TB8100 Base Station

Specifications Manual

MBA-00001-16 · Issue 16 · June 2016

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Contents

Preface

Scope of Manual

Welcome to the TB8100 Specifications Manual. This manual provides general, performance and physical specifications for the TB8100 5 W, 50 W and 100 W base stations.

The 100W PA is not available in all markets. A lower power level is also available if required. Consult your regional Tait office for more information.

Document Conventions

Within this manual, four types of alerts may be given to the reader. The following paragraphs illustrate each type of alert and its associated symbol.

Warning **This alert is used when there is a hazardous situation which, if not avoided, could result in death or serious injury.**

Caution This alert is used when there is a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice This alert is used to highlight information that is required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.

This icon is used to draw your attention to information that may improve your understanding of the equipment or procedure.

Associated Documentation

The following associated documentation is available for this product:

- MBA-00005-**xx** TB8100 Installation and Operation Manual
- MBA-00010-**xx** TB8100 Service Kit User's Manual
- MB8100-80-00-806 TB8100 Alarm Center User's Manual
- MBA-00011-**xx** TB8100 Calibration Kit User's Manual
- MBA-00012-**xx** Safety and Compliance Information
- MBA-00013-**xx** TBA0STU/TBA0STP Calibration and Test Unit Operation Manual
- MBA-00016-**xx** TB8100 Service Manual.

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

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.

All available TB8100 product documentation is provided on the Product CD supplied with the base station. Updates may also be published on the Tait Technical Resources website.

Publication Record

Issue	Publication Date	Description
1	June 2003	first release
2	July 2003	minor errors corrected
3	March 2004	■ System Specifications chapter added ■ Reciter and PMU Specifications updated ■ minor errors corrected
4	June 2004	■ specifications added for 24VDC and 48VDC PMU, and for B and C bands[a] ■ manual product code changed
5	December 2004	■ specifications added for K-band equipment[a] ■ System and Reciter Specifications updated
6	March 2005	■ specifications added for L-band equipment and 12V PA ■ System and Reciter Specifications updated
7	June 2005	■ corrections to K and L-band frequencies[a] ■ Reciter and PMU Specifications updated
8	December 2005	■ System and Reciter Specifications updated ■ minor corrections and additions

Issue	Publication Date	Description
9	April 2006	■ Reciter Specifications updated ■ Appendix A added
10	September 2006	■ specifications added for H4 band equipment ■ PMU and Reciter Specifications updated
11	May 2007	transmitter intermodulation specifications updated
12	December 2007	specifications added for: ■ dual base station power & current consumption ■ BTU load values ■ CWID deviation
		PMU DC startup voltages updated
13	January 2010	specifications added for: ■ base station receive power & current consumption for 110VAC ■ reciter supply current for 12VDC ■ frequency stability with an external reference
		12V PA startup voltage updated module weights updated compliance standards updated
14	November 2012	■ current consumption for 100W & dual 50W base stations updated ■ information added on compliance standards and FCC narrowbanding regulations
15	March 2014	■ dual base station current consumption specifications updated to include 240VAC and 110VAC; also 13.8VDC changed to 12.5VDC for consistency with other specifications ■ torque setting for SMA connectors reduced
16	June 2016	■ compliance standards updated to include the PA EU Marine standards: EN301 929-1 and EN301 929-2

a. Refer to "Identifying the Reciter" on page 24 and "Identifying the PA" on page 43 for the actual frequency coverage in these bands.

1 System Specifications

This chapter provides specifications pertaining to the TB8100 base station. You will find the specifications for individual modules in separate chapters in this manual.

The product Release Notes contain known issues or limitations which describe how the performance of the base station varies from the specifications published in this manual. You should always refer to the latest issue of the Release Notes for any known variations from these specifications.

Unless stated otherwise, the performance figures given in the power and current consumption specifications are typical figures based on using the equipment listed in the tables below.

AC and 12VDC Test Equipment

Module	Description
reciter	mid-band UHF (H2 band) reciter with isolated system interface board; the test frequency was 475MHz
PA	5W, 50W or 100W PA, as stated in the appropriate specifications
PMU	AC and DC PMU (12V DC module) fitted with a standby power supply card and an auxiliary power supply board
control panel	standard control panel, unless stated otherwise

24VDC and 48VDC Test Equipment

Module	Description
reciter	mid-band UHF (H2 band) reciter with standard system interface board; the test frequency was 460.5MHz
PA	5W, 50W or 100W PA, as stated in the appropriate specifications
PMU - 24VDC tests	AC and DC PMU (24V DC module) fitted with a standby power supply card and an auxiliary power supply board
PMU - 48VDC tests	AC and DC PMU (48V DC module) fitted with a standby power supply card and an auxiliary power supply board
control panel	standard control panel, unless stated otherwise

AC measurements were made using a Voltech PM100 power analyser. High power DC measurements were made using an HP 6032A DC power supply. All measurements for Power Save modes were made using a Tektronix TM502A current probe.

For AC power measurements the voltage, current drawn, volt.amp product, and true power are given. True power is equal to the volt.amp product multiplied by the power factor.

AC Input

Transmit Power and Current Consumption - 240VAC Input

	A	VA	W
5W Base Station			
Minimum RF Output Power (1W)	480mA	115VA	30W
Maximum RF Output Power (5W)	490mA	118VA	41W
50W Base Station			
Minimum RF Output Power (5W)	550mA	133VA	66W
50% RF Output Power (25W)	650mA	155VA	102W
Maximum RF Output Power (50W)	740mA	177VA	132W
100W Base Station			
Minimum RF Output Power (10W)	640mA	154VA	100W
50% RF Output Power (50W)	870mA	209VA	171W
Maximum RF Output Power (100W)	1.4A	330VA	303W

Transmit Power and Current Consumption - 110VAC Input

	A	VA	W
5W Base Station			
Minimum RF Output Power (1W)	350mA	39VA	30W
Maximum RF Output Power (5W)	430mA	47VA	39W
50W Base Station			
Minimum RF Output Power (5W)	650mA	72VA	67W
50% RF Output Power (25W)	990mA	109VA	105W
Maximum RF Output Power (50W)	1.3A	138VA	136W
100W Base Station			
Minimum RF Output Power (10W)	960mA	106VA	103W
50% RF Output Power (50W)	1.6A	178VA	176W
Maximum RF Output Power (100W)	3A	325VA	323W

Transmit Power and Current Consumption - AC Input Voltage Extremes

	A	VA	W
5W Base Station (at 5W RF output power)			
88VAC	530mA	45VA	42W
264VAC	540mA	142VA	40W
50W Base Station (at 50W RF output power)			
88VAC	1.6A	139VA	138W
264VAC	730mA	194VA	131W
100W Base Station (at 100W RF output power)			
88VAC	3.8A	335VA	330W
264VAC	1.3A	342VA	300W

Receive Power and Current Consumption

The specifications in this section refer to a base station operating in receive mode with no signal present and the speaker off.

	A	VA	W
240VAC			
Single Base Station	330mA	79VA	19W
Dual Base Station	357mA	87VA	33W
110VAC			
Single Base Station	231mA	25VA	18W
Dual Base Station	321mA	37VA	32W

12.5VDC Input

Transmit Power and Current Consumption - 12.5VDC Input

	PMU		12V PA	
	A	**W**	**A**	**W**
5W Base Station				
Minimum RF Output Power (1W)	1.8A	23W	1.3A	16W
Maximum RF Output Power (5W)	2.6A	32W	2A	25W
50W Base Station				
Minimum RF Output Power (5W)	4.6A	58W	3.8A	41W
50% RF Output Power (25W)	7.6A	95W	6.7A	76W
Maximum RF Output Power (50W)	10A	125W	9.2A	107W
100W Base Station[a]				
Minimum RF Output Power (10W)	9A	113W	—	—
50% RF Output Power (50W)	16.5A	206W	—	—
Maximum RF Output Power (100W)	25A	313W	—	—

a. At 850MHz.

Transmit Power and Current Consumption - DC Input Voltage Extremes

	PMU		12V PA	
	A	**W**	**A**	**W**
5W Base Station (at 5W RF output power)				
10.5VDC	2.9A	30W	2.3A	24W
15.5VDC	2.1A	33W	1.6A	25W
50W Base Station (at 50W RF output power)				
10.5VDC	11.7A	123W	10.5A	110W
15.5VDC	8.3A	128W	6.8A	105W
100W Base Station (at 100W RF output power)[a]				
10.5VDC	28A	294W	—	—
15.5VDC	20A	300W	—	—

a. At 850MHz.

Receive Power and Current Consumption

The specifications in this section refer to a base station operating in receive mode with an input voltage of 12.5VDC.

Note: The Power Save control panel does not shut down in Sleep and Deep Sleep modes if the reciter is fitted with a TaitNet RS-232 system interface board (TBA10L0). This will increase the base station's power consumption by approximately 100mW.

Note: If the reciter is fitted with a TaitNet Ethernet system interface board, the base station's power consumption will increase by approximately 1W.

	PMU		**12V PA**	
	A	**W**	**A**	**W**
Normal Mode, No Power Save[a]				
Full Speaker Audio	1.1A	13.9W	0.8A	10W
Gate Open, Speaker Off	1A	12.5W	0.7A	8.8W
Normal Mode, 20ms Receiver Cycling, 20ms Transmit Key Time				
Gate Closed, Standard Control Panel	745mA	9.3W	575mA	7.2W
Power Save Control Panel	720mA	9W	550mA	6.9W
Sleep Mode, 200ms Receiver Cycling[b]	400mA	5W	340mA	4.3W
Deep Sleep Mode[c,d]				
200ms Receiver Cycling	160mA	2W	120mA	1.5W
500ms Receiver Cycling	122mA	1.52W	82mA	1.02W
1s Receiver Cycling	109mA	1.36W	70mA	870mW
5s Receiver Cycling	98mA	1.23W	60mA	750mW

a. With standard control panel.

b. With Power Save control panel, and standby power supply card fitted to PMU.

c. With Power Save control panel, and standby power supply card fitted to PMU.

d. Power consumption in the 12V PA is calculated as approx. 720mW + (30mW x the number of sniffs in 5 seconds). Refer to "Power Saving Timing Values" on page 19 for more information on the Rx sniff period.

