KENTROX

AI232
32-Port High Speed Asynchronous Line Card
User's Guide

Version 9.6x

About this Document

This document explains how to install, configure, and operate the AI232 32-port high speed asynchronous line card.

You should have a working knowledge of the following:

● Your network

● TCP/IP and Asynchronous Protocols

Document Conventions

Table 1 describes the text conventions used in this document.

Table 1   Document Conventions

Convention	Meaning
`Screen Text, Menu Items, System Prompts, Messages and Reports`	This style indicates configuration screen text, menu items, system prompts, messages, and reports.
`Static Command Text`	In a command statement, this style indicates text that should be entered exactly as shown at a command line.
`Variable Command Text`	In a command statement, this style indicates user-specified text.
`...`	In a command statement, ellipses (`...`) signify that the preceding parameter can be repeated a number of times.
`[ ]` `[	]`	In a command statement, square brackets indicate an optional parameter. Two or more parameters in square brackets with a vertical bar (|) between them indicate a choice of optional parameters.
`{	}`	In a command statement, two or more parameters in braces with a vertical bar (|) between them indicate a choice of required parameters.
Menus and Menu Commands	This style indicates menu and menu commands. A vertical bar (|) separates the menus from the submenus or menu commands. The vertical bar also indicates the order in which you should click the menus, submenus, and menu commands.
Dialog Boxes, Tabs, Fields, Check Boxes, and Command Buttons	This style indicates dialog boxes, tabs, fields, check boxes, and command buttons.
Variable Field Text	This style indicates variable information you type in a dialog box field.
KEYS	Uppercase body text indicates keys on a keyboard, such as the TAB or ENTER keys. Keys used in combination are connected with a plus symbol (+).
Labels	This style designates physical components on Kentrox products such as jumpers, switches, and cable connectors.

Table 1   Document Conventions (Continued)

Convention	Meaning
Note:	Note messages emphasize or supplement important points of the main text.
Important:	Important messages provide information that is essential to the completion of a task.
Tip:	Tip messages provide information that assists users in operating equipment more effectively.
CAUTION:	Caution messages indicate that failure to take a specified action could result in loss of data and/or harm to the software or hardware.
WARNING:	Warning messages indicate that failure to take a specified action could result in physical harm to the user.
LASER DANGER:	Laser danger messages indicate that failure to take a specified action could result in eye damage or blindness to the user due to overexposure to invisible laser radiation.

Cautions and Warnings

Electrostatic Discharge Caution

⚠️
CAUTION: Kentrox equipment and its peripherals contain electrostatic sensitive components. Proper handling, shipping, and storage precautions must be exercised:

- You must remove and install cards in a static-free environment. Wear an antistatic wrist strap that is plugged into the Kentrox equipment so you are grounded at the same point as the equipment.

- Do not remove cards from their antistatic plastic bags until you are ready to install them into the chassis.

- Immediately after you remove a card from the chassis, you must insert it into its antistatic bag.

- When the cards are not in use, keep them in their antistatic plastic bags.

- Do not ship or store cards near strong electrostatic, electromagnetic, or radioactive fields.

Ground Caution

⚠️
CAUTION: For Kentrox equipment to operate safely and correctly, there must be a safety ground strap between the equipment ground bolts and the office ground.

Proper Cooling Caution

⚠️
ENSURE PROPER COOLING
CAUTION: When AI232 is installed into an AI180 AIswitch series 180 chassis, the chassis must be equipped with the AIcool chassis cooling and Baffle-HS heat baffle with sensor assemblies.

The AI180I AIswitch series 180 integrated chassis has a built-in fan and baffle assembly and does not require additional assemblies.

FCC Warning

The Federal Communications Commission has set limits for emitted radio interference, and AI232 is constructed with this electromagnetic interference (EMI) limitation in mind. AI232 is classified under FCC regulations as a Class A device, that is, a device for use in commercial environments and not in residential areas. This device has been tested and shown to comply with the following FCC rule: Part 15 Subpart J. Operation of this equipment in a residential area may cause interference to radio and TV reception, requiring the user to take whatever steps are necessary to correct the interference.

Information is available from the FCC describing possible corrective actions. To maintain low EMI levels, we suggest that you use only metal connectors and shielded cable grounded to the frame.

Specifications are subject to change without notice.

Customer Assistance

Kentrox offers technical support 24 hours a day, seven days a week.

Before you contact Kentrox for assistance, please have the following information available:

● The type of hardware and software you are using

● The error number and exact wording of any messages that appeared on your screen

● What happened and what you were doing when the problem occurred

● How you tried to solve the problem

Web Site Support

Support is available 24 hours a day using our Web site at:

http://www.kentrox.com

Email Support

Email support is available 24 hours a day. When you use email support, please be sure to include the details of your problem within the email.

To contact Technical Support, send email to:

techsupport@aiinet.com

Phone Support

Phone support is available. When you call Kentrox for support, please be sure you are at your computer and have the details of your problem available.

To contact Technical Support, call (866) 480-3571.

Kentrox Product Documentation

To order documentation, please contact your sales representative at (800) 247-9482 or +1 (614) 798-2000.

You can also access and view the most current versions of Kentrox product documentation on our Web site at:

http://www.kentrox.com

Table of Contents

Product Description

This chapter provides an overview of the AI232 32-port high speed asynchronous line card.

Guide to this Chapter

Features

AI232 is a high-performance asynchronous network interface card used in an AIswitch. AI232 includes the following features:

Break Propagation

AI232 supports break handling from one end of a connection to another end regardless of the protocols used for data transport. Refer to Chapter 7: Alias and Call Routing Configuration for details about available types of break handling.

DCD/DSR/RTS/DTR Signal Lead Control

AI232 supports user selectable disconnect on DCD low, DCD high-to-low transition, DSR low, and DSR high-to-low transition. Additionally, AI232 allows for user selectable connection control of DTR/RTS.

Dynamic Port Configuration

AI232 allows for configuration changes on a per port basis without resetting the card.

IRB Connectivity

AI232 communicates with other cards in the same chassis over an internal repeater bus. It cannot communicate over the backplane with line cards that do not use the IRB.

LAN/WAN Connectivity

AI232 supports communications with other TCP/IP devices in a LAN/WAN environment.

Modem Control

AI232 provides full modem control and is configurable for auto-answer or dial-modem modes.

Performance Monitoring, Maintenance, Troubleshooting

Shell and winslc commands let users handle performance monitoring, maintenance, and troubleshooting for AI232.

SNMP Manageability

AI232 supports configuration using SNMP as well as monitoring. SNMP traps are generated by AI232 and are sent to all the management stations that exist in the trap table.

Standalone Configuration

AI232 operates as a standalone card when it is installed in the AIswitch series 110 chassis. Standalone mode lets AI232 function without dependence on AI198 for configuration and management. Refer to Appendix B: Standalone Mode and Switch Mode for more details.

System Diagnostics

AI232 lets users view diagnostic data on existing connections and internal information about serial links. For more information about viewing system diagnostics, refer to sections:

AI232 Hardware Components

AI232 has four high-density connectors that provide 32 EIA-232-E asynchronous ports that support speeds up to and including 115 Kilobits per second. All ports have modem control for host or modem applications and can be used to connect user terminals, personal computers, modems, and other high-speed asynchronous ports. AI232 can also be used as a high-speed terminal server that handles asynchronous to TCP/IP conversions. A distribution panel is required to serve as a physical interface for AI232.

⚠

CAUTION: AIswitch and its peripherals contain electrostatic sensitive components. Exercise proper handling, shipping, and storage precautions.

Front Panel Components

Figure 1-1 displays the AI232 front panel components.

DC OK LED	Illuminates green when +5 Volts is present.
FAULT LED	Illuminates red if the card fails.
PORTS 25-32 Connector	Connects ports 25 to 32 to the distribution panel.
PORTS 17-24 Connector	Connects ports 17 to 24 to the distribution panel.
PORTS 9-16 Connector	Connects ports 9 to 16 to the distribution panel.
PORTS 1-8 Connector	Connects ports 1 to 8 to the distribution panel.
ACT LED	Illuminates green when the card is transmitting or receiving packets.
LINK LED	Illuminates green when valid link integrity pulses are being received.
COL LED	Illuminates red when collisions are detected.
10BASET Connector	Specifies the external 10BaseT port connector.

Figure 1-1
AI232

Technical Specifications

Table 1-1 lists the AI232 technical specifications.

Table 1-1   Technical Specifications

Component	Description
10BaseT	Ethernet port on the AI232 front panel.
High Density SCSI	32 asynchronous, EIA-232-E (individual ports are accessed by using a distribution panel)
Port Speed	300 bps to 115 Kbps
Installation	Requires one slot in an AIswitch (can be hot swapped)
Current Draw	2.0 A, maximum
Compliance	For use with AI UL listed AIswitch Series Chassis

Distribution Panels

Distribution panels provide a physical interface for AI232. The following distribution panel models and interfaces are available:

- Model DP232-19/23 (16 DB-25/EIA-232-E interfaces)

- Model DP232-RJ45 (32 RJ-45/EIA-232-E interfaces)

Model DP232-19/23

This distribution panel provides 16 DB-25/EIA-232-E interfaces for AI232. To access all 32 ports on AI232, two distribution panels are required. The distribution panel is available in two sizes for 19-inch or 23-inch rack installations. Figure 1-2 displays the distribution panel and Table 1-2 lists the specifications.

Connect to Network Elements
(16 ports)

Connect to the AI232

PORT 1/17   PORT 5/21   PORT 9/25   PORT 13/29
PORT 2/18   PORT 6/22   PORT 10/26   PORT 14/30
PORT 3/19   PORT 7/23   PORT 11/27   PORT 15/31
PORT 4/20   PORT 8/24   PORT 12/28   PORT 16/32

PORTS 1 - 8   PORTS 9 - 16

DP232
APPLIED INNOVATION INC.
COPYRIGHT 1999
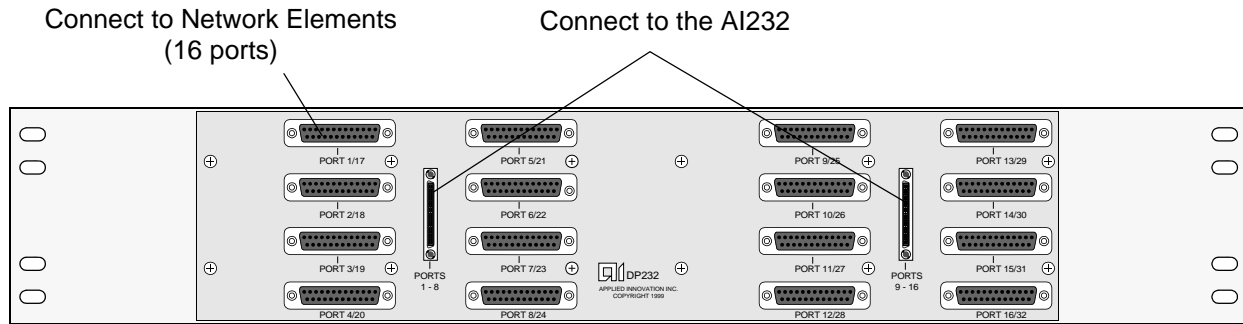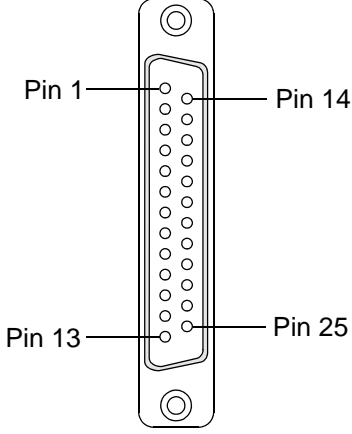
Figure 1-2   DP232-19/23 Distribution Panel

Table 1-2   Specifications for DP232-19/23

Description	Specification
Mounting	DP232-19: mounts to a 19-inch rack DP232-23: mounts to a 23-inch rack
I/O Ports	16 DB-25/EIA-232-E interfaces
Weight (approximately)	2.5 lb (1.12 kg)
Size	Height: 4 in. (10.16 cm) Width: 19 in. (48.26 cm)/23 in. (58.42 cm) Depth: 1.12 in. (2.84 cm)

Table 1-2   Specifications for DP232-19/23 (Continued)

Description	Specification
Pin Assignments	 Pin Signal 2 TXD 3 RXD 4 RTS 5 CTS 6 DSR 7 Signal GND 8 DCD
Cables	• CAB467: Connects one connector (8 ports) on the AI232 to the distribution panel. Each distribution panel requires two cables. • CAB469: Connects network elements to the individual connectors on the distribution panel.

Installation Procedure

1. Install the distribution panel(s) on the rack. Figure 1-3 on page 1-9 displays a typical installation.

2. Attach cables from AI232 to the distribution panel.
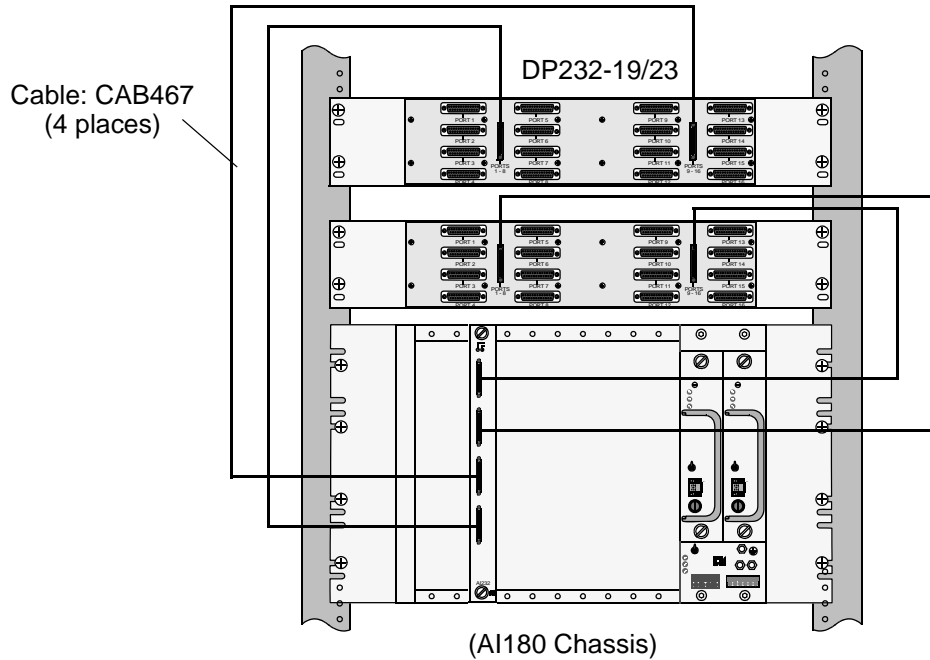
Figure 1-3   Typical Installation

Model DP232-RJ45

This model provides 32 RJ-45/EIA-232-E interfaces for AI232. Reversible mounting flanges allow for installation to a 19-inch or 23-inch rack. Figure 1-4 displays the distribution panel and Table 1-3 lists the specifications.
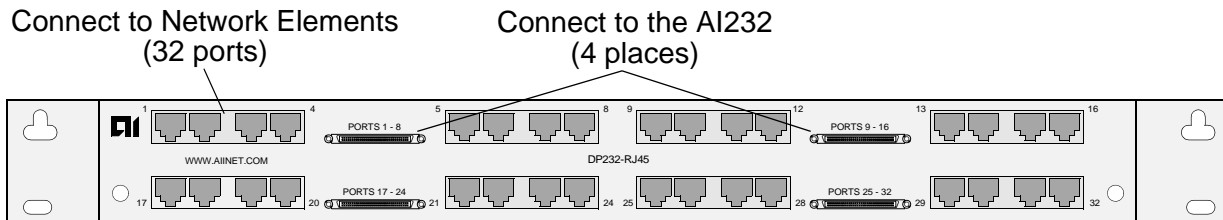
Figure 1-4   DP232-RJ45 Distribution Panel

Table 1-3   Specifications for DP232-RJ45

Description	Specification
Mounting	Mounts to a 19-inch or 23-inch rack
I/O Ports	32 RJ-45 ports
Weight (approximately)	4.8 lb (2.16 kg)
Size	Height: 2 in. (5.08 cm) Width: 16.9 in. (42.92 cm) without mounting flanges Depth: 3.5 in. (8.89 cm)
Pin Assignments	Pin 1 Pin 8 Pin Signal 1 RTS 2 DTR 3 TXD 4 DCD 5 RXD 6 GND 7 DSR 8 CTS
Cables	CAB467—Connects one connector (8 ports) on the AI232 to the distribution panel. The distribution panel requires four cables. CAB513—An RJ45 to DB25 null cable that connects network elements to the individual connectors on the distribution panel (straight through applications).

Installation Procedure

1. Attach the mounting flanges and tie bar as shown in Figure 1-5. (Table 1-4 shows the part list.)

2. Install the distribution panel to the rack. Figure 1-6 shows a typical installation.
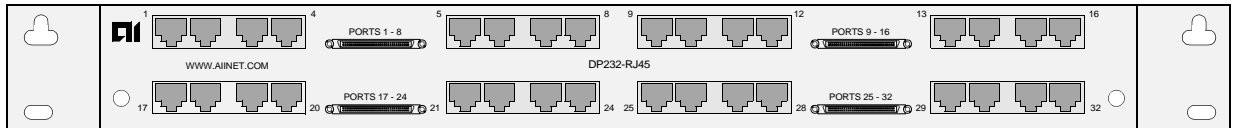
Setting flanges for a 19-inch rack
Install the mounting flanges in the desired location
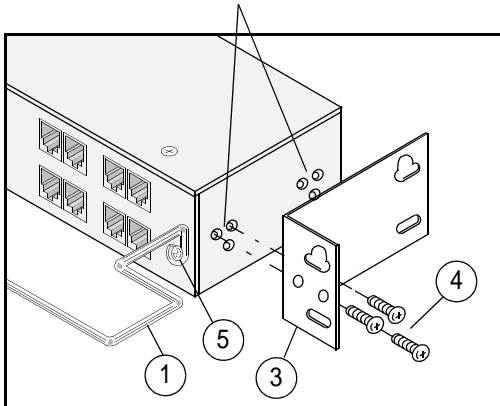
Setting flanges for a 23-inch rack
Install the mounting flanges in the desired location
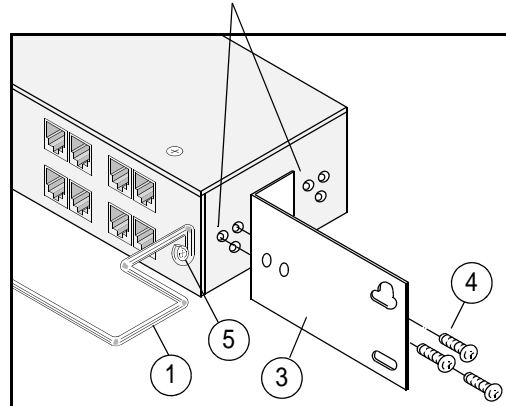
Figure 1-5   DP232-RJ45 Distribution Panel

Table 1-4   Parts List

Item	Description	Part No.	Quantity
1	Tie Bar	06-410-002	1
2	Mounting Flange (left side)	06-110-003	1
3	Mounting Flange (right side)	06-110-005	1
4	#6-32 Screw with lockwasher	00-018-001	6
5	#12-24 Screw with lockwasher	00-015-003	2
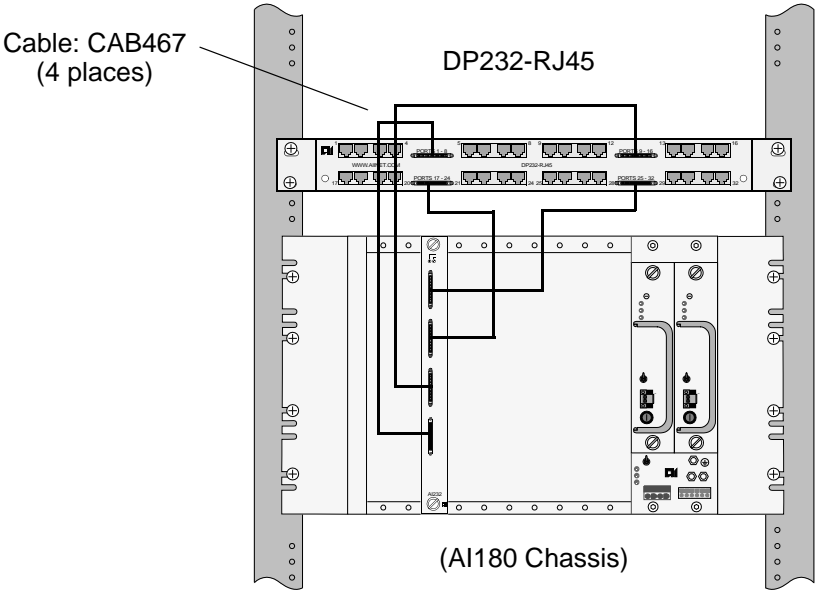
Figure 1-6   Typical Installation

Typical Applications

AI232 is used primarily for connecting to asynchronous network elements and modems. The following applications are discussed in this section:

- [Asynchronous to TCP/IP Application](#)

- [Modem Multiplexer Application](#)

Asynchronous to TCP/IP Application

[Figure 1-7](#) illustrates an asynchronous to TCP/IP application.
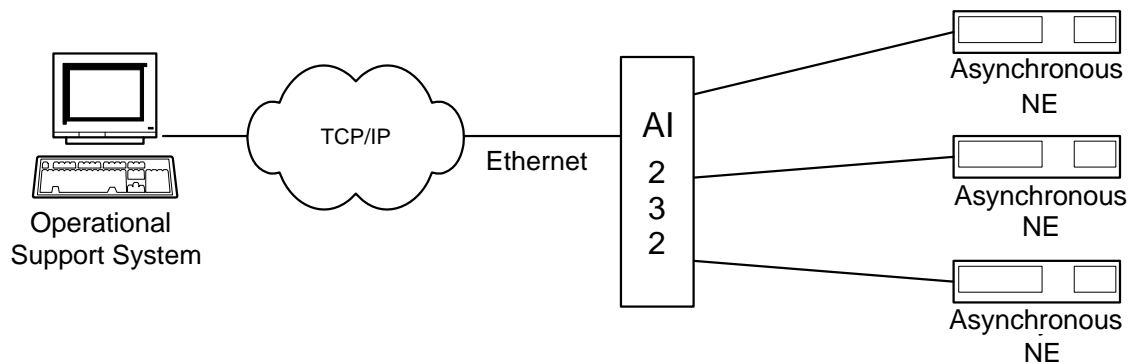
Figure 1-7   Asynchronous to TCP/IP Application

The following events occur in [Figure 1-7](#):

- The OSS sends TCP/IP calls to AI232.

- AI232 routes the TCP/IP calls to an asynchronous NE using an asynchronous port.

Modem Multiplexer Application

Figure 1-8 illustrates a modem multiplexer application.
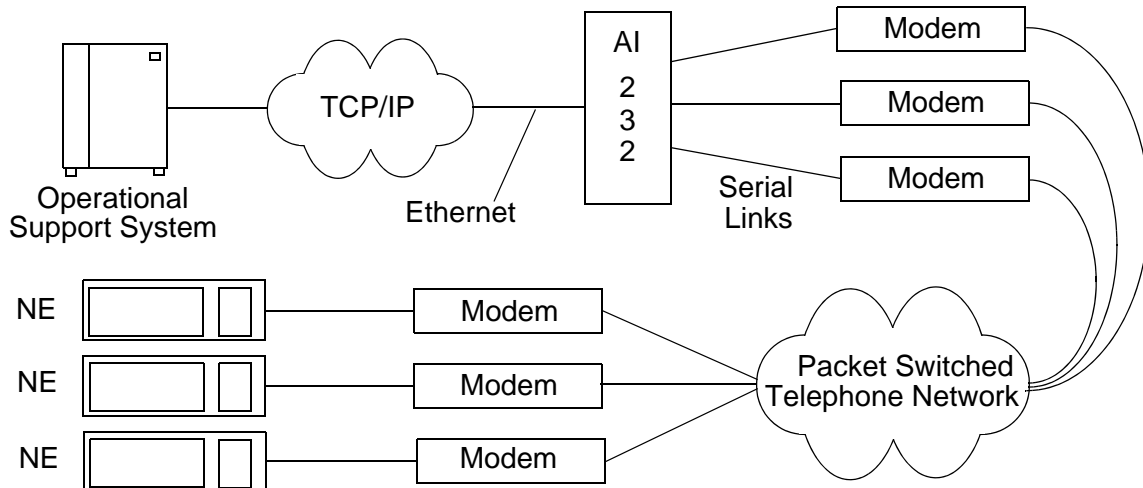
Figure 1-8   Modem Multiplexer Application

The following events occur in Figure 1-8:

- The OSS sends a TCP/IP call to AI232.

- AI232 routes the TCP/IP call over a serial link to one of several available modems in a modem pool. When a call comes in that requires a modem, one is selected from the pool and dials out appropriately. For information on configuring the modem pool and modem selection for incoming calls, refer to the Modem Mux configuration menu.

    🖉

    Note: Round-robin dialing has been incorporated for ModMux links to balance the demand placed on available modems by incoming calls. Rather than always starting at the first available modem, the ModMux driver rotates through all available modems so that the first available one is not always the first to be dialed.

- The modem routes the call through the PSTN (packet switched telephone network) to a remote modem.

- The remote modem sends the call to an NE.

Using the AI198 Menu System

This chapter provides information on starting, ending, and navigating through an AI198 menu system session.

Guide to this Chapter

Accessing the Menu System

To access the AI198 menu system:

1. Log into AI198.

2. At the prompt, enter **menu**. The Main Menu appears.

```
>menu
                                                              Main Menu

01+Configure options affecting the system as a whole
02+Create, delete, or modify a destination name
03+Display all destination names
04+Configure cards
05+Set or remove connection restrictions based on port numbers
06+Display all connection restrictions
07+Configure slot density
08+Configure the alias translation table
09+Display the list of alias translation entries
10+Configure the BOOTP table






21 Exit the configuration menu system
Enter item number and optional ",value" then push <CR> key
>
```

Navigating the Menu System

Menu Numbering Structure

All menus accessed from the Main Menu are identified with a numerical reference at the top right corner of the menu screen. This numerical reference specifies the location within the menu system. Each digit in the menu number represents a menu item that was previously selected. For example, Menu 4.2 indicates that menu item 4 and 2 were selected.

```
>2
                                                               Menu 4.2

01 Configure as Empty Slot
02+Configure as AI183/AI185 standard 4/16 port card
03+Configure as AI193/194 Ethernet card with slot expansion of-----
04+Configure as AI192/196 X.25 network card with slot expansion of--------
05+Configure as ASP or Advanced Smart Line Card with slot expansion of--------
06 Configure as AI196-I network card with LocalView
07 Configure as AI2524 Router card
08 Configure as AI294 Ethernet Switch card
09+Configure as AI196-I network interface card with menu support
10 Configure as Independent Smart Line Card
11+Configure as AI296 network interface card
12+Configure as AI192/196 with full menu support and slot expansion of--------
13+Configure as AI285 network interface card
14+Configure as AI232 network interface card
15 Configure as AI Modem
16 Configure as AIFlex Fiber LAN Extender Card
17 Configure as AI120 Card
18 Configure as AIE1 Card
19 Configure as AITC Card
20 Next Page
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

Types of Menu Items

The following four types of menu items are available:

- [Submenus](#)

- [Toggles](#)

- [Data](#)

- [Functions](#)

Submenus

Submenus go to deeper levels in the menu hierarchy. They provide additional configuration menus. Menu items that contain submenus have a plus sign (+) next to their menu item number. In this example, menu item 02 will display a submenu.

```
02+Configure as AI232 network interface card
```

Some submenus require a selection from a list and then re-display the previous menu showing the selection. Other submenus have their own submenus that request additional information. After saving the entries, the top-level menu re-appears.

Toggles

Toggles display two or more values that can be selected for a parameter. Toggles have an asterisk (*) next to their menu item number. Entering the menu item number toggles to the next selection.

In this example, menu items 06 and 07 are toggles.

```
06*TCP Default Window Size (200, 512, 1024, 2048)------------------------ 200
07*TCP Send Ahead----------------------------------------------------------OFF
```

For 06*TCP Default Window Size, the user can toggle between values 200, 512, 1024, and 2048. For 07*TCP Send Ahead, the user can toggle between ON and OFF.

Data

Data menu items request text entries (such as destination names and card descriptions) or numeric values (such as port numbers and IP addresses). To enter information in a data menu item, enter the menu item number followed by a comma (or a space) and the configuration information.

In this example, the menu item requires an IP address entry.

```
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------000.000.000.000
```

To enter an IP address of 172.016.002.043, enter the following:

1, 172. 016. 002. 043

The menu re-appears with the entered IP address.

```
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------172.016.002.043
```

To change configuration data that has been entered for a menu item, enter the menu item number followed by a comma and the new data.

Tip: To change a typed entry, use BACKSPACE to back up to the desired position in the text and retype the changes. However, once the user presses ENTER, changes can be made only by selecting that menu item and re-entering the data.

Functions

Menu item functions appear at the bottom of each menu. This example displays menu items that can appear and Table 2-1 describes them.

```
17 Display first page
18 Next page
19 Delete entry
20 Save the changes made
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

Table 2-1   Menu Item Descriptions

Menu Item	Description
17	Displays the first page of a menu.
18	Displays additional pages of a menu.
19	Deletes information for a specified entry.
20	Saves the entered information and re-displays the previous related menu. **Important:** Configuration entries take effect only after every screen has been saved going back to the main menu.
21	Exits a menu without saving changes. All items on the menu return to the previously configured values.

Exiting the Menu System

To exit the menu system:

1. Access the Main Menu.

2. Enter **21**. The command prompt appears.

AI232 Local Menu System

This chapter provides information on the configuration and navigation of the AI232 menu system. This system offers on-board configuration capabilities similar to those available in the AI198 menu system. The AI232 menu system is available when the card is operating in both switch mode and standalone mode.

Guide to this Chapter

Identifying AI232 Menu System Security Options

Logging Into AI232

Accessing the Local Menu System

Navigating the Local Menu System

Accessing the Help Menu

Exiting the Local Menu System

Identifying AI232 Menu System Security Options

AI232 has a variety of security options, including:

- [Multilevel User Name and Password Security](#)

- [RADIUS Authentication](#)

- [TACACS+ Authentication](#)

- [PPP Authentication Protocols (PAP and CHAP)](#)

Multilevel User Name and Password Security

Up to 10 configurable user account profiles can be assigned to an AI232 user. Five system profiles are available for providing various levels of user access. For more information about user profiles, refer to command profile on page 1-103.

RADIUS Authentication

RADIUS authentication verifies user login information against valid user information in a database on a centralized RADIUS authentication server. A primary and secondary RADIUS server are configurable to provide secure access for an entire AI232 network. AI232 RADIUS authentication is available for Telnet, asynchronous, and synchronous ports. For more information on RADIUS authentication, refer to section RADIUS Configuration on page 1-19.

TACACS+ Authentication

TACACS+ authentication verifies user login information against the user's permission level on a TACACS+ server. Up to 9 TACACS+ servers are configurable to provide secure access for an entire AI232 network. AI232 TACACS+ authentication is available for Telnet, asynchronous, and FTP connections. For more information on TACACS+ authentication and server configuration, refer to the following commands:

- [aaa authen on page 8-7](#)

- [aaa author on page 8-8](#)

- [aaa fallback on page 8-10](#)

- [aaa timeout on page 8-19](#)

- [aaa ppp authen on page 8-11](#)

- [tacacs server on page 8-96](#)

- [tacacs server phase on page 8-98](#)

- [tacacs server ip on page 8-97](#)

- [tacacs server port on page 8-100](#)

- [tacacs server secret on page 8-101](#)

PPP Authentication Protocols (PAP and CHAP)

All asynchronous and synchronous PPP links are configurable to use either PAP or CHAP PPP authentication protocols. PAP establishes peer identity using a 2-way handshake that is done only upon initial link establishment. CHAP performs a 3-way handshake upon initial link establishment, then proceeds to verify the link with 3-way handshakes at random intervals. CHAP also encrypts the user's password over the PPP link to provide added security.

Logging Into AI232

Log into AI232 with a Telnet connection or with any of AI232's asynchronous ports that are configured as Login ports.

✐

Note: ai is the default user ID and password. AI232 prompts you to create a new user ID and password after the fifth login with the default values. Refer to command <u>useradd on page 8-119</u> to create a new user ID and password.

Using a Telnet Connection for Login

Logging in using a Telnet connection requires that AI232 has a configured IP address. If an IP address has not been configured, refer to <u>Chapter 4: System Configuration</u> to assign an IP address.

To log into AI232 using a Telnet connection:

1. Power on AI232.

2. Connect the Ethernet network connection to the 10BaseT port on the front panel of AI232.

3. Telnet to AI232. The login prompt appears.

✐

Note: ai is the default user ID and password. There are five grace period logins. If after the fifth login a new ID and password have not been created, AI232 prompts you to create a user ID and password. Use the useradd command described in <u>Chapter 8: AI232 Commands</u> to create a user ID and password.

4. Enter your user ID. The password prompt appears.

5. Enter your password. The destination menu appears. You are now logged into AI232.

The following message appears when AI232 is configured to contact a TACACS+ server during authentication:

```
login: test
Password:
Contacting TACACS+ server.  Please wait.
```

The following message appears when AI232 is configured to contact a TACACS+ server during authentication, but the contact attempt fails:

```
login: test
Password:
Contacting TACACS+ server.   Please wait.
TACACS+ server(s) not responding.
```

✎

Note: Five consecutive failed login attempts generate an SNMP trap and a log message saying that the login failed. Also, an entry appears in the log file with text stating `Warning:  x consecutive failed login attempts` where x is the number of consecutive failed login attempts.

Using an Asynchronous Port for Login

Two tools are required for logging into AI232 using an asynchronous port:

● A PC with terminal emulation software such as HyperTerminal (included with Windows 95/98/2000/XP) or ProComm.

● Terminal cable with these specifications: null (RS232) cable with DB25 male connector for AI232 distribution panel connection and appropriate connector for your PC.

To log into AI232 using an asynchronous port:

1. Set the terminal emulation software to the following settings:

    ● 9600 baud

    ● No parity

    ● Eight data bits

    ● One stop bit

2. Power on AI232.

3. Connect a PC to port 1 on the DP232 distribution panel.

    ✎

    Note: Link 1 on AI232 is enabled and configured for login by default, which allows access through the link. AI232 may also be accessed through any asynchronous link that is enabled and configured for login.

4. Press ENTER. The login prompt appears.

5. Enter your user ID. The password prompt appears.

6. Enter your password. The destination menu appears. You are now logged into AI232.

The following message appears when AI232 is configured to contact a TACACS+ server during authentication:

```
login: test
Password:
Contacting TACACS+ server.  Please wait.
```

The following message appears when AI232 is configured to contact a TACACS+ server during authentication, but the contact attempt fails:

```
login: test
Password:
Contacting TACACS+ server.  Please wait.
TACACS+ server(s) not responding.
```

Note: Five consecutive failed login attempts generate an SNMP trap and a log message saying that login failed. Also, a new entry will appear in the log file with text stating `Warning:` x `consecutive failed login attempts` where x is the number of consecutive failed login attempts.

Accessing the Local Menu System

To access the AI232 menu session:

1. Log into AI232. Refer to section for more information.

2. At the destination menu, enter `ai`. The AI232 shell prompt appears.

3. Enter `menu`. The AI232 Main Menu appears.

```
                              AI232 Main Menu



     + Link Menu

     + Alias Menu

     + System Menu

     + Static Route Menu




          ..............................................................
          :                                                            :
          :   Select the desired menu option using the UP or DOWN arrow key.  :
          :   Then press ENTER or RETURN to continue.                  :
          :............................................................:



       <F1> Help                        <F4> Close
```

✎

Note: The Alias Menu is only available when you log into AI232 in standalone mode.

Navigating the Local Menu System

Arrow keys and keyboard short cuts can be used to navigate through the local menu system. Refer to Table 3-1 for a list of arrow key movements and keyboard shortcuts.

✎

Note: To use the arrow keys in the menu system, make sure the VT100 arrow keys are enabled in either your Telnet settings or your terminal emulation program.

Table 3-1   Direction Keys

Direction	Keys
Up	Use the up arrow key or Press <Ctrl-p>
Down	Use the down arrow key or Press <Ctrl-n>
Right	Use the right arrow key or Press <Ctrl-f>
Left	Use the left arrow key or Press <Ctrl-b>

Identifying Types of Menu Items

The AI232 local menu system contains data items that let you input information or toggle between available selections.

Data Entry Items

The following screen shot displays an example of a data entry menu item:

```
Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . .     1
```

To enter information for a data entry menu item:

1. Move the cursor to the menu item.

    ✎

    Note: If the selected menu item has a range of valid values, that range will appear in the bottom right of the screen.

2. Enter your data.

To erase existing data for a data entry menu item:

1. Move the cursor to the menu item.

2. Delete the data using BACKSPACE or DELETE and press ENTER.

    OR

    Enter new data.

To save your changes:

- Press F2 (or use the up and down arrow keys to highlight [Send]) and ENTER.

- Enter **y** to save. If an error message appears, check your work and make changes as necessary.

- Press CTRL-E to save data entries immediately without being queried to save. If an error message appears, check your work and make changes as necessary.

Toggle Items

The following screen shot displays an example of a toggle menu item. The selected option has brackets around it.

```
Link state . . . . . . . . . . . . . . . . . . . . . . . . . . .    [Up]    Down
```
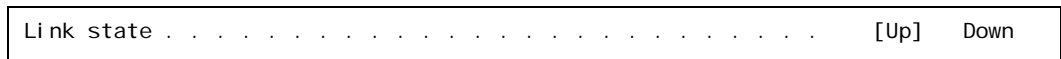
To select a value for a toggle menu item:

1. Move the cursor to the menu item.

2. Highlight the option you want to select and press ENTER. The brackets move to that option.

To save your changes:

- Press F2 (or use the up and down arrow keys to highlight [Send]) and ENTER.

- Enter **y** to save. If an error message appears, check your work and make changes as necessary.

- Press CTRL-E to save data entries immediately without being queried to save. If an error message appears, check your work and make changes as necessary.

Accessing the Help Menu

The AI232 help menu lists all available keyboard codes and function keys with their associated purposes. The help menu can be accessed by doing one of the following things:

- Pressing F1 and ENTER

- Selecting Help on the menu and ENTER

- Pressing ESC-1 and ENTER.

The following example displays the first page of the local menu system help screen:

```
                        Navigation Help                      Page 1 of 4


This screen displays when you press the <F1> key or if you enter an invalid key-
stroke from the Main Menu.  The following keyboard function keys are programmed
to allow you to enter or change data in menus:

  <F1>;  <F2>;  <F4>;  UP Arrow;  DOWN Arrow;  LEFT Arrow;  RIGHT Arrow

If you can not locate these keys on your keyboard, use the following keyboard
equivalent codes to provide the same functionality:

Keyboard Code Function Key        Purpose

   Esc  1        <F1>       HELP - displays this help screen from any menu.

   Esc  2        <F2>       SEND - transmits the currently displayed data.  You
                           are given a confirmation prompt before the actual
                           transmittal of data occurs.  When you press the <F2>
                           key, the RIGHT and LEFT arrow keys can then be used
                           to access the other commands.


              Press SPACE BAR to continue, or 'q' to quit
```

Exiting the Local Menu System

To exit the local menu system and save all changes:

1. Select `<F2> Send` and press ENTER.

    The following prompt appears:

    `Save changes? (y/n)`

2. Save the changes:

    y

3. Select `<F4> Close` and press ENTER until you are out of the menu system.

To exit the local menu system without saving changes, execute step 3.

Note: Entering **<CTRL>** + **R** takes you directly to the main menu.

System Configuration

This chapter provides information on configuring AI232 system settings with the AI198 menu system and the AI232 local menu system. To configure AI232 with the AI198 menu system, the AI198 software must be at version 1.90 or later. The AI198 menu system settings take effect only when AI232 is operating in switch mode (non-standalone mode).

