TB8100 base station

Specifications Manual

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

Contents

Preface

Scope of Manual

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

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 Ltd reserves the right to update the equipment or this manual or both without prior notice.

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Disclaimer

There are no warranties extended or granted by this manual. Tait Electronics Ltd accepts no responsibility for damage arising from use of the information contained in the manual or of the equipment and software it describes. It is the responsibility of the user to ensure that use of such information, equipment and software complies with the laws, rules and regulations of the applicable jurisdictions.

Associated Documentation

TB8100 Installation and Operation Manual.

TB8100 Installation Guide (a subset of the Installation and Operation Manual).

TB8100 Service Manual.

TB8100 Service Kit and Alarm Center User's Manuals and online Help.

TB8100 Calibration Kit User's Manual and online Help.

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 CD supplied with the base station[1]. Updates may also be published on the Tait support website.

1. Technical notes are only available in PDF format from the Tait support website. Consult your nearest Tait Dealer or Customer Service Organisation for more information.

1 System Specifications

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

The performance figures given in the power and current consumption specifications are typical figures based on using the equipment listed in the table below. The test frequency used was 475MHz.

Module	Description
reciter	mid-band UHF (H2 band) reciter with isolated system interface PCB
PA	5W, 50W or 100W PA, as stated in the appropriate specifications
PMU	AC and DC PMU fitted with a 10W standby power supply card and a 40W auxiliary power supply PCB
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.

Note 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.

Transmit Power and Current Consumption - 240 VAC Input

	A	VA	W
5W BSS			
Minimum RF Output Power (1W)	480mA	115VA	30W
50% RF Output Power (2.5W)	490mA	118VA	37W
Maximum RF Output Power (5W)	490mA	118VA	41W
50W BSS			
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 BSS			
Minimum RF Output Power (10W)	640mA	154VA	100W
50% RF Output Power (50W)	870mA	209VA	171W
Maximum RF Output Power (100W)	1.1A	262VA	230W

Transmit Power and Current Consumption - 110 VAC Input

	A	VA	W
5W BSS			
Minimum RF Output Power (1W)	350mA	39VA	30W
50% RF Output Power (2.5W)	400mA	44VA	36W
Maximum RF Output Power (5W)	430mA	47VA	39W
50W BSS			
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 BSS			
Minimum RF Output Power (10W)	960mA	106VA	103W
50% RF Output Power (50W)	1.6A	178VA	176W
Maximum RF Output Power (100W)	2.2A	239VA	237W

Transmit Power and Current Consumption - AC Input Voltage Extremes

	A	VA	W
5W BSS*			
85VAC	530mA	45VA	42W
264VAC	540mA	142VA	40W
*at 5W RF output power			
50W BSS*			
85VAC	1.6A	139VA	138W
264VAC	730mA	194VA	131W
*at 50W RF output power			
100W BSS*			
85VAC	2.9A	243VA	242W
264VAC	1.0A	274VA	229W
*at 100W RF output power			

Transmit Power and Current Consumption - 12.5VDC Input

	A	W
5W BSS		
Minimum RF Output Power (1W)	1.8A	23W
50% RF Output Power (2.5W)	2.2A	28W
Maximum RF Output Power (5W)	2.6A	32W
50W BSS		
Minimum RF Output Power (5W)	4.6A	58W
50% RF Output Power (25W)	7.6A	95W
Maximum RF Output Power (50W)	10A	125W
100W BSS		
Minimum RF Output Power (10W)	8.0A	100W
50% RF Output Power (50W)	14.0A	175W
Maximum RF Output Power (100W)	19.2A	240W

Transmit Power and Current Consumption - DC Input Voltage Extremes

	A	W
5W BSS*		
10.5VDC	2.9A	30W
15.5VDC	2.1A	33W
*at 5W RF output power		
50W BSS*		
10.5VDC	11.7A	123W
15.5VDC	8.3A	128W
*at 50W RF output power		
100W BSS*		
10.5VDC	21.7A	228W
15.5VDC	15.0A	232W
*at 100W RF output power		

Receive Power and Current Consumption

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

	A	W
Normal Mode, No Power Save*		
Full Speaker Audio	1.1A	13.9W
Gate Open, Speaker Off	1.0A	12.5W
*with standard control panel		
Normal Mode, 20ms Receiver Cycling, 20ms Transmit Key Time		
Gate Closed, Standard Control Panel	745mA	9.3W
Power Save Control Panel	720mA	9.0W
Sleep Mode, 200ms Receiver Cycling*	400mA	5.0W
*with power save control panel and standby power supply card		

Receive Power and Current Consumption (Continued)

	A	W
Deep Sleep Mode*		
200ms Receiver Cycling	160mA	2.0W
500ms Receiver Cycling	122mA	1.52W
1s Receiver Cycling	109mA	1.36W
5s Receiver Cycling	98mA	1.23W

*with power save control panel and standby power supply card

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*	
Single 5/50W Base Station System	20.6kg (45.4lb)
Dual 5/50W Base Station System	27.6kg (60.8lb)
Single 100W Base Station System	21.5kg (47.4lb)

*with AC and DC PMU

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

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 29.

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-B-2002 and ETSI-EN specifications. You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait Electronics Ltd.

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	±5.0kHz	15.0kHz

a. Mid bandwidth is available only in H band reciters (400MHz 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.

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.

Note 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 nearest Tait Dealer or Customer Service Organisation for more information regarding the availability of specific models and options.

