HUGHES™
NETWORK SYSTEMS

AIReach™ OFFICE

Installation and Commissioning Manual

1026209–0001
Revision B
February 24, 2000

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Trademarks

Revision record

Revision	Date of issue	Scope
A	November 8, 1999	Initial release
B	February 24, 2000	Added instructions for several additional procedures; minor revisions throughout.

Contents

Figures

Tables

About this manual

Scope

This manual provides instructions for installing and commissioning the AIReach Office System (AIReach OS).

Audience

This manual is written for installers responsible for installating and commissioning the AIReach OS.

Organization

This manual is divided into the following chapters and appendices:

Chapter 1 – Introduction

Chapter 2 – Adding cards to the System Controller

Chapter 3 – Installing the Controller

Chapter 4 –Verifying the System Controller configuration

Chapter 5 – Installing and Configuring the Router

Chapter 6 – Testing picocells

Chapter 7 – Installing picocells

Chapter 8 – Connecting to external equipment

Chapter 9 – System testing

Chapter 10 – Installation inspection

Chapter 11 – Provisioning

Chapter 12 – Remote access

Chapter 13 – Troubleshooting

Chapter 14 – Maintaining Quad T1 cards

Appendix A – Equipment specifications

Appendix B – Standards compliance information

Appendix C – Equipment part numbers

Appendix D – Updating software; backing up databases

The instructions in this manual are organized according to tasks. The instructions are intended to be followed in the order in which they appear in the manual.

AIReach Office documentation set

The AIReach Office documentation set for each user is listed below with the documentation number and description of the manual.

All audiences

AIReach Office CD–ROM (1026207–0001)
Contains PDF files of all documents for online viewing.

Phone user audience

AIReach Office Mobile Phone Network Features Quick Guide (1027893–0001)
Describes how to use each of the features of the AIReach Office System phone.

Network administrator audience

Site Preparation Manual (1026208–0001)
Describes the tasks required to prepare the site for the AIReach Office System, including the System Controller and picocell specifications.

Getting Started (1027677–0001)
Provides an introduction for using the system and its user interface. Describes logging on and off, manipulating screens and menus, navigating through the user interface and using Help are included in this manual. (Also applicable for the provider audience).

Network Administrator's Guide (1027680–0001)
Describes the regular scheduled and non–scheduled tasks the network administrator performs. This manual includes directions for subscriber provisioning, software upgrade, backup, and operator management and security. It also includes first–level troubleshooting instructions.

Provider audience

Installation and Commissioning Manual (1026209–0001)
Describes how to install and commission the AIReach Office system, including: picocell installation, System Controller hardware and software configuration, System Controller installation, cabling the system, commissioning the system, and installation troubleshooting.

Configuring the System (1027678–0001)
Describes how to configure all of the elements that are a part of the system, including the system, System Controller, picocells, NSS/MSC, and BSCs.

Monitoring System Performance, Troubleshooting, and Alarms (1027679–0001)
Describes how to monitor the status of the system and its components, and how to troubleshoot the system when problems occur. Also includes instructions for disaster recovery.

Printing PDF files

This manual is provided in Adobe Systems' Portable Document Format (PDF) for online viewing and searching. To successfully print the entire manual from the PDF file, and ensure optimum print quality, you should use a Postscript™ printer and a computer with ample free hard disk space or a network print queue. On non–Postscript printers, print a relatively small number of pages at a time. Try 30 pages—results will vary depending on printer memory, hard disk space, printer drivers, and other factors.

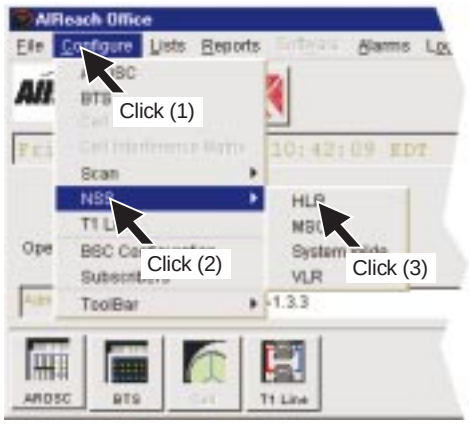
Conventions for software instructions

The following conventions are used in the software instructions included in this manual:

Select means to click the mouse to make a choice, such as a menu selection. For example: Select **Configure**. Items you can select on a software screen are shown in **bold type**.

To *click* or *double–click*, use the *left* mouse button unless the right mouse button is specified.

Select **Configure** → **NSS** → **HLR** means to make three selections consecutively, as shown here:



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Important safety information

For your safety and protection, read this entire manual before you attempt to prepare the site for installation of the AIReach Office System Controller and picocells. In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

Types of warnings used in this manual

This section introduces the various types of warnings used in this manual to alert you to possible safety hazards.

WARNING

Where you see this alert symbol and WARNING heading, strictly follow the warning instructions to avoid personal injury.

WARNING

Fall hazard: Where you see this symbol and WARNING heading, strictly follow the warning instructions to prevent personal injury.

WARNING

Heavy equipment hazard: Where you see this symbol and WARNING heading, strictly follow the warning instructions to prevent personal injury due to lifting heavy equipment.

WARNING

Potential fire hazard: Where you see this symbol and WARNING heading, strictly follow the warning instructions to prevent personal injury or death due to fire.

Warnings used in this manual

This manual includes the following safety warnings:

WARNING

When installing the picocell on the mounting plate, use care to avoid falling and injuring yourself.

WARNING

The AIReach Office System Controller can weigh in excess of 50 pounds. To avoid personal injury or damage to equipment, follow these precautions:

- **Do not attempt to move or install the System Controller by yourself. Two people are required for these tasks.**
- **If the System Controller will be rack mounted, secure the rack to the floor or wall so the rack cannot fall.**

WARNING

The AIReach Office System Controller can weigh in excess of 50 pounds. To avoid personal injury or damage to equipment, follow these precautions:

- **Do not attempt to move or install the System Controller by yourself. Two people are required for these tasks.**
- **Do not stack more than three System Controller boxes.**

WARNING

To reduce the risk of fire, use only No. 24 AWG or larger line cord to connect to the picocell, and replace the fuse only with a fuse of the type and rating identified on the fuse label.

Failure to heed these warnings could result in personal injury or death.

Chapter 1
Introduction

This chapter includes the following topics:

1.1 System components

The AIReach Office System (AIReach OS) is a wireless communications system designed to provide in–building voice communications. The System is integrated with an existing hard wired PBX phone system.

The AIReach OS is driven by an industrial computer that processes cellular telephone calls. Operators use this computer, the System Controller, to configure, control, monitor, and troubleshoot the system.

The System Controller has most of the functionality of larger macro cell Operation and Maintenance Centers (OMCs), including Base Station Controllers (BSCs) and Mobile Switching Centers (MSCs). These functions run as applications under Microsoft Windows NT on the System Controller, which is equipped with special cards to enable telephony support.

Figure 1-1 System Controller

The AIReach OS features:

- A Windows NT based System Controller with a graphical user interface (GUI) for configuration, operation, and troubleshooting
- Up to 64 picocells (line powered)
- A Primary Rate T1 connection from the Controller to the PBX
- An IS–41 TCP/IP connection from the Controller to the macro cellular system
- An optional LAN connection to a remote computer.

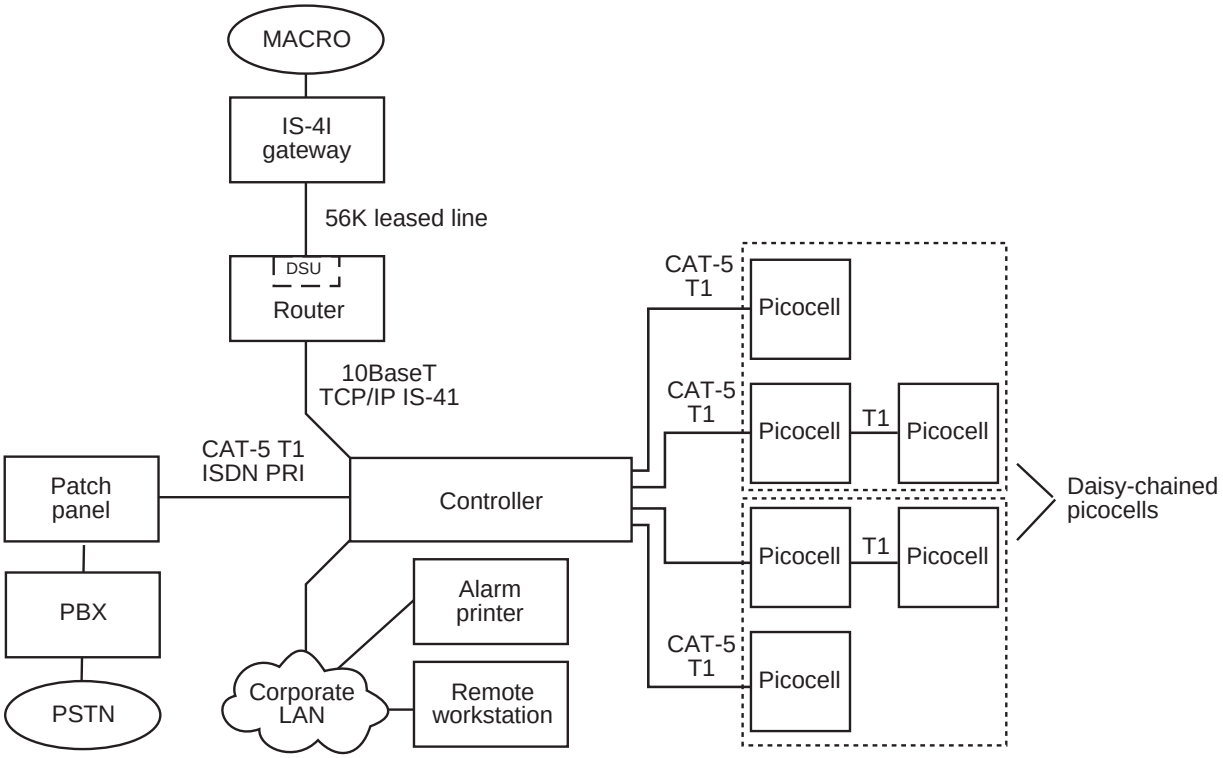

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Figure 1-2 AIReach OS block diagram

The System Controller is rack or table mounted in close proximity to the PBX.

The picocells are small Base Transceiver Stations (BTSs) designed to be mounted on office walls throughout a building. They are line powered and connected to the System Controller using CAT 5 T1 cables.

The OMC functions of the AIReach OS can be performed at a specially configured (customer provided) remote computer. This computer can be located on an internal corporate LAN and provide the network administrator with the ability to monitor and control the system without having to be physically at the System Controller location.

System Controller

The System Controller consists of the following components:

- A Windows NT computer with an internal floppy disk drive, a read/write CD–ROM drive, a 20–slot backplane, and system software
- Telephony cards to support the AIReach OS. (For a complete description, see Chapter 5.)
- A rack mounted 17–inch color monitor
- A rack mounted keyboard with integrated touchpad

Hardware

The standard (factory) configuration includes the System Controller with monitor and keyboard with integrated touchpad. A telco rack is optional.

There are three options for mounting the System Controller:

- Desktop mount
- Chassis slide mount
- Full rack mount (illustrated in Figure 1-3)

The Controller front panel has a power switch and indicators for disk activity, CD–ROM read and write activity, and power supply status. The Controller keyboard connects to the rear panel or behind the locking front access door.

A remote computer, if used, connects to the System Controller through a LAN or dial–up modem connection, using Windows NT Remote Access Server (RAS).

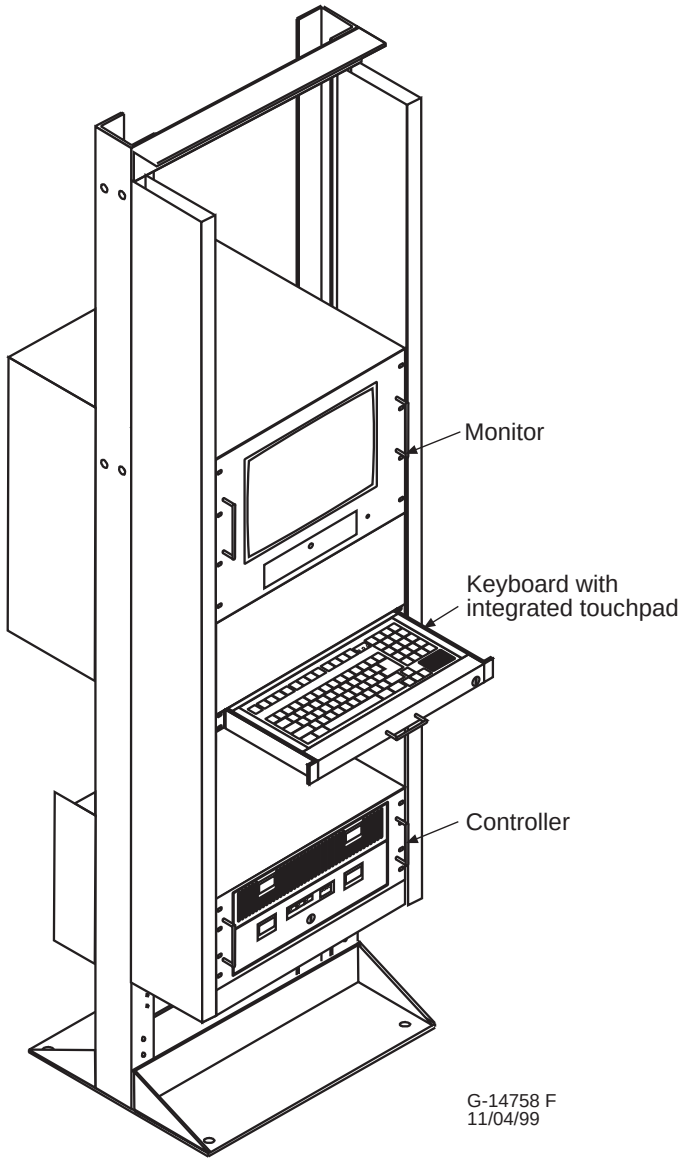

Figure 1-3 Example of full rack mount

Both the CD–ROM R/W (read/write) drive and a 3.5 inch floppy drive are accessible through a drop down panel on the front of the unit. Status indicators are provided on the front for fan, temperature, drive, and power. See Figure 1-4.

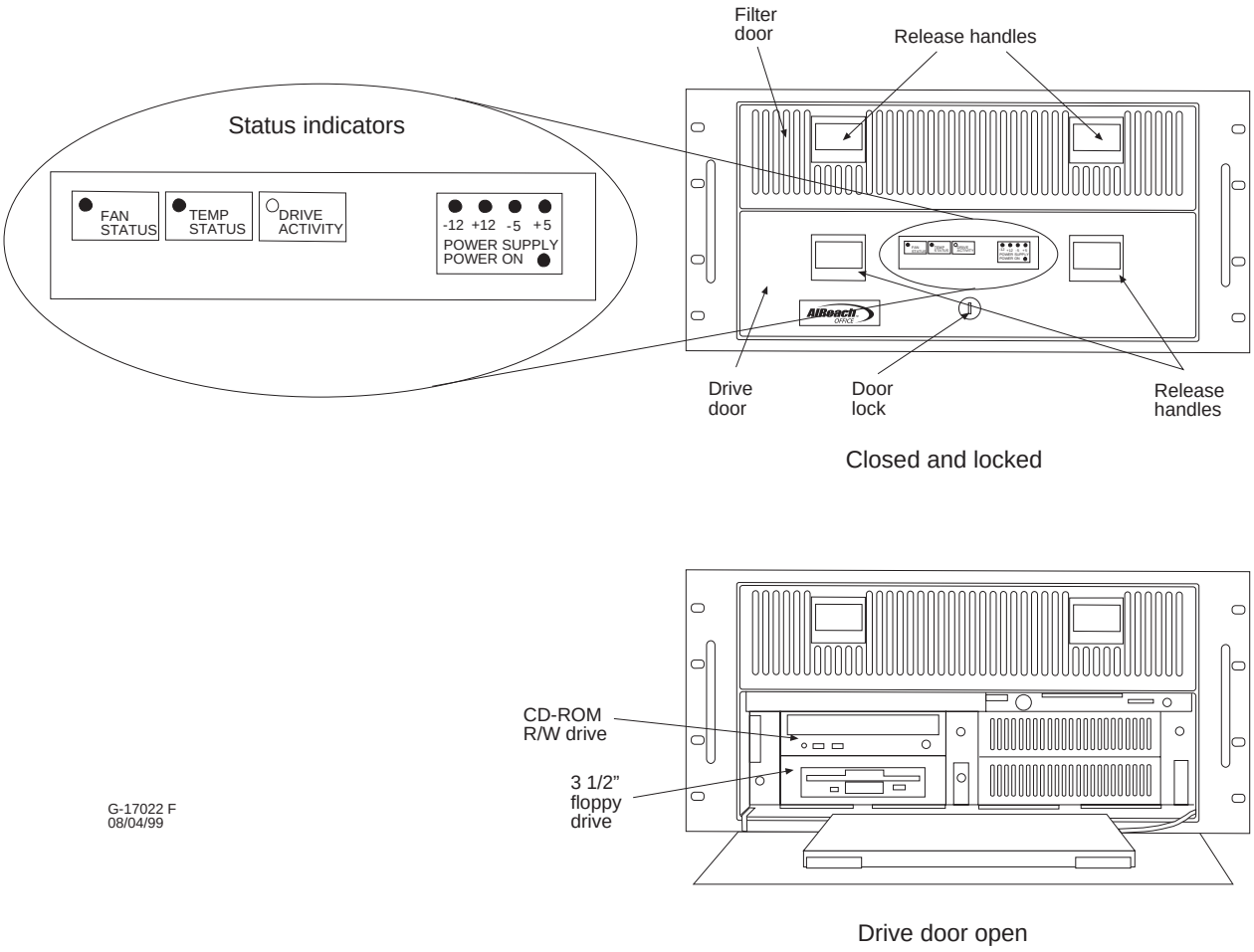

Figure 1-4 System Controller front panel

The System Controller is configured with a subset of the following hardware:

- **Hardware (cards):** The cards that are installed in the System Controller are standard plug–in type CPU cards that are ISA or PCI compatible. The System Controller has eight ISA slots and nine PCI slots. The following cards are installed in the System Controller:
  - Quad T1 cards (1 minimum, 6 maximum) with four T1 ports per card
  - TX2000 IP card (1)
  - Conference card (0, 1, or 2)
  - CD–ROM SCSI card (1)
  - 56K modem card (1)
  - Ethernet cards (1 or 2)
  - *Optional:* TX2000 SS7 card (1)

- **Hardware (System Controller components)**
  - Keyboard with integrated touchpad
  - Passive backplane supporting 8 ISA, 9 PCI, and PICMG single board computers
  - 512 MB PC100 error correcting synchronous DRAM
  - 10/100BaseT PCI ethernet card
  - 56K V.90 X2 modem, ISA bus
  - 8.4 GB Ultra ATA hard drive (minimum, connected to IDE interface number 1)
  - 1.44 MB floppy drive
  - CD–RW drive with SCSI interface (2X write mode, 6X read mode minimum, installed in ISA slot 7)
  - VGA monitor allowing a minimum of 640x480 resolution (optional)
  - standard EIA 19 inch equipment chassis

Software

The System Controller includes the following software:

- Windows NT computer
- Oracle database software
- System Controller and OMC software on CD–ROM
- Computer–based Training (CBT – available as a separate CD–ROM)
- Online PDF documentation (available as a separate CD–ROM)

Picocell components

The picocell consists of a backplane covered by an external housing and contains the following internal components:

- **Master oscillator:** Provides a reference frequency for picocell signal timing.
- **Power supply:** Converts the –48 Vdc input power to –6.5 Vdc for internal picocell operation.
- **Transceivers:** Each traffic picocell includes up to four transceivers, with each transceiver providing three full–rate TDMA channels. One channel is used as the digital control channel (DCCH) to provide access information to the mobiles. The remaining full–rate channels are used as digital traffic channels (DTC). Each picocell can handle 11 mobile voice channels simultaneously, when fully loaded. Each mobile phone requires one voice channel. Transceivers are used only in traffic picocells.
- **Scanning receiver:** This module is used in scanning or traffic picocells to monitor the transmitter signal strength of the neighboring base stations. One scanner (maximum) is used per scanning picocell.
- **Picocell Controller:** This module is the processor of the picocell. It configures and controls the transceivers operation using a proprietary protocol via the ST–BUS. The Picocell controller uses one T1 slot to communicate with the System Controller. The remaining slots are used to provide bearer services.
- **Antenna and branching module:** The transmit and diversity receivers of the installed transceivers are combined and split in this module. The picocell has a 360° omnidirectional radiation pattern in azimuth.
- **Locking tab, lock, and key:** The lock and key secure the picocell to the locking tab on the mounting plate.
- **Mounting plate:** To ensure secure mounting, the installer attaches a mounting plate to the wall, and then mounts the picocell to the mounting plate.

Procedural flow chart

The following flow chart (Figure 1-5 on page 1–9) shows the sequence of major tasks required for site preparation, installation, and commissioning of the AIReach OS.

Test picocells *at the System Controller site.* Complete picocell cabling *before* you install the System Controller and test picocells.

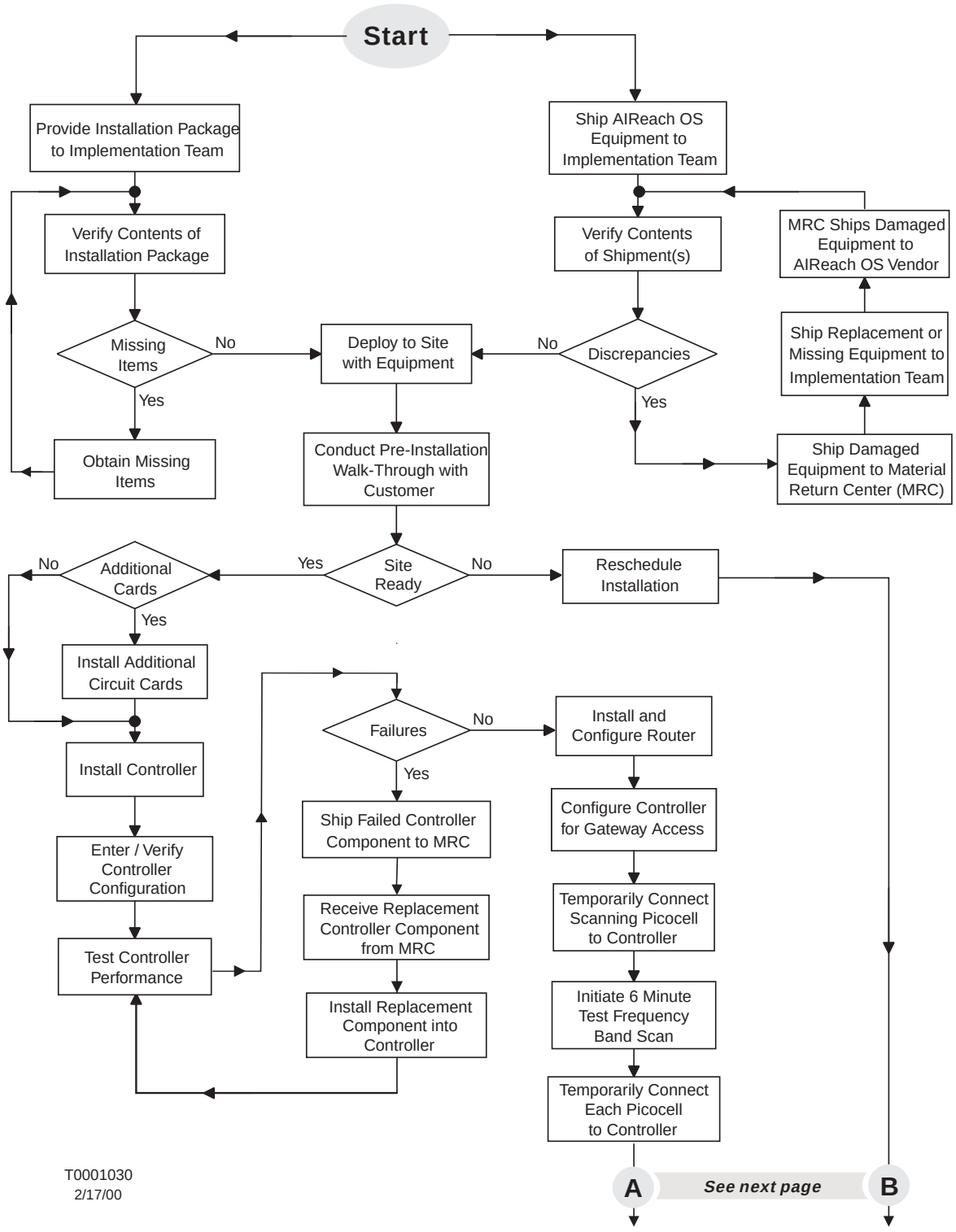

Figure 1-5 Flow chart: AIReach OS major installation and test tasks

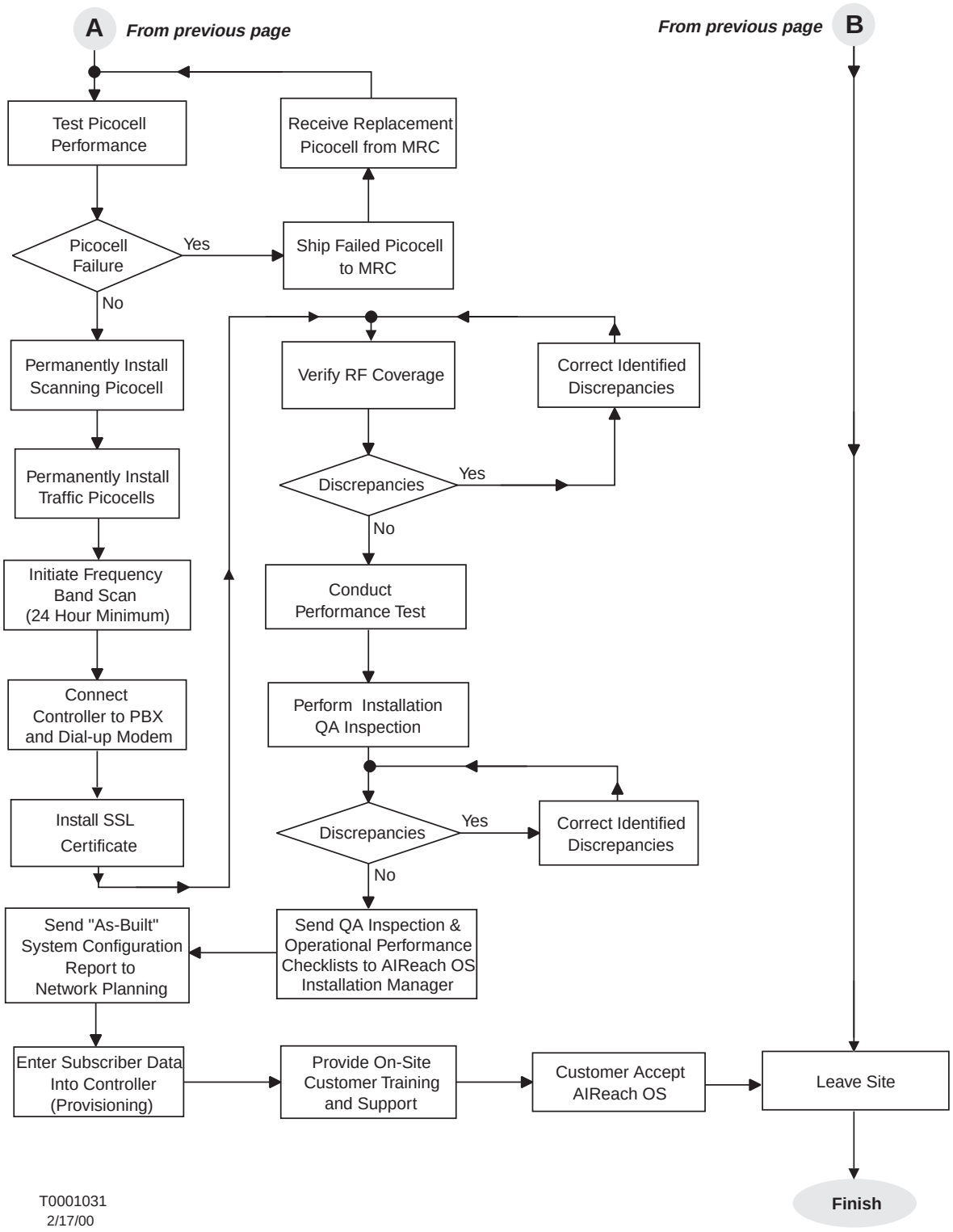

Figure 1-5 Flow chart: AIReach OS major installation and test tasks (Continued)

Tools and materials

To install and service the AIReach OS, you need the tools and materials listed below.

Required tools

The following tools are *required* to complete the AIReach OS installation:

- Cell phones (2 – Nokia 6160 or 6161 for PCS and 800 MHz; Nokia 6120 for 800 MHz only)
- Punchdown block tool with BIX, 66 block, and 110 die
- Step ladder (6 foot minimum, per team)
- Level
- Stud finder
- Tone chaser/generator
- Tape measure (10–foot minimum)
- Crimp tool with RJ–45 die
- Crimp tool with RJ–11 die
- Multimeter
- Hole saw
- Wire stripper/cutter
- Fish tape
- Flashlight
- Scissors
- Flushcuts
- Anti–static wrist strap
- Power strip (multi–socket extension cord)
- Common hand tools (screwdrivers, pliers, hammer)
- Tool case/bag

Recommended tools

In addition, the following tools are *recommended:*

- Two–way radio (2 each)
- Mini–Champ (or equivalent) signal strength measurement tool
- Label maker (P–touch or equivalent)
- Cordless drill (with bits)
- Cable tester
- Staple gun

Required materials

The following materials are required:

- Drywall screws
- E–Z Anchor self–drilling drywall anchors (plastic), light duty
- Wood screws
- RJ–45 connectors
- RJ–11 connectors
- Pull string
- CAT 5 T1 cable
- CAT 5 T1 test cable (minimum 2 each, 6 feet, flipped and terminated with an RJ–45 connector on each end)
- Cross–connect blocks (i.e. BIX, 66, 110 block)
- Cable ties

Other requirements

A –48 Vdc power supply is required for testing picocells.

1.6

Configuration options

Several options are available for system installation:

- The picocells are line powered and use an ac–to–dc power supply providing –48 Vdc.
- The System Controller can be configured with up to six T1 cards, each supporting four T1 lines to picocells.
- A traffic picocell can be configured with one to four transceiver cards.
- Picocells can be daisy–chained to one System Controller T1 port or individually connected to a System Controller T1 port.
- The System Controller can be installed as:
  - Desktop mount
  - Chassis slide mount
  - Full rack mount

Chapter 2

Adding cards to the System Controller

This chapter includes the following topics:

The System Controller is shipped in a standard configuration with all software and the following standard cards installed (one of each):

- Quad T1 card
- TX2000 IP card
- Conference card
- LAN card
- 56K modem card

If additional cards are required (typically to expand service), they are installed and configured at the customer site.

Note

The System Controller's hardware configuration is site–specific and is specified in the *AIReach Office Configuration Report*. This report is prepared by the HNS Network Planning Department.

Unpacking the System Controller

The System Controller is delivered in three boxes containing:

- System Controller (chassis)
- Monitor
- Keyboard

The optional rack, if ordered, is shipped in a separate container.

Rack mounting the System Controller is recommended, but table mounting is acceptable.

Unpack the Controller as follows:

1. Remove the System Controller and accessory packages from the packing container as shown in Figure 2-1.

   Also refer to the unpacking instructions shipped with the Controller.
2. Remove the monitor and keyboard from their respective boxes.
3. Verify all parts against the enclosed packing lists. Visually inspect the components for damage.

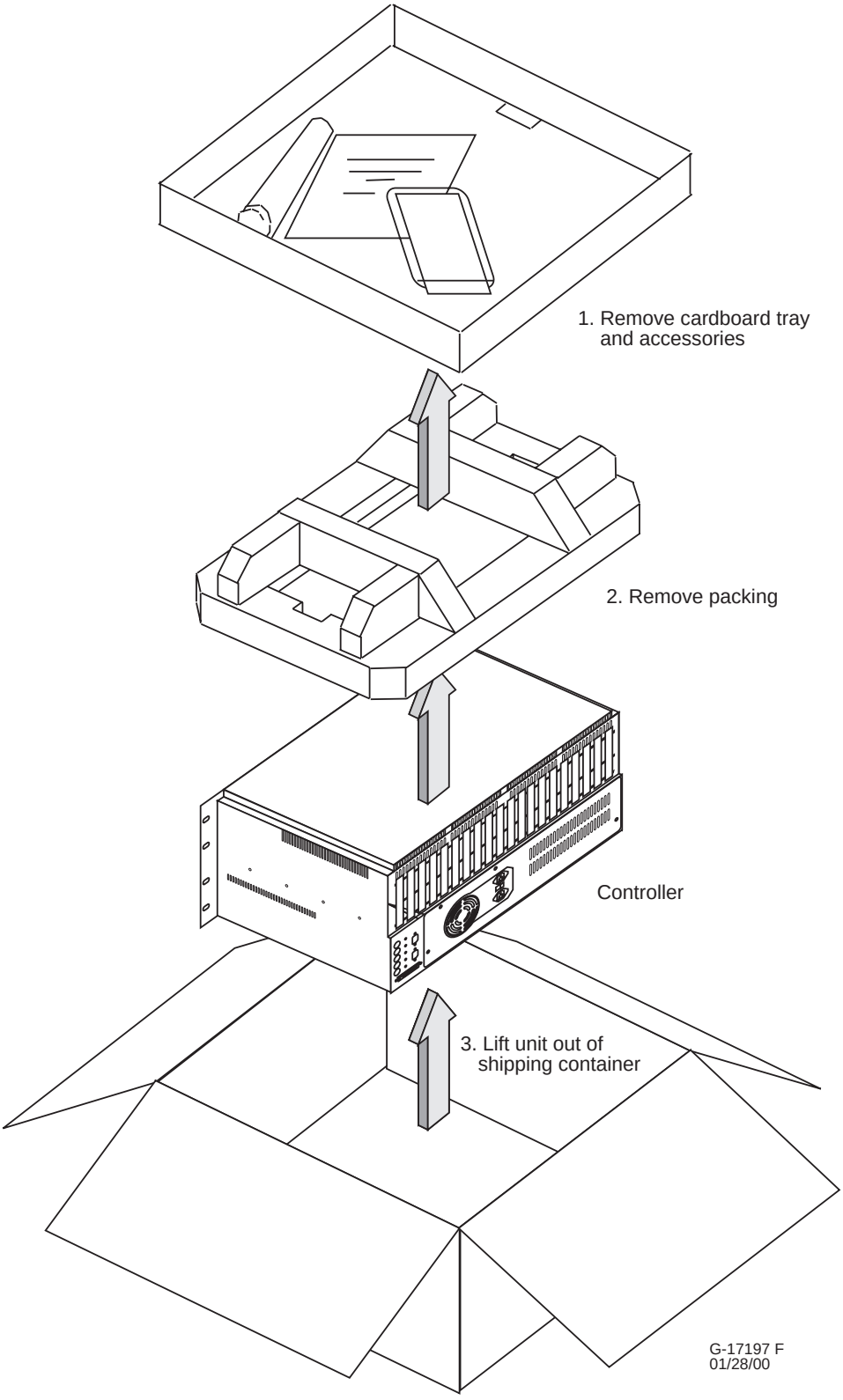

Figure 2-1 Unpacking the System Controller

Unpacking the picocells

After unpacking the Controller, unpack the picocells so you can record their serial numbers. Picocells are not installed until later (as explained in Chapter 7), but you need to record their serial numbers so you can enter them when you verify the Controller configuration (Chapter 4).

Each picocell is packaged in a cardboard box. Unpack the picocells using the following steps. See Figure 2-2.

1. Open the box at the top. Note that the picocell is supported in the box by two end caps made of form–fitted foam packing material.
2. Remove the picocell and packing from the box as one piece.
3. Remove both end caps from the picocell. Remove the plastic bag covering the picocell.

   Note that the mounting plate is mounted and locked to the picocell.

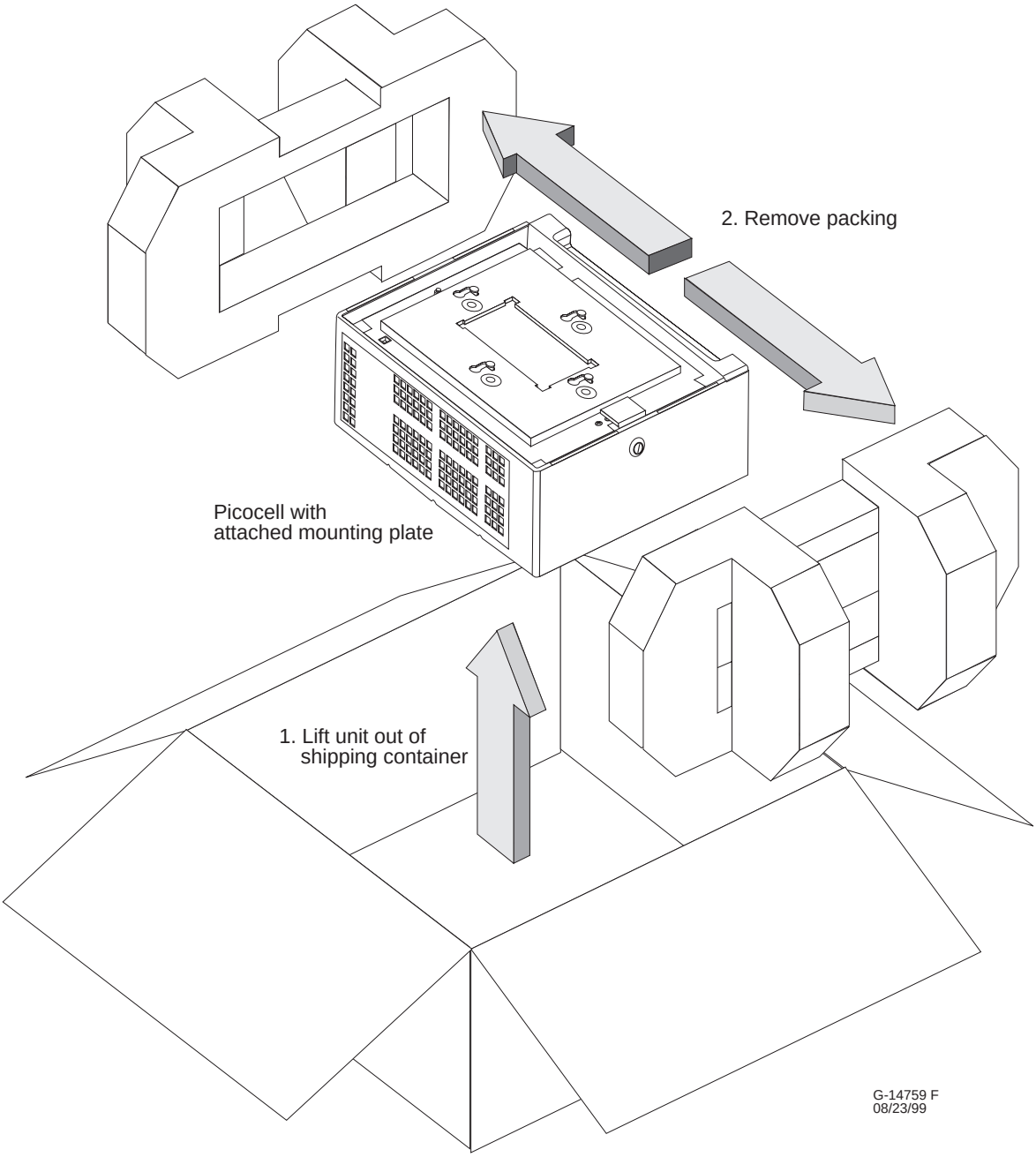

Figure 2-2 Unpacking the picocell

4. Remove the lock key that is taped to the outside of the picocell mounting plate.
5. Use the key to unlock the picocell from the mounting plate. Insert the key and turn it clockwise to a vertical position to unlock the mounting plate, as shown in Figure 2-3.

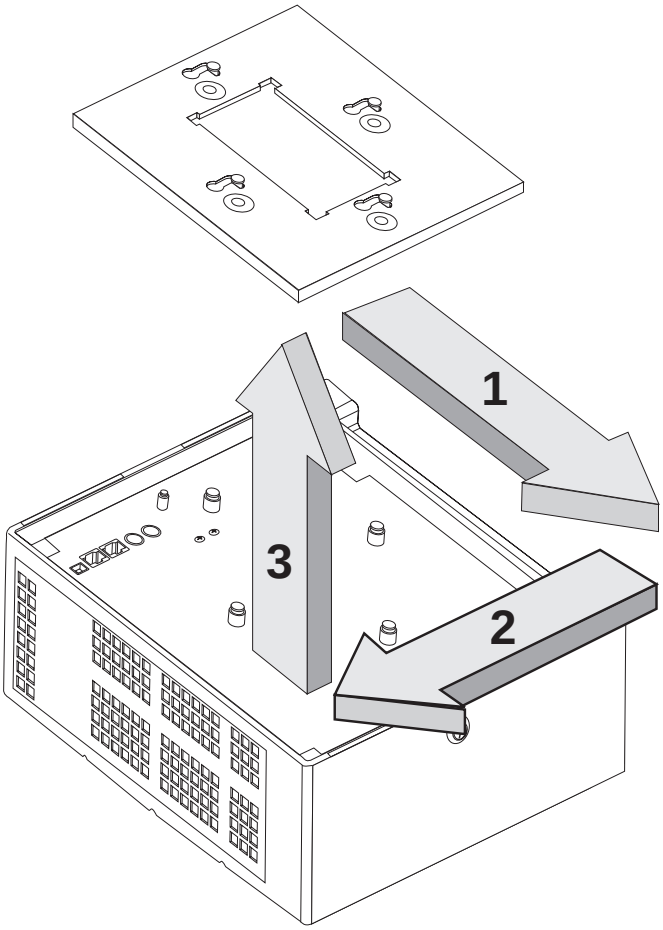

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Figure 2-3 Unlocking the mounting plate from the picocell

6. Remove the mounting plate from the picocell.

7. Record the serial numbers of all the picocells, from the label on the back of each picocell.

   Later you enter the picocell serial number as part of the base transceiver station (BTS) configuration information for the Controller. **For proper picocell operation, *you must enter the serial number exactly as it appears on the label*—as indicated in figure 2-4.**

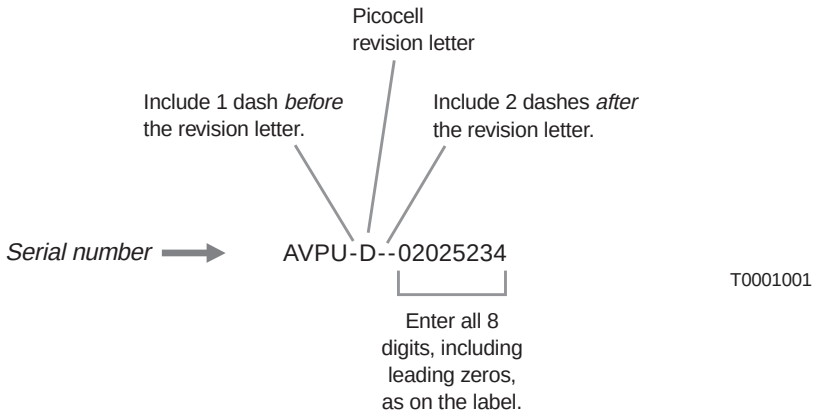


Figure 2-4 Recording and entering the serial number from the back of each picocell

8. Visually inspect all contents for damage.
9. Save the boxes and packing material until the system operation is verified and the system is released to the customer. When packing materials are disposed of, recycle the materials.

System Controller card configurations

This section shows:

- How to identify the backplane slots of the System Controller
- The standard and fully loaded Controller configurations

Backplane slot identification

As shown in Figures 2-5 and 2-6, each slot is identified in two ways:

- By slot number: Slots are labeled 1 through 20 on the rear of the System Controller.
- By ISA or PCI number (slot type ID): PCI 1–9, ISA 1–8. The slot type IDs are labeled on the inside of the Controller, on the backplane.

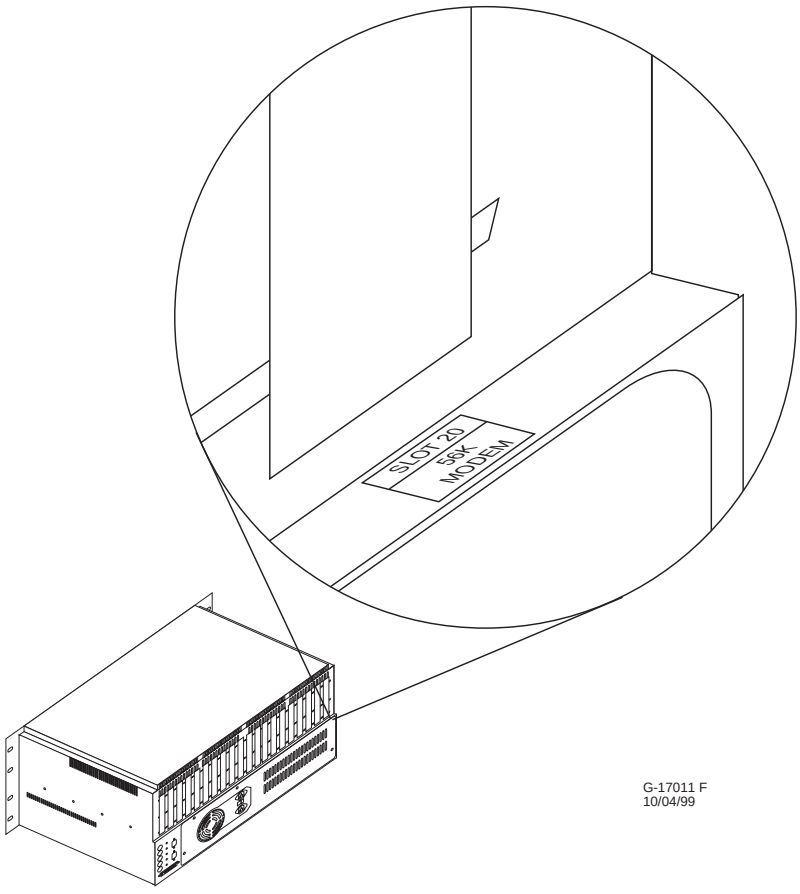


Figure 2-5 Slot label on rear of System Controller

Cards are installed in PCI or ISA slots, as listed below:

PCI slots: Ethernet and T1 cards

ISA slots: TX2000, conference, and modem cards

Standard (factory) configuration

The following cards are installed in the System Controller at the factory (one each):

- TX2000 IP card
- Quad T1 card
- Conference card
- LAN card
- 56K modem card

For backplane slot assignments for each card, see Figure 2-6. See also Figure 2-7.

