WebConsole & Programming Guide

NI Series

NetLinx Integrated Controllers

NI-700/900
NI-2000/3000/4000
NI-2100/3100/4100
NXC-ME260/64

	Enabled	Port Number	Default Port
Telnet:	☑	23	23
ICSP:	☑	1319	1319
HTTP:	☑	80	80

NetLinx Integrated Controllers

Last Revised: 4/24/2007

AMX Limited Warranty and Disclaimer

All products returned to AMX require a Return Material Authorization (RMA) number. The RMA number is obtained from the AMX RMA Department. The RMA number must be clearly marked on the outside of each box. The RMA is valid for a 30-day period. After the 30-day period the RMA will be cancelled. Any shipments received not consistent with the RMA, or after the RMA is cancelled, will be refused. AMX is not responsible for products returned without a valid RMA number.

Warranty Repair Policy

- AMX will repair any defect due to material or workmanship issues during the applicable warranty period at no cost to the AMX Authorized Partner., provided that the AMX Authorized Partner is responsible for in-bound freight and AMX is responsible for out-bound ground freight expenses.
- The AMX Authorized Partner must contact AMX Technical Support to validate the failure before pursuing this service.
- AMX will complete the repair and ship the product within five (5) business days after receipt of the product by AMX. The AMX Authorized Partner will be notified if repair cannot be completed within five (5) business days.
- Products repaired will carry a ninety (90) day warranty or the balance of the remaining warranty, whichever is greater.
- Products that are returned and exhibit signs of damage or unauthorized use will be processed under the Non-Warranty Repair Policy.
- AMX will continue to provide Warranty Repair Services for products discontinued or replaced by a Product Discontinuance Notice.

Non-Warranty Repair Policy

- Products that do not qualify to be repaired under the Warranty Repair Policy due to age of the product or Condition of the product may be repaired utilizing this service.
- The AMX Authorized Partner must contact AMX Technical Support to validate the failure before pursuing this service.
- Non-warranty repair is a billable service.
- Products repaired under this policy will carry a ninety (90) day warranty on material and labor.
- AMX will notify the AMX Authorized Partner with the cost of repair, if cost is greater than the Standard Repair Fee, within five (5) days of receipt.
- The AMX Authorized Partner must provide a Purchase Order or credit card number within five (5) days of notification, or the product will be returned to the AMX Authorized Partner.
- The AMX Authorized Partner will be responsible for in-bound and out-bound freight expenses.
- Products will be repaired within ten (10) business days after AMX Authorized Partner approval is obtained.
- Non-repairable products will be returned to the AMX Authorized Partner with an explanation.
- See AMX Non-Warranty Repair Price List for minimum and Standard Repair Fees and policies.

Table of Contents

Overview

NetLinx Integrated Controllers

NetLinx Integrated Controllers (Masters) can be programmed to control RS-232/422/485, Relay, IR/ Serial, and Input/Output devices using the NetLinx Studio application (version 2.4 or higher).

NetLinx Integrated Controllers			
NI-700	(FG2105-03)	**NI-900**	(FG2105-09)
NI-2000	(FG2105-01)	**NI-2100**	(FG2105-04)
NI-3000	(FG2105-02)	**NI-3100**	(FG2105-05)
NI-4000	(FG2105)	**NI-4100**	(FG2105-06)

NXC-ME260/64	(FG2010-64)

These NI Controllers feature an on-board Web Console which allows you to connect to the NI Controller via a web browser and make various configuration and security settings.

The Web Console is described in this document (starting with the *Onboard WebConsole User Interface* section on page 21).

These NI Controllers are Duet-compatible and can be upgraded via firmware. Duet is a dual-interpreter firmware platform from AMX which combines the proven reliability and power of NetLinx with the extensive capabilities of the *Java® MicroEdition (JavaME)* platform. Duet simplifies the programming of a system that includes the NI-900 and other third party devices by standardizing device and function definitions, defaulting touch panel button assignments, and controlling feedback methods.

Dynamic Device Discovery makes integration even easier by automatically identifying and communicating with devices which support this new beaconing technology.

Refer to the *Manage Devices - Device Options* section on page 65 for more detailed information on the use of *Dynamic Device Discovery* (DDD).

About This Document

This document describes using the on-board Web Console, as well as NetLinx send commands and terminal communications to configure the NI Controllers:

- Each major section of the Web Console is described in a separate section of this document. Refer to:
  - the *Onboard WebConsole User Interface* section on page 21,
  - the *WebConsole - WebControl Options* section on page 25,
  - the *WebConsole - Security Options* section on page 27, and
  - the *WebConsole - System Options* section on page 41).
- The *Initial Configuration and Firmware Upgrade* section (page 5) describes upgrading the firmware on NI Controllers.
- The *Programming* section (page 77) lists and defines the NetLinx send commands that are supported by these NI Controllers.
- The *Terminal (Program Port/Telnet) Commands* section (page 91) describes the commands and options available via either a Program Port (RS232) or Telnet terminal session with the NI Controller.

Related Documents

For detailed descriptions of NI Controller hardware, including specifications, port assignments, installation procedures, connection and wiring information, refer to the *Hardware Reference Guide* for your Master:

Related Documents
Title
NXI-700/900 NetLinx Integrated Controllers - Hardware Reference Guide
NXI-x000 NetLinx Integrated Controllers - Hardware Reference Guide (NI-2000, NI-3000, NI-4000)
NXI-x100 NetLinx Integrated Controllers - Hardware Reference Guide (NI-2100, NI-3100, NI-4100)
NXC-ME260/64 NetLinx Master-Ethernet Card/Module - Hardware Reference Guide
NetLinx CardFrame, Control Cards, and NetModules Instruction Manual
NetLinx Studio v2.4 or higher Instruction Manual
NetLinx Programming Language Reference Guide

NOTE

All product documentation is available to view or download from ***www.amx.com****.*

Quick Setup and Configuration Overview

Installation Procedures

The general steps involved with most common installations of this device include:

- Unpack and confirm the contents of box (see the *Specifications* tables in the *Hardware Reference Guide* for each Controller).
- Connect all rear panel components and supply power to the NI Controller from the external power supply.

Configuration and Communication

The general steps involved with setting up and communicating with the NI Controllers' on-board Master. In the initial communication process:

- Set the communication speed on the front Configuration DIP switch (*default =* ***38400)***.
- Connect and communicate with the on-board Master via the Program port.
- Set the System Value being used with the on-board Master.
- Re-assign any Device values.
- You can then either get a DHCP Address for the on-board Master or assign a Static IP to the on-board Master.
- Once the IP information is determined, rework the parameters for Master Communication in order to connect to the on-board Master via the Ethernet and not the Program port.

Update the On-board Master and Controller Firmware

- Before using your new NI unit, you must first update your NetLinx Studio to the most recent release.
- Upgrade the on-board Master firmware through an IP Address via the Ethernet connector (*Upgrading the On-board Master Firmware via an IP* section on page 12) (**IP recommended**).
- Upgrade the Integrated Controller firmware through an IP Address via the Ethernet connector (*Upgrading the NI Controller Firmware Via IP* section on page 14) (**IP recommended**).

Configure NetLinx Security on the NI Controller

- Setup and finalize your NetLinx Security Protocols (*WebConsole - Security Options* section on page 27).
- Program your NI Controller (*Programming* section on page 77).

Initial Configuration and Firmware Upgrade

This section describes using the NetLinx Studio software application to perform the initial configuration of the Master, as well as upgrading the firmware for various Master components.

- NetLinx Studio is used to setup a System number, obtain/assign the IP/URL for the connected NI Controller, and transfer firmware Kit files to the Master.
- NetLinx Studio is available to download (free of charge) from **www.amx.com**.

WARNING

Before commencing, verify you are using the latest firmware Kit file (this file contains both the NI Integrated Controller and on-board Master firmware.
*The NI-4000/3000/2000 Kit file begins with **2105_X000**.*
*The NI-4100/3100/2100 Kit file begins with **2105_04_X100**.*
*The NI-700/900 Kit file begins with **2105_03_NI-X00** and **2105_09_NI-X00** respectively.*

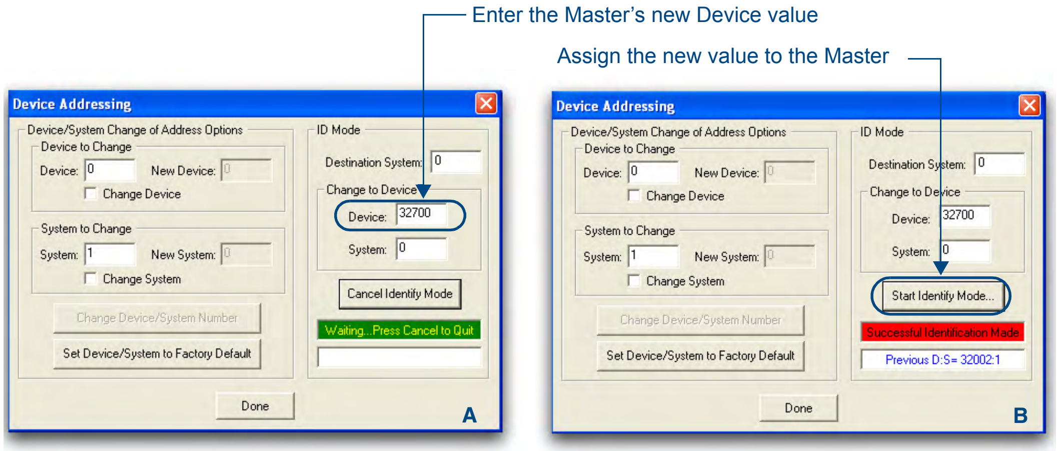
Before You Start

1. Verify you have the latest version of NetLinx Studio on your PC. Use the **Web Update** option in NetLinx Studio's Help menu to obtain the latest version. Alternatively, go to www.amx.com and login as a Dealer to download the latest version.
2. Verify that an Ethernet/ICSNet cable is connected from the NI Controller to the Ethernet Hub.
3. Connect an programming cable (RS-232) from the Program Port on the NI Controller to a COM port on the PC being used for programming.
4. Verify that any control cards (***NI-4000 and NI-4100 only***) are inserted and their respective connectors are attached to the rear of the NI Controller before continuing.
5. Verify that the NI Controller is powered On.

Using the ID Button to Change the Master Device Value

The steps described and the dialogs shown in this section are in the NetLinx Studio application.

1. Access the *Device Addressing* dialog (FIG. 1) by selecting **Diagnostics** > **Device Addressing**.



Enter the Master's new Device value

Assign the new value to the Master

Device Addressing (A)

Device/System Change of Address Options
Device to Change — Device: 0; New Device: 0; ☐ Change Device
System to Change — System: 1; New System: 0; ☐ Change System
ID Mode — Destination System: 0
Change to Device — Device: 32700; System: 0
Waiting...Press Cancel to Quit

Device Addressing (B)

Device/System Change of Address Options
Device to Change — Device: 0; New Device: 0; ☐ Change Device
System to Change — System: 1; New System: 0; ☐ Change System
ID Mode — Destination System: 0
Change to Device — Device: 32700; System: 0
Successful Identification Made
Previous D:S= 32002:1

Change Device/System Number
Set Device/System to Factory Default
Cancel Identify Mode
Start Identify Mode...
Done
A
B

FIG. 1 NetLinx Studio: Device Addressing dialog (using the ID mode to set the NI Controller's device value)

2. In the *Device* field (**A** in FIG. 1), enter the new value for the NI Controller (range = 0 - 32767).
3. Press the **Start Identify Mode** button (**B** in FIG. 1).

This action causes the **Not Active** message (in red) to display a *Waiting...Press Cancel to Quit* message (in green). This message indicates that Studio is waiting to detect the device value of the NI Controller associated with the **ID** button.

4. Press the NI Controller's **ID** button to read the device value of the NI Controller, and assign it to the new value entered in step 2.
   - Once the swap has been successfully made, a red *Successful Identification Made* field appears.
   - The previous Device and System numbers of the NI Controller are displayed below the red field.

     Example: *Previous D:S=32002:1*,

     where **32002** represents the previous device value of the NI Controller (**D**) and **1** represents the NI Controller's System value (**S**).

Obtaining the NI Controller's IP Address (using DHCP)

NOTE

Verify there is an active Ethernet connection on the NI Controller's Ethernet port before beginning these procedures.

1. In NetLinx Studio, select **Diagnostics** > **Network Addresses** from the Main menu to access the Network Addresses dialog (FIG. 2).

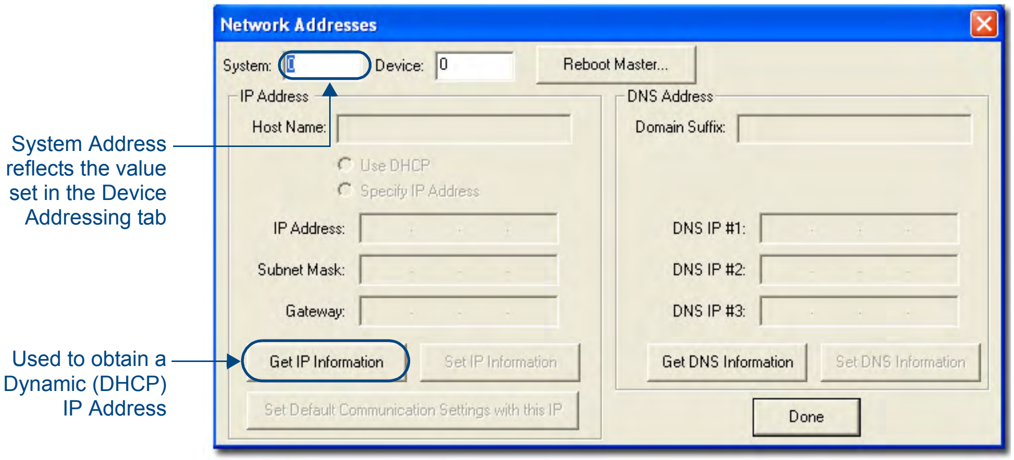


FIG. 2 NetLinx Studio: Network Addresses dialog (for a DHCP IP Address)

2. Verify that both the **System** number corresponds to the System value previously assigned within the Device Addressing tab and that zero (0) is entered into the *Device* field.

NOTE

The system value must correspond to the Device Address entered in the Device Addressing dialog. Refer to the Manage System - System Number section on page 42 *for more detailed instructions on setting a system value.*

3. Click the **Get IP Information** button to configure the on-board Master for DHCP usage and then read the IP Address obtained from the DHCP Server.

NOTE

DO NOT enter ANY IP information at this time; this step only gets the System Master to recognize that it should begin using an obtained DHCP Address.

4. Note the obtained IP Address *(read-only*). This information is later entered into the **Master Communication Settings** dialog and used by NetLinx Studio v 2.x to communicate to the NI Controller via an IP. This address is reserved by the DHCP server and then given to the Master.

NOTE

If the IP Address field is empty, give the Master a few minutes to negotiate a DHCP Address with the DHCP Server, and try again. The DHCP Server can take anywhere from a few seconds to a few minutes to provide the Master with an IP Address.

5. Verify that **NetLinx** appears in the *Host Name* field (*if not, then enter it in at this time*).
6. Click the **Use DHCP** radio button from the *IP Address* section.
7. Click the **Set IP Information** button to retain the IP Address from the DHCP server and assign it to the on-board Master. A popup window then appears to notify you that Setting the IP information was successful and it is recommended that the Master be rebooted.
8. Click **OK** to accept the change to the new IP/DNS information.
9. Click the **Reboot Master** button and select **Yes** to close the Network Addresses dialog.
10. Click **Reboot** (from the *Tools* > *Reboot the Master Controller* dialog) and wait for the System Master to reboot and retain the newly obtained DHCP Address.

    The STATUS and OUTPUT LEDs should begin to alternately blink during the incorporation. Wait until the STATUS LED is the only LED to blink.
11. Press **Done** once until the *Master Reboot Status* field reads **Reboot of System Complete**.

NOTE

Verify that these IP values are also entered into the related fields within either the IP Settings section of the System Connection page (on the touch panel) or within the Address field on the web browser.

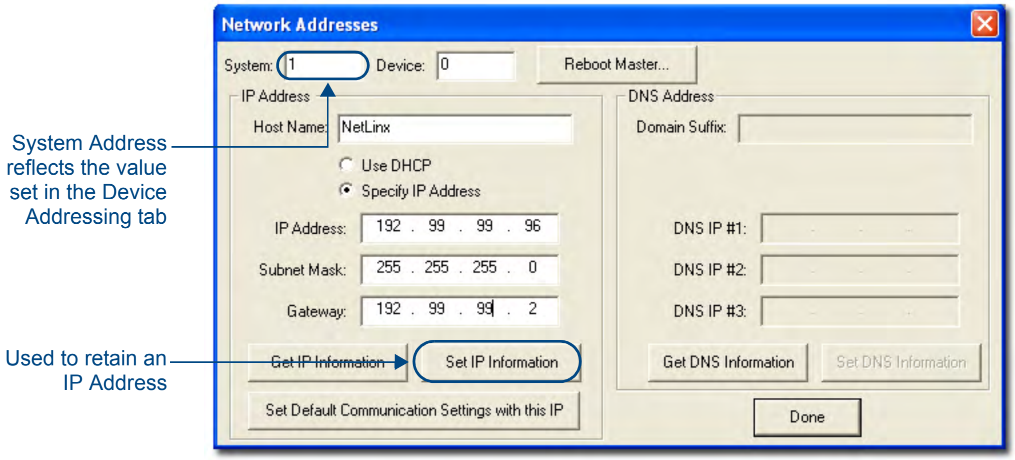
12. Complete the communication process by continuing on to the *Communicating Via an IP* section on page 9.

Assigning a Static IP to the NI Controller

NOTE

Verify there is an active Ethernet connection on the Ethernet port of the Master before beginning these procedures.

1. In NetLinx Studio, select **Diagnostics** > **Network Addresses** from the Main menu to access the Network Addresses dialog (FIG. 3).



System: 1 Device: 0

Host Name: NetLinx

○ Use DHCP

● Specify IP Address

IP Address: 192 . 99 . 99 . 96

Subnet Mask: 255 . 255 . 255 . 0

Gateway: 192 . 99 . 99 . 2

Domain Suffix:

DNS IP #1:

DNS IP #2:

DNS IP #3:

System Address reflects the value set in the Device Addressing tab

Used to retain an IP Address

FIG. 3 Network Addresses dialog (for a pre-obtained Static IP Address)

2. Verify that both the **System** number corresponds to the System value previously assigned within the Device Addressing tab and that zero (0) is entered into the *Device* field.

NOTE

The system value must correspond to the Device Address previously entered in the Device Addressing tab. Refer to the Manage System - System Number section on page 42 *for more detailed instructions on setting a system value.*

3. Click the **Get IP Information** button to temporarily configure the on-board Master for DHCP usage and then read the IP Address obtained from the DHCP Server.
4. Click the **Specify IP Address** radio button from the IP Address section. With this action, all IP fields become editable.
5. Verify that **NetLinx** appears in the *Host Name* field (*if not, then enter it in at this time*).
6. Enter the IP Address, Subnet Mask, and Gateway information into their respective fields.
7. Click the **Set IP Information** button to cause the on-board Master to retain this new IP Address (pre-obtained from the System Administrator).
8. Click **OK** to accept the change to the new IP/DNS information.
9. Click the **Reboot Master** button and select **Yes** to close the Network Addresses dialog.
10. Click **Reboot** (*from the Tools > Reboot the Master Controller dialog*) and wait for the System Master to reboot and retain the newly obtained DHCP Address.

    The STATUS and OUTPUT LEDs should begin to alternately blink during the incorporation. Wait until the STATUS LED is the only LED to blink.
11. Press **Done** once until the *Master Reboot Status* field reads **Reboot of System Complete**.

NOTE

Verify that these IP values are also entered into the related fields within either the IP Settings section of the System Connection page (on the touch panel) or within the Address field on the web browser.

12. Complete the communication process by continuing on to the *Communicating Via an IP* section on page 9.

Communicating Via an IP

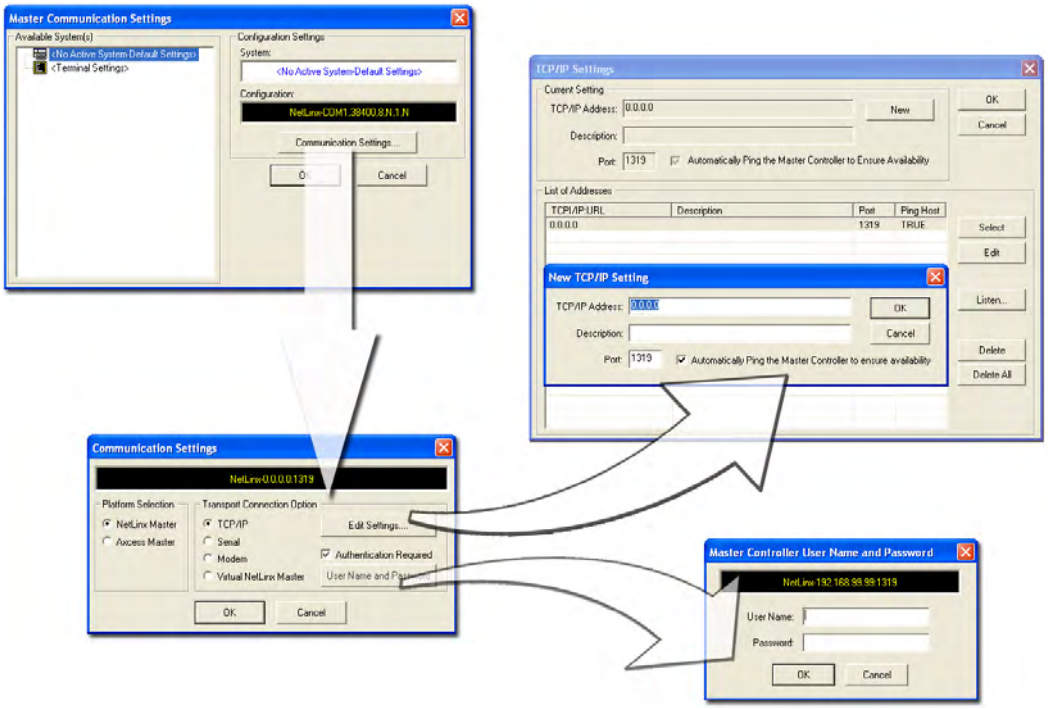
Whether the on-board Master's IP Address was Static Set (via the **Set IP Info** command) or Dynamically obtained (via the **Get IP Info** command), use the IP Address information from the Network Addresses dialog to establish communication via the Ethernet-connected Master.

1. Use NetLinx Studio to obtain the IP Address of the NI Controller from your System Administrator.

   If you do not have an IP Address:

   - Follow the steps outlined in either the *Obtaining the NI Controller's IP Address (using DHCP)* section on page 6,
   - or the *Assigning a Static IP to the NI Controller* section on page 8.

2. Select **Settings** > **Master Communication Settings** from the Main menu to open the Master Communication Settings dialog (FIG. 4).



Master Communication Settings

Available System(s): <No Active System Default Settings>, <Terminal Settings>

System: <No Active System-Default Settings>

Configuration: NetLinx-COM1,38400,8,N,1,N

TCP/IP Settings

Current Setting — TCP/IP Address: 0.0.0.0; Description: ; Port: 1319; ☑ Automatically Ping the Master Controller to Ensure Availability

List of Addresses

TCPI/IP:URL	Description	Port	Ping Host
0.0.0.0		1319	TRUE

New TCP/IP Setting

TCP/IP Address: 0.0.0.0; Description: ; Port: 1319; ☑ Automatically Ping the Master Controller to ensure availability

Communication Settings

NetLinx-0.0.0.0:1319

Platform Selection: ● NetLinx Master ○ Axcess Master

Transport Connection Option: ● TCP/IP ○ Serial ○ Modem ○ Virtual NetLinx Master

☑ Authentication Required

Master Controller User Name and Password

NetLinx-192.168.99.99:1319

User Name:

Password:

FIG. 4 Assigning Master Communication Settings and TCP/IP Settings

3. Click the **Communications Settings** button to open the Communications Settings dialog.

4. Click on the **NetLinx Master** radio button (*from the Platform Selection section*) to indicate you are working with a NetLinx Master (such as the NXC-ME260/64 or NI-Series of Integrated Controllers).

5. Click on the **TCP/IP** radio button (*from the Transport Connection Option section*) to indicate you are connecting to the Master via an IP Address.

6. Click the **Edit Settings** button (*on the Communications Settings dialog*) to open the TCP/IP Settings dialog (FIG. 4). This dialog contains a series of previously entered IP Address/URLs and their associated names, all of which are stored within Studio and are user-editable.
7. Click the **New** button to open the New TCP/IP Settings dialog where you can enter both a previously obtained DHCP or Static IP Address and an associated description for the connection into their respective fields.
8. Place a checkmark within the *Automatically Ping the Master Controller to ensure availability* radio box to make sure the Master is initially responding online before establishing full communication.
9. Click **OK** to close the current New TCP/IP Settings dialog and return to the previous TCP/IP Settings dialog where you must locate your new entry within the List of Addresses section.
10. Click the **Select** button to make that the currently used IP Address communication parameter.
11. Click **OK** to return to the Communications Settings dialog and place a checkmark within the *Authentication Required* radio box if your Master has been previously secured with a username/password.
12. Click on the **Authentication Required** radio box (if the Master is secured) and then press the **User Name and Password** button to open the *Master Controller User Name and Password* dialog.
13. Within this dialog, you must enter a previously configured username and password (with sufficient rights) before being able to successfully connect to the Master.
14. Click **OK** to save your newly entered information and return to the previous Communication Settings dialog where you must click **OK** again to begin the communication process to your Master.

NOTE

If you are currently connected to the assigned Master, a popup asks whether you would want to temporarily stop communication to the Master and apply the new settings.

15. Click **Yes** to interrupt the current communication from the Master and apply the new settings.
16. Once the particular System Master is configured for communication via an IP Address, remove the DB9 connector from the Program port on the NI on-board Master.
17. Click **Reboot** (from the *Tools > Reboot the Master Controller dialog*) and wait for the Master to reboot.

    The STATUS and OUTPUT LEDs should begin to alternately blink during the incorporation. Wait until the STATUS LED is the only LED to blink.
18. Press **Done** once until the *Master Reboot Status* field reads **Reboot of System Complete**.
19. Click the **OnLine Tree** tab in the Workspace window to view the devices on the System. *The default System value is one (1).*
20. Right-click the associated System number and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system. *The communication method is then highlighted in green on the bottom of the NetLinx Studio window.*

NOTE

If the connection fails to establish, a Connection Failed dialog appears.
Try selecting a different IP Address if communication fails.
*Press the **Retry** button to reconnect using the same communication parameters.*
*Press the **Change** button to alter your communication parameters and repeat steps 4 thru 18.*

Verifying the Firmware Version On the Master

All NI Controllers contain both an on-board NI Master and an Integrated Controller. If you are using an NI-4000 or NI-4100 with installed NXC cards, these will also show up within the Online Tree tab.

- The on-board Master shows up within the Online Tree as **00000 NI Master**
- The Integrated Controller of the NI shows up as **0XXXX NI-XXXX** (ex: *050001 NI-700*)

Each of these components has its own corresponding firmware shown in parenthesis ().

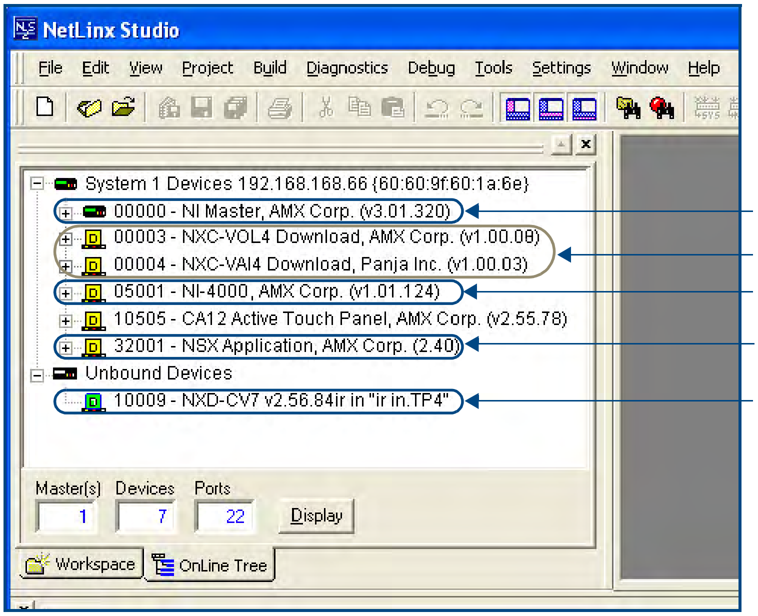
1. After Studio has established a connection with the target Master, click on the **OnLine Tree** tab in the Workspace window to view the devices on the System. *The default System value is one (1)*.
2. Right-click the associated System number and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system. *The communication method is highlighted in green on the bottom of the NetLinx Studio window.*

NOTE

The current installed firmware version of the on-board NI Master is displayed to the right of the device within the Online Tree tab as ***00000 NI Master****.*

3. After the Communication Verification dialog indicates active communication between the PC and the Master, verify the NetLinx Master (***00000 NI Master***) appears within the **OnLine Tree** tab of the Workspace window (FIG. 5).

   The default NI Master value is zero (00000) and cannot be changed.



System 1 Devices 192.168.168.66 (60:60:9f:60:1a:6e)
00000 - NI Master, AMX Corp. (v3.01.320)
00003 - NXC-VOL4 Download, AMX Corp. (v1.00.08)
00004 - NXC-VAI4 Download, Panja Inc. (v1.00.03)
05001 - NI-4000, AMX Corp. (v1.01.124)
10505 - CA12 Active Touch Panel, AMX Corp. (v2.55.78)
32001 - NSX Application, AMX Corp. (2.40)
Unbound Devices
10009 - NXD-CV7 v2.56.84ir in "ir in.TP4"

Master(s)	Devices	Ports
1	7	22

On-board NI Master

Control cards (NI-4x00 ONLY)

NetLinx Integrated Controller

NetLinx Studio version

Unbound Dynamic Device

FIG. 5 Sample NetLinx Workspace window (showing OnLine Tree tab)

4. If either the on-board NI Master or Integrated Controller is not the latest firmware version, follow the procedures outlined in the following sections to obtain these Kit files from **www.amx.com** and then transfer the new firmware Kit files to the device.

Upgrading the On-board Master Firmware via an IP

The on-board Master firmware Kit file is not the same as the Integrated Controller Kit file. Below is a table outlining the current sets of on-board Master and Integrated Controller Kit files used by the NI-Series of products:

Firmware Kit File usage for NI Controllers	
NI-4100	On-board Master Kit file: 2105_04_NI-X100**_Master**
	Integrated Controller Kit file: 2105_04_NI-X100
NI-3100	On-board Master Kit file: 2105_04_NI-X100**_Master**
	Integrated Controller Kit file: 2105_04_NI-X100
NI-2100	On-board Master Kit file: 2105_04_NI-X100**_Master**
	Integrated Controller Kit file: 2105_04_NI-X100
NI-4000	On-board Master Kit file: 2105_NI-X000**_Master**
	Integrated Controller Kit file: 2105_NI-X000
NI-3000	On-board Master Kit file: 2105_NI-X000**_Master**
	Integrated Controller Kit file: 2105_NI-X000
NI-2000	On-board Master Kit file: 2105_NI-X000**_Master**
	Integrated Controller Kit file: 2105_NI-X000
NI-700	On-board Master Kit file: 2105-03_NI-X000**_Master**
	Integrated Controller Kit file: 2105-03_NI**_X00**
NI-900	On-board Master Kit file: 2105-03_NI-X000**_Master**
	Integrated Controller Kit file: 2105-09_NI**_X00**

*Only Master firmware Kit files use the word **_Master** in the Kit file name.*

1. Follow the procedures outlined within the *Communicating Via an IP* section on page 9 to connect to the target NI device via the web.
2. After NetLinx Studio has established a connection to the target Master, click the **OnLine Tree** tab of the Workspace window to view the devices on the System. *The default System value is one (1)*.
3. Right-click the associated System number and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system. *The communication method is highlighted in green on the bottom of the NetLinx Studio window.*
4. After the Communication Verification dialog window verifies active communication between the PC and the Master, verify the NetLinx Master (***00000 NI Master***) appears in the **OnLine Tree** tab of the Workspace window. *The default NI Master value is zero (00000)*.

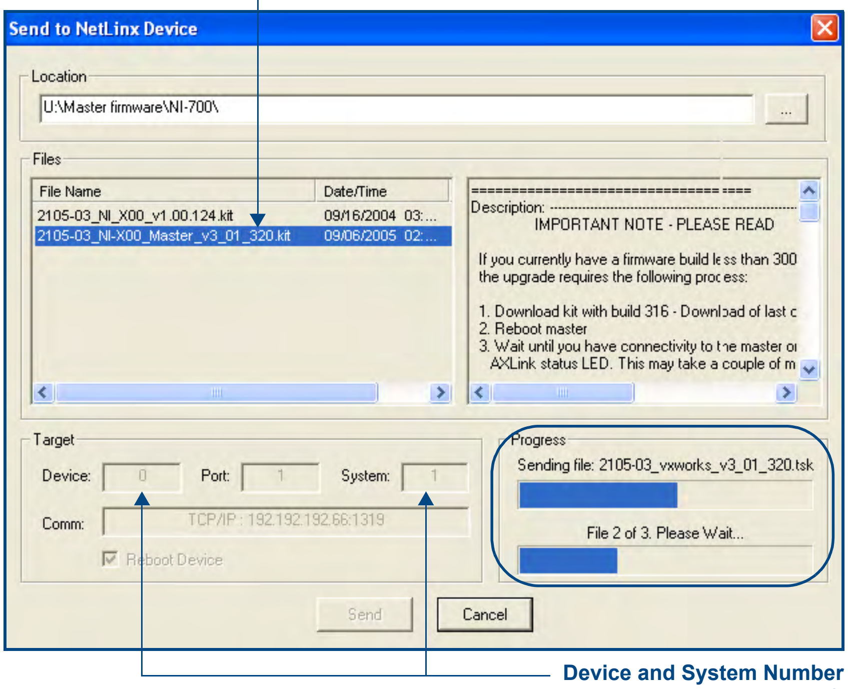
First *upgrade of the on-board Master using the Master's Kit file.*
The Integrated Controller can later be upgraded using the Controller's Kit file.
BOTH Kits should be used when upgrading any firmware associated with the Integrated Controllers.

5. If the on-board Master firmware being used is not current, download the latest Kit file by first logging in to **www.amx.com** and then navigating to **Tech Center** > **Firmware Files**, where you can locate the desired file from within the NetLinx section of the web page.
6. Click on the desired Kit file link and after you've accepted the Licensing Agreement, verify you have downloaded the correct NI Master firmware (Kit) file to a known location.

7. In NetLinx Studio, select **Tools** > **Firmware Transfers > Send to NetLinx Device** to open the Send to NetLinx Device dialog (FIG. 6). Verify the target's System number matches the value listed within the active System folder in the **OnLine Tree** tab of the Workspace.

   The Device number is always **0** for the NI Master.

Selected Master firmware file



Send to NetLinx Device

Location: U:\Master firmware\NI-700\

Files

File Name	Date/Time
2105-03_NI_X00_v1.00.124.kit	09/16/2004 03:...
2105-03_NI-X00_Master_v3_01_320.kit	09/06/2005 02:...

```
================================ ====
Description: ------------------------------------------
        IMPORTANT NOTE - PLEASE READ

 If you currently have a firmware build less than 300
 the upgrade requires the following process:

 1. Download kit with build 316 - Download of last c
 2. Reboot master
 3. Wait until you have connectivity to the master or
    AXLink status LED. This may take a couple of m
```

Target

Device: 0 Port: 1 System: 1

Comm: TCP/IP : 192.192.192.66:1319

☑ Reboot Device

Progress

Sending file: 2105-03_vxworks_v3_01_320.tsk

File 2 of 3. Please Wait...

Description field for selected Kit file

Firmware download status

Device and System Number must match the Device and System values listed in the Workspace window

FIG. 6 Send to NetLinx Device dialog (showing on-board NI_Master firmware update via IP)

8. Select the NI Master's Kit file from the **Files** section (FIG. 6).

NOTE

*The Kit file for the NI-2000/3000/4000 Masters begins with **2105_NI-X000_Master**.*

*The Kit file for the NI-2100/3100/4100 Masters begins with **2105_04_NI-X100_Master**.*

*The Kit file for the NI-700/900 Masters begins with **2105-03_NI-X000_Master**.*

Do not use the 2105-03_NI_Master Kit file on anything other than an NI-700/900, since each Master Kit file is specifically configured to function on a specific NI unit.

9. Enter the **System** number associated with the target Master (listed in the OnLine Tree tab of the Workspace window) and verify the Device number value. *The Port field is disabled.*

10. Click the **Reboot Device** checkbox to reboot the NI unit after the firmware update process is complete.

11. Click **Send** to begin the transfer. The file transfer progress is indicated on the bottom-right of the dialog (FIG. 6).

NOTE

***Only upon the initial installation** of a new Kit file to an on-board Master will there be a error message displayed indicating a failure of the last component to successfully download.*
This is part of the NI Master update procedure and requires that the firmware be reloaded after a reboot of the unit. This consecutive process installs the final component of the new Kit file.

12. After the last components fails to install, click **Done.**
13. Click **Reboot** (from the *Tools > Reboot the Master Controller dialog*) and wait for the System Master to reboot.

    The STATUS and OUTPUT LEDs should begin to alternately blink during the incorporation. Wait until the STATUS LED is the only LED to blink.
14. Press **Done** once until the *Master Reboot Status* field reads **Reboot of System Complete**.
15. Repeat steps 5 - 9 again (the last component will now successfully be installed).
16. Click **Close** once the download process is complete.

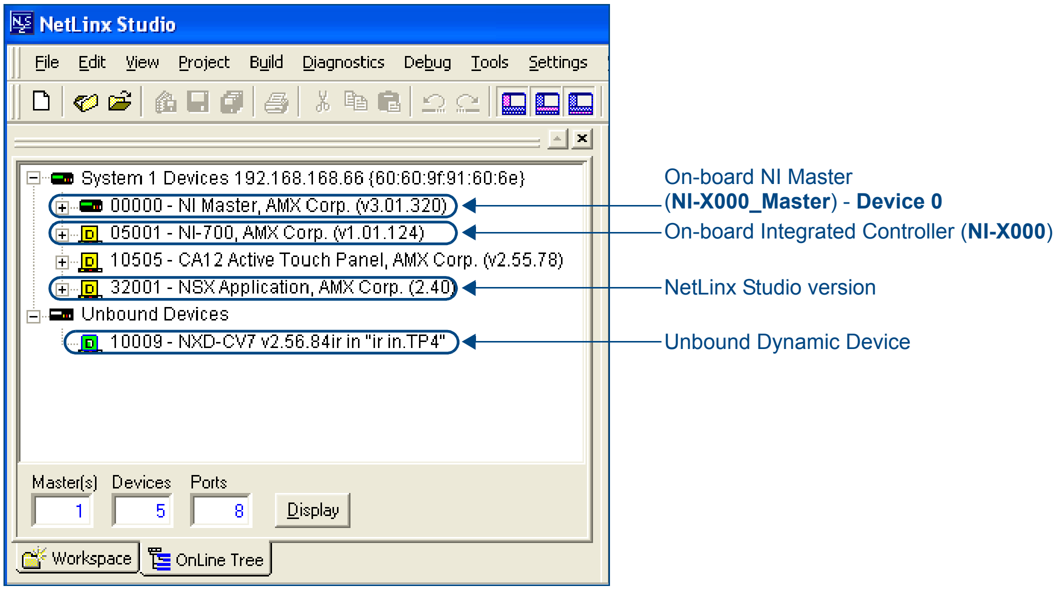
NOTE

The OUTPUT and INPUT LEDs alternately blink to indicate the on-board Master is incorporating the new firmware. Allow the Master 20 - 30 seconds to reboot and fully restart.

17. Right-click the System number and select **Refresh System**. This establishes a new connection to the System and populates the list with the current devices (*and their firmware versions*) on your system.

Upgrading the NI Controller Firmware Via IP

1. Follow the procedures outlined within the *Communicating Via an IP* section on page 9 to connect to the target NI device via the web.
2. After Studio has established a connection to the target Master, click the **OnLine Tree** tab of the Workspace window to view the devices on the System. *The default System value is one (1).*
3. Right-click the associated System number and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system. *The communication method is highlighted in green on the bottom of the NetLinx Studio window.*
4. After the Communication Verification dialog window verifies active communication between the PC and the NI unit, verify the Integrated Controller appears in the **OnLine Tree** tab (FIG. 7) of the Workspace window (ex: *NI-4000* or *NI-700*). This entry is different than the NI Master which uses a device value of *00000* (see below):



System 1 Devices 192.168.168.66 {60:60:9f:91:60:6e}
00000 - NI Master, AMX Corp. (v3.01.320)
05001 - NI-700, AMX Corp. (v1.01.124)
10505 - CA12 Active Touch Panel, AMX Corp. (v2.55.78)
32001 - NSX Application, AMX Corp. (2.40)
Unbound Devices
10009 - NXD-CV7 v2.56.84ir in "ir in.TP4"

Master(s): 1 Devices: 5 Ports: 8

On-board NI Master (**NI-X000_Master**) - **Device 0**

On-board Integrated Controller (**NI-X000**)

NetLinx Studio version

Unbound Dynamic Device

FIG. 7 Sample NetLinx Workspace window (showing separate NI-Master and Controller)

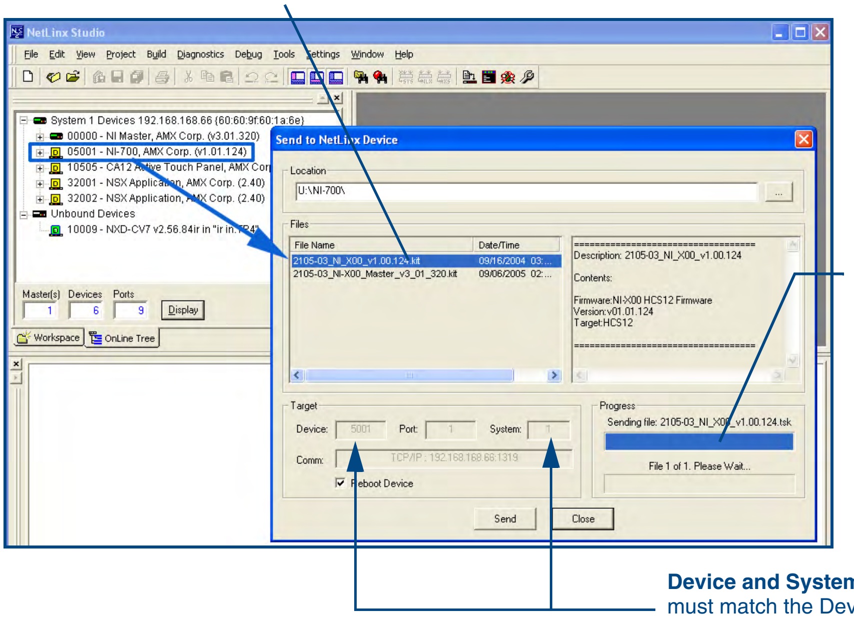
5. If the NI Controller firmware being used is not current, download the latest Kit file by first logging in to **www.amx.com** and then navigating to **Tech Center** > **Firmware Files**, where you can locate the desired file from within the *NI Series Device* (Integrated Controller) section of the web page.

6. Click on the desired Kit file link and after you've accepted the Licensing Agreement, verify you have downloaded the Integrated Controller firmware (Kit) file to a known location.

7. From within Studio, select **Tools** > **Firmware Transfers** > **Send to NetLinx Device** from the Main menu to open the Send to NetLinx Device dialog (FIG. 8). Verify the target's System number matches the value listed within the active System folder in the **OnLine Tree** tab of the Workspace.

   The Device must match the entry for the on-board Integrated Controller (ex: *NI-4000* or *NI-700*) device.

Selected on-board Integrated Controller firmware file



System 1 Devices 192.168.168.66 (60:60:9f:60:1a:6e)
00000 - NI Master, AMX Corp. (v3.01.320)
05001 - NI-700, AMX Corp. (v1.01.124)
10505 - CA12 Active Touch Panel, AMX Corp
32001 - NSX Application, AMX Corp. (2.40)
32002 - NSX Application, AMX Corp. (2.40)
Unbound Devices
10009 - NXD-CV7 v2.56.84ir in "ir in TP4"

Master(s) 1 Devices 6 Ports 9

Location: U:\NI-700\

Files

File Name	Date/Time
2105-03_NI_X00_v1.00.124.kit	09/16/2004 03:...
2105-03_NI-X00_Master_v3_01_320.kit	09/06/2005 02:...

```
===================================
Description: 2105-03_NI_X00_v1.00.124

Contents:

Firmware:NI-X00 HCS12 Firmware
Version:v01.01.124
Target:HCS12

===================================
```

Target

Device: 5001 Port: 1 System: 1

Comm: TCP/IP : 192.168.168.66:1319

☑ Reboot Device

Progress

Sending file: 2105-03_NI_X00_v1.00.124.tsk

File 1 of 1. Please Wait...

Firmware download status

Device and System Number must match the Device and System values listed in the Workspace window

FIG. 8 Send to NetLinx Device dialog (showing on-board Integrated Controller firmware update via IP)

NOTE

*The Kit file for the Integrated Controller on the NI-2000/3000/4000 begins with **2105_NI_X000.***

*The Kit file for the Integrated Controller on the NI-2100/3100/4100 begins with **2105_04_NI_X100.***

*The Kit file for the NI-700/900 Series begins with **2105-03_NI_X000***

> *Do not use the 2105-03_NI_X00 Kit file on anything other than an NI-700/900 since each Kit file is specifically configured to function on a specific NI unit.*

8. Select the Integrated Controller’s (**_X00**) from the **Files** section (FIG. 8).
9. Enter the **System** and **Device** numbers associated with the target Master (*listed in the Workspace window*). *The Port field is greyed-out.*
10. Click the **Reboot Device** checkbox to reboot the NI unit after the firmware update process is complete.
11. Click **Send** to begin the transfer. The file transfer progress is indicated on the bottom-right of the dialog (FIG. 8).
12. Click **Close** once the download process is complete.

NOTE

The OUTPUT and INPUT LEDs alternately blink to indicate the unit is incorporating the new firmware. Allow the unit 20 - 30 seconds to reboot and fully restart.

13. Right-click the System number and select **Refresh System**. This establishes a new connection to the System and populates the list with the current devices (*and their firmware versions*) on your system.

If The Connection Fails

If the connection fails to establish, a Connection Failed dialog appears.
Try selecting a different IP Address if communication fails.

- Press the **Retry** button to reconnect using the same communication parameters.
- Press the **Change** button to alter your communication parameters and repeat steps 2 thru 11.

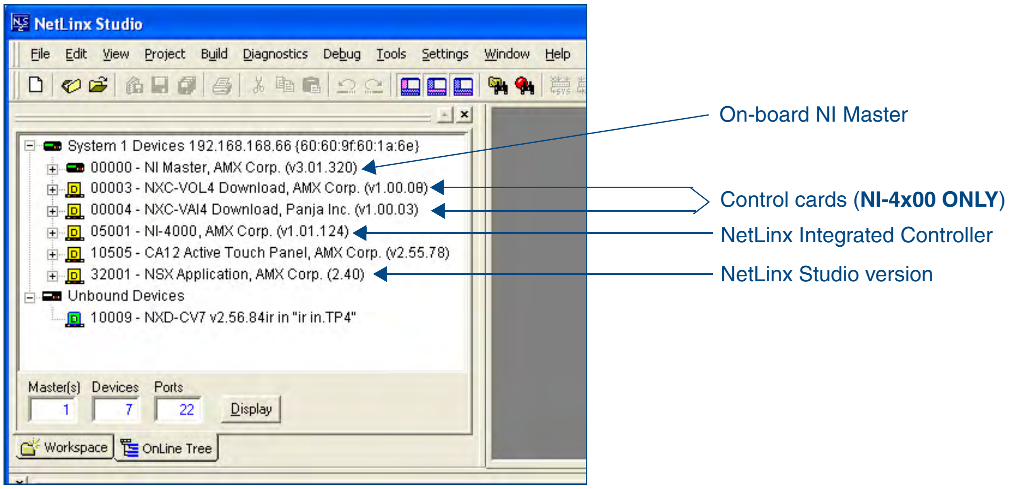
Upgrading NXC Card Firmware Via IP

NOTE

This section applies to the NI-4000 and NI-4100 0nly.