Guide to this Chapter

General System Properties Configuration

RADIUS Configuration

TACACS+ Configuration

SNMP Configuration

Static Route Configuration

TID to Modem Mux Configuration

Time Configuration

General System Properties Configuration

General system properties are configurable at the first level of the AI198 and AI232 System menu. The following menu items can be configured:

- Destination Menu Break Sequence

- Ethernet Port Settings

- FTP Port

- IP Settings

- System Prompt

- TCP Settings

- Telnet Port

Destination Menu Break Sequence

Description

This menu item sets the character sequence that lets the user exit a connection from the destination menu.

Format

Destination menu break sequences take the following format:

attention_keystroke [*delay_start*, *delay_end*] *next_character*

attention_keystroke	Defines the keystroke that indicates that a break sequence is coming. Valid values are:
	• *<x>* where *x* represents the decimal ASCII value of the keystroke. For example, enter **<9>** to represent the TAB key.
	• **<c>***x* where **<c>** represents the CTRL key and *x* represents the actual key name. For example, enter **<c>^** to represent CTRL+SHIFT+6.
	• **<c><***x***>** where **<c>** represents the CTRL key and *x* represents the decimal ASCII value of the actual key name. For example, enter **<c><9>** to represent CTRL+TAB.
delay_start	Defines the amount of time (in seconds) you must wait before entering the next character. Valid values are integers from 0 to 8.

delay_end   Defines the amount of time (in seconds) before which you must enter the next character. Valid values are integers from 1 to 9.

        🖉

        Note: If you do not enter the next character within the configured time frame, then both the *attention_keystroke* and *next_character* values are treated as data and forwarded.

next_character   Defines the next character in the sequence. Valid values are:

- <*x*> where *x* represents the decimal ASCII value of the keystroke. For example, enter **<9>** to represent the TAB key.
- **<c>***x* where **<c>** represents the CTRL key and *x* represents the actual key name. For example, enter **<c>^** to represent CTRL+SHIFT+6.
- **<c>**<*x*> where **<c>** represents the CTRL key and *x* represents the decimal ASCII value of the actual key name. For example, enter **<c><9>** to represent CTRL+TAB.

🖉

Note: You can include multiple characters with delays between each in the break sequence. For example, `<c>^[1,5]x[0,9]k` is a valid entry.

Menu Item Type
Data

Configuration in the AI198 Menu System
1. Access Menu 4.2.14 pg 2.

2. From Menu 4.2.14 pg 2, enter **3,** and the desired destination menu break sequence. The maximum length is 44 characters. The default is `<c>^[1,5]x`.

This example displays item `03 Destination Menu Break Sequence` configured as `<c>^[2,6]x`.

```
>3,<c>^[2,6]x
                                                             Menu 4.2.14 pg 2
01*10 Base T Ethernet--------------------------------------------------OFF
02+Radius Configuration Menu
03 Destination Menu Break Sequence------------------------------<c>^[2,6]x
```

Configuration in the AI232 Local Menu System

1. Access the System Menu.

2. Enter a character sequence for `Destination Menu Break Sequence`. Maximum length is 44 characters. The default is `<c>^[1,5]x`.

The following example displays item `Destination Menu Break Sequence` set to `<c><33>`.

```
                                    System Menu


    System Prompt  .  .  ............................................... [232]
    Destination Menu Break Sequence  .  .  .  .  .  ..................... <c><33>
```

Ethernet Port Settings

Description

The Ethernet port settings are configured using two menu items:

- `10BaseT Ethernet`—Enables or disables the 10BaseT Ethernet port on the front panel of AI232.

- `Dual Ethernet`—Enables or disables simultaneous operation of the faceplate mounted 10BaseT Ethernet port and the IRB.

    ✎

    Note: When the dual Ethernet setting is enabled, the 10BaseT Ethernet setting has no effect on AI232 operation.

Menu Item Type
Toggle for both menu items

Configuration in the AI198 Menu System

1. Access Menu 4.2.14 pg 2.

2. For `01*10 Base T Ethernet`, enter 1 to select `OFF` or `ON`. The default is `OFF`.

3. For `07*Dual Ethernet`, enter 7 to select `OFF` or `ON`. The default is `OFF`.

This example displays `01*10 Base T Ethernet` set to `ON` and `07*Dual Ethernet` set to `OFF`.

```
>7
                                                              Menu 4.2.14 pg 2
01*10 Base T Ethernet------------------------------------------------------ ON
02+Radius Configuration Menu
03 Destination Menu Break Sequence---------------------------------<c>^[1,5]x
04+TACACS Configuration Menu
05 TCP Outgoing Connection Timer (2-360s)---------------------------------075
06+TID to Modem Mux Configuration Menu
07*Dual Ethernet (On, Off)-----------------------------------------------OFF
```

Configuration in the AI232 Local Menu System

1. Access the System Menu.

2. For 10 Base T Ethernet, select Off or On. The default is off when running in switch mode. The default is on when running in standalone mode.

3. For Dual Ethernet, select Off or On. The default is Off.

This example displays 10 Base T Ethernet set to ON and Dual Ethernet set to OFF.

```
                              System Menu


  System Prompt  .  .  ...............................................  [232]
  Destination Menu Break Sequence  .  .  .  .  .  ....................  <c><33>
  TCP Default Window Size  .  .  .  .  .  .  .  .  .  .   [200]   512   1024   2048
  TCP Send Ahead .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .   On   [Off]
  Telnet Port  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  . ... 23
  FTP Port .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  . .. 21
  10 Base T Ethernet .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .   Off   [On]
  Dual  Ethernet  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .   [Off]   On
```

FTP Port

Description

This menu item sets the FTP server port number.

Menu Item Type

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.

2. For 16 FTP port number, enter **16,** and the FTP server port number. Valid values are 1 to 65534. The default is 21.

This example displays 16 FTP port number set to 220.

```
>16, 220
                                                              Menu 4.2.14 pg 1
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------000.000.000.000
02 IP Address Range (1 - 255)-------------------------------------------001
03 IP Subnet Mask (0.0.0.1 - 255.255.255.254) ------------------255.255.255.254
04 Primary IP Router Address (0.0.0.0 - 255.255.255.254) -------000.000.000.000
05 Secondary IP Router Address (0.0.0.0 - 255.255.255.254) -----000.000.000.000
06*TCP Default Window Size (200, 512, 1024, 2048)------------------------ 200
07*TCP Send Ahead-------------------------------------------------------OFF
08+SNMP System Parameters



12+Link Setup

14+IP Static Routes
15 Telnet port number (1..65534)-----------------------------------------00023
16 FTP port number (1..65534)-------------------------------------------00220
```

Configuration in the AI232 Local Menu System

1. Access the System Menu.

2. For FTP Port, enter the desired FTP port value. Valid values are from 0 to 65534.

This example displays FTP Port set to 1752.

```
                                  System Menu


  System Prompt  .  .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . [232]
  Destination Menu Break Sequence  .  .  .  .  . . . . . . . . . . . . . <c><33>
  TCP Default Window Size  .  .  .  .  .  .  .  .  . .  [200]   512    1024    2048
  TCP Send Ahead .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  On   [Off]
  Telnet Port  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  . 23
  FTP Port . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1752
```

IP Settings

Description

The IP settings are configurable using five menu items in the CLC menu or via a shell command on AI232. The configurable values are:

●   IP address

●   IP address range

●   IP subnet mask

●   Primary IP router address

●   Secondary IP router address.

Menu Item Types

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.

2. For `01 IP Address`, enter **1,** and the IP address for AI232. The default is `000.000.000.000`.

3. For `02 IP Address Range`, enter **2,** and the number of the IP addresses to be assigned to AI232. The valid range is `1` to `255`.

4. For `03 IP Subnet Mask`, enter **3,** and the IP subnet mask for AI232. The default is `255.255.255.254`.

5. For `04 Primary IP Router Address`, enter **4,** and the IP address of the primary router for AI232. The default is `000.000.000.000`.

6. For `05 Secondary IP Router Address`, enter **5,** and the IP address of the secondary router for AI232. The default is `000.000.000.000`.

This example displays:

- `01 IP Address` set to `10.38.49.12`
- `02 IP Address Range` set to `3`
- `03 IP Subnet Mask` set to `255.255.000.000`
- `04 Primary IP Router Address` set to `010.038.000.001`
- `05 IP Router Address` set to `010.038.000.002`

```
>5,10.38.0.2
                                                        Menu 4.2.14 pg 1
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------010.038.049.012
02 IP Address Range (1 - 255)----------------------------------------------003
03 IP Subnet Mask (0.0.0.1 - 255.255.255.254) ------------------255.255.000.000
04 Primary IP Router Address (0.0.0.0 - 255.255.255.254) -------010.038.000.001
05 Secondary IP Router Address (0.0.0.0 - 255.255.255.254) -----010.038.000.002
```

Note: For information about configuring IP setting with shell commands, refer to commands ip on page 8-61 and ip init on page 8-62.

System Prompt

Description
This item sets the system prompt value in the CLI.

Menu Item Type
Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.

2. For 17 Prompt String, enter **17,** and the desired system prompt value. There is no default prompt string. The maximum length is 64 characters.

This example displays item 17 Prompt String set to NewPrompt.

```
>17,NewPrompt
                                                            Menu 4.2.14 pg 1
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------010.040.057.012
02 IP Address Range (1 - 255)----------------------------------------------001
03 IP Subnet Mask (0.0.0.1 - 255.255.255.254) ------------------255.255.000.000
04 Primary IP Router Address (0.0.0.0 - 255.255.255.254) -------010.040.000.001
05 Secondary IP Router Address (0.0.0.0 - 255.255.255.254) -----000.000.000.000
06*TCP Default Window Size (200, 512, 1024, 2048)------------------------ 200
07*TCP Send Ahead----------------------------------------------------------OFF
08+SNMP System Parameters



12+Link Setup

14+IP Static Routes
15 Telnet port number (1..65534)--------------------------------------------00023
16 FTP port number (1..65534)-----------------------------------------------00021
17 Prompt String--------------------------------------------------------NewPrompt
```

Configuration in the AI232 Local Menu System

1. Access the System Menu.

2. For System Prompt, enter the desired system prompt.

This example displays System Prompt set to NewPrompt.

```
                                 System Menu


   System Prompt  .  .  ............................................... NewPrompt
```

TCP Settings

Description

The TCP settings are configured using two menu items. The configurable values are:

- `TCP default window size`—Sets the TCP default window size for AI232. The window size specifies how many bytes AI232 will send to another device or how many bytes another device may send to the AI232 before receiving an acknowledgement.

  📝
  Note: A small default window size way slow transfers to and from AI232.

- `TCP send ahead`—Enables or disables AI232's ability to send a TCP window without requiring an acknowledgment. When enabled, acknowledgment is not required. When disabled, acknowledgment is required.

Menu Item Type

Toggle

Configuration in the AI198 Menu System

1. Access System Menu 4.2.14.

2. For `06*TCP Default Window Size`, enter **6** to select `200`, `512`, `1024`, or `2048`. The default is `200`.

3. For `07*TCP Send Ahead`, enter **7** to select `OFF` or `ON`. The default is `OFF`.

This example displays `06*TCP Default Window Size` set to `1024` and `07*TCP Send Ahead` set to `ON`.

```
>7
                                                         Menu 4.2.14 pg 1
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------010.040.057.012
02 IP Address Range (1 - 255)------------------------------------------------001
03 IP Subnet Mask (0.0.0.1 - 255.255.255.254) ------------------255.255.000.000
04 Primary IP Router Address (0.0.0.0 - 255.255.255.254) -------010.040.000.001
05 Secondary IP Router Address (0.0.0.0 - 255.255.255.254) -----000.000.000.000
06*TCP Default Window Size (200, 512, 1024, 2048)-----------------------1024
07*TCP Send Ahead------------------------------------------------------------ ON
```

Configuration in the AI232 Local Menu System

1. Access the System Menu.

2. For `TCP Default Window Size`, select `200`, `512`, `1024`, or `2048`. The default is `200`.

3. For `TCP Send Ahead`, select `Enabled` or `Disabled`. The default is `Disabled`.

This example displays TCP Default Window Size set to 1024 and TCP Send Ahead set to Enabled.

```
                              System Menu


   System Prompt  .  .  .......................................... NewPrompt
   Destination Menu Break Sequence  .  .  .  .  .  ...................  <c>^[1,5]x
   TCP Default Window Size  .  .  .  .  .  .  .  .  .  .      200    512   [1024]   2048
   TCP Send Ahead .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .       [Enabled]   Disabled
```

Telnet Port

Description
This item sets the Telnet port value for AI232.

Menu Item Type
Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.

2. For 15 Telnet port number, enter 15, and the desired port number value. Valid values are 1 to 65534. The default is 23.

This example displays 15 Telnet port number set to 122.

```
>15, 122
                                                            Menu 4.2.14 pg 1
01 IP Address (0.0.0.0 - 255.255.255.254)----------------------010.040.057.012
02 IP Address Range (1 - 255)------------------------------------------------001
03 IP Subnet Mask (0.0.0.1 - 255.255.255.254) ------------------255.255.000.000
04 Primary IP Router Address (0.0.0.0 - 255.255.255.254) -------010.040.000.001
05 Secondary IP Router Address (0.0.0.0 - 255.255.255.254) -----000.000.000.000
06*TCP Default Window Size (200, 512, 1024, 2048)-----------------------1024
07*TCP Send Ahead----------------------------------------------------------- ON
08+SNMP System Parameters



12+Link Setup

14+IP Static Routes
15 Telnet port number (1..65534)-------------------------------------------00122
```

Configuration in the AI232 Local Menu System

1. Access the System Menu.

2. For Telnet Port, enter the desired value. The default is 23.

This example displays `Telnet Port` set to 55.

```
                                System Menu


System Prompt  .  .  .  .............................................  NewPrompt
Destination Menu Break Sequence  .  .  .  .  .  .  ...................  <c>^[1,5]x
TCP Default Window Size  .  .  .  .  .  .  .  .  .  .     200    512  [1024]   2048
TCP Send Ahead .  .  .  .  .  .  .  .  .  .  .  .  .  .  .      [Enabled]   Disabled
Telnet Port  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .. 55
```

RADIUS Configuration

RADIUS authentication verifies user login information against valid user information in a database on a centralized RADIUS authentication server. A primary and secondary RADIUS server are configurable to provide secure access for an entire AI232 network. AI232 RADIUS authentication is available for Telnet, asynchronous, and synchronous ports. The following menu items can be configured for RADIUS:

- [Server Settings](#)

- [Shell/FTP Options](#)

Server Settings

Description

The RADIUS server settings are configured using four menu items for the primary and secondary server. The configurable values are:

- `Primary/secondary server status`—Enables or disables the primary or secondary server.

- `Primary/secondary server IP address`—Defines an IP address for the primary or secondary server.

- `Primary/secondary server port`—Defines the port number for the primary or secondary server.

- `Primary/secondary server secret`—Defines a password for the primary or secondary server.

Menu Item Types

Toggle for primary/secondary server status

Data for primary/secondary server IP address, server port, and server secret

Configuration in the AI198 Menu System

✎

Note: RADIUS and TACACS+ cannot both be configured at the same time. Attempting to do this generates an error.

To configure the RADIUS server settings:

1. Access Menu 4.2.14-2.2.

2. For `01*Primary Server Status`, enter 1 to select `ENABLED` or `DISABLED`. The default is `DISABLED`.

3. For `02 Primary Server IP Address`, enter 2, and the desired IP address. The default is `0.0.0.0`.

4. For `03 Primary Server Port`, enter **3,** and the desired port number. The default is `1812`.

5. For `04 Primary Server Secret`, enter **4,** and the desired password. The default is `applied`.

6. If desired, repeat steps 2 through 5 for the secondary server settings.

This example displays:

- `01*Primary Server Status` set to `ENABLED`
- `02 Primary Server IP Address` set to `050.023.156.012`
- `03 Primary Server Port` set to `122`
- `04 Primary Server Secret` set to `hilltop`.

```
>4,hilltop
                                                         Menu 4.2.14-2.2
01*Primary Server Status (Enabled, Disabled)------------------------- ENABLED
02 Primary Server IP Address------------------------------------050.023.156.012
03 Primary Server Port (1..65535)----------------------------------------00122
04 Primary Server Secret-------------------------------                  hilltop
```

Configuration in the AI232 Local Menu System

1. Access the RAS Configuration Menu located under the System Menu.

2. For `RADIUS Primary Server Status`, select `Enabled` or `Disabled`.

3. For `IP address`, enter an IP address. The default is `0.0.0.0`.

4. For `Port Number`, enter a port number. The default is `1812` for RADIUS servers.

5. For `Secret`, enter a password. The default is `applied`.

6. Repeat steps 2 through 5 for the secondary RADIUS server.

This example displays:

- `RADIUS Primary Server Status` set to `Enabled`
- `IP Address` set to `12.33.57.2`
- `Port Number` set to `122`
- `Secret` set to `newone`.

```
                          RAS Configuration Menu


RADIUS Primary Server Status . . . . . . . . . . .    [Enabled]   Disabled
       IP Address . . . . . ... 12.33.57.2        Port Number . . . . . 122
       Secret . . . .............. newone
```

Shell/FTP Options

Description

This item sets the Shell/FTP option for RADIUS as one of the following:

- `Enabled`—Enables RADIUS login.

- `Disabled`—Disables RADIUS login.

- `Local fallback`—Enables RADIUS login, but resorts to local login if the RADIUS login fails.

    🖉

    Note: RADIUS and TACACS+ cannot both be configured at the same time. Attempting to do this generates an error.

Menu Item Type

Toggle

Configuration in the AI198 Menu System

To configure the shell/FTP RADIUS option:

1. Access Menu 4.2.14-2.2.

2. For `09*Shell/FTP Radius Option`, enter 9 to select `ENABLED`, `DISABLED`, or `LOCAL FALLBACK`. The default is `DISABLED`.

This example displays `09*Shell/FTP Radius Option` set to `LOCAL FALLBACK`.

```
>9
                                                          Menu 4.2.14-2.2
01*Primary Server Status (Enabled, Disabled)------------------------- ENABLED
02 Primary Server IP Address-----------------------------------050.023.156.012
03 Primary Server Port (1..65535)---------------------------------------00122
04 Primary Server Secret-------------------------------            hilltop
05*Secondary Server Status (Enabled, Disabled)-----------------------DISABLED
06 Secondary Server IP Address---------------------------------000.000.000.000
07 Secondary Server Port (1..65535)-------------------------------------01812
08 Secondary Server Secret----------------------------            applied
09*Shell/FTP Radius Option (Enabled, Disabled, Local Fallback)---LOCAL FALLBACK
```

Configuration in the AI232 Local Menu System

To configure the shell/FTP RADIUS option:

1. Access the RAS Configuration Menu located under the System Menu.

2. For `Shell RAS Option`, select `Disabled`, `RADIUS`, `RADIUS/Fallback`. The default is `Disabled`.

This example displays the shell RAS option set to RADIUS/Fallback.

```
                        RAS Configuration Menu


RADIUS Primary Server Status . . . . . . . . . . .     [Enabled]   Disabled
        IP Address . . . . ....... 0.0.0.0        Port Number . . . .  1812
        Secret . . . ............. newone


RADIUS Secondary Server Status . . . . . . . . . .     Enabled   [Disabled]
        IP Address . . . . ....... 0.0.0.0        Port Number . . . .  1812
        Secret . . . ............. applied

Shell RAS Option:     Disabled    RADIUS   [RADIUS/Fallback]
```

TACACS+ Configuration

TACACS+ authentication verifies user login information against the user's permission level on a TACACS+ server. Up to 9 TACACS+ servers are configurable to provide secure access for an entire AI232 network. AI232 TACACS+ authentication is available for Telnet, asynchronous, and FTP connections. The following menu items can be configured for TACACS+ on the AI198 menu system:

- [Server Settings](#)

- [Shell/FTP Options](#)

✎

Note: TACACS+ is not configurable from the AI232 local menu system.

Server Settings

Description

From the AI198 Menu System, the TACACS+ server settings are configured using four menu items for the primary and secondary server. The configurable values are:

- `Primary/secondary server status`—Enables or disables the primary or secondary server.

- `Primary/secondary server IP address`—Defines an IP address for the primary or secondary server.

- `Primary/secondary server port`—Defines the port number for the primary or secondary server.

- `Primary/secondary server secret`—Defines a password for the primary or secondary server.

Menu Item Types

Toggle for primary/secondary server status

Data for primary/secondary server IP address, server port, and server secret

Configuration in the AI198 Menu System

To configure the TACACS+ server settings:

1. Access Menu 4.2.14-2.4.

2. For `01*Primary Server Status`, enter **1** to select `ENABLED` or `DISABLED`. The default is `DISABLED`.

3. For `02 Primary Server IP Address`, enter **2**, and the IP address. The default is `0.0.0.0`.

4. For `03 Primary Server Port`, enter **3**, and the port number. The default is `49`.

5. For 04 Primary Server Secret, enter 4, and the password. The default is applied.

6. Repeat steps 2 through 5 for the secondary server settings.

This example displays:

- 01*Primary Server Status set to ENABLED

- 02 Primary Server IP Address set to 050.023.156.011

- 03 Primary Server Port set to 122

- 04 Primary Server Secret set to hilltop.

```
>4,hilltop
                                                        Menu 4.2.14-2.4
01*Primary Server Status (Enabled, Disabled)------------------------- ENABLED
02 Primary Server IP Address----------------------------------050.023.156.012
03 Primary Server Port (1..65535)----------------------------------------00122
04 Primary Server Secret-----------------------------              hilltop
```

Shell/FTP Options

Description
This item sets the Shell/FTP option for TACACS+ as one of the following:

- Enabled—Enables TACACS+ login.

- Disabled—Disables TACACS+ login.

- Local fallback—Enables TACACS+ login, but resorts to local login if the TACACS+ login fails.

🖉

Note: RADIUS and TACACS+ cannot both be configured at the same time. Attempting to do this generates an error.

Menu Item Type
Toggle

Configuration in the AI198 Menu System
Important: Configuration of the shell/FTP TACACS+ option results in privilege level authorization and supersedes any TACACS+ configuration on the AI232 card.

To configure the shell/FTP TACACS+ option:

1. Access Menu 4.2.14-2.4.

2. For 09*Shell/FTP TACACS Option, enter 9 to select ENABLED, DISABLED, or LOCAL FALLBACK. The default is DISABLED.

This example displays 09*Shell/FTP TACACS Option set to LOCAL FALLBACK.

```
>9
                                                        Menu 4.2.14-2.4
01*Primary Server Status (Enabled, Disabled)-------------------------DISABLED
02 Primary Server IP Address-------------------------------------000.000.000.000
03 Primary Server Port (1..65535)----------------------------------------00049
04 Primary Server Secret------------------------------                applied
05*Secondary Server Status (Enabled, Disabled)-----------------------DISABLED
06 Secondary Server IP Address-----------------------------------000.000.000.000
07 Secondary Server Port (1..65535)--------------------------------------00049
08 Secondary Server Secret----------------------------                applied
09*Shell/FTP TACACS Option (Enabled, Disabled, Local Fallback)---LOCAL FALLBACK
```

SNMP Configuration

This section discusses SNMP configuration options. The following configuration components are available:

- [Authentication Traps](#)

- [Community Names](#)

- [Contact Persons](#)

- [Node Information](#)

- [SNMP Manager](#)

Authentication Traps

Description

This item enables or disables the generation of authentication failure traps by AI232. When a user enters faulty login information, authentication traps are sent from an SNMP agent to inform the management station about the incorrect login attempt.

Menu Item Types

Toggle

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.8.

2. For `04*Send authentication traps`, enter **4** to select `ON` or `OFF`. The default is `ON`.

The following example displays item `04*Send authentication traps` set to `ON`.

```
>4
                                                                Menu 4.2.14.8
01 Contact person for this node------------------------------------------------
02 Node name-------------------------------------------------------------------
03 Node location---------------------------------------------------------------
04*Send authentication traps----------------------------------------------- ON
```

AI232 Local Menu Item Configuration

1. Access the SNMP Menu located under the System Menu.

2. For `Send authentication traps`, select `On` or `Off`. The default is `ON`.

The following example displays the selection of `On` for menu item `Send authentication traps`.

```
                                 SNMP Menu


Contact person for this managed node . . . . . . . . . . . . . .
Node name . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Node location . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Send authentication traps . . . . . . . . . . . . . . . . . .     [On]    Off
```

Community Names

Description
SNMP community names provide embedded password access to MIB contents.
There are 3 menu items available for configuring AI232 SNMP community name
information:

- `Read Community Name`—Sets the name that permits read only access to all objects in the MIB.

- `MIB2 Read Community Name`—Sets the name that permits read only access to all objects in MIB2.

- `Write Community Name`—Sets the name that permits read and write access to all objects in the MIB.

Menu Item Types
Data for all menu items

Configuration in the AI198 Menu System
1. Access Menu 4.2.14.8.

2. For `05 Read Community Name`, enter **5,** and the community name value. The maximum length is 32 characters. The default value is `readonly`.

3. For `06 MIB2 Read Community Name`, enter **6,** and the community name value. The maximum length is 32 characters. The default value is `public`.

4. For `07 Write Community Name`, enter **7,** and the community name value. The maximum length is 32 characters. The default value is `administrator`.

The following example displays:

- Item 05 `Read Community Name` set to `ReadComm`.
- Item 06 `MIB2 Read Community Name` set to `MIB2`.
- Item 07 `Write Community Name` set to `WriteComm`.

```
>7,WriteComm
                                                          Menu 4.2.14.8
01 Contact person for this node------------------------------------------------
02 Node name-------------------------------------------------------------------
03 Node location---------------------------------------------------------------
04*Send authentication traps------------------------------------------------ ON
05 Read Community Name-------------------------------------------------ReadComm
06 MIB2 Read Community Name-------------------------------------------------MIB2
07 Write Community Name-----------------------------------------------WriteComm
```

AI232 Local Menu Item Configuration

1. Access the SNMP Menu located under the System Menu.

2. For menu item `Read Community Name`, enter the community name value. The maximum length is 32 characters. The default value is `readonly`.

3. For menu item `MIB2 Read Community Name`, enter the community name value. The maximum length is 32 characters. The default value is `public`.

4. For menu item `Write Community Name`, enter the community name value. The maximum length is 32 characters. The default value is `administrator`.

The following example displays:

- Item `Read Community Name` set to `ReadComm`.
- Item `MIB2 Read Community Name` set to `MIB2`.
- Item `Write Community Name` set to `WriteComm`.

```
                              SNMP Menu


Contact person for this managed node . . . . . . . . . . . . .
Node name . . . . . . . . . . . . . . . . . . . . . . . . . ...............
Node location . . . . . . . . . . . . . . . . . . . . . . . ...........
Send authentication traps . . . . . . . . . . . . . . . . .      [On]   Off
SNMP Manager #1  . . . . . . . . . . . . . . . . . . . . . . . . 10.35.0.30
SNMP Manager #2  . . . . . . . . . . . . . . . . . . . . . . . . 10.35.0.60
SNMP Manager #3  . . . . . . . . . . . . . . . . . . . . . . . . 10.35.0.20
SNMP Manager #4  . . . . . . . . . . . . . . . . . . . . . . . . . 0.0.0.0
SNMP Manager #5  . . . . . . . . . . . . . . . . . . . . . . . . . 0.0.0.0
Read Community Name . . . . . . . . . . . . . . . . . . . . . . . ReadComm
MIB2 Read Community Name . . . . . . . . . . . . . . . . . . . . . . . MIB2
Write Community Name . . . . . . . . . . . . . . . . . . . . . . WriteComm
```

Contact Persons

Description

This item defines the name of the person to contact regarding a specific node.

Menu Item Types

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.8.

2. For `01 Contact person for this node`, enter **1,** and the desired contact person. The maximum length is 40 characters.

The following example displays `John Doe` configured for menu item `01 Contact person for this node`:

```
>1,John Doe
                                                              Menu 4.2.14.8
01 Contact person for this node--------------------------------------John Doe
```

AI232 Local Menu Item Configuration

1. Access the SNMP Menu located under the System Menu.

2. For `Contact person for this managed node`, enter the contact person. The maximum length is 40 characters.

The following example displays `John Doe` configured for menu item `Contact person for this managed node`:

```
                              SNMP Menu


Contact person for this managed node . . . . . . . . . . . . . ...... John Doe
```

Node Information

Description

There are two menu items available for configuring node information:

- `Node Name`—Defines the name of a location on a network.

- `Node Location`—Defines a location on a network.

Menu Item Types

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.8.

2. For `02 Node name`, enter `2,` and the node name. The maximum length is 40 characters.

3. For `03 Node location`, enter `3,` and a node location description. The maximum length is 40 characters.

The following example displays the configuration of node name `newNode` and node location `Office B`.

```
>3,Office B
                                                            Menu  4.2.14.8
01 Contact person for this node---------------------------------------John Doe
02 Node name----------------------------------------------------------newNode
03 Node location------------------------------------------------------Office B
```

AI232 Local Menu Item Configuration

1. Access the SNMP Menu located under the System Menu.

2. For `Node name`, enter the node name. The maximum length is 40 characters.

3. For `Node location`, enter a node location description. The maximum length is 40 characters.

The following example displays the configuration of node name `newNode` and node location `Office B`.

```
                              SNMP Menu


Contact person for this managed node . . . . . . . . . . . . . . ....... John Doe
Node name . . . . . . . . . . . . . . . . . . . . . . . . . . . ....... newNode
Node location . . . . . . . . . . . . . . . . . . . . . . . ...... Office B
```

SNMP Manager

Description

An SNMP manager is a combination of monitoring software running on a network management station (NMS) and the actual device running the software. It collects and acts on information from the various devices being monitored and/or controlled. The SNMP manager also periodically polls the devices it is managing to get status information. AI232 allows for the configuration of up to 5 SNMP managers.

✎

Note: SNMP managers are only configurable when AI232 is in standalone mode. They are not configurable through the AI198 menu system.

Menu Item Types

Data

AI232 Local Menu Item Configuration

1. Access the SNMP Menu located under the System Menu.

2. For SNMP Manager #1, enter the IP address of the first SNMP manager. The default is 0.0.0.0.

3. For SNMP Manager #2, enter the IP address of the second SNMP manager. The default is 0.0.0.0.

4. For SNMP Manager #3, enter the IP address of the third SNMP manager. The default is 0.0.0.0.

5. For SNMP Manager #4, enter the IP address of the fourth SNMP manager. The default is 0.0.0.0.

6. For SNMP Manager #5, enter the IP address of the fifth SNMP manager. The default is 0.0.0.0.

The following example displays:

- SNMP Manager #1 set to 10.65.32.4
- SNMP Manager #2 set to 10.65.32.5
- SNMP Manager #3 set to 10.65.32.6
- SNMP Manager #4 set to 10.65.32.7
- SNMP Manager #5 set to 10.65.32.8

```
                                  SNMP Menu


Contact person for this managed node . . . . . . . . . . . . .
Node name . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Node location . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Send authentication traps . . . . . . . . . . . . . . . . .    [On]   Off
SNMP Manager #1  . . . . . . . . . . . . . . . . . . . . . . . . . . . .  10.65.32.4
SNMP Manager #2  . . . . . . . . . . . . . . . . . . . . . . . . . . . .  10.65.32.5
SNMP Manager #3  . . . . . . . . . . . . . . . . . . . . . . . . . . . .  10.65.32.6
SNMP Manager #4  . . . . . . . . . . . . . . . . . . . . . . . . . . . .  10.65.32.7
SNMP Manager #5  . . . . . . . . . . . . . . . . . . . . . . . . . . . .  10.65.32.8
```

Static Route Configuration

AI232 allows for the configuration of static routes using both the AI198 and AI232 menu systems.

IP Address Settings

Description

Static routes are configured with a destination and next hop IP address. The destination IP address defines the static IP route you want to configure. The next hop IP address defines the IP address of the router you want the system to use when trying to reach the destination IP address.

Menu Item Types

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.14.

2. From Menu 4.2.14.14, enter a value from **3** to **11**. Menu 4.2.14.14.1 appears.

3. For `01 Destination IP`, enter an IP address value.

4. For `02 Next Hop IP`, enter an IP address value.

The following example displays the configuration of destination address `84.238.45.2` and next hop address `23.51.93.5`.

```
>2,023.051.093.005
                                                           Menu 4.2.14.14.1
01 Destination IP----------------------------------------------084.238.045.002
02 Next Hop IP-------------------------------------------------023.051.093.005
```

AI232 Local Menu Item Configuration

1. Access the Static Route Menu.

2. Select `[Add]`. The IP Static Route Edit Menu appears.

3. For `Destination IP Address`, enter an IP address value. The default is `1.1.1.1`.

4. For `Next Hop IP Address`, enter an IP address value. The default is `1.1.1.1`.

The following example displays the configuration of destination IP address `12.240.54.3` and next hop IP address `12.240.54.4`.

```
                         IP Static Route Edit Menu

Destination IP Address  . . . . . . . . . . . . . . . . . .......... 12.240.54.3
Next Hop IP Address . . . . . . . . . . . . . . . . . . . .......... 12.240.54.4
```

TID to Modem Mux Configuration

The following are available:

- [Inactivity Timeout](#)

- [Initialization String](#)

- [Port Bit Settings](#)

- [TID to Route](#)

Inactivity Timeout

Description

This menu item defines the amount of time (in seconds) the Modem Mux connection must be inactive before it times out.

Menu Item Types

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14-2.6.

2. From Menu 4.2.14-2.6, enter a value from 2 to 11. Menu 4.2.14-2.6.1 appears.

3. For 06 Inactivity Timeout, enter 6, and a timeout value. Valid values are from 0 to 100000. The default is 300.

This example displays 06 Inactivity Timeout set to 1500.

```
>6,1500
                                                           Menu 4.2.14-2.6.1
01 TID to route-------------------------------------------
02*Port Data Bits (7, 8)-------------------------------------------------8
03*Port Stop Bits (1, 2)-------------------------------------------------1
04*Port Parity (None, Even, Odd)-------------------------------------None
05 Init String---------------------------------
06 Inactivity Timeout (0 - 100000)-------------------------------001500
```

AI232 Local Menu Item Configuration

1. Access the TID to Modem Mux Menu located under the System Menu.

2. From the TID to Modem Mux Summary Menu, select [Add TID]. The TID To Modem Mux Edit Menu appears.

3. For Inactivity Timeout, enter a timeout value. Valid values are from 0 to 100000. The default is 300.

This example displays `Inactivity Timeout` set to `1500`.

```
                         TID To Modem Mux Edit Menu

  TID to route . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
  Port Data Bits . . . . . . . . . . . . . . . . . . . . .     Seven   [Eight]
  Port Stop Bits . . . . . . . . . . . . . . . . . . . . . .       [One]    Two
  Port Parity  . . . . . . . . . . . . . . . . . . . .   [None]   Even    Odd
  Init String  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
  Inactivity Timeout . . . . . . . . . . . . . . . . . . . . . . . . . .  1500
```

Initialization String

Description

This menu item defines the string that is sent upon indication that there is a device connected to the port (DSR asserted).

Menu Item Types

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14-2.6.

2. From Menu 4.2.14-2.6, enter a value from **2** to **11**. Menu 4.2.14-2.6.1 appears.

3. For `05 Init String`, enter **5,** and an initialization string value. Maximum length is 30 characters.

This example displays `05 Init String` set to `conn23`.

```
>5,conn23
                                                         Menu 4.2.14-2.6.1
01 TID to route--------------------------------------------
02*Port Data Bits (7, 8)-------------------------------------------------8
03*Port Stop Bits (1, 2)-------------------------------------------------1
04*Port Parity (None, Even, Odd)-------------------------------------None
05 Init String----------------------------------            conn23
```

AI232 Local Menu Item Configuration

1. Access the TID to Modem Mux Menu located under the System Menu.

2. From the TID to Modem Mux Summary Menu, select `[Add TID]`. The TID To Modem Mux Edit Menu appears.

3. For `Init String`, enter a string value. Maximum length is 30 characters.

This example displays `Init String` set to `conn23`.

```
                           TID To Modem Mux Edit Menu

    TID to route . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
    Port Data Bits . . . . . . . . . . . . . . . . . . . . .    Seven   [Eight]
    Port Stop Bits . . . . . . . . . . . . . . . . . . . . . .       [One]    Two
    Port Parity  . . . . . . . . . . . . . . . . . . . . .    [None]    Even     Odd
    Init String  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .   conn23
```

Port Bit Settings

Description

There are 3 menu items available for configuring TID to Modem Mux port bits:

● `Port Data Bits`—Defines the number of databits in a data byte.

● `Port Stop Bits`—Defines the number of stop bits for TID to Modem Mux. A stop bit is an extra bit at the end of an asynchronous character that helps the receiver recognize the end of the character.

● `Port Parity`—Defines parity, which is a process for detecting whether or not bits of data have been altered during data transmission.

Menu Item Types

Toggle for all menu items

Configuration in the AI198 Menu System

1. Access Menu 4.2.14-2.6.

2. From Menu 4.2.14-2.6, enter a value from **2** to **11**. Menu 4.2.14-2.6.1 appears.

3. For `02*Port Data Bits`, enter **2,** to select `7` or `8`. The default is `8`.

4. For `03*Port Stop Bits`, enter **3,** to select `1` or `2`. The default is `1`.

5. For `04*Port Parity`, enter **4,** to select `None`, `Even`, or `Odd`. The default is `None`.

This example displays:

● `02*Port Data Bits` set to `7`

● `03*Port Stop Bits` set to `1`

● `04*Port Parity` set to `Even`.

```
>4, Even
                                                                 Menu 4.2.14-2.6.1
01 TID to route-------------------------------------------
02*Port Data Bits (7, 8)------------------------------------------------------7
03*Port Stop Bits (1, 2)------------------------------------------------------1
04*Port Parity (None, Even, Odd)------------------------------------------Even
```

AI232 Local Menu Item Configuration

1. Access the TID to Modem Mux Menu located under the System Menu.

2. From the System Menu, select `TID to Modem Mux`. The TID to Modem Mux Summary Menu appears.

3. From the TID to Modem Mux Summary Menu, select `[Add TID]`. The TID To Modem Mux Edit Menu appears.

4. For `Port Data Bits`, select `7` or `8`. The default is `8`.

5. For `Port Stop Bits`, select `1` or `2`. The default is `1`.

6. For `Port Parity`, select `None`, `Even`, or `Odd`. The default is `None`.

This example displays:

- `Port Data Bits` set to `7`
- `Port Stop Bits` set to `1`
- `Port Parity` set to `Even`.

```
                          TID To Modem Mux Edit Menu

    TID to route . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
    Port Data Bits . . . . . . . . . . . . . . . . . . . .    [Seven]    Eight
    Port Stop Bits . . . . . . . . . . . . . . . . . . . . .    [One]    Two
    Port Parity  . . . . . . . . . . . . . . . . . . . .    None   [Even]    Odd
```

TID to Route

Description

This menu item defines the string that represents the TID to be routed to the Modem Mux link.

Menu Item Type

Data

Configuration in the AI198 Menu System

1. Access Menu 4.2.14-2.6.

2. From Menu 4.2.14-2.6, enter a value from **2** to **11**. Menu 4.2.14-2.6.1 appears.

3. For `01 TID to route`, enter **1,** and the desired TID. Maximum length is 20 characters.

This example displays the TID configured as `COLUMBUS-OH`.

```
    >1 columbus-oh
                                                           Menu 4.2.14-2.6.1
    01 TID to route------------------------------------------    COLUMBUS-OH
```

AI232 Local Menu Item Configuration

1. Access the TID to Modem Mux Menu located under the System Menu.

2. From the TID to Modem Mux Summary Menu, select `[Add TID]`. The TID To Modem Mux Edit Menu appears.

3. For `TID to route`, enter the desired TID. Maximum length is 20 characters.

This example displays the TID configured as `COLUMBUS-OH`.

```
                          TID To Modem Mux Edit Menu

  TID to route . . . . . . . . . . . . . . . . . . . . . . . . . ......... COLUMBUS-OH
```

Time Configuration

AI232 supports the Simple Network Time Protocol (SNTP). SNTP is a time protocol that maintains a common time among Internet hosts.

✎

Note: Time configuration options are only available when AI232 is operating in standalone mode.