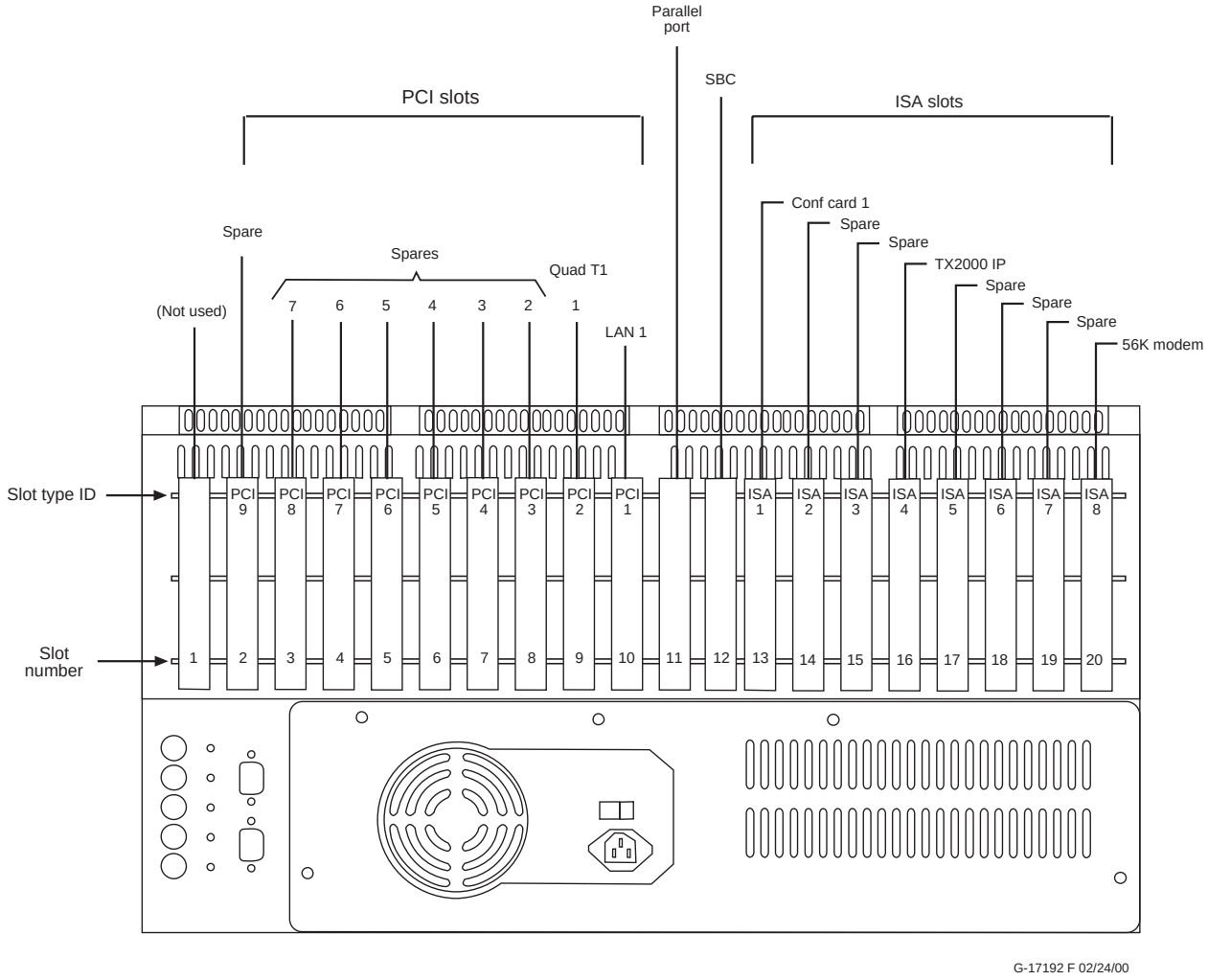


Figure 2-6 Backplane slot assignments: System Controller standard configuration

Fully loaded configuration

A fully loaded System Controller has the backplane loaded as shown in Figure 2-7. In this configuration, four card slots are unused and available for future functions.

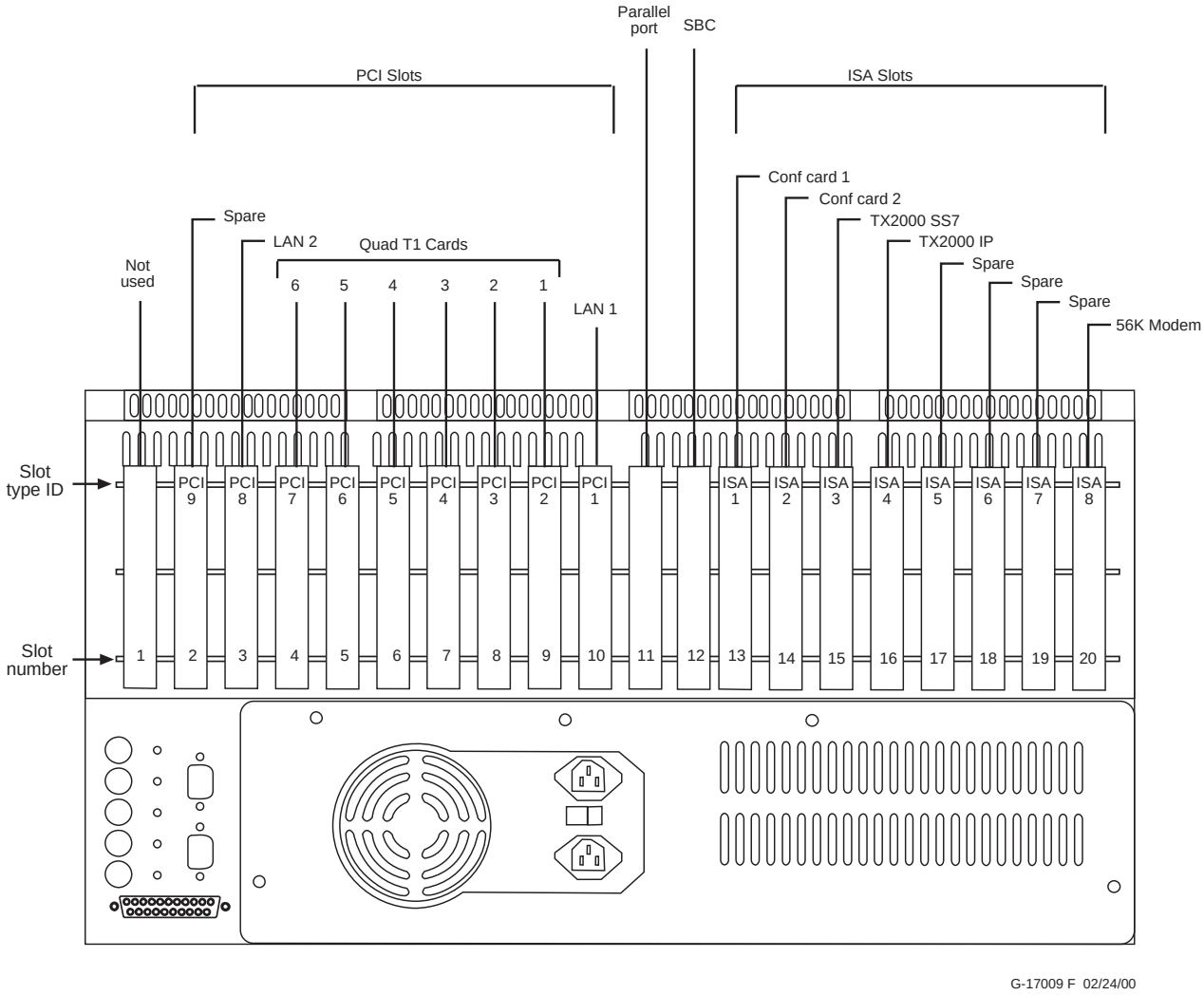


Figure 2-7 Backplane slot assignments: System Controller fully loaded configuration

Adding cards to the System Controller (first steps)

In addition to the factory–installed cards listed in Section 2.3, the *Site Configuration Report* may specify additional cards:

- Additional Quad T1 cards
  (up to 5 additional, for a total of 6)
- A TX2000 SS7 card
- A second conference card
- A second LAN card

If you need to *replace, move, or remove* a Quad T1 card see Chapter 14 for important instructions.

To install a card in the System Controller, follow these steps:

1. Make sure the Controller is powered off.
2. Remove the Controller chassis cover, as follows:
   a. Loosen the five spring–loaded Phillips head screws at the rear (top) of the chassis (Figure 2-8).
   b. Remove the chassis top cover by lifting the back edge of the cover (approximately 1 inch) and then sliding the cover toward the rear of the chassis.

   Use care to avoid damaging the copper finger stock under the front of the cover.

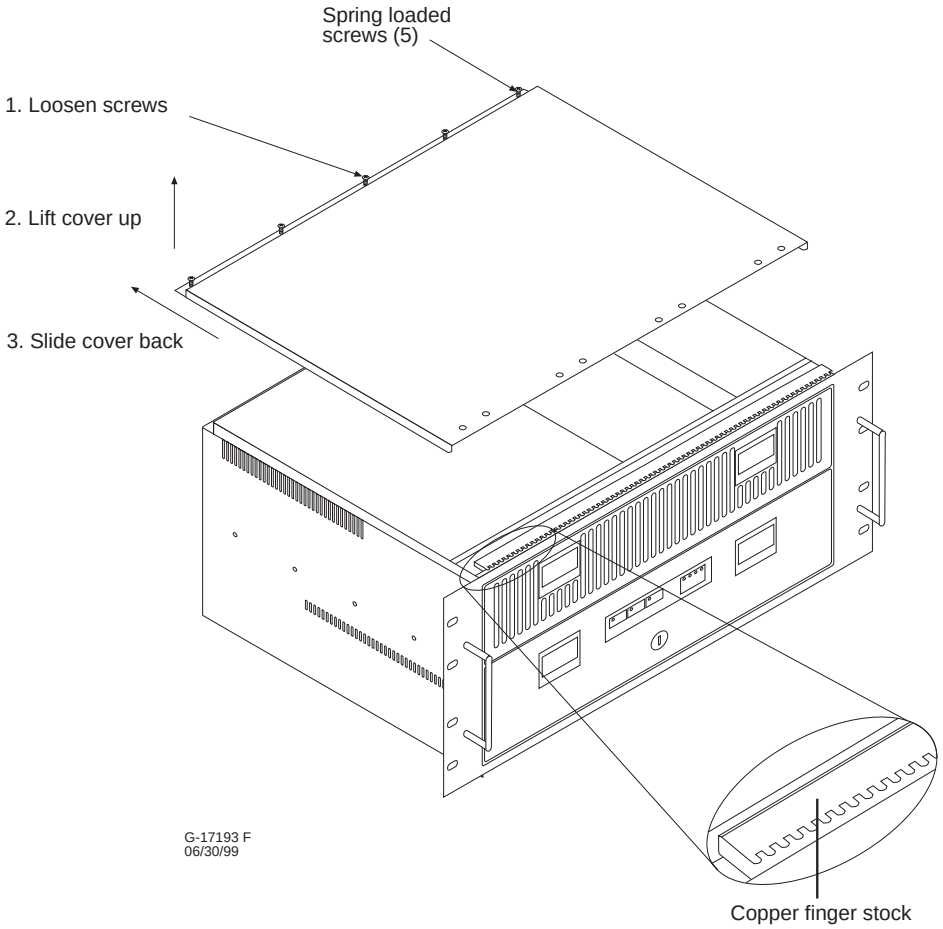


Figure 2-8 Removing the System Controller cover

3. Unpack the card.

CAUTION

Before removing or installing electronic components, make sure static electricity has been discharged from yourself and any object that may contact the component. Wear a new or recently tested anti–static wrist strap and use an anti–static pad while handling components.

Failure to follow these instructions could result in damage to components.

4. Check all dual inline package (DIP) switch and jumper settings. You may need to change some settings. See Section 2.5, *Jumper and DIP switch settings*.

Jumper and DIP switch settings

This section specifies all jumper and DIP switch settings for all System Controller cards.

Before adding or replacing any card in the System Controller, make sure all jumper switches and DIP switches on the new card are set correctly. You may need to change some settings, and should check *all* jumpers and switches to make sure they are set correctly.

Note that for Quad T1, TX2000, and conference cards, settings are different depending on whether the card is the first of its type installed, or is a subsequently installed card of the same type.

The instructions below tell you which jumpers and DIP switches you need to change, and they specify the correct settings for *all* jumpers and switches (including those that do not need to be changed). This is so you can check all settings and correct them if necessary.

If you experience a problem with a card, make sure all jumpers and DIP switches are set as specified here before contacting HNS for customer support.

The jumper and switch settings indicated in the following sections have been established for the combination of cards used the AIReach System Controller. **Do not use other settings.**

Quad T1 card

DIP switches

The only option on the Quad T1 card is to set DIP switch S1 (Figure 2-9) to enable or disable H.100 bus termination.

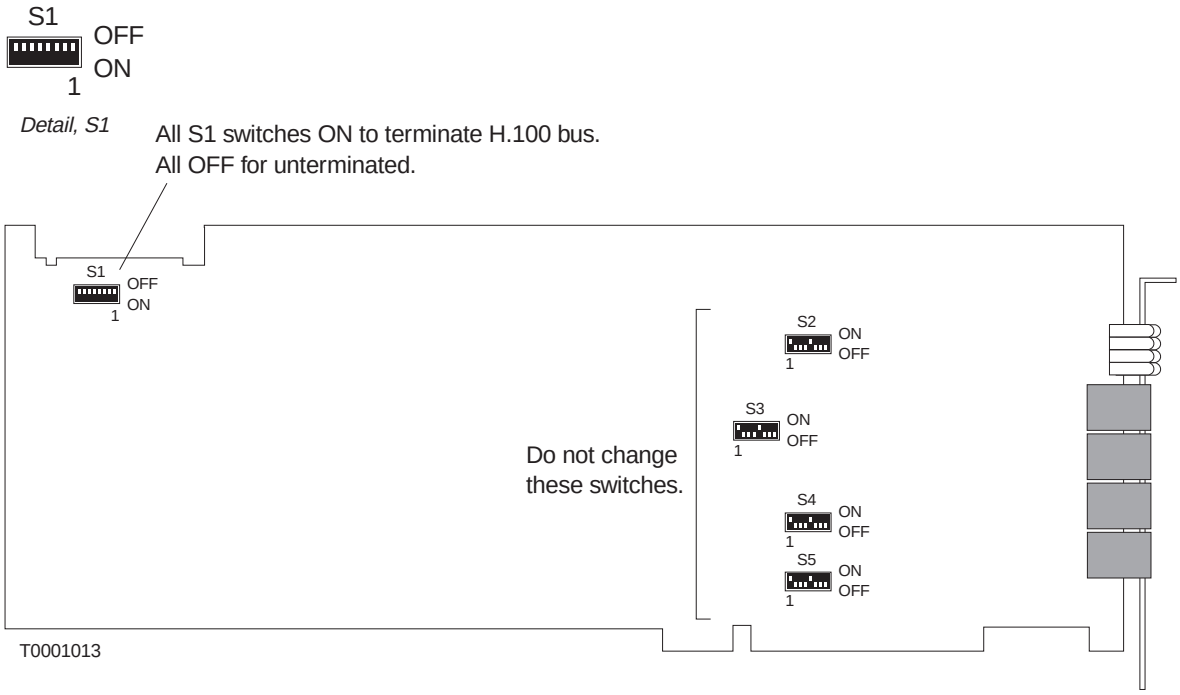


Figure 2-9 DIP switches on Quad T1 card

A Quad T1 card is factory installed in slot 9. When only one Quad T1 card is installed (or if the card is replaced), set all S1 switches to ON (terminated). This is the default setting.

If you add a Quad T1 card (in slots 4 through 8), the setting for switch S1 depends on where the card is on the H.100 bus:

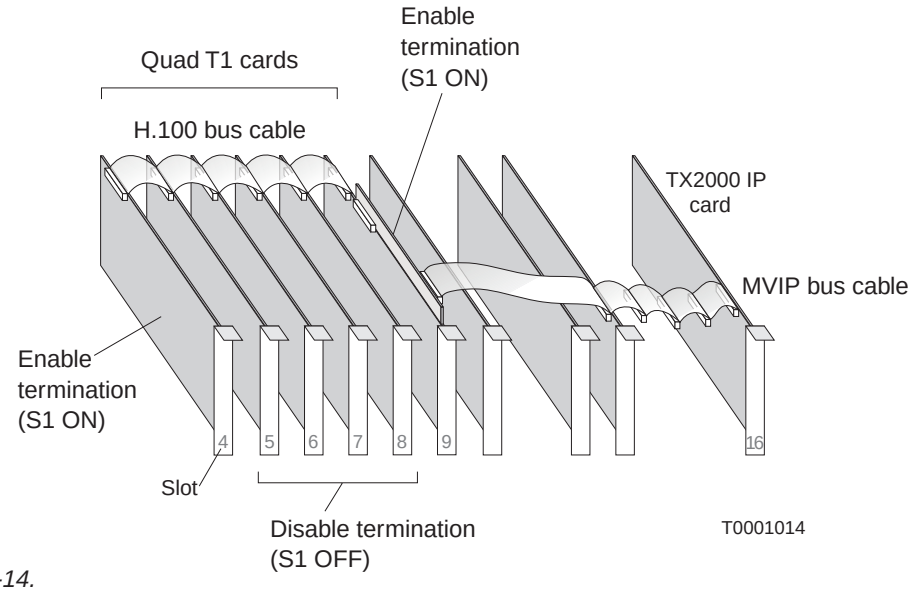
- If the Quad T1 card is the first or last Quad T1 card on the H.100 bus, set all S1 switches to ON (H.100 bus terminated).
- For cards that are *not* first or last on the H.100 bus, set all S1 switches to OFF (unterminated). See Figure 2-10.

Termination reduces line noise caused by signal reflection off the two ends of the bus, and is critical for correct transmission of referenced T1 clock signals.

Switches S2 through S5 are factory configured with the following default settings: Sx–1 and Sx–5 ON, and all others OFF. **Do not change these settings.** Switches S2 through S5 may be covered with an adhesive label.

MVIP bus

If the System Controller has two or more Quad T1 cards, the ends of the MVIP bus should not be terminated. Remove jumpers JP14 and JP16 from the TX2000 IP card in slot 16 (the last card on the MVIP bus).



See also Figure 2-14.

Figure 2-10 H.100 bus termination

For additional explanation of the H.100 and MVIP buses, see Section 2.6.

IRQ and address

The Quad T1 card interrupt request (IRQ) and address are automatically configured through the BIOS. They are not user selectable.

TX2000 IP and TX2000 SS7 cards

This section applies to both the TX2000 IP card (factory installed in slot 16) and the TX2000 SS7 (optional, slot 15). Most settings are the same for both cards; those that are different are clearly pointed out.

The key settings to check on the TX2000 cards are the IRQ and I/O address. All jumpers other than JP7 (IRQ selection) should be left in their factory default positions.

Jumpers

Make sure the IRQ selection jumper is in position 7, as shown in Figure 2-11. (The factory default is IRQ 10. “NO” disables the ISA bus.) Use IRQ 7 only.

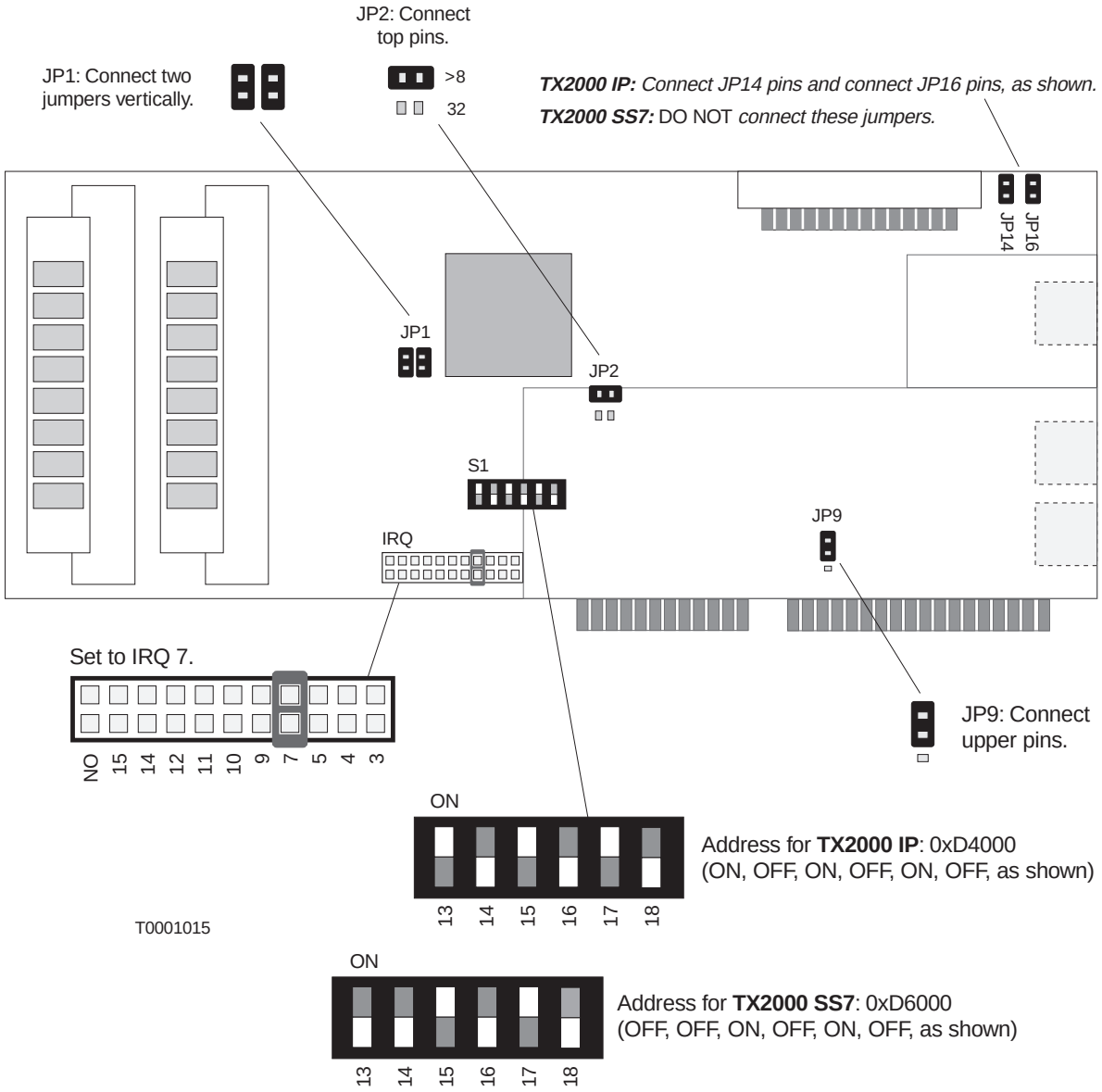


Figure 2-11 Jumpers and address switch on TX2000 IP and TX2000 SS7 cards

Figure 2-11 illustrates all the TX2000 jumpers. Table 2-1 identifies the function of each jumper and summarizes the correct settings:

Table 2-1 Jumper settings for TX2000 IP and TX2000 SS7 cards

Use these settings.

Jumper	Function	TX2000 IP	TX2000 SS7
IRQ	Interrupt request (IRQ) signal	IRQ 7	IRQ 7
JP1	Boot type	Both jumpers in vertical position (for dual port RAM); see Figure 2-11.	Both jumpers in vertical position (for dual port RAM); see Figure 2-11.
JP2	Boot device size	>8	>8
JP9	Shared interrupts between multiple TX2000 cards (enable/disable)	Upper 2 pins (1–2) connected (enabled)	Upper 2 pins (1–2) connected (enabled)
JP14	MVIP bus terminator (enable/disable)	Connected (jumper ON) (terminated) [1]	Not connected (no jumper)
JP16	MVIP bus terminator (enable/disable)	Connected (jumper ON) (terminated) [1]	Not connected (no jumper)
[1] If multiple Quad T1 cards are used, remove this jumper. See *MVIP bus* on page 2–14.			

As shown in Table 2-1 , all jumper settings are the same for both card types, except the MVIP bus termination jumpers, JP14 and JP16. **For the TX2000 SS7 card, jumpers JP14 and JP16 should not be connected under any circumstances.** (Not connected is the default setting for the TX2000 SS7 card.)

I/O address

For the TX2000 IP card, the I/O address selection (DIP switch S1) is factory set to 0xD4000. ***If you add a TX2000 SS7 card,*** set the TX2000 SS7 card address to OxD6000, as shown in Figure 2-11.

To set DIP switch 1, set all switches up, to ON, then push the switches down (OFF) for the positions marked with an underscore (__) in Table 2-2 . The addresses in Table 2-2 are provided for troubleshooting purposes only. When installing a card, use only the address specified above.

Table 2-2 TX2000 card I/O address settings (switch S1)

Address	Setting	Address	Setting
8000	13 14 15 16 17 18	C000	13 14 15 16 17 __
8200	__ 14 15 16 17 18	C200	__ 14 15 16 17 __
8400	13 __ 15 16 17 18	C400	13 __ 15 16 17 __
8600	__ __ 15 16 17 18	C600	__ __ 15 16 17 __
8800	13 14 __ 16 17 18	C800	13 14 __ 16 17 __
8A00	__ 14 __ 16 17 18	CA00	__ 14 __ 16 17 __
8C00	13 __ __ 16 17 18	CC00	13 __ __ 16 17 __
8E00	__ __ __ 16 17 18	CE00	__ __ __ 16 17 __
9000	13 14 15 __ 17 18	D000	13 14 15 __ 17 __
9200	__ 14 15 __ 17 18	D200	__ 14 15 __ 17 __
9400	13 __ 15 __ 17 18	**D400** [1]	13 __ 15 __ 17 __
9600	__ __ 15 __ 17 18	D600 [2]	__ __ 15 __ 17 __
9800	13 14 __ __ 17 18	D800	13 14 __ __ 17 __
9A00	__ 14 __ __ 17 18	DA00	__ 14 __ __ 17 __
9C00	13 __ __ __ 17 18	DC00	13 __ __ __ 17 __
9E00	__ __ __ __ 17 18	DE00	__ __ __ __ 17 __
A000	13 14 15 16 __ 18	E000	13 14 15 16 __ __
A200	__ 14 15 16 __ 18	E200	__ 14 15 16 __ __
A400	13 __ 15 16 __ 18	E400	13 __ 15 16 __ __
A600	__ __ 15 16 __ 18	E600	__ __ 15 16 __ __
A800	13 14 __ 16 __ 18	E800	13 14 __ 16 __ __
AA00	__ 14 __ 16 __ 18	EA00	__ 14 __ 16 __ __
AC00	13 __ __ 16 __ 18	EC00	13 __ __ 16 __ __
AE00	__ __ __ 16 __ 18	EE00	__ __ __ 16 __ __
B000	13 14 15 __ __ 18	F000	13 14 15 __ __ __
B200	__ 14 15 __ __ 18	F200	__ 14 15 __ __ __
B400	13 __ 15 __ __ 18	F400	13 __ 15 __ __ __
B600	__ __ 15 __ __ 18	F600	__ __ 15 __ __ __
B800	13 14 __ __ __ 18	F800	13 14 __ __ __ __
BA00	__ 14 __ __ __ 18	FA00	__ 14 __ __ __ __
BC00	13 __ __ __ __ 18	FC00	13 __ __ __ __ __
BE00	__ __ __ __ __ 18	FE00	__ __ __ __ __ __

[1] Default for TX2000 IP (slot 16). [2] Use for TX2000 SS7 (slot 15).
Note: Underline (__) indicates switch in OFF position.

Conference card

I/O address

I/O address 0x2140 is used for the first conference card (in slot 13). ***If you install a second conference card*** (in slot 14), use DIP switch S1 to select address 0x2160, as shown in Figure 2-12.

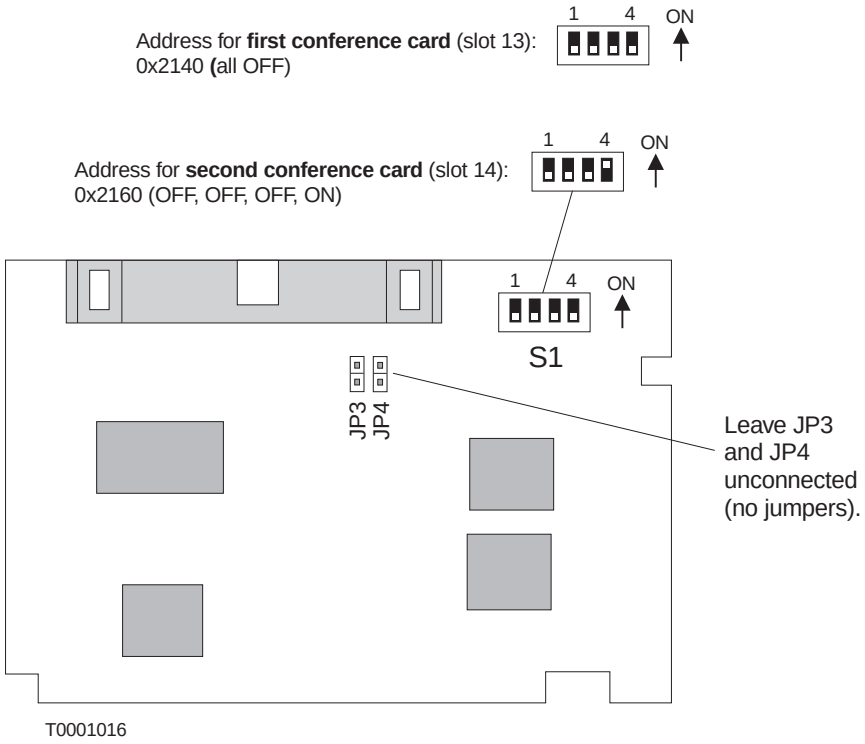


Figure 2-12 Conference card jumpers and address switch

For troubleshooting purposes only, Table 2-3 shows all addresses that can be assigned to a conference card. When installing a card, use only the address specified above.

Jumpers (MVIP bus termination)

For either conference card (in slot 13 or 14), leave jumpers JP3 and JP4 unconnected. This disables MVIP bus termination for the card.

IRQ

The conference card does not need an IRQ.

Table 2-3 Conference card I/O address settings (switch S1)

Base addr	S1–1	S1–2	S1–3	S1–4
0640	ON	ON	ON	ON
0620	ON	ON	ON	OFF
0560	ON	ON	OFF	ON
0540	ON	ON	OFF	OFF
0240	ON	OFF	ON	ON
0220	ON	OFF	ON	OFF
0160	ON	OFF	OFF	ON
0140	ON	OFF	OFF	OFF
2640	OFF	ON	ON	ON
2620	OFF	ON	ON	OFF
2560	OFF	ON	OFF	ON
2540	OFF	ON	OFF	OFF
2240	OFF	OFF	ON	ON
2220	OFF	OFF	ON	OFF
2160 [1]	OFF	OFF	OFF	ON
2140 [2]	OFF	OFF	OFF	OFF

[1] Use for second conference card (slot 14).
[2] Default for first conference card (slot 13).

LAN cards

The Ethernet LAN cards (slot 10, and slot 3 if a second LAN card is used) are configured automatically through BIOS Plug and Play (PnP); they have no user selectable jumpers.

Modem card

The modem card (slot 20) is configured automatically through BIOS Plug and Play (PnP); it has no user selectable jumpers. (The modem uses COM2 and IRQ3.)

Single board computer (SBC)

In the event of a problem with the SBC (slot 12), make sure DIP switch SW1 is set correctly, depending on the installed CPU, and check all jumpers.

Processor configuration

The standard CPU shipped with the AIReach OS System Controller is an Intel Pentium II, 450 MHz processor. Normally, the system BIOS autodetects the CPU and sets the system bus frequency accordingly. If the BIOS does not do this, or if you elect to use a different processor, you must set DIP switch SW1 to the correct bus frequency and processor multiplier for the CPU, as specified in table 2-4 . The location of switch SW1 is shown in Figure 2-13.

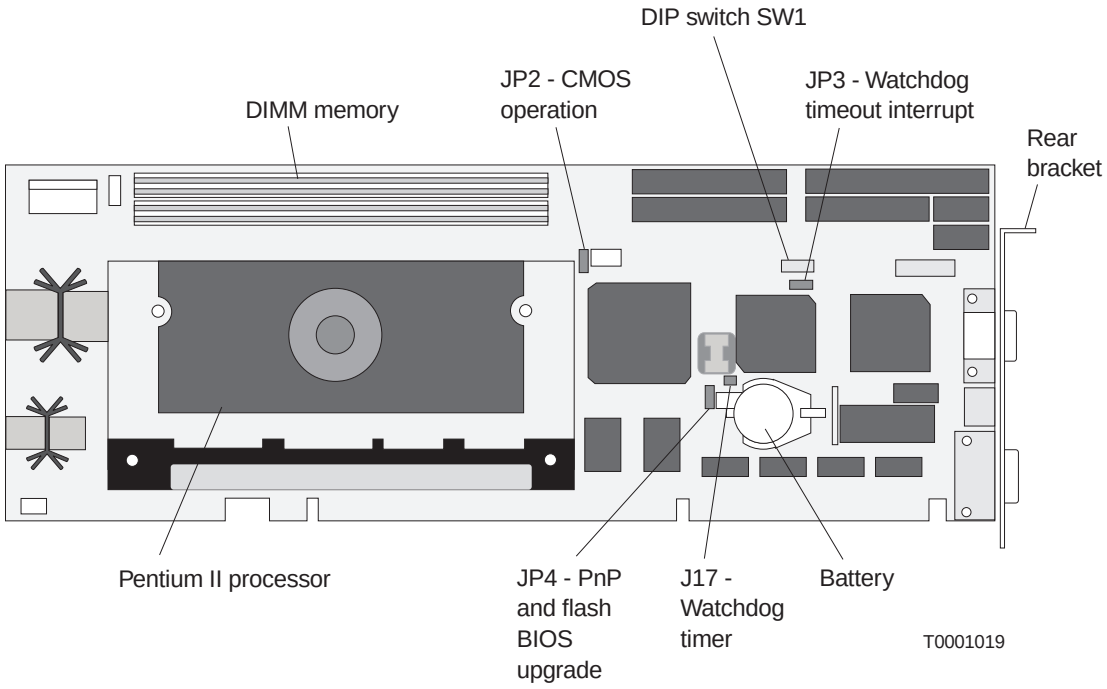


Figure 2-13 SBC jumper and DIP switch locations

As shown in Table 2-4 , switch SW1–1 selects the processor front side bus frequency (FSB), more commonly known as the bus or memory frequency. Switches SW1–2 to SW1–5 select the processor multiplier.

To determine the proper FSB and multiplier for a particular processor, first read the clock speed from the label on top of the processor casing. Look at the last six numbers in the first row of numbers and/or letters. For example, 450512 indicates a processor clock speed (first three numbers) of 450 MHz, with 512K of Level–2 (L2) cache (last three numbers). In general, any Pentium II processor 333 MHz or slower uses a 66–MHz FSB, while any processor 350 MHz or faster uses a 100–MHz FSB.

To determine the processor multiplier, divide the processor clock speed by the FSB. For the 450–MHz processor, set the FSB to 100 MHz (SW1–1 OFF) and the multiplier at 4.5 (SW1–2 OFF, SW1–2 ON, SW1–3 ON, and SW1–5 OFF). See the following chart for other processor combinations and settings.

Table 2-4 SBC processor settings (switch SW1)

Processor (MHz)	FSB	SW1–1	X	SW1–2	SW1–3	SW1–4	SW1–5
		Selects FSB	Multiplier	These switches select the multiplier.			
Pentium II 233 MHz	66	ON	3.5	OFF	ON	OFF	ON
Pentium II 266 MHz	66	ON	4	ON	ON	ON	OFF
Pentium II 300 MHz	66	ON	4.5	OFF	ON	ON	OFF
Pentium II 333 MHz	66	ON	5	ON	ON	OFF	OFF
Pentium II 350 MHz	100	OFF	3.5	OFF	ON	OFF	ON
Pentium II 400 MHz	100	OFF	4	ON	ON	ON	OFF
Pentium II/III 450 MHz	100	OFF	4.5	OFF	ON	ON	OFF
Pentium III 500 MHz	100	OFF	5	ON	ON	OFF	OFF

SW1–6 to SW1–8 are reserved and should be left in the OFF position.
Highlighted (gray): Standard processor for AIReach OS Controller

Jumpers

Set all jumpers as specified in Table 2-5 . The location of each jumper is shown in Figure 2-13.

The SBC uses the watchdog timer (jumper J17). Even though the pre–timeout interrupt option (JP3) of the watchdog timer is not used, leave a jumper across pins 2–3. A jumper over JP4 pins 2 and 3 enables PnP capabilities and the ability to upgrade the flash BIOS.

Connect JP2 pins 2 and 3 for normal CMOS operation. In the event that CMOS settings prevent the AIReach OS Controller from booting, you can clear the CMOS settings by placing a jumper over JP2 pins 1 and 2. *Do this only in an emergency.* Clearing the CMOS helps correct only certain hardware problems. Operating system or software problems cannot be remedied through clearing the CMOS. If it is necessary to clear CMOS settings, see HNS document 1027630 for the proper settings.

Table 2-5 SBC card jumper settings

Use these settings.

Jumper	Function	Setting	
J17	Watchdog timer	Enabled	ON
JP2	Normal CMOS operation	Normal operation	Connect pins 2–3
JP3	Watchdog timer pre–timeout interrupt option	Disabled	Connect pins 2–3
JP4	PnP and BIOS flash upgrade	Enabled	Connect pins 2–3

Attaching the bus cables

After all cards are installed, make sure the MVIP and H.100 bus ribbon cables are connected to the cards as shown in Figure 2-14. **If you added any cards, connect the bus cables to the added card(s), as shown.**

The MVIP bus ribbon cable connects to:

- The small bus adapter card attached to the top of the first Quad T1 card (in slot 9)
- Any TX2000 cards
- Any conference cards

The H.100 bus cable connects to all Quad T1 cards.

Make sure the bus adapter card is secure and in full contact with the (slot 9) Quad T1 card.

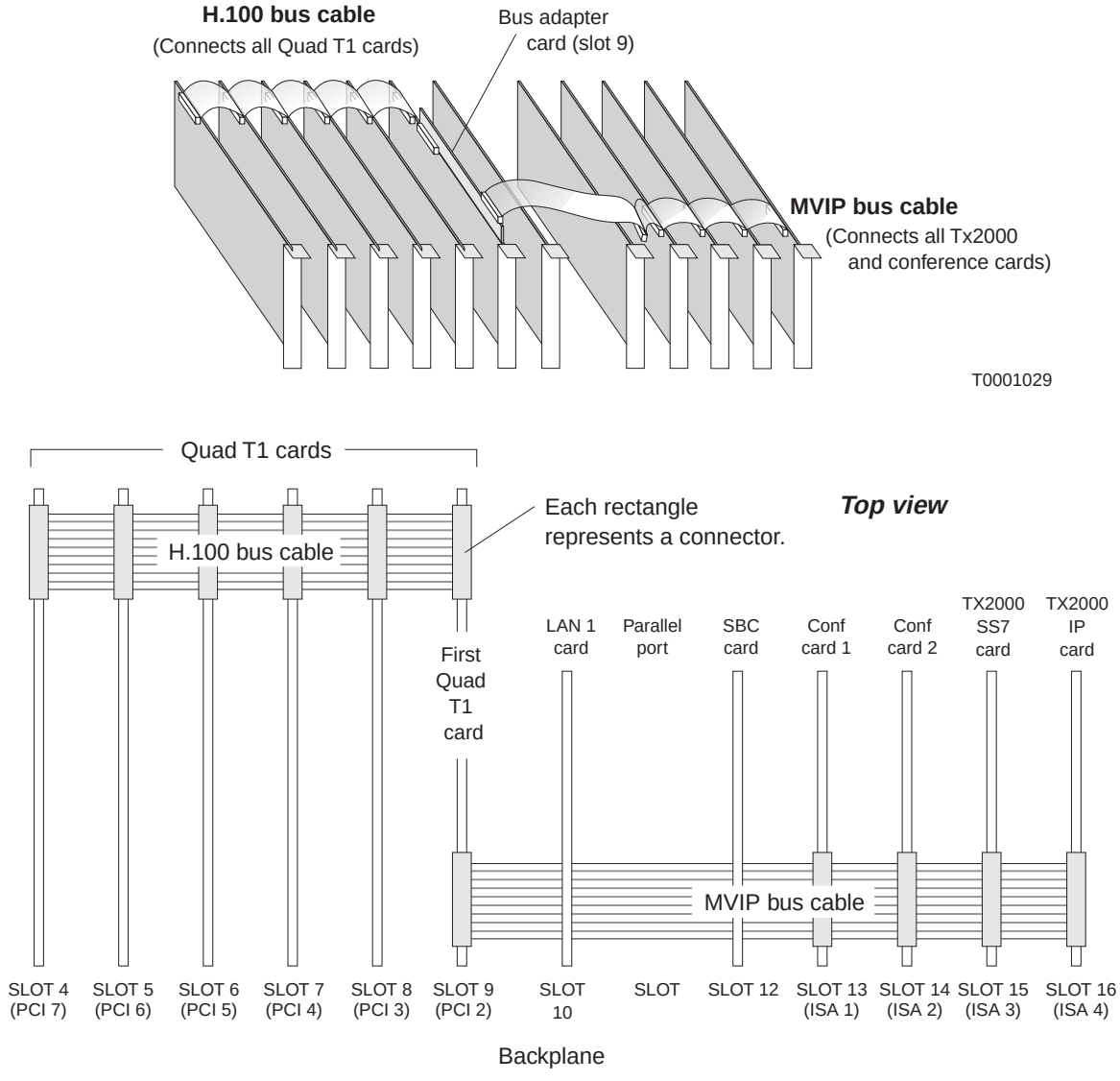


Figure 2-14 H.100 and MVIP bus cables (2 views)

Adding cards to the System Controller (final steps)

After making sure all jumpers and DIP switches on the card are set correctly:

1. Use a Phillips screwdriver to remove the screw from the card slot cover (blank panel), and then remove the card slot cover from the Controller chassis.
2. Slide the card into place. Fully insert the card's edge connector(s) into the sockets on the System Controller backplane.

   Install the card according to the manufacturer's directions.
3. Replace and tighten the slot cover screw (now into the card bracket) to secure the card to the Controller chassis.
4. When all cards are installed, replace the System Controller top cover.
5. Connect power to the Controller.
6. Boot the Controller. (Power it on.)

Configuring System Controller cards

Use the System Controller installation software to:

- Configure a new System Controller
- Configure a replacement card
- Reconfigure a card after moving it to a different slot

For a new System Controller, follow the configuration steps below *after* all cards are installed.

If an installed card is replaced or moved, you must follow the steps in this section to configure or reconfigure it.

Important: For values needed to configure the picocell, see the site–specific *AIReach Office Configuration Report*. References to *specified* values or parameters in this manual refer to values and parameters specified in the *Configuration Report*. For values not listed in the *Configuration Report*, use the default values shown in the software or specified in these instructions.

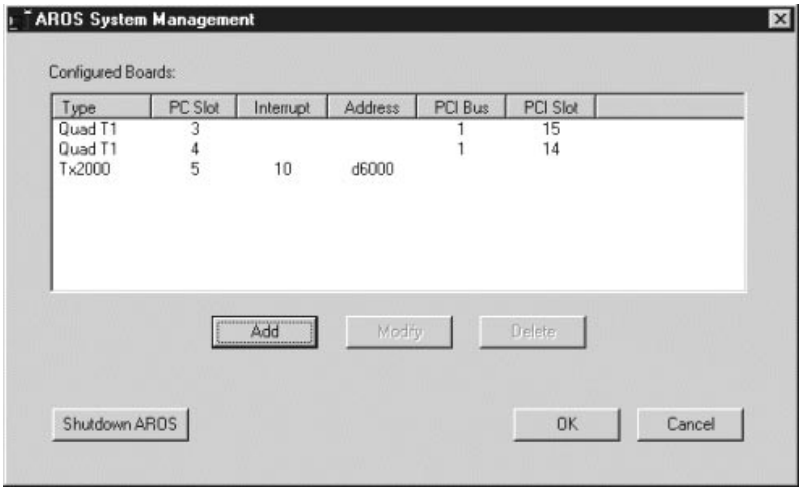
Specifying basic card information

Follow the steps below to enter basic configuration information for newly installed cards.

If you are using the standard Controller configuration, with no additional cards, verify that the standard cards are installed, and verify the configuration information.

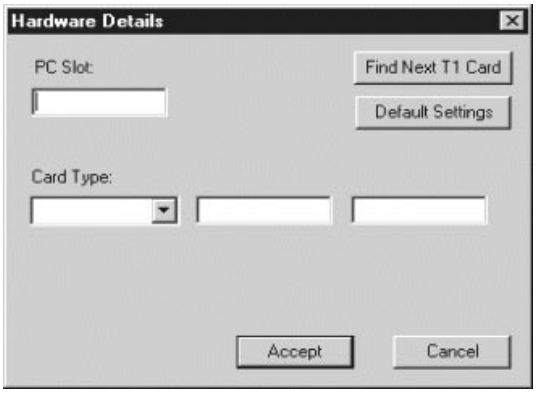
1. At the System Controller, start Windows NT.
2. From the Windows NT desktop, double–click the **AROSHWCf . . .** (hardware configuration) icon:

The AIReach OS software displays the AROS System Management window, shown below:



3. If any AIReach OS applications are running, close them by clicking **Shutdown AROS**.

4. For newly installed cards only, click **Add** to display the Hardware Details window:



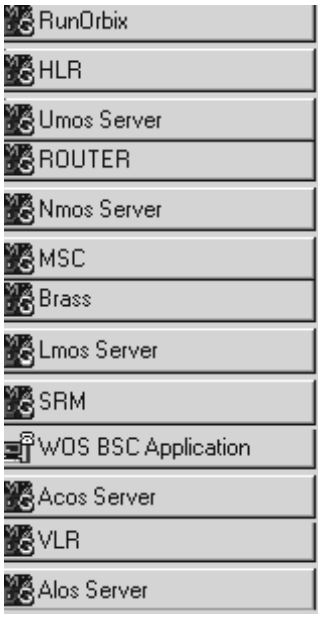
5. For each newly installed card, enter the following information:
   a. Select the Card Type for the new card from the dropdown list.
   b. Enter the PC Slot, PCI Bus, and PCI Slot or Address values specified in the Configuration Report.

      If you click **Find Next T1 Card**, the software locates the next Quad T1 card (not TX2000 or conference cards) and automatically display detected configuration data.
   c. Click **Accept**.
6. Reboot the Controller: Click **Start** → **Shut Down**, select **Restart the computer?**, and click **Yes**.

Verifying the card configuration

After entering information for new cards (Section 2.8), verify the card configuration as follows:

1. As the System Controller becomes operational (after rebooting), several background processes appear on the Windows taskbar. Verify that the AIReach OS software applications are present, as indicated on the Windows taskbar:



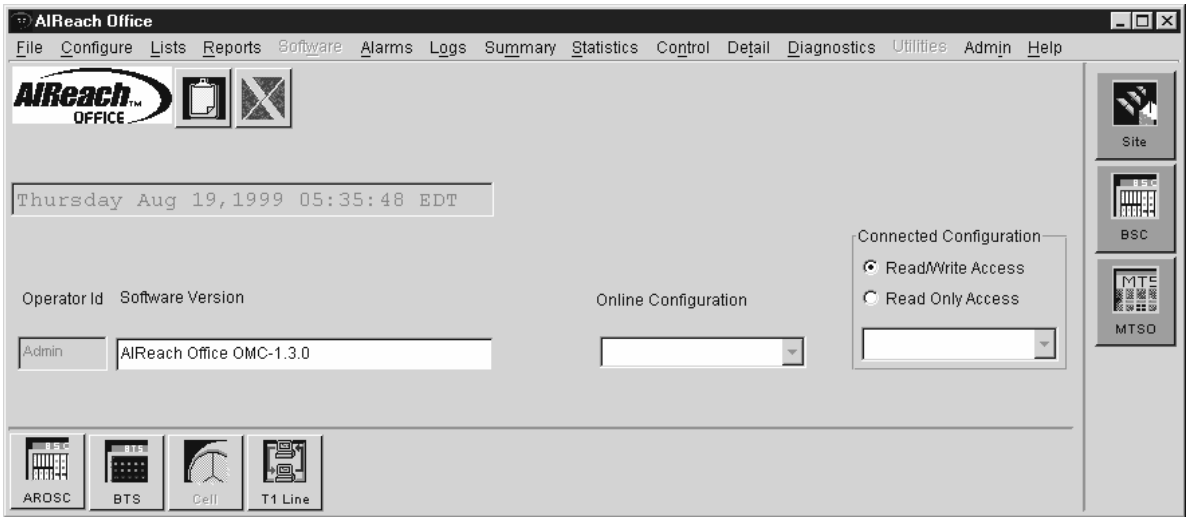
   The taskbar may show other applications in addition to those shown here.

   (The taskbar is shown vertically here, so the labels can be read. Typically, it appears horizontally across the bottom of the screen.)

   If any applications are missing, contact your HNS Installation Manager.

2. Launch the AIReach Office application by double–clicking on the desktop icon labeled AROS Configuration (shown below).

The software displays the AIReach Office banner window shown below and a Login dialog box that shows **AROSC: Localhost**. "Localhost," the default Controller selection, indicates that you are logging onto the local Controller.