Product Code	Description
TBA**X**XXX-XXXX	4 = reciter
TBA4**X**XX-XXXX	0 = default
TBA4X**XX**-XXXX	**Frequency Band and Sub-band** B2 = 136MHz to 156MHz B3 = 148MHz to 174MHz H1 = 400MHz to 440MHz H2 = 440MHz to 480MHz H3 = 470MHz to 520MHz H4 = 380MHz to 420MHz
TBA4XXX-**XXX**X	**System Interface PCB** 000 = no system interface PCB fitted 0A0 = standard 0B0 = isolated 0C0 = isolated E & M 0T1 = TaitNet
TBA4XXX-XXX**X**	0 = default

General

Number of Channels	255
Supply Voltage	
Operating Voltage	12VDC to 29.5VDC
Standard Test Voltage	28VDC
Polarity	negative earth
Polarity Protection	Zener diode and thermal resistor
Supply Current	
Receiver and Exciter Operating	<330mA at 28VDC
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 immediately in front of the control panel
Cooling	convection
Connectors	
RF Input	BNC female
RF Output	SMA female
Control and Alarm	16-way IDC male
External Reference Frequency Input	BNC female
28VDC Input	4-way Micro-Fit 3.0 (Molex) male
Auxiliary DC Input	4-way Micro-Fit 3.0 (Molex) male
System	depends on system interface PCB fitted* *refer to Installation and Operation Manual
Dimensions	
Height	143.6mm (5.7in)
Width	54.6mm (2.1in)
Length	333.3mm (13.1in)
Weight	2.1kg (4.6lb)

Receiver RF Section

Frequency Bands	
B Band	136MHz to 174MHz
H Band	400MHz to 520MHz
Frequency Sub-bands	
B2	136MHz to 156MHz
B3	148MHz to 174MHz
H4	380MHz to 420MHz
H1	400MHz to 440MHz
H2	440MHz to 480MHz
H3	470MHz to 520MHz
Type	triple conversion superheterodyne; first conversion is analogue, second is hybrid, and third is digital
Frequency Increments	
B Band	3.125kHz and 2.5kHz
H Band	5kHz and 6.25kHz
Switching Range	>2% of the centre frequency* *e.g. ±1.36MHz from the centre frequency at 136MHz, ±4MHz from the centre frequency at 400MHz, or ±5.2MHz from the centre frequency at 520MHz
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)
Frequency Stability	±1ppm –30°C to +60°C (–22°F to +140°F)
RSSI	–120dBm to –60dBm (0.22µV to 223.6µV), 0.5V to 6V, programmable slope
IF Stages - B Band	
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	14.0kHz, –3dB

Receiver RF Section (Continued)

IF Stages - H Band

Frequencies	
Analogue	70.1MHz
Digital	9.9MHz and 0Hz
Analogue IF Bandwidth	20kHz, –4dB
Digital IF Bandwidths	
Narrow Bandwidth	8.8kHz, –3dB
Mid Bandwidth	12.0kHz, –3dB
Wide Bandwidth	14.0kHz, –3dB

Sensitivity*

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**

*12dB SINAD

**up to 2dB degradation at extremes of temperature

Maximum Usable Sensitivity*

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)**

*sensitivity for 20dB SINAD, psophometrically weighted, RF source modulated at 60% deviation with 1kHz

**up to 2dB degradation at extremes of temperature

Ultimate Signal-to-Noise Ratio*

Narrow Bandwidth	45dB (ANSI/TIA)**
	50dB (CEPT - psophometric)**
Mid Bandwidth+	50dB (ANSI/TIA)**
Wide Bandwidth	55dB (ANSI/TIA)**

*at –47dBm

+H band only

**up to 5dB degradation at extremes of switching range and temperature

Receiver RF Section (Continued)

Selectivity	
B Band	
Narrow Bandwidth	50 dB (ANSI/TIA-603-B)*
	89 dB (ETSI)*
Wide Bandwidth	87 dB (ANSI/TIA-603-B)*
H Band	
Narrow Bandwidth	46 dB (ANSI/TIA-603-B)*
	85 dB (ETSI)*
Mid Bandwidth	85 dB (ETSI)*
Wide Bandwidth	82 dB (ANSI/TIA-603-B)*
	*up to 5 dB degradation at extremes of switching range and temperature
Spurious Response Attenuation	≥100 dB (ANSI/TIA)*
	≥90 dB (ETSI)
	*AGC switched off in H band reciter
Intermodulation Response Attenuation	
Narrow Bandwidth	80 dB (ETSI)*
Mid Bandwidth**	80 dB (ETSI)*
Wide Bandwidth	85 dB (ANSI/TIA)*
**H band only	*up to 5 dB degradation at extremes of switching range and temperature
Blocking Rejection	
1–10 MHz	100 dB (ETSI)
>10 MHz	110 dB (ETSI)
±1, ±2, ±5 and ±10 MHz	100 dB (ANSI/TIA)*
	*AGC switched off in H band reciter
Co-channel Rejection	
Narrow Bandwidth	–8 dB
Mid Bandwidth*	–8 dB
Wide Bandwidth	–5 dB
*H band only	
Amplitude Characteristic*	≤3 dB (ETSI)
*RF Input Level –107 dBm to –13 dBm	
Spurious Emissions	
Conducted	<–90 dBm to 2 GHz
	<–70 dBm 2 GHz to 4 GHz
Radiated	<–57 dBm EIRP to 1 GHz
	<–47 dBm EIRP 1 GHz to 4 GHz

Receiver Audio Section - General

Outputs Available	speaker output via control panel balanced and unbalanced line outputs via system interface PCB
Frequency Response	flat or de-emphasised (750 µs)
De-emphasised Response	
Bandwidth	300 Hz to 2.55 kHz (NB) 300 Hz to 3.4 kHz (MB)* 300 Hz to 3.4 kHz (WB)
Response	within +1, –3 dB of a –6 dB/octave de-emphasis curve (ref. 1 kHz)

*H band only

Flat Response	Balanced Audio	Unbalanced Audio
Bandwidth	67 Hz to 2.55 kHz (NB) 67 Hz to 3.4 kHz (MB)* 67 Hz to 3.4 kHz (WB)	10 Hz to 2.55 kHz (NB) 10 Hz to 3.4 kHz (MB)* 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

*H band only

Balanced Line Output (via System Interface PCB)	
Output Level Range	–20 dBm to +10 dBm
Output Impedance	600 Ω
Distortion*	
De-emphasised	≤2%
Flat	≤4% (NB) ≤2% (WB)

*at –70 dBm signal level

Unbalanced Line Output (via System Interface PCB)	
Output Level Range	0.3 Vpp to 3 Vpp into 10 kΩ
Speaker Output (via Control Panel)	
Power	0.5 W maximum
Speaker Impedance	16 Ω nominal
Distortion*	≤3% at 1 kHz, 0.35 W, 16 Ω

