AMX Essentials Course

Version 1.2
05/01/06

Credits
Written by AMX University.
Printed in Richardson, Texas.

For additional questions or suggestions, feel free to call us.

AMX University
3000 Research Drive
Richardson, TX 75082
Phone: 469.624.8000
Fax 469.624.7192

Contents

AMX Overview

AMX was founded in 1982. The world headquarters is in Richardson, Texas. We have more than 700 dealers in the United States, and we support 82 International countries. AMX has been on the "Best Places to Work" list for both 2004 (3rd place) and 2005 (1st place) by the *Dallas Business Journal*.

CEO remarks

I'm Rashid Skaf, AMX president and CEO. I'd like to welcome you to AMX University to take part in our world class training. I personally believe that training is key in the control system industry.

When it comes to technology, change is the only thing that remains the same. Today's bleeding-edge product will one day be archaic which why continually learning and adapting to change is so important.

At AMX, we surveyed training trends with our dealers and found that dealers who come to training increased their revenue by approximately 19% in the following year. I believe for any technology-based industry to grow, its leaders must unite behind a common goal and ensure their employees continue to learn and constantly challenge themselves.

Again, I thank you for coming to AMX for your training needs. I have no doubt that we will take our industry to new heights.

Rashid Skaf

Vertical markets

AMX provides ample business opportunities by supporting numerous vertical markets. Using AMX tools that you will learn about in this class, you can easily sell and deliver control systems. AMX can be found in the following vertical markets:

Broadcasting	Houses of Worship
Education	Multiple Dwelling Units
Entertainment	Network Operations Centers
Government	Presentation Facilities
Health care	Private Transportation
Home Theater	Retail
Hotels	Whole Home

Case studies

Some examples of AMX control systems include:

- The United States Whitehouse
- "London Lady" luxury yacht
- Daryl Johnston’s (of the Dallas Cowboys) home
- Turin Winter Olympics figure skating competition

AMX Benefits

AMX provides tools and resources to make working with AMX easy. Below are several AMX benefits:

- 24 x 7 global customer support
- Online dealer self-serve tools
  - Price sheets
  - Purchase order information
  - Shipping confirmations
- World class training
- Remote/international field offices
- Award-winning products
- One email address for all issues **service@amx.com**
- Compatibility between all AMX user interfaces and AMX controllers

About this course

This course covers the basic information you need to know before you begin selling, designing, installing, or programming AMX control systems. You will learn how AMX control systems benefit customers, as well as AMX equipment, software, and some basic skills beneficial when implementing control systems.

Audience

This course is for anyone who is interested in learning the basics about AMX control systems. It is also highly recommended for students who are pursuing ACE certification as a Designer, Installer, or Programmer, or pursuing certification in all three areas.

Why take this course

You should take this course so you understand what components and protocols are used in control systems and what AMX equipment and software tools you use to create a control system. If you are pursuing ACE certification, you should take this course so you have the background information required to complete the additional courses and complete your certification.

You are here

If you are new to AMX, AMX highly recommends you take the AMX Essentials course before you pursue any ACE certification so you understand AMX's business, products, software, and basic networking knowledge.

Listed below are the three certifications you can earn and the courses required for certification.

	ACE Designer	ACE Installer	ACE Programmer
Prerequisites	Getting Started with AMX* Introduction to Networking for A/V Professionals*	Getting Started with AMX* Introduction to Networking for A/V Professionals*	Getting Started with AMX* Introduction to Networking for A/V Professionals*
Recommended courses	**AMX Essentials** Quest for Power*	**AMX Essentials** Quest for Power*	**AMX Essentials**
Courses, Tests and Practicals	AMX Designer or AMX Residential Bootcamp	AMX Installer or AMX Residential Bootcamp	AMX Programmer I AMX Programmer II

* Online Course – http://www.amx.com/training

Prerequisites

You should take the following On Demand courses:

- Getting Started with AMX
- Introduction to Networking for AV Professionals

You need to pass the quiz for each course, with a score of 80% or greater before taking this course.

To take the On Demand prerequisite courses:

1. Log into www.amx.com/training.
2. Click the course link to complete the course.

To take the quiz for Getting Started with AMX, click the **Online Tests** link on the training web page to take the quiz.

The quiz for Introduction to Networking for AV Professionals is part of the online class.

Agenda

Below is the suggested time frame for this course.

Table 1: Course Agenda

Lesson	Duration
Course Intro	.5 hour
Control Systems	1.25 hour
LUNCH	.75 hour
Control System Hardware	1.5 hour
Networks	.75 hour
AMX Software Applications	1 hour
AMX Tools	.5 hour

How to use course materials

AMX provides course guides, a CD, and job aids for all classroom courses. Course guides can include various types of hands-on exercises.

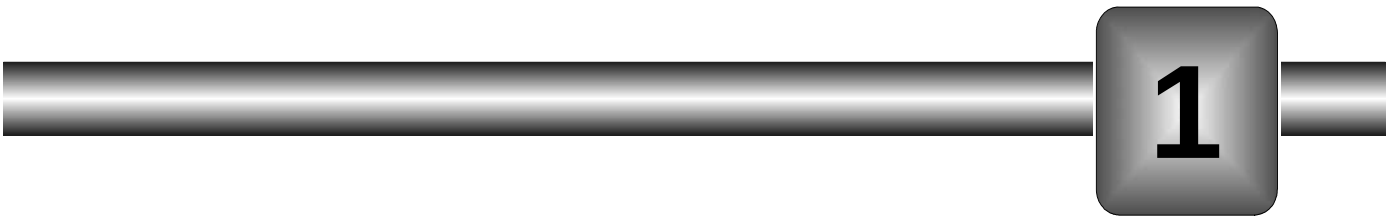
Table 2: Hands-on Exercise

Type	Definition
Demo	To be performed by the instructor only. Demos are performed when equipment is not available for all students or when the exercise could cause network or equipment problems when performed simultaneously by multiple users.
Together	To be performed with the instructor. The steps to perform the exercise are listed and are specific to the scenario.
On Your Own	To be performed on your own. The steps are not listed in the section. It is up to the student to use the course guide to perform the exercise for a specific scenario.
Practical	To be performed on your own. The same as On Your Own except exercises labeled Practical will be turned in to the instructor to prove you have the skills to earn an ACE Certification.
Steps	To be a reference only. These are generic steps to instruct you how to perform a task but not specific to a classroom scenario.

You will see some words in **bold** or in *italics* in the **Togethers** and **Steps** throughout the course guides. **Bold** items can be links, tabs, buttons, or other software options. **Bold** and *italic* items may also represent information you are asked to type or select. See the examples below when asked to type information:

Table 3: Typing examples

Step	What you should type
Type **DVD Player** in the **Device** field.	You should type exactly what is in bold, **DVD Player**.
Type your *IP address* in the **IP** field.	Type your own IP address, such as 192.168.103.10.



Control Systems

In this lesson, you have the opportunity to operate a control system and view many of the solutions and features that AMX provides to customers. You will also identify the benefits of AMX control systems. Additionally, you will learn how the AMX website can help you in a variety of situations.

Lesson objectives

At the end of this lesson, you will:

- Identify benefits of an AMX control system
- Operate a control system
- Explore the AMX website

Benefits of control systems

Control systems simplify life for clients, whether it is residential or commercial clients. There is no need to have multiple remotes or switches. With a control system, the customer can make multiple events happen with the touch of a button. Additionally, you can monitor and control an entire home and from remote locations.

Not only can you control your Audio/Video equipment, you can control things such as pools, lights, and HVAC systems.

The main goal is to have an intuitive interface that any user can easily use to control multiple devices with minimal instruction. Another reason to have a control system is to take advantage of the ability to program macros and presets. For example, a user can press a button such as **Watch Movie** and automatically the drapes close, the lights dim, the projector and DVD player power up, and the volume level is set to a preset level.

How?

A control system allows the user to command, control, and communicate with a variety of devices through a simple user interface.

The control system consists of user interfaces that allow you to select activities, a master that interprets those actions, and control ports to communicate with the controlled devices.

Command	Control	Communicate
UI	Controller	Devices

There are many tasks involved in implementing a successful control system that you will examine in this course. As you learned in the prerequisites, control systems can control any device that was designed to be controlled. Devices can include audio/video equipment, pools, spas, security cameras, multimedia servers, lights, HVAC equipment, drapes, and the list goes on.

On your own - Operate control system

The first thing you will do in this course is operate a working control system. You will operate a very simple control system with some optional features available to customers. Your instructor will demonstrate additional products and features that are not available at each individual workstation.

Use the touch panel located at your workstation to do the following:

- Play DVD
- Adjust volume
- View weather
- View photos

Solutions

You viewed some basic control system features at your workstation, but there are others that the instructor will demo in the classroom, such as additional touch panel features, multimedia servers, remote management and scheduling, and concierge services.

