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What’s in this Manual

This manual provides basic, essential information for planning, configuring and monitoring an HVAC system consisting of Andover Continuum controllers and CyberStation software. This manual provides the following information:

- An introduction to planning for an HVAC system
- Step-by-step procedures for basic configuration tasks in CyberStation
- Step-by-step procedures for monitoring your HVAC system using CyberStation
- An overview of advanced HVAC features that you may want to implement in your facility

This manual is intended to be used with the CyberStation online help and the documentation that accompanies the controllers. For complete user-interface details (beyond the scope of the basic tasks in this manual), you must consult the online help and the other CyberStation documents listed in the next section. The procedural information in this manual assumes that your HVAC hardware and software are installed, online, and ready to be configured.
Related Documentation

For additional or related information, refer to these documents.

<table>
<thead>
<tr>
<th>Document</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CyberStation online help</td>
<td>n/a</td>
</tr>
<tr>
<td>CyberStation Access Control Essentials Guide</td>
<td>30-3001-405</td>
</tr>
<tr>
<td>CyberStation Installation Guide</td>
<td>30-3001-720</td>
</tr>
<tr>
<td>Continuum Remote Communication Configuration Guide</td>
<td>30-3001-814</td>
</tr>
<tr>
<td>NetController II Operation and Technical Reference Guide</td>
<td>30-3001-995</td>
</tr>
<tr>
<td>Introducing BACnet - A Guide for Continuum Users</td>
<td>30-3001-863</td>
</tr>
<tr>
<td>Andover Plain English Language Reference</td>
<td>30-3001-872</td>
</tr>
</tbody>
</table>
Symbols Used

The Notes, Warnings and Cautions used in this manual are listed below.

**Note:** Contains additional information of interest to the user.

<table>
<thead>
<tr>
<th>CAUTION or WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of hazard</td>
</tr>
<tr>
<td>How to avoid hazard.</td>
</tr>
<tr>
<td>Failure to observe this precaution can result in injury or equipment damage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTRIC SHOCK HAZARD</td>
</tr>
<tr>
<td>How to avoid hazard.</td>
</tr>
<tr>
<td>Failure to observe these instructions will result in death or serious injury.</td>
</tr>
</tbody>
</table>
About this Manual
Chapter 1

Getting Started

This chapter offers guidance on planning your HVAC system and includes the following topics:

- A review of a sample floor plan displaying a variety of common HVAC devices that the system manages.
- A network configuration of controllers, servers, and CyberStation workstations that provides the HVAC infrastructure for the sample site.
Planning a Building Control System

Schneider Electric’s products support the full range of HVAC needs:

- Small buildings to multi-site facilities
- Controlled regulation of humidity and temperature for individual areas within a larger facility

As you prepare to implement an HVAC system in your organization, you may want to work from floor plans of your facility to identify the following factors that affect implementation:

- Locations where HVAC specific controllers are needed
- Locations where HVAC devices are needed
- Personnel who can adjust the HVAC settings for these areas
- How you want to manage regulating the environment in each location (for example regulating the temperature or humidity in an office or a freezer)
The following illustration shows a small warehouse with the main facility, an office and a freezer. All of these areas require some form of HVAC control.

The following issues for this sample site determine the HVAC devices that are needed and the configuration of the system.

- For the main warehouse how can the humidity be monitored and regulated?
- How will the freezer temperature be monitored and maintained at a constant below freezing temperature?
- How will the office be monitored and regulated separate from the other two areas?
• Who will have administrative access to adjust the controllers that monitor and regulate all the HVAC devices in the facility?

The following illustration shows the same floor plan, with HVAC devices in place.

In this floor plan:

• The Humidity Sensor in the warehouse monitors the humidity level and sends information back to the appropriate controller(s) if an adjustment is required. A dehumidifying device is then activated, by the controller, to reduce the humidity.
• The Temperature Sensor in the freezer monitors any dramatic rise in temperature. It also detects if the temperature rises above the required “constant freezing” temperature. If the temperature does rise above freezing, then the sensor alerts the controller assigned to the freezer. The controller then activates the chiller attached to the freezer, which lowers the temperature back to the proper level.

• The Thermostats in the office and warehouse, monitor and regulate the temperature (using air conditioning or heating units) for personnel in these areas. The regulation of the temperature in these areas is maintained separately from the regulation of the temperature in the freezer.
Overview of Building Control Networks

This illustration represents a sample Andover Continuum HVAC architecture.
Andover Continuum Product Description

Andover Continuum is a mixture of hardware and software that is designed to monitor and control the various functions of a building. These functions include, but are not limited to, security, access control, lighting, heating, ventilation, and cooling.

The hardware consists of equipment controllers, network communication controllers and input and output interfaces. The CyberStation software is an application program that allows you to communicate with, monitor and control the operation of the entire Andover Continuum system.

Andover Continuum Hardware Products

The Andover Continuum product line encompasses a wide variety of components including the following:

- NetController II, which replaced the NetController, CX9000, CX9200, CX9300 and the CX9500
- Infinet bCX1, which replaced the CMX9924, CMX220 and the CMX240
- ACX (57xx), which replaced the SiteController 9702, ACX780 and ACX700

These components are networked to create a total building automation system.

Andover Continuum System Architecture

Depending upon the complexity of the site architecture, a system can range from a single-user configuration with one workstation to a large, multi-user configuration with a network of multiple workstations, a file server, and numerous controllers.
**Single-User Configuration**

In single user configurations (also referred to as stand alone systems) the Andover Continuum product line consists of a network controller (NetController II with optional input/output modules), a bCX1 or a ACX (57xx) and a CyberStation workstation. The SQL Express database also resides on the workstation. The NetController.bCX1/ACX (57xx) use Ethernet TCP/IP protocol to communicate with the workstation. Communication between the network controller and the I/O modules is conducted over a special I/O bus. There are two versions of the bCX1. One uses Schneider Electric proprietary Infinet protocol and the other communicates using the BACnet protocol. The following illustration shows a single-user configuration.
**Multi-User Configuration**

The Andover Continuum system design is based on scalability, so expansion to a multi-user, larger network configuration in a local area network (LAN) is easily accomplished. The following illustration shows such a configuration. In this configuration, the network is expanded to include another workstation and an SQL database server.
**Network Controllers**

There are several types of Andover Continuum network controllers:

- bCX1 Series
  - Infinet bCX1
  - BACnet bCX1
- NetController II series
- ACX (57xx)

All are Ethernet TCP/IP compatible. The first four contain at least one *Infinet* port to allow communication with *Infinet* application controllers.

The bCX1 series is a series of Infinet and native BACnet routers and controller/routers. The bCX1 Infinet device functions as a Ethernet-to-Infinet field bus router. The bCX1 BACnet devices function as BACnet/IP-to-MS/TP field bus routers.

The NetController II and ACX (57xx) are powerful CPUs with flash EPROM, providing the central network management functions for Andover Continuum building automation system. These network controllers can be connected to individual IOU modules via a different proprietary RS-485 protocol called ACC-LON.

The ACX (57xx) includes the equivalent of a NetController, a power supply, and an AC-1 access control module in one small package.
Infinet Controllers

These controllers include combinations of inputs and outputs for the monitoring and control of local sensors and devices. There is a wide variety of Infinet controllers (including i2 controllers); each device is designed for a specific purpose.

Infinet controllers are connected to network controllers via the proprietary Infinet network.

BACnet Controllers

BACnet controllers communicate via the ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) protocol. This open protocol allows controllers to communicate with other BACnet devices made by different manufacturers.

These controllers include combinations of inputs and outputs for the monitoring and control of local sensors and devices. They are equivalent in function to the Infinet i2 Series controllers mentioned above.

BACnet controllers are connected to a bCX1 via the Master-Slave/Token Passing (MS/TP) network.

Workstations

A personal computer (PC) connected to the Continuum Ethernet network runs the CyberStation software and database. The system can contain a single workstation or multiple workstations, depending on the site configuration.

Networks

Infinet is Andover Continuum’s proprietary high-performance, token-passing LAN that allows Infinet application field controllers to communicate with each other and to a single network controller. With repeaters, it is possible to have 127 Infinet controllers on one Infinet network.
The LBus is the cable that connects IOU modules to a CX network controller or via the LA-1 to a NetController or NetController II. Only one LBus can be connected to a CX network controller. Each LBus can handle up to 32 IOUs.

The BACnet MS/TP network is an RS-485 based industry standard LAN that allows BACnet b3 field controllers to communicate with each other and to a single bCX1. It is possible to have 127 Infinet controllers on one MS/TP network.

**Note:** For Continuum, it is possible to have 255 Infinet controllers on one MS/TP network (with a maximum of 127 per comm port).

### NetController I/O Modules

NetController I/O modules are specialized units that receive sensor inputs and activate equipment (valves, fans, chillers, and so on) and perform access control functions.