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

Receiver Audio Section - CTCSS

High Pass (Subaudible) Filter

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

**1kHz at 60% system deviation, CTCSS at 10% system deviation

*H band only

Tone Detect

Tone Squelch Opening	better than 6dB SINAD 3dB SINAD at 250.3Hz (typical) 4dB SINAD at 100Hz (typical)
Tone Detect Bandwidth	±2Hz accept (typical) ±3Hz reject (typical)
Response Time	150ms open and close (typical)

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*	1.5dB to 6dB
Opening Time	≤20ms
Closing Time	50 ±10ms

*programmable

RSSI Gating

Opening Level	–117dBm to –70dBm
Accuracy	±3dB
Hysteresis*	2dB to 10dB
Opening Time	≤5ms
Closing Time	50 ±10ms

*programmable

Exciter RF Section

Frequency Bands	
B Band	136MHz to 174MHz
H Band	400MHz to 520MHz
Frequency Sub-bands	
B2	136MHz to 156MHz
B3	148MHz to 174MHz
H4	380MHz to 420MHz
H1	400MHz to 440MHz
H2	440MHz to 480MHz
H3	470MHz to 520MHz
Modulation Type	FM
Frequency Increments	
B Band	3.125kHz and 2.5kHz
H Band	5kHz and 6.25kHz
Switching Range - B Band	>8MHz* *i.e. >±4MHz from the centre frequency
Switching Range - H Band	>2% of the centre frequency* *i.e. ±4MHz from the centre frequency at 400MHz, and ±5.2MHz from the centre frequency at 520MHz
Output Load Impedance	50Ω nominal (VSWR <2:1)
Frequency Stability	±1ppm –30°C to +60°C (–22°F to +140°F)
Power Output	+11dBm ±2dB

Exciter Audio Section - Inputs

Inputs Available	microphone input via control panel balanced and unbalanced line inputs via system interface PCB
Microphone Input	
Input Level Range*	80dB SPL to 115dB SPL
Impedance	600Ω
Compressor	
Attack Time	10ms
Decay Time	800ms
Dynamic Range	35dB
Distortion	≤3%

*60% modulation at 1kHz

Exciter Audio Section - Inputs (Continued)

Balanced Line Input

Input Level Range*	–20dBm to +10dBm
Impedance	600Ω balanced

*60% modulation at 1kHz

Unbalanced Line Input

Input Level Range	0.3Vpp to 3Vpp
Impedance	>10kΩ

Exciter Audio Section - Modulation Characteristics

Frequency Response*	flat or pre-emphasised**
*below limiting	**microphone input via control panel, balanced and unbalanced line inputs via system interface PCB

Line and Microphone Inputs

Pre-emphasised Response		
Bandwidth	300Hz to 2.55kHz (NB) 300Hz to 3kHz (MB)* 300Hz to 3kHz (WB)	
Below Limiting	within +1, –3dB of a 6dB/octave pre-emphasis curve (ref. 1kHz)	
Flat Response	Balanced Audio	Unbalanced Audio
Bandwidth	67Hz to 2.55kHz (NB) 67Hz to 3kHz (MB)* 67Hz to 3kHz (WB)	10Hz to 2.55kHz (NB) 10Hz to 3kHz (MB)* 10Hz to 3kHz (WB)
Response	within +1, –3dB of output level at 1kHz	within +1, –1dB of output level at 1kHz

*H band only

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

Hum and Noise

Narrow Bandwidth	–50dB typical (ETSI)*
Mid Bandwidth**	–50dB typical (ETSI)*
Wide Bandwidth	–55dB typical, 300Hz to 3kHz (ANSI/TIA)*
**H band only	*up to 5dB degradation at extremes of switching range and temperature

Exciter Audio Section - CTCSS

Standard Tones	all 37 ANSI/TIA group A, B and C tones plus 13 commonly used tones
Frequency Error*	0.08% maximum
*from ANSI/TIA tones	
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*	10MHz or 12.8MHz
*One frequency must be specified by the Service Kit.	
Lock Range	±50Hz
Input Level	300mVpp to 5Vpp
Input Impedance	≥1kΩ

Compliance Standards

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

RF	EN 300 086-2:V1.2.1 EN 300 113-2 (03/2001) AS4295-1995 CFR 47 Parts 15, 22 and 90 RSS-119 Iss 6
EMC	ETSI EN 301 489 V1.4.1 (2002-08) CFR 47 Part 15 Level B1
Safety	BS EN 60950-1:2002 ANSI/UL Std. 60950 3rd edition CAN/CSA-C22.2 No. 60950-00 3rd edition AS/NZS 60950 and ACATS001

Compliance Standards (Continued)

Environmental

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

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-B-2002 and ETSI-EN specifications. You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait Electronics Ltd.

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 (400MHz to 520MHz).

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.

Note 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 nearest Tait Dealer or Customer Service Organisation 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
TBAXX**XX**-XXXX	**Frequency Band and Sub-band** B1 = 136MHz to 174MHz H0 = ~~400MHz to 520MHz~~ 380MHz to 520MHz
TBAXXXX-**X**XXX	0 = default
TBAXXXX-X**X**XX	0 = default
TBAXXXX-XX**X**X	0 = default
TBAXXXX-XXX**X**	0 = default

General

Supply Voltage	
Operating Voltage	26.5VDC to 29.5VDC
Standard Test Voltage	28VDC
Polarity	negative earth only
Polarity Protection	reverse polarity diode

Supply Current	Maximum	Typical
Standby	50mA	42mA
Transmit*		
5W PA @ 5W	600mA	530mA
50W PA @ 50W	5A	4.2A
100W PA @ 100W	10A	8.3A

*into a 50Ω load

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 fan mounted in subrack
Connectors	
28VDC Input	Phoenix Combicon MVSTBR2.5HC
RF Input	SMA female
RF Output	N-type female
Control and Alarm	16-way IDC male
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	4.9kg (10.8lb)
100W PA	5.8kg (12.8lb)

Power Amplifier RF Section

Frequency Bands	
B Band	136MHz to 174MHz
H Band	~~400MHz to 520MHz~~ 380MHz to 520MHz
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	
Rated Power	100W
Range of Adjustment	10W to 100W in 1W steps
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 *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 for one hour*
Stability	5:1 load VSWR at all phase angles* *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* and Wide Bandwidth	<–70dBc
Transient (Unmodulated)	
Narrow Bandwidth	<–50dBc
Mid* and Wide Bandwidth	<–60dBc