TakeNote

TakeNote is an application that allows you to use your finger or a stylus to annotate directly on Modero touch panels. The annotation is then displayed on both the Modero and the PC. TakeNote is delivered by a USB control stick with the Windows version of G4 Computer

Control. After an initial simple configuration, you just install the stick in a networked computer and launch TakeNote.

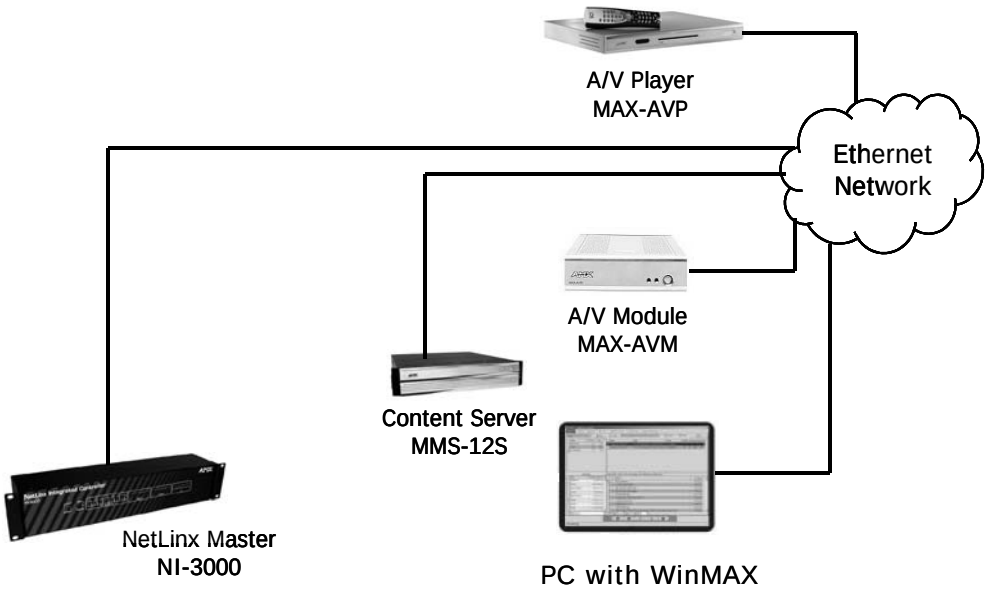
This is a great extra feature to show your clients.

Demo - View TakeNote

Watch as your instructor demonstrates how to use TakeNote.

MAX multimedia servers

MAX is a product line that manages audio/video content and delivery for home entertainment systems, corporations, hotels, universities, and restaurants. MAX is a personal content server designed to store, manage, distribute, and protect a growing amount of digital audio and video data. MAX provides you the ability to upload, organize, and access the content you need. The following is a diagram of a simple MAX configuration.



You can use MAX to:

- Select DVD cover art
- Sort by artist, title, genre, etc.
- Deliver content to as many as 25 destinations

WinMAX

You can use WinMAX, a free software application, to control MAX servers from any Windows PC. The PC must be connected to the same Ethernet network as the server. Multiple PCs running WinMAX can control the server simultaneously. Typically, you use WinMAX to establish the initial communication with the server, even if an AMX control system will be used.

Demo - View MAX

The instructor will demonstrate how to view and play content with a MAX multimedia server. Each student can view and control the MAX--Please be courteous.

Resource Management Suite (RMS)

RMS contains the tools you need to easily manage system resources by allowing users to schedule rooms and monitor equipment.

RMS is packaged into three sets of features based on what the end user is looking for.

- **AssetManager** allows corporate or residential environments to monitor equipment and provides the ability for a dealer to monitor equipment at remote locations.
- **MeetingManager** allows corporate or residential environments to perform the tasks of AssetManager, and adds scheduling capabilities.
- **ClassroomManager** is packaged in 100 room sets for the education market and provides the same features as MeetingManager.

RMS also includes Intelligent Manager and IP Link interface to monitor Extron equipment.

RMS is adaptable to network configuration changes. There is not any special network design needed to accommodate AMX in a building. If a new room or building needs to come online, RMS automatically recognizes these rooms and devices when they are installed.

RMS gives home owners the ability to have their home's system proactively monitored by a dealer without making a house call. Additionally, this feature allows home owners to monitor their own houses from anywhere in the world.

Demo - RMS

Watch as your instructor demonstrates Resource Management Suite.

OnSite (continental U.S. only)

OnSite is a 24-hour, 7-day a week service provided to customers in the continental United States. It is a concierge service that can be accessed through a touch panel, by phone, or by email. OnSite is a callback service. OnSite services include:

- Dining - Recommend restaurants and make reservations.
- Travel - Find a pet sitter or get directions.
- Sports and Recreation - Make a tee time or sign up for scuba lessons.
- Entertainment - Purchase sporting event or concert tickets.
- Household - Arrange maid service.
- Tourist and City Info - Find best area or buy tour tickets.
- Shopping - Find perfect gift or send gifts.
- Other - Locate a rare wine or a store open past 10 p.m., plan a party, or find free family events.

Together - OnSite

Click the OnSite button on your touch panel.

Amenities Solution

Amenities Solution is an automation system designed for multi-dwelling units (MDUs), such as luxury condominiums and other planned communities. It provides communication between residents and hospitality services. Using AMX Modero touch panels in their residences, homeowners can enjoy the same conveniences of a five-star hotel, including concierge services, activity scheduling, maintenance requests, reservations, and business and local information access.

In 2005, Custom Electronic Design and Installation Association (CEDIA) awarded Amenities Solution with Manufacturer’s Excellence "Best New Product" award. The same year, EH Publishing awarded Amenities Solution "Product of the Year."

Demo - Amenities Solution

Watch as your instructor demonstrates Amenities Solution.

AMX website

The AMX website (http://www.amx.com) has almost everything you need to know about AMX. You need a login identification so you can log on to the website and access specifications. This consists of an email address and a password.

The website includes:

- AMX University
- Training schedules and registration
- AMX product information
- InConcert partner product program

- Marketing materials
- Installation guides
- Data sheets
- Product drawings and images

You will use the website at various times during this course to locate information.

Demo - AMX website

Watch as your instructor accesses different areas of the AMX website.

Together - Log on to AMX website

In this example, you will log on to the AMX website and view some home theater control systems.

1. Open browser and type **www.amx.com**.
2. Enter the *user name* and *password* you created when registering on the website.
3. Click **Dealers**.
4. Click **Marketing Center**.
5. Click the **Download PDF** link and view the following brochures: "The Nautilus" and "Franklin Lakes Home Theater".

On your own - AMX website

Use the AMX website to answer the following questions.

1. What area of the website would you go to find the AMX InConcert list?

   _____

2. What area of the website would you go to find software application files?

   _____

3. What area of the website would you go to find AMX products?

   _____

Lesson review

Use the AMX website, the information in this lesson, and your in-class experience to answer the following questions:

1. What is one of the benefits of an AMX control system?

   _____

2. Was the touch panel intuitive enough for you to easily perform the functions listed in the Operate a Control System exercise in this lesson. _____
3. Which software application would you sell to a client that needed to monitor equipment in multiple rooms? _____
4. Which software application would you sell to a client that needed to schedule rooms and monitor equipment? _____
5. What equipment and software would you sell a customer to manage their CDs and DVDs?

   _____

6. Where could you get the IR file for a Cyberhome CHDVD300?

   _____

Lesson summary

In this lesson, you were able to operate a control system and view AMX solutions. You learned the benefits of AMX control systems. You also learned the AMX website provides information and downloads to help dealers sell and implement AMX control systems.

2

Control System Hardware

There is various AMX equipment available to successfully implement control systems. You will learn about the different types of AMX equipment and the naming conventions used. You will locate hardware information on the AMX website. Along with the hardware, the cabling and power requirements are very important to creating a working control system. You will learn AMX cabling and power requirements at a high level.

Lesson objectives

At the end of this lesson, you will be able to:

- Identify control system hardware
- Define cable types
- Calculate power consumption

Before you begin this section of the course, you will review the control system hardware and cabling and control types that were covered in the prerequisite course.

On your own - Review control systems

1. Draw a line to match the equipment to the appropriate equipment type. One equipment type can have more than one piece of equipment.

OEM Devices

Central Controllers

User Interfaces

2. What are the three types of AMX user interfaces?

   _____

   _____

Enter the letter(s) of the control networks to the corresponding statements listed below. A statement can be associated with multiple control networks.

A. AXLink

B. ICSNet

C. Ethernet

D. ICSHub

3. AMX proprietary communication _____
4. Connects Axcess devices _____

5. Connects NetLinx devices _____
6. Widely used networking standard _____
7. Uses CAT5 cable _____
8. Regenerates signals _____
9. Carries power _____

Answer the following questions.