The following configuration items are available:

- Daylight Savings Time
- SNTP Settings
- Time Zone

Daylight Savings Time

Description

This menu item enables or disables daylight savings time, which is when clocks are set ahead one hour the first Sunday in April and back one hour the last Sunday in October to provide an extra hour of daylight during summer.

Menu Item Types

Toggle

AI232 Local Menu Item Configuration

1. Access the System Menu.

2. From the System Menu, select `Time Menu`. The Time Menu appears.

3. For `Daylight Saving Time on this host is`, select `Enabled` or `Disabled`.

This example displays `Daylight Saving Time on this host is` set to `Enabled`.

```
                                Time Menu


Current Time Zone (+/-hh:mm) . . . . . . . . . . . . . . . . . . . . . . . .+00:00
Daylight Saving Time on this host is . . . . . . . .    [Enabled]   Disabled
```

SNTP Settings

Description

SNTP is a time protocol that maintains a common time among Internet hosts. There are 4 menu items available for configuring SNTP settings:

- `SNTP client on this host is`—Enables or disables SNTP. If `Enabled` is selected, the system attempts to contact the primary and secondary SNTP servers for the exact time. If AI232 is unable to contact either the primary or secondary SNTP server, it uses the local time maintained by AI232. If `Disabled` is selected, the system uses the local time maintained by AI232.

- `Primary SNTP Server`—Defines the IP address of the first SNTP server from which AI232 will attempt to retrieve the exact time.

- `Secondary SNTP Server`—Defines the IP address of the second SNTP server from which AI232 will attempt to retrieve the exact time.

    🖉

    Note: The SNTP client must be enabled before the primary or secondary SNTP server can be defined.

- `SNTP Poll Interval (minutes)`—Defines the time interval (in minutes) for AI232 to poll the SNTP servers.

Menu Item Types

Toggle for `SNTP client on this host is`

Data for `Primary SNTP Server`, `Secondary SNTP Server`, and `SNTP Poll Interval (minutes)` settings

AI232 Local Menu Item Configuration

1. Access the Time Menu located under the System Menu.

2. For `SNTP client on this host is`, select `Enabled` or `Disabled`. The default is `Enabled`.

3. For `Primary SNTP Server`, enter the primary server IP address. The default is `0.0.0.0`.

4. For `Secondary SNTP Server`, enter the secondary server IP address. The default is `0.0.0.0`.

5. For `SNTP Poll Interval (minutes)`, enter the time in minutes for the SNTP servers to be polled. The default is `10`.

This following example displays:

- `SNTP client on this host is` set to `Enabled`
- `Primary SNTP Server` set to `12.43.167.59`
- `Secondary SNTP Server` set to `12.43.167.60`
- `SNTP Poll Interval (minutes)` set to `7`.

```
                                Time Menu


Current Time Zone (+/-hh:mm) . . . . . . . . . . . . . . . . . . . . . . .+00:00
Daylight Saving Time on this host is . . . . . . . .     [Enabled]   Disabled

SNTP client on this host is . . . . . . . . . . . . .    [Enabled]   Disabled
Primary SNTP Server . . . . . . . . . . . . . . . . . . . . . . . 12.43.167.59
Secondary SNTP Server . . . . . . . . . . . . . . . . . . . . . . 12.43.167.60
SNTP Poll Interval (minutes) . . . . . . . . . . . . . . . . . . . . . . . . 7
```

Time Zone

Description

This menu item configures the time zone for AI232 to use. The configured value represents the number of hours you are from UTC.

Menu Item Types

Data

AI232 Local Menu Item Configuration

1. Access the Time Menu located under the System Menu.

2. For `Current Time Zone (+/-hh:mm)`, enter the time zone you want AI232 to use:

    - For `+/-`, enter the direction (+ = east) (- = west) of Universal Coordinated Time (UTC) or Greenwich Mean Time.

    - For `hh`, enter the number of hours.

    - For `mm`, enter the number of minutes.

    🖉

    Note: The time entered is the number of hours you are from UTC. For example, if you are located in the Eastern Standard Time (EST) zone, you would enter -05:00 in this field. This indicates that you are 5 hours behind UTC.

This example displays a time zone configuration of `-05:00`.

```
                                Time Menu


Current Time Zone (+/-hh:mm) . . . . . . . . . . . . . . . . . . . . . . .-05:00
```

Link Configuration

This chapter provides information on configuring AI232 links in the AI198 and AI232 local menu systems.

Guide to this Chapter

AI232 Link Types

AI232 has 3 configurable link types:

- Asynchronous

- Asynchronous PPP

- Modem Multiplexer

Asynchronous

Asynchronous links use asynchronous transmission and support multiple baud rates, parity types, stop bits, and software flow or hardware control.

See Also

- Connect Options Configuration

- Disconnect Options Configuration

- General Link Properties Configuration

- Modem Option Configuration

- RTS/DTR Lead Control Configuration

Asynchronous PPP

Asynchronous PPP links use PPP (point-to-point protocol) and asynchronous transmission. They support PAP and CHAP for authentication and can be set as bridged (BCP) or routed (IPCP) interfaces.

See Also

- Connect Options Configuration

- Disconnect Options Configuration

- General Link Properties Configuration

- General PPP Properties Configuration

- Modem Option Configuration

- PPP Authentication Configuration

- RTS/DTR Lead Control Configuration

Modem Multiplexer

The modem multiplexer gives users access to a modem pool. The modem pool is the list of ModMux links with attached modems. When a call comes in that requires a modem, one is selected from the pool and dials out appropriately. The phone number to dial is configurable for incoming calls that need to be attached to modems.

Note: Round-robin dialing has been incorporated for ModMux links to minimize the demand placed on individual modems. Rather than always starting at the first available modem, the ModMux driver rotates through all available modems so that the first available one is not always the first to be dialed.

See Also

- [General Link Properties Configuration](#)

- [General PPP Properties Configuration](#)

- [PPP Authentication Configuration](#)

Connect Options Configuration

Connect options configure the AI232 connection parameters. These options are available for asynchronous links and asynchronous PPP links. The following configuration items are available:

- [Alias](#)

- [Call Retry Interval](#)

- [Connect String](#)

- [Connection Settings](#)

- [Link Application](#)

Alias

Description

This menu item specifies an alias name for the connection. When the link connection options are satisfied, a call is placed based on information contained in the alias name.

The specified name must correspond to an alias that has been created in the Alias Menu. If no alias name is specified and `Link Application` is set to `ALIAS` in the AI198 menu system (`AppAlias` in the AI232 local menu system), then a default alias is used. The default alias is the concatenation of the string `asy.` with the numeric link number, such as `asy.3`, which indicates link number 3.

✎

Note: The `02 Alias` menu item is used only if `01*Link Application` is set to `ALIAS` (`AppAlias` in the AI232 local menu system).

Menu Item Type
Data

Link Type Availability
Async

Configuration in the AI198 Menu System
1. Access Menu 4.2.14.12.11.

2. For `02 Alias`, enter **2,** and the alias name.

This example displays 02 Alias set to async.4.1.

```
>2,async.4.1
                                                       Menu 4.2.14.12.11
01*Link Application (Login, Destination, Alias)--------------------------ALIAS
02 Alias-----------------------------------------------------------async.4.1
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select Connect Options Menu. The Connect Options Menu appears.

3. For Link Application Alias, enter the alias value.

This example displays Link Application Alias set to async.4.1.

```
                             Connect Options Menu



Link being configured  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .      1

Link Application .  .  .  .  .  .  .  .  .  .  .  .         Login     Destination    [AppAlias]
Link Application Alias .  .  .  .  .  .  ...............................    async.4.1
```

Call Retry Interval

Description
This menu item defines a value for the call retry interval. If a call fails to connect and the retry interval is greater than 0, the link attempts to place the call again after the specified number of seconds elapse. This setting has no effect on calls placed to the link when the link is the destination and not the call originator. A value of 0 disables call retry interval functionality.

Menu Item Type
Data

Link Type Availability
Async

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.11.

2. For 03 Call retry interval, enter 3, and the interval value. The default is 0.

This example displays 03 Call retry interval set to 134.

```
>3,134
                                                        Menu 4.2.14.12.11
01*Link Application (Login, Destination, Alias)-------------------------ALIAS
02 Alias----------------------------------------------------------async.4.1
03 Call retry interval (0 - 32767 s, 0 = disabled)-----------------------00134
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select Connect Options Menu. The Connect Options Menu appears.

3. For Call Retry Interval, enter the desired interval value. The default is 0.

This example displays Call Retry Interval set to 134.

```
                              Connect Options Menu



Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . .   1

Link Application . . . . . . . . . . . .    Login    Destination   [AppAlias]
Link Application Alias . . . . . . ................................. async.4.1
Call Retry Interval (0 - 32767s, 0 = disable) . . . . . . . . . . . . .. 134
```

Connect String

Description
This menu item configures the string that is sent after a connection is established. The following character values apply:

- **<b>** sends a break signal.

- *<n>* represents the decimal value of an ASCII character. Valid values are 0 to 255.

- *text* represents the text value in the string.

- **<p #>** represents a pause control sequence. # is the number of tenths of seconds to pause. Valid values are 1 to 20 (for 0.1 seconds to 2 seconds).

For example, string <b>login<13><p 10><b> sends:

- A break signal
- Text "login"
- A carriage return
- A 1 second pause
- Another break signal.

Menu Item Type

Data

Link Type Availability

Async

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.11.

2. For 08 Connect string, enter 8, and the connect string.

This example displays 08 Connect string set to <b>newstring<33><p 13><b>.

```
>8,<b>newstring<33><p 13><b>
                                                        Menu 4.2.14.12.11
01*Link Application (Login, Destination, Alias)-------------------------ALIAS
02 Alias-------------------------------------------------------------async.4.1
03 Call retry interval (0 - 32767 s, 0 = disabled)----------------------00134
04 Dial/Connect when DSR is on-------------------------------------------N/A
05*Connect when DCD is on------------------------------------------------OFF
06*Connect when characters are received---------------------------------- ON
07*Connect without DSR, DCD or received characters-----------------------OFF
08 Connect string------------------------------------<b>newstring<33><p 13><b>
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select Connect Options Menu. The Connect Options Menu appears.

3. For Connect String, enter the connect string.

This example displays Connect String set to <b>newstring<33><p 13><b>.

```
                        Connect Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . . .   1

Link Application . . . . . . . . . . .     Login    Destination   [AppAlias]
Link Application Alias . . . . . . . . . . . . . . . . . . . . . . . async.4.1
Call Retry Interval (0 - 32767s, 0 = disable) . . . . . . . . . . . . . . 134
Dial/Connect when DSR is on . . . . . . . . . . . . . . . . .    On    [Off]
Connect when DCD is on. . . . . . . . . . . . . . . . . . . .   [On]    Off
Connect when characters are received. . . . . . . . . . . . .    On    [Off]
Connect without DSR, DCD or received characters . . . . . . .    On    [Off]
Connect String . . . . . . . . . . . . . . . . . . . . <b>newstring<33><p 13><b>
```

Connection Settings

Description
The connection settings are configured using three menu items:

- `Connect when DCD is on`—Enables or disables link connection when DCD is asserted. If `Connect when characters are received` is also enabled and is satisfied first, then `Connect when DCD is on` has no effect on the link connection.

- `Connect when characters are received`—Enables or disables the link connection when incoming characters are received. If `Connect when DCD is on` is also enabled and is satisfied first, then `Connect when characters are received` has no effect on the link connection.

- `Connect without DSR, DCD or received characters`—When this menu item is enabled, `Connect when DCD is on` and `Connect when characters are received` are forced off and the retry interval is set to `30`. If the link application type is set to `LOGIN` or `ALIAS`, connection will occur as soon as the link is enabled (completely independent from the DCD and incoming character status). If the link application type is set to `DESTINATION`, the link will connect immediately when an outgoing call is placed to the destination (also completely independent from DCD and incoming character status).

✎

Note: `Dial/Connect when DSR is on` has no effect on AI232 operation.

Menu Item Type
Toggle

Link Type Availability
Async

Configuration in the AI198 Menu System
1. Access Menu 4.2.14.12.11.

2. For `05*Connect when DCD is on`, enter **5** to select `ON` or `OFF`. The default is `OFF`.

3. For `06*Connect when characters are received`, enter **6** to select `ON` or `OFF`. The default is `ON`.

4. For `07*Connect without DSR, DCD or received characters`, enter **7** to select `ON` or `OFF`. The default is `OFF`.

This example displays:

- 05*Connect when DCD is on set to ON
- 06*Connect when characters are received set to OFF
- 07*Connect without DSR, DCD or received characters set to OFF.

```
>5
                                                       Menu 4.2.14.12.11
01*Link Application (Login, Destination, Alias)-------------------------ALIAS
02 Alias---------------------------------------------------------------async.4.1
03 Call retry interval (0 - 32767 s, 0 = disabled)----------------------00030
04 Dial/Connect when DSR is on------------------------------------------N/A
05*Connect when DCD is on----------------------------------------------- ON
06*Connect when characters are received--------------------------------OFF
07*Connect without DSR, DCD or received characters---------------------OFF
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select Connect Options Menu. The Connect Options Menu appears.

3. For Connect when DCD is on, select ON or OFF. The default is OFF.

4. For Connect when characters are received, select ON or OFF. The default is ON.

5. For Connect without DSR, DCD or received characters, select ON or OFF. The default is OFF.

This example displays:

- Connect when DCD is on set to On
- Connect when characters are received set to Off
- Connect without DSR, DCD or received characters set to Off.

```
                          Connect Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . .     1

Link Application . . . . . . . . . . . .    Login    Destination   [AppAlias]
Link Application Alias . . . . . .......................... async.4.1
Call Retry Interval (0 - 32767s, 0 = disable) . . . . . . . . . . . . . 134
Dial/Connect when DSR is on . . . . . . . . . . . . . . . . .    On   [Off]
Connect when DCD is on. . . . . . . . . . . . . . . . . . . .   [On]   Off
Connect when characters are received. . . . . . . . . . . . .    On   [Off]
Connect without DSR, DCD or received characters . . . . . . . .   On   [Off]
```

Link Application

Description

This menu item configures the link application type. The following options are available:

- `Login`—Specifies that the link will prompt for a user name and password when connected. Upon successful login, a menu appears showing the available destination alias names.

- `Destination`—Specifies that the link does not accept incoming calls. The link must be accessed internally using alias lookup from another link or from a TCP/IP connection.

- `Alias` (`AppAlias`)—Specifies that the link will attempt to place a call using direct alias lookup without displaying a destination menu. If the link has a link application alias name configured, then that name is used. Otherwise, a default alias name (`ASY.linkNum`) is used.

Menu Item Type

Toggle

Link Type Availability

Async

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.11.

2. For `01*Link Application`, enter **1** to select `LOGIN`, `DESTINATION`, or `ALIAS`. The default is `LOGIN`.

This example displays `01*Link Application` set to `DESTINATION`.

```
>1
                                                          Menu 4.2.14.12.11
01*Link Application (Login, Destination, Alias)--------------------DESTINATION
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select `Connect Options Menu`. The Connect Options Menu appears.

3. For `Link Application`, select `Login`, `Destination`, or `AppAlias`. The default is `Login`.

This example displays `Link Application` set to `Destination`.

```
                           Connect Options Menu



Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . . . .    1

Link Application . . . . . . . . . . . .        Login    [Destination]    AppAlias
```

Disconnect Options Configuration

Disconnect options configure the parameters that are used when AI232 disconnects. These options are available for asynchronous and asynchronous PPP links. The following configuration items are available:

- [Disconnect Inactivity Timer Settings](#)
- [Disconnect Settings](#)
- [Disconnect String](#)

Disconnect Inactivity Timer Settings

Description

The disconnect inactivity timer settings are configured using three menu items:

- `Disconnect inactivity timer`—Defines an inactivity timer value. This value establishes a timeout interval after which the link will automatically disconnect if no data has been sent or received for the specified number of seconds. This value only applies to incoming calls on links that have a retry interval timer setting of `0` and a link application setting of `LOGIN` or `ALIAS` (`AppAlias`).

    🖉

    Note: The `Disconnect inactivity timer` option must be set to a value greater than 0 for the inactivity timer to function.

- `Inactivity timer enabled when link receives call`—Enables or disables the disconnect inactivity timer when the link receives a call.

- `Inactivity timer resets on incoming characters from destination`—When enabled, incoming characters count as activity on a link (the inactivity timer resets). When disabled, they do not count (the inactivity timer does not reset).

Menu Item Type

Data for disconnect inactivity timer

Toggle for Inactivity timer enabled when link receives call and Inactivity timer resets on incoming characters from destination

Link Type Availability

Async

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.12.

2. For `04 Disconnect inactivity timer`, enter **4,** and the timer value. The default is `0`.

3. For 05*Inactivity Timer enabled when link receives call, enter 5 to select ON or OFF. The default is OFF.

4. For 06*Inactivity Timer resets on incoming characters from destination, enter 6 to select ON or OFF. The default is ON.

This example displays:

- 04 Disconnect inactivity timer set to 236
- 05*Inactivity Timer enabled when link receives call set to ON
- 06*Inactivity Timer resets on incoming characters from destination set to OFF.

```
>6
                                                    Menu 4.2.14.12.12
01 Disconnect when DSR off-------------------------------------------------N/A
02*Disconnect when DCD off-------------------------------------------------OFF
03*Disconnect when a break character is received--------------------------- ON
04 Disconnect inactivity timer (0 - 32767 s, 0 = disabled)----------------00236
05*Inactivity Timer enabled when link receives call------------------------ ON
06*Inactivity Timer resets on incoming characters from destination----------OFF
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select Disconnect Options Menu. The Disconnect Options Menu appears.

3. For Disconnect inactivity timer, enter the timer value. The default is 0.

4. For Inactivity Timer enabled when link receives call, select On or Off. The default is Off.

5. For Inactivity Timer resets on incoming characters from destination, select On or Off. The default is On.

This example displays:

- Disconnect inactivity timer set to 367.
- Inactivity Timer enabled when link receives call set to On.
- Inactivity Timer resets on incoming characters from destination set to Off.

```
                         Disconnect Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . .     3

Disconnect when DCD is off . . . . . . . . . . . . . . . . . . .    On    [Off]
Disconnect when a Break character is received  . . . . . . . . .   [On]    Off
Disconnect inactivity timer (0 - 32767s, 0 = disabled) . . . . . . . . . .. 367
Inactivity Timer enabled when link receives call . . . . . . . .   [On]    Off
Inactivity Timer resets on incoming characters from destination    On    [Off]
```

Disconnect Settings

Description

The disconnect settings are configured using two menu items:

- `Disconnect when a break character is received`—Enables or disables link disconnection when a break character is received.

- `Disconnect when DCD off`—Enables or disables link disconnection when DCD is not asserted.

✎

Note: AI232 does not consider the DSR state when disconnecting calls.

Menu Item Type

Toggle

Link Type Availability

Both menu items are available for async links

Menu item Disconnect when DCD off is available for asyncPPP links

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.12.

2. For `02*Disconnect when DCD off`, enter **2** to select `ON` or `OFF`. The default is `OFF`.

3. For `03*Disconnect when a break character is received`, enter **3** to select `ON` or `OFF`. The default is `ON`.

This example displays `02*Disconnect when DCD off` set to `ON` and `03*Disconnect when a break character is received` set to `OFF`.

```
>3
                                                     Menu 4.2.14.12.12
01 Disconnect when DSR off-----------------------------------------------N/A
02*Disconnect when DCD off--------------------------------------------- ON
03*Disconnect when a break character is received--------------------------OFF
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select `Disconnect Options Menu`. The Disconnect Options Menu appears.

3. For `Disconnect when DCD is off`, select `On` or `Off`. The default is `Off`.

4. For `Disconnect when a Break character is received`, select `On` or `Off`. The default is `On`.

This example displays `Disconnect when DCD is off` set to `On` and `Disconnect when a Break character is received` set to `Off` for an async link.

```
                        Disconnect Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . .      3

Disconnect when DSR is off . . . . . . . . . . . . . . . . . .      On    [Off]
Disconnect when DCD is off . . . . . . . . . . . . . . . . . .     [On]    Off
Disconnect when a Break character is received  . . . . . . . .      On    [Off]
```

Disconnect String

Description

This menu item configures the string the link sends before the link disconnects. The following character values apply:

- **<b>** sends a break signal.

- **<*n*>** represents the decimal value of an ASCII character. Valid values are 0 to 255.

- *text* represents the text value in the string.

- **<p *#*>** represents a pause control sequence. *#* is the number of tenths of seconds to pause. Valid values are 1 to 20 (for 0.1 seconds to 2 seconds).

For example, string `<b>login<13><p 10><b>` sends:

- A break signal
- The text "login"
- A carriage return
- A one second pause
- Another break signal.

Menu Item Type

Data

Link Type Availability

Async

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.12.

2. For `07 Disconnect string`, enter **7,** and the disconnect string. Maximum length is 80 characters.

This example displays 07 Disconnect string set to <b>newString<33><p 15><b>.

```
>7,<b>newString<33><p 15><b>
                                                      Menu 4.2.14.12.12
01 Disconnect when DSR off----------------------------------------------N/A
02*Disconnect when DCD off--------------------------------------------- ON
03*Disconnect when a break character is received---------------------------OFF
04 Disconnect inactivity timer (0 - 32767 s, 0 = disabled)----------------00000
05*Inactivity Timer enabled when link receives call------------------------OFF
06*Inactivity Timer resets on incoming characters from destination---------- ON
07 Disconnect string----------------------------------<b>newString<33><p 15><b>
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu.

2. Select Disconnect Options Menu. The Disconnect Options Menu appears.

3. For Disconnect String, enter the disconnect string.

This example displays Disconnect String set to <b>newString<33><p 15><b>.

```
                           Disconnect Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . .      3

Disconnect when DCD is off . . . . . . . . . . . . . . . . .    [On]   Off
Disconnect when a Break character is received  . . . . . . . .    On   [Off]
Disconnect inactivity timer (0 - 32767s, 0 = disabled) . . . . . . . . . 367
Inactivity Timer enabled when link receives call . . . . . . . .  [On]   Off
Inactivity Timer resets on incoming characters from destination    On   [Off]
Disconnect String . . . . . . . . . . . . . . . ........... <b>newString<33><p 15><b>
```

General Link Properties Configuration

General link properties are configurable using menus accessed directly from the link configuration menu. The following configuration items are available:

- [Auto Disable Error Limit](#)
- [Flow Control](#)
- [Link Description](#)
- [Link Number](#)
- [Link State](#)
- [Link Type](#)

- [Port Data Bits](#)
- [Port Parity](#)
- [Port Speed](#)
- [Port Stop Bits](#)
- [Xon Repeat Interval](#)

Auto Disable Error Limit

Description

This menu item disables a link when the rate of errors received on that link exceeds a user-specified threshold. This prevents a bad link or cable from streaming enough errors to lock up or crash AI232.

Menu Item Type

Data

Link Type Availability

Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `Auto Disable Error Limit`, enter the associated item number, a comma, and the error limit value. (For example, `9, 25000`.) The default is `0`.

This ModMux link example displays `08 Auto Disable Error Limit` set to `25000`.

```
>8, 25000
                                                              Menu 4.2.14.12
01 Link Number (1-32)---------------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)-------------------------------- ModMux
03 Link Description----------------------------               Async link 1
04*Link state (Enabled, Disabled)------------------------------------- Enabled
05+Port speed----------------------------------------------------------- 9600
06*Flow Control (None, XonXoff)-----------------------------------------   None
07 Xon Repeat interval (0 - 120s with 0 = no repeat)-----------------------000
08 Auto Disable Error Limit (0-1000000)------------------------------0025000
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. Select `Auto Disable Menu`. The Link Auto Disable Menu appears.

3. For `Errors/second limit for auto disable`, enter the error limit value. The default is `0`.

This example displays `Errors/second limit for auto-disable` set to `25000`.

```
                          Link Auto Disable Menu



Link being configured  . . . . . . . . . . . . . . . . . . . . . . . .   03

Errors/second limit for auto-disable  . . . . . . . . . . . . . . . . 25000
```

Flow Control

Description

This menu item enables a receiving device to tell a sending device to stop sending data when data is coming too fast and to start sending data when the receiver is ready.

There are two available flow control options for AI232:

- `None`—Specifies no flow control.

- `XonXoff`—Specifies the flow control option that uses standard ASCII control characters to tell a sending device to stop or resume data transmission.

Menu Item Type

Toggle

Link Type Availability

Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For 09*Flow Control, enter 9 to select None or XonXoff. The default is None.

This async link example displays 09*Flow Control set to XonXoff.

```
>9
                                                         Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)--------------------------------  Async
03 Link Description-----------------------------           Async link 1
04*Link state (Enabled, Disabled)------------------------------------- Enabled
05+Port speed-------------------------------------------------------- 9600
06*Port Data Bits (7, 8)----------------------------------------------------8
07*Port Stop Bits (1, 2)----------------------------------------------------1
08*Port Parity (None, Odd, Even)----------------------------------------None
09*Flow Control  (None, XonXoff)----------------------------------------XonXoff
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. For SW Flow Control, select None or XonXoff.

This example displays SW Flow Control set to XonXoff.

```
                            Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . 1
Link Description . . . . . . . . . . . . . . . .................. Async link 1
Link state . . . . . . . . . . . . . . . . . . . .     [Enabled]   Disabled
Link Type . . . . . . . . . . . . . . . .       [Async]    AsyncPPP    ModMux
Port speed (in bits per second):
    300    1200    2400    4800   [9600]   19.2K    38.4K    57.6K    115.2K
    Autobaud
Port data bits  . . . . . . . . . . . . . . . . . . . .   Seven    [Eight]
Port stop bits  . . . . . . . . . . . . . . . . . . . .    [One]    Two
Port parity  . . . . . . . . . . . . . . . . . . . .  [None]   Even    Odd
SW Flow Control  . . . . . . . . . . . . . . . . . . . .  None    [XonXoff]
```

Link Description

Description

This menu item defines a description for a link.

Menu Item Type

Data

Link Type Availability

Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `03 Link Description`, enter `3,` and a description associated with the link. Maximum length is 30 characters.

This example displays `03 Link Description` set to `New Async Link`.

```
>3,New Async Link
                                                              Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------03
02*Link Type (Async, AsyncPPP, ModMux)--------------------------------  Async
03 Link Description----------------------------              New Async Link
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. For `Link Description`, enter a description associated with the link. Maximum length is 30 characters.

This example displays `Link Description` set to `New Async Link`.

```
                          Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
Link Description . . . . . . . . . . . . . . . . . . . . . . . . . New Async Link
Link state . . . . . . . . . . . . . . . . . . . .    [Enabled]   Disabled
Link Type . . . . . . . . . . . . . . . .    [Async]   AsyncPPP    ModMux
```

Link Number

Description
This menu item defines the number of the link being configured.

Menu Item Type
Data

Link Type Availability
Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `01 Link number`, enter `1,` and the link number. The default is `1`.

This example displays 01 Link number set to 3.

```
>1,3
                                                                      Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------------03
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. For Link to configure, enter the link number. The default is 1.

This example displays Link to configure set to 3.

```
                              Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .   3
```

Link State

Description

This menu item enables or disables a link.

Menu Item Type

Toggle

Link Type Availability

Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For 04*Link state, enter 4 to select Enabled or Disabled. The default is Enabled.

This example displays 04*Link state set to Disabled.

```
>4
                                                                      Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------------03
02*Link Type (Async, AsyncPPP, ModMux)---------------------------------    Async
03 Link Description-----------------------------               Async link 3
04*Link state (Enabled, Disabled)-------------------------------------Disabled
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. For Link state, select Enabled or Disabled. The default is Disabled.

This example displays `Link state` set to `Disabled`.

```
                              Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  3
Link Description . . . . . . . . . . . . . . . . . . . . . . . . . . .  Async link 3
Link state . . . . . . . . . . . . . . . . . . . . . . .     Enabled   [Disabled]
```

Link Type

Description

This menu item defines the type of link as asynchronous, asynchronous PPP, or ModMux. Refer to section for more information about link types.

Menu Item Type

Toggle

Link Type Availability

Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `02*Link Type`, enter 2 to select `Async`, `AsyncPPP`, or `ModMux`. The default is `Async`.

This example displays `02*Link Type` set to `ModMux`.

```
>2
                                                                   Menu 4.2.14.12
01 Link Number (1-32)------------------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)---------------------------------  ModMux
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. For `Link Type`, select `Async`, `AsyncPPP`, or `ModMux`. The default is `Async`.

This example displays `Link Type` set to `ModMux`.

```
                            Modem Mux Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  3
Link Description . . . . . . . . . . . . . . . . . . . . . . . . . . .  Async link 3
Link state . . . . . . . . . . . . . . . . . . . . . . .     Enabled   [Disabled]
Link Type . . . . . . . . . . . . . . . . . . . .     Async    AsyncPPP   [ModMux]
```

Port Data Bits

Description
This menu item defines the number of databits in a data byte.

Menu Item Type
Toggle

Link Type Availability
Async and AsyncPPP

Configuration in the AI198 Menu System
1. Access Menu 4.2.14.12.

2. For 06*Port Data Bits, enter 6 to select 7 or 8. The default is 8.

This example displays 06*Port Data Bits set to 7.

```
>6
                                                        Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)--------------------------------  Async
03 Link Description-----------------------------                 Async link 1
04*Link state (Enabled, Disabled)------------------------------------ Enabled
05+Port speed----------------------------------------------------------- 9600
06*Port Data Bits (7, 8)-----------------------------------------------------7
```

Configuration in the AI232 Local Menu System
1. Access the Async Link Menu or AsyncPPP Link Menu.

2. For Port data bits, select Seven or Eight. The default is Eight.

This example displays `Port data bits` set to `Seven`.

```
                              Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
Link Description . . . . . . . . . . . . . . . . . . . . . . . . New Async Link
Link state . . . . . . . . . . . . . . . . . . . . . . .    [Enabled]   Disabled
Link Type . . . . . . . . . . . . . . . . . .     [Async]    AsyncPPP     ModMux
Port speed (in bits per second):
    300    1200    2400    4800    [9600]    19.2K    38.4K    57.6K    115.2K
    Autobaud
Port data bits  . . . . . . . . . . . . . . . . . . . . .      Seven    [Eight]
Port stop bits . . . . . . . . . . . . . . . . . . . . . . .      [One]     Two
Port parity  . . . . . . . . . . . . . . . . . . . . . .    None    Even    [Odd]
```

Port Parity

Description

This menu item defines parity, which is a process for detecting whether or not bits of data have been altered during data transmission.

Menu Item Type

Toggle

Link Type Availability

Async and AsyncPPP

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `08*Port Parity`, enter 8 to select `None`, `Odd`, or `Even`. The default is `None`.

This example displays `08*Port Parity` set to `Odd`.

```
>8
                                                            Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)--------------------------------- Async
03 Link Description----------------------------               Async link 1
04*Link state (Enabled, Disabled)------------------------------------- Enabled
05+Port speed---------------------------------------------------------- 9600
06*Port Data Bits (7, 8)---------------------------------------------------8
07*Port Stop Bits (1, 2)---------------------------------------------------1
08*Port Parity (None, Odd, Even)---------------------------------------- Odd
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. For `Port parity`, select `None`, `Even`, or `Odd`. The default is `None`.

This example displays `Port parity` set to `Odd`.

```
                          Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . .  3
Link Description . . . . . . . . . . . . . . . . ................ Async link 3
Link state . . . . . . . . . . . . . . . . . . . .        Enabled   [Disabled]
Link Type . . . . . . . . . . . . . . . . .     [Async]   AsyncPPP    ModMux
Port speed (in bits per second):
    300    1200    2400    4800    [9600]   19.2K    38.4K    57.6K    115.2K
    Autobaud
Port data bits  . . . . . . . . . . . . . . . . . . . .    Seven    [Eight]
Port stop bits  . . . . . . . . . . . . . . . . . . . . .    [One]    Two
Port parity  . . . . . . . . . . . . . . . . . .      None     Even    [Odd]
```

Port Speed

Description
This menu item defines the baud rate for a port.

Menu Item Type
Data in the AI232 local menu system

Link Type Availability
Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System
1. Access Menu 4.2.14.12.

2. For `Port speed`, enter the associated item number.

Menu 4.2.14.12.5 appears.

```
>5
                                                           Menu 4.2.14.12.5

01 300    Baud
02 1200   Baud
03 2400   Baud
04 4800   Baud
05 9600   Baud
06 19200  Baud
07 38400  Baud
08 57600  Baud
09 115200 Baud
10 Auto   Baud
```

✎

Note: 10 Auto Baud is not available for AsyncPPP or ModMux.

3. Enter a value from **1** to **10** to select the port speed. Menu 4.2.14.12 reappears
    with the new port speed selection.

This example displays 05+Port speed set to 4800.

```
>4
                                                             Menu 4.2.14.12
01 Link Number (1-32)-------------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)---------------------------------  Async
03 Link Description-----------------------------             Async link 1
04*Link state (Enabled, Disabled)------------------------------------- Enabled
05+Port speed------------------------------------------------------------- 4800
```

Configuration in the AI232 Local Menu System

1. Access the Link Menu.

2. For `Port speed`, select `300`, `1200`, `2400`, `4800`, `9600`, `19.2K`, `38.4K`, `57.6K`, `115.2K`, or `Autobaud`. The default is `9600`.

This example displays `Port speed` set to `4800`.

```
                              Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  3
Link Description . . . . . . . . . . . . . . . . . . . . . . . . . . . New Async Link
Link state . . . . . . . . . . . . . . . . . . . . . .  [Enabled]   Disabled
Link Type . . . . . . . . . . . . . . . . .       [Async]    AsyncPPP     ModMux
Port speed (in bits per second):
    300     1200     2400    [4800]    9600     19.2K     38.4K     57.6K    115.2K
    Autobaud
```

Port Stop Bits

Description
This menu item defines the number of stop bits. A stop bit is an extra bit at the end of an asynchronous character that helps the receiver recognize the end of the character.

Menu Item Type
Toggle

Link Type Availability
Async and AsyncPPP

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `07*Port Stop Bits`, enter **7** to select `1` or `2`. The default is `1`.

This example displays `07*Port Stop Bits` set to `2`.

```
>7
                                                                    Menu 4.2.14.12
01 Link Number (1-32)-------------------------------------------------------01
02*Link Type (Async, AsyncPPP, ModMux)--------------------------------  Async
03 Link Description-----------------------------              Async link 1
04*Link state (Enabled, Disabled)------------------------------------- Enabled
05+Port speed--------------------------------------------------------- 9600
06*Port Data Bits (7, 8)----------------------------------------------------8
07*Port Stop Bits (1, 2)----------------------------------------------------2
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. For `Port stop bits`, select `One` or `Two`. The default is `One`.

This example displays `Port stop bits` set to `Two`.

```
                              Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . .  3
Link Description . . . . . . . . . . . . . . . . . . . . . . . . New Async Link
Link state . . . . . . . . . . . . . . . . . . . . . . .  [Enabled]   Disabled
Link Type . . . . . . . . . . . . . . . . . .  [Async]    AsyncPPP    ModMux
Port speed (in bits per second):
     300     1200    2400    [4800]    9600    19.2K    38.4K    57.6K    115.2K
     Autobaud
Port data bits  . . . . . . . . . . . . . . . . . . . . . . .  Seven   [Eight]
Port stop bits  . . . . . . . . . . . . . . . . . . . . . . .   One    [Two]
```

Xon Repeat Interval

Description

This menu item enables or disables the XON repeat interval. When enabled, AI232 sends multiple XON characters at the specified interval. Some equipment requires the receipt of multiple XONs before sending data after it has received an XOFF.

Menu Item Type

Data

Link Type Availability

Async, AsyncPPP, and ModMux

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.

2. For `10 Xon Repeat interval`, enter `10`, and a interval value. The default is `0`.

This example displays 10 Xon Repeat interval set to 30.

```
>10, 30
                                                            Menu 4.2.14.12
01 Link Number (1-32)-----------------------------------------------------03
02*Link Type (Async, AsyncPPP, ModMux)---------------------------   Async
03 Link Description----------------------------           New Async Link
04*Link state (Enabled, Disabled)-------------------------------------- Enabled
05+Port speed------------------------------------------------------ 4800
06*Port Data Bits (7, 8)------------------------------------------------8
07*Port Stop Bits (1, 2)------------------------------------------------2
08*Port Parity (None, Odd, Even)------------------------------------- Odd
09*Flow Control (None, XonXoff)-------------------------------------   None
10 Xon Repeat interval (0 - 120s with 0 = no repeat)----------------------030
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. For XON Repeat Interval, enter a interval value. The default is 0.

This example displays XON Repeat Interval set to 30.

```
                            Async Link Menu


Link to configure . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3
Link Description . . . . . . . . . . . . . . . .................... New Async Link
Link state . . . . . . . . . . . . . . . . . . . . . . .   [Enabled]   Disabled
Link Type . . . . . . . . . . . . . . . . .       [Async]    AsyncPPP     ModMux
Port speed (in bits per second):
     300    1200    2400    4800    [9600]    19.2K    38.4K    57.6K    115.2K
     Autobaud
Port data bits  . . . . . . . . . . . . . . . . . . . . .    Seven   [Eight]
Port stop bits  . . . . . . . . . . . . . . . . . . . . . .    [One]    Two
Port parity  . . . . . . . . . . . . . . . . . . . . . .  [None]   Even    Odd
SW Flow Control  . . . . . . . . . . . . . . . . . . . . .  [None]   XonXoff
XON Repeat Interval (0 - 120s with 0 = no repeat)  . . . . . . . . . . . . 30
```

General PPP Properties Configuration

The following menu items are available for PPP configuration:

- [IPCP Address Settings](#)

- [Maximum Unit Settings](#)

- [Network Control Protocol](#)

IPCP Address Settings

Description

The IPCP address settings are configured using three menu items:

- `Local IP address`—Defines a valid local IP address for AI232.

- `Remote IP address`—Defines an IP address for the remote device.

- `Subnet mask`—Defines a subnet mask for the link.

Menu Item Type

Data

Link Type Availability

AsyncPPP and ModMux

Configuration in the AI198 Menu System

1. Do one of the following:

   - For an asynchronous PPP link, access Menu 4.2.14.12-2.2.

   - For a ModMux link, access Menu 4.2.14.12.10.

2. For `01*Network Control Protocol`, enter **1** to select `IPCP`. The default is `IPCP`.

3. For `02 Local IP Address`, enter **2,** and the IP address. Entering `0.0.0.0` specifies that the remote device will assign the IP address for AI232. The default is `0.0.0.0`.

4. For `03 Remote IP Address`, enter **3,** and the IP address. Entering `0.0.0.0` specifies that the remote device will assign its own IP address. The default is `0.0.0.0`.

5. For `04 Subnet Mask`, enter **4,** and the subnet mask. The default is `255.255.255.240`.

This example displays:

- 01*Network Control Protocol set to IPCP
- 02 Local IP Address set to 099.045.006.033
- 03 Remote IP Address set to 106.046.092.004
- 04 Subnet Mask set to 255.255.255.000.

```
>4,255.255.255.000
                                                           Menu 4.2.14.12-2.2
01*Network Control Protocol (IPCP, BCP)------------------------------------IPCP
02 Local IP Address--------------------------------------------099.045.006.033
03 Remote IP Address-------------------------------------------106.046.092.004
04 Subnet Mask-------------------------------------------------255.255.255.000
```

Configuration in the AI232 Local Menu System

1. Access the AsyncPPP or ModMux Link Menu.

2. Select PPP Configuration Menu. The PPP Configuration Menu appears.

3. For Local IP address, enter the IP address. Entering 0.0.0.0 specifies that the remote device will assign the IP address for AI232. The default is 0.0.0.0.

4. For Remote IP address, enter the IP address. Entering 0.0.0.0 specifies that the remote device will assign its own IP address. The default is 0.0.0.0.

5. For Subnet Mask, enter the subnet mask. The default is 255.255.255.240.

This example displays:

- Local IP address set to 23.230.34.5
- Remote IP address set to 23.230.34.6
- Subnet Mask set to 255.255.255.000.