*H band only

Sideband Noise*	
±25kHz	<–137dBc/Hz
±1MHz	<–147dBc/Hz
±10MHz	<–147dBc/Hz at 5W <–157dBc/Hz at 50W <–160dBc/Hz at 100W

*no modulation, measured from centre frequency

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

*H band only

Intermodulation	–40dBc with interfering signal at –30dBc at PA output

Transmitter RF Section (Continued)

Radiated Spurious Emissions	
Transmit	<–36dBm to 1GHz <–30dBm 1GHz to 4GHz
Standby	<–57dBm to 1GHz <–47dBm 1GHz to 4GHz
Conducted Spurious Emissions	
Transmit	<–36dBm to 1GHz <–30dBm 1GHz to 12.75GHz
Standby	<–57dBm to 1GHz <–47dBm 1GHz to 12.75GHz
Transmitter Switching	complies with EN 300 113-1 v1.4.1 and EN 300 113-2 (03/2001)
Transmit Key Time*	
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

*with VCO in lock

Control and Monitoring

Control Inputs and Outputs	I^2C data, clock and ground PA key line input fan control output
Monitor Outputs*	
Permanently Assigned	forward power reverse power
Selectable**	ambient temperature RF power control voltage

*analogue
**select one

Compliance Standards

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

Safety	BS EN 60950-1:2002 ANSI/UL Std. 60950 3rd edition CAN/CSA-C22.2 No. 60950-00 3rd edition AS/NZS 60950 and ACATS001
EMC	ETSI EN 301 489 V1.4.1 (2002-08) CFR 47 Part 15 Level B1
RF	EN 300 086-2:V1.2.1 EN 300 113-2 (03/2001) AS4295-1995 CFR 47 Parts 15, 22 and 90 RSS-119 Iss 6
Environmental	
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

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
- DC module - 12VDC.

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 Electronics Ltd.

Product Identification

TB8100 PMUs are identified by a product code printed on the label fixed to the rear panel. The product codes are explained in the following table.

Product Code	Model
TBA30A0-xxxx	AC PMU - 88VAC to 264VAC input
TBA3001-xxxx	DC PMU - 12VDC input
TBA30A1-xxxx	AC and DC PMU - 88VAC to 264VAC input 12VDC input

General

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 fan mounted in subrack
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
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	4.60kg (10.1lb)
DC PMU	4.86kg (10.7lb)
AC and DC PMU	6.40kg (14.1lb)

Input - AC Module

Input	
Voltage	88VAC to 264VAC
Frequency	45Hz to 65Hz
Power Factor	>0.95
Total Harmonic Distortion (THD)	<8%
Inrush Current	<30A
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

Input - AC Module (Continued)

General

Efficiency at Rated Output*	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

*at 220VAC

Input - DC Module

Input - 12V System

Factory-set Limits	
Minimum Run Voltage	9.5V ±0.3V
Minimum Turn-on Voltage	11.7V ±0.3V
Maximum Run Voltage	18.1V ±0.3V
Maximum Turn-on Voltage	17.1V ±0.3V
User-programmable Limits*+	
Low Battery Shutdown Voltage	10.0V to 13.5V
Low Battery Restart Voltage (after shutdown)	12.0V to 15.0V
User-programmable Alarms*	
Low Battery Voltage	10V to 14V
High Battery Voltage	14V to 17.5V

*using the Service Kit software
+only available if the 10W standby power supply card is fitted

Protection

Fault Current (Input)	circuit breaker or fuse in external wiring*
Wrong Input Voltage	electronic lock-out
Wrong Input Voltage Polarity	shunt diode

*provided by user

General

Efficiency at Rated Output*	82%
Input-to-output Isolation	1000VAC, 50Hz, 1 minute

*at 13VDC

Output - AC and DC Modules

High Current Output for PA

Voltage	28V
Current	14A maximum
Regulation	±0.5%
Ripple and Noise*	50mV pp
Ripple and Noise rms	10mV rms
Transient Response on 28V Loadstep**	2% overshoot and recover within 0.6ms

*100MHz bandwidth
**10% to 100% loadstep

Low Current Output for Reciter

Voltage	28.6V 26.5V in hysteresis mode
Current	1.2A maximum
Regulation	±3.5%
Ripple and Noise*	50mV pp
Ripple and Noise rms	10mV rms

*100MHz bandwidth

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

Optional 10W Standby Output - DC Module

Low Current Output for Reciter

Voltage	28.9V
Current	0.3A maximum
Regulation	±2.5%
Ripple and Noise*	50mV pp
Ripple and Noise rms	10mV rms

*100MHz bandwidth

Protection

Overload/Short Circuit	electronic current limit

Optional 10W Standby Output - DC Module (Continued)

General

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

Optional 40W Auxiliary Power Supply

The output from this optional power supply PCB may also be used to trickle-charge a 12V battery.

DC Input Voltage	28V ±15%

DC Output*

Voltage	13.65V
Current	3A maximum
Regulation	±2%
Ripple and Noise**	50mV pp
Ripple and Noise rms	10mV rms
Zero Load Ripple	100mVpp

*also for trickle-charging 12V battery
**100MHz bandwidth

Protection

Overload/Short Circuit	electronic current limit
Overvoltage*	16V Zener diode

*for 12V

General

Efficiency at Rated Output	88%
Input-to-output Isolation	1000VAC, 50Hz, 1 minute
Output-to-chassis Isolation	500VAC, 50Hz, 1 minute

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

Connections (Continued)

DC Input*

Connector Type	M6 screw into threaded fitting on bus bar
Flexible Wire Size	2AWG for a length of 1.5m to 2m (5ft to 6.5ft) (typical)**
Current Rating	50A

*battery

**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

Connector Type	Phoenix MVSTBR2.5HC/2-ST/5.08 female
Flexible Wire Size	11AWG
Current Rating	16A

DC Output - 28V Low Current

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

DC Output - 12V Low Current/Battery Charger

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

Compliance Standards

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

Safety	BS EN 60950-1:2002 ANSI/UL Std. 60950 3rd edition CAN/CSA-C22.2 No. 60950-00 3rd edition AS/NZS 60950 and ACATS001
EMC	ETSI EN 301 489 V1.4.1 (2002-08) CFR 47 Part 15 Level B1