The I/O modules, available in several configurations including input, output, mixed I/O, and display are listed in the following table:

<table>
<thead>
<tr>
<th>Type</th>
<th>Module</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>UI-8-10</td>
<td>Universal Input Module</td>
</tr>
<tr>
<td></td>
<td>UI-10-10V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UI-6 AC</td>
<td>AC Digital Input Module</td>
</tr>
<tr>
<td></td>
<td>UI-6 AC HV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DI-8</td>
<td>Digital Input Module</td>
</tr>
<tr>
<td></td>
<td>DM-20</td>
<td>Digital Input/Output Module (for DIO-20)</td>
</tr>
<tr>
<td></td>
<td>MI-6</td>
<td>MilliAmp Input Module</td>
</tr>
<tr>
<td>Output</td>
<td>AO-4-8</td>
<td>Analog Output Module</td>
</tr>
<tr>
<td></td>
<td>AO-4-8-O</td>
<td>Analog Output Module with overrides</td>
</tr>
<tr>
<td></td>
<td>DO-4-R</td>
<td>Relay Output Module</td>
</tr>
<tr>
<td></td>
<td>DO-4-R-O</td>
<td>Relay Output Module with overrides</td>
</tr>
<tr>
<td></td>
<td>DO-6-TR</td>
<td>Triac Output Module</td>
</tr>
<tr>
<td></td>
<td>LO-2</td>
<td>Lighting Output Module</td>
</tr>
<tr>
<td></td>
<td>LO-2-O</td>
<td>Lighting Output Module with overrides</td>
</tr>
</tbody>
</table>
Controller Expansion Modules

Expansion modules extend the I/O capability of certain Infinet i2, BACnet b3, and bCX1 controllers.

<table>
<thead>
<tr>
<th>Type</th>
<th>Expansion Module</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal</td>
<td>xPUI4</td>
<td>4-Channel Universal Input Module</td>
</tr>
<tr>
<td></td>
<td>xPBD4 *</td>
<td>4-Channel Universal Input and 4-Channel Digital Output Module</td>
</tr>
<tr>
<td></td>
<td>xPBA4 *</td>
<td>4-Channel Universal Input and 4-Channel Analog Output Module</td>
</tr>
<tr>
<td>Input</td>
<td>xPDI8</td>
<td>8-Channel Digital Input Module</td>
</tr>
<tr>
<td>Output</td>
<td>xPAO2</td>
<td>2-Channel Analog Output Module</td>
</tr>
<tr>
<td></td>
<td>xPAO4</td>
<td>4-Channel Analog Output Module</td>
</tr>
<tr>
<td></td>
<td>xPDO2</td>
<td>2-Channel Relay Output Module</td>
</tr>
<tr>
<td></td>
<td>xPDO4</td>
<td>4-Channel Digital Relay Output Module</td>
</tr>
<tr>
<td>Display</td>
<td>xP Display</td>
<td>Internal Mounted Keypad/Display Module (920 only)</td>
</tr>
<tr>
<td></td>
<td>xP Remote Display</td>
<td>Externally Mounted Keypad/Display Module</td>
</tr>
</tbody>
</table>

**Note:** * These modules (xPBD4 and xPBA4) can only be used to expand the I/O of bCX1 series controllers.
**CyberStation Software**

A key component of the Andover Continuum system is a Windows-based application program called CyberStation that runs on a PC workstation and interacts with the control system. Andover Continuum’s other key software component is the database that stores all the vital information pertaining to the building automation control system.

**CyberStation**

CyberStation provides a graphic user interface that can display and manage data. This interface allows adjusting schedules and setpoints, acknowledging alarms, tracking temperature and humidity readings, and so on.

Andover Continuum allows you to connect several CyberStation workstations simultaneously to provide for the most flexible configuration/control and monitoring operation available.
**Database**

The information that describes the structure and operation of your building is stored in the CyberStation database. The values of each point in the system, the settings for limits, the configuration of the hardware, the personal data of the personnel granted access to monitor and adjust a building's HVAC systems, and more, are contained in the database.

The database engine that CyberStation uses is either Microsoft SQL Express server or Microsoft Date Engine (MSDE) 2000.

**Objects**

The components associated with your site (networks, workstations, controllers, sensors, and so on) are created, monitored, and controlled as *objects* in CyberStation. For example, for every controller you have in a building, CyberStation stores a controller object. When you have created an object for a piece of hardware, you can monitor, disable, change the settings for, and enable that equipment using that object in CyberStation. Objects represent every aspect of Andover Continuum’s building control system, whether it is building security, lighting, or HVAC control.

**Attributes**

An attribute is a characteristic of an object. All objects have attributes associated with them. In most cases, there are several attributes that describe an object. (Attributes are known as *properties* in BACnet objects.)
Chapter 1: Getting Started
Chapter 2

Configuring an HVAC System

This chapter contains step-by-step procedures for configuring an HVAC network in CyberStation, using NetController II controllers. The chapter presents basic configuration tasks in the sequence that you would typically perform them.

So that you can more readily understand how the elements of an HVAC network work together, the procedures in this chapter cover basic setup tasks for a simple network. Each procedure provides cross references to the CyberStation online help so that you can obtain complete, detailed information about all the options associated with a configuration task.
Task 1: Open Continuum Explorer

Objects are the building blocks of your HVAC network. In CyberStation, objects are categorized by class. Areas, Schedules, and Controllers are examples of object classes. An object’s attributes are determined by its object class, although the attribute values are specific to the individual objects.

Objects may represent:

- Physical devices, such as a controller or a workstation
- Folders that are storage locations for objects
- Data, such as points, alarms and schedules

When you configure a network in CyberStation, you create the objects that correspond to the devices, folders, and data in your network, and you specify their attribute values. Continuum Explorer is the tool that you use to configure and manage your network.

Open Continuum Explorer

1. Open CyberStation if it is not running on your workstation, and login.

   **Note:** You can also open CyberStation by clicking `Start>Programs>Continuum>Continuum Explorer`.

2. At the CyberStation main menu, click **Explorer**.

   Continuum Explorer opens. The navigation pane does not yet contain any network objects or controllers. However, other predefined objects, created for you during installation, are displayed.

3. Proceed to “Task 2: Create a Network and a Controller” on page 32.
Infinity vs. BACnet Viewing Options

When you open Continuum Explorer, to view various folders and devices, you can select one of several views. The views are Infinity Controller and BACnet Device, Infinity Controller Only and BACnet Device Only.

The Infinity Controller and BACnet Device view allows you to view both Infinity and BACnet devices. The Infinity Controller Only view shows only Infinity devices in Continuum Explorer, while the BACnet Device Only view displays BACnet devices only.

To change views in Continuum Explorer:

1. From Continuum Explorer, select View>Show TAC BACnet Device As.
2. Select one of the three choices from the drop down menu.

More About Continuum Explorer

See the topic, “Continuum Explorer” in the CyberStation online help.
Task 2: Create a Network and a Controller

A network is a logical organization of controllers that are linked to each other and have the ability to exchange data.

Containers and Parent/Child Objects

Each network in CyberStation has a hierarchical structure of objects. Many objects can be containers for other objects. For example, a network object contains all the controllers in that network.

A container object is also called a parent object. All objects within the container are child objects that are “owned” by the parent object. These relationships are important for organizing the many objects that make up a network. They are also significant because you can apply settings to container objects that affect all the child objects within them.
Create a Network

When you configure an HVAC network, the first object you create is the network itself.

1. In Continuum Explorer, right click Root, select New, and then select Network.

2. Enter a name for the network for Object Name, and click the Create button.

3. In the Network editor, enter the Universal Time Coordinate (UTC) offset in minutes for Time Zone.

   The UTC offset is the difference between your local time and Greenwich Mean Time (GMT). Enter - if local time is behind GMT.

   Note: “-300” minutes is an example of the Time Zone offset for Eastern Standard Time.

4. Click OK.
Web Configuration for Controllers

NetController II devices are commissioned and configured using your PC's Internet Browser.

IP-configurable NetControllers are shipped with default IP addresses and Subnet Mask values. These values must be changed to new values, which are assigned by your local IT personnel.

The default values for all Andover Continuum IP-configurable controllers are:

- IP Address: 169.254.1.1
- Subnet Mask: 255.255.0.0

Prior to changing these values, the PC being used to commission the controllers must be configured to communicate with the controllers.

The setup values are:

- IP Address: 169.254.1.(191-254)
- Subnet Mask: 255.255.255.0

1. From Microsoft Internet Explorer, in the Address field, enter the controller’s default IP address.

The Andover Continuum Embedded WebServer page appears.

2. From the left hand menu, select Controller Configuration Options.

The Controller Configuration login dialog displays.

3. In the login dialog enter:
   - Username: acc
   - Password: acc

4. Select OK.

The Controller Configuration screen appears.

5. From the left hand menu, select Controller Configuration.
6. In the **Configurable Properties** section, enter the appropriate information.

**Note:** For further information on configuring a NetController II, refer to the *NetController II Operation and Technical Reference Guide*, 30-3001-995.

7. In the **Miscellaneous** section, using the dropdown menu, select the following information:
   - IO Configuration
   - Comm4 Port Line

8. Select **Submit to Controller**.

9. Exit the configuration setup.

**Note:** Once you have finished commissioning your controller, your PC's IP address and Subnet Mask value can be returned to their normal settings.
Create a Controller

**Note:** Before performing this procedure, you must first install the controller, connect it to your Ethernet network, and then commission the controller. Refer to “Web Configuration for Controllers” on page 34.

