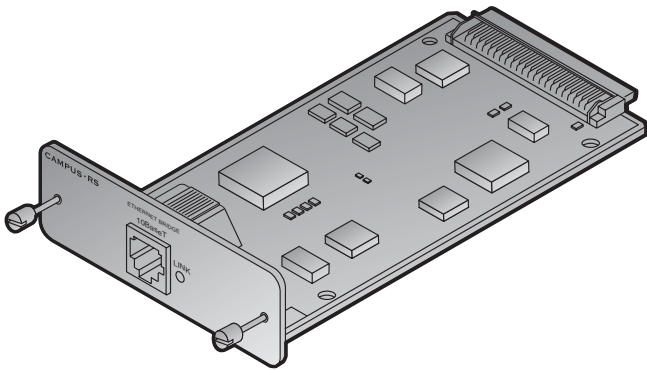


USER MANUAL



Campus-REX RS Interface Card
Catalog Number: CAD1069I5 Issue 5



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April, 2001

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FCC NOTICE

This unit complies with the limits for a Class A 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. However, 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 situation by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Consult the dealer or an experienced radio or television technician for help.

Any changes or modifications not expressly approved by the grantee of this device voids the user's authority to operate the equipment.

USING THIS MANUAL

This manual documents the Campus-REX[®] RS Interface Card (part number 150-1175-51). It includes information on how to:

- install the card in either a Campus-RS[™] Desktop Unit (150-1158-01, 150-1158-02, 150-1158-51, or 150-1158-52) or Campus-Star[®] chassis (150-1220-01, 150-1220-02, or 150-1220-51)
- configure the Campus-REX to operate as a bridge or a router
- monitor the Campus-REX
- contact ADC for assistance.

DOCUMENT CONVENTIONS

Two types of messages, identified by icons, appear in the text.



Notes contain information about special circumstances.



Cautions indicate the possibility of personal injury or equipment damage.

This manual uses the following conventions:

- This font indicates text that appears on the LCD or terminal.
- Keycaps, such as **ESC**, indicate keys that you press on a terminal keyboard.
- Key names in **bold font** indicate buttons on the desktop unit or line unit that you press.

For a list of abbreviations used in this manual, see [“Abbreviations” on page B-1](#).

UNPACK AND INSPECT THE SHIPMENT

Upon receiving the Campus-REX RS Interface Card:

- 1** Unpack the card and inspect it for signs of damage. If it has been damaged in transit, report the extent of the damage to the transportation company and to your sales representative immediately. Order replacement equipment if necessary.
- 2** Compare the contents of the package against the packing list to ensure a complete and accurate shipment. If the shipment is incomplete or incorrect, contact ADC as described in [“Contacting ADC”](#) on page D-1.

If you need to store the unit for several days or more before installing it, return it to the original packaging.

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ABOUT THE PRODUCT

1

The Campus[®] Remote Ethernet eXpress (Campus-REX) RS Interface Card installs into a:

- Campus-Star[®] chassis, along with a Campus-RS[™] (Rate Selectable) Line Unit
- Standalone Campus-RS Desktop Unit

This comprises half of a High-bit-rate Digital Subscriber Line (HDSL) transmission system. When connected to another Campus-RS, Campus-T1[®], Campus-768[®], or Campus-E1[®] Desktop Unit or Line Unit, the Campus-RS system can transport digitized voice, data, and video signals over existing copper wire at a number of different HDSL rates.



This version of the Campus-REX must be installed in a Campus-RS or Campus-HRS Desktop Unit or with a Campus-RS or Campus-HRS Line Unit. It cannot be installed in an older Campus Desktop Unit or with an older Campus Line Unit.

The Campus HDSL system provides a connection between geographically distributed Ethernet Local Area Networks (LANs) in a campus environment. To provide the connection, the Campus-REX performs transparent 802.3 MAC bridging or static IP routing over an HDSL line. You can use existing telephone-grade copper wiring as the HDSL transmission medium.

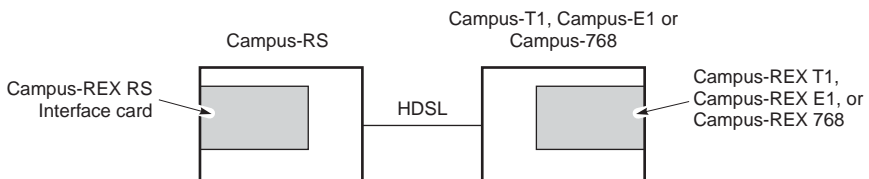
PRODUCT FEATURES

The Campus-REX provides complete main bridging tasks such as dynamic address learning, forwarding, filtering, and hashing/buffer management. Other features include:

- embedded Simple Network Management Protocol (SNMP) agent
- IEEE 802.1d transparent MAC level bridging with Spanning Tree protocol support
- static IP Routing
- BOOTP for configuration of IP parameters
- HDLC (High-level Data Link Control) or PPP (Point-to-Point Protocol) frame encapsulation options
- 10BASE-T port for connection to an 802.3 LAN
- console port for maintenance and management

COMPATIBILITY WITH EARLIER CAMPUS PRODUCTS

When mated with a Campus-RS Desktop Unit or Campus-RS Line Unit, the Campus-REX RS Interface Card is compatible, over the HDSL link, with earlier versions of Campus products, such as the Campus-T1, Campus-E1, and Campus-768, as shown in the following illustration. Campus-RS units are not currently compatible with Campus-384 products.



All earlier versions of Campus products are manufactured to operate at a single HDSL transmission rate, while the Campus-RS transmission rate is user-selectable. To support compatibility with earlier Campus Products, the following configuration options must be set on the Campus-REX:

- Set the HDSL Operating Mode to Standard Mode.
- Set the Standard Mode HDSL Rate to T1, E1, or 768, to match the rate of the earlier product.

If a Campus-RS unit is connected over an HDSL link to an earlier Campus product, and if either unit has the HDSL Transceiver (XCVR) Mode set to AUTO, the HDSL link may not operate properly.

When operating the Campus-RS product with an earlier version of the Campus products, to avoid any problems with link startup or operation, it is recommended that the Transceiver Mode be set as follows:

- Campus-RS = **MASTER**
- Campus E1/T1/768 = **SLAVE**

If one or both units are already set to AUTO and the HDSL link is active, disconnect the HDSL link, change the settings as recommended, and reconnect the link. This will assure the link integrity on any subsequent startups.

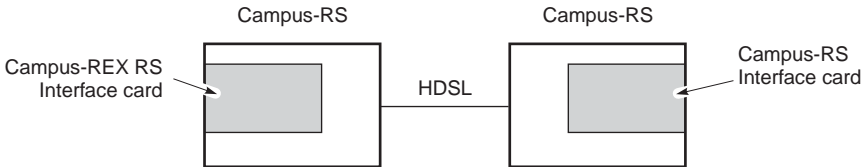


This situation does not apply to a circuit with two Campus-RS units. You may leave the units set to their default setting of AUTO, and they will operate properly.

For information on setting these options, see [“Set the HDSL Operating Mode”](#) on page 3-7.

COMPATIBILITY WITH CAMPUS-RS PRODUCTS

The Campus-REX RS Interface Card is also compatible, over the HDSL link, with another Campus-RS unit, as shown in the following illustration.



When connecting to another Campus-RS Desktop Unit or Line Unit, Standard Mode is still supported, providing access to HDSL transmission rates of T1, E1 and 768 kbps. In addition, the Campus-RS system can be configured to support an extended set of HDSL transmission rates, over either one or two HDSL loops.

To support these additional transmission rates, set the following options on the Campus-REX:

- Set the HDSL Operating Mode to Extended Mode or AutoSync Mode.
- Set the Extended Mode Loop Configuration to 1 Loop or 2 Loops, depending on the physical layout of your HDSL network.
- Set the Extended Mode HDSL Rate to the desired setting.

The range of rates available for the HDSL Rate depends on the setting of the Extended Mode Loop Configuration:

- 1 Loop HDSL Rate settings are between 128 kbps and 1.152 Mbps, in 64 kbps increments
- 2 Loop HDSL Rate settings are between 256 kbps and 2.304 Mbps, in 128 kbps increments



Not all of these modes and rates are available if the remote Campus-RS system does not support them. Refer to the remote interface card User Manual to see the HDSL modes and rates supported by the card.

For information on setting these options, see [“Set the HDSL Operating Mode”](#) on page 3-7.

ESTABLISHING AN HDSL LINK

Before an HDSL link can be established in Standard or Extended Mode, the HDSL parameters for both the local and remote units must be set identically.

Using AutoSync Mode allows one unit to determine the HDSL parameters. In AutoSync Mode, one unit is configured as a master and the other as a slave. Upon startup, the HDSL parameters of the master unit are used to establish the HDSL link. No further configuration of the slave unit is required.

If the remote unit is not configured as an AutoSync slave, an AutoSync connection will not be established and the system generates an AutoSync minor alarm. After several failed attempts, the master enters Fallback Mode and attempts to establish a normal HDSL link with the same HDSL parameters. If this is unsuccessful, for example, if the slave unit is configured to a different HDSL Rate, the master unit reverts to attempting to establish an AutoSync connection.

APPLICATION

When installed in a Campus-RS Desktop Unit or Campus-Star chassis, the Campus-REX functions as a remote bridge or static IP router.

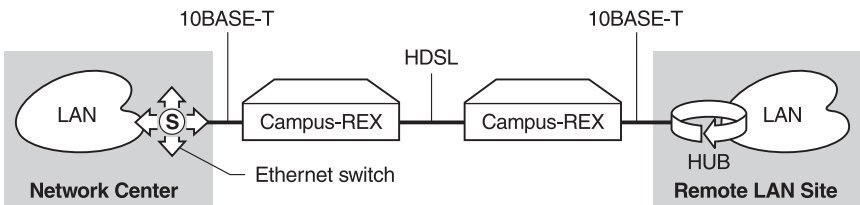
You can use the Campus-REX to extend subnetworks to remote sites within a campus. Or, for sites separated by greater distances, you can use the Campus-REX to connect them through a public T1/E1 Wide Area Network (WAN). See [“Point-to-Point LAN Extension”](#) and [“LAN Connections Over a WAN”](#) on page 1-7 for more information.

Campus-REX software provides complete main bridging tasks of learning, forwarding, filtering, and hashing/buffer management, 802.1d Spanning Tree protocol, 802.3 drivers, packet sequencing, segmentation and reassembly, and other local tasks. The Campus-REX is specifically designed for 10BASE-T LANs that use unshielded twisted pair (UTP) segments with reach of more than 100 meters and that require low-cost, high performance connectivity.

The Campus-REX performs full-bandwidth filtering on the 10BASE-T port, and forwarding at the selected transmission rate.

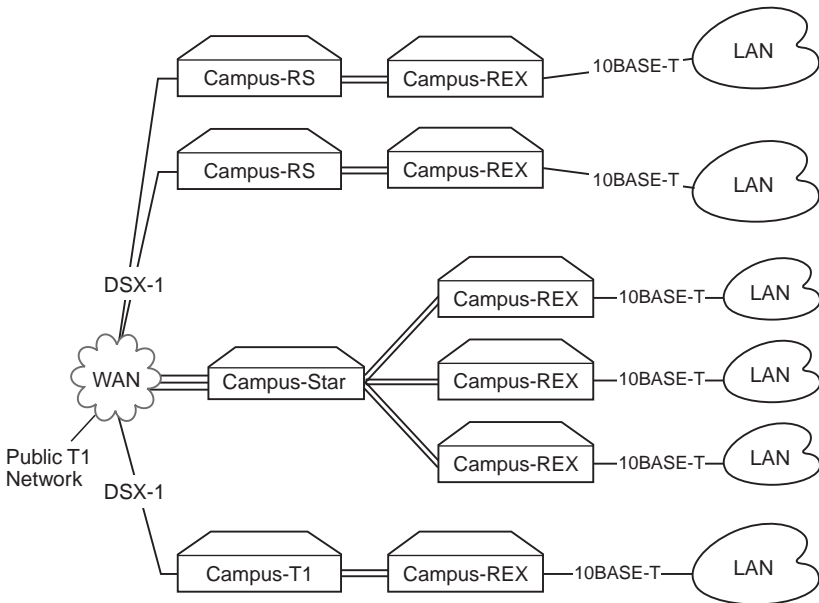
Point-to-Point LAN Extension

As organizations move or change, LANs also evolve and may become fragmented or physically separated. The Campus-REX provides a lower-cost alternative to other LAN-extension solutions. The Campus-REX provides a built-in 10BASE-T LAN interface that eliminates the need for other internetworking devices while providing 30 times the performance of other sub-rate wireless connectivity options, as shown in the following figure.



LAN Connections Over a WAN

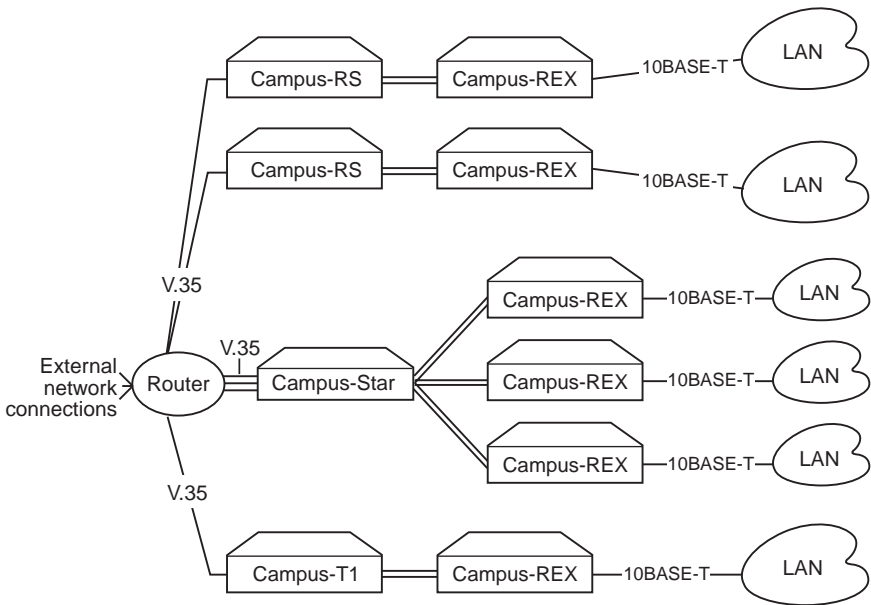
When LANs are distributed over a large physical area (such as within a metropolitan area) or cabling is not available between sites, you can lease appropriate unloaded copper pairs from a local carrier for LAN connectivity. For transport over public networks, you can connect the public T1 network (DSX-1 signal) to the LAN through Desktop Units with CSU/DSX-1 interface cards and the Campus-REX in a Desktop Unit. This application, as shown in the following figure, simplifies access to public high-speed WANs for LAN connectivity to remote sites.



LAN Extension in a Routed Environment

The Campus-REX, set for bridging over PPP, can extend LAN access to a centralized router. This application, as shown in the following figure, requires two settings for the remote Campus-REX units:

- set the Bridge/Router mode to Bridge
- set the Encapsulation to PPP



In this application, the router ports must be configured for bridging with PPP encapsulation.

INSTALLING THE CAMPUS-REX RS INTERFACE CARD

2

You can mate the Campus-REX with either a Campus-RS Desktop Unit or a Campus-RS Line Unit.

To Learn How to:	See Page:
Install the Card	2-1
Connect the Ethernet Line	2-4
Power Up and Check the Ethernet Line	2-7

INSTALL THE CARD

The following sections describe how to install the Campus-REX RS Interface Card.



Make sure you install the Campus-REX into a Campus-RS Desktop Unit or into a Campus-Star chassis with a Campus-RS Line Unit. The Campus-REX will not operate if it is installed in an earlier version of these Campus products.

Ensure you read important information on surge protection for HDSL line installation in the line unit or desktop unit manual before installing the interface card.

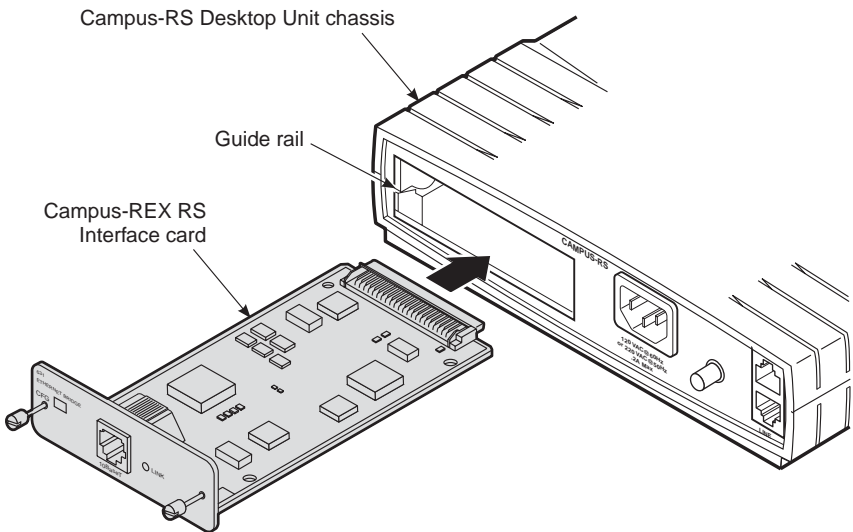
Installing into a Campus-RS Desktop Unit

This section describes how to install the Campus-REX into a Campus-RS Desktop Unit.



Turn off the power on the Desktop Unit before you install the card. Installing the card with the power on may cause damage to the Desktop Unit, the card, or both.

- 1 Slide the card into the guide rails in the rear of the Desktop Unit.



- 2 Gently press the card into place until it is seated firmly in the mating connector.
- 3 Use the two screws on the card to secure it into place.
- 4 To connect the Campus system to an HDSL line, see the *Campus-RS Desktop Unit User Manual*.

