TB8100 base station

Multi-reciter Subracks

Application Note TN-1148-AN
28 April 2006

Contents

Associated Documentation

TB8100 Installation and Operation Manual (MBA-00005-xx).
TB8100 Specifications Manual (MBA-00001-xx).
TB8100 Service Kit User's Manual (MBA-00010-xx) and online Help.
TN-742-AN: Remotely Monitoring and Configuring the TB8100.
TN-906-AN: Connecting to TB8100 Base Stations via an Asynchronous Port Switch.
TN-1142-AN: Connecting to a TB8100 via Ethernet.

1 Overview

This Application Note provides information on how install, configure, and operate the TB8100 multi-reciter subrack.

Until now a maximum of two receive-only reciters could be installed in a TB8100 subrack, using the dual base station control panel (XBA2040), and dual base station subrack interconnect board.

The multi-reciter subrack allows multiple receive-only reciters to be installed in a subrack: one to five reciters with a PMU, or one to seven reciters with no PMU.

The multi-reciter configuration is made up of two modules: the XBA2060 multi-reciter control panel (spares code TBA-SP-2060), and the XBAK22C6 multi-reciter subrack interconnect board (spares code TBA-SP-K22C6).

This Application Note is intended for use by system integrators. It contains information applicable to multi-reciter operation which is not already provided in the TB8100 Installation and Operation Manual.

2 Applicability

This Application Note applies to TB8100 subracks using the XBA2060 control panel and XBAK22C6 subrack interconnect board.

3 Functional Description

Refer to Figure 1 on page 6.

The multi-reciter subrack allows multiple receive-only reciters to be installed in a TB8100 subrack. The multi-reciter subrack can accommodate one to five reciters with a PMU, or one to seven reciters with no PMU (refer to "Connection" on page 19 for more details).

Note Reciters are numbered from right to left when viewed from the front of the subrack. Reciters should always be installed starting from the right-hand side of the subrack.

The important functions of the multi-reciter subrack are to:

- provide an integrated wiring solution for the system control bus and DC power connections to each reciter
- allow reciters to be replaced without affecting the operation of other reciters in the subrack
- provide a means of connecting to and monitoring, configuring and diagnosing any reciter in the subrack
- allow the status of all reciters in the subrack to be monitored in real time.

Hardware

The multi-reciter configuration is made up of two special modules: the multi-reciter control panel and the multi-reciter subrack interconnect board. The control panel provides the user with some manual control of the reciters in the subrack, and can display status information for each reciter (refer to "Operating Controls" on page 10). The subrack board provides switching and control logic (refer to "Installation" on page 14).

Reciters are installed in the subrack from right to left (viewed from the front), with the right-hand position corresponding to position 1 on the control panel. Only the reciter in position 1 can communicate with the PMU (if fitted).

The multi-reciter subrack interconnect board and control panel must be used together and cannot be used in other types of TB8100 subracks. The connection between the control panel and subrack board is made with a high density 26-way D-range connector.

When power is applied to the subrack, the control panel will default to reciter position 1. When a PMU is fitted, power is connected to the PMU in the normal way (as described in the Installation and Operation Manual). When no PMU is fitted, the DC input to the subrack is connected to a terminal block mounted on the rear of the subrack (refer to "Power Supply Connections" on page 23).

Control Panel and Indicator LEDs

The multi-reciter control panel allows you to select which reciter is connected to the control panel. This reciter will then drive the status LEDs, and respond to inputs from the controls on the control panel. You can also connect to this reciter using the Service Kit (if the system interface board fitted to the reciter supports front panel connection - refer to "Connection" on page 19 for more details).

Note When a reciter is not fitted and that subrack position is selected, the status LEDs will reflect the status of the channel which was selected before the change was made. This is because there is no reciter present in the newly selected position to update or clear the status of the LEDs.

The channel LEDs use different colours to indicate the currently selected reciter, and to provide real-time status information for any reciter installed in the subrack (refer to "Operating Controls" on page 10). Any reciter can update (in real time) the channel LEDs to display one of two possible reciter status signals: Rx gate or alarm. Links on the multi-reciter subrack interconnect board allow you to choose which status signal (either Rx gate or alarm) is connected to the channel LEDs. Links on the control panel board also allow you to select which colour (either red or green) will be used for the selected status signal; the other colour will then be used to indicate the currently selected reciter. The default colours for TB8100 are green for Rx gate and red for alarm. If the LED for the currently selected reciter receives a status signal, it will change to orange. Refer to "Installation" on page 14 for more information.

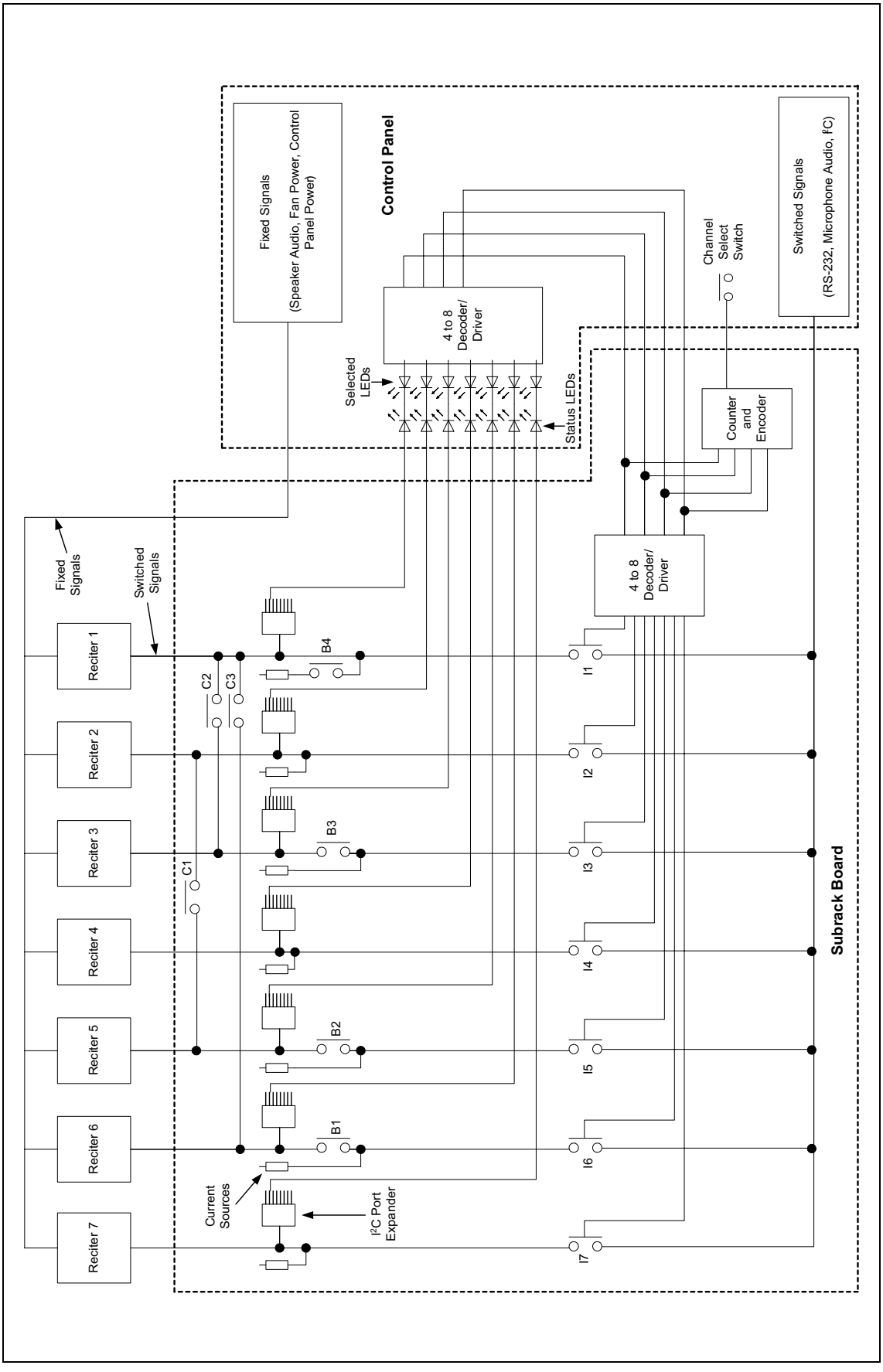
Audio

The speaker outputs from all reciters are summed together by the multi-reciter control panel. The summed output is then amplified and sent to the speaker. You can enable the speaker output mode for each reciter to pass audio to the speaker, even if it is not the selected reciter (refer to "Speaker Button and LED" on page 11 for more details). Once you have enabled the speaker output for the required reciters, you can monitor the received signal on any reciter in the subrack.