1. In Continuum Explorer, right click the network object, select New, and then select InfinityController.

2. Enter a controller name for **Object Name**, and click the Create button.

3. In the **InfinityController** editor, enter a unique number from 1 to 190 for the **ACCNetID**.

   The ACCNetID value uniquely identifies the controller within the HVAC network.

   **Note:** The ACCNetID must be identical to the one entered in Step 6, of the Web Configuration for Controllers procedure. See “Web Configuration for Controllers” on page 34

4. Select the controller model from the **Controller Type** dropdown menu.

   For example, select 9680 for a NetController II controller.

5. Select the **Network** tab.

6. Enter the IP address of the controller and subnet mask, and if required, enter the subnet mask and default router.

   You can obtain this information from your IT administrator.

7. Click **Apply**.

8. Select the **General** tab, and then click the **Teach** button.

9. In the **Select Teach Mode** dialog, select the InfinityController Teach radio button, and click **OK**.
Note: To confirm that the **Comm Status** is online, click the **Refresh** button.

10. Click **OK** to close the **InfinityController** editor.
More about Networks and Controllers

See the following topics in the CyberStation online help:

- “Network Editor”
- “InfinityController Editor”
Task 3: Configure IOU Modules

After you finish configuring the controller, you can define your input and output. Start by defining the IOU modules with the IOU Module editor.

IOU modules are electrical units that contain a number of input and/or output circuits that are electrically and sometimes physically attached to controllers. They provide controllers with the ability to interface with the outside world. There are four types of IOU Modules:

- Input modules
- Output modules
- Mixed input and output modules
- Special-purpose modules

Creating an IOU Module Object

The following steps allow you to add an IOU Module object for an IOU Module connected to a controller.

1. Right click the controller that you want to own this module, select New, and then select IOU Module.

2. When the New dialog appears, name the IOU Module, and click Create.
**General Tab – IOUModule Editor**

Use the **General** tab to enter basic information about the IOU module.

| Description | The description is optional, but a good description of the IOUModule object helps others when they need to test, modify or manipulate the network. To enter a description, type up to 32 characters (including spaces) in the text field.
|             | For example, enter **Fan Control** for a DO4 IOUModule object. |
| IOU Number  | Enter the IOU number here. You must manually assign a unique number (between 1 and 32) for each IOU module on a network controller. Physically label the IOU modules with the numbers you assign. This number is **not** the same as the 12-digit module ID # assigned to the individual module at the factory. You will use this number when you configure points on this controller. |
| Model Number| The model number identifies the type of the IOUModule and is read from the module. |
| Comm Status | This displays **Online** or **Offline**, depending on whether the controller is in communication with the module. |
| Module ID and Program ID | These Schneider Electric-assigned numbers appear after the Learn process. The only time you will need these numbers is when speaking to a Schneider Electric Support Representative. These numbers will help our staff to answer your questions. You may manually enter the Module ID number in this field, (if you know it), rather than following the Learn process. |
| Learn       | Use the **Learn** button to commission the IOU module on the network. See “**Commissioning an IOU Module**” on page 42 later in this chapter. |
| **Wink** | Use the **Wink** button after commissioning the IOU module to confirm that your system recognizes the IOU module. Click the **Wink** button. The **Status** light on the IOU module should flash. This indicates the IOU module was successfully commissioned. |
| **Update IOU** | Click the **Update IOU** button to browse for a *.iou file (a Schneider Electric-provided Flash File for individual modules) when updating IOU modules with new firmware. |
Commissioning an IOU Module

Perform this procedure after installing the IOU module on the controller.

1. In the IOUModule editor, click the Learn button.

   A dialog displays requesting the operator to press the Commission button on the physical module.

2. At the IOU Module, press the Commission button on the front panel.

   The dialog at the workstation should close indicating that it received the information from the module.

   If the module is not easily accessible, you can manually enter the module ID into the field instead of using the Commission button. The module ID is found on the label inside the cover of the module. After entering the module ID, click the Apply button.

3. In the IOUModule editor, click the Refresh button.

   The ModuleID for commissioned module, the ProgramID field, and the IO model type (such as AO-4-8) are automatically entered. This information was received from the module. Also, the Comm Status should be Online.

More about Commissioning an IOU Module

See the following topic and its associated topics in the CyberStation online help:

- “IOU Module Editor”
Task 4: Configure Controller Comm Ports

After a controller is defined, its communication ports (comm ports) need to be configured for the devices connected to them. A comm port is an electrical interface used to connect the controller to an external device, such as a printer or a terminal.

The comm port you select to configure and the settings you choose in the CommPort editor depend on the model of the network controller and the device you want to connect to it. You use the CommPort editor to provide settings that enable the comm port to work with the device attached to it.

To configure a comm port, follow these steps:

1. In Continuum Explorer, expand the network controller whose comm ports you want to configure.

2. Comm Port objects appear in the list of objects in the viewing pane. Double click the CommPort class folder under the controller.

3. Double click the CommPort object you want to configure.

4. In the CommPort editor, select the appropriate settings in each tab as described on the following pages.

5. Click OK.

More about Configuring Controller Comm Ports

See the following topic and its associated topics in the CyberStation online help:

- “CommPort Editor”
General Tab – CommPort Editor

In the General tab, enter basic information about the comm port.

Note: When Infinet or Wireless is selected in the Default Mode field, another tab, Field Bus Controllers, appears. See “Field Bus Controllers Tab – CommPort Editor” on page 51.

<table>
<thead>
<tr>
<th>Description</th>
<th>Type in a description for the comm port. You can use up to 32 alphanumeric characters. This attribute is optional, but providing a good description can aid other users.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm Port Number</td>
<td>The CommPort attribute displays the number of the comm port(s) you are editing.</td>
</tr>
</tbody>
</table>
| Default Mode | Each comm port has a default mode. To change the default mode, select a different one from the Default Mode dropdown menu. The Settings tab displays different attributes, depending on the default mode you select.  
   The available default modes include:  
   • Printer  
   • Infinet  
   • AutoSet  
   • XDriver  
   • Wireless  
   • Command  
   • LBus  
   • TankNet  
   • MSTP  
   For more information on the available default modes, refer to the General Tab online help page for the CommPort Editor. |
Chapter 2: Configuring an HVAC System

Note: In the event of a controller reset, each comm port reverts to its original default mode.

**Default Modes**

The following table briefly describes each comm port default mode.

<table>
<thead>
<tr>
<th>Default Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printer</td>
<td>Select this option when connecting a serial printer to this port.</td>
</tr>
<tr>
<td>Infinet (Comm 1 and 2 Only)</td>
<td>Select this option to set up this comm port as an Infinet port. An Infinet port connects an Infinity controller to an Infinet network. When the default mode is set to Infinet, another tab is added to the CommPort editor: <strong>Field Bus Controllers</strong>. See “Field Bus Controllers Tab – CommPort Editor” on page 51</td>
</tr>
<tr>
<td>Wireless</td>
<td>Select this option to use a Wireless Adapter on a NetController II, for communication over a wireless subnetwork.</td>
</tr>
<tr>
<td>Lbus</td>
<td>Select this option to set up communications between your controller and one or more IOU boards on an Lbus. Lbus is supported for COMM1 on a NetController II.</td>
</tr>
<tr>
<td>TankNet</td>
<td>Select this option to connect to an Infinity level-sensing probe.</td>
</tr>
</tbody>
</table>
### Chapter 2: Configuring an HVAC System

**NetController II 9680**

The following table lists the default mode (and other modes available) for the NetController II model 9680.

<table>
<thead>
<tr>
<th>Comm Port</th>
<th>Default Mode</th>
<th>Other Available Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infinet</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>User Port</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>COMM1</td>
<td>AutoSet</td>
<td>Printer; Infinet; LBus; LON; PPP; Wireless; XDriver</td>
</tr>
<tr>
<td>COMM2</td>
<td>AutoSet</td>
<td>Printer; Infinet; Wireless; XDriver</td>
</tr>
<tr>
<td>COMM3</td>
<td>AutoSet</td>
<td>Printer; XDriver</td>
</tr>
<tr>
<td>COMM4</td>
<td>AutoSet</td>
<td>Printer; LBus; XDriver</td>
</tr>
<tr>
<td>COMM16</td>
<td>LON</td>
<td>XDriver</td>
</tr>
<tr>
<td>Custom Port</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
More about the General Tab - CommPort Editor

For a complete list of default modes for each comm port on each controller, see the following CommPort associated topics in the CyberStation online help:

- “Default Modes for Controller Comm Ports”
- “Summary of Comm Port Modes”
Viewing the Status of an XDriver Device

In the General tab, click the XDriver Status button to view the status of the device that is using the XDriver. The XDriver Status button displays the following read-only information:

<table>
<thead>
<tr>
<th>Status</th>
<th>Displays the status of the device, or XdrvNotInstalled when no XDriver file has been selected.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error</td>
<td>Displays the last error to occur on the device.</td>
</tr>
<tr>
<td>Error Time</td>
<td>Displays the time and date that the last error occurred on the device.</td>
</tr>
<tr>
<td>Error Count</td>
<td>Displays the number of errors that have occurred on the device since you last set it to zero. Increments to 255 errors and remains set at 255 until you reset it to zero by clicking the Reset Count button.</td>
</tr>
</tbody>
</table>
**Settings Tab – CommPort Editor**

The **Settings** tab is where you view or edit the communications speed and ‘handshaking’ settings for the mode that you have chosen for the port.