```
                              PPP Configuration Menu


Link being configured . . . . . . . . . . . . . . . . . . . . . . . . . .      3



Network Control Protocol  . . . . . . . . . . . . . . . . . .     [IPCP]    BCP

IPCP Address Parameters
Local IP address  . . . . . . . . . . . . . . . . . . . . . . ...  23.230.34.5
Remote IP address . . . . . . . . . . . . . . . . . . . . . . ...  23.230.34.6
Subnet Mask . . . . . . . . . . . . . . . . . . . . . . . .    255.255.255.000
```

Maximum Unit Settings

Description

The maximum unit settings are configured using two menu items:

● `Maximum receive unit` (MRU)—Defines the maximum number of bytes that can be received in a single packet.

● `Maximum transmit unit` (MTU)—Defines the maximum number of bytes that can be transmitted in a single packet.

✎

Note: During LCP negotiations on a PPP link, AI232 will advertise the MRU configured by the user. If the peer negotiates its MRU with AI232, then the MTU on the AI232 side will be set to the peer's MRU. If the peer does not negotiate its MRU, then the MTU on the AI232 side will be set to the value configured by the user.

Menu Item Type

Data

Link Type Availability

AsyncPPP and ModMux

Configuration in the AI198 Menu System

1. Do one of the following:

    ● For an asynchronous PPP link, access Menu 4.2.14.12-2.2.

    ● For a ModMux link, access Menu 4.2.14.12.10.

2. For `05 Maximum Receive Unit`, enter **5,** and the byte value. The defaults are `1518` for network control protocol `BCP` and `1500` for network control protocol `IPCP`.

3. For `06 Maximum Transmit Unit`, enter **6,** and the byte value. The defaults are `1518` for network control protocol `BCP` and `1500` for network control protocol `IPCP`.

This example displays `05 Maximum Receive Unit` set to `1000` and `06 Maximum Transmit Unit` set to `900`.

```
>6,900
                                                          Menu 4.2.14.12-2.2
01*Network Control Protocol (IPCP, BCP)----------------------------------- BCP
02 Local IP Address----------------------------------------------000.000.000.000
03 Remote IP Address---------------------------------------------000.000.000.000
04 Subnet Mask--------------------------------------------------255.255.255.240
05 Maximum Receive Unit (128-1568)----------------------------------------1000
06 Maximum Transmit Unit (64-1600)----------------------------------------0900
```

Configuration in the AI232 Local Menu System

1. Access the AsyncPPP or ModMux Link Menu.

2. Select `PPP Configuration Menu`. The PPP Configuration Menu appears.

3. For `Maximum Receive Unit`, enter the byte value. The defaults are `1518` for network control protocol `BCP` and `1500` for network control protocol `IPCP`.

4. For `Maximum Transmit Unit`, enter the byte value. The defaults are `1518` for network control protocol `BCP` and `1500` for network control protocol `IPCP`.

This example displays `Maximum Receive Unit` set to `1000` and `Maximum Transmit Unit` set to `900` for an `IPCP` network control protocol.

```
                        PPP Configuration Menu


Link being configured . . . . . . . . . . . . . . . . . . . . . . . . .       3



Network Control Protocol  . . . . . . . . . . . . . . .     [IPCP]    BCP

IPCP Address Parameters
Local IP address  . . . . . . . . . . . . . . . . . . .  ....... 0.0.0.0
Remote IP address . . . . . . . . . . . . . . . . . . .  ....... 0.0.0.0
Subnet Mask . . . . . . . . . . . . . . . . . . . . . .  255.255.255.240

Maximum Receive Unit  . . . . . . . . . . . . . . . . . . . . . . . . . 1000
Maximum Transmit Unit . . . . . . . . . . . . . . . . . . . . . . . . .  900
```

Network Control Protocol

Description

This menu item defines the network control protocol as BCP or IPCP. BCP configures, enables, and disables bridge protocol modules on both ends of a PPP link. IPCP configures, enables, and disables IP protocol modules on both ends of a PPP link.

Menu Item Type

Toggle

Link Type Availability

AsyncPPP and ModMux

Configuration in the AI198 Menu System

1. Do one of the following:

   ● For an asynchronous PPP link, access Menu 4.2.14.12-2.2.

   ● For a ModMux link, access Menu 4.2.14.12.10.

2. For 01*Network Control Protocol, enter **1** to select IPCP or BCP. The default is IPCP.

This example displays 01*Network Control Protocol for an asynchronous PPP link set to BCP.

```
>1
                                                        Menu 4.2.14.12-2.2
01*Network Control Protocol (IPCP, BCP)--------------------------------- BCP
```

Configuration in the AI232 Local Menu System

1. Access the AsyncPPP Link Menu or ModMux Link Menu.

2. Select PPP Configuration Menu. The PPP Configuration Menu appears.

3. For Network Control Protocol, select IPCP or BCP. The default is IPCP.

This example displays Network Control Protocol set to IPCP.

```
                              PPP Configuration Menu


Link being configured . . . . . . . . . . . . . . . . . . . . . . . . .      3



Network Control Protocol   . . . . . . . . . . . . . . . .     [IPCP]    BCP
```

Modem Option Configuration

The following menu items are used for modem option configuration. They are available for asynchronous and asynchronous PPP links:

- Modem String

- Dialing Time-out Interval

- Number of Dial Attempts

Modem String

Description

This menu item configures the modem string, which can be any of the following:

- The text sent to a port when an associated link starts or restarts following the termination of a call

- The dial string the link to uses to dial the modem automatically once it is enabled

- A command that places the modem in auto answer mode so that it is set to receive calls

Menu Item Type

Data

Link Type Availability

Async and AsyncPPP

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.14.

2. For 01 Modem string, enter 1, and the modem string. Maximum length is 80 characters.

This example displays 01 Modem string set to 6145553003.

```
>1, 6145553003
                                                  Menu 4.2.14.12.14
01 Modem string------------------------------------------------------6145553003
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. Select `Modem Setup Menu`. The Modem Setup Menu appears.

3. For `Modem string`, enter the modem string.

This example displays `Modem string` set to `6145552002`.

```
                              Modem Setup Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . . . . .       3

Modem string . . . . . . . . . . . . . . . . . ..............................  6145552002
```

Dialing Time-out Interval

Description
This menu item configures the amount of time in seconds that the modem waits
before redialing a call when connection is not initially established.

Menu Item Type
Data

Link Type Availability
Async and AsyncPPP

Configuration in the AI198 Menu System

1. Access Menu 4.2.14.12.14.

2. For `02 Dialing time-out`, enter `2,` and the timeout value. The default is `30`.

This example displays `02 Dialing time-out` set to `10`.

```
>2, 10
                                                              Menu 4. 2. 14. 12. 14
01 Modem string-------------------------------------------------------6145553003
02 Dialing time-out (5 - 300 s)-----------------------------------------------010
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. Select `Modem Setup Menu`. The Modem Setup Menu appears.

3. For `Dialing time-out`, enter the time out value. The default is `30`.

This example displays `Dialing time-out` set to `10`.

```
                              Modem Setup Menu



Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . . .     3

Modem string . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 6145552002
Dialing time-out (5 - 300 s). . . . . . . . . . . . . . . . . . . . . . . 10
```

Number of Dial Attempts

Description
This menu item configures the number of times the modem redials before terminating a call.

Menu Item Type
Data

Link Type Availability
Async and AsyncPPP

Configuration in the AI198 Menu System
1. Access Menu 4.2.14.12.14.

2. For `03 Number of dial attempts`, enter **3,** and the number of redial attempts. The default is `3`.

This example displays `03 Number of dial attempts` set to `15`.

```
>3,15
                                                            Menu 4.2.14.12.14
01 Modem string-------------------------------------------------------6145553003
02 Dialing time-out (5 - 300 s)----------------------------------------------010
03 Number of dial attempts (0 - 100, 0 = continuous retry)------------------015
```

Configuration in the AI232 Local Menu System
1. Access the Async Link Menu or AsyncPPP Link Menu.

2. Select `Modem Setup Menu`. The Modem Setup Menu appears.

3. For `Number of dial attempts`, enter the number of redial attempts. The default is `3`.

This example displays `Number of dial attempts` set to 15.

```
                            Modem Setup Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . .    3

Modem string . . . . . . . . . . . . . .............................. 6145552002
Dialing time-out (5 - 300 s). . . . . . . . . . . . . . . . . . . . . . . 10
Number of dial attempts (0 - 100, 0 = continuous retry) . . . . . . . . . . 15
```

PPP Authentication Configuration

The following menu items are available for PPP authentication configuration:

- [Local Authentication Settings](#)

- [RAS Option](#)

- [Remote Authentication Settings](#)

Local Authentication Settings

Description

The local authentication settings are configured using three menu items:

- `Local authentication method`—Defines the local authentication method as one of the following options:

  - `PAP`—Specifies the method that uses a two-way handshake that is done only upon initial link establishment.

  - `CHAP`—Specifies the method that verifies the identity of the peer using a three-way handshake that is done upon initial link establishment. Verification may be repeated any time after the link has been established. CHAP also encrypts the user's password over the PPP link to provide added security.

  - `None`—Specifies no authentication will be used.

- `Local PAP/CHAP identity`—Defines the user name for local PAP/CHAP authentication.

- `Local PAP password/CHAP secret`—Defines the password for local PAP/CHAP authentication.

Menu Item Type

Toggle for local authentication method

Data for local PAP/CHAP identity and local PAP password/CHAP secret

Link Type Availability

AsyncPPP and ModMux

Configuration in the AI198 Menu System

1. Do one of the following:

   - For an asynchronous PPP link, access Menu 4.2.14.12-2.1.

   - For a ModMux link, access Menu 4.2.14.12.9.

2. For `02*Local Authentication Method`, enter **2** to select `None`, `PAP`, or `CHAP`. The default is `None`.

3. For `03 Local PAP/CHAP identity`, enter **3,** and the user name. Maximum length is 24 characters. The default is `applied`.

4. For `04 Local PAP Password/CHAP Secret`, enter **4,** and the password. Maximum length is 24 characters. The default is `applied`.

This example displays:

- `02*Local Authentication Method` set to `PAP`
- `03 Local PAP/CHAP identity` set to `bri24`
- `04 Local PAP Password/CHAP Secret` set to `documentation`.

```
>4,documentation
                                                         Menu 4.2.14.12.9
01*RAS Option (DISABLED, RADIUS, RADIUS_FB, TACACS, TACACS_FB)------------ DISABLED
02*Local Authentication Method (None, PAP, CHAP)-------------------------- PAP
03 Local PAP/CHAP identity----------------------------                bri24
04 Local PAP Password/CHAP Secret---------------------        documentation
```

Configuration in the AI232 Local Menu System

1. Access the AsyncPPP Link Menu or ModMux Link Menu.

2. Select `PPP Authentication Menu`. The PPP Authentication Menu appears.

3. For `Local Authentication Method`, select `None`, `PAP`, or `CHAP`. The default is `None`.

4. For `Local PAP/CHAP Identity`, enter the user name. The default is `applied`.

5. For `Local PAP Password/CHAP Secret`, enter the password. The default is `applied`.

This example displays:

- `Local Authentication Method` set to `CHAP`
- `Local PAP/CHAP Identity` set to `bri24`
- `Local PAP Password/CHAP Secret` set to `documentation`.

```
                         PPP Authentication Menu



Link being configured .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .     3

Authentication Options

Local Authentication Method  .  .  .  .  .  .  .  .  .  .  .  .       None     PAP    [CHAP]
RAS Option:      Disabled    RADIUS    [RADIUS/Fallback]
Local PAP/CHAP Identity  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  ...............  bri24
Local PAP Password/CHAP Secret  .  .  .  .  .  .  .  .  .  .  .  .  .  .....  documentation
```

RAS Option

Description

This menu item configures the method AI232 uses to obtain ID and password information for a link. The following options are available:

- Disabling RAS causes AI232 to use local ID and password information to validate the ID and password sent from a remote device.

- Enabling RADIUS causes AI232 to use the ID and password information configured in the RADIUS server to validate the ID and password sent from the remote device.

- Enabling RADIUS with fallback causes AI232 to attempt to use the ID and password information configured in the RADIUS server to validate the ID and password sent from the remote device. If neither of the RADIUS servers respond, AI232 uses the local ID and password (configured in the PPP Authentication Menu) for validation.

- Enabling TACACS+ causes AI232 to use the ID and password information configured in the TACACS+ server to validate the ID and password sent from the remote device.

- Enabling TACACS+ with fallback causes AI232 to attempt to use the ID and password information configured in the TACACS+ server to validate the ID and password sent from the remote device. If neither of the TACACS+ servers respond, AI232 uses the local ID and password (entered in the PPP Authentication Menu) for validation.

✎

Notes: When connecting to a remote PPP device, ensure that the PPP authentication timeout on that device is set to a minimum of 30 seconds. If the network latency is high, set that value to a higher number of seconds.

✎ The TACACS+ server used must support version 1.78 or later of the TACACS+ protocol.

Menu Item Type

Toggle

Link Type Availability

AsyncPPP and ModMux

Configuration in the AI198 Menu System

1. Do one of the following:

    *   For an asynchronous PPP link, access Menu 4.2.14.12-2.1.

    *   For a ModMux link, access Menu 4.2.14.12.9.

2. For `01*RAS Option`, enter 1 to select `DISABLED`, `RADIUS`, `RADIUS_FB`, `TACACS`, or `TACACS_FB`. The default is `DISABLED`.

This example displays `01*RAS Option` set to `TACACS` for an asynchronous PPP link.

```
>1
                                                              Menu 4.2.14.12-2.1
01*RAS Option (DISABLED, RADIUS, RADIUS_FB, TACACS, TACACS_FB)------------   TACACS
```

Configuration in the AI232 Local Menu System

To configure RADIUS PPP authentication:

1. Access the AsyncPPP Link Menu or ModMux Link Menu.

2. Select `PPP Authentication Menu`. The PPP Authentication Menu appears.

3. For `RAS Option`, select `Disabled`, `RADIUS`, or `RADIUS/Fallback`. The default is `Disabled`.

This example displays `RAS Option` set to `RADIUS/Fallback`.

```
                             PPP Authentication Menu


Link being configured . . . . . . . . . . . . . . . . . . . . . . . .      3

Authentication Options

Local Authentication Method  . . . . . . . . . . . .     None    PAP    [CHAP]
RAS Option:     Disabled    RADIUS    [RADIUS/Fallback]
```

Tip: To configure TACACS+ PPP authentication on AI232, use shell command <u>aaa authen on page 8-7</u>.

Remote Authentication Settings

Description

The remote authentication settings are configured using three menu items:

- `Remote authentication method`—Defines the remote authentication method as one of the following options:

    - `PAP` specifies the method that uses a two-way handshake that is done only upon initial link establishment.

    - `CHAP` specifies the method that verifies the identity of the peer by using a three-way handshake that is done upon initial link establishment. Verification may be repeated any time after the link has been established. CHAP also encrypts the user's password over the PPP link to provide added security.

    - `None` specifies no authentication will be used.

- `Remote PAP/CHAP identity`—Defines the user name for remote PAP/CHAP authentication.

- `Remote PAP password/CHAP secret`—Defines the password for remote PAP/CHAP authentication.

Menu Item Type

Toggle for remote authentication method

Data for remote PAP/CHAP identity and remote PAP password/CHAP secret

Link Type Availability

AsyncPPP and ModMux

Configuration in the AI198 Menu System

1. Do one of the following:

    - For an asynchronous PPP link, access Menu 4.2.14.12-2.1.

    - For a ModMux link, access Menu 4.2.14.12.9.

2. For `05*Remote Authentication Method`, enter 5 to select `None`, `PAP`, or `CHAP`. The default is `None`.

3. For `06 Remote PAP/CHAP identity`, enter 6, and the user name. The default is `applied`.

4. For `07 Remote PAP Password/CHAP Secret`, enter 7, and the password. The default is `applied`.

This example displays:

- `05*Remote Authentication Method` set to `CHAP`
- `06 Remote PAP/CHAP identity` set to `bri24`
- `07 Remote PAP Password/CHAP Secret` set to `documentation`.

```
>7,documentation
                                                              Menu 4.2.14.12.9
01*RAS Option (DISABLED,RADIUS,RADIUS_FB,TACACS,TACACS_FB)------------ DISABLED
02*Local Authentication Method (None, PAP, CHAP)-------------------------- PAP
03 Local PAP/CHAP identity----------------------------                  bri24
04 Local PAP Password/CHAP Secret----------------------         documentation
05*Remote Authentication Method (None, PAP, CHAP)------------------------CHAP
06 Remote PAP/CHAP identity----------------------------                 bri24
07 Remote PAP Password/CHAP Secret--------------------         documentation
```

Configuration in the AI232 Local Menu System

1. Access the AsyncPPP or ModMux Link Menu.

2. Select `PPP Authentication Menu`. The PPP Authentication Menu appears.

3. For `Remote Authentication Method`, select `None`, `PAP`, or `CHAP`. The default is `None`.

4. For `Remote PAP/CHAP Identity`, enter the user name. The default is `applied`.

5. For `Remote PAP Password/CHAP Secret`, enter the password. The default is `applied`.

This example displays:

- `Remote Authentication Method` set to `CHAP`
- `Remote PAP/CHAP Identity` set to `bri24`
- `Remote PAP Password/CHAP Secret` set to `documentation`.

```
                          PPP Authentication Menu


Link being configured . . . . . . . . . . . . . . . . . . . . . . .      3

Authentication Options

Local Authentication Method . . . . . . . . . . .      None    PAP    [CHAP]
RAS Option:     Disabled    RADIUS   [RADIUS/Fallback]
Local PAP/CHAP Identity . . . . . . . . . . . . . . . . . . . . . . bri24
Local PAP Password/CHAP Secret   . . . . . . . . . . . . . ..... documentation

Remote Authentication Method . . . . . . . . . . .      None    PAP    [CHAP]
Remote PAP/CHAP Identity . . . . . . . . . . . . . . . . . . . . . . bri24
Remote PAP Password/CHAP Secret  . . . . . . . . . . . . . ..... documentation
```

RTS/DTR Lead Control Configuration

The following configuration items are available for RTS and DTR lead control configuration:

- [DTR State Configuration](#)
- [RTS State Configuration](#)

DTR State Configuration

Description
DTR is an RS-232 signal sent from a computer or terminal to a modem that indicates that it (the computer or terminal) is able to accept data. DTR lead control is configured using two menu items:

- `DTR connect state`—Sets the DTR connect state to `ON` or `OFF`. `ON` sets DTR to on while the link is connecting and while it is connected. `OFF` turns this functionality off.

- `DTR disconnect state`—Sets the DTR disconnect state to one of the following options:

    - `ON`—Sets DTR to on when the link disconnects.

    - `OFF`—Sets DTR to off when the link disconnects.

    - `TOGGLE`—Makes DTR pulse when the link disconnects. The pulse polarity is opposite to the sense specified for the connected state.

✎
Note: The RTS/DTR lead control options only take effect when the link is configured as a destination link.

Menu Item Type
Toggle

Link Type Availability
Async and AsyncPPP

Configuration in the AI198 Menu System
1. For an asynchronous or asynchronous PPP link, access Menu 4.2.14.12.13.

2. For `01*DTR connect state`, enter 1 to select `ON` or `OFF`. The default is `ON`.

3. For `02*DTR disconnect state`, enter 2 to select `ON`, `OFF`, or `TOGGLE`. The default is `OFF`.

This example displays `01*DTR connect state` set to `OFF` and `02*DTR disconnect state` set to `TOGGLE`.

```
>2
                                                               Menu 4.2.14.12.13
01*DTR connect state---------------------------------------------------------ON
02*DTR disconnect state (On, Off, Toggle)------------------------------TOGGLE
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. Select `RTS/DTR Lead Control Options Menu`. The RTS/DTR Lead Control Options Menu appears.

3. For `DTR connect state`, select `On` or `Off`. The default is `On`.

4. For `DTR disconnect state`, select `On`, `Off`, or `Toggle`. The default is `Off`.

This example displays `DTR connect state` set to `Off` and `DTR disconnect state` set to `Toggle`.

```
                            RTS/DTR Control Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . . . .      3

DTR connect state . . . . . . . . . . . . . . . . . . . . .     On    [Off]
DTR disconnect state . . . . . . . . . . . . . . . . .     On     Off    [Toggle]
```

RTS State Configuration

Description

RTS is an RS-232 signal that is sent from a transmitting terminal to a receiving terminal to request permission to transmit. It is configured using the following menu items:

`RTS connect state`—Sets the RTS connect state to one of the following options:

- `On`—Sets RTS to on when the link is connecting or connected.

- `Off`—Sets RTS to off when the link is connecting or connected.

- `FlowControl`—Enables RTS to follow the hardware flow control convention.

RTS disconnect state—Sets the RTS disconnect state to one of the following options:

- On—Sets RTS to on when the link disconnects.

- Off—Sets RTS to off when the link disconnects.

- Toggle—Makes RTS pulse when the link disconnects. The pulse polarity is opposite to the sense specified for the connected state.

Menu Item Type
Toggle

Link Type Availability
Async and AsyncPPP

Configuration in the AI198 Menu System

1. For an asynchronous or asynchronous PPP link, access menu 4.2.14.12.13.

2. For 03*RTS connect state, enter 3 to select ON, OFF, or FLOW CONTROL. The default is ON.

3. For 04*RTS disconnect state, enter 4 to select ON, OFF, or TOGGLE. The default is OFF.

This example displays 03*RTS connect state set to FLOW CONTROL and 04*RTS disconnect state set to TOGGLE.

```
>4
                                                      Menu 4.2.14.12.13
01*DTR connect state-----------------------------------------------------ON
02*DTR disconnect state (On, Off, Toggle)--------------------------------OFF
03*RTS connect state (On, Off, Flow Control)-----------------------FLOW CONTROL
04*RTS disconnect state (On, Off, Toggle)----------------------------TOGGLE
```

Configuration in the AI232 Local Menu System

1. Access the Async Link Menu or AsyncPPP Link Menu.

2. Select RTS/DTR Lead Control Options Menu. The RTS/DTR Lead Control Options Menu appears.

3. For RTS connect state, select On, Off, or FlowControl. The default is On.

4. For RTS disconnect state, select On, Off, or Toggle. The default is Off.

This example displays RTS connect state set to FlowControl and RTS disconnect state set to Toggle.

```
                          RTS/DTR Control Options Menu


Link being configured  . . . . . . . . . . . . . . . . . . . . . . . .     3

DTR connect state . . . . . . . . . . . . . . . . . . . . . .     On    [Off]
DTR disconnect state . . . . . . . . . . . . . . . . . .    On    Off   [Toggle]
RTS connect state . . . . . . . . . . . . . .    On    Off   [FlowControl]
RTS disconnect state . . . . . . . . . . . . . . . . .    On    Off   [Toggle]
```

TID Multiplexing

This chapter provides information on configuring TID multiplexing.

Guide to this Chapter

Overview

AI232 supports TID multiplexing, which enables a single call from an OSS to fan out into multiple calls to various NEs. The initiating call may be asynchronous or TCP, but cannot originate from a destination menu. Refer to Figure 6-1 for an illustration of TID multiplexing.
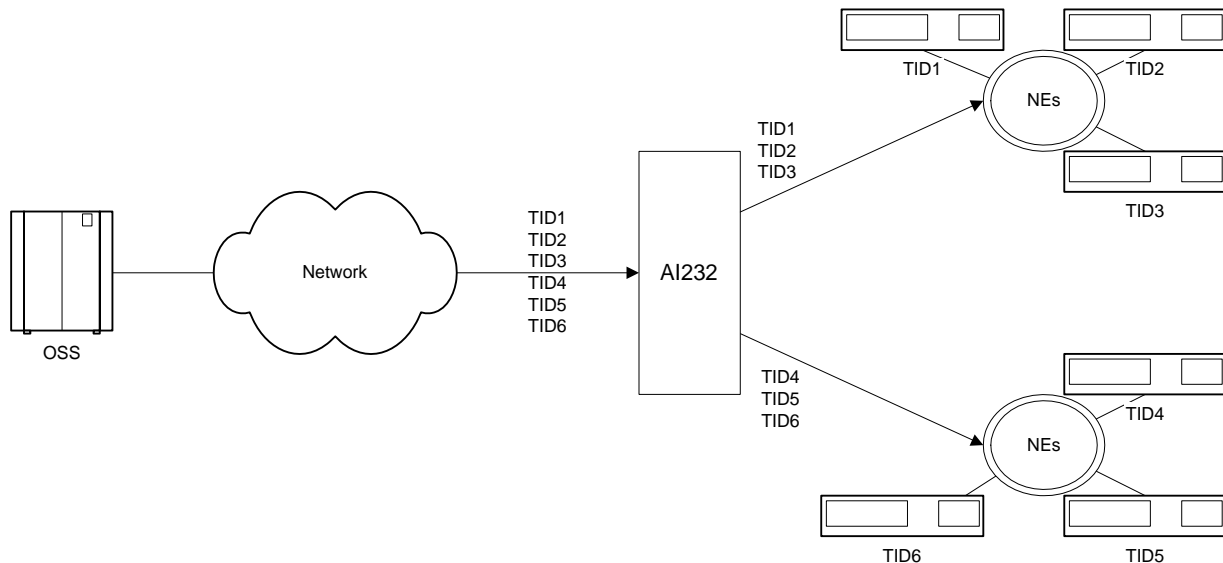
Figure 6-1   TID Multiplexing Overview

In Figure 6-1, AI232 takes a single call from an OSS and routes TL1 commands to various NEs by means of the TID in the TL1 command. Similarly, AI232 receives TL1 responses and NE reporting messages from several NEs and routes these messages to the appropriate OSS. The call to AI232 from the OSS is a parent call. The calls from AI232 to the various NEs are children calls.

After receiving a TL1 command from the OSS, AI232 checks to see if there is an existing connection for each TID. If a connection to the appropriate NE is already established, then AI232 forwards the TL1 command to the NE as specified by the TID.

The following characteristics apply to AI232 when it attempts to connect to an NE:

- If AI232 is unable to establish a connection to an NE, it will buffer the TL1 command and try to reconnect within 2 seconds.

- AI232 tries to connect up to three times if it cannot immediately establish a connection.

- AI232 buffers only one TL1 command for each NE. If a connection is made, AI232 forwards the buffered command to the NE.

- If a connection is not established after four tries or if AI232 receives a TL1 command with an unknown TID, the TL1 command gets discarded and a message gets logged.

- If the OSS is disconnected from AI232, all associated children calls to the NEs are disconnected.

TID Multiplexing Configuration

Establish TID multiplexing by configuring aliases for calls that will go through AI232. Configure a parent alias to accept the incoming call from the OSS. After doing this, configure children aliases to route calls to the various network elements. For more information about aliases, refer to Chapter 7: Alias and Call Routing Configuration.

Configuring the Parent Alias

✎

Note: AI recommends that you do not use connect-on-activity PVCs to establish a parent connection.

Configuration in the AI198 Menu System

1. Log in to AI198.

2. At the prompt, enter **menu** to access the Main Menu.

3. For 08+Configure the alias translation table, enter **8**. The alias configuration menu appears.

```
>8
                                                                      Menu 8
01 Alias name -*********************************************************************
02+Simple alias translation
03 Destination -
04 Called address -
05 This alias is visible in the destination menu---------------------------NO
06 Link number is (1..16) -
07 Caller's address -
08 Call data -
09 App. string -
10 Called protocol -
11 Caller's protocol -
12 Alternate routing alias -

14+Test macros
15 Show entire alias
16 Show the first entry in the alias translation table
17 Show the previous entry in the alias translation table
18 Show the next entry in the alias translation table
19+Delete the above alias translation entry
20 Save the changes made (20b: to the beginning, 20e: to the end)
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

4. For 01 Alias name, enter the alias name for the call coming from the OSS.

5. For `02+Simple alias translation`, enter **2**. Menu 8.2 appears with the available translation options.

```
>2
                                                                      Menu 8.2

01 Simple alias translation
02 Multiplexed connection
03 Multiplexed only translation
04 SLC routing translation














21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

6. For `04 SLC routing translation`, enter **4**. Menu 8 reappears with `SLC routing translation` selected for menu item 2.

7. If you are using single alias translation, for `03 Destination`, enter **3,** and the IP address of AI232.

8. For `08 Call data`, enter **8,** and the parent name.

   🖉
   Note: When creating the parent name, note that you use the parent name to make the children alias names. For example, if a parent is named PARENT1, valid child names would be PARENT1.1 and PARENT1.2.

9. For `09 App. string`, enter:

   TMUX_n_ [**TID:** _tid_for_AI232_]

   _n_   Defines the maximum number of children connections. Valid values are 1 to 128.

   _tid_for_AI232_   Defines the terminal identifier for AI232.

10. For `10 Called protocol`, enter **10, =""**

11. (optional) For `11 Caller's protocol`, enter **11,** and the caller's protocol.

12. Save your changes.

Configuration in the AI232 Local Menu System

✏️

Note: To configure aliases in the AI232 local menu system, AI232 must be in standalone mode.

1. Log in to the AI232 Main Menu.

2. From the AI232 Main Menu, select Alias Menu. The Alias Summary Menu appears.

3. From the Alias Summary Menu, select Add Alias. The Alias Edit Menu appears.

```
                          Alias Edit Menu

   Alias Name . . . . .

   Destination  . . . ................................................
   Caller's Address . . ............................................
   Called Address . . . ...........................................
   Call Data  . . . . ............................................

   Caller's Protocol  . ...........................................
   Called Protocol  . . ...........................................

   Application String . ...........................................
   Alternate Route  . . ...........................................
   Description  . . . . ...........................................

   Display Alias in Destination Menu . . . . . . . . . . . . . .    [Yes]   No
   Alias Location  . . . . . . . . . . . . . . . . . . . .      Beginning  [End]

 + Alias Test Menu



                                                   Range: {255 characters}
   <F1> Help  <F2> Send            <F4> Close     <Ctrl-R> Return to Main Menu
```

4. For Alias Name, enter the alias name for the call coming from the OSS.

5. If you are using single alias translation, for Destination, enter the IP address of AI232. By entering a destination value, you are specifying the use of single alias translation.

6. For Call data, enter the parent name.

✏️

Note: When creating the parent name, note that you use the parent name to make the children alias names. For example, if a parent is named PARENT1, valid child names would be PARENT1.1 and PARENT1.2.

7. For `Application string`, enter:

   TMUX_n_ [**TID:** _tid_for_AI232_]

_n_	Defines the maximum number of children connections. Valid values are 1 to 128.
_tid_for_AI232_	Defines the terminal identifier for AI232.

8. For `Called protocol`, enter `=""`.

9. (optional) For `Caller's protocol`, enter the caller's protocol.

10. Save your changes.

Configuring the Children Aliases

Configuration in the AI198 Menu System

AI232 supports a maximum of 512 child connections. These connections can be asynchronous or TCP/IP.

To configure the child aliases:

1. Log into AI198.

2. At the prompt, enter **menu** to access the Main Menu.

3. For `08+Configure the alias translation table`, enter **8**. The alias configuration menu appears.

```
>8
                                                                         Menu 8
01 Alias name -***********************************************************************
02+Simple alias translation
03 Destination -
04 Called address -
05 This alias is visible in the destination menu----------------------------NO
06 Link number is (1..16) -
07 Caller's address -
08 Call data -
09 App. string -
10 Called protocol -
11 Caller's protocol -
12 Alternate routing alias -

14+Test macros
15 Show entire alias
16 Show the first entry in the alias translation table
17 Show the previous entry in the alias translation table
18 Show the next entry in the alias translation table
19+Delete the above alias translation entry
20 Save the changes made (20b: to the beginning, 20e: to the end)
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

4. For `01 Alias name`, enter:

   parent_name.m

parent_name	Defines the name you entered for `08 Call data` during the parent alias configuration.
m	Defines the child number. Valid values are 1 to n (specified during the parent alias configuration).

5. For `02+Simple alias translation`, enter **2**. Menu 8.2 appears with the available translation options.

```
>2
                                                              Menu 8.2

01 Simple alias translation
02 Multiplexed connection
03 Multiplexed only translation
04 SLC routing translation















21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

6. For `04 SLC routing translation`, enter **4**. Menu 8 re-appears with `SLC routing translation` selected for menu item 2.

7. If you are using single alias translation, for `03 Destination`, enter **3,** and the IP address of AI232. By entering a destination value, you are specifying the use of single alias translation.

8. For `04 Called address`, enter **4,** and the called address.

9. For `07 Caller's address`, enter **7,** and the caller's address.

10. For `08 Call data`, enter **8,** and the call data information.

11. For 09 App. string, enter:

   TID: *tid*

   tid   Defines the TID of the destination NE. Maximum length is 20 characters.

12. (optional) For 10 Called protocol, enter 10, and the called protocol.

13. For 11 Caller's protocol, enter 11, ="".

Configuration in the AI232 Local Menu System

✎

Note: To configure aliases in the AI232 local menu system, AI232 must be in standalone mode.

1. Log in to the AI232 Main Menu.

2. From the AI232 Main Menu, select Alias Menu. The Alias Summary Menu appears.

3. From the Alias Summary Menu, select Add Alias. The Alias Edit Menu appears.

```
                            Alias Edit Menu

    Alias Name . . . . .

    Destination   . . . ...............................................
    Caller's Address . . ...............................................
    Called Address . . . ...............................................
    Call Data  . . . . . ...............................................

    Caller's Protocol   . ...............................................
    Called Protocol   . . ...............................................

    Application String . ...............................................
    Alternate Route  . . ...............................................
    Description  . . . . ...............................................

    Display Alias in Destination Menu . . . . . . . . . . . . . .   [Yes]   No
    Alias Location  . . . . . . . . . . . . . . . . . . . .   Beginning  [End]

  + Alias Test Menu


                                                   Range: {255 characters}
    <F1> Help  <F2> Send            <F4> Close      <Ctrl-R> Return to Main Menu
```

4. For `Alias name`, enter:

    parent_name.m

parent_name	Defines the name you entered for `08 Call data` during the parent alias configuration.
m	Defines the child number. Valid values are 1 to *n* (specified during the parent alias configuration).

5. If you are using single alias translation, for `Destination`, enter the IP address of AI232. By entering a destination value, you are specifying the use of single alias translation.

6. For `Called address`, enter the called address.

7. For `Caller's address`, enter the caller's address.

8. For `Call Data`, enter the call data information.

9. For `Application String`, enter:

    TID: *tid*

    tid Defines the TID of the destination NE. Maximum length is 20 characters.

10. (optional) For `Called protocol`, enter the called protocol.

11. For `Caller's protocol`, enter `=""`.

12. Save your changes.

Example Configurations

The following screens display parent and child alias configurations that do the following:

1. A call comes in on alias 172.16.30.61 at port 6001 (`172.16.30.61#6001`).

2. The call fans out into two children calls. `09 App. string` in the parent alias configuration determines the number of children; in this case, it is noted by `TMUX2`. The children have the following names: `PARENT1.1` and `PARENT1.2`. These names are established through `08 Call data` in the parent alias configuration. The calls to the first and second child are PVCs.

3. AI232 forwards all TL1 commands with TIDs `NE-OH-COLUMBUS-1`, `NE-OH-COLUMBUS-2`, and `NE-OH-COLUMBUS-3` through the first child connection. It forwards all TL1 commands with TIDs `NE-OH-WORTHINGTON-1` and `NE-OH-WORTHINGTON-2` through the second child connection.

This example displays the parent alias configuration in the AI198 menu system.

```
>11 =""
                                                                       Menu 8
01 Alias name ---------------------------------------------172.16.30.61#6001
02+Simple alias translation
03 Destination -
04 Called address -
05 This alias is visible in the destination menu--------------------------YES
06 Link number is (1..16) -
07 Caller's address -
08 Call data ----------------------------------------------------------PARENT1
09 App. string --------------------------------------------------------TMUX2
10 Called protocol ------------------------------------------------------=""
11 Caller's protocol ----------------------------------------------------=""
12 Alternate routing alias -

14+Test macros
15 Show entire alias
16 Show the first entry in the alias translation table
17 Show the previous entry in the alias translation table
18 Show the next entry in the alias translation table
19+Delete the above alias translation entry
20 Save the changes made (20b: to the beginning, 20e: to the end)
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

This example displays the parent alias configuration in the AI232 menu system.

🖉

Note: To configure aliases in the AI232 local menu system, AI232 must be in standalone mode.

```
                          Alias Edit Menu

   Alias Name . . . .  . . . . . . . . . . . . . . . . . . . . . . . . 172.16.30.61#6001

   Destination   . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Caller's Address . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Called Address . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Call Data  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . PARENT1

   Caller's Protocol   . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ="" 
   Called Protocol   . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ="" 

   Application String . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . TMUX2
   Alternate Route  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Description  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

   Display Alias in Destination Menu . . . . . . . . . . . . . .    [Yes]    No

 + Alias Test Menu




    <F1> Help  <F2> Send            <F4> Close    <Ctrl-R> Return to Main Menu

```

These examples display two of the child alias configurations in the AI198 menu system.

```
>11 =""
                                                                Menu 8
01 Alias name ---------------------------------------------------PARENT1.1
02+Simple alias translation
03 Destination -------------------------------------------------172.16.30.61
04 Called address ------------------------------------------------------PVC
05 This alias is visible in the destination menu--------------------------YES
06 Link number is (1..16) -
07 Caller's address -
08 Call data -----------------------------------------------------ASY.29.1
09 App. string --TID:NE-OH-COLUMBUS-1 TID:NE-OH-COLUMBUS-2 TID:NE-OH-COLUMBUS-3
10 Called protocol -----------------------------------------------------=""
11 Caller's protocol ---------------------------------------------------=""
12 Alternate routing alias -

14+Test macros
15 Show entire alias
16 Show the first entry in the alias translation table
17 Show the previous entry in the alias translation table
18 Show the next entry in the alias translation table
19+Delete the above alias translation entry
20 Save the changes made (20b: to the beginning, 20e: to the end)
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

```
>11 =""
                                                                Menu 8
01 Alias name ---------------------------------------------------PARENT1.2
02+Simple alias translation
03 Destination -------------------------------------------------172.16.30.61
04 Called address ------------------------------------------------------PVC
05 This alias is visible in the destination menu--------------------------YES
06 Link number is (1..16) -
07 Caller's address -
08 Call data -----------------------------------------------------ASY.30.1
09 App. string -----------------TID:NE-OH-WORTHINGTON-1 TID:NE-OH-WORTHINGTON-2
10 Called protocol -----------------------------------------------------=""
11 Caller's protocol ---------------------------------------------------=""
12 Alternate routing alias -

14+Test macros
15 Show entire alias
16 Show the first entry in the alias translation table
17 Show the previous entry in the alias translation table
18 Show the next entry in the alias translation table
19+Delete the above alias translation entry
20 Save the changes made (20b: to the beginning, 20e: to the end)
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

These examples display two of the child alias configurations in the AI232 menu
system.

✎

Note: To configure aliases in the AI232 local menu system, AI232 must be in
standalone mode.