24VDC Input

Transmit Power and Current Consumption - 24VDC Input

	A	W
5W Base Station		
Minimum RF Output Power (1W)	1A	24W
Maximum RF Output Power (5W)	1.3A	31W
50W Base Station		
Minimum RF Output Power (5W)	2.5A	60W
50% RF Output Power (25W)	4.1A	98W
Maximum RF Output Power (50W)	5.4A	130W
100W Base Station		
Minimum RF Output Power (10W)	4A	96W
50% RF Output Power (50W)	7.4A	178W
Maximum RF Output Power (100W)	13A	312W

Transmit Power and Current Consumption - DC Input Voltage Extremes

	A	W
5W Base Station (at 5W RF output power)		
21VDC	1.5A	32W
35.6VDC	1.1A	39W
50W Base Station (at 50W RF output power)		
21VDC	6.1A	128W
35.6VDC	3.8A	135W
100W Base Station (at 100W RF output power)		
21VDC	15A	315W
35.6VDC	8.8A	313W

Receive Power and Current Consumption

The specifications in this section refer to a base station operating in receive mode with an input voltage of 24VDC.

Note: The Power Save control panel does not shut down in Sleep and Deep Sleep modes if the reciter is fitted with a TaitNet RS-232 system interface board (TBA10L0). This will increase the base station's power consumption by approximately 100mW.

Note: If the reciter is fitted with a TaitNet Ethernet system interface board, the base station's power consumption will increase by approximately 1W.

	A	W
Normal Mode, No Power Save[a]		
Full Speaker Audio	580mA	13.9W
Gate Open, Speaker Off	530mA	12.7W
a. With standard control panel.		
Normal Mode, 20ms Receiver Cycling, 20ms Transmit Key Time		
Gate Closed, Standard Control Panel	375mA	9W
Power Save Control Panel	360mA	8.6W
Sleep Mode, 200ms Receiver Cycling[b]	200mA	4.8W
b. With Power Save control panel and standby power supply card.		
Deep Sleep Mode[c]		
200ms Receiver Cycling	88mA	2.11W
500ms Receiver Cycling	66mA	1.58W
1s Receiver Cycling	61mA	1.46W
5s Receiver Cycling	49mA	1.18W
c. With Power Save control panel and standby power supply card.		

48VDC Input

Transmit Power and Current Consumption - 48VDC Input

	A	W
5W Base Station		
Minimum RF Output Power (1W)	435mA	21W
Maximum RF Output Power (5W)	610mA	29W
50W Base Station		
Minimum RF Output Power (5W)	1.2A	58W
50% RF Output Power (25W)	2A	96W
Maximum RF Output Power (50W)	2.6A	125W
100W Base Station		
Minimum RF Output Power (10W)	1.9A	91W
50% RF Output Power (50W)	3.6A	173W
Maximum RF Output Power (100W)	6.5A	312W

Transmit Power and Current Consumption - DC Input Voltage Extremes

	A	W
5W Base Station (at 5W RF output power)		
42VDC	680mA	29W
69.2VDC	450mA	31W
50W Base Station (at 50W RF output power)		
42VDC	2.9A	122W
69.2VDC	1.8A	128W
100W Base Station (at 100W RF output power)		
42VDC	7.5A	315W
69.2VDC	4.5A	311W

Receive Power and Current Consumption

The specifications in this section refer to a base station operating in receive mode with an input voltage of 48VDC.

Note: The Power Save control panel does not shut down in Sleep and Deep Sleep modes if the reciter is fitted with a TaitNet RS-232 system interface board (TBA10L0). This will increase the base station's power consumption by approximately 100mW.

Note: If the reciter is fitted with a TaitNet Ethernet system interface board, the base station's power consumption will increase by approximately 1W.

	A	W
Normal Mode, No Power Save[a]		
Full Speaker Audio	265mA	12.7W
Gate Open, Speaker Off	245mA	11.8W
a. With standard control panel.		
Normal Mode, 20ms Receiver Cycling, 20ms Transmit Key Time		
Gate Closed, Standard Control Panel	180mA	8.6W
Power Save Control Panel	170mA	8.2W
Sleep Mode, 200ms Receiver Cycling[b]	98mA	4.7W
b. With Power Save control panel and standby power supply card.		
Deep Sleep Mode[c]		
200ms Receiver Cycling	43mA	2.06W
500ms Receiver Cycling	35mA	1.68W
1s Receiver Cycling	31mA	1.49W
5s Receiver Cycling	24mA	1.15W
c. With Power Save control panel and standby power supply card.		

Dual Base Station Power and Current Consumption

The performance figures given in these specifications are typical figures based on using the equipment listed below.

AC Test Equipment

- Base station 1: B3 band reciter with B1 band 5 W or 50 W PA (VHF).
- Base station 2: B2 band reciter with B1 band 5 W or 50 W PA (VHF).
- AC PMU.

DC Test Equipment

- Base station 1: H4 band reciter with H0 band PA (UHF).
- Base station 2: B3 band reciter with B1 band PA (VHF).
- PMU: 12 V, 24 V or 48 V model as appropriate.

240 VAC Input

	A	VA	W
Both Base Stations Idle[a]	530 mA	128 VA	37 W
a. Neither base station is transmitting or receiving.			
Both Base Stations Transmitting			
5 W RF Output Power	620 mA	150 VA	85 W
50 W RF Output Power	1.35 A	323 VA	293 W

110 VAC Input

	A	VA	W
Both Base Stations Idle[a]	410 mA	45 VA	37 W
a. Neither base station is transmitting or receiving.			
Both Base Stations Transmitting			
5 W RF Output Power	830 mA	91 VA	87 W
50 W RF Output Power	2.75 A	303 VA	301 W

12.5VDC Input

	A	W
Both Base Stations Idle[a]	2.1A	26W
a. Neither base station is transmitting or receiving.		
Both Base Stations Transmitting		
Minimum RF Output Power (5W)	9.3A	116W
50% RF Output Power (25W)	16.6A	207W
Maximum RF Output Power (50W)	23.9A	298W

24VDC Input

	A	W
Both Base Stations Idle[a]	1.1A	26W
a. Neither base station is transmitting or receiving.		
Both Base Stations Transmitting		
Minimum RF Output Power (5W)	4.5A	108W
50% RF Output Power (25W)	8A	192W
Maximum RF Output Power (50W)	12.4A	298W

48VDC Input

	A	W
Both Base Stations Idle[a]	0.5A	24W
a. Neither base station is transmitting or receiving.		
Both Base Stations Transmitting		
Minimum RF Output Power (5W)	2.2A	106W
50% RF Output Power (25W)	3.9A	187W
Maximum RF Output Power (50W)	6.2A	298W

Power Saving Timing Values

This section provides the actual timing values for the Power Saving parameters which may be set using the TB8100 Service Kit (Configure > Channel Profiles > Edit channel profile > Power Saving tab).

Rx Sniff Period[a]

Rx Cycling ≤100 ms	25 ms
Rx Cycling ≥100 ms	50 ms

a. This is the time the receiver takes to power up the relevant receiver circuitry, take measurements to detect the presence (or not) of a carrier signal at the receiver input, then power down the relevant receiver circuitry.

Sleep and Deep Sleep Tx Keyup Time[b]

Medium (Sleep mode)	20 ms
Slow (Deep Sleep mode)	500 ms

b. This is the time it takes the transmitter RF output power to reach 90% of the set maximum, once an active Tx Key input to the system interface board has been detected by the reciter during an Rx sniff period.

System Response Times

External Key Time	the sum of the following parameters: remaining Rx Off time[c] sniff time relevant Tx keyup time
Internal TTR Time	the sum of the following parameters: remaining Rx Off time[c] sniff time gate threshold time CTCSS decode time relevant Tx keyup time

c. This will vary, depending on when the input is applied during a power saving cycle.

BTU Load Values

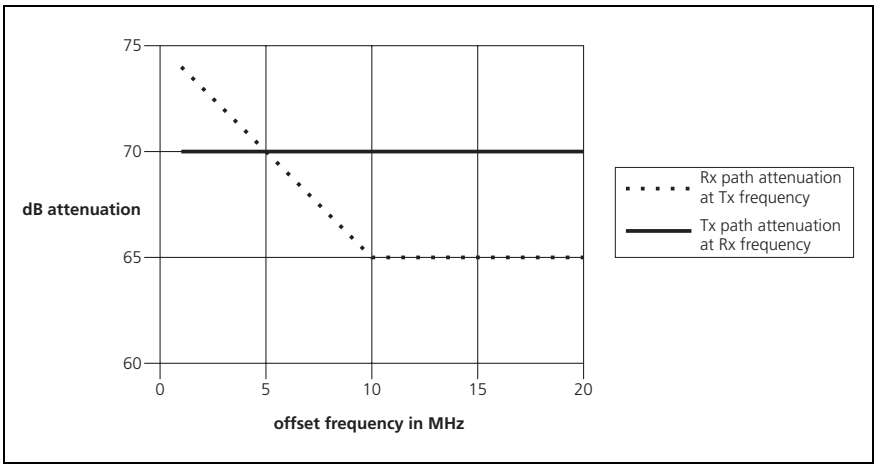
	W	BTU/h
Base Station[a]		
5W	36W	122BTU/h
50W	86W	292BTU/h
100W	225W	768BTU/h

a. Transmitting at rated output power.

Duplexer Attenuation Requirements

The following graph shows the attenuation requirements for duplexers used with the TB8100 base station. The dotted plot represents the attenuation required in the Rx path at the Tx frequency, while the continuous plot shows the attenuation required in the Tx path at the Rx frequency.

A 100W transmitter is assumed. The quoted attenuation will ensure not more than 1dB receiver desensitization, and has a 5dB margin built in.



Miscellaneous

Dimensions and Weight

Dimensions		
Height	176.8mm (7in)	
Width	482.6mm (19in)	
Length		
Subrack Only	385mm (15.2in)	
Including Front Panel	410mm (16.1in)	
Weight	**PMU (AC and DC)**	**12V PA**
Single 5/50W Base Station	21.5kg (47.4lb)	14.5kg (32lb)
Dual 5/50W Base Station	28.6kg (63.1lb)	21.6kg (47.6lb)
Single 100W Base Station	22.8kg (50.3lb)	—

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

Reliability

MTBF	≥80,000 hours (estimated)

2 Reciter Specifications

This chapter provides specifications pertaining to the receiver and exciter circuitry within the reciter module. However, the transmitter RF specifications which pertain to the combination of exciter and power amplifier are given in "Transmitter RF Section" on page 47.

The performance figures given in these specifications are applicable only to equipment operating as an integral part of a TB8100 base station. These performance figures are minimum figures, unless otherwise indicated (e.g. "typical"), for equipment tuned with the maximum switching range and operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltage (28VDC).

Where applicable, the test methods used to obtain these figures are those described in the ANSI/TIA-603-D-2010 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.

The product Release Notes contain known issues or limitations which describe how the performance of the base station varies from the specifications published in this manual. You should always refer to the latest issue of the Release Notes for any known variations from these specifications.

Bandwidth

The terms "wide bandwidth", "mid bandwidth" and "narrow bandwidth" used in this and following sections 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[a] (MB)	20kHz	±4kHz	12kHz
Wide Bandwidth (WB)	25kHz	±5kHz	15kHz

a. Mid bandwidth is available only in H-band reciters (380MHz to 520MHz).