Before beginning with this section, verify that both the on-board Master and on-board Integrated Controller have been updated with the latest firmware and that the NetLinx cards are securely inserted into the NI-4000 or NI-4100.

1. Follow the procedures outlined within the *Communicating Via an IP* section on page 9 to connect to the target NI device via the web.
2. After NetLinx Studio has established a connection to the target Master, click the **OnLine Tree** tab of the Workspace window to view the devices on the System. *The default System value is one (1).*
3. Right-click the associated System number and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system. *The communication method is highlighted in green on the bottom of the NetLinx Studio window.*
4. After the Communication Verification dialog window verifies active communication between the PC and the NI unit, verify the NetLinx NXC Control Cards appear in the **OnLine Tree** tab of the Workspace window (FIG. 9).



System 1 Devices 192.168.168.66 {60:60:9f:60:1a:6e}
00000 - NI Master, AMX Corp. (v3.01.320)
00003 - NXC-VOL4 Download, AMX Corp. (v1.00.08)
00004 - NXC-VAI4 Download, Panja Inc. (v1.00.03)
05001 - NI-4000, AMX Corp. (v1.01.124)
10505 - CA12 Active Touch Panel, AMX Corp. (v2.55.78)
32001 - NSX Application, AMX Corp. (2.40)
Unbound Devices
10009 - NXD-CV7 v2.56.84ir in "ir in.TP4"

FIG. 9 Sample NetLinx Workspace window (showing OnLine Tree tab)

NOTE

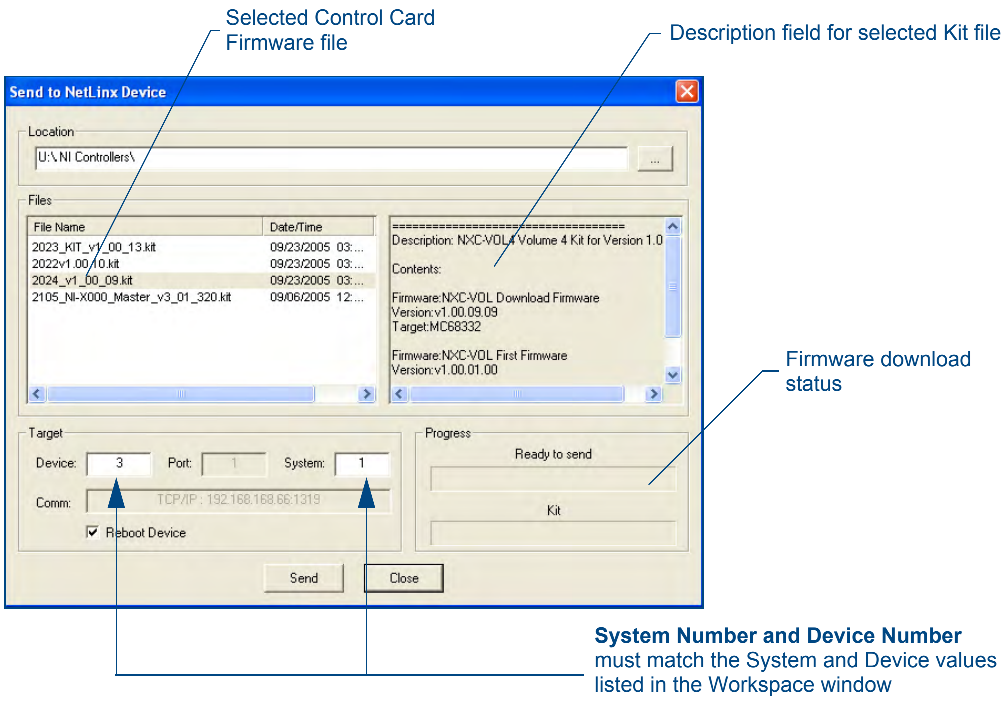
*If the control card firmware is not up to date; download the latest firmware file from **www.amx.com** > **Tech Center** > **Downloadable Files** > **Firmware Files** > NXC-XXX.*
In this example, the NXC-VOL card contains out-of-date firmware and requires build 1.00.09.

5. If the NXC card firmware being used is not current, download the firmware file by first logging in to **www.amx.com** and then navigate to **Tech Center** > **Firmware Files** and from within the NetLinx section of the web page locate the NXC card entries.

6. Click on the desired Kit file link and after you've accepted the Licensing Agreement, verify you have downloaded the NetLinx NXC card firmware (Kit) file to a known location.

7. Verify you have downloaded the latest NetLinx Control Card firmware (Kit) file to a known location.

8. Select **Tools** > **Firmware Transfers > Send to NetLinx Device** from the Main menu to open the Send to NetLinx Device dialog (FIG. 10). Verify the target's **Device and System** numbers matches the value listed within the System folder in the Workspace window.



Selected Control Card Firmware file

Description field for selected Kit file

Firmware download status

System Number and Device Number must match the System and Device values listed in the Workspace window

Send to NetLinx Device

Location: U:\ NI Controllers\

Files

File Name	Date/Time
2023_KIT_v1_00_13.kit	09/23/2005 03:...
2022v1.00.10.kit	09/23/2005 03:...
2024_v1_00_09.kit	09/23/2005 03:...
2105_NI-X000_Master_v3_01_320.kit	09/06/2005 12:...

```
====================================
Description: NXC-VOL4 Volume 4 Kit for Version 1.0

Contents:

Firmware:NXC-VOL Download Firmware
Version:v1.00.09.09
Target:MC68332

Firmware:NXC-VOL First Firmware
Version:v1.00.01.00
```

Target

Device: 3 Port: 1 System: 1

Comm: TCP/IP : 192.168.168.66:1319

☑ Reboot Device

Progress

Ready to send

Kit

FIG. 10 Select Control Card firmware file for download page (via IP)

9. Select the Control Card's Kit file from the **Files** section (FIG. 10) (*in our above example we chose to update the NXC-VOL4 card*).

10. Enter the **System** and **Device** numbers associated with the desired Master (*listed in the Workspace window*). *A device value of **00003** is the same as a value of **3***.

11. Click the **Reboot Device** checkbox to reboot the NI unit after the firmware update process is complete and then re-detect the new NXC card firmware.

12. Click **Send** to begin the transfer. The file transfer progress is indicated on the bottom-right of the dialog (FIG. 10).

13. Click **Close** once the download process is complete.

14. Click **Reboot** (from the *Tools* > *Reboot the Master Controller dialog*) and wait for the System Master to reboot.

    The STATUS and OUTPUT LEDs should begin to alternately blink during the incorporation. Wait until the STATUS LED is the only LED to blink.

15. Press **Done** once until the *Master Reboot Status* field reads **Reboot of System Complete**.

16. Cycle power to the Master (unplug and reconnect power to the unit).

NOTE *This process of cycling power acts to reset the updated NetLinx Control Card and detect its new firmware update. It also serves to allow the Integrated Controller to detect and reflect the new firmware on the card to the NetLinx Studio display on the Workspace window.*

17. After Studio has establish a connection to target Master, click the **OnLine Tree** tab of the Workspace window to view the devices on the System. *The default System value is one (1)*.

18. Right-click the associated System number and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system.

    The communication method is highlighted in green on the bottom of the NetLinx Studio window.

Resetting the Factory Default System and Device Values

1. In NetLinx Studio, access the *Device Addressing* dialog (FIG. 1 on page 5) by either one of these two methods:

    - Right-click on any system device listed in the Workspace and select **Device Addressing**.
    - Select **Diagnostics** > **Device Addressing** from the Main menu.

2. Click the **Set Device/System to Factory Default** button. This resets both the system value and device addresses (for definable devices) to their factory default settings. The system information (in the **OnLine Tree** tab of the Workspace window) refreshes and then displays the new information.

NOTE *By setting the system to its default value (#1), Modero panels that were set to connect to the Master on another System value will not appear in the **OnLine Tree** tab of the Workspace window.*
For example: A Modero touch panel was previously set to System #2. The system is then reset to its default setting of System #1 and then refreshed from within the Workspace window. The panel will not reappear until the system is changed (from within the System Connection page on the Modero) to match the new value and both the Master and panel are rebooted.

3. Click **Done** to close the *Device Addressing* dialog.

4. Click **Reboot** (from the *Tools* > *Reboot the Master Controller* dialog) and wait for the System Master to reboot.

    The STATUS and OUTPUT LEDs should begin to alternately blink during the incorporation. Wait until the STATUS LED is the only LED to blink.

5. Press **Done** once until the *Master Reboot Status* field reads **Reboot of System Complete**.

6. Click the **OnLine Tree** tab in the Workspace window to view the devices on the System.

    The default System value is one (1).

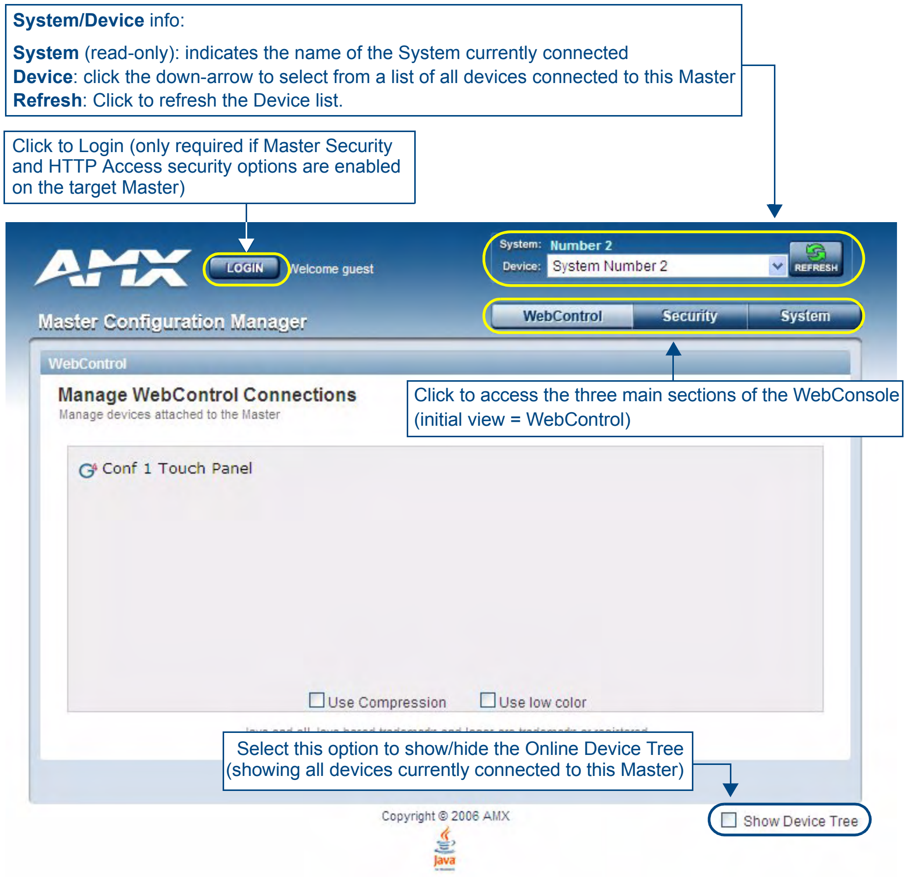
7. Right-click the associated System number (*or anywhere within the tab itself*) and select **Refresh System**. This establishes a new connection to the specified System and populates the list with devices on that system.

8. Use **Ctrl+S** to save these changes to your NetLinx Project.

Onboard WebConsole User Interface

WebConsole UI Overview

NetLinx Masters have a built-in WebConsole that allows you to make various configuration settings via a web browser on any PC that has access to the Master. The webconsole consists of a series of web pages that are collectively called the "Master Configuration Manager" (FIG. 11).



System/Device info:

System (read-only): indicates the name of the System currently connected
Device: click the down-arrow to select from a list of all devices connected to this Master
Refresh: Click to refresh the Device list.

Click to Login (only required if Master Security and HTTP Access security options are enabled on the target Master)

Click to access the three main sections of the WebConsole (initial view = WebControl)

Select this option to show/hide the Online Device Tree (showing all devices connected to this Master)

FIG. 11 Master Configuration Manager - WebControl Page (initial view)

The webconsole is divided into three primary sections, indicated by three control buttons across the top of the main page (FIG. 12):

FIG. 12 WebConsole Control Buttons

- **WebControl**: This is the option that is pre-selected when the WebConsole is accessed. Use the options in the *Manage WebControl Connections* page to manage G4WebControl connections (see the *WebConsole - WebControl Options* section on page 25).
- **Security**: Click to access the System Security page. The options in this page allow you to configure various aspects of NetLinx System and Security on the Master (see the *WebConsole - Security Options* section on page 27).
- **System**: Click to access the System Details page. The options on this page allow you to view and configure various aspects of the NetLinx System (see the *WebConsole - System Options* section on page 41).

Accessing the WebConsole

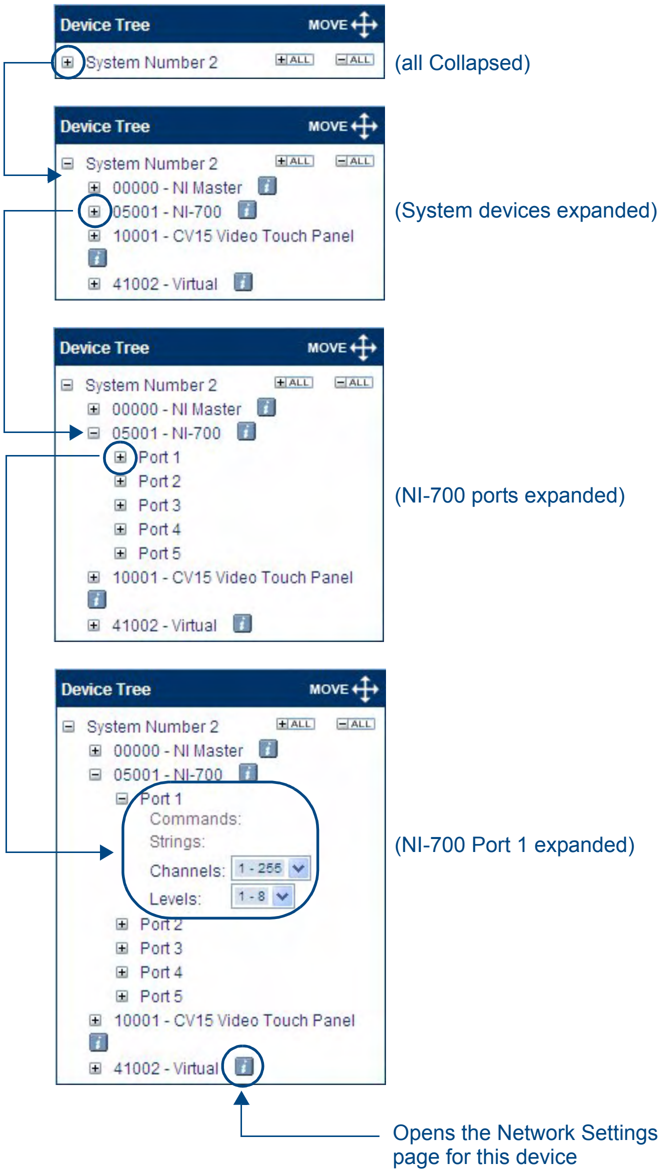
From any PC that has access to the LAN that the target Master resides on:

1. Open a web browser nd type the IP Address of the target Master in the Address Bar.
2. Press Enter to access WebConsole for that Master. The initial view is the *WebControl* page (FIG. 11).

Device Tree

Click the **Show Device Tree** checkbox to show/hide the online device tree, which indicates all devices currently connected to this Master. Use the plus and minus symbols to the left of each item in the Device Tree to expand the view to include System devices, ports and individual Port settings.

At the Port view, you can use the Device Tree to make specific port assignments (including Channel and Level assignments) (FIG. 13).



(all Collapsed)

(System devices expanded)

(NI-700 ports expanded)

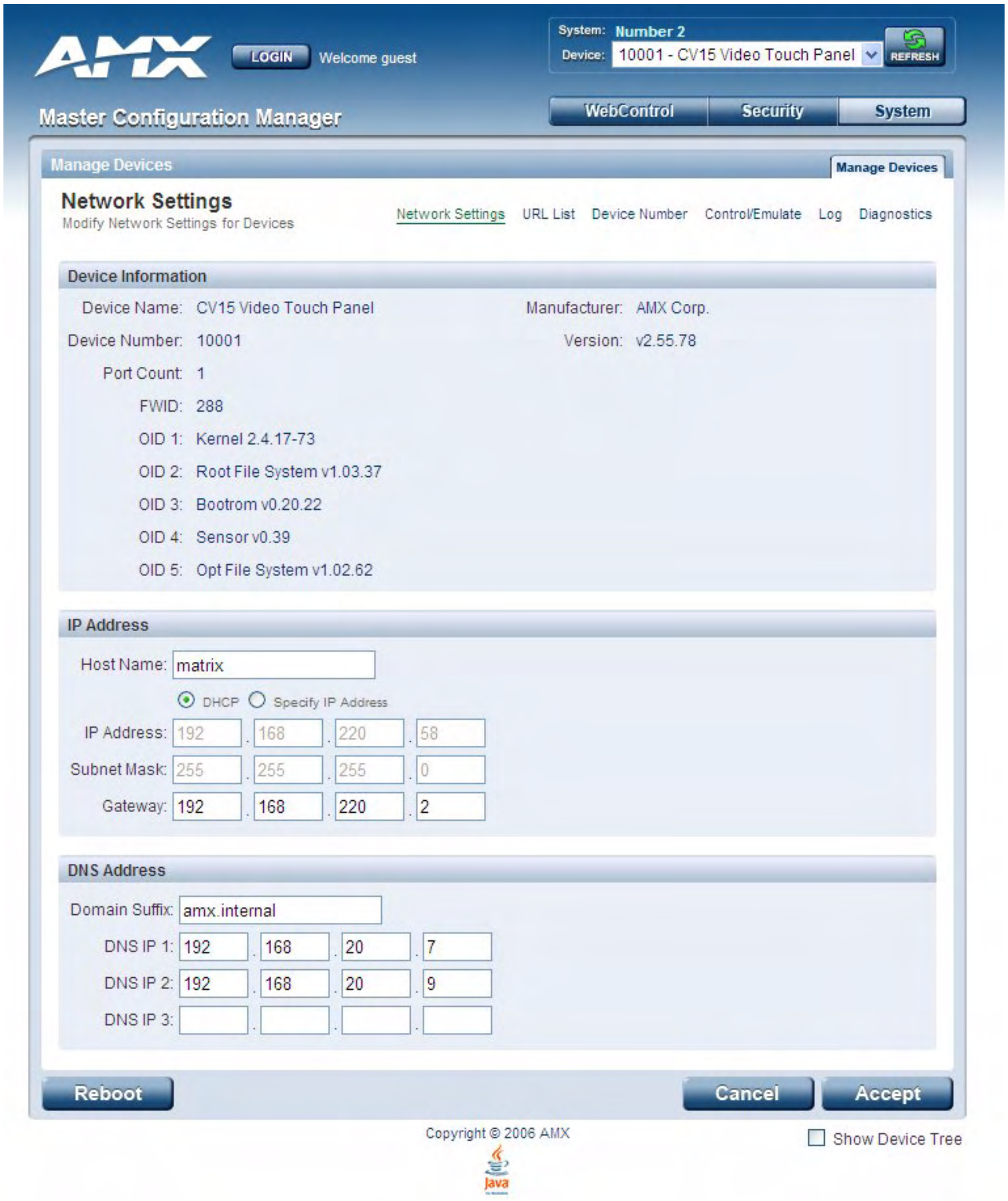
(NI-700 Port 1 expanded)

Opens the Network Settings page for this device

FIG. 13 Online Device Tree

Device Network Settings Pages

Click on the blue Information (***i***) icon next to any device listed in the Device Tree to access the Network Settings page for the selected device (FIG. 14).



System: Number 2

Device: 10001 - CV15 Video Touch Panel

Network Settings

Modify Network Settings for Devices

Device Information

Device Name: CV15 Video Touch Panel

Manufacturer: AMX Corp.

Device Number: 10001

Version: v2.55.78

Port Count: 1

FWID: 288

OID 1: Kernel 2.4.17-73

OID 2: Root File System v1.03.37

OID 3: Bootrom v0.20.22

OID 4: Sensor v0.39

OID 5: Opt File System v1.02.62

IP Address

Host Name: matrix

● DHCP ○ Specify IP Address

IP Address: 192 . 168 . 220 . 58

Subnet Mask: 255 . 255 . 255 . 0

Gateway: 192 . 168 . 220 . 2

DNS Address

Domain Suffix: amx.internal

DNS IP 1: 192 . 168 . 20 . 7

DNS IP 2: 192 . 168 . 20 . 9

DNS IP 3: . . .

FIG. 14 Example Network Settings page for a sample CV15 connected to the Master

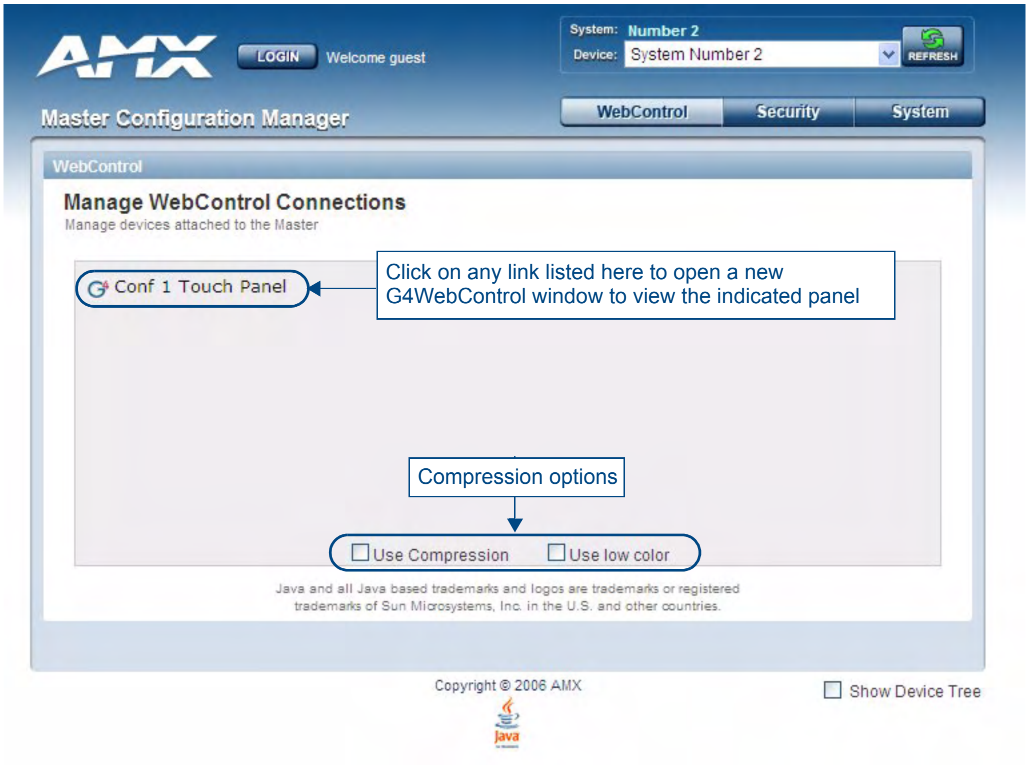
- Use the options on this page to view/edit the device’s network settings.
- Refer to the *System - Manage System* section on page 41 for details.

WebConsole - WebControl Options

Manage WebControl Connections

The WebControl page is accessed by clicking on the **WebControl** button (FIG. 15). This page allows you to view all touch panels running the G4WebControl application.

Each G4WebControl-equipped touch panel connected to this Master is indicated by a link. Click on any of the links to open a new G4WebControl window, displaying the selected panel, using the native resolution of the target panel. For example, a CA15 panel link opens a new G4WebControl window at 800 x 600 resolution.



System: Number 2

Device: System Number 2

Click on any link listed here to open a new G4WebControl window to view the indicated panel

Compression options

□ Use Compression □ Use low color

Java and all Java based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries.

□ Show Device Tree

FIG. 15 Manage WebControl Connections page (populated with 1 compatible G4 touch panel)

To establish a secure connection between the touch panel and the target Master, the panel must be using a valid username and password (*that can be matched to a previously configured user on the target Master*) and the **ICSP Connectivity** option must be enabled within the System Level Security page.

Compression Options

The checkboxes at the bottom of this page allow you to choose from two compression options. Use compression to decrease response delay when viewing G4WebControl windows over a bandwidth-restricted network, or over the Internet. By default, compression options are disabled.

- **Use Compression** allows you to specify that the transmitted data packets be compressed. This speeds up the visual responses from the panel by minimizing the size of the information relayed through the web and onto the screen.
- **Use Low Color** allows you to specify the number of colors used to display the image from the panel be reduced. By reducing the numbers of colors, the size of the information is reduced and the response delay is decreased.

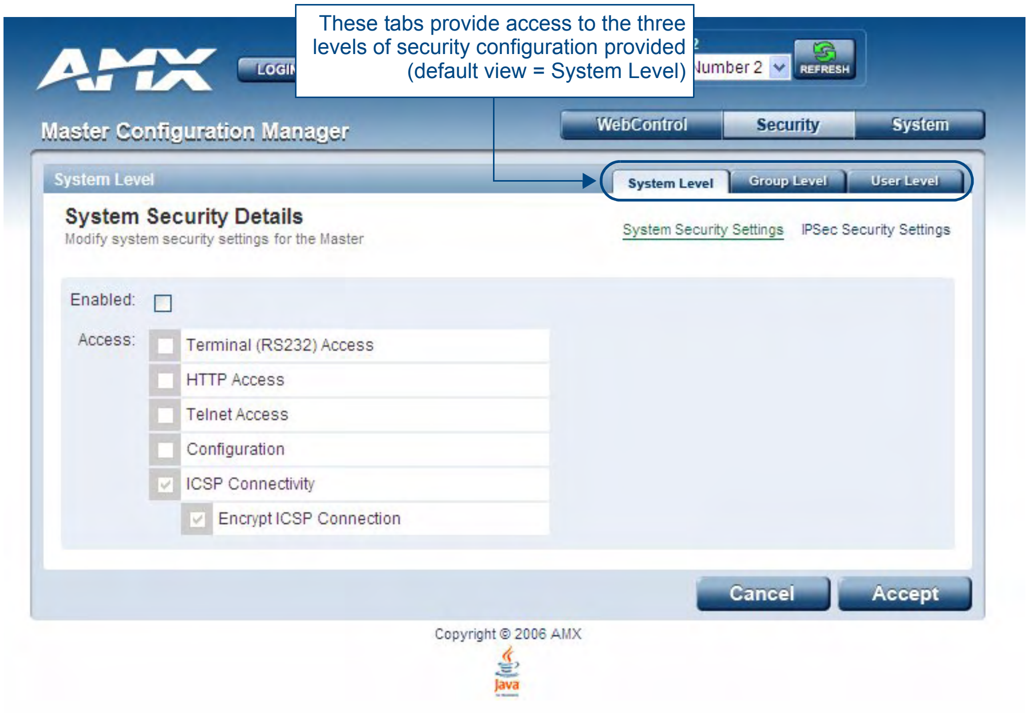
WebConsole - Security Options

Security Overview

The *Security System Details* page is accessed by clicking on the **Security** button. This page allows you to view configure and modify the Master's security settings at three levels:

- **System Level** - changes made at this level affect the system globally.
  See the *System Security - System Level* section on page 29 for details.
- **Group Level** - changes made at this level affect specific User Groups.
  See the *System Security - Group Level* section on page 33 for details.
- **User Level** - changes made at this level affect individual Users.
  See the *System Security - User Level* section on page 38 for details.

The default view for the option is System Level Security / System Security Settings (FIG. 16).



These tabs provide access to the three levels of security configuration provided (default view = System Level)

System Security Details
Modify system security settings for the Master

Enabled: □

Access:
□ Terminal (RS232) Access
□ HTTP Access
□ Telnet Access
□ Configuration
☑ ICSP Connectivity
☑ Encrypt ICSP Connection

FIG. 16 System Security Details Page (System Security Settings)

NOTE

By default, all System-level security options are disabled.

Default Security Configuration

By default, the NetLinx Master creates the following accounts, access rights, directory associations, and security options:

Default Security Configuration		
Account 1	**Account 2**	**Group 1**
Username: administrator	*Username*: NetLinx	
Password: password	*Password*: password	
Group: administrator	*Group*: none	*Group*: administrator
Rights: All	*Rights*: FTP Access	*Rights*: All
Directory Association: /*	*Directory Association*: none	*Directory Association*: /*
***Note**: The "administrator" User account cannot be deleted or modified with the exception of its password. Only a user with both Configuration access and administrator rights can alter the administrator's password.*	***Note**: The "NetLinx" User account is compatible with previous NetLinx Master firmware versions. This account is initially created by default and can later be deleted or modified.*	***Note**: The "administrator" Group account cannot be deleted or modified.*

- FTP Security is always enabled on the Masters.
- The **Admin Change Password Security** option (in the Group and User Level Security Details pages is enabled by default.
- All other security options are **disabled** by default.

Login Rules

There is no limit to the number of concurrent logins allowed for a single user. This allows for the creation of a single User that is provided to multiple ICSP devices (touch panels, for example) using the same login to obtain access to the Master.

For example, if you had 50 devices connected to a Master, you would not have to create 50 individual user accounts-one for each device. Instead, you only need to create one which all 50 devices use for access.

The first layer of security for the Master is to prompt a user to enter a valid username and password before gaining access to a secured feature on the target Master.

Depending on the Security configuration, Users may be prompted to enter a valid username and password before gaining access to various features of the WebConsole. User access is specified by the administrator in the Group and User Level pages of the Security section.

NOTE

This username and password information is also used by both G4 touch panels (within the System Connection firmware page) and AMX software applications such as NetLinx Studio v 2.4 to communicate securely with a Master using encrypted communication.

User Name and Password Rules

- Case-sensitive.
- Must be between 4 and 20 characters.
- Characters such as # (pound) & (ampersand) and ' " (single and double quotes) are invalid and should not be used in usernames, group names, or passwords.

System Security - System Level

System Level Security options provide authorized users the ability to alter the current security options of the entire system assigned to the Master.

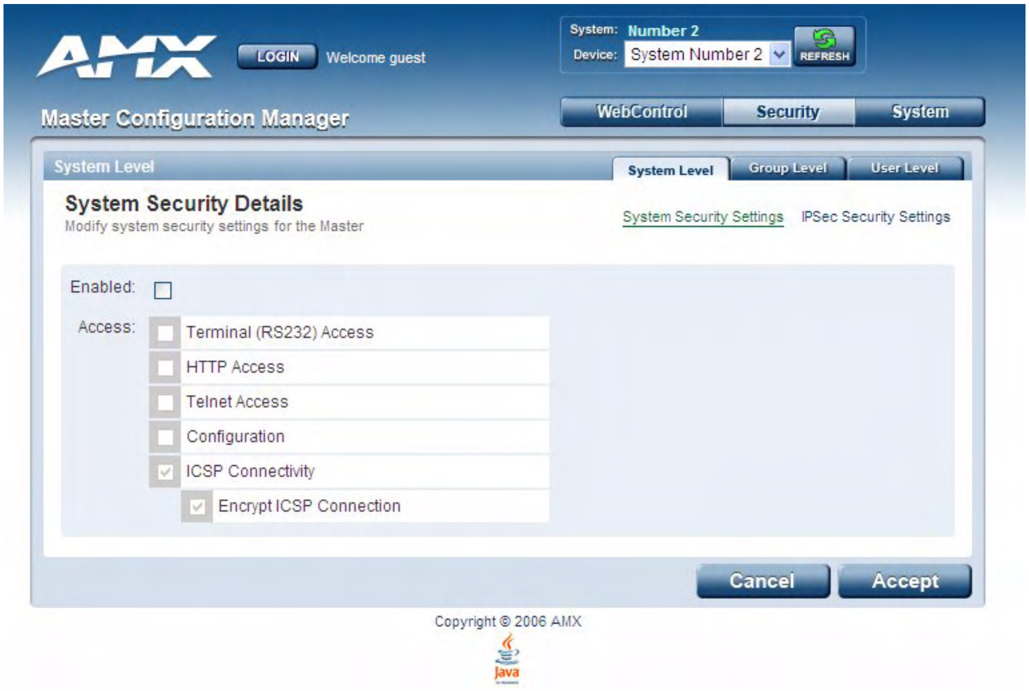
There are two System Level Security pages, accessible via the **System Security Settings** and **Security Settings** links in the System Level Tab:

NOTE

*The. **Security Settings** option is only available on the NI-700/900 and NI-X100 series.*

System Level Security - System Security Settings

Click the **System Security Settings** link to access the System Security Details page (FIG. 17). The options in this page allow you to establish wether the Master will require a valid username and password be entered prior to gaining access to the configuration options.



System Security Details

Modify system security settings for the Master

Enabled: □

Access:
- □ Terminal (RS232) Access
- □ HTTP Access
- □ Telnet Access
- □ Configuration
- ☑ ICSP Connectivity
  - ☑ Encrypt ICSP Connection

FIG. 17 System Security Settings Page

These are global options that enable or disable the login requirement for both users and groups.

Check the **Enabled** option to make the *Access* options available for selection.

System Security Access Options

System Security Access Options	
Option	**Description**
Enabled:	This option enables the Access options this page. If the Master Security checkbox is not enabled, all subordinate options are greyed-out and not selectable, meaning that the Master is completely unsecured and can be altered by any user (regardless of their rights).
Terminal (RS232) Access:	If selected, a valid username and password is required for Terminal communication via the Master's RS232 Program port.
HTTP Access:	If selected, a valid username and password is required for communication over HTTP or HTTPS Ports, including accessing the WebConsole.
Telnet Access:	If selected, a valid username and password is required for Telnet Access. Telnet access allows communication over either the Telnet and/or SSH Ports. ***Note**: SSH version 2 (only) is supported.* To establish a secure Telnet connection, an administrator can decide to disable the Telnet Port and then enable the SSH Port. Refer to the *Port Settings* section on page 51 for details.
Configuration:	If selected, a valid username and password is required before allowing a group/user to alter the current Master's security and communication settings via NetLinx Studio. This includes such things as: IP configuration/Reset, URL list settings, Master communication settings, and security parameters.
ICSP Connectivity:	If selected, a valid username and password is required to communicate with the NetLinx Master via an ICSP connection (TCP/IP, UDP/IP, and RS-232). • This feature allows communication amongst various AMX hardware and software components. This feature works in tandem with the *Require Encryption* option (see below) to require that any application or hardware communicating with the Master must provide a valid username and password. • In a Master-to-Master system, the Master which accepts the IP connection initiates the authentication process. This configuration provides compatibility with existing implementations and provides more flexibility for the implementation of other devices. ***Note**: The ICSP Connectivity option is required to allow authenticated and/or secure communication between the Master and other AMX hardware/software. To establish an authenticated ICSP connection (where the external AMX hardware/software has to provide a valid username and password), this option must be enabled.*
Encrypt ICSP Connection:	If selected, this option requires that any data being transmitted or received via an ICSP connection (among the various AMX products) be encrypted, and that any application or hardware communicating with the Master over ICSP must provide a valid username and password. ***Note**: When enabled, this option requires more processor cycles to maintain.* *ICSP uses a proprietary encryption based on RC4 and also requires CHAP-type authentication including username and password.* *CHAP (Challenge Handshake Authentication Protocol) authentication is an access control protocol for dialing into a network that provides a moderate degree of security.* • *When the client logs onto the network, the network access server (NAS) sends the client a random value (the challenge).* • *The client encrypts the random value with its password, which acts as an encryption key. It then sends the encrypted value to the NAS, which forwards it along with the challenge and username to the authentication server.* • *The CHAP server encrypts the challenge with the password stored in its database for the user and matches its results with the response from the client. If they match, it indicates the client has the correct password, but the password itself never left the client's machine.*

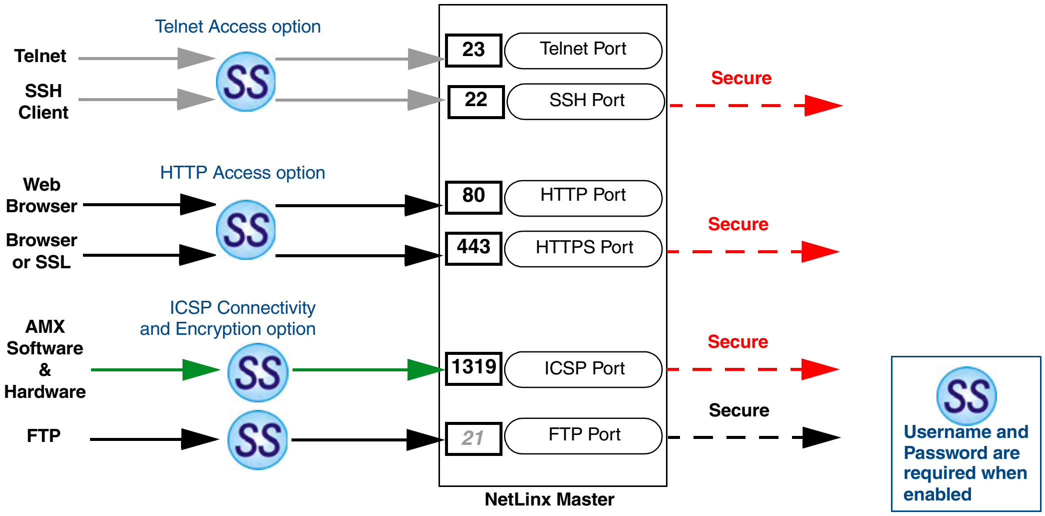


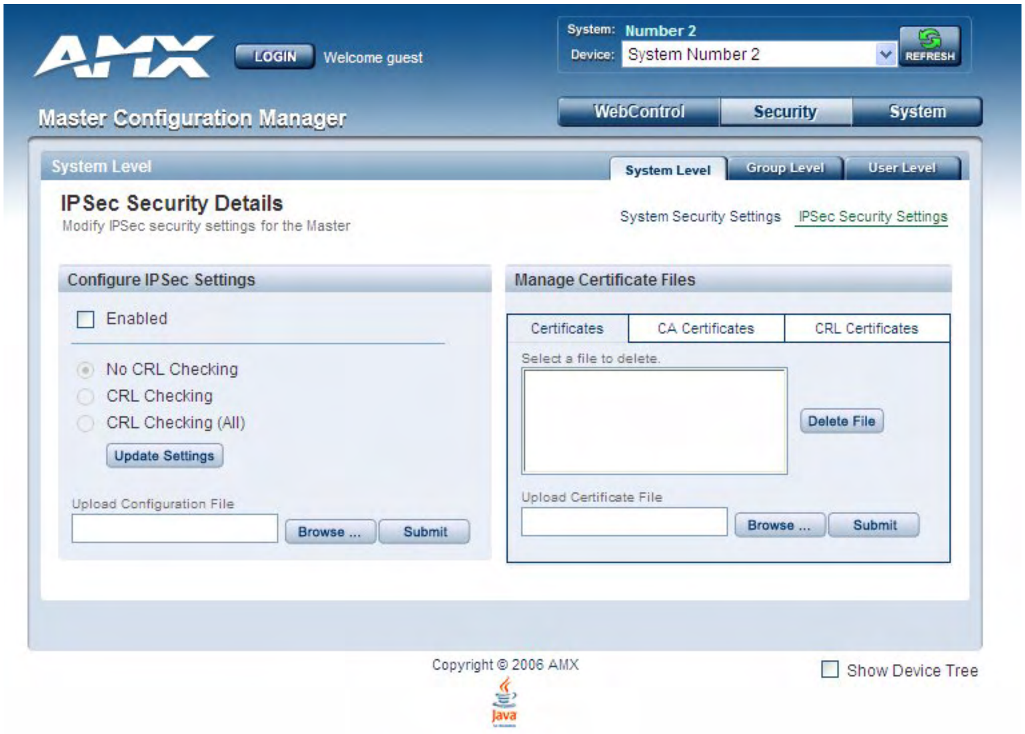
FIG. 18 Port Communication Settings

Accepting Changes

Click the **Accept** button to save changes on this page. Accepting changes is instantaneous and does not require a reboot.

System Level Security - IPSec Security Settings

Click the **IPSec Security Settings** link to access the *IPSec Security Details* page (FIG. 19). The options in this page allow you configure IPSec-specific security options on the Master at the System level.


System: Number 2

Device: System Number 2

Welcome guest

Master Configuration Manager

System Level

IPSec Security Details

Modify IPSec security settings for the Master

Configure IPSec Settings

□ Enabled

● No CRL Checking

○ CRL Checking

○ CRL Checking (All)

Upload Configuration File

Manage Certificate Files

Select a file to delete.

Upload Certificate File

Copyright © 2006 AMX

□ Show Device Tree

FIG. 19 IPSec Security Settings Page

NOTE

The IPSec Security Settings option is only available on the NI-700/900 and NI-X100 series.

Configuring Settings

1. Check the **Enabled** option to enable Security, and make the following *CRL Checking* options available (click the radio buttons to toggle on/off):
   - **No CRL Checking**: No CRL (*Certificate Revocation List*) checking will be done.
   - **CRL Checking**: Only the certificate in question will be checked against the CRL.
   - **CRL Checking (All)**: Each certificate in an entire chain of certificates should be checked against the CRL.
2. Click the **Update Settings** button to save all changes to the Master.

Uploading an Configuration File

1. Click **the** Browse button (next to the *Upload Configuration File* text box) to locate and select a NetLinx compatible configuration file from your PC (or LAN).

NOTE

The configuration file name can use any suffix, but it will be re-suffixed to ***.cfg** *by the Master.*

2. Click the **Submit** button to transfer the selected configuration file to the Master.

Managing Certificate Files

The *Managing Certificate Files* section of the page provides a display box that lists all of the existing Certificate Files resident on the Master.

NOTE

A certificate is a cryptographically signed object that associates a public key and an identity. Certificates also include other information in extensions such as permissions and comments
"CA" is short for "Certification Authority" - an trusted third party (or internal entity) that issues, signs, revokes, and manages these digital certificates.

The display is separated into three tabs (click to view the selected type of Certificate Files):

- **Certificates**: This tab displays all Identity certificates on the Master.
- **CA Certificates**: This tab displays all Certificate Authority (CA) certificates on the Master.
- **CRL Certificates**: This tab displays all Certificate Revocation List (CRL) certificates on the Master.

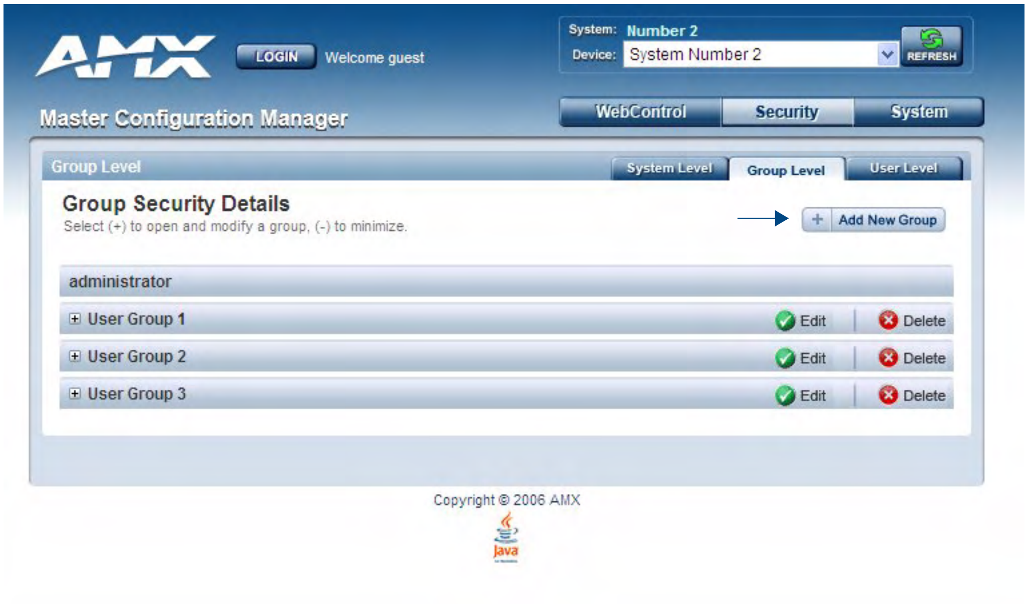
To delete a Certificate from the Master, select a Certificate in any of the three tabs, and click **Delete File**.

AMX IPSec Configuration file

Refer to the *Appendix A: IPSec Configuration File* section on page 115 for a listing and description of the configuration lines supported by the AMX IPSec Configuration file.

System Security - Group Level

Select the *Group Level* tab of the Security Page to access the **Group Security Details** page (FIG. 20).



System: Number 2
Device: System Number 2

Group Security Details

Select (+) to open and modify a group, (-) to minimize.

FIG. 20 Group Security Details page

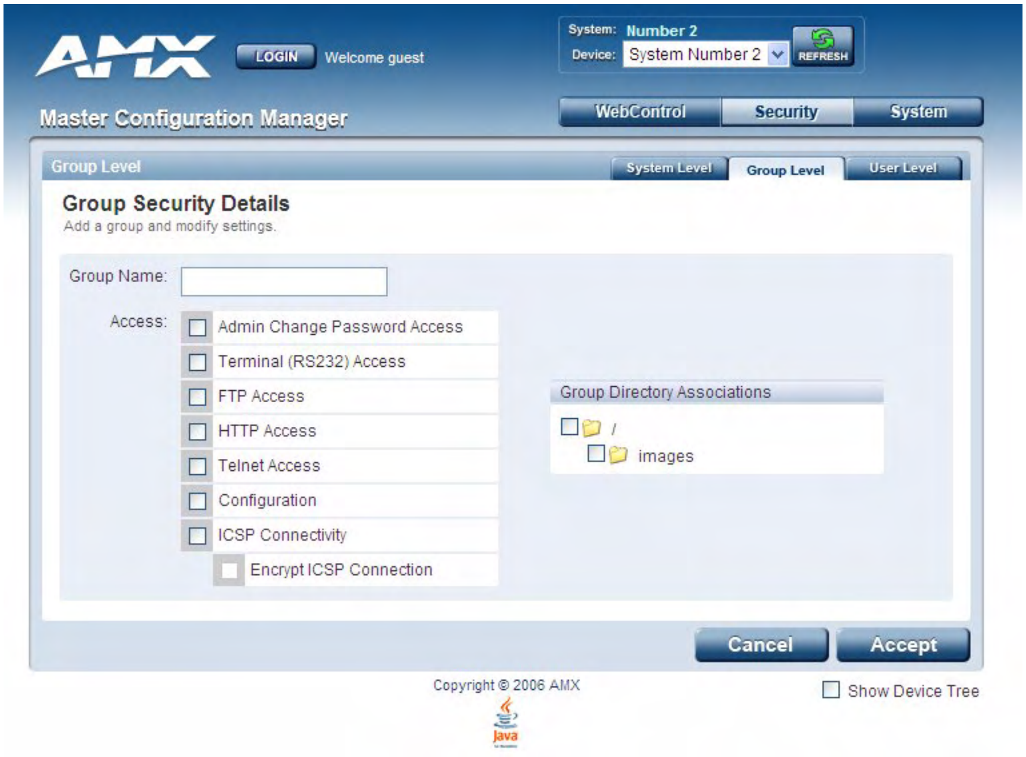
The options in this page allow authorized users to assign and alter group properties such as creating, modifying, or deleting a group's rights, and also allows for the definition of the files/directories accessible by a particular group.

NOTE

A Group represents a logical collection of individual users. Any properties possessed by a group are inherited by all members of that group.

Adding a New Group

1. Select the **Group Level** tab (*in the **Security** section*) to open the Group Security Details page.
2. Click the **Add New Group** button (see FIG. 20) to access the **Add a group and modify settings** page (FIG. 21).
3. In the **Group Name** field, enter a unique name for the new group.
   - The name must be a valid character string consisting of 4 - 20 alpha-numeric characters.
   - The string is case sensitive and must be unique.
   - The word "*administrator*" cannot be used for a new group name since it already exists by default.
4. Enable the security access rights you want to provide to the group. By default, all of these options are disabled. See the *Group and User Security Access Options* section on page 34 for details.
5. In the **Group Directory Associations** section, place a checkmark next to the directories (available on the target Master) to provide an authorized group with access rights to the selected directories.



Group Security Details

Add a group and modify settings.