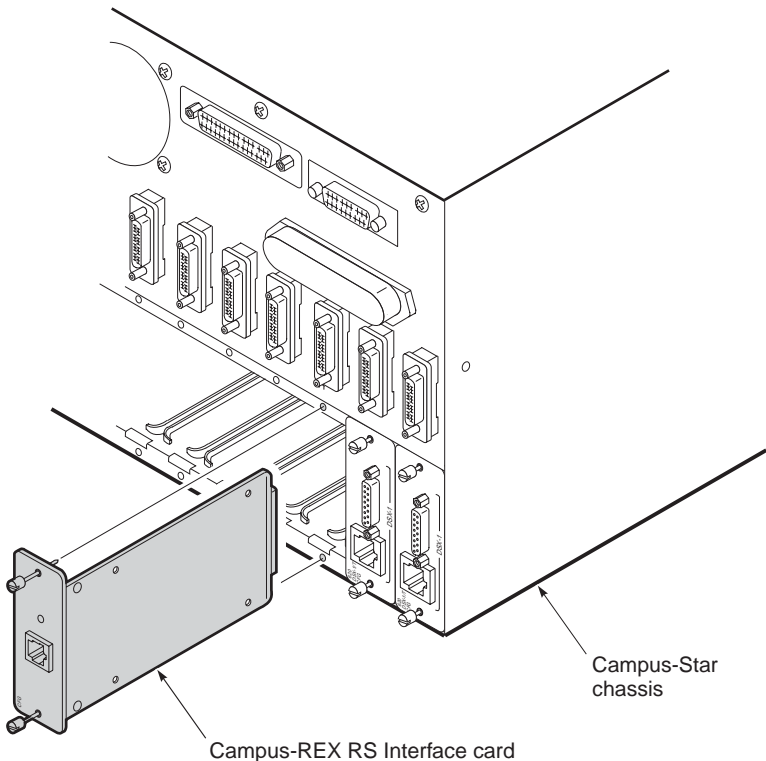
Installing into a Campus-Star Chassis

This section describes how to install the Campus-REX in a Campus-Star chassis.



Before installing the Campus-REX, make sure there is not a Line Unit installed in the corresponding slot on the front of the Campus-Star chassis. The Campus-REX is not hot-swappable. Installing the Campus-REX with a corresponding Line Unit installed may cause damage to the Campus-REX, the Line Unit, or both.

- 1 Slide the card into the guide rails in the desired slot on the rear of the Campus-Star chassis.



- 2 Gently press the card into place until it is seated firmly in the mating connector.
- 3 Use the two screws on the card to secure it into place.
- 4 To install a Campus-RS Line Unit to work with the interface card, and to connect the Campus system to an HDSL line, see the *Campus-RS Line Unit User Manual*.

CONNECT THE ETHERNET LINE

The 10BASE-T MDI port on the rear of the Campus-REX card connects the Campus-REX to hubs, repeaters, or other routers.

Choosing the Cable

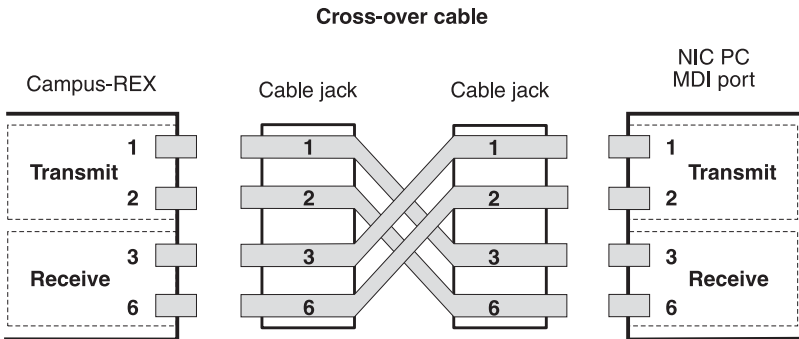
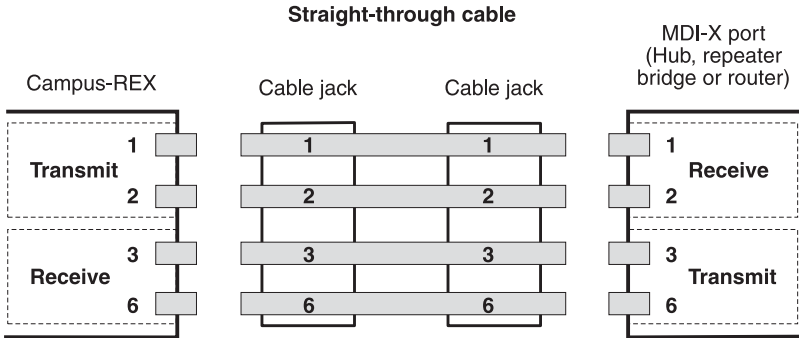
Use a straight-through cable (Category 3 or better) to connect the card to a device with an MDI-X port. Use a cross-over cable (Category 3 or better) to connect the Campus-REX to a device with an MDI port.

The following table lists the 10BASE-T interface data signals for both MDI and MDI-X port configurations.

MDI Pin ^(a)	MDI-X Pin	Signal	Description
1	3	TD+	Transmit Data (+)
2	6	TD-	Transmit Data (-)
3	1	RD+	Receive Data (+)
4	4		
5	5		
6	2	RD-	Receive Data (-)
7	7		
8	8		

(a) A 10BASE-T port on a PC is always configured as an MDI port.

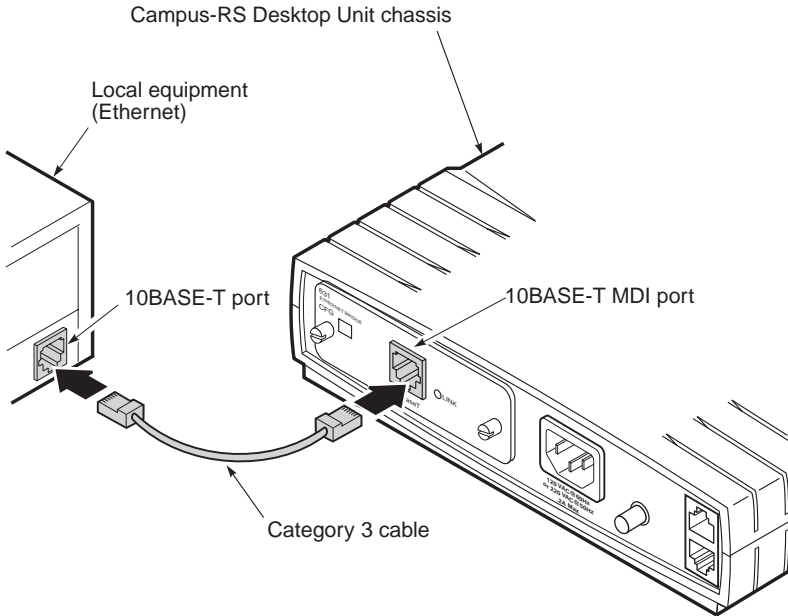
The following figures illustrate the signals for straight-through and cross-over cables.



Connecting the Cable

To connect the 10BASE-T cable to the Campus-REX RS Interface Card:

- 1 Plug one end of the Category 3 cable into the 10BASE-T MDI connector on the rear of the Campus-REX.



- 2 Connect the other end of the cable to your local equipment (repeater, PC, or other 802.3 device).

POWER UP AND CHECK THE ETHERNET LINE

- 1 Verify that the power cord is connected to the Desktop Unit or to the Campus-Star chassis (if you have an AC power supply) and to an external power source.
- 2 Do one of the following:
 - If the Campus-REX is installed in a Desktop Unit, press the power button on the back of the Desktop Unit.
 - If the Campus-REX is installed in a Campus-Star, continue with [Step 3](#).
- 3 Verify that the Link LED on the Campus-REX card is green. This indicates that the 10BASE-T connection is operating correctly. If the Link LED does not light green, check the 10BASE-T cabling configuration.

SET UP THE CAMPUS-REX SYSTEM

3

There are four sets of configuration options that must be set correctly for the Campus-REX to operate. With the default settings, the Campus-REX is set to operate:

- with the HDSL Operating Mode set to Standard Mode
- with the Standard Mode HDSL Rate set to T1
- as a bridge, with the encapsulation format set to HDLC and Spanning Tree protocol disabled
- with the Timing Source set to Internal

Depending on the requirements of your network, you may be able to use the default settings for one or more of these options. If so, you can skip the relevant section(s).

To Learn How to:	See Page:
Set Up an ASCII Terminal	3-2
Set the HDSL Operating Mode	3-7
Configure the Campus-REX as a Bridge or Router	3-19
Set the Timing Source	3-29

SET UP AN ASCII TERMINAL

You can configure the Campus system through an ASCII terminal connected to the Desktop Unit or Campus-Star in which the Campus-REX is installed. The terminal provides access to some configuration options not available through the LCD menus.

Depending on your immediate configuration plans, you may not need to set up an ASCII terminal now. However, you need to set up a terminal if one of the following applies:

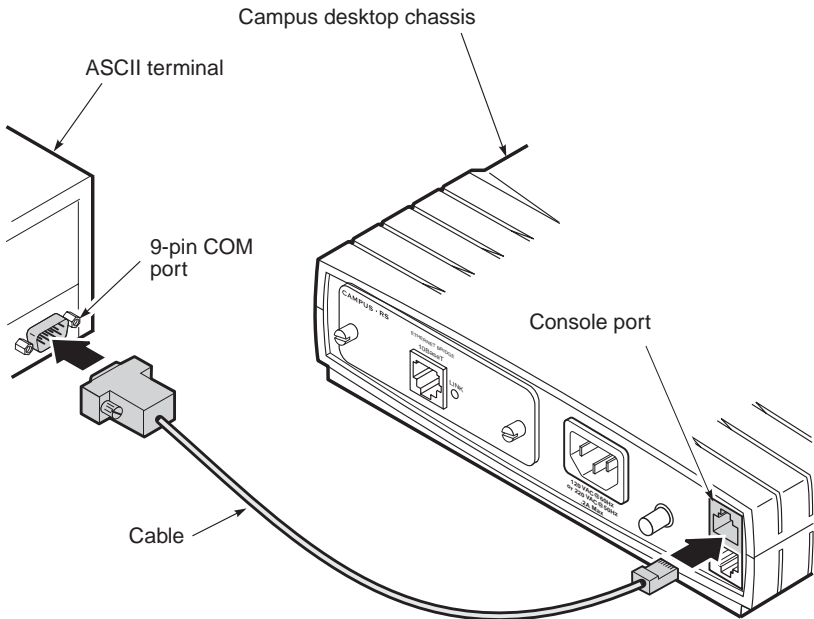
- you plan to use the Campus-REX as a router
- you need to change the HDSL transmission rate and do not want to use the LCD menus
- you plan on setting additional configuration options at this time
- you want to view performance statistics on the HDSL and 10BASE-T interfaces

If none of these reasons apply to you, skip this section and proceed to “[Set the HDSL Operating Mode](#)” on page 3-7.

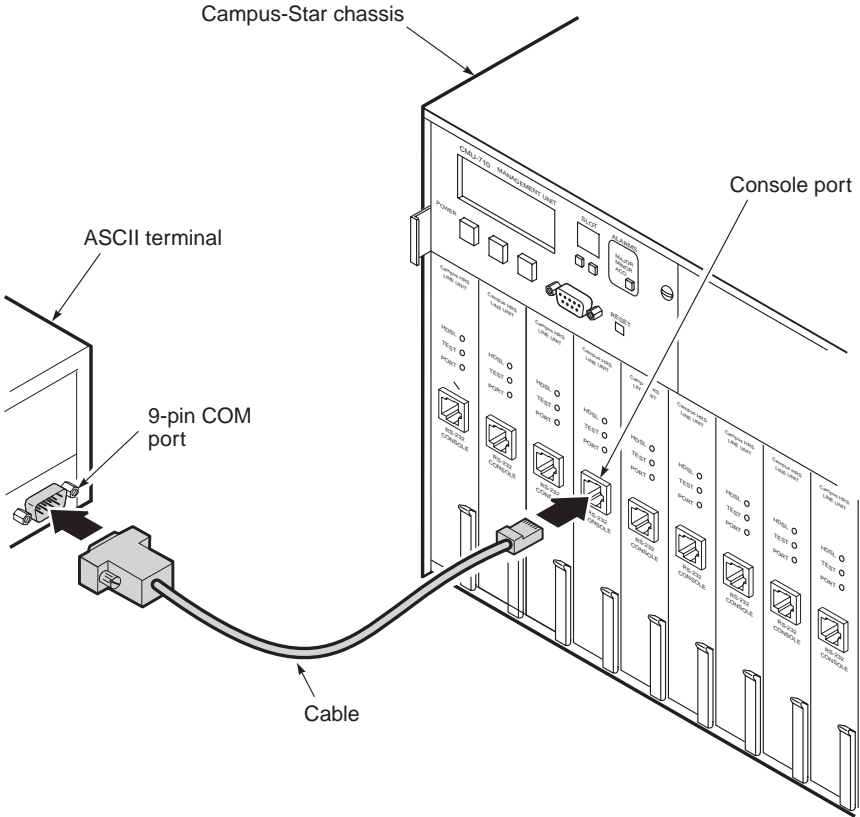
Connecting the ASCII Terminal to the Campus Unit

To connect the Campus-REX RS Interface Card to an ASCII terminal:

- 1 Plug the console adapter into the standard 9-pin COM port on the ASCII terminal and tighten the attached screws until they are snug. Skip this step if the ASCII terminal provides an RJ-48 jack.
- 2 Plug one end of the console cable into the console adapter, then do one of the following:
 - Plug the other end of the console cable into the console port on the Desktop Unit.



- If the Campus-REX is installed in a Campus-Star, do one of the following:
 - plug the other end of the console cable into the console port on the front of the Line Unit.



- use an adapter to plug the other end of the console cable into the console port of the Campus Management Unit (CMU) on the Campus-Star, as described in the *Campus-Star User Manual*.

3 Configure the ASCII terminal to the following communications settings:

- 9600 baud
- no parity
- 8 data bits
- 1 stop bit
- no hardware flow control

Logging Onto the Terminal

- 1** Press the **SPACEBAR** on the ASCII terminal keyboard several times until the baud rate is established and the Login Password screen displays on the terminal monitor.

```
May 3,1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:12:59
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

LOGIN PASSWORD >
```

- 2 Press **ENTER** to log on. If you have set a password, type your password then press **ENTER**. The Main Menu displays.

```
May 3 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:14:02
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                MAIN MENU

1) SYSTEM STATUS
2) DATA PORT SETTINGS
3) SYSTEM SETTINGS
4) DIAGNOSTICS
5) REMOTE LOGON

                                (L)ogout

ENTER CHOICE>
```

If the system does not respond when you attempt to log on, ensure that hardware flow control is turned off on the ASCII terminal.

SET THE HDSL OPERATING MODE

The Campus-REX is set to operate in Standard Mode with a T1 (1.544 Mbps) HDSL Rate. This is compatible with other Campus-RS products and with Campus-T1 Desktop Units and Line Units. If this is the desired setting for your system, proceed to [“Configure the Campus-REX as a Bridge or Router” on page 3-19](#). Otherwise, follow the steps in this section to adjust the HDSL transmission rate.

There are two ways to configure the HDSL line:

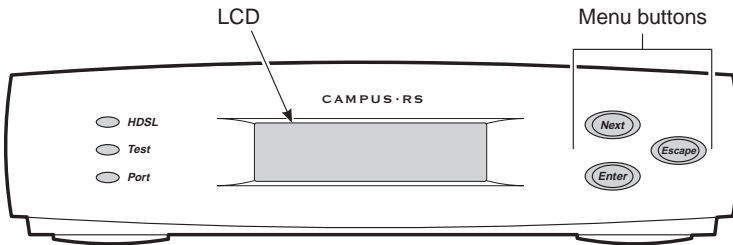
- To use the LCD menus, see [“Using the LCD,”](#) below.
- To use an ASCII Terminal, see [“Using an ASCII Terminal”](#) on [page 3-11](#).



Changes to the HDSL operating mode or transmission rate are not automatically made to the remote unit. These changes must be made at both the local and remote units for the HDSL link to be re-established. If the remote unit is not easily accessible, you can follow the instructions in [“Logging Onto a Remote Campus Unit”](#) on [page 5-3](#) to use an ASCII terminal to perform a remote logon (if an HDSL link is up) and make the desired change. When you change the HDSL settings for the remote unit, the HDSL link is lost; it is re-established when you make the identical change(s) to the local unit.

Using the LCD

The steps in this section use the menu buttons and LCD on the front of the Desktop Unit or the Campus-Star Campus Management Unit (CMU). The figure below shows the LCD and menu buttons on the Campus-RS Desktop Unit. See the *Campus-Star User Manual* for the location of the LCD and menu buttons on the CMU. For a complete description of how to use the menu buttons and LCD, see “[Navigating the LCD Menu](#)” on page 4-2.



To set the HDSL Transmission Rate:

- 1 Press **Escape** until `Campus RS I/F: REX` displays.
- 2 Press **Next**. `HDSL LINK CONFIG & STATUS` displays.
- 3 Press **Enter**. `OPERATING MODE` displays.
- 4 Continue with one of the following sections, depending on whether you are using Standard Mode ([page 3-8](#)), Extended Mode ([page 3-9](#)), or AutoSync Mode ([page 3-10](#)).

Standard HDSL Mode

This section continues from [Step 4](#) in the previous section to set a Standard Mode HDSL Rate.

Choose from the following settings:

- T1
- E1
- 768

- 1 If the Operating Mode is set to Standard Mode, proceed to [Step 3](#). Otherwise, press **Enter**.
- 2 Press **Next** until the LCD displays STANDARD, then press **Enter**. The Operating Mode changes to Standard.
- 3 Press **Next** until HDSL RATE displays, then press **Enter**.
- 4 Press **Next** until the desired HDSL transmission rate displays, then press **Enter**.

To continue setting up the system, proceed to “[Configure the Campus-REX as a Bridge or Router](#)” on page 3-19.

Extended HDSL Mode

This section continues from [Step 4](#) in “[Using the LCD](#)” on page 3-8 to set the Extended Mode parameters.

To set an Extended Mode HDSL Rate, you must:

- Set the Extended Mode Loop Configuration to 1 Loop or 2 Loop, depending on the physical layout of your HDSL network.
- Set the Extended Mode HDSL Rate to one of the options determined by the Extended Mode Loop Configuration:
 - 1 Loop HDSL Rate settings are between 128 kbps and 1.152 Mbps, in 64 kbps increments.
 - 2 Loop HDSL Rate settings are between 256 kbps and 2.304 Mbps, in 128 kbps increments.

- 1 With the LCD displaying OPERATING MODE, press the **Enter** button.
- 2 Press **Next** until EXTENDED displays, then press **Enter**. The LCD displays OPERATING MODE.
- 3 Press **Next** two times. LOOP MODE displays.
- 4 Press **Enter**.
- 5 Press **Next** until the desired Loop Mode setting displays, then press **Enter**. The LCD displays LOOP MODE.

- 6 Press **Next**. HDSL RATE displays.
- 7 Press **Enter**.
- 8 Press **Next** until the desired HDSL transmission rate displays, then press **Enter**.

To continue setting up the system, proceed to [“Configure the Campus-REX as a Bridge or Router” on page 3-19](#).

AutoSync HDSL Mode

This section continues from [Step 4 in “Using the LCD” on page 3-8](#) to set the Extended Mode parameters.

