

ASACA AM-SERIES DVD
Digital Virtual Library

SERIAL/TELNET INTERFACE
MANUAL

ASACA AM SERIES
Digital Virtual Library
Serial Interface Manual

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Preface

This manual is intended for the system administrator and/or computer operator. It contains information on how the AM-Series Library works, how to perform setup procedure, conduct normal operations and maintain the library. Complete installation instructions are included in Appendix A.

WARNING

Always use extreme caution when working on the AM-Series DVD Library with AC power present. Before beginning the installation, read the safety precautions at the beginning of Appendix A. It is strongly suggested that the entire manual be read before proceeding with installation.

This manual is a companion to the following documents:

ASACA AM-Series Multi-Media Library Service Manual
ASACA AM-250 DVD Library Users Manual
ASACA AM-750 DVD Library Users Manual
ASACA AM-1450 DVD Library Users Manual
ASACA AM-Series DVD Library SCSI Reference Manual
ASACA AM-Series DVD Library Web Interface Manual

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This chapter provides a hardware overview, interface descriptions, connection instructions, and theory of operation for the ASACA AM SERIES Digital Virtual Library.

1.1 Overview of Product

The ASACA AM SERIES Digital Virtual library is a robotic disk handling system for network databases, multimedia, or large computer systems. The heart of the library is the internal revolving robotics, which can position itself to manipulate media within the library. A single cabinet can hold up to 250, 750 or 1450 disks. The disks are stored in magazines that are mounted on shelves and removable through the front or rear door. A magazine can store up to 50 disks. Single disks are accessed through the Import/Export mechanism at the front of the library.

The library has multiple, redundant user interfaces for interacting with the library including:

- a Front Panel user interface for basic configuration, status, and diagnostic functions
- two SCSI-2 interface connectors for communication with the Host CPU for library control and diagnostics
- an RS-232 serial port for system configuration, upgrades, and access to diagnostics from a local location
- an Ethernet port for utilizing TCP/IP protocols such as telnet for remote terminal support of serial applications, ftp for file transfer support, and http for World Wide Web monitoring of system status, configuration, diagnostics and upgrades.

This manual concerns itself with the serial and telnet interfaces.

1.2 Interface Connection

The cabinet is a freestanding unit and is enclosed by top and side panels as well as front and rear doors as shown in Figure 1.2-1. Front panel control is located on the front of the library while the SCSI, network, and RS232 connectors are accessible from the rear (Figure 1.2-2 and 1.2-3). The controlling software for the cabinet (Syscon) is located on a PCMCIA Flash disk accessible from the rear connector panel on the AM750 and by opening the side panel on the AM250. The cabinet can be rolled freely on four casters for access to the rear of the unit.

The connector panels pictured in Figure 1.2-2 for the AM750 and 1.2-3 for the AM250, show the location of the RS232 and Ethernet connectors. To connect to the RS232 port, use a standard PC, null modem, 9 pin cable.

To connect the library to your local network, connect a category 5 cable to the RJ45 connector located on the connector panel. The library is shipped with a default address of 127.0.0.10 and a netmask of 255.255.255.0. After obtaining an IP address and netmask for the library from your network administrator, set the addresses through the front panel and cycle power on the machine. For instructions on using the front panel, see the ASACA User's Guide for your library.



Figure 1.2-1 AM SERIES Library



Figure 1.2-2 AM750 Connector Panel

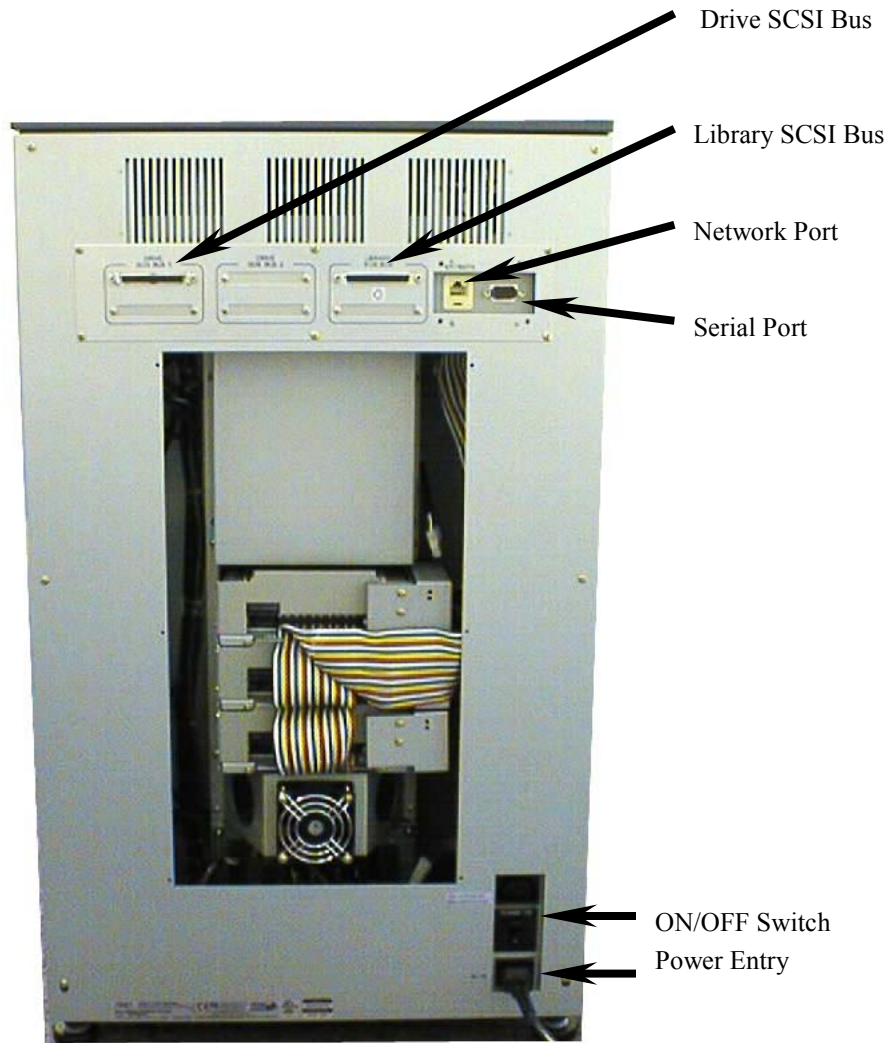


Figure 1.2-3 AM250 Back and Connector Panel

1.3 Library Operation

The AM Series operates as most medium changers in that the library has an allocated number of drives, storage shelves, one or more locations to get media in and out of the library, and mechanical picker mechanisms to move media. Library resources within a physical library are defined as follows:

Media Storage Elements (ST) is the physical location where a disc is stored in the library. Fifty storage elements are contained in a removable magazine.