Group Name:

Access:

- □ Admin Change Password Access
- □ Terminal (RS232) Access
- □ FTP Access
- □ HTTP Access
- □ Telnet Access
- □ Configuration
- □ ICSP Connectivity
  - □ Encrypt ICSP Connection

Group Directory Associations

- □ /
  - □ images

□ Show Device Tree

FIG. 21 Group Level Security Settings Page (Add a group and modify settings page)

NOTE

If you select a group directory, all lower groups in that tree will be selected.

6. Click the **Accept** button to save your changes to the target Master.

If there are no errors within any of the page parameters, a "*Group added successfully*" is displayed at the top of the page.

NOTE

Security changes made from within the web browser are applied instantly, without the need to reboot.

Group and User Security Access Options

Group and User Security Access Options	
Option	**Description**
Admin Change Password Access:	This selection enables or disables the Administrator right to change Group and User passwords.
Terminal (RS232) Access:	If selected, a valid username and password is required for Terminal communication via the Master's RS232 Program port.
HTTP Access:	If selected, a valid username and password is required for communication over HTTP or HTTPS Ports, including accessing the WebConsole.

Group and User Security Access Options (Cont.)	
Option	**Description**
Telnet Access:	If selected, a valid username and password is required for Telnet Access. Telnet access allows communication over either the Telnet and/or SSH Ports. ***Note**: SSH version 2 (only) is supported.* • To establish a secure Telnet connection, an administrator can decide to disable the Telnet Port and then enable the SSH Port. Refer to the *Manage System - Server Options* section on page 51.
Configuration:	If selected, a valid username and password is required before allowing a group/ user to alter the current Master's security and communication settings via NetLinx Studio. This includes such things as: IP configuration/Reset, URL list settings, Master communication settings, and security parameters.
ICSP Connectivity:	If selected, a valid username and password is required to communicate with the NetLinx Master via an ICSP connection (TCP/IP, UDP/IP, and RS-232). • This feature allows communication amongst various AMX hardware and software components. This feature works in tandem with the *Require Encryption* option (see below) to require that any application or hardware communicating with the Master must provide a valid username and password. • In a Master-to-Master system, the Master which accepts the IP connection initiates the authentication process. This configuration provides compatibility with existing implementations and provides more flexibility for the implementation of other devices. ***Note**: The ICSP Connectivity option is required to allow authenticated and/or secure communication between the Master and other AMX hardware/software. To establish an authenticated ICSP connection (where the external AMX hardware/software has to provide a valid username and password), this option must be enabled.*
Encrypt ICSP Connection:	If selected, this option requires that any data being transmitted or received via an ICSP connection (among the various AMX products) be encrypted, and that any application or hardware communicating with the Master over ICSP must provide a valid username and password. ***Note**: When enabled, this option requires more processor cycles to maintain.*

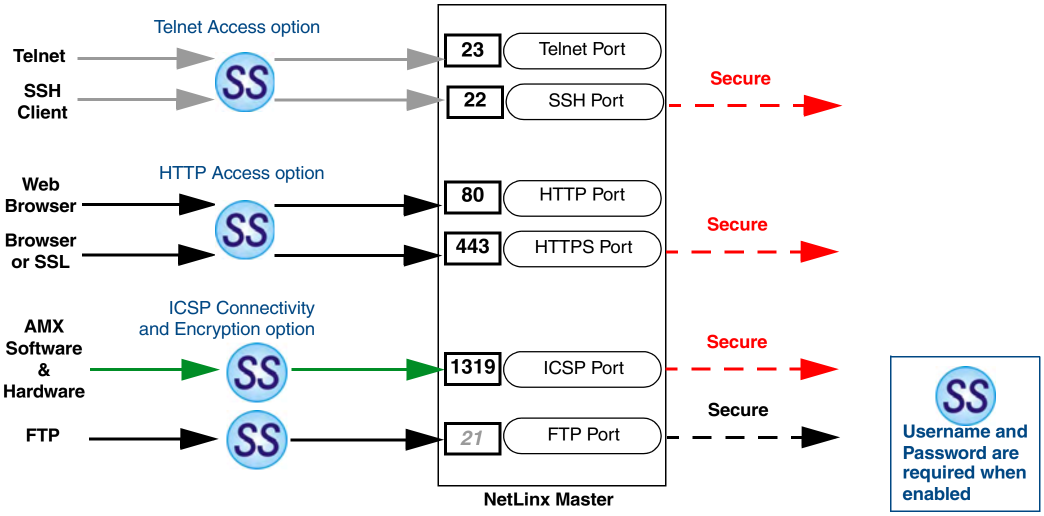
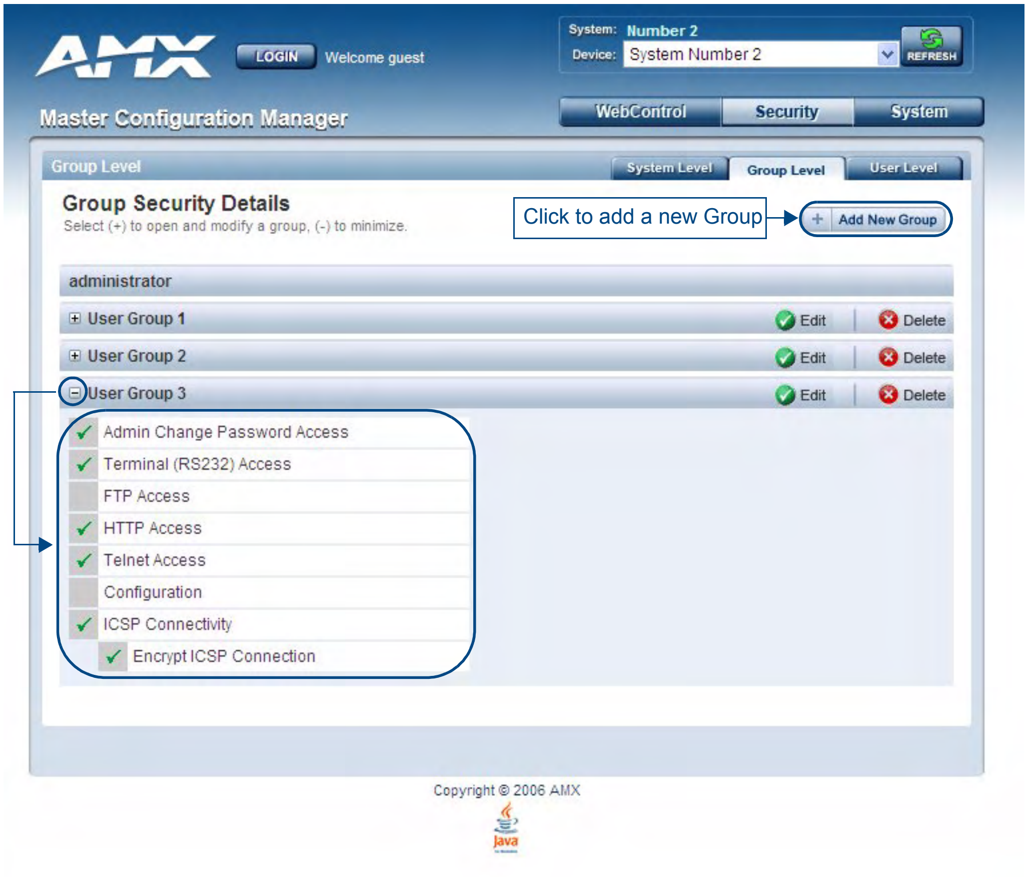


FIG. 22 Port Communication Settings

Viewing Group Security Settings Details

Click on any Group listed in the *Group Security Details* page to expand the view to show details for the selected user Group (FIG. 23):



Group Security Details

Select (+) to open and modify a group, (-) to minimize.

administrator

⊞ User Group 1

⊞ User Group 2

⊟ User Group 3

- ✓ Admin Change Password Access
- ✓ Terminal (RS232) Access
- □ FTP Access
- ✓ HTTP Access
- ✓ Telnet Access
- □ Configuration
- ✓ ICSP Connectivity
  - ✓ Encrypt ICSP Connection

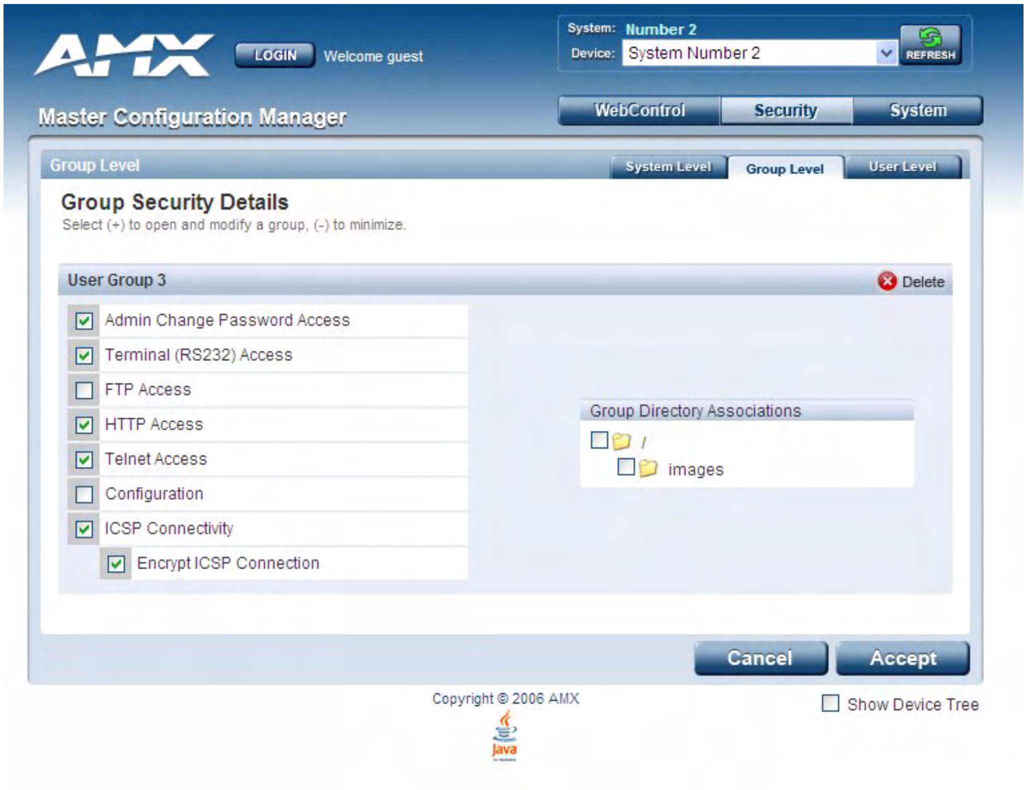
FIG. 23 Group Security Details Page

- Click the **Edit** button to edit the Security Access options for the selected user group.
- Click **Delete** to delete the selected User Group from the Master.

Modifying the Properties of an Existing Group

1. Select the **Group Level** tab (in the *Security* section) to open the Group Security Details page.
2. Click the **Edit** button to open the *Group Security Details* page for the selected group (FIG. 24).
3. Modify the previously configured access rights by enabling / disabling the checkboxes. See the *Group and User Security Access Options* section on page 34 for details.
4. Modify the selected group's directory access rights in the Group Directory Associations section, as necessary (place / remove checkmarks next to the available directories).
5. Click the **Accept** button to save your changes to the Master.

   If there are no errors with the modification of any of this page's parameters, a "*Group updated successfully*" is displayed at the top of the page.



System: Number 2
Device: System Number 2

Group Security Details

Select (+) to open and modify a group, (-) to minimize.

User Group 3

- ☑ Admin Change Password Access
- ☑ Terminal (RS232) Access
- □ FTP Access
- ☑ HTTP Access
- ☑ Telnet Access
- □ Configuration
- ☑ ICSP Connectivity
  - ☑ Encrypt ICSP Connection

Group Directory Associations

- □ /
  - □ images

□ Show Device Tree

FIG. 24 Group Security Details Page (Edit Group Security Details)

NOTE

The "administrator" group account cannot be modified or deleted.

Any properties possessed by groups (ex: access rights, update rights, directory associations, etc.) are inherited by users assigned to that particular group.

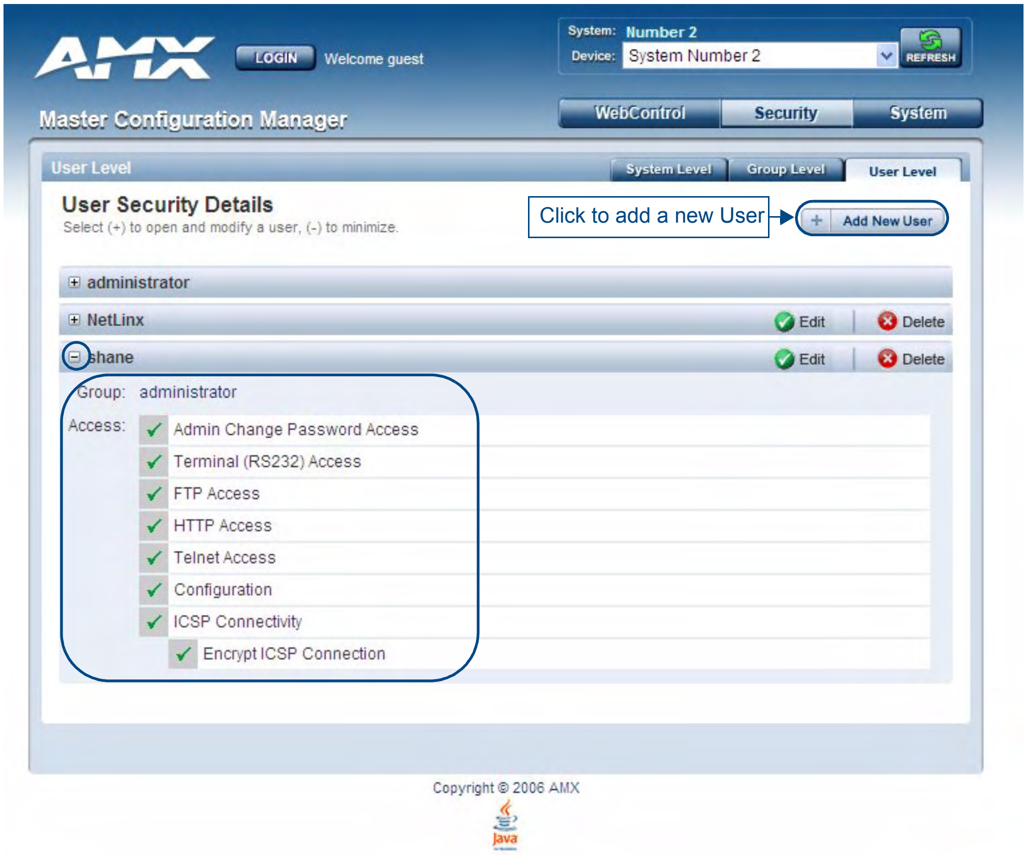
Unchecking a security option (which is available within the associated group) does not remove that right from the user. The only way to remove a group’s available security right from a target user is either to not associate a group to a user or to alter the security rights of the group being associated.

Deleting a Group

1. Select the **Group Level** tab (in the *Security* section) to open the *Group Security Details* page.
2. Press the **Delete** button to remove the selected group and refresh the page. The system will prompt you to verify this action - click **OK** to proceed.
   - If you are not logged into the Master, you receive a reminder message: *"You must login before Security Settings can be changed"*. In this case, log into the Master and repeat the previous steps.
   - If the group is associated with several users, you might get an error while trying to delete the group. If this happens, change the group association of those specific users utilizing the old group and either give them a new group or assign them (none) as a group. When you return to delete the desired group, you receive a message saying *"Group deleted successfully"*.
3. Click the **Accept** button to save your changes to the Master.

System Security - User Level

Select the *User Level* tab of the Security Page to access the **User Security Details** page (FIG. 25). The options on this page allow authorized users to add/delete User accounts and configure User's Access rights.



User Security Details

Select (+) to open and modify a user, (-) to minimize.

Click to add a new User

Group: administrator

Access:
- ✓ Admin Change Password Access
- ✓ Terminal (RS232) Access
- ✓ FTP Access
- ✓ HTTP Access
- ✓ Telnet Access
- ✓ Configuration
- ✓ ICSP Connectivity
  - ✓ Encrypt ICSP Connection

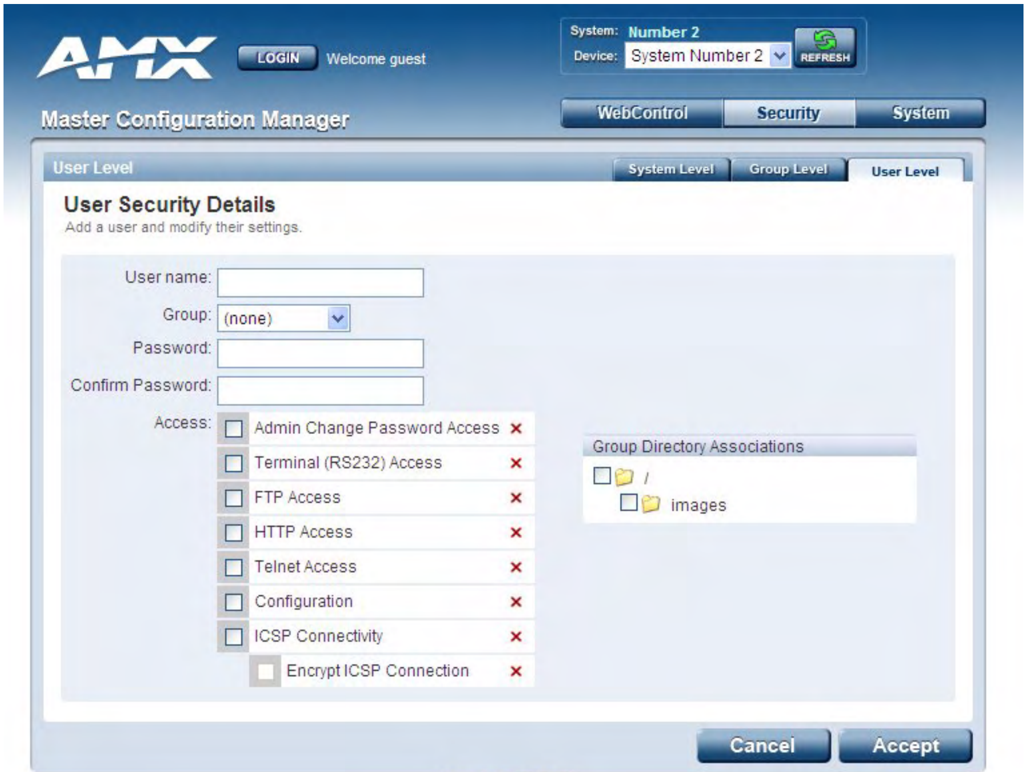
FIG. 25 User Security Settings Page

NOTE

*A **User** represents a single client of the Master, while a **Group** represents a collection of Users. Any properties possessed by a Group are inherited by all of the Users in the group.*

Adding a New User

1. Select the **User Level** tab (in the *Security* section) to open the User Security Details page.
2. Click the **Add New User** button (see FIG. 25) to access the Add/Modify User page (FIG. 26).
3. In the **User Name** field, enter a unique name for the new group.
   - The name must be a unique alpha-numeric character string (4 - 20 characters), and is case sensitive.
   - The words "*administrator" and "NetLinx"* cannot be used since they already exist by default.
4. In the **Group** drop-down list, choose from a list of pre-configured Groups and associate these rights to the new user.
5. Enter a user password in both the **Password** and **Password Confirm** fields.



User Security Details

Add a user and modify their settings.

User name:

Group: (none)

Password:

Confirm Password:

Access:

- □ Admin Change Password Access ✗
- □ Terminal (RS232) Access ✗
- □ FTP Access ✗
- □ HTTP Access ✗
- □ Telnet Access ✗
- □ Configuration ✗
- □ ICSP Connectivity ✗
  - □ Encrypt ICSP Connection ✗

Group Directory Associations

- □ /
  - □ images

FIG. 26 User Security Settings Page (Add/Modify User page)

The password must be a unique alpha-numeric character string (4 - 20 characters), and is case sensitive.

6. Enable the security access rights you want to provide to the user. See the *Group and User Security Access Options* section on page 34 for details.
7. In the **Group Directory Associations** section, place a checkmark next to the directories (available on the target Master) to provide an authorized user with access rights to the selected directories. This selection includes any sub-directories that exist within the selection.
8. Click the **Accept** button to save your changes to the Master.

NOTE

Any security changes made to the Master from within the web browser are instantly reflected within a Terminal session without the need to reboot.

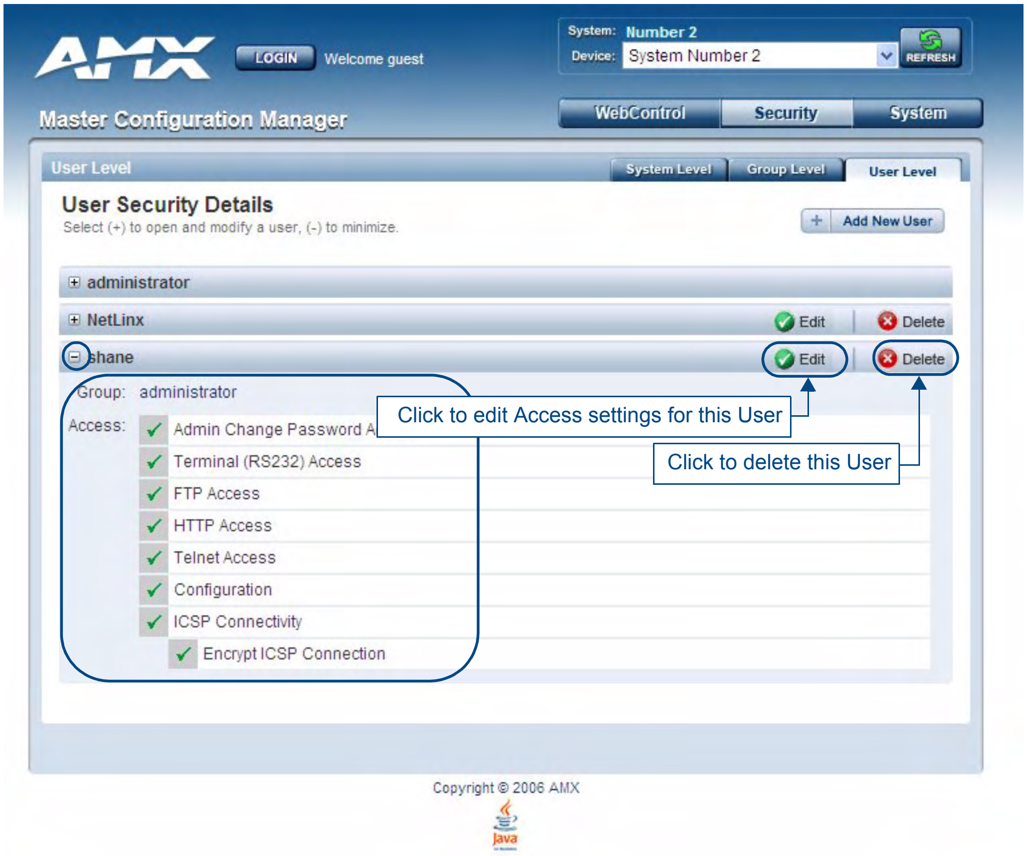
Viewing and Editing User Security Settings

Click on any User listed in the *User Security Details* page to view and edit security settings for the selected User (FIG. 27):

- Click the **Edit** button to edit the Security Access options for the selected User.
- Click **Delete** to delete the selected User from the Master.

Deleting a User

1. Select the **User Level** tab (in the *Security* section) to open the User Security Details page.
2. Press the **Delete** button to remove the selected User and refresh the page. The system will prompt you to verify this action - click **OK** to proceed.



User Security Details

Select (+) to open and modify a user, (-) to minimize.

Group: administrator

Access:
- ✓ Admin Change Password A
- ✓ Terminal (RS232) Access
- ✓ FTP Access
- ✓ HTTP Access
- ✓ Telnet Access
- ✓ Configuration
- ✓ ICSP Connectivity
  - ✓ Encrypt ICSP Connection

Click to edit Access settings for this User

Click to delete this User

FIG. 27 User Level Security Settings Page (Viewing User Security Settings Details)

If you are not logged into the Master, you receive a reminder message: *"You must login before Security Settings can be changed"*. In this case, log into the Master and repeat the previous steps.

3. Reboot the Master via the **Reboot** button on the Manage System Page (select the **System** control button to access).

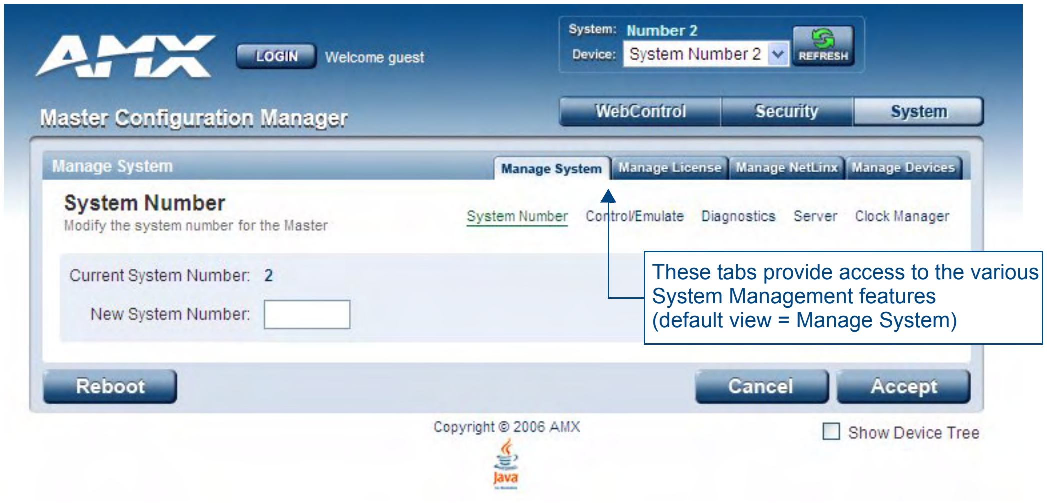
WebConsole - System Options

System Overview

The *Manage System* page is accessed by clicking on the **System** button. This page allows you to view and configure various aspects of the NetLinx System, separated by four tabs:

- **Manage System** - Options in this tab allow you to view/change the Master's *System Number*, Control/Emulate system devices, perform Diagnostics, configure Server settings and set the time/date via the Clock Manager. See the *System - Manage System* section on page 41 for details.
- **Manage License** - Options in this tab allow you to add device licenses (Product ID and License Key) to the Master. See the *System - Manage License* section on page 61 for details.
- **Manage NetLinx** - Options in this tab allow you to view a detailed list of NetLinx devices connected to the Master. See the *System - Manage NetLinx* section on page 63 for details.
- **Manage Devices** - Options in this tab allow you to view the details of additional attached devices (including module-supported third-party devices). See the *System - Manage Devices* section on page 65 for details.

The default view for the System option is Manage System / System Number (FIG. 28).



Current System Number: 2

New System Number:

These tabs provide access to the various System Management features (default view = Manage System)

FIG. 28 Manage System (System Number)

System - Manage System

The **Manage System** tab contains links to several different System-related configuration pages, as described in the following subsections:

Manage System - System Number

The options on this page display the current System Number assigned to the target Master (read-only), and allow you to change the system number (see FIG. 28).

Changing the System Number On the Master

1. Enter the new numeric value into the **New System Number** field.
2. Click the **Accept** button to save this new value to the system on the target Master.

   The message; "*System number changed to X. Master must be rebooted for the change to take effect.*", reminds you that the Master must be rebooted before the new settings take effect.
3. Click **Reboot** to reboot the target Master.
   - The Device Tree then reads "Rebooting....". After a few seconds, the Device Tree refreshes with the current system information (including the updated system number assignment).
   - If the Device Tree does not refresh within a few minutes, press the **Refresh** button and reconnect to the Master.

Using Multiple Netlinx Masters

When using more than one Master, each unit must be assigned to a separate System value.

A Master's System value can be changed but **it's device Address must always be set to zero (00000)**. The Device Addressing dialog will not allow you to alter the NetLinx Master address value.

Example: Using an NI-2000 and NI-4100:

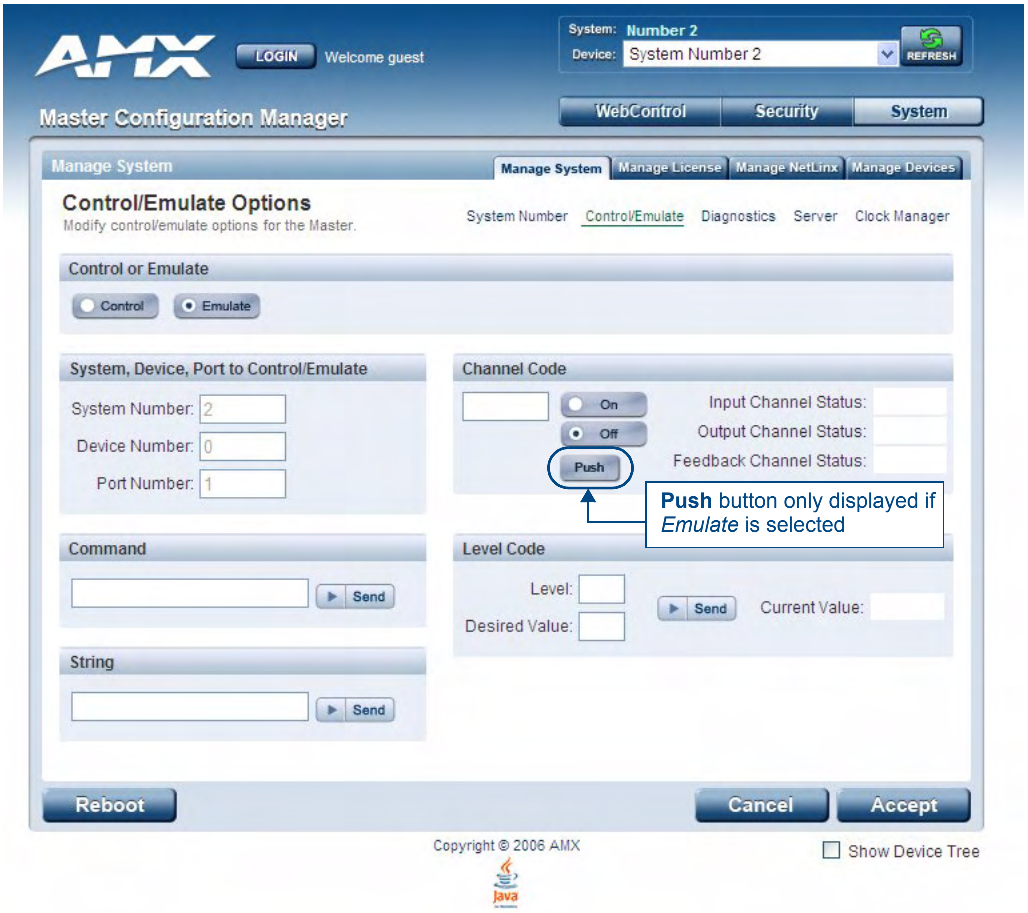
- The NI-2000 could be assigned to **System 1** (with an Address of 00000).
- The NI-4100 could be assigned to **System 2** (with an Address of 00000).

Manage System - Control/Emulate Options

Click the **Control/Emulate** link (in the *Manage System* tab) to access the Control/Emulate Options page (FIG. 29). The options on this page allow you to *Control* or *Emulate* a device connected to this Master.

Device Control/Emulation is accomplished by manipulating a target device's channels, levels, and sending both send commands and strings to the device.

- To **Control** a device means that the program generates messages which appear to a specified device to have come from the Master.
- To **Emulate** a device means that the program generates messages which appear to the Master to have come from a specified device (physical or virtual). When *Emulate* is selected, a **Push** button is added to the Channel Code section (see FIG. 29).



System: Number 2

Device: System Number 2

Control/Emulate Options

Modify control/emulate options for the Master.

System Number: 2

Device Number: 0

Port Number: 1

Push button only displayed if *Emulate* is selected

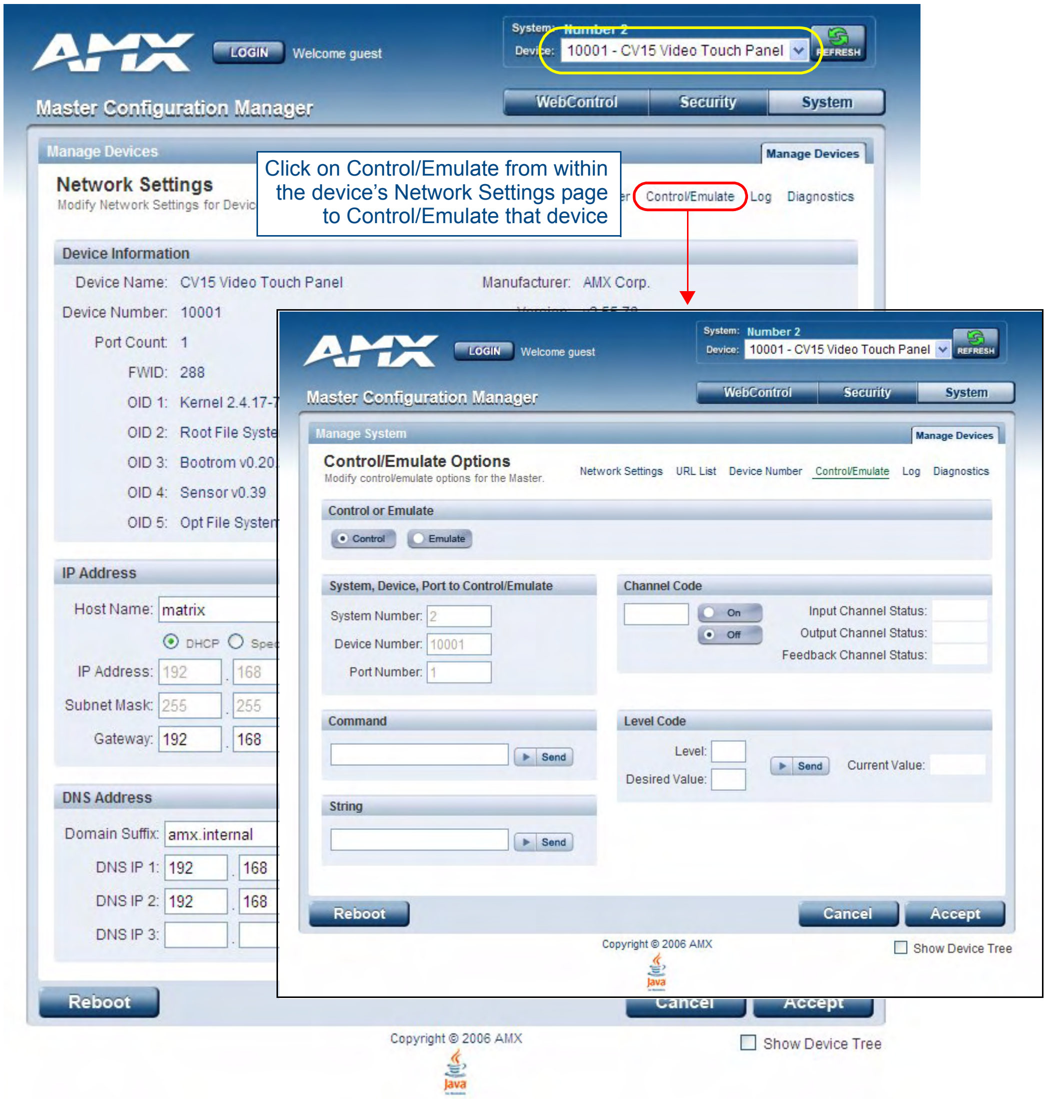
FIG. 29 Manage System (Control/Emulate)

NOTE

The System Number, Device Number, and Port Number fields are read-only. Instead of specifying these values for a System Device, select a device via the Device Tree to populate these fields with that device's information.

Controlling or Emulating a System Device

1. Select the device that you want to Control or Emulate, via the Device Tree:
   a. Click the **Show Device Tree** option to show the Device Tree window (if it is not already enabled).
   b. In the Device Tree, click on the *Information* (***i***) icon for the device that you want to control or emulate. This opens a Network Settings page showing network configuration details for the selected device. See the *Device Network Settings Pages* section on page 23 for details.
   c. Click on the *Control/Emulate* link. This opens a Control/Emulate Options page for the selected device (FIG. 30).
2. Select either the **Control** or **Emulate** option.
3. In the *Channel Code* section, enter a valid Channel number to emulate Channel messages (i.e., Push/Release, CHON, and CHOFF) for the specified <D:P:S>.
   - The Channel number range is **1 - 65535**.



Click on Control/Emulate from within the device's Network Settings page to Control/Emulate that device

System: Number 2
Device: 10001 - CV15 Video Touch Panel

Network Settings
Modify Network Settings for Devic

Device Information

Device Name: CV15 Video Touch Panel
Manufacturer: AMX Corp.
Device Number: 10001
Port Count: 1
FWID: 288
OID 1: Kernel 2.4.17-7
OID 2: Root File Syste
OID 3: Bootrom v0.20
OID 4: Sensor v0.39
OID 5: Opt File System

IP Address

Host Name: matrix
● DHCP ○ Spe
IP Address: 192 . 168
Subnet Mask: 255 . 255
Gateway: 192 . 168

DNS Address

Domain Suffix: amx.internal
DNS IP 1: 192 . 168
DNS IP 2: 192 . 168
DNS IP 3:

System: Number 2
Device: 10001 - CV15 Video Touch Panel

Manage System

Control/Emulate Options
Modify control/emulate options for the Master.

Network Settings | URL List | Device Number | Control/Emulate | Log | Diagnostics

Control or Emulate
● Control ○ Emulate

System, Device, Port to Control/Emulate
System Number: 2
Device Number: 10001
Port Number: 1

Channel Code
○ On
● Off
Input Channel Status:
Output Channel Status:
Feedback Channel Status:

Command
Send

Level Code
Level:
Desired Value:
Send
Current Value:

String
Send

FIG. 30 Select Control/Emulate from within a selected Device's Network Settings page

Select the **On** or **Off** buttons to Emulate Channel ON (CHON) and Channel OFF (CHOFF) messages for the specified <D:P:S>.

4. Select the **Push** button to Emulate a push/release on the specified channel (not displayed if the *Control* option is selected). Click and hold the **Push** button to observe how the device/Master responds to the push message.

5. In the *Level Code* section, enter a valid Level number and Level data value for the specified <D:P:S> and press the **Send** button to transmit the level data.

   - The *Level number* range is **1 - 65535**.
   - The table below lists the valid Level data types and their ranges:

Level Data Type	Minimum Value	Maximum Value
CHAR	0	255
INTEGER	0	65535
SINTEGER	-32768	32767
LONG	0	429497295
SLONG	-2147483648	2147483647
FLOAT	-3.402823466e+38	3.402823466e+38

6. In the *Command* and *String* fields, enter any character strings that can be sent as either a String or Command, and press **Send** to transmit to the Master.

   - When entering a **Send Command**, do not include the "send c" or "send_command" in the statement - only type what would normally occur within the quotes (but don't include the quotes either).

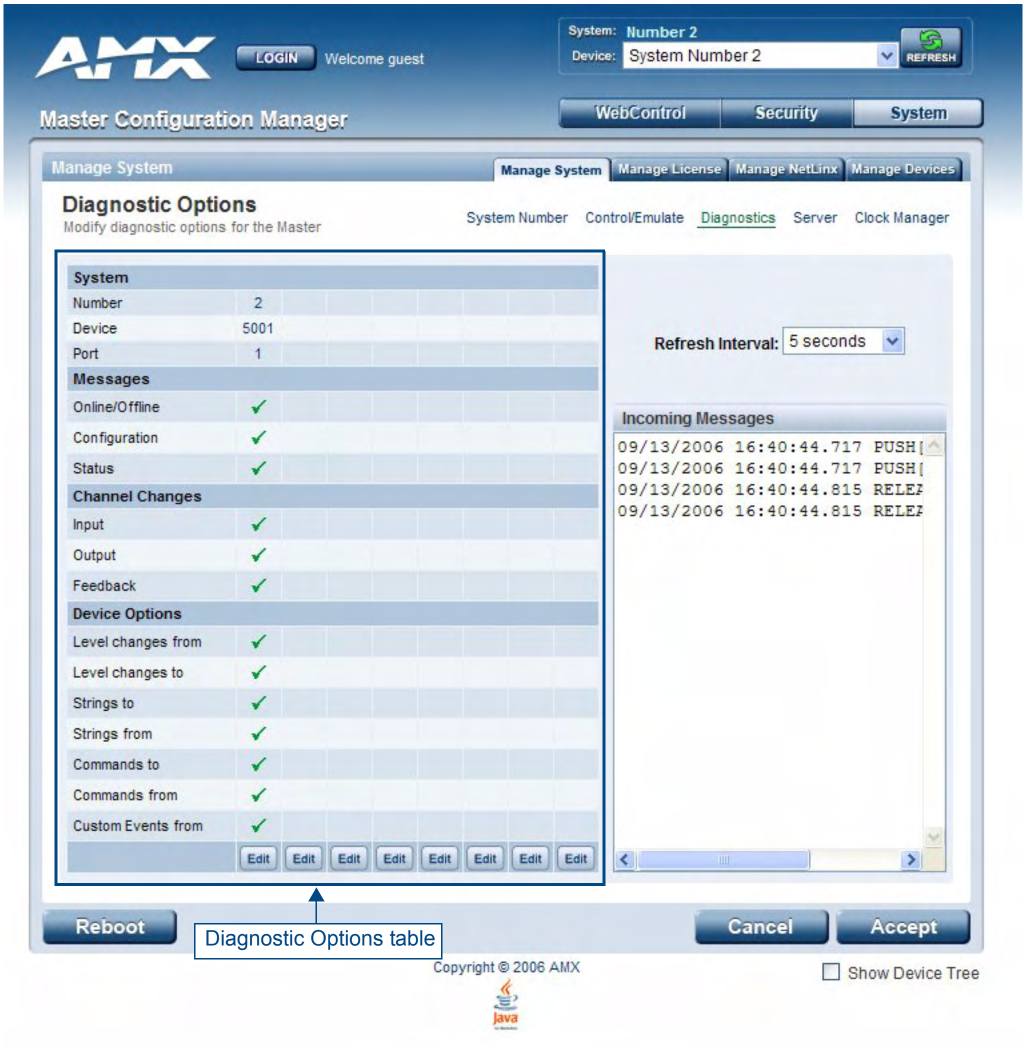
     For example to send the "CALIBRATE" send command, type **CALIBRATE** (no quotes) rather than SEND_COMMAND <dev> "CALIBRATE".

   - **String Expressions** start and end with double quotes (**" "**). Double quotes are not escaped, rather they are embedded within single quotes. String expressions may contain string literals, decimal numbers, ASCII characters and hexadecimal numbers (prepended with a $), and are comma-delimited.

   - **String Literals** start and end with single quotes (**'**). To escape a single quote, use three single quotes (**'''**).

Manage System - Diagnostics Options

Click the **Diagnostics** link (in the *Manage System* tab) to access the Diagnostics Options page (FIG. 31). The options on this page allow authorized users to enable and monitor various diagnostic messages coming from and going to System Devices.



System: Number 2

Device: System Number 2

Diagnostic Options

Modify diagnostic options for the Master

System	
Number	2
Device	5001
Port	1
Messages	
Online/Offline	✓
Configuration	✓
Status	✓
Channel Changes	
Input	✓
Output	✓
Feedback	✓
Device Options	
Level changes from	✓
Level changes to	✓
Strings to	✓
Strings from	✓
Commands to	✓
Commands from	✓
Custom Events from	✓

Refresh Interval: 5 seconds

Incoming Messages

```
09/13/2006 16:40:44.717 PUSH[
09/13/2006 16:40:44.717 PUSH[
09/13/2006 16:40:44.815 RELEA
09/13/2006 16:40:44.815 RELEA
```

☐ Show Device Tree

Diagnostic Options table

FIG. 31 Diagnostics Options Page (with diagnostic messages enabled)

NOTE

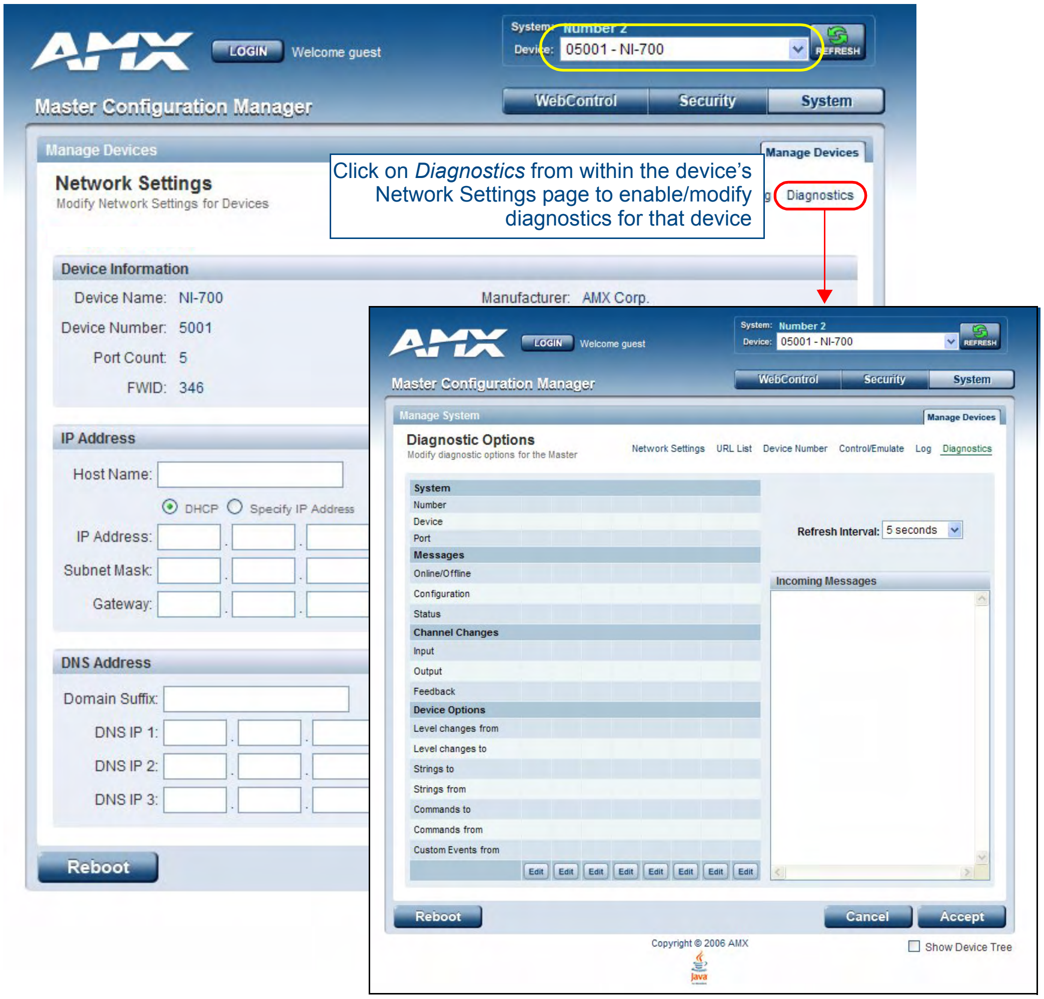
The System Number, Device Number, and Port Number value fields are read-only (disabled). Instead of specifying these values for a System Device, select a device via the Device Tree to populate these fields with that device's values, as described below.

Enabling Diagnostics On a Selected System Device

1. Select the device that you want to Control or Emulate, via the Device Tree:
    a. Click the **Show Device Tree** option to show the Device Tree window (if it is not already enabled).
    b. In the Device Tree, click on the Information (***i***) icon for the device for which you want to enable or modify Diagnostics options. This opens a Network Settings page showing detailed

information on the selected device (including network configuration details). An example Network Settings page is shown in FIG. 32:

c. Click on the **Diagnostics** link. This opens a Diagnostics Options page for the selected device (FIG. 32).



Click on *Diagnostics* from within the device's Network Settings page to enable/modify diagnostics for that device

System: Number 2
Device: 05001 - NI-700

Network Settings
Modify Network Settings for Devices

Device Information
Device Name: NI-700
Device Number: 5001
Port Count: 5
FWID: 346
Manufacturer: AMX Corp.