```
                           Alias Edit Menu

   Alias Name . . . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  PARENT1.1

   Destination  . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  172.16.30.61
   Caller's Address . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Called Address . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  PVC
   Call Data  . . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  ASY.29.1

   Caller's Protocol  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  =""
   Called Protocol  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  =""

   Application String . TID:NE-OH-COLUMBUS-1 TID:NE-OH-COLUMBUS-2 TID:NE-OH-COL
   Alternate Route  . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Description  . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

   Display Alias in Destination Menu . . . . . . . . . . . . . .     [Yes]    No

 + Alias Test Menu




    <F1> Help  <F2> Send            <F4> Close     <Ctrl-R> Return to Main Menu
```

```
                           Alias Edit Menu

   Alias Name . . . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  PARENT1.2

   Destination  . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  172.16.30.61
   Caller's Address . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Called Address . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  PVC
   Call Data  . . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  ASY.30.1

   Caller's Protocol  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  =""
   Called Protocol  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .  =""

   Application String . . . . . . . .  TID:NE-OH-WORTHINGTON-1 TID:NE-OH-WORTHINGTON-2
   Alternate Route  . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
   Description  . . .  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

   Display Alias in Destination Menu . . . . . . . . . . . . . .     [Yes]    No

 + Alias Test Menu




    <F1> Help  <F2> Send            <F4> Close     <Ctrl-R> Return to Main Menu
```

TID Multiplexing Troubleshooting

If an OSS is not getting a response from an NE, it can send a TL1 retrieve header command (`RTRV-HDR`) to determine if the problem is with the NE or with AI232. The parent connection on AI232 responds to `RTRV-HDR` commands that have the same TID as the one configured for the card.

Tip: For more information regarding TL1 commands, responses, and formats, refer to the Belcore document GR-833-CORE.

RTRV-HDR

This command is used primarily as an aliveness check.

Format

RTRV-HDR: [*tid*]::*ctag*;

Parameters

tid   Defines the TID for AI232. Note that the TID and SID are the same.

ctag   Defines the correlation tag used to correlate responses to input commands. Each input command has a unique *ctag* . Maximum length is 6 characters. Responses include the identical *ctag*.

Normal Response Format

This example displays the format of the response that appears when `RTRV-HDR` is successfully executed:

```
<cr><lf><lf>
<sp><sp><sp><SID><sp><YY-MM-DD><sp><HH:MM:SS><cr><lf>
M<sp><sp><ctag><sp>COMPLD<cr><lf>;
```

Table 6-1 describes each of the items in the above response format.

Table 6-1   RTRV-HDR Response Format Description

Response Item	Description
cr	Specifies a carriage return.
lf	Specifies a line feed.
sp	Specifies a space.
SID	Specifies a system identifier (system ID).

Table 6-1   RTRV-HDR Response Format Description (Continued)

Response Item	Description
YY-MM-DD	Specifies the date.
HH:MM:SS	Specifies the time of day.
ctag	Specifies the correlation tag.
COMPLD	Specifies completion. The Input requirement is satisfied.

Normal Response Example

This example displays the response that appears when `RTRV-HDR: AI232: 12345;` is executed.

```
AI232 00-04-14 05:06:39
M   12345 COMPLD;
```

Error Response Format

If AI232 receives TL1 commands other than `RTRV-HDR` with the same card TID, it responds with a deny message. This example displays the deny message format.

```
<cr><lf><lf>
<sp><sp><sp><SID><sp><YY-MM-DD><sp><HH:MM:SS><cr><lf>
M<sp><sp><ctag><sp>DENY<cr><lf>
<sp><sp><sp><errcde><cr><lf>;
```

Table 6-2 describes each of the items in the above response format.

Table 6-2   Error Response Format Description

Response Item	Description
cr	Specifies a carriage return.
lf	Specifies a line feed.
sp	Specifies a space.
SID	Specifies a system identifier (system ID).
YY-MM-DD	Specifies the date.
HH:MM:SS	Specifies the time of day.
ctag	Specifies the correlation tag.
DENY	Specifies that the input requirement is not satisfied.

Table 6-2   Error Response Format Description (Continued)

Response Item	Description
errcde	Specifies the error code.

Error Response Example

This example displays the response that appears if `RTRV-HDR` fails.

```
AI232 00-04-14 05:06:39
M  12345 DENY
IIAC;
```

Diagnostics for TID Multiplexing

To view information on TID multiplexed calls and the associated TIDs, use `diag-tconn`. This command displays a list of all connections on the card in the same format as `diag-conn`. However, `diag-tconn` is not interactive.

Use this command either from the AI232 shell or through AI198 as a `winslc` command. Refer to for more information.

7

Alias and Call Routing Configuration

This chapter provides information on configuring aliases and routing calls on AI232.

Guide to this Chapter

Overview

AI232 uses aliases to route calls across the backplane of AIswitch. Each incoming call's routing information must match an entry in the alias table, or else the call is rejected. When AI232 is in switch mode, the alias table is stored on AI198. When AI232 is in standalone mode, the alias table is stored in AI232's local memory. For more information about alias translation and macros, see sections Call Routing on page 7-4 and Alias Macros on page 7-19.

Figure 7-1 displays a typical call processing data flow scenario where AI232 is used. Data flow can be upstream or downstream, depending on the direction from which the data originates.
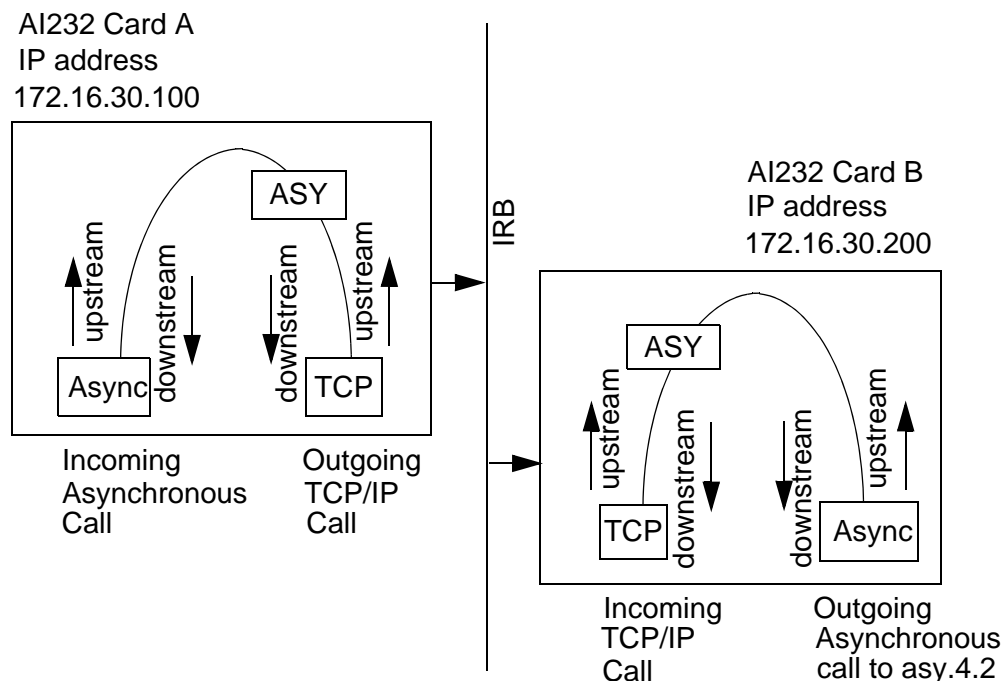
Figure 7-1   Call Data Flow

In Figure 7-1, an asynchronous protocol call is coming into AI232 card A and needs to pass over the IRB and be sent out AI232 card B. Refer to the figure to follow the flow of the call.

The following events occur if the data flow is from left to right:

1. The data comes into AI232 card A as an asynchronous packet.

2. The data travels upstream and is converted into a TCP call.

3. The data starts downstream through the ASY protocol option to preserve the packetization. Refer to ASY on page 7-18 for information about the ASY protocol.

4. The data is sent out AI232 card A over TCP on the IRB.

5. The TCP packet is received by AI232 card B.

6. The data travels upstream through the ASY protocol option to preserve packetization.

7. The data packet is converted, travels downstream, and is transmitted out AI232 using an asynchronous protocol with the original packetizing characteristics preserved.

Call Routing

To route calls within AI232, an alias must be configured according to the source protocol and the destination protocol.

Note: Aliases created in AI198 are not visible to AI232 when it is running in standalone mode. However, you can configure aliases in the AI232 local menu system when it is in standalone mode.

Configuring an Alias

To route calls with AI232, you must configure an alias for a source and destination protocol. The following procedure takes you through the configuration of an alias name on a single AI232 card and between two AI232 cards.

Note: Specific configuration information about menu items in the following procedures is located in sections and .

Configuring an Alias in the AI198 Menu System

To configure an alias in the AI198 Menu System:

1. Log in to AI198.

2. At the prompt, type `menu`. The main menu appears.

3. To access menu 08+Configure the alias translation table, enter 8. Menu 8 appears:

```
>8
                                                                   Menu 8
01 Alias name -*********************************************************
02+Simple alias translation
03 Destination -
04 Called address -
05 This alias is visible in the destination menu---------------------------NO
06 Link number is (1..16) -
07 Caller's address -
08 Call data -
09 App. string -
10 Called protocol -
11 Caller's protocol -
12 Alternate routing alias -

14+Test macros
15 Show entire alias
16 Show the first entry in the alias translation table
17 Show the previous entry in the alias translation table
18 Show the next entry in the alias translation table
19+Delete the above alias translation entry
20 Save the changes made (20b: to the beginning, 20e: to the end)
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

4. For 01 Alias name -, enter 1, followed by the alias name for the incoming (source) call.

AI198 translates the alias name into a call of the type defined in the remaining alias menu items.

🖉

Note: The alias name may include leading, trailing, or embedded wildcard matching characters. You may enter an asterisk (*) which replaces zero or more characters, a question mark (?) which replaces one character, or an alias macro that starts with an equal sign (=).

For information on acceptable alias naming elements and conventions, refer to:

- Table 7-1 on page 7-10
- Table 7-2 on page 7-10
- Table 7-3 on page 7-11
- Table 7-4 on page 7-11.

5. To access menu 02+Simple alias translation, enter 2. Menu 8.2 appears:

```
>2
                                                                          Menu 8.2
01 Simple alias translation
02 Multiplexed connection
03 Multiplexed only translation
04 SLC routing translation




















21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

6. To select 04 SLC routing translation, enter 4. Menu 8 reappears with the SLC routing translation configuration items.

> **Important:** Menu item 04 SLC routing translation is the only valid menu item for AI232. Use SLC routing translations to route calls through cards that support non-time division subchannel (TDS) connections.

7. (optional) If you are routing calls between two AI232 cards, enter 3, and the IP address of the remote AI232.

8. For 04 Called address -, enter 4, and the the called (destination) address.

   The called (destination) address defines the IP address to contact. Maximum length is 14 characters. The actual IP address or an alias macro can be entered here.

9. For 05 This alias is visible in the destination menu, enter 5 to toggle between Yes and No.

   This setting specifies if the alias will appear in the welcome screen.

10. (optional) For 08 Call data -, enter 8, and the call user data.

    Call data is dependent on the type of SLC being used. It may be directly entered as an alias macro.

11. (optional) For `10 Called protocol -`, enter **10,** and the called protocol type.

   For more information about protocol types, refer to [Protocol Processing Modules on page 7-14](#).

12. (optional) For `11 Caller's protocol -`, enter **11,** and the caller's protocol type.

   For more information about protocol types, refer to [Protocol Processing Modules on page 7-14](#).

13. For `20 Save the changes made`, enter **20** to save the alias configuration.

14. Repeat this procedure for additional alias configurations.

Configuring an Alias in the AI232 Menu System

To configure an alias in the AI232 Menu System:

1. Log in to AI232.

2. At the prompt, type **menu**. The AI232 Main Menu appears.

3. Access the Alias Menu. The Alias Summary Menu appears.

4. From the the Alias Summary Menu, select `[Add Alias]`. The Alias Edit Menu appears:

```
                          Alias Edit Menu

    Alias Name . . . . .

    Destination   . . . ...................................................
    Caller's Address . . ..................................................
    Called Address . . . ..................................................
    Call Data  . . . . . ..................................................

    Caller's Protocol  . ..................................................
    Called Protocol  . . ..................................................

    Application String . ..................................................
    Alternate Route  . . ..................................................
    Description  . . . . ..................................................

    Display Alias in Destination Menu . . . . . . . . . . . . .   [Yes]   No

  + Alias Test Menu



                                            Range: {255 characters}
    <F1> Help  <F2> Send           <F4> Close     <Ctrl-R> Return to Main Menu
```

5. For `Alias Name`, enter the alias name for the incoming (source) call.

    AI232 translates the alias name into a call of the type defined in the remaining alias menu items.

    🖉

    Note: The alias name may include leading, trailing, or embedded wildcard matching characters. You may enter an asterisk (*) which replaces zero or more characters, a question mark (?) which replaces one character, or an alias macro that starts with an equal sign (=).

    For information on acceptable alias naming elements and conventions, refer to:

    - [Table 7-5 on page 7-12](#)
    - [Table 7-6 on page 7-12](#)
    - [Table 7-7 on page 7-12](#)
    - [Table 7-8 on page 7-13](#).

6. (optional) If you are routing calls between two AI232 cards, enter the IP address of the remote AI232 in the `destination` field.

7. (optional) For `Called Address`, enter the called (destination) address.

    The called (destination) address defines the IP address to contact. Maximum length is 14 characters. The actual IP address or an alias macro can be entered here.

8. (optional) For `Call Data`, enter the call user data.

    Call data is dependent on the type of SLC being used. It may be directly entered as an alias macro.

9. (optional) For `Caller's Protocol`, enter the caller's protocol type.

    For more information about protocol types, refer to [Protocol Processing Modules on page 7-14](#).

10. (optional) For `Called Protocol`, enter the called protocol type.

    For more information about protocol types, refer to [Protocol Processing Modules on page 7-14](#).

11. For `Display Alias in Destination Menu`, select `Yes` or `No`.

    This setting specifies if the alias will appear in the welcome screen.

12. Select `<F2> Send` to save the changes.

13. Repeat this procedure for additional alias configurations.

Source/Destination Protocol Tables

The following tables are organized according to source protocols. Match the destination protocol with the source protocol to find the appropriate menu item entries:

- Asynchronous Source Without Breaks (AI198) on page 7-10

- Asynchronous Source With Breaks (AI198) on page 7-10

- TCP/IP Source Without Telnet Breaks (AI198) on page 7-11

- TCP/IP Source With Telnet Breaks (AI198) on page 7-11

- Asynchronous Source Without Breaks (AI232) on page 7-12

- Asynchronous Source With Breaks (AI232) on page 7-12

- TCP/IP Source Without Telnet Breaks (AI232) on page 7-12

- TCP/IP Source With Telnet Breaks (AI232) on page 7-13.

The following parameters are referenced in Table 7-1 on page 7-10 through Table 7-8 on page 7-13:

call_data	Defines the call data. Maximum length is 16 characters.
called_address	Defines the address being called. Maximum length is 14 characters.
caller_address	Defines the address of the caller. Maximum length is 14 characters.
ip_address	Defines the IP address in dotted decimal format. The # symbol must be entered as a field separator between the *ip_address* field and the *tcp_port_number* field.
link_number	Defines the number of the serial link.
tcp_port_number	Defines the TCP port number. Valid values are from 1 to 65535.

Source/Destination Protocol Tables for the AI198 Menu System

Table 7-1   Asynchronous Source Without Breaks (AI198)

Source	Destination	Menu Item	Information
Async	Async	01	*baseport*. asy. *link_number* Example: 16. asy. 3
		02	SLC Routing Translation
		04	PVC
		08	asy. *link_number* Example: asy. 3
Async	TCP	01	*baseport*. asy. *link_number* Example: 16. asy. 3
		02	SLC Routing Translation
		04	Destination IP Address: *ip_address*#*tcp_port_number* Example: 198. 29. 5. 6#389

Table 7-2   Asynchronous Source With Breaks (AI198)

Source	Destination	Menu Item	Information
Async	TCP with telnet break	01	*baseport*. asy. *link_number* Example: 16. asy. 3
		02	SLC Routing Translation
		04	Destination IP Address: *ip_address*#*tcp_port_number* Example: 198. 29. 5. 6#389
		10	TN (refer to)
		11	=""

Table 7-3   TCP/IP Source Without Telnet Breaks (AI198)

Source	Destination	Menu Item	Information
TCP	TCP	01	*ip_address*#*tcp_port_number* Example: **198.29.5.6#389**
		02	SLC Routing Translation
		04	Destination IP Address: *ip_address*#*tcp_port_number* Example: **198.29.5.6#389**
TCP	Async	01	*ip_address*#*tcp_port_number* Example: **198.29.5.6#389**
		02	SLC Routing Translation
		04	PVC
		08	**asy.***link_number* Example: **asy.3**

Table 7-4   TCP/IP Source With Telnet Breaks (AI198)

Source	Destination	Menu Item	Information
TCP	Async with async break	01	*ip_address*#*tcp_port_number* Example: **198.29.5.6#389**
		02	SLC Routing Translation
		04	PVC
		08	**asy.***link_number* Example: **asy.3**
		11	TN (refer to <u>TN on page 7-17</u>)

Source/Destination Protocol Tables for the AI232 Menu System

Table 7-5   Asynchronous Source Without Breaks (AI232)

Source	Destination	Menu Item	Information
Async	Async	`Alias Name`	**asy.** *link_number* Example: **asy. 3**
		`Called Address`	PVC
		`Call Data`	**asy.** *link_number* Example: **asy. 3**
Async	TCP	`Alias Name`	**asy.** *link_number* Example: **asy. 3**
		`Called Address`	Destination IP Address: *ip_address#tcp_port_number* Example: **198. 29. 5. 6#389**

Table 7-6   Asynchronous Source With Breaks (AI232)

Source	Destination	Menu Item	Information
Async	TCP with telnet break	`Alias Name`	**asy.** *link_number* Example: **asy. 3**
		`Called Address`	Destination IP Address: *ip_address#tcp_port_number* Example: **198. 29. 5. 6#389**
		`Called Protocol`	TN (refer to)
		`Caller's Protocol`	**=""**

Table 7-7   TCP/IP Source Without Telnet Breaks (AI232)

Source	Destination	Menu Item	Information
TCP	TCP	`Alias Name`	*ip_address#tcp_port_number* Example: **198. 29. 5. 6#389**
		`Called Address`	Destination IP Address: *ip_address#tcp_port_number* Example: **198. 29. 5. 6#389**

Table 7-7   TCP/IP Source Without Telnet Breaks (AI232) (Continued)

Source	Destination	Menu Item	Information
TCP	Async	`Alias Name`	*ip_address*`#`*tcp_port_number* Example: **198.29.5.6#389**
		`Called Address`	PVC
		`Call Data`	**asy.***link_number* Example: **asy.3**

Table 7-8   TCP/IP Source With Telnet Breaks (AI232)

Source	Destination	Menu Item	Information
TCP	Async with async break	`Alias Name`	*ip_address*`#`*tcp_port_number* Example: **198.29.5.6#389**
		`Called Address`	PVC
		`Call Data`	**asy.***link_number* Example: **asy.3**
		`Caller's Protocol`	TN (refer to <u>TN on page 7-17</u>)

Protocol Processing Modules

Protocol processing modules are used to process data as it passes through AI232.

Module Types

The following module types are available:

● Packetizing module ([PKT](#))

● Translation language one ([TL1](#))

● Telnet module ([TN](#))

● Asynchronous protocol processing module ([ASY](#))

● Line discipline module ([STT](#))

PKT

The packetizing module holds data as it arrives until AI232 receives specified characters (such as new lines). Once the packetizing character is received, all of the data that has been held is passed on as a single packet. This module also allows data to be packetized on a timer, which you can set. It also allows you to specify which characters, if any, to be filtered out of the data stream. PKT works on all protocols.

Defaults

Sets no packetizing timer

Sets no idle packetizing timer

Sets the packetizing timer to .06 seconds

Sets no filter characters

Passes the break upstream

Passes the break downstream

Discards unpacketized data when passing the break upstream

Optional Parameters

-Td Sets the packetizing timer to d hundredths of a second. It packetizes d hundredths of a second after the last time it was packetized. By setting d to zero, the option is turned off.

-I d Sets the idle packetizing timer to d hundredths of a second. It packetizes after d hundredths of a second after not receiving any new characters.

-Pd, d, d Sets the packetizing characters to the numbers entered in each d option. Specify up to 16 characters.

-F*d, d, d*   Sets the filter characters to the numbers entered in each *d* option. Specify up to 16 characters. It is possible to packetize on a filtered character.

-U   Prevents the passing of breaks upstream.

-D   Prevents the passing of breaks downstream.

-S   Packetizes on a specific sequence of characters. Enter up to 16 characters. The packet module accepts only one -S parameter.

-E   Activates local echo back to the original Telnet session.

Examples

`PKT -T6`   Provides packetizing and sets the packetizing timer to .06 seconds.

`PKT -P0xD, 0x3B`   Provides packetizing and sets the packetizing characters to carriage return and semi-colon.

`PKT -F10, 127`   Provides packetizing and filters out the characters for line feed and delete.

`PKT -U`   Provides packetizing but prevents breaks from being propagated upstream.

`PKT -I 10 -P0x0D -D`   Provides packetizing on carriage returns for .10 seconds of idle time and prevents breaks from being propagated downstream.

`PKT -S13, 10`   Provides packetizing and sets the sequence to carriage return followed by a line feed.

TL1

The Translation Language One module typically works with messages traveling between asynchronous protocols. However, it also works with all other protocols. Some OSSs require that each TL1 command/response be fully contained in one packet. By packetizing on the TL1 termination characters (";<>"), the TL1 module ensures that each TL1 command/response is transmitted in one packet.

Defaults

Sets no packetizing timer

Sets no idle packetizing timer

Sets the packetizing timer to .06 seconds

Sets no filter characters

Passes the break upstream

Passes the break downstream

Discards unpacketized data when passing the break upstream

Optional Parameters

-T*d*	Sets the packetizing timer to *d* hundredths of a second. It packetizes *d* hundredths of a second after the last time it was packetized. By setting *d* to zero, this option is turned off.
-I *d*	Sets the idle packetizing timer to *d* hundredths of a second. It packetizes after *d* hundredths of a second after not receiving any new characters.
-P*d, d, d*	Sets the packetizing characters to the numbers entered in each *d* option. Specify up to 16 characters.
-F*d, d, d*	Sets the filter characters to the numbers entered in each *d* option. Specify up to 16 characters. It is possible to packetize on a filtered character.
-U	Prevents the passing of breaks upstream.
-D	Prevents the passing of breaks downstream.
-S	Packetizes on a specific sequence of characters. Enter up to 16 characters. The packet module accepts only one -S parameter.
-E	Activates local echo back to the original Telnet session.

Examples

TL1 -T6	Provides TL1 packetizing and sets the packetizing timer to .06 seconds.
TL1 -F10, 127	Provides TL1 packetizing and filters out the characters for line feed and delete.
TL1 -U	Provides TL1 packetizing and prevents breaks from passing upstream.
TL1 -120 -D	Provides TL1 packetizing on TL1 delimiters for 20 seconds of idle time. Prevents breaks from passing downstream.

TN

The Telnet module filters Telnet commands out of the data stream and processes them appropriately. It also adds commands, as necessary, to data as it travels downstream. When a Telnet break is received, it is converted to an asynchronous break as required. When an asynchronous break is received from upstream, it is converted to a Telnet break and passed downstream.

Defaults

Passes breaks upstream

Passes breaks downstream

Initiates Telnet negotiation for WILL Echo and WILL SGA

Optional Parameters

-U	Prevents passing break upstream.
-D	Prevents passing break downstream.
-E*d, d*	Initiates Telnet negotiation for WILL Echo and WILL Suppress Go Ahead (SGA). This is useful when a Telnet connection is made to a remote device that provides an echo. If *d, d* is specified, then the Telnet negotiation string is modified. The Telnet negotiation string can be up to 32 characters.

Examples

`TN -U`   Provides Telnet handling, but prevents breaks from being propagated upstream.

`TN -E`   Provides Telnet handling and initiates Telnet negotiation for WILL Echo and WILL SGA.

`TN -E255,1`   Provides Telnet handling and causes the Telnet session to send IAC (255) ECHO (1) when the connection is initiated. Initiates WILL SGA.

ASY

The ASY module takes a single argument that specifies the string to be transmitted on the outgoing connection when a call is placed. The string typically contains a modem dial sequence.

Optional Parameters

Echo   Causes local echo from an ASY port.

Edit   Buffers calls for line editing and sends lines as a whole when ENTER is pressed. Lines can be edited by using BACKSPACE.

STT

The STT module provides support for local echo and line edit capabilities.

Optional Parameters

Echo   Echoes received characters back to the sender.

Edit   Echoes characters and provides buffering and line editing capabilities. With this option, received characters are forwarded one line at a time after receiving a terminating carriage return. Characters entered before the carriage return arrives can be deleted with the <Backspace> key.

Alias Macros

An alias macro is a program within an alias that translates incoming call requests into outgoing call requests. It is a shortcut that allows a programmer to write many aliases by only writing one macro.

Macros allow for call routing with fewer aliases. Using them with alternate routing provides multiple routes for a single alias.

A macro may be entered for combinations of any or all of the following items:

● Alias names

● Called addresses

● Caller's addresses

● Call data

● Application-specific strings

● Alternate routing aliases.

Each macro acts as a command line with instructions for matching patterns in alias fields and for manipulating them for redirection.

The following topics are covered in this section:

● <u>Alias Macro Components</u>

● <u>Alias Macro Configuration</u>

Alias Macro Components

This section discusses the components in an alias macro, including:

● <u>Start Symbols</u>

● <u>Comments</u>

● <u>Constants</u>

● <u>Variables</u>

● <u>Wildcard Symbols</u>

● <u>Operators</u>

● <u>Functions</u>

Start Symbols

The start symbol for an alias macro is an equal (=) sign. It is followed by one or more alias macro components.

Comments

Comments are added at the programmer's discretion to explain macro functionality. Comments can be entered either on a blank line or at the end of a line containing a macro. To enter a comment on a blank line, it must begin with two forward slashes (//). To enter a comment in a field with a macro, it must begin with a pound sign (#) at the end of a macro.

This example displays a comment on its own line in the `Application String` field and a comment after a macro in the `Alternate Route` field.

```
Application String . ......................................... //links 1-4
Alternate Route  . . ................................ ="6145550384"#from OH
```

Note: The pound sign (`#`) can be entered as part of the macro string if it is enclosed in either single or double quotes. The pound sign may be either directly enclosed (`=A+'#'+D(C)`), or the string that the pound sign resides in may be enclosed (`='198.127.1.4#23'`).

Constants

Macro constants are either fixed alphanumeric characters enclosed in single or double quotes or integers between positive and negative 2,147,483,647. All constant strings equal zero. Constant strings cannot be used in mathematical functions.

Variables

Several variables are recognized by macros. Refer to for more information.

Note: Variables are not case-sensitive.

Table 7-9   Macro Variables

Variable	Value
C (CUD)	Specifies a "call user data" variable.
A (CALLED)	Specifies a "called address" variable.
B (CALLER)	Specifies a "caller's address" variable.

Wildcard Symbols

Macros have two available wildcard symbols:

- ? matches any single character.

- * matches zero or more characters.

📝

Note: Alias names that use wildcards are not really macros. Wildcards are not processed in alias names that start with '='.

Operators

Operators are used for calculation of mathematical expressions in alias macros. AI232 evaluates expressions from left to right in order of precedence as shown in Table 7-10. To change the order of precedence, a programmer may enclose a portion of an expression in parentheses ( ) to calculate that portion first.

4+3*2   Specifies an equation that equals 10.

(4+3)*2   Specifies an equation that equals 14.

AI232 evaluates both regular and boolean logic operators. Refer to Table 7-10 for a list of all available operators in order of precedence.

Table 7-10   Operators in Order of Precedence

Operator	Description
#	Specifies a comment at the ends the alias macro expression.
* / %	Specifies a multiplication operation. Specifies a division operation. Specifies the remainder of a division operation.
+ -	Specifies an addition operation. Specifies a subtraction operation.
Expressions that use the following operators return "0" for a false condition and "-1" for true condition:	
<< <<= = > >= <<>	Specifies a less than evaluation. Specifies a less than or equal to evaluation. Specifies an equal to evaluation. Specifies a greater than evaluation. Specifies a greater than or equal to evaluation. Specifies a not equal to evaluation.

Table 7-10   Operators in Order of Precedence (Continued)

Operator	Description
&	Specifies a boolean logical AND evaluation. This requires that two conditions are true before continuing with the evaluation.
^	Specifies a boolean logical exclusive OR evaluation. This requires that one condition or another (not both) is true before continuing with the evaluation.
|	Specifies a boolean logical OR evaluation. This requires that one condition or both conditions are true before continuing with the evaluation.
!	Specifies a boolean logical NOT evaluation. This changes a true condition to a false condition (and vice versa) before continuing with the evaluation.

Functions

Functions are preset command keywords that perform string and value conversions. Some functions can be entered with only a single character. For example, `s` and `switch` represent the same function.

Note: Functions are not case-sensitive.

Table 7-11 lists available functions and their descriptions in alphabetical order.

Table 7-11   Alias Macro Functions

Alias Macro Function	Description of Operation
`asc(`*string*`)`	Returns the ASCII integer value of the first character in a string.
`chr$(`*n*`)`	Returns the character that corresponds to ASCII integer value *n*.
`hex$(`*n*`)` or `h(`*n*`)`	Returns the hexadecimal equivalent to decimal value *n*. For example, `=hex$(31)` returns hex value 1F.
`if(`*expression*`, `*a*`, `*b*`)` or `i(`*expression*`, `*a*`, `*b*`)`	Returns *a* if *expression* is not zero or *b* if *expression* is zero.

Table 7-11   Alias Macro Functions (Continued)

Alias Macro Function	Description of Operation
left$(*string*, *n*) or l(*string*, *n*)	Returns the left-most *n* characters of *string*. If *n* is greater than the length of *string*, the function returns the entire string.
len(*string*) or n(*string*)	Returns the length of *string*.
mid$(*string*, *x*, *n*) or m(*string*, *x*, *n*)	Returns *n* characters from *string* starting with the *x*th character. If *x* is greater than the length of *string*, the function returns a null string. If fewer than *n* characters follow character *x*, the function returns to end of the string.
mid$(*string*, *x*) or m(*string*, *x*)	Returns characters from *string* starting with the *x*th character and continuing to the right-most end character. If *x* is greater than the length of *string*, the function returns a null string.
myip(*n*)	Returns a string representation of the *n*th IP address assigned to AI232. *n* must be greater than 0.
pos(*string*, *char*, *n*) or p(*string*, *char*, *n*)	Returns the position of the *n*th occurrence of *char* in *string*. If there are less than *n* occurrences of *char* in *string*, the function returns the length of *string*.
right$(*string*, *n*) or r(*string*, *n*)	Returns the right-most *n* characters of *string*. Returns the entire string if *n* is greater than the length of the string.
str$(*n*) or d(*n*)	Returns *n* converted into a decimal string.
switch(*target_exp*, *default*, *exp1*, *result1*, *exp2*, *result*2...) or s(*target_exp*, *default*, *exp1*, *result1*, *exp2*, *result2*...)	If *target_exp* matches *exp1*, the function returns *result1*. If *target_exp* matches *exp2*, the function returns *result2*. This continues through all pairs of expressions and results. If *target_exp* does not match any of the expressions, then *default* is returned.

Table 7-11   Alias Macro Functions (Continued)

Alias Macro Function	Description of Operation
val(*string*) or v(*string*)	Converts a string to its decimal integer value. For example, =v(″032″) returns integer 32.
?(*n*)	Returns the *n*th wildcard string from the alias match.

Alias Macro Configuration

Often there are several ways to write a macro and get the same result. One programmer will likely design macros differently than another.

✎

Note: From the Alias Menu, you can input a string with * in it and the search will break apart the string using * as a delimiter. The search checks the alias list for an alias name that contains the components. It does not limit the search to the beginning and end of text of the alias as in AI198.

Configuration Examples

This example displays an alias where:

- Alias name 172.16.32.237#30* matches source address 172.16.32.237 with a port number of 30 followed by zero or more characters
- The caller's address is PVC
- Call data ='ASY.'+D((V(?(1))%6)+1) creates strings from ASY.1 to ASY.6.

```
                            Alias Edit Menu

Alias Name . . . . . ...................................... 172.16.32.237#30*

Destination  . . . . . ....................................................
Caller's Address . . ............................................... PVC
Called Address . . . ....................................................
Call Data  . . . . . ............................... ='ASY.'+D((V(?(1))%6)+1)
```

This example displays an alias where:

- Alias name `43042*` matches source addresses that start with 43042 and may end with zero or more characters
- Called Address `='ASY.'+D((V(?(1))%6)+1)` creates a called address string of `ASY.1` through `ASY.6`.

```
                            Alias Edit Menu

Alias Name .  .  .  .  ...........................................  43042*

Destination   .  .  .  .  ...................................................
Caller's Address .  .  .  ..................................................
Called Address .  .  .  .............................. ='ASY.'+D((V(?(1))%6)+1)
Call Data  .  .  .  .  .  ..............................................  TOSUN
```

This example displays an alias where:

- Alias name `=L(A,P(A,'#',1)-1)=MYIP(1)` matches the base IP address of AI232 with any port number
- Called address `='10.9.8.7#'+R(A,LEN(A)-P(A,'#',1))` redirects the call to 10.9.8.7 with the same port number
- Called protocol `TN` specifies that the Telnet protocol is used for the connection to the called address.

```
                            Alias Edit Menu

Alias Name .  .  .  .  . ............. =L(A,P(A,'#',1)-1)=MYIP(1)

Destination   .  .  .  .  .......................................
Caller's Address .  .  .  ......................................
Called Address .  .  . ... ='10.9.8.7#'+R(A,LEN(A)-P(A,'#',1))
Call Data  .  .  .  .  .......................................

Caller's Protocol  .......................................
Called Protocol  .  .......................................  TN
```

AI232 Commands

This chapter provides information about each AI232 shell command and all AI198 winslc commands that are supported by AI232. These commands perform AI232 system tasks.

Guide to this Chapter

Commands Overview

Commands Overview

AI232 is configurable directly through the local system using shell commands or through AI198 using winslc commands and the menu system.

Shell Commands

Shell commands offer some of the same functionality available in the AI232 local menu system, including:

- Creating, modifying, or deleting users and passwords

- Accessing the AI232 menu

- Configuring PVCs

- Monitoring performance and diagnostic information

- Pinging an IP address

- Setting up an ARP table

- Setting the trace level.

Shell Connections

Before using the shell commands, a shell connection to AI232 must be established. You can connect locally using an asynchronous port on the AI232 front panel or remotely using a Telnet connection.

Establishing a Local Shell Connection

Establish a local shell connection to AI232 through any port configured as a login port. (By default, all ports are configured as login ports, but only port 1 is enabled.)

1. Use a PC or laptop with terminal emulation software such as HyperTerminal to connect to AI232. For information on operating your particular terminal emulation software, refer to the documentation provided with the program.

2. Set up your terminal emulation software to connect using COM port 1 (**COM1**).

3. Configure COM port 1 with the following parameters:

    - Bits per second: 9600

    - Data bits: 8

    - Parity: None

    - Stop bits: 1

    - Flow control: None

4. From within your terminal emulation software, press ENTER to request a login prompt.

5. At the login prompt, enter your user name.

6. At the password prompt, enter your password.

> 🖉
> **Notes:** `ai` is the default user name and password. AI232 allows only five logins using the default password. On the sixth login, AI232 will prompt you to change the default password to a new password.

> 🖉 Keep a copy of your username and password in a safe place. If you lose or forget your password on AI232 in standalone mode, you must call AI customer service for assistance in gaining access to the card.

The destination menu appears.

7. Enter `ai`.

Establishing a Remote Shell Connection

Establish a remote shell connection to AI232 using AI198 command `telnet` or using another Telnet client. To establish a Telnet session:

1. Use a PC or laptop with terminal emulation software such as HyperTerminal to connect to AI232. For information on operating your particular terminal emulation software, refer to the documentation provided with the program.

2. For user name, enter `ai`.

3. For password, enter `ai`. The destination menu appears.

4. For destination, enter `ai`. The `[232]` prompt appears.

winslc Commands

The winslc commands let the user communicate with AI232 from AI198. Use these commands to enter data, diagnose problems, and retrieve information from AI232.

Displaying winslc Command Logging

To monitor winslc commands, press CTRL+l when logged into AI198 to turn on logging.

Using winslc Commands

To use winslc commands, the user must be logged into AI198 to receive output from AI232. AI198 relays the command to AI232, which processes the command and sends the result to the system log port (as configured in AI198 Menu 1.1). Valid winslc commands are:

- arp
- break
- creset
- diag-tconn
- help
- ip
- link
- panic
- ping

- pvclist
- router
- show
- staeia
- staslc
- tcpoutconn
- telnet
- update
- xon-interval

From the AI198, you can view the available winslc commands by entering the following command:

    winslc *baseport* help

where *baseport* specifies the baseport number of AI232.

Log/Alarm Message Header

To obtain output from winslc commands, enable the activity/alarm log (AI198 Menu 1.1, menu item 01*The activity and alarm log is turned). The first line of the response for most winslc commands shows the following standard log/alarm message header:

```
>@AI19807:42:26 081104 Sev=F Base=016 Msg:
```

Table 8-1 describes the Log/Alarm message header elements.

Table 8-1   Log/Alarm Message Header Elements

Header Element	Description
@AI198	Specifies the node name for the device that is producing the log/alarm message (in this case, AI198).
7:42:26	Specifies the current time.

Table 8-1   Log/Alarm Message Header Elements (Continued)

Header Element	Description
081104	Specifies the current date.
Sev=F	Specifies the message severity level.
Base=016	Specifies the line card baseport number.
Msg	Introduces the log/alarm message.

aaa account

Description

This command enables or disables TACACS+ accounting of user login events and shell command events. An accounting start packet or stop packet is issued each time a user logs into or out of AI232. An accounting start packet is also issued for each shell command that is run.

✎

Note: If enabled, accounting is performed for all shell connection types (Async, Telnet, and FTP), even if authentication is disabled. For information about authentication, refer to command aaa authen on page 8-7.

Command Type

shell

Formats

```
aaa account { disable | enable }
```

Parameters

disable   Disables TACACS+ accounting.

enable   Enables TACACS+ accounting.

Command Defaults

Disabled TACACS+ accounting

Examples

This example displays the enabling of TACACS+ accounting.

```
[232]aaa account enable
[232]
```

aaa authen

Description

This command enables or disables TACACS+ authentication for AI232 command shell access. TACACS+ authentication may be enabled on all connections, or on a connection type basis. By default, TACACS+ authentication is disabled on all connection types.

Command Type

shell

Formats

```
aaa authen { enable | disable } [ all | async | telnet | ftp ]
```

Parameters

`enable`	Enables TACACS+ authentication.
`disable`	Disables TACACS+ authentication.
`all`	Enables or disables TACACS+ authentication on all connection types.

   Note: If no connection type is specified, `all` is automatically selected.

`async`	Enables or disables TACACS+ authentication on asynchronous link connections.
`telnet`	Enables or disables TACACS+ authentication on Telnet connections.
`ftp`	Enables or disables TACACS+ authentication on FTP connections.

Examples

This example displays the enabling of TACACS+ authentication on all connection types.

```
[232]aaa authen enable
[232]
```

This example displays the disabling of TACACS+ authentication on asynchronous link connections.

```
[232]aaa authen disable async
[232]
```

aaa author

Description

This command configures the TACACS+ authorization method for the AI232 shell. The authorization method can be either privilege level or per-command. Privilege level authorization is based on the priv-lvl returned from the TACACS+ server. Per-command authorization requires AI232 to contact the TACACS+ server for each shell command run by a user. Individual commands are then allowed or denied.

🖉

Note: Authorization is performed only on the connection types that have enabled authentication. For information about enabling authentication, refer to command [aaa authen on page 8-7](#).

Command Type

shell

Formats

```
aaa author { priv-lvl | command }
```

Parameters

priv-lvl   Configures the TACACS+ authorization method based on the priv-lvl returned from the TACACS+ server.

command   Configures the TACACS+ authorization method that requires AI232 to contact the TACACS+ server for each shell command run by a user. Individual commands are then allowed or denied.

Command Defaults

priv-lvl

Examples

This example displays the configuration of per-command TACACS+ authorization.

```
[232]aaa author command
[232]
```

aaa chpass

Description

This command changes the current user's password on the TACACS+ server.

🖉

Note: The TACACS+ server may not support, or be configured to support, password changes.

Command Type

shell

Formats

aaa chpass

Examples

This example displays a successful password change on a TACACS+ server.

```
[232] aaa chpass

Old Password:

New Password:

Re-enter New password:
Password Changed


Password Change was successful
[232]
```

aaa fallback

Description

This command enables or disables TACACS+ fallback for shell access. If TACACS+ fallback is enabled and attempts to contact all configured TACACS+ servers fail, then AI232's user database is used for authentication and authorization. The AI232 local log file is used for accounting.

Command Type

shell

Formats

```
aaa fallback { disable | enable }
```

Parameters

disable   Disables TACACS+ fallback.

enable   Enables TACACS+ fallback.

Command Defaults

Enabled TACACS+ fallback

Examples

This example displays the disabling of TACACS+ fallback.