Drive Elements (DT) define the physical drive where media is placed for reading and writing.

Media Transport Elements (MT) are the physical devices that move media from storage elements to drive elements. There are two physical media transport elements per cabinet in the AM Series library. MT elements are managed internally to the library to maximize the efficiency of media movement.

Import/Export Elements (IE) are physical locations that allow single pieces of media to be loaded or

removed from the library without interrupting operation.

In a multi-cabinet environment, the vendor-unique Pass Through element (PT) refers to the mechanism to move media from one chassis to the next.

1.3.1 Multiple Cabinets

The AM750 and AM1450 libraries are capable of being chained into multiple cabinet configurations of up to eight cabinets. Libraries are connected to each other with a pass through mechanism which transports media from one cabinet to the other. This allows users incrementally expand their library as storage needs increase.

1.3.2 Virtual Libraries

The ASACA library is capable of assigning its resources into what appear to be either multiple smaller “virtual” libraries or a larger virtual library which includes multiple ASACA cabinets. Virtual libraries provide extensive new functionality to library systems by allowing:

- different library applications to access library resources simultaneously
- different media types to be used within the same library
- libraries to be resized based upon current needs
- additional libraries to be added to the current library for expanding data requirements
- quick hot swap reconfiguration in a multiple robot configuration from one host to another by rebinding the physical interface of the virtual library.

1.3.3 Resource Allocation within Virtual Libraries

Allocation of the various library resources (ST, DT, MT, and IE elements) into a virtual library is performed by the system administrator. The system administrator will define the number of ST and DT elements allocated within each virtual library. IE and MT elements are shared resources and cannot be uniquely allocated to any specific virtual library. PT elements, only available in multi-cabinet installations are also automatically assigned to the virtual library.

Since the AM750-DVD and AM1450-DVD library models allow up to 8 cabinets to be connected together into a single physical library it is possible to define a virtual library that spans cabinets. As a result of this capability, the number of IE, MT, and PT elements multiply with the number of cabinets spanned in the virtual library. When multiple cabinets are spanned in the definition of a virtual library, all elements allocated are assigned sequential element numbers starting in the left most cabinet to the right most cabinet.

Once a digital virtual library is defined, it must be bound to an interface for control operation. Usually this is assigned to a SCSI interface on one of the cabinets at a specific logical unit address (LUN).

Chapter 2

Serial/Telnet Connection

Syscon software controls the ASACA AM SERIES Digital Virtual library. A user can connect to Syscon via telnet or serial connection to perform system maintenance functions. This Chapter provides the procedures for various administrative tasks performed through these interfaces.

2.1 Operating System Overview

Syscon software controls the ASACA AM SERIES Digital Virtual library and is run by a UNIX-like real-time operating system. The PCMCIA flash disk, where Syscon resides, contains a navigable file system. Configuration files, executables, and logging files are contained within the file system. A subset of standard UNIX commands are used for file manipulation and file system translations. The login shell for the Syscon is the Korn shell and a vi-like editor is supplied for ascii file editing. For administrators unfamiliar with UNIX, any generic UNIX reference such as “UNIX in a Nutshell” from O’Reilly and Associates would be useful.

2.2 Logging On

Once the library is cabled either serially or via Ethernet as described in Section 1.2, the user can log on to the library. There are two accounts setup for customer use, “root” and “admin”. The “root” account should be used when making changes to the configuration of the system. The “admin” should be used to retrieve information.

For serial connections, a terminal emulation program such as Microsoft HyperTerminal can be used (see Appendix A on instructions for configuring HyperTerminal). A vt100 emulator with a standard size terminal of 80 characters by 24 lines is recommended. If the connection and communication parameters are correct, you should see “login:” on the menu.

For a telnet connection, the library must be connected to your network and be assigned an address and netmask within your domain (Section 1.2). When the library is connected, “login” should appear on the screen. For instructions on using telnet through Windows, see Appendix A.1.

2.3 Terminal Emulation

The terminal emulation type is typically set automatically during login, depending on the device at the other end. In cases where the terminal type is not detected, editing or configuration programs will not run properly. To check the current terminal emulation, type:

```
# echo $TERM
```

If the response is ‘unkown’ or incorrect, the terminal type will need to be set. If are logging in through a vt100 terminal emulator type:

```
# v
```

which is an alias used to set this type. If you are using another terminal type such as ansi, type:

```
# export TERM=type  
# stty +load
```

where *type* is vt100 or ansi.

2.4 Administration Utilities

The AM SERIES library requires very little administration if you intend to run the library with a default setup. There are however, a few utilities that may be needed including changing passwords, redirecting logging, adding a route, and reconfiguring the library definition.

2.4.1 Changing Passwords

The “root” and “admin” accounts have default passwords. For security reasons, it is important to change the passwords as soon as the system is installed, as unauthorized users could potentially log in and modify library settings remotely using any of these interfaces.

To change a password, first login as the user you want to change (root or admin). Once logged in type:

```
# passwd  
New password:  
Retype new password:
```

The passwd utility will prompt you for a new password and then again for verification of that password as shown. The new password is required for the next login for this user.

2.4.2 Library Shutdown

Because the ASACA AM SERIES libraries are running a filesystem from a PCMCIA flash, it is important for file system integrity to properly shut down the library when either a power cycle or a complete shutdown is necessary. Shutdown can be accomplished through the front panel or by telnet or serial login to the library. The administrator must first login as root in order to perform these operations (see 2.3.1). To recycle the library type:

```
# shutdown
```

To power down the library type:

```
# shutdown -b
```

It is safe to turn off the power in approximately 10 seconds.

2.4.3 Configuration

AM Series libraries are shipped with a default configuration that may or may not need to be changed on site. The following conditions require reconfiguring the library:

- 1) SCSI ID of 6 will not work on your bus.
- 2) SCSI bus termination is not at the library.
- 3) More than one virtual library is desired.
- 4) Default operating parameters are not desirable.
- 5) The library will reside and be accessible to an internal network.
- 6) An additional library is being added to the current configuration.

Limited configuration is accomplished through the front panel. More extensive configuration can be done through a serial/network connection or through a WEB browser connected to the library. The serial/telnet configuration utility, “cfg” is described in Chapter 3.