IP Address
Host Name:
● DHCP ○ Specify IP Address
IP Address:
Subnet Mask:
Gateway:

DNS Address
Domain Suffix:
DNS IP 1:
DNS IP 2:
DNS IP 3:

Diagnostic Options
Modify diagnostic options for the Master

Refresh Interval: 5 seconds

FIG. 32 Select Diagnostics from within a selected Device's Network Settings page

NOTE

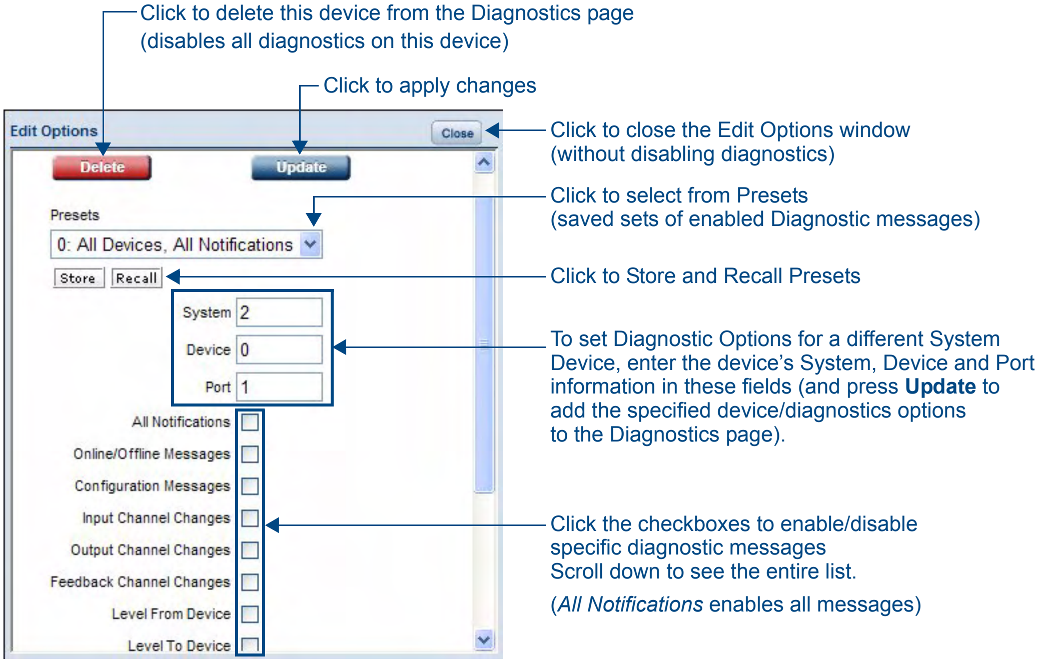
*The currently selected device is also indicated in the **Device** field at the top of the page.*

2. By default, all diagnostics are disabled (see FIG. 32). To enable diagnostic messages from this device, click on one of the **Edit** buttons along the bottom of the Diagnostics Options table.

This opens the Edit Options window (FIG. 33), where you can select which Diagnostics messages to enable or disable for this device.

Once you have selected the diagnostics messages to enable, click **Update** to apply your changes, close the Edit Options window, and return to the Diagnostics page.

Refer to the *Diagnostics Options Definitions* section on page 49 for definitions of each Diagnostic option.



Click to delete this device from the Diagnostics page (disables all diagnostics on this device)

Click to apply changes

Click to close the Edit Options window (without disabling diagnostics)

Click to select from Presets (saved sets of enabled Diagnostic messages)

Click to Store and Recall Presets

To set Diagnostic Options for a different System Device, enter the device's System, Device and Port information in these fields (and press **Update** to add the specified device/diagnostics options to the Diagnostics page).

Click the checkboxes to enable/disable specific diagnostic messages Scroll down to see the entire list.

(*All Notifications* enables all messages)

Edit Options

Close

Delete

Update

Presets

0: All Devices, All Notifications

Store

Recall

System 2

Device 0

Port 1

All Notifications □

Online/Offline Messages □

Configuration Messages □

Input Channel Changes □

Output Channel Changes □

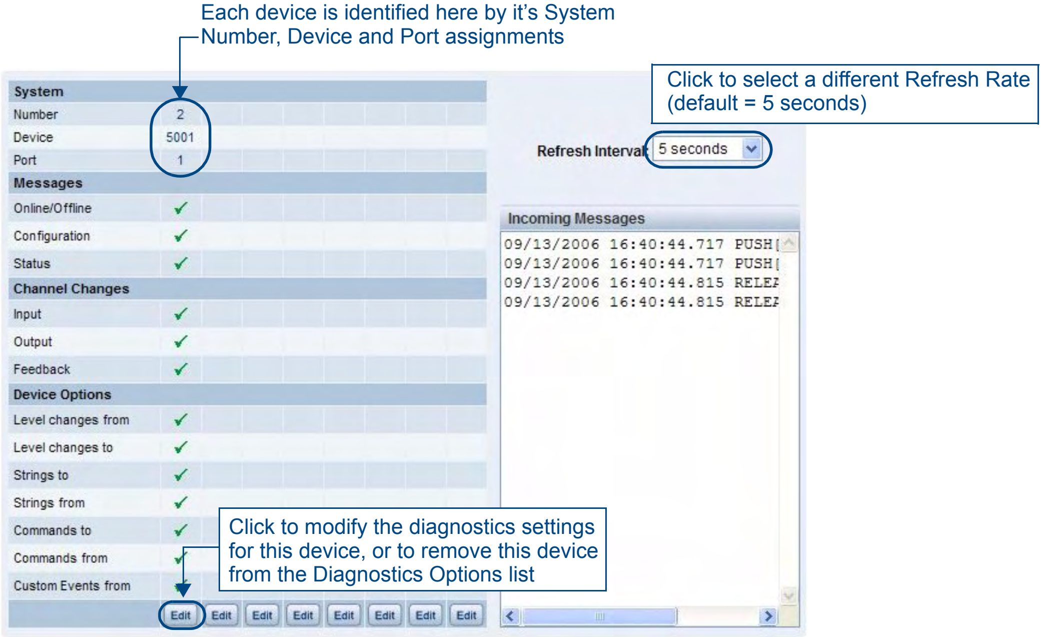
Feedback Channel Changes □

Level From Device □

Level To Device □

FIG. 33 Edit Options window

3. The device that you just enabled diagnostics for appears in the Diagnostics Options page (identified by its Number, Device and Port assignments at the top of the Diagnostics Option list), with the currently enabled diagnostics indicated with a green checkmark (FIG. 34).



Each device is identified here by it's System Number, Device and Port assignments

Click to select a different Refresh Rate (default = 5 seconds)

Click to modify the diagnostics settings for this device, or to remove this device from the Diagnostics Options list

System	
Number	2
Device	5001
Port	1
Messages	
Online/Offline	✓
Configuration	✓
Status	✓
Channel Changes	
Input	✓
Output	✓
Feedback	✓
Device Options	
Level changes from	✓
Level changes to	✓
Strings to	✓
Strings from	✓
Commands to	✓
Commands from	✓
Custom Events from	✓
	Edit

Refresh Interval 5 seconds

Incoming Messages

```
09/13/2006 16:40:44.717 PUSH[
09/13/2006 16:40:44.717 PUSH[
09/13/2006 16:40:44.815 RELEA
09/13/2006 16:40:44.815 RELEA
```

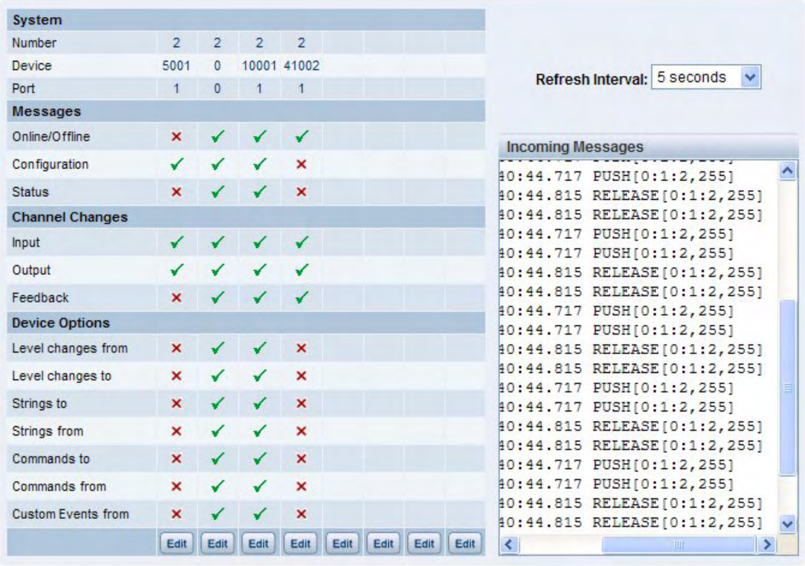
FIG. 34 Edit Options window

All returned messages are displayed in the Incoming Messages window. By default, all messages are refreshed every 5 seconds, as indicated by the **Refresh Interval** field. Use the Refresh Interval drop-down to specify how often your messages are updated (available values = 2 seconds, 5 seconds, or 10 seconds). The default setting is 5 seconds.

4. To add more devices to the Diagnostics Options page:

- Repeat steps 1-3.
- Alternatively, you can click one of the **Edit** buttons to open the Edit Options window, and specify a System *Number*, *Device* and *Port* for a known System Device. Select the Diagnostics messages that you want to enable for this device and click **Update**.

  The device will appear in the Diagnostics Options window, in the next available column (to the right of the last device added - see FIG. 35).



System								
Number	2	2	2	2				
Device	5001	0	10001	41002				
Port	1	0	1	1				
Messages								
Online/Offline	✗	✓	✓	✓				
Configuration	✓	✓	✓	✗				
Status	✗	✓	✓	✗				
Channel Changes								
Input	✓	✓	✓	✓				
Output	✓	✓	✓	✓				
Feedback	✗	✓	✓	✓				
Device Options								
Level changes from	✗	✓	✓	✗				
Level changes to	✗	✓	✓	✗				
Strings to	✗	✓	✓	✗				
Strings from	✗	✓	✓	✗				
Commands to	✗	✓	✓	✗				
Commands from	✗	✓	✓	✗				
Custom Events from	✗	✓	✓	✗				
	Edit	Edit	Edit	Edit	Edit	Edit	Edit	Edit

Refresh Interval: 5 seconds

Incoming Messages

```
40:44.717 PUSH[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.717 PUSH[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
40:44.815 RELEASE[0:1:2,255]
```

FIG. 35 Edit Options window indicating four devices with Diagnostics enabled

NOTE

You can monitor diagnostics for up to eight System Devices in this page.

Diagnostics Options Definitions

The following table describes each of diagnostics options that can be enabled via the Edit Options window:

Diagnostic Options	
Diagnostic Option	**Description**
All Notifications:	Enables every notification field.
System	
• Number • Device • Port:	Use these fields to enter a device:port:system (D:P:S) combination for the device for which you want to enable notifications. A value of **0** for any option gives you all of the systems, devices, or ports. This dialog also allows you to store/recall presets.
Messages	
• Online/Offline	Generates a message when there is a change in the target device's online/offline status.
• Configuration	Generates a message when there is a change in the target device's configuration.
• Status	Generates a message when there is a change in the target device's status.

Diagnostic Options (Cont.)	
Diagnostic option	**Description**
Channel Changes	
• Input	Generates a message when there is an input channel change (i.e. Push/Release) in the target device.
• Output	Generates a message when there is an output channel change (i.e. CHON/CHOFF) in the target device.
• Feedback	Generates a message when there is a feedback channel change in the target device.
Device Options	
• Level Changes From	Generates a message when there is a level channel change from the target device.
• Level Changes To	Generates a message when there is a level channel change to the target device.
• Strings To	Generates a message when there is a string sent to the target device.
• Strings From	Generates a message when there is a string from the target device.
• Commands To	Generates a message when there is a command to the target device.
• Commands From	Generates a message when there is a command from the target device.
• Custom Events From	Generates a message there is a custom event occurring from the target device.

Disabling all Diagnostic Options For a Device

There are two ways to disable all diagnostics for a device:

- In the Edit Options window, select **Delete** to remove the device from the Diagnostics Options page and disable all diagnostics.
- In the Edit Options window, deselect all selected diagnostics options and click **Update**. This disables all diagnostics for this device, but leaves the device on the Diagnostics Options page.

Creating and Recalling Diagnostics Presets

The **Store** and **Recall** options in the Edit Options window allow you to save and recall preset diagnostics configurations.

NOTE

Presets are saved via cookies, so they do not persist across multiple browsers/ computers.

1. Click the **Presets** down arrow to open a list of previously stored Presets. By default, the only preset is called **0: All Devices, All Notifications**. This default Preset cannot be modified.
2. Select an empty Preset (for example **1:**)
3. Select the desired diagnostic options, and click **Store**.
4. A popup window prompts you to name this Preset. Enter a name and click **OK**.

To recall an existing Preset, select it from the drop-down list and click on **Recall**.

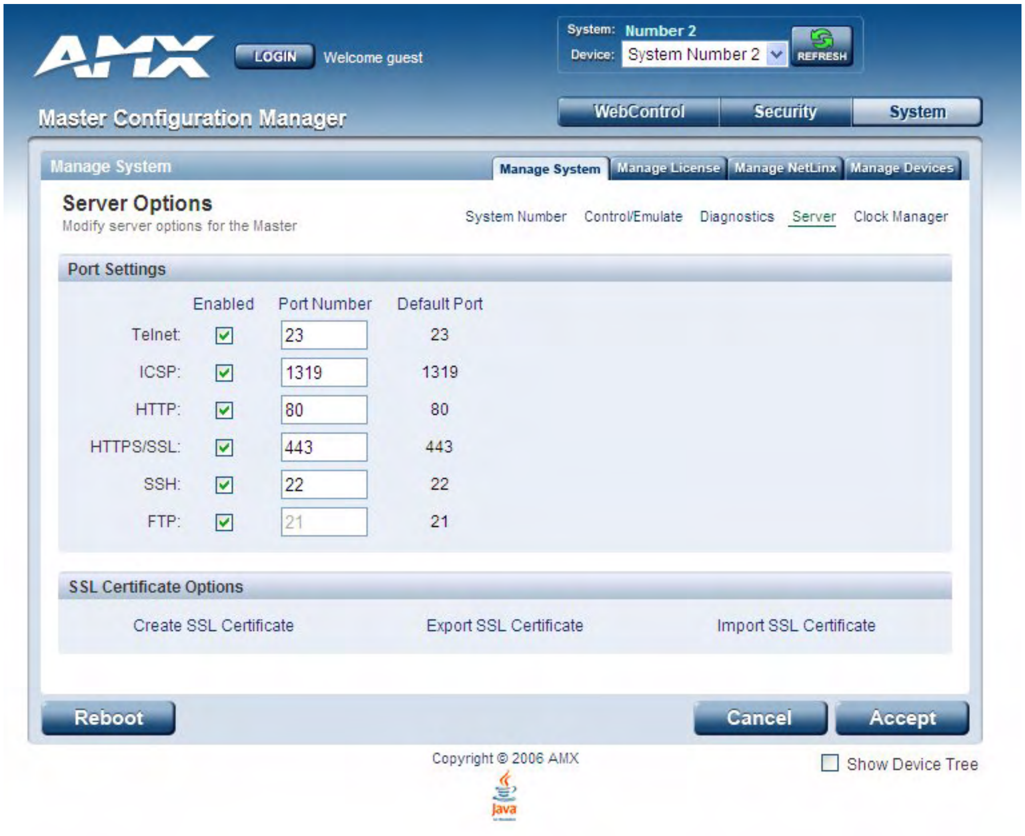
NOTE

A Preset MUST be Recalled before clicking the Update button. If you do not press this button, none of the fields or checkboxes are modified or selected. In essence, all options become disabled.

Manage System - Server Options

Click the **Server** link (in the *Manage System* tab) to access the Server Options page (FIG. 36). The options on this page allow you to:

- Change the port numbers (used by the Master for various Web services)
- Configure the SSL settings used on the Master
- Manage existing and pending license keys, manage the active NetLinx system communication parameters
- Configure/modify the SSL certificates on the target Master



Server Options

Modify server options for the Master

Port Settings

	Enabled	Port Number	Default Port
Telnet:	☑	23	23
ICSP:	☑	1319	1319
HTTP:	☑	80	80
HTTPS/SSL:	☑	443	443
SSH:	☑	22	22
FTP:	☑	21	21

SSL Certificate Options

Create SSL Certificate   Export SSL Certificate   Import SSL Certificate

FIG. 36 Server Options page

The options on this page are described below:

Port Settings

Allows a user to modify the server settings; specifically those port assignments associated with individual services.

- All items can be either enabled/disabled via the **Enabled** checkboxes.
- The port number values (except the FTP port) can be modified in this page.
- The default port for each service is listed to the right.

Server Port Settings

The following table describes each of the Port Settings presented on this page:

Server Port Settings	
Feature	**Description**
Telnet:	The port value used for Telnet communication to the target Master. Enabling this feature allows future communication with the Master via a separate Telnet application (such as HyperTerminal). • The default port value is **23**. • Refer to the *NetLinx Security with a Terminal Connection* section for more information on the related procedures.
ICSP:	The port value used for ICSP data communication among the different AMX software and hardware products. This type of communication is used by the various AMX product for communication amongst themselves. Some examples would be: NetLinx Studio communicating with a Master (for firmware or file information updates) and TPDesign4 communicating with a touch panel (for panel page and firmware updates). • The default port value is **1319**. ***Note**: To further ensure a secure connection within this type of communication, a user can enable the Require Encryption option which requires additional processor cycles. Enabling of the encryption feature is determined by the user.*
HTTP:	The port value used for unsecure HTTP Internet communication between the web browser's UI and the target Master. By disabling this port, the administrator (or other authorized user) can require that any consecutive sessions between the UI and the target Master are done over a more secure HTTPS connection. By default, the Master does not have security enabled and must be communicated with using **http://** in the *Address* field. • The default port value is **80**. ***Note**: One method of adding security to HTTP communication is to change the Port value. If the port value is changed, any consecutive session to the target Master has to add the port value at the end of the address (within the Address field). An example is if the port were changed to 99, the new address information would be: **http://192.192.192.192:99**.*
HTTPS/SSL:	The port value used by web browser to securely communicate between the web server UI and the target Master. This port is also used to simultaneously encrypt this data using the SSL certificate information on the Master as a key. This port is used not only used to communicate securely between the browser (using the web server UI) and the Master using HTTPS but also provide a port for use by the SSL encryption key (embedded into the certificate). Whereas SSL creates a secure connection between a client and a server, over which any amount of data can be sent securely, HTTPS is designed to transmit individual messages securely. Therefore both HTTPS and SSL can be seen as complementary and are configured to communicate over the same port on the Master. These two methods of security and encryption are occurring simultaneously over this port as data is being transferred. • The default port value is **443**. ***Note**: Another method of adding security to HTTPS communication would be to change the port value. If the port value is changed, any consecutive session to the target Master has to add the port value at the end of the address (within the Address field). An example is if the port were changed to 99, the new address information would be: **http://192.192.192.192:99**.*
SSH:	• The port value used for secure Telnet communication. A separate secure SSH Client would handle communication over this port. When using a secure SSH login, the entire login session (including the transmission of passwords) is encrypted; therefore it is secure method of preventing an external user from collecting passwords. • SSH **version 2** is supported. • The default port value is **22**. ***Note**: If this port's value is changed, make sure to use it within the Address field of the SSH Client application.*

Server Port Settings (Cont.)	
Feature	**Description**
FTP:	The default port value used for FTP communication. This port can be disabled/enabled but the value can not be changed. • The default port value is **21**.

Once any of the server port settings have been modified, press the **Accept** button to save these changes to the Master. Once these changes are saved, the following message appears: *"Unit must be rebooted for the change to take effect"*.

Click the **Reboot** button (*from the top of the page*) to remotely reboot the target Master. No dialog appears while using this button. The Device Tree then reads *"Rebooting...."*. After a few seconds, the Device Tree refreshes with the current system information (indicating updated port numbers).

NOTE

If the Device Tree contents do not refresh within a few minutes, press the browser's Refresh button and reconnect to the Master.

SSL Certificate Options

There are three SSL Certificate options, presented as links along the bottom of this page:

SSL Certificate Options	
Create SSL Certificate:	Opens the Create SSL Certificate window where you can create a self-generated SSL certificate. ***Note**: A self-generated certificate has lower security than an external CA (officially issued) generated certificate.*
Export SSL Certificate Request:	Takes the user to the Server Certificate page where they can view a previously created certificate. An authorized user can also copy the raw text from a generated Certificate request into their clipboard and then send it to the CA.
Import SSL Certificate:	Takes the user to the Import Certificate page where they can import and paste the raw text from a CA issued Certificate.

Creating an SSL Server Certificate

Initially, a NetLinx Master is not equipped with any installed certificates. In order to prepare a Master for later use with "CA" (*officially issued*) server certificates, it is necessary to:

- **First create a self-generated certificate** which is automatically installed onto the Master.
- **Secondly, enable the SSL feature** from the Enable Security page. Enabling SSL security after the certificate has been self-generated insures that the target Master is utilizing a secure connection during the process of importing a CA server certificate over the web.

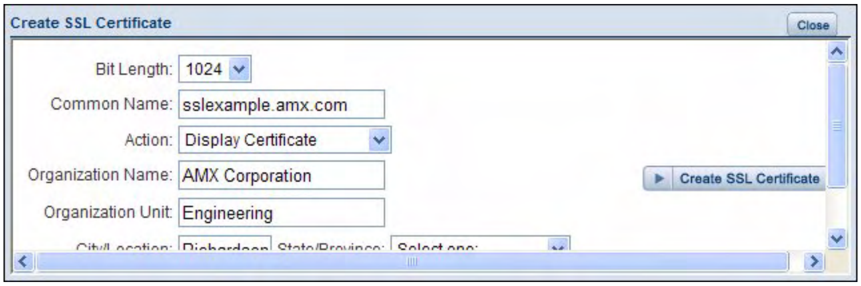
NOTE

A certificate consists of two different Keys:

*The **Master Key** is generated by the Master and is incorporated into the text string sent to the CA during a certificate request. It is unique to a particular request made on a specific Master. Note that regenerating a previously requested and installed certificate invalidates that certificate because the Master Key has been changed.*

*The **Public Key** is part of the text string that is returned from the CA as part of an approved SSL Server Certificate. This public key is based off the submitted Master key from the original request.*

1. Click the **Create SSL Certificate** link (under *SSL Certificate Options*) to access the *Create SSL Certificate* window (FIG. 37).



Create SSL Certificate

Bit Length: 1024

Common Name: sslexample.amx.com

Action: Display Certificate

Organization Name: AMX Corporation

Organization Unit: Engineering

City/Location: Richardson State/Province: Select one:

FIG. 37 Create SSL Certificate window

2. Fill out the information in this window, according to the descriptions in the *SSL Certificate Entries* section below.

3. Click **Create SSL Certificate** to update the Master with the information entered on this page. This process can take several minutes.

SSL Certificate Entries

The following table describes the SSL Certificate entries presented in the *Create SSL Certificate* window (FIG. 37):

SSL Certificate Entries	
Entry	**Description**
Bit Length:	Provides a drop-down selection with three public key lengths (512, 1024, 2048). • A longer key length results in more secure certificates. • Longer key lengths result in increased certificate processing times.
Common Name:	The Common Name of the certificate must match the URL Domain Name used for the Master. Example: If the address used is www.amxuser.com, that must be the Common name and format used. • The Common Name can not be an IP Address. • If the server is internal, the Common Name must be *Netbios*. • For every website using SSL that has a distinct DNS name, there must be a certificate installed. Each website for SSL must also have a distinct IP Address. • This domain name must be associated to a resolvable URL Address when creating a request for a purchased certificate. • The address does not need to be resolvable when obtaining a free certificate.
Action:	Provides a drop-down selection with a listing of certificate actions: • **Display Certificate** - Populates the Server Certificate fields with the information from the certificate currently installed on the Master. *This action is used only to display the information contained in the certificate on the target Master.* • **Create Request** - Takes the information entered into these fields and formats the certificate so it can be exported to the external Certificate Authority (CA) for later receipt of an SSL Certificate. *This action is used to request a certificate from an external source.* • **Self Generate Certificate** - Takes the information entered into the previous fields and generates its own SSL Certificate. *This action is used when no previous certificate has been installed on the target Master, or a self-signed certificate is desired.* • **Regenerate Certificate** - Takes the information entered into the previous fields and regenerates an SSL Certificate. This action changes the Master Key. *This method of certificate generation is used to modify or recreate a previously existing certificate already on the Master.*

SSL Certificate Entries (Cont.)	
Entry	**Description**
Organization Name:	Name of your business or organization. This is an alpha-numeric string (1 - 50 characters in length).
Organization Unit:	Name of the department using the certificate. This is an alpha-numeric string (1 - 50 characters in length).
City/Location:	Name of the city where the certificate is used. This is an alpha-numeric string (1 - 50 characters in length).
State/Province:	Name of the state or province where the certificate is used (alpha-numeric string, 1 - 50 characters in length). ***Note**: The state/province name must be fully spelled out.*
Country Name:	Provides a drop-down selection with a listing of currently selectable countries.

Displaying SSL Server Certificate Information

Click the *Create SSL Certificate* link in the Server Options page to open the Create SSL Certificate window.

- By default, the *Display Certificate* Action is selected and the fields in this window are populated with information from the certificate installed on the Master.
- If the Master does not have a previously installed certificate, these fields are blank.

Creating a Request for an SSL Certificate

1. Click the *Create SSL Certificate* link in the Server Options page to open the *Create SSL Certificate* window.
2. Fill out the fields, according to the descriptions in the *SSL Certificate Entries* section on page 54.
3. Click the down arrow next to the *Action* field, and choose **Create Request** from the drop-down list.
4. Click the **Create SSL Certificate** button to accept the information entered into the above fields and generate a certificate file. Click **Close** to exit without making changes to the Master.

   This refreshes the Server Certificate page, and if the certificate request was successful, displays a *"Certified request generated"* message.

Self-Generating an SSL Certificate

1. Click the *Create SSL Certificate* link in the Server Options page to open the Create SSL Certificate window.
2. Fill out the fields, according to the descriptions in the *SSL Certificate Entries* section on page 54.
3. Click the down arrow next to *Action* and choose **Self Generate Certificate**.

   When this request is submitted, the certificate is generated and installed into the Master in one step.
4. Click **Create SSL Certificate** to save the new encrypted certificate information to the Master. Click **Close** to exit without making changes to the Master.

Regenerating an SSL Server Certificate Request

This action allows you to is used to modify or recreate a certificate already on the Master. For example, if the company has moved from Dallas to Houston, all of the information is reentered exactly except for the City.

1. Click the **Create SSL Certificate** link in the *Server Options* page to open the *Create SSL Certificate* window.
2. Modify the certificate information as needed (see the *SSL Certificate Entries* section on page 54).
3. Click the down arrow next to *Action* and choose **Regenerate Certificate**.

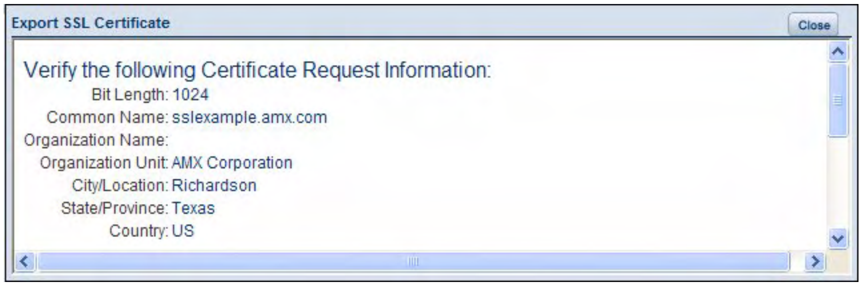
4. Click **Create SSL Certificate** to save the newly modified certificate information to the Master. Click **Close** to exit without making changes to the Master.

CAUTION

*Only use the **Regenerate Certificate** option when you have self-generated your own certificate. Do not regenerate an external CA-generated certificate.*

Exporting an SSL Certificate Request

1. First follow the procedures outlined in the *Creating a Request for an SSL Certificate* section on page 55 to create a session-specific Master certificate.
2. Click the **Export SSL Certificate** link to display the certificate text file in the Export SSL Certificate window (FIG. 38).



Verify the following Certificate Request Information:

Bit Length: 1024
Common Name: sslexample.amx.com
Organization Name:
Organization Unit: AMX Corporation
City/Location: Richardson
State/Province: Texas
Country: US

FIG. 38 Export SSL Certificate window

3. Place your cursor within the certificate text field. The certificate text begins with the line that reads "-----BEGIN CERTIFICATE REQUEST-----" (scroll down to view the certificate text.)
4. Select all (**Ctrl** + **A**) of the certificate text.

   You must copy all of the text within this field, including the **-----BEGIN CERTIFICATE REQUEST-----** and the **-----END CERTIFICATE REQUEST-----** portions. Without this text included in the CA submission, you will not receive a CA-approved certificate.
5. Copy (**Ctrl** + **C**) the text to the clipboard.
6. Paste (**Ctrl** + **V**) this text into the *Submit Request* field on the CA's Retrieve Certificate web page.
7. Choose to view the certificate response in raw DER format.

   Note the **Authorization Code** and **Reference Number** (for use in the e-mail submission of the request).
8. Submit the request.
9. Paste the copied text into your e-mail document and send it to the CA with its accompanying certificate application.

WARNING

When a certificate request is generated, you are creating a private key on the Master. You can not request another certificate until the previous request has been fulfilled. Doing so voids any information received from the previously requested certificate and it becomes nonfunctional if you try to use it.

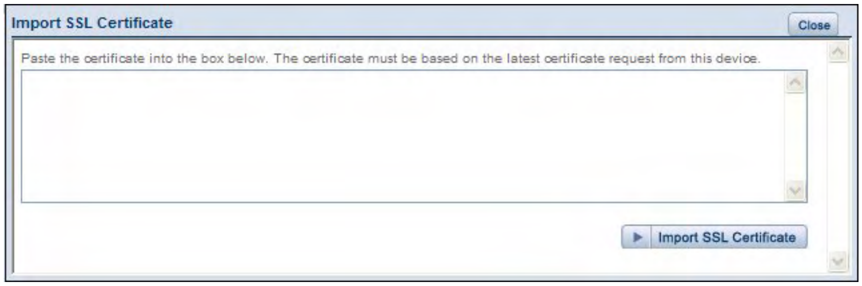
Once you have received the returned CA certificate, follow the procedures outlined in the following section to import the returned certificate (*over a secure connection*) to the target Master.

Importing an SSL Certificate

Click the **Import SSL Certificate** link to import a CA server certificate. Before importing an SSL Certificate you must:

- **First**, have a self-generated certificate installed onto your target Master.
- **Second**, enable the *HTTPS/SSL* feature from the Server Options page (FIG. 36), to establish a secure connection to the Master prior to importing the encrypted CA certificate.

1. Copy the returned certificate (signed by the CA) to your clipboard.
2. Click the *Import SSL Certificate* link to open the Import SSL Certificate window (FIG. 39).



Paste the certificate into the box below. The certificate must be based on the latest certificate request from this device.

FIG. 39 Import SSL Certificate window

3. Place the cursor inside the text box and paste the returned certificate text, in its entirety.
4. Click **Import SSL Certificate** to save the new certificate information to the Master.

CAUTION

Once a certificate has been received from an external CA and installed on a Master, do not regenerate the certificate or alter its properties. Regenerating a previously installed certificate, invalidates the certificate.

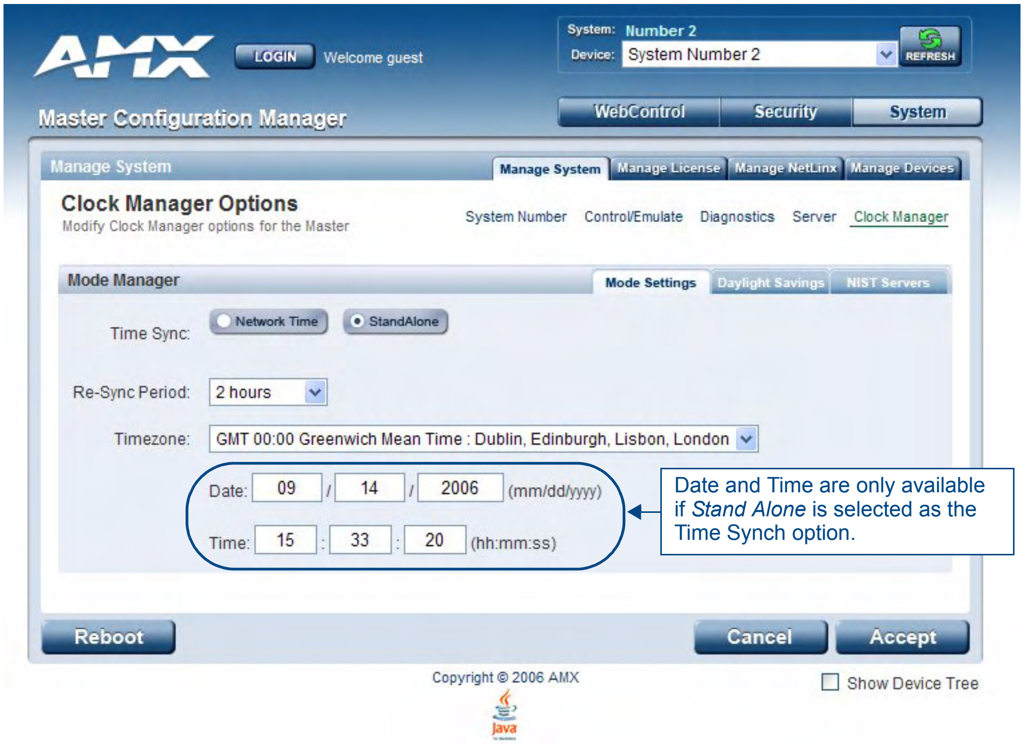
5. Click the **Display Certificate** link to confirm the new certificate was imported properly to the target Master.

NOTE

A CA certificate can only be imported to a target Master only after both a self-generated certificate has been created and the SSL Enable feature has been selected on the Master. These actions configure the Master the secure communication necessary during the importing of the CA certificate.

Manage System - Clock Manager Options

Click the **Clock Manager** link (in the *Manage System* tab) to access the *Clock Manager Options* page (FIG. 40). The options on this page allow you to enable/disable using a network time source and provide access to Daylight Saving configuration and which NIST servers to use as a reference.



Time Sync: ○ Network Time ● StandAlone

Re-Sync Period: 2 hours

Timezone: GMT 00:00 Greenwich Mean Time : Dublin, Edinburgh, Lisbon, London

Date: 09 / 14 / 2006 (mm/dd/yyyy)

Time: 15 : 33 : 20 (hh:mm:ss)

□ Show Device Tree

Date and Time are only available if *Stand Alone* is selected as the Time Synch option.

FIG. 40 Clock Manager Options - Mode Settings tab

The Clock Manager Options are separated into three tabs:

- **Mode Settings** - The Mode Manager in this tab allows you to set the Clock Manager Mode (Network Time or Stand Alone).
- **Daylight Savings** - The Daylight Savings Manager in this tab allows you to specify how and when to implement Daylight Savings rules on the clock.
- **NIST Servers** - The NIST Server Manager in this tab allows you to connect to a specific NIST (Internet Time Service) Server.

Setting the Mode for the Clock Manager

1. In the *Mode Settings* tab (FIG. 40), select a **Time Synch** option.

   - **Network Time**: This option allows the Master to manage it's clock by connecting to a NIST (Internet Time Service) Server. When this option is selected, the Master will connect to the default NIST Server to get date and time information.

     You can select a different NIST Server (or specify the IP Address of a known NIST Server) in the *NIST Servers* tab (see the *Selecting a Custom NIST Server* section on page 60).

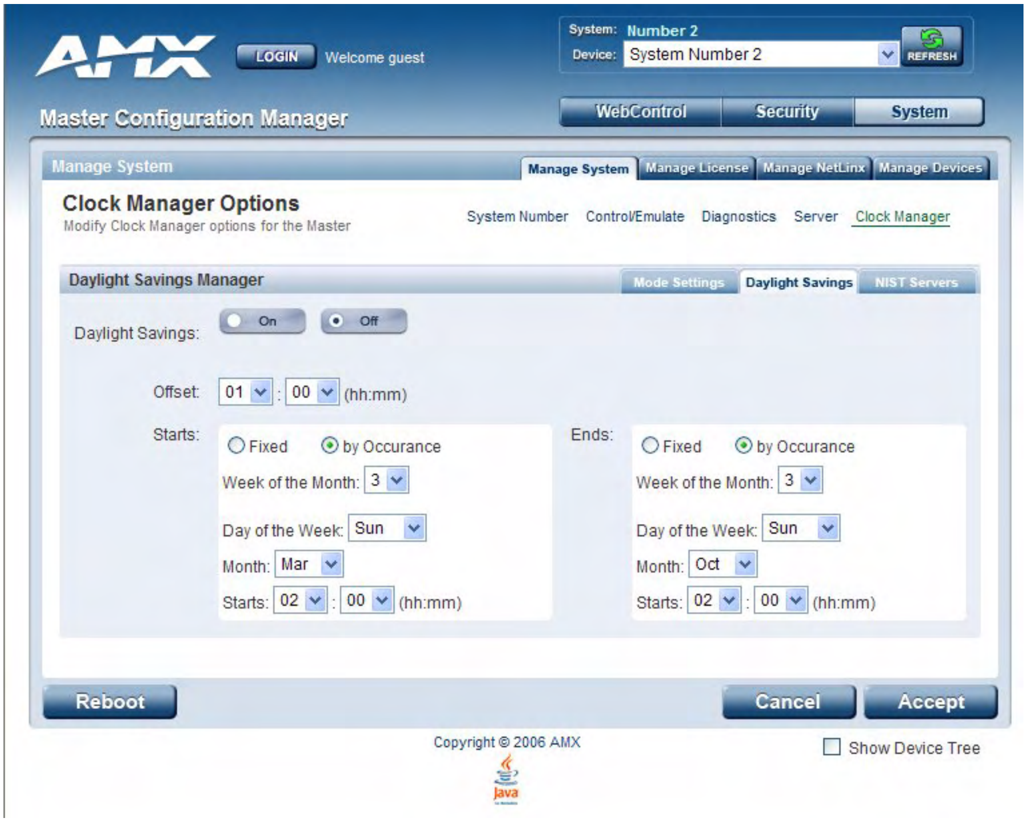
   - **Stand Alone**: This option lets the Master use its own internal clock. When this option is selected, two additional fields are available on this tab:

     - **Date** - Enter the current date in these fields (mm/dd/yyyy).
     - **Time** - Enter the current time in these fields (hh/mm/ss).

2. Click **Accept** to save these settings to the Master.

Setting Daylight Savings Rules

1. In the *Daylight Savings* tab (FIG. 41), enable Daylight Savings mode by clicking the **On** button.



Clock Manager Options

Modify Clock Manager options for the Master

Daylight Savings Manager

Daylight Savings: ○ On ● Off

Offset: 01 : 00 (hh:mm)

Starts: ○ Fixed ● by Occurance

Week of the Month: 3

Day of the Week: Sun

Month: Mar

Starts: 02 : 00 (hh:mm)

Ends: ○ Fixed ● by Occurance

Week of the Month: 3

Day of the Week: Sun

Month: Oct

Starts: 02 : 00 (hh:mm)

FIG. 41 Clock Manager Options - Daylight Savings tab

2. Use the **Offset** drop-down menus to adjust the amount of time (hours and minutes) to offset Daylight Savings. By default, the offset is set to 1 hour.

NOTE

Although most places that support Daylight Savings usually adjust the local time by one hour this doesn't cover all locations. To provide flexibility for such locations it is possible to configure a different daylight savings time offset.

3. Use the **Starts** fields to specify when Daylight Savings should start. The Starts rules include:

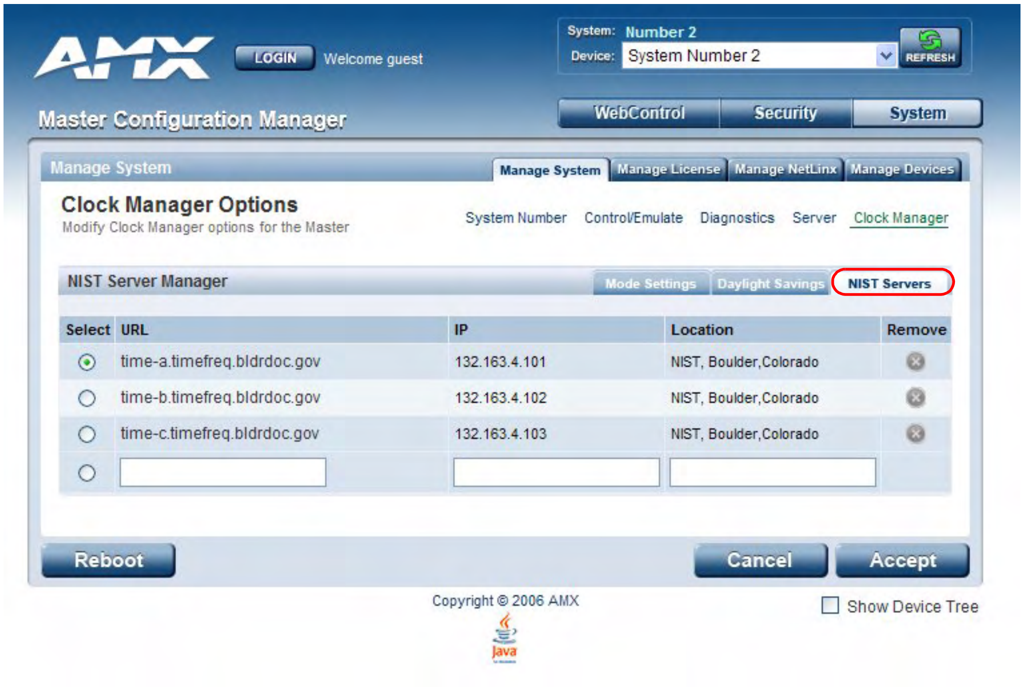
- Select **Fixed** to specify the calendar date when the rule applies as a specific date ("March 21"). When *Fixed* is selected, use the **Day**, **Month** and **Starts** fields to specify the date and time (hh:mm) to start Daylight Savings time.
- Select **by Occurrence** to specify the calendar date when the rule applies as a heuristic, ("the 3rd Sunday in March"). When *by Occurrence* is selected, use the **Week of the Month**, **Day of the Week**, **Month** and **Starts** fields to specify the occurrence to start Daylight Savings time.

  The range is 1 through *Last*, where **Last** indicates the last occurrence of a particular day of the month. This is to accommodate months that include four weeks as well as those that include five.

4. Use the **Ends** fields to specify when Daylight Savings should end. The Ends rules match the Start rules, and follow the same logic. Select **Fixed** or **by Occurrence**, and specify the End date/time information accordingly.

5. Click **Accept** to save these settings to the Master.

Selecting a Custom NIST Server



System: Number 2

Device: System Number 2

Select	URL	IP	Location	Remove
●	time-a.timefreq.bldrdoc.gov	132.163.4.101	NIST, Boulder,Colorado	⊗
○	time-b.timefreq.bldrdoc.gov	132.163.4.102	NIST, Boulder,Colorado	⊗
○	time-c.timefreq.bldrdoc.gov	132.163.4.103	NIST, Boulder,Colorado	⊗
○				

FIG. 42 Clock Manager Options - NIST Servers tab

1. In the *NIST Servers* tab (FIG. 42), use the radio buttons to select one of the NIST Servers in the list.

2. Click **Accept** to save these settings to the Master.

Adding a Custom NIST Server To the List

1. Click on the radio button next to the last (blank) entry in the *NIST Server Manager* list.

2. In the **URL** field, enter the URL of the NIST Server. The URL is used only to help you manage entries, and is not verified or used internally by the clock manager.

3. Enter the NIST Server's IP Address in the **IP** field. This is used internally and must be a valid IP address.

NOTE

*The strings entered into the URL and Location fields are not used to connect to NIST Servers. The IP Address (entered into the **IP** field) specifies the NIST Server(s) that will be used. As stated above, the address entered into the **IP** field must be must be a valid IP address (not a URL).*

4. Enter the NIST Server's location in the **Location** field. This is used only to help the user manage entries and it is not verified or used internally by the clock manager.

5. Click **Accept** to save these settings to the Master.

Removing an NIST Server From the List

1. Click on the **Remove** (x) button to the right of a *user-added* NIST Server in the *NIST Server Manager* list.
2. Click **Accept** to save these settings to the Master.

NOTE

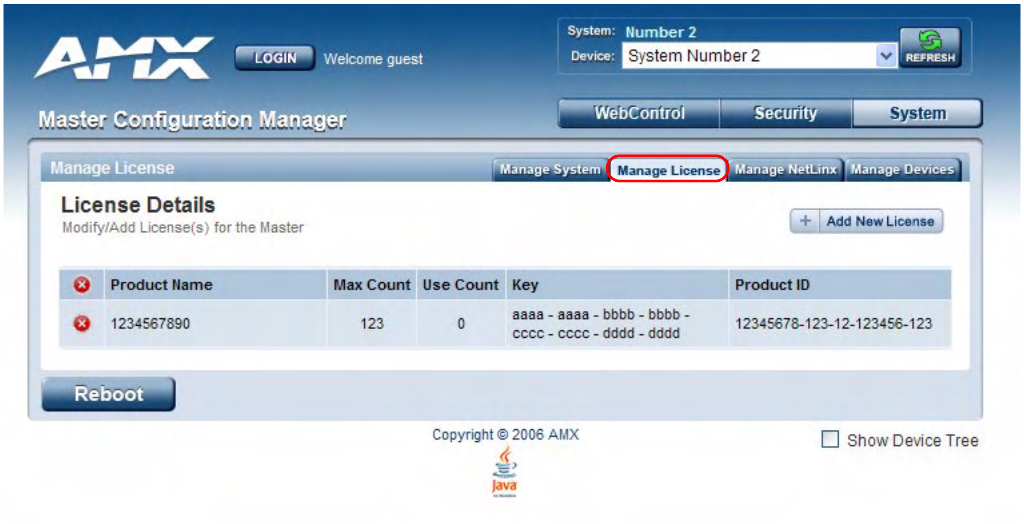
The built-in entries cannot be removed.

Clock Manager NetLinx Programming API

Refer to *Appendix B: Clock Manager NetLinx Programming API* section on page 141 for a listing and description of the Types/Constants and Library Calls that are included in the NetLinx.AXI to support Clock Manager functions.

System - Manage License

The **Manage License** tab displays current as well as pending license keys (FIG. 43).



System: Number 2

Device: System Number 2

License Details

Modify/Add License(s) for the Master

	Product Name	Max Count	Use Count	Key	Product ID
⊗	1234567890	123	0	aaaa - aaaa - bbbb - bbbb - cccc - cccc - dddd - dddd	12345678-123-12-123456-123

FIG. 43 System - Manage License tab (with one example entry)

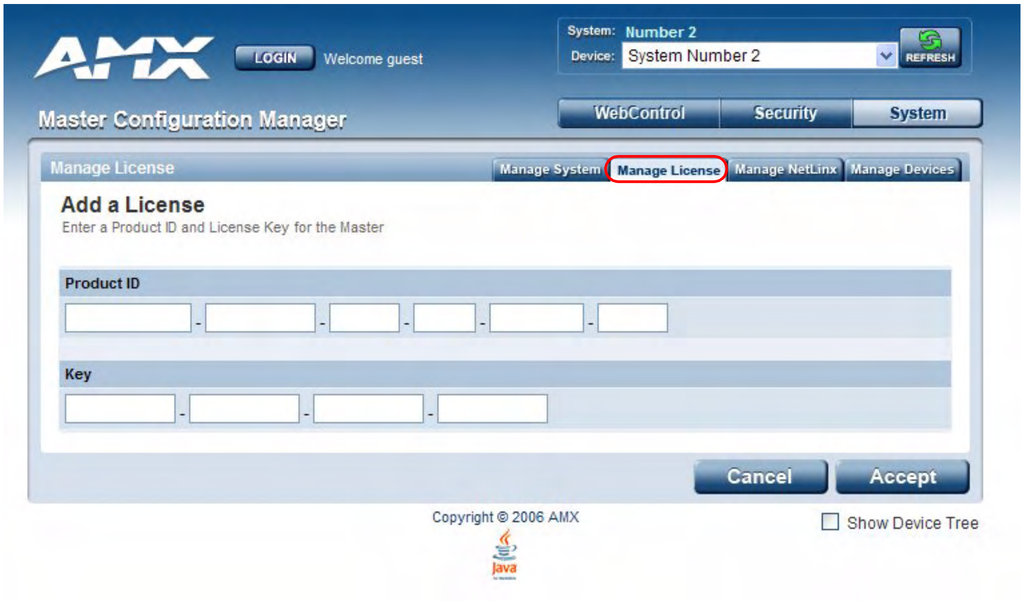
The **Add New License** button allows for the addition of new license keys associated with currently used modules/products. Adding new License Keys requires the entry of both a Product ID and a Serial Key (example: *i!-Voting)*.

