



Computrols Building Automation Software

# User Manual



## **CBAS User Manual**

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# Chapter 1 » Getting Started

## Read Me First

Congratulations on owning the most simple-to-use software in the Building Automation Industry. The intention of this program is simplicity for the operator. All commands can be done with either the mouse or the keyboard. The following terms are used frequently throughout this manual and should be understood prior to continuing:

**Using the Mouse:** Right clicking is equivalent to pressing the Escape (Esc) key on the keyboard, and left clicking is equivalent to pressing the Enter key. There are very few exceptions to this rule, and they will be addressed in the appropriate sections of this help guide.

**Left Click:** Also referred to as “Click.” When entering information, or selecting a field, left click or press enter.

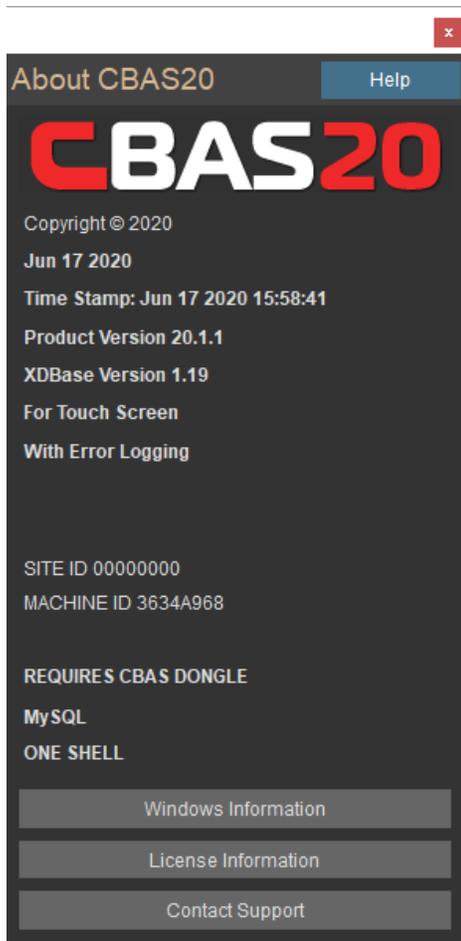
**Right Click:** To return to the previous screen and save all changes made to the current screen, right click or press Esc.

In order to simulate logic, you can change setpoints in order make heat or cool work. However, on the Program screen of analog input points, there is a Force Output button that allows you to change a temperature etc. The button is in the top right of the Point Program screen.

## CBAS Software Versions

This revision of the CBAS Manual was created during the release of CBAS Revision 20, so many sections only show the operation of that revision. Where there are major differences between the above version and previous versions, those will be discussed, but the main focus will be on the latest version.

In order to determine your revision, go to the Main Menu, System Menu and then CBAS Version. The revision number will be listed as “Product Version X.X.X”. The Timestamp is the date the revision was compiled.



Two lines below the Product Version you will see one of either Professional or Commercial. These are product classes. Here is a brief explanation of the classes:

- **Professional:** This is the main, full-featured version of CBAS, which has no point limits and is more than sufficient for any size building.
- **Commercial:** This class was added to make CBAS more cost-effective for use in smaller buildings and has a limit of 10 controllers or 250 hardware points.

## Installing CBAS

Contact [techsupport@computrols.com](mailto:techsupport@computrols.com) to obtain a link to download the installer named CBAS 20 setup.exe. Right-click the file and choose Run as Administrator. This is necessary even if you think you are logged into Windows as an administrator. Otherwise, Windows could prevent certain files from being installed and that will prevent CBAS from running. Once the Setup begins, follow on-screen directions.

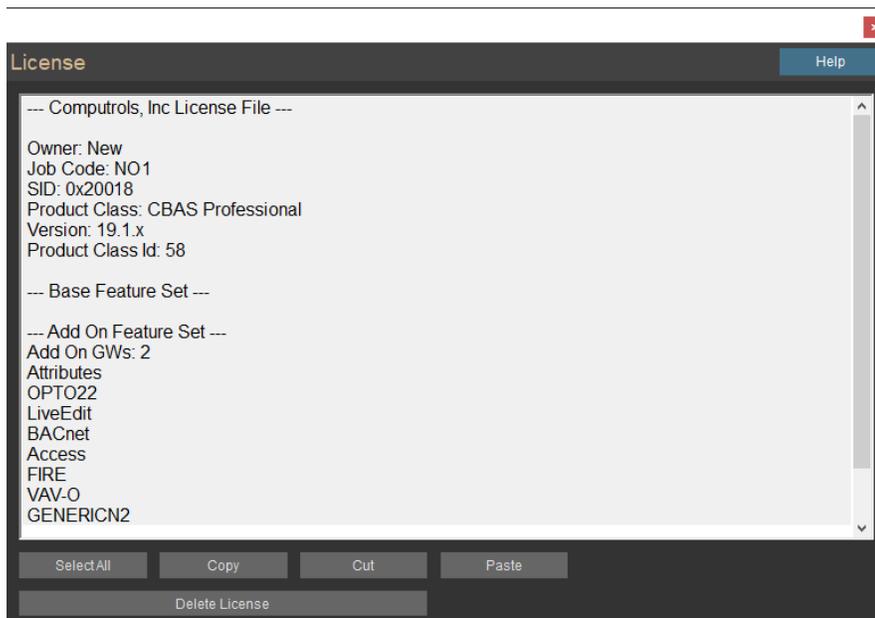
Once completed, use the shortcuts that were placed on the desktop the first time by right-clicking them and clicking Run as Administrator. This should prevent Windows from asking Are You Sure(?) before opening the program the next time.

When you first open CBAS, you will receive 3 errors that the database cannot be loaded. Close these errors by clicking OK. You must first Install a database by obtaining a backup either from Tech Support or by making a backup from your building's CBAS, then going to the Database menu and choosing Install Database. Point to the backup and click Install. You must choose a backup created in CBAS 15 or a more recent version. Installing and Opening Databases is covered in detail in Chapter 2 of this manual.

## Licensing

In order to enter Real Mode (next section), you must purchase a license to use the CBAS software. This is also required in order to use add-on features like 3rd party protocol interfaces and other features. You will be issued a Key-Lok (dongle), which is a hardware key that plugs into a USB slot. It works in conjunction with a license text file. Both are assigned an ID number and name of the site. The two have to match in order for CBAS Real Mode to work. The license text file is now stored in the database. The Site ID on both must match and the version on the license must match the version of CBAS that you are running, at least the first 2 numbers of the version. Like 17.1 or 19.1.

To view your CBAS license, select the Database menu and choose License/>more/CBAS (see below).



If you have upgraded your license or added a new add-on feature, you must delete the old license and restart CBAS to pick up a new license placed in the CBAS root folder. In CBAS, go to Database, Database Maintenance, and then License. There is a button below the text section to delete the License. Do not attempt to alter the text, because that will corrupt the license.

**Restart CBAS in order to pick up the new license file.**

If you are still not able to enter Real Mode, it might be that either:

- The Dongle Key is not installed, or
- The license is not unzipped and placed in the CBAS folder, or
- The license and dongle do not match.

To see if the Dongle Key is installed in Windows, go to the search field next to the Start Button, then type Device Manager and choose it from the list. At the bottom of the Device list you should see USB Key, then the sub item USB Dongle-Software Protection Device. If there is a yellow question mark or red X on it, then new drivers are required.

Instructions on acquiring and installing the dongle drivers, see Chapter 9, Section 3: Installing Dongle Drivers.

# New Features

## New Features in CBAS 15

- CBAS 15 runs in the CBAS 15 folder.
- CBAS 15 will no longer be compiled for Windows XP or Vista. The reason is that now CBAS Graphics View has been made more touchscreen friendly. In addition, the touch screen functionality only works with Windows 7 or 8, 64-bit version. If you have 32-bit Windows, CBAS 15 will work but some of the touch screen functions will not.
- SMTP EMailer and CBAS Logger now run as a service. These are explained in later sections and the new Computrols Support Service is explained in Chapter 7, Section 13, Web Weather Points.
- You are required to change the Computrols user password when upgrading a database.
- CBAS 15 now uses MySQL as the database for passwords, logical groups, and graphics instead of Microsoft Access.
- Menus have changed. Most notably, the Database menu is now present in Real Mode and anything database related, like Backup or Close Database, have moved to this menu.
- You can now choose to make passwords more secure. See detailed instructions in Chapter 5, Section 7 – Setup Passwords CBAS Simulator. Previously, you could only simulate 1 BASnet controller at a time. Simulator mode works great now for databases of all sizes.
- Added a Copy Email Alarm button which copies the setup of the contacts to new points. Increased the number of Header Points allowed in CBAS from 2 to 10.
- Added GW Graphics Directory in Configure Workstation. Now from a GW you can set the Graphics Relative Path Prefix.
- Graphics paths are now relative paths to the database. This will change in CBAS 17. The Decimal Places for Analog points have been moved to the More button.
- CBAS no longer has a history size limitation. See History Maintenance All software points in the DPU are shown in Editor Mode.
- Added new features to the Text View Search feature.
- Added button in Configure Workstation to disable the double click – auto mouse moves feature in CBAS.

## New Features in CBAS 17

- CBAS 17 runs from the CBAS 17 folder.
- Databases can only be run from the C:\CBAS 17\Sites or C:\CBAS19\Sites folder.
- Enhanced passwords allowed using Setup Passwords on the System Menu. Chapter 5, Section 7.
- Heat Maps in CBAS Graphics.
- No History Size Limitation and lower default History Save Settings.
- Text View, All Points can now be scaled to increase or decrease font size, allowing more or less points to display.
- There is a new Graphics engine which allows more graphics formats including transparent PNGs and animated GIFs. Also, Menus display properly on multi-monitor systems.
- You can now setup email alarms to only go out to users while they are on their shift.

## New Features in CBAS 19

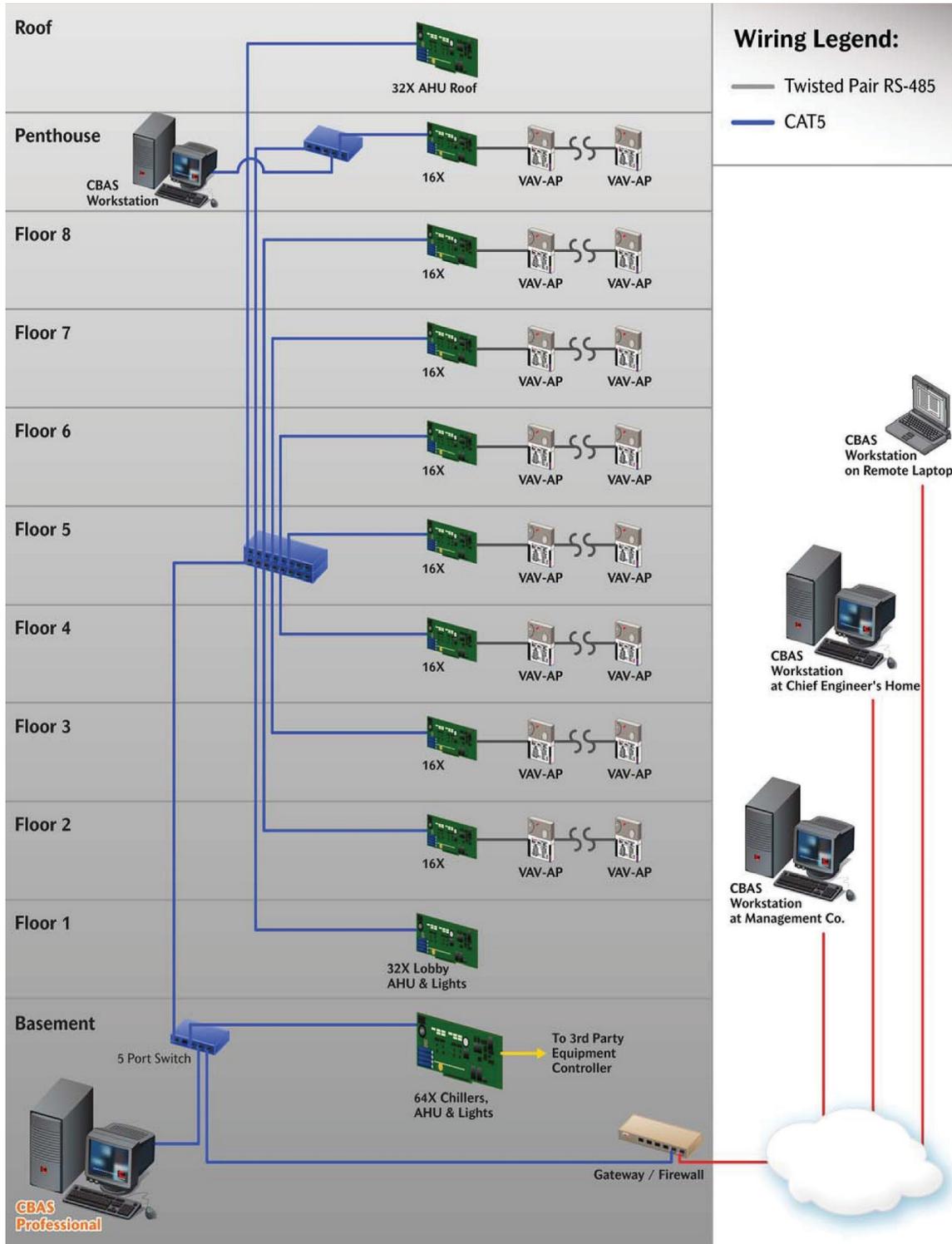
- In addition to Web Weather Points, CBAS now has Future Web Weather Points that give you forecasts.
- There is a new BACnet Setting feature that allows you to copy settings like Instance, Change of Value and Read Multiple to other controllers that haven't been Probed.
- You can now setup Email Alarm and add Contacts directly on a Point's Alarm Setup screen.
- There is now a Dry Bulb Calculation in Logic.
- Alarm Report now has a choice of the old report and a new grid style report with all parameters.
- Added Alarm Activity Report with Acknowledgments that can auto-email daily.
- Stulz Protocol. CBAS can be run as a Service.

## New Features in CBAS 20

- Now CBAS has a dark color theme and you can toggle between traditional CBAS colors and the dark theme.
- Dual Monitors.
- Email Tech Support.

- Hardware View now includes Host and Secondary Channels.
- Per Channel Licensing.

## CBAS System Architecture



More network topologies can be found later in this manual under Sample Wiring Layouts.

# Chapter 2 » Getting Around CBAS

## Modes

You can run CBAS in Real Mode, Editor Mode, Simulator Mode, or Graphic Workstation (GW) Mode with each mode allowing different capabilities.

## Real Mode

Real Mode is the only mode where communication is enabled between the CBAS computer and the controllers and workstations in the database. Consequently, this is the only mode where On Scan and Off Scan work. Points can be commanded On, Off, and Auto. All programming of Channels, Controllers, and Points can be done in Real Mode, including Logic, Schedules, PIDs, Alarms, etc. Points can be repositioned in Text View. On the System Menu, some statistics and controller information can be obtained.

When viewing Controllers and Points in Hardware View using Classic CBAS Color Theme, the columns on the right side will be a blue color when Normal Communication is present, and yellow when communication is Lost. Using the new Dark Color Theme, the points will be dark gray when Normal and yellow when lost.

The Database Menu did not exist in Real Mode prior to CBAS 20. Adding Channels, Controllers, Points and Workstations is not possible in Real Mode. However, an add-on feature (Live Edit) to your license will allow you to add points in Real Mode. Peer-to-Peer cannot be configured in Real Mode.

## Editor Mode

Editor Mode is used for creating databases, adding and removing Channels, Controllers, and Points, while also configuring Peer-to-Peer. The computer does not communicate to the controllers in Editor Mode. The Database Menu exists only in Editor Mode.

## Simulator Mode

Simulator Mode allows you to test logic and other programming by simulating Real Mode. In CBAS 20, Simulator Mode was improved to be able to simulate all controllers in the database. Prior to this, you could only simulate 1 controller at a time. When Simulator Mode is started, you are required to select the 1 controller you want to simulate. CBAS 20 allows you to simulate an entire database of controllers.

In order to simulate logic, you can change setpoints in order make heat or cool work. However, on the Program screen of analog input points, there is a Force Output button that allows you to change a temperature etc. The button is in the top right of the Point Program screen.

## Graphic Workstation (GW) Mode

Graphic Workstation Mode (GW) allows a workstation computer with CBAS installed on it to connect to and share its database. A GW is used to monitor a database, but not to make major programming changes. Adding and removing Channels, Controllers and Points, as well as some administrative functions, are not possible on a GW.

These are the things you can't do from a GW:

- Adding and Removing Channels, Controllers, and Points
- Editing Graphics
- Edit Logical Groups - Only seen on GW
- No other administrative features on the System Menu work

Except:

- Access control menu is available
- Header points: Works for GW only, doesn't change DPU
- For instructions on opening databases in these different modes, see the next section, Databases.

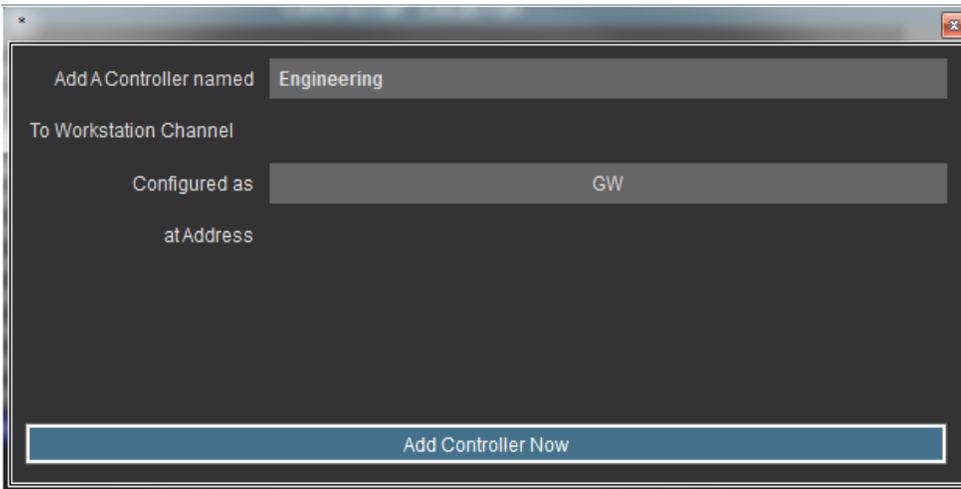
## CBAS Workstations: How many, how to program and connect

The term for a Workstation in CBAS is GW (Graphical Workstation). On the DPU or Automation Server, the CBAS software runs the Database for the building in Real Mode and communicates to the Controllers at the site. Workstations connect to the DPU and basically share the database.

From CBAS on the GW, you can do most everything that can be done on the DPU: command points; change Logic, Schedules and PIDs etc.; run reports; add and remove Access Control Cards; add users etc. Some things you can't do from GW are make backups, add and remove controllers, points and channels, etc.

By default, CBAS Professional allows up to 2 GWs to connect at one time. You can program as many as you want in the Workstation Channel, but only 2 can connect. However, additional GWs can be purchased and added to the site license giving the building more.

Generally, when the database is first programmed and the controllers commissioned, 2 GWs are added to the database by the technician doing the installation. To add GWs to the DPU, go to Editor Mode then Hardware View, click the Workstation Channel then Controllers. On a new database, you will only see the Local GW, which is really the graphical interface to the DPU running in Real Mode, and always shows that it has Normal communication. Click Add a GW/Strings server.



Give it a name that indicates where it is located or who is using it, then choose GW for the configuration and click Add NOW! Under Configuration, there are other choices: You can also add a Stringserver (allows a CBASweb Server to connect) and VAV-B Commission (connects and opens the VAV-B Utility Program). Once you have added all needed GWs, escape from the Workstation Channel screen then click it again and click Program. On this screen, make sure the IP address listed is the IP address of the DPU's network card. You can get this by opening a Command Prompt and typing ipconfig/all then Enter. If you have more than one IP address, make sure you enter the one that is on the subnet where the GW computers are. Otherwise, CBAS doesn't know which network card to reply back to, so it might choose the wrong one. Once entered, escape and you can return to Real Mode. You can change the IP address in Real Mode but you have to restart CBAS after.

To connect a GW, you must have CBAS installed on another computer. The version of CBAS must be very close to the same version as the DPU. To see what version is running on either the GW or DPU, go to System, then CBAS Version and note the Product Version. If you are not on the same version, you can close CBAS and copy the CBAS 20.exe from the C:\CBAS20 folder on the DPU and copy it to the same location on the GW.

When you open CBAS on the GW, it will probably open in Editor mode. If a database opens, close it by going to Database, Close Database. Once closed, you will only see Database and System on the Main Menu. Click Database, then Open Database and choose Remote GW.

**TCP/IP Login** Help

**Remote DPU Address**  
Enter the address of the remote DPU to which you are attempting to connect.  
TCP/IP Address  
192.168.1.200  
Previous GW Connections  
Advanced

**GW Name**  
Enter the name of the GW that you want to sign on as. A GW with this name must already be programmed in the DPU's database for the login to be successful. Once accepted, your computer will be referred to by this name for the remainder of the session.  
GW Name for this computer (case sensitive)  
GW1  
 Load GW Names from DPU  
Connect

**GW Password**

Cancel Login

Type in the IP address of the DPU then check the box to Load GW Names and wait. If successful, you can click the dropdown list above and choose a GW name that is not already connected. The list will tell you which ones are not connected. If they are all connected, then you need to add more GWs to the DPU. After choosing a GW, click the connect button and give it a minute to download, then you can begin using CBAS.

There are a few things that can prevent the connection.

- The DPU might not be in Real Mode.
- If you get a TCP\IP error then you might have the wrong IP address for the DPU or there could be a network problem preventing the connection.
- It could also be the Windows Firewall on the DPU. Turn off the firewall or make an exception for incoming IP Port 8750. If the CBAS version is 15 or later, you also need to open port 3306 for MySQL.

## TCP/IP Connection with Controller

What happens when you get to a site where you only have a standalone controller and you forgot the database because you just moved into a new laptop? One choice is the Commission Program, which is covered in the Troubleshooting section under Commission Program. The other choice is CBAS "TCP/IP Connection with Controller."

**NOTE:** *It is recommended that you keep backup copies of all databases in safe, offsite storage.*

## Opening and Closing Databases

The directory structure for Databases has changed as of CBAS 19 and CBAS 20.

Databases are now contained in CBAS20\Sites\[Database Name] or CBAS20\Sites\[Database Name]. Under the [Database Name] you will find separate folders for Database, History, Graphics, Backups, System Log and a few others. If your Database was named "Computrols Building" for example:

**C:\CBAS20\Sites\ComputrolsBuilding\Database\** - contains all database files and folders.

**C:\CBAS20\Sites\ComputrolsBuilding\History\** - contains all History files.

**C:\CBAS20\Sites\ComputrolsBuilding\Graphics\** - contains all Graphics background pictures and animation files. No sub-folders can be used.

**C:\CBAS20\Sites\ComputrolsBuilding\Backups\** - contains any backups that are made manually or automatically.



Also, the Database Menu when Opening and Restoring Databases has changed. When you don't have a Database open, the Database Menu now shows:

- Open Database
- New Database
- Restore Database
- Install Database
- Remove Database

When you select 'Open Database' you can choose Real Mode, GW Mode, Editor Mode or Simulator Mode first, then you will be given a list of Databases to choose from that have already been Installed into this Computer. You will only be able to select from this list. If you only have 1 Installed database, then Open Database will skip this step and just open that database (there is nothing to choose from).

'New Database' allows you to create a new Database from scratch. All folders are created for you under Sites and it will show up on the list of Installed Databases.

When you select 'Restore Database' you will see a slightly different Restore Options screen. If you have only one Installed Database, it will select the most recent backup. The same is true for the last Database you opened. If you click the PICK button in the top right, it will take you to the list of Installed Databases. Click one and it will find the latest backup and put the path on the next line. Click the second PICK button and you can select another backup from the list.

'Install Database' is used to add a database or upgrade a database. In order to do this, you need to place a CBAS 15, CBAS 17, CBAS 19 or CBAS 20 backup in CBAS20\Backups folder. Actually, you can browse to the CBAS20\Backups folder too. When you click Install Database, you will see a different version of Restore Options. Click PICK, browse to the Backups folder and select the Backup file, then Click Restore. CBAS will create all the folders for you.

Clicking 'Remove Database' will take you to the Installed Database list where you can select a Database to remove. You might want to copy the Backup and Graphics folder to another location before completing the remove procedure. CBAS does not remove the files and folders, just renames the [Database Name] to removed\_date\_removed. If you want to permanently remove a DB you would have to use File Explorer and manually delete the directory under sites. If you want to undo the removal of the DB (restore), then use File Explorer and remove the 'removed' string before the database name and next time you start CBAS it will be there.

To upgrade a Database from CBAS 14 or earlier:

- Open the Database in CBAS 14 then close CBAS 14. It is advised that you run Debug to clean up any corruption first and run Verify RDatabase for corruption in Logical Groups.
- Copy the Database folder from CBAS to CBAS 20 and open the Database in CBAS 20.
- Make a Backup and this can be used to "Install" the Database in CBAS 17, 19 or 20.

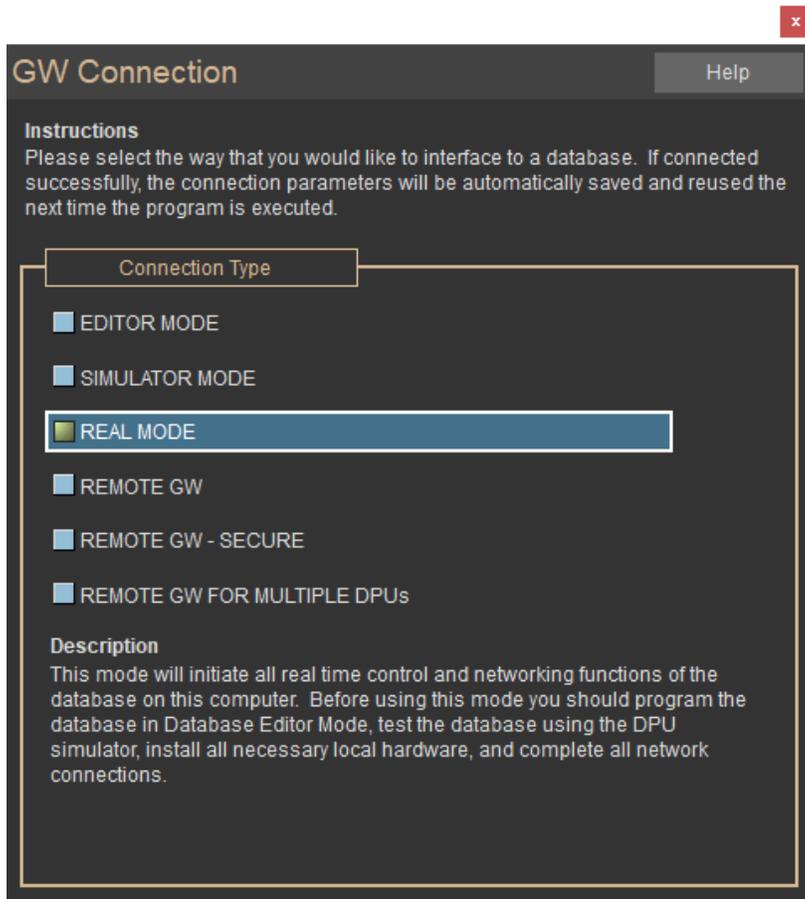
To open a database in legacy version prior to CBAS 17:

If CBAS is not already open, click on the CBAS Editor, CBAS Real, or CBAS Simulator icon on the Windows Desktop. The last database that was opened will open in the mode you selected. If you do not have an icon, go to Start, Programs, CBAS, and CBAS. The database will open in the Mode it was opened in last.

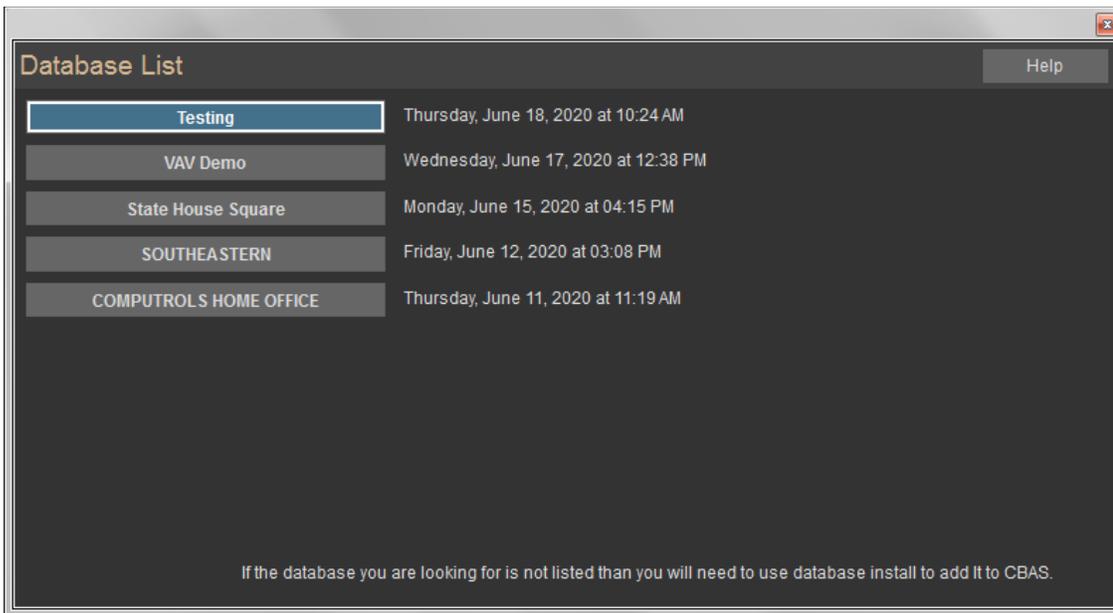
If CBAS is already open, hit ESC until you get to the Main Menu.

- Click System and click Close Database. You will only see Database and System on the Main Menu.
- Click Database and click the mode that you want to open. Starting in CBAS 15, Close Database and other Database functions are located on the Database Menu now available in Real Mode.

The following window will appear after you click Open Database:



- From the connection screen, choose the way you would like to interface with the database – Editor Mode, Simulator Mode, Real Mode, or Remote GW.
- For Editor, Simulator and Real Modes, you will see a Browse for Folder dialog box. Select your database from the tree in the Browse for Folder window. The database folder must be located in the C:\CBAS20 folder (or C:\CBAS 2000 folder, for versions prior to 2.1.0). Do not choose a sub-folder of the database, as those are individual controllers and cannot be opened. Click OK and the database will open in the mode you selected.
- Once the operation mode is selected, the Database List dialogue will appear. This dialogue will allow you to select from all available databases on the DPU.



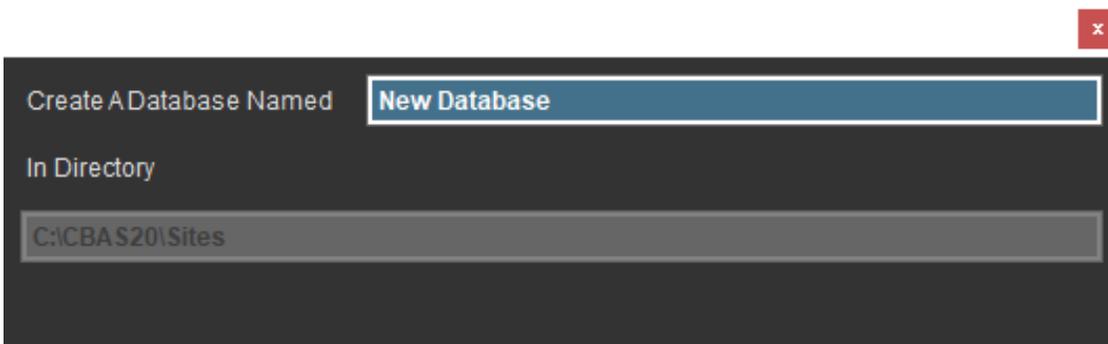
To change modes, simply close the database from the System Menu, and follow the “If CBAS is already open” directions above. Or, simply close CBAS and reopen using the Editor or Real Mode shortcuts.

For instructions on Remote GW Connections, see the Graphic Workstation section.

## Creating a New Database

To create a new database:

- If you have a database open already, click Close Database from the System Menu.
- From the Database menu, click New Database.



- Enter a descriptive name for the database.
- You cannot select a location for the Database because CBAS 20 will place it in CBAS20\Sites.
- Hit Enter and a folder will be created for your new Database.

After a short time, the new database will open in Editor Mode/Hardware View. The only existing channels in the new database will be appropriately named TCP/IP for Workstations Channel and the TCP/IP for Controllers Channel. You can now create Channels, Controllers and Points, in that order. For instructions on Adding Channels, see the Channels section.

For information on opening a database from a backup, see the Backups section.

## Viewing the Database

CBAS provides three ways to view your data: Text View, Hardware View, and Graphics View. Each of these views is unique in the way you look at and manipulate the system, but you can accomplish the same tasks from any view.

To view a database, left-click on the view you prefer from the Main menu.



## Text View

This view contains a list of points sorted and filtered by your specifications. The figure below shows a Text View of all the points measured by a status of ON or OFF.

POINT NAME	VALUE	PRIORITY	CONDITION	POINT NAME	VALUE	PRIORITY	CONDITION
ESB LIGHTING FL3 LED	OFF	Oper		ESB BOILER 2 FLAME 1	OFF		
ESB CHW SYSTEM ENABLE	OFF	Log1		ESB BOILER 2 FLAME 2	OFF		
ESB WEEKLY ROTATION SCHEDULE	OFF	Sch		ESB BOILER 3 FLAME 1	OFF		
ESB FREEZE PROTECTION MODE	OFF	Oper		ESB BOILER 3 FLAME 2	OFF		
ESB PRI CHW PUMP 1 STATUS	OFF			ESB BOILER RM OSA FAN STATUS	OFF	Log1	
ESB PRI CHW PUMP 2 STATUS	OFF			ESB AHU 1 UNOCCUPIED COOL	OFF	Log1	
<b>ESB CHILLER ENABLE</b>	OFF	Log1		ESB AHU 1 UNOCCUPIED HEAT	OFF	Log1	
ESB CHILLER ENABLE FB	OFF	Log1		ESB AHU 1 UNOCCUPIED HUMIDITY	OFF		
ESB SEC CHW PUMP 1 STATUS	OFF	Sch		ESB AHU 1 SCHEDULE	ON	Sch	
ESB SEC CHW PUMP 2 STATUS	OFF			ESB AHU 1 STATUS	OFF		
ESB CDW PUMP 1 STATUS	OFF			ESB AHU 1 RETURN HI RH MODE	OFF	Log1	
ESB CDW PUMP 2 STATUS	OFF			ESB AHU 1 HEAT NEEDED	OFF		
ESB CHILLER RM EXH FAN 1 STATUS	OFF	Log1		ESB AHU 1 COOL NEEDED	OFF		
ESB HEATER 2 FAN STATUS	OFF	Log1		ESB AHU 2 UNOCCUPIED COOL	OFF	Log1	
ESB HEATER 3 FAN STATUS	OFF	Log1		ESB AHU 2 UNOCCUPIED HEAT	OFF	Log1	
ESB TOWER ENABLE	OFF	Log1		ESB AHU 2 UNOCCUPIED HUMIDITY	OFF	Log1	
ESB TOWER FAN STATUS	OFF	Log1		ESB AHU 2 SCHEDULE	ON	Sch	
<b>ESB BOILER SYSTEM</b>	OFF			ESB AHU 2 STATUS	OFF		
ESB HW SYSTEM ENABLE	ON	Log1		ESB AHU 2 RETURN HI RH MODE	OFF	Log1	
ESB HW PUMP 1 STATUS	OFF			ESB AHU 2 HEAT NEEDED	OFF		
ESB HW PUMP 2 STATUS	OFF			ESB AHU 2 COOL NEEDED	OFF		
<b>ESB BOILER SYSTEM ENABLE</b>	OFF	Log1		ESB AHU 3 UNOCCUPIED COOL	OFF	Log1	
ESB BOILER 1 FLAME 1	OFF			ESB AHU 3 UNOCCUPIED HEAT	OFF	Log1	
ESB BOILER 1 FLAME 2	OFF			ESB AHU 3 UNOCCUPIED HUMIDITY	OFF	Log1	

Text View allows you to sort and view a list of points that share a common attribute. When you click Text View, a drop-down menu lets you choose to view All Points in the system, create or edit a logical group, or view a group created by CBAS.

Items in the menu that have a double arrow (>>) beside them display a drop-down menu of sub-groups from which to select:



## All Points

Display every point in the system in the order that the points were added. The points may be repositioned one at a time from the Text View Point Positioning button on any Point Program screen, or from Position Points on the System Menu. (Discussed in the System Menu Section)

## Communication Status

When viewing Points in Text View using Classic CBAS Color Theme, the columns on the right side will be a blue color when Normal Communication is present, and yellow when communication is Lost. Using the new Dark Color Theme, the points will be dark gray when Normal and yellow when lost. Remember, communication to Controllers only occurs when in Real Mode. Also, the same colors are used in Hardware View for Controllers on a Channel and the Points on Controllers.

## Status and Priority

What is Priority in CBAS?

When you look at the list of points, either in Text View or Hardware View, you see the Point Name on the left. To the right of that is the Status of the Point, and to the right of that is the Priority of the Point.

Point Name	Value	Priority	Condition
TOWER MODE	SUMMER		
TOWER SUPPLY LOAD	0.0 %LOAD	PID	
TOWER 1 LOW SPEED	STOP	Log1	
<b>TOWER 1 SPEED CONTROL</b>	30 Hz	Log1	
TOWER 1 SETPOINT	73.0 DEG F	Log1	

Status is either the value that the sensor is sending back, or in the case of an output, whatever the point was commanded to. Priority only applies to outputs, because inputs cannot be commanded.

In the previous picture, Tower Mode has no Priority, so it is either an input or it has been "Autoed" and nothing has commanded it since. When you click an output point and click AUTO, it removes the Priority until something else commands it. That something could be one of many things:

**OPER** means an Operator (someone at the computer) has commanded it. This Priority means it is no longer automated because OPER overrides most Logic and all Schedules.

**SCH** means it was commanded by a Schedule residing on the point. Schedules only evaluate and command once a minute. It doesn't get commanded again if it is already in the scheduled state.

**LOG1** means it was commanded by Logic Level 1 residing on the point or another point. Unless the conditions of the Logic are met, the Point is not commanded and the Priority will remain blank if you Autoed it.

As you can see, some Priorities override others and that's why it's called Priority. To see what overrides what, in CBAS go to Text View, then Priority Summary.

Text View		Hardware View		
All Points				
Logical Groups	>more...			
Alarm Summary				
WireCheck Summary				
Lost Communications				
Unit Summary	>more...			
Binary Status Summary	>more...			
Fire Status Summary	>more...			
Priority Summary	>more...	Lowest Level	1 Sch	Weekly Schedule
Program Summary	>more...		2 Opt	Optimal Start
Disabled Summary	>more...		3 Hol	Holiday Schedule
Future Commands			4 HoO	Holiday Optimal Start
Activity			5 *Sch	Overtime Schedule
			6 *Opt	Overtime Optimal Start
Advanced Filter			7 PID	PID Control
			8 Done	Finished Tuning PID
			9 Tune	Autotune
			10 Log1	Logic 1 Programming
			11 Log2	Logic 2 Programming
			12 WEB	Webserver
			12 Oper	Operator
			12 HH	Hand Held
			13 Log3	Logic 3 Programming
		Highest Level	14 Log4	Logic 4 Programming

Notice that Weekly Schedule is the lowest Priority and everything else can override it. Also notice that a few other schedule type features can override it also, like Optimal Start, Holiday Schedule and Overtime. When these features finish running, they AUTO, allowing the Schedule to take over again.

7, 8 and 9 have to do with PIDs which command Analog Outputs like Chill Water Valves and Dampers. 8 and 9 have to do with Auto-Tuning a PID, which is a feature on the PID Program screen. This is designed to optimize the settings of the PID.

Logic 2 can override Logic 1. The reason for this is if you need to use one Logic for one situation and another to override that Logic in another situation. Once the conditions are no longer met for that second situation, you must write the Logic to AUTO the point so that the lesser Logic can take over again.

Notice that the next three are all Priority Level 12. That means they can override each other because they are equal, and they can override everything else that is a lower Priority. They are all Operator commands from different sources: CBASweb, CBAS and the Handheld Programmer that plugs into a X or LX controller.

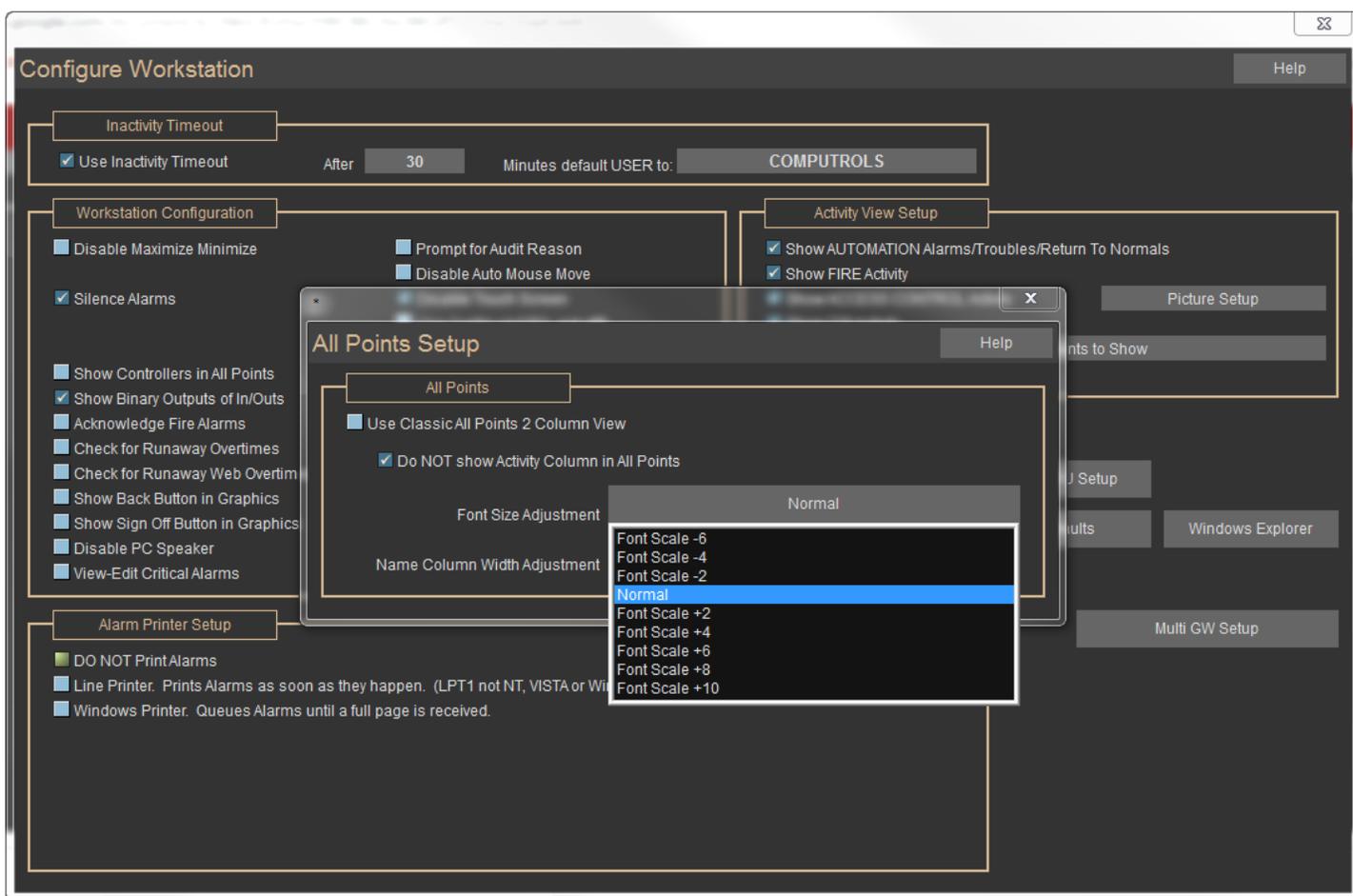
The final thing to understand is that the only Priorities that can override the Operator Priorities are Logic 3 and Logic 4. If you have a critical Point that you don't want an OPER to override, you make your Logic level 3 or 4.

One other thing about Priority Summary is that you can click on these Priorities on the list and see what points are commanded by that Priority. So, if you want to see every point that has been overridden by OPER, click it. It will be mostly Setpoints, but you might find a Valve, Damper or AHU Fan Start Point in that Priority and might need to be "Autoed".

## Scale Text View to Fit More or Less Points

There is a feature that allows you to increase or decrease the size of the Points to fit more or less Points. This was added because building managers now like to put CBAS on a large wall mounted monitor to view in the engineering office. Sometimes the Points are too small and that makes it hard to read. Other times, you might want to fit more Points on the screen.

This feature can be found on the System Menu under Configure Workstation. In the middle left of that screen, click the All Points Setup button. Then click the Font Size Adjustment button.

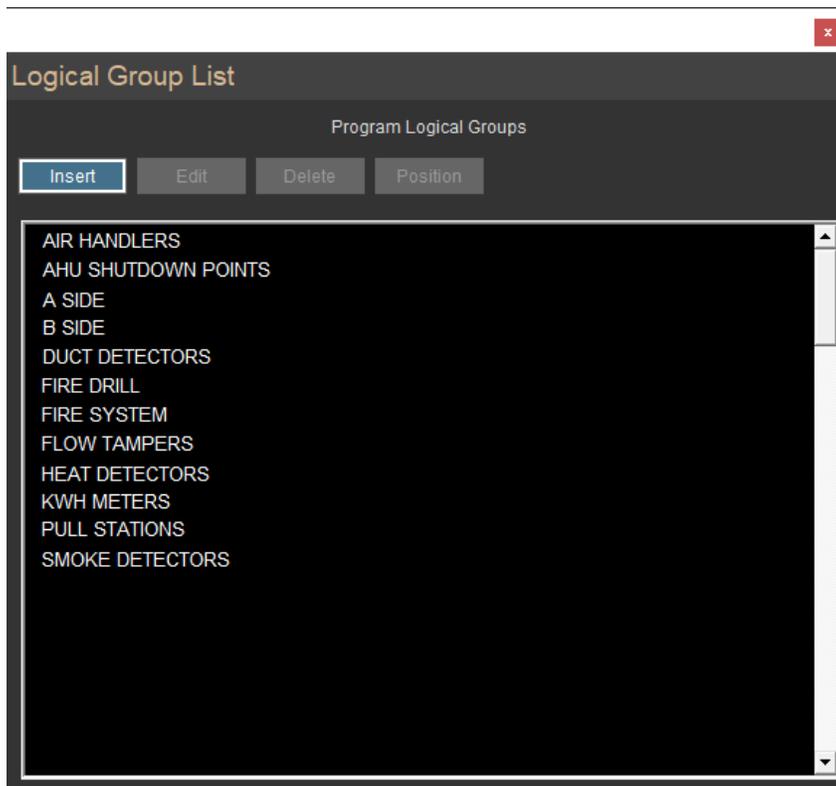


When you click that button, you get a drop-down list of scaling choices. If you choose one of the + choices, the points will be larger and fewer will fit on the screen. If you choose one of the – choices, text will be smaller but more will fit on the page.

Once you make a choice and exit Configure Workstation, a popup will appear telling you to restart CBAS. Do that then check All Points to see if you like it.

## Logical Groups

Create a new group based on whatever criteria you choose, edit or delete an existing group, or view the points in an existing group. To view a group of points, click the group you wish to view. To edit, delete, or add a new group, click Edit Logical Groups on the Logical Groups sub-menu:



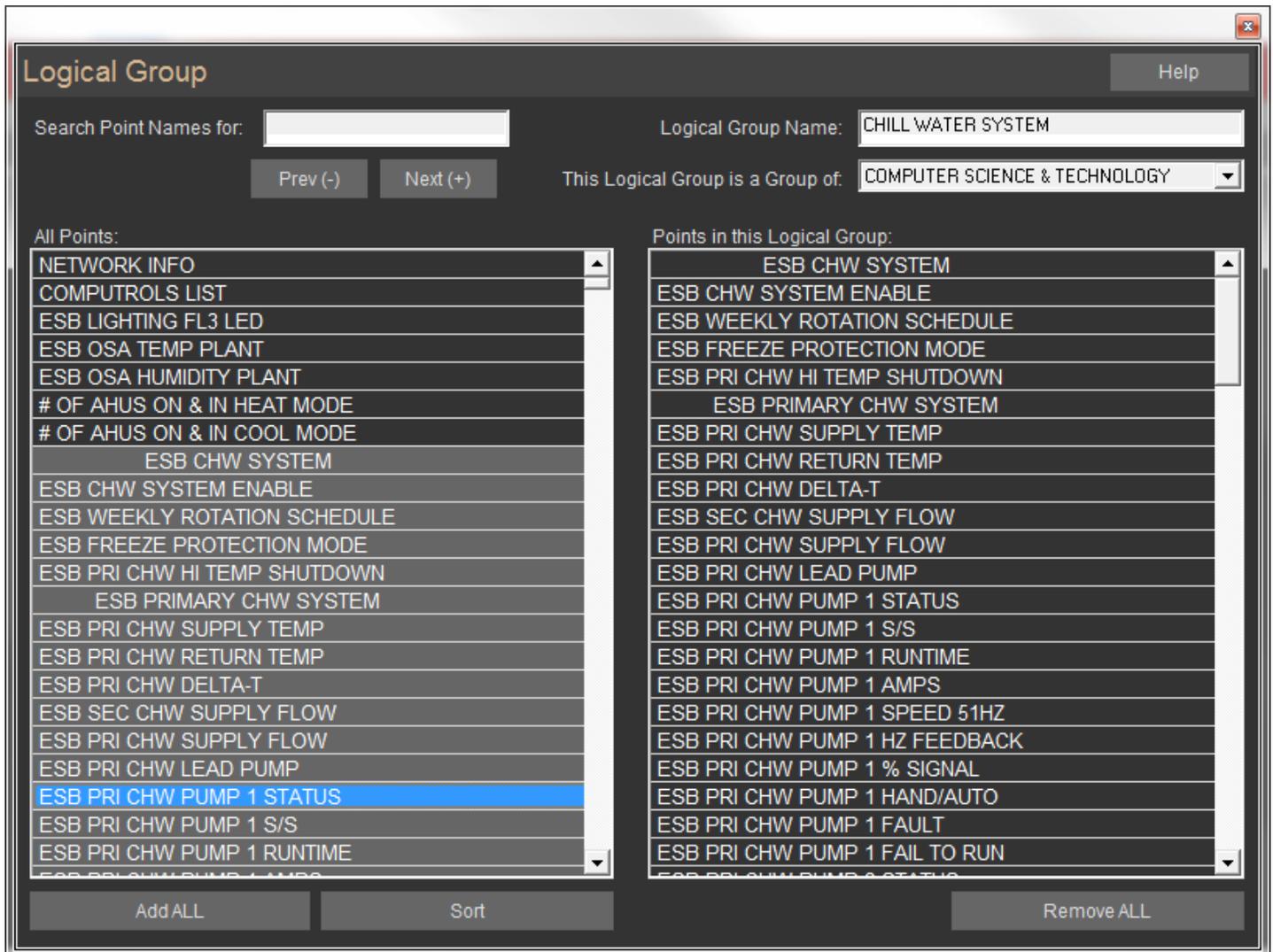
**Insert:** Create a new Logical Group. When you click Insert, a red line and a plus symbol will accompany the cursor. The new group will be positioned in the field below the red line. The new group must be positioned above an existing group.

**Edit:** Modify an existing group.

**Delete:** Remove a group from the Logical group list. Click Delete, then the group you wish to remove.

**Position:** Change the order in which the groups are displayed. Click Position, then the point you wish to move. A red bar will accompany the cursor. Click when the red bar is where you want the group to be positioned.

See the Logical Group Editing screen below:



**Search Point Names For:** Easily Search through the All Points list by typing in any portion of the point name you would like to add to the logic group.

To search down the list, press **(+)** or click **Next (+)**. To search back up the list, press **(-)** or click **Prev (-)**.

**Logical Group Name:** In the top right corner of the Logical Group Editing screen, you can name the group. We recommend naming it based on the common attribute that the points in the group share.

**This Logical Group is a Group of:** Make your new group a subgroup of either the Logical Group Main Menu or your choice of existing groups. Whatever group you select here will have a drop-down menu that includes your new group.

**Note:** *The points that make up the original group can no longer be viewed in the same place.*

The following example should make this clear:

## Logical Groups >> FREE COOLING >> New Logical Group

Where New Logical Group is a sub-group of FREE COOLING, a sub-group of the Logical Groups Main Menu.

*Note: The points that make up FREE COOLING can no longer be viewed as a group.*

**All Points:** From the list on the left side, click the points you would like to add to the group. To remove from the group, click the points again. In the example screen, the three shaded groups are selected.

**Points in this Logical Group:** Lists the points in the logical group you are editing.

**Add All:** Allows you to add all points from the left window to the logical group.

**Sort:** Modify the All Points list to choose from. See Advanced Sort below.

**Remove All:** Clears the Logical Group of all points.

## Pre-set Point Summaries

**Alarm Summary:** Lists all points that are currently in alarm.

**Lost Communications:** Lists all points in the database currently with a lost status.

**Unit Summary:** Lists all points that share the same units of measurement. When you click Units Summary, you can choose from Analog or Binary units. Then select the units by which the points you would like to view are measured.

**Binary Status Summary:** The submenu of this item allows you to view all points with a particular Binary Status, such as ON, Start, Open, etc.

**Priority Summary:** Lists all possible ways by which a point can be commanded. (Schedule, Logic, etc.) The prioritized command options are listed from lowest to highest. If a point is commanded by two or more different priorities, the highest priority will command the point. Click on a menu item to see a list of all points being commanded by that particular priority.

**Program Summary:** Lists all points that share the same Programming options from the Point Program screen. For example, all points with alarms can be viewed by clicking on the Alarm submenu item.

**Disabled Summary:** Submenu items list all points that share the same Programming options from the Point Program screen when those programs are disabled.

**Attributes:** A way of commanding groups of points to the same value. Covered in the Advanced Programming section.

**Activity:** Developed for showing live Access Control activity, like cards used and door alarms. Can also be configured to show other types of alarms and activity by going to System, Configure Workstation, Activity View Setup.

**Advanced Sort:** This window appears when you click the Sort button. It allows you to narrow a search based on specific sort criteria.

## Additional Text View Tools

There are some other tools for organizing and grouping points.

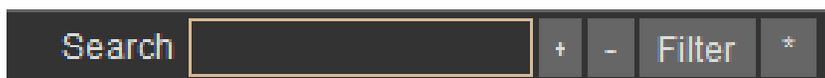
**F3:** In Text View, you can add bold lines between points by highlighting a point and pressing the F3 function key. This will add a bold line above the point. Press F3 again to remove the line. This feature is good for creating groupings of related points.

**F4:** You can bold the name of a particular point by highlighting it and pressing F4. Press F4 again to return to normal font.

**Search:** At any time, you can search for a point by typing the name or a portion of it and pressing the (+) key to search down the list, and the (-) key to search back up the list. Starting in CBAS 15.2, there is a Filter button that, when clicked, shows you only the points with names that contain what you typed.

## Searching the List

In the top left of All Points is a search field and some buttons:



Just type part of the name of the point or points you are looking for, then click one of the buttons to the right.

+ takes you down the list and finds the first example.

- takes you back up the list.

**Fltr** gives you all examples of the string in its own list.

\* deletes what you have typed in the field. Otherwise you can back space.

# Hardware View

Hardware View uses an expandable tree diagram to represent the automation hardware of the system. Unlike the Text View, this starts from the DPU to the channels, to the controllers, to the points. To expand a tree, click the channel name:

Channels in SOUTHEASTERN						
Channel Name	Channel Type	Bytes/Sec	Scan Rate	Online	Offline	Off Scan
Workstation Channel	TCP/IP for Workstations	---	---	10	2	---
Controller Channel	TCP/IP for Controllers	---	---	9	0	0
VAWS 8-1 to 8-27	BASNet 485 over TCP/IP	---	---	26	0	0
VAWS 9-1 TO 9-18 ,46,47	BASNet 485 over TCP/IP	---	---	20	0	0
VAWS 9-19 TO 9-45	BASNet 485 over TCP/IP	---	---	27	0	0
CST PLANT BACNET IP	BACnet TCP/IP	---	---	1	0	0
TEST	TCP/IP for Controllers	---	---	0	0	0
Add A Channel						
Software points in DPU						
NETWORK INFO	Binary Input	Software				
COMPUTROLS LIST	Binary Input	Software				
CTS Total Gas Consumption	Analog Input	Software	1828105 CUF			
Add A Software Point in DPU						

Hardware View is a way of looking at the database logically or topographically. First, you see the channels connected to the computer. As you go deeper, you see the controllers connected to each channel. By looking into the controllers, you see the points. Any Channel, Controller, or Point can be completely configured in Hardware View.

Below the Channels, you can see a list of Points added to the “DPU”. In other words, they are Points that do not reside in a Controller, but stay in the CBAS Database on the server running CBAS. Some Points cannot be added to Controllers, like System Points, and others are just best not being in the Controller.

## Channel View

When you click on Hardware View, the first view you see is a list of channels. At the top of the channel list you will see “List of Channels in (Database Name).” Each line lists the channel name, channel type and lists how many controllers are online, offline, and off scan. Some communication statistics are also shown. See the previous figure.

The first channel listed is “TCP/IP for Workstations” channel, which contains a list of Graphic Workstations (GW) which share the database on the DPU. This channel is actually the same channel as the TCP/IP Channel containing controllers, but is provided as a convenience to separate controllers from workstations.

If you click on this channel and click Program, you will see the IP Address of the Channel. This is actually the IP Address of the network card in the computer and is configured automatically when the database is created. If the IP Address needs to be changed, it can be changed here. In later versions, there are places for 2 IP addresses. The second IP would be for a Secondary DPU, which is a redundancy feature that will be covered in Advanced Programming.

There are other things on the Workstation Channel, such as:

String Servers which allow CBASweb to connect and share the CBAS Database. In Editor Mode you will see 12 String Servers because one is required for each time someone connects to CBASweb. You will only see one in Real Mode.

VAV-B Commission is the link between CBAS and the VAV-B Utility program when you click a VAV-B in Hardware View.

Critical Alarm Terminal is a special type of GW that works with the Critical Alarm feature to make sure that engineers are addressing Alarms.

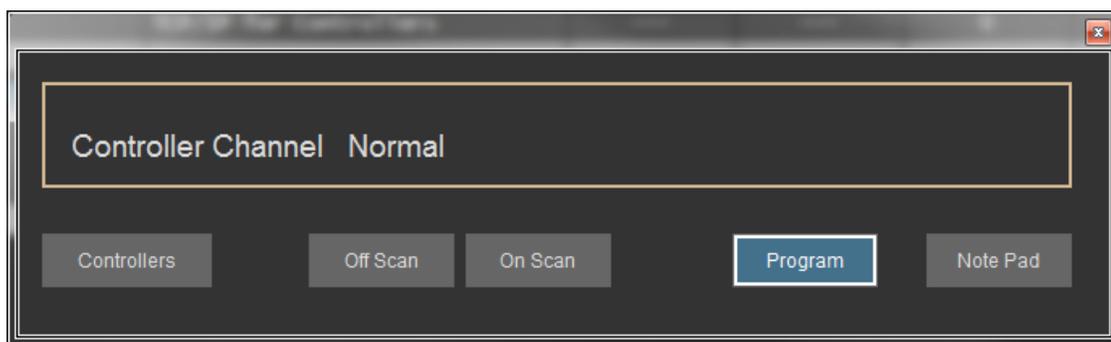
DDCC give CBAS a connection to the program that applies firmware changes to X and LX controllers.

GW Secure and Cloud Interface are features that will be included in future versions.

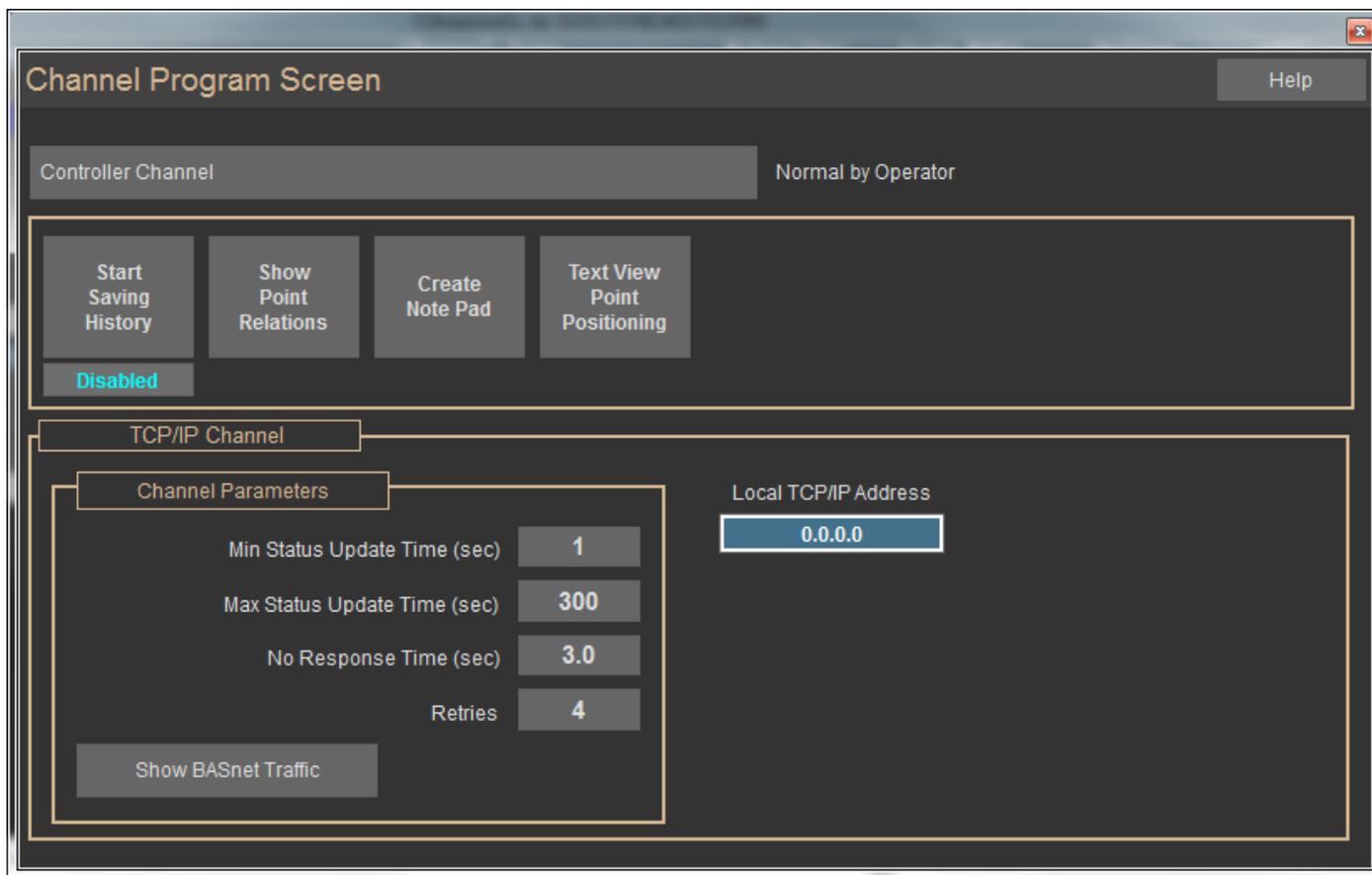
If you click on the TCP/IP for Workstations Channel and click Controllers, you will see the list of Workstations. You will notice that Local GW is always online because it is the Graphical Interface of the DPU, not a Remote Workstation. A new Workstation can be added here by clicking the last line, Add a GW/ String Server. Right click or press ESC to return to Channel View.

BASnet TCP/IP, BASnet RS-485 over TCP/IP, BASnet, and Opto channels are listed in Channel View and can be added by clicking on the bottom line of the list, Add a Channel. To learn how to create channels see the Channels section.

Click the Channel then Controllers to see the Controllers programmed on the Channel. Clicking a Channel will also bring up a window that allows you to take the entire channel Off Scan, put it On Scan, and Program the channel. Off Scan disables communications with all of the controllers on the channel. On Scan enables communications with the controllers on the channel.



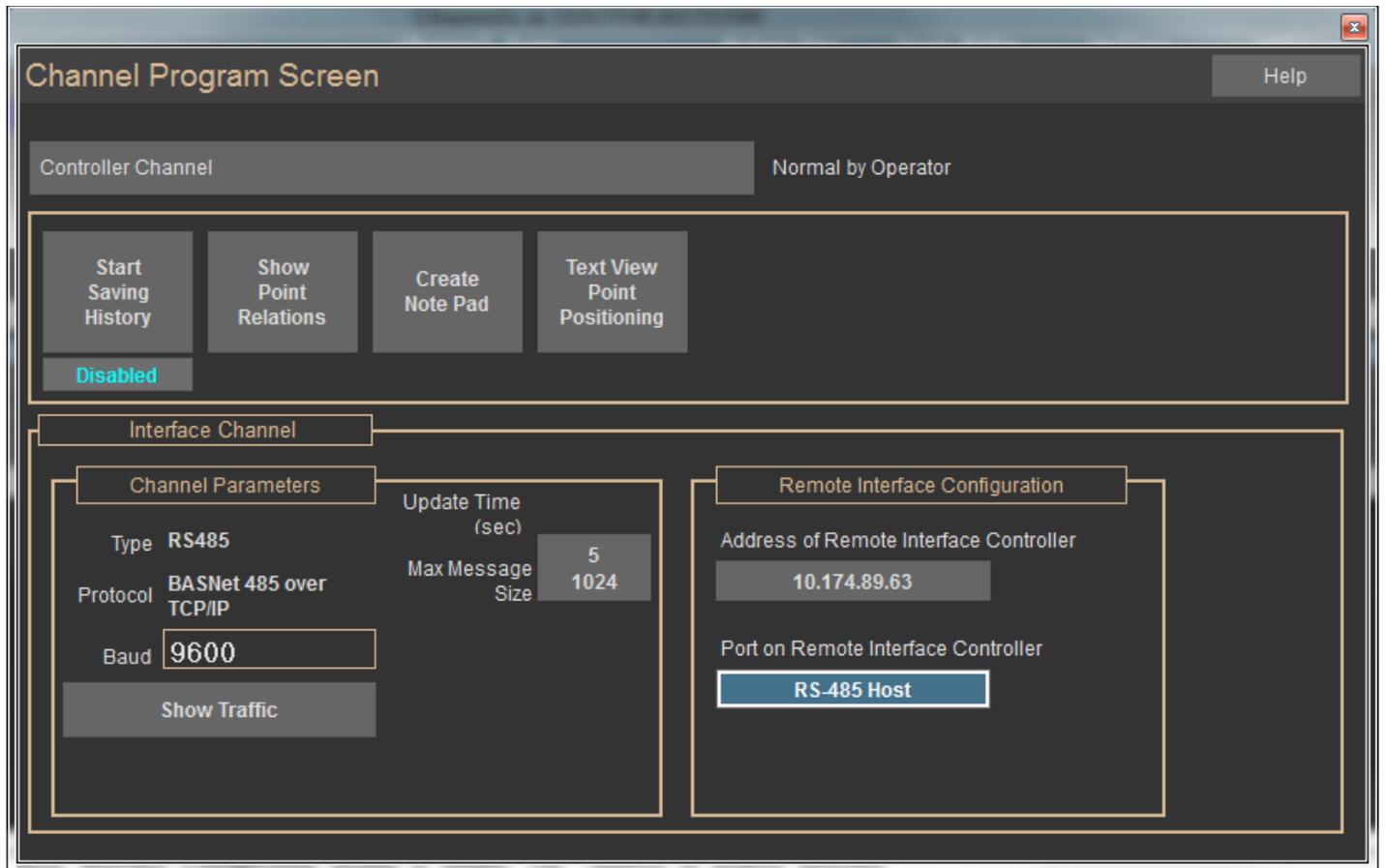
When you click on the Program button, you will see the Channel Program Screen below, which is an example of a Channel Program screen for a BASnet TCP/IP channel:



Here, you can view or change the IP Address and other parameters of the channel. It is recommended that the default parameters not be changed unless recommended by Computrols Technical Support. By clicking Show BASnet Traffic, you can view information about the packets going back and forth on the channel when in Real Mode. By clicking on the name of the Channel, in this case IP Test Channel, you can change the name of the channel.

**Note:** To view packets of data, you must be in Real Mode with the channel in "On Scan" mode.

From the Channel Program screen, click a BASnet RS-485 over TCP/IP channel, then the Program button to bring up the window below. This type of channel uses RS-485 communication on a channel hosted by a controller residing on a TCP/IP Channel. A TCP/IP controller can host two of these channels using the Host Channel and the Secondary Channel.

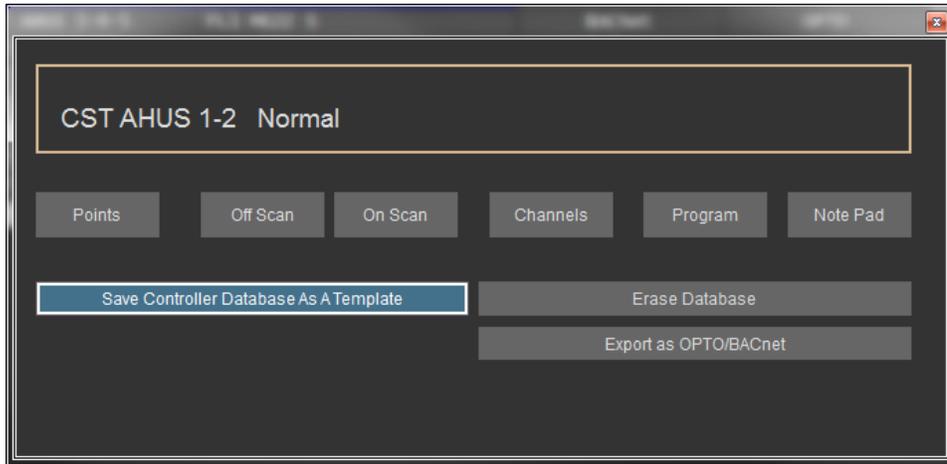


You can do many of the same things on this type of channel that you can do on the TCP/IP Channel; however, the Remote Interface Configuration section is unique. The “Address of Remote Interface Controller” is the actual IP Address of the controller that is hosting the channel. The “Port of Remote Interface Controller” can be either RS-485 Host or RS-485 Secondary.

To learn how to create channels go to: Channels

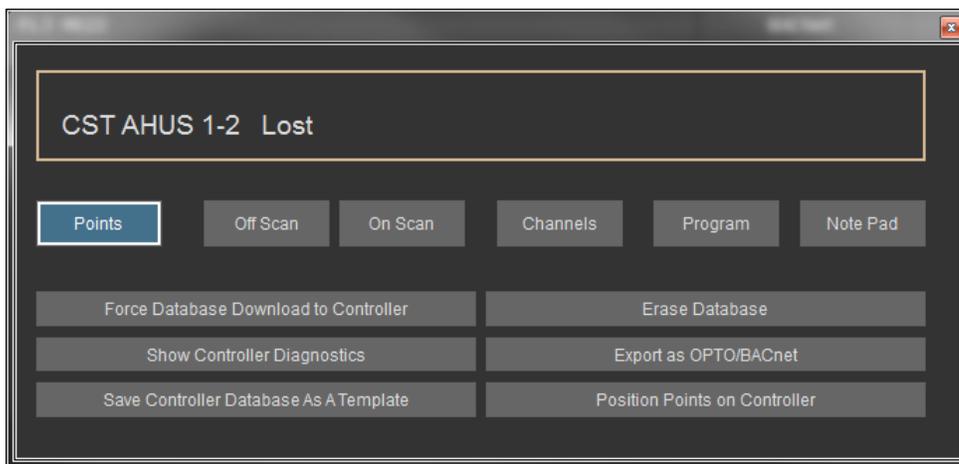
## Controller View

To view controllers on a particular channel, click the channel and then click Controllers. You will see a list that shows the address, controller type, controller name, and communication status. Communication status will either be Lost (Yellow), Normal (Blue), Scan Off (Gray), and Alarm (Red) when viewing in Classic Color Theme. When viewing the new Dark Color Theme, then colors will be Lost (Yellow), Normal (Dark Gray), Scan Off (Yellow), and Alarm (Red). Click on a controller to see the following window:



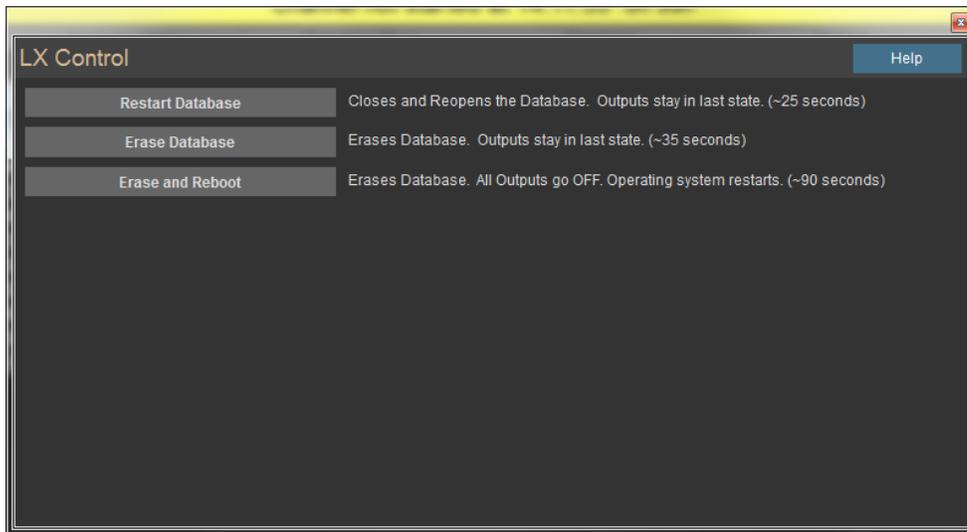
From here you can take the controller off scan and put it back on scan. From the Channels button, you can view the channels on the controller and add RS-485 channels. If you are planning on adding other controllers with the same points, you can Save Controller as a Template. Templates are fully explained in Chapter 3, Section 3, Templates.

Click Note Pad if you want to write down some information about this particular controller. In Real Mode, you will see a few more choices. See below:



When changes are made to a controller's database, the new database should download to it automatically. If you have made changes to a controller's database and you are not sure if it has downloaded to the controller, you can click "Force Database Download to Controller." "Erase Database" will do the same thing, because a controller with no database will always download automatically. However, when you select the erase the

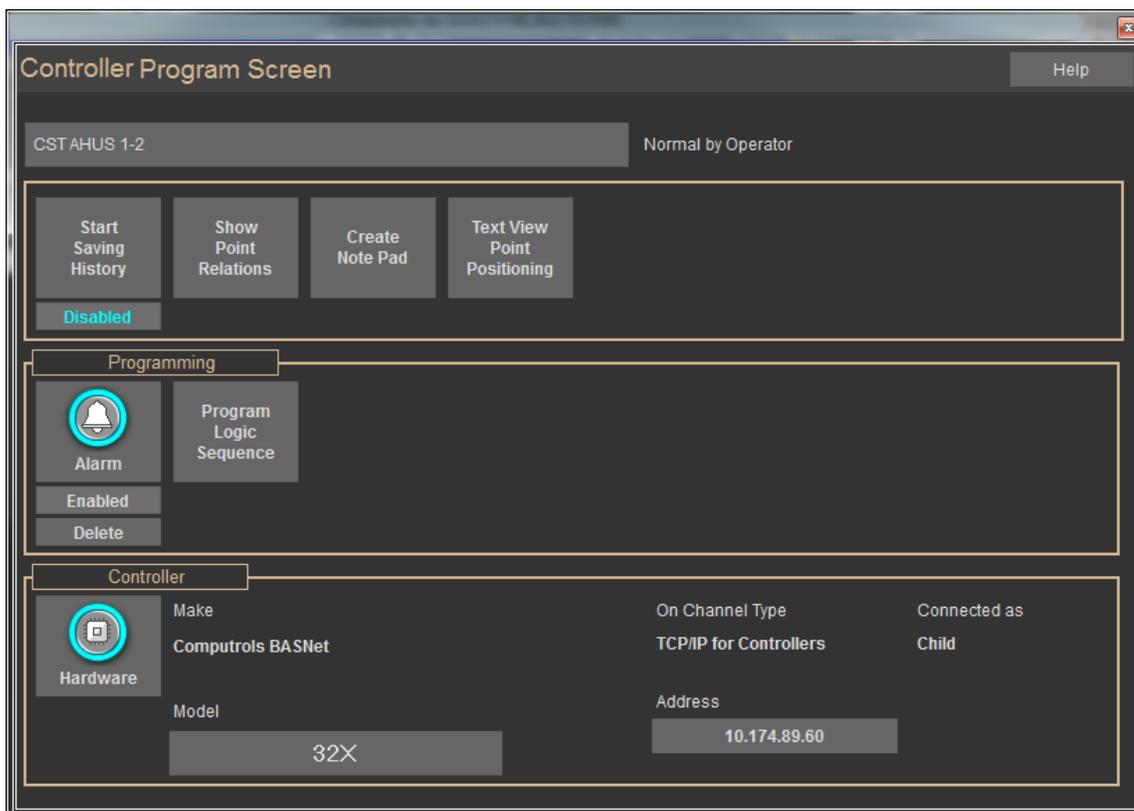
database on the controller, it will give you three options from which to choose.



Click "Show Controller Diagnostics" to see a screen listing diagnostic information on the controller.

Controller Diagnostics can be a useful tool for troubleshooting problems with the following controllers: 8X, 16X, 32X, 64X, 8LX, 16LX, 32LX, 64LX, VAV-B, UNI-B and VAVs. This feature will be explained further in the Troubleshooting chapter.

Click the Program button to get the following window:



From the Controller Program Screen, you can change the name of the Controller, change the address, view some information about the controller, and setup an Alarm that will go off if communication to the controller

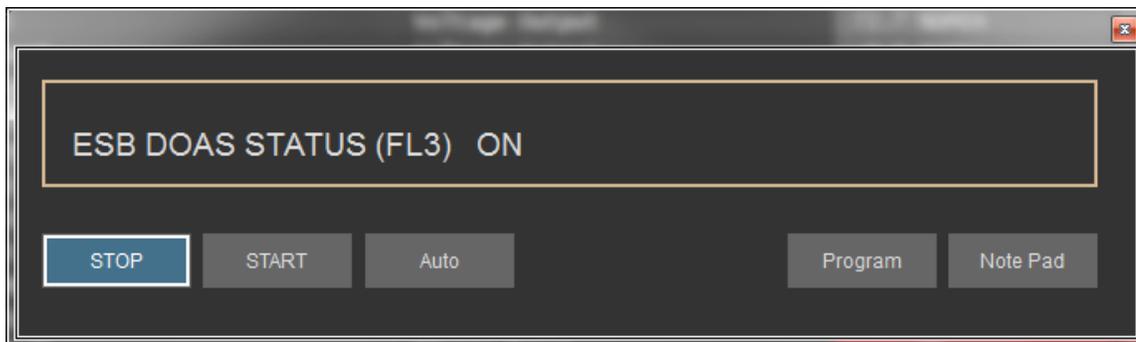
is lost.

## Points View

To view the Points on a particular Controller, Click the Controller then click Points. The points are listed in order of physical position on the controller, with Software points below Hardware points.

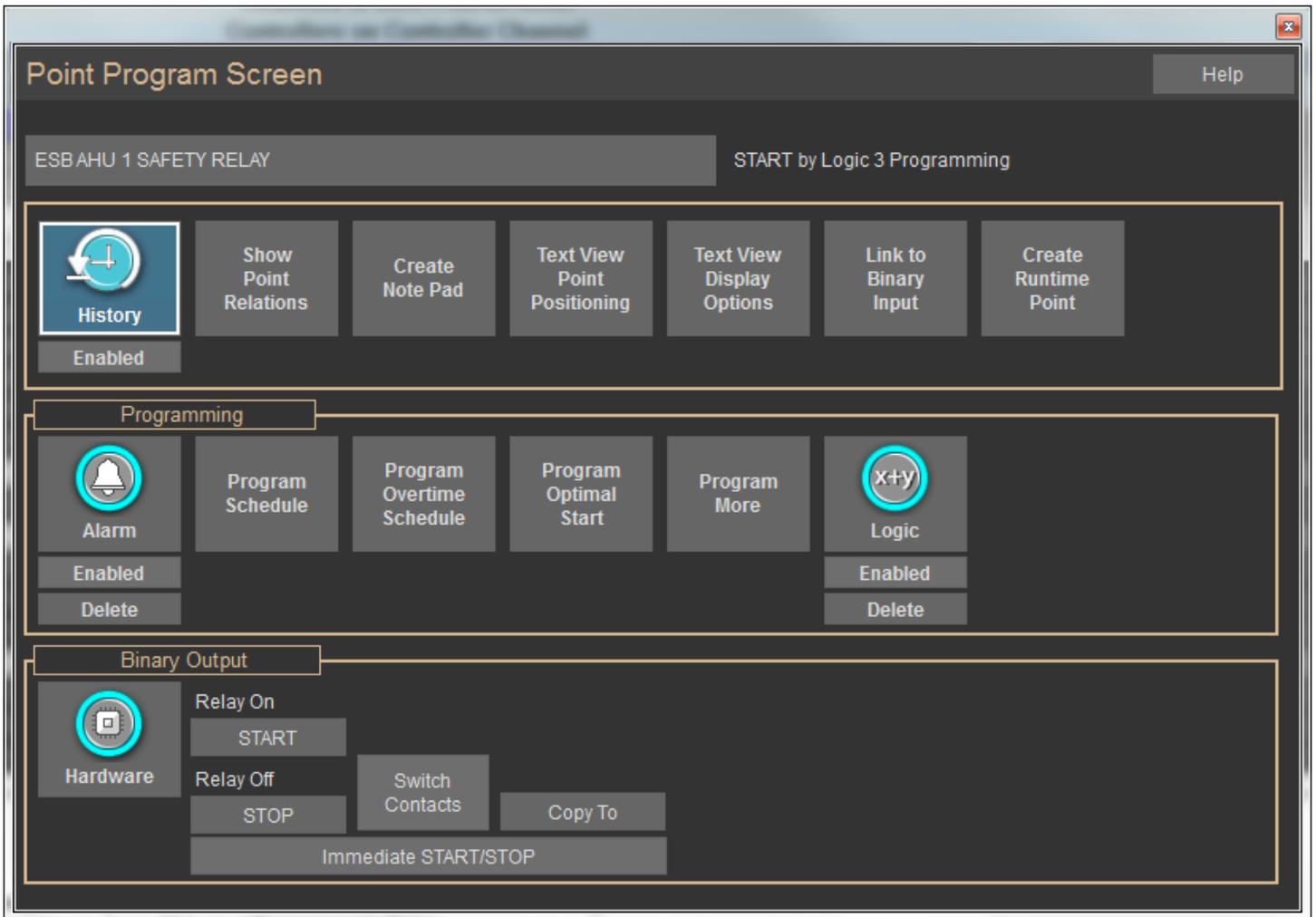
Position	Point Name	Configuration	Status
Point 1	ESB AHU 1 SAFETY RELAY	Binary Output	START
Point 2	ESB AHU 1 AMPS	Voltage Input	0.0 AMPS
Point 3	ESB AHU 1 DRAIN PAN FLOAT	Binary Input	NORMAL
Point 4	Add A Point		
Point 5	ESB AHU 1 SUPPLY TEMP	Deg F (10K) Input	74.2 DEG F
Point 6	ESB AHU 1 RETURN TEMP	Deg F (10K) Input	73.4 DEG F
Point 7	ESB AHU 1 RETURN CO2	Voltage Input	346 PPM-CO
Point 8	ESB AHU 1 OSA CFM	Voltage Input	0 CFM
Point 9	ESB AHU 1 CHW VALVE	Voltage Output	0.0 %OPEN
Point 10	ESB AHU 1 RETURN HUMIDITY	Voltage Input	38.1 %RH
Point 11	ESB AHU 1 REHEAT VALVE	Voltage Output	0.0 %OPEN
Point 12	Add A Point		
Point 13	ESB AHU 1 OSA DAMPER	Binary Output	CLOSE
Point 14	Add A Point		
Point 15	ESB AHU 2 SAFETY RELAY	Binary Output	START
Point 16	ESB AHU 2 AMPS	Voltage Input	0.0 AMPS
Point 17	ESB AHU 2 DRAIN PAN FLOAT	Binary Input	NORMAL
Point 18	Add A Point		
Point 19	ESB AHU 2 SUPPLY TEMP	Deg F (10K) Input	69.5 DEG F
Point 20	ESB AHU 2 RETURN TEMP	Deg F (10K) Input	69.4 DEG F
Point 21	ESB AHU 2 RETURN CO2	Voltage Input	458 PPM
Point 22	ESB AHU 2 SUPPLY CFM	Voltage Input	4 CFM
Point 23	ESB AHU 2 CHW VALVE	Voltage Output	0.0 %OPEN
Point 24	ESB AHU 2 RETURN HUMIDITY	Voltage Input	50.8 %RH
Point 25	ESB AHU 2 REHEAT VALVE	Voltage Output	0.0 %OPEN
Point 26	ESB AHU 2 PREHEAT TEMP	Deg F (10K) Input	68.0 DEG F
Point 27	ESB AHU 2 PREHEAT VALVE	Voltage Output	0.0 %OPEN
Point 28	ESB AHU 2 OSA DAMPER	Binary Output	CLOSE
Point 29	Add A Point		
Point 30	Add A Point		
Point 31	ESB AHU 1 MIX TEMP	Deg F (10K) Input	73.6 DEG F
Point 32	ESB AHU 2 RETURN CFM	Voltage Input	0 CFM
Software	ESB AHU 1 STATUS	Binary Input	OFF

Each point listing shows the position, point name, configuration, and status. The Status column shows the current value in units specified in configuration, as well as how the point was commanded, also known as Priority. Priorities include “OPER” for Operator, “HH” for Handheld, “SCHED” for Schedule, “PID” for PID and “LOG1” for Logic. (There are 4 levels of Logic that can command a point) Click a Binary Output point to see the following window:



The window shows the point name and status. Click Stop to turn off and Start to turn on. The Status column in Points View will show Stop and OPER if you click STOP. Click Auto and the point can be commanded either by Logic, Schedule, PID, etc., depending on how it is programmed. The Status column will then reflect how it was commanded.

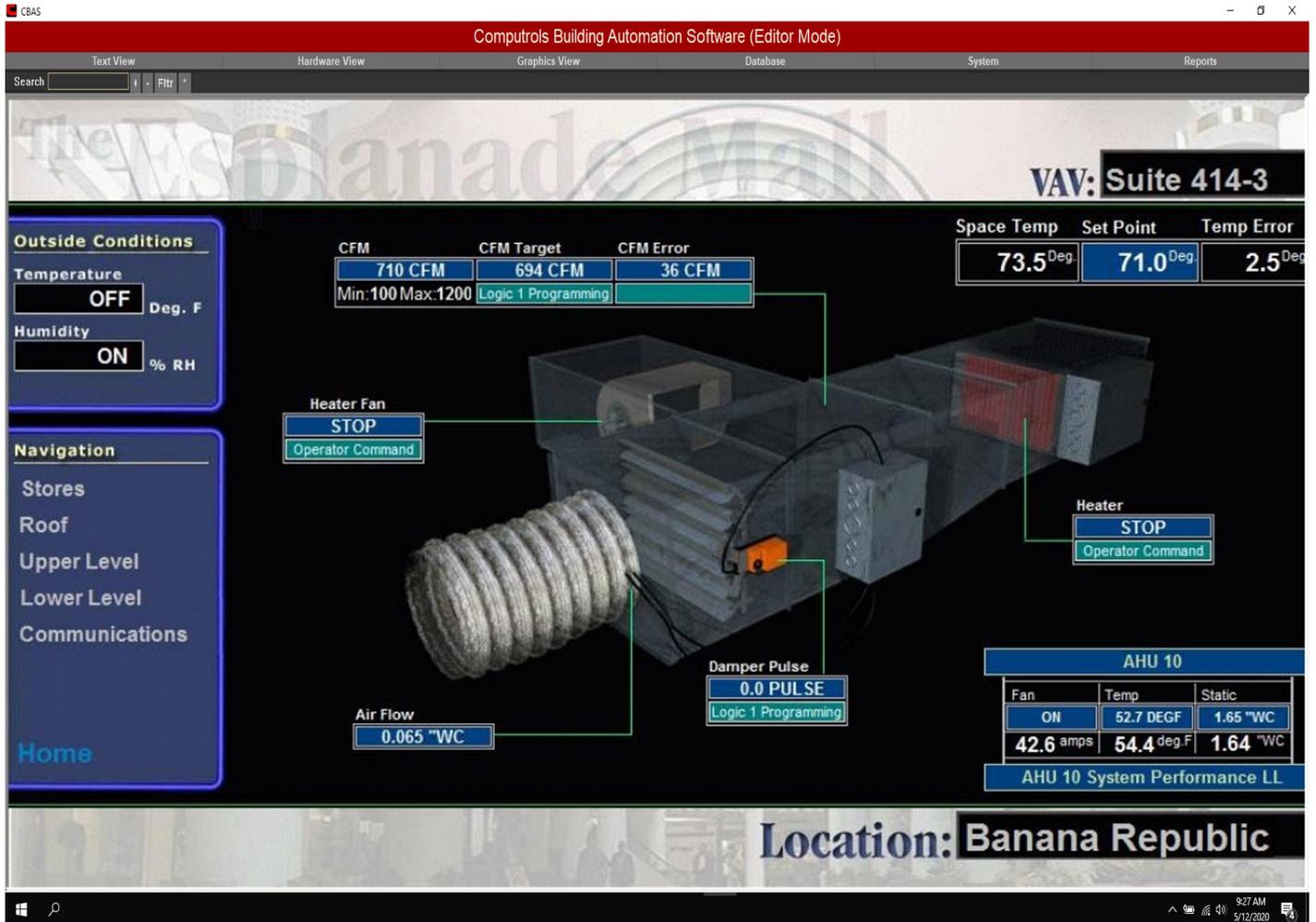
Click the Program button to see the following window:



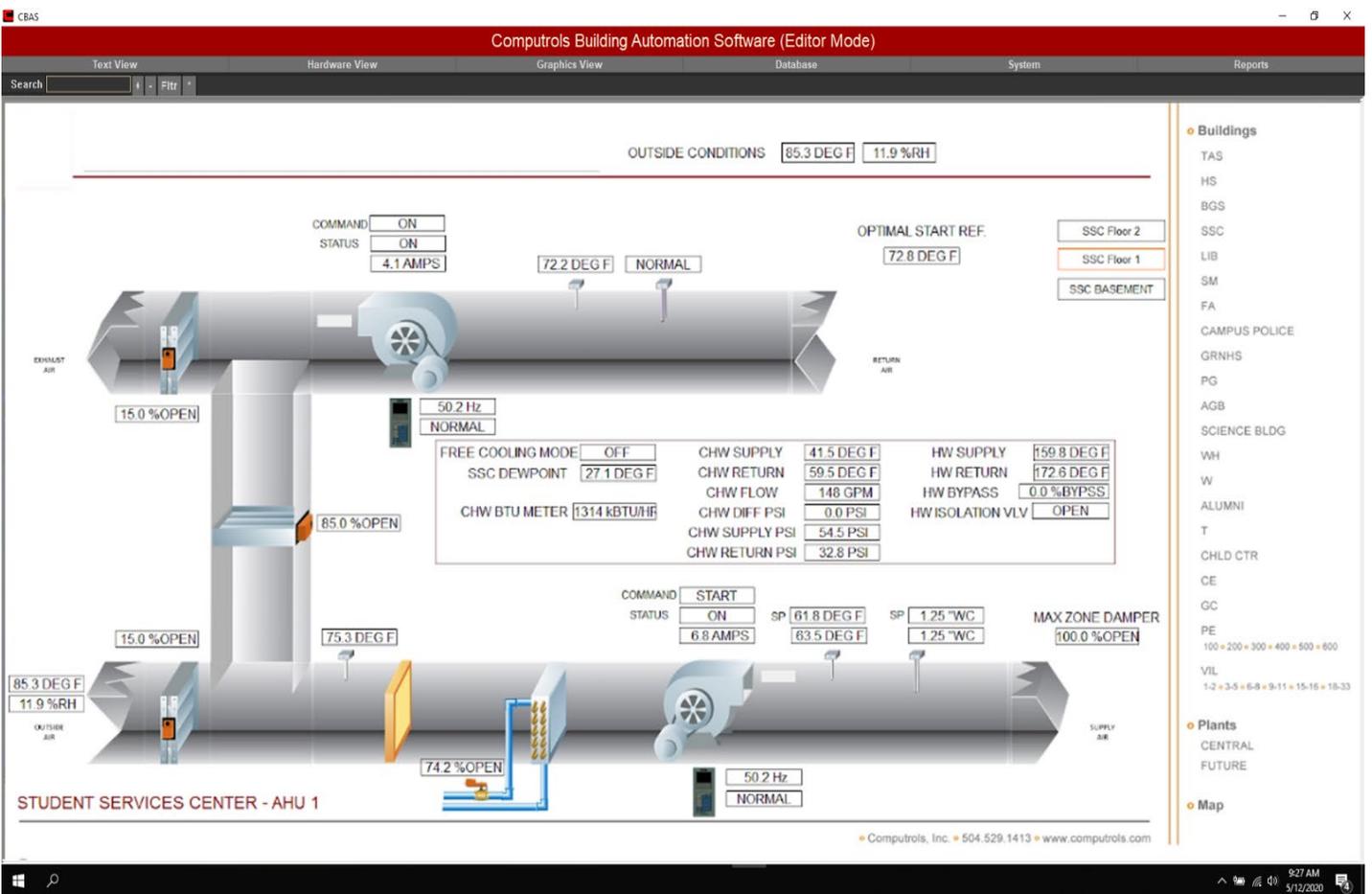
In the above example, the point may be commanded by either Schedule or Logic. For information on the Point Programming Screen, go to Chapter 4 Programming Points.

# Graphics View

This view depicts a graphical representation of your building’s equipment. From this view, you can navigate from a floor to the equipment on the floor, to the controllers, and eventually to individual points. Below is an example of a VAV controller.



Using the Graphics View presents an infinite array of possibilities for both navigating and displaying any building’s database. With the aid of the built-in CBAS Graphics Editor, any user can easily create a thorough yet simple-to-use graphical user interface (GUI). The graphics editor allows you to import graphic files (BMP or JPG) to use as backgrounds. Over these backgrounds can be displayed any of a number of different attributes of any point in the system’s database. The editor offers most of the features found in today’s more popular object-oriented editing software. Menu items such as global edit objects, layering and “hot keys” make editing your graphics in CBAS simple from the start.



**Main:** Before any graphics have been programmed, the system will default to a blank graphic titled Main. The name assigned to the first graphic created will then replace the title “Main.” Usually this first graphic is used as the Graphics View home page. As you will read later, graphics can be repositioned allowing you to make any graphic the first or Main graphic.

**Select Graphic:** This option allows you to select from and view each of the graphics in the current database whose “Hidden” checkbox has not been checked. If no graphics have yet been added to the current database, the Select Graphic sub-menu will be empty. If there have been graphics created for the database, the Select Graphic sub-menu will list those graphics in the order in which they were created, unless otherwise re-ordered through Position Graphics described in Chapter 3, Section 5.

In order to select a graphic from the list, simply click its name. The selected graphic will then be displayed in the active view area.

## Graphics Library

Each CBAS software installation comes with a Graphics Library, which is provided for your convenience and can be accessed through Windows Explorer. The 3-D VAV in the previous graphic is an example of what is in the Graphics Library. Pictures are sorted into folders by type, such as Air Handling units, VAVs, Central Plant. These pictures can be used as backgrounds for graphics pages in your database, and cover most types of equipment in use today. They can be changed using any graphics program. Custom graphics can also be obtained from Computrols for a fee.

To access the Graphics Library from Windows Explorer, go to C:\CBAS\Graphics Library. The first time you access this folder the contents will have to be unzipped by clicking on GraphicsLibrarySetup.exe

At any time while in Graphics View, you can enter Program Graphics Mode by pressing CTRL+E. Programming Graphics is covered in Chapter 3, Section 5, Program Graphics.

## Visio BAS Graphics

Below is an example of an RTU created in Microsoft Visio using the “shapes” developed by Computrols. Dealers can obtain these shape stencils and create their own 3-D graphic representations of AHU schematics and central plant piping.

# Chapter 3 » Programming Databases

## Channels

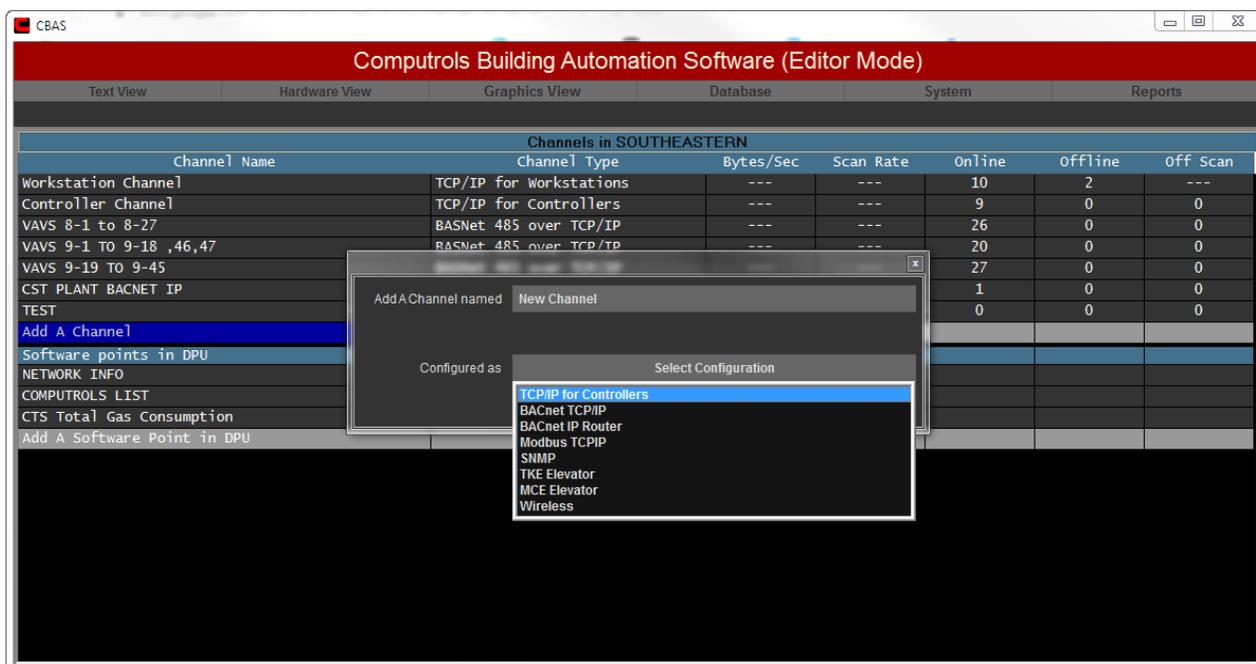
### Adding a Channel

A Channel is the communication link between the controller and the head-end PC or DPU. They are often called “trunks” in the building automation industry. A Cat-5 cable is connected from a Network Card or twisted pair is connected from a “Host Controller”. Generally, only one Network Card and TCP/IP Channel will be needed for TCP/IP controllers, as each channel can host up to 252 controllers. To add more than 252 IP Controllers, add a second channel. For instructions on how to configure networking in Windows to facilitate 2 TCP/IP Channels, call Computrols Technical Support.

**Note:** Adding Channels, Controllers, and Points must be done from Editor Mode.

To add a channel from Hardware View:

- From Channel View, click the last line, “Add a Channel”.
- In the dialogue box that appears, click on the Channel name field and type a name for the channel. The name should be descriptive of the location of the controller hosting the channel, similar to the image below. It can be up to 32 characters long.
- Hit Enter and select a configuration from the following list:



- BASnet TCP/IP for Computrols controllers

- BACnet TCP/IP for 3rd Party BACnet controllers
- BACnet IP Router for connecting to BACnet Routers that bridge to other protocols
- Modbus TCP/IP to 3rd Party Meters mainly
- Simple Network Management Protocol to datacenter PDU, UPS mainly
- Thyssenkrupp elevator destination system
- Mitsubishi elevator destination system
- Hit Enter and Enter again or click the “Add Channel Now!” button.

## Adding a BASnet RS-485 over TCP/IP Channel

In order to add a BASnet RS-485 over TCP/IP channel, you must first add a host controller to the TCP/IP Channel. Each controller on the TCP/IP for Controllers Channel can host 2 RS-485 channels. See the next section for instructions to add a controller. Once you have added the controller that will host the BASnet RS-485 channel, follow the steps below:

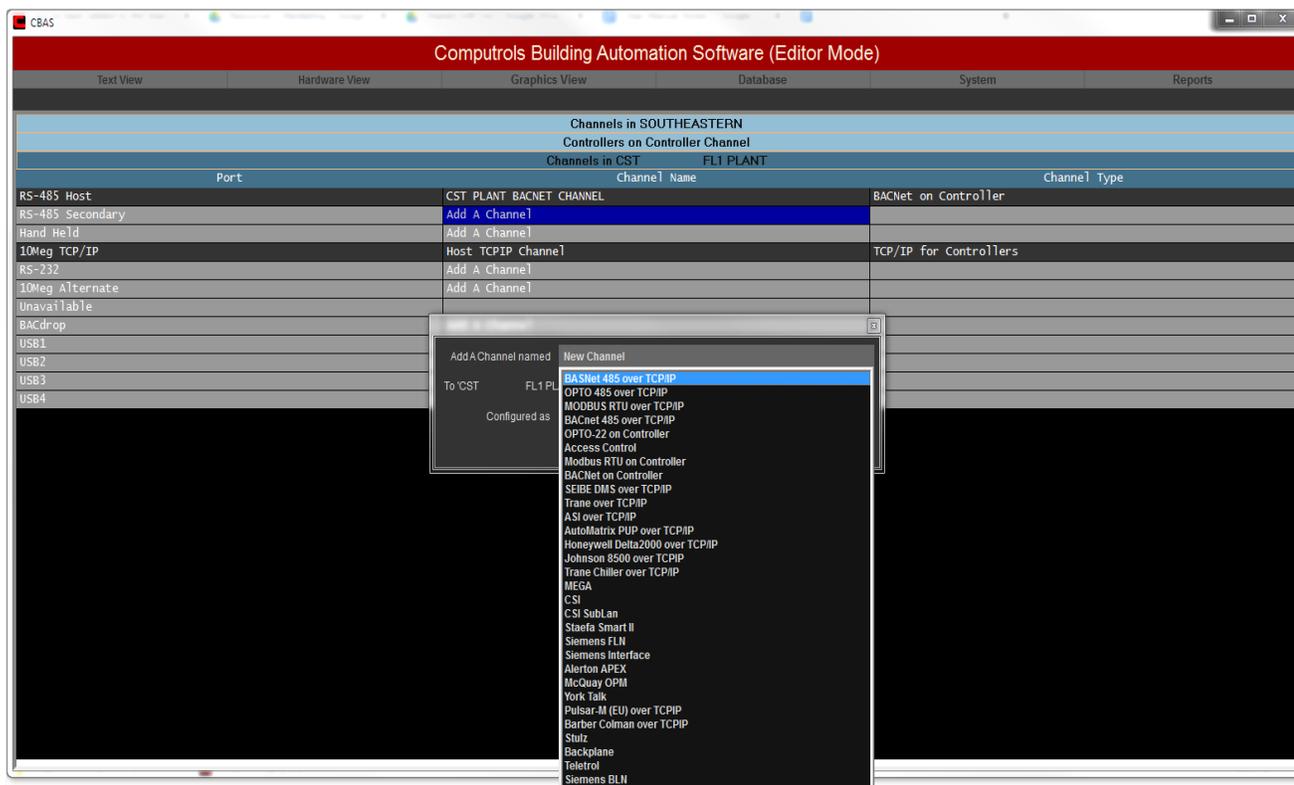
- In Hardware View, go to the TCP/IP for Controllers Channel and locate the controller that will host the RS-485 channel.
- Click the controller and click Channels. Refer to the figure below.
- Click “Add a Channel” on either the RS-485 Host or RS-485 Secondary line.
- Give the new channel a name that describes its location.
- Under Select Configuration, choose BASnet RS-485 over TCP/IP. Notice that there are many choices here. The others are interfaces to other manufacturers’ equipment, which require an add-on license to be purchased.
- Click “Add Point Now!”
- Press ESC and you will now see the channel listed in Channel View.

BACnet TCP/IP for 3rd Party BACnet controllers

BACnet IP Router for connecting to BACnet Routers that bridge to other protocols

Modbus TCP/IP to 3rd Party meters mainly

Simple Network Management Protocol to datacenter PDU, UPS mainly Thyssenkrupp elevator destination system



### 3rd Party and “on Controller” Channels

As you can see above, there are many different RS485 channel types available in CBAS which are mostly “interface” channels that just pass data back and forth to the DPU. The channel types with “on Controller” contain the child controller points in the Host Controller’s database and the Host acts as a DPU itself.

**Note:** When making database changes, always do a Backup first.

### Removing a Channel

**Note:** In order to remove a channel, you must be in Editor Mode.

- From the Main menu, click Database and click Remove a Channel.
  - Or, if you are removing an “On Controller” channel, choose Remove a Channel On A Controller.
- From the list that appears, select the channel you want to delete.
  - When removing a Channel On A Controller, you must first choose the TCP/IP for Controllers channel, then the controller that hosts the channel.

- Host Controllers can contain 2 Channels, so select the one you want to remove.
- You will be asked twice if you are sure you want to delete the channel. If you are sure, answer Yes. You will no longer see the channel in Hardware view.

**Note:** The only way to get the removed channel back is to restore a backup of the database.

## Controllers

### Adding a Controller

**Note:** Adding Channels, Controllers, and Points must be done in Editor Mode.

To add a controller from Hardware View:

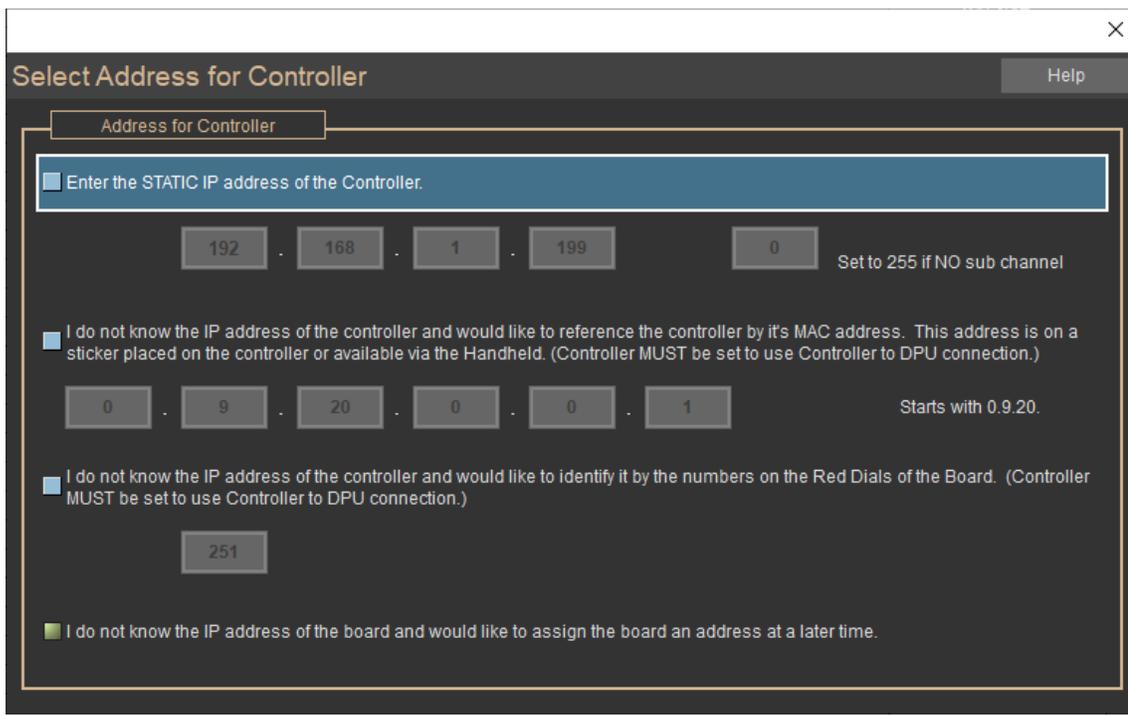
- From the Channel View screen, click the channel you wish to add the controller to, then click Controllers.
- Click on the bottom line, “Add a BASnet Controller.”

The following screen will appear. This is an example of adding a controller on a BASnet TCP/IP channel.

The screenshot shows a dialog box titled "Add A Controller" with the following fields and options:

- Add A Controller named:** New Controller
- To Controller Channel:**
  - Configured as:** 16X
  - atAddress:** 192.168.1.199 STATIC IP
- Database Options:**
  - CREATE A NEW BLANK DATABASE
  - Use a template to create the new controller's database
  - Copy a database from another controller
- Button:** Add Controller Now

- Enter a name for the controller and hit Enter.
- Select a Controller type and hit Enter. Put in an IP Address that will work on the channel. Select CREATE A NEW BLANK DATABASE, USE A TEMPLATE... DATABASE or COPY A DATABASE FROM ANOTHER CONTROLLER. If using a template, you must create a template from the same controller type and the same version of CBAS. For more information on templates, go to the Templates section.



- Click Add Controller NOW!

If you choose to add from template, you will be sent to the Templates folder to select the Template. If you choose to copy, you will be sent to select a controller from the other controllers in the current database.

To add a wider range of controllers, add them from the Database menu. However, the preferred method of adding controllers is through Hardware View.

- From the Database menu, left-click Add a Controller.
- Type in the name and click Next >. The name can contain up to 32 characters and must be unique throughout the database.
- Left-click the Make and Model. Make is the communication language of the channel. Model is the type of control board. For each Make, there are different choices of Models. Click Next >.
- Left-click the database if you have more than one in which you want the controller to reside. Click Next >.
- Left-click one of the existing communication channels to which the controller is connected. Click Next >.
- Left click an open address on the Channel. A channel can have up to 247 controllers, but we recommend adding up to 80 for quicker communication. Each controller takes time to communicate through the channel, so the fewer you have, the more rapid the communication. We recommend selecting the address so that you can easily remember later on. For example, a DDC on the 22nd floor could be addressed 22. Click Next >.

- Choose either a blank database, or from a list of Pre-Programmed Templates. If you choose a blank database, you have added the controller and are ready to begin adding points. If you choose Preprogrammed templates, continue.
- Choose a template. See the Templates section below.

## Removing Controllers

**Note:** *In order to remove a controller, you must be in Editor Mode.*

- From the Main menu, click on Database and click Remove a Controller.
- From the list that appears, select the channel that contains the controller you want to delete. From the list that appears, select the controller that you want to delete. You will be asked twice if you are sure you want to delete the channel. If you are sure, answer Yes.

You will no longer see the controller or its associated points in Hardware view.

## Templates

A template is a duplicate of any Computrols BASnet controller and all its points, logic, schedules etc. It is used in order to save time when programming multiple controllers used for the same function. For example, if 20 AHUs in a building are controlled by 20 32Xs with the same points for each, you can create a template with the first 32X you program and then select that template for the other 19.

CBAS 20 already has many templates for the UNI-B controller, which uses the BASnet protocol. They are located in CBAS20\Templates\UNIB folder are named based on the different VAV application that are possible and each type also has 3 varieties depending on the temp sensor and setpoint types. Example: FTB 0-10 HW VALVE S3SP means Fan Terminal Box with 0-10V HW Valve and MN-S3 Setpoint and Temp.

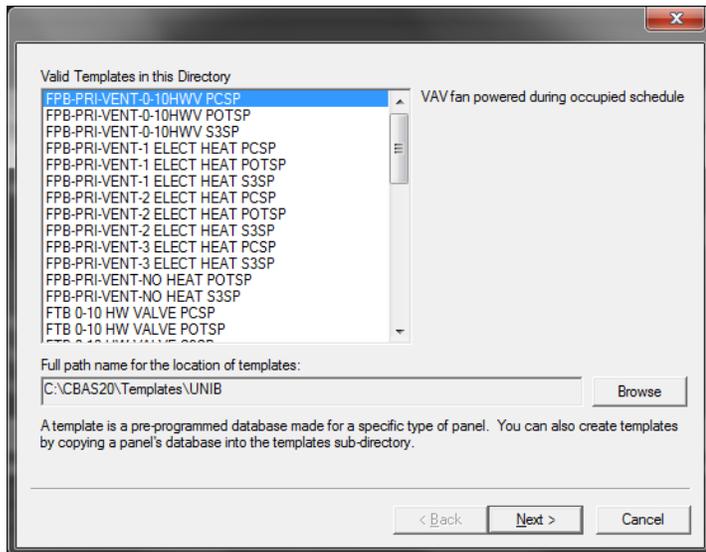
You can also get templates for the larger IP Controllers and many different AHU types by opening the Template Database. Contact Computrols Tech support at [Techsupport@computrols.com](mailto:Techsupport@computrols.com) and let them know what CBAS version you and that you would like a backup of the Template Database. In CBAS 20 you will take that backup and Install the database, covered previously. Making a Template is covered later in this section.

OPTO, BACnet and Modbus controllers cannot be saved as templates, but can be Exported and the Export file can be used when adding another of the same type. To do so, go to the Database Menu, and then click Copy a Controller. Follow the prompts. Or you can do an Export and Import. To do so, click an OPTO controller, for example, then click Export Database. Then, when you add a new controller of the same type, it will ask if you want to Import the Points. You then select an export file and you will be given the opportunity to change the point names, as discussed later in this section.

## Selecting a Template

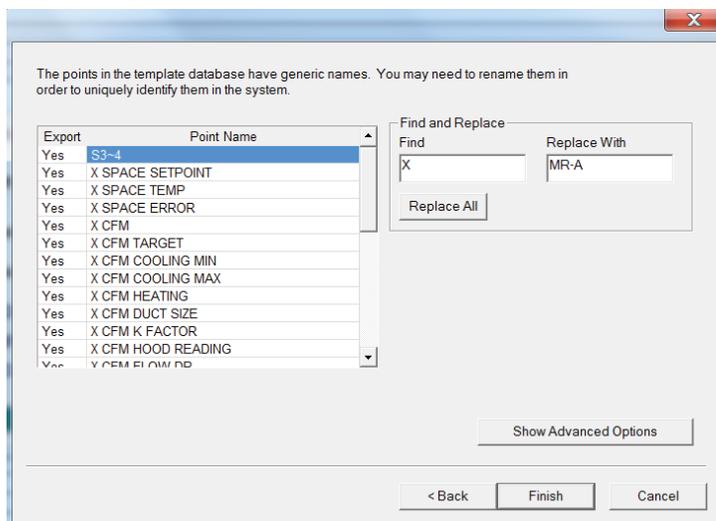
To select a template:

- First, add a controller.
- In the next step, click USE A TEMPLATE TO CREATE THE NEW CONTROLLERS DATABASE. The window below will open. All Templates of the controller type you are adding will be listed.



CBAS automatically finds templates in C:\CBAS\Templates\[controller type] folder. However, you can click the Browse button and browse to the Template Database folder, and CBAS will find all eligible templates. (you must have a template created in the same CBAS version)

- Click a Template from the list. The window below will open:



Anything you type in the “Find” box will be changed to whatever you type in the “Replace With” box when you click “Replace All”.

- Click “Show Advanced Options”.
- Click “Replace” to replace the selected point highlighted in blue. What you type in the Prefix box will be the first characters in the name and what you type in the Suffix box will fall after the name.
- Click “Finish.”

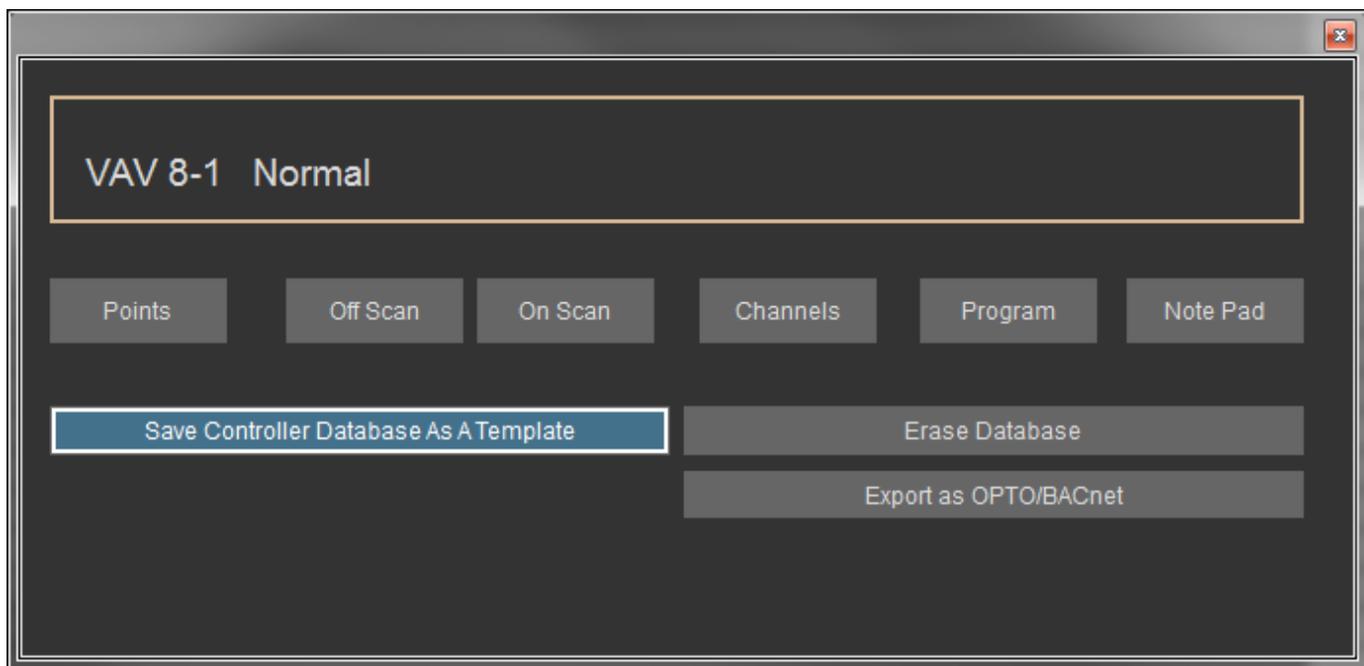
**Add to Name:** Adds the prefix and suffix to the selected point.

**Add to All:** Adds the prefix and suffix to all the points in the list.

**Manually Replace Name:** Fill in the box to the left of this button. When you click this button, the highlighted point’s name will change to what you typed in the box.

## Creating a BASnet Template

From the Hardware view, click the channel that the controller is on and find the controller you wish to use as a template. When you click the controller name, the screen below will open:



### Save Controller Database as a Template

Click here to save all the programming and parameters of this controller to a template. This is useful if your facility has the same automation needs for different floors or areas of the facility. When you left-click here, CBAS prompts you to create notes in the Note Pad relating to this template and then asks you to give the template a name. When you add a controller to your system that will be programmed and wired similarly to the one you are saving as a template, the task will be simpler.

# The Point Database

## CBAS

When CBAS is first installed, no site-specific data is programmed into the system. Each database is unique to the individual site. Whether you are installing it yourself, or having Computrols or one of our licensed dealers install CBAS, it is helpful to continue reading to familiarize yourself with the system setup.

## Engineering

Engineering the project is the first step. Specific information about the facility is needed before programming can begin. Blueprints including locations of all mechanical equipment, specifications,

as-built drawings from any existing system, and any specific instruction must be made available to the project manager. If you are upgrading an existing automation system, most necessary information can be obtained from reports and printouts for the existing control equipment. For new installations,

a Computrols design Engineer, or your own project manager should provide all specifications. Once you have the project planned out, you can begin entering data into CBAS.

## Points

All field devices and any logic or calculations associated with those devices are points. A point can be an actuator, a temperature sensor, a control sequence or any other quantity or status that can be monitored or controlled. We recommend naming your points based on their location and function to make it easier for the operator. For example, if you have a temperature sensor that reads the space that AHU-2 serves, name the point "AHU-2 Space Temp." There are two categories of points: Hardware and Software.

## Hardware Points

Hardware points are devices that can be physically wired to the terminal strip of a controller. They include field devices such as relays, actuators, and sensors. Their function is to transmit data back to the controller or physically carry through a CBAS command.

There are four main types of hardware points. They are analog inputs, analog outputs, binary inputs, and binary outputs. Binary points have only two states such as ON/ OFF, OPEN/ CLOSE, or START/ STOP. Analog points on the other hand, represent a range of measurement such as a temperature of 0°F to 110°F, a pressure of 1psi to 5psi, or a flow rate of 100 "WC to 200 "WC.

Whether a point is Binary or Analog, it must be either an input or an output. Points that monitor the status of a field device are inputs. Field devices send their condition or quantity to an input on the controller.

Points that control the status of a field device are outputs. The user can either control outputs manually, or allow for automatic control based on schedule, logic, PID, or other software outputs programmed in CBAS.

### Example Points:

Point Type	Input	Output
Analog	Pressure Sensor	Damper Actuator
Binary	AHU Fan Status ON/OFF	Relay

In addition to the four main point types, points can be IN/ OUT, supervised, or counter.

**Linked Points:** A separate input can be used to verify that a field device responded to an output. When these two points are linked, it becomes one point called a Linked point. For example, a relay that turns an AHU on when contact is made is a binary output. A device in the duct that indicates an increase or decrease in differential pressure in order to verify that the unit turned on when commanded is a binary input. When the relay output and differential pressure input are linked, the operator can command the AHU to start and watch the status change from OFF to ON through a single point. If you setup an alarm on the points, you will know that the AHU started or not.

**Supervised Points:** Monitors the consistency of a wire. Sends one of a possible three states: Open, Closed, or Trouble. Trouble is how CBAS defines a broken connection between the controller and the point. For example, if a door is normally closed, a binary point would indicate an open or closed door. A supervised point would do the same thing, but would also indicate when the wire connected from the controller to the door monitor has been tampered with.

**Counter Points:** Counts the number of times that a binary point changed status. These are most often used in Kilowatt (KW) meters for monitoring power usage. This number is constantly increasing and rolls over to 0 when it reaches 4,000,000.00.

## Software Points

Software points include calculations, points of reference, and logic statements. They are intelligent points that are not physically connected to the controller. Instead, they gather data and send commands to hardware points. An example of gathering data is the average supply temperature of all VAVs on a floor. An example of sending Logic commands is, "if Outside Air Temp is less than 50°F, then start VAV heat strips." For a complete description of Software Points, see Chapter 4, Section 2 "Software Points."

## Adding Points

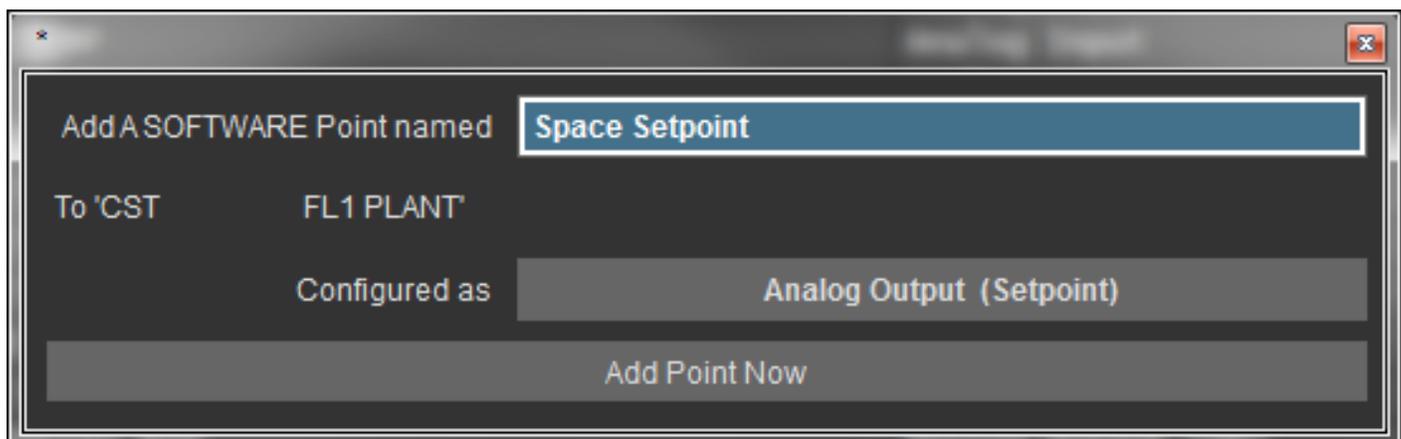
Each panel has a given number of hardware points based on the type of controller. The entire database can have up to 60,000 software points. Once a panel is added to the system, there are two ways to add a point: From Database on the Main Menu or from Hardware View. The preferred method is from Hardware View and the Database Menu is used only to add special “System Points”.

You will be prompted for all of the information necessary to add the points to the system. Note that CBAS prompts you with only choices that make sense based on previous choices. Therefore, some steps may not be necessary for certain point types. The steps involved in adding points from the main menu are as follows:

**Note:** To add points, you must be in Editor Mode. The best way to add points is from Hardware View.

To Add Points:

- Click the channel that contains the controller to which you want to add the points.
- Click the Controllers button and find the controller in the list.
- Click the controller and click the Points button.
- On X Controllers (8X, 16X, 32X, 64X), any point position can be any of the four point types. On VAV Controllers, certain positions are allotted for certain point types, such as Analog, Binary, In, or Out. Software Points are added below the Hardware Points.
- From the list of points, click “Add a Point” on the position where you want to add the point.
- Give the point a unique and descriptive name.
- Choose the Configuration type for the point.
- To add a Software Point, click “Add a Software Point” on the bottom line of the list. The following window will appear:



- Type in a descriptive and unique name for the point. It can contain up to 32 Characters.
- Hit Enter and select a configuration from the drop-down list.
- Hit Enter and Enter again, then click on the Add Point NOW! button.

The process is not complete until you reach the Points Program Screen. If you press ESC or right-click at any time before reaching the Program Screen, the point will not be added.

Once the point has been added, program the point how you wish. If you do not wish to program the point at this time, right-click to return to the main menu. For more information on programming the point after it has been added, go to Chapter 4 Programming Points.

## Removing Points

**Note:** *It is recommended that you remove any logic on the point you are removing, before removing it. Also, any logic or PID, etc. that causes a Point Relation to the point in question should be removed. In order to remove a point, you must be in Editor Mode.*

- From the Main menu, click Database and click Remove a Point.
- From the list that appears, select the channel that contains the controller that contains the point you want to delete.
- From the next list that appears, select the controller that contains the point that you want to delete. Select the point and you will be asked twice if you are sure you want to delete the point. If you are sure, answer Yes.

You will no longer see the point in Hardware View or Text View.

## Point Subsystems

Points are broken down into what we call subsystems, which can work together to provide a complete solution to automation needs. Their title defines the way a point behaves or what its function is. The three subsystems are listed and defined below.

**Automation:** These points fall under Energy Management. These automated points are the most flexible, and have the most control features available. They are not as application specific as the other sub-systems. Therefore, they require more programming to accomplish what your building requires.

**Fire:** These points are used in fire detection and prevention. Because the application is more standard than automation, programming is less customizable. This feature requires an add-on to the CBAS license and is a separate purchase.

**Access Control:** This sub-system formerly utilized a separate database to provide controlled access into and out of secured areas of a facility. This feature requires an add-on to the CBAS license and is a separate purchase.

Using subsystems allows for a more organized automation system.

# Chapter 4 » Programming Points

## Point Program Screen Description

The Point Program Screen shown below allows the user to program a selected point and view its properties. The options displayed vary based on the properties of the selected point. This makes it easier for the user by limiting the choices to only those features that are relevant to that particular point type.

