TB8100 base station

Installation and Operation Manual

MB8100-00-00-315
June 2003

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Preface

Scope of Manual

Welcome to the TB8100 base station system Installation and Operation Manual. This manual provides information on installing and operating the TB8100 hardware in PDF format. You can view it online or print it if you want a paper copy. Also included in this manual are a high level circuit description, a quick guide to configuration and a maintenance guide.

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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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.

Typographical Conventions

"File > Open" means "click File on the menu bar, then click Open on the list of commands that pops up". "Monitor > Module Details > Reciter" means "click the Monitor icon on the toolbar, then in the navigation pane find the Module Details group, and select Reciter from it".

Associated Documentation

TB8100 Installation Guide (a subset of this manual).

TB8100 Service Manual.

TB8100 Specifications 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.

Publication Record

Issue	Publication Date	Description
1	June 2003	first release

1. The service manual and 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 Description

The TB8100 is a software-controlled base station system (BSS) which is designed for operation on most standard frequency ranges[1]. It makes extensive use of digital and DSP technology. Many operating parameters such as channel spacing, audio bandwidth, signalling, etc. are controlled by software. It is also capable of generating alarms for remote monitoring.

The TB8100 BSS comprises a number of separate modules. Each module is inserted into the TB8100 4U subrack from the front and is secured at the front with a metal clamp. Both clamp and module are easily removed for rapid module replacement. The modules are secured laterally with plastic guides which clip into the top and bottom of the subrack. These guides can be easily repositioned to change the configuration of a subrack. The heavier modules are also secured laterally by metal tabs at the rear of the subrack.

All modules are interconnected at the front of the subrack. The only connections at the rear of the subrack are:

- RF input from and output to the antenna
- external frequency reference input
- AC and/or DC power supply input
- auxiliary 40W 13.8VDC output (optional)
- system inputs and outputs (via the optional system interface PCB fitted to the reciter).

The TB8100 BSS features rugged construction with generous heatsinks and fan-forced cooling for continuous operation from −30°C to +60°C (−22°F to +140°F). Several different configurations are possible. The most common are:

- one 5 or 50W base station plus accessory modules or extra receivers
- two 5 or 50W base stations
- one 100W base station plus accessory modules or extra receivers.

1. Consult your nearest Tait Dealer or Customer Service Organisation for information on the most suitable equipment for your area and application.

1.1 The TB8100 BSS Modules

The modules which make up the TB8100 BSS are described briefly below. You can find more detailed information on these modules in the other chapters in this manual, and also in the service manual.

Reciter

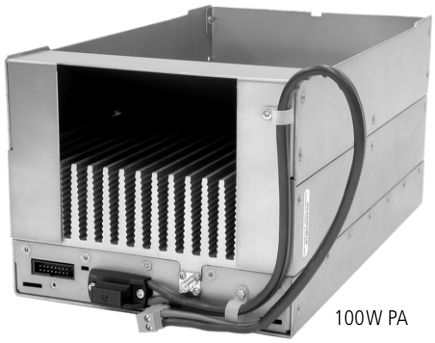
The receiver, exciter and digital control circuitry is located in the reciter module. It also incorporates an optional system interface PCB which provides standard system inputs and outputs.

Power Amplifier

The power amplifier (PA) amplifies the RF output from the reciter and is available in 5, 50 and 100 W models.

The 5 and 50 W models mount vertically in the subrack, while the 100 W model mounts horizontally as it has a wider heatsink. The 100 W PA is also fitted with an airflow duct.

5/50 W PA



100 W PA

Power Management Unit

The power management unit (PMU) provides the 28 VDC power supply for the modules in the TB8100 BSS. A 13.8 VDC auxiliary output is also available when the optional 40 W power supply is fitted. The input voltage can be AC, DC or both AC and DC, depending on the model.

AC and DC PMU shown

Front Panel

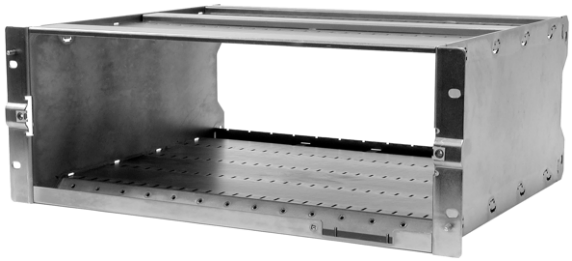
The TB8100 front panel is mounted onto the subrack with two quick-release fasteners. It incorporates the cooling fans for the PA and PMU.

Control Panel

The TB8100 control panel is mounted onto the subrack and is accessible through an opening in the front panel. It provides the user with hardware controls and connections for direct control of the BSS.

Subrack

The TB8100 4U subrack is made of passivated steel and is designed to fit into a standard 19 inch rack or cabinet.



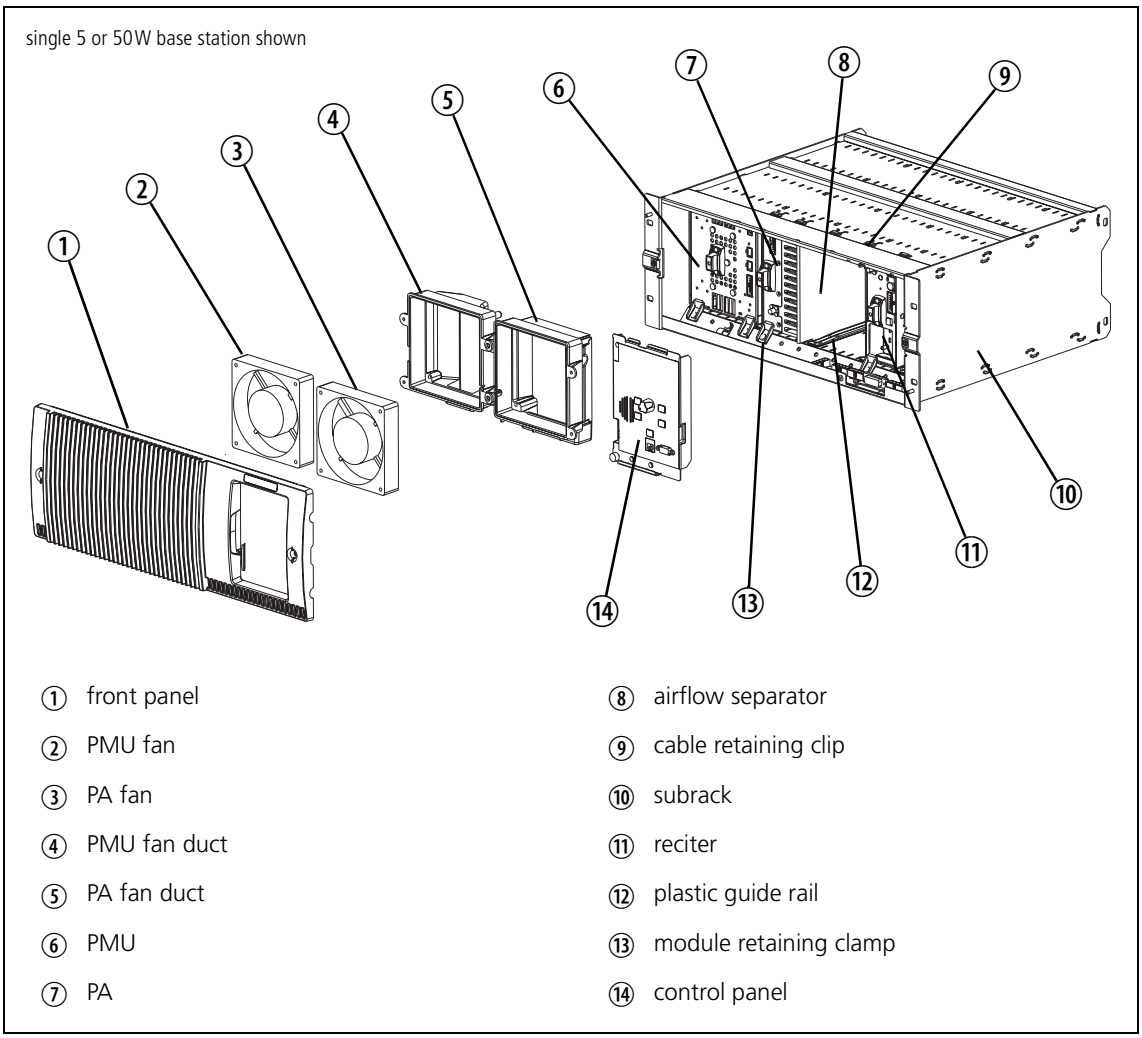
Calibration Test Unit

The TB8100 calibration test unit (CTU) provides a selection of inputs and outputs which allows the TB8100 BSS to be connected to standard test equipment, and also to a PC running the Service Kit or Calibration Kit software.

1.2 Mechanical Assembly

The main mechanical components of the TB8100 BSS are shown in the following illustrations.

Figure 1.1 Mechanical Assembly - Front Panel, Fans and Control Panel



① front panel
② PMU fan
③ PA fan
④ PMU fan duct
⑤ PA fan duct
⑥ PMU
⑦ PA
⑧ airflow separator
⑨ cable retaining clip
⑩ subrack
⑪ reciter
⑫ plastic guide rail
⑬ module retaining clamp
⑭ control panel

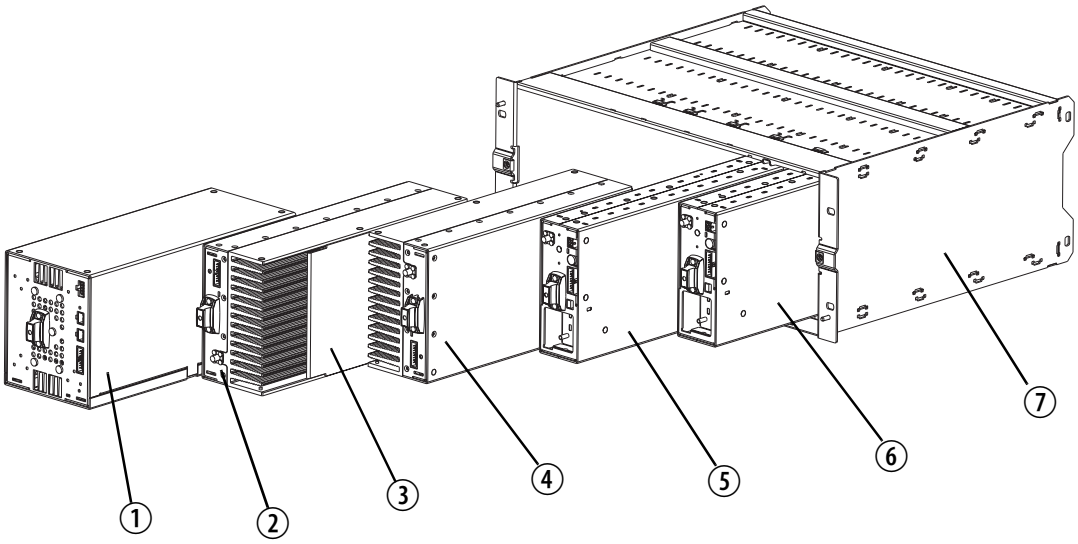
The front panel can be easily removed from the subrack by undoing two quick-release fasteners. Once the front panel is removed, the control panel can also be removed from the subrack by undoing a single screw. Refer to "Replacing Modules" on page 43 for more details.

Note Figure 1.1 above shows the cooling fans and their ducts detached from the front panel only for the clarity of the illustration. The cooling fans and ducts are normally screwed to the rear of the front panel.

Figure 1.1 above also shows the configuration for a typical single 5 or 50W base station. The PMU occupies the slot at the left end of the subrack, with the PA directly beside it. The single reciter normally occupies the second slot from the right of the subrack.

The single PA is mounted vertically with the heatsink facing the centre of the subrack. This positions the cooling fins directly behind the PA fan. The airflow separator is fitted directly beside the PA to help direct the cooling airflow through the heatsink.

Figure 1.2 Mechanical Assembly - Dual 5 or 50W Base Station



1. PMU
2. PA for base station 1
3. airflow separator
4. PA for base station 2
5. reciter for base station 1
6. reciter for base station 2
7. subrack

Figure 1.2 above shows the configuration for a typical dual 5 or 50W base station. The PMU occupies its normal slot at the left end of the subrack, with the reciters in the two right-hand slots.

The two PAs are mounted vertically in the middle of the subrack with the heatsinks facing each other. This positions the cooling fins directly behind the PA fan. The airflow separator between the PAs helps to direct the cooling airflow evenly through each heatsink.

Figure 1.3 Mechanical Assembly - Single 100W Base Station

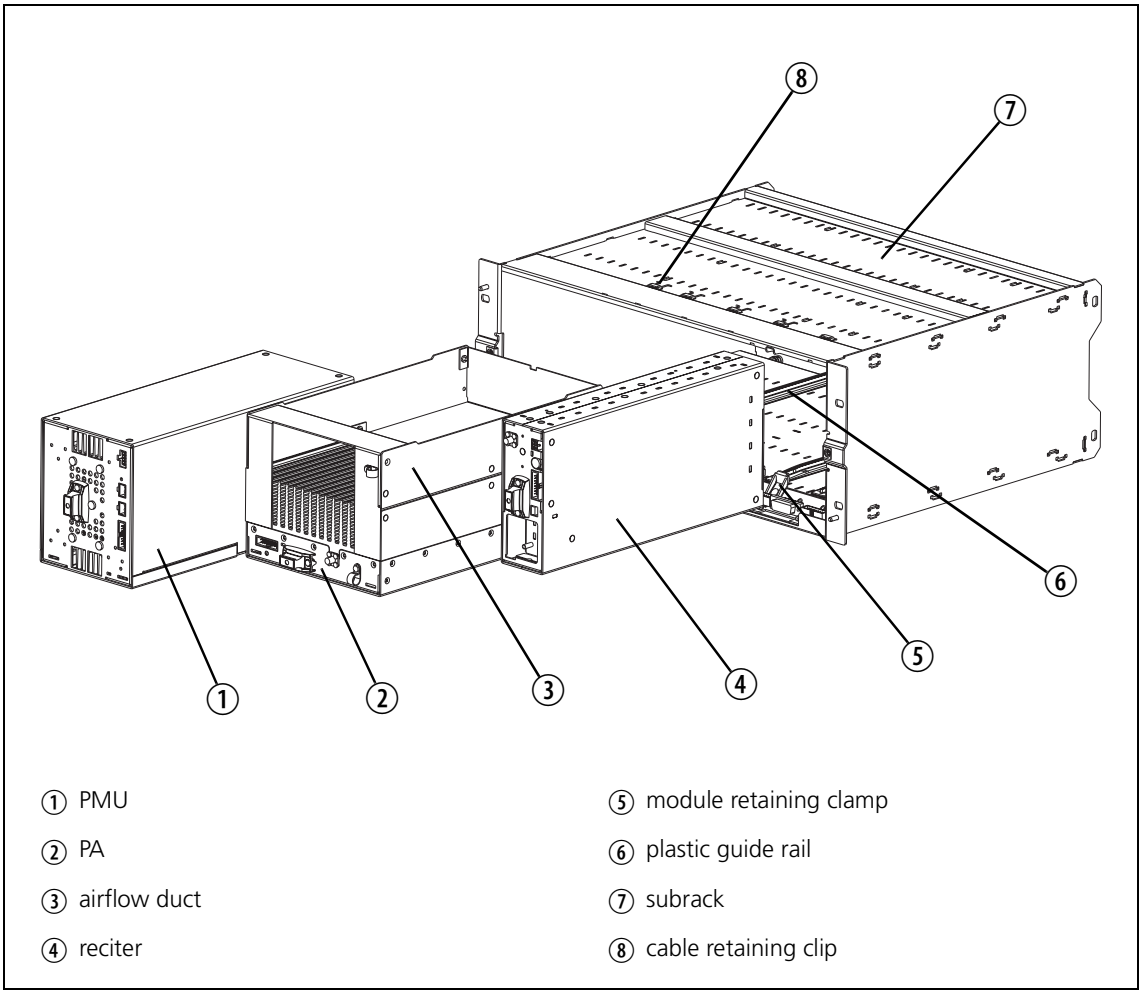


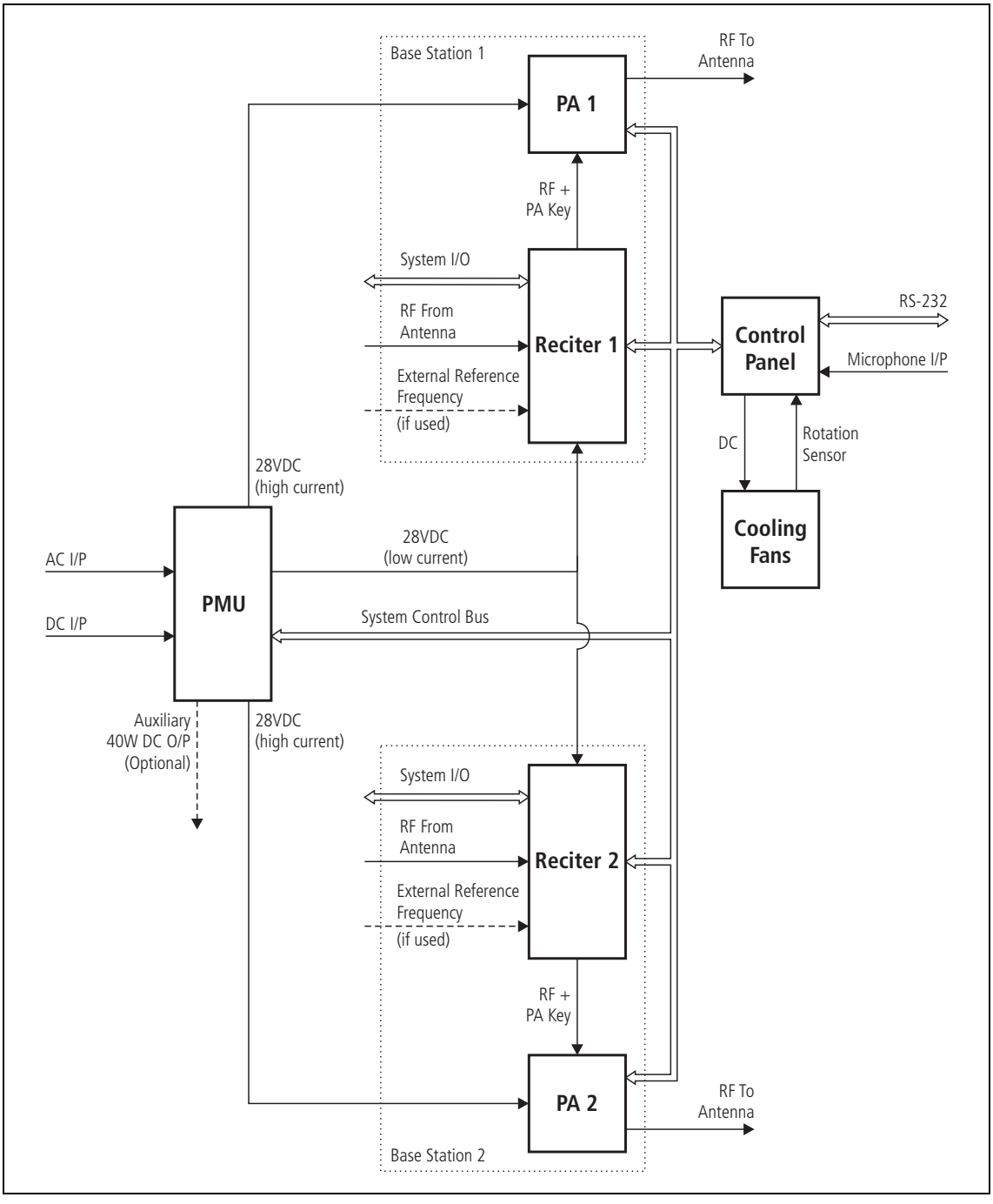
Figure 1.3 above shows the configuration for a typical single 100W base station. The PMU occupies its normal slot at the left end of the subrack, with the PA directly beside it. The single reciter occupies the slot immediately to the right of the PA.