The Master confirms this registration information before running the module or product.

Adding A New License

1. Click the **Add New License** button to access the *Add a License* page (FIG. 44).
2. Enter the Product ID (certificate number) provided with the product into the **Product ID** fields.

   Contact the AMX Sales department with both the product serial number (or certificate number) and the serial number of target Master to register your product and in turn receive the necessary Key information (typically 32 to 36 digits in length) which is then entered into the Key fields on this page.
3. Enter the Product Key into the **Key** fields. The Product Key is Master-specific and is typically provided by AMX upon registration.



Add a License

Enter a Product ID and License Key for the Master

FIG. 44 Manage License - Add a License page

Example: *AMX Meeting Manager* and *i!-Voting* applications are examples of products that require both a Product serial number and a Master-specific key prior to usage.

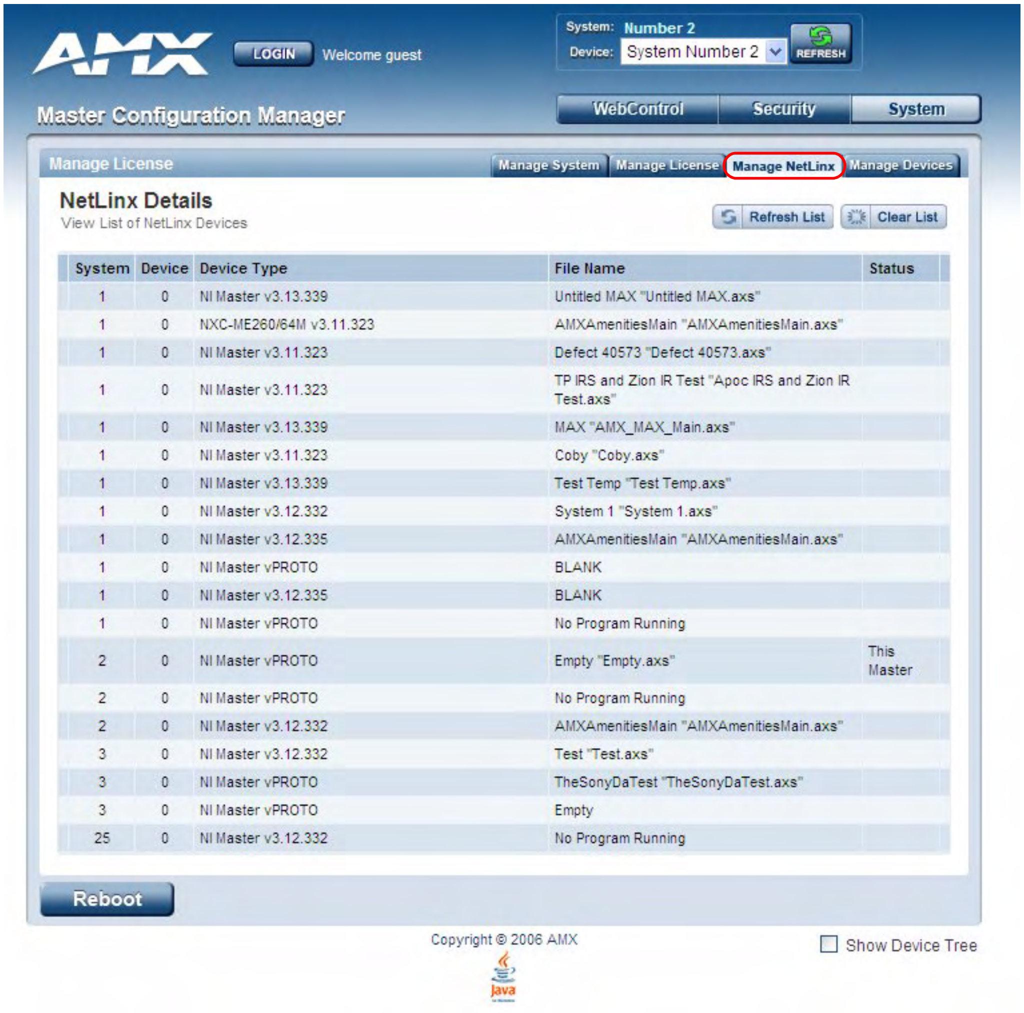
4. Press the **Accept** button to save the information. If there are no errors with the information on this page, a "*Key successfully added for Product ID XXXX*" is displayed at the top of the page.

Removing a License

1. Click the **Remove** (x) icon to the left of the license that you want to remove.
2. The system will prompt you to verify this action before the license is removed from the Master. Click **OK** to proceed.
3. Press the **Accept** button to save the information.

System - Manage NetLinx

The **Manage NetLinx** tab displays a list of NetLinx device connected to the Master, and indicates device status (FIG. 45).



System: Number 2

Device: System Number 2

□ Show Device Tree

NetLinx Details

View List of NetLinx Devices

System	Device	Device Type	File Name	Status
1	0	NI Master v3.13.339	Untitled MAX "Untitled MAX.axs"	
1	0	NXC-ME260/64M v3.11.323	AMXAmenitiesMain "AMXAmenitiesMain.axs"	
1	0	NI Master v3.11.323	Defect 40573 "Defect 40573.axs"	
1	0	NI Master v3.11.323	TP IRS and Zion IR Test "Apoc IRS and Zion IR Test.axs"	
1	0	NI Master v3.13.339	MAX "AMX_MAX_Main.axs"	
1	0	NI Master v3.11.323	Coby "Coby.axs"	
1	0	NI Master v3.13.339	Test Temp "Test Temp.axs"	
1	0	NI Master v3.12.332	System 1 "System 1.axs"	
1	0	NI Master v3.12.335	AMXAmenitiesMain "AMXAmenitiesMain.axs"	
1	0	NI Master vPROTO	BLANK	
1	0	NI Master v3.12.335	BLANK	
1	0	NI Master vPROTO	No Program Running	
2	0	NI Master vPROTO	Empty "Empty.axs"	This Master
2	0	NI Master vPROTO	No Program Running	
2	0	NI Master v3.12.332	AMXAmenitiesMain "AMXAmenitiesMain.axs"	
3	0	NI Master v3.12.332	Test "Test.axs"	
3	0	NI Master vPROTO	TheSonyDaTest "TheSonyDaTest.axs"	
3	0	NI Master vPROTO	Empty	
25	0	NI Master v3.12.332	No Program Running	

FIG. 45 System - Manage NetLinx tab

The table on this page consists of five columns:

NetLinx Device Details	
Column	**Description**
System:	Displays the System value being used by the listed NetLinx Master.
Device:	• Displays the assigned device value of the listed unit. This Device entry applies to both the Master and those NDP-capable devices currently connected to that Master.
Device Type:	• Displays a description of the target Master or connected device, and its current firmware version. Example: *NI Master v3.01.323*.
File Name:	Displays the program name and/or file resident on the device.

NetLinx Device Details (Cont.)	
Column	**Description**
Status:	Indicates the Master or device state: • **This Master**: Indicates its the target Master currently being used and being browsed to. Its this Master's web pages which are currently being viewed. • **Orphan**: Indicates that the device is currently not yet "bound" or assigned to communicate with a particular Master. This state shows an adjacent **Bind** button which is used to bind the device to the Master whose web pages are currently being viewed. • **Searching**: Indicates that the device is trying to establish communication with it's associated Master. • **Bound**: Indicates that the device has established communication with it's associated Master. This state shows an adjacent **Unbind** button which is used to release/disassociate the device from communicating with its current Master. • **Lost**: Indicates that the device has tried to establish communication with it's associated or "bound" Master, but was after a period of time, unable to establish communication.

- **Refresh List**: Click this button to regenerate the device listing by looking for broadcasting devices. This causes the Master to send out a message asking devices to resend their NDP device announcements. The list is then updated as those devices send back their announcements to the Master.

  The information displayed can not only include Masters and devices on this system but Masters and devices on other systems as well. By default, the target Master always appears in the list.

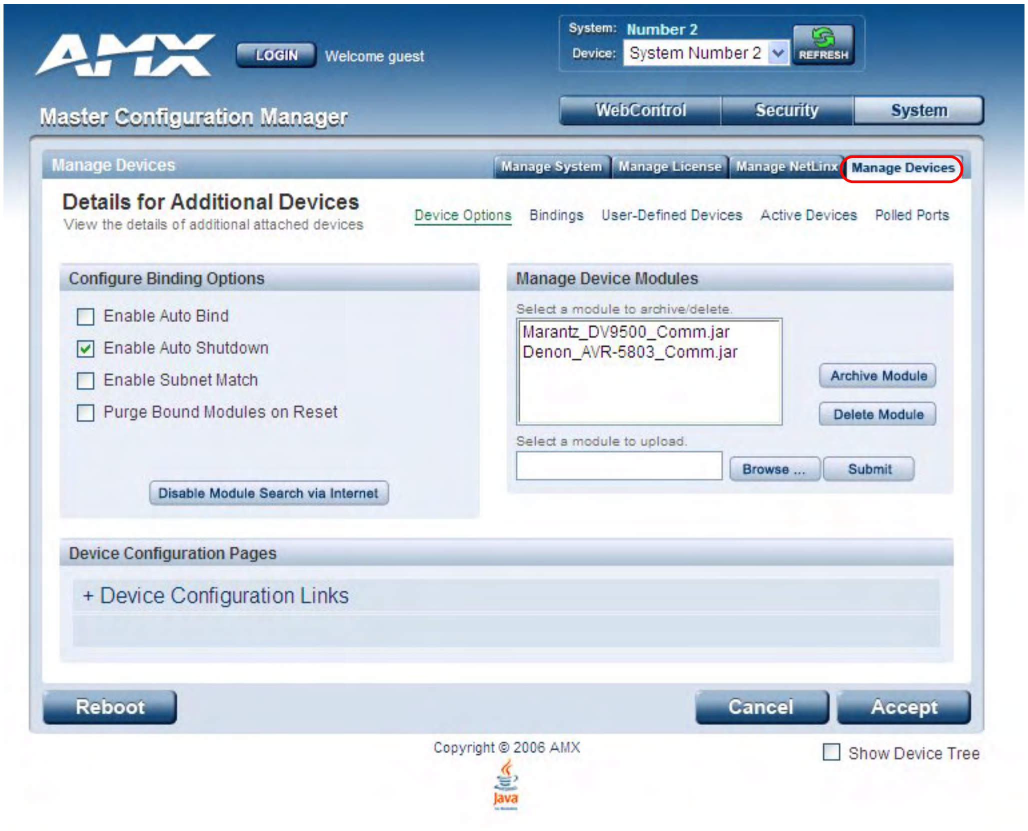
NOTE

Due to system delays, message collisions, and multicast routing, not all devices may respond immediately.

- **Clear List**: Click this button causes the entries to be temporarily deleted from the page, either until you refresh the list (using the *Refresh List* button), or until the Master begins to detect any multi-cast transmissions from System Devices.

System - Manage Devices

The **Manage Devices** tab (FIG. 46) contains links to several different device-related pages, as described in the following subsections:



Details for Additional Devices

View the details of additional attached devices

Configure Binding Options

- ☐ Enable Auto Bind
- ☑ Enable Auto Shutdown
- ☐ Enable Subnet Match
- ☐ Purge Bound Modules on Reset

Manage Device Modules

Select a module to archive/delete.

Marantz_DV9500_Comm.jar
Denon_AVR-5803_Comm.jar

Select a module to upload.

FIG. 46 System - Manage Devices (Details for Additional Devices)

Manage Devices - Device Options

Click the **Device Options** link (in the *Manage Devices* tab) to access the **Details for Additional Devices** page (FIG. 46). The options on this page display various details specific to additional (non-NetLinx) System Devices.

Configuring Device Binding Options

1. Use the **Configure Binding Options** options to specify how the Master will manage Bound Devices:

Binding Options	
Option	**Description**
Enable Auto Bind:	This selection allows you to toggle the state of the automatic binding for DDD (On/Off). When auto-binding is enabled, the Master automatically attempts to connect any newly discovered device with an associated application device (defined in the running NetLinx application). Auto-binding can only be accomplished if the Master's firmware determines a one-to-one correlation between the newly discovered device and a single entry within the list of defined application devices (accessed via the *Binding* link at the top of this page).

Binding Options (Cont.)	
Option	**Description**
Enable Auto Bind (Cont.):	For example, if the application only has one VCR defined and a VCR is detected in the system, auto-binding can then be accomplished. If there were two VCRs defined within the application, auto-binding could not be completed due to the lack of a clearly defined one-to-one correspondence. When this option is not selected, no auto-binding activity takes place and all binding of the newly discovered devices must be accomplished manually via the Web control interface.
Enable Auto-Shutdown:	Auto-Shutdown forces the termination of modules that have lost communication with their respective physical device. This capability is needed for plug-and-play support. By default, Auto-Shutdown is enabled. If automatic termination of modules when they have lost communication is not desired, this selection should be disabled.
Enable Subnet Match:	This selection allows you to specify whether or not IP devices should only be detected/discovered if they are on the same IP Subnet as the Master.
Purge Bound Modules on Reset:	This selection indicates that all modules should be deleted from the bound directory upon the next reboot. During the binding process, the associated Duet modules for a device are copied from the /unbound directory into a protected /bound area. Due to the dynamic nature of Java class loading, it is not safe to delete a running .JAR file. Therefore, this selection provides the administrator the capability of removing existing modules upon reboot by forcing a re-acquisition of the module at bind time. This selection is a one-time occurrence - upon the next reboot, the selection is cleared.
Disable Module Search via Internet:	This option toggles the capability of searching the Internet (either AMX's site or a device specified site) for a device's compatible Duet modules. This capability is automatically disabled if the Master does not have Internet connectivity. Upon enabling Internet connectivity, the AMX License Agreement is displayed. The License Agreement must be accepted for Internet Module search feature to be enabled. When this feature is enabled, the Master queries either AMX's Online database of device Modules and/or pulls Modules from a separate site specified by the manufacturer's device. You can later disable this feature by toggling this button.

2. Press the **Accept** button to save your changes.

Managing Device Modules

Use the **Manage Device Modules** set of options to archive or delete modules from the Master. All modules currently present on the Master are indicated in the Module list.

To archive a module:

1. Select a module and click the **Archive Module** button.
2. This action copies the selected module (*.JAR) file to your PC.
3. The system will prompt you to specify a target directory to save the module file to.

To delete a module:

Select a module and click the **Delete Module** button. This action deletes the selected module from the **/unbound** directory.

NOTE

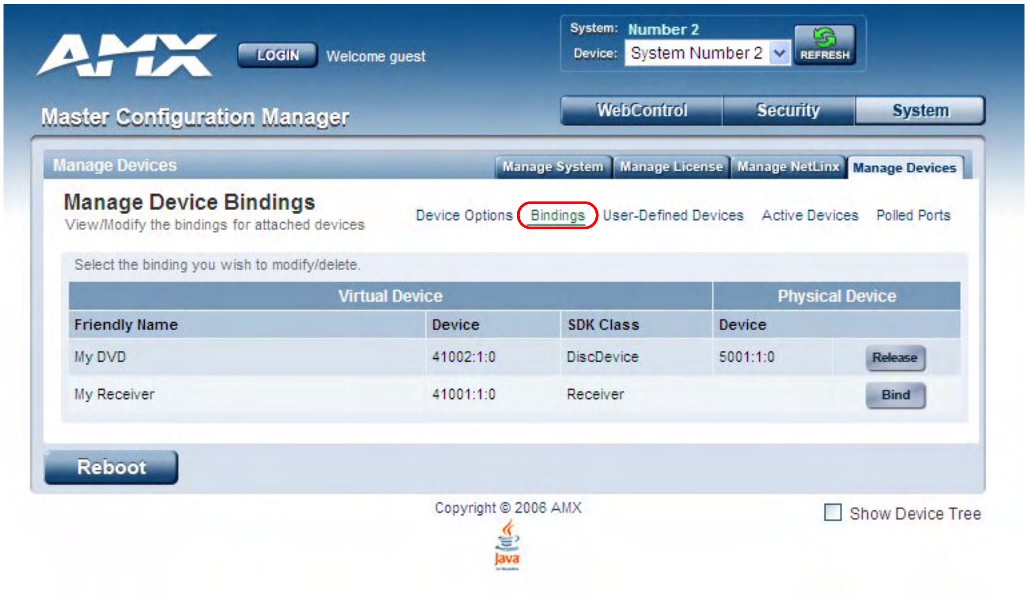
Any corresponding module within the /bound directory will not be deleted. Bound modules must be deleted via the Purge Bound Modules on Reset selection described within the Configure Device Bindings section.

To browse for a Module file and then upload it to the Master:

1. Click the *Browse* button next to the **Select a module to upload** text field to browse for Duet Modules on your PC/Network.
2. Select the JAR file that you want to upload to the Master.
3. Click the **Submit** button to upload a copy of the selected JAR file to the target Master's **/unbound** directory.
   - If a file of the same specified name already exists within the **/unbound** directory, the system will prompt you to confirm overwriting the existing file.
   - Only JAR file types are allowed for Upload to the target Master.

Manage Devices - Bindings

Click the **Bindings** link (in the *Manage Devices* tab) to access the **Manage Device Bindings** page (FIG. 47). Use the options on this page to configure application-defined Duet virtual devices with discovered physical devices.



System: Number 2

Device: System Number 2

Manage Device Bindings

View/Modify the bindings for attached devices

Select the binding you wish to modify/delete.

Virtual Device			Physical Device	
Friendly Name	Device	SDK Class	Device	
My DVD	41002:1:0	DiscDevice	5001:1:0	Release
My Receiver	41001:1:0	Receiver		Bind

FIG. 47 System - Manage Devices (Manage Device Bindings)

The table on this page displays a list of all application-defined devices, including each device's "Friendly Name", the Duet virtual device's D:P:S assignment, the associated Duet Device SDK class (indicating the type of the device), and the physical device's D:P:S assignment. This information has to be pre-coded into the NetLinx file currently on the Master.

Configuring Application-Defined Devices

Elements such as DUET_DEV_TYPE_DISC_DEVICE and DUET_DEV_POLLED are defined within the NetLinx.axi file.

The NetLinx.axi file contains both the new API definitions, as well as the pre-defined constants that are used as some of the API arguments (ex: DUET_DEV_TYPE_DISC_DEVICE).

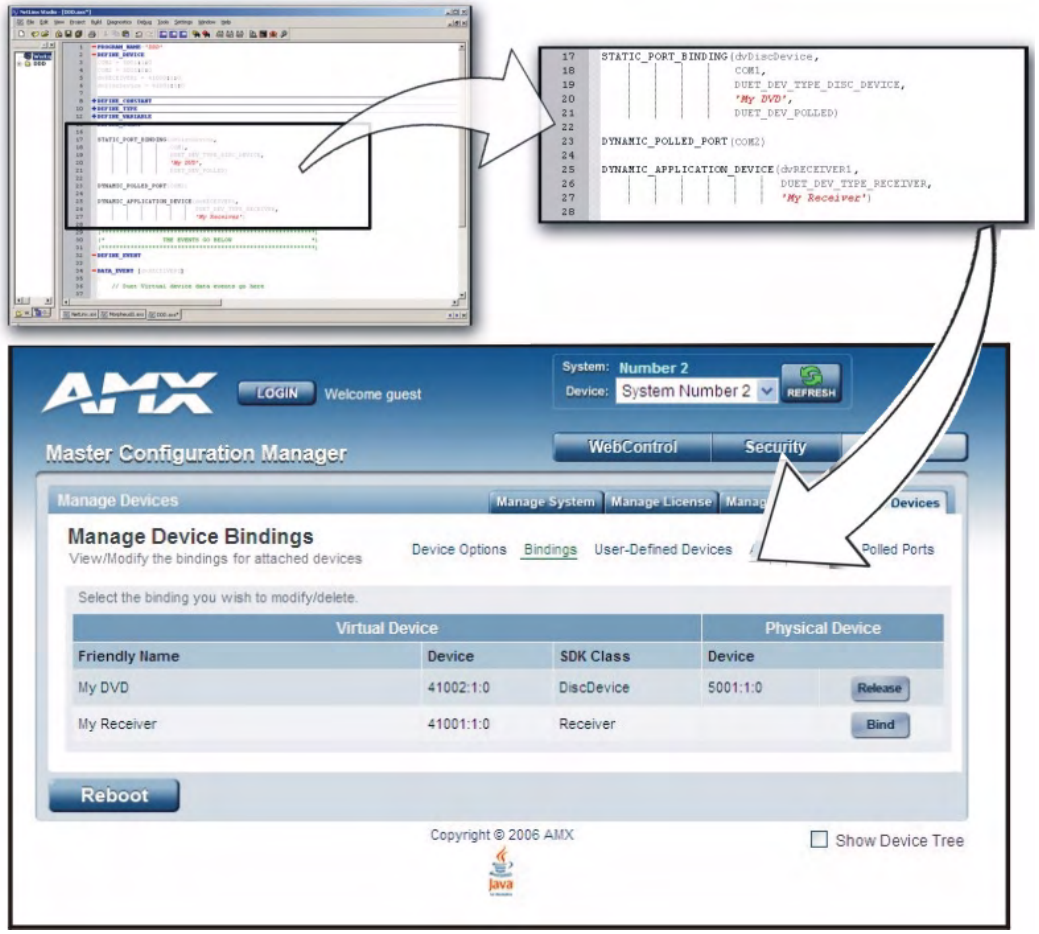
NOTE

*Physical device names are typically prefixed with "**dv**" and Virtual device names are typically prefixed with "**vdv**".*

Example Code:

```
PROGRAM_NAME='DDD'
DEFINE_DEVICE
COM1 = 5001:1:0
COM2 = 5001:2:0
dvRECEIVER1 = 41000:1:0
dvDiscDevice = 41001:1:0

DEFINE_CONSTANT
DEFINE_TYPE
DEFINE_VARIABLE

DEFINE_START

STATIC_PORT_BINDING(dvDiscDevice, COM1, DUET_DEV_TYPE_DISC_DEVICE,
    'My DVD', DUET_DEV_POLLED)

DYNAMIC_POLLED_PORT(COM2)

DYNAMIC_APPLICATION_DEVICE(dvRECEIVER1, DUET_DEV_TYPE_RECEIVER,
   'My Receiver')

(************************************************************)
(*                THE EVENTS GO BELOW                       *)
(************************************************************)
DEFINE_EVENT

DATA_EVENT [dvRECEIVER1]
{
    // Duet Virtual device data events go here
}
```

Sample code can be found within the DEFINE_START section, as shown in FIG. 48:



```
STATIC_PORT_BINDING(dvDiscDevice,
                    COM1,
                    DUET_DEV_TYPE_DISC_DEVICE,
                    'My DVD',
                    DUET_DEV_POLLED)

DYNAMIC_POLLED_PORT(COM2)

DYNAMIC_APPLICATION_DEVICE(dvRECEIVER1,
                           DUET_DEV_TYPE_RECEIVER,
                           'My Receiver')
```

Manage Device Bindings

View/Modify the bindings for attached devices

Select the binding you wish to modify/delete.

Virtual Device			Physical Device	
Friendly Name	Device	SDK Class	Device	
My DVD	41002:1:0	DiscDevice	5001:1:0	Release
My Receiver	41001:1:0	Receiver		Bind

FIG. 48 Manage Device Bindings page - showing the NetLinx code relation

This code gives the Master a “heads-up” notification to look for those devices meeting the criteria outlined within the code.

Application Devices and Association Status

There are two types of application devices: **Static Bound** application devices and **Dynamic** application devices:

- **Static Bound** application devices specify both a Duet virtual device and its associated Device SDK class type, as well as a NetLinx physical device port to which the application device is always associated (i.e. statically bound).
- **Dynamic** application devices specify both the Duet virtual device and its associated Device SDK with no association to a physical port. Binding of an application device to a physical device/port occurs at run-time (either via auto-binding or manual binding).

Application devices that have a "bound" physical device display their physical device ID within the **Physical Device** column. If an associated Duet module has been started to communicate with the device, its associated property information is displayed in a mouse-over popup dialog when the cursor hovers over the physical device ID (see FIG. 49 on page 71).

Each entry in the table has one of four buttons to the right of the Physical Device D:P:S assignment:

- **Static Bound** application devices will either be **blank,** or display a **Release** button:
  - Static Bound application devices that have not yet detected a physical device attached to their associated port have a **blank** button.
  - Once a physical device is detected and its associated Duet module has been started, a **Release** button is then displayed. Click **Release** to force the associated Duet module to be destroyed and the firmware then returns to detecting any physical devices attached to the port.
- **Dynamic** application devices either display a **Bind** or **Unbind** button:
  - Dynamic application devices that have been bound display an **Unbind** button. When the user selects **Unbind**, any associated Duet module is then destroyed and the "link" between the application device and the physical device is then broken.
  - Dynamic application devices that have not been bound to a physical device display a **Bind** button. When this button is selected, a secondary display appears with a listing of all available unbound physical devices that match the application device's Device SDK class type.

NOTE

If a currently bound device needs to be replaced or a Duet Module needs to be swapped out, the device should be unbound and the new module/driver should then be bound.

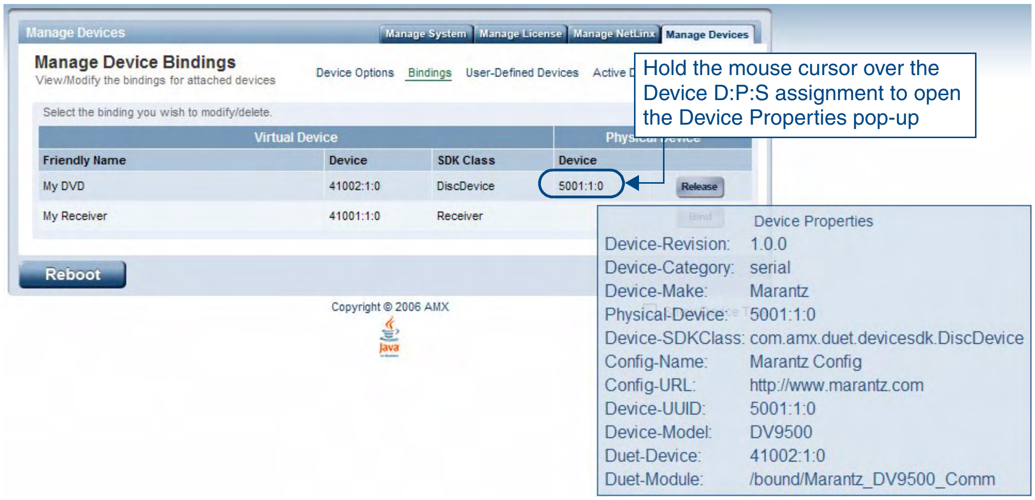
The administrator/user can then select one of the available physical devices to bind with the associated application device. When the **Save** button is selected, the binding is created and a process begins within the target Master to find the appropriate Duet Module driver. Once a driver is found, the Duet Module is then started and associated with the specified application device (Duet virtual device). If the **Cancel** button is selected, the binding activity is then aborted.

NOTE

If the manufacturer device does not support Dynamic Device Discovery (DDD) beaconing, you must use the Add New Device page to both create and manage those values necessary to add a dynamic physical device. This process is described in detail within the following section.

Viewing Physical Device Properties

Hold the mouse cursor over the Physical Device - **Device** entry in the table to display detailed device properties for that device, in a pop-up window (FIG. 49).



Manage Device Bindings
View/Modify the bindings for attached devices

Select the binding you wish to modify/delete.

Virtual Device			Physical Device	
Friendly Name	Device	SDK Class	Device	
My DVD	41002:1:0	DiscDevice	5001:1:0	Release
My Receiver	41001:1:0	Receiver		Bind

Hold the mouse cursor over the Device D:P:S assignment to open the Device Properties pop-up

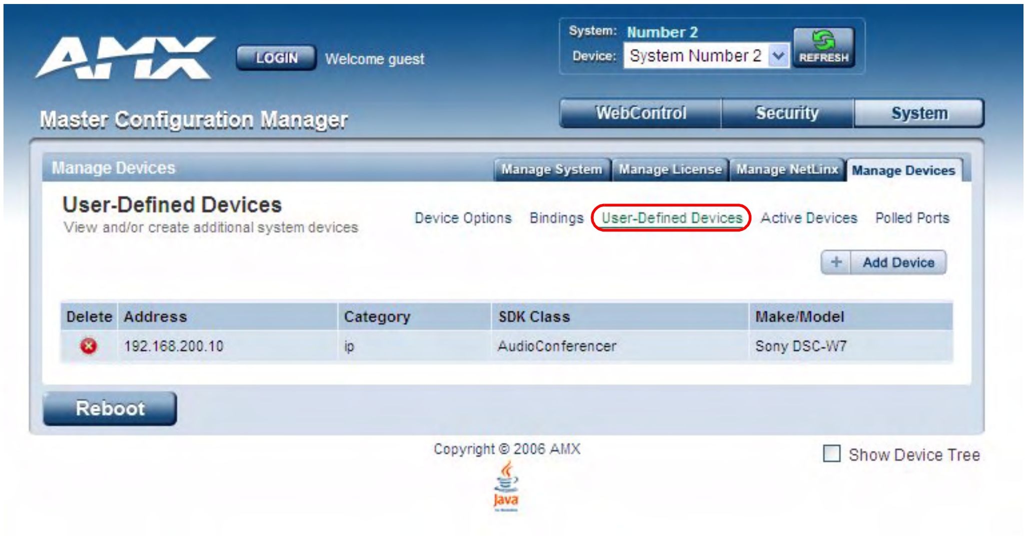
Device Properties

Device-Revision:	1.0.0
Device-Category:	serial
Device-Make:	Marantz
Physical-Device:	5001:1:0
Device-SDKClass:	com.amx.duet.devicesdk.DiscDevice
Config-Name:	Marantz Config
Config-URL:	http://www.marantz.com
Device-UUID:	5001:1:0
Device-Model:	DV9500
Duet-Device:	41002:1:0
Duet-Module:	/bound/Marantz_DV9500_Comm

FIG. 49 Manage Device Bindings - Device Properties pop-up

Manage Devices - User-Defined Devices

Click the **User-Defined Devices** link (in the *Manage Devices* tab) to access the **User-Defined Devices** page (FIG. 50). This page provides a listing with all of the dynamic devices that have been discovered in the system, and allows you to add and delete User-Defined Devices.



System: Number 2
Device: System Number 2

User-Defined Devices
View and/or create additional system devices

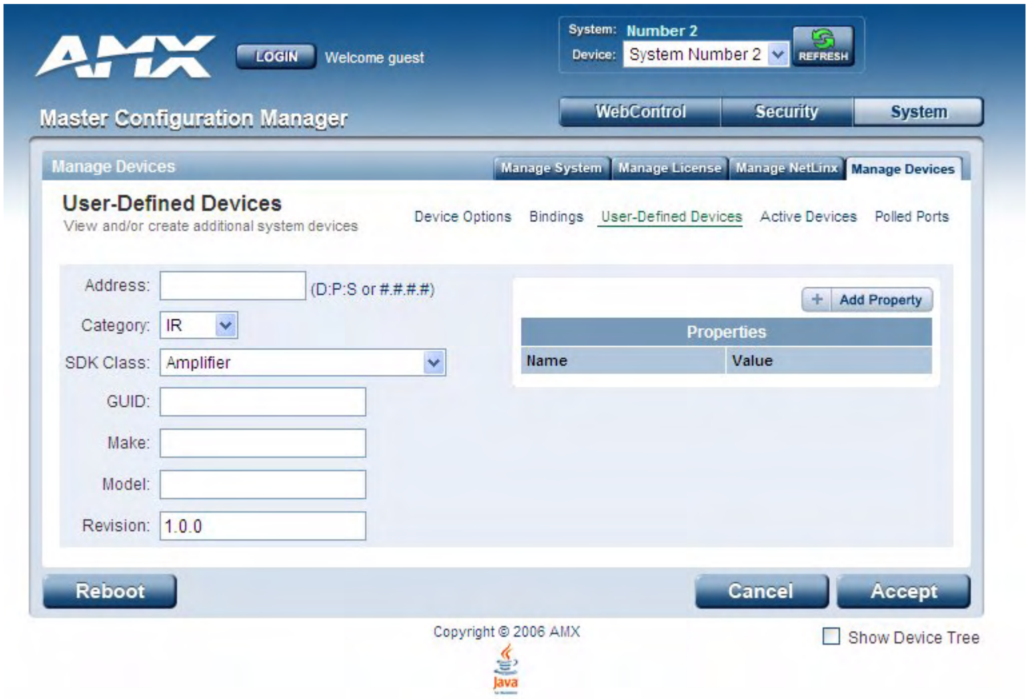
Delete	Address	Category	SDK Class	Make/Model
⊗	192.168.200.10	ip	AudioConferencer	Sony DSC-W7

□ Show Device Tree

FIG. 50 System - Manage Devices (User-Defined Devices)

Adding a User-Defined Device

1. Click the **Add Device** button (in the User-Defined Devices page) to access the **Add User Defined Device** page (FIG. 51):



System: Number 2

Device: System Number 2

User-Defined Devices

View and/or create additional system devices

Address: (D:P:S or #.#.#.#)

Category: IR

SDK Class: Amplifier

GUID:

Make:

Model:

Revision: 1.0.0

Properties	
Name	Value

□ Show Device Tree

FIG. 51 User-Defined Devices - Add User Defined Device

2. Fill in the device information fields, as described in the following table:

User-Defined Device Information Fields	
Address:	Enter the address of the physical device in the Address field. This information can be either the NetLinx Master port value (D:P:S) or an IP Address (#.#.#.#).
Category:	Use the drop-down list to select the control method associated with the physical target device (*IR*, *IP*, *Serial*, *Relay*, *Other*).
SDK Class:	Use the drop-down list to select the closest Device SDK class type match for the physical target device. The **SDK-Class Types** table (below) provides a listing of the available choices.
GUID:	Enter the manufacturer-specified device's GUID (Global Unique Identification) information. Either the GUID or Make/Model must be specified in this field.
Make:	Enter the name of the manufacturer for the device being used (ex: Sony, ONKYO, etc.) • Up to 55 alpha-numeric characters • Either the GUID or Make/Model must be specified within this field. • Spaces in the name will be converted to underscores.
Model:	Enter the model number of the device being used (ex: Mega-Tuner 1000) • Up to 255 alpha-numeric characters • Either the GUID or Make/Model must be specified within this field.
Revision	Enter the firmware version used by the target device. • Text is required within this field. • The version must be in the format: major.minor.micro (where major, minor, and micro are numbers). An example is: 1.0.0 (revision 1.0.0 of the device firmware).

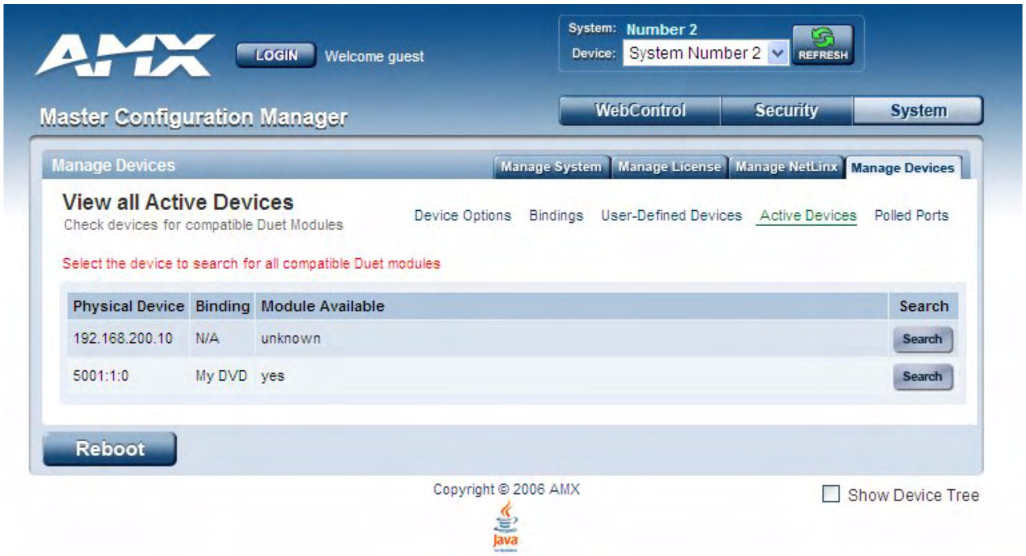
SDK-Class Types		
Amplifier	HVAC	SlideProjector
AudioConferencer	IODevice	Switcher
AudioMixer	Keypad	Text Keypad
AudioProcessor	Light	TV
AudioTape	Monitor	UPS
AudioTunerDevice	Motor	Utility
Camera	MultiWindow	VCR
Digital Media Decoder	PoolSpa	VideoConferencer
Digital Media Encoder	PreAmpSurroundSoundProcessor	VideoProcessor
Digital Media Server	RelayDevice	VideoProjector
Digital Satellite System	Receiver	VideoWall
Digital Video Recorder	Security System	VolumeController
Disc Device	Sensor Device	Weather
DocumentCamera	SettopBox	

3. Once you are done creating the profile for the new device, click the **Add Property** button to access the **Name** and **Value** fields property information for association with the new User Defined Device.

4. Click the **Accept** button. The new device is indicated in the list of discovered physical devices (in the *User-Defined Devices* page).

Manage Devices - View All Active Devices

Click the **Active Devices** link (in the *Manage Devices* tab) to access the **View All Active Devices** page (FIG. 52). The options on this page allow you to check devices for compatible Duet Modules.



View all Active Devices

Check devices for compatible Duet Modules

Select the device to search for all compatible Duet modules

Physical Device	Binding	Module Available	Search
192.168.200.10	N/A	unknown	Search
5001:1:0	My DVD	yes	Search

□ Show Device Tree

FIG. 52 System - Manage Devices (User-Defined Devices)

Searching For All Compatible Duet Modules for a Selected Device

1. Click the Search button for the device that you want to find a Duet Module for. This action initiates a search for compatible modules, based on the following options:

- Unless the **Disable Module Search via the Internet** option was selected in the Manage Devices page (*see the Manage Devices - Device Options* section on page 65*)*, the search includes a query of the AMX online database as well as any manufacturer specified URLs that match the IP Address of the physical device for a compatible module.
- If the device specified a **URL** in its DDD beacon, the file is retrieved from the URL either over the Internet or from the physical device itself, provided the device has an inboard HTTP or FTP server.
- If **Module Search via Internet** is ***NOT enabled***, the search does NOT query the AMX online database nor will it pull any manufacturer specified URLs that do not match the IP Address of the physical device itself.

Modules that are retrieved from either the Internet or from the manufacturer's device are then placed into the **/unbound** directory and automatically overwrite any existing module of the same name.

2. Once a list of all compatible modules is compiled, the Available Modules list is displayed on this page.

   Each module is listed with its calculated “match” value. The greater the “match” value, the better the match between the Duet Module's properties and the physical device's properties.

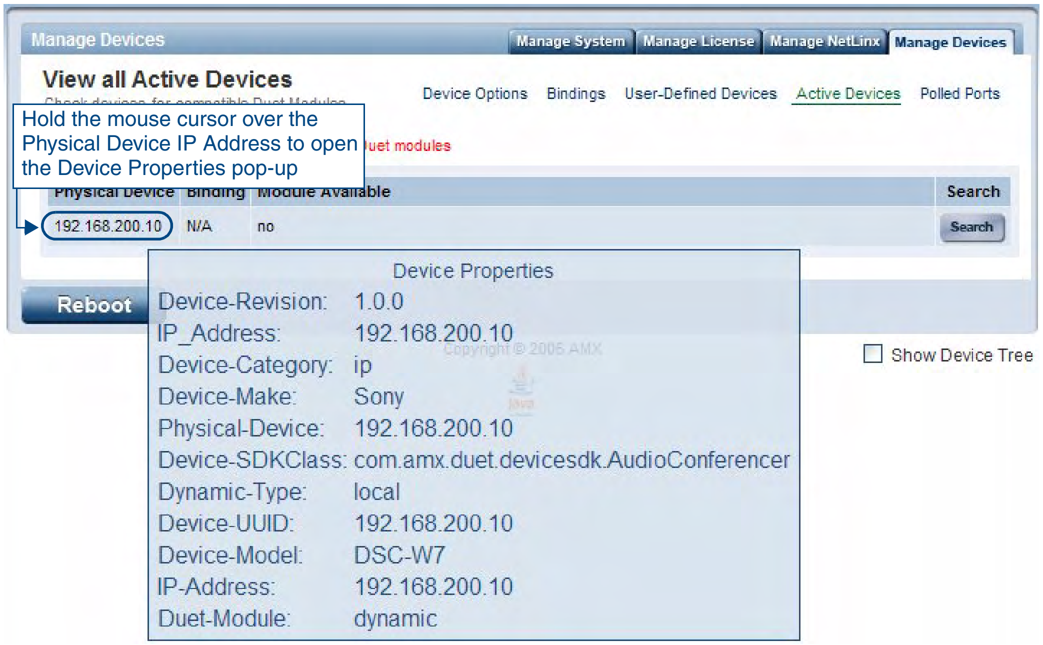
3. Select a module and click the **Accept** button to associate the selected Duet module with the physical device.

NOTE

This action will not affect any currently running Duet module associated with the physical device. The module is associated with the device upon reboot.

Viewing Physical Device Properties

Hold the mouse cursor over the **Device** entry in the table to display detailed device properties for that device, in a pop-up window (FIG. 53).



Hold the mouse cursor over the Physical Device IP Address to open the Device Properties pop-up

Physical Device	Binding	Module Available
192.168.200.10	N/A	no

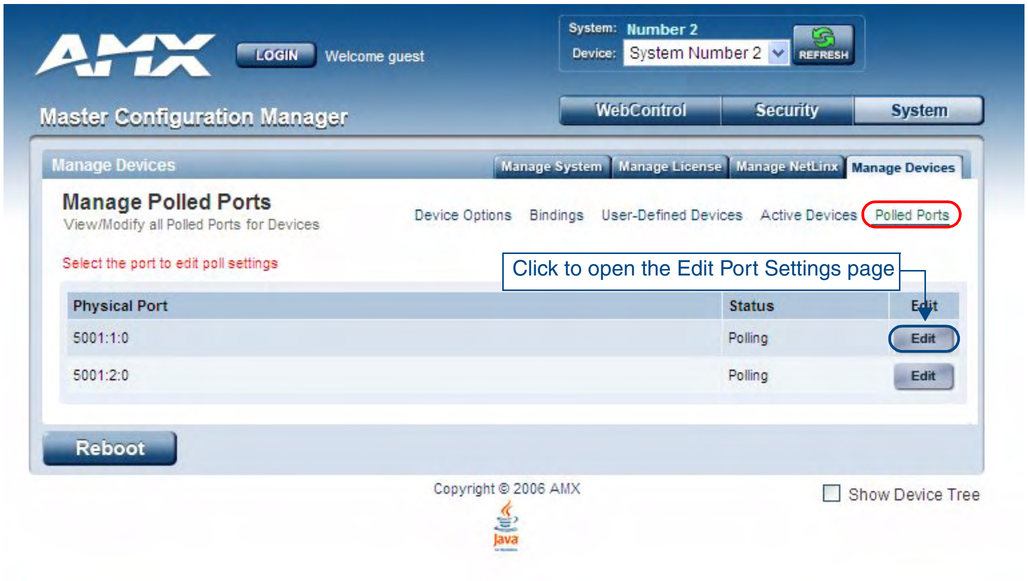
Device Properties

Device-Revision:	1.0.0
IP_Address:	192.168.200.10
Device-Category:	ip
Device-Make:	Sony
Physical-Device:	192.168.200.10
Device-SDKClass:	com.amx.duet.devicesdk.AudioConferencer
Dynamic-Type:	local
Device-UUID:	192.168.200.10
Device-Model:	DSC-W7
IP-Address:	192.168.200.10
Duet-Module:	dynamic

FIG. 53 View All Active Devices - Device Properties pop-up

Manage Devices - Manage Polled Ports

Click the **Polled Ports** link (in the *Manage Devices* tab) to access the **Manage Polled Ports** page (FIG. 54). The options on this page allow you to view/modify settings for all polled ports in the System.



Manage Polled Ports

View/Modify all Polled Ports for Devices

Select the port to edit poll settings

Click to open the Edit Port Settings page

Physical Port	Status	Edit
5001:1:0	Polling	Edit
5001:2:0	Polling	Edit

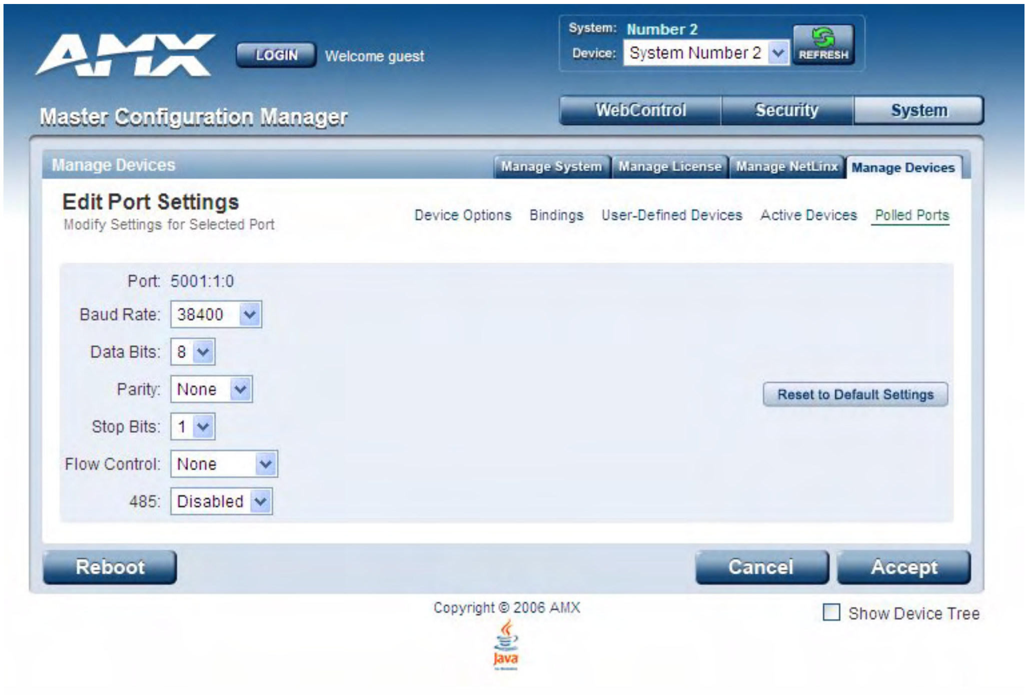
FIG. 54 System - Manage Devices (Manage Polled Ports)

NOTE

Polled Ports must be specified in the Master's code in order for this page to be populated.

Editing Polled Port Settings

Click the **Edit** button for a port in the Physical Port list to access the Edit Port Settings page (FIG. 55):



Port: 5001:1:0
Baud Rate: 38400
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None
485: Disabled

FIG. 55 Manage Polled Ports - Edit Port Settings

Use the drop-down menus to modify the Port settings.

Click **Reset to Default Settings** to return this port to its default configuration:

Default Port Settings	
Baud Rate:	9600
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control	None
485:	Disabled

Programming

Overview

This section describes the Send_Commands, Send_Strings, and Channel commands you can use to program the Integrated Controller. The examples in this section require a declaration in the DEFINE_DEVICE section of your program to work correctly. Refer to the *NetLinx Programming Language* instruction manual for specifics about declarations and DEFINE_DEVICE information.

Master Send_Commands

These commands are specific to the Master and not the Controller. These commands are sent to the DPS 0:1:0 (the Master you are connected to).

A device (<DEV>) must first be defined in the NetLinx programming language with values for the Device: Port: System (<D:P:S>).

Master Send_Commands	
Command	**Description**

CLOCK
Set the date and time on the Master.
	The date and time settings are propagated over the local bus.
	Syntax:
	`SEND_COMMAND <DEV>,"'CLOCK <mm-dd-yyyy> <hh:mm:ss>'"`
	Variables:
	mm-dd-yyyy = Month, day, and year. Month and day have 2 significant digits. Year has 4 significant digits.
	hh-mm-ss = Hour, minute, and seconds. Each using only 2 significant digits.
	Example:
	`SEND_COMMAND 0,"'CLOCK 04-12-2005 09:45:31'"`
	Sets the Master's date to April 12, 2005 with a time of 9:45 am.