2.4.4 Date

If the date on the library is incorrect, login to the library and type:

```
# date CCYYMMDDhhssmm[.ss]
```

where:

- CC : is the century
- YY : is the year
- MM : is the month
- DD : is the day
- hh : is the hour
- mm : is the minute
- .ss : is an optional second field

```
# rtc -s at
```

2.4.5 Creating a Host Table

The host table is a simple text file which maps IP addresses to host names. This is an old style of name lookup which is largely not used now because of distributed database techniques such as DNS. If the library is on a network which does not use DNS, it may be necessary to set up a host table. The default table is contained in the file “/etc/hosts” and is shown in Figure 2.3-1.

```
#  
# Host Database  
# This file should contain the addresses and aliases  
# for local hosts that share this file.  
# It is used only for "ifconfig" and other operations  
# before the nameserver is started.  
#  
# $Revision: 1.2 $  
# $Name: Rel1_2 $  
#
```

```
127.0.0.1    localhost
#
# Imaginary network.
127.0.0.10   am750_1
```

Figure 2.3-1 AM750DVD Default Host Table

Entries in this table consist of an IP address followed by the hostname assigned to that IP address. To change the file:

```
# cd /etc
# vi hosts
```

2.4.6 Syscon Upgrades and Patches

Periodically, ASACA puts out patches and new releases to the SYSCON software. On site installation of a patch requires:

- a network connection to the ASACA library
- the ftp file transfer utility to move the archive onto the Syscon FLASH disk, and
- a telnet or a serial terminal connection to perform the install.

After receiving a patch from ASACA support, the patch archive is added to the library by first moving the archive to a host machine that is networked to the library. The file must then be transferred via ftp to the library as follows

```
# ftp <library> (where library is the hostname or IP of the library).
Name () : root
Password: #####
ftp> type binary
ftp> send C:\<path>\<patch> (where path is the location of the patch and patch is the file name)
ftp> quit
```

where path is the path to the archive location and patch name is the name of the archive file.

Login into the library as root using telnet or serial connection (see the AM-Series Serial/Telnet Interface Manual). From the root directory type:

```
# sinstall <patch>
```

If the install completes without error, type

```
# shutdown
```

which performs a restart of the library.

Chapter 3 CONFIGURATION

This chapter describes how to use the serial configuration utility “cfg”. “cfg” should be used if you are not connected to the library Web server or if new components are being installed in the library.

3.1 “cfg” Overview

The configuration program “cfg” is the serial/telnet equivalent to the embedded Web server administration utilities on the AM Series libraries with a few exceptions noted below.

- The “cfg” utility provides a lower level configuration interface and is used by ASACA to set the installed configuration of the library. You cannot change the number of physical elements within the WEB interface.
- cfg does not provide the Virtual library Reset option.
- The “cfg” utility does not contain a library power-cycle option as does the WEB, but can be done at the command line as described in Section 2.
- “cfg” is independent of the configuration manager running on the system. It changes the data on disk only and not the data used by the WEB processes. This can cause unexpected results if a combination of the WEB and “cfg” are used.

3.2 Terminal Emulation Requirements

The “cfg” utility requires a minimum screen dimension of 24 lines by 80 characters across and a vt100 terminal emulation. If you are logging in through Microsoft Windows HyperTerminal or telnet, see Appendix A for proper setup.

3.3 Menu Layout and User Interface

The screen is divided into 3 sections: title area, entry area, and message area. The title area remains constant and is of no concern to the user. The entry area changes with the current menu and is the user navigation area. The message area is used to display error messages, instructions, and prompts to the user.

TO	PRESS
Change Fields	TAB/ARROWs
Change the state of a check box	CR
Select a Menu	CR
Return to Previous Menu	ESC
To get out of insert or edit	CR
To drop down a menu (>V)	CR at ‘>V’
To delete a character	DEL

Table 3.3-1 cfg Navigation Table

There are three kinds of input fields in “cfg”: entry boxes, check boxes, and menu selections. Table 3.3-1 explains how to navigate and change values in a menu.

3.4 System Configuration Menu

Once you have logged onto the library as described in Chapter 2, type:

```
# cfg
```

This brings up the System Configuration Menu as shown in Figure 3.4-1. This is the main menu for the program and selects the library to configure.

Multi-Cabinet Configuration brings up configuration for multi-cabinet systems. This page sets up the ordering and low-level network identification.

Cabinet Configuration, when selected, changes the menu to the Cabinet Configuration menu which sets the cabinet specific information.

Logical Library Configuration, when selected, changes the menu to the Virtual Library Configuration menu which is needed to divide a library into virtual libraries.

Exit cfg, exits the configuration program. If changes have been made and not written, the user is prompted to save the changes or exit anyway.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X                                     ASACA                                     X
X                                     Digital Virtual Library                 X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X                                     System Configuration                     X
X                                                                              X
X                                                                              X
X                                     o Multi-Cabinet Configuration         X
X                                     o Cabinet Configuration                 X
X                                     o Logical Library Configuration         X
X                                     o Exit cfg                             X
X                                                                              X
X                                                                              X
X                                                                              X
X                                                                              X
X                                                                              X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X <ESC> = Change Menu <CR> = Select <TAB><^><v> = Transverse             X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

Figure 3.4-1 System Configuration Menu

3.4.1 Multi-Cabinet Configuration Page

The Multi-Cabinet Configuration menu sets up the libraries to be used in a multi-cabinet string. Adding a library to an existing cabinet string requires that the library be added through cfg or the WEB. Figure 3.4.1 shows the Multi-Cabinet Configuration Menu.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     ASACA                                     x
x                                     Digital Virtual Library                 x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     Multi-Cabinet Configuration            x
x                                                                              x
x Total Number of Cabinets  >0 2                                         x
x                                                                              x
x Left to Right Order:                                                    x
x                                                                              x
x Node #           1           [ ]                                         x
x                                                                              x
x MAC Address      00AE      [ ]                                         x
x                                                                              x
x Alive           [X]       [ ]                                         x
x                                                                              x
x                                                                              x
x                                                                              x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x <ESC> = Change Menu <CR> = Select <TAB><^><v> = Transverse             x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

Figure 3.4.1 Multi-Cabinet Configuration Menu

Total Number of Cabinets sets the number of cabinets connected by pass through. The default value is one and maximum is eight. Changing the value increases the number of entry fields available to the user.

Multiple cabinets communicate over network using a proprietary network protocol and TCP/IP. The proprietary network protocol is based upon MAC address and a network node number, unique to the network. ASACA uses network node numbers from 1 to 8 only. They can be assigned in any order within the library string but must correspond to the left to right order of the menu. The default shipping value of the node number is one. Node numbers can only be changed through the Front Panel which is described in the AM-Series Users’s guide for the library.

