TB7100 base station

Installation Guide

Contents

Associated Documentation

MBB-00001-xx TB7100 Installation and Operation Manual.
MBB-00002-xx TB7100 Specifications Manual.

All available TB7100 product documentation is provided on the Product CD supplied with the base station. Updates may also be published on the Tait support website. Consult your nearest Tait Dealer or Customer Service Organisation for more information

Tuning and Configuration

If your TB7100 base station has not been tuned to your requirements at the factory, you will need to tune the base station before operating it. To do this you will need to use the Calibration Application software included on the Product CD, plus the TBA0ST1 calibration test unit including the TB7100 adapter board. The TB7100 base station has been programmed with a default software configuration and default passwords at the factory. You will need to use the Program Application software to configure your base station to suit the requirements of your radio system. Refer to the Calibration Application and Program Application documentation for full details on these procedures. If a duplexer has been ordered, it will be tuned at the factory.

1   Installation

This chapter describes how to install the TB7100 base station in a standard 19 inch rack or cabinet. It also provides some general information on safety precautions and site requirements. We recommend that you read the entire chapter before beginning the installation.

1.1   Personal Safety

1.1.1   Explosive Environments

Warning!! **Do not operate TB7100 base station equipment near electrical blasting caps or in an explosive atmosphere. Operating the equipment in these environments is a definite safety hazard.**

1.1.2   Proximity to RF Transmissions

Do not operate the transmitter when someone is standing within 90 cm (3 ft) of the antenna. Do not operate the transmitter unless you have checked that all RF connectors are secure.

1.1.3   High Temperatures

Take care when handling a TB7100 base station which has been operating recently. Under extreme operating conditions (+60°C [+140°F] ambient air temperature) or high duty cycles the external surfaces of the TB7100 base station can reach temperatures of up to +80°C (+176°F).

1.2   Equipment Safety

1.2.1   ESD Precautions

Important This equipment contains devices which are susceptible to damage from static charges. You must handle these devices carefully and according to the procedures described in the manufacturers' data books.

We recommend you purchase an antistatic bench kit from a reputable manufacturer and install and test it according to the manufacturer's instructions. Figure 1.1 shows a typical antistatic bench set-up.

You can obtain further information on antistatic precautions and the dangers of electrostatic discharge (ESD) from standards such as ANSI/ESD S20.20-1999 or BS EN 100015-4 1994.

Figure 1.1   Typical antistatic bench set-up
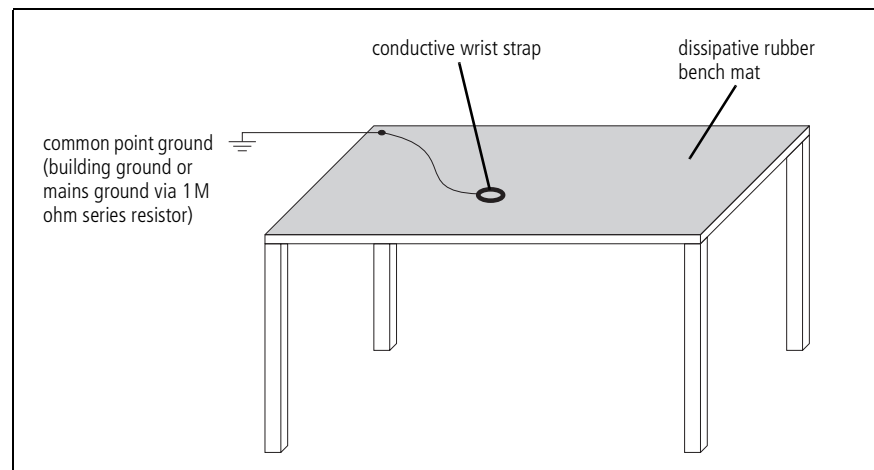
1.2.2   Antenna Load

The TB7100 base station has been designed to operate safely under a wide range of antenna loading conditions. However, damage will occur if the load is removed while the base station is transmitting. Transmitting into a low VSWR will maximise the power delivered to the antenna.

1.2.3   Equipment Grounding

To ensure safe operation the TB7100 base station must be correctly grounded as described in these installation instructions.

1.2.4   Installation and Servicing Personnel

The TB7100 base station should be installed and serviced only by qualified personnel.

1.3 Regulatory Information

1.3.1 Distress Frequencies

The 406 to 406.1 MHz frequency range is reserved worldwide for use by Distress Beacons. Do **not** program transmitters to operate in this frequency range.