The Point Program Screen is divided into four sections shown here:



## Name and Status

**Name:** To change the name (AUTO POINTS FOR AHU 10 TO 28), click it and type the new name.

**Status:** Displays the current status of the Point (OFF).

## History and Display Options

**History:** CBAS records changes in point status over time based on parameters set by the user. The History function allows you to set the criteria for recording history and view the history of a selected point. If this button is labeled “Start Saving History”, then you might need to enable History saving for the whole database. Do this from History Maintenance on the System Menu.

**Show Point Relations:** Lists all points that are related to the selected point by Logic, PID, etc. You can click on some relations and view how they are setup.

**Create Note Pad:** Provides a journal for each individual point to record any information about that point.

**Text View Point Positioning:** Lists all points and allows for changing the order in which they are displayed in the Text View/All Points. When you select this feature, click the position in the list that appears and it is moved there.

**Text View Display Options:** Helps you organize the layout of the text view. You can place a bar above a point or bold a point. This can also be done with the F3 or F4 keys, respectively. The bars help to group points, and bolding highlights frequently used points.

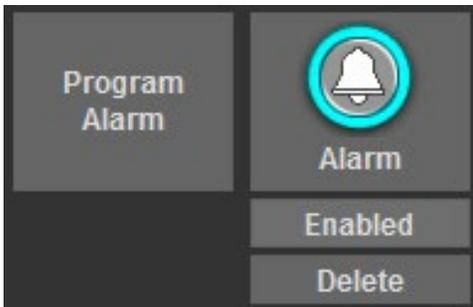
**Link to Binary Input:** Allows you to display a Binary Input and Binary Output as one point. Mainly for setting up alarms when status fails to match output.

**Create Runtime Point:** Creates a point which tracks how long a binary point has been in a specified status.

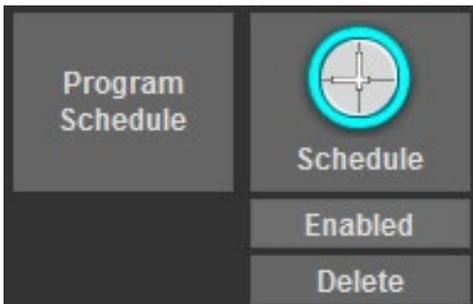
## Programming

All programming for an individual point can be done from this section of the Point Programming Screen. Below, each button is displayed and described briefly. Not all of these buttons appear on all point types.

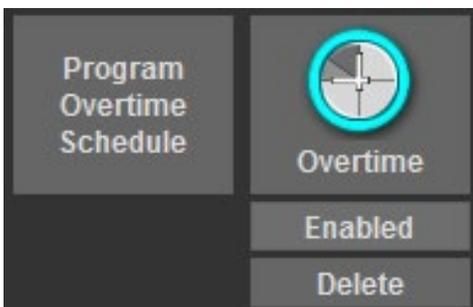
*Note: The button to the left is displayed before any programming has been done. The button to the right is displayed after you program the feature.*



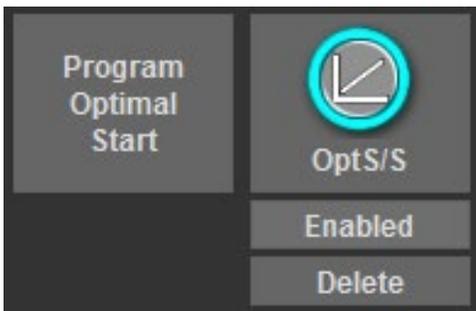
**Program Alarm:** Program an audio and visual alarm to indicate when a point is functioning differently than you would like.



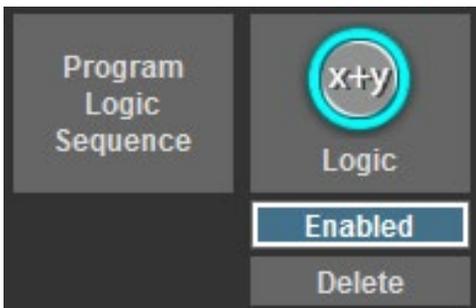
**Program Schedule:** Program a weekly time schedule for automatically commanding a binary point.



**Program Overtime Schedule:** Extend or adjust weekly schedules by programming overtime schedules for a specific date.



**Program Optimal Start/Stop:** Program the system so that equipment runs for the least amount of time while maintaining desired conditions.



**Program Logic Sequence:** Use English-language, If / Then statements to customize the sequence of operations.

Points can be configured as Binary Outputs, Binary Inputs, Analog Outputs, or Analog Inputs. The point in the example is a Software Binary Output. The buttons listed below are found only on certain point types.

**Software/Hardware:** Indicates whether points are software or hardware. Hardware points are physically wired to the controller. Software points include information that affects the functioning of hardware points. Clicking this button tells you where a point is physically located and how it is configured.

**Relay On/Relay Off:** Allows you to view and change the units of measurement for the point. Click the button with the existing unit of measurement. A window with a list of measurement options from which to select will appear. The buttons will look different for various point types. These buttons are found on Binary Outputs only.

**Switch Contacts:** For Binary points, you can reverse the relationship between the position of the dry contact (relay) and the status of the point you are controlling. For example, a relay is normally wired to turn an AHU on when the relay is commanded on. If instead, the relay is wired in a way that the AHU turns off when the relay is commanded on, you can click this button to inform CBAS that the relationship is reversed. Found only on Binary Output points.

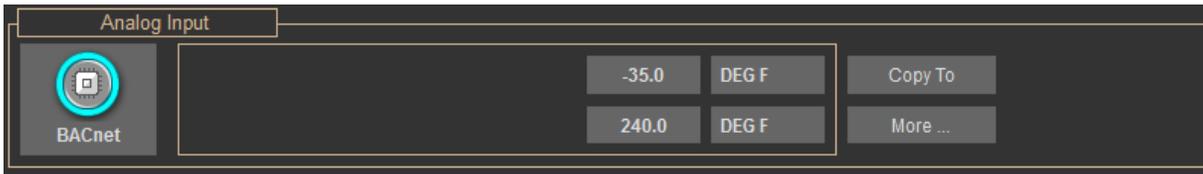
**Copy To:** Copies all the Programming and parameters from this point to another point of the same type. Click the button and you will see a list of similar points in the database.

**Immediate ON/OFF:** Allows you to delay the starting and stopping of equipment in order to spread out the energy consumption. Applies to Binary Output points on a controller only. Not system wide.



**More:** Gives you more options based on the properties of the point so that you can customize the properties of the point. Only found on Analog Input points. From here you can add an offset to the status of a sensor if you believe it is inaccurate. Starting in CBAS 15, there is a field to insert the number of Decimal places in the value of the input.

**DEG F:** Allows you to change the units of measurement and the parameters of the point. Found on Analog points.



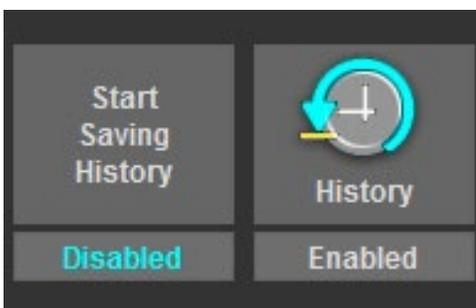
**Change Set point to Reset Schedule:** Allows you to change a Setpoint to a Reset Schedule, and vice versa.

## Recording Histories

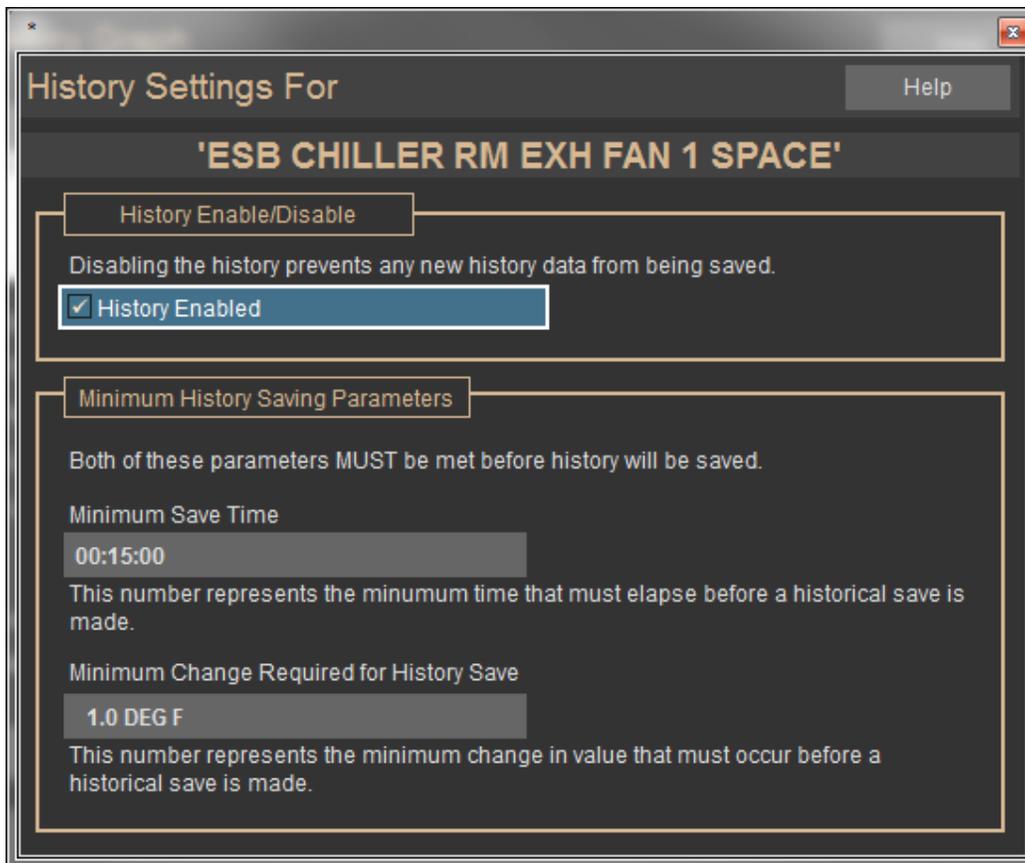
Recording and viewing Histories lets the user know how the status of a point has changed over time. By knowing what has happened in the past, you can better understand what will happen in the future, and set baselines to know when the equipment is functioning properly. Troubleshooting is more manageable with a good understanding of how points have reacted to past changes in the environment.

To begin Recording History:

- From the Point Program Screen, click the History button to view histories or set the parameters for saving Histories.



- Begin saving new data by enabling the history. This can be done by clicking the Disabled button under the History button in the Point Program Screen or by clicking the History button, then checking the History Enabled box in the Point History screen. To disable history, uncheck the History Enabled box.
- To change History Saving parameters, click the History Button, then click the “Modify History Saving Settings for this Point” button.



For Binary points, all changes of state are saved. For analog points, history is recorded based on parameters set by the user. In the History Settings screen, you can define how often data is recorded. Both of the conditions below must be met in order for data to be saved to the history file.

**Minimum Report Time:** Sets the least amount of time that must pass before data is saved to the History file. Click 00:15:00, and then use the arrows to make adjustments. In the example above, 15 minutes must elapse before a temperature is recorded. This is the default, but can be lowered for a more detailed History Graph on some points.

**Minimum Analog Counts:** Sets the minimum change in status that must occur before history is recorded. Click 3.0 DEG F, then, type in your desired minimum change. In the example on the previous page, temperature must change by 3 Deg F before a point in time is recorded.

In the above example, the temperature must change by 3 Deg F within 15, 30, 45, etc. minutes for a history save to occur. To get the most realistic looking graph, lower these settings to 1 minute and .1 degree. Do this only on points that you need to keep an accurate history of. Otherwise, the History file will become bloated with unneeded data, which could lead to problems. Also, histories need to be purged of old data regularly. This can

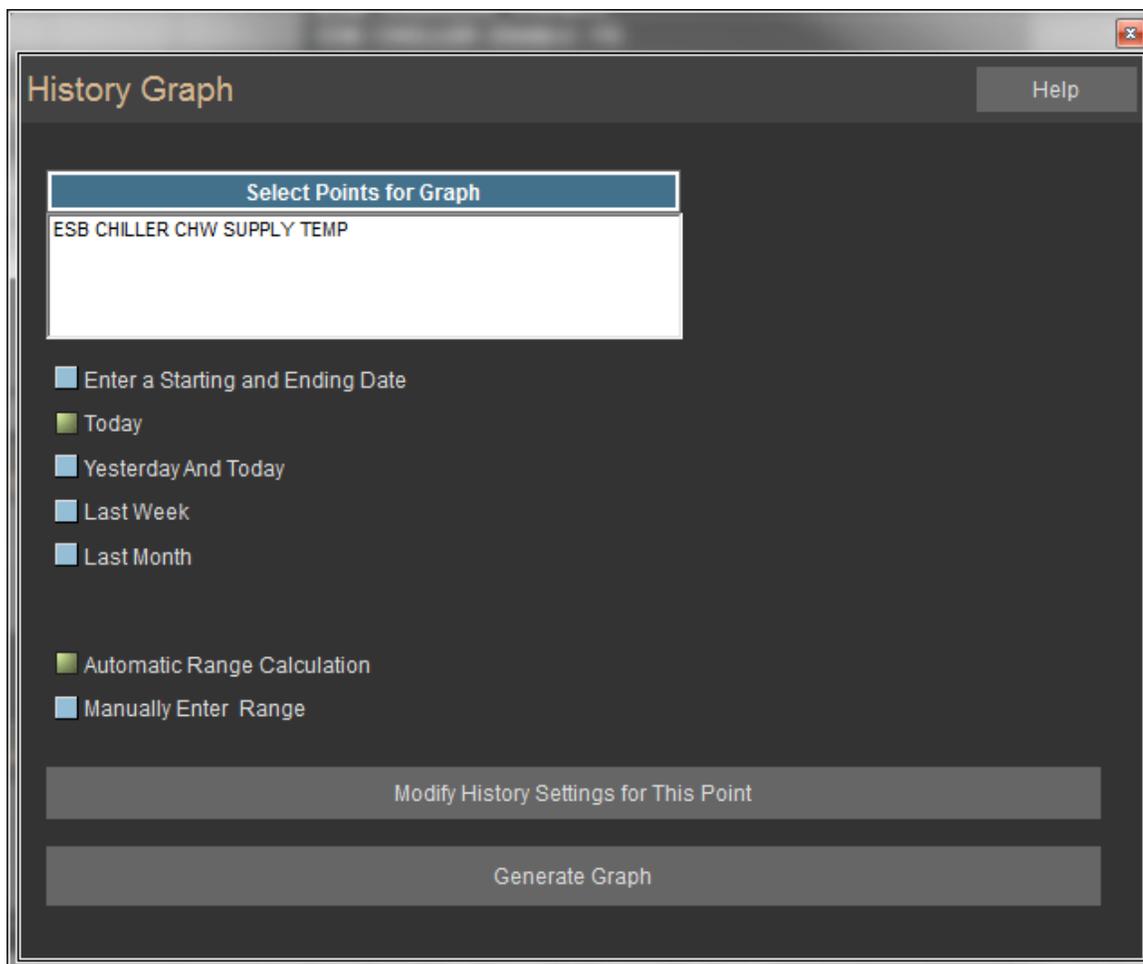
be done through the History Maintenance function on the System Menu. System Menu items are discussed in detail in Chapter 5. As of CBAS 15.2, purging of history is done automatically and all purged files are accessed when necessary. So manual purging is no longer necessary.

**Note:** When History is enabled, the defaults are 15 Minutes and 3 Deg F (or 30 analog counts).

## Graphing Histories

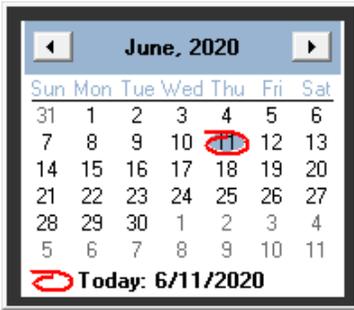
To graph a Point History:

- From the Point History screen, click to display a graphical representation of a point's history. The window below will appear:

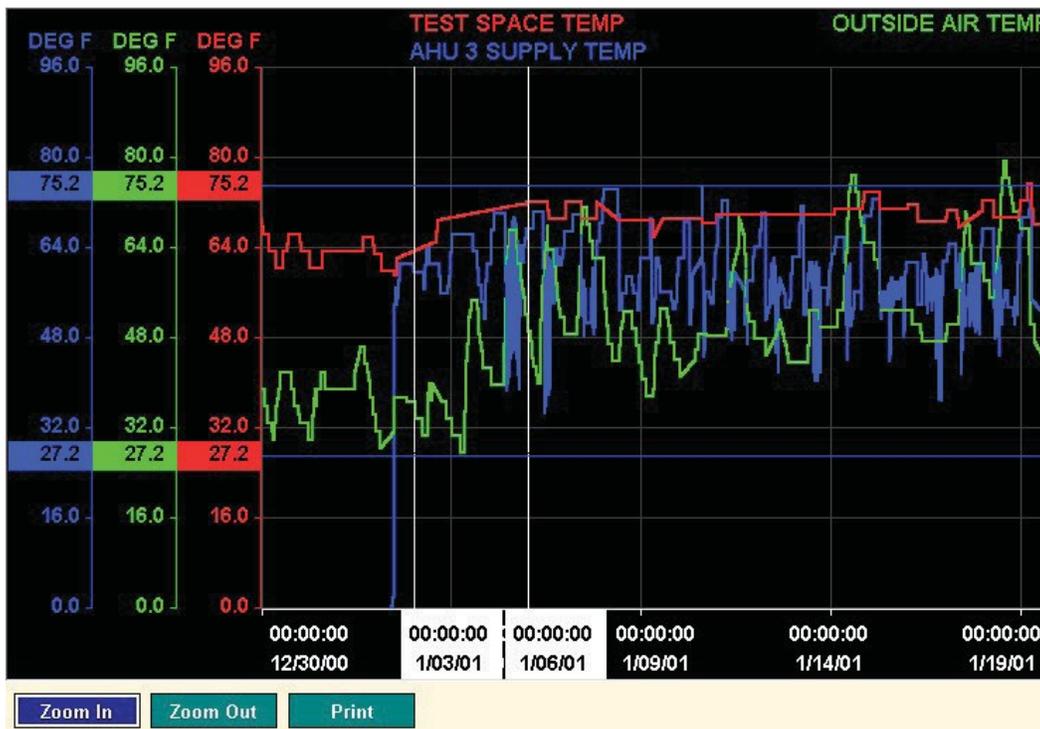


- In order to make comparisons, up to 4 points can be chosen to graph at the same time. For example, you can see when a fan started by choosing the Start/ Stop point, and see how the supply air and space temperatures change as a result, by choosing those points for the same graph. Click "Select Points for Graph", choose your points from the list, and then right click.
- Choose a time period for the graph by checking one of the boxes on the left. Above is an example with Enter

a Starting and Ending Date checked. Click on the Starting or Ending Date and a calendar will appear.



- To change the Month, click the month and choose from the list. To change the year, click it then the up and down arrows. Or, you can use the left and right arrows to change the month and year.
- Today's date will be circled in Red. Right-click anywhere on the calendar to select today's date, or click on another date to choose it.
- Click on the Start or End Time to change. Move the time forward and backward by clicking the up and down arrows next to the time.
- Click the Display Graph button to open a History Graph. The resulting graph displays the history for the points and time frame selected in step 2.



The points are listed at the top of the screen and are color coded to match the units of measurement on the left side of the graph (Y-axis). Across the bottom (X-axis) are the dates. Each point has a unique colored line to represent the change in its value over time. When you move the cursor, you will notice lines pointing to the X- and Y-axis, where the date and value are displayed.

**Zoom In:** Allows you to closely view a section of the graph. Click a location on the graph as the starting point and then click an ending point. The space between the two points will be displayed when you zoom in.

**Zoom Out:** Displays the graph from which you zoomed in.

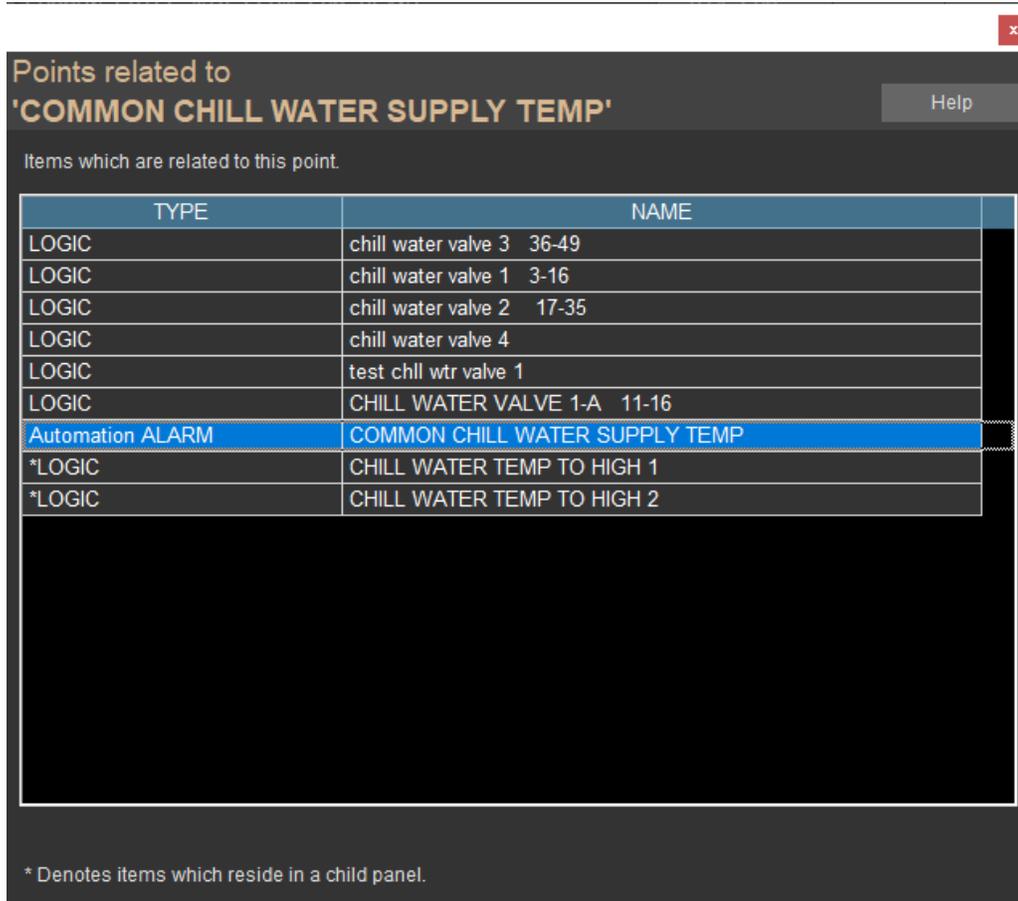
**Print:** Sends the displayed graph to the printer.

## Point Relations

Let's say that you have a point that is being commanded by LOG1, but there is no logic programmed on that point. Go to Point Relations and you will find what is commanding the point.

The Point Relations window shows you what other points are related to this point by way of Logic Statements, PIDs, Alarms, etc. There is no configuration necessary. However, if you click on a line, CBAS will show you the Logic Statement, Schedule, etc. that references the point name.

Here is an example of the Point Relations Screen:



The screenshot shows a window titled "Points related to 'COMMON CHILL WATER SUPPLY TEMP'". It contains a table of related items and a legend at the bottom.

TYPE	NAME
LOGIC	chill water valve 3 36-49
LOGIC	chill water valve 1 3-16
LOGIC	chill water valve 2 17-35
LOGIC	chill water valve 4
LOGIC	test chl wtr valve 1
LOGIC	CHILL WATER VALVE 1-A 11-16
Automation ALARM	COMMON CHILL WATER SUPPLY TEMP
*LOGIC	CHILL WATER TEMP TO HIGH 1
*LOGIC	CHILL WATER TEMP TO HIGH 2

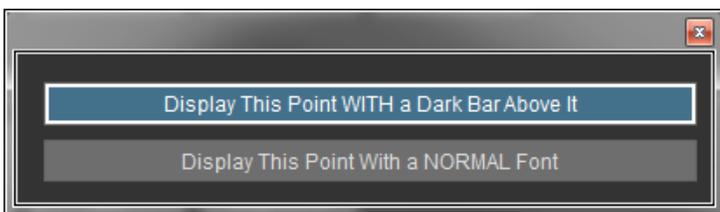
\* Denotes items which reside in a child panel.

Another feature of Point Relations is the \*, which denotes items residing in the “Child Panel.” First of all, any controller programmed in CBAS is a Child Panel. In addition to the Parent Database that you see in CBAS, there is a Child Database that is downloaded to the controller whenever changes are made. The Child Database is kept separate in order to facilitate the download to the correct address.

Usually, Logic is programmed on a Point which resides on a Controller (Child Panel). But sometimes Logic may be programmed on a point that resides on the head-end (Server). If the \* is not present, the point resides on the head-end by choice, or the Logic has not yet downloaded to the Child Controller (Database Scaling may be necessary). If a logic contains points on more than one controller, the logic will remain on the head-end.

## Display Options

In this feature, there are some other tools for organizing and grouping points in Text View. When you click on the Display Options button, the following box appears:



- Click once on the top button to add a dark bar above the point. Click once more to remove it
- Click once on the bottom button to change the name to a bold font. Click once more to change it back to a normal font.

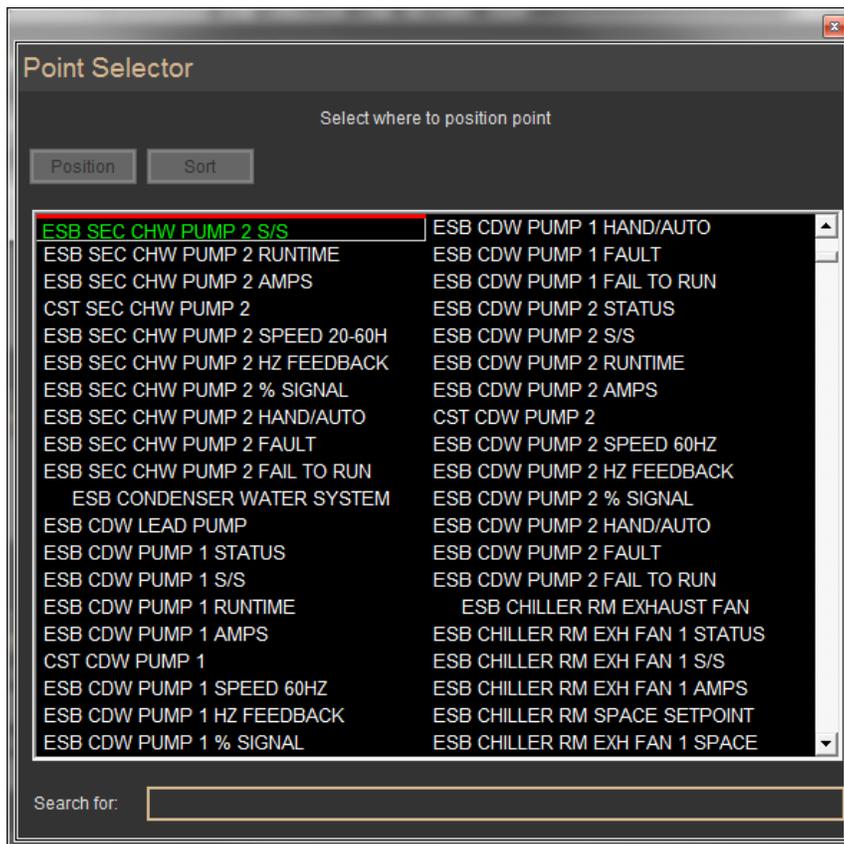
These options can also be changed in Text View by using the following function keys:

**F3:** In Text View, you can add bold lines between points by highlighting a point and pressing the F3 function key. This will add a bold line above the point. Press F3 again to remove the line. This feature is good for creating groupings of related points.

**F4:** Also, you can bold the name of a particular point by highlighting it and pressing F4. Press F4 again to return to normal font.

## Text View Point Positioning

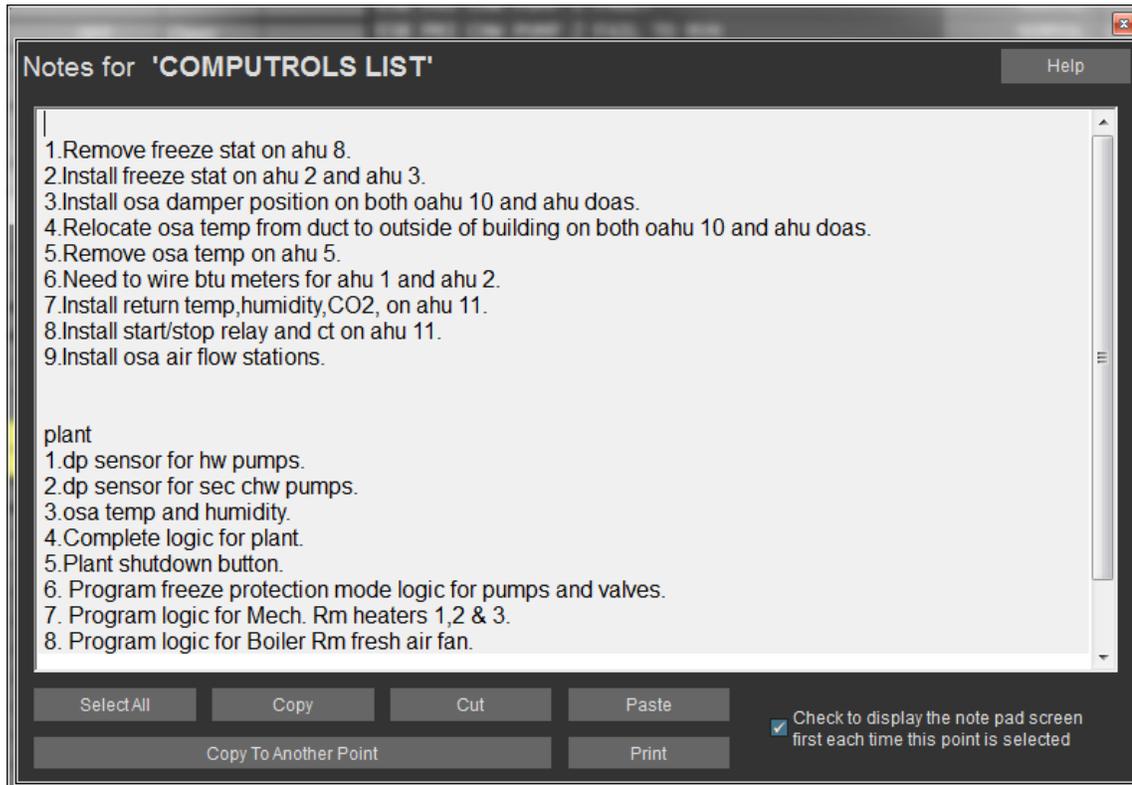
This menu item allows the user to change the position of the point in Text View, so points that need to be viewed more often can be placed at the top of the list and associated points can be grouped together. When you click this button, the following window appears:



The point you are repositioning will have a green background. Place your mouse pointer where you want the point moved to and a red line will appear. Click there and the point will be moved. If you have a hard time finding the location, you can search by typing the name or part of the name and hitting the + or – signs on the 10 key pad of your keyboard. Multiple points can be positioned at the same time by going to Position Points on the System Menu.

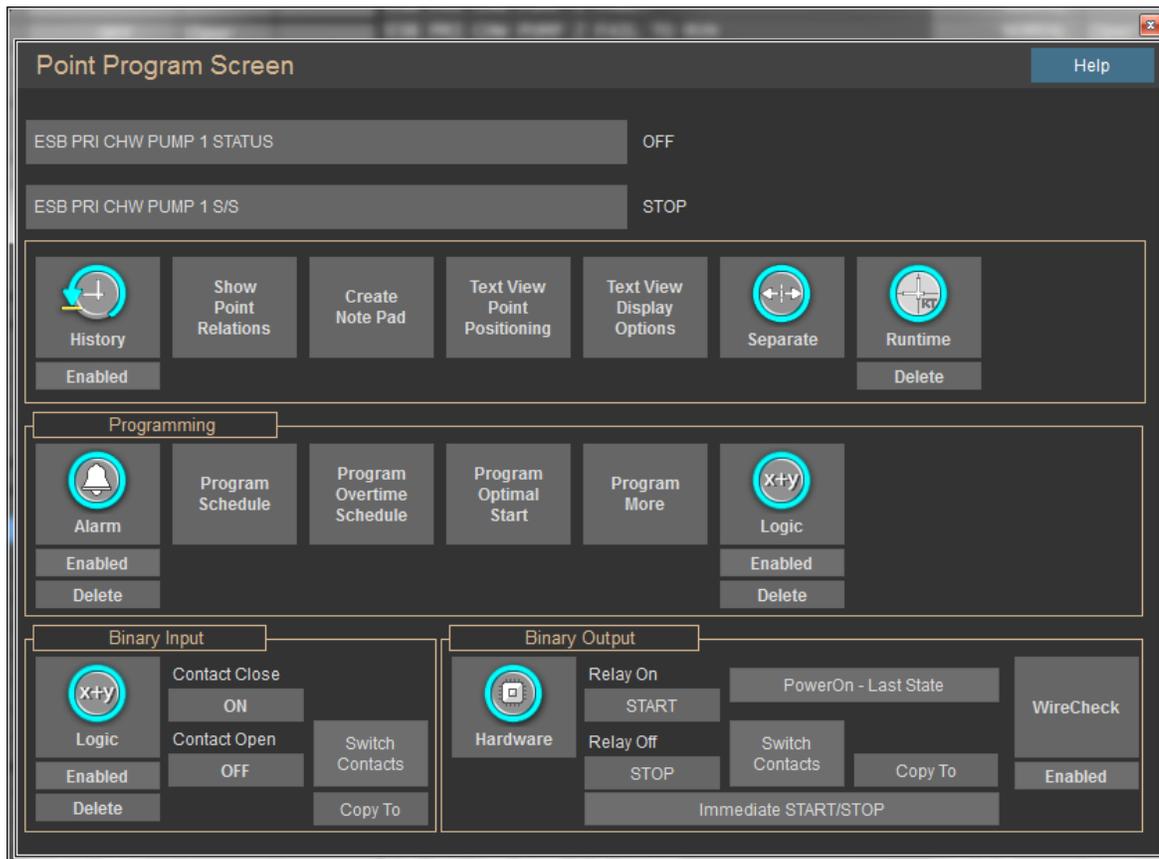
## Note Pad

Note Pad is used as a place to store information about a point. It could be information about the programming of that point or the actual equipment that the point controls. By checking the box in the bottom right, the Note Pad is displayed first when the point is selected. This feature is used to remind users of changes in programming or problems with equipment. Because Note Pad is a text editor, some text editing command buttons are provided as well as a print button and a button which copies the text to another point's Note Pad. Just click on this button and choose the point or points that you want to copy to.



## Linked Points

Only Binary Input and Output points can be “Linked” together, mainly for the purpose of Alarms. For example, an Alarm has been setup on the point, with the following configuration.

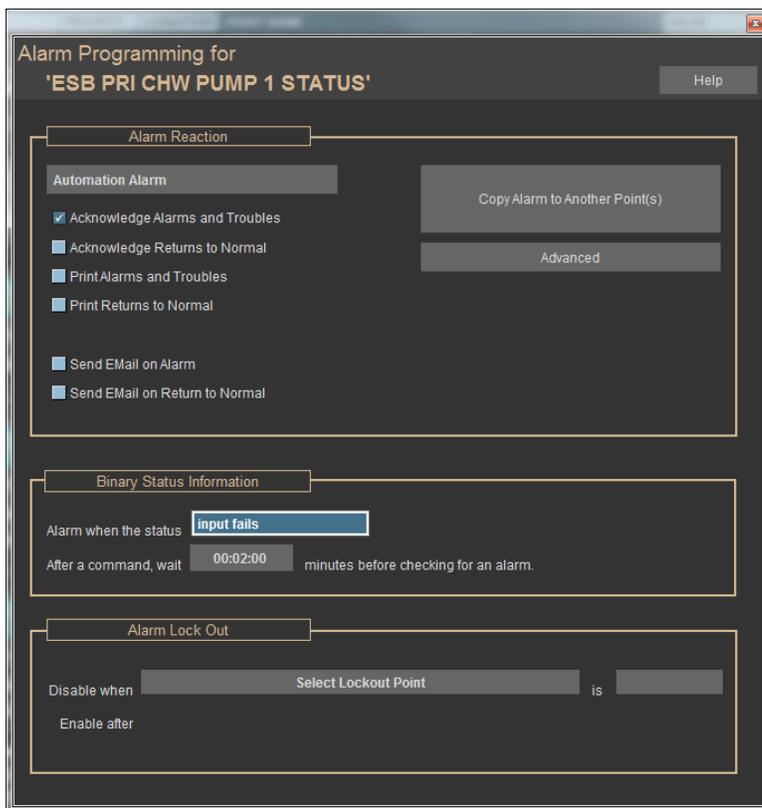


It is set to Alarm when “Input Fails” for 2 minutes, meaning that it will Alarm when it is commanded ON and the status of the Input is OFF for 2 minutes. The Input is based on Logic that says:

**If CH 1C1 SF AMPS is greater than 10.0AMPS**

**then CH 1C1 SF S/S is ON**

**else CH 1C1 SF S/S is OFF**



So, 2 minutes is there to give the unit a chance to start and get up to the expected amperage draw, in case there is a built-in delay. You know there is a problem, such as a broken drive belt, if it goes into alarm.

When you click “Show Point Relations” on a Linked Binary, the relations for the Output point are shown first, then the relations for the Input point.

## Linking Points

Like everything else in CBAS, linking and unlinking points is easy. In the Point Program screen shown at the beginning of this section, there is a button that says “Link to Binary Input”. To link, go to the Point Program screen on a Binary Output and click the button labeled “Link to Binary Input.” (Linking can be done from the Input point also) Select the related point from the list, which has been narrowed down intuitively by CBAS. The points will now be linked and only the Status point will be listed in Text View. In Hardware View, you will see both points listed, but when you click on one, you will see both points in the Linked Point Program screen. The “Link” button has now changed to “Separate”. Click the “Separate” button to unlink the points.

**Note:** When writing logic that involves Linked Points, you may want to separate the points in order to differentiate between Input and Output points.

**Note:** In Configure Workstation, on the System Menu, you can choose to show, in Text View, both the Input and Output points of a linked pair. However, when you click on one of the two, you will see the two points in one Program screen.

## Alarms

Program alarms so that the system will alert the user when the value of a particular point is not in its desired position. If an alarm is triggered, the point's status will turn red. CBAS can also provide an

audio and visual indication (the bar across the top of the screen will turn red and the server will beep). To acknowledge the alarm (and stop the beeping), press the F1 key or click the Alarm Bar at the top of the screen. Checking Silence Alarms, under Configure Workstation on the System Menu, can silence all alarms. For instructions on setting the alarm sound to play through a sound card, see Alarms Through Sound Card.

There is also a new feature that allows your Points with Alarms to display a different color than red when in alarm. See Point Status Coloring at the end of this section.

## Programming an Alarm

To program an alarm, click the point onto which you want the alarm programmed. If it is an analog point, the Point Program screen will open. If it is a binary point, you must first click Program to open the program screen. Click Program Alarm to open the Alarm-Programming screen for the selected point.

The screenshot shows the 'Alarm Programming for ESB AHU 1 RETURN TEMP' window. It is divided into three main sections:

- Alarm Reaction:** Contains a list of actions with checkboxes: 'Automation Alarm' (checked), 'Acknowledge Alarms and Troubles', 'Acknowledge Returns to Normal', 'Print Alarms and Troubles', 'Print Returns to Normal', 'Send Email on Alarm', and 'Send Email on Return to Normal'. There are also buttons for 'Copy Alarm to Another Point(s)', 'Advanced', and '0 Recipients'.
- Analog Alarm Limits:** A table with four columns: Low Alarm Limit (65.0 DEG F), High Alarm Limit (76.0 DEG F), Dead Band (1.0 DEG F), and Alarm Delay (00:01:00).
- Alarm Lock Out:** Includes fields for 'Disable when' (ESB AHU 1 STATUS), 'Enable after' (00:20:00), and 'Delete Lockout'. A toggle switch is currently set to 'OFF'.

**Alarm Reaction:** This section includes a drop-down menu (Automation Alarm) and check boxes.

The drop-down menu provides the options for setting the priority of the alarm. Priorities are listed in order from lowest (Automation) to highest (Fire). In the event that two or more alarms are triggered simultaneously, the alarm bar will display and acknowledge those with the highest priority first. Click Automation Alarm for a drop-down list that allows you to set alarm priorities.

Check the first box to force users to acknowledge whenever the alarm is triggered. Users may be required to log in to acknowledge an alarm. Check the second box to prompt the user when a point returns back to normal following an alarm condition. The third box should be checked when you would like to print a copy of the alarm. The fourth is for printing when the point returns back to normal. More than one or all boxes can be checked at the same time.

Newly added in CBAS 19 are the next 2 check boxes that allow you to set this Alarm to be sent out as an Email Alarm. When you check these boxes, you are taken to Email Alarm Contacts where you can select who the email is sent to. Contacts are added in Program Email Alarms\Contacts on the System Menu. This is covered in more detail in a Chapter 5 Section 6.

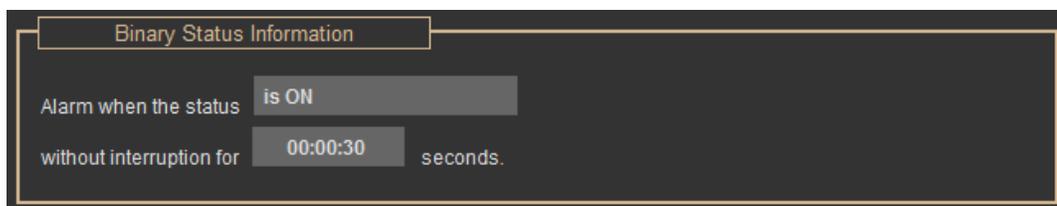
**Analog Alarm Limits:** In the fields provided, set the Low Limit, High Limit, and Dead Band. The low and high limits are the set points at which alarms are triggered. For example: If you want the temperature of a space to remain between 65°F and 77°F, set the low limit to 64°F and the high limit to 78°F. When the temperature reaches either limit, CBAS will trigger an alarm.

**Dead band:** A buffer zone that prevents points from bouncing into and out of alarm. Without the 1 degree Dead Band, if supply air in the example above fluctuated between 77.5°F and 78°F, the alarm would turn on and off. With a Dead Band set at 1, when an alarm is triggered, it will remain in alarm until the value reaches either 77°F (the High limit minus the Dead Band, or 78-1), or 65°F (the low limit plus the Dead Band, or 64+1).

**Binary Status Information:** Some Binary Output points are linked to Inputs and some are independent.

## Independent Points

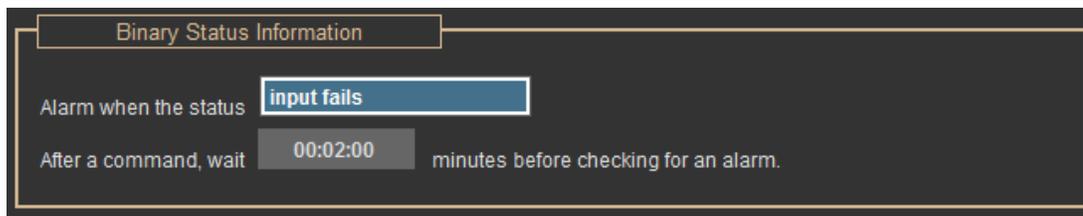
Here is an example of an independent Binary. You can choose to have an alarm condition when the status is On/Off, Open/Closed, etc. You can also choose how long the point must be in that state before an alarm happens.



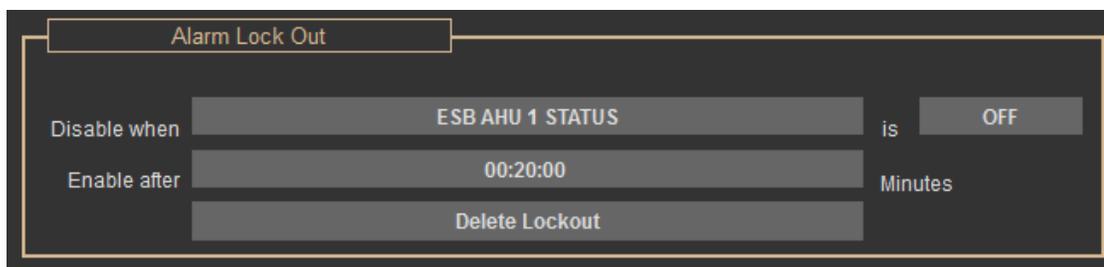
The image shows a configuration window titled "Binary Status Information". It contains two rows of settings. The first row is "Alarm when the status" followed by a dropdown menu set to "is ON". The second row is "without interruption for" followed by a time input field set to "00:00:30" and the word "seconds".

## Linked Points

Here is an example of a linked point:



**Input Fails:** Means that if there is a difference between the status and the command given, for 00:20:00 (a specified amount of time), sound an alarm. For example: Suppose you command an AHU to start, and it should take a current transducer 2 minutes to indicate that the unit is on. If the transducer does not indicate that the unit is on 2 minutes after the AHU is commanded to start, CBAS will sound an alarm to indicate that the AHU is not working properly.



**Alarm Lock Out:** Allows you to disable an alarm under a certain condition. When that condition changes, the alarm is enabled after a specified amount of time. For example: Suppose an alarm is set to go off when the pressure in a duct drops below a 3" water column. However, if the AHU for that duct is commanded off, the pressure will naturally drop below 3", so you can disable the alarm when the AHU is set to stop. When the AHU comes back on, it may take 2 minutes to reach and maintain the desired pressure range. In that case, command CBAS to wait at least 2 minutes after the AHU starts before enabling the alarm.

**Delete Lockout:** Used to turn an Alarm Lock Out off.

## Point Status Coloring - New Feature

Point Status Coloring is a new feature that allows you to have a point's status/priority change color without going into alarm. The point color will change in both Text View and Graphics View. It is limited to Binary Output (BO) or Binary Input (BI) Software Points in the DPU only, which means it isn't available on points programmed on controllers. However, you can setup a logic statement that makes the DPU BO or BI point mirror the status of a BO or BI on a controller.

When using Point Status Coloring, you can't Acknowledge or Print the Alarm. All it does is change the color, nothing else. So you cannot send an Email Alarm on it either.

This feature goes hand in hand with the Group Commander, so that you can easily see which points in the Group are on.

First, this is how you make a BO or BI on the DPU:

- In Editor Mode, click Database on the Main Menu, then Add A Point. Give the point a name, then click Next.
- Choose Binary, then Next. Choose Software, then Next.
- Choose Binary Output or Binary Input, then Next.
- On the final screen, you choose the name of the database you are working on, which should be the top line. Click Finish.

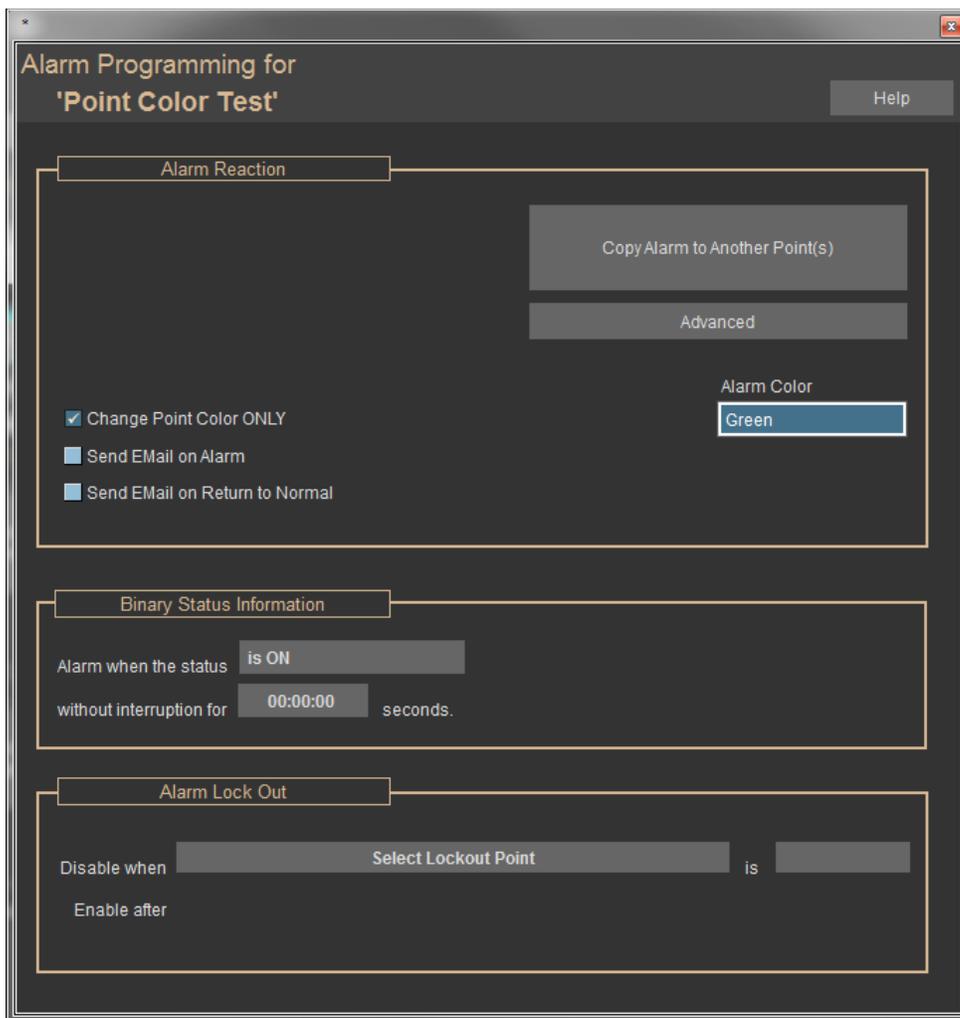
Your new point will be found as the last line in Text View. To see it, go to Text View, All Points, then type CTRL+End and that will take you to the bottom of the list. You can position that point anywhere in Text View or put it in a Logical Group.

- Click the point and go to the Program screen.
- Click Program Alarm and then check Change Point Color ONLY. See screenshot below.
- On the right, click Alarm Color and change to the desired color. The choices are Red, Yellow, Green, and Blue.
- Exit the Alarm Programming screen and click Program Logic.

If it is a BO point, program a Logic statement that will give that point the same status as the point you are mirroring. Something like:

```
If    FL2 RM 116 Lights is START  
then ON FL2 RM 116 Lights Color  
else  OFF FL2 RM 116 Lights Color
```

Make sure to AUTO the point when in Real Mode.



You can also program an Input, but the logic statement will look different. The steps are:

- If the Hardware point is ON, then Set Value of Software Point ON
- Else Set Value of Software Point OFF. The Logic statement will look like this:

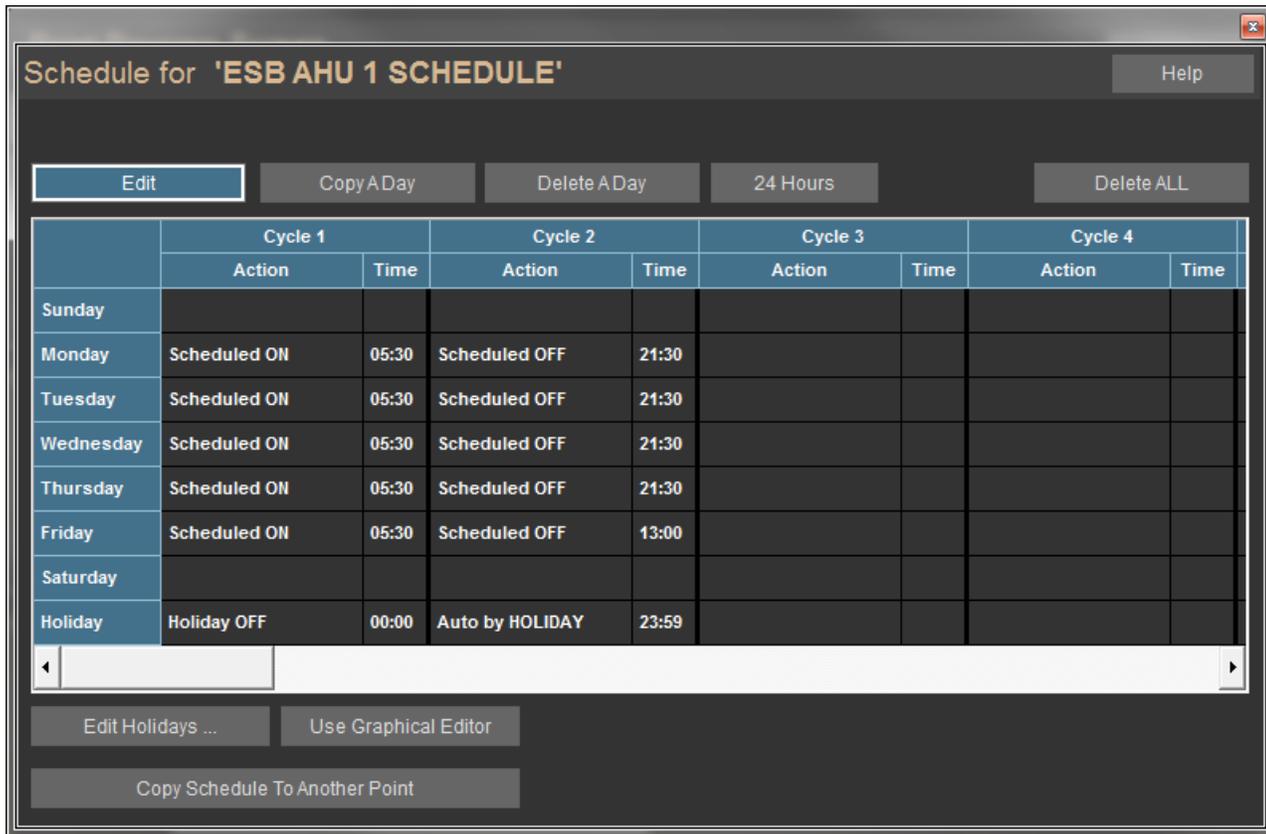
**If     32X 85 Fan Status is ON**  
**then Point Color Test Input is ON**  
**else  Point Color Test Input is OFF**

You can test your programming in Simulator Mode or Real Mode.

Show Downloads in Alarm Bar There is now a checkbox in the Alarm screen for controllers now, that when checked, would cause an alarm to show in the Alarm Banner when the controller downloads. This can come in handy if you are not sure whether your changes are getting to the controller when you edit the database. Click a controller in Hardware View then go to Program to setup an alarm on a controller.

# Schedules

Schedules allow the user to easily setup a daily time schedule for commanding the status of a binary point. To apply a schedule, click on the point you wish to schedule then choose Program. This will take you to the Point Program screen where you should select the Schedule button. Now you are ready to schedule the point.



**Edit:** For each day, you can schedule 24 different commands. Each command is called a Cycle and most schedules will only have 2 cycles, On and Off. Begin with Cycle 1 for the day you wish to control. Do this by clicking Edit then choosing the cell that corresponds to that day and cycle. In the example above, the first cell in the top left corner that reads Scheduled ON indicates Sunday, Cycle 1. Once you choose the cell, you are prompted with options for controlling that particular point. Repeat this process for the remaining Cycles and for each day to complete the schedule.

**Copy a Day:** If your schedules for many days are identical, you can copy a day’s schedule to any of the remaining days. Select Copy a Day, and then follow the directions displayed at the top of the schedule screen.

**Delete A Day:** Allows you to delete all cycles for a particular day. Click the button, and then click the day you would like to remove.

**24 Hours:** Useful for equipment that you would like to run continuously, or if you want to put an Overtime Schedule on a point that is always off. Overtime will not work if there is no Schedule for the same point, so give the point a 24 Hours Off schedule first. To do this, click the 24 Hours button, and then choose Off.

**Delete All:** Removes the schedule for the week from the selected point.

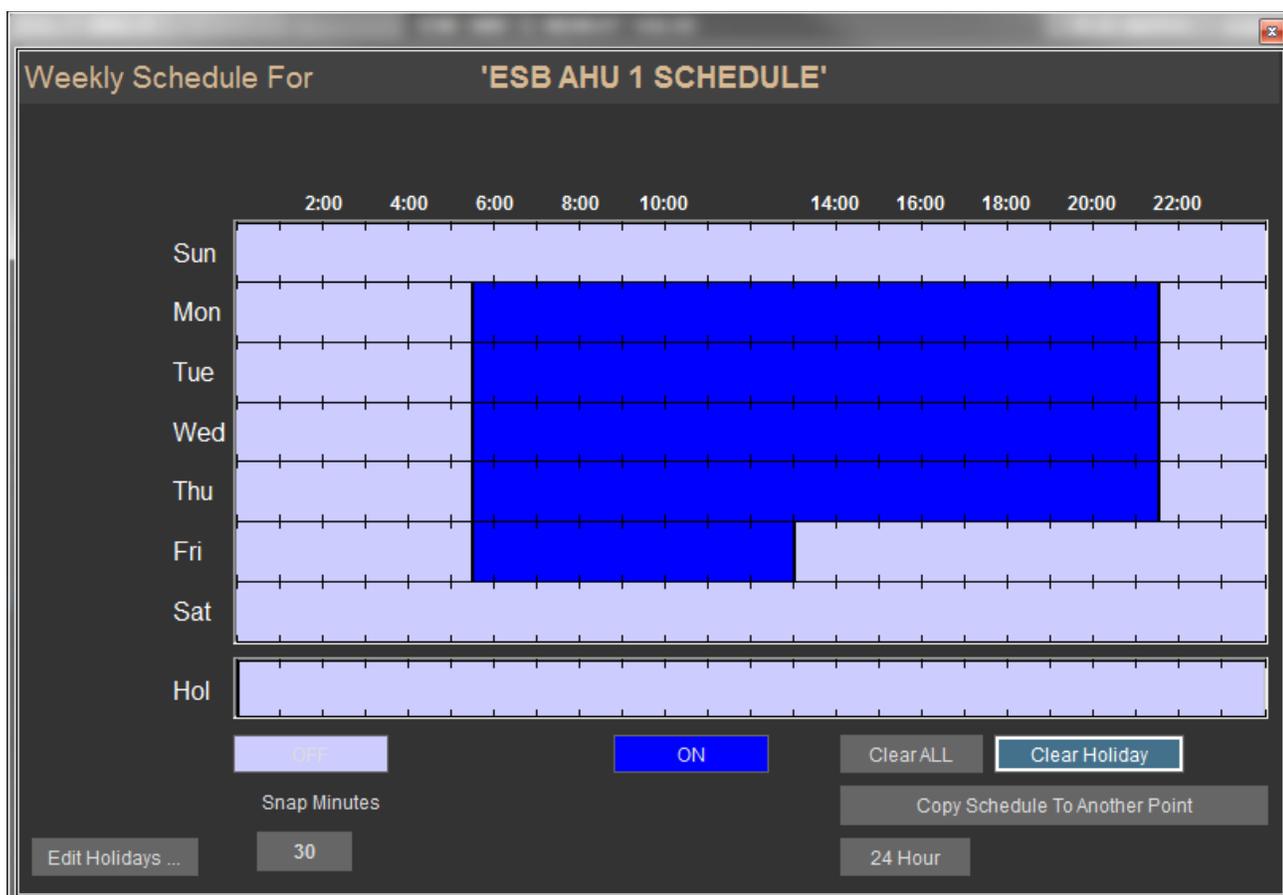
**Copy Schedule To Another Point:** For similar devices that should run on the same schedule, you may copy a complete schedule from one point to another. Click Copy Schedule To Another Point, and then select the points to which you want the identical schedule applied.

**Edit Holidays:** If you have scheduled holidays when you do not want regularly scheduled equipment to run, click Edit Holidays to Create, Edit or Delete a holiday. This Holiday list will affect every point in the system that has a schedule and will follow the schedule on the Holiday line. If you have some points that you don't want to follow the Holiday Schedule, program an Overtime Schedule for that day.

**Undo All Changes:** If you make an error while editing a schedule, click this button to revert back to the schedule that existed before you began editing.

**Use Graphical Editor:** An alternative way to schedule is to use the Graphical Editor. The screen capture below is an example of the Schedule Graph. Notice when you move the cursor over the graph, a small time-window |Tue @ 09:00 | indicates the day and time which corresponds to that cursor position.

First, set a range of time that you would like to manipulate. To do this, use the time window to position the cursor over the day and time at which you wish to begin a range, then left-click and drag the cursor to the end of the time range and release. There are two choices for the range of time selected. Choices vary based on the binary units of measurement chosen earlier in the program screen for that point. For example, if the units of measurement for the point are ON/ OFF, your choices will be Off and On. If there is an Optimal Start setup for the point, there will also be an Opt Start button.



**STOP:** Sets the point to OFF for the selected time range.

**START:** Sets the point to ON for the selected time range. In the example above, the AHU is scheduled to be on Mon-Fri. from 6:00 am to 12:00 pm.

**Optimal Start:** Drag the mouse over the time range you would like CBAS to begin calculating optimal start/ stop. The beginning of the range indicates when to turn optimal start/stop on. The end of the range indicates the time by which set point should be reached. Example: If a room is set to 72°F, and you want it to reach that set point by 8:00, then end the time range at 8:00. The longer you give CBAS to find the optimal start time, the more accurate the result will be. However, if you know that it never takes longer than three hours to cool a building to the set point and begin Opt start less than three hours before the set point is desired.

**Snap Minutes:** Choose the intervals of time for setting schedules. Ex: a Snap Minutes of 30 means that you can set schedules in half-hour intervals.

**Clear All:** Clears all existing schedules for this point.

**Clear Holiday:** Deletes the schedule for the holidays on this point.

**Copy To:** Copies this schedule to another point. Click this button, then choose the point to which you want this schedule applied.

**24 Hour:** Commands the point ON at all times.

**Undo:** Deletes all changes made since you entered the schedule graph screen.

## Overtime Schedules

Overtime schedules should be set for events that extend or alter an existing schedule. For example, a tenant requests lights and HVAC for employees working on late night projects during the week of 05/06/17, but the original schedule sets the lights and A/ C on from 8:00AM to 6:00PM.

**Overtime Schedule for 'LIGHTS PLAZA LOBBY'** Help

2:00 4:00 6:00 8:00 10:00 14:00 16:00 18:00 20:00 22:00

Weekly Schedule

Day	2:00	4:00	6:00	8:00	10:00	14:00	16:00	18:00	20:00	22:00
Sun										
Mon				OT	OT	OT	OT	OT	OT	OT
Tue				OT	OT	OT	OT	OT	OT	OT
Wed				OT	OT	OT	OT	OT	OT	OT
Thu				OT	OT	OT	OT	OT	OT	OT
Fri				OT	OT	OT	OT	OT	OT	OT
Sat										

Buttons: Edit, Copy A Day, Delete A Day, Delete ALL Overtimes

Prev OT	Cycle 1		Cycle 2		Cycle 3		Cycle 4	
Prev Week	Action	Time	Action	Time	Action	Time	Action	Time
6/28/2020								
6/29/2020								
6/30/2020								
7/01/2020								
7/02/2020								
7/03/2020								
7/04/2020								

Buttons: Edit Holidays ..., Use Graphical Editor, Copy OvertimeTo Another Point

To program an overtime schedule, click on the point and click Program to enter the Point Program screen. Click Program Overtime Schedule to open the schedule graph window. This screen differs from the graphical editor for regular schedules in that you can choose a specific date rather than just a day of the week. The pre-set weekly schedule will be displayed in the schedule graph window. Here, you can add overtime schedules to the existing schedule.

To modify the existing schedule by adding overtime, first find the week you would like to adjust. Click Prev Week to find the week that falls before dates listed on the left side of the graph. Click Next Week to find the week following the dates listed.

**Prev OT and Next OT:** allow you to scroll through existing overtime schedules. After finding the date, click and drag the pointer to select a range of time to modify. Then choose from three options: OT OFF, OT Opt ON, and OT ON. All but the following buttons work the same way they do in the schedule graphical window, except that they are specific to the overtime schedule.

**Clear All:** Removes all overtime schedules for the selected point.

**Clear OT:** Removes a span of time selected but not yet designated as start, stop, or optimal start.

**Text View:** Lists all existing overtime schedules for the selected point.

## Optimal Start

Optimal Start is used to anticipate the heating or cooling needs of a space by starting equipment early enough to reach setpoint just at the beginning of scheduled occupancy. The Optimal Start function in CBAS does this by calculating the difference between the Actual Temperature and the Occupied Temperature Setpoint. Based on a heating or cooling slope determined by the user, the unit is started early enough to bring the space temperature to the desired level. By doing this, you can avoid putting a heavy load on the equipment that would normally occur by starting right at the occupied time and playing catch-up. Under extreme conditions, playing catch-up could mean running at full capacity for several hours before reaching setpoint.

Optimal Start is a feature that can be found under the Optimal Start button in the Program screen of any Binary Output. Go there and you'll find a screen similar to the screen below:

The screenshot shows a configuration window titled "Optimal Start for HEBIESEN LARGE AHU START/STOP". The window includes a "Help" button in the top right corner. Below the title, the "Binary Output" is set to "HEBIESEN LARGE AHU START/STOP" and the "START/STOP" mode is selected. The "Analog Input" is set to "HEBIESEN AHU SPACE TEMP" with units of "DEG F".

The "Setpoint Selection" section contains two sub-sections:

- Low/Heat Setpoint:** Includes radio buttons for "Setpoint is CBAS point" (selected) and "Setpoint is internal number". Below is a slider for "HEBIESEN LOW SETPOINT" with units "DEG F".
- High/Cool Setpoint:** Includes radio buttons for "Setpoint is CBAS point" (selected) and "Setpoint is internal number". Below is a slider for "HEBIESEN HIGH POINT" with units "DEG F".

The "Cooling Parameters" section has a "Slope" of 15 minutes per degree. The "Heating Parameters" section also has a "Slope" of 15 minutes per degree.

The "Adaptive Control" section has a checked checkbox for "Allow optimal start to adaptively adjust the cooling and heating slope" and a "Show Adaptive History" button.

## New Features in 3.1.6

Optimal Start is programmed on a Binary Output that starts and stops an Air Handling Unit. There must be a weekly schedule programmed on the point to begin with.

The screenshot shows a software interface titled "Optimal Start for ESB AHU 1 SCHEDULE". At the top, it displays "Binary Output ESB AHU 1 SCHEDULE ON/OFF" and "Analog Input ESB AHU 1 SPACE TEMP DEG F". Below this is a "Setpoint Selection" section with two sub-sections: "Low/Heat Setpoint" and "High/Cool Setpoint". Each sub-section has two radio buttons: "Setpoint is CBAS point" (unchecked) and "Setpoint is internal number" (checked). The "Low/Heat Setpoint" has a value of 72 DEG F, and the "High/Cool Setpoint" has a value of 76 DEG F. Below the setpoint section are "Cooling Parameters" and "Heating Parameters", both with a "Slope" of 10 minutes per degree. To the right of these is an "Undo ALL Changes" button. At the bottom is an "Adaptive Control" section with a checked box "Allow optimal start to adaptively adjust the cooling and heating slope", a "Max adaptive slope adjustment" of 0, and a "Show Adaptive History" button. A note below the slope adjustment says "Set to 0 to not use this feature".

If looking at an older existing Optimal Start, the “Setpoint is a CBAS Point” box would be checked and your Setpoints listed. You can still do Optimal Start that way, but now you can enter your Heating and Cooling Setpoints right there on the Optimal Start screen. Just check the “Setpoint is internal number” box and enter your setpoint numbers. This makes setting up Optimal Starts on multiple controllers much easier than before.

## Adaptive Optimal Start

When you check the box to “Allow OPTIMAL START to ADAPTIVELY adjust the Cooling and Heating Slope,” CBAS will save several parameters about the last 16 Heating and 16 Cooling Optimal Starts. The parameters saved are:

- Slope
- What the temperature difference was when the Optimal Start began.
- How long before the Schedule Start time did the Optimal Start begin. (Actually, not stored but can be calculated from A and B above)
- Did the Optimal start reach its goal? If not, then what was the temperature difference at schedule start time?

- The day the Optimal Start ran.
- Was the unit off for more than 36 Hours when the Optimal Start first evaluated? (Tells you if it was after a Holiday or on a Monday)

You can click the “Show Adaptive History” button to see the data on the above parameters. Once you have enabled Adaptive Optimal Start, CBAS will determine the “slope”, or amount of time required to change the temperature by 1 degree, and adjust on a daily basis.

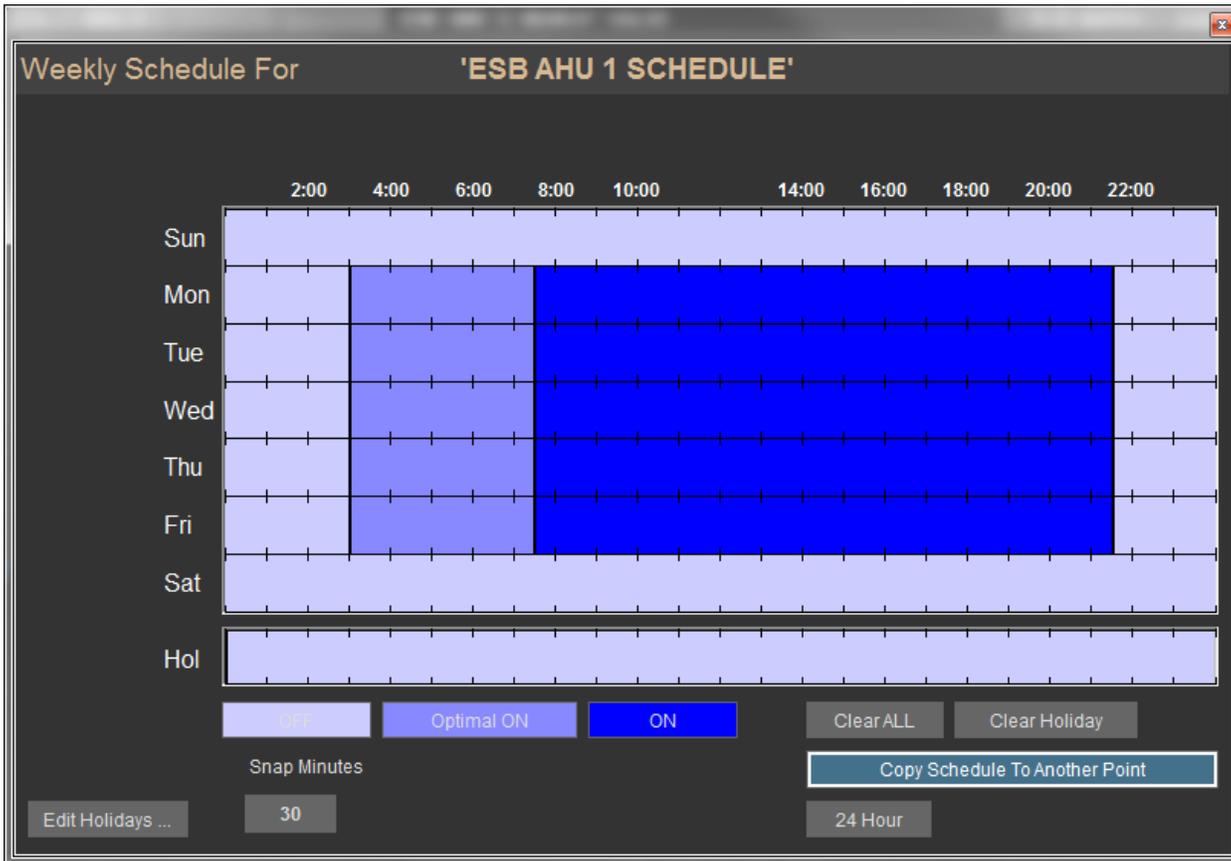
Cooling and Heating parameters need to be determined unless using Adaptive Optimal Start. The slope parameter is the number of minutes it takes the AHU to change the temperature by 1 degree. By looking at histories, you should be able to determine this information.

- Do a History Graph on the AHU Binary Out and select the space temperature point to be graphed also.
- Look at the time when the unit first comes on for the day. In cooling mode, you will see the binary point come on and the graph of the space temp will begin to go down.
- By zooming in on that part of the graph, you should be able to tell exactly how long it takes to lower the temperature by 1 degree. But you might want to see how long it takes to change by 3 or 4 degrees and take the average.
- Do the same thing on a day when heat is required. **Note:** These slopes might have to be adjusted in the future.
- Enter the slope times in the appropriate places on the Optimal Start setup screen.

Once you have saved the Optimal Start by exiting the setup screen, you now have to determine when to start the Optimal Start and add that to the schedule. If using Adaptive Optimal Start, the Slope will be determined for you, and your schedule can be adjusted accordingly.

- Do a history on the Space Temperature point for a week, during the hottest and coldest times of the year.
- You will be able to see how high or low the temperature got in relation to the setpoint. Subtract the lowest and highest numbers from the respective setpoints to get the maximum number of degrees change needed.
- If you are using a “night Setback” or Unoccupied Setpoint to keep from getting too far away from the Occupied Setpoint, you can just subtract setpoint from the unoccupied setpoint to get the maximum number.

- Multiply this number by the larger of the two slopes determined earlier to get the amount of time the Optimal Start schedule should precede the regular schedule. (Maximum Slope, 30 Mins) X (Maximum Degrees, 5) = 2.5 Hours)
- Open the Schedule for the point in question and you will notice that the first column of the schedule is labeled Optimal Start. You can edit this column or use the Graphical Editor by clicking the button.
- In the Graphical Editor, click and hold the pointer at 2.5 hours before the beginning of the regular schedule, and then drag down and to the right to fill up the space (see figure below).



- Let up the mouse button and the line around the time period remains.
- Click the Optimal Start button below and the time period will change to the color of the button. (Start, Optimal Start, and Stop sections are different shades, as are the corresponding buttons)
- Exit the Schedule Editor and the Schedule will be saved.

You will need to monitor the operation by graphing some histories of the space temperature and Start/ Stop points for the unit to see if any parameters need to be adjusted. There should be no need to shorten time periods during mild weather periods, because the schedule will not turn the unit on until it needs to.

*\* Very Important Note! \**

*If using CBAS points for setpoints, you have to “command” your setpoints or they will not work correctly, even if you have set the limits to a range of 1 degree on the point program screen. When you create a setpoint in CBAS and set the range on the setpoint (70-74), the value of the setpoint is 0 until you command it the first time. The value of the setpoint is 0 even though it will be displayed as the lower limit (70). This causes PIDs and Optimal Starts to not work. For example, a user created a setpoint and set its range from 74 to 74 because he never wants the setpoint to change. He then used this setpoint in an Optimal Start. The Optimal Start would come on at the beginning of the scheduled time period every day. The setpoint was showing a value of 74 but really it was 0. As soon as he commanded the setpoint to 74 it started to work.*

# PID

The combination of Proportional, Integral, and Derivative (PID) produces a versatile and robust sequence that reacts immediately to disturbances, has zero steady-state error and begins backing off before a set point is overshoot. CBAS has made many advances in the automation of standard (PID) control systems. One of these is the Auto-tuning and learning PID. This simplifies the automation of many valves and damper systems to maintain precise space, chilled water, and hot water temperatures. A PID is programmed on any analog output point and needs two additional points, a feedback and a set point, to complete the PID loop. The feedback, usually a temperature sensor, must be a hardware analog input. The set point will be an analog software point. The following screen is from the PID editor:



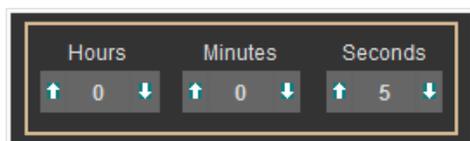
**Proportional:** % of change X Error. Error = desired - actual.

**Integral:** The time it takes for the controller to adjust to the error.

**Derivative:** How far the controller looks ahead to predict error. The larger the derivative, the farther the controller looks into the future.

To program a PID, click the analog point, click Program, and then click the Program PID button.

**Rate:** How often CBAS runs the PID.



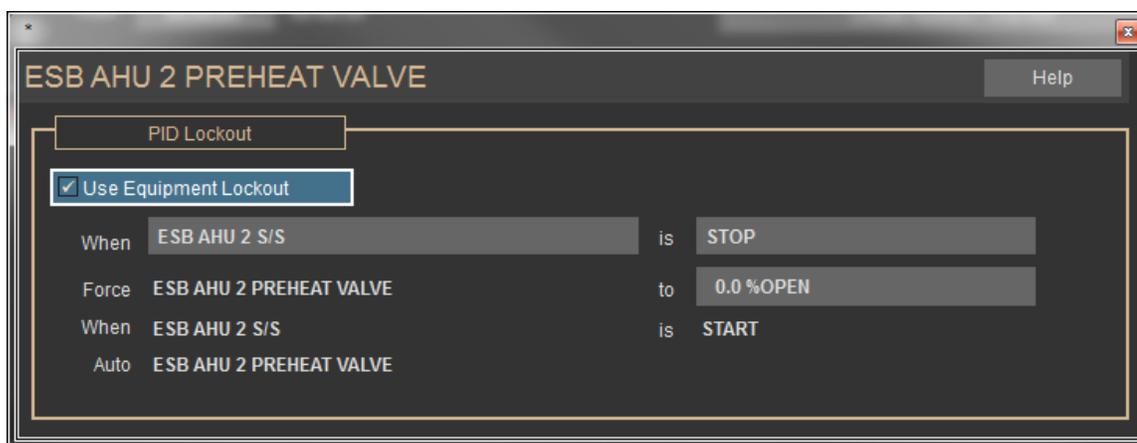
The more often CBAS runs the PID, the more quickly the setpoint is reached. In this example, CBAS runs the PID every five seconds. Click the rate and either use the arrows to adjust the time (see image below), or click the number of hours, minutes, or seconds to type in a new quantity of time. Right-click inside the window to save changes and return to the PID editor.

**Some Default Parameters:** Click this button to see some tried and true parameters used by Computrols field technicians. There are values for controlling Space Temperature, Supply Temperature, and Static Pressure. It is recommended that you use these numbers before trying Autotune.

**Auxiliary Setpoint:** This feature creates a setpoint range rather than a single setpoint. When you click this button, a window will appear with a list of points from which to choose. The original setpoint will become the high range, and the point you select here will become the low range. Now, the quantity will remain within this range.

**Create Lockout:** This feature will allow you to disable the PID, and close the actuator you are controlling, when the unit is off. Click this button and choose the Start/ Stop point for the unit, and the rest will be done for you. You can reverse the action by clicking on STOP, or change the lockout percentage by clicking 0% OPEN.

See the figure below:



**Gain Schedules:** This function is used so that you can avoid re-tuning PID as seasons change. Setup to three PIDs for when the value changes for the Season point or Outside Air point you choose.

For example, a cooling tower's capability to cool water varies based on the outside temperature. Therefore, auto tuning would result in a different PID on days with different temperatures. To efficiently reach setpoint, setup a PID for winter and a second PID for summer. The PID will change linearly between the two values.

**Initiate Autotune:** If default parameters do not satisfy your needs, try Autotune, which is a feature found only in Real Mode. When you click on the button, you will be asked a series of questions, and then the process will start.

**Initiate Manual Tune:** Click on this button to easily adjust the Oscillation of the damper and speed up the adjustment time while watching the results in real time.

**PID Internals:** Shows the numbers behind the actual operation of the PID.

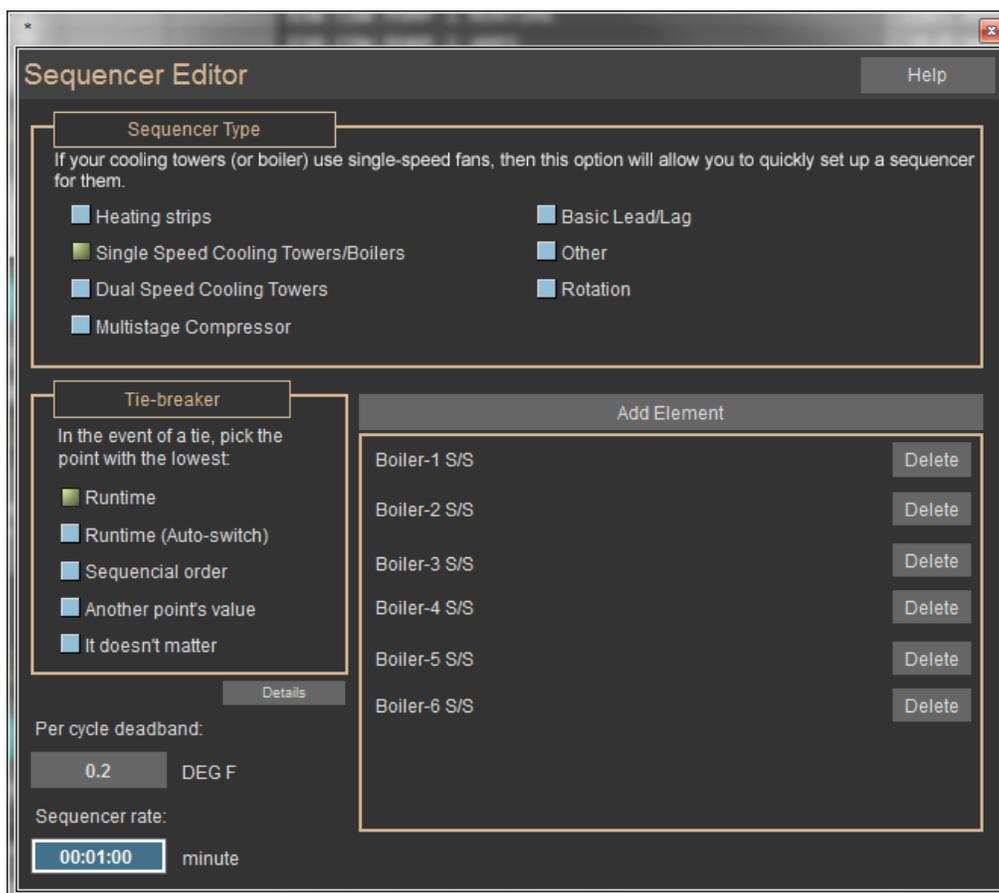
**Copy to Another PID:** Allows you to copy the parameters of this PID to other PIDs in the system. Click the button and choose PID points you would like to copy to.

## The Sequencer

A good way to tell if you need a sequencer is to ask yourself this question: “Do I have multiple pieces of equipment that combine to control a single entity—such as supply temp?”

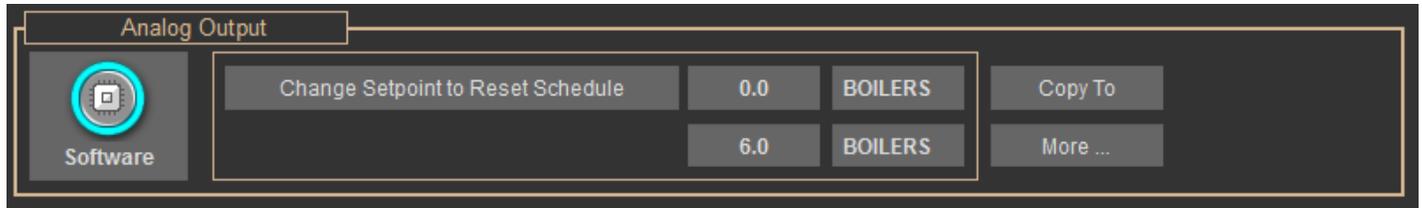
If the answer is yes, then the sequencer is for you—even if you don’t want to use fancy runtime rules. The simple analog quantity is both simpler and works far better.

A sequencer takes several binary points and combines them into a single continuous analog output. This feature can be found on the Point Program Screen of a Software Analog Output Setpoint. Click the Setpoint, click Program, then click Program Sequencer. The Sequence Editor is shown in the image to the below:



Recently, a Computrols Dealer, used the Sequencer to automate the use of six Boilers in one of the buildings at the Statue of Liberty National Monument. He wanted to sequence the boilers based on need and lowest runtime. First, he added runtime points to the status points for the boilers and linked the status to the Start/Stop points. He then went to the sequencer and added the six boiler Start/Stop points as well as choosing the type of equipment to sequence (see screenshot, top left).

The next step is to make the range of the units on the point containing the Sequencer “0-6” (see screenshot, bottom-left).



Next, he created a logic sequence that commands the Sequencer point to the right number of Stages based on need. In this case, he used a logic sequence.

Because “Runtime” is selected in the Tiebreaker section of the Sequencer Editor, the Boiler with the least amount of runtime will be the first to come on when a boiler is needed. The Boiler with the most amount of runtime will be the first to go off when one is no longer needed. If “Runtime (Auto-switch)” had been selected, then a boiler would be shut down and another automatically started when runtime dictates. When adding elements to the Sequencer using Auto-Switch, you will be prompted for the “Auto-Switch Difference”, which is the number of minutes that the highest runtime must be over the next highest runtime before it is shut down and another element started. Without Auto-switch, the starting order of the Elements only changes when one with a higher runtime is shut down, thus moving the others up in the order.

Other choices in the Tie Breaker section include:

- Sequential Order starts and stops Elements in the order they are added in the Elements section.
- Another Point’s Value allows you to throw in a wild card based the activity of other equipment, like cooling towers. You will be prompted for the other point each time you add an Element.
- If you choose It doesn’t matter, the Sequencer will arbitrarily choose the next Element for you.

Per Cycle Deadband is used to prevent short-cycling equipment, just like any other Deadband. Normally, if the point is calling for 1.5 Boilers, the 0.5 will round up and the next element will come on. If you set the Deadband at 0.2, the next element will come on at 1.7 ( $1.5 + 0.2 = 1.7$ ), and when a unit must go off, it happens at 0.3.

The Sequencer Rate determines how often the sequencer evaluates the conditions. It could also be looked at as the amount of time to wait between commanding pieces of equipment on or off. However, if two or more elements are needed, they will be started at the same time after the Sequencer Rate time has elapsed. In the example above, the Sequencer Rate is unnecessary because the logic will only allow the number of boilers needed to change by one every ten minutes. A Rate of one second would be fine in this case.

If two or more elements need to be started at once, by default they will be started at the same time, after the Sequencer Rate time has elapsed. There is a way to limit how many pieces can start at one time. There is a small “Details” button just below the Tie Breaker section of the Sequencer Editor.

If you change the “Maximum cycle changes per evaluation” to one, only one element will come one. After the Sequencer Rate time has elapsed, the Sequencer will evaluate again and another element will come on if

needed. By default, this parameter is set to eight, which will allow all elements to come on at once. In the case of chillers, this can cause an electrical surge and possibly an additional charge from the power provider.

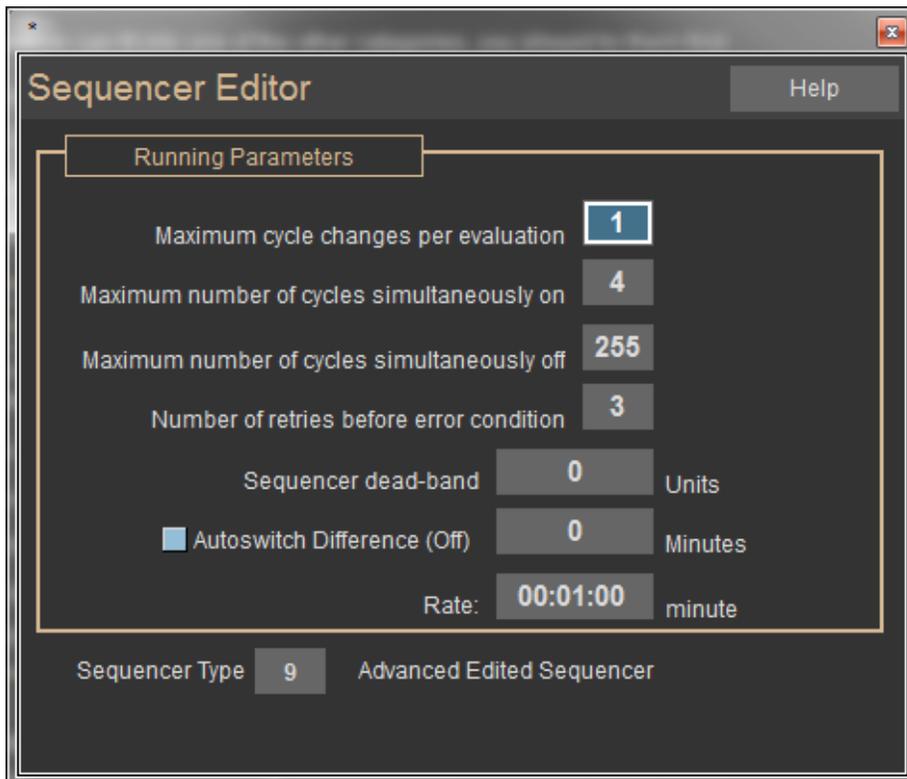
Let's say you have eight boilers and you don't want to use more than six at any time. Change "Maximum number of cycles simultaneously on" to six. The same can be achieved by setting the high range of the analog point to six.

Let's say you want to make sure that there is always one boiler on. Change "Maximum number of cycles simultaneously off" to seven. With a total of eight elements, that will leave one on. The same can be achieved by setting the low range of the analog point to one instead of zero.

There is a limit of eight "Elements" in the sequencer. Rudy had a situation in another building where he needed to sequence ten boilers. To get past the eight-element limitation, he programmed two sequencers with five elements in each. Then he added logic that makes one sequencer the Lead and the other the Lag. His logic toggles the Lead and Lag once a week. He could also use a third Sequencer set on Basic Lead/ Lag to do the same.

If an element is part of a Binary In/Out combination, or Linked Binary, this is automatically recognized. In this case, if an element fails to start, it will be locked out of the sequence and another element is started. The Priority of starting or stopping an element is Logic Level

- A failed unit is locked out with Priority Logic Level
- Having "Linked Binary" points gives you the full functionality of the Sequencer, by enabling the "Lock-out" functionality. You can link Binaries by clicking the Link to Binary button on the Point Program Screen of the outputs.



You may need to Scale Database when adding Elements to the Sequencer. If so, you will get an error message when closing the Sequencer Editor: *“Cannot save this resource in side panel XXXX because there is no space available. Sequencer Element Table is full.”* To scale the database, go to Utility Mode and Scale Database on the System Menu. If you are using more than 1 Sequencer, raise the number of Sequencers. Then, raise the number of Sequencer Cycles to meet the total number of elements.

## **Basic steps to setting up a Sequencer:**

- Add your start/ stop (Binary Output) points for the elements of the Sequencer.
- Add status (Binary Input) points for those elements (preferred).
- Link the outputs to their corresponding input points (preferred).
- Add runtime points to either the input or output (this must be done *before* adding Elements to the Sequencer if controlling by Runtime).
- Add a software analog output setpoint to contain your Sequencer
- From the Point Program Screen of the AO point, click the “Program Sequencer” button.
- Choose a sequencer type.
- Choose a tie breaker.
- Add elements.
- Make any necessary changes under the Details button.
- Save your settings by exiting the Sequencer Editor
- Change the range and units on the Point Program Screen to match the equipment you are controlling. (*Example: 0-6 Stages*)
- Write logic or PID on that point to change the number of stages/ elements based on need.
- Test your Sequencer.

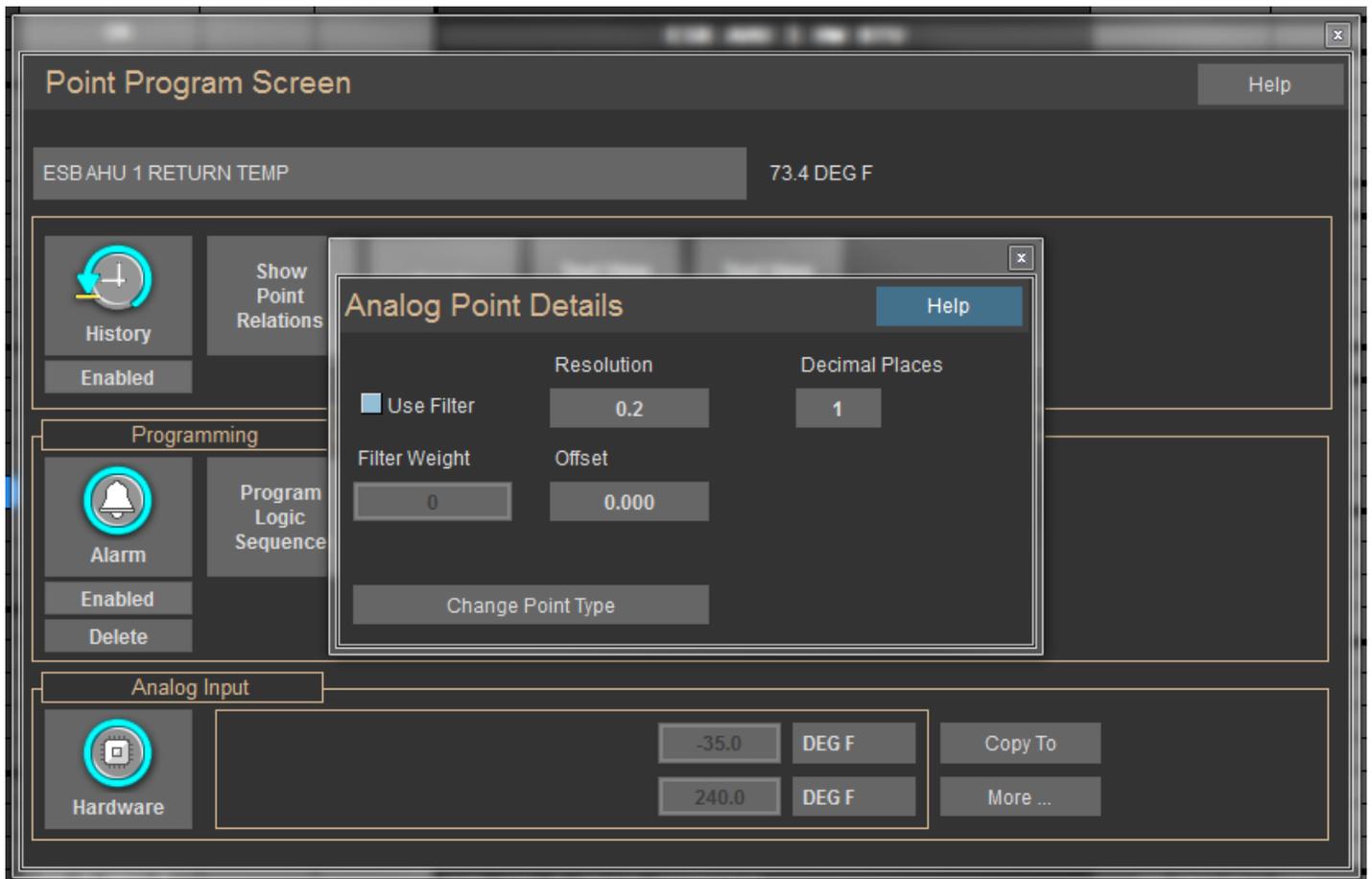
If the settings in the Sequencer Editor need to be changed, you must delete the Elements, make changes, and re-add them.

## Change Point Type and 10K Type 2 Sensors

Did you know that you can now use 10K Type II temperature sensors in addition to 10K Type III in CBAS? This means that if Type II sensors are in place when retrofitting controllers at a site, you don't have to change them.

The use of Type II is limited to the LX line of controllers, as they have more space to fit the needed Ohms-Degrees lookup table into memory on the controller. You must have a CBAS 19 version and LX firmware dated January 15, 2020 or later for this to work.

To get one of these Type II sensors into CBAS you first add a regular Deg F point to an LX controller in Hardware View. Click the point then click Program to see the program screen. In the bottom right you will see the MORE button. If you don't see the MORE button, log on as a user that has full rights, like the Computrols user.

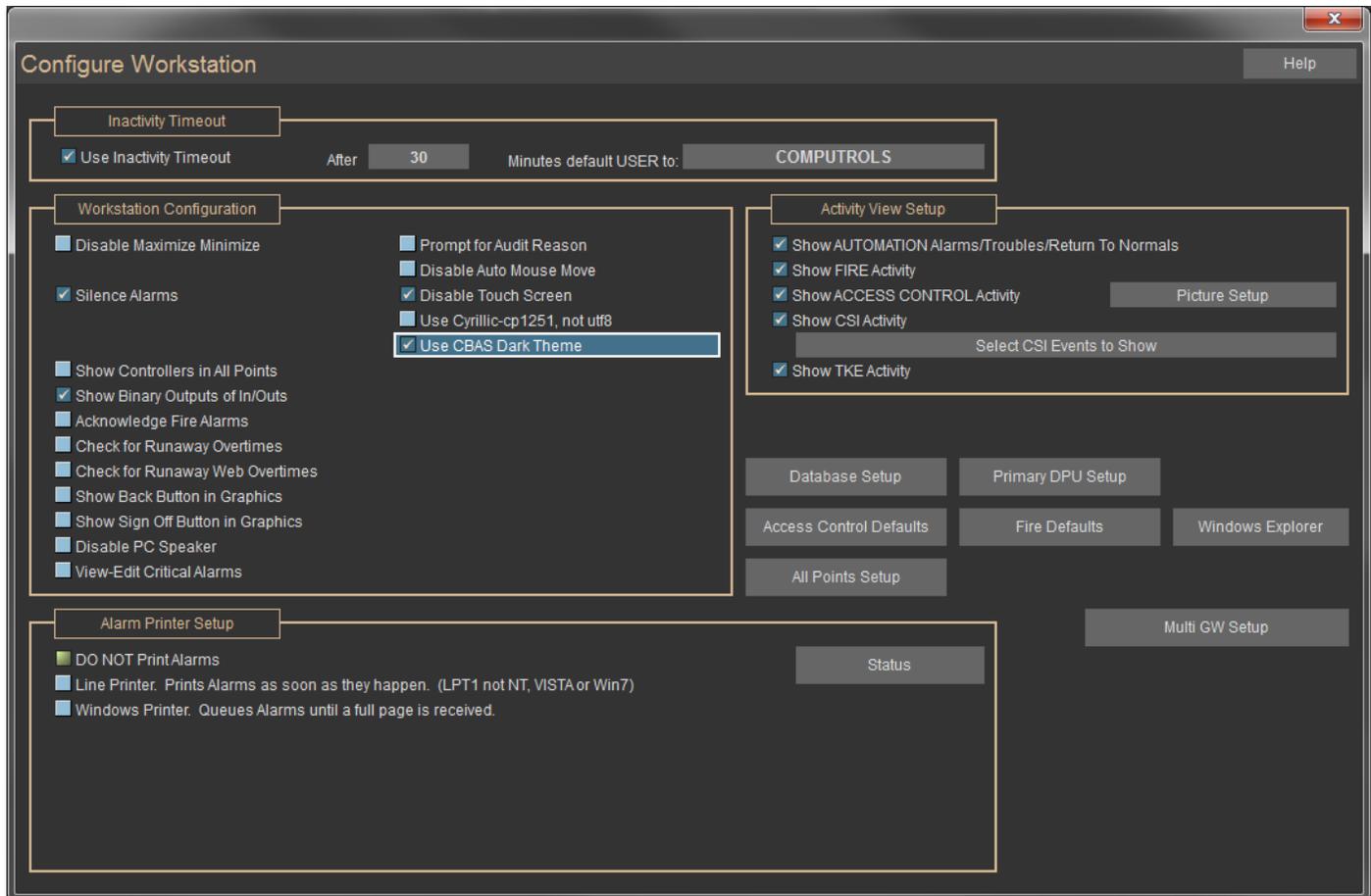


Click the MORE button and in that screen, there is a Change Point Type button. Click it and you will be asked a series of questions which you will answer No to until the fourth question: 'Do you want to change the point from a 10K Type III sensor to a 10K Type II Model 24 temperature sensor?'. Answer Yes. When you go back to Real Mode, erase the database on the controller so that the change will download. That's all there is to it!

In the first 3 questions, you can also change the point type from a 10K Type III Degrees Fahrenheit to Degrees Centigrade. The second question asks if you want to change it to a Voltage Input and the third question is to change to an Ohms input.

## Changing to Dark Theme Colors

Did you notice in the picture above that CBAS looked darker than you are used too? That is because it is running with the Dark theme as opposed to the regular CBAS theme from the past. If you would like to try it, go to System, then Configure Workstation. Check the box to Use Dark Theme and Escape then follow on-screen instructions.



# Description of Software Points

When you add a software point to a controller, you have to choose from a long list of point types.



In the list above, some of the more obvious point types are not shown because the list is scrolled to the bottom. Here's a brief explanation of the point types on the list.

## Analog Types

**Analog Output:** Some of the most obvious point types are Analog Output (Setpoint) or (Reset Schedule), which are actually the same point type. By going to the point program screen on either of these points, you can convert the point to the other type by clicking a button. A Setpoint is pretty obvious, but a Reset Schedule is used to change your setpoint automatically, based on another input, like an Outside Air Temperature point. To setup a Reset Schedule, add the point and go to the Point Program Screen, then click on the Program Reset Schedule button. From the Reset Schedule Program Screen, you can choose your input point and temperatures.

**Calculation:** The Analog Input (Calculation) point type is mainly used to calculate a Setpoint Error or an average of several temperature points in a space. To configure this point type, go to the Point Program Screen and click the Program Calc button. The logic is programmed just like any other logic.

**Meter Total:** The Meter and Meter Total points are used in conjunction with pulse meter Counter points to convert the pulses into usable data like KWH or BTUs. Setting up these points is somewhat complicated and is another complete article. For complete instructions, see Chapter 7, Section 2, Pulse Meters.

## IEEE 754 Float Types

These point types are the same as the previous Analog types except that behind the scenes, they are Floats instead of Integers. This means that the points can represent much larger numbers and are compatible with Modbus float points in calculations.

Here's the difference between Analog and Analog Float points. If you select Analog Input under Analog Types you get the old Analog Type. If you select Analog Input under IEEE 754 FLOAT TYPES you get the new Analog Float point type. Both points work with logic, but there are differences between the 2.

**Analog Point Type:** This point is stored internally as an integer. Its max range is 0-65,000 for unsigned and –32,000 to 32,000 for signed values. When doing logic, the math is done as integer math. An Integer does not have a decimal place. We fake out the decimal place when displaying it to the user. You can set the min and max range on this type of point.

**Analog Float Point Type:** This was added to CBAS just a few years ago. Internally this point is stored as a real floating point number. Not an integer pretending to be a floating point number. A floating point number can represent 7 significant digits. It can have any number of decimal places or store very large numbers and very small numbers. So it can store values that the old Analog point type cannot. But you can't set the min/max range on this point type. With Analog Float points you also have the option to scale the points value using the point slope formula  $y = mx + b$ .

So you can add both types of Analog points to CBAS. There is NO conversion between the 2 Analog point types. If you added it as Analog Float you would have to delete and re-add as Analog.

## Binary Types

**Event Sequence:** The Binary Output (Event Sequence) point type is a good place to put a Schedule, Overtime, or Logic that will control other points or operations. It works just like any other hardware binary output.

**Logic:** Since this is an Input, you cannot put a Schedule or Overtime on it, but it is a good place to put logic that sets the value of the point itself. Many times this point is used as a status point that monitors amps and can be linked to an output that controls a piece of equipment.

It is also used to monitor other alarms and act as a "Master" or "Critical" alarm for a group of alarms.

## Multi-State Types

Multi-State points are Output points that simulate 3, 4 or 5 state outputs. They can be used to simulate the standard states of a wall thermostat (Off/ Heat/ Cool). Multi-State software points appear to be supervised points, but they are not. There is also a Generic Multistate point that can have up to 10 states.

## System Types

The next section of points is the System Points. The term “System Points” means that the data for these points is derived locally from the system or DPU computer.

**DPU Run Minutes:** If added to a controller’s database, this point gives you the amount of time the computer on the controller has been running without rebooting. If added to the DPU database, it tells you how long the DPU has been running without rebooting. This point type is mainly used for troubleshooting purposes.

**Month of Year, etc.:** Month of Year, Day of Week and the rest of the time-related points give you information from the calendar or clock of the DPU operating system. For example, the Month of Year point gives you a 1-12 depending on what month it is, and Day of Week gives you a 1-7 depending on what day it is (Sunday is 1). These points can be used for many things, but here is one example: Suppose you wanted a different schedule for each month to control when outside lighting is on. Create a Month of Year point and an Event Sequence for each month with a different schedule on each one, and add a Binary Out (Logic) with a logic like:

**If Month of Year is X**

**And X Month Schedule Point is ON**

**Then on Binary Out (Logic) point**

**Else if (Same thing for next month)**

The final step would be to add logic to the point that is being commanded. This logic would turn the point on when the Binary Out (Logic) point is On.

**DPU Communications Lost:** This point works in conjunction with the DPU Comm Lost Timeout point and is mainly a tool for troubleshooting communication problems. When added to a controller, the Communications Lost point will output a status of YES if there is no communication between the controller and the DPU for a certain time period (default is 10 minutes). The time period is adjustable by commanding the Timeout point to a value (in seconds).

You would have to add some logic to this point or another point on the controller to make use of this point, because you will never see it from the DPU when it is true.

The possibilities for using these system points are infinite. Use your imagination when programming a difficult sequence of operation and you can probably put some of these point types to use.

# Chapter 5 » Graphics View

## Getting Started with Graphics

### Overview

Where do I start and what are the possibilities? How do I make the background pictures? A CBAS user may be asking these questions when he gets ready to do graphics for the first time.

The first thing the Dealer should do is take a look at the graphics that come with CBAS Demo software. The software no longer comes with example databases as of CBAS 15. You can obtain an example from Computrols Tech Support.

Open the database, go to Graphics View, and choose Home Page. You'll usually see a picture of the building and a column of links for each floor, Cooling Tower, and Central Plant. Click on a floor and you'll see the floor plan, with statuses of the various temperature sensors and links to the Air Handling Units on the floor. Click on one and it will take you to a graphic of the AHU with many points listed.

Notice that the links to the floors are still there on the left side.

Hold down the CTRL key and hit E. This will take you to Program Graphics Mode, where you will see only the points, links and labels that are peculiar to the graphic. Hit the spacebar on your keyboard and the background picture will reappear. Hit it again and it goes away. You'll notice that the labels for the points can be embedded in the background picture. This can be a good way of doing graphics if you have many graphics that are exactly alike or very similar because all your AHUs use the same JPG image file.

Double-click in the open space in the middle of the page and you will see a configuration window, where you select your background picture. The browse button can be used to select a picture, if you were adding a new graphic page. Right-click the Graphic Picture window to close it.

Double-click the Return Air Temperature, and you will see the Graphic Object configuration window. Notice that the Object Type is "Point" and the point name is listed in the object attributes. The only attribute that is checked is Show Value. In this case, the only thing that will be shown is the temperature. Nothing else is needed, since the rest of what is needed; frame, point name, and units (degrees Fahrenheit), are embedded in the background.

Double-click one of the floor links on the left of the screen and you will see a similar configuration window, but this time, the object type is "Label." Close this window and drag the object to the right, exposing another object. Double-click the exposed object and you'll see that the object is a link. Click on the link name and you will see a list of other graphics that you can choose to link to. Right-click to close the window.

Duplicating graphics makes a building like this easy to program. Hit CTRL-D to see the Graphic Picture window again. Change the name then click in the Find field at the bottom. Type the number of the AHU you are duplicating, like 19-W, then type 50-S in the replace field. Hit the enter button and now you have a new graphic

for AHU 50-S (fiftieth floor South). Right-click then go to Select Graphic on the main menu. Select AHU 50-S at the bottom of the list and you will see your new graphic. Notice that all the links are there and the Label at the top has changed. All you have to do now is click each point and select the right point for that floor. If the point names were exactly the same from one AHU to the next, the points would be changed for you. However, in this case, 50-S doesn't exist, so the point names would not have changed. To get out of Program Graphics mode, press CTRL-E again.

## Graphics Library

Included with every CBAS version, there is a Graphics Library folder located in the CBAS folder. Inside the folder, there is a GraphicsLibrarySetup.exe, which you must click on to unzip. Explore it and you will see that the graphics are divided into categories and subcategories. The majority of them are sized to fit the CBAS graphics window when using a screen resolution of 1024x768. Many of the graphics are 3-dimensional, and some of the .max files are provided so that you can change them using the program they were created in, 3-D Studio Max.

## Visio BAS Graphics

While standard system graphics continue to be offered with CBAS licenses, Computrols, Inc. is pleased to announce a powerful tool developed specifically for the continued success of our dealers: the CBAS Visio Graphics Library/Stencil. This compilation of industry-specific graphics was developed for use with one of the business world's most popular programs, Microsoft Visio. Contact Computrols for more information.

## Other Programs

The graphics in the library can be manipulated using any illustration program, such as Adobe Illustrator. Windows comes with a limited illustrator called Paint, which can be used to add or change the labels that won't differ from graphic to graphic. You can also take digital pictures and manipulate them with a program like Photoshop.

Wiring diagrams can be made using Microsoft's Visio program, which is designed for making network maps and flowcharts. Some dealers are using this program for all their graphics, since CAD drawings can be inserted as backgrounds and other objects or labels can be layered on top. Visio accepts dwg and DXF files, but it seems as though you have to match your Visio version to the right version of Auto-cad, or Visio will not accept them. Once the drawing is complete, it can be exported in many different formats to be used as CBAS graphics.

AutoCAD drawings and portions thereof can also be exported as, JPG, GIF or BMP (bitmap) files. You might have to play around with the size of the exported files in order to make them fit right in the CBAS Graphics window. Be aware that the resolution of the resulting export can leave a little to be desired, as labels that are large in CAD are very small as JPGs. However, labels that are too small to read can always be re-written using an Illustrator program.

**Note:** The size of CBAS graphics background pictures depends on the resolution of the monitor you are using. To get the size of the background at a different resolution, subtract 8 x 134 pixels from the total resolution. The most common resolution we use now is:

1920 x 1080, use a size of 1912 x 944.

Some older sizes were:

1280 x 960, use a size of 1272 x 824.

1680 x 1050, use a size of 1672 x 916.

1280 x 720, use a size of 1272 x 584.

## Back Button and Sign-Off Feature for Graphics

In the Configure Workstation dialog there is a new check box named "Show BACK button in Graphics". Check that box in order to display a BACK button in each graphic. Selecting the BACK button will take the user to the previously visited graphic.

**Note:** The BACK button will appear starting with the second graphic visited

The BACK button will appear as a giant button right in the middle of the graphic.

Enter Edit Graphics (CTRL+E) mode and edit the BACK button (name, colors, screen pos, size, font...). That will become the default BACK button. This button will then appear on every graphic page and it will be exactly the same on every page. The Sign Off button works the same way.

If you edit the BACK button on any page it will change it on ALL pages. There is only 1 BACK button. The BACK button will disappear if the user goes back to the beginning. The back queue is only 20 items deep. So you can only press back 20 times before the button will disappear. Previously, the BACK button only worked for the last 10.

If there are issues with the back button you can reset it back to its default values by deleting the CBAS.reg1 and CBAS.reg2 files in the CBAS directory. The BACK button settings are stored in this file along with anything else that gets read/written to/from the registry. For Workstations, copy the CBAS.reg1 and cbas.reg2 to the CBAS folder on the GW, or the back button will be placed in the middle of the graphics screens.

Of course, you can also use the middle mouse button to go back one graphic.

# Hotkeys for Use in CBAS Graphics Programming

*Note: Print this page as a quick reference to keep next to your keyboard.*

## General

When creating or editing graphics in CBAS, it is always best to use the hotkeys rather than using the menus.

**Middle Mouse Button (Scroll Wheel):** Takes you back to the last screen you were in when not in Edit Graphics.

**CTRL+E:** Toggles from Program mode to regular viewing mode if you're already in Graphics View.

Insert Graphic (**CTRL+Insert**)

Delete Graphic (**CTRL+Del**)

Duplicate Graphics (**CTRL+D**)

Position Graphics (**CTRL+Shift+P**)

Delete Multiple Graphics (**Alt+Del**)

Show/Hide Art (**Space Bar**)

Global Edit Object (**Alt+E**)

Insert Object (**INS**)

Delete Object (**Delete**)

## Moving Objects

Arrow Key moves object 20-pixels Arrow Key+CTRL moves object 1 pixel

## Sizing Objects

Arrow Key+Shift sizes object 20-pixels Arrow Key+Shift+CTRL sizes object 1 pixel

## Aligning Objects

Make Same Width (**Alt+Shift+W**)

Make Same Height (**Alt+Shift+H**)

Make Same Size (**Alt+Shift+S**)

Space Across (**Alt+Shift+A**)

Space Down (**Alt+Shift+D**)

Align Left Edges (**Alt+Shift+Left Arrow**)

Align Right Edges (**Alt+Shift+Right Arrow**)

Align Top Edges (**Alt+Shift+Up Arrow**)

Align Bottom Edges (**Alt+Shift+Down Arrow**)

## Layering Objects

Copy (**CTRL+C**)

Paste (**CTRL+V**)

Cut (**CTRL+X**)

Paste to Multiple Graphics (**CTRL+Alt+V**)

Send Backward (**CTRL+B**)

Send to Back (**CTRL+Shift+B**)

Send Forward (**CTRL+F**)

Send To Front (**CTRL+Shift+F**)

# Graphics View Menu

## Home

This first menu selection will bring the user to the “Home” or the designated default starting graphic.

## Select Graphic

This menu item allows you to go to any graphic in the database whose Hidden checkbox has not been checked. When left-clicked, a drop-down menu with a list of graphics from which to choose will open. They are listed in the order they were created. Left-click the graphic you wish to select. The last option is “More,” which will open a list of all existing graphics.

The preferred method of editing graphics is to go to the graphic you want to edit, and use the hot-key combination CTRL + E to enter Program Graphics Mode. When you do this, you will see the menu change as below:

A graphic is a screen that represents a floor, controller, piece of mechanical equipment or any group of objects that you wish to view and manipulate from one screen. Here are explanations of the menu items in the Program Graphics menu.

## Program Graphics

This menu item reveals the Program Graphics sub menus. Select this option to enter the area of the software that allows you to create and edit CBAS graphics.

## Program Graphics Sub Menus

### Select Graphic

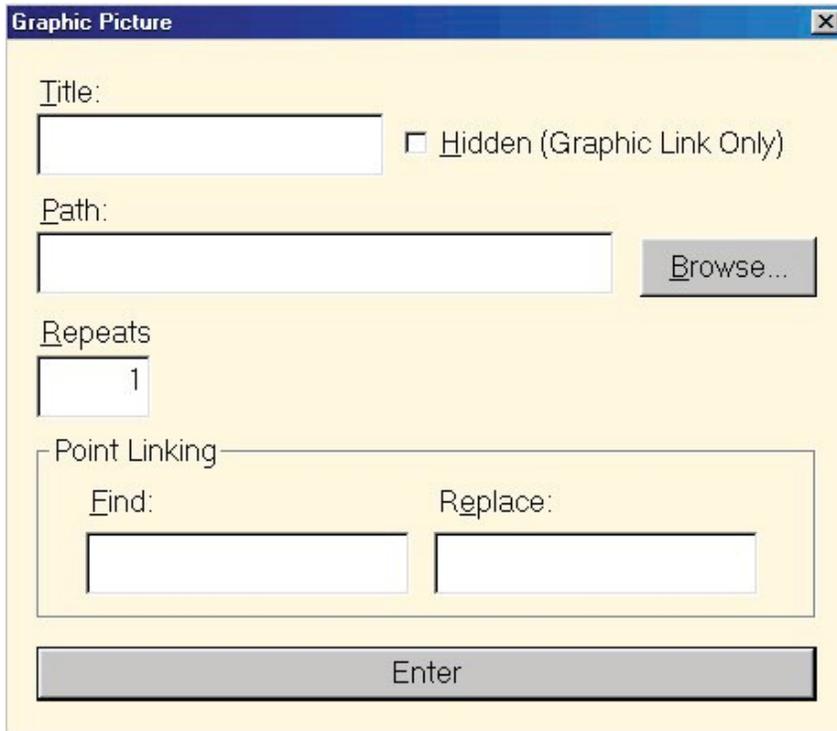
This menu item gives you a list of existing graphics already programmed in the database. Choose the graphic you want to edit from the drop-down list.

### Graphic

The Graphic sub-menu allows you to perform a number of tasks related to individual or multiple graphics in the system. A Graphic is really a background picture (.JPG or .BMP [bitmap]) on top of which objects are placed. When you insert a graphic, you insert a picture, and then add the objects on top of it.

## Insert Graphic (CTRL+Insert)

Inserting a new graphic into the current database is simple. When this command is selected, you will be prompted with the figure below. The information entered here will be applied to the graphic being installed. When you first get CBAS, you will be given some graphics to choose from.



The image shows a dialog box titled "Graphic Picture" with a close button (X) in the top right corner. The dialog box has a yellow background and contains the following elements:

- Title:** A text input field.
- Hidden (Graphic Link Only)**: A checkbox.
- Path:** A text input field with a "Browse..." button to its right.
- Repeats:** A spin box containing the number "1".
- Point Linking:** A section containing two text input fields labeled "Find:" and "Replace:".
- Enter:** A large button at the bottom of the dialog.

**Note:** *The Graphic Picture window's properties can be changed at any time by simply double-clicking the background of the current graphic while in editor mode.*

**Title:** Text entered here will be the title of the current graphic. This is the name that shows up in the Select Graphic submenu. Again, this property can be changed at any time by double clicking the background of the current graphic while in editor mode.

**Hidden (Graphic Link Only):** This feature is useful for hiding certain graphics from users who are password-protected from programming graphics. Checking this checkbox will hide the current graphic's title from the Select Graphic submenu when you are only viewing graphics. Even if this option is checked, the current graphic's title will be displayed when programming graphics.

**Path:** This is where the graphic file (JPG, BMP, etc.) is physically stored on your computer or on the network. As of CBAS 17, all graphic background files, and animation files, have to be placed in the Graphics folder at the right path as discussed in the first chapter: C:\CBAS20\Sites\[database name]\Graphics. Do not place subfolders or the contents will not work in CBAS. For versions older than CBAS 17, the path can be typed in or browsed for. Left-clicking "Browse..." allows you to navigate through the computer and network to find the location of the file. If you are not sure where the graphics are located, you can use the find files or folders function in your start

menu at the bottom left of the screen. However, all graphics files should be placed in a folder called Graphics inside the database folder.

**Repeat:** In CBAS you can create multiple graphics with one graphic insertion. This feature is useful when the same image file will be used for more than one graphic. Simply enter in the total number of graphics you would like to create whose properties will be identical. Change the name of repeated graphics by double clicking the background of the current graphic while in editor mode.

**Find and Replace:** This is used for multiple graphics. If a number of graphics are identical, but you want the point names to change, use this feature. The name you type in the Find field will be replaced with what you type in the Replace field throughout the database. For example, if you want any name that has VAV to change to VAV-B, type VAV in the Find field and VAV-B in the Replace field.

***Note:** The graphic you insert must be located in the same folder as the database. If you would like to add a graphic that is not in the database folder, copy the graphic and paste it into the folder where your database resides. Once you select Enter, if you do not see the graphic, you could have artwork hidden. If so, press the spacebar or go to Insert Graphic (CTRL+Insert) > Show/Hide Art (Space).*

### **Delete Graphic (CTRL+Del)**

This is used to delete the graphic you are currently viewing. Selecting this option will open a warning window. This is a safety feature so that a graphic isn't deleted as a result of you selecting the wrong option on the menu. Left-click and the current graphic with all of its objects will be deleted from the current database.

### **Delete Multiple Graphics (Alt+Del)**

This selection allows for more than one graphic and their associated objects to be deleted. Selecting this option will cause a "Select Graphic" window to open. In this window you can specify which of the existing graphics to delete from the database. There are several methods for doing this:

- **(CTRL+Mouse):** Selects multiple (non-sequential) names in the list.
- **(Shift+Mouse):** Selects a range of names.
- **(Select All):** Selects all names in the list.
- **(Clear All):** Deselects all names in the list.
- Right-click to return to the program screen.
- Click Enter to delete.

Changes will not be visible until you exit and re-enter the graphics view.

## Position Graphics (CTRL+Shift+P)

Selecting this option allows you to reorder the display of graphic names in the Select Graphic sub-menu. When selected, a window with a list of all points opens. At the bottom of the window are options. In order to reposition the graphics in the list, left-click the graphic titles in the order in which you want them positioned in the Select Graphic menu. The first title you left-click will be displayed first in the menu as indicated by a number 1 to the left of the graphic title. The second one you left-click will be number 2 and so on. On the bottom right of the screen you will notice a number. Above it is the number 5, which indicates that the next title you left-click will become the fifth graphic title listed.

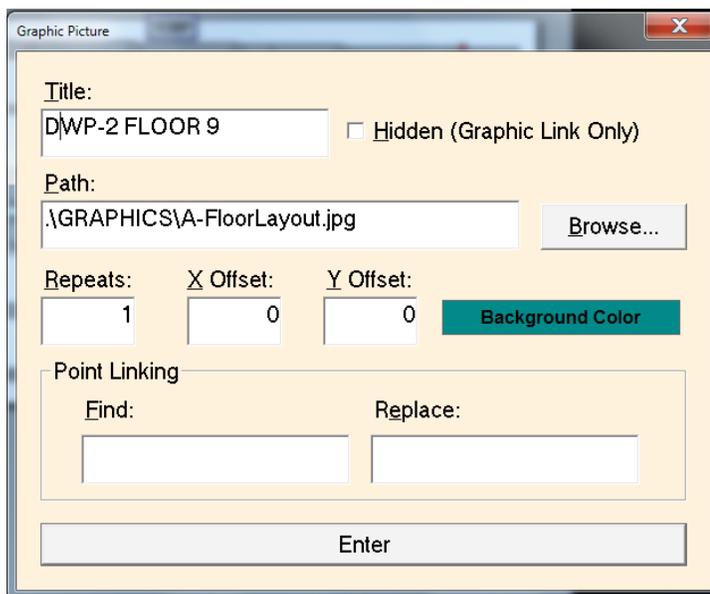
**Reset All:** Changes the order back to how it was before you began repositioning.

**Set Start:** This is used to set the Home or Main Graphic page so that when you go to Graphics View, then Main, you get the Home Graphic that has links to all of the other Graphics. When you open Position Graphics, just click the Graphic that you want to be the Main or #1 Graphic and you will see the number next to it change to 1.

**Reset:** You can also move a graphic down the order by clicking it again.

**Enter:** Saves the changes in positioning and returns you to the graphic you were viewing. If you change your mind and don't want to save the changes, just Escape.

**Duplicate Graphics (CTRL+D):** This is used to make copies of the current graphic you are viewing and allows you to change the point names and background picture. The window from Insert Graphic opens with the name and path of the current graphic already typed in. The number typed in the Repeats box is the number of copies made. When you CTRL+D, you will see the following screen:



The screenshot shows a dialog box titled "Graphic Picture". It contains the following elements:

- Title:** A text box containing "DWP-2 FLOOR 9" and a checkbox labeled "Hidden (Graphic Link Only)".
- Path:** A text box containing "\GRAPHICS\A-FloorLayout.jpg" and a "Browse..." button.
- Repeats:** A text box containing "1".
- X Offset:** A text box containing "0".
- Y Offset:** A text box containing "0".
- Background Color:** A teal button.
- Point Linking:** A section with "Find:" and "Replace:" labels and two empty text boxes.
- Enter:** A large button at the bottom.

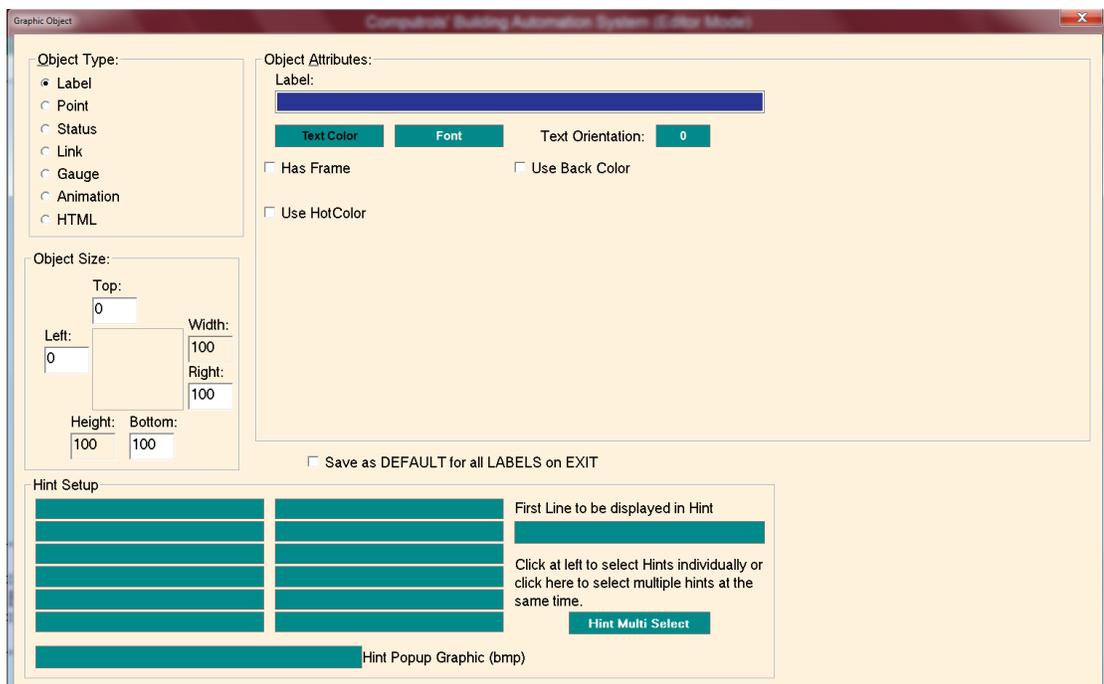
Change the name to match the new graphic. Click Browse to change the background picture. In the Find field, type in the prefix for the current points, like DWP-2 FLOOR 9. In Replace, type in the prefix for the new points, like DWP-2 FLOOR 10. Since the first part of the prefix is the same for both, DWP- 2 FLOOR, you can just put 9 in the Find and 10 in the Replace. All other parts of the point names must match or some points will not change. For this reason, you must check to make sure your points are changing.

**Show/Hide Art (Space):** Selecting the SPACE BAR changes the way the graphic screen appears. Selecting it once displays only objects placed on top of the background. Selecting it again displays the pictures and objects. This is only a visual tool, meaning that the screen functions the same, but looks different. Choose the view that is most comfortable for whatever you wish to accomplish.

## Object

An object is an image within a graphic. Selecting a submenu from Object on the Graphic Edit Menu allows you to perform a number of “graphic object” related tasks. Once again, it is recommended that you use the hot-keys, which are listed below in parentheses.

**Insert Object (INS):** Selecting the Insert key on your keyboard will insert a new object into the current graphic. The Graphic Object window shown below will open. Here you can customize the object you wish to insert.



## Definition of Object Types

**Label:** Has no link to any point. Only used to label the graphic page or something on the page.

**Point:** Is related to an actual point in the database. Can display its name, status, units, etc.

**Status:** Is a special object that is normally linked to a status point and can be set to fill up with a different color as analog status increases, or binary status changes. Use a back color, then a different color as the fill color.

**Link:** Is a link on the graphic to another graphic.

**Gauge:** Represents an analog input and looks like the needle of a gauge. Needle moves as status rises and falls.

Similar to a Status.

**Animation:** Represents the motion of a fan, pump or other binary input point. Requires a still picture and a video clip file to simulate off and on conditions. For the OFF position, you can use a bmp, png, or jpg. For the ON position you need something with motion. Files types are avi and animated gif. For an animation object based on a Binary point, you must browse to and select a file for both the ON and OFF positions. Use an animated file for the on position of a fan or other moving object. For analog points, like a temperature, you can add up to 10 pictures. These would usually be colors that represent ranges in temperature.

**HTML:** Is a link to a web page and requires an internet or network connection to a web page.

Select the type and attributes of the new object. Size can be set after the object is added to the Graphic. Pressing the ESC button will remove the Graphic Object window from the active view and you will notice an “X” next to the pointer (cursor). This indicates that you are ready to place the new object where you wish. Click and drag down and to the right to create the box for the object.

#### **New objects can be drawn in one of two ways:**

- Single clicking in the active view area will place the upper left corner of the new object at the point of the click. By default, any new objects placed using the single click method are 100 pixels in width by 100 pixels in height.
- Left-click where you want the left corner of the new object and drag the cursor to where you want the right corner of the object, and then release the left mouse button.