10. What are five types of control?

    _____
    _____
    _____

11. What type of control communicates a range of values? It can be used to dim lights or for volume.

    _____
    _____

12. What type of commonly-used control is subject to light interference and has one-way communication?

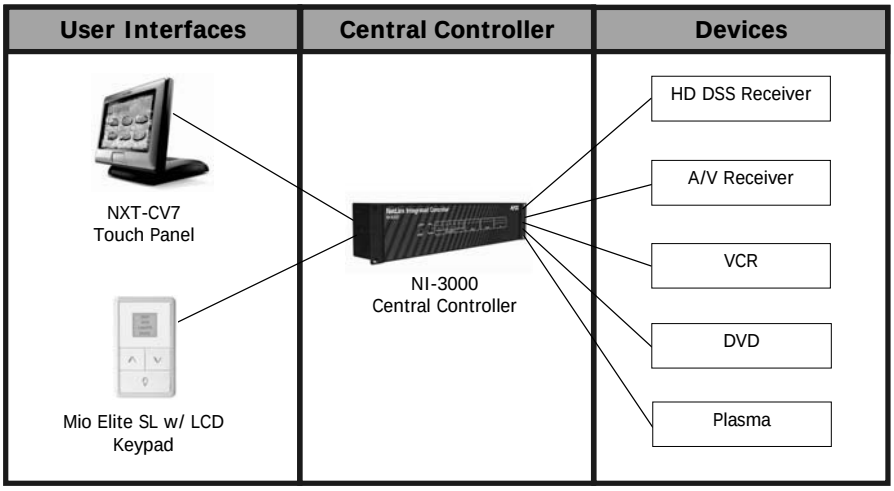
    _____

13. What type of control is becoming more commonly used with third party devices and uses a standard cable?

    _____
    _____

Control system hardware

Below is a diagram of a simple control system. This example is a single master system because it has only one master and will control a small area. It consists of user interfaces connected to a controller that controls devices.



Your workstation control system includes these three types of equipment, but it has a lot of additional devices as well. In this lesson, you will identify all the hardware used in the control system at your workstation. You have reviewed some of these devices in the prerequisite class.

Control systems consist of the following device types:

- User Interface - The equipment that the user will use to control the whole system. This can be a touch panel, keypad, or handheld remote.
- Controller (master) - The brains of the control system. The program is run here.
- Control Ports - Equipment used for physical connection and communication to controlled devices.
- Accessories - These can include power supplies, racks, sensors, and other miscellaneous equipment to complete the control system.
- Devices - The devices to be controlled by the user. These can include projectors, DVDs, HVAC systems, and so forth.

As you go through the control system hardware in class, you will have the opportunity to locate specifications on the AMX website. You can also find the Data Sheets and Quick Start Guides for products.

AMX naming conventions

If you understand the AMX product naming conventions, it is easier to make sense of product names. Typically, the first two or three characters of the model number tell you the device product family. The third character defines if the device is a card, box, table top, wall mount, or accessory.

Examples:

- AXT-CV6 - AXLink 6" touch panel with color video
- NXC-NH - NetLinx Card for NetLinx Hub

Platform	Form Factor	Descriptor
AL – AMX Lutron	A – Accessory	A – Active Matrix
AX – AxLink	B – Box	C – Color
NS – NetLinx Software	C – Card	G – Graphic/RGB
NX – NetLinx	D – Decora, Wallmount, Dimmer	P – Passive Matrix
PL – Phast Landmark	F – Frame	V - Video
RD – Radia	H – Hub	
	I – Integrated Controller	
	K – Keypad	
	L – Lighting	
	M – Rackmount	
	T – Tilt/Table Top	
	U – Unimount	

On your own - Identify equipment

1. Look at the control system at your workstation. List the AMX model numbers for all the equipment. When you finish the list, look up the part numbers on the AMX website to read in more detail what the equipment is designed to do.

   _____
   _____
   _____
   _____
   _____
   _____
   _____

User interfaces

The user interface is the most important element of a control system to an end user. It is the user's only point of contact with the entire system. The user interfaces come in various sizes and can include wall mount, table top, and wireless versions. In some instances, you may use a web browser as an additional user interface to control devices.

The complexity of the control system and the customer budget will determine the type of user interface you use. The handheld remote and keypads are more economical, but they do not offer as many features as touch panels.

Touch panels

AMX offers a wide range of touch panels from 4"-17" that can be wall-mounted, used on a tabletop, or wireless.

There are two families of touch panels: G3 (4" and 6") and G4 (5"-17"). These are AMX's 3rd and 4th generation panels. Below is a table of features for each family of touch panels.

Table 4: G3 and G4 Touch Panels

Features	G3	G4
Screen Size	4" to 6"	5" to 17"
Control Network	AXLink	Ethernet and/or Wireless
Panel Design	TPDesign3	G4Panel Builder or TPDesign4
Resolution	320 x 240	800 x 480 - 1280 x 768
Color Depth	Optimize 24-bit color to render to match a modified 256-color pallet.	Up to 24-bit

The G3 panels offer our lowest cost touch panel, and they must be designed separately from G4 panels using TPDesign3. You can migrate from G3 to G4, but not from G4 to G3.

The G4 family includes the Modero Panels and TPI4. You use G4 PanelBuilder to build AMX G4 touch panel designs from our pre-designed templates. For your own custom designs, you can use TPDesign4 to build designs from scratch.

You can create user interface designs in VisualArchitect using templates and make minor modifications for G4 touch panels.

The Modero VG series offers the latest in style, graphics capabilities, and streaming video to meet your client's user interface needs. Below is the MVP-8400.

Demo - Wireless touch panel

Watch as your instructor undocks the wireless touch panel out of the wall.

Keypads

AMX offers many keypad styles. Keypads offer reliable control at a lower cost than touch panels. You use KeypadBuilder or VisualArchitect software to design the keypad's button layouts and labels.

Mio Modero Series keypads

The Mio Modero Series keypads are available in U.S. standard single and double gang sizes, and accommodate standard U.S. and European back boxes. International accent frames are available for larger back boxes. Mio keypads use AXLink to communicate with the master.

- **The Classic** - Uses solid, engraved buttons and an LED that glows to indicate feedback. When a control function is activated, you'll immediately see the lit LED and know everything is working as it should. It is available in black, white, and beige.

- **The Prestige** - Has clear buttons that can be labeled with custom text and icons using laser printed inserts. It is available in black, white and beige.

- **The Elite** - The first keypad designed to complement Lutron® Architectural Matte colors. Choose from almond, beige, black, brown, gray, ivory, light almond, taupe, white, metallic gold, and metallic silver. It uses solid, engraved backlit buttons that glow blue and change to red when selected to indicate feedback. The “people sensor” activates the keypad as you approach, while the LCD display allows you to scroll, select, and control directly on the screen. Select up to 10 devices/functions and 10 sub-devices/functions for up to 100 commands per keypad.

- **The Attaché** - The wireless IR Attaché table top keypad is ideal for homes, conference rooms, offices, hotels, and other environments where the user wants the flexibility of taking control from a coffee table, nightstand, desk, or conference room table. It includes solid, engraved backlit buttons that glow blue and change to red when selected to indicate feedback. The Attaché features a 270-degree dispersal pattern that enables command signals from virtually every possible angle, and the LCD display allows you to scroll, select, and control directly on screen. Select up to 10 main menu items with 10 available sub-menu items to combine for 100 control options and 22 buttons.

Mio Modero DMS and DMS Pinnacle

The Mio Modero DMS and DMS Pinnacle have Dynamic Menu System (DMS) keypad control. The DMS structure allows for speedy navigation. On the DMS, simply press the up and down push buttons to scroll line-by-line and page-by-page. With the touch of a finger, the DMS Pinnacle slider takes you through entire page flips. Make selections by touching the LCD display in a matter of seconds.

Handheld remote controls

There are two models of handheld remote controls.

The Mio Modero R-1 remote is ideal for smaller rooms where IR control of a specific number of integrated devices is required.

The R-1 is a traditional-style handheld remote that provides an alternative to larger touch panels. The R-1 comes ready to operate all surrounding technology through the AMX control system with just a few simple configuration steps. You can use macro keys to power on the projector, lower the screen, select a DVD, activate audio, and adjust volume. With an IR receiver, you can move from room to room with no additional programming required.

Below are several of the features of the R-1:

- 45 backlit laser-engraved buttons
- Automatically powers on when picked up
- Automatically powers down after non-use
- Easy-to-read LCD display
- Made with black-brushed aluminum and chrome plating
- First AMX remote to use standard AAA batteries

The R-1 has 45 backlit laser-engraved buttons. Three are designated to activate macros, or pre-determined sequences of events. Six are slated for accessing devices, such as DVD/CD players, a projector, satellite receiver, and television. The remaining 36 represent specific operating functions for each device. In the center of the remote resides a large circular chrome button that acts as a simplified navigation tool – up, down, left, right, and select. Positioned adjacently are two square chrome buttons programmed to change channels and adjust volume levels. At the bottom of the R-1 is a set of 12 buttons that can be used for a numeric keypad.

Pick up the remote and the LCD and buttons instantly illuminate. The remote can be configured to automatically power off within a certain amount of time to conserve the battery life.

