1 Band	216 MHz to 226 MHz (Later release)
H5 Band	400 MHz to 470 MHz
H6 Band	450 MHz to 530 MHz
H7 Band	450 MHz to 520 MHz

Output Power*

Low Power Option

Rated Power	25 W
Range of Adjustment	1 W to 25 W
Level 1 Very Low	1 W
Level 2 Low	5 W
Level 3 Medium	12 W
Level 4 High	26 W

High Power Option

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

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

Output Power Accuracy* ±0.5 dB into a 50 Ω 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 50 Ω 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	
25 or 50 watts	B1 136 MHz to 174 MHz (VHF)
25 or 40 watts	H5 400 MHz to 470 MHz (UHF)
25 watts	H6 450 MHz to 530 MHz (UHF)
40 watts	H7 450 MHz to 520 MHz (UHF)
Protection	
Temperature	power foldback to 10% if RF power devices exceed safe operating conditions
Current	power foldback and shutdown if RF power devices exceed safe operating currents
Supply Voltage	power foldback to 10% when supply voltage is 24 V to 26 V and 30 V to 32 V; shutdown when supply voltage is < 24 V and > 32 V
VSWR	power foldback to 10% at VSWR extremes; continuous analogue power foldback to maintain 100% duty cycle into mismatched loads
Ruggedness	Tait ruggedness standard
Number of Channels	100
Channel Spacing	
NB	12.5 kHz
MB	20 kHz
WB	25 kHz
Modulation Scheme*	
Analogue NBFM	– –, 11K0F3E, 11 kHz
Analogue MBFM	– –, 14K0F3E, 14 kHz
Analogue WBFM	– –, 16K0F3E, 16 kHz
CP4GFSK	12 kbps, 12K0F1D, 12 kHz
CP4GFSK	19.2 kbps, 19K6F1D, 19.6 kHz
NB FFSK	1.2 kbps, 7K2F2D, 7.2 kHz
MB FFSK	1.2 kbps, 9K36F2D, 9.36 kHz
WB FFSK	1.2 kbps, 10K8F2D, 10.8 kHz
* Raw Data Rate, Emission Designator, Bandwidth	
Frequency Increments	
H Bands*	5 kHz and 6.25 kHz
*Channel offsets of half these values can be programmed	
Frequency Accuracy	±1.5 ppm – 30°C to + 60°C (– 22°F to + 140°F)

Transmitter RF Section (Continued)

Adjacent Channel Power	
Steady State (Full Deviation)	
Narrow Bandwidth	< – 60 dBc (ETS 300 086, EIA)
Mid and Wide Bandwidth	< – 70 dBc (ETS 300 086, EIA)
Transient (Unmodulated)	
Narrow Bandwidth	< – 50 dBc (ETS 300 113)
Mid and Wide Bandwidth	< – 60 dBc (ETS 300 113)
Wideband Noise*	
± 1 MHz	< – 100 dBc
Intermodulation	– 40 dBc with interfering signal at – 30 dBc at TB7100 base station RF output
Radiated Spurious Emissions	
Transmit - B, C and H Bands	< – 36 dBm EIRP to 1 GHz < – 30 dBm 1 GHz to 4 GHz
Standby	< – 57 dBm EIRP to 1 GHz < – 47 dBm 1 GHz to 4 GHz < – 47 dBm 1 GHz to 12.75 GHz
Conducted Spurious Emissions	
Transmit - B, C and H Bands	< – 36 dBm to 1 GHz < – 30 dBm 1 GHz to 12.75 GHz
Standby	< – 50 dBm discrete emissions <700 Hz bandwidth < – 57 dBm to 1 GHz < – 47 dBm 1 GHz to 12.75 GHz
Voltage and Temperature Extremes*	< – 30 dBm 9 kHz to 2.9 GHz
TXKEY Input Transmit Key Time	
Key Up	
25 W to 90% full power	≤ 8 ms
25 W to mod path*	≤ 18 ms
Key Down	
25 W release to –10 dBm	≤ 6 ms

*no modulation, measured from centre frequency, measured in 15 kHz bandwidth

*(AS4295)

*T8 enabled

Transmitter RF Section (Continued)

Talk Through Repeater Transmit Key Time*	
Opening time	
Noise mute (SINAD gating applied)	≤ 40 ms
Closing time	
Noise mute (SINAD gating applied)	≤ 31 ms

*Receive antenna to Transmit antenna

Microphone PTT Transmit Key Time	
Key Up	
25 W to 90% full power	≤ 20 ms
Key Down	
25 W to 10% full power	≤ 20 ms

Continuous Repetitive Key Rate	24 Hz 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 13)
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	300 Hz to 3 kHz
Impedance	600 Ω
Distortion	≤ 3 %

*60% modulation at 1 kHz

Microphone PTT	
Deactivated state	V input < 0.5 V
Activated state	V input > 2 V
Hookswitch active state	5 Ω t0 22 Ω to ground

Transmitter Audio Section - Modulation Characteristics (Continued)

Line and Microphone Inputs

Pre-emphasised Response

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

Flat Response

	Balanced Audio	Unbalanced Audio
Bandwidth	300 Hz to 2.55 kHz (NB) 300 Hz to 3 kHz (MB) 300 Hz to 3 kHz (WB)	67 Hz to 2.55 kHz (NB) 67 Hz to 3 kHz (MB) 67 Hz to 3 kHz (WB)
Response	within ±3 dB of a 6 dB / octave pre-emphasis curve (ref. 1 kHz)	within ±3 dB of output level at 1 kHz

Limiting Deviation (Modulation Limiting)

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

Distortion* < 3%

*60% modulation at 1kHz

Bulk Delay

Transmitter*

Audio Tap in T12	≤ 2.5 ms
Audio Tap in T8	≤ 10 ms

Talk Through Repeater** ≤ 20 ms

*from audio input to antenna

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

Group Delay*

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