1.3.2 FCC Compliance[1]

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

1.3.3 Unauthorised Modifications

Any modifications you make to this equipment which are not authorised by Tait Electronics Ltd. may invalidate your compliance authority's approval to operate the equipment.

1.3.4 Health, Safety and Electromagnetic Compatibility in Europe

In the European Community, radio and telecommunications equipment is regulated by Directive 1999/5/EC, also known as the Radio and Telecommunications Terminal Equipment (R&TTE) directive. The requirements of this directive include protection of health and safety of users, as well as electromagnetic compatibility.

Intended Purpose of Product
This product is an FM radio transceiver. Its intended purpose is for radio communication in Private Mobile Radio (PMR) services or Public Access Mobile Radio (PAMR) services.

Important   This product can be programmed for frequencies or emissions that may make its use illegal. A license must be obtained before this product is used. All license requirements must be observed. Limitations may apply to transmitter power, operating frequency, channel spacing, and emission.

Declaration of Conformity
Brief Declarations of Conformity appear on page 18. You can download the formal Declaration of Conformity from http://eudocs.taitworld.com/. You can also obtain a signed and dated paper copy of the Declaration of Conformity from Tait Europe Ltd.

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1. Refer to the TB7100 Specifications Manual for more information on the compliance standards to which the TB7100 base station has been tested and approved.

1.4　Environmental Conditions

1.4.1　Operating Temperature Range

The operating temperature range of the TB7100 base station is −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 fans.

1.4.2　Humidity

The humidity should not exceed 95% relative humidity through the specified operating temperature range.

1.4.3　Dust and Dirt

For uncontrolled environments, the level of airborne particulates must not exceed $100\mu g/m^3$.

1.5　Grounding and Lightning Protection

1.5.1　Electrical Ground

The TB7100 base station modules are grounded by physical contact between the module mounting points and the chassis. To ensure a good ground connection you must tighten each module securely (refer the Installation and Operation Manual chapter "Replacing Modules" for the correct torque).

A threaded grounding connector is provided on the rear of the tray for connection to the site ground point (refer to the Installation and Operation Manual chapter "Connection" for more details).

1.5.2　Lightning Ground

It is extremely important for the security of the site and its equipment that you take adequate precautions against lightning strike. Because it is outside the scope of this manual to provide comprehensive information on this subject, we recommend that you conform to your country's standards organisation or regulatory body.

1.6 Recommended Tools

It is beyond the scope of this manual to list every tool that an installation technician should carry. However, the following tools are specifically required for installing the TB7100 base station:

- Phillips #2 tip screwdriver used to connect a DC power supply to the DC input terminals of the TB7100.
- Pozidriv PZ3 screwdriver for the M6 screws used to secure the tray to the cabinet in Tait factory-assembled systems
- Torx T10 screwdriver for the M3 pan head screws with captured shake-proof washer and flat washer used to secure the modules in the TB7100.
- Torx T10 screwdriver for the M3 countersunk screws used to secure the cover and the heatsink channels to the chassis of the TB7100 tray.
- Pozidriv PZ1 screwdriver for the M3 pan head self tapping screws used to secure the fans to the fan mounting frame.

You can also obtain the TBA0ST2 tool kit from your nearest Tait Dealer or Customer Service Organisation. It contains the basic tools needed to install, tune and service the TB7100 base station.

1.7 Ventilation

Always ensure there is adequate ventilation around the TB7100 base station. **Do not** operate at high duty cycles in a sealed cabinet. You **must** keep the ambient temperature within the specified range, and we **strongly** recommend you ensure that the cooling airflow is not restricted.

Important   The cooling fans are mounted behind the front panel. To ensure adequate airflow through the base station, do not operate it for more than a few minutes with the fans discon-nected (e.g. for servicing purposes).

1.7.1 Cabinet and Rack Ventilation

Refer to Figure 1.2 on page 9.

Adequate cooling airflow is critical to the performance of the TB7100 base station. The cooling airflow for the TB7100 base station enters through the front panel and exits at the rear of the tray. For optimum thermal performance, the heated air that has passed through a base station must not be allowed to re-enter the air intakes on the front panel.

Each TB7100 Base station requires an unobstructed airflow of 18m^3/hr. (11 cfm).

To allow enough cooling airflow through a cabinet mounted base station we recommend the following:

■ a distance of 5cm minimum clearance to any obstruction to the front of the tray.

■ an open area of at least 50 cm^2 (8 in^2) per tray of ventilation slots or louvres in front of the air intakes for the fans for each tray; for example ten 6x85mm (0.25x3.3in) slots will allow the recommended airflow.