To add a second cabinet to the right of an existing cabinet, 2 should be selected from the number of cabinets. The node number which was changed throught the front panel should be entered in the rightmost node field (legal numbers are 2-8). The MAC address for the second cabinet can be found on a barcode strip located on the connector panel which is at the bottom, rear of the library (Figure 1.2-2). The barcode strip can be found close to the SCSI inputs for the library. Note the last four digits of the MAC address from the string of numbers below the barcode and enter them into the second MAC address field.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X                                     ASACA                                     X
X                                     Digital Virtual Library                   X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X                                     Cabinet Configuration                       X
X                                                                              X
X      Cabinet Number      SCSI ID      Vendor ID      ASACA      X
X          11          6          X
X      Number of Elements Available      Product ID      AM1450DUD      X
X      ST      DT      IE      PT          [ ] Store Drive Media on Power      X
X      1100      24      1      0          X
X          o Cabinet Drive Configuration      X
X          o SCSI Parameters                    X
X          o Network Setup                      X
X          o Logging Configuration             X
X                                                                              X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X <ESC> = Change Menu <CR> = Select <TAB><^><v> = Transverse      X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

Figure 3.5-1 Cabinet Configuration Menu

3.5 Cabinet Configuration Menu

The Cabinet Configuration Menu (Figure 3.5-1) handles setting of cabinet specific options. This includes SCSI hardware setup, network configuration, and the specific elements allocated in this cabinet. The Cabinet Configuration menu pertains to physical rather than virtual library resources.

Cabinet Number selects which cabinet number to configure and must be in the left to right string set in the Multi-Cabinet Configuration menu. Valid entries for this field are 1-8. Changing this value will refresh the screen with the values for that cabinet or the default values for a new configuration.

The SCSI ID can be set from 0 to 7 since the SCSI implementation on the AM Series library conforms to the Fast-10 configuration (narrow 8 bit SCSI, 10 MB/s synchronous transfer rate). The SCSI interface has been configured to accommodate standard Fast-20 cabling (wide 16-bit SCSI, 20 MB/s synchronous transfer rate).

Vendor ID and Product ID sets the SCSI INQUIRY Data values for vendor and manufacturer.

The Number of Elements Available refers to the number of elements installed in the library. These values should be set at the factory or when new drives or other hardware has been installed. This data should always reflect the installed hardware and should not be changed unless the hardware has changed. Note that the number of PT elements should be 0, for no pass through or 2 for either one or two pass throughs.

Cabinet Drive Configuration, SCSI Parameters, and Network Setup options all bring up a new menu and are discussed in the following sections.

3.5.1 Cabinet Drive Configuration

The Cabinet Drive Configuration menu is used to set the SCSI ID for the drive, the drive position, and SCSI termination. The SCSI ID sets what is returned in a READ ELEMENT STATUS command, SCSI bus address field. Figure 3.5-3 shows an example of the Cabinet Drive Configuration menu for a 3 drive AM750-DVD.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     ASACA                                     x
x                               Digital Virtual Library                       x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                               Cabinet Drive Configuration                   x
x                                                                           x
x Drive #           1       2       3                                     x
x                                                                           x
x SCSI ID           5       4       3                                     x
x                                                                           x
x Magazine #       4       4       4                                     x
x                                                                           x
x Position         Top    Mid    Bot                                     x
x                                                                           x
x Terminated      [ ]   [ ]   [X]                                     x
x                                                                           x
x                                                                           x
x                                                                           x
x                                                                           x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x <ESC> = Change Menu                                                    x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    
```

Figure 3.5-2 Cabinet Drive Configuration Menu

Magazine # and Position fields define the location of a drive. Each group of three drives is considered a

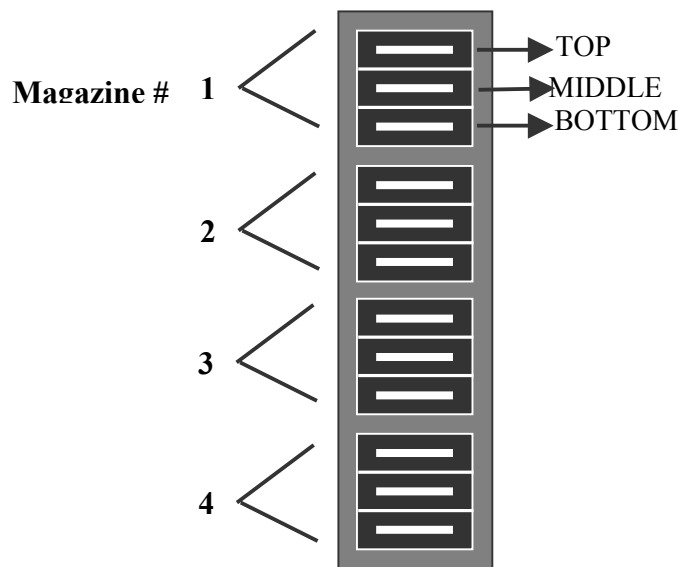


Figure 3.5-3 Drive Positions

magazine. Magazines are numbered from 1 to the total number of magazine positions in the library. For an AM750DVD, valid magazine numbers are from 1 to 4 where 1 is at the top of the chassis. Position refers to which drive in the magazine: the top, middle or bottom drive and valid entries include “Top”, “Mid”, or “Bot”. Figure 3.5-3 illustrates the drive position definitions.

3.5.2 SCSI Parameters

The SCSI Parameters menu lists a series of check boxes for the low level SCSI behavior (Figure 3.5-4). Note that changes to SCSI configuration will only take affect after the next power cycle.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     ASACA                                     x
x                                     Digital Virtual Library                     x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     SCSI Operating Parameters                   x
x                                                                                   x
x                                     [X] Parity Enable                         x
x                                     [X] Synchronous Enable                     x
x                                     [ ] Initiator Disconnect Disable          x
x                                     [ ] Target Disconnect Disable            x
x                                     [X] Initiator Reset Disable              x
x                                     [X] Termination Enable                   x
x                                                                                   x
x                                                                                   x
x                                                                                   x
x                                                                                   x
x                                                                                   x
x                                                                                   x
x                                                                                   x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x <ESC> = Change Menu                                                            x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

Figure 3.5-4 SCSI Operating Parameters Menu

Parity Enable when checked turns on parity checking. Parity is always generated on transmissions from the AM Series library. The parity bit should be checked for best security and performance.

Synchronous Enable when checked enables sync negotiation between the host device and the AM Series library. With Synchronous Enable unchecked, the library will not allow sync negotiation and speeds will conform to the SCSI-1 speeds. For best performance, this field should be checked.

Initiator Disconnect Disable turns off the ability of the AM Series library from disconnecting from a target device when acting as an initiator. Left unchecked the library will disconnect from the SCSI bus during long operations to other targets. This field should be left unchecked for best performance.

Target Disconnect Disable turns off the ability of the AM Series library from disconnecting form an initiator when acting as a target device. When blank the library will disconnect/reconnect from the host. This field should always be left blank for best performance and to accommodate most host devices

which expect this behavior.

Initiator Reset Disable when checked, disables the AM Series library from generating a reset condition on the SCSI bus during power up of the library system. When blank, the AM series library may generate a reset signal on the SCSI bus during power up which will in some cases cause a conflict with attached host computers.

Termination Enable sets the state of SCSI termination at the AM series library. If the library is the last device on the SCSI bus, this value should be checked. If the library and the drives are on the same bus, leave the box blank because the library drive chain should be terminated at the last drive.

3.5.3 Network Setup

The Network Setup menus shown in Figure 3.5-5, sets the values that allow the library to be connected to a local network. Changes to the network configuration require a power cycle to take effect.

Host Name defines a friendly name for the AM Series library used in place of the IP address and resolved through the local domain name server. The default name of the library is set to the model of the library and the robot number (ie. am750_1, am250_1).

The Network IP address can be set initially through the front panel to allow the Web interface to work or through cfg. By default, the library defines a loopback address for the library.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     ASACA                                     x
x                                     Digital Virtual Library                   x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     Cabinet Network Setup                     x
x                                                                              x
x Host Name      am1450_2              Network IP Address 192 .168.1 .100 x
x                                                        255 .255.248.0  x
x Domain Name   asaca.com             Name Server       192 .168.1 .1   x
x                                                        Route           192 .168.1 .1   x
x                                                                              x
x                                                                              x
x                                                                              x
x                                                                              x
x                                                                              x
x                                                                              x
x                                                                              x
x                                                                              x
x                                                                              x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x <ESC> = Change Menu <CR> = Select <TAB><^><v> = Transverse             x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    
```