Unlike the 5 and 50W PAs, the 100W PA is mounted horizontally with the heatsink facing upwards. It is also fitted with an airflow duct to channel the airflow from the cooling fan through the heatsink fins.

2 Circuit Description

Figure 2.1 below shows a typical TB8100 dual base station system of 5 or 50 W. It illustrates the main inputs and outputs for power, RF and control signals, as well as the interconnection between modules. The circuitry of the individual modules that make up the BSS is described in more detail in the following sections.

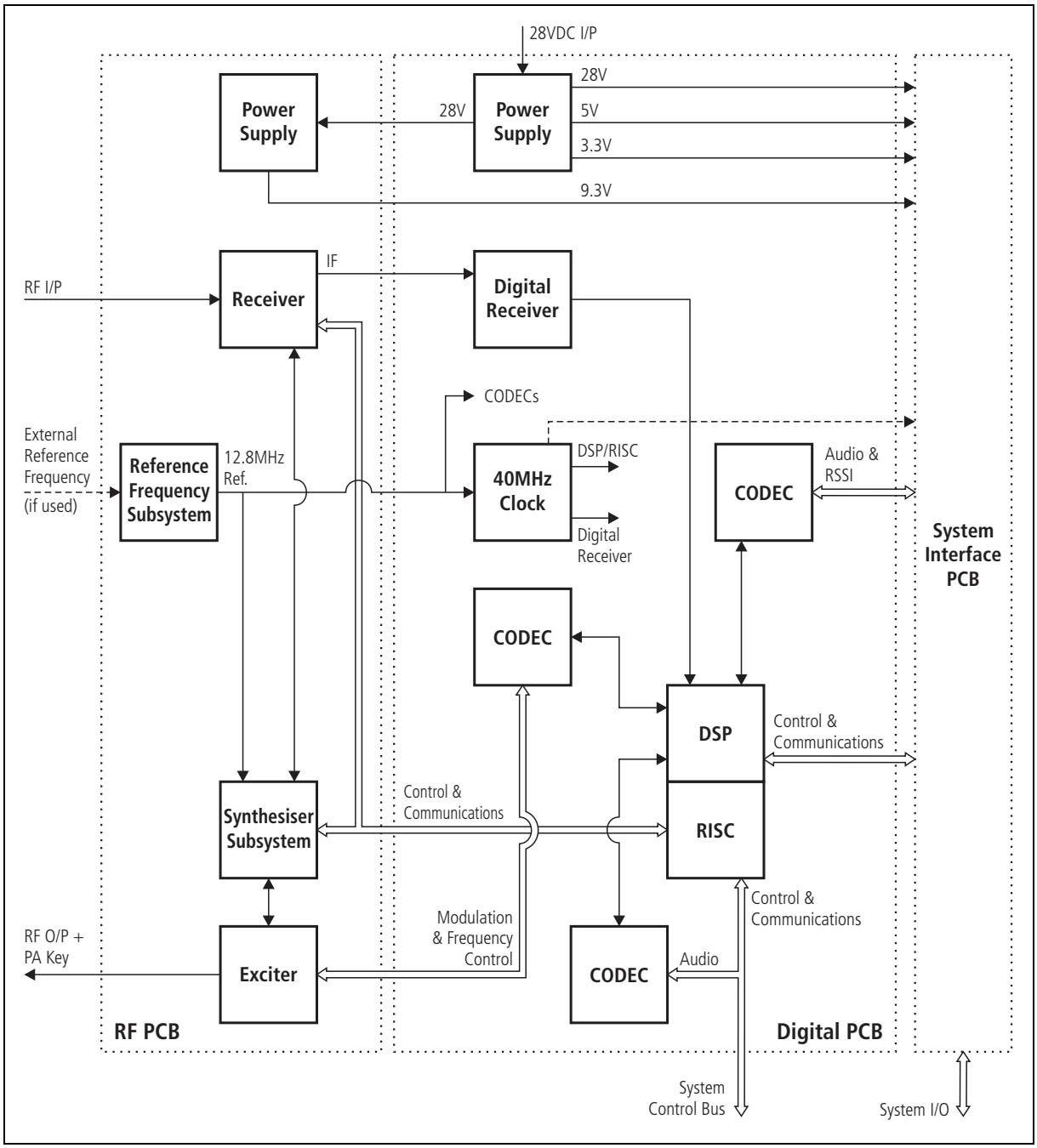
Figure 2.1 Dual Base Station System High Level Block Diagram



2.1 Reciter

The reciter comprises three PCBs: an RF, a digital, and an optional system interface PCB. These PCBs are mounted on a central chassis/heatsink. Figure 2.2 below shows the configuration of the main circuit blocks, and the main inputs and outputs for power, RF and control signals.

Figure 2.2 Reciter High Level Block Diagram



Receiver RF

The incoming RF signal is fed through a triplet helical filter, followed by a simple low-pass network. It then passes through further stages of filtering, amplification and AGC[1] (automatic gain control) before being fed to the mixer where it is converted down to the 70.1 MHz IF (intermediate frequency). A VCO (voltage controlled oscillator) provides a +17 dBm input to the mixer, and a diplexer terminates the mixer IF port in 50 Ω. The signal from the mixer is fed through a 4-pole crystal filter to the IF amplifier which provides enough gain to drive the digital receiver. The signal is finally passed to the ADC (analogue-to-digital converter) in the digital receiver via an anti-alias filter.

Exciter RF

Audio signals from the line or microphone input are fed to the exciter RF circuitry via the DSP (digital signal processor) and CODECs (encoder/decoder). These modulating signals are applied to the exciter at two points (dual point modulation): low frequency modulation is via the FCL (frequency control loop), which modulates the exciter synthesiser's frequency reference, and speech band modulation is supplied directly to the VCO.

The VCO is phase-locked to the frequency reference via the synthesiser. The output from the VCO passes through the VCO buffer to the exciter amplifier, which increases the RF signal to +20 dBm. This signal is then attenuated through a pad to +10 dBm. An 8 VDC PA Key signal is mixed in with the RF signal which is then fed to the PA.

Digital Circuitry

The 70.1 MHz IF from the receiver RF circuitry is passed through an ADC and a DDC (digital downconverter) to the DSP. The DSP provides demodulation, RSSI calculation, SINAD calculations, muting, and decoding of subaudible signals. Audio and RSSI from the DSP is passed via CODECs to the system interface PCB.

Incoming audio from the system interface PCB or microphone is passed to the exciter RF circuitry via the DSP and CODECs. The DSP provides the audio characteristics, generates subaudible signals (e.g. DCS, CTCSS), and controls the CODECs for line audio input.

Control Circuitry

The RISC controls the operating functions of the reciter and provides the interface to the outside world. Some of the functions it controls are:

- Tx key and Rx gate
- communications to the system interface PCB
- digital input from the system interface PCB
- communication with the other modules in the TB8100 BSS via the I^2C bus
- communications with the Service Kit software.

1. AGC can be disabled using the Service Kit software.

System Interface PCB

The reciter can be fitted with an optional system interface PCB which provides the links between the reciter's internal circuitry and external equipment. The circuitry on the system interface PCB provides additional signal processing so that the outputs meet standard system requirements. Several different types of system interface PCB are available, although only one PCB can be fitted to a reciter at any one time. Each system interface PCB can identify itself to the reciter control circuitry.

Power Supply

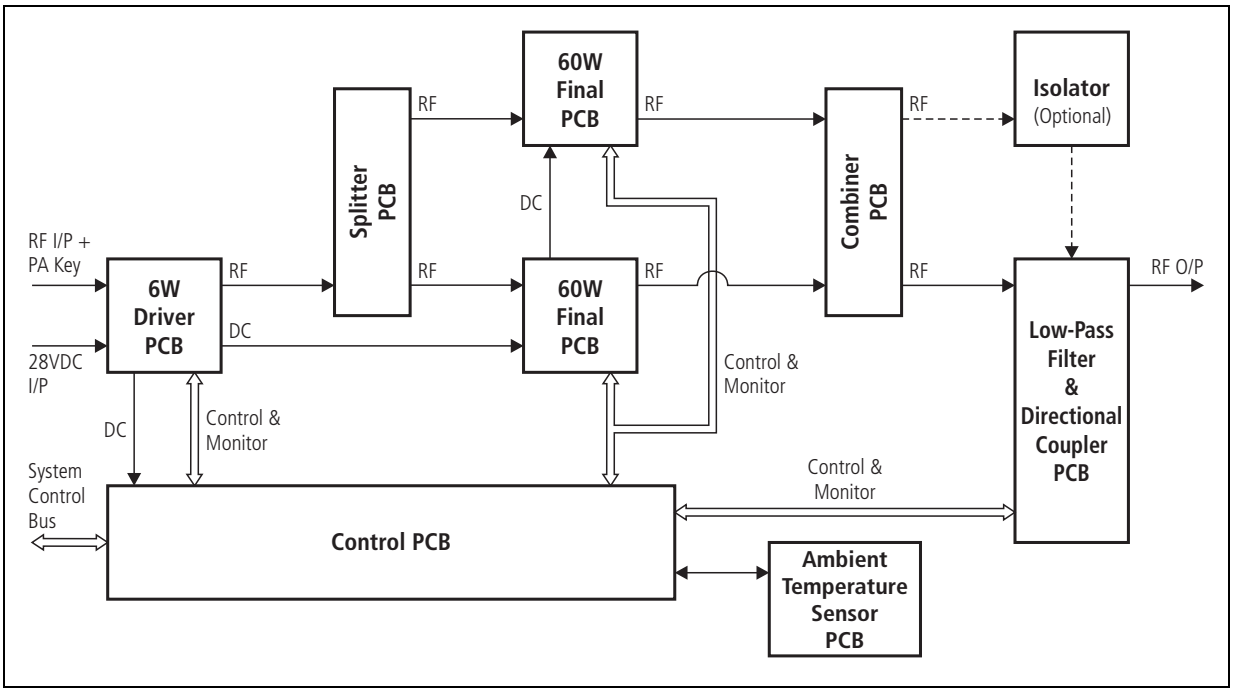
The reciter operates off a +28 VDC supply. The supply is fed to two separate power supplies, one on the RF PCB and a second on the digital PCB. The power supply on the RF PCB also powers some of the circuitry on the system interface PCB.

The power supply on the RF PCB provides 5 V and 8 V regulated supplies. This 5 V supply is boosted to 22 V and also provides a 3 V regulated supply. The power supply on the digital PCB provides 3.3 V and 5 V regulated supplies. It is also fed through to provide a 2.5 V supply.

2.2 PA

The TB8100 PA is a modular design with the circuitry divided among separate PCBs (and optional isolator) which are assembled in different configurations in different models. Interconnect PCBs are used in certain models to connect PCBs that are physically separated on the heatsink. Figure 2.3 below shows the configuration for a 100 W PA, along with the main inputs and outputs for power, RF and control signals.

Figure 2.3 100W PA High Level Block Diagram



RF Circuitry

The RF output from the reciter is fed first to the 6 W driver PCB. In the 100 W model shown above, the output from the 6 W driver PCB is fed into a −3 dB hybrid coupler on a separate splitter PCB and then to two 60 W final PCBs in quadrature. The outputs from these two PCBs are then combined by another −3 dB hybrid coupler on a separate combiner PCB before being fed to the low-pass filter (LPF)/directional coupler PCB.

In the 50 W model, the output from the 6 W driver PCB is fed to one 60 W final PCB and then to the LPF/directional coupler PCB. In the 5 W model, the output from the 6 W driver PCB is fed directly to the LPF/directional coupler PCB.

It is possible to fit an isolator to the TB8100 PA if required. The isolator is a separate module which improves intermodulation performance by providing additional isolation from reflected power.

Control Circuitry

The microprocessor located on the control PCB monitors and controls the operation of the PA. There are no manual adjustments in the PA because all the calibration voltages and currents required to control and protect the PA are monitored by the microprocessor. The software also automatically detects the PA configuration and controls the PA accordingly.

If any of the monitored conditions exceeds its normal range of values, the microprocessor will generate an alarm and reduce the output power to a preset level (foldback). If the measured values do not return within the normal range after foldback, the PA will be shut down.

The alarms and diagnostic functions are accessed through I^2C bus messages on the system control bus via the reciter, control panel and Service Kit software. Some measurements are logged by the microprocessor and this information can also be accessed through the system control bus.

The operation of the cooling fan mounted on the front panel is determined by the temperature limits set in the PA software. If two PAs are fitted in a TB8100 subrack, either PA will turn on the fan when required.

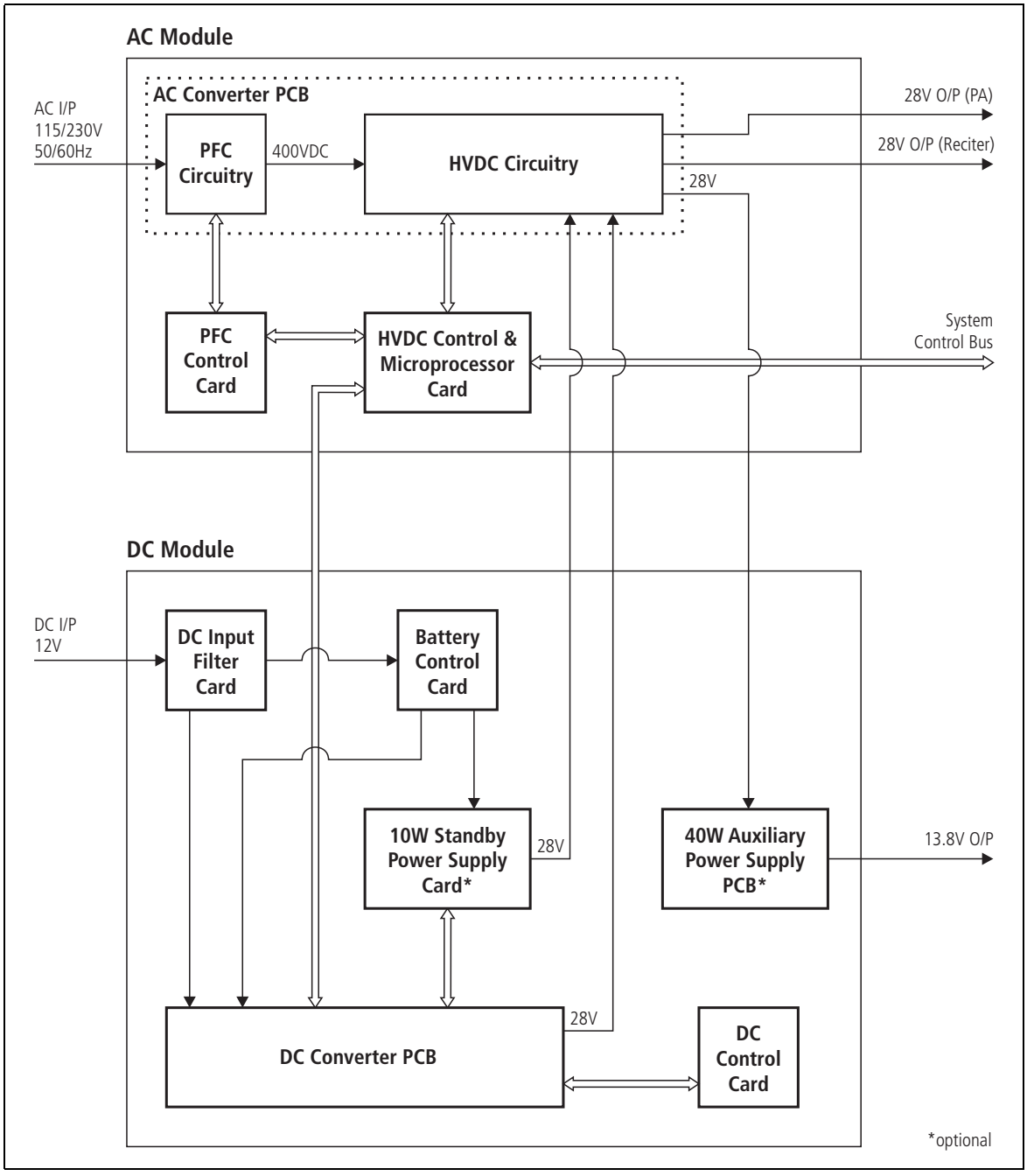
Power Supply

The TB8100 PA operates off a single +28 VDC external power supply. The PA also has four internal power supplies located on the control PCB which produce −3, +2.5, +5 and +10 VDC.

2.3 PMU

The TB8100 PMU provides stable, low-noise 28 VDC outputs to power the TB8100 BSS. The PMU is made up of a number of individual PCBs and cards which comprise two main modules, the AC module and the DC module. The 10 W standby power supply card and 40 W auxiliary power supply PCB are optional. Figure 2.4 below shows the configuration for an AC and DC PMU, along with the main inputs and outputs for power and control signals.