G4WC
Add G4WebControl devices to Web control list displayed by the Web server in a browser.
	The internal G4WC Send command (to Master 0:1:0) has been revised to add G4WebControl devices to Web control list displayed in the browser.
	Syntax:
	`SEND_COMMAND <D:P:S>,"'G4WC "Name/Description",IP Address/URL,IP Port,Enabled'"`
	Variables:
	• Name/Description = A string, enclosed in double quotes, that is the description of the G4 Web Control instance. It is displayed in the browser.
	• IP Address/URL = A string containing the IP Address of the G4 Web Control server, or a URL to the G4 Web Control server.
	• IP Port = A string containing the IP Port of the G4 Web Control Server.
	• Enabled = 1 or 0. If it is a 1 then the link is displayed. If it is a 0 then the link is disabled.
	The combination of Name/Description, IP Address/URL, and IP Port are used to determine each unique listing.
	Example:
	`SEND_COMMAND 0:1:0,"'G4WC "Bedroom",192.168.1.2,5900,1'"`
	Adds the BEDROOM control device using the IP Address of 192.168.1.2.

Master Send_Commands (Cont.)

Command	Description

~IGNOREEXTERNALCLOCKCOMMANDS
Set the Master so that it cannot have it’s time set by another device which generates a ‘CLOCK’ command.
	Syntax:
	`SEND_COMMAND <D:P:S>,"'~IGNOREEXTERNALCLOCKCOMMANDS'"`
	Example:
	`SEND_COMMAND 0:1:0,"'~IGNOREEXTERNALCLOCKCOMMANDS'"`

Master IP Local Port Send_Commands

These commands are specific to the Master and not the Controller. These commands are sent to the DPS 0:1:0 (the Master). A device must first be defined in the NetLinx programming language with values for the Device: Port: System.

In these programming examples, <DEV> = Device. The term <D:P:S> = Device:Port:System.

Master IP Local Port Send_Commands

Command	Description

UDPSENDTO
Set the IP and port number of the UDP local ports destination for sending future packets.
	This is only available for Type 2 and Type 3 Local Ports. Type 2 and Type 3 are referring to the protocol type that is part of the IP_CLIENT_OPEN call (4th parameter).
	Type 1 is TCP.
	Type 2 is UDP (standard)
	Type 3 is UDP (2 way)
	The NetLinx.axi defines constants for the protocol types:
	CHAR IP_TCP = 1
	CHAR IP_UDP = 2
	CHAR IP_UDP_2WAY = 3
	Syntax:
	`SEND_COMMAND <D:P:S>,"'UDPSENDTO-<IP or URL>:<UDP Port Number>'"`
	Variables:
	• IP or URL = A string containing the IP Address or URL of the desired destination.
	• UDP Port Number = A String containing the UDP port number of the desired destination.
	Example 1:
	`SEND_COMMAND 0:3:0,"'UDPSENDTO-192.168.0.1:10000'"`
	Any subsequent SEND_STRING to 0:3:0 are sent to the IP Address 192.168.0.1 port 10000.
	Example 2:
	`SEND_COMMAND 0:3:0,"'UDPSENDTO-myUrl.com:15000'"`
	Any subsequent SEND_STRING to 0:3:0 are sent to the URL myURL.com port 15000.

LED Disable/Enable Send_Commands

NOTE

The following sections only apply to the integrated controller component of the NIs.

The following commands enable or disable the LEDs on the Integrated Controller. In the examples: <DEV> = Port 1 of the device. Sending to port 1 of the NI-700 (affects all ports).

LED Send_Commands	
Command	**Description**

LED-DIS
Disable all LEDs (on 32 LED hardware) for a port.
	Regardless of whether or not the port is active, the LED will not be lit. Issue this command to port 1 to disable all the LEDs on the Controller. When activity occurs on a port(s) or Controller, the LEDs will not illuminate.
	Syntax:
	`SEND_COMMAND <DEV>,"'LED-DIS'"`
	Example:
	`SEND_COMMAND Port_1,"'LED-DIS'"`
	Disables all the LEDs on Port 1 of the Controller.

LED-EN
Enable the LED (on 32 LED hardware) for a port
	When the port is active, the LED is lit. When the port is not active, the LED is not lit. Issue the command to port 1 to enable the LEDs on the Controller (default setting). When activity occurs on a port(s) or Controller, the LEDs illuminate.
	Syntax:
	`SEND_COMMAND <DEV>,'LED-EN'`
	Example:
	`SEND_COMMAND System_1,'LED-EN'`
	Enables the System_1 Controller's LEDs.

Port Assignments By NI Model

Port Assignments By NI Model					
NI Model	**RS-232/422/485**	**IR/Serial**	**IR/RX**	**Relays**	**I/O**
NI-700	Ports 1 - 2	Port 3	Port 5		Port 4
NI-900	Port 1	Ports 2-4	Port 6		Port 5
NI-2000		Ports 1-3	Ports 5-8	Port 4	Port 9
NI-3000		Ports 1-7	Ports 9-16	Port 8	Port 17
NI-4000		Ports 1-7	Ports 9-16	Port 8	Port 17
NI-2100		Ports 1-3	Ports 5-8	Port 4	Port 9
NI-3100		Ports 1-7	Ports 9-16	Port 8	Port 17
NI-4100		Ports 1-7	Ports 9-16	Port 8	Port 17

RS232/422/485 Ports Channels

RS232/422/485 ports are Ports 1-2 (NI-700) and Port 1 (NI-900).

RS232/422/485 Ports Channels	
255 - CTS push channel	Reflects the state of the CTS input if a 'CTSPSH' command was sent to the port.

RS-232/422/485 Send_Commands

RS-232/422/485 Send_Commands	
Command	**Description**

B9MOFF
Set the port's communication parameters for stop and data bits according to the software settings on the RS-232 port (default).
	Disables 9-bit in 232/422/455 mode. By default, this returns the communication settings on the serial port to the last programmed parameters. This command works in conjunction with the 'B9MON' command.
	Syntax:
	`SEND_COMMAND <DEV>,"'B9MOFF'"`
	Example:
	`SEND_COMMAND RS232_1,"'B9MOFF'"`
	Sets the RS-232 port settings to match the port's configuration settings.

B9MON
Override and set the current communication settings and parameters on the RS-232 serial port to 9 data bits with one stop bit.
	Enables 9-bit in 232/422/455 mode. This command works in conjunction with the 'B9MOFF' command.
	Syntax:
	`SEND_COMMAND <DEV>,"'B9MON'"`
	Example:
	`SEND_COMMAND RS232_1,"'B9MON'"`
	Resets the RS-232 port's communication parameters to nine data bits, one stop bit, and locks-in the baud rate.

CHARD
Set the delay time between all transmitted characters to the value specified (in 100 Microsecond increments).
	Syntax:
	`SEND_COMMAND <DEV>,"'CHARD-<time>'"`
	Variable:
	time = 0 - 255. Measured in 100 microsecond increments.
	Example:
	`SEND_COMMAND RS232_1,"'CHARD-10'"`
	Sets a 1-millisecond delay between all transmitted characters.

CHARDM
Set the delay time between all transmitted characters to the value specified (in 1-Millisecond increments).
	Syntax:
	`SEND_COMMAND <DEV>,"'CHARDM-<time>'"`
	Variable:
	time = 0 - 255. Measured in 1 millisecond increments.
	Example:
	`SEND_COMMAND RS232_1,"'CHARDM-10'"`
	Sets a 10-millisecond delay between all transmitted characters.

CTSPSH
Enable Pushes, Releases, and Status information to be reported via channel 255 using the CTS hardware handshake input.
	This command turns On (enables) channel tracking of the handshaking pins. If Clear To Send (CTS) is set high, then channel 255 is On.
	Syntax:
	`SEND_COMMAND <DEV>,"'CTSPSH'"`
	Example:
	`SEND_COMMAND RS232_1,"'CTSPSH'"`
	Sets the RS232_1 port to detect changes on the CTS input.

CTSPSH OFF
Disable Pushes, Releases, and Status information to be reported via channel 255.
	This command disables tracking. Turns CTSPSH Off.
	Syntax:
	`SEND_COMMAND <DEV>,"'CTSPSH OFF'"`
	Example:
	`SEND_COMMAND RS232_1,"'CTSPSH OFF'"`
	Turns off CTSPSH for the specified device.

RS-232/422/485 Send_Commands (Cont.)

Command	Description

GET BAUD
Get the RS-232/422/485 port's current communication parameters.
	The port sends the parameters to the device that requested the information.
	The port responds with:
	<port #>,<baud>,<parity>,<data>,<stop> 485 <ENABLED | DISABLED>
	Syntax:
	`SEND_COMMAND <DEV>,"'GET BAUD'"`
	Example:
	`SEND_COMMAND RS232_1,"'GET BAUD'"`
	System response example:
	`Device 1,38400,N,8,1 485 DISABLED`

HSOFF
Disable hardware handshaking (default).
	Syntax:
	`SEND_COMMAND <DEV>,"'HSOFF'"`
	Example:
	`SEND_COMMAND RS232_1,"'HSOFF'"`
	Disables hardware handshaking on the RS232_1 device.

HSON
Enable RTS (ready-to-send) and CTS (clear-to-send) hardware handshaking.
	Syntax:
	`SEND_COMMAND <DEV>,"'HSON'"`
	Example:
	`SEND_COMMAND RS232_1,"'HSON'"`
	Enables hardware handshaking on the RS232_1 device.

RXCLR
Clear all characters in the receive buffer waiting to be sent to the Master.
	Syntax:
	`SEND_COMMAND <DEV>,"'RXCLR'"`
	Example:
	`SEND_COMMAND RS232_1,"'RXCLR'"`
	Clears all characters in the RS232_1 device's receive buffer waiting to be sent to the Master.

RXOFF
Disable the transmission of incoming received characters to the Master (default).
	Syntax:
	`SEND_COMMAND <DEV>,"'RXOFF'"`
	Example:
	`SEND_COMMAND RS232_1,"'RXOFF'"`
	Stops the RS232_1 device from transmitting received characters to the Master.

RXON
Start transmitting received characters to the Master (default).
	Enables sending incoming received characters to the Master. This command is automatically sent by the Master when a 'CREATE_BUFFER' program instruction is executed.
	Syntax:
	`SEND_COMMAND <DEV>,"'RXON'"`
	Example:
	`SEND_COMMAND RS232_1,"'RXON'"`
	Sets the RS232_1 device to transmit received characters to the Master.

RS-232/422/485 Send_Commands (Cont.)

Command	Description

SET BAUD
Set the RS-232/422/485 port's communication parameters.
	Syntax:
	`SEND_COMMAND <DEV>,"'SET BAUD <baud>,<parity>,<data>,<stop> [485 <Enable | Disable>]'"`
	Variables:
	baud = baud rates are: 115200, 76800, 57600, 38400, 19200, 9600, 4800, 2400, 1200, 600, 300, 150.
	parity = N (none), O (odd), E (even), M (mark), S (space).
	data = 8 data bits.
	stop = 1 and 2 stop bits.
	485 Disable = Disables RS-485 mode and enables RS-422.
	485 Enable = Enables RS-485 mode and disables RS-422.
	Note*: The only valid 9 bit combination is (baud),N,9,1.*
	Example:
	`SEND_COMMAND RS232_1,"'SET BAUD 115200,N,8,1 485 ENABLE'"`
	Sets the RS232_1 port's communication parameters to 115,200 baud, no parity, 8 data bits, 1 stop bit, and enables RS-485 mode.

TSET BAUD
Temporarily set the RS-232/422/485 port's communication parameters for a device.
	TSET BAUD works the same as SET BAUD, except that the changes are not permanent, and the previous values will be restored if the power is cycled on the device.
	Syntax:
	`SEND_COMMAND <DEV>,"'TSET BAUD <baud>,<parity>,<data>,<stop> [485 <Enable | Disable>]'"`
	Variables:
	baud = baud rates are: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200, 600, 300.
	parity = N (none), O (odd), E (even), M (mark), S (space).
	data = 8 or 9 data bits.
	stop = 1 or 2 stop bits.
	485 Disable = Disables RS-485 mode and enables RS-422.
	485 Enable = Enables RS-485 mode and disables RS-422.
	Note*: The only valid 9 bit combination is (baud),N,9,1.*
	Example:
	`SEND_COMMAND RS232_1,"'TSET BAUD 115200,N,8,1 485 ENABLE'"`
	Sets the RS232_1 port's communication parameters to 115,200 baud, no parity, 8 data bits, 1 stop bit, and enables RS-485 mode.

TXCLR
Stop and clear all characters waiting in the transmit out buffer and stops transmission.
	Syntax:
	`SEND_COMMAND <DEV>,"'TXCLR'"`
	Example:
	`SEND_COMMAND RS232_1,"'TXCLR'"`
	Clears and stops all characters waiting in the RS232_1 device's transmit buffer.

XOFF
Disable software handshaking (default).
	Syntax:
	`SEND_COMMAND <DEV>,"'XOFF'"`
	Example:
	`SEND_COMMAND RS232_1,"'XOFF'"`
	Disables software handshaking on the RS232_1 device.

RS-232/422/485 Send_Commands (Cont.)

Command	Description

XON
Enable software handshaking.
	Syntax:
	`SEND_COMMAND <DEV>,"'XON'"`
	Example:
	`SEND_COMMAND RS232_1,"'XON'"`
	Enables software handshaking on the RS232_1 device.

RS-232/422/485 Send_String Escape Sequences

This device also has some special SEND_STRING escape sequences:

If any of the 3 character combinations below are found anywhere within a SEND_STRING program instruction, they will be treated as a command and not the literal characters.

In these examples: <DEV> = device.

RS-232/422/485 Send_String Escape Sequences

Command	Description

27,17,<time>
Send a break character for a specified duration to a specific device.
	Syntax:
	`SEND_STRING <DEV>,"27,17,<time>"`
	Variable:
	time = 1 - 255. Measured in 100 microsecond increments.
	Example:
	`SEND_STRING RS232_1,"27,17,10"`
	Sends a break character of 1 millisecond to the RS232_1 device.

27,18,0
Clear the ninth data bit by setting it to 0 on all character transmissions.
	Used in conjunction with the 'B9MON' command.
	Syntax:
	`SEND_STRING <DEV>,"27,18,0"`
	Example:
	`SEND_STRING RS232_1,"27,18,0"`
	Sets the RS232_1 device's ninth data bit to 0 on all character transmissions.

27,18,1
Set the ninth data bit to 1 for all subsequent characters to be transmitted.
	Used in conjunction with the 'B9MON' command.
	Syntax:
	`SEND_STRING <DEV>,"27,18,1"`
	Example:
	`SEND_STRING RS232_1,"27,18,1"`
	Sets the RS232_1 device's ninth data bit to 1 on all character transmissions.

27,19,<time>
Insert a time delay before transmitting the next character.
	Syntax:
	`SEND_STRING <DEV>,"27,19,<time>"`
	Variable:
	time = 1 - 255. Measured in 1 millisecond increments.
	Example:
	`SEND_STRING RS232_1,"27,19,10"`
	Inserts a 10 millisecond delay before transmitting characters to the RS232_1 device.

27,20,0
Set the RTS hardware handshake's output to high (> 3V).
	Syntax:
	`SEND_STRING <DEV>,"27,20,0"`
	Example:
	`SEND_STRING RS232_1,"27,20,0"`
	Sets the RTS hardware handshake's output to high on the RS232_1 device.

RS-232/422/485 Send_String Escape Sequences (Cont.)	
Command	**Description**

27,20,1
Set the RTS hardware handshake's output to low/inactive (< 3V).
	Syntax:
	`SEND_STRING <DEV>,"27,20,1"`
	Example:
	`SEND_STRING RS232_1,"27,20,1"`
	Sets the RTS hardware handshake's output to low on the RS232_1 device.

IR / Serial Ports Channels

IR / Serial Ports Channels	
CHANNELS:	**Description**
00001 - 00229	IR commands.
00229 - 00253	May be used for system call feedback.
00254	Power Fail. (Used w/ 'PON' and 'POF' commands).
00255	Power status. (Shadows I/O Link channel status).
00256 - 65000	IR commands.
65000 - 65534	Future use.

NOTE

The NI series of NetLinx Masters support Serial control via the IR/RX port when using firmware version 300 or greater.

IR RX Port Channels

IR / Serial Ports Channels	
00001 - 00255	PUSH and RELEASE channels for the received IR code.

IR/Serial Send_Commands

The following IR and IR/Serial Send_Commands generate control signals for external equipment. In these examples: <DEV> = device.

IR/Serial Send_Commands	
Command	**Description**

CAROFF
Disable the IR carrier signal until a 'CARON' command is received.
	Syntax:
	`SEND_COMMAND <DEV>,"'CAROFF'"`
	Example:
	`SEND_COMMAND IR_1,"'CAROFF'"`
	Stops transmitting IR carrier signals to the IR_1 port.

CARON
Enable the IR carrier signals (default).
	Syntax:
	`SEND_COMMAND <DEV>,"'CARON'"`
	Example:
	`SEND_COMMAND IR_1,"'CARON'"`
	Starts transmitting IR carrier signals to the IR_1 port.

IR/Serial Send_Commands (Cont.)

Command	Description

CH
Send IR pulses for the selected channel.
	All channels below 100 are transmitted as two digits. If the IR code for ENTER (function #21) is loaded, an Enter will follow the number. If the channel is greater than or equal to (>=) 100, then IR function 127 or 20 (whichever exists) is generated for the one hundred digit. Uses 'CTON' and 'CTOF' times for pulse times.
	Syntax:
	`SEND_COMMAND <DEV>,"'CH',<channel number>"`
	Variable:
	channel number = 0 - 199.
	Example:
	`SEND_COMMAND IR_1,"'CH',18"`
	This device performs the following:
	• Transmits IR signals for 1 (IR code 11). The transmit time is set with the CTON command.
	• Waits until the time set with the CTOF command elapses.
	• Transmits IR signals for 8 (IR code 18).
	• Waits for the time set with the CTOF command elapses. If the IR code for Enter (IR code 21) is programmed, the Controller performs the following steps.
	• Transmits IR signals for Enter (IR code 21).
	• Waits for the time set with the CTOF command elapses.

CP
Halt and Clear all active or buffered IR commands, and then send a single IR pulse.
	You can set the Pulse and Wait times with the 'CTON' and 'CTOF' commands.
	Syntax:
	`SEND_COMMAND <DEV>,"'CP',<code>"`
	Variable:
	code = IR port's channel value 0 - 252 (253 - 255 reserved).
	Example:
	`SEND_COMMAND IR_1,"'CP',2"`
	Clears the active/buffered commands and pulses IR_1 port's channel 2.

CTOF
Set the duration of the Off time (no signal) between IR pulses for channel and IR function transmissions.
	Off time settings are stored in non-volatile memory. This command sets the delay time between pulses generated by the 'CH' or 'XCH' send commands in tenths of seconds.
	Syntax:
	`SEND_COMMAND <DEV>,"'CTOF',<time>"`
	Variable:
	time = 0 - 255. Given in 1/10ths of a second. Default is 5 (0.5 seconds).
	Example:
	`SEND_COMMAND IR_1,"'CTOF',10"`
	Sets the off time between each IR pulse to 1 second.

CTON
Set the total time of IR pulses transmitted and is stored in non-volatile memory.
	This command sets the pulse length for each pulse generated by the 'CH' or 'XCH' send commands in tenths of seconds.
	Syntax:
	`SEND_COMMAND <DEV>,"'CTON',<time>"`
	Variable:
	time = 0 - 255. Given in 1/10ths of a second. Default is 5 (0.5 seconds).
	Example:
	`SEND_COMMAND IR_1,"'CTON',20"`
	Sets the IR pulse duration to 2 seconds.

IR/Serial Send_Commands (Cont.)

Command	Description

GET BAUD
Get the IR port’s current DATA mode communication parameters.
	The port sends the parameters to the device that requested the information. Only valid if the port is in Data Mode (see SET MODE command).
	The port responds with:
	<port #> <baud>,<parity>,<data bits>,<stop bits>
	Syntax:
	`SEND_COMMAND <DEV>,"'GET BAUD'"`
	Example:
	`SEND_COMMAND IR_1,"'GET BAUD'"`
	System response example:
	`PORT 9 IR,CARRIER,IO LINK 0`

GET MODE
Poll the IR/Serial port's configuration parameters and report the active mode settings to the device requesting the information.
	The port responds with: <port #> <mode>,<carrier>,<io link channel>.
	Syntax:
	`SEND_COMMAND <DEV>,"'GET MODE'"`
	Example:
	`SEND_COMMAND IR_1,"'GET MODE"`
	The system could respond with:
	PORT 4 IR,CARRIER,IO LINK 0

IROFF
Halt and Clear all active or buffered IR commands being output on the designated port.
	Syntax:
	`SEND_COMMAND <DEV>,"'IROFF'"`
	Example:
	`SEND_COMMAND IR_1,"'IROFF"`
	Immediately halts and clears all IR output signals on the IR_1 port.

POD
Disable previously active 'PON' (power on) or 'POF' (power off) command settings.
	Channel 255 changes are enabled. This command is used in conjunction with the I/O Link command.
	Syntax:
	`SEND_COMMAND <DEV>,"'POD'"`
	Example:
	`SEND_COMMAND IR_1,"'POD"`
	Disables the 'PON' and 'POF' command settings on the IR_1 device.

POF
Turn Off a device connected to an IR port based on the status of the corresponding I/O Link input.
	If at any time the IR sensor input reads that the device is ON (such as if someone turned it on manually at the front panel), IR function 28 (if available) or IR function 9 is automatically generated in an attempt to turn the device back OFF. If three attempts fail, the IR port will continue executing commands in the buffer.
	If there are no commands in the buffer, the IR port will continue executing commands in the buffer and trying to turn the device OFF until a 'PON' or 'POD' command is received. If the IR port fails to turn the device OFF, a PUSH and RELEASE is made on channel 254 to indicate a power failure error. You can only use the 'PON' and 'POF' commands when an IR device has a linked I/O channel. Channel 255 changes are disabled after receipt of this command.
	You can only use the 'PON' and 'POF' commands when an IR device has a linked I/O channel.
	Syntax:
	`SEND_COMMAND <DEV>,"'POF'"`
	Example:
	`SEND_COMMAND IR_1,"'POF'"`
	Sends power down IR commands 28 (if present) or 9 to the IR_1 device.

IR/Serial Send_Commands (Cont.)

Command	**Description**
PON *Turn On a device connected to an IR port based on the status of the corresponding I/O Link input.*	If at any time the IR sensor input reads that the device is OFF (such as if one turned it off manually at the front panel), IR function 27 (if available) or IR function 9 is automatically generated in an attempt to turn the device back ON. If three attempts fail, the IR port will continue executing commands in the buffer and trying to turn the device On. If there are no commands in the buffer, the IR port will continue trying to turn the device ON until a 'POF' or 'POD' command is received. If the IR port fails to turn the device ON, a PUSH and RELEASE is made on channel 254 to indicate a power failure error. You can only use the 'PON' and 'POF' commands when an IR device has a linked I/O channel. Channel 255 changes are disabled after receipt of this command.

PON (Cont.)	Syntax:
	`SEND_COMMAND <DEV>,"'PON'"`
	Example:
	`SEND_COMMAND IR_1,"'PON'"`
	Sends power up IR commands 27 or 9 to the IR_1 port.

PTOF
Set the time duration between power pulses in .10-second increments.
	This time increment is stored in permanent memory. This command also sets the delay between pulses generated by the 'PON' or 'POF' send commands in tenths of seconds. It also sets the delay required after a power ON command before a new IR function can be generated. This gives the device time to power up and get ready for future IR commands.
	Syntax:
	`SEND_COMMAND <DEV>,"'PTOF',<time>"`
	Variable:
	time = 0 - 255. Given in 1/10ths of a second. Default is 15 (1.5 seconds).
	Example:
	`SEND_COMMAND IR_1,"'PTOF',15"`
	Sets the time between power pulses to 1.5 seconds for the IR_1 device.

PTON
Set the time duration of the power pulses in .10-second increments
	This time increment is stored in permanent memory. This command also sets the pulse length for each pulse generated by the 'PON' or 'POF' send commands in tenths of seconds.
	Syntax:
	`SEND_COMMAND <DEV>,"'PTON',<time>"`
	Variable:
	time = 0 - 255. Given in 1/10ths of a second. Default is 5 (0.5 seconds).
	Example:
	`SEND_COMMAND IR_1,"'PTON',15"`
	Sets the duration of the power pulse to 1.5 seconds for the IR_1 device.

IR/Serial Send_Commands (Cont.)

Command	Description

SET BAUD
Set the IR port's DATA mode communication parameters.
	Only valid if the port is in Data Mode (see SET MODE command).
	Syntax:
	`SEND_COMMAND <DEV>,"'SET BAUD <baud>,<parity>,<data>,<stop>'"`
	Variables:
	baud = baud rates are: 19200, 9600, 4800, 2400, and 1200.
	parity = N (none), O (odd), E (even), M (mark), S (space).
	data = 7 or 8 data bits.
	stop = 1 and 2 stop bits.
	Example:
	`SEND_COMMAND IR_1,"'SET BAUD 9600,N,8,1'"`
	Sets the IR_1 port's communication parameters to 9600 baud, no parity, 8 data bits, and 1 stop bit.
	Note: *The maximum baud rate for ports using SERIAL mode is 192000. Also, SERIAL mode works best when using a short cable length (< 10 feet).*

SET IO LINK
Link an IR or Serial port to a selected I/O channel for use with the 'DE', 'POD', 'PON', and 'POF' commands.
	The I/O status is automatically reported on channel 255 on the IR port. The I/O channel is used for power sensing (via a PCS or VSS). A channel of zero disables the I/O link.
	Syntax:
	`SEND_COMMAND <DEV>,"'SET IO LINK <I/O number>'"`
	Variable:
	I/O number = 1 - 8. Setting the I/O channel to 0 disables the I/O link.
	Example:
	`SEND_COMMAND IR_1,"'SET IO LINK 1'"`
	Sets the IR_1 port link to I/O channel 1. The IR port uses the specified I/O input as power status for processing 'PON' and 'POF' commands.

SET MODE
Set the IR/Serial ports for IR or Serial-controlled devices.
	Sets an IR port to either **IR**, **Serial**, or **Data** mode.
	Syntax:
	`SEND_COMMAND <DEV>, 'SET MODE <mode>'"`
	Variable:
	mode = IR, SERIAL, or DATA.
	Example:
	`SEND_COMMAND IR_1,"'SET MODE IR'"`
	Sets the IR_1 port to IR mode for IR control.
	Note: *The maximum baud rate for ports using SERIAL mode is 192000. Also, SERIAL mode works best when using a short cable length (< 10 feet).*

SP
Generate a single IR pulse.
	Use the 'CTON' to set pulse lengths and the 'CTOF' for time Off between pulses.
	Syntax:
	`SEND_COMMAND <DEV>,"'SP',<code>"`
	Variable:
	code = IR code value 1 - 252 (253-255 reserved).
	Example:
	`SEND_COMMAND IR_1, "'SP',25"`
	Pulses IR code 25 on IR_1 device.

IR/Serial Send_Commands (Cont.)

Command	Description
XCH *Transmit the selected channel IR codes in the format/ pattern set by the 'XCHM' send command.*	Syntax: `SEND_COMMAND <DEV>,"'XCH <channel>'"` Variable: channel = 0 - 999. Example: For detailed usage examples, refer to the 'XCHM' command.

XCHM
Changes the IR output pattern for the 'XCH' send command.
	Syntax:
	`SEND_COMMAND <DEV>,"'XCHM <extended channel mode>'"`
	Variable:
	extended channel mode = 0 - 4.
	Example:
	`SEND_COMMAND IR_1,"'XCHM 3'"`
	Sets the IR_1 device's extended channel command to mode 3.
	Mode 0 Example (default): [x][x]<x><enter>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	Transmits the IR code as 3-enter.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	Transmits the IR code as 3-4-enter.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	Transmits the IR code as 3-4-3-enter.
	Mode 1 Example: <x> <x> <x> <enter>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	Transmits the IR code as 0-0-3-enter.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	Transmits the IR code as 0-3-4-enter.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	Transmits the IR code as 3-4-3-enter.
	Mode 2 Example: <x> <x> <x>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	Transmits the IR code as 0-0-3.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	Transmits the IR code as 0-3-4.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	Transmits the IR code as 3-4-3.
	Mode 3 Example: [[100][100]…] <x> <x>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	Transmits the IR code as 0-3.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	Transmits the IR code as 3-4.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	Transmits the IR code as 100-100-100-4-3.
	Mode 4:
	Mode 4 sends the same sequences as the 'CH' command. Only use Mode 4 with channels 0 - 199.

Input/Output Send_Commands

The following Send_Commands program the I/O ports on the Integrated Controller.

I/O ports: Port 4 (NI-700).
Channels: 1 - 8 I/O channels.

I/O Send Commands

Command	**Description**

GET INPUT
Get the active state for the selected channels.
	An active state can be high (logic high) or low (logic low or contact closure). Channel changes, Pushes, and Releases generate reports based on their active state. The port responds with either 'HIGH' or 'LOW'.
	Syntax:
	`SEND_COMMAND <DEV>,"'GET INPUT <channel>'"`
	Variable:
	channel = Input channel 1 - 8.
	Example:
	`SEND_COMMAND IO,"'GET INPUT 1'"`
	Gets the I/O port's active state.
	The system could respond with:
	`INPUT1 ACTIVE HIGH`

SET INPUT
Set the input channel's active state.
	An active state can be high (logic high) or low (logic low or contact closure). Channel changes, Pushes, and Releases generate reports based on their active state. Setting an input to ACTIVE HIGH will disable the ability to use that channel as an output.
	Syntax:
	`SEND_COMMAND <DEV>,"'SET INPUT <channel> <state>'"`
	Variable:
	channel = Input channel 1 - 8.
	state = Active state HIGH or LOW (default).
	Example:
	`SEND_COMMAND IO,"'SET INPUT 1 HIGH'"`
	Sets the I/O channel to detect a high state change, and disables output on the channel.

Terminal (Program Port/Telnet) Commands

Overview

There are two types of terminal communications available on NetLinx Integrated Controllers:

- **Program Port** - The "Program" port is a RS232 port located on the rear panel of the Master that allows terminal communication with the Master. This type of terminal communication requires that you are physically connected to the Master to access the configuration options and commands supported. Since this method of terminal communication requires physical proximity as well as a physical connection to the Master, it is the most secure form of terminal communication.

  For this reason, all Security Configuration options are only available via the Program port (and cannot be access via Telnet).
- **Telnet** - This type of terminal communication can be accessed remotely, via TCP/IP. It is a less secure form of terminal communication, since it does not require a physical connection to the Master to connect. Further, the Telnet interface exposes information to the network (which could be intercepted by an unauthorized network client).

NOTE

It is recommended that you make initial configurations as well as subsequent changes via the WebConsole. Refer to the Onboard WebConsole User Interface section on page 21*.*

Refer to the *Terminal Commands* section on page 93 for a listing of all commands available in a terminal session.

Note that all commands in the table are available for both Program Port and Telnet sessions, with two exceptions: "Help Security" and "Resetadminpassword". These commands are only available via a Program Port connection.

Establishing a Terminal Connection Via the Program Port

To establish a terminal session via the Program Port, the PC COM (RS232) port on your PC must be physically connected to the Program port on the NetLinx Master.

You will also need to know the current baud rate setting for the Master, so that you can verify that it matches the settings on your PC.

1. In Windows, go to **Start** > **Programs** > **Accessories** > **Communications** to launch the *HyperTerminal* application to open the *Connection Description* dialog.
2. Enter any text into the *Name* field and click **OK**. This action invokes the *Connect to* dialog.
3. Click the down-arrow From the *Connect Using* field, and select the PC COM port being used for communication by the target Master and click **OK** when done.
4. From the *Bits per second* field, click the down-arrow and select the baud rate being used by the target Master.
5. Configure the remaining communication parameters as follows:

• **Data Bits:**	8
• **Parity:**	None
• **Stop bits:**	1
• **Flow control:**	None

6. Click **OK** to complete the communication parameters and open a new Terminal window.
7. Type **echo on** to view the characters while entering commands. If that does not work, press <Enter> key on your keyboard.

NOTE

It is very important to execute the 'logout' command prior to disconnecting from a Master. Simply removing the RS-232 connector from the Program Port maintains your logged-in status until you either return to logout via a new session or reboot the target Master.

PC COM Port Communication Settings

Be sure that your PC's COM port and terminal program's communication settings match those in the table below:

PC COM Port Communication Settings	
Baud:	38400 (default)
Parity:	None
Data Bits:	8
Stop Bits:	1
Flow Control:	None

NetLinx Integrated Controllers - Port Assignments

Each of the NetLinx Integrated Controllers has specific port assignments:

NI-700 Port Assignments

Port	ICSP Port #
Serial Port #1	1
Serial Port #2	2
IR/Serial Port	3
I/O Port	4
IR RX Port	5

NI-900 Port Assignments

Port	ICSP Port #
Serial Port #1	1
IR/Serial Port #1	2
IR/Serial Port #2	3
IR/Serial Port #3	4
I/O Port	5
IR RX Port	6

Establishing a Terminal Connection Via Telnet

1. In your Windows taskbar, go to **Start** > **Run** to open the Run dialog.
2. Type **cmd** in the *Open* field and click **OK** to open an instance of the Windows command interpreter (Cmd.exe).
3. In the CMD (command), type "**telnet**" followed by a space and the Master’s IP Address info.

   Example: `>telnet XXX.XXX.XXX.XXX`
4. Press *Enter*.
   - Unless Telnet security is enabled, a session will begin with a welcome banner:

     ```
     Welcome to NetLinx vX.XX.XXX Copyright AMX Corp. 1999-2006
     >
     ```
   - If Telnet security is enabled, type in the word **login** to be prompted for a Username and Password before gaining access to the Master.
5. Enter your username to be prompted for a password.
   - If the password is correct you will see the welcome banner.
   - If the password is incorrect, the following will be displayed:

```
Login: User1
Password: *****
Login not authorized. Please try again.
```

After a delay, another login prompt will be displayed to allow you to try again.

If after 5 prompts, the login information is not entered correctly, the following message will be displayed and the connection closed:

```
Login not allowed. Goodbye!
```

NOTE

If a connection is opened, but a valid a username / password combination is not entered (i.e. just sitting at a login prompt), the connection will be closed after one minute.

Terminal Commands

The Terminal commands listed in the following table can be sent directly to the Master via either a Program Port or a Telnet terminal session (with the exception of the "*Help Security*" and "*Resetadminpassword*" commands, which are only available to a Program Port (RS232) connection.

In your terminal program, type "**Help**" or a question mark ("**?**") and **<Enter>** to access the Help Menu, and display the Program port commands described below:

Terminal Commands	
Command	**Description**
`----- Help ----- <D:P:S>`	(Extended diag messages are OFF) `<D:P:S>`: Device:Port:System. If omitted, assumes Master.
`? or Help`	Displays this list of commands.

`DATE`	Displays the current date and day of the week.
	Example:
	`>DATE`
	`10/31/2004 Wed`

`DEVICE HOLDOFF ON|OFF`	Sets the Master to holdoff devices (i.e. does not allow them to report ONLINE) until all objects in the NetLinx program have completed executing the `DEFINE_START` section.
	If set to `ON`, any messages to devices in `DEFINE_START` will be lost, however, this prevents incoming messages being lost in the Master upon startup.
	When `DEVICE_HOLDOFF` is `ON`, you must use `ONLINE` events to trigger device startup `SEND_COMMAND`s.
	By default, `DEVICE HOLDOFF` is `OFF` to maintain compatibility with Axcess systems where devices are initialized in `DEFINE_START`.
	Note*: This command sets the state of the device holdoff. The GET DEVICE HOLDOFF command reveals whether the state is On or Off.*
	Example:
	`>Device Holdoff ON`
	`Device Holdoff Set.`

`DEVICE STATUS <D:P:S>`	Displays a list of all active (on) channels for the specified D:P:S. If you enter DEVICE STATUS without the D:P:S variable, the Master displays ports, channels, and version information.

`DISK FREE`	Displays the total bytes of free space available on the Master.
	Example:
	`>DISK FREE`
	`The disk has 2441216 bytes of free space.`

Terminal Commands (Cont.)

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>DNS LIST <D:P:S&gt;</td><td>Displays the DNS configuration of a specific device including:
• Domain suffix·
• Configured DNS IP Information
Example:<pre>
>DNS LIST [0:1:0]
 Domain suffix:amx.com
  The following DNS IPs are configured
  Entry 1-192.168.20.5
  Entry 2-12.18.110.8
  Entry 3-12.18.110.7
</pre></td></tr>
<tr><td>ECHO ON|OFF</td><td>Enables/Disables echo (display) of typed characters.</td></tr>
<tr><td>GET DEVICE HOLDOFF</td><td>Displays the state of the Master’s device holdoff setting.
<b><i>Note</i></b><i>: This command reveals the state of the device holdoff set using the DEVICE HOLDOFF ON|OFF command.</i>
Example:<pre>
>GET DEVICE HOLDOFF
 Device Holdoff is off.
</pre></td></tr>
<tr><td>GET DUET MEMORY</td><td>Display the amount of memory allocated for Duet Java pool. This is the current Java memory heap size as measured in Megabytes. An example is a value of 5 = 5 MB.</td></tr>
<tr><td>GET ETHERNET MODE</td><td>Displays the current ethernet configuration setting.
Settings are either "auto" in which the ethernet driver will discover it's settings based on the network it is connected to OR <speed> and <duplex> where speed is either 10 or 100 and duplex is either full or half.
Example:<pre>
>GET ETHERNET MODE
 Ethernet mode is auto.
</pre><b><i>Note</i></b><i>: See SET ETHERNET MODE.</i></td></tr>
<tr><td>GET IP &lt;D:P:S&gt;</td><td>Displays the IP configuration of a device.
If you enter GET IP without the D:P:S variable, the Master displays it’s D:P:S, Host Name, Type (DHCP or Static), IP Address, Subnet Mask, Gateway IP, and MAC Address.
Example:<pre>
>GET IP [0:1:50]
  IP Settings for 0:1:50
     HostName   MLK_INSTRUCTOR
     Type   DHCP
     IP Address 192.168.21.101
     Subnet Mask 255.255.255.0
     Gateway IP 192.168.21.2
     MAC Address 00:60:9f:90:0d:39
</pre></td></tr>
<tr><td>HELP SECURITY</td><td>Displays security related commands.
<b><i>Note</i></b><i>: This command is only available to Program Port terminal sessions. It is not available to Telnet sessions (see the Overview</i> section on page 91<i>).</i>
Example:<pre>
>HELP SECURITY
>logout   Logout and close secure session
>setup security Access the security setup menus
</pre></td></tr>
<tr><td>ICSPMON ENABLED|DISABLED
[PORT]</td><td>Enables or disables ICSP monitoring out the specified IP port.
By enabling icspmon on an IP port, an external application could connect to that port and "listen" on the ICSP traffic.</td></tr>
</table>

Terminal Commands (Cont.)

Command	Description

`IP STATUS`	Provides information about the current NetLinx IP Connections.
	Example:
	`>IP STATUS`
	` NetLinx IP Connections`
	` No active IP connections`

`IPSEC ON|OFF|STATUS`	Enables/Disables IPSec security or displays current setting.

`MEM`	Displays the largest free block of the Master's memory.
	Example:
	`>MEM`
	`The largest free block of memory is 11442776 bytes.`

`MSG ON|OFF`	Enables/Disables extended diagnostic messages.
	• MSG On sets the terminal program to display all messages generated by the Master.
	• MSG OFF disables the display.
	Example:
	`> MSG ON`
	`  Extended diagnostic information messages turned on.`
	`> MSG OFF`
	`  Extended diagnostic information messages turned off.`

`OFF [D:P:S or NAME,CHAN]`	Turns off a specified channel on a device. The device can be on any system that the Master you are connected to is able to reach.
	You can specify the device number, port, and system, or the name of the device that is defined in the DEFINE_DEVICE section of the program.
	Syntax:
	`OFF[name,channel]`
	-or-
	`OFF[D:P:S,channel]`
	Example:
	`>OFF[5001:7:4]`
	` Sending Off[5001:7:4]`

`ON [D:P:S or NAME,CHAN]`	Turns on a specified channel on a device. The device can be on any system that the Master you are connected to is able to reach.
	You can specify the device number, port, and system, or the name of the device that is defined in the DEFINE_DEVICE section of the program.
	Syntax:
	`ON[name,channel]`
	-or-
	`ON[D:P:S,channel]`
	Example:
	`>ON[5001:7:4]`
	` Sending On[5001:7:4]`

Terminal Commands (Cont.)	
Command	**Description**

`PASS [D:P:S or NAME]`	Sets up a pass through mode to a device. In pass through mode, any string received by the device is displayed on the screen, and anything typed is sent as a string to the device.
	The device can be on any system that the Master you are connected to is able to reach.
	You can specify the device number, port, and system, or the name of the device that is defined in the DEFINE_DEVICE section of the program.
	• Mode is exited by ++ ESC ESC.
	• Display Format is set by ++ ESC `n`
	Where `n` =
	A, format = ASCII
	D, format = Decimal
	H = Hex
	Note*: Refer to the ESC Pass Codes* section on page 106 *for detailed descriptions of the supported pass codes.*
	Example:
	`>pass[5001:7:4]`
	` Entering pass mode.`

`PING [ADDRESS]`	Pings an address (IP or URL), to test network connectivity to and confirms the presence of another networked device. The syntax is just like the PING application in Windows or Linux.
	Example:
	`>ping 192.168.29.209`
	` 192.168.29.209 is alive.`

`PROGRAM INFO`	Displays a list of program files and modules residing on the Master.
	Example:
	`>PROGRAM INFO`
	` -- Program Name Info`
	` -- Module Count = 1`
	`      1   Name is i!-PCLinkPowerPointTest`
	
	` -- File Names = 2`
	`      1 = C:\Program Files\AMX Applications\i!-`
	`PCLinkPowerPoint`
	`      2 = C:\Program Files\Common`
	`Files\AMXShare\AXIs\NetLinx.axi`
	`      2 = Name is MDLPP`
	
	` -- File Names = 2`
	`      1 C:\AppDev\i!-PCLink-PowerPoint\i!-`
	`PCLinkPowerPointMod.axs`
	`      2 C:\Program files\Common`
	`Files\AMXShare\AXIs\NetLinx.axi`

`PULSE [D:P:S or NAME,CHAN]`	Pulses a specified channel on a device on and off. The device can be on any system the Master you are connected to can reach.
	You can specify the device number, port, and system; or the name of the device that is defined in the DEFINE_DEVICE section of the program.
	Example:
	`>PULSE[50001:8:50,1]`
	`Sending Pulse[50001:8:50,1]`

`PWD`	Displays the name of the current directory.
	Example:
	`pwd`
	`      The current directory is doc:`

Terminal Commands (Cont.)

Command	Description

`REBOOT <D:P:S>`	Reboots the Master or specified device.
	Example:
	`>REBOOT [0:1:0]`
	` Rebooting...`

`RELEASE DHCP`	Releases the current DHCP lease for the Master. ***Note**: The Master must be rebooted to acquire a new DHCP lease.* Example: `>RELEASE DHCP`
`RESETADMINPASSWORD`	This command resets the administrator password back to "password". ***Note**: This command is only available to Program Port terminal sessions. It is not available to Telnet sessions (see the Overview* section on page 91*).*

`ROUTE MODE DIRECT|NORMAL`	Sets the Master-to-Master route mode:
	• Normal mode - allows a Master to communicate with any Master accessible via the routing tables (shown with the SHOW ROUTE command).
	This includes a directly-connected Master (route metric =1) and indirectly connected Masters (route metric greater than 1, but less than 16).
	• Direct mode - allows communication only with Masters that are directly connected (route metric = 1). Indirectly connected Masters cannot be communicated within this mode.
	Examples:
	`>ROUTE MODE DIRECT`
	` Route Mode "Direct" Set`
	`>ROUTE MODE NORMAL`
	` Route Mode "Normal" Set`

`SEND_COMMAND D:P:S or NAME,COMMAND`	Sends a specified command to a device. The device can be on any system that the Master you are connected to can reach.
	You can specify the device number, port, and system; or the name of the device that is defined in the DEFINE_DEVICE section of the NetLinx Program.
	The data of the string is entered with the following NetLinx string syntax:
	`SEND_COMMAND 1:1:1,"'This is a test',13,10"`
	`SEND_COMMAND RS232_1,"'This is a test',13,10"`

`SEND_STRING D:P:S or NAME,STRING`	Sends a string to a specified device. The device can be on any system that the Master you are connected to can reach. You can specify the device number, port, and system; or the name of the device defined in the DEFINE_DEVICE section of the NetLinx Program. The data of the string is entered with NetLinx string syntax.

`SET DATE`	Prompts you to enter the new date for the Master.
	When the date is set on the Master, the new date will be reflected on all devices in the system that have clocks (i.e. touch panels). By the same token, if you set the date on any system device, the new date will be reflected on the system's Master, and on all connected devices.
	***Note**: This command will not update clocks on devices connected to another Master (in Master-to-Master systems).*
	Example:
	`>SET DATE`
	` Enter Date: (mm/dd//yyyy) ->`

<table>
<tr><th colspan="2">Terminal Commands (Cont.)</th></tr>
<tr><th>Command</th><th>Description</th></tr>
<tr><td><code>SET DNS <D:P:S&gt;</code></td><td>
Sets up the DNS configuration of a device.
This command prompts you to enter a Domain Name, DNS IP #1, DNS IP #2, and DNS IP #3.
Then, enter Y (yes) to approve/store the information in the Master.
Entering N (no) cancels the operation.
<b><i>Note</i></b><i>: The device must be rebooted to enable new settings.</i>
Example:
<pre>
>SET DNS [0:1:0]
-- Enter New Values or just hit Enter to keep current
settings --

  Enter Domain Suffix: amx.com
  Enter DNS Entry 1 : 192.168.20.5
  Enter DNS Entry 2 : 12.18.110.8
  Enter DNS Entry 3 : 12.18.110.7

  You have entered: Domain Name: amx.com
                     DNS Entry 1: 192.168.20.5
                     DNS Entry 2: 12.18.110.8
                     DNS Entry 3: 12.18.110.7

  Is this correct? Type Y or N and Enter -> Y
  Settings written. Device must be rebooted to enable
  new settings
</pre>
</td></tr>
<tr><td><code>SET DUET MEMORY</code></td><td>
Set the amount of memory allocated for Duet Java pool. This is the current Java memory heap size as measured in Megabytes. This feature is used so that if a NetLinx program requires a certain size of memory be allotted for its currently used Duet Modules, it can be reserved on the target Master.
Valid values are:
• 2 - 8 for 32MB systems
• 2 - 36 for 64MB systems.
This setting does not take effect until the next reboot.
<b><i>Note:</i></b><i> If you are trying to accomplish this setting of the Duet Memory size via a NetLinx program, the program command "DUET_MEM_SIZE_SET(int)" should call REBOOT() following a set.</i>
</td></tr>
<tr><td><code>SET ETHERNET MODE &lt;CMD&gt;</code></td><td>
This command sets the current ethernet configuration settings - auto OR speed = 10 | 100, duplex = full | half
Example:
<pre>
set ethernet mode auto
      set ethernet mode speed=100 duplex=full
</pre>
<b><i>Note</i></b><i>: See GET ETHERNET MODE.</i>
</td></tr>
<tr><td><code>SET FTP PORT</code></td><td>
Enables/Disables the Master’s IP port listened to for FTP connections.
<b><i>Note</i></b><i>: The Master must be rebooted to enable new settings.</i>
Example:
<pre>
>SET FTP PORT
 FTP is enabled
 Do you want to enable (e) or disable (d) FTP (enter e or d):
 FTP enabled, reboot the master for the change to take affect.
</pre>
</td></tr>
<tr><td><code>SET HTTP PORT</code></td><td>
Sets the Master’s IP port listened to for HTTP connections.
<b><i>Note</i></b><i>: The Master must be rebooted to enable new settings.</i>
Example:
<pre>
>SET HTTP PORT
 Current HTTP port number = 80
 Enter new HTTP port number (Usually 80) (0=disable HTTP):
 Setting HTTP port number to
 New HTTP port number set, reboot the master for the change
 to take affect.
</pre>
</td></tr>
</table>

Terminal Commands (Cont.)