To configure AutoSync Mode, you must:

- Set the Transceiver Mode to Master or Slave.
 - If the Transceiver Mode is set to Master, set the HDSL Loop Mode to 1 Loop or 2 Loop, depending on the physical layout of your HDSL network.
 - If the Transceiver Mode is set to Master, set the HDSL Rate to one of the options determined by the HDSL Loop Mode:
 - 1 Loop HDSL Rate settings are between 128 kbps and 1.152 Mbps, in 64 kbps increments.
 - 2 Loop HDSL Rate settings are between 256 kbps and 2.048 Mbps, in 128 kbps increments.
- 1 With the LCD displaying OPERATING MODE, press **Enter**.
 - 2 Press **Next** until AUTOSYNC displays, then press **Enter**. OPERATING MODE displays. If you are configuring an AutoSync slave system, skip the remainder of this section and proceed to [“Configure the Campus-REX as a Bridge or Router” on page 3-19](#). For an AutoSync master system, continue with the remaining steps.
 - 3 Press **Next** until XCVR MODE displays.
 - 4 Press **Enter**.
 - 5 Press **Next** until the MASTER displays, then press **Enter**. XCVR MODE displays.
 - 6 Press **Next** until LOOP MODE displays.

- 7 Press **Enter**.
- 8 Press **Next** until the desired Loop Mode setting displays, then press **Enter**. LOOP MODE displays.
- 9 Press **Next**. HDSL RATE displays.
- 10 Press **Enter**.
- 11 Press **Next** until the desired HDSL transmission rate displays, then press **Enter**.

To continue setting up the system, proceed to “Configure the Campus-REX as a Bridge or Router” on page 3-19.

Using an ASCII Terminal

The steps in this section use an ASCII terminal. To set the HDSL transmission rate:

- 1 Follow the steps in “Set Up an ASCII Terminal” on page 3-2 to connect the ASCII terminal and log on to the Main Menu.
- 2 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```
May 3, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:18:41
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12         Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 3 Type **2** then press **ENTER**. The Standard Mode HDSL Parameters or Extended Mode HDSL Parameters menu displays. While the illustrations in this section show the Standard Mode HDSL Parameters menu, the instructions are the same for both menus.

```
Dec 9, 1999  ADC DSL SYSTEMS INC.,  CAMPUS RS,  Version x.xx          00:27:03
Local Unit ID: Campus REX Unit #34          Local I/F: REX
Remote Unit ID: Campus REX Unit #12        Remote I/F: REX
Circuit ID:

                STANDARD MODE HDSL PARAMETERS

1) HDSL Operating Mode: Standard          (Standard, Extended)
2) Transceiver Mode:   Auto              (Master, Slave, Auto)
3) HDSL Rate:         T1                  (768, T1, E1)

Changes will not be effective until this menu is exited!

                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

- 4 Continue with one of the following sections, depending on whether you are using Standard Mode ([page 3-12](#)), Extended Mode ([page 3-13](#)), or AutoSync Mode ([page 3-16](#)).

Standard HDSL Mode

This section continues from [Step 4](#) in the previous section to set a Standard HDSL mode.

Choose from the following settings:

- T1
- E1
- 768

To set a Standard HDSL Mode:

- 1 If the HDSL Operating Mode is set to Extended Mode, type **1** then press **ENTER**.
- 2 From the HDSL Parameters menu, type **3** then press **ENTER**. The HDSL Rate option changes to the next setting.
- 3 Repeat the previous step until the HDSL Rate option is set to the desired setting.
- 4 Type **R** to exit the menu, then confirm any HDSL changes you have made.

To continue setting up the system, proceed to “[Configure the Campus-REX as a Bridge or Router](#)” on page 3-19.

Extended HDSL Mode

This section continues from [Step 4 on page 3-12](#) to set an extended HDSL mode.

To set a Standard Mode HDSL Rate, you choose from the list of predefined rates. To set an Extended Mode HDSL Rate, you must:

- Set the Extended Mode Loop Configuration to 1 Loop or 2 Loop, depending on the physical layout of your HDSL network.
- Set the Extended Mode HDSL Rate to one of the options determined by the Extended Mode Loop Configuration:
 - 1 Loop HDSL Rate settings are between 128 kbps and 1.152 Mbps, in 64 kbps increments.
 - 2 Loop HDSL Rate settings are between 256 kbps and 2.304 Mbps, in 128 kbps increments.

- 1 From the HDSL Parameters menu, type **1** then press **ENTER**. The HDSL Operating Mode options changes from Standard Mode to Extended Mode.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:19:32
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                EXTENDED MODE HDSL PARAMETERS

1) HDSL OPERATING MODE:  Extended          (Standard, Extended)
2) TRANSCIVER MODE:     Auto              (Master, Slave, Auto)
3) HDSL LOOP MODE:      2 Loops           (1 Loop, 2 Loops)
4) HDSL RATE:           256

      *Note:
        1 Loop = single loop, full duplex
        2 Loops = two loops, full duplex

Changes will not be effective until this menu is exited!

                (R)eturn (M)ain Menu
ENTER CHOICE>
```

- 2 To change the HDSL Loop Mode, type **3** then press **ENTER**. Repeat this step until the desired HDSL Loop Mode setting displays.
- 3 Type **4** then press **ENTER**. The Select HDSL Rate menu displays.

```
Mar 10, 2001  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:19:32
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                SELECT HDSL HIGH RATE

Current HDSL Rate: 256
Current Loop Mode: 2 Loops

1)  N/A                7)  896 kbps          13) 1664 kbps
2)  256 kbps          8) 1024 kbps         14) 1792 kbps
3)  384 kbps          9) 1152 kbps         15) 1920 kbps
4)  512 kbps          10) 1280 kbps        16) 2048 kbps
5)  640 kbps          11) 1408 kbps        17) 2176 kbps
6)  768 kbps          12) 1536 kbps        18) 2304 kbps

                                (R)return (M)ain Menu

ENTER CHOICE>
```

- 4 Type the number for the desired HDSL transmission rate then press **ENTER**. The terminal returns to the HDSL Parameters menu and displays the new HDSL Rate.
- 5 Type **R** to exit the menu, then confirm any HDSL changes you have made.

To continue setting up the system, proceed to “Configure the Campus-REX as a Bridge or Router” on page 3-19.

AutoSync HDSL Mode

This section continues from [Step 4 on page 3-12](#) to set up AutoSync HDSL mode.

To configure AutoSync Mode, you must:

- Set the Transceiver Mode to Master or Slave.
 - If the Transceiver Mode is set to Master, set the HDSL Loop Mode to 1 Loop or 2 Loop, depending on the physical layout of your HDSL network.
 - If the Transceiver Mode is set to Master, set the HDSL Rate to one of the options determined by the HDSL Loop Mode:
 - 1 Loop HDSL Rate settings are between 128 kbps and 1.152 Mbps, in 64 kbps increments.
 - 2 Loop HDSL Rate settings are between 256 kbps and 2.048 Mbps, in 128 kbps increments.
- 1 From the Standard Mode HDSL Parameters menu, type **1** then press **ENTER** until the HDSL Operating Mode options changes to AutoSync Mode. If the terminal is already set to the AutoSync Mode HDSL Parameters menu, skip this step.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:19:32
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                          AUTOSYNC MODE HDSL PARAMETERS

1) HDSL Operating Mode:  Autosync          (Standard, Extended, Autosync)
2) Transceiver Mode:    Slave             (Master, Slave)
   HDSL Loop Mode:
   HDSL Rate:

Note:
   Remote Unit must be set as Autosync, Master.

Changes will not be effective until this menu is exited!

                          (R)eturn (M)ain Menu
ENTER CHOICE>
```

- 2 To change the Transceiver Mode, type then press **ENTER**. The Transceiver Mode changes to the next available setting.

Continue with the following steps if the Transceiver Mode is set to Master. If you set the Transceiver Mode to Slave, you cannot configure the remaining options on this menu. These settings will be acquired from the master unit when the HDSL link is established.

```

Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:19:32
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                AUTOSYNC MODE HDSL PARAMETERS

1) HDSL Operating Mode:  Autosync      (Standard, Extended, Autosync)
2) Transceiver Mode:    Master         (Master, Slave)
3) HDSL Loop Mode:      2 Loops       (1 Loop, 2 Loops)*
4) HDSL Rate:           256

*Note:
  1 Loop = single loop, full duplex
  2 Loops = two loops, full duplex

Remote Unit must be set as Autosync, Slave.

Changes will not be effective until this menu is exited!

                (R)return (M)ain Menu

ENTER CHOICE>

```

- 3 To change the HDSL Loop Mode, type **3** then press **ENTER**. The HDSL Loop Mode changes to the next available setting.
- 4 Type **4** then press **ENTER**. The Select HDSL High Rate (if the HDSL Loop Mode is set to 1 Loop) or Select HDSL Low Rate (if the HDSL Loop Mode is set to 2 Loops) menu displays.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:19:32
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                SELECT HDSL HIGH RATE

Current HDSL Rate: 256
Current Loop Mode: 2 Loops

  1) N/A                13) 1664 kbps
  2) 256 kbps          14) 1792 kbps
  3) 384 kbps          15) 1920 kbps
  4) 512 kbps          16) 2048 kbps
  5) 640 kbps
  6) 768 kbps
  7) 896 kbps
  8) 1024 kbps
  9) 1152 kbps
 10) 1280 kbps
 11) 1408 kbps
 12) 1536 kbps

                (R)eturn (M)ain Menu

ENTER CHOICE>
```

- 5 Type the number for the desired HDSL transmission rate then press **ENTER**. The terminal returns to the HDSL Parameters menu and displays the new HDSL Rate.

To continue setting up the system, proceed to the next section.

CONFIGURE THE CAMPUS-REX AS A BRIDGE OR ROUTER

The Campus-REX can be configured to operate in one of two ways:

- as a bridge to forward 802.3 frames using MAC addresses (see [“Configuring as a Bridge”](#))
- as a router to forward IP packets based on a static routing table (see [“Configuring as a Router”](#) on page 3-23)

For an overview of bridges, routers, and other network management concepts, see [“Internetworking and Management Overview”](#) on page 7-1.

Configuring as a Bridge

Two configuration options, described in [“MAC-Level Bridging and Spanning Tree Protocol”](#) on page 7-2, define how the Campus-REX operates as a bridge. These options:

- set Encapsulation to HDLC or PPP:
 - Use HDLC for most applications.
 - Use PPP when the remote unit includes a synchronous interface card, such as a V.35 card.
- enable or disable Spanning Tree

This section describes how to configure the bridge options for the Campus-REX.

From the LCD

The steps in this section use the menu buttons and LCD on the front of the Desktop Unit or the Campus-Star CMU.



If the Campus-REX has been set as a router, you must use an ASCII terminal if you want to change it back to a bridge. See “From an ASCII Terminal” on page 3-21.

To configure the Bridge options:

- 1 Press **Escape** until Campus RS I/F: REX displays.
- 2 Press **Next** twice, until DATA PORT CONFIG & STATUS displays, then press **Enter**. The LCD displays CONFIGURE REX SETTINGS.
- 3 Press **Enter**. The LCD displays REX MODE BRIDGE MODE.
- 4 Press **Next** twice. ENCAPSULATION displays.
- 5 Press **Enter**. The LCD displays the current Encapsulation setting.
- 6 Press **Next** until the desired Encapsulation setting displays, then press **Enter**.
- 7 Press **Next**. SPANNING TREE displays.
- 8 Press **Enter**. The LCD displays the current Spanning Tree setting.
- 9 Press **Next** until the desired Spanning Tree setting displays, then press **Enter**.
- 10 Press **Next**. Press Enter to reset interface displays.
- 11 Press **Enter**. The Campus-REX restarts with the changes in effect.

From an ASCII Terminal

- 1 If you have not already done so, follow the steps in “Set Up an ASCII Terminal” on page 3-2 to connect the ASCII terminal and log on to the Main Menu.
- 2 From the Main Menu, type **2** then press **ENTER**. The Data Port Settings menu displays.



On the Data Port Settings menu, option 4 to Reset the Interface Card displays only when you have changed configuration that requires you to save to NVRAM and then reset the modem to effect the change.

```

Dec 9, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:16:44
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                DATA PORT SETTINGS

MAC ADDRESS:      00:20:A7:21:2F:6B
10 BASE-T STATUS: Up

                                1) BRIDGE/ROUTER CONFIGURATION
                                2) SNMP CONFIGURATION

                                3) WRITE NVRAM
                                4) RESET INTERFACE CARD

WARNING: NVRAM must be written and interface card reset for any
configuration changes to take effect.

                                (R)eturn

ENTER CHOICE>

```

- 3 Type **1** then press **ENTER**. The Bridge/Router Configuration menu displays.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:17:00
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
                BRIDGE/ROUTER CONFIGURATION

MODE SETTING  1) Bridge/Router Mode:   Bridge      (Bridge, Router)
                2) Encapsulation:      HDLC        (HDLC, PPP)
                3) Timing Source:      Internal    (Internal, HDSL)
                4) Spanning Tree:      Disabled    (Disabled, Enabled)

                5) Local IP Address:    0.0.0.0
                6) Local Subnet Mask:   255.255.255.0
                7) Default Router:     0.0.0.0

                8) BOOT Mode:          Local       (Local, Network)

                (R)eturn (M)ain Menu

ENTER CHOICE>
```

- 4 To change the packet encapsulation format, type **2** then press **ENTER**. The Encapsulation option changes from HDLC to PPP.
- 5 To enable Spanning Tree, type **4** then press **ENTER**. The Spanning Tree option changes from Disable to Enable.
- 6 Type **5** then press **ENTER**. The terminal prompts you to enter the local IP address of the Campus-REX. This must be set for the Campus-REX to respond to the application (SNMP) that uses the IP protocol.
- 7 Type the address, in decimal-dotted notation, then press **ENTER**. The Bridge/Router Configuration menu displays the new address.
- 8 Type **6** then press **ENTER**. The terminal prompts you to enter the subnet mask of the Campus-REX. This allows the Campus-REX to determine if a host, such as an SNMP management station or trap receiver, is on the same local subnet. If it is, the Campus-REX can send messages directly to the host; if not, messages must be sent through a default router. This must be set for the Campus-REX to respond to applications that use the IP protocol.
- 9 Type the subnet mask, in decimal-dotted notation, then press **ENTER**. The Bridge/Router Configuration menu displays the new subnet mask.
- 10 Type **7** then press **ENTER**. The terminal prompts you to enter the IP address of the default router the Campus-REX uses to reach a host (SNMP station or trap receiver) on another network.

- 11 Type the address, in decimal-dotted notation, then press **ENTER**.
- 12 Type **R** then press **ENTER** to return to the Data Port Settings menu.
- 13 Type **3** then press **ENTER** to write the new bridge configuration to NVRAM.
- 14 If you are done making configuration changes, type **4** then press **ENTER** to reset the Campus-REX and enable the changes. If you plan to continue making configuration changes, wait until you have finished before resetting the system.



Make sure you reset the interface card when you have finished changing bridge/router configuration options. The changes do not take effect until the system is reset.

Configuring as a Router

Several options, described in “[Static IP Routing](#)” on page 7-4, define how the Campus-REX operates as a router. Use these options to:

- enter the address of a default gateway router
- set Encapsulation to HDLC or PPP:
 - Use HDLC for most applications.
 - Use PPP when the remote unit is a synchronous interface card, such as a V.35 card.
- enter up to three destination addresses, subnet masks and gateway addresses into the IP Static Routing Table
- enter the IP address and subnet mask for the Campus-REX

This section describes how to configure the Campus-REX as a router.



You can only configure the Campus-REX as a router through an ASCII terminal. Router options are not available through the LCD menus.

- 1 If you have not already done so, follow the steps in “Set Up an ASCII Terminal” on page 3-2 to connect the ASCII terminal and log on to the Main Menu.
- 2 From the Main Menu, type **2** then press **ENTER**. The Data Port Settings menu displays.



On the Data Port Settings menu, option 4 to Reset the Interface Card displays only when you have changed configuration that requires you to save to NVRAM and then reset the modem to effect the change.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:16:44
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-REX Unit #12     Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                DATA PORT SETTINGS

MAC ADDRESS:      00:20:A7:21:2F:6B
10 BASE-T STATUS: Up

      1) BRIDGE/ROUTER CONFIGURATION
      2) SNMP CONFIGURATION

      3) WRITE NVRAM
      4) RESET INTERFACE CARD

WARNING: NVRAM must be written and interface card reset for any
configuration changes to take effect.

                                (R)eturn

ENTER CHOICE>
```

- 3 Type **1** then press **ENTER**. The Bridge/Router Configuration menu displays.

```

Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:17:00
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
                BRIDGE/ROUTER CONFIGURATION

MODE SETTING  1) Bridge/Router Mode:  Bridge      (Bridge, Router)
               2) Encapsulation:      HDLC        (HDLC, PPP)
               3) Timing Source:      Internal    (Internal, HDSL)
               4) Spanning Tree:      Disabled   (Disabled, Enabled)
               5) Local IP Address:    0.0.0.0
               6) Local Subnet Mask:   255.255.255.0
               7) Default Router:     0.0.0.0
               8) BOOT Mode:          Local      (Local, Network)

(R)return (M)ain Menu

ENTER CHOICE>

```

- 4 If the Bridge/Router Mode is set to Bridge, type **1** then press **ENTER**. The Bridge/Router Configuration menu displays the router options.

```

May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:17:19
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
                BRIDGE/ROUTER CONFIGURATION

MODE SETTING  1) Bridge/Router Mode:  Router      (Bridge, Router)
               2) Encapsulation:      HDLC        (HDLC, PPP)
               3) Timing Source:      Internal    (Internal, HDSL)

LAN PORT      4) LAN IP Address:      0.0.0.0
               5) LAN Subnet Mask:    0.0.0.0

LINE PORT     6) Line IP Address:     0.0.0.0
               7) Line Subnet Mask:   0.0.0.0

               DESTINATION      SUBNET MASK      GATEWAY ADDRESS
IP STATIC     8) Default Router:     0.0.0.0         0.0.0.0
               9) 0.0.0.0           0.0.0.0         0.0.0.0
ROUTING       10) 0.0.0.0           0.0.0.0         0.0.0.0
TABLE        11) 0.0.0.0           0.0.0.0         0.0.0.0

(R)return (M)ain Menu

ENTER CHOICE>

```

- 5 To change the packet encapsulation format, type **2** then press **ENTER**. The Encapsulation option changes from HDLC to PPP.

- 6 Type **8** then press **ENTER**. A prompt displays, asking you to enter the default router IP address. This address defines the next hop default router for the Campus-REX to use to route packets that have a destination address that is not in the IP Static Routing Table.
- 7 Type the address, in decimal-dotted notation then press **ENTER**.
- 8 Continue with the following sections.