Depending on which Default Mode you select on the **General** tab, some of the attributes on this tab may be disabled (appear gray).

<table>
<thead>
<tr>
<th><strong>Baud Rate</strong></th>
<th>The baud rate is the speed, measured in bits per second, at which the controller sends information to the device that you are connecting to the comm port. Select the baud rate required by the equipment connected to this port.</th>
</tr>
</thead>
</table>
| **Track CXD** | This option monitors a communications carrier detect signal called CXD. When selected, it enables the controller to detect when communication with connected objects has been lost.  

Depending on your modem configuration, the CXD (sometimes called DCD) signal (pin 8 on an RS-232 connector) is asserted “high” when the communications link is established between modems. Once the carrier signal is lost, CXD goes “low.” Track CXD looks for the high-to-low transition and makes the controller reset this comm port to its default mode. Track CXD “cleans up” the comm port by logging off the last user. Track CXD is selected by default, and it is required for comm ports that are connected to modems. If Track CXD is not selected, the controller cannot respond to the loss of the CXD signal. |
### Flow Control

The flow control type determines how the communications port handles the flow of data between the controller and its attached device (usually a printer, modem, or terminal). This process is also known as “handshaking.”

Select one of the following options from the dropdown menu:

- **NoFlowControl:** Select this flow control type if you do not want to regulate the flow of information between the controller and its attached printer, modem, or terminal. Without a flow control type, buffers that hold data that is being transmitted or received could overflow, and some data could get lost.

- **CtsRts:** This flow control type uses hardware signals to send “clear to send” (Cts) and “request to send” (Rts) messages. Both of these messages must be acknowledged by the controller and its attached device before information can be transmitted.

- **XonXoff:** This control flow type uses software signals in the form of characters that are sent as part of the data being transmitted. When the controller or its attached device detects that it has been sent an **Xon** character, it makes itself available to receive data. It considers all data received after the **Xon** character as valid. When it detects an **Xoff** character at the end of the data stream, the controller or attached device knows the transmission is complete.

- **XonXoff CtsRts:** This flow control type uses both the software (**XonXoff**) and hardware (**CtsRts**) handshake methods for regulating the flow of information between the controller and its attached device.
Field Bus Controllers Tab – CommPort Editor

When you set Default Mode on the General tab to Infinet or Wireless, the Field Bus Controllers tab is added and appears on the CommPort editor.

This tab displays the controllers that reside on their respective field bus network — Infinet, BACnet, or Wireless — connected to this comm port. The controllers will not display, however, until you click the Learn button on the Settings tab.

The CommStatus column displays either Online or Offline for controllers listed in the Name column. When a controller is Online, it is communicating with the rest of the network. When a controller is Offline, it is not in communication with the rest of the network. This information is read only.

| Current Mode | This is a read-only attribute that shows you the default mode selected in the General tab. |

![Field Bus Controllers Tab](image)
**More about the Field Bus Controllers Tab - CommPort Editor**

For more information about the Field Bus Controllers Tab, see the following CommPort associated topics in the CyberStation online help:

- “Field Bus Controllers Tab”
- “Settings Tab”
- “CommPort Editor”

**More about the CommPort Editor**

For additional information about the CommPort Editor, see the following topic and its associated topics in the CyberStation online help:

- “CommPort Editor”
**Task 5: Create CyberStation Points**

A point is an object that stores a value, such as an input indicating the temperature of an area, an output that turns a chiller on or off, or a True-False condition that triggers an alarm.

In HVAC systems, you most often work with the following types of point objects:

<table>
<thead>
<tr>
<th>Point Type</th>
<th>Use in HVAC Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>InfinityInput</td>
<td>Used to monitor contact status as well as the condition of the wiring.</td>
</tr>
<tr>
<td>InfinityOutput</td>
<td>Used to specify a digital (On or Off) value, allowing CyberStation to change the status of a switch or a contact.</td>
</tr>
</tbody>
</table>

Points enable you to monitor and control HVAC events. You use these points with schedules, alarms, and other objects to establish routine HVAC routines and to respond to out-of-range HVAC events.

**Note:** Two other forms of CyberStation points are InfinityNumerics and AnalogOutput points which are also described in this topic.

---

**Create an InfinityInput Point**

Supervised input points can monitor:

- The status of a contact or switch
- Whether the wiring for the contact or switch is defective

Supervised points can have one of three values: On, Off, or Trouble.

You create a supervised input point for each input (for example, from a contact sensor) from the devices wired to channels at each controller in your network.

1. In Continuum Explorer, right click the controller where you want to create the point, select **New**, and then select **InfinityInput**.
2. Enter a point name for **Object name**, and click the **Create** button.
3. In the **General** tab of the **InfinityInput** editor, in the **Units** field, enter the units for this point.

For example, define the meaning of the On value: “On = Closed.”

Leave the **Value** field at 0. The system updates the value with the input from the associated controller channel.
4. Select the **Settings** tab.

![Image of settings tab](image)

5. Select **Supervised** for **Elec Type**.

6. For **Channel**, enter the controller channel number (marked on the controller) to which this input is wired.

7. Enter $######_#### for **Format**.

   $ indicates a text value. Each # is a placeholder for one character. This format enables On, Off, or Trouble to be reported for the value.

8. Select the appropriate input type based on the wired configuration of the switch (normally open with a resistor in series, normally closed with a resistor in series, etc.).

**Note:** For a NetController II, the IOU menu is available. In this menu, you must select the IO module or IOU board on the LBus that is sending the input.
9. Click **OK**.

10. To set conversion options for the HVAC configuration, see “Setting the Conversions Tab” on page 56.

**Setting the Conversions Tab**

The **Conversions** tab allows you to set conversions for input sensor readings into engineering units. These input signals are converted to temperatures, relative humidity and atmospheric pressure. The readings are helpful when monitoring and regulating an HVAC system in an area.

In the **Threshold** field, enter the amount of change, in engineering units, that must occur before the point updates other objects, such as alarms, reports and exports to other controllers.
Note: A threshold of zero (0) indicates no threshold and increases network traffic. Increasing the threshold can reduce network traffic for exported points.

Enter a conversion formula in the Conversion field or use the Auto Conversion fields to set the top and bottom scale values. The input signals are converted to temperatures, relative humidities, atmospheric pressures, etc.

For the HVAC system, to continue configuring the InfinityInput Editor, see “Setting the Logs Tab” on page 58.
Chapter 2: Configuring an HVAC System

**Setting the Logs Tab**

In the **Logs** tab, you define logs and extended logs for a point.

A log is a collection of point values stored in a structure from which you can print, e-mail, or retrieve them. The structure, also known as an array, looks like a two-column table. The first column contains an index of entry numbers. The second column contains recorded values.

In the **Logs** tab, you define and activate two types of logs for a point.

- **Logs**: Stores log entries on the local controller that owns the point. See “Logs” on page 59.
- **Extended logs**: Stores log entries that would otherwise be deleted once the maximum number of local-controller log entries are filled. When you activate extended logs, the additional "extra" entries are transferred (uploaded) to a workstation's Continuum database, to capture them before they are deleted in the controller. The extended log, which is an extension of a log, continues recording values where the log leaves off. It records values depending on how
you set up the short-term log. These extended log entries can be uploaded from both local-area network (LAN) controllers and remote-access services (RAS) network controllers to the workstation. Extended logs work according to the attribute settings on this tab, in addition to the extended-log settings in the **General Preferences** dialog and on the **Preferences** tab of the **Device** editor for a workstation.

**Logs**

Under the **Logs** section, in the **Number of Entries** field, enter the number of entries you want stored in the log table. The maximum number of entries allowed is dependent on the memory available on your PC.

In the **Type** field, use the dropdown menu to view and select a log type. The log types include:

- **Manual**: This type is not set by CyberStation and can only be set from the Command Line, a report, or a Plain English program.
- **loginstataneous**: CyberStation stores the current value of this point at the beginning of every interval.
- **LogAverage**: CyberStation calculates the average point value over every interval using a weighted average algorithm. Average values are stored at the end of every interval.
- **LogMinimum**: CyberStation compares all values over an interval, finds the minimum and stores it at the end of every interval.
- **LogMaximum**: CyberStation compares all values over an interval, finds the maximum and stores it at the end of every interval.
If the Type is not Manual, under the Interval section, set the interval. This setting determines how often CyberStation stores new values in the log. The following intervals are available:

- **Days**: The maximum value is 365.
- **Hours**: The maximum value is 23.
- **Minutes**: The maximum value is 59.
- **Seconds**: The maximum value is 59.

**Tip:** In order to have a log updated at the same time every hour (such as every quarter hour or every half hour) the interval must be evenly divisible into one hour (for example, 1 minute, 2 minutes, 3 minutes, etc.).

If you select any other Type other than Manual, in the Extended Logs section, you can activate the extended logs option. This log is an extension of the short-term log stored in the controller, and continues recording values into the database. The values are recorded in the extended log, depending on how you set the short-term log. These extended log entries can be uploaded from both LAN controllers and RAS controllers to the CyberStation workstation.