Figure 2.4 PMU High Level Block Diagram



The PMU is available in three main configurations:

- AC PMU (AC input only)
- DC PMU (DC input only)
- AC and DC PMU (both AC and DC converters are fitted to allow both AC and DC inputs).

AC Module

The AC module accepts an input of 115/230 VAC 50/60 Hz nominal. The input is fed via the PFC (power factor control) input stage to the HVDC (high voltage DC) stage on the AC converter PCB. The HVDC circuitry generates the final 28 VDC outputs and provides galvanic isolation between the mains input and DC output. The output stage on the AC converter PCB provides a common output filter and current monitoring circuit which is used by both AC and DC modules.

Each power stage is controlled by its own plug-in control card. The microprocessor is also located on the HVDC control card. The microprocessor is used by both the AC and DC modules and is fitted to all PMU models.

The leaded components are situated on the AC converter PCB, while the plug-in cards have only SMD components.

DC Module

The DC module accepts an input of 12 VDC nominal. The input is fed through the DC input filter to the input of the power stage on the DC converter PCB. This circuitry provides PWM (pulse width modulation) conversion to produce the final DC output. It also provides galvanic isolation, allowing the DC input to be positive or negative ground. The final DC output is fed back to the output stage on the AC convertor PCB.

The battery control card monitors the DC input voltage and prevents the PMU from starting if an incorrect input voltage is applied. It also operates as a fail-safe to prevent deep discharge of the battery, and provides information to the microprocessor to allow the Service Kit software to display information about the battery.

The DC control card controls the power stage of the DC converter. It also provides protection from overload and short circuit conditions.

The leaded components are situated on the DC converter PCB, while the plug-in cards have only SMD components.

10W Standby Power Supply

This optional power supply card plugs into the DC converter PCB and provides power to the reciter output. This allows the main DC unit to be switched off to reduce current consumption in low-power situations, e.g. when the PA is not transmitting. Also, when battery capacity is low, it will maintain the power supply to the microprocessor and shut down the rest of the PMU. This card must be fitted to enable the software-controlled power saving feature to operate.

40W Auxiliary Power Supply

This optional power supply PCB is mounted on the DC module. The input power is provided from the PA output of the HVDC circuitry on the AC converter PCB. It provides a high quality 13.8VDC (nominal) output to power external accessory equipment, or can be used to float charge a 12V battery. It can be configured using the Service Kit software to operate whenever mains voltage is available, or whenever the PA output is available.

Microprocessor

The microprocessor on the HVDC control card monitors and controls the operation of the PMU. There are no manual adjustments in the PMU because all the calibration voltages and currents required to control and protect the PMU are monitored by the microprocessor. The software also automatically detects the PMU configuration and controls the PMU accordingly.

If any of the monitored conditions exceeds its normal range of values, the microprocessor will generate an alarm and take appropriate action, depending on the configuration of the PMU.

The alarms and diagnostic functions are accessed through I^2C bus messages on the system control bus via the reciter, control panel and Service Kit software.

The operation of the cooling fan mounted on the front panel is determined by the temperature limits set in the PMU software.

2.4 Control Panel

The control panel is designed to be the link between the user and the TB8100 BSS. The circuitry for the operation of the control panel is located on a PCB mounted behind its front face. All communication between the BSS and the control panel is via the system control bus. Figure 2.5 below shows the configuration of the main circuit blocks, and the main inputs and outputs for power, audio and control signals.

Control Circuitry

The control panel PCB translates:

- I^2C messages from the reciter into an appropriate response on the LEDs
- control panel key inputs and fan rotation inputs from both fans into appropriate I^2C messages
- RS-232 communications from the programming port into 0V to 5V open-collector signals which feed from and drive up to six reciters.

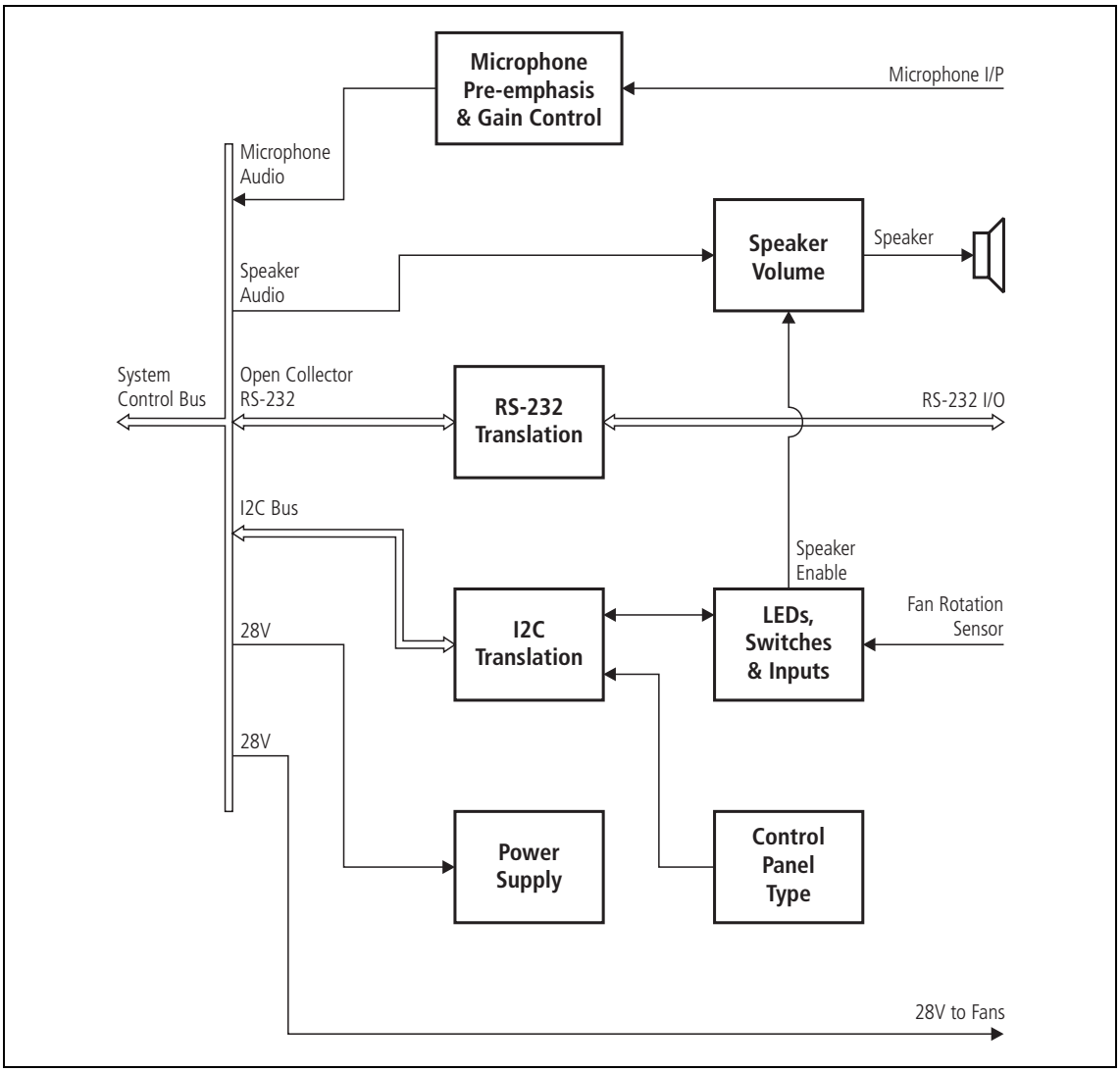
Audio Circuitry

The control panel provides a volume knob to control the volume of the speaker. In addition, the control panel circuitry performs gain control so that the power output into a 16Ω speaker is ≥0.5W at the maximum position of the knob, with an input of 167mVpp.

Power Supply

The control panel operates off a 28V (nominal) power supply provided by the reciter. The power supply for the cooling fans mounted on the front panel is fed through the control panel.

Figure 2.5 Control Panel High Level Block Diagram



2.5 System Control Bus

The system control bus provides the communications link between the modules in the TB8100 BSS. It provides the following physical paths:

- I^2C communications between modules
- RS-232 communications between the reciter and Service Kit software, via the control panel port
- fan power from the PA and PMU
- speaker and microphone signals to and from the control panel
- power connections for the control panel.

The system control bus is a multi-drop bus which has all signals going to all modules. Where a signal is not used, that module provides a no-connect. The physical locations of the signals on the bus have been optimised to minimise the effects of cross-talk.

Both the PA and PMU fan power and ground signals are electrically isolated from all other system signals. This is to ensure fan noise is not transferred to other sensitive system components.

The I^2C current source is located in the PMU so that the TB8100 BSS can operate with the control panel removed. The PMU must be powered up to enable the I^2C communications to operate.

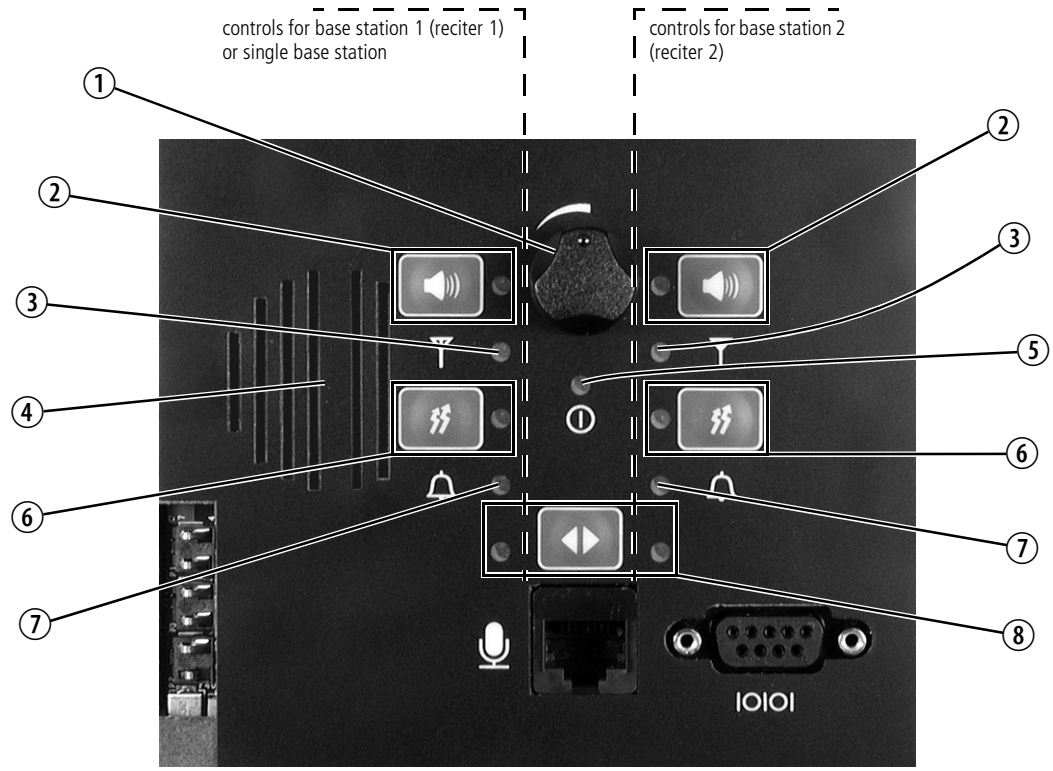
3 Operating Controls

The TB8100 BSS has a number of hardware controls which are available to the user. These controls are located on the control panel, reciter and PMU. This chapter identifies and describes these controls.

3.1 Control Panel

The operating controls on the control panel allow some manual control of one or two base stations in a TB8100 BSS. These controls and their associated LED indicators are identified in Figure 3.1 below, and their functions are explained in the paragraphs which follow. Refer to "Connection" on page 55 for information on the connectors located on the control panel.

Figure 3.1 Operating Controls on the Control Panel



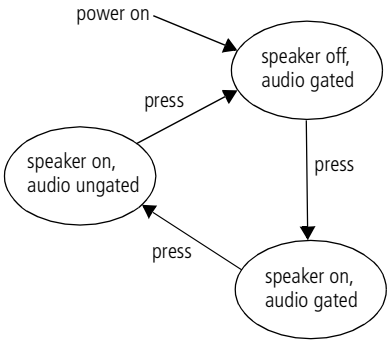
① speaker volume
② speaker button and LED
③ receive LED
④ speaker
⑤ power LED
⑥ carrier button and transmit LED
⑦ alarm LED
⑧ microphone channel button and LEDs

Speaker Volume

Controls the volume of the speaker mounted behind the control panel. Rotate clockwise to increase the volume, and anticlockwise to decrease the volume.

Speaker Button and LED

The speaker button cycles the base station audio through three states. At power-on the speaker is off and the receiver audio is gated (muted). Pressing the button once turns the speaker on, but leaves the audio gated. Pressing the button a second time leaves the speaker on and ungates the audio (monitor mode). Pressing the button for a third time returns to the start of the sequence, with the speaker off and audio gated.



The green speaker LED is lit when the speaker is turned on.

Receive LED

The green receive LED is lit when a valid signal is received on its associated base station.

Speaker

The control panel is fitted with a 0.5W speaker. Audio from either or both base stations can be connected to this speaker.

Power LED

The green power LED is lit when the PMU is turned on and supplying power to the TB8100 BSS.

Carrier Button and Transmit LED

The carrier button is a momentary press switch. When held down, it keys the transmitter while disabling the 600Ω balanced and unbalanced line, and microphone audio. The transmitted signal is unmodulated, i.e. carrier only.

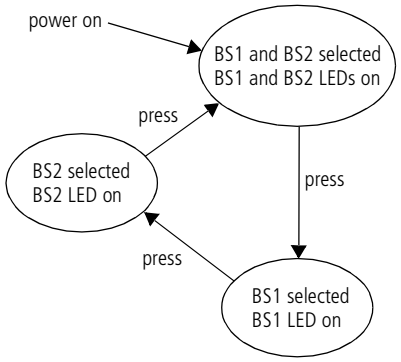
The red transmit LED is lit while its associated transmitter is transmitting.

Alarm LED

The red alarm LED will flash at a rate of 2 to 5Hz when an alarm has been generated by any of the TB8100 BSS modules. It will continue to flash until the alarm is cancelled or the fault is fixed. Note that only those alarms which are enabled using the Service Kit (Configure > Alarms > Alarm Control) will cause this LED to flash. Refer to the Service Kit documentation for more information.

Microphone Channel Button and LEDs

The microphone channel button selects which base station (BS) the microphone is connected to. At power-on both base stations are selected. Pressing the button once will connect the microphone audio to base station 1. Pressing the button a second time will connect the audio to base station 2. Pressing the button for a third time returns to the start of the sequence, with the microphone audio connected to both base stations.

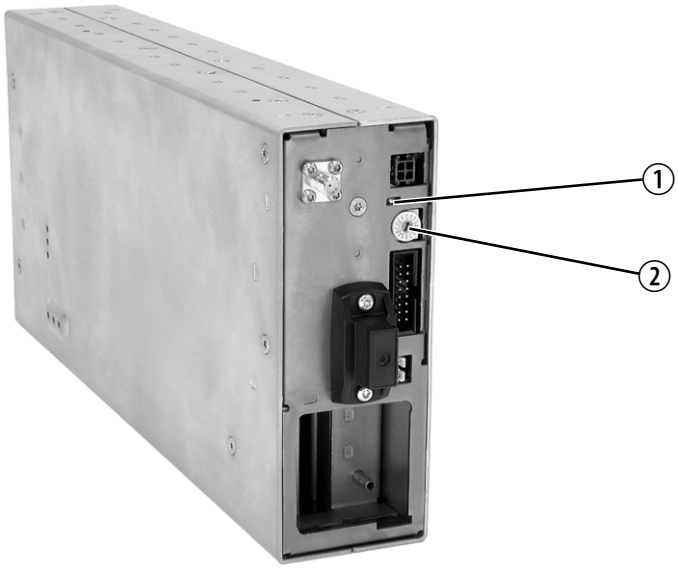


The green LED is lit when the microphone audio is connected to its associated base station.

3.2 Reciter

The only controls on the reciter are the rotary hex switch mounted on the front panel, and the indicator LEDs visible through a slot in the front panel.

Figure 3.2 Operating Controls on the Reciter



① indicator LEDs ② hex switch

Hex Switch

This switch is used to assign an identity number to each base station in the BSS. For example, the reciters in a dual base station system would be numbered "1" and "2". The reciter with the lowest hex number becomes the "control" reciter. In a single base station system, the hex switch on the reciter is set to "1".

Indicator LEDs

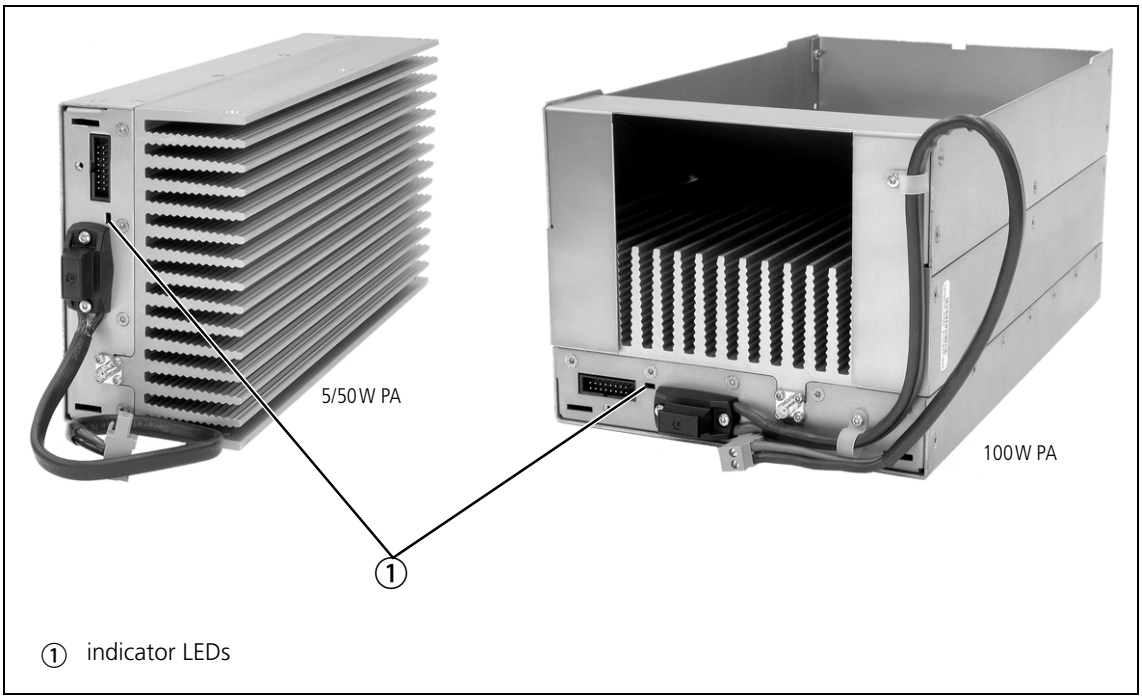
These LEDs provide the following information about the state of the reciter:

- steady green - the reciter is powered up
- flashing red - one or more alarms have been generated; you can use the Service Kit software to find out more details about the alarms.