Once an object has been inserted it can be easily copied by highlighting the object, then click CTRL+C to Copy, the CTRL+V to paste. Any selected object (one click) can be re-sized with the arrow keys used in conjunction with either the Shift or Shift + CTRL keys. Using the Shift key in combination with an arrow key will resize the selected object in 20 pixel increments. Using Shift + CTRL keys in combination with an arrow will resize the selected object in one-pixel increments. If you set the first object on a graphic to the correct size, then copy and paste all objects from the original object, then use the arrow key combinations to move them around, you should never have to use the alignment features (next).

### **Edit Object**

This option allows you to edit both the size and attributes of the focused object. The options are the same as in Insert Object (Insert). Double-click an object to edit.

### **Global Edit Object (Alt+E)**

This is a powerful feature, which allows you to modify the attributes of multiple graphic objects within the current database at the same time. (Edit)

## Delete Object (Delete)

This option will delete all selected graphic objects.

## Align

This allows you to organize the objects in each graphic. Select multiple graphics by holding down CTRL and left clicking each object you wish to manipulate. Below is the list of alignment options. To the right of each option is a shortcut. For example, to make all selected objects the same size, press Alt, Shift, and S on your keyboard at the same time.

### Alignment

***Note:** For all Align options, the first item selected will be the object with which the other selected objects will align. For example, if you select three objects by holding down shift while left-clicking each, then select Align Left Edges, the left edges of each object will move in line with the left edge of the first object selected.*

- **Align Left Edges (Alt+Shift+Left Arrow):** Select this to force the left edges of all selected objects to line up with that of the last object selected.
- **Align Right Edges (Alt+Shift+Right Arrow):** Select this to force the right edges of all selected objects to line up with that of the last object selected.
- **Align Top Edges (Alt+Shift+Up Arrow):** Select this to force the top edges of all selected objects to line up with that of the last object selected.
- **Align Bottom Edges (Alt+Shift+Down Arrow):** Select this to force the bottom edges of all selected objects to line up with that of the last object selected.

### Distribution

This following 2 options effect the distribution of all selected objects.

- **Space Across (Alt+Shift+A):** Distributes objects evenly on the horizontal line.
- **Space Down (Alt+Shift+D):** Distributes objects evenly on the vertical line.

## Sizing

This remaining 3 options allow you to make selected objects all the same size.

- **Make Same Width (Alt+Shift+W):** Select this to force all selected items to become the same width as the last item selected.
- **Make Same Height (Alt+Shift+H):** Select this to force all selected items to become the same height as the last item selected.
- **Make Same Size (Alt+Shift+S):** Select this to force all selected items to become the same height and width as the last item selected.

## Layer

This is useful for objects within a graphic that lay on top of one another. The object that is selected will move in relation to all other objects in that graphic. Objects in front of another object will be visible to the operator. Objects behind another will not be visible. There are four options:

- **Send Backward (CTRL+B):** Moves the selected object back one level.
- **Send To Back (CTRL+Shift+B):** Moves the selected object behind all other objects.
- **Send Forward (CTRL+F):** Moves the selected object forward one level.
- **Send To Front (CTRL+Shift+F):** Moves the selected object in front of all other objects.

## Misc

This menu contains some additional options that do not fall into the other categories. The list of options is shown below and each is briefly described.

- **Set Snap Size:** Changes the increments in which the objects move when using the arrows. The choices are 1, 2, 5, 10, and 20 pixel increments. Left-click your choice. The current Snap Size will have (current) written next to it.
- **Delete Dead Links:** For space purposes, this removes links that have been broken for whatever reason. Deleting Dead Links is a good way of managing your graphic database. This option is especially useful if there have been graphics deleted from the database, which were linked to remaining graphics. Eliminating these “dead links” will keep your database running efficiently.
- **Cut (CTRL+X):** Removes selected objects from their current location, but saves them to a clipboard so they can be pasted to a different location. This can be done by holding CTRL and pressing X.

- **Copy (CTRL+C):** Saves selected objects to a clipboard so they can be pasted to a different location. This can be done by holding CTRL and pressing C.
- **Paste (CTRL+V):** Inserts objects that have been cut or copied. Within the same graphic, pasted object(s) will be placed slightly up and to the right of the original object. If an object is pasted into a new graphic, it will be placed in the same location of the new graphic as the original copied or cut object was in the original graphic from which it was cut or copied. This can also be done by holding CTRL and pressing V.
- **Paste to Multiple Graphics (CTRL+Alt+V):** Objects can be pasted to more than one graphic. Selecting this opens a window with a list of graphics into which you can paste the copied or cut object(s).
- **Select All (CTRL+A):** Selects all graphic object in the current graphic being edited.

## Exit Program Mode

This option allows the user to exit the Program Mode and return to the graphics view.

## Working in Program Mode

### Selected vs. Focused

There are several ways in which a user can select graphic objects in the active view area.

- **Single Click:** single clicking an object will select it. Multiple objects can also be selected by pressing the left mouse button without releasing, dragging the mouse and then releasing when all of the graphic objects needing to be selected have been encompassed.
- **Shift Key (Shift+Mouse):** Pressing and holding the shift key in combination with a single mouse click enables you to select multiple objects.
- **Control Key (CTRL+Mouse):** this key combination will alternate between select and deselect when used on any graphic object. If multiple objects have been selected, and you wish to deselect only one of them, hold CTRL while left clicking the object you wish to deselect. The rest will remain selected.

In the CBAS graphic editor, a graphic object can reside in one of four states:

- **Selected:** A selected graphic object is indicated with a fill of diagonal lines. When a graphic object is selected, it can be repositioned in the active area. Press ENTER to open the object properties.
- **Focused:** Handles on the edges of the object indicate a graphic object that is focused.
- **Not Selected:** The object has neither handles nor diagonal lines within its borders.

- **Focused and Not Selected:** The object has focus handles but does not have diagonal lines between its borders. Pressing the Enter key will open the graphic object window for this object.

## Moving Graphic Objects

Moving objects can be done with the keyboard or mouse. In order to move a graphic object, it must be selected.

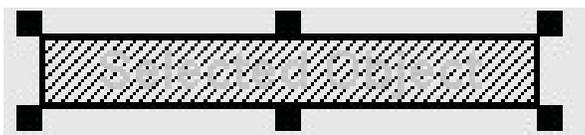
**Mouse:** Left-click inside the object or any object within a selected group of objects without releasing the mouse button. Then move the object or objects with the mouse to where you want them positioned. Release the mouse button when the object is where you want it. It is difficult to obtain exact alignment using this method.

**Keyboard:** Single and multiple objects can be moved using the arrow keys. Pressing an arrow key will move a graphic object in 20-pixel increments. Using the CTRL key in conjunction with the arrows will move the objects in one-pixel increments. We recommend that you move objects with the arrow keys rather than the mouse so that the alignment in relation to the other objects will remain symmetrical.

## Resizing a Graphic Object

Any selected object can be resized using either the keyboard or mouse.

**Mouse:** Once the object is selected, it becomes filled with diagonal lines and six black focus handles appear as shown in this example:



When you position the cursor over one of the focus handles, the cursor will change into a set of resizing arrows. To resize the object, left-click without releasing and drag.

**Keyboard:** Any selected object can be resized with the arrow keys used in conjunction with either the Shift or Shift + CTRL keys. Using the Shift key in combination with an arrow key will resize the selected object in 20 pixel increments. Using Shift + CTRL keys in combination with an arrow key will resize the selected object in one pixel increments.

## Back Button

This button will take you to the previous graphic screen that has been accessed. It works like this:

In the Configure Workstation dialog, there is a new checkbox named “Show BACK button in Graphics”. Check that box. Then in the first graphics screen, there will not be a BACK button (since there is nothing to go back to). Click a link and go to another graphic. The BACK button will appear as a giant button right in the middle of the graphic. Enter Edit Graphics mode and edit the BACK button (name, colors, screen position, size, font...). That

will become the default BACK button. This button will then appear on every graphic page. It will be exactly the same on every page. If you edit the BACK button on any page it will change it on ALL pages. There is only 1 BACK button. The BACK button will disappear if the user goes back to the beginning. The back queue is only 20 items deep, so you can only press back 20 times before the button will disappear. Previously, the BACK only worked for the last 10.

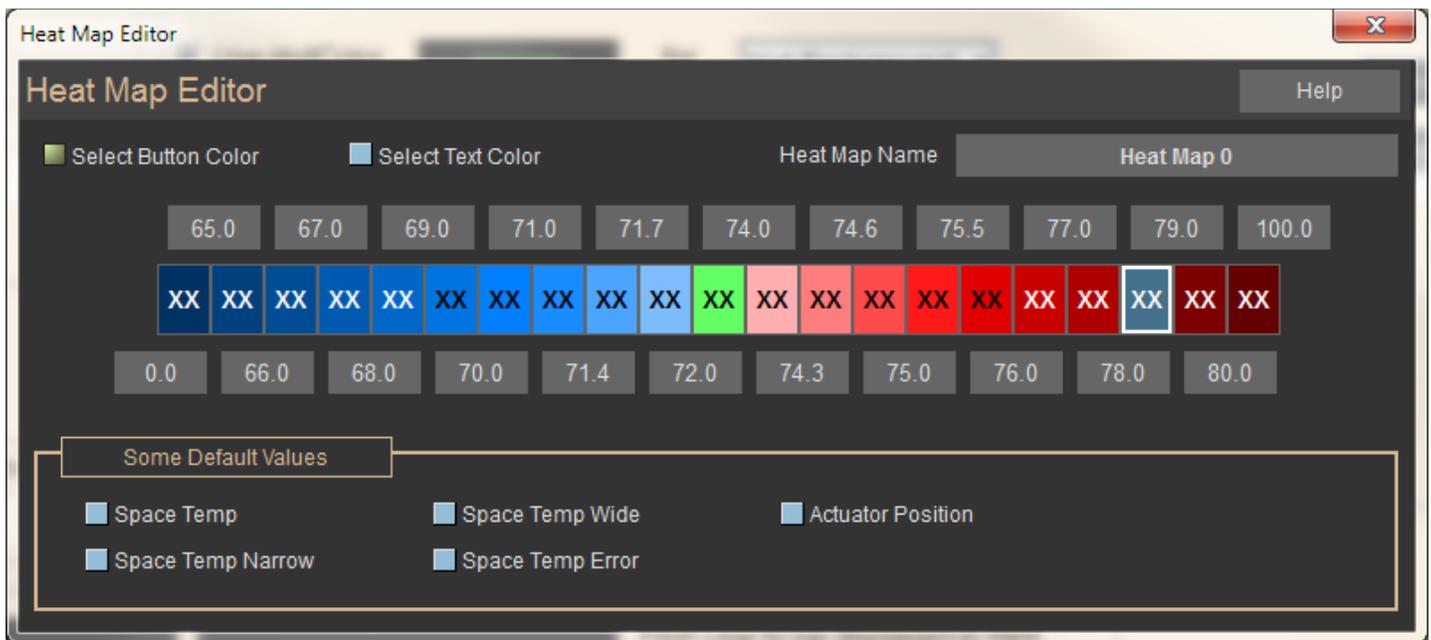
If there are issues with the back button, you can reset it back to its default values by deleting the CBAS.reg1 and CBAS.reg2 files in the CBAS directory. The BACK button settings are stored in this file along with anything else that gets read/written to/from the registry. For Workstations, copy the CBAS.reg1 and cbas.reg2 to the CBAS folder on the GW, or the back button will be placed in the middle of the graphics screens.

## Heat Map

In CBAS 17, there is a new graphic object called Heat Map. Actually, it's an option under the common Point object that shows the value of a Point. It is mainly used so that you can see where warm and cool spots exist on floor plans.

The screenshot shows the configuration window for a Point object. On the left, under 'Object Type', 'Point' is selected. Below that, 'Object Size' is set with 'Top' at 281. The main 'Object Attributes' section has 'Point' set to 'AHU 54 Space Temp'. A 'Select Point' button is next to the text field. Below this are buttons for 'Text Color' and 'Font'. There are several checkboxes: 'Has Frame' (checked), 'Use Back Color' (unchecked), 'Use HotColor' (unchecked), 'Change color if item is Normal, Trouble or Alarm' (unchecked), 'Clickable' (checked), 'Heat Map' (checked), 'Show Name' (unchecked), 'Show Value' (checked), 'Show Units' (checked), 'Show Condition' (unchecked), and 'Show Priority' (unchecked). On the right side, there is an 'Edit Heat Maps' button and a 'Heat Map 0' button.

If you check the Heat Map box in the Object Attributes screen for the Point object, you are allowed to choose from a few Heat Maps that are provided by default: Space Temp Wide Range, Space Temp Narrow Range, Space Temp Error, or even Actuator Position. These can be edited to change the colors associated with a temperature range, or new Heat Maps can be created from scratch. Click Edit Heat Maps.



For instance, you can use a Humidity point and create your own range of colors based on 0-100% Humidity. Or, just use the Actuator default which is also 0-100% and uses shades of gray to black.

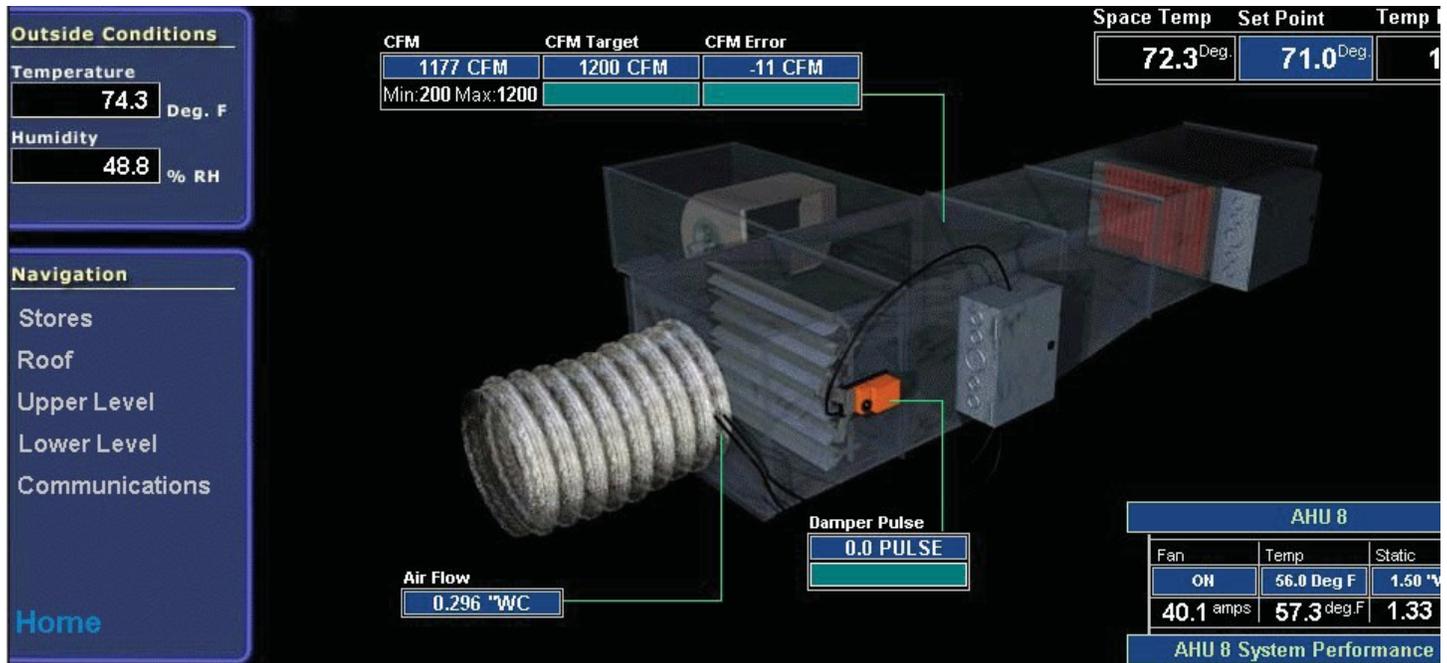
Once a new Heat Map is created, it will be available for any other point on any other graphic in the database.

Because it is based on a Point, it can also be setup to do some of the same things as any other Point object, like display the Point Name, Value, Units, make the point Clickable etc. However, you cannot setup a "Hot Color" or make it change colors when in alarm. If you need to do those things, you can overlay another version of the Point object on top of the Heat Map. A great use of the Heat Map object is on a floor plane where you have VAV Temperatures. Here's an example.



## Viewing Graphics

Once all graphics are programmed, the graphics view is a helpful tool for easily keeping an eye on your facility. Below is an example of a completed graphic screen capture of a VAV box. All points on the VAV are programmable from this screen. Click any point to enter the point-programming screen. Notice when you move the cursor over any object, a pop-up window displays the name of the object.



On the bottom, left side of the figure above, there is a navigation window, which allows you to easily maneuver around the facility. Each line in this section is a Link to another Graphic. In this case, there are two floors and a roof that are graphical representations of the actual facility.

Clicking Stores, in this case, opens a list of all the stores in this building grouped the way the programmer chooses. Each of these click-able buttons takes you to a different view of the facility. It is basically a blueprint with all mechanical equipment and controllers.

# Chapter 6 » System/Database Menu

## System Menu Overview

The System Menu lists many high-level functions that apply to the database in general. From many of these functions, the end user can make global changes to the database and change the appearance of CBAS. From others, one can configure high-level functions like Peer-to-Peer, Dialouts, and Email Alarms.

There are some differences in the System Menu, depending on whether you are in Editor Mode or Real Mode.

Sign On	Sign On
Peer To Peer Setup	Peer To Peer Test
Popup Graphics Setup	Popup Graphics Setup
Program Passwords	Program Passwords
Setup Passwords	Setup Passwords
Program Logical Groups	Program Logical Groups
Header Points	Header Points
Program Dialouts	Program Dialouts
EEmail Alarms >more...	EEmail Alarms >more...
Configure Workstation	Configure Workstation
Messaging	Secondary DPU Control Messaging
History Maintenance	History Maintenance
VAV-B	
FIRE >more...	BASNet Controller Information
	BASNet VAV Firmware Download
CBAS Version	Commission Controller
Help >more...	VAV-B Connection >more...
Exit CBAS	FIRE >more...
	CBAS Version
	Help >more...
	Exit CBAS

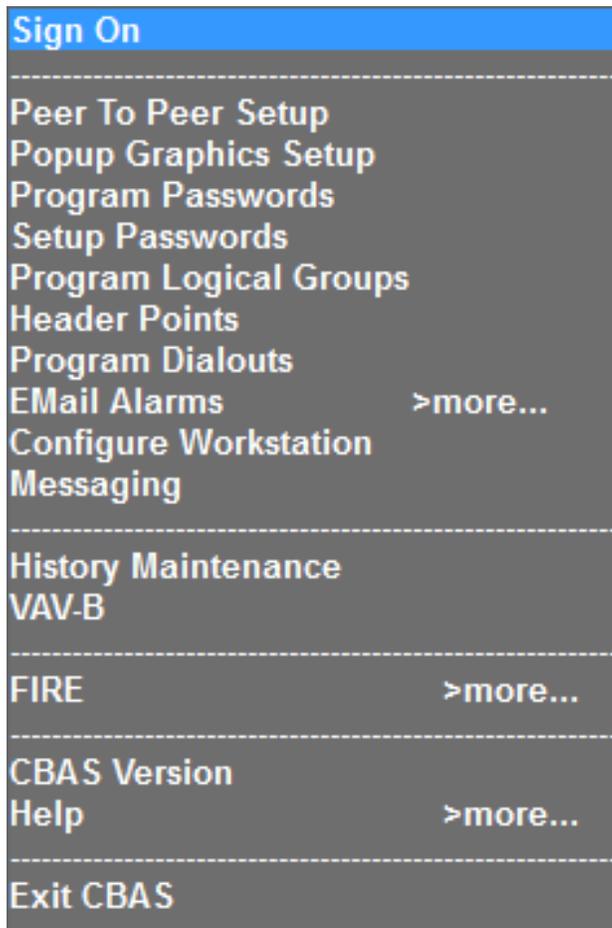
On the left is the System Menu as it appears in Editor Mode, on the right Real Mode. Notice the functions that require communication to controllers or changes to the operating system (Change Time) are only present in Real Mode. Peer-to-Peer is only present in Editor Mode, because this function adds points and changes the database, things which are done in Editor Mode.

At one time, the Database Menu was only seen in Editor Mode, but now that many items on the System Menu have been moved to the Database Menu, it is available in Real Mode also. Database Menu will also be covered in this section.

# System Menu Functions

## Sign On

When CBAS starts, the Default User is automatically logged on. By default, the Default User has all rights and is allowed to make all types of changes to the database. It is a good idea to take away most rights from this user after creating at least one other full-rights user. Log in as that user and take away rights, leaving only appropriate rights. After a period of inactivity, the user will be logged off and Default will automatically login. The default Inactivity Period is 30 Minutes, and can be changed under Configure Workstation, which is discussed later.



## Change Time

This item is only available in Real Mode and allows you to change the date also. Changes here are also reflected in Windows. Just Click on Change Time, click on the Date field and select the date from the calendar. Right click or ESC to save. Click on the Time field and enter the time. Right click or ESC to save. Right click or ESC again to exit.

## Peer-to-Peer Setup

This item is only available in Editor Mode because it adds points and makes changes to the database. Peer-to-Peer Setup allows you to select points that will be shared with other controllers, even when the CBAS DPU computer is off-line or not present. This feature extends the functionality of Computrols full line of stand-alone BASnet controllers beyond the controller level to the system level.

The Peer-to-Peer Setup interface has instructions built in to make it easy to configure. For more information, see Chapter 5, Section 2 - Peer-to-Peer.

## Program Passwords

If you are logged in with unrestricted rights, this function allows the user to add users, change passwords, and change restrictions on user accounts. When a new database is created, Default is the only user and this user has no restrictions. Before the database is put into service and made available to other users, the database administrator should create a user account with unlimited restrictions for him to use. The Default user should be edited to restrict its access and other users should be added to give them access to what they need.

General restrictions can be made by un-checking various topics which will limit access to certain areas of the program. You can also restrict access to individual points in the points Restrictions subsection. See detailed instructions in Chapter 5, Section 3 – Password Protection.

## Setup Passwords

This new feature in CBAS 15 allows you to setup restrictions on Passwords in order to make CBAS more difficult to hack into. See detailed instructions in Chapter 5, Section 7 – Setup Passwords.

## Program Logical Groups

This menu item is also found in Text View, Logical Groups. It allows the user to create a new group based on whatever criteria you choose, edit or delete an existing group, or view the points in an existing group. Editing Logical Groups is explained fully in the Text View section.

## Position Points (Now on Database Menu)

This menu item allows the user to position multiple points in Text View, so that points that need to be viewed more often can be placed at the top of the list and associated points can be grouped together. Click on the Position Points menu item.

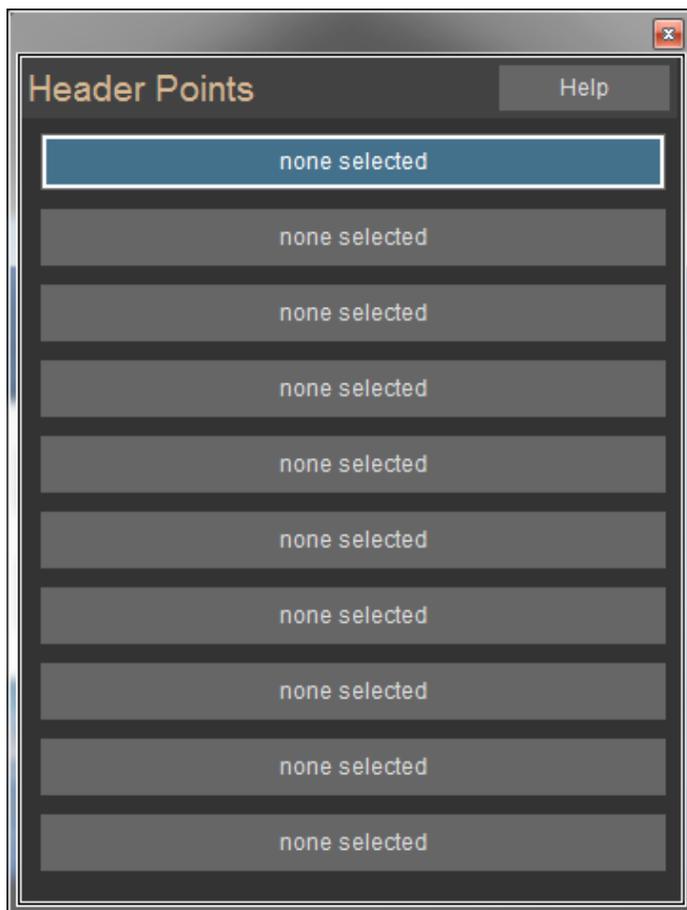
Select multiple points on the left side of the Group Position window. Use the Shift key to select contiguous points and the CTRL key to select non-contiguous points. The selected files will be placed in the middle section. Select the point you want to place the points above in the list on the right side. Right click or hit Esc to save the changes.

## Header Points

Header Points are points that you can choose to show just below the Main Menu when in Real Mode. These points and their statuses will show up there no matter what view you are in.

In CBAS 15, we have increased the number of Header Points possible from 2 to 10 depending on the screen resolution and the size of your monitor.

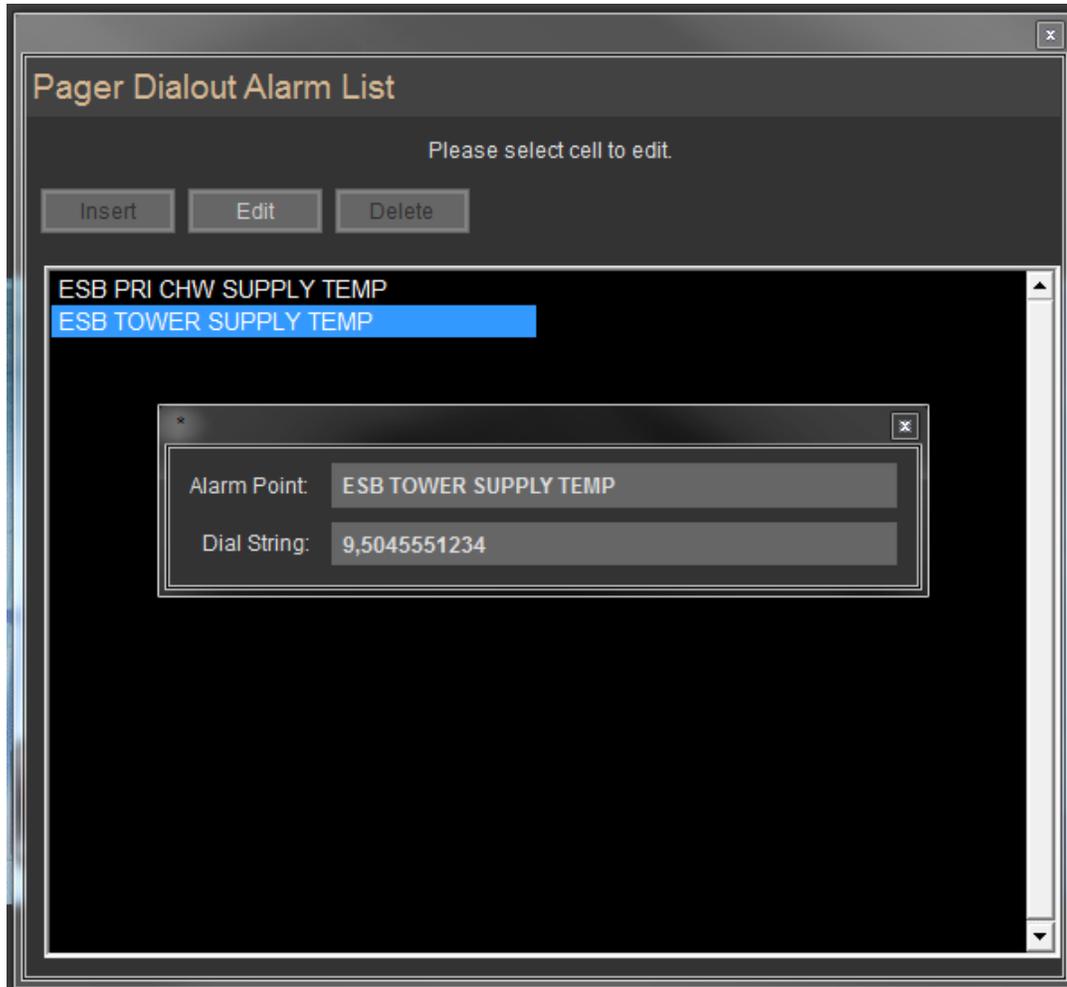
Header Points couldn't be easier to program. Just click on Header Points on the System Menu and you'll see the following window:



Click Header 1 Point and select your point from the list. Do the same for Header 2 Point. These selections can easily be changed at any time. To find out how many you can fit, keep adding points until you run out of room.

## Program Dialouts

Dialouts is a feature that allows CBAS to send out a message to a pager whenever an Alarm occurs on selected points. This function works with the modem only, not high-speed Internet services like DSL. Computrols no longer supplies a modem with the computers it supplies and they are rarely used in the real world. For notification of alarms using high-speed Internet, see Email Alarms. When you click on Program Dialouts, you see the Pager Dialout Alarm List, seen below:



Click "Insert" and a dialog box will appear. Click on "Click to specify Point," and select the point from the list of points. Select the point that has the alarm setup. In the Dial String field, type the phone number of the pager and add a number, which will signify that the point is in alarm. If a number is required to get an outside line, put it in first followed by a comma. The comma pauses the dialing process for a few seconds. You might have to adjust the number of commas depending on your phone system. Right click or hit Esc to save the changes.

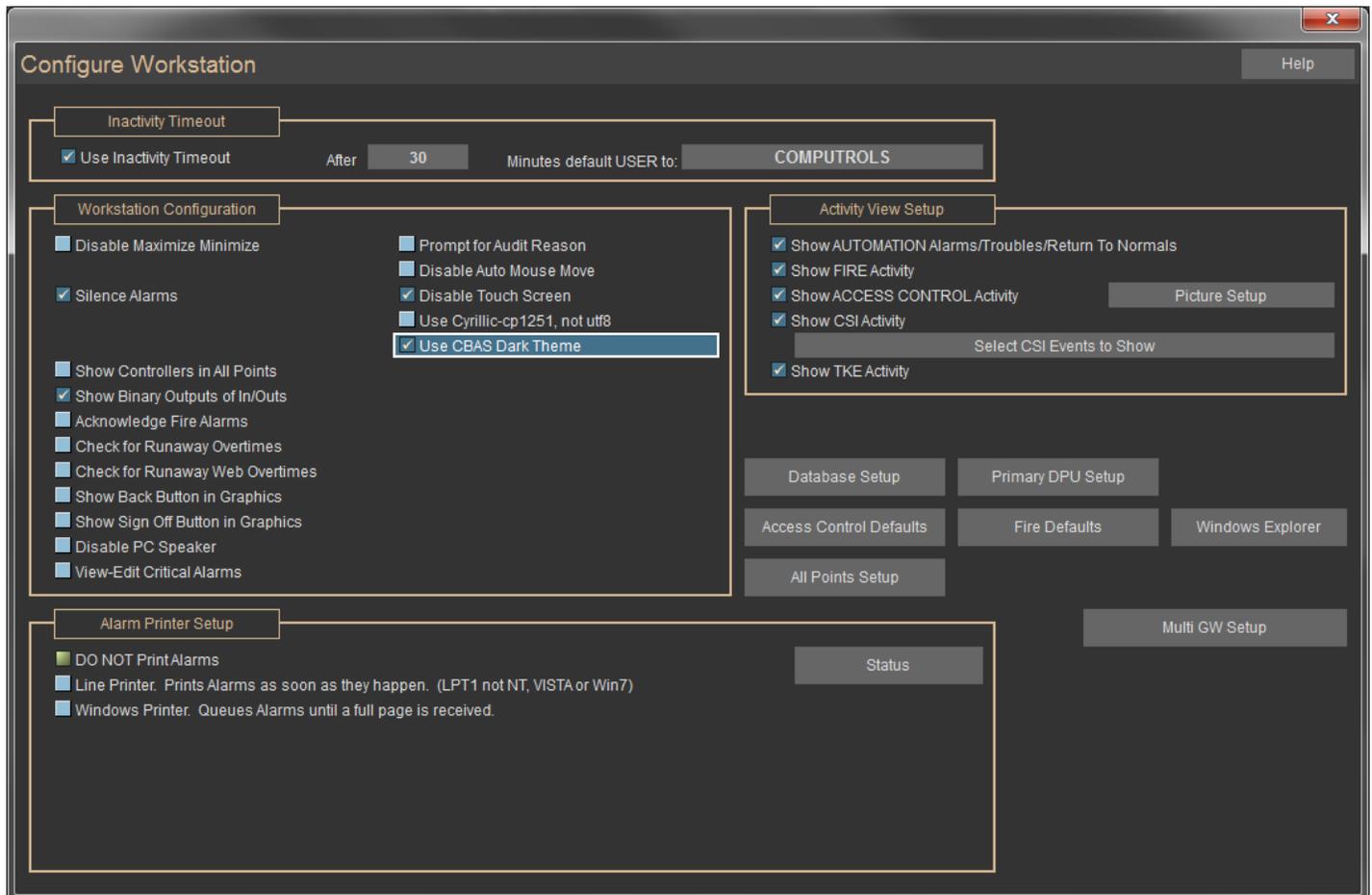
## Program Email Alarms

This feature is very similar to Dialouts, except that it sends an email to the specified email address instead of paging. This feature was included to accommodate CBAS systems that have high-speed Internet service instead of Dialout service. The email message includes the name of the point and the status.

In order for this feature to work, you have to setup the Computrols SMTP EMailer program with a valid Email Account. Outlook Express and Thunderbird are no longer used as of CBAS 12. See complete instructions in Chapter 5, Section 6 – Email Alarms.

## Configure Workstation

This feature is used to configure some security, alarm and convenience portions of CBAS.



### Inactivity Timeout

- **Use Inactivity Timeout:** By default, CBAS logs out a user after 30 minutes of inactivity. This can be changed as well as the user account that becomes active when a timeout occurs. Uncheck the box to not use this feature. (NOT RECOMMENDED)
- **Disable Minimize/Maximize:** This is a security feature. When it is checked, you cannot minimize CBAS.
- **Access Control Defaults:** This is for use with the Access Control add-on feature.

## Workstation Configuration

- **Disable Maximize Minimize:** Removes the ability for the user to minimize the user interface.
- **Silence Alarms:** If you don't want to be bothered by alarms on the DPU, check Silence Alarms.
- **Show Controllers in All Point:** By checking, controllers will be listed in Text View
- **Acknowledge Fire Alarms:** Allows the logged in user to acknowledge fire alarms.
- **Show Binary Outputs:** If you have Linked Binary Points in the database, you may want to check this to see them in Text View.
- **Show Back/Sign Off Button in Graphics:** This must be disabled when editing Graphics and re-enabled when finished.
- **Disable PC Speaker:** This is the internal speaker. Separate from external speakers.
- **Critical Alarms/Audit:** New features which are licensed to make sure that Alarms are addressed.
- **Disable Auto Mouse Move:** When you click an output point, the mouse automatically moves to the most logical button on the next screen. Can be dangerous if someone double-clicks.
- **Disable Touch Screen:** CBAS is setup to work with touchscreen monitors. If you don't have a touchscreen, you can disable this feature here.
- **Use Cyrillic:** Applies to Russian sites.
- **Use CBAS Dark Theme:** Applies dark theme to the CBAS user interface.

## Activity View Setup

Activity View is on the Text View menu and shows current card Access and Alarm activity. Check the appropriate boxes.

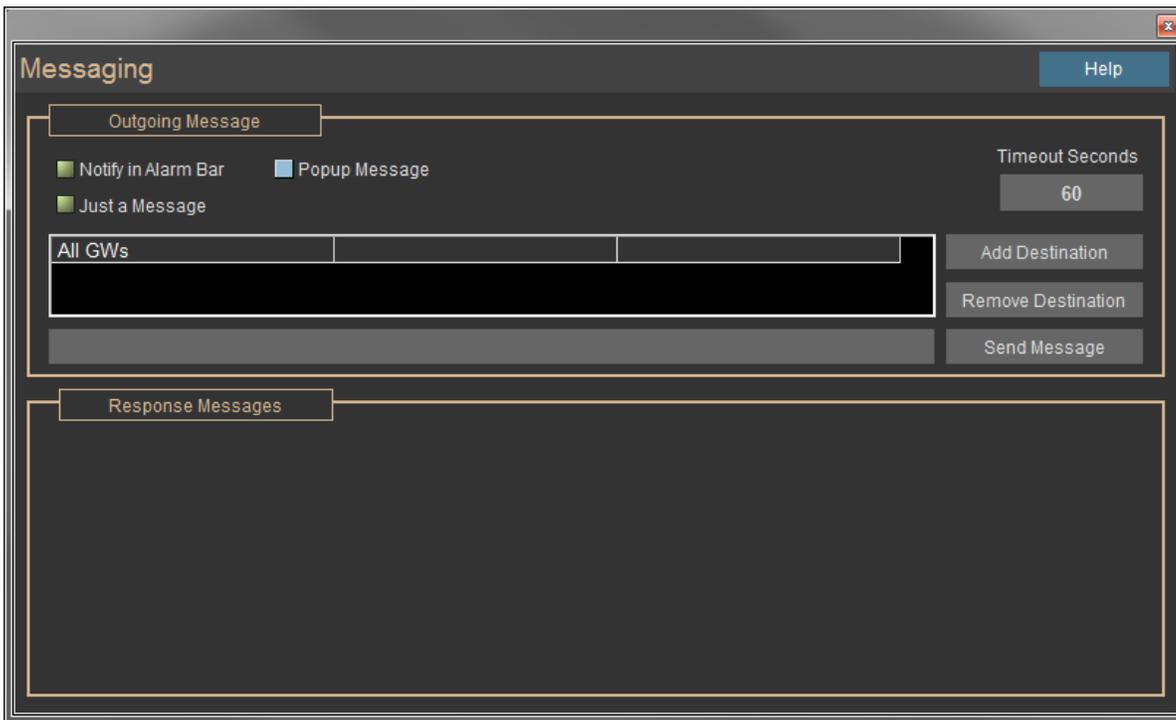
- **Picture Setup:** Allows you to decide where to show a cardholder picture or not show pictures in Activity.
- **Access Control Defaults** allow you to choose default card and reader settings when adding new to the database.
- **Fire Defaults** same when adding sensors to Fire panels.

## Alarm Printer Setup

This section was added to accommodate Windows 2000 and XP, which do not work with single line printing on Desk Jet printers. Check the appropriate box for your operating system or for no alarm printing. See the section on Alarms for more information on printing alarms.

## Messaging

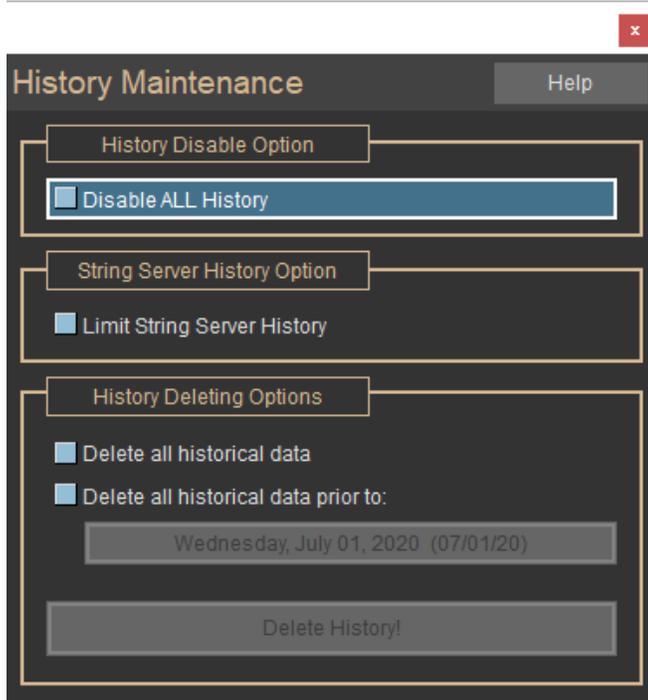
Messaging is a little used feature that allows you to send a message to people at the Workstations, or vice versa. It can be used to notify people that Real Mode is going to close and they will lose their GW connection. The program is pretty straightforward.



Click Add Destination to choose workstations to send a message to. Type your message in the field to the left of the Send Message button. When complete, click Send Message. You can view responses below.

## History Maintenance

In CBAS 15 forward, CBAS now starts a new History file when necessary and all previous files are accessible. So, it is no longer necessary to purge past history.



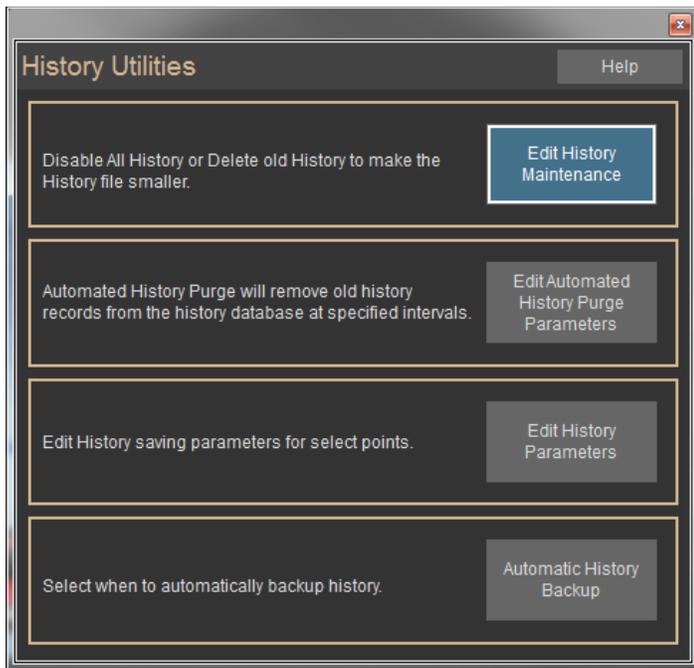
In previous versions, there is a hard size limit of 2GB for a history file in CBAS. Once this limit has been reached, CBAS will stop recording all histories. In an effort to avoid loss of history collection, CBAS has been outfitted with several tools to help warn of impending loss as well as to manage and archive histories.

## History Size Alarm

CBAS will display an alarm when the history file reaches 50, 60, 70, 80, 85, 90, 91, 92, 93, 94, 95 percent full. After 95 percent full an alarm message will be displayed every minute. If the user decided to do nothing about it than history saving will stop when it reaches 100 % full.

Alarm messages for 50, 60 and 70 % full will be Normal conditions while 80 will display as a Trouble and 85 percent and higher will display as an Alarm.

No longer necessary in CBAS 15. The following is provided for version prior to 15.



## Edit History Maintenance

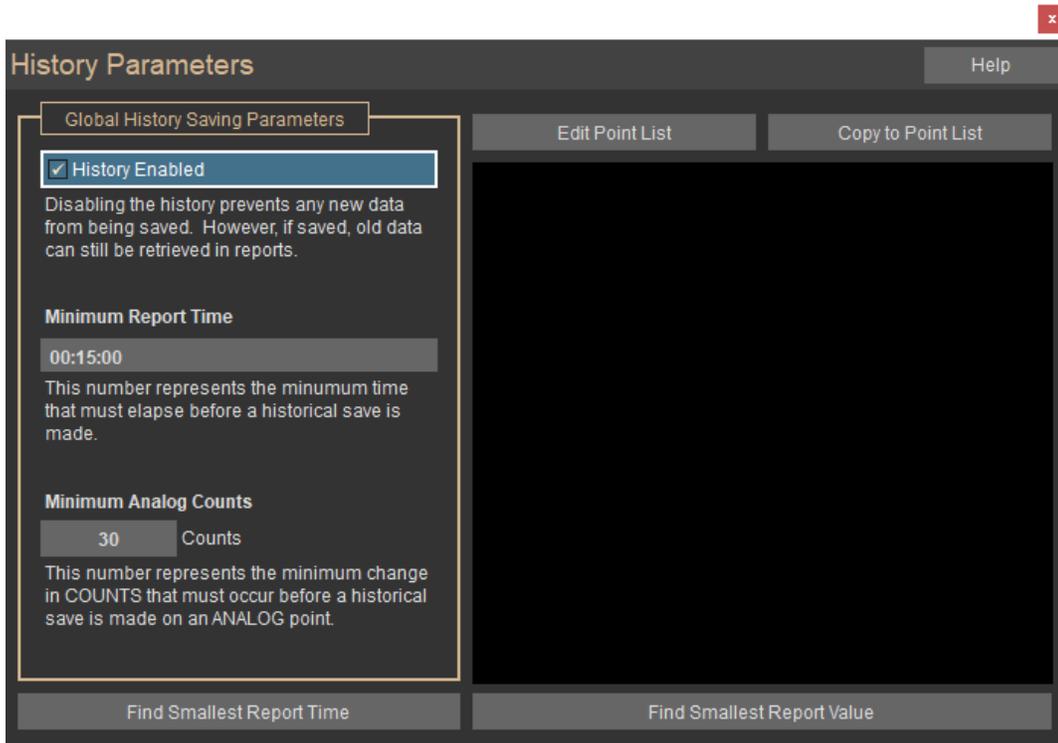
From here you can disable history saving or delete old histories.

It is recommended that you keep no more than 1 year of history in large databases. This will prevent the file from getting too large, which can cause problems.

From Edit History Maintenance, you can disable or enable all history saving, or manually delete histories prior to a given date.

## Edit History Parameters

Here, you can globally change the History Saving Parameters for the whole database. This can also be done on single points through the History button in the point program screen of any point. But here you can select a group of points to change the settings.



## Edit Automated History Purge Parameters Size

If the database has a large number of points, and all of the points are set to save history, the history file can grow rapidly. By default, the parameters for saving history are set so that not too many saves are made, thus limiting the growth of the history file. For example, temperature points only save after a minimum of 15 minutes or when a change of 3 degrees occurs. But this can lead to incomplete or unrealistic graphs. It is recommended that, on points where you need a more detailed graph, you lower those points only to settings of 1 minute and 1 degree.

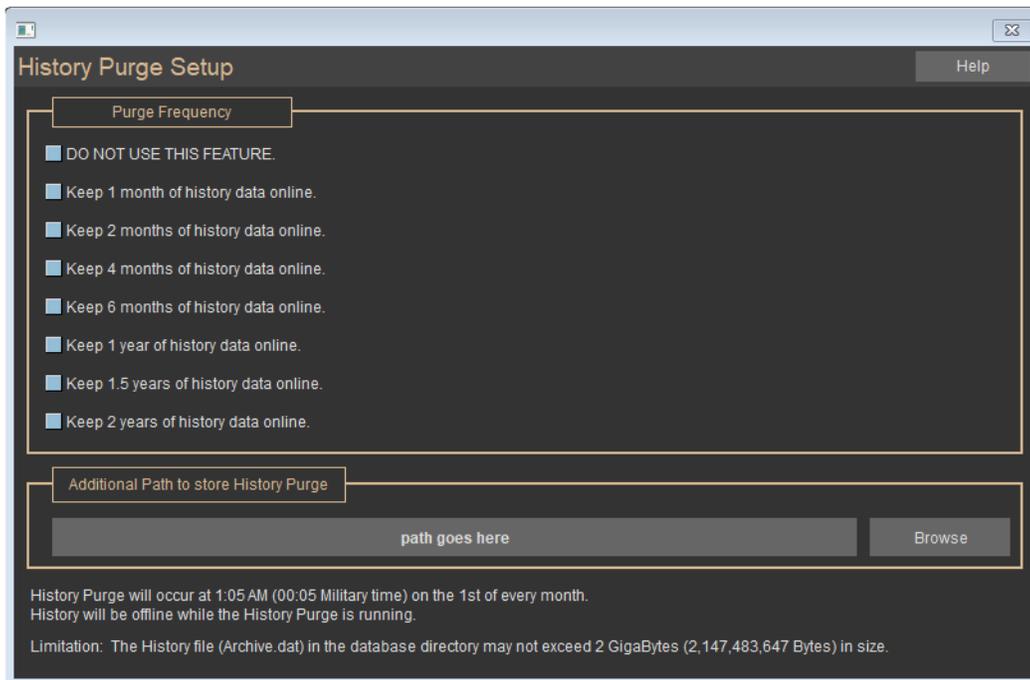
There are 2 ways to change history saving parameters, individually and globally. To change a point individually, click the History button on the point program screen for that point, and click “Modify History Settings for this Point.”

To change many points at one time, go to the System Menu, History Maintenance, then “Edit History Parameters.” Change your settings on the left side, (30 analog “counts” corresponds to 3 Degrees) then choose points to change by clicking the Edit Point List button on the top right. There are also buttons at the bottom of the screen that will populate the list with points that have the “Smallest Report Time” and “Smallest Report Value.” (These can be useful if you feel the need to limit the number of history saves by raising the saving parameters) Once you have populated the list, click the “Copy to Point List” button.

## Purging

Once you have set your history saving parameters, you should then setup Automated History Purging.

To do so, go to the System Menu, History Maintenance, then “Edit Automated History Purge Parameters.” In the setup screen, choose the amount of history you would like to save, from 1 month up to a year.



For large databases, it is recommended to keep 6 months of history or less, and for smaller databases, keep 1 year. Click the Browse button and choose a location for the purged history file.

For the purpose of using the new feature to view purged history, it is recommended to save to the database folder: C:\CBAS\ [database name]. The purged history files will be saved with a name like Pur010107Archive.dat, where the numbers represent the purge date.

## Viewing Purged History

This feature is only available in Editor Mode for a good reason: If you opened a purged history file in Real Mode, CBAS would begin making history saves to the purged file, not the current history file. Of course, as long as you are in Editor Mode, no history saving will happen, so you should never stay in Editor Mode for too long.

In Editor Mode, go to the System Menu, then Database Maintenance and there is a button named "Open History File". When you click that, you will be asked if you want to change from the present history files, which are ARCHIVE.DAT and ARCHIVE.mdb. Select the Archive.dat file with Pur[date] in the name. The history file that you select must be in the same directory as the original Archive.dat. After you select the file that you want, a message will be displayed telling you the beginning and ending dates of the history that is in the file you selected. WITHOUT going into Real Mode, you can now go to the point(s) to view their history. Remember, this is EDITOR

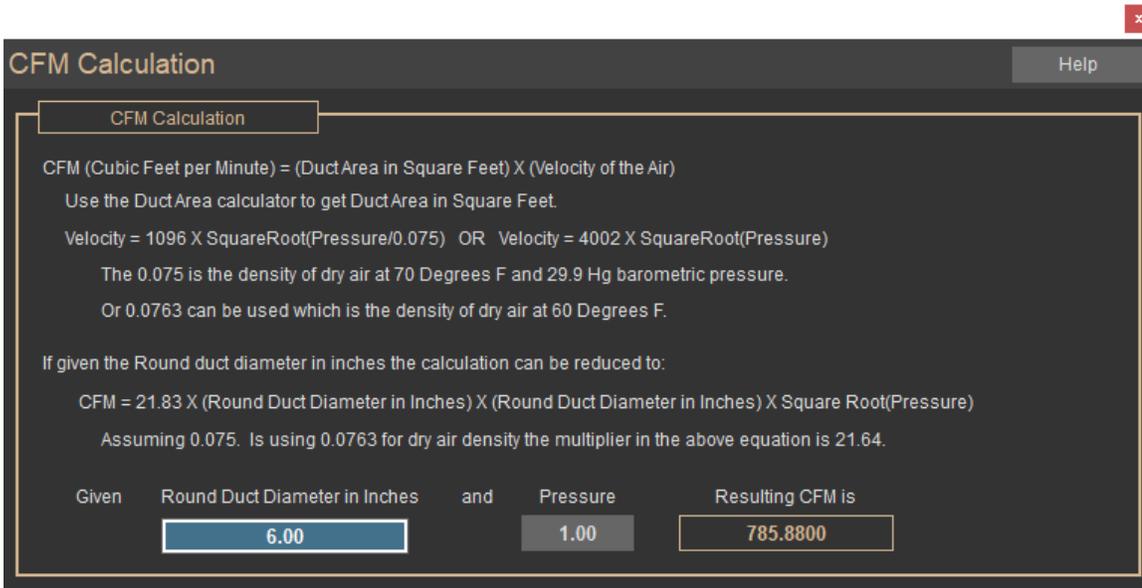
MODE ONLY. It can't be done in REAL mode because CBAS is actively writing history to the file and CBAS can't switch files while it is being written to. After you have viewed and possibly printed the graphs you need, but before going into Real Mode, you need to go back to the "Open History File" button and change back to the current Archive. dat file.

## Database Maintenance

Detailed instructions in Chapter 5, Section 5 - Database Utilities.

## Formulas and Calculations

Formulas are provided to calculate duct size as well as CFM calculations.



## Channel Statistics

This section provides real time byte transfer statistics on scanning TCP/IP channels. No configuration is necessary. This is mainly a troubleshooting tool, and is only available in Real Mode.

## BASnet Controller Information

This is another advanced feature that should not be used without proper training or without the advice of Computrols Support.

## CBAS Version

Gives information on the revision of CBAS software you are running.

## Close Database

This is the first step in opening another database or the same database in another mode. For full instructions, see the Databases section. In CBAS 15, this has moved to the Database Menu.

## Exit CBAS

This is the same as clicking the close button in the top right corner of the program.

## Peer-to-Peer

Peer-To-Peer (PTP) is the process of sharing point statuses directly to other controllers on a network without having to pass data through the head end PC. PTP Setup is accessed in Editor Mode only. In Real Mode, Peer to Peer testing is available.

**Note:** Only inputs (software or hardware) can be shared. Once designated as shared, the point will “broadcast” its status to other controllers as specified in the PTP setup screen. If a point used in a logic statement is shared, then that logic statement will be stored in the controller instead of the head end PC.

### In what situations would you want to use Peer-to-Peer?

- Stand-alone systems: a few controllers without an Automation Server.
- Communication to the Automation Server is down. You can't really determine when this going to happen, but if you set it up in advance, you have added redundancy to the system.

### Limitations

- Peer-to-Peer will work with the following controllers:
  - 8X
  - 16X
  - 32X
  - 64X
  - UNI-B
- Only available on versions of CBAS from 1.5.21 forward (Feb 2003)

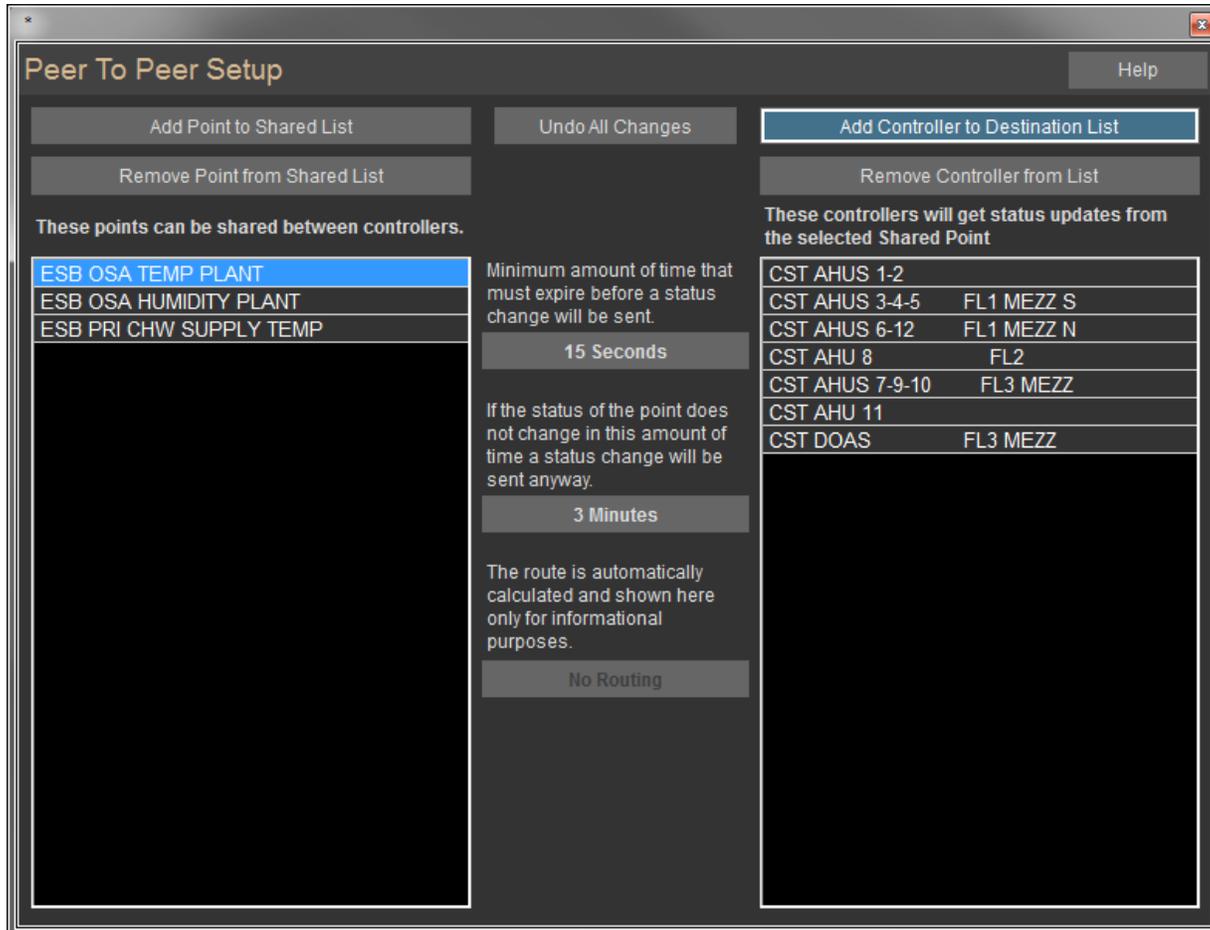
Point types that can be PEER points:

- Binary Hardware or Software
- Analog Hardware or Software
- Peer-to-Peer will not work across a Router on TCP/IP networks
- Must be able to send/ receive “broadcast” packets

- When writing Logic involving a PEER point, do not use the “is in alarm” phrase referring to that point. The packet sent by PEER points does not contain that information.
- Commandable points can be shared as PEER points, but the PEER version of Points are not commandable, (A PEER version of the original point resides on the controller(s) that it is shared with).

Programming PEER points is easy.

- First, go to System, and then Peer-to-Peer Setup and you will see the editor:



- Click the “Add Point to Shared List” button and choose the points you want to share from the list that appears.
- Once shared, highlight a point and you will see a list of controllers it is shared with in the list on the right.
- Click the “Add Controller to Destination List” button to choose controllers that will receive status updates from the shared point.
- Highlight a point in the shared list and use the buttons in the middle of the editor to change the minimum and maximum amount of time that statuses are sent.

- Click the “Generate Report” button to see a report that shows each point and the controllers it is shared with. With one page per shared point, the report can be quite lengthy.
- All CBAS reports can either be printed, or saved in one of many different formats. Click  to save the report.

Go to Hardware View. In each controller that a point is shared with, you will see that point listed with the word “PEER” after its name. This point will never show the correct status that is shown on the original point. However, the correct status will be displayed on a Handheld Terminal.

Routing is also shown on the PEER Editor screen and is configured automatically depending on whether the host controller has RS-485 channels programmed. Controllers with no RS-485 channels are assigned “No Routing”, meaning that the status is broadcast only by that controller. Controllers with RS-485 channels are assigned “Routing 1”, which means that status is broadcast on all channels. When another controller receives the status, it re-broadcasts on all channels except the one it was received on.

When writing a logic statement involving a PEER point, you will not see the local “PEER” point listed as a selectable point. You have to go to the “All Points” list and select the original point. CBAS knows that it is a PEER point and will take care of the rest for you.

Some good examples of points that might be shared between controllers include:

- Outside Air Temperature
- Outside Air Humidity
- Summer/ Winter Mode
- Building Master Schedule
- AHU Master Schedule

Peer Testing: Previously, Peer-to-Peer could be edited in Editor Mode only. There is now a menu option for Peer Testing in Real Mode only. In this feature, you select a controller and click START. That controller sends out a blank Peer Broadcast message. All Peer panels receiving this message will, in turn, respond with a broadcast message. All of the panels that respond will be listed. This will tell you if a controller can talk to another controller via a broadcast message. (**Note:** Broadcast packets will not be forwarded through a Router, only a Switch) Firmware version 10.1 or later is required for this feature.

When configured properly, Peer-to-Peer can add sophistication and/ or redundancy to a sequence of operation. It can turn a small group of stand-alone controllers (without a server) into a real interactive system, similar to one with a server. Or it can add some redundancy in the case when a server is offline.

# Password Protection by Operator Management

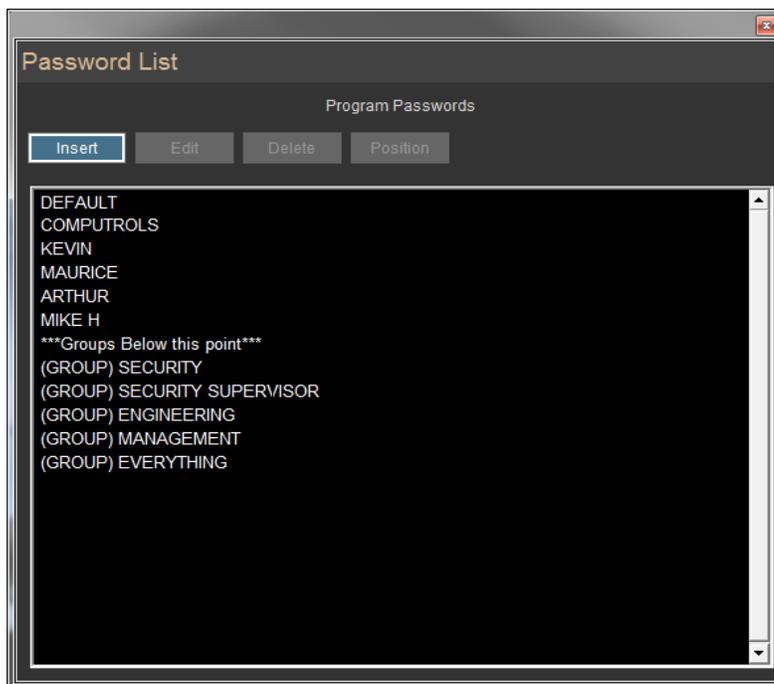
CBAS is unique in that you can customize the rights of each user. Most software only allows for different levels of password protection—usually only four standard levels. With levels, you can't pick and choose the specific features you give individual operators. With CBAS, you have full control over which operators have access to each feature.

## Managing Operators

Each operator in your facility is responsible for different aspects of building automation. For this reason, it is a good idea to regulate access to viewing and/ or manipulating each CBAS feature. For example, you might want to give only the chief engineer the right to program points, but you want all the building technicians to be able to view points. Groups can be added and given rights. Rights of users can then be based on the rights of a group.

## Inserting an Operator or Group

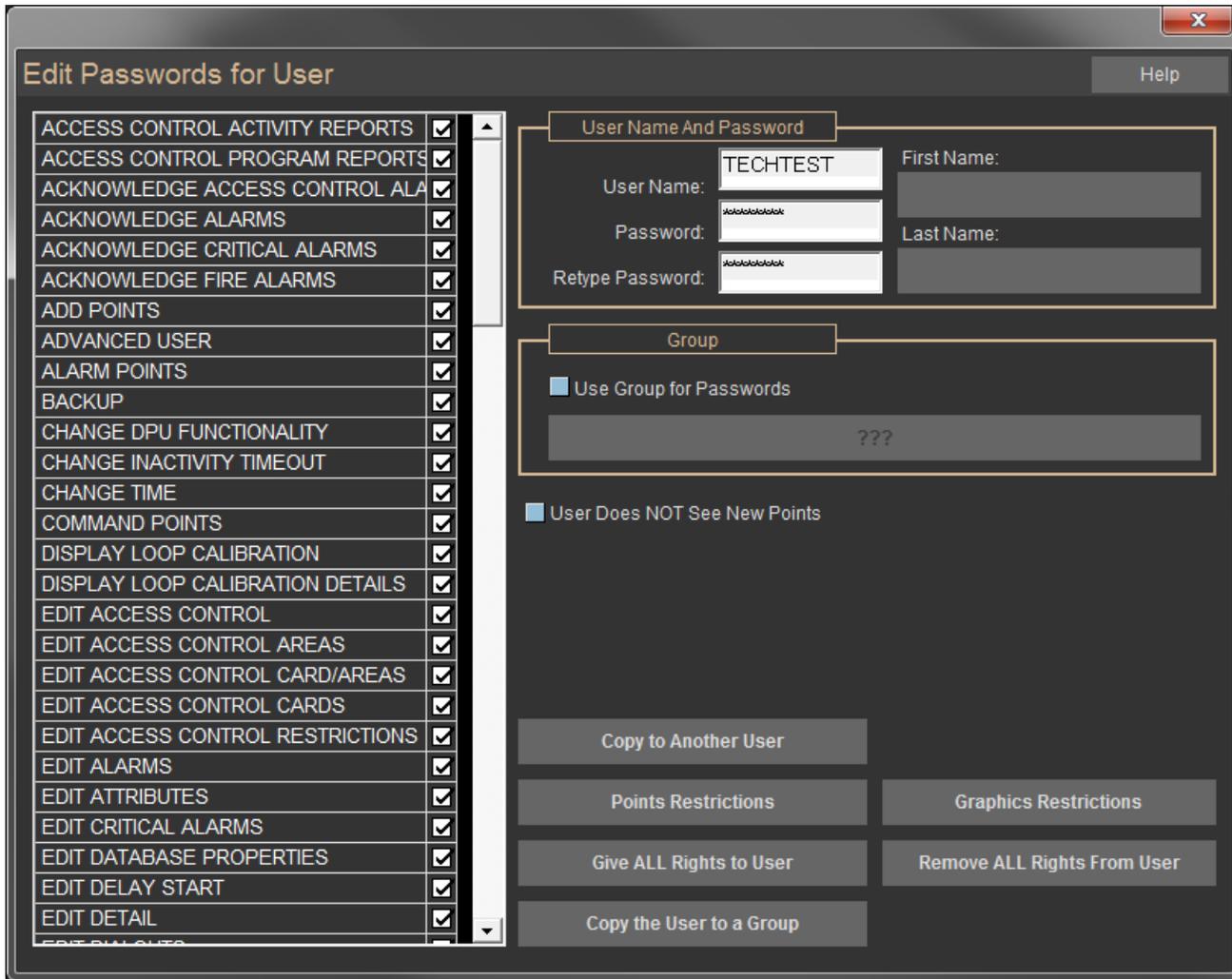
From the System menu, left-click Program Passwords to bring up the following window:



This window contains a list of operators. Each operator in this example has a unique password with a different set of rights. Groups are at the bottom of the list.

- Click the Insert button, and then move the mouse down until the red bar is located above the first field in the list. Click there to add a user. To add a Group, locate the red bar just below **\*\*\*Groups Below this point\*\*\***.

- The following screen will appear:



In the User Rights list on the left side of the window check the box beside the right you want to apply to this operator. In this case, THEO has no authority to use any features. Click the checkbox to add or remove a feature. Use the scroll bar to navigate up or down the list.

**Note:** At the end of this section, you will find an explanation of each check box.

## Editing an Operator

To edit an operator's access rights:

- Click the Edit button.
- Click the operator's name from the list, and make required changes in the Edit Passwords screen.

## Deleting an Operator

To delete an operator:

- From Password List screen, left-click the Delete button.
- Click the user you want to remove.

## Positioning an Operator

To position an operator in the Password List:

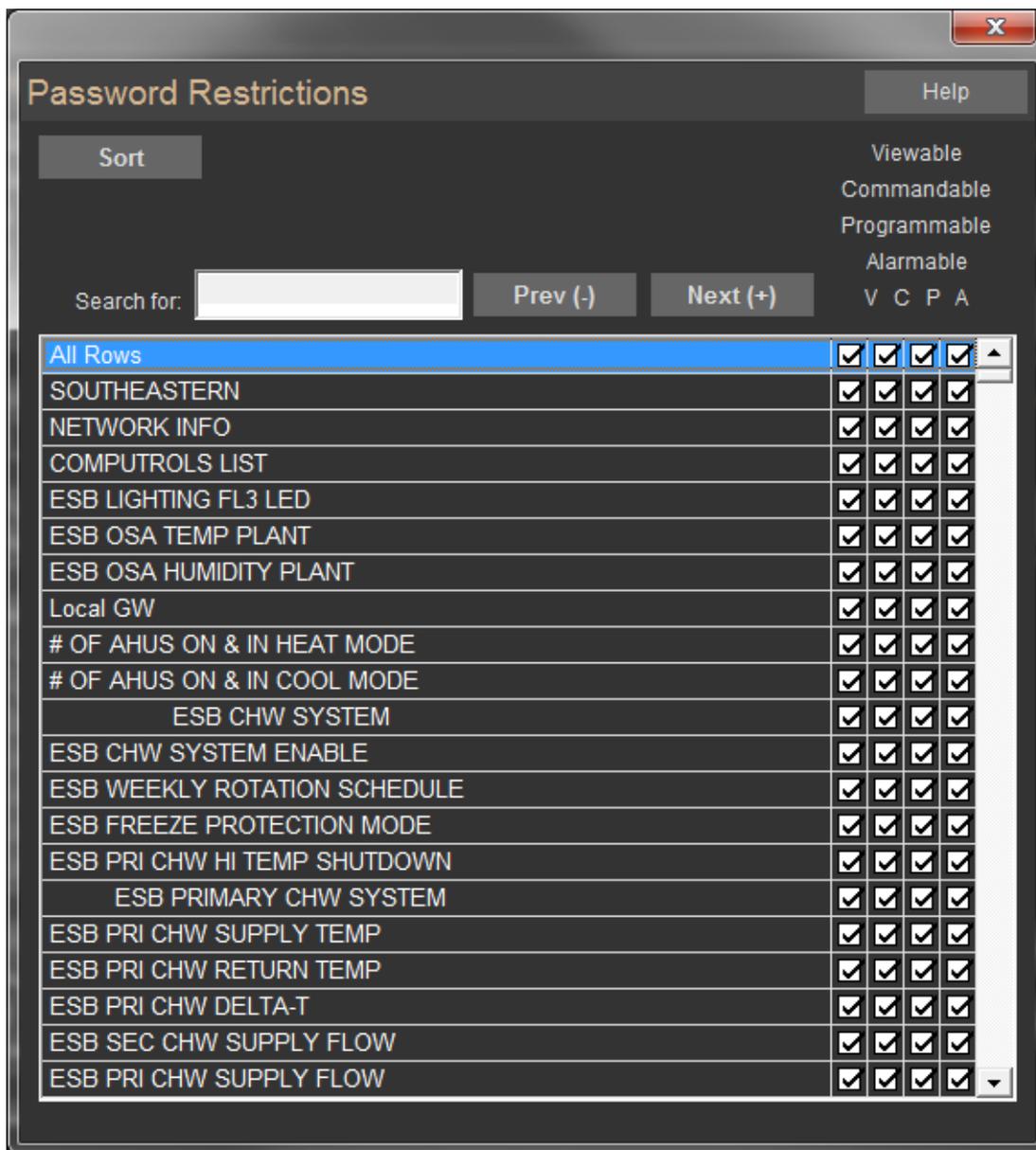
- From the Password List screen, left-click the Position button.
- Move the mouse down until the red bar is located above the field where you wish to relocate the operator name and click.

## Feature Descriptions

- **User Name:** Type in the name of the operator to whom you are giving access. When that operator signs on, he/ she will type this name under User Name.
- **Password:** Allows the operator to select and type in a password that is unique to only that operator. Make sure no one else knows that password. When each operator signs on, they will type this in under Password. This will enable you to later analyze all activity by that person by generating a User Activity Report.
- **Retype Password:** Retype the password for verification.
- **Group:** Check the box and click the “???” button to choose a group. Once a group is chosen, the user takes on the rights of that group. Just uncheck the box to remove the user from the group.
- **Copy to Another User:** Left-click here to open a window that lists the authorized operators. Click the operator name to select or deselect the operator or operators to whom you want to give the same rights. In this window, you can left-click a "select all" button to copy the rights to all operators, or a “clear all” to deselect all selected operators. Right-click to save changes and return to the Edit Password screen.
- **Give All Rights to User:** Click here to give the selected user all rights.
- **Remove All Rights from User:** Click here to remove all rights from the selected user.
- **Points Restrictions:** Each point can be Viewed, Commanded, and Programmed. There are some points you would like an operator to view, but not command or program. For example, suppose you want the

operator to see the status of the Penthouse Exhaust fan, but not to change the status or go to the Point Program screen. You would simply un-check the Commandable and Programmable boxes on that line. If checked, Alarmable means that the user will be able to acknowledge alarms, and when logged in.

Points Restrictions are shown in the following screen:



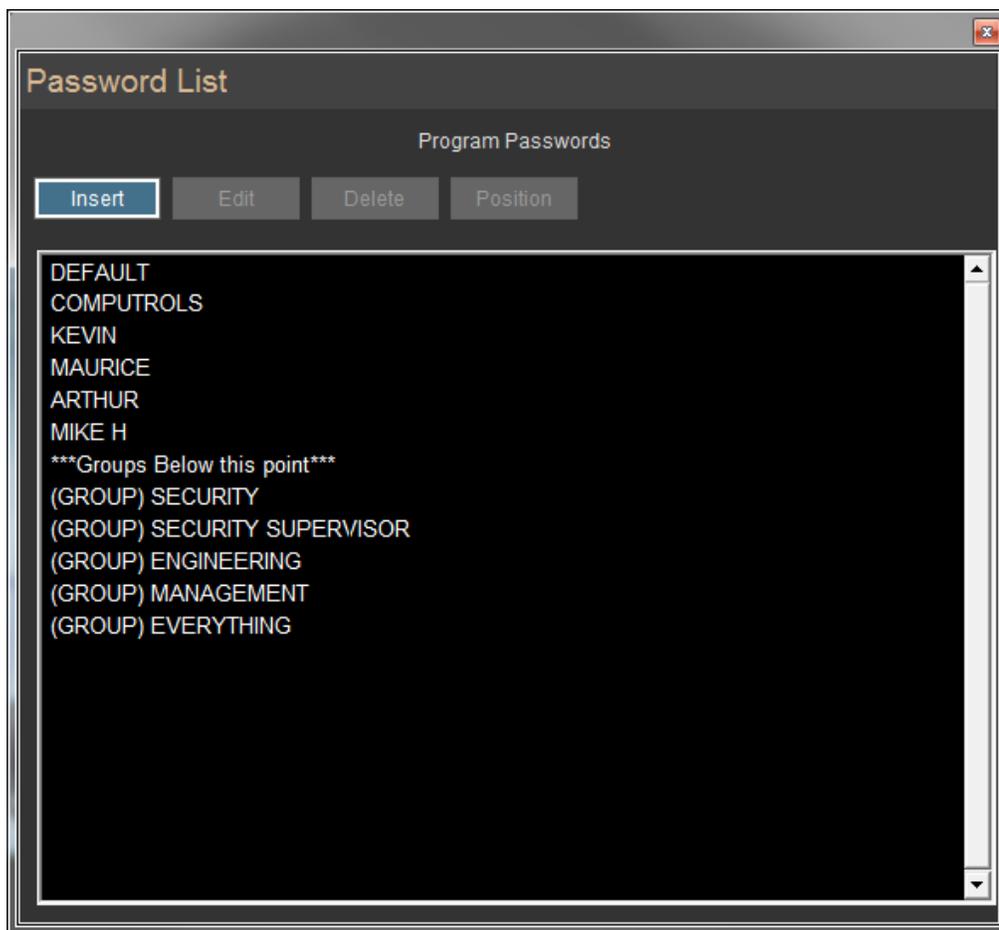
- **Sort:** Left-click here to narrow down the list of points shown to those that share some common attributes. See Advanced Sort.
- **Search For:** Anything you type will automatically go into the "Search for" field. Type the name or a portion of the name you want to locate and press (+) or left-click Next (+) to search down the list. Press (-) or left-click Prev (-) to search up the list.

## Adding Groups for User Management

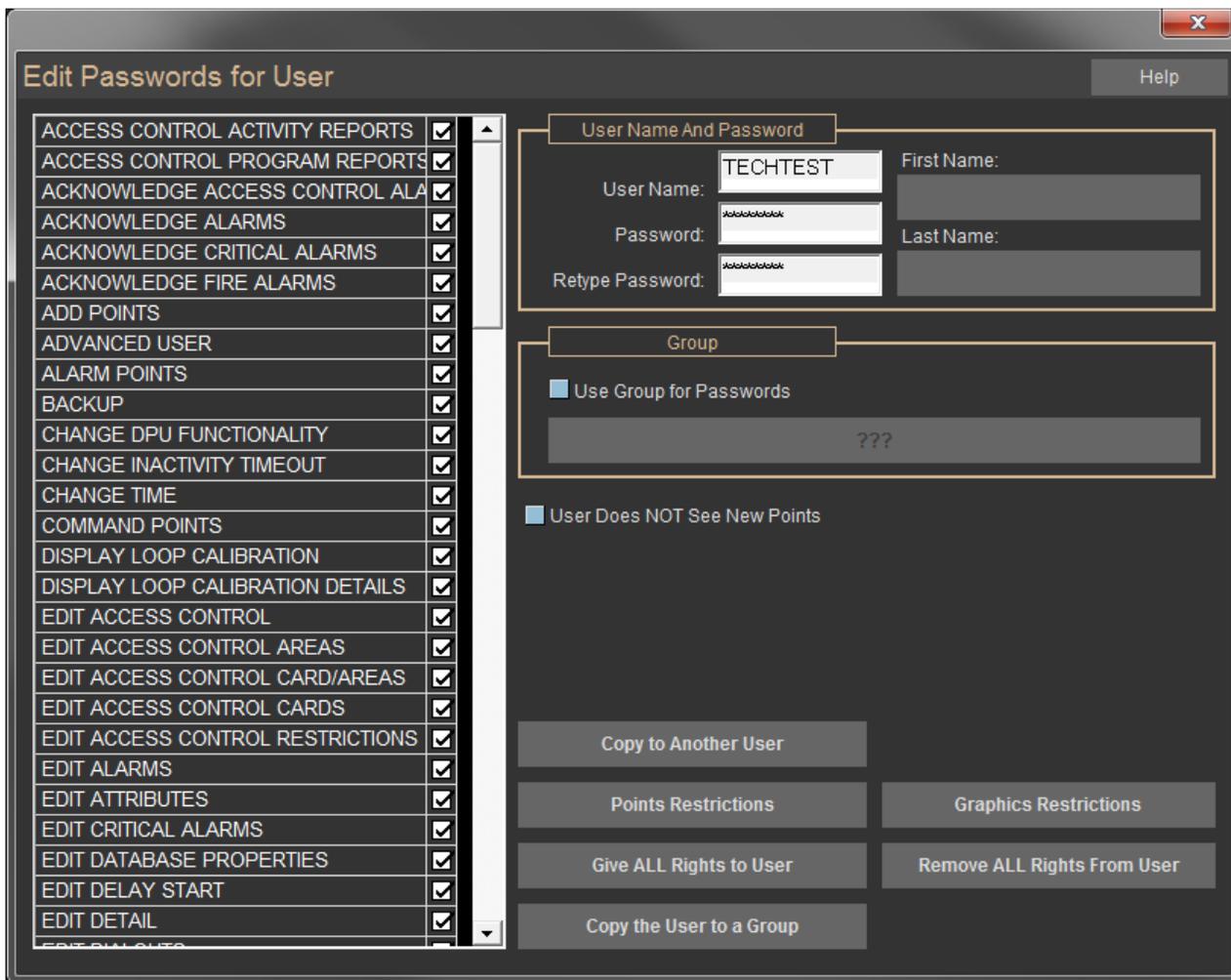
Did you know that you can setup Groups of Users in CBAS that have the same rights? The Users will still be individuals for purposes of knowing who did something in CBAS using the User Activity Report.

It's a good idea to setup a User and password for everyone who will be using CBAS. Your most experienced Users will have rights to View and Command everything or nearly everything. You might have building security staff monitoring alarms overnight and notifying engineering of any alarms that come up. Security Users might only have rights to see Activity View and acknowledge Alarms, but must log in to do so. Then you have less experienced Engineers who investigate these Alarms and have rights to View Graphics and Text View to figure out why there was an alarm. But in order to command a point or change a schedule, they have to pass it to a senior Engineer who can log in and do what is necessary.

To add the Users and Groups in CBAS, go to System, then Program Passwords and you will see the User List.



Click the Insert button, move your cursor down to the list and you will see a red line. That is where your new Users will be inserted. So, once you have it in the right spot, left-click and the User Editor will open. See picture:



In the top right enter the username, password and name (optional). On the left you see categories of access that can be given to the User by checking the boxes. This section disappears if you make the User a member of a Group by checking the box and selecting a Group from the dropdown list in the Group section.

If not a member of a Group, you can limit the individual points that the user can View, Command, Program or receive Alarms from by clicking the Points Restrictions button. You can also limit what Graphics pages the User can View under the Graphics Restrictions button. You can also Give or Remove all Rights for the User by clicking the appropriate buttons.

All of the above can be found on the Group rights screen except for the Username and Password. Just give the Group a name and setup its rights. Then go back to the Users List and click Edit, then click a User and add it to a Group.

## Graphics Restrictions

Here, Graphics pages can be restricted the same way that individual Points can be restricted in Points Restrictions. Each point in a single graphic is treated the same and you can limit the graphics that the selected user can View, etc.

## Explanation of User Permission Checkboxes in Program Passwords

### *Permission checked: Means User Can...*

- **ACCESS CONTROL ACTIVITY REPORTS:** GENERATE ACCESS CARD ACTIVITY REPORTS
- **ACCESS CONTROL PROGRAMMING REPORTS:** GENERATE ACCESS CONTROL PROGRAMMING REPORTS
- **ACKNOWLEDGE ACCESS CONTROL ALARMS:** ACKNOWLEDGE ALARMS FROM ACCESS CONTROL
- **ACKNOWLEDGE ALARMS:** ACKNOWLEDGE ALARMS THAT ARE NOT ACCESS CONTROL OR FIRE
- **ACKNOWLEDGE FIRE ALARMS:** ACKNOWLEDGE ALARMS FROM CSimon FIRE SYSTEM
- **ADD AND REMOVE POINTS FROM SCAN:** TAKE POINTS OUT OF SCAN (COMM.) PUT BACK IN SCAN
- **ADD POINTS:** ADD HARDWARE AND SOFTWARE POINTS TO CONTROLLERS IN HARDWARE VIEW
- **ADVANCED USER:** PERFORM ADVANCED FUNCTIONS SUCH AS (see note 1)
- **ALARM POINTS:** NOT SEE ALARMS UNLESS CHECKED (SHOULD ALWAYS GIVE THIS TO DEFAULT USER)
- **BACKUP:** MAKE BACKUPS FROM SYSTEM/BACKUP DATABASE
- **CHANGE DPU FUNCTIONALITY:** SHOW ALARMS AND DYNAMIC SCREEN UPDATES CHECK BOXES (IN CONFIGURE WORKSTATION)
- **CHANGE INACTIVITY TIMEOUT:** CHANGE AMOUNT OF TIME OF INACTIVITY BEFORE CBAS SWITCHES TO DEFAULT USER (ON SYSTEM/CONFIGURE WORKSTATION)
- **CHANGE TIME:** NOT NECESSARY AND ONLY IN REAL MODE AT SYSTEM MENU (CBAS GETS TIME FROM WINDOWS TIME AND CONTROLLERS GET TIME FROM CBAS)
- **COMMAND POINTS:** COMMAND POINTS ON/OFF, OR TO AN ANALOG VALUE BY OPER DISPLAY LOOP CALIBRATION: SEE DETAILS OF PID LOOPS IN PID SCREEN
- **DISPLAY LOOP CALIBRATION DETAILS:** SEE MORE DETAILS OF PID LOOPS IN PID SCREEN

**\*\* THE FOLLOWING “EDIT” CHECKBOXES ALLOW THE USER TO MAKE PROGRAMMING CHANGES ON THE INDICATED SCREEN. MOST ARE SELF-EXPLANATORY \*\***

- **EDIT ACCESS CONTROL:** CAN ENTER THE ACCESS CONTROL MENUS
- **EDIT ACCESS CONTROL AREAS:** PROGRAM AREAS
- **EDIT ACCESS CONTROL CARD/AREAS:** PROGRAM CARD/AREAS EDIT ACCESS CONTROL CARDS: PROGRAM CARDS
- **EDIT ACCESS CONTROL RESTRICTIONS:** SEE THE PASSWORDS MENU ITEM ON SYSTEM/ACCESS CONTROL, WHICH ALLOWS USERS TO ADD CARDS TO CERTAIN AREAS
- **EDIT ALARMS:** SETUP AND CHANGE ALARM PARAMETERS FROM POINT PROGRAM SCREEN
- **EDIT ATTRIBUTES:** ON SYSTEM/PROGRAM ATTRIBUTES
- **EDIT DATABASE PROPERTIES:** SCALE DATABASE IN UTILITY MODE
- **EDIT DELAY START:** CHANGE BINARY OUT IMMEDIATE START TO DELAY QUEUE START EDIT DETAIL: ADD/CHANGE NOTEPADS ON POINTS ETC
- **EDIT DIALOUTS:** PROGRAM PAGER DIALOUTS ON SYSTEM MENU EDIT FIRE: CHANGE ANYTHING ON THE FIRE MENUS
- **EDIT FONTS:** CHANGE FONTS FROM BUTTON ON CONFIGURE WORKSTATION EDIT GRAPHICS: ADD/MAKE CHANGES TO GRAPHICS
- **EDIT GROUPS:** CAN ADD/CHANGE GROUPS IN PROGRAM PASSWORDS EDIT HEADER POINTS: ADD/CHANGE POINTS DISPLAYED ON HEADER
- **EDIT HISTORY:** MAKE CHANGES TO HISTORY SAVING PARAMETERS ON POINT PROGRAM SCREEN
- **EDIT INTERLOCKS:** FROM THE SYSTEM/ACCESS CONTROL MENU
- **EDIT LIGHTING:** ANYTHING ON THE SYSTEM/LIGHTING MENU
- **EDIT LOGIC:** ADD/CHANGE LOGIC FROM THE POINT PROGRAM SCREEN
- **EDIT LOGICAL GROUPS:** ADD/CHANGE LOGICAL GROUPS FROM THE TEXT VIEW MENU
- **EDIT OPTIMAL START-STOP:** ADD/CHANGE OPTIMAL START FROM THE POINT PROGRAM SCREEN
- **EDIT PASSWORDS:** ADD/CHANGE USERS AND THEIR PERMISSIONS
- **EDIT PEER TO PEER:** IN EDITOR MODE, ADD/CHANGE PEER RELATIONS
- **EDIT PID LOOPS:** ADD/CHANGE PID PARAMETERS ON ANALOG OUTPUT PROGRAM SCREEN
- **EDIT POPUP GRAPHICS:** ADD/CHANGE POPUP GRAPHICS ON SYSTEM MENU

- **EDIT RANGE:** CHANGE RANGE ON ANALOG POINTS PROGRAM SCREEN
- **EDIT RUN STATE:** ADD/DELETE RUNTIME POINTS
- **EDIT SCHEDULES:** ADD/CHANGE SCHEDULES ON POINT PROGRAM SCREEN
- **EDIT SCHEDULES OVERTIME:** ADD/CHANGE OVERTIME SCHEDULES ON POINT PROGRAM SCREEN
- **EDIT SEQUENCERS:** ADD/CHANGE SEQUENCERS FROM ANALOG OUTPUT PROGRAM SCREEN
- **EDIT SMOKE CONTROL:** ADD/CHANGE SMOKE CONTROL FROM THE FIRE MENU/SYSTEM
- **EDIT UNITS:** CHANGE UNITS (EX DEG F) FROM POINT PROGRAM SCREEN EXIT CBAS 2000: CLOSE THE CBAS PROGRAM
- **GAIN SCHEDULING:** ADD/CHANGE GAIN SCHEDULE FROM PID EDITOR
- **IMPORT DOS DATABASE:** IMPORT A DATABASE FROM AN EXISTING CBAS DOS DATABASE
- **MANUAL TUNING SCREEN:** TUNE PIDs MANUALLY AS OPPOSED TO AUTO-TUNE

**\*\* THE FOLLOWING “MENU” ITEMS REMOVE THE ITEMS FROM THE SYSTEM MENU IF NOT CHECKED \*\***

- MENU ATTRIBUTES
- MENU CALIBRATION
- MENU CHANNEL STATISTICS MENU COMMISSION CONTROLLER MENU CONTROLLER INFO
- MENU DATABASE MAINTENANCE
- MENU FORMULAS (AND CALCULATIONS) MENU HISTORY MAINTENANCE
- MENU VAV DOWNLOAD
- **MOVE POINTS:** NO LONGER USED
- **POSITION POINTS:** ARRANGE THE ORDER OF POINTS IN TEXT VIEW/ALL POINTS. DONE FROM SYSTEM/POSITION POINTS OR FROM POINT PROGRAM SCREEN
- **PRINT LABELS:** PRINT WIRE LABELS FROM REPORTS MENU
- **PROGRAM POINTS:** VISIT THE POINT PROGRAM SCREEN
- **RENAME POINTS:** CHANGE THE NAME OF POINTS FROM THE POINT PROGRAM SCREEN

**\*\* THE FOLLOWING “REPORT” ITEMS REMOVE THE ITEMS FROM THE REPORTS MENU IF NOT CHECKED \*\***

- **REPORT ACCESS CONTROL:** ACCESS CONTROL REPORTS REPORT ALARM ACTIVITY
- **REPORT ALARMS:** ALARMS SETUP ON POINTS REPORT COMMAND
- **REPORT CSI:** INFO FROM CSI INTERFACE
- **REPORT DEGREE DAY:** DEGREE DAY REPORT UNDER POINTS REPORT MENU REPORT DETAIL: NOTEPAD ENTRIES ON POINTS REPORT
- **REPORT EXPORT HISTORY:** HISTORY EXPORT RARELY USED (ALL HISTORY SAVES FOR A DAY)
- **REPORT FIRE REPORT HARDWARE**
- **REPORT IP ADDRESS REPORT LOGIC REPORT METER REPORT PID REPORT POINTS**
- **REPORT PRINT LABELS REPORT SCHEDULE REPORT USER ACTIVITY**
- **VAV BELIMO CONVERSION:** CONVERT LEGACY VAV CONTROLLER TO VAV-B VAV UTILITY: LAUNCH VAV-B UTILITY FROM CBAS

**\*\* THE FOLLOWING “VIEW” ITEMS REMOVE THE ITEMS FROM THE MAIN OR SYSTEM MENU IF NOT CHECKED. FOR ITEMS ON POINT PROGRAM SCREEN, YOU WILL BE ASKED TO LOG ON IF YOU CLICK THE BUTTON \*\***

- **VIEW ACCESS CONTROL:** ON SYSTEM MENU VIEW ACTIVITY: ON TEXT VIEW MENU
- **VIEW ALL POINTS:** ON TEXT VIEW MENU VIEW HARDWARE: MAIN MENU
- **VIEW GRAPHICS:** ON MAIN MENU
- **VIEW HISTORY:** ON POINT PROGRAM SCREEN VIEW LIGHTING: ON SYSTEM MENU
- **VIEW LOGIC:** ON POINT PROGRAM SCREEN
- **VIEW OPTIMAL START-STOP:** ON POINT PROGRAM SCREEN VIEW PID LOOPS: ON POINT PROGRAM SCREEN
- **VIEW REPORTS:** ON MAIN MENU
- **VIEW SCHEDULES:** ON POINT PROGRAM SCREEN
- **VIEW SMOKE CONTROL:** ON SYSTEM, FIRE, SYSTEMS

**NOTE 1: Advanced user shows up 61 times in the source code. Here they are in no particular order:**

- Card Linked shows Add/Remove Controller Combo. Shows FCI bootload command.
- Shows Fire1 time.
- Allows LogicMan to show nested IF statements in Logic.
- Allows you to select Outputs points as an input to reset schedules. Shows PID Internals.
- Shows Advanced button in sequencer. Shows MORE button in Analog screen. Shows Network Traffic in Interface Channel. Shows Diagnostics in CSI channel.
- Shows Diagnostics for other channel types. Shows extra buttons on Channel command dialog Shows extra buttons on Panel command dialog.
- Shows logic button on Panels.
- Shows GraphicID in PointName. GraphicID is really point index. Shows Debug button.
- Shows resolution when Analog is Number.
- Allows user to change BASnet controller type. Shows convert to Interface.
- Allows download firmware. Allows 'Hide Child Points' PIDRate Dialog.
- BACnet server report Modbus server report Firmware download.
- Access Control download totals screen. Access control free card editor.
- Live Edit.
- Attribute Command Commission controller VAVB Download.

## Database (Now on Database Menu in CBAS 15)

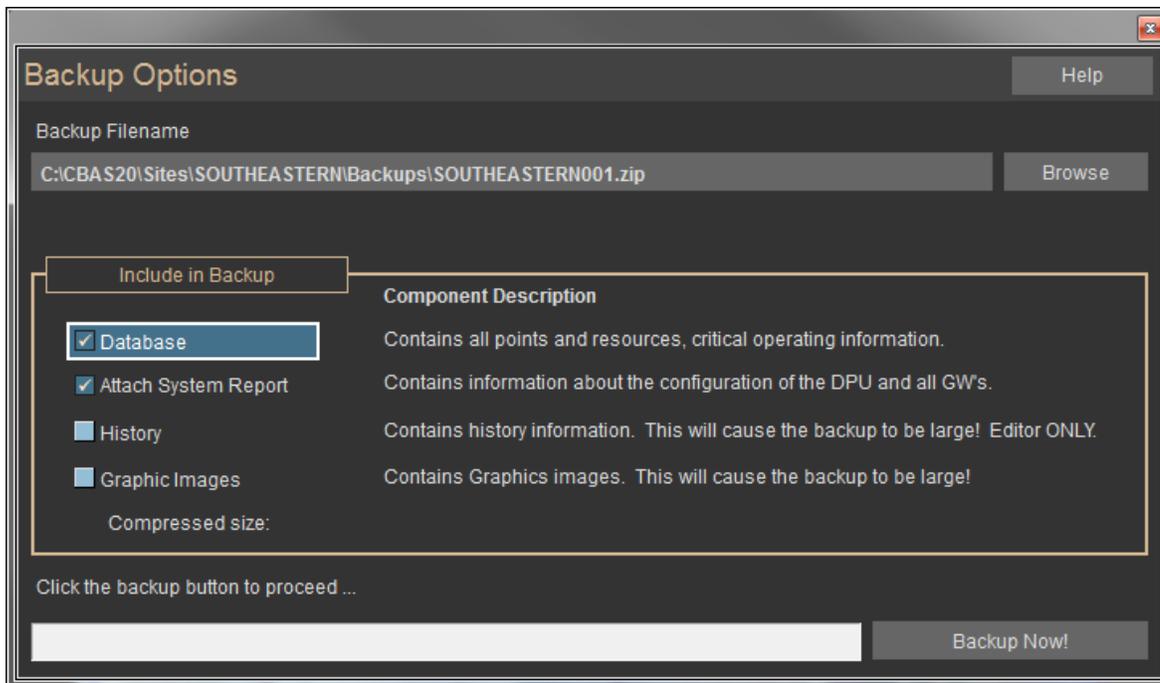
Let's face it, despite all the advancements in computer hardware and software in the last decade, computers are still unreliable. That's why Computrols offers computers now with redundant hard drives. Still, when considering the stability of your automation system, the importance of frequent backups cannot be overstated.

Here are some best practices for backing up the database:

- Do a backup before and after making database changes.
- Setup Automated Backups.
- Back up the graphics folder manually.
- Copy backups to CD, USB flash drive and over the network to the GW.
- Keep some backups off site.
- Keep all software and driver disks handy.
- GW as backup.

### Creating a Backup

Whenever making changes to the database, such as adding points, adding channels, adding users, or major logic changes, it is a good idea to do a backup before and after. If something unexpected happens, sometimes the only way to recover is to restore the backup and start over. Backup Database is located on the Database menu as of CBAS 15. Backups can be made to the hard drive, network drive or to a flash drive.



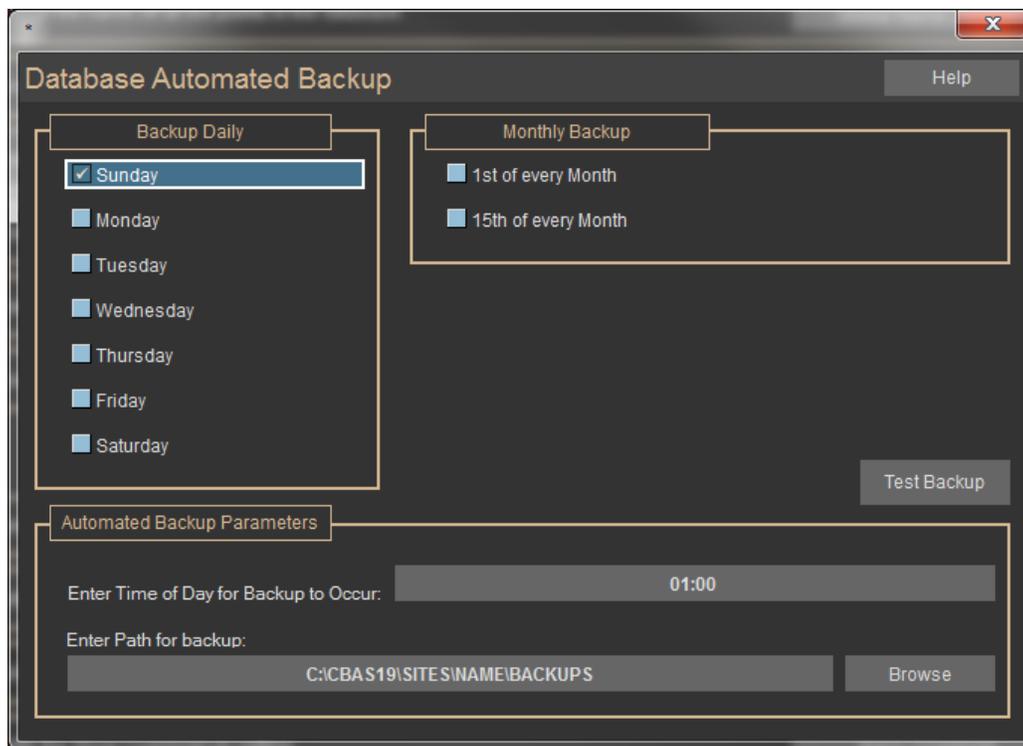
## Backup Database

Allows the user to backup the database to a file or USB disk. Can be done in Editor or Real Mode.

## Automated Backup

Automated Backup is located on the Database Menu under Database Maintenance, Automated Back-up. From there you can select to backup on certain days of the week, on the 1st of the month, and the 15th of the month. You can select the time for the backup to occur, in military time. Click on the Browse button to choose a location to write backups to (probably the Backups folder - See below).

On computers with a second hard drive, it is a good idea to make automated backups to the second drive. When you do this, a backup will still be made to the Backups folder on the primary drive also. A USB Flash Drive can also be chosen as the location for backups



## Manual Backup

When you do a backup in CBAS, whether manual or automatic, the actual pictures are not backed up, only the links, labels and points you create. It is a good idea to make a manual backup of the pictures also. Generally, the pictures are contained in a folder called Graphics, located in the database folder: C:\CBAS19\Sites\[database]. Backup the entire Graphics folder. You can also backup the entire database folder when doing this. This is the only way to make a backup of the History file.

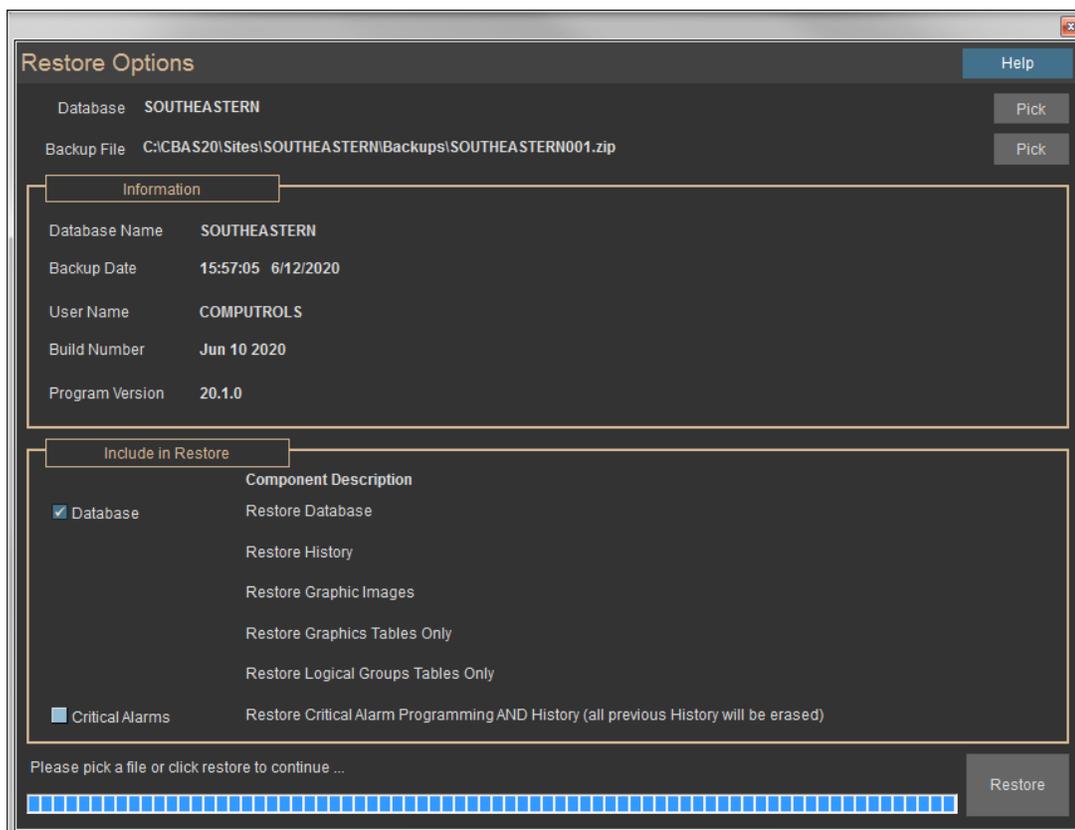
- You can also copy the entire database folder and Backups to a workstation over the network through Windows “My Network Places” or “Network Neighborhood.”
- Keep a copy on site and a copy off site.
- Make backups to a USB Flash Drive. Servers come with USB ports on the front and back of the case.
- In case of a major computer hardware failure, keep all software and driver disks that came with the computer handy. This will facilitate reinstallation if it comes down to that.

## Workstation as a Backup

One of the best things about having a Graphic Workstation is that it can be converted to a DPU when needed. With TCP/IP controllers hosting all the RS-485 channels, the GW can be converted to DPU in a matter of minutes. That’s why it is good to keep a copy of the database folder on the GW.

## Restoring a Backup

As of CBAS 17 the file structure has changed as mentioned in the first chapter. But if you close your Database, then go to Database, Restore Database, it will take you to the right place and choose the most recent backup. That is in CBAS 19\Sites\[Database Name]\Backups. If you have a Backup file from another computer, then place it in the Backups folder.



CBAS will take you to the location of the Database you last had open.

If you have more than one Database in your system and you want to restore a different one, click the Pick button in the top left.

Then choose a different Database from the list. Once you choose a Database, CBAS will load the most recently created Backup.

If you want to restore an older Backup, click the second Pick button in the top right and choose the one you want. Once chosen, the Information section will tell you the Database Name and when the backup was made, as well as by what User and the version of CBAS that it was made from. Build Number is the date the version was compiled.

If you want to restore the Critical Alarm part of the Database, check that box, but all Critical Alarm history will be deleted. Otherwise, click Restore and it will be restored to the correct folder for that Database.

Once the Restore Options screen disappears, the Restore is complete and you can open it by going to Database, Open Database.

As mentioned in the beginning of the manual, 'Install Database' is used to add a database or upgrade a database. In order to do this, you need to place a CBAS 15, CBAS 17 or CBAS 19 backup in CBAS 19\Backups folder. Actually, you can browse to the CBAS 15\Backups folder too.

When you click Install Database, you will see a different version of Restore Options. Click PICK, browse to the Backups folder and select the Backup file, then Click Restore. CBAS will create all the folders for you.

## **Graphics and History Restore**

To Restore the Graphics background pictures, copy them from the location they were stored in before and copy them to CBAS 19\Sites\[Database Name]\Graphics, then reopen CBAS and you should see the pictures.

If there are any sub-folders, copy the contents of them and place them in the Graphics folder. Sub-folders are not allowed starting with CBAS 17.

History files from previous versions are located in C:\ CBAS 15\ [Database Name]. There are about 21 files related to History, the most important 2 are named Archive.dat and Archive.mdb. The rest are short term History files with history in the name and one named Main.dat. All should be copied to CBAS 19\Sites\[Database Name]\History.

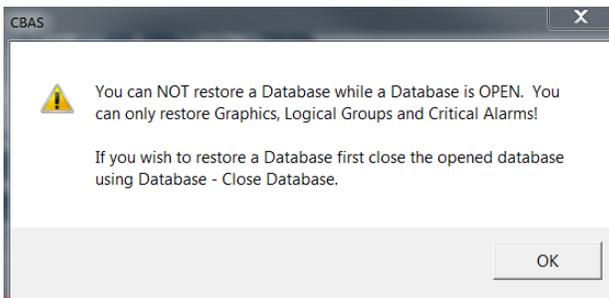
## Restoring Graphics Only

Did you know that you can work on Graphics on another computer then restore only the Graphics changes to the CBAS Server?

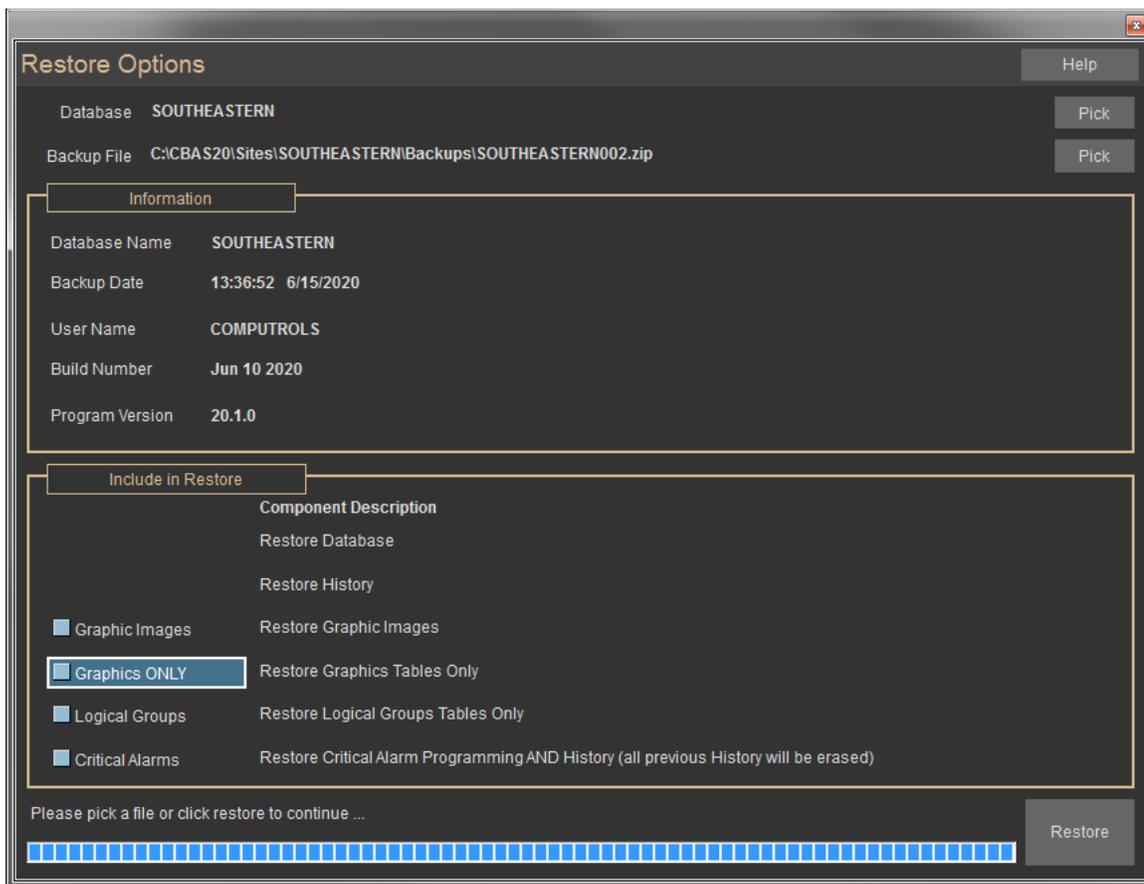
Here's the scenario: Let's say you are completing a new building controls installation and technicians are still working on the database, tweaking the sequence of operation to make the building more efficient. But at the same time, you need to start working on Graphics. You can't take the technicians away from CBAS and you can't program graphics on a Workstation (GW).

What you have to do is make a backup first thing in the morning. Take that to another computer that has the same version of CBAS installed and restore the backup. This could be on a technician's laptop, an already installed GW or someone at the office. Run the database in Editor Mode and edit the Graphics based on the Points that are currently in the database. When finished for the day, make a backup and get it to the site Computer. In CBAS 17 or 19, place the backup in CBAS 19\Sites\[database name]\Backups. Restoring Graphics only will not have any effect on new points or changes to the database that were done during the day, because the changes you made to Graphics only involve the Points that were already there.

The database Graphics can be restored in Real Mode. In CBAS, go to Database, then Restore. You will see the following warning that the entire Database cannot be Restored in Real Mode but Graphics can.



Click OK and you will see the Restore Options screen where you can click the second "Pick" button and choose the Backup you just placed in the Backups folder if it isn't already selected.



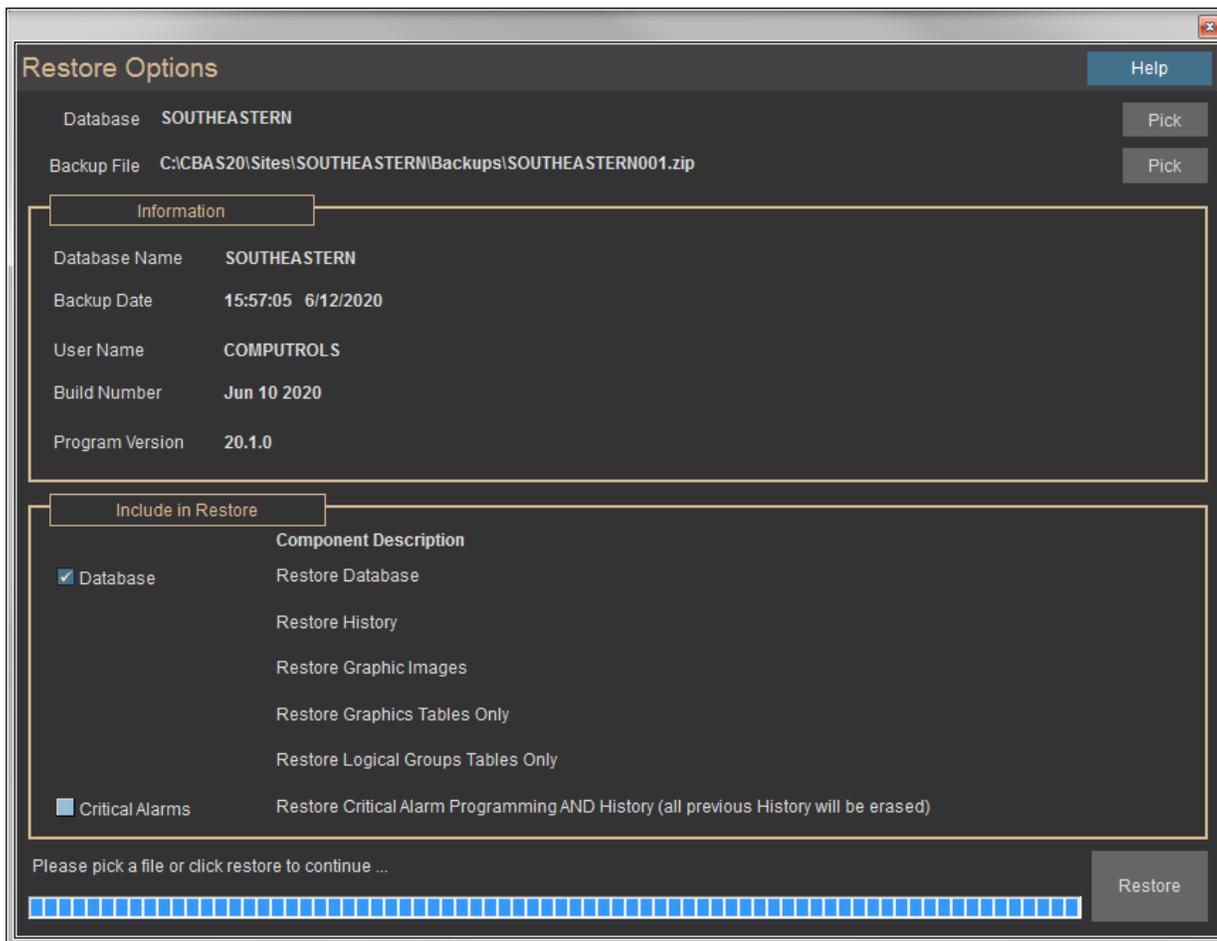
Then, in the bottom left, check the box for Graphics ONLY. Notice that you can also restore Logical Groups because that is also stored in the Relational Database like Graphics. If you have been editing Logical Groups along with Graphics, then check that box too. Critical Alarms is another story for another day. Click the Restore button in the bottom right and wait for the process to complete.

If you have added new background pictures to Graphics, copy those pictures to CBAS 19\Sites\[database name]\Graphics. And you should not use subfolders in the Graphics folder.

Now you can check Graphics View to make sure your changes and additions are there. Do the same with Logical Groups. If everything is there, then make another Backup.

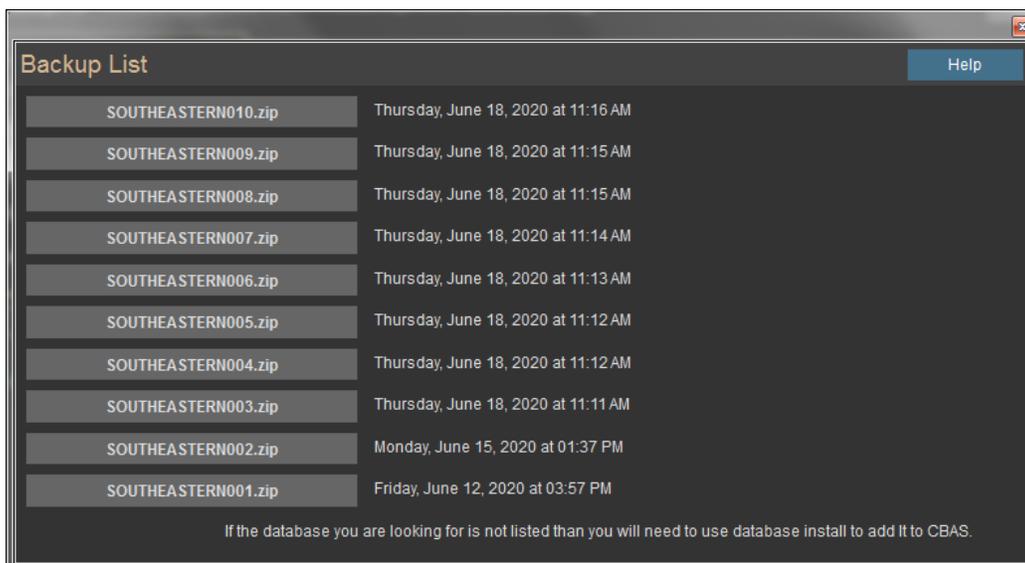
#### Versions Prior to CBAS 17

If you are restoring a backup from another computer, place the backup file in C:\CBAS\ Backups folder using Windows Explorer. If you already have a database open, you will have to close it in order to restore a database. To do this, go to the Database Menu (previously System Menu) and click Close Database. Now you will only have Database and System on the Main Menu. From here, select Database and then Restore Database. The Restore Options window will then open.



The first line is Backup File and in most cases you will find that this line already lists the directory and file name of your most recent backup file saved to the hard drive. In order to select an older backup, select Pick at the end of the same line. A new window will open where you can browse for your backup file. Select the zip file you would like to use to restore your database.

At the bottom of the Restore Options window you should see a button labeled Restore. When you click it, a new window will open.



This is where you will select the folder of the database you want to restore to. Again, it should be pointing to your existing database. In the case that you had to reinstall CBAS, or if you have never opened this database before, you will have to create a folder for the database before you start the restore process. Use Windows Explorer to make the folder in C:\CBAS 15. Once you select the destination folder for the restore, click OK and the restore will begin.

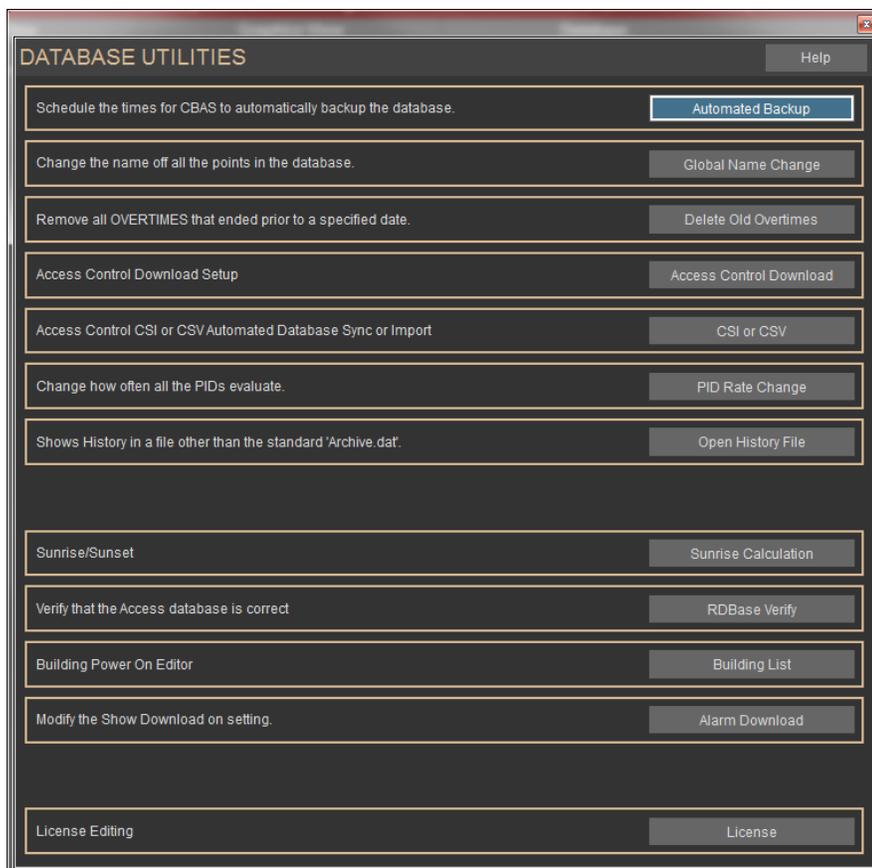
Now we move on to restoring your graphics. While CBAS does not automatically restore the pictures, it is fairly easy to restore them manually provided you followed the steps to back them up. This process requires using Windows Explorer to move around the file structure. First navigate your way to the CBAS directory and locate your database folder. In a new window, locate the backup copy of the graphics folder you created. Now simply highlight and Copy (CTRL+C) the backup graphics folder. Switch back to the CBAS directory, highlight your database folder, and Paste (CTRL+V) the copy in the directory. When you return to CBAS all of your graphics should be restored.

## Database Maintenance (now on Database Menu in CBAS 15)

Database Utilities is where you go to make global changes to the database, purge old overtimes and schedule Automatic Backups.

The first section is “Automated Backups.” From here you can schedule a recurring automatic backup.

For more information on this, see Chapter 5, Section 4-Backing Up Your Database.

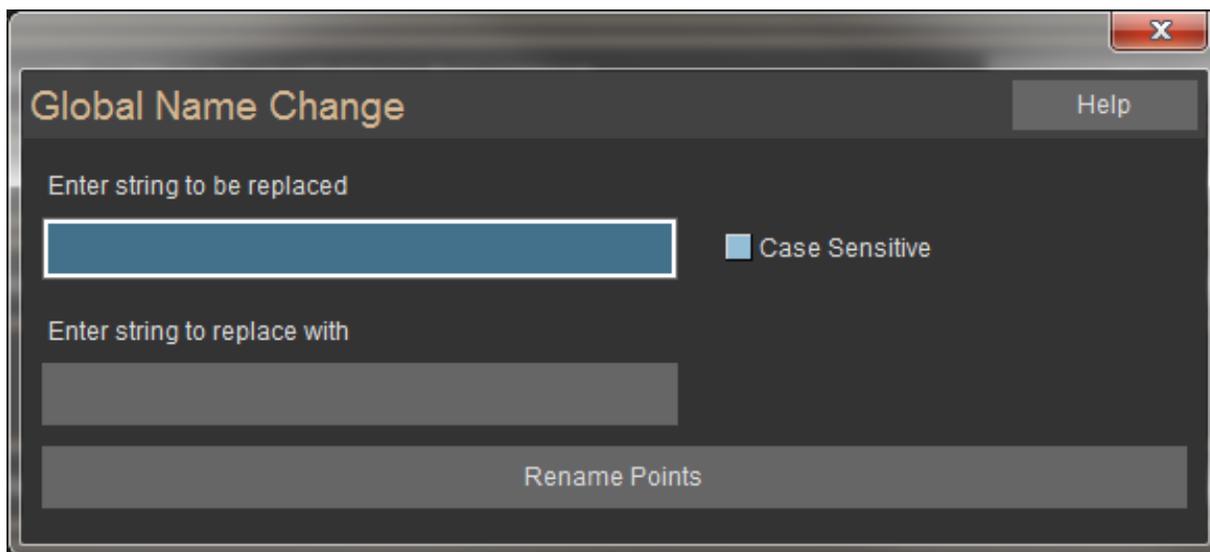


Database Utilities is where you go to make global changes to the database, purge old overtimes and schedule Automatic Backups. This item was previously on the System Menu prior to CBAS 15.

The first section is “Automated Backups.” From here you can schedule a recurring automatic backup. For more information on this, see Chapter 5, Section 4-Backing Up Your Database.

## Global Name Change

Under “Global Name Change”, you can change a group of point names that have common characters in their names. For instance, if there are many points with AHU in the name, that could be changed to UNIT. Click on global name change and you will see the following window.



Let’s say you want to change the word Unit to UNIT. Put Unit in the top field and UNIT in the bottom field then, check the box next to Case Sensitive. Click Rename Points.

## Delete Old Overtimes

It is a good idea to periodically purge old overtimes so that the database doesn’t grow unnecessary.

Under “Delete Old Overtimes”, click on the date field and select the date that you would like to remove old overtimes from. Then click “Remove Old Overtimes Now.”

## Access Control Download (Covered in Access Control Manual)

Allows you to setup an automatic download so that new cards and card changes get to the Access Controllers.

## Access Control CSI Sync

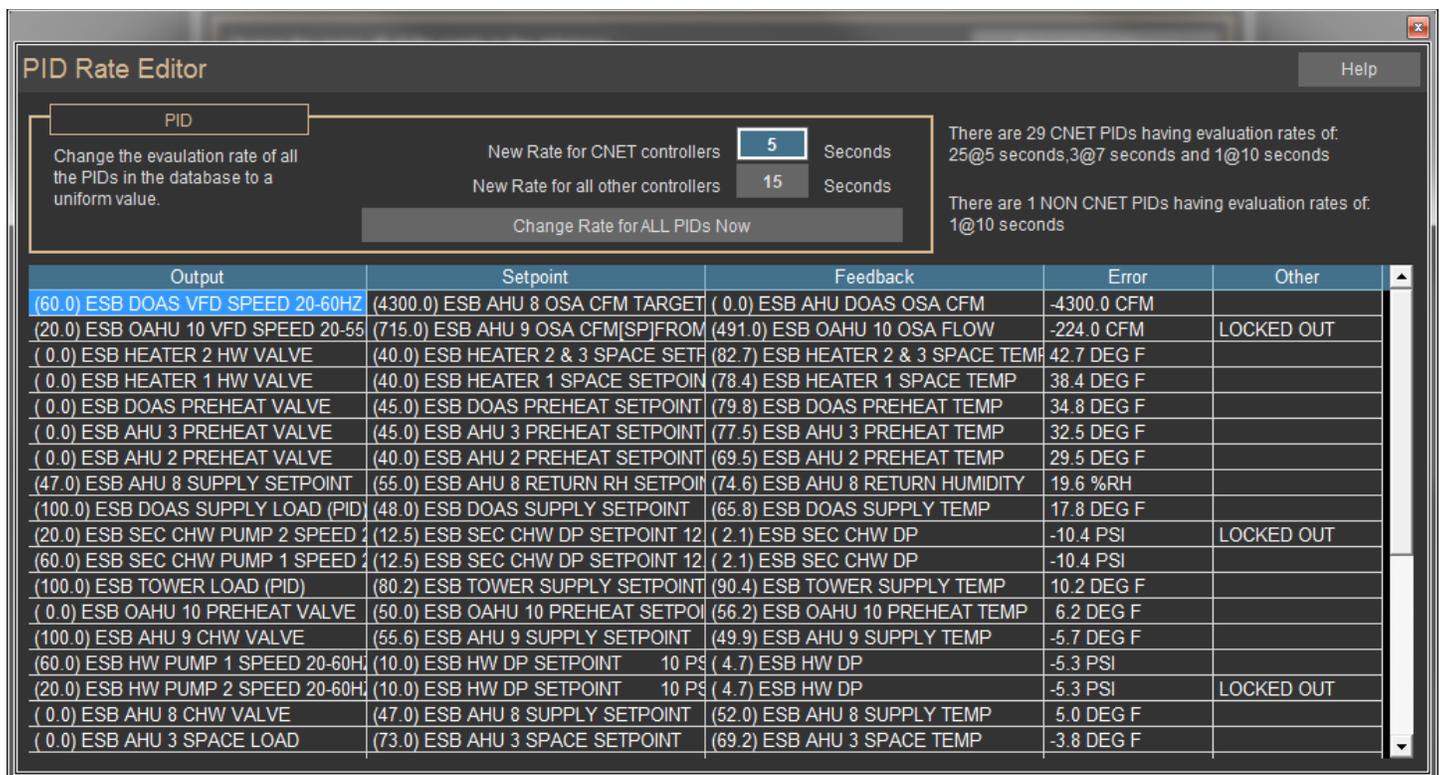
Applies to CSI interface only.

### PID Rate Change

If you have a database with many PIDs on Opto controllers, you might want to raise the evaluation rate of all PIDs. Because all processing of logic for Opto controllers is done on the DPU, many PIDs can cause a heavy processing burden on the computer. This is not a problem with BASnet controllers.

The default rate for PIDs is 5 seconds and the Rate can be changed on the PID Program Screen.

However, you can change all PIDs together from the PID Rate Change button. See the figure below:



The screenshot shows the 'PID Rate Editor' window. It has a 'Help' button in the top right. Below the title bar, there is a 'PID' label and a description: 'Change the evaluation rate of all the PIDs in the database to a uniform value.' There are two input fields: 'New Rate for CNET controllers' with a value of 5 and 'New Rate for all other controllers' with a value of 15. A 'Change Rate for ALL PIDs Now' button is below these fields. On the right, there are two text boxes: 'There are 29 CNET PIDs having evaluation rates of: 25@5 seconds, 3@7 seconds and 1@10 seconds' and 'There are 1 NON CNET PIDs having evaluation rates of: 1@10 seconds'. Below this is a table with 5 columns: Output, Setpoint, Feedback, Error, and Other. The table contains 20 rows of PID data.