Environmental

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

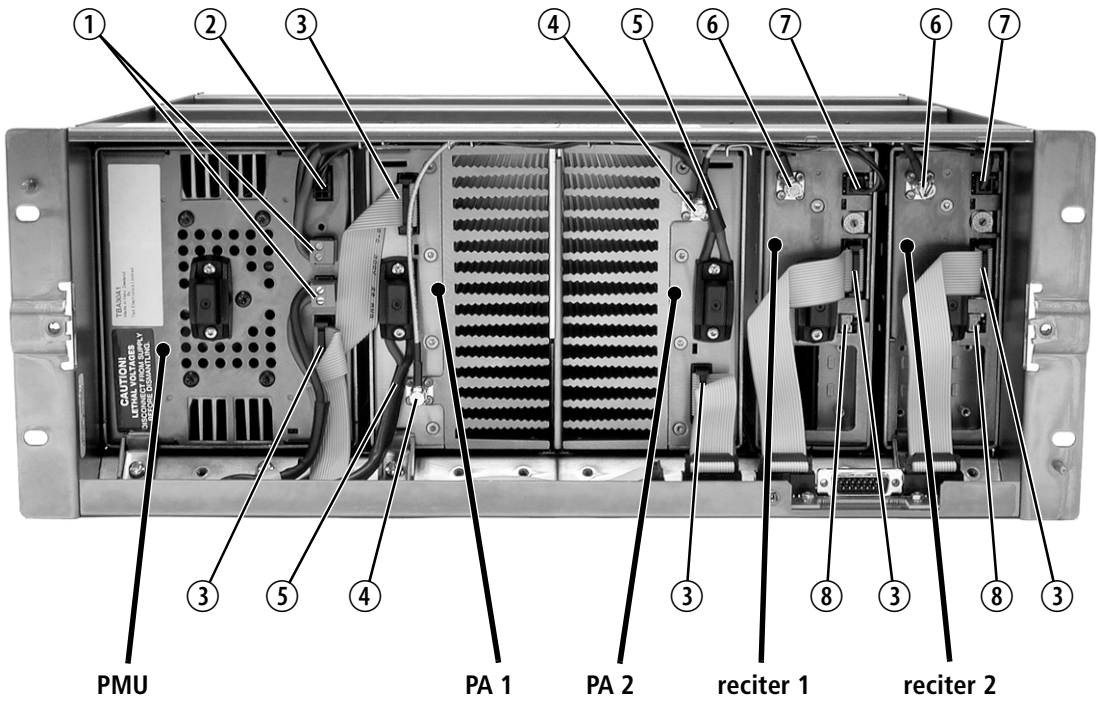
7 Connection

Once the TB8100 BSS hardware is installed, you need to connect the individual modules to each other, and to any ancillary equipment required in your system. This chapter provides information on all the inputs and outputs available on the TB8100 BSS.

7.1 Overview of Inputs and Outputs

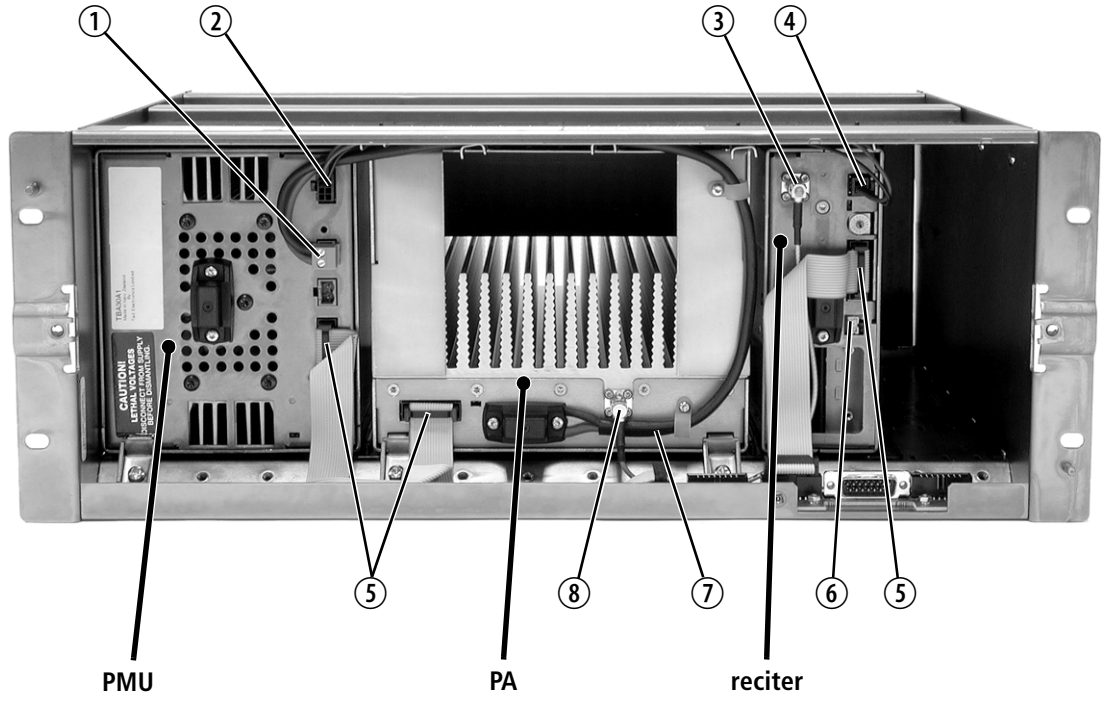
This section identifies the main input and output connections for the TB8100 BSS. Figure 7.1 below identifies the connections at the front of a dual base station, and Figure 7.3 on page 85 identifies those at the rear. Figure 7.2 on page 84 identifies the connections at the front of a single 100 W base station. Figure 7.4 on page 85 and identifies the connections on the control panel. Refer to the following sections in this chapter for more details on these connections.