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.

FCC Narrowbanding Regulations

The following information applies to all base stations, not just to those sold in countries where FCC regulations apply.

From 1 January 2013 it is an FCC requirement that land mobile radio systems must not operate channels with a bandwidth greater than 12.5kHz in the 150–174MHz and 421–470MHz frequency bands. From this date all base stations will be supplied with firmware that requires a software feature license to operate a mid-bandwidth or wide bandwidth channel in these frequency bands.

The TBAS083 20/25kHz Unrestricted Wideband feature license is available to any customer who is not subject to the relevant FCC regulations, or who has an FCC waiver. Note that this feature license is also required to operate a mid-bandwidth or wide bandwidth channel on the spot frequencies which are exempt from the FCC requirement. To obtain the feature license, or for more information about it, contact your regional Tait office.

Identifying the Reciter

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

This explanation of reciter product codes is not intended to suggest that any combination of features is necessarily available in any one reciter. Consult your regional Tait office for more information regarding the availability of specific models and options.

Product Code	Description
TBA**X**XXX-XXXX	4 = reciter 5 = receive-only reciter
TBA4**X**XX-XXXX	0 = default
TBA4X**XX**-XXXX	**Frequency Band and Sub-band** B2 = 136MHz to 156MHz B3 = 148MHz to 174MHz C1 = 174MHz to 193MHz C2 = 193MHz to 225MHz H1 = 400MHz to 440MHz H2 = 440MHz to 480MHz H3 = 470MHz to 520MHz H4 = 380MHz to 420MHz K4 = 762MHz to 870MHz[a] L1 = 852MHz to 854MHz and 928MHz to 930MHz L2 = 896MHz to 902MHz (receive only) L2 = 927MHz to 941MHz (transmit only)
TBA4XXX-**XXX**X	**System Interface Board** 000 = no system interface board fitted 0A0 = Standard 0B0 = Isolated 0C0 = Isolated E & M 0J0 = High Density/Ethernet 0K0 = TaitNet Ethernet 0L1 = TaitNet RS-232 0M0 = High Density/RS-232 0T1 = TaitNet
TBA4XXX-XXX**X**	0 = default

a. The actual frequency coverage in this band is:
Transmit: 762MHz to 776MHz, and 850MHz to 870MHz
Receive: 792MHz to 824MHz

Operational

Number of Channels	255
Channel Change Time	300 ms
Supply Voltage	
Operating Voltage	10.8 VDC to 32 VDC (non-operating survival voltage ≤36 VDC)
Standard Test Voltage	28 VDC
Polarity	negative earth
Polarity Protection	Zener diode and thermal resistor
Supply Current[a]	
12 VDC	<580 mA
28 VDC	<330 mA
Operating Temperature Range	–30 °C to +60 °C (–22 °F to +140 °F) ambient temperature[b]

a. Receiver and exciter operating.

b. Ambient temperature is defined as the temperature of the air immediately in front of the control panel.

Physical

Cooling	convection
Connectors	
RF Input	BNC female
RF Output	SMA female
Recommended SMA Torque	0.6 N·m (5 lbf·in)
Control and Alarm	16-way IDC male
External Reference Frequency Input	BNC female
DC Input	4-way Micro-Fit 3.0 (Molex) male
Auxiliary DC Input	4-way or 2-way Micro-Fit 3.0 (Molex) male[a]
System	depends on system interface board fitted[a]
Dimensions	
Height	143.6 mm (5.7 in)
Width	54.6 mm (2.1 in)
Length	333.3 mm (13.1 in)
Weight	2.4 kg (5.3 lb)

a. Refer to the Installation and Operation Manual.

System Interface

Refer to the receiver and exciter audio sections for audio specifications.

RSSI Output

Output Impedance	800Ω
Output Level Range	0.5V to 6V, programmable slope
Accuracy	±300mV
Response Time	≤5ms
RF Input Range	–120dBm to –60dBm (0.22μV to 223.6μV)

Rx Gate Output

Low Voltage Level	<0.4V
High Voltage Level	<30V
Low Level Sink Current	<250mA
High Level Leakage Current	<100μA

Tx Key Input

Low Input Voltage	≤2V
High Input Voltage	≥5V
Input Hysteresis	≅3V
Input Resistance	≥10kΩ
Maximum External Pull-up Voltage	≤20V
Internal Pull-up Voltage	8V

Tx Relay Output

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

Digital Inputs

Guaranteed High Level Threshold	<3.5V
Guaranteed Low Level Threshold	>1.5V
Internal Pull-up	+5V
Input Resistance	≥1k8Ω
Maximum External Pull-up Voltage	≤20V

Digital Outputs

Low Level	<0.4V
High Level	<30V
Low Level Output Current	<100mA
High Level Current	<100μA

Optocoupler Input (with active current regulator)

Control Current	>±6mA
Control Voltage	>±10V
Control Voltage	<±60V

System Interface (Continued)

Optocoupler Output	
Peak Voltage	±350V
Resistance (On)	35Ω
Peak Load Current	±120mA
Line Output - Balanced	
Output Level Range	–20dBm to +10dBm
Output Impedance	600Ω
Distortion (at –70dBm signal level)	
De-emphasised	≤2%
Flat	≤4% (NB) ≤2% (WB)
Line Output - Unbalanced	
Output Level Range	0.3V_{pp} to 3V_{pp} into 10kΩ
Line Input - Balanced	
Input Level Range (60% modulation at 1kHz)	–20dBm to +10dBm
Impedance	600Ω balanced
Line Input - Unbalanced	
Input Level Range	0.3V_{pp} to 3V_{pp}
Impedance	>10kΩ
Tone On Idle	
Outputs Available	balanced and unbalanced line outputs
Output Level Range[b]	–20dBm to 0dBm, relative to the configured line level
Output Frequency Range	700Hz to 3.4kHz

b. The balanced output level can be adjusted separately from the unbalanced output level using the Service Kit.

Receiver RF Section

Frequency Bands	
B Band	136MHz to 174MHz
C Band	174MHz to 225MHz
H Band	380MHz to 520MHz
K Band	792MHz to 824MHz
L Band	852MHz to 930MHz
Frequency Sub-bands	
B2	136MHz to 156MHz
B3	148MHz to 174MHz
C1	174MHz to 193MHz
C2	193MHz to 225MHz
H1	400MHz to 440MHz
H2	440MHz to 480MHz
H3	470MHz to 520MHz
H4	380MHz to 420MHz
K4	792MHz to 824MHz
L1	852MHz to 854MHz and 928MHz to 930MHz
L2	896MHz to 902MHz
Type	triple conversion superheterodyne; first conversion is analogue, second is hybrid, and third is digital
Frequency Increments	
Synthesizer	
B and C Bands	2.5kHz and 3.125kHz
H, K and L Bands	5kHz and 6.25kHz
Fine Tuning[a]	125Hz steps
Switching Range	>2% of the centre frequency For example: B Band 3MHz at 150MHz C Band 4MHz at 200MHz H Band 10MHz at 500MHz K Band 18MHz between 792MHz and 824MHz L1 Band 852MHz to 854MHz 928MHz to 930MHz L2 Band 896MHz to 902MHz
Input Load Impedance	50Ω nominal (VSWR <2:1)
RF Input Protection	no degradation after 5 minutes exposure to on-channel signals at +20dBm (2.2V)

a. Receiver selectivity may be slightly degraded if fine tuning is used.

Receiver RF Section (Continued)

Frequency Stability	
Internal Reference	±0.5ppm –30°C to +60°C (–22°F to +140°F)
External Reference	
B, C and H Bands	±1Hz ± multiplied accuracy of external reference
K and L Bands	±2Hz ± multiplied accuracy of external reference
RSSI	–120dBm to –60dBm (0.22µV to 223.6µV), 0.5V to 6V, programmable slope
IF Stages - B and C Bands	
Frequencies	
Analogue	16.9MHz
Digital	16.9MHz and 0Hz
Analogue IF Bandwidths	
Narrow Bandwidth	9kHz, –3dB
Wide Bandwidth	20kHz, –3dB
Digital IF Bandwidths	
Narrow Bandwidth	8.8kHz, –3dB
Wide Bandwidth	14kHz, –3dB
IF Stages - H, K and L Bands	
Frequencies	
Analogue	70.1MHz
Digital	9.9MHz and 0Hz
Analogue IF Bandwidth	20kHz, –4dB
Digital IF Bandwidths	
Narrow Bandwidth	8.8kHz, –3dB
Mid Bandwidth	12kHz, –3dB
Wide Bandwidth	14kHz, –3dB
Sensitivity[b,c]	
De-emphasised Response	
Centre of Switching Range	<–119dBm (0.25µV) at 25°C
Edge of Switching Range	<–117dBm (0.32µV) at 25°C
Flat Response	
Centre of Switching Range	<–117.5dBm (0.30µV) at 25°C
Edge of Switching Range	<–115.5dBm (0.38µV) at 25°C

b. 12dB SINAD.

c. Up to 2dB degradation at extremes of temperature.

Receiver RF Section (Continued)

Maximum Usable Sensitivity[d,e]

De-emphasised Response	
Centre of Switching Range	<–116dBm (0.35µV) at 25°C (NB)
	<–118dBm (0.28µV) at 25°C (WB)
Edge of Switching Range	<–114dBm (0.45µV) at 25°C (NB)
	<–116dBm (0.35µV) at 25°C (WB)
Flat Response	
Centre of Switching Range	<–112dBm (0.56µV) at 25°C (NB)
	<–116dBm (0.35µV) at 25°C (WB)
Edge of Switching Range	<–110dBm (0.71µV) at 25°C (NB)
	<–114dBm (0.45µV) at 25°C (WB)

d. Sensitivity for 20dB SINAD, psophometrically weighted, RF source modulated at 60% deviation with 1kHz.

e. Up to 2dB degradation at extremes of temperature.

FM Quieting[f]

Narrow Bandwidth	–113dBm
Wide Bandwidth	–117dBm

f. 20dB FM quieting, measured with de-emphasis on.

Ultimate Signal-to-Noise Ratio (at –47dBm)[g]

B, C and H Bands	
Narrow Bandwidth	45dB (ANSI/TIA)
	50dB (CEPT - psophometric)
Mid Bandwidth[h]	50dB (ANSI/TIA)
Wide Bandwidth	55dB (ANSI/TIA)
K and L Bands	
Narrow Bandwidth	43dB (ANSI/TIA)
Wide Bandwidth	47dB (ANSI/TIA)

g. Up to 5dB degradation at extremes of switching range and temperature.

h. H band only.