3.3 PA

The only controls on the PA are the indicator LEDs visible through a slot in the front panel.

Figure 3.3 Operating Controls on the PA



① indicator LEDs

Indicator LEDs

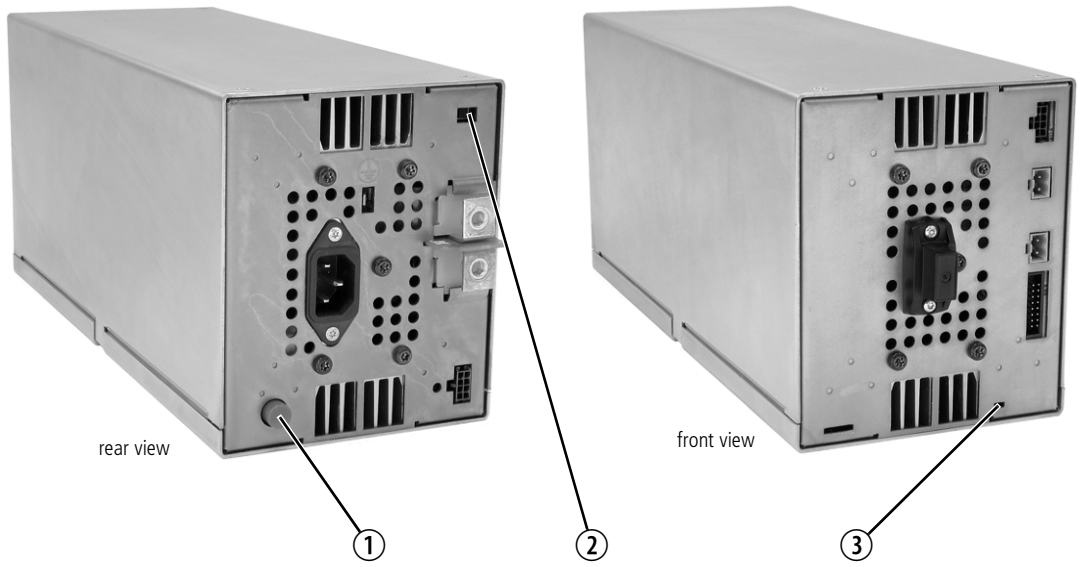
These LEDs provide the following information about the state of the PA:

- steady green - the PA is powered up
- flashing green - the PA has no application firmware loaded; you can use the Service Kit software to download the firmware
- flashing red - one or more alarms have been generated; you can use the Service Kit software to find out more details about the alarms.

3.4 PMU

The only controls on the PMU are the on/off switches on the rear panel for the AC and DC modules, and the indicator LEDs visible through a slot in the front panel.

Figure 3.4 Operating Controls on the PMU



① AC module on/off switch

② DC module on/off switch

③ indicator LEDs

AC Module On/Off Switch

This switch turns the AC input to the PMU on and off. Note that this switch breaks only the phase circuit, not the neutral.

DC Module On/Off Switch

This switch turns the DC output from the PMU on and off. It is recessed to prevent the DC module being accidentally switched off, thus disabling the battery back-up supply.

Note that this switch disables only the control circuitry - the DC input is still connected to the power circuitry.

Warning!! **These switches do not totally isolate the internal circuitry of the PMU from the AC or DC power supplies. You must disconnect the AC and DC supplies from the PMU before dismantling or carrying out any maintenance. Refer to the service manual for the correct servicing procedures.**

Indicator LEDs

These LEDs provide the following information about the state of the PMU:

- steady green - the PMU is powered up
- flashing green - the PMU has no application firmware loaded; you can use the Service Kit software to download the firmware
- flashing red - one or more alarms have been generated; you can use the Service Kit software to find out more details about the alarms.

4 Installation

This chapter describes how to install the TB8100 BSS 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.

4.1 Personal Safety

Lethal Voltages

Warning!! **The PMU contains voltages that may be lethal. Refer to the ratings label on the rear of the module.**

The TB8100 BSS must be installed so that the rear of the PMU is located in a service access area. Disconnect the mains IEC connector and wait for five minutes for the internal voltages to self-discharge before dismantling.

The AC power on/off switch does **not** isolate the PMU from the mains. It breaks only the phase circuit, not the neutral.

The PMU should be serviced only by qualified technicians. All servicing should be carried out only when the PMU is powered through a mains isolating transformer of sufficient rating. We **strongly recommend** that the mains power to the whole of the repair and test area is supplied via an earth leakage circuit breaker.

Explosive Environments

Warning!! **Do not operate TB8100 BSS equipment near electrical blasting caps or in an explosive atmosphere. Operating the equipment in these environments is a definite safety hazard.**

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.

High Temperatures

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

4.2 Equipment Safety

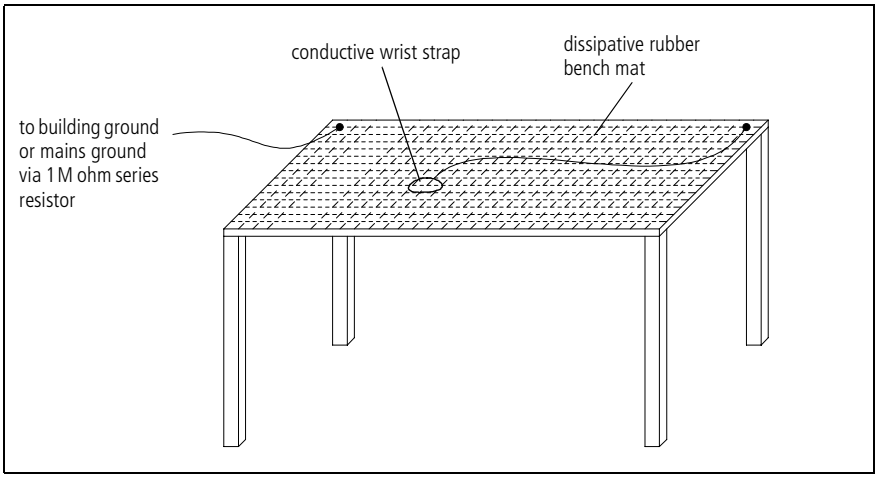
ESD Precautions

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 4.1 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 ESD S4.1-1997 (revised) or BS EN 100015-4 1994.

Figure 4.1 Typical Antistatic Bench Set-up



Aerial Load

The TB8100 BSS equipment has been designed to operate safely under a wide range of aerial loading conditions. However, we strongly recommend that the transmitter should always be operated with a suitable load to prevent damage to the transmitter output power stage.

Equipment Grounding

To ensure safe operation the TB8100 BSS equipment must be correctly grounded as described in these installation instructions.

Installation and Servicing Personnel

The TB8100 BSS should be installed and serviced only by qualified personnel.

4.3 Regulatory Information

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.

FCC Compliance

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

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.

4.4 Environmental Conditions

Operating Temperature Range

The operating temperature range of the TB8100 BSS 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.

Humidity

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

Dust and Dirt

For uncontrolled environments, the level of airborne particulates must not exceed 100µg/m^3.

4.5 Grounding and Lightning Protection

Electrical Ground

The TB8100 BSS modules are grounded by physical contact between the module case and the subrack. To ensure a good ground connection you must tighten each module retaining clamp securely (refer to "Final Reassembly" on page 53 for the correct torque setting).

A threaded grounding connector is provided on the rear of the subrack for connection to the site ground point (refer to "Connection" on page 55 for more details).

Lightning Ground

It is extremely important for the security of the site and its equipment that you take adequate precautions against lightning strike. While it is outside the scope of this manual to provide comprehensive information on this subject, the following guidelines apply:

- install a suitable lightning rod at the top of the tower and connect it to a secure ground point with appropriate conductors and connectors
- position site buildings and equipment within the cone of protection provided by the grounded tower
- protect all cables entering the site to prevent lightning energy from entering site buildings.

4.6 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 TB8100 BSS:

- Pozidriv PZ3 screwdriver for the M6 screws used to secure the subrack to the rack or cabinet, and also for the DC input terminals on the PMU
- Pozidriv PZ2 screwdriver for the M4 screws used to secure the module retaining clamps
- 0.25in or 6mm flat blade screwdriver for the fasteners used to secure the front panel to the subrack
- 8mm AF spanner for the SMA connectors.

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 TB8100 BSS.

4.7 Ventilation

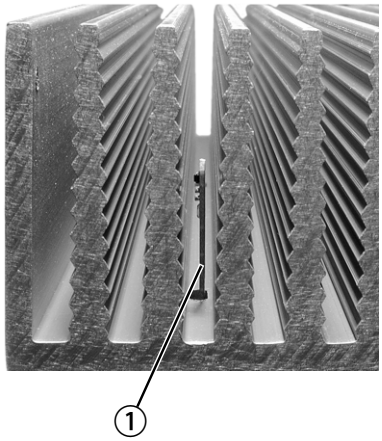
Always ensure there is adequate ventilation around the TB8100 BSS. **Do not** operate it in a sealed cabinet. You **must** keep the ambient temperature within the specified range, and we **strongly** recommended that you ensure that the cooling airflow is not restricted.

Important The cooling fans are mounted on the front panel and will only operate when the panel is fitted correctly to the front of the subrack. To ensure adequate airflow through the BSS, do not operate it for more than a few minutes with the front panel removed (e.g. for servicing purposes).

Ambient Air Temperature Sensor

The ambient air temperature reading for the TB8100 BSS is provided by the ambient air temperature sensor PCB ① fitted to the PA control PCB.

The sensor PCB is inserted through slots in the control PCB and heatsink to be positioned between the heatsink fins.



Important If the sensor PCB is to provide accurate ambient temperature readings, it must have forced airflow and must not come into contact with the metal of the heatsink fins. **Do not stack PAs with the fins together.** It is possible for the fins on one heatsink to slide between the fins on the other heatsink. This can damage the sensor PCB, and possibly result in the heatsink fins becoming locked together.

Cabinet and Rack Ventilation

Refer to Figure 4.2 on page 37.

The cooling airflow for the TB8100 BSS enters through the front panel and exits at the rear of the subrack. For optimum thermal performance, the heated air that has passed through a BSS must not be allowed to re-enter the air intakes on the front panel. Any space at the front of the cabinet not occupied by equipment should be covered by a blanking panel.

To allow enough cooling airflow through a cabinet-mounted BSS, we recommend the following:

- an area of at least 150 cm^2 (23 in^2) of unrestricted ventilation slots or holes in front of the air intakes for the fans for each subrack; for example, thirty 6x85 mm (0.25x3.3 in) slots will allow the recommended airflow
- a vent in the top of the cabinet with an area of approximately 150 cm^2 (23 in^2) per subrack, or a similar area of ventilation per subrack at the rear of the cabinet behind each subrack
- 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 +60°C (+140°F).

If the TB8100 BSS is installed in a rack or cabinet with other equipment with different ventilation requirements, we recommend that the TB8100 be positioned below this equipment.

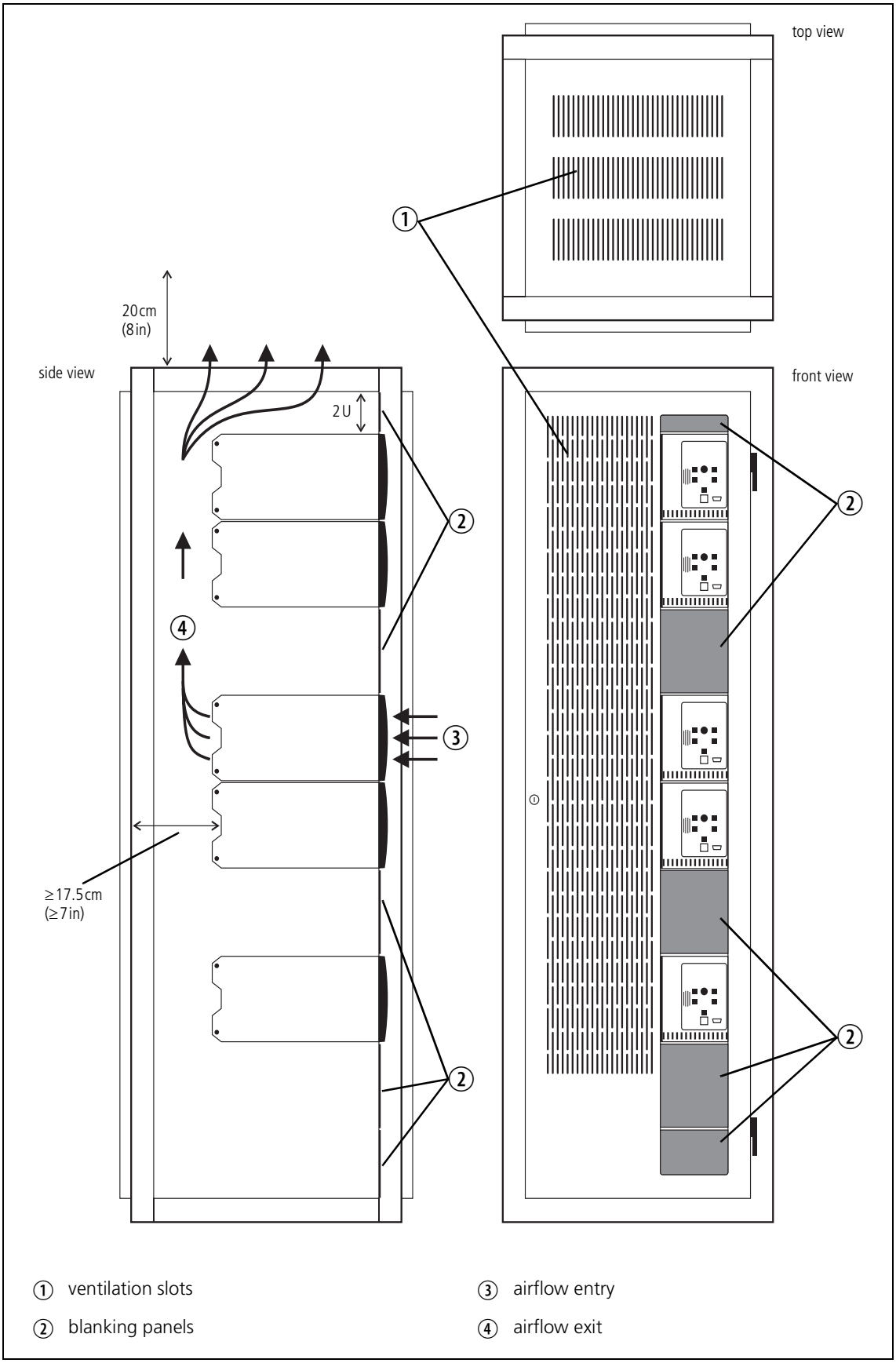
Auxiliary Extractor Fans

The TB8100 BSS does not require auxiliary extractor fans mounted in the top of the cabinet. If your cabinet is already fitted with fans, the following procedures apply:

- if there are six or more 120 mm (4.75 in) fans, each capable of extracting 160 m^3 per hour (94.2 CFM), they must run continuously
- if there are fewer than six fans, you must remove them and ensure the vent in the top of the cabinet has an area of approximately 150 cm^2 (23 in^2) per subrack.

If you have any other configuration, the performance of your system will depend on how closely you comply with the TB8100 BSS airflow requirements described above.

Figure 4.2 Typical Cabinet Ventilation Requirements



4.8 Installing the Base Station System

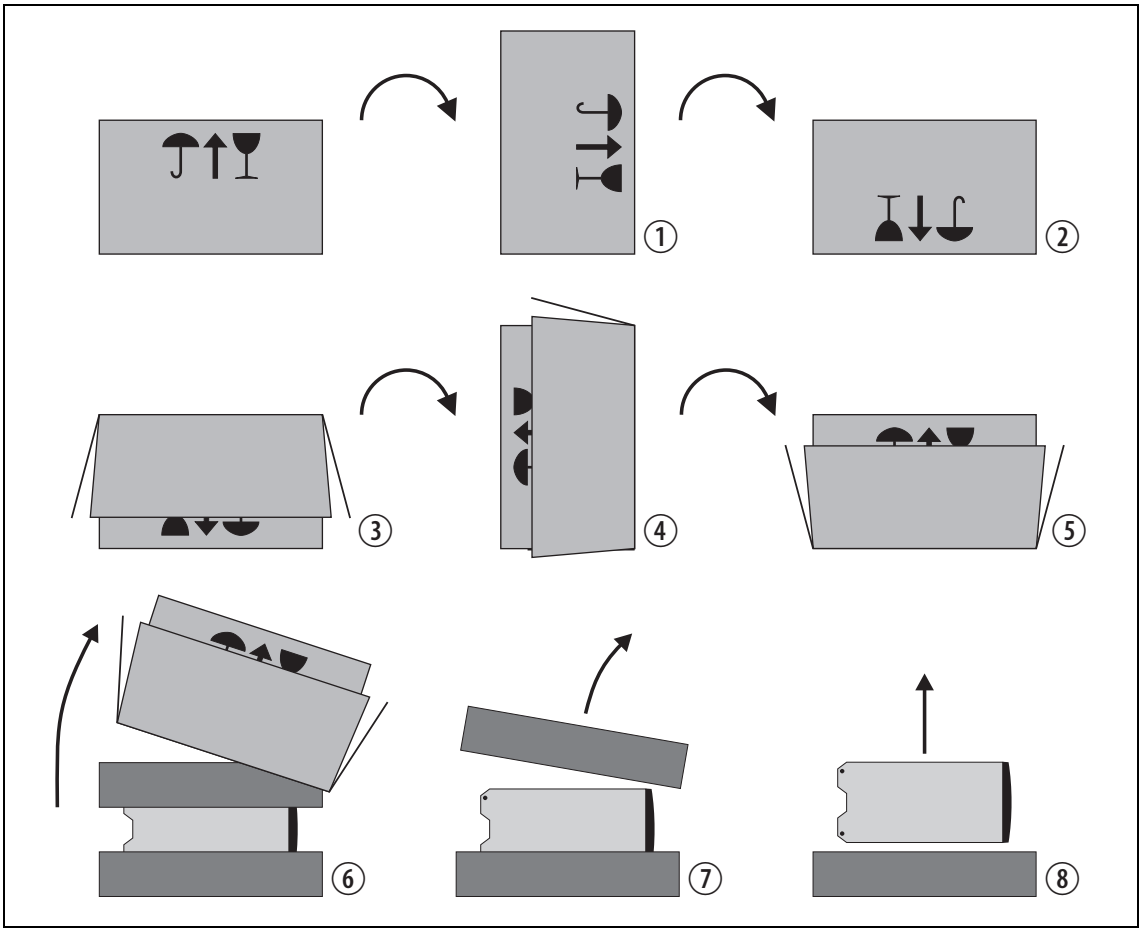
Caution **A TB8100 subrack complete with modules can weigh up to 28kg (62lb), or up to 30kg (66lb) complete with packaging. We recommend that you remove the modules from the subrack before moving the equipment, or have another person help you with the lifting. In all cases follow safe lifting practices.**

Unpacking the Equipment

Unpacking the TB8100 BSS

The TB8100 BSS is packed in a strong corrugated cardboard carton with top and bottom foam cushions. To prevent personal injury and damage to the equipment, we recommend that two people unpack the BSS.