■ a distance of 10cm minimum clearance to any obstruction to the rear of the tray.

■ an open area of at least 50 cm2 (8 in^2) per tray of ventilation slots or louvres in the top of the cabinet, or to the rear of each tray.

■ a 2U gap at the top of the cabinet

Note   The ventilation opening must be unrestricted. If the slots or holes are covered with a filter, mesh or grille, the open area must be increased to allow the same airflow as an unrestricted opening.

The maximum ambient temperature entering the cabinet must not exceed the maximum temperature specified for the base station.
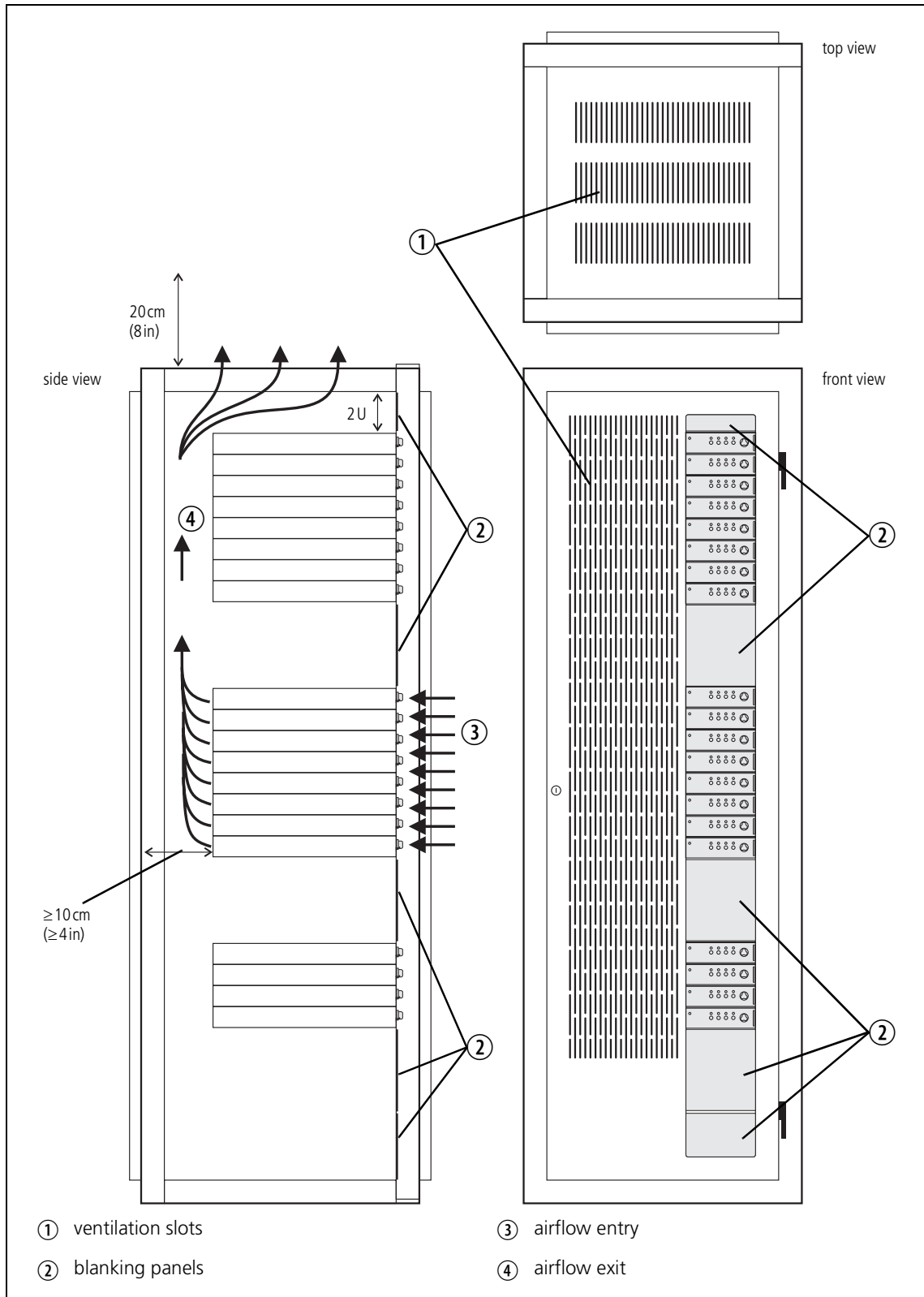
If the TB7100 base station is installed in a rack or cabinet with other equipment with different ventilation requirements, we recommend that the TB7100 be positioned below this equipment.