Figure 7.1 Dual 5 or 50W Base Station Inputs and Outputs - Front View



① 28VDC high current output for PA
② 28VDC low current output for reciter
③ system control bus
④ RF input from reciter
⑤ 28VDC high current input cable from PMU
⑥ RF output to PA
⑦ 28VDC low current input from PMU
⑧ DC output (for optional reciter fan only)

Figure 7.2 Single 100W Base Station Inputs and Outputs - Front View



① 28VDC high current output for PA

② 28VDC low current output for reciter

③ RF output to PA

④ 28VDC low current input from PMU

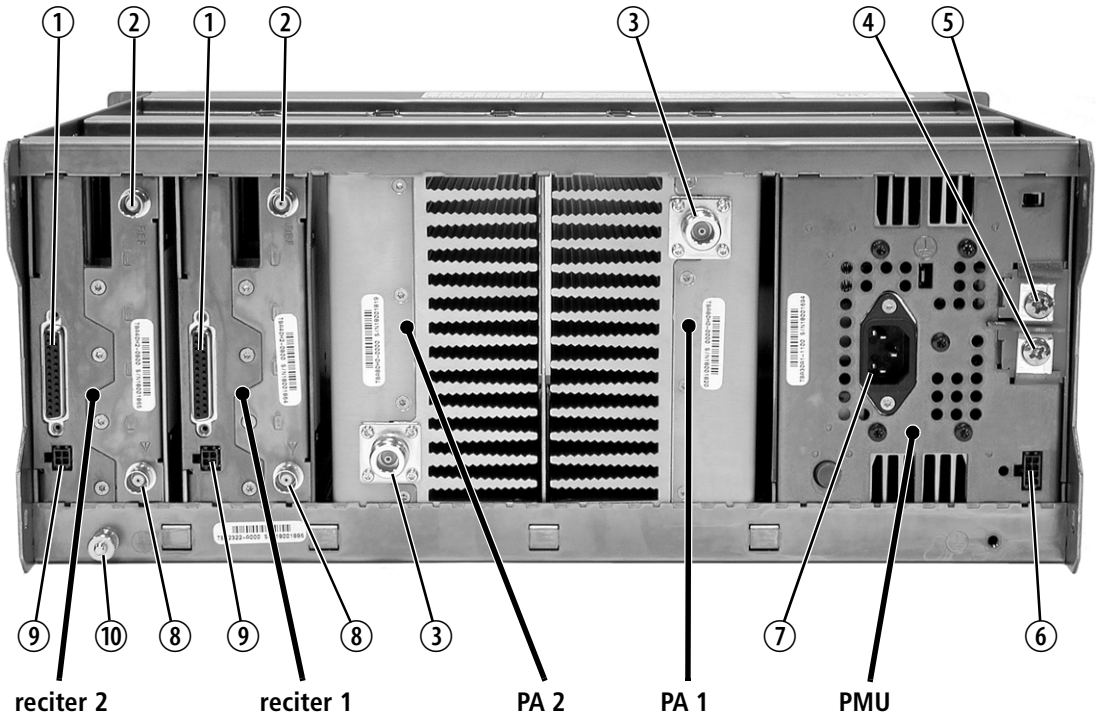
⑤ system control bus

⑥ DC output (for optional reciter fan only)

⑦ 28VDC high current input cable from PMU

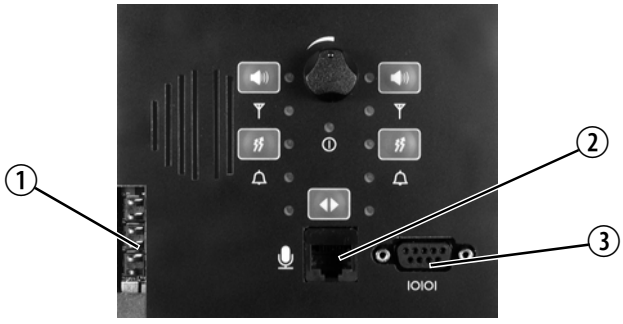
⑧ RF input from reciter

Figure 7.3 Dual 5 or 50W Base Station Inputs and Outputs - Rear View



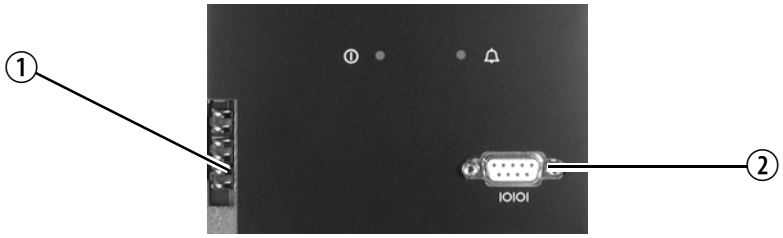
① system interface connector
② external reference frequency input
③ RF output
④ –VDC input
⑤ +VDC input
⑥ auxiliary 12VDC output
⑦ AC mains input
⑧ RF input
⑨ auxiliary 12VDC input for system interface
⑩ subrack ground connector

Figure 7.4 Standard Control Panel Inputs and Outputs



① DC outputs for fans mounted on front panel; also used for fan rotation detectors (if fitted)
② microphone connector
③ RS-232 programming port

Figure 7.5 Power Save Control Panel Outputs



① DC outputs for fans mounted on front panel; also used for fan rotation detectors (if fitted)

② RS-232 programming port

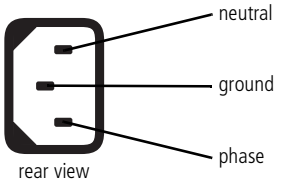
7.2 Power Supply Connections

AC Power

The TB8100 PMU is designed to accept a mains input of 88 to 264 VAC at 45 to 65 Hz. We recommend that a standard 3-wire grounded outlet is used to supply the AC power. The socket-outlet must be installed near the equipment and must be easily accessible. This outlet should be connected to an AC power supply capable of providing a maximum of 600 W. The requirements of two typical AC supplies are given in the following table.

Nominal Supply	Current Requirement	Circuit Breaker/Fuse Rating
115 VAC	8 A	10 A
230 VAC	4 A	6 A

Your TB8100 BSS should come supplied with a power supply cord to connect the male IEC connector on the PMU to the local AC supply. The pins of the IEC connector on the PMU are identified at right.