For the HVAC system, to continue configuring the InfinityInput Editor, see “Setting the Triggers Tab” on page 61.


Setting the Triggers Tab

The **Triggers** tab is where you associate triggers with a point. Triggers are Plain English programs whose status changes to active when the point value changes by at least the amount of the Threshold attribute setting. One point may have numerous triggers associated with it. Conversely, one program can be triggered by many points.

To associate an Infinity program with a point, click the **Add** button. This displays a **Browse** dialog for Plain English programs. Once you have found the Infinity program you want, click the **Select** button, and that program will be added to the point’s trigger list.

To delete an Infinity program from the trigger list, click it, then click the **Remove** button.
Create an InfinityOutput Point

An InfinityOutput point is a digital point that stores the value of a signal sent to a device. The value is sent via the controller channel to which the device is wired, and is used to control the device. For example, the output may turn off a fan.

An output point can have a value of On or Off. You create an output point for each output to the devices wired to channels at each controller in your network.

1. In Continuum Explorer, right click the controller where you want to create the point, select New, and then select InfinityOutput.

2. Enter a point name for Object name, and click the Create button.

3. In the General tab of the InfinityOutput editor, enter the units for this point.

   For example, define the meaning of the On value: “On = A/C Unit Runs.”

   Leave the Value field at 0. The system updates the value with the input from the associated controller channel.

4. Select the Settings tab.

5. From the Elec Type drop down menu, select the appropriate electrical type for the input.

6. Enter the controller channel number (marked on the controller) to which this output is wired.

7. Enter $### for Format.

   $ indicates a text value. Each # is a placeholder for one character. This format enables On or Off to be reported for the value.

8. Click OK.

   For example, if the point will be a constant, enter the number. If the value will be the result of a calculation, do not enter anything in the field.
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9. Enter the format of the value for **Format**.

   $ indicates a text value. Each # is a placeholder for one character. Use a period to indicate the position of the decimal point, if needed.

   And example for the **Format** value is “$########.#”.

10. Click **OK**.

**Create an InfinityNumeric Point**

InfinityNumerics are temporary storage locations in the controller’s memory. InfinityNumerics store numeric information, which includes the values ON, OFF and - ON. Typically, InfinityNumerics are used to store temperature setpoints.

An InfinityNumeric, when it is created for a BACnet device on an Infinity b4920 controller, bCX1 (40x0) series controller, or an Infnet b36xx, b38xx, or b39xx controller becomes one of the following BACnet value objects:

- AnalogValue
- BinaryValue
- MultistateValue

When you create an InfinityNumeric for an Infinity controller or an Infinity Infinet controller, and select AnalogValue, BinaryValue, or MultistateValue as the BACnet **Device Type** in the **General** tab of the InfinityNumeric editor, a BACnet AnalogValue, BinaryValue, or MultistateValue is also created, respectively.

**Note:** For third-party BACnet devices that become part of the Andover Continuum system, AnalogValue, BinaryValue, and MultistateValue objects are already created as objects on those third-party BACnet controllers.

When you create an InfinityNumeric, you configure certain values for its attributes, which are characteristics of the InfinityNumeric. Some attributes for an InfinityNumeric include value, units and description.

1. In Continuum Explorer, right click the controller where you want to create the point, select **New**, and then select **InfinityNumeric**.
2. Enter a point name for **Object name**, and click the **Create** button.

3. In the **General** tab of the **InfinityNumeric** editor, enter the units and a description for this point.

For example, define the meaning of the On value: “On = A/C Unit Runs.”

Leave the **Value** field at 0. The system updates the value with the input from the associated controller channel.

**More about InfinityNumeric Points**

See the “InfinityNumeric Editor” topic and its associated subtopics in the CyberStation online help.
Create an AnalogOutput Point

An AnalogOutput is a BACnet object that is created via the **Infinity Output** editor. AnalogOutputs are associated with BACnet devices on the Andover Continuum system.

When you create an InfinityOutput for an Infinity controller or an Infinity Infinet controller, and select an analog electrical type via the **Settings** tab of the Infinity Output editor, a BACnet AnalogOutput is created if the Infinity or Infinet controller on which it resides was created as a BACnet device specifically:

- If the Infinity controller was created as a b4920 controller or a bCX1 (40x0) series controller
- If the Infinet 2 controller was created as a b36xx, b38xx, or b39xx controller

---

**Note:** For third-party BACnet devices that become part of the Andover Continuum system, AnalogOutput objects were already created as objects on those third-party BACnet controllers. Therefore, Continuum Explorer already lists these objects as AnalogOutputs within third-party devices.

An output changes or affects the environment by controlling a piece of equipment, such as a heater or fan. Infinity controllers have up to 48 channels for output points. A channel in this case is simply an area in the controller than can be physically connected to a device.

**More about AnalogOutput Points**

See the “AnalogOutput Editor” topic and its associated subtopics in CyberStation online help.
More about Points

See the following topics in the CyberStation online help:

- “InfinityInput Editor”
- “InfinityOutput Editor”
- “InfinityNumeric Editor”
- “AnalogOutput Editor”

To continue configuring the HVAC system, see “Task 6: Create Schedules” on page 67.
Task 6: Create Schedules

A schedule is a graphical calendar of events that CyberStation uses to determine when activities occur. HVAC activities that you can manage with schedules, for example, include:

- When heat or air conditioning turns on or off during evenings or weekends.
- When vents are opened or closed.

About Schedule Points

Schedules use the following points to determine when the schedule is active and which CyberStation objects are controlled by the schedule:

- InfinityDateTime points that are updated with occupied and unoccupied times.
- An InfinityNumeric or InfinityOutput point whose value is set by the schedule. Other objects that reference this point, such as a door, are controlled by the schedule that sets the point value.

Create and Configure a Schedule

You create schedules in the controller where the schedule will be used. (Later, you can use the Schedule editor’s Mass Create feature to copy the schedule to other controllers in your network, if needed.)

Note: Before creating a schedule, you must create the points called for in the schedule. See “Task 5: Create CyberStation Points” on page 53.

1. In Continuum Explorer, right click the controller, select New, and then select Schedule.
2. Enter a schedule name, and click the Create button.
3. In the **Schedule** editor, select the **Configuration** tab.

4. Under **Point Configuration**, use the browse button to locate each of the following points:
   - An InfinityDateTime point that the schedule updates with the next occupancy time (the date and time at which an area will next be occupied)
   - An InfinityDateTime point that the schedule updates with the next unoccupancy time (the date and time at which an area will next be unoccupied)

5. Use the browse button to locate the InfinityNumeric point that the schedule will set for **Occupancy Point**.
   The value of this point will be set to On (Occupancy Time is now) or Off (Unoccupancy Time is now.).

6. Check the **Automatic Download** check box, and select the day of the week and the time you want CyberStation to download the schedule to the controller.
7. Click **OK**.

8. In Continuum Explorer, right click the workstation that you want to perform the schedule download, and select **Open**.

9. In the **General** tab of the **Device** editor, click the **Auto Download** check box, and select **OK**.

Each week, at the day and time you selected in the schedule, this workstation downloads the next seven days of the schedule to the controller.
More about Schedules

See the following topics in the CyberStation online help:

- “Schedule Editor”
- “Options Tab” (located in the “Door Editor” topics in the CyberStation online help)
Task 7: Configure Alarms

When you have configured your HVAC system to define when (for example, extreme temperature shifts or drops), where (in a freezer, cooler or other temperature regulated area), and to whom HVAC regulation is permitted, your next task is to set up alarms that notify you when these alarm conditions occur.

Two CyberStation objects work together to define alarm conditions and the system’s response to the alarm:

- An EventNotification object determines what happens in response to the alarm.
- An AlarmEnrollment object specifies the conditions that define the alarm state and the return to normal state. You attach an AlarmEnrollment object to the objects, such as doors and points, to configure the alarm for that object.

About Event-Notification Objects

In an EventNotification object, you specify how the system responds to an alarm condition. You also specify how a user, when notified of an alarm, must respond to acknowledge the alarm.

Actions the system can take include:

- Displaying alarm messages in the Active Alarm View window or the Alarm Status bar at specific workstations
- Beeping or playing an audio file at the workstations
- Sending an e-mail message and/or paging one or more individuals
- Displaying a video layout that shows video from cameras in locations affected by the alarm
- Displaying a graphics panel associated with the alarm

You can also specify the notification actions that occur when the conditions that triggered the alarm return to normal.

**Create an Event-Notification Object**

You create EventNotification objects in Root. Typically, you create a folder in Root to store both EventNotification objects and AlarmEnrollment objects.

1. In Continuum Explorer, right click **Root**, select **New**, and then select **Folder**.

2. Enter a folder name, and click the **Create** button.

3. Right click the folder, select **New**, and then select **EventNotification**.

4. Enter a name, and click the **Create** button.

5. In the **General** tab of the **EventNotification** editor, enter a number for the priority of the alarm state and the return to normal state.
Priority is used to sort events in the Active Alarm View window, with higher-priority events (events with a smaller priority number) at the top of the list. For example, a certain kind of alarm may be priority 1, while the return to normal for the alarm is priority 10. You can choose how you want to assign priorities to alarms.