The LCD display located at the top of the Mio Modero remote indicates the current state of the remote.

Laser-engraved buttons can be customized to meet the needs of individual end users and unique applications. A custom set of laser-engraved buttons can be created and ordered from AMX using a template design available with AMX's KeypadBuilder software.

The R-1 transmits AMX IR Codes only.

There is also a R-2 remote which includes the same features of the R-1, but also adds 418 MHz or 433 MHz radio frequency control.

On your own - Locate user interface information

Using the AMX website, complete the following questions:

1. What is the display resolution of the Modero 10" touch panel? _____
2. Which two applications can you use to design keypads?
   _____
   _____
   _____
3. TPDesign4 is used to design touch panels for which product series?
   _____
   _____
   _____
4. What is the difference between the R1 and the R2?
   _____
   _____
   _____

Central controllers

Integrated controllers combine the controller and control ports in one piece of equipment. The following picture shows the NI-3000, which is very popular for larger systems because of its low cost.

Figure 1: NI 3000

The NI-3000 integrates 7 serial ports, 8 relay channels, 8 IR ports, and 8 IO channels, plus Ethernet, AXLink, and ICSNet connectivity.

Below are the different available controllers. As more ports are added to a controller, the product model number increases.

- NI-700
- NI-900
- NI-2000 (featured at your workstation)
- NI-2100
- NI-3000
- NI-3100
- NI-4000
- NI-4100

On your own - Locate controller products

Use the AMX website to answer the following questions.

1. List the number of each port type for the NI-700 integrated controller.

   _____
   _____
   _____
   _____
   _____

2. Which integrated controller would be a good fit for a residential customer building a simple home theater with the following devices?

   - Projector (serial)
   - Satellite (serial)
   - DVD (IR)
   - Drapes (contact closure)
   - AV receiver (serial)

   _____

3. What integrated controller would you select for a commercial project with the following devices?

   - VCR (IR)
   - DVD (IR)
   - Projector (serial)
   - Projection screens (serial)
   - Lights (IR)
   - Drapes (contact closure)
   - HVAC system (serial)
   - Security system (serial)

   _____

AMX equipment

In this lesson, you listed some additional devices that were located in the control system at your workstation. Below are the definitions.

Volume control

You use a volume control device to get functionality that is not available on controlled device. For example, the volume control device allows you to adjust audio to preset audio levels and display that level in real time on a bar graph. With IR control, you have no way to know the volume level of a device.

The AXB-VOL3 is an AXLink device that controls volume for three audio channels. It is programmable for 128 steps of audio level, audio mute, variable ramp speed, and level presets. There is also a NetLinx version of the volume controller, NXC-VOL4, which is a 4-channel control card to be used in a mini cardframe or module shell.

Sensors

Video Sync Sensors

You can use a VSS2 (Video Sync Sensor) for systems that require true power status for a VCR, tuner, or satellite receiver. Most video source device generates blue/black screen video output when the device is on, and the VSS2 can sense the true on and off status.

The VSS2 monitors the video output of each source and sends a contact closure to an AMX I/O channel in the controller. The programmer will monitor that channel and issue power commands as needed.

Power Current Sensors

The Power Current Sensors (PCS) provides power current status for AMX equipment. AMX accessories. The PCS detects the AC current drawn by the equipment plugged into its AC receptacle.

There are various accessories you must have within a control system. This can include rack mount kits, power supplies, DVD players, switches, and wireless routers.

Breakout boxes

The NXA-AVB/Ethernet breakout box comes with Modero color touch panel kits and is used to transfer audio, video, and data signals from an outside source to and from the Modero touch panel up to 200 feet from the AVB breakout box. You can also use the breakout box to pass-through power and Ethernet connections. At your workstation, you have an NXA-AVB/Ethernet breakout box.

Wireless access point

The wireless access point (NXA-WAP200G) creates fast, flexible, and highly secure networks in business or at home, all without wires. The flexible and secure WAP supports any AMX Modero touch panel with a wide coverage area and long range.

The WAP is fully compatible with the IEEE 802.11b (2.4GHz) frequency band and forward compatible with 802.11g for future expandability of new and existing wireless networks. It can be powered over Ethernet without an electrical outlet, increasing deployment options and the speed of installation while reducing the overall cost.

The WAP can be installed, configured, and activated in a matter of minutes, and it incorporates standard 64-bit and 128-bit WEP encryption for added security. A wide-area wireless distribution system can be achieved by connecting multiple WAPs wirelessly to each other.

Network switches

AMX provides an NXA-ENET24 managed switch that provides 24 ports for connecting AMX devices with MAX servers. There is also an NXA-ENET24 PoE which delivers power over Ethernet. This can be used to power a wireless access point.

On your own - Identify new products

The instructor will assign you a new product to look up on the AMX website so you can share the information with the rest of the class.

Defining cable types

There are various cables used in control systems. The following list contains some of the more common cables and the connection types in which they are typically used.

Table 5: Cable Types

Cable Type	Uses
CAT5 cable with RJ45 connector	Used for ICSNet, ICSHub, and Ethernet with straight-through cable.
18/2 and 22/2 shielded bundle	Used for AXLink connections.
IR Emitter	Used to transmit IR signals to controlled devices. There are two sides to the emitter, one for low output and one for high output.
Serial Control cable	Used with serial ports to connect to controlled sources. These cables are device specific and more than 700 cables are available from AMX.
Contact Closure cable	Connects relays to controlled sources. Typically, the cable is unshielded, 18-gauge multi-conductor. These cables are device specific.
AMX Program cable	Connects PC Serial (Comm) port to the master program port (FG10-727). This cable can be ordered from AMX or custom built. This is typically a 9-pin null modem cable using pins 2, 3 & 5.

The initial connection between your computer to a controller is through a null modem serial cable. The pinout should be 2-3, 3-2, and 5-5.

If you do not have a null serial cable, you can purchase 2 STS adapters from AMX (FG959) and create your own programming cable.

Demo - Cables

The instructor will distribute various cable types mentioned above and an AMX STS adapter.

Power requirements

Power is an important element of control systems that system designers need to address when designing a control system. All AMX devices operate at a nominal 12 volts of DC power.

AMX offers three system power supplies: PSN2.8, PSN4.4, and a PSN6.5 where the numbers indicate the current capacity (Amps). These power supplies come with a NetLinx-compatible 2-pin captive wire connector.

To determine the power supply requirements, you must add the current consumption requirements of each interface device, and select the power supply(s) need to meet the demand. You can find power consumption on the product data sheets.

Below is an example of a simple AMX system.

Table 6: Total Power Consumption

Device	Power Consumption
Integrated Controller NI-2000	700 mA
NXT-CV7 Touch Panel	1.5 A
TOTAL Power Consumption	2.2 A

For this example, the PSN2.8 power supply would be sufficient to power the control system.

On your own - Calculate power consumption

Calculate the power consumption for the equipment at your workstation and recommend the appropriate AMX power supply.

- NI-2000 (700 mA)
- NXT-CV7 (1.5 A)
- VSS2 (20 mA)
- AXB-VOL3 (230 mA)
- NXA-AVB/Ethernet (50mA)

Lesson review

Answer the following questions.

1. What are the three models of AMX (NetLinx) power supplies?

   _____

2. AMX devices operate at a nominal _____ volts of DC power.
3. Using this manual and the AMX website, complete the puzzle below.

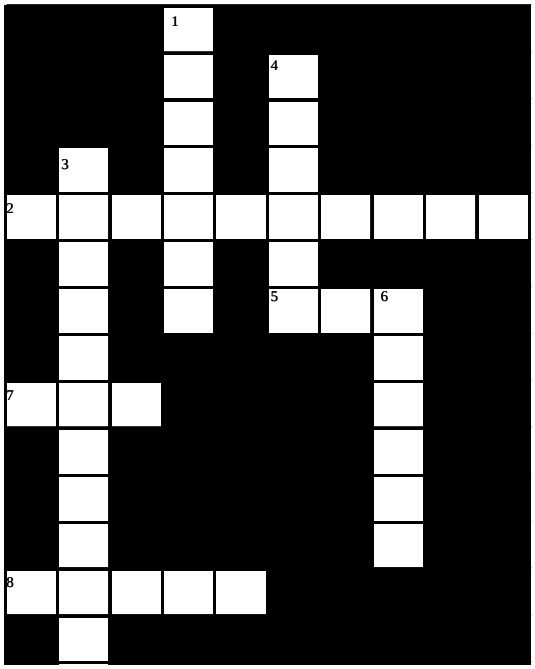


Table 7: Lesson Review

ACROSS	DOWN
2. An MVP-8400 is what type of product?	1. A wireless keypad. Mio Modero _____
5. A series of Mio Modero keypads with an LCD menu selection.	3. A PSN2.8 is what type of product?
7. Acronym for a device used to provide true power status for a VCR or other devices _ _ _ 2.	4. A type of user interface.
8. A series of keypads with a "people sensor." Mio Modero _____	6. Cable types that are device-specific and available from AMX.