Figure 4.3 Unpacking the TB8100 BSS



1. Rotate the carton carefully onto its side ① and then onto its top ②.
2. Cut the tape securing the flaps at the bottom of the carton and fold them flat against the sides ③.

3. Rotate the carton carefully onto its side ④, and then onto its bottom ⑤, ensuring that none of the flaps is trapped underneath.

4. Slide the carton upwards over the foam cushions and lift it away ⑥.

5. Remove the cushion from the top of the BSS ⑦ and then lift the BSS out of the other cushion ⑧.

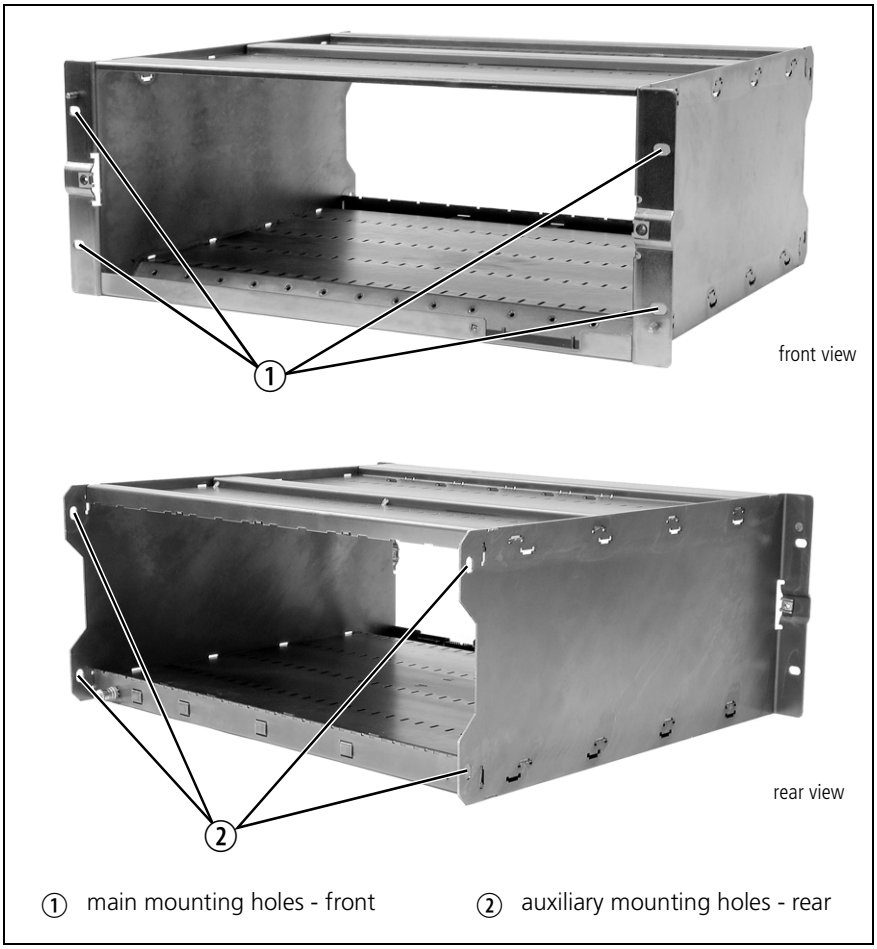
Disposal of Packaging

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.

Mounting the Subrack

Caution **We recommend that you remove the modules from the subrack before lifting it (refer to "Replacing Modules" on page 43), or have another person help you with the lifting.**

Figure 4.4 Subrack Mounting Points



① main mounting holes - front ② auxiliary mounting holes - rear

1. Remove the front panel, as described in "Preliminary Disassembly" on page 43.

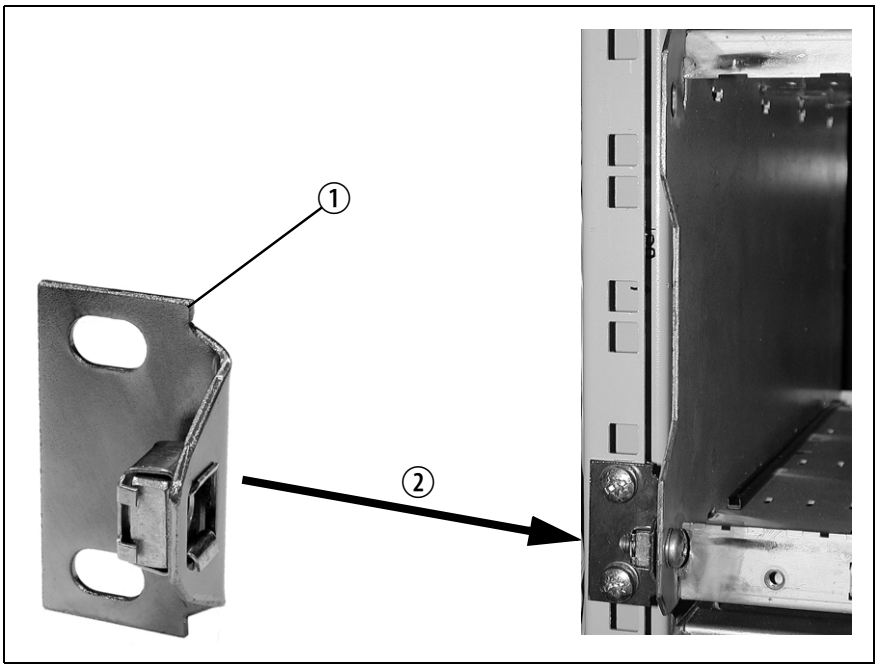
2. Fit the subrack into the cabinet or rack and secure it firmly with an M6 screw, flat and spring washer in each of the four main mounting holes ①, as shown in Figure 4.4 on page 39.

Note If you need extra mounting security, there are additional mounting holes ② provided at the rear of the subrack for auxiliary support brackets.

Auxiliary Support Bracket

TBA2140 auxiliary support brackets can be fitted to the rear of the TB8100 subrack to provide additional mounting security. Figure 4.5 below shows a standard TBA2140 bracket ① fitted in a typical Tait Electronics cabinet ②. If you are not using a Tait cabinet, you may have to make your own brackets to suit your installation.

Figure 4.5 Auxiliary Support Bracket



Important You **must** fit the auxiliary support brackets if you intend to transport a cabinet fitted with a fully built-up TB8100 BSS.

We also recommend that you fit the brackets under the following conditions:

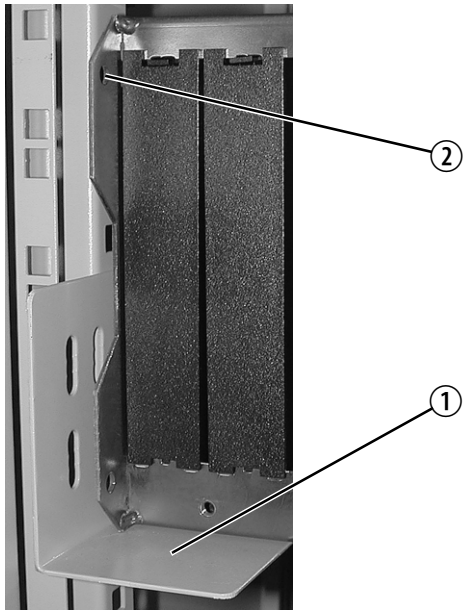
- when the installation is in an area prone to earthquakes
- when third party equipment is installed hard up underneath the TB8100 BSS subrack.

Optional Slide Mounting Rails

You can also use TBA2141 slide mounting rails ① when mounting the TB8100 BSS in a cabinet, as shown in Figure 4.6 below. These rails will support the BSS while you slide it into the cabinet.

However, you must still secure the BSS to the cabinet with four M6 screws through the main mounting holes on the front of the subrack, as shown in Figure 4.4 on page 39.

Figure 4.6 Optional Slide Mounting Rail - Rear View



Important The slide mounting rails are not suitable for transporting a cabinet fitted with a fully built-up TB8100 BSS. In this case, you must also fit the TBA2140 auxiliary support brackets to the upper set of rear mounting holes ②.

Cabling

General

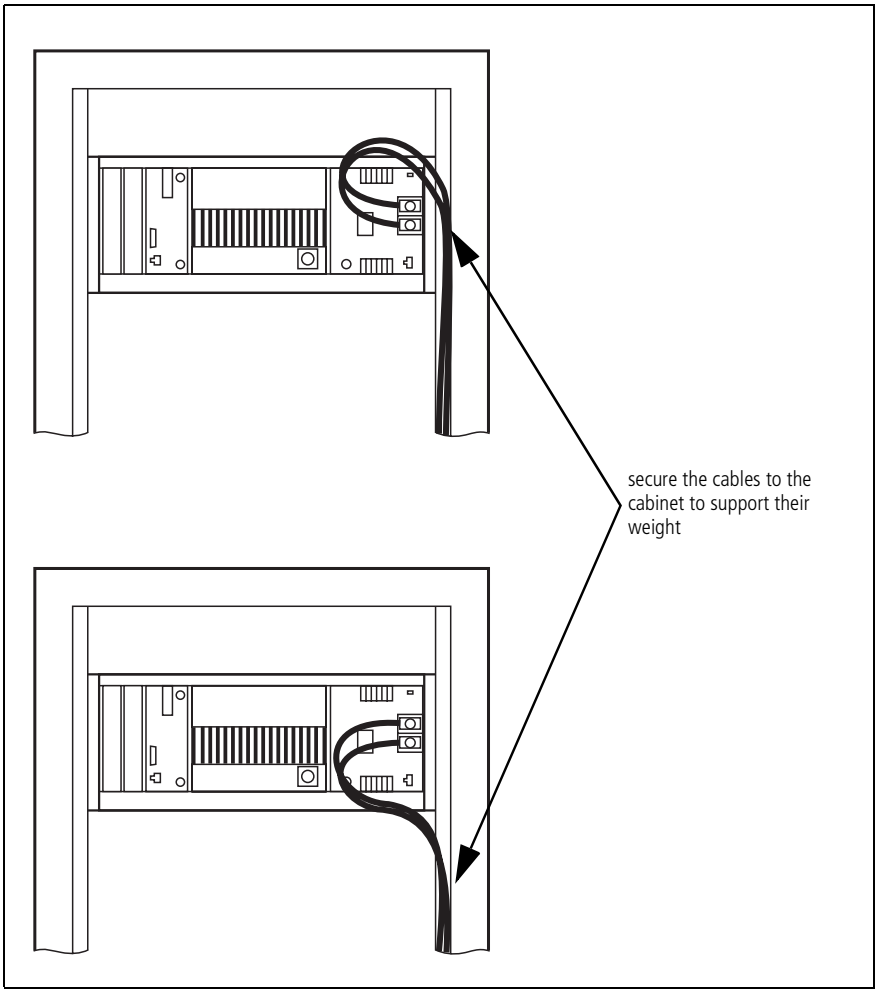
We recommend that you try to route all cables to and from the TB8100 BSS along the side of the cabinet so the cooling airflow is not restricted.

DC Power Cabling

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

Figure 4.7 below shows two recommended methods of securing these cables to prevent straining either set of terminals.

Figure 4.7 DC Power Cabling



5 Replacing Modules

Caution **The TB8100 PA and PMU weigh between 4.6kg (10.1lb) and 5.8kg (12.8lb) each. Take care when handling these modules to avoid personal injury.**

Important The cooling fans are mounted on the front panel and will only operate when the panel is fitted correctly to the front of the subrack. To ensure adequate airflow through the base station, do not operate it for more than a few minutes with the front panel removed (e.g. for servicing purposes). **Do not** transmit on full power if the front panel is removed.

5.1 Saving the Base Station's Configuration

Before replacing a module in the TB8100 BSS, you should decide whether you need to save its configuration data. If you are unsure whether you have a record of the configuration, use the Service Kit to read the base station and save the configuration file before removing any modules. Once you have replaced the module, you will be able to restore the original configuration by programming the saved configuration back into the base station. If one or more of the modules is faulty, you may be unable to read the base station. In this case, you will have to restore the configuration from a back-up file. Refer to the Service Kit and its associated documentation for more information.

5.2 Preliminary Disassembly

Hot-pluggable Modules

The reciter, PA and control panel are hot-pluggable and can be removed from the TB8100 BSS without powering down the whole BSS. These modules can also be removed without disrupting the system control bus communications with the other modules in the BSS.

In a dual base station system, you can remove the reciter and/or PA from one base station without disrupting the operation of the other base station.

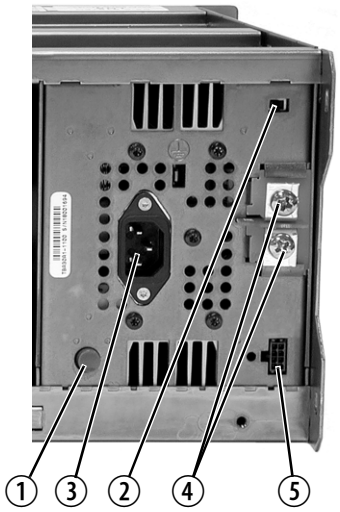
If you want to disconnect the power before working on the BSS, carry out the instructions in "Disconnect the Power" below.

Important Before removing a PA, disconnect the DC input and RF input first, followed by the RF output. After refitting the PA, reconnect the RF output first, followed by the RF input, and then the DC input.

Disconnect the Power

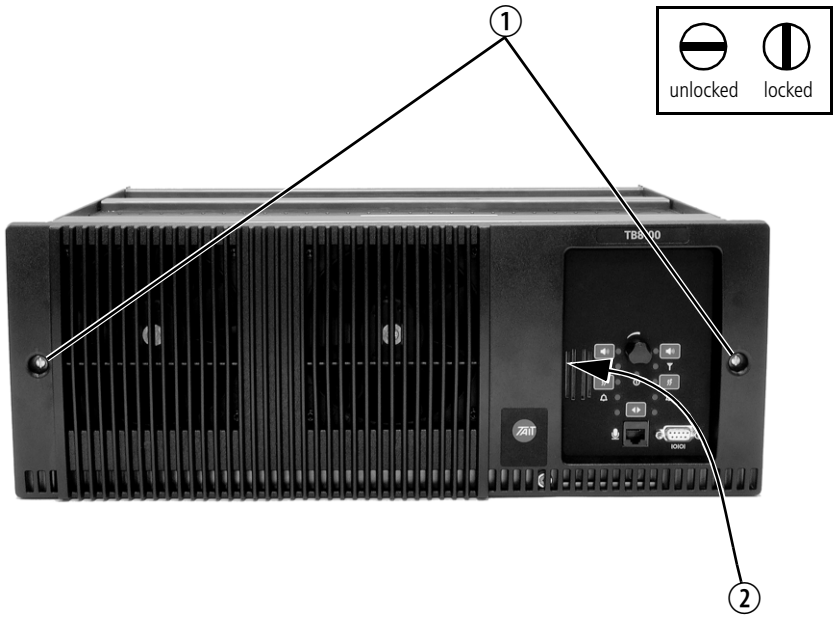
1. Turn off the AC ① and DC ② switches at the rear of the PMU.

2. Also at the rear of the PMU disconnect the mains ③ and battery ④ supply leads, and the auxiliary DC supply lead ⑤ (if fitted).



Remove the Front Panel

1. Undo the fastener at each end of the front panel ① with a quarter turn anti-clockwise.

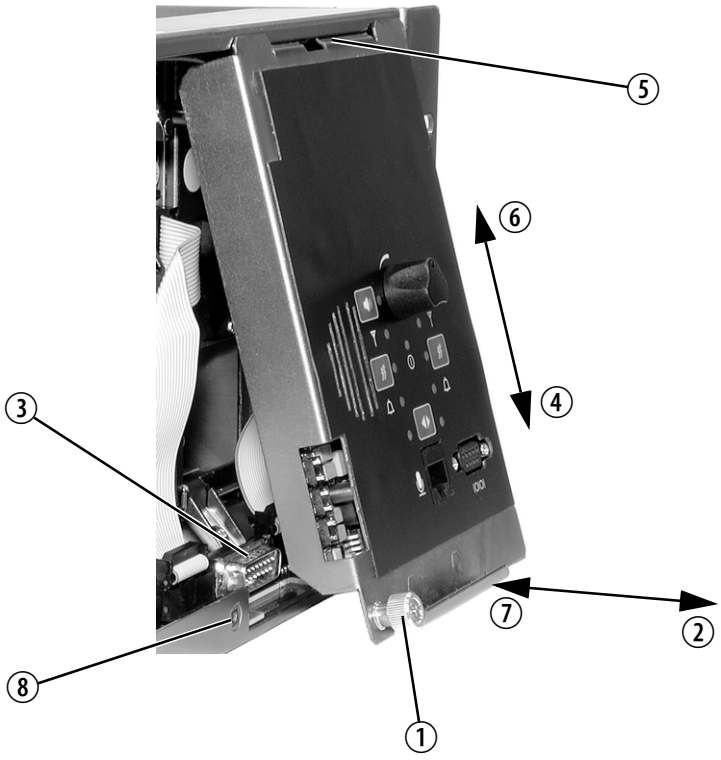


2. While supporting the left end of the front panel, place your fingers in the recess provided on the left side of the control panel opening ② and pull the right end of the front panel away from the subrack. You will need to overcome the resistance of the spring clip securing the front panel to the control panel.