Figure 3.5-5 Cabinet Network Setup

The Netmask field defines the range of IP addresses that are acceptable on your network. The mask is a

series of bits designed to ‘mask’ certain portions of the IP address. The default netmask is 255.255.255.0.

Domain Name sets the name of the site domain. This value is used for setting up the Domain Name Service (DNS) and can be left blank if none is used. The Name Server fields sets the IP address of the domain name server. If none exists, set the field to 0.0.0.0.

Some sites require a default route address for redirecting network traffic to machines that don’t reside on the libraries network. The default router must be directly connected to the library. If no route is needed, set the field to 0.0.0.0.

3.5.4 Syscon Logging Configuration

The ASACA AM SERIES libraries use the UNIX logging facility syslog to perform all logging. This facility supports not only local logging but also remote logging over the network using standard protocols. The syslog facility allows administrators to redirect log messages from the library to other systems running the syslog daemon. This logging facility is shipped with most varieties of UNIX and can be obtained for other platforms. A shareware version of the syslog daemon is also available for NT. Contact ASACA for more information.

By default, libraries are shipped to log to four local files located in the /syscon/log directory: “scsilog” which logs SCSI data, “mechlog” which logs mechanical problems, “statlog” which is currently not used, and “pktlog” which contains internal command tracking information. Because of the limited size of the Syscon FLASH disk, files are automatically concatenated to keep from overrunning the disk. To obtain continuous logging, an administrator can redirect logging to another machine on a local net.

To automate syslog setup, the Logging Configuration Menu can be entered from the Cabinet Configuration Screen (Figure 3.5.1). Each of the four log types is represented along with a logging level and logging location. Logging levels are customized for the log type. Moving the cursor to the ‘>V’ under levels will drop down a menu for selecting the level for that type. Table 3.x shows the levels contained in each drop down with the default value in italics. Values are from limited logging to very verbose logging. For most situations, the default values are adequate unless directed by ASACA service.

Verose	SCSI	Mechanical	Statistics	Packet
Low	Errors	Fatal	Errors	<i>Errors</i>
	Warnings	NonFatal	Warning	Warning
	<i>CDBs</i>	<i>Warning</i>	<i>Notice</i>	Notice
	Trace	Info	Info	Info
High	Debug	Debug	Debug	Debug

Table 3.5-1 SYSCON Logging Levels

The Log Location field sets the logging machine or file on the SYSCON. To log to another machine on the net running syslog, the field should contain @loghost, where loghost is a resolved name of a host on my net. Log location in this case is determined by setup at loghost. The checkbox ‘Log to ASACA’ sets

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     ASACA                                     x
x                               Digital Virtual Library                       x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                               Logging Configuration                          x
x                                                                           x
x                               Log Level                                Log Location    x
x                                                                           x
x                               x U CDBs                               /syscon/log/scsilog  x
x                               x U Warning                           /syscon/log/mechlog   x
x                               x U Notice                             /syscon/log/statlog   x
x                               x U Errors                             /syscon/log/pktlog    x
x                                                                           x
x                               [ ] Log to ASACA                          x
x                                                                           x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x <ESC> = Change Menu  <CR> = Select  <TAB><^><u> = Transverse          x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

Figure 3.6-1 System Logging Configuration Menu

all of the fields to @www.asaca.com. This requires a route to an internet gateway to work and can be used when working with ASACA to solve a problem. This should normally be kept off.

3.6 Virtual Library Configuration

The Virtual Library Configuration menu (Figure 3.6-1) allows the user to divide the library into multiple smaller virtual libraries or to cross library boundaries in a multiple library system. Up to four virtual libraries are allowed per library. For a single library system, one virtual library must be defined for the library to operate. By default, that library is equivalent to the physical library. Operating parameters for the library are defined on a per virtual library basis so that behavior can be dictated by the application running the virtual library.

Virtual Library # selects the virtual library to edit. Virtual libraries are numbered from 1 and must be unique within a group of libraries connected together.