Power Saving

Power Saving is possible in the multi-reciter subrack, but with some limitations. Refer to "Operational Constraints" on page 7 for more details.

Figure 1 Multi-reciter functional block diagram



3.1 Operational Constraints

The multi-reciter subrack imposes a number of constraints on the operation of TB8100 modules. These are listed below.

Reciter

- Only reciters with firmware version 3.00 or later can be used in a multi-reciter subrack. The control panel will not work with earlier versions of reciter firmware.

Power Saving

Important If there is a PMU in the subrack, the reciter in subrack position 1 should never have Deep Sleep mode enabled, only Sleep mode. If Deep Sleep is enabled for reciter 1, it will turn off the power to all reciters in the subrack.

This is because the reciters in the multi-reciter subrack are powered from the PA DC output on the PMU. In Deep Sleep mode this DC output is turned off, which will power down all the reciters.

All other reciters in the subrack can have Sleep or Deep Sleep mode enabled.

Service Kit

- The Service Kit can only log on to the currently selected reciter via the control panel.
- As the PMU is associated with reciter 1, no PMU settings for reciters 2 to 7 will function. This includes the PMU battery voltage display, monitoring, diagnostics, and power management display.
- All PMU alarms for reciters 2 to 7 must be disabled (the alarm LEDs on the **Alarm** screen will therefore be grey).
- In the Configure > Base Station > Miscellaneous form for reciters 2 to 7, the **Power configuration** areas will display voltages of zero.
- All fan faults will not be detected, displayed, or acted on (if disabled) for all reciters. All Fan failure alarms should be disabled.
- The display of fan states in Diagnostic forms may be incorrect.

Recommended Service Kit Settings

The following Service Kit settings are recommended for multi-reciter operation:

- Disable the "Fan failure" alarm for the PA for all reciters.
- Disable the "Fan failure" alarm for the PMU for all reciters (whether a PMU is fitted or not).
- Disable the "No PMU detected" alarm for reciters 2 to 7 if a PMU is fitted. If no PMU is fitted, disable the alarm for all reciters.
- Disable the "No PA detected" alarm for all reciters.
- Disable Alarm Center and Email on all reciters (refer also to "Service Kit and Alarm Center Connections" below).

Service Kit and Alarm Center Connections

If you want to use the serial port on the control panel to connect to a reciter in a multi-reciter subrack, you must first select the reciter using the channel button. You cannot connect to the serial port on the control panel and then remotely select the reciter you want to connect to (for example by using an APS or CMS serial port switching device connected to a modem).

It is also impossible for any reciter that has generated an alarm to dial out to an Alarm Center if that reciter is not the currently selected reciter. If you do require dial-out access to an Alarm Center, or remote dial-in access to any reciter in the subrack, you will need to install reciters fitted with TaitNet RS-232 or TaitNet Ethernet system interface boards. These boards will allow connection to any reciter in the subrack via the rear panel connector. Refer to "Associated Documentation" on page 2 for a list of relevant Application Notes.

4 Circuit Description

The control panel is designed to be the link between the user and the modules in the subrack. The circuitry for the operation of the control panel is located on a board mounted behind its front face. All communication between the modules and the control panel is via the system control bus. Figure 2 on page 9 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 board translates:

- I^2C messages from the reciter into an appropriate response on the LEDs (except the channel LEDs)
- control panel button inputs (except the channel button) and fan rotation inputs from the PMU fan (if fitted) into appropriate I^2C messages
- RS-232 communications from the programming port into 0V to 5V open-collector signals which are connected to whichever reciter is selected with the channel button.

Note When a reciter fitted with a TaitNet RS-232 system interface board is used in a multi-reciter subrack, the RS-232 port on the control panel is disabled. In this situation you must connect to the RS-232 port at the rear of the reciter. Refer to the Installation and Operation Manual for more details.

Audio Circuitry

The multi-reciter control panel provides a volume knob to control the volume of the speaker. In addition, the control panel circuitry performs a summation of the audio signals from all reciters and provides a 0.5W drive for the 16Ω speaker. Speaker audio is a shared output from any combination of reciters in the subrack, depending on the speaker mute setting for each reciter.

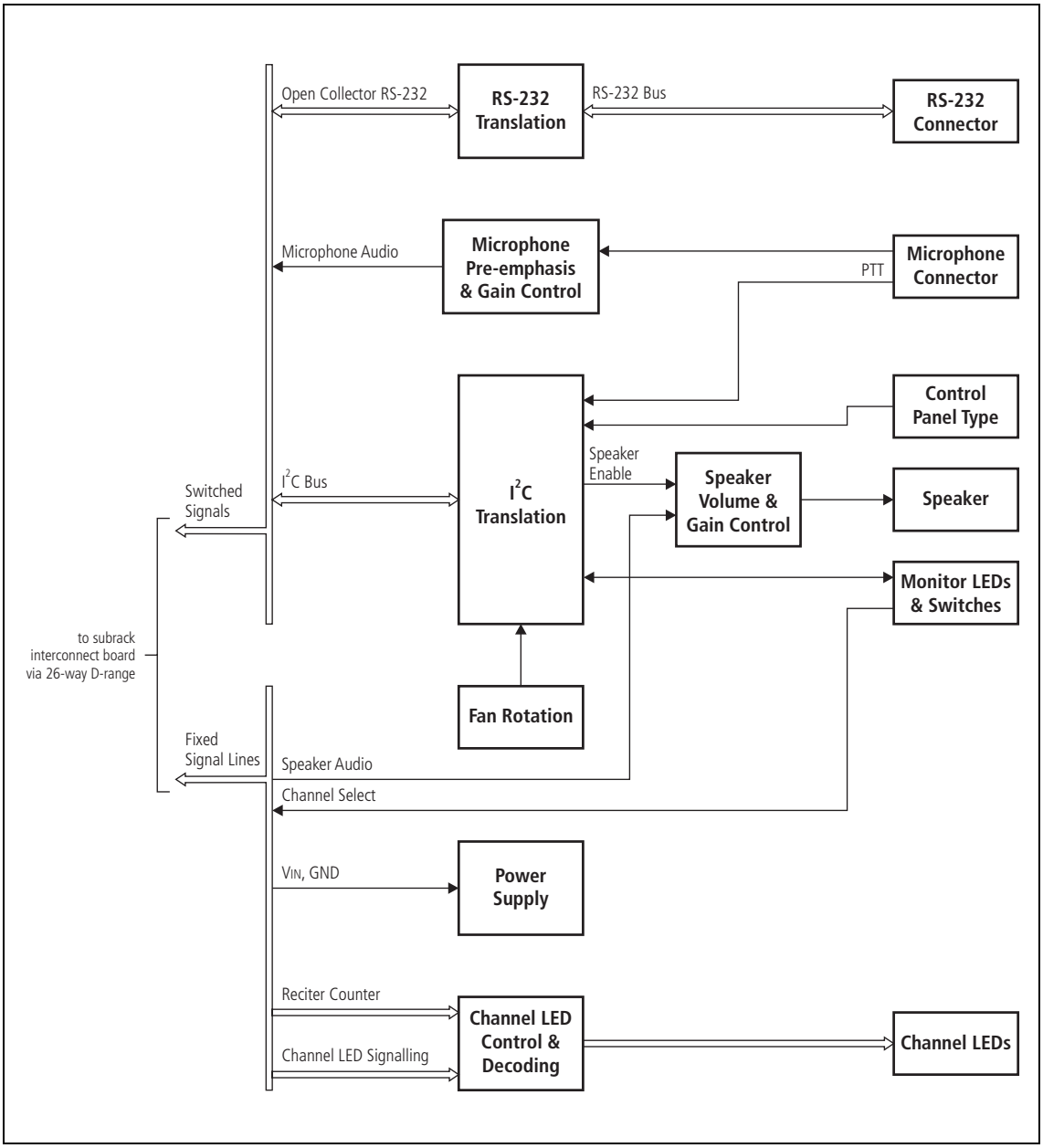
Signal Switching

Speaker audio and power for the control panel are common signals for all reciters in the subrack. The remaining signals (microphone audio, I^2C messages, fan power, and RS-232 communications) are switched so that only one reciter is connected to the control panel at a time. This switching takes place on the subrack interconnect board and is controlled by the channel button on the control panel.