Output	Setpoint	Feedback	Error	Other
(60.0) ESB DOAS VFD SPEED 20-60HZ	(4300.0) ESB AHU 8 OSA CFM TARGET	(0.0) ESB AHU DOAS OSA CFM	-4300.0 CFM	
(20.0) ESB OAHU 10 VFD SPEED 20-55	(715.0) ESB AHU 9 OSA CFM[SP]FROM	(491.0) ESB OAHU 10 OSA FLOW	-224.0 CFM	LOCKED OUT
(0.0) ESB HEATER 2 HW VALVE	(40.0) ESB HEATER 2 & 3 SPACE SETP	(82.7) ESB HEATER 2 & 3 SPACE TEMP	42.7 DEG F	
(0.0) ESB HEATER 1 HW VALVE	(40.0) ESB HEATER 1 SPACE SETPOINT	(78.4) ESB HEATER 1 SPACE TEMP	38.4 DEG F	
(0.0) ESB DOAS PREHEAT VALVE	(45.0) ESB DOAS PREHEAT SETPOINT	(79.8) ESB DOAS PREHEAT TEMP	34.8 DEG F	
(0.0) ESB AHU 3 PREHEAT VALVE	(45.0) ESB AHU 3 PREHEAT SETPOINT	(77.5) ESB AHU 3 PREHEAT TEMP	32.5 DEG F	
(0.0) ESB AHU 2 PREHEAT VALVE	(40.0) ESB AHU 2 PREHEAT SETPOINT	(69.5) ESB AHU 2 PREHEAT TEMP	29.5 DEG F	
(47.0) ESB AHU 8 SUPPLY SETPOINT	(55.0) ESB AHU 8 RETURN RH SETPOINT	(74.6) ESB AHU 8 RETURN HUMIDITY	19.6 %RH	
(100.0) ESB DOAS SUPPLY LOAD (PID)	(48.0) ESB DOAS SUPPLY SETPOINT	(65.8) ESB DOAS SUPPLY TEMP	17.8 DEG F	
(20.0) ESB SEC CHW PUMP 2 SPEED	(12.5) ESB SEC CHW DP SETPOINT 12	(2.1) ESB SEC CHW DP	-10.4 PSI	LOCKED OUT
(60.0) ESB SEC CHW PUMP 1 SPEED	(12.5) ESB SEC CHW DP SETPOINT 12	(2.1) ESB SEC CHW DP	-10.4 PSI	
(100.0) ESB TOWER LOAD (PID)	(80.2) ESB TOWER SUPPLY SETPOINT	(90.4) ESB TOWER SUPPLY TEMP	10.2 DEG F	
(0.0) ESB OAHU 10 PREHEAT VALVE	(50.0) ESB OAHU 10 PREHEAT SETPOINT	(56.2) ESB OAHU 10 PREHEAT TEMP	6.2 DEG F	
(100.0) ESB AHU 9 CHW VALVE	(55.6) ESB AHU 9 SUPPLY SETPOINT	(49.9) ESB AHU 9 SUPPLY TEMP	-5.7 DEG F	
(60.0) ESB HW PUMP 1 SPEED 20-60HZ	(10.0) ESB HW DP SETPOINT 10 PSI	(4.7) ESB HW DP	-5.3 PSI	
(20.0) ESB HW PUMP 2 SPEED 20-60HZ	(10.0) ESB HW DP SETPOINT 10 PSI	(4.7) ESB HW DP	-5.3 PSI	LOCKED OUT
(0.0) ESB AHU 8 CHW VALVE	(47.0) ESB AHU 8 SUPPLY SETPOINT	(52.0) ESB AHU 8 SUPPLY TEMP	5.0 DEG F	
(0.0) ESB AHU 3 SPACE LOAD	(73.0) ESB AHU 3 SPACE SETPOINT	(69.2) ESB AHU 3 SPACE TEMP	-3.8 DEG F	

The PID Rate Change screen will tell you how many BASnet (CNET) PIDs and Non-BASnet PIDs are in the database. Input the Rate in seconds for both types of controllers separately then, click Change Rate for all PIDs NOW.

### Open History File

Allows you to access history data from Purged History Files but should only be done in Editor Mode or you will start adding new history to this file. Just point to a purged history file.

## Access Control CSI Sync

Applies to CSI interface only.

## Sunrise Sunset

Allows you to program logic to turn on lights based on Sunset in your location and turn them off at Sunrise. See full instructions in Section 8 – Sunrise Sunset

## RDatabase Verify

If you have any inconsistencies in Logical Groups, use this to verify and correct them. Run it until you get zero errors at the final count. If you get any popups saying “There was an error in GPR Testing” click OK and disregard.

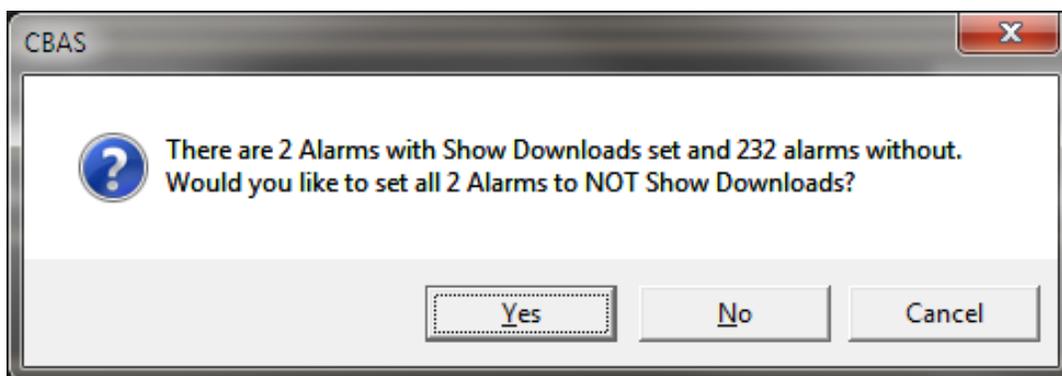
## Building Manager

This feature is no longer used.

## Alarm Download

This feature allows you to decide globally whether controllers give you a Download Alarm when they download a database. If changes are made to a Controller’s database, the changes download automatically. Sometimes you need to know if they download, and with TCP\IP controllers, the download can happen so fast that you do not see it. Also, if a controller is having database or network issues, it may be downloading over and over. With this alarm, you will know that it is happening and can troubleshoot the problem.

When you click the Alarm Download button, you will see the following:



Click either Yes or No to show or not show the Download Alarm for all Controllers based on the question posed in the dialogue box.

## License Editing

The license text file is now stored in the database. It works with the Dongle Key to allow you to use CBAS in Real Mode. The Site ID on both must match and the version on the license must match the version of CBAS that you are running, at least the first 2 numbers of the version. Like 15.1 or 15.2. If you have upgraded your license or added a new add-on feature, you must delete the old license and restart CBAS to pick up a new license placed in the CBAS root folder. There is a button below the text section to delete the License. Do not attempt to alter the text, because that will corrupt the license.

## Email Alarms

This feature sends an email to the specified email address when critical points go into alarm. The email message that is sent only includes the name of the point and the status of that point. Email Program

## SMTP Emailer

As of CBAS version 12 (2012), you must use Computrols email program SMTP Emailer, which is added to the CBAS folder when CBAS is installed. As of CBAS 15, the SMTP Emailer runs as a service. The SMTP Emailer is installed when CBAS is installed. Use the SMTP Emailer located in the CBAS 15 folder to setup your email account, then close the Emailer and settings are saved to the config file.

Restart the service to pick up the settings.

The SMTP Emailer program in the CBAS 19 folder should NOT be left running at the same time as the service. To start or stop the service:

- Open Task Manager by right clicking the Start button in Windows 10 then clicking Task Manager.
- Go to the Services tab and locate Computrols Email Service. You can put them into alphabetical order by clicking the top of the Name column.
- Right-click the service and click Start or Stop.

Prior to CBAS 15, the program needs to be running for CBAS to send out Email Alarms, so it is best to place a shortcut to the program in the Startup folder. In Windows 7, go to Start, All Programs and scroll down to Startup. Right-click Startup then click Explore. When Windows Explorer comes up, paste the shortcut into the right side of Explorer.

An Email folder is created in the CBAS folder. Inside are 3 folders:

- Error Sending
- Sent
- Unsent.

When an Email Alarm is needed, CBAS places a text file in the Unsent folder and the program sends it within 15 seconds, then places the text file in the Sent Folder.

If an Email is not sent because of any type of error, it goes to the Error Sending folder.

When you open the program, it will move to the systray. That is in the bottom-right of your screen, next to the time. Click the up-facing arrow and then double-click the green icon.

Fill out all of the information needed, just like any other email program. See below:

The screenshot shows the SMTP EMailer Version 16.1.1 configuration window. The fields are as follows:

- SMTP Server: smtp.gmail.com
- Port: 465
- Seconds Between Msgs: 15
- Authentication: SSL Gmail
- Login: buildingemail@gmail.com
- Password: \*\*\*\*\*
- Sender Name: CBAS DPU
- Sender Email: buildingemail@gmail.com (Must be valid email address)
- Reply To: buildingemail@gmail.com
- Subject: SMTP EMail testing
- Recipient: recipient@computrols.com (Only used for Test Emails)
- Priority: NORMAL
- Mailer Name: CBAS mailer
- Msg Line: Testing this new email software. Plk (Only used for Test Emails)
- Email Directory: C:\CBAS15\EMail

Buttons: Send Test EMail NOW!!!, Save, Return to Tray (Mimimize), Exit EMail Program.

Status: Running for 105 Seconds, Sent 0 EMail with 0 Errors.

Choose the correct authentication method and the program will write in the correct SMTP Port. FYI, Gmail uses either SSL or TLS and the SMTP Server is smtp.gmail.com.

The 15 second delay is there so that your ISP doesn't think the emailer is spitting out spam.

Sender Name is who the email appears to be coming from, so it should reflect the name of the building and the Subject line should reflect that it is an Email Alarm. Recipient is only used for test emails.

In CBAS 15, the Email Directory path has changed from previous versions because CBAS resides in the C:\CBAS 15\Email.

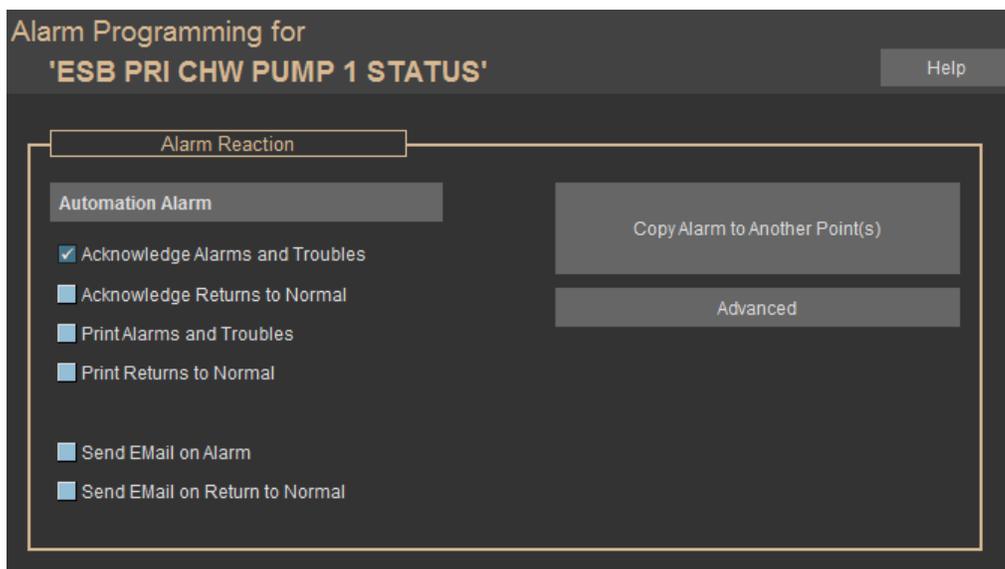
Once all the information is correct, click the Save button then Send Test Email.

Once you have test emails sent successfully, setup email alarms in CBAS and test by putting one of the Points in Alarm.

## Alarms on Points

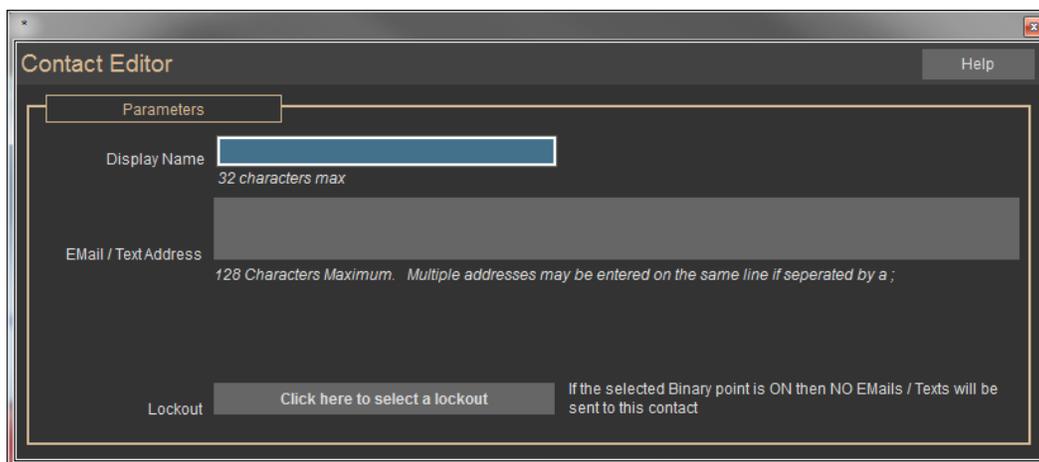
First, you need to setup points with alarms. These points must have the box checked next to “Acknowledge Alarms and Troubles” as in the example below. Programming Alarm is covered in detail in Chapter 4: Programming Points. Contacts for Email Alarms can now be added on the Alarm Programming screen.

To program an Alarm, click the Program Alarm button on the Program screen of the point.



## Configure Email Alarms

From the System Menu, click Email Alarms, then Contacts. Select Insert, and the following window will appear:



The screenshot shows a window titled "Contact Editor" with a "Help" button in the top right corner. Below the title bar is a "Parameters" section. It contains a "Display Name" field with a blue border and the text "32 characters max" below it. Below that is an "Email / Text Address" field with a grey border and the text "128 Characters Maximum. Multiple addresses may be entered on the same line if separated by a ;" below it. At the bottom of the window, there is a "Lockout" field with a button labeled "Click here to select a lockout" and a note: "If the selected Binary point is ON then NO EMailS / Texts will be sent to this contact".

- Enter a display name for the Contact.
- Enter an email address, or addresses using a semicolon and a space between each. In the latter case, a Contact becomes a Contact List. Any mistake in an email address can cause emails not to be sent.
- When finished adding email addresses, press Enter, then ESC to return to the Contact List.

## Putting Emails Alarms on a Schedule

There is a new feature starting in CBAS 17. You can now set Email Alarm Contacts to receive Alarm Emails only during scheduled times? This means that you can choose to send the emails to some building engineers during the times they are on duty and not when they are off. Of course, some engineers like the chief engineer or property manager, should probably receive the emails all of the time so that they know what is going on in their building.

The way this new feature works is you first setup Binary Output Software points for each shift. These points can be added to the DPU in the bottom of Hardware View, and they will not download to a Controller. Put a Schedule on the point to command it OFF during the time period of the work shift and ON when you don't want the Email Contacts to receive Alarm Emails. This is going to be an Email Lockout point.

Now go to System, Email Alarms then Contacts. Either click Edit then a Contact to change an existing Contact or click Insert to create a new Contact. See previous picture.

Give a new Contact the name "Day Shift" for example. In the Email/Text Address field, you can type in or paste email addresses separated by a semicolon. Or you can use text addresses the same way. For example: 5045291234@txt.att.net

Below that you can click the Lockout field and choose the Email Lockout point that was created for their shift.

To edit an existing Contact, click Edit, and then choose a Contact from the list.

Once you have added all Contacts, ESC then return to the Main Menu.

Now go to System, Email Alarms, and then Alarm Emails.

Click Insert, and then choose the point from the list. This point must have an Alarm associated with it.

Press ESC and you will see the point listed with (0 Contacts) next to it.

Click Edit, and then select an Alarm Point from the list.

Choose a Contact from the list and you will see it listed again on the right side of the window. You can choose multiple Contacts. To remove a Contact, click it again.

Once you have finished selecting Contacts, ESC and you will return to the list of Alarm Points.

As of CBAS 17 you can add Email Alarms and Contacts when programming an Alarm on a Point. This is covered in Chapter 4: Programming points.

When you have finished adding Email Alarms, ESC again to close the list. If this is the first time you are setting up Email Alarms, restart CBAS to make the connection between CBAS and SMTP EMailer.

Test by making an Alarm Point go into alarm, then you can browse to C:\CBAS 15\Email and check the folders to see if the email is in the Sent folder, is still in the Unsent folder or in Error sending.

## **More**

If you select to Silence Alarms in System\Configure Workstation, Email Alarms will not be sent. Sending an Email Alarm as a Text to a mobile phone is easy. Here are some examples of what to enter for the contact:

### **AT&T**

your cell number@txt.att.net

4443332222@txt.att.net

### **Nextel**

your cell number@messaging.nextel.com

4443332222@messaging.nextel.com

## **T-Mobile**

your cell number@tmomail.net

4443332222@tmomail.net

## **Verizon**

your cell number@vtext.com

4443332222@vtext.com

## **Sprint PCS**

your cell number@messaging.sprintpcs.com

4443332222@messaging.sprintpcs.com

## **For Pagers: Provider Device Address Example**

SkyTel your pager number@skytel.com

[4443332222@skytel.com](mailto:4443332222@skytel.com)

## **Alarm Activity Report New Feature**

Now the Alarm Activity Report gives you options as to what you want to see on the report. There are checkboxes to show Automation Alarms, Fire Alarms and Access Control Activity as well as Acknowledgments, and Returns to Normal. If you choose to show Acknowledgements, you have a choice to show Acknowledgments from All Operators or Selected Operators. Of course, you have to setup Users\Operators and force them to login by taking that right away from the Default User. If an Alarm does not require an Acknowledgment it will say so after the Point Name.

To use this Report, go to the Reports menu then Alarm Activity Report. Choose All Points or Selected Points (up to 4 Points) then a time period. Then check the boxes to show what you want to see in the Report. Click Generate Report. Click the Printer button at the top or the Export button to the right of that. When you export, you have many choices for the format of the export file. PDF and CSV (comma separated values or spreadsheet) are the most used formats.

## New Alarm Programming Report

Now when you print an Alarm Programming Report, you have a choice of the old format and a new Grid format. Either format gives you all of the Alarms programmed in the database. The old format summarized the configuration of the Alarm in text. The Alarm Grid Report gives you columns showing all of the configuration settings including which boxes are checked and whether or not Alarm Emails are sent, but not the recipients. To use this Report, go to the Reports menu then Alarm Report. Choose All Points, a Logical Group or use the filter to select a point. Then choose the Old Report or the New Grid Report. Of course, you can choose to Print or Export the Report just like all others in CBAS.

## Setup Password

In an effort to increase security in CBAS, several new features have been added to version 15 to help users manage password security. CBAS administrators now have the ability to control restrictions on all user passwords. If you select System / Setup Passwords in CBAS 15, you are brought to the screen below:

User	Meets Criteria	Locked Out	Strength (5=best)
DEFAULT	YES		0
COMPUTROLS	YES		3
KEVIN	YES		3
MAURICE	YES		2
ARTHUR	YES		1
MIKE H	YES		5

## Minimum Number of Characters

The first setting is used to set a minimum number of characters to be used. Type in the number and it will be saved when exiting the Password Setup editor.

## Case Sensitivity

Prior to CBAS 15, passwords were always converted to uppercase. This meant that all passwords were case insensitive. This was done for simplicity. Users could type in their passwords as lower, upper or mixed case and it would always work. As in most systems, passwords are not echoed onto the screen when the user is typing. So with case-sensitive passwords, extra care is required to ensure that the user does not have CAPS LOCK on.

In CBAS 15, checking the box labeled Allow Lower Case letters, causes all passwords to become case sensitive. This places the burden on users to work with CAP LOCKS and Shift keys as needed.

## Character Variety

The following checkboxes force users to add a variety of character types to their passwords:

- Require Uppercase Letters
- Numerical Digit required
- Special Characters required

Check any of these options to force users to use at least one of each variety of characters.

## Password Expiration

The default option for Days before Password Expiration is 0 (zero). Zero means that passwords will never expire. Setting it to any other number enables this new feature by expiring user passwords after the number of specified days. Users will be prompted to change their password upon the first login attempt after the expiration.

## Failed Login Attempts

The default option for Failed Login Attempts before locking out user is 0 (zero). Zero means that there is no limit on the number of times a user can type in an incorrect password while attempting to log in. Setting it to any other number enables this new feature.

With the Lockout set, if a user types an incorrect password too many times the user becomes Locked Out. After this happens, CBAS administrators (those with 'ADVANCED USER' rights) can reset the login from the password editor screen. Simply go to System / Program Passwords, and edit the user that is locked out. There is a button to UNLOCK the user.

Be aware that the Computrols user can be Locked Out as well. So if this feature is enabled, administrators should ensure make that there is another user with Advanced User Rights.

## **Fingerprint Readers**

CBAS 15 now supports fingerprint readers for additional login security. Call your service representative for more information on this feature.

## **Voluntary Password Change**

Prior to CBAS 15, users could not change their own password unless they were an administrator. In CBAS 15, Administrators can still change any password, but users are also given the option to change their own password during any login.

The CBAS 15 Login screen has a new button named 'Login and Change Password'. When selected, CBAS first verifies the user's current password. Then it prompts the user to enter a new password. Of course, the new password must meet any password criteria listed above.

## **Transitioning to Higher Security Passwords**

Upon first upgrading to CBAS 15, passwords programmed from previous versions may not meet any of the new password criteria. However, this should not be an issue until the new features are enabled.

As soon as a CBAS administrator changes the password requirements, users will be affected on their NEXT login. If user passwords already meet the new criteria, they will log in with no problem. However, users whose passwords do not meet the new criteria will be prompted to enter a new password.

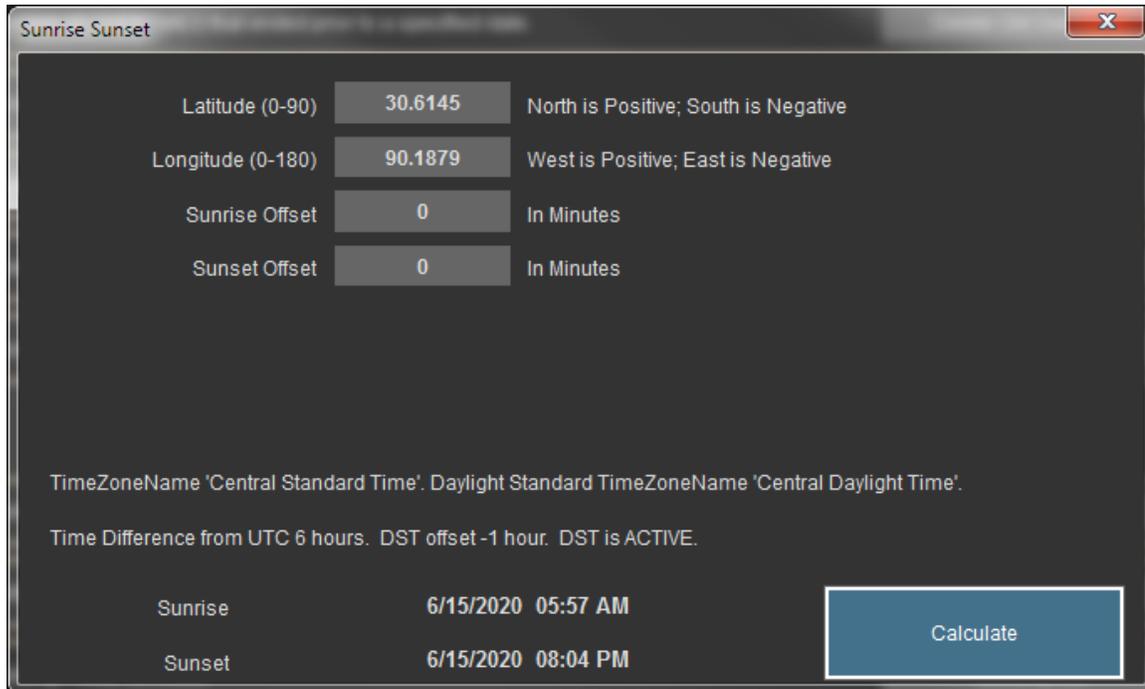
At the bottom of the Password Setup screen, there is a dynamic list of the users in the system and whether or not they meet the criteria set above. It also shows password strength and indicates if the user is locked out. This screen assists administrators in selecting password criteria based on the current user programming.

## **User Activity**

The User Activity screen now displays all Logins, Logouts, Failed Logins and User Locked Out messages.

## Sunrise Sunset

CBAS has a Sunrise / Sunset feature, which is used to help control outdoor or atrium lighting. Under Database Maintenance there is a Sunrise / Sunset button. It opens a window that allows you to enter your latitude and longitude. You can also enter a time offset in minutes for sunrise and sunset. This will allow you to turn on lights so many minutes before or after sunrise/sunset. Just add to your logic: If Daytime is DAY, then Command Lights OFF. If Daytime is NIGHT, then command Lights ON.



Latitude (0-90)	30.6145	North is Positive; South is Negative
Longitude (0-180)	90.1879	West is Positive; East is Negative
Sunrise Offset	0	In Minutes
Sunset Offset	0	In Minutes

TimeZoneName 'Central Standard Time'. Daylight Standard TimeZoneName 'Central Daylight Time'.  
Time Difference from UTC 6 hours. DST offset -1 hour. DST is ACTIVE.

Sunrise	6/15/2020 05:57 AM
Sunset	6/15/2020 08:04 PM

Calculate

There are 6 new System points for use with this feature.

Daytime and Daytime with Offset. Units are Night/Day.

Other points are Sunrise, Sunrise with Offset, Sunset and Sunset with Offset. These points represent hours and minutes in values between 0000 and 2359. There is a time system point already in CBAS that you can use to compare against these points using a logic statement.

Sunrise/Sunset calculation is done within the first minute of CBAS running, and every 4 hours after that. So if you change the latitude or longitude, click the Calculate button, or you would have to wait up to 4 hours for the sunrise/sunset times to change (or restart CBAS).

## Add the Points

- In CBAS versions prior to 15, open CBAS in Editor Mode. On the Main Menu go to Database then Add A Point.
- Name the first point Daytime, then click Next.
- Choose Binary then Next.
- Choose Software then Next.
- Choose System then Next.
- Choose Daytime then Next.
- Choose the name of your database (should be first on the list) and click Finish.

The point will be added to the bottom of Text View, All Points. Repeat the above steps to add Daytime with Offset point. Now you can write your Logic to turn lights on and off. There are a few other ways of doing the logic using the Time of Day point and the analog points, but the above example is the simplest way of doing it.

If you need the other points, follow these instructions:

- In CBAS versions prior to 15, open CBAS in Editor Mode. On the Main Menu go to Database then Add A Point.
- Name the first point Sunrise, then click Next.
- Choose Analog then Next.
- Choose Software then Next.
- Choose System then Next.
- Choose Sunrise then Next.
- Choose the name of your database (should be first on the list) and click Finish.

## Database Menu

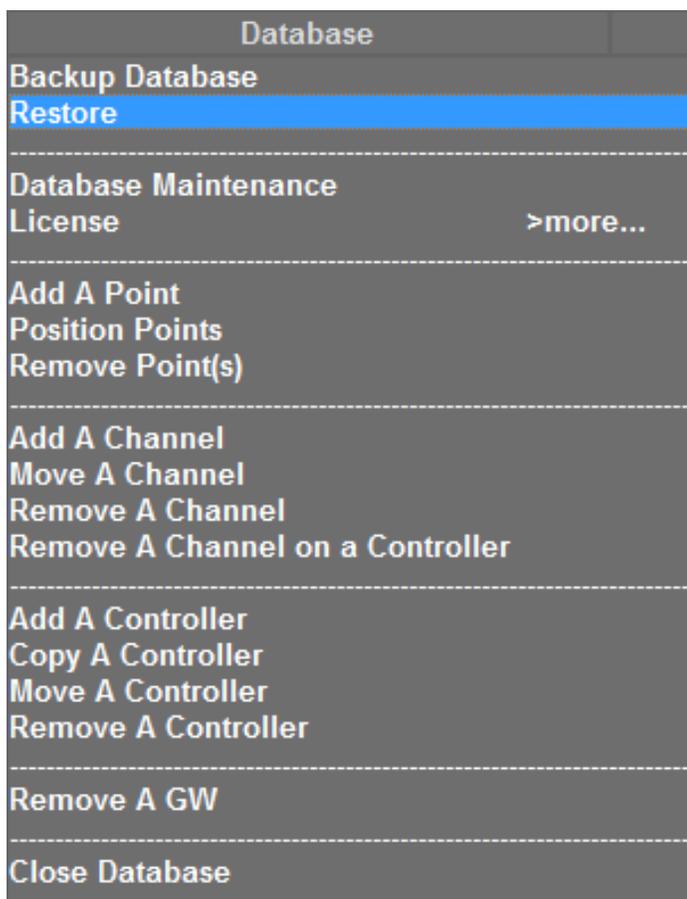
As stated before, some things that were on the System Menu have moved to the Database Menu.

### Backup Database

Covered previously in this chapter, Section 4.

### Restore

Restoring a database is done when there is no database open. This was also covered in Section 4.



However, using this feature you can restore Graphics, Logical Groups and Critical Alarms edited on another computer using a backup from the DPU without wiping out any point changes to the DPU that have been made since the backup was made. When you click the Restore menu item, you will get a warning about this. Click OK and you will see the Restore Options screen.

Use the Pick button in the top right to select the correct Backup. Check one of the boxes to restore:

- Graphics
- Logical Groups
- Critical Alarms

When finished, check the database to see if the changes are there.

## **Add a Point**

Most of the time, points are added to Controllers in Hardware View. This menu item is used to add points to the DPU that don't reside on a Controller. Covered previously in this chapter, Section 8 – Sunrise Sunset.

## **Position Points (Previously on System Menu)**

This menu item allows the user to position multiple points in Text View, so that points that need to be viewed more often can be placed at the top of the list and associated points can be grouped together. Click on the Position Points menu item.

Select multiple points on the left side of the Group Position window. Use the Shift key to select contiguous points and the CTRL key to select non-contiguous points. The selected files will be placed in the middle section. Select the point you want to place the points above in the list on the right side. Right click or hit Esc to save the changes.

## **Remove Point(s)**

To remove a point from the database, whether on a controller or not, click this item and find the point in the list. The list is in the same order as Text View.

## **Add a Channel**

This is normally done in Hardware View, but can also be done here. Not recommended.

## Move a Channel

This is for moving a channel from one host controller to another. You must have another controller in the database that has an available Host or Secondary 485 channel. Click the item and choose the channel you want to move. Then you will see a list of controllers in the database. Choose a controller that has an available channel and you will get a warning to make sure you really want to do this.

## Remove a Channel

To remove a channel that is no longer needed, click this and answer a few questions. Then choose a channel from the list. Before it is deleted, you will be asked to confirm.

## Remove a Channel on a Controller

This is the same as removing a channel except that it applies only to “On Controller” Channels. Click the item and choose the Controller Channel, then choose the controller that has the “on controller” channel you want to remove. Confirm the change.

## Add a Controller

This is normally done in Hardware View, but can also be done here. Not recommended.

## Copy a Controller

This is used to copy a non-BASnet controller to an open address. Choose the channel first, then the controller to copy. Then choose the channel and address you want to copy to. Then you will see Find and Replace dialog box. In the Find field, type the identifying part of the point names you are copying from, like AHU-5. In the replace field, type what you want to replace that part of the point names with. As long as find names were correct, the controller will be added with new point names.

## Move a Controller

This feature allows you to move a controller from one channel to another channel of the same type. First, select a channel then a controller on that channel. On the right side you will see a list of channel in the database. Select a channel of the same type. Prior to this, you can also check the box at the bottom to prompt you to change the name of the controller.

## **Remove a Controller**

This is how you remove a controller from the database. First, you should remove any logic on the controller that is associated with points on another controller. Also, logic on another controller that references a point on this controller should be removed. Click Remove A Controller then choose a channel that contains the controller you want to remove. Next choose the controller to remove. There will be warnings.

## **Remove a GW**

This feature is rarely used. The Workstation channel contains not only Workstations (GW), but also string servers that allow CBAS-Web to connect, the connection to the VAV-B Utility program, Secondary DPU connection, and Critical Alarm Terminal connection.

## **Close Database**

This is done in order to open another database or reopen the same database in another Mode, like Real Mode etc. Once closed, click Database then Open Database and choose another Mode and database to open.

# Chapter 7 » Reports

## Reports Overview

Reports make it easy to keep track of the activity in your facility. From the Main Menu, click the Reports menu item to get the Reports.

Reports	
History Graph	
History Report	
Alarm Activity Report	>more...
User Activity Report	
Inform Activity Report	
Command Report	
Export History	
Export Logical Groups	
-----	
Points Report	>more...
Hardware Report	
IP Address Report	
Degree Day Report	
CSI Event Report	
DD Elev Event Report	
Scale Database Report	
Meter Report	>more...
Extended Meter Report	>more...
Critical Alarm Activity	
Critical Alarm Programming	
-----	
Alarm Report	>more...
Logic Report	>more...
PID Report	>more...
Schedule (Overtime) Report	
Schedule (Weekly) Report	>more...
Holiday Report	>more...
Note Pad Report	>more...
-----	
Print Labels	
FIRE Programming	
SMOKE Programming	
FIRE Input Groups	
FIRE Output Groups	
FIRE Activity	
FIRE Analog Value	>more...

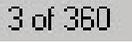
**Note:** Large reports often take a long time to generate, therefore, you can click cancel while generating a report. CBAS will display whatever is complete by the time you select cancel. The date and time the report was created as well as the page number is printed at the bottom of each page of every report.

Once a report is generated, CBAS displays it on the screen with the following toolbar:



 **First Page:** Takes you to the first page of the report.

 **Previous Page:** Takes you to the previous page in the report.

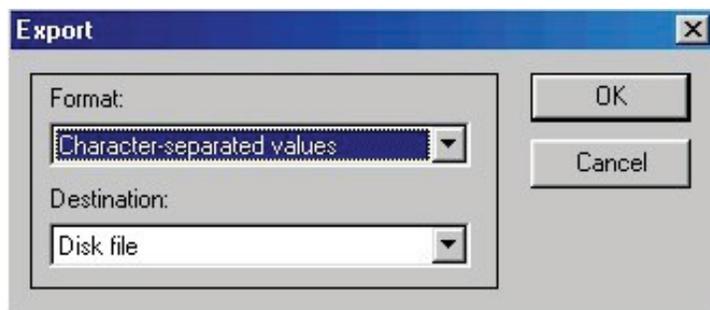
 **Page Indicator:** This example indicates that you are on 3 of 360 total pages.

 **Next Page:** Takes you to the next page in the report.

 **Last Page:** Takes you to the last page in the report.

 **Print:** Prints the report.

 **Export:** Allows you to export the report to a specified location. The following screen appears when you select this icon.



You can export reports in any of the following formats by clicking the arrow beside the Format drop-down menu:

- Character-separated values
- Comma-separated values (CSV)
- Microsoft Excel (XLS)
- Adobe Acrobat (PDF)
- Text
- HTML
- ODBC
- And many other types

Additionally, you can select the Destination by clicking the arrow beside the Destination drop-down menu. When you are satisfied with the Format and Destination, click OK. If you do not wish to export, click the Cancel button.



**Zoom:** Changes the view of the report on screen by zooming in and out.

**Total:** The number of listings a report includes.

**% Indicator:** Percentage of the report that has completed. Remember that you can cancel report generating at any time to get a partial report.

## Report Descriptions

### History Graph

Shows the same graph you would get by going to the History button on the Point Program Screen of any point. Select up to 4 points to graph at a time.

### History Report

Gives the user a text listing each time a save is made to the history file. Includes Date, Time, and value of point. Select as many points as you want.

## Alarm Activity

Only available in Real Mode, this report can be run for all points or selected points and shows all alarms that occurred during the specified time period. If you click this menu item, you will see a sub-menu with Old Format, New Format and Schedule.

If New Format is selected, more information is presented to the user such as: Alarm, Normal or Acknowledgement. In the case of acknowledgements, the additional information includes the name of the workstation, the user who acknowledged the alarm as well as the value of the alarm point.

Under Schedule, you can set a time for the Report to be emailed daily, and the report will contain alarms from the previous day. It will email to selected Contacts from the Email Alarm Contacts list. So you must already have Contacts added under System, Email Alarms.

## User Activity Report

Lists what a given user or users did over the specified time period, including viewing and commanding points. The report includes date, time, user, and command. This Report can be focused on single or multiple points, user, and command type.

## Command Report

Lists what user, Logic, PID or Schedule commanded what points over the specified time period. Choose All Points or selected points can be specified.

## Export History

This report shows all history saves over the course of 1 day. Mainly used for troubleshooting.

## Export Logical Groups

Creates files that are used to import Logical Groups as Views in CBAS-Web.

## Points Report

This report is a snapshot of Text View and can be sorted the same way as Text View: All Points, Logical Groups, etc. For each point, it shows the Name, Status, Priority, Condition, and whether or not each of the following is programmed: Alarm, Detail (Notepad), PID, and Schedule.

Under the Points Report submenu, there are six reports listed: Export Points, Time of Day, Group, Daily Scheduled, Min Max and Daily Export.

## **Export Points CSV**

This Report can be found on the Points Report submenu. Clicking this actually creates multiple CSV reports giving all information on Points, Controllers, and Channels and places them in CBAS 15\Export Database folder.

## **Time of Day Report**

This report allows you to choose pairs of points and choose up to 24 hourly times to report on them. The Report was created to serve hospitals that by law are required to keep a record of temperature and humidity in operating rooms. This Report can be found on the Points Report submenu.

## **Group Report**

This report was also created for hospitals. It allows hospital design engineers to select up to 10 points and report the value of those points on a time interval of as little as 15 minutes up to 4 hours. The report can be saved in 2 formats: CSV and pdf or it can be printed to the screen. This Report can also be found on the Points Report submenu. Choose groups of reports and the frequency of data saved in the report.

## **Daily Scheduled Report**

This Report exports the selected points into a .CSV (comma separated values) format and separates the numbers and units into 2 separate fields. It can be scheduled to run daily, providing you with an easy way to export information to spreadsheets and other document types. This Report can be found on the Points Report submenu. Under the Setup Groups submenu, choose groups of points, give the Group a name then choose what format to save it to. Under the Scheduled List submenu, choose how often to run the report (daily, weekly, monthly) and at what time of the day.

## **Min Max Report**

Once again you can setup groups of points to determine what were the Min and Max for each over the time period selected. From the list of groups, you can choose Select to run a report. Or the Run submenu allows you to select points and run the report immediately without setting up a Group. This Report can be found on the Points Report submenu.

## **Scheduled Export**

This Report can be found on the Points Report submenu. The report was designed to satisfy an energy management consultant. It exports the points' values in CSV once daily in 5-minute up to 30 minute intervals.

## **Hardware Report**

This report shows all Hardware, Software, and Child points on all or selected controllers. Choose to show or hide Software points and narrow controllers in the report by Channel or individual controller. There is also a Controller Tree choice that gives totals of each type of controller, then lists each Channel and the Controllers on them.

## **IP Address Report**

This report gives a list of all TCP/IP Controllers in the database, in order of IP address. This report will come in handy when adding controllers to a large database, or one with multiple TCP/IP Channels.

## **Degree Day Report**

Choose a temperature point and the report will give the Min, Max, Mean, and Average values for each day in the time period chosen, as well as other calculations.

## **CSI Event Report**

This report was added with the addition of the CSI interface. This report allows you to select specific CSI events to include in the report. You can also configure which events you want to show in Activity and the Alarm Bar.

## **DD Elevator Event Report**

DD stands for Destination Dispatch, which is an interface to elevator control kiosk systems made by Mitsubishi and Thyssenkrupp. The report gives information about each access card use at a kiosk in chronological order.

## Scale Database Report

Saves a CSV file to CBAS 15\Reports. The report contains a line for each controller and a column for each section of the controller's' memory. Only used for troubleshooting after getting an error message that "the resource cannot be saved" when adding something like Logic or Schedule.

## Meter Report

Applies to pulse meters. See the following sections for information on this report: Meter Reports and Advanced Programming, Pulse Meters.

## Extended Meter Report

See details in Extended Meter Report, later in this section.

## Critical Alarm Report

Covers all activity related to Critical Alarm Terminal (CAT) points. Can be narrowed to individual points and individual types of activity.

## Alarm Report

This report shows what alarms are programmed on points and how they are programmed. It can be sorted the same as **Text View**: All Points, Logical Groups, etc.

## Logic Report

This report shows what logic is programmed on points and shows that logic. It can be sorted the same way that Text View can be sorted: All Points, Logical Groups, etc.

## PID Report

This report shows what PIDs are programmed on points and how they are programmed. It can be sorted the same way that Text View can be sorted: All Points, Logical Groups, etc.

## **Schedule (Overtime) Report**

This report shows what Overtimes are programmed on points and how they are programmed. It can be sorted by point and time period.

## **Schedule (Weekly) Report**

This report shows what Overtimes are programmed on points and how they are programmed. It can be sorted the same way that Text View can be sorted: All Points, Logical Groups, etc.

## **Holiday Report**

The Holidays programmed in CBAS apply to all Schedule points in the database. This report shows what time each point will start and stop by schedule on those Holidays.

## **Notepad Report**

This report shows what points in the database contain Notepad entries and what those entries are. It can be sorted the same way that Text View can be sorted: All Points, Logical Groups, etc.

## **Print Labels**

This one is useful when pulling wire for a job. Print wire labels for points on a controller by first selecting the channel, and then the controller. Use File Folder labels, 5066, 5366, etc. These labels are .5" x 3" and come in 2 columns of 15 labels per page.

## **FIRE Programming/Activity**

These reports are only available if your CBAS license includes the CSimon FIRE Alarm System add-on.

- Fire Programming shows the detectors and other devices on all loops of the Fire system.
- The next 2 reports show the Input and Output Groups.
- Fire Activity shows all Troubles and Alarms and what time they happened during the chosen time period.
- Fire Analog Values shows the value of detectors at the time of the report.

## Access Programming/Activity

These reports are only available if your CBAS license includes the Access Control system add-on. Access Programming reports show everything currently programmed in your system and can be generated based on Cards, Areas, Readers, Companies, Schedules and Interlocks.

Access Activity shows all Card Activity during the chosen time period and can be narrowed down based on a single Card, Areas, Readers and Companies.

Daily First Access shows the time that the card(s) was used each day during the time period selected.

Daily Last Access shows the last time the card(s) was used each day during the time period selected.

Daily Time calculates the amount of time between the first and last use of a card. This could be useful for employee work hour verification, but only if the employees were required to use the card when leaving.

Anti-passback lists any card that was in violation of anti-passback during the time period selected. Anti-passback areas must be present in the system, usually in garages to prevent someone from passing their card back to another car. A card is in violation if it is used on an IN reader a second time before it is used on an OUT reader. The card is denied the second time.

**Card Inactivity:** lists Cards that haven't been used in the selected time period.

The Everything report shows all card activity in chronological order during the selected time period, similar to Activity View.

## Meter Reports

### Overview

In order to print a Meter Report, you must have your counter and meter points setup correctly. This report only works with pulse meters and a certain type of Meter point. For complete instructions, see Chapter 7 – Advanced Programming, Section 2 – Meters. However, the same results can be achieved with the Extended Meter Report (next page) using only a Counter Point.

To print a report of total KWH usage over a period of time, Go to the Reports Menu on the Main Menu and choose Meter Report. Choose a starting date and time. Press escape and choose an ending date and time. Press escape and CBAS will scan for meter data during that time period and will show the report on the screen. Click on Print and the report will be printed. An example of a portion of a Meter Report is shown below:

<b>Point Name:</b>	32 at 50 KWH Total
<b>Beginning of metering period:</b>	5/03/2004, 00:00:00
<b>End of metering period:</b>	5/06/2004, 00:00:00
<b>Meter total for specified time span:</b>	436,063.50

<b>Point Name:</b>	Meter Total
<b>Beginning of metering period:</b>	5/03/2004, 00:00:00
<b>End of metering period:</b>	5/06/2004, 00:00:00
<b>Meter total for specified time span:</b>	20,468.00

## Extended Meter Report

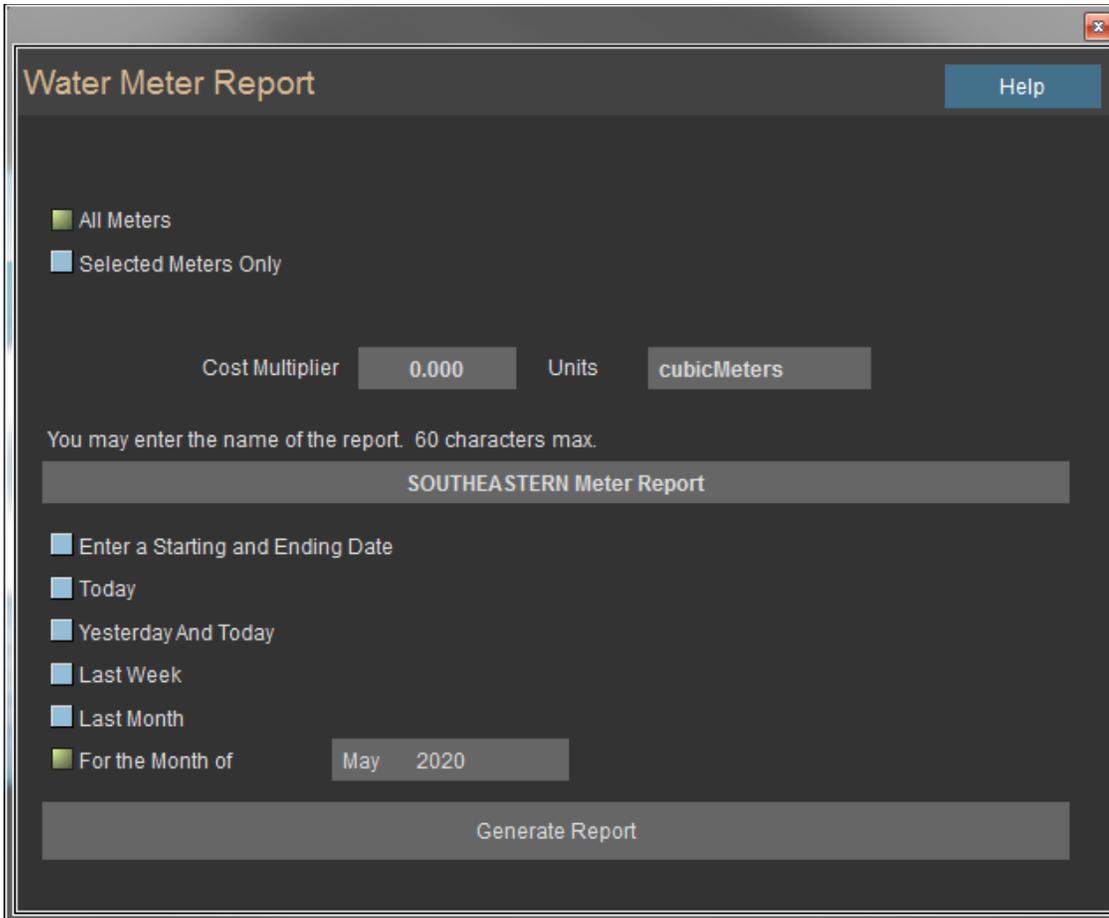
A new Extended Meter Report has been added to CBAS version 2.2.2. With this report, you can either do a simple KW report over a period of time or a more complicated report comparing 2 meters and 2 temperatures. This report was designed for our Russia branch and was intended for use in determining hot water usage and associated cost. It will be up to the end user to determine new and different ways of using this report.

The original Meter Report only allows you to select a period of time, and then prints the data from all Meter Total Points in the database. This does not include Veris Hawkeye meters on Modbus RTU channels. The Extended Meter Report allows you to select the meter points to base the report on, including Hawkeye meters and other brands of meters.

Before you can run this report, you first have to setup and save the parameters for the report. To do this from the Main Menu, go to Reports, Extended Meter Report, then Setup. Click Insert and you will see the Advanced Meter Editor.

You should give the report a name that describes which meter is used or what the calculation is, select meter points for the report. Enter a multiplier or leave the value at 1.0 if not needed. Right-click and the report will be saved.

To run the report, go to Reports, Extended Meter Report, then Run. You will see the Meter Report Run Selection Editor. In this example we show the Water Meter Report:



Check the “Selected Meters Only” checkbox and select your saved report(s). The reports will be listed in the top right of the editor as in the example above. If you selected more than one report to run, then you might want to give the whole report a name. Select a time period for the report and click Generate Report. The report looks something like this:

3/01/2005 00:00		Test Meter 1 and 2 Report		4/01/2005 00:00			
	<u>SupplyKW</u>	<u>ReturnKW</u>	<u>Supply Temp</u>	<u>Return Temp</u>	<u>KWH</u>	<u>Cost</u>	
Test Meter	0	0	1.00	0.00	0.00	0.00	
Test 2	0	0	1.00	0.00	0.00	0.00	

# Chapter 8 » Advanced Programming

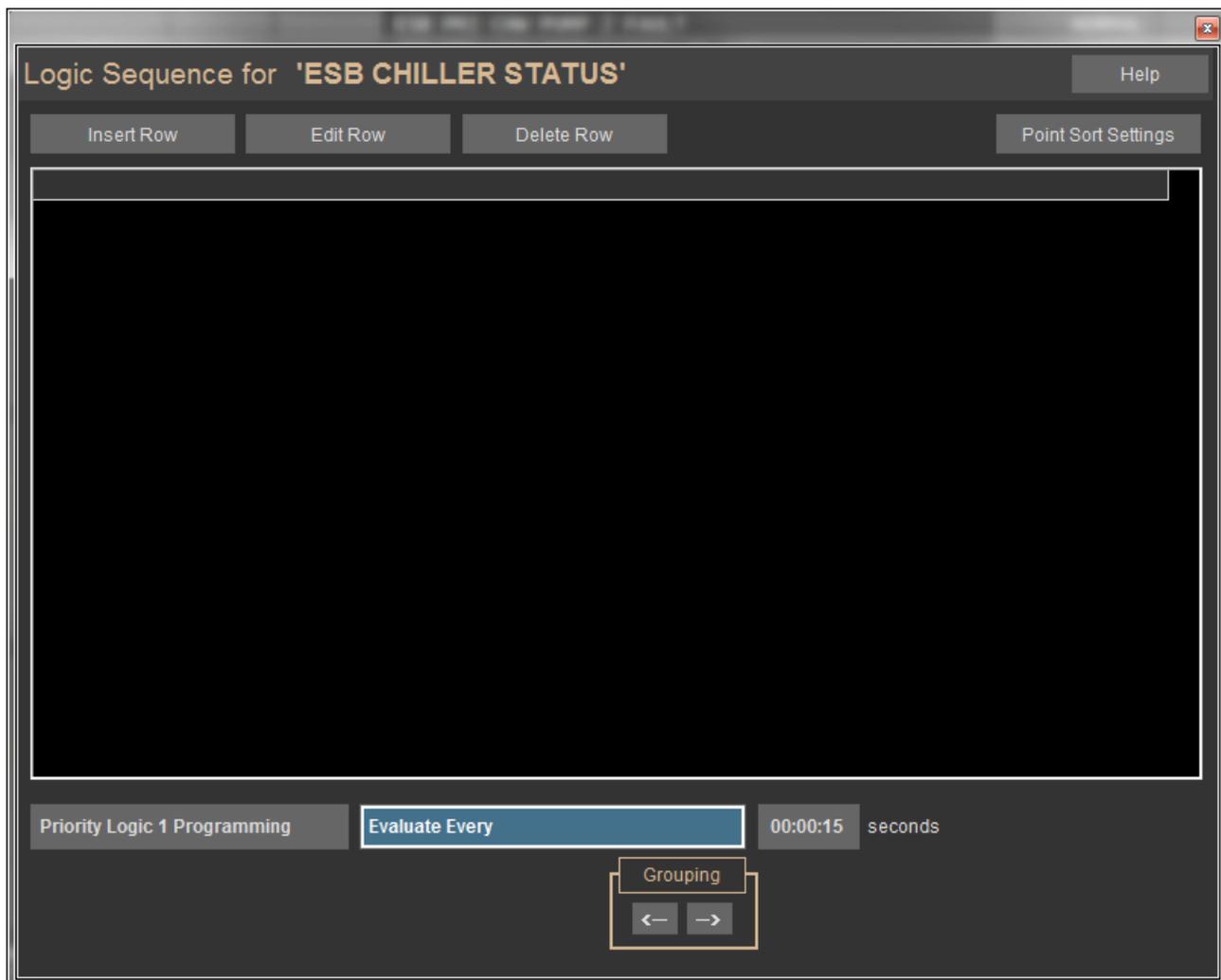
## Logic Programming

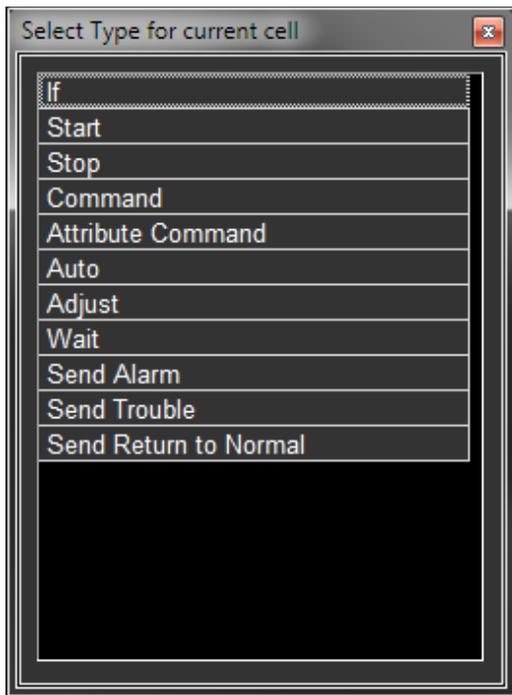
### Basics of Logic Programming

In this article, we will explore all the buttons on the Logic Programming Screen, including Priority, Evaluation periods, and Copying logic.

First of all, you can program logic on just about any point in your system, be it a hardware or software point. For more information on software points, see Chapter 4, Section 2 - Software Point Types. Begin by going to any point that you want to add logic to.

From the Point Program Screen, click on and you will see the following window:

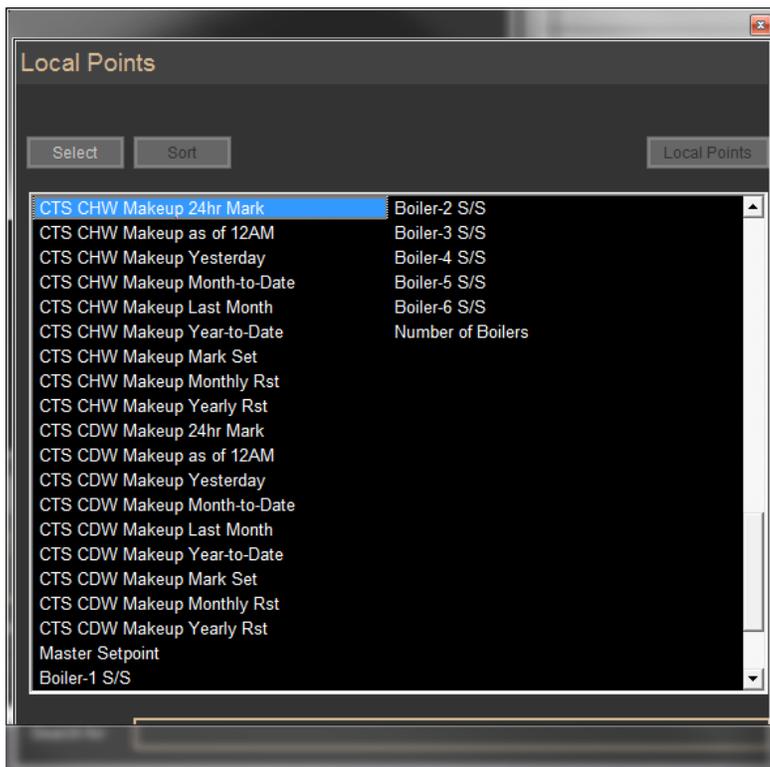




To start writing a logic sequence, click on the first line and a box will pop up containing choices for starting a sequence (see left).

Click on the first line (If) and another box will pop up with a list of possible point names.

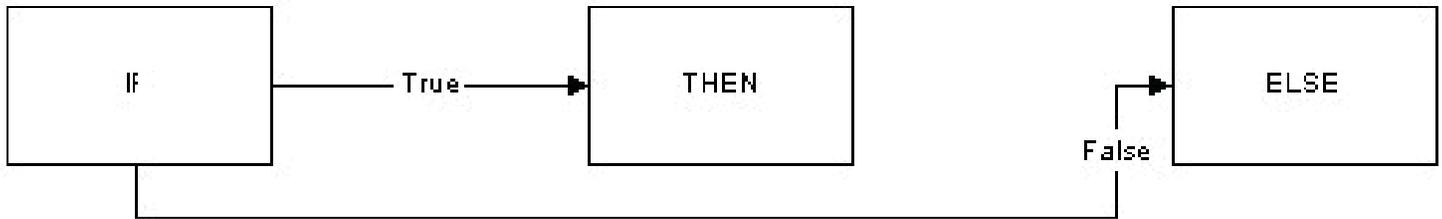
Notice that the list only includes “Local Points”, which are points local to the controller that contains the point you are adding the logic to. To get a list of “All Points” or all the possible points in the database, right-click then click the Local Points button:



Keep in mind that if you use a point on another controller, the CBAS Server is re-quired to make the logic work unless that point is a “Peer-to-Peer” point. Peer-to-Peer is discussed in Chapter 5, Section 2, Peer-to- Peer.

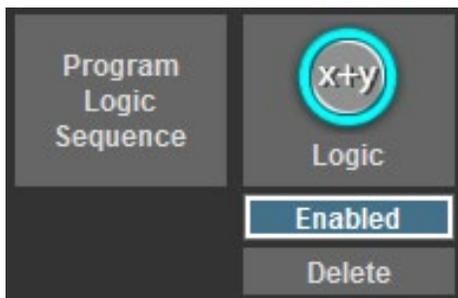
Choose the point name you would like to base the “If” condition on, and another box will pop up with condition choices, like “Is greater than.” By now, you are starting to get the picture. The CBAS logic editor will give you appropriate choices based on your previous choices. And, as you might have noticed by now, “If, Then, Else” is the basis of almost all logic statements.

In an “If, Then, Else” sequence, the “Then” is not executed unless the “If” is true. If it is NOT true, the “Else” is executed. See the flowchart below.



There are too many possible choices and sequences to show them all here. For examples of logic, view the Example Database and the Template Database included with CBAS. For more information on this subject, continue on to the next section.

- To go back and edit a row, right-click, click “Edit Row,” then select the row you want to change.
- To delete a row, right-click, click “Delete Row,” and select the row you want to delete.
- To insert a row, right-click and click “Insert Row.” Move your pointer between the lines of logic and a red line will appear. Click there and a window will appear with appropriate choices for that line.
- To save a newly created or edited logic sequence, just right-click or escape to close the window. The Logic button will now appear.



- To temporarily disable a logic sequence, click “Enabled” and the button will turn to “Disabled.” Click “Disabled” to re-enable the logic.
- To delete the logic completely, click on “Delete.”

## Other Features in the Logic Sequence Window

Click on the “Priority Logic 1 Programming” button below the Logic Sequence window and you will see a list of priorities. From here you can change the priority of a logic sequence so that it overrides, or is overridden by, another logic statement, schedule, etc.

Lowest Level	1	Sch	Weekly Schedule
	2	Opt	Optimal Start
	3	Hol	Holiday Schedule
	4	HolO	Holiday Optimal Start
	5	*Sch	Overtime Schedule
	6	*Opt	Overtime Optimal Start
	7	PID	PID Control
	8	Done	Finished Tuning PID
	9	Tune	Autotune
	10	Log1	Logic 1 Programming
	11	Log2	Logic 2 Programming
	12	WEB	Webserver
	12	Oper	Operator
	12	HH	Hand Held
	13	Log3	Logic 3 Programming
Highest Level	14	Log4	Logic 4 Programming

For a list of priorities, go to Text View, Priority Summary. The list is shown here. (You can click on any line and get a Logical Group of points commanded by that priority) Notice that Logic 3 and Logic 4 are the highest priorities and will override any other priority. By using these priorities, you can make sure that one logic sequence overrides the other when 2 sequences command the same point.

- Next to the “Evaluate Every” button, you can change how often a Logic Sequence is evaluated. The default is every 15 seconds.
- Click on the “Evaluate Every” button, and you can change it so that the sequence only evaluates when the status of the point hosting the logic changes.

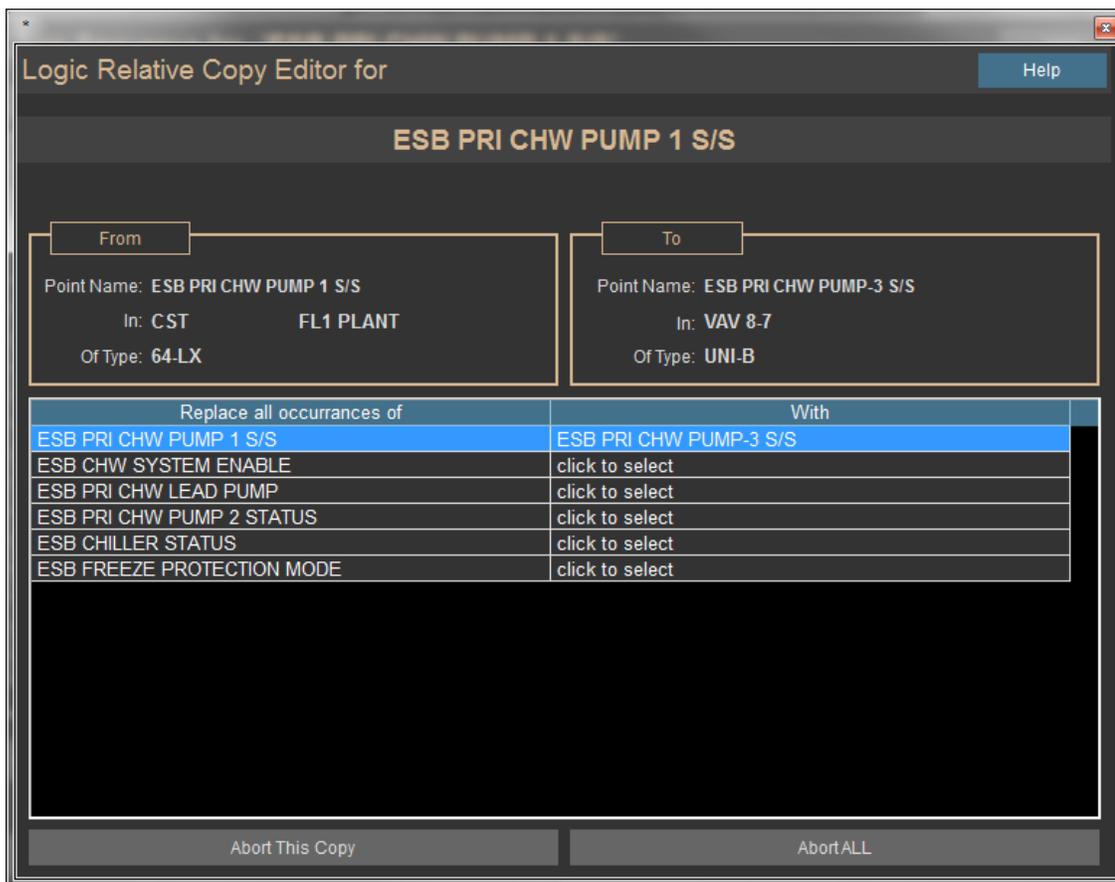
**Logic Sequence for 'ESB PRI CHW PUMP 1 S/S'**

If	ESB CHW SYSTEM ENABLE is ON
and	ESB PRI CHW LEAD PUMP is 1
then	START ESB PRI CHW PUMP 1 S/S by Logic 1 Programming
If	ESB CHW SYSTEM ENABLE is ON
and	ESB PRI CHW LEAD PUMP is 2
and	ESB PRI CHW PUMP 2 STATUS is ON
for	00:00:20
then	STOP ESB PRI CHW PUMP 1 S/S by Logic 1 Programming
If	ESB CHW SYSTEM ENABLE is OFF
and	ESB CHILLER STATUS is OFF
for	00:06:00
then	STOP ESB PRI CHW PUMP 1 S/S by Logic 1 Programming
If	ESB FREEZE PROTECTION MODE is ON
and	ESB PRI CHW LEAD PUMP is 1
then	START ESB PRI CHW PUMP 1 S/S by Logic 4 Programming
If	the priority of ESB PRI CHW PUMP 1 S/S is Logic 4 Programming
and	ESB FREEZE PROTECTION MODE is OFF
then	auto ESB PRI CHW PUMP 1 S/S by Logic 4 Programming

Priority Mixed Evaluate on each status change of ESB PRI CHW PUMP 1 S/S

Copy To Print Relative Copy To Point Copy To Clipboard Grouping Undo ALL Changes

- The “Copy to Point” button is used to copy the logic statement to another point. However, point names will have to be manually changed on the copied logic statement using the “Edit Row” button.
- To avoid having to do this, use the “Relative Copy to Point” button. Choose the point you want to copy to, then right-click twice to get the following window. This feature is only available on BASnet controllers.



- You can click on any line and select a valid point. Once you make your selections, right-click and the point names are changed.
- The “Copy to Clipboard” button allows you to copy the entire logic sequence to the Windows clipboard. You can then paste the logic sequence into a text document and save or print it.
- The Grouping section arrows will be explained in the Logic Grouping section.

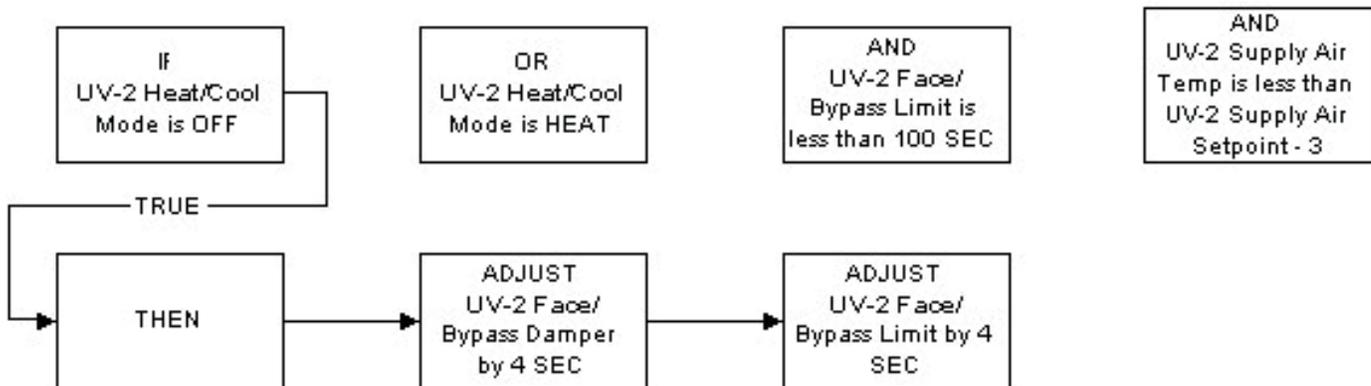
## Logic Grouping

There’s one rule of thumb when writing logic on a point for a sequence of operation: “Keep it as simple as you can.” If you can’t keep it simple, because of a complicated sequence of operation, grouping portions of logic statements can help. Sometimes it’s hard to know how to group and, or, and for, statements. Here’s a brief explanation, using the following example:

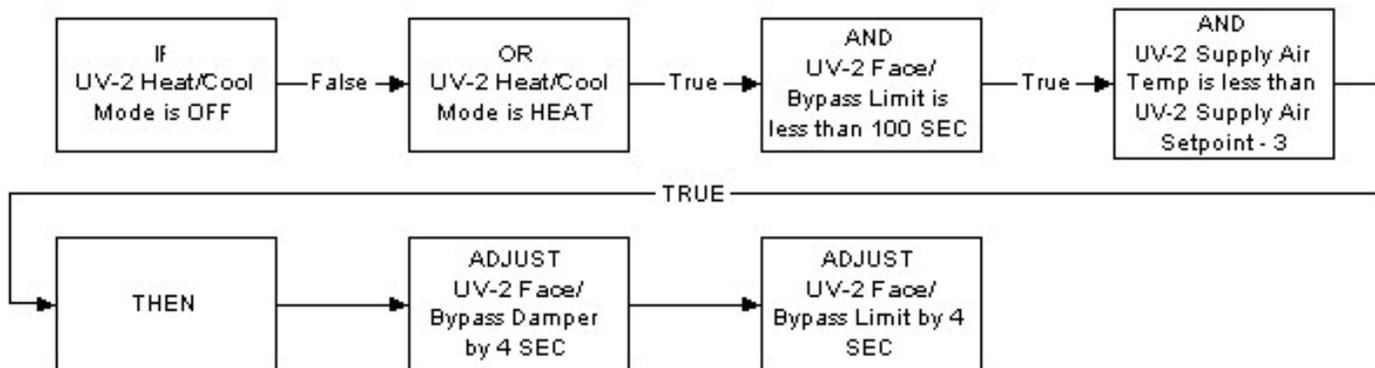
**If**            **UV-2 Heat/ Cool Mode is OFF**  
**or**            **UV-2 Heat/ Cool Mode is HEAT**  
**and**          **UV-2 Face/Bypass Limit is less than 100 SEC**  
**and**          **UV-2 Supply Air Temp is less than Equation Begin**  
                  **(UV-2 Supply Air Setpoint -3) Equation End**  
**then**         **adjust UV-2 Face/Bypass Damper by 4 SEC**  
                  **adjust UV-2 Face/ Bypass Limit by 4 SEC**

**If**            **UV-2 Heat/ Cool Mode is OFF**  
**or**            **UV-2 Heat/ Cool Mode is HEAT**  
**and**          **UV-2 Face/ Bypass Limit is greater than -100 SEC**  
**and**          **UV-2 Supply Air Temp is greater than Equation Begin**  
                  **(UV-2 Supply Air Setpoint +3) Equation End**  
**then**         **adjust UV-2 Face/ Bypass Damper by -4 SEC**  
                  **adjust UV-2 Face/ Bypass Limit by -4 SEC**

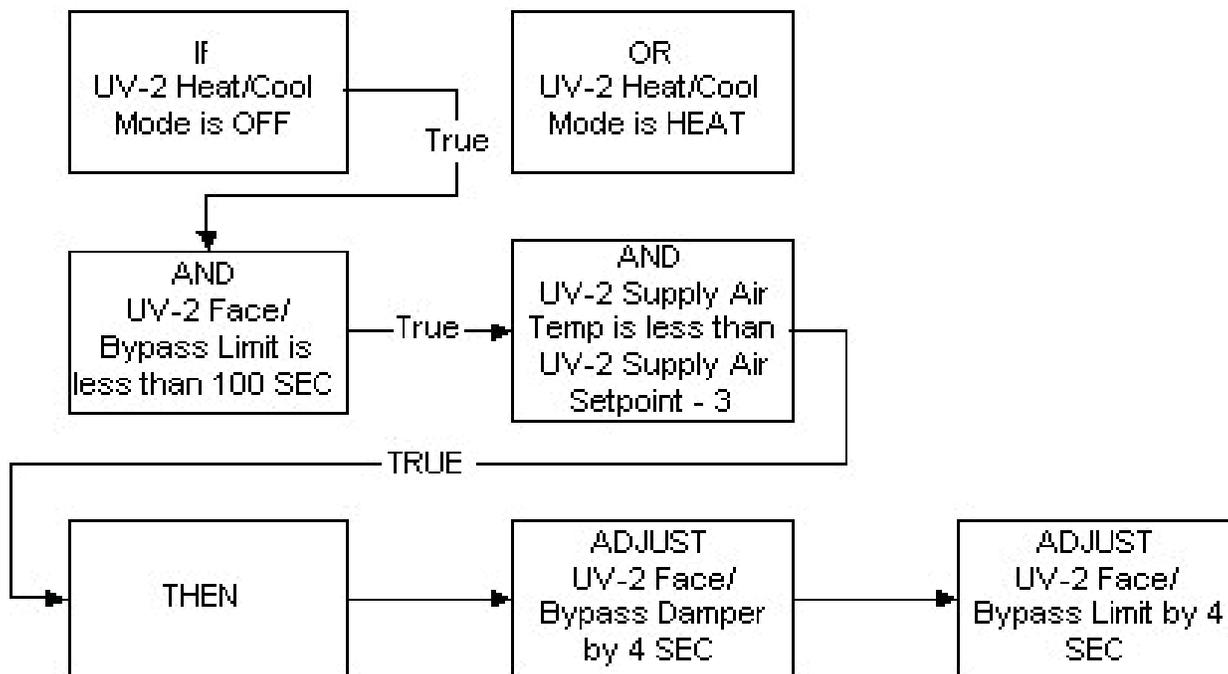
In the preceding 2 If/ Then statements, the And & Or statements are grouped differently. Let's look at the first statement. If the first line is true, then there is no need to evaluate the Or on the second line. And, since the 2 And lines are grouped to the right of the Or (subordinate to the Or), they are not evaluated and the Then is executed. Here's a flowchart to make it easier to understand:



If the Mode was Heat, then it could not have been Off, so the first line would have been false. Then, the second line would have to be evaluated. By the nature of the Ands, they must also be evaluated. So, the entire statement will evaluate. Here's a flowchart:



In the second statement, the And lines are no longer subordinate to the Or line because they are grouped equally. So, because of the nature of the Or, the second line is not evaluated if the first line is true. But, by nature, the Ands must be evaluated because they are grouped in line with the Or. Here's a flowchart:



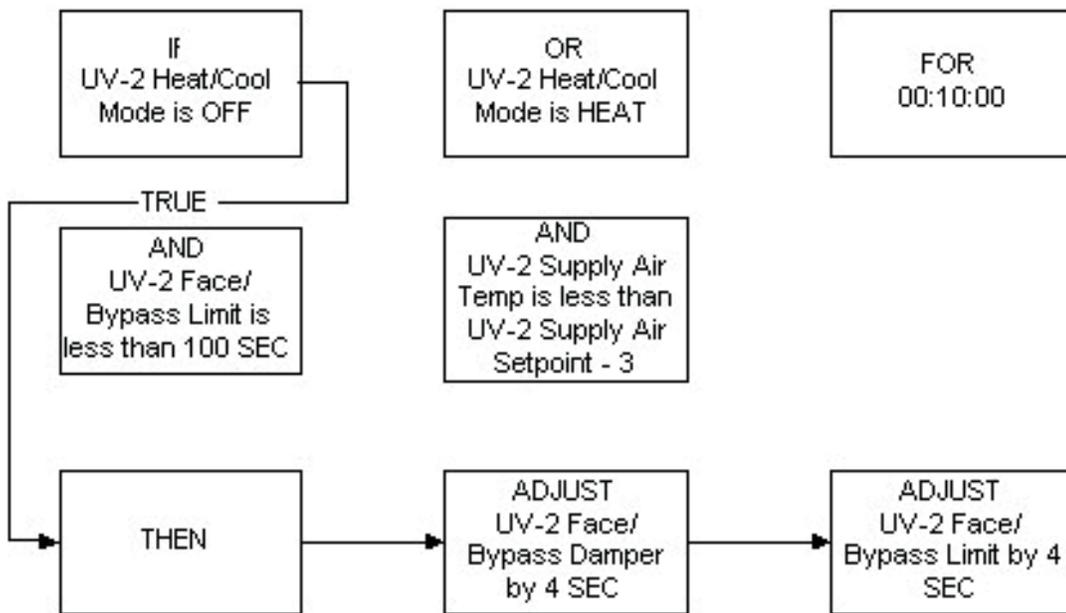
The same rules apply to the For statement, which adds a requirement that the state be maintained for a period of time before the statement is determined to be true. Whenever a For statement is added, it is always subordinate to the statement it follows. If the statement it follows is not true, the For statement does not execute. In other words, it won't wait the specified time. Here's an example:

**If**            **UV-12 Heat/Cool Mode is OFF**  
**or**        **UV-12 Heat/ Cool Mode is HEAT**  
**for 00:10:00**  
**and**    **UV-12 Face/ Bypass Limit is less than 100 SEC**  
**and**    **UV-12 Supply Air Temp is less than Equation Begin (UV-12 Supply Air Setpoint -3) Equation End**  
**then**    **adjust UV-12 Face/Bypass Damper by 4 SEC**  
             **adjust UV-12 Face/ Bypass Limit by 4 SEC**

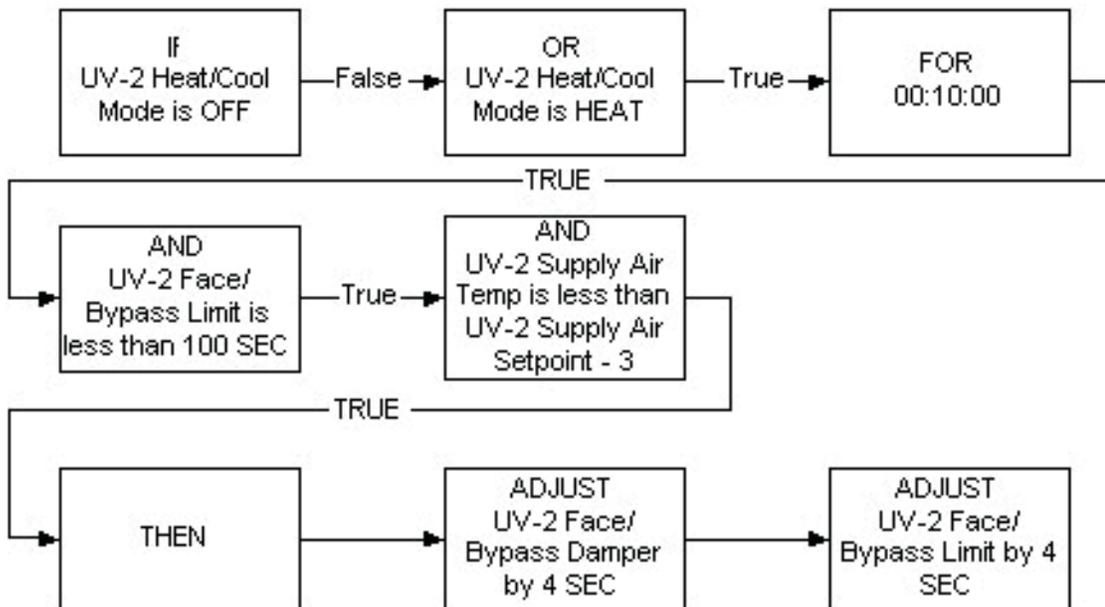
**If**            **UV-12 Heat/Cool Mode is OFF**  
**or**        **UV-12 Heat/ Cool Mode is HEAT**  
**for 00:10:00**  
**and**    **UV-12 Face/ Bypass Limit is less than -100 SEC**  
**and**    **UV-12 Supply Air Temp is less than Equation Begin (UV-12 Supply Air Setpoint +3) Equation End**  
**then**    **adjust UV-12 Face/Bypass Damper by -4 SEC**  
             **adjust UV-12 Face/ Bypass Limit by -4 SEC**

In the first If/ Then statement, let's say the Mode is OFF for 10 minutes. It will then evaluate the And statements, because the Ands are in line with the Or. If the Mode is HEAT, then it will go straight to the And statements without waiting.

In the second statement, the Ands are subordinate to the Or. So, if the Mode is OFF, the For, and Ands will not be evaluated. Here's a flowchart:



If the Mode is HEAT for 10 minutes, then the For & And statements will be evaluated.



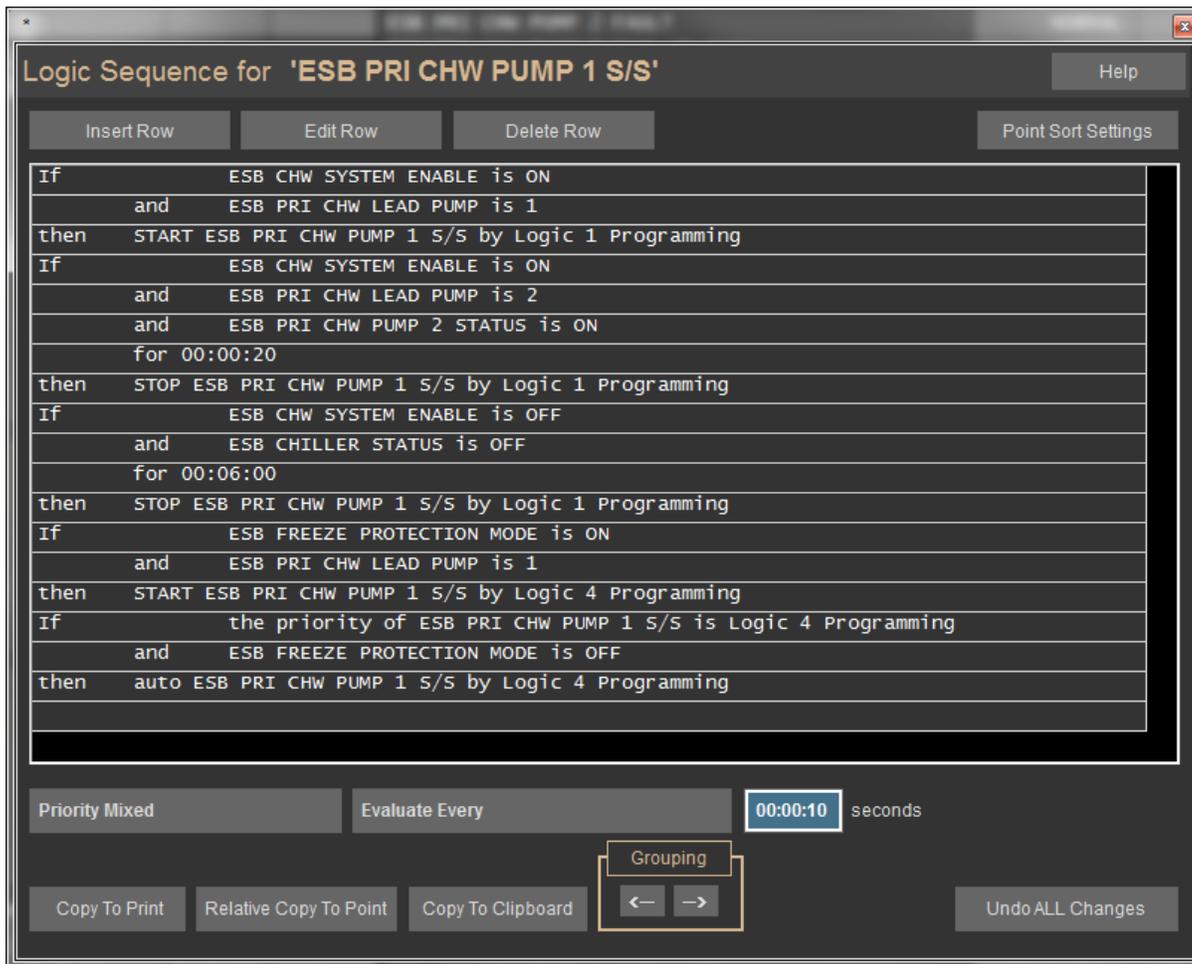
Suppose you want the For to apply to all the Or & And statements in the sequence. Here is an example of how to do that:

```
if      UV-12 Heat/Cool Mode is OFF  
or     UV-12 Heat/ Cool Mode is HEAT  
and    UV-12 Face/ Bypass Limit is less than 100 SEC  
and    UV-12 Supply Air Temp is less than Equation Begin (UV-12 Supply Air  
        Setpoint 3 ) Equation End  
  
for 00:10:00  
  
then   adjust UV-12 Face/ Bypass Damper by 4 SEC
```

Notice that the “For” is in line with all of the “Ors” and “Ands.” Because of this, the “For” applies to the “Or” and both of the “Ands.” In this case, the 10-minute requirement applies to both of the “Ands” and at least one of the “Ors.”

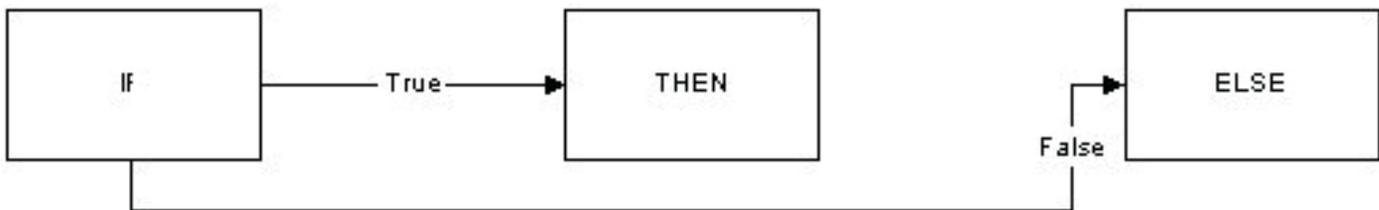
One more thing should be said about adding “For” statements to logic sequences: There is a limit of 4 “For” statements per logic sequence. If you try to add a 5th, you will get an error message stating that it cannot be saved when exiting the logic editor.

As you can see, grouping can make a big difference in the way your logic is executed and whether or not the sequence of operation is achieved. To change grouping, click on the left or right arrow in the Grouping section of the Logic Sequence window (shown below). Then, click on the line you want to move.



## If and Else If

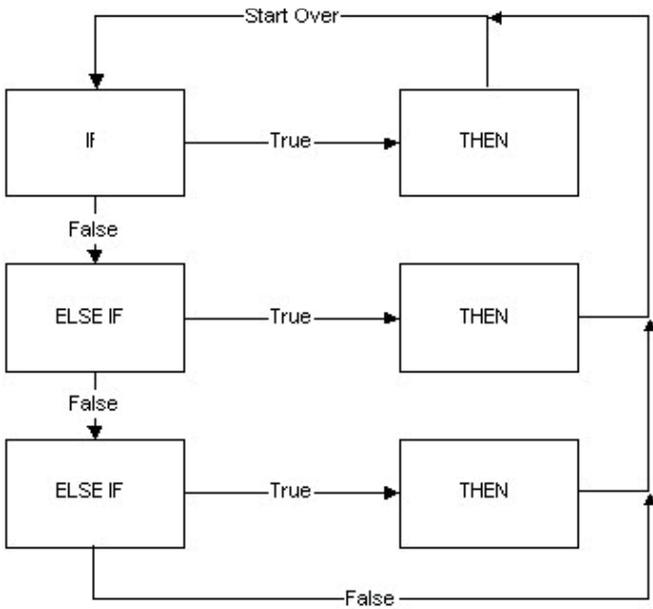
Have you seen or written logic on a point that contains two or more “If, Then, Else” sequences? Have you seen logic that contains an “If, Then, Else If” sequence? You might have wondered what the difference is and why you would use one or the other. The simple answer is: Use an “Else If” sequence if you want to avoid conflicts between the two sequences. In an “If, Then, Else” sequence, the “Then” is not executed unless the “If” is true. If it is NOT true, the “Else” is executed. See the flowchart below.



The same is true for the “If, Then, Else If” sequence. Consider the following logic example:

```
If      AHU 10 is OFF  
      or   the priority of AHU 10 is Optimal Start  
      or   AHU 10 NIGHT SETBACK is ON  
      or   AHU 10 OVERRIDE TIMER is greater than 0 MINS  
then   command AHU 10 MIXED DAMPER to 0%OPEN  
else if AHU 10 is ON  
      and  AHU 10 ECONOMIZER MODE is OFF  
then   command AHU 10 MIXED DAMPER to 15%OPEN  
else if AHU 10 is ON  
      and  AHU 10 ECONOMIZER MODE is ON  
      and  the priority of AHU 10 MIXED DAMPER is Logic 1 Programming  
then   auto AHU 10 MIXED DAMPER
```

In the above example, if any of the first conditions are met, the damper is commanded to 0% OPEN and the 2 else if sequences are not evaluated. If none of the first conditions are met, the first else if sequence is evaluated. If both conditions are met in the first else if, the damper is commanded to 15% Open and the next else if is not evaluated. If one condition is not met, the second else if is then evaluated. If one of those conditions is not met, nothing changes and the sequence starts over at the first If.



Above is a simplified flow chart. Start from the top left “IF” box and follow the True or False arrows. All possibilities are covered in this chart.

**Logic Sequence for 'AHU-10 MIXED AIR DAMPER'**

Insert Row   Edit Row   Delete Row   Point Sort Settings   Help

```

If
  or
  or
  or
then
else if
  and
then
else if
  and
  and
then
  
```

Priority Logic 1 Programming   Evaluate Every   00:00:05 seconds

Grouping   ←   →   Undo ALL Changes

Notice that the process starts over after execution of the Then sequence or if the final Else If is false. The amount of time delay before the process starts again can be determined by changing the “Evaluate Every” time, as shown here. Once the bottom of a Logic Sequence is reached, CBAS waits that amount of time before starting over.

When you have two “If, Then, Else” sequences, instead of an “If, Then, Else If” sequence, both sequences are evaluated. You have to be very careful to make sure that both “If” sequences cannot be true at the same time, otherwise the two “Then” sequences could be in conflict. In the following example, there is no way that both sequences could be true because the ranges do not overlap.

<b>If</b>	<b>AHU 10 SPACE TEMP is greater than 85.0 DEG F</b>
<b>or</b>	<b>AHU 10 SPACE TEMP is less than 65.0 DEG F</b>
<b>then</b>	<b>ON AHU 10 NIGHT SETBACK</b>
<b>If</b>	<b>AHU 10 SPACE TEMP is less than 82.0 DEG F</b>
<b>and</b>	<b>AHU 10 SPACE TEMP is greater than 68.0 DEG F</b>
<b>then</b>	<b>OFF AHU 10 NIGHT SETBACK</b>

In fact, there is a 3-degree dead-band between the ranges. This couldn't be achieved using a standard “If, Then, Else” sequence, like this:

<b>If</b>	<b>AHU 10 SPACE TEMP is greater than 85.0 DEG F</b>
<b>or</b>	<b>AHU 10 SPACE TEMP is less than 65.0 DEG F</b>
<b>then</b>	<b>ON AHU 10 NIGHT SETBACK</b>
<b>else</b>	<b>OFF AHU 10 NIGHT SETBACK</b>



## The “For” Statement

Here is some additional information about “FOR.”

Suppose you want the For to apply to all the “OR” and “AND” statements in the sequence. Here is an example of how to do that:

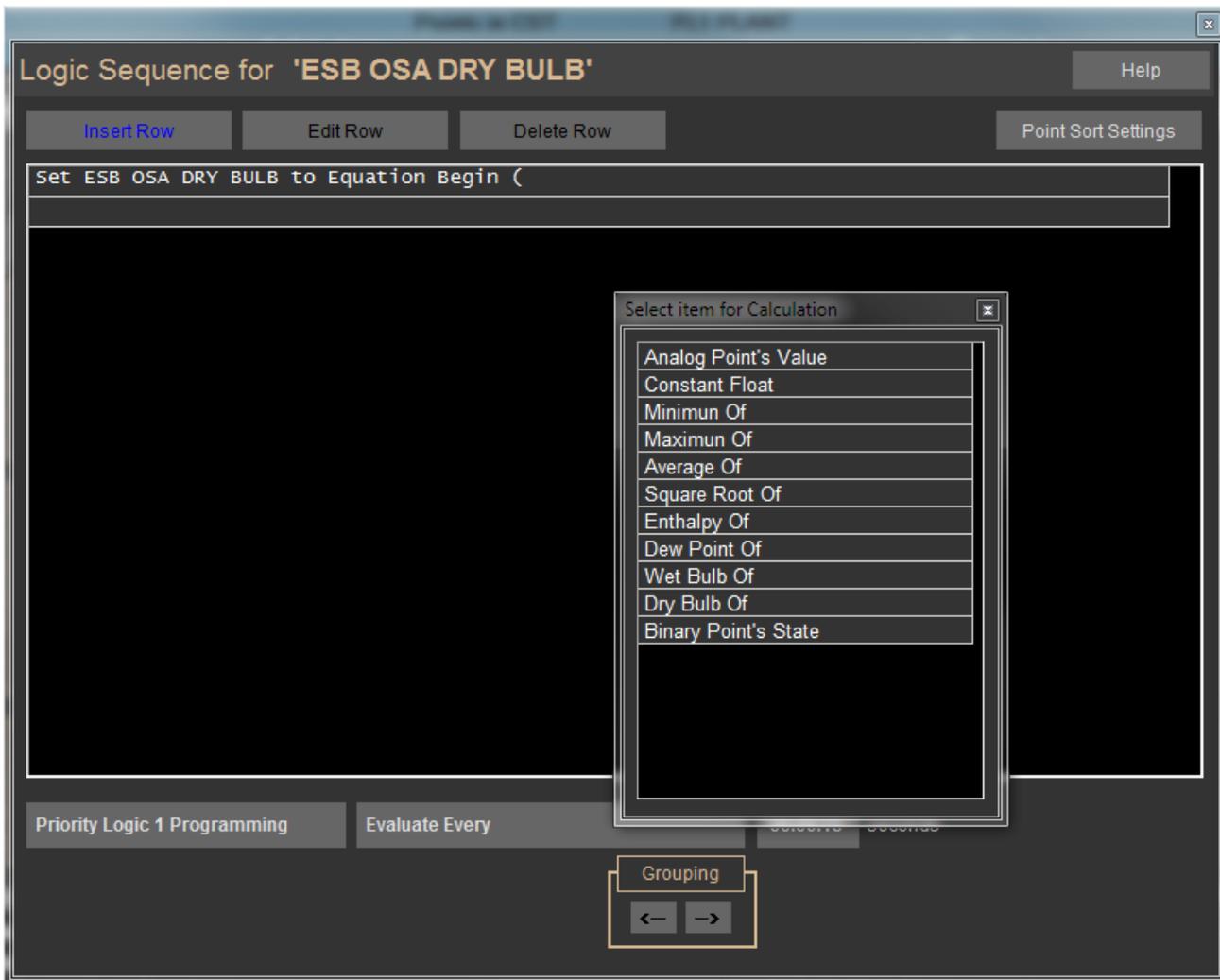
```
if      UV-12 Heat/ Cool Mode is OFF  
or     UV-12 Heat/ Cool Mode is HEAT  
and    UV-12 Face/ Bypass Limit is less than 100 SEC  
and    UV-12 Supply Air Temp is less than Equation Begin (UV-12 Supply Air  
        Setpoint -3) Equation End  
for 00:10:00  
then   adjust UV-12 Face/ Bypass Damper by 4 SEC
```

Notice that the For is in line with all of the Ors and Ands. Because of this, the For applies to the Or and both of the Ands. In this case, the 10-minute requirement applies to both of the Ands and at least one of the Ors.

One more thing should be said about adding For statements to logic sequences: There is a limit of four For statements per logic sequence. If you try to add a 5th, you will get an error message that it cannot be saved when exiting the logic editor.

## Calculations in Logic Now include Dry Bulb

There are many preset calculations in Logic that only require 2 existing Points to be associated. See below:



To program an Analog Input Software Point to calculate one of the functions listed above, go to the Program screen of the Input Point. Click Program Calculation, then click the first line of the Logic section or click Insert Line.

Click Set Value of Software Point which is the last line.

Click the Calculation button. The next window is shown in the picture above.

Let's choose "Dew Point of", because that is one of the components of Dry Bulb Calculation.

The next window asks for a Dry Bulb Temperature. Choose the temperature in the space.

Next, choose the Relative Humidity Point for the same space.

Then choose End Equation and Finished.

When you do the Dry Bulb Calculation on another Analog Input Software Point, the first Point you will be asked for is the Dewpoint like you just added.

You can also do these Calculations on an Analog Output Setpoint. Click Program Logic and click the first line.

From the choices, choose Command and choose the Setpoint you are on.

Choose Calculation and the next screen gives you the same choices.

## Meters

### Hawkeye Meters

Many building management companies are interested in monitoring energy usage, either for tenant spaces or for the entire building. Sometimes they need to monitor power usage in tenant spaces for billing purposes. Other times they might have to monitor for power company verification or conservation purposes. What the end user might not realize is that this monitoring can be included in their CBAS system through the use of Veris Hawkeye meters.

The most preferable meters to use with a Computrols CBAS system are the Hawkeye 8035 and 8036 models, made by Veris. These meters communicate by Modbus protocol and all programming is included with the CBAS software. To use these meters, you first create a Modbus RTU channel on the Host or Secondary channel of an 8X, 16X, 32X, or 64X. The Modbus RTU channel is an interface channel, which is an add-on item when purchasing CBAS software. Purchasing this interface will allow you to add as many Modbus Channels and Meters as you need. Other Hawkeye models can be added to this channel, however there is a charge for each new model added.

These meters can send a variety of information to CBAS, including KWH Consumption, KWH Demand, Voltage, Average Current, and many others. For more information on these meters, go to;

[http://www.veris.com/docs/comms/mb\\_pmap/H8035-8036\\_pm\\_10101.pdf](http://www.veris.com/docs/comms/mb_pmap/H8035-8036_pm_10101.pdf).

#### **To add a Modbus RTU channel, in Hardware View:**

- Locate the controller that will be acting as the Modbus host.
- Click on the controller and click Channels.
- Click on “Add a Channel” next to RS-485 Host or RS-485 Secondary.
- Give the channel a descriptive name and choose Modbus RTU over TCP/IP for the configuration.
- Click Add Channel Now.

## To add the controllers to the channel:

- Right-click twice and locate the Modbus channel you just created.
- Click on the channel, click Controllers, and locate the line that has the address that you want to give the Hawkeye meter.
- Click Add a Modbus Controller on that line and give the controller a descriptive name. Choose the
- Hawkeye controller from the list under “Select Configuration.”
- Click Add Controller Now and you are finished.

## To add points to the Hawkeye:

- Click on the controller and click Points. You will see a list of points that say Add A Point to the right.
- Add the points you want to use by clicking on Add a Point and giving each point a descriptive name. If you have more than one Hawkeye meter, you will want to include the name of the controller in the point’s name.

Below is the list of possible points on the Hawkeye 8036, which offers a much more extensive choice of points than the 8035. The 8035 only has the top two points on the list:

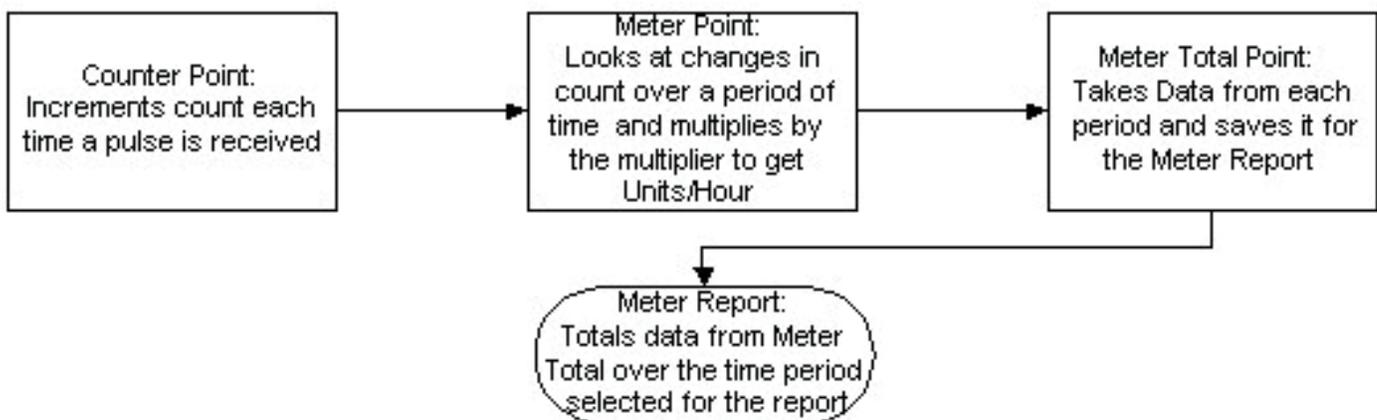
kWH Consumption
kWH Demand
Reactive Power
Apparent Power
Power Factor
Voltage (Line-Line)
Voltage (Line-Neutral)
Average Current
kWH Demand (Phase A)
kWH Demand (Phase B)
kWH Demand (Phase C)
Power Factor (Phase A)
Power Factor (Phase B)
Power Factor (Phase C)
Voltage (Phase A-B)
Voltage (Phase B-C)
Voltage (Phase A-C)
Voltage (Phase A-Neutral)
Voltage (Phase B-Neutral)
Voltage (Phase C-Neutral)
Current (Phase A)
Current (Phase B)
Current (Phase C)
Average Demand
Minimum Demand
Maximum Demand

## Pulse Meters

Other meters send out a simple electrical pulse only. Each model has a corresponding multiplier that must be used to get the KW value of each pulse. This is done in CBAS using a Meter point that looks at a Counter point. The Counter point increments the number of pulses as they are received from the meter. A second meter point can be setup to calculate the amount of KW over a period of time.

First of all, the metering hardware should be revenue grade, to ensure accuracy. Many meters give you the ability to adjust the pulse rate and multiplier. It is more desirable to have a high pulse rate and low multiplier, because in that case, if a pulse is missed or not counted, there is a lesser impact on the total Kilowatts.

The following flowchart shows how the points work together:



To setup a pulse meter in CBAS:

- Go to Hardware View and click on the controller that will host the Pulse Counter point.
- Click Points and find the point you want to use for the counter.
- Click Add a Point and give the Point a descriptive name that includes Counter.
- Choose Counter Point under Select Configuration.
- Click Add Point Now and you will see your point listed.
- Scroll to the bottom of the points list and click on Add a Software Point
- Give the point a descriptive name that includes Meter.
- Under Select Configuration, choose Meter.
- Click Add Point Now and you will see your point listed.
- Click Add a Software Point again.

- Give the point a descriptive name that includes Meter Total.
- Under Select Configuration, choose Meter Total.
- Click Add Point Now. Now you must configure the points.

The only thing that might need to be configured on the Counter Point is Resolution. This determines how many pulses are counted before the status changes in CBAS. The default is 10, which means that the status will only change every 10 pulses counted.

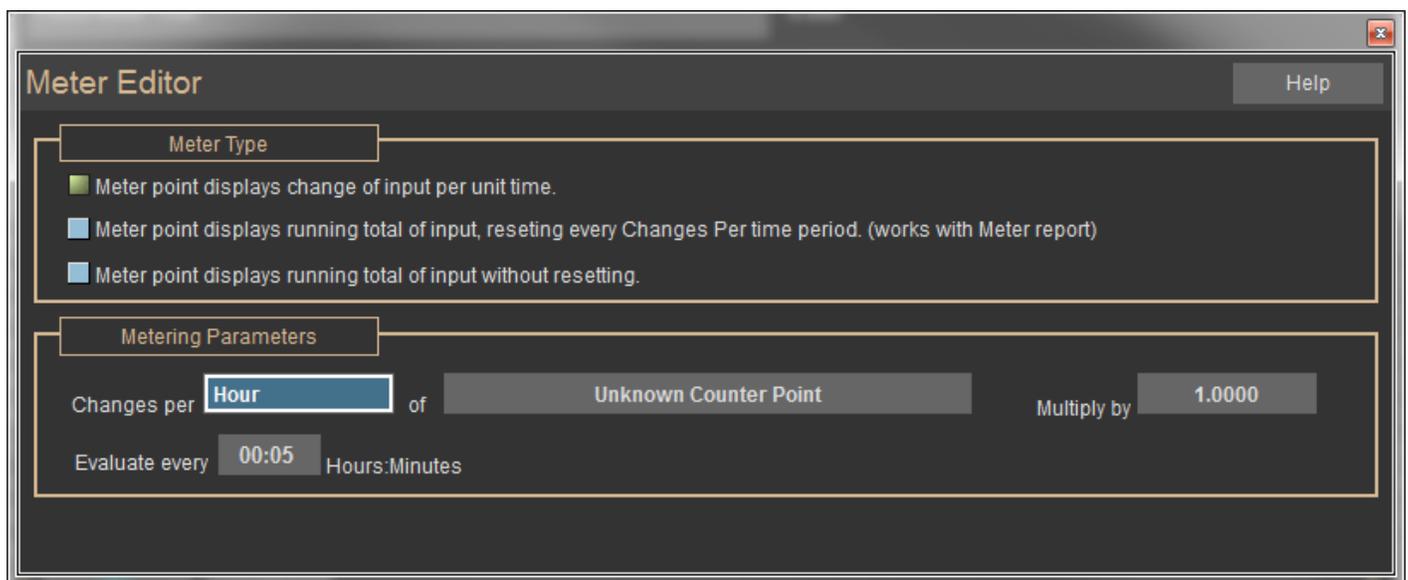
The Meter point can be configured two ways. One displays changes over a unit of time multiplied by the multiplier to get KW/ time period. The second displays a running total of counts, resetting after a period of time. The Meter Editor screen is shown here.

For Meter Type, choose the second line, “Meter point displays running total, resetting every Changes Per time period”. This will allow it to work with the Meter Total point.

In Metering Parameters, click on Unknown Meter Point and select the Counter point from the list. Adjust the Evaluation Period, which is 5 minutes by default. The KWH status of this point will be 00 until the first evaluation period has passed.

The Meter Total point is used for reporting purposes. If configured properly, this point will count up to 999,999 and roll over to 0. These numbers are stored for use in the Meter Report.

To configure a Meter Total point, click on the one you created and click Configure Meter to get to the following screen:



Select “Meter point displays running total of input, resetting every Changes Per time period” for the Meter Type. Click on “Unknown Counter Point,” and select the meter point you just finished configuring.

## Meter Report

To print a report of total KWH usage over a period of time, Go to the Reports menu on the Main Menu and choose Meter Report. Choose a starting date and time. Press ESC and choose an ending date and time. Press ESC and CBAS will scan for meter data during that time period and will show the report on the screen. Click on Print and the report will be printed. An example of a portion of a Meter Report is shown below:

<b><u>Point Name:</u></b>	32 at 58 KWH Total
<b><u>Beginning of metering period:</u></b>	5/03/2004, 00:00:00
<b><u>End of metering period:</u></b>	5/06/2004, 00:00:00
<b><u>Meter total for specified time span:</u></b>	436,063.50

<b><u>Point Name:</u></b>	Meter Total
<b><u>Beginning of metering period:</u></b>	5/03/2004, 00:00:00
<b><u>End of metering period:</u></b>	5/06/2004, 00:00:00
<b><u>Meter total for specified time span:</u></b>	20,468.00

## Display Stats

For thermostats with LCD display, CBAS works with Schneider Electric (formerly TAC, Invensys, Seibe) MN-S3-700, MN-S3-HT, and MN-S4 LCD room sensors. The MN-S3-HT is the same as the MN-S3-700, with a humidity sensor added. The MN-S4 has a Fan On/ Off button.

These display stats can be added to VAV controllers or to X-line controllers (using an SI-S3 Stat Interface board). Only one S3 can be added to a VAV, VAV-B, or UNI-B but it does not require an interface board. You must follow different methods to add an S3 to the 2 different controller types.

### Adding a Display Stat to a VAV or UNI-B

The MN-S3 Display Stat can also be programmed on a Host or Secondary Channel of an Internet controller by using a Computrols Stat Interface Board (SI-S3). There are separate instructions for that purpose. The VAV-B controller is configured using the VAV-B Utility Program, so there is no way to program a channel on it. You decide what type of stat is used in the Installer section of VAV-B Utility and there are points programmed in CBAS to display the Space Temp, Setpoint, etc.

Once you have wired the MN-S3 to Analog Input 3 of the UNI-B controller, you are ready to program it in Editor Mode of CBAS. First program the UNI-B controller, then follow the instructions below:

- Once you have programmed the UNI-B controller, find it in Hardware View.
- Click the UNI-B, and then click Channels.
- Click “Seibe Channel”, and then Controllers. (Originally, the S3 was a Siebe product)
- There is only one address available on the Siebe Channel hosted by a UNI-B controller.
- Click Add Controller.
- Give it a name that describes its location.
- For Configuration, select S3. (There is only one choice)

Now, you can add points to the MN-S3. Unfortunately, you cannot use a Template at this time. However, if you add one VAV-B or UNI-B and add a MN-S3, you can make a Template of the VAV-B or UNI-B that will contain the MN-S3 points.

- Click the controller and click “Channels.”
- Click “Siebe Channel” and click “Controllers.” You will see the Display Stat listed.

- Click on the Display Stat and click “Points.” You will see a list of points with “Add A Point” next to each. These points are standard points, but they need to be added in order for them to show up in Text View.
- Click “Add A Point” next to the points you want to use. Give the point a descriptive name and select the one available configuration.
- Click “Add Point Now.”

The functions of the points are pre-determined and most are obvious. Here’s a description of some of the less obvious ones:

- **Mode:** There are 4 modes, which determine what is seen in the display on the Display Stat itself.
- **Temp:** Stat display shows the Space Temp.
- **SPTemp:** Display shows Setpoint when in OCCupied status, shows Space Temp when in UNOCCupied status.
- **Setpnt:** Shows Setpoint all the time.
- **Altern:** Display shows Alternate Display Number, which can be set to anything.
- **Alternate Display Number:** Put in the number you want to be displayed when in Altern Mode.
- **Unoccupied/ Occupied Enable:** When enabled, this allows you to change Occupied/ Unoccupied mode from the button on the Display Stat.

If you need to program many identical UNI-B controllers with S3 Display Stats, you can use a template. Program the first UNI-B with the Siebe channel, S3 and its points. Click the controller and click Save Controller Database as Template. When programming the subsequent controllers, choose to create the controller from a template, instead of a blank database. With a VAV-B on an OPTO Channel, click the controller then Export Database.

## Adding a Display Stat to an X-Line Controller

In order to program a Wall Stat, you must first program the controller that it is wired to. Let’s assume we have an 8X controller programmed on a TCP/IP channel already. There is an approximate limit of 16 S3 Stats per channel. In Editor Mode, go to Hardware View, TCP/IP Controllers channel, Controllers button, and then click the controller that is to Host the MN-S3 stat(s).

- Click “Channels,” and click “Add a Channel” next to RS-485 Host or Secondary.
- Enter a name for the channel and click “Select Configuration.”
- Choose “Opto-22 on Controller” and click on “Add Channel Now.”

This channel will not show up in the channel list in Hardware View. You will only be able to access it through Channels on the Host Controller.

- To program the S3 Stat on the channel you created, click the channel, then “Controllers.”
- Next to the address, you want to use, click “Add a Controller.”
- Give the controller a name that describes its location.
- For Configuration, choose S3.
- Click “Add Controller Now”.
- Click “Finish” and you can now add points to your Wall Stat.

To add points, go back to Hardware View, click on the controller and click “Channels.”

- Click on the channel you created earlier and click “Points.”
- Click “Add A Point” next to the point you want to program and give it a name that describes its location.
- Click “Add Point Now.”

The functions of the points are predetermined and most are obvious. Here are descriptions of some of the less obvious ones.

- **Mode:** There are 4 modes, which determine what is seen in the display on the Wall Stat itself.
- **Temp:** Stat display shows the Space Temp.
- **SPTemp:** Display shows Setpoint when in OCCupied status, shows Space Temp when in UN-OCCupied status.
- **Setpnt:** Shows Setpoint all the time.
- **Altern:** Display shows Alternate Display Number, which can be set to anything RH: This mode does not work, except on an S3 attached to a VAV.

It is a good idea to erase any database that might be on the S3 Stat host controller when opening the database in Real Mode after adding a S3 Stat to the database. To do that, click the S3 Stat Host controller and click Erase Database. The changes will be downloaded automatically.

## Setting the address on the Stat Interface Board

There are toggle switches numbered 1 thru 8 which relate to the values of a binary Byte. Flip enough toggle switches to equal the number of the address. The values are as follows:

1 = 128

2 = 64

3 = 32

4 = 16

5 = 8

6 = 4

7 = 2

8 = 1

For example, a controller with address 10 would have switch 5 and 7 in the ON position.  $8 + 2 = 10$  Address 97 would have switches 2, 3, and 8 in the ON position.  $64 + 32 + 1 = 97$

## Lights on the Interface Board

- **+5V:** This light should be solid green when power is properly applied.
- **RUN:** Steady red blink when the board is running.
- **STAT:** Steady red blink when communication established with the Display Stat. (Stat will display also).
- **RxD:** Steady fast yellow blink when normal 485 communication is established.
- **TxD:** Occasional green blink when normal 485 communication is established.

## Programming Modbus Channels

With the CBAS Modbus RTU interface, you communicate (monitor and command) with any manufacturer's equipment. Modbus is an application layer messaging protocol that provides client/ server communication between devices connected on different types of buses and networks. It is similar to RS485 and RS232, and has been a standard industrial protocol since 1979 when Modicon introduced the protocol in its PLCs (Programmable Logic Controller). Schneider Electric now owns Modicon.

Modbus is a request/ reply protocol and offers services specified by function codes. These function codes are elements of the Modbus request/reply protocol data units (PDUs).

There are three categories of Modbus:

- **Modbus Serial:** Either Modbus ASCII or Modbus RTU
- **Modbus ASCII:** Each eight-bit byte in a message is sent as two ASCII characters; main advantage is that it allows time intervals of up to one second to occur between characters without causing an error.
- **Modbus RTU:** Each eight-bit byte in a message contains two four-bit hexadecimal characters, main advantage is its greater character density allows better data throughput than ASCII for same baud rate.
- **Other Serial Modbus:** Several manufacturers have made modifications to the Modbus protocol to meet their specific application needs, these would include a Modbus Daniels, Modbus Omniflow, Modbus Tek Air, and others.

### Modbus RTU

Modbus RTU is the standard used by the Modbus channel in CBAS. In order to use this channel, an add-on license must be purchased for each site. This will enable you to program as many Modbus RTU channels as you need at the site, so you don't have to put all Modbus devices on the same channel.

### Veris Meters

When first added to CBAS in January of 2003, the Modbus channel was only intended for use with Veris Hawkeye 8035 and 8036 meters. If you program a Modbus channel in CBAS, you will find these in the list of controllers to add to the channel. There is also a text file (covered later) available for the Veris Hawkeye 8136 meter.

## 485 vs. 422

Most Modbus devices on the market offer a choice between 4-wire and 2-wire communications. Just like a RS485 channel, a Modbus RTU over 485 channel uses 2-wire communications, which is a misnomer because it uses 3 wires: +, -, and shield. Some manufacturers use only 4-wire communication, also known as RS422. In this situation, you will have to use the converter that the manufacturer recommends. In some situations, you will have to use Computrols RP1 to convert 485 to 232, then a 232 to 422 (4-wire 485) converter.

## Master/Slave

Modbus RTU is a version of RS 485, which is a Master/ Slave protocol. In CBAS, all Modbus devices in the system must act as Slaves. The CBAS Server is the Master.

## Modbus Generic

The Modbus RTU channel in CBAS started with just 2 controllers: The Veris Hawkeye 8035 and 8036 Meters. These controllers are the Computrols standard for metering, and all points offered by those devices are there when you add the controller to the Modbus RTU channel. All you have to do is “add” the ones you want to use.

Because all Modbus RTU devices use the same standards and we were getting requests to add more and more devices to the channel, it was only natural to add a new controller to the channel. With CBAS version 2.0.1, the Modbus Generic controller type was added to the channel to handle any and all of these requests. Since then, many different manufacturers’ equipment has been programmed using this controller type. Until recently, the channel had a limit of 64 addresses that could be programmed. As of CBAS version 2.2.4, up to 255 addresses can be programmed.

Each Modbus controller on the market has a list of points that are available to be monitored or commanded. You don’t have to use all of them, but for each one that you want to monitor, you will need 2 or 3 pieces of information: Modbus Register or Position, Modbus Function, and Modbus Data Type or Range (in the case of Functions 3 or 6, which are analog). This information can be obtained from the equipment manufacturer or dealer, and can often be found on their web site.

## Modbus Registers and Functions

When Modbus was first added to CBAS, the range of Register addresses supported was limited to holding registers in one range. Now, the full range of registers is supported and they can be programmed at any register regardless of data type when you add a New Modbus Controller. More info on that in the step by step instructions for adding points. When addressing points in CBAS on Modbus Generic controllers, it is very important to understand the basics of Modbus registers. There are several “functions” in the Modbus protocol, and they are related to address ranges. Many manufacturers of Modbus RTU protocol equipment do not give the full address, but a partial address and the Modbus Function. So it is up to you to know the address ranges of the Functions that CBAS supports:

- Modbus Function 1 Read Coil Status. CBAS Modbus addresses in the range 1-9999. (Binary Inputs)
- Modbus Function 2 Read Input Status. CBAS Modbus addresses in the range 10001-19999. (Binary Inputs)
- Modbus Function 3 Read Holding Registers. CBAS Modbus addresses in the range 40001-49999. (Analog Inputs)
- Modbus Function 4 Read Input Registers. CBAS Modbus addresses in the range 30001-39999. (Analog Inputs)
- Modbus Function 5 Force Coil Status. CBAS Modbus addresses in the range 1-9999. (Same as Function 1, but Outputs instead of Inputs)
- Modbus Function 6 Preset Single Register. CBAS Modbus addresses in the range 40001-49999. (Same as Function 3, but Outputs instead of Inputs)

Generally speaking, manufacturers’ documentation will give a table of addresses in one function, like Function 2, Read Input Status. Sometimes, they will give you the full address, like 10001. Other times, they will give you 1 to 3 digit addresses. In this case, we know that Function 2 involves addresses in the range of 10001 to 19999. Some manufacturers’ specs force you to add a 1 and others don’t. If the addresses given in the tables start with 0, you would add 10001 to the address. If the addresses in the table start with 1, then you would just add 10000. In all cases, CBAS will actually subtract 1 from the address before sending out the request. It’s a little confusing, but if it is not working, try subtracting or adding 1 to the address.

Here's an example:

ModBusFunction 1 Read Coil Status [r] and Function 5 Force Coil Status [w]	MODBUS Address	C6000	
		r	w
Unit on/off general 1=on, 0=off	0	x	x
Alarmreset, write 1 to reset	1		1
Local Stop 1=on, 0=Local Stop	2	x	
Unit on/off by ModBus 1=on, 0=ModBus Stop	3	x	
Local UPS 1=Local UPS on	4	x	
Remote UPS 1=Remote UPS on	5	x	x
G/CW-mode; G:1;CW:0	6	x	x
Note: Writing to address 0 is equivalent to reading address 3! (Except C7000IC)			

In the above table, Functions 1 and 5 are shown. If there is an x in the r (Read) column, it is possible to read the register, which means it is Function 1. Since the addresses start at 0 in this case, the address of the Unit On/ Off General point would be programmed as 10001 in CBAS. CBAS will subtract 1 from the request before it goes out. When programming the point, make it a Binary Input, and CBAS will send it out as a Function 1 request.

There is an x in the w (Write) column, so it is possible to command the Unit On/ Off. That would be function 5 Force Coil Status. The address would be the same, 10001, and you would program it as a Binary Output. CBAS will subtract a 1 and send the request out as a Function 5.

**Analog Example:** The tables below show examples of Functions 3, 16, and 4, which are analog functions:

ModBusFunction 3 Read Holding Registers [r] and Function 16 (0x10) Write Multip. Registers [w]	MODBUS Address	C6000	
		r	w
Setpoint temperature 10.0..30.0°C	0	x	x

ModBus Function 4 Read Input Registers			
Actual / return air temperature 0..100°C	0	x	x
Actual / return air humidity 0..100%	2	x	x

The first point, Setpoint Temperature, can be programmed in CBAS as address 40001 and configured as one of the analog point types. (More on those later) For Function 3, program it as an Input. CBAS does not, at this time, support Function 16. If the device supported Function 6, Preset Single Register, you would program it as an Output. Return Air Temperature and Return Air Humidity would be programmed as addresses 30001 and 30003 respectively. Because the addresses fall into the Function 4 range, the request will be sent out as a Function 4. Choose one of the analog point types to match the manufacturer's specifications. There is no write function for Function 4 address points.

## Licensing

There are 2 types of Modbus RTU Channels in CBAS: Modbus RTU over TCP/IP and Modbus RTU on Controller. Both types require an add-on entry in the CBAS license file. Purchase the Modbus RTU Protocol add-on, as well as any other add-on, when you purchase CBAS. An add-on feature can also be purchased at a later time, and an updated license file can be emailed.

**Note:** *The license file cannot be altered by the end user.*

## Three Types of Channels

When the Modbus RTU over TCP/IP channel is programmed, the Host controller merely passes data back and forth between the Modbus device and the CBAS Server. This is fine for monitoring and non-critical commands. There is a “traffic” screen (see Troubleshooting section) available on this channel that is not available on the “Modbus RTU on Controller” channel. Also, the On Scan/ Off Scan buttons work only on this channel type.

When the Modbus RTU on Controller channel is programmed, the database and its programming reside in the database on the Host controller. Program software points on the Host controller and place any logic on those points. This way, if communication between the server and Modbus device is lost or CBAS is in Editor Mode, the sequence of operations continues with the Host controller acting as the CBAS Server. Statuses are still updated on the CBAS server, and the “child” points can be monitored using a Handheld terminal at the Host controller. A controller on this channel can only be taken Off Scan by going to the Program screen of the controller and checking the Off Scan box. Restart CBAS for the change to take effect.

**Note:** *Because the Modbus RTU on Controller is contained in the Host controller's database, it can only be accessed in CBAS through the Host controller/ Channels. That is, the channel will not be listed in the Channels screen of Hardware View. Points will appear in Text view.*

Modbus TCP/IP is the third type of channel available in CBAS. Communication is over the Local Area Network and uses IP addresses. Everything else is the same in CBAS.

### To add a Modbus RTU channel, in Hardware View:

- Locate the controller that will be acting as the Modbus host.
- Click on the controller and click Channels.
- Click on “Add a Channel” next to RS485 Host or RS485 Secondary.

- Give the channel a descriptive name and choose either Modbus RTU over TCP/IP or Modbus RTU on Controller for the configuration.
- Click Add Channel Now.

#### **To add a Modbus TCP/IP channel, in Hardware View:**

- At the bottom of the Channel list, click Add A Channel.
- Give it a descriptive name and choose Modbus TCP/IP for the configuration.
- Click Add Point Now!
- You can only have one Modbus TCP/IP channel because they would both use the same TCP/IP Port. The second channel would not work. So place all Modbus TCP/IP controllers on the same channel.

#### **To add the controllers to the channel:**

- If the channel is “on controller” right-click twice and locate the Modbus channel you just created. If the channel is Modbus RTU on Controller type, then you must access it by clicking the Host controller, then Channels.
- Click the channel, click Controllers, and locate the line that has the address of the Modbus device.
- Click Add a Modbus Controller on that line and give the controller a descriptive name. Choose the Generic Modbus controller from the list under “Select Configuration”. You now have a choice between New Modbus and Old Modbus. It is recommended that you select New Modbus. See note below.
- Click Add Controller Now and you are finished.

#### **To add points to the controller:**

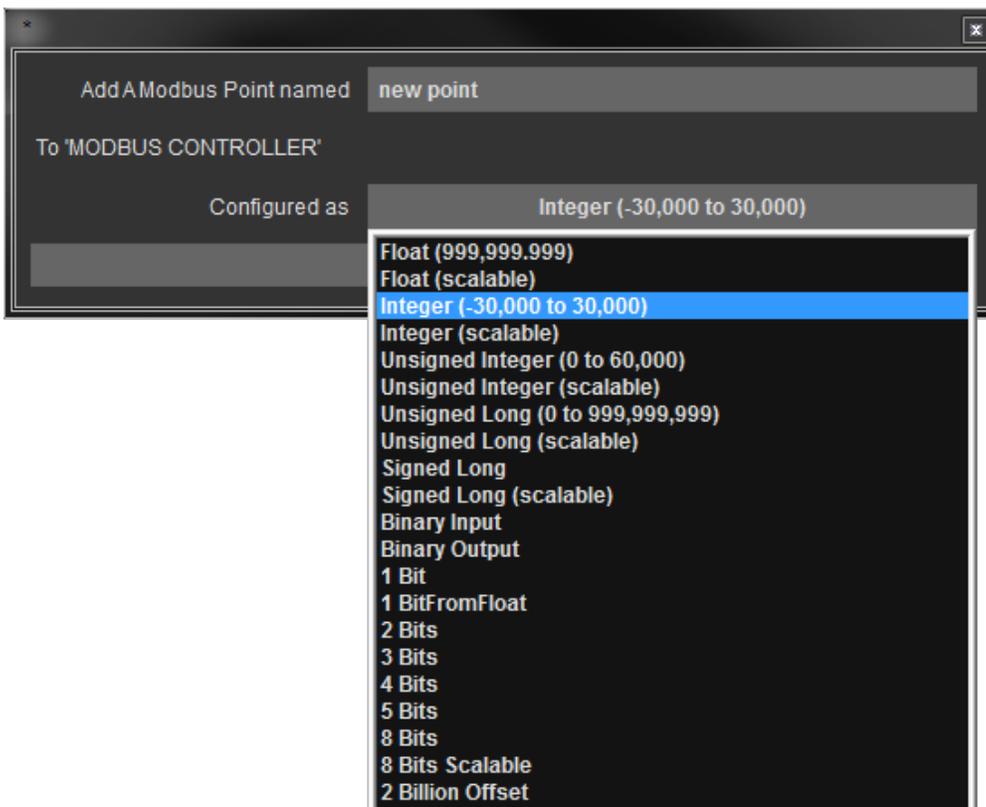
- Click the controller and click Points. You will see Add a Modbus Point.
- Add the points you want to use by clicking Add a Modbus Point and giving each point a descriptive name. If you have more than one Modbus controller, you will want to include the name of the controller in the point’s name.
- Based on the manufacturer’s point mapping specifications, choose a configuration type from the list.
- More configuration will be done in the next section.
- Click Add Point Now!

## To configure the points:

- Click the point then the Modbus button in the bottom left of the Point Program screen. (See figure below)
- Click the Modbus Position field and enter the address, which will be a number within one of the standard register ranges listed above.
- If you need to change the Modbus Type, click on the field and select from the list.
- Right click or ESC to save.
- After changing any Modbus parameters in CBAS you must restart CBAS before the changes will take effect.

## New Modbus vs Old Modbus

It is recommended that you use New Modbus. Actually, you no longer have a choice, as the old Modbus was removed. Old Modbus required that you have all Function 3-Read Holding Registers in the 40,000 register range and Function 4-Read Input Registers in the 30,000 register range, etc. as stated in a previous section. With New Modbus, you can have any type of Function at any register. So, a Holding Register could be register 1 instead of 40,001. However, you must specify what type of register it is: Holding Register, Input Register, Coil (binary) or Discrete Input. This should be noted in the manufacturer's documentation. Unfortunately, most of the documentation you will get is incomplete and you have to try different things.



## Modbus “Text” Files

What is the easiest way of adding multiple identical Modbus controllers? Computrols controllers, VAV, 8X, 16X, etc., can be saved as templates. So, you program the first controller as completely as possible, then save it as a Template. For the rest of the controllers, you add them from the Template you saved, or you can copy the original controller directly.

With Modbus Generic controllers, you save the controller to a text file, then add the rest of them using the text file.

### To Save a Text file:

- In Editor Mode, click the completed Modbus Generic controller, then click Export Database.
- It will ask you to type in a description. Click OK, then type your description. When finished, right click or ESC.
- A pop-up box will tell you that the file was saved to C:\ CBAS\ Bin\ Modbus\ ModbusGeneric.txt.
- If you will be making more than one text file because you have different configurations, find the above file and change its name.

### To add the controllers using a text file:

- Click on the channel, click Controllers, and locate the line that has the address of the Modbus device.
- Click Add a Modbus Controller on that line and give the controller a descriptive name. Choose the Generic Modbus controller from the list under “Select Configuration”.
- A pop-up box will ask you “Would you like to import the points into the newly added panel?” Click Yes.
- In the next window, select the correct text file and click OPEN.
- Next, you will be asked to “Please enter a prefix for all of the points to be added (max 12 characters)”. Click OK, then enter a word that will differentiate the points from others in the database.
- After the progress window shows that the points have been added, another window will state how many points were added.
- Click OK, and you are finished adding the Generic Modbus controller.
- To view the points, click the controller, then Points.

## More on the Modbus Generic Controller

The Modbus Generic controller is limited to 256 points.