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     ASACA                                     x
x                                     Digital Virtual Library                 x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x                                     Virtual Library Configuration          x
x                                     Virtual Library # 1                     x
x                                     I                                     x
x                                     I/O Cabinet                            x
x                                     SCSI LUN #                             x
x                                     1                                     x
x                                     SCSI Element Addressing               x
x                                     ST DT IE MT                           x
x                                     0x1000 0x40 0x80 0x1                   x
x                                     [ ] IES on Door Close                x
x                                     [ ] IES on Power Up                x
x                                     [ ] IES Changed Magazine Only        x
x                                     [ ] Remember Drive Status Through IES x
x                                     [ ] Enable Exception Door Close      x
x                                     [X] Auto Eject Media on Drive Pick   x
x                                     [ ] Import/Export to next Logical    x
x                                     [ ] Import/Export to previous Logical x
x                                     Robot                                x
x                                     o Configure Virtual Location        x
x                                     o Save Virtual Library              x
x                                     o Delete Virtual Library            x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
x <ESC> = Change Menu <CR> = Select <TAB><^><v> = Transverse             x
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

```

Figure 3.6-1 Virtual Library Configuration Menu

I/O Cabinet defines which cabinet is providing the SCSI connection for the virtual library. In a single cabinet system, this number is the same as the cabinet number. Valid entries are 1-8.

SCSI LUN number sets which SCSI logical unit is used to address this virtual library.

SCSI Element Addressing defines the values used by the SCSI interface to select the desired element.

IES changed magazines only when checked will automatically perform an IES for this virtual library only when a magazine is detected as changed. This option works in conjunction with the IES on door closure and IES on power up check boxes as shown in Table 3.6.1.

Remember drive status through IES when checked will remember the status of the media and original storage location of the media when an IES is performed. Since it is not wise to pull the media from a drive during an IES, the AM Series library can be instructed to remember the media and storage locations for the drives. When unchecked, the status of the drive and storage location of any media will not be remembered and will be unknown until physically inventoried or moved from the drive.

Enable exception status on door close when checked will set the exception bit in the element data base any time the door is opened. This option allows the element data base to be marked as unknown condition where operators are allowed to open the doors while the host system is in operation. When unchecked, the element data base is not marked as unknown and it is assumed that the operators will not manually move or change the media/pallet states.

IES Door Close	IES Power Up	IES Magazine Change Only	Action Taken
			No Automatic IES performed
X			Automatic IES performed for VL on door close
	X		Automatic IES performed for VL on power up.
X	X		Automatic IES performed for VL on power up and door close.
		X	No Automatic IES performed
X		X	Automatic IES performed on changed magazines only on door close.
	X	X	Automatic IES performed on changed magazines only on power up.
X	X	X	Automatic IES performed on changed magazines only on power on and door close.

Table 3.6-1 Automatic IES Flag Summary

Auto Eject media on drive pick when checked will force the drive to eject the media when a pick request from a drive location is made. This feature should be set when the host application does not automatically eject the media from a drive prior to issuing the move request. When unchecked the library will not eject the media from the drive and if the drive is not in an ejected position when a move request is received, an error will be generated.

Allow I/E to next cabinet when checked will allocate the passthrough mechanism if installed as an Import/Export mechanism allowing import/export operations to the next cabinet in left to right order. When unchecked no import/export element will be added for the right passthrough.