Entering Port Addresses

This section describes how to enter the port addresses for the Campus unit. There are two port addresses:

- The LAN Port IP address is the IP address for the 10BASE-T port on the Campus-REX.
 - The Line Port IP address is the IP address for the HDSL port on the Campus Desktop Unit or Campus-Star chassis. If the HDSL line connects two Campus-REX units, this address is hidden from the rest of the network. In this case, you can assign artificial parameters to the Line Port, although the Line Port addresses must belong to the same IP subnet.
- 1 From the Bridge/Router Configuration menu, type **4** then press **ENTER**. The terminal prompts you to enter the LAN IP Address.
 - 2 Type the address, in decimal-dotted notation, then press **ENTER**. The new address displays.
 - 3 Type **5** then press **ENTER**. The terminal prompts you to enter the LAN Subnet Mask.
 - 4 Type the mask, in decimal-dotted notation, then press **ENTER**. The new subnet mask displays.
 - 5 Type **6** then press **ENTER**. The terminal prompts you to enter the Line IP Address.
 - 6 Type the address, in decimal-dotted notation, then press **ENTER**. The new address displays.

- 7 Type **7** then press **ENTER**. The terminal prompts you to enter the Line Subnet Mask.
- 8 Type the mask, in decimal-dotted notation, then press **ENTER**. The new subnet mask displays.
- 9 Continue with the following section.

Setting Up the IP Static Routing Table

This section describes how to enter the IP static routing table for the Campus unit. This table can contain up to four explicit routes and one default router. Each route consists of the destination network, subnet mask, and next-hop gateway. The default route does not have a configurable subnet mask, but uses the mode associated with the LAN or LINE networks, as described in the previous section.

Fill in as many routing table entries as are appropriate to your network. You can also proceed to the next section and leave the IP static routing table blank.

The steps in this section assume that you started from the beginning of the previous section.

- 1 From the Bridge/Router Configuration menu, type **9** then press **ENTER**. The terminal prompts you to enter the destination address for the first routing table entry.
- 2 Type the destination address, in decimal-dotted notation, then press **ENTER**. The terminal prompts you to enter the subnet mask for the table entry.
- 3 Type the mask, in decimal-dotted notation, then press **ENTER**. The terminal prompts you to enter the gateway address for the table entry.
- 4 Type the gateway address, in decimal-dotted notation, then press **ENTER**. The terminal displays the Bridge/Router Configuration menu with the first entry of the routing table filled in.

- 5 Type **1 0** then press **ENTER**. The terminal prompts you to enter the Destination address for the second routing table entry.
- 6 Repeat steps 2 through 4. The terminal displays the Bridge/Router Configuration menu with the first two entries of the routing table filled in.
- 7 Type **1 1** then press **ENTER**. The terminal prompts you to enter the Destination address for the third routing table entry.
- 8 Repeat steps 2 through 4. The terminal displays the Bridge/Router Configuration menu with the completed routing table.
- 9 Type **R** then press **ENTER** to return to the Data Port Settings menu.
- 10 Type **3** then press **ENTER** to write the new bridge configuration to NVRAM.
- 11 If you are done making configuration changes, type **4** then press **ENTER** to reset the Campus-REX and enable the changes. If you plan to continue making configuration changes, wait until you have finished before resetting the system.



Make sure you reset the interface card when you have finished changing bridge/router configuration options. The changes do not take effect until the system is reset.

SET THE TIMING SOURCE

The Timing Source option determines the source of circuit timing on the HDSL link. There are two settings for the Timing Source option:

- **Internal:** Sets the Campus unit to take its timing from an internal oscillator. This is the default setting.
- **HDSL:** Sets the Campus unit to take its timing from the HDSL link.

The proper setting of the Timing Source option depends upon the interface card of the remote Campus unit:

- If the Campus-REX is connected to a Campus unit with another Campus-REX RS Interface Card, leave the Timing Source option set to Internal. The Campus system will not operate properly if both units are set to HDSL.
- If the Campus-REX is connected to a Campus unit with a synchronous interface card, such as a Fractional V.35 card, the timing source depends on the setting of the Primary Timing Source option of the remote unit:
 - Set the Timing Source to HDSL if the remote unit is set to Internal or Port.
 - Set the Timing Source to Internal if the remote unit is set to HDSL.

See the *Campus-RS Fractional Interface Card User Manual* for information on the Primary Timing Source option.

- If the Campus-REX is connected to a Campus unit with a Campus CSU/DS-1 or CSU/DSX-1 interface card, leave the Timing Source option set to Internal.

Using the LCD

To set the Timing Source from the LCD:

- 1 Press **Escape** until `Campus RS I/F: REX` displays.
- 2 Press **Next** twice, until `DATA PORT CONFIG & STATUS` displays, then press **Enter**. The LCD displays `CONFIGURE REX SETTINGS`.
- 3 Press **Enter**. The LCD displays `REX MODE`.
- 4 Press **Next** until `TIMING SOURCE` displays, then press **Enter**. The LCD displays the current Timing Source setting.
- 5 Press **Next** until the desired Timing Source setting displays, then press **Enter**. The LCD displays the new Timing Source setting.

Using an ASCII Terminal

To set the Timing Source from an ASCII terminal:

- 1 Connect the ASCII terminal and log on to the Main Menu. See “[Set Up an ASCII Terminal](#)” on page 3-2 for instructions.
- 2 From the Main Menu, type `2` then press **ENTER**. The Data Port Settings menu displays.

```
Dec 9, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:16:44
Local Unit ID: Campus-REX Unit #34           Local I/F: REX
Remote Unit ID: Campus-REX Unit #12         Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                DATA PORT SETTINGS

MAC ADDRESS:           00:20:A7:21:2F:6B
10 BASE-T STATUS:     Up

                                1) BRIDGE/ROUTER CONFIGURATION
                                2) SNMP CONFIGURATION

                                3) WRITE NVRAM
                                4) RESET INTERFACE CARD

WARNING:  NVRAM must be written and interface card reset for any
          configuration changes to take effect.

                                (R)return
ENTER CHOICE>
```

- 3 Type **1** then press **ENTER**. The Bridge/Router Configuration menu displays.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:17:00
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
                                     BRIDGE/ROUTER CONFIGURATION

MODE SETTING  1) Bridge/Router Mode:  Bridge      (Bridge, Router)
               2) Encapsulation:      HDLC        (HDLC, PPP)
               3) Timing Source:       Internal    (Internal, HDSL)
               4) Spanning Tree:       Disabled   (Disabled, Enabled)
               5) Local IP Address:     0.0.0.0
               6) Local Subnet Mask:    255.255.255.0
               7) Default Router:       0.0.0.0
               8) BOOT Mode:           Local      (Local, Network)

                                     (R)return (M)ain Menu

ENTER CHOICE>
```

- 4 Type **3** then press **ENTER**. The Timing Source option changes Internal to HDSL.
- 5 Repeat the previous step until the Timing Source option is set to the desired setting.

CONFIGURING AND MONITORING THROUGH THE LCD

4

You can configure the Campus-REX RS Interface Card and view system information using the LCD and menu buttons located on the front of the Campus-RS Desktop Unit or a CMU installed in the Campus-Star chassis.

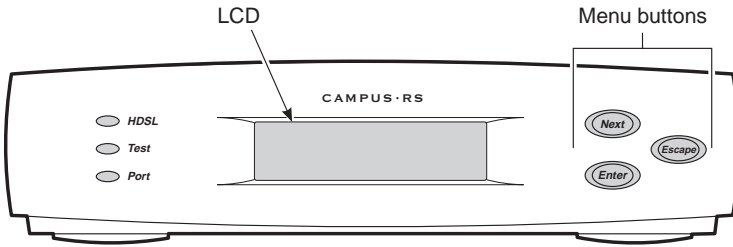
This chapter describes how to use the LCD to set the individual configuration options.

For Information About:	See Page:
Navigating the LCD Menus	4-2
Restoring the System to Default Values	4-3
Configuring the Campus-REX as a Master or Slave Unit	4-4
Viewing and Configuring Alarms	4-5
Configuring Loopbacks	4-10
Viewing System Information	4-12
Viewing Status Information	4-13

You can also perform these functions through an ASCII terminal connected to the Desktop Unit or a Campus-RS Line Unit installed in the Campus-Star. To use an ASCII terminal to configure the system, see [“Configuring with an ASCII Terminal”](#) on page 5-1. To view system and status information, see [“Monitoring with an ASCII Terminal”](#) on page 6-1.

NAVIGATING THE LCD MENUS

Use the LCD and menu buttons on the Desktop Unit or CMU to navigate the menus and configure the Campus-RS system. The illustration below shows the LCD and menu buttons on the Desktop Unit. See the *Campus-Star User Manual* for the location of the LCD and menu buttons on the CMU.



The following table describes how to use the menu buttons to move through the menus and select items.

Button	Function
Next	Scrolls to the next LCD menu or option at the same level of the menu structure
Enter	Selects the displayed LCD menu or option
Escape	Returns to the previous LCD menu selection

Instructions for setting individual configuration options are included with each option. The basic procedure is:

- 1 Press **Escape** until **CAMPUS RS I/F: REX** displays.
- 2 Press **Next** until the desired menu name displays.
- 3 Press **Enter** to access the menu options.
- 4 Press **Next** until the desired option name displays.
- 5 Press **Enter** to access the settings for the option.
- 6 Press **Next** until the desired setting displays.

- 7 Press **Enter** to select and save the desired option.
- 8 If desired, press **Escape** several times to return to the top of the menu structure (CAMPUS RS I/F: REX).

See “LCD Menu Reference” on page A-3 for an illustration of the hierarchical structure of the LCD menus.

RESTORING THE SYSTEM TO DEFAULT VALUES

You can restore all of the configuration options to their factory default values. This is an easy way to remove undesired configurations you may have set and want to return to their former settings.

To return the system configuration options to their default values:

- 1 Press **Escape** until CAMPUS RS I/F: REX displays.
- 2 Press **Enter**. S/W REV displays.
- 3 Press **Next** six times. Press ENTER to factory reset displays.
- 4 Press **Enter**. The system configuration options return to the default values.



Some options, such as the HDSL Rate must be the same for both the local and remote unit. Resetting the Campus unit configuration values on one unit only may cause the HDSL link to go down.

CONFIGURING THE CAMPUS-REX AS A MASTER OR SLAVE UNIT

The Transceiver Mode option determines the hierarchy of the two Campus units when attempting to establish an HDSL link. There are three settings: Master, Slave and Auto. Master and Slave are available for all three HDSL Operating Mode settings. Auto Mode is only available for Standard and Extended Modes, and is not available for AutoSync Mode.

- If a unit is set to Master, it initiates the HDSL link. The other Campus unit must be set to Slave or Auto.
- If a unit is set to Slave, it waits for the other Campus unit to initiate the HDSL link. The other unit must be set to Master or Auto. Slave is the default setting for AutoSync HDSL Mode.
- If a unit is set to Auto, it automatically switches between Master and Slave until an HDSL link is established. The setting of the other Campus unit is irrelevant. Auto is the default setting for Standard and Extended HDSL Modes.



Unless you have a compelling reason for doing otherwise, leaving the Transceiver Mode option set to Auto is recommended.

To change the Transceiver Mode:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next**. `HDSL LINK CONFIG & STATUS` displays.
- 3 Press **Enter**. `OPERATING MODE` displays.
- 4 Press **Next**. `XCVR MODE` displays.
- 5 Press **Enter**.
- 6 Press **Next** to scroll through the Transceiver Mode options until the desired setting displays.
- 7 Press **Enter** to select the displayed setting. `XCVR MODE` displays.

VIEWING AND CONFIGURING ALARMS

To determine if there is an active alarm condition:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next** three times. `ALARM CONFIG & STATUS` displays.
- 3 Press **Enter**. The LCD displays the current alarm status. There are three indicators that can appear under `CURRENT ALARMS`:
 - `HDSL` indicates an HDSL alarm
 - `LOC` indicates a local alarm
 - `REM` indicates a remote alarm

If a specific indicator does not display, there is no alarm in that area of the system.

The following sections describe how to view specific alarm information for the HDSL, local, and remote ports, and how to configure thresholds for the various alarms.

HDSL Alarms

This section describes how to view and configure alarms on the HDSL line.

Viewing Current Alarms

If the `CURRENT ALARMS` display indicates an HDSL alarm, you can determine the alarm type:

- 1 From the `CURRENT ALARMS` display, press **Next**. `HDSL LINK ALARMS CONFIG & STATUS` displays.
- 2 Press **Enter**. The current status of three alarms displays:
 - `LINK` shows whether the HDSL link is on or off
 - `ES` shows whether the errored seconds threshold has been exceeded on the local unit, remote unit, or both
 - `MARGIN` shows whether the margin threshold has been exceeded on the local unit, remote unit, or both

Configuring Alarm Thresholds

Alarm thresholds determine the level at which an alarm condition is reached. There are two types of HDSL alarm thresholds:

- Link ES threshold determines the number of errored seconds that must occur to trigger an alarm. This threshold can be set to 17 or 170 errored seconds. You can also disable this alarm.
- Margin threshold determines the margin, in dB, that triggers an alarm. This threshold can be set anywhere between 1 dB and 25 dB, in 1 dB increments. You can also disable this alarm.

To set the alarm thresholds:

- 1 From the **CURRENT ALARMS** display, press **Next**. **HDSL LINK ALARMS** displays.
- 2 Press **Enter**. The current HDSL alarm status displays.
- 3 Press **Next**. **HDSL ES THRESHLD** displays.
- 4 Press **Enter**.
- 5 Press **Next** to scroll through the settings for the ES threshold until the desired setting displays.
- 6 Press the **Enter** button to select the desired setting. **HDSL ES THRESHLD** displays.
- 7 Press **Next**. **MARGIN THRESHLD** displays.
- 8 Press **Enter**.
- 9 Press **Next** to scroll through the settings for the margin threshold until the desired setting displays.
- 10 Press **Enter** to select the desired setting. **MARGIN THRESHLD** displays.

Viewing 24-Hour HDSL Alarm History

You can view the number of HDSL alarm conditions that have occurred over the past 24 hours. The LCD displays 24-hour information for the following alarms:

- local errored seconds (LOCAL ES)
- remote errored seconds (REMOTE ES)
- local unavailable seconds (LOCAL UAS)
- remote unavailable seconds (REMOTE UAS)

You may also view the time when the counter was last cleared and clear the counter.

To view the HDSL alarm history:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next**. `HDSL LINK CONFIG & STATUS` displays.
- 3 Press **Enter**, then press **Next** until `PERFORMANCE STATUS` displays.
- 4 Press **Enter**, then press **Next** to scroll through the alarm history displays.
- 5 To reset the counter, press **Next** until `Press ENTER to clear error cnts` displays, then press **Enter**.

AutoSync Alarms

The system generates an AutoSync alarm if the HDSL Operating Mode is set to AutoSync and an HDSL connection cannot be established in AutoSync Mode. This alarm is generated even if the HDSL link is eventually established through Fallback Mode. This section describes how to view and configure this alarm.

Viewing Current Alarms

- 1 From the CURRENT ALARMS display, press **Next** until HDSL LINK ALARMS displays.
- 2 Press **Enter** until the current HDSL alarm status displays.
- 3 Press **Next** until AUTOSYNC : displays.
- 4 If the AutoSync alarm is on or acknowledged, press **Enter** for more information.

Configuring the Alarm

- 1 From the CURRENT ALARMS display, press **Next** until HDSL LINK ALARMS displays.
- 2 Press **Enter** until the current HDSL alarm status displays.
- 3 Press **Next** until AUTOSYNC CFG ALM displays.
- 4 Press **Enter**.
- 5 Press **Next** to scroll through the settings for the AutoSync alarm until the desired setting displays.
- 6 Press **Enter** to select the desired setting. AUTOSYNC CFG ALM displays.

Local Alarms

Loss of Signal (LOS) alarms can occur on the local unit. This section describes how to view and configure this alarm.

Viewing Current Alarms

If the CURRENT ALARMS display indicates a local alarm, you can determine the alarm type:

- 1 From the CURRENT ALARMS display, press **Next** twice. LOCAL I/F ALARMS CONFIG & STATUS displays.
- 2 Press **Enter**. The current status of the local alarm displays.

Configuring the Alarm

To enable or disable the local Loss of Signal alarm:

- 1 From the CURRENT ALARMS display, press **Next** twice. LOCAL I/F ALARMS CONFIG & STATUS displays.
- 2 Press **Enter**. The current status of the local alarm displays.
- 3 Press **Next**. LOC LOSS OF SIG ALM displays.
- 4 Press **Enter**.
- 5 Press **Next** to scroll through the settings for the alarm.
- 6 Press **Enter** to select the desired setting. LOC LOSS OF SIG ALM displays.

Remote Alarms

Loss of Signal (LOS) alarms can occur on the remote unit. This section describes how to view and configure this alarm.

Viewing Current Alarms

If the CURRENT ALARMS display indicates a remote alarm, you can determine the alarm type:

- 1 From the CURRENT ALARMS display, press **Next** three times. RMT I/F ALARMS CONFIG & STATUS displays.
- 2 Press **Enter**. The current status of the remote alarm displays.

Configuring the Alarm

To enable or disable the remote Loss of Signal alarm:

- 1 From the CURRENT ALARMS display, press **Next** three times. RMT I / F ALARMS displays.
- 2 Press **Enter**. The current status of the remote alarm displays.
- 3 Press **Next**. LOSS OF SIG ALM displays.
- 4 Press **Enter**.
- 5 Press **Next** to scroll through the settings for the alarm.
- 6 Press **Enter** to select the desired setting. RMT LOSS OF SIG ALM displays.

CONFIGURING LOOPBACKS

Loopbacks provide a way to test the data communication path between the Campus unit, the remote unit, and the remote host equipment. The Campus-REX supports two types of loopbacks:

- Local to Remote loopbacks test the remote data port, the data path inside the remote Campus unit, the HDSL line, the HDSL transceivers of both units, and most of the internal data path inside the local unit. This loopback does not test the local data port drivers and receivers.
- Remote to Remote loopbacks test the remote data port and a small portion of the remote interface card.



If both the local and remote units have a Campus-REX interface card, no loopbacks are supported.

Once a loopback condition has been initiated, it remains in effect until cleared. You may also set a loopback timeout to clear the loopback automatically after a set period of time has elapsed.

You manage loopbacks through the DIAGNOSTICS menu:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next** four times. `DIAGNOSTICS` displays.
- 3 Press **Enter**. `LOOPBACK MODE` displays.

The following sections describe how to initiate and clear loopbacks, and to set a loopback timeout.

Initiating a Loopback

To initiate a loopback condition:

- 1 From the `LOOPBACK MODE` display, press **Enter**.
- 2 Press **Next** to scroll through the loopback options until the desired loopback condition displays.
- 3 Press **Enter** to initiate the loopback. `LOOPBACK MODE` displays.

Clearing a Loopback

To clear a loopback condition:

- 1 From the `LOOPBACK MODE` display, press **Enter**.
- 2 Press **Next** to scroll through the loopback options until `NONE` displays.
- 3 Press **Enter** to clear the loopback. `LOOPBACK MODE` displays.

Setting the Loopback Timeout

The loopback timeout determines the amount of time before a loopback clears automatically. To set a loopback timeout:

- 1 From the LOOPBACK MODE display, press **Next**. LOOPBACK TIMEOUT displays.
- 2 Press **Enter** to access the loopback timeout options.
- 3 Press **Next** to scroll through the options until the desired setting appears.



If you set the loopback timeout to NONE, loopbacks run until you clear them manually or turn the unit off.

- 4 Press **Enter** to select the option and return to the LOOPBACK TIMEOUT display.

VIEWING SYSTEM INFORMATION

Through the LCD menu you can view the following product information (with the option name in parentheses):

- firmware version and PROM checksum (S/W REV and S/W CKSUM)
- hardware configuration information (H/W CONFIG)
- local unit ID (LOCAL UNIT ID)
- remote unit ID (REMOTE UNIT ID)
- remote interface card type (REMOTE I/F)
- circuit ID (CIRCUIT ID)

You cannot change any of this information through the LCD. Use an ASCII terminal to set the local and remote unit IDs, and the circuit ID. See [“Entering System Information”](#) on page 5-17.

To view the system information:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Enter** to view the firmware version and PROM checksum.
- 3 Press **Next** to scroll through the remaining options.

VIEWING STATUS INFORMATION

The LCD provides access to the following status information:

- Ethernet information, such as the MAC address and 10BASE-T status
- Current HDSL margin
- Frame statistics on the Ethernet and HDSL ports

Ethernet Information

You can view the following information about the Ethernet port:

- MAC address
- current 10BASE-T status

To view Ethernet information:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next** twice. `DATA PORT CONFIG & STATUS` displays.
- 3 Press **Enter**. `CONFIGURE REX SETTINGS` displays.
- 4 Press **Next** to view the `MAC ADDRESS`.
- 5 Press **Next** again to view the current status of the 10BASE-T port.

HDSL Margin

You can view the current HDSL loop margin values, measured in dB, for the local and remote HDSL loop. The listed values represent the margin relative to a signal-to-noise ratio required for a Bit Error Rate (BER) of 10^{-7} . A margin value greater than zero indicates a performance of better than 10^{-7} . The system provides a minimum margin of 6 dB, which translates to a performance of 10^{-10} BER or better.

To view the HDSL margin:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next**. `HDSL LINK CONFIG & STATUS` displays then press **Enter**.
- 3 Press **Next** until `MARGIN` displays.

Port Statistics

You can view the following statistics for the Ethernet and HDSL ports:

- number of frames correctly received (IN)
- number of frames correctly transmitted (OUT)
- number of frames dropped due to an overflow of the input or output buffer on the port (DSCRD)
- number of frames received in error from both the input and output buffers, such as CRC errors, alignment errors, and dribbling hit errors (ERR)

To view the port statistics:

- 1 Press **Escape** until `CAMPUS RS I/F: REX` displays.
- 2 Press **Next** four times. `DIAGNOSTICS` displays.
- 3 Press **Enter**. `LOOPBACK MODE` displays.
- 4 Press **Next** two times. `REX STATISTICS` displays.
- 5 Press **Enter**. `ETHERNET PORT FRAMES` displays.

- 6 Press **Next** until the desired port displays, then press **Enter**.
- 7 Press **Next** to scroll through the statistics for the selected port.
- 8 To clear the counters, press **Next** until `Press ENTER to clear statistics` displays, then press **Enter**.
- 9 When you have finished, press **Escape** to return to `REX STATISTICS`.

CONFIGURING WITH AN ASCII TERMINAL

5

You can use an ASCII terminal (or PC with terminal emulation software) to configure Campus system options and generate system reports. The ASCII terminal connects to the console port on the Campus-RS Desktop Unit or on the Campus-RS Line Unit installed in the Campus-Star chassis.

This chapter describes how to use an ASCII terminal to set the individual configuration options. To use an ASCII terminal to view system performance and other status information, see [“Monitoring with an ASCII Terminal”](#) on page 6-1.

For Information About:	See Page:
Setting Up and Logging On to an ASCII Terminal	5-2
Logging Onto a Remote Campus Unit	5-3
Logging Off of a Campus Unit	5-3
Using the Terminal Menus	5-4
Returning Configuration Options to Default Values	5-5
Configuring the Campus-REX for SNMP Management	5-6
Configuring Startup Parameters	5-10
Configuring the Campus-REX as a Master or Slave Unit	5-12
Configuring Alarms	5-15
Entering System Information	5-17
Configuring Loopbacks	5-20
Updating the Campus-REX Firmware	5-24

You can also use the LCD and menu buttons on the front of the Campus-RS Desktop Unit or on the Campus Management Unit (CMU) on the Campus-Star chassis. To do this, see [“Configuring and Monitoring Through the LCD”](#) on page 4-1.

SETTING UP AND LOGGING ON TO AN ASCII TERMINAL

See [“Set Up an ASCII Terminal”](#) on page 3-2 for complete information on setting up and logging on to the ASCII terminal Main Menu.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:14:02
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-REX Unit #12     Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                MAIN MENU

1) SYSTEM STATUS
2) DATA PORT SETTINGS
3) SYSTEM SETTINGS
4) DIAGNOSTICS
5) REMOTE LOGON

                                (L)ogout

ENTER CHOICE>
```