Selectivity[i]	EIA-603	TIA/EIA-603-D	ETSI
B and C Bands			
Narrow Bandwidth	85dB	50dB	85dB
Wide Bandwidth	90dB	87dB	—
H Band			
Narrow Bandwidth	85dB	46dB	85dB
Mid Bandwidth	—	—	85dB
Wide Bandwidth	90dB	82dB	—
K and L Bands			
Narrow Bandwidth	79dB	45dB	—
Wide Bandwidth	84dB	75dB	—

i. Up to 5dB degradation at extremes of switching range and temperature.

Offset Selectivity (K band wide bandwidth only)	>20dB
Signal Displacement Bandwidth	>40% of the rated system deviation

Receiver RF Section (Continued)

Spurious Response Attenuation	
All Bands Except C Band	≥100dB (ANSI/TIA)[j] ≥90dB (ETSI)
C Band	≥95dB (ANSI/TIA) ≥90dB (ETSI)

j. AGC switched off in H-band reciter.

Intermodulation Response Attenuation[k]	
B, C and H Bands	
Narrow Bandwidth	80dB (ETSI)
Mid Bandwidth[l]	80dB (ETSI)
Wide Bandwidth	85dB (ANSI/TIA)
K and L Bands	
Narrow Bandwidth	80dB (ANSI/TIA)
Wide Bandwidth	85dB (ANSI/TIA)

k. Up to 5dB degradation at extremes of switching range and temperature.

l. H band only.

Blocking Rejection	
B, C and H Bands	
1–10MHz	100dB (ETSI)
>10MHz	110dB (ETSI)
±1, ±2, ±5 and ±10MHz	100dB (ANSI/TIA)[m]
K and L Bands	
1–10MHz	100dB (ANSI/TIA)
>10MHz	110dB (ANSI/TIA)
±1, ±2, ±5 and ±10MHz	100dB (ANSI/TIA)

m. AGC switched off in H-band reciter.

Co-channel Rejection	
Narrow Bandwidth	–8dB
Mid Bandwidth[n]	–8dB
Wide Bandwidth	–5dB

n. H band only.

Amplitude Characteristic[o]	≤3dB (ETSI)

o. RF Input Level –107dBm to –13dBm.

Spurious Emissions	
Conducted	<–90dBm to 2GHz <–70dBm 2GHz to 4GHz
Radiated	<–57dBm EIRP to 1GHz <–47dBm EIRP 1GHz to 4GHz

Receiver Audio Section - General

Outputs Available	speaker output via control panel balanced and unbalanced line outputs via system interface board (see "System Interface" on page 26)
Frequency Response	flat or de-emphasised (750 µs) For more information refer to "Frequency Response Diagrams" on page 58.
De-emphasised Response	
Bandwidth	300 Hz to 2.55 kHz (NB) 300 Hz to 3.4 kHz (MB)[a] 300 Hz to 3.4 kHz (WB)
Response	within +1, −3 dB of a −6 dB/octave de-emphasis curve (ref. 1 kHz)

a. H band only.

Flat Response	Balanced Audio	Unbalanced Audio
Bandwidth	67 Hz to 2.55 kHz (NB) 67 Hz to 3.4 kHz (MB)[b] 67 Hz to 3.4 kHz (WB)	10 Hz to 2.55 kHz (NB) 10 Hz to 3.4 kHz (MB)[b] 10 Hz to 3.4 kHz (WB)
Response	within +1, −3 dB of output level at 1 kHz	within +1, −1 dB of output level at 1 kHz

Flat Response - Bypass Audio Path	
Bandwidth	2 Hz to 3 kHz (NB) 2 Hz to 3 kHz (WB)
Response	within +1, −3 dB of output level at 1 kHz
Flat Response - Extended Bypass Audio Path	
Bandwidth	2 Hz to 4.5 kHz (NB) 2 Hz to 6.5 kHz (WB)
Response	within +1, −1 dB of output level at 1 kHz

b. H band only.

Bulk Delay	
Receiver[c]	
Audio Filter Selected	≤6 ms
Bypass Audio Path[d]	≤2 ms
Extended Bypass Audio Path[d]	≤3 ms
Talk Through Repeater[e]	≤6 ms

c. From antenna to audio output.

d. Unbalanced audio only.

e. From antenna input to antenna output.

Group Delay	
Full Flat or Bypass Audio Path	≤40 μs_{pp} 300 Hz to 3.4 kHz
Extended Bypass Audio Path	≤40 μs_{pp} 300 Hz to 6.5 kHz

Receiver Audio Section - General (Continued)

Speaker Output (via Control Panel)

Power	0.5W maximum
Speaker Impedance	16Ω nominal
Distortion[f]	≤3% at 1kHz, 0.35W, 16Ω

f. At –70dBm signal level, de-emphasis selected.

Receiver Audio Section - CTCSS

High Pass (Subaudible) Filter

Bandwidth	300Hz to 2.55kHz (NB) 300Hz to 3.4kHz (MB)[b] 300Hz to 3.4kHz (WB)
Response	within +1, –3dB of level at 1kHz
Hum and Noise[a]	30dB minimum at 250.3Hz 35dB typical (67Hz to 240Hz)

a. 1kHz at 60% system deviation, CTCSS at 10% system deviation.

b. H band only.

Tone Detect

Tone Squelch Opening	better than 6dB SINAD 3dB SINAD at 250.3Hz (typical) 4dB SINAD at 100Hz (typical)	
	T800	EIA603
Tone Detect Bandwidth		
Accept (typical)	±2Hz	±1.8%
Reject (typical)	±3Hz	±3%
Response Time (open and close, typical)	≤120ms	≤120ms

Receiver Audio Section - Gating Operation

Systems Available	SINAD gating (noise mute) RSSI gating (carrier mute)
SINAD Gating	
Opening Level	8dB to 20dB SINAD
Accuracy	±3dB
RF Hysteresis (programmable)	1.5dB to 6dB
Opening Time	≤20ms
Closing Time	50 ±10ms
RSSI Gating	
Opening Level	–117dBm to –70dBm
Accuracy	±3dB
Hysteresis (programmable)	2dB to 10dB
Opening Time	≤5ms
Closing Time	50 ±10ms

Exciter RF Section

Frequency Bands	
B Band	136MHz to 174MHz
C Band	174MHz to 225MHz
H Band	380MHz to 520MHz
K Band	762MHz to 776MHz and 850MHz to 870MHz
L Band	852MHz to 941MHz
Frequency Sub-bands	
B2	136MHz to 156MHz
B3	148MHz to 174MHz
C1	174MHz to 193MHz
C2	193MHz to 225MHz
H1	400MHz to 440MHz
H2	440MHz to 480MHz
H3	470MHz to 520MHz
H4	380MHz to 420MHz
K4	762MHz to 776MHz and 850MHz to 870MHz
L1	852MHz to 854MHz and 928MHz to 930MHz
L2	927MHz to 941MHz
Modulation Type	F3E (FM) G3E (PM)
Peak Deviation	
Narrow Bandwidth	≤2.5kHz
Mid Bandwidth	≤4kHz
Wide Bandwidth	≤5kHz
Limiting Deviation[a]	≥90% of peak deviation for the configured bandwidth

a. With modulation input driven at a frequency of 1kHz, and at a level 20dB above the nominal level set in the configuration file in use.

Nominal Deviation (average)[b]	55% to 65% of peak deviation

b. With modulation input driven at the nominal level set in the configuration file in use.

CWID Deviation	40% of peak deviation
Frequency Increments	
Synthesizer	
B and C Bands	3.125kHz and 2.5kHz
H, K and L Bands	5kHz and 6.25kHz
Fine Tuning	125Hz steps

Exciter RF Section (Continued)

Switching Range	
B and C Bands	8 MHz
H Band	10 MHz
K Band	762 MHz to 776 MHz and 850 MHz to 870 MHz
L1 Band	852 MHz to 854 MHz and 928 MHz to 930 MHz
L2 Band	927 MHz to 941 MHz
Output Load Impedance	50Ω nominal (VSWR <2:1)
Frequency Stability	±0.5 ppm –30°C to +60°C (–22°F to +140°F)
Power Output	+11 dBm ±2 dB

Exciter Audio Section - Inputs

Inputs Available	microphone input via control panel balanced and unbalanced line inputs via system interface board (see "System Interface" on page 26)
Microphone Input	
Input Level Range[a]	80 dB SPL to 115 dB SPL
Impedance	600Ω
Compressor	
Attack Time	10 ms
Decay Time	800 ms
Dynamic Range	35 dB
Distortion	≤3%

a. 60% modulation at 1 kHz.

Exciter Audio Section - Modulation Characteristics

Frequency Response (below limiting)	flat or pre-emphasised[a] For more information refer to "Frequency Response Diagrams" on page 58.

a. Microphone input via control panel, balanced and unbalanced line inputs via system interface board.

Line and Microphone Inputs

Pre-emphasised Response		
Bandwidth	300 Hz to 2.55 kHz (NB) 300 Hz to 3 kHz (MB)[b] 300 Hz to 3 kHz (WB)	
Below Limiting	within +1, –3 dB of a 6 dB/octave pre-emphasis curve (ref. 1 kHz)	
Flat Response	Balanced Audio	Unbalanced Audio
Bandwidth	67 Hz to 2.55 kHz (NB) 67 Hz to 3 kHz (MB)[b] 67 Hz to 3 kHz (WB)	10 Hz to 2.55 kHz (NB) 10 Hz to 3 kHz (MB)[b] 10 Hz to 3 kHz (WB)
Response	within +1, –3 dB of output level at 1 kHz	within +1, –1 dB of output level at 1 kHz
Flat Response - Bypass Audio Path		
Bandwidth	2 Hz[c] to 2.5 kHz (NB) 2 Hz[c] to 2.5 kHz (WB)	
Response	within +1, –3 dB of output level at 1 kHz	
Flat Response - Extended Bypass Audio Path		
Bandwidth	2 Hz to 5.5 kHz (NB) 2 Hz to 5.5 kHz (WB)	
Response	within +1, –1 dB of output level at 1 kHz	

b. H band only.

c. High pass filter enabled. With the high-pass filter disabled, the LF response extends to DC.

Above Limiting Response	within +1, –2 dB of a flat response (ref. 1 kHz)
Distortion	<2%

Hum and Noise[d]

Narrow Bandwidth	–50 dB typical (ETSI)
Mid Bandwidth[e]	–50 dB typical (ETSI)
Wide Bandwidth	–55 dB typical, 300 Hz to 3 kHz (ANSI/TIA)

d. Up to 5 dB degradation at extremes of switching range and temperature.

e. H band only.

Exciter Audio Section - Modulation Characteristics (Continued)

Bulk Delay	
Transmitter[f]	
Audio Filter Selected	≤6ms
Bypass Audio Path[g]	≤2ms
Extended Bypass Audio Path[g]	≤2ms
Talk Through Repeater[h]	≤6ms

f. From audio input to antenna.

g. Unbalanced audio only.

h. From antenna input to antenna output.