Lesson summary

In this lesson, you learned about AMX control system hardware, including AMX product naming conventions. You also learned about the various cables used in control systems. In addition, you learned how to calculate the total capacity of amps needed to power AMX equipment in a control system.

3

Networks

Networks are a way of connecting equipment and resources. A network can consist of a small group of computers or a complex network with hundreds of computers, servers, routers, switches, and hubs. Developing a control system connected to a network gives you the power to share information with any device on the network, including your PC, touch panels, and other NetLinx systems. This lesson teaches you why networks are beneficial to control systems and the basic skills to connect to integrated controllers and how to do very high level troubleshooting.

Lesson objectives

At the end of this lesson, you will be able to:

- Identify the benefits of a network
- Connect to a NetLinx master
- Identify controller LEDs

Benefits of a network

The NetLinx system is designed to be connected to a network. Networking is not required, but it can be very beneficial when designing, installing, and maintaining control systems. There are many benefits to having a network. You must have a network to use some of the features demonstrated earlier in this course, such as RMS, Amenities, TakeNote, etc.

Keep in mind that many customers will already have networks set up in their homes, so you will integrate their control system with that network. In those cases, you need to understand the network setup and be able to access the customer network.

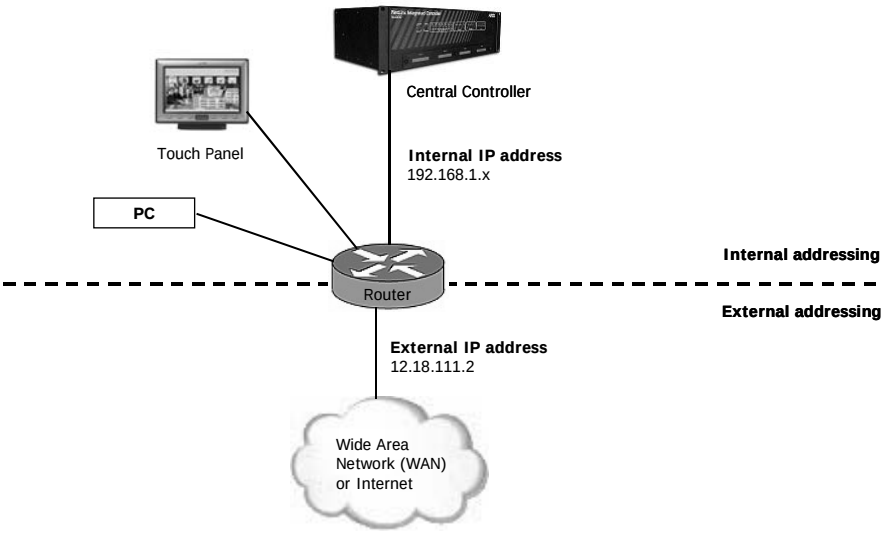
You must have a network to use the following features:

- Modero touch panels
- Internet access for client's computers on the NetLinx master
- integration! Solutions (Two are listed here, but there are more you can view on the AMX website).
  - i!-PCLink/Web - With a computer attached to the network, this free solution enables customers to launch the Internet from a touch panel. The touch panel controls the PC and functions as a remote display.

- i!Weather - This feature gives the user the current weather conditions and 5-day forecast on a touch panel. AMX locations are free, but there is a fee for custom locations.

- PictureFrame - This feature is available for a small fee and allows users to create a slide show of their personal photographs that appears on a touch panel like a screensaver. All photos in a designated folder on the client's computer will be displayed on the touch panel.
- Remote Access - One of the best features of a network is that dealers can remotely access the client's control system through the network to troubleshoot or perform maintenance. This same feature allows users to control one system from another system from a different geographical location. For example, a customer can control or monitor a vacation home regularly from their primary home or office.
- Reporting/Monitoring - RMS facilitates troubleshooting, monitoring and reporting capabilities.

Below is a simple network that is used at your workstation.



Single-master AMX controllers and user interfaces will work out of the box when connected to a network with DHCP services.

Wireless networks are popular because of the flexibility they provide the user, the installation is faster, and you can place network devices almost anywhere, including places that wiring is not possible.

AMX offers a wirless access point (NXA-WAP200G) that provides WLAN access for home computers, and G4 Modero wireless touch panels with connection speeds of up to 54 Mbps.

Ethernet

Ethernet is the term that describes today's most common networks, specifically those delivered over CAT5 cabling.

TCP/IP is the protocol used to communicate on Ethernet networks and the larger Internet. You may have heard of an IP address. This is your device's address on a network using the TCP/IP protocol. The IP address is similar to your mailing address and is required for successful message delivery on the network. Every device on the network needs an IP address, and a network router passes appropriately addressed messages along the correct path using those addresses.

Static and dynamic IP addressing

There are two ways to assign an IP address to a device.

- Static - An IT administrator assigns an IP address to devices and computers. The static address must be manually entered.

  Although the user may set the IP address, the address should be obtained from the IT administrator.

- Dynamic - IP addresses are automatically assigned by a DHCP server, as pre-determined by the network administrator. No user intervention is required; it should just work!

With properly assigned static addresses, a router is not required for internal network communication. For example, a PC at 192.168.0.5 could communicate with a NetLinx master at 192.168.0.100 with just a network switch or even a crossover cable. With dynamic addresses, you must have a router to assign and manage the addresses.

Router addressing

A router has two IP addresses; one for the local network (LAN) and one for the external Internet (WAN) connection. Routers typically have a default internal IP address that starts with the following: 192.168.1.x. The external address is set by DHCP when the router connects to the Internet Service Provider (ISP). This exemplifies network address translation (NAT) performed by the router.

If the network is set up to support dynamic addressing, the AMX control equipment can be connected to the network with CAT 5 cable, receive IP addresses, find each other as appropriate, and communicate automatically.

If the network is set up for static addressing, the user or IT administrator will need to assign IP addresses to the control system equipment.

Demo - Connect to controller through Ethernet

Your instructor will connect to the controller using the IP address.

Together - Connect to controller through Ethernet

You must have the IP address of the master to connect through Ethernet. Your instructor will give you the IP address of your controller.

1. Open a web browser.
2. Type the *IP address* of the master.
3. In the System Settings area, click **Manage System**.

   You should see something similar to the screenshot below:

In the example above, the NI Master is chosen, so its properties are shown in the lower left area. The **Network Settings** button is selected, so the Network Settings are shown in the lower right area.

4. Click through the tabs to view the options available from the browser to manage the system.
5. Click **Manage Connections**.
6. Click **Install** to install ActiveX.
7. Click the title in the middle of the page.

   The touch panel pages appear on your PC.

Controller LEDs

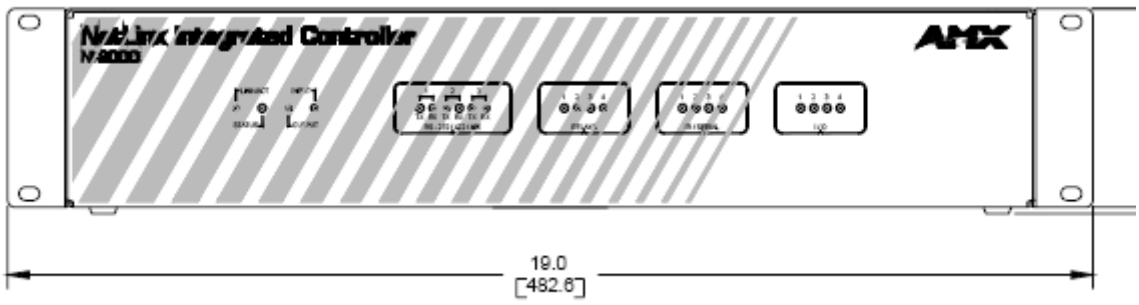
There are simple ways to ensure the master is working correctly by viewing the LED lights on the controller. If there are no LEDs lit, you should verify the system is receiving power. Below is a table of the LEDs included on a controller.

Table 8: Controller LEDs

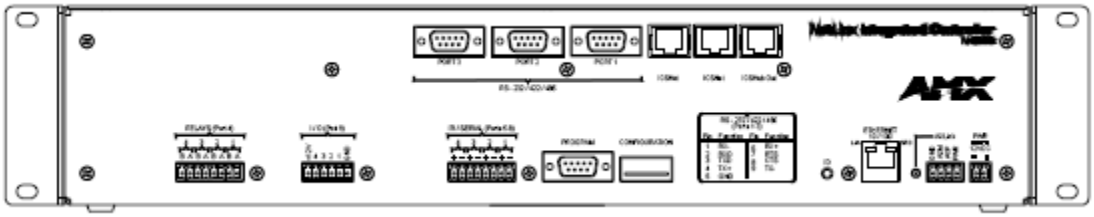
LED	Status
AXLink LED (on back of NetLinx masters)	Green blinks once per second when normal.
LINK/ACT	Link LED is steady when Ethernet is connected properly. Activity causes LED to blink. (Activity is network communication).
Status	Green LED blinks once per second when system is programmed and communicating properly. LED is solid when no program is loaded. LED blinks fast if no IP address.
Output	Red LED blinks when master transmits data.
Input	Yellow LED blinks when master receives data, typically from user interface.
RS-232/422/485 TX/RX	Red (TX) LED blinks when transmitting data and yellow (RX) LED blinks when receiving data. Every TX should be followed by RX. If not, check cabling.
Relays	Red LED indicates relay channels are active (closed). Each relay is a channel.
IR/Serial	Red LED indicates the IR/Serial channels are transmitting control data, typically an IR function like play, stop, pause, etc.
I/O	Yellow LED indicates the I/O channels are active. Each I/O is a channel.