5.3 Replacing the Control Panel

Removal

1. If you have not already done so, carry out the instructions in "Preliminary Disassembly" on page 43.
2. Undo the retaining screw ①. Note that the screw stays attached to the control panel.
3. Pull the bottom of the control panel away from the subrack ② to disconnect the D-range socket on the back of the panel from the plug ③ on the subrack.
4. Pull the control panel down ④ to disengage the centre tab ⑤ from the subrack.



Refitting

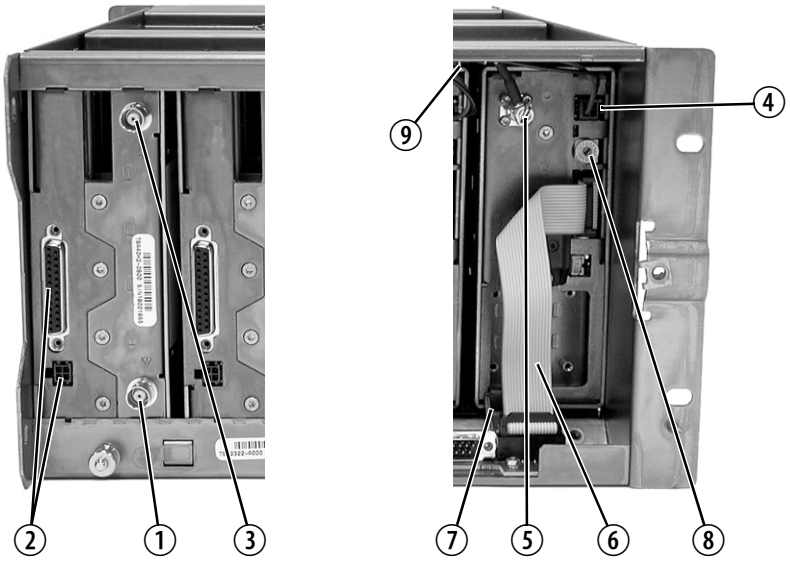
1. Fit the top of the control panel to the subrack so that the centre tab is behind the lip of the subrack and between the two locating tabs formed in the lip. Push the control panel firmly upwards ⑥.
2. Align the D-range socket on the back of the control panel with the plug on the subrack. Gently push the bottom of the panel home against the subrack ⑦ to engage the plug into the socket.
3. Insert the securing screw into the floating nut ⑧ in the subrack and tighten. Note that you may have to push the screw in and down to pick up the floating nut.
4. Carry out the instructions in "Final Reassembly" on page 53.

5.4 Replacing the Reciter

Important The operating times for the PA and PMU fans are stored in the reciter. Before replacing a reciter, record the total running times for the fans, and then program these totals into the replacement reciter. Refer to the Service Kit documentation for more information.

Removal

1. If you have not already done so, carry out the instructions in "Preliminary Disassembly" on page 43, and remove the control panel, as described in "Replacing the Control Panel" on page 45.
2. At the rear of the reciter, unplug the RF input cable ①, any system cables ② and the external reference cable ③ (if fitted).
3. At the front of the reciter, unplug the DC input cable ④ and the RF output cable ⑤, and move both cables to one side. Unplug both ends of the system control bus ⑥ and remove it.
4. Loosen the screw securing the retaining clamp ⑦ and rotate the clamp through 90° to clear the module.
5. Slide the reciter out of the subrack, taking care not to damage any of the cables.



Refitting

1. Slide the replacement reciter into the subrack and secure it with the retaining clamp. Ensure that you set its hex switch ⑧ to the same number as the original reciter.
2. Reconnect all the front and rear panel cables previously disconnected. Ensure the front panel cables are retained by the cable retaining clips ⑨ in the top of the subrack.

Note If you need to remove any front panel cables, simply pull the front of the cable retaining clip down and then slide it out from the sub-rack until it reaches the end of its travel.

3. Tighten the nut on the SMA connector to a torque of 0.9Nm (8in.lbf).

4. Refit the control panel, as described in "Replacing the Control Panel" on page 45.

5. Carry out the instructions in "Final Reassembly" on page 53.

5.5 Replacing the Power Amplifier

Important Before removing a PA, disconnect the DC input and RF input first, followed by the RF output. After refitting the PA, reconnect the RF output first, followed by the RF input, and then the DC input.

Removal

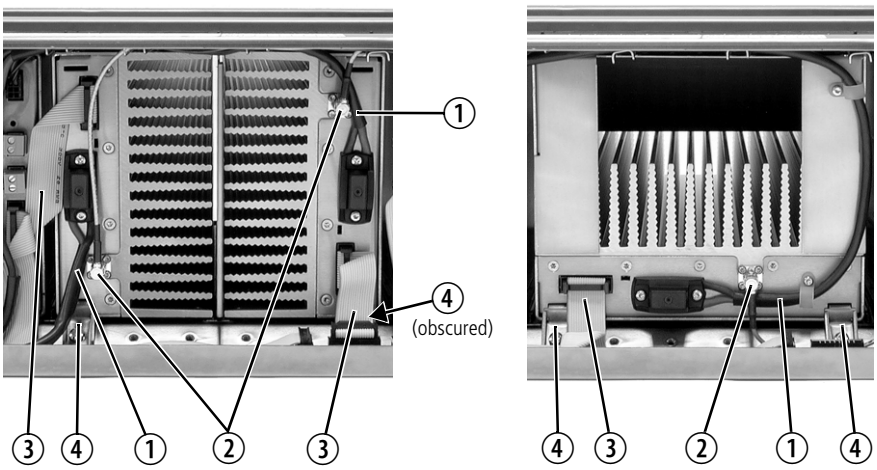
1. If you have not already done so, carry out the instructions in "Preliminary Disassembly" on page 43. If necessary, remove the control panel, as described in "Replacing the Control Panel" on page 45.

2. At the rear of the PA, unplug the RF output cable.

3. At the front of the PA, unplug the DC input cable ① and the RF input cable ②, and move both cables to one side. Unplug both ends of the system control bus ③ and remove it.

4. Loosen the screw securing the retaining clamp(s) ④ and rotate the clamp(s) through 90° to clear the module.

5. Slide the PA out of the subrack, taking care not to damage any of the cables.



Refitting

1. Slide the replacement PA into the subrack and secure it with the retaining clamp(s).
2. Reconnect all the front and rear panel cables previously disconnected. Ensure the front panel cables are retained by the cable retaining clips in the top of the subrack.

Note If you need to remove any front panel cables, simply pull the front of the cable retaining clip down and then slide it out from the subrack until it reaches the end of its travel.

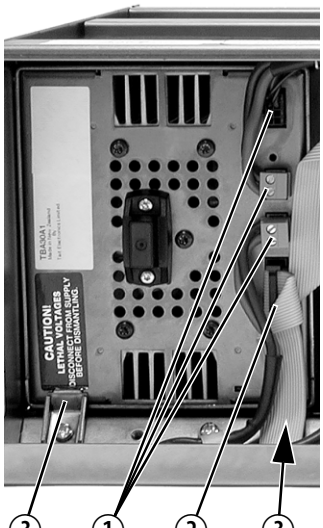
3. Tighten the nut on the SMA connector to a torque of 0.9Nm (8in.lbf).
4. If necessary, refit the control panel, as described in "Replacing the Control Panel" on page 45.
5. Carry out the instructions in "Final Reassembly" on page 53.

5.6 Replacing the Power Management Unit

Important You must disconnect the AC and DC power cables before removing the PMU from the subrack.

Removal

1. If you have not already done so, carry out the instructions in "Preliminary Disassembly" on page 43.
2. At the front of the PMU, unplug the output power cable(s) ① and system control bus ②, and move them to one side.
3. Loosen the screw securing the retaining clamps ③ and rotate the clamps through 90° to clear the module.
4. Slide the PMU out of the subrack, taking care not to damage any of the cables.



Refitting

1. Slide the replacement PMU into the subrack and secure it with the retaining clamps.
2. Reconnect all the front and rear panel cables previously disconnected. Connect the DC power cables on the rear panel as shown in Figure 4.7 on page 42. Ensure the front panel cables are retained by the cable retaining clips in the top of the subrack.

Note If you need to remove any front panel cables, simply pull the front of the cable retaining clip down and then slide it out from the sub-rack until it reaches the end of its travel.

3. Carry out the instructions in "Final Reassembly" on page 53.

5.7 Replacing the Front Panel Fans

Unless otherwise indicated, the following instructions refer to Figure 5.1 on page 51.

Removal

1. If you have not already done so, carry out the instructions in "Preliminary Disassembly" on page 43.
2. PA Fan
   a. Remove the four screws labelled ① and remove the duct and fan assembly from the front panel.
   b. Unplug the fan from the fan contact PCB ②.
   c. Remove the fours screws holding the fan into the duct ③ and remove the fan.
3. PMU Fan
   a. Remove the PA fan/duct assembly as described above.
   b. Remove the two screws labelled ④ and remove the PMU fan/duct assembly.
   c. Unplug the fan from the fan contact PCB ⑤.
   d. Remove the fours screws holding the fan into the duct ⑥ and remove the fan.

Refitting

1. Fit the replacement fan into the duct with the power wires located in the slot in the side of the duct ⑦.
2. Refit the four screws securing the fan into the duct. **Do not** overtighten these screws or you will distort the fan body.
3. PMU Fan
   a. Refit the PMU fan/duct assembly onto its mounting bosses. Note that the two inner mounting tabs ⑧ fit over the bosses.
   b. Plug the fan into the fan contact PCB ⑤ and route the wires around the PA fan opening ⑨.
   c. Refit the two screws labelled ④.
   d. Refit the PA fan as described below.
4. PA Fan
   a. Plug the power wires into the fan contact PCB ② and route the wires around the PA fan opening ⑨.

b. Refit the PA fan/duct assembly onto its mounting bosses. Note that the two inner mounting tabs ⑩ fit over the inner tabs of the PMU fan. Ensure that all the power wires are secured under the retaining hooks ⑪ and are not crimped.

c. Refit the fours screws labelled ①.

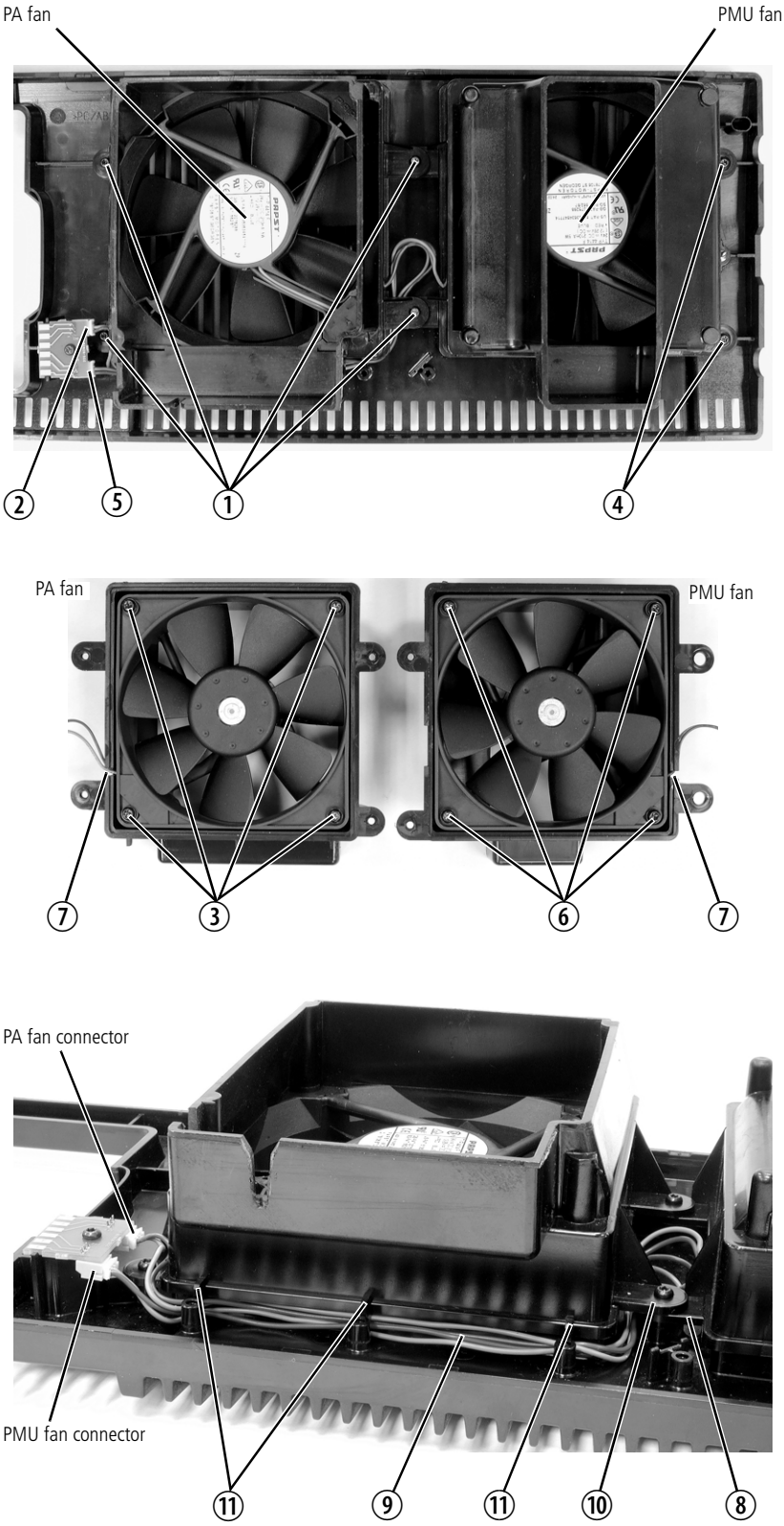
5. Reset the PA and PMU fan operating time using the Service Kit software (Monitor > Data logging > System Data).

6. Carry out the instructions in "Final Reassembly" on page 53.

Important You must connect the fans to the correct sockets on the fan contact PCB. If the fan connections are reversed, the wrong fan will be activated when a module needs cooling. The module may then fold back and shut down. When you power-up the TB8100 BSS, check that the PMU fan runs first, followed by the PA fan. Each fan will run for about five seconds.

Important You must refit the correct duct to the PA fan. There are several small but important differences between the duct for a 5 or 50 W PA and the duct for a 100 W PA. Refer to Figure 5.2 on page 53 for more details.

Figure 5.1 Replacing the Front Panel Fans



100W base station front panel shown

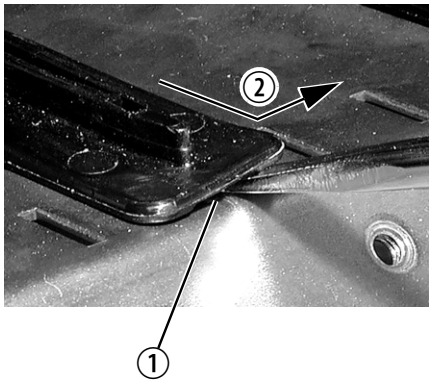
5.8 Replacing the Module Guide Rails

The module guide rails are held in place by four hooks that fit through the slots in the top and bottom of the subrack. There is also a locking tab which prevents the guide rails from working loose.

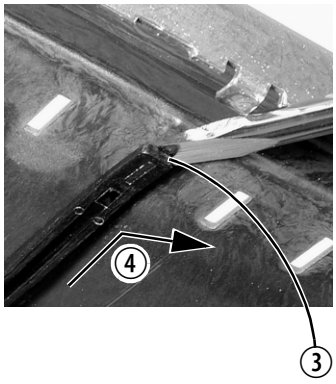
Removal

1. Bottom Guide Rails
   a. Insert a small flat-blade screwdriver under the front end of the guide rail and lift it slightly ①. This will ensure the small locking tab is clear of the slot in the subrack.
   b. Whilst holding the front end of the guide rail up, pull the guide rail towards the front of the subrack ② and lift it clear of the slots.
2. Top Rails
   a. Insert a small flat-blade screwdriver under the rear end of the guide rail and lift it slightly ③. This will ensure the small locking tab is clear of the slot in the subrack.
   b. Whilst holding the rear end of the guide rail up, pull the guide rail towards the rear of the subrack ④ and lift it clear of the slots.

bottom guide rail



top guide rail



Refitting

1. Bottom Guide Rails
   a. With the locating hooks pointing towards the rear of the subrack, insert the hooks into the slots in the subrack.
   b. Push the guide rail towards the rear of the subrack until you hear the locking tab "click" into place.
2. Top Guide Rails
   a. With the locating hooks pointing towards the front of the subrack, insert the hooks into the slots in the subrack.
   b. Push the guide rail towards the front of the subrack until you hear the locking tab "click" into place.