Group Delay	
Full Flat or Bypass Audio Path	≤40μs_{pp} 300Hz to 3.4kHz
Extended Bypass Audio Path	≤40μs_{pp} 300Hz to 5.5kHz

Exciter Audio Section - CTCSS

Standard Tones	all 37 ANSI/TIA group A, B and C tones plus 13 commonly used tones
Frequency Error (from ANSI/TIA tones)	0.08% maximum
Generated Tone Distortion	1.2% maximum
Generated Tone Flatness	flat across 67Hz to 250.3Hz to within 1dB
Modulation Level	adjustable
Modulated Distortion	<5%

External Reference Input

Frequencies (one frequency must be specified by the Service Kit)	10MHz or 12.8MHz
Lock Range	±50Hz
Input Level	300mV_{pp} to 5V_{pp}
Input Impedance	≥1kΩ

Paging

These specifications are based on a TB8100 reciter fitted with a TBA101B paging applications board. For more information on installing and configuring the TBA101B board, refer to TN-1047.

Modulation Format	POCSAG
Channel Spacing	12.5 kHz and 25 kHz[a]
System Deviation	±90% of full system deviation
Baud Rates	512, 1200, and 2400[a]
Interface Levels	$V_{HIGH} \geq 1$ V $V_{LOW} \leq 0.3$ V 5.6 kΩ minimum internal pull-up to 8 V
Operational Modes	paging (via unbalanced interface) voice (via balanced interface)
Frequency Reference	internal and external[a]

a. The TBA101B board can only be used on frequency bands and at power levels which have the appropriate paging compliance. For more information on current TB8100 paging compliances, consult your regional Tait office.

Compliance Standards

Where applicable, this equipment has been tested and approved to the following standards.

RF	EN 300 086-2 EN 300 113-2 AS/NZS 4295 CFR Title 47 Parts 15, 22 and 90 RSS-119 HKTA 1002[a] HKTA 1016[b] TS LMR[c]
EMC	ETSI EN 301 489-5 CFR Title 47 Part 15
EMC Regulatory Compliance in Australia N46	This product meets all ACMA regulatory requirements for electromagnetic compatibility (EMC). For more information about EMC compliance, visit the ACMA website at www.acma.gov.au.
Safety	EN 60950
Environmental	
Low Pressure (altitude)[d]	MIL-STD-810F 500.4 Proc 2
Humidity	IEC60068-2-30
Vibration	MIL-STD-810F 514.5 Proc 1
Shock	MIL-STD-810F 516.5 Proc 1

a. H band only
b. K band only
c. B and H bands only
d. 4572 m (15000 ft).

3 Power Amplifier and Transmitter Specifications

This chapter provides specifications pertaining to the power amplifier as a separate module. It also includes a number of transmitter RF specifications which pertain to the combination of power amplifier and exciter.

The performance figures given in these specifications are applicable only to equipment operating as an integral part of a TB8100 base station. These performance figures are minimum figures, unless otherwise indicated, for equipment operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltage (28VDC).

Where applicable, the test methods used to obtain these figures are those described in the ANSI/TIA-603-D-2010 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.

The product Release Notes contain known issues or limitations which describe how the performance of the base station varies from the specifications published in this manual. You should always refer to the latest issue of the Release Notes for any known variations from these specifications.

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	12.5kHz	±2.5kHz	7.5kHz
Mid Bandwidth[a]	20kHz	±4kHz	12kHz
Wide Bandwidth	25kHz	±5kHz	15kHz

a. Mid bandwidth is available only in H-band transmitters (380MHz to 520MHz).

FCC Narrowbanding Regulations

The following information applies to all base stations, not just to those sold in countries where FCC regulations apply.

From 1 January 2013 it is an FCC requirement that land mobile radio systems must not operate channels with a bandwidth greater than 12.5kHz in the 150–174MHz and 421–470MHz frequency bands. From this date all base stations will be supplied with firmware that requires a software feature license to operate a mid-bandwidth or wide bandwidth channel in these frequency bands.

The TBAS083 20/25kHz Unrestricted Wideband feature license is available to any customer who is not subject to the relevant FCC regulations, or who has an FCC waiver. Note that this feature license is also required to operate a mid-bandwidth or wide bandwidth channel on the spot frequencies which are exempt from the FCC requirement. To obtain the feature license, or for more information about it, contact your regional Tait office.

Identifying the PA

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

This explanation of PA product codes is not intended to suggest that any combination of features is necessarily available in any one PA. Consult your regional Tait office for more information regarding the availability of specific models and options.

Product Code	Description
TBA**X**XXX-XXXX	7 = 5W 8 = 50W 9 = 100W
TBAX**X**XX-XXXX	0 = default 1 = 12V PA
TBAXX**XX**-XXXX	**Frequency Band and Sub-band** B1 = 136MHz to 174MHz C0 = 174MHz to 225MHz H0 = 380MHz to 520MHz[a] K2 = 760MHz to 870MHz[b] L0 = 850MHz to 960MHz[c]
TBAXXXX-**X**XXX	0 = default
TBAXXXX-X**X**XX	0 = default
TBAXXXX-XX**X**X	0 = default
TBAXXXX-XXX**X**	0 = default

a. Only PAs with hardware version 00.02 and later can operate from 380MHz to 520MHz. PAs with hardware version 00.01 and earlier can only operate from 400MHz to 520MHz.

b. The actual frequency coverage in this band when used with a K-band TB8100 reciter is 762MHz to 776MHz, and 850MHz to 870MHz.

c. The actual frequency coverage in this band when used with an L-band TB8100 reciter is:
852MHz to 854MHz and 928MHz to 930MHz
927MHz to 941MHz (transmit only)

Operational

Supply Voltage - 12V PA

Operating Voltage	10.5VDC ±0.25V to 16.8VDC[a]
Standard Test Voltage	12.5VDC
Minimum Startup Voltage	10.8VDC ±0.25V[a]
Polarity	negative earth only
Protection	
Input Voltage	electronic lock-out
Input Voltage Polarity	shunt diode[b]

Supply Voltage - 28V PA

Operating Voltage	26.5VDC to 29.5VDC
Standard Test Voltage	28VDC
Polarity	negative earth only
Polarity Protection	shunt diode

a. These limits are set in hardware at the factory, and cannot be adjusted in normal operation by the user. However, the startup voltage can be increased to 12VDC ±0.25V by carrying out the hardware modifications described in TN-1305 ("Changing the Startup Voltage of a 12V PA").

b. Circuit breaker or fuse in external wiring provided by user.

Supply Current - 12V PA[c]	Maximum	Typical
Standby	200mA	165mA
Transmit		
5W PA at 5W	1.5A	1.2A
50W PA at 50W	10.2A	9.2A

Supply Current - 28V PA	Maximum	Typical
Standby	50mA	42mA
Transmit - B, C and H Bands[d]		
5W PA at 5W	600mA	530mA
50W PA at 50W	5A	4.2A
100W PA at 100W	10A	8.3A
Transmit - K and L Bands[d]		
5W PA at 5W	600mA	530mA
50W PA at 50W[e]	5A	4.2A
100W PA at 100W	11A	8.5A

c. Measured at 12.5VDC input.

d. Into a 50Ω load.

e. 50W model unavailable in L band.

Operating Temperature Range	–30°C to +60°C (–22°F to +140°F) ambient temperature[f]

f. Ambient temperature is defined as the temperature of the air at the intake to the cooling fan.

Physical

Cooling	forced air over heatsink via fan mounted in subrack

Connectors - 12V PA

12VDC Input	Phoenix MSTBA2.5HC/2-G-5.08 male[a]
12VDC Output	4-way Micro-Fit 3.0 (Molex) female
RF Input	SMA female
Recommended SMA Torque	0.6N·m (5lbf·in)
RF Output	N-type female
Control and Alarm	16-way IDC male
Power Saving Control Input	2-way Micro-Fit 3.0 (Molex) male[b]

a. This is the connector fitted to the PA. The matching connector for the DC input leads is the Phoenix MVSTBR2.5HC/2-ST/5.08 female (recommended screw torque 0.5N·m or 4.5lbf·in).

b. This is the connector fitted to the PA. The matching connector for the Power Saving control lead is the 2x1-way Molex 43025-0200/crimp socket 43030-0001 female.

Connectors - 28V PA

28VDC Input	Phoenix MVSTBR2.5HC/2-ST/5.08 female[c]
RF Input	SMA female
RF Output	N-type female
Control and Alarm	16-way IDC male

c. Recommended screw torque 0.5N·m or 4.5lbf·in.

Dimensions

Height	86mm (3.4in)
Length	350mm (13.8in)
Width	
5W and 50W PAs	144mm (5.7in)
100W PA	177mm (7in)

Weight

5 and 50W PAs	4.6kg (10.1lb)
100W PA	5.9kg (13lb)

Power Amplifier RF Section

Frequency Bands	Frequency	5W	50W	100W
B Band	136MHz to 174MHz	✓	✓	✓
C Band	174MHz to 225MHz	✓	✓	✓
H Band	380MHz to 520MHz[a]	✓	✓	✓
K Band	760MHz to 870MHz[b]	✓	✓	✓
L Band	850MHz to 960MHz[b]	✓	—	✓

a. Only PAs with hardware version 00.02 and later can operate from 380MHz to 520MHz. PAs with hardware version 00.01 and earlier can only operate from 400MHz to 520MHz.

b. Refer to "Identifying the PA" on page 43 for the actual frequency coverage in these bands when used with a TB8100 reciter.

Input Power	+11dBm ±2dB
Output Power	
5W PA	
Rated Power	5W
Range of Adjustment	1W to 5W in 1W steps
50W PA	
Rated Power	50W
Range of Adjustment	5W to 50W in 1W steps
100W PA (28V PA only)	
Rated Power	100W
Range of Adjustment	10W to 100W in 1W steps
Output Power Accuracy[c,d]	±0.5dB into a 50Ω load

c. Within normal operating voltages and temperatures.

d. Measured directly on PA output.

Duty Cycle[e]	100% at maximum rated output power at +60°C (+140°F) ambient temperature

e. Measured directly on PA output.

Input Load Impedance	50Ω nominal (VSWR ≤1.8:1)
Output Load Impedance	50Ω nominal
Mismatch Capability	
Ruggedness	open and short circuit load at any phase angle 1h[f]
Stability	5:1 load VSWR at all phase angles[f]

f. Under power foldback.