Power Supply

The control panel is powered from the subrack interconnect board. 28VDC is supplied to the subrack board from the PMU (if fitted). If no PMU is fitted, 10.5VDC to 32VDC is supplied to the subrack board from the DC input connector at the rear of the subrack. The power supply for the cooling fan (if fitted) mounted on the front panel is fed through the control panel.

Figure 2 Multi-reciter control panel high level block diagram

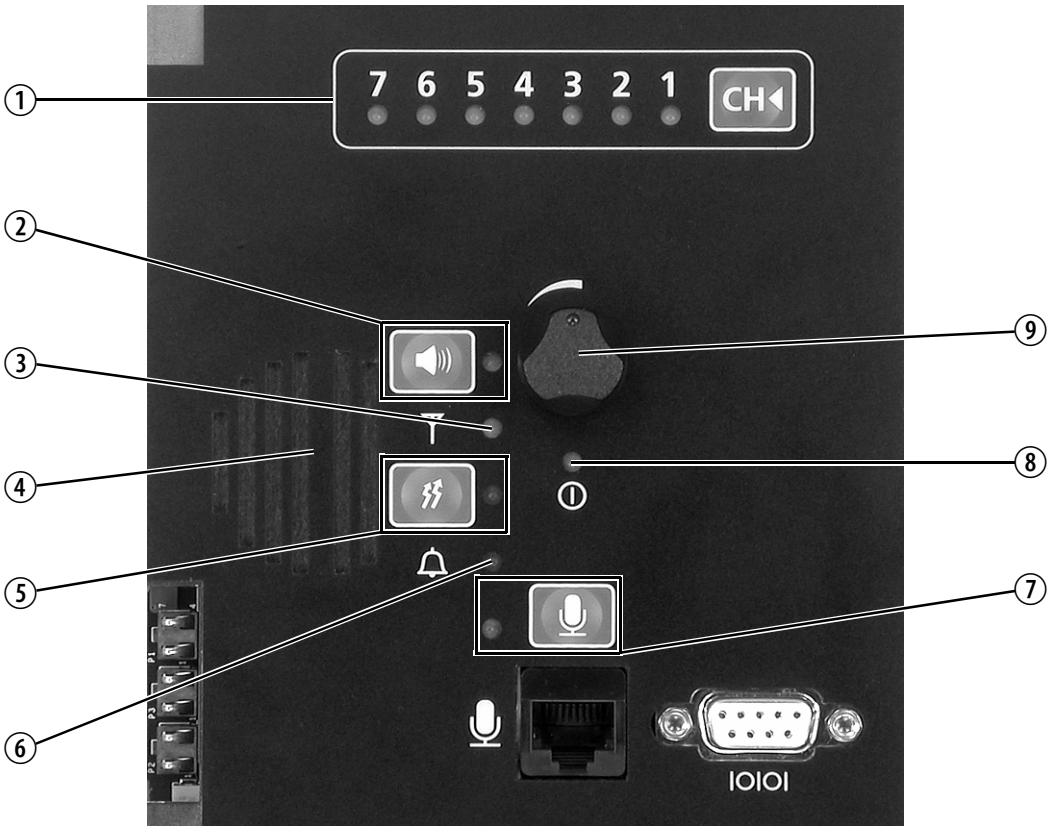


5 Operating Controls

5.1 Control Panel

The operating controls on the multi-reciter control panel allow some manual control of the equipment mounted in the subrack. These controls and their associated LED indicators are identified in Figure 3 below, and their functions are explained in the subsections which follow. Refer to "Connection" on page 19 for information on the connectors located on the control panel.

Figure 3 Operating controls on the multi-reciter control panel



① channel button and LEDs
② speaker button and LED
③ receive LED
④ speaker
⑤ carrier button and transmit LED
⑥ alarm LED
⑦ microphone button and LED
⑧ power LED
⑨ speaker volume

Channel Button and LEDs

CH

The channel button selects which reciter is connected to the control panel. Repeatedly pressing this button cycles through positions 1 to 7 in the subrack, regardless of whether the position is occupied. The selection defaults to position 1 on power-up.

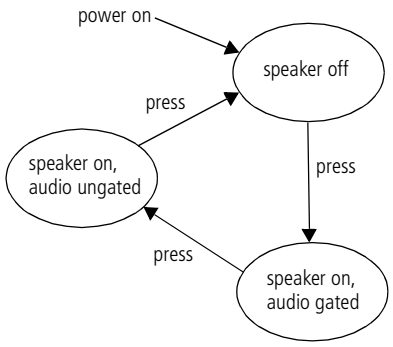
The channel LEDs have the following states (default settings):

- red indicates which is the currently selected reciter
- green indicates that the reciter is receiving a valid signal
- orange indicates that the currently selected reciter is receiving a valid signal.

Important The operation of these LEDs is controlled by links on the subrack interconnect and control panel boards. The links on the subrack board select whether the reciter's Rx gate or alarm status signal is connected to the control panel. The links on the control panel board select the colour of the LED when the selected status signal is received from the reciter. The default settings are for the Rx gate signal to turn the LED green. Refer to "Installation" on page 14 for more details.

Speaker Button and LED

The speaker button cycles the audio of the currently selected reciter through three states. At power-on the speaker is off. Pressing the button once turns the speaker on, but leaves the audio gated (muted). 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.



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

In a multi-reciter subrack, use the channel button to select the reciter, then use the speaker button to set the speaker output mode for that reciter. Repeat this process for each reciter in the subrack.

Note The speaker audio is the sum of the audio from all reciters in the subrack. For this reason we recommend that you disable the speaker audio for all channels not being monitored.

Receive LED

The green receive LED is lit when a valid signal is received on the selected reciter.

Speaker

The control panel is fitted with a 0.5W speaker. Audio from each reciter can be connected to this speaker.

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.

The carrier button is not used in a receive-only subrack.

Alarm LED

The red alarm LED will flash at a rate of 2 to 5Hz when an alarm has been generated by the currently selected reciter. 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.

Alarm status signals can also be connected to the channel LEDs by setting links on the subrack interconnect board (refer to "Configuring the Subrack Interconnect Board" on page 14).

Microphone Button and LED

The microphone button enables and disables the microphone input.

The green LED is lit when the microphone is enabled. The microphone input is connected only to the currently selected reciter.

Power LED

The green power LED is lit when the PMU is turned on and supplying power to the modules in the subrack, or when the DC supply is connected to the DC input connector at the rear of the subrack.

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.

5.2 Reciter

The rotary hex switch ① mounted on the front panel is not used and has no effect on the operation of the reciter.

Figure 4 Reciter hex switch

6 Installation

This section provides information applicable to multi-reciter operation which is not already provided in the TB8100 Installation and Operation Manual

The TB8100 subrack can accommodate up to seven reciters, or up to five reciters with a PMU (as shown in Figure 7 on page 20). The PMU occupies reciter positions 6 and 7 (numbered from right to left).

Note The DC output connector on the subrack interconnect board for reciter 2 is located in front of reciter 3. You will need to disconnect reciter 2's power cable from the subrack board before removing reciter 3.