Below are diagrams of the front and back of an NI-2000.

Front NI-2000



Back NI-2000



Together - View controller LEDs

Press Play on the DVD player. You should see the LEDs for the Output, Input, and IR blink as you press the button. The DVD player is attached by an IR emitter to an IR port, so the appropriate port LED should light up.

Lesson review

Answer the following questions.

1. What are the two ways you can assign IP addresses? Circle the one that is recommended so that two devices are not assigned the same address.

   _____
   _____

2. List three NetLinx features that require network connectivity.

   _____
   _____
   _____

3. What is the minimum standard of cable that can be used with a networked AMX control system? _____

4. List one reason you might want a wireless network?

   _____
   _____

Lesson summary

In this lesson, you learned the benefits of adding a control system to a network. You learned the solutions only available with a network. You also learned how to connect to a controller and how to ensure the controller is working correctly by viewing the LEDs.

4

AMX Software Applications

In this lesson, you will learn about the different software applications that AMX provides as tools to help you design, program, and install control systems. There are various tools to help you no matter how complex your control system.

Lesson objectives

At the end of this lesson, you will be able to:

- Identify AMX software applications
- Identify VisualArchitect functions
- Open a VisualArchitect project
- Identify NetLinx Studio functions
- Open a NetLinx Studio workspace

AMX software

AMX has several software applications to help you create a control system. These applications can be downloaded from the AMX website.

The tools you use depend on the size and complexity of the control system you are designing. In this lesson, you will learn more abut the two most widely used software applications, VisualArchitect and NetLinx Studio.

Below are the software applications available for different tasks in control system implementation.

Table 9: Software Applications

Control System Tasks	Applications
System Design	**VisualArchitect**
User Interface Design	**VisualArchitect** TPDesign4 G4 PanelBuilder / G4 Panel Preview KeypadBuilder / Keypad Preview
Generate Code for Single Master Systems	**VisualArchitect (automatic code generation)** **NetLinx Studio**
Write Custom Code	**NetLinx Studio** Cafe Duet
Manage IR Files	**VisualArchitect** **NetLinx Studio** IREdit
Transfer Files for Installation	**VisualArchitect** **NetLinx Studio** File Transfer 2

The most comprehensive and most used software applications are VisualArchitect and NetLinx Studio. You will learn more about these two applications later in this lesson. Other software applications you might use include:

- TPDesign4 - Allows you to create touch panel pages.
- G4 PanelBuilder - Allows you to create touch panel designs from templates.
- G4 Panel Preview - Allows you to preview touch panel files on a computer as they should appear on a real panel.
- KeypadBuilder - Used to design keypad button layouts.
- Cafe Duet - Allows you to program Java code for devices.
- IREdit - Allows you to manage IR files from the AMX database or capture your own IR files.

- File Transfer 2- Used to transfer files to master, controllers, and touch panels.

Some of these applications are embedded in VisualArchitect and NetLinx Studio, but they can be used on their own. For example, you might have a laptop in which only File Transfer 2 is loaded so you can transfer files to a master during the installation of a control system.

In the AMX Designer course, you use VisualArchitect to design a control system. In the AMX Programmer course, you use NetLinx Studio to write custom code to program a control system.

VisualArchitect

For simple residential systems that do not need master-to-master control, you can use VisualArchitect, an intuitive tool that allows you to:

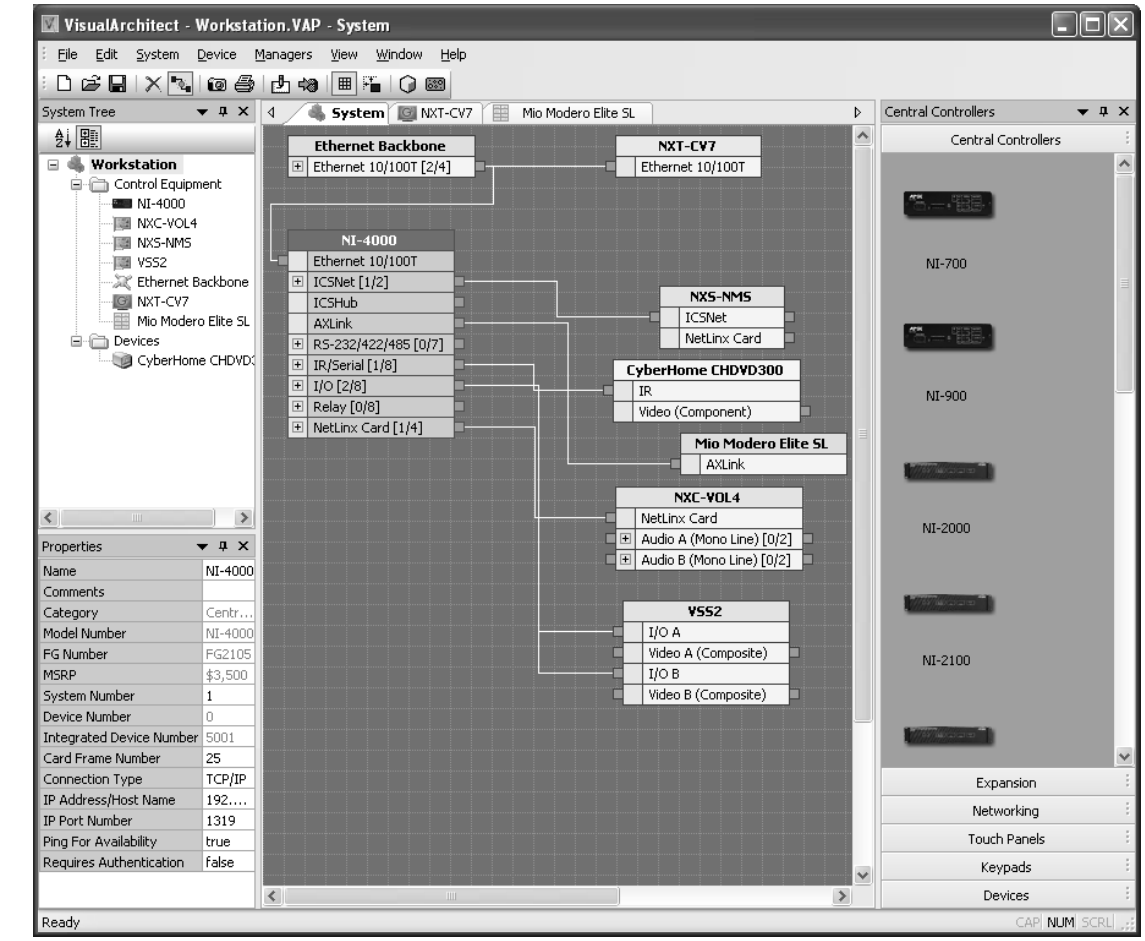
- Create equipment lists.
- Design control system diagrams.
- Create controlled device connections.
- Generate programming code for single master systems.
- Design user interfaces.
- Transfer files.

Together - Open a VisualArchitect project

Open VisualArchitect to view the interface and view a control system diagram that includes a master, a touch panel, a keypad, and devices.

1. Double-click **My Computer**.
2. Double-click **AMX Training (D:)**.
3. Double-click **Workstation**, and then double-click **Workstation.VAP**.

Below is a sample of the VisualArchitect workspace.



System Tree Workspace Toolbox

System Tree - The upper portion of the window is the Device List, indicating the devices currently in your system, separated into two categories: Control Equipment representing AMX equipment, and Devices, representing controlled equipment.

Beyond providing a visual summary of the devices in your system, the System Tree also provides shortcuts to many device-oriented functions of VisualArchitect, via the System Tree context menu. Right-click any device in the device tree to access this menu.

If you are viewing a Navigation diagram (touch panel or keypad), the controlled equipment list has an additional feature: Un-check the check box next to any device in the list to remove its element from the Navigation diagram. This does not remove the device from the system. It just removes it from the Navigation diagram.

The lower portion of this section is the Properties area. Use the Properties area to view/edit various properties for the selected device, template element, or keypad button, depending on which tab is active in the Workspace.

Workspace - The workspace is the large area in the middle of the application window, where you will view representations of every device in your system, as well as all device connections and Navigation diagrams for the user interfaces.