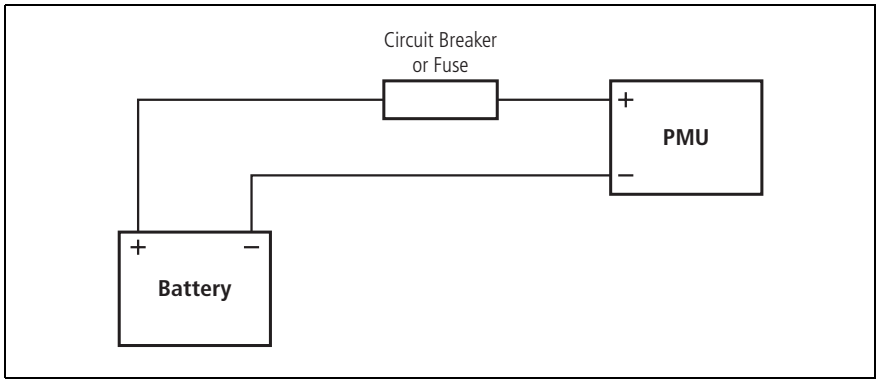
DC Power

The TB8100 PMU is designed to accept a DC input of 10.3 to 15.5 VDC with negative or positive ground. There is a minimum DC start-up threshold to prevent damaging a battery which has little capacity left.

You must connect the DC supply from the battery to the PMU via a fuse or DC-rated circuit breaker with a rating of 60 A. The DC input leads should be of a suitable gauge to ensure less than 0.2 V drop at maximum load over the required length of lead.

Terminate and insulate the DC input leads so they are protected from accidentally shorting to the subrack if the PMU is removed before the leads are disconnected.

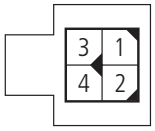
Figure 7.6 Recommended DC Power Connection



Reciter Auxiliary DC Input

The system interface PCB in the reciter has an auxiliary DC input connector. DC from the auxiliary DC output on the PMU (see "PMU Auxiliary DC Output" below) can be supplied to the +AUX_V pin on the system interface connector via this input.

The pin allocations for the auxiliary DC input on the system interface PCB are given in the following table. Note that pins 1 & 3 and pins 2 & 4 on this connector are linked. Refer to "System Connections" on page 89 for the pin allocations for +AUX_V on each system interface PCB.



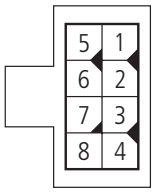
Pin	Description	Links
1	+V input	
2	ground	
3	+V input	
4	ground	

The DC output from the PMU is 12VDC. Although this power output is isolated, the negative side of the supply is grounded on the system interface PCB to give a +V output.

PMU Auxiliary DC Output

The PMU can provide an auxiliary DC output when it is fitted with the optional 40W auxiliary power supply PCB. This power supply is current limited to 3A and is available on the auxiliary DC output connector on the rear panel. DC from this output can be supplied to the +AUX_V pin on the system interface connector on the reciter via the auxiliary DC input connector on the system interface PCB (see "Reciter Auxiliary DC Input" above).

The pin allocations for the auxiliary DC output on the PMU are given in the following table. Note that pins 1 to 4 and pins 5 to 8 on this connector are linked.



Pin	Description	Links
1	+V output	
2	+V output	
3	+V output	
4	+V output	
5	ground	
6	ground	
7	ground	
8	ground	

7.3 RF Connections

The RF input to the TB8100 BSS is via the lower BNC connector on the rear panel of the reciter. The RF output is via the N-type connector on the rear panel of the PA (refer to Figure 7.3 on page 85).

We recommend that you use dual-screened coaxial cable such as RG223 for the BNC connections, and RG214 for the N-type connections.

7.4 System Connections

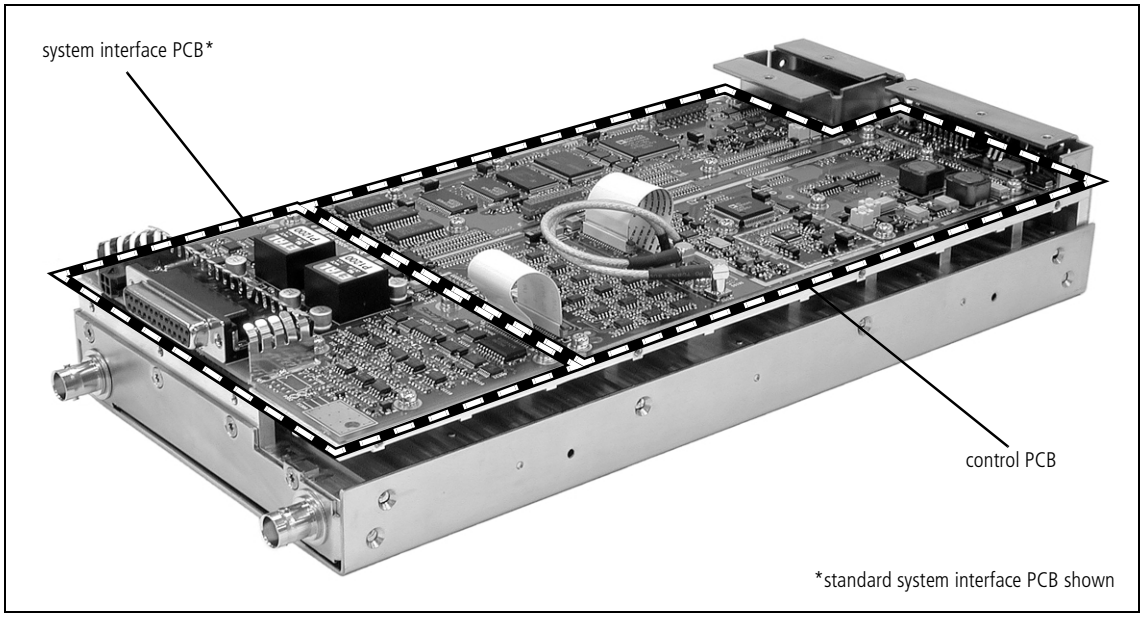
The reciter can be fitted with an optional system interface PCB which provides the links between the reciter's internal circuitry and external equipment. This PCB is securely mounted to the reciter's chassis and is connected to the control PCB with a flexible connector. The system interface PCB is fitted with industry-standard connectors and several standard types are available for different applications.