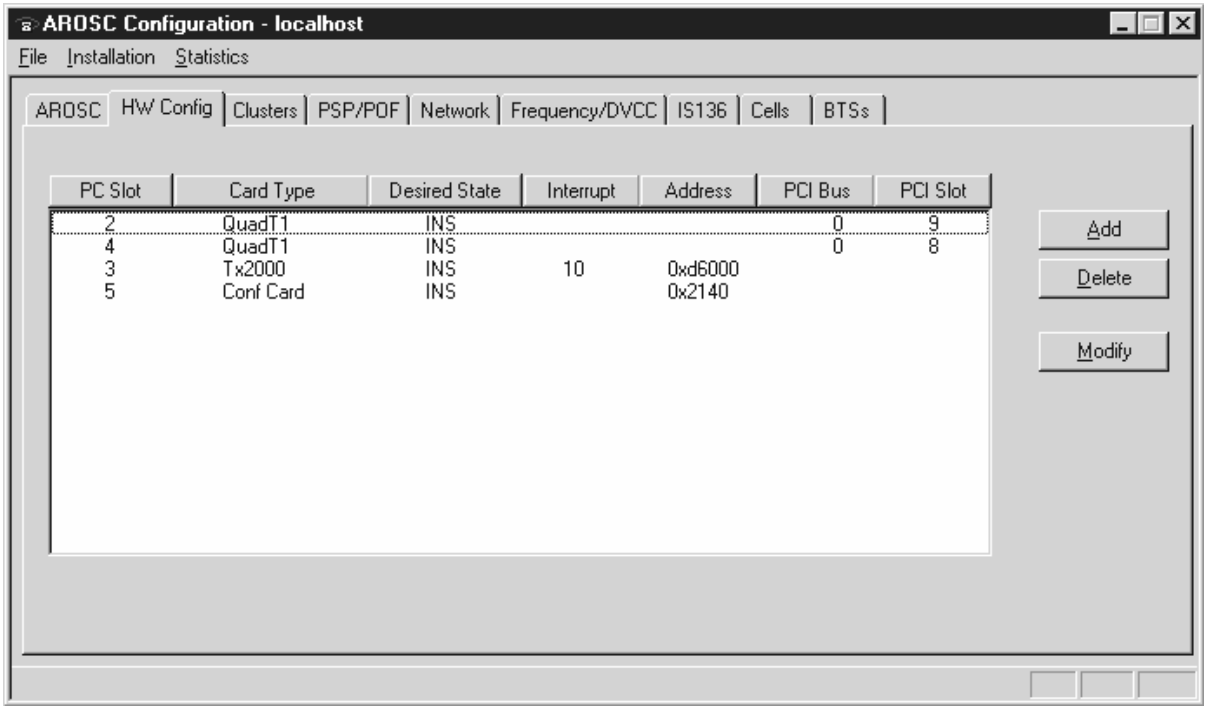
3. In the Login dialog box, enter:

   - The name of the Controller you want to connect to (after AROSC)
   - User name
     (No entry is needed if this field is grayed out.)
   - Password
     The default administrator password is "abc123."

4. Click **Connect**.
   The Login dialog box disappears.

5. After you successfully log in, change the administrator password: Click **File** → **Change Password**, and enter a password.

6. From the AIReach banner window main menu, select **Configure → BSC Configuration**.
7. Click the **HW Config** tab to display the AROSC Configuration window shown below.

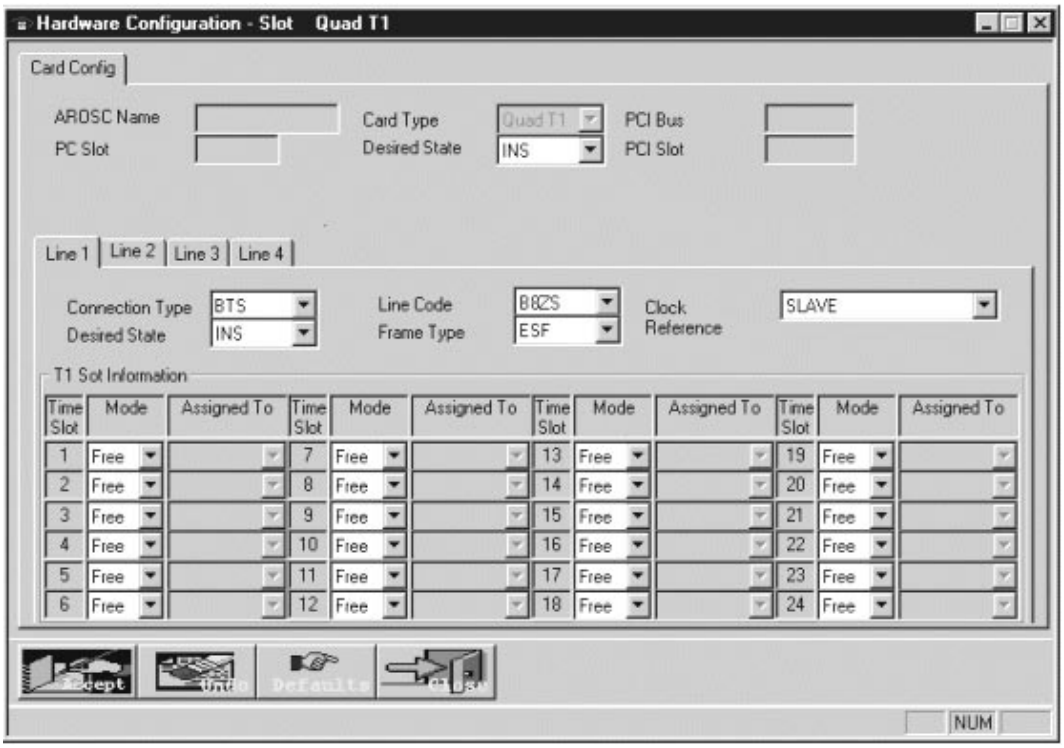


8. If any installed cards are not listed, click **Add** to add the card(s).
9. The AIReach OS software prompts you to enter the type of card you want to add.

   After you enter the appropriate information, the software displays a configuration window for the type of card you indicated.
10. To add:
    - A Quad T1 card, go to step 11.
    - A TX2000 or conference card, go to step 14.

Adding a Quad T1 card

If you specified a Quad T1 card (in step 9), the software displays this window, which shows parameters for configuring the Quad T1 card:

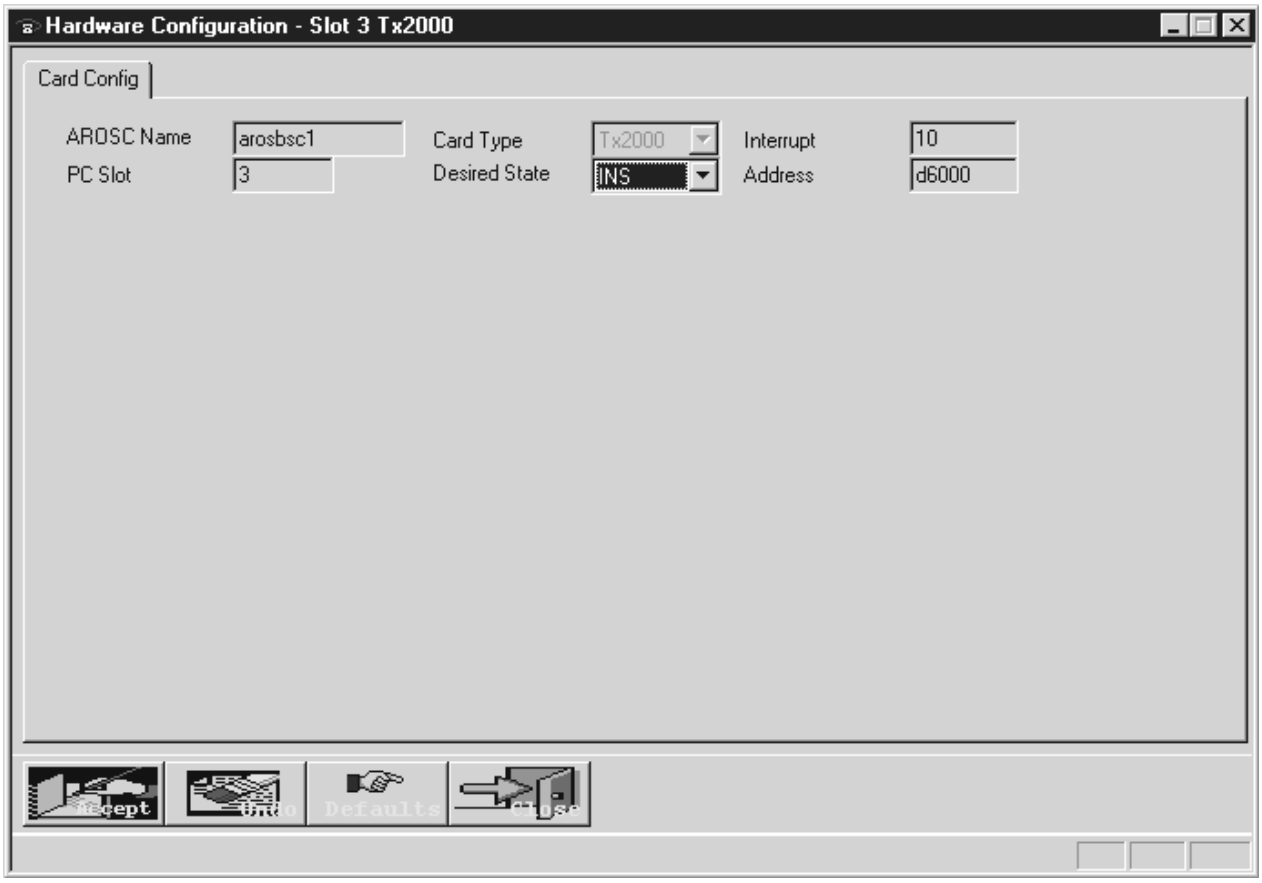


11. For each T1 line (Line 1, Line 2 . . .), verify or select the following values:
    - PC Slot: Slot where the card is installed.
    - Connection Type: **BTS** or **PBX**. Set according to whether a BTS or PBX will be connected to the line. If initially there will be no connection to a line, select **BTS**.
    - Desired State: **INS** (in service).
    - Line Code: **B8ZS**.
    - Frame Type: **ESF**.
    - Clock Reference: **SLAVE**, **MASTER_EXTERNAL**, or **BACKUP**.

      Set all lines configured as BTS Connection Type to **SLAVE**. Set one (and only one) PBX connection on the Controller to **MASTER_EXTERNAL**. If a second PBX connection is present, set it to **BACKUP**. Set an other PBX connections to **SLAVE**.
    - T1 Time Slot: All T1 slots should be set to **Free**.
12. Click **Accept** to save the information.
13. After adding cards or modifying any settings under the HW Config tab, click **Start** → **Shut Down** to reboot the Controller.

Adding a TX2000 or conference card

If you specified a TX2000 card or conference card (in step 9), the software displays this window, which shows parameters for configuring the TX2000 card or conference card:



14. Select the TX2000 or conference card from the Card Type dropdown list.
15. Verify the displayed values.
16. Select **INS** from the **Desired State** menu.
17. Click **Accept** to save the information.
18. After adding cards or modifying any settings under the HW Config tab, click **Start** → **Shut Down** to reboot the Controller.

Chapter 3

Installing the Controller

This chapter includes the following topics:

The AIReach OS System Controller, monitor, and associated components are typically installed in a rack. *All cards must be installed in the System Controller before the Controller is installed in the rack.*

To install cards in the Controller, see *Chapter 2.*

For verification information and procedures, see *Chapter 4.*

Rack–mount configuration

Mount the System Controller, monitor, and keyboard (with touchpad) on an available 19–inch rack, as shown in Figure 3-1 .

Optionally, a UPS, power distribution tray, patch panel, and CSU tray can be mounted on the same rack. (These components are also shown in Figure 3-1.)

WARNING

The AIReach Office System Controller can weigh in excess of 50 pounds. To avoid personal injury or damage to equipment, follow these precautions:

- **Do not attempt to move or install the System Controller by yourself. Two people are required for these tasks.**
- **If the System Controller will be rack mounted, secure the rack to the floor or wall so the rack cannot fall.**

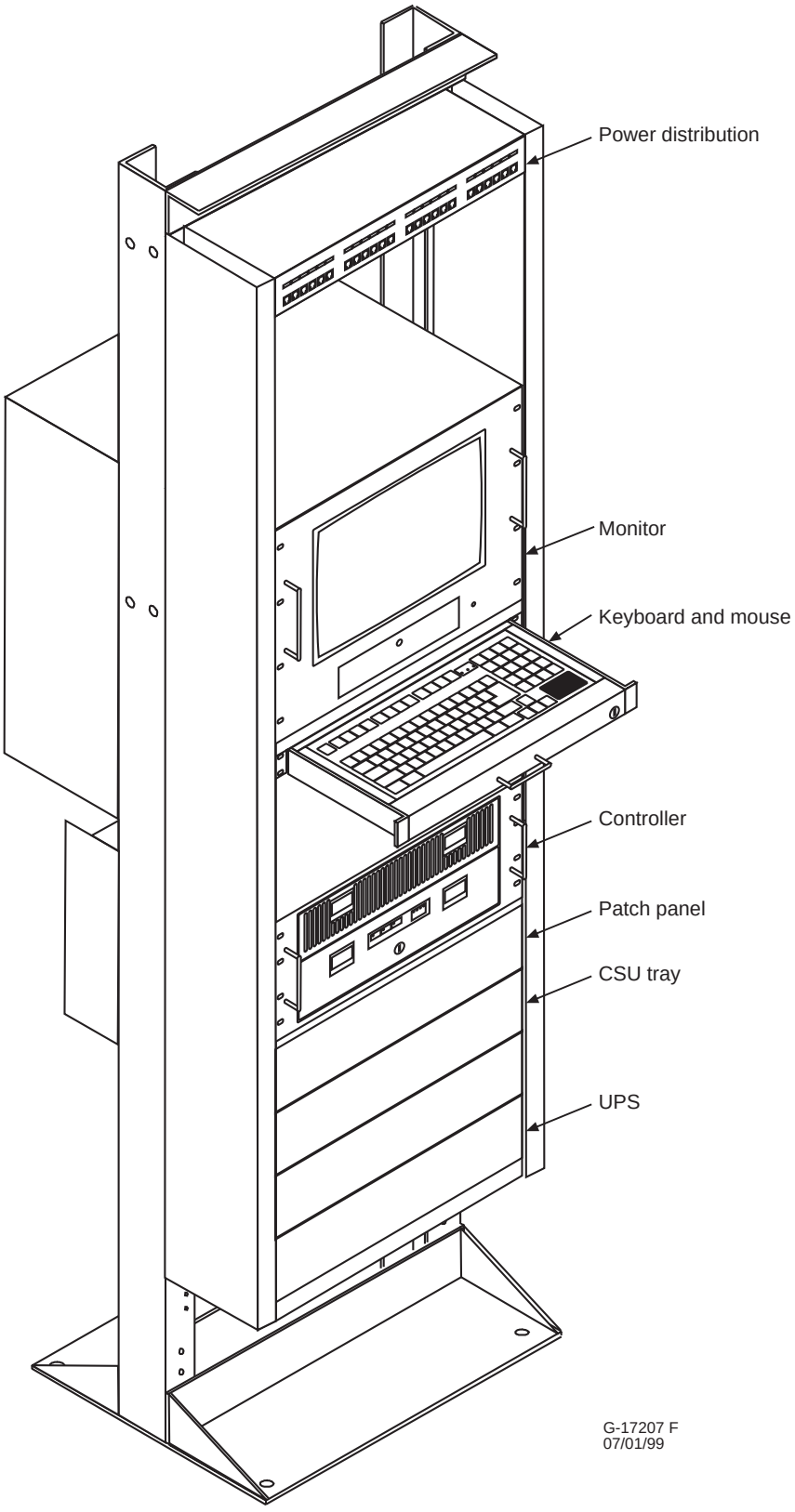


Figure 3-1 System Controller and associated components in a 19–inch rack (typical installation)

Mounting the Controller chassis

Mount the System Controller chassis to the rack as follows:

1. Choose a location in the rack that allows easy access to the monitor, keyboard and rear of the Controller.
2. Position the Controller on the vertical side rails of the rack.
3. Secure the Controller to the front of the rack using the eight provided mounting screws. See Figure 3-2, which shows the screw holes on each side of the chassis (front).

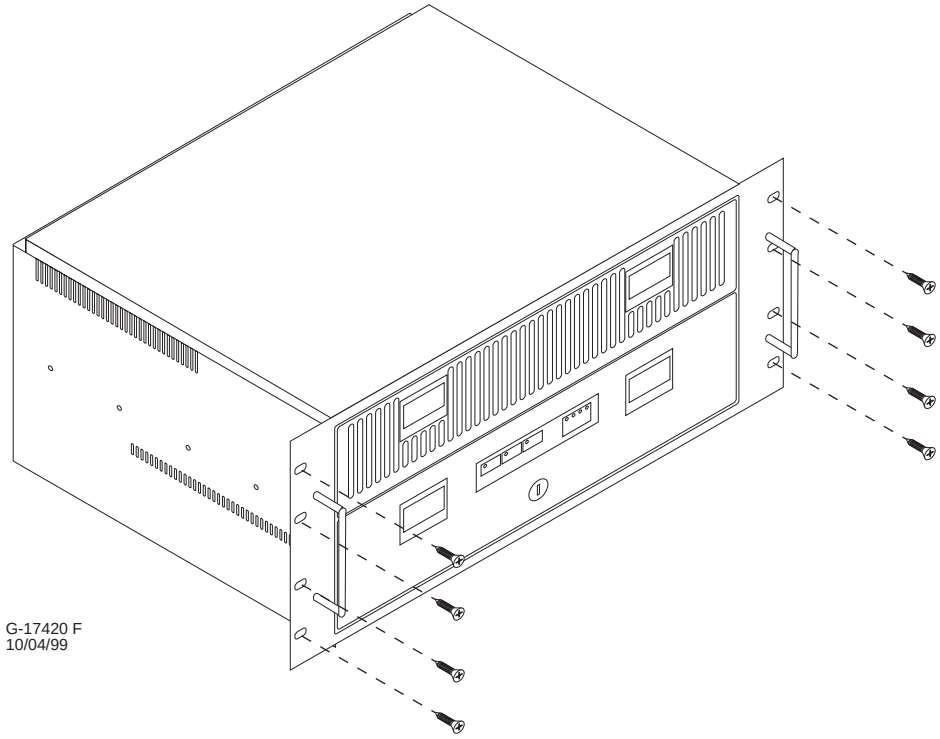


Figure 3-2 Installing the chassis

4. Tighten the mounting screws.

Controller cabling

After mounting the components in the rack, connect the keyboard, monitor, touchpad cables, and printer (if used) to the ports shown in Figure 3-3:

1. Connect the monitor video cable to the video port on the rear of the single board computer (SBC) (slot 12).
2. Connect the touchpad to the mouse port on the rear of the SBC card.

   The touchpad and keyboard cables split off from a single cable. The connectors on these cables are identified by symbols that look like a computer mouse and a keyboard.
3. Connect the keyboard cable to the port on the left rear of the System Controller.
4. If your configuration includes a printer (optional), connect the printer to the parallel port (slot 11).

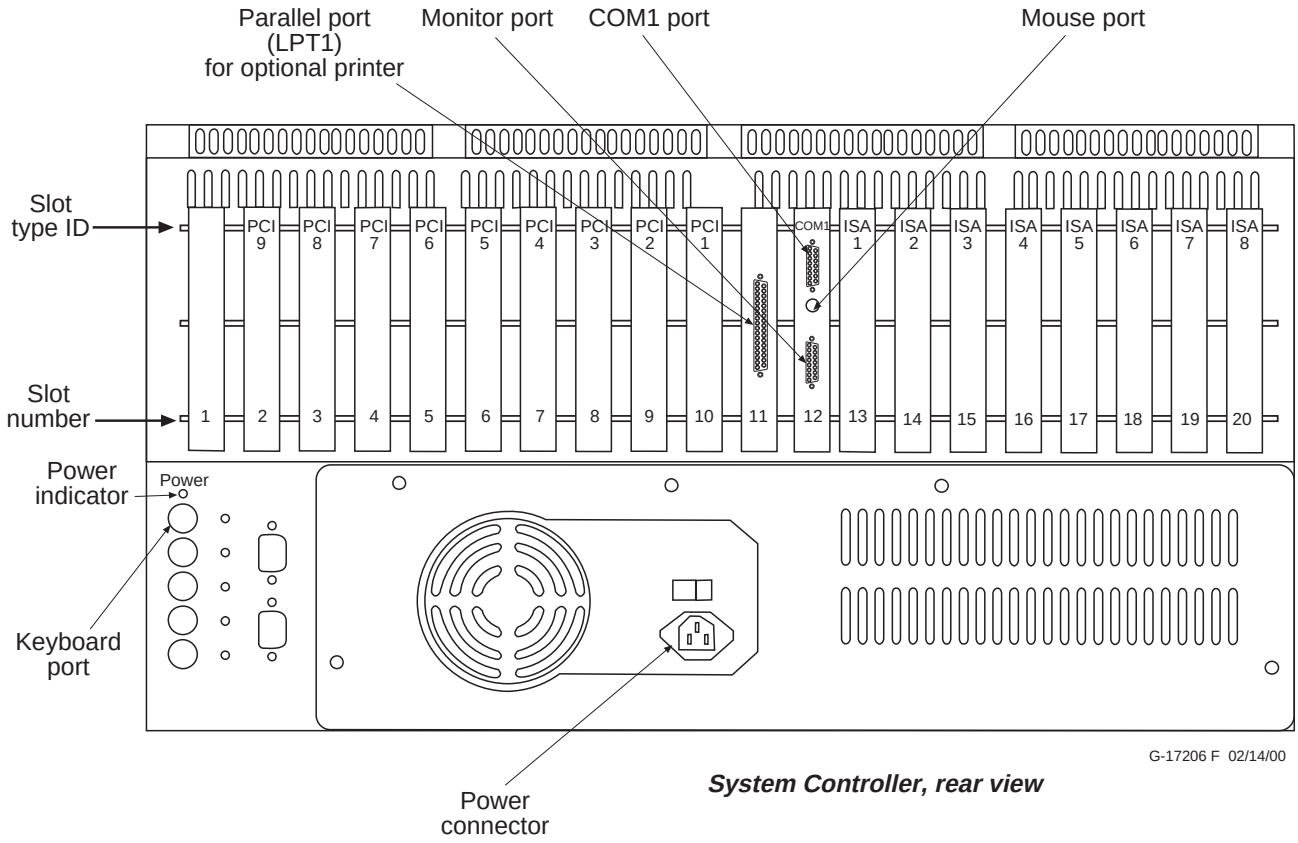


Figure 3-3 System Controller connectors for monitor, keyboard, touchpad, and power

5. Provide power to the monitor and System Controller (110 Vac, 60 Hz). Figure 3-3 shows the Controller power connector.
6. Verify that the System Controller power indicators are lit.

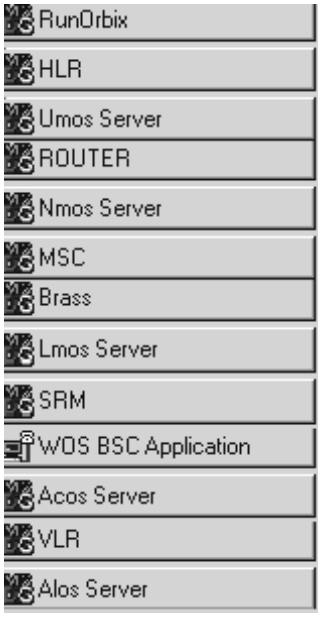
   The power indicators on the front and rear of the Controller are on only if power is connected to the Controller *and* the front panel power switch is on.

3.4 Checking System Controller operation

To check System Controller operation:

1. Power on the System Controller.
2. Verify that the Controller successfully boots up. You should see the Windows NT desktop on the monitor, with no error messages.

   If the Controller does not boot, make sure all cards in the Controller are properly seated.
3. Verify that the keyboard, touchpad, and monitor are operational.
4. As the System Controller becomes operational, several background processes appear on the Windows taskbar. Verify that the AIReach OS software applications are present, as indicated on the Windows taskbar:



   The taskbar may show other applications in addition to those shown here.

   (The taskbar is shown vertically here; typically, it appears horizontally across the bottom of the screen.)

System cabling

For information on system cabling, see the *Site Preparation Manual (1026208–0001).*

Chapter 4

Verifying the System Controller configuration

After the System Controller has been unpacked, configured with hardware (cards), and installed, verify the configuration as explained in the following sections:

4.1

Data required

To verify the System Controller configuration, the following data must be available before you begin:

- Password (administrator level password used to access the computer)
- IP address for:
  - System Controller (or whether DHCP server assigns it)
  - IS–41 gateway
  - optional second LAN card, if used
- IS–41 gateway socket number
- DNS (domain name servers) IP addresses
- Subnet mask
- Gateway for the subnet on which the System Controller resides
- System identification (SID)
- Public system identification (PSID)
- System operator console (SOC)

Verifying the System Controller configuration

To verify the System Controller configuration, you use the AIReach Office Operation and Maintenance Center (OMC) software, as explained below. The OMC software runs on the System Controller, under Microsoft Windows NT.

Important: For configuration values to enter in the AIReach OS software windows, see the site–specific *AIReach Office Configuration Report*. References to *specified* values or parameters in this manual refer to values and parameters specified in the *Configuration Report*. For values not listed in the *Configuration Report*, use the default values shown in the software or specified in these instructions.

Controller (BSC) configuration windows are available to only one user (local or remote) at a time.

Verifying the site information

Starting from the Windows NT desktop, verify the site information as follows:

1. Launch the AIReach Office application by double–clicking on the traffic light icon labeled AROS Configuration, shown below.

   The software displays the AIReach Office banner window and a Login dialog box.

   If the application is already running, click its button on the Windows taskbar (and skip step 2).

2. In the Login dialog box, enter:

   - System to log into

     To use the local Controller, leave the default, **`Localhost`**, after AROSC.

   - User name

     (No entry is needed if this field is grayed out.)

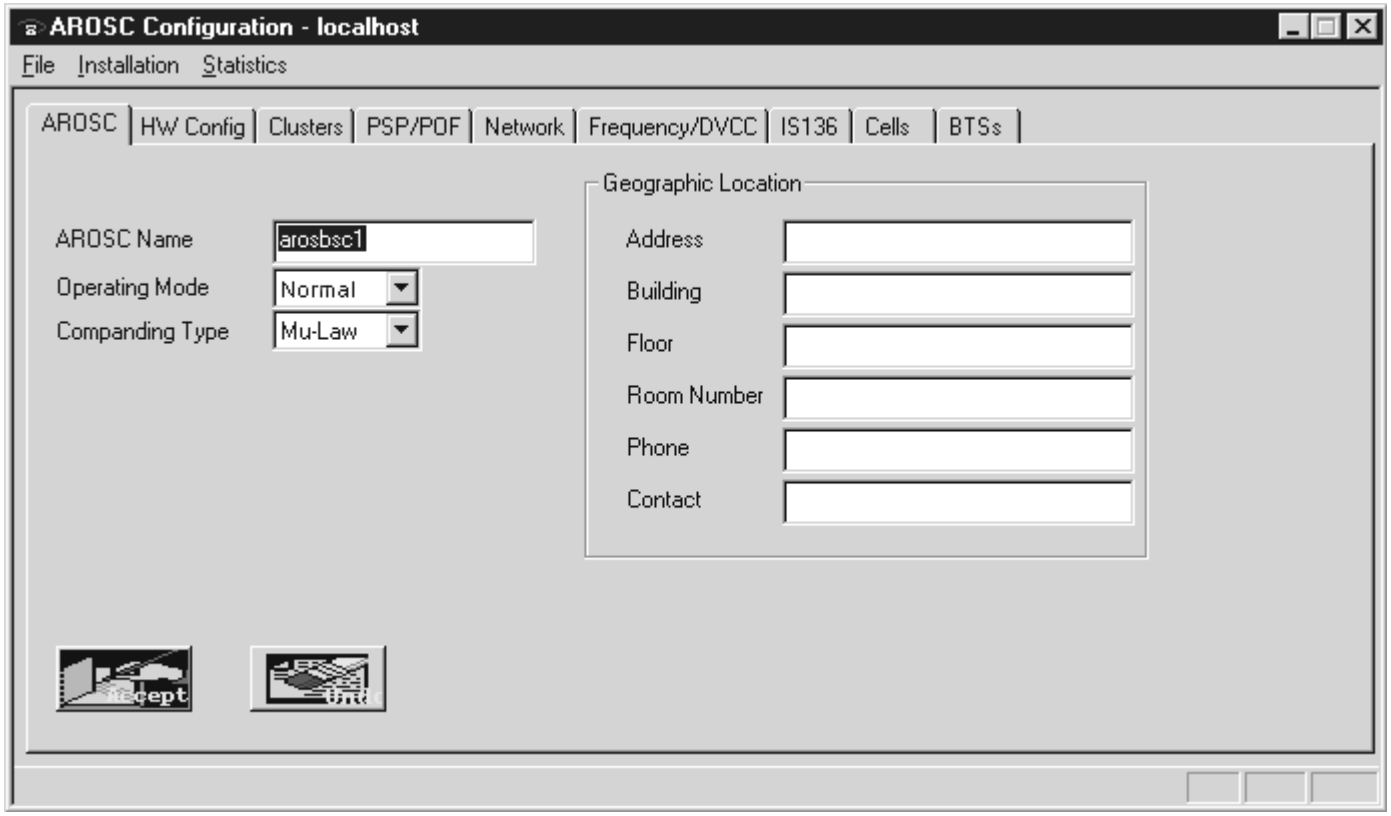
   - Password

     The default administrator password is “abc123.”

3. Click **Connect**.

4. After you successfully log in, change the administrator password if you have not already done so: Click **File** → **Change Password**, and enter a password.

5. Select **Configure** → **BSC Configuration** from the AIReach Office banner to display the main AROSC Configuration window, shown below.



6. Verify the following information:
   - AROSC Name

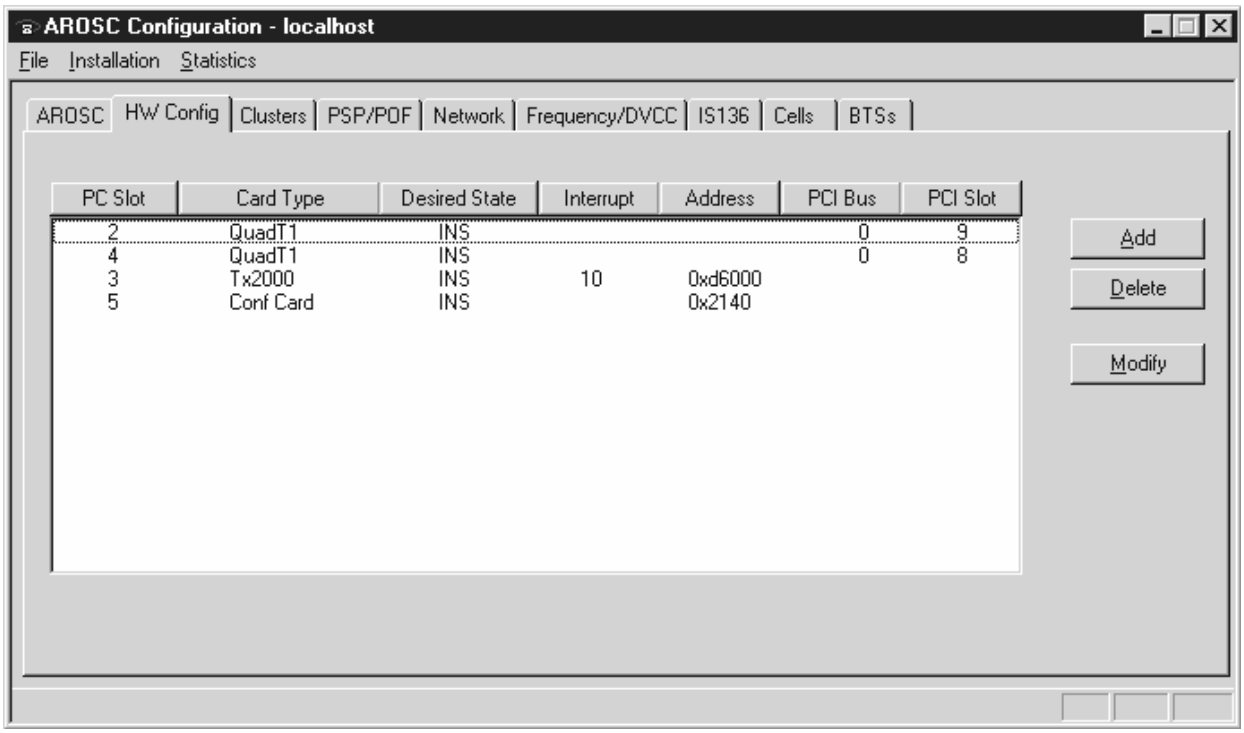
     Verify that the AROSC Name matches the name assigned to the Controller by clicking **Start** → **Settings** → **Control Panel** → **Network** → **Network ID**.

     Do not change the AROSC Name unless the TAC instructs you to do so.
   - Operating Mode: Normal
   - Companding Type: Mu–Law
7. Enter the **Geographic Location** information; then click **Accept**.

Verifying the card information

Verify the card information for each card that is installed in the System Controller.

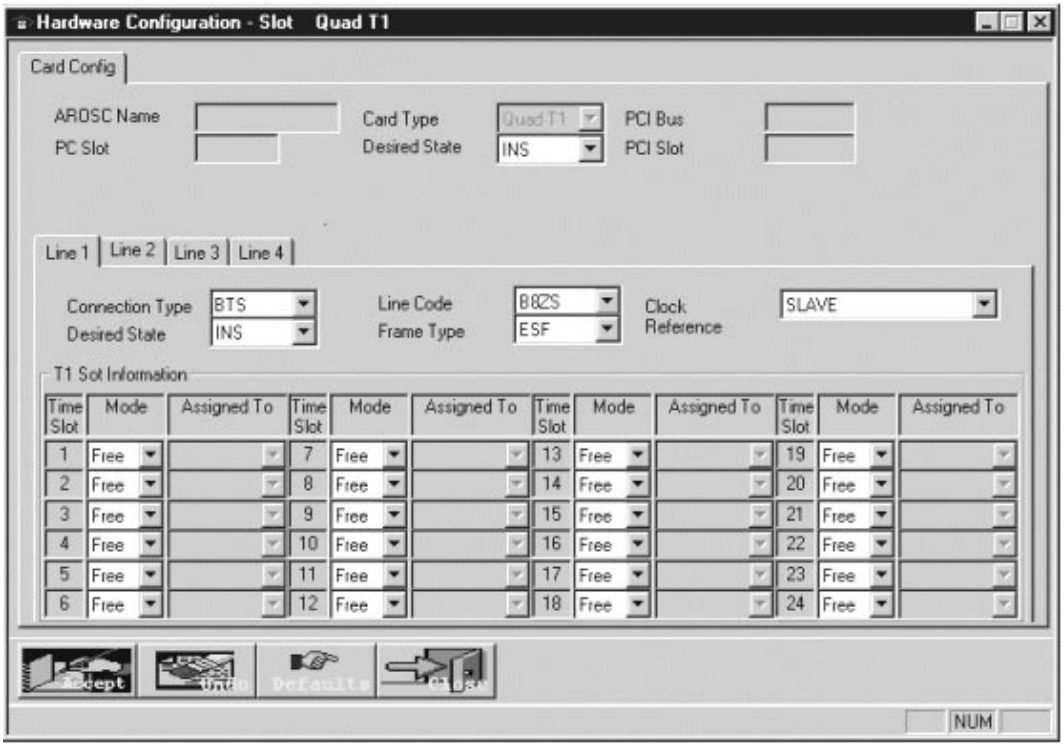
1. Click the **HW Config** tab to see information for the installed cards:



2. Verify that the cards installed in the Controller are configured for the specific site.

   At least one Quad T1 card, one TX2000 card, and one conference card must be listed.

3. Select (highlight) the first Quad T1 card and double–click on the card name to display the Hardware Configuration window.



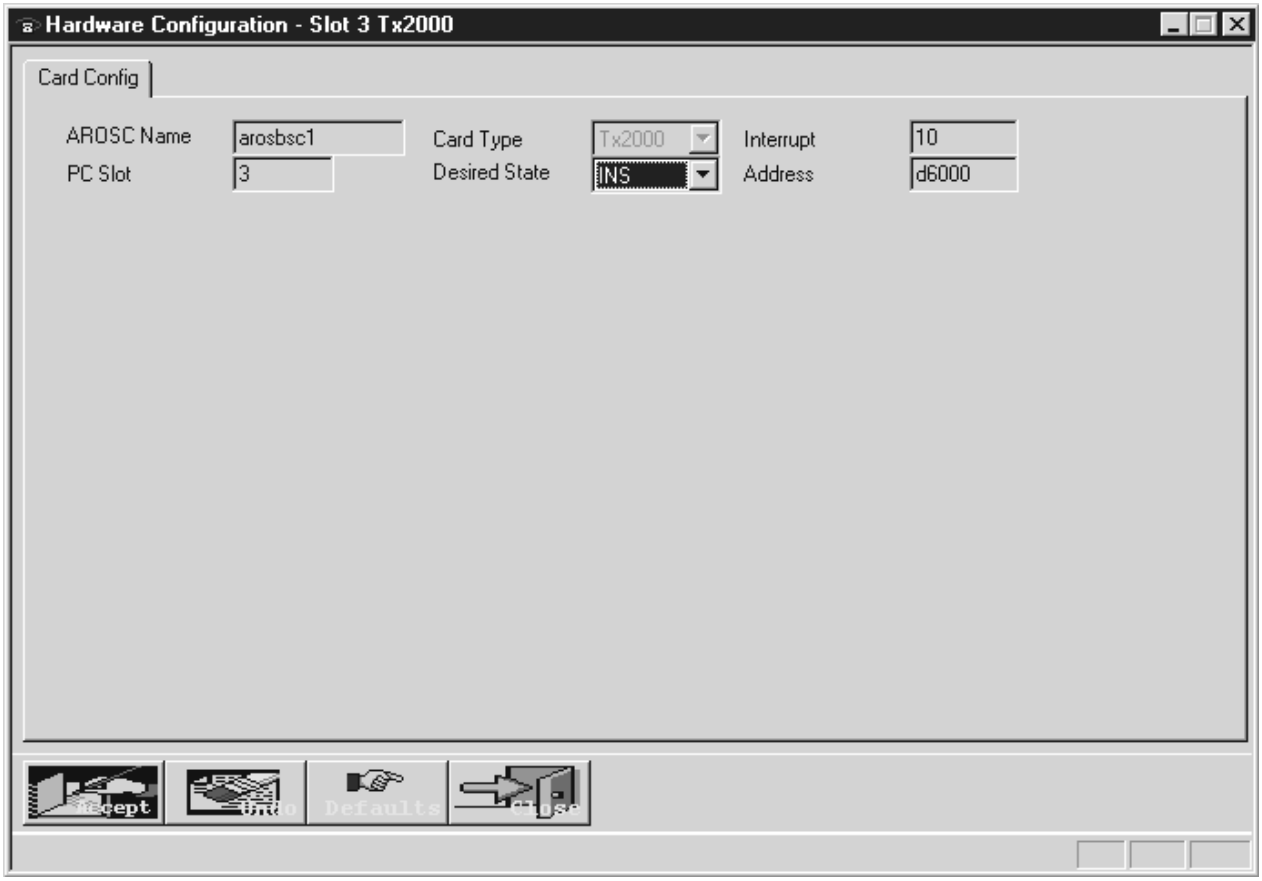
4. Select the **Line 1**, **Line 2**, **Line 3**, and **Line 4** tabs, in order, and verify the displayed information.

   Select SLAVE clock reference for all line numbers *except* those connected to the PBX.

   For the Quad T1 port connected (or to be connected) to the PBX, set the Clock Reference to MASTER_EXTERNAL.

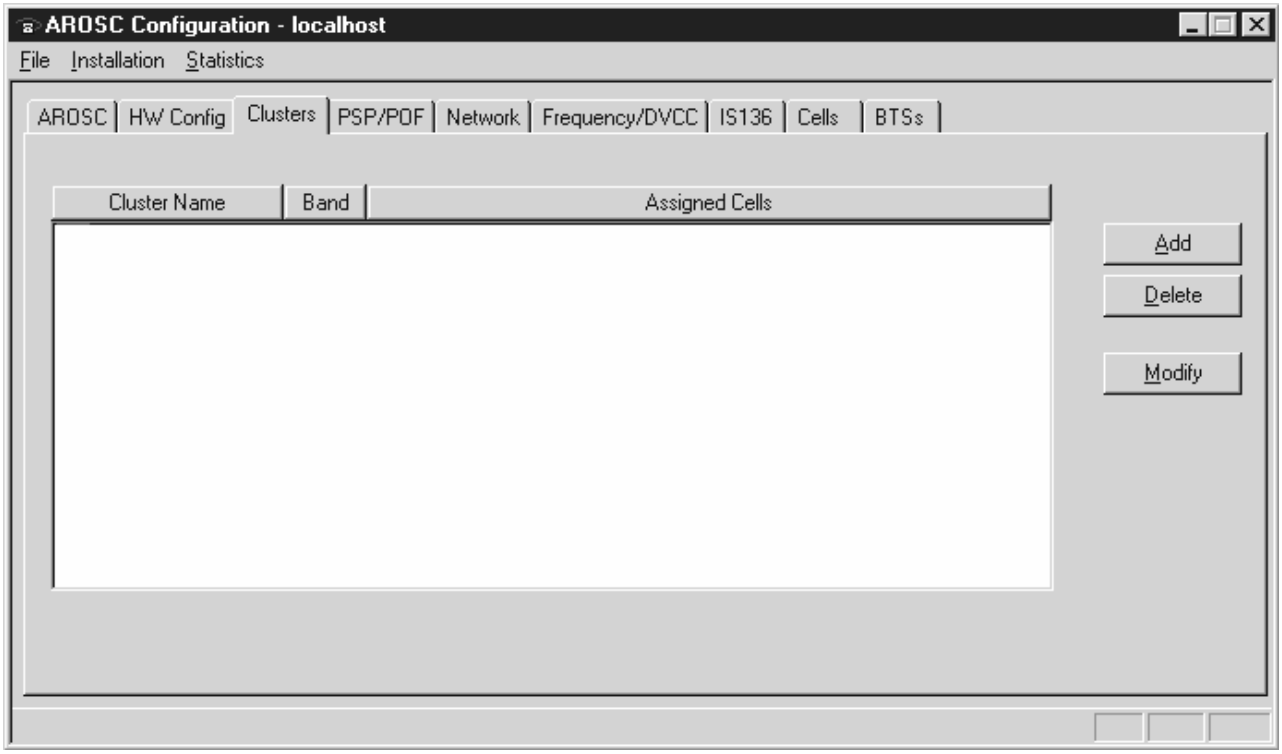
   A second PBX connection can be set to BACKUP. Set any additional PBX connections to SLAVE.
5. Click **Accept**.
6. For each additional Quad T1 card, repeat steps 3 through 5 to verify the information for all T1 lines.
7. Click **Close** to return to the AROSC Configuration window.

8. Highlight the TX2000 card and double–click to display the Hardware Configuration window.
9. Verify the **Desired State**—**INS** (in service); then click **Accept**.



10. Highlight the conference card and double–click to display the Hardware Configuration window.
11. Verify the **Desired State**—**INS** (in service); then click **Accept**.

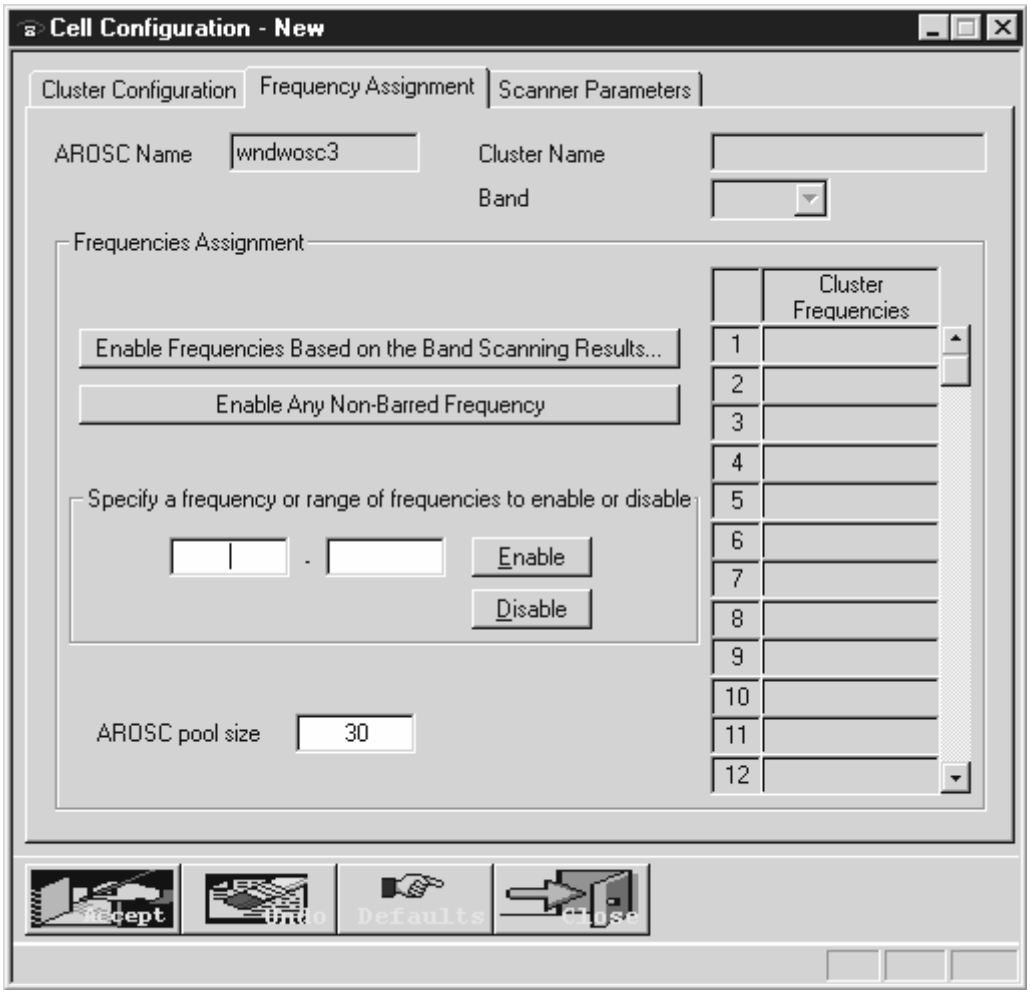
12. In the AROSC Configuration window, click the **Clusters** tab.



13. If the specified clusters are not listed, click **Add** to display the Cell Configuration – New window:

14. Enter the specified cluster name.
15. Select the band to use from the Band dropdown list, and click **Accept**.

16. Select the **Frequency Assignment** tab.



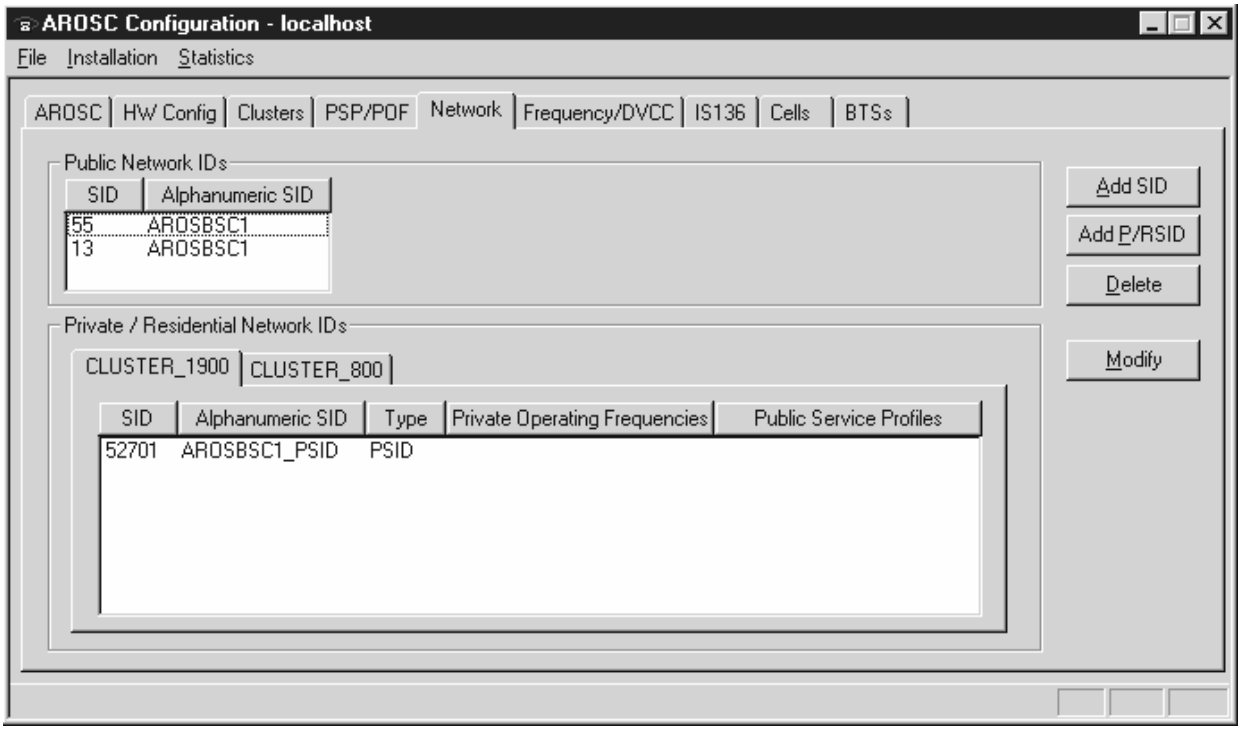
17. If no channels are listed in the Cluster Frequencies column (values are channels, not frequencies):
    a. For the specified band, enter the start channel in the left box and the end channel in the right box below "Specify a frequency or range . . . "
    b. Click **Enable**.
    c. Enter AROSC pool size: 30
    d. Click **Accept**.
18. Click the **Scanner Parameters** tab.
    (The screen for this tab is not shown.)
19. Verify or enter the specified values, and click **Accept**.
20. Close the Cell Configuration – New window.