Power Amplifier RF Section (Continued)

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 24V to 26V and 30V to 32V; shutdown when supply voltage is <24V and >32V
VSWR	power foldback to 10% at VSWR extremes; continuous analogue power foldback to maintain 100% duty cycle into mismatched loads

Transmitter RF Section

The specifications in this section pertain only to the combination of a 5W, 50W or 100W power amplifier with a TB8100 reciter.

Adjacent Channel Power	
Steady State (full deviation)	
Narrow Bandwidth	<–60dBc
Mid[a] and Wide Bandwidth	<–70dBc
Transient (unmodulated)	
Narrow Bandwidth	<–50dBc
Mid[a] and Wide Bandwidth	<–60dBc

a. H band only.

Sideband Noise[b]	B, C and H Bands	K and L Bands
±25kHz	<–137dBc/Hz	<–130dBc/Hz
±10MHz	<–160dBc/Hz at 5W	<–160dBc/Hz at 5W
	<–160dBc/Hz at 50W	<–158dBc/Hz at 50W
	<–160dBc/Hz at 100W	<–156dBc/Hz at 100W

b. No modulation, measured from centre frequency.

Hum and Noise[c]	
Narrow Bandwidth	–50dB (300Hz to 3kHz [ANSI/TIA])
Mid Bandwidth[d]	–54dB (300Hz to 3kHz [ANSI/TIA])
Wide Bandwidth	–55dB (300Hz to 3kHz [ANSI/TIA])

c. Measured with de-emphasis selected.

d. H band only.

Transmitter RF Section (Continued)

Intermodulation	–40dBc with interfering signal at –30dBc at PA output; for Europe, the 70dB ratio is achieved using an external circulator/isolator with a minimum isolation of 30dB and less than 0.5dB insertion loss; complies with the essential requirements of EN 301 929 with dual external isolators fitted
Radiated Spurious Emissions	
Transmit - B, C and H Bands	<–36dBm 30MHz to 1GHz <–30dBm 1GHz to 4GHz
Transmit - K Band	<–20dBm to 9GHz
Transmit - L Band	<–20dBm to 10GHz
Standby	<–57dBm to 1GHz <–47dBm 1GHz to 4GHz
Conducted Spurious Emissions	
Transmit - B, C and H Bands	<–36dBm 9kHz to 1GHz <–30dBm 1GHz to 4GHz
Transmit - K Band	<–20dBm to 9GHz
Transmit - L Band - 5W	<–30dBm to 12.75GHz
Transmit - L Band - 100W	<–30dBm to 12.75GHz
Standby	<–57dBm to 1GHz <–47dBm 1GHz to 12.75GHz
Transient Behaviour - B, C and H Bands	complies with EN 300 113-1 v1.6.2 and EN 300 113-2 v1.4.2
Transmit Key Time (with VCO in lock)	
Key Up	
5W PA	≤2.5ms
50 and 100W PAs	≤2ms
Key Up Debounce Timer	20ms
Key Down	
5W PA	≤2.5ms
50 and 100W PAs	≤2ms
Key Down Debounce Timer	20ms
Continuous Repetitive Key Rate	24Hz maximum
Lock Time	≤20ms

Control and Monitoring

Control Inputs and Outputs	I^2C data, clock and ground PA key line input fan control output

Compliance Standards

Where applicable, this equipment has been tested and approved to the following standards.

RF	EN 300 086-2 EN 300 113-2 EN 301 929[a] AS/NZS 4295 CFR Title 47 Parts 15, 22 and 90 RSS-119 HKTA 1002[b] HKTA 1016[c] TS LMR[d]

a. Complies with the essential requirements of EN 301 929 with dual external isolators fitted. B band only. The 50W and 100W variants are both compliant with the EU Marine standards EN301 929-1 and EN301 929-2.

b. H band only.

c. K band only.

d. B and H bands only.

EMC	ETSI EN 301 489-5 CFR Title 47 Part 15
EMC Regulatory Compliance in Australia N46	This product meets all ACMA regulatory requirements for electromagnetic compatibility (EMC). For more information about EMC compliance, visit the ACMA website at www.acma.gov.au.
Safety	EN 60950
Environmental	
Low Pressure (altitude)[e]	MIL-STD-810F 500.4 Proc 2
Humidity	IEC60068-2-30
Vibration	MIL-STD-810F 514.5 Proc 1
Shock	MIL-STD-810F 516.5 Proc 1

e. 4572 m (15000 ft).

4 Power Management Unit Specifications

This chapter provides specifications pertaining to the power management unit (PMU) as a separate module.

The performance figures given in these specifications are applicable only to equipment operating as an integral part of a TB8100 base station. These performance figures are minimum figures, unless otherwise indicated, for equipment operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltages as follows:

- AC module - 230VAC
- 12V DC module - 12VDC
- 24V DC module - 24VDC
- 48V DC module - 48VDC.

Where applicable, the test methods used to obtain these figures are those described in the ETSI-EN specifications. You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait.

The product Release Notes contain known issues or limitations which describe how the performance of the base station varies from the specifications published in this manual. You should always refer to the latest issue of the Release Notes for any known variations from these specifications.

Identifying the PMU

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

This explanation of PMU product codes is not intended to suggest that any combination of features is necessarily available in any one PMU. Consult your regional Tait office for more information regarding the availability of specific models and options.

Product Code	Description
TBA**X**XXX-XXXX	3 = PMU
TBA3**X**XX-XXXX	0 = default
TBA3X**X**X-XXXX	0 = AC module not fitted A = AC module fitted
TBA3XX**X**-XXXX	0 = DC module not fitted 1 = 12V DC module fitted 2 = 24V DC module fitted 4 = 48V DC module fitted
TBA3XXX-**X**XXX	0 = standby power supply card not fitted 1 = 12VDC standby power supply card fitted 2 = 24VDC standby power supply card fitted 4 = 48VDC standby power supply card fitted
TBA3XXX-X**X**XX	0 = auxiliary power supply board not fitted 1 = 12VDC auxiliary power supply board fitted 2 = 24VDC auxiliary power supply board fitted 4 = 48VDC auxiliary power supply board fitted
TBA3XXX-XX**X**X	0 = default
TBA3XXX-XXX**X**	0 = default

Operational

Operating Temperature Range	–30°C to +60°C (–22°F to +140°F) ambient temperature[a]

a. Ambient temperature is defined as the temperature of the air at the intake to the cooling fan.

Front Panel LED Indicators	
Green - Steady	PMU operating correctly
Green - Flashing	PMU not operating, bootloader in progress
Red - Flashing	one or more alarm conditions present
Parameters Monitored by PMU Microprocessor	mains input good signal DC input voltage PA output current and voltage heatsink temperatures of AC and DC modules

Physical

Cooling	forced air over heatsink via fan mounted in subrack
Dimensions	
Height	143.5mm (5.6in)
Width	121.4mm (4.8in)
Length	
AC PMU	324mm (12.8in)
DC PMU	337mm (13.3in)
AC and DC PMU	337mm (13.3in)
Weight	
AC PMU	4.8kg (10.6lb)
DC PMU	5.1kg (11.2lb)
AC and DC PMU	7kg (15.4lb)

Connections

The following specifications refer to the external wiring and connectors which are connected to the PMU. They do not refer to the wiring and connectors built into the PMU itself.

AC Input

Connector Type	IEC female
Current Rating	8A

DC Input - 12VDC (battery)

Connector Type	M6 screw into threaded fitting on bus bar
Recommended Screw Torque	2–2.25N·m (18–20lbf·in)
Connector Current Rating	50A
Flexible Wire Size	2AWG[a]
Flexible Wire Cross Section	35mm^2 [a]

DC Input - 24VDC (battery)

Connector Type	M6 screw into threaded fitting on bus bar
Recommended Screw Torque	2–2.25N·m (18–20lbf·in)
Connector Current Rating	25A
Flexible Wire Size	5AWG[a]
Flexible Wire Cross Section	16mm^2 [a]

DC Input - 48VDC (battery)

Connector Type	M6 screw into threaded fitting on bus bar
Recommended Screw Torque	2–2.25N·m (18–20lbf·in)
Connector Current Rating	12A
Flexible Wire Size	8AWG[a]
Flexible Wire Cross Section	8mm^2 [a]

a. For a length of 1.5m to 2m (5ft to 6.5ft) (typical). The DC input leads should be of a suitable gauge to ensure less than 0.2V drop at maximum load over the required length of lead.

DC Output - 28V High Current for PA

Connector Type	Phoenix MVSTBR2.5HC/2-ST/5.08 female
Recommended Screw Torque	0.5N·m (4.5lbf·in)
Connector Current Rating	16A
Flexible Wire Size	11AWG

DC Output - 28V Low Current for Reciter

Connector Type	2x4-way Molex 43025-0800/crimp socket 43030-0001 female
Connector Current Rating	3A
Flexible Wire Size	20AWG

DC Output - Low Current
(from auxiliary power supply)

Connector Type	Phoenix MVSTBR2.5HC/2-ST/5.08 female
Recommended Screw Torque	0.5N·m (4.5lbf·in)
Connector Current Rating	3A to 16A
Flexible Wire Size	20AWG to 11AWG

Input - AC Module

Input	
Voltage	88VAC to 264VAC
Frequency	45Hz to 65Hz
Power Factor	>0.95
Total Harmonic Distortion (THD)	<8%
Inrush Current	
230VAC	<30A at <4ms
115VAC	<15A at <4ms
Leakage Current	<3.5mA/240VAC
Protection	
Fault Current (input)	10A fuse
Transient Suppression	275V MOV (line-to-line)
Overvoltage Inhibit (self-recovering)	275VAC ±10V
Undervoltage Signal	83VAC ±5V
General	
Efficiency at Rated Output (at 220VAC)	86%
Input-to-chassis Isolation	1500VAC, 50Hz, 1 minute
Input-to-output Isolation	3000VAC, 50Hz, 1 minute
Output-to-chassis Isolation	500VAC, 50Hz, 1 minute

Input - DC Module

Input Voltage	12V PMU	24V PMU	48V PMU
User-programmable Alarms[a]			
Low Battery Voltage	10V to 14V	20V to 28V	40V to 56V
High Battery Voltage	14V to 17.5V	28V to 35V	56V to 70V
User-programmable Limits[b]			
Startup Voltage (after shutdown)	10.9V to 15V ±0.3V	21.8V to 30V ±0.5V	43.6V to 60V ±1V
Shutdown Voltage	10V to 13.5V ±0.3V	20V to 27V ±0.5V	40V to 54V ±1V
Battery Protection (Fail-safe) Limits[c]			
Startup Voltage	10.8V ±0.2V	21.6V ±0.5V	43.2V ±1V
Undervoltage Shutdown	9.5V ±0.3V	19V ±0.5V	38V ±1V
Overvoltage Shutdown	18.1V ±0.3V	36.2V ±0.5V	72.4V ±1V
Overvoltage Shutdown Reset	17.1V ±0.3V	34.2V ±0.5V	68.4V ±1V

a. User-programmable alarms can be set for low or high battery voltage, using the Service Kit software. The alarms will be triggered when the set voltage levels are reached. These limits are subject to the tolerances of the battery protection circuitry, as stated in "Battery Protection (Fail-safe) Limits" above.

b. The user-programmable startup and shutdown limits allow for adjustable startup and shutdown voltages. Using the Service Kit software, these limits can be adjusted for different numbers of battery cells, or for the particular requirements of the base station operation. Once the limits are reached, the PMU will shutdown. These limits are subject to the tolerances of the battery protection circuitry.

c. The battery protection limits are set in hardware at the factory, and cannot be adjusted by the user. These limits will not be reached under normal operation conditions, but are provided as "fail-safe" measures to protect the battery from deep discharge.