Auxiliary Extractor Fans   If multiple base stations are fitted in a cabinet, auxiliary extractor fans may be required to ensure adequate cooling. If fitted they should be capable of extracting 18m^3/hr. (11 cfm) per base station in the cabinet.

If you have any other configuration, the performance of your system will depend on how closely you comply with the TB7100 base station airflow requirements described above.

Figure 1.2   Typical cabinet ventilation requirements

① ventilation slots   ③ airflow entry

② blanking panels   ④ airflow exit

1.8 Installing the Base Station

1.8.1 Unpacking the Equipment

Unpacking the TB7100 Base Station

The TB7100 base station is packed in a strong corrugated cardboard carton with top and bottom foam cushions.

1. Cut the tape securing the flaps at the top of the carton and fold them flat against the sides.

2. Rotate the carton carefully onto its side and then onto its top, ensuring that none of the flaps is trapped underneath.

3. Slide the carton upwards over the foam cushions and lift it away. Remove the cushion from the bottom of the base station.

4. Lift the base station clear of the remaining cushion.

Disposal of Packaging

If you do not need to keep the packaging, we recommend that you recycle it according to your local recycling methods. The foam cushions are CFC- and HCFC-free and may be burnt in a suitable waste-to-energy combustion facility, or compacted in landfill.

1.8.2 Mounting the base station

1. Fit the base station into the cabinet or rack and secure it firmly with an M6 (or 0.25 in if you are using imperial fittings) screw, flat and spring washer in each of the four main mounting holes ①, as shown in Figure 1.3 on page 11.

2. The TB7100 base station can be wall mounted by rotating the front mounting brackets and fitting the optional rear brackets (TBBA03-01). When the TB7100 base station is wall mounted ensure the airflow is from bottom to top (front panel mounted down) or side to side.

3. For transport or in installations subject to vibration the TB7100 should be supported at the rear using a transit bracket. (recommended part 302-05282-00 – TB7100 Transit Bracket)

Figure 1.3   Base station mounting points

|			
①	main mounting holes - front	④	ground point
②	TB7100 base station	⑤	rack frame
③	DC connector - rear		
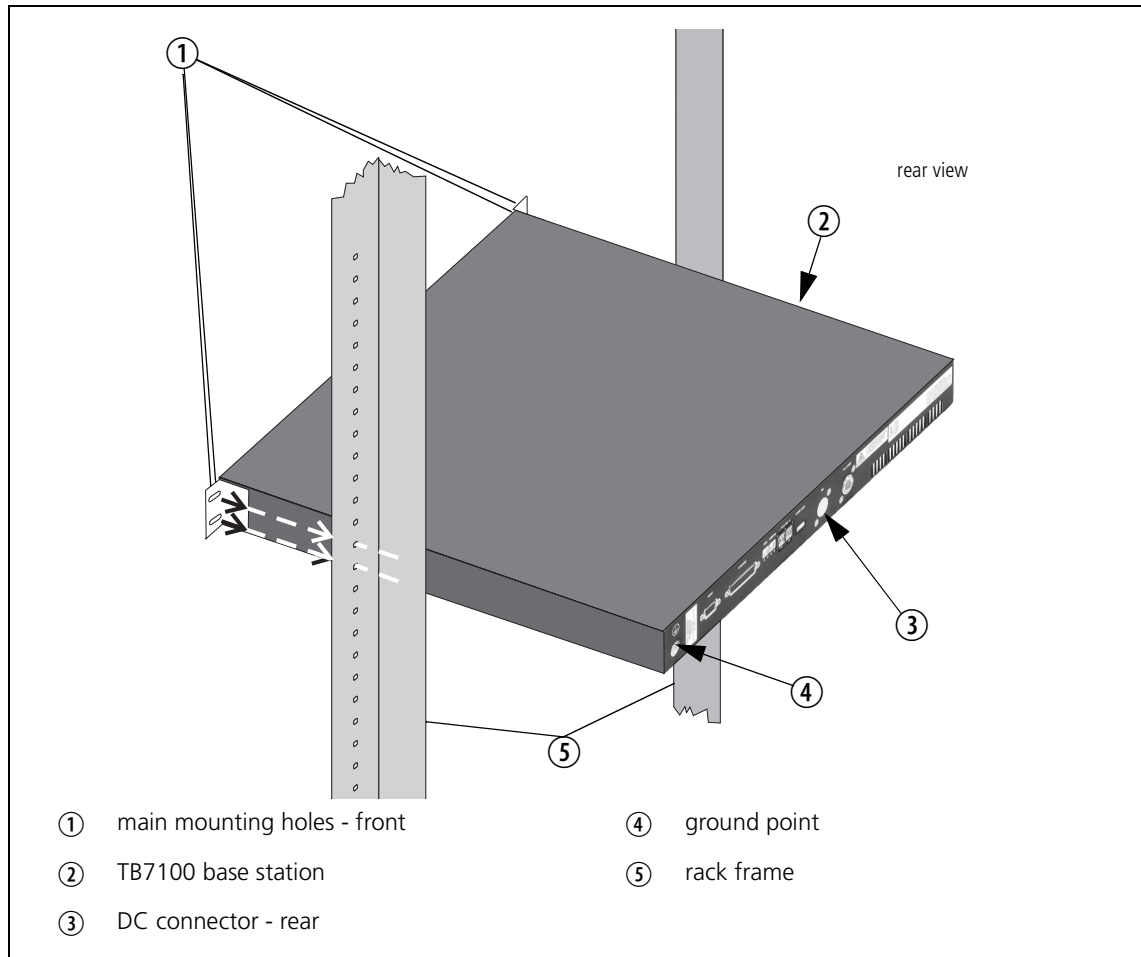
1.8.3   Cabling