As you can see by the previous figure, there are several different data types supported by the various Modbus RTU Functions. Originally, the Modbus Generic controller was limited to Reading/Writing of Holding registers (Modbus Function 3 and 6). As stated earlier, Functions 1 through 6 are now supported. Holding Registers are Integers and have a range of roughly 65,000 (65,536, or 256 x 256 to be exact). Some points will take up 2 Holding Registers (Long and Float). A Modbus register is 16 bits (or 1 WORD).

Below is an explanation of each type of Modbus data that is supported by CBAS. Manufacturers may use different terminology to describe these data types. Some possibilities are included in parentheses.

### Modbus Functions 3, 4, and 6

- **FLOAT (REAL):** This point type takes up 2 register addresses, which makes it 32 bits long. The first register is the upper 16 bits. Can be an Input or Output depending on the Function/ Address.
- **UNSIGNED LONG (UINT32):** Uses 2 registers. The first register is the Lower 16 bits. Range 0-999,999. Very similar to a Float, and the 2 types are interchangeable in CBAS.
- **LONG (SINT32):** A signed 32-bit is a LONG (in CBAS) that can go negative or positive.
- **INTEGER (SINT16):** Takes up 1 Modbus register and is 16 bits long. Range -30,000 to 30,000 because it is “signed”.
- **UNSIGNED INTEGER (UINT16):** Uses 1 register. Range of 0 to 65,000. An “unsigned 16-bit” is an Unsigned Integer in CBAS.

There are also **SCALED** versions of the above types. That means there is a Scale Factor field on the Point Program screen where you can put in a multiplier if the manufacturer specs says it is necessary. Decimal places can also be added.

### Modbus Functions 1, 2, and 5

- **BINARY INPUT (DISCRETE), BINARY OUTPUT (COIL):** Uses 1 register, but only 0 or 1 of it.
- **BIT:** Let you control single/ multiple bits out of a register. A Byte is 8 Bits.

## Bit Points

Manufacturers often use single bits out of the 16 bit registers to indicate Alarms or Status of a particular feature (Alarm or Normal, On or Off). Bit points are points that have the same register, but do different things, depending on the Bit you set. You need to add the "1 Bit" point type. Or, up to 16 of them for each address (40001 for example). Then in the configuration for the Modbus point, enter the 0-15 number in the "Start Bit Position." The first bit in the register is bit 0. For each Modbus bit address, you could have 1 point each of type "1 Bit" all with the same Modbus address. The only difference between them all will be their "Start Bit Position". So, for bit points you need a register number and a start bit.

## Multiple Bit Inputs and Outputs

Some manufacturers use multiple bits in the same Modbus register to represent things. In CBAS there are Modbus bit point types that represent 1-5 bits out of a Modbus register. 2 Bit, 3 Bit Inputs and Outputs, etc., are the same thing as a 1 bit, except that they return or send more than 1 Bit from the register.

- If you have a 1 Bit with starting position 3, it will return the value of the 00000000000000x00 bit (value from 0 to 1).
- If you have a 2 Bit with starting pos 3, it will return the value of the 000000000000xx00 bits (value from 0 to 3).
- If you have a 3 bit with starting pos 3, it will return the value of the 00000000000xxx00 bits (value from 0 to 7).
- Byte is the same as an 8 bit start at 3, it will return the value of the 000000xxxxxxx00 bits (values from 0 to 255).

All of these items, 1 Bit thru Byte, return multiple values out of a single register. Take the following Modbus register for example:

40001      aaaaabbbbcccddef

- aaaaa is Status 1
- bbbb is Status 2
- ccc is Status 3
- dd is Status 4
- e is Status 5
- f is Status 6

So there are 6 status points in the 1 Modbus register. So, you would program the following 6 points in CBAS to see the status of all 6 points:

<b>Modbus Type</b>	<b>Start Bit Position</b>	<b>Modbus</b>	<b>Position</b>
5 Bit Input	11	40001	Status 1
4 Bit Input	7	40001	Status 2
3 Bit Input	4	40001	Status 3
2 Bit Input	2	40001	Status 4
1 Bit Input	1	40001	Status 5
1 Bit Input	0	40001	Status 6

The Modbus Type is how many bits you want to pick out of the register (1 to 5). Usually, if there are more than 5 bits, the manufacturer will use an entire Byte (8 bits). The Start Bit is how many bits into the 16 bit Modbus Register to start. 0 = Start from beginning, 15 = Only look at the very last bit.

## Other Considerations

Once a Modbus Generic controller is added to the database, it is possible to change the address or remove the controller completely.

## Changing the Address

- Click the controller, then Program.
- In the bottom right of the Program screen, click the address and change it.
- ESC to close, then ESC again to close the channel.
- Click the Channel, then Controllers to reopen the channel. You will see the controller at the new address.

## Removing a Controller

- In Editor Mode, click the Database Menu, then Remove a Controller.
- Choose the Channel where the controller is located.
- Select the controller to be removed.
- Click Yes if you are sure you want to remove it.
- You will be returned to the controller list for the channel, after the progress window closes.
- Choose another controller to remove, or ESC to finish removing controllers.

## Baud Rate

Manufacturers of Modbus RTU devices use different baud rates, or communication speeds. It is possible to change the baud rate of a channel. All controllers on the channel must be capable of communicating at the same speed. Each host controller has 2 channels available. So, if you have devices that use different baud rates that can't be changed, just add another channel. The default for CBAS is 9600 baud. Other rates available are 19.2K baud and 38.4K baud. When hosted by an X controller, it is recommended to stay at 19.2 or 9600 because of the speed of the processor on the controller.

## Changing the Baud Rate

- Click the Modbus Generic controller, then click Program.
- In the Channel Parameters section, click the Baud rate and select one of the 2 other choices.
- ESC to close the Channel program screen.
- If you are in Real Mode, close CBAS and reopen for the change to take effect.
- If the channel is an “on controller” channel

## Troubleshooting

### Channel Not Started

When you receive a yellow trouble banner, this means that a channel is programmed, but not added to the license file. You must have an add-on feature added to the licenseX.txt file, or the add-on channel will not work. You only get this alarm when CBAS first starts in Real Mode, and it only applies to add-on protocol channels, not BASnet or OPTO-22 on Controller.

### On Scan/Off Scan

The On Scan/ Off Scan buttons work the same on a Modbus RTU over TCP/IP controller as on a BASnet controller. However, in the case of a Modbus RTU on Controller channel, you must go to the Program screen of the controller and check the Off Scan box to take it Off Scan. You must restart CBAS for the change to take effect. To put it back On Scan, uncheck the box, then restart CBAS.

### Viewing Traffic on the Channel

In CBAS version 7.1.9, after 9/ 24/ 07, a "show traffic" button was added to the program screen of the Modbus RTU over TCP/IP Channel (Modbus Interface). It is NOT available on the Modbus on Controller channel. It is similar to the traffic screen on a BASnet Channel, and will tell you if the Modbus device is responding back to CBAS (see figure below).

It will also show you the NACK code if the Modbus controller is returning a negative acknowledgement. A NACK will be returned for several reasons, like invalid address specified, unsupported command, etc.

It will also show you the poll messages to the Modbus devices.

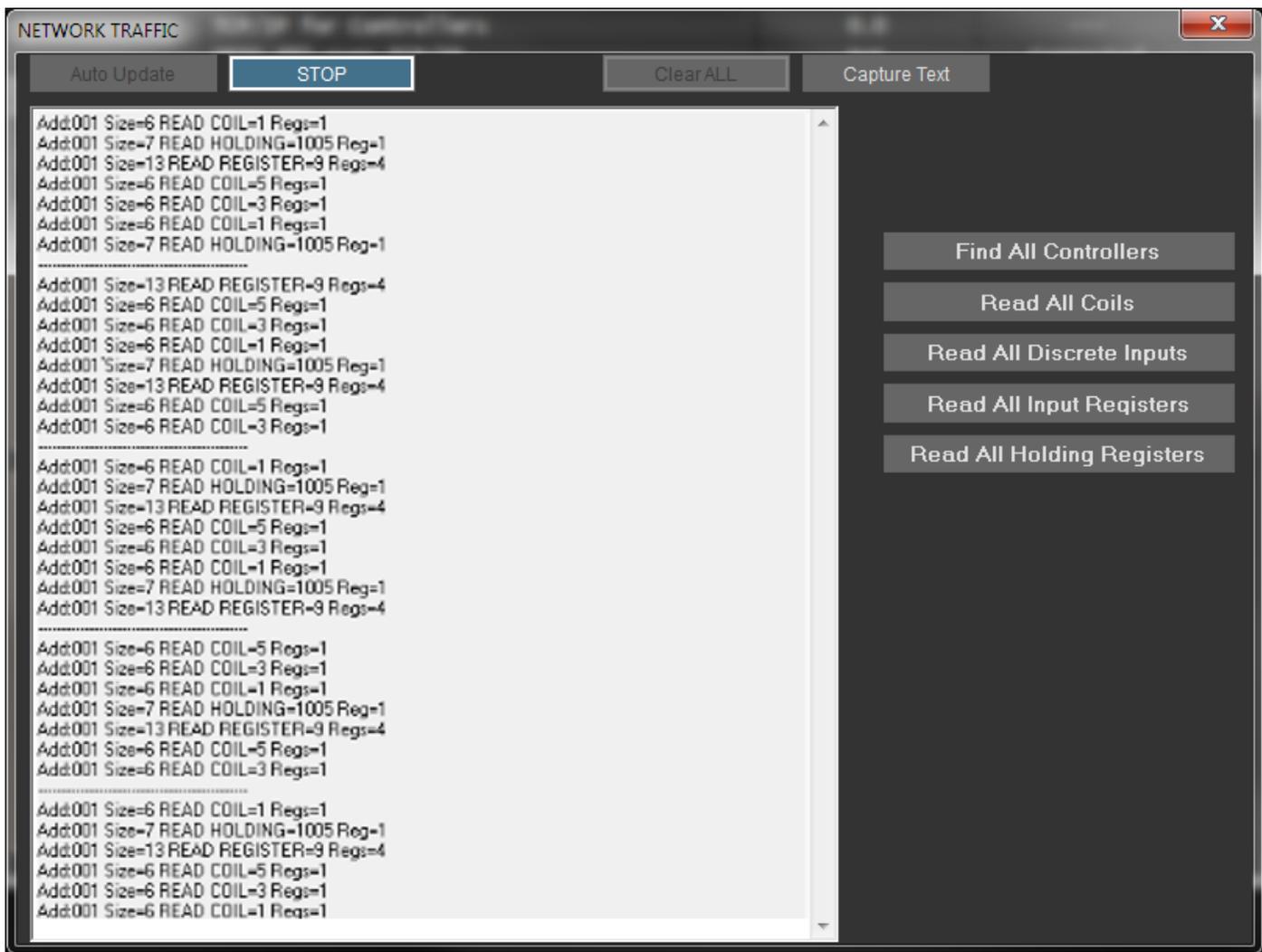
There is a 'Find All Controllers' button that will go out and send a 'REPORT\_SLAVE\_ID' message to all serial addresses from 1 to 250. The response will show up in the Traffic window.

Also there are buttons to 'Read All Coils', 'Read All Discrete Inputs', 'Read All Input Registers', 'Read All Holding Registers'. When you press these buttons first it will ask you for the Modbus controller address that you want to read from. Then it will read the first 1000 points for the section that you picked.

If you press the button again it will read the next 1000 points. And so on. The response will be displayed in the Traffic window.

There is also a STOP button that you can press at any time to cancel one of the aforementioned scans.

There is also a 'Capture Text' button. When you press this button it will save everything that is displayed in the Traffic window to a text file. The text file will be "C:\CBAS\Data\Capturexxx.txt. Where xxx is the next unused number from 0 to 255.



READ HOLDING=40259 Regs=40

This line in the capture tells you that CBAS is reading registers 40259 thru 40299, all in one message. That means that you have points programmed on all of the addresses in between. When CBAS is polling, it checks for continuous addresses and will read all those registers in 1 message. This improves the scan rate.

## Explanation Button

In the Modbus address program screen, there is also a new "Explanation" button. This will open a box that gives a brief description of the Modbus protocol as implemented in CBAS.

# Attributes

Attributes are a way of grouping multiple points or point types together to be commanded at once by a single logic command.

For example, if you wanted to reset all set points in your building at night to help conserve energy, you would have to write logic for every point to do so at the predetermined time for each day/ schedule. This can be very time consuming just on the initial setup and if that set point needs to be adjusted, you would have to go through all of the points individually again. Instead, we can assign an attribute to all the set points and create 1 logic statement to automate the process in a comparatively short time. Furthermore, any changes can be made by adjusting the one software point instead of each individual set point.

## Assigning Attributes

- With your database open in Editor mode, click 'System' and select 'Program Attributes' (In the window that opens, you will see 5 sections each with a title bar and a lined section underneath.)
- Click on the title bar of the first attribute group and enter a descriptive title. Let's say this attribute will be used to command groups of points on and off. We will name this first group "On/Off"
- Next, click on the first line of the lined section in the On/Off group. Type 'AHU' in the first line and then move to the second line and type 'Lighting'
- Now we can assign the attribute to the appropriate points by selecting 'Assign Attributes to Points' in the bottom right corner. The following window will show you the attribute groups you have programmed.
- Click the box under our new group and a drop down will appear with AHU and Lighting as options. Selecting one and right clicking will bring you to a point list where you can start to select the points you wish to assign the attribute group to.
- Once all points are selected (highlighted green) right click again and the attribute will be assigned.

## Commanding Attributes

With the attribute groups assigned points, we now have to add logic which will command the attribute group.

- Select a point to add logic to (most cases, this is a software point with a unique name such as 'AHU Command' and will be of the point type 'Binary Output (Event Sequence)')
- Select 'Program Logic Sequence' to start programming logic. After you click the first line to insert logic, you will notice in the options 'Attribute Command'. Choosing this will bring up the attribute options.
- Since our example is for On/ Off or Start/ Stop, we will then select Binary in the 'Attribute Command to Value section' and then Low to command the point off (low is off/ stop and high is on/ start)
- In the Attributes section, you should see the main attribute group and clicking on the box under it will give you a drop down with the sub-groups where you will select the group you want to command.

After our logic is programmed, you will notice in the main logic screen that there are several blank lines with dashes. These are placeholders for other attribute types and will have no effect on the logic.

## Adding SNMP Functions to CBAS

Simple Network Management Protocol or SNMP is a network-based protocol that allows communication with and control of various network devices.

Battery backups, switches, and servers are likely candidates to support SNMP. CBAS has the capability to talk to SNMP devices and provide you valuable information about your system and device. This feature will require a CBAS and license upgrade if you are using CBAS 8.X.XX or lower.

The basic steps are as follows:

- Get the IP address of the device
- Get a copy of your products MIB file from the manufacturer
- Make sure you have software to read an MIB file (we recommend ServersCheck MIB Browser)
- Create an SNMP channel in CBAS
- Create an SNMP controller in CBAS
- Add points and configure them

In this example, we will be using a standard UPS device with an add-on Ethernet card.

Once installed and your network connected to the UPS, you will need the IP address of the device. In our case, software was provided to locate the UPS on the network and manually assign an IP. Next, you will need a copy of the MIB file for the device. The MIB was provided on the software disk for

our device as well as being available as a free download from the manufacturer's site. (Most MIB's will be free downloads from the manufacturer) Next, install and start the MIB browser software and open your MIB file. This will list all of the functions that can be passed between the devices using the SNMP protocol.

**Note:** *CBAS only supports the GET command at this time meaning CBAS only monitors or receives data. We do not currently support TRAPS or WRITING of the SNMP protocol.*

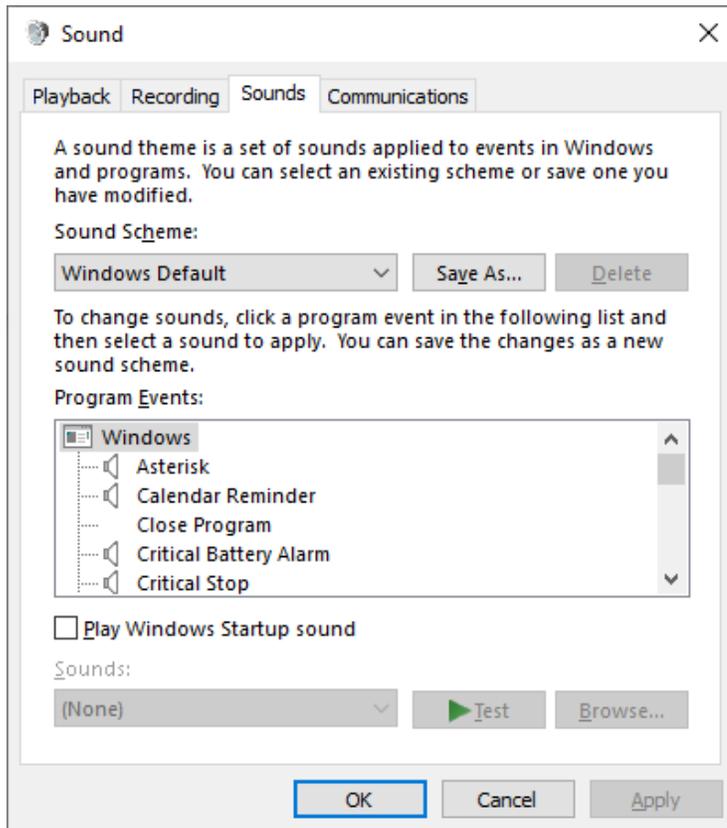
Once you have located the point you would like to monitor, you will need to make note of the OID number from the MIB browser.

In editor mode of CBAS, go to Hardware View and Add A Channel – Name your channel and configure as SNMP. Next, select the newly created SNMP channel and select Controllers and Add an SNMP Controller – name your controller and Configure as SNMP and lastly, enter the IP address obtained at the beginning.

**Note:** *If you do not know the IP address at the time of programming, you can add it later by going to the SNMP controller in the hardware view, select Program and enter the address.*

Now we are ready to add points to our controller. Select your SNMP device through the Hardware menu and click on Points – Add A SNMP Point and name your point and select the point type and add. Now select the point to bring up the Point Program Screen and click the SNMP box in the lower left-hand corner. This will bring up an SNMP Description box and click Edit Address box in the lower right corner. The Community in most cases will be Public unless you have manually configured the device you are trying to talk to. The OID number should match the point you selected through the MIB browser and adjust the update interval accordingly. Now you are ready to exit CBAS Editor Mode and enter into CBAS Real Mode to check your additions.

## CBAS Alarms Play Through Sound Card



Normally, CBAS Alarms play through the built-in speaker inside the computer case. This can be hard to hear in a mechanical room where a lot of noisy equipment is running. As of CBAS Version 2.0.1 and later, CBAS Alarms automatically play through any installed sound card. Also, Computrols computers now come with a built-in sound card and a pair of powered speakers.

When an alarm sounds, it plays the Windows “Critical Stop” sound. In order to make this sound more noticeable, we have changed the wave file to a more irritating sound that is hard to ignore. To change this sound to a wav file of your choice, go to Windows Control Panel, Sounds and Multimedia.

Highlight “Critical Stop” and click on the down arrow next to the Name field. You will see a list of wav files in the C:\WINNT\Media folder, which is the default folder for Windows sounds. You can choose a sound from there or click the Browse button and select one from another location. To test the sound, click the right arrow between the name field and the Browse button.

# Windows

## Setting Up Windows to Log On Automatically

Windows 7 and Windows 10

Here's How:

Click on Start and then enter the following command in the search box:

```
netplwiz
```

Press the ENTER key.

This command will load the Advanced User Accounts Control Panel applet.

In the Users tab, uncheck the box next to Users must enter a user name and password to use this computer.

Click on the Apply button at the bottom of the User Accounts window.

When the Automatically Log On dialog box appears, enter the user name you wish to automatically login to Windows 7\10 with. Then enter your account password in the two fields where it's asked.

Click the OK button.

Click OK on the User Accounts window to complete the process.

## Creating Shortcuts and Setting Up CBAS to Start with Windows

In case of an unexpected computer shutdown, you will want to have CBAS start automatically when Windows boots. You might also want to have a CBAS icon on your desktop, or an icon for each mode. All Computrols Automation Servers are setup with shortcuts and auto startup when shipped. In case you need to do this on your own, what follows are the instructions to do so.

### Shortcuts

To add a shortcut to the desktop, open Windows Explorer by right clicking on My Computer and selecting "Explore."

Navigate to the C:\ CBAS folder and find the CBAS 15.exe file.

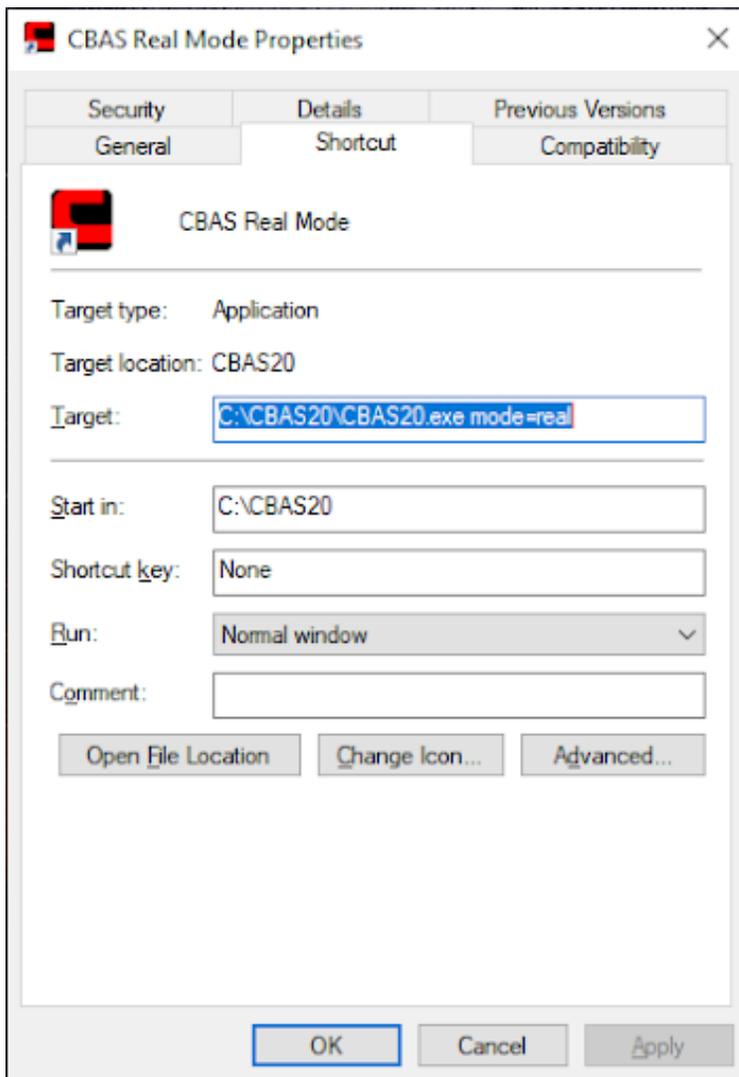
Right click on CBAS 19.exe and go to Send To, then click Desktop (Create Shortcut).

Now minimize Windows Explorer and there should be a Shortcut to CBAS 15.exe icon.

To change the name of the shortcut, highlight it by clicking on it.

Click one more time and start typing.

Press Enter when finished.



## Mode Shortcuts

You might want to have a shortcut to each of the different modes, like Real, Editor, GW, etc. Start with the icon you just created.

- Right click on the icon and click Create Shortcut.
- Right click the new icon and click Properties.
- Go to the Shortcut tab.
- In the Target field, click after CBAS.exe or CBAS 19.exe
- to insert the cursor.
- Hit the spacebar once then type Mode=Real, as in the window at right.
- Click OK.
- Rename the Icon. Repeat for each mode icon wanted.

## Starting CBAS Automatically when Windows Boots

### Windows 7

- Click the Start button then All Programs
- Scroll down to Startup folder and right-click it
- Click Explore and Windows Explorer will open to the Startup folder
- Paste the CBAS shortcut (copy from the desktop) into the folder and close Explorer
- Test by restarting the computer
- The actual path to the folder is C:\Users\[choose user that is logged on]\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup

## Windows 8

To add a program to the startup:

- Windows Explorer
- C:\Users and select the user that you are logging in as.
- Make sure view is set to show Hidden Files (check the box)
- AppData
- Roaming
- Microsoft
- Windows
- Start Menu
- Programs
- Startup
- Paste shortcut to CBAS or another program

## Windows 10 startup folder location.

Your personal startup folder should be;

C:\Users\\AppData\Roaming\Microsoft\Windows\StartMenu\Programs\Startup. The All Users startup folder should be C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Startup.

These programs start up for the current logged in user only. To directly access this folder, open Run, type shell:startup and hit Enter. Or to quickly open the folder, press Windows Key, type shell:startup and hit Enter.

## Windows Server 2012

C:\ProgramData\Microsoft\Windows\Start Menu\Programs\StartUp

Show Hidden Files or you will not see Program Data folder. This is done in Control Panel, Folder Options on the second Tab: Show Hidden Files.

## Windows Server 2016

Same as 2012 above.

### Older Windows Versions

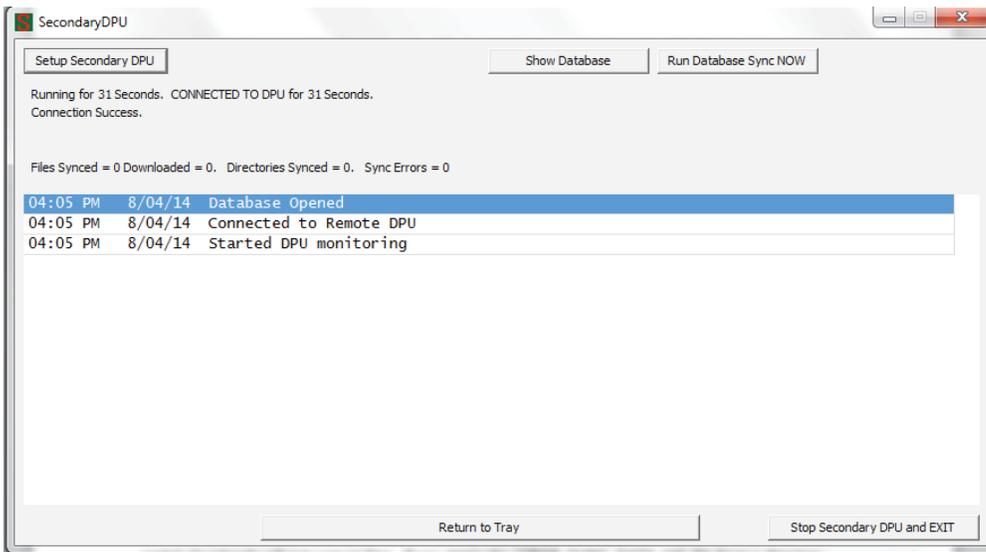
- Right click on the Windows Taskbar (at the bottom of the Desktop)
- Click Properties
- Go to the Advanced tab.
- Click Add, then the Browse button.
- Scroll down to see the list of shortcut icons on the desktop.
- Choose a CBAS shortcut icon and click OK.
- Select Startup under Start Menu/ Programs and click Next.
- Click Finish
- Reboot to confirm that CBAS starts after Windows boots.

Unless you selected a mode icon, CBAS will automatically start in the last mode it was in before shutting down. Other modes include: editor and simulator.

## Secondary DPU

There is a new Secondary DPU (SDPU) program included with CBAS, which also has a sync program for keeping files up to date (ex. Graphics, backups, or access control pictures). The SDPU is now a Dialog based program that is separate from CBAS and can start CBAS if it has stopped on the DPU (server).

Point statuses are updated every minute that SDPU is connected, so there is a very slim chance that something commanded ON will be OFF when SDPU takes over. The program runs as a Tray Application, so it will go directly to the Windows Systray as soon as you start the program. SDPU only works with CBAS version 14 compiled on April 23, 2014, or later.



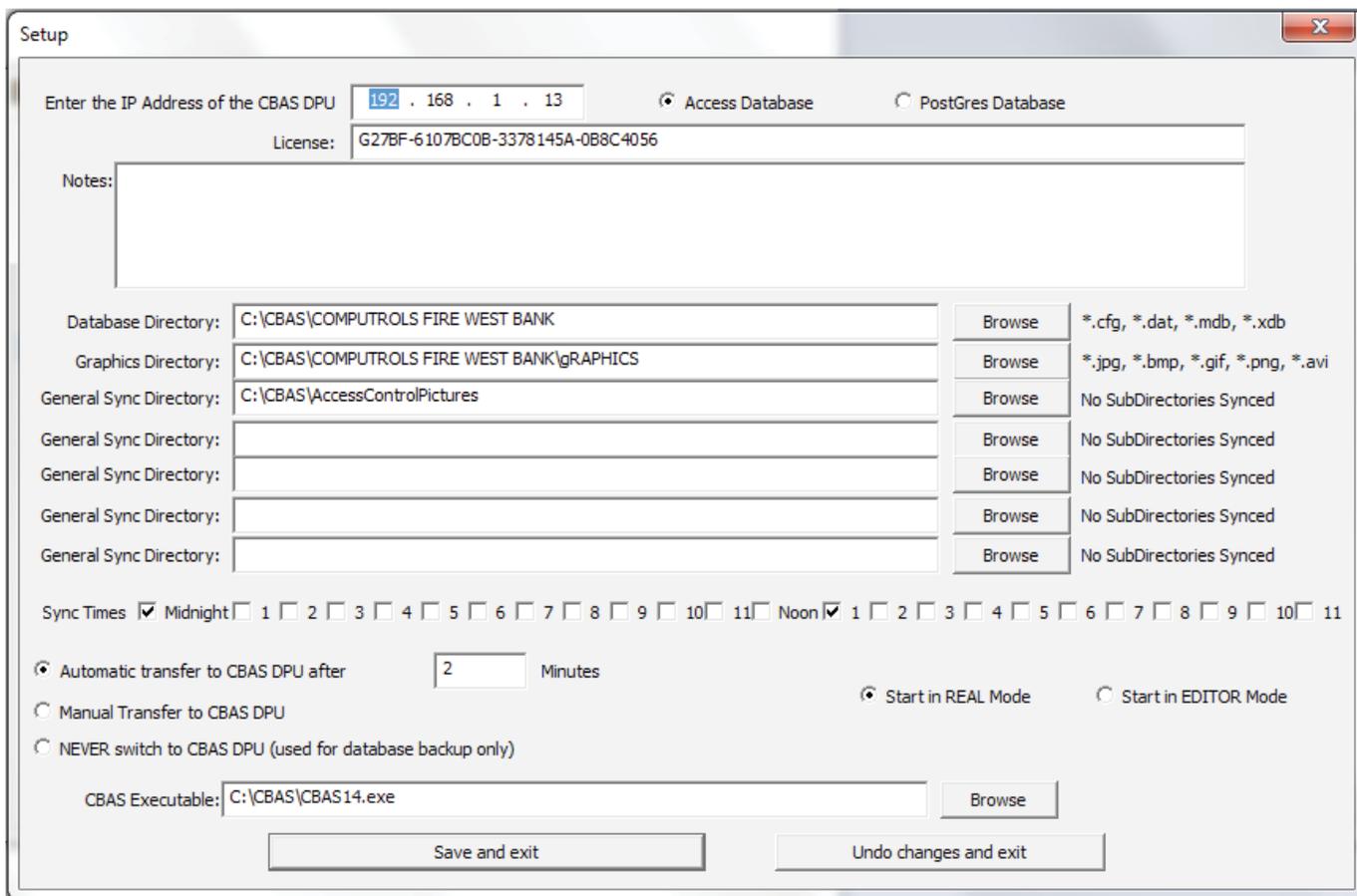
The icon for SDPU is green with a big red 'S'. To start the program, find it in the C:\CBAS folder and double-click. In Windows 7, on the right side of the taskbar, you will see an arrow pointing up. Click the arrow and then double-click the icon.

If the program has previously been setup, you will see the status of the connection. If a database sync is needed, it will happen almost immediately and not wait for the prescribed sync time. Or, you can click the "Run Database Sync NOW" button if you have made changes to a sync directory and don't want to wait.

If you would like to compare the statuses of the points in the SDPU to those on the DPU, click "Show Database" and scroll through the list of points.

If you are finished configuring, you can click "Return to Tray" or "Stop Secondary DPU and EXIT".

To setup a new SDPU, click the "Setup Secondary DPU" button in the top right.



The first bit of information that needs to be entered is the IP address of the CBAS DPU or Server. Usually, that is 192.168.1.2 and should be listed on the Program screen of the TCP/IP Channel in CBAS. If you don't know your IP address, you can open a Command Prompt and type ipconfig, then ENTER. You can also check network settings in Windows.

Do not change the selection of Access Database unless you are running a Postgres SQL version of CBAS, which is extremely rare.

SDPU will connect to CBAS through a StringServer connection. So CBAS-Web will appear to be

Online in CBAS Workstation Channel when SDPU is connected. In the License field in SDPU Setup, you must enter a CBAS-Web license for it to connect. To obtain a license, go to CBAS, System menu, CBAS Version. Email the Machine ID to Techsupport@computrols.com and request an SDPU license. One will be emailed back to you, so you can paste it in the field.

If you do not have a StringServer added to the Workstation Channel on the DPU, then add at least one. CBAS-Web will also need one, so you might as well add several. Name them CBASALL.

If you would like to keep any notes about the current setup, type them in the Notes section.

## Sync Directories

When configuring SDPU, you must pick the directories that you want to sync with the remote computer. The Database Directory is hardcoded to sync 2 levels deep and only sync files that end with \*.cfg, \*.dat, \*.mdb and \*.xdb. The Graphics Directory is hardcoded to sync up to 5 levels deep and only files that end with: jpg, bmp, gif, png and avi. You can select up to 5 other directories to sync. These directories will sync ONLY the directory selected (no subdirectories) and will ONLY sync files that have 3 character extensions.

In the sync directories on the SDPU you will notice a file named "CBAS\_SYNC\_DATA.dat". This file is used to tell if the local and remote files are different. This file stores the filename, size of the file and the last write time of the file on the DPU computer. If file size or last write time changes then the file is downloaded to the SDPU computer. When files are downloaded they are first saved to a temporary file and once the download is complete that temporary copy of the file is copied over the real file. This way partial downloads will not corrupt files. If you delete the "CBAS\_SYNC\_DATA.dat" file from a directory then ALL files will be downloaded in that directory the next time the sync is done.

Next, select the times that you want to do the sync. This is limited to once per hour on the hour. It is advised to do the sync at a time that is not being used for Automatic Backups or History Purges.

There are 3 connection options in SDPU:

- The first choice is to start CBAS after xx minutes of no connection to the Primary DPU. To the right, you can choose the timeout in Minutes.
- The second option is never to automatically switch to Primary DPU but instead make the user press the button in SDPU which will then start CBAS. In this case, you should leave the SDPU maximized so that you can always tell when the connection is lost.
- And the third option is to NEVER start the Primary DPU. The third option would be used to keep a backup on another computer.

To the far right of the transfer options, you have a choice of starting in Real Mode or Editor Mode. If you chose transfer option 1, you will probably want to start in Real Mode.

In SDPU setup you must select the program that you want to run when connection is lost. That will usually be "C:\CBAS\CBAS14.exe". When SDPU starts the program it will append "mode=real" or "mode=editor" on the end. This will force CBAS to open in the correct mode. But it will not force CBAS to the correct database directory. You must have opened CBAS at least once so that if SDPU starts it, it will start with the correct database. Once you have completed your settings, click "Save and Exit".

If the Secondary starts up and then the Primary restarts, there was a problem where it was not seeing that the secondary was already running and therefore it would also start in Real mode. That problem only occurs if there is more than 1 IP address on the Secondary computer. The GW channel has an IP address that it listens on. But the IP address on the Primary and Secondary are different. So the fix was to now allow users to enter 2 IP addresses on a GW channel. So the program screen for a GW channel now has spaces for 2 IP addresses. When doing Primary / Secondary setup, enter the IP address of both computers. This feature appears in CBAS 14

compiled on 7/31/14 or later.

SDPU keeps a log file just like CBAS. The difference is that the file name will start with es instead of er.

Test SDPU by closing CBAS on the DPU computer.

## **Secondary DPU with CBAS 15/17/19**

The only screen that changed was the PostGres Setup screen.

### ***New steps required:***

You MUST first do a CBAS 15/17/19 database restore on the Secondary CPU computer. This will load the database into the local MySQL database. Click the Database Setup button at the top of the screen. Then when you click the top 'Test Connection' button it will load the names of all databases in the 'Database Name' combo box. From there you select your database.

## **Group Commander**

Group Commander is a feature that runs from the CBAS Software on the Server. It allows you to command a group of Binary Output points ON, OFF, or AUTO. There is also a Group Commander Status point that will tell you how many points have not been commended to the desired state. The Group Commander point can be commanded by the operator (OPER), by Logic or by Schedule.

Each Group Command is limited to 2000 points.

A Group Command can ONLY have Binary Output points as its members.

The Group Status point MUST be an Analog Input Software point, programmed in the DPU (not in a controller). Group status is the number of points NOT in the correct state. Points in the wrong state with a higher priority than the Group are NOT counted as being in the wrong state.

All Group Commanders combined should command no more than 10,000 points.

Commands are issued every 15 seconds at the 1, 16, 31 and 46 second mark. Points not in the correct state will be commanded again every 15 seconds.

The Group Status points are updated every 15 seconds at the 59, 14, 29 and 44 second mark. So after commands are issued the status has 13 seconds to change before it will be considered in the wrong state.

The states of the Group Command point are NONE, OFF and ON. When a group command is put in the NONE state, an AUTO will be sent out to all of its points ONLY ONCE.

If multiple groups are commanding the same point ON and OFF, the ON will win and the point will stay ON, assuming that the priority of the commands are the same.

To add a Group Command point you must add it using the Add A Point wizard. The point is added to the DPU, not in a controller. Follow these steps: From the Main Menu, Database, Add A Point. Name the point. Then Supervised, Then Software. The 7th item from bottom is Group Commander:

Select it. Pick the DPU for destination controller (Identified by the name of the database), click Finish.

To add a Group Status point you must also use the Add A Point wizard. The point is also added to the DPU, not in a controller. Follow these steps: Database, Add A Point, Name the point, Analog, Software, Analog Input (Calculation), Pick the DPU for destination controller (Identified by the name of the database), click Finish. In the program screen you will need to change the upper range from 120.0 to 2000. Then remove the units of 'DEG F'.

In the Program screen of the Group Commander point there is a button right next to Logic named 'Program Group Command'. Click it and you can select the group members, the status point and the priority of the Group command.

The 'Delete' and 'Disable' buttons under the Group Command Button work.

In the Alarm screen of the Group Command point, you can check the box for "Change Point Color Only" then select a color in the box to the right. Then, when the point is on, the point will change to that color.

This feature only works on points that are in the DPU, not on a controller.

It should be mentioned that the entire Group Commander configuration is stored in either the General Purpose SMALL or General Purpose LARGE XDatabase tables.

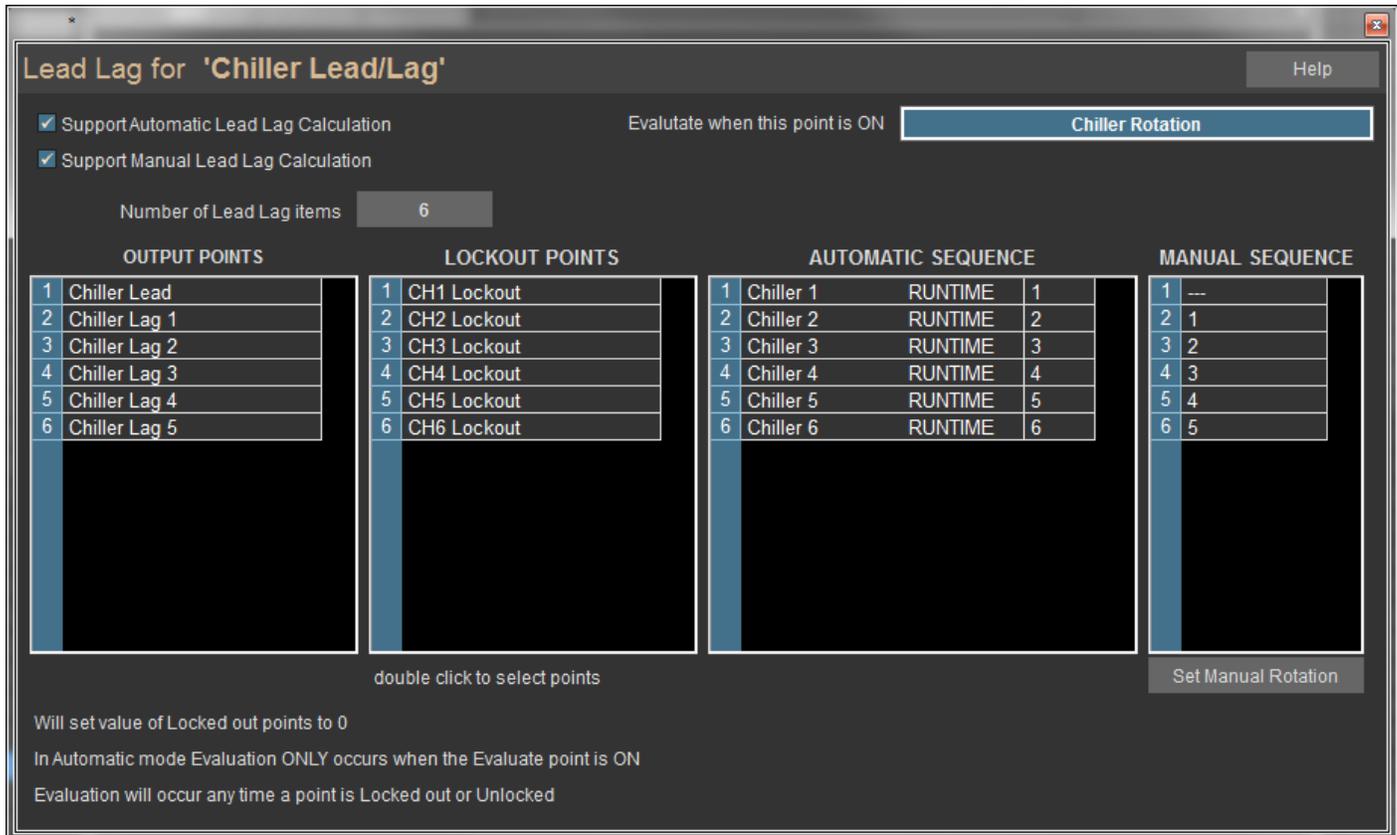
Each General Purpose LARGE record table can hold 125 points. So, if you have a Group Commander with 2000 points it will consume 16 General Purpose Large entries and 1 General Purpose Small entry.

In an existing database, you might be required to scale the database to add more General Purpose Tables.

# Lead-Lag Resource

Lead-Lag is a DPU ONLY feature in CBAS 15. In other words, it doesn't download to the controller level, so it runs out of the DPU. Unlike the CBAS Sequencer, the Lead Lag feature does not command actual Binary Outputs. You still have to write logic to command the outputs based on the recommendations of the Lead Lag feature.

Program a new Binary Software point of type 'Lead Lag'. This point can ONLY be programmed using Database, Add A Point. After giving it a name, choose Binary, Software, then Lead Lag. This point will have units AUTO and MANUAL. Instead of a Logic button in the program screen it will have a Program Lead Lag Sequence button. The Lead Lag Resource will automatically adjust the units on this point if you select Automatic Only or Manual Only. Commanding this point will change the mode of the Lead Lag to Automatic or Manual mode.



Before creating a Lead Lag resource, you will need to first create the output points for the Lead Lag (later this can be done automatically). The output points for the Lead Lag must be Software Analog Inputs. Change the range on these points to remove the decimal place. You must have 1 output point for each item in the Lead Lag. (i.e. 5 chillers will require 5 output points). Output points can be named Lead, Lag1, Lag2, Lag3 and Lag4.

POINT NAME	VALUE	PRIORITY	CONDITION
Chiller Lead/Lag	LOGIC		
Chiller 1	STOP		
Chiller 1	RUNTIME	0 HOURS	
Chiller 2	STOP		
Chiller 2	RUNTIME	0 HOURS	
Chiller 3	STOP		
Chiller 3	RUNTIME	0 HOURS	
Chiller 4	STOP		
Chiller 4	RUNTIME	0 HOURS	
Chiller 5	STOP		
Chiller 5	RUNTIME	0 HOURS	
Chiller 6	STOP		
Chiller 6	RUNTIME	0 HOURS	
Chiller Rotation	OFF		
CHW Supply Temp	44.0 DEG F		
CHW Return Temp	52.0 DEG F		
Chiller Lead	1		
Chiller Lag 1	2		
Chiller Lag 2	3		
Chiller Lag 3	4		
Chiller Lag 4	5		
Chiller Lag 5	6		

The Lead Lag has 2 modes: Automatic and Manual. In Manual mode the output points are commanded to predetermined values setup by a user. In Automatic mode the output points are commanded by the order of the values of the input points. Smallest to Largest. So if you use Runtime points to switch, then the item with the smallest Runtime will be placed first.

In Automatic mode you select another point so the Lead Lag knows when to reevaluate. When the selected point is OFF the output order will not be changed. When the point is ON the output order will change according to the values of the Input points (Runtime). So you would probably want to put a schedule or logic on this point so that the sequence will change weekly or monthly, etc.

There are also Lockout/Failure points. These points are used in both Automatic and Manual mode. If an item is commanded to Lockout/Failure it will be removed from the list. Commanding an item to Lockout/Failure will cause the list to be rearranged immediately. Likewise putting something back into service will also cause the output list to be rearranged immediately.

The output of the Lead Lag Resource commands the output points to integer values between 1 and the number of items selected. For example: if in Automatic mode and Chiller 3 has the lowest runtime then the first output point (Lead) will be commanded to 3. You then have to write logic and know what the number 3 means.

The Lead Lag resource evaluates every 5 seconds and can hold up to 30 items.

There are 3 new user privileges in Program Passwords:

- EDIT LEAD LAG
- EDIT MANUAL LEAD LAG
- VIEW LEAD LAG

If a user does not have EDIT LEAD LAG but does have EDIT MANUAL LEAD LAG, then that user will ONLY be able

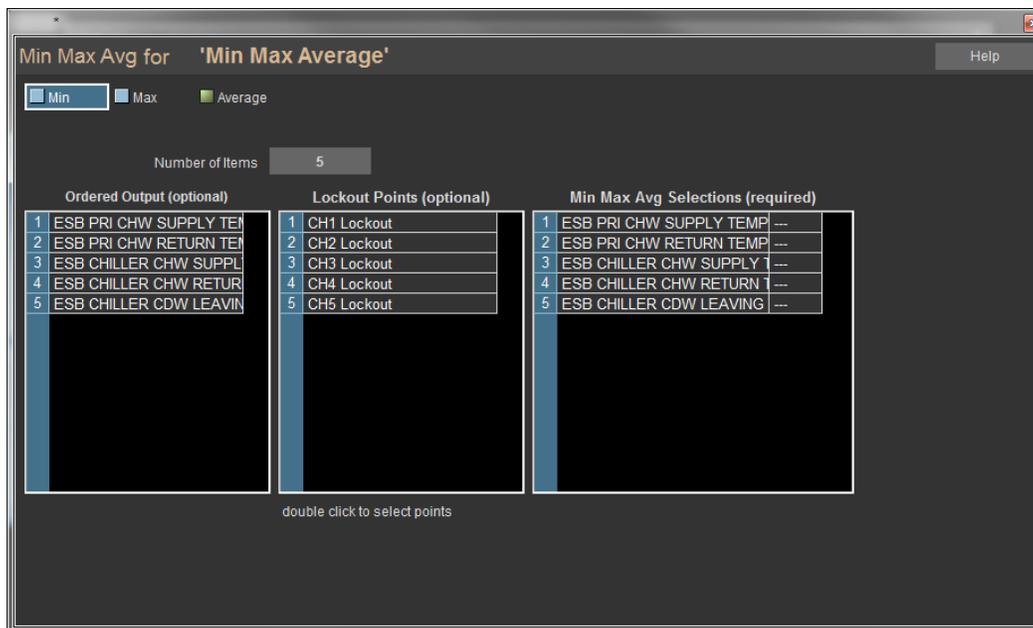
to change the Manual mode order in the Lead Lag Resource.

The included screen shot is an example: There are 5 chillers setup in the Lead Lag Resource. The Lead Lag is in AUTO mode and Chiller4 has the lowest Runtime so it is listed as Lead Chiller. Followed by Lags of 5,1,3 and 2 (ordered by runtime). If you were to command the Lead Lag to MANUAL mode, the Lead chiller would become 2 followed by Lags of 4,1,3 and 5. If you were to command a Lockout point ON, then that numbered item would be removed from the list. Everything would move up and the last item, Lag4, would be assigned a value of 0.

## Min-Max-Average Feature

There is a new feature in the DPU named 'Min Max Avg'. It can be an Analog, Float or Counter point type. . This point can ONLY be programmed using Database, Add A Point. After giving it a name, choose Binary, Software, then Min Max Average. Depending on which selection you make, the output of this point will display either a Minimum, Maximum or Average of the points selected.

In the program screen for these points you will see a Min Max Avg button instead of Lead Lag button. If you click it you will see the Lead Lag screen with a few minor changes.



Choose whether you want to make the point a Min, Max or Average. If you want all 3, add 3 of these points and make a different selection on each.

Count the number of points involved in the calculation and enter that number in the Number of Items field. This is important because it is the divisor in the average calculation and if you don't add the right number of points, the changes will not be saved when exiting.

Click the first line in the list to the right and select your first point from the All Points list. Repeat until you have all of the lines filled.

Now select a Lockout Point for each temperature point. This is optional, but you might want to lock out a point because of unoccupied status or the AHU status is off.

Ordered Output Points are points that get commanded to the order of the points. So, if you select MIN than the point that is the smallest will have an Ordered Output of 1. The next largest point will have an Ordered Output of 2.

If you haven't selected the full number of points, you won't be able to save the settings. So, if you have empty lines in the Min Max Avg Selections table, adjust the number of items to match what you have.

Right-click or ESC to save. The point will begin displaying the calculated temperature.

## Web Weather and Future Weather Point

Outside Air Temp and Humidity sensors can be unreliable. Sometimes they are affected by the sun during portions of the day. Sometimes they are inaccurate and other times they just fail. Did you know that there is a Web Weather service in CBAS that give you outside weather information? This first section covers how to setup the current weather points and the second section covers future weather points. If you already have current weather and you want to explore future weather, skip to Future Weather Points.

### Current Weather

CBAS Web Weather points work in CBAS 15 as of September 2015. The service continues in CBAS 17 and CBAS 19.

The weather data passed on to CBAS is the NOAA current observation and it comes from the airfield weather station closest to the zip code of the jobsite. NOAA updates their weather hourly and CBAS is updated every 15 minutes.

Computrols server is located at [weather.computrols.com](http://weather.computrols.com). CBAS polls using TCP/IP port 80. There are 4 system points in CBAS that give you Temperature, Humidity, Dew Point and another point that verifies that the service is working.

The CBASSupportService must be running for the web weather points to work. To verify that the service is running, do a CTRL+Alt+Delete and open Task Manager. Go to the Services tab and click the top of the Name column to put them in alphabetical order. Then look for Computrols Support Service. It will say it's either Running or Stopped. You can right-click that line to start or stop it. If it is stopped, you can verify that it is setup to run automatically by clicking Services in the bottom right of Task Manager. Right-click the service and go to Properties to change the way it starts. When CBAS 15 was installed, it should have been configured to Start Automatically (Delayed Start).

There is one more thing to set your zip code. Go to the CBAS 15/CBAS 17/CBAS 19/CBAS 20 folder and there is an application called CBASsupportWin32.exe. Double click it and set your zip code. You can also verify that you can get weather data by clicking the "Get" button. Close the program (settings will save to a config file) and you have to restart the support service so that it picks up the changes in the config file. Restarting the Service is described in the previous paragraph.

The service and the exe can be running at the same time but close the CBASsupportWin32.exe when you are finished.

You can add the points in Real Mode, but CBAS will have to be restarted after adding. If you have the old weather points, delete them. To add the points to CBAS 20:

Go to Database, Add A Point, then give the first point a name like Web Weather Outside Temperature. Click Next and choose Float, Next, Software, Next, System, Next, then Web Outside Air Temp. Click Next then choose the database name from the top of the list. This is because the points can only be added to the DPU. Click Finish and repeat this for the other 2 points: Web Outside Humidity and Web Outside Dewpoint.

There is one more point that verifies that there is a good connection to the Weather Server. You should add this point and put an alarm to be acknowledged if the point is Not Valid.

Go to Database, Add A Point, then give the point a name like Web Weather Is Valid. Click Next and choose Binary, Next, Software, Next, System, Next, then Web Outside Is Valid. Click Next then choose the database name from the top of the list. This is because the points can only be added to the DPU. Click Finish. If you added the points in Real Mode, you must restart CBAS. Within 15 minutes, you should see values for the weather points.

Weather is also available in CBASweb as a Dashboard Widget.

The weather widget uses NOAA for the current observation, just as above, below, the weekly forecast with a modern style uses the Forecast.io webserver (they use data from NOAA and other sources).

The forecast widget uses NOAA Forecast database, based on a latitude/longitude inferred from the zip code.

## Future Weather Points

Future Weather points have been added to CBAS version 19 as of September 26th of 2018. The feature also requires a new CBAS Support Service from September 20th 2018. The old service must be removed and the new one installed.

There are points for Today and Tomorrow's High and Low Temps and there are up to 12 points that give the future temperature in 3-hour increments. Also, the same thing for future humidity points.

The Future weather points in CBAS can only be added by using the 'Add A Point' wizard and not hardware view.

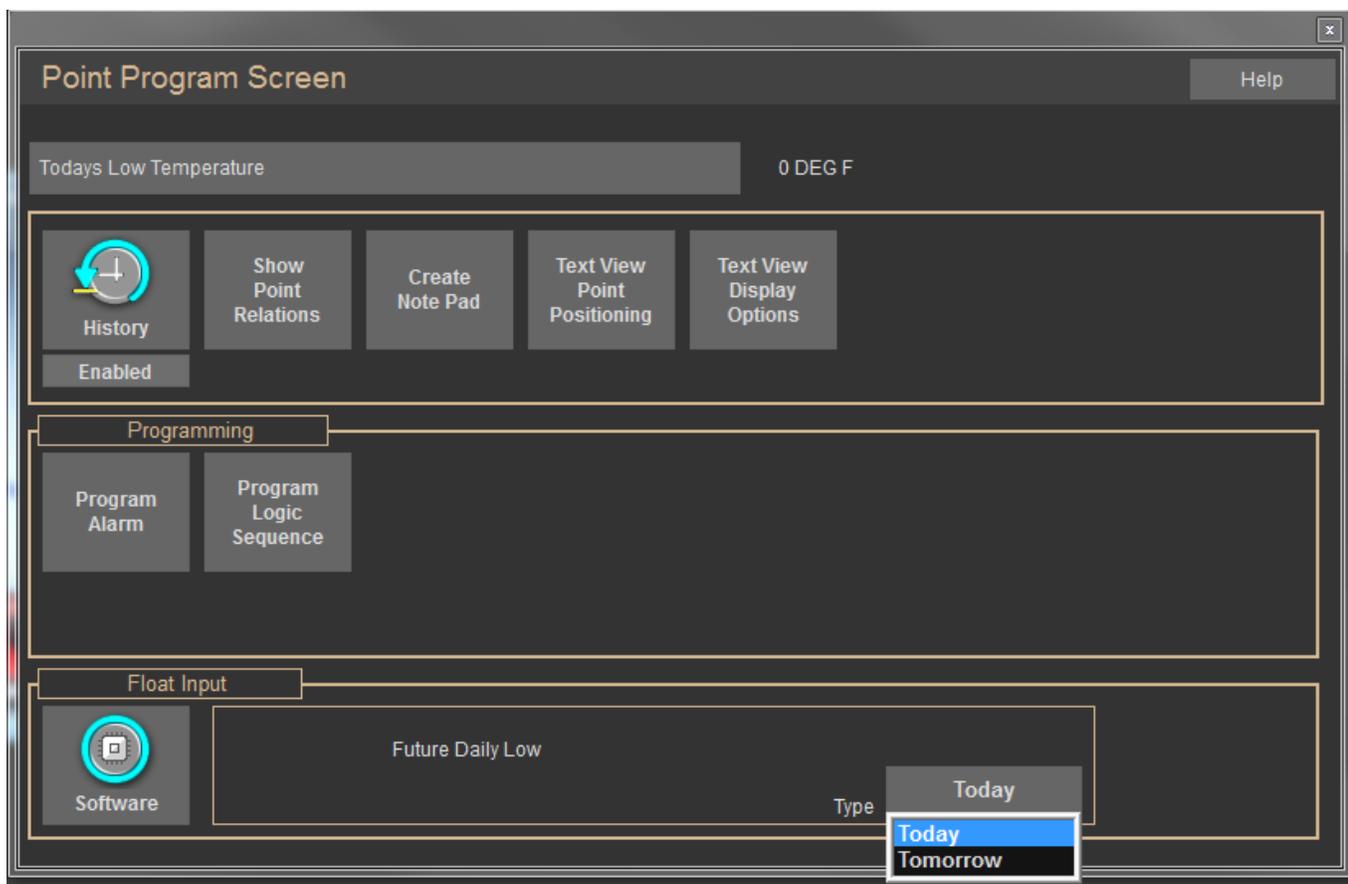
- In CBAS, go to the Main Menu and click Database, then Add A Point.

- Give the point a name. Let's use "Today's Low Temp" for this first point. (apostrophes are not allowed in point names).
- Click Next then choose Float.
- Click Next then choose Software.
- Click Next then scroll to the bottom of the list and choose Outside Daily Low Temp.
- Click Next then Finish (These points will be added to the DPU, not a controller).

When the point is added, the Program screen will pop up. Here you can choose Tomorrow on the next point but leave this one as Today.

The points added in this way will show up in the first screen of Hardware View in the lower section labeled "Software Points in the DPU" but can also be placed anywhere in Text View using Text View Point Positioning on the Program screen or Position Points on the Database Menu. Until you move the points, they will show up at the end of the list in Text View, All Points.

You can now add Tomorrows Low Temp by adding the same point and changing it to Tomorrow on the Program screen.



Now add Todays High Temp and Tomorrows High Temp the same way.

Now add Future Temps in 3-hour increments by choosing Outside Future Temp. Do the same procedure and choose how far in the future you want the temps using the drop down on the Program screen. Add the number of hours in the future to the name of the point.



The same can be done for Future Humidity.

You can add up to 12 of the Temp and Humidity points at different hours in the future and you can always go back and change the settings and the point name on the Program screen. Just click the point.

In order for new weather points to work you have to totally close CBAS and reopen, not just close the database and reopen.

## CBAS Services

We just discussed the CBAS Support Service and there are a few other features that run as a service: The SMTP Emailer Service and the CBAS Error Logger, as well as CBAS 19 can itself run as a Service when Windows starts.

The SMTP Emailer Service was discussed in the Email Alarms section previously.

The CBAS Logger Service is the feature that creates Error Logs. It previously ran as a program that showed up in the Systray and had to be setup to start with Windows by adding a shortcut to the Startup folder. Starting with CBAS 15, when you install CBAS, the service is configured to start with Windows startup. Error Logs are still kept in the CBAS 19\ErrLogs folder with subfolders Year and Month for easy searching. The average CBAS user will have a hard time interpreting the entries in a log, but you might be asked to provide log files to Technical Support when troubleshooting a software or comm issue.

### Removing old shortcuts from Startup.

You will browse to the folder and just delete the shortcuts. The path has changed over the years:

Windows 7-8 To remove a program from startup:

Windows Explorer

C:\Users and select the user that you are logging in as.

Make sure view is set to Show Hidden Files (check the box).

AppData

Roaming

Microsoft

Windows

Start Menu

Programs

Startup

Delete the shortcut to CBAS or other program.

Windows 7: you can go to Start, All Programs, then Startup folder. Right click and Explore then paste shortcut there.

Windows 10 startup folder location.

Your personal startup folder should be:

C:\Users\\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup. The All Users startup folder should be C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Startup

These programs start up for the current logged in user only. To directly access this folder, open Run, type shell:startup and hit Enter. Or to quickly open the folder, press WinKey, type shell:startup and hit Enter.

## **Windows Server 2012**

C:\ProgramData\Microsoft\Windows\Start Menu\Programs\StartUp

Show Hidden Files or you will not see Program Data folder. This is done in Control Panel, Folder Options on the second Tab: Show Hidden Files

## **Windows Server 2016**

Same as 2012 above

## **Changing Services**

If you upgrade from CBAS 17 to CBAS 19, make sure the services are running in the correct directory (folder). To do this, open Task Manager. You can either do a CTRL+ALT+DEL and click Task Manager; or click the Start button, then type Task Manager in the search field, and select Task Manager from the list.

In Task Manager, go to the Services tab and put it into Alphabetical order by clicking the top of the Name column. Scroll down to Computrols Email Service. You can Stop and Start it by right-clicking on it.

## **When upgrading**

If you have upgraded from CBAS 17 to 19, the Support, Logger or Email Service might still be running out of the CBAS 17 folder. To check that, click the Services button in the bottom right. Scroll down to the CBAS Support Service and double-click it to see the properties. Look at the Path to the Executable. If it still says CBAS 17 folder, then you have to uninstall that and install the one in CBAS 19.

Run Command Prompt as Administrator (Right Click shortcut, then click Run as Administrator). Get to the CBAS 17 directory by typing cd.. twice then cd CBAS 17. At the CBAS 17 prompt, type: CBASSupportService.exe – remove, then Enter. That removes the old one from the Services List. While you are in that directory, remove the other services:

CBASLoggerService.exe -remove

ComputrolsEmailService.exe -remove

Then type `cd..` and then `cd CBAS 19`. Then type `CBASSupportService.exe –install`, then Enter. That adds the new one back to the Services List. Do the same with the other 2 services. Then you have to open Services and set the service to auto start with delay. Also, make sure the service is running.

## **CBAS as a Service**

In today's world of Virtual Machines (VM) as opposed to a PC sitting on a desk, CBAS 19 can now be run as a Service. This negates the need to add a shortcut to the Startup folder of Windows. So, if you have to run CBAS as a Service, you will need to remove the shortcuts that were installed with CBAS. That as well as installing the Service will be covered in this section.

If you have to run CBAS without a Dongle Key, you can find instructions in the Troubleshooting Chapter, Installing Dongle Driver section.

### **Installing CBAS 19 Service.**

Put the `CBASService.exe` in the same directory as CBAS 19.

Open a Command Prompt as Administrator. (right-click shortcut and click Run as Administrator)

To remove the old Service, if there is one, enter the following at the command prompt:

To get to the CBAS 19 directory (folder) type `cd..` twice then: `cd CBAS 19`

Then, type `C:\CBAS19\CBASService.exe –remove`

If the service was not already installed you will get an error. Or if the previous version of `CBASService` was in a different directory then change the command prompt to match. If you get a new version of the Service, you need to remove then install.

Install (or Reinstall) the Service. At the `C:\CBAS19\` command prompt type `CBASService.exe –install`

Hit Enter and It should say `INSTALLED` and not give an error.

Open Services in Windows.

Look for 'Computrols CBAS Service'. Right click and select Properties.

Change Startup Type from Manual to Automatic and click Apply.

Click Start.

Now you can run regular CBAS in GW Mode pointing to IP address of the computer it's running on. This is the only way you can monitor CBAS in Real Mode. Otherwise, you have to stop the service and start CBAS in Editor Mode in order to add controllers, etc.

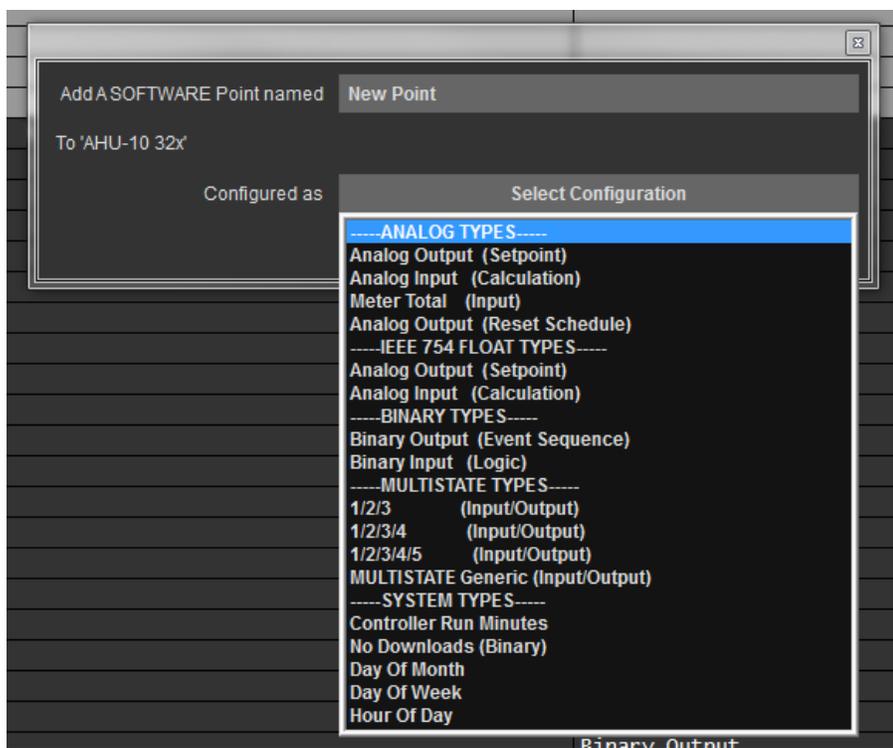
In the CBAS 19 directory there will be a file named 'CBAS 19Service.rn'. You can change the extension of the file from .rn to .txt and open it with notepad. It will tell you how long the Service has been running and the rev number of the service. The current service is Rev: 19.1.15.149. This file is a good means of verifying that the service is running correctly. CBAS Service updates the file every 5 seconds.

When connecting GWs, make sure that the Workstation channel on the DPU has the correct IP address for the DPU network card that the GWs connect on, or they will not be able to connect.

Also, copy the graphics files to the GW and put them in the same path: CBAS 19\Sites\[database name]\Graphics.

## System Points and Another way to Add Points

The easiest way to program Software Points is by going to Hardware View, finding the controller then going to Points. In Editor Mode or in Live Edit you will see a line at the bottom of the Points that says Add A Software Point. Click that to add a Point.



Note that all the standard Software Point types are there but there are only 5 System Point types. For example, Controller Run Minutes is a Point that counts up minutes as long as the controller has been running without reboot. Use this point if you believe that your Controller might be rebooting for some reason.

Did you know that there are many other Point types that can be added to Controllers and many that can only be added to the DPU (in CBAS software). Probably the most used DPU Points are the Web Weather Points that

give you weather information provided by NOAA. This was discussed in a previous section. There are also Points that are involved with the Sunrise\Sunset feature, covered in the Manual under Advanced Programming Chapter 7. More information about Points can also be found in Section 4 of the manual, and Web Weather Points in Chapter 7.

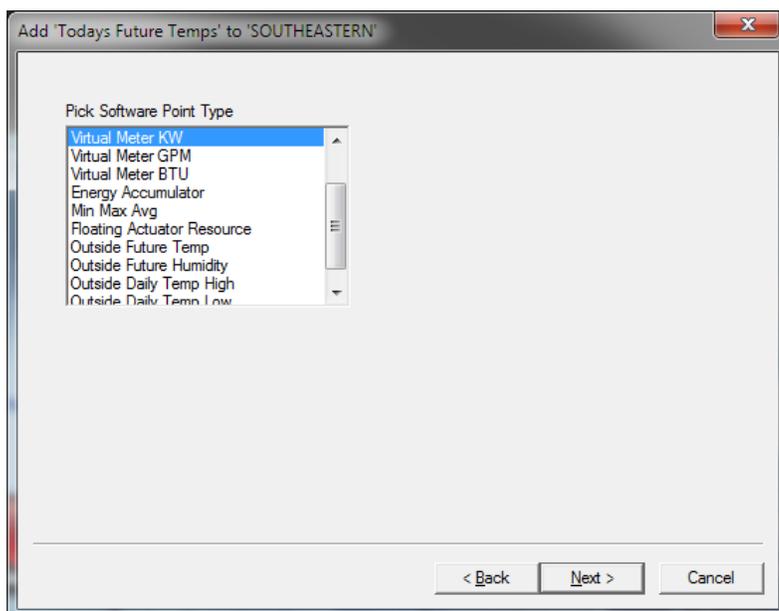
To program more Points, go to Database on the Main Menu of CBAS.

- Click Add a Point and the wizard starts.
- Give the Point a name and click Next.
- Choose a Point Type from the list, then click Next.
- Choose Software then click Next and you will see a list of Points.
- If you choose System you will see another list of points.

Once you choose a Point, click Next and you will see a list of Controller names. Choose the Controller you want the Point to reside on. For Points that can only reside on the DPU and not a Controller, choose the very first line of this list, which is the name of the database. That will put it on the "DPU". If you add a non-Controller Point to a Controller, it will still reside on the DPU.

One example of useful Points are the ones that go with Sunrise\Sunset. To add the Daytime point, name the point Daytime, then choose Binary, Software, then System and scroll down. You will see Daytime with Offset and Daytime. This tells you when to turn your outside lights off.

On that list you will also see Web Outside is Valid which tells you when you have a connection to the Weather Server. Other Weather Points can be found by choosing Analog, Software, System and you will see the 3 Current Weather Points. You will also see more Sunrise Points. There is more to the Weather and Sunrise setup so check the manual to setup these features. Under Float Point types you will find several "resource points" and all of the Future Weather Points.



# Chapter 9 » Networking

## Hardware

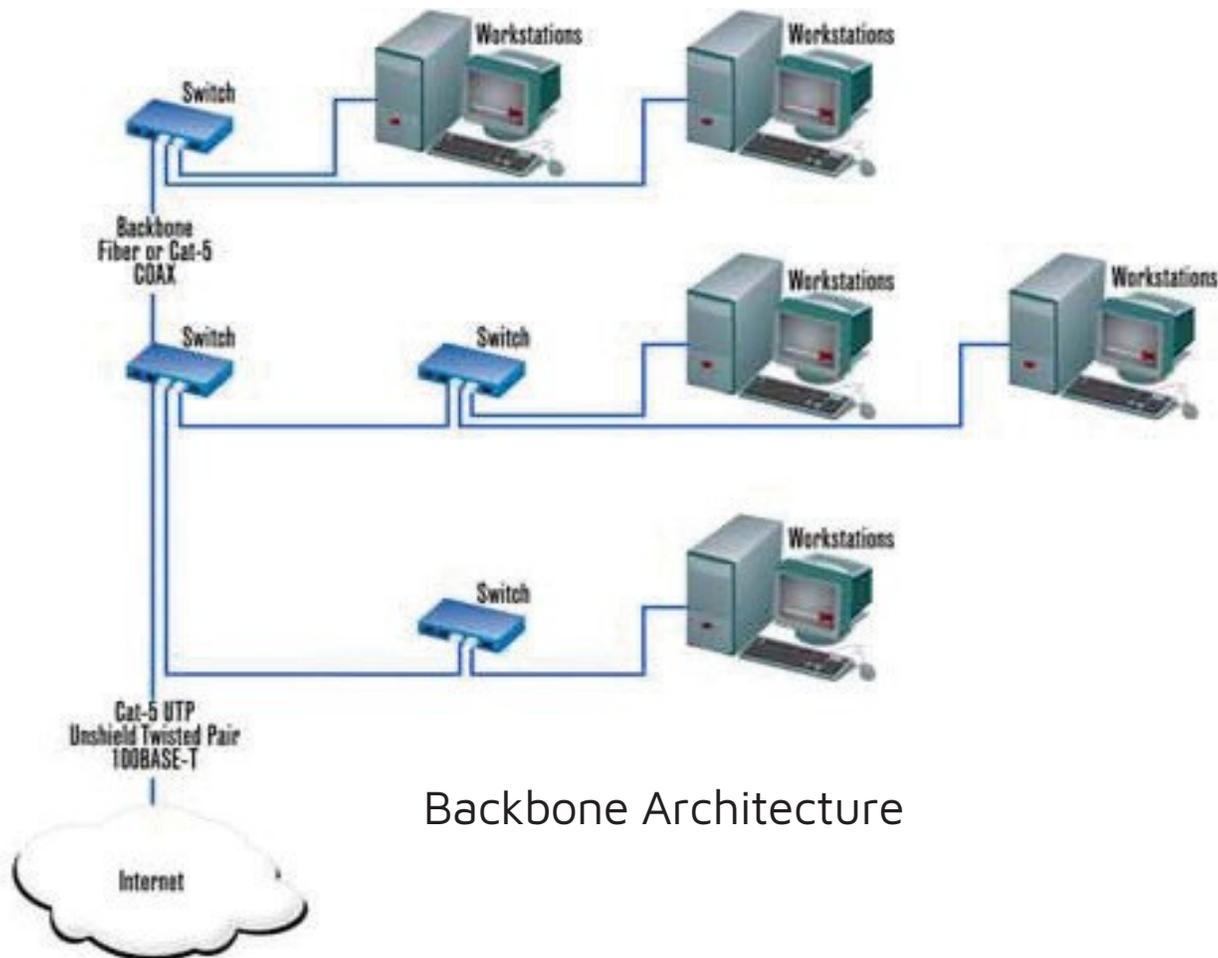
### Wiring

The RS-485 protocol used in BASnet and OPTO implementations of CBAS systems also uses a Bus topology with a single twisted pair wire and token passing.

Today's building automation communications is Twisted Pair Ethernet, which employs a star topology by connecting each computer to a central Switch. More switches are then connected in a star or daisy chained fashion.

Star networks can also be connected using a bus or backbone.

### Backbone Architecture



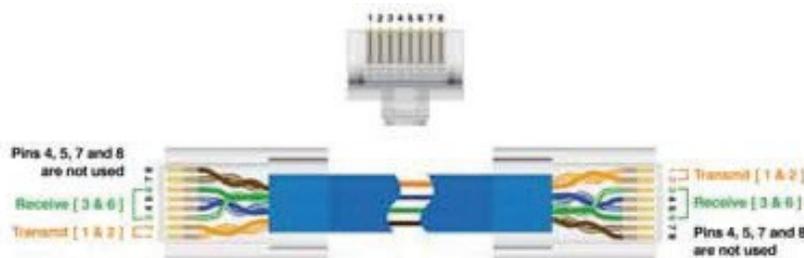
Backbone Architecture

10Base-T (10Mbps, Baseband, Twisted Pair) and 100Base-TX (100Mbps, Fast Ethernet) are wiring standards that

use Unshielded Twisted Pair (UTP) wire, usually with a Plenum rated coating. Plenum rated means it is for use in walls and drop ceilings. There are several standards of UTP, but the one you need to know is CAT5, which handles speeds up to 100Mbps (Megabits per second). The CAT5 standard specifies the size of wire, the number of twists per foot, and has a distance limitation of 100 meters or 328 feet per segment. RJ-45 connectors are used on the ends. For more information on wiring, see Section 4: Sample Wiring Layouts.

## Making a Cable

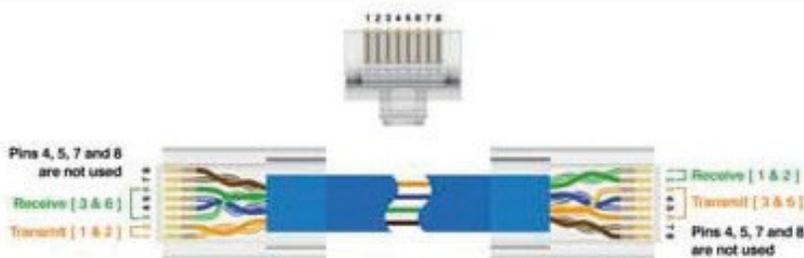
Twisted pair wire actually contains 4 pairs of wire but only two of the pairs are used. The standards designate those pairs as the Green pair and the Orange pair. The Blue and Brown pairs are not used but are still crimped into the RJ-45 connector. There are 2 standards for the order in which the wires go into the connector. 568A and 568B are actually opposites of each other. Here's how they look:



Straight Through		
Wire		Becomes
1	→	1
2	→	2
3	→	3
6	→	6

Pin No.	Wire Color
Pin 1	Orange / White
Pin 2	Orange
Pin 3	Green / White
Pin 4	Blue
Pin 5	Blue / White
Pin 6	Green
Pin 7	Brown / White
Pin 8	Brown

568B



Pin No.	Wire Color
Pin 1	Orange / White
Pin 2	Orange
Pin 3	Green / White
Pin 4	Blue
Pin 5	Blue / White
Pin 6	Green
Pin 7	Brown / White
Pin 8	Brown

568B

Crossed-Over		
Wire		Becomes
1	→	3
2	→	6
3	→	1
6	→	2

Pin No.	Wire Color
Pin 1	Green / White
Pin 2	Green
Pin 3	Orange / White
Pin 4	Blue
Pin 5	Blue / White
Pin 6	Orange
Pin 7	Brown / White
Pin 8	Brown

568A

A straight through cable has both ends made with the same standard and is used to go from a computer to a switch or a switch to a switch. A crossover cable has opposite standards on opposite ends and is used to go from a computer directly to another computer or controller without using a switch. A switch actually reverses the polarity for you so you don't need a crossover cable. To connect a laptop or other computer directly to a Computrols controller without a switch, you must use a crossover cable. Computrols X-Line controllers communicate at 10 megabit half duplex. LX-Line controllers are 10/100 megabit.

It doesn't really matter which standard is used for a straight-through cable, but we recommend that you use 568B, so that all wall jacks purchased will be the correct standard.

To determine which wire is wire number 1, hold the RJ-45 with the open end to you and the clip facing down so that the copper side is facing up. When looking down at the copper side, wire 1 will be on the far left.

To make a cable:

- Strip about 1 inch off the end of the wire.
- Make sure there are no nicks in the coatings on the wires.
- Cut the nylon string off completely.
- Untwist the pairs and straighten the wires.
- Place them in the order for the 568B standard with wire one to the left and no space between the wires.
- Cut the wire off so that you have about  $\frac{1}{2}$ " of exposed wire.
- Holding the connector with the clip down, slide the wires into the back of the connector so that each wire goes into its own compartment.
- Push the wires all the way in and make sure the outer coating is half way into the connector, or as far as it can go. This will make a much more reliable cable because only a small portion of wire is untwisted, and the outer coating is crimped into the connector, thus making it stable.
- Check the order of the wires again before wasting a connector. The wire to the left should have a white background and they should alternate from there between striped and solid.
- Crimp the connector.
- Tug firmly on the connector to see if it is crimped properly.
- If you are making a straight-through cable, make the other end the same way. If you are making a crossover cable, use the other standard (568A).
- Test the cable.

Wall mount jacks are made in both standards, so be sure to use only 568B jacks. Actually, Leviton makes jacks that have color-coding for both standards on each jack. If you should happen to get a 568A jack, then the cable from the jack to the computer should be 568B. The wall side of the jack is color-coded.

## Network Interface Card (NIC)

Computrols computers should come with 1 or 2 NICs already installed and configured. Actually, the newest Automation Servers have 2 NICs built into the motherboard, and the top NIC is configured for use. The second NIC is disabled, in order to avoid any conflicts.

If you should have to install a NIC yourself, make sure you ground yourself to the case to avoid damaging anything with static electricity. Make sure the card is firmly seated and held in place by a screw. One other thing should be mentioned about NICs, and that is, the MAC address. The MAC address is also known as the hardware address and is a unique hexadecimal number hard coded to the NIC at the factory. These numbers are given out by the IEEE and are intended to be unique in the entire world. Computrols Internet ready controllers also have a unique MAC address.

## Hubs and Switches

A hub is basically a multi-port repeater. When a packet of data arrives on a hub, it forwards out to all ports. The problem with this is that traffic is multiplied. Another problem is that you are limited in the number of hubs that can be placed between 2 computers. On a 10Mbps network, you're limited to 4 hops, 2 on a 100Mbps network. A hop is basically any hardware that the data goes through, like a hub or switch.

A switch is a more intelligent repeater, in that it forwards the packets to the intended PC port rather than all ports, thus reducing traffic. Also, the hop limitation is irrelevant with switches. Today, Hubs are rarely used.

If the link light is lit on an uplink port, or any other port for that matter, you have a good connection to the next node. If the device at the next node is off or the wire is unplugged, then the link light will stay off. Most switches now sold have auto-sensing ports, which sense the polarity on the line and adjust to it, so that uplink ports are no longer necessary.

## Controllers

- A few things to know about the controllers:
- The only ways to set the IP address, etc. is by using the handheld device, or in the case of a LX controller, the last octet of the IP address can be set using the red dials at the top of the controller. However, the other 3 octets will be 192.168.1.
- Controllers come with a default IP address of 192.168.1.199.

- There is no need to upgrade the handheld to communicate with the new controllers.
- It is possible to communicate to 2 RS-485 channels through a X or LX “host” controller.
- Controllers are hard coded with a unique MAC address at the Computrols production facility. This address cannot be changed, but can be viewed using a handheld.

To set the IP Address of a controller:

- Plug in the handheld device to the female serial port on the terminal board of the controller. You will see the firmware version and date on the screen.
- Press enter twice to see the Modes menu.
- Press the number 3 for web, and press enter.
- IP address is shown. Scroll down for other settings, like Subnet Mask and Default Gateway.
- To change, press select. You will see a blank IP address.
- Enter the numbers 192.168.1.X. When you enter a 3-digit number, the “dot” will be added for you. If you enter a 1- or 2-digit number, you will have to add the “dot” manually.
- Hit enter when finished entering the address. You will be prompted to reboot for changes to take effect.
- Turn the power switch off then back on.

## Controller LEDs

Lights on LX and using them to troubleshoot 485 comm.

The LX controllers are a much more powerful drop-in replacement for the X controllers, and there are some differences in the lights on the controllers. The X controllers had Local Area Network lights on the controller, but the LX version has lights on the network adapter jack. Additionally, the Run light blinks differently and the 485 Channel lights are labeled better. Here are the details.

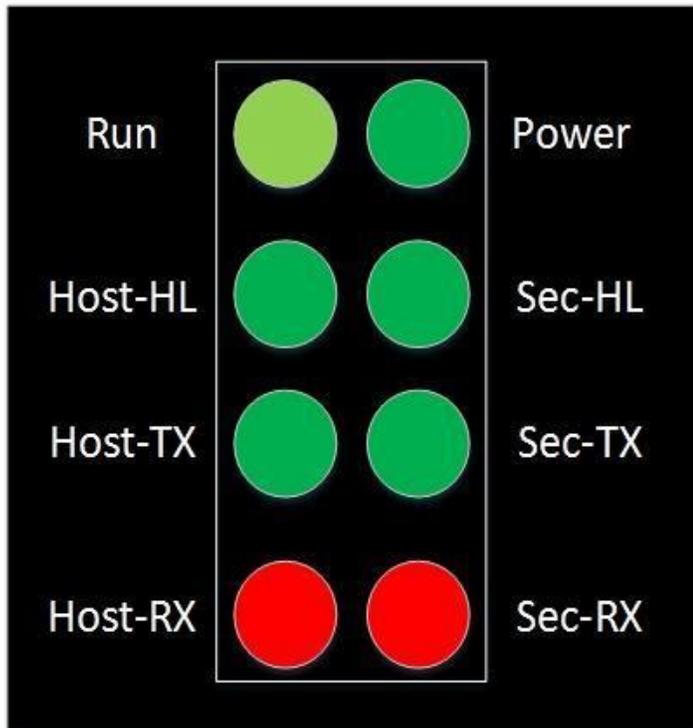
On startup: The 485 lights come on solid when the brain is not running. The run light is supposed to blink red on startup. Then once the brain gets up and running it starts blinking light green. So, there is a time when the light is blinking both red and green at the same time. That gives you some mixed colors. Once running: It blinks a double green blink if there is no database; Steady green blink means it has database and is running.

So that means, if the Run LED on a LX blinks twice it means it does not have a database.

The RUN LED stays on SOLID when downloading a database. For Ethernet you probably will not notice, but on 485 downloads it goes on solid for a long time.

If it blinks 3 times it means the controller has downloaded its database and is initializing.

Network: With X line controllers, the IP Network lights were on the front, but with the LX you have to look at the RJ45 jack on the top of the controller. On the left there is a yellow light that will be lit when you have a connection to the network switch that it is plugged into. On the right, the green light will blink whenever a network packet reaches the controller. These lights can be useful when troubleshooting communication to CBAS. There are also some blue lights that relate to the computer running the controller. You can disregard those.



The picture above shows the lights as they are on the LX controllers.

- Power light will be green when sufficient 24VAC power is applied to the controller.
- Run light is described in the first paragraphs of this article.
- 485 Comm lights:
- Host-HL will blink green when a High-Level packet is sent out on the Host Channel.
- A High-Level packet is a command from the CBAS head-end through the LAN.
- Host-TX will blink green when the LX transmits a packet to a controller on the Host Channel.
- Host-RX will blink when the LX receives a packet from a controller on the Host Channel. On X controllers, this light was labeled Activity.
- The lights labeled Sec work the same and apply to the Secondary Channel.

**Troubleshooting comm:** The TX and RX lights are a basic troubleshooting feature and should always be consulted first when a 485 channel will not work. If your controller is transmitting (TX light blinking), then the LX is trying to communicate with a controller on the channel. The TX light will not blink if there is no controller programmed on the channel, the channel is not licensed, or the channel was created in CBAS but never downloaded to the Host Controller.

If the channel was not downloaded, the controller doesn't know it has a channel much less a controller on it. Hardware View will show Not Connected on the channel statistics. Try erasing the database on the LX and letting it download. Give it a minute after rebooting before checking the lights.

If the channel is not licensed, you should get a yellow Trouble in CBAS stating "Channel Not Started". Contact Sales to purchase the channel Protocol and get a new license.

If there is no controller programmed on the channel, you will probably get a Trouble stating that a channel is locked up. Program a controller and one valid point and that should go away. If it's an "on controller" channel, then you need to erase the database again so it will download. In the case of BACnet protocol, you don't need to program a point and the controller will show Normal Comm for a minute, in which time you can start a Probe and get information from the controller.

If the RX is not blinking, then this is a clear indication that the controller or meter is not getting the transmits or just not communicating back. It could be that the wire is not landed on the correct terminals on the device, and I have also seen cases where the device was not configured by the installer to communicate with a BAS system. If the device has RX and TX lights on it, you can see if the TX from CBAS is getting there by checking the RX light on it.

Here's a brief explanation about what the LEDs on the 8X, 16X, 32X, and 64X really mean;

- **Power Light:** Sufficient power is supplied to the board when it is solid green.
- **Run Light:** Blinking red light means normal operations. Solid red means the onboard computer is booting. No light/ solid light means that the onboard computer is not running.
- **10Mbps Link Light:** Solid orange means you have a good link to the next hub or switch on the network.
- **10Mbps Activity:** Data is passing to and from the controller.

RS-232 LEDs are active when connected to the controller using HyperTerminal or the Commission program.

- **RS-232 Receive:** Blinks yellow when receiving data on RS-232 port.
- **RS-232 Transmit:** Blinks green when sending data on RS-232 port.

Port 1 and Port 2 LEDs signify activity on the Host and Secondary ports respectively. They act differently depending on the protocol in use. Following is a description of behavior when BASnet RS-485 is in use. The activity LEDs will be the most active.

- **Port 1 Receive:** Blinks yellow when receiving a high-level command from the DPU to a controller on the RS-485 Host channel.
- **Port 1 Transmit:** Blinks green when sending data (token) on RS-485 Host channel.
- **Port 1 Activity:** Blinks orange when receiving or passing tokens on RS-485 Host channel.
- **Port 2 Receive:** Blinks yellow when receiving a high-level command from the DPU to a controller on the RS-485 Host channel.
- **Port 2 Transmit:** Blinks green when sending data (token) on RS-485 Secondary channel.
- **Port 2 Activity:** Blinks orange when receiving or passing tokens on RS-485 Host channel.

*Note: Generally, a solid RS-485 Activity light means that the polarity of the wires is reversed.*

# Software

## TCP/IP Configuration

To communicate on a Local Area Network (LAN) using TCP/IP protocol you need:

- An IP Address
- A Subnet Mask

To access the Internet (outside of the LAN) you also need:

- A Default Gateway
- A DNS Server Address

Each one of these TCP/IP requirements is described in the following sections. In addition, descriptions of Ping, Network Identification, and Workgroup are provided.

### TCP/IP Address

Every computer on a TCP/IP network must have an IP address that uniquely identifies it and distinguishes it from the other computers on the Local Area Network (LAN). An IP address is a 32-bit number that consists of four numbers between 0 and 255 separated by periods. We are used to seeing the decimal version, which represents the binary form that the computer software understands. For example, the IP address 168.212.226.204 in binary form is 10101000.11010100.11100010.11001100. A portion of the address identifies the network that the computer is on and a portion identifies the node. The size of the network address depends on the class of the network address.

Since we will be dealing with mainly Class C addresses, here is an example of a Class C address. In a Class C address, the first 3 numbers identify the network and the last number identifies the node. So, in the number 192.168.1.200, 192.168.1 is the network or subnet, and the number 200 identifies the computer. There can be over 2 million Class C networks, but each one can only have 254 nodes. If we have a building that has more than 254 nodes requiring IP addresses, we will have to change the Subnet Mask to accommodate more 254 node subnets.

In a class B network, the Subnet Mask is 255.255.0.0, so 192.168 identifies the network or subnet, 1.200 is the node address. So, you can have 65,025 addresses (255 X 255).

There are certain subnets of addresses that are reserved for use on internal networks. Internal networks are separated from the Internet by a router, and therefore, aren't directly exposed to the Internet. Here at Computrols, we generally use the Class C addresses ranging from 192.168.1.1 to 192.168.1.254. There is also an address called the loopback address, which is used to test the operation of a NIC. This address is 127.0.0.1 and it identifies the Local computer NIC.

Computrols controllers come pre-programmed with an IP address of 192.168.1.199. Automation Servers generally come with an IP address of 192.168.1.2. CBAS-Web servers come with IP address 192.168.1.3 by default. Do not assign an IP Address of 192.168.1.0 or 192.168.1.255, as those are the Subnet and the Broadcast addresses respectively, and thus are not valid addresses. 192.168.1.1 is generally reserved for the Gateway (or router that allows internet access).

## **Subnet Mask**

The subnet mask is used to determine what subnet an IP address belongs to. A typical Subnet Mask for a Class C network is 255.255.255.0, which is represented in binary as 11111111.11111111.1111 111.00000000. The 255 basically masks the corresponding portion of the IP address, making it the network address. More 254 node subnet can be added using a Subnet Mask like 255.255.252.0, for instance. This kind of subnetting is beyond the scope of this course. If you have a controller that is exposed directly to the Internet, you will be given a Subnet Mask by the Internet Service Provider (ISP). This number will likely have a number other than 255 in it. Computrols controllers come pre-programmed with a Subnet Mask of 255.255.255.0.

In the case of a Subnet Mask of 255.255.255.0, there are only 254 possible nodes. If you have a job that requires more than 254 nodes, contact Computrols Tech Support for instructions.

## **Default Gateway**

In order to get to the Internet from a LAN, you need to go through a router. The LAN address of that router is the Default Gateway. To communicate with a server, web page, or another computer on the Internet, you might go through several different routers. The Default Gateway is the first router in that string of routers, and forwards your packets on to the next router. Computrols controllers come pre-programmed with a Default Gateway of 192.168.1.1.

## **DNS Server Address**

When you type an Internet address such as <http://www.computrols.com/> that address has to be translated into an IP address in order for your packets to reach their destination server and receive a web page. A Domain Name Service (DNS) server does translation of Internet addresses. Generally, the ISP provides DNS server addresses. Without a DNS server, you will never be able to surf the web.

## **Ping**

You can use the ping utility to test a connection or a NIC. To test a NIC, click on Start, then Run, type “command” and hit enter. At the command prompt, type: Ping 127.0.0.1, and hit enter. If you get a reply, it means the NIC is installed properly and TCP/IP is setup properly. To test a connection to another PC or controller, type ping, space, followed by the IP address of the PC or controller.

## **Network Identification**

Each computer on a network must have a unique Computer Name, also known as NetBIOS Name. It is usually a name that describes the use, user, or location of the computer.

## **Workgroup**

To share files in Windows’ My Network Places, the computers should be in the same workgroup or domain. Like the Computer Name, this is accomplished in the Identification section of Windows Network Configuration.

## **TCP/IP Computer Settings**

To setup TCP/IP on a computer, follow the instructions for either Windows 98 or Windows 2000/ XP below. The examples assume an IP address of 192.168.1.2, etc.

## **Windows 7, 8 or 10**

To setup a computer using Windows 7, 8 or 10:

- Click the Start button and go to Control Panel. (Windows 10: type Control Panel in the search field)
- In Control Panel, click Network and Sharing Center.
- In the top left, click Change Adapter Settings.
- Right-click Local Area Connection and go to Properties.
- Double-click Internet Protocol Version 4.
- Click Use the Following IP Address and fill out the information.
- If you have an Internet connection, do the same for the DNS Server addresses
- Click OK and OK again and your address is set.

## CBAS Configuration

### To configure CBAS:

- If you aren't using a pre-existing database, you must create a database.
- A TCP/IP channel for Controllers is automatically created as well as one for Workstations. The TCP/IP for Workstations channel is actually going to be the same channel because it uses the same NIC and IP address. It just provides a way to subdivide the workstations from the controllers.

### Verify IP Address on TCP/IP channels:

The IP address of the TCP/IP Channels should match that of the NIC. If the computer has 2 NIC, having a wrong IP address on the channels can cause a problem.

- Go to Editor Mode, Hardware View.
- Click one of the TCP/IP channels and go to Program.
- The IP address is in the bottom left. If it doesn't match the NIC, insert the correct IP address and escape.
- Repeat step 3 on all TCP/IP channels and then restart CBAS.

### To add a TCP/IP controller:

- Click the TCP/IP for Controllers channel and click Add a BASnet Controller.
- Put in a name that describes its location or use that will distinguish it from other controllers.
- Choose a controller type from the next drop-down list. Put in the IP Address of the controller and hit enter.
- Select to Create a New Blank Database then click Add Controller Now!

If you have multiple controllers of the same type, that have identical point configurations, you can create a template by clicking the controller in Hardware View, and click Save Database as Template. The Template will be stored in C:\CBAS19\Templates. When Creating a Database from a template, browse to that directory and select your template. You can also change all the point names to match the name of the new controller in the "Create Form Template" wizard.

## To create a RS-485 over TCP/IP channel:

- In Hardware View, click your TCP/IP channel and then click the controller that will act as the RS-485 interface Host.
- Click the Channels button.
- In the next window, click Add a Channel next to RS-485 Host or RS-485 Secondary. You will be prompted for the type of channel, which will be BASnet RS-485. A few other channel types are available here. Complete the wizard and the channel will now show up in Hardware View.

Since the advent of Internet controllers, there have been changes made to the way GWs connect to the DPU. The database folder no longer has to be shared in Windows in order to connect from a GW. You still have the choice of connecting through a network share but connecting without the share creates less traffic because the entire database is copied to the GW and only the changes are updated.

## Setting Up a GW (Graphic Workstation)

In order to setup a GW, the Server and the GW must be able to communicate on a network basis. In other words, if you can see the GW in the Network Neighborhood window of the DPU, or you can ping the GW, it is possible. For more information on how to set this up, see the previous section.

When connecting as a GW, the CBAS version on the GW must be the same (or nearly the same) as the Server, or the Server will refuse the connection. Version 14.1.X will not work with 15.1.X, which will not work with 15.2.X, etc.

Before you can setup a GW, you will need the IP address of the Server and the GW, as well as the GW Name of both. To get this info:

- In Windows 98, from the windows desktop, click on Start, Run, type winipcfg, and enter.
- In Windows 2000/ XP, click on Start, Run, type “command” or “cmd” and hit Enter. At the prompt, type ipconfig and hit Enter.
- Write down the IP addresses of both computers. Close the window.

First, you must setup the DPU to accept the GW:

- In Editor Mode, click Hardware View from the Main Menu.
- Click the TCP/IP for Workstations channel, then Controllers.
- On the last line, click Add A GW/ Stringsserver.
- On the first line, enter a name for the GW. The default is “NEW GW”. Enter a name that describes the location or function of the GW computer, like Plant GW or Security GW.
- For Configuration, choose GW. The IP address of the GW is not needed. Click Add Controller Now!
- Close the database and reopen in real mode. Now go to the GW computer.
- In CBAS, click Database (System prior to CBAS 15) on the main menu, then Close Database.
- Click Database, Open Database, and Remote GW (see next figure).
- Enter the IP address of the DPU, and check the box to “Load GW Names from DPU” or enter the name of the GW as you entered it on the DPU. Click Connect and the database should open.

**Note:** In the workstation Channel on the Server, there is a Local GW listed. This is actually the Graphic Interface on the Server itself. It is added by default when a database is created, and cannot be removed or renamed.

Below is the GW Connection screen:

The screenshot shows a 'TCP/IP Login' dialog box. It has a title bar with a close button. The main area is titled 'TCP/IP Login' and contains three input fields: 'Remote DPU Address' (with '192.168.1.200' entered), 'GW Name' (with 'GW1' entered), and 'GW Password'. Below these fields are buttons for 'Previous GW Connections', 'Advanced', 'Connect', and 'Cancel Login'. A 'Help' button is in the top right corner.

In CBAS 19, the only thing that you need to place on the hard drive of a GW is the Graphics background pictures. Place them in C:\CBAS19\Sites\[database name]\Graphics.

There are a few things that can cause the GW Connection attempt to fail:

- TCP/IP Error: You will get this error message if TCP/IP is not configured correctly on one of the computers, or if you have used the wrong IP address for the Server (DPU).
- Workstation Name is not in the Database: Either you have not entered the workstation in the Workstation Channel on the server, or you spelled the name wrong on the TCP/IP Login screen.
- CBAS is not running in Real Mode on the Server.
- CBAS version is incorrect: Upgrade the GW to the same version that the Server is running. In some cases, it will ask you if you want to download the correct version from the DPU. If the Install. exe file is on the Server, then this will work.
- This GW is already in use: Another GW has logged in using the Workstation Name you specified. Try another Workstation Name, or add more GWs to the Server.
- Number of GW Connections has been exceeded: CBAS Professional comes with 2 Remote GW Connections by default. A license for more GWs can be purchased. Meanwhile, have someone log off in order to connect.

Notice the “Use File Sharing Connection” checkbox in the sample GW Connection screen. Advantages and disadvantages of File Sharing are outlined also.

If you want to connect using the file sharing method:

- Check the box next to “Use File Sharing Connection.”
- Click on the “Browse” button in the Database Path section. The window that opens will have selected the database you just closed.
- Click on the minus sign next to the database then, scroll down to “Network Neighborhood” or “My Network Places.”
- Click the plus sign next to “Network Neighborhood” and locate the DPU by its computer name.
- Click the plus sign next to the DPU computer and select the shared database on the DPU.
- Click OK and the network path will appear in the Database Path field.
- Click “Connect” and the database will open.

# Advanced Networking

Connecting Computrols controllers, DPUs, and GWs over a Wide Area Network (WAN) involves some advanced networking knowledge. Whenever making connections over a WAN, there are routers involved. This is the Default Gateway discussed earlier. A router basically protects the Local Area Network (LAN) computers from the Internet (hackers/viruses) and allows users on the LAN to access the Internet. In order to access or pass information to a computer or controller on the other side of a router, certain TCP/IP ports must be forwarded to the IP address of a computer or controller. Otherwise, the router will reject the request. The following illustration shows the ports needed. In a normal router, all ports are closed to access from the outside to the inside, unless communication is initiated from the inside through the same port.

## Computrols Network Architecture

### CBAS Professional Version:

- No ports need to be opened on the DPU Server side.
- The controller subnet router must have port 8760 opened to receive connection requests by the DPU.
- If workstation access is required, port 8751 must be opened on the GW subnet, and 8750 on the DPU subnet.
- If RS-485 channels are being automated, ports 8770 and 8771 should be opened on the automating controllers subnet.

### Web Only Access:

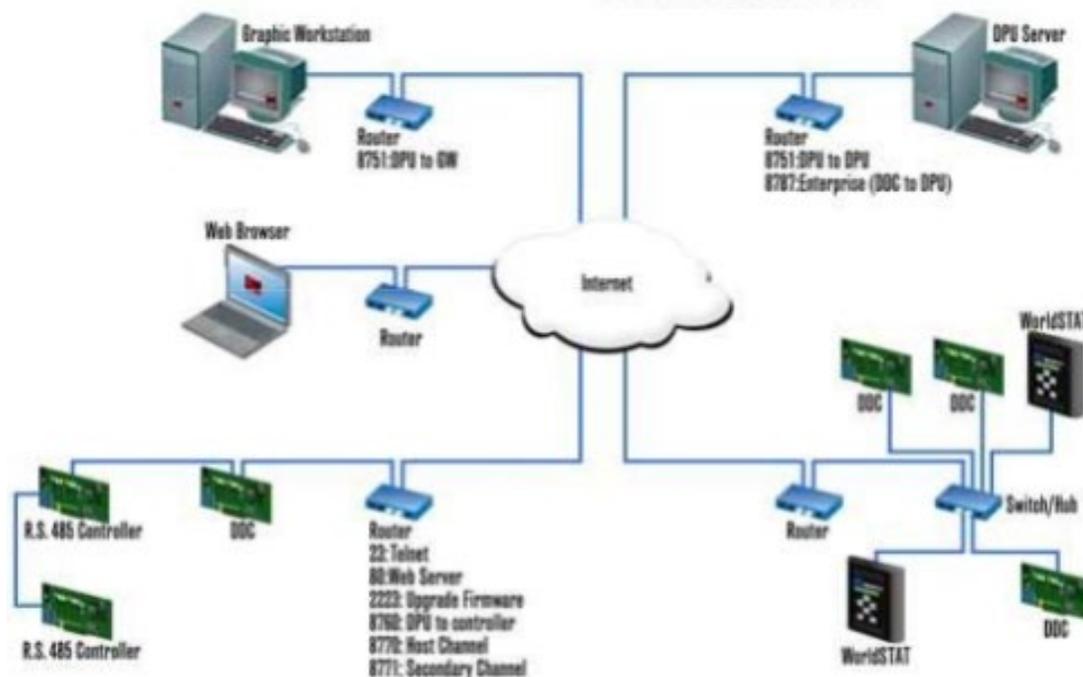
- No ports need to be opened on the client side.
- The controller subnet router must have port 80 opened to receive incoming HTTP requests.

### CBAS Enterprise Version:

- Port 8787 needs to be opened on the DPU Server side.
- The controller initiates requests to the DPU; no ports need to be opened on its subnet.
- If workstation access is required, port 8751 must be opened on the GW subnet, and 8750 on the DPU subnet.
- If RS-485 channels are being automated, ports 8770 and 8771 should be opened on the automating controllers subnet.

### Optional Ports:

- MiniTelnet can be used by opening port 23 on the controllers subnet.
- In-system reprogrammability is possible by opening port 2223 on the controllers subnet.
- The controller can be pinged if it has an external IP address or the client is on the same LAN/WAN (via UDP packet to port 2224).



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It is no longer necessary to forward TCP/IP port 8751 at the Router on the LAN where a Graphical Workstation exists. Now, the Graphical Workstation initiates communication to the DPU on port 8750 and the DPU communicates back on the same port.

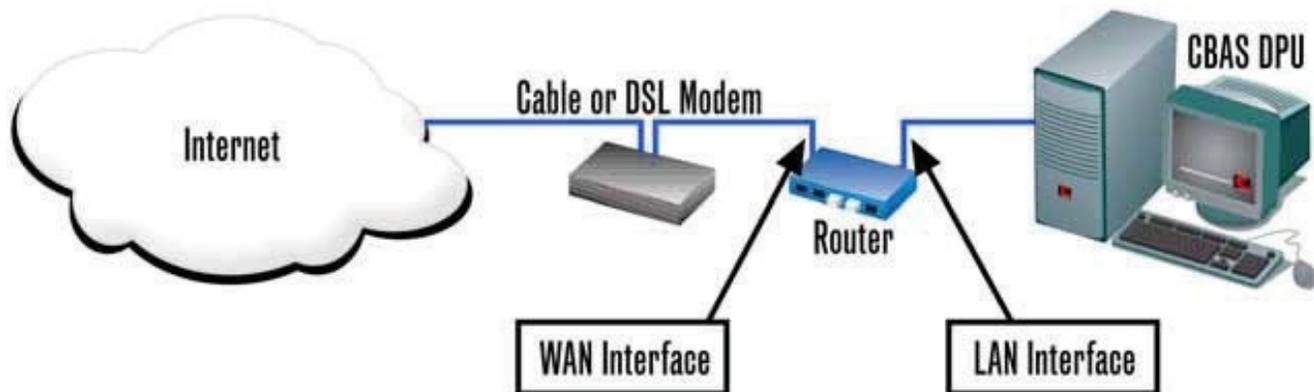
## Router Configuration Instructions

Computrols recommends the use of an inexpensive Cable/DSL router, in addition to the modem provided by the Internet Service Provider (ISP), when connecting CBAS systems to the Internet. But if your ISP provides a user configurable Firewall with the router, then it is not necessary to have another router. The router/firewall is recommended because it will provide a high level of security against viruses and hacker attacks. It does this by blocking packets intended for the internal network on all TCP/IP ports, except those specifically forwarded to the computers, programs, or controllers that will accept them.

In order for computers to work with multiple incoming and outgoing network communication packets, the TCP/IP protocol uses thousands of “ports”. Standard programs use specific ports, called “Well Known Ports”. Some examples of Well Known Ports are: port 80/html (Web pages); port 25/smtp (email); port 110/pop (email). CBAS uses some of the ports in the range from port 8750 to 8790. See CBAS Network Architecture (above) for more specifics about CBAS ports.

The router, by default, is setup to allow all outgoing packets. However, most of the time, only port 80 is needed to access the Internet. NAT, or Network Address Translation, is used to disguise or hide the computer accessing the Internet. The router does this by changing the source IP address of the sender to the IP address of the router itself. Thus, the actual sending computer remains anonymous.

The following illustration shows the physical configuration of an Internet connection using a router:



In order to configure a router to allow access to the Internet, you must configure both the WAN interface and the LAN interface. (The WAN is the Wide Area Network and the LAN is the Local Area Network) However, today most routers are plug and play.

Configure the WAN interface with the IP address, subnet mask, default gateway, and DNS server address that is provided by the Internet Service Provider. This will probably be done by the installer working for the ISP. For more information on these terms, see Chapter 8, Section 2-TCP/IP Configuration.

The LAN interface usually comes pre-configured with an IP address and subnet mask. However, a computer will have to be configured with the correct IP address in order to access and configure both the LAN and WAN interfaces. Configuration is generally done through a webpage based configuration tool on the router itself. Follow the manufacturer’s instructions to configure the router.

Once you can access the Internet from the computer on the LAN side of the router, you can forward the necessary ports through the router to the correct IP addresses.

#### **Recommended routers:**

- Linksys BEFSR11, w/ 1 LAN port
- Linksys BEFSR41, w/ 4 Port switch
- D-Link DI-604, w/ 4 port switch

## **Adding More Than 252 IP Controllers to a CBAS System**

Let's say you have a CBAS server with IP address 192.168.1.2 and subnet mask 255.255.255.0. This means you have a class C subnet and address range of 192.168.1.1 through 254. 1 is usually for the Default Gateway, which is the router that allows you access to the Internet. With the server on 2, you have 252 more addresses to work with. What happens if you need more addresses? Although most of us will never see this situation, there are 2 ways of dealing with it.

### **Increase the Size of Your Class B Subnet**

Changing the Default Gateway to 255.255.254 will add another 254 addresses. You will be able to access IP address on subnet 192.168.0.x and 195.168.1.x. Default Gateway 255.255.252.0 will add more subnets. This is advanced networking.

### **Change Your Subnet to a Class B Subnet**

If you change the Subnet Mask on the server to 255.255.0.0, you will then have a Class B subnet. Now you can work with IP addresses with different 3rd octet numbers, like 192.168.2.X, 192.168.3.X, etc. This gives you a possibility of over 64,000 addresses. The Subnet Mask on the controllers will also have to be changed to 255.255.0.0.

### **Add another IP Address/Subnet to Your Server**

Adding another Class C IP address to your server's network card will allow it to talk to another subnet of 254 addresses, thus giving you over 500 possibilities. This IP address should be something like 192.168.2.2 and the controllers on that subnet would have addresses 192.168.2.3 through 254.

Go to Windows Network properties, Local Area Connection properties, and go to properties on TCP/IP. Click the Advanced button and add an IP address like 192.168.2.X and the subnet mask 255.255.255.0. Click ok, etc.

In CBAS Hardware View, add a TCP/IP Channel. Click on the newly created channel and click Program. Change the IP address to match the IP address you added to your Local Area Connection

in the previous paragraph. You can now begin adding controllers to that subnet, using addresses 192.168.2.x.

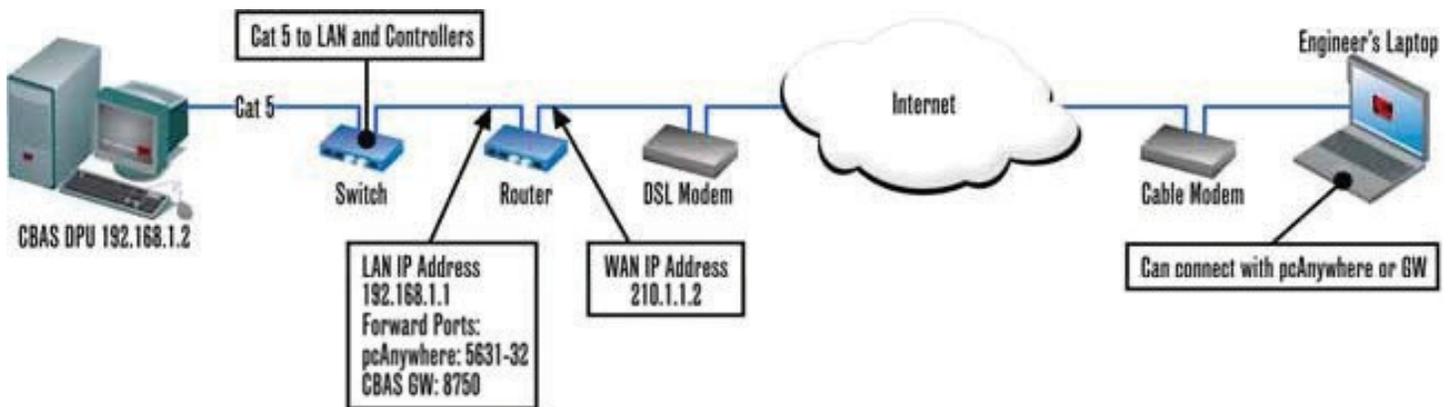
## CBAS and the Internet

When Computrols introduced its line of Internet Controllers, it opened up a whole new way for people to communicate with controllers and automation systems. With that came a lot of confusion about what can and can't be done in regards to remote access to controllers and whole CBAS systems.

Let's see if we can clear up some of the confusion by going through the different scenarios.

## Remote Access Software

Third party programs such as LogMeIn or TeamViewer are recommended for remote access. There will be a charge for these services, but there may also be a free shareware program available. No ports have to be forwarded because the accessible computer initiates the connection to a web site and the accessing computer connects through that web site.



## Graphic Workstation (GW)

The same connectivity concepts apply to a CBAS GW over the Internet, but it will be much slower than remote access software. When you gain access with LogMeIn, you get access to everything on the computer, including access to other programs and other computers on the network. Many network administrators don't allow these programs on their LANs because of this. With GW, you only gain access to the CBAS database, so there's no security risk. With one of these methods, engineers and technicians can be at home, at another building, or in a cybercafé, and get access when they get a call, page, or email alarm.

## Email Alarms

Another benefit of high-speed Internet is that you can program Email Alarms on any point that has an alarm programmed already. Emails can be sent to a dispatcher, people at home, or as a text to a phone. Instructions for setting up email alarms were outlined in a previous section of this manual.

## Controller Web Pages

Although this feature isn't extensively used, you can access a web page on the LX Controller itself. The web page can be set to require the user to log in to gain access. From there you have a choice of Text View or Hardware view, and command-able points can be commanded.

## CBAS-Web Server

Now that we've covered the basics, let's get into some more unusual or complex situations. First, there's the CBAS-Web Server. This product allows engineers and tenants to schedule overtime for their AHU by accessing a web page. Access Control card access can be managed through CBAS-Web also, as well as commanding points. A separate computer next to the DPU serves the web page. The web page is exposed to the Internet by forwarding a single TCP/IP port from the public (WAN) side of the router to the Overtime Web Server. For more details, go to <https://www.computrols.com/support/documentation> and locate the CBAS-Web Manual or data sheet.

## Stand-Alone Controllers

Stand-alone controller access is another possibility using the Internet. Let's say you have a small building requiring only one 32-point controller, and the occupants of the building have a LAN with Internet access. That controller could be placed on the LAN by running a network wire from the controller to a nearby switch that is part of the network. Then, one port needs to be forwarded from the router to the controller. The technician would have the database for that controller in CBAS on his office computer or laptop. In that database, the IP address of the controller would be the IP address of the router, and the router would forward communications to the controller. Also, that database could contain a channel of RS RS-485 controllers like VAVs, or a Modbus RTU channel for some Veris Hawkeye power meters.

## Multiple Stand-Alone

Let's say you have a building management company that manages several small buildings that require one Internet controller with up to 64 hardware points and maybe a few more controllers or VAVs. Probably the best way to handle this situation would be to have the DPU at the management office and allow GW access from the outside by forwarding one port on the router. Business DSL or cable access with a static IP address would be preferable at each location, allowing the DPU to have a database containing a controller from each, connecting in the same way described in the previous paragraph. If more controllers are needed at a particular location, they could be placed on the RS-485 channel hosted by the one Internet controller.

People at the management office could monitor the building from there, but what happens when a technician is needed at the site? A permanent workstation could be placed at the remote building or, the technician brings a laptop, plugs his cable into the router or a switch on the LAN, and connects as a GW.

## Multiple DPUs

On the other hand, you could have a DPU at each of the management company's buildings and a workstation at the main office. However, this would not be a viable solution logistically or financially unless they have four buildings or less. A CBAS Commercial license would be required at each location, as opposed to one Professional license in the previous example. To connect from the main office, the user would have to connect as a GW or with remote access software separately to each building, one at a time. Unless the user was connected at the time, he would not see alarms as they occur. Email Alarm could take care of that.

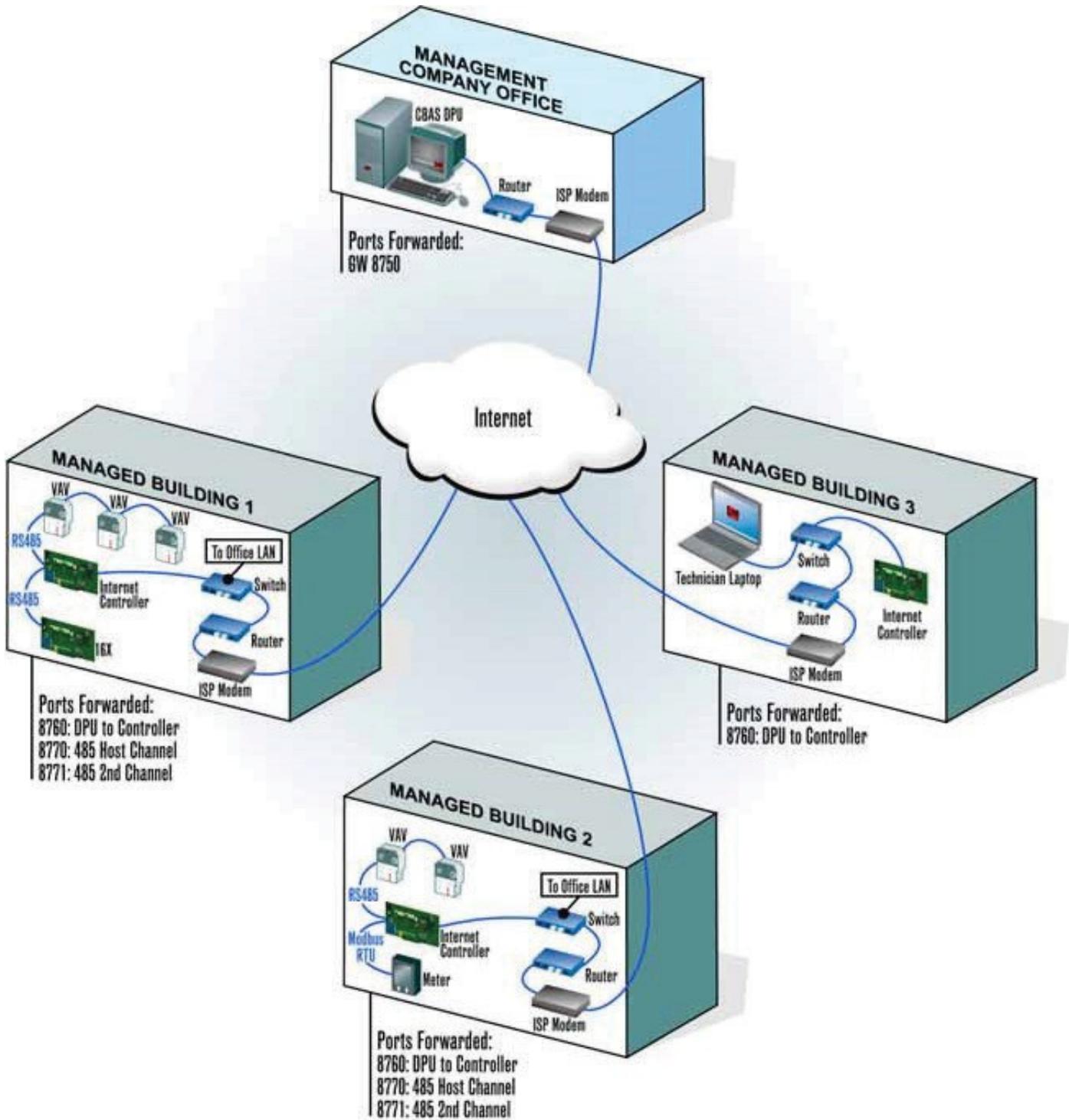
## DPU to Controller

Let's say a management company has 100 or more sites in many cities, maybe across multiple time zones. With a WorldSTAT or other Internet Controller in each location, and a DPU in the corporate headquarters, CBAS software would give them the features they need to achieve rapid deployment of new locations and regional management.

While these are just a few of the scenarios that are possible with Internet controllers and CBAS software, they cover the main concepts necessary to understand connectivity.

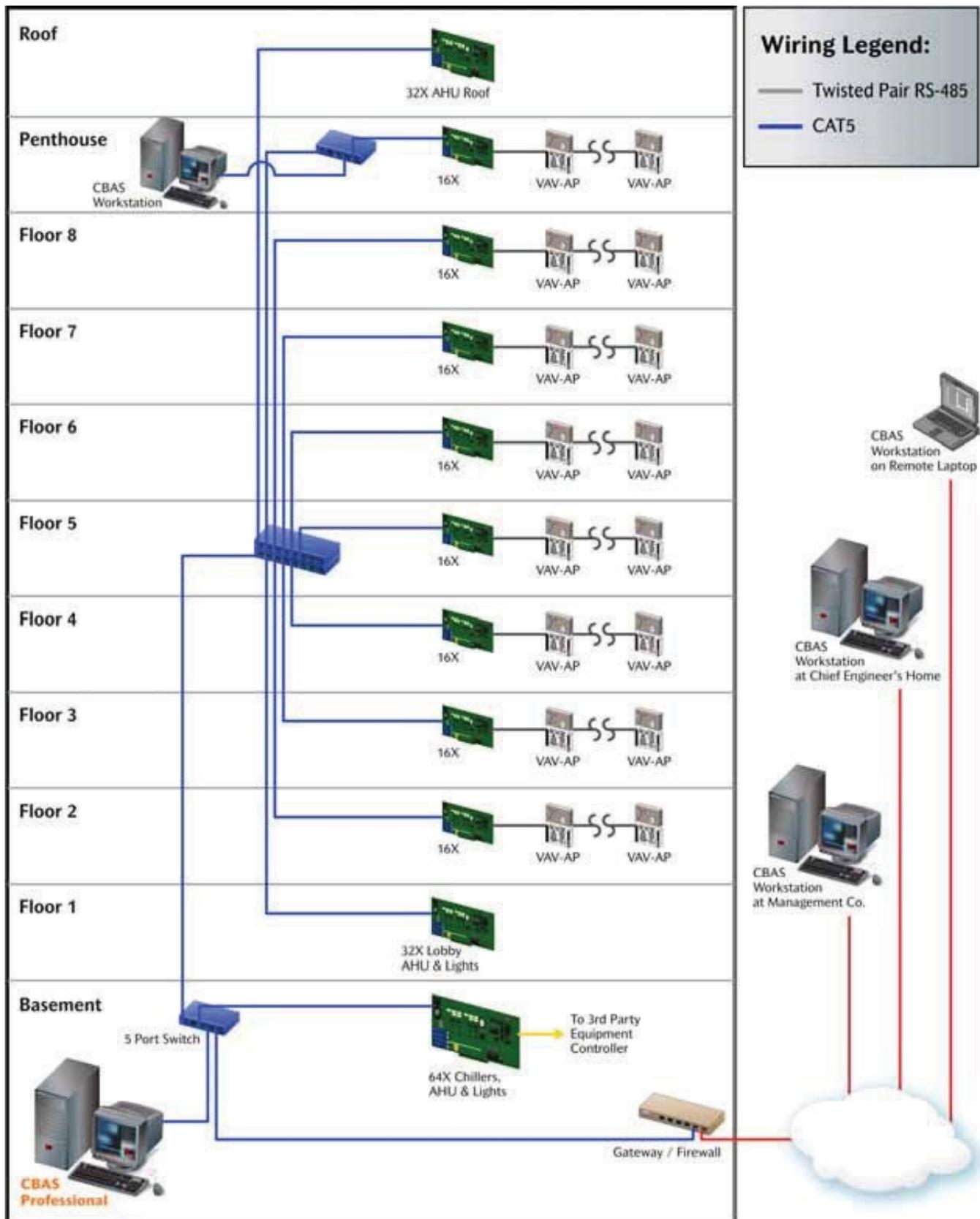
## Example Diagram

Below is an example of one way to connect buildings over the Internet. It shows a management company that manages three buildings from its office using one CBAS Automation Server and one TCP/IP controller in each building. A laptop can be connected to the network in any building and log on as a workstation to the Server in the main office.

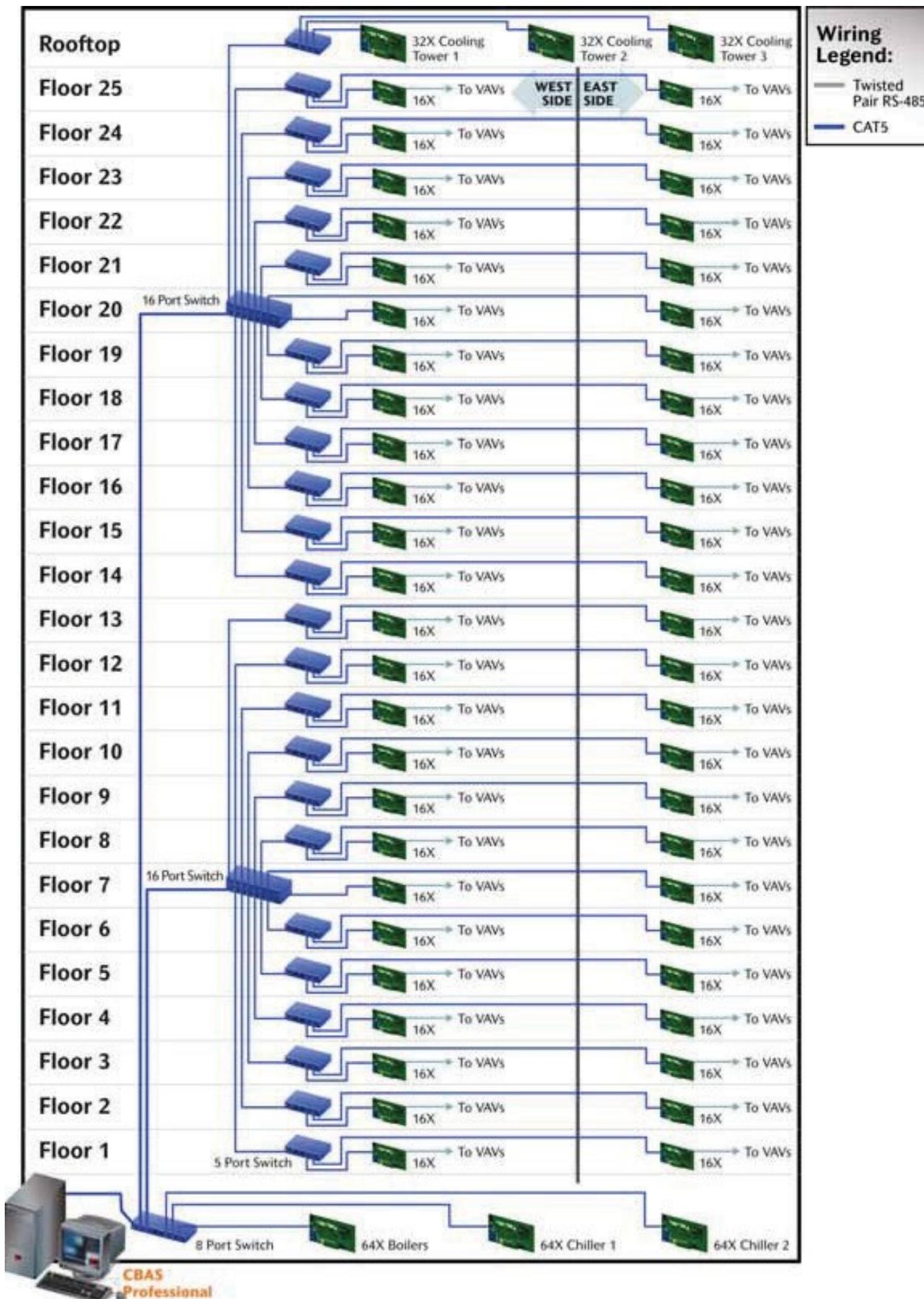


# Sample Wiring Layouts

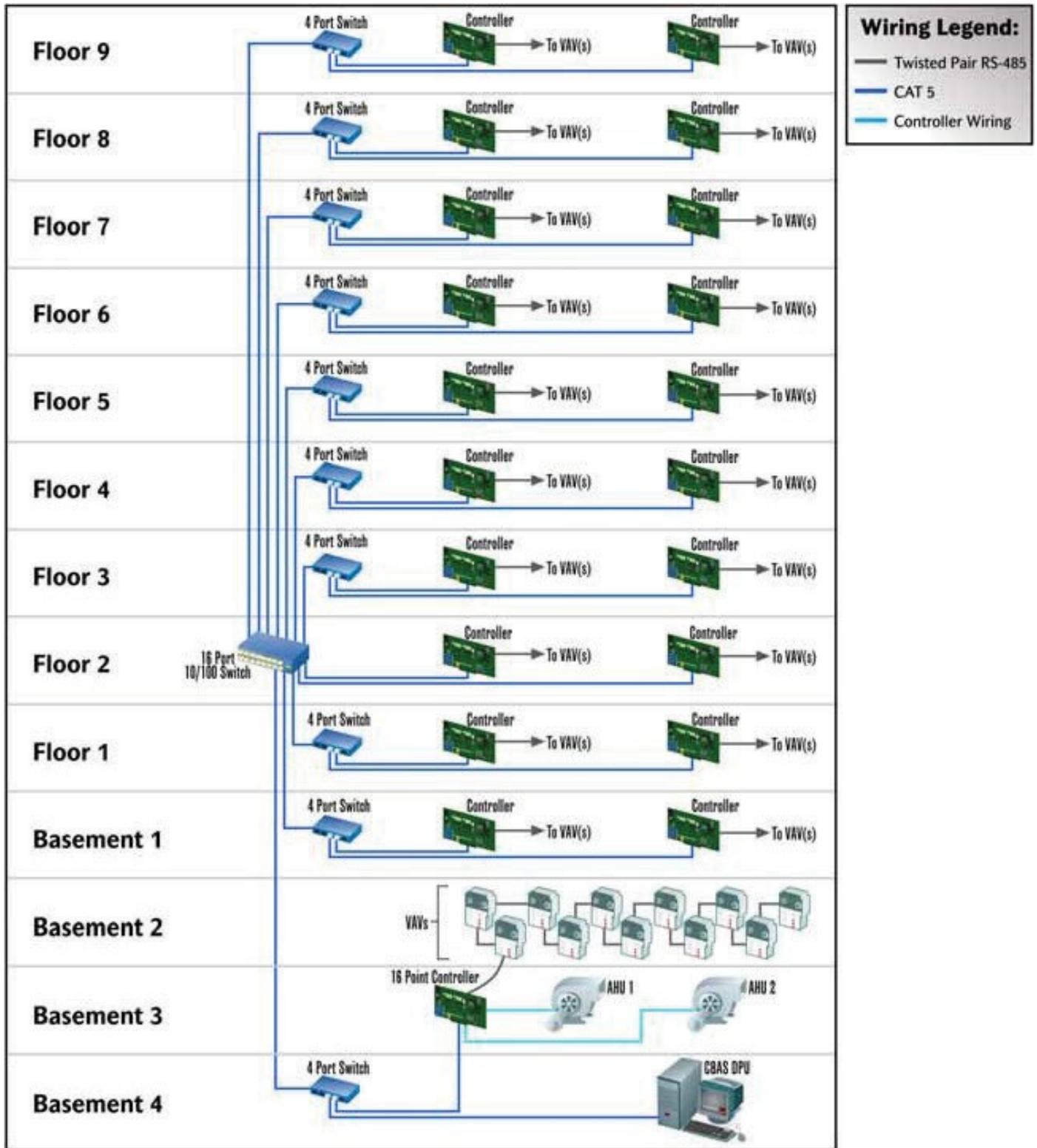
## Sample Nine-Story Building



# Fully Loaded 25-Story Building



# Nine-Story Building with VAV Controllers



# Chapter 10 » Troubleshooting

## Tools and Software

### Operating the Computrols Hand Held Terminal

The Hand Held Terminal is very easy to use. Just plug it into the Hand-Held port on the board and it will power up. The first screen gives you the part number and firmware version. For example:

**8 Ver 9.9**

**Feb 16 2006@14:20:25**

This means that the Hand-Held is plugged into an 8X with version 9.9 firmware. The Date of the firmware is 02/16/2006 at 2:20PM.