```
[232]aaa fallback disable
[232]
```

aaa ppp authen

Description

This command enables or disables TACACS+ authentication and sets the fallback mode for specified AsyncPPP links.

✐

Note: The link type must be set to AsyncPPP for this command to have any effect.

Command Type

shell

Formats

aaa ppp authen { *link_range* | * } { disable | enable | fallback }

Parameters

link_range	Defines a link or range of links. Valid values are 1 to 32. Individual values are separated by commas (,) and hyphens (-). For example, 1,4-6 specifies links 1, 4, 5, and 6.
*	Specifies all links.
disable	Disables TACACS+ authentication.
enable	Enables TACACS+ authentication with no fallback.
fallback	Enables TACACS+ authentication with fallback.

Command Defaults

Disabled (all links)

Examples

This example displays the enabling of TACACS+ authentication for link range 19,23-29.

```
[232]aaa ppp authen 19,23-29 enable
[232]
```

aaa profile

Description

This command associates a custom profile with a privilege level or range of privilege levels. The following rules apply:

- TACACS+ privilege levels range from 0 to 15.

- Custom profiles can be associated with privilege levels 2 through 14.

- Privilege levels 2 through 14 default to the management system profile.

- Privilege levels 0, 1, and 15 are reserved for the Status, Management, and Supervisor system profiles (respectively).

For information on creating custom profiles, refer to command <u>profile on page 8-78</u>.

Privilege levels are used only if the authorization method is set to `priv-lvl`. The only exception to this occurs under all of the following conditions:

1. The authentication server returns a privilege level.

2. The authorization server cannot be reached.

3. The authorization is set to per-command and fallback is enabled.

For information on configuring the authorization method, refer to command <u>aaa author on page 8-8</u>.

Command Type

shell

Formats

    aaa profile { *priv_range* } { *profile_name* | default }

Parameters

priv_range   Defines the range of privilege levels that will be associated with the profile. Individual values are separated by commas (,) and hyphens (-). For example, `1,4-6` specifies privilege levels 1, 4, 5, and 6.

profile_name   Specifies the name of an existing profile.

default   Removes the association between a range of privilege levels and a profile.

Command Defaults

No associations configured

Examples

This example associates privilege level 2 with profile newprof1:

```
[232] aaa profile 2 newprof1
[232]
```

This example associates privilege levels 3 to 6 and 14 with profile newprof2:

```
[232] aaa profile 3-6,14 newprof2
[232]
```

aaa retry

Description

This command configures the number of consecutive connection attempts that are made to a TACACS+ server before the attempt fails.

Note: Consecutive attempts are only made if the TACACS+ server responds but refuses a connection. If no response is received from a TACACS+ server before the configured timeout period, then no further connection attempts are made. For information on configuring the timeout period, refer to command <u>aaa timeout on page 8-19</u>

Command Type

shell

Formats

```
aaa retry { retry_count | default }
```

Parameters

retry_count   Defines the number of consecutive connection attempts that are made. Valid values are 1 to 100.

`default`   Resets the number of connection attempts to the default value.

Command Defaults

1 connection attempt

Examples

This example displays the configuration of consecutive connection attempts to 5.

```
[232] aaa retry 5
[232]
```

aaa stats

Description

This command displays or clears AAA specific counters and statistics.

Command Type

shell

Formats

```
aaa stat [ clear ]
```

Parameters

`clear`   Clears all counters and statistics.

Examples

This example displays all AAA specific counters and statistics.

```
AAA Statistics
--------------
Authentication Attempts:  0
Authentication Failures:  0
Authentication Fallbacks: 0

Authorization Attempts:  0
Authorization Failures:  0
Authorization Fallbacks: 0

Accounting Attempts:  0
Accounting Failures:  0
Accounting Fallbacks: 0

[232]
```

Display Item	Description
Authentication Attempts	Displays the number of TACACS+ authentication attempts.
Authentication Failures	Displays the number of failed TACACS+ authentication attempts.
Authentication Fallbacks	Displays the number of TACACS+ authentication fallbacks, where AI232's user database was used for authentication instead of the TACACS+ server.

Display Item	Description
`Authorization Attempts`	Displays the number of TACACS+ authorization attempts.
`Authorization Failures`	Displays the number of failed TACACS+ authorization attempts.
`Authorization Fallbacks`	Displays the number of TACACS+ authorization fallbacks, where AI232's user database was used for authorization instead of the TACACS+ server.
`Accounting Attempts`	Displays the number of TACACS+ accounting attempts.
`Accounting Failures`	Displays the number of failed TACACS+ accounting attempts.
`Accounting Fallbacks`	Displays the number of TACACS+ accounting fallbacks, where AI232's system log was used for accounting instead of the TACACS+ server.

aaa summary

Description

This command displays a summary of all authentication, authorization, and accounting settings.

Command Type

shell

Formats

`aaa summary`

Examples

This example displays a summary of all authentication, authorization, and accounting settings.

```
[232] aaa summary

Async Shell Access:      Local
Telnet Shell Access:     Local
FTP Access:              Local
Authorization:           Priv-lvl
Accounting:              Disabled
Fallback:                Disabled
AAA Timeout:             15 seconds
AAA Retry Count:         5


Priv-lvl  2: newprof1
Priv-lvl  3: newprof2
Priv-lvl  4: newprof2
Priv-lvl  5: newprof2
Priv-lvl  6: newprof2
Priv-lvl 14: newprof2
[232]
```

Display Item	Description
Async Shell Access	Displays the status of asynchronous shell access as AAA (TACACS+ authentication enabled) or local (TACACS+ authentication disabled).
Telnet Shell Access	Displays the status of Telnet shell access as AAA (TACACS+ authentication enabled) or local (TACACS+ authentication disabled).

Display Item	Description
FTP Access	Displays the status of FTP access as AAA (TACACS+ authentication enabled) or local (TACACS+ authentication disabled).
Authorization	Displays the TACACS+ authorization method for the AI232 shell as Priv-lvl (based on the user's privilege level) or Per-command (based on per-command request/reply handling).
Accounting	Displays the TACACS+ accounting status of user login events and shell command events as Enabled or Disabled.
Fallback	Displays the status of TACACS+ fallback as Enabled or Disabled.
AAA Timeout	Displays the number of seconds AI232 will wait for a response from a TACACS+ server. If no response is received from the server in the allowed number of seconds, the connection attempt fails.
AAA Retry Count	Displays the number of consecutive connection attempts that are made to a TACACS+ server before the attempt fails.
Priv-lvl settings	Displays the configured privilege levels with their associated profiles.

aaa timeout

Description

This command configures the number of seconds to wait for a response from a TACACS+ server. If no response is received from the server in the allowed number of seconds, the connection attempt fails.

Command Type

shell

Formats

aaa timeout { *timeout_value* | default }

Parameters

timeout_value   Defines how long (in seconds) AI232 will wait for a response from a TACACS+ server when a connection attempt is made. Valid values are 1 to 120.

default   Resets the timeout value to its default.

Command Defaults

15 seconds

Examples

This example displays the configuration of the TACACS+ timeout value to 93 seconds.

```
[232]aaa timeout 93
[232]
```

alarm

Description

This command:

- Displays a list of the alarm groups and the overall alarm severity

- Displays alarms for a specified alarm group or for a specified range of severity levels within an alarm group

- Displays alarms by severity level or for a specified range of severity levels

- Clears all non-self-clearing alarm groups and the overall alarm severity

- Clears a specified non-self-clearing alarm group

- Masks a specified alarm group

- Unmasks a specified alarm group.

Command Type

shell

Formats

alarm [*group* [*range*]]

alarm -sev [*range*]

alarm { -clear [*group*] | -mask *group* | -unmask *group* }

Parameters

group	Defines the group of alarms to display, clear, mask, or unmask. Valid values are existing alarm groups.
range	Defines a range of alarm severity levels to display. Valid values are 1 to 32. Individual values in the range are separated by hyphens (-).
-sev	Displays all alarms or a range of alarms based severity level.
-clear	Clears all non-self-clearing alarm groups or a specified non-self-clearing alarm group.

      ✎

    Note: Only non-self-clearing alarm groups can be manually cleared. Self-clearing alarms clear themselves when the problem that caused the alarm is resolved.

-mask	Prevents a specified alarm group from affecting overall alarm severity.
-unmask	Allows a specified alarm group to affect overall alarm severity.

Examples

This example displays a list of the alarm groups and the overall alarm severity.

```
[232] alarm
 Alarm Group Sev Date & Time Message (most recent, most severe in group)
 ----------- --- ----------- ----------------------------------------------
*general      0  00-00 00:00
 links        0  06-05 21:19 Link 3 up.
 ----------- --- ----------- ----------------------------------------------
*not self-clearing    () masked
 Overall alarm severity: 0
[232]
```

This example displays all system alarms in group links.

```
[232] alarm links
 Num Sev Date & Time Message
 --- --- ----------- -----------------------------------------
   1  0  00-00 00:00
   2  0  00-00 00:00
   3  0  00-00 00:00
   4  0  00-00 00:00
   5  0  00-00 00:00
   6  0  00-00 00:00
   7  0  00-00 00:00
   8  0  00-00 00:00
   9  0  00-00 00:00
  10  0  00-00 00:00
  11  0  00-00 00:00
  12  0  00-00 00:00
  13  0  01-26 15:34 Link 13 up.
  14  0  01-26 15:34 Link 14 up.
  15  0  00-00 00:00
  16  0  00-00 00:00
  17  0  00-00 00:00
  18  0  00-00 00:00
  19  0  00-00 00:00
  20  0  00-00 00:00
  21  0  00-00 00:00
  22  0  00-00 00:00
  23  0  00-00 00:00
  24  0  00-00 00:00
  25  0  00-00 00:00
  26  0  00-00 00:00
  27  0  00-00 00:00
  28  0  00-00 00:00
  29  0  00-00 00:00
  30  0  00-00 00:00
  31  0  00-00 00:00
  32  0  00-00 00:00
 --- --- ----------- -----------------------------------------
 'links' alarm group severity: 0
[232]
```

This example displays alarms for links `5-8` in group `links`.

```
[232]alarm links 5-8
 Num Sev Date & Time Message
 --- --- ----------- -------------------------------------------
   5  4  06-13 14:40 Link 5 is enabled but has not come up.
   6  0  06-13 14:40 Link 6 up.
   7  0  06-13 14:40 Link 7 up.
   8  0  06-13 14:40 Link 8 up.
 --- --- ----------- -------------------------------------------
 'links' alarm group severity: 4
[232]
```

This example displays all alarms by severity level.

```
[232]alarm -sev
Alarm Group Num Sev Date & Time Message
----------- --- --- ----------- -------------------------------------------
links         1   4  06-13 14:40 Link 1 is enabled but has not come up.
links         5   4  06-13 14:40 Link 5 is enabled but has not come up.
links        10   4  06-13 14:40 Link 10 is enabled but has not come up.
links        12   4  06-13 14:40 Link 12 is enabled but has not come up.
general       1   6  06-13 14:40 Unable to find auto ID name of 222 board
----------- --- --- ----------- -------------------------------------------
( ) masked
[232]
```

This example displays all alarms that have a severity level between `4` and `7`.

```
[232]alarm -sev 4-7
Alarm Group Num Sev Date & Time Message
----------- --- --- ----------- -------------------------------------------
links         1   4  06-13 14:40 Link 1 is enabled but has not come up.
links         5   4  06-13 14:40 Link 5 is enabled but has not come up.
links        10   4  06-13 14:40 Link 10 is enabled but has not come up.
links        12   4  06-13 14:40 Link 12 is enabled but has not come up.
general       1   6  06-13 14:40 Unable to find auto ID name of 222 board
----------- --- --- ----------- -------------------------------------------
( ) masked
[232]
```

This example displays the clearing of all non-self-clearing alarm groups.

```
[232] alarm -clear
Alarm groups cleared.
Overall alarm severity set to 0.
[232]
```

This example displays the clearing of non-self-clearing alarm group `general`.

```
[232] alarm -clear general
Alarm group cleared.
[232]
```

This example displays the prevention of alarm group `links` from affecting the overall alarm severity.

```
[232]alarm -mask links
Alarm group masked.
[232]alarm
```

This example displays the unmasking of alarm group `links`.

```
[232]alarm -unmask links
Alarm group unmasked.
[232]
```

arp

Description

This command displays, deletes, or adds entries in the ARP cache.

Command Types

shell and winslc

Formats

For the shell:

> arp -a [*ip_address*]
>
> arp -d *ip_address*
>
> arp -s *ip_address* *mac_address*

For the winslc command:

> winslc *baseport* arp -a [*ip_address*]
>
> winslc *baseport* arp -d *ip_address*
>
> winslc *baseport* arp -s *ip_address* *mac_address*

Parameters

-a	Displays all entries in the ARP cache table or just the *ip_address* entry.
ip_address	Defines the IP address of the destination device in dotted decimal format.
-d	Deletes an entry from the ARP cache table.
-s	Adds a permanent entry to the ARP cache for the current session. Permanent entries must be in the same subnetwork as the IP address of the destination device.
mac_address	Defines the MAC address of the destination device.
baseport	Defines the baseport number for AI232.

Examples

This example displays all ARP cache entries.

```
[232] arp -a

Internet Address       Ethernet Address    Type     Life
172.16.52.16           00-00-92-90-F2-D9   temp      5 mins
172.16.2.9             00-40-72-00-7F-96   temp      2 mins
[232]
```

Column	Description
Internet Address	Displays the IP address of the destination device.
Ethernet Address	Displays the MAC address of the destination device.
Type	Displays the type of ARP cache entry as perm or temp. Type temp specifies that the entry is temporary and will be deleted when the time interval specified in the Life column expires. Type perm specifies that the entry was entered by the user with the **-s** option. This entry will not expire and can be removed using the **-d** delete option. 🖉 **Note:** Resetting AI232 clears both permanent and temporary entries.
Life	Displays the time interval for which the temporary entry will remain in the ARP cache.

This example displays an ARP cache entry with IP address 172.16.31.100.

```
[232] arp -a 172.16.31.100

Internet Address       Ethernet Address    Type     Life
172.16.31.100          08-00-09-7B-88-0C   temp      5 mins
[232]
```

This example displays the configuration of an ARP cache entry with IP address 172.16.31.106 and MAC address 08-00-09-4a-c5-5a.

```
[232] arp -s 172.16.31.106 08-00-09-4a-c5-5a
172.16.31.106 mapped to Ethernet address 08-00-09-4A-C5-5A

[232]
```

This example displays the deletion of an ARP cache entry with IP address
172.16.30.117.

```
[232] arp -d 172.16.30.117

Mapping for 172.16.30.117 deleted

[232]
```

break

Description

This command terminates an asynchronous or shell connection. Use command <u>diag-tconn on page 8-55</u> (not command <u>who on page 8-123</u>) when referencing connections and connection ID numbers.

✏

Note: This command only works for calls connected to the shell.

⚠

CAUTION: This command operates without regard to current activity on the serial port.

Command Types

shell and winslc

Formats

For the shell command:

> **break** { *link_number* | *connection_origin* }

> **break -id** *id_number*

For the winslc command:

> **winslc** *baseport* **break** { *link_number* | *connection_origin* }

> **winslc** *baseport* **break -id** *id_number*

Parameters

link_number	Defines the link number for the connection being terminated.
connection_origin	Defines the IP address and port number of the device connection being terminated.
id_number	Defines the ID number of the device connection being terminated.
baseport	Defines the baseport number for AI232.

Examples

This example displays the termination of a shell connection for a device with IP address 10.40.5.11 and port number 1821.

```
[232]break 10.40.5.11#1821
Breaking connection:   10.40.5.11#1821
[232]
```

This example displays the termination of a connection for a device with ID 65.

```
[232]break -id 65
Breaking connection with ID:   65
[232]
```

creset

Description

This command resets the error counters for a link or a range of links. There is no output for this command. To see if the error counters were reset for the links you specified, enter command .

Command Types

shell and winslc

Formats

For the shell command:

    creset *range*

For the winslc command:

    winslc *baseport* creset *range*

Parameters

range   Defines the link or a range of links being reset. Valid values are:
- A single link number (for example, 3 to reset error counters for link 3)
- A series of link numbers separated by commas (for example, 1, 2, 3 to reset error counters for links 1, 2, and 3)
- A range of link numbers separated by a dash (for example, 1-2 to reset error counters for links 1 and 2)
- Any combination of a single link number, series, and/or range (for example, 1, 2-3 to reset error counters for links 1, 2, and 3)
- * to reset error counters for all links.

baseport   Defines the baseport number for AI232.

Examples

This example displays the resetting of error counters for links 5 to 7.

```
[232]creset 5-7
[232]
```

date

Description

This command sets and displays the date and the time for AI232 when it is operating in standalone mode.

Command Types

shell

Formats

```
date
```

Examples

This example displays the configuration of date 08-04-2005 and time 10:24:49 for AI232 in standalone mode.

```
[232]date
Today is Thursday 05-01-2004 01:09:52
Please enter the date and/or time.
Use 'MM-DD-YYYY' and/or 'hh:mm:ss' (24-hour format): 08-04-2005 10:24:49
[232]
```

debug

Description

This command enables or disables the logging of debugging data.

Tip: You have to have logging turned on to view debug information from a shell connection.

Command Type

shell

Formats

```
debug { alias | x25 | pvcfsm | asypvcfsm | nlipvcfsm | tpifsm |
modmuxfsm | allfsm | pppfsm | linkChange | bootp | all } { on | off }
```

Parameters

`alias`	Enables or disables the logging of alias translation debugging data.
`x25`	Used primarily by AI Technical Support to isolate system faults.
`pvcfsm`	Used primarily by AI Technical Support to isolate system faults.
`asypvcfsm`	Used primarily by AI Technical Support to isolate system faults.
`nlipvcfsm`	Used primarily by AI Technical Support to isolate system faults.
`tpifsm`	Used primarily by AI Technical Support to isolate system faults.
`modmuxfsm`	Used primarily by AI Technical Support to isolate system faults.
`allfsm`	Used primarily by AI Technical Support to isolate system faults.
`pppfsm`	Used primarily by AI Technical Support to isolate system faults.
`bootp`	Enables or disables the logging of bootp attempts so that users can determine if the bootp process is still underway or if it has been completed.
`linkChange`	Enables or disables the logging of debugging data when the PPP protocol on a link has gone down.
`all`	Enables or disables the logging of all debugging data.
`on`	Enables the logging of specified debugging data.
`off`	Disables the logging of specified debugging data.

Examples

This example displays the enabling of all debug data logging.

```
[232]debug all on
debug alias is on
debug pvcfsm is on
debug asypvcfsm is on
debug nlipvcfsm is on
debug tpifsm is on
debug modmuxfsm is on
debug allfsm is on
debug pppfsm is on
debug linkChange is on
debug bootp is on
[232]
```

delete

Description

This command deletes a specified file that resides on AI232.

Command Type

shell

Formats

delete *filename*

Parameters

filename　　Defines the name of the file to delete.

Examples

This example displays the deletion of file `log.txt`.

```
[232]delete log.txt
Are you sure you want to delete 'log.txt'? (y/n) y
log.txt deleted.
[232]
```

diag-conn

Description

This command displays a list of enabled links along with connection information for each link. Data can be displayed continuously, one page at a time, or sent to the screen one time only for all connections. The default mode is a continuous display.

Command Type

shell

Formats

diag-conn

Examples

This example displays existing connections across AI232.

```
C O N N E C T I O N S  Mode: Continuous  [Search Inactive]

103.  ASY.1.1                  [ Idle          ]
113.  TCP 172.16.2.9#1032      <--Data Transfer-->   SHELL

Enter S-kip, I-nternal, A-ll, M-ore, D-etail, F-ind, P-revPg, N-extPg or Q-uit:
```

🖉

Note: For explanations of the states shown, such as idle and data transfer, refer to section .

Display Item	Description
S-kip	This option bypasses connections. It gives a prompt for the number of connections to skip.
I-nternal	This option toggles between I-nternal and H-ide Int. I-nternal displays all the internal loopback connections along with other connections.
A-ll	This option displays all connections without page breaks. The display does not show duplicate connections. For example, if connection number 15 is connected to 30, the connection from 30 to 15 will not appear.
M-ore	This option toggles between M-ore and L-ess. It displays the link and PVC number for X.25 PVCs, the link and X.121 addresses for X.25 SVCs, and the alias used to make the connection.

Display Item	Description
`D-etail`	This option prompts for the ID of the connection to view and displays details for that connection.
`F-ind`	This option displays specific types of connections. `F-ind` indicates text matches that are applied to the display lines. The matching is not case-sensitive. The logic for the matches can be AND or OR. PATTERN 1, LOGIC 2, and PATTERN 3 are evaluated before LOGIC 4 and PATTERN 5 are considered.
`P-revPg`	This option displays the previous page of connections. Twenty connections per page appear. The numbers that appear in front of the description (for example, `103.` and `113.`) are relative numbers and do not represent any particular link, port, or PVC. The display does not show duplicate connections. For example, if connection number 15 is connected to 30, the connection from 30 to 15 will not appear.
`N-extPg`	This option displays the next page of connections. Twenty connections per page appear. The numbers that appear in front of the description (for example, `103.` and `113.`) are relative numbers and do not represent any particular link, port, or PVC. The display does not show duplicate connections. For example, if connection 15 is connected to 30, the connection from 30 to 15 will not appear.
`Q-uit`	This option exits the command display and returns the user to the prompt.

diag-eth

Description

This command monitors and displays Ethernet diagnostic information.

Using Interpretation Mode

There are three levels of diagnostic information:

● Minimum—Displays minimal diagnostic information (mostly the packet's source and destination). This is the default interpretation mode setting.

● Medium—Displays protocol fields that are likely to change for each packet, as well as those with values that are out of the ordinary.

● Maximum—Displays all protocol fields.

To configure interpretation mode:

1. At the prompt, enter `diag-eth`.

2. Enter `interpret minimum`, `interpret medium`, `interpret maximum`, or `interpret`.

Tip: Entering `interpret` with no additional parameter toggles interpretation off and on. When interpretation is toggled from off to on, the diagnostic level is set to the minimum level (the default).

Using the Timestamp Option

Timestamps can be configured to appear on the diagnostic display. The time that appears is the number of days, hours, minutes, seconds, and thousandths of a second since AI232 was last reset.

To enable or disable timestamp display:

1. At the prompt, enter `diag-eth`.

2. Enter `timestamp` to toggle between enabling and disabling the display of the timestamp.

Using Promiscuous Mode

Promiscuous mode can be enabled or disabled during Ethernet diagnostic sessions. By disabling promiscuous mode, only packets traveling on the network that are destined for your Ethernet card appear. By enabling promiscuous mode, all the packets traveling on the network appear.

To enable and disable promiscuous mode:

1. At the prompt, enter `diag-eth`.

2. Enter **promiscuous** to toggle between enabling and disabling promiscuous mode.

✎

Note: Operating AI232 in the promiscuous mode can reduce performance. The default setting is disabled promiscuous mode. AI232 automatically returns to the default setting (promiscuous mode disabled) when the user quits the **diag-eth** command.

Using the Help Option
To obtain command help:

1. At the prompt, enter **diag-eth**.

2. Enter **help**. The **diag-eth** help screen appears.

Configuring Filters
While using the **diag-eth** command, various filters can be defined to display specific or general diagnostic information.

💡

Tip: There is help associated with the **filter** command. To view this help, enter **filter** after you enter **diag-eth**. The **filter** help screen appears.

Important: If you are connecting to AI232 using Telnet, remember to filter out the traffic associated with the telnet connection. Failure to do so can cause the diagnostic program to become overloaded, which makes AI232 unresponsive.

To configure a filter:

1. At the prompt, enter **diag-eth**.

2. Enter the desired filter. Refer to section for information on filter formats.

Capturing Data
While using the **diag-eth** command, data can be captured for Ethernet diagnostics. All variables and filters can be configured for specific or general information capture.

To configure data capture:

1. Define the following settings:

   ● Interpretation Mode

   ● Timestamp Mode

   ● Promiscuous Mode

   ● Data Mode

   ● Filters

2. Enter **go**. The system starts capturing data with the user-defined settings and filters.

3. Enter **stop** to stop capturing data.

Exiting the diag-eth Session

To exit the **diag-eth** session, type **quit**. The [232] prompt appears.

Command Type

shell

Formats

    diag-eth

The following formats apply to filters:

    filter { add | delete } [src mac_address] [dst mac_address]
    filter { add | delete } [src ip_address] [dst ip_address]
    filter { add | delete } [src ip_address#port_number]
    [dst ip_address#port_number]
    filter { add | delete } [src *#port_number] [dst *#port_number]
    filter { add | delete } protocol [ip | tcp | udp | icmp | arp | osi]
    filter { add | delete } all
    filter list

Parameters

add	Adds a filter.
delete	Deletes a filter.
src	Defines the source address (MAC, IP, or TCP/UDP) for the filter being created.
mac_address	Defines the MAC address to use for either the source or destination of the filter being created.
dst	Defines the destination address (MAC, IP, or TCP/UDP) for the filter being created.
ip_address	Defines the IP address to use for either the source or destination of the filter being created.
ip_address#port_number	Defines the IP address and the TCP/UDP port number for either the source or destination of the filter being created.

*#*port_number*	Defines the TCP/UDP port number regardless of the MAC/IP address settings.
protocol	Adds or deletes a specific protocol filter. Available protocol filters are: ● ip ● tcp ● udp ● icmp ● arp ● osi.
all	Deletes all the filters or adds a filter to show all Ethernet traffic.
list	Lists all the filters in the system.

Examples

This example displays the configuration of diagnostic interpretation level `medium` for the Ethernet diagnostic session display.

```
[232]diag-eth
interpret medium
Interpretation is now set to MEDIUM.
```

This example displays the enabling and disabling of the timestamp display.

```
[232]diag-eth
timestamp
Timestamps will now be displayed.
timestamp
Timestamps will no longer be displayed.
```

This example displays the enabling and disabling of promiscuous mode.

```
[232]diag-eth
promiscuous
The ethernet chip is now in promiscuous mode.
promiscuous
The ethernet chip is now in normal mode.
```

This example displays Ethernet diagnostic help information.

```
[232]diag-eth
help
Commands for diag-eth:
  interpret    Turn on data interpretation.
  quit         Exit diag-eth.
  help         Display this help text.
  data         Toggle uninterpreted data display.
  timestamp    Toggle data timestamping.
  go           Begin data capturing.
  stop         Terminate data capturing.
  filter       Add a data filter.
  promiscuous  Toggle promiscuous mode for the ethernet chip.
```

This example displays the help associated with the Ethernet diagnostic `filter` command.

```
[232]diag-eth
filter
Usage: FILTER <ADD|DELETE> [SRC <mac>] [DST <mac>]
       FILTER <ADD|DELETE> [SRC <ipAddr>] [DST <ipAddr>]
       FILTER <ADD|DELETE> [SRC <ipAddr#port>] [DST <ipAddr#port>]
       FILTER <ADD|DELETE> [SRC <*#port>] [DST <*#port>]
       FILTER <ADD|DELETE> PROTOCOL <IP|TCP|UDP|ICMP|ARP|OSI>
       FILTER <ADD|DELETE> ALL
       FILTER LIST

  Where:
       <mac>       is the MAC address desired, with the format
                   XX:XX:XX:XX:XX:XX, with each 'X' representing
                   a hexidecimal digit.
       <ipAddr>    is the desired IP address, with the format
                   X.X.X.X, where 0 < X < 256.
       <port>      is the desired TCP port.
```

This example displays the diagnostic Ethernet display when the following parameters are entered:

- `interpret max` to set maximum interpretation
- `timestamp` to enable timestamping
- `promiscuous` to enable promiscuous mode
- `filter add src 172.16.2.9` to add a filter for address `172.16.2.9`
- `data` to display data
- `go` to start the data capture
- `stop` to stop capturing data.

```
[232]diag-eth
interpret max
Interpretation is now set to MAXIMUM.
timestamp
Timestamps will now be displayed.
promiscuous
The ethernet chip is now in promiscuous mode.
filter add src 172.16.2.9
New filter added.
data
Uninterpreted data will now be displayed.
go
--------------------------------------------------------------------------
Timestamp: 0d 00:31:25.356
<- Ethernet: [ 00:40:72:00:7F:96 ] -> [ 00:00:0C:7E:F2:72 ]
            Protocol [ 0x0800:IP ]

   IP:      [ 172.16.2.9 ] -> [ 172.16.0.1 ]
            Version [ 4 ]
            Header Length [ 20 bytes ]
            Type-Of-Service [ none ]
            Identifier [ 37903 ]
            Fragmentation Flags [ none ] Offset [ 0 bytes ]
            Time-To-Live [ 60 hops ]
            Protocol [ 0x01:ICMP ]

   ICMP:    Type [ 8 ] Code [ 0 ]
            (echo request)

   00 00 48 44 41 42 43 44 45 46 47 48 49 4A 4B 4C    ..HDABCDEFGHIJKL
   4D 4E 4F 50 51 52 53 54 55 56 57 58 59 5A 41 42    MNOPQRSTUVWXYZAB
   43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F 50 51 52    CDEFGHIJKLMNOPQR
   53 54 55 56 57 58 59 5A 41 42 43 44 45 46 47 48    STUVWXYZABCDEFGH
   49 4A 4B 4C                                        IJKL
--------------------------------------------------------------------------
stop
```

This example displays the diagnostic Ethernet display when the following is entered:

- `filter add src 00:40:72:00:d2:d9` to configure a filter with source MAC address 00:40:72:00:d2:d9
- `filter add dst 00:40:72:00:d2:d9` to configure a filter with destination MAC address 00:40:72:00:d2:d9
- `go` to start the capture
- `stop` to end the capture.

```
[232]diag-eth
filter add src 00:40:72:00:d2:d9
New filter added.
filter add dst 00:40:72:00:d2:d9
New filter added.
go
--------------------------------------------------------------------
<- 01 80 C2 00 00 00 00 40 72 00 D2 D9 00 26 42 42    .......@r....&BB
   03 00 00 00 00 81 00 20 00 40 72 00 D2 D9 00 00    ....... .@r.....
   00 00 00 20 00 40 72 00 D2 D9 80 65 00 00 07 00    ... .@r....e....
   09 00 0F 00 00 00 00 00 00 00 00 00                ............
--------------------------------------------------------------------
<- 00 40 72 00 D2 D9 00 40 72 00 7F 96 08 00 45 00    .@r....@r.....E.
   00 29 0F 81 00 00 3C 06 F4 8A AC 10 02 09 AC 10    .)....<.........
   20 9A 04 16 00 17 75 87 E4 2F 30 E0 B6 B4 50 10     .....u../0...P.
   08 00 A6 96 00 00 41 0D 01 B4 6D 74 01 B4 FF FC    ......A...mt....
--------------------------------------------------------------------
<- stop
```

This example displays the diagnostic Ethernet display when the following is entered:

- `filter add protocol tcp` to configure a filter with a defined TCP protocol
- `go` to start the capture
- `stop` to end the capture.

```
[232]diag-eth
filter add protocol tcp
New filter added.
go
--------------------------------------------------------------------
<- 00 A0 C9 22 D8 C4 00 00 92 B6 2F 97 08 00 45 2C    ..."....../...E,
   00 6C CF B7 40 00 80 06 69 4B AC 10 37 14 AC 10    .l..@...iK..7...
   32 28 10 9A 00 8B 01 67 55 24 00 D0 5D 81 50 18    2(.....gU$..].P.
   1E 59 5C 61 00 00 00 00 00 40 FF 53 4D 42 2B 00    .Y\a.....@.SMB+.
   00 00 00 18 03 80 00 00 00 00 00 00 00 00 00 00    ................
   00 00 07 08 FE CA 02 10 41 0F 01 01 00 1B 00 4C    ........A......L
   57 4F 20 43 57 20 56 4C 4F 20 44 45 4F 20 4D 41    WO CW VLO DEO MA
   57 20 4C 4D 57 20 41 52 57 00                      W LMW ARW.
--------------------------------------------------------------------
stop
```

This example displays the diagnostic Ethernet display when `filter list` is entered to display all filters.

```
[232]diag-eth
filter list
Filters currently being used by diag-eth:
  protocol tcp
  dst 00:40:72:00:d2:d9
  src 00:40:72:00:d2:d9
  dst 172.16.2.9
  src 172.16.2.9
  protocol tcp
```

This example displays the deletion of filter `protocol tcp`.

```
[232]diag-eth
filter delete protocol tcp
Filter 'protocol tcp' has been deleted.
```

This example displays the deletion of all filters.

```
[232]diag-eth
filter delete all
Filter 'dst 00:40:72:00:d2:d9' has been deleted.
Filter 'src 00:40:72:00:d2:d9' has been deleted.
Filter 'dst 172.16.2.9' has been deleted.
Filter 'src 172.16.2.9' has been deleted.
```

diag-info

Description

This command displays diagnostic information for asynchronous, Ethernet, and TCP connections as well as for memory. Different screens of information can be viewed depending on the command option that is entered. The screens display the state of serial links and system updates once per second. The available display options are M, A, E, and T. They display the following information:

● Option M displays the STREAMS allocation and memory information.

● Option A displays asynchronous information. This is the default display.

● Option E displays Ethernet information.

● Option T displays TCP data.

Note: Type X to exit the command display.

Command Type

shell

Formats

```
diag-info
```

Examples

This example displays diagnostic information for STREAMS allocation and memory, which are accessed by typing M.

```
            S T R E A M S    A L L O C A T I O N
NAME             FREE    ALLOC    %FREE      USED    FAIL    HWM
Queues           8361      239       97      1073       0    241
Streams          2085      115       94       532       0    116
Bufcalls           64        0      100         0       0      0
Timeouts         2387       13       99    402908       0     45
Message blocks  16015      369       97    588495       0    551
Data blocks:
Class 0          1519       17       98      7954       0     40
Class 1          4080       16       99       835       0     18
Class 2         14944       56       99    301866       0     64
Class 3          9981       19       99     11034       0     32
Class 4           500        0      100         0       0      0
Class 5           390      260       60    222746       0    263
Class 6             1        1       50         1       0      1
Extended          350        0      100         0       0      0

  S Y S T E M   A L L O C A T I O N   (alloc failed=0)
REGION:      ASIZ    CNT CNT_HWM    USED USED_HWM  UNIT_SIZE
AI1        741664    324     424   17632    20704         32
AI2        741664      0       0       0        0         32
AI3        741664     32      36  179296   180832         32
Enter M-emory, A-sync, E-thernet, T-cp or Q-uit:
```

Column	Description
NAME	Displays the name of the STREAMS resource.
FREE	Displays the number of free or available STREAMS resources.
ALLOC	Displays the number of STREAMS resources allocated at the time of the display.
%FREE	Displays the percentage of free or available STREAMS resources.
USED	Displays the number of STREAMS resources used since AI232 was last reset.
FAIL	Displays the number of times an allocation failed.
HWM	Displays the highest number of resources ever allocated at one time.
REGION	Displays the memory allocation regions.
ASIZ	Displays the size of the memory allocation regions in bytes.
CNT	Displays the number of blocks allocated from a region (regardless of size).

Column	Description
CNT_HWM	Displays the highest number of blocks allocated since AI232 was last reset.
USED	Displays the number of bytes currently allocated from a region.
USED_HWM	Displays the highest number of bytes allocated since AI232 was last reset.
UNIT_SIZE	Displays the size in bytes of the memory units that can be allocated.

This example displays diagnostic information for asynchronous connections, which is accessed by typing A. This is the default display.

```
                          ASYNC DIAG INFO

LINK    STATE    BYTES_IN    BYTES_OUT       LINK    STATE    BYTES_IN    BYTES_OUT
  1       1          0            0            16       0         0            0
  2       1          0            0            17       0         0            0
  3       1          0            0            18       0         0            0
  4       0          0            0            19       0         0            0
  5       0          0            0            20       0         0            0
  6       0          0            0            21       0         0            0
  7       0          0            0            22       0         0            0
  8       0          0            0            23       0         0            0
  9       0          0            0            24       0         0            0
 10       0          0            0            25       0         0            0
 11       0          0            0            26       0         0            0
 12       0          0            0            27       0         0            0
 13       0          0            0            28       0         0            0
 14       0          0            0            29       0         0            0
 15       0          0            0            30       0         0            0
 16       0          0            0            31       0         0            0
 17       0          0            0            32       0         0            0
Enter M-emory, A-sync, E-thernet, T-cp or Q-uit:
```

Column	Description
LINK	Displays the link number.
STATE	Displays the state of the driver. Two states are available: • 0 specifies that the link is not established. • 1 specifies that the link is enabled. The link does not have to have a connection to be enabled.
BYTE_IN	Displays the number of bytes coming into the link.
BYTE_OUT	Displays the number of bytes going out of the link.

This example displays diagnostic information for the front panel Ethernet interface, which is accessed by typing **E**.

```
                                ETHERNET 0
Rx LG frame length violation: ---0
Rx NO nonoctet aligned frame: ---0
Rx SH short frame (runt): -------0
Rx CR CRC error: ---------------0
Rx OV overrun: -----------------0
Rx CL collision: ---------------0
Rx BSY buffers exhausted: -------0
Rx frames missed: --------------0
Rx frames received: ------------0
Rx bytes received: -------------0

Tx RL retry limit exceeded: -----0
Tx RC collisions: --------------0
Tx UN underruns: ---------------0
Tx LC late collisions:----------0
Tx CSL carrier sense lost: ------2451095
Tx queued buffers: -------------0
Tx frames sent: ----------------2451095
Tx bytes sent: ------------------233814304
Unexpected interrupts: ----------0
Enter M-emory, A-sync, E-thernet, T-cp or Q-uit:
```

Display Item	Description
`Rx LG frame length violation`	Displays the number of frame length violations in received packets.
`Rx NO nonoctet aligned frame`	Displays the number of misaligned, received frames.
`Rx SH short frame (runt)`	Displays the number of short received frames.
`Rx CR CRC error`	Displays the number of packets received that have had CRC errors.
`Rx OV overrun`	Displays the number of packets not received by the interface because of a receiver overrun.
`Rx CL collision`	Displays the transmit collisions on received frames. This is the number of times the Ethernet device goes to transmit but cannot because someone else is already transmitting.
`Rx BSY buffers exhausted`	Displays the number of times all receive buffers were used, but more were required.
`Rx frames missed`	Displays the number of frames that were supposed to be received, but were missed.

Display Item	Description
`Rx frames received`	Displays the number of frames received on the connection.
`Rx bytes received`	Displays the number of bytes received on the connection.
`Tx RL retry limit exceeded`	Displays the number of times transmitted frames exceeded the retry limit.
`Tx RC collisions`	Displays the number of transmit collisions. This is the number of times the Ethernet device goes to transmit but cannot because someone else is already transmitting.
`Tx UN underruns`	This displays the number of times the transmitter has run out of data due to the system being busy.
`Tx LC late collisions`	Displays the number of late collisions on transmitted frames.
`Tx CSL carrier sense lost`	Displays the number of times that the carrier sense was lost.
`Tx queued buffers`	Displays the number of queued buffers.
`Tx frames sent`	Displays the number of frames that were transmitted.
`Tx bytes sent`	Displays the number of bytes that were transmitted.
`Unexpected interrupts`	Displays the number of times that the transfer of frames was unexpectedly interrupted.

This example displays diagnostic information for the Ethernet sonic chip in use on this card (SONIC0), which is accessed by typing **E**.