The circuitry on the system interface PCB provides additional signal processing so that the outputs meet standard system requirements. It also enables the PCB to identify itself to the reciter control circuitry.

The system interface PCB is removable, which makes it possible to change the application of a reciter by removing one type of PCB and fitting another. Only one system interface PCB can be fitted to a reciter at any one time.

This section provides details on the system interface PCBs available at the time of publication. Other types may be developed for future applications.

Figure 7.7 System Interface PCB



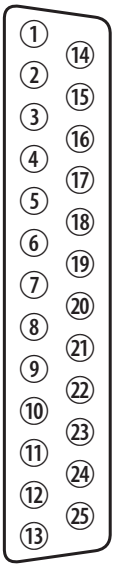
Standard

The standard system interface PCB is fitted to reciters bearing the product code TBA4xxx-0A0x or TBA5xxx-0A0x. If purchased separately, it has the product code TBA10A0. It provides:

- non-isolated 600T balanced audio I/O
- high impedance unbalanced audio I/O
- Tx key
- Rx gate
- RSSI
- Tx relay

- digital I/O.

It is fitted with a 25-way female D-range connector and an auxiliary DC input connector. The pin allocations are listed in the table below.



rear view

Pin	Signal Name	Signal Type	Notes
1	Rx line out +	audio output	non-isolated AC coupled line
2	Rx line out –		
3	Rx audio out	audio output	AC coupled
4	ground	ground	
5	Tx audio in	audio input	AC coupled
6	Tx line in +	audio input	AC coupled line
7	Tx line in –		
8	RSSI	DC signal	
9	Rx gate	output	open collector
10	Tx key	input	
11	digital out 1	output	open collector
12	digital out 2		
13	+AUX_V	power output	
14	digital in 1	input	5V logic
15	digital in 2		
16	digital in 3		
17	digital in 4		
18	digital in 5		
19	digital in 6		
20	digital in 7		
21	digital in 8		
22	digital in 9		
23	digital in 10		
24	Tx relay	output	open collector
25	ground	ground	

Isolated

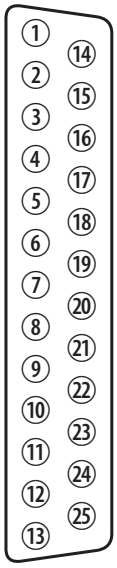
This system interface PCB is fitted to reciters bearing the product code TBA4xxx-0B0x or TBA5xxx-0B0x. If purchased separately, it has the product code TBA10B0. It is the same as the standard model, except that the balanced audio interfaces are galvanically isolated.

Isolated E&M

This system interface PCB is fitted to reciters bearing the product code TBA4xxx-0C0x or TBA5xxx-0C0x. If purchased separately, it has the product code TBA10C0. It provides:

- isolated balanced audio I/O
- opto-isolated keying
- opto-isolated gate output.

It is fitted with a 25-way female D-range connector and an auxiliary DC input connector. The pin allocations are listed in the table below.

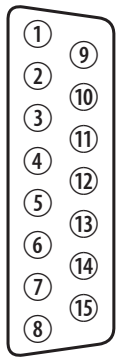


rear view

Pin	Signal Name	Signal Type	Notes
1	Rx line out +	audio output	transformer isolated line
2	Rx line out –		
3	Rx audio out	audio output	
4	audio ground	ground	
5	Tx audio in	audio input	
6	Tx line in +	audio input	transformer isolated line
7	Tx line in –		
8	RSSI	DC signal	
9	Rx gate	output	open collector
10	Tx key	input	
11	digital out 1	output	open collector
12	digital out 2		
13	+AUX_V	power output	
14	digital in 1	input	5V logic
15	digital in 2		
16	digital in 3		
17	digital in 4		
18	digital in 5		
19	digital in 6		
20	opto +/–	isolated keying input	
21	opto –/+		
22	relay +/–	isolated gate output	
23	relay –/+		
24	Tx relay	output	open collector
25	ground	ground	

TaitNet

This system interface PCB is fitted to reciters bearing the product code TBA4xxx-0T1x or TBA5xxx-0T1x. If purchased separately, it has the product code TBA10T1. It is designed for use with MPT trunking systems. It is fitted with a 15-way female D-range connector and an auxiliary DC input connector. The pin allocations are listed in the table below.

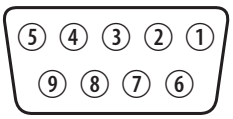


rear view

Pin	Signal Name	Signal Type	Notes
1	Rx line out +	audio output	AC coupled line
2	Rx line out –		
3	Rx audio out	audio output	
4	Rx gate	output	open collector
5	Tx key	input	
6	Tx audio in	audio input	
7	Tx line in +	audio input	AC coupled line
8	Tx line in –		
9	+AUX_V	power output	
10	digital out 3	output	open collector
11	no connection		
12	digital out 1	output	open collector
13	digital out 2		
14	digital in 1	input	5V logic
15	ground	ground	

7.5 Service Kit Connections

The TB8100 service kit is connected to the BSS via the RS-232 serial port on the control panel. This port is a 9-way female D-range connector. Use a straight through cable, as supplied with the service kit, to connect your programming computer to the BSS. The pin allocations for the serial port are given in the following table. Note that pins 1, 4 & 6 and pins 7 & 8 are linked. This port is also used for remote connection to the Service Kit or Alarm Center software via a modem or radio modem.

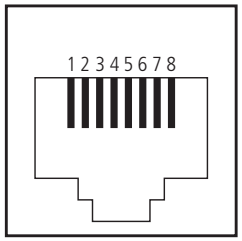


front view

Pin	Description	Links
1	not connected	
2	receive data	
3	transmit data	
4	not connected	
5	ground	
6	not connected	
7	not connected	
8	not connected	
9	not connected	

7.6 Microphone Connection

You can connect a microphone to the TB8100 BSS via the standard RJ45 socket on the control panel. If a standard TB8100 microphone has not been supplied with your BSS, you should use an electret microphone. The pin allocations for the microphone socket are given in the following table.



front view

Pin	Description
1	not connected
2	not connected
3	not connected
4	PTT and hookswitch
5	voice band (microphone) input
6	microphone ground
7	not connected
8	not connected