- Press Enter, and Enter again to get to the Modes menu. You will see: 1=Hardware (Points in Database) 2=Date (System Time and Date) 3=Web (Network/TCP/IP Settings).
- Press 1, and Enter to see a list of points on the board. If you see “DATABASE NOT LOADED”, then the controller has not received a database from the server.
- Arrow up or down to see all the points.
- Press Select to command any command-able point.
- Press 1 to command and 2 to place the point in Auto.
- Press ESC to return to the Modes Menu.
- Press 3 and Enter to view and change TCP/IP settings.
- The first setting you will see is the TCP/IP address.
- Arrow up or down to see other TCP/IP settings.

Please see Computrols’ Network Manual for significance of various settings.

**NOTE:** *DHCP and Controller to DPU are used by WorldSTAT only.*

- Press Select to change a setting, then type in the numbers and dots to separate them.
- When you enter a 3-digit number, the dot will be added for you. After completing the number, press Enter and you will be prompted to reboot the board.
- Turn the controller off then back on for the Web settings to take effect.

- Press ESC to return to the Modes Menu.
- Press 2 and Enter to view the controller's Time and Date. Time and Date are set by the CBAS Server
- Press Select to change the Time and Date (not advised).

## Advanced Hand Held Use

There is a hidden menu item on the Modes Menu. This feature is to be used with extreme caution! From the Modes Menu, press 5, then Enter.

### SELECT TO ERASE DATABASE

If you need to erase the database from the controller, Press the SEL key. You will be prompted to enter a 1 or 0 and press ENTER to complete the process.

**CAUTION:** Do not erase the database unless you are sure. If the controller has no communication to the server, the database will not download again, and the controller will not work. A database download will be required.

To see more advanced menu items, press the down arrow.

### SELECT TO ENTER BOOTLOAD

**CAUTION:** Do not EVER press SEL here! This will render the controller useless, and it will have to be replaced.

The feature is for factory use only. Press the down arrow key.

### SELECT TO OFFSET PORTS

This menu item is no longer used, but was used to change the TCP/IP port on which its web page is served. For more information on this feature, see "Forwarding a Router to Multiple Controller Web Pages" in this Manual and in the Manuals & Instructions section of Computrols website.

<http://www.computrols.com/support/documentation/> Press the down arrow key.

### HOST TX000000 RX000000

On this screen you are seeing live activity on the Host RS-485 port. TX stands for Transmit and RX stands for Receive. If you see no activity on either one, then you have a communications problem. If you are receiving, but not transmitting, then the controllers on the channel are talking to you, but you are not talking back. This could mean that you have your wires crossed, or one wire is loose.

Below, you will see statistics on various categories of packet types. Press the down arrow and you will see another page of statistics. If the numbers are going up in any category, you may have a wiring or other communication problem. The one most important category is FE. If numbers are constantly going up here, then you are getting Framing Errors, which means you have a wiring problem.

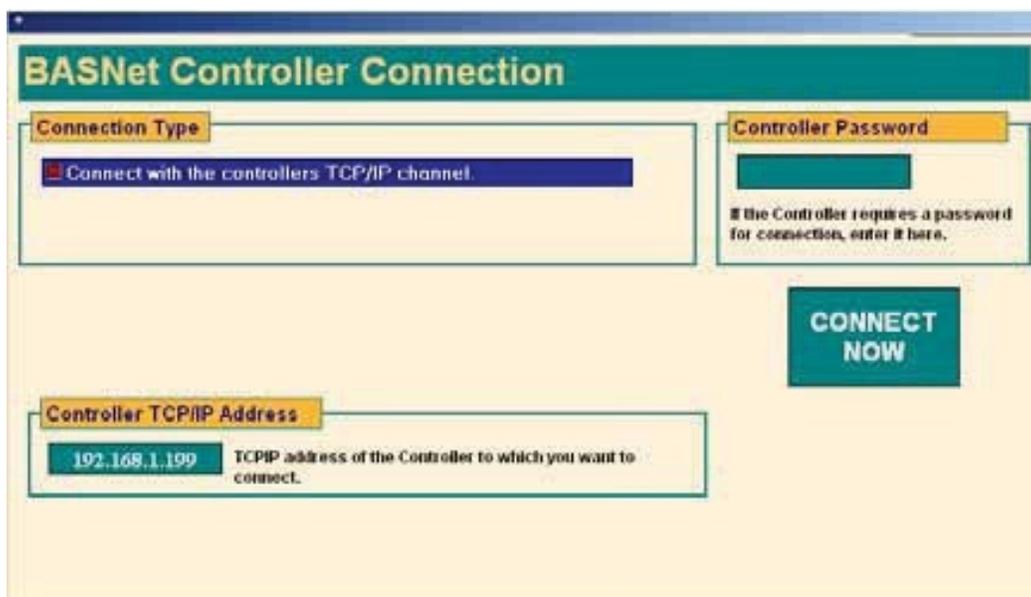
Continue to arrow down.

You will see more statistics from the TCP/IP channel. Good luck trying to decipher. Press ESC to return to the Modes Menu.

TCP/IP Connection With Controller (Or, “How do I retrieve the database from a controller?”).

In previous versions of CBAS, this feature does 2 other types of connections in addition to TCP/IP. However, due to the limitations of the other 2 connection types, you probably won’t want to use them, and only the TCP/IP Connection will be covered.

To explore this feature, close any database that you might have open by going to the System Menu, then Close Database. Next, go to the Database Menu then Open Database. Instead of choosing Editor Mode or Real Mode, go to the 5th choice, “TCP/IP Connection with Controller.”



## TCP/IP

Check the box to “Connect with the controller’s TCP/IP Channel”. A field will appear where you can enter the IP address of the controller. You only need to put in a password if a password had been previously entered for the controller. This can be done on the Controller Program Screen.

After entering the IP address, click the “Connect Now” button.

Once the database is downloaded from the controller, you will have limited versions of Text View, Hardware View, and System Menu. Hardware View will give you most of what you would normally have, but with only one controller, of course. System menu will give you software version, CBAS Help, and allow you to close the database or exit CBAS.

Text View/All Points will give you all of the hardware, software, and S3 points contained in the controller's database. The available summaries under Text View are also functional. You can click on a point and go to the Point Program Screen. From there, you can make changes, but be aware that some functionality will be lost due to the fact that you are not connected to the Parent (DPU) database and points on other controllers might not be accessible. Some things you can't do include:

- Histories (stored on the DPU)
- Graphical Schedule Editor
- Anything having to do with points on other controllers or the DPU

## **Saving the Database**

Once the database is open, a copy is saved. CBAS saves the controller's database in the C:\CBAS\ Uploads\ [controllers name] (or C:\CBAS2000\ Uploads\ [controllers name]) directory. Then yes, you can use that as a template. There may be a problem in some versions of CBAS and firmware versions, but it will work on a 10.x firmware rev.

Then create a new database and add a controller using the downloaded database as a template. Then you can open that in real mode and talk to the controller.

## **Controller Diagnostics**

Controller Diagnostics can be a useful tool for troubleshooting problems with the following controllers: 8X, 16X, 32X, 64X and VAVs (AP, P, A, X). To access Controller Diagnostics, find the controller in Hardware View. Click once on the controller and then Controller Diagnostics.

One of the most common uses of this screen (see the next page) is to check the firmware version. When calling Tech Support for help with a problem, you might be asked for this information. The firmware version is listed as "Partnumber". In the example above, "8 V9.1" means that the controller is an 8, and the firmware is version 9.1. The other way to get the firmware version is by using a Hand-Held Terminal.

In the Database Storage section, you can see if changes made to the controller's database have downloaded. Check the "Stored At" date and time on the "Database stored in FLASH?" line. If the time listed is prior to making the changes, then the database has not downloaded. However, the chances of this happening are slim. CBAS automatically checks for differences between the server's database and the controller's database. If there is a difference, the server's database will download to the controller.

**64 Diagnostics**

**On Board Voltages**

Supply Voltage	26.4 Volts	Internal Voltage	3.10 Volts	Low Power Lockout	NO
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**Database Storage**

		<u>DBase Size</u>	<u>Stored at</u>	<u>Checksum</u>
Database stored in FLASH?	YES	65378	Monday 4/24/2017 18:30:50	2177822320
Status Table Stored in FLASH?	YES	26320	Monday 5/08/2017 08:56:46	

**Memory Usage**

Heap Used	388875	Heap Available	135412
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**Does NOT use CRC Connection**      **BO Lockout**

**Stop Polling**      Controller Time: Monday 5/08/2017 09:46:27      Run Days=4 Hours=11 Min=55  
 Partnumber: 64 V17.4 640000 Mar 18 2015@11:06:05 NOWEB      **File System**

**TCP/IP Diagnostics**

**Load**      Received=2272448 Transmitted=341783 Collided=0 TCPRetransmits=141 TCPExpired=0  
 ERRORS:Framing=0 CRC=116 HeaderIndexMismatch=0 InvalidPacketSize=0  
 ERRORS:HeaderBadPacket=0 MissedPacket=0 PacketsDroppedOverflow=0 RxOverflow=0

**Reset**      PORT RXs: 51702 0 0 0 11794 PORT TXs: 94506 0 0 0 179624 WEB:TotalUse=0 ExcessTicTm=4

SerialNumber=000091419157 LotNumber=903 MACAddr=0.9.20.0.73.130  
 IP=192.168.1.203 Gateway=192.168.0.1 Subnet=255.255.252.0 DNS=0.0.0.0  
 Model=64 TechsName=Brian D  
 DPU to Controller  
 NOT USEING DHCP  
 FilterMedian=21 Exp=2

**21**   **2**   **Set Analog Filter**

The TCP/IP Diagnostics section could be helpful in troubleshooting communications problems. If you have errors here, then perhaps you have a network problem, like a bad wire, switch, or a computer/ controller sending out bad packets.

The bottom section, below TCP/IP Diagnostics, lists network settings, such as IP Address, Default Gateway, Subnet Mask, and DNS Server Address. You can also tell if the controller is set to contact the CBAS Server instead of being contacted by it. By default, controllers are set for DPU to Controller, which means that the Server initiates the communication link. Controller to DPU means just the opposite. The controller must also be setup in CBAS for this setting to work. Generally, this setting works in conjunction with DHCP, which allows your controller to receive an IP address dynamically from a DHCP server on the local area network. By default, controllers are set to not use DHCP and have a static IP address of 192.168.1.199.

The Controller Diagnostics screen for a VAV controller looks a little different, but contains much of the same information. Since VAV controllers communicate using RS-485 protocol, there will be no TCP/IP information.

### Deleting the Database from a Controller

Deleting a controller’s database is a way of forcing a download to the controller. Also, if a controller has been used on a RS-485 channel, and still holds that database, it will be necessary to erase the database. A TCP/IP

database will not download until the RS-485 database has been removed. There are four ways of deleting the database from a controller:

- From CBAS in Hardware View, locate and click the controller, then click Erase Database. CBAS must be in Real Mode with Normal communications to the controller. After rebooting, the controller will immediately download the database again.
- From the Hand –Held Terminal, go to the Main Menu.
- Press 5 (not listed) then Enter.
- Press Select to Delete.
- Follow instructions, cycle power to controller.
- Connect using HyperTerminal.
- Type the command: ERASEDATABASE.
- Using the Address Dials on an 8X, 16X, 32X, or 64X.
- Set Red Dial address to 999.
- Power up the board.
- Change Red Dial address to 990.
- Change Red Dial address to 900.
- Change Red Dial address to 000.
- At this point the controller would recognize this number sequence and erase the database.
- It will ONLY work if the Red Dial address is 999 after a power up.

## Computrols Commission Program

Computrols Commission Program (Commission.exe) is a program designed to operate a Computrols controller without using CBAS software and has the same functionality as the Hardware section of the Hand-Held Terminal. The program is very useful for commissioning and balancing VAV and UNI-B controllers in a building under construction where communication to the head end is not setup yet, or it is impractical to use the head end. VAV balancing technicians will find the program easy to use and can go from one VAV box to the next using a laptop.

A database has to be present on the controller for this program to work. Otherwise, there would be no points to command. To do this, program the controller in CBAS and connect to it in Real Mode. The database will download to the controller automatically.

The program uses RS-232 or RS-485 communications protocol through a serial port. Controllers supported are the Professional line of controllers, including the 8X, 16X, 32X, 64X, UNI-B and VAV controllers. VAV-B controllers do not use this program, but use the VAV-B Utility program. See the VAV-B Manual for more information.

## Cables

The most common use for the Commission Program is the direct connection to the UNI-B for balancing. To do this, you need the Ulinx cable made by B&B Electronics. Their part number is USOPTL4 and when buying through Computrols, the part number is USB-ISO. The cable converts 232 to 485 and is isolated so that there are no grounding problems. The USB end connects to the laptop/tablet and the other end connects to the Local 485 Port on the UNI-B. See the UNI-B wiring diagram for options to connect through wall sensors.

The cable needed for the Professional line controllers is a cross-over RS-232 cable with a female DB9 connector on both ends. Pins for the DB9 connectors are as follows: Pin 2=Transmit (black), Pin 3=Receive (red), Pin 5=Ground (green or white). Pins 2 and 3 are reversed on the other end. Plug one end of the cable into the serial port on the computer and the other end into the RS-232 port on the terminal board of the controller.

The cable needed for the VAV controllers is the same as shown above, with the other end stripped to bare wires. The wires are connected to the terminals on the VAV board as follows: Black=RS-232 Rx; Red=RS-232 Tx; Green or White=RS-232 Ground.

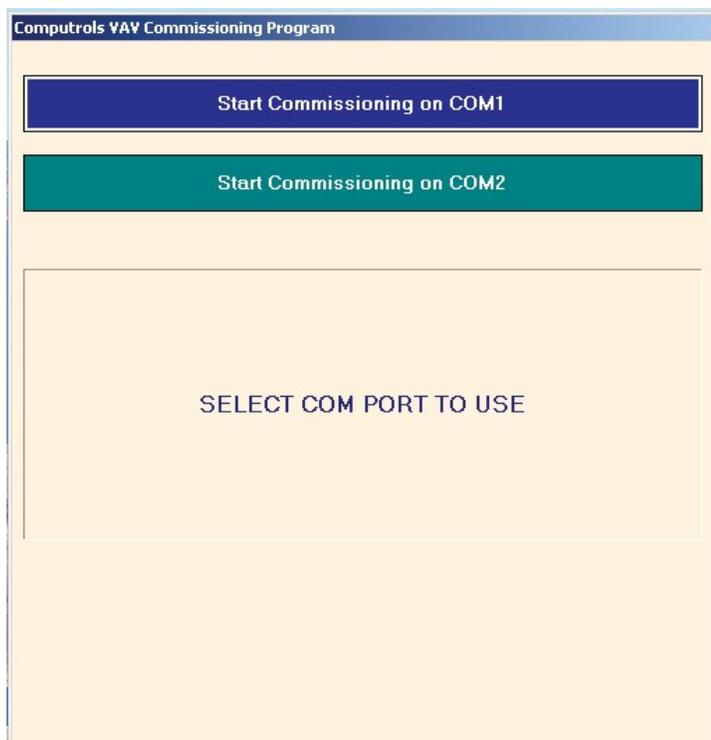
There is one more way to connect to the VAV, but it requires a special cable. When wiring a VAV controller and using an Invensys S3 Display Stat, an extra 2-conductor wire can be run (under separate cover) from the S3 to the VAV RS-232 Rx/Tx. The distance limit for this wire is 50', but might actually be shorter or longer in real life applications depending on interference levels from electrical sources in walls and ceilings. Wiring for this is outlined in the VAV Wiring Diagram. The cable needed from the laptop serial port to the jacks on the S3 is a special cable, which can be obtained from Computrols.

If your computer does not have a Serial or Com port, you can use a USB to Serial cable to make the connection. These can be purchased for about \$30. You will have to install the drivers for the cable prior to plugging in the cable. Since Commission only works with Com1 and Com2, you will have to designate this cable as one of those by going to Windows Device Manager.

## Software

Commission.exe comes along with six .ocx files in a zip file called "Commission Program.zip". The program doesn't need to be installed, just unzip the file to a convenient place on the computer. The .ocx files should remain in the same folder with the .exe file, because the program will attempt to register these files upon opening. If you would like a shortcut on the desktop, right click on commission.exe, click Send to, then Desktop (Shortcut).

Double click the Commission .exe icon and the following window will appear:



Select the correct Com Port. If you only have one Com port, select COM1.

The following window will appear:

Point Name	Value	Units
8X 51 VOLTAGE IN 1	0	%OPEN
8X 51 VOLTAGE IN 2	0.00	"WC
8X 51 VOLTAGE IN 3	0.18	"WC
8X 51 VOLTAGE IN 4	0	%OPEN
8X 51 VOLTAGE IN 5	0.01	"WC
8X 51 VOLTAGE IN 6	0.02	"WC
8X 51 VOLTAGE IN 7	0.02	"WC
8X 51 VOLTAGE IN 8	0.02	"WC
S3 HOST SPACE TEMP	76.2	DEG F
Temp S3 2	78.5	DEG F
S3 ADDR3SPACE TEMP	78.4	DEG F
S3 ADDR4 SPACE TEMP	77.0	DEG F
S3 ADDR5 SPACE TEMP	77.9	DEG F
S3 ADDR6 SPACE TEMP	74.4	DEG F
S3 ADDR8 SPACE TEMP	74.1	DEG F
S3 ADDR7 SPACE TEMP	78.4	DEG F
S3 ADDR1 SPACE TEMP SP	73	DEG F
mODE 1		TEMP
MODE S3 2		SETPNT
SP S3 2	75	DEG F
SP 3	73	DEG F
MODE 3		ALTERN
SP 4	73	DEG F
MODE 4		ALTERN
TEMP STAT 255	76.5	DEG F
SP STAT 255	72	DEG F
MODE STAT 255		SETPNT
Alt S3 2	70	

From here, you can see the status of any point in the database on the controller. Click on any commandable point to command.

Right click or press Esc and you will see the following screen:

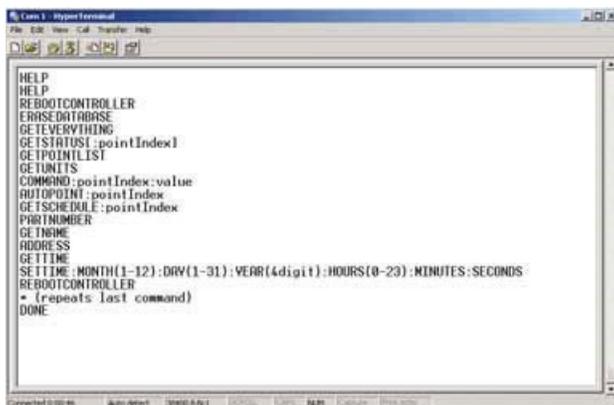
Computrols VAV Commissioning Program		
8X 51 VOLTAGE IN 1	0	%OPEN
8X 51 VOLTAGE IN 2	0.00	"WC
8X 51 VOLTAGE IN 3	0.18	"WC
8X 51 VOLTAGE IN 4	0	%OPEN
8X 51 VOLTAGE IN 5	0.01	"WC
8X 51 VOLTAGE IN 6	0.02	"WC
8X 51 VOLTAGE IN 7	0.02	"WC
8X 51 VOLTAGE IN 8	0.02	"WC
S3 HOST SPACE TEMP	76.2	DEG F
Temp S3 2	78.5	DEG F
S3 ADDR3SPACE TEMP	78.4	DEG F
S3 ADDR4 SPACE TEMP	77.0	DEG F
S3 ADDR5 SPACE TEMP	77.9	DEG F
S3 ADDR6 SPACE TEMP	74.4	DEG F
S3 ADDR8 SPACE TEMP	74.1	DEG F
S3 ADDR7 SPACE TEMP	78.4	DEG F
S3 ADDR1 SPACE TEMP SP	73	DEG F
mODE 1	TEMP	
MODE S3 2	SETPNT	
SP S3 2	75	DEG F
SP 3	73	DEG F
MODE 3	ALTERN	
SP 4	73	DEG F
MODE 4	ALTERN	
TEMP STAT 255	76.5	DEG F
SP STAT 255	72	DEG F
MODE STAT 255	SETPNT	
Alt S3 2	70	

From here you can get information about your controller (“Version” refers to firmware version). You can exit the program, return to the point list, or set the time by clicking the appropriate button.

## HyperTerminal

Open the Windows program, HyperTerminal. In Windows2000/ XP, it is located under: Start/ Programs/ Accessories/ Communications/ HyperTerminal. Microsoft removed HyperTerminal in later Windows versions. So now you should use the free download program called Putty.

Choose a name for your connection and click OK. Pick your Com port (1 or 2) and click OK. Under Port Settings, change the Bits per Second to 38400 and the Flow Control to None. Click OK. When the window opens, type help, and you will get a list of commands. This means you are connected. See the figure below:



- Use the commands listed to get statuses, command points, re-boot the controller, etc.
- To close the connection, just close the HyperTerminal window.
- HyperTerminal can also be used with all of the cables listed in the previous article about the Commission Program.
- It is possible for Hyper-Terminal to work over longer wire distances than Commission.

## Troubleshooting Communications

### TCP/IP Controller

Let's say you have a controller programmed on a TCP/IP channel and you cannot get it to download and communicate. Here are some things to check:

- Check Network Settings on the Controller using the Hand-Held Terminal, and on the network card on the computer. See TCP/IP Config.
- Delete Database from controller using the Hand-Held Terminal. (From Menu, hit 5 then Enter).
- Ping the controller IP address.
- Check the Link Light on the controller, Switch and NIC.
- From command prompt [ARP -d 192.168.x.x] will clear the ARP cache.
- Telnet 192.168.x.x
  - Help (Commands)
  - Socks - Tells you if you are connected
  - Socks? - Tells you who's connected
  - Ident - Tells you version and IP
  - Files
- If connecting over the Internet, make sure the controller has the correct Default Gateway.
- Check IP Addresses in CBAS on Channel Program screen and Controller Program screen.

## RS-485 Communications

Make sure you have the channel programmed in CBAS correctly

- IP Address of Host controller is correct
- Host or Secondary port
- Correct Channel Type (RS-485, Modbus, Opto)

Is host controller communicating?

- If it is a new channel, delete the database on the host controller and make sure the database has downloaded.
- Try reversing the polarity of the wires on the RS-485 + and – terminals.
- Reversed polarity will cause the RS-485 Port Activity light to be on solid.
- Make sure the Run Light is blinking on the RS-485 controller
- Make sure that the Host and child controllers are grounded
- Secondary side of transformers' common to earth ground
- Make sure that the wire is 18-2 shielded
- Make sure that shield is tied together and terminated on shield terminal of all controllers
- Avoid "T-Tapping" the wiring
  - "Daisy Chaining" or a straight-line bus is the proper method
  - T-Taps create multiple ends-of-line, increasing reflections that can cause interruptions or Framing Errors
- Intermittent communications can be caused by loose screw terminals
- Try a RP1 repeater at the beginning of the channel to boost the signal on long channels or channels with more than 40 controllers
- Use Show Traffic button on the Program screen of the channel or Use the Hand-Held Terminal to check for Framing Errors on the Host Controller. See Hand-Held Terminal operation for details.

## Lights on LX and using them to troubleshoot 485 comm

The LX controllers are a much more powerful drop-in replacement for the X controllers, and there are some differences in the lights on the controllers. The X controllers had Local Area Network lights on the controller, but the LX version has lights on the network adapter jack. Additionally, the Run light blinks differently and the 485 Channel lights are labeled better. Here are the details.

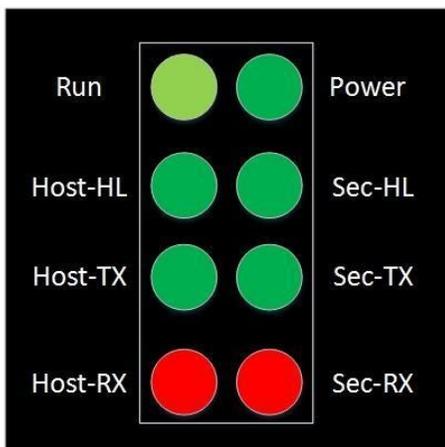
**On startup:** The 485 lights come on solid when the brain is not running. The run light is supposed to blink red on startup. Then once the brain gets up and running it starts blinking light green. So, there is a time when the light is blinking both red and green at the same time. That gives you some mixed colors. Once running: It blinks a double green blink if there is no database; Steady green blink means it has database and is running.

So that means, if the Run LED on a LX blinks twice it means it does not have a database.

The RUN LED stays on SOLID when downloading a database. For Ethernet you probably will not notice, but on 485 downloads it goes on solid for a long time.

If it blinks 3 times it means the controller has downloaded its database and is initializing.

**Network:** With X line controllers, the IP Network lights were on the front, but with the LX you have to look at the RJ45 jack on the top of the controller. On the left there is a yellow light that will be lit when you have a connection to the network switch that it is plugged into. On the right, the green light will blink whenever a network packet reaches the controller. These lights can be useful when troubleshooting communication to CBAS. There are also some blue lights that relate to the computer running the controller. You can disregard those.



The picture above shows the lights as they are on the LX controllers.

- **Power** light will be green when sufficient 24VAC power is applied to the controller.
- **Run** light is described in the first paragraphs of this article.
- **485 Comm Lights:** Host-HL will blink green when a High-Level packet is sent out on the Host Channel.
- A **High-Level** packet is a command from the CBAS head-end through the LAN.

- **Host-TX** will blink green when the LX transmits a packet to a controller on the Host Channel.
- **Host-RX** will blink when the LX receives a packet from a controller on the Host Channel. On X controllers, this light was labeled Activity.
- The lights labeled **Sec** work the same and apply to the Secondary Channel.

**Troubleshooting Comm:** The TX and RX lights are a basic troubleshooting feature and should always be consulted first when a 485 channel will not work. If your controller is transmitting (TX light blinking), then the LX is trying to communicate with a controller on the channel. The TX light will not blink if there is no controller programmed on the channel, the channel is not licensed, or the channel was created in CBAS but never downloaded to the Host Controller.

If the channel was not downloaded, the controller doesn't know it has a channel much less a controller on it. Hardware View will show Not Connected on the channel statistics. Try erasing the database on the LX and letting it download. Give it a minute after rebooting before checking the lights.

If the channel is not licensed, you should get a yellow Trouble in CBAS stating "Channel Not Started". Contact Sales to purchase the channel Protocol and get a new license.

If there is no controller programmed on the channel, you will probably get a Trouble stating that a channel is locked up. Program a controller and one valid point and that should go away. If it's an "on controller" channel, then you need to erase the database again so it will download. In the case of BACnet protocol, you don't need to program a point and the controller will show Normal Comm for a minute, in which time you can start a Probe and get information from the controller.

If the RX is not blinking, then this is a clear indication that the controller or meter is not getting the transmits or just not communicating back. It could be that the wire is not landed on the correct terminals on the device, and I have also seen cases where the device was not configured by the installer to communicate with a BAS system. If the device has RX and TX lights on it, you can see if the TX from CBAS is getting there by checking the RX light on it.

For more information on the LX line of controllers, contact [Techsupport@computrols.com](mailto:Techsupport@computrols.com) for a copy of the LX Manual PDF or download from our website at:

<https://www.computrols.com/support/documentation/>

## How Voltage Drops Over Long Distances

Usually in the controls business, you try to locate your controllers as close as possible to the devices they are controlling. Sometimes that is not possible, such as in a case where you have rooftop units in a cold climate. Controllers can't handle below freezing temperatures, so you have to locate the controllers somewhere in the building, maybe hundreds of feet away. How do you know that the resistance of a long run of wire won't cause

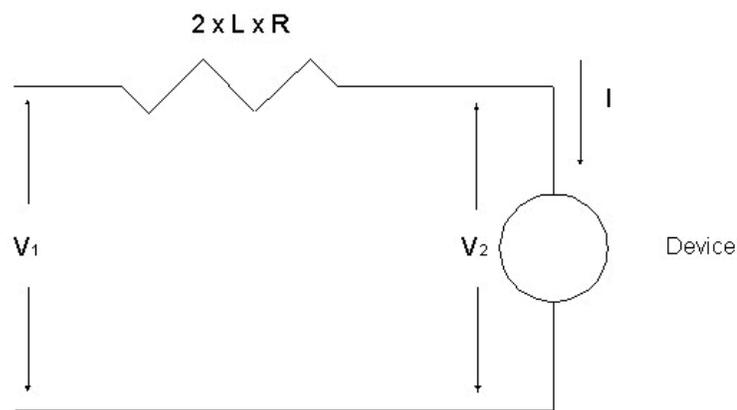
a voltage drop bad enough to cause problems?

As you probably know, a long enough wire run will cause a voltage drop, but it has to be pretty long to cause any problems. Now, a voltage drop on a signal coming back to a Voltage Input from a sensor will cause the reading to be inaccurate. The National Electrical Code contains tables for figuring this out, but here's a way of doing it on your own.

You have to know the length and resistance of the wire, the source voltage, and the maximum current of the circuit. The following website shows the resistance of light gauge wires:

<http://www.cirris.com/testing/resistance/wire.html>

Most 24 Volt control wire is 18 AWG, and according to the above-mentioned site, the resistance of 18-gauge wire is .00639 Ohms per foot. Since the maximum current on a Computrols Professional controller is 24VDC Binary Output is 50mAmps, we'll use that as the current. Let's look at the formula and circuit diagram.



$$V_2 = V_1 - 2 \times L \times R \times I$$

R = Resistance of Wire  
V1 = Voltage at Source  
V2 = Voltage at End  
L = Length of Wire  
I = Current (Amps)

In this example, let's go with a wire distance of 1000', which is probably more distance than you'll ever have to run. The variables are:

»  $V_1 = 24\text{VDC}$ ;  $R = 0.00639/\text{Ft.}$ ;  $L = 1000'$ ;  $I = 0.05\text{ Amps}$

»  $24 - (2 \times 1000 \times 0.00639 \times 0.05) = 24 - 0.639 = 23.361\text{ Volts at End}$

As you can see, the voltage at the end is still over 23 Volts, so 1000' should not be a problem powering a device. Even at 2000', the voltage drop is just 1.278 volts.

In the case of powering a long line of VAV controllers from one transformer, it would be very complicated to calculate the voltage drop. Computrols recommends that you use a 28V transformer to compensate for any voltage drop.

You probably don't have to worry about voltage drops when powering a device or relay as in the above example, but a Voltage Input could pose an accuracy problem. We recommend the use of Voltage-to-Current converters or 4-20mA transmitters. This also makes it noise immune from nearby 60Hz sources.

In the case of a long run to a thermistor, we also suggest using a 4-20mA device instead of a plain thermistor. No matter what the resistance due to wire length, the current will remain constant.

## Troubleshooting BASnet Traffic

The BASnet Traffic screen in CBAS, makes troubleshooting BASnet channels much easier. You must have 10.14 or later firmware on the controller that is hosting the BASnet channel. Newly purchased controllers will have the proper firmware.

The screenshot shows the 'BASnet NETWORK TRAFFIC' window. At the top, there are buttons for 'Auto Update', 'STOP', 'CLEAR ALL', and 'Capture Text'. Below these are several status indicators with 'Explain' links: 'LastCallTo=077', 'LastAnswerFrom=010', 'CallScanRate=052 Seconds', 'TokenScanRate=000 Seconds', 'CurrentTokenHolder=010', 'PickUpTokenCount=40', 'DeadAirCount=537', 'MessagesCutOff=222', 'FramingErrors=7', 'OverrunErrors=182', and 'ChecksumErrors=0'. The main area is a table with the following data:

Name	Address	Token	Status
Interface Channel	248		ON Line
Unknown Controller	0		OFF Line
Unknown Controller	1		OFF Line
Unknown Controller	3		OFF Line
Unknown Controller	4		OFF Line
VAV ESTIMATING DE 6			ON Line
VAV LEFT SIDE MEE 7			ON Line
GEORGE OFFICE_M, 8			ON Line
VAV 9 CONFERENCE 9			ON Line
VAV 10 ENGINEERS	10	TOKEN	ON Line
vav 11	11		ON Line
Unknown Controller	12		OFF Line
Unknown Controller	13		OFF Line
Unknown Controller	16		OFF Line
Unknown Controller	18		OFF Line
Unknown Controller	23		OFF Line
Unknown Controller	24		OFF Line
Unknown Controller	25		OFF Line
Unknown Controller	27		OFF Line
Unknown Controller	32		OFF Line
Unknown Controller	33		OFF Line
Unknown Controller	34		OFF Line
Unknown Controller	36		OFF Line
Unknown Controller	37		OFF Line
Unknown Controller	39		OFF Line

The screen can be found on the Program screen of any BASnet 485 channel, Show BASnet Traffic, and has the following features:

- On each packet that is listed on the left side of the screen, the packet type is included: Status, database, etc.
- On the right side, each controller on the channel is listed by name and address.
- Token column shows which controller currently has the token.

- Another column shows the status of the controller: Off-line, On-line, downloading, Passing token but off-line, etc. This makes it easy to see if there is a controller with a wrong address on the channel.
- At the top, there are statistics, including various types of errors, and explanations for each type of error. If error counts are rising, you obviously have a communication problem, which is narrowed down by the category it is in.

Example: Rising numbers in the “MessagesCutOff” category most probably means that there are two controllers with the same address replying at the same time. Rising numbers of “Framing Errors” most probably indicates a wiring problem.

## Installing Dongle Drivers

For the dongle (hardware lock) to do its job of allowing you to run CBAS in Real Mode, it must be accompanied by a matching license file, and the drivers for the dongle must be installed. Everything you need to do this should come with computers purchased from Computrols. If you install CBAS, the latest drivers for the dongle will be installed. However, if you install an older version of CBAS, an older version of the drivers will be installed and they might not work with Windows 7 to 10. In this case you can download the latest drivers from:

<https://www.keylok.com/support/install-utility-download>

When installing, double-click the Install.exe file you download and choose KEYLOK II, USB w/drivers and Standalone. Sometimes, Windows will install and new update that makes the driver incompatible. In this case, get the latest drivers and install them. In some cases, it might be necessary to uninstall the drivers first. To see if the drivers are installed, go to Control Panel, then Device Manager. At the bottom of the list you should see USBKey, then the sub-item USB Dongle-Software Protection Device. If there is a yellow question mark or red X on it, then new drivers are required.

The license file, LICENSE15.txt, should be copied and pasted into the CBAS 15 folder on the DPU computer. The job name on the dongle has to match the job name in the LICENSE15.txt file. The CBAS version on the license file must match the CBAS version (for instance: CBAS Professional 15.2.X) that is running on the DPU, but does not have to match the dongle. So, to upgrade your CBAS version, you won't need a new dongle, just a license file. The License.txt file can be viewed as a text file, but cannot be altered in any way, or you will get a corrupt license message.

If you have upgraded your license or added a new add-on feature, you must delete the old license and restart CBAS to pick up a new license placed in the CBAS root folder. In CBAS, go to Database, Database Maintenance, and then License. There is a button below the text section to delete the License. Do not attempt to alter the text, because that will corrupt the license.

Restart CBAS in order to pick up the new license file. If you are still not able to enter Real Mode, it might be that either: The Dongle Key is not installed, or The license is not unzipped and placed in the CBAS folder, or The license and dongle do not match.

## Running CBAS without a Dongle Key

Here are the steps. If you cannot start with a dongle, then the process gets even more complicated. Contact Technical Support.

- Run CBAS in Real mode with a valid Dongle and License file on the database that you want to lock. Make sure you have the Site's License file.
- Press the 'Database-License Lock' button in the Database/ Database Maintenance menu.
- CBAS will then prompt you for a password. You will have to contact Techsupport@computrols.com for a password that will allow you access to this feature. Send them your Machine ID (found in System, CBAS Version) and a copy of the license you are using. This password changes daily. IF THE MACHINE ID IS ALL 00000000, THEN YOU NEED TO RUN CBAS AS AN ADMINISTRATOR ONE TIME SO THE REGISTRY ENTRY CAN BE MADE.
- A 'DONE' message should appear.
- Open the CBAS Version window and there should now be a line that reads 'DATABASE ID 12345678'.
- Get that number to Tech Support who will a put the following line into your license file 'DBID: 12345678'.
- Put that new license file in.
- Erase the existing license file from within CBAS and Restart CBAS. New License file should be retrieved when CBAS is started again. Check by going to Database, License.
- Remove Dongle
- Start CBAS Real Mode and it should run without the dongle.

**NOTE:** *If you change the name of the database CBAS will act just like the dongle was removed.*

## Interpreting CBAS Troubles

Troubles are the yellow banners that appear at the top of the screen when in Real Mode, and are system generated as opposed to Alarms that are set on points. Here they are along with an explanation.

### Controller Lost Not Logged On

The 'Not Logged On' message is sent from a controller to the DPU to tell the DPU that it is not connected to the DPU. If the DPU thinks that the controller is connected then you will get that error. So, it means that the DPU thought that a controller was connected but the controller did not have a connection to the DPU. You have to

understand a little about sockets. If a socket connection is closed on one side of the connection incorrectly (abruptly) the other side does not know that the socket was closed for almost 1 minute. When a socket is shutdown correctly then both sides know that the socket is closed and both sides disconnect. So, this condition would occur if the socket on the controller's side was closed without going thru the closing procedure. The DPU side still thinks it is holding a good socket connection, but in reality, the other side of the socket is closed. A power outage on a controller could cause this. Or some other error condition in the controller.

## **Controller Lost Panel Not Up**

Related is Panel Not UP, this is generated when there have not been any messages passed between the DPU and controller over the socket for 5 minutes. The DPU has a good socket connection (it thinks) with a controller but there is no data flowing across it. So, the DPU closes the socket and generates the 'Panel Not UP' error. Any time there are no messages passed between DPU and controller for 30 seconds the DPU will send an 'Are You There?' message to the controller. If the controller does not respond for 5 minutes (10 Are You There's) then obviously it is not really there.

## **Controller Not Keyed**

If CBAS starts talking to a controller and it has no key, CBAS will set its key and you get that error. The controller will then come online. If the controller has the wrong key, CBAS does NOT rekey it. It will just stay offline. You have to manually rekey the controller using DDCC program and the DPUs dongle. If you are unsure what controller it is, look for a lost LX-line controller or Access Controller in the Controller Channel (TCP/IP). Only LX and Access Controllers get Keyed.

## **DPU LOST**

DPU LOST is a trouble you will see only on a GW. It means the connection between the GW and DPU was broken. It will reconnect after 1 minute as long as the DPU is in Real Mode by that time.

## **History Full Message**

This only applies up to CBAS 15.2. CBAS will display an alarm bar message when the history gets 50,60,70,80,85,90,91,92,93,94,95 Percent Full. After 95 percent full an alarm message will be displayed every minute. The alarm message will tell the user what percentage full the history is. If the user decided to do nothing about it than history saving will stop when it reaches 100 % full. I am not going to automatically restart the history file like I had talked about. Alarm messages for 50, 60, and 70 % full will be Normal conditions. 80 will display as a Trouble and everything else will display as an Alarm.

**Note:** CBAS no longer has a history size limitation as of version 15. Now when the Archive.dat file reaches 1 Gigabyte a new Archive file will be created. The next one will be named Archive001. dat, then Archive002.dat ... There is still only 1 Archive.mdb file. So, the only limitation now is hard drive space. All of this history (from all files) is available online all the time. Removed the Purge history option in CBAS (and auto purge). Also changed the default parameter for history saving of points from 15 minutes and 3 degrees to 30 seconds and 0.5 degrees.

## Internal CBAS Error

Internal CBAS Error will be generated anytime CBAS tries to do something but can't, like put a command into the command queue. Or some value is out of its possible range. When this is generated there should also be a corresponding error log message. The ErrorLog message should read: User- Alarm Ch=xx Sess=xx Code=xx.

The Code number will be between 1000 and 2000. This code number will tell us exactly where the error came from. The Ch and Sess numbers will tell me in what channel and which controller the error was generated. If you just get one or two of these you should not worry about it. If you get these on a regular basis then something is wrong and we should figure out what.

## Invalid Message on Channel

When there is too much traffic on the network the controllers start sending invalid messages back to the DPU. Best solution if you have a network that is too busy would be to put the CBAS system, controllers and DPU, on a separate network. Also, a VLAN (virtual) might be a solution. You can also enable the CBAS Logger and look at the error logs from that time and determine which controller is sending the invalid messages. Check the wiring and maybe replace the controller. I have also seen where a bad wire or wire that wasn't plugged in all the way could send the same alarm.

## Power Outage Reboot

This CBAS Alarm will be displayed if a controller lost power. But only lost power for a second. If the controller lost power for more than a few seconds then the alarm will not be displayed. If the ROM in the controller had time to clear on the power outage then the alarm will not be displayed.

## Queue Full

CBAS has buffers (queues) where all the incoming messages go while they are waiting to be processed. If the messages come in faster than CBAS can process them then the queue will get full and you will get that error message. While the queue is full all new incoming messages are lost. This error can be caused by the PC doing

something very processor intensive outside of CBAS, when the computer is doing Windows Updates or virus scans/updates.

## **UI Locked Up**

UI Locked up will get reported if the User Interface does not respond for 10 seconds. This can be caused by excessively long Automatic Downloads, Database Backups, Automated Reports. If you just get one or two of these you should not worry about it. If you get these on a regular basis then something is wrong.

## **Watchdog Reboot**

Controller Watchdog Reboot. This CBAS alarm will be displayed if the watchdog on the controller caused the controller to reboot. i.e.-Firmware lockup.

# Chapter 11 » BACnet Programming

## Programming 3<sup>rd</sup> Party BACnet Controllers in CBAS

### BACnet MS/TP

- Programming a 3rd Party BACnet MS/TP Channel and Controller is much like programming a BASnet channel of VAVs. You need an 8X or other Host controller first. (8X, 16X, 32X, or 64X, 8-LX etc)
- It is suggested that the Host controller have recent or newest firmware, as many changes have been made to BACnet over the years.
- You will also need to set the 3rd party device's address and verify the Baud Rate that it will use to communicate. CBAS can communicate with the following Baud Rates: 4800, 9600, 19.2K, and 38.4K. However, X-line controllers have a slower processor than LX controller so it is recommended that you not go higher than 19.2K Baud using an X as Host controller. On the LX, Baud rates up to 115.2K Baud are available.
- BACnet is a token passing protocol, so all devices should be set to Master.
- All BACnet controllers must have a unique "instance" number. So, you may have to set an instance in CBAS to correspond to the instance you find when you "Probe" the controller.
- Communication wiring should use 18-2 shielded twisted pair.
- Multiple controllers can be "daisy chained" like any other RS485 bus.
- BACnet TCP/IP is also covered later in this document.

**Note:** Instructions below assume that you have read all the CBAS Programming portion of the manual and understand how to program controllers, channels and points.

- Program a BACnet 485 over TCP/IP channel on the Host Controller.
- Set the Baud Rate by going to the Program screen of the channel. (Match the Baud Rate of the device. Some are set to auto-negotiate by default. Example: Viconics thermostats)
- Program a BACnet Generic controller on the channel at the address that the device is set to. (0 is NOT a valid address)
- When you are asked if you want to import the points, answer No. (First time only)
- Go to Real Mode and wait for the Host controller to come Online. If you just added a BACnet Channel to it, you must Erase the Database and let it download again so that it knows it has a new Channel.

- Once the Host Controller is Normal, keep an eye on the BACnet channel to see if the Controller comes Online. Even without any Points programmed, it should turn Normal and stay Normal for about 1 minute. It will not stay Normal because it has no Points to poll.
- While it is Normal, click the Generic BACnet Controller and go to Program. Click the Probe button to start the Probe, which will only work when the Controller is Normal.
- **Alternative:** Using the manufacturer's documentation, program one point that you are sure about on the controller. If you do not program a point on the controller, it will not stay communicating. This is because CBAS has nothing to poll, so you will get no response.
- **Once you add the point**, you have to go to the program screen on the point, then click the BACnet button (bottom left), and set the address. Also make sure the point type is correct.
- Go into Real Mode and if the channel is BACnet On Controller, make sure the new database downloads to the Host controller, otherwise it doesn't know about the new point.
- Do this by clicking the Host Controller, then Erase Database and wait about 5 seconds for the controller to reboot.
- Take the controller OFF SCAN, then back ON SCAN, and it should download within a few seconds.
- The Generic BACnet controller and its points should turn Normal (Blue) if it is correct.
- If the Probe was successful, you can import the points from it. Just click the controller and click Import Probe File. That should open a window to CBAS19\Sites\Database Name\Data. Point to the last probe file by date and follow directions.

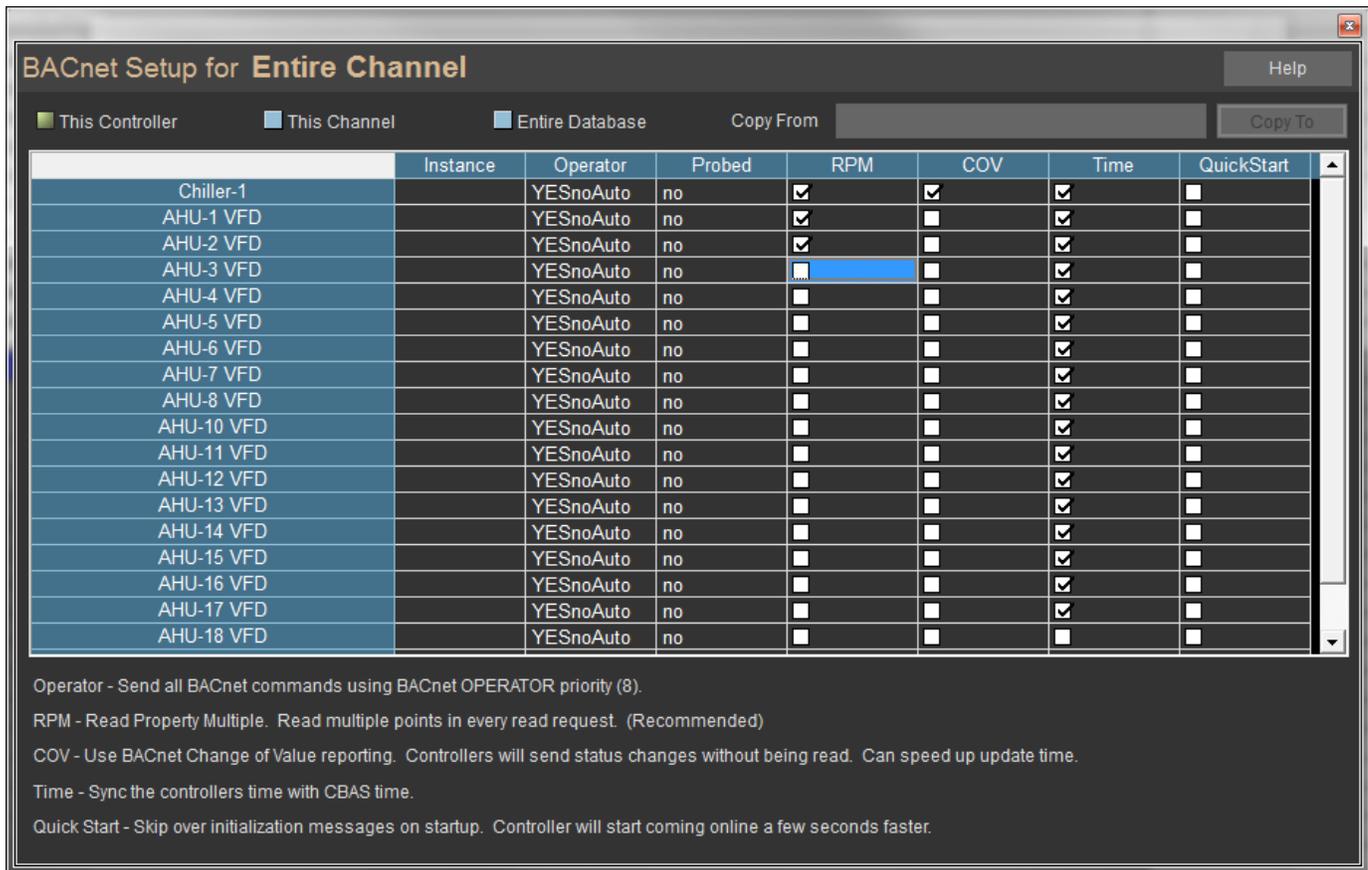
At the end of the Probe text file, there will be a list of the points on the BACnet controller. You can program the rest of the points from this list or import them as in the last step. If there are no points listed with point names and values, then the controller did not probe correctly. Try again and if it doesn't give you points, then the device is not cooperating and you will have to work from manufacturers documentation. This is rare but it does happen.

At the beginning of the text file, there is an instance number. BACnet protocol requires that communications include the instance number. If you are having trouble communicating, try adding the instance number to the program screen of the Generic BACnet controller. If you cannot Probe the controller, you may need to get the Instance from the device's configuration utility.

After the basic information that is stored on the controller, you will see BACnet Services that are supported, if it says SUPPORTED to the left of the service. CBAS only supports COV (Change of Value) and Read Property Multiple in addition to the basic default Read Property and Write Property. When you successfully probe a BACnet device, CBAS sets these Services to be used when communicating.

CBAS has a new feature where you can check the supported services as well as the instance number set in CBAS. If you go to any BACnet Generic Controller in CBAS, select the controller and then click Program, you will see a

BACnet Settings button. Click the Settings button and you will see the following:



By default, you will get just that one controller, but you can choose the Entire Channel or the Entire Database. Each line is a controller and they are labeled with the names they were given when programmed. Everything is explained briefly at the bottom of the screen. Instance number, if inserted on the Program screen of the controller, is shown. Operator means Operator Priority Only and is checked by default on the program screen of the controller when added. This is explained in a later section: BACnet Priority Array. You can also see if the controller has been probed. If for some reason RPM and COV are checked and they are not actually supported, you can uncheck them and restart CBAS. If they are on an “on controller” BACnet channel, then erase the database on the Host Controller. Time and QuickStart are also checked by default.

If you are having trouble with controllers going in and out of Normal comm, try unchecking COV. Some manufacturers versions of COV can cause problems.

**Note:** Computrols VAV-B BACnet controllers do not support RPM or COV, only Read and Write Property.

**Note:** Sometimes the Probe file point list will differ from the manufacturers’ documentation because of recent firmware or model changes, but the Probe file will show the correct points. Also, not all devices will respond to the Probe, but most will.

**\*\* While editing points in Real Mode: if you change point addresses, change point types, add points, change the controller address or the baud rate, CBAS MUST BE RESTARTED. \*\***

It should also be noted that BACnet MS/TP devices generally take a few minutes to start communicating after the Host controller has Normal communications. To watch this process, go to the Program screen of the BACnet Channel. Click the Show Traffic button. You will see messages that are being sent. The first one should be “WHO IS” if you haven’t put in an Instance number. You may see 2 of these before a response from the controller. Once you have seen at least 3 of these messages without a response, you can conclude that something is configured wrong, most probably in the configuration of the device itself. It could also be that the polarity of the communication wires is reversed. In this case, the Port 1 or Port 2 Activity light on the controller should be solid. Consult the manufacturer’s documentation for help. However, if this is the case, the Probe would not have worked.

Once the 3<sup>rd</sup> party device responds, you will begin to see COMPLEX ACK messages:

```
Add:1 Sz:17 COMPLEX ACK (3)
```

```
READ AV 7 (3)
```

Add:1 means the address of the device is 1. Sz:17 is the size of the packet. (3) means this is the 3<sup>rd</sup> packet received. The next line means the packet contains address 1’s reading of Analog Value 7.

If you have a wrong address or point type, you will see errors:

```
Add:1 Sz:7 ERROR OBJ UnkObj (36)
```

```
0.0.0.1 READ AI 0 (36)
```

In this case, Add:1 is the address of the controller/device. AI 0 is analog input position 0, which is an invalid point because 0 cannot be used. UnkObj means the point is not in the database of the device as configured by the manufacturer.

## Duplicating controllers

- Additional controllers can be added easily once the first one is programmed and working. Once you have verified that all points are correct on the first controller, you can click the controller, and then click Export Database. (In older versions, Export to OPTO/BACnet)
- NOTE: If you get error messages when you export and the export file saves as 0 bytes size, then you need to scale the General Purpose Table of the Host controller. See the last section of this manual for instructions on scaling.
- Follow onscreen prompts to complete the export.

- The export file will be saved to C:\CBAS\Bin\BACNET as BACnetGeneric.txt.
- If you will be saving multiple point configurations, you will want to rename that file to reflect the configuration, or it will be overwritten.
- When you add subsequent Generic BACnet controllers, you will be asked if you want to import the points.
- Answer YES and you will be taken to the same folder to select the proper file.
- When adding the points, you will be prompted to add a prefix to the point names.
- If the point names don't turn out the way you want them, they can be changed one at a time through the Point Program screen, or through Global Name Change at Database\Database Maintenance.

**Note:** To avoid problems when naming points and adding prefixes, make the point names generic on the controller that you are exporting from. Example: instead of naming points like RM 1 SPACE TEMP, add them as SPACE TEMP. You can add the RM 1 part using the prefix feature when adding from the export file.

## BACnet on Controller

In the preceding configuration (BACnet 485 over TCP/IP), commands to a BACnet device may be head-end dependent, because you cannot download programming, like logic or schedules, to the 3<sup>rd</sup> party controller. Software points containing logic etc. exist on the Host controller or other needed points may exist on other controllers. In situations where a loss of communication occurs, which can happen when CBAS is not in Real Mode, you will lose functionality. It may be necessary to program the channel as “BACnet on Controller”, or to convert the channel to that type. Since this channel type is fairly new to CBAS, the latest firmware is necessary on the Host controller.

When programmed on a BACnet on Controller Channel, the database of the Generic BACnet Controller is contained in the database of the Host controller. The BACnet points communicate directly with software and hardware points on the Host, eliminating the need to communicate with the head-end computer. Statuses and changes of state are then relayed to the head end.

**Note:** An “on Controller” channel is not seen in the main screen of Hardware View. You can find the channel by going to where you programmed it originally: Click the Host controller, then Channels. Click either the Host or Secondary channel, then controllers. Of course, the points can also be found in Text View\All Points, and can be added to Logical Groups or Graphics View. Otherwise, programming controllers and points on this type of channel is exactly the same as described in the first section.

The tool for converting a channel to an “on Controller” channel can be found in Utility Mode on the System Menu under Controller and Channel Maintenance. For information on Utility Mode, see the final section of this manual.

## BACnet TCP/IP

The instructions for this type are almost exactly the same as BACnet MS/TP, except that you don’t need a Host controller. The BACnet TCP/IP channel is added on the first screen of Hardware View.

- In Editor Mode, go to Hardware View and click Add a Channel. The configuration will be BACnet TCP/IP.
- Once the Channel is added, click the Channel then Controllers.
- Add a BACnet Generic controller.
- Everything else is the same, except that each Generic BACnet Controller will need a unique IP address within the subnet that the CBAS Server and other controllers are in.
- If you program on a Laptop and transfer the database to the DPU at the Site, the IP address of the Channel may need to change. Any TCP\IP Channel must have the IP address of the Network Card on the DPU, especially if the DPU has more than one Network Card.
- Logic and schedules etc. can be programmed on the points, however, they reside on the head-end.

**\*\* Important Note: You can have only 1 BACnet TCP\IP channel because BACnet uses IP Port 47808 and that port cannot be shared by 2 Channels. All BACnet IP controller must reside on the same Channel\Network Card. If you have a second Card, then you CAN make another Channel, just set the correct IP address on the Program screen. \*\***

For more information on TCP/IP networking, refer to the Networking section of the CBAS Programming Manual.

The installer of the BACnet device is usually responsible for setting the IP address, as well as any other necessary settings, through its local interface.

## BACnet Router

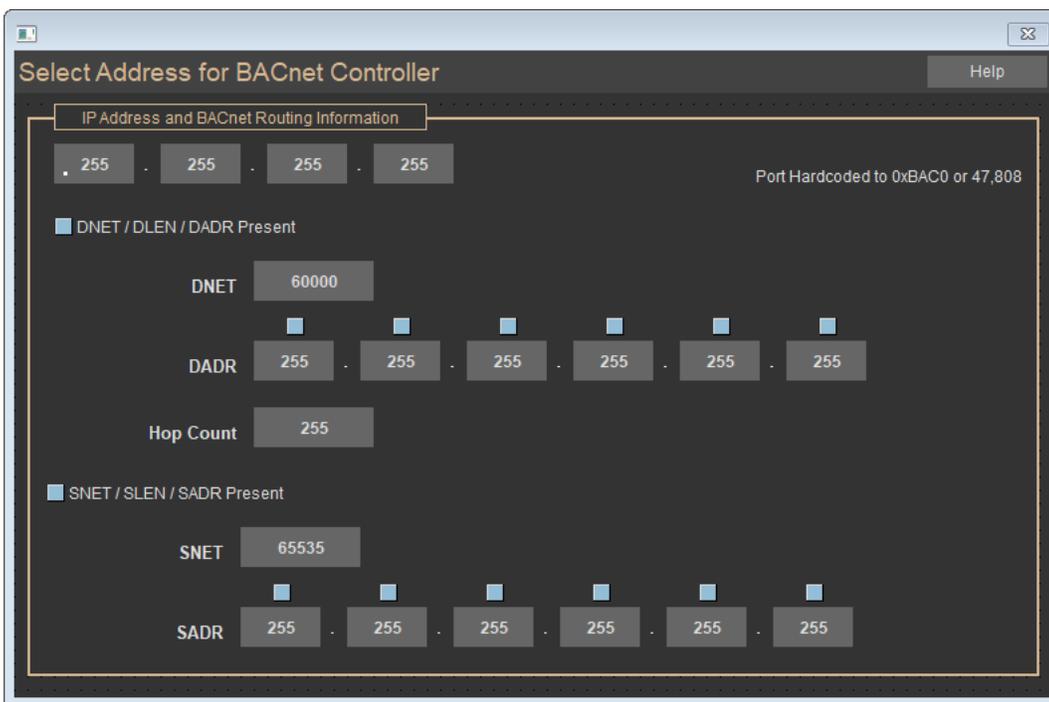
BACnet Router is where you communicate with a Router over BACnet TCP\IP and comm is routed out to multiple controllers on a 485 Comm loop. The loop could be BACnet, Modbus, Lonworks or some other protocol. Sometimes it can be difficult to know from manufacturers documentation whether they are using BACnet Router. But if you see anything about Destination Network (DNET) or Destination Address (DADR), then it is a Router.

As was said earlier, you can only have one BACnet IP Channel because of the IP Port 47808 usage. If you already have a BACnet TCP\IP Channel with non-router devices on it, the channel can be converted easily to Router and the non-router controllers will still work. Just don't check the box for DNET\DLEN\DADR Present as in the picture below. All of the controllers behind the router will have the same IP address and different Destination Addresses.

To convert the Channel type to Router, click the channel then Program. There is a button in bottom left to Change Channel Type.

To get to the screen below, click the BACnet TCP\IP Channel, Controllers, then the Generic BACnet Controller. Click Program then click the IP address in the bottom right. As said before, do not check that first box for DNET if it's not a Router. If so, then check the first box and enter the DNET and DADR.

SNET has not been implemented as of yet.



1 HELP\_BUTTON\_IDD\_CONTROLLER\_BACNET\_ADDRESS

## BACnet Priority Array

BACnet commandable points have something that BACnet calls the Priority Array. This is a list of 16 command values. The BACnet list matches up very nicely with our CBAS priority list. Operator is right in the middle, Logic 4 is at the top and Schedule is at the bottom. Each BACnet output has a list of 16 commands, one for each priority. So, let's say a BACnet Air Handler has the following commands for a BACnet Binary Output:

Logic4      OFF

Logic3      ON

OPER	OFF
Logic2	none
Logic1	OFF
Overtime	ON
Schedule	OFF

The AHU would be OFF by Logic4 priority. If you were to AUTO the Logic4 command, the AHU would immediately turn ON by Logic3. If you send an AUTO by Logic3 it would then turn back OFF by OPER. Each BACnet point keeps a record of all commands for each level. When you release 1 level it searches the list and commands the point to the next highest level. Notice that not all priorities have to have commands associated.

CBAS takes a different approach by only storing the current command state. If you AUTO a CBAS point, you then have to wait until something comes along like a Schedule and reevaluates to command the point.

Other differences: In BACnet if you AUTO a point you are ONLY autoing that 1 priority. So, if you send an OPERATOR AUTO it will ONLY release the OPER command, not the Logic3 or Logic4 commands. Since you can't send an OPER AUTO in Logic the only way to release an OPER command would be to have an operator AUTO it. You can't release an OPER command via Logic in a BACnet controller.

This is where the 'Oper PRI Only' checkbox comes into play. This is located on the Program screen of the Generic BACnet controller. If you check this box and restart CBAS, then ALL commands from CBAS to the BACnet controller will have priority OPERATOR. In CBAS the original priority will be remembered and displayed to the user. So, for example the AHU is being turned on by Schedule. CBAS will tell the BACnet device to turn on the BO by OPERATOR priority, but the CBAS user will still see the priority as being Schedule. Doing it this way there should ONLY be 1 command in the BACnet device. So if you AUTO the BACnet device it should just wait for a new command before doing anything. The down side to this is that if your BACnet device has any internal programming then you may not be able to override the internal programming if it is a higher priority than OPERATOR.

Anyone that has done much BACnet interfacing should be familiar with the BACnet Diagnostics screen. This screen will show the user all the commands in the BACnet point and allow the CBAS user to release these commands. If Operator Priority Only still does not command the point, it's possible that a higher priority still controls the point even though it hasn't been commanded recently. There is a way to check this and release any priorities. Go to the point program screen of the output and click the BACnet button in the bottom left. Click Point Info and click the drop-down list at the top. Choose Priority Array and click Load. This will show you all of the priorities. If there is a number to the right of a priority level, then you can release that by following the directions at the bottom (double-click to release).

BACnet also has a priority called MINIMUM\_ON\_OFF. It is between OPERATOR and LOGIC3. This is the ONLY BACnet priority that can NOT be released or commanded. This is only used internal to the BACnet device and is used to force a minimum ON or OFF time of the point. I have had people tell me that they can command a point On/Off with Logic3 but then if they try to command by Operator it does not work. That is because many

BACnet devices use the Min On/Off time and set it to 5 minutes. Logic3 is higher than MIN\_ON\_OFF so it overrides it. But Operator is Lower so you must wait the 5 minutes (or whatever time the device uses for min\_on\_off) before the point will change. So you can still command the point On/Off by Operator but the BACnet controller itself will force the Min On/Off times before the command will take. Using the BACnet Diagnostics screen you can see if the point is in MINIMUM\_ON\_OFF priority, but if it is there is nothing you can do about it except wait until the device releases the MIN\_ON\_OFF.

BACnet standard says you MUST implement Priority Array for all BACnet BO and AO points. But implementation of Priority Array for BV and AV and MV points is optional. In the Computrols VAVB-BACnet I purposely did not make any of the points in that controller BO or AO. They are all BV and AV. That way I did not have to implement Priority Array in the VAVB-BACnet.

BO = Binary Output

AO = Analog Output

BV = Binary Value

AV = Analog Value

MV = Multistate Value

## **Optimizing BACnet MS/TP Communication**

### **BACnet polling**

BACnet is a Token Passing protocol. That means only the node that has the token can talk. To read a BACnet point, CBAS sends a message to the BACnet controller requesting the point's value. But before that message can be transmitted over the 485 wire, the host controller must get the token first. The BACnet controller normally responds with REPLY\_POSTPONED. That means it will give me the requested data later. So then the Token goes around. When the BACnet controller gets the token, if it has the data ready it will then respond to the read request. As soon as CBAS gets the response back it immediately sends out the next Read Point message. So if there are 40 BACnet controllers on a channel then there should be 40 BACnet messages out waiting for responses at all times. If a BACnet controller never responds then CBAS will timeout after about 15 seconds and then read the next point. It doesn't matter how many BACnet channels or how many BACnet controllers are on each channel, there is 1 and only 1 message being done to every BACnet controller at all times. So if you have a total of 5000 BACnet controllers then there are 5000 BACnet messages out being handled.

The slow part is the Token Passing. If you have many BACnet controllers on a channel then it takes longer for the Token to go around. And remember a device can only talk when it has the token, so the host gets the Token and sends a message to BACnet address 5, then passes the token to next device. When BACnet controller address 5 gets the token he then responds back to my original message. That can take some time if the token is going around slowly.

Many of you have seen BACnet 485 channels that have normal communications, but the status points don't seem to update. This is due to too much traffic and the command queue gets backed up so that only commands go out. Here are some things you can do to make the BACnet 485 communication better.

First thing you should do is probe the BACnet device and see if it supports Read Multiple, Write Multiple and COV (change of value). It probably does. If you add the points from the Probe file, these settings will be set in the Generic BACnet controller and after a CBAS restart, will start using those features. If you can't add the points from the probe file, you can set these settings manually by going to the Program screen of the Generic BACnet controller, then BACnet Settings. Check the boxes and close, then restart CBAS. If Read Multiple is enabled, then CBAS will get up to 5 statuses at once. COV will actually send changes as they happen. If write multiple is enabled, it will send up to 5 commands at once, putting less packets into the command queue. Write multiple is only available on interface, not On Controller channels. However, On Controller BACnet scans faster.

**Note:** Do not enable these features if the BACnet device doesn't support them.

## BACnet on Controller

Every time the X controller gets the BACnet token it sends out 1 message to each controller on the channel. So on smaller BACnet channels (less controllers) the token will be faster and therefore the polling will be faster. Commands take priority over polls. If there are any commands waiting to be sent out then the 1 message for that next token will be a command. If there are no commands to be sent out but a point was recently commanded then the commanded point is polled next. That makes commanded points update fast. So if there are no commands and nothing was commanded recently then the next point in the BACnet point list is polled.

BACnet interface (BACnet 485 over TCP/IP) is different. Until recently, a BACnet interface channel would poll 1 point per second per controller. At a job site recently, there were 180 points in a controller. It would take 3 minutes for all the points to update, and that is if there are no commands. Consequently, this was causing the BACnet controller to appear not to work. It was changed so that polls are sent as soon as the response from the last poll is received. Now it polls all 180 points in about 10 seconds.

Other things to speed up the channel:

- Use highest possible baud rate
- Reduce the number of controllers on the channel
- Reduce the number of points on the controllers

**Question:** Does it do any good to evaluate a PID if the feedback does not update but once every minute?

**Answer:** NO. If the PID is evaluating once every 5 seconds then it will evaluate and send 12 commands to the output point before the feedback updates. Those 12 commands take the place of 12 points being polled during that minute, which slows down how often points are updated. Also, the PID is sending commands based on an old feedback point value. This could cause the PID to not work. It does no good to evaluate a PID any faster

than the feedback point is updating. It is actually a detriment to do so.

What really slows BACnet polling down is to have BACnet points programmed that are lost. Each time one of those points is polled it has to timeout (about 15 seconds). These are probably points that don't exist or are incorrectly configured. If there are 2 points that are configured the same, the second will stay lost. Remove any points that stay lost.

## MS/TP Troubleshooting Example

I just got back from CBAS University where they had a BACnet channel that the controllers would go lost many times a day. I put the snoop on the 485 lines and found that 1 BACnet controller was acting weird. So, it looked like this:

xx – destination address

xx – source address

```
55 FF 00 11 0A 00 00 04    TOKEN
55 FF 00 13 11 00 00 E9    TOKEN
55 FF 00 14 13 00 00 60    TOKEN
55 FF 00 1F 14 00 00 71    TOKEN
55 FF 00 20 1F 00 00 73    TOKEN
55 FF 00 1F 14 00 00 71    TOKEN
55 FF 00 22 20 00 00 CD    TOKEN
55 FF 00 (fe)00 (fe)BE      Tm = 80 milliseconds. (fe) = framing error
```

If you notice address 14 passes the token to address 1F. 1F then passes the token to address 20. So the next message should be address 20 passing the token to address 22 but instead it is address 14 passing the token to address 1F AGAIN! And that is where the problem comes in. This causes 2 BACnet controllers to think they have the token at the same time, so the next message has framing errors (fe) because 2 controllers are talking at the same time. This particular channel has a lot of framing errors. They are ALL caused by the VFD drive address 14 not recognizing that address 1F did receive the token and passed it along to the next address (20). Most of the time this just caused Framing Errors and the channel recovers, but every few minutes this causes a total breakdown in the BACnet token passing. The Token must be reacquired by everyone. During this address discovery time the X line is offline for 30+ seconds and all the BACnet devices on that channel go LOST in CBAS.

There are 6 VFD drives and 5 BTU meters on this channel. The VFD drives talk just fine to other VFD drives but the problem comes in when the VFD drive is listening for a message from the BTU meter. It does not hear that message and therefore retransmits. All 11 of these drives are mounted on the same wall just feet from each other and are running at 9600 baud.

A technician called the ABB drive guy and he suggested putting in the EOL (end of line) resistor on address 14. Even though this address 14 is not the end of the line we changed the switch settings on the ABB drive to put in the EOL resistor and rebooted the ABB drive. This cleared up the problem. After that address 14 did recognize messages from address 1F and ALL the Framing errors went away.

Without snooping on the 485 line we would have never known that the problem BACnet device was address 14. The CBAS Diagnostics (only available on "On Controller" channels, DIAGS button) screen for this channel was showing the Framing Errors. So from CBAS you know there are framing errors. The problem is you don't know which of the 11 addresses on the channel is causing them. The only way to determine who is causing the BACnet framing errors is to look at a snoop file and understand the Token passing scheme of BACnet. Otherwise you would have to eliminate controllers physically from the channel until it stabilizes.

## TOKEN PASSING

More about token passing. The way a BACnet device knows who to pass the token to is that every few seconds that address sends a CALL message to an address that is not online. If something at that address responds then it comes online and will join the Token passing group. Remember that a BACnet device can ONLY talk if it is passing the token. So in the Southeastern database the last BACnet address programmed on this channel is address 36. The Host is programmed as address 1 (Address field on Program screen of Channel) instead of the default 127. So if for any reason we no longer are part of the Token passing group then it is up to address 36 to CALL us so we can rejoin the Token passing. So how that works is address 36 calls address 37. A few seconds later it will call address 38. ... Probably about 1 minute into this address 36 will call address 128. 128 is the maximum allowed address so it rolls over to 0. So then a few seconds later it will call address 0. Then a few seconds after that it will call address 1!!! Finally, we can respond to the CALL and rejoin the Token passing group. So the fact that we are address 1, which is the farthest possible address away from 36 means that it takes us minutes to rejoin the Token passing group after losing the token. So what Arthur and I did was we changed the CBAS BACnet address from 1 to 22. The last VFD drive is address 20. So now if the token is lost we are only 2 addresses away (only 2 CALL messages away) from a previous address and we should get back online MUST faster. When we were at address 1 we were 94 addresses away from a previous address. So making a good choice for our BACnet address has a BIG impact on how fast we can rejoin the conversation after a token loss.

Yes, lowering to 2 after the last address is a good idea if you have a channel that loses the token a lot. On a good BACnet channel it should not be an issue since the token should never be lost in the first place.

They have all the BACnet addresses set to 1 at Southeastern, from 127. There were 11 addresses from 2 to 36 that were used. There was a gap from 20 to like 30 that were not used so we just put it in the middle. Actually,

since the issue was with the ABB drives passing token to BTU meters, we put our address in between them. So now the ABB drive talks to US and then we talk to BTU meters. So that could have been part of the solution. It seemed like the ABB drives had trouble understanding messages from BTU meters.

Read Single and read multiple

COV

Probe

BACnet Router

### **Another example:**

I understand setting the Max Master to the highest used MAC/serial number on the channel. Say I have VAV #s 1-27. Set the BACnet address on the channel to 28 and MaxMaster to 28. This value for MaxMaster also needs to be set in at least VAV 27, correct?

Also Max Frames - I've seen values from 1 to 2 to 63. Any recommendations to keep things consistent here?

### **Answer**

If address 27's MaxMaster is set to 28 than it will not look for any addresses above that. So if it was left at 127 than it is going to look for all addresses all the way to 127 than back to 0. When set to 28 than it will look for 28 than back to 0. So the BACnet protocol will still work if different controllers have different values for MaxMaster but controllers could be much faster to come online if set properly. I guess there is an instance where setting MaxMaster incorrectly would prevent controllers from coming on line. If 27 has MaxMaster set to 28 and we were still at 127 than 27 would never look for address 127 and so it would never start passing the token and come online. But yes you are correct if last controller is 27 and we are 28 than set MaxMaster to 28.

MaxFrames is just the number of messages a controller can send before it MUST pass the token to the next guy. So I recommend setting all controllers to a low number which limits them from using too much of the bandwidth. Then set us to the highest number possible. Previously, I had the LX set to 8 but I changed it to 100 when testing lyric job. So now when I get the token I will send 100 messages before I pass the token on to the next guy. That is, if I have 100 messages ready to send. So I use all the bandwidth. But I don't want them to use much bandwidth at all so I would set them to 4.

## Utility Mode and Scaling Databases

To start CBAS in Utility Mode, copy the CBAS icon on your desktop, then paste it so that you now have a new one. Right-click the icon and go to its properties, and add the following to the end of the target: **[space]mode=utility**

This will start CBAS in a special utility mode that you should not allow the end user access to. From here we can scale the controller database and other items unavailable in Editor mode.

- To scale the database on a controller, start the system in Utility Mode, go to the System then Scale Database.
- When asked if you want to scale the DPU database, click NO.
- When asked if you want to scale a controller database, click YES.
- Click the TCP/IP for Controllers channel.
- Pick a controller from the list.
- A screen with database items will open and display the number of items used and available.
- Make sure the number available is more than the number used.

### Example:

Logic 32 used and 32 available, change the available to 60

PIDS 12 used and 12 available, change the available to 30

Make sure that the Total Available Memory at the bottom of the window is a positive number. If not, then lower the numbers you scaled previously. Click Save Changes and Exit.

You will have to acknowledge a message to erase SRAM. This means you have to delete the database from the controller and let it download again. A convenient way to delete several databases at once is to change to Real Mode, go to the System > BASnet controller information screen, select a controller or more than one, and hit the Delete Database button.

The General Purpose Tables are at the bottom of the list. Scale all 3 of them to more than the number of points. If you have 19 points, scale them to 30 to be safe. Save changes. You do not have to go to Real Mode and back to Editor Mode in order to Export from the Generic BACnet controller now.

## Convert Database to “On Controller”

- To convert the database, open CBAS in Utility Mode, go to the System Menu, then Controller and Channel Maintenance.
- In the bottom left, click the button labeled “Convert Interface Channel to On Board 8X Channel”.
- It will remind you to do a Backup first. Click Yes, then choose the channel and it will convert.
- Once again, you will have to delete the database from the Host controller so that the changes are downloaded.

# Chapter 12 » CBAS Modbus Programming Guide

## CBAS Modbus

With the CBAS Modbus RTU interface, you communicate (monitor and command) with any manufacturer's equipment.

### A Little Background

Modbus is an application layer messaging protocol that provides client/server communication between devices connected on different types of buses and networks. It is similar to RS485 and RS232, and has been a standard industrial protocol since 1979 when Modicon introduced the protocol in its PLCs (Programmable Logic Controller). Schneider Electric now owns Modicon.

Modbus is a request/reply protocol and offers services specified by function codes. These function codes are elements of the Modbus request/reply protocol data units (PDUs).

#### There are three categories of Modbus:

- Modbus Serial – either Modbus ASCII or Modbus RTU
- Modbus ASCII – each eight-bit byte in a message is sent as two ASCII characters, main advantage is that it allows time intervals of up to one second to occur between characters without causing an error.
- Modbus RTU – each eight-bit byte in a message contains two four-bit hexadecimal characters, main advantage is its greater character density allows better data throughput than ASCII for same baud rate.
- Other Serial Modbus – several manufacturers have made modifications to the Modbus protocol to meet their specific application needs, these would include a Modbus Daniels, Modbus Omniflow, Modbus Tek Air and others.

### Modbus RTU

Modbus RTU is the standard used by the Modbus channel in CBAS. In order to use this channel, an add-on license must be purchased for each site. This will enable you to program as many Modbus RTU channels as you need at the site, so you don't have to put all Modbus devices on the same channel.

## Veris Meters

When first added to CBAS in January of 2003, the Modbus channel was only intended for use with Veris Hawkeye 8035 and 8036 meters. If you program a Modbus channel in CBAS, you will find these in the list of controllers to add to the channel. There is also a text file (covered later) available for the Veris Hawkeye 8136 meter.

## 485 vs. 422

Most Modbus devices on the market offer a choice between 4-wire and 2-wire communications. Just like a RS485 channel, a Modbus RTU over 485 channel uses 2-wire communications, which is a misnomer because it uses 3 wires: +, -, and shield. Some manufacturers use only 4-wire communication, also known as RS422. In this situation, you will have to use the converter that the manufacturer recommends. In some situations, you will have to use Computrols RP1 to convert 485 to 232, then a 232 to 422 (4-wire 485) converter.

## Master/Slave

Modbus RTU is a version of RS 485, which is a Master/Slave protocol. In CBAS, all Modbus devices in the system must act as Slaves. The CBAS Server is the Master.

## Modbus Generic

The Modbus RTU channel in CBAS started with just 2 controllers: The Veris Hawkeye 8035 and 8036 Meters. Because all Modbus RTU devices use the same standards and we were getting requests to add more and more devices to the channel, it was only natural to add a new controller to the channel. With CBAS version 2.0.1, the Modbus Generic controller type was added to the channel to handle any and all of these requests. Since then, many different manufacturers' equipment has been programmed using this controller type. Until recently, the channel had a limit of 64 addresses that could be programmed. As of CBAS version 2.2.4, up to 255 addresses can be programmed.

Each Modbus controller on the market has a list of points that are available to be monitored or commanded. You don't have to use all of them, but for each one that you want to monitor, you will need 2 or 3 pieces of information: Modbus Register or Position, Modbus Function, and Modbus Data Type or Range (in the case of Functions 3 or 6, which are analog). This information can be obtained from the equipment manufacturer or dealer, and can often be found on their web site.

## Modbus Registers and Functions

When Modbus was first added to CBAS, the range of Register addresses supported was limited to holding registers in one range. As of CBAS Version 3.1.9, the full range of registers is supported. When addressing points in CBAS on Modbus Generic controllers, it is very important to understand the basics of Modbus registers. There are several “functions” in the Modbus protocol, and they are related to address ranges. Many manufacturers of Modbus RTU protocol equipment do not give the full address, but a partial address and the Modbus Function. It is up to you to know the address ranges of the Functions that CBAS supports:

- Modbus Function 1 Read Coil Status. CBAS Modbus addresses in the range 1-9999. (Binary Inputs)
- Modbus Function 2 Read Input Status. CBAS Modbus addresses in the range 10001-19999. (Binary Inputs)
- Modbus Function 3 Read Holding Registers. CBAS Modbus addresses in the range 40001-49999. (Analog Inputs)
- Modbus Function 4 Read Input Registers. CBAS Modbus addresses in the range 30001-39999. (Analog Inputs)
- Modbus Function 5 Force Coil Status. CBAS Modbus addresses in the range 1-9999. (Same as Function 1, but Outputs instead of Inputs)
- Modbus Function 6 Preset Single Register. CBAS Modbus addresses in the range 40001-49999. (Same as Function 3, but Outputs instead of Inputs)

Generally speaking, manufacturers’ documentation will give a table of addresses in one function, like Function 2, Read Input Status. Sometimes, they will give you the full address, like 10001. Other times, they will give you 1- to 3-digit addresses. In this case, we know that Function 2 involves addresses in the range of 10001 to 19999. Some manufacturers specs force you to add a 1 and others don’t. If the addresses given in the tables start with 0, then you would add 10001 to the address. If the addresses in the table start with 1, then you would just add 10000. In all cases, CBAS will actually subtract 1 from the address before sending out the request. It’s a little confusing, but if it is not working, try subtracting or adding 1 to the address.

Here’s an example:

ModBusFunction 1 Read Coil Status [r] and Function 5 Force Coil Status [w]	MODBUS Address	C6000	
		r	w
Unit on/off general 1=on, 0=off	0	x	x
Alarmreset, write 1 to reset	1		1
Local Stop 1=on, 0=Local Stop	2	x	
Unit on/off by ModBus 1=on, 0=ModBus Stop	3	x	
Local UPS 1=Local UPS on	4	x	
Remote UPS 1=Remote UPS on	5	x	x
G/CW-mode; G:1;CW:0	6	x	x

Note: Writing to address 0 is equivalent to reading address 3! (Except C7000IC)

In the above table, Functions 1 and 5 are shown. If there is an x in the r (Read) column, it is possible to read the

register, which means it is Function 1. Since the addresses start at 0 in this case, the address of the Unit On/Off General point would be programmed as 10001 in CBAS. CBAS will subtract 1 from the request

before it goes out. When programming the point, make it a Binary Input, and CBAS will send it out as a Function 1 request.

There is an x in the w (Write) column, so it is possible to command the Unit On/Off. That would be function 5 Force Coil Status. The address would be the same, 10001, and you would program it as a Binary Output. CBAS will subtract a 1 and send the request out as a Function 5.

Analog Example:

The tables below show examples of Functions 3, 16, and 4, which are analog functions.

ModBusFunction 3 Read Holding Registers [r] and Function 16 (0x10) Write Multip. Registers [w]	MODBUS Address	C6000	
		r	w
Setpoint temperature 10.0..30.0°C	0	x	x

ModBus Function 4 Read Input Registers			
Actual / return air temperature 0..100°C	0	x	x
Actual / return air humidity 0..100%	2	x	x

The first point, Setpoint Temperature, can be programmed in CBAS as address 40001 and configured as one of the analog point types. (More on those later) For Function 3, program it as an Input. CBAS does not, at this time, support Function 16. If the device supported Function 6, Preset Single Register, you would program it as an Output. Return Air Temperature and Return Air Humidity would be programmed as addresses 30001 and 30003 respectively. Because the addresses fall into the Function 4 range, the request will be sent out as a Function 4. Choose one of the analog point types to match the manufacturer specifications. There is no write function for Function 4 address points.

## Programming Modbus in CBAS

### Licensing

There are 2 types of Modbus RTU Channels in CBAS: Modbus RTU over TCP/IP and Modbus RTU on Controller. Both types require an add-on entry in the CBAS license file. Purchase the Modbus RTU Protocol add-on, as well as any other add-on, when you purchase CBAS. An add-on feature can also be purchased at a later time, and an updated license file can be emailed.

**Note:** *The license file cannot be altered by the end user*

## 2 Types of Channels

When the Modbus RTU over TCP/IP channel is programmed, the Host controller merely passes data back and forth between the Modbus device and the CBAS Server. This is fine for monitoring and non-critical commands. There is a “traffic” screen (see Troubleshooting section) available on this channel that is not available on the “Modbus RTU on Controller” channel. Also, the On Scan/ Off Scan buttons work only on this channel type.

When the Modbus RTU on Controller channel is programmed, the database and its programming reside in the database on the Host controller. Program software points on the Host controller and place any logic on those points. This way, if communication between the server and Modbus device is lost or CBAS is in Editor Mode, the sequence of operations continues with the Host controller acting as the CBAS Server. Statuses are still updated on the CBAS server, and the “child” points can be monitored using a Handheld terminal at the Host controller. A controller on this channel can only be taken Off Scan by going to the Program screen of the controller and checking the Off Scan box. Restart CBAS for the change to take effect.

***Note:** Because the Modbus RTU on Controller is contained in the Host controllers' database, it can only be accessed in CBAS through the Host controller/Channels. That is, the channel will not be listed in the Channels screen of Hardware View.*

## 2 Types of Controllers

Originally, there was only one type of Modbus Generic which adhered to the standards expressed above, meaning that Holding Registers must have register addresses in the 40,000 range. It was found that manufacturers were now making points that were Holding Registers in any range, possibly starting at 1. In order to accommodate this, New Modbus Generic controller type was added. Now you can program a point at any register and choose what Function it is: Holding Register, Coil etc.

### Programming Modbus

To add a Modbus RTU channel, in Hardware View:

- Locate the controller that will be acting as the Modbus host.
- Click the controller and click Channels.
- Click “Add a Channel” next to RS485 Host or RS485 Secondary.
- Give the channel a descriptive name and choose either Modbus RTU over TCP/IP or Modbus RTU on Controller for the configuration.
- Click Add Channel Now.

To add the controllers to the channel:

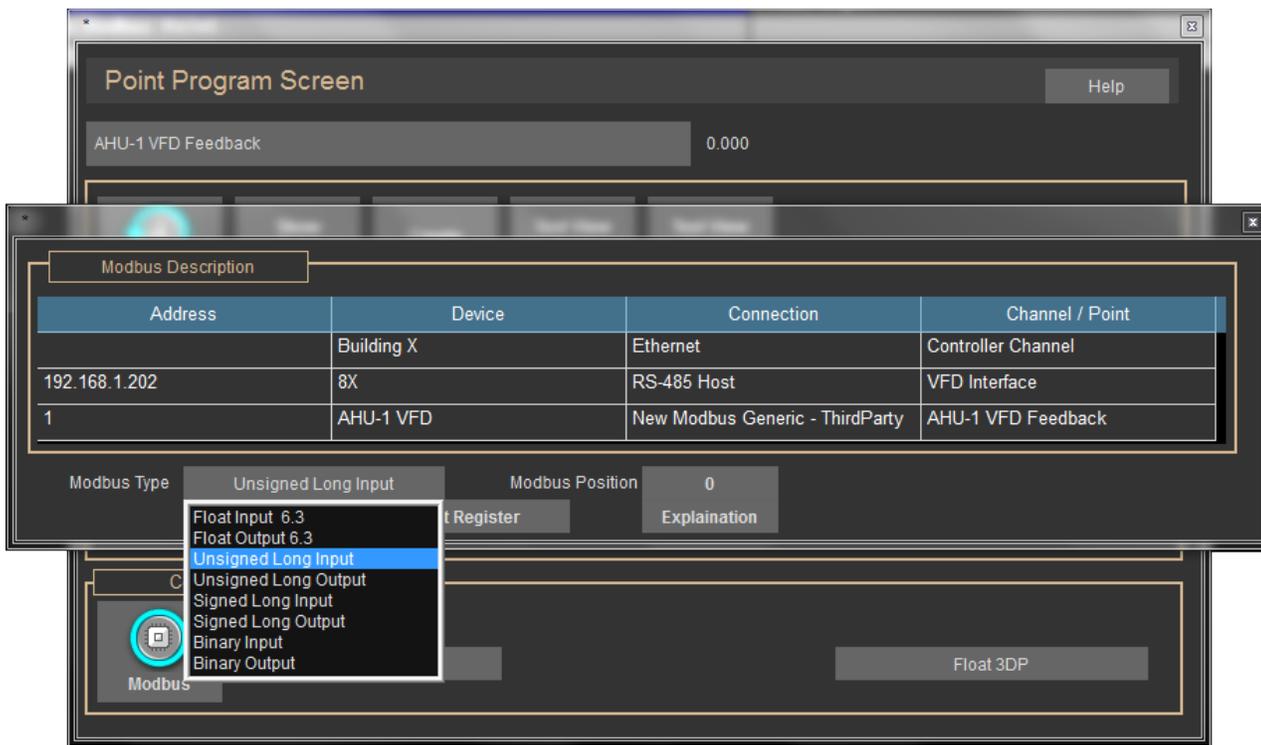
- Right-click twice and locate the Modbus channel you just created. If the channel is Modbus RTU on Controller type, then you must access it by clicking the Host controller, then Channels.
- Click the channel, click Controllers, and locate the line that has the address of the Modbus device.
- Click Add a Modbus Controller on that line and give the controller a descriptive name. Choose the Old Modbus Generic or New ModbusGeneric controller from the list under “Select Configuration”.
- Click Add Controller Now and you are finished.

To add points to the controller:

- Click the controller and click Points. You will see Add a Modbus Point.
- Add the points you want to use by clicking Add a Modbus Point and giving each point a descriptive name. If you have more than one Modbus controller, you will want to include the name of the controller in the point’s name.
- Based on the manufacturer’s point mapping specifications, choose a configuration type from the list. More configuration will be done in the next section.
- Click Add Point Now!

To configure the points:

- Click the point then the Modbus button in the bottom left of the Point Program screen. (See figure below)
- Click the Modbus Position field and enter the address, which may be a number within one of the standard register ranges listed above.
- If you need to change the Modbus Type, click on the field and select from the list.
- If New Modbus Generic, you must select the type of register.
- Right click or ESC to save.
- After changing Modbus parameters in CBAS, you must restart CBAS for the changes to take effect.



## Modbus “text” files

What is the easiest way of adding multiple identical Modbus controllers? Computrols controllers, VAV, 8X, 16X, etc, can be saved as templates. So, you program the first controller as completely as possible, then save it as a Template. For the rest of the controllers, you add them from the Template you saved, or you can copy the original controller directly.

With Modbus Generic controllers, you save the controller to a text file, and then add the rest of them using the text file.

### To Save a Text file:

- In Editor Mode, click the completed Modbus Generic controller, then click Export Database.
- It will ask you to type in a description. Click OK, then type your description. When finished, right-click or ESC.
- A pop-up box will tell you that the file was saved to C:\CBAS\Bin\Modbus\ModbusGeneric.txt.
- If you will be making more than one text file because you have different configurations, find the above file and change its name to reflect the configuration.

## To add the controllers using a text file:

- Click on the channel, click Controllers, and locate the line that has the address of the Modbus device.
- Click Add a Modbus Controller on that line and give the controller a descriptive name. Choose the Generic Modbus controller from the list under “Select Configuration”.
- A pop-up box will ask you “Would you like to import the points into the newly added panel?” Click Yes.
- In the next window, select the correct text file and click OPEN.
- Next, you will be asked to “Please enter a prefix for all of the points to be added (max 12 characters).” Click OK, then enter a word that will differentiate the points from others in the database.
- After the progress window shows that the points have been added, another window will state how many points were added.
- Click OK, and you are finished adding the Generic Modbus controller.
- To view the points, click the controller, then Points.

## More on the Modbus Generic Controller

The Modbus Generic controller is limited to 512 points.

As you can see by the previous figure, there are several different data types supported by the various Modbus RTU Functions. Originally, the Modbus Generic controller was limited to Reading/Writing of Holding registers (Modbus Function 3 and 6). As stated earlier, Functions 1 through 6 are now supported. Holding Registers have a range of roughly 65,000 (65,536, or 256 x 256 to be exact). Some points will take up 2 Holding Registers. A Modbus register is 16 bits (or 1 WORD).

Below is an explanation of each type of Modbus data that is supported by CBAS.

### Modbus Functions 3, 4, and 6.

- FLOAT (REAL) - This point type takes up 2 register addresses, which makes it 32 bits long. The first register is the upper 16 bits. Can be an Input or Output depending on the Function/Address.
- UNSIGNED LONG (UINT32) - Uses 2 registers. The first register is the Lower 16 bits. Range 0-999,999. Very similar to a Float, and the 2 types are interchangeable in CBAS.
- LONG (SINT32) – To some manufacturers, a signed 32-bit or signed integer 32 (SINT32) is a LONG, that can go negative or positive
- INTEGER (SINT16) - Takes up 1 Modbus register and is 16 bits long. Range -32,000 to 32,000. So it is really

a Signed Integer - A signed 16-bit is a Integer in CBAS.

- UNSIGNED INTEGER (UINT16) - Uses 1 register. Range of 0 to 65,000. An “unsigned 16-bit” is an Unsigned Integer in CBAS.
- When it is “Signed”, that means the value can go negative, thus a minus sign.

## Added Nov 6 2009

- Scaled Integer (1 register) (SINT16) -32K to 32K
- Scaled Unsigned Integer (1 register) (UINT16) 0 to 65K
- Float (2 registers) 6 significant digits
- Signed Long (2 registers) (SINT32) new -2 billion to 2 billion
- Unsigned Long (2 registers) (UINT32) 0 to 4 billion

### Example:

- Onicon 4200 Series Ultrasonic Flow Meter Page 43
- Flow Velocity 1001 Input Register 4 Real 29.165
- When it is 4 Bytes (32 bits) and Real, then that is a Float in CBAS.
- When it is 4 Bytes (32 bits) and Integer, that is a Long in CBAS.

## Scaling

We’ve added a scalable point type to each of the points above. We have seen several Modbus implementations where the point received had to be scaled in order to get the real value of the point. So previously you would have to create a software point and a logic statement to get the real value.

The new scalable point type is stored internally as a floating-point number. That means it stores 6 or 7 significant digits. So the number 123,456,789 would be truncated and stored as  $1.23456 \times 10^8$ . The (8) means to the 8th power. Likewise .00000123456789 would be stored internally as  $1.23456 \times 10^{-6}$ . So any point with more than 6 digits will lose some precision.

The scalable point type has a value that allows you to scale the received Modbus number by another floating point number. Leave this value at 1.0 to not scale. There is a Decimal Points box that allows you to select how many decimal points to display in the All Points view. There is a Change Value box that allows you to select the

smallest amount of change that is required for the point to change status in CBAS.

Until further notice only Modbus channels running in the DPU will support the new point types (Modbus TCPIP and Modbus Interface). The new features are not in the firmware.

## Modbus Functions 1, 2, and 5

- Binary Input, Binary Output - Uses 1 register.
- Bits - Let you control single/multiple bits out of a register.
- A Byte is 8 Bits

## Bit Points

Bit points are points that have the same register, but do different things, depending on the Bit you set.

You can monitor 1 bit out of the 16 bits in a single register. You need to add the "1 Bit" point type. Or, up to 16 of them for each address (40001 for example). Then in the configuration for the Modbus point, enter the 1-16 number in the "Start Bit Position". So, for each Modbus bit address, you would have 1 point each of type "1 Bit" all with the same Modbus address. The only difference between them all will be their "Start Bit Position".

## Multiple Bit Inputs and Outputs

Some manufacturers use multiple bits in the same Modbus register to represent things. In CBAS there are Modbus bit point types that represent 1-5 bits out of a Modbus register. 2 Bit, 3 Bit Inputs and Outputs, etc, are the same thing as a 1 bit, except that they return or send more than 1 Bit from the register.

If you have a 1 Bit with starting position 3, it will return the value of the

000000000000x00 bit (value from 0 to 1).

If you have a 2 Bit with starting pos 3, it will return the value of the

000000000000xx00 bits (value from 0 to 3).

If you have a 3 bit with starting pos 3, it will return the value of the

000000000000xxx00 bits (value from 0 to 7).

Byte is the same as an 8 bit start at 3, it will return the value of the

000000xxxxxxx00 bits (values from 0 to 255).

All of these items, 1 Bit thru Byte return multiple values out of a single register.

Take the following Modbus register for example:

40001 aaaaabbbbcccddef

aaaaa is Status 1

bbbb is Status 2

ccc is Status 3

dd is Status 4

e is Status 5

f is Status 6

There are 6 status points in the 1 Modbus register. So, you would program the following 6 points in CBAS to see the status of all 6 points:

Modbus Type Start Bit Position Modbus Position

5 Bit Input 11 40001 Status 1

4 Bit Input 7 40001 Status 2

3 Bit Input 4 40001 Status 3

2 Bit Input 2 40001 Status 4

1 Bit Input 1 40001 Status 5

1 Bit Input 0 40001 Status 6

The Modbus Type is how many bits you want to pick out of the register (1 to 5). Usually, if there are more than 5 bits, the manufacturer will use an entire Byte (8 bits).

The Start Bit is how many bits into the 16 bit Modbus Register to start. 0 = Start from beginning, 15 = Only look at the very last bit.

## Other Considerations

Once a Modbus Generic controller is added to the database, it is possible to change the address or remove the controller completely.

## Changing the address

Click the controller, then Program.

In the bottom right of the Program screen, click the address and change it.

ESC to close, then ESC again to close the channel.

Click the Channel, then Controllers to reopen the channel. You will see the controller at the new address.

## Removing a controller

- In Editor Mode, click the Database Menu, then Remove a Controller.
- Choose the Channel where the controller is located.
- Select the controller to be removed.
- Click Yes if you are sure you want to remove it.
- You will be returned to the controller list for the channel, after the progress window closes.
- Choose another controller to remove, or ESC to finish removing controllers.

## Baud Rate

Manufacturers of Modbus RTU devices use different baud rates, or communication speeds. It is possible to change the baud rate of a channel. All controllers on the channel must be capable of communicating at the same speed. Each host controller has 2 channels available. So, if you have devices that use different baud rates that can't be changed, just add another channel. The default for CBAS is 9600 baud. Other rates available are 19.2K baud and 38.4K baud.

Changing the baud rate:

- Click the Modbus Generic controller, then click Program.
- In the Channel Parameters section, click the Baud rate and select one of the 2 other choices.
- ESC to close the Channel program screen.
- If you are in Real Mode, close CBAS and reopen for the change to take effect.

## Modbus TCP/IP

Modbus TCP/IP is now available in CBAS. Of course, there is no Host Controller needed, because the channel is actually the LAN and emanates from the network card on the CBAS DPU. You must add a MODBUS TCP/IP Channel to the Channels screen in Hardware View.

In Editor Mode, go to Hardware View and click "Add a TCP/IP Channel".

Give the channel a descriptive name, then under Select Configuration, choose MODBUS TCP/IP.

Click "Add Point Now"

From there, everything is the same as adding a Generic Modbus Controller and Points to a Modbus RTU over TCP/IP Channel.

## Troubleshooting

### Channel Not Started

When you receive a yellow trouble banner, this means that a channel is programmed, but not added to the license file. You must have an add-on feature added to the licenseX.txt file, or the add-on channel will not work. You only get this alarm when CBAS first starts in Real Mode, and it only applies to add-on protocol channels, not Basnet or OPTO-22 on Controller.

### On Scan/Off Scan

The On Scan/Off Scan buttons work the same on a Modbus RTU over TCP/IP controller as on a BASnet controller. However, in the case of a Modbus RTU on Controller channel, you must go to the Program screen of the controller and check the Off Scan box to take it Off Scan. You must restart CBAS for the change to take effect. To put it back On Scan, uncheck the box, then restart CBAS.

### Viewing Traffic on the Channel

In CBAS version 7.1.9, after 9/24/07, a "show traffic" button was added to the program screen of the Modbus RTU over TCP/IP Channel (Modbus Interface). It is NOT available on the Modbus on Controller channel. It is similar to the traffic screen on a Basnet Channel, and will tell you if the Modbus device is responding back to CBAS. (see figure below)

It will also show you the NACK code if the Modbus controller is returning a negative acknowledgement. A NACK will be returned for several reasons, like invalid address specified, unsupported command, etc. It will also show you the poll messages to the Modbus devices. Below implemented 9/26/07. Now, there is a 'Find All Controllers' button that will go out and send a 'REPORT\_SLAVE\_ID' message to all serial addresses from 1 to 250. The



# Chapter 13 » Access Control

## Requirements

### Firmware

- Upgrade firmware on host controller (8X, 16X, etc.) to v11.3.
  - Must be Access Control Firmware
  - While burning firmware with DDCC program, you have to key the controller.
- AC2 and AC3 controllers must have Opto-22 firmware.

### Key Controller

- You must key the controller to the jobsite using DDCC, in conjunction with the Dongle (hardware lock) for the jobsite.
- A password is required to make changes with the Handheld on all Access Control Brain controllers (8X, 16X, 32X, 64X).

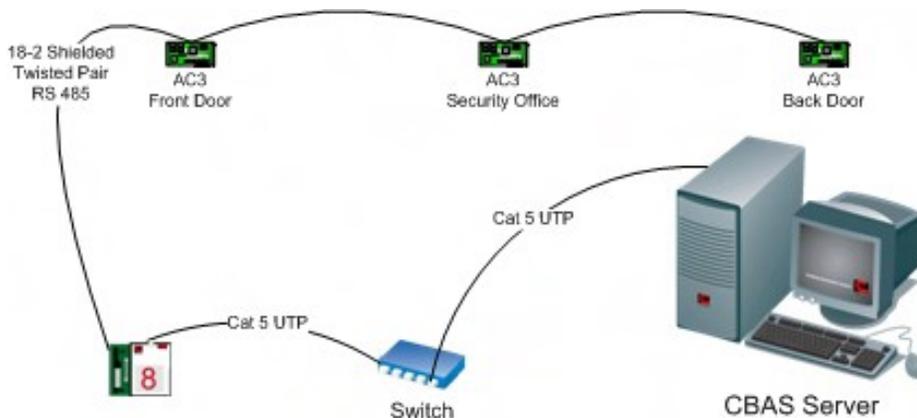
### Software

Use CBAS version 3.1.10 or later.

### License

Access Control is an Add-On feature for CBAS. Without this add-on feature listed in the license text file, you will not be able to see Access Control menu items, even in Editor Mode.

# Communications Architecture



The following figure shows a simple representation of the communication topology employed in the Computrols CBAS Access Control system.

## Adding Access Control to an Existing Database

If adding Access Control to an existing database, you may have to upgrade the database to the minimum version for Access Control. Open in Editor mode first and Access Control tables will be added to the database automatically.

When you open the database, sign on as Computrols and go to System, Program Passwords. Click Edit then click a User. On any User that you want to be able to View Access Activity, Edit Access Control, or Acknowledge Access Control Alarms, you have to check the appropriate boxes.

Only on existing databases, you have to go to Utility Mode, System Menu and Scale db on the DPU.

There are some new things listed at the bottom:

- Attributes, n/a, only for CBAS Enterprise
- Areas, default is 510
- Cards, default is 20,000
- Card-Area, default is 30,000
- Reader-Area, default is 30,000
- Company, default is 1,000

In the above list, default means how the database is scaled by default when a new database is created. Change the categories to a sufficient number for the building. When finished changing the numbers in the “Num Records” column, click Save Changes and Close.

Determining how many Cards or Areas you have is easy. To determine how many Card-Areas you need to scale the Host Controller database for, multiply the number of Areas in the Brain (Host) controller, by the number cards that may have access to those Areas. For example: Let's say that you have an 8X hosting 10 Readers and each Reader is designated as a separate Area. You also have 2000 Cards that have access to all of those Areas.  $10 \text{ Areas} \times 2000 \text{ Cards} = 20,000 \text{ Card-Areas}$ . If there are some Cards that do not have access to some Areas, it is more difficult to get an exact count. You have to take the number of Cards for each Area and add them together. To cover all of your bases, just use the above formula.

There is a limit of 38,000 Card-Areas per Brain Controller. If you need more Card-Areas, add more Brain Controllers.

- Go back to editor mode
- In Hardware View, add the controller(s) that will host Access Control to the TCP/IP for Controllers Channel.
- Program your 8X, 16X, 32X or 64X as an Access Control 8, 16, etc.
- When you click Add Controller Now, it will take a little longer to add than a normal controller, because more tables and channels are added.
- Once the host controller is added, click it and click the Channels button.
- Click Host or Secondary Opto channel, then Controllers. This is where you program the AC3s.
- Then add the points to the AC controllers.

When you make changes to an Access database, you have to manually download to controllers. This is because they go offline to download. If you have a lot of controllers, it could take a while. You don't want doors becoming inaccessible during high traffic periods. After making changes that require a download, CBAS will display "Access Control Download Required" in the Header Points space, below the Main Menu.

## Creating a New Access Control Database

### Create a new database

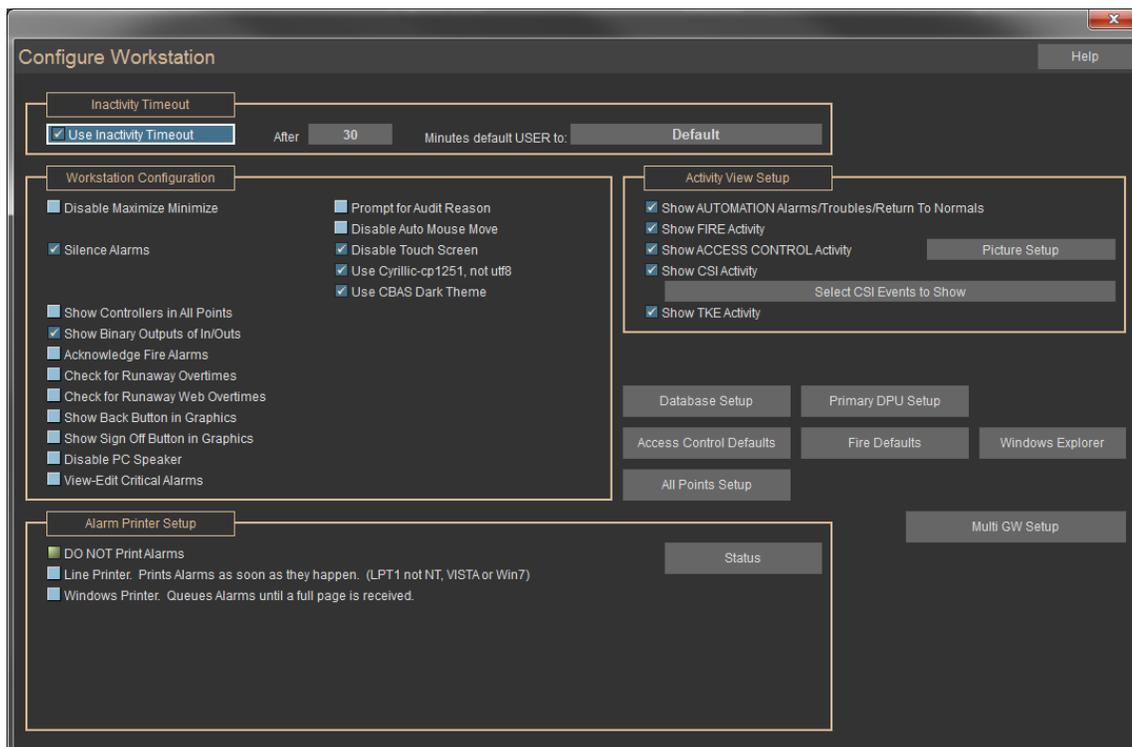
- If you have a database open already, click Close Database from the System Menu.
- From the Database menu, click New Database.
- Enter a name for the database and hit Enter.
- Select C:\CBAS for the directory and hit Enter or click OK.
- Hit Enter or click the Create Database NOW! Button. A folder will be created to contain the database files.

After a short time, the new database will open in Editor Mode/Hardware View. The only existing channels in the new database are the TCP/IP for Workstations Channel, and the TCP/IP for Controllers Channel. You can now create Controllers and Points.

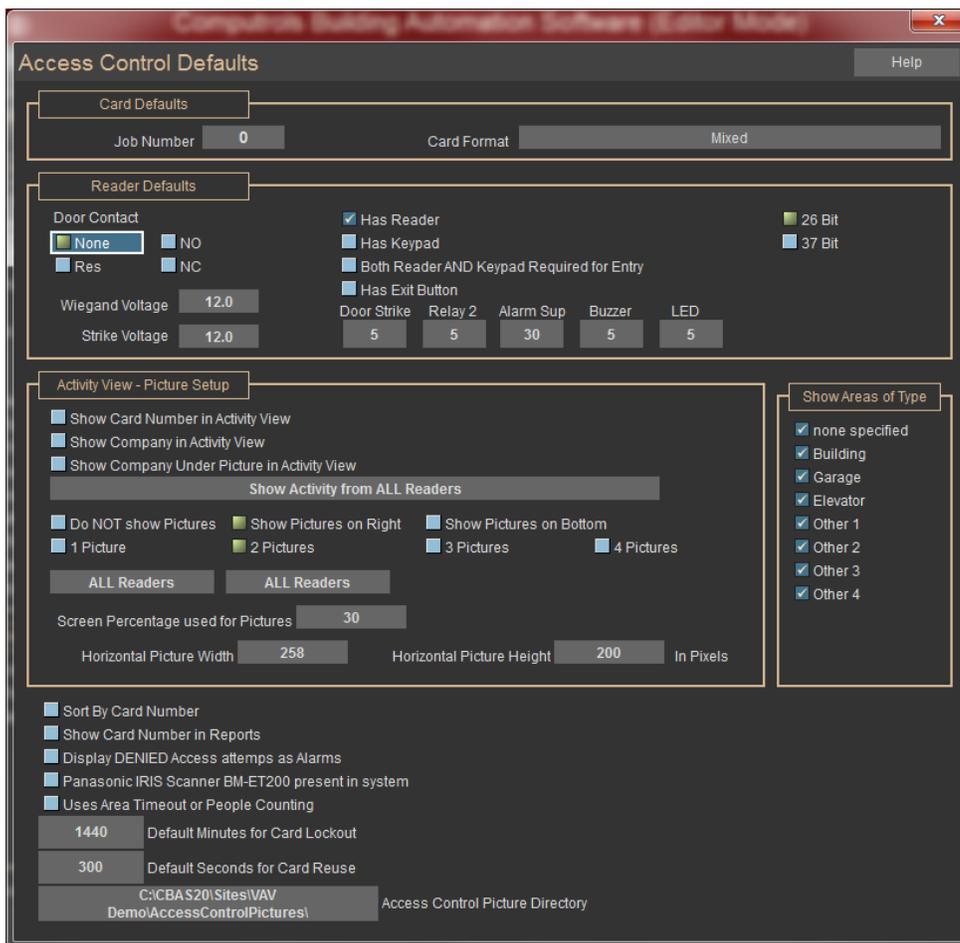
## Configure Workstation

Before you start setting up your database, there is an easy way to setup default values, such as Job Number, Reader Defaults, and Activity View display settings. *Reader default times will be 0 if you do not change them.* Doors will not open if the Door Strike value is set to 0.

- From the Main Menu, go to System, then Configure Workstation.



- In Activity View Setup, check the boxes for the types of activity you want to see.
- Click the Access Control Defaults button.



- Enter the Card Job Number in the appropriate field. Each time you add a Card, the number will be added for you.
- In the Reader Defaults section, choose the appropriate values for each section and field. If you do not put in values, they will default to 0, and all Readers will have to be edited later. See the later section, “Program Readers” for brief explanations of Reader Defaults.
- In the last section, check the first box to sort the Card List by Card Number, instead of Last Name.
- Check the next box to show the Company under the Picture of the cardholder in Activity View.
- If “Display DENIED Access attempts as Alarms” is checked, CBAS will display an Alarm Banner at the top of the screen when Access is denied to any card. These Alarms must be acknowledged by someone who has rights to do so.
- If you are using the Panasonic IRIS Scanner, check the final box.
- There is a feature in the Card Edit screen that allows you to lockout a card immediately. Put in a number in the field for the default number of minutes that a Card will be denied. The feature is explained in the Cards section.
- Other check boxes in this section are self-explanatory. Voltages must match the specifications of the Wiegand card reader and door strike device.

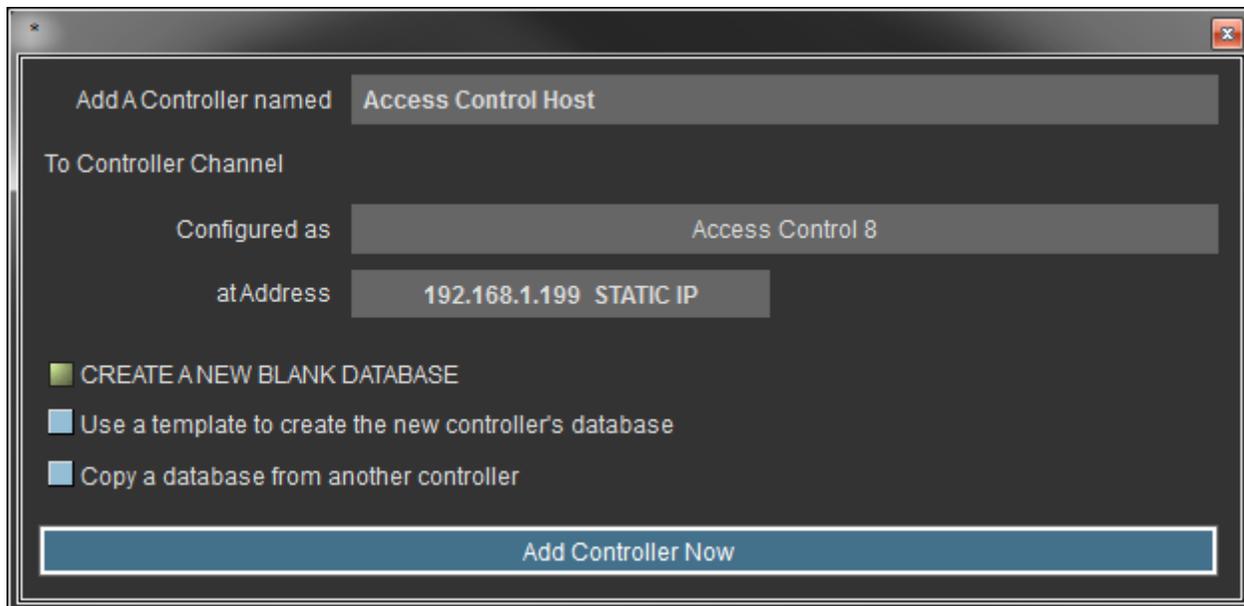
- ESC to save changes.

By displaying an Alarm for denied access, Administrators will always know when someone is trying to gain access with a lost, stolen, expired Card, or is trying to gain access to an un-allowed Area.

## Add Brain Controllers

In order to create a RS 485 channel to host AC controllers, you must first add a controller to the TCP/IP for Controllers channel. This controller, called the Brain or Host, contains a copy of the database for all Readers it hosts. The channels that host the AC controllers will be added automatically.

- Click the TCP/IP for Controllers Channel then Controllers.
- Click Add a Controller.



The screenshot shows a dialog box titled "Add Controller" with the following fields and options:

- Add A Controller named:** Access Control Host
- To Controller Channel:** (empty)
- Configured as:** Access Control 8
- atAddress:** 192.168.1.199 STATIC IP
- CREATE A NEW BLANK DATABASE
- Use a template to create the new controller's database
- Copy a database from another controller
- Add Controller Now** (button)

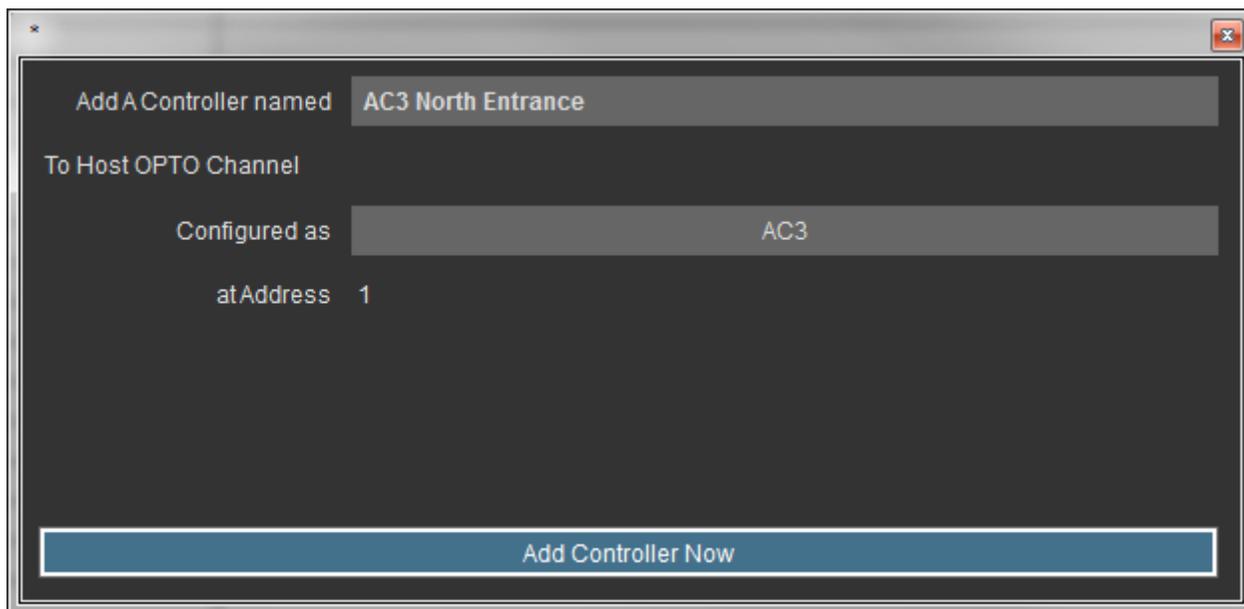
- Give the controller a descriptive name.
- Choose Access Control 8, 16, 32, or 64 for the configuration.
- Give the controller an IP address that will work on the subnet.
- Choose to Create a New Blank Database.
- Click Add Controller Now!
- After a short wait, the controller will be added to the list.

## Add Readers

A Reader is a controller that interfaces to the actual reader/keypad device. Supported Readers consist of the Computrols AC3.

Now you can add AC3s (one for each door) to the controller that is hosting the communication channel.

- Click the controller you added in the last section.
- Click Channels.
- Notice that the RS485 Host and Secondary channels are already programmed as OPTO-22 on Controller channel type.
- Click the Host Channel, then Controllers.
- The list is in order by address. Click Add a Controller on address 1. (Actually, it could be any address you want to use)



The screenshot shows a dialog box titled "Add Controller" with a dark background. It contains the following fields and options:

- "Add A Controller named" with a text input field containing "AC3 North Entrance".
- "To Host OPTO Channel" with a dropdown menu.
- "Configured as" with a dropdown menu showing "AC3".
- "atAddress" with a text input field containing "1".
- A large blue button at the bottom labeled "Add Controller Now".

- As in the above figure, give the controller a descriptive name.
- In the "Configured as" drop-down list, choose AC3.
- Click Add Controller Now and the controller will appear on the list.
- Add a controller for each door by repeating steps 5 through 8.

## Program Readers

Once you have added Readers, there may be some settings that have to be changed, especially if you did not set the Access Control Defaults, as covered in Configure Workstation previously. Below is the Program screen for a Reader. If a Reader belongs to an Area that is an anti-passback area, then it MUST be either an IN or an OUT reader. An IN reader will allow a card into an Area, whereas an OUT reader will allow a card out of an Area. A Card that has been used on an IN reader MUST be used on an OUT reader in the same Area before it may be used on an IN reader again.

A Reader may consist of a Reader, a Keypad or both, connected to an AC3. Generally, the Reader and Keypad will be part of the same piece of hardware. If both a Reader and Keypad are required for entry, then the 'Has Reader', 'Has Keypad' AND 'Both Reader AND Keypad Required for Entry' must all be selected. If a Reader and Keypad are both present, BUT either may grant access, then the 'Both' option should not be selected.



- From the Access Control Menu, click Program Readers.
- From the Readers list, click Edit, then choose a Reader.
- You will see a screen similar to the figure above.
- Click on the name of the controller, in this case, AC3, to change the name of the Reader.
- If the Reader is part of an Anti-Passback Area, select In or Out for the Reader type under Anti-Passback.
- If there is a Door Contact (gives status of door; open/closed), choose
  - NO for Normally Open

- NC for Normally Closed (default)
  - Res for Supervised input
  - None for no Door Contact
- Check the next box if there is an Exit Button.
  - Adjust Wiegand Voltage and Strike Voltage to match the hardware. The range is 5 to 24 Volts. The hardware will not operate properly unless the voltage is set correctly, and can be damaged by setting the voltage too high.
  - Check Has Reader box if needed. 26 Bit is the reader type and is chosen by default.
  - Check Has Keypad if there is a Keypad also, and choose whether a 4- or 6-digit code is required.
  - If Both Keypad and Reader are required for Entry, check the appropriate box. Then, if the Keypad entry is required first, check the Keypad First box.
  - If you check “Show Denied Access”, the reader will beep twice instead of the long beep when access is granted.
  - IMPORTANT: Checking this box allows you to stop the feature which will grant access in case of a loss of communication to the card database held in the Brain controller. When this communication is lost for one minute, the reader will grant access to any card within the range between the highest and lowest card. It is important to make sure that cards have the correct job code and you do not have multiple job codes for this reason. A job code of 0 will allow access to many more cards than normal.
  - Do not check “Use MultiDoor Lockout”. This applies to a future product only, and allows other doors to be locked when a particular door is open.
  - Adjust the amount of time, in seconds, that the Door Strike is open and the Buzzer and LED are on, as well as the Alarm Suppress (see below):
    - Click the time field under the appropriate heading
    - Default is 5 seconds
    - See below for explanation of Alrm Sp
  - You may change the address of the Reader by clicking the Address field.
  - Right-click or ESC to save changes and return to the Reader List.

Programming Readers can also be done from Hardware View and from the Area Editor. Changes on this screen may require a download to the Host or Brain controller.

## Alarm Suppress

Set the Alarm Suppress time in the Reader Program screen. There is a point in the reader called Door Contact with Suppress, which will allow you to monitor the alarm suppress. Add an Alarm to that point. When a valid card is swiped or the exit button is pressed, the alarm suppress will stay active for the desired amount of time. If the door contact is still open after Alarm Suppress time has expired, then the Door Contact with Suppress point will go into alarm. If the Door Contact becomes open and no Card was swiped, or the Exit Button was not pressed, the Alarm point will go into Alarm immediately.

## Add Points to Readers

The controllers come with a predefined set of points, but you have to add the ones you need. If you add a point that is not needed and not wired to a device, it will show a “Lost” status when in Real Mode. For ease of viewing and organizing the database, the beginning of each point name should include the door or Reader name, then the point type. Example: REAR DOOR BUZZER.

- In Hardware View, click the controller you added then click Points.
- Click Add a Point next to the point you need.
- Give the point a name that includes the name of the door.

The screenshot shows the 'Hardware View' of the software. A table lists various points with columns for Position, Point Name, Configuration, and Status. A dialog box is open over the 'Voltage Alarm' row, showing the configuration for a new point named 'North Entrance Voltage Alarm'.

Position	Point Name	Configuration	Status
Door	North Entrance Reader	Supervised Output	READY
Last Access Value	North Entrance Last Card	Counter Input	9
Door Strike	North Entrance Door Strike	Momentary Output	LOCK
Relay	Add A Point		
Buzzer	Add A Point		
Green LED	Add A Point		
Door Contact	North Entrance Door		OPEN
Exit Button	North Entrance Exit		OFF
Door Contact with Suppress	Add A Point		
Wiegand Voltage	North Entrance Wiegand		12.4 VOLTS
Strike Voltage	North Entrance Strike		24.6 VOLTS
Voltage Alarm	Add A Point		
Red LED	Add A Point		
Internal Temperature	Add A Point		

Dialog Box: Add A HARDWARE Point named North Entrance Voltage Alarm  
To AC3 North Entrance at position Voltage Alarm  
Configured as Binary Input  
BINARY TYPES: Binary Input

- Choose the configuration type that is provided.
- Click Add Point Now!
- Repeat steps 2 through 5 on each point that is needed.

## Explanation of points:

- **Door:** Supervised Output that controls the state of the Door.
  - Can be commanded to Lock, Open or Ready
    - Lock: Door will not Open with Card Swipe
    - Open: Door is Open and Card Swipe is not necessary
    - Ready: Default. Means that Door is Ready for Card Swiping
  - In Ready Mode, toggles between SwipeA and SwipeB when card is used
  - A Schedule can be placed on the Point Program Screen of this point
- **Last Access Value:** Counter Input that shows last Card use.
  - Shows a D if denied access
  - If granted, shows Job Number, Card Number.
- **Door Strike:** Momentary Output, commands the door strike open if normally closed
  - Time period can be changed on Reader Program screen
- **Relay:** This is the second relay on the AC3. See below.
- **Alarm Suppress:** Momentary Output, used for suppressing an alarm system while door is open. Explained in previous section.
- **Buzzer:** Momentary Output, sounds the buzzer to tell user that the door is unlocked.
  - Coincides with Door Strike
- **Green LED:** Momentary Output, Light on reader turns green to tell user that the door is open
- **Door Contact:** Can be Binary or Supervised Input, open contacts tell you door is open. Supervised Input requires 1.9K Ohm resistor. See wiring diagram.
- **Exit Button:** Binary Input, input used to tell the door to open and let user out.
- **Door Contact with Suppress:** Enables Alarm on Open Door Contacts when Card has not been swiped. See previous section for details.
- Adjust the Wiegand Voltage to match the manufacturer's specifications for the Reader. (Be careful: the wrong voltage can break hardware)
- Adjust the Strike Voltage to match the manufacturer's specifications for the Door Strike hardware.

## Relay

This point controls Relay 2 on the AC3 controller. Relay 2 can be used for anything and can be controlled by a Swipe, Logic or Schedule. For example, it could be used to control a secondary car gate, which could be Open during scheduled hours. Then, during closed hours, will also Open when a card is Swiped.

## Administration

Once you have added all of your door controllers and their points, you can begin adding Areas, Companies, Schedules and Access Cards. You might want to expand and restrict Rights for other users of the CBAS Server.

## Program Passwords

If someone else will be the Administrator, or at least have the responsibility of adding Cards, you will need to add a User Account and Password for them. This way, you will have a record of who added each card. Additionally, you may want to add User Accounts for security personnel that will monitor Activity View.

There is also a Passwords item on Access Control menu. This feature will allow you to restrict CBAS users to edit Cards in certain Areas only (this is covered in a later section). When a new Database is started, the Default User Account has rights to do everything in CBAS. You should first add a User Account for yourself and remove most rights, other than viewing Activity, from the Default User. When a User is logged on, that user will be logged off automatically after a default period of 30 minutes of inactivity, and the Default User is logged on. The inactivity period can be changed by going to Configure Workstation on the System Menu.

To edit or add users:

- From the Main Menu, go to System, Program Passwords.
- Click Edit then click a User.
- On any User that you want to be able to View Access Activity, Edit Access Control, or Acknowledge Access Control Alarms, you have to check the appropriate boxes. Edit Access Control allows the User to add Cards and other Access Control Menu functions.
- Once you have checked and un-checked the appropriate boxes, right-click or ESC to save the changes.
- To add a new User, click the Insert button and slide the pointer to the top of the list where the red line can be seen, and click there.
- To add a Group, insert the red line in the Groups area.
- Check the appropriate boxes to allow the User access to specific parts of CBAS.
- Right-click or ESC to save.

The main Rights that need to be checked for Access Control Users are:

- Access Control Activity Reports - to view and print Activity Report
- Access Control Program Reports - to view and print Programming Reports
- Acknowledge Access Control Alarms
- Edit Access Control - view and make changes on the Access Control Menu
- There are other Edit Access Control items that allow you to narrow down what the user can do while editing Access Control items: Areas, Cards, etc
- View Activity
- Edit Passwords (to change Users' rights)

For more detailed instructions on editing Users' Rights, see the complete CBAS Manual.