6. Under **Colors and Fonts**, right click to select the colors and fonts used to display the alarm in the Active Alarm View window and the Alarm Status bar.

7. If you want the notification to be reissued if the alarm continues, enter the number of minutes between notifications for **Repeat**.

8. Select the **Actions** tab.
9. Select the check box next to each action you want the system to take in notifying users of the alarm and the return to normal.

![EventNotification - DoorAlarms](image)

10. Select the **Delivery** tab.

11. Click the **Add Recipient** button.

12. In the **Recipients Configuration** dialog, click the browse button to locate and select the CyberStation workstation to be notified of the alarm.

   **Note:** The “recipients” referred to in this dialog are the CyberStation workstations that you want to be notified of the alarm and that will then take the actions you selected in the **Actions** tab.

13. Specify the days and times of day that this workstation should receive the messages.
For example, you might designate Workstation 1 as the recipient of alarm notification during office hours Monday through Friday. You might then designate another workstation as the recipient of notification at night and on weekends.

![Screenshot of Recipients Configuration window]

14. Click the check box next to the actions the workstation should take if it receives notification during the times you selected.

<table>
<thead>
<tr>
<th>If you want the workstation . . .</th>
<th>Then . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always to perform the action</td>
<td>Select the check box under <strong>Primary</strong> for the action.</td>
</tr>
<tr>
<td>To perform the action only if a workstation that was designated as primary for this action is offline</td>
<td>Select the check box under <strong>Secondary</strong> for the action.</td>
</tr>
<tr>
<td>To perform the action only if a repeat of the alarm has occurred</td>
<td>Select the check box under <strong>Backup</strong> for the action.</td>
</tr>
</tbody>
</table>
15. Click **OK**.

16. Select the **Deactivate** tab.

17. Select when to remove the alarm from the Active Alarm View window.

18. Click **OK**.

You can now create an AlarmEnrollment object that uses this EventNotification object.

**About Notification by E-mail and Pages**

If you want to use the e-mail and paging options in an EventNotification object, you also need to set up distribution lists in the e-mail application at the computer that distributes alarm notifications. For each EventNotification object, create a distribution list of the people you want to be paged or receive e-mail when an associated alarm occurs.

Create the lists in the first address book that appears in the e-mail application, and use the formats shown in the following table for the list names. The list names in the Example column are for an EventNotification object named “dooralarms.”

Requirements for forwarding CyberStation alarms via e-mail or page are:

- The CyberStation workstations that have been designated primary and backup e-mail and/or page handlers must have a MAPI-compliant e-mail client such as MS Exchange or Outlook.
- The e-mail client application can communicate with an existing e-mail server application, such as MS Exchange Server.
- The primary or backup e-mail/paging workstation must be running CyberStation at the time an alarm is generated.
- Each EventNotification object associated with the alarms that you wish to e-mail or page must have its own e-mail distribution list in the personal address book or Contacts list of the client e-mail application, using a specified naming convention as outlined in Step 4 below.
Creating an EventNotification Distribution List

To create an e-mail or page distribution list, proceed as follows:

**Note:** The following steps are based on Microsoft Outlook. Other mail applications may have different menu names and choices but the general procedure is the same.

1. Open the Address Book for the e-mail account on the CyberStation workstation that will be providing the e-mail/paging service(s). Your toolbar may have a button for this. If not, use the Address Book option of the Tools menu.
2. Select New Entry from the Files menu.
3. Select the entry type Personal Distribution List and add this entry in the Personal Address Book.
4. In the Name field, enter a name for the distribution list using the following format:

<table>
<thead>
<tr>
<th>List Type</th>
<th>Format of List Name</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>acc.eventnotification.name</td>
<td>acc.eventnotification.dooralarms</td>
</tr>
<tr>
<td>Paging</td>
<td>acc.page.eventnotification.name</td>
<td>acc.page.eventnotification.dooralarms</td>
</tr>
</tbody>
</table>

For example, if your EventNotification object is named Severe, the personal distribution list for e-mail deliveries should be named: ACC.Severe. Likewise, your personal distribution list for page deliveries should be named: ACC.page.Severe.

**Note:** Use the EventNotification object Name not the Alias, for example, Critical Temp, not CriticalTemp.
5. Add members (the e-mail addresses or pager and service numbers of those to whom the notification of the alarm will be sent) to your personal distribution lists.

6. Set address book options so that the address book where your personal distribution lists are stored is the first one to be searched when sending e-mails or pages. For example, in Microsoft Exchange, select Options from the Tools menu. Click the Addressing tab. When sending mail, check names using these address lists in the following order area, use the Add button, then the up or down arrow buttons to add the correct address book to this field and position it at the top of the list.

**About Alarm-Enrollment Objects**

An AlarmEnrollment object:

- Defines the conditions that your HVAC system uses to determine that a point is in the alarm state
- Defines the conditions that the system uses to determine that the point has returned to its normal state
- Contains the text messages that are displayed in the Active Alarm View window or the Alarm Status bar
- Has an attached EventNotification object that defines how the system responds to the alarm and notifies the appropriate people

You attach an AlarmEnrollment object to points, doors, and other objects that you want to alarm.

**Create an Alarm-Enrollment Object**

You create AlarmEnrollment objects in the Root or in an alarms folder that you previously created in the Root for AlarmEnrollment and EventNotification objects.

1. In Continuum Explorer, right click the folder that contains your AlarmEnrollment objects, select New, and then select AlarmEnrollment.

2. Enter a name for the alarm (e.g., doorisajar), and click the Create button.
3. In the **General** tab of the **AlarmEnrollment** dialog, click the browse button to locate and select the EventNotification object that determines how the system responds to the alarm.

![Screen capture of AlarmEnrollment dialog](image)

The EventNotification object you select here determines how the system responds if the alarm condition occurs.

4. Select **Value** for **Alarmed Attribute**.

   This is the attribute that triggers the alarm, based on the parameters you define for **Value** in the **Algorithms** tab.

5. Select **Expression** for the **Alarm Type**.

   You define the expression used to define the alarm condition in the **Algorithms** tab. Most access control alarms use the Expression alarm type.

6. Under **Send**, select the **Alarm** check box. If you want to be notified at the return to normal, select this check box as well.

7. Select the **Algorithms** tab.

8. In the **Expression** field, enter the alarm condition that triggers the alarm.
For example, enter `DoorAjar = True` to generate an alarm that occurs when the value for the attribute `DoorAjar` is equal to 1, indicating that the door has been left open.

9. Select the **Feedback** tab.

10. Enter the messages that you want to be displayed in the Active Alarm View or the Alarm Status bar.
Use wildcards as placeholders for the object name and description of the object to which you attach this alarm:

- Enter \%n in place of the object name.
- Enter \%d in place of the object description (entered in the General tab of the object editor).

Using wildcards enables you to attach the same AlarmEnrollment object to multiple objects while still providing an alarm message that is unique to the object where the alarm has occurred.

11. Click OK.

**About Attaching Alarms to Objects**

You can attach up to eight AlarmEnrollment objects to a Door object or a point object. For example, you might create and attach alarms to a Door object for door ajar, switch tampering, and forced entry conditions.

**Attaching Alarms to a Point**

Once you have created the appropriate EventNotification and AlarmEnrollment objects, you need to open a point object editor. From the navigation pane of the Continuum Explorer:

1. Double click the Infinity controller that contains the points you want to alarm.

2. In the viewing pane of Continuum Explorer, right click the icon for the point, and select Open from the drop down menu.

   The object editor for that point appears.

3. Select the Alarms tab (or Advanced Alarms tab on some object editors).
Chapter 2: Configuring an HVAC System

The **Alarms** tab (or **Advanced Alarms** tab) appears. For example:

**Using the Alarms / Advanced Alarms Tab of an Object Editor**

Use the **Alarms** tab (or **Advanced Alarms** tab) to browse for up to eight **AlarmEnrollment** objects to attach to the point.

To attach an alarm to an object:

1. Click the browse button in one of the empty alarm fields.
2. Search and find the alarm you want.
3. Click the **Select** button.
4. Check the **Enabled** checkbox.

To delete an attached alarm, select its name in the text field and press the **Delete** key on your keyboard.
Additional information you can add from the **Alarms** tab include the following attributes:

<table>
<thead>
<tr>
<th>Graphic</th>
<th>Click the browse button in the <strong>Graphic</strong> field to search for the desired graphic panel that you want to appear when the alarm goes off. Select the page number of the graphic panel you want first to appear.</th>
</tr>
</thead>
</table>
| Program  | Click the browse button in the **Program** field to search for the desired report program or any other Plain English program to this object.  

**Note:** You cannot select an HTML report directly. To associate an HTML report with an object, you must select a program that uses the SHOWREPORT keyword to run an HTML report. An example of the SHOWREPORT keyword is:  

```
SHOWREPORT: “C:\PROGRAM FILES\CONTINUUM\REPORTS\SYSTEMCHK.HTM”
```
Alarm Points

Alarm points allow any expression alarm that you attach on this tab to reference up to four "alarm points," named Point 1, Point 2, Point 3, and Point 4. Using alarm points prevents you from having to change the expression (via the **Algorithms** tab of the AlarmEnrollment editor for that alarm object) every time you attach an expression alarm to a different point:

![Alarm Enrollment Editor](image)

**Note:** For additional information on the Algorithm expressions refer to “Select the Feedback tab.” on page 80.
To configure these alarm points for an attached expression alarm, click the **Alarm Points** button to bring up the **Alarm Points** dialog:

![Image of Alarm Points dialog]

Using the **Alarm Points** dialog, you must specify the actual point names for every alarm point the attached expression alarm references. The referenced point, for example, can be an input-point temperature reading.
Follow this procedure:

1. In the **General** tab of the AlarmEnrollment editor, for the alarm you want to attach, make sure that you select **Expression** for the **Alarm Type**. Any attached alarm to which you want to apply alarm points must be an expression alarm.