```
                                  SONIC0
frames_received       2133706   2451073
bytes_received        204088549 233809600
frames_sent           317511
bytes_sent            38293966  0
collisions            116       0
transmit_errors       0         0
crc_errors            0         0
alignment_errors      0         0
missed_packets        0         0
rx_buffers_exhausted  0         0
heartbeatlost         0         0
rx_overruns           0         0
rba_exceeded          0         0
current_tda           8
ex_defers             0         0
ex_coll               0         0
tx_underruns          0         0
bad_tx_size           0         0
tx_blocked            0         2451086
tx_delayed            0         0
state                 2         2451086
eth intr stuck: 0----------------233812081
```

Display Item	Description
frames_received	Displays the number of frames received on the connection.
bytes_received	Displays the number of bytes received on the connection. 🖉 **Note:** This field displays a negative number after it reaches a count of 2,147,483,647. This is normal operation and does not indicate an error.
frames_sent	Displays the number of frames sent from the connection.
bytes_sent	Displays the number of bytes sent from the connection. 🖉 **Note:** This field displays a negative number after it reaches a count of 2,147,483,647. This is normal operation and does not indicate an error.
collisions	Displays the number of transmit collisions. This is the number of times the Ethernet device goes to transmit but cannot because someone else is already transmitting.
transmit_errors	Displays the number of transmit errors that have occurred.

Display Item	Description
crc_errors	Displays the number of packets received that have had CRC errors.
alignment_errors	Displays the number of alignment errors.
missed_packets	Displays the number of missed packets.
rx_buffers_exhausted	Displays the number of times all receive buffers were used, but more were required.
heartbeatlost	Displays if there is an error between the Ethernet interface and the Ethernet transceiver.
rx_overruns	Displays the number of packets not received by the interface because of a receiver overrun.
rba_exceeded	Displays the number of times that the maximum number of receive buffers have been exceeded.
current_tda	Displays the current data area being transmitted.
ex_defers	Displays the number of times that the maximum limit on the excessive deferral timer is exceeded. An excessive deferral error is recorded when the following events occur: ● A transmission attempt is made while another node is transmitting. ● The transmit period is longer than the excessive deferral timer limit.
ex_coll	Displays the number of times an excessive collision has been recorded. An excessive collision is recorded when a transmit attempt occurs 16 times and a collision occurs each time.
tx_underruns	Displays the number of times the transmitter has run out of data due to the system being busy.
bad_tx_size	Displays the number of times the transmit byte count was incorrect.
tx_blocked	Displays a 1 if the transmitter is blocked. Otherwise, a 0 is displayed.
tx_delayed	Displays the number of times the transmitter has been blocked.

Display Item	Description
`state`	Displays the current state of the Ethernet interface. The following values may appear: ● 0—The Ethernet interface is uninitialized. ● 1—The Ethernet interface is idle. ● 2—The Ethernet interface is active. ● 3—The Ethernet interface needs to be reset.
`eth intr stuck`	Displays the number of times the Ethernet interface interrupt has stuck while servicing the interrupt.

This example displays diagnostic information for TCP data, which is accessed by typing T.

```
        T C P / I P   I N F O

Copied ethernet receive packet:    0
TCP keepalive failed:              0
TCP max keepalive tries:           1
Dropped SNMP request:              0

Enter M-emory, A-sync, E-thernet, T-cp or Q-uit:
```

Display Item	Description
`Copied ethernet receive packet:`	Displays the number of copied Ethernet receive packets.
`TCP keepalive failed:`	Displays the number of TCP keep-alive messages that have been sent and were expected to be received, but were not received.
`TCP max keepalive tries:`	Displays the maximum number of TCP keep-alive messages received on the connection.
`Dropped SNMP request:`	Displays the number of dropped SNMP requests.

diag-line

Description

This command monitors incoming and outgoing asynchronous traffic and displays diagnostic information for the traffic. A help screen provides a list of commands available for line monitoring diagnostics.

⚠️

CAUTION: The line monitor degrades the performance of AI232. Do not use this command in heavy traffic situations in which performance is crucial.

✎

Note: Information from the line monitor diagnostic mode only appears when data is passed on serial links. If no data is passed, the screen is blank.

Table 8-2 displays the line monitor mode options that can be entered after `diag-line` is entered.

Table 8-2   Line Monitor Mode Options

Option	Function
`data`	Toggles the display of data on or off.
`modem`	Toggles the display of modem signals on or off.
`t`	Toggles the display of a timestamp for each frame of data displayed on or off.
`h` or `r`	Hides (`h`) or reveals (`r`) all lines on AI232.
`h l x` or `r l x`	Hides (`h`) or reveals (`r`) a specified line (x).
`r l x y`	Reveals a specified LCN (y) on a specified line (x).
`r l x y z`	Reveals a range of specified LCNs (y through z) on a specified line (x).
`h l x y -` or `r l x y -`	Hides or reveals all LCNs from a specified LCN (y) on up on a specified line (x).
`h l x -y` or `r l x -y`	Hides or reveals all LCNs from 0 to a specified LCN (y) on a specified line (x).
`filterL2`	Toggles the filtering of level 2 frames without packet information on or off.

Table 8-2   Line Monitor Mode Options (Continued)

Option	Function
interpret [a | x]	Toggles the display of decoded packet data on the line monitor on or off and optionally selects the format of the data in the data portion of the packet (a or x). ● a displays the data in the data portion of the packet in ASCII/hexadecimal format. Unprintable data (hexadecimal values 0x00 to 0x20 and 0x7F to 0xFF) appears as two digit hexadecimal numbers separated by a space. Printable data appears as printable characters. This option only applies to data. ● x displays all the data in the data portion of the packet in hexadecimal format. All data appears as two-digit hexadecimal numbers separated by a space. This option only applies to data.
print	Prints the range of revealed LCNs for all lines.
CTRL+s	Pauses the line monitor.
go or CTRL+q	Reactivates the line monitor after displaying the line monitor options.
ESC or q	Quits monitoring traffic, exits from the line monitor, and returns to the prompt.
?	Displays a list of the options available for line monitoring diagnostics.

Tip: Press ENTER to execute a command and press ESC to end the diagnostic session.

CAUTION: If you are connected to AI232 through a serial port, do not monitor the port with command diag-line. Use command hide to hide and not monitor the port. Failure to comply with this statement can cause AI232 to become unresponsive.

Command Type

shell

Formats

diag-line

Examples

This example displays a typical default line monitor display for asynchronous data.

```
06>d FF 03 00 31 00 01 FF FF FF FF FF FF 00 00 92 9B    ...1............
     59 0C 08 06 00 01 08 00 06 04 00 01 00 00 92 9B    Y...............
     59 0C AC 10 32 05 00 00 00 00 00 00 AC 10 22 79    Y...2........."y
     00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    ................
     00 00                                              ..
06<d FF 03 02 01 00 00 00 00 00 80 00 00 40 72 00 6F    ............@r.o
     77 00 00 00 00 80 00 00 40 72 00 6F 77 80 04 00    w.......@r.ow...
     00 14 00 02 00 0F 00                               .......
06>d FF 03 00 31 00 01 FF FF FF FF FF FF 00 10 4B D0    ...1.........K.
     D3 5D 08 06 00 01 08 00 06 04 00 01 00 10 4B D0    .]...........K.
     D3 5D AC 10 33 D1 00 00 00 00 00 00 AC 10 20 EB    .]..3......... .
     00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    ................
     00 00                                              ..
06>d FF 03 00 31 00 01 FF FF FF FF FF FF 00 10 4B D0    ...1.........K.
     D3 5D 08 06 00 01 08 00 06 04 00 01 00 10 4B D0    .]...........K.
     D3 5D AC 10 33 D1 00 00 00 00 00 00 AC 10 1E 82    .]..3...........
     00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00    ................
     00 00                                              ..
```

Column	Description
Line number	Displays the line number, which can range from 01 to 32.
Direction indicator	Displays the direction indicator for the line. One of the following appears: ● > for transmitted frames ● < for received frames.
Frame type indicator	Displays the frame type indicator for the line. One of the following appears: ● d for asynchronous links ● Blank for other frames or packets.
Data	If the data field byte count is disabled, it gets displayed as ct: <# of bytes in data field>. If the data display is enabled and only present in data packets, then the data byte count is displayed as <ASCII STRING>.

diag-tconn

Description

This command displays a list of enabled links along with connection information for each link. It displays all connections on AI232 in the same format as command <u>diag-conn on page 8-34</u>, but it is not interactive.

Command Types

shell and winslc

Formats

For the shell command:

> `diag-tconn`

For the winslc command:

> `winslc` *baseport* `diag-tconn`

Parameters

baseport   Defines the baseport number for AI232.

Examples

This example displays active connections on AI232. This is a partial display. The rest of the response follows the pattern below for the remaining connections.

```
[232] diag-tconn
TIDMUXsw#1
13:26:30 040900 Sev=F Base=032 Msg:
 AI232 Complete Connections Dump:

  1. PARENT2                               <-----> 32.ASY.2.1
  3. TCP 172.16.31.45#5001                <-----> PARENT2.1
     TID(s):  SONEPLEX-NE3         SONEPLEX-NE4

 15. TCP 192.168.31.15#5001              <-----> PARENT2.2
     TID(s):  NE4-DAYTON-OH       NE5-DAYTON-OH        NE6-DAYTON-OH
              NE7-DAYTON-OH       NE8-DAYTON-OH        NE9-DAYTON-OH
[232]
```

✎

Note: The connection ID is the first number that appears for each connection. For example, the connection ID for connection PARENT2 is 1.

dir

Description

This command displays a list of files with associated times, dates, permissions, and sizes.

Command Type

shell

Formats

dir [-l]

Parameters

-l   Displays a list of the available files and file information such as permission, time, date, and file size. The ls command with this option is the same as the dir command.

Examples

This example displays all available files.

```
[232]dir
boot.ini
boot.img
232.img
log.txt
primary.cnf
[232]
```

This example displays all available files with permission, size, time, and date information.

```
[232]dir -l
-rw-r--r--   1 0        0                143 Jun  1 22:52 boot.ini
-r--r--r--   1 0        0            2175720 Aug 15 09:54 boot.img
-rw-r--r--   1 0        0              22061 Jun  1 00:00 log.txt
-rw-r--r--   1 0        0               4342 Aug 15 08:21 core.txt
-rw-r--r--   1 0        0               7092 Jun 13 22:46 primary.cnf
[232]
```

exit

Description

This command ends the current shell session and returns to the login prompt.

Command Type

shell

Formats

exit

Examples

This example displays an exit from the current shell session.

```
[232]exit

Writing Configuration ...
Goodbye.

Valid destinations are as follows:

AI

Enter destination name (or "EXIT" to logout):
>
```

head

Description

This command displays the first few lines of a file.

Command Type

shell

Formats

head [**-n** *lines*] *file_name* ...

Parameters

[**-n** *lines*]   Defines the number of lines to display. The default is 20.

file_name   Defines the name of the file to display.

    Note: Several filenames can be entered with this command.

Examples

This example displays the first 30 lines of file core.txt.

```
[232] head -n 30 core.txt

Crash Code= 00000025
PC= 000e72d8     SP= 01ca2140     IMMR= ff000031     MSR= 00000002
GPR00= 00000025     GPR01= 00000001     GPR02= 0025c980
GPR03= 002295c4     GPR04= 00000025     GPR05= 002295e8
GPR06= 00000064     GPR07= 00000005     GPR08= 0effffff
GPR09= 002c0000     GPR10= 002c0000     GPR11= 0027a7d4
GPR12= 01ca20b8     GPR13= 01bf5738     GPR14= 01ca2128
GPR15= 00000001     GPR16= 0a000069     GPR17= 01ca2188
GPR18= 0000000a     GPR19= 00000055     GPR20= 00000063
GPR21= 01bf5738     GPR22= 01ca2110     GPR23= 0001cc08
GPR24= 00000001     GPR25= 00000001     GPR26= 01ca2110
GPR27= 00000055     GPR28= 00000069     GPR29= 00000002
GPR30= 01ca2198     GPR31= 00000005
CR= 22000000     SSR0= 000e72d8     SSR1= 00009002
LR= 000f4894     XER= 0000b020     CTR= 00000000
PVR= 00500000     PS0S1= 000346fc   PS0S2= 01ca20a8     PS0S3= 0001cbb0
Stack dump:                                       Caller
01ca2140:  01ca 2180 000f 3c8c 7573 6167 653a 2025     000f3c8c
01ca2150:  7320 3c70 6173 7377 6f72 643e 0a00 0c00
01ca2160:  01ca 2180 000f 3c8c 0000 0001 0000 0000
01ca2170:  0000 0000 01f4 5274 0000 0007 0027 ab6c
01ca2180:  01ca 21f0 000e d294 01f4 5274 0000 0200     000ed294
01ca2190:  0000 0055 0000 000b 01d3 533c 01d3 5342
01ca21a0:  0000 01fc 0000 0004 0000 0001 0005 0374
[232]
```

help

Description

This command lists all available system commands or information for a specific command.

Command Types

shell and winslc

Formats

For the shell command:

help [*command*]

For the winslc command:

winslc *baseport* **help** [*command*]

Parameters

baseport   Defines the baseport number for AI232.

command   Defines the name of the command for which specific information will be displayed.

Examples

This example displays a list of all available commands.

```
[232]help
The following commands are available:
    *ftplogin        diag-tconn        modmux           staslc
    *telnetlogin     dir               more             syncflash
    alarm            exit              passwd           tail
    arp              head              ping             tcpoutconn
    break            help              pppstatus        tftp
    creset           id                profile          tftpboot
    debug            ip                pvclist          type
    delete           link              reset            useradd
    diag-conn        log               sholog           userdel
    diag-eth         logout            show             users
    diag-info        ls                staeia           who
    diag-line        menu              standalone
[232]
```

This example displays help information for command show.

```
[232]help show
Usage: show [perf | comments | conn | data | mem | tcp | tconn | pvc |
       eth | ip | router | version | log | crash | inventory | ports]
[232]
```

id

Description

This command displays the current user name and profile.

Command Type

shell

Formats

`id`

Examples

This example displays the current user name and profile.

```
[232]id
Username: 'pubs'
Profile: 'supervisor'
[232]
```

ip

Description

This command displays the following system settings:

- IP address

- Subnet mask

- High IP address

- Primary router IP address

- Backup router IP address

Command Type

shell

Formats

    ip

Examples

This example displays the configured IP address information.

```
[232]ip
IP Address          Subnet Mask         High IP Address
--------------------------------------------------------
010.040.057.012     255.255.000.000     010.040.057.012

Router IP Address
------------------------
010.040.000.001 (Default)
No backup router

[232]
```

ip init

✎

Note: This command is only valid when AI232 is in standalone mode.

Description

This command configures the following settings for AI232 in standalone mode:

- IP address

- Subnet mask

- High IP address

- Primary gateway address

- Backup gateway address

- IP address range

⚠

CAUTION: The following message appears when the "ip init" command is invoked and no login ports are configured:

```
There are no login ports currently configured for this system. Please take
necessary precautions to prevent lockout.
```

Command Type

shell

Formats

```
ip init
```

Examples

This example displays the prompt that appears when **ip init** is entered. A prompt appears for each configurable IP address item.

```
[232] ip init
Enter IP Address (xxx.xxx.xxx.xxx):
```

This example displays the configuration of all the IP settings available with this command:

```
[232] ip init
Enter IP Address (xxx.xxx.xxx.xxx):172.16.2.39
Setting IP Address to 172.16.2.39
Enter Subnet Mask (xxx.xxx.xxx.xxx):255.255.000.000
Setting Subnet Mask to 255.255.000.000
Enter Router Address (xxx.xxx.xxx.xxx):172.16.000.1
Setting Router Address to 172.16.000.1
Enter Backup Router Address (default none):172.16.2.41
Setting Backup Router Address to 172.16.2.41
Enter IP Address Range (default 1):
Setting range to 1
[232]
```

link

Description

This command is used to:

- Force a serial link to connect or disconnect

  Note: When this command is used to disconnect a serial link, all calls are torn down. The serial link does not come back online until command `link start` is issued.

  Important: If you are connected to the AI232 shell using a serial port, remember not to disable that port or else loss of connectivity will result.

- Restart a link, which is a stop followed by a start

- Show a configuration summary for a link or range of links.

Command Types

shell and winslc

Formats

For the shell command:

    link { *link_range* | * } { start | stop | restart }

For the winslc command:

    winslc *baseport* link { *link_range* | * } { start | stop | restart }

Parameters

link_range   Defines a link or range of links. Valid values are 1 to 32. Individual values are separated by commas (,) and hyphens (-). For example, `1,4-6` specifies links 1, 4, 5, and 6.

Note: This parameter applies to any action the user is trying perform (start, stop, restart, or show information).

*   Specifies all links.

start   Enables the serial links.

stop   Disables the serial links.

restart   Restarts the serial links.

baseport   Defines the baseport number for AI232.

Examples

This example displays the starting of links 1 through 4 and 6.

```
[232]link 1-4,6 start
[232]
```

This example displays the stopping of links 6 and 8.

```
[232]link 6,8 stop
[232]
```

log

Description

This command turns the display of log messages on or off.

Command Type

shell

Formats

```
log { on | off }
```

Parameters

on   Specifies the option that turns the display of log messages on.

off   Specifies the option that turns the display of log messages off.

Examples

This example displays the current status of the log message display.

```
[232]log
Display of log messages is currently disabled.
[232]
```

This example displays the activation of the log message display.

```
[232]log on
Display of log messages is now enabled.
[232]
```

This example displays the deactivation of log message display.

```
[232] log off
Display of log messages is now disabled.
[232]
```

logout

Description

This command closes a shell session.

Command Type

shell

Formats

`logout`

Examples

This example displays the closing of a shell session.

```
[232]logout

Writing Configuration ...
Goodbye.

** Disconnecting **
```

ls

Description

This command displays a list of available files.

Command Type

shell

Formats

ls [-l]

Parameters

-l   Displays a list of the available files and file information such as permission, time, date, and size.

> ✎
> **Note:** Entering ls with this option is the same as entering dir.

Examples

This example displays all available files.

```
[232]ls
boot.ini
boot.img
log.txt
core.txt
primary.cnf
[232]
```

This example displays all available files with associated permission levels, times, dates, and sizes.

```
[232]ls -l
-rw-r--r--   1 0        0               143 Jun  1 22:52 boot.ini
-r--r--r--   1 0        0           2175720 Aug 15 10:05 boot.img
-rw-r--r--   1 0        0             22061 Jun  1 00:00 log.txt
-rw-r--r--   1 0        0              4342 Aug 15 08:21 core.txt
-rw-r--r--   1 0        0              7092 Jun 13 22:46 primary.cnf
[232]
```

menu

Description

This command accesses the AI232 main menu system.

Command Type

shell

Formats

`menu`

Examples

This example displays the `AI232 Main Menu`.

```
                                AI232 Main Menu


 + Link Menu

 + Alias Menu

 + System Menu

 + Static Route Menu




        ...............................................................
        :                                                             :
        :   Select the desired menu option using the UP or DOWN arrow key.   :
        :   Then press ENTER or RETURN to continue.                   :
        :...............................................................:


    <F1> Help                         <F4> Close
```

⚠️
CAUTION: The following message appears in the shell when the user exits the main menu and has the last login port disabled:

`There are no login ports currently configured for this system. Please take necessary precautions to prevent lockout.`

This message is only seen when the system is running in standalone mode.

modmux

Description

This command displays the status of links in the modem pool.

Command Type

shell

Formats

modmux

Examples

This example displays the status of links in the modem pool.

```
[232]modmux

Link      Current Status   Conn Up Time    Init String
  1:              Idle
  3:              Idle
  5:         Connected        0:06:13           ATDT 555-1212
  6:              Idle
 19:         Disabled
 24:         Connected        0:13:09       AT\n|ATDT 555-1234
 29:              Idle
 30:         Disabled


[232]
```

Column	Description
Link	Displays link numbers.
Current Status	Displays the statuses of links. The following values are possible: ● Disabled indicates that the link has been disabled by a user. ● Idle indicates that the link is waiting for a connection to make an outgoing call. ● Connected indicates that the protocol connected to the link and the modem made an outgoing call.
Conn Up Time	Displays the up time for the connection. ✎ **Note:** This column is only displayed if the link state is Connected.

Column	Description
Init String	Displays the phone number that was dialed. 🖉 **Note:** This column is only displayed if the link state is Connected.

more

Description

This command prints the content of a file to the current shell session one page at a time.

✎

Note: You cannot use this command to view code image files or configuration files (`.img` and `.cnf` extensions).

Command Type

shell

Formats

> **more** *filename*

Examples

This example displays the contents of file `log.txt` one page at a time.

```
[232]more log.txt
00:00:17 060100 Sev=F Msg:
Starting 232 in CLC mode.
00:00:17 060100 Sev=F Msg:
Pre-release code
Version 32HPA920.000135 created on 2000-06-27 at 15:27:37
Product Version *AI 232 Version 9.20.   This is PRE-RELEASE code.


00:00:19 060100 Sev=F Msg:
SNMP Research SNMP Agent Resident Module Version 12.3.0.3
Copyright 1989, 1990, 1991, 1992, 1993, 1994 SNMP Research, Inc.
00:00:34 060100 Sev=F Msg:
232 initialization complete.
10:13:24 073100 Sev=F Msg:
Version 32HPA920.000135 created on 2000-06-27 at 15:27:37
Boot Loader Version 32B2L100.000015

10:14:22 073100 Sev=F Msg:
User ai has logged into the Destination Menu.

10:14:25 073100 Sev=F Msg:
User ai has entered the shell.

Press Space for more or q to quit:
```

panic

Description

This command forces AI232 to crash dump and halt.

Command Type

winslc

Formats

`winslc` *baseport* `panic`

Parameters

baseport   Defines the AI232 baseport number.

passwd

Description

This command changes an existing user's password.

Command Type

shell

Formats

passwd

✎

Note: After the initial command is entered, AI232 prompts the user for information needed to configure the new password.

Examples

This example displays the configuration of a new password for existing user pubs.

```
[232]passwd
Please enter the login name of the user
whose password is being changed.
pubs
Please enter the OLD password for user 'pubs'.

Please enter the NEW password.
Passwords are truncated at 10 characters.

Please retype NEW password.

Password successfully changed.
[232]
```

ping

Description

This command sends an ICMP echo request to the specified IP address. If the IP device responds to the echo request, a reply receipt message appears. If a reply is not received within 5 seconds, a no reply message appears. This command can be used to troubleshoot network level problems.

Command Types

shell and winslc

Formats

For the shell command:

`ping` *ip_address*

For the winslc command:

`winslc` *baseport* `ping` *ip_address*

Parameters

ip_address   Defines the IP address of the destination device in dotted decimal format.

baseport   Defines the baseport number for AI232.

Examples

This example displays what happens when host 172.16.30.110 replies to a ping.

```
[232] ping 172.16.30.110
Pinging host 172.16.30.110
ICMP Echo Reply:TTL 60
Host 172.16.30.110 replied to the ping
```

The TTL (time-to-live) is the number of jumps or hops the message is allowed to take.

This example displays what happens when no reply is received from host 172.16.30.114.

```
[232] ping 172.16.30.114
Pinging host 172.16.30.114
Host 172.16.30.114 didn't reply to the ping
```

pppstatus

Description

This command displays the status of all ModMux and asynchronous PPP-IPCP links. If IPCP is running on the link (the link status is RUNNING), this command also displays the local and remote IP addresses.

Command Type

shell

Formats

```
pppstatus
```

Examples

This example displays the status of all PPP-IPCP links.

```
[232] pppstatus
Link Phase        Local IP Addr.   Remote IP Addr.
  1: ESTABLISH    N/A              N/A
 14: SERIALCONN   N/A              N/A
[232]
```

Column	Description
Link	Displays the link number.
Phase	Displays the status of the link. Values are: ● INITIALIZE—Indicates the link is down. ● SERIALCONN—Indicates the link is up, but not connected. The link is waiting for the data carrier detect (DCD) signal or the data set ready (DSR) signal to come up. ● ESTABLISH—Indicates the link is up, but not connected. The AI232 and the remote device are negotiating basic information on how the connection will operate. ● AUTHENTICATE—Indicates the link is up, but not connected. The link is validating ID and password information with the remote device. ● NETWORK—Indicates the link is up, but not connected. The link is negotiating the local and remote IP addresses. ● RUNNING—Indicates the link is up and connected. IPCP is running on the link. The AI232 and the remote device can transfer IP packets over the link.

Column	Description
Local IP Addr.	Displays one of the following: ● The IP address of AI232 (if the link status is RUNNING) ● N/A (if the link status is INITIALIZE, SERIALCONN, ESTABLISH, AUTHENTICATE, or NETWORK)
Remote IP Addr.	Displays one of the following: ● The IP address of the remote device (if the link status is RUNNING) ● N/A (if the link status is INITIALIZE, SERIALCONN, ESTABLISH, AUTHENTICATE, or NETWORK)

profile

Description

This command allows a user account profile to be customized. The following six system profiles are maintained:

- Supervisor

- Management

- Status

- Empty

- Destination menu

- Connect

Profile names are limited to 19 characters. Only 20 user configurable profiles are allowed to be configured at the same time.

Command Type

shell

Formats

```
profile -n
profile -l profile_name
profile -c existing_profile new_profile
profile -a profile_name [ commands [ -w ] ] ...
profile -d profile_name [ commands ] ...
profile -remove [ profile_name ]
```

Parameters

-n	Lists all user profile names.
-l	Lists all commands associated with a specific user profile.
profile_name	Defines the name of a user profile.
-c	Creates a new profile from an existing user profile.
existing_profile	Specifies the name of an existing user profile.
new_profile	Defines the name of a new user profile.

-a	Adds commands to a profile and optionally adds write permission.
command	Defines the name of a command to associate with a user profile.
-w	Adds write permission for a command that otherwise would not have write permission.
-d	Deletes commands from a user profile.
-remove	Removes a user profile.

Examples

This example displays each of the profile parameter options with associated functionality.

```
[232]profile
Usage: profile -n
       to list profile names
     : profile -l <profile name>
       to list all commands associated with a given profile
     : profile -c <existing profile name> <new profile name>
       to create a new profile from an existing profile
     : profile -a <profile name> [commands [-w]]...
       to add commands to a profile and possibly add write permission
     : profile -d <profile name> [commands]...
       to delete commands from a profile
     : profile -remove <profile name>
       to completely remove a profile
[232]
```

pvclist

Description

This command lists the PVCs in the system and displays their current state. If there are many PVCs in the system, this command redirects its output to a file named pvc.lst for easier viewing.

Command Types

shell and winslc

Formats

For the shell command:

> pvclist [*link_range* | *]

For the winslc command:

> winslc *baseport* pvclist [*link_range*]

Parameters

link_range   Defines a link or range of links. Valid values are 1 to 32. Individual values are separated by commas (,) and hyphens (-). For example, 1, 4-6 specifies links 1, 4, 5, and 6.

*   Specifies all links.

baseport   Defines the baseport number for AI232.

Examples

This example displays PVC information for link 1.

```
[232] pvclist 1
[PVC list]
+asy.1.1     passive ASD: state=idle      muxid=0     fd=107    flags=0041
[232]
```

Column	Description
First column	Displays the PVC protocol type, link number, and LCN (logical channel number).

Column	Description
Second column	Displays the timer type for the PVC. Possible values are: ● `ct`—Displays the connect timer if the PVC is active. The number indicates the timer setting in seconds. ● `it`—Displays the inactivity timer if the PVC is a connect-on-activity PVC. The number indicates the timer setting in seconds. ● `Passive`—Appears if the PVC is a passive type of PVC.
Third column	Defines the state of the PVC. Possible values are: ● `idle`—Indicates the PVC is ready to connect. ● `dataxfer`—Indicates the PVC is connected and able to pass data. ● `incon`—Indicates the PVC is in a transition state. ● `attaching`—Indicates the PVC is in a transition state. ● `not attached`—Indicates that the PVC is not connected. ● `detached`—Indicates the PVC is in a transition state. If the display indicates one of the transition states, this should only appear for a short period of time. If the state remains in this condition, contact Technical Support.
Fourth column	Defines the MuxID, which is an internal number used by developers to describe which data stream is used for the connection.
Fifth column	Defines the file descriptor, which is an integer value used by developers to describe which data stream is used for the connection.
Sixth column	Defines the flag, which gives a code that indicates the purpose of the data stream.

reset

Description

This command resets AI232.

⚠️

CAUTION: All call processing will stop and all connections will be lost during the reboot process.

Command Type

shell

Formats

```
reset
```

Examples

This example displays the resetting of AI232.

```
[232] reset
Are you SURE you want to reset the system? (y/n) y
```

router

Description

This command sets a default router in Menu 4.18 of the AI198 menu system. AI232 uses the default router when a static route has not been specified.

✎

Note: This address can also be set in Menu 4.2.14 of the AI198 menu system. If the address is entered in both menus, Menu 4.18 takes precedence.

Command Type

winslc

Formats

router *ip_address*

Parameters

ip_address   Defines the IP address of the default router.

Examples

This example displays a router address of 172.016.000.001 defined in Menu 4.18 of the AI198 Menu System. This command can only be used in Menu 4.18.

```
>1 router 172.016.000.001
                                                        Menu 4.18 pg 1
01 router 172.016.000.001
02
03
04
05
06
07
08
09
10
11
12
13
14

16 Previous page [,page]
17 Next page
18 Insert line
19 Delete line
20 Retain these changes for saving
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key
>
```

Usage Notes

The router address takes effect after AI232 is booted. After booting, the address no longer appears in Menu 4.18. However, the address is stored on the AI198 and can be viewed or changed in Menu 4.2.14.

Note: View the router IP address with command `winslc` *baseport* `show router`.

selcnf

✏️

Note: This command is only available for AI232 in standalone mode.

Description

This command has two forms: One allows for the recovery of an overwritten runtime configuration file and the other allows for the deletion of the specified configuration file. Any configuration file (with a .cnf extension) can be used for system boot up. The configuration file is written to boot.ini.

Command Type

shell

Formats

selcnf -r

selcnf -d *config_file*

Parameters

-r　　　　　Specifies the option that recovers the current overwritten run-time configuration file.

-d　　　　　Specifies the option that deletes a configuration file.

config_file　Defines a configuration file for deletion; it must end with a .cnf extension.

Examples

This example displays the available options for command `selcnf`.

```
[232]selcnf
usage: selcnf -r
       selcnf [-d] <config_file>
Selects the specified config file for current configuration.
Options:
 -r              Recovers the current over-written run-time config file
 -d              Deletes the specified configuration file
[232]
```

sholog

Description

This command displays the contents of the log file. The last 32,000 characters of log messages that were sent to the log port are displayed.

Note: This command has the same functionality as command `show log`.

Command Type

shell

Formats

`sholog -p`

Parameters

`-p`   Displays the content of the file one page at a time.

Note: This option is not available with command `show log`.

Examples

This example displays the contents of an AI232 log file one page at a time.

```
[232]sholog -p
:26 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) DISCONNECT -> INITIALIZE

09:01:26 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) INITIALIZE -> SERIALCONN

09:01:27 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) SERIALCONN -> ESTABLISH

09:01:57 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) ESTABLISH -> DEAD

09:01:57 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) DEAD -> DISCONNECT

09:01:57 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) DISCONNECT -> INITIALIZE

09:01:57 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) INITIALIZE -> SERIALCONN

09:01:58 072304 Sev=F Msg:
PPPD Phase Change: (Link 4) SERIALCONN -> ESTABLISH
Press Space for more or q to quit:
```

show

Description

This command displays various types of information for AI232.

Command Types

shell and winslc

Formats

For the shell command:

```
show [ perf [ link_range | * ] | comments | conn | data [ link_range
| * ] | mem | tcp | tconn | pvc | eth | ip | router | version | log |
crash | inventory | ports [ link_range | * ] ]
```

For the winslc command:

```
winslc baseport show [ perf [ link_range | * ] | comments | conn |
data [ link_range | * ] | mem | tcp | tconn | pvc | eth | ip | router
| version | log | crash | inventory | ports [ link_range | * ] ]
```

Parameters

baseport	Defines the baseport number for AI232.
`perf`	Displays serial link performance.
link_range	Defines a link or range of links. Valid values are 1 to 32. Individual values are separated by commas (,) and hyphens (-). For example, `1,4-6` specifies links 1, 4, 5, and 6.
`*`	Specifies all links.
`comments`	Displays comments.
`conn`	Displays all active connections.
`data`	Displays link data.
`mem`	Displays memory allocation.
`tcp`	Displays TCP information (Ethernet retry packet, keep-alive tries, dropped SNMP requests).
`tconn`	Displays complete connections.
`pvc`	Displays pvc connections.
`eth`	Displays Ethernet information.

`ip`   Displays the IP address, subnet mask, and high IP address.

`router`   Displays the default and backup gateway IP address.

`version`   Displays the version number of AI232.

`date`   Displays the date and time.

`log`   Displays the contents of the log file, same as command `sholog`.

`crash`   Displays crash dump information.

`inventory`   Displays the serial number, product name, and manufacture date.

`ports`   Displays the link number, link type, and description for all available ports or for a specified range of ports.

Examples

This example displays the AI232 version number.

```
[232]show version
Version 32HPA950.000009 created on 2004-05-04 at 08:43:02
Boot Loader Version 32B2L105.000044
[232]
```

This example displays the serial link performance for links 2-5.

```
[232]show perf 2-5

Performance for last 60 seconds:
Intrf  Type  Input Chars/sec   Output Chars/sec
  2    ASY                0                   0
  3    ASY                0                   0
  4    ASY                0                   0
  5    ASY                0                   0
Intrf  Type  Input Chars/sec   Output Chars/sec
[232]
```

This example displays the link numbers, link types, and descriptions for ports 21-23.

```
[232]show ports 21-23

Link Type Description
 21: ASY  Async link 21
 22: ASY  Async link 22
 23: ASY  Async link 23

[232]
```

staeia

Description

This command displays the status of the EIA leads.

Command Types

shell and winslc

Formats

For the shell command:

staeia { *link_range* | * }

For the winslc command:

winslc *baseport* staeia { *link_range* | * }

Parameters

link_range   Defines a link or range of links. Valid values are 1 to 32. Individual values are separated by commas (,) and hyphens (-). For example, 1, 4-6 specifies links 1, 4, 5, and 6.

*   Specifies all links.

baseport   Defines the baseport of AI232.

Examples

This example displays the status of the EIA leads for links 1 to 5.

```
[232] staeia 1-5

Link Type Status            IN              OUT
                      DSR   DCD   CTS    DTR   RTS
  1: ASY  Disabled
  2: ASY  Enabled    -     -     -      +     +
  3: ASY  Enabled    -     -     -      +     +
  4: ASY  Enabled    -     -     -      +     +
  5: ASY  Disabled
[232]
```

Column	Description
DSR	DSR is an incoming EIA lead control signal. The plus symbol (+) indicates that this lead is asserted. The minus symbol (-) indicates that the lead is negated.

Column	Description
DCD	DCD is an incoming EIA lead control signal. The plus symbol ($+$) indicates that this lead is asserted. The minus symbol ($-$) indicates that the lead is negated.
CTS	CTS is an incoming EIA lead control signal. The plus symbol ($+$) indicates that this lead is asserted. The minus symbol ($-$) indicates that the lead is negated.
DTR	DTR is an outgoing EIA lead control signal. The plus symbol ($+$) indicates that this lead is asserted. The minus symbol ($-$) indicates that the lead is negated.
RTS	RTS is an outgoing EIA lead control signal. The plus symbol ($+$) indicates that this lead is asserted. The minus symbol ($-$) indicates that the lead is negated.

standalone

Description

This command enables or disables standalone mode. For more information about the difference between standalone mode and switch mode, refer to Appendix B: Standalone Mode and Switch Mode.

Command Type

shell

Formats

standalone { *true* | *false* }

Parameters

true   Puts AI232 in standalone mode.

false   Takes AI232 out of standalone mode.

Examples

This example displays the current standalone mode status.

```
[232]standalone
Currently forced standalone mode is OFF.
Currently running in switch mode.
[232]
```

This example displays the configuration of standalone mode for AI232.

```
[232]standalone true
[232]
```

staslc

Description

This command displays the status of the links and the DP232 cable.

Command Types

shell and winslc

Formats

For the shell command:

staslc { *link_range* | * }

For the winslc command:

winslc *baseport* staslc { *link_range* | * }

Parameters

link_range   Defines a link or range of links. Valid values are 1 to 32. Individual values are separated by commas (,) and hyphens (-). For example, 1,4-6 specifies links 1, 4, 5, and 6.

*   Specifies all links.

baseport   Defines the baseport number for AI232.

Examples

This example displays the link and cable status information for links 1 to 5.

```
[232]staslc 1-5

Link    Status  Appl.  DTR RTS CTS DSR DCD   Format       Parity Frame Overun Underun
  1:      Idle Login    +   +   -   -   -   9600, 8, n, 1     0     0     0       0
  2: Disabled Login     ?   ?   ?   ?   ?   9600, 8, n, 1     0     0     0       0
  3:     -MMUX          ?   ?   ?   ?   ?   19200             0     0     0       0
  4: Disabled Login     ?   ?   ?   ?   ?   9600, 8, n, 1     0     0     0       0

  5: Disabled Login     ?   ?   ?   ?   ?   9600, 8, n, 1     0     0     0       0
DP232 Cable Status: Ports 1-8   Connected      Ports 9-16  Not Connected
                    Ports 17-24 Not Connected  Ports 25-32 Not Connected

[232]
```

✎

Note: Not all links are displayed here. Entering the command with no additional parameters would show all 32 links.

Column	Description
Link	Displays the number of the link.
Status	Displays the link status as dataxfer (data is being transfered), idle, or disabled.
Appl.	Displays the application specified for the link (Alias, Login, or Destination).
DTR RTS CTS DSR DCD	Displays the status of the control signals. (+ means the signal is asserted and - means the signal is negated.)
Format	Displays the baud rate, number of data bits, parity (none, odd, or even), and number of stop bits specified for the link.
Parity	Displays the number of parity errors.
Frame	Displays the number of framing errors.
Overun	Displays the number of overrun errors.
Underun	Displays the number of underrun errors.

syncflash

✎

Note: This command is only available when AI232 is in standalone mode.

Description

This command synchronizes the AI232 configuration with the configuration information stored on AI198. Enabling this feature ensures that if AI232 is placed in standalone mode, it will operate as it did in switch mode.

Command Type

shell

Formats

syncflash { *true* | *false* }

Parameters

true   Enables the update configuration functionality.

false   Disables the update configuration functionality.

✎

Note: When running in standalone mode, AI232 always writes to its file system when configuration changes are made. When running in switch mode, the running configuration on AI232 is always kept current with AI198's configuration.

Examples

This example displays the AI232 configuration being synchronized with the configuration information stored on AI198.

```
[232]syncflash true
[232]
```

tacacs info

Description

This command identifies how the current shell session was authenticated. If the current session was authenticated by a TACACS+ server, it will display the IP address of the server. If a TACACS+ server could not be contacted and fallback is enabled, it will display `Fallback to local`. If TACACS+ authentication was disabled, it will display `Local`.

Command Type

shell

Formats

```
tacacs info
```

Examples

This example displays the TACACS+ authentication information as `192.168.001.089`.

```
[232] tacacs info

Current session authenticated by: 192.168.001.089
[232]
```

tacacs server

Description

This command enables, disables, or removes the configuration for specified TACACS+ servers.

Command Type

shell

Formats

```
tacacs server { server_range | * } { disable | enable | default }
```

Parameters

server_range	Specifies a server number or range of server numbers. The server number represents a server's priority level. AI232 attempts to contact all servers in the range starting with the lowest numbered ones. If the connection to server #1 fails, AI232 will attempt to contact server #2, and so on. Valid values are 1 to 9. Individual values are separated by commas (,) and hyphens (-). For example, `1,4-6` specifies servers 1, 4, 5, and 6.
*	Specifies all TACACS+ servers.
disable	Disables the TACACS+ server or range of TACACS+ servers.
enable	Enables the TACACS+ server or range of TACACS+ servers.
default	Disables all servers in the range and sets all configuration values to their defaults.

Command Defaults

Disabled

Examples

This example displays the enabling of servers `1`, `4` and `7`.

```
[232] tacacs server 1,4,7 enable
[232]
```

tacacs server ip

Description

This command configures an IP address for specified TACACS+ servers.

🖉

Note: AI232 does not prevent users from configuring multiple server entries with the same IP address.

Command Type

shell

Formats

tacacs server ip { *server_range* | * } { *ip_address* }

Parameters

server_range Specifies a server number or range of server numbers. Valid values are 1 to 9. Individual values are separated by commas (,) and hyphens (-). For example, 1,4-6 specifies servers 1, 4, 5, and 6.

* Specifies all TACACS+ servers.

ip_address Defines the server IP address.

Command Defaults

0.0.0.0

Examples

This example displays the configuration of IP address 12.56.120.4 for TACACS+ servers 3.