## Access Control Menu

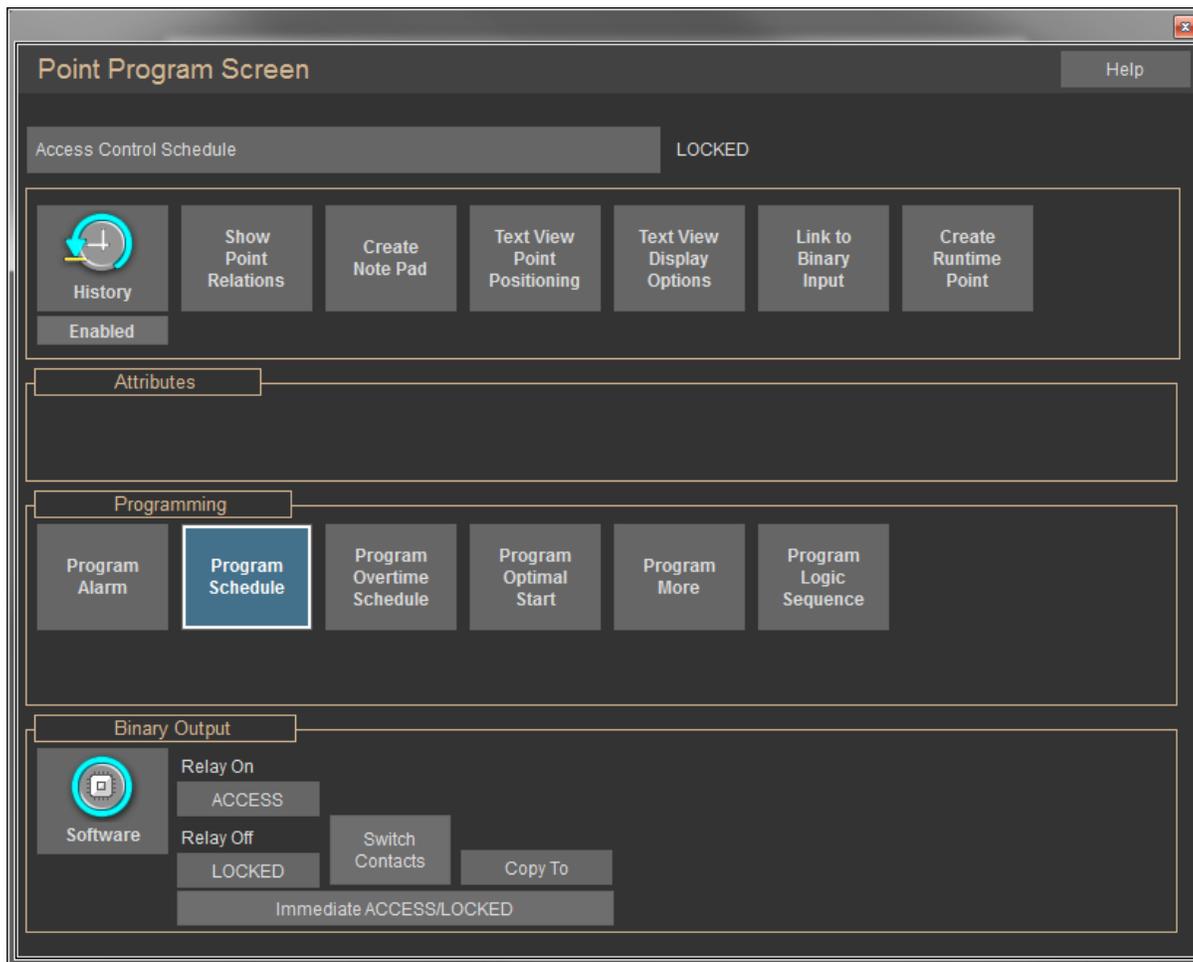
From the Main Menu, go to the System Menu, then click Access Control and you will see the Access Control Menu. If Schedules and Companies are needed when adding Cards, add them first, then Areas and then Cards.



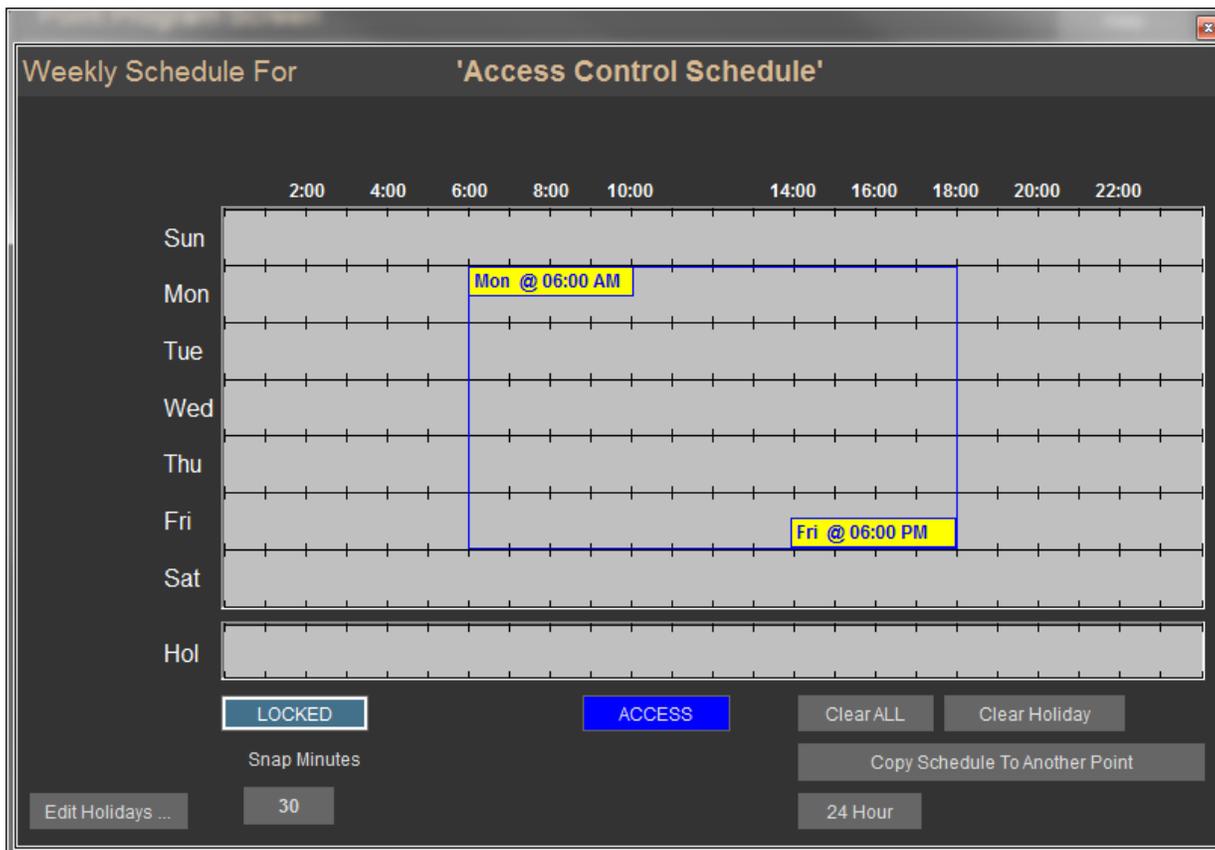
## Schedules

Each Card added to the system will need a Schedule associated with it. Without a schedule associated, the card will have 24-Hour access. Add up to 128 schedules here. You might want to have a Schedule for each Company, or Area, in order to facilitate adding Overtime later. Overtime will be discussed in a later section. Let's add a Schedule that allows access during normal business hours.

- From the Access Control Menu, click Program Schedules.
- From the Schedule List window, click Insert.
- Give the Schedule a name, like Normal Schedule, then press or click Enter.
- Click the Edit button, and then click the Schedule from the list.



- Click the Program Schedule button, and then click Use Graphical Editor.



- Click and hold in the gray area and drag down to the right. This will open a box covering the scheduled times. (See above) The entire week can be scheduled with one drag.
- Click the Access button and the area will turn dark blue.
- To schedule 24 hour access, click the 24 Hour button.
- Right-click or ESC to escape and you will see a text representation of the schedule. The schedule can be edited there also, by clicking on any field.
- Right-click or ESC to return to the Schedule List
- Click the Insert button to add another Schedule, or Edit to change an existing schedule.
- ESC to close the Schedule List.

## Companies

In order to group cards, it can be useful to assign Companies to Cards. Grouping in this way also gives you more sorting options when printing Reports.

- From the Access Control Menu, click Program Companies.
- From the Company List window, click Insert.

- Give the Company a name, location and phone number.
- Right-click or ESC to return to the list.
- Add more Companies, or click the Edit button, and then click the Schedule from the list.

**NOTE:** Do not use punctuation in the company name.

## Areas

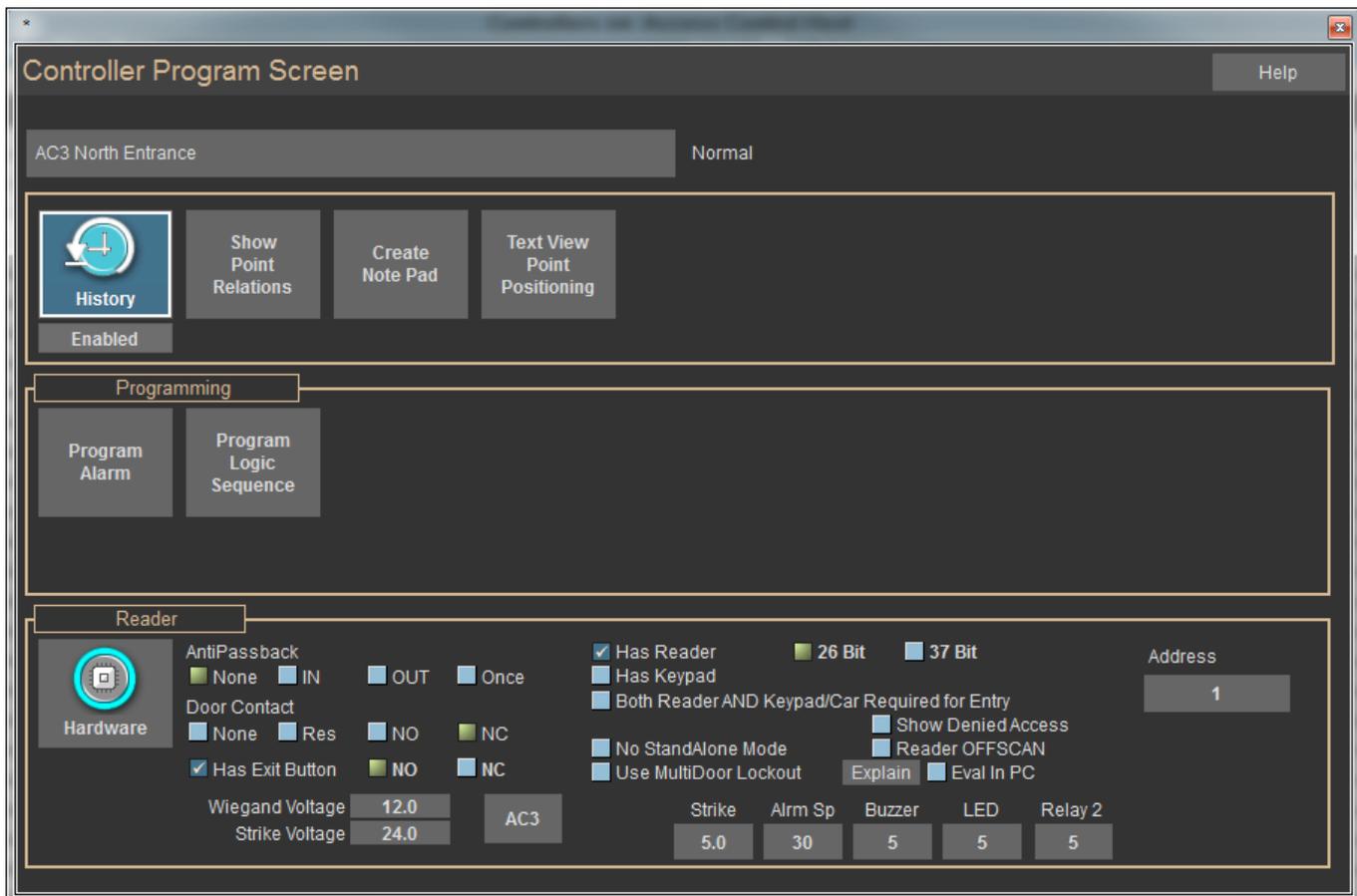
Before cards can be used, Areas must be associated with them. Areas are really groups of doors or Readers, each of which are controlled by AC3 controllers. Adding controllers was covered in the previous section, Add Readers. An Area is an easy way to give people access to many readers at the same time. CBAS is limited to 500 Areas. Areas may not overlap. In other words, Readers may not belong to more than one Area. There is one exception: elevator Readers may belong to more than one Area. Elevators will be covered in a later section.

**Anti-passback Areas cannot span multiple Brain controllers.** Non-Anti-passback Areas can span over multiple Brain controllers, however, this is not recommended and should only be done as a last resort.

- From the Access Control Menu, click Program Areas.
- From the Area List window, click Insert to see the Area Editor.

- Click the field under Area Name and give the Area a name.
- If the Area is intended to be an Anti-Passback Area, select Anti-Passback Area. If Area is an Anti-Passback Area, at least 2 readers must be added. 1 must be an IN Reader and 1 must be an OUT Reader.

- Click the field under 'Area is in Controller' and choose the controller that is hosting the Reader/Door controllers. It will be an Access Control 8, 16, etc, and only one is allowed per Area. (Unless absolutely necessary)
- Click the Add Reader button and choose Readers from the list.
- Click the Remove Reader button and choose Readers to remove.
- Click Edit Readers and you will be taken to the Program Screen for that controller.



- From there you can change the way the door behaves. Click on the buttons to change the amount of time the door stays open, the buzzer buzzes, and the LED stays lit.
- Adjust Wiegand Voltage and Strike Voltage to match the hardware. The range is 5 to 24 Volts. (Be careful: The wrong voltage can break hardware)
- Right-click to close.
- Right-click or ESC to save the changes and return to the Area List.

Any time you make changes to the database, you must download the changes to the Brain controllers. Download Controllers will be covered in a later section. Programming Readers can also be done from Hardware View and from Program Readers (covered earlier).

## Anti-Passback

The purpose of anti-passback is to prevent a cardholder from passing back his or her card to a second person in order to gain entry into an access-controlled area. The anti-passback features of the CBAS Access Control System can be used to maximize security, prevent fraudulent use of cards and maintain an accurate record of the number of people who are currently in any one area (possibly for safety reasons).

In an Anti-passback Area, there must be an 'In Reader' and an 'Out Reader'. A Card that has gained access to through an 'In Reader', must go out through an 'Out Reader' before being allowed to re-enter.

**Anti-passback Areas cannot span multiple Brain Controllers.** See the previous section for instructions on Anti-Passback programming.

## Adding Access Cards

- From the Access Control menu, click Program Cards to see the Card List. The list is in order by the first four letters of the Last Name of the Card Holder. (The list can be sorted by card number, by going to System, Configure Workstation, Access Control Defaults)
- To edit an existing Card, click Edit and select the Card from the list. If the Edit button cannot be selected, right-click to de-select the previous button.
- To delete an existing Card, click Delete and select the Card from the list. If the Delete button cannot be selected, right-click to de-select the previous button. (Delete button added in version 3.1.2)
- To Search for a Card, click Search and enter the first four letters of the First or Last Name from the Card Search screen. You can search by as little as the first letter. Right-click to close the Search screen and the card list will contain all Cards meeting the search criteria. You can also search by Company and Card number.
- To add a new Card, click Insert and the Card Editor screen will appear.

- Click each field to enter the appropriate information.
- To choose a Company, highlight the Company in the Company List, and then right-click or ESC to exit the list.
- If a Company has not yet been added, click on the Edit Companies button to add the Company.
- Enter the Job Code and Card Number from the card.
- If there is a Key Pad associated with a Reader in the Area, then add the Key Code number.
- Select a Card Status:
  - Free: means that the card has been returned and is ready to be assigned to another user. The card is disabled until it is reassigned.
  - Lost: means the card has been lost. The card is disabled when in this status.
  - Used: means that the card is in use and the user will gain access when the card is swiped, as long

as the schedule for that card allows it.

- Expired: this status is achieved automatically when card expires, access is not granted.
  - Expire On Use: will expire X number of days after Card used for the first time. See note below.
- If you want the card to expire, click the field next to Card Expiration Date and use the calendar to choose a date.
  - Use the arrows at the top of the calendar to move a month forward or backward.
  - Click a date and it will be placed into the field.
  - Click the Clear Expiration button to disable Expiration.
- Check Notify on Use to receive a notification at the CBAS Server or GW when the card is swiped.
- Check Allow Access if Locked. This feature will allow an administrator or security officer entrance even if the door has been locked. See note below for details.
- Car Transmitter. Check this box if the Card will have a Car Transmitter associated with it. This feature is explained in a later section.
- To have a picture displayed when access is granted, place a jpg or bmp picture of the user in C:\CBAS\AccessControlPictures.
- Click the Photograph Name field to access the Picture Viewer.
- In the Picture Viewer, click the Browse button and select the picture in the Access Control Pictures folder.
- The following fields are for information purposes only:
  - Location
  - Phone Number
  - Car Tags
  - Comments
- The date when the card was last edited is shown just above the Areas list.
- The date and time that the card was created is shown along with the user who was logged on at that time.
- Click the Edit Area List button and choose Areas that the user will have access to.
- To simply duplicate the Areas that have been given to another User, click the Copy From button and choose a user from the list.

- While in the Area List, right-click or ESC to save selections and return to the Card Editor.
- Once again, right-click or ESC to save the card and return to the Card List.
- You must manually download to the controller any time you add a card or make changes to the status of a Card.

**Note:** Expire on Use is a feature that allows cards to be programmed that will expire X number of days after they are used for the first time. This feature is used mainly for visitors who will only need access for a predetermined number of days. The user must turn the Card in before leaving on the final day. When you check the "Expire on Use" checkbox, the "Expiration Date" item changes to "Card Expires After." Click the field and enter the number of days before expiration. A zero (0) here means that it will expire at the end of the day in which the card was used. A one (1) means it will expire and the end of the day after the card was first used. When the card is first used the controller will send a message to the CBAS Server. When the Server receives the message, it will change the card from "Expire On Use" to "Used", then set the Expiration Date to the specified date. After that, the card is treated like a regular USED card with expiration. But, just like any other Access Control change, it must be downloaded to the controller before it will take affect. So, the CBAS installation MUST be using the Automatic Access Control Download feature. This feature is explained in a later section.

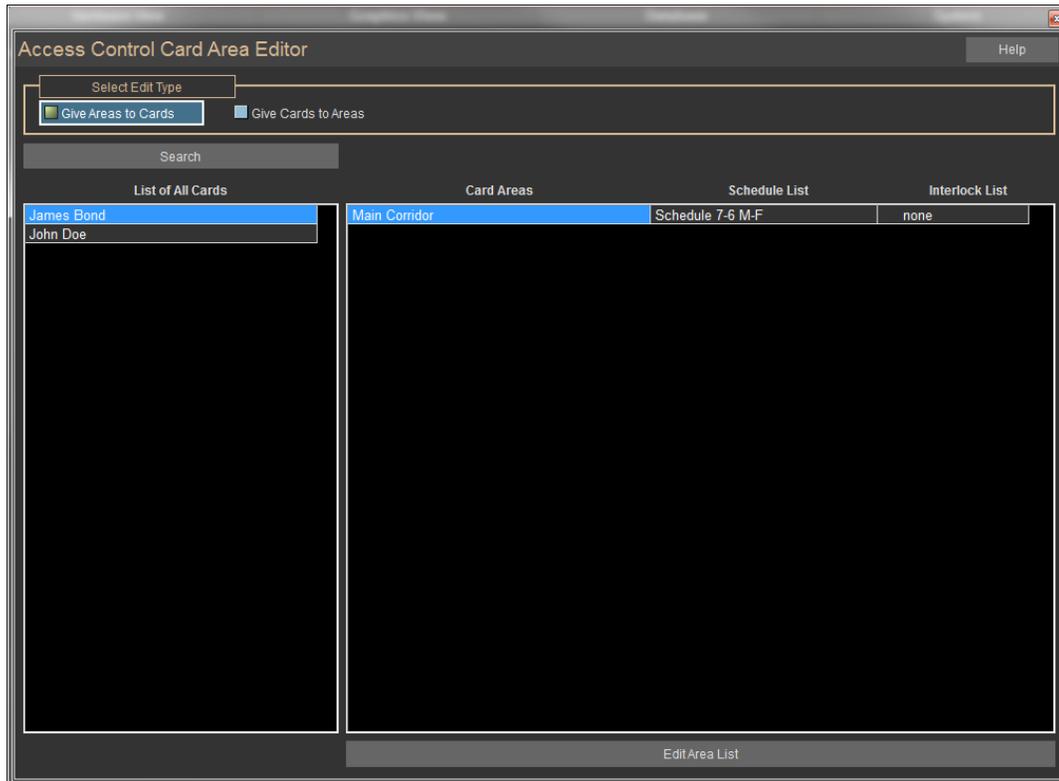
**Note:** The "Allow Access if Locked" for an Access Control Card ONLY applies to the Door. In other words, if the Door point on a particular Reader is locked. The Door must be locked by Schedule, Logic1, or Logic2, for 'Allow Access If Locked' to work. Also, the Card must have access to the door it is trying to get into and the Card Schedule must allow it. If the door is locked by Operator, Logic3, or Logic4, access will still be denied.

**Note:** In order to give someone else the Rights to add and edit Cards, you must add them as a User. For instructions, see the first sub-section under the Administration section, Program Passwords.

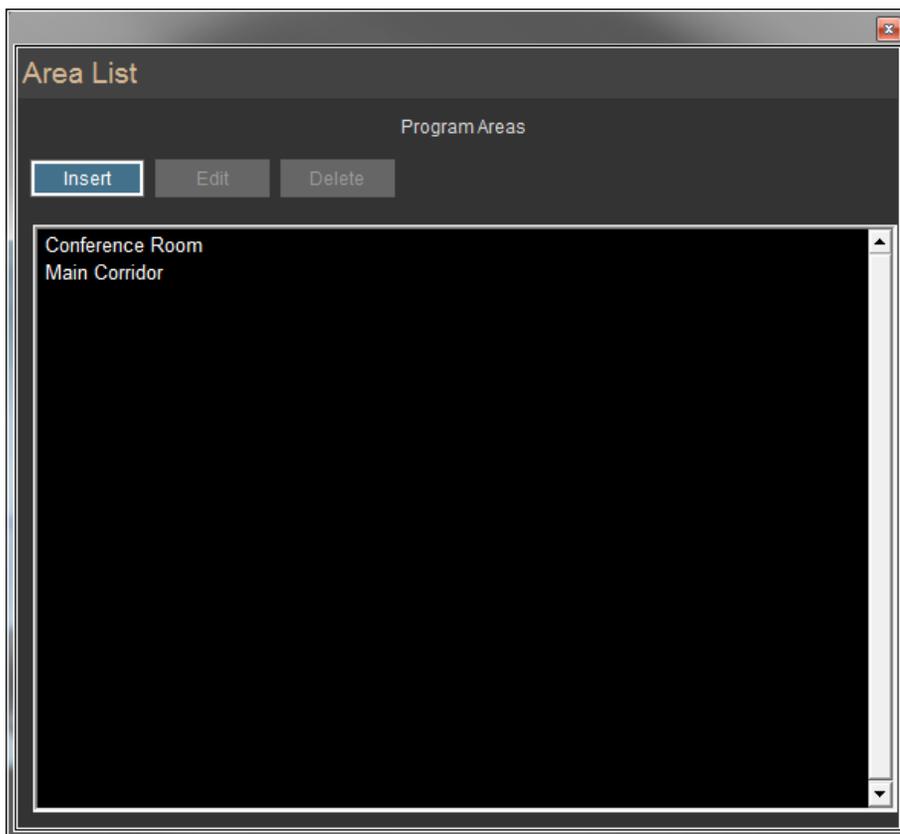
## Add Areas and Schedules to Cards

Once you have added Cards, you must give them the Areas where they are allowed to access, as well as Schedules and Interlocks, if necessary. In addition to adding Areas in the Card Editor, they can be added in the Card Area Editor, where you have a choice of adding Areas to Cards, or Cards to Areas.

- From the Access Control Menu, choose Program Card/Areas. You will see the Access Control Card Area Editor. See below.



- Select a Card from the list on the left side, and you will see a list of Card Areas on the right.
- To add Areas to Cards, click the Edit Area List button.
- From the Area List, select Areas then right-click to save and close the list.
- If you do not add a Schedule for an Area, 24-hour access will be granted to the Area.
- To add a Schedule, click the field in the Schedule List column.
- Choose a Schedule from the list then right-click to save and close.
- To add an Interlock, click the field in the Command List column and choose one from the list.
- Right-click twice to save and close the list.
- To change a Schedule or Interlock, click on the appropriate field.
- To Remove Areas from a card, click the Edit Area List button and the Area List will appear.



- The Areas highlighted in green have already been added to the list on the right. Click the green Areas on the main list to remove them from the list on the right.
- Right-click twice to save and return to the Card Area Editor.
- Once you have added Areas and Schedules, right-click or ESC to close the Card Area Editor.

**Note:** The database on the Access Control (Brain) controller may need to be scaled to handle the number of Card/Areas. If each Card has access to all Areas, then the number of records is figured using the formula: # of Cards X # of Areas.

## Download Controllers

Whenever changes are made to the database, such as adding a card or changing a schedule, the changes must be manually downloaded to the Host/Brain controllers. Do not do this during high-traffic periods, as the Reader will reboot and be disabled for a few seconds. Editing anything in the Reader Program screen causes a download to the Brain controller of that Reader automatically. So there is no need to use the Access Control Download option when editing the Reader parameters. Only things like Cards/Areas need to be manually downloaded, or automatically downloaded (see next section).

- From the Access Control Menu, click Download Controllers.
- You will see a progress screen while the controllers are downloaded to.

## Download Controllers

Go

	Readers	Cards	Areas	Card/Area	Reader/Area	Schedules	Interlocks
DPU	1	48 of 1000	1 of 8	1920 of 40000	0 of 1000	4 of 126	1 of 1
Access Control	1	48 of 2000	0 of 1	48 of 8000	0 of 500	2 of 32	1 of 80

- On the next screen, Access Control brains are shown along with some statistics about how many records are used in their databases. The download is complete.
- Right-click or ESC to return to the Access Control Menu.

## Automatic Downloads

For your convenience, there is a way to set up CBAS so that downloads occur overnight at a time when few people, if any, will be using the access control system. If you rely on this feature, new cards and changes to existing cards will not take effect until the next day.

To set up Auto-Downloads:

- Go to the System Menu, then Database Maintenance.
- Click the Access Control Download button.
- See below. When the download time is set to 00:00, there will be no download. Change the time by clicking on it and entering a time when there is very little traffic.
- Right-click or ESC to save.

**Access Control Automated Download** Help

Enter the Time of Day in which the Automatic resynchronization of the Access Control databases will occur:  
(Set to 00:00 to not use this feature)

During the Access Control download (resynchronization) all access attempts may be denied.

Also download Car / Card junction to controllers. (Will happen 30 minutes after Access Control Download.)

Also sync with CCure Database (Will happen 45 minutes before Access Control Download)

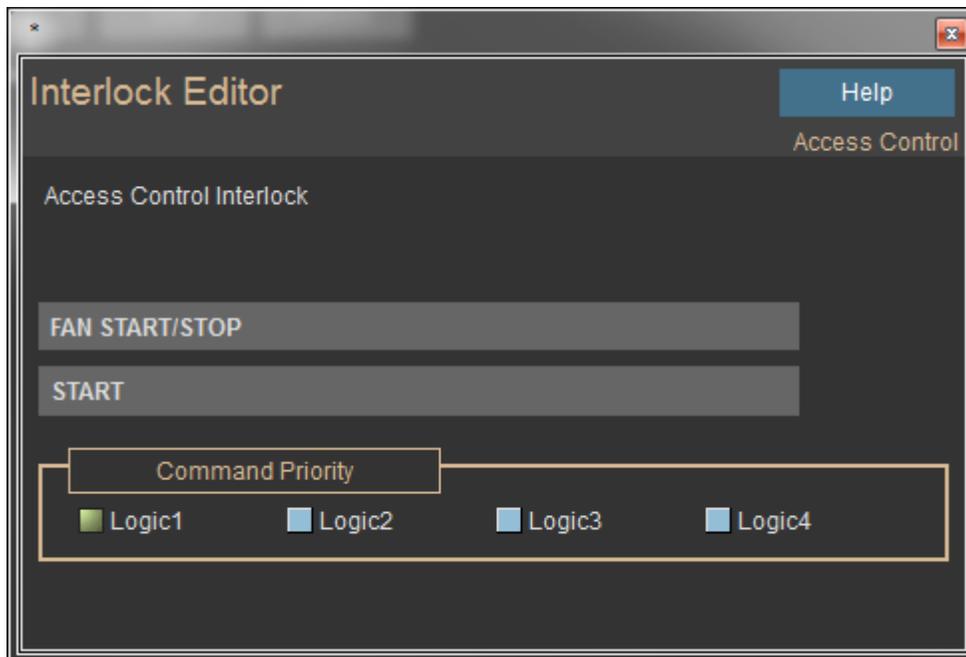
Link Point for Sync status  0=not run; 1=Running; 2=Success; 3=Failed

## Add Interlocks

Interlocks are Output points that will be triggered when a card is swiped. In order to add Interlocks, you must first add Automation points to the database. An Interlock will command any Binary or Momentary, Hardware or Software Output. You can set the Interlock to command the point On or Off.

Enabling buttons in an elevator is one of the most common Interlocks.

- From the Access Control menu, click Program Interlocks.
- From the Interlock List, click Insert, and you will see the Interlock Editor.



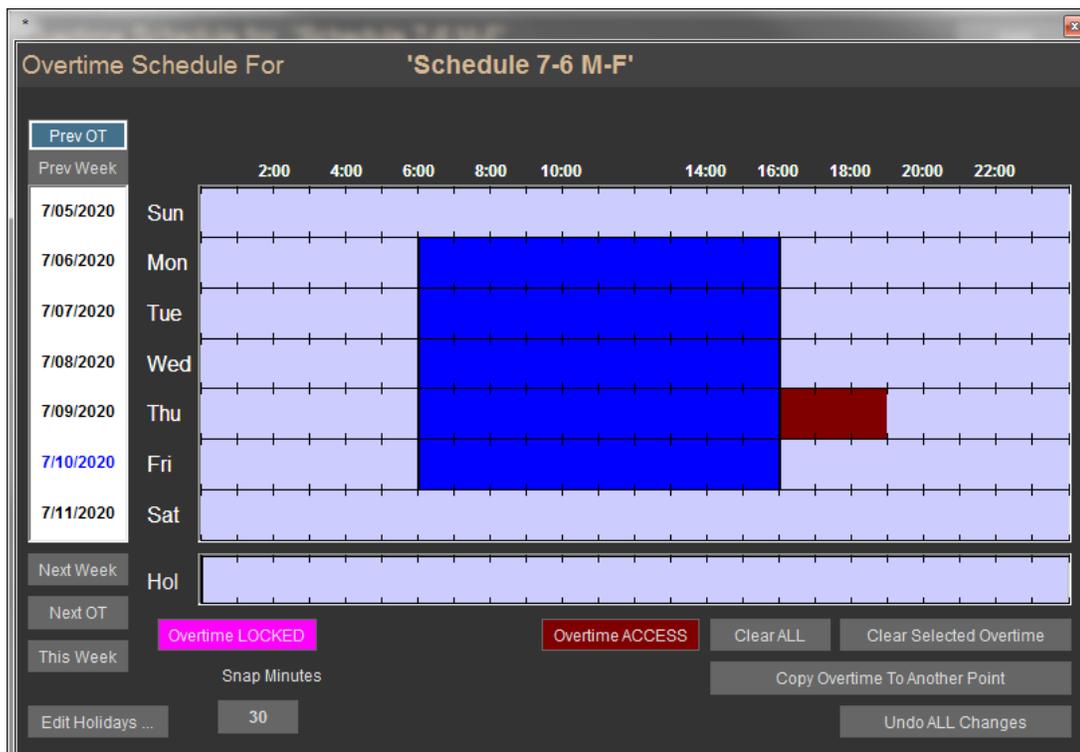
- Click the Select Output Point field and choose a point from the list.
- Only Binary and Momentary Output points are listed, including the second Relay Output point on the AC3, if it has been programmed.
- Click the next field and choose On/Off, Start/Stop, etc.
- For the Command Priority, Logic 1 will override a Schedule that is already in effect on the point.
- Choose Logic 2 to override a Logic 1, etc.
- Right-click to save the Interlock.
- Go to the Card/Area Editor to add the Interlock to a Card.

You can now command a software point from an interlock. The Software point must be in the same controller as the Hardware Binary Input that the interlock is programmed on. You cannot toggle the state of a software point from within an Interlock. You can only command it to a value. You can command analog and multistate points as well as binary points. You can still toggle the state of a hardware binary output from within an interlock. When commanding a software point from within an interlock, the speed will be much slower. The change of state should happen within 1 second. When an interlock commands a hardware output the change of state is within a few hundred milliseconds. **Note:** You must have Firmware rev 11.4 or later for this feature to work. For more information on Command Priority, go to Text View, then Priority Summary. There is a list showing what command type has priority over others. Don't forget to Download Controllers after making changes. You must be in Real Mode to do this.

## Overtimes

What if a Company, tenant, or a particular area needs to have access past the normal schedule? You can easily add an Overtime Schedule to the normal Schedule.

- From the Access Control menu, click Program Schedules.
- Click the Edit button, then the Schedule you want to add overtime to.
- Click Program Overtime Schedule.
- Click Use Graphical Editor.



- Highlight the part of the Schedule that you want to Add Overtime to by clicking and dragging down and to the right, then releasing.
- Click Overtime ACCESS and the time period will change color.
- To change to a future week and schedule Overtime, click the Next Week button. Dates are shown in the column on the left.
- Right-click or ESC to save and you will see a text representation of the Overtime. You can edit here by clicking on any field.
- Right-click or ESC to save and return to the Schedule list.

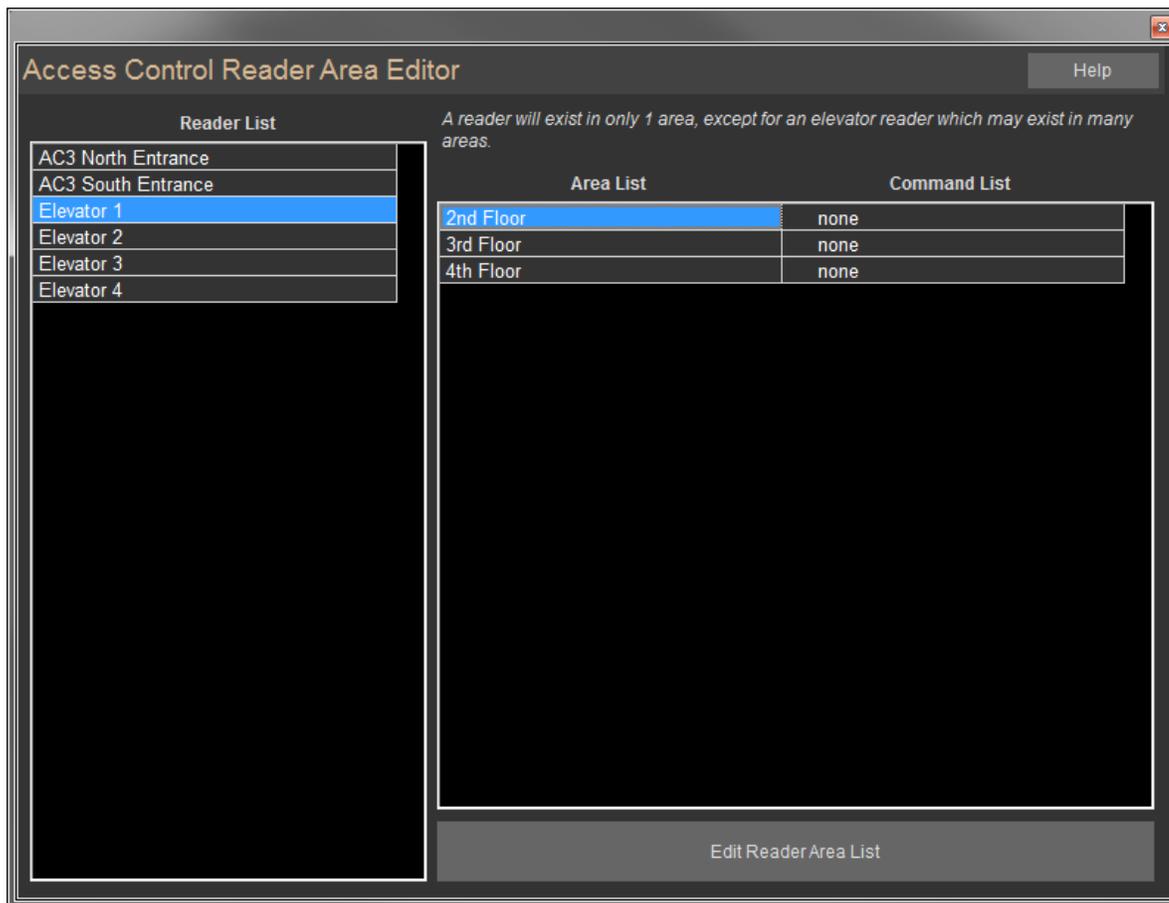
Don't forget to Download Controllers after making changes. You must be in Real Mode to do this. You should occasionally purge old Overtimes by going to System, Database Maintenance. Otherwise, you will eventually get to a point where you cannot add new Overtimes.

## Reader Areas

Readers only exist in 1 area, with the exception of elevator Readers. The Reader Area Editor is where you add Areas to Elevator Readers.

### DO NOT use the Reader Area Editor unless you are adding Areas to Elevator Readers!

- From the Access Control menu, click Program Reader/Areas.
- Select a Reader from the list on the left side of the editor and on the right you will see the Areas the Reader exists in.



- To add Areas to an elevator Reader, click Edit Reader Area List.
- Select Areas from the list and right-click to exit.
- Click any line in the Command List column to add an Interlock to an Area.
- Right-click or ESC to save changes and return to the Access Control menu.

Don't forget to Download Controllers after making changes. You must be in Real Mode to do this.

## Car/Card Junction

If a location is using a CR-NMR microwave reader, there is a device called the Combi-Booster, which is an active tag that is specifically designed to be used in combination with HID prox cards. The Combi-Booster enables simultaneous identification of the HID proximity card and the embedded vehicle ID, resulting in rapid combined driver and vehicle monitoring. On the windshield, the Nedap 2N-9888888 Combi-Booster - HID Proximity Card Integrated Dual ID Tag is mounted and the HID card is placed inside.

The Car/Card Junction menu item brings up an editor which allows you to track relationships between Cards and Car Transmitters (Combi-Booster). If a Cardholder has a Car Transmitter, check the Car Transmitter checkbox in the Card Editor. Then, go to System/Access Control/Car Card Junction/Program. This is where you relate Access Cards to Car Cards. For more information on this subject, please contact Technical Support.

## Passwords

The Passwords feature on the Access Control menu allows you to restrict the Areas that CBAS users can add, remove, and edit Cards to/from. When you open the Passwords feature, you will see the same list of Users found in Program Passwords on the System menu. For the User to be able to Program Cards and add Areas to them, you must first give them that right in Program Passwords.

- On the Main Menu, go to System, then click Program Passwords.
- To add a new User, click Insert and then click somewhere in the list.
- To Edit an existing User's rights, click Edit, then click the User from the list.
- Check all of the boxes next to items on the list containing the words Access Control. There are 2 items referring to Reports, and the rest pertain to Editing Access Control. If you check Edit Access Control Cards, but do not check Edit Access Control Areas, then the User will not be able to add Areas to a Card. More detailed instructions in previous Administration/Program Passwords section.
- Once you have checked the appropriate boxes, right-click or ESC to close.
- You may edit another User, or close the Password List screen.
- Now go to System, Access Control, then Passwords, if you want to restrict the Areas in which a User can or cannot edit Cards.
- Click a User from the list.
- By default, Users are allowed to Edit Cards in all Areas. To remove Areas, click the green button at the bottom of the screen.
- Click an Area on the main list and it will be removed from the secondary list on the right.
- Once you have finished editing a User, right-click or ESC to close.
- You may edit another User, or close the Password List screen.

## Card Lockout

Card Lockout is a feature that allows the CBAS Access Control Administrator to immediately lockout a Cardholder for 1 day (1440 Minutes). This forces the Cardholder to talk to the Administrator/Security upon arrival. In the Edit Card screen there is a Lockout Card button. Click it and it adds that user to a list of users that will be denied access. The User will be blocked from all access for the next 24 hours, or until they are removed from the lockout list. With the Lockout Card feature, an Access Control download is NOT required. The system is limited to a maximum of 14 users that can be locked out at any one time, and it takes about 20 seconds for the lockout to take affect. Go to Card Lockout on the Access Control menu to check Lockout status or to add/remove Cards to/from the list. The Card Lockout Editor can also be accessed from the Lockout Card button in the Edit Card screen. Clicking this button adds the Card to the list immediately.

- Go to System, Access Control, then Card Lockout.
- Locked out Cards will be listed along with the number of minutes remaining before the lockout ends.
- To add a Card to the list, click Edit Card Lockout List on the top left of the screen.
- Select a Card from the list, then right-click. The Card will begin counting down from 1440 minutes.
- To remove a card from the list, click the top right button, then click the Card.
- Right-click or ESC to exit the Card Lockout Editor.

## Activity View

To monitor current Card use activity, use Activity View. The last 200 Card swipes will be listed, including the users' name, Access granted or denied, door, and time of use. If a card is denied access, the line will be red and it will show the reason for denial. Possibilities for denial are: Unknown Card, Disabled Card, and Lock by Schedule. If you get the message "Denied DB Error", this means that you need to scale the database on the controllers and the server to accommodate the number of Card/Areas. If pictures are associated with Cards, each time a Card is used, the picture is displayed on the upper right side of the Activity List.

- From the Main Menu, click Text View, then Activity.
- You will see a list of Cards that have been recently used.
- To the upper right of the list, you will see a picture of the last Card user to gain entrance.
- Click on a line in the list and the picture of the user will be shown in the bottom right.
- Right-click or ESC to exit Activity View.



## Activity View Setup

Go to the System Menu, then Configure Workstation. In the Activity View Setup section, check the appropriate boxes. To display Automation Alarms (generally HVAC and Lighting points), check the first box. The second check box is to display Fire Alarms, if a Csimon Fire Panel is present in the system. To NOT show Access Control Activity in Activity View, uncheck the third box. To specify which Readers to display activity from, check the next box, then click the Select Readers button and choose Readers from the list. To NOT show pictures, uncheck the next box. If the Show Pictures box is checked, check the Show on Bottom box to make pictures display at the bottom of the screen instead of the side.

## Card Pictures

As stated earlier in the Adding Cards section, you can associate a picture with the Cards in the database. Each time a card is used, the picture will be displayed in Activity View.

- Pictures must be jpeg or bitmap format and should be placed in the C:\CBAS\AccessControlPictures folder.
- If the afore-mentioned folder does not exist, add it using Windows Explorer.
- Go to Program Cards on the Access Control menu.
- From the Card list, click Edit, then the card you want to add a picture to.
- Click the Browse button and select the picture from the *AccessControlPictures* folder.
- Click the Open button.

- Right-click or ESC to save and close the Card Editor.
- It is **NOT necessary** to Download Controllers after adding pictures.

## Access Workstation

Many administration and monitoring functions can also be performed on a CBAS Graphic Workstation. Graphic Workstation Mode (GW) allows a workstation computer with CBAS installed on it to connect to and share the server's database. A GW is used to monitor a database, but not to make major programming changes. Adding and removing Channels, Controllers and Points, as well as some administrative functions, are not possible on a GW. However, some Access Control administration functions are available on the GW, such as Adding/Editing Cards and Schedules. Activity View and Reports work the same as they do on the Server. In order to view pictures in Activity View on the GW, you must copy the Access Control Pictures folder from the Server to the GW and place it in C:\CBAS. ONLY 1 computer at a time can edit the Access Control Card database. So if editing is taking place on a GW, the DPU and all other Workstations will not be able to edit until the GW that is editing finishes. An error message will be displayed informing the user that editing is not possible at the present time. A GW is finished editing when the user either does a download, logs off, or there is no activity for 20 minutes. Adding and connecting a GW will be covered in this section, as well as copying the pictures folder.

## Setting up a GW (Graphic Workstation)

In order to set up a GW, the Server and the GW must be able to communicate on a network basis. In other words, if you can see the GW in the Network Neighborhood window of the DPU, it is possible. It is also possible to connect a GW over the Internet. When connecting as a GW, the CBAS version on the GW must be the same (or nearly the same) as the Server, or the Server will refuse the connection. Version 1.6.X will not work with 2.0.X, which will not work with 2.1.X, etc. Before you can set up a GW, you will need the IP address of the Server and the GW, as well as the computer name of both.

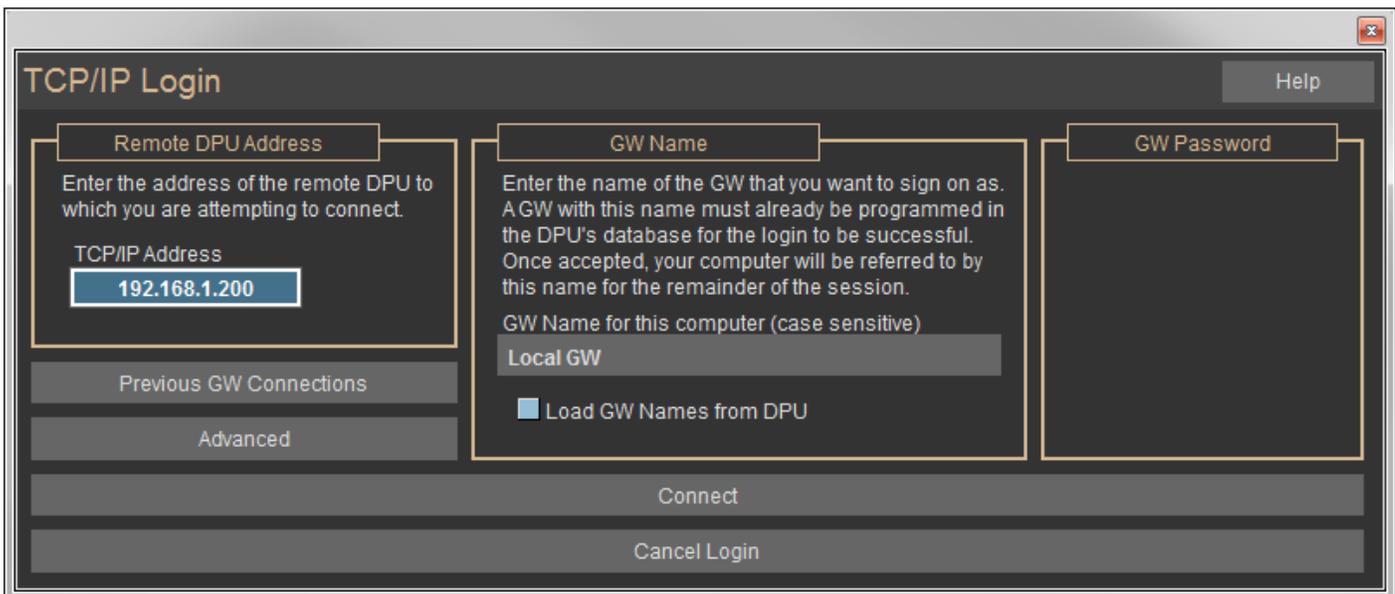
To get this info:

- In Windows 98, from the windows desktop, click on Start, Run, type winipcfg, and enter.
- In Windows 2000/XP, click on Start, Run, type command and hit Enter. At the prompt, type ipconfig and hit Enter.
- Write down the host name of the DPU and the IP address of both computers. Close the window.

First, you must set up the DPU to accept the GW:

- In Editor Mode, click on Database from the main menu, and then click on Add A GW.

- The first window will ask you for a name for the GW. The default is “NEW GW”. Enter a name that describes the location or function of the GW computer. Click next.
- Enter the IP address of the GW. Click finish.
- If you go to Hardware View, TCP/IP Channel, Controllers, you will see the GW you created, with a status of LOST.
- Close the database and reopen in real mode. Now go to the GW computer.
- In CBAS, click on System on the main menu, then Close Database.
- Once the database is closed, click on Database, Open Database, and Remote GW.
- Enter the IP address of the DPU, and the name of the GW exactly as you entered it on the DPU. Click Connect and the database should open.
- The GW Connection screen is shown below:



When you connect using the method above, the entire database is zipped and downloaded to the workstation. It resides in C:\CBAS\[GW Name]. If the database has changed since the last connection was made, the changes will be downloaded. Notice the” Use File Sharing Connection” checkbox in the figure above. Advantages and disadvantages of File Sharing are outlined also. File Sharing is not required or recommended for an Access Control GW. However, you may want to activate file sharing in Windows in order to transfer Access Control Pictures to the GW whenever cards are added.

## How to add the Access Control Pictures to the Workstation

For full instructions on file-sharing permissions and sharing files in Windows see the Advanced Programming section of the CBAS Manual. Once you have shared the CBAS folder on the Server and can access it from the GW:

- Open Windows Explorer.
- Double-click on the My Network Places icon on tree (left side).
- Navigate to the Server computer and double-click on it to see the shared folder list.
- Double-click on the CBAS folder.
- Right-click the AccessControlPictures folder and click copy.
- From the Explorer tree on the left, open the C:\CBAS folder
- Ctrl-V or right-click in an open space then click Paste.
- Answer Yes to overwrite.
- Close Windows Explorer.
- The new pictures should now show up in the lower picture position of Activity View if you click on one of the activity records on the left.

## Reports

From the Main Menu, go to the Reports Menu. There are 2 categories of Access Control Reports: Programming and Activity. All reports can be generated then printed or saved to a variety of formats.

### Programming Reports

Access Control Programming Reports are designed to give information about what has been programmed into the database, including Cards, Readers, Areas, Schedules, Companies, and Interlocks. There are many sorting options for these reports. For instance, when generating the Card report, you can choose to print All Cards or Selected Cards, and sort the results by Name, Card Number, Company, or Status. You can choose to generate the report in short format (limited information) or long format (all Information). There is also a check box for showing Areas on the report.

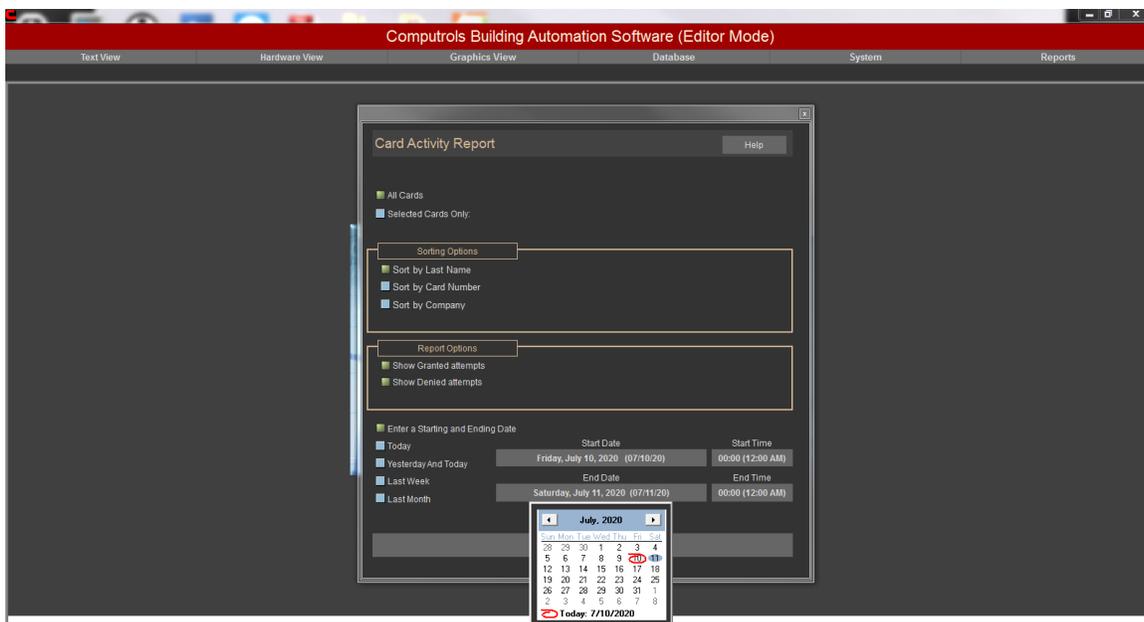
## Activity Reports

Access Control Activity Reports are designed to give the user historical information on Card use. The reports in this section give the same information, but offer different ways of formatting that information. For instance, the Card Report can give you name, card number, Company, status. Then, for each access during the reporting period, it gives you granted or denied, door, time and date. The Area Report gives you Card access for a selected Area or All Areas. Under each Area, it gives you name, granted or denied, Door, date, and time for the chosen time period. The Everything Report is a hard copy of Activity View, in order by time over the chosen time period. There are too many possible combinations to cover them all here, so try a few different reports and find some that suit your needs.

## Generating Reports

To generate a report:

- From the Main menu, click Reports.
- From the Reports Menu, choose either Access Control Programming or Access Control Activity.
- From the submenu, choose the report you want.
- Choose the sorting options you want or go with the defaults.
- Choose a time period.
- If you choose to Enter a Starting and Ending Date, click on Start Date and use the Calendar to choose date.



- Use the arrows to change the month.

- Click a date to select.
- Select Start and End Times or leave at default, which is midnight.
- Click Generate Report

Once a report is generated, CBAS displays it on the screen with the following tool bar:

**First Page:** Takes you to the first page in the report.

**Previous Page:** Takes you to the previous page in the report.

**Page Indicator:** This example indicates that you are on 3 of 360 total pages.

**Next Page:** Takes you to the next page in the report.

**Last Page:** Takes you to the last page in the report.

**Print:** Prints the report.

**Export:** Allows you to export the report a specified location. The following screen appears when you select this icon. You can export reports in any of the following formats by clicking the arrow beside the Format dropdown menu:

- Character-separated values
- Comma-separated values (CSV)
- Excel (XLS)
- Acrobat (PDF)
- HTML
- ODBC
- Many other types

Additionally, you can select the Destination by clicking the arrow beside the Destination drop-down menu. When you are satisfied with the Format and Destination, click OK. If you do not wish to export, click the Cancel button.

**Zoom:** Changes the view of the report on screen by zooming in and out.

**Total:** The number of listings a report includes.

**% Indicator:** Percentage that report has completed. Remember that you can cancel report generating at any time to get a partial report.

## Quick Start Guide to Access Control Elevator Programming

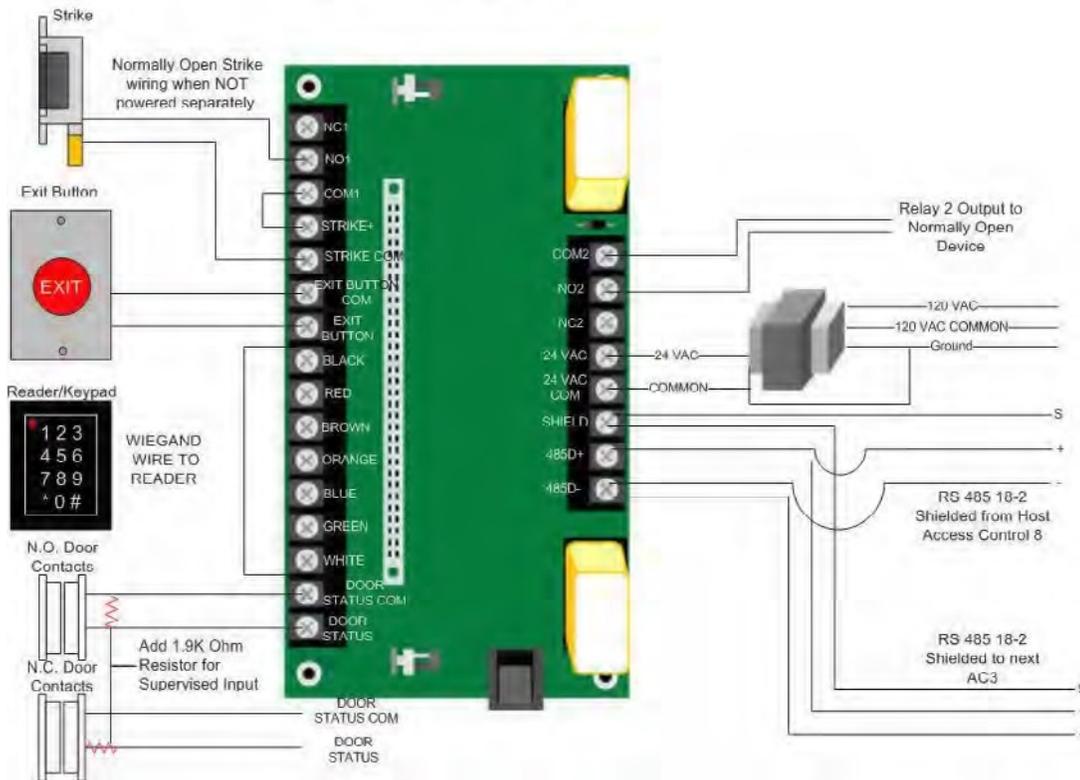
- Add an Access Control controller to the TCP/IP controller channel. The controller must have enough points to control the number of elevators times the number of floors (buttons). Ex. 4 Elevs X 8 Floors = 32 points

Add points to the controller for each Elev/floor; Elev 1 FL 1, Elev 1 FL 2, etc. Make these points Momentary Outputs. On the program screen for these points, set your “On Time”, which is how long the relay stays on to keep the button active. Click Switch Contacts if necessary, to make the relays reverse acting.

- Add a reader for each Elevator. Edit the Reader and check the appropriate boxes on the Reader Program screen.
- Add points to the Reader. Because there is no strike etc, Elevator Readers generally only require 2 points: Door and Last Access.
- Add Areas for each floor, but do not add Readers at this time.
- Add Interlocks for each Elev/Floor. Select the output points created in step 2. Select Start or Stop based on whether the point is NO or NC. If other logic may command a point, adjust logic level accordingly.
- Go to the Reader/Area Editor and select a Reader, then add Areas to each Elevator Reader.
- In the “Command List” column, add an interlock point for each area.
- Add Schedules so that users don’t have to swipe a Card during normal business hours. Add a Binary Output Event Sequence Software point to the controller hosting the button relay momentary points. Add a Schedule to that point. Add Logic level 2 to that point: When the schedule point is on, start the button points, else Auto the same points. Make the logic evaluate more often than the duration of the momentary outputs. In other words: if the momentary outputs are set to be ON for 10 seconds, make the logic evaluate every 5 to 8 seconds. This should keep the momentary points ON the whole time that the Schedule is ON. There are limits to how many lines can be written into a logic statement (125). Another way of doing the logic would be to put it on each individual output point, referencing the Schedule point in the statement.

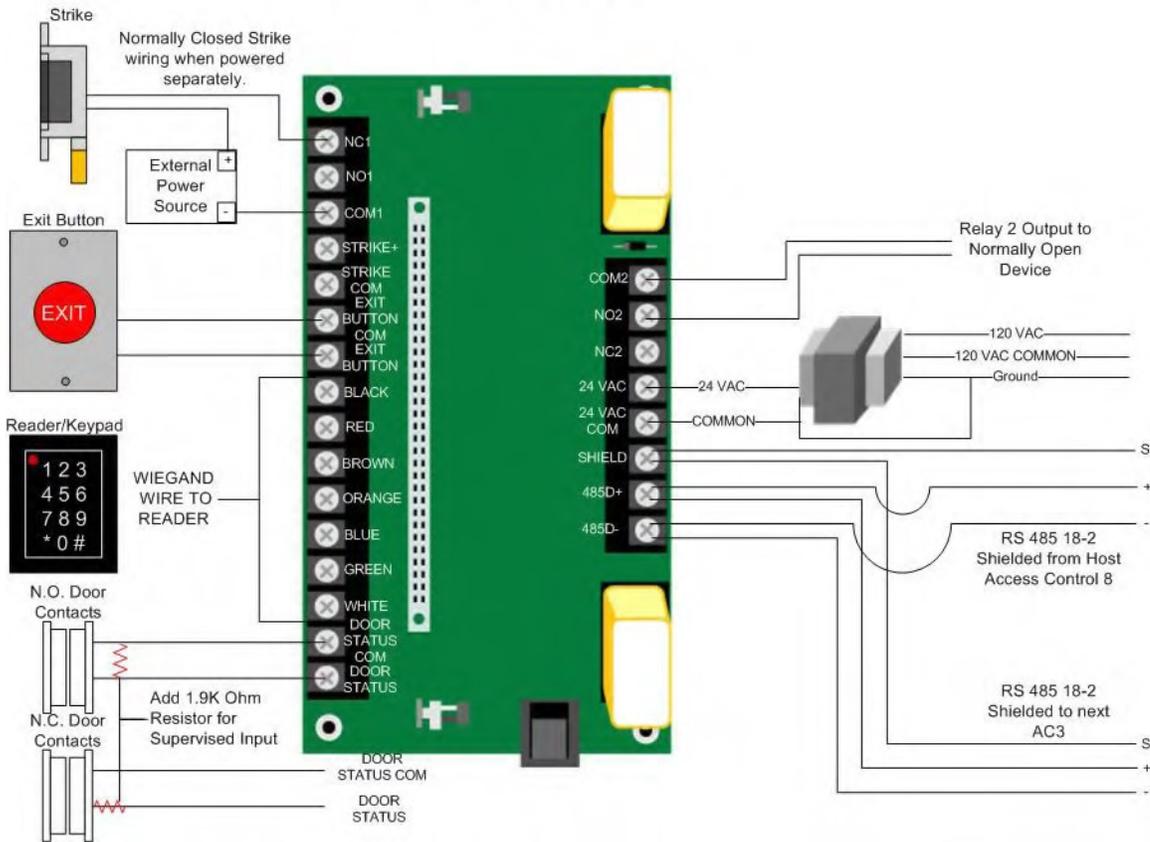
# AC-3 Wiring Diagrams

AC-3 Wiring Diagram 1



Wiring diagram with strike powered from the AC-3. Can be "Normally Open" or "Normally Closed."

## AC-3 Wiring Diagram 2



Wiring diagram with strike powered separately from the AC-3. Can be “Normally Open” or “Normally Closed.”

# Chapter 14 » CSimon Fire Protection System

## Introduction

### Description

The Fire System consists of 5 Signaling Loop Circuit (SLC) Modules with 2 channels per module used for Class A configuration (only 1 channel for Class B configuration), 2 Power Supply Modules, 1 Battery Backup Module, 1 Brain Module and 1 User Interface Module all attached to a Terminal Board via DIN connectors and ribbon cables. The communications between each module is RS 485 and is referred to Local RS 485 bus port. The Terminal Board with all of these modules attached is mounted in a UL listed custom panel enclosure. The Terminal Board consists of 1 RS-232 printer port, 10 SLC ports, 4 relays contacts (NO and NC), 3 non-specific 24VDC outputs, 2 temperature sensor inputs used to monitor cabinet and battery temperature, 2 RS-485 panel ports, 1 Local RS 485 bus port, 1 set of battery input terminals and 1 set of 24VAC input terminals. The Brain Module includes a 10Mbit port. This will be used to connect to a PC for additional monitoring and for setting the initial database for the Fire System. There is a variety of third party equipment that will wire to some of these ports. This equipment is listed in Section 1.2.

### System Operation

When an alarm occurs on a zone, the control panel indicates the alarm condition at the panel by sounding an audible signal and by flashing a red alarm LED until manually reset.

An alarm may be acknowledged by pressing the “ACK” button on the User Interface. This shall silence the panel sounder and change the status of the “Alarm LED” and the individual “Zone LED” from flashing to steady.

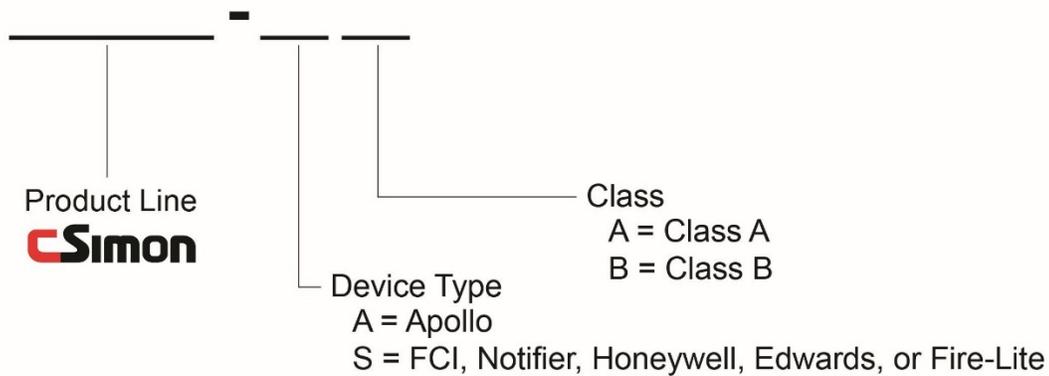
In the event of a microprocessor failure, the system will execute a default-signaling program, which will enable the panel to operate the notification appliances and notify the Fire Department through the on-board “Fire Dept” notification relay. It has normally open and normally closed relay contacts, which are software programmable to switch upon any alarm condition. The “Fire Dept” notification relay is designed for connection to a UL listed Digital Alarm Communicator Transmitter (DACT). See Section 4.1.5.

## Maximum Devices

Class A & B	5 Signaling Line Circuit (SLC) per fire panel
APOLLO Signaling Line Circuit (SLC)	126 devices [detectors or (control, monitor, relay, I/O) modules]
FCI, Notifier, Honeywell, Fire-Lite, Edwards Signaling Line Circuit (SLC)	126 (control, monitor, relay) modules

## Ordering Information

### BUILD A PART NUMBER



#### Sample Part Number

**CSimon -AA**

(This part number represents **CSimon** Apollo, Class A)

## Features

### Ground Fault

All Ground Fault detection ties through Earth Ground.

## System Components

### Fire Controller

## Terminal Board

The terminal board is the “motherboard” for the entire fire controller. It consists of many terminals described in Section 3.0. It has a RS 485 backbone for each module to be on the same communication trunk.

## Enclosure

The enclosure consists of a box with cut-out to access the User Interface (Section 1.6.8) via password protection and a full access cabinet door accessible with a keylock. It is made of 14-gauge steel and contains various knockouts and vents. When opened, the full access cabinet door allows the user to access everything in the cabinet including all modules, terminations, batteries, transformers, etc.

## Brain Board

The brain board contains an Intel 386 Processor, which stores the entire database for the fire system. When the fire system is initially installed, this database will be set-up via Ethernet. This is explained in Section 2.0. However, once the database is programmed, the fire controller is completely stand-alone and can function fully without the Ethernet connection.

## 2-Channel Signaling Line Circuits

The 2-Channel Signaling Line Circuit (SLC) provides communication with all analog addressable devices including the devices listed in 1.8 and 1.9. There are a maximum of five 2-channel SLC modules per fire panel. Each module has two channels to be wired as Class B (using both channels on a SLC) or Class A (using only 1 channel per SLC). Each channel can accommodate 126 addressable points. These SLC's are intrinsically power limited.

- SLC Output Voltage: 21.8 to 21.8 Volts DC
- SLC Max current = 300mA
- SLC Impedance = 16 Ohms

The CSimon comes in different models. It can be set up to use either devices manufactured by APOLLO listed in section 1.8 or it can be set up to use devices manufactured by FCI, Honeywell, Edwards, Notifier and Fire-Lite listed in section 1.9.

## Power Supply

A single Power Supply module outputs the 5 amps of current. However, the Fire System allows an optional second power supply to be placed in parallel to output a total of 10 amps. This module converts 24 Volts AC

taken from the transformer to 33.8 volts DC unregulated and then to 24 volts DC regulated, 8 volts DC regulated and 5 volts DC regulated.

The ratings are as follows:

- 120 Vac, 60 Hz, Max. Current Draw @ NS = 1.07A
- 120 Vac, 60 Hz, Max. Current Draw @ A = 1.905A

## **Battery Backup**

The Battery Backup module charges the Power Sonic Re-chargeable Sealed Lead-Acid Batteries (see section 1.6.11) when the main power transformer is feeding the fire system. However, when the main power transformer is not feeding the fire system with its required power for any reason, the Battery Backup module switches the batteries into the circuit to feed the entire system.

## **User Interface**

The User Interface Module consists of a keypad, LCD and LED's. It allows the user with the password to access the keypad and to fully operate the fire system. The User Interface Operations are explained in section 3.0.

## **Printer**

The printer is a Keltron 90 Series Fire Alarm Printer. It prints alarms and troubles and provides a "hard copy" as opposed to an electronic message for the fire system. It prints the alarms and troubles on a roll of 3 inch wide paper. This paper should be maintained at all times by monitoring the paper status LEDs. (Refer to Keltron's 90 Series Fire Alarm Printer installation manual for installation instructions.)

## **Transformer**

The transformer input is 110/220VAC. The output is 28VAC @ 6.2Amps. This transformer is factory installed. (Refer to Triad Magnetics' part number VPS28-6250 installation manual for further information.)

## **Batteries**

The batteries are rechargeable sealed lead-acid batteries by Power Sonic. They are 12 volt, 55 amp-hours needed for max load. The part number is PS-12550. These are factory installed. (Refer to Power Sonic's part number PS-12550 installation manual for further information.) When the AC voltage drops below 103 Volts the FIRE system will switch to Battery. The FIRE system will switch back to AC power after the AC voltage has been

above 106V for 5 seconds.

When AC power is lost the FIRE system will switch to Battery. The system will continue to run from the Battery until the battery voltage drops to a point where it can no longer run the system (or until the AC voltage comes back on for 100 seconds). BUT, the FIRE system will not start from the Battery. This means that if the system is running from Battery and someone flips the Battery Disconnect switch or disconnects the battery, the FIRE system will STAY POWERED DOWN UNTIL AC VOLTAGE IS REAPPLIED even if the Battery Disconnect switch is flipped back or the battery is reconnected. There is NO WAY to get the FIRE system back up in an AC outage once the battery has been disconnected until the AC power is back.

## Battery Calculations

The battery backup must last for 24 hours in standby mode and 5 minutes in Alarm mode as per NFPA72 4.4.1.5.3.1 (2002 Edition). Use the chart and formula on the following page to calculate the battery required.

Device Manufacturer	Device Name	Device Part No.	Quantity	Alarm Current (amps)	Standby Current (amps)	Total Alarm Current [Q x Alarm Current] (amps)	Total Standby Current [Q x Standby Current] (amps)
APOLLO	Discovery Ionization Monitor	58000-550		0.0035	0.0005		
APOLLO	Discovery Optical Monitor	58000-650		0.0034	0.0004		
APOLLO	Discovery Heat Detector	58000-450		0.0034	0.0005		
APOLLO	Discovery Multisensor	58000-750		0.0035	0.0005		
APOLLO	XP95A Beam Detector	55000-266		0.018	0.0165		
APOLLO	XP95A Priority Switch Monitor Module	55000-806		0.005	0.0006		
APOLLO	XP95A Sounder Control Module	55000-825		0.004	0.001		
APOLLO	XP95A Mini Switch Monitor Module	55000-831		0.005	0.0006		
APOLLO	XP95A Switch Monitor Module	55000-805		0.005	0.0006		
APOLLO	XP95A Switch Monitor I/O Module	55000-820		0.005	0.00085		
APOLLO	XP95A Mini Priority Switch Monitor Module	55000-830		0.005	0.0006		
APOLLO	Discovery Sounder Beacon Base	45681-524		0.00636	0.0013		
APOLLO	Analog Addressable Duct Detector (Ionization)	SL-DAA-N		0.0025	0.00028		
APOLLO	Analog Addressable Duct Detector (Photoelectric)	SL-DAA-P		0.0045	0.00034		
FCI	Monitor Module	AMM-4		0.00575	0.0004		
FCI	Mini Monitor Module	AMM-2		0.0006	0.0004		
FCI	Control Module	ADM-2S		0.0003	0.0003		
FCI	Relay Control Module	ADM-2R		0.0003	0.0003		
FCI	Zone Monitor Module	AMM-4S		0.0003	0.0003		
EDWARDS	Monitor Module	M500MF		0.0051	0.000375		
EDWARDS	Mini Monitor Module	M501MF		0.000375	0.000375		
EDWARDS	Relay Control Module	M500RF		0.0051	0.000375		
EDWARDS	Control Module	M500SF		0.0051	0.000255		
NOTIFIER	Monitor Module	FMM-1		0.0051	0.000375		
NOTIFIER	Mini Monitor Module	FMM-101		0.000375	0.000375		
NOTIFIER	Relay Control Module	FRM-1		0.0065	0.000375		
NOTIFIER	Control Module	FCM-1		0.0065	0.000255		
NOTIFIER	Zone Monitor Module	FZM-1		0.0065	0.000255		
FIRE-LITE	Monitor Module	MMF-300		0.0051	0.0004		
FIRE-LITE	Mini Monitor Module	MMF-301		0.000375	0.000375		
FIRE-LITE	Relay Control Module	CRF-300		0.0051	0.00027		
FIRE-LITE	Control Module	CMF-300		0.0051	0.00039		
FIRE-LITE	Zone Monitor Module	MMF-302		0.0051	0.00039		
HONEYWELL	Monitor Module	TC809A1058		0.0051	0.000375		
HONEYWELL	Relay Control Module	TC810R1024		0.0051	0.000375		
HONEYWELL	Control Module	TC810N1013		0.0051	0.000255		
COMPUTROLS	Supervisory	SC1		0.5000	0.5000		
PRECON	Encapsulated Thermistor Sensor	ST-R3		0.0050	0.0050		
KELTRON	90 Series Fire Alarm Printer	VS4095/5 w/ VS ENCREDD		1.0000	0.1000		
<b>TOTALS</b>						<b>{Sum of Alarm Currents}</b>	<b>{Sum of Standby Currents}</b>

Ampere-hours needed during STANDBY phase:

$(0.36 + \text{Sum of Standby Currents}) \text{ Amperes} \times 24 \text{ Hours}$  Ampere-hours needed during ALARM phase:

$(0.36 + \text{Sum of Alarm Currents}) \text{ Amperes} \times 0.084^1 \text{ Hours}$  Total amp hours requirement:

$\{[(0.36 + \text{Sum of Standby Currents}) \times 24] + [(0.36 + \text{Sum of Alarm Currents}) \times 0.084]\} \times 1.2^2$

Example calculation with:

- 12 APOLLO Discovery Ionization Monitors
- 5 APOLLO Discovery Optical Monitors
- APOLLO XP95A Switch Monitor Modules

---

5 minutes = 0.084 Hours

20% overrating factor for safety

» 1 APOLLO XP95A Switch Monitor I/O Module:

Device Manufacturer	Device Name	Device Part No.	Quantity	Alarm Current (amps)	Standby Current (amps)	Total Alarm Current [Q x Alarm Current] (amps)	Total Standby Current [Q x Standby Current] (amps)
APOLLO	Discovery Ionization Monitor	58000-550		0.0035	0.0005	0.042	0.006
APOLLO	Discovery Optical Monitor	58000-850		0.0034	0.0004	0.017	0.002
APOLLO	Discovery Heat Detector	58000-450		0.0034	0.0005	0	0
APOLLO	Discovery Multisensor	58000-750		0.0035	0.0005	0	0
APOLLO	XP95A Beam Detector	55000-266		0.018	0.0165	0	0
APOLLO	XP95A Priority Switch Monitor Module	55000-808		0.005	0.0006	0	0
APOLLO	XP95A Sounder Control Module	55000-825		0.004	0.001	0	0
APOLLO	XP95A Mini Switch Monitor Module	55000-831		0.005	0.0006	0	0
APOLLO	XP95A Switch Monitor Module	55000-805		0.005	0.0006	0.01	0.0012
APOLLO	XP95A Switch Monitor I/O Module	55000-820		0.005	0.0006	0.005	0.00085
APOLLO	XP95A Mini Priority Switch Monitor Module	55000-830		0.005	0.0006	0	0
APOLLO	Discovery Sounder Beacon Base	45681-524		0.0036	0.0013	0	0
APOLLO	Analog Addressable Duct Detector (Ionization)	SL-DAA-N		0.0025	0.00028	0	0
APOLLO	Analog Addressable Duct Detector (Photoelectric)	SL-DA-A-P		0.0045	0.00034	0	0
FCI	Monitor Module	AMM-4		0.00575	0.0004	0	0
FCI	Mini Monitor Module	AMM-2		0.0008	0.0004	0	0
FCI	Control Module	ACM-2S		0.0003	0.0003	0	0
FCI	Relay Control Module	ACM-2R		0.0003	0.0003	0	0
FCI	Zone Monitor Module	AMM-4S		0.0003	0.0003	0	0
EDWARDS	Monitor Module	M500MF		0.0051	0.000375	0	0
EDWARDS	Mini Monitor Module	M501MF		0.000375	0.000375	0	0
EDWARDS	Relay Control Module	M500RF		0.0051	0.000375	0	0
EDWARDS	Control Module	M500SF		0.0051	0.000255	0	0
NOTIFIER	Monitor Module	FMM-1		0.0051	0.000375	0	0
NOTIFIER	Mini Monitor Module	FMM-101		0.000375	0.000375	0	0
NOTIFIER	Relay Control Module	FRM-1		0.0065	0.000375	0	0
NOTIFIER	Control Module	FCM-1		0.0065	0.000255	0	0
NOTIFIER	Zone Monitor Module	FZM-1		0.0065	0.000255	0	0
FIRE-LITE	Monitor Module	MMF-300		0.0051	0.0004	0	0
FIRE-LITE	Mini Monitor Module	MMF-301		0.000375	0.000375	0	0
FIRE-LITE	Relay Control Module	CRF-300		0.0051	0.00027	0	0
FIRE-LITE	Control Module	CMF-300		0.0051	0.00039	0	0
FIRE-LITE	Zone Monitor Module	MMF-302		0.0051	0.00039	0	0
HONEYWELL	Monitor Module	TC809A1058		0.0051	0.000375	0	0
HONEYWELL	Relay Control Module	TC810R1024		0.0051	0.000375	0	0
HONEYWELL	Control Module	TC810N1013		0.0051	0.000255	0	0
COMPUTROLS	Supervisory	SC1		0.5000	0.5000	0	0
PRECON	Encapsulated Thermistor Sensor	ST-R3		0.0050	0.0050	0	0
KELTRON	90 Series Fire Alarm Printer	V840955 w/VS ENCHED		1.0000	0.1000	0	0
TOTALS						0.074	0.01005

Example Total Amp-Hour requirement:

$$\{[(0.36 + 0.01005) \times 24] + [(0.36 + 0.074) \times 0.084]\} \times 1.2 = 10.7012$$

## Bases (Optional)

### XP95A Base (45681-210)

The XP95A base has been designed to enable the detector to be fitted without the need for any force. (Refer to Apollo Fire Detectors Limited's part number 58000-650 installation manual for installation instructions.)

### XP95A E-Z Fit Base (45681-250)

The XP95A E-Z Fit base is an ultra-low profile mounting base for XP95A and Discovery smoke and heat detectors and can be fitted to mounting boxes up to 4in (100mm) in size. (Refer to Apollo Fire Detectors Limited's part number 45681-250 installation manual for installation instructions.)

## **Detectors (Optional)**

### **Apollo Discovery Ionization Monitor (58000-550)**

Ionization chamber smoke detectors irradiate the air in the polarized smoke chamber, which creates a current flow. Smoke entering the chamber causes a current flow to be reduced and this creates an alarm condition. It is a good general-purpose detector that responds well to fast burning, flaming fires. Some common applications include hotel rooms, studio apartments, offices, long corridors, hospital wards, light industrial factory units, warehouses and bars. These modules can be used with either the XP95A Isolator Base 20D or XP95A EZ Fit Base. (Refer to Apollo Fire Detectors Limited's part number 58000-550 installation manual for installation instructions.)

### **Apollo Discovery Optical Monitor (58000-650)**

The Discovery optical smoke detector is suitable for slow burning or smoldering fires and should be positioned where these are most likely to occur. They can be set to a sensitivity mode best suited for the application. Some common applications include suites, hotel rooms, studio apartments, offices, long corridors, hospital wards, light industrial factory units, warehouses, bars, loading bays, car parks and boiler rooms. These modules can be used with either XP95A Isolator Base 20D or XP95A EZ Fit Base. (Refer to Apollo Fire Detectors Limited's part number 58000-650 installation manual for installation instructions.)

### **Apollo Discovery Heat Detector (58000-450)**

The Discovery heat detector uses a single thermistor to sense the air temperature around the detector. This type of detector is particularly useful where the environment is dirty or smoky under normal conditions. Some common applications are kitchens, laundry rooms and boiler rooms. These modules can be used with either XP95A Isolator Base 20D or XP95A EZ Fit Base. (Refer to Apollo Fire Detectors Limited's part number 58000-450 installation manual for installation instructions.)

### **Apollo Discovery Multi-sensor (58000-750)**

The Discovery multisensor detector is an optical smoke detector and temperature sensor whose outputs are combined to give the final analog value. As a result, the multisensory is useful over a wide range of applications and is highly immune to false alarms. Some common applications include suites, hotel rooms, studio apartments, warehouses, bars, loading bays or car parks. These modules can be used with either XP95A Isolator Base 20D or XP95A EZ Fit Base. (Refer to Apollo Fire Detectors Limited's part number 58000-750 installation manual for installation instructions.)

### **Apollo XP95A Beam Detector (55000-266)**

The XP95A beam detector has been designed to protect large open spaces such as atria, museums, churches, warehouses and factories. It is made up of three main parts: the transmitter, which projects a beam of infra-red light, the receiver, which registers the light and produces an electrical signal, and the interface, which processes the signal and generates alarm or fault signals. (Refer to Apollo Fire Detectors Limited's part number 55000-266 installation manual for installation instructions.)

### **Monitor/Control Modules (Optional)**

#### **Apollo XP95A Priority Switch Monitor Module (55000-806)**

(Refer to Apollo Fire Detectors Limited's part number 55000-806 installation manual for installation instructions.)

#### **Apollo XP95A Sounder Control Module (55000-825)**

(Refer to Apollo Fire Detectors Limited's part number 55000-825 installation manual for installation instructions.)

#### **Apollo XP95A Mini Switch Monitor Module (55000-831)**

(Refer to Apollo Fire Detectors Limited's part number 55000-831 installation manual for installation instructions.)

#### **Apollo XP95A Switch Monitor Module (55000-805)**

(Refer to Apollo Fire Detectors Limited's part number 55000-805 installation manual for installation instructions.)

#### **Apollo XP95A Switch Monitor I/O Module (55000-820)**

The ratings for the I/O Module:

- 120 Vac, 60 Hz, Max. Current Draw @ NS = 208 mA
- 120 Vac, 60 Hz, Max. Current Draw @ A = 211 mA

(Refer to Apollo Fire Detectors Limited's part number 55000-820 installation manual for installation instructions.)

**Apollo XP95A Mini Priority Switch Monitor Module (55000-830)**

(Refer to Apollo Fire Detectors Limited's part number 55000-830 installation manual for installation instructions.)

**Apollo Discovery Sounder Beacon Base (45681-524)**

(Refer to Apollo Fire Detectors Limited's part number 45681-524 installation manual for installation instructions.)

**Apollo Analog Add. Duct Detector Ionization (SL-DAA-N)**

(Refer to Apollo Fire Detectors Limited's part number SL-DAA-N installation manual for installation instructions.)

**Apollo Analog Add. Duct Detector Photoelectric (SL-DAA-P)**

(Refer to Apollo Fire Detectors Limited's part number SL-DAA-P installation manual for installation instructions.)

**FCI Monitor Module (AMM-4)**

(Refer to Fire Controls Instruments' part number AMM-4 installation manual for installation instructions.)

**FCI Mini Monitor Module (AMM-2)**

(Refer to Fire Controls Instruments' part number AMM-2 installation manual for installation instructions.)

**FCI Control Module (AOM-2S)**

(Refer to Fire Controls Instruments' part number AOM-2S installation manual for installation instructions.)

**FCI Relay Control Module (AOM-2R)**

(Refer to Fire Controls Instruments' part number AOM-2R installation manual for installation instructions.)

**FCI Zone Monitor Module (AMM-4S)**

(Refer to Fire Controls Instruments' part number AMM-4S installation manual for installation instructions.)

**Edwards Monitor Module (M500MF)**

(Refer to Edwards Systems Technology's part number M500MF installation manual for installation instructions.)

**Edwards Mini Monitor Module (M501MF)**

(Refer to Edwards Systems Technology's part number M501MF installation manual for installation instructions.)

**Edwards Relay Control Module (M500RF)**

(Refer to Edwards Systems Technology's part number M500RF installation manual for installation instructions.)

**Edwards Control Module (M500SF)**

(Refer to Edwards Systems Technology's part number M500SF installation manual for installation instructions.)

**Notifier Monitor Module (FMM-1)**

(Refer to Notifier's part number FMM-1 installation manual for installation instructions.)

**Notifier Mini Monitor Module (FMM-101)**

(Refer to Notifier's part number FMM-101 installation manual for installation instructions.)

**Notifier Relay Control Module (FRM-1)**

(Refer to Notifier's part number FRM-1 installation manual for installation instructions.)

**Notifier Control Module (FCM-1)**

(Refer to Notifier's part number FCM-1 installation manual for installation instructions.)

**Notifier Zone Monitor Module (FZM-1)**

(Refer to Notifier's part number FZM-1 installation manual for installation instructions.)

**Fire-Lite Monitor Module (MMF-300 (old part # M300))**

(Refer to Fire-Lite Alarms' part number MMF-300 installation manual for installation instructions.)

**Fire-Lite Mini Monitor Module (MMF-301 (old part # M301))**

(Refer to Fire-Lite Alarms' part number MMF-301 installation manual for installation instructions.)

**Fire-Lite Relay Control Module (CRF-300 (old part #C304))**

(Refer to Fire-Lite Alarms' part number CRF-300 installation manual for installation instructions.)

**Fire-Lite Control Module (CMF-300 (old part #C304))**

(Refer to Fire-Lite Alarms' part number CMF-300 installation manual for installation instructions.)

**Fire-Lite Zone Monitor Module (MMF-302)**

(Refer to Fire-Lite Alarms' part number MMF-302 installation manual for installation instructions.)

**Honeywell Monitor Module (TC809A1058)**

(Refer to Honeywell's part number TC809A1058 installation manual for installation instructions.)

**Honeywell Relay Control Module (TC810R1024)**

(Refer to Honeywell's part number TC810R1024 installation manual for installation instructions.)

**Honeywell Control Module (TC810N1013)**

(Refer to Honeywell's part number TC810N1013 installation manual for installation instructions.)

## Accessories

### Computrols SC1

The Computrols SC1 (Refer to Computrols, Inc.'s part number SC1 installation manual for installation instructions.)

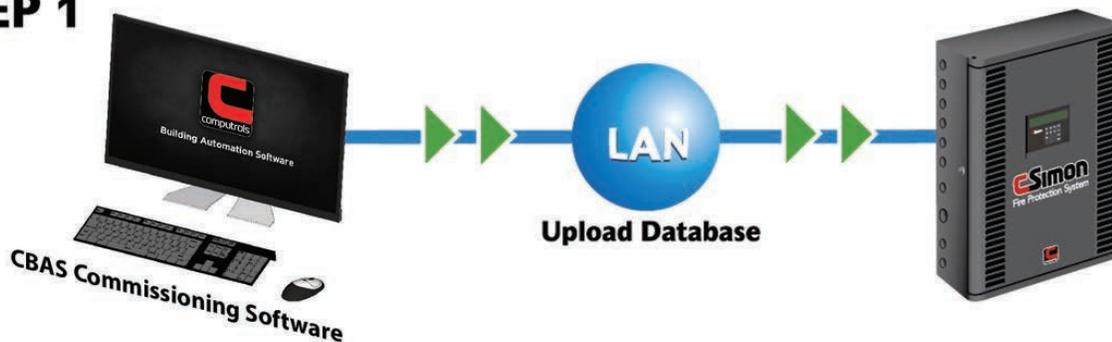
### Precon Encapsulated Thermistor Sensor

The Precon Encapsulated Thermistor Sensors are type III 10K ohm thermistors providing precision remote temperature sensing. The active sensing element is a highly stable precision thermistor material accurate to within  $\pm 0.36^{\circ}\text{F}$  ( $\pm 0.2^{\circ}\text{C}$ ). They come factory installed. (Refer to Precon's part number ST-R3 installation manual for further information.)

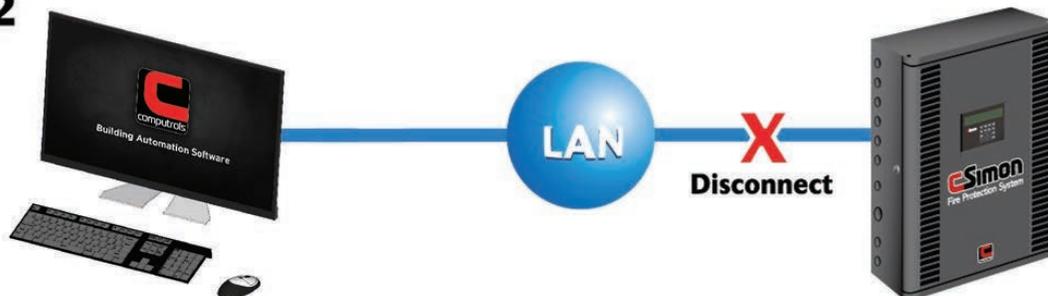
## Database Setup Using CBAS

### Commissioning Hardware Diagram

#### STEP 1



#### STEP 2



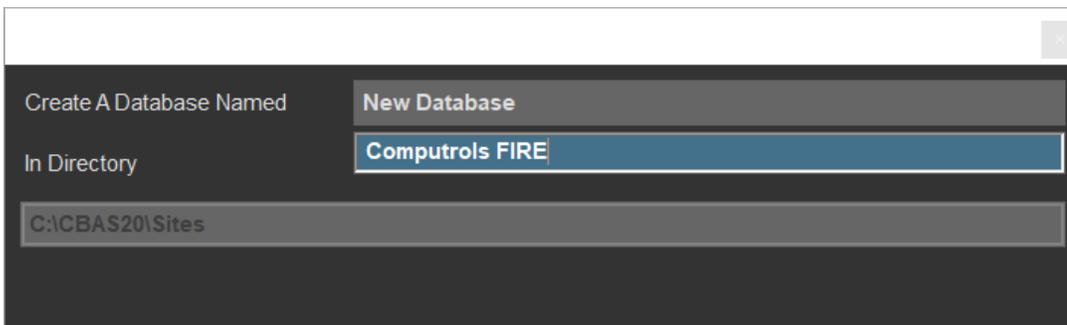
## Software Setup

Once a CSimon Fire System is commissioned, the software is for monitoring only. Alarms must be acknowledged from the user interface panel. The entire system must be programmed from the monitoring computer. To do this, the panel being programmed must be placed into Commission Mode. If a Fire Panel does not have a database, it will automatically go into Commission Mode after 3 minutes. When entering Real mode in the software, the database will download to the panel automatically, as long as it doesn't have a database already. To replace or update a database, erase the database on the panel first from the software. To do this, click the controller in Hardware View and click Erase Database. The new database will then download to the panel.

## Create New Database

Open the CSimon software by clicking on CSimon on the Program Menu or the Icon on the Windows Desktop. If the software opens to an existing database, you will need to close it by going to the System Menu and clicking on Close Database. Once the database is closed, you will only see 2 menus listed: Database and System.

To start a new database, Click on Database, then New Database, and you will see the following window.



The screenshot shows a dialog box titled "Create A Database Named" with a text input field containing "New Database". Below this, there is a label "In Directory" followed by a text input field containing "Computrols FIRE". At the bottom of the dialog, there is a text input field containing the path "C:\CBAS20\Sites". The dialog box has a dark background and a light-colored border.

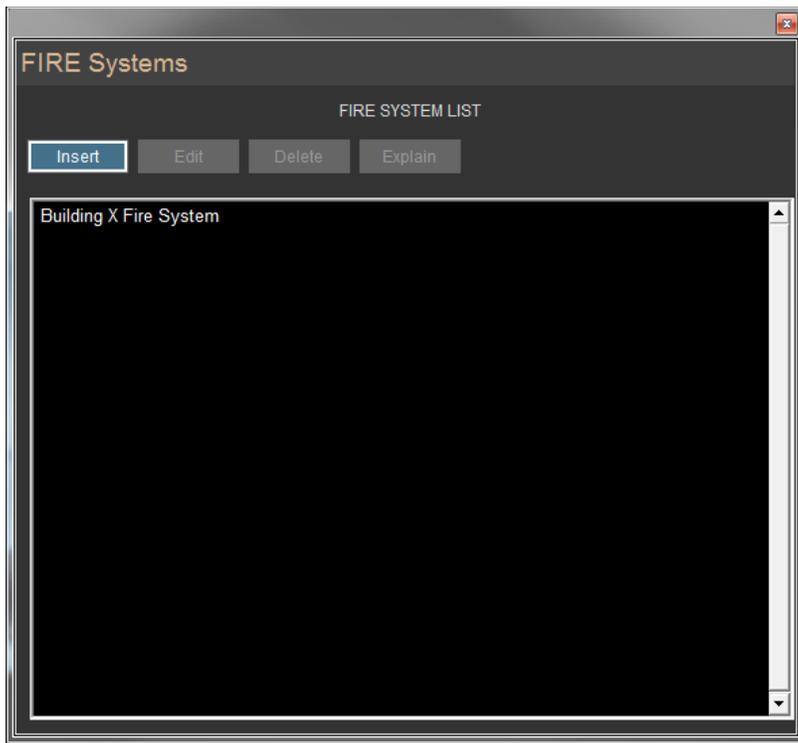
Enter a descriptive name for the database, probably containing the building name. Choose C:\ CBAS for the location. Click "Create Database Now!" and a folder will be created. The location is C:\CBAS20\Sites\Database Name\Database. After a short time, the database will open. Go to System menu then FIRE.



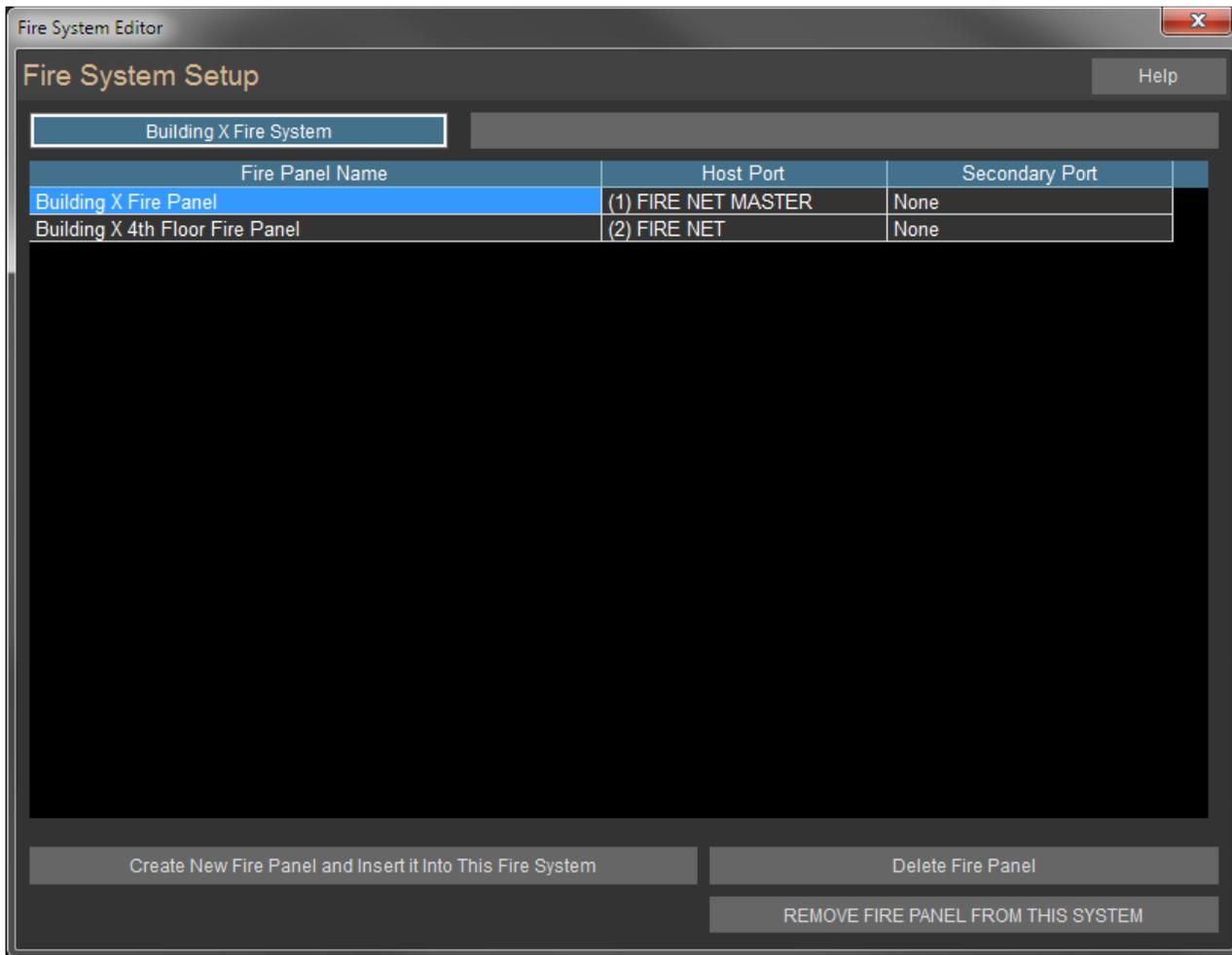
Click FIRE.



Click Systems.



Click Edit then click New Fire System or if you are editing an existing System, click the name of the Fire System. The next picture is an example of an existing System with a Master Panel and 1 Slave Panel. To create another System, Click Insert then click Edit. To delete a System click Delete then the System you want to remove.



On the Host Port you will notice that the System is using FIRE NET protocol as Peer to Peer RS485 comm between the Panels.

On a new FIRE System click Create New Fire Panel and Insert it into This Fire System.

If you have a separate building that you want to make a separate System then go back to Systems and insert another System. You will see the next screen.

Module Type	Prefix for each Fire Module Card (upto 6 characters)
<input checked="" type="checkbox"/> Apollo <input type="checkbox"/> System Sensors	LM1
<input checked="" type="checkbox"/> Apollo <input type="checkbox"/> System Sensors	LM2
<input checked="" type="checkbox"/> Apollo <input type="checkbox"/> System Sensors	LM3
<input checked="" type="checkbox"/> Apollo <input type="checkbox"/> System Sensors	LM4
<input checked="" type="checkbox"/> Apollo <input type="checkbox"/> System Sensors	LM5
Power Supply 1	PS1
Power Supply 2	PS2
Battery Backup	BB
User Interface	UI

Click the Fire Panel Name and change it to reflect the location and whether it is a Master or Slave.

Change the IP address to one that works on your network.

Do not change the Panel Type unless you are adding Smoke Control Controllers. Smoke Control is covered later.

Choose how the Secondary 485 port will be used or not used.

Choose a prefix up to 8 characters for the Fire points that are added when the panel is created.

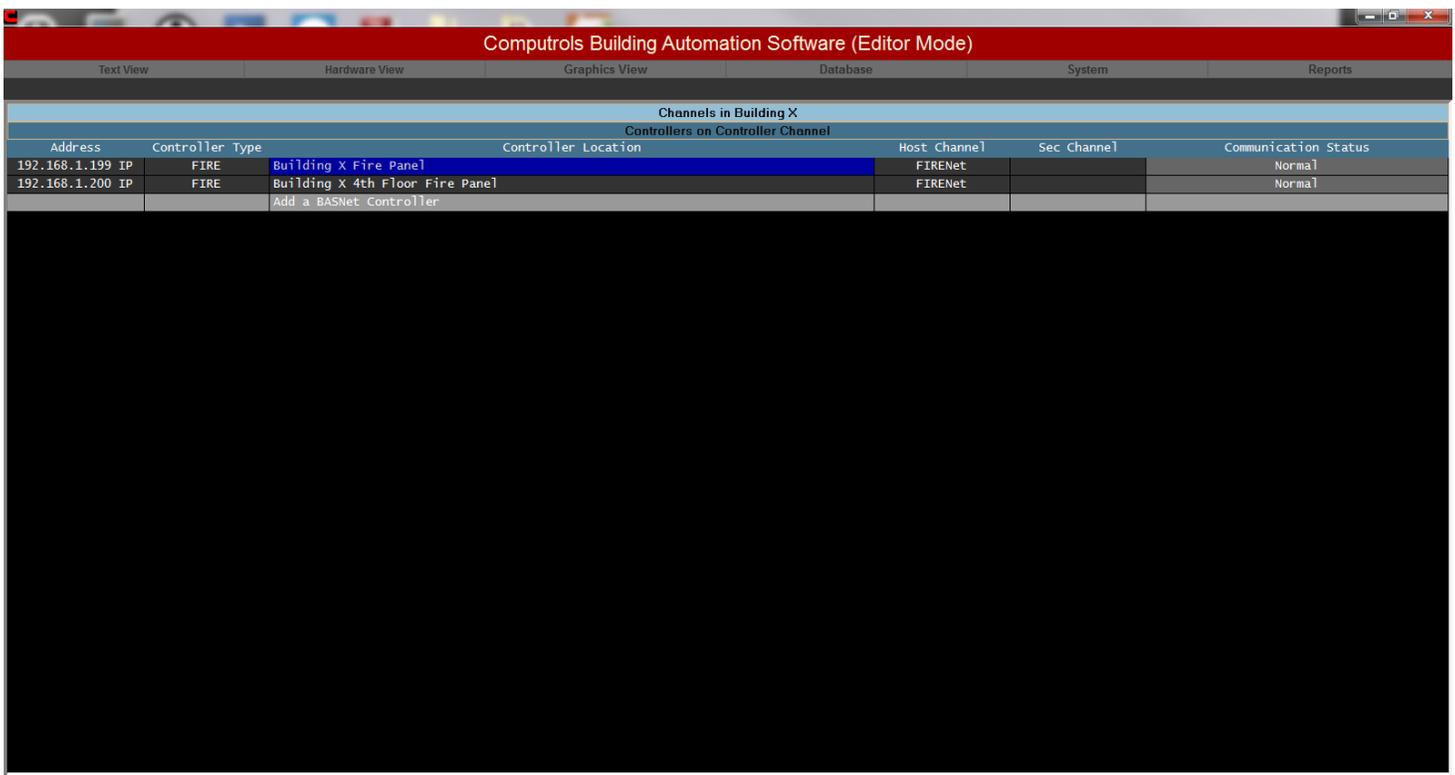
By default, the preferred Loop Module Type is Apollo and all modules are set to that type. If you are working with legacy System Sensor devices like Honeywell on some or all of your Modules, check the System Sensor box next to LM1 through LM5 and the Apollo box will be unselected.

You can change the names of the Loop Modules up to 6 characters, but that is not necessary. The power supplies, battery backup and user interface come with every Panel and cannot be removed.

Once you are satisfied with your changes, right-click the screen and the Panel and all of its points will be added, excluding devices on the loops which will be added later. If you change your mind, then click the Cancel button at the bottom.

You will see your new Panel(s) listed in the System Setup screen. From there you can Remove or Add more panels. Now right-click 2 times to return to the Main Menu.

Now go to Hardware View. Click the TCP/IP for Controllers Channel then Controllers and you will see the Panels you created.



The screenshot shows the 'Computrols Building Automation Software (Editor Mode)' interface. At the top, there is a red header bar with the software name. Below it is a navigation bar with tabs for 'Text View', 'Hardware View', 'Graphics View', 'Database', 'System', and 'Reports'. The main content area displays a table titled 'Channels in Building X' with a sub-header 'Controllers on Controller Channel'. The table has six columns: 'Address', 'Controller Type', 'Controller Location', 'Host Channel', 'Sec Channel', and 'Communication Status'. There are three rows of data, with the first two containing specific fire panel information and the third being a button to 'Add a BASNet controller'.

Channels in Building X					
Controllers on Controller Channel					
Address	Controller Type	Controller Location	Host Channel	Sec Channel	Communication Status
192.168.1.199 IP	FIRE	Building X Fire Panel	FIRENet		Normal
192.168.1.200 IP	FIRE	Building X 4th Floor Fire Panel	FIRENet		Normal
Add a BASNet controller					

## Points and Adding Devices to Panels

Click the Fire Panel then Points and you will see something like the picture below. These are all the default points that are added when you add a Fire Panel. Some are for your information and others can be commanded.

Mainly this screen tells you whether you have an Alarm or Trouble in the system and what Input and Output Groups are in Alarm or Normal.

**Computrols Building Automation Software (Editor Mode)**

Text View    Hardware View    Graphics View    Database    System    Reports

Channels in Building X  
Controllers on Controller Channel

Points in Building X Fire Panel

Position	Point Name	Configuration	Status
Alarm Output	FP1 Alarm Output	Binary Output	STOP
Trouble Output	FP1 Trouble Output	Binary Output	STOP
F. Dept and Cen. St.	FP1 F. Dept and Cen. S	Binary Output	STOP
B0 Spare1	FP1 B0 Spare1	Binary Output	STOP
B0 Spare2	FP1 B0 Spare2	Binary Output	STOP
Binary Spare3	Add A Point		
Cabinet Temp	FP1 Cabinet Temp	Deg C (10K) Input	0.0 DEG C
Battery Temp	FP1 Battery Temp	Deg C (10K) Input	0.0 DEG C
Alarm	FP1 Alarm	Binary Input	NORMAL
Supervisory	FP1 Supervisory	Binary Input	NORMAL
Trouble	FP1 Trouble	Binary Input	NORMAL
Ground Fault	FP1 Ground Fault	Binary Input	NORMAL
Battery Status	FP1 Battery Status	Supervised Input	NORMAL
Remote Alarm	FP1 Remote Alarm	Binary Input	NORMAL
Remote Supervisory	FP1 Remote Supervisory	Binary Input	NORMAL
Remote Trouble	FP1 Remote Trouble	Binary Input	NORMAL
Reset	FP1 Reset	Binary Output	
Silence	FP1 Silence	Binary Output	
Acknowledge	FP1 Acknowledge	Binary Output	
Schedule 1	FP1 Schedule 1	Binary Output	DAY
Schedule 2	FP1 Schedule 2	Binary Output	DAY
Schedule 3	FP1 Schedule 3	Binary Output	DAY
Schedule 4	FP1 Schedule 4	Binary Output	DAY
Schedule 5	FP1 Schedule 5	Binary Output	DAY
Schedule 6	FP1 Schedule 6	Binary Output	DAY
Schedule 7	FP1 Schedule 7	Binary Output	DAY
Pos Alarm Seq State	FP1 Pos Alarm Seq Stat	Supervised Output	READY
Pos Alarm Seq Time	FP1 Pos Alarm Seq Time	Counter Input	0 COUNTS
Local Alarm Count	FP1 Local Alarm Count	Ohms Input	0
Local Supervisory Count	FP1 Local Supervisory	Ohms Input	0
Local Trouble Count	FP1 Local Trouble Coun	Ohms Input	0
Software	Default Alarm Group	Fire Group	NORMAL
Software	Default Supervisory Group	Fire Group	NORMAL

Click ESC or right-click then click the Fire Panel. Click Channel and you will see the next screen.

**Computrols Building Automation Software (Editor Mode)**

Text View    Hardware View    Graphics View    Database    System    Reports

Channels in Building X  
Controllers on Controller Channel  
Channels in Building X Fire Panel

Port	Channel Name	Channel Type
RS-485 Host	FIRE Channel	FIRENet
RS-485 Secondary	Add A Channel	
Hand Held	Backplane	Backplane
10Meg TCP/IP	Programming Channel	TCP/IP for Controllers
RS-232	Add A Channel	
Unavailable		

Once again, the Host channel is by default the FIRENet channel which is used for Peer to Peer comm between Fire Panels.

Click Backplane and you will see the Loop Modules and other devices you setup and named when adding the Panel.

Channels in Building X			
Controllers on Controller Channel			
Channels in Building X Fire Panel			
Controllers on Building X Fire Panel			
Address	Controller Type	Controller Location	Status
0	Add A Controller		
1	Apollo Discovery ClassA	FP1 LM1	not loaded
2	Apollo Discovery ClassA	FP1 LM2	not loaded
3	Apollo Discovery ClassA	FP1 LM3	not loaded
4	Apollo Discovery ClassA	FP1 LM4	not loaded
5	Apollo Discovery ClassA	FP1 LM5	not loaded
6	Power Supply	FP1 PS1	not loaded
7	Power Supply	FP1 PS2	not loaded
8	Battery Backup	FP1 BB	not loaded
9	User Interface	FP1 UI	not loaded
10	Add A Controller		
11	Add A Controller		
12	Add A Controller		
13	Add A Controller		
14	Add A Controller		
15	Add A Controller		
16	Add A Controller		
17	Add A Controller		
18	Add A Controller		
19	Add A Controller		
20	Add A Controller		
21	Add A Controller		
22	Add A Controller		
23	Add A Controller		
24	Add A Controller		
25	Add A Controller		
26	Add A Controller		
27	Add A Controller		
28	Add A Controller		
29	Add A Controller		
30	Add A Controller		
31	Add A Controller		

Click one of the Loop Modules and you will see a screen like the picture below.

The first 12 points are added by default and mostly give information about the module for troubleshooting purposes.

Next you will see places for the Apollo addressable sensors and modules that will reside on the loop. If you scroll down you will see that there are addresses up to 126 for these.

Scroll down further and you will see up to 40 addresses for Fire Input Link to IO Modules like Tamper Switches, Flow Switches, and Pull Stations etc.

Channels in Building X  
 Controllers on Controller Channel  
 Channels in Building X Fire Panel  
 Controllers on Building X Fire Panel

Points in FPI LM1

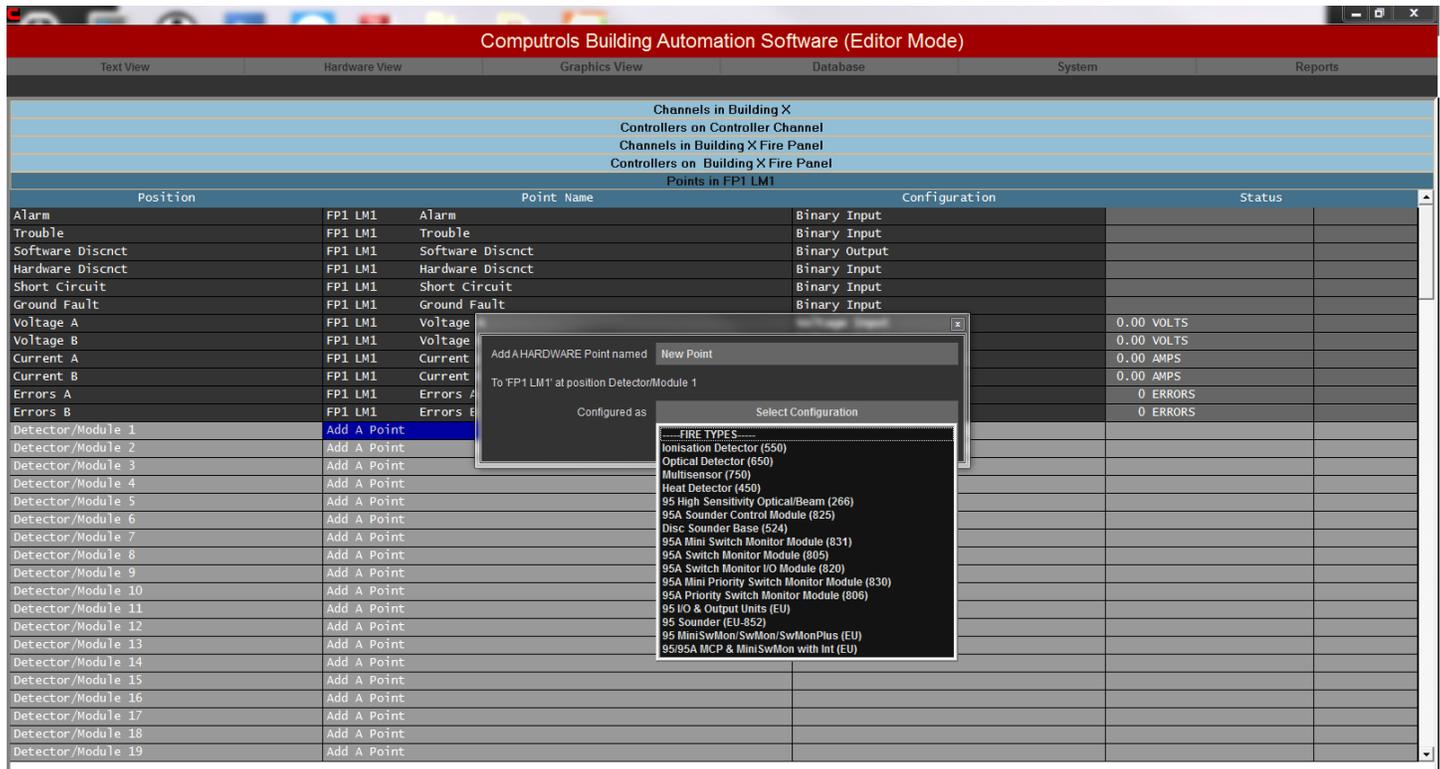
Position	Point Name	Configuration	Status
Alarm	FPI LM1 Alarm	Binary Input	
Trouble	FPI LM1 Trouble	Binary Input	
Software Discnct	FPI LM1 Software Discnct	Binary Output	
Hardware Discnct	FPI LM1 Hardware Discnct	Binary Input	
Short Circuit	FPI LM1 Short Circuit	Binary Input	
Ground Fault	FPI LM1 Ground Fault	Binary Input	
Voltage A	FPI LM1 Voltage A	Voltage Input	0.00 VOLTS
Voltage B	FPI LM1 Voltage B	Voltage Input	0.00 VOLTS
Current A	FPI LM1 Current A	Voltage Input	0.00 AMPS
Current B	FPI LM1 Current B	Voltage Input	0.00 AMPS
Errors A	FPI LM1 Errors A	Counter Input	0 ERRORS
Errors B	FPI LM1 Errors B	Counter Input	0 ERRORS
Detector/Module 1	Add A Point		
Detector/Module 2	Add A Point		
Detector/Module 3	Add A Point		
Detector/Module 4	Add A Point		
Detector/Module 5	Add A Point		
Detector/Module 6	Add A Point		
Detector/Module 7	Add A Point		
Detector/Module 8	Add A Point		
Detector/Module 9	Add A Point		
Detector/Module 10	Add A Point		
Detector/Module 11	Add A Point		
Detector/Module 12	Add A Point		
Detector/Module 13	Add A Point		
Detector/Module 14	Add A Point		
Detector/Module 15	Add A Point		
Detector/Module 16	Add A Point		
Detector/Module 17	Add A Point		
Detector/Module 18	Add A Point		
Detector/Module 19	Add A Point		

## Adding Devices to Loop Modules

Scroll back to the top and click Add a Point. You will see a screen like the picture below.

Give the device a name which includes the type of device and its location.

Hit Enter and choose a device type from the dropdown. These are the only Apollo devices that are available on the loop.



Choose a detector or module type then click Add Point Now.

If you have already setup input and Output Groups then you can select the device to be members of those Groups on the Next screen. Right-click or ESC and you will see the new device listed.

Click the new device and you will see the next screen. Click the Command State button and you will see the commands that are possible.

From here you can change the operating state of the device. However, to change the Command State, the controller must be in Commission Mode, which can only be done through the User Interface. Auto removes the Priority from the point's status and allows the point's state to be commanded by logic or schedule.

**Computrols Building Automation Software (Editor Mode)**

Channels in Building X  
 Controllers on Controller Channel  
 Channels in Building X Fire Panel  
 Controllers on Building X Fire Panel  
 Points in FP1 LM1

Position	Point Name	Configuration	Status
Alarm	FP1 LM1	Alarm	Binary Input
Trouble	FP1 LM1	Trouble	Binary Input
Software Discnct	FP1 LM1	Software Discnct	Binary Output
Hardware Discnct	FP1 LM1	Hardware Discnct	Binary Input
Short Circuit	FP1 LM1	Short Circuit	Binary Input
Ground Fault	FP1 LM1	Ground Fault	Binary Input
Voltage A	FP1 LM1	Voltage A	Voltage Input
Voltage B	FP1 LM1		0.00 VOLTS
Current A	FP1 LM1		0.00 VOLTS
Current B	FP1 LM1		0.00 AMPS
Errors A	FP1 LM1		0.00 AMPS
Errors B	FP1 LM1		0 ERRORS
Detector/Module 1	LM1 ION 1		0 ERRORS
Detector/Module 2	Add A Point		UNK
Detector/Module 3	Add A Point		
Detector/Module 4	Add A Point		
Detector/Module 5	Add A Point		
Detector/Module 6	Add A Point		
Detector/Module 7	Add A Point		
Detector/Module 8	Add A Point		
Detector/Module 9	Add A Point		
Detector/Module 10	Add A Point		
Detector/Module 11	Add A Point		
Detector/Module 12	Add A Point		
Detector/Module 13	Add A Point		
Detector/Module 14	Add A Point		
Detector/Module 15	Add A Point		
Detector/Module 16	Add A Point		
Detector/Module 17	Add A Point		
Detector/Module 18	Add A Point		
Detector/Module 19	Add A Point		

LM1 ION 1 UNKNOWN

Command State

Click on Program and you will see the Point Program Screen. See below.

**Point Program Screen** Help

LM1 ION 1 UNKNOWN

History

Enabled

Attributes

Programming

Alarm

Hardware

Enabled

Delete

Fire

Status

Command State: LED OFF Mode: none Value: 0

Device Status: UNKNOWN Drift Limit:

Ionisation Detector (550) Position 1 Schedule Number (0=none) 0

APOLLO  Two Devices for Alarm

Sensitivity

Day Mode3 0.70 and 5 Sec (Normal)

Night Mode3 0.70 and 5 Sec (Normal)

GroupType  Does NOT Blink

Has Remote LED

Positive Alarm Sequence

Group Membership

Edit Groups

Output Groups

Default Output Group (1)

# Programming Points

Referring to the Program screen above, you can setup many things on the device. The first 2 sections are covered in the CBAS Programming Manual under Programming Points.

Below that in the Fire section you can see the status of the point.

Next you will see the type of device. If you need to change the type, click it and choose another type from the dropdown list.

You can also change the address. If you do, exit the Loop Module and go back in to see the device on a different address.

To the right you can choose a schedule number and setup a change in Sensitivity between day and night. Leave at 0 to not use this feature. The Schedule points show up when you click the Fire Panel and go to Points. You can click on them and setup a Schedule.

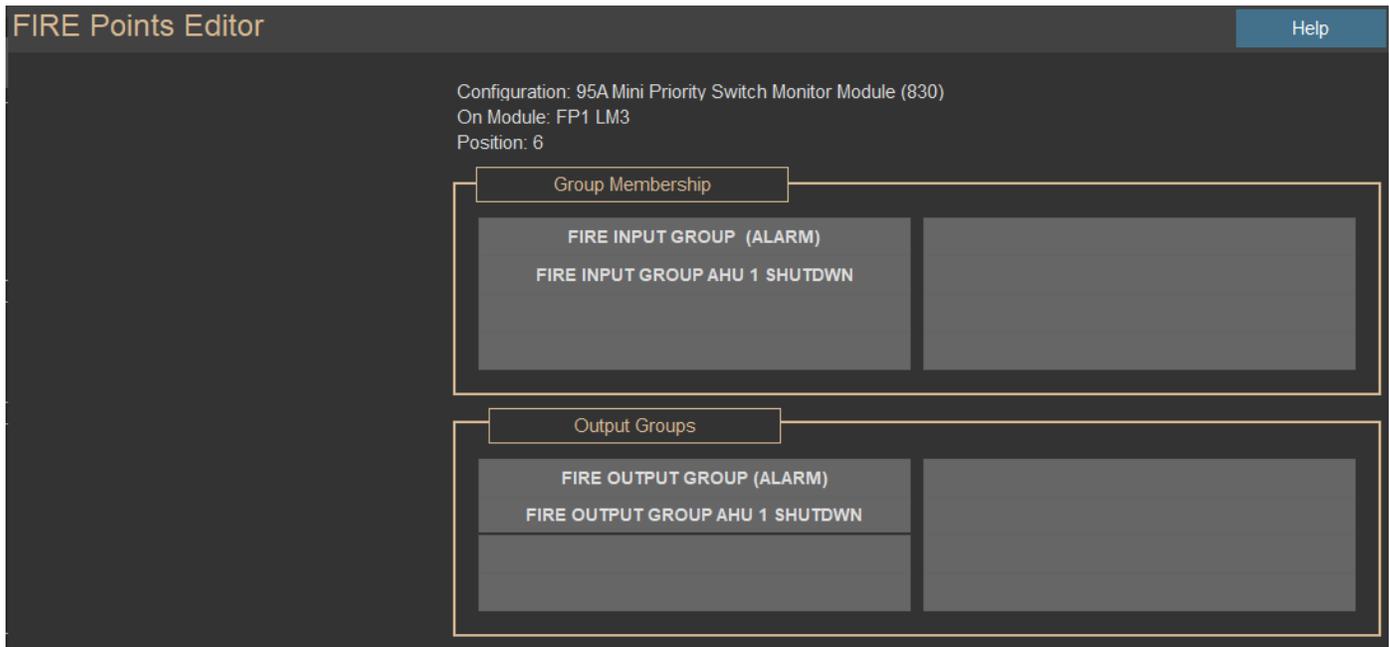
Click the check box if you want to not have a Fire Alarm unless there are 2 devices in Alarm.

Some people do not want to see the sensors blink, so check the next box to enable this.

You can also wire in a remote LED and select the next box for this.

Choose Positive Alarm Sequence if needed.

New Points are added to the default Alarm Group. To add to other Input or Output Groups, click the Edit Groups button and you will see this screen.



Click the dropdowns to select Groups from the list of available Groups. An easier way to do this is to add all of your devices then you can edit Groups to add Members. That is next.

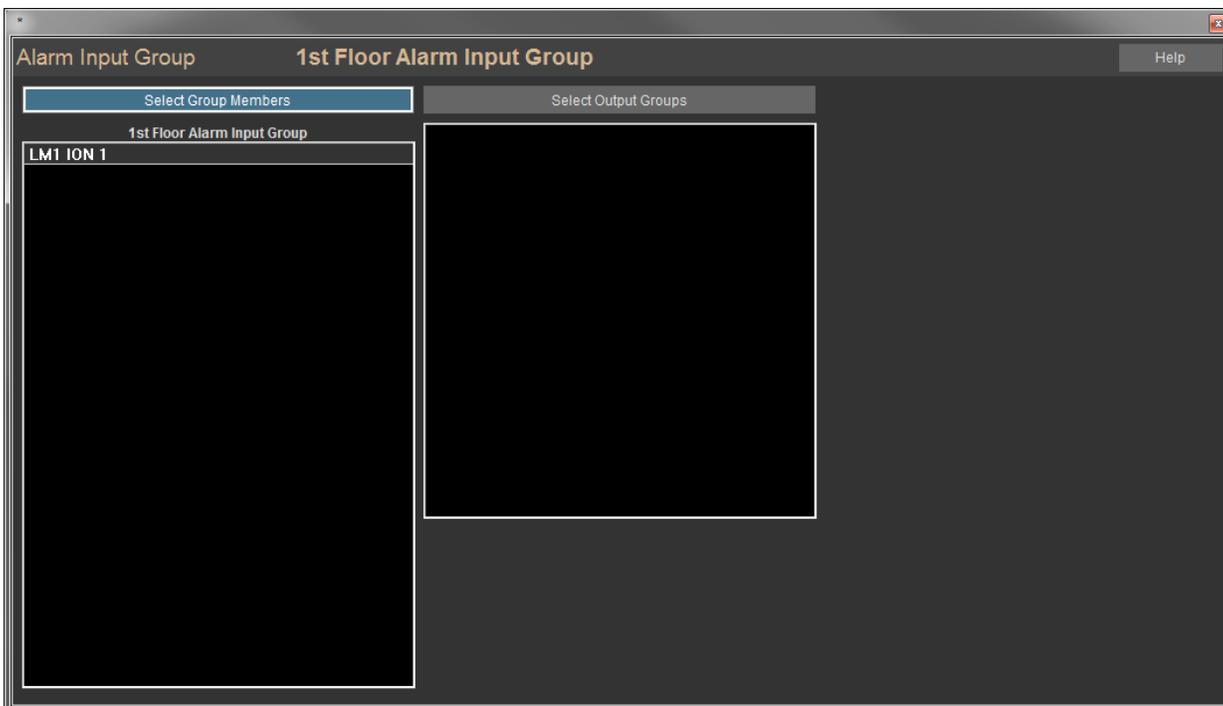
## Adding Input and Output Groups

Now go back to the System Menu then Fire and you will see choices for Groups. Click Alarm Input FIRE Groups then Insert Alarm Input Fire Group. See below.



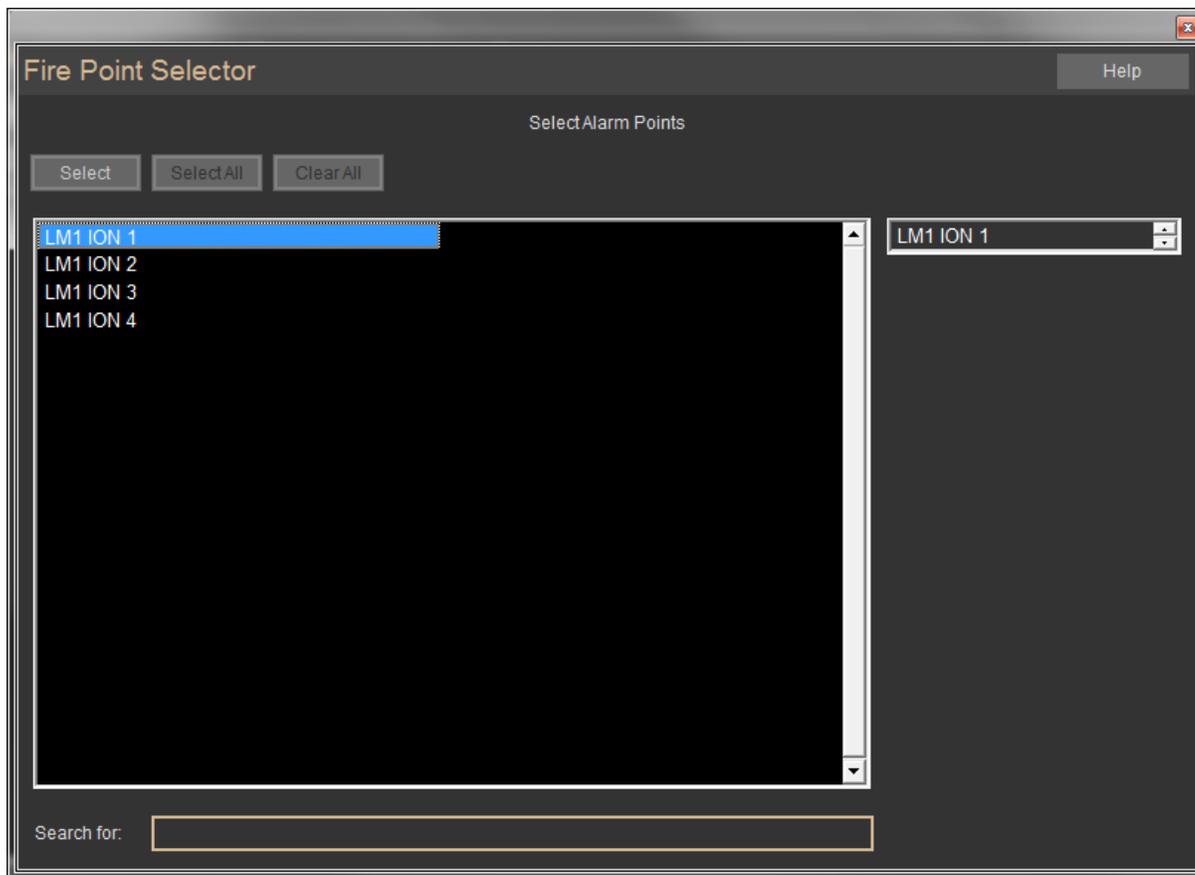
Give the Group a name then click Enter.