Command	Description

SET HTTPS PORT	Sets the Master's IP port listened to for HTTPS connections.
	***Note**: The Master must be rebooted to enable new settings.*
	Example:
	`>SET HTTPS PORT`
	` Current HTTPS port number = 443`
	` Enter new HTTPS port number (Usually 443) (0=disable HTTPS):`
	Once you enter a value and press the ENTER key, you get the following message:
	` Setting HTTPS port number to`
	` New HTTPS port number set, reboot the master for the change`
	` to take affect.`

SET ICSP PORT	Sets the Master's IP port listened to for ICSP connections.
	***Note**: The Master must be rebooted to enable new settings.*
	Example:
	`>SET ICSP PORT`
	`  Current ICSP port number = 1319`
	`  Enter new ICSP port number (Usually 1319) (0=disable ICSP):`
	Once you enter a value and press the ENTER key, you get the following message:
	`  Setting ICSP port number to`
	`  New ICSP port number set, reboot the master for the change`
	`  to take affect.`

SET ICSP TCP TIMEOUT	Sets the timeout period for ICSP and i!-WebControl TCP connections.
	***Note**: The new timeout value is immediately (no reboot required).*
	Example:
	`>SET ICSP TCP TIMEOUT`
	` This will set the timeout for TCP connections for both`
	`ICSP and i!-WebControl.When no communication has been`
	`detected for the specified number of seconds, the socket`
	`connection is closed.ICSP and i!-WebControl have built-in`
	`timeouts and reducing the TCP timeout below these will`
	`cause undesirable results. The default value is 45`
	`seconds.`
	`The current ICSP TCP timeout is 45 seconds`
	`Enter new timeout (in seconds):`
	Once you enter a value and press the ENTER key, you get the following message:
	`New timeout value set (in affect immediately).`

SET IP <D:P:S>	Sets the IP configuration of a specified device.
	Enter a Host Name, Type (DHCP or Fixed), IP Address, Subnet Mask, and Gateway IP Address.
	***Note**: For NetLinx Central Controllers, the "Host Name" can only consist of alphanumeric characters.*
	• Enter Y (yes) to approve/store the information into the Master.
	• Enter N (no) to cancel the operation.
	***Note**: The Device must be rebooted to enable new settings.*
	Example:
	`>SET IP [0:1:0]`
	` --- Enter New Values or just hit Enter to keep current settings ---`
	
	` Enter Host Name:    MLK_INSTRUCTOR`
	` Enter IP type. Type D for DHCP or S for Static IP and then Enter:`
	`DHCP`
	` Enter Gateway IP:   192.168.21.2`
	
	` You have entered: Host Name   MLK_INSTRUCTOR`
	`                   Type        DHCP`
	`                   Gateway IP  192.168.21.2`
	` Is this correct? Type Y or N and Enter -> y`
	` Settings written. Device must be rebooted to enable new settings.`

Terminal Commands (Cont.)

Command	Description

SET LOG COUNT	Sets the number of entries allowed in the message log.
	***Note**: The Master must be rebooted to enable new settings.*
	Example:
	`>SET LOG COUNT`
	`  Current log count = 1000`
	`  Enter new log count (between 50-10000):`
	Once you enter a value and press the ENTER key, you get the following message:
	`  Setting log count to`
	`  New log count set, reboot the Master for the`
	`  change to take affect.`

SET QUEUE SIZE	Provides the capability to modify maximum message queue sizes for various threads. Example: `set queue size` This will set the maximum message queue sizes for several threads. ***Use caution when adjusting these values.*** **Set Queue Size Menu:** 1. Interpreter (factory default=2000, currently=600) 2. Notification Manager (factory default=2000, currently=200) 3. Connection Manager (factory default=2000, currently=500) 4. Route Manager (factory default=400, currently=200) 5. Device Manager (factory default=500, currently=500) 6. Diagnostic Manager (factory default=500, currently=500) 7. TCP Transmit Threads (factory default=600, currently=200) 8. IP Connection Manager (factory default=800, currently=500) 9. Message Dispatcher (factory default=1000, currently=500) 10. Axlink Transmit (factory default=800, currently=200) 11. PhastLink Transmit (factory default=500, currently=500) 12. ICSNet Transmit (factory default=500, currently=500) 13. ICSP 232 Transmit (factory default=500, currently=500) 14. UDP Transmit (factory default=500, currently=500) 15. NI Device (factory default=500, currently=500) Enter choice or press ESC.

SET SSH PORT	Sets the Master's IP port listened to for SSH connections.
	***Note**: The Master must be rebooted to enable new settings.*
	Example:
	`>SET SSH PORT`
	`  Current SSH port number = 22`
	`  Enter new SSH port number (Usually 22) (0=disable SSH):`
	Once you enter a value and press the ENTER key, you get the following message:
	`  Setting SSH port number to 22`
	`  New SSH port number set, reboot the Master for`
	`  the change to take affect.`

<table>
<tr><th colspan="2">Terminal Commands (Cont.)</th></tr>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>

```
SET TELNET PORT
```

</td><td>

Sets the Master’s IP port listened to for Telnet connections.

***Note**: The Master must be rebooted to enable new settings.*

Example:

```
>SET TELNET PORT
 Current telnet port number = 23
 Enter new telnet port number (Usually 23)(0=disable Telnet):
```

Once you enter a value and press the ENTER key, you get the following message:

```
   Setting telnet port number to 23
   New telnet port number set, reboot the Master for the
   change to take affect.
```

</td></tr>
<tr><td>

```
SET THRESHOLD
```

</td><td>

Sets the Master's internal message thresholds.

This command will set the thresholds of when particular tasks are pended. The threshold is the number of messages queued before a task is pended.

Use extreme caution when adjusting these values.

***Note**: The Master must be rebooted to enable new settings.*

Example:

```
>SET THRESHOLD

  -- This will set the thresholds of when particular tasks are
pended. The threshold is the number of messages queued before a task
is pended.--
  --Use extreme caution when adjusting these values.--
  Current Interpreter Threshold = 2000
  Enter new Interpreter Threshold (Between 1 and 2000)(Default=10):
```

Once you enter a value and press the ENTER key, you get the following message:

```
  Current Lontalk Threshold = 50
  Enter new Lontalk Threshold (Between 1 and 2000) (Default=50):50
  Current IP Threshold = 600
  Enter new IP Threshold (Between 1 and 2000) (Default=200): 600
  Setting Thresholds to: Interpreter 2000
                         Lontalk     50
                         IP          600
  New thresholds set, reboot the Master for the changes to
  take affect.
```

</td></tr>
<tr><td>

```
SET TIME
```

</td><td>

Sets the current time.

When the time is set on the Master, the new time will be reflected on all devices in the system that have clocks (i.e. touch panels). By the same token, if you set the time on any system device, the new time will be reflected on the system’s Master, and on all connected devices.

***Note**: This will not update clocks on devices connected to another Master (in Master-to-Master systems).*

Example:

```
>SET TIME
 Enter Date: (hh:mm:ss) ->
```

</td></tr>
<tr><td>

```
SET TIMELINE LOOPCNT
```

</td><td>

Sets the Master's timeline/event max loopcount.

</td></tr>
</table>

Terminal Commands (Cont.)	
Command	**Description**

`SET UDP BC RATE`	Sets the UDP broadcast rate. A broadcast message is sent by the Master to allow devices to discover the Master. This command allows the broadcast frequency to be changed or eliminate the broadcast message.
	Example:
	`>SET UPD BC RATE`
	` Current broadcast message rate is 5 seconds between messages.`
	`  Enter broadcast message rate in seconds between messages`
	` (off=0 ; default=5) (valid values 0-300):`
	Once you enter a value and press the ENTER key, you get the following message:
	`  Setting broadcast message rate to 300 seconds between`
	`messages`
	`  New broadcast message rate set.`

`SET URL <D:P:S>`	Sets the initiated connection list URLs of a device.
	Enter the URL address and port number of another Master or device (that will be added to the URL list).
	• Enter Y (yes) to approve/store the new addresses in the Master.
	• Enter N (no) to cancel the operation.
	Example:
	`>SET URL [0:1:0]`
	`     No URLs in the URL connection list`
	` Type A and Enter to Add a URL or Enter to exit.`
	`> a`
	
	` Enter URL -> 192.168.21.200`
	` Enter Port or hit Enter to accept default (1319) ->`
	` Enter Type (Enter for permanent or T for temporary) ->`
	`     URL Added successfully.`

`SHOW BUFFERS`	Displays a list of various message queues and the number of buffers in each queue
	Example:
	`show buffers`
	`Thread       TX     RX    Queued`
	`----------- ----   ----   ----`
	`Axlink         0`
	`UDP            0          0-Sent=NO Waiting=NO`
	`IPCon Mgr      0`
	
	`Con Manager         0`
	`Interpreter         0`
	`Device Mgr          0`
	`Diag Mgr            0`
	`Msg Dispatch        0`
	`Cfg Mgr             0`
	`Route Mgr           0`
	`Notify Mgr          0`
	`            ----   ----   ----`
	`Total          0    0     0 GrandTotal 0`
	***Note**: See SHOW MAX BUFFERS.*

`SHOW COMBINE`	Displays a list of devices, levels, and channels that are currently combined.
	Example:
	`> SHOW COMBINE`
	`  Combines`
	`  --------`
	`  Combined Device([33096:1:1],[96:1:1])`
	`  Combined Level([33096:1:1,1],[128:1:1,1],[10128:1:1,1])`
	`  Combined Device([33128:1:1],[128:1:1],[10128:1:1])`

<table>
<tr><th colspan="2">Terminal Commands (Cont.)</th></tr>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>

`SHOW DEVICE <D:P:S>`

</td><td>

Displays a list of devices present on the bus, with their device attributes.

Example:

```
>SHOW DEVICE [0:1:0]
Local devices for system #1 (This System)
-------------------------------------------------------------------
---------
Device (ID)Model                (ID)Mfg                FWID Version
00000 (00256)NXC-ME260/64M      (00001)AMX Corp.         00336
v3.00.312
       (PID=0:OID=0) Serial=0,0,0,0,0,0,0,0,0,0,0,0,
       Physical Address=NeuronID 000531589201
         (00256)vxWorks Image    (00001)                  00337
v3.00.312
         (PID=0:OID=1) Serial=N/A
         (00256)BootROM          (00001)                  00338
v3.00.312
         (PID=0:OID=2) Serial=N/A
         (00256)AXlink I/F uContr(00001)                  00270
v1.03.14
         (PID=0:OID=3) Serial=0000000000000000
```

</td></tr>
<tr><td>

`SHOW LOG`

</td><td>

Displays the log of messages stored in the Master's memory.

The Master logs all internal messages and keeps the most recent messages. The log contains:·

- Entries starting with first specified or most recent
- Date, Day, and Time message was logged
- Which object originated the message
- The text of the message:

`SHOW LOG [start] [end]`

`SHOW LOG ALL`

- <start> specifies message to begin the display.

- If start is not entered, the most recent message will be first.

- If end is not entered, the last 20 messages will be shown.

- If <ALL> is entered, all stored messages will be shown, starting with the most recent.

Example:

```
>SHOW LOG
 Message Log for System 50 Version: v2.10.75
 Entry        Date/Time       Object
      Text
 -----------------------------------------------------------------
  1: 11-01-2001 THU 14:14:49 ConnectionManager
     Memory Available = 11436804 <26572>
  2: 11-01-2001 THU 14:12:14 ConnectionManager
     Memory Available = 11463376 <65544>
  3: 11-01-2001 THU 14:10:21 ConnectionManager
     Memory Available = 11528920 <11512>
  4: 11-01-2001 THU 14:10:21 TelnetSvr
 Accepted Telnet connection:socket=14 addr=192.168.16.110 port=2979
  5: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 10002:1:50
  6: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 128:1:50
  7: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OffLine 128:1:50
  8: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 96:1:50
  9: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OffLine 96:1:50
 10: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 128:1:50
 11: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 96:1:50
 12: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 5001:16:50
 13: 11-01-2001 THU 14:05:51 Interpreter
     CIpEvent::OnLine 5001:15:50
 14: 11-01-2001 THU 14:05:51 Interpreter
```

</td></tr>
</table>

<table>
<tr><th colspan="2">Terminal Commands (Cont.)</th></tr>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>SHOW MAX BUFFERS</td><td>

Displays a list of various message queues and the maximum number of message buffers that were ever present on the queue.

Example:

```
show max buffers
Thread       TX   RX
----------- ---- ----
Axlink         1
UDP            1
IPCon Mgr      0  (Total for TCP Connections TX=0)

Con Manager         8
Interpreter        17
Device Mgr          8
Diag Mgr            1
Msg Dispatch        0
Cfg Mgr             0
Route Mgr           0
Notify Mgr          0
            ---- ---- ----
Total          2   34 GrandTotal 36
```

See SHOW BUFFERS.

</td></tr>
<tr><td>SHOW MEM</td><td>Displays the memory usage for all memory types.</td></tr>
<tr><td>SHOW NOTIFY</td><td>

Displays the Notify Device List (Master-Master). This is a list of devices (up to 1000) that other systems have requested input from and the types of information needed.

***Note**: The local system number is **1061**.*

Example:

```
>SHOW NOTIFY

 Device Notification List of devices requested by other Systems

    Device:Port   System  Needs
    --------------------------------------------------
    00128:00001   00108   Channels Commands Strings Levels
    33000:00001   00108   Channels Commands
```

</td></tr>
<tr><td>SHOW REMOTE</td><td>

Displays the Remote Device List (Master-Master). This is a list of the devices this system requires input from and the types of information needed.

If when a NetLinx Master connects to another NetLinx Master, the newly connecting system has a device that the local system desires input from; the new system is told what information is desired from what device.

***Note**: The local system number is **1062**.*

Example:

```
>SHOW REMOTE

 Device List of Remote Devices requested by this System

   Device  Port  System  Needs
   --------------------------------------------------
   00001  00001  00001   Channels Commands
   00002  00001  00001   Channels Commands
   33000  00001  00001   Channels Commands
   00128  00001  00108   Channels Commands Strings Levels
   33000  00001  00108   Channels Commands
```

</td></tr>
</table>

<table>
<tr><th colspan="2">Terminal Commands (Cont.)</th></tr>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>SHOW ROUTE</td><td>Displays information about how this NetLinx Master is connected to other NetLinx Masters (routing information).
Example:<pre>
>SHOW ROUTE
   Route Data:

   System Route Metric PhyAddress

  -> 50   50   0   Axlink
</pre></td></tr>
<tr><td>SHOW SYSTEM <S></td><td>Displays a list of all devices in all systems currently on-line.
The systems lists are either directly connected to this Master (i.e. 1 hop away), or are referenced in the DEFINE_DEVICE section of the NetLinx program.
Optionally, you may provide the desired system number as a parameter to display only that system's information (e.g. SHOW SYSTEM 2001).
The systems listed are in numerical order.
Example:<pre>
>SHOW SYSTEM
 Local devices for system #50 (This System)

 Device (ID)Model   (ID)Mfg   FWID Version
 00000 (00256)Master   (00001)AMX Corp.   00256
v2.10.75
       (PID=0:OID=0) Serial='2010-12090',0,0,0,0,0,0
       Physical Address=NeuronID 000239712501
         (00256)vxWorks Image   (00001)   00257
v2.00.77
         (PID=0:OID=1) Serial=N/A
         (00256)BootROM   (00001)   00258
v2.00.76
         (PID=0:OID=2) Serial=N/A
        (00256)AXlink I/F uContr(00001)   00270   v1.02
         (PID=0:OID=3) Serial=0000000000000000
 00096 (00192)VOLUME 3 CONTROL BO(00001)AMX Corp.   00000
v2.10
       (PID=0:OID=0) Serial=0000000000000000
       Physical Address=Axlink
 00128 (00188)COLOR LCD TOUCH PAN(00001)AMX Corp.   32778
v5.01d
       (PID=0:OID=0) Serial=0000000000000000
       Physical Address=Axlink
 05001 (00257)NXI Download   (00001)AMX Corp.   00260
v1.00.20
       (PID=0:OID=0) Serial=0,0,0,0,0,0,0,0,0,0,0,0,
       Physical Address=NeuronID 000189145801
         (00257)NXI/NXI-1000 Boot(00001)   00261
v1.00.00
         (PID=0:OID=1) Serial=0,0,0,0,0,0,0,0,0,0,0,0,
 10002 (00003)PHAST PLK-IMS   (00001)Phast Corp.   0003
v3.12
       (PID=0:OID=0) Serial=0000000000000000
       Physical Address=NeuronID 0100417BD800
</pre></td></tr>
<tr><td>TCP LIST</td><td>Displays a list of active TCP/IP connections.
Example:<pre>
>TCP LIST
 The following TCP connections exist(ed):
 1: IP=192.168.21.56:1042 Socket=0 (Dead)
 2: IP=192.168.21.56:1420 Socket=0 (Dead)
</pre></td></tr>
<tr><td>TIME</td><td>Displays the current time on the Master.
Example:<pre>
>TIME
 13:42:04
</pre></td></tr>
</table>

Terminal Commands (Cont.)

Command	Description

`URL LIST <D:P:S>`	Displays the list of URL addresses programmed in the Master (or another system if specified).
	Example:
	`>URL LIST`
	`    The following URLs exist in the URL connection list`
	`  ->Entry 0-192.168.13.65:1319 IP=192.168.13.65`
	`State=Connected`
	`    Entry 1-192.168.13.200:1319 IP=192.168.13.200 State=Issue`
	`Connect`

ESC Pass Codes

There are 'escape' codes in the pass mode. These codes can switch the display mode or exit pass mode. The following 'escape' codes are defined.

Escape Pass Codes

Command	Description
`+ + ESC ESC`	*Exit Pass Mode:* Typing a plus (shift =) followed by another plus followed by an ESC (the escape key) followed by another escape exits the pass mode. The Telnet session returns to "normal".
`+ + ESC A`	*ASCII Display Mode:* Typing a plus (shift =) followed by another plus followed by an ESC (the escape key) followed by an 'A' sets the display to ASCII mode. Any ASCII characters received by the device will be displayed by their ASCII symbol. Any non-ASCII characters will be displayed with a \ followed by two hex characters to indicate the characters hex value.
`+ + ESC D`	*Decimal Display Mode:* Typing a plus (shift =) followed by another plus followed by an ESC (the escape key) followed by a 'D' sets the display to decimal mode. Any characters received by the device will be displayed with a \ followed by numeric characters to indicate the characters decimal value.
`+ + ESC H`	*Hex Display Mode:* Typing a plus (shift =) followed by another plus followed by an ESC (the escape key) followed by an 'H' sets the display to hexadecimal mode. Any characters received by the device will be displayed with a \ followed by two hex characters to indicate the characters hex value.

Accessing the Security Configuration Options

The help security option is only available to Program Port connections (see the *Overview* section on page 91).

1. In the Terminal session, type **help security** to view the available security commands. Here is a listing of the security help:

```
---- These commands apply to the Security Manager and Database ----
logout                    Logout and close secure session
setup security            Access the security setup menus
```

NOTE

The 'help security' and 'setup security' functions are only available via a direct RS232 Program Port connection. They are not available to Telnet sessions.

2. Type **setup security** to access the *Setup Security* menu, shown below:

```
>setup security

--- These commands apply to the Security Manager and Database ----
 1) Set system security options for NetLinx Master
 2) Display system security options for NetLinx Master
 3) Add user
 4) Edit user
 5) Delete user
 6) Show the list of authorized users
 7) Add group
 8) Edit group
 9) Delete group
10) Show list of authorized groups
11) Set Telnet Timeout in seconds
12) Display Telnet Timeout in seconds
13) Make changes permanent by saving to flash

Or <ENTER> to return to previous menu

Security Setup ->
```

3. The Setup Security menu shows a list of choices and a prompt. To select one of the listed choices, simply enter the number of the choice (**1** - **13**) at the prompt and press <Enter>.

Each option in the Setup Security menu displays a submenu specific to that option. The following subsections describe using each of the Setup Security menu options.

NOTE

Changes made to the target Master from within the Terminal window are not reflected within the web browser, until the Master is rebooted and the web browser connection is refreshed. Any changes made to the Master, from within the web browser are instantly reflected within the Terminal session without the need to reboot.

Setup Security Menu

The Setup Security menu is described below:

Setup Security Menu	
Command	**Description**
`1) Set system security options for NetLinx Master` See the *Security Options Menu* section on page 109 for descriptions of each menu item.	This selection will bring up the Security Options Menu that allows you to change the security options for the NetLinx Master. These are "global" options that enable rights given to users and groups. For instance, if you want to disable Telnet security for all users, you would simply go to this menu and disable Telnet security for the entire Master. This would allow any user, whether they have the rights to Telnet or not. These options can be thought of as options to turn on security for different features of the NetLinx Master.
`2) Display system security options for NetLinx Master`	This selection will display the current security options for the NetLinx Master.
`3) Add user`	This selection will prompt you for a name for the User you are adding. The User name must be a unique alpha-numeric string (4 - 20 characters). ***Note**: User and Group names are case sensitive.* After the User is added, you will be taken to the *Edit User* menu to setup the new User's right (see page 110).
`4) Edit user`	This selection will prompt you select a User to edit properties for. Once you have selected the User you want to edit, it will take you to the *Edit User* menu so you can edit the User's rights (see page 110).
`5) Delete user`	This selection will prompt you select a user to delete.
`6) Show the list of authorized users`	This selection displays a list of users.
`7) Add group`	This selection will prompt you for a name for the Group you are adding. The Group name must be a unique alpha-numeric string (4 - 20 characters). ***Note**: User and Group names are case sensitive.* After the Group is added, you will be taken to the *Edit Group* menu to setup the new users right (see page 110).
`8) Edit group`	This selection will prompt you select a Group to edit properties for. Once you have selected the Group you want to edit, it will take you to the Edit Group Menu so you can edit the group's rights (see page 110).
`9) Delete group`	This selection will prompt you select a group to delete. A group can only be deleted if there are no users assigned to that group.
`10) Show list of authorized groups`	This selection displays a list of groups.
`11) Set Telnet Timeout in seconds`	This selection allows you to set the time a telnet session waits for a user to login. When a Telnet client connects to the NetLinx Master, it is prompted for a username. If the client does not enter a users name for the length of time set in this selection, the session will be closed by the NetLinx Master.
`12) Display Telnet Timeout in seconds`	This selection allows you to display the time a telnet session waits for a user to login.

Setup Security Menu (Cont.)	
Command	**Description**
`13) Make changes permanent by saving to flash`	When changes are made to the security settings of the Master, they are initially only changed in RAM and are not automatically saved permanently into flash. This selection saved the current security settings into flash. Also, if you attempt to exit the Main Security Menu and the security settings have changed but not made permanent, you will be prompted to save the settings at that time.
`14) Reset Database (administrator only function)`	These functions are only visible to administrators. If a user has been given "administrator rights", this additional menu option is displayed. This selection will reset the security database to its Default Security Configuration settings, erasing all users and groups that were added. This is a permanent change and you will be asked to verify this before the database is reset.
`15) Display Database (administrator only function)`	These functions are only visible to administrators. If a user has been given "administrator rights", this additional menu option is displayed. This selection will display the current security settings to the terminal (excluding user passwords). It also displays all users (minus passwords), their group assignment (if any) and their rights, as well as all groups and their rights.

Security Options Menu

Select "**Set system security**" from the Setup Security Menu to access the *Security Options* menu, described below:

Security Options Menu	
Command	**Description**
`1) Terminal (RS232) Security (Enabled/Disabled)`	This selection enables/disables Terminal Security. on the Program (RS232) Port. If *Terminal Security* is enabled, a user must have sufficient access rights to login to a Program Port terminal session.
`2) HTTP Security (Enabled/Disabled)`	This selection enables/disables HTTP (Web Server) Security. If *HTTP Security* is enabled, a user must have sufficient access rights to access the Master’s WebConsole via a web browser.
`3) Telnet Security (Enabled/Disabled)`	This selection enables/disables Telnet Security. If *Telnet Security* is enabled, a user must have sufficient access rights to login to a Telnet terminal session.
`4) Configuration Security (Enabled/Disabled)`	This selection enables/disables configuration access rights for the Master. If *Configuration Security* is enabled, a user must have sufficient access rights to access the Setup Security menu (see page 108), and make changes to the Master’s security parameters.
`5) ICSP Security (Enabled/Disabled)`	This selection enables/disables security of ICSP data being transmitted between the target Master and external AMX components (software and hardware such as TPD4 and a Modero Touch Panel).
`6) ICSP Encryption Required (Enabled/Disabled)`	This selection enables/disables the need to require encryption of the ICSP communicated data. If enabled: • All communicating AMX components must authenticate with a valid username and password before beginning communication with the Master. • All communication must be encrypted.

Edit User Menu

The Edit User Menu is accessed whenever you enter the **Add user**, or **Edit user** selections from the Setup Security menu. The Edit User Menu options are described in the following table:

Edit User Menu	
Command	**Description**
`1) Change User Password`	This selection prompts you to enter the new password (twice) for the user. Once the new password is entered, the user must use the new password from that point forward.
`2) Change Inherits From Group`	This selection will display the current group the user is assigned to (if any). It will then display a list of current groups and prompts you to select the new group.
`3) Add Directory Association`	This selection will display any current directory associations assigned to the user, and then will prompt you for a path for the new directory association.
`4) Delete Directory Association`	This selection will display any current directory associations assigned to the user, and then will prompt you to select the directory association you want to delete.
`5) List Directory Associations`	This selection will display any current Directory Associations assigned to the user.
`6) Change Access Rights`	This selection will display access the *Access Rights menu*, which allows you to set the rights assigned to the user. ***Note**: See the Access Rights Menu section (below) for descriptions of each menu item.*
`7) Display User Record Contents`	This selection will display the group the user is assigned to and the current Access Rights assigned to the user.

Edit Group Menu

The Edit Group Menu is accessed whenever you enter the **Add group**, or **Edit group** selections from the Setup Security menu. The Edit Group Menu options are described in the following table:

Edit Group Menu	
Command	**Description**
`3) Add Directory Association`	This selection will display any current directory associations assigned to the group, and then will prompt you for a path for the new directory association.
`4) Delete Directory Association`	This selection will display any current directory associations assigned to the group, and then will prompt you to select the directory association you want to delete.
`5) List Directory Associations`	This selection will display any current Directory Associations assigned to the group.
`6) Change Access Rights`	This selection will display access the *Access Rights menu*, which allows you to set the rights assigned to the group. ***Note**: See the Access Rights Menu section (below) for descriptions of each menu item.*
`7) Display Access Rights`	This selection will display the current Access Rights assigned to the group.

Access Rights Menu

The Access Rights Menu is accessed whenever you select **Change Access Rights** (option **6**) from the Edit User menu, or **Change Access Rights** from the Edit Group menu. The options in this menu is described below:

Access Rights Menu

Command	Description
`1) Terminal (RS232) Access (Enable/Disable)`	Enables/disables Terminal (RS232 Program port) Access. The account has sufficient access rights to login to a Terminal session if this option is enabled.
`2) Admin Change Password Access (Enable/Disable)`	Enables/disables Administrator Change Password Access. The account has sufficient access rights to change the administrator password if this option is enabled.
`3) FTP Access (Enable/Disable)`	Enables/disables FTP Access. The account has sufficient access rights to access the NetLinx Master's FTP Server if this option is enabled.
`4) HTTP Access (Enable/Disable)`	This selection enables/disables HTTP (Web Server) Access. The account has sufficient access rights to browse to the NetLinx Master with a Web Browser if this option is enabled.
`5) Telnet Access (Enable/Disable)`	This selection enables/disables Telnet Access. The account has sufficient access rights to login to a Telnet session if this option is enabled.
`6) Configuration Access (Enable/Disable)`	This selection enables/disables Configuration Access rights for the target Master. The account has sufficient access rights to access the Main Security Menu if this option is enabled.
`5) ICSP Security (Enabled/Disabled)`	This selection enables/disables ICSP communication access. The account has sufficient access rights to initiate ICSP data communication.
`6) ICSP Encryption Required (Enabled/Disabled)`	This selection enables/disables the need to require encryption of the ICSP communicated data. If enabled: - All communicating AMX components must authenticate with a valid username and password before beginning communication with the Master. - All communication must be encrypted.

Adding a Group

1. Type **7** and <Enter> at the Security Setup prompt (at the bottom of the Main Security Menu) to add a group account. A sample session response is:

```
The following groups are currently enrolled:
administrator


Enter name of new group:
```

2. Enter a name for the group. A group name is a valid character string (4 - 20 alpha-numeric characters) defining the group. This string is ***case sensitive***, and each group name must be unique.
3. Press <Enter> to display the Edit Group menu.

Edit Group Menu: Add Directory Association

1. At the **Edit Group** prompt, type **1** to add a new directory association.

   A *Directory Association* is a path that defines the directories and/or files that a particular user or group can access via the HTTP (Web) Server on the NetLinx Master. This character string can range from 1 to 128 alpha-numeric characters. This string is ***case sensitive***. This is the path to the file or directory you want to grant access. Access is limited to the user (i.e. doc:user) directory of the Master. All subdirectories of the user directory can be granted access.

   A single '/' is sufficient to grant access to all files and directories in the user directory and it's sub-directory. The '*' wildcard can also be added to enable access to all files. All entries should start with a '/'.

   Here are some examples of valid entries:

Path	Notes
`/`	Enables access to the user directory and all files and subdirectories in the user directory.
`/*`	Enables access to the user directory and all files and subdirectories in the user directory.
`/user1`	If `user1` is a file in the user directory, only the file is granted access. If `user1` is a subdirectory of the user directory, all files in the `user1` and its sub-directories are granted access.
`/user1/`	`user1` is a subdirectory of the user directory. All files in the `user1` and its sub-directories are granted access.
`/Room1/iWebControlPages/*`	`/Room1/iWebControlPages` is a subdirectory and all files and its subdirectories are granted access.
`/results.txt`	`results.txt` is a file in the user directory and access is granted to that file.

   By default, all accounts that enable HTTP Access are given a '`/*`' Directory Association if no other Directory Association has been assigned to the account.

   When you are prompted to enter the path for a Directory Association, the NetLinx Master will attempt to validate the path. If the directory or file is not valid (i.e. it does not exist at the time you entered the path), the NetLinx Master will ask you whether you were intending to grant access to a file or directory. From the answer, it will enter the appropriate Directory Association.

   The NetLinx Master will not create the path if it is not valid. That must be done via another means, most commonly by using an FTP client and connecting to the FTP server on the NetLinx Master.

Default Security Configuration

By default, the NetLinx Master will create the following accounts, access rights, directory associations, and security options.

```
Account 1:             User Name: administrator
Password:              password
Group:                 administrator
Rights:                All
Directory Association: /*

Account 2:             User Name: NetLinx
Password:              password
Group:                 none
Rights:                FTP Access
Directory Association: none

Group 1:               Group: administrator
Rights:                All
Directory Association: /*

Security Options:      FTP Security Enabled
                       Admin Change Password Security Enabled
                       All other options disabled
```

- The ***administrator*** user account cannot be deleted or modified with the exception of its password. Only a user with "Change Admin Password Access" rights can change the administrator password.
- The ***NetLinx*** user account is created to be compatible with previous firmware versions.
- The ***administrator*** group account cannot be deleted or modified.
- The ***FTP Security*** and ***Admin Change Password Security*** are always enabled and cannot be disabled.

Logging Out of a Terminal Session

It is very important to execute the '**logout**' command prior to disconnecting from a Master.

Simply removing the RS-232 connector from the Program Port maintains your logged-in status until you either return to logout via a new session or reboot the target Master.

Notes on Specific Telnet/Terminal Clients

Telnet and terminal clients will have different behaviors in some situations. This section states some of the known anomalies.

Windows^{TM} Client Programs

Anomalies occur when using a Windows client if you are not typing standard ASCII characters (i.e. using the keypad and the ALT key to enter decimal codes). Most programs will allow you to enter specific decimal codes by holding ALT and using keypad numbers.

For example, hold ALT, hit the keypad 1, then hit keypad 0, then release ALT. The standard line feed code is entered (decimal 10). Windows will perform an ANSI to OEM conversion on some codes entered this way because of the way Windows handles languages and code pages.

The following codes are known to be altered, but others may be affected depending on the computer's setup.

> Characters 15, 21, 22, and any characters above 127.

This affects both Windows Telnet and Terminal programs.

Linux Telnet Client

The Linux Telnet client has three anomalies that are known at this time:

- A null (\00) character is sent after a carriage return.
- If an ALT 255 is entered, two 255 characters are sent (per the Telnet RAFT).
- If the code to go back to command mode is entered (ALT 29 which is ^]), the character is not sent, but Telnet command mode is entered.

Appendix A: IPSec Configuration File

IPSec Config file

The IPSec Configuration file contains user specified IPSec rule definitions to be applied to the running IPSec database. The IPSec Configuration file is read at boot-up and the individual lines are applied to the IPSec database. Configuration lines are applied to the database in the order that they appear in the configuration file.

Each line of the configuration file represents an individual rule. All lines follow the format:

```
<config action>=<config string>
```

All characters of a configuration line, both the action and the string, are case sensitive and white space is relevant.

Lines beginning with a '**#**' symbol are considered comments and are subsequently ignored during the loading process.

All references to the master's IP address in configuration lines can be substituted by **%LOCAL_ADDR%** in order to provide flexibility and reuse of an IPSec Config file. At boot, all occurrences of **%LOCAL_ADDR%** will be replaced by the actual IP address of the master. In this way, a single IPSec configuration file can be uploaded to multiple masters that are to be configured with the same IPSec configuration without having to specify the master's local IP Address directly.

The IPSec Configuration file is loaded onto the master via the master's Web interface under **Security->IPSec Security Settings**.

The following are the list of configuration lines supported by the AMX IPSec Configuration file.

Internet Key Exchange (IKE)

ikeAddPeerAuth

ikeAddPeerAuth	
NAME	**ikeAddPeerAuth** – add a peer's authentication information
SYNOPSIS	`ikeAddPeerAuth=configString`
DESCRIPTION	This rule is used to specify IKE authentication information between the host and a peer. This rule may be called multiple times to define a set of peers with which the host will conduct IKE negotiations.
NOTE	Specifying KEYPFS to this function will not enable perfect forward secrecy when negotiating with the peer unless a DHGROUP is also specified in the Phase 2 attributes, set via spdSetPropAttrib.

	Rule Value:
	`configString`
	A string formatted as follows:
	`peerIpAddress,interfaceIpAddress,proposalName,PFS,`
	`authenticationMethod,authenticationInfo`
	where
	- *peerIpAddress* is the address of the IKE peer.
	- *interfaceIpAddress* is the local IP address that is to communicate with the peer.
	- *proposalName* is an existing Phase 1 proposal name, defined via ikeSetProp.
	- *authenticationMethod* is PSK (pre-shared key) or RSA (certificate support).
	- *authenticationInfo* depends on authenticationMethod. See below.
	When authenticationMethod is PSK, authenticationInfo is the pre-shared key, represented as printable ASCII.
	When authenticationMethod is RSA, authenticationInfo is a string formatted as follows:
	`localKey,localKeyPassword,localCertificate[,PEER_CERT,peerCertificate]`
	• *localKey* - The filename where the local peer's key is stored.
	• *localKeyPassword* - The password for the local peer's key. Specify NOPASS if there is no password. Note that the maximum password length is MAX_PRIVATE_KEY_PASSWORD_LENGTH.
	• *localCertificate* - The filename where the local peer's certificate is stored.
	• *peerCertificate* - The filename where the remote peer's certificate is locally stored. If PEER_CERT is specified, any certificate payload(s) received from the remote IKE peer during IKE phase 1 negotiation will be ignored and the certificate specified in peerCertificate will be used to authenticate the remote peer.
	All keys and certificates are stored on the local file system, in the directory set by the project facility parameter IKE_CERT_PATH.

ikeAddPeerAuth (Cont.)	

EXAMPLES	Using a pre-shared key for IPv4:
	`ikeAddPeerAuth=100.100.100.4,100.100.100.1,mm_grp2,NOPFS,PSK, thisisatest`
	Using a pre-shared key for IPv6:
	`ikeAddPeerAuth=3ffe:2::2,3ffe:1::2,mm_grp2,NOPFS,PSK,thisisatest`
	Using certificates for IPv4:
	`ikeAddPeerAuth=192.168.1.36,192.168.1.35,ph1_g1_1,NOPFS,RSA, local_key.key,mypassword,local_cert.crt,PEER_CERT,peer_cert.crt`
	`ikeAddPeerAuth=192.168.1.36,192.168.1.35,ph1_g1_1,NOPFS,RSA,`
	`local_key.key,mypassword,local_cert.crt`
	`ikeAddPeerAuth=192.168.1.36,192.168.1.35,ph1_g1_1,NOPFS,RSA,`
	`local_key.key,NOPASS,local_cert.crt`

Config String Format	`peerIpAddress,interfaceIpAddress,proposalName,authenticationMethod, authenticationInfo`

Pre-defined proposal names	The following are proposal names already defined inside the AMX Firmware and available for use in the ikeAddPeerAuth configuration:
	`mm_g2=mm_3des_sha,mm_3des_md5,mm_des_sha,mm_des_md5`
	`Attributes: DHGROUP=G2, LIFETIME=28800 sec`
	`mm_g1=mm_3des_sha,mm_3des_md5,mm_des_sha,mm_des_md5\n"`
	`Attributes: DHGROUP=G1, LIFETIME=28800 sec`
	`mm_prop=mm_des_md5`
	`Attributes: DHGROUP=G2, LIFETIME=300 sec`
	`mm_prop1= mm_des_md5`
	`Attributes: DHGROUP=G2, LIFETIME=3600 sec`
	Additional IKE proposals and attributes can be created with the next two API’s.

ikeSetProp

ikeSetProp	
NAME	**ikeSetProp** – create a Phase 1 proposal
SYNOPSIS	`ikeSetProp=configString`
DESCRIPTION	This rule creates a Phase 1 proposal with previously defined Phase 1 transform names.

	Rule Value:
	`configString`
	A string formatted as follows:
	`proposalName,transformName,[transformName][,transformName]...`
	where
	- *proposalName* is a unique name for a Phase 1 proposal.
	- *transformName* is an existing Phase 1 transform name, defined via ikeSetXform.

EXAMPLES	`ikeSetProp=mm_group2,mm_3des_sha,mm_3des_md5,mm_des_sha,mm_des_md5`
Config String Format	`proposalName,transformName,[transformName][,transformName]…`

Pre-defined proposal names	A transform consists of an encryption algorithm and a hash algorithm. The first value is the encryption, the second the hash.
	`mm_3des_sha=3DES,SHA-1`
	`mm_3des_sha2_256=3DES,SHA2-256`
	`mm_3des_sha2_384=3DES,SHA2-384`
	`mm_3des_sha2_512=3DES,SHA2-512`
	`mm_3des_md5=3DES,MD5`
	
	`mm_des_sha=DES,SHA-1`
	`mm_des_sha2_256=DES,SHA2-256`
	`mm_des_sha2_384=DES,SHA2-384`
	`mm_des_sha2_512=DES,SHA2-512`
	`mm_des_md5=DES,MD5`
	
	`mm_aes_sha=AES,SHA-1`
	`mm_aes_sha2_256=AES,SHA2-256`
	`mm_aes_sha2_384=AES,SHA2-384`
	`mm_aes_sha2_512=AES,SHA2-512`
	`mm_aes_md5=AES,MD5`

ikeSetPropAttrib

<table>
<tr><th colspan="3">ikeSetPropAttrib</th></tr>
<tr><td>NAME</td><td colspan="2">ikeSetPropAttrib – set attributes of an IKE Phase 1 proposal</td></tr>
<tr><td>SYNOPSIS</td><td colspan="2">ikeSetPropAttrib=configString</td></tr>
<tr><td>DESCRIPTION</td><td colspan="2">This rule sets the attributes for a previously defined IKE Phase 1 proposal.</td></tr>
<tr><td rowspan="6"></td><td colspan="2">Rule Value:
configString
A string formatted as follows:
proposalName,attributeType,attributeValue,[attributeType,attributeValue]...
proposalName is the name of an existing Phase 1 proposal. Valid attribute
type/value pairs are shown in the following table:</td></tr>
<tr><td>Attribute Type</td><td>Attribute Value</td></tr>
<tr><td>• DHGROUP</td><td>G1 for DH Group 1 or G2 for DH Group 2</td></tr>
<tr><td>• UNITOFTIME</td><td>SECS, MINS, or HRS for seconds, minutes or hours; default is minutes.</td></tr>
<tr><td>• LIFETIME</td><td>Default is 28800 seconds. If the lifetime is greater than 0 and less than PHASE1_MIN_LIFE_IN_SECS, then it defaults to PHASE1_MIN_LIFE_IN_SECS, which is defined in ike.h.</td></tr>
<tr><td>• SOFTLIFETIME</td><td>Default is 75% of the LIFETIME. If the soft lifetime is greater than 0 and less than PHASE1_MIN_LIFE_IN_SECS then it defaults to PHASE1_MIN_LIFE_IN_SECS, which is defined in ike.h.</td></tr>
<tr><td>EXAMPLES</td><td colspan="2">ikeSetPropAttrib=mm_group2,DHGROUP,G2
ikeSetPropAttrib=mm_group2,LIFETIME,28880,UNITOFTIME,SECS</td></tr>
<tr><td>Config String Format</td><td colspan="2">proposalName,attributeType,attributeValue,[attributeType, attributeValue]…</td></tr>
</table>

Security Policy Database (SPD)

spdAddTransport

<table>
<tr><th colspan="2">spdAddTransport</th></tr>
<tr><td><b>NAME</b></td><td><b>spdAddTransport</b> – add a transport mode policy</td></tr>
<tr><td><b>SYNOPSIS</b></td><td><code>spdAddTransport=pConfStr</code></td></tr>
<tr><td><b>DESCRIPTION</b></td><td>This rule adds a transport mode policy.</td></tr>
<tr><td></td><td><b><i>Rule Value</i></b>:
<code>pConfStr</code>
A stringValue specifier formatted as follows:
<code>protocolSelector[/destinationPort/sourcePort],</code>
<code>destinationAddressSelector,sourceAddressSelector,directionality,</code>
<code>useSelectors,keyManager,saProposalName</code>
where:
- <i>protocolSelector</i> is a decValue IANA protocol number or ANY (6 for TCP or 17 for UDP).
- <i>destinationPort</i> is a decValue port number or ANY.
- <i>sourcePort</i> is a decValue port number or ANY.
- <i>destinationAddressSelector</i> is an address in the format:
<code>ipAddress1[-ipAddress2 |/ipMaskPrefix].</code>
- <i>sourceAddressSelector</i> is an address in the format:
<code>ipAddress1[-ipAddress2 |/ipMaskPrefix].</code>
- <i>directionality</i> is IN (for inbound) or OUT (for outbound). If IN, this policy applies to traffic coming into the current host. If OUT, it applies to traffic going out of the current host. A mirrored policy is automatically created for the opposite traffic flow.
- <i>useSelectors</i> is PACKET (use packet selectors) or POLICY (use policy selectors).
- <i>keyManager</i> is MANUAL (manual negotiation) or IKE (key negotiation).
- <i>saProposalName</i> is an SA proposal name.</td></tr>
<tr><td><b>EXAMPLES</b></td><td>IPv4:
<code>spdAddTransport=ANY,30.0.0.1,30.0.30.1,OUT,PACKET,IKE,</code>
<code>qm_sa_default</code>
IPv6:
<code>spdAddTransport=ANY,3ffe:1::2,3ffe:2::2,OUT,PACKET,IKE,</code>
<code>qm_sa_default</code></td></tr>
<tr><td><b>Config String Format</b></td><td><code>protocolSelector[/destinationPort/sorucePort],</code>
<code>destinationAddressSelector,sourceAddressSelector,directionality,</code>
<code>useSelector,keyManager,saProposalName</code></td></tr>
</table>

SpdAddTunnel

SpdAddTunnel	
NAME	**spdAddTunnel**– create a tunnel mode policy in the SPD
SYNOPSIS	`spdAddTunnel=pConfStr`
DESCRIPTION	This rule creates a tunnel mode policy in the SPD.

	Rule Value:
	`pConfStr`
	A stringValue specifier formatted as follows:
	`protocolSelector[/destinationPort/sourcePort],`
	`destinationAddressSelector, sourceAddressSelector,directionality,`
	`useSelectors,keyManager,saProposalName, tunnelEndpointAddress`
	where:
	- protocolSelector is a decValue IANA protocol number or ANY (6 for TCP or 17 for UDP).
	- destinationPort is a decValue port number or ANY.
	- *sourcePort* is a decValue port number or ANY.
	- *destinationAddressSelector* is an address in the format:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *sourceAddressSelector* is an address in the format:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *directionality* is IN (for inbound) or OUT (for outbound). If IN, this policy applies to traffic coming into the current host. If OUT, it applies to traffic going out of the current host. A mirrored policy is automatically created for the opposite traffic flow.
	- *useSelectors* is PACKET (use packet selectors) or POLICY (use policy selectors).
	- *keyManager* is MANUAL (manual negotiation) or IKE (key negotiation).
	- *saProposalName* is an SA proposal name.
	- *tunnelEndpointAddress* is the remote gateway. You must specify a single valid IPv4 or IPv6 host address. You cannot specify multiple endpoints.

EXAMPLES	IPv4:
	`spdAddTunnel=ANY,0.0.0.0/0,10.8.30.30,OUT,POLICY,MANUAL,`
	`qm_sa_default,10.9.9.180`
	IPv6:
	`spdAddTunnel=ANY,::/0,3ffe:4::1,OUT,POLICY,MANUAL,qm_sa_default,`
	`3ffe:1::2`

Config String Format	`protocolSelector[/destinationPort/sorucePort],`
	`destinationAddressSelector,sourceAddressSelector,directionality,`
	`useSelector,keyManager,saProposalName,tunnelEndpointAddress`

SpdAddBypass

SpdAddBypass	
NAME	**spdAddBypass**– create a bypass policy in the SPD
SYNOPSIS	`spdAddBypass=pConfStr`
DESCRIPTION	This rule creates a bypass policy in the SPD.

	Rule Value:
	`pConfStr`
	A stringValue specifier formatted as follows:
	`protocolSelector[/destinationPort/sourcePort],`
	`destinationAddressSelector, sourceAddressSelector,`
	`directionality,mirroring`
	where
	- *protocolSelector* is a decValue IANA protocol number or ANY (6 for TCP or 17 for UDP).
	- *destinationPort* is a decValue port number or ANY.
	- *sourcePort* is a decValue port number or ANY.
	- *destinationAddressSelector* is an address in the format:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *sourceAddressSelector* is an address in the format:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *directionality* is IN (for inbound) or OUT (for outbound). If IN, this policy applies to traffic coming into the current host. If OUT, it applies to traffic going out of the current host.
	- *mirroring* is NOTMIRRORED or MIRRORED. NOTMIRRORED creates a policy only in the specified direction. MIRRORED creates two policies, one in each direction.

EXAMPLES	IPv4:
	`spdAddBypass=17/0/17185,0.0.0.0/0,0.0.0.0/0,OUT,NOTMIRRORED`
	IPv6:
	`spdAddBypass=17/0/17185,::/0,::/0,OUT,NOTMIRRORED`

Config String Format	`protocolSelector[/destinationPort/sorucePort],`
	`destinationAddressSelector,sourceAddressSelector,directionality,`
	`mirroring`

SpdAddDiscard

SpdAddDiscard	
NAME	**spdAddDiscard** – create a discard policy in the SPD
SYNOPSIS	`spdAddDiscard=pConfStr`
DESCRIPTION	This rule creates a discard policy in the SPD.

	Rule Value:
	`pConfStr`
	A stringValue specifier formatted as follows:
	`protocolSelector[/destinationPort/sourcePort],`
	`destinationAddressSelector, sourceAddressSelector,`
	`directionality,mirroring`
	where
	- *protocolSelector* is a decValue IANA protocol number or ANY (6 for TCP or 17 for UDP).
	- *destinationPort* is a decValue port number or ANY.
	- *sourcePort* is a decValue port number or ANY.
	- *destinationAddressSelector* is an address in the format:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *sourceAddressSelector* is an address in the format:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *directionality* is IN (for inbound) or OUT (for outbound). If IN, this policy applies to traffic coming into the current host. If OUT, it applies to traffic going out of the current host.
	- *mirroring* is NOTMIRRORED or MIRRORED. NOTMIRRORED creates a policy only in the specified direction. MIRRORED creates two policies, one in each direction.