6.1 Configuring the Subrack Interconnect Board

The multi-reciter subrack interconnect board has a set of DIP switches and links that must be set correctly before the equipment is used. The locations of these switches and links are shown in Figure 5 on page 16.

Switch Settings

You must set switches S1, S2, S3 and S4 according to the type of modules installed in the subrack. The switch settings are given in Table 1.

Table 1 DIP switch settings for subracks with and without a PMU

Switch Number	Switch Settings with a PMU[a]	Switch Settings without a PMU
S1:1 S1:2 S1:3 S1:4	OFF OFF ON ON	OFF OFF ON ON
S2:1 S2:2 S2:3 S2:4	OFF OFF ON ON	OFF OFF ON ON
S3:1 S3:2 S3:3 S3:4	ON ON OFF OFF	OFF OFF ON ON
S4:1 S4:2 S4:3 S4:4	not used not used OFF OFF	not used not used ON ON

a. Note that these switch settings allow the Service Kit to communicate with the PMU associated with reciter 1.

Link Settings

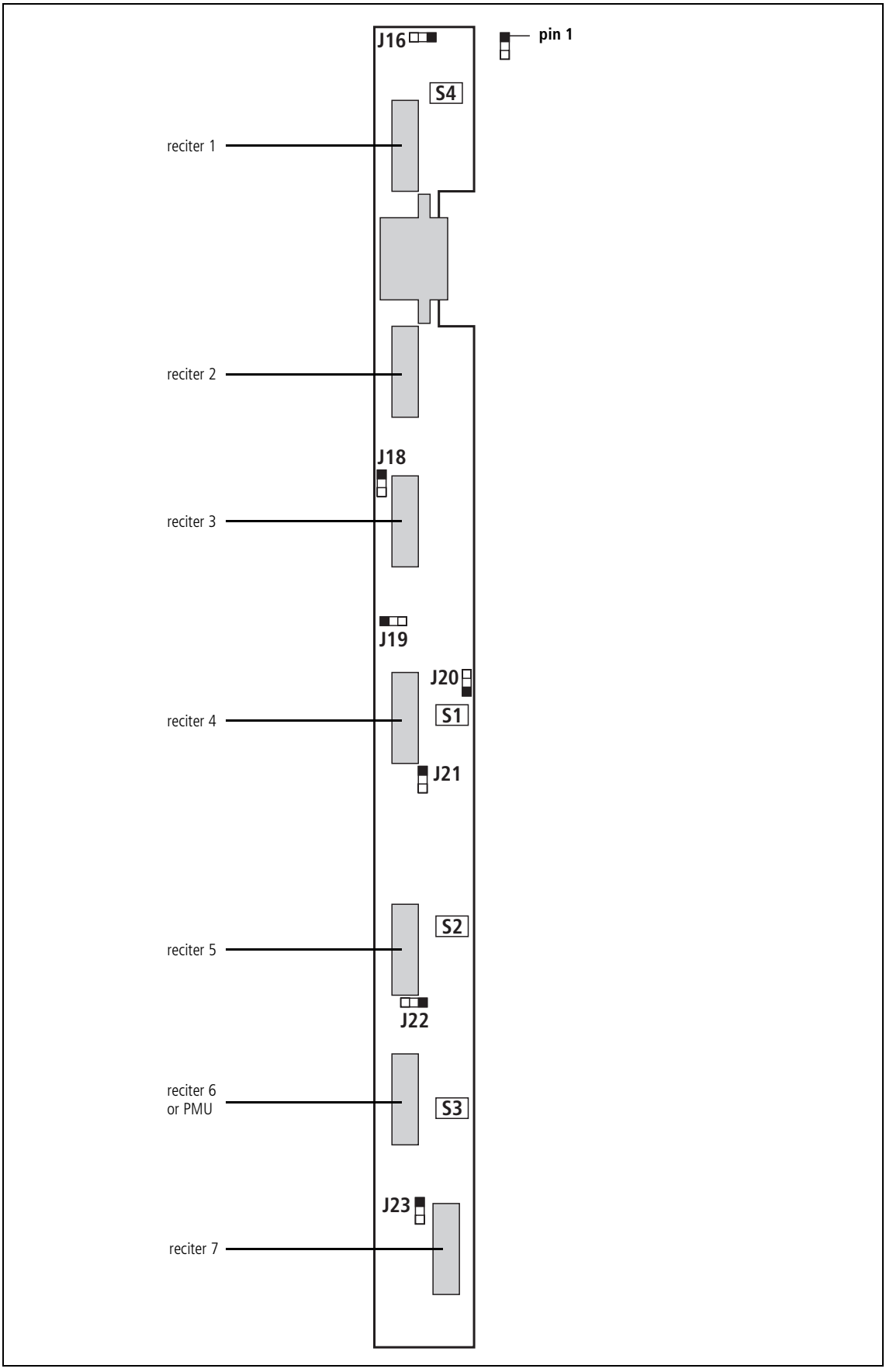
A set of links is provided on the interconnect board for each position in the subrack, as described in Table 2. You can set these links to connect either the reciter's alarm or Rx gate status signal to the appropriate channel LED on the control panel (refer to "Operating Controls" on page 10).

Note There is a link on the control panel board which allows you to select the colour displayed by these LEDs. Refer to "Configuring the Control Panel Board" on page 17.

Table 2 Link settings for selecting alarm or Rx gate signals

Subrack Position	Link	Link Settings
1	J16	alarm status signal: link pins 1 & 2 Rx Gate status signal: link pins 2 & 3
2	J18	
3	J19	
4	J20	
5	J21	
6	J22	
7	J23	

Figure 5 Location of switches and links on the subrack interconnect board



6.2 Configuring the Control Panel Board

A link (J300) is provided on the control panel board which allows you to select the colour displayed by the seven channel LEDs (refer to the examples below). This link selects the colour for all the channel LEDs.

Note Figure 6 on page 18 shows the bottom side of the board (as seen with the board mounted in the control panel chassis). J300 is mounted on the top side of the board, and is accessible from the top of the control panel assembly.

Examples of LED Colours

Example 1

With the following link settings:

- subrack interconnect board links set for Rx gate status signal
- control panel board link across pins 1 and 2

the channel LEDs will have the following states:

- red indicates which is the currently selected reciter
- green indicates that the reciter is receiving a valid signal
- orange indicates that the currently selected reciter is receiving a valid signal.

The link settings described above are the TB8100 factory default settings.