General

We recommend that you try to route all cables to and from the TB7100 base station along the side of the cabinet so the cooling airflow is not restricted.

DC Power Cabling

DC power cables should be well supported so that the terminals on the base station and on the ends of the cables do not have to support the full weight of the cables.

The Figure 1.4 on page 12 shows two recommended methods of securing these cables to prevent straining either set of terminals.

Figure 1.4   DC power cabling

secure the cables to the
cabinet to support their
weight
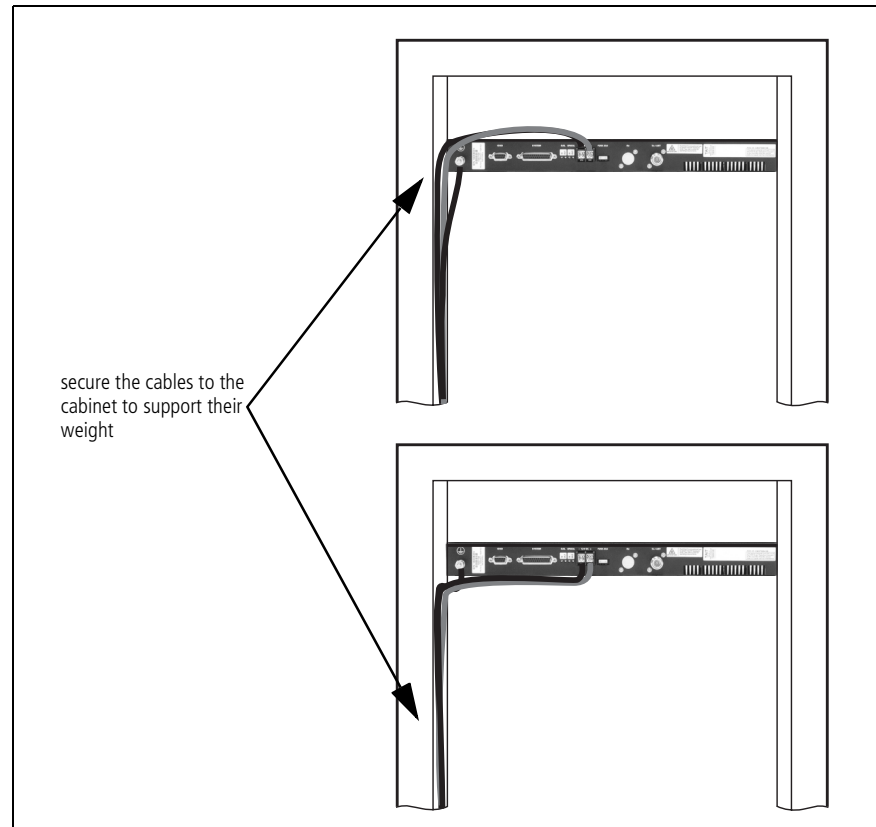
1.8.4   Power Supply Options

General   The TB7100 base station can be powered by the station's own DC supply
            or by a T809-10-70Cx AC power supply.