2. In the **Algorithms** tab of the AlarmEnrollment editor, enter the expression in the **Expression** field. When you want to use alarm points, the alarm point name (point1, point2, point3, or point4) must be part of the expression. For example:
   
   ...value > point1 + 2...

3. Save the AlarmEnrollment object after making these expression-alarm changes.

4. On this tab of this editor, click the **Alarm Points** button to search for and select the name of an object for every alarm point referenced by attached expression alarm. The **Alarm Points** dialog appears, showing fields where you may specify up to four point names, Point 1 through Point 4.

5. Click the browse button in one of the point's fields.

6. Once you have found the point you want, click the **Select** button. That point specified in the field will be associated with that alarm point and applied to the attached expression alarm, which references the point.

7. Click **OK**.

---

**More about Alarms**

See the following topics in the CyberStation online help:

- “EventNotification Editor”
- “AlarmEnrollment Editor”
- “Alarms Tab” subtopic for the “Network Editor” topic. This subtopic details how to attach an alarm to an object.
Task 8: Create Graphic Panels and Controls

The CyberStation application includes a graphics application, Pinpoint, that you use to create dynamic control panels that let you monitor and respond to HVAC events.

CyberStation control panels are computer-generated representations of physical panels. They consist of a screen display of buttons, switches, animations and text, and other “controls” that control particular points, particular elements of log or array points, point attributes, system variables, or certain Continuum objects, such as areas and doors. Every control placed on a CyberStation control panel can be easily changed, deleted and re-assigned through software.

Controls can be active or passive:

- Active controls, such as a switch or button, can be manipulated by the user. For example, a switch control, when “turned,” might set a point value or setpoint.
- Passive controls convey information, such as gauges and read-only text controls that display values. A text control might display the current room temperature.
A control panel can have one or more controls, or not controls at all.

Pinpoint supports a simple form of animation that uses multiple images of the same control. Because each image is slightly different, viewing them in a sequential order produces the effect of animation.

The following example shows a Pinpoint graphics panel that monitors HVAC equipment on one floor of a building.
### About Graphic Controls for HVAC

Pinpoint has several dynamic controls that are intended for HVAC:

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Text Controls</strong></td>
<td></td>
</tr>
<tr>
<td>Controller Time/Date</td>
<td>[Controller Date/Time: 4/5/00 12:49:42 PM]</td>
</tr>
<tr>
<td></td>
<td>This is a text control tied to the system clock. It displays the date and time.</td>
</tr>
<tr>
<td>Power Fail</td>
<td>[Power Fail: Off]</td>
</tr>
<tr>
<td></td>
<td>This text control indicates whether the power fail condition is true or false. This is especially helpful if you have a freezer or other HVAC area that must constantly be operational and is susceptible to power failure.</td>
</tr>
</tbody>
</table>

The other text controls are also tied to various points throughout the system and include such information as the amount of free system memory, which server is being accessed, alarm and error counts, etc.
## Chapter 2: Configuring an HVAC System

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Bar Control  | **Temperature Gauge**<br>![Temperature Gauge Image](image-url)  
An bar control shows the value of the point by rising or descending to a particular level as the value of the point changes. Both horizontal and vertical bar controls are available in the image library. This bar control is linked to a sensor and displays the temperature graphically. |
| Switches     | **Gate Switches**  
Pinpoint switch controls allow you to control two-state (on-off) points. In addition to their control capabilities, they also can display a different image for each state. Clicking once activates or deactivates the control. When on, the indicator on the top of the switch turns red. These switch controls can operate dampers or vents for HVAC systems. |
Other Pinpoint controls and tools let you customize the appearance and operation of graphics panels as needed. For example:

- Use an image file of a floor plan as the panel background, and arrange HVAC devices (such as thermostats or temperature sensors) and areas (such as a freezer) based on the physical location of the objects they represent.
- Use text, switch, button, and other controls to display information or perform specific actions, such as opening a Listview window.

More about Graphics Panels and Controls

See the “Pinpoint Graphics” topic in the CyberStation online help.
Task 9: Configure Reports

CyberStation provides powerful report-generation capabilities that enable you to gather, view and distribute data about events in your HVAC system.

About Report Objects

In a Report object, you specify the characteristics of the report that you want to generate:

- The data included
- The report format (text, bar chart, pie chart, etc.)
- The output format, including whether the report is viewed on screen, printed, or saved to a file
- Whether the report is generated automatically or manually
- Whether the report is automatically e-mailed to a list of recipients

Create a Report

You can create reports in a folder or a controller. You may want to create a folder that stores all your reports.

1. In Continuum Explorer, right click Root, select New, and then select Folder.

2. Enter a folder name, and click the Create button.

3. Right click the folder, select New, and then select Report.
The **Report** dialog appears.

![Report dialog](image)

4. Enter a report name, and click the **Create** button.

5. In the **Source** tab of the **Report** editor, select a data source.

6. From the **Report Type** drop down menu, select a report type.

7. Select a chart type and subtype, which determine the presentation of your data.
   
   To generate a tabular report, select **Text**.

8. Click the **Select Columns** button.
The **Selectable Columns** dialog appears.

9. In the **Selectable Columns** dialog, select column settings:
   - Columns to include or exclude
   - Sequence of columns
   - Sort order of the data
10. Click **OK**.
11. From the **Report** dialog, select the **Filter** tab.
12. Select the **Log Filter** radio button, and select a predefined filter for the time interval of the report.

   The **Time Interval** radio button allows you to specify a custom time interval.

13. Select the **Path** browse button, and locate and select the controller with the objects that you want to include in the report.

14. Click the **Add** button to locate and select the objects in this controller that you want to include in the report.

15. Select the **Output** tab.
Chapter 2: Configuring an HVAC System

The **Output** tab appears.

16. Options in this tab allow you to define the output format.

    You can use wildcards for the following data:

    - `%r` represents the report type
    - `%t` represents the report date and time
    - `%p` represents the page number

17. Select options for e-mailing the report and saving the report to a file, as needed.

18. Click **Apply**.

19. Click the **View Report** button to generate the report and display the content in the Report Viewer window.

20. Click the close button to close the Report Viewer window.

21. Click **OK**.
More about Reports

See “Reports and Report Editor” in the CyberStation online help.
Chapter 3: Monitoring a Building Control System

Monitoring a Building Control System

When your HVAC system is configured and operating, CyberStation has numerous features that enable you to monitor HVAC activity. This chapter introduces the following features:

- Alarm Status bar and Active Alarm View window
- EventView windows
- Group windows
- ListView windows
- Using Logs
- Loops Configuration for BACnet objects
Responding to Alarms

When you configure alarms, you typically specify that an alarm message be displayed at one or more CyberStation workstations. At a workstation, alarm messages appear either in the Alarm Status bar or in the Active Alarm View window, depending on settings in the EventNotification object associated with the alarm.

About the Alarm Status Bar

An alarm message is displayed in the Alarm Status bar when an alarm is triggered. If multiple alarms are active, the alarm displayed in the status bar is the first alarm that would appear in the list of alarms in the Active Alarm View window.

Buttons to the left of the message enable you to silence, mute, or acknowledge the alarm, and to perform other related actions.

About the Active Alarm View Window

The Active Alarm View window notifies you of alarms and provides information about current alarm conditions. The window displays automatically when an alarm occurs if you selected the Display Alarm View option in the EventNotification object associated with the alarm.

If the window does not display automatically, you can display it by clicking the Alarm icon in the Alarm Status bar. You can open this window whether or not any alarms are currently active.
This window updates in real time as alarms occur, are responded to, or the affected objects return to their normal state.

By default, alarms are sorted by priority. Alarms with a priority of 1 are considered the most urgent. They appear at the top of the list.

Use buttons to the left of the entries in the list to respond to alarm notifications:

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![ACK]</td>
<td>Acknowledge the alarm. Click this button when you have seen the alarm message and have taken the appropriate action to address the alarm condition. Your user name is recorded in the <strong>Acknowledged by</strong> field for the alarm. If the workstation was beeping or playing audio, and if the alarm message was flashing, these stop when you click the Acknowledge button.</td>
</tr>
<tr>
<td>![Mute]</td>
<td>Silence the audio associated with the alarm at all workstations that received the notification. Silencing an alarm does not acknowledge the alarm. Your username is recorded in the <strong>Silenced by</strong> field for the alarm. To silence audio at your workstation only, click ![Mute] in the toolbar, or click <strong>Mute!</strong> in the menu bar at the top of the Active Alarm View window. Additional toolbar buttons and menu options enable you to obtain more information about alarms and the objects associated with them.</td>
</tr>
</tbody>
</table>
More about Responding to Alarms

See the “Active Alarm View” topic in the CyberStation online help.
Using Groups

A Group is an object used to view a collection of like objects. Each group has a list of objects known as members. Members are objects of any class that are related (for example, Relative Humidity, Space Temperature and Temperature Average).