Example 2

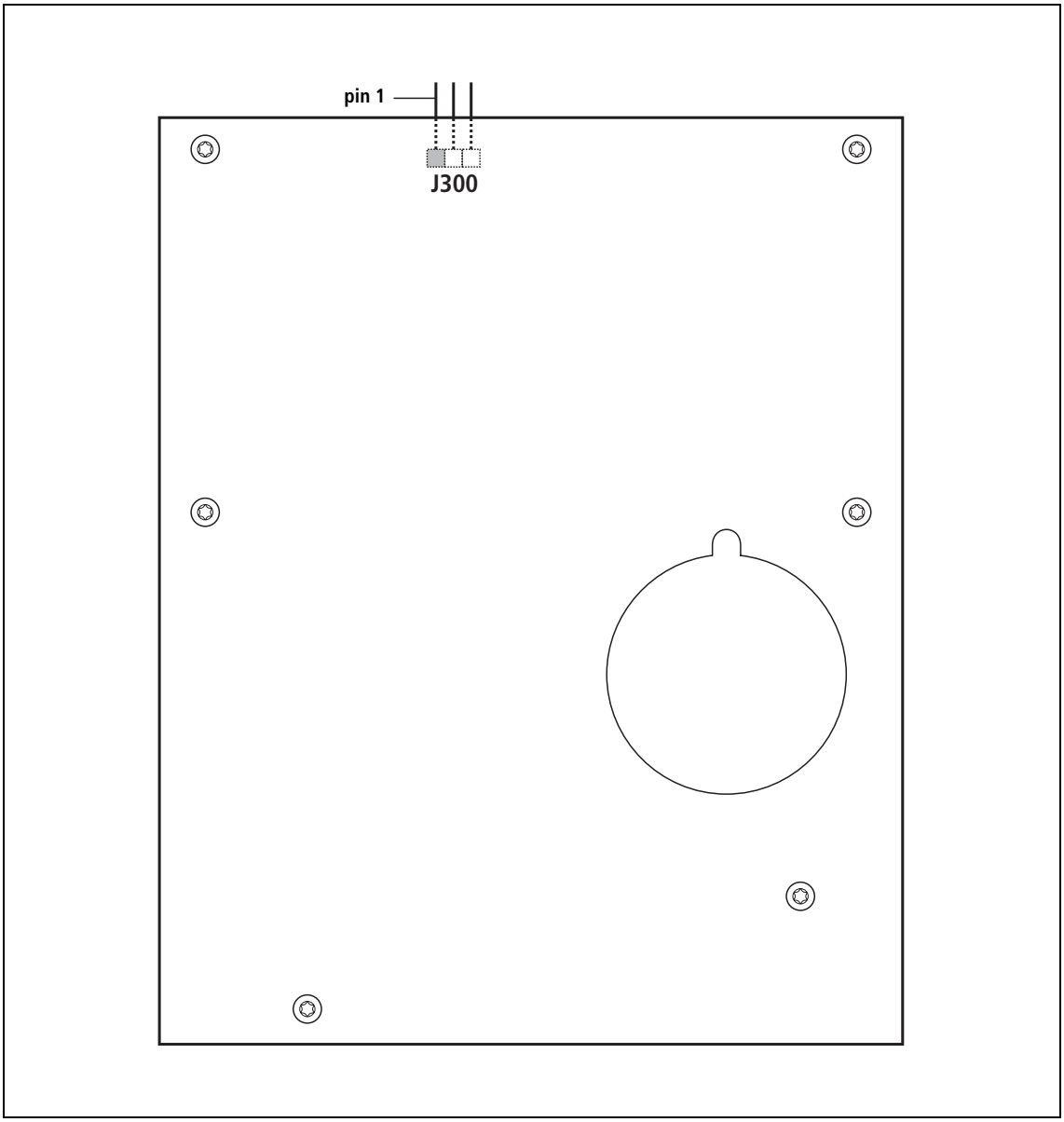
With the following link settings:

- subrack interconnect board links set for alarm status signal
- control panel board link across pins 2 and 3

the channel LEDs will have the following states:

- green indicates which is the currently selected reciter
- red indicates that the reciter is generating an alarm
- orange indicates that the currently selected reciter is generating an alarm.

Figure 6 Location of links on the control panel board



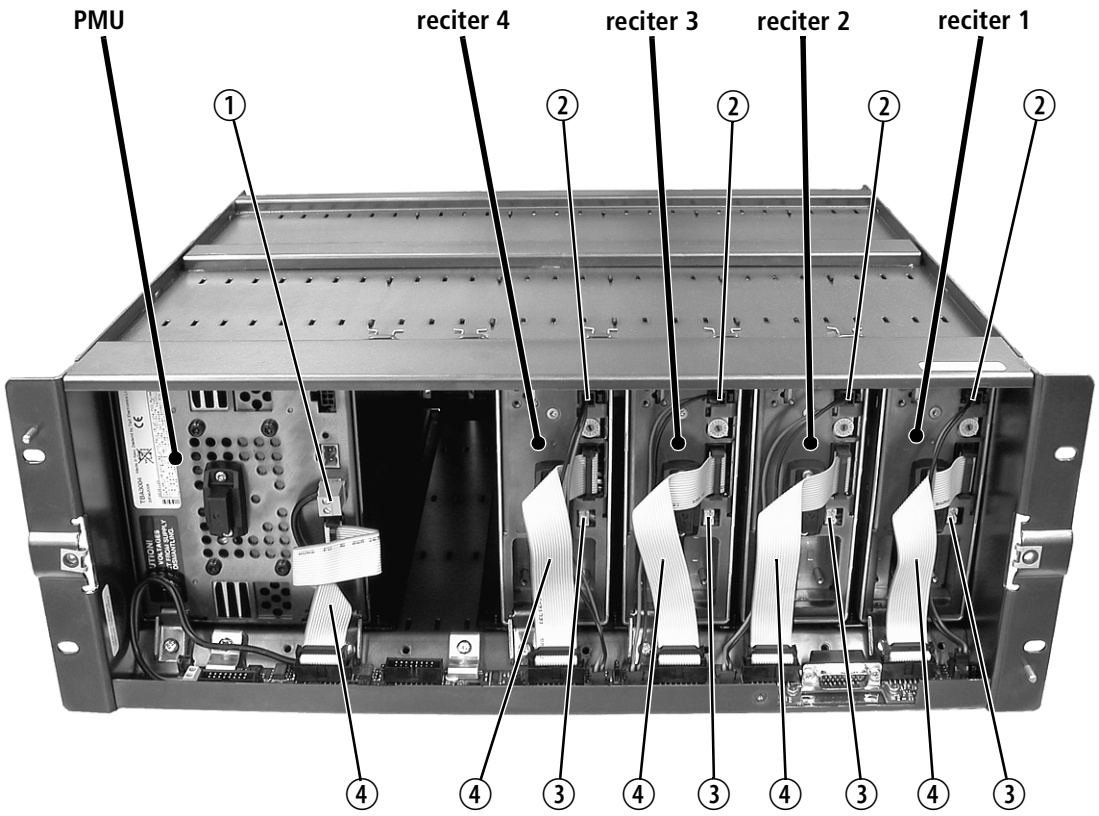
7 Connection

7.1 Overview of Inputs and Outputs

Once the TB8100 hardware is installed, you need to connect the individual modules to each other, and to any ancillary equipment required in your system. This section identifies the main input and output connections for the multi-reciter subrack.

- Figure 7 on page 20 identifies the connections at the front of a multi-reciter subrack fitted with a PMU
- Figure 8 on page 21 identifies the connections on the multi-reciter subrack interconnect board
- Figure 9 on page 22 identifies the connections on the multi-reciter control panel.

Figure 7 Inputs and outputs on a multi-reciter subrack with PMU - front view



① 28VDC output to subrack board

② 28VDC input from subrack board

③ DC output (for optional reciter fan only)

④ system control bus

The TB8100 subrack can accommodate one to seven reciters, or one to five reciters with a PMU (as shown in Figure 7). When fitted, the PMU occupies reciter positions 6 and 7 (numbered from right to left viewed from the front).

Note When a PMU is fitted, it is associated with reciter 1 and is visible to the Service Kit for monitoring, configuration and diagnostics when reciter 1 is selected.