LOGGING ONTO A REMOTE CAMPUS UNIT

This section describes how to log on to a remote Campus unit.

- 1 Press the spacebar on the ASCII terminal keyboard several times until the baud rate is established and the Login Password screen displays on the terminal monitor.
- 2 Press **ENTER** to log on. If you have changed the password, type your password then press **ENTER**. The Main Menu displays.
- 3 Press **5** then press **ENTER**.

The menu header changes to indicate the remote unit ID as the local unit, and local unit ID as the remote. This shows that the terminal program is physically connected to the local unit, but is configuring as if it were connected to the remote unit. The prompt changes to REMOTE LOGON PASSWORD.

If the remote unit is a Campus-REX, the screens and procedures on the Remote Main Menu are identical to those on the Local Main Menu, except the REMOTE LOGON option is unavailable. If the remote unit is not a Campus-REX, the screens will be those for the remote interface card. See the User Manual for the interface card for a description of the screens and configuration options.

LOGGING OFF OF A CAMPUS UNIT

From the Main Menu, type **Q** then press **ENTER** to log off of the unit menus. If the Main Menu is not the current menu, type **R** then press **ENTER** until the Main Menu displays.

USING THE TERMINAL MENUS

The bottom of each menu screen identifies all of the keys you can use on that screen. Several keys operate identically on all of the menu screens:

- To access menu items, type the number of the item then press **ENTER**.
- Press **ESC** or type **R** then press **ENTER** to exit the current menu and return to the previous one.
- In menus more than one level below the Main Menu, type **M** then press **ENTER** to return to the Main Menu.

There are two types of configuration options. One type lets you select the desired value from a list of predefined values. The other type prompts you to type in the required information.

To set an option from a list of predefined values:

- 1 Type the number of the option then press **ENTER**. The option setting changes to the next value in the list and the screen redraws.
- 2 Repeat the first step until the option is set to the desired value.

To set an option that requires you to enter information:

- 1 Type the number of the option then press **ENTER**. The screen prompts you for information.
- 2 Type the information, in the format requested then press **ENTER**.

See “[ASCII Terminal Menu Reference](#)” on page A-5 for an illustration of the hierarchical structure of the ASCII terminal menus.

RETURNING CONFIGURATION OPTIONS TO DEFAULT VALUES

You can restore all of the configuration options to their factory default values. This is an easy way to remove undesired configurations you may have set and want to return to their former settings.

To restore the system to its default configuration:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:18:41
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The System Parameters screen displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:18:50
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-REX Unit #12     Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                        SYSTEM PARAMETERS

1) Change System Time
2) Change System Date
3) Change Unit ID
4) Change Circuit ID
5) Change Password
6) HDSL ES Alarm Threshold: Disabled (Disabled, 17, 170)
7) HDSL Margin Alarm Threshold: Disabled
8) Autosync Configuration Alarm: Enabled (Enabled, Disabled)
9) Local Data Port LOS Alarm: Disabled (Disabled, Enabled)
10) Remote Data Port LOS Alarm: Disabled (Disabled, Enabled)

11) RESET TO FACTORY DEFAULT

                        (R)eturn (M)ain Menu

ENTER CHOICE>
```

3 Type **1 1** then press **ENTER**.

The system restores the configuration options to their default values.



Some options, such as the HDSL Rate must be the same for both the local and remote unit. Resetting the Campus unit configuration values on one unit only, may cause the HDSL link to go down.

CONFIGURING THE CAMPUS-REX FOR SNMP MANAGEMENT

The SNMP protocol provides a way to configure the Campus-REX system over the network. For more information about SNMP management, see “SNMP” on page 7-11.

The following SNMP parameters must be set to manage the Campus-REX over an SNMP network:

- SNMP Read Only Comm String provides the authentication string used for SNMP read-only operations
- SNMP Read Write Comm String provides the authentication string used for SNMP read-write operations

You can also set the Campus-REX to perform authentication error trap generation. To enable this feature, do the following:

- Set the Authentication Trap Status to Enabled or Disabled.
- Enter the IP Address for the first Trap Receiver.
- Enter a comm string for the first Trap Receiver.
- Enter the IP Address for the second Trap Receiver.
- Enter a comm string for the second Trap Receiver.

To configure the SNMP parameters:

- 1 From the Main Menu, type **2** then press **ENTER**. The Data Port Settings menu displays.

```

Dec 9, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:16:44
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                DATA PORT SETTINGS

MAC ADDRESS:      00:20:A7:21:2F:6B
10 BASE-T STATUS: Up

                                1) BRIDGE/ROUTER CONFIGURATION
                                2) SNMP CONFIGURATION

                                3) WRITE NVRAM
                                4) RESET INTERFACE CARD

WARNING: NVRAM must be written and interface card reset for any
configuration changes to take effect.

                                (R)eturn

ENTER CHOICE>

```

- 2 Type **2** then press **ENTER**. The SNMP Configuration menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:18:03
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
                        SNMP CONFIGURATION

1) SNMP Read Only Community String:   public
2) SNMP Read/Write Community String:  private
3) Authentication Trap Status:        Disabled      (Disabled, Enabled)
4) Trap Receiver 1 IP Address:        0.0.0.0
5) Trap Receiver 1 Community String:  public
6) Trap Receiver 2 IP Address:        0.0.0.0
7) Trap Receiver 2 Community String:  public

                                (R)return
ENTER CHOICE>
```

- 3 Continue with the following sections to enter the required parameters and, if desired, enable authentication error trap generation.

Entering Required SNMP Parameters

To set the required parameters:

- 1 From the SNMP Configuration menu, type **1** then press **ENTER**. The system prompts you to enter the Read Only Comm String.
- 2 Type Public, or another string of up to 32 characters then press **ENTER**. The SNMP Configuration menu displays.
- 3 Type **2** then press **ENTER**. The system prompts you to enter the Read Write Comm String.
- 4 Type Private, or another string of up to 32 characters as prompted then press **ENTER**. The SNMP Configuration menu displays.

Enabling Authentication Error Trap Generation

To enable authentication error trap generation:

- 1 From the SNMP Configuration menu, type **3** then press **ENTER**. The system enables authentication trap generation.
- 2 Type **4** then press **ENTER**. The system prompts you to enter the IP address for the first trap receiver.
- 3 Type the IP address, in decimal-dotted notation, then press **ENTER**. The SNMP Configuration menu displays.
- 4 Type **5** then press **ENTER**. The system prompts you to enter the character string for the first trap receiver.
- 5 Type a string of up to 64 characters then press **ENTER**. The SNMP Configuration menu displays. If you are only using one trap receiver, you have finished setting up authentication error trap generation. Otherwise, continue to set up the second trap receiver.
- 6 Type **6** then press **ENTER**. The system prompts you to enter the IP address for the second trap receiver.
- 7 Type the IP address, in decimal-dotted notation, then press **ENTER**. The SNMP Configuration menu displays.
- 8 Type **7** then press **ENTER**. The system prompts you to enter the character string for the second trap receiver.
- 9 Type a string of up to 64 characters then press **ENTER**. The SNMP Configuration menu displays.

CONFIGURING STARTUP PARAMETERS

The Campus-REX can take its startup information from its internal NVRAM or from a network server. For more information about downloading startup information from a network, see “[Management Protocols](#)” on page 7-11.

Set the Boot Mode option to one of the following:

- Local sets the Campus-REX to receive its protocol and network configuration from internal memory.
- Network sets the Campus-REX to receive its startup data from a network server.



Set the Boot Mode only when the Campus-REX is set as a bridge. The Boot Mode setting has no effect when the Campus-REX is in router mode.

- 1 From the Main Menu, type **2** then press **ENTER**. The Data Port Settings menu displays.

```
Dec 9, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:16:44
Local Unit ID: Campus-REX Unit #34                               Local I/P: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/P: REX
Circuit ID:   Network Extension Circuit 5001

                                DATA PORT SETTINGS

MAC ADDRESS:                00:20:A7:21:2F:6B
10 BASE-T STATUS:          Up

    1) BRIDGE/ROUTER CONFIGURATION
    2) SNMP CONFIGURATION
    3) WRITE NVRAM
    4) RESET INTERFACE CARD

WARNING: NVRAM must be written and interface card reset for any
configuration changes to take effect.

                                (R)eturn
ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The Bridge/Router Configuration menu displays.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:17:00
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
                BRIDGE/ROUTER CONFIGURATION

MODE SETTING  1) Bridge/Router Mode:  Bridge      (Bridge, Router)
                2) Encapsulation:      HDLC        (HDLC, PPP)
                3) Timing Source:       Internal   (Internal, HDSL)
                4) Spanning Tree:       Disabled  (Disabled, Enabled)
                5) Local IP Address:     0.0.0.0
                6) Local Subnet Mask:    255.255.255.0
                7) Default Router:       0.0.0.0
                8) BOOT Mode:            Local     (Local, Network)

                (R)return (M)ain Menu

ENTER CHOICE>
```

- 3 If the Bridge/Router Mode is set to Router, type **1** then press **ENTER**. The Bridge/Router Configuration menu displays the bridge options.
- 4 To change the Boot Mode, type **8** then press **ENTER**. The Bridge/Router Configuration menu displays the new Boot Mode.

CONFIGURING THE CAMPUS-REX AS A MASTER OR SLAVE UNIT

The Transceiver Mode option determines the hierarchy of the two Campus units when attempting to establish an HDSL link. There are three settings: Master, Slave and Auto. Master and Slave are available for all three HDSL Operating Mode settings. Auto Mode is only available for Standard and Extended Modes, and is not available for AutoSync Mode.

- If a unit is set to Master, it initiates the HDSL link. The other Campus unit must be set to Slave or Auto.
- If a unit is set to Slave, it waits for the other Campus unit to initiate the HDSL link. The other unit must be set to Master or Auto. Slave is the default setting for AutoSync HDSL Mode.
- If a unit is set to Auto, it automatically switches between Master and Slave until an HDSL link is established. The setting of the other Campus unit is irrelevant. Auto is the default setting for Standard and Extended HDSL Modes.



Unless you have an important reason for doing otherwise, leaving the Transceiver Mode option set to Auto is recommended.

To change the Transceiver Mode:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```
May 3, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:18:41
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **2** then press **ENTER**. The Standard Mode HDSL Parameters menu or Extended Mode HDSL Parameters menu displays. The following illustration shows the Standard Mode HDSL Parameters menu, but the instructions are identical if the HDSL Operating Mode is set to Extended Mode.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      00:27:03
Local Unit ID: Campus REX Unit #34      Local I/F: REX
Remote Unit ID: Campus REX Unit #12     Remote I/F: REX
Circuit ID:

                STANDARD MODE HDSL PARAMETERS

1) HDSL Operating Mode: Standard      (Standard, Extended)
2) Transceiver Mode:   Auto          (Master, Slave, Auto)
3) HDSL Rate:         T1             (768, T1, E1)

Changes will not be effective until this menu is exited!

                (R)eturn (M)ain Menu
ENTER CHOICE>
```

- 3 Type **2** then press **ENTER**. The HDSL Parameters menu displays the new Transceiver Mode setting. Repeat this step until the desired setting displays.

CONFIGURING ALARMS

You can configure four different alarm options:

- HDSL ES Alarm Threshold determines the number of errored seconds that must occur to trigger an alarm
- HDSL Margin Alarm Threshold determines the margin, in dB, that triggers an alarm
- Alarm on Local I/F LOS lets you enable or disable the local Loss of Signal alarm
- Alarm on Remote I/F LOS lets you enable or disable the remote Loss of Signal alarm

To configure the alarm options:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```

May 3, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx           13:18:41
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>

```

- 2 Type **1** then press **ENTER**. The System Parameters menu displays.

```

May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:18:50
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                SYSTEM PARAMETERS

1) Change System Time
2) Change System Date
3) Change Unit ID
4) Change Circuit ID
5) Change Password
6) HDSL ES Alarm Threshold: Disabled (Disabled, 17, 170)
7) HDSL Margin Alarm Threshold: Disabled
8) Autosync Configuration Alarm: Enabled (Enabled, Disabled)
9) Local Data Port LOS Alarm: Disabled (Disabled, Enabled)
10) Remote Data Port LOS Alarm: Disabled (Disabled, Enabled)

11) RESET TO FACTORY DEFAULT

                                (R)eturn (M)ain Menu

ENTER CHOICE>

```

- 3 To configure the HDSL ES Alarm Threshold, type **6** then press **ENTER**. The System Parameters menu shows the new HDSL ES Alarm Threshold setting. Repeat this step until the desired setting displays.
- 4 To configure the HDSL Margin Alarm Threshold, type **7** then press **ENTER**.
- 5 Type the desired margin threshold value, or **D** to disable, then press **ENTER**. The System Parameters menu shows the new HDSL Margin Threshold setting. Repeat this step until the desired setting displays.
- 6 To enable or disable the AutoSync alarm, type **8** then press **ENTER**. The System Parameters menu shows the new AutoSync alarm setting. Repeat this step until the desired setting displays.
- 7 To enable or disable the local LOS alarm, type **9** then press **ENTER**. The System Parameters menu shows the new Alarm on Local I/F LOS setting. Repeat this step until the desired setting displays.
- 8 To enable or disable the remote LOS alarm, type **1 0** then press **ENTER**. The System Parameters menu shows the new Alarm on Remote I/F LOS setting. Repeat this step until the desired setting displays.