Input Current	12V PMU	24V PMU	48V PMU
0V to Battery Protection Startup Voltage[d]	2mA maximum	2mA maximum	1.2mA maximum
Battery Protection Startup Voltage to User-programmed Startup Voltage[e]	40mA (typical) at 10.8V	30.1mA (typical) at 21.6V	13.2mA (typical) at 43.2V
Operating Current	refer to "System Specifications" on page 8		

d. When the input voltage drops below the battery protection undervoltage shutdown limit, and until the voltage rises above the battery protection startup voltage.

e. At initial power-up; or, after battery protection has occurred, when the input voltage rises above the battery protection startup voltage (PMU now under control of its microcontroller), but is still below the user-programmed startup voltage.

Protection	
Fault Current (input)	circuit breaker or fuse in external wiring[f]
Wrong Input Voltage	electronic lock-out
Wrong Input Voltage Polarity	shunt diode

f. provided by user

General	
Efficiency at Rated Output	
12VDC	82%
24VDC	85%
48VDC	90%
Input-to-output Isolation	1000VAC, 50Hz, 1 minute

Output - AC and DC Modules

High Current Output for PA

Voltage	28V
Current	14A maximum
Regulation	±0.5%
Ripple and Noise (100MHz bandwidth)	50mV pp
Ripple and Noise rms	10mV rms
Transient Response on 28V Loadstep (10% to 100% loadstep)	2% overshoot and recover within 0.6ms

Protection - PA Output

Overload	electronic current limit above 16A
Short Circuit	hiccup mode, self-resetting
Overvoltage	
AC Module	electronic shutdown latch (33.5V)
DC Module	electronic hysteric control (33.5V)

Protection - Reciter Output

Short Circuit	2.5A self-resetting fuse

Standby Output - DC Module

Low Current Output for Reciter

Voltage	28.9V
Current	0.3A maximum
Regulation	±2.5%
Ripple and Noise (100MHz bandwidth)	50mV pp
Ripple and Noise rms	10mV rms

Protection

Overload/Short Circuit	electronic current limit

General

Efficiency at Rated Output	86%
Input-to-output Isolation	1000VAC, 50Hz, 1 minute
Control	shutdown signal (isolated)

Auxiliary Power Supply

DC Input Voltage	28V ±15%		
DC Output	**12V**	**24V**	**48V**
Voltage	13.65V	27.3V	54.6V
Current	3A maximum	1.5A maximum	750mA maximum
Regulation	±2%	±2%	±2%
Ripple and Noise (100MHz bandwidth)	50mV pp	50mV pp	50mV pp
Ripple and Noise rms	10mV rms	10mV rms	10mV rms
Zero Load Ripple	100mVpp	100mVpp	100mVpp
Protection	**12V**	**24V**	**48V**
Overload/Short Circuit	electronic current limit	electronic current limit	electronic current limit
Overvoltage	16V Zener diode	32V Zener diode	62V Zener diode
General			
Efficiency at Rated Output	88%		
Input-to-output Isolation	1000VAC, 50Hz, 1 minute		
Output-to-chassis Isolation	500VAC, 50Hz, 1 minute		

Compliance Standards

Where applicable, this equipment has been tested and approved to the following standards.

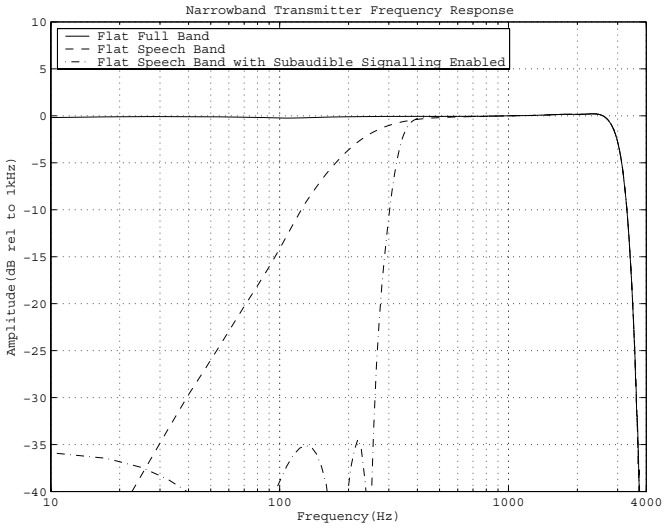
Safety	EN 60950-1 UL E223047 AS/NZS 60950-1 Q090114
EMC	ETSI EN 301 489-5 CFR Title 47 Part 15
EMC Regulatory Compliance in Australia N46	This product meets all ACMA regulatory requirements for electromagnetic compatibility (EMC). For more information about EMC compliance, visit the ACMA website at www.acma.gov.au.
Environmental[a]	
Low Pressure (altitude)	MIL-STD-810F 500.4 Proc 2
Humidity	IEC60068-2-30
Vibration	MIL-STD-810F 514.5 Proc 1
Shock	MIL-STD-810F 516.5 Proc 1

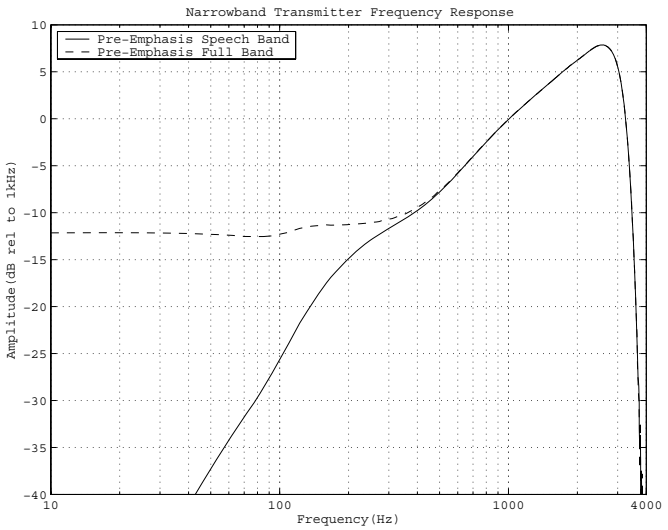
a. 4572m (15000ft).

A Frequency Response Diagrams

This appendix shows the transmitter and receiver frequency response diagrams.

Figure A.1 Transmitter frequency response – narrow bandwidth





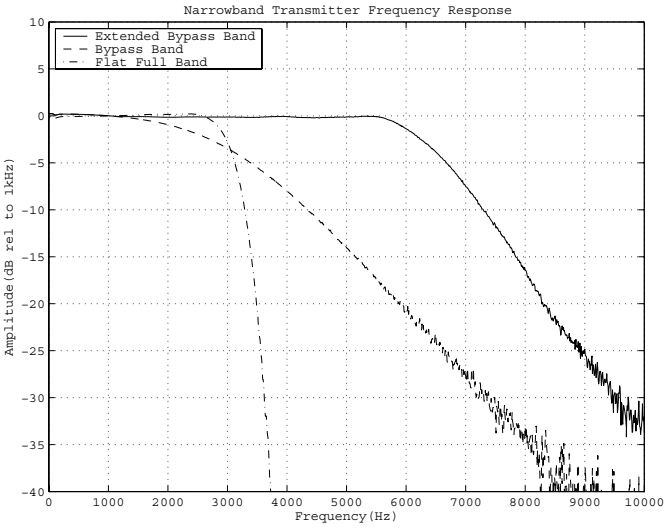
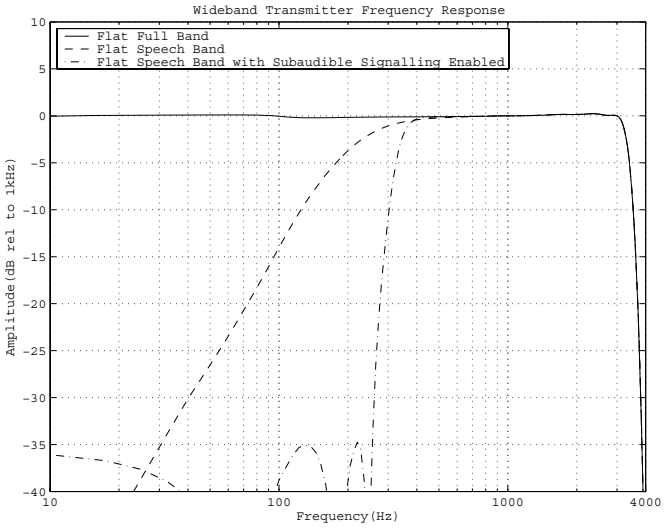
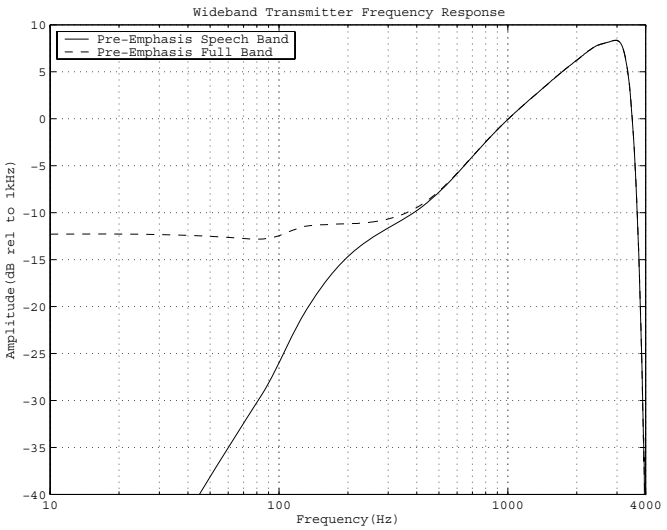