Figure 8 Inputs and outputs on the multi-reciter subrack interconnect board

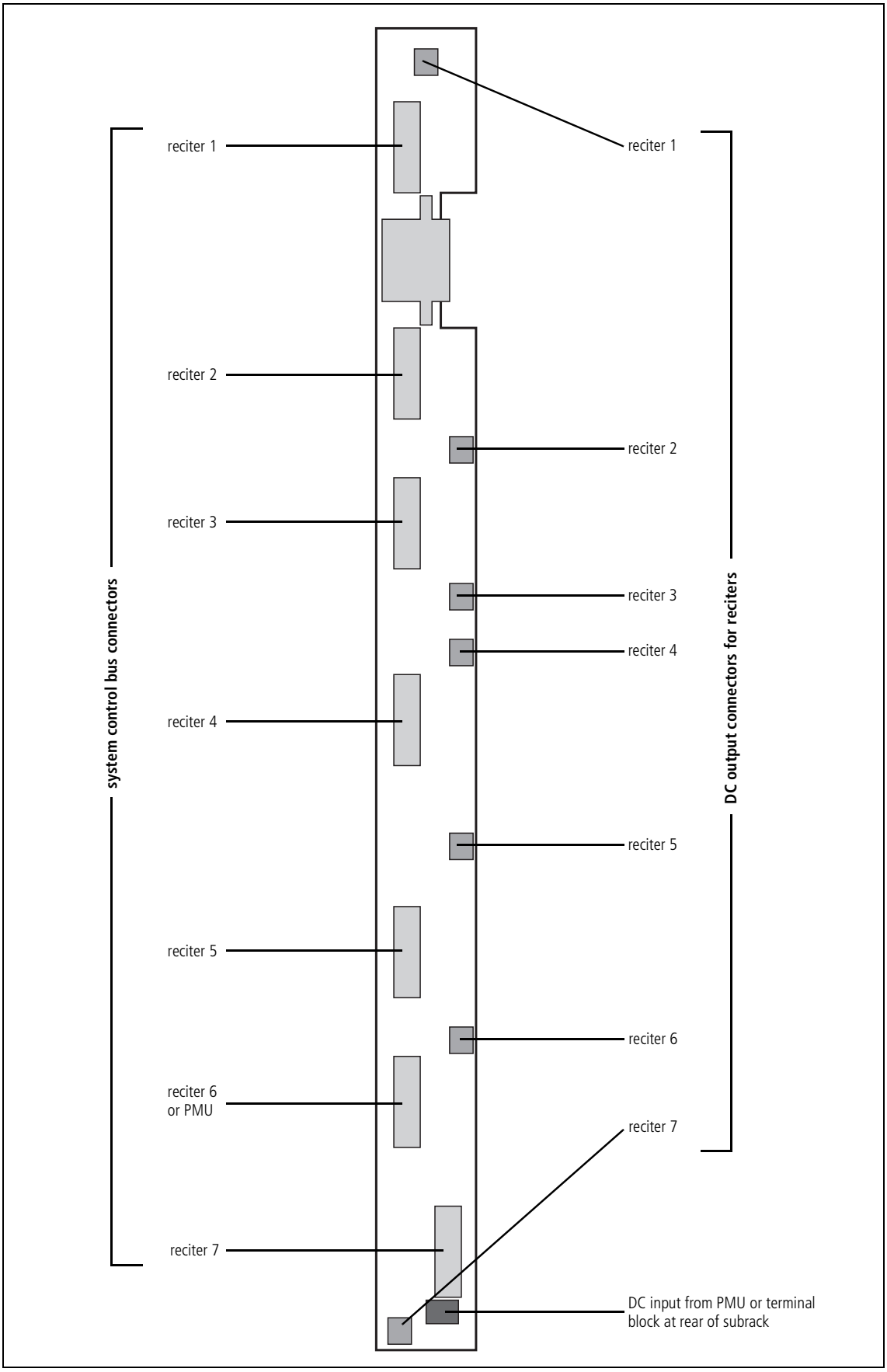
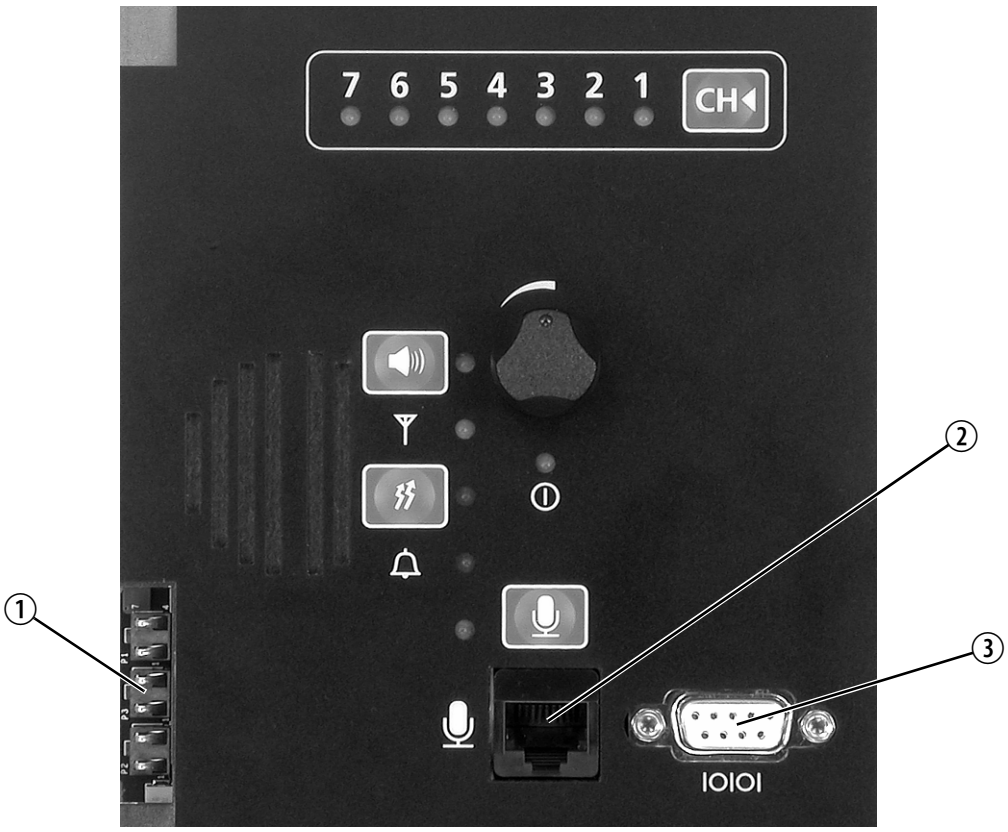


Figure 9 Inputs and outputs on the multi-reciter control panel



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

② microphone connector

③ RS-232 programming port

Note The microphone input feeds to the currently selected reciter, and the PTT can only be used on that channel. The RS-232 connection is only to the currently selected reciter. You should disconnect the Service Kit before switching reciters.

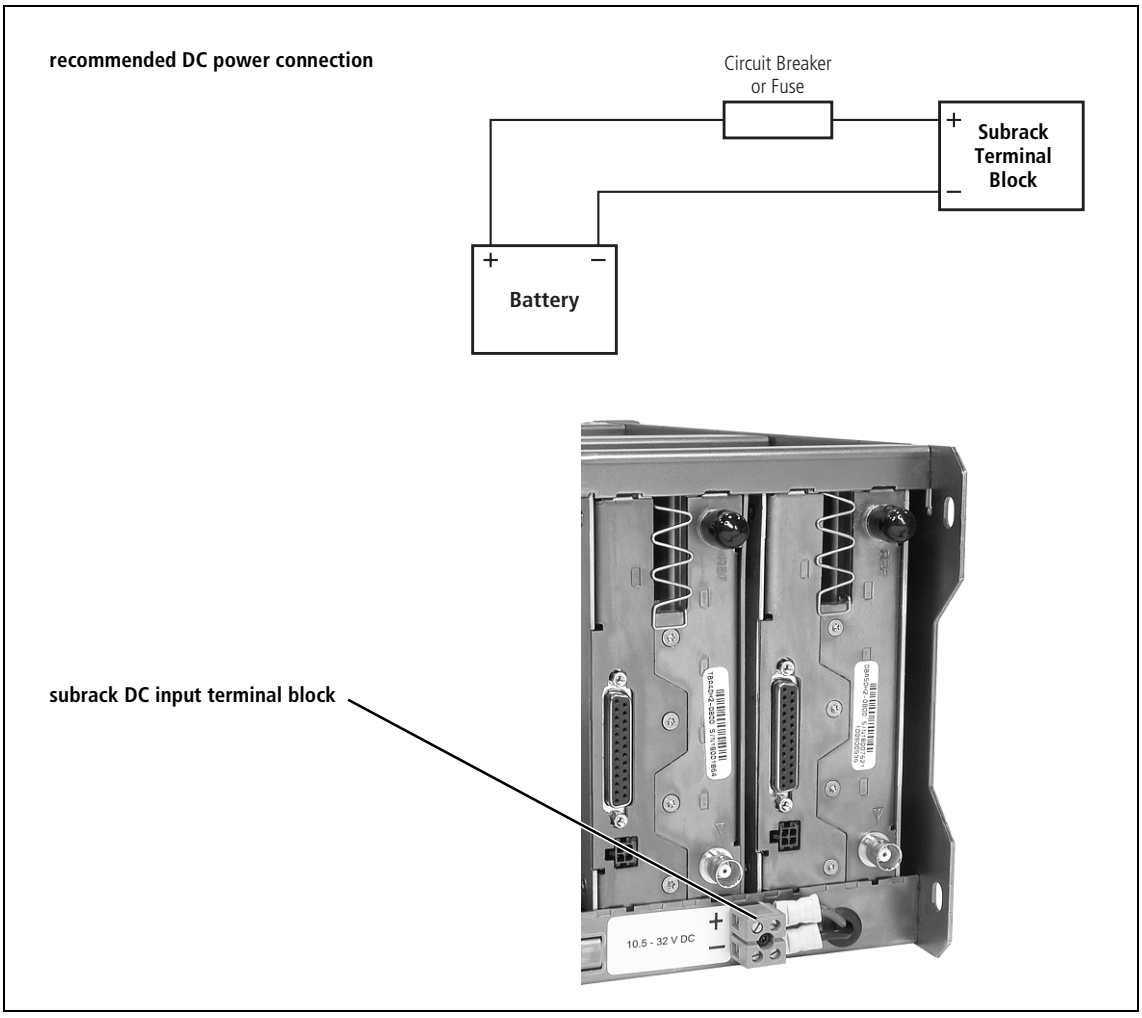
Note When a reciter fitted with a TaitNet RS-232 system interface board is used in a multi-reciter subrack, the RS-232 port on the control panel is disabled. In this situation you must connect to the RS-232 port at the rear of the reciter. Refer to the TB8100 Installation and Operation Manual for more details.