ENTERING SYSTEM INFORMATION

This section describes how to enter information about the system. This information is not required for system operation, but can assist in maintenance and troubleshooting tasks. Tasks described in this section are:

- setting the system time and date
- setting a password
- labeling the unit and circuit with unique identifiers

You perform all of these tasks from the System Parameters menu. To access this menu:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```
May 3, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:18:41
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The System Parameters menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:18:50
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                        SYSTEM PARAMETERS

1) Change System Time
2) Change System Date
3) Change Unit ID
4) Change Circuit ID
5) Change Password
6) HDSL ES Alarm Threshold: Disabled (Disabled, 17, 170)
7) HDSL Margin Alarm Threshold: Disabled
8) Local Data Port LOS Alarm: Disabled (Disabled, Enabled)
9) Remote Data Port LOS Alarm: Disabled (Disabled, Enabled)

10) RESET TO FACTORY DEFAULT

                        (R)eturn (M)ain Menu

ENTER CHOICE>
```

- 3 Continue with the following sections to set the desired options.

Setting the Time and Date

The Campus unit uses the time and date to record system events, such as alarms. To set the time and date:

- 1 From the System Parameters menu, type **1** then press **ENTER**. The system prompts you to enter the time.
- 2 Type the correct hour, in 24-hour format, a colon (:), and the minute then press **ENTER**. The system displays the System Parameters menu with the correct time.
- 3 Type **2** then press **ENTER**. The system prompts you to enter the date.
- 4 Type the number of the day, the number of the month, and the four-digit year, separated by slashes (/) then press **ENTER**. The system displays the System Parameters menu with the correct date.

Setting a Password

A password prevents unauthorized access to Campus configuration options. Once a password has been set, it must be entered to log on to the system.

Your password can be any combination of up to ten letters or numbers, but the first character must be a letter. Passwords are case-sensitive.

To set a password:

- 1 From the System Parameters menu, type **5** then press **ENTER**. The system prompts you to enter the existing password.
- 2 If a password has already been set, type the password then press **ENTER**. If there is no password, just press **ENTER**. The system prompts you to enter the new password.

If you did not enter the correct password, the system prompts you to enter it again. If this happens, repeat the previous step.

- 3 Type the new password, up to ten characters then press **ENTER**. The system prompts you to confirm the password.
- 4 Type the new password again then press **ENTER**. The system displays the System Parameters menu.

If you did not enter the correct password, the system prompts you to enter the new password again. Return to [Step 3](#).



If you forget your password and cannot log onto the Campus-REX, use the LCD to restore the configuration settings to their default values. This removes the password. For more information, see “Restoring the System to Default Values” on page 4-3.

Identifying the Unit and Circuit

The Campus system supports two different identifiers:

- the Unit ID identifies the individual Campus unit
- the Circuit ID identifies the individual HDSL circuit, and is the same for both the local and remote units

To set or change these identifiers:

- 1 From the System Parameters menu, type **3** then press **ENTER**. The system prompts you to enter the Unit ID.
- 2 Type a unique identifier for the unit, up to 64 characters then press **ENTER**. The system displays the System Parameters menu.
- 3 Type **4** then press **ENTER**. The system prompts you to enter the circuit ID.
- 4 Type a unique identifier for the circuit, up to 32 characters then press **ENTER**. The system displays the System Parameters menu.

CONFIGURING LOOPBACKS

Loopbacks provide a way to test the data communication path between the Campus unit, the remote unit, and the remote host equipment. Depending on the remote unit, the Campus system supports the following types of loopbacks:



If both the local and remote units have a Campus-REX RS Interface Card, no loopbacks are supported.

- The Local to Local loopback tests the local data port and a small portion of the Campus-REX RS Interface Card.
- The Local HDSL loopback tests the local data port and the entire data path of the local Campus-REX RS Interface Card, including the local HDSL transceiver. The data path in this loopback extends to the HDSL line transformer, and causes the HDSL link to go down (a Link Alarm occurs).
- The Remote to Local loopback tests the local data port, the entire data path inside the local Campus unit, the HDSL line, the HDSL transceivers of both units, and most of the internal data path inside the remote unit.

- The Remote to Remote loopback tests the remote data port.
- The Local to Remote loopback tests the remote data port, the entire data path inside the remote Campus unit, the HDSL line, the HDSL transceivers of both units, and most of the internal data path inside the local unit. This loopback does not test the local data port drivers and receivers.

Once a loopback condition has been initiated, it remains in effect until cleared. You may also set a loopback timeout to clear the loopback automatically after a set period of time has elapsed.

All loopback options are accessed through the Loopback Settings menu. To open this menu:

- 1 From the Main Menu, type **4** then press **ENTER**. The Diagnostics Menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:29:35
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                DIAGNOSTICS MENU

1) LOOPBACK SETTINGS MENU
2) DOWNLOAD MODE

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The Loopback Settings Menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:29:44
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12         Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                LOOPBACK SETTINGS

ACTIVE LOOPBACK: None

1) Local Data Port toward Local Data Port  N/A
2) Remote Data Port toward Local Data Port  N/A
3) Local Data Port toward Remote Data Port
4) Remote Data Port toward Remote Data Port
5) Terminate Loopbacks
6) Loopback Timeout (min):  None           (20, 60, 120, None)

WARNING: Any loopback will remove data link from service.

                                (R)return (M)ain Menu

ENTER CHOICE>
```

Initiating a Loopback

To initiate a loopback condition:

- 1 Open the Loopback Settings menu.
- 2 Type the number that corresponds to the desired loopback then press **ENTER**. The Loopback Settings menu displays the new loopback status.

Clearing a Loopback

To clear a loopback condition:

- 1 Open the Loopback Settings menu.
- 2 Type **6** then press **ENTER**. The system disables the loopback and the Loopback Settings menu displays.

Setting the Loopback Timeout

The loopback timeout determines the amount of time before a loopback clears automatically. Choose one of the following:

- 20 minutes
- 60 minutes
- 120 minutes
- None (disables the loopback timeout)



If you set the loopback timeout to NONE, a loopback runs until you clear it manually or turn the unit off.

- 1 Open the Loopback Settings menu.
- 2 Type **7** then press **ENTER**. The Loopback Settings menu shows the new Loopback Timeout setting. Repeat this step until the desired setting displays.

UPDATING THE CAMPUS-REX FIRMWARE

Before you can upgrade a Campus-RS unit, you must first download the firmware file(s) to your computer. These files are available on the ADC Web site, www.adc.com.

- 1 From the Main Menu, type **4** then press **ENTER**. The Diagnostics menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:29:35
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                                DIAGNOSTICS MENU

1) LOOPBACK SETTINGS MENU
2) DOWNLOAD MODE

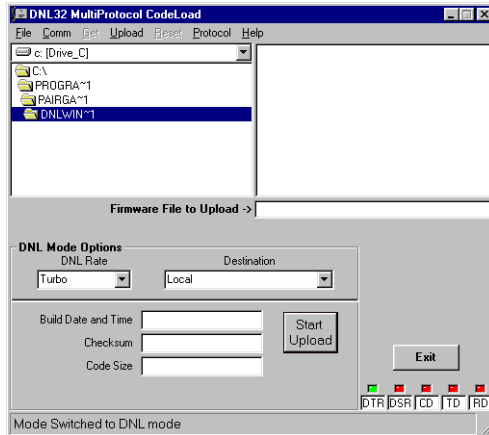
                                (R)eturn

ENTER CHOICE>
```

- 2 Type **2** and press **ENTER** to select Download Mode.
- 3 Type **Y** and press **ENTER** to confirm the selection.

The console freezes and the Test LED on the line unit or desktop unit front panel illuminates, indicating that the Campus-RS unit is in Download Mode.

- 4 Close the terminal emulation program you are using for the ASCII terminal.
- 5 Start the Download Utility (DNL32.exe).



- 6 Click **Comm, Comm Port**, then select the COM port to which the Campus-RS unit is connected.
- 7 Click **Comm, Baud Rate, 9600**.
- 8 Click **Protocol, DNL Mode**.
- 9 In the **DNL Mode Options** box, set the DNL Rate to **Standard**.
- 10 In the **DNL Mode Options** box, set the Destination to **Local**.
- 11 Select the directory and file you want to copy to the Campus-RS unit. The path and file name display in the **Firmware File to Upload** box.
- 12 Click **Start Upload**.

Within 20 seconds, a status bar displays to indicate upload progress. When the upload is complete, the unit resets and terminates Download Mode. If the Test LED remains lit, indicating that the unit is still in Download Mode, the file was not copied successfully. Repeat the procedure until the copy is successful.

- 13 Follow the steps in [“Returning Configuration Options to Default Values” on page 5-5](#) to restore the Campus-RS unit configuration options to their default values.

MONITORING WITH AN ASCII TERMINAL

6

This chapter describes how to use an ASCII terminal to view performance and product information. To use an ASCII terminal to configure system options, see the previous chapter.

For Information About:	See Page:
Monitoring HDSL Performance	6-2
Viewing Local Alarm History	6-6
Viewing Ethernet Statistics	6-8
Viewing Product Information	6-10

To view the information described in this chapter, you must first connect an ASCII terminal to the Campus-RS Desktop Unit or Campus-Star chassis in which the Campus-REX is installed. See [“Set Up an ASCII Terminal” on page 3-2](#) for instructions on connecting a terminal. See [“ASCII Terminal Menu Reference” on page A-5](#) for an illustration of the hierarchical structure of the ASCII terminal menus.

You may also view this information through the LCD menus. See [“Configuring and Monitoring Through the LCD” on page 4-1](#) for instructions on using the LCD panel.

MONITORING HDSL PERFORMANCE

The Current System Status menu provides a variety of information on the current performance of the Campus system. To open the Current System Status menu:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.

```
May 3, 1999   ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:14:18
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                        SYSTEM STATUS MENU

1) CURRENT SYSTEM STATUS
2) 24 HOUR HDSL PERFORMANCE HISTORY
3) 7 DAY HDSL PERFORMANCE HISTORY
4) LOCAL ALARM HISTORY
5) PRODUCT INFORMATION

                        (R)eturn

ENTER CHOICE>
```


2 Type **1** then press **ENTER**. The Current System Status menu displays.

```

May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:14:35
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:  Network Extension Circuit 5001

                                CURRENT SYSTEM STATUS

Local Alarms:
Remote Alarms:
Loopback: None

                                HDSL-A
                                LOCAL      REMOTE
                                -----
                                mn/cr/mx    mn/cr/mx
Margin (dB):                    na/na/na    na/na/na
Pulse Attn (dB):                00          00
24 Hour ES:                     00000       00000
24 Hour UAS:                    05671       00000
Last Cleared:                   None

                                HDSL-B
                                LOCAL      REMOTE
                                -----
                                mn/cr/mx    mn/cr/mx
Margin (dB):                    na/na/na    na/na/na
Pulse Attn (dB):                00          00
24 Hour ES:                     00000       00000
24 Hour UAS:                    05671       00000
Last Cleared:                   None

                                (U)update (C)lear
                                (R)return (M)ain Menu

ENTER CHOICE>

```

The Current System Status menu provides the following information:

- Local Alarms indicates the current local alarm status
- Remote Alarms indicates the current remote alarm status
- Loopback indicates the current loopback status
- Margin indicates the minimum (mn), current (cr), and maximum (mx) HDSL margin value, measured in dB, relative to the signal-to-noise ratio required for a Bit Error Rate (BER) of 10^{-7}
- Pulse Attn indicates the decrease in amplitude of the transmitted signal as measured at the HDSL receiver
- 24 Hour ES indicates the number of errored seconds over the last 24 hours
- 24 Hour UAS indicates the number of unavailable seconds over the last 24 hours
- Last Cleared indicates the date and time when the error counter was last cleared

The information on the Current System Status menu does not update automatically. To update this information, type **U** then press **ENTER**.

To clear the 24 Hour ES and 24 Hour UAS counters, type **C** then press **ENTER**.

The following sections describe how to monitor HDSL performance history.

24-Hour Performance History

To display HDSL information for the last 24 hours:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.
- 2 Type **2** then press **ENTER**. The 24 Hour HDSL Performance History screen displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:14:56
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-REX Unit #12     Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                24 HOUR HDSL PERFORMANCE HISTORY

                HDSL-A                HDSL-B
                LOCAL      REMOTE      LOCAL      REMOTE
                ES/UAS     ES/UAS     ES/UAS     ES/UAS
                -----     -----     -----     -----
11:00          000/000     000/000     000/000     000/000
11:15          000/000     000/000     000/000     000/000
11:30          000/000     000/000     000/000     000/000
11:45          000/000     000/000     000/000     000/000
12:00          000/000     000/000     000/000     000/000
12:15          000/000     000/000     000/000     000/000
12:30          000/000     000/000     000/000     000/000
12:45          000/000     000/000     000/000     000/000
Current        000/000     000/000     000/000     000/000

                (P)revious (N)ext (U)pdate
                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

To view more history information:

- To view the next page of the report, type **N** then press **ENTER**.
- To view the previous page, type **P** then press **ENTER**.

To update information on this screen, type **U** then press **ENTER**.



Performance history information is lost when power is removed from the Campus unit.

Seven-Day Performance History

To display HDSL information for the last seven days:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.
- 2 Type **3** then press **ENTER**. The 7 Day HDSL Performance History screen displays.

```

May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:15:13
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:  Network Extension Circuit 5001

              7 DAY HDSL PERFORMANCE HISTORY

                HDSL-A                HDSL-B
                LOCAL  REMOTE          LOCAL  REMOTE
                ES/UAS ES/UAS          ES/UAS ES/UAS
                -----
Jan 24          00000/00000 00000/00000  00000/00000 00000/00000
Jan 25          00000/00000 00000/00000  00000/00000 00000/00000
Jan 26          00000/00000 00000/00000  00000/00000 00000/00000
Jan 27          00000/00000 00000/00000  00000/00000 00000/00000
Jan 28          00000/00000 00000/00000  00000/00000 00000/00000
Jan 29          00000/00000 00000/00000  00000/00000 00000/00000
Jan 30          00000/00000 00000/00000  00000/00000 00000/00000
Jan 31*         00000/00000 00000/00000  00000/00000 00000/00000

*Since Midnight

                                (U)pdate
                                (R)eturn (M)ain Menu

ENTER CHOICE>

```

To update information on this screen, type **U** then press **ENTER**.



Performance history information is lost when power is removed from the Campus unit.

VIEWING LOCAL ALARM HISTORY

To display alarm history information:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:14:18
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-REX Unit #12     Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                          SYSTEM STATUS MENU

1) CURRENT SYSTEM STATUS
2) 24 HOUR HDLSL PERFORMANCE HISTORY
3) 7 DAY HDLSL PERFORMANCE HISTORY
4) LOCAL ALARM HISTORY
5) PRODUCT INFORMATION

                                (R)return

ENTER CHOICE>
```

2 Type **4** then press **ENTER**. The Local Alarm History screen displays.

```

May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:15:34
Local Unit ID: Campus-REX Unit #34          Local I/F: REX
Remote Unit ID: Campus-REX Unit #12        Remote I/F: REX
Circuit ID:  Network Extension Circuit 5001

                                LOCAL ALARM HISTORY

      Type      Current      First              Last              Count
HDSL Link,     ACTIVE      Dec 09, 1999-04:30:03  Nov 31, 1999-12:21:01  1
ES,            HDSL-A      OFF                  0
ES,            HDSL-B      OFF                  0
Margin,        HDSL-A      OFF                  0
Margin,        HDSL-B      OFF                  0
LOS,           Port       OFF                  0

Last Cleared:  None

(S)witch to Remote Alarm History
(U)update (C)lear
(R)return (M)ain Menu

ENTER CHOICE>

```

This screen shows alarm history of the local unit. If the HDSL line uses two loops, the screen includes information for both loops. The screen includes information on the following alarms:

- Errored seconds (ES)
- Margin
- Loss of Signal (LOS)

To view remote alarm history, type **S** then press **ENTER**.

To update the information, type **U** then press **ENTER**.

To clear the information, type **C** then press **ENTER**.



Alarm history information is lost when power is removed from the Campus unit.

VIEWING ETHERNET STATISTICS

The REX Statistics screen provides a count of valid Ethernet packets received and forwarded by the Ethernet and HDSL ports. To open the REX Statistics screen:

- 1 From the Main Menu, type **2** then press **ENTER**. The Data Port Settings menu displays.

```
Dec 9, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx      13:16:44
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-REX Unit #12     Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001

                        DATA PORT SETTINGS

MAC ADDRESS:          00:20:A7:21:2F:6B
10 BASE-T STATUS:    Up

    1) BRIDGE/ROUTER CONFIGURATION
    2) SNMP CONFIGURATION

    3) WRITE NVRAM
    4) RESET INTERFACE CARD

WARNING:  NVRAM must be written and interface card reset for any
          configuration changes to take effect.

                        (R)return
ENTER CHOICE>
```

2 Type **5** then press **ENTER**. The REX Statistics screen displays.

```

May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version x.xx          13:18:21
Local Unit ID: Campus-REX Unit #34                               Local I/F: REX
Remote Unit ID: Campus-REX Unit #12                             Remote I/F: REX
Circuit ID:   Network Extension Circuit 5001
              REX STATISTICS

ETHERNET PORT:          INPUT FRAMES:          0000492348
                       OUTPUT FRAMES:          0000095613
                       DISCARDED FRAMES:        0000000000
                       ERRORED FRAMES:          0000000000

HDSL PORT:              INPUT FRAMES:          0000256138
                       OUTPUT FRAMES:          0000138945
                       DISCARDED FRAMES:        0000000000
                       ERRORED FRAMES:          0000000000

              (U)update (C)lear
              (R)return (M)ain Menu

ENTER CHOICE>

```

The REX Statistics screen monitors the following information for the Ethernet and HDSL ports:

- Input Frames is the number of frames correctly received by the port
- Output Frames is the number of frames correctly transmitted through the port
- Discarded Frames is the number of frames dropped due to an overflow of the input or output buffer for the port
- Errored Frames is the number of frames received in error from both the input and output buffers (such as CRC errors, alignment errors, and dribbling hit errors)

To update the statistics, type **U** then press **ENTER**.

To clear the counters, type **C** then press **ENTER**.