Verifying the Network data information

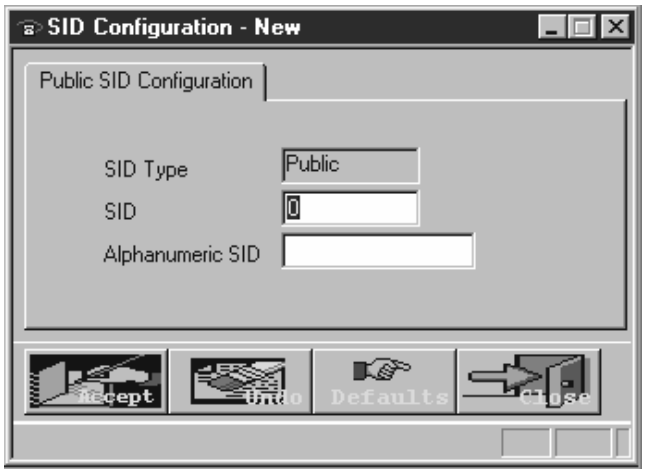
Configure or verify the information for the network data.

For all configuration windows shown or referred to through the end of this chapter, do not change default information unless you are instructed to do so in this manual or by the RF engineer.

1. In the AROSC Configuration window, click the **Network** tab to display the window shown below.



2. If the SID (system identification) is not displayed, click **Add SID** to display the SID Configuration – New window.



3. Enter the SID and alphanumeric SID for the macro–cellular provider in the region; then click **Accept**.

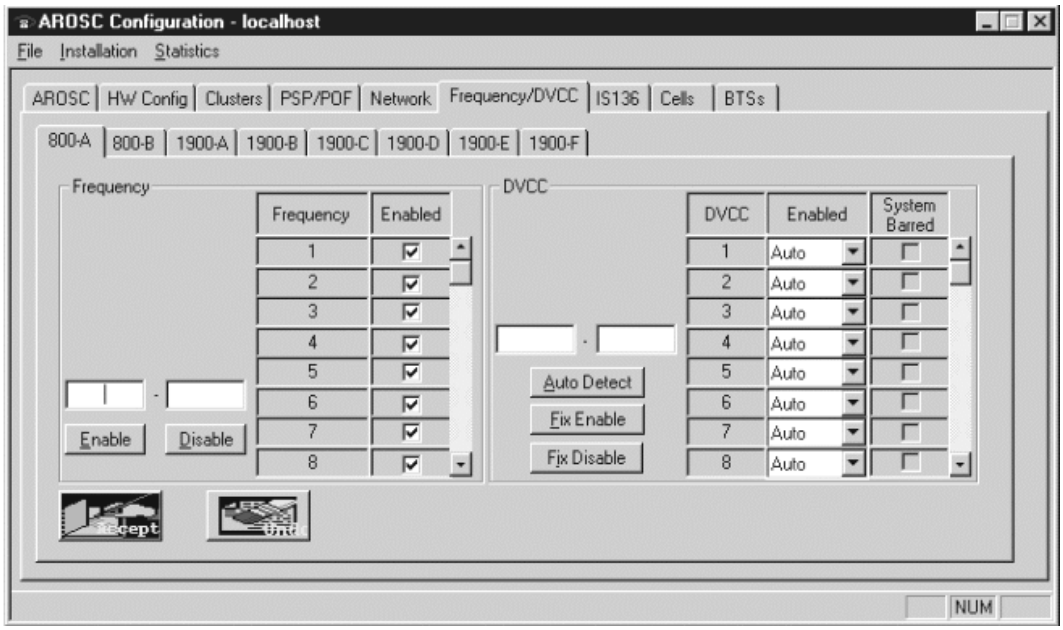
4. If the PSID (public system identification) is not displayed for the cluster, click **Add P/RSID**.

   Make sure all AIReach Office clusters are assigned the same PSID value.

5. Enter the specified PSID information for each cluster and click **Accept**.

6. Click **Close** to return the AROSC Configuration window.

7. Click the **Frequency/DVCC** tab; then click the tab for the specified band (800–A in the example below) to display the window illustrated below:



8. Verify that all Frequency values (channels) are enabled (box checked).

   If the Frequency values are not enabled:

   a. Enter the start channel value in the left Frequency window and the end channel value in the right Frequency window.

   b. Click **Enabled**.

Note

In the PCS bands (1900 MHz), channels 1000 and above are not available and must be disabled.

9. Click the **IS136** tab (not shown) to display the AROSC configuration window.
10. Click the **Network Parameters** tab.
11. Verify the Service Operator (SOC) and Mobile country information; then click **Accept**.

12. Click the **Mobile Call Control** tab.
13. Verify the information displayed; then click **Accept**.

14. Click the **AROSC Services** tab.
15. Verify the information displayed; then click **Accept**.

16. Click the **Call Control** tab.
17. Verify the information displayed; then click **Accept**.

18. Click the **Registration Control** tab.
19. Verify the information displayed; then click **Accept**.

20. Click the **Timers** tab.
21. Verify the information displayed; then click **Accept**.
    Use the scroll bar to view all timers.

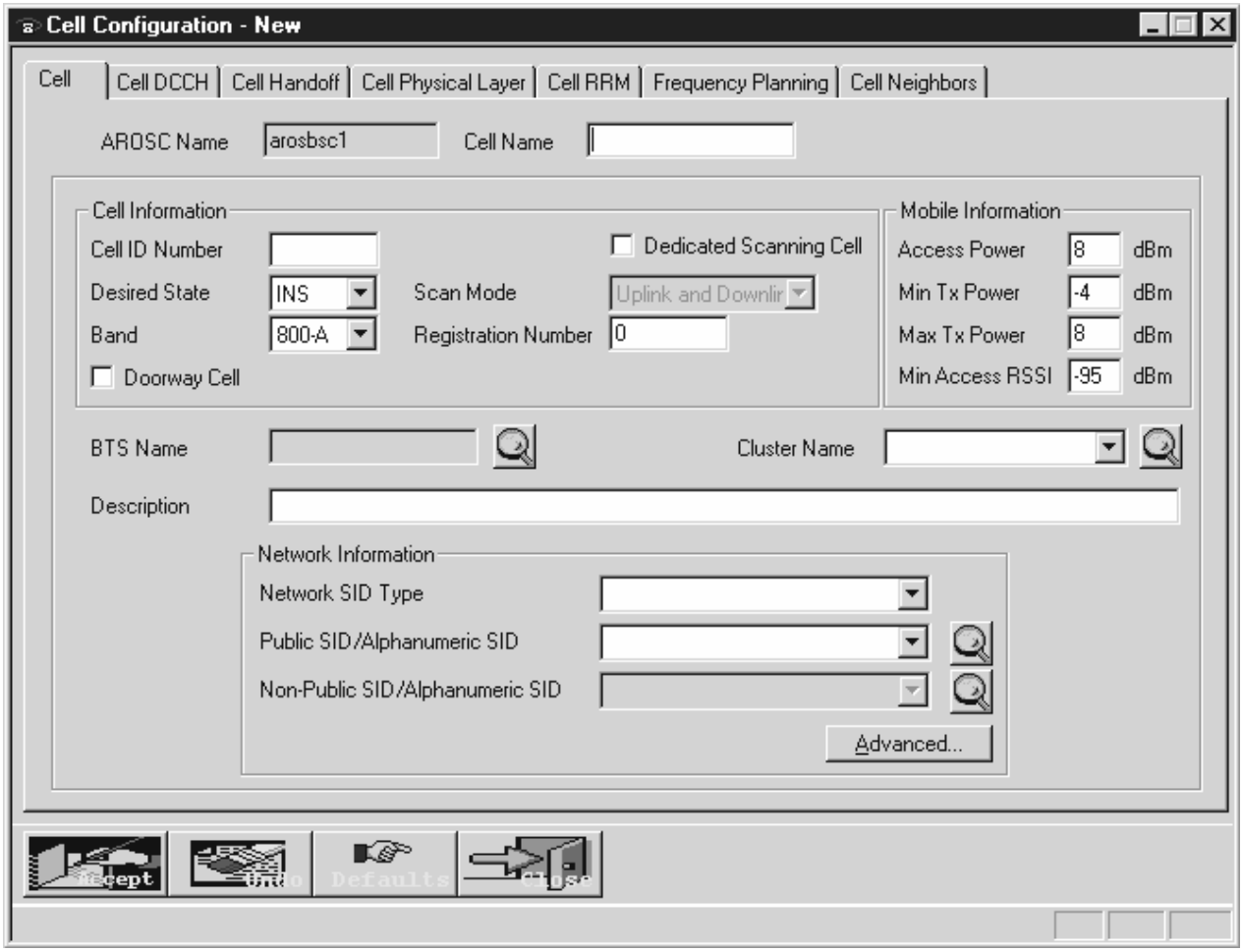
Verifying the Cell information

Cell information is configured to provide the Controller with data for each picocell's DCCH, handoff, physical layers, RRM, and the dedicated scanning picocell.

To configure the picocell information:

1. Click the **Cells** tab.

   (The window displayed—not shown here—may or may not contain data.)
2. Click **Add** to display the Cell Configuration – New window.



3. Enter the data for the scanning picocell.
4. Make sure there is a check mark in the **Dedicated Scanning Cell** box.
5. Click **Accept**.

6. Click **Close** to return to the AROSC Configuration window. The scanning picocell you added should now be listed.

7. Click **Add** to display the Cell Configuration – New window.
8. Enter the required data for a traffic picocell.

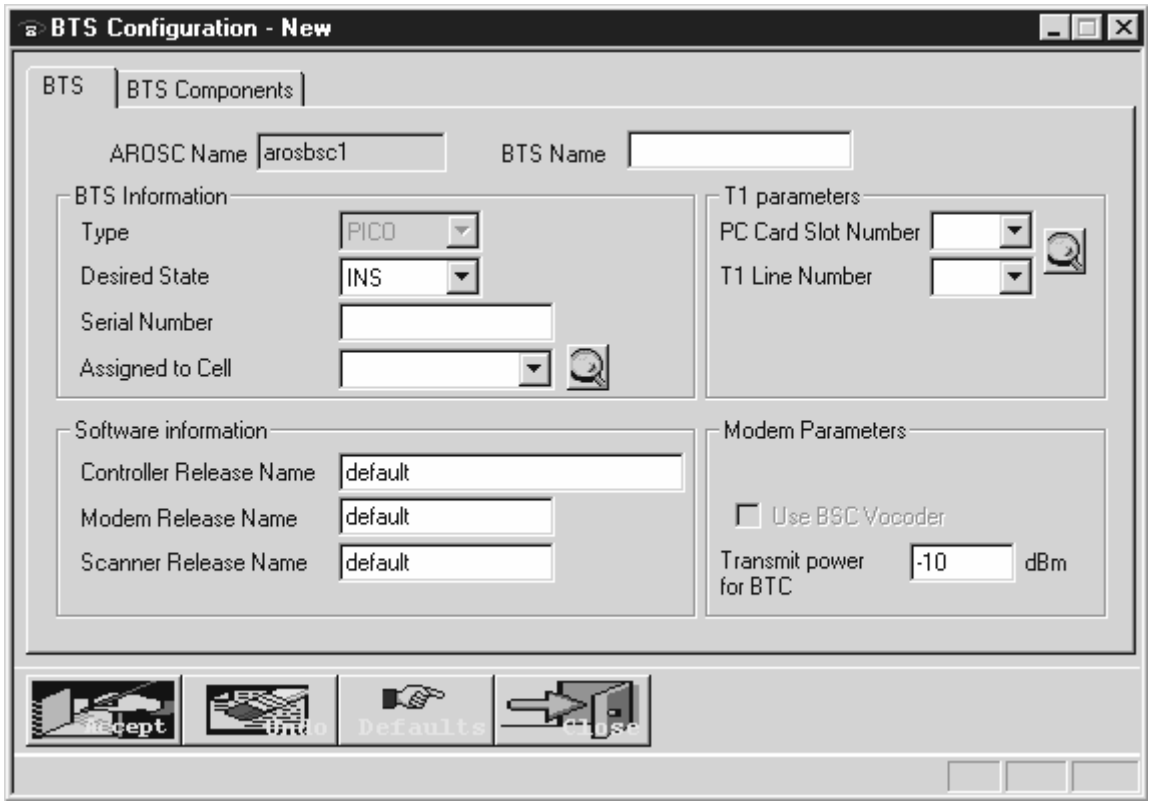
9. Click the **Cell DCCH** tab. Verify the information displayed.
10. Click the **Cell Handoff** tab. Verify the information displayed.
11. Click the **Cell Physical Layer** tab. Verify the information displayed.
12. Click the **Cell RRM** tab. Verify the information displayed.
13. Click **Close** to return to the AROSC Configuration window.

    If you made changes, the software prompts you to accept them.
14. Repeat steps 7 through 13 until all traffic picocells are listed in the AROSC Configuration window (**Cell** tab).

Verifying the BTS information

To provide the System Controller with the BTS information, follow these directions:

1. Click the **BTSs** tab.
   (The BTSs window may or may not contain data.)
2. Click **Add** to display the BTS Configuration – New window.
3. Enter or verify the information for the scanning picocell.



When you enter the serial number (from the label on the back of each picocell), ***you must enter the serial number exactly as it appears on the label*—as indicated in figure 4-1.** If the serial number is entered incorrectly, the picocell may not operate correctly.

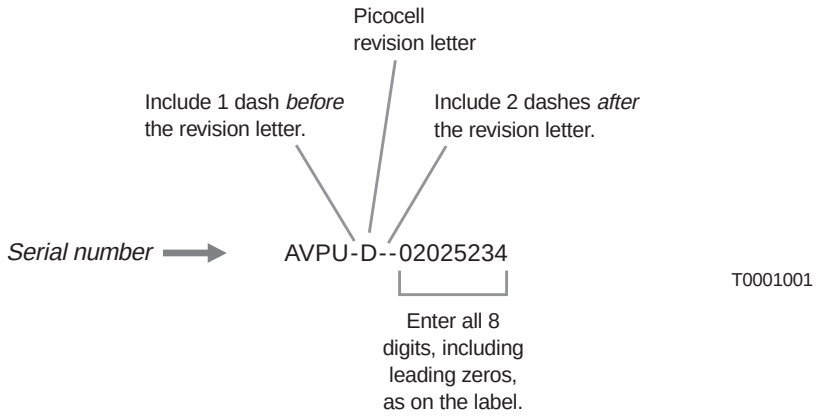
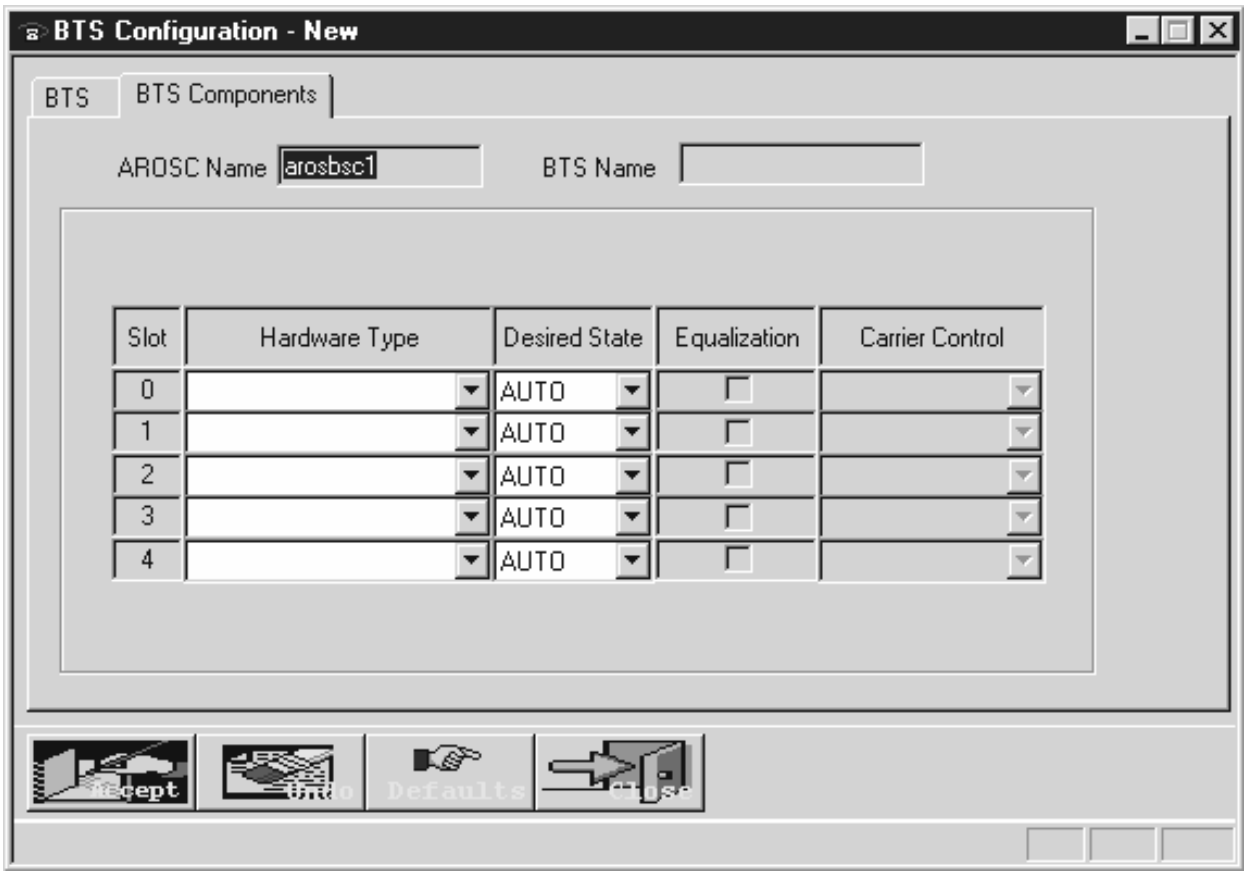


Figure 4-1 Recording and entering the serial number from the back of the picocell

4. When you have verified all data in the BTS Configuration – New window. click **Accept**.

5. Click the **BTS Components** tab.
6. Enter or verify the information for the BTS components. The Desired State for all slots should be set to **AUTO**.
7. Click **Accept**.
8. Click **Close** to return to the AROSC Configuration window.

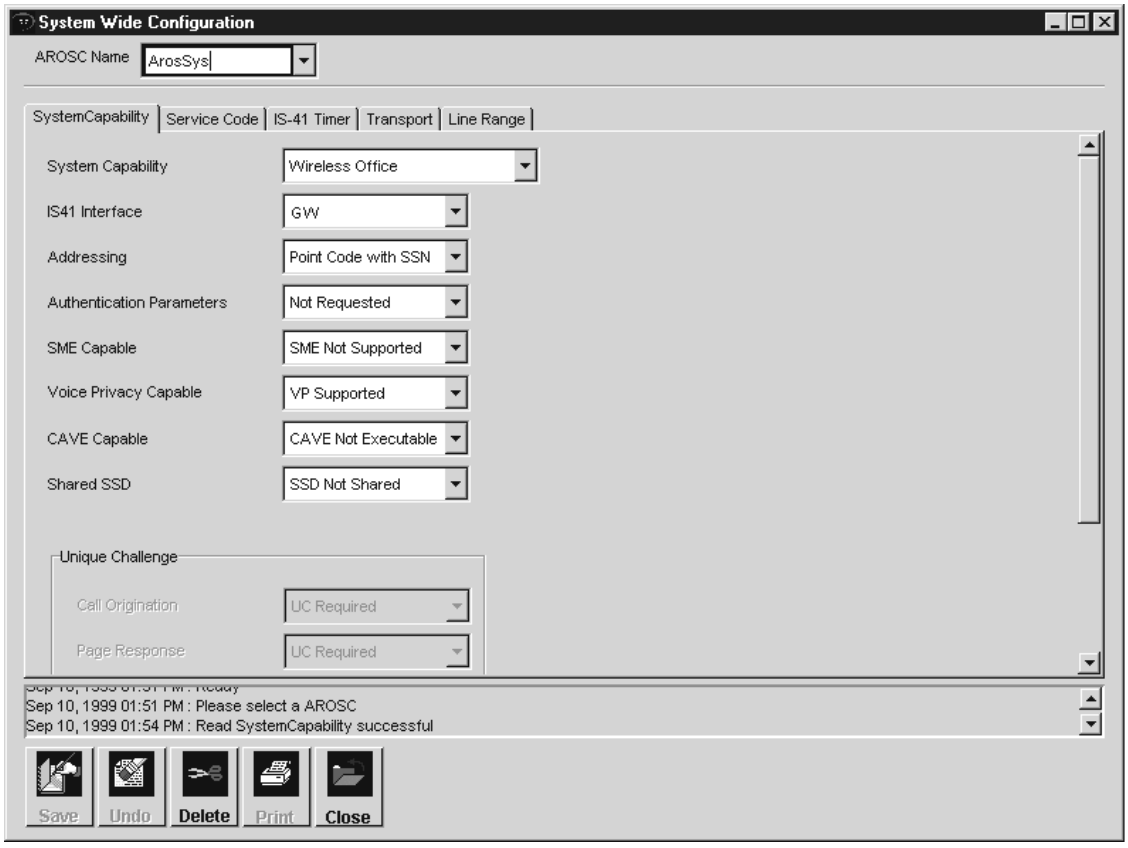


9. Repeat steps 1 through 5 until all traffic picocells are listed in the AROSC Configuration window (**BTSs** tab).
10. Minimize the AROSC Configuration window to return to the AIReach Office window.

Verifying the systemwide configuration

To verify the systemwide configuration:

1. From the AIReach Office banner menu, select **Configure** → **NSS** → **Systemwide** to display the System Wide Configuration window.
2. Click the **System Capability** tab.



3. Select the specified **AROSC Name** from the dropdown list.
4. Enter or verify the system capability information.

   The default selection for IS41 Interface is **GW** (gateway). If you change IS41 Interface to **SS7**, check all parameters to make sure they are set correctly for an SS7 interface.
5. Click **Save**.

Notes

The customer may provide updated information at the time of installation.

In the following steps, if you have not entered or changed any information, you do not need to save; you can go on to the next tab.

6. Click the **Service Code** tab.

   The Service ID should display **Emergency**. The customer may provide updated information during the time of installation.
7. Enter or verify the information; then click **Save**.

8. Click the **IS–41 Timer** tab.
9. Enter or verify the information; then click **Save**.

10. Click the **Transport** tab.
11. Enter or verify the information for the **WOS to Gateway Server Address** and **Server Port** values; then click **Save**.

12. Click the **Line Range** tab.
13. Verify the Line Range values.
14. *If you need to modify the Line Range values:*
    a. Click **ADD**.
    b. Check the Enabled box so you can enter values for HLR Point Code, mobile phone Begin NpaNxx, and mobile phone End NpaNxx.

       If the AIReach OS is a standalone system, the local HLR point code is 55 55 229.

       If the AIReach OS is connected to a macro system gateway, enter an invalid but non–zero point code such as 1 1 1.
    c. After entering the correct values, click **Save**.
15. Click **Close** to return to the AIReach Office window.

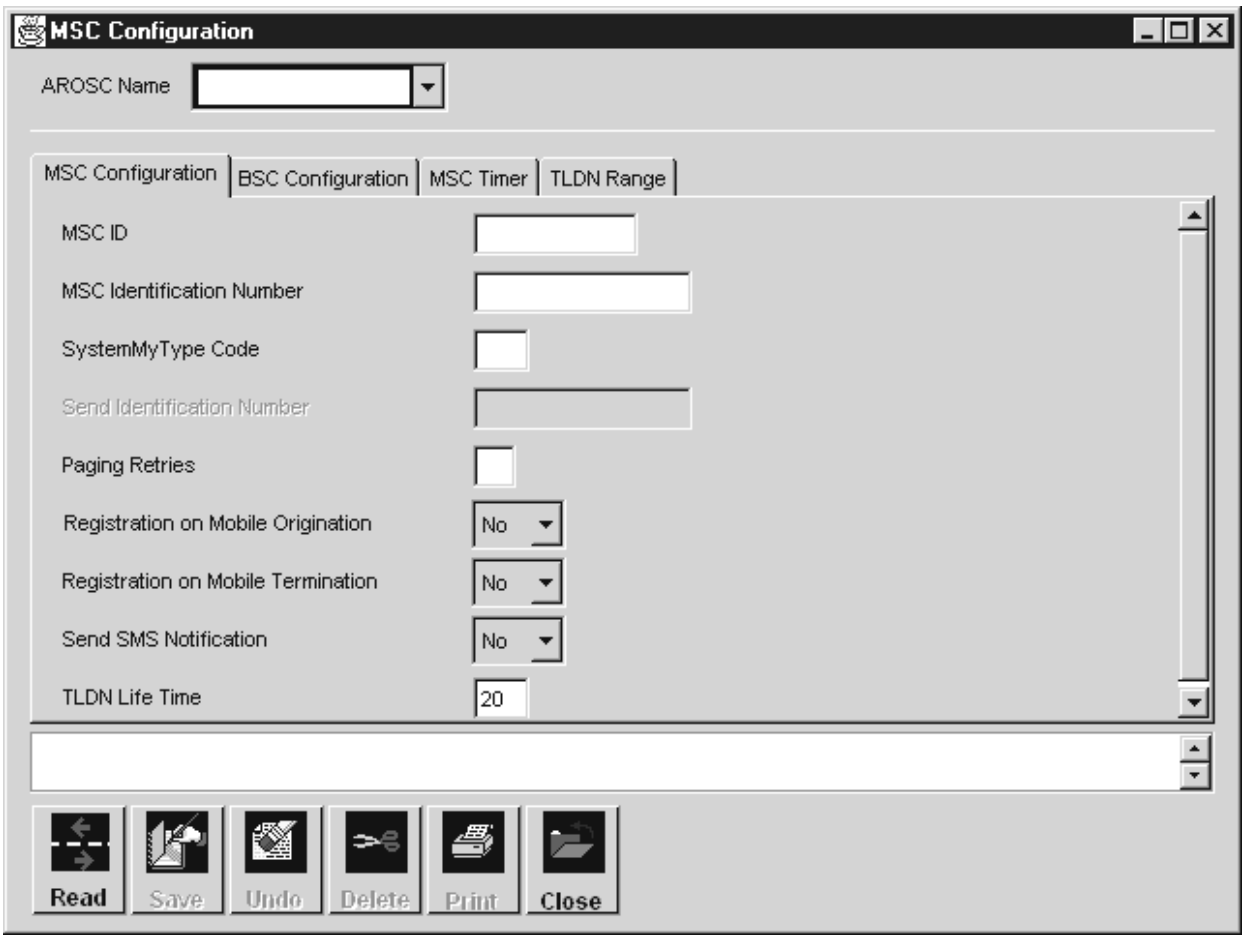
Verifying the MSC configuration

Verify the MSC Configuration as follows:

1. From the AIReach Office banner menu, select **Configure** → **NSS** → **MSC** → **MSC Configuration**.
2. Click the **MSC configuration** tab.

   The parameters that appear in the MSC Configuration window depend on whether you selected **GW** (for gateway) or **SS7** from the IS41 Interface dropdown list in the System Wide Configuration window.

   The screen shown below is for a gateway (**GW**) configuration. If you selected **SS7** as the IS41 Interface, the MSC Configuration screen will be different.



3. Select the specified **AROSC Name** from the dropdown list.
4. Enter or verify the MSC configuration information; then click **Save**.

5. Click the **BSC Configuration** tab.
6. Enter or verify the information.

   Make sure all traffic picocells to be installed are assigned a BSC.

   Verify that all enabled BSC RNUM values are greater than zero and match the Registration Number entered in the Cell Configuration – New window (shown on page 4–12).
7. Click **Save**.
8. Click the **MSC Timer** tab.
9. Enter or verify the information.

   Use the scrollbar to view all fields.
10. Click **Save**.

11. Click the **TLDN Range** tab.

    A temporary local directory number (TLDN) enables a macro user to communicate with a mobile registered on the Controller.

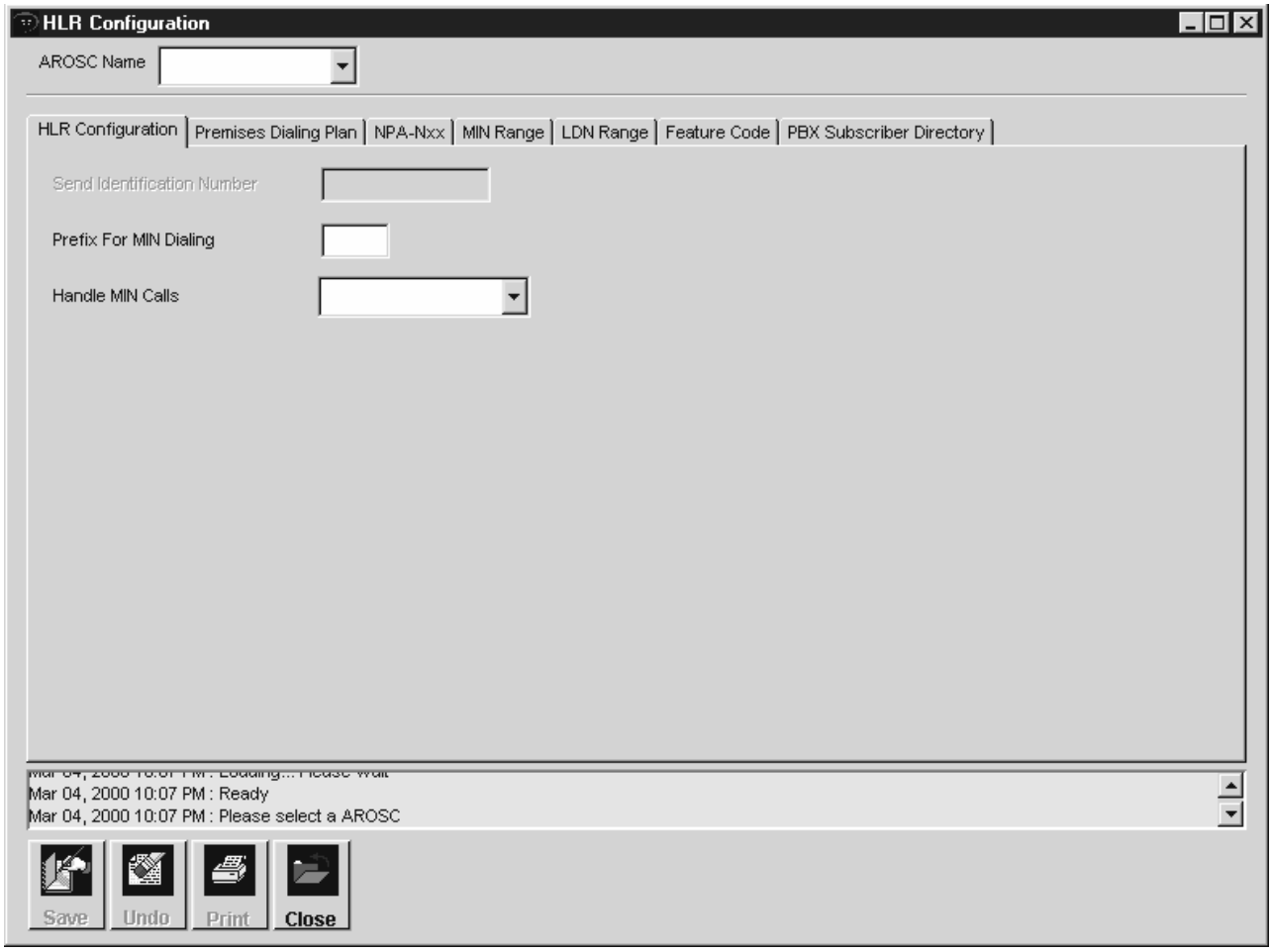
    The TLDN maximum range is 100 numbers.

    The TLDN cannot be a duplicate of an LDN.
12. Enter or verify the information; then click **Save**.
13. Click **Close** to return to the AIReach Office window.

Configuring the HLR

Configure the HLR (Home Location Register) as follows:

1. From the AIReach Office window, select **Configure** → **NSS** → **HLR** to display the HLR Configuration window. (This window initially contains no data.)



Note

You only need to configure the HLR once (not once for each picocell).

2. Select the **AROSC Name** from the dropdown menu and enter the specific values. Then click the **Save** button.
3. Select the **NPA–Nxx** tab.
   You must configure the NPA–Nxx before you can enter the premises dialing plan.
4. Enter the appropriate values, then click **Save**.

5. Select the **Premises Dialing Plan** tab.
6. Enter the appropriate values, then click **Save**.

7. Select the **MIN Range** tab.
8. Enter the following values for the first test mobile:
    a. Begin MIN: Enter the test mobile MIN (mobile identification number).
    b. Allocation Type: Select **Individually allocated** from the dropdown list.
    c. MIN Type: Select **AROS only subscriber** from the dropdown list.
9. Click **Save**.
10. Repeat steps 8 and 9 for the second test mobile phone.

    Provision at least two test subscribers in the System Controller to verify proper traffic picocell operation.

11. Select the **LDN Range** tab.
12. Enter the following for the first test mobile:
    a. Begin Ldn Block: Enter the temporary LDN (local directory number) assigned to the test mobile.
    b. Allocation Type: Select **Allocated Individually** from the dropdown list.
    c. Ldn Type: Select **Local Directory Number** from the dropdown list.
13. Click **Save**.
14. Repeat steps 12 and 13 for the second test mobile phone.
15. Click **Close**.

Chapter 5

Configuring the router

This chapter includes the following topics:

The AIReach OS supports the Cisco 1602–R router. The information in this chapter applies to the Cisco 1602–R router. If you use a different router, you may be able to apply some of this information, but you will have to configure your router according to the manufacturer's instructions.

5.1

Installing the router

When you install the router:

- Install the router in the location specified in the Configuration Report.
- Install the router according to the manufacturer's instructions.
- Use CAT 5 T1 cable to connect the router to the Controller and to the service provider's gateway.

5.2

Configuring the router

To configure the router, you need to obtain the gateway IP address and circuit identification values from the customer.

To configure the Cisco 1602–R router for use in the AIReach OS:

1. Refer to the network diagram in Figure 5-1 and verify the IS–41 gateway configuration and IP addresses.

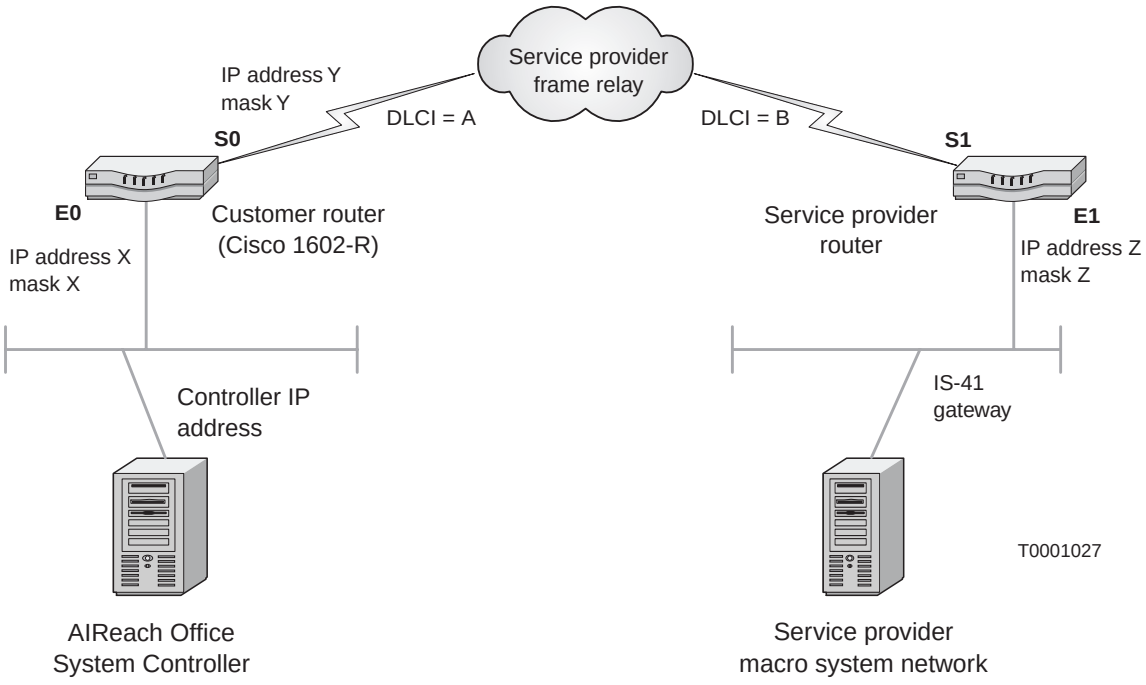


Figure 5-1 AIReach OS IS–41 gateway network diagram

2. Use Notepad to open the standard router configuration text file, which is loaded on the Controller.

   The name of the router configuration file is site–specific. Examples: **`router.txt`**, **`RELIATEL_bldg2.txt`**
3. Save the configuration file *using a new file name* (to preserve the original file).

4. Edit the renamed router configuration file, listed below, with the appropriate IP addresses, masks, and passwords (if used):

```
service udp-small-servers
service tcp-small-servers
!
hostname <CUSTOMER NAME>
!
ip subnet-zero
no ip domain-lookup
!
interface Ethernet0
  ip address <IP Address X> <Mask X>
!
interface Serial0
  description Leased Line to AT&T (<A>-><B>)
  ip address <IP Address Y> <Mask Y>
  encapsulation frame-relay
  bandwidth 56
  frame-relay interface-dlci <B>
!
no router rip
!
ip route Z.Z.Z.0 255.255.255.224 <IP Address Z>
!
no ip http server
no ip classless
!
line con 0
line vty 0
  password <customer determined>
  login
line vty 1
  password <customer determined>
  login
  length 0
line vty 2 4
  password <customer determined>
  login
!
end
```

For an example of a typical configuration file, see page 5–6.

5. Save the edited configuration file.
6. Connect an 8–conductor phone cable from the router console port to the Controller, via the DB–9 adapter.
7. From the Windows desktop on the Controller (or a separate PC), select **Start** → **Programs** → **Accessories** → **HyperTerminal.**

8. *If a router HyperTerminal was previously configured:*
   a. Click the desired HyperTerminal icon.
   b. Select **Connect** from the dropdown list.
9. *If a router HyperTerminal was not configured:*
   a. Click the HyperTerminal icon.
   b. Select **Connect** from the dropdown list.
   c. Enter the name for the HyperTerminal (Cisco) and select an icon.
   d. Select **Direct to com 1**.
   e. Click **OK**.
   f. Select **9600** (bits per second) from the dropdown list.
   g. Click **OK** to display an active HyperTerminal window.
10. Connect power to the router and turn the power switch on.

    The router displays a series of boot–up messages.

    After bootup is complete, the router displays the user prompt: **`Router >`**.
11. Enter the router privileged mode (**`Router #`**) by entering **`enable`** at the **`Router >`** prompt.

    You cannot modify the configuration file unless the router is in router privileged mode.
12. Enter the router configuration mode (**`Router (config) #`**) by entering **`config term`** at the **`Router >`** prompt.

    You cannot enter the configuration file unless the router is in configuration mode.
13. Copy and paste the router configuration text file created in step 4 into the router. (Place the cursor after the **`Router(config)#`** prompt; then paste.)
14. Save the router configuration file you entered by typing **`write`** at the **`Router(config)#`** prompt.
15. Verify that the router configuration file is running by entering **`sho run`** (show running program) at the **`Router (config)#`** prompt.

    You should see the contents of the file you edited and saved.
16. Verify that the router configuration file is also the startup program by entering **`sho startup`** at the **`Router (config)#`** prompt.
17. To exit configuration mode, enter **`exit`** at the **`Router (config)#`** prompt.

Note

To see the router help screen, enter ? at the **`Router >`** prompt.

18. To exit router privileged mode, enter **`exit`** at the **`Router >`** prompt.
19. Connect the router to the service provider frame relay service.

Router configuration example

Figure 5-2 and the file that follows are examples of a typical router configuration.

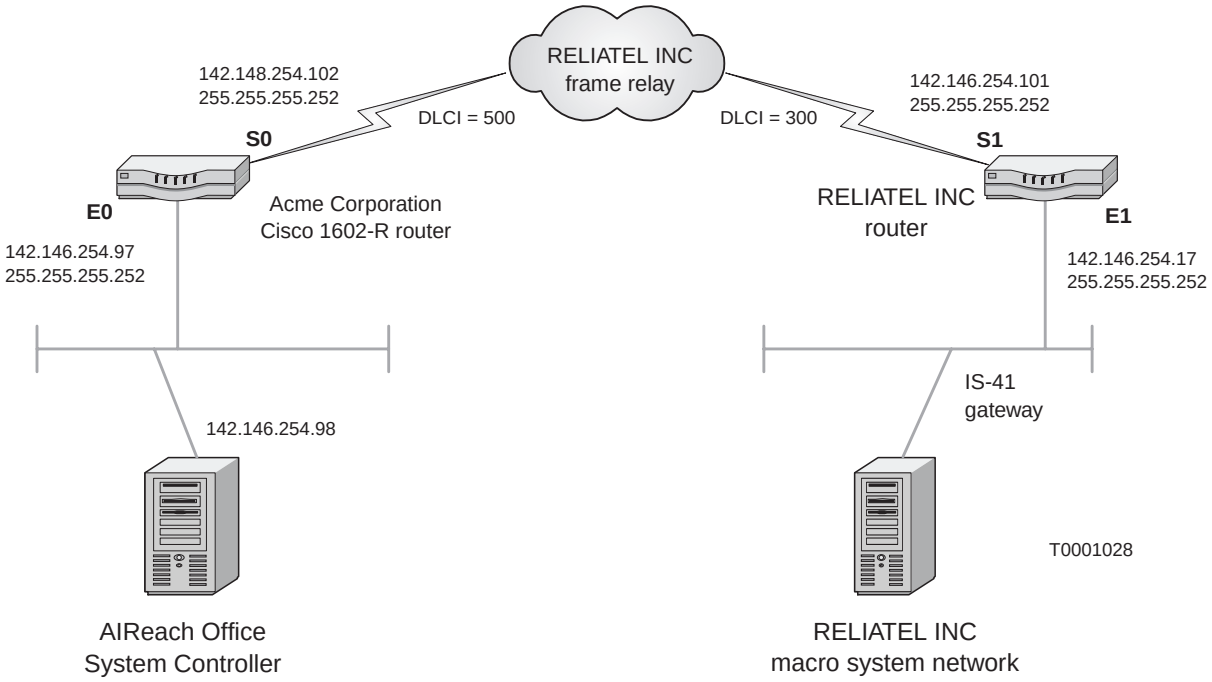


Figure 5-2 Typical AIReach OS IS–41 gateway network diagram

The file below is an example of a typical router configuration. It is the configuration file for the network shown in Figure 5-2.

```
service udp-small-servers
service tcp-small-servers
!
hostname acme64
!
ip subnet-zero
no ip domain-lookup
!
interface Ethernet0
  ip address 142.146.254.97 255.255.255.252
!
interface Serial0
  description Leased Line to RELIATEL
  ip address 142.146.254.102 255.255.255.252
  encapsulation frame-relay
  bandwidth 56
  frame-relay interface-dlci 300
!
no router rip
!
ip route 142.146.254.0 255.255.255.224 142.146.254.101
!
no ip http server
no ip classless
!
line con 0
line vty 0
  password mercury&4
  login
line vty 1
  password mercury&4
  login
  length 0
line vty 2 4
  password mercury&4
  login
!
end
```

Gateway access

To set up the AIReach OS System Controller to access the IS–41 gateway:

1. Using Notepad, edit the file **C:\gwroutes.bat** to remove **REM** from the line

```
route ADD –p yyy.yyy.yyy.0 mask 255.255.255.0 xxx.xxx.xxx.xxx
```

2. Enter the first three digits of the IS–41 gateway IP address in place of **yyy.yyy.yyy** .
   For example, if the IS–41 gateway IP address is 198.225.8.1, enter **198.225.8**, so the address (after **–p**) would be **198.225.8.0**.
3. In the **xxx.xxx.xxx.xxx** position, enter the IP address of the router on the Controller side of the frame relay connection to the IS–41 gateway.
4. Save the file and close Notepad.
5. Click **Start** → **Settings** → **Control Panel**.
6. Double–click the ***Network*** icon.
7. Click the **Protocols** tab.
8. Double–click **TCP/IP Protocol**.
9. In the Adapter dropdown list, select the first adapter card if it is not selected by default.
10. In the IP Address window, enter the IP address designated by the customer network administrator for the Controller's connection to the IS–41 gateway.
11. Enter **255.255.255.0** in the Subnet Mask window.
12. For the gateway address, enter the IP address of the router on the Controller side of the frame relay.
13. Close all network windows.
    You should be prompted to reboot the Controller when you close the last network window.
14. Click **OK** to reboot the Controller.

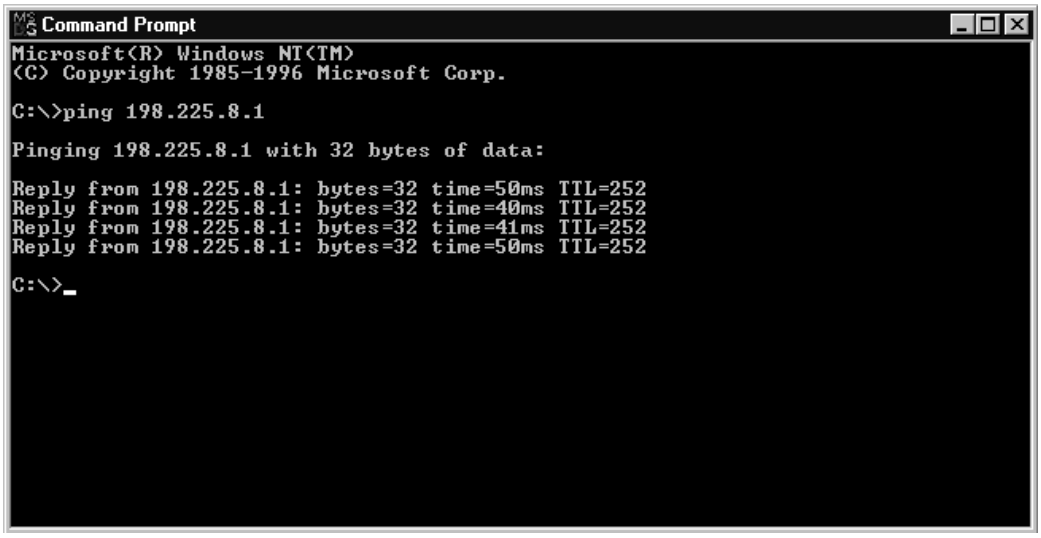
15. After the Controller reboots, verify connectivity to the IS–41 gateway by pinging the gateway IP address:

    a. Select **Start** → **Programs** → **Command Prompt** to open a DOS window.

    b. At the DOS prompt (**`C:>\`**), enter

    `ping` <**`IS–41 gateway IP address`**>

    c. A successful ping from the device associated with the IS–41 gateway IP address results in **`Pinging`** and **`Reply from`** messages similar to those shown below:



Chapter 6
Testing picocells

This chapter includes the following topics:

Each picocell is tested at the System Controller location (staging area), so that if a unit fails, it can be replaced before installation.

First you test the scanning picocell, then you test the traffic picocells.

Important: References to *specified* values or parameters in this manual refer to values and parameters specified in the *AIReach OS Configuration Report*. For values not listed in the *Configuration Report*, use the default values shown in the software or specified in these instructions.

Connecting a picocell for testing

This section explains how to connect a picocell (scanning picocell or traffic picocell) at the staging area for testing *(not for actual installation).*

Test cable: The test cable referred to below is a CAT 5 T1 cable terminated with RJ–45 connectors at both ends. The cable is "flipped" so the TX pinouts at one end connect to the RX pinouts at the other end. (For pinout details, see page 7-12.)

For staging area testing, you connect power from a –48 Vdc power supply to the test cable, which in turn connects to the picocell.

Connect the scanning picocell first (since it is tested first). Follow these instructions to connect a scanning picocell *or* a traffic picocell:

1. Connect the test cable to the picocell VOICE/DATA IN (LINE POWER) port, as shown in Figure 6-1.
2. Connect the other end of the test cable to the first Quad T1 card (in slot 9) on the System Controller. See Figure 6-2:
   - *For a scanning picocell,* connect to the *second* port (from the top) of the first Quad T1 card.
   - *For a traffic picocell,* connect to the *third* port (from the top) of the first Quad T1 card.

CAUTION

Make sure the picocell power switch is OFF (middle position) before connecting the picocell to the Controller.