Allow I/E to previous cabinet when checked will allocate the passthrough mechanism if installed as an Import/Export mechanism allowing import/export operations to the previous cabinet in left to right order. When unchecked no import/export element will be added for the left passthrough.

Note – Passthrough mechanisms will be assigned sequential Import/Export element numbers after the real import/export elements assigned to the logical library. The passthrough mechanisms will be assigned left passthrough first then right passthrough.

Hitting return on Configure Virtual Location brings up the menu as described in 3.6.1 Save Virtual Library will save the current settings of the virtual library and should be done after checking the virtual location.

Delete Virtual Library removes the virtual library definition of the virtual library number shown. One virtual library is required to run a library. Use caution not to delete all library definitions.

the topmost drive installed.

No. of DT Elements refers to the total number of contiguous drives allocated to this virtual library.

Chapter 4

MULTI-CABINET CONFIGURATION

This chapter describes how to change the multi-cabinet configuration.

4.1 Adding Cabinets

Asaca recommends adding cabinets through the WEB interface, however if only a serial connection is available, the following steps can be performed:

1. Be sure that both libraries are connected to a common network.
2. From the front panel of the new cabinet, set the library offline. See the ASACA AM-Series User's Guide for your library for instructions on using the front panel.
3. Enter the Setup menu and optionally set the IP address, netmask, and route if desired.
4. Change the node number from the default shipping node of 1 to the next available node number in the range of 2 to 8. Note that changing the node number automatically restarts the library to make the node number active.
5. Login to the library as root using your serial connection to the left-most library.
6. Type "cfg" at the prompt to enter the configuration program.
7. Enter the Multi-Cabinet Configuration Menu and change the number of libraries.
8. In left to right order, set the node numbers in the Node entry row.
9. Set the MAC addresses associated with the node. For the new chassis, check the rear connector panel barcode as described in Section 3.4.1, to get the last four digits of the MAC address.
10. Hit <ESC> in order to save the settings. After several seconds the alive status should come back with all boxes checked. If any libraries are unavailable, check the network connection, the MAC address accuracy, and retry. If all libraries are still not alive, contact your service representative.
11. Enter the Virtual Library Configuration Menu to make changes to the virtual libraries. By default, all virtual libraries previously defined on the installed library will exist. The new library will have a virtual library defined along the cabinet boundaries with the first available number. For example, if there was a single virtual library prior to installing the second cabinet, there will now be a virtual library 2 contained only within the new chassis.
12. To make one continuous virtual library, select the new virtual library contained in the new cabinet, traverse to Delete Virtual Library and press enter.
13. For all virtual libraries that you want to expand into the new chassis, see Section 4.2.
14. After all changes have been saved, exit cfg.
15. Restart all libraries from the front panel to boot with the new configuration.

4.2 Adding Cabinets to Virtual Libraries

To extend an existing virtual library into a newly installed cabinet perform the following:

1. Login to the library as root.
2. Type cfg at the prompt.

3. Select the Virtual Library Configuration option and press enter.
4. Select the virtual library number that you wish to expand.
5. Transverse the menu to Configure Virtual Library and press enter.
6. There should now be as many columns as there are libraries defined left to right. Under the node number of the cabinet to add, enter the location to add. Note that the cabinets should be continuous.
7. Hit <ESC> to go back to the Virtual Library Menu.
8. Select Save Virtual Library and press enter.
9. When all changes are complete, exit cfg. The libraries must be rebooted for the changes to take effect.

4.3 Removing a Cabinet from a Virtual Library

To remove a cabinet from a virtual library span do the following:

1. Login into the library as root.
2. Start cfg and enter the Virtual Library Configuration Menu.
3. Select the virtual library number to edit
4. Enter the Configure Virtual Location Menu.
5. Under the cabinet node number that you want to remove, set the start and number of DT and ST elements to 0 and hit <ESC>. Note that a virtual library must span continuous libraries. If you have a virtual library that spans 3 libraries (nodes 1, 2, and 3 in left to right order), you cannot remove only the cabinet definition in the middle.