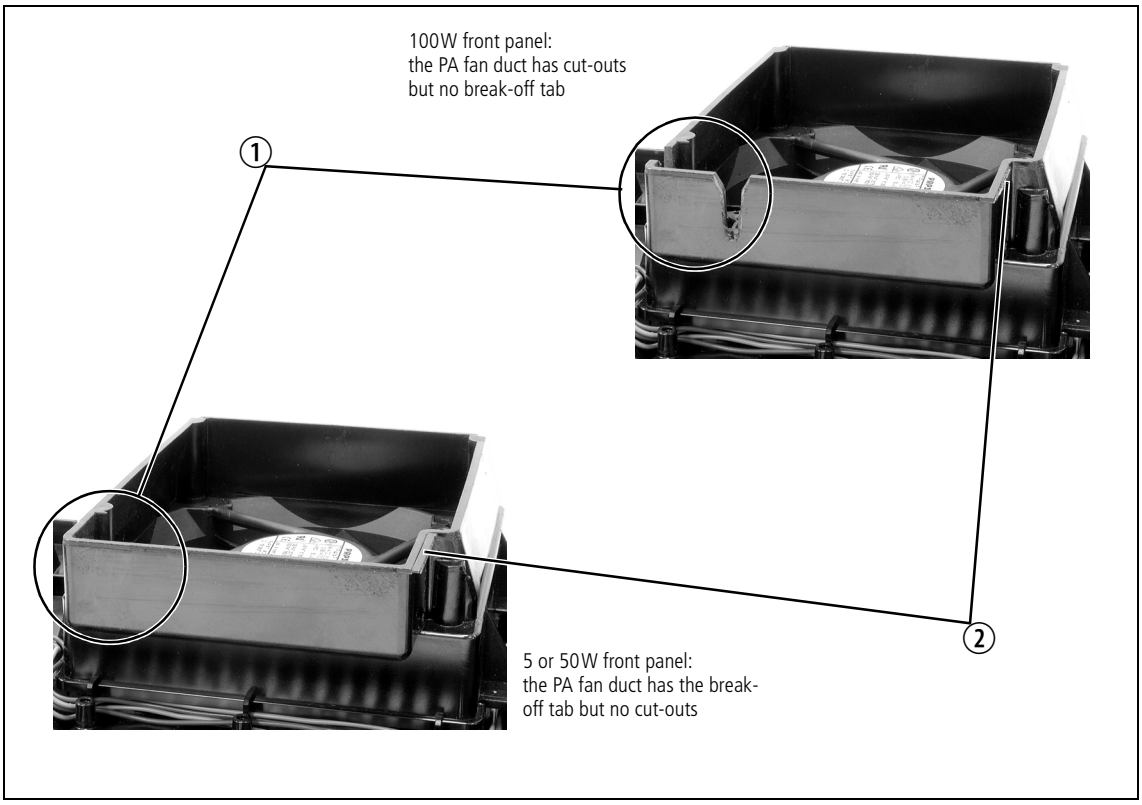
5.9 Final Reassembly

Important You must refit the correct front panel to your TB8100 BSS. The serial number on the front panel must match the number on the subrack. This will ensure that the PA and PMU fan operating times stored in the reciter match the actual operating times of the fans fitted to the BSS. In all cases you must also fit the correct type of front panel to your BSS. There are several small but important differences between the front panel for a 5 or 50 W BSS and the front panel for a 100 W BSS. These differences are in the duct for the PA fan and are described in the following paragraphs.

5 or 50W Front Panel The PA fan duct does not have the cut-outs ① required for the 100 W PA RF and DC cables. The break-off tab ② will also still be present and will jam on the system control bus. Do not try to fit this front panel to a 100 W BSS or you will damage these cables and possibly the front panel itself.

100W Front Panel Do not fit this front panel to a 5 or 50 W BSS. The presence of the cut-outs and absence of the break-off tab will allow air to escape and reduce the velocity of air directed through the heatsink.

Figure 5.2 Identifying the Correct Front Panel

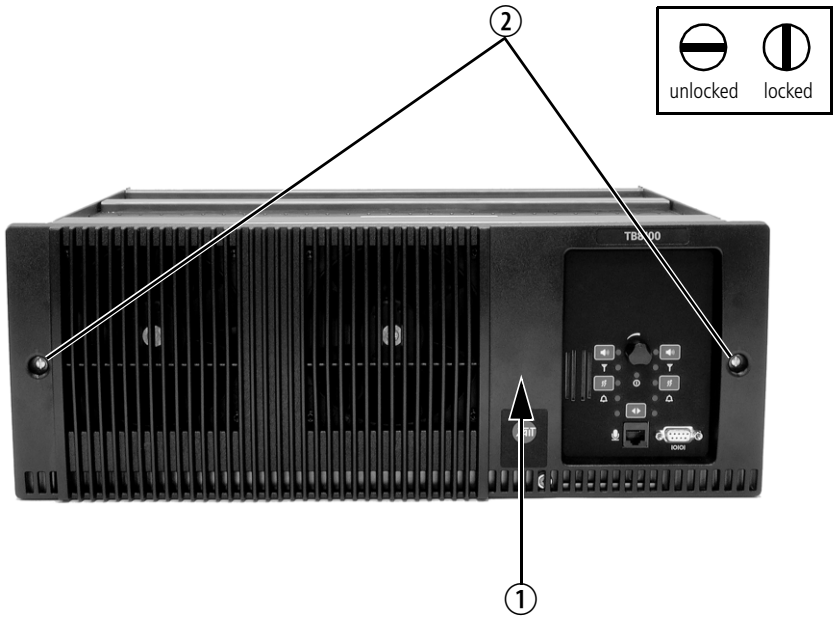


1. Before fitting the front panel, ensure that all cables are secured and positioned correctly so they are clear of the fan ducts (refer to Figure 6.1 on page 55 and Figure 6.2 on page 56). Otherwise the panel may not fit properly, or you may damage the cables.

2. Refit the Front Panel

   a. Fit the front panel onto the locating pegs on the subrack Fit the left end first, followed by the right end, pressing the panel in the centre as shown ① to secure the spring clip behind the control panel.

   b. Secure the fastener at each end ② with a quarter turn clockwise. Align the slot horizontally, then press the fastener in and turn to lock.



3. Reconnect the mains and battery supply leads at the rear of the PMU. Also reconnect the auxiliary DC supply lead (if fitted).

4. Turn the PMU on with the switch(es) at the rear of the module.

Important When refitting modules, make sure they are fitted correctly into the subrack and all retaining clamps are securely tightened. The recommended torque for the retaining clamp screws is 1.9 Nm (17 in.lbf). As well as holding the modules in place, the retaining clamps push the modules hard against the rear rail of the subrack to ensure a good ground connection between the modules and subrack.

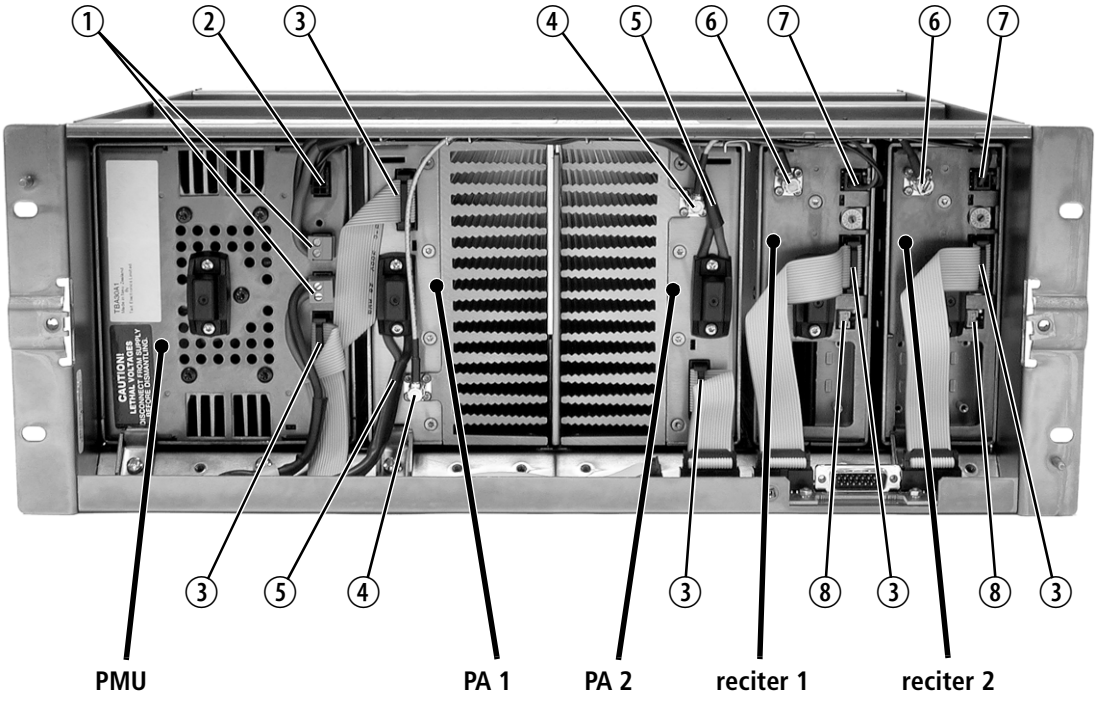
6 Connection

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.

6.1 Overview of Inputs and Outputs

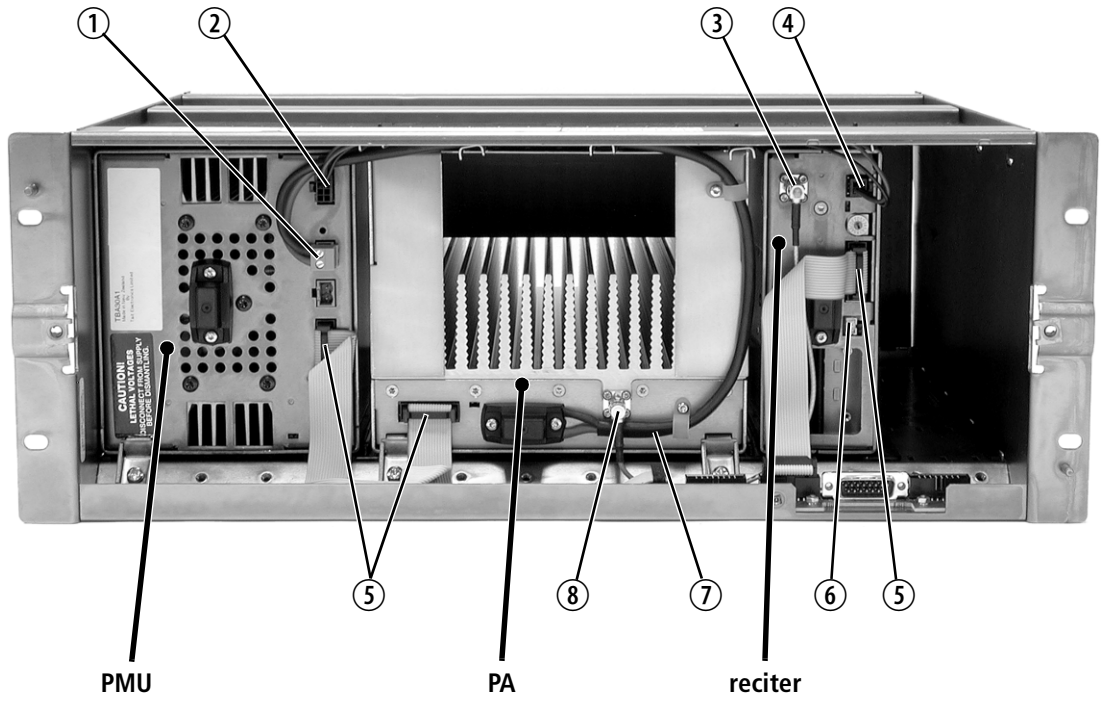
This section identifies the main input and output connections for the TB8100 BSS. Figure 6.1 below identifies the connections at the front of a dual base station, and Figure 6.3 on page 57 identifies those at the rear. Figure 6.2 on page 56 identifies the connections at the front of a single 100 W base station. Figure 6.4 on page 57 identifies the connections on the control panel. Refer to the following sections in this chapter for more details on these connections.

Figure 6.1 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 6.2 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

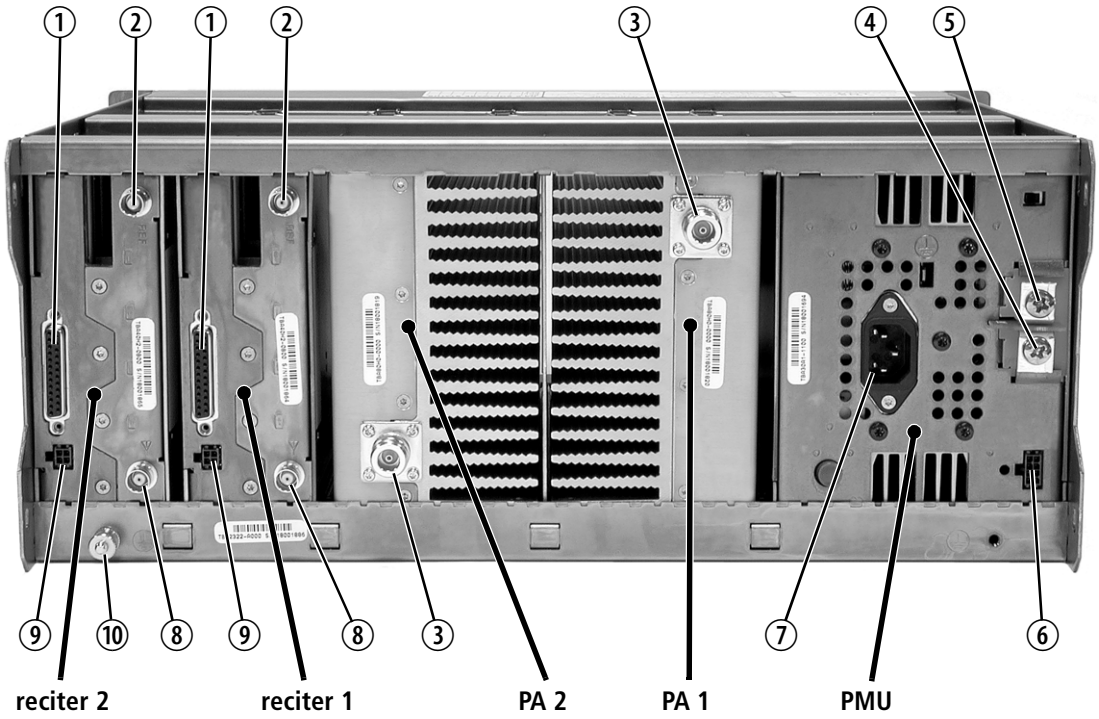
⑤ system control bus

⑥ DC output (for optional reciter fan only)

⑦ 28VDC high current input cable from PMU

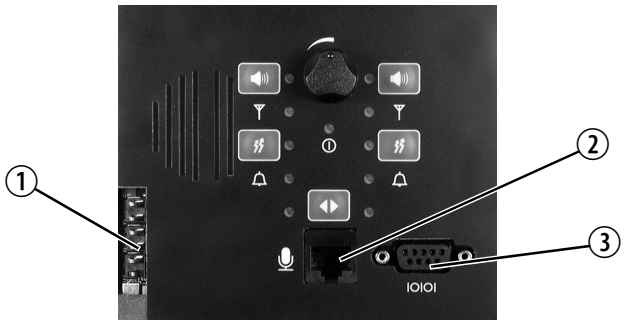
⑧ RF input from reciter

Figure 6.3 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 6.4 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

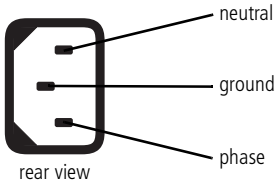
6.2 Power Supply Connections

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.



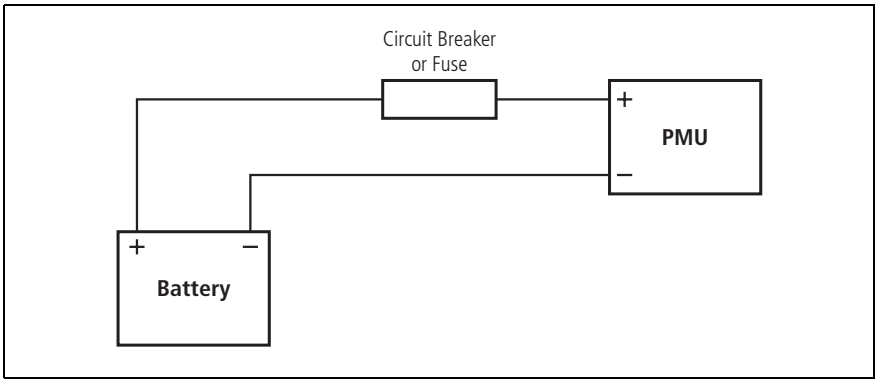
DC Power

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.

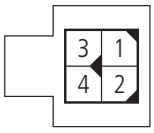
Figure 6.5 Recommended DC Power Connection



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 60 for the pin allocations for +AUX_V on each system interface PCB.



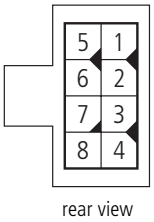
Pin	Description	Links
1	+V input	
2	ground	
3	+V input	
4	ground	

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	

6.3 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 6.3 on page 57).

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

6.4 System Connections

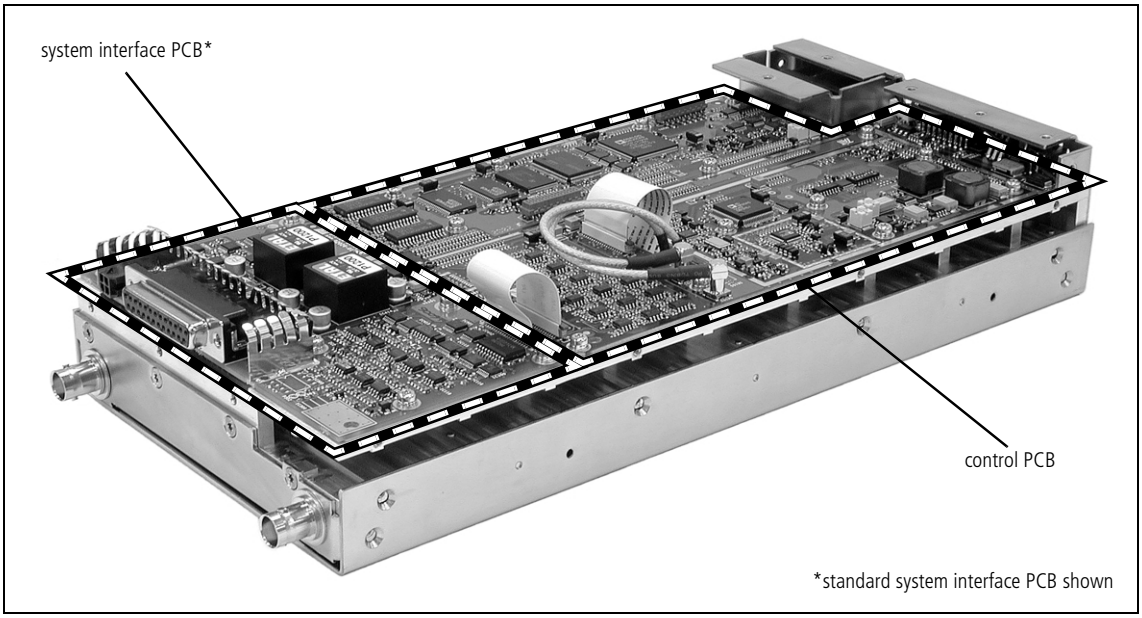
The reciter can be fitted with an optional system interface PCB which provides the links between the reciter's internal circuitry and external equipment. This PCB is securely mounted to the reciter's chassis and is connected to the control PCB with a flexible connector. The system interface PCB is fitted 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 6.6 System Interface PCB

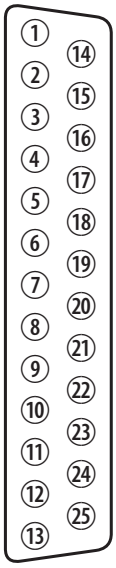


Standard

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 600Ω 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

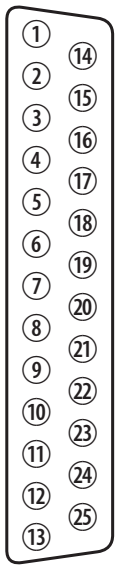
This system interface PCB is fitted to reciters bearing the product code TBA4xxx-0B0x or TBA5xxx-0B0x. If purchased separately, it has the product code TBA10B0. It is the same as the standard model, except that the balanced audio interfaces are galvanically isolated.