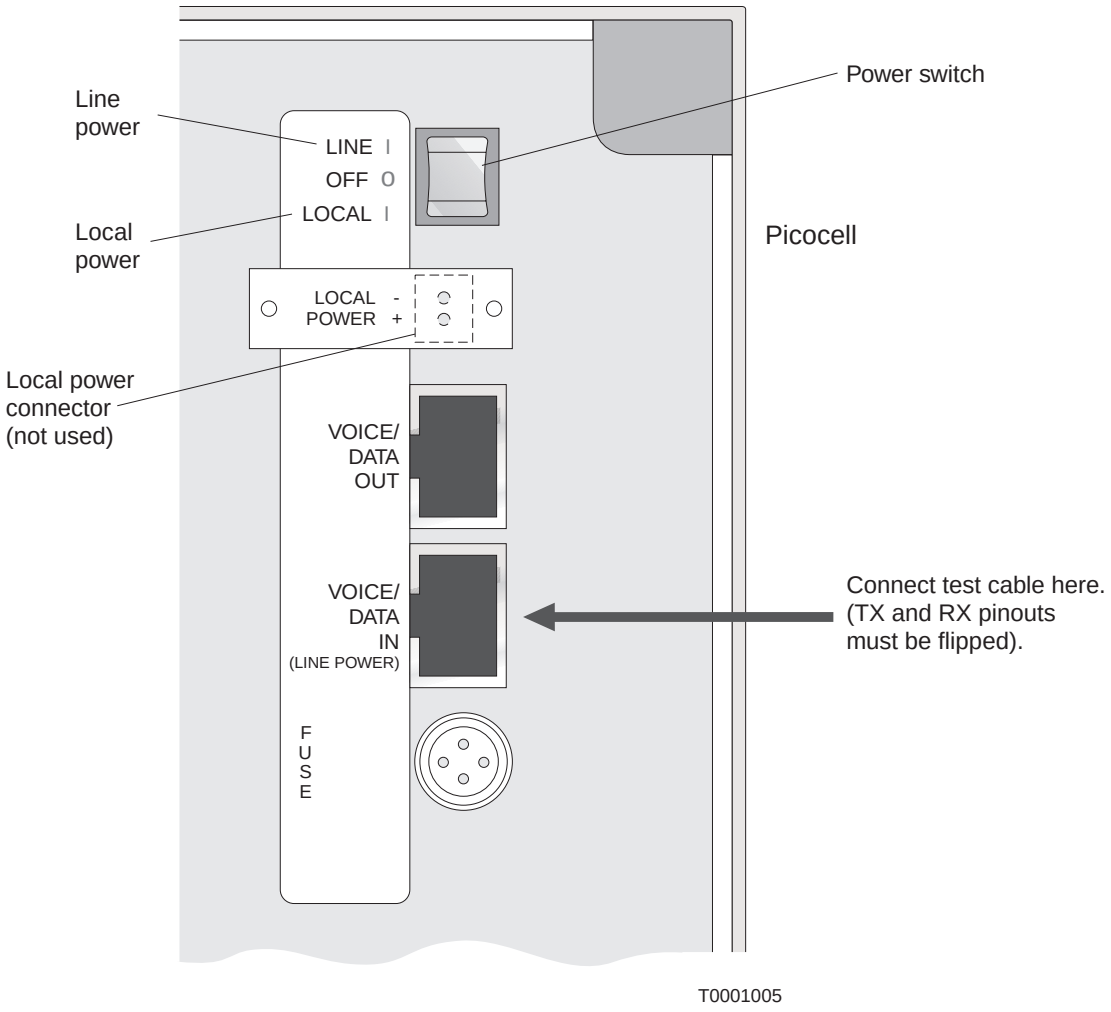


Figure 6-1 Picocell connection for testing (scanning or traffic) picocell at System Controller location

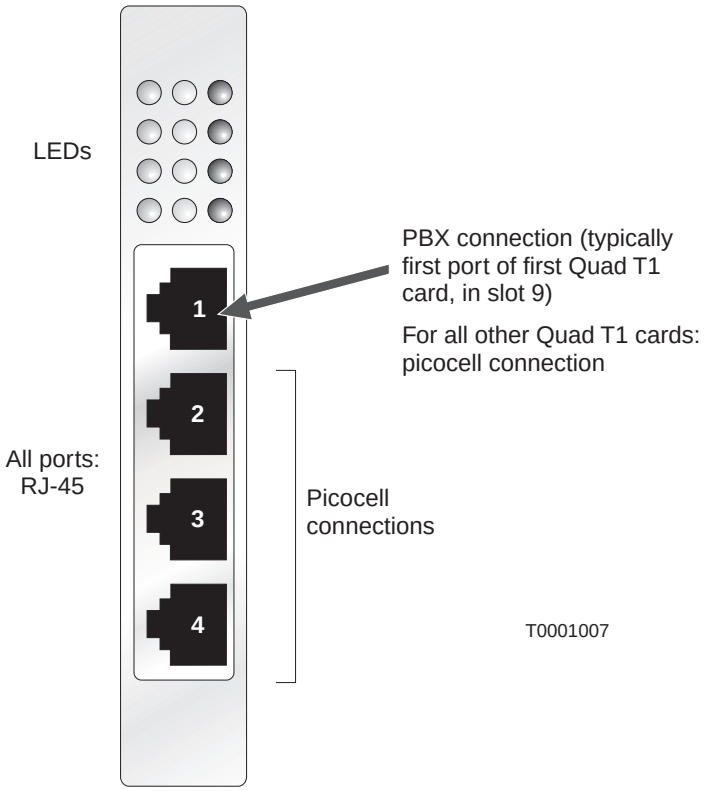


Figure 6-2 Ports on Quad T1 card

Providing power to the picocell

Provide power to the picocell:

1. Connect a –48 Vdc power supply to the test cable.
2. Plug the power supply into a 120 Vac, 60 Hz ac outlet.

Power supply

The following symbols appear on the picocell power supply:

Symbols on power supply

The house symbol indicates that the power supply should be used only in a dry environment. The exclamation (**!**) symbol means to read the instructions in this manual concerning the power supply.

As stated on the power supply, there are NO USER SERVICEABLE PARTS INSIDE. **Do not attempt to open or repair the power supply.**

For power supply specifications, see Appendix A, Section A.3.

Verifying software load

Power on the picocell, and observe the picocell LEDs as the System Controller automatically downloads software to the picocell:

1. Press the picocell power switch to the LINE (line power) position.
2. Observe the LEDs for normal operation:
   a. During software loading, the Temp LED on the front of the picocell is orange. See Figure 6-3.
   b. When the picocell is fully loaded and operational, the Power and Temp LEDs display green, and the Alarm LED is off.

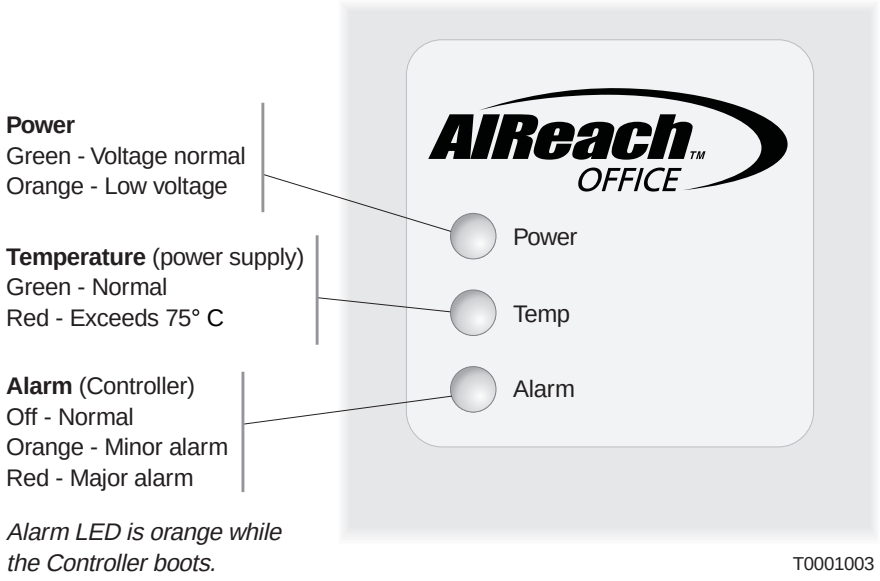


Figure 6-3 LEDs on front of picocell

Note

The LED information above is for production picocells. LED codes may be different for pre–production picocells.

Checking scanning picocell operation

At the System Controller, verify scanning picocell operation first, as explained in this section. Then verify traffic picocell operation, as explained in Section 6.5.

Check the scanning picocell operability, as follows:

1. Verify that the scanning picocell is connected with the test cable as explained in Section 6.1.
2. Make sure the picocell is powered on (power switch in the LINE position).
3. Verify that scanning picocell–to–Controller connectivity is good (green LED on the Quad T1 card, port where the picocell is connected).

   (The Quad T1 LEDs are explained in Figure 6-4.)

   If a red or yellow LED is illuminated on the Quad T1 card:

   a. Check the T1 test cable. Use a cable tester to verify that the cable is good and correctly flipped (TX to RX). Re–terminate the RJ–45 connectors if necessary.

   b. If the cable is good, reconnect the picocell to another Quad T1 card port.

   c. From the AIReach Office window, select **Configure → BTS Configuration**. This opens the BTS Configuration window.

   d. Select the scanning picocell from the BTS pulldown list.

   e. Select the new Quad T1 card port from the T1 Line Number dropdown list, and click **Save**.

      If the traffic picocell is connected to a new Quad T1 card, select the new card number from the T1 Card Number pulldown list before selecting the T1 Line Number.

      It may take up to 3 minutes for the red LED to turn off and the green LED to light up.

f. If the red or yellow LED remains lit, repeat steps c through e.

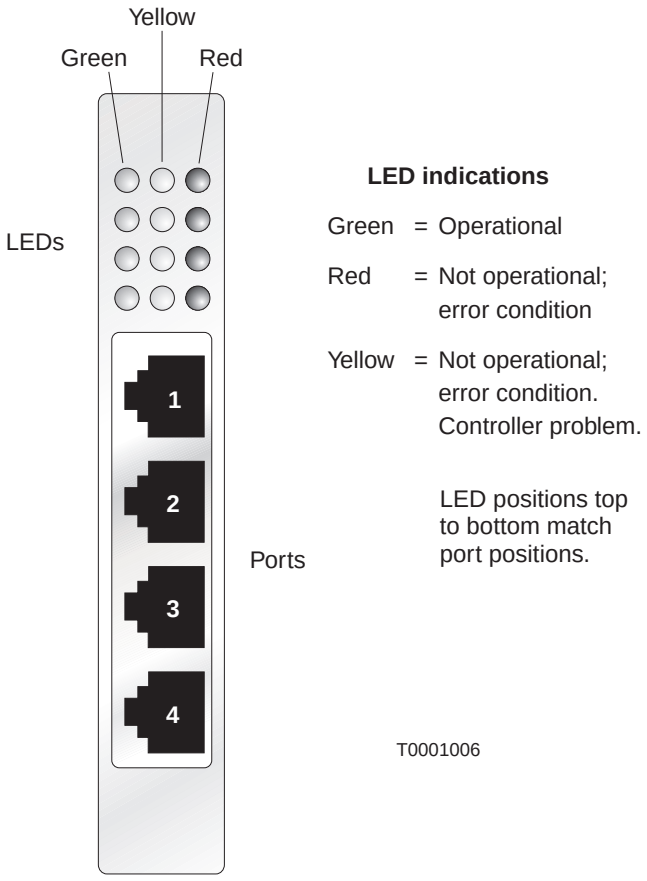
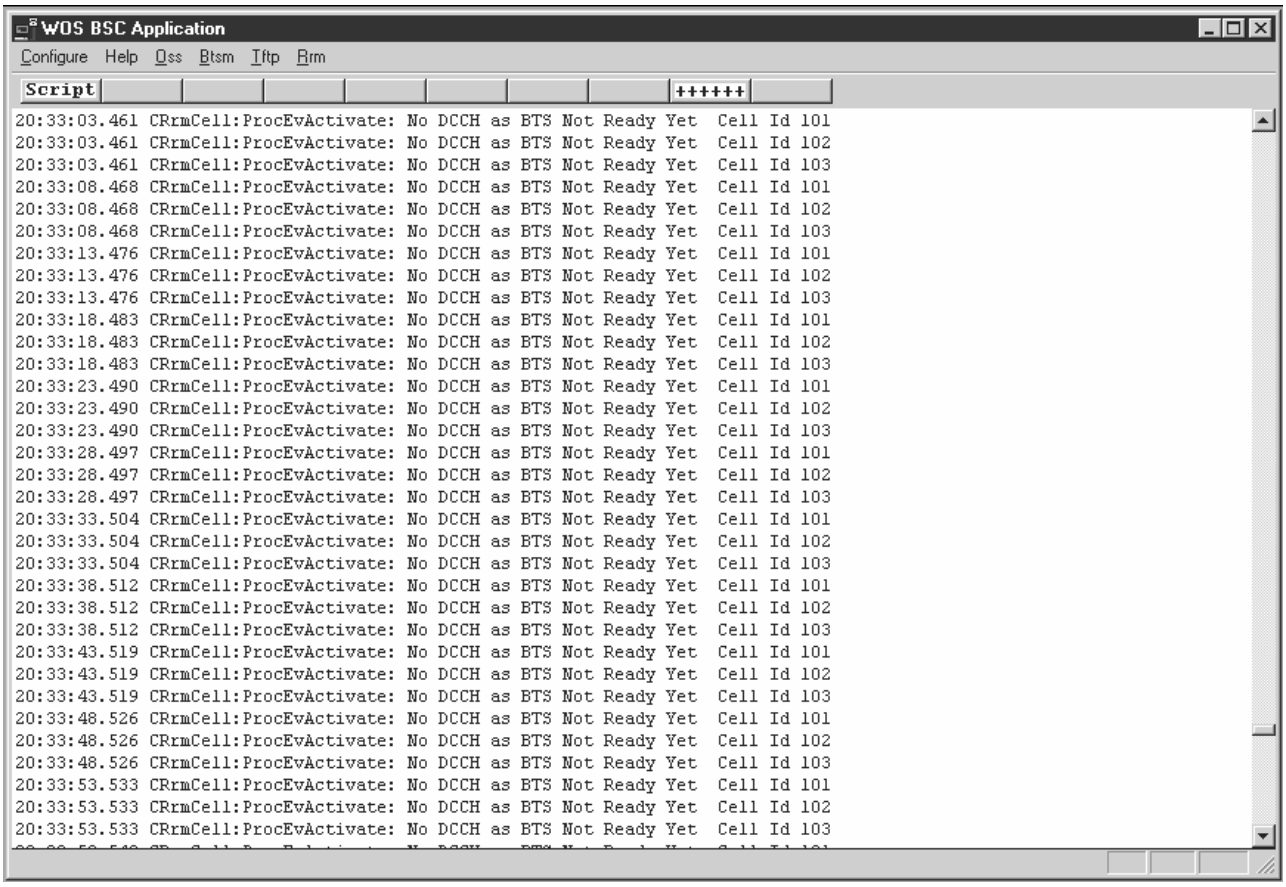
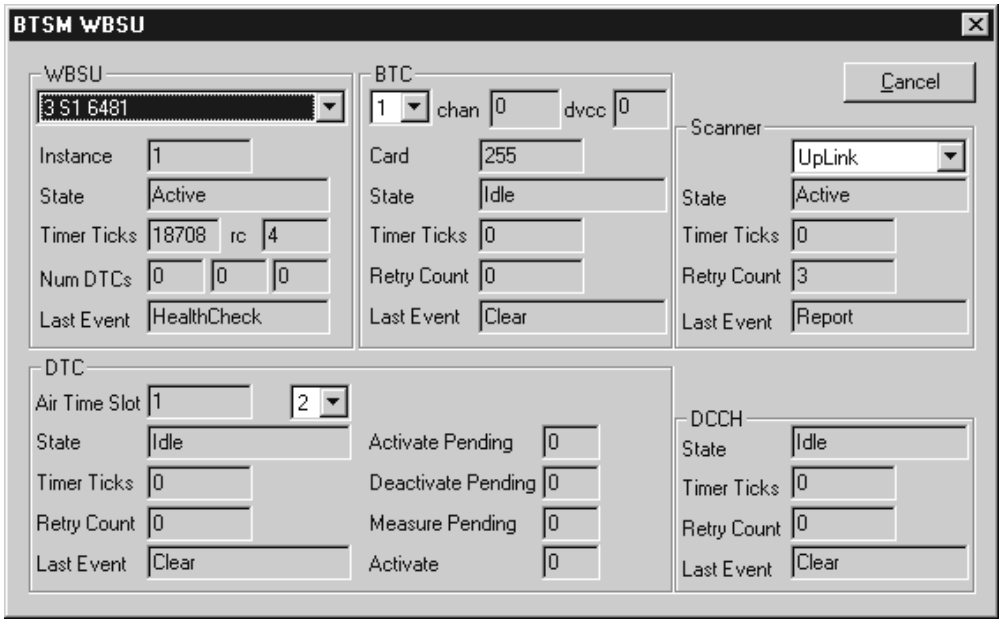


Figure 6-4 LEDs on Quad T1 card

4. Click **WOS BSC Application** to display the **WOS BSC Application** window.



5. Select **Btsm** → **State** to display the Select BTS window.
6. Select the scanning picocell from the dropdown menu.



7. Verify that the scanning picocell self–test and software download are successful:
   a. BTC: Select each BTC (using the dropdown menu) and verify that `0` appears in the chan window.
   b. WBSU State: Verify that the state is Active.
   c. Close the window and return to the WOS BSC Application window.
8. Minimize the WOS BSC Application window to return to the AIReach Office window.

   Do not close the WOS BSC Application window. This window is required during normal operation. (If you inadvertently close this window, it will restart automatically.)

Performing a test frequency band scan

Perform an initial (test) 6–minute frequency band scan at the System Controller location. The initial band scan is used to quickly find a frequency that can be used to test all the picocells at the Controller location. Later, you perform a 24–hour (or longer) band scan to set up the system for normal operation.

Note
The system is not available for traffic during a band scan.

Switching to Setup mode

To initiate a frequency band scan, the Controller must be in Setup mode.

Follow these steps to put the Controller in Setup mode:

1. From the AIReach Office banner, select **Configure** → **BSC Configuration** → **AROSC**.
2. Select **Setup** from the Operating Mode dropdown list, then click **Accept**.

   Call processing is disabled while the Controller is in Setup mode.

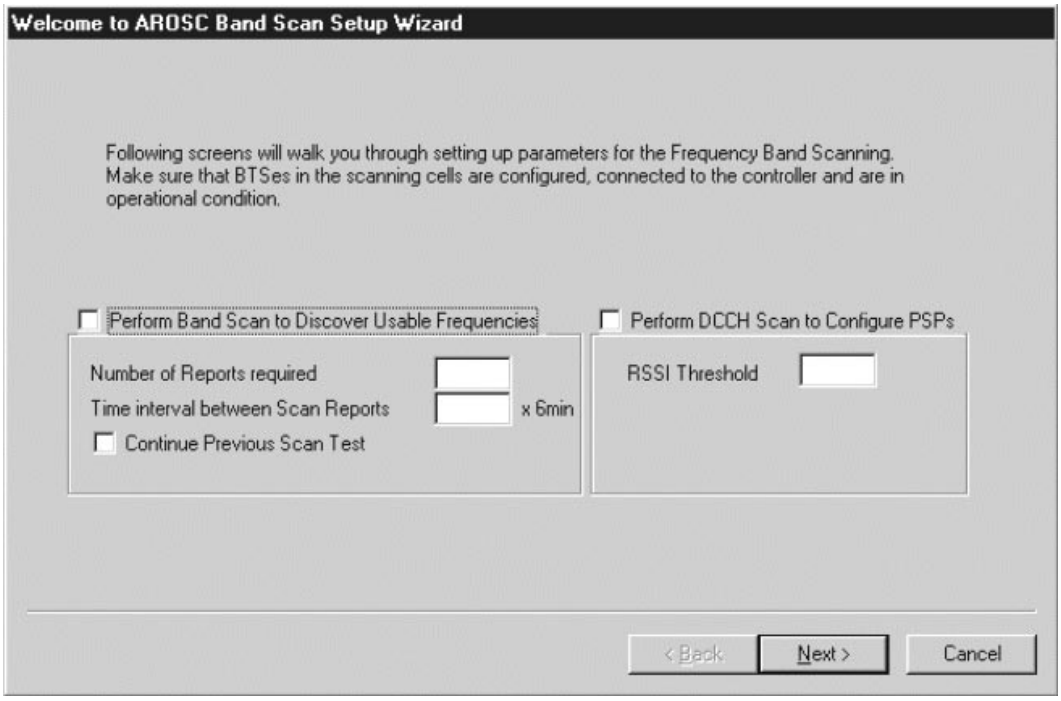
   Clicking **Accept** disables all Controller T1 lines; therefore, wait (a few minutes) until the Controller T1 line connectivity is re–established before initiating the frequency band scan.

Setting up the frequency band scan

Set up the band scan as follows:

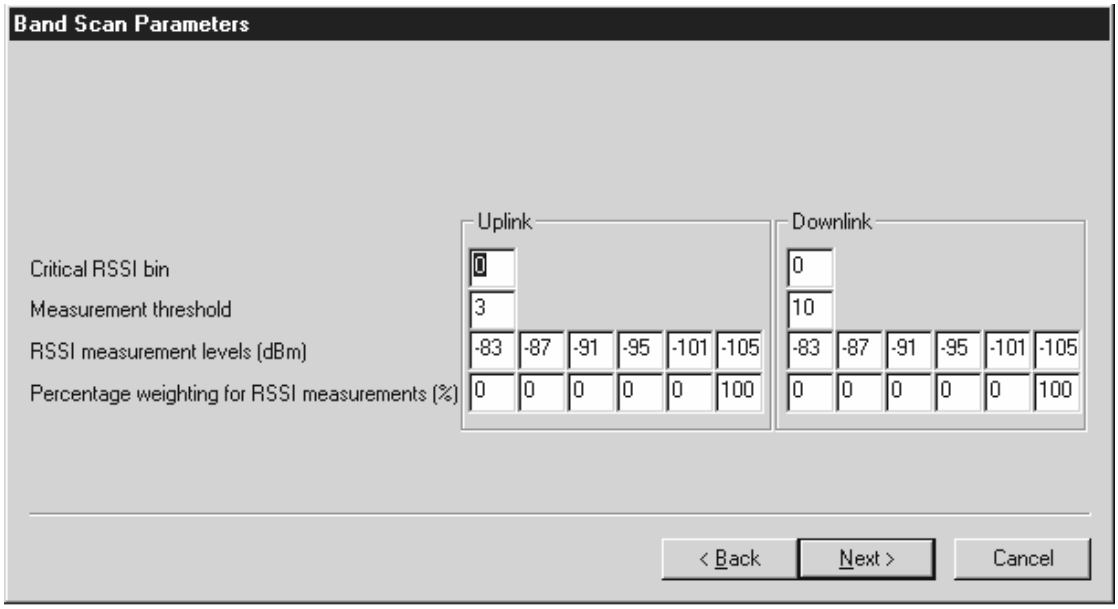
1. From the AIReach Office banner, select **Installation** → **Auto Setup**.

   The software displays the Welcome to AROSC Band Scan Setup Wizard window:



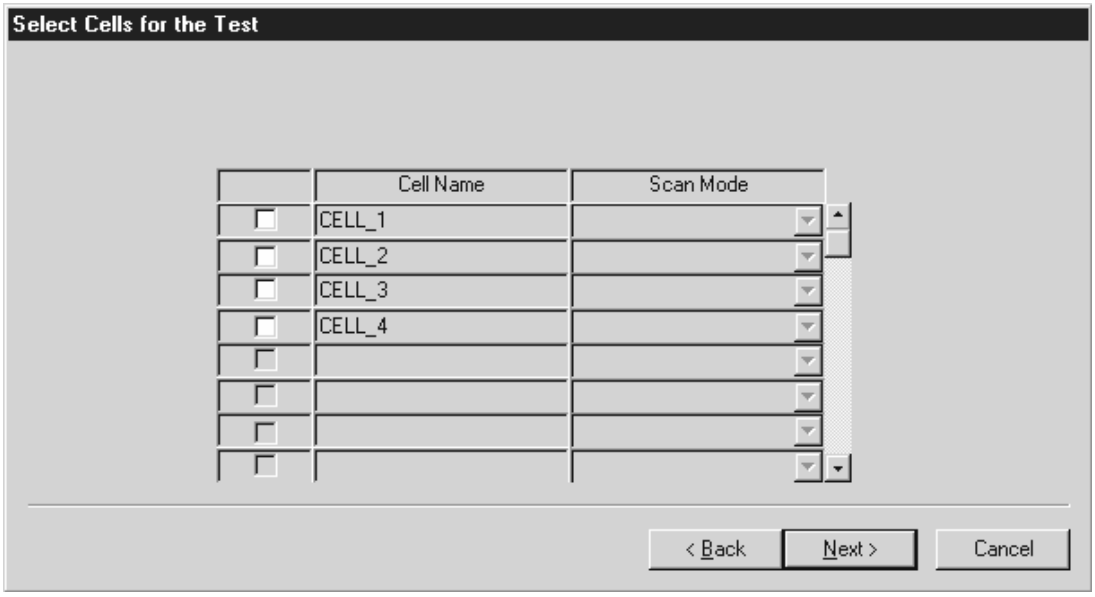
2. Enter the following entries in the Setup Wizard window:
   a. Perform Band Scan to Discover Usable Frequencies: *Check* (Click the box so a check mark is displayed.)
   b. Perform DCCH Scan to Configure PSPs: *Check*
   c. Number of Reports required: **1**.
   d. Time interval between Scan Reports: **1**.
   e. Continue Previous Scan Test: *Not checked*.
   f. RSSI Threshold: –**105**.

3. Click **Next** to display the Band Scan Parameters window.



4. Set Critical RSSI bin Uplink and Downlink to 0 for the 6–minute band scan

   (For the subsequent 24–hour band scan, set Critical RSSI bin Uplink and Downlink to 3.)
5. In the remaining boxes, use the default parameters unless otherwise instructed (for example, by the macro provider, or in release notes).
6. Click **Next** to display the Select Cells for the Test window.



7. Check the box associated with the scanning picocell name and select the **Uplink / Downlink Scan** in the Scan Mode column when necessary.
8. Click **Next** to display the Start Scan Frequency Band Scan window.
9. In the Start Scan Frequency Band Scan window (not shown here), check these items *only:*
   - View Band Scan results before generating Private Operating and Traffic Frequencies
   - View DCCH Scan results before generating Public Service Profile information for AROS cell

Starting the scan and observing the results

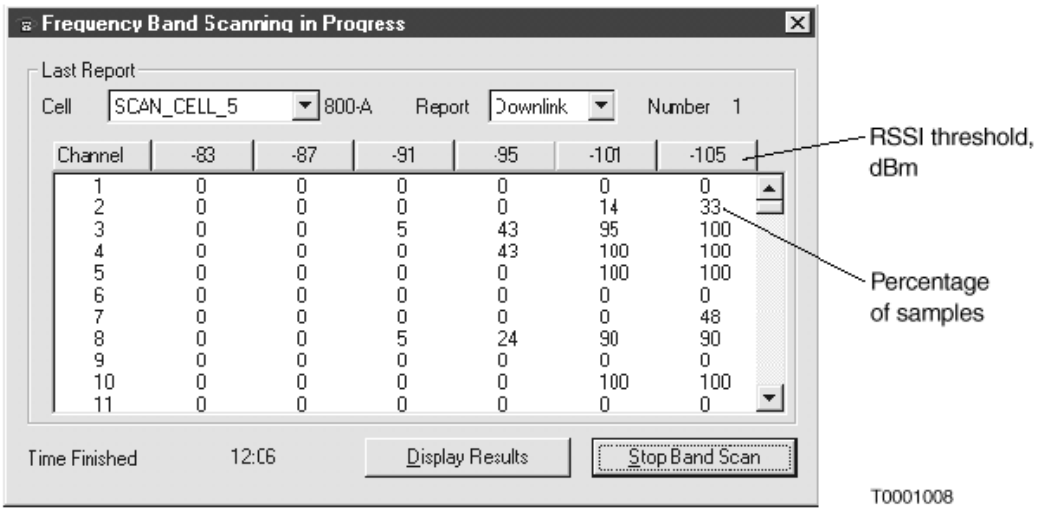
Follow these steps to start the band scan and observe the results:

1. In the Start Scan Frequency Band Scan window, click **Next** to start the frequency band scan.

   When you click **Next**, the software displays a Measurement in Progress window, and then (automatically) the Frequency Band Scanning in Progress window.
2. Wait for the band scan to finish.

   No results are shown until the frequency scan is finished.

   The values shown in the Frequency Band Scanning in Progress window are explained below:

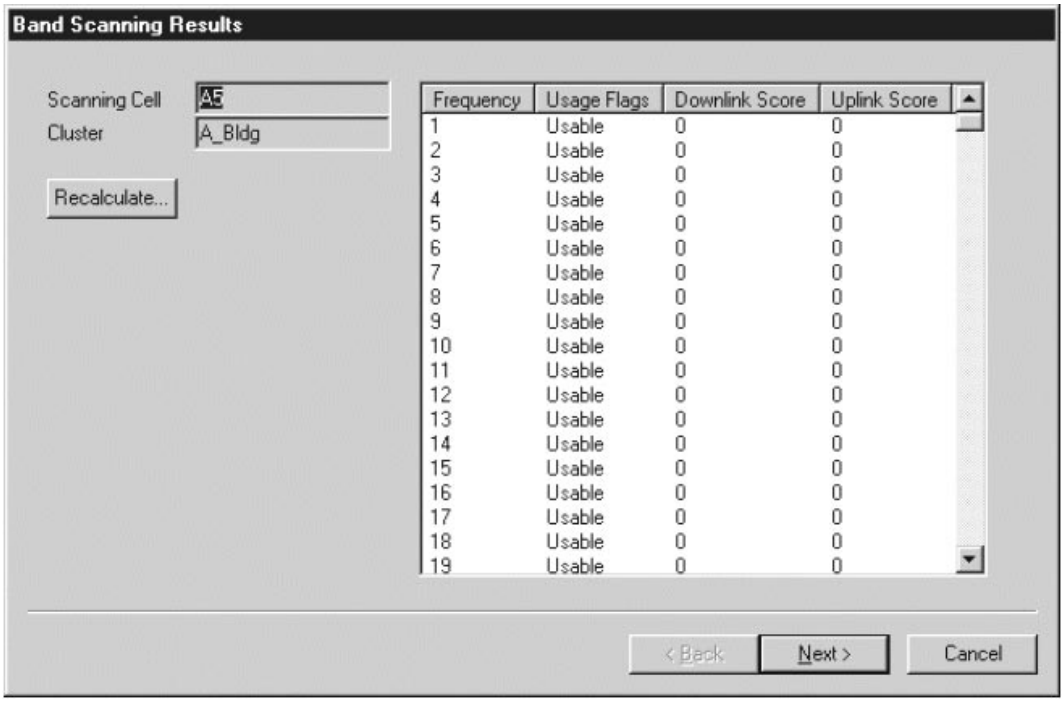


The system continuously measures the received signal strength indication (RSSI) for the whole band, and reports the percentages above the given threshold as a cumulative distribution. Each value is the percentage of samples above the given RSSI, which is shown at the top of each column. For example, for channel 2 above, 14% of the samples were measured above –101 dBm (RSSI), and 33% were above –105 dbm.

A “Time Started” message and value are shown in the lower left corner of the window when the band scan is being successfully performed.

Approximately 6 minutes after the band scan was started, the Frequency Band Scanning in Progress window automatically closes and the DCCH Scanning in Progress window is automatically displayed (not shown here).

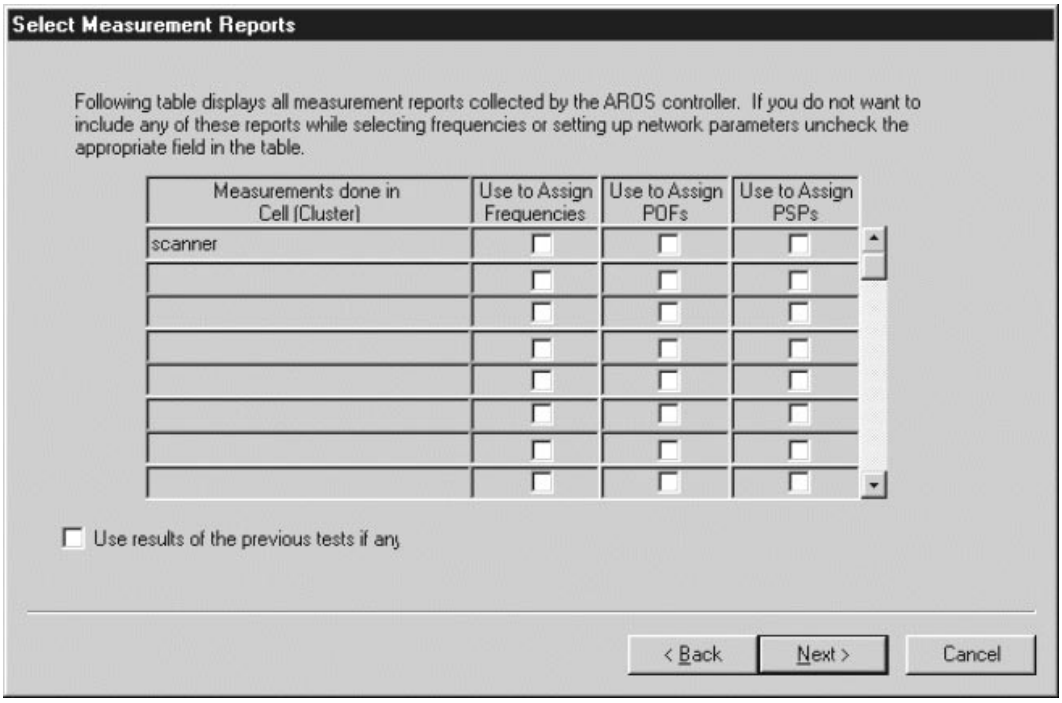
When the DCCH band scan is finished, the DCCH Scanning in Progress window automatically closes, and the Band Scanning Results window is automatically displayed:



The Band Scanning Results window indicates if frequencies are usable or not, based on user–specified limits. Note that it shows channels, not frequencies.

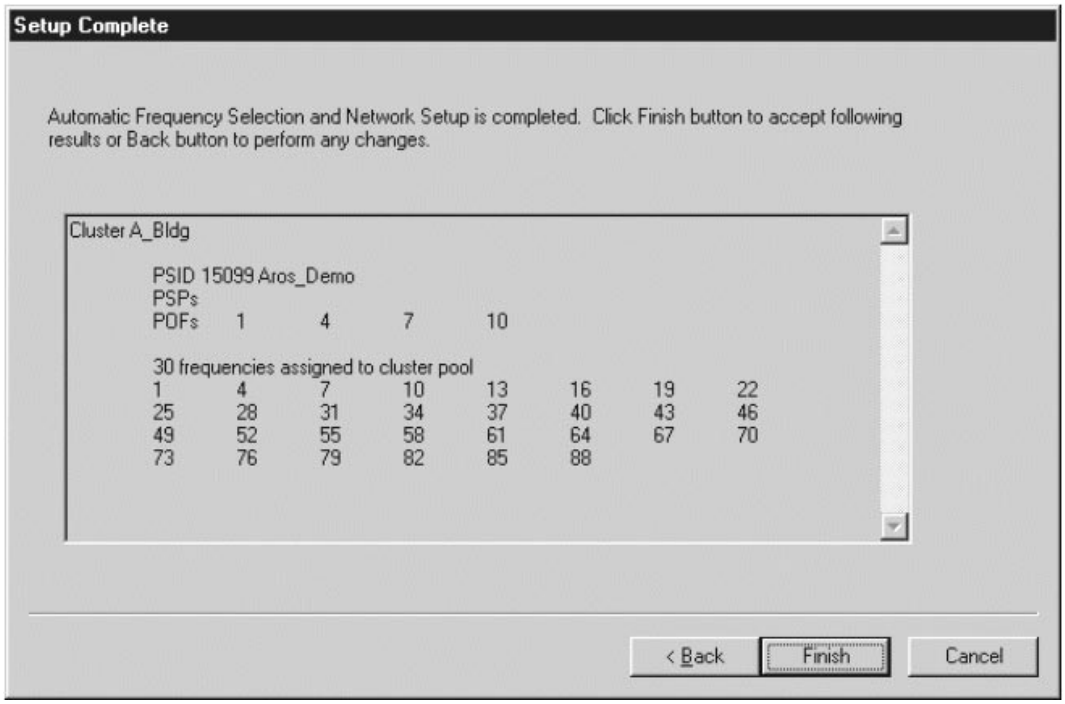
This data is used to generate an initial frequency list. (Subsequently, all frequency management is dynamic.) The score values indicate interference at the specified threshold. Some frequencies are marked non–usable because the system tries to avoid using adjacent channels.

3. Click **Next** to see the DCCH Scanning Results window (not shown here).
4. Click **Next** to access the Select Measurements Reports window.



5. For the scanning picocell used to perform the frequency and DCCH band scan:
   a. Check:
      - Use to Assign Frequencies
      - Use to Assign POFs (private operating frequencies)
      - Use to Assign PSPs (public service profiles)
   b. Do *not* check "Use results of previous tests if any."
6. Click **Next** in succession to display these windows:
   a. Initial PSP assignment window
   b. Initial POF Assignment window (listing the available channels and POFs)

7. Click **Next** again and the Setup Complete window is displayed.



8. Click **Finish** and the AIReach Office banner window is displayed.

   The POFs and cluster pool are now automatically assigned.

Returning to normal operation

1. From the AIReach Office banner, select **Configure** → **BSC Configuration** → **AROSC**.
2. Select **Normal** from the Operating Mode dropdown list, then click **Accept**.

   Clicking **Accept** disables the Controller T1 lines; therefore, wait (a few minutes) until the Controller T1 line connectivity is re–established before checking traffic picocell operation (Section 6.5).

Checking traffic picocell operation

Perform this test sequence for each traffic picocell.

Temporarily connect the traffic picocell to the System Controller to verify that the picocell is operating properly.

1. Verify that the traffic picocell is connected with the test cable, as explained in Section 6.1.
2. Make sure the picocell is powered on (power switch in the LINE position).
3. Verify that the traffic–picocell–to–Controller connectivity is good (LED green on the corresponding Quad T1 card port).

   (The Quad T1 LEDs are explained on page 6–7.)

   If a red LED is illuminated on the Quad T1 card:

   a. Check the T1 test cable. Use a cable tester to verify that the cable is good and correctly flipped (TX to RX). Re–terminate the RJ–45 connectors if necessary.

   b. If the cable is good, reconnect the traffic picocell to another port.

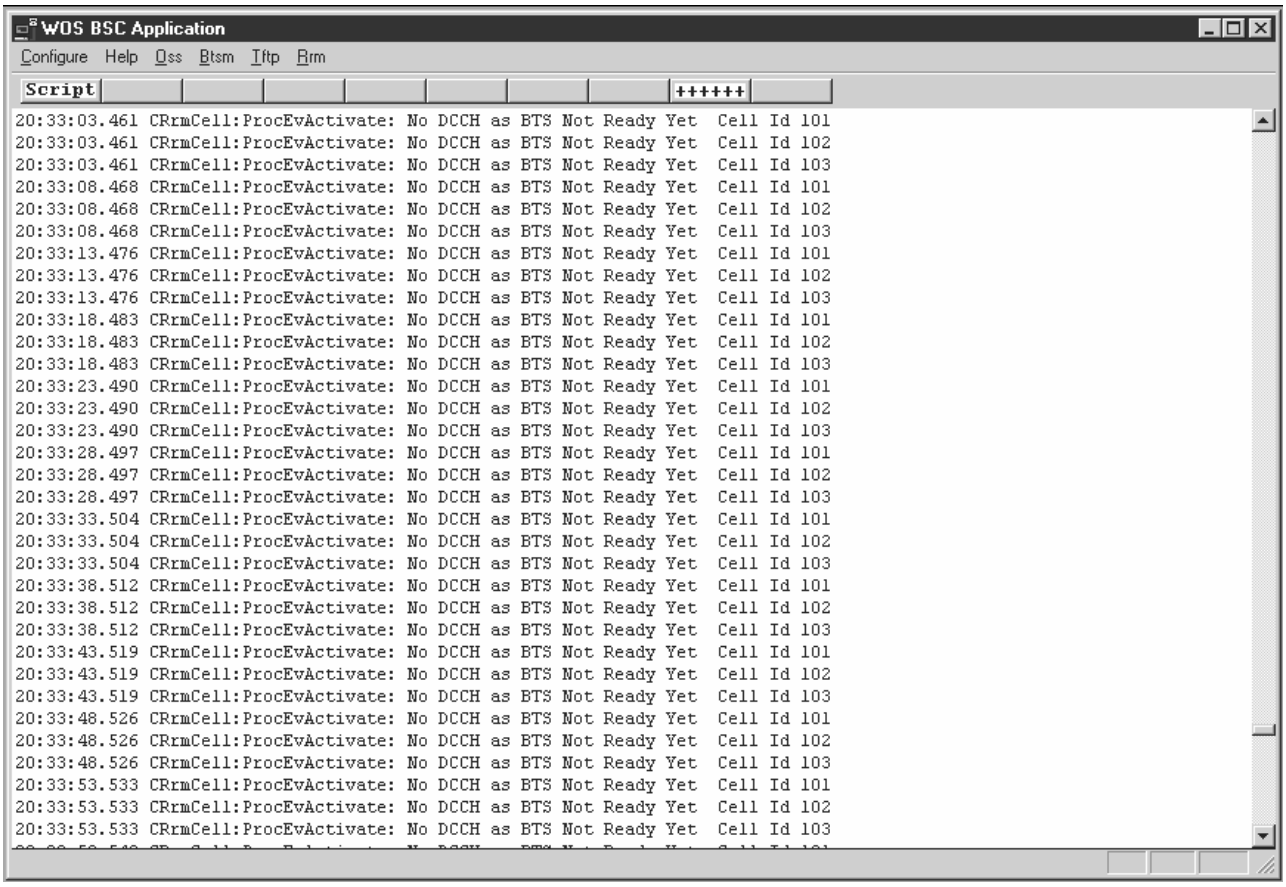
   c. From the AIReach Office window, select **Configure** → **BTS**. This opens the BTS Configuration window.

   d. Select the new Quad T1 card port from the T1 Line Number dropdown list, and click **Save**.

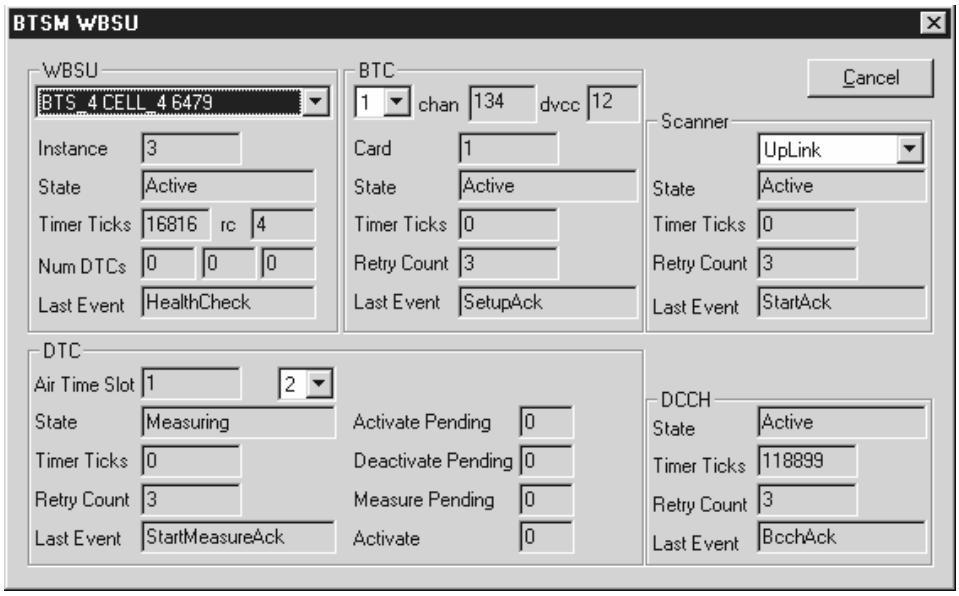
      If the traffic picocell is connected to a new Quad T1 card, select the new card number from the T1 Card Number pulldown list before selecting the T1 Line Number.

      It may take up to 3 minutes for the red LED to turn off and the green LED to light up.

4. Click **WOS BSC Application** to display the WOS BSC Application window.



5. Select **Btsm** → **State**.
6. Select the traffic picocell using the dropdown menu below "WBSU."



7. Verify that the traffic picocell self–test and software download are successful:
   a. BTC: Verify that one of the channels identified as usable from the test frequency band scan appears for BTC 1.
   b. WBSU State: Verify that the state is Active.
   c. BTC State: Verify that the state is Active.
   d. DCCH State: Verify that the state is Active.
8. Minimize the **WOS BSC Application** window to return to the AIReach Office window.

   Do not close the WOS BSC Application window. This window is required during normal operation. (If you inadvertently close this window, it will restart automatically.)

Provisioning test mobile phones

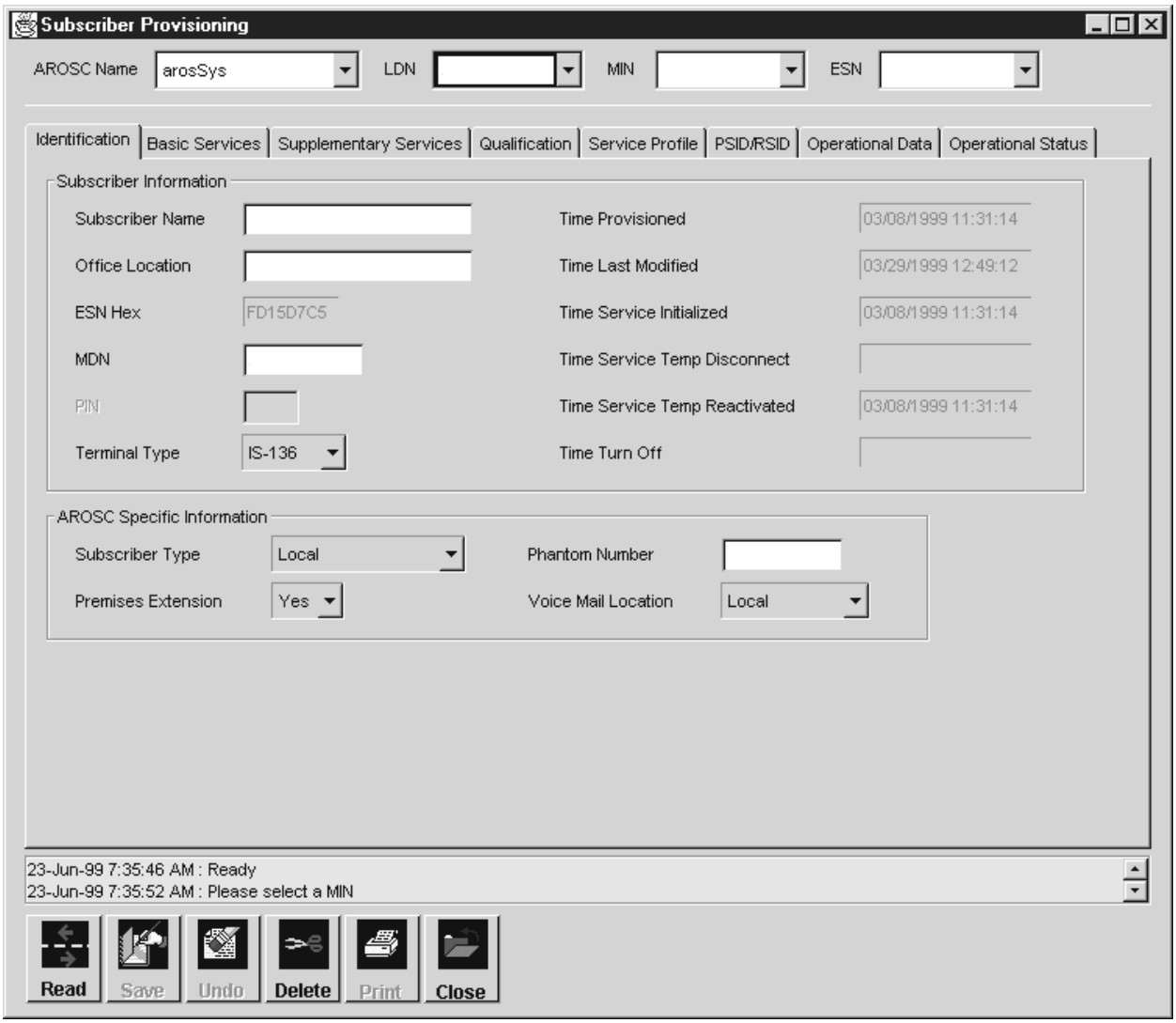
This section explains how to provision test mobile phones so they can be used to check traffic picocells.