1.8.5   Accessories

General   The TB7100 base station can use the following accessories:

- T809-10-70Cx PSU
- Internal Duplexer
- Wall Mount Bracket
- TMAA02-01 fist microphone
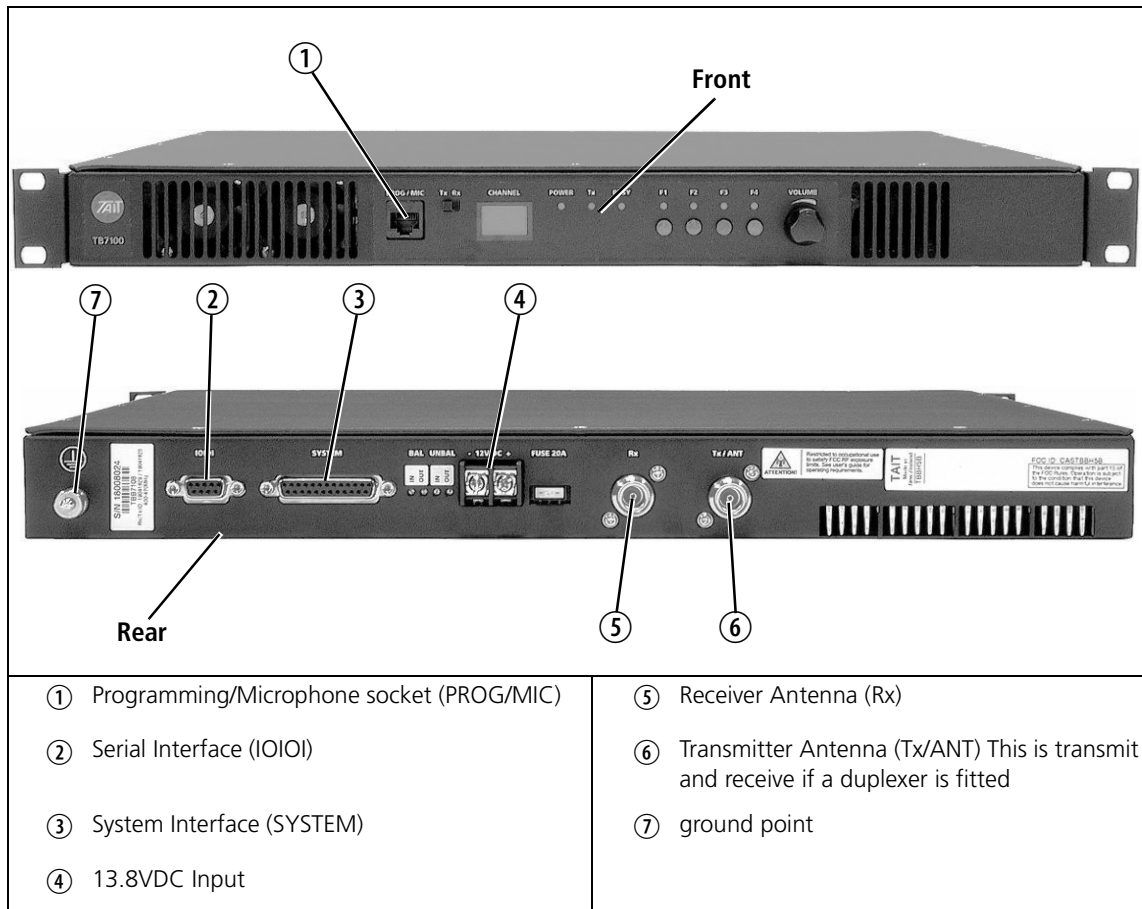- TMAA10-01 desk microphone

2 Connection

This chapter provides information on all the inputs and outputs on the TB7100 base station.

2.1 Overview of Inputs and Outputs

This section identifies the main input and output connections for the TB7100 base station. The figure below identifies the connections at the front and rear of the base station. Refer to the following sections in this chapter for more details on these connections.

Figure 2.1   TB7100 base station inputs and outputs

①	Programming/Microphone socket (PROG/MIC)	⑤	Receiver Antenna (Rx)
②	Serial Interface (IOIOI)	⑥	Transmitter Antenna (Tx/ANT) This is transmit and receive if a duplexer is fitted
③	System Interface (SYSTEM)	⑦	ground point
④	13.8VDC Input		

2.2 Power Supply Connections

DC Power   The TB7100 base station is designed to accept a nominal 13.8VDC, with negative ground.

You must connect the DC supply from the battery to the base station via a readily accessible disconnect device such as a fuse or DC–rated circuit breaker with the appropriate rating, as shown in the table below. 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.