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.

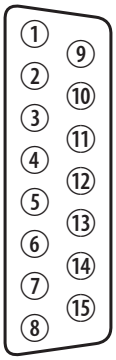


rear view

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.

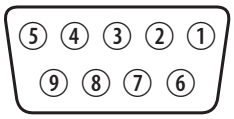


rear view

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	

6.5 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.

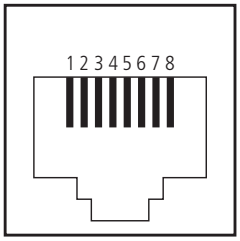


front view

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	

6.6 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

7 Preparation for Operation

Once the TB8100 BSS has been installed and connected, it is time to prepare it for operation. The main procedures required to ensure your BSS is ready for operation are as follows:

- applying power
- tuning
- configuration
- test transmissions.

The following sections provide more detail on these procedures. Some sections provide only an overview, as the full procedures are described in other documents.

7.1 Applying Power

1. Before turning the TB8100 BSS on:
   - check that the PMU is turned off (refer to Figure 3.4 on page 29)
   - remove the front panel (refer to "Preliminary Disassembly" on page 43)
   - check that all looms and cables at the front and rear of the BSS are fitted correctly (refer to "Overview of Inputs and Outputs" on page 55)
   - check that all connectors are secure
   - refit the front panel - ensure it is fitted correctly so that the fans will operate if needed (refer to "Final Reassembly" on page 53).
2. Apply power by turning on the PMU.
3. Check that the BSS powers up correctly:
   - check that the cooling fans in the front panel turn on in the correct order after power-up: the PMU fan will run first, followed by the PA fan; each fan will run for about five seconds and then switch off
   - check that the power and microphone channel LEDs on the control panel turn on after about five seconds, and all other LEDs remain off (refer to "Control Panel" on page 25)
   - at this point you can also safely press the speaker and microphone channel buttons and check that they are operating correctly.

7.2 Tuning

If you have not already done so, you must tune the TB8100 BSS reciter modules before operating them in your radio system. To do this you will need to use the Calibration Kit software included on the Service Kit CD-ROM, plus the TB8100 calibration test unit (CTU).

Refer to the Calibration Kit documentation for full details on the tuning procedures.

7.3 Configuration

Software

The TB8100 BSS can be configured using software to operate in many different ways. Although it is programmed with a default configuration at the factory, you will need to use the Service Kit software to configure your BSS to suit the requirements of your radio system.

Refer to the Service Kit and its associated documentation for full details of all the options available in the complete configuration process.

Note The BSS will be programmed at the factory with default passwords which you will need to use to log on for the first time. Refer to the Service Kit Help for more information on these passwords and how to change them.

Hardware

Each base station in a TB8100 BSS must be assigned an identity. This identity is used to identify the base station to the Service Kit and Calibration Kit software, and to the control panel.

You set the identity of each base station with the hex switch on the front panel of its reciter (refer to Figure 3.2 on page 27). For example, the reciters in a two-channel BSS would be numbered "1" and "2". The reciter with the lowest hex number becomes the "control" reciter. In a single base station system, set the hex switch on the reciter to "1".

Note Reciters and PAs are normally numbered from left to right when facing the front of the BSS (refer to Figure 6.1 on page 55). In a single base station system, fit the reciter and PA into the positions allocated for "reciter 1" and "PA 1". These positions also correspond to the layout of the controls on the control panel (refer to Figure 3.1 on page 25).

7.4 Test Transmissions

Once you have completed the procedures described in the previous sections, you may want to make some test transmissions. These will verify that your TB8100 BSS is operating correctly.

Note You may wish to have the Service Kit software running during these tests so that you can monitor the performance of the BSS.

1. Ensure that the BSS is correctly connected to an appropriate antenna and that all RF connectors are secure.
2. Plug the microphone into the RJ45 socket on the control panel (refer to "Control Panel" on page 25).
3. Select the channel you wish to transmit on with the microphone channel button.
4. Turn on the speaker audio for the selected channel with the speaker button.
5. Press the PTT switch on the microphone and make your transmission. Check that:
   - the red transmit LED turns on
   - there are no alarms generated
   - the audio quality on the receiving radio is good.
6. When the other radio answers your transmission, check that:
   - the green receive LED turns on
   - the audio quality from the speaker in the control panel is good (adjust the speaker volume as required).

8 Maintenance Guide

The TB8100 BSS is designed to be very reliable and should require little maintenance. However, performing regular checks will prolong the life of the equipment and prevent problems from happening.

It is beyond the scope of this manual to list every check that you should perform on your BSS. The type and frequency of maintenance checks will depend on the location and type of your system. The checks and procedures listed below can be used as a starting point for your maintenance schedule.

Remote Monitoring

You can monitor the performance of your TB8100 BSS remotely by using the Service Kit and Alarm Center software provided with the equipment. You can use the Service Kit to configure the BSS to generate alarms when its performance falls outside your own pre-defined limits. Refer to the Service Kit and Alarm Center documentation for more details.

Performance Checks

We suggest you monitor the following operational parameters using the Service Kit:

- VSWR
- DC input voltage, especially on transmit
- receiver sensitivity
- the setting of the receiver gate opening
- any temperature alarms.

These basic checks will provide an overview of how well your BSS is operating.

Reciter

There are no special maintenance requirements for the reciter. You may, however, choose to recalibrate the TCXO frequency periodically. Refer to the Calibration Kit documentation for more details.

PA

There are no special maintenance requirements for the PA.

PMU

There are no special maintenance requirements for the PMU. However, if you are using battery back-up, you should check the batteries regularly in accordance with the manufacturer's recommendations.

Ventilation

The TB8100 BSS has been designed to have a front-to-back cooling airflow. We strongly recommend that you periodically check and maintain the ventilation requirements described in "Ventilation" on page 35 to ensure a long life and trouble-free operation for your BSS.

Cooling Fans

The cooling fans have a long service life and have no special maintenance requirements. You can use the Service Kit to monitor the total running time of the fans and configure the BSS to generate an alarm if either of the cooling fans fails. You can also set an alarm in Task Manager which will be generated when the total running time of the fan reaches a specified total. Refer to the Service Kit and Alarm Center documentation for more details.

Glossary

This glossary contains an alphabetical list of terms and abbreviations related to the TB8100 base station system. For information about trunking, mobile, or portable terms, consult the glossary provided with the relevant documentation.

A B C D E F G H I K L N P R S T U V W

A

access level — There are three different levels of access to a base station: Administrator, User, and Read-only. The User access level has a configurable access profile; the Administrator decides which functions that access level can carry out.

action — An action is the second part of a Task Manager task. It specifies what the base station must do when the first part (the input) becomes true.

active — Digital outputs are active when the base station pulls their voltage low and current is flowing. Digital inputs are active when external equipment is pulling them to ground. All base station digital inputs and outputs are open collector.

ADC — Analog-to-Digital Converter. A device for converting an analog signal to a digital signal that represents the same information.

Alarm log — The alarm log is a list of the last 50 alarms that the base station generated. This list is stored in the base station. To view it, select Monitor > Alarms > Reported Alarms.

Alarm Center — Alarm Center is a utility provided with the Service Kit that is able to receive, store, and display alarms from any number of base stations with dial-up connections. Participating base stations need an Alarm Reporting license. Alarm Center also routes emailed messages to the email server.

alarm notification — Alarm notification is the process by which the base station passes on information about an alarm condition. It can notify alarms over the air, over the line, via email, or to an Alarm Center. It can also activate a digital output. If the Service Kit is logged on to the base station, it is automatically notified of any alarms.

air intake temperature — The temperature of the air as measured at the PA's air intake.

anti-kerchunking Anti-kerchunking is a base station configuration that discourages users from kerchunking.

B

balanced line A balanced line has two wires carrying equal and opposite signals. It is typically used in a line-connected base station for connecting to the despatcher console. The system interface identifies the balanced line in as Rx+ and Rx-, and the balanced line out as Tx+ and Tx-.

BCD BCD (binary coded decimal) is a code in which a string of four binary digits represents a decimal number.

BSS A BSS (base station system) is a subrack containing at least one TB8100 base station.

C

Calibration Kit The TB8100 Calibration Kit is a utility for defining the switching ranges of the receiver and the exciter and for flattening the receiver response across its switching range. It can also be used to calibrate various parts of the reciter and the PA circuitry.

CCDI2 CCDI2 (computer controlled data interface version 2) is a proprietary Tait command protocol used between computer equipment and a Tait radio.

channel A channel is:

- A frequency pair (or just a single frequency in a simplex system).
- A set of configuration information that defines the frequency pair and other settings. Also referred to as a channel configuration. Generally, 'channel' has this meaning in the Service Kit.

channel profile A channel profile is a named set of configuration items relating to the base station's RF configuration, transmitter power output and power saving modes. Like the signalling profile, it can be applied to any channel. Together, these profiles define most configuration items.

channel spacing Channel spacing is the bandwidth that a channel nominally occupies. If a base station has a channel spacing of 12.5 kHz, there must be a separation of at least 12.5 kHz between its operating frequencies and those of any other equipment.

channel table The channel table is the base station's database of channel configurations. To view it, select Configure > Base Station > Channel Table.

CODEC An IC which combines analog-to-digital conversion (coding) and digital-to-analog conversion (decoding).

configuration file A configuration file consists of all the configuration settings needed for a base station, stored as a file in the configurations folder. Configuration files have the extension *.t8c.

connection A connection is a named group of settings that the Service Kit uses when establishing communications with a BSS.

control bus The control bus is used for communications between modules in a base station system. It is an I^2C bus, a bi-directional two-wire serial bus which is used to connect integrated circuits (ICs). I^2C is a multi-master bus, which means that multiple chips can be connected to the same bus, and each one can act as a master by initiating a data transfer.

control panel The control panel is an area at the front of the BSS with buttons, LEDs and other controls that let you interact with the BSS.

CTCSS CTCSS (continuous tone controlled squelch system), also known as PL (private line), is a type of signalling that uses subaudible tones to segregate groups of users.

custom action A custom action is a user-defined Task Manager action that consists of more than one pre-defined action.

custom input A custom input is a user-defined Task Manager input that consists of a combination of pre-defined inputs.

CWID CWID (**C**ontinuous **W**ave **ID**entification) is a method of automatically identifying the base station using a Morse code. Continuous wave means transmission of a signal with a single frequency that is either on or off, as opposed to a modulated carrier.

D

DAC Digital-to-Analog Converter. A device for converting a digital signal to an analog signal that represents the same information.

DCS DCS (digital coded squelch), also known as DPL (digital private line), is a type of subaudible signalling used for segregating groups of users. DCS codes are identified by a three-digit octal number, which forms part of the continuously repeating code word. When assigning DCS signalling for a channel, you specify the three-digit code.

de-emphasis De-emphasis is a process in the receiver that restores pre-emphasised audio to its original relative proportions.

duty cycle Duty cycle is used in relation to the PA. It is the proportion of time (expressed as a percentage) during which the PA is operated. The TB8100 PA can be operated continuously.

E

EIA Electronic Industries Alliance. Accredited by the American National Standards Institute (ANSI) and responsible for developing telecommunications and electronics standards in the USA.

EMC Electromagnetic Compatibility. The ability of equipment to operate in its electromagnetic environment without creating interference with other devices.

ETSI European Telecommunications Standards Institute. The non-profit organisation responsible for producing European telecommunications standards.

F

flag A flag is a programming term for a "yes/no" indicator used to represent the current status of something. The base station has a set of system flags that are read and set by Task Manager. There is also a separate set of flags that you can use in your own Task Manager tasks.

frequency band The range of frequencies that the equipment is capable of operating on.

front panel The cover over the front of the BSS containing fans for the PA and PMU.

G

gating Gating is the process of opening and closing the receiver gate. When a valid signal is received, the receiver gate opens.

H

hiccup mode Many power supplies switch off in the event of a short-circuit and try to start again after a short time (usually after a few seconds). This "hiccup"-type of switching off and on is repeated until the problem is eliminated.

hysteresis Hysteresis is the difference between the upper and lower trigger points. For example, the receiver gate opens when the upper trigger point is reached,

but will not close until the level falls to the lower trigger point. An adequate hysteresis prevents the receiver gate from repeatedly opening and closing when the level is about that of the trigger point.

Hysteresis mode A mode of PMU operation designed to save power. The PMU is mainly turned off, but switches back on intermittently to maintain output voltage when the output current is low.

I

inactive Digital outputs are inactive if the base station is doing nothing to them. They are floating, open collector outputs. Digital inputs are inactive when they are open circuit.

Intercom mode Intercom mode makes it possible for the operator at the dispatch centre and the servicing technician at the base station to communicate with each other over the line. It connects the base station microphone to line out.

isolator An isolator is a passive two-port device which transmits power in one direction, and absorbs power in the other direction. It is used in a PA to prevent damage to the RF circuitry from high reverse power.

K

kerchunking Kerchunking is transmitting for a second or less without saying anything in order to test the base station. This results in a 'kerchunk' sound.

L

line-controlled base station A TB8100 is a line-controlled base station when it receives audio (sending it out via its systems interface), transmits audio received over its systems interface, and its transmitter is keyed via the Tx Key line.

logging on Once you are connected to a BSS, you log on to a base station. This establishes communications between the Service Kit and a particular base station.

N

navigation pane The navigation pane is the left-hand pane of the Service Kit application window. It displays a hierarchical list of items. When you click an item, the main pane displays the corresponding form.

O

operating range Operating range is another term for switching range.

P

PA The PA (power amplifier) is a base station module that boosts the exciter output to transmit level.

PMU The PMU (power management unit) is a module that provides power to the BSS.

pre-emphasis Pre-emphasis is a process in the transmitter that boosts higher audio frequencies.

R

reciter The reciter is a module of a TB8100 base station that acts as receiver and exciter.

reverse tone burst Reverse tone bursts can be used with CTCSS. When reverse tone bursts are enabled, the phase of the generated tones is reversed for a number of cycles just before transmission ceases. If the receiver is configured for reverse tone burst, it responds by closing its gate.

RSSI RSSI (Received Signal Strength Indicator) is a level in dBm or volts that indicates the strength of the received signal.

Run mode Run mode is the normal operating mode of the base station.

signalling profile A signalling profile is a named set of configuration items related to signalling that can be applied to any channel. Items include subaudible signalling and transmit timers.

S

sensitivity The sensitivity of a radio receiver is the minimum input signal strength required to provide a useable signal.

SINAD SINAD (Signal plus Noise and Distortion) is a measure of signal quality. It is the ratio of (signal + noise + distortion) to (noise + distortion). A SINAD of 12dB corresponds to a signal to noise ratio of 4:1. The TB8100 can provide an approximate SINAD value while in service by comparing the in-

band audio against out-of-band noise. This value should not be relied upon to make calibrated measurements.

Sleep mode Sleep mode is a power saving state in which a part of the base station is switched off, and then periodically switched on again.

Standby mode Standby mode is a mode of base station operation in which active service is suspended so that special operations can be carried out, such as programming the base station with a new configuration.

status message A status message is a set of information about the base station that can be emailed. It identifies the base station, indicates the current operating channel, lists the status of all alarms, and gives the current values of a number of other monitored parameters. It also contains the alarm log.

subaudible signalling Subaudible signalling is signalling that is at the bottom end of the range of audible frequencies. The TB8100 base station supports CTCSS and DCS subaudible signalling.

subtone A subtone (subaudible signalling tone) is a CTCSS tone or a DCS code.

switching range The switching range is the range of frequencies (about 10 MHz) that the equipment is tuned to operate on. This is a subset of the equipment's frequency band.

system flag System flags are binary indicators that are read and set by Task Manager. Generally, they are used to disable or enable configured base station functions.

system interface The system interface is the set of inputs to and outputs from the base station (excluding power and RF), provided by a board inside the reciter. A range of different boards are available for different applications.

T

TB8100 Base Station A Tait TB8100 base station consists of the equipment necessary to receive and transmit on one channel. Generally, this means a reciter, a PA, and a PMU. Often abbreviated to TB8100 or base station.

Talk Through Repeater A TB8100 is a talk through repeater when its audio path is configured to pass the audio it receives on to the transmitter.

Task Manager Task Manager is a part of the TB8100 base station firmware that carries out tasks in response to inputs. These tasks are formulated using the Service Kit.

template file A template file contains configuration information that can be used to create a new base station configuration. Template files have the extension *.t8t.

transmit lockout The transmit lockout feature prevents the base station from transmitting for a time once the transmit timer has expired. It is designed to prevent users from monopolising the base station.

U

Unbalanced line An unbalanced line has one wire earthed. It is typically used for short connections, for example, between a base station and a repeater on the same site. The system interface identifies the wires of unbalanced lines with Rx audio, Tx audio, and Audio Ground. Audio Ground is common to line-in and line-out.

V

valid signal A valid signal is a signal that the receiver responds to by opening the receiver gate. A signal is valid for example when it is stronger than a minimum level and when it has the specified subtone.

VSWR Voltage Standing Wave Ratio (VSWR) is the ratio of the maximum peak voltage anywhere on the line to the minimum value anywhere on the line. A perfectly matched line has a VSWR of 1:1. A high ratio indicates that the antenna subsystem is poorly matched.

W

Watchdog A watchdog circuit checks that the system is still responding. If the system does not respond (because the firmware has locked up), the circuit resets the system.