7.2 Power Supply Connections

With PMU Refer to the Installation and Operation Manual.

Without PMU The multi-reciter subrack is designed to accept a DC input of 10.5 VDC to 32 VDC with negative ground. The DC input terminal block is mounted on the rear of the subrack (refer to Figure 10).

Figure 10 DC power supply connection



7.3 Calibration Kit Connections

You can connect to a particular reciter in a multi-reciter subrack via the control panel by using the following procedures.

If the subrack is already powered up.

1. Connect the PC to the RS-232 port on the control panel.
2. Using the channel button on the control panel, select the reciter you want to calibrate.
3. Start the TB8100 Calibration Kit program.
4. Click **Connect** to start the connection process.
5. As soon as you see the "Waiting for logon prompt from Reciter" screen, disconnect then reconnect the power to the selected reciter.
6. The reciter will generate the logon prompt within 20 to 30 seconds after power-up and complete the connection to the Calibration Kit.

If the subrack is not powered up.

1. Connect the PC to the RS-232 port on the control panel.
2. Start the TB8100 Calibration Kit program.
3. Click **Connect** to start the connection process. The "Waiting for logon prompt from Reciter" screen appears.
4. Power up the subrack.
5. Within 20 seconds, select the reciter you want to calibrate using the channel button on the control panel. The selected reciter will generate the logon prompt and complete the connection to the Calibration Kit.

8 Replacing Modules

This section provides information applicable to multi-reciter operation which is not already provided in the TB8100 Installation and Operation Manual

Important Be careful when removing module retaining clamps and screws in a live system. Dropping any metal items onto the subrack interconnect board can cause shorts which may damage the equipment.

Note The DC output connector on the subrack interconnect board for reciter 2 is located in front of reciter 3. You will need to disconnect reciter 2's power cable from the subrack board before removing reciter 3.

8.1 Replacing the Subrack Interconnect Board

Refer to Figure 11 on page 26.

Removal

6. If you have not already done so, carry out the following procedures:
   - disconnect power from the subrack
   - remove the front panel
   - remove the control panel.

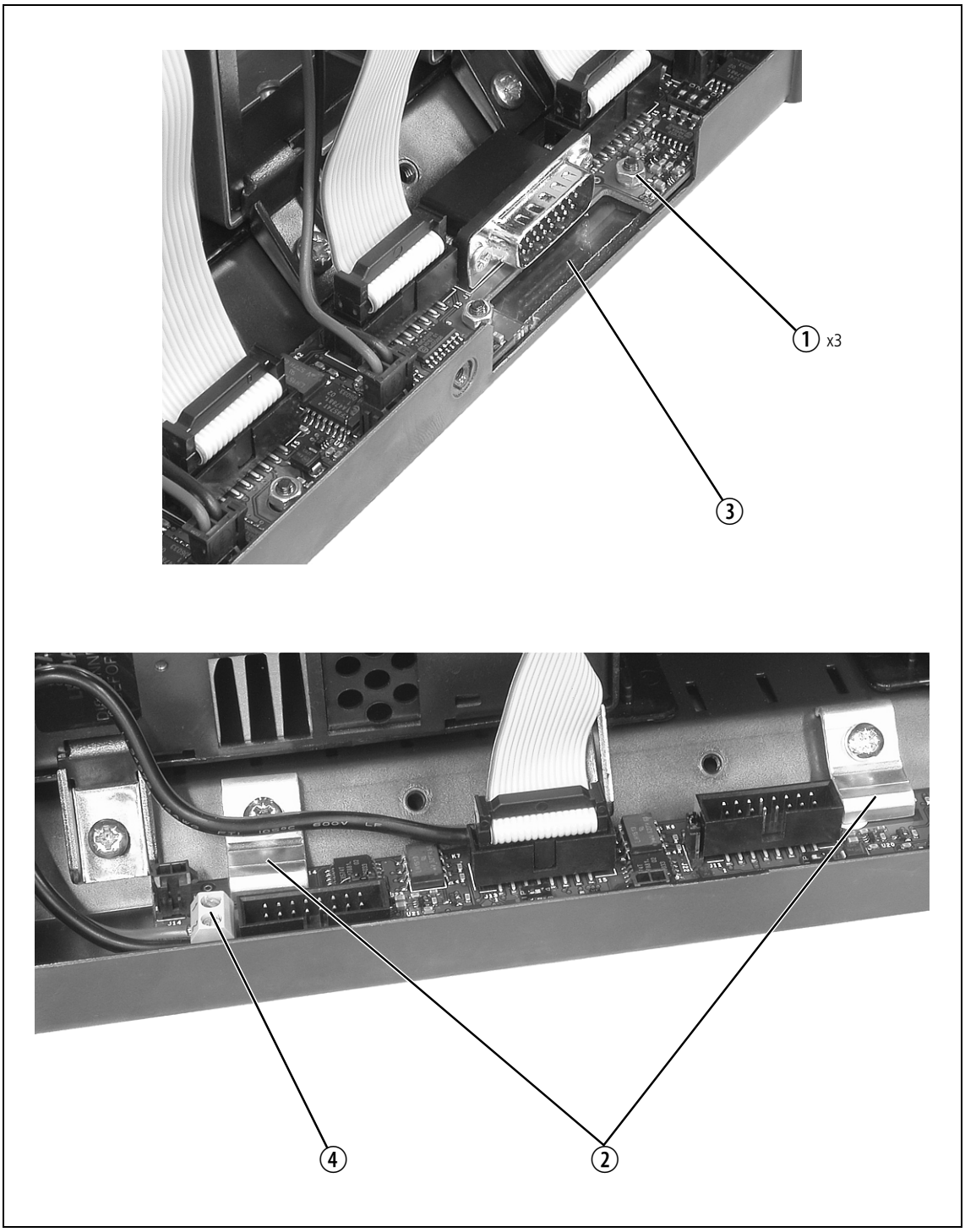
   These procedures are described in detail in the Installation and Operation Manual.
7. Disconnect any system control bus cables and DC power cables from the interconnect board.
8. Remove the M3 nuts and spring washers ① securing the right end of the board to the subrack.
9. Remove the two retaining clamps ② securing the left end of the board.
10. Remove the board.