Multiple users can access and use subscriber configuration windows at the same time.

Subscriber provisioning

Enter and verify the subscriber provisioning information.

1. From the AIReach Office window:
   a. Select the **Configure** → **Subscribers**.
   b. Click the **Identification** tab.
   Initially, this window does not contain data.



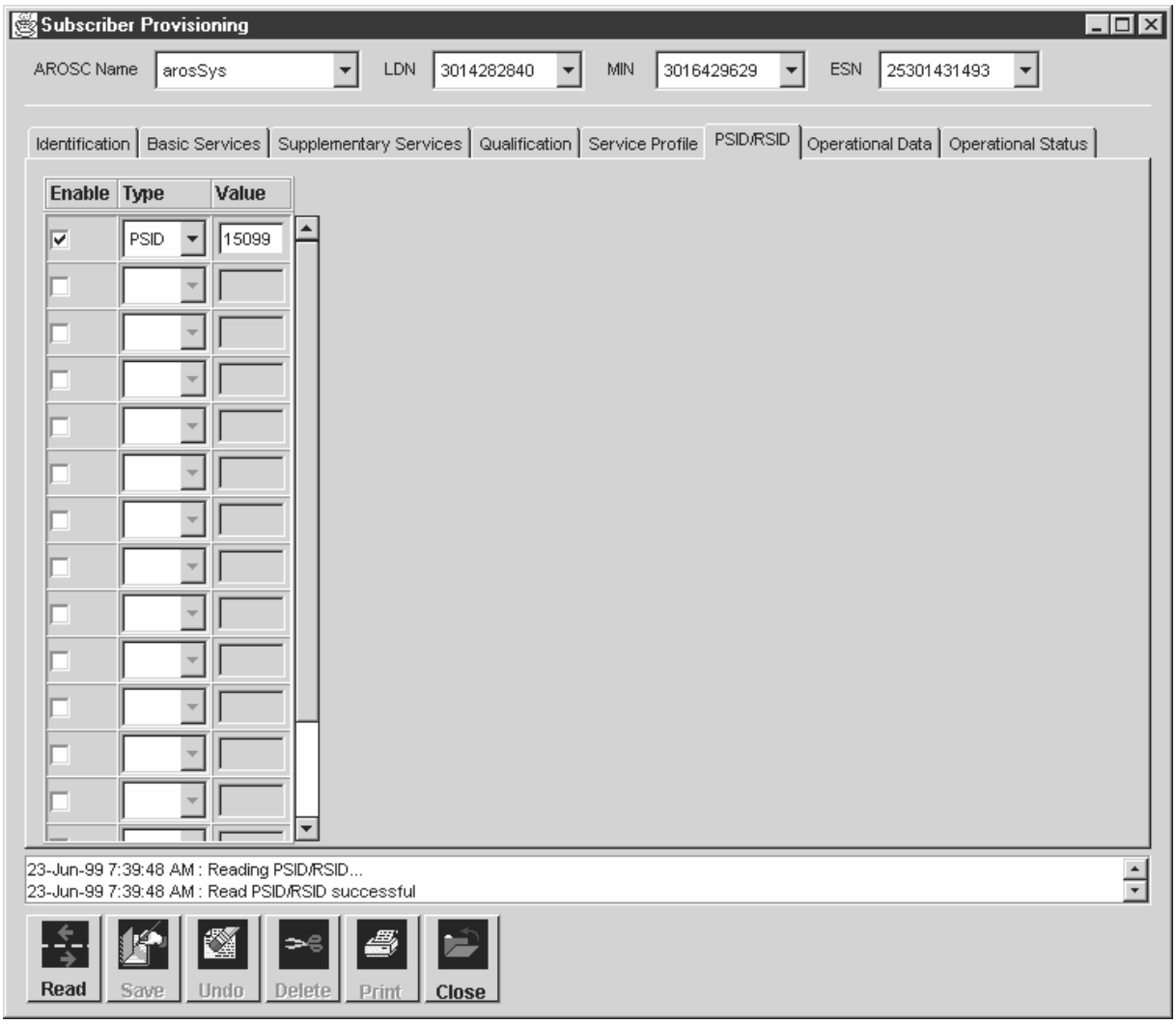
2. Select the **AROSC Name** using the pulldown menu.
3. Enter the first test mobile LDN, MIN, and ESN values, then click **Save**.
4. Select Subscriber Type: **Local**.
5. Select Premises Extension: **No**.
6. Click **Save**.

7. Click the **Basic Services** tab.
8. Enter the information; then click **Save**.

9. Select the **Supplementary Services** tab.
10. Enter the information; then click **Save**.

11. Select the **Service Profile** tab.
12. Enter the information; then click **Save**.

13. Select the **PSID/RSID** tab.
14. Enter the PSID value.
    When you enter a value, press the Enter or Tab key afterward. The **Save** button is "grayed" (not available) until you press the Enter or Tab key.
15. After entering the information; click **Save**.



16. Click the **Operational Data** tab.
17. Enter or verify the specified values; then click **Save**.

18. Click the **Operational Status** tab.
19. Verify that the specified HLR Flags and VLR Flags are displayed.

6.7

Programming test mobile phones

The next step (detailed in Section 6.9) is to place test calls to test the picocells. However, before phones can be used for testing, they must be programmed for the customer system, as explained below, and then registered (as explained in Section 6.8).

Installers use Nokia 6120, 6160, or 6161 mobile phones to test the AIReach OS. To program a Nokia series 6000 mobile phone for testing, follow the steps below. All other necessary values are loaded when the phone is registered onto the AIReach OS.

1. Enter ***3001#12345#**.
2. Activate field test mode:
   a. Press ^ until **`Field Test`** is highlighted.
   b. Press \ (OK).
   c. Press ^ until **`Enabled`** is highlighted.
   d. Press \ .
3. Enter the assigned MIN:
   a. Press ^ until **`NAM1`** is highlighted.
   b. Press \ .
   c. Press v until **`Own Number`** is highlighted.
   d. Verify that the MIN displayed is the correct MIN.
   e. *If the displayed MIN is not correct:*
      i. Press \ .
      ii. Enter the correct MIN
      iii. Press \ .

Registering test mobile phones

To register the test mobile phones on the AIReach OS, follow the steps below.

Prerequisites:

- The test phone must be provisioned, with the correct MIN and ESN (Section 6.6).
- The phone must be in field test mode (Section 6.7).

Registration procedure:

These instructions are for Nokia 6120 and 6160 mobile phones.

1. Power the phone off, then on.
2. Make sure the phone is on the correct band:

   The phone must be on the correct band before you initiate registration. When the phone is in field test mode, the band is displayed on the third line of window 01. A lowercase **a** or **b** represent the two 850 MHz cellular bands, and uppercase **A** through **F** represents the 1900 MHz PCS bands. If the phone camps on an incorrect band, power cycle the phone while shielding the antenna. The phone should begin to search each band. *Once it begins searching the correct band, proceed with step 3 before the phone moves to the next band.*
3. Select **Menu**.
4. Scroll down the options and select **System**.
5. Select **New Search** and **OK**.

   The phone should display **`Searching`** and then **`New System – xxxxxx`**, where **`xxxxxx`** is the alpha tag (alphanumeric SID) for the system.
6. *If the displayed alpha tag is the alpha tag assigned to the AIReach OS,* select **OK** complete the registration.

   (If you don't know the AIReach OS alphanumeric SID, you can find it on the Controller: From the AIReach Office banner menu, select **Configure** → **BSC Configuration**, and then click the **Network** tab.)

   When the phone is registered on the system, the alpha tag is displayed in window 07 of the test phone.
7. *If the displayed alpha tag is <u>not</u> the alpha tag assigned to the AIReach OS,* select **Next** to continue searching.

   If the phone displays **`No New Systems`**, verify that the correct information is entered in the subscriber window (Section 6.6), paying special attention to the MIN, ESN, and PSID values. Then repeat steps 1 through 6 to register the phone on the system.

Placing test calls

The procedures below explain how to test all transceivers in each installed traffic picocell.

1. Determine which picocell slots contain transceivers (BTCs).

   A label attached to the picocell tells you which slots contain BTCs. The slot arrangement and numbering scheme are shown in Figure 6-5.

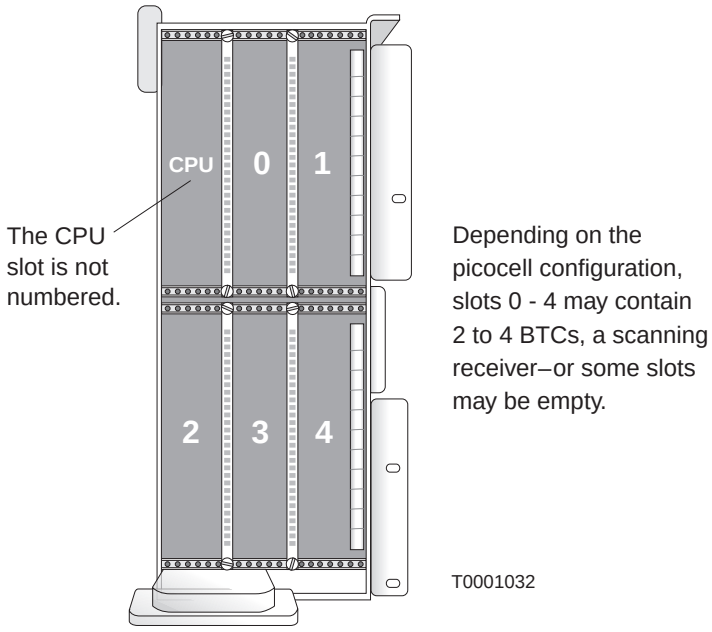


Figure 6-5 Picocell slot numbers

2. From the AIReach Office Window, select **Configure** → **BSC Configuration**.
3. Click the **BTSs** tab.
4. Highlight and double–click on the traffic picocell to be tested, and click the **BTS Components** tab.

First transceiver test

Test the first transceiver (any one) as follows:

1. Leave the transceiver to be tested in service (INS). Take all other transceivers (BTCs) out of service (OOS).
   a. For each slot that contains a BTC:
      i. Select **BTC** from the Hardware Type dropdown list.
      ii. Select **OOS** from the Desired State dropdown list.
   b. Click **Accept**.

      The software displays the AROSC Configuration window.
2. Record the power level displayed on the test mobiles.
3. Initiate a mobile–to–mobile test call. (Dial the 4–digit LDN assigned to the other test mobile.)

4. The test is successful if the transceiver processes the call *and* the displayed power level reading varies no more than 5 units from all other picocells.
5. Notify the MRC and request an RMA if:
   - The transceiver fails to process a test call.
   - The power level reading varies by more than 5 units compared with readings from all other picocells.

Testing the remaining transceivers

Test the remaining transceivers as follows:

1. Bring another traffic picocell transceiver into service:
   a. Highlight the picocell to be tested and click the **BTS Components** tab.
   b. For the transceiver just tested, select **OOS** from the Desired State dropdown list.
   c. For the BTC to be tested:
      i. Select **BTC** as the Hardware Type.
      ii. Select **AUTO** from the Desired State dropdown list.
   d. Click **Accept**.
      The software displays the AROSC Configuration window.
2. Repeat the test call procedure for all transceivers installed in the traffic picocell being tested.
   (Record power level; initiate test call; observe power level—steps 2 through 4 in the previous section.)
3. After testing all transceivers, turn off and disconnect the traffic picocell from the Controller.
4. Repeat the test call procedure for each traffic picocell. (Test all transceivers.)
5. In the event you find a failed transceiver, toe tag and ship the picocell to the MRC, with assigned RMA number.
   Do not ship any components without an RMA number.

Additional phone programming procedures

The following programming procedures for Nokia Series 6000 mobile phones are provided for the installer's convenience. However, normally, these procedures are not required to complete and test the installation.

Home system ID

To program the home system ID number for a Nokia 6000 series mobile phone:

1. Enter ***3001#12345#**.
2. Press ▲ until **Field Test** displays, then press \ .
3. Press ▲ until **Enabled** is highlighted and press \ (OK).
4. Press ▲ until **NAM1** is highlighted and press \ .
   Verify **Home System ID** displays **13**.
5. If **13** does not display, press \ , enter **13** and press \ .

Home SOC

To program the Home SOC for a Nokia series 6000 phone:

1. Press ▼ until **Home SOC** displays. Verify that the **Home SOC** displays **4**.
2. If the **Home SOC** is not correct, press \ , enter **4**, and press \ .

PSID/RSID number

To program the PSID/RSID number:

1. Press ▼ until **PSID/RSID** displays and press \ .
2. Select ▼ **P/RSID 1**.
3. Press until the **PSID/RSID** displays. Verify that **15099** displays for the **PSID**.
4. If the **PSID** is incorrect, press \ , enter the **PSID 15099**, and press \ .

System ID number

To program the system ID number for a Nokia series 6000 phone:

1. Press ▼ until the **System ID** displays and press \ .
2. Verify that the **System ID** displays **13**.
3. If the **System ID** is incorrect, press \ , enter **13**, and press \ .

Operator Code (SOC)

To program the Operator Code (SOC):

1. Press ⌄ until the **Operator Code (SOC)** displays and press \ .
2. Verify that the **Operator Code** displays **4**.
3. If the **Operator Code** is incorrect, press \ , enter **4**, and press \ .

NAM status

To program the NAM Status for a Nokia series 6000 phone:

1. Press ⌄ or / (*right* button) until **NAM1** displays and press \ .
2. Press ⌃ until **Change Defaults** displays and press \ .
3. Verify that the **NAM Status** displays **enabled**.
4. If the **NAM Status** is incorrect, highlight **enabled** and press \ .
5. Press / (*right* button) until **NAM1** is highlighted.
6. Press ⌄ until **NAM2** displays and press \ .
7. Press ⌃ until **Change Defaults** displays and press \ .
8. Verify that the **NAM Status** displays **disabled**.
9. If the **NAM Status** is incorrect, highlight **disabled** and press \ .
10. Press ⌄ until **NAM3** is highlighted and press \ .
11. Press ⌃ until **Change Defaults** displays and press \ .
12. Verify that the **NAM Status** displays **disabled**.
13. If the **NAM Status** is incorrect, highlight **disabled** and press \ .

Initializing settings

To initialize changed settings for a Nokia series 6000 phone:

(You do not need to do these steps after putting the phone into field test mode and entering the MIN.)

1. Power off the cellular phone and then turn the power on.
2. Press \ (Menu) to display the menu.
3. Press ^ or v until **Setting** displays and press \ .
4. Press v until **Network Services** displays.
5. Verify that **digital & analog** displays.
6. If **digital & analog** does not display, press v until **digital & analog** displays and press \ .
7. Press v until **Public System** displays and press \ .
8. Press ^ until **Any System** is highlighted and press \ .
9. Press / (*right* button) until the main screen displays.
10. Press v until **System** displays and press \ .
11. Highlight **New Search** and press \ .
12. Verify that **Alpha Tag** displays and press \ .

Chapter 7

Installing picocells

This chapter describes how to install a picocell at the permanent site. It includes the following sections:

Install the scanning picocell first, and then the traffic picocells.

Follow the instructions in the *AIReach OS Configuration Report* for specifications on picocell location, cable labeling and telco block assignments.

Important: All T1 wiring must comply with TIA/EIA–568A and TIA/EIA–606. (In Canada, must comply with CSA Standards T528 and 529.)

7.1

Preparing for picocell installation

CAUTION

Before removing or installing electronic components, make sure static electricity has been discharged from yourself and any object that will contact the component. Wear a new or recently tested anti–static wrist strap and use an anti–static pad while handling components.

Failure to follow these instructions could result in damage to components.

Before you begin installing picocells, ensure that . . .

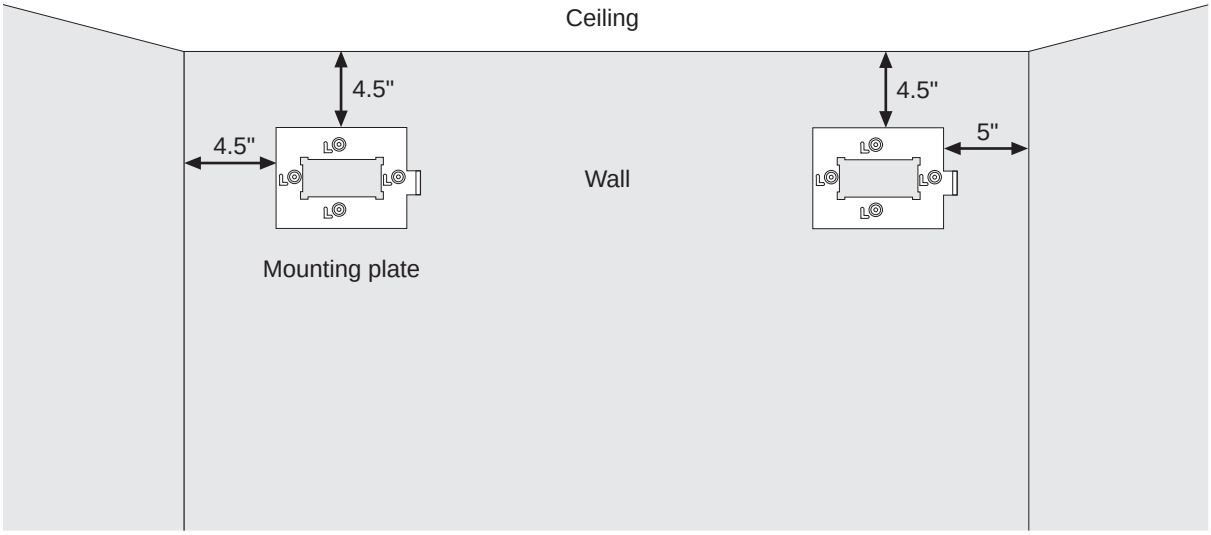
- The power supply for line power is mounted in the telco room and correctly connected to the telco block.
- The T1 cables are punched down and correctly labeled on the telco block.
- The power supply voltage to the picocell is –48 Vdc.
- The picocell location will not interfere with door clearances.
- The picocell will not be located in an inappropriate room (for example: a room without air conditioning).

Mounting the picocells

The picocell is designed to be attached to different wall surfaces: wallboard, concrete, wood, or metal or wood studs.

Installing the mounting plate

The mounting plate must have at least 4.5 to 5. inches of clearance on all sides (from ceiling, floor, and walls) so the picocell will have proper clearance (3 inches minimum) for mounting and ventilation. See Figure 7-1.



The clearances shown above allow a 3-inch minimum clearance on the sides and top of the picocell, when it is mounted.

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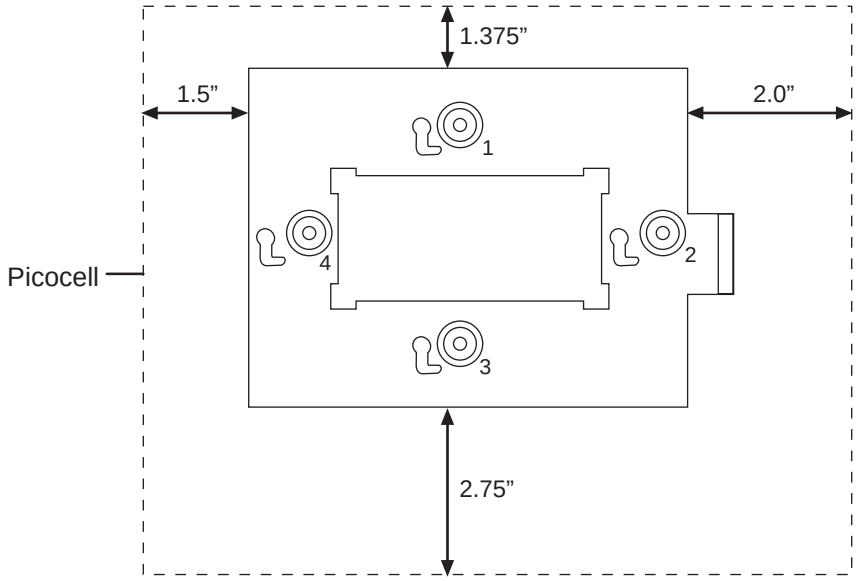
Figure 7-1 Placing the mounting plate to allow proper clearance around the picocell

Figure 7-2 shows the position of the mounting plate relative to the picocell.



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Notice that clearance for the mounting plate is not the same on each side.

Figure 7-2 Position of the picocell on the mounting plate

Note

This note applies only to pre–production picocells: Mounting plate revisions are not upward compatible. This means you cannot use Revision B plates on Revision C picocells, but you can use Revision C plates on Revision B picocells.

Fasteners

To mount the picocell mounting plate to the wall surface, **use only the fasteners shown in Table 7-1 —these are the only approved fasteners.** See the *AIReach Office Configuration Report* for site specifications.

For wood or metal studs, HNS recommends two fasteners. See Table 7-1 and Figure 7-3.

For walls composed of concrete, block, or drywall, HNS recommends four fasteners. See Table 7-1 and Figure 7-4.

Table 7-1 Approved mounting plate fasteners

Surface	Fastener	Fastener part number	Hole locations [1]
Drywall (hollow)	E–Z Anchor self–drilling drywall anchor and screw	9010193–0001	1, 2, 3, 4
Concrete block or concrete	Lead anchor for 10–24 screw	9004929–0001	1, 2, 3, 4
	Phillips head machine screw, 10–24 x 3/4”	9003333–0074	
Metal wall or metal studs	Sheet metal screw, self–drilling, self–tapping, 10 x 3/4”	1028868–0018	1, 3
Wood wall or wood studs	Wood screw, 10 x 1–1/4”	1028228–0021	1, 3
[1] As shown in figures 7-3 and 7-4.			

If the picocell is located near a door, make sure the door opens without hitting the picocell:

1. Mount the picocell so the bottom of the picocell is above the top of the door and door hardware, or
2. Mount the picocell far enough from the door so the door can open fully without hitting the picocell.

Note

If you use option 1 to mount the picocell near a door, remember to maintain the proper clearance between the top edge of the picocell and the ceiling.

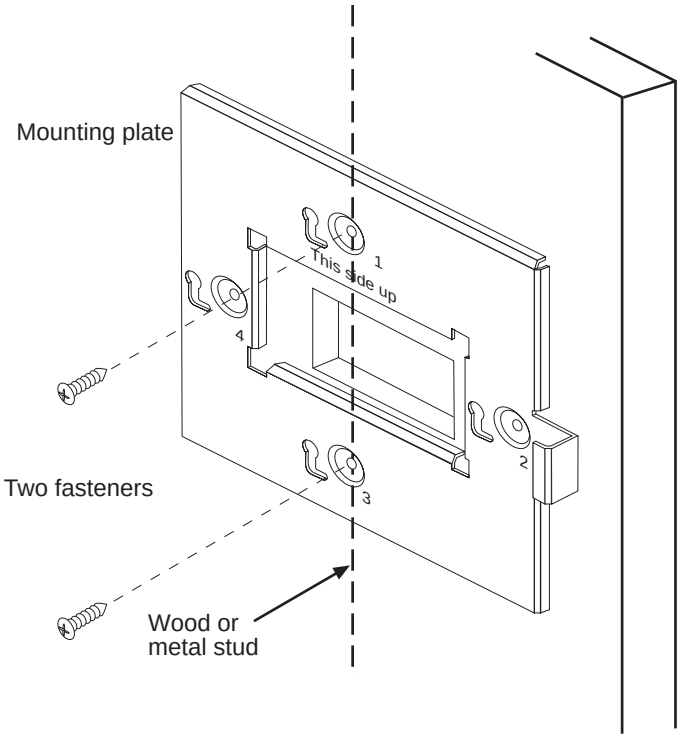


Figure 7-3 Attaching the picocell mounting plate to wood or metal studs

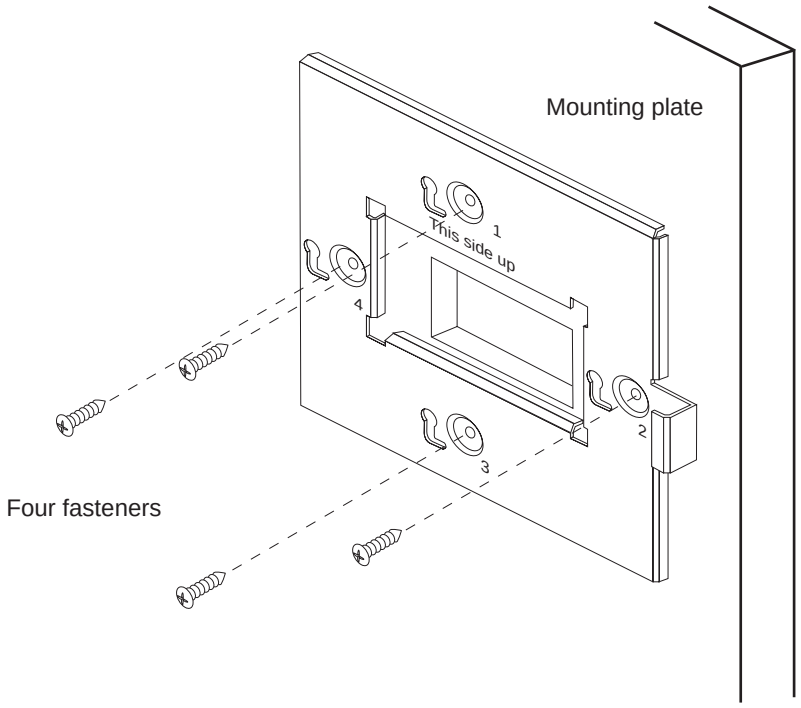


Figure 7-4 Attaching the picocell mounting plate to concrete, block, or wallboard

To attach the mounting plate (for all wall types):

1. Position the mounting plate on the wall:
   a. Make sure the part labeled “This side up” is on top.
   b. Allow at least the minimum clearance, as shown in Figure 7-1.
   c. Make sure the mounting plate is level.
2. Mark on the wall the position of each mounting screw.
3. *If the cable to the picocell will be installed through the wall and mounting plate:*
   a. Mark on the wall the outline of the rectangular hole in the center of the mounting plate.
   b. Remove the plate so you can cut the hole.
   c. Cut the hole in the wall, inside the rectangular wall marking.
4. Mount the mounting plate on the wall using the fasteners specified in Table 7-1 .

Installing and connecting picocells

This procedure applies to both the scanning picocell and traffic picocells.

Install the scanning picocell in its permanent location prior to completing the 24–hour (minimum) frequency band scan (section 7.4).

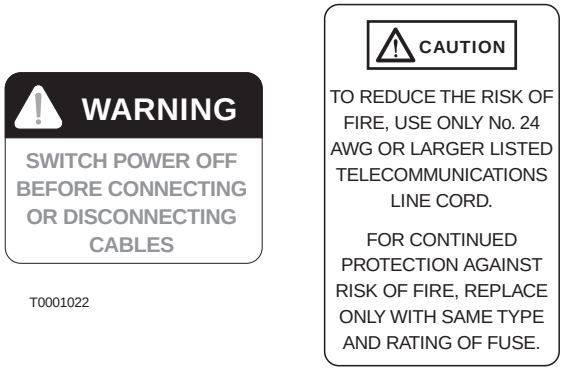
To save time, initiate the 24–hour frequency band scan (Section 7.4) and then install the traffic picocells at their permanent locations while the band scan is running.

Note

The site–specific *AIReach Office Configuration Report* contains the information needed to install the picocells, including locations where picocells are to be installed, cable labeling, punchdown block assignments, and required fasteners.

Warnings and cautions

The following labels appear on the picocell connector panel:



Labels on picocell

As indicated by the WARNING label, make sure the picocell power switch is OFF (middle position) before connecting or disconnecting cables. This is to protect the picocell connectors from possible damage.

As indicated by the CAUTION label, use only No. 24 AWG line cord to connect to the VOICE/DATA ports. If you replace the picocell fuse, use only a fuse of the type and rating identified on the fuse label.

WARNING

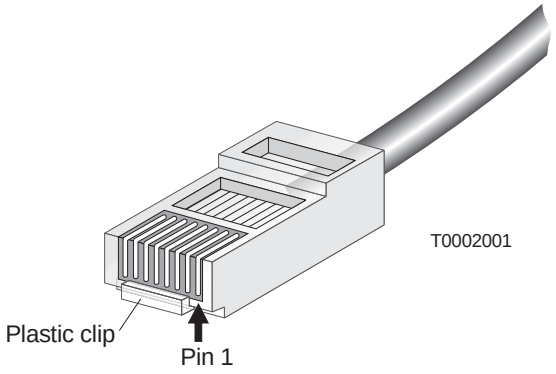
To reduce the risk of fire, use only No. 24 AWG or larger line cord to connect to the picocell, and replace the fuse only with a fuse of the type and rating identified on the fuse label.

Failure to heed these warnings could result in personal injury or death.

Picocell connections

Connect the T1/power cable as follows:

1. Terminate the T1 cable(s) with RJ–45 connectors on each end using the pinout plan shown in Table 7-2 .



RJ–45 connector, showing pin 1 position

Table 7-2 T1 (RJ–45) connector pinouts

Pin	T1 connector signal	CAT 5 color coding
1	RX RING	White–blue
2	RX TIP	Blue–white
3	+VDC1 (GND)	White–green
4	TX RING	White–orange
5	TX TIP	Orange–white
6	–VDC1	Green–white
7	+VDC2 (GND)	White–brown
8	–VDC2	Brown–white

2. Label the cable at the picocell end.

3. Route the T1/power cable through the opening in the wall mounting plate (as shown in Figure 7-5).

   An acceptable alternative is to run the cable down from the ceiling, along the wall to the picocell.

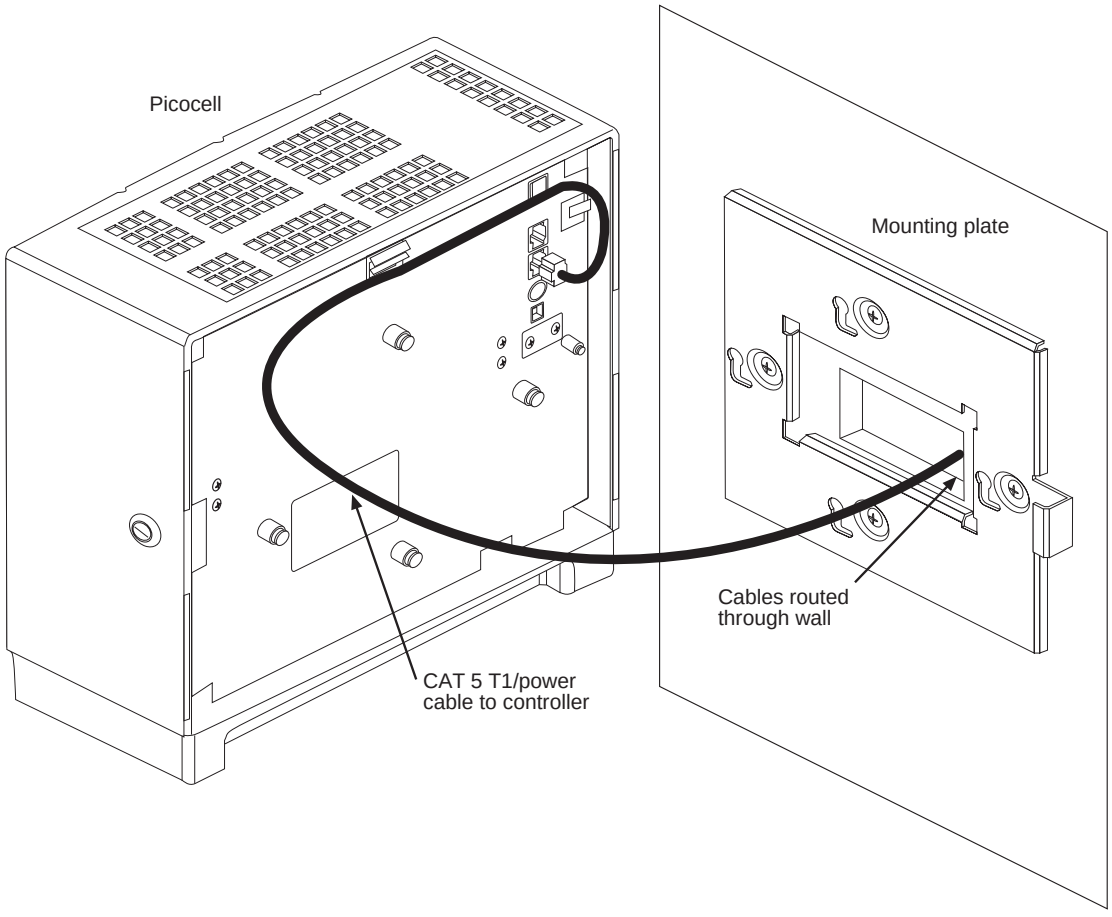


Figure 7-5 Cabling the picocell

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4. Connect the T1 cable (with RJ–45 connector) to the appropriate picocell port, as shown in Figure 7-6.

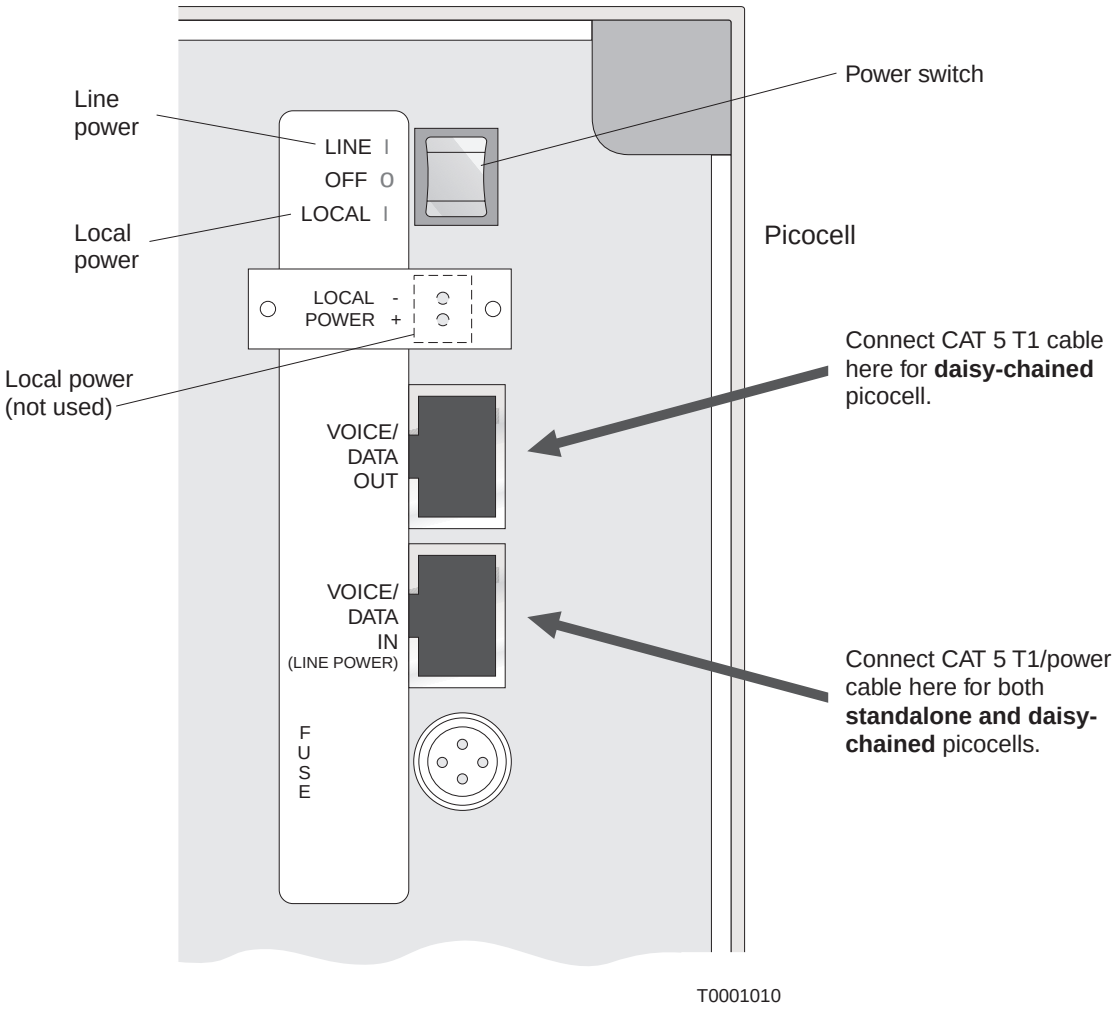


Figure 7-6 T1 cable and power connections at the picocell

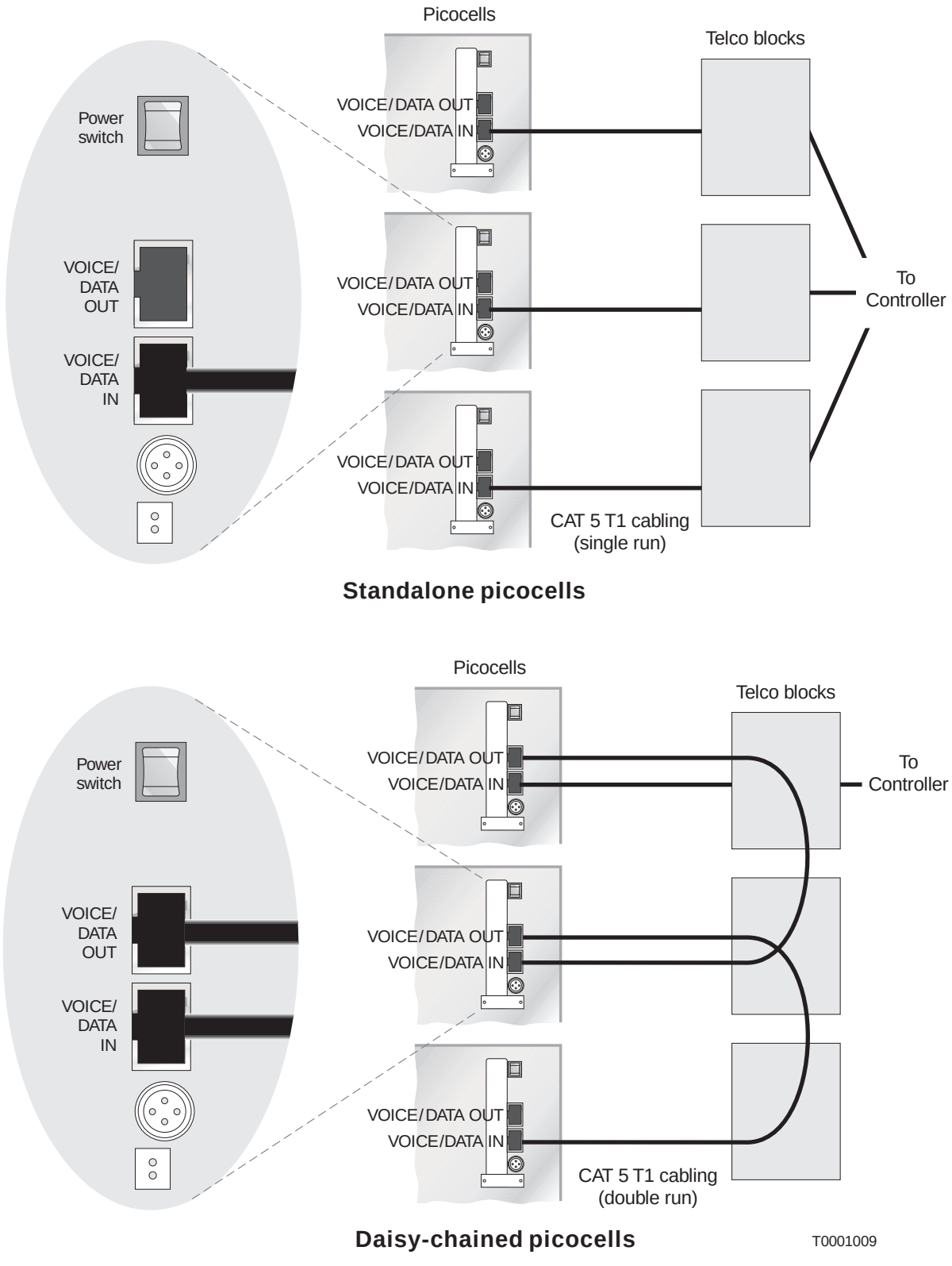


Figure 7-7 T1 cabling for standalone and daisy–chained picocells

Mounting the picocell

Mount the picocell as follows:

1. Power on the picocell by pressing the power switch to the LINE position.
2. Mount the picocell to the mounting plate by aligning the lock on the picocell housing with the positioning tab on the mounting plate, as shown in Figure 7-8.

WARNING

When installing the picocell on the mounting plate, use care to avoid falling and injuring yourself.

3. Push the picocell into the mounting plate, and then slide it down and to the right to the locking position.
4. Turn the lock key to the horizontal position to lock the unit after it is mounted.

   If the key is difficult or impossible to turn, the picocell may not be properly mounted. If this is the case, reinstall the picocell on the mounting plate.

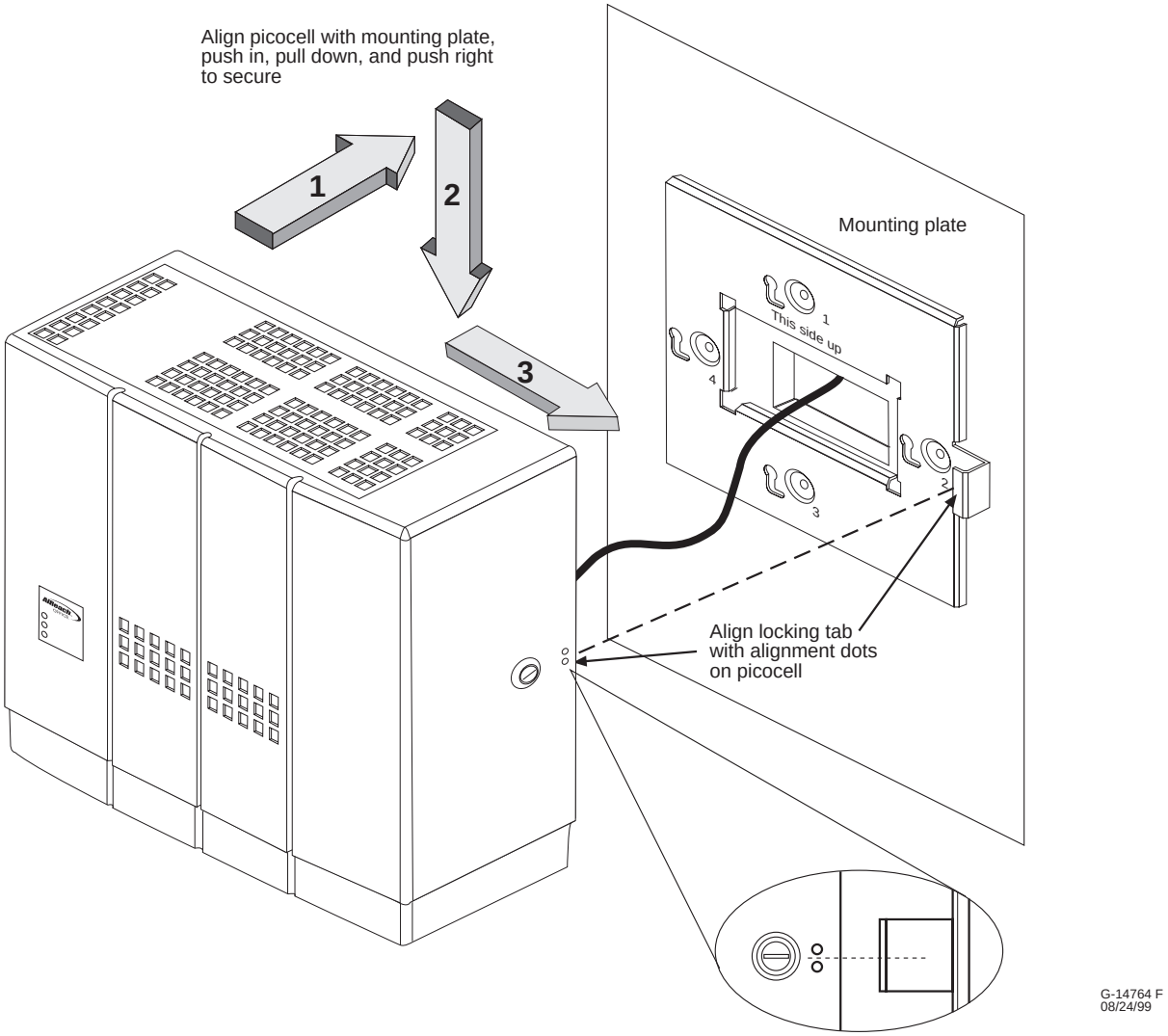


Figure 7-8 Mounting the picocell

5. Punch down and label the T1 cables on the telco room termination block.

6. Set up the power connection:
   a. Mount the power supply in the telco room.
      Typically, the power supply is mounted to plywood.
   b. Remove the DIN connector from the power wire.
   c. Strip the end of the wire.
   d. Clip the green wire (not used), fold it back, and heat shrink it.
   e. Connect the wires from the power supply to the terminal block, as shown in Figure 7-9 and Table 7-3 .
   f. Plug the power cable into a 110 Vac outlet.

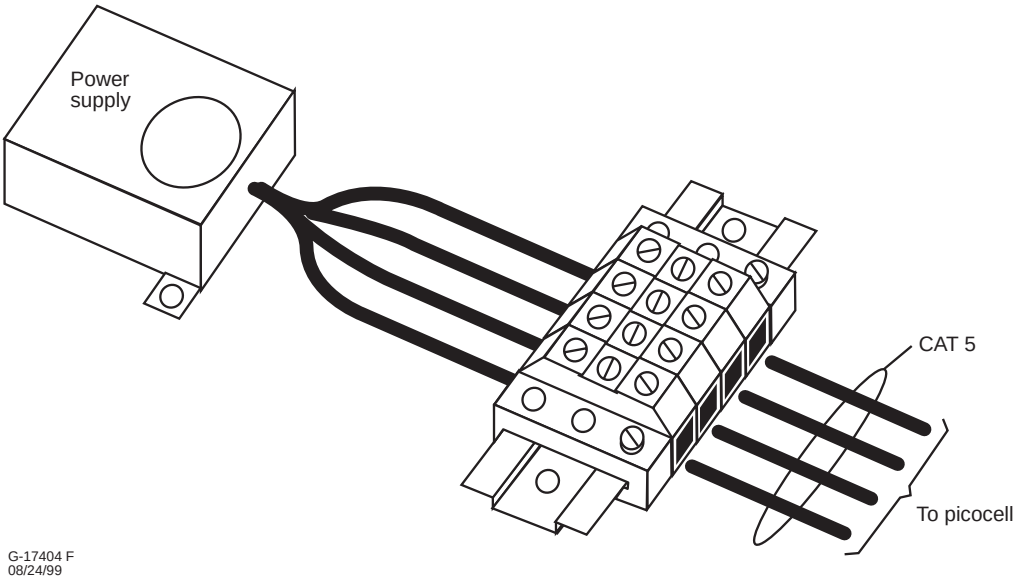


Figure 7-9 Power terminal block connections

Table 7-3 Power supply and CAT 5 wire colors

	Power supply wire	Cat 5 wire
–48 Vdc load	White	Green–white
	Black	Brown–white
–48 Vdc return	Red	White–green
	Brown	White–brown
AC ground (not used)	Green	Not applicable

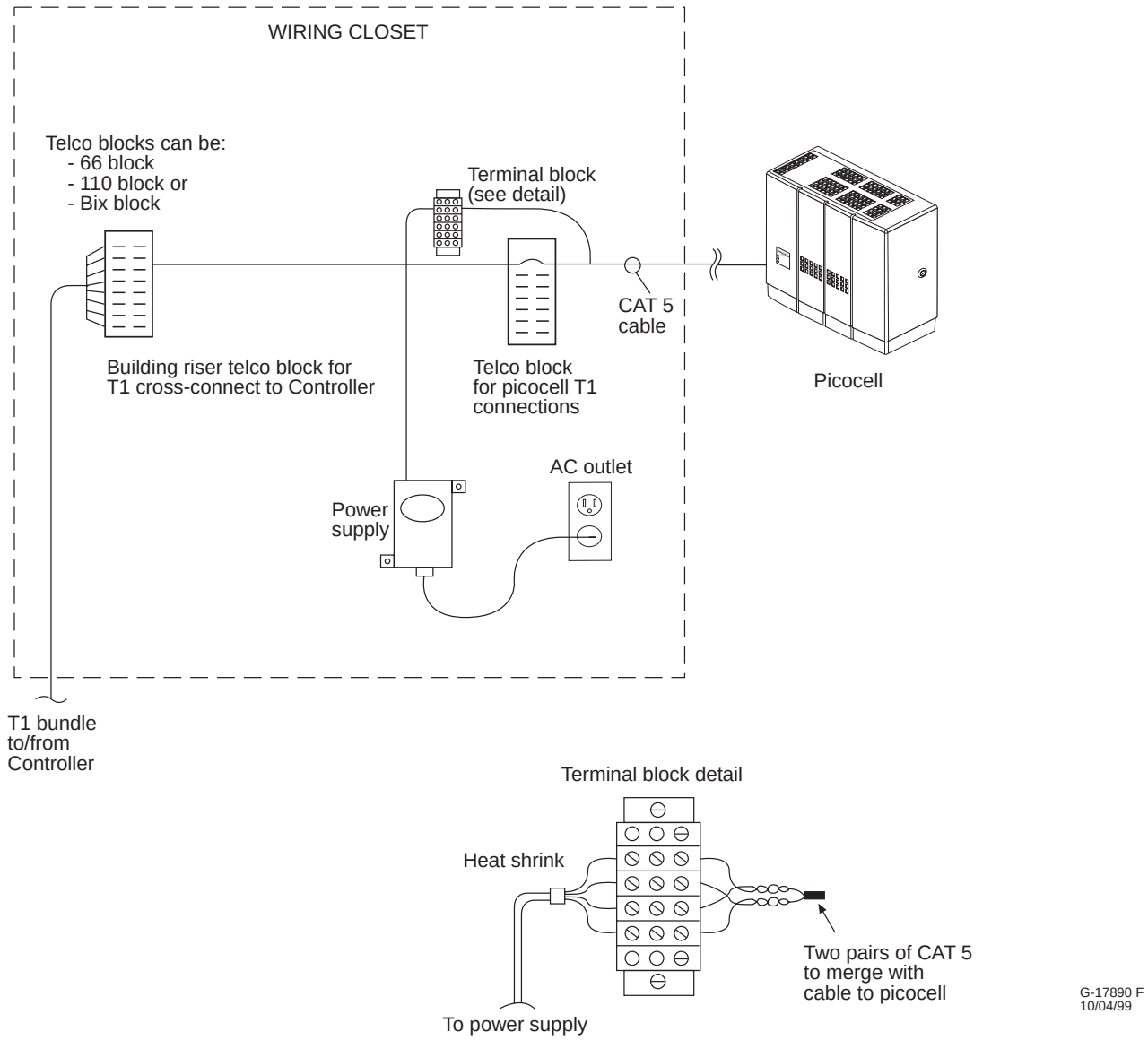


Figure 7-10 Picocell connections at the telco closet

T1 wiring and flip

Important: All T1 wiring must comply with TIA/EIA–568A and TIA/EIA–606. (In Canada, T1 wiring must comply with CSA Standards T528 and T529.) These standards are listed in Appendix B, Section B.5.