VIEWING PRODUCT INFORMATION

The Product Information screen displays manufacturing information about the Campus-REX RS Interface Card. This information is important if you ever need to contact ADC for technical support. To open the Product Information screen:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status screen displays.
- 2 Type **5** then press **ENTER**. The Product Information screen displays.

```
May 3, 1999  ADC DSL SYSTEMS INC., CAMPUS RS, Version 4.1e      13:15:50
Local Unit ID: Campus-REX Unit #34      Local I/F: REX
Remote Unit ID: Campus-V.3              Remote I/F: FRAC V.35
Circuit ID:      Network Extension Circuit 5001

                                PRODUCT INFORMATION

Software Version:      4.1e
PROM Checksum:        B24E
Hardware Version:      FFD0
                                Desktop
                                AC
                                RTC Not Installed

                                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

The Product Information screen displays the following information:

- the version number of the Campus-REX software (this also displays in the heading of all the terminal screens)
- the PROM checksum, a hexadecimal number used to verify unit PROMs
- the hardware version of the Campus-REX RS Interface Card

INTERNETWORKING AND MANAGEMENT OVERVIEW

7

You can configure the Campus-REX as a bridge to forward Ethernet data based on MAC addresses, or as a router to route Ethernet data based on IP addresses. You can also configure parameters for management and encapsulation protocols.

This chapter provides an overview of internetworking and network management concepts.

For Information About:	See Page:
MAC-Level Bridging and Spanning Tree Protocol	7-2
Static IP Routing	7-4
Management Protocols	7-11
Encapsulation Protocols	7-15

MAC-LEVEL BRIDGING AND SPANNING TREE PROTOCOL

The following sections describe the MAC-level bridge and the Spanning Tree algorithm function.

MAC-Level Bridging

A bridge moves information across an internetwork from a source to a destination at the link layer (of an OSI reference model). The information is sent to a physical address known as a Media Access Control (MAC) address.

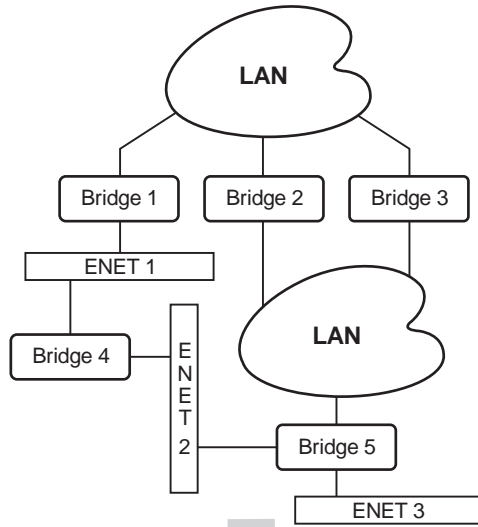
The Campus-REX provides transparent Ethernet MAC-level bridging. It is a completely self-contained bridge with a CPU, memory subsystems (RAM, Flash, etc.), an Ethernet controller and Ethernet drivers, and other glue logic. It provides complete main bridging tasks of learning, forwarding, filtering, and hashing/buffer management. Additionally, it offers 802.1d Spanning Tree protocol, packet encapsulation (through HDLC or PPP framing), and other local tasks.

Forwarding performance is at a full serial line rate and filtering performance is at a full Ethernet rate of 14 kpps for 64-byte frames (minimum size).

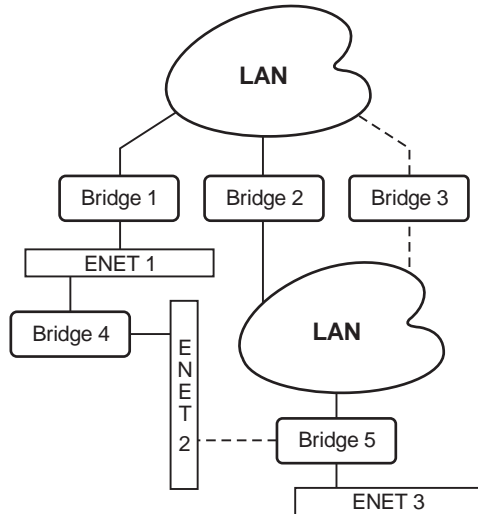
Spanning Tree

Spanning Tree protocol creates a logical topology to overlay a physical network. This overlay disables all loops in the data path. Enabling Spanning Tree ensures a unique, primary path from any node on a network to any other node. Also, if the primary path is lost, Spanning Tree creates a new primary path by enabling links in the physical network that were previously disabled in creating the active topology. The following figure shows an example of Spanning Tree.

Example Physical Network*



**Loop-free Topology
Using Spanning Tree Protocol**



*This physical configuration is valid only when used with Spanning Tree to eliminate loops.

To enable or disable Spanning Tree, see “[Configure the Campus-REX as a Bridge or Router](#)” on page 3-19. The Campus-REX uses the Spanning Tree defaults shown in the table below. These values are user-configurable through SNMP as part of the Spanning Tree group in RFC 1493.

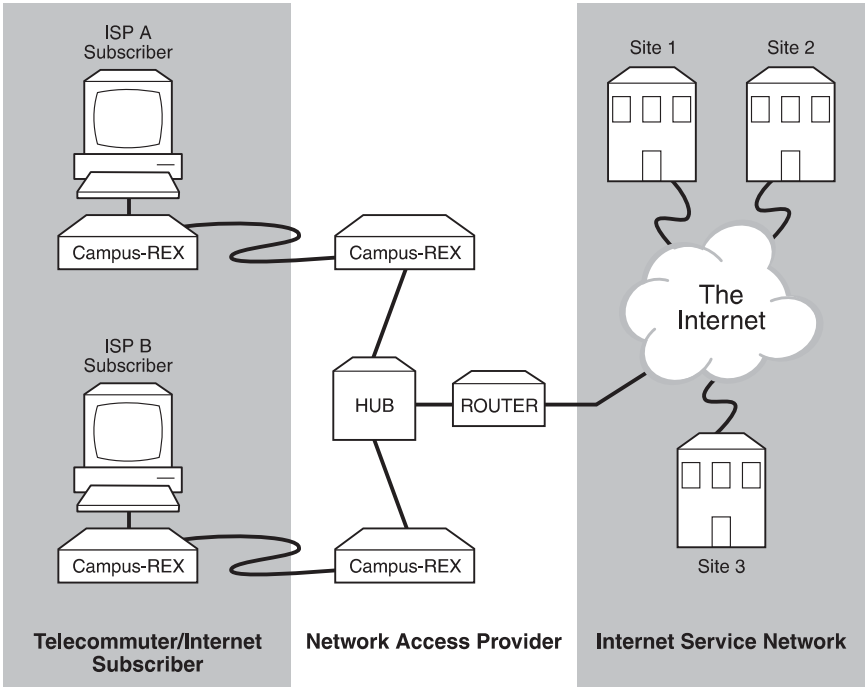
Spanning Tree Attribute	Default Value
ST Bridge Priority	Hx0000
ST Max Age	30 seconds
ST Hello Time	10 seconds
ST Hold Time	10 second
ST Forward Delay	10 second
ST Port 1 Priority (LAN)	0
ST Port 2 Priority (HDSL)	0
ST Port Path Cost	1

STATIC IP ROUTING

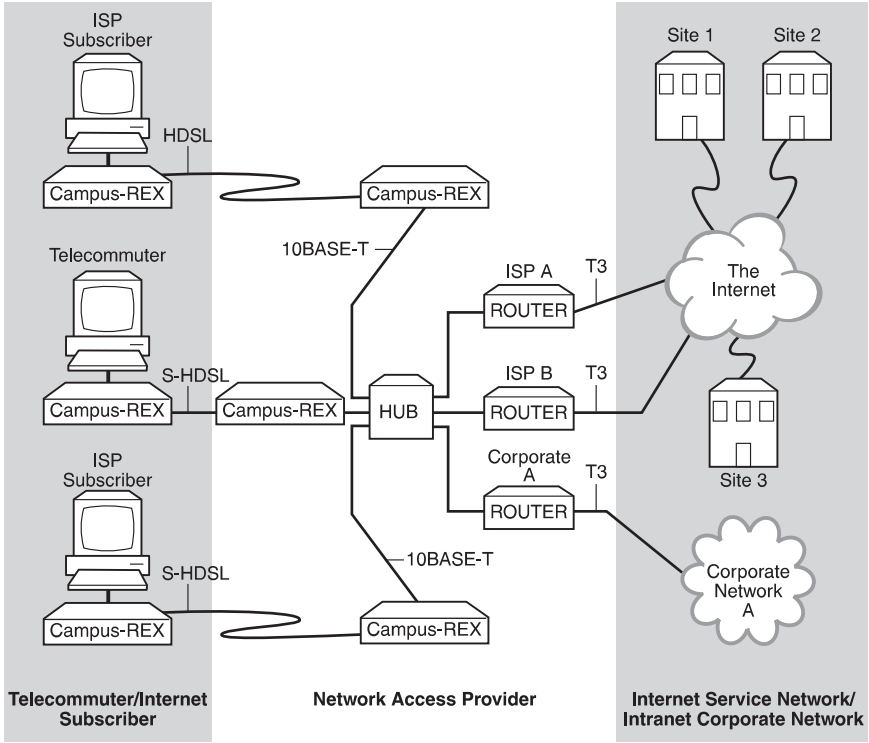
Through the static IP routing feature, you can configure the Campus-REX as an IP router with statically programmed route entries. You can enable this function as a security feature to prevent eavesdropping and to provide broadcast filtering, as well as to specify multiple destination gateways. When static IP routing is enabled, you can access only specific remote IP subnets or hosts.

Since IP routers make forward or filter decisions based on the network-layer IP address instead of the MAC hardware address, MAC-level broadcast frames are prevented from reaching unwanted destinations in the network.

The following example shows a simple Internet Service Provider (ISP) site that uses the static IP routing feature to filter MAC-level broadcast frames sourced by ISP Subscriber A from reaching ISP Subscriber B. In this example, all frames from Subscriber A and Subscriber B are directed to the router at the Network Access Provider site. From there, frames from both subscribers are forwarded directly to the Internet.



The following shows a more complex example of multiple gateways that use static IP routing to route packets sourced from specific users to different destination gateways. In this example, packets from each subscriber are routed through a common hub to a router dedicated to that subscriber.



When you choose to configure the Campus-REX for static IP routing, set the configuration options defined in the following table. To set these options, see “Configuring as a Router” on page 3-23.

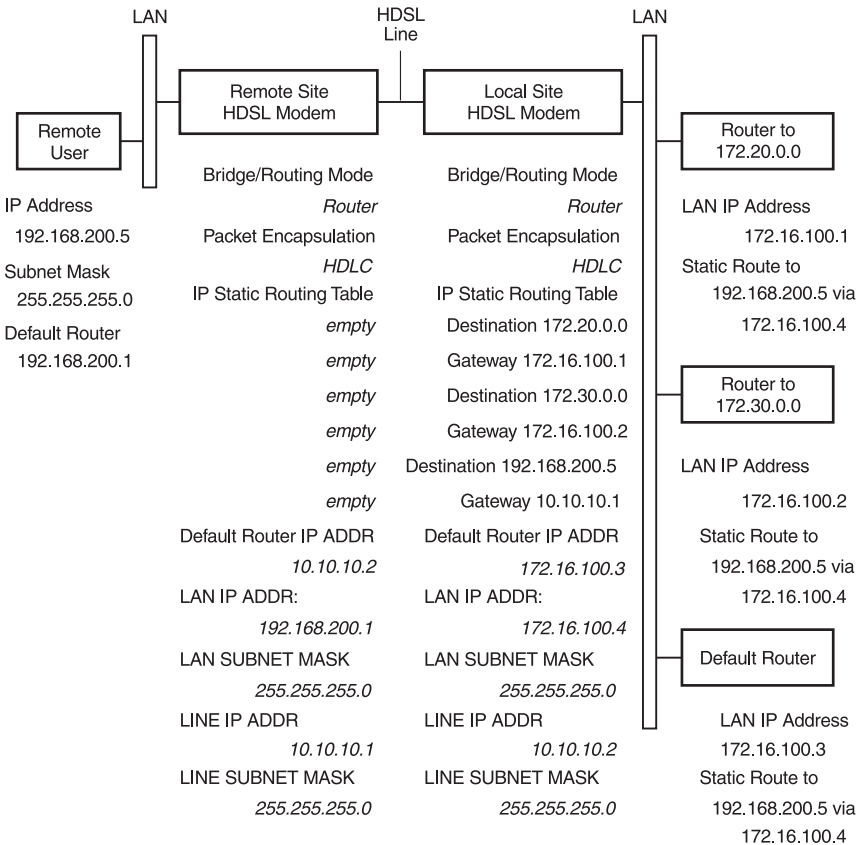
Parameter	Definition
Bridge/Router Mode	Select Bridge or Router. Both Campus-REX units connected through the HDSL link must be configured as routers for static routing to work.
Packet Encapsulation	Select either PPP or HDLC. You must set both Campus-REX units connected through the HDSL link to the same encapsulation option. For static routing, set this option to HDLC.
Default Router IP Address	Specifies the next hop default router entry. This entry tells the Campus-REX what to do with a packet that has a destination address that is not in the Static IP Routing table.
IP Static Routing Table	Specify up to three static route entries, where each entry includes: destination Subnet or host IP address, destination Subnet Mask, and the IP address of the next-hop Gateway to which the packet should be sent. When you configure the remote end of a point-to-point HDSL connection, you can leave this table blank and specify a single default router IP address since all packets will be forwarded to the other end of the connection. Or for security, you can choose to fill in the table.
LAN IP Address and Subnet Mask	Enter the IP address and subnet mask for the LAN Port (10BASE-T port). These must be configured for static IP routing to function properly.
Line IP Address and Subnet Mask	Enter the IP address and subnet mask for the Line Port (HDSL port). These must be configured for static IP routing to function properly. When you configure a point-to-point system, the Line IP address of both units must belong to the same IP subnet and the Line Subnet Mask parameters for both units must be the same. The Line IP Address and Subnet Mask for a point-to-point system are isolated and hidden from the rest of the network—you may use any subnet.

Configure a Static Route entry in any of the external routers that may have been specified as a Default Router IP address or as a Gateway address in the Campus-REX. This is required because the Campus-REX does not send periodic route updates using protocols like Routing Information Protocol (RIP) or Open Shortest Path First (OSPF) so that other external routers can automatically update their routing tables. This implementation prevents other

parties from eavesdropping to discover routes to remote sites connected through the HDSL line. The format of this entry varies among different router vendors, but it will typically be in the form of Destination, Mask, and Next Hop Gateway, where:

- destination is the remote IP subnet or host address
- gateway is the LAN IP address of the Campus-REX on the same subnet as the external router

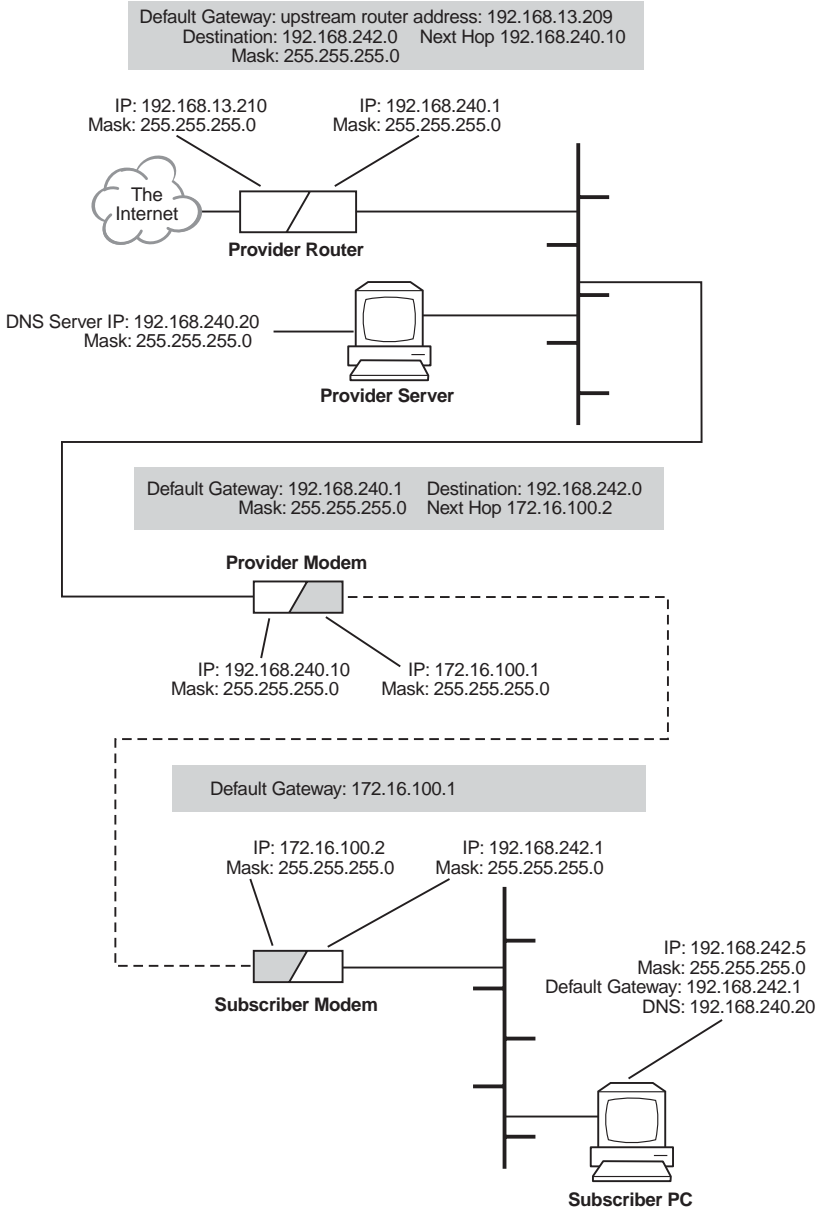
The following figure shows an example of a point-to-point HDSL system with hypothetical parameter values.



Campus-REX IP Addresses

Each Campus-REX unit has two IP addresses, the LAN address and the Line address. In the following figure, the non-shaded side of the Campus-REX indicates the LAN address, which is for the Ethernet (10BASE-T) connection. The shaded side of the Campus-REX is the IP Line address, which is for the HDSL connection. Note that the IP Line address is different from the LAN addresses. When connecting two Campus-REX units point-to-point through HDSL, the IP Line addresses are completely isolated and hidden from the rest of the network. You can assign any subnet to the Line IP addresses.

When routing, data travels one hop at a time. The figure below shows destination and next hop IP addresses. The destination address indicates the network and subnetwork of the next hop. The next hop is the next-stop IP address node. The default gateway is the upstream routing device. Use this example to help you determine/record static IP routing addresses.



MANAGEMENT PROTOCOLS

SNMP is used for remote configuring of system and bridge parameters, monitoring statistics, and performing advanced management. BOOTP is available for the Campus-REX to download system software code.

SNMP

This messaging protocol specifies how to send information between a Network Management Station (NMS) and managed devices on a network. Managed devices (such as the Campus-REX) have agent software or firmware that interprets SNMP requests and responds to them. The NMS communicates with the agents in the managed devices to:

- set configuration options
- read configuration information
- read status parameters

A Management Information Base (MIB) defines these configuration and status parameters. The Internet Engineering Task Force (IETF) specifies standard MIBs for certain types of devices, ensuring that any NMS can manage them. Additionally, vendors can issue proprietary MIBs for their devices that provide higher management functionality.

The following table shows the configuration parameters that must be maintained and restored to the Campus-REX through the system's local console port. These parameters are stored in the Campus-REX NVRAM (non-volatile memory) and are used in subsequent initializations.

Attribute	Factory Default
Local IP Address	0.0.0.0
Local Subnet Mask	255.255.255.0
Boot Router IP Address	0.0.0.0