Toolbox - If you are viewing the **System** tab of the Workspace, the Toolbox provides thumbnail images of the devices you can add to your system. In this scenario, use the Toolbox to select AMX hardware and third-party devices to add to the system.

If you are viewing a UI tab of the Workspace, the toolbox provides access to all elements available within the template selected for a touch panel.

To add elements, click the appropriate tab on the right and drag elements to the Workspace. Connections are automatically made to the correct control port when the Auto-Connect feature is enabled. Select a piece of equipment in the Workspace to view its Properties in the Properties area.

The system diagram and user interface diagrams can be printed or exported.

Together - View touch panel and change color scheme

1. Click the **NXT-CV7** tab at the top of the workspace.
2. Right-click the **NAV2** element, and select **Preview UI**.
3. Click **Close**.
4. Right-click the **Cyberhome** device, and select **Preview UI**.

   This user interface is for a DVD player.
5. Click **Close**.
6. From the menu, select **Touch Panel > Color Schemes**.
7. Scroll through the list and select a different color scheme, and select **OK**.
8. Use the steps above to preview the user interface.

   You should see the new color scheme you selected on the user interface.

On your own - Navigate VisualArchitect

Use VisualArchitect to answer the following questions:

1. List the options available from the System menu.

   _____
   _____
   _____
   _____
   _____

2. Are there shortcut keys for the options you listed above? _____
3. In the Workspace, click the NI-2000 controller. What is the connection type listed in the Properties area?

   _____

4. What other connection types are listed for the NI-2000 controller?

   _____

NetLinx Studio

For more complex control systems, use NetLinx Studio to:

- Program custom code for any control systems.
- Program code for multiple master projects.
- Perform diagnostics.

Use NetLinx Studio to complete the Programmer I, Programmer II, and Programmer III courses. After successfully completing the Programmer II course, you will earn the ACE Programmer certification.

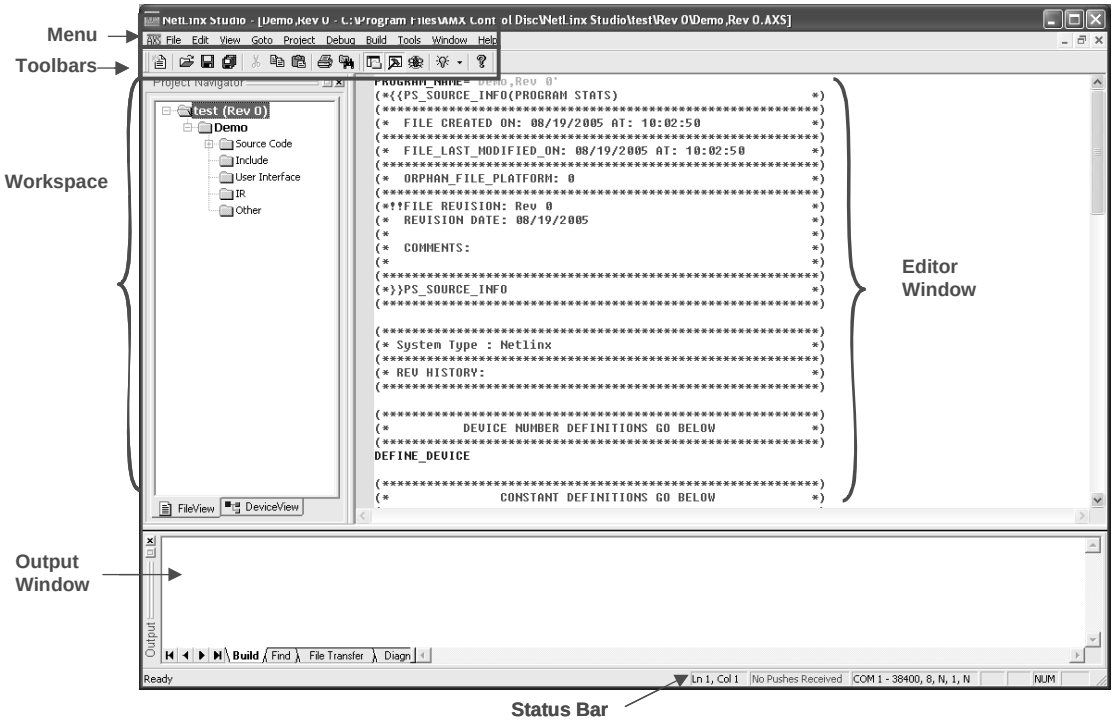
Together - Navigate NetLinx Studio

Log on to NetLinx Studio to view the interface. You will use NetLinx Studio later in this course to connect to a master and view the connected devices.

1. Double-click **My Computer**.
2. Double-click **AMX Training (D:)**.
3. Double-click **Workstation**, and then double-click **Workstation-VA.apw**.

4. Expand **Source**.
5. Double-click **workstation.axs** to open the editor window to view the programming code.

There are several areas of NetLinx Studio that you should be familiar with before creating control systems. Below is a screenshot of the default user interface in NetLinx Studio when a workspace is open.



The NetLinx Studio interface includes:

- **Menu** - The options shown on the NetLinx Studio menu bar vary based on whether there is a file open in the Editor window. Click any of the main menu items to open the menu. Menu Options differ when the Editor window is opened or closed.
- **Toolbars** - The Standard toolbar contains toolbar buttons for many of the main NetLinx Studio menu commands. The Standard toolbar appears when you launch NetLinx Studio. You can click **View > Toolbars > Standard** to view or hide this toolbar. Standard examples: New, Open, Cut, Copy, and so forth. Other toolbars are Debug Watch, Window Mgmt, Edit, Diagnostics, Project, Terminal, and Build.
- **Workspace** - Use the Workspace to manage project files, define devices, and view online devices. The Workspace contains three tabs FileView, DeviceView and Online Tree, which display all open projects and their associated system files, the devices named in the active master Source Code file, and all devices currently online, in a tree structure. Use the Project Navigator to view multiple Projects and their component files and devices. The

Workspace is visible when a Project is opened, created, or when enabled via the View menu.

- **Editor window** - The Source Code Editor is where the program code is created and modified. It displays files and allows you to view and edit code files. You can have multiple files open, and the Source Code Editor displays each code file in a separate Source Code Editor window. You must open the source code file to view it in the Editor window.
- **Output window** - The Output window contains six tabs: Status, Find In Files, Find IRfiles, File Transfer Status, Notifications, and Diagnostics. The Status tab displays build and port status information. The Find Files and File IR Files window display search results. The Transfer Status tab displays status of files that have been or are being transferred. The Notifications tab displays the asynchronous notification messages being received from the master. The Diagnostics tab displays all the internal system diagnostic messages generated by a NetLinx controller.
- **Status bar** - The Status Bar displays master communication status, a brief description of any menu/toolbar item in the application, cursor location, last Push received, COM port currently being used, network IP address (NetLinx systems only), and current PC keyboard settings.

You can use NetLinx Studio to troubleshoot and perform system diagnostics.

On your own - Navigate NetLinx Studio

Perform the following activities using the instructions in this lesson.

1. Use the View menu to open the Editor window, Output window, and Status Bar.
2. Which tab allows you to display online devices? _____

Lesson review

Answer the following questions.

Which software application(s) would you use to:

1. Design touch panels from templates?
   _____
2. Create a single master control system? _____
3. Manage IR files? _____
4. Program Java code for devices? _____
5. Program code for multiple master projects? _____
6. Create control system diagrams? _____
7. Write custom code for NetLinx masters? _____

Lesson summary

In this lesson, you learned AMX offers free software applications to enable you to design, program, and install AMX control systems. You also looked at two of the most commonly used software applications, VisualArchitect and NetLinx Studio.

5

AMX Tools

This lesson identifies the training and AMX personnel available to you as you implement AMX control systems.

Lesson objectives

At the end of this lesson, you will be able to:

- Identify ACE certifications
- Identify AMX training
- Identify AMX resources

ACE certifications and training

ACE (AMX Certified Expert) certification is a great way to prove you have the needed skills to work on AMX control systems. Many jobs require ACE certification to earn contracts because ACE certification demonstrates an industry-recognized level of expertise.

There are three individual ACE certifications you can earn.

- **ACE Designer -** This certifies you can design a complete control system, including power requirements, cable pinouts, and design user interfaces.

- **ACE Installer** - This certifies you can install the components of a control system, properly cable various control networks, ensure devices are mapped correctly, transfer files to a controller, and troubleshoot control systems.
- **ACE Programmer** - This certifies you can program the code to enable a control system to meet customer expectations while following AMX guidelines. You will also learn how to test the system.
- **ACE Expert** - This certifies you have completed all three certifications. An ACE Certified Dealer is a company that employs personnel with all three certifications.

To earn any of the certifications, you must pass the prerequisite courses, attend the instructor-led class at one of our sites, pass an online test, and complete a practical exam.

AMX training

There are courses available for everyone, from designing, installing, or programming an AMX control system to just learning the basics of the industry. Courses range from introductory level that give you an overview of the subject to advanced information and troubleshooting.