Refitting

1. If previously removed, replace the insulator ③.
2. Reconnect the DC feed wires to connector J17 ④ on the interconnect board (red (+) to pin 1).
3. Refit the board and secure with the M3 nuts and spring washers. Replace the two retaining clamps.
4. Set the switches and links as described in "Configuring the Subrack Interconnect Board" on page 14.

5. Reconnect the system control bus cables and reciter DC cables as shown in "Connection" on page 19.

Figure 11 Replacing the subrack interconnect board



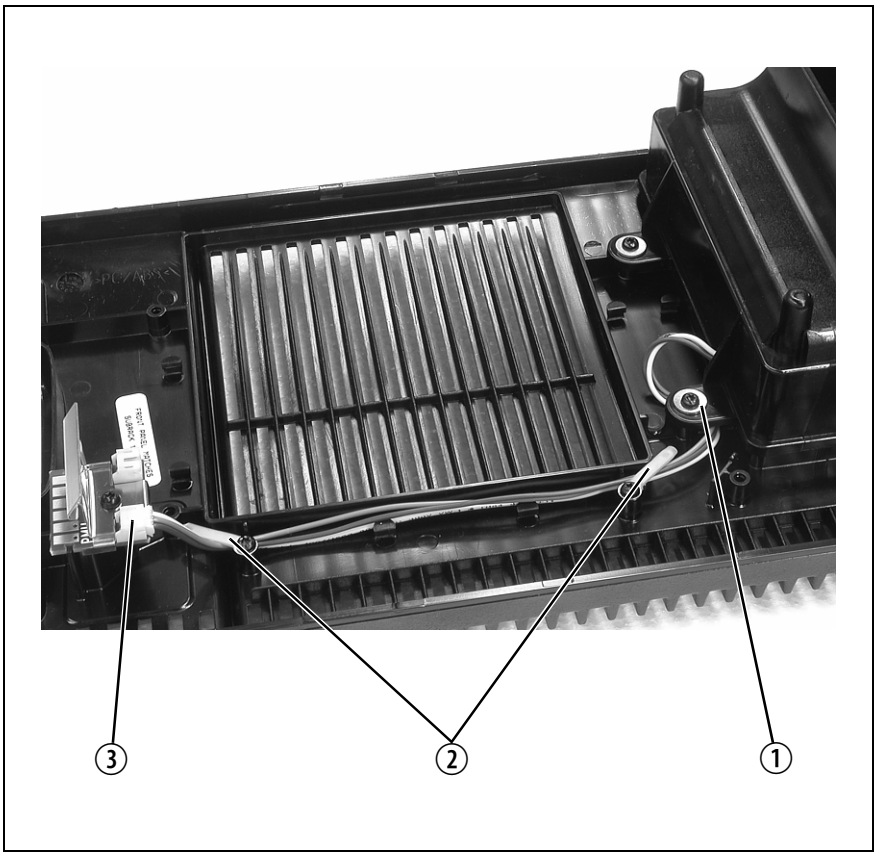
8.2 Replacing the PMU Fan (if fitted)

To replace the PMU fan, follow the basic procedures described in the Installation and Operation Manual.

When refitting the fan, note the following points (refer to Figure 12):

- the PMU fan assembly is secured with two M3 washers ①
- secure the fan wires with the two sleeved solder tags ②
- connect the fan wire to the correct socket ③ on the fan contact board.

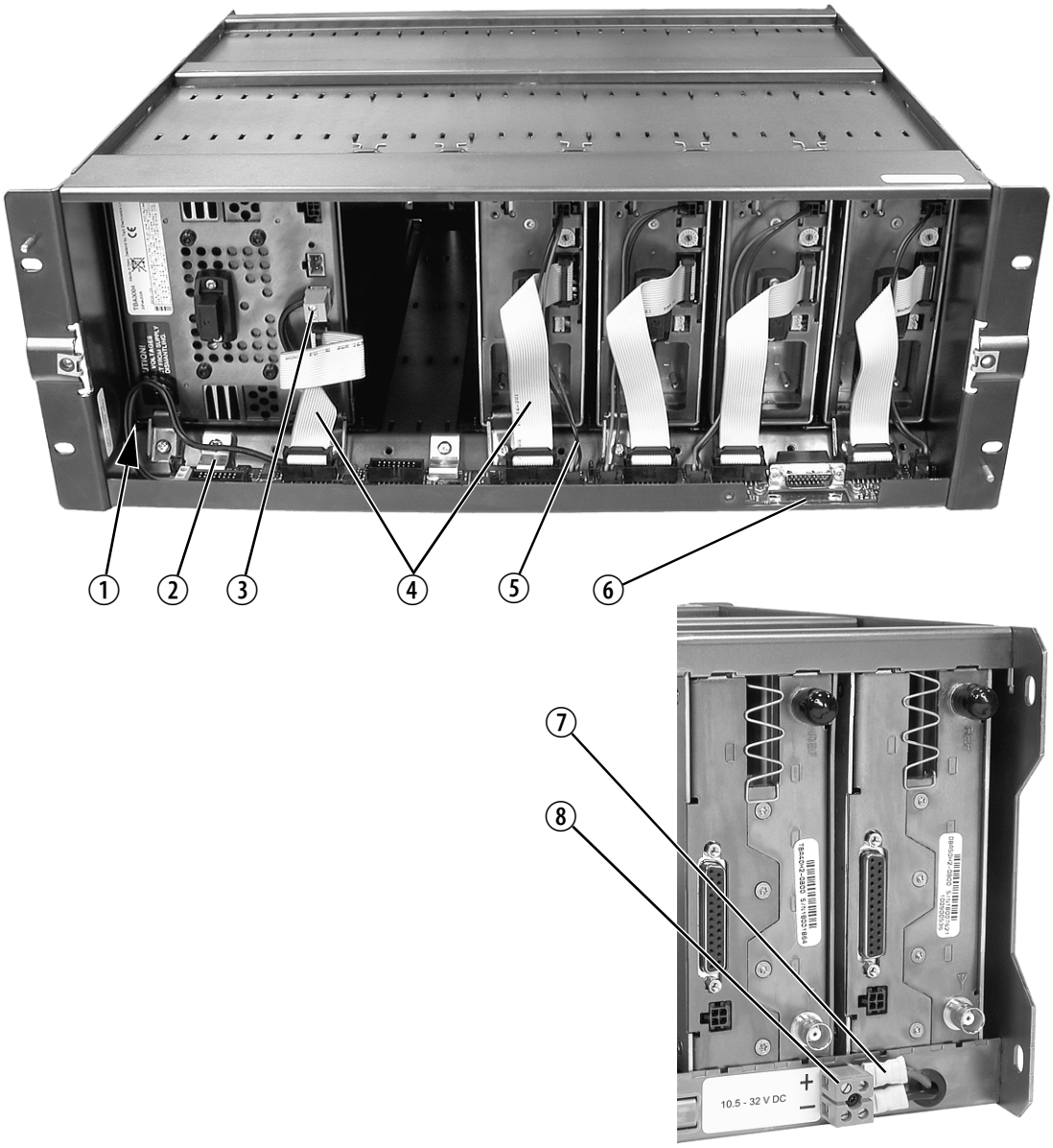
Figure 12 PMU fan installation



9 Subrack Parts List

The TB8100 Service Manual has a full description of the mechanical parts and cables used in a standard subrack. Figure 13 on page 29 identifies the cables and special mechanical parts used in the multi-reciter subrack.

Figure 13 Cables and mechanical parts used in the multi-reciter subrack



	Description	IPN
①	bottom guide rail for reciter fitted in subrack position 7	307-02054-XX
②	retaining clamp for securing subrack interconnect board	302-10066-XX
③	DC power cable - PMU to subrack interconnect board	219-03069-XX
④	system control bus ribbon cable - reciter and PMU to subrack interconnect board	219-02858-XX
⑤	DC power cable - subrack interconnect board to reciter	219-03068-XX
⑥	insulator for subrack interconnect board	362-01135-XX
⑦	DC power cable - subrack DC input connector to subrack interconnect board (when no PMU fitted)	219-03067-XX
⑧	DC input connector (when no PMU fitted)	240-04030-03

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