A T568B–compliant wiring flip *must be used* between:

- The Controller and picocell
- Daisy–chained picocells (that is, between each picocell–to–picocell connection)

The flip is accomplished at the patch panel (as shown in Figure 7-11) or using a modular jack (Figure 7-12). The flip must be T568B compliant, as shown in these two illustrations.

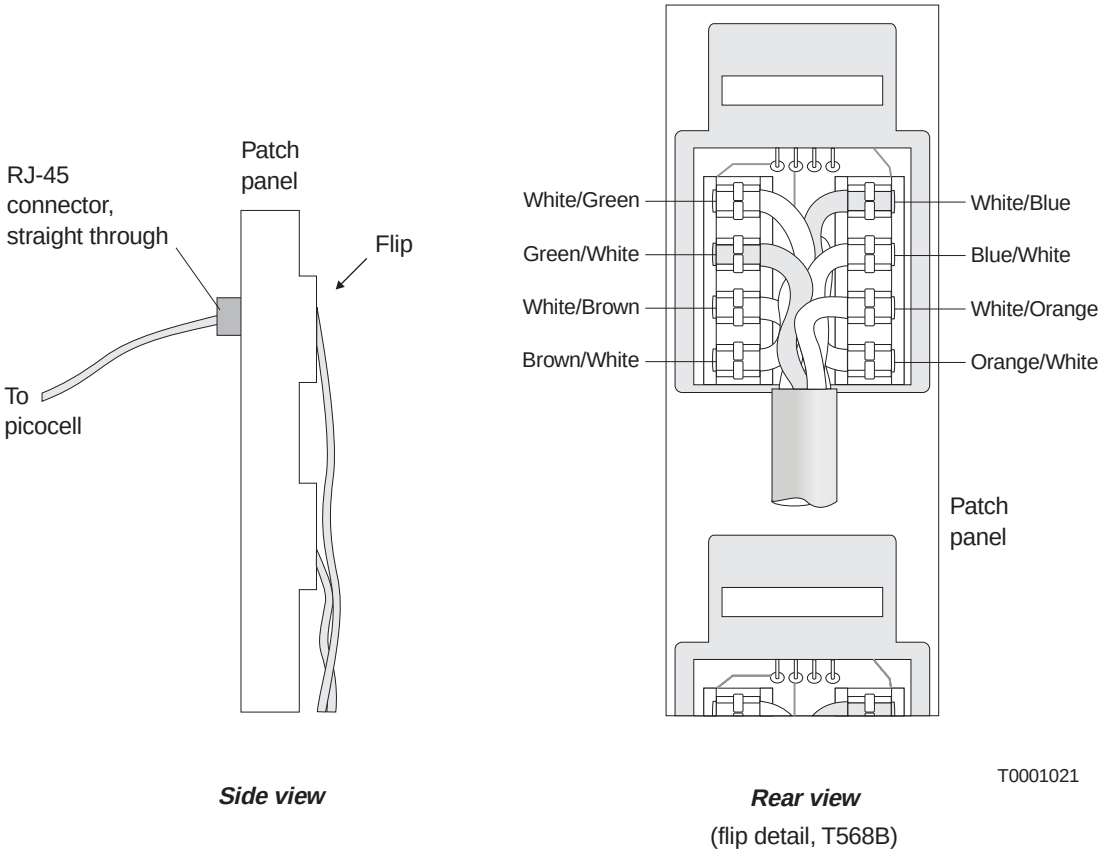
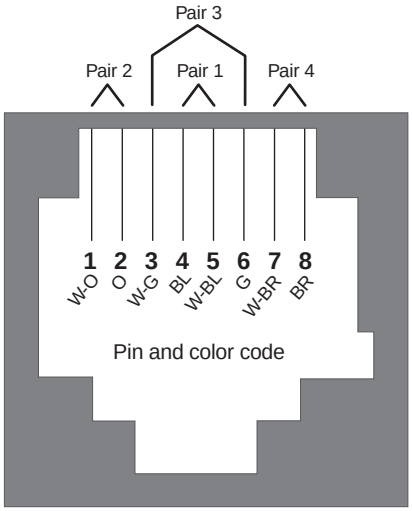


Figure 7-11 T568B–compliant wiring flip at patch panel



View from front opening, tab down

RJ-45 connector pinout for T568B-compliant flip

T568B				Flipped end			
Pin	**Signal**		**Color code**	**Pin**	**Signal**		**Color code**
1	TX	Ring	White-orange	5	RX	Ring	White-blue
2	TX	Tip	Orange-white	4	RX	Tip	Blue-white
3	Pos	DC	White-green	3	Pos	DC	White-green
4	RX	Tip	Blue-white	1	TX	Ring	White-orange
5	RX	Ring	White-blue	2	TX	Tip	Orange-white
6	Neg	DC	Green-white	6	Neg	DC	Green-white
7	Pos	DC	White-brown	7	Pos	DC	White-brown
8	Neg	DC	Brown-white	8	Neg	DC	Brown-white

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Figure 7-12 T568B–compliant wiring flip using modular jack

1. Terminate and label the CAT 5 T1 cable on the specified terminal block, using the specified pin assignments.

   Label the cables in accordance with TIA/EIA–606.
2. Terminate the T1 cable with an RJ–45 connector at the System Controller end.
3. Plug the RJ–45 connector into the first Quad T1 card (in slot 9), second port from the top, at the back of the System Controller.

Note

The physical port assignment for the T1 cable must match the virtual port assignment made in the AIReach OS software.

Check for proper operation

Verify that the picocell successfully completes its self test and that the Power LED (top) and Temp LED (middle) are green after approximately 2 minutes. The Alarm LED (bottom) is orange, then turns off—this is normal cycling of the unit.

Performing the frequency band scan

Section 6.3 explains how to initiate a test (6–minute) frequency band scan (starting on page 6–10). Now that the system is installed, you perform a band scan to set up the system for normal operation—specifically, to determine what frequencies the AIReach OS can use. **The post–installation scan takes a minimum of 24 hours.** The *AIReach Office Configuration Report* states the actual time requirement.

Initiate the 24–hour band scan as explained in Section 6.3 (page 6–10), *except:*

In the Band Scan Parameters window, set Critical RSSI bin to 3 (Uplink and Downlink).

Otherwise, follow the directions in Section 6.3 (but ignore references to a 6–minute band scan).

Chapter 8

Connecting to external equipment

This chapter includes:

As shown in Figure 1-2 (page 1–2), the AIReach OS Controller connects to:

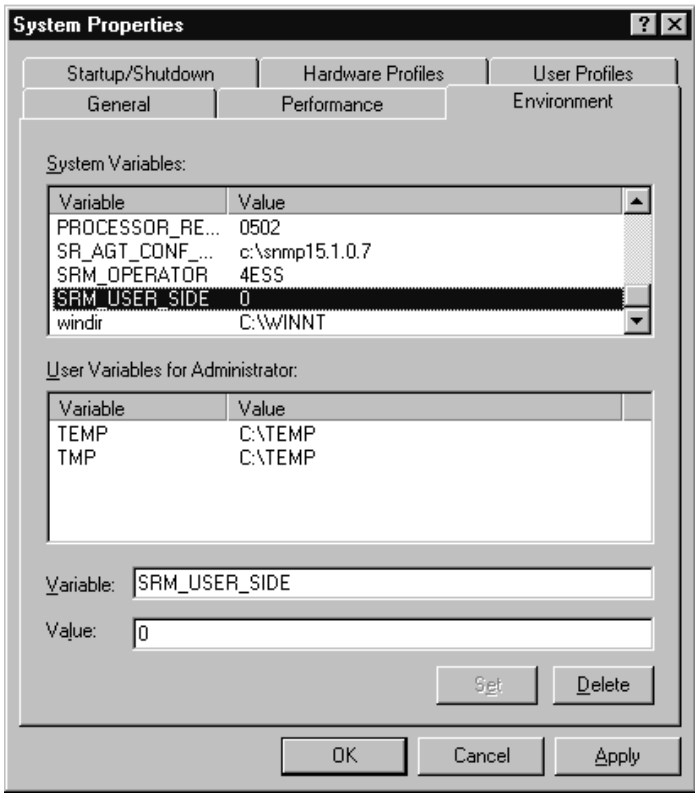
- The customer's PBX
- The macro cellular system
- The customer's corporate LAN (optional)

The procedures explained in this chapter are related to these connections.

Connecting the Controller to the PBX

To establish final System Controller connectivity, connect the Controller to the PBX and connect the analog line as follows:

1. Terminate the PBX T1 trunk CAT 5 cable with a RJ–45 connector.
2. Connect the PBX T1 trunk to port 1 of the assigned Quad T1 card.
3. Verify that the Controller configuration values indicated below are set to the values specified in the (customer site–specific) AIReach OS Configuration Report. If any values are not as specified, change them to the specified values.
   a. System Capability – For instructions concerning System Capability configuration, see page 4–17.
   b. Transport configuration – See page 4–18.
   c. MSC Configuration – See page 4–19.
   d. HLR Configuration – See page 4–21.
4. Configure the link between the Controller and the PBX:
   a. On the Controller, click **Start** → **Settings** → **Control Panel**.
   b. Double–click the **System** icon.
   c. Click the **Environment** tab (shown below).



d. In the System Variables listing, search for SRM_USER_SIDE and SRM_OPERATOR:

SRM_USER_SIDE
0 (**default**) – Set this variable to 0 if the Controller is on the network side of the ISDN interface.
1 – Set the variable to 1 if the Controller is on the user side of the ISDN interface.

SRM_OPERATOR
Protocol used on the ISDN link to the PBX:
4ESS (**default**)
Other possible values: DMS100, N12, and 5E10

If the variable is not present, the default value is applied.

If the default value is acceptable, no action is required if:

- The variable is not listed (because if the variable is not listed, the default is effective) *or*
- The variable is listed with the default value

e. *If you need to change a value and the variable is present:*
   i. In the list of System Variables, click the variable name to select it.
      The variable and value appear in the boxes at the bottom of the window.
   ii. Change the value to the correct setting.
   iii. Click **Set** to save the value.
   iv. Reboot the Controller so the change will take effect.

f. *If you need to change a value and the variable is not present:*
   i. Click on any variable name in the list of System Variables.
      The variable and value appear in the boxes at the bottom of the window.
   ii. In the Variable box at the bottom of the window, delete the variable name and enter the new variable name.
   iii. In the Value box immediately below the Variable box, delete the value and enter the correct value.
   iv. Click **Set** to save the value.
   v. Reboot the Controller so the changes will take effect.

Installing the SSL certificate

Follow the instructions in this section to obtain and install a Secure Socket Layer (SSL) certificate:

(SSL provides data encryption between the Controller and the IS–41 gateway.)

Creating the request file

First you create a file you will use to request an SSL certificate:

1. Open a DOS window by selecting **Start** → **Programs** → **Command Prompt**.
2. At the DOS prompt (**C:\>**) enter

   cd C:\Program Files\spst
3. At the DOS prompt (**C:\Program Files\spst\>**), create the files **csr.pem** and **spst.key** by entering:

ssleay.exe req –new –nodes –out csr.pem –config install\ca\ssleay.cnf

4. Enter the information indicated below when prompted. Substitute customer–specific information inside the brackets [ ] as appropriate.

```
Country Name (2 letter code) [US]:
State or Province Name (full name) [Maryland]:
Locality Name (city, town, etc.) [Germantown]:
Organization Name (company) [Hughes Network Systems]:
Organizational Unit Name (division) [Wireless Office Service]:
Common Name (webserver hostname) [209.84.215.36]:
```

   For **Common Name (webserver hostname)**, enter the IP address of the gateway's hostname. Ask the gateway provider what to use for the common name.
5. The program **ssleay.exe** generates the files **csr.pem** and **spst.key** in the **spst** folder.
6. Use Notepad to open **csr.pem** and change the line

   BEGIN CERTIFICATE REQUEST

   to

   BEGIN NEW CERTIFICATE REQUEST
7. At the end of the **csr.pem** file, change the line

   END CERTIFICATE REQUEST

   to

   END NEW CERTIFICATE REQUEST

Requesting the certificate

Request a certificate via e–mail from the appropriate service provider representative, with the **csr.pem** file edited in steps 6 and 7 above attached.

The service provider representative sends back the information you need to complete a certificate. (See Figure 8-1 for an example of a certificate.)

Completing the certificate

To complete the certificate, refer to Figure 8-1 and follow these instructions:

1. Copy the **<WOSC Certificate Follows>** block of information, starting with (and including) the header

   ----BEGIN CERTIFICATE----

   and ending with (and including) the footer

   ----END CERTIFICATE----

2. Paste the block just copied at the beginning of the **spst.key** file created in step 3 on page 8–4.
3. Save the modified **spst.key** file created in steps 1 and 2 above as **spst_c.pem**.
4. Open the file **spstca.pem**.
5. *If the CA certificate has already been installed*—that is, if **<CA Certificate Follows>** is already included in the file, as shown in Figure 8-1, proceed to the next section, *Installing the certificate*.
6. *If the CA certificate has not been installed,* follow these steps:
   a. Copy the **<CA Certificate Follows>** block of information, starting with the header

      ----BEGIN CERTIFICATE----

      and ending with the footer

      ----END CERTIFICATE----

   b. Paste the block just copied at the end of the **spstca.pem** file.

      Note

      The CA certificate may already be included in the **spstca.pem** file.

   c. Save the modified file created in steps a and b as **spstca.pem**.

```
> ====================<WOSC Certificate Follows>====================
>
> WOS Certificate follows:
>
> -----BEGIN CERTIFICATE-----
> MIICozCCAgygAwIBAgIBQTANBgkqhkiG9w0BAQQFADBoMQswCQYDVQQGEwJVUzEf
> MB0GA1UEChQWQVQmVCBXaXJlbGVzcyBTZXJ2aWNlczEQMA4GA1UECxMHVERHIExh
> YjEmMCQGA1UEAxMdVERHIExhYiBDZXJ0aWZpY2F0ZSBBdXRob3JpdHkwHhcNOTkx
> MTA4MTkzMjI0WhcNMDQxMTA2MTkzMjI0WjCBjjELMAkGA1UEBhMCVVMxETAPBgNV
> BAgTCE1hcnlsYW5kMRMwEQYDVQQHEwpHZXJtYW50b3duMR8wHQYDVQQKExZIdWdo
> ZXMgTmV0d29yayBTeXN0ZW1zMSAwHgYDVQQLExdXaXJlbGVzcyBPZmZpY2UgU2Vy
> dmljZTEUMBIGA1UEAxMLR01UV01EQUJEMDEwgZ8wDQYJKoZIhvcNAQEBBQADgY0A
> MIGJAoGBANFkiH/w8GNzFYX94D5amyPVuFH2kCVfF5SkS3oLyDlyoLtVuQifA+kf
> KXFAfy7FK7XSrWSwWTUusHt3RpQeNecpVDZLWV+yXEw8zV/G07RbUCLzSC+DETsX
> vSAfp48MkVXgMaSSiChuzKQxo2Rbzuwe9/t2ndI0UpLA8row18z9AgMBAAGjNjA0
> MBEGCWCGSAGG+EIBAQQEAwIAgDAfBgNVHSMEGDAWgBST+NNwPh0m0K0ZheiYX9yL
> buzkSTANBgkqhkiG9w0BAQQFAAOBgQADlh72BvdvtxnEueo7TbuOtbBwpmq8Uby3
> 5ST+U7is6XpkaYJP7FucsEamoPJH/DeO9Z3z/slha/QKvjQMX3W/Vadqg2kHk8QE
> XzR9HNHRss2xUs7F5c6ECbEwF3ciKpVZzzU1ACo9U7cp7qolWp1c782Jl1I31s8u
> lmjJ7NJ7Ww==
> -----END CERTIFICATE-----
>
>
> ====================<CA Certificate Follows>====================
>
> -----BEGIN CERTIFICATE-----
> MIICiDCCAfGgAwIBAgIBATANBgkqhkiG9w0BAQQFADBoMQswCQYDVQQGEwJVUzEf
> MB0GA1UEChQWQVQmVCBXaXJlbGVzcyBTZXJ2aWNlczEQMA4GA1UECxMHVERHIExh
> YjEmMCQGA1UEAxMdVERHIExhYiBDZXJ0aWZpY2F0ZSBBdXRob3JpdHkwHhcNOTgw
> NzMxMjI0MzEyWhcNMDAwNzMwMjI0MzEyWjBoMQswCQYDVQQGEwJVUzEfMB0GA1UE
> ChQWQVQmVCBXaXJlbGVzcyBTZXJ2aWNlczEQMA4GA1UECxMHVERHIExhYjEmMCQG
> A1UEAxMdVERHIExhYiBDZXJ0aWZpY2F0ZSBBdXRob3JpdHkwgZ8wDQYJKoZIhvcN
> AQEBBQADgY0AMIGJAoGBAKKVRDrifhgJJYri2bJDEKebKu5L+1OzNVESS5DkgtGR
> UOA7eAhodsPqe7+kYr1WRtc8hou8Baglc406IbdtKPxh3i+nkXeQ9gkKjhZhrrAM
> sl2EkvzgmyAz9mtjdmFyGNWSXBgIWYy7mrQQn/S5Rx7NyrYwcB4aeH+W4tXJ1maH
> AgMBAAGjQjBAMB0GA1UdDgQWBBST+NNwPh0m0K0ZheiYX9yLbuzkSTAfBgNVHSME
> GDAWgBST+NNwPh0m0K0ZheiYX9yLbuzkSTANBgkqhkiG9w0BAQQFAAOBgQByb81c
> yIa8tDY8L23gQXjVs+Mjsk9+WqyjQH/jMcoQusnH2dKXcJuj2LJiDZd0SHNvM8nz
> NrsxvW+YWjNDwE9626o6vxroR7V9lrJIzWSYSgrySNZvLC7SdhIr41AxrlBI028R
> MKH5M/KKr8PIre/JorP8rnn6hCjGynSnGkraEw==
> -----END CERTIFICATE-----
>
```

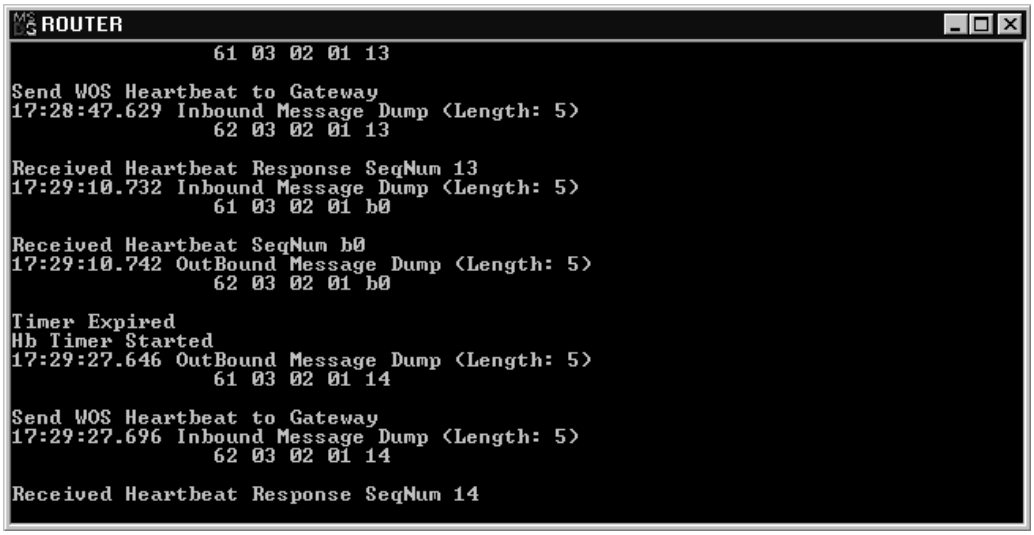
Figure 8-1 Example of a signed SSL certificate

Installing the certificate

Install the SSL certificate:

1. Open the AIReach Office Application if it is not already open.
2. Select **Configure** → **NSS** → **Systemwide** to open the System Configuration window.
3. Click the **Transport** tab.
4. In the WOS to Gateway Server Address line, enter the gateway address and port number. (Obtain these from the gateway provider.)
5. Click **Save**.
6. By default, the IS–41 link is configured to operate in secure mode. *If the IS–41 interface is operating in clear mode*, make these changes:
   a. Enter the clear mode address and port in the Transport window.
   b. Edit the **`startup.dat`** file in the bin directory of the current release: Change the router startup option from **`–ATTSSL`** to **`–ATT`** (clear mode).
7. Click the ROUTER application on the taskbar to verify router connectivity (heartbeat received) to the IS–41 gateway.

   If the gateway connection is active, the ROUTER window displays messages indicating that heartbeat has been received:



If a heartbeat is not received, ping the gateway to try to determine where the problem is. If you cannot resolve the problem, notify the service provider representative responsible for establishing IS–41 connectivity.

Repointing the HLR

Once the SSL link has been established and heartbeats are received from the gateway, repoint the AIReach OS HLR to the macro HLR, as follows:

1. From the AIReach Office banner menu, select **Configure → NSS → SystemWide**.
2. Select the **Line Range** tab.
3. Select the AROSC Name.
4. Change the HLR Point Code to an invalid but non–zero number, such as 1.1.1.
5. Restart the Router application by closing the Router window.
6. After the router restarts and heartbeats resume, update the BSC point code with the new remote point code:
   a. Open a Command Prompt window and enter
      `cd %aros_root_dir%\bin\msc`
   b. To open the file containing the remote point code, enter
      `notepad inst1.ini`
      Note the value of the **`remotepc`** entry in this file.
   c. Close **`inst1.ini`**.
   d. In the Command Prompt window, enter
      `cd %aros_root_dir%\bin`
   e. Enter
      `notepad inst1.ini`
   f. Change the value of the **`localpc`** entry to the value of **`remotepc`** noted in step 6b.
   g. Save the file.
   h. Reboot the Controller.

Installing a second LAN card and driver (optional)

If a second LAN card is required for an administrative LAN, follow the instructions below to install the second card and LAN card driver:

Installing the LAN card

Install the second LAN card in chassis slot 3, according to the manufacturer's instructions.

Note

The second LAN card must be the same brand and model as the LAN card shipped from the factory. Any exceptions must be approved through the TAC.

Installing the LAN card driver

To install the driver for the second LAN card:

Editing gwroutes.bat

1. Power up the Controller.
2. Use Notepad to open the file **`C:\gwroutes.bat`**.
3. Remove the comments from the lines

   `route DELETE 0.0.0.0`

   and

`route ADD –p 0.0.0.0 mask 0.0.0.0 xxx.xxx.xxx.xxx`

4. Replace `xxx.xxx.xxx.xxx` with the IP address for the administrative (second) LAN card.

   Obtain the IP address from the customer's network administrator.
5. Save the changes.

Install the driver

1. Click **Start** → **Settings** → **Control Panel**.
2. Double–click the **Network** icon to launch the networking window.
3. Click the **Adapters** tab.

   There should be two adapters listed.
4. Click **Add** to open the new adapter card window.
5. *If a driver was provided with the new LAN card,* click on **Have Disk** … to use the drivers provided with the LAN card.
6. Place the floppy disk or CD containing the driver into the Controller and select the appropriate disk drive.
7. *If a driver was not provided with the LAN card,* select the LAN card from the list of drivers shown.
8. *If a driver was not provided and is not listed,* contact TAC to obtain the correct driver.
9. Follow the on–screen instructions to install the driver.
10. Close the Network window.

Entering the IP address

1. Enter an IP address for the LAN card:
   a. For the IP address, enter the administrative IP address provided by the customer network administrator.
   b. Use a subnet mask value of 255.255.255.0 unless otherwise instructed by the network administrator.
   c. Do not enter a value for the default gateway.
2. Click the **DNS** tab and enter the IP address provided by the customer network administrator for the DNS server. If no DNS server is available, leave this field blank.
3. Close all remaining network windows.

   The software prompts you to reboot the Controller.
4. Click **OK**.
5. After the Controller reboots, verify that the IS–41 router reconnects—if it was previously connected: Verify that external IP addresses can be reached using a web browser or by pinging a remote address.

Enabling alarm paging

The AIReach OS can be configured to page the system operator when a critical or major alarm occurs. To enable alarm paging, you must:

- Install an external modem.
- Configure the operator's pager information in the AIReach OS.

Alarm paging also requires HipLink Lite software, which is factory–installed on the System Controller.

Instructions for installing the external modem and configuring the pager information are given below.

If the customer does not want to use alarm paging, proceed to Chapter 3.

Installing the external modem

Alarm paging can be set up to use one or two analog lines. The advantage of using two lines is that alarm pages are delivered even when someone is dialed into the Controller. The disadvantage of using two lines is the cost of the second line. The decision to use one or two lines should be made by the customer.

Follow these instructions to install the external modem:

If one analog line is used:

1. Connect the line to the input jack on the internal modem.
2. Daisy chain the analog line from the internal modem to the line–in jack on the external modem.
3. Connect the external modem to the serial port (COM1) on the back of the Controller.
4. Attach the power cable to the modem and to an outlet, and make sure the modem power switch (if present) is on.
5. Provide the dial–up number to the TAC—that is the direct inward dialing (DID) number of the line coming into the internal modem.

If two analog lines are used:

1. Connect one line to the input jack of the internal modem.
2. Connect the other line to the input jack on the external modem.
3. Connect the external modem to the serial port (COM1) on the back of the Controller.
4. Attach the power cable to the modem and to an outlet, and make sure the modem power switch (if present) is on.
5. Provide the dial–up number to the TAC—that is the direct inward dialing (DID) number of the line coming into the internal modem.

Note

If two lines are used, the line used for alarm paging does not have to be a DID line.

Configuring the AIReach OS for alarm paging

Configure the AIReach OS with the operator's pager, mobile phone, or beeper information, as explained below. (The HipLink software must already be installed.)

Notes

If the AIReach OS is configured to direct alarm pages to a mobile phone on the AIReach OS, the mobile phone may not receive an alarm page in the event of an outage.

If you need assistance using HipLink, call the Cross Communi–cations support hotline at (630) 964–4282.

Required information

Obtain the following information from the customer:

- Pager number
- PIN (for pagers)
- MIN (for mobile phones)
- Maximum character length

Editing the ArosPageInfo.dat file

You must enter the operator and page information in the file

`C:\HipLink\ArosPageInfo.dat`

A sample file is located in

`C:\%OMC_ROOT_DIR%\config\ArosPageInfo.dat`

To configure an operator to receive critical and major alarm pages:

1. Use Notepad to edit **`C:\HipLink\ArosPageInfo.dat`**, as explained in the following steps:
2. Edit **`ArosPageInfo.dat`** to include:

   ```
   PagingEnabled yes
   ```

   (Entries in **`ArosPageInfo.dat`** are not case–sensitive.)
3. Uncomment "UserData" (remove " # ") and change the information to the Controller name or number (10 characters maximum), for example:

   ```
   UserData AROSC1
   ```

   In this example, AROSC1 is a text string that uniquely identifies the Controller.

   If alarms will be sent to a beeper or non–alphanumeric pager, use numbers only.

   When an alarm occurs, the Controller name or number you enter is displayed on the pager.

4. Uncomment (remove " # " from) the appropriate lines in **`ArosPageInfo.dat`**, and add appropriate information to identify the pager or beeper type, service provider, and (for pagers only) personal identification number (PIN):

   Required for alphanumeric pagers:

   ```
   pagerType alpha
   serviceProvider <provider ID>
   pin <operator PIN>
   ```

   Use the provider ID for the customer's service provider, as listed in Table 8-1 :

Table 8-1 Supported alphanumeric service providers

Provider/service name	Provider ID
AirTouch 408	AIR408
AirTouch 602	AIR602
Alert 702	ALR702
American Pager 210	AMP210
American Pager 800	AMP800
American Paging 512	AMP512
Ameritech 314	AMT314
AmeritechIL 708	AMT708
AT&T Paging 801	ATT801
AT&T Wireless 888	ATT888
Bell Atlantic 800–1	BAL800
Bell Mobility	BELLMO
Cell One 888	CELL1
ComTech 800	CTH800
Cook Paging 206	CKP206
Cook Paging 209	CKP209
Cook Paging 415	CKP415
DeTeMobil	TD1
FirstPage	FSTPAG
MapComm 800	MAP800
Metro 200 407	M2_407
MetroCall 800	MCL800
MetroMedia 800	MTM800
Minn Comm 612	MNC612
MobileComm 410	MCM410
MobileComm 800	MCM800
MobileComm 910	MCM910
MobileMedia 800 A	MM800A

Table 8-1 Supported alphanumeric service providers

Provider/service name	Provider ID
MobileMedia 800 B	MM800B
MobileMedia 804	MM_804
MobileMedia 817	MM_817
Nextel 312	NXT312
Nextel 415	NXT415
Nextel 510	NXT510
Nextel 630	NXT630
Nextel 708	NXT708
Nextel 847	NXT847
Nextel 847–344	NEXTEL
PacBell 415	PAC415
PageBridge 407	PBR407
PageMart 800	PMR800
PageNet Nationwide 800	PAGENE
Page New England 800	PNE800
Page New York 716	PNY716
PageNet 404	PNT404
PageNet 408	PNT408
PageNet 415	PNT415
PageNet 503	PNT503
PageNet 510	PNT510
PageNet 602	PNT602
PageNet 617	PNT617
PageNet 619 A	PN619A
PageNet 619 B	PN619B
PageNet 714	PNT714
PageNet 800 CA	PN800C
PageNet Nationwide	PAGNET
PageNet Nationwide 888	PNT888
PageNet 818	PNT818
PageNet 908	PNT908
PagePlus 918	PPL918
Pagesouth 910	PSO910
ProNet 510	PRN510
SkyTel 707	SKY707
SkyTel 800	SKY800
SkyTel 2–Way	SKY2WY
SkyTel Nationwide 800 [1]	SKYTEL
Sprint	SPRINT

Table 8-1 Supported alphanumeric service providers

Provider/service name	Provider ID
TNI Paging 800	TNI800
Touch Tel Paging 510	TTP510
US West 520	USW520
Westlink Paging 602	WLP602
Westlink Paging 801	WLP801
[1] For SKYTEL alphanumeric users who have a pin number instead of an 800 number, the dialup number will be 1–800–679–2778. (See *Creating a new provider ID* below.)	

Required for numeric pagers:

```
PagerType numeric
ServiceNumber <service provider phone number>
PIN <operator PIN>
```

Required for beepers:

```
PagerType beeper
BeeperNumber <beeper number>
```

Required for alphanumeric mobile phones:

```
pagerType alpha
serviceProvider <provider ID>
min <operator MIN>
```

Required for numeric mobile phones:

```
PagerType numeric
ServiceNumber <service provider phone number>
MIN <operator MIN>
```

Sample entries for ArosPageInfo.dat:

Sample entries for alphanumeric Skytel pager with PIN number 8863647:

```
pagingEnabled yes
pagerType alpha
perviceProvider SKYTEL
pin 8863647
```

Sample entries for numeric pager with phone number 888–886–3647 and PIN number 348593:

```
pagingEnabled yes
pagerType numeric
serviceNumber 18888863647
pin 348593
```

Sample entries for beeper with beeper number 703–580–2077:

```
pagingEnabled yes
pagerType beeper
beeperNumber 17035802077
```

Creating a new provider ID

If the customer's paging provider or service is not listed in Table 8-1 , follow the procedure illustrated below to create a new provider ID.

The steps below illustrate how to add a new phone number for a service provider and create a new provider ID. In this example, the new provider is a TAC service provider with the phone number 1–800–679–2778:

1. Double–click the **HipLink** icon in the Windows system tray.
2. Select **Modify** → **Network service**.
3. Click **New**.
4. In the Network description field, enter a description to identify the service (30 characters maximum):

   `Tac New Service`
5. Click the Phone field.

   The Network Key field now shows TACNEW (in all capital letters). This is the service provider name (6 characters maximum) to be entered in the **`ArosPageInfo.dat`** file. (See step 4 on page 8–13.)
6. Enter the phone number (800–679–2778) in the phone field.
7. Set the maximum message length to 200 characters.

   Note

   If the service supports a message length of less than 200 characters, the message may be truncated.
8. Leave all other (default) values as they are.
9. Save the modified Network service definition.
10. Enter **`TACNEW`** as the service provider name in the **`ArosPageInfo.dat`** file, and save the file.

Chapter 9
System testing

This chapter addresses the following tasks:

- Testing RF coverage – page 9–1
- Conducting performance tests – page 9–2

Verify operational performance by completing the *Performance Test Checklist* referred to in Section 9.2. This verification is the final step in commissioning the AIReach OS.

9.1 Testing RF coverage

Using a test cell phone, perform a walk–through of the entire customer site to confirm AIReach OS RF coverage and record signal strengths:

1. Test *interior* coverage, with the *customer representative* present:

   Record signal strength readings at the test points outlined in the (customer site–specific) AIReach OS RF Engineering Plan.

   Immediately notify the HNS TAC if:

   - The RF coverage is not as specified in the RF Engineering Plan
   - Signal strength readings inside the facility are 5 dBm above or below the specified values

2. Test *exterior* RF coverage, with the *service provider representative* present:

   a. Record signal strength readings at the test points outlined in the RF Engineering Plan.

   b. Make sure coverage does not extend beyond 30 feet (9.1 meters) from the building: Make a call inside the building, walk outside, and walk away from the building.

      The call should drop from the AIReach OS (and reselect to the macro network) before you are 30 feet (9.1 meters) from the building.

   Immediately notify the HNS TAC if:

   - The RF coverage is not as specified in the RF Engineering Plan
   - Signal strength readings outside the facility are stronger than specified values

Performance testing

To complete installation of the AIReach OS, conduct performance tests as follows:

1. Obtain the *Performance Test Checklist* from your AIReach OS Program Manager.
2. Complete this checklist by performing each listed test and checking the associated box after each test is successfully completed.

   Note

   A customer representative should witness the performance tests.

3. Sign the completed checklist.
4. Obtain the customer's representative's signature.
5. Send the completed *Performance Test Checklist* to the HNS Installation Manager.
6. Correct the Configuration Report to reflect the "as–built" AIReach OS installation.
7. Correct (red line) the Configuration Report to reflect the "as–built" installation.
8. Copy the AIReach OS default.cfg file to a floppy disk.

   To find the AIReach OS current release directory, which contains default.cfg, enter:

   ```
   cd %AROS_Root_Dir%
   ```

   from the DOS prompt.
9. Send the corrected Configuration Report and default.cfg floppy disk to the HNS Installation Manager.

Chapter 10

Installation inspection

This chapter briefly discusses the installation quality inspection.

When all the initial AIReach Office subscribers have been entered into the Controller, complete the *Installation Quality Assurance (QA) Inspection Checklist*. Obtain this checklist from your AIReach OS Program Manager.

Invite a customer representative to accompany the person performing the QA inspection.

Complete the *Installation Quality Assurance (QA) Inspection Checklist* as follows:

1. Check the **Y** box when an item is complete or the **N** box when an item is NOT complete (discrepancy).
2. Correct any discrepancies and initial the associated **CLEARED** box when the discrepancy is corrected.
3. Sign the checklist when the inspection is complete.
4. Obtain the customer's representative's signature.
5. Send the completed *Installation Quality Assurance (QA) Inspection Checklist* to the HNS Installation Manager.

Chapter 11
Provisioning

This chapter explains the procedure for provisioning permanent subscribers. To provision temporary subscribers (visitors, for example), see page 4–20.

11.1 Provisioning permanent subscribers

After the system has been installed and verified, provision the subscribers as follows:

1. If not already connected to the system, click the **Connect** button in the **Connect** window to display the main AROSC Configuration window.
2. Select **Configure** → **NSS** → **HLR**.
3. Click the **MIN Range** tab to display the HLR Configuration window.
4. Select the specified **AROSC Name** from the dropdown list.
5. Enter the specified MIN range values, then click **Save** to save them.
6. Repeat step 5 until the information for all subscribers is entered.

Note

When using **Allocation Type, Individually Allocated**, information must be entered for each subscriber.

7. Click the **LDN Range** tab.
8. Enter the LDN range values, and then click **Save** to save them.
9. Repeat step 8 until the information for all subscribers is entered.

Note

When using **Allocation Type, Individually Allocated**, information must be entered for each subscriber.

10. When the information for all subscribers is entered, click **Close** to return to the main AIReach Office window.
11. Select **Configure** → **Subscriber**.
12. Click the **Identification** tab to display the Subscriber Provisioning window.

    (Initially, this window may contain no data.)

13. Select the specified AROSC Name from the dropdown list.
14. Enter each subscriber's information, including LDN extension, MIN, and ESN. Then click **Save**.

Note

Observe the status bar above the option windows. If the status bar is red, a subscriber information error exists. Use the vertical scroll bar to display the error message. Before proceeding, review the message and correct the error. The software shows a **`Successful Load`** message when the subscriber information is entered correctly.

Chapter 12

Remote Client

This chapter includes:

12.1

AIReach OS Remote Client

The Remote Client can be installed on a Windows 95, Windows 98, or Windows NT computer to provide access from a remote location to the AIReach OS. The Remote Client provides the graphical user interface that allows you to access the System Controller and AIReach Office software application. Through the Client, you can execute Controller functions from the remote computer.

The remote access service is typically provided by the Microsoft Windows Remote Access Server (RAS). RAS answers incoming phone connections and provides a PPP connection. Once a PPP connection is established, the remote computer (client) functions as if it were on the same physical network as the Controller. A LAN intranet connection can be used as an alternative to RAS.

Typically, the System Controller is placed in a secure, limited access area with the PBX. A separate operations room is typically used for daily PBX and AIReach OS tasks, such as adding users and deleting users. If desired, these operations can be performed on a remote computer.

Note

Multiple users can access Subscriber configuration windows at the same time, but only one user at a time can access Controller configuration windows.

Requirements

To use the Remote Client, the remote computer must have either:

- IP connectivity between the remote computer and the Controller
- Dial–in access from the remote computer to the Controller

  For dial–in access, the Controller must have a modem and RAS configured and enabled.

Installing the Remote Client

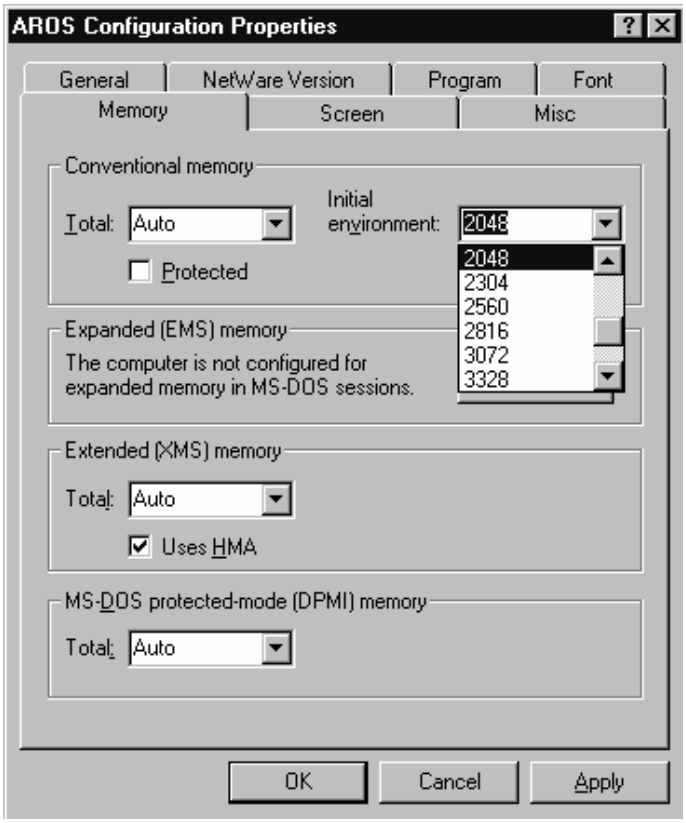
Follow these steps to install the Remote Client on a remote computer:

1. Load the AIReach OS software CD into the computer's CD drive.
2. Using the Windows Explorer, find the folder called **`GUIInst`**, and double–click to open it.
3. Double–click on the **`setup.exe`** file.
   This starts the InstallShield.
4. Read the instruction file displayed by the InstallShield; follow the on–screen instructions; and respond to the questions.
   After you complete the installation, InstallShield reboots the computer, and the AROS Configuration icon (shown below) appears.

Windows 95 or Windows 98

If the remote computer is running Windows 95 or Windows 98, you must change the GUI's initial environment memory setting:

1. Right–click the **AROS Configuration** icon (shown in step 4), and select **Properties**.
2. Click the **Memory** tab.



3. Change the Initial Environment value from the default setting to 2048.
4. Click **OK**.

12.3

Testing the Remote Client

Make sure the Remote Client connects to the Controller:

The instructions below are for Windows 95, Windows 98, or Windows NT .

1. At the remote computer, double–click the **AROS Configuration** icon:

   The software displays the AIReach Office banner and a Login dialog box.

2. In the Login dialog box, enter:

   - The name of the Controller you want to connect to
     (Replace the default entry, **`Localhost`**, after AROSC, with the name of the Controller you want to connect to.)
   - User name
     (No entry is needed if this field is grayed out.)
   - Password
     The default administrator password is “abc123.”

3. Click **Connect**.
   The login window disappears, and the Remote Client connects to the Controller you specified.
   If the Remote Client cannot connect, it displays a message stating that the connection failed.

Chapter 13
Troubleshooting

This chapter includes information for troubleshooting a newly installed AIReach OS; it does not address troubleshooting for routine (post–installation) operation. It addresses:

13.1 Controller problems

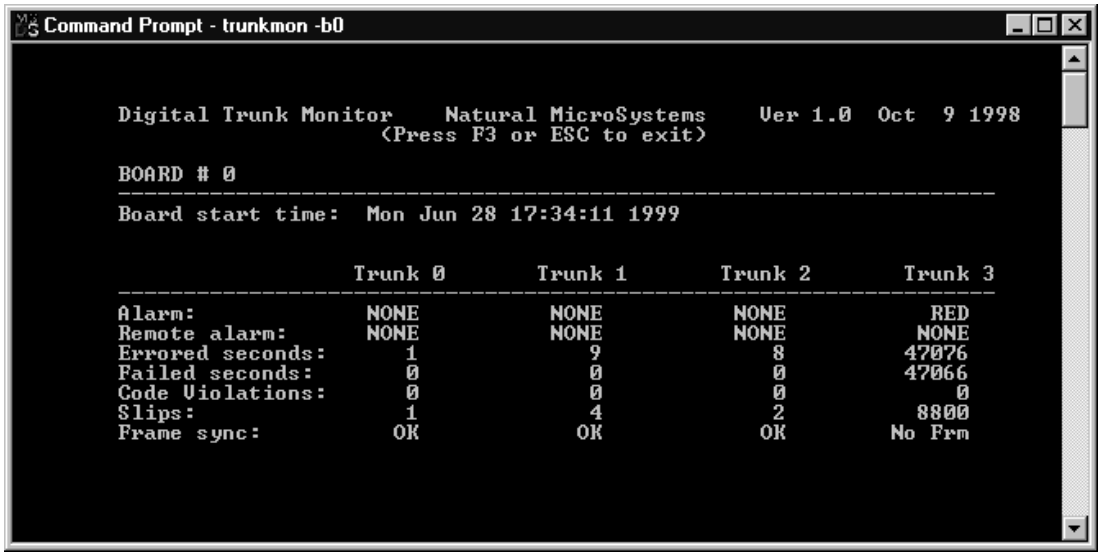
Problems with System Controller cards

Make sure the card is properly seated in the Controller backplane socket. Check cables and connections (if applicable). Make sure all DIP switches and jumpers on the card are set correctly—as explained in Section 2.5 (page 2–13).

Problems with a Quad T1 card or T1 line

To diagnose problems with a Quad T1 card or T1 line, access the Digital Trunk Monitor utility on the Controller:

1. At the DOS prompt, enter
   `trunkmon -bX`
   where **X** can be 0 to n–1, where n = the number of Quad T1 cards in the system
   The utility is shown in a Command Prompt window:



Indications that a T1 trunk is good are:

Alarms: **NONE**

Frame sync: **OK**

2. Press **F3** or **Esc** to exit.
3. At the DOS prompt, enter **Exit** to close the Command Prompt window.

13.2

Picocell problems

(See also Section 13.4, *Picocell alarms*.)

Picocell won't boot

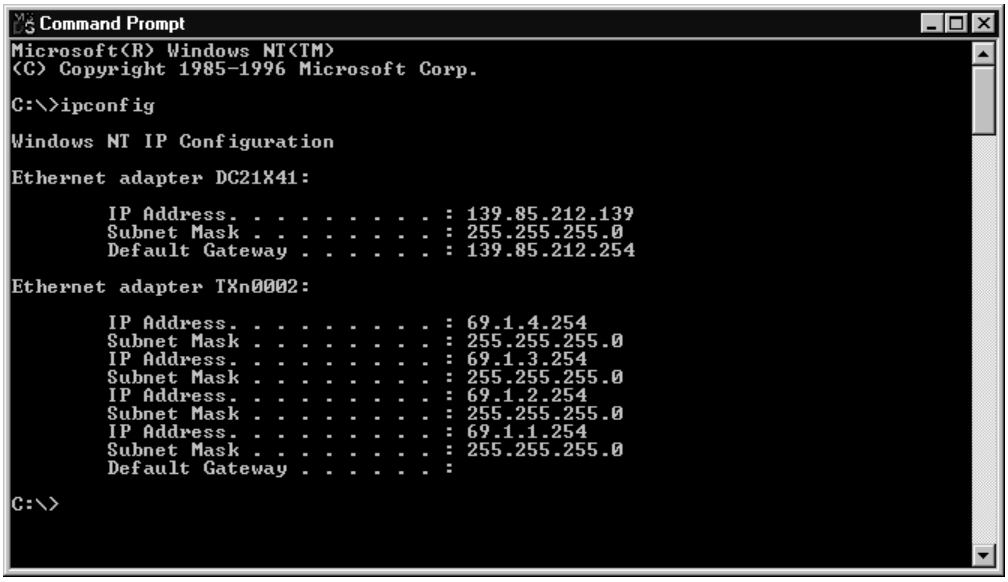
If a picocell or picocells won't boot:

- Verify that the correct picocell IP addresses are entered in the Controller
- Add picocell IP addresses if necessary

Checking the IP addresses

Verify that the correct picocell IP addresses are entered in the Controller:

1. Select **Start** → **Program Files** → **Command Prompt** to display a **Command Prompt** window.
2. At the DOS prompt (**C:\>**), enter **ipconfig** to display the system's IP configuration:



3. In the "**`Ethernet adapter TXn0002`**" section of the configuration screen, make sure the correct IP addresses are displayed for the picocells to be installed in the system.