6. Select Save Virtual Library and hit enter.
7. If all changes are complete, reboot all libraries for the changes to take place.

4.4 Uninstalling a Cabinet

To remove a cabinet from configuration when it has been uninstalled, do the following:

1. Through your serial connection, login to one of the remaining libraries as root.
2. Type cfg at the prompt.
3. Enter the Virtual Library Configuration Menu.
4. For each virtual library that spans the removed chassis, select the virtual library and remove the cabinet from the virtual library cabinet as described in Section 4.3. Save each virtual library as changes are made.
5. Be sure that the I/O chassis for any remaining virtual libraries is not the removed library. If it is, change the I/O chassis to one of the remaining libraries.
6. Select the Multi-Cabinet Configuration Menu.
7. Edit the cabinet data to reflect the new left to right order.
8. Set the number of cabinets and type <ESC> to save the changes.
9. Exit cfg and reboot all of the remaining chassis.

A.1 Microsoft HyperTerminal Configuration

To setup Microsoft Windows for using the library serial interface, complete the following steps.

- 1) Bring up HyperTerminal folder by selecting Start, Programs, Accessories, and HyperTerminal.
- 2) Double click the icon labeled “Hypertrm.exe”.
- 3) Once the program is started, the window shown in Figure A.1.1 “Connect Description” will pop up. Type in the name of the file to store connection information to the ASACA library and click “OK”.

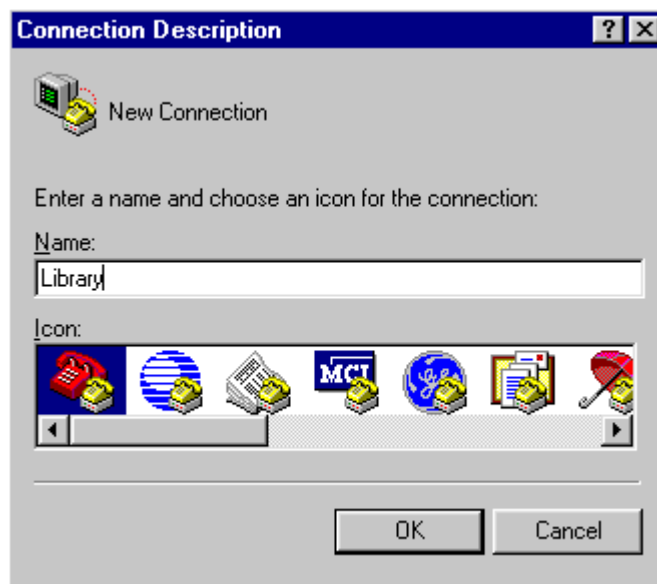


Figure A.1-1 HyperTerminal Connection Description Window

- 4) HyperTerm then brings up a window for phone information (Figure A.1-2). Click on the “Connect Using” drop down menu, select the com port that is connected to the ASACA library and click the OK button.
- 5) The “COM Properties” window should now appear on the screen . Select 9600 bits per second, 8 data bits, parity “none”, 1 stop bit, and hardware flow control as shown in Figure A.1-3. Click the “OK” button when finished.
- 6) Back in the main HyperTerm window, click on “File” and select properties to set up terminal behavior.
- 7) Once the properties window appears, click on the tab marked “Settings” to bring that menu forward.



Figure A.1-2 Connect To Menu

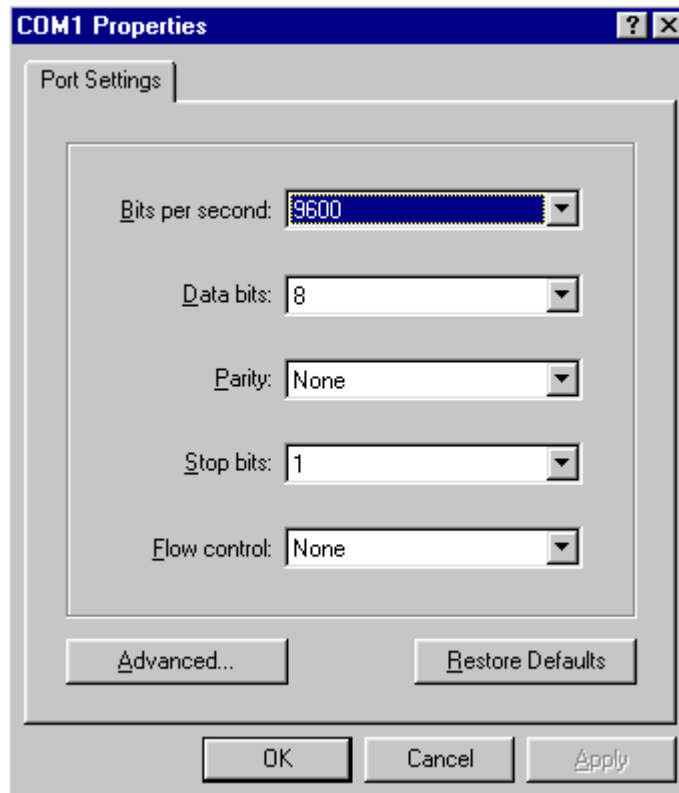


Figure A.1-3 COM Properties

- 8) Click “Terminal keys”, “Ctrl+H” (Windows 98 only), select “VT100” from the Emulation menu, and set “Backscroll buffer lines” to 500 as shown in Figure A.1-4.

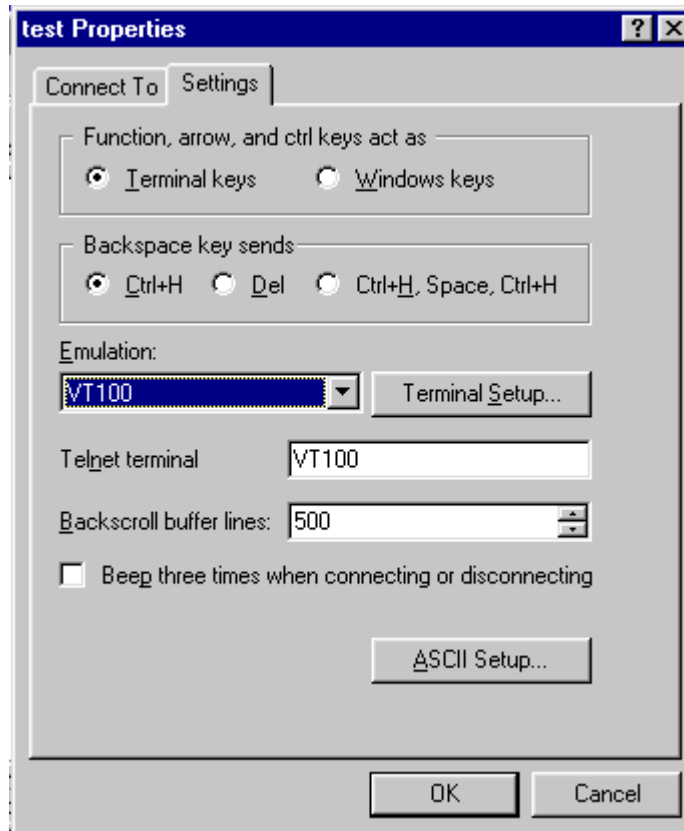


Figure A.1-4 Settings

- 9) Click the “Terminal Setup” button on the Settings menu. This will bring up the menu shown in Figure A.1-5.
- 10) Click the “Block” and “Blink” boxes under Cursor.
- 11) Make sure that “Cursor keypad mode only” is the only box with a check under the terminal modes section.
- 12) Select “ASCII” as the Character set and click on “OK” to return to the Settings Menu.
- 13) Click on the “ASCII Setup” button to bring up the menu shown in Figure A.1-6.
- 14) Under the “ASCII Sending” section, there should be nothing selected and 0 millisecond delays for both line and characters.
- 15) Make sure that nothing is selected under ASCII Receiving and click “OK” to return to the Settings menu.
- 16) Click “OK” on the settings menu to complete HyperTerminal setup.

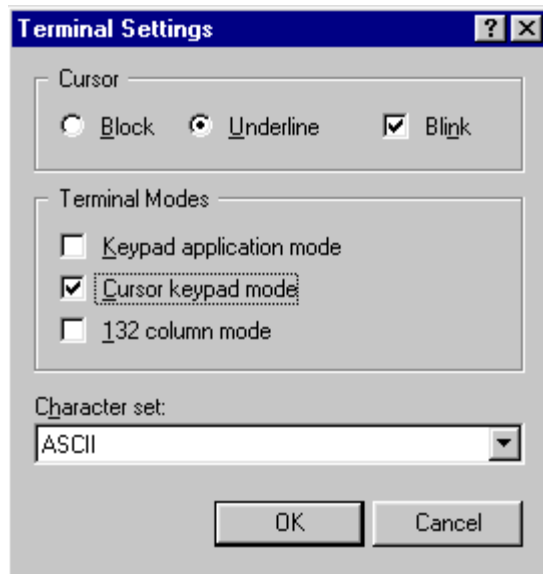


Figure A.1-5 Terminal Settings

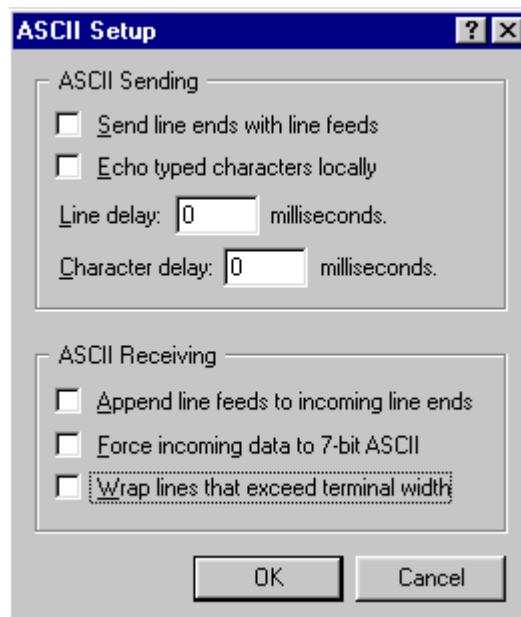


Figure A.1-6 ASCII Setup

Microsoft telnet Setup

To configure Microsoft's telnet for the ASACA AM Series libraries, perform the following:

- 1) Start a telnet session with the library by clicking on "Start" followed by "Run".
- 2) Type telnet in the Open box of the Run window and click "OK" to bring up the telnet window.
- 3) Click "Terminal" and then "Preferences" in the drop down menu. This brings up the window shown in Figure A.2-1.

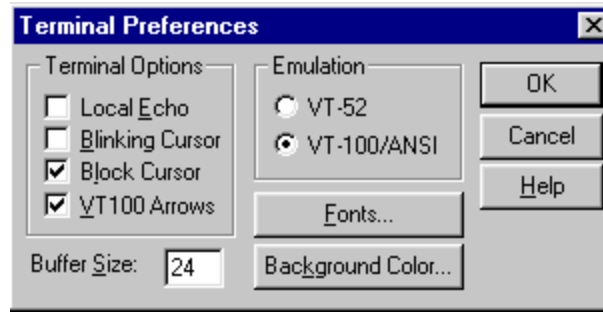


Figure A.2-1 Telnet Terminal Preferences

- 4) Under Terminal Options, “Block Cursor” and “VT100 Arrows” should be checked.
- 5) The “VT-100/ANSI” option should be selected under emulation and “Buffer Size” must be 24 to set the number of lines on the terminal. Click “OK” when finished.
- 6) Click “Connect” inside the telnet window and then “Remote System” to bring up the connect window shown in Figure A.2-1.

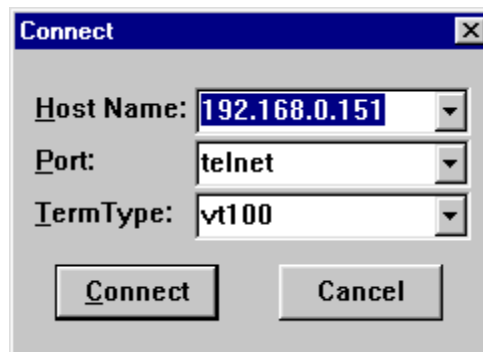


Figure A.2-2 Telnet Connect Window

- 7) Enter either a hostname if the library is setup to lookup names from a local Domain Name Server or an IP address in the “Host Name” entry field.
- 8) Set the “Port” field to telnet and “TermType” to vt100. Click “Connect” when finished.
- 9) Click the mouse inside the telnet window and hit <CR> until “login” appears on the screen.