Figure A.2 Transmitter frequency response – wide bandwidth





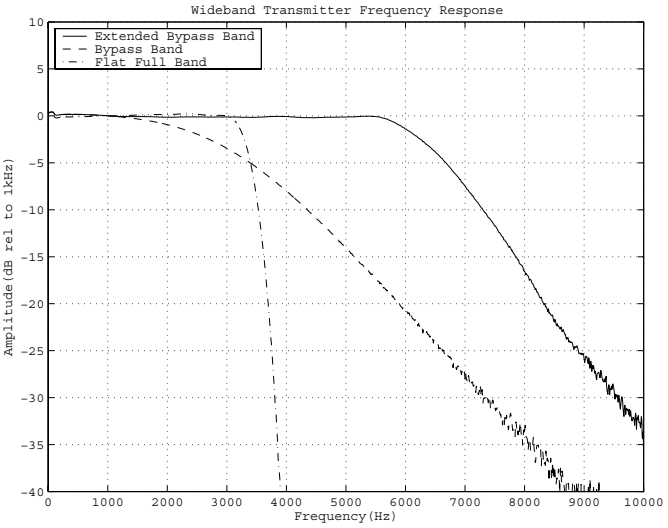
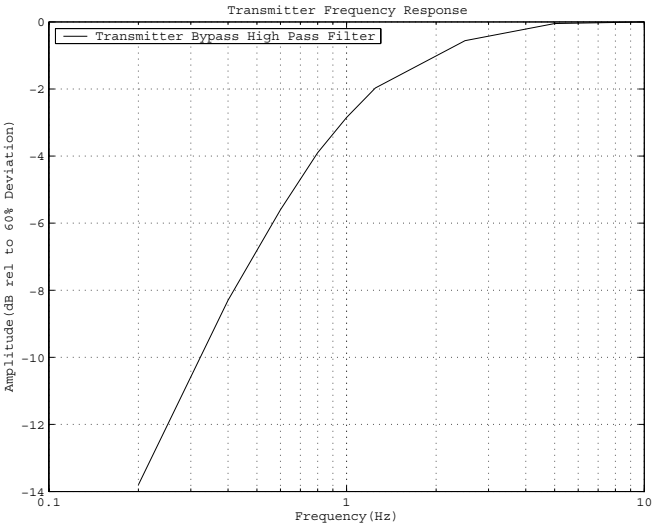


Figure A.3 Transmitter frequency response – high-pass filter, and subaudible band



With the high-pass filter disabled, the LF response extends to DC.

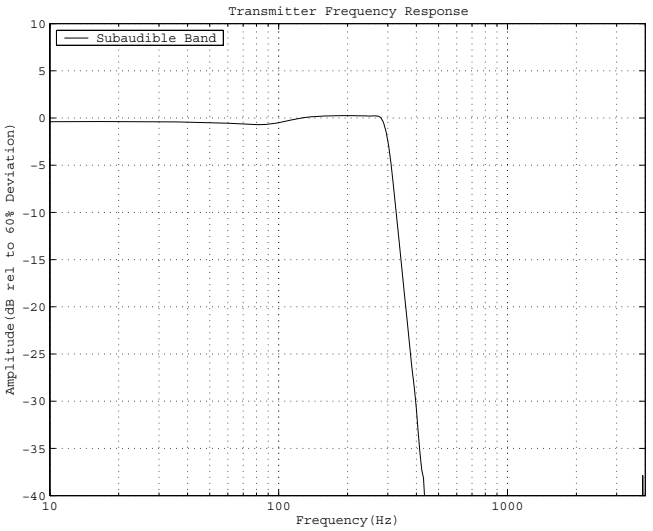
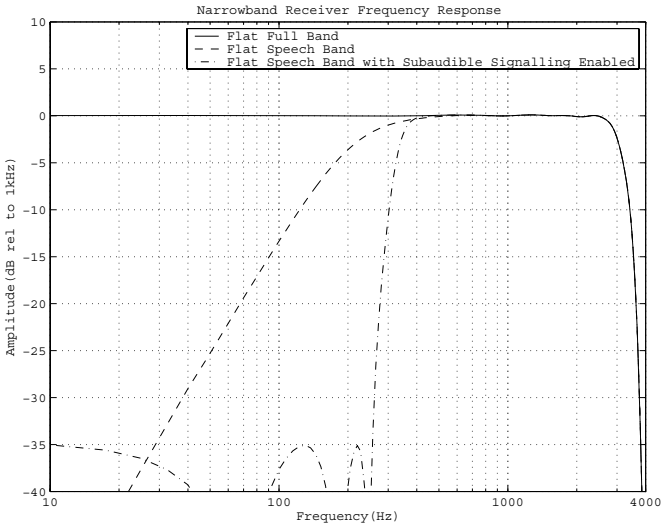
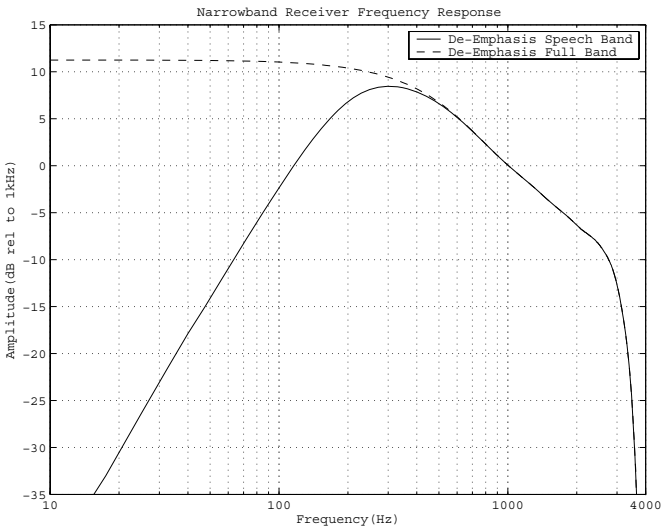


Figure A.4 Receiver frequency response – narrow bandwidth





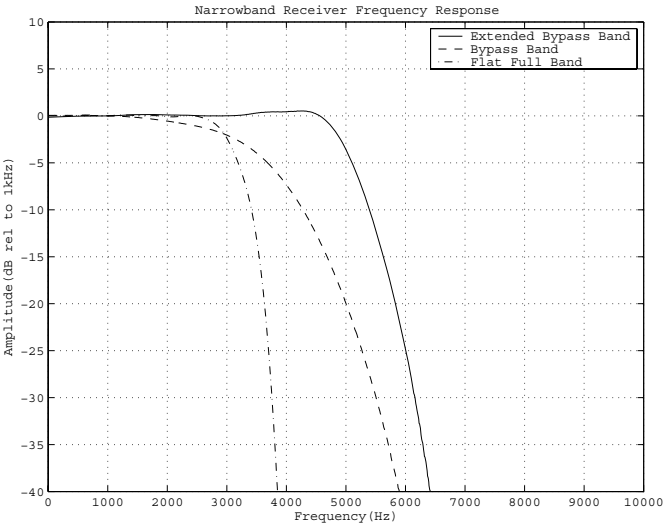


Figure A.5 Receiver frequency response - wide bandwidth

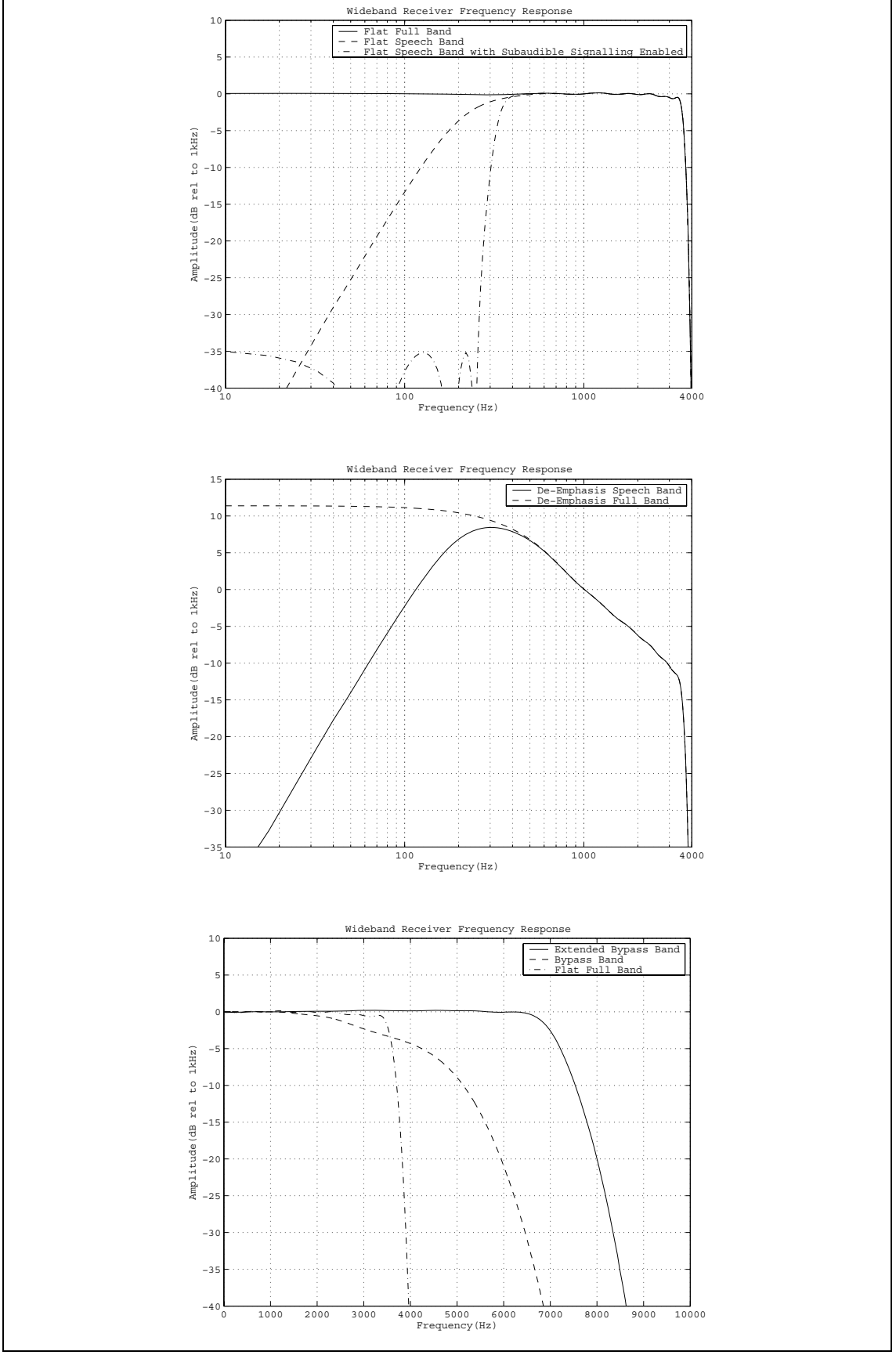


Figure A.6 Receiver frequency response – subaudible band