   An IP address must be listed for each picocell, in sequential order, as illustrated below:

Picocell	IP Address
1	69.1.1.254
2	69.1.2.254
3	69.1.3.254
4	69.1.4.254
.	.
.	.

Notes

When a picocell boots up, it is assigned the next available IP address. Only picocell IP addresses are assigned to the TX2000 IP card.

You will need to add picocell IP addresses (as explained in the next section) if:

- The number of picocell IP addresses is less than the number of picocells to be installed in the system
- The picocell IP addresses do not correspond in sequence to the picocells installed

Notes

The number of addresses configured can exceed the number of picocells; this will not cause a problem.
Up to eight addresses can be configured.

4. At the DOS prompt (**`C:\>`**), enter **`exit`** to return to the Windows desktop.

Adding picocell IP addresses

You need to add picocell IP addresses *only if the number of picocell addresses is incorrect*, as explained in the previous section (*Checking the IP addresses*). Skip this section if the picocell IP addresses are configured correctly.

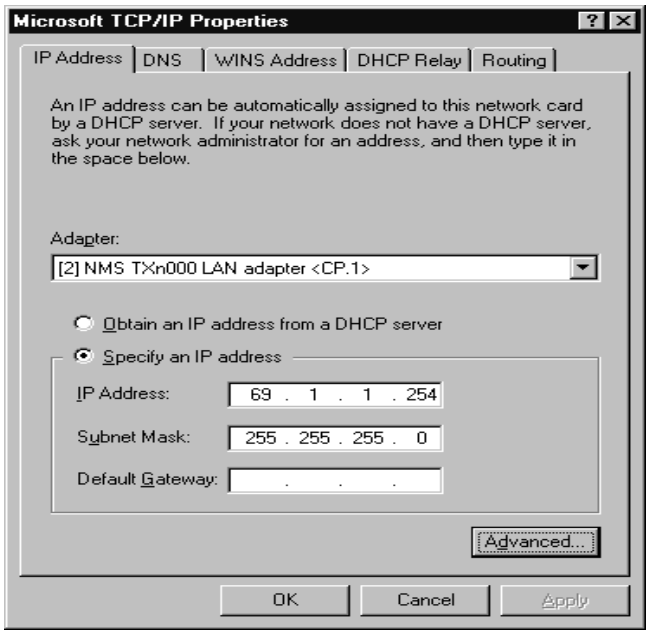
If you need to add picocell IP addresses:

1. Select **Start** → **Settings** → **Control Panel** → **Network** → **Protocols**.

   This opens the **Network** window:

2. Select **TCP/IP** → **Properties** → **IP Address**.
3. Highlight the **NMS TXn000 LAN adapter <CP.1>** from the **Adapter** pulldown list and click **Specify an IP address**.

This opens the **Microsoft TCP/IP Properties** window:

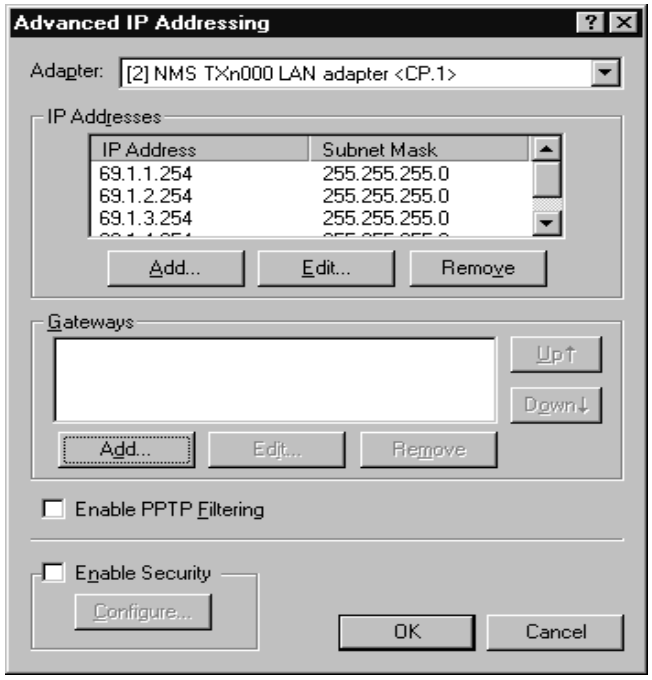


The initial TXn000 IP address must be 69.1.1.254 with a Subnet Mask of 255.255.255.0.

Leave the Default Gateway field blank.

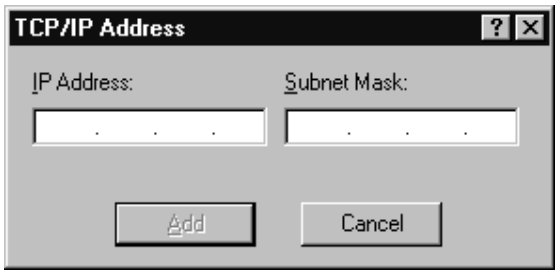
4. Click **Advanced.**

   This opens the **Advanced IP Addressing** window:



5. Click **Add** under IP Addresses.

This opens the **TCP/IP Address** window:



6. Enter the appropriate picocell IP Address and Subnet Mask; then click **Add**.

   Picocell IP addresses are in the form: 69.1.X.254, where X is the next available number in sequence, that is, 2, 3, 4, 5 ...

   The Subnet Mask is always 255.255.255.0.

   Note

   The **Add** button is not activated until an IP Address is entered.

7. Repeat step 6 until a picocell IP address and subnet mask is entered for all the picocells installed in the system.

13.3

General operational problems

Cells do not load

LEDs on the Quad T1 card should show **green** for each connected port. If the LEDs do not show green, check the following:

- The wiring for proper wire schedule, crimps, etc.
- The power connections to the picocells.
- The software loads under the **BTS** tab. It should be set to default settings.
- The serial numbers under the BTS tab. Make sure the serial numbers are correct and that the correct cells are connected to the correct port.

If some cells have booted, but others have not, substitute a non–booting cell for a booting cell and change the serial number under the **BTS** tab. Replace any faulty cells with spare cells and contact TAC.

DCCHs are not available

Call TAC.

Phones do not lock or register

If the phones do not lock or register, check:

- The phone programming
- The subscriber entries on the provisioning screens
- The DCCH configuration

Mobile phones cannot contact each other

If two mobile phones cannot call each other, check:

- The PBX connection LED on the rear of the System Controller.
- That the PBX administrator has activated the T1 and entered the phantom numbers correctly.
- That all cells are listed under **MSC Configuration, BSC Configuration.**
- The dialing plan in the configuration information. Make sure the information has been entered correctly.

Coverage and handoff problems

Call TAC in case of:

- Bad signal strength
- Dragging calls
- Frequent handoffs
- System Controller cutoffs
- Signal strength outside the building

Picocell alarms

Table 13-1 describes the alarm codes from the picocell.

There are four categories of picocell alarms:

- Critical – BTS requires service immediately
- Major – Major performance or capacity loss
- Minor – Minor performance or capacity loss
- Info – Informational alarm

When critical or major alarms occur, the Alarm LED on the picocell front panel is red. When a minor alarm occurs, the Alarm LED is orange. When an information alarm occurs, the Alarm LED is not lit: the information is sent to the System Controller for information only.

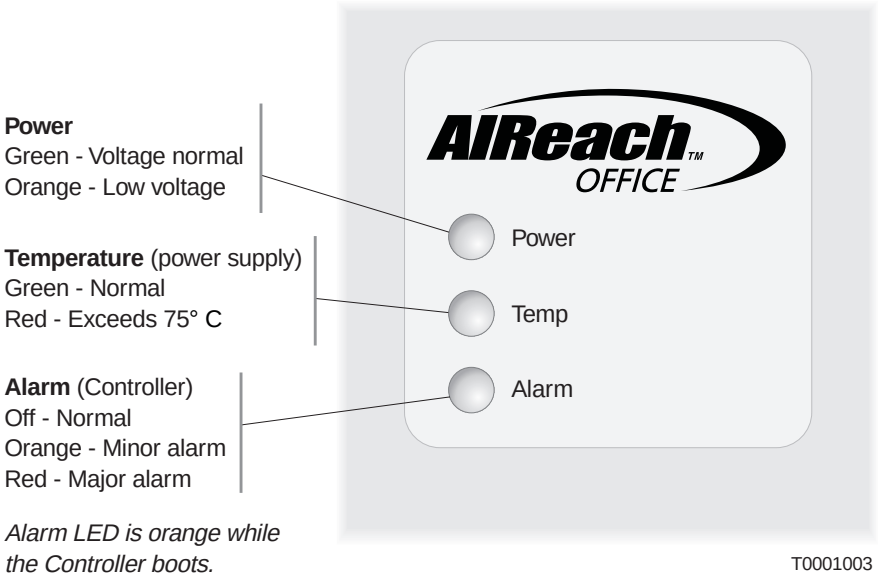


Figure 13-1 LEDs on front of picocell

Note

The LED information above is for production picocells. LED codes may be different for pre–production picocells.

Table 13-1 Picocell alarms

Name	Alarm	Severity	Meaning	Suggested Action
WBSU Rebooting	2180	Info	WBSU has been rebooted	Perform WBSU startup procedures
WBSU Restart	2181	Info	WBSU has been warm booted	Perform WBSU startup procedures
Get Time–of–day Failed	2185	Minor	WBSU could not contact WOSC time server to get time–of–day	Check IP address of time server
CPU Busy	2188	Info	CPU idle time < 5%	
CPU Available	2189	Info	CPU idle time > 5%	
Master Oscillator Failed	218A	Critical	Master oscillator failed	Replace master oscillator
Power Supply Voltage Alarm	2281	Critical	Power supply output is out of range	Service required
Software Image File Corrupt	2380	Major	Download software image has CRC error	Check software download image on WOSC
Software Download Started	2381	Info	Software download in progress	
Software Download Completed	2382	Info	Software download finished	
Abis Queue Full	2383	Minor	Abis receive buffers usage is 75% of maximum capacity	Suspend forward messaging to WBSU until Abis Queue Available Alarm received
Abis Queue Available	2384	Minor	Abis receive buffers usage is below 25%	Resume forward messaging to WBSU
Card Insertion	3280	Info	Card has been inserted	Setup card
Card Reboot/Reset	3281	Minor	Card has been rebooted or reset	Setup card
Card Removed	3282	Minor	Card has been removed	Decommission card and associated protocol stacks
Card Failed	3283	Major	Card does not respond	Decommission card and associated protocol stacks
Traffic Channel Failed	5280	Minor	Fatal error in protocol stack	Decommission and then re–commission protocol stack

Chapter 14

Maintaining Quad T1 cards

This chapter includes the following topics:

To add a Quad T1 card, see Sections 2.4 through 2.8.

The instructions in this chapter are not part of the initial installation procedure. They are provided in case you need to replace, move, or remove a Quad T1 card.

If you need to replace, move, or permanently remove (delete) a Quad T1 card, you must exercise special care because specific instructions for DIP switch settings, an adapter card, and bus cables depend on the slot where the card is installed (or removed from).

Replacing a Quad T1 card in the same slot

To replace a Quad T1 card in the same slot, follow these steps:

Note

When you replace a Quad T1 card in the same slot, do not make any software configuration changes.

1. Shut down the Controller: Click **Start** → **Shutdown**, select **Shut down the computer?**, and click **Yes**.
2. After you see the message indicating that it's OK to turn off power to the computer, turn off the Controller power switch.
3. Remove the Controller cover (as explained on page 2–11).
4. Remove any PBX or BTS connections to the back of the Quad T1 card to be replaced.
5. Disconnect the H.100 ribbon cable (shown in Figure 14-1) from the card to be replaced.

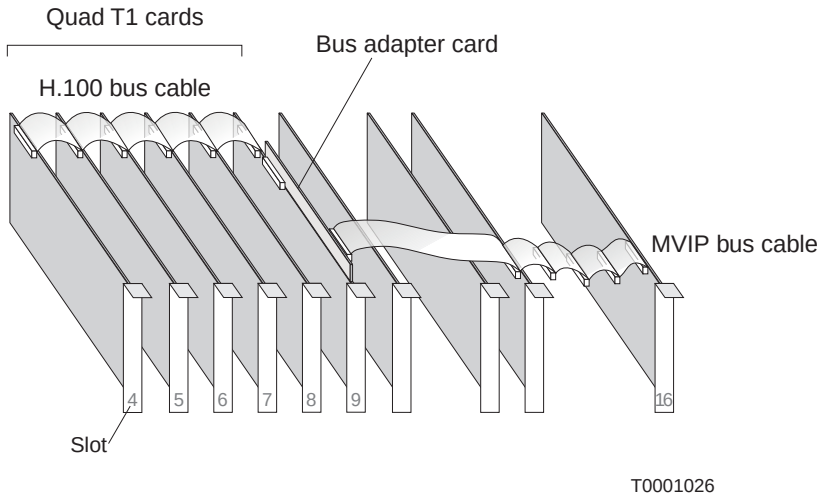


Figure 14-1 H.100 and MVIP bus cables

6. *If there are Quad T1 cards in both slots adjacent to the card to be replaced (on each side),* remove the cable from all cards to the end of the cable in either direction (so you can remove the card).
7. *If the card to be replaced is the first one in a chain of Quad T1 cards* (typically in slot 9), remove the MVIP cable also. See Figure 14-1.
8. Unscrew the hold–down screw for the card to be removed.
9. Remove the card by carefully lifting it up.
10. Set the S1 (termination) DIP switches on the new card to match those on the removed card. (For the location of these switches, see Figure 2-9 on page 2–13.)

11. *If the removed card was the first in a chain of Quad T1 cards,* an MVIP–to–H.100 bus adapter card is attached at the top of the Quad T1 card (Figure 14-1): Unscrew the bus adapter card (or use a new bus adapter card) and connect it to the new Quad T1 card, as shown in Figure 14-2.

    The bus adapter card must be secure and in full contact with the Quad T1 card.

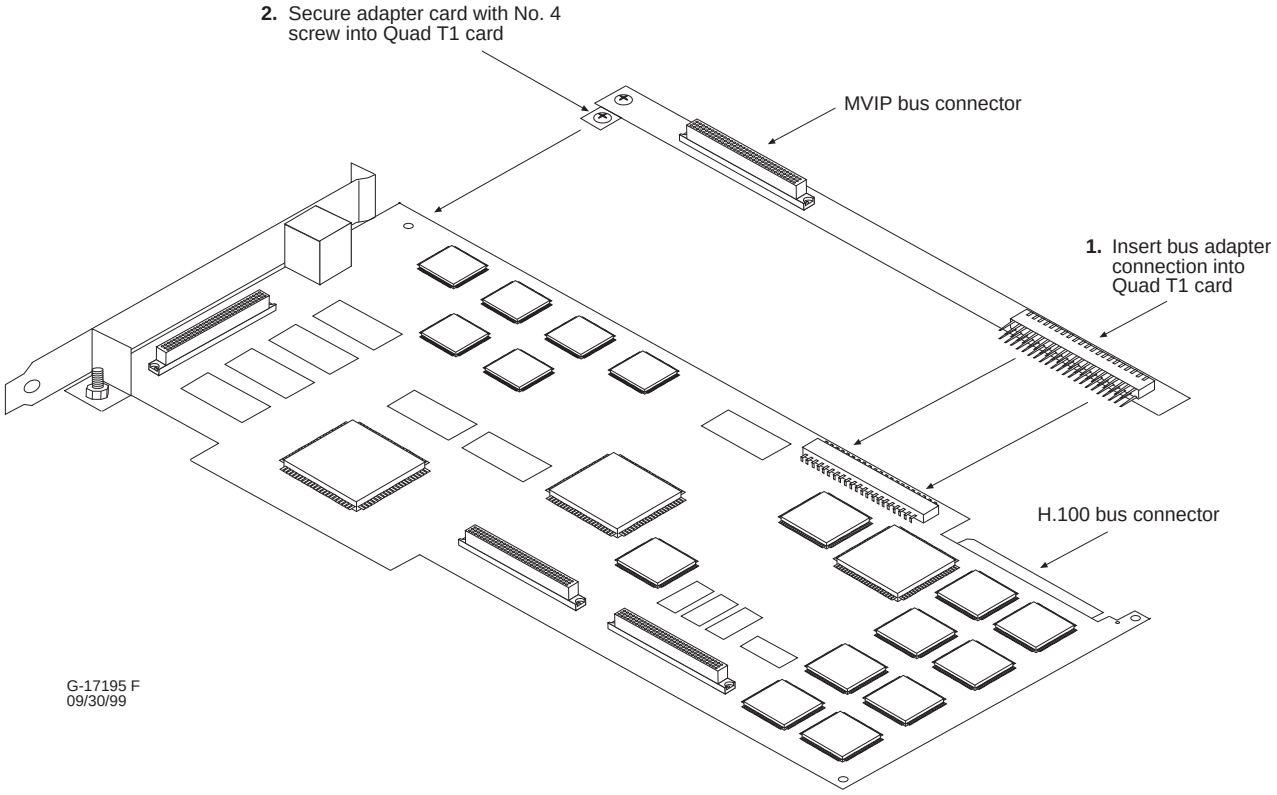


Figure 14-2 MVIP bus adapter card (on the first Quad T1 card)

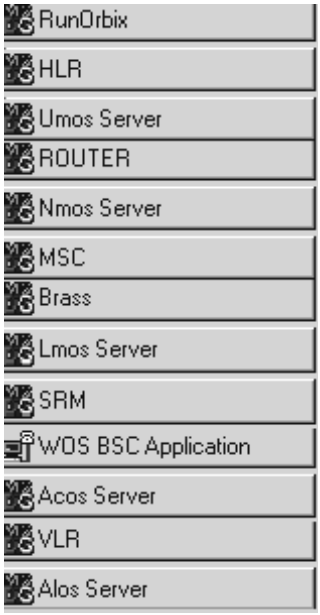
12. Insert the new Quad T1 card into the slot where the original card was removed.

    Press down carefully to seat the card in the motherboard connector. Be especially careful if a bus adapter card is attached to the Quad T1 card.

13. Insert and tighten the hold–down screw removed from the original card.
14. Reconnect the H.100 cable to all Quad T1 cards. Refer to Figure 14-1.
15. *If the card replaced is the first card in a chain of Quad T1 cards,* carefully reconnect the MVIP cable. See Figure 14-1.
16. Reconnect any PBX or BTS cables to the back of the card.
17. Replace the Controller cover.

    Be careful not to damage the copper finger stock under the front edge of the cover.

18. Turn the power switch on and wait for the Controller to boot up.
19. After you log in, make sure all AIReach OS software application buttons are displayed on the Windows NT desktop (taskbar buttons here are shown vertically stacked):



The taskbar may show other applications in addition to those shown here.

If any applications are missing, contact your HNS Installation Manager.

20. Verify that the new card is operational by checking the state of any BTSs connected to the card and any PBX connections to the card:

Checking the BTS state:

a. Open the WOS BSC Application window.
b. **Select Btsm → State**.
c. From the dropdown BTS name list, select each BTS located on the new card.
d. Verify that each BTS has booted up and is Active.

Checking a single PBX connection:

Place a call from a mobile configured on the system to a PBX extension or to an LDN, and answer the desk phone.

Checking multiple PBX connections:

a. Disconnect all PBX connections except for the connection on the card to be tested.
b. Place a call from a mobile configured on the system to a PBX extension or to an LDN, and answer the desk phone.

Moving or replacing a Quad T1 card to a different slot

If you are moving a Quad T1 card to a different slot or replacing a Quad T1 card to a different slot (original card removed from slot x, but replacement installed in slot y), follow the steps below (*Physical steps* and *Configuring the card*):

Moving a Quad T1 card is not recommended, because it may result in a configuration mismatch. However, if a chassis slot is malfunctioning or is suspected of malfunctioning, you might want to move a card.

Physical steps

1. Shut down the Controller: Click **Start** → **Shutdown**, select **Shut down the computer?**, and click **Yes**.
2. After you see the message indicating that it's OK to turn off power to the computer, turn off the Controller power switch.
3. Remove the Controller cover (as explained on page 2–11).
4. Remove any PBX or BTS connections to the back of the Quad T1 card to be moved or replaced.
5. Disconnect the H.100 ribbon cable (shown in Figure 14-1) from the card to be moved or replaced.
6. *If there are Quad T1 cards in both slots adjacent to the card to be moved or replaced (that is, on each side),* remove the cable from all cards to the end of the cable in either direction (so you can remove the card).
7. *If the card to be moved or replaced is the first one in a chain of Quad T1 cards* (typically in slot 9), remove the MVIP cable also. See Figure 14-1.
8. Remove the hold–down screw for the card to be removed.
9. Remove the card by carefully lifting it up.
10. Remove the hold–down screw and blank panel from the slot where the card is to be installed and insert the blank panel and screw into the slot the card was removed from.
11. *If the card is to be replaced,* set the S1 DIP switches (termination) on the replacement card to match those on the removed card.
12. *If you move a card from the end of a Quad T1 chain to an inside position,* set the S1 DIP switches as follows:

    Card on the inside – Disable termination (S1 OFF)

    Card on the end – Enable termination (S1 ON)

    For further details, see Section 2.5.

13. *If the removed card was the first in a chain of Quad T1 cards,* an MVIP–to–H.100 bus adapter card is attached at the top of the card (Figure 14-1): If the card will no longer be the first one in the chain or the card is being replaced, unscrew the bus adapter card (or use a new bus adapter card) and connect it to the Quad T1 card *that will be the first in the chain.* See Figure 14-2.

    The bus adapter card must be secure and in full contact with the Quad T1 card.

    You may have to temporarily remove an additional card to make room so you can install the bus adapter card.
14. Insert the Quad T1 card being moved or the replacement Quad T1 card into the proper slot.

    Press down carefully to seat the card in the motherboard connector. Be especially careful if a bus adapter card is attached to the Quad T1 card.
15. Insert and tighten the hold–down screw.
16. Reconnect the H.100 cable to all Quad T1 cards. Refer to Figure 14-1.
17. *If the card replaced is the first card in a chain of Quad T1 cards,* carefully reconnect the MVIP cable. See Figure 14-1.
18. Reconnect any PBX or BTS cables to the back of the card.
19. Replace the Controller cover.

    Be careful not to damage the copper finger stock under the front edge of the cover.

Configuring the card

Follow these steps to configure the moved T1 Quad card or the replacement card:

1. Turn the power switch on and wait for the Controller to boot up.
2. After all processes on the Controller have started (as explained in step 1 on page 2–27), open the AIReach Office application and launch the BSC Configuration / HW Config window.

    For details, see Section 2.9, steps 1 through 7.

Configuring the BTS

1. Select the Quad T1 card configured in the PC Slot where the moved or replaced card was *originally located*.
2. Click **Modify** to open the Hardware Configuration window.
3. Write down the Card Number of the selected card and the configuration for each line.

    Note

    The Card Number is not the same field as the PC Slot, PCI Bus, or PCI Slot fields.

4. Click **Close** to close the window.

5. Click on the **BTSs** tab of the BTS Configuration window.

   This window lists all configured BTSs.

6. Move any BTSs configured on the Card Number of the old card (original card or original card location) to a different card number.

   At this point, the BTSs may be configured on the same card and port as another BTS.

7. To move a BTS:
   a. Click on the BTS and then click **Modify**.
   b. On the BTS Configuration window, change the card number to a different card, then click **Accept**.

      Write down which BTSs have been moved so you will know which ones to move to the new card. If there are no other Quad T1 cards in the system, the BTSs must be deleted and then recreated after the new card is added. **Make sure all associated data, such as RF parameters, are recorded prior to deleting the BTS.**

8. Click on the **HW Config** tab to return to the AROSC Configuration window.
9. Click on the card in the old slot location; then click **Delete** to remove the card.
10. Click **Add** and enter the information for the new PC slot and the line configuration. Use the information you wrote down from the old card configuration.

    For detailed instructions, see Section 2.9, steps 9, 11, and 12.

11. Click the **BTSs** tab of the BTS Configuration window.
12. Click on any of the BTSs which were previously moved and then click **Modify**.
13. In the BTS Configuration window, change the card number to the number of the moved card, then click **Accept**.

    The card number is the same as it was originally.

14. If you had to delete any BTSs, re–create them now using the parameters you previously wrote down.
15. Click **File** → **Exit** to close the BTS Configuration window.
16. From the AIReach banner window, click **File** → **Exit** to exit the AIReach Office application.

Configuring the T1 Quad card

1. Launch the AROSHWCfg utility by double–clicking on the **AROSHWCf . . .** (hardware configuration) icon:

2. Stop all AROS processes: Click **Shutdown AROS** and then click **Yes** when prompted, “Do you really want to quit?”
3. The AROSHWCfg window lists the Quad T1 boards.
4. In the AROSHWCfg window, select the card that has been moved by clicking on the PC slot number; then click **Delete** to remove the card.
5. Click **Add** to add the moved card, in its new location, back into the system.
6. In the configuration box that appears, click **Find Next T1 Card**.

   The system should automatically locate the new T1 card.
7. *If the new card is not found:*
   a. Open a Command Prompt window by clicking **Start → Programs → Command Prompt**
   b. Enter `blocate` <Enter>.

      The system displays a list of all cards. Locate the new board by finding the PCI bus / PCI slot number combination *that is not listed* in the AROSHWCfg window.
   c. Enter the PCI bus and PCI slot numbers in the New Card window.
8. Enter the new PC slot number.

   The Find Next T1 Card function automatically enters the card type (Quad T1) and the new PCI bus and PCI slot number.
9. Exit the AROSHWCfg the utility: Click **Accept** and then **OK**.
10. Reboot the Controller: Click **Start → Shut Down**, select **Restart the computer?**, and click **Yes**.
11. After all processes on the Controller have started, verify that the new card is operational by checking the state of any BTSs connected to the card and any PBX connections to the card.

    For details, see steps 19 and 20 on page 14–4.

Removing (deleting) a Quad T1 card

If you are removing—and not replacing—a Quad T1 card (deleting the card), follow the instructions in this section.

When you remove and do not replace a Quad T1 card, *remove the last card added*. If you need to delete a different card (not the last added), you must:

1. Delete the last card added.
2. Move the card to be deleted to the position where the last card was located.

   For example, a system has Quad T1 cards in slots 4, 6, and 8. The card in slot 6 was the last card added to the system, but the card in slot 4 is the card to be deleted. In this example, delete the card in slot 6, and then move the card in slot 4 to slot 6.

Follow the steps in the two sections below to delete the last card added from the software configuration (*Deleting the card from the configuration*) and then physically remove the card (*Physically removing the card*).

Deleting the card from the configuration

Delete the last card added, as follows:

1. Verify which card was the last card added:
   a. Open the BSC Configuration (HW Configuration) window.

      For detailed instructions, see Section 2.9, steps 1 through 7.
   b. Select each Quad T1 card and then click **Modify**.
   c. Observe the Card Number listed for each Quad T1 card.

      The card with the highest number is the last card installed.
   d. Click **Cancel** to close each Quad T1 Hardware Configuration window.
2. Delete the Quad T1 card with the highest number:
   a. Select the Quad T1 card with the highest number.
   b. Write down the PC slot for the card you are about to delete.
   c. Click **Delete**.
3. Click **File** → **Exit** to close the BTS Configuration window.
4. From the AIReach Office banner window, click **File** → **Exit** to exit the AIReach Office application.
5. Launch the AROSHWCfg utility by double–clicking on the **AROSHWCf . . .** (hardware configuration) icon:

6. Stop all AROS processes: Click **Shutdown AROS** and then click **Yes** when prompted, “Do you really want to quit?”

7. The AROSHWCfg window lists the Quad T1 boards.
8. In the AROSHWCfg window, select the card with the same PC slot number as the card previously deleted; then click **Delete** to remove the card.
9. Click OK to exit the AROSHWCfg utility.
10. Shut down the Controller: Click **Start** → **Shutdown**, select **Shut down the computer?**, and click **Yes**.
11. After you see the message indicating that it's OK to turn off power to the computer, turn off the Controller power switch.

Physically removing the card

To remove the card from the chassis:

1. Remove the Controller cover (as explained on page 2–11).
2. Remove any PBX or BTS connections to the back of the Quad T1 to be removed.
3. Disconnect the H.100 ribbon cable (shown in Figure 14-1) from the card to be removed.
4. *If the card to be removed is the first one in a chain of Quad T1 cards* (typically in slot 9), remove the MVIP cable also. (This cable is shown in Figure 14-1.)
5. Unscrew the hold–down screw for the card to be removed.
6. Remove the card by carefully lifting it up.
7. Install a blank panel in the slot where the card was removed and attach it with the hold–down screw from the card that was removed.
8. Reconnect the H.100 cable (as necessary) so it connects to all Quad T.1 cards (as shown in Figure 14-1).
9. *If the card removed had the MVIP–to–H.100 bus adapter card attached to it* (Figure 14-1 on page 14–2), remove the bus adapter card and install it on the card that is now at the end of the Quad T1 card chain. See Figure 14-2 on page 14–3.
10. *If the card removed was at either end of the Quad T1 card chain*, set the S1 DIP switches on the card now at the end of the chain to ON to enable termination.
11. Replace the Controller cover.

    Be careful not to damage the copper finger stock under the front edge of the cover.
12. Turn the power switch on and wait for the Controller to boot up.
13. After all processes on the Controller have started, verify that the new card is operational by checking the state of any BTSs connected to the card and any PBX connections to the card.

    For details, see steps 19 and 20 on page 14–4.

Appendix A

Equipment specifications

This appendix lists preliminary specifications for the AIReach OS equipment:

All specifications in this appendix are preliminary and are subject to change.

A.1

System Controller specifications

The AIReach OS System Controller provides the mobile switching functionality. The System Controller is connected to multiple picocells to provide wireless coverage and to the internal PBX to integrate with desktop phones and outside lines.

Security

The drive bays are protected with a door that can be latched and locked.

Mechanical

The mechanical requirements are:

- Height: 10.47 inches (6 rack units)
- Width: 19 inches
- Depth: 19 inches
- Weight: 50 pounds when all components are installed

Shipping size

- Height: 20 inches
- Width: 27.5 inches
- Depth: 24.5 inches

WARNING

The AIReach Office System Controller can weigh in excess of 50 pounds. To avoid personal injury or damage to equipment, follow these precautions:

- **Do not attempt to move or install the System Controller by yourself. Two people are required for these tasks.**
- **Do not stack more than three System Controller boxes.**

Electrical

The System Controller requires a standard electrical outlet (NEMA 15P) located within 6 feet.

The power supply provides power only to the System Controller. When battery backup is required, a UPS (uninterruptable power source) unit is necessary.

The ac input connects to a single phase, two–wire service. This interface occurs through a standard IEC 320 style connector. The power cord is of a double reinforced insulation design as required by safety agencies.

Voltage, frequency, and phase

The input voltage, frequency, and phase are:

- Input voltage:
  - Low range: 95 Vac to 132 Vac nominal 110–125 Vac
  - High range: 190 Vac to 263 Vac nominal 230–240 Vac
- Input frequency: range 47 Hz to 63 Hz
- Input phase: single, three–wire earthed interface
- Consumption: < 700 watts

AC input protection

The System Controller has an internal fuse. Limited protection is provided from power surges or other transients on the dc input. This meets with the levels provided by IFC–801–4 and IEC–801–2.

AC input connection

The ac input connects to a single phase, three–wire service through a standard IEC 320 connector. The power cord is a double/reinforced insulation design as required by safety agencies.

Surge protection

The surge requirements on the ac power line meet the requirements of the IEC 61–000–4–5 standards:

- ±1 kV (DM)
- ±2 kV (CM)

Power draw

For dc power, the maximum power draw of the System Controller does not exceed 400 watts.

Bus support

The System Controller's single–board computer is capable of sinking up to 64 mA and source up to 32 mA for the ISA bus.

Environmental

The environmental specifications for the System Controller are consistent with indoor commercial electronic communication products.

Table A-1 System Controller environmental specifications

Preliminary specifications – subject to change

	Operational	Non–operational (unpackaged)	Non–operational (packaged)
Temperature	+5°C to +50°C Temperature gradient of up to 20°C per hour within the operational temperature range	–40°C to +60°C	
Humidity	5% – 85% relative humidity over the operational temperature range	Up to 95% relative humidity over the non–operational temperature range	
Vibration	0.21 g rms of random vibration **Frequency (Hz)** / **PSD (g^2/Hz)** 5–350 / 0.0001 350–500* / 500 / 0.00005 * Slope: –6 dB/Oct	2.09 g rms of random vibration **Frequency (Hz)** / **PSD (g^2/Hz)** 5–100 / 0.0150 100–137* / 137–350 / 0.0080 350–500* / 500 / 0.0039 * Slope: –6 dB/Oct	The vibration limits for transport in a turbo propeller aircraft (3g peak acceleration from 50 to 500 Hz) apply. The System Controller was tested on all three axes, 10 minutes per axis. Swept sine: **Freq. (Hz)** / **g Force (g)** / **Sweep Rate octave/min** 5–50 / 0.5 / 0.1 50–500 / 3.0 / 0.25 Resonant dwell: the System Controller will not be damaged as a result of a 0.5 g (0 to peak) resonant search, from 5 Hz to 200 Hz at a sweep rate of 1 octave per minute, followed by a 5 minute dwell at package resonance. Random: **Frequency (Hz)** / **PSD (g^2/Hz)** 5–100 / 0.0150 100–200* / 200 / 0.0039 * Slope: –6 dB/Oct

Table A-1 System Controller environmental specifications

Preliminary specifications – subject to change

	Operational	Non–operational (unpackaged)	Non–operational (packaged)
Seismic Vibration	(per NEBS, Zone 4 upper floors requirement) **Frequency (Hz) / Accel (g)** 0.3 / 0.2 0.6 / 2.0 2.0 / 5.0 5.0 / 5.0 15.0 / 1.6 50.0 / 1.6		
Shock	10g at 10 ms, 1/2 sine, three shocks per each of three axes	Non–operational: 55g at 10 ms, 1/2 sine, three axes non–operational drop: 2 inch drop complies with Bellcore NEBS–TR–NWT–000063 test configuration	Non–operational drop: 36 inch drop complies with Bellcore NEBS–TR–NWT–000063 test configuration
Altitude	200 feet below sea level to 10,000 feet above sea level when the specifications meet temperature and humidity limits specified	55,000 feet above sea level	

Acoustics

Acoustic noise does not exceed 50dBA when measured 1 meter from the System Controller's midpoint.

A.2 Picocell specifications

The picocells provide the air interface to the mobile subscribers. The picocells are wall–mounted inside customer buildings and are adjusted to provide radio coverage to a given area within the building. The picocells are placed throughout the building to ensure complete building coverage. The picocells are connected to the System Controller.

Security

Each picocell is equipped with a locking tab on the mounting bracket and a lock on the picocell housing. The lock is opened and closed with a key.

Mechanical

The dimensions of the picocells are:

- Height: 13.2 inches
- Width: 12.5 inches
- Depth: 5.5 inches

The picocell weighs less than 20 pounds when all components are installed.

Shipping size

- Height:
- Width:
- Depth:

Electrical

The picocell is line powered using the T1 cable. The picocell operates over an input dc voltage range of –24 to –54 volts.

For dc power, the maximum power draw of the picocell does not exceed 50 watts.

Environmental specifications

The environmental specifications for the picocell are consistent with indoor commercial electronic communication products.

Table A-2 Picocell environmental specifications

Preliminary specifications – subject to change

	Operational	Non–operational (unpackaged)	Non–operational (packaged)
Temperature	0°C to +50°C Temperature gradient of up to 8.3°C per hour within the operational temperature range	–40°C to +65°C	
Humidity	10% to 95% relative humidity, non–condensing	10% to 95% relative humidity non–condensing, not powered	
Vibration	0.5–g rms random, 5 to 500 Hz, three axes, 10 minutes per axis **Frequency (Hz)** / **PSD (g^2/Hz)** 5–350 / 0.00060 350–500 / 0.00029	1.5 g peak acceleration from 10 to 50 Hz	3g peak acceleration from 50 to 500 Hz (Example transport in turbo propeller aircraft).
Shock	10g at 11 ms, 1/2 sine, three shocks applied to each of the three axes.	Non–operational: 60g at 11 ms, 1/2 sine, three shocks applied to each of the three axes. Non–operational drop: 12 inch drop complies with Bellcore GR–63–CORE, 1995 test configuration	Non–operational: 36 inch drop complies with Bellcore GR–63–CORE, 1995 test configuration
Altitude	200 feet below sea level to 10,000 feet above sea level when the specifications meet temperature and humidity limits		

RF levels

Maximum RF power output (Equivalent Radiated Power) for the 100 mW radio option of the Pico BTS is ±20 dBm with +1/–3 dB accuracy. The BTS has a nominal dynamic range of at least 26 dB (from ±20 dBm to –6 dBm), adjustable in steps of 1 dB.

For the 10 mW radio option, maximum RF power output (Equivalent Radiated Power) of the Pico BTS is +10 dBm with +1/–3 dB accuracy. The BTS has a nominal dynamic range of at least 16 dB (from +10 dBm to –6 dBm), adjustable in steps of 1 dB. Power is measured at the antenna port.

Antenna

The antenna connections are male "SMA" connectors with nominal impedance of 50 ohms. The return loss is 12 dB minimum. The connections are labeled "Antenna A" and "Antenna B".

A.3

Picocell power supply

A power supply is used to power each picocell. The mechanical specifications of the power supply are:

- Height: 6.58 inches
- Width: 4.0 inches
- Depth: 1.98 inches
- Weight: 22 ounces (excludes cords)

The input specifications are:

- Input voltage: 100 Vac to 250 Vac –10%, +6%
- Input frequency: range 47 Hz to 63 Hz
- Current: 2.0 A max. at 100 VAC input

The output specifications are:

- 1.875 amps at –48 volts (90 watts)
- Combined line and local voltage regulation of ±1%
- Transient response of 0.5 ms for 50% local change
- Hold time of 18 msec minimum at 120 Vac and 120 msec minimum at 240 Vac.
- ±10% "square" output current limiting
- Short circuit protection
- Over voltage crowbar

Table A-3 Power supply environmental specifications

Preliminary specifications – subject to change

	Operational	Non–operational
Temperature	0°C to +50°C	–30°C to +85°C
Humidity	5% to 95% relative humidity, non–condensing	
Altitude	0 feet to 10,000 feet	

An area must be available on the wall near the telco wiring blocks and electrical outlet to fasten the power supply to the wall.

Appendix B

Standards compliance information

This appendix lists standards compliance information for the AIReach OS components:

B.1 FCC compliance

The AIReach Office System Controller and picocells have been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected
- Consult an experienced radio/TV technician for help

Picocell regulatory compliance

Type acceptance

FCC Part 22 and 24, Personal Communications Services, October 1, 1997. Part 22 – Cellular band. Part 24 – PCS band.

Spurious emissions

FCC Part 15, Class B Radio Frequency Devices – Subpart B, unintentional radiators, October 1, 1997 or April 16, 1999

EN 55022 Class A, Limits and methods of measurement of radio disturbance characteristics of information technology equipment, December 1, 1995

Telecom

FCC Part 68, February 1998

Safety

UL 1950 (without D3 deviations), Safety of Information Technology Equipment, Including Electrical Business Equipment

EN 60950, Safety of Information Technology Equipment, Including Electrical Business Equipment, 1992

CSA C22.2 No. 950, Safety of Information Technology Equipment, Including Electrical Business Equipment, March 1, 1998

Immunity

EN 50082–1, Electromagnetic compatibility – Generic immunity standard Part 1, Residential, commercial, and light industry, 1997

System Controller regulatory compliance

CSA C22.2 No. 950, Safety of Information Technology Equipment, Including Electrical Business Equipment, March 1, 1998

EIA/TIA–232–F, Interface between data terminal equipment and data circuit terminating equipment employing serial binary data interchange, October 1997

EN 55022 Class A, conducted and radiated

EN 55022 Class A, Limits and methods of measurement of radio disturbance characteristics of information technology equipment, December 1, 1995

EN 60950 “Safety of Information Technology Equipment, Including Electrical Business Equipment” 1992

MIL–HNDBK–217F Military Handbook, Reliability Predication of Electronic Equipment

FCC Part 15, CFR47, Class B Radio Frequency Devices – Subpart B unintentional radiators, October 1, 1997 or April 16, 1999

Type acceptance

FCC Part 68 February 1998

Emissions

FCC Part 15 Class B

EN 55022 Class B with 6 dB or margin on both radiated and conducted units

Power Transients

IEEE 587 – System Controller power supplies adheres to these power transient standards

Safety

UL 1950 (without D3 deviations), Safety of Information Technology Equipment, Including Electrical Business Equipment, Third Edition, March 1, 1998

Immunity

EN 50082–1, Electromagnetic compatibility – Generic immunity standard Part 1, Residential, commercial, and light industry, 1997

IEC 61000–4–2, electrostatic discharge

IEC 61000–4–3, radiated RF

IEC 61000–4–4, electrically fast transients

IEC 61000–4–5, surge

IEC 61000–4–6, conducted RF

B.4

Picocell power supply compliance

CE compliant

CSA950

Complies with EMC Directives

In Case IEC320 with ground

TUV/IEC950

UL1950

B.5

Other compliance

AWS Wireless Office Service System Specification, Document WOS–97–01, Rev 1.0

The BTS complies with the latest revision of TIA/EIA/IS–136.1A and TIA/EIA/IS–136.2A.

EIA/TIA–232–F, Interface between data terminal equipment and data circuit terminating equipment employing serial binary data interchange, October 1997

TIA/EIA–568A, Commercial Building Telecommunications Cabling Standard

TIA/EIA–606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

CSA Standard T528, Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings

CSA Standard 529, Design Guidelines for Telecommunications Wiring Systems in Commercial Buildings

EN 50082–1, Electromagnetic compatibility – Generic immunity standard part 1. Residential, commercial, and light industry, 1997

IS130A, July 1997

IS135, April 1995

IS136A (updates provided per Terms of Conditions):

- IS136.1A specifies the Digital Control Channel
- IS–136.2A specifies the Digital Traffic Channel
- RF performance complies with the latest revision of IS–138A, with the exception of delay interval compliance, which is not required for this short–range base station

IS138A (updates provided per Terms of Conditions)

IEEE–C62.41 class A and B. The PSS complies with the requirements of this standard.

MIL–HDBK–217F Military Handbook, Reliability prediction of Electronic Equipment, 1992

National Electrical Code, Section 800 – latest code

WBSU–WOSC Interface Specification Avalcom document No. A9.20.0002

Appendix C

Equipment part numbers

This appendix lists part numbers for major components of the AIReach OS:

C.1 Customer documentation

For document numbers for AIReach OS customer documents, see the *About* section of this manual.

C.2 Component part numbers

Table C-1 lists the major components of the AIReach OS, field replaceable units (FRUs), parts needed for installation, and their part numbers.

Table C-1 Major AIReach OS components, FRUs, and installation parts

Component	HNS part number
System Controller and major components	
AROSC System Controller with 1 Quad T1 card, 1 TX2000 IP card, 1 LAN card, and 1 conference card	1028007–0001
CD ROM drive, read/write, internal	9010029–0001
Hard drive, 8.4 Gb	9010025–0001
Floppy disk drive, 3.5 inch, 1.44 Mb	9010028–0001
TX2000 IP card	9010089–0002
TX2000 SS7 card	9010089–0001
Quad T1 card	9010087–0001
Conference card	9010086–0001
Ethernet 10/100 LAN card	9010111–0001
Modem, V.90/56K voice/fax ISA	9010027–0001
System Controller installation parts	
MVIP to H.100 adapter card	9010118–0001
Short MVIP assembly for 1 Quad T1 cards	1028010–0002
H.100 ribbon cable (For Quad T1 cards), with 68–position CHAMP connector	1028158–0001

Table C-1 Major AIReach OS components, FRUs, and installation parts

Component	HNS part number
Picocells and picocell components	
Picocell base transceiver station (BTS) Multiple types: 800 or 1900 MHz; 100 mW or 10 mW; T1 or E1. 1 scanner no radios; 2 radios with vocoder no scanner; 2 radios (no vocoder) no scanner; Controller (no radios or scanners); radio spares with vocoder. For specific picocell type and part numbers for your site, refer to the site–specific *AIReach OS Configuration Report*.	1026426–00xx
Transceiver, 800 MHz, 100 mW	1026426–0033
Transceiver, 800 MHz, 10 mW	1026426–0034
Transceiver, 1900 MHz, 100 mW	1026426–0035
Transceiver, 1900 MHz, 10 mW	1026426–0036
Scanning receiver (scanner), 800 MHz	1026426–0041
Scanning receiver (scanner), 1900 MHz	1026426–0042
Picocell power supply with bracket and screws (90–264 Vac/48 Vdc 90 W)	1028482–0001
Picocell RF cable	1026426–0043
Picocell antenna (FRU)	{ TBD }
Picocell terminal block assembly (for connecting DC power supply to picocell). Terminal block, rail, end bracket, and end cover.	1028211–0001
Cable, LAN CAT 5, 24 AWG, 4 pr.	9008537–0001
RJ–45 connector, plug	9010236–0001
Other components	
17” video, monitor 1600x1200 resolution	9010043–0001
Keyboard, compact 104–key with touchpad	9009294–0002
Router	9010254–0001
Rack mounting items and options	
Slide assembly, steel, 24–inch (allows Controller and monitor to slide)	9010132–0001
Keyboard Frame	1028301–0001
Lock, cordset connector	9007022–0003
Junction box panel assembly, 12–port RJ–45 CAT5	9010215–0001
Junction box panel assembly, 24–port RJ–45 CAT5	9010216–0001

Table C-1 Major AIReach OS components, FRUs, and installation parts

Component	HNS part number
Other options	
Contact your AIReach OS Program Manager for information on the following additional options: Monitor enclosure options UPS and power distribution options Rack frame and frame mounting components options Rack cable routing options Rack frame bracing options (for ceiling or cable ladder) Rack extenders (7–inch) Router options CSU options	

Appendix D

Updating software; backing up databases

This chapter includes the following topics:

D.1

Updating software with a new release

A new software release could be a release of the AIReach Office application software, an OMC release, or both.

Install the new release during non–business hours. AIReach Office functions are not available during this time.

To install a new release of AIReach software:

1. Read and follow all instructions in the software release notes or Service Bulletin provided by the TAC.
2. Back up the current subscriber database on a floppy disk following the instructions in *Section D.2*.
3. Close the AIReach Office application.
4. Exit any other programs that may be running, including any connections to remote workstations.

CAUTION

When prompted during a software reload: "Is the nss database, nss to be created again?," reply N. If you reply Y, you will destroy parts of the existing database.

5. Insert the CD with the new software release into the drive and follow the interactive instructions to install the software.
6. Reboot the System Controller.
7. Start the AIReach Office application, and make sure the main window (banner with AIReach logo) displays.

Backing up and restoring databases

To safeguard system data, create regular backups of all databases created and maintained by the AIReach Office software. Databases may be restored to the Controller hard disk, if necessary.

All AROS software applications are stopped during backup or restore operations. Any calls in progress are dropped, and no new calls can be made until the Controller restarts. Therefore, backup and restore operations should be done when there are no users on the network, and users should be informed that the system will be down.

Backing up

To backup the AIReach OS databases to a writable CD:

1. Close the AIReach OS banner window.
2. Load a formatted RW CD into the CD–ROM drive.
   (If the CD is unformatted, format it before loading it.)
3. Enter these commands from a DOS prompt:
   ```
   cd %omc_root_dir%\tools
   backup <CD-ROM drive letter>
   ```
   A db_log.LOG file opens.
4. When you see “Export terminated successfully without warning” at the bottom of the log, close the file.
   If you do not see this message, contact HNS TAC for assistance.

Starting the software after backup

To start the AROS software after backup, follow these steps:

1. Select **Start** → **Settings** → **Control Panel**.
2. Double–click on **Services**.
3. Select **WOS LOAD/Monitor** and press **Start**.
4. Wait for all processes to start.
   (For a list of the processes, see the taskbar illustration on page 3–6, step 4.)
5. After all processes have started, you can open the AIReach OS banner window. (Double–click on the AROS Configuration icon and log in.)

Restoring

To restore the databases from a CD to the Controller hard disk:

1. Enter these commands from a DOS prompt:

   ```
   cd %omc_root_dir%\tools
   cleanupdb
   ```

   The **cleanupdb** script closes all AROS processes and cleans the databases. After some time, the Controller reboots itself, but no AROS services start.

2. After the Controller reboots, enter:

   ```
   cd %omc_root_dir%\tools
   restore <CD-ROM drive letter>
   ```

   The Controller reboots again.

3. Launch the AIReach Office application and verify that the database has been restored. Check the NSS, HLR, MSC and systemwide configurations.

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