Default Router IP Address	0.0.0.0
Boot Server IP Address	0.0.0.0
Boot Mode (local, network)	Local
Image Load Mode (local, network)	Local
SNMP RO Community String	Public
SNMP RW Community String	Private
Trap Receiver 1 IP Address	0.0.0.0
Trap Receiver 1 Community String	Null string
Trap Receiver 2 IP Address	0.0.0.0
Trap Receiver 2 Community String	Null string
Authentication Trap enable/disable	Disable
ST Enable/disable	Disable

Campus-REX SNMP Agent

An agent is software or firmware code resident in managed devices (such as the Campus-REX, modems, nodes, routers and hubs). Agents translate data on remote networks into code the NMS can read. The NMS uses SNMP as the transport mechanism to communicate with an agent. SNMP uses the standard Internet Protocol (IP) to transport incoming and outgoing messages to the appropriate agent or NMS address. Each SNMP command requires an IP address or NMS from the agent to transport these messages.

The Campus-REX provides an SNMP agent that supports several MIBs for the management of the system. The SNMP agent can process datagrams received from both the Ethernet interface (LAN) and the HDSL interface (Line). The agent and the protocol stack complies with the following RFCs:

- RFC 1155, Structure of Management Information (SMI)
- RFC 1157, Simple Network Management Protocol (SNMP)
- RFC 826, Address Resolution Protocol (ARP)
- RFC 792, Internet Control Message Protocol (ICMP)
- RFC 791, Internet Protocol (IP)
- RFC 768, User Datagram Protocol (UDP)

MIB and Trap Support

Each managed device has configuration, status, and statistical information that defines its functionality and operational capabilities. All of these elements make up the MIB for the device being managed. The MIB defines the kind of information an NMS can retrieve from a managed device and the settings an NMS can control in a managed device.

The Campus-REX supports the following MIBs:

- RFC 1213, Management Information Base for Network Management of TCP/IP-Based Internets: MIB-II. Covers: system, interfaces, IP, ICMP, UDP, and SNMP groups. The Ethernet interface has the ifIndex value of 1.
- RFC 1215, A Convention for Defining Traps for Use with the SNMP. Covers: ColdStart, linkUp, linkDown, and authenticationFailure traps. Link status traps are sent for events related to Ethernet.
- RFC 1493, Definition of Managed Objects for Bridges. Covers: Base, Spanning Tree, and transparent bridging groups. The Spanning Tree MIB can only be accessed if the Spanning Tree protocol is enabled.
- Proprietary REX MIB, an enterprise specific MIB designed for the agent in the Campus-REX for managing the HDSL portion of the unit.

You can download product-specific MIBs through the Internet at ftp.adc.com. Use the following:

- FTP ftp.adc.com
- log in using anonymous as your login name
- use guest or your e-mail address as your user password
- enter cd /snmp/rex/mib
- get pgregxmib.txt

BOOTP

BOOTP is used to download configuration information to the Campus-REX from a BOOTP server. You can also configure these parameters and save them in NVRAM so that BOOTP can be bypassed. It is recommended that the BOOTP server be connected to the same segment as the Campus-REX 10BASE-T port.

The Campus-REX supports both local and remote loading of bootstrap information (IP configuration only) and operational image code. Local bootstrap configuration information is contained in NVRAM. Local image code is contained in Flash devices for local loading of operational code.

When loading over the network is preferred, you can use BOOTP (RFC 951) to obtain bootstrap information and image files. Booting and image download are controlled by the use of two attributes which are Boot Mode and Image Load Mode. Other applicable RFCs are:

- RFC 1533, DHCP Options and BOOTP Vendor Extensions
- RFC 1542, Clarification and Extensions for the Bootstrap Protocol (Updates 951)

ENCAPSULATION PROTOCOLS

You can select from two packet encapsulation formats for Ethernet data for the Campus-REX:

- High-level Data Link Control (HDLC)
- Point-to-Point Protocol (PPP)

HDLC is the default setting, and should be used in most applications. Use PPP only if the remote unit is a synchronous interface card, such as V.35.

When PPP is selected from bridging mode, the Campus-REX runs the Bridging Control Protocol (BCP) RFC 1638. PPP provides interoperability with other product types. HDLC is a compressed version of the encapsulation protocol and is preferable when there is like equipment.

TECHNICAL REFERENCE



SPECIFICATIONS

Physical

Height	0.7 inches (1.8 cm)
Width	2.8 inches (7.0 cm)
Depth	5.6 inches (14.1 cm)
Weight	4.0 ounces (113.4 gm)

Equipment Interface

Ethernet Port

Connector	RJ-45C, 10BASE-T
Bandwidth Filtering	14 kpps (64-byte frames) max
Forwarding	2.7 kpps Full-duplex
Encapsulation Format	HDLC or PPP
Bridging	IEEE 802.1d Transparent Bridging with Spanning Tree Protocol

Clock Options

Internal (± 50 ppm), HDSL

Electrical

Power Consumption	3.5W max
-------------------	----------

Environmental

Operating Temperature	0° to 50° C
Relative Humidity	0 to 85%
Electromagnetic Emissions	Per FCC Part 15 Class A, CE
Safety Compliance	UL, CSA, CE

ADC reserves the right to change features and specifications without notice.

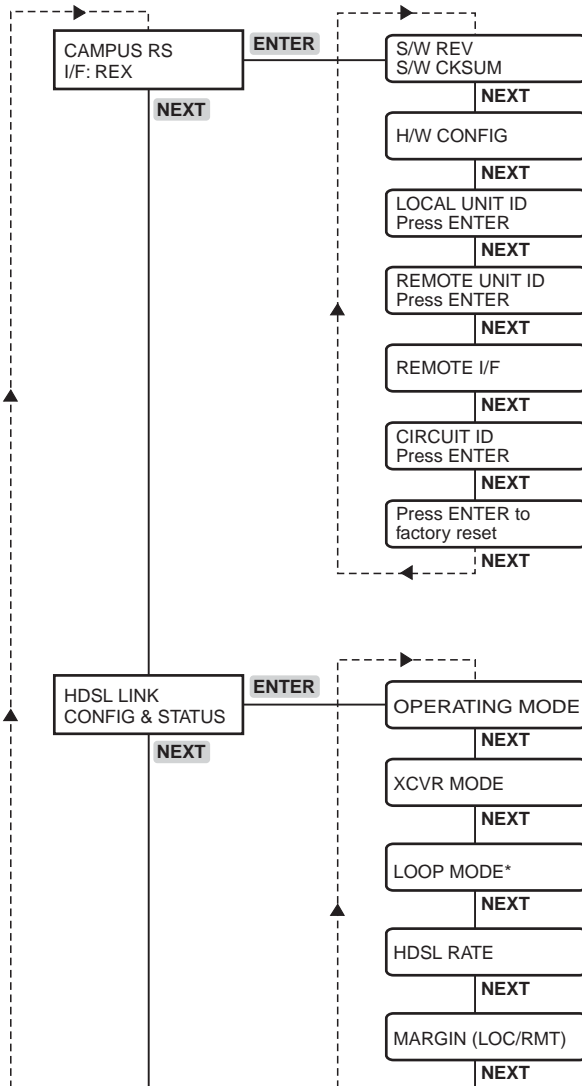
DEFAULT SETTINGS

The following table lists default settings for Campus-REX RS Interface Card configuration options:

Parameter	Default
Bridge/Router Settings	
Bridge/Router Mode	Bridge
Encapsulation	HDLC
Timing Source	Internal
Spanning Tree	Disable
Boot Mode	Local
HDSL Settings	
HDSL Mode	Standard
HDSL Rate	T1
XCVR Mode	Auto
Loopback Timeout	20 Minutes

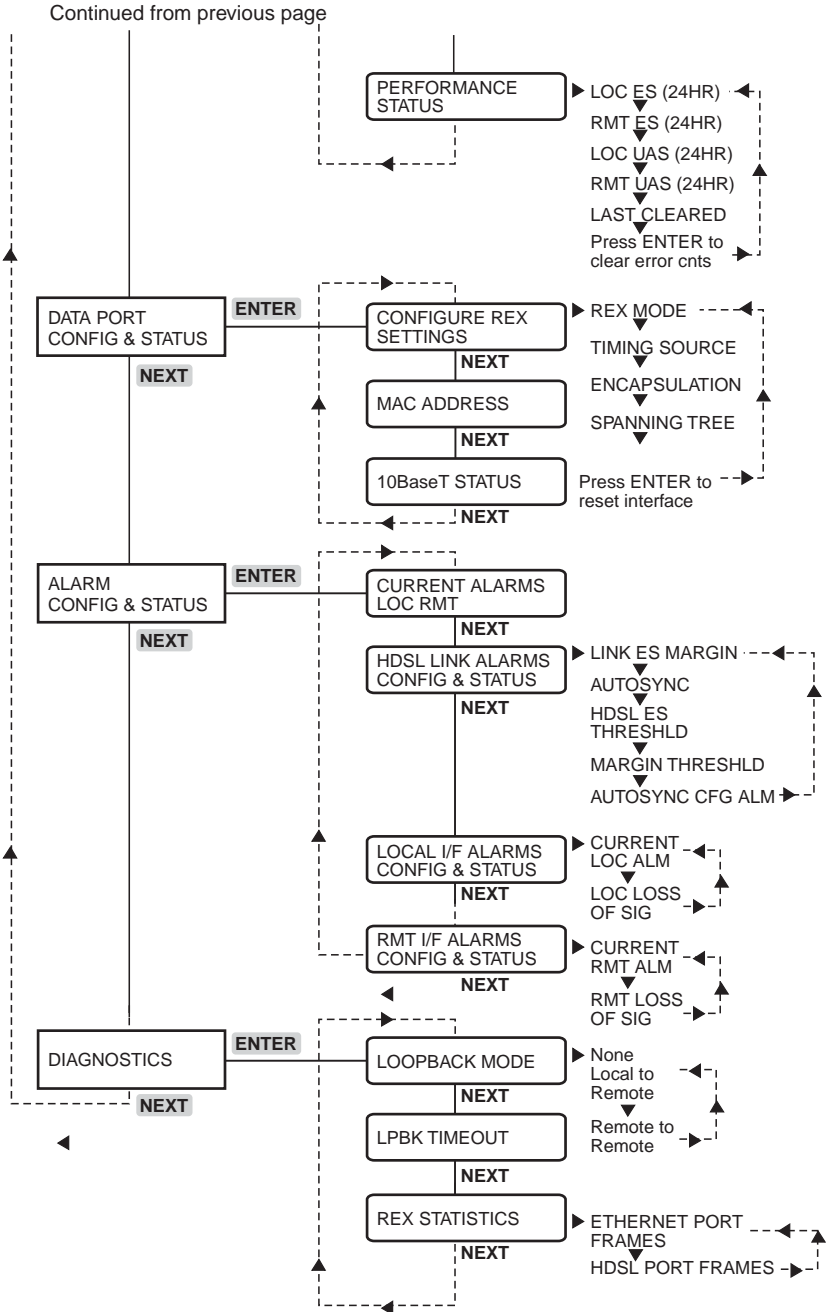
LCD MENU REFERENCE

The illustration on the following pages diagrams the LCD menu structure.



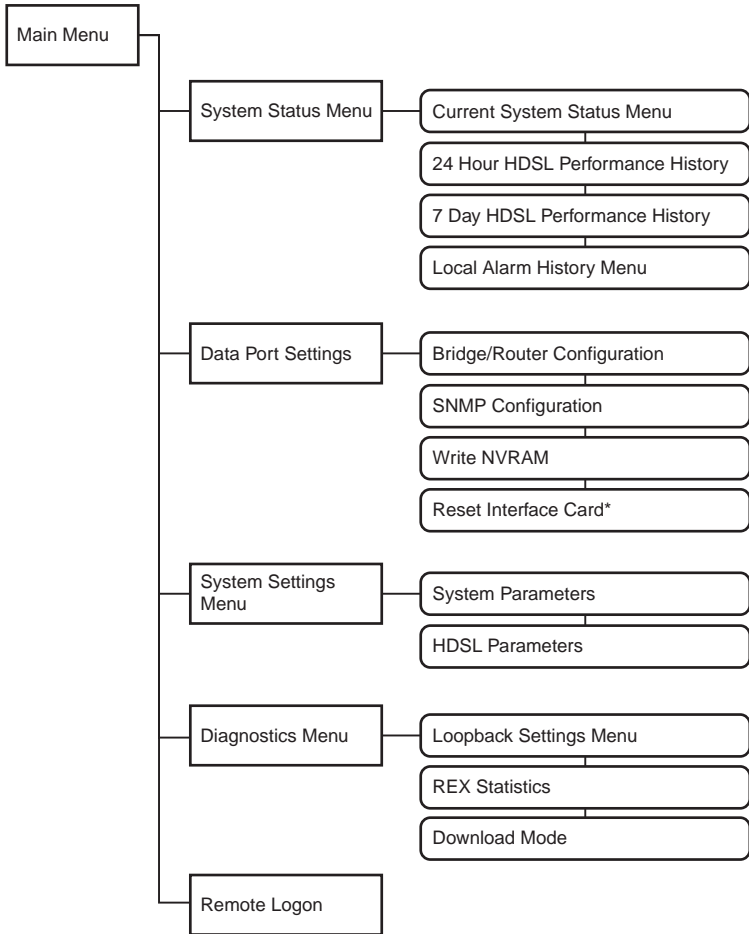
Continued next page

* Option displays only in extended mode.



ASCII TERMINAL MENU REFERENCE

The illustration on the following pages shows the ASCII terminal menu structure for the Campus-REX unit.



* Option displays only when configuration is changed that requires you to save to NVRAM and then RESET the modem.

ABBREVIATIONS

B

2B1Q	2 Binary,1 Quaternary
BER	Bit Error Rate
CMU	Campus Management Unit
CTS	Clear to Send
DCE	Data Circuit-Terminating Equipment
DSR	Data Set Ready
DSX-1	DS1 Cross-connect Frame
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
ES	Errored Seconds
HDLC	High-level Data Link Control
HDSL	High-bit-rate Digital Subscriber Lines
LOS	Loss of Signal
NVRAM	Non-volatile Random Access Memory
POTS	Plain Old Telephone Service
PPP	Point-to-Point Protocol
RD	Receive Data
RLSD	Receive Line Signal Detect

RS	Rate Selectable
RTS	Request to Send
SCR	Serial Clock Receive
SCT	Serial Clock Transmit
SD	Send Data
SNR	Signal-to-Noise Ratio
TT	Terminal Timing
UAS	Unavailable Seconds
UL	Underwriters Laboratory

THE DOCUMENTATION SET



This table describes the manuals and guides in the Campus-RS documentation set.

Document	Description
<i>Campus-Star User Manual</i>	Contains instructions for setting up and using a Campus-Star. The manual includes instructions for installing Line Units and interface cards into the Campus-Star chassis.
<i>Campus-RS Line Unit User Manual</i>	Describes the features of the Campus-RS Line Unit and provides installation instructions.
<i>Campus-RS Desktop Unit User Manual</i>	Describes the features of the Campus-RS Desktop Unit and provides instructions for installing interface cards, and connecting the unit to an HDSL line.
Campus Interface Card User Manuals	Describes the features of the individual Campus interface cards, one card per manual, and contains instructions for configuring and monitoring the system through the cards.

CONTACTING ADC



PRODUCT SUPPORT

ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products.

Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center.

Sales Assistance

800.366.3891 extension 73000
(USA and Canada)
952.917.3000
Fax: 952.917.3237

- Quotation Proposals
- Ordering and Delivery
- General Product Information

Systems Integration

800.366.3891, extension 73000
(USA and Canada)
952.917.3000

- Complete Solutions (from concept to installation)
- Network Design and Integration Testing
- System Turn-Up and Testing
- Network Monitoring (upstream or downstream)
- Power Monitoring and Remote Surveillance
- Service/Maintenance Agreements
- Systems Operation

ADC Technical Assistance Center

800.638.0031
714.730.3222
Fax: 714.730.2400
Email: wsd_support@adc.com

- Technical Information
- System/Network Configuration
- Product Specification and Application
- Training (product-specific)
- Installation and Operation Assistance
- Troubleshooting and Repair/Field Assistance

Continued

Online Technical Support

- www.adc.com/Knowledge_Base/index.jsp

Online Technical Publications

- www.adc.com/library1/

Product Return Department

800.366.3891 ext. 73748 or
952.917.3748

Fax: 952.917.3237

Email: repair&return@adc.com

- ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.

All 800 lines are toll-free in the USA and Canada.

ADVANCE REPLACEMENT

Any product determined by ADC not to comply with the applicable warranty within 30 calendar days from the date of shipment to the Buyer, or as otherwise authorized, are eligible for advance replacement free of charge. A replacement product will be shipped to the Buyer within 24 hours of ADC's receipt of notification from the Buyer.

If products returned to ADC for advance replacement are not received by ADC within 30 calendar days of shipment of the replacement product or if no trouble is found (NTF) as determined by ADC, the Buyer will be responsible for payment of the cost of the replacement product.

BILLING

Equipment returned for repair, replacement, or credit, whether in warranty or out of warranty, which is found to be damaged due to customer negligence or which has had parts removed will be repaired on a time and material basis. ADC will contact the customer for disposition on any equipment that is in this condition or found to be unrepairable.

In the event that the returned equipment is not covered by warranty, ADC will contact the customer with estimated repair or replacement charges and obtain customer disposition of the product if a purchase order has not been provided.

Equipment returned for repair or replacement is subject to a \$70 per unit NTF (no trouble found) charge in the event that diagnostic evaluation reveals no evidence of functional failure or physical defects.

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ADC DSL Systems, Inc.

14402 Franklin Avenue
Tustin, CA 92780-7013

Tel: 714.832.9922

Fax: 714.832.9924

Technical Assistance

Tel: 800.638.0031

Tel: 714.730.3222

Fax: 714.730.2400



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