On the AMX University website, you can find classroom and online classes in the following areas:

- Control Systems
- Networking
- AMX Hardware
- AMX Software

AMX offers the following course environments:

- Classroom - An instructor-led interactive hands-on training.
- Live Online - An instructor-led course you complete online.
- On Demand Online - Web training available 24 hours a day.

To learn more about registering or taking courses, access the Training area of the AMX website at http://www.amx.com/training. Below are courses you might want to take relating to the three main tasks involved in creating control systems.

Table 10: Courses

Courses	Design	Program	Install
Getting Started with AMX	X	X	X
Intro to Networking for AV Professionals	X	X	X
AMX Essentials	X	X	X
Introduction to Wireless Networking	X		X
Designing/Installing Wireless Networks with Multiple Access Points	X		X
Quest for Power	X		X
NetLinx Studio for New Users		X	
Intro to AMX Product	X		X
Introduction to MAX			X
G4 PanelBuilder Training Demo	X		
TPDesign 4 Tutorial	X		
KPDesign Tutorial	X		
AMX Designer	X		
AMX Installer			X
AMX Residential Bootcamp	X		X
AMX Programmer I		X	
AMX Programmer II		X	
AMX Programmer III		X	
Intro to Duet		X	
Building Java Modules Using Cafe Duet		X	

AMX resources

AMX provides resources to help you implement AMX control systems. As you learned throughout this course, the AMX website provides a lot of information to help you implement control systems.

There are groups within AMX that are also available to help you.

Professional services

The Professional Services group is available for hire to help in any aspect of implementing control systems. You can contact them for quotes at:

- email to **proservices@amx.com**
- or by phone at **800-652-6965**.
- You can click the **Request for Quote** link to get a quote for a specific job by going to the Pro Services area of the website.

Technical support

If you need technical help, you can contact the AMX Technical Support Group 24 x 7.

- email to **support@amx.com**
- email international requests to **international@amx.com**
- by phone at 800.932.6993

For more international phone numbers and email addresses, visit **www.amx.com**, view contact information, and select the link with the region nearest you.

Forums

AMX host online forums so that you can trade information applicable to AMX control systems with other AMX users. You must register at **www.amxforums.com** to use the forums.

Lesson review

Answer the following questions.

1. What are the three ACE certifications?

   _____
   _____

2. Name some AMX departments that are available as resources.

   _____
   _____

3. What three classes are recommended for designers, programmers, and installers?

   _____

   _____

Lesson summary

In this lesson, you learned about the different programs available to help you create and maintain control systems. You learned about the ACE certifications, the additional training offered by AMX in various formats, and the available resources through AMX Corporation.

Glossary

Amps

Amperes, a unit of measurement for electrical current. An ampere of electrical current represents one coulomb of electrical charge (6.24 x 1018 charge carriers) moving past a specific point in one second.

Analog

An input or output that can have many values. A continuous signal that takes time to make a transition from one level to another.

AP (Access Point)

Acts as a communication hub for users of a wireless device to connect to a wired LAN. APs are important for providing heightened wireless security and for extending the physical range of service to which a wireless user has access.

AWG (American Wire Gauge)

A standard measurement for wire conductor diameter.

Axcess

AMX trade name for a family of integrated control system products capable of supporting 255 control devices on the AXLink network.

Axcess Programming Language

The programming language of the Axcess system that uses easy to understand keywords and operators.

AXLink

A four-wire data bus used to transmit and receive data from the AXLink master to any of 255 devices in the system.

Broadcast

Allows one transmitter to send messages to multiple receivers at the same time. One device at the transmission end and multiple devices connected at the receiving end. Share common information to multiple devices.

Browser

A program run on a client computer for viewing World Wide Web pages. Examples include Netscape, Microsoft's Internet Explorer, Mozilla Firefox, and Mosaic.

Bus Controller

An AMX Axcess control device that connects to the AXLink bus.

Central Controller

A device that contains the Master Processor and Control Ports. The Central Controller can come in several forms including the NXI, and the NI series.

Channel

In AMX terms, one control function of a control port, such as one relay in a group of eight.

Contact Closure

A circuit that is formed when two contacts of an open circuit are brought together. The AMX Lighting controller uses TTL logic levels normally pulled High to 5v. A closure to ground pulls the level to logic Low and is read as a closure. Each of the eight closure inputs is independently operated and controlled.

Control Current

The current used by a dimmer or switch to perform its function. Each AMX lighting controller supplies this current to its control ports, and each AMX lighting module uses and requires this current to operate the dimmer or switch.

Current

The flow of electrical charge measured in amperes.

Device Controllers

Act as a bridge that allows AMX control technology to interact with virtually any device or system. It receives a signal, translates the command, and then directs it to the appropriate device. Device controllers are control ports on the integrated controllers.

DHCP (Dynamic Host Configuration Protocol)

A protocol that lets one device on a network assign temporary IP addresses to other network devices.

Ethernet

A network protocol that specifies how data is sent on a common transmission medium. Ethernet uses a bus or star topology and supports data transfer rates of 10 Mbps (10baseT), 100 Mbps (100baseT or Fast Ethernet), and proposed up to 1 Gb per second.

Firewall

Security measures that protect a local network from hackers.

GUI (Graphical User Interface)

Usually pronounced GOO-ee, a graphical (rather than textual) user interface to a computer or control system.

I/O (Input/Output)

In AMX terms, a channel that can act as a solid-state (TTL) closure input or output.

IP (Internet Protocol)

A protocol used to send data over a network.

IP Address

The address used to identify a computer or device on an Ethernet network.

ISP (Internet Service Provider)

The company which provides you with a connection to the Internet via either a dial-up connection or a direct connection.

Internet

A global network connecting millions of computers.

Keypad

A simple user interface that consists of buttons and possibly an LCD display.

LAN (Local Area Network)

A computer network limited to the immediate area, usually the same building or floor of the building.

LED

Light-Emitting Diode.

MAC Address

The physical address of a device typically assigned by the equipment manufacturer required for access to the Internet.

Master Processor

Sometimes referred to as the brain of the system, the master processor is the programming memory and network manager for the entire system. It recognizes which button the user pushes and triggers the requested event.

Network

A system of connected computers exchanging information with each other. A LAN is a relatively smaller form of a network in comparison to the Internet, a world wide network of computers.

PING

A program for determining if another computer is connected to the Internet.

Port

In AMX terms, a uni- or bi-directional connection between a controller and a specific controlled source.

Relay

Electro-mechanical devices that permit low-level voltage levels to control higher power devices. For example, your computer cannot control a conventional 100 watt light bulb directly; an interface is required.

RJ-45

A connector typically used for data connections with 8 pins. RJ is an acronym for registered jack use in telecommunications as specified by Part 68, Subpart F. Section 68.502 of the FCC code. In this case the term jack is gender neutral and refers both to the plug and receptacle.

RS-232

An Electronic Industries Association (EIA) serial digital interface standard specifying the electrical and mechanical characteristics of the communication path between two devices using Dtype connectors. This standard is used for relatively short range communications and does not specify balanced control lines.

Serial

In general usage, a data port. In AMX terms, a control port that can transmit standard IR, wired IR, or RS-232.

Serial Communication

Data bits are transmitted one after another. Pattern of pulses (on/off) comprises the messages required by the protocol. Other signals such as request to send and clear to send use their own wires in sophisticated systems.

TCP/IP (Transmission Control Protocol/Internet Protocol)

A suite of communications protocols used to connect hosts on the Internet. TCP/IP uses several protocols, but the two main ones are TCP and IP. TCP/IP is built into the UNIX operating system and is used by the Internet, making it the de facto standard for transmitting data over networks. Other Internet protocols, such as FTP, Gopher, and HTTP sit on top of TCP/IP.

Touch Panel

A user interface that uses a touch-sensitive overlay covering a graphics display, allowing software-defined control imaging and operation.

Twisted Pair

A cable composed of two small, insulated conductors twisted together. Since both wires have nearly equal exposure to any interference, the differential noise is slight.

UPS

Uninterruptible Power Supply.

URL

Uniform Resource Locator - the method by which Internet sites are addressed, such as http://www.amx.com.

User Interface

The components of the control system that allow people to interact with the control system. User interfaces come in the form of touch panels, handheld remotes, and keypads. These come with many different sizes and options.

Volt (V)

A unit of measurement used to measure how much pressure is used to force electricity through a circuit.

WAN (Wide Area Network)

Network with an active, full-time connection between multiple LANs.

WEP (Wired Equivalent Privacy)

Data privacy mechanism (based on a 64-bit or 128- bit share a key algorithm,) as described in the IEEE 802.11 standard.

Wi-Fi Protocol

Another name for the IEEE 802.11b protocol.

WWW (World Wide Web)

A subset of the Internet, which uses a combination of text, graphics, audio, and video (multimedia) to provide information on almost every subject imaginable.

Index

A

B

C

D

E

F

G

I

K

L

M

N

O

P

R

S

T

U

V

W