```
[232] tacacs server ip 3 12.56.120.4
[232]
```

tacacs server phase

Description

This command configures the AAA phases that are allowed for specified TACACS+ servers.

Command Type

shell

Formats

```
tacacs server phase { server_range | * } { disable | enable }
{ account | all | authen | author }
```

Parameters

server_range	Specifies a server number or range of server numbers. Valid values are 1 to 9. Individual values are separated by commas (,) and hyphens (-). For example, `1,4-6` specifies servers 1, 4, 5, and 6.
*	Specifies all TACACS+ servers.
disable	Disables the specified AAA phases for the specified TACACS+ servers.
enable	Enables the specified AAA phases for the specified TACACS+ servers.
account	Enables or disables the accounting phase for the specified TACACS+ servers.
all	Enables or disables all AAA phases for the specified TACACS+ servers.
authen	Enables or disables the authentication phase for the specified TACACS+ servers.
author	Enables or disables the authorization phase for the specified TACACS+ servers.

Command Defaults

All phases

Examples

This example displays the disabling of the accounting phase for servers 1 to 5 and 8.

```
[232] tacacs server phase 1-5,8 disable account
[232]
```

tacacs server port

Description

This command configures the TCP port number for specified TACACS+ servers.

Command Type

shell

Formats

```
tacacs server port { server_range | * } { port_number }
```

Parameters

server_range	Specifies a server number or range of server numbers. Valid values are 1 to 9. Individual values are separated by commas (,) and hyphens (-). For example, `1, 4-6` specifies servers 1, 4, 5, and 6.
*	Specifies all TACACS+ servers.
port_number	Defines the TCP port number for the TACACS+ servers. Valid values are 1 through 65535.

Command Defaults

TCP port 49

Examples

This example displays the configuration of TCP port number `32500` for TACACS+ servers `7` to `9`.

```
[232] tacacs server port 7-9 32500
[232]
```

tacacs server secret

Description

This command configures the TACACS+ shared secret, which is similar to a password, for specified TACACS+ servers.

Command Type

shell

Formats

```
tacacs server secret { server_range | * } { shared_secret }
```

Parameters

server_range	Specifies a server number or range of server numbers. Valid values are 1 to 9. Individual values are separated by commas (,) and hyphens (-). For example, 1,4-6 specifies servers 1, 4, 5, and 6.
*	Specifies all TACACS+ servers.
shared_secret	Defines the TACACS+ shared secret for the server or server range. The maximum length of the shared secret is 24 characters.

Command Defaults

No secret configured

Examples

This example displays the configuration of shared secret newguy for TACACS+ server 8.

```
[232] tacacs server secret 8 newguy
[232]
```

tacacs server summary

Description

This command displays a summary of TACACS+ server configuration settings for specified servers.

Command Type

shell

Formats

    tacacs server summary [*server_range* | *****]

Parameters

server_range   Specifies a server number or range of server numbers. Valid values are 1 to 9. Individual values are separated by commas (,) and hyphens (-). For example, `1,4-6` specifies servers 1, 4, 5, and 6.

*   Specifies all TACACS+ servers.

Examples

This example displays all configured TACACS+ servers and server settings.

```
[232] tacacs server summary

Server IP Address      Port  Secret                    Phases
------ --------------- ----- ------------------------- --------------------
+ 1    012.056.120.004   49                            Authen Author
- 2    012.056.120.004   49                            Authen Author
- 3    012.056.120.004   49                            Authen Author
+ 4    012.012.012.012   49                            Authen Author
- 5    012.012.012.012   49                            Authen Author
- 6    012.012.012.012   49                            Authen Author Account
+ 7    000.000.000.000 32500                           Authen Author Account
- 8    000.000.000.000 32500               newguy      Authen Author
- 9    000.000.000.000 32500                           Authen Author Account

[232]
```

Display Item	Description
`Server`	Displays the server numbers. The `+`/`-` signs indicate if the associated servers are enabled (`+`) or disabled (`-`).
`IP Address`	Displays the configured TACACS+ IP addresses for the specified TACACS+ servers.

Display Item	Description
Port	Displays the configured TACACS+ port numbers for the specified TACACS+ servers.
Secret	Displays the TACACS+ shared secrets (passwords) for specified TACACS+ servers.
Phases	Displays the AAA phases that are allowed for specified TACACS+ servers.

tacacs sholog

Description

This command displays the contents of the TACACS+ debug log file. The TACACS+ debug log file records all connection attempts to TACACS+ servers. The following information is displayed for each connection attempt:

- A record of the timestamp

- The IP address of TACACS+ server

- The AAA phase

- The success or failure status associated with each connection.

✎

Note: The TACACS+ debug log file is only populated when TACACS+ debugging is enabled using command `debug tacacs on`.

Format

`tacacs sholog [ -p ]`

Parameters

-p   Displays the contents of the debug log file one page at a time.

Examples

This example displays a TACACS+ debug log file.

```
[232] tacacs sholog

[02:26:32 030406]   192.168.001.074   AUTHEN FAIL
[02:26:32 030406]   192.168.001.089   AUTHEN SUCCESS
[02:26:32 030406]   192.168.001.074   AUTHOR FAIL
[02:26:32 030406]   192.168.001.089   AUTHOR SUCCESS
```

tacacs stats

Description

This command displays or clears TACACS+ specific counters and statistics.

Command Type

shell

Formats

```
tacacs stats [ clear ]
```

Parameters

clear   Clears all TACACS+ specific counters and statistics.

Examples

This example displays all TACACS+ specific counters and statistics.

```
TACACS+ Statistics
------------------------
Connect Attempts:               0
Connect Failures:               0

Wrong Header Type:              0
Wrong Header Sequence Number:   0
Wrong Header Session ID:        0
Wrong Body Length:              0

Write Errors:                   0
Read Errors:                    0
Short Header Received:          0
Short Body Received:            0

Timed-out waiting for response:  0

[232]
```

Display Item	Description
Connect Attempts	Displays the number of attempts that were made to connect to the TACACS+ server.
Connect Failures	Displays the number of failed connection attempts that were made to the TACACS+ server.
Wrong Header Type	Displays the number of packets received from the TACACS+ server that had an invalid type.

Display Item	Description
`Wrong Header Sequence Number`	Displays the number of packets received from the TACACS+ server that had a sequence number that was out of order.
`Wrong Header Session ID`	Displays the number of packets received from the TACACS+ server that had an invalid session ID.
`Wrong Body Length`	Displays the number of packets received from the TACACS+ server that had a body length attribute that did not match the actual length of body received.
`Write Errors`	Displays the number of errors that occurred when AI232 attempted to send a packet to the TACACS+ server.
`Read Errors`	Displays the number of errors that occurred when AI232 attempted to read a packet from the TACACS+ server.
`Short Header Received`	Displays the number of incomplete headers that were received when AI232 attempted to read a packet from the TACACS+ server.
`Short Body Received`	Displays the number of packets with incomplete bodies that were received when AI232 attempted to read them from the TACACS+ server.
`Timed-out waiting for response`	Displays the number of times AI232 timed out while waiting for a response from the TACACS+ server. For information about configuring the time out value, refer to command aaa timeout on page 8-19.

tail

Description

This command displays the last few lines of a file.

Command Type

shell

Formats

`tail [ -n lines ] file_name ...`

✎

Note: More than one file name can be specified in this command.

Parameters

`-n`	Specifies that a line number value will be entered.
lines	Defines the number of lines to display. The default is 20.
file_name	Defines the name of the file to display.

Examples

This example displays the last 20 lines of file `log.txt`.

```
[232]tail -n 20 log.txt
Configuration has changed
13:39:08 050304 Sev=F Msg:
Unknown WINSLC command TRACE
14:07:52 050304 Sev=F Msg:
Valid commands are:
ARP          BREAK        CRESET       DIAG-TCONN   HELP
IP           LINK         PANIC        PING         PVCLIST
ROUTER       SHOW         STAEIA       STASLC       TCPOUTCONN
TELNET       UPDATE       XON-INTERVAL

14:21:01 050304 Sev=F Msg:
Valid commands are:
ARP          BREAK        CRESET       DIAG-TCONN   HELP
IP           LINK         PANIC        PING         PVCLIST
ROUTER       SHOW         STAEIA       STASLC       TCPOUTCONN
TELNET       UPDATE       XON-INTERVAL

14:31:19 050304 Sev=F Msg:
The WINSLC command 'TELNET 75' must be executed from
the CLC's menu 4.18 for this SLC.
[232]
```

tcpoutconn

Description

This command controls how long outgoing TCP connections wait for a connection to be established before failing.

Command Type

shell and winslc

Formats

For the shell command:

tcpoutconn [*timeout*]

For the winslc command:

winslc *baseport* **tcpoutconn** [*timeout*]

Parameters

timeout   Defines the length of the timeout. The range is 2 to 360 seconds. The default is 75.

baseport   Defines the baseport number for AI232.

✏

Note: In standalone mode, resetting AI232 resets the timeout to the default of 75.

Examples

This example displays the configuration of the TCP outgoing connection timer to 30 seconds.

```
[232]tcpoutconn 30
TCP Outgoing Connection Timer Value: 30
[232]
```

telnet

Description

This command changes the port number used to receive incoming telnet connections from default port 23.

Important: This command must be executed from CLC Menu 4.18 in the AI198 menu system. When AI232 is booted, Menu 4.18 entries are no longer visible. To see the current telnet port number after AI232 is booted, use the `winslc telnet` command.

Command Type

winslc

Formats

`telnet` *port_number*

Parameters

port_number   Defines the port number used to receive incoming telnet connections. Valid values are from 1 to 65534. The default is 23.

Examples

This example changes the telnet port to port 68.

```
>1 telnet 68
                                                              Menu 4.18 pg 1

01 telnet 68
02
03
04
05
06
07
08
09
10
11
12
13
14

16 Previous page [,page]
17 Next page
18 Insert line
19 Delete line
20 Retain these changes for saving
21 Exit this menu with no changes
Enter item number and optional ",value" then push <CR> key

>
```

tftp

✎

Note: This command is only available when AI232 is in standalone mode.

Description

This command downloads a file from the Trivial File Transfer Protocol (TFTP) server to AI232 or uploads a file to the TFTP server from AI232.

The following rules apply when uploading or downloading a file:

● File names must contain an extension of .ini, .img, .zmg, .cnf, or .txt.

● Configuration files can be downloaded directly to file primary.cnf or to another .cnf file.

● The only .txt file allowed is banner.txt and the only .ini file allowed is boot.ini.

● AI232 must be updated in order to run a downloaded image file.

● Any .img filename is acceptable except boot.img, which is reserved, and primary_devel.img, which is the primary image.

● All .zmg files must be written to a destination file with a .img extension. If no destination file name is given, the name will default to the source file name with a .img extension.

● The source and destination file names must have the same extension (excluding .zmg files, which use a .img extension).

Command Type

shell

Formats

tftp { get | put } [*address*] [*source_filename*] [*dest_filename*]

Parameters

get   Downloads a file from the TFTP server.

put   Uploads a file to the TFTP server.

address   Defines the IP address of the TFTP server to which the file download or upload will occur.

source_filename   Defines the file to download from or upload to the TFTP server.

✎

Note: The source file name cannot contain spaces or special characters.

dest_filename   Defines the name of the source file after it has been downloaded from or uploaded to the server. If no destination file name is specified, the file will have the same name as the source file.

✏

Note: The destination file name cannot contain spaces or special characters.

Examples

This example displays the upload of file `primary.cnf` to file `secondary.cnf` on TFTP server `10.34.6.13`.

```
[232] tftp put 10.34.6.13 primary.cnf secondary.cnf
File Uploaded successfully.

[232]
```

This example displays the download of file `secondary.cnf` to file `primary.cnf` from TFTP server `10.34.6.13`.

```
[232] tftp get 10.34.6.13 secondary.cnf primary.cnf
Attempting to Download the file secondary.cnf ...
File Downloaded successfully.

[232]
```

tftpboot

Description

This command displays the BOOTP/TFTP status or aborts attempts to contact the BOOTP server. The AI232 card attempts to contact a BOOTP server if certain conditions are met. These conditions are:

● The card is in standalone mode.

   AND

● The card does not have an IP address set or no BOOT.INI file exists.

Attempts to contact the BOOTP server continue until a valid reply is received or until the IP address gets set by the user in another manner, such as with an "ip init" shell command.

🖉

Note: If the conditions are initially met, then the card will not attempt to contact the BOOTP server.

When AI232 receives the necessary information from the BOOTP server, it attempts to retrieve a configuration file from the TFTP server. The TFTP server information is contained in the response from the BOOTP server.

Command Type

shell

Formats

```
tftpboot
```

Examples

This example displays the result of a card booting without a BOOTP/TFTP session.

```
[232]tftpboot
Usage:  tftpboot [abort]
Displays BOOTP/TFTP status or aborts retry attempts.

BOOTP/TFTP did not run this session.
[232]
```

This example displays the result of a card booting when no BOOTP or TFTP server is on the net.

```
[232] tftpboot
Usage: tftpboot [abort]
Displays BOOTP/TFTP status or aborts retry attempts.

Waiting for a response from the BOOTP server.


[232] tftpboot abort
BOOTP/TFTP retry attempts will be aborted.
[232]
```

This example displays the result of a boot when the BOOTP server is on the net but the TFTP server is not available:

```
[232] tftpboot
Usage: tftpboot [abort]
Displays BOOTP/TFTP status or aborts retry attempts.

Waiting for a response from the TFTP server.
BOOTP Response:
        IP Address:  10.48.60.11
        TFTP Server: 10.48.60.1
        TFTP File:  296v950b002.cnf
        Subnet Mask: 255.255.0.0
        Router: 10.48.0.1
[232]
```

This example displays the result of a reboot with a successful BOOTP/TFTP session:

```
[232]tftpboot
Usage: tftpboot [abort]
Displays BOOTP/TFTP status or aborts retry attempts.

BOOTP/TFTP is finished.
[232]
```

timezone

✏️

Note: This command is only available when AI232 is in standalone mode.

Description

This command displays or changes the time zone or adjusts the time to reflect daylight savings.

Command Type

shell

Formats

timezone [**-dston** | **-dstoff**] [{ **+** | **-** } *hh*:*mm*]

Parameters

-dston   Enables daylight savings time for AI232.

-dstoff   Disables daylight savings time for AI232.

hh   Defines the number of hours from UTC (Universal Coordinated Time or Greenwich Mean Time).

mm   Defines the number of minutes from UTC (Universal Coordinated Time or Greenwich Mean Time).

+   Specifies that the value is east of UTC.

-   Specifies that the value is west of UTC.

✏️

Note: For +/-, enter the direction (+ = east) (- = west) of Universal Coordinated Time (UTC) or Greenwich Mean Time.

The time entered here is the number of hours from UTC. For example, if the desired location is in the Eastern Standard Time (EST) zone, enter -05:00 in this field. This indicates a time 5 hours behind UTC.

Examples

This example displays the current daylight savings time setting.

```
[232]timezone
Daylight saving is disabled on this system
Current time zone: +00:00
[232]
```

This example displays the enabling of daylight savings time and the setting of the timezone to -5:00.

```
[232]timezone -dston
Daylight saving is enabled on this system
Current time zone: +00:00
[232]timezone -05:00
Daylight saving is enabled on this system
Current time zone: -05:00
[232]
```

type

Description

This command displays the text of any file other than a code image or configuration file.

✎

Note: This command has the same functionality as command `cat`.

Command Types

shell

Formats

`type` [`-p`] *filename*

Parameters

`-p`   Displays text from the file one page at a time.

filename   Defines the file for which you want to view the contents.

Examples

This example displays the first page of contents for file `log.txt`.

```
[232]type -p log.txt
14:48:28 042904 Sev=F Msg:
User 'pubs' has deleted the log file.
16:30:58 042904 Sev=0 Msg:
Configuration has changed
16:30:58 042904 Sev=F Msg:
User pubs from 10.40.5.20#2088 has exited the shell.

16:31:00 042904 Sev=F Msg:
User pubs from 10.40.5.20#2088 has logged out of the Destination Menu.

09:34:57 043004 Sev=F Msg:
User pubs from 10.40.5.20#1212 has logged into the Destination Menu.

09:34:59 043004 Sev=F Msg:
User pubs from 10.40.5.20#1212 has entered the shell.

13:12:38 043004 Sev=0 Msg:
Configuration has changed
13:12:38 043004 Sev=F Msg:
User pubs from 10.40.5.20#1212 has exited the shell.

13:31:14 043004 Sev=F Msg:
User pubs from 10.40.5.20#1212 has entered the shell.
Press Space for more or q to quit:
```

update

Description

This command displays information about the image and configuration files. When entered with arguments, this command updates AI232 software. Update the software by copying a new image or configuration file to a destination file.

Command Types

shell and winslc

Formats

For the shell command:

>   update *src_file dest_file*

For the winslc command:

>   **winslc** *baseport* **update** *src_file dest_file*

Parameters

src_file   Defines the source file to copy.

dest_file   Defines the file where the source file is to be stored.

baseport   Defines the baseport number for AI232.

🖉

Note: The *src_file* and the *dest_file* must both have a file extension of either .cnf or .img.

Examples

This example displays the update of source image file 232.img to destination image file boot.img.

```
[232]update 232.img boot.img
[232]
```

uptime

Description

This command displays the current time and the amount of time AI232 has been running since it was last booted.

Command Type

shell

Formats

```
uptime
```

Examples

This example displays the current time and the amount of time AI232 has been running since it was last booted.

```
[232]uptime
 4:22pm  up 0 days, 0:07:44
 (uptime rolls over every 497 days, 2:27:52)
[232]
```

useradd

Description

This command adds a username and password. When the user first logs into AI232, the login name and password are both **ai** by default. Five grace logins are available before a username and password must be configured. A total of ten users can be added to the database.

Command Type

shell

Formats

useradd [*-profile_name*] [*username*]

Parameters

profile_name   Assigns a permission to a username. Table 8-3 describes the permissions. The default permission is **supervisor**.

username   Defines the login name for a user (up to 8 characters). After entering a *username*, a prompt appears that asks for a password (up to 10 characters).

Table 8-3   Description of Permissions

profile_name	Permission
supervisor	Specifies a user who can execute all commands on the system. At least one supervisor permission must be configured. The system will not allow the deletion of the only supervisor user. The default permission is **supervisor**.
mgmt	Specifies a user who can execute all commands except for **useradd**.

Table 8-3   Description of Permissions (Continued)

profile_name	Permission
status	Specifies a user who can only execute the following commands: • creset • debug • diag-conn • diag-info • diag-eth • diag-tconn • help • ip • menu • ping • pvclist • show • staela • staslc
dest	Specifies a user who can login into AI232 and access the destination menu. The user cannot connect to destination ai to retrieve status or to change the configuration.
connect	Specifies a user who is automatically connected to a specific destination at login. The destination is specified when the permission is assigned.

Examples

This example displays the addition of user brian with profile mgmt to the user database. The system prompts the user for the password after the username and profile are entered.

```
[232]useradd -mgmt brian
Adding user of type 'mgmt'
Please enter a password.
Passwords are truncated at 10 characters.

Please retype the password.


User "brian" added successfully.

[232]
```

userdel

Description

This command deletes a username and password from the database.

Command Type

shell

Formats

userdel

Examples

This example displays the deletion of user brian from the database. After the command is initially entered, prompts appear that tell the user what information needs to be entered.

```
[232] userdel
Please enter the login name of the user to DELETE.
newguy
Delete user "newguy"? (y/n) y

User "newguy" deleted successfully.

[232]
```

users

Description

This command displays currently configured AI232 users with the associated profile names and destinations.

Command Types

shell

Formats

user

Examples

This example displays all currently configured AI232 users with associated profile names and destinations. In this case, pubs is the only configured user.

```
[232] users

User Name       Profile Name    Destination
----------------------------------------------
"pubs"          supervisor

[232]
```

who

Description

This command displays the users currently logged into AI232. It displays the user name, time of login, user ID, the source of the connection, and command currently being used by each user. The destination is shown only if the user has connected to an alias with the destination menu.

Important: Do not use the ID displayed with this command to break a connection.

Command Type

shell

Formats

who

Examples

This example displays all the users currently logged in to the AI232. In this case, pubs is the only logged in user.

```
[232] who
User        Login Time     ID  From                    Command (-> Destination)
-------------------------------------------------------------------------------
"pubs"      Jul 28 02:42   149  10.40.5.12#1241         who
[232]
```

xon-interval

Description

This command adjusts the amount of time between consecutive Xons. If inbound flow control is enabled on an asynchronous link, AI232 transmits Xons at regular intervals.

Command Type

winslc

Formats

winslc *baseport* xon-interval *link seconds*

Parameters

baseport   Defines the baseport number for AI232.

link   Defines the link number to adjust the XON interval. Valid values are 1 to 32.

seconds   Defines the number of seconds the link waits between sending consecutive XONs. The default interval is 15 seconds. The valid range is 1 to 120 seconds.

Examples

This example displays the configuration of the XON transmit interval to 45 seconds on link 3.

```
NODE-XXX AISwitch Shell Connection  14
>winslc 16 xon-interval 3 45
NODE-XXX AISwitch Shell Connection  14
```

AI232 Crash Codes

This appendix provides information about AI232 crash codes.

Guide to this Appendix

Crash Codes

Kentrox Technical Support

Crash Codes

Crash codes report to the log port when a card crashes and you receive an AIswitch fault message. This message indicates that the system has detected a serious hardware or software fault.

Common Crash Codes

These codes are common to all software (not just AI products). The first column of Table A-1 displays the hexadecimal code for the error message. The second column displays the decimal value for the same message. The third column provides a description of the error message. Contact AI Technical Support to report any of the following crash codes.

Table A-1   Common Crash Codes

Error Code Hexadecimal	Error Code Decimal	Description
0001	1	Specifies a bus error.
0002	2	Specifies an address error.
0003	3	Specifies an illegal instruction.
0004	4	Specifies a zero divide error.
0005	5	Specifies a check instruction trap.
0006	6	Specifies a TRAPV error.
0007	7	Specifies a privilege error.
0008	8	Specifies a trace trap.
0009	9	Specifies an unused exception vector.
09*xx*	>264	Specifies an illegal vector. *xx* is the vector number (non-zero) used in place of the codes above to ensure that the exact vector number is determined if an exception occurs.

AI232 Crash Codes

Table A-2 displays crash codes that are specific to AI232. Contact AI Technical Support to report any of the following crash codes.

Table A-2   AI232 Crash Codes

Error Code Hexadecimal	Error Code Decimal	Description
0020	32	Specifies a failure to free resource (streams).
0021	33	Specifies a failure to free memory (system).
0022	34	Specifies a failure of resource allocation (streams).
0023	35	Specifies a failure of memory allocation.
0024	36	Specifies a checksum error.
0025	37	Specifies that a panic message has been printed.
0026	38	Specifies an attempt to boot while up.
0027	39	This code is not used.
0028	40	Specifies that AI232 has been halted by Central Switch command. This code is seen when you enter command `stpslc` for a card.
0030	48	Specifies a crash in the shell.
0031	49	Specifies a crash in transport layer multiplexing.
0032	50	Specifies a crash in association daemon.
0033	51	Specifies a crash in bootp.
0034	52	Specifies a crash in X.25.
0035	53	Specifies a crash in an asynchronous driver.
0036	54	Specifies a crash in the PVC daemon.
0037	55	Specifies a crash in the config daemon.
0038	56	Specifies a generic stream error.
0039	57	Specifies a crash in the AEP or AEPN protocol processing option.
003A	58	Specifies a crash in the pktmod or TL1mod protocol processing option.

Table A-2   AI232 Crash Codes (Continued)

Error Code Hexadecimal	Error Code Decimal	Description
00AA	170	Specifies a serious memory error (unable to allocate system memory).
00AC	172	Specifies that a serial communication controller is not responding.
00AD	173	Specifies a software download. This is normal to see when doing a software update to AI232.

System Failure Crash Reports

Crash codes report to the log port when a card crashes and you receive an AIswitch fault message. This message indicates that the system has detected a serious hardware or software fault.

A message similar to the following appears:

```
SLC has CRASHED - registers to follow:
Crash Code= 000000ad
PC= 00000000     SP= 00000000     IMMR= 00000000     MSR= 00000000
GPR00= 00000000     GPR01= 00000000     GRP02= 00000000
GPR03= 00000000     GPR04= 00000000     GRP05= 00000000
GPR06= 00000000     GPR07= 00000000     GRP08= 00000000
GPR09= 00000000     GPR10= 00000000     GRP11= 00000000
GPR12= 00000000     GPR13= 00000000     GRP14= 00000000
GPR15= 00000000     GPR16= 00000000     GRP17= 00000000
GPR18= 00000000     GPR19= 00000000     GRP20= 00000000
GPR21= 00000000     GPR22= 00000000     GRP23= 00000000
GPR24= 00000000     GPR25= 00000000     GRP26= 00000000
GPR27= 00000000     GPR28= 00000000     GRP29= 00000000
GPR30= 00000000     GPR31= 00000000
CR= 00000000     SSR0= 00000000     SSR1= 00000000
LR= 00000000     XER= 00000000     CTR= 00000000
PVR= 00500000     PS0S1=00000000     PS0S2=00000000     PS0S3= 00000000
```

Kentrox Technical Support

Some alarm conditions and crash codes reveal serious problems for which you should contact Kentrox Technical Support. If one of these alarm conditions or crashes should occur, record relevant information associated with the problem and contact Kentrox Technical Support.

Phone:

Kentrox Technical Support	(866) 480-3571
Kentrox Operator (toll-free)	(800) 247-9482
Kentrox Operator (international)	(614) 798-2000

Email:

Kentrox Technical Support	techsupport@aiinet.com

When you send email to Kentrox, be sure to include your name, company name, and telephone number.

Standalone Mode and Switch Mode

This appendix provides information about standalone and switch mode for AI232.

Guide to this Appendix

Standalone Mode

Switch Mode

Standalone Mode

Standalone mode refers to the mode where AI232 stores its configuration locally (to flash) or on a TFTP server. The CLC might be used as the TFTP server in some cases. This lets the card operate as a self-contained unit. When operating in standalone mode, AI232 has a local menu system that is used instead of the AI198 menu system for tasks such as alias and IP configuration. AI232 operates in standalone mode when it is installed in the AI110 chassis.

The following characteristics apply when AI232 is operating in standalone mode:

- The front panel Ethernet port is the default (rather than the IRB).

- AI232 cards are not hot-swappable—the card configuration must be set up manually.

- AI232 has a unique system OID.

- The AI232 local menu system has slightly different options than when the card is running in switch mode.

Downloading Software for a Standalone AI232

To download software for AI232 in standalone mode:

1. Open a command prompt window.

2. At the command prompt, start the FTP utility:

    `ftp`

3. At the FTP prompt, open AI232:

    open *ip_address*

    ip_address   Specifies the AI232 IP address.

    The FTP utility prompts you for a user name and password.

4. Put the FTP utility in binary mode:

    `binary`

5. Transfer the software image to AI232:

    put *filepath/imagename*.**img**

    filepath   Defines the path to the software image file.

    imagename   Defines the software image file name.

    ✎
    Note: Wait for a completion message after entering this command.

6. Exit the FTP utility.

7. Login to the shell with a serial or Telnet connection.

8. Update the existing boot program image with the new software image file:

    update *imagename*.**img boot.img**

    imagename   Defines the software image file name.

9. When the update is complete, reboot AI232.

Configuring BOOTP/TFTP

The AI232 configuration can be automatically downloaded from a TFTP server when the card is in standalone mode and has BOOTP information stored in AI198 Menu 10. For more information about BOOTP configuration, refer to "Configuring the BOOTP Table" in the *AI198 Common Logic Controller System Manager/User's Manual*.

When AI232 starts, it determines if the following conditions are met before using BOOTP to find IP address information:

● AI232 is in standalone mode

● The IP address is not set.

If both of these conditions are met, AI232 attempts to contact a BOOTP server until it obtains valid IP address information or the IP address is set by a user with the **ip init** shell command. When an IP address has been obtained either by BOOTP or through the ip init command, AI232 will resume its boot process.

The following events occur when AI232 attempts to download a configuration file from the TFTP server:

● Once the IP address information has been correctly configured from the BOOTP reply, AI232 will attempt to contact a TFTP server only if the TFTP server IP address and configuration filename were received by the BOOTP reply.

● AI232 will try to download the configuration file from the TFTP server once every 60 seconds for a maximum of 10 retries.

● If no valid configuration file is downloaded from the TFTP server after 10 retries, AI232 will remove the previously configured IP address information from the BOOTP server and completely restart the BOOTP process.

● If at any time the local configuration file stored on flash is changed by a user, AI232 will stop attempting to contact the TFTP server.

● If a valid configuration is successfully downloaded from the TFTP server, AI232 will update the current configuration with the downloaded file.

Switch Mode

Switch mode refers to the mode where AI232 is managed by the CLC. When AI232 is in switch mode, the AI198 menu system must be used to configure IP addresses, aliases, IP static routes, and SNMP traps. AI232 must be located in the AI130 or AI180 chassis to operate in switch mode.

The following characteristics apply when AI232 is operating in switch mode:

- AI232 gets its configuration from the CLC at boot time (instead of locally or by TFTP).

- The CLC is used to route calls and maintain alias configuration information.

- The IRB is the default port (rather than the front panel Ethernet port).

- AI232 cards are hot-swappable—the card configuration does not have to be set up manually.

Note: Switch mode may also be referred to as CLC mode.

Downloading Software for AI232 in Switch Mode

To download software for AI232 when it is in switch mode:

1. Open a command prompt window.

2. At the command prompt, start the FTP utility:

   `ftp`

3. At the FTP prompt, open AI198:

   open *ip_address*

   ip_address   Specifies the AI198 IP address.

   The FTP utility prompts you for a user name and password.

4. Put the FTP utility in binary mode:

   `binary`

5. Transfer the software image to AI198:

   put *filepath/imagename.**img*

   filepath   Defines the path to the software image file.

   imagename   Defines the software image file name.

   Note: Wait for a completion message after entering this command.

6. Exit the FTP utility.

7. Log in to AI198.

8. At the command prompt, update AI232 with the new software image:

    `winslc` *baseport* `update`

    baseport   Defines the baseport of AI232.

    🖉
    Note: You can watch the download process by entering CTRL+L.

9. Wait for the completion message.

Commands for AI232 TACACS+ Server Enhancements

This appendix provides a list of commands that users need when configuring a TACACS+ server to utilize AI232's authorization enhancements.

Guide to this Appendix

AI232 Commands

Important: To authorize a command with no additional arguments, remember to enter `permit ^$` in the argument list.

The following AI232 commands can be included in an authorization set on the TACACS+ server:

`2401`	`pvclist`
`aaa`	`queue`
`ai`	`ip`
`alarm`	`link`
`arp`	`log`
`break`	`logout`
`cat`	`ls`
`clear`	`reset`
`crash`	`rm`
`crc`	`selcnf`
`creset`	`sholog`
`date`	`show`
`debug`	`snmp`
`del`	`id`
`delete`	`sonic`
`diag-conn`	`staeia`
`diag-eth`	`standalone`
`diag-info`	`staslc`
`diag-line`	`syncflash`
`diag-tconn`	`tacacs`
`dir`	`tail`
`exit`	`task`
`head`	`tcpoutconn`
`help`	`tftp`
`memory`	`tftpboot`
`memtrack`	`timezone`
`menu`	`type`
`modmux`	`update`
`more`	`uptime`
`passwd`	`useradd`
`ping`	`userdel`
`pppstatus`	`users`
`profile`	`who`

The following keyword lets users access destinations:

`dest`   Provides authorization at the destination menu. Individual destination names can be used as arguments. For example, {`permit AI, permit somedestination, permit EXIT`}.

AI232 Menu Aliases

The following AI232 menu aliases can be included in an authorization set on the TACACS+ server. Authorization occurs when level 1 menu items are traversed:

`menu`	Provides access to the menu.
`menu_link`	Provides read access to the link menu.
`menu_link write`	Provides write access to the link menu.
`menu_alias`	Provides read access to the alias menu.
`menu_alias write`	Provides write access to the alias menu.
`menu_system`	Provides read access to the system menu.
`menu_system write`	Provides write access to the system menu.
`menu_route`	Provides read access to the static route menu.
`menu_route write`	Provides write access to the static route menu.

Note: Keyword `write` is treated as an argument.

FTP Sessions

The following AI232 keywords apply to FTP access:

`ftplogin`   Provides FTP read access.

`ftpwrite`   Provides FTP write access.

Acronyms and Abbreviations

Table 1   Acronyms and Abbreviations

Acronym	Meaning
ABR	Area Border Router
ACK	Acknowledgement (positive)
ACTA	Administrative Council for Terminal Attachments
AEP	Applied Innovation Encapsulation Protocol
AEPN	Applied Innovation Encapsulated Protocol with the Network option
AI	Applied Innovation Inc.
ALS	Address Lookup Server
AMI	Alternate Mask Inversion
ARP	Address Resolution Protocol
AS	Autonomous System
ASBDR	Autonomous System Boundary Router
ASBR	Autonomous System Boundary Router
ASE	Autonomous System External
ASEX	Autonomous System External
ASP	Application Service Provider
BAM	Bistate Alarm Module
BCP	Bridging Control Protocol
BER	Bit Error Rate
BERT	Bit Error Rate Test
BGMP	Border Gateway Multicast Protocol

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
BGP	Border Gateway Protocol
BOC	Bell Operating Company
BPDU	Bridge Protocol Data Unit
BRI	Basic Rate Interface
C	Common
CAAML	Centralized Autonomous AI Message Logging
CALLA	Call Accepted Packet
CALLC	Call Connected Packet
CALLR	Call Request Packet
CCI	Command and Control Interface
CCITT	Consultative Committee on International Telegraphy and Telephony
CD	Carrier Detect
CEV	Controlled Environment Vault
CHAP	Challenge-Handshake Authentication Protocol
CLC	Common Logic Controller
CLEC	Competitive Local Exchange Carrier
CLEI	Common Language Equipment Identifier
CLI	Command Line Interface
CLNP	Connectionless Network Protocol
CLRC	Clear Confirmation Packet
CLRI	Clear Indication Packet
CLRR	Clear Request Packet
CPE	Customer Premises Equipment
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
CRT	Cathode Ray Tube
CSU	Channel Service Unit
CTS	Clear to Send
CUD	Call User Data
DAD	Data Acquisition Device
DCD	Data Carrier Detect
DCE	Data Circuit Terminating Equipment or Data Communication Equipment
DCN	Data Communications Network
DD	Database Description
DHCP	Dynamic Host Configuration Protocol
DLC	Data Link Control
DLCI	Data Link Connection Identifier (Information)
DNS	Domain Name Service
DSR	Data Set Ready
DSU	Digital Service Unit
DSX	Digital System Cross-Connect
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
DVMRP	Distance Vector Multicast Routing Protocol
EEPROM	Electronically Erasable Programmable Read-Only Memory
EGP	External Gateway Protocol
EIA	Electronic Industries Association
EM	Element Manager
EMI	Electro Magnetic Interference
EPROM	Erasable Programmable Read-Only Memory

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
ES	End System
ESD	Electrostatic Discharge
ES-IS	End System to Intermediate System
EST	Eastern Standard Time
FCC	Federal Communications Commission
FDM	Frequency Division Multiplexing
FDX	Full Duplex
FGND	Frame Ground
FIC	Faculty Interface Code
FOC	Fiber Optics Communications
FTAM	File Transfer, Access, and Management
FTP	File Transfer Protocol
GMT	Greenwich Mean Time
GRE	Generic Routing Encapsulation
GUI	Graphical User Interface
HDLC	High Level Data Link Control
I/O	Input/Output
ICALL	Incoming Call Packet
ICMP	Internet Control Message Protocol
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Multicast Protocol
IGP	Interior Gateway Protocol
IPCP	IP Control Protocol
IPX	Internetwork Packet Exchange

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
IRB	Inter-repeater Bus
IS	Intermediate System
ISDN	Integrated Services Digital Network
IS-IS	Intermediate System to Intermediate System
ISO	International Standards Organization
ISP	Internet Service Provider
ITU	International Telecommunication Union
IXE	IP Protocol over X.25 Encapsulation
JRE	Java Runtime Environment
LAN	Local Area Network
LAPB	Link Access Protocol - Balanced
LBO	Line Build Out
LCN	Logical Channel Number
LCP	Link Control Protocol
LED	Light Emitting Diode
LLC	Logical Link Control
LSA	Link State Advertisement
LSR	Link State Request
LSU	Link State Update
MAC	Media Access Control
MAN	Metropolitan Area Network
MBR	Master Boot Record
MCI	Master Communications Interface
MD	Mediation Device
MIB	Management Information Base

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
MMF	Multimode Fiber Optic Cable
MSDP	Multicast Source Discovery Protocol
MUX	Multiplexer
NAK	Negative Acknowledgment
NC	Normally Closed
NCP	Network Control Protocol
NE	Network Element
NEBS	Network Equipment Building System
NEC	National Electrical Code
NI	Network Interface
NLPID	Network Layer Protocol Identifier
NMS	Network Management System
NO	Normally Opened
NOC	Network Operations Center
NSA	Nonservice Affecting
NSAP	Network Service Access Point
NSSA	Not-So-Stubby Area
NTP	Network Time Protocol
NUD	Neighbor Unreachability Detection
NVT	Network Virtual Terminal
OAM&P	Operations, Administration, Maintenance, and Provisioning
ODBC	Open Database Connectivity
OS	Operating System
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
OSS	Operating Support System
PAD	Packet Assembler Disassembler
PAP	Password Authentication Protocol
PBX	Private Branch eXchange
PC	Personal Computer
PDU	Protocol Data Unit
PID	Private ID or password
PMC	PCI Mezzanine Card
POTS	Plain Old Telephone Service
PPP	Point-to-Point Protocol
PRI	Primary Rate Interface
PROM	Programmable Read Only Memory
PSI	Pounds per Square Inch
PUC	Public Utility Commission
PVC	Permanent Virtual Connection
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
QPLC	Quad Physical Layer Controller
QTAM	Queued Telecommunications Access Method (IBM)
RAM	Random Access Memory
RAM	Router Access Module
RAS	Remote Access Server
RBOC	Regional Bell Operating Company
RCV	Receiver
RD	Routing Domain

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
RDP	Router Discovery Protocol
REN	Ringer Equivalence Number
RF	Radio Frequency
RIP	Routing Information Protocol
RMON	Remote Network Monitoring Specification
ROM	Read Only Memory
RTS	Request to Send
RXD	Receive Data
SAM	Serial Alarm Module
SAP	Service Advertisement Protocol
SCC	Specialized Common Carrier
SCCS	Switching Center Control System
SCID	SONET Circuit ID
SDH	Synchronous Digital Hierarchy
SG	Signal Ground
SIC	Secure Internal Communication
SID	System Identification number
SKU	Stock Keeping Unit
SLC	Smart Line Card
SLIP	Serial Line Interface Protocol
SMF	Single Mode Fiber
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SONET	Synchronous Optical Network

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
SPF	Shortest Path First
SQL	Structured Query Language
STP	Shielded Twisted Pair
STP	Spanning Tree Protocol
SVC	Switched Virtual Connection
TACACS	Terminal Access Controller Access System
TARP	TID Address Resolution Protocol
TBOS	Telemetry Byte Oriented Serial
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol over Internet Protocol
TCP/UDP	User Datagram Protocol
TDM	Time Division Multiplexing
TDMA	Time Division Multiple Access
TELCO	Telephone Company
TFTP	Trivial File Transfer Protocol
TID	Target Identifier
TL1	Transaction Language One
TOS	Type of Service
TTL	Time to Live
TXD	Transmit Data
UA	Unnumbered Acknowledgement
UART	Universal Asynchronous Receiver/Transmitter
UDP	User Datagram Protocol
UL	Underwriters Laboratories
UTC	Universal Coordinated Time

Table 1   Acronyms and Abbreviations (Continued)

Acronym	Meaning
UTP	Unshielded Twisted Pair
VC	Virtual Channel
VLAN	Virtual LAN
VPN	Virtual Private Network
VRRP	Virtual Router Redundancy Protocol
VT	Virtual Terminal
WAN	Wide Area Network
WINSLC	Window to a Smart Line Card
XKMS	XML Key Management Specification
XNS	Xerox Network Services
ZIP	Zone Information Protocol