Nominal Supply Voltage	Input Voltage Range	Circuit Breaker/ Fuse Rating	Recommended Wire Gauge[a]
13.8VDC	10VDC to 16VDC	20A	8AWG / 8.35mm^2

a. For a length of 1.5m to 2m (5ft to 6.5ft) (typical).

Terminate the DC input leads with a suitable crimp connector for attaching to the rear panel DC input M4 screws.

Figure 2.2   Recommended DC power connection
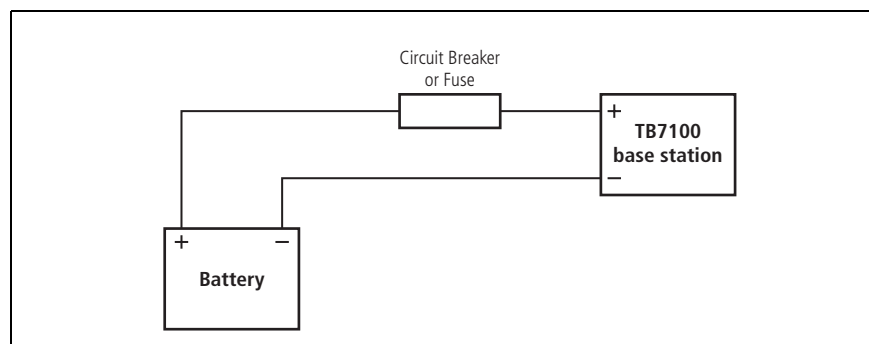
2.3   RF Connections

RF Input and Output   The RF input to the TB7100 base station is via the N–type connector on the rear panel of the base station. The RF output is via the N–type connector on the rear panel of the base station.

We recommend that you use dual–screened coaxial cable such as RG214 for the N–type connections.

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.

2.4 Base Station Connections
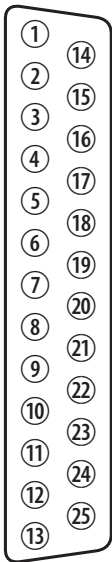
2.4.1 Rear Panel

The rear panel has the serial interface, the system interface, the DC input and the RF in and out connectors. Each of these is described in this section.

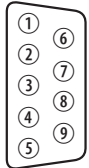**System Interface**   The system interface connector provides the following:

■ transformer isolated 600Ω balanced audio I/O	■ Tx key
■ opto-isolated keying	■ Tx relay
■ opto-isolated gate output	■ Rx gate
■ digital I/O (bidirectional)	■ RSSI

The pin allocations for the 25–way female D-range system interface connector are listed in the table below.

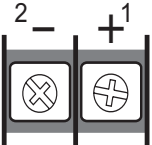| System Interface	Pin	Signal Name	Signal Type	Notes
	1	Rx line output +	audio output	transformer isolated line
	2	Tx/Rx digital input 1	input	high ≥1.7 V, low ≤0.7 V
	3	Tx/Rx digital input 2		
	4	Rx line output –	audio output	transformer isolated line
	5	Tx line input +	audio input	transformer isolated line
	6	Tx/Rx digital input 3	input	high ≥1.7 V, low ≤0.7 V
	7	Tx/Rx digital input 4	input	output: high ≥3.1 V (no load), low <0.6 V (10mA sink) input: high ≥1.7 V, low ≤0.7 V
	8	Tx line input –	audio input	transformer isolated line
	9	RSSI	output	DC signal
	10	Tx digital in/out 1	input/output	output: high ≥3.1 V (no load), low <0.6 V (10mA sink) input: high ≥1.7 V, low ≤0.7 V
	11	Tx audio input	audio input	
	12	Tx digital in/out 2	input/output	output: high ≥3.1 V (no load), low <0.6 V (10mA sink) input: high ≥1.7 V, low ≤0.7 V
	13	ground	ground	
	14	Rx gate	output	open collector
	15	Tx key	input	active low
	16	Rx relay (comm)	output	
	17	Rx relay (NO or NC)	output	
	18	Rx Inhibit	input	
	19	Rx digital in/out 1	input/output	output: high ≥3.1 V (no load), low <0.6 V (10mA sink) input: high ≥1.7 V, low ≤0.7 V
	20	Tx Opto input +	input	input voltage range 10VDC to 60VDC
	21	Tx Opto input –	input	
	22	Rx digital in/out 2	input/output	output: high ≥3.1 V (no load), low <0.6 V (10mA sink) input: high ≥1.7 V, low ≤0.7 V
	23	Digital output/Tx relay	output	
	24	Rx audio output	output	
	25	13.8 volt output	power output	resetable SMD fuse 1.5A

external view

Serial Interface

The serial interface connector provides a data connection to the TB7100 base station. The pin allocations for the 9-way female D-range serial interface connector are listed in the table below.