Three Group views exist: the Member list view, Graph view and the History view.

- **Member list view** displays the name, class and value of every member object in the Group.
- **Graph view** — displays logged values for the selected member list objects.
- **History view** — displays a list of all selected member list objects, as well as their logged values over a particular period.
From Continuum Explorer, you can create a Group by right clicking a specific controller and selecting **New** and **Group**. Enter an **Object Name** for the Group and select **Create**. The Group editor appears.

Use the Group editor to create a Group, build and modify its member list, and configure the group’s graph and history views.

**More about Group Objects**

See the “Group Editor” topic in the CyberStation online help.
Using ListView Windows

ListView windows are objects that display a list of attribute values for an object class, such as Schedule objects or Areas objects. You typically use ListView windows when you want to review the event history of an object or a person. For example, reviewing the event history may help you resolve a recurring problem, such as frequent High Humidity events in a specific area.

About Predefined ListView Objects

Several predefined ListView windows for HVAC setups are available from the ListViews page of the CyberStation main menu.

You can customize ListView windows using menu options in the windows. You can create and edit ListViews in the ListView editor.
Chapter 3: Monitoring a Building Control System

**About Creating ListView Objects**

ListView objects are highly customizable. Settings that you can define include:

- Object class, including special ListView object classes, such as AlarmInformation, that you can use to track system events
- Types of data displayed, whether the data displayed when you open a ListView window is the most recent available from the controllers or is retrieved from the CyberStation database. (You can also update the window to get “live” data.)
- Filters for time intervals
- Path in which to look for objects of the selected class, which enables you to focus on objects of interest
- Columns included in the ListView window, their arrangement, fonts, and colors
- Qualifiers that further refine the selection of objects whose data is shown in the ListView window

**More about ListView Objects**

See the following topics in the CyberStation online help:

- “ListView Editor”
- “CyberStation Main Screen”
Using Logs

A log is a collection of point values for an object. The structure of the log (array) looks like a two-column table. The first column contains an index of entry numbers. The second column contains the recorded values. A log is especially helpful when tracking recorded values, such as humidity level or the average temperature for an area.

From the Logs tab of the InfinityInput Editor and various other point editors, you can define the type of log (Log or Extended Log), the number of entries, type of log, and the time intervals for recording the log.

More about Logs

For more information, see the Log topics in the CyberStation online help or the “Setting the Logs Tab” on page 58.
Loop Configuration for BACnet

A Loop is a BACnet specific object that allows you to create a feedback system without having to manually alter the Plain English code. The Loop object automatically adjusts input values to achieve the desired setpoint in the shortest amount of time possible. This is accomplished by using a PID (Proportional, Integral and Derivative) control algorithm. This is particularly helpful in maintaining an HVAC system that includes BACnet devices whose values can fluctuate periodically in such a system, requiring regulation and stability.

The BACnet controller obtains the value of the input by polling the current value of the input. Once the controller obtains the current value, it uses the PID algorithm to monitor the input. Based on the monitored input, the PID algorithm determines the output value that is assigned to the output reference or an object whose values control items such as sensors and dampers.

The difference between the input value and the setpoint value is used by the PID algorithm to adjust the output value.

The Tuning tab allows you to set and adjust the input value, output value and setpoint value to your particular preferences.
The **General** tab allows you to view and/or alter the current state of the loop object.

**Note:** All output-reference, setpoint-reference, and input-reference values are references to objects originally created either as points on Andover Continuum controllers, or as BACnet objects on third-party BACnet controllers.
**HVAC Control Loop**

The figure below illustrates the components of a typical HVAC control loop. The entire process is configured in the Loop editor, on the Tuning tab.

Shown is a forced air heating system utilizing a heating coil provided with steam, hot water or some other heating source. Cold air is forced through the system and heated to some desired temperature. The sensor measures the temperature of the supply air (the controlled variable) and transmits this information to the controller. In the controller, the measured temperature (the control point) is compared to the desired temperature (the set point). The difference between the set point and the control point is called the error. Using the error, the controller calculates an output signal and transmits that signal to the valve (the controlled device). As a result of the new signal, the valve changes position and changes the flow rate of the heating medium through the coil (the process plant). This, in turn, changes the temperature of the supply air. The sensor sends the new information to the controller and the cycle is repeated.
More about Loop Object Configuration

For more information see the “Loop Editor” topic in the CyberStation online help.

More about BACnet

For more information about BACnet, BACnet objects, BACnet devices and CyberStation’s implementation of BACnet, see “BACnet” topics in the CyberStation online help. See also: Introducing BACnet - A Guide for Continuum Users, 30-3001-863.
Chapter 4: Advanced Configuration for HVAC Control

Chapter 4

Advanced Configuration for HVAC Control

This chapter briefly describes additional features of CyberStation that can help you manage your HVAC system:

- Introduction to Plain English (PE) Programs
- Security groups for CyberStation users
Introduction to Plain English Programs

Note: For more information on the Plain English language refer to the Andover Continuum CyberStation Plain English Language Reference, 30-3001-872.

The Plain English language (PE) allows you to customize your HVAC building automation systems in accordance with specific site requirements. PE, which is similar to BASIC, is based on keywords that provide a simple, the basic programming language to develop programming statements and requires minimal programming experience.

Plain English is included as part of Continuum’s Plain English Integrated Development Environment (IDE), a complete suite of highly integrated tools for writing, editing and debugging PI programs.

Plain English programs can accomplish a variety of tasks that are particularly helpful when maintaining an HVAC system:

- Controlling Air Handlers
- Controlling Boilers, and Air Handling units at multiple sites
- Enabling and controlling Chiller interfaces
- Printing Temperature and/or Humidity related reports

More about Plain English Programs

See the Andover Continuum CybeStation Plain English Language Reference, 30-3001-872 and see “Plain English/IDE Programming” help topic and related topics in the CyberStation online help.
Security Groups for CyberStation Users

Just as you can customize personnel access to specific physical areas of your facility, you can also customize the access that CyberStation users have to features and data in the CyberStation application, including HVAC entities (such as thermostats, chillers and temperature logs). You accomplish this using three types of objects:

- User objects
- Security group objects
- Security level objects

About User Objects

A user is a person who logs into a CyberStation workstation to monitor or manage your HVAC system. For each user, you create a User object, via the User editor, that must include the following information:

- User name and password
- Security group(s) to which the user belongs

The security group assignments of each user determine the objects and data the user can view and edit, and well as other actions they can perform, such as deleting objects.

You can further define each user’s interaction with the CyberStation application by specifying the following in User objects:

- Programs that start when the user logs in or out
- A graphics panel that is displayed when the user logs in
- A CyberStation menu page that is displayed when the user logs in
- A report program that runs when the user logs in

For example, you might assign a graphics panel representing a floor plan of your building, with Pinpoint controls for areas, thermostats, chillers and other objects, to be displayed when a security guard logs in to CyberStation.
**About Security Groups**

A security group is a CyberStation Security object that contains a collection of privileges for using CyberStation editors and applications and for viewing CyberStation data. Security groups enable you to define the HVAC control privileges needed by different types of users. After you set up security groups, you assign users to the appropriate security group(s) based on the access that each user needs.

You use the Security editor to specify the privileges of each security group. CyberStation provides 1024 security groups in which you can define access privileges. By default, the Security editor displays the first 128 of these.

In the **Actions** tab of the Security editor, privileges are organized in folders for object classes and actions. For example, the Area object class includes all the actions associated with Area objects and the list of tabs in the Area editor.

Each column corresponds to one security group. The lock and key icons indicate whether the security group has the access privilege (🔒) or is denied the privilege (🔓).

![Security Group Configuration](image)
**About SecurityLevel Objects**

SecurityLevel objects define access privileges for individual objects or containers. You use the SecurityLevel editor to specify the privileges assigned to security groups in each SecurityLevel object. (This process is very similar to assigning security group privileges in the Security editor.)

You then attach a SecurityLevel object to CyberStation objects to further refine the access privileges that users have to those objects. If you attach a SecurityLevel object to a container object, such as a controller or a folder, access to all objects in the container is also controlled by the SecurityLevel object.

For example, by creating SecurityLevel objects that you attach to the controllers in each of your buildings, you could allow system administrators to control the air conditioning and heating settings in their areas or buildings but not in other areas or buildings.
About ControllerUser Objects

A ControllerUser object allows a user access to the command terminal for each remotely connected NetController.

**Note:** Create ControllerUser objects under the applicable NetController. ControllerUser objects cannot exist under the Root object.

A ControllerUser object also allows you to assign the security level permissions for a command terminal interface for a NetController. When a user makes changes to the NetController using the terminal interface, these changes are tracked using an activity log. This is especially helpful if you want to adjust the security level for a specific controller that monitors and controls one particular HVAC device.

More about Users and Security

See the following topics in the CyberStation online help:

- “User Editor”
- “Security Editor”
- “SecurityLevel Editor”
- “ControllerUser Editor”