EXAMPLES	IPv4:
	`spdAddDiscard=17/17185/0,0.0.0.0/0,0.0.0.0/0,IN,NOTMIRRORED`
	IPv6:
	`spdAddDiscard=17/17185/0,::/0,::/0,IN,NOTMIRRORED`

Config String Format	`protocolSelector[/destinationPort/sorucePort],`
	`destinationAddressSelector,sourceAddressSelector,directionality,`
	`mirroring`

SpdSetProp

SpdSetProp	
NAME	**spdSetProp**– add Phase 2 transforms to a Phase 2 proposal
SYNOPSIS	`spdSetProp=pConfStr`
DESCRIPTION	This rule adds one or more existing Phase 2 transforms to a Phase 2 proposal.

	Rule Value:
	`pConfStr`
	A stringValue specifier formatted as follows:
	`proposalName,transformName[,transformName...]`
	where
	- *proposalName* is a unique Phase 2 proposal name.
	- *transformName* is the name of an existing Phase 2 transform. You can specify up to eight transform names.

EXAMPLES	`spdSetProp=proposal_foo,ah_xform`
Config String Format	`proposalName,transformName,[,transformName…]`

Pre-defined proposal names	The following are Phase II proposal names already defined inside the AMX Firmware and available for use.
	`ah_g1_transport=ah_sha,ah_md5`
	`Attributes:`
	`DHGROUP=G1,`
	`ENCAP=TRANSPORT`
	`HARDLIFETIME=1800`
	`SOFTLIFETIME=1500`
	
	`ah_g2_transport=ah_sha,ah_md5`
	`Attributes:`
	`DHGROUP=G2`
	`ENCAP=TRANSPORT`
	`HARDLIFETIME=1800`
	`SOFTLIFETIME=1500`
	
	`ah_g1_tunnel=ah_sha,ah_md5`
	`Attributes:`
	`DHGROUP=G1`
	`ENCAP=TUNNEL`
	`HARDLIFETIME=1800`
	`SOFTLIFETIME,1500`
	
	`ah_g2_tunnel=ah_sha,ah_md5`
	`Attributes:`
	`DHGROUP=G2`
	`ENCAP=TUNNEL`
	`HARDLIFETIME=1800`
	`SOFTLIFETIME=1500`

SpdSetProp (Cont.)	

	esp_g1_transport=esp_3des_sha,esp_3des_md5,esp_3des,esp_des_sha,esp_des_md5,esp_des,esp_null_sha,esp_null_md5
	Attributes:
	DHGROUP=G1
	ENCAP=TRANSPORT
	HARDLIFETIME=1800
	SOFTLIFETIME,1500
	
	esp_g2_transport=esp_3des_sha,esp_3des_md5,esp_3des,esp_des_sha,esp_des_md5,esp_des,esp_null_sha,esp_null_md5
	Attributes=
	DHGROUP=G2
	ENCAP=TRANSPORT
	HARDLIFETIME=1800
	SOFTLIFETIME=1500
	
	esp_g1_tunnel=esp_3des_sha,esp_3des_md5,esp_3des,esp_des_sha,esp_des_md5,esp_des,esp_null_sha,esp_null_md5
	Attributes =
	DHGROUP=G1
	ENCAP=TUNNEL
	HARDLIFETIME=1800
	SOFTLIFETIME=1500
	
	esp_g2_tunnel=esp_3des_sha,esp_3des_md5,esp_3des,esp_des_sha,esp_des_md5,esp_des,esp_null_sha,esp_null_md5
	Attributes=
	DHGROUP=G2
	ENCAP=TUNNEL
	HARDLIFETIME=1800
	SOFTLIFETIME=1500

Pre-defined Phase II transform names	AH Transforms
	ah_sha=AH_SHA
	ah_sha2_256=AH_SHA2-256
	ah_sha2_384=AH_SHA2-384
	ah_sha2_512=AH_SHA2-512
	ah_md5=AH_MD5
	ah_ripemd=AH_RIPEMD
	ah_aes_xcbc_mac=AH_AES-XCBC-MAC
	
	ESP Transforms
	esp_3des_sha =ESP_3DES,SHA
	esp_3des_md5=ESP_3DES,MD5
	esp_3des_hmac_sha=ESP_3DES,HMAC-SHA
	esp_3des_hmac_sha2_256=ESP_3DES,HMAC-SHA2-256
	esp_3des_hmac_sha2_384=ESP_3DES,HMAC-SHA2-384
	esp_3des_hmac_sha2_512=ESP_3DES,HMAC-SHA2-512
	esp_3des_hmac_ripemd=ESP_3DES,HMAC-RIPEMD
	esp_3des_aes,ESP_3DES=AES-XCBC-MAC
	esp_3des_hmac_md5=ESP_3DES,HMAC-MD5
	esp_3des=ESP_3DES

SpdSetProp (Cont.)

```
esp_des_sha=ESP_DES,SHA
esp_des_md5=ESP_DES,MD5
esp_des_hmac_sha=ESP_DES,HMAC-SHA
esp_des_hmac_sha2_256=ESP_DES,HMAC-SHA2-256
esp_des_hmac_sha2_384=ESP_DES,HMAC-SHA2-384
esp_des_hmac_sha2_512=ESP_DES,HMAC-SHA2-512
esp_des_hmac_ripemd=ESP_DES,HMAC-RIPEMD
esp_des_aes=ESP_DES,AES-XCBC-MAC
esp_des_hmac_md5=ESP_DES,HMAC-MD5
esp_des=ESP_DES


esp_aes_cbc_sha=ESP_AES-CBC,SHA
esp_aes_cbc_md5=ESP_AES-CBC,MD5
esp_aes_cbc_hmac_sha=ESP_AES-CBC,HMAC-SHA
esp_aes_cbc_hmac_sha2_256=ESP_AES-CBC,HMAC-SHA2-256
esp_aes_cbc_hmac_sha2_384=ESP_AES-CBC,HMAC-SHA2-384
esp_aes_cbc_hmac_sha2_512=ESP_AES-CBC,HMAC-SHA2-512
esp_aes_cbc_hmac_ripemd=ESP_AES-CBC,HMAC-RIPEMD
esp_aes_cbc_aes=ESP_AES-CBC,AES-XCBC-MAC
esp_aes_cbc_hmac_md5=ESP_AES-CBC,HMAC-MD5
esp_aes_cbc=ESP_AES-CBC

esp_aes_cbc_192_sha=ESP_AES-CBC,KEY_LENGTH,192,SHA
esp_aes_cbc_192_md5=ESP_AES-CBC,KEY_LENGTH,192,MD5
esp_aes_cbc_192_hmac_sha=ESP_AES-CBC,KEY_LENGTH,192,HMAC-SHA
esp_aes_cbc_192_hmac_sha2_256=ESP_AES-CBC,KEY_LENGTH,192,HMAC-SHA2-256
esp_aes_cbc_192_hmac_sha2_384=ESP_AES-CBC,KEY_LENGTH,192,HMAC-SHA2-384
esp_aes_cbc_192_hmac_sha2_512=ESP_AES-CBC,KEY_LENGTH,192,HMAC-SHA2-512
esp_aes_cbc_192_hmac_ripemd=ESP_AES-CBC,KEY_LENGTH,192,HMAC-RIPEMD
esp_aes_cbc_192_aes=ESP_AES-CBC,KEY_LENGTH,192,AES-XCBC-MAC
esp_aes_cbc_192_hmac_md5=ESP_AES-CBC,KEY_LENGTH,192,HMAC-MD5
esp_aes_cbc_192=ESP_AES-CBC,KEY_LENGTH,192

esp_aes_cbc_256_sha=ESP_AES-CBC,KEY_LENGTH,256,SHA
esp_aes_cbc_256_md5=ESP_AES-CBC,KEY_LENGTH,256,MD5
esp_aes_cbc_256_hmac_sha=ESP_AES-CBC,KEY_LENGTH,256,HMAC-SHA
esp_aes_cbc_256_hmac_sha2_256=ESP_AES-CBC,KEY_LENGTH,256,HMAC-SHA2-256
esp_aes_cbc_256_hmac_sha2_384=ESP_AES-CBC,KEY_LENGTH,256,HMAC-SHA2-384
esp_aes_cbc_256_hmac_sha2_512=ESP_AES-CBC,KEY_LENGTH,256,HMAC-SHA2-512
esp_aes_cbc_256_hmac_ripemd=ESP_AES-CBC,KEY_LENGTH,256,HMAC-RIPEMD
esp_aes_cbc_256_aes=ESP_AES-CBC,KEY_LENGTH,256,AES-XCBC-MAC
esp_aes_cbc_256_hmac_md5=ESP_AES-CBC,KEY_LENGTH,256,HMAC-MD5
esp_aes_cbc_256=ESP_AES-CBC,KEY_LENGTH,256


esp_aes_ctr_sha=ESP_AES-CTR,SHA
esp_aes_ctrl_hmac_sha=ESP_AES-CTR,HMAC-SHA
esp_aes_ctr_hmac_sha2_256=ESP_AES-CTR,HMAC-SHA2-256
esp_aes_ctr_hmac_sha2_384=ESP_AES-CTR,HMAC-SHA2-384
esp_aes_ctr_hmac_sha2_512=ESP_AES-CTR,HMAC-SHA2-512
esp_aes_ctr_hmac_ripemd=ESP_AES-CTR,HMAC-RIPEMD
esp_aes_ctr_aes=ESP_AES-CTR,AES-XCBC-MAC
esp_aes_ctr_hmac_md5=ESP_AES-CTR,HMAC-MD5
esp_aes_ctr_md5=ESP_AES-CTR,MD5
```

SpdSetProp (Cont.)	

	esp_aes_ctr_192_sha=ESP_AES-CTR,KEY_LENGTH,192,SHA
	esp_aes_ctr_192_hmac_sha=ESP_AES-CTR,KEY_LENGTH,192,HMAC-SHA
	esp_aes_ctr_192_hmac_sha2_256=ESP_AES-CTR,KEY_LENGTH,192,HMAC-SHA2-256
	esp_aes_ctr_192_hmac_sha2_384=ESP_AES-CTR,KEY_LENGTH,192,HMAC-SHA2-384
	esp_aes_ctr_192_hmac_sha2_512=ESP_AES-CTR,KEY_LENGTH,192,HMAC-SHA2-512
	esp_aes_ctr_192_hmac_ripemd=ESP_AES-CTR,KEY_LENGTH,192,HMAC-RIPEMD
	esp_aes_ctr_192_aes=ESP_AES-CTR,KEY_LENGTH,192,AES-XCBC-MAC
	esp_aes_ctr_192_hmac_md5=ESP_AES-CTR,KEY_LENGTH,192,HMAC-MD5
	esp_aes_ctr_192_md5=ESP_AES-CTR,KEY_LENGTH,192,MD5
	
	esp_aes_ctr_256_sha=ESP_AES-CTR,KEY_LENGTH,256,SHA
	esp_aes_ctr_256_hmac_sha=ESP_AES-CTR,KEY_LENGTH,256,HMAC-SHA
	esp_aes_ctr_256_hmac_sha2_256=ESP_AES-CTR,KEY_LENGTH,256,HMAC-SHA2-256
	esp_aes_ctr_256_hmac_sha2_384=ESP_AES-CTR,KEY_LENGTH,256,HMAC-SHA2-384
	esp_aes_ctr_256_hmac_sha2_512=ESP_AES-CTR,KEY_LENGTH,256,HMAC-SHA2-512
	esp_aes_ctr_256_hmac_ripemd=ESP_AES-CTR,KEY_LENGTH,256,HMAC-RIPEMD
	esp_aes_ctr_256_aes=ESP_AES-CTR,KEY_LENGTH,256,AES-XCBC-MAC
	esp_aes_ctr_256_hmac_md5=ESP_AES-CTR,KEY_LENGTH,256,HMAC-MD5
	esp_aes_ctr_256_md5=ESP_AES-CTR,KEY_LENGTH,256,MD5
	
	esp_null_sha=ESP_NULL,SHA
	esp_null_hmac_sha=ESP_NULL,HMAC-SHA
	esp_null_hmac_sha2_256=ESP_NULL,HMAC-SHA2-256
	esp_null_hmac_sha2_384=ESP_NULL,HMAC-SHA2-384
	esp_null_hmac_sha2_512=ESP_NULL,HMAC-SHA2-512
	esp_null_hmac_ripemd=ESP_NULL,HMAC-RIPEMD
	esp_null_aes=ESP_NULL,AES-XCBC-MAC
	esp_null_hmac_md5=ESP_NULL,HMAC-MD5
	esp_null_md5=ESP_NULL,MD5

SpdSetPropAttrib

SpdSetPropAttrib	
NAME	**spdSetPropAttrib**– set attributes of an IKE Phase 2 proposal
SYNOPSIS	`spdSetPropAttrib=pConfStr`
DESCRIPTION	This rule sets or modifies the attributes of an existing IKE Phase 2 proposal.

Rule Value:

```
pConfStr
```

A stringValue specifier formatted as follows:

```
proposalName,attributeType,attributeValue[,attributeType,
attributeValue...]
```

- *proposalName* is the name of an existing Phase 2 proposal.

- *attributeType* is an attribute type from the table below.

- *attributeValue* is an attribute value from the table below.

Attribute Type	**Attribute Value**
• ANTIREPLAY	DISABLED or ENABLED (default)
• DHGROUP	NONE (default) for no PFS, G1 for D-H Group 1, G2 for D-H Group 2
• ENCAP	TUNNEL or TRANSPORT
• UNITOFTIME	SECS (default), MINS, or HRS
• HARDLIFETIME	Default is 28800 seconds. attributeValue is converted to seconds. If attributeValue > 0 and attributeValue < PHASE2_MIN_HARD_LIFE_IN_SECS then it defaults to PHASE2_MIN_HARD_LIFE_IN_SECS, which is defined to be 120 seconds. Behavior is undefined if attributeValue=0.
• SOFTLIFETIME	Default is 75% of HARDLIFETIME. attributeValue is converted to seconds. If attributeValue > 0 and attributeValue < PHASE2_MIN_SOFT_LIFE_IN_SECS then it defaults to PHASE2_MIN_SOFT_LIFE_IN_SECS, which is defined to be 90 seconds. Behavior is undefined if attributeValue=0.
• HARDLIFESIZE	Default is 4608000 KB. If attributeValue > 0 and attributeValue < PHASE2_MIN_HARD_LIFE_IN_KB then it defaults to PHASE2_MIN_HARD_LIFE_IN_KB, which is defined to be 2560 KB. Behavior is undefined if attributeValue=0.
• SOFTLIFESIZE	0 for no lifesize; default is 75% of HARDLIFESIZE. If attributeValue > 0 and attributeValue < PHASE2_MIN_SOFT_LIFE_IN_KB then it defaults to PHASE2_MIN_SOFT_LIFE_IN_KB, which is defined to be 1920 KB. Behavior is undefined if attributeValue=0.
• PSKEEPALIVE	DISABLED, ENABLED, or GLOBAL (default) Sets the keep-alive flag for protection suites created using this proposal. If you choose ENABLED, all protection suites derived from this proposal will renew when their soft lifetimes expire. If you choose GLOBAL, the global keep-alive flag will be consulted when soft lifetimes expire.

SpdSetPropAttrib (Cont.)	

EXAMPLES	`spdSetPropAttrib=ah_default,DHGROUP,G2`
	`spdSetPropAttrib=ah_default,ENCAP,TUNNEL,HARDLIFESIZE,4608000`
	`spdSetPropAttrib=proposal_foo,DHGROUP,G1,ENCAP,TRANSPORT,`
	`HARDLIFETIME,140,SOFTLIFETIME,120`

Config String Format	`proposalName,attributeType,attributeValue[,attributeType,attributeValue…]`

spdSetSA

spdSetSA	
NAME	**spdSetSA** – create an SA proposal in the SPD– create an SA proposal in the SPD
SYNOPSIS	`spdSetSA=pConfStr`
DESCRIPTION	This rule creates an SA proposal in the SPD. An SA proposal is a list of proposals. IKE sends the list to the peer during negotiation.

	Rule Value:
	`pConfStr`
	A stringValue specifier formatted as follows:
	`saName,proposalName,proposalNumber[,proposalName,proposalNumber...]`
	where
	- *saName* is unique Phase 2 SA name.
	- *proposalName* is the name of an existing proposal with its attributes already set. You can specify up to four proposal names.
	- *proposalNumber* is the proposal number, which determines the ordering and combination of proposals in the SA proposal.
	When combining ESP and AH transforms, you may configure an ESP tunnel policy with an AH tunnel policy, or an ESP transport policy with an AH transport policy, by using the same proposal number for both policies.

EXAMPLES	`spdSetSA=qm_sa_default,esp_tunnel,1,ah_tunnel,1,esp_tunnel_A,2,`
	`esP_tunnel_B,3`
	`spdSetSA=qm_sa_default,esp_transport,1,ah_transport,1`
	`spdSetSA=qm_sa_default,esp_tunnel,1,ah_tunnel,2`

Config String Format	`saName, proposalName,proposalNumber[,proposalName,proposalNumber…]`

Pre-defined Security Association (SA) proposal names	The following are Phase II SA proposal names already defined inside the AMX Firmware and available for use.
	`qm_sa_g1_transport=esp_g1_transport,1,ah_g1_transport,2`
	`qm_sa_g2_transport=esp_g2_transport,1,ah_g2_transport,2`
	`qm_sa_g1_tunnel=esp_g1_tunnel,1,ah_g1_tunnel,2`
	`qm_sa_g2_tunnel=esp_g2_tunnel,1,ah_g2_tunnel,2`

Manual Key Manager (MKM)

mkmAddBypass

<table>
<tr><th colspan="2">mkmAddBypass</th></tr>
<tr><td><b>NAME</b></td><td><b>mkmAddBypass</b> – add a bypass Security Association</td></tr>
<tr><td><b>SYNOPSIS</b></td><td>mkmAddBypass=cptr_mkm_sa</td></tr>
<tr><td><b>DESCRIPTION</b></td><td>This rule adds a bypass Security Association (SA). After adding an SA, mkmCommit must be called to commit the SA to the Security Association Database (SADB).</td></tr>
<tr><td></td><td><b><i>Rule Value</i></b>:
cptr_mkm_sa
A string formatted as follows:
saNumber,protocolSelector[/destinationPort/sourcePort]>,
destinationAddressSelector,sourceAddressSelector,
directionality,mirroring
where
- <i>saNumber</i> is a decValue, a unique number to be assigned to the SA.
- <i>protocolSelector</i> is the IANA IP protocol number, decValue | ANY. Use 6 for TCP or 17 for UDP.
- <i>destinationPort</i> and sourcePort are:
decValue | ANY.
- <i>destinationAddressSelector</i> and sourceAddressSelector are:
ipAddress1[-ipAddress2 | /ipMaskPrefix].
- <i>directionality</i> is IN | OUT. If IN then this policy applies to traffic coming into the current host. If OUT it applies to traffic going out of the current host. A mirrored policy will automatically be created for the opposite traffic flow.
- <i>mirroring</i> is NOTMIRRORED | MIRRORED. NOTMIRRORED will create a policy only in the specified direction. MIRRORED will create two policies, one in each direction.</td></tr>
<tr><td><b>EXAMPLES</b></td><td>IPv4:
mkmAddBypass=8,17/ANY/17185,0.0.0.0/0,0.0.0.0/0,OUT,NOTMIRRORED
IPv6:
mkmAddBypass=8,17/ANY/17185,::/0,::/0,OUT,NOTMIRRORED"</td></tr>
<tr><td><b>Config String Format</b></td><td>saNumber.protocolSelector[/destinationPort/sourcePort],
destinationAddressSelector,sourceAddressSelector,directionality,
mirroring</td></tr>
</table>

mkmAddDiscard

mkmAddDiscard	
NAME	**mkmAddDiscard** – add a discard Security Association
SYNOPSIS	`mkmAddDiscard=cptr_mkm_sa`
DESCRIPTION	This rule adds a discard Security Association (SA). After adding an SA, mkmCommit must be called to commit the SA to the Security Association Database (SADB).

	Rule Value:
	`cptr_mkm_sa`
	A string formatted as follows:
	`saNumber`
	`protocolSelector[/destinationPort/`
	`sourcePort],destinationAddressSelector,sourceAddressSelector,`
	`directionality,mirroring`
	where
	- *saNumber* is a decValue, a unique number to be assigned to the SA.
	- *protocolSelector* is the IANA IP protocol number, decValue | ANY. Use 6 for TCP or 17 for UDP.
	- *destinationPort* and sourcePort are decValue | ANY.
	- *destinationAddressSelector* and *sourceAddressSelector* are:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *directionality* is IN | OUT. If IN then this policy applies to traffic coming into the current host. If OUT it applies to traffic going out of the current host. A mirrored policy will automatically be created for the opposite traffic flow.
	- *mirroring* is NOTMIRRORED | MIRRORED. NOTMIRRORED will create a policy only in the specified direction. MIRRORED will create two policies, one in each direction.

EXAMPLES	IPv4:
	`mkmAddDiscard=9,17/ANY/17185,0.0.0.0/0,0.0.0.0/0,IN,NOTMIRRORED`
	IPv6:
	`mkmAddDiscard=9,17/ANY/17185,::/0,::/0,IN,NOTMIRRORED`

Config String Format	`saNumber.protocolSelector[/destinationPort/sourcePort],`
	`destinationAddressSelector,sourceAddressSelector,directionality,`
	`mirroring`

mkmAddTransport

mkmAddTransport	
NAME	**mkmAddTransport** – add a transport mode Security Association
SYNOPSIS	`mkmAddTransport=cptr_mkm_sa`
DESCRIPTION	This rule adds a transport mode Security Association (SA). After adding an SA and setting the associated transform ID and keys, mkmCommit must be called to commit the SA to the Security Association Database (SADB).

	Rule Value:
	`cptr_mkm_sa`
	A string formatted as follows:
	`saNumber,protocolSelector[/destinationPort/sourcePort],`
	`destinationAddressSelector,sourceAddressSelector,`
	`directionality,networkInterfaceAddress`
	where
	- *saNumber* is a decValue, a unique number to be assigned to the SA.
	- *protocolSelector* is the IANA IP protocol number, decValue | ANY. Use 6 for TCP or 17 for UDP.
	- *destinationPort* and sourcePort are:
	`decValue | ANY.`
	- *destinationAddressSelector* and *sourceAddressSelector* are:
	`ipAddress1[-ipAddress2 | /ipMaskPrefix].`
	- *directionality* is IN | OUT. If IN then this policy applies to traffic coming into the current host. If OUT it applies to traffic going out of the current host. A mirrored policy will automatically be created for the opposite traffic flow.
	- *networkInterfaceAddress* is the IP address of the network interface to which the inbound SA is bound.

EXAMPLES	IPv4:
	`mkmAddTransport=5,6/2001/ANY,100.100.100.4,100.100.99.1,`
	`OUT,100.100.99.1`
	IPv6:
	`mkmAddTransport=5,6/2001/ANY,3ffe:2::2,3ffe:1::2,OUT,3ffe:1::2`

Config String Format	`saNumber.protocolSelector[/destinationPort/sourcePort],`
	`destinationAddressSelector,sourceAddressSelector,directionality,`
	`networkInterfaceAddress`

mkmAddTunnel

<table>
<tr><th colspan="2">mkmAddTunnel</th></tr>
<tr><td><b>NAME</b></td><td><b>mkmAddTunnel</b> – add a tunnel mode Security Association</td></tr>
<tr><td><b>SYNOPSIS</b></td><td>mkmAddTunnel=cptr_mkm_sa</td></tr>
<tr><td><b>DESCRIPTION</b></td><td>This rule adds a tunnel mode Security Association (SA). After adding an SA and setting the associated transform ID and keys, mkmCommit must be called to commit the SA to the Security Association Database (SADB).</td></tr>
<tr><td></td><td><b><i>Rule Value</i></b>:
cptr_mkm_sa
A string formatted as follows:
saNumber,protocolSelector[/destinationPort/sourcePort],
destinationAddressSelector,sourceAddressSelector,directionality,
tunnelEndpointIPAddress,networkInterfaceAddress
where
- <i>saNumber</i> is a decValue, a unique number to be assigned to the SA.
- <i>protocolSelector</i> is the IANA IP protocol number, decValue | ANY. Use 6 for TCP or 17 for UDP.
- <i>destinationPort</i> and <i>sourcePort</i> are:
decValue | ANY.
- <i>destinationAddressSelector</i> and <i>sourceAddressSelector</i> are:
ipAddress1[-ipAddress2 | /ipMaskPrefix].
- <i>directionality</i> is IN | OUT. If IN then this policy applies to traffic coming into the current host. If OUT it applies to traffic going out of the current host. A mirrored policy will automatically be created for the opposite traffic flow.
- <i>tunnelEndpointIPAddress</i> is the identity of the remote gateway, for example "10.9.9.180" for the IPv4 address.
- <i>networkInterfaceAddress</i> is the IP address of the network interface to which the inbound SA is bound.</td></tr>
<tr><td><b>EXAMPLES</b></td><td>IPv4:
mkmAddTunnel=6,17/ANY/ANY,100.100.100.0/24,100.100.200.4,
OUT,100.100.100.4,100.100.99.1")
mkmAddTunnel=7,ANY,10.8.30.30,0.0.0.0/0,IN,100.100.100.4,
100.100.99.1
IPv6:
mkmAddTunnel=6,17/ANY/ANY,3ffe:2::/64,3ffe:3::1,OUT,3ffe:2::2,
3ffe:1::2
mkmAddTunnel=7,ANY,3ffe:3::1,::/0,IN,3ffe:2::2,3ffe:1::2</td></tr>
<tr><td><b>Config String Format</b></td><td>saNumber.protocolSelector[/destinationPort/sourcePort],
destinationAddressSelector,sourceAddressSelector,directionality,
tunnelEndpointIPAddress,networkInterfaceAddress</td></tr>
</table>

mkmSetInboundAH

mkmSetInboundAH	
NAME	**mkmSetInboundAH** – set the transform ID and key for an inbound AH SA
SYNOPSIS	`mkmSetInboundAH=cptr_value_string`
DESCRIPTION	This rule sets the transform ID and key for an inbound AH SA.

	Rule Value:
	`cptr_value_string`
	A string formatted as follows:
	`saNumber,spi,ahTransformID,key`
	where
	- *saNumber* is a unique unsigned integer specified by the user.
	- *spi* is the decValue for the security parameter index, an unsigned long. SPI >255 and SPI < SPI_BOUNDARY, which is defined as 2048.
	- *ahTransformID* is:
	`MD5 | SHA | HMAC-MD5 | HMAC-SHA | HMAC-SHA2-256 | HMAC-SHA2-384 | HMAC-SHA2-512 | HMAC-RIPEMD | AES-XCBC-MAC`
	Note that MD5 (deprecated) is equivalent to HMAC-MD5; SHA (deprecated) is equivalent to HMAC-SHA.
	- *key* is the authentication algorithm key in hexadecimal. It must be 32 characters for MD5; 40 characters for SHA; 64 characters for SHA2-256; 96 characters for SHA2-384; 128 characters for SHA2-512; and 40 characters for RIPEMD.
	The traffic selectors for the transport or tunnel SA should be added before attempting to set the transform and keys for the same Security Association (identified by SA Number).

EXAMPLES	`mkmSetInboundAH=0,258,HMAC-MD5,123456789ABCDEF0FEDCBA987654321`
Config String Format	`saNumber.spi,ahTransformID,key`

mkmSetInboundESP

mkmSetInboundESP	
NAME	**mkmSetInboundESP** – set the transform ID and key for an inbound ESP SA
SYNOPSIS	`mkmSetInboundESP=configuration_string`
DESCRIPTION	This rule sets the transform ID and key for an inbound Encapsulating Security Payload (ESP) Security Association (SA).

	Rule Value:
	`configuration_string`
	A string formatted as follows:
	`saNumber,spi,espTransformID,attributeType,attributeValue [,attributeType,attributeValue]...`
	where
	- *saNumber* is a unique unsigned integer specified by the user.
	- *spi* is the decValue for the security parameter index, an unsigned long. spi >255 and spi < SPI_BOUNDARY, which is defined as 2048.
	- *espTransformID* is:
	`ESPDES | ESP3DES | ESP_DES | ESP_3DES | ESPAES | ESP_AES | ESPAES-CTR | ESP_AES-CTR | ESPNULL | ESP_NULL`
	Note that ESP transform names of the form ESPxxx are deprecated; the preferred names are of the form ESP_xxx and the deprecated forms will be removed in the future.
	Attribute types and values are shown in the following table

Attribute Type	Attribute Value
• DECKEY	Decryption key in hexadecimal format; must be 16 characters for DES, 48 characters for 3DES and 32 characters for AES.
• AUTHALG	MD5 | SHA | HMAC-MD5 | HMAC-SHA | HMAC-SHA2-256 | HMAC-SHA2-384 | HMAC-SHA2-512 | HMAC-RIPEMD | AES-XCBC-MAC
• AUTHKEY	Authentication key in hexadecimal format; must be 32 characters for MD5; 40 characters for SHA; 64 characters for SHA2-256; 96 characters for SHA2-384; 128 characters for SHA2-512; and 40 characters for RIP-EMD.

	The traffic selectors for the transport or tunnel SA should be added before attempting to set the transform and keys for the same Security Association (identified by SA Number). Note that MD5 (deprecated) is equivalent to HMAC-MD5; SHA (deprecated) is equivalent to HMAC-SHA.
EXAMPLES	`mkmSetInboundESP=00,258,ESP_DES,DECKEY,2134657812435687,AUTHALG, HMAC-MD5,AUTHKEY,123456789ABCDEF0FEDCBA9876543210`
Config String Format	`saNumber.spi,espTransformID,attributeType,attributeValue [,attributeType,attributeValue]…`

mkmSetOutboundAH

mkmSetOutboundAH	
NAME	**mkmSetOutboundAH** – set the transform ID and key for an outbound AH SA
SYNOPSIS	`mkmSetOutboundAH=cptr_value_string`
DESCRIPTION	This rule sets the transform ID and key for an outbound AH SA.

	Rule Value:
	`cptr_value_string`
	A string formatted as follows:
	`saNumber,spi,ahTransformID,key`
	where
	- *saNumber* is a unique unsigned integer specified by the user.
	- *spi* is the decValue for the security parameter index, an unsigned long. SPI >255 and SPI < SPI_BOUNDARY, which is defined as 2048.
	- *ahTransformID* is:
	`MD5 | SHA | HMAC-MD5 | HMAC-SHA | HMAC-SHA2-256 | HMAC-SHA2-384 | HMAC-SHA2-512 | HMAC-RIPEMD | AES-XCBC-MAC`
	Note that MD5 (deprecated) is equivalent to HMAC-MD5; SHA (deprecated) is equivalent to HMAC-SHA.
	- *key* is the authentication algorithm key in hexadecimal. It must be 32 characters for MD5; 40 characters for SHA; 64 characters for SHA2-256; 96 characters for SHA2-384; 128 characters for SHA2-512; and 40 characters for RIPEMD.
	The traffic selectors for the transport or tunnel SA should be added before attempting to set the transform and keys for the same Security Association (identified by SA Number).

EXAMPLES	`mkmSetOutboundAH=0,258,HMAC-MD5,123456789ABCDEF0FEDCBA987654321`
Config String Format	`saNumber.spi,ahTransformID,key`

mkmSetOutboundESP

<table>
<tr><th colspan="2">mkmSetOutboundESP</th></tr>
<tr><td><b>NAME</b></td><td><b>mkmSetOutboundESP</b> – set the transform ID and key for an outbound ESP SA</td></tr>
<tr><td><b>SYNOPSIS</b></td><td><code>mkmSetOutboundESP=configuration_string</code></td></tr>
<tr><td><b>DESCRIPTION</b></td><td>This rule sets the transform ID and key for an outbound Encapsulating Security Payload (ESP) Security Association (SA).</td></tr>
<tr><td></td><td><b><i>Rule Value</i></b>:
<code>configuration_string</code>
A string formatted as follows:
<code>saNumber,spi,espTransformID,attributeType,attributeValue</code>
<code>[,attributeType,attributeValue]...</code>
where
- <i>saNumber</i> is a unique unsigned integer specified by the user.
- <i>spi</i> is the decValue for the security parameter index, an unsigned long. SPI >255 and SPI < SPI_BOUNDARY, which is defined as 2048.
- <i>espTransformID</i> is:
<code>ESPDES | ESP3DES | ESP_DES | ESP_3DES | ESPAES | ESP_AES |</code>
<code>ESPAES-CTR | ESP_AES-CTR | ESPNULL | ESP_NULL</code>
Note that ESP transform names of the form ESPxxx are deprecated; the preferred names are of the form ESP_xxx and the deprecated forms will be removed in the future.
Attribute types and values are shown in the following table:
<table>
<tr><th>Attribute Type</th><th>Attribute Value</th></tr>
<tr><td>• ENCKEY</td><td>Decryption key in hexadecimal format; must be 16 characters for DES, 48 characters for 3DES and 32 characters for AES.</td></tr>
<tr><td>• AUTHALG</td><td>MD5 | SHA | HMAC-MD5 | HMAC-SHA | HMAC-SHA2-256 | HMAC-SHA2-384 | HMAC-SHA2-512 | HMAC-RIPEMD | AES-XCBC-MAC</td></tr>
<tr><td>• AUTHKEY</td><td>Authentication key in hexadecimal format; must be 32 characters for MD5; 40 characters for SHA; 64 characters for SHA2-256; 96 characters for SHA2-384; 128 characters for SHA2-512; and 40
characters for RIPEMD.</td></tr>
<tr><td>• IV</td><td>Initialization Vector for encryption; must be 16 characters for DES and 3DES and 32 characters for AES.</td></tr>
</table>
The traffic selectors for the transport or tunnel SA should be added before attempting to set the transform and keys for the same Security Association (identified by SA Number).
Note that MD5 (deprecated) is equivalent to HMAC-MD5; SHA (deprecated) is equivalent to HMAC-SHA.</td></tr>
<tr><td><b>EXAMPLES</b></td><td><code>mkmSetOutboundESP="00,258,ESP_DES,ENCKEY,2134657812435687,</code>
<code>IV,1001100110011001,AUTHALG,HMAC-MD5,AUTHKEY,</code>
<code>123456789ABCDEF0FEDCBA9876543210</code></td></tr>
<tr><td><b>Config String Format</b></td><td><code>saNumber.spi,espTransformID,attributeType,attributeValue</code>
<code>[,attributeType,attributeValue]…</code></td></tr>
</table>

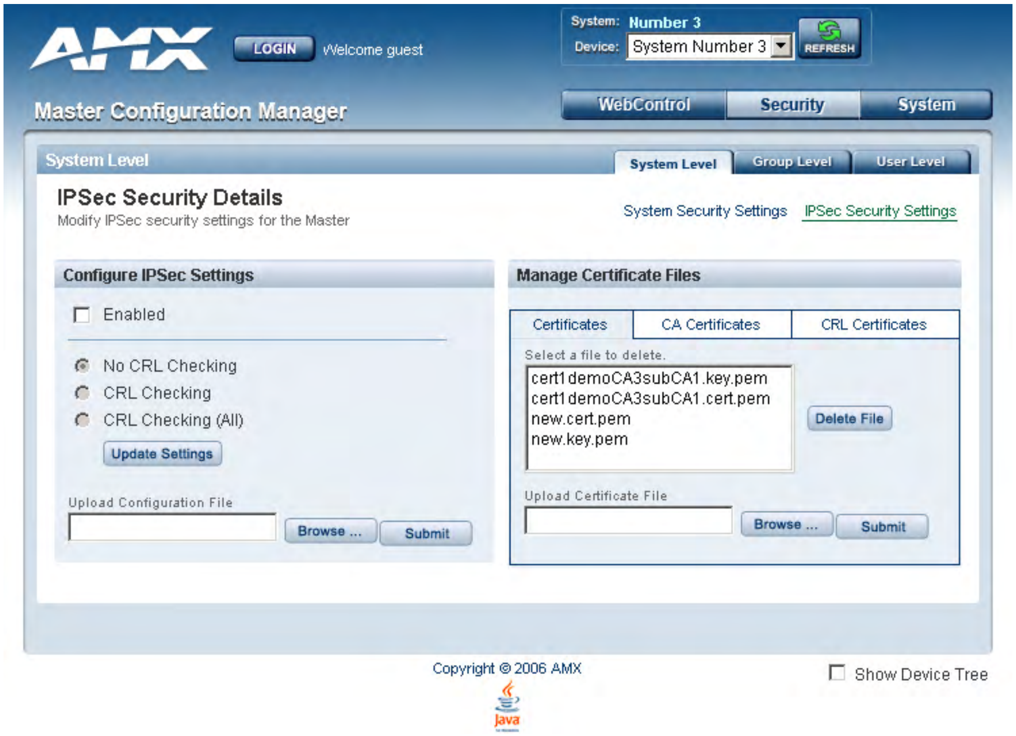
Sample IPSec Configuration File

The following is a sample IPSec configuration file:

```
ikeAddPeerAuth=192.168.220.57,%LOCAL_ADDR%,mm_g2,RSA,new.key.pem,AMXCA,
new.cert.pem
ikeAddPeerAuth=192.168.220.37,%LOCAL_ADDR%,mm_g2,PSK,password

spdAddTransport=ANY,192.168.220.57,%LOCAL_ADDR%,OUT,PACKET,IKE,qm_sa_g2_transport
spdAddTransport=ANY,192.168.220.37,%LOCAL_ADDR%,OUT,PACKET,IKE,qm_sa_g2_transport

# add bypass for IKE TCP port (500)
spdAddBypass=17/500/500,192.168.220.57,%LOCAL_ADDR%,OUT,MIRRORED
spdAddBypass=17/500/500,192.168.220.37,%LOCAL_ADDR%,OUT,MIRRORED

# add bypass for IPSEC-ESP protocol
spdAddBypass=50,192.168.220.57,%LOCAL_ADDR%,OUT,MIRRORED
spdAddBypass=50,192.168.220.37,%LOCAL_ADDR%,OUT,MIRRORED

# add bypass for IPSEC-AH protocol
spdAddBypass=51,192.168.220.57,%LOCAL_ADDR%,OUT,MIRRORED
spdAddBypass=51,192.168.220.37,%LOCAL_ADDR%,OUT,MIRRORED
```

IPSec Web Configuration Interface

Once the IPSec Config file for a system has been created on a PC, the configuration of IPSec on a master is accomplished via its Web interface. The following is a screen shot of the IPSec Security Settings page and descriptions of each field (FIG. 56). **All setting and file modifications require a system reboot to take effect.**



System: Number 3

Device: System Number 3

IPSec Security Details

Modify IPSec security settings for the Master

Configure IPSec Settings

□ Enabled

● No CRL Checking

○ CRL Checking

○ CRL Checking (All)

Upload Configuration File

Manage Certificate Files

Select a file to delete.

cert1demoCA3subCA1.key.pem
cert1demoCA3subCA1.cert.pem
new.cert.pem
new.key.pem

Upload Certificate File

Copyright © 2006 AMX

FIG. 56 IPSec Security Settings page

- The "**Enabled**" checkbox turns "on" and "off" the entire IPSec feature.
- The **CRL radio** buttons indicate the level of Certificate Revocation List checking that is performed for IPSec connections.

  "*CRL Checking*" checks the sources certificate while "*CRL Checking (All)*" checks all of the certificates in a sources certificate chain. If either "*CRL Checking*" or "*CRL Checking (All)*" are selected, then at least one certificate must be present in the CRL Certificates directory on the master.
- The **Upload Configuration File** section provides the capability to upload the IPSec Config file onto a master. Simply browse to the file's location on a PC, select the file, and select "Submit". The file will be uploaded to its proper location on the master.

  There is no "delete" capability for the Config file. New uploads overwrite the existing Config file.
- The "**Certificates**", "**CA Certificates**" and "**CRL Certificates**" sub-pages provide the ability to upload certificates, certificate authority certificates and certificate revocation list certificates respectively onto the master. Simply browse to the location of the certificate data on the PC, select the file and select "Submit". The selected file will be uploaded to the appropriate directory on the master.

  To delete a certificate file, simply select the desired file and select "Delete". This will cause the file to be removed from the master.

Appendix B: Clock Manager NetLinx Programming API

Types/Constants

The NetLinx.axi file that will ship with NetLinx Studio includes the following types/constants:

```
(*------------------------------------------------------------------------------------*)
(* Added v1.28, Clock Manager Time Offset Structure *)
(*------------------------------------------------------------------------------------*)
STRUCTURE CLKMGR_TIMEOFFSET_STRUCT
{
  INTEGER     HOURS;
  INTEGER     MINUTES;
  INTEGER     SECONDS;
}

(*------------------------------------------------------------------------------------*)
(* Added v1.28, Clock Manager Time Server Entry Structure *)
(*------------------------------------------------------------------------------------*)
STRUCTURE CLKMGR_TIMESERVER_STRUCT
{
  CHAR     IS_SELECTED;               (* TRUE/FALSE *)
  CHAR     IS_USER_DEFINED;           (* TRUE/FALSE *)
  CHAR     IP_ADDRESS_STRING[48];     (* Allow enough room for IPv6 in the future *)
  CHAR     URL_STRING[32];            (* Example: time.organization.net *)
  CHAR     LOCATION_STRING[32];       (* Example: Boulder, Colorado, US *)
}

(* Added v1.28, Clock Manager *)
INTEGER CLKMGR_MODE_NETWORK    = $01; (* Used to enable Clock Manager Functionality *)
INTEGER CLKMGR_MODE_STANDALONE = $02; (* Use a free-running clock - legacy
                                            behavior. *)
```

Library Calls

The NetLinx.axi file that ships with NetLinx Studio includes the following Clock Manager-specific library calls:

NetLinx.axi - Library Calls	
CLKMGR_IS_NETWORK_SOURCED()	Returns FALSE/0 or TRUE/1. The default setting is FALSE/0.
CLKMGR_SET_CLK_SOURCE (CONSTANT INTEGER MODE)	Can be set to CLKMGR_MODE_NETWORK or CLKMGR_MODE_STANDALONE.
CLKMGR_IS_DAYLIGHTSAVINGS_ON()	Returns FALSE/0 or TRUE/1. The default setting is FALSE/0.
CLKMGR_SET_DAYLIGHTSAVINGS_MODE (CONSTANT INTEGER ONOFF)	Can be set to ON/TRUE or OFF/FALSE.
CLKMGR_GET_TIMEZONE()	Returns Timezone as a string in the format: UTC[+|-]HH:MM
CLKMGR_SET_TIMEZONE (CONSTANT CHAR TIMEZONE[])	Input string must have the correct format: UTC[+|-]HH:MM
CLKMGR_GET_RESYNC_PERIOD()	Returns the Clock Manager's re-sync period in minutes. The default setting is one (1) hour. This setting has no effect if the Clock Manager mode is set to STANDALONE.
CLKMGR_SET_RESYNC_PERIOD (CONSTANT INTEGER PERIOD)	Sets the re-sync period to the specified minute value. The upper bound is 480 minutes (i.e., 8 hours).
CLKMGR_GET_DAYLIGHTSAVINGS_OFFSET (CLKMGR_TIMEOFFSET_STRUCT T)	Populates the TIMEOFFSET structure with the current Daylight Savings Offset configured. The function returns a negative SLONG value if it encounters an error.
CLKMGR_SET_DAYLIGHTSAVINGS_OFFSET (CONSTANT CLKMGR_TIMEOFFSET_STRUCT T)	Sets the Daylight Savings Offset to the specified value.
CLKMGR_GET_ACTIVE_TIMESERVER (CLKMGR_TIMESERVER_STRUCT T)	Populates the TIMESERVER structure with the currently active time server's data. The function returns a negative SLONG value if it encounters an error.
CLKMGR_SET_ACTIVE_TIMESERVER (CONSTANT CHAR IP[])	Sets the time server entry that has the matching IP-ADDRESS to the IP parameter as the active time server entry.
CLKMGR_GET_TIMESERVERS (CLKMGR_TIMESERVER_STRUCT T[])	Populates the currently configured time server entries from the Clock Manager into the specified TIMESERVER array. The function returns a negative SLONG value if it encounters an error, otherwise the return value is set to the number of records populated into the CLKMGR_TIMESERVER_STRUCT array.
CLKMGR_ADD_USERDEFINED_TIMESERVER (CONSTANT CHAR IP[], CONSTANT CHAR URL[], CONSTANT CHAR LOCATION[])	Adds a user-defined time server entry.
CLKMGR_DELETE_USERDEFINED_TIMESERVER (CONSTANT CHAR IP[])	Deletes the user-defined entry that has its IP-ADDRESS matching the parameter.

NetLinx.axi - Library Calls (Cont.)	
CLKMGR_GET_START_DAYLIGHTSAVINGS_RULE()	Gets a string representation of when Daylight Savings is supposed to START. The Fixed-Date rules have the form: "fixed:DAY,MONTH,HH:MM:SS" with all fields as numeric except for the word "fixed". The Occurrence-Of-Day rules have the form: "occurence:OCCURENCE, DAY-OF-WEEK,MONTH,HH:MM:SS" with all fields as numeric except for the word "occurence". • OCCURANCE range = 1-5 ’5’ indicates the 'LAST' occurrence of a particular day of the month. • DAY-OF-WEEK translates as: 1=Sunday 2=Monday 3=Tuesday 4=Wednsday 5=Thursday 6=Friday 7=Saturday Examples: "fixed:5,10,16:00:00" = October 5, at 4:00PM). "occurence:5,1,10,02:00:00" = last Sunday in October, at 2:00AM).
CLKMGR_SET_START_DAYLIGHTSAVINGS_RULE (CONSTANT CHAR RECORD[])	Sets the START Daylight Savings rule to the specified string which *must* be in either the Fixed-Date format or the Occurence-Of-Day format. The function returns a negative SLONG value if it encounters an error. The Fixed-Date rules have the form: "fixed:DAY,MONTH,HH:MM:SS" with all fields as numeric except for the word "fixed". The Occurrence-Of-Day rules have the form: "occurence:OCCURENCE, DAY-OF-WEEK,MONTH,HH:MM:SS" with all fields as numeric except for the word "occurence". • OCCURANCE range = 1-5 ’5’ indicates the 'LAST' occurrence of a particular day of the month. • DAY-OF-WEEK translates as: 1=Sunday 2=Monday 3=Tuesday 4=Wednsday 5=Thursday 6=Friday 7=Saturday Examples: "fixed:5,10,16:00:00" = October 5, at 4:00PM). "occurence:5,1,10,02:00:00" = last Sunday in October, at 2:00AM).

NetLinx.axi - Library Calls (Cont.)	
CLKMGR_GET_END_DAYLIGHTSAVINGS_RULE()	Gets a string representation of when Daylight Savings is supposed to END. The Fixed-Date rules have the form: "fixed:DAY,MONTH,HH:MM:SS" with all fields as numeric except for the word "fixed". The Occurrence-Of-Day rules have the form: "occurence:OCCURENCE, DAY-OF-WEEK,MONTH,HH:MM:SS" with all fields as numeric except for the word "occurence". • OCCURANCE range = 1-5 ’5’ indicates the 'LAST' occurrence of a particular day of the month. • DAY-OF-WEEK translates as: 1=Sunday 2=Monday 3=Tuesday 4=Wednsday 5=Thursday 6=Friday 7=Saturday Examples: "fixed:5,10,16:00:00" = October 5, at 4:00PM). "occurence:5,1,10,02:00:00" = last Sunday in October, at 2:00AM).
CLKMGR_SET_END_DAYLIGHTSAVINGS_RULE (CONSTANT CHAR RECORD[])	Sets the END Daylight Savings rule to the specified string which MUST be in either the Fixed-Date format or the Occurence-Of-Day format. The function returns a negative SLONG value if it encounters an error. The Fixed-Date rules have the form: "fixed:DAY,MONTH,HH:MM:SS" with all fields as numeric except for the word "fixed". The Occurrence-Of-Day rules have the form: "occurence:OCCURENCE, DAY-OF-WEEK,MONTH,HH:MM:SS" with all fields as numeric except for the word "occurence". • OCCURANCE range = 1-5 ’5’ indicates the 'LAST' occurrence of a particular day of the month. • DAY-OF-WEEK translates as: 1=Sunday 2=Monday 3=Tuesday 4=Wednsday 5=Thursday 6=Friday 7=Saturday Examples: "fixed:5,10,16:00:00" = October 5, at 4:00PM). "occurence:5,1,10,02:00:00" = last Sunday in October, at 2:00AM).

It's Your World - Take Control™

3000 RESEARCH DRIVE, RICHARDSON, TX 75082 USA • 800.222.0193 • 469.624.8000 • 469-624-7153 fax • 800.932.6993 technical support • www.amx.com