Serial Interface	Pin	Signal Name	Signal Type	Notes
	1	not connected	not used	
	2	receive data	output	data transmitted by TB7100
	3	transmit data	input	data received by TB7100
	4	not connected	not used	
	5	ground	ground	
	6	not connected	not used	
	7	ready to transmit	output	request to send
	8	clear to send	input	clear to send
	9	not connected	not used	

external view

DC Input

The DC input connector is a heavy duty M4 screw terminal connector suitable for many forms of connection. The pin allocations for the 2-way DC input connector are listed in the table below.

DC Input	Pin	Signal Name	Signal Type	Notes
	1	13.8VDC	input	
	2	ground	input	

External view
Bottom of TB7100

RF Connectors

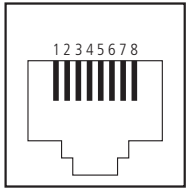See earlier reference on page 14.

Ground

Mounted on the rear panel in the left hand corner is a terminal for grounding the TB7100 tray to the mounting rack.

2.4.2   Front Panel

The front panel has the user interface providing the programming/microphone connector.

Programming/Microphone

The TB7100 programming and calibration applications are connected to the base station via the programming/microphone socket. This socket is an 8-way female RJ–45 connector. Use the T2000–A19 programming lead and a TMAA20–04 adapter to connect your programming computer to the base station. It is possible to plug the RJ11 directly into the RJ45 socket without the use of the adapter, but this is not recommended. A microphone can also be connected to the TB7100 base station via this socket. The pin allocations for the programming/microphone socket are given in the following table.

Programming/Microphone	Pin	Signal Name	Signal Type	Notes
	1	not connected		not connected
	2	+13V8_SW	output	+13.8V, 250mA
	3	TXD	input	transmit data
1 2 3 4 5 6 7 8	4	PTT	input	PTT
	5	MIC_AUD_IN	input	voice band (microphone) input
	6	GND	ground	
external view	7	RXD	output	receive data
	8	not connected		not connected

CE ⓘ Directive 1999/5/EC Declaration of Conformity

da   Dansk

Undertegnede Tait Electronics Limited erklærer herved, at følgende udstyr TBBB1A, TBBH5A overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF. Se endvidere: http://eudocs.taitworld.com/

de   Deutsch

Hiermit erklärt Tait Electronics Limited die Übereinstimmung des Gerätes TBBB1A, TBBH5A mit den grundlegenden Anforderungen und den anderen relevanten Festlegungen der Richtlinie 1999/5/EG. Siehe auch: http://eudocs.taitworld.com/

el   Ελληνικός

Με την παρουσα Tait Electronics Limited δηλωνει οτι TBBB1A, TBBH5A συμμορφωνεται προσ τισ ουσιωδεισ απαιτησεισ και τισ λοιπεσ σχετικεσ διαταξεισ τησ οδηγιασ 1999/5/ΕΚ. βλέπε και: http://eudocs.taitworld.com/

en   English

Tait Electronics Limited declares that this TBBB1A, TBBH5A complies with the essential requirements and other relevant provisions of Directive 1999/5/EC. See also: http://eudocs.taitworld.com/

es   Español

Por medio de la presente Tait Electronics Limited declara que el TBBB1A, TBBH5A cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE. Vea también: http://eudocs.taitworld.com/

fi   Suomi

Tait Electronics Limited vakuuttaa täten että TBBB1A, TBBH5A tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen. Katso: http://eudocs.taitworld.com/

fr   Français

Par la présente, Tait Electronics Limited déclare que l'appareil TBBB1A, TBBH5A est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE. Voir aussi: http://eudocs.taitworld.com/

it   Italiano

Con la presente Tait Electronics Limited dichiara che questo TBBB1A, TBBH5A è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE. Vedi anche: http://eudocs.taitworld.com/

nl   Nederlands

Hierbij verklaart Tait Electronics Limited dat het toestel TBBB1A, TBBH5A in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/ EG. Zie ook: http://eudocs.taitworld.com/

pt   Português

Tait Electronics Limited declara que este TBBB1A, TBBH5A está conforme com os requisitos essenciais e outras provisões da Directiva 1999/5/CE. Veja também: http://eudocs.taitworld.com/

sv   Svensk

Härmed intygar Tait Electronics Limited att denna TBBB1A, TBBH5A står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/ 5/EG. Se även: http://eudocs.taitworld.com/

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World website.