On the next screen, choose the Fire System that it should be a member of. Click Select, then the System and it will be highlighted. Right click and you will see the next screen.



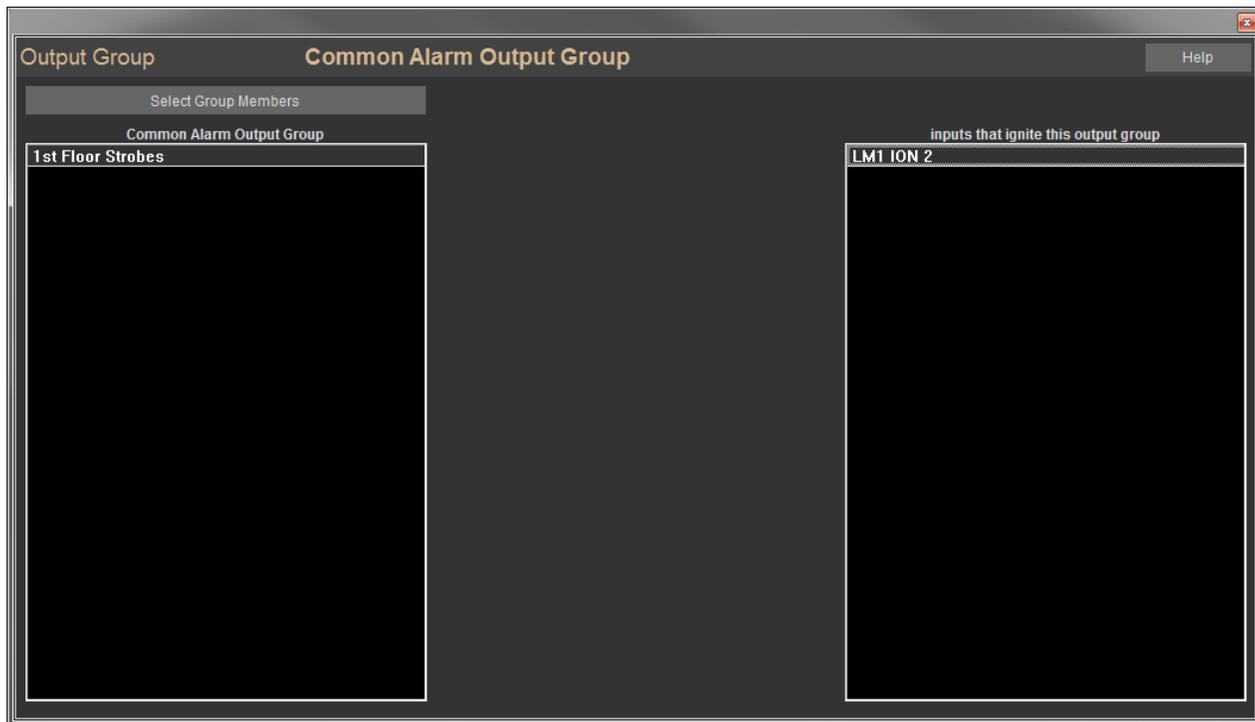
Click Select Group Members and choose sensors and modules from the list. See below.

They will show up in another list on the right when selected. When finished, right-click twice.



You will return to the last screen and see the sensors that you added. You can also click Select Output Groups and the same points to the list of Output Groups. Right-click and you will see the Output Groups on the previous screen. Right-click when finished adding Members to Groups.

Now go back to System, Fire, then Output Groups. If you need a new Output Group then click the last line of the submenu to add a group, It is just like adding an Input Group as covered earlier. Or click an existing group from the submenu and you will see the following.



You can also add points to a Group individually by going to the program screen of the point and clicking Edit Groups as discussed earlier.

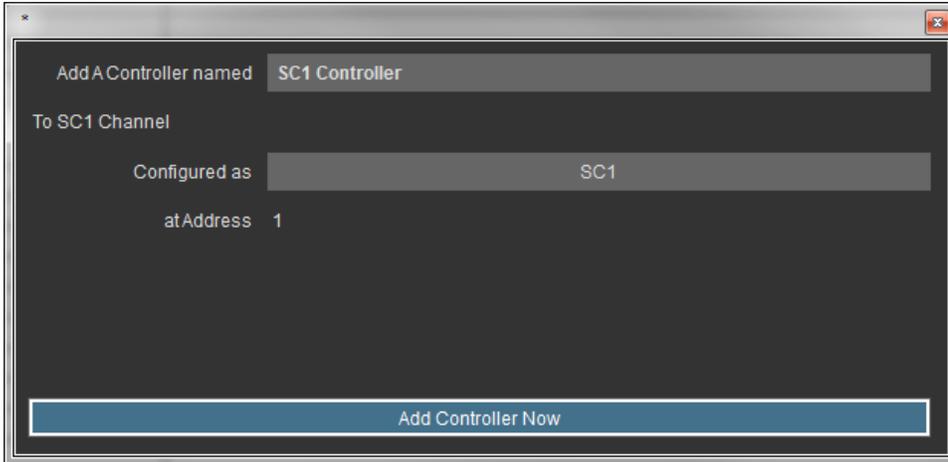
## Adding a Computrols SC1 to the System

The SC1 controller will give you an additional 25 supervised points and is wired to the Secondary 485 Port on the 8X in a Slave Fire panel only. The points can be configured as up to 25 input points, or up to 16 output points and 9 input points.

To add a SC1:

- Go to Hardware View then click the Controller Channel and click Controllers.
- Click on a slave controller then Channels.
- Click Add a Controller on the RS-485 Secondary channel. See picture below.
- Give the channel a descriptive name
- Select Opto-22 on Controller for the Channel Type » Click Add Channel Now!
- Click the newly added channel and click Controllers

- On the line for the address you want to use, click Add a Controller
- Give the Controller a descriptive name
- Choose SC1 for “Configured as”
- Click Add Controller Now!



Now that the controller is added to the list, click the controller and click Points.

To add points:

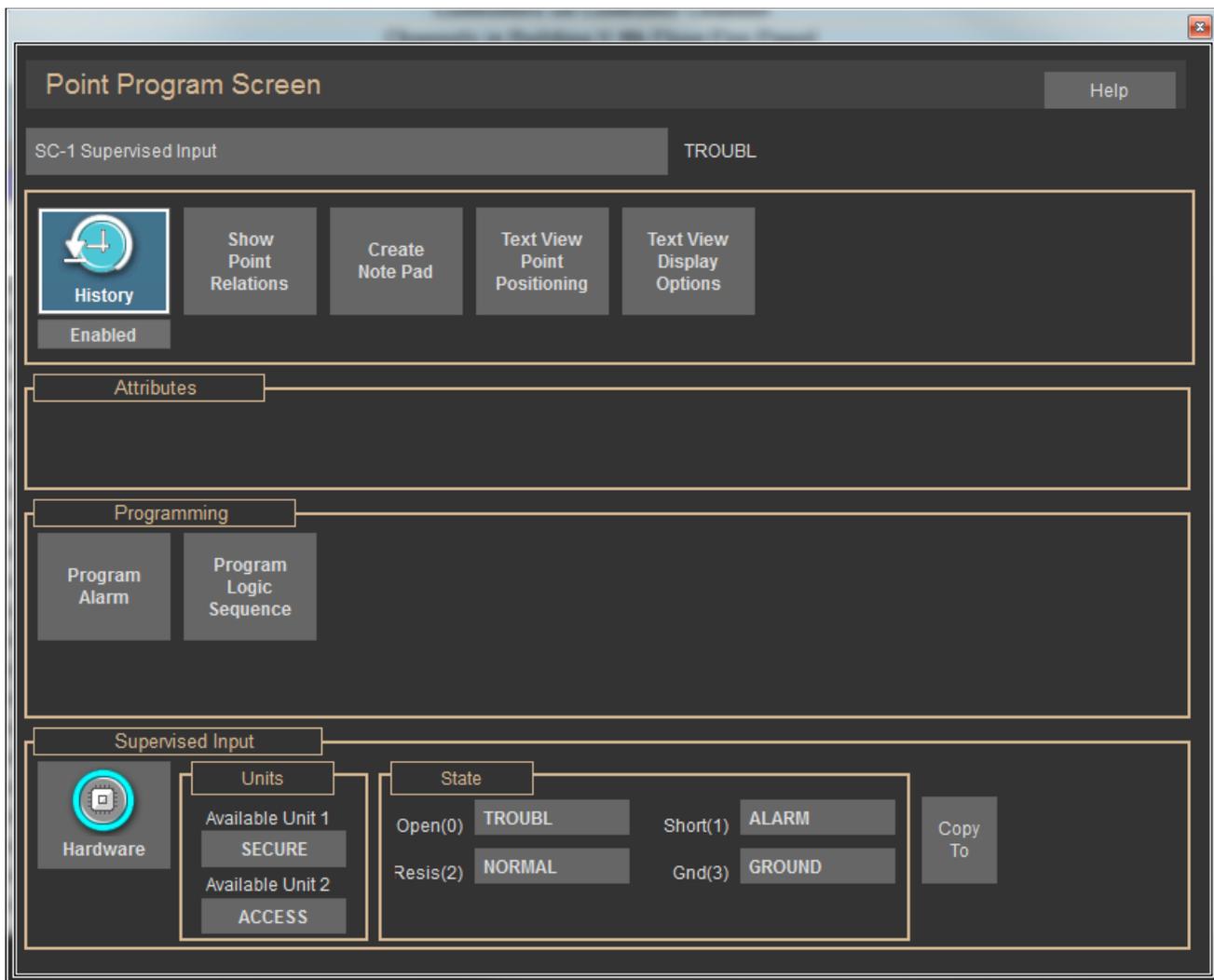
Click “Add A Point”

Give the point a descriptive name

Choose a configuration from the drop-down list. (NO) means Normally Open

Click Add Point Now!

Now that the point is added to the list, click on the point and you will see the Point Program screen. Shown below is the Point Program screen for a Supervised Point.



Under Units, click on the “Available Unit 1” button and you will see a list of unit names for you to choose from. You can also add your own unit names. Available Unit 1 will show as the status of the point when it is open. When it is closed, it will show Unit 2.

The State box shows the states of the supervised input: Open, Short, Resistor, or Ground.

From the Fire Groups button, you can select the groups that will be put into alarm if the supervised input goes into Alarm.

To add a Fire Supervised point to an SC1, click Add a Point on one of the first 16 points.

Give it a name then choose Fire Supervised and add the point.

Click the point then go to the Program Screen. See below.

You can see that it is just like a point on a Fire Panel.

Point Program Screen Help

SC-1 Input UNKNOWN

---

  
 History  
 Enabled

Show Point Relations

Create Note Pad

Text View Point Positioning

Text View Display Options

---

Attributes

---

Programming

  
 Alarm  
 Enabled

  
 Hardware

---

Fire

Status

Command State: **LED OFF** Value: 0

Device Status: **UNKNOWN**

FIRE Supervised

Unknown

Position **1**

COMPUTROLS

GroupType

Alarm

Positive Alarm Sequence

---

Group Membership

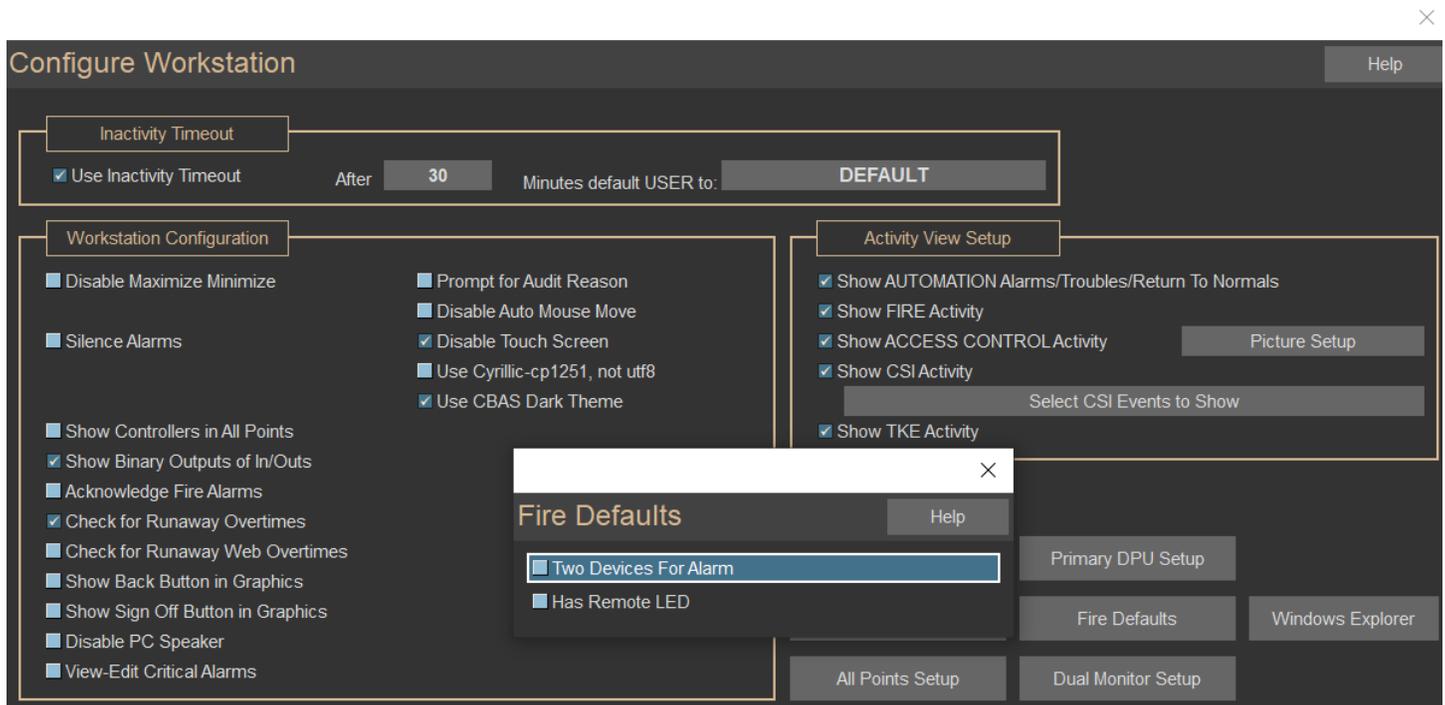
Output Groups

Default Output Group (1)

## Fire Defaults and Fire Activity

You can set a few defaults that will be used as settings on all subsequently added Fire Points.

Go to System, Configure Workstation and click the Fire Defaults Button. See picture below.



If you want FIRE Alarms to only be generated when 2 devices go into Alarm, then check the first box.

If all devices will have Remote LEDs then check that box.

When you close that screen, the choices will be saved.

Activity View shows current alarm activity on various types of points and is mainly used in Access Control systems for security personnel to see what is going on.

You can check the box to Show Fire Activity, but all types of activity are checked by default.

## Remote Panels

If someone requires that the Alarm, Trouble, Fire Dept relay goes on for both a local and/or remote items than a Factory Certified Logic Writer will have to write logic. The logic would need to be by priority Logic4 below.

**If Alarm Software Point is ALARM**

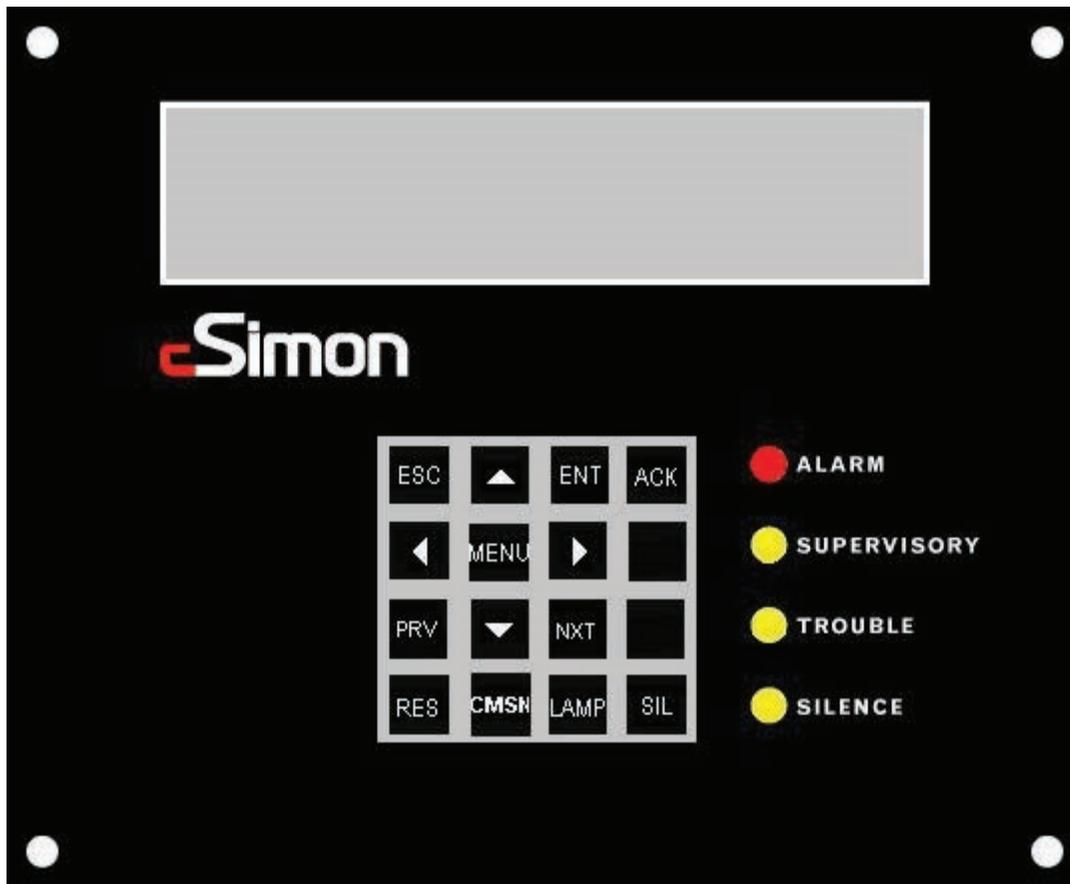
**AND RunMinutes > 10**

**AND Fire Dept Relay is STOP then RESET the FIRE panel else if Alarm Software Point is ALARM then START Fire Dept Relay else STOP Fire Dept Relay**

This would cause the FIRE panel to reboot if an ALARM occurred. The ALARM would have to come in again within 10 minutes of the panel rebooting for the Fire Dept Relays to change state.

# User Interface Operation

## Keypad Operations



The normal screen will display:

CSimon Fire System

COMPUTROLS INC.

Revision 1.0

hh:mm:ss Day Month Year

If the time is changing on the user interface than the user interface is communicating with the Master Fire brain.

When the user presses the MENU button they will see:

Enter Passcode: 0000

See Section 3.2 for passcode information.

The user will use the Left, Right, Up and Down arrows to enter the number. Pressing Escape exits and pressing Enter accepts the number. The first screen will look like:

\*\*> Point – Operates on a single point

Group – Starts an entire group

Walk Test

System

Exit

Pressing the up/down arrow keys will move the \*\*>. Pressing the Enter or Right Arrow key will select the menu option.

## Point

Selecting Point will give the next screen:

\*\*> Select Point By Alarm Group

Select Point By Supervisory Group

Select Point By Output Group Select Point By Module

### Select Point By Alarm Group

All of the Alarm Groups will be displayed. Select an Alarm Group and all of the points in that Alarm Group will be displayed. Use Prev and Next to scroll through the list of points.

### Select Point By Supervisory Group

All of the Supervisory Groups will be displayed. Select a Supervisory Group and all of the points in that Supervisory Group will be displayed.

### Select Point By Output Group

All of the Output Groups will be displayed. Select an Output Group and all of the points in that Output Group will be displayed.

## Select Point By Module

All of the module cards will be displayed. Starting with the 5 Loop boards and continuing through the Power Supply, Battery Backup and User Interface. Selecting a Module will display all of the points in that module.

After a point has been selected a point screen will appear. This will be different according to the type of point that was selected. From here a point may be commanded. The valid commands from the list below will be displayed according to the point type:

- Disable Device / Enable Device
- Start Self Test
- Start Rapid Compensation
- Turn LED ON / Turn LED OFF
- Turn Device ON / Turn Device OFF

For an Apollo Discovery device the Manufacture Date and Drift value will also be displayed in the point screen.

## Group

A list of all groups will be displayed. Selecting a Group will turn it on. To turn off a group you must RESET the FIRE panel.

## Walk Test

Walk Test will display the next screen:

\*\*> SLC 1 – Start Walk Test

SLC 2 - Start Walk Test

SLC 3 - Start Walk Test

SLC 4 - Start Walk Test

SLC 5 - Start Walk Test

Selecting a SLC module will put the entire module into Walk Test mode. Any device that goes into Alarm on that module will display a Walk Test Alarm but NO end devices will actually be set off. A walk test will timeout after 6 hours.

If a SLC is already in walk test then the menu will display “STOP Walk Test xxx Min Remain”. Where xxx is the time remaining before the Walk Test will be stopped.

## System

System will be followed by the following screen:

\*\*> Date Time

Module Information

Passcode Editor

TCP / IP Setup

### Date Time

Date Time will display the current date and time and allow the user to change the date and time.

### Module Information

Module Information will display the part number, version number and other information about the module. Use Prev / Next to scroll through all of the modules installed in the Fire panel.

### Passcode Editor

Passcode Editor will allow the user to change the passcodes for each level.

### TCP/IP Setup

TCP / IP Setup will allow the user to change the IP address and the subnet of the FIRE panel.

## Passcodes

There are 3 levels of Passcode. Each has a valid range from 0000 to 9999. The Level 3 Passcode is required to do the following:

Edit Passcodes.

Put the system in Walk Test

Edit Date Time

Edit TCP/IP address and SubNet Mask

## Command Points Turn on a Group

There is also a separate passcode to put the system into or take it out of Commission mode.

The default Passcodes are:

Level 1 - 0001

Level 2 - 0002

Level 3 - 0003

Commission - 0007

If a menu is displayed and there is no button press for 5 minutes the user interface will timeout and go back to the opening screen.

If an incorrect passcode is entered 5 times in a row the menu feature will be locked out for a period of 5 minutes.

If there is no 485 communication between the User Interface and the Brain Module for a period of 1 minute the user interface will display:

DPU FAILURE...

And the User Interface buzzer will sound continuously and the Trouble LED will light up.

## Acknowledge

When an Alarm is displayed on the User interface the internal buzzer will sound continuously. If a Supervisory is displayed the buzzer will be on for 5 seconds and then off for 1 second. For a Trouble the Buzzer will be on for 3 seconds and then off for 1 second. For a Return to Normal condition the buzzer will sound 1 second on and 1 second off. Once the displayed condition has been acknowledged the buzzer will stop sounding.

Alarms are displayed and therefore acknowledged one at a time. But Supervisories, Troubles and Return to Normals are displayed 4 at a time and therefore pressing the acknowledge button acknowledges all 4 displayed items.

## Reset

The Reset button may be pressed at ANY time. Once pressed the following will be displayed:

Are you sure you want to RESET?

Press RESET Again to RESET!

Any other key to ABORT.

Pressing Reset again will reset the FIRE controller. It will also reset all other FIRE controllers that are connected via 485.

## **Silence**

Pressing the Silence button will turn off the local piezo buzzer on ALL Fire panels that are interconnected via 485. If another Alarm comes in while silenced the local piezo buzzer will resound. The Silence LED will remain lit after the Silence button has been pressed. A RESET is required to make the Silence LED go off.

## **Lamp Test**

Pressing the Lamp Test button will light up all LEDs and sound the internal User Interface Buzzer for a period of approximately 6 seconds.

## **Commission Mode**

This button is used to enter/exit commission mode. While the FIRE panel is in Commission mode the Trouble LED will remain on. Also a Trouble will be displayed every hour while in Commission mode. The FIRE panel must be in commission mode before any programming can be done.

# Terminal Descriptions/Installation Instructions

## Terminal Description with Installation Instructions

### Alarm No/Alarm Common

The ALARM NO and ALARM COMMON terminal is a normally open dry contact. During normal conditions, the contact will remain open. When any part of the fire system is in an alarm condition, the contact will be closed. See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

### Alarm NC/Alarm Common

The ALARM NC and ALARM COMMON terminal is a normally closed dry contact. During normal conditions, the contact will remain closed. When any part of the fire system is in an alarm condition, the contact will be opened. See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

### Trouble No/Trouble Common

The TROUBLE NO and TROUBLE COMMON terminal is a normally open dry contact. During normal conditions, the contact will remain open. When any part of the fire system is in a trouble, ground fault (10 k-ohms impedance trigger) or supervisory condition, the contact will be closed. When the AC Power goes out the Trouble Relay will not energize for 90 minutes. Unless there is some other kind of trouble in the system. See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

## Trouble NC/Trouble Common

The TROUBLE NC and TROUBLE COMMON terminal is a normally closed dry contact. During normal conditions, the contact will remain closed. When any part of the fire system is in a trouble, ground fault (1.0 k-ohms impedance trigger) or supervisory condition, the contact will be opened. When the AC Power goes out the Trouble Relay will not energize for 90 minutes. Unless there is some other kind of trouble in the system. See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

## Dept No/F Dept Common

The F DEPT NO and F DEPT COMMON terminal is a normally open dry contact. During normal conditions, the contact will remain open. When there is a microprocessor failure, the contact will be closed. This relay is designed for connection to a UL Listed Digital Alarm Communicator Transmitter (DACT). See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

## Dept NC/F Dept Common

The F DEPT NC and F DEPT COMMON terminal is a normally closed dry contact. During normal conditions, the contact will remain closed. When there is a microprocessor failure, the contact will be opened. This relay is designed for connection to a UL Listed Digital Alarm Communicator Transmitter (DACT).

See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

### Cen St No/Cen St Common

The CEN ST NO and CEN ST COMMON terminal is a normally open dry contact. During normal conditions, the contact will remain open. When there is an alarm, the contact will be closed. This relay is designed for connection to a UL Listed Digital Alarm Communicator Transmitter (DACT). See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

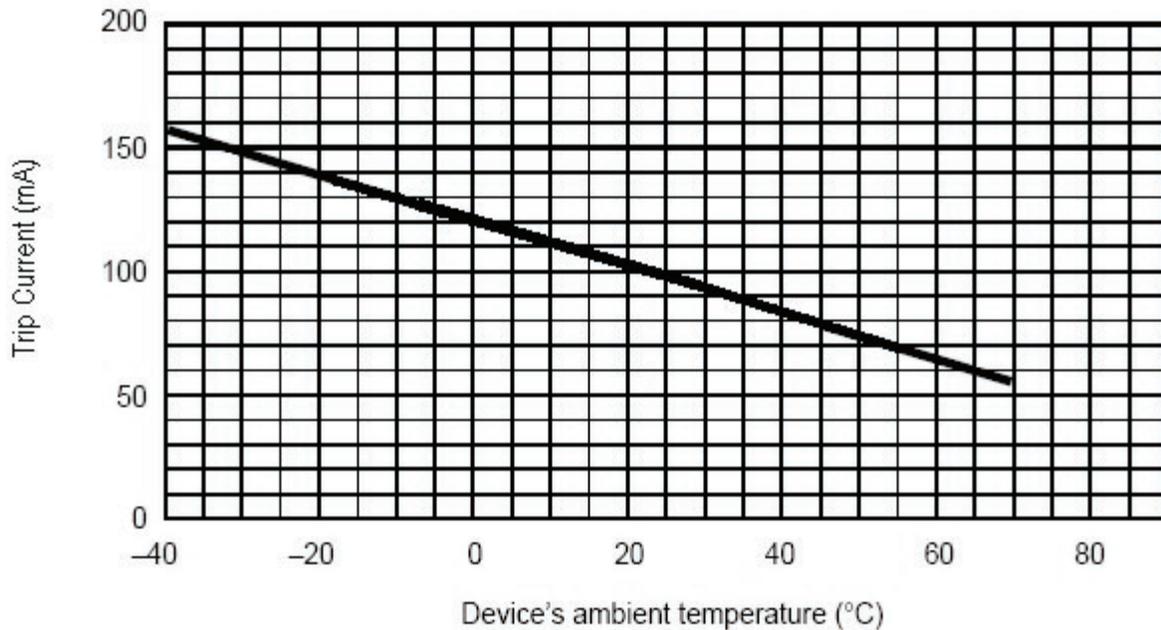
### Cen St NC/Cen St Common

The CEN ST NC and CEN ST COMMON terminal is a normally closed dry contact. During normal conditions, the contact will remain closed. When there is an alarm, the contact will be opened. This relay is designed for connection to a UL Listed Digital Alarm Communicator Transmitter (DACT). See chart below for contact ratings.

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A (AC), 3 A (DC)	1.50 A (AC), 1.50 A (DC)
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load	10 $\mu$ A, 10 mVDC	

### Binary Output/Binary Common

The BINARY OUTPUT and BINARY COMMON terminals are 24 Volt DC outputs. The current output is dependent on the fire system's ambient temperature. See chart below. The trip current is the current level in milli-amps when the fire system's re-settable fuse will trip.



### **Temp (Cabinet/Battery) (Optional)**

The CABINET TEMP and BATTERY TEMP terminals are 10K Type III thermistor inputs. These inputs are used to measure the temperature of the fire system inside of the cabinet and the temperature of the batteries.

### **Host +, -, Shield**

This terminal is used when there are multiple Fire Controllers in one system. It uses RS-485 communication. This terminal is the host port, which is a separate channel from the secondary port.

### **SECONDARY +, -, SHIELD**

This terminal is used when there are multiple Fire Controllers in one system. It uses RS-485 communication. This terminal is the secondary port, which is a separate channel from the host port.

### **USER INTERFACE**

The User Interface terminal connects the User Interface Module to the Terminal Board via a 10 pin ribbon cable. This terminal uses a connector with latching ears which locks the ribbon cable down in normal situations, but allows the User Interface to be replaced. The ribbon cable should never be unplugged unless the Fire Controller is being serviced.

## **SLC + (A, B)**

The SLC + (A, B) terminals are used to connect the Signaling Line Circuit (or loop) devices. The “+” denotes the positive polarity of the SLC device. These signals are Power Limited. SLC Output Voltage: 21.8 to 21.8 Volts DC, Max current = 300mA, Impedance = 16 Ohms. Note that your CSimon can either connect to APOLLO manufacturer devices or FCI, NOTIFIER, HONEYWELL, FIRELITE and EDWARDS devices, but not both. These devices include the detectors listed in section 1.2.6 and monitor modules listed in section 1.2.7. See section 1.3.1.4 for further explanation.

## **SLC – (A, B)**

The SLC - (A, B) terminals are used to connect the Signaling Line Circuit (or loop) devices.

The “-” denotes the negative polarity of the SLC device. These signals are Power Limited. SLC Output Voltage: 21.8 to 21.8 Volts DC. Note that your CSimon can either connect to APOLLO manufacturer devices or FCI, NOTIFIER, HONEYWELL, FIRELITE and EDWARDS devices, but not both. These devices include the detectors listed in section 1.2.6 and monitor modules listed in section 1.2.7. See section 1.3.1.4 for further explanation.

## **Printer Port (RX, TX, GND, RTS, CTS, GND)**

The Printer Port is used to connect the printer listed in section 1.2.2. Connect the signals from the printer to the fire controller according to the signal name. For example, connect RX on the printer to RX on the fire controller. To power the printer, use the 24VDC Regulated Source explained in section 4.1.21.

## **Local BUS (+, -, S)**

The Local Bus terminals will not be used.

## **Battery +/Battery –**

The Battery + terminal is used to connect the positive side of the batteries. The Battery – terminal is used to connect the negative side of the battery.

## **Battery Disconnect Switch**

The Battery Disconnect Switch is used to disconnect the battery. This is used for testing the battery. When selecting the switch to the ON position, the batteries are CONNECTED. When selecting the switch to the OFF position, the batteries are DISCONNECTED.

## **24VAC ~ /**

The transformer listed in section 1.2.3 will be pre-wired to these terminals from the factory. The transformer will be connected between the two 24VAC~ terminals and the earth ground will be connected to the.

The ratings are as follows:

- 120 Vac, 60 Hz, Max. Current Draw @ NS = 1.07A
- 120 Vac, 60 Hz, Max. Current Draw @ A = 1.905 A

## **24VDC Regulated/DC Common**

This terminal is a 24 Volt (DC Power Output Range: 17.6 Volts to 24.6 Volts DC) DC regulated source of 1 Amp used for powering the printer. This source is Non-Power Limited.

## **24VDC Unregulated / DC Common**

This terminal is not used and is for testing purposes only.

## **10Mbit Port**

This port is used for additional monitoring (Optional) of the fire system and for initial setup of the fire system's database explained in section 2.0. (See Section 4.2.2, which shows Monitoring)

## **Enclosure Door Hinge Relocation**

The door of the CSimon enclosure is custom designed to be modified in the field from right-opening to left-opening. This is helpful in the event that a particular installation location does not allow for easy access from the standard setup. The door lock can also be easily relocated to the opposing side to complete the change.

To swap the hinge pin from the left side to the right, follow these steps:

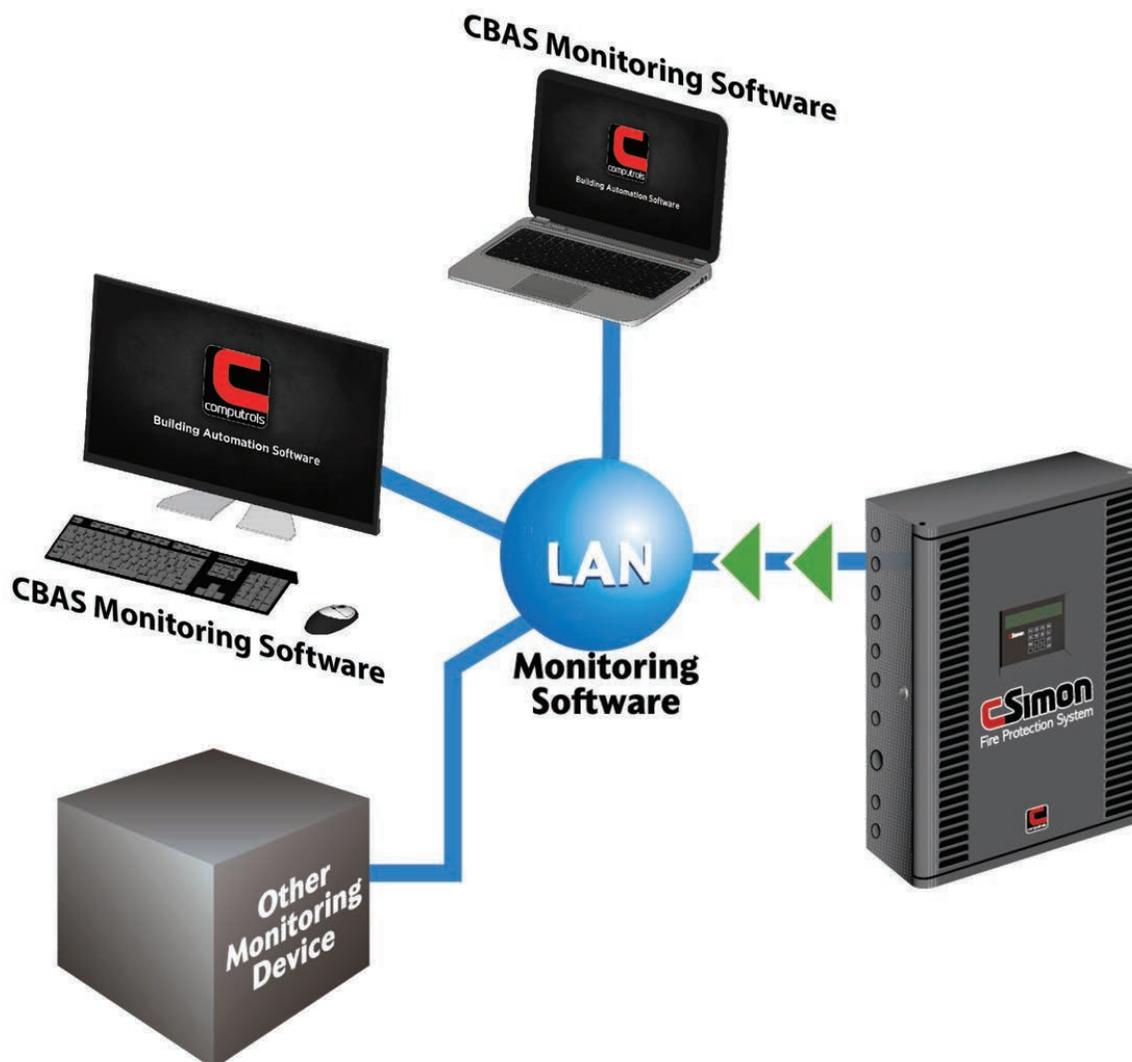
- Unlock the door with the provided key.
- Using needle-nosed pliers, remove the Cotter pin from the top of the hinge. Place the Cotter pin in a secure area for reuse.
- While holding the bottom edge of the door, grab the long hinge pin with needlenosed pliers and slide it up through the top of the enclosure until it has been completely removed.
- With the hinge pin completely removed, the door will be free. Position the door against the enclosure

as if it were closed.

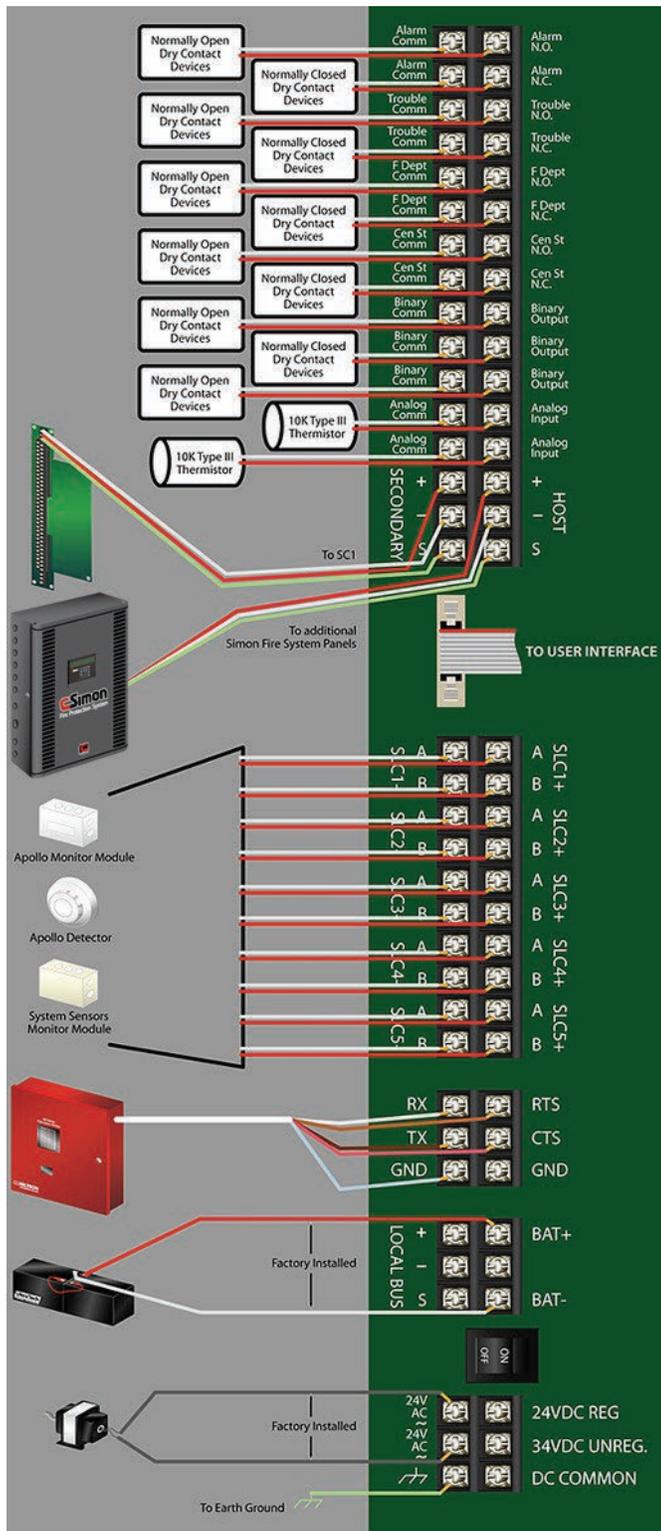
- Push the hinge pin into the top hole of the side you want the hinge to be located. Make sure it goes completely through both the enclosure hole and the corresponding door hole.
- Carefully open the door and guide the hinge pin through the bottom door hole and bottom enclosure hole.
- Push the pin down until it is completely secure. Approximately 1/16" of the hinge pin will still be exposed on the outside of the enclosure when complete.
- Using the appropriate tools, remove the door lock and relocate to the opposing side. Ensure that the lock cam is positioned correctly to lock the door when shut.

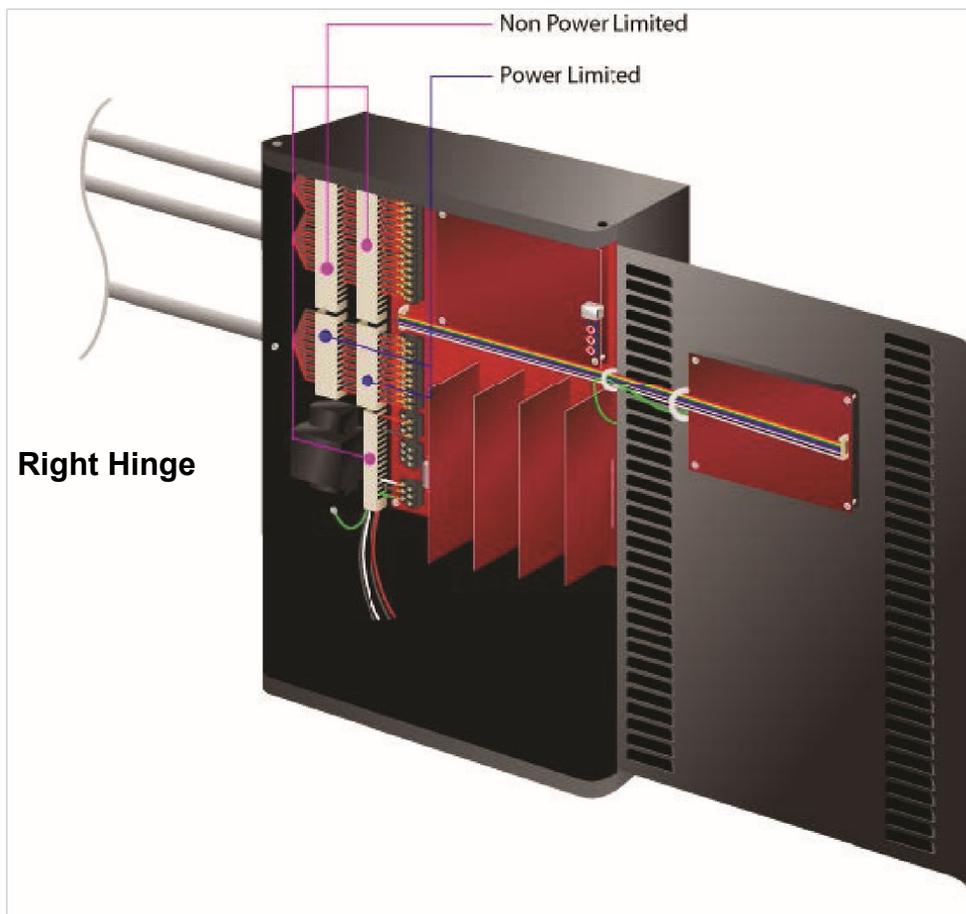
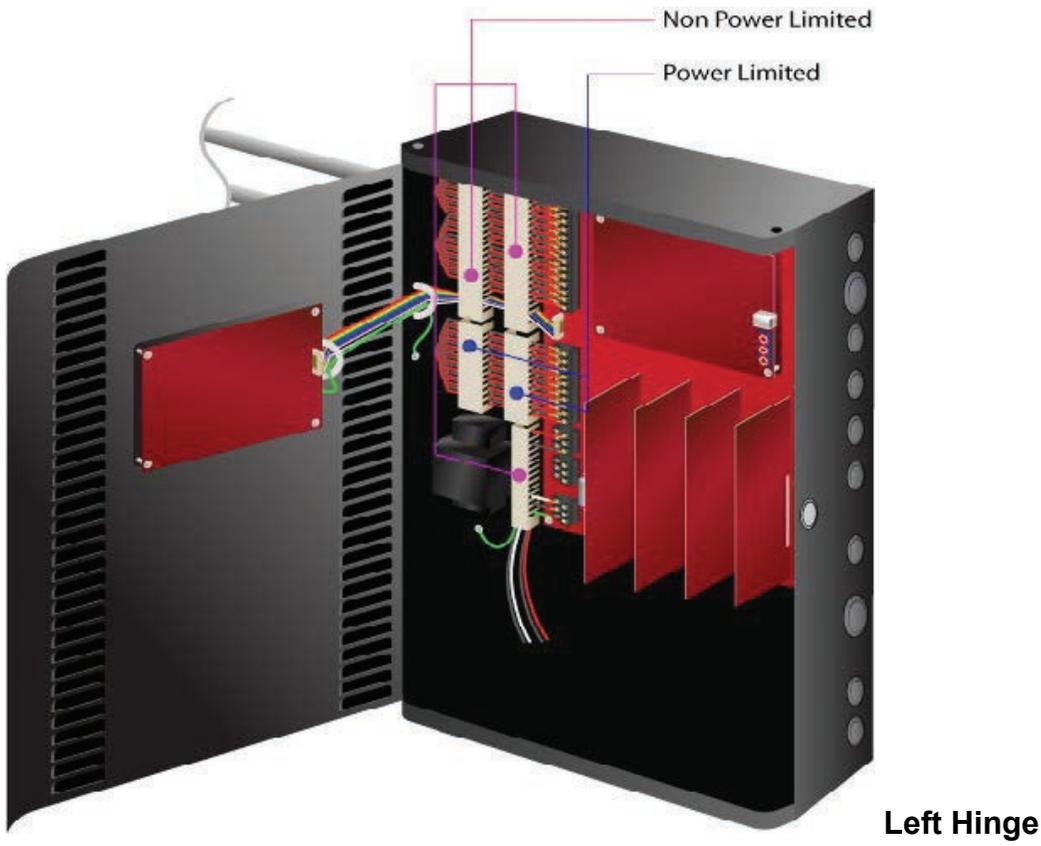
## System Diagrams

### System Monitoring Diagram



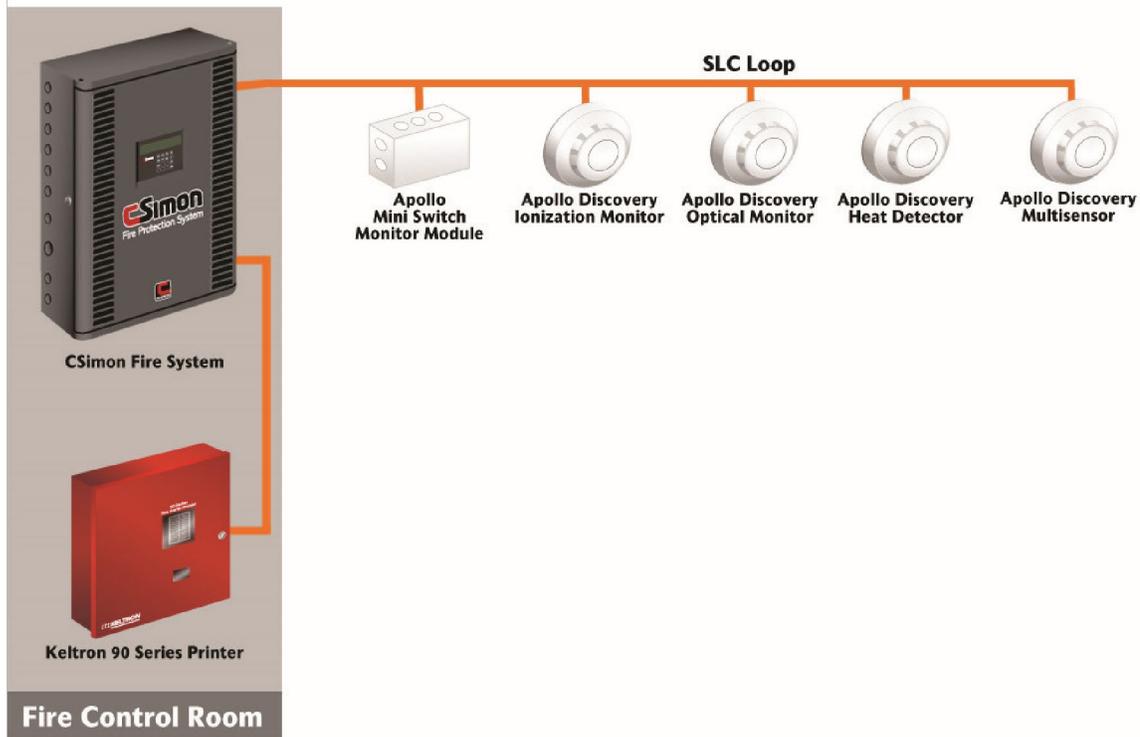
# Installation/Wiring Diagram



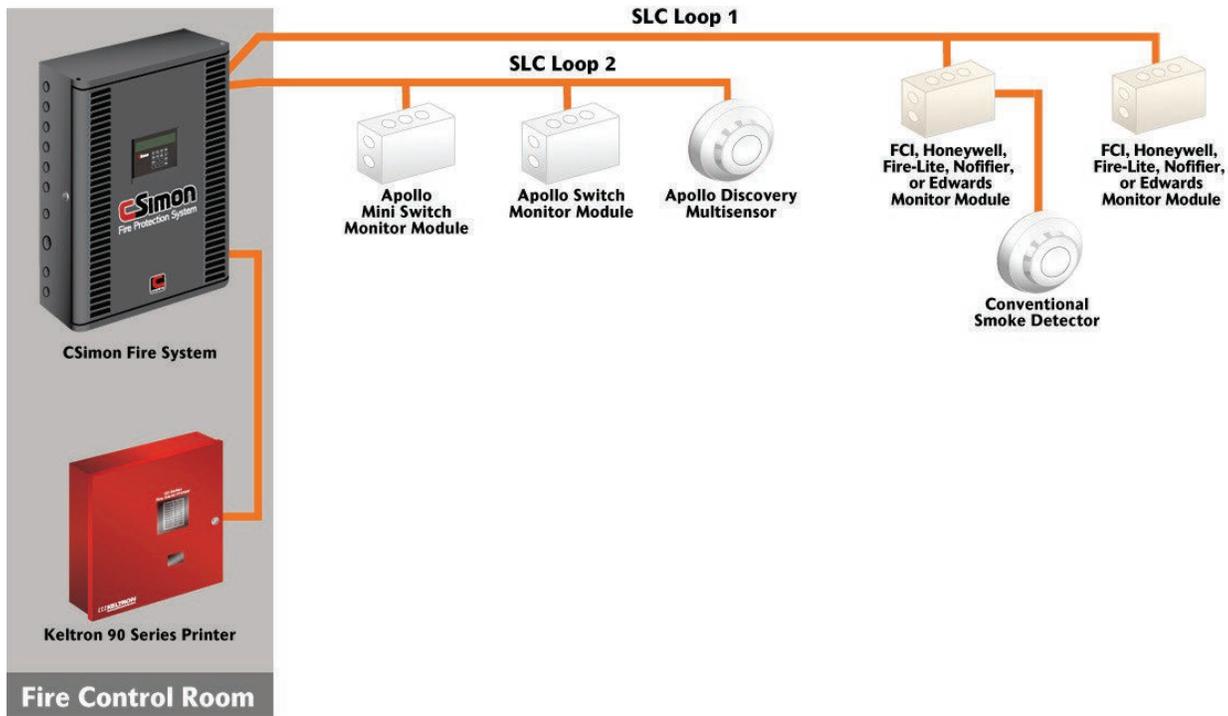


# Sample Topologies

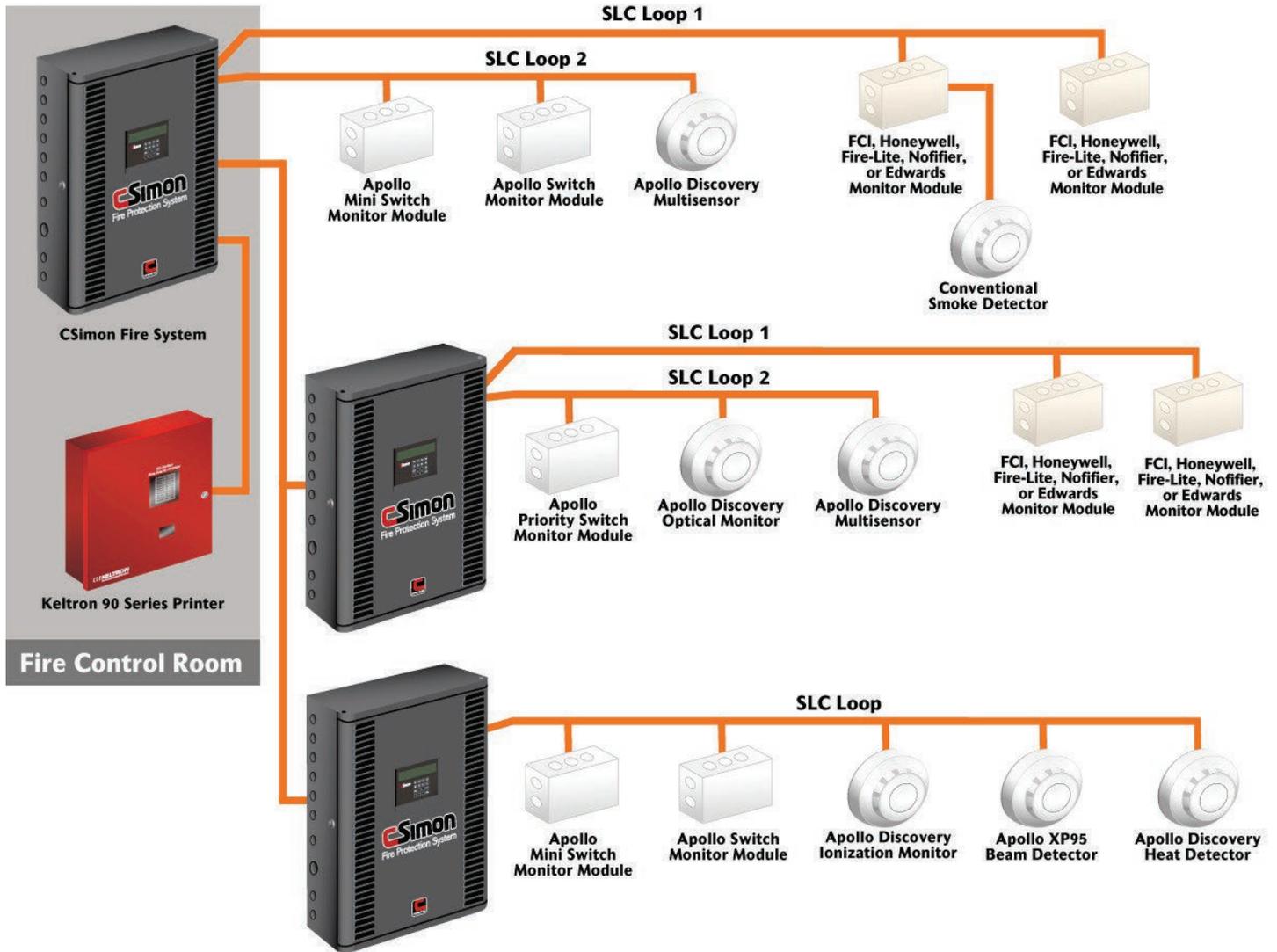
## SAMPLE TOPOLOGY 1



## SAMPLE TOPOLOGY 2



# SAMPLE TOPOLOGY 3



# System Maintenance

## Control Equipment

**Functions:** At a minimum, control equipment shall be tested to verify correct receipt of alarm, supervisory, and trouble signals (inputs), operation of evacuation signals and auxiliary functions (outputs), circuit supervision including detection of open circuits and ground faults, and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.

**Fuses:** The rating and supervision shall be verified.

**Interfaced equipment:** Integrity of single or multiple circuits providing interface between two or more control panels shall be verified. Interfaced equipment connections shall be tested by operating or simulating operation of the equipment being supervised. Signals required to be transmitted shall be verified at the control panel.

**Lamps and LEDs:** Lamps and LEDs shall be illuminated.

**Primary (main) power supply:** All secondary (standby) power shall be disconnected and tested under maximum load, including all alarm appliances requiring simultaneous operation. All secondary (standby) power shall be reconnected at end of test. For redundant power supplies, each shall be tested separately.

## Secondary (Standby) Power Supply

All primary (main) power supplies shall be disconnected and the occurrence of required trouble indication for loss of primary power shall be verified. The system's standby and alarm current demand shall be measured or verified and, using manufacturer's data, the ability of batteries to meet standby and alarm requirements shall be verified. General alarm systems shall be operated for a minimum of 5 minutes and emergency voice communications systems for a minimum of 15 minutes. Primary (main) power supply shall be reconnected at end of test.

## Batteries

**General Tests** Prior to conducting any battery testing, the person conducting the test shall ensure that all system software stored in volatile memory is protected from loss.

**Visual inspection** Batteries shall be inspected for corrosion or leakage. Tightness of connections shall be checked and ensured. If necessary, battery terminals or connection shall be cleaned and coated. Electrolyte level in lead-acid batteries shall be visually inspected.

Batteries shall be replaced in accordance with the recommendations of the alarm equipment manufacturer or when the recharged battery voltage or current falls below the manufacturer's recommendations.

**Charger test** Operation of battery charger shall be checked in accordance with charger test for the specific type of battery.

Discharge test with the battery charger disconnected, the batteries shall be load tested following the manufacturer's recommendations. The voltage level shall not fall below the levels specified. Exception: An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be used in conducting this test.

Load voltage test with the battery charger disconnected, the terminal voltage shall be measured while supplying the maximum load required by its application. The voltage level shall not fall below the levels specified for the specific type of battery. If the voltage falls below the level specified, corrective action shall be taken and the batteries shall be retested. Exception: An artificial load equal to the full fire alarm load connected to the battery shall be permitted to be used in conducting this test.

## **Battery Tests**

### **Sealed lead-acid type**

- Charger test - With the batteries fully charged and connected to the charger, the voltage across the batteries shall be measured with a voltmeter. The voltage shall be 2.30 volts per cell  $\pm 0.02$  volts at 25°C (77°F) or as specified by the equipment manufacturer.
- Load voltage test - Under load, the battery shall perform in accordance with the battery manufacturer's specifications.

## **Public Reporting System Tests**

In addition to the tests and inspection required above, the following requirements shall apply. Manual tests of the power supply for public reporting circuits shall be made and recorded at least once during each 24-hour period. Such tests shall include the following:

- Current strength of each circuit. Changes in current of any circuit exceeding 10 percent shall be investigated immediately.
- Voltage across terminals of each circuit inside of terminals of protective devices. Changes in voltage of any circuit exceeding 10 percent shall be investigated immediately.
- 2 Voltage between ground and circuits. If this test shows a reading in excess of 50 percent of that shown in the test specified in (2), the trouble shall be immediately located and cleared. Readings in excess of 25 percent shall be given early attention. These readings shall be taken with a calibrated voltmeter of not more than 100-ohms resistance per volt. Systems in which each circuit is supplied by an independent current source (Forms 3 and 4) require test between ground and each side of each circuit. Common current source systems (Form 2) require voltage tests between ground and each terminal of each battery and other current source.
- Ground current reading shall be permitted in lieu of (3). If this method of testing is used, all grounds

showing a current reading in excess of 5 percent of the supplied line current shall be given immediate attention.

- Voltage across terminals of common battery, on switchboard side of fuses.
- Voltage between common battery terminals and ground. Abnormal ground readings shall be investigated immediately.

Tests specified in (5) and (6) shall apply only to those systems using a common battery. If more than one common battery is used, each common battery shall be tested.

## **Transient Suppressors**

Lightning protection equipment shall be inspected and maintained per the manufacturer's specifications. Additional inspections shall be required after any lightning strikes. Equipment located in moderate to severe areas outlined in NFPA 780, Standard for the Installation of Lightning Protection Systems, Appendix H, shall be inspected semiannually and after any lightning strikes.

## **Control Unit Trouble Signals**

- Audible and visual operation of panel trouble signals shall be verified as well as ring-back feature for systems using a trouble-silencing switch that requires resetting.
- Disconnect switches If control unit has disconnect or isolating switches, performance of intended function of each switch shall be verified and receipt of trouble signal when a supervised function is disconnected shall also be verified.
- Ground-fault monitoring circuit If the system has a ground detection feature, the occurrence of ground-fault indication shall be verified whenever any installation conductor is grounded.
- Transmission of signals to off-premises location

An initiating device shall be actuated and receipt of alarm signal at the off-premises location shall be verified.

A trouble condition shall be created and receipt of a trouble signal at the off-premises location shall be verified.

A supervisory device shall be actuated and receipt of a supervisory signal at the off-premises location shall be verified. If a transmission carrier is capable of operation under a single- or multiple-fault condition, an initiating device shall be activated during such fault condition and receipt of a trouble signal at the off-premises location shall be verified, in addition to the alarm signal.

## Conductors — Metallic

**Stray Voltage:** All installation conductors shall be tested with a volt/ohmmeter to verify that there are no stray (unwanted) voltages between installation conductors or between installation conductors and ground. Unless a different threshold is specified in the system installed equipment manufacturer's specifications, the maximum allowable stray voltage shall not exceed 1 volt AC/DC.

**Ground Faults:** All installation conductors other than those intentionally and permanently grounded shall be tested for isolation from ground per the installed equipment manufacturer's specifications.

**Short-Circuit Faults:** All installation conductors other than those intentionally connected together shall be tested for conductor-to-conductor isolation per the installed equipment manufacturer's specifications. These same circuits also shall be tested conductor-to-ground.

**Loop Resistance:** With each initiating and indicating circuit installation conductor pair short-circuited at the far end, the resistance of each circuit shall be measured and recorded. It shall be verified that the loop resistance does not exceed the installed equipment manufacturer's specified limits.

**Supervision:** Introduction of a fault in any circuit monitored for integrity shall result in a trouble indication at the control unit. One connection shall be opened at not less than 10 percent of the initiating devices, notification appliances and controlled devices on every initiating device circuit, notification appliance circuit, and signaling line circuit.

## Conductors — Nonmetallic

### Circuit integrity

Each initiating device, notification appliance, and signaling line circuit shall be tested to confirm that the installation conductors are monitored for integrity in accordance with the requirements of Chapter 4 and Chapter 6.

### Fiber optics

The fiber-optic transmission line shall be tested in accordance with the manufacturer's instructions by the use of an optical power meter or by an optical time domain reflectometer used to measure the relative power loss of the line. This relative figure for each fiber-optic line shall be recorded in the fire alarm control panel. If the power level drops 2 percent or more from the value recorded during the initial acceptance test, the transmission line, section thereof, or connectors shall be repaired or replaced by a qualified technician to bring the line back into compliance with the accepted transmission level per the manufacturer's recommendations.

## Supervision

Introduction of a fault in any supervised circuit shall result in a trouble indication at the control unit. One connection shall be opened at not less than 10 percent of the initiating device, notification appliance, and signaling line circuit. Each initiating device, notification appliance, and signaling line circuit shall be tested for correct indication at the control unit. All circuits shall perform as indicated in Table 6.5, Table 6.6.1, or Table 6.7.

## Initiating Devices

**Fire Extinguishing System(s) or Suppression System(s) Alarm Switch:** The switch shall be mechanically or electrically operated and receipt of signal by the control panel shall be verified.

**Fire-Gas and Other Detectors:** Fire-gas detectors and other fire detectors shall be tested as prescribed by the manufacturer and as necessary for the application.

### Heat Detectors

- Fixed-temperature, rate-of-rise, rate of compensation, restorable line, spot type (excluding pneumatic tube type) - Heat test shall be performed with a heat source per the manufacturer's recommendations for response within 1 minute. A test method shall be used that is recommended by the manufacturer or other method shall be used that will not damage the non-restorable fixed-temperature element of a combination rate-of-rise/fixed-temperature element detector.
- Fixed-temperature, non-restorable line type - Heat test shall not be performed. Functionality shall be tested mechanically and electrically. Loop resistance shall be measured and recorded. Changes from acceptance test shall be investigated.
- Fixed-temperature, non-restorable spot type - After 15 years from initial installation, all devices shall be replaced or two detectors per 100 shall be laboratory tested. The two detectors shall be replaced with new devices. If a failure occurs on any of the detectors removed, additional detectors shall be removed and tested to determine either a general problem involving faulty detectors or a localized problem involving one or two defective detectors. If detectors are tested instead of replaced, tests shall be repeated at intervals of 5 years.
- Non-restorable (general) - Heat tests shall not be performed. Functionality shall be tested mechanically and electrically.
- Restorable line type, pneumatic tube only - Heat tests shall be performed (where test chambers are in circuit) or a test with pressure pump shall be conducted.
- Single- and multiple-station heat alarms - Functional tests shall be conducted according to manufacturer's instructions. Non-restorable heat detectors shall not be tested with heat.

**Fire Alarm Boxes:** Manual fire alarm boxes shall be operated per the manufacturer's instructions. Key-operated pre-signal and general alarm manual fire alarm boxes shall both be tested.

**Radiant Energy Fire Detectors:** Flame detectors and spark/ember detectors shall be tested in accordance with the manufacturer's instructions to determine that each detector is operative. Flame detector and spark/ember detector sensitivity shall be determined using any of the following:

- Calibrated test method
- Manufacturer's calibrated sensitivity test instrument
- Listed control unit arranged for the purpose
- Other approved calibrated sensitivity test method that is directly proportional to the input signal from a fire, consistent with the detector listing or approval. If designed to be field adjustable, detectors found to be outside of the approved range of sensitivity shall be replaced or adjusted to bring them into the approved range. Flame detector and spark/ember detector sensitivity shall not be determined using a light source that administers an unmeasured quantity of radiation at an undefined distance from the detector.

**Smoke Detectors:** System detectors and single-station smoke alarms used in other than one- and two-family dwellings. The detectors shall be tested in place to ensure smoke entry into the sensing chamber and an alarm response. Testing with smoke or listed aerosol approved by the manufacturer shall be permitted as acceptable test methods. Other methods approved by the manufacturer that ensure smoke entry into the sensing chamber shall be permitted. Any of the following tests shall be performed to ensure that each smoke detector is within its listed and marked sensitivity range:

- Calibrated test method
- Manufacturer's calibrated sensitivity test instrument
- Listed control equipment arranged for the purpose
- Smoke detector/control unit arrangement whereby the detector causes a signal at the control unit when its sensitivity is outside its listed sensitivity range
- Other calibrated sensitivity test method approved by the authority having jurisdiction

**Single- and Multiple-Station Smoke Alarms:** Functional tests shall be conducted according to manufacturer's instructions.

**Air Sampling:** Per manufacturer's recommended test methods, detector alarm response shall be verified through the end sampling port on each pipe run; airflow through all other ports shall be verified as well.

**Projected Beam Type:** The detector shall be tested by introducing smoke, other aerosol, or an optical filter into the beam path.

**Smoke Detector with Built-in Thermal Element:** Both portions of the detector shall be operated independently as described for the respective devices.

**Smoke Detectors with Control Output Functions:** It shall be verified that the control capability shall remain operable even if all of the initiating devices connected to the same initiating device circuit or signaling line circuit are in an alarm state.

## Initiating Devices, Supervisory

**Control Valve Switch:** Valve shall be operated and signal receipt shall be verified to be within the first two revolutions of the hand wheel or within one-fifth of the travel distance, or per the manufacturer's specifications.

**High- or Low-Air Pressure Switch:** Switch shall be operated. Receipt of signal obtained where the required pressure is increased or decreased a maximum 70 kPa (10 psi) from the required pressure level shall be verified.

**Room Temperature Switch:** Switch shall be operated. Receipt of signal to indicate the decrease in room temperature to 4.4°C (40°F) and its restoration to above 4.4°C (40°F) shall be verified.

**Water Level Switch:** Switch shall be operated. Receipt of signal indicating the water level raised or lowered 76.2 mm (3 in.) from the required level within a pressure tank, or 305 mm (12 in.) from the required level of a non-pressure tank, shall be verified, as shall its restoral to required level.

**Water Temperature Switch:** Switch shall be operated. Receipt of signal to indicate the decrease in water temperature to 4.4°C (40°F) and its restoration to above 4.4°C (40°F) shall be verified.

## Mechanical, Electrosonic, or Pressure-Type Waterflow Device

Water shall be flowed through an inspector's test connection indicating the flow of water equal to that from a single sprinkler of the smallest orifice size installed in the system for wet-pipe systems, or an alarm test bypass connection for dry-pipe, pre-action, or deluge systems in accordance with NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

## Special Hazard Equipment

**Abort Switch (special type):** Abort switch shall be operated. Correct sequence and operation in accordance with authority having jurisdiction shall be verified. Sequencing on as-built drawings or in owner's manual shall be observed.

**Cross-Zone Detection Circuit:** One sensor or detector on each zone shall be operated. Occurrence of correct sequence with operation of first zone and then with operation of second zone shall be verified.

**Matrix-Type Circuit:** All sensors in system shall be operated. Development of correct matrix with each sensor operated shall be verified.

**Release Solenoid Circuit:** Solenoid shall be used with equal current requirements. Operation of solenoid shall be verified.

**Verified, Sequential, or Counting Zone Circuit:** Required sensors at a minimum of four locations in circuit shall be operated. Correct sequence with both the first and second detector in alarm shall be verified.

**All Above Devices or Circuits or Combinations Thereof:** Supervision of circuits shall be verified by creating an open circuit.

## **Supervising Station Fire Alarm Systems — Receiving Equipment**

**Digital Alarm Radio Receiver (DARR):** The following conditions of all DARRs on all subsidiary and repeater station receiving equipment shall be caused. Receipt at the supervising station of correct signals for each of the following conditions shall be verified:

- AC power failure of the radio equipment
- Receiver malfunction
- Antenna and interconnecting cable failure
- Indication of automatic switchover of the DARR
- Data transmission line failure between the DARR and the supervising or subsidiary station

**McCulloh Systems:** The current on each circuit at each supervising and subsidiary station under the following conditions shall be tested and recorded:

- During functional operation
- On each side of the circuit with the receiving equipment conditioned for an open circuit

A single break or ground condition shall be caused on each transmission channel. If such a fault prevents the functioning of the circuit, receipt of a trouble signal shall be verified. Each of the following conditions at each of the supervising or subsidiary stations and all repeater station radio transmitting and receiving equipment shall be caused; receipt of correct signals at the supervising station shall be verified:

- RF transmitter in use (radiating)
- AC power failure supplying the radio equipment

- RF receiver malfunction
- Indication of automatic switchover

**Radio Alarm Supervising Station Receiver (RASSR) and Radio Alarm Repeater Station Receiver (RARSR):** Each of the following conditions at each of the supervising or subsidiary stations and all repeater station radio transmitting and receiving equipment shall be caused; receipt of correct signals at the supervising station shall be verified:

- AC power failure supplying the radio equipment
- RF receiver malfunction
- Indication of automatic switchover, if applicable

**Private Microwave Radio Systems:** Each of the following conditions at each of the supervising or subsidiary stations and all repeater station radio transmitting and receiving equipment shall be caused; receipt of correct signals at the supervising station shall be verified:

- RF transmitter in use (radiating)
- AC power failure supplying the radio equipment
- RF receiver malfunction
- Indication of automatic switchover

# Chapter 15 » Smoke Control System

## Overview

Smoke Control in CBAS is achieved by using a 32X with special Smoke Control Firmware (32Xsc) and a Firefighter's Smoke Control Panel (FSCP) supplied by ADI.

The 32Xsc will be connected to the FireNet Fire serial channel on the Host port to all CSimon FIRE panels.

The 32Xsc will be connected to the FSCP via the Secondary port. The FSCP uses the Modbus protocol for communication. There may be more than 1 32Xsc in the smoke control system and they all must be connected on their secondary 485 channel to the FSCP panel.

The 32Xsc must also be connected via Ethernet.

## Two Important Notes:

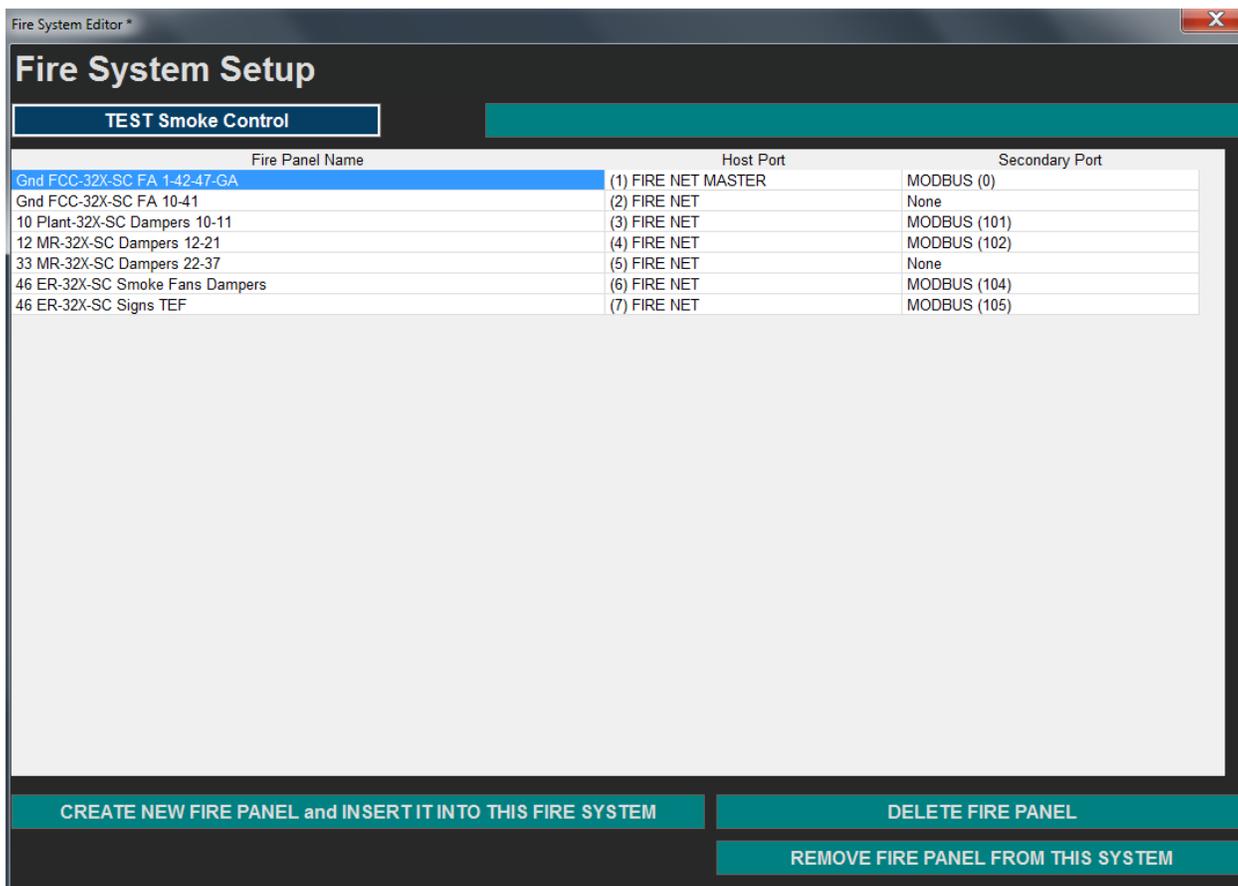
All equipment to be controlled in the instance of a Fire Alarm should be programmed on the 32Xsc. This is because the Smoke Control Resource only works with Local points. Anything on another controller will not work in the case of a Fire Alarm. However, regular Logic can be used to control some things like dampers.

32Xsc controllers do not download database changes automatically. If you make changes to points, especially including Smoke Control Resource points, you must erase database on the controller and let it download the complete database.

## Programming Smoke Control in CBAS

You can ONLY add 32Xsc panels to CBAS using the System – Fire – Systems menu. First click the Insert button and a new System is added. Then Click the Edit button and click the New System.

Logic, PIDs and Schedules may be used in a 32Xsc just like any other 32X, so it is possible to program AHUs.



Click CREATE NEW FIRE PANEL and choose a Name, IP address and select 32-SC for the Panel Type. When you make that choice, irrelevant questions are removed. Right-click or Escape and the panel will be created. Manually add the Modbus On-Controller Channel to Secondary Channel after adding the 32Xsc by going to Hardware View, Controller Channel. Click the new controller then go to Channels and Add A Channel to the Secondary 485. Choose Modbus On-Controller. After adding, Edit the Channel and set the address.

On the first 32Xsc, set the Serial Fire Network address for the Modbus On-Controller channel to 0. On the next 32Xsc Modbus On-Controller channel, set it to 100, then 101 etc. Modbus is a Master Slave protocol but for our use in the Fire system it will have multiple masters. There will be ONLY 1 Modbus Slave and that will be the FSCP panel. Add Modbus Master and Modbus Sub-Master to On-Controller Modbus as appropriate. To set the address as above, go to Hardware View, Controller Channel, the 32Xsc then Channels, Secondary Channel, Program. See picture below.

# Channel Program Screen

Modbus for FOP in FCC

Show  
Point  
Relations

## Serial Channel

### Channel Parameters

Type **RS485**

Protocol **Modbus RTU on**

Baud **19200**

Parity **NONE**

Turn Around  
Time (msec) **50**

No Response  
Time (msec) **1000**

Retries **3**

StopBits(1,2) **1**

### Serial Port Configuration

Address on Serial FIRE Network

**0**

All Fire Alarm Groups will automatically get added to each 32Xsc as software points. These are added by CBAS when a Fire System is added and only apply to that System.

Now add FSCP Panel to the Modbus On-Controller Channel. Click the Channel and on address 1, click Add a Controller. Name FSCP Panel and configure it as New Modbus Generic. Click Add Controller Now!

The Modbus points are added manually. The first SC controller will get a full list of every Modbus point. Other SC controllers can get a full list, but that would be unnecessary. So other 32Xsc controllers only get a partial list of Modbus points, the ones that it will need access to. The Modbus list is given in a PDF document from ADI when you buy a FSCP panel. The list will be different for every job. Manually type in the entire Modbus point list once. Test it out to make sure they all communicate, then save that as a template. (Click the controller then Export Database) Then make a copy of that template for every SC controller. Remove the points from the template that are not needed for each SC. Then Import the modified list for every SC controller.

The FSCP panel MUST be address 1. For each Modbus channel there must be a 'New Modbus Controller' programmed at address 1. The points programmed in that controller will depend on how many of the points are needed in that Smoke Controller. The Master 32Xsc will have all the Modbus points. When adding the controller, CBAS will ask if you want to import the points. Say Yes to import and Yes to enter a Prefix. For the Prefix, enter 2 for the second Panel, 3 for the third etc.

Address 100 is reserved for the Master. There can only be 1 Master on a Modbus channel. So the Main Smoke Controller that is deemed as Master will have nothing programmed at address 100 because that would be itself. The main Smoke Controller will then have a 32X-SubMaster programmed at addresses starting at 101. Each SubMaster must have 1 point programmed: Holding Register 1. This is used by the SubMasters to signal the Master that they have a command that needs to be sent. See picture. The example controller at 103 has no Modbus channel because it has no Smoke Control Points.

99	Add A Controller	
100	Add A Controller	
101	32X Smoke SubMaster	1 ModbusSub101
102	32X Smoke SubMaster	1 ModbusSub102
103	Add A Controller	
104	32X Smoke SubMaster	1 ModbusSub104
105	32X Smoke SubMaster	1 ModbusSub105
106	Add A Controller	

Now for all the other Smoke Controllers that are NOT MASTER they only have 2 panels programmed on their Modbus channel. The real FSCP at address 1 and the Master at address 100. The FSCP only needs those points that are necessary for local control programmed. The Master at address 100 does not have any points programmed. See below. Note: Controller type Master, not SubMaster.

90	Add A Controller	
99	Add A Controller	
100	32X Smoke Master	6 to Modbus Master
101	Add A Controller	
102	Add A Controller	

In the program screen of the Modbus channel in each Smoke controller there is an Address. For the Smoke controller that is MASTER that address is 0. For all other Smoke Controllers that address will be unique and starts at 101. That address must match the SubMasters programmed on the Modbus channel on the Master Smoke Controller.

## Smoke Control Resource

There is a new point type in CBAS named ‘Smoke Control’. This point has several states and they are: NORMAL, START, WAITING, FAULT and ON.

**Normal:** normal condition.

**Start:** The Smoke Control resource is starting and in the process of commanding points.

**Waiting:** The Smoke Control resource is waiting for the points that were commanded to reach their final state.

**Fault:** The feedback of the output failed so the item is FAULTED.

**On:** The feedback of the output was successful. The Smoke Control was successful at turning on the output point.

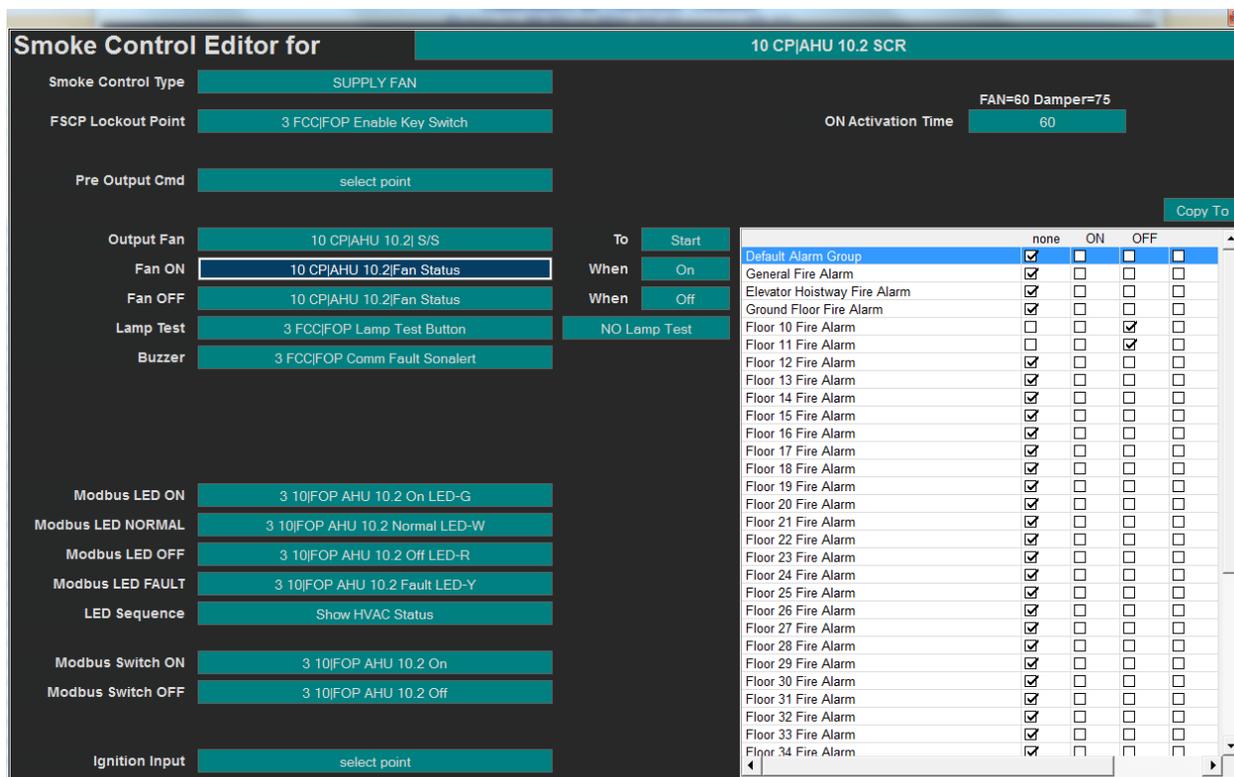
The Smoke Control Resource (SCR) allows you to select all the points that operate on the Smoke Control device then CBAS handles the operation of the Smoke Control device.

Add 1 SCR point for each piece of equipment that will need to be controlled. To add a SCR point, go to the Smoke Controller (32Xsc) in Hardware View, then Points and scroll to the bottom. Click Add a Point, give it a name then choose Smoke Control from the Multi-state points section. Click Add Point Now!

On the Program Screen of the point, click the Smoke Control button. See picture below.

All points for a piece of Smoke Control equipment to be controlled MUST be in the same 32Xsc!!!!

The Modbus points from the FSCP will get put into every 32Xsc that is added after the first 32Xsc. So they will be available to select in the SCR.



## Explanation of Smoke Control Editor:

**Smoke Control Type:** The type of device being controlled. Fan, Damper, Zone, Door... The button labels and control sequence will change according to the type of device selected.

**FSCP Lockout Point:** The FSCP Panel Enable Switch. Manual operation of the FSCP is only allowed if the Panel Enable switch is in the Enabled position.

**Lockout Point:** Optional. Secondary lockout point.

**Pre Output Cmd:** Optional. Under some circumstances it may be necessary to turn another piece of equipment On/Off prior to turning the Output Fan/Damper.

**Pre Output Type:** Options are: Nothing, Wait for Feedback and Wait for Timer. If Nothing is selected then the Pre Output will turn on then immediately the Output will be turned on. If Wait for Feedback is selected then the Pre Output will be turned on but the Output will not be turned on until the Pre Output feedback is in the selected state. If Wait for Timer is selected then the Pre Output will be turned on and then xx seconds later the Output will be turned on. Please see NFPA 92 to make sure that you satisfy the turn on time of the output.

**Pre Output Delay Time:** The amount of time to wait after turning the Pre Output on before turning the Output on.

**Pre Output Feedback:** The feedback point for the Pre Output.

**Output Fan/Damper:** The Output point to be controlled by this Smoke Control resource. This will be started when the system is in alarm.

**Fan On:** Choose the Status point for the Fan/Damper. Positive feedback that the Output Fan went On or Damper went Open. The state that the output should go into when the output is energized. Choose State in the field to the right. Normally the choice would be ON.

**Fan Off:** Choose the same Status point. Negative feedback that the Output Fan/Damper went On/Open. Choose State in the field to the right. Normally the choice would be OFF.

**Lamp Test:** The Modbus Lamp Test point from the FSCP. If you want a Lamp Test point, program another Smoke Control point and edit the SCR on that point. Choose Type, Lamp Test Point, and LED points (listed on Modbus Channel on the 32Xsc).

**Buzzer:** Choose the Modbus Comm Fault Sonalert point.

**Reset:** Reset from a CSimon Fire panel only. Upon a reset all automatic Smoke Control objects will get turned off. Any device in manual control will be left alone.

**Silence:** Silence from the CSimon Fire panel. Upon a silence from the fire panel all automatic Smoke Control objects will get turned off. And device in manual control will be left alone.

**Linked Zone:** This applies to the Zone Smoke Control Point. When editing a Zone Smoke Control resource you will select the linked Damper and Fans.

**Modbus LEDs:** These are the LEDs on the FSCP. The Smoke Control Resource will turn them On/Off as necessary. Choose the Modbus points related to the equipment you are controlling.

**LED Sequence:** Choose Show HVAC Status or Original Smoke Control Only. Choose to Show HVAC Status if you want that when not in when not in Smoke Control.

**Modbus Switches:** These are the switch inputs from the FSCP available on the Modbus On Controller channel.

**Ignition Input 1:** Optional. This is an outside source that will trigger the automatic operation sequence of the Smoke Control resource. Just as if the Alarm Fire Group had gone on. Could be used to schedule monthly testing.

**On Activation Time:** The amount of time that the Output Feedback point has to get into the correct state. Otherwise the Smoke Control point will go into Fault.

**Lamp Test Time:** If left at 0 then when Lamp Test is pressed the LEDs will light up and when it is released they will turn off. If set to a number (say 10) then when the lamp test button is released the LEDs will remain on for another 10 seconds.

**Alarm Group Grid:** This grid displays all Fire Alarm Groups. You select how each group should control the Smoke Control resource if that group goes into Alarm.

## **Notes on FSCP:**

The Panel Enable key cannot be removed while in the Enabled position. It can only be removed when disabled. So that means you can't take the key out and silence when FSCP is active. You may want to keep both keys in?

You should not leave the panel Enabled when FSCP control is not needed. When panel is enabled and the Smoke system is active, the current status of units will not be displayed.

Smoke Control mode can not only be initiated by the FSCP key but also by an Alarm Input in the building. If any Alarm Input triggers in the system, the FSCP will start working in Smoke Control Mode.

In Smoke Control Mode AUTO position, the On/Off LEDs are not lit. The Normal LED will be lit. When in Smoke Mode the On/Off LEDs will only light if they are being commanded to On or Off by Smoke Control.

In Smoke Control Mode On/OFF position the Normal LED will NOT be lit. Only 1 LED is ever on at a time. It will be either On or OFF. If failure, then only Fault. On a Fault, the On/Off LEDs will go out and ONLY Fault will be on.

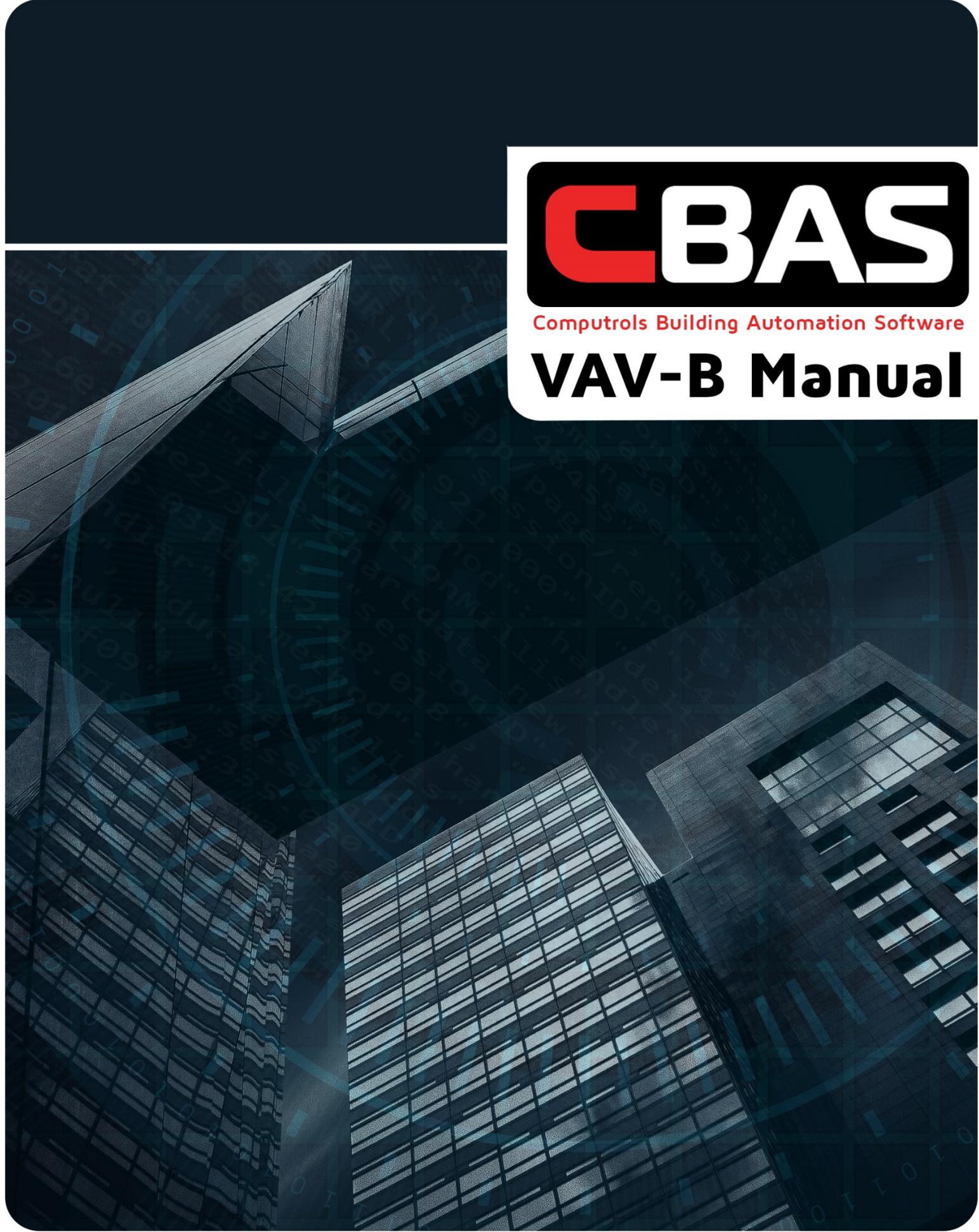
When in Smoke Mode, the Normal LED is ON unless being overridden by FIRE Alarm event or FSCP switch.

**< END >**



Computrols Building Automation Software

# VAV-B Manual



# Chapter 1 » Overview

## Things you will need

- CBAS version 12 or newer
- Firmware version 17.4 or newer on Host controller
- USB-485 Isolator cable (B&B Elec. model USOPTL4, Computrols part no. USB-ISO)
- Drivers for isolator (disk comes with cable) or <https://www.bb-elec.com/Tech-Support/Search-for-Drivers.aspx>
- VAV\_UTILITY.exe commissioning software (latest)

All of the above software and firmware are included in the VAV-B Package (installs with CBAS-resides in CBAS19+ folder). Contact Customer Service or Technical Support for this, or for cables.

## Things you need to know

The preferred protocol for the VAV-B is OPTO. It is easier to program the points in CBAS with OPTO. However, BASnet is also available if you need to add a VAV-B to an existing BASnet channel. We also now have special firmware versions for BACnet and Siemens VAV-B, as well as Teletrol.

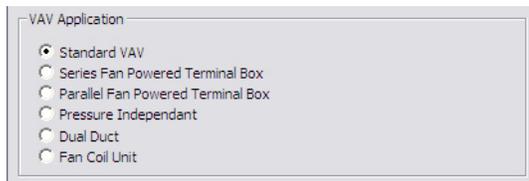
There are 2 ways of connecting to the VAV-B controller: One is through a USB port direct to the controller's Local 485 Port using a USB to 485 cable. This method is also used for balancing VAV boxes later after installation. The second is through the CBAS DPU using the host controller and OPTO 485 or BASnet channel. The second method is covered later in this manual. For your first time, it is suggested that you use the direct connection method in your office before going to the jobsite.

In order to connect through CBAS to BACnet VAV-B, the host controller must be a LX controller with BACnet Router enabled. This requires BACnet Router in the site's license file. Instructions included later.

The points you program in the CBAS database DO NOT DOWNLOAD to the controller. They are there for you to monitor the application that is running on the controller, and to command a few points if necessary.

It is suggested that you run a second 18-2 Shielded wire from the wall stat to the Local Port on the VAV-B. This will facilitate an easy connection with the Utility Program to the VAV-B for use in commissioning, balancing and firmware upgrades. DO NOT combine this with the Stat comm wires in an 18-4 wire as it will not work. See wiring diagram.

The available applications included with the controller are:



The last firmware that had Dual Duct is 1.22.21: To get this new Fan Coil application to fit, Dual Duct has been removed from the firmware. So, this firmware set (Application 22) will do regular VAV boxes OR Fan Coils. If you need to program Dual Duct you will need to use Application version 21 or before.

Fan Coil 1.22.22

Dual Duct 1.22.21

## Basic Steps Summary

- Wire the VAV-B including power, 485 Comm to Host, and commissioning cable.
- Set Address using dipswitches.
- Place the VAV\_UTILITY.exe commissioning software in the CBAS folder.
- Create shortcut to above software (optional).
- Plug in the cable to a USB slot and complete installation using drivers.
- Start Utility Program.
- Click VAV Connection and set the parameters to connect.
- Choose "Serial Port via 485 converter" and enter address.
- Select USB serial port, then click Connect. Database should download and Status should show Ready.
- You can now Click Pre Box Setup and work your way down the list of parameters. Click OK.
- Do the same with Installer button.
- Click "Save and Export Database".
- Click Save All Changes to VAV. The controller will reboot and the program will reconnect.
- To zero out the pressure pickup and damper actuator, etc, click Test and Balance.
- Return to Main Screen, then Save/Export Database.
- Save All Changes to the VAV.

- Open CBAS in Editor Mode.
- In Hardware View, add a channel to host the VAV-B controllers (could be OPTO, BASnet, or BACnet).
- Add a VAV-B to the channel.
- OPTO: Import points from file saved in earlier step during commissioning.
- BASnet: Add a blank controller. Choose to Add from Template, or Copy from another controller. Click controller, then Add Points to VAV-B.
- BACnet: Add points either from text file saved when Save/Export Database or use an export file from another VAV-B.
- Siemens: Templates are available from Tech Support.
- Go to Real Mode and start monitoring.
- Add a VAV-B Commission point to the Workstation channel. This allows you to commission VAV-Bs through the 485 channels. VAV\_Utility.exe must be in the C:\CBAS folder.

# Chapter 2 » Hardware

## Wiring the VAV-B Controller

See wiring diagram. The commissioning cable can be connected through a MN-S3 display stat as shown.

- If you are not using a MN-S3, you will need a cable with bare wires on the end opposite the USB plug.
- The black wire (RDA-) attaches to the Programming Port (-) terminal and the red wire (TDB+) attaches to the (+) terminal.
- The 24VDC common must be connected to earth ground!
- You may daisy chain up to 32 VAV-B controllers on one 485 channel connected to either the Host port or Secondary port on the Host Controller.
- Terminate sensor and output wires to terminals according to the label on the controller.

## Set the Address

Using the dipswitches, set the address.

- There is one set of dipswitches for the 10s and one set for the 1s, so the address can be from 1 to 99. Zero is an invalid address.
- Dipswitches in the UP position are added up to make the address. SW4=1, SW3=2, SW2=4, SW1=8.
- There are examples shown on the controller's label. Cycle power after changing the address.

## Install Commission Cable

To install the Ulinx USOPTL4 USB to RS-485 adapter, follow the instructions provided with the driver installation CD. To install the USB to 485 cable, continue.

- Plug in the USB to 485 commissioning cable and the Found New Hardware Wizard will appear.
- Browse to the location where you placed the cable drivers.
- Inside the i386 folder, highlight the ftdibus.sys file and click next.
- Complete the installation wizard.

The cable will be listed in Device Manager under Ports, as USB Serial Port COMXX. (XX represents the comm port number)

# Chapter 3 » Software

## Utility Program

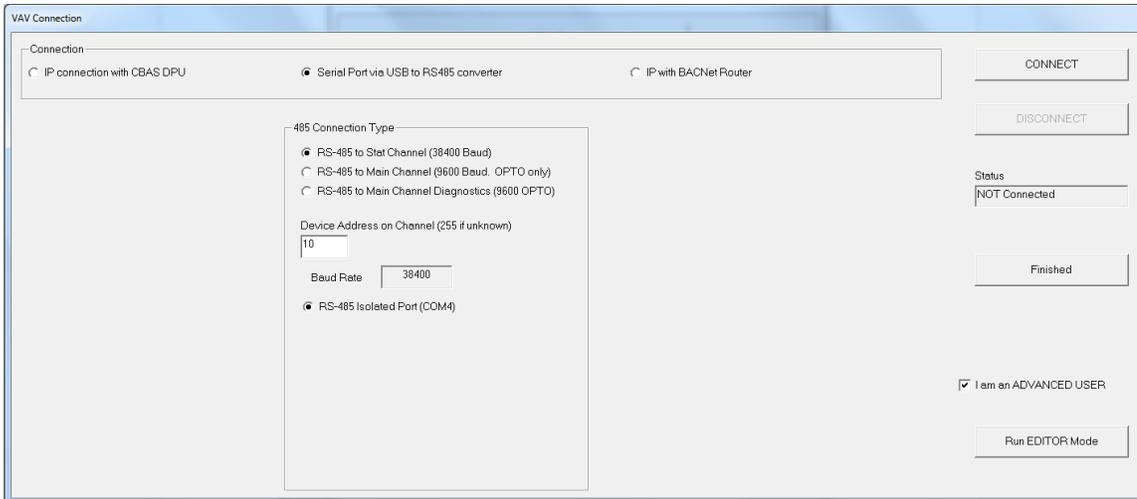
VAV Utility is installed to the CBAS19 folder when CBAS is installed. If you acquire an updated version of the program, copy the VAV\_Utility.exe commissioning software to C:\CBAS19 (or other CBAS directory where CBAS is installed).

Right-click the file and click Send To, then Desktop (Shortcut), if you need a desktop shortcut for commissioning purposes.

## Connecting

- Start the VAV\_Utility program.
- If you get an error, run the vcredist\_x86.exe then start the program again. (Should only be necessary on Windows XP, if CBAS has not been installed on the PC)
- With Windows 7, 8, 10, you might have to run as administrator. Right Click the program and go to Properties. On the Compatibility tab, check Run this Program as an Administrator.
- When program starts, at the top of the window, click VAV Connection. (See Figure below)
- Choose Serial Port Via 485 converter. If you do not see this option, you have not completed installation of the Commissioning Cable. The other 2 connection types are covered later.
- Choose RS-485 to Stat Channel. (Main Channel refers to 485 network to Host controller)
- Enter the address of the VAV-B.
- Leave the Baud rate at default.
- Choose the USB Serial port. Should say Isolated Port.
- Check the “I am an advanced User” box.
- Click Connect and the database will load within 10 seconds.

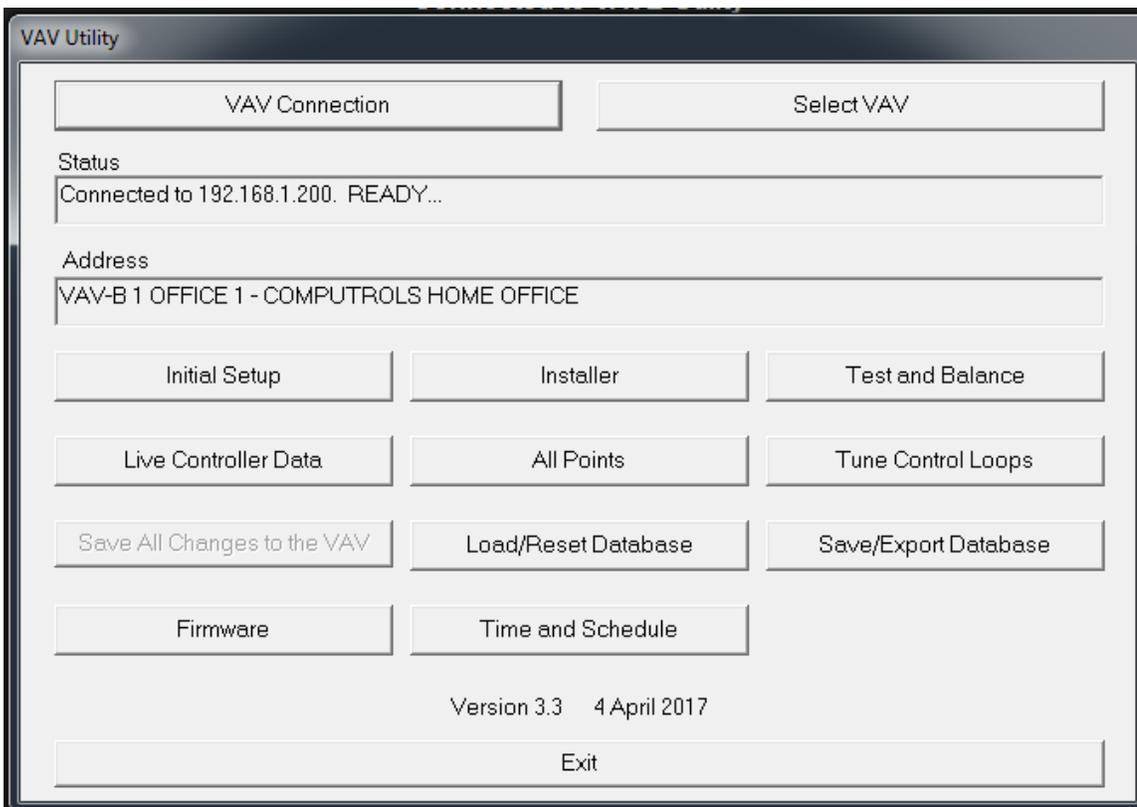
Note: Editor mode is a way to simulate programming without being connected to a controller. This is equivalent to Simulator Mode in CBAS.



## Commissioning the First VAV-B

Once you have connected, all the buttons will be active, except the Save All Changes button. It will be active as soon as changes are made. See picture below.

The buttons are in order from top to bottom, but you should normally only need the first 3, then the Save and Load buttons will be used.



# Initial Setup

Click the first button, Initial Setup. (See Figure below)



The image shows a software dialog box titled "Initial Box Setup". It contains several sections for configuring a VAV box:

- VAV Name-Location:** A text box containing "Standard OPTO". To its right is a checked checkbox labeled "I am an ADVANCED USER".
- VAV Application:** A group box containing six radio button options: "Standard VAV" (selected), "Series Fan Powered Terminal Box", "Parallel Fan Powered Terminal Box", "Pressure Independant", "Dual Duct", and "Fan Coil Unit".
- Protocol:** A group box containing three radio button options: "BASnet", "OPTO" (selected), and "BACnet". To the right is a "BACnet Setup" button. Below these options, it says "BASnet - OPTO Baud = 9600".
- Network Address:** A group box containing two radio button options: "From Dip Switches" (selected) and "Set From Softwar". Each has a corresponding "Address" text box containing the value "0". Below these is a checked checkbox labeled "Local Port is Multidrop".
- Engineering Units:** A group box containing three radio button options: "English (United States) - DegF, inch H2O, sq ft, CFM" (selected), "Metric - DegC, KPa, sq millimeters, Cubic Meters per Hour (CM", and "Mixed - DegC, inch H2O, sq ft, CFM".
- Master or Slave Box?:** A group box containing three radio button options: "Normal box" (selected), "MASTER BOX. Has SLAVE BOXes connected on Programming Port", and "SLAVE BOX."

At the bottom of the dialog box are two buttons: "OK" and "Cancel".

Type in a Name/Location.

## Choose the VAV Application Type

Choices should be self-explanatory.

Note: Pressure Independent controls the VAV box based solely on Space Temperature and Setpoint, not CFM and CFM Min/Max.

## Network Address

You should not have to change anything in the Network Address section. It is possible to change the address by selecting “Set in Software”.

- When you Save to VAV, the address changes.
- You will lose connection and will have to restart the connection using the new address.
- Choose your protocol and baud rate.
- BACnet is covered later.

## Engineering Units

Select from English, Metric, or Mixed.

## Master or Slave Box?

With most VAV-Bs, the box type will be Normal Box. Master and Slave are used when you have 2 or more boxes sharing a single space temperature and setpoint. The Master will contain the actual Space Temp and Setpoint.

- Select Master for the Master box and Slave for the Slave Box.
- You must also select “Local Port is Multidrop”. (Necessary for controllers to share Temp and SP) You have to select “I am an Advanced User” on the VAV Connection screen in order to see this option.
- Then, connect the 485 Local Port wires together on the 2 VAV-Bs.
- The Master box will share its space temp and setpoint with the Slave box. You can have multiple slave boxes per master. So, you could have 1 VAV-B with a S3 then several other VAV-Bs maintaining the space temp using the Master space temp and setpoint.

## Saving Changes

Once you have made all of your choices under PreBox Setup, click OK to save them. However, they will not be saved to the VAV-B until you Save All Changes to the VAV from the main screen. But you will complete the Installer screen setup prior to saving.

## Installer Screen

Now click the Installer button. (See Figure below)

The screen will have different choices depending on the application chosen in the PreBox Setup screen.

- Make your choices for the type of temperature sensor, setpoint, and overtime. The Software Point choices refer to a point on the VAV-B controller where the setpoint can be commanded only from CBAS. This is covered in a later section.
- To change the range of the Setpoint (ex. 68-72), click the Setpoint Setup button.
- If you choose MN-S3 Display Stat, click the Space Temp Setup button for choices on how the S3 setpoint range and the buttons should work.

The Installer screen is divided into several sections:

- Hardware Configuration:** Includes options for Space Temp (Wall Sensor) with radio buttons for 10K Thermistor, Software Point, and MN-S3 Display Stat. A "SpaceTemp Setup" button is present.
- Setpoint Adjustment:** Includes radio buttons for Software Point (selected), 10K Potentiometer (Resistive Input 1), and MN-S3 Display Stat.
- Overtime Request:** Includes radio buttons for None (selected), Software Point, Short 10K Thermistor, and MN-S3 Display Stat.
- Heat:** Includes radio buttons for None (selected), 1 Stage (BO2), 2 Stage (BO3), 3 Stage (BO4), and four Prop Hot Water Valve options.
- Cool:** Includes radio buttons for None, Binary No Feedback (Internal Actuator Default) (selected), Binary Resistive Feedback (Int Actuator and Int Res), Analog (AO1) No Feedback, and Analog (AO1) Voltage Feedback (AI1). An "Actuator Setup" button is present.
- CFM Setup:** Includes input fields for Min Cool Flow (100 CFM), Max Cool Flow (1200 CFM), Heat Flow (100 CFM), Duct Area (0.54 Sq Ft), and Min Readable Pressure (0). A "Calculate..." button is present, followed by the text "10.0" Round Duct".
- Table:** A table with two columns: "Point" and "Configuration".

Point	Configuration
Internal Actuator	Cooling Actuator
Internal Resistive Feedback	
Internal Voltage Feedback	
Internal Pressure Sensor	Pressure
B01 Fan	---
B02 Heat1	---
B03 Heat2	---
B04 Heat3	---
Analog Output1	---
Analog Output2	---
Wall Sensor	---
Resistive Input 1	---
Resistive Input 2	---
Volt Input1	---
Volt Input2	---

Double Click to Manually configure points

Generic Control Sequence 1 (available)

Generic Control Sequence 2 (available)

Return to Main Screen

## Choose Your Type of Heat, or None

- The 1 – 3 Stage Heat choices are for electric heat of course, and require a relay. Proportional Hot Water Valves are 0-10VDC and it is possible to change to 2-10VDC by clicking the Actuator Setup button.
- The final 2 choices are for Pulse Valves and those choices take up 2 Binary Outputs each. BO1 pulses the valve in a positive direction and BO2 is the negative or opposite pulse. The same is true for BO3 and 4.

## Choose Your Cooling Damper Type, or None

- Binary No Feedback is the default when you are using the internal damper included with the VAV-B-AP.
- With Resistive Feedback, you would not be using an Internal Damper. On the VAV-B-X, there is a plug on the side where you would plug in that damper with feedback.
- The final 2 choices are for External Dampers on AO1 and are 0-10VDC. Click the Actuator Setup button and you will find a check box to make the damper 2-10 Volts.
- The last choice allows you to use the actuator feedback on AI1.

## Unused Points

- In the section listing the points in the bottom right, you can click a line that is not being used and manually configure the type of input or output. Use the Scaler Setup button to manually configure scaling on any of the scalable points. You can use the following Generic Control Sequences to command the outputs. Unless the points are configured here, they will not work in CBAS.

## Generic Control Sequence 1 and 2

- Click one of the Generic Control Sequence buttons to configure a sequence to override internal application and/or command a point.
- You can find an example of how to use these sequences in Appendix B at the end of this manual.

## Initial CFM Calibration

In the top right section, set your Min, Max, and Heat CFM targets.

- For your CFM calculation to work, you must set the correct duct area.
- Click the Calculate button.
- Enter the size and shape of the duct and click Calculate.
- Then click Save and it will be saved to the Duct Area field.
- Min Readable Pressure is the lowest that your sensor can read in Inches of Water Column (“WC). Anything below this amount will display as 0 CFM. The default value for this point should work fine.
- If you are not using a pressure sensor, you can choose the Pressure Independent application on the Initial Setup screen.

When the Installer screen is complete, click Return to Main Screen and it will be saved.

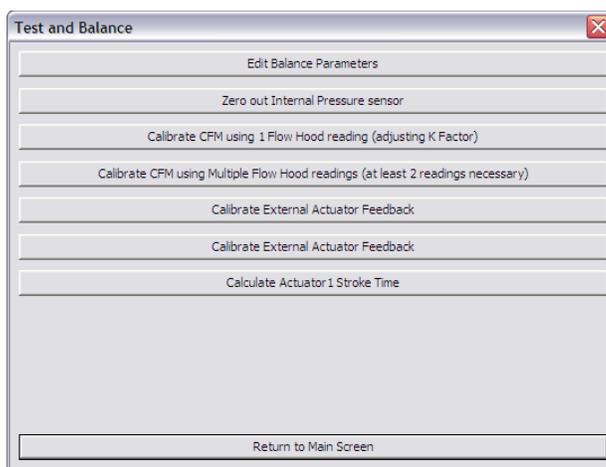
## Save Configuration

Now is a good time to click Save/Export Database. This will create a file containing all of the setup choices you have made. The file is saved in the C:\CBAS19\Personalities folder and can be used to add identical VAV-B controllers in the future. This will be covered in a later section.

Now click Save All Changes to VAV. Within a minute, the utility program will reconnect to the VAV-B for further configuration.

## Test, Balance and Zero-Out Pressure/Damper

From the Main Screen, click the Test and Balance button. (See figure below)



## Edit Balance Parameters (See Figure Below)

The screenshot shows the 'Test and Balance' software interface. It is divided into several sections:

- Test Damper Loop:** Includes a 'Force Damper To' input field (set to 0), a 'Go' button, and a 'Done' button. A note says '(Release damper to control loop)'. There is also an empty input field.
- Test Flow Control Loop:** Includes a 'Desired CFM' input field (set to 0), a 'Go' button, and a 'Done' button. A note says '(Release CFM Setpoint to control loop)'. There is also an empty input field.
- CFM Control Loop Setup:** Features a row of 12 radio buttons for selecting control loop speed, with 'Default' selected. Below are 'Slowest', 'Default', and 'Fastest' labels. To the right is a 'CFM Deadband' input field (set to 10) and 'CFM' label. A checkbox for 'Use Pressure Sensor Filter' is checked.
- Cooling Design CFM:** Includes 'Min Cool' and 'Max Cool' input fields (both set to 595) and 'CFM' labels.
- Heating Design CFM:** Includes a 'Heating Design CFM' input field (set to 595) and 'CFM' label.
- Unoccupied CFM:** Includes an 'Unoccupied CFM' input field (set to 100) and 'CFM' label.
- Duct Size:** Includes a 'Duct Size' input field (set to 0.5454) and 'Sq In' label. A 'Duct Size Calculator' button is next to it.
- VAV Readings:** A panel on the right showing real-time data: 'Damper Position' (4.21041), 'Feedback' (4.21), 'Overshoot' (-5), 'Pressure' (0), 'CFM' (0), 'Disabled' (Damper Disabled), and 'Force Value' (0.0).
- Return to Main Screen:** A button at the bottom center of the window.

From this screen, you can test the operation of the damper alone and in relation to CFM Targets. Also, targets, duct size and control loop speed can be adjusted.

To test, just type in a damper position or a desired CFM flow then click the GO button. You will see actual readings from the damper on the right as they change. When finished testing, click Done and the control loop will take over.

This is also the only screen where you can set the Unoccupied CFM. If you are using an Occupied Schedule or commanding the VAV-B to Unoccupied at any time, then you might want to set this to a different number, or 0. Usually the Unoccupied CFM is required to be 0.

Click Return to Main Screen when finished testing and making changes. If changes are made to the control loop and CFM Targets, you will need to Save All Changes again.

## Zero Out Internal Pressure Sensor

In order to get an accurate zero CFM reading from the internal pressure sensor when there is no airflow, you must zero it out. Click the button and you will see the following screen. This is done at the factory, but if you think there is a problem, you might want to do this.

Zero Pressure Sensor

To Zero out the Pressure sensor you must first remove all pressure from the pressure sensor. Do this by either:

- 1) Removing the air line from the pressure sensor or
- 2) Turning off the Air Handler.

When all pressure has been removed press the 'Pressure Sensor is at ZERO' button.

Pressure Sensor is at ZERO

Current Zero offset in Controller -1

New Zero Offset to be saved to Controller  Manual Zero Set

Current Pressure Reading 0.000

Current Pressure Reading using new Zero --

Live Counts 264

265 264 264 264 264

Minimum Pressure the sensor can reliably read  °WC

Save New Zero Number

Return to Previous Screen

- This is an easy process. Either turn off the AHU or remove the tubes from the pressure sensor on the VAV-B.
- When you know that the flow has stopped, click Pressure Sensor is at ZERO. The process will take about a minute.
- When the process is complete, the Save New Zero Number button will become active. Click that button.
- You will get a warning to Reboot Controller for New Setting to Take Affect.
- Click OK to return to the Test and Balance choices.
- When you save changes again, the new settings will be saved.

## Calibrate CFM Using 1 Flow Hood Reading

Click this button and you will see the following screen, which is intended for use in balancing the VAV boxes after installation.

The first step is to override the CFM so that it doesn't move during the calibration process. Wait for the CFM to settle, then click the Load Average.

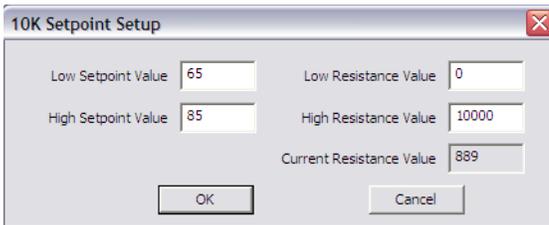
- Click Load Average CFM From Controller.
- Type in the CFM Reading from the Flow Hood and click Calculate New K Factor.
- If you would like to manually set the K factor, type it into the New K Factor field and click the button to the right.
- To test the operation of the damper in relation to the Setpoints, click the buttons in the next section.
- Be sure to click the Release CFM Override button when finished.
- Click Return to Previous Section.

## Calibrate CFM Using Multiple Flow Hood Readings

Complete the process by following the onscreen instructions for steps 1 and 2. There is also a test section identical to the one in the Edit Balance Parameters screen. When finished, click Return to Main Screen.

## Calibrate 10K Resistive Setpoint

If you are using a 10K Potentiometer for the field setpoint, you will see this button and this is where you set the range of possible temperatures for the setpoint. In most cases, you should be able to just type in the low and high setpoint value and click OK. This is the same screen as the Setpoint Setup found on the Installer screen.



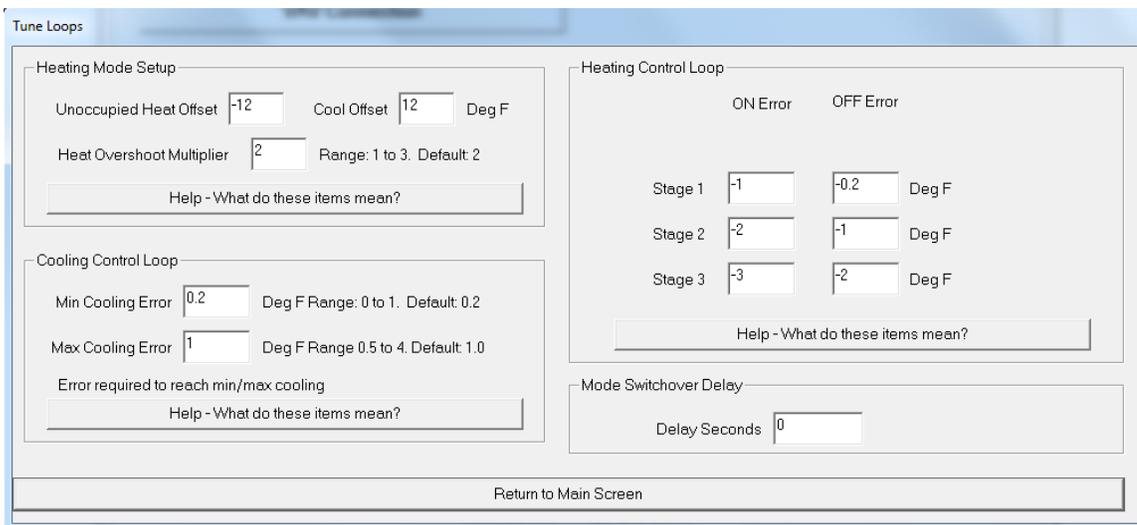
## Calibrate Actuator 1 Stroke Time

You must calibrate (or at least verify) stroke time. It should not be necessary to do this with the Internal Damper, as it is calibrated at the factory. Stroke time is the time it takes to go from 0% to 100%. The standard damper has a stroke time of about 95 seconds. Damper 1 is the Internal Damper. If all VAV boxes at a site are the same, then maybe you can calibrate the first few, then use the same setting on the rest.

- This is another easy process. Click the first button.
- When the damper has gotten to zero percent, click the second and it will go to 100 percent.
- You must watch the damper. When it stops moving, click the third button and it will stop counting.
- Click the next button to save the new stroke time.

## Tune Control Loops

See figure below.



- Change your Unoccupied Heating and Cooling Offsets. Ex: if Heat Setpoint is 68 and the offset is  $-12$ , then Heat will activate when the temperature gets below 56 Degrees.
- Cooling Control Loop allows you to change when the box goes into Min and Max cooling CFM. Click Help

for explanation.

- Heating Control Loop allows you to change when Heating is activated. The above example shows 3 stages of electric heat.
- Mode Switchover Delay allows you to put in a delay in seconds before switching between Heating and Cooling.

## Time and Schedule

This screen allows you to adjust the time and set an Occupied Schedule. It should be self-explanatory, except Network Schedule. Choosing that allows you to add the Occupied point in CBAS and place a Schedule on the point. When the point goes On, the VAV-B is commanded to Occupied.

	Optimal Start Time	Occupied Time	Unoccupied Time
Sunday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM
Monday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM
Tuesday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM
Wednesday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM
Thursday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM
Friday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM
Saturday	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM	<input type="checkbox"/> 3:10:53 PM

**DON'T FORGET TO SAVE CHANGES TO VAV!**

## Live Controller Data

This screen (picture below) allows you to see what is actually happening in the application on the controller. For instance, you can change the setpoint in the field or in CBAS, and watch it change from Heat Mode to Cool Mode as well as the CFM Setpoint change. This is a good way to test operation.

In the Position column, OPTO point configurations are shown. This is a good resource when you want to know how to program a point in CBAS.

Also, you can double-click points with a \*\* next to them in order to command.

The S3 section allows you to simulate changing the setpoint at the S3, but only when in Editor Mode, which can be selected on the VAV Connection screen. This is like using Simulator Mode in CBAS.

Network Space Temp can be commanded to a value for testing purposes, but you must remember to release it by commanding to 0. Otherwise, the VAV-B will not control properly because the Space Temperature will never change.

Network Setpoint works the same as the point in CBAS with the same name. Use it to command the setpoint. It releases back to 0 automatically when commanded but you will see the actual setpoint change.

Actuator 1 is the Cooling Damper Actuator and Actuator 2 is the Heating Valve Actuator. The example below does not have a heating valve.

The screenshot shows a 'Live Data' window with a table of system parameters and a control panel for the S3 setpoint.

Point	Configuration	Position	Value
Internal Pressure Sensor	Pressure	ADF 2	0.000
Wall Sensor	S3	ADF 3	90.140
Resistive Input 1	10K Typelll Temp	ADF 4	91.520
Resistive Input 2		ADF 5	1.000
Internal Resistive Input		ADF 6	1.000
Voltage Input 1		ADF 7	1.000
Voltage Input 2		ADF 8	1.000
Voltage Input Internal		ADF 9	1.000
Voltage Monitor 3V		ADF 10	0.000
Voltage Monitor 5V		ADF 11	0.000
Voltage Monitor 15V		ADF 12	0.000
Voltage Monitor 19.5V		ADF 13	19.840
Analog Output 1		ADF 14	0.000
Analog Output 2		ADF 15	0.000
			0
			0
Internal Actuator	BinaryActuator	BD 19	0
B01 Fan		BD 20	0
B02 Heat1	BinaryOutput	BD 21	0
B03 Heat2		BD 22	0
B04 Heat3		BD 23	0
UpdateCount			2
Last Reset Source		Power On	

Item	Position	Value
Box Mode **	BD 26	Cool
Application Running	BD 27	YES
Box Running	BD 35	YES
Emergency Shutdown **	BD 29	NO
RunTime	ADI 3	Days:111 Minutes:6529
Occupied	BD 45	Occupied
Occ Change Value**	BD 52	none
UnOcc Change Value **	BD 53	none
S3 Occupied **	BD 39	YES
Running	BD 35	YES
Network Schedule **	BD 46	UseLocal
Overtime **	BD 47	NO
Space Temp	ADF 3	90.1
Setpoint Actual - Heat/Cool	ADF 23	73.0 73.0 - 73.0
Space Temp Error	ADF 19	17.1
Space Temp Alarm	BD 50	ALARM
Space Temp Override **	ADF 18	0.0
Setpoint Auto-Hand **	BD 41	Hand
Setpoint Override **	BD 49	73
S3 Setpoint **	BD 36	72
S3 Temp/Humid	ADF 16	90.1 65.2
Fan/Heat Loop Disable **	BD 56	NO
Heat Mode Starting	BD 31	YES
Heat Overshoot Time Left	ADI 13	0
COOLING CFM LOOP 1		*****
Pressure	ADF 27	0.000000
CFM Loop Auto-Hand **	BD 60	Auto
CFM	ADI 17	0
CFM Setpoint **	ADI 100	400
CFM Min-Max	AI 40 AI 42	250 400
ACTUATOR 1		***** Internal ***
Disabled **	BD 64	Auto
Command **	BD 64	100.0 UPPER LIMIT
Overshoot	ADI 35	237

Control Panel for S3 Setpoint:

S3: 90.1

72

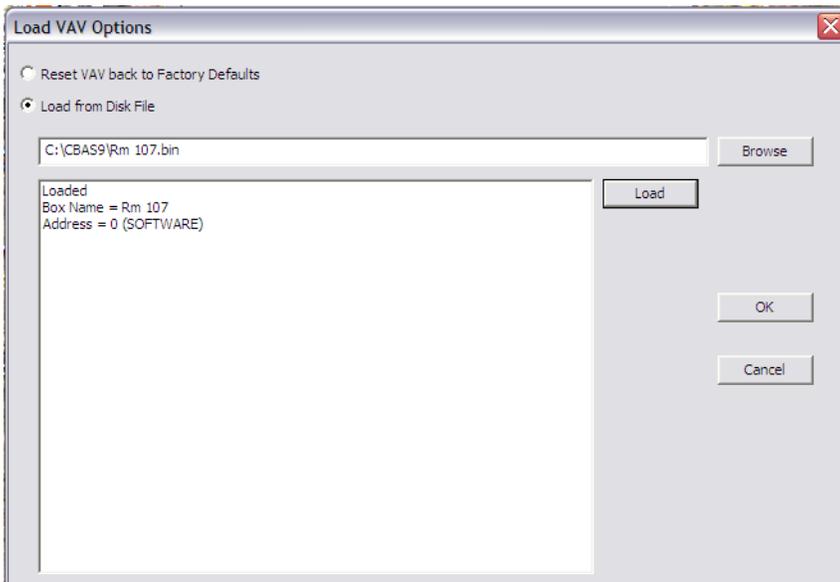
65.2

Buttons: OK, Cancel, X, [ ]

Text: Double Click on items with \*\*\* to command or calibrate.

## Adding More VAV-Bs from Saved Configuration File

- First, open the Utility program and connect to the next VAV-B.
- Now click Load/Reset Database.



- Click Browse and find the file you saved earlier. It should have been saved in C:\CBAS\Personalities.
- Select the file with the .bin extension and click OPEN. The path will be shown next to the Browse button.
- Click Load, then OK.
- Now go back to Pre Box Setup and change the name/location of the box, then click OK.
- If the duct size or Min/Max CFM is different on this box, go back to the Installer screen and make the change there, then click OK.
- If you would like to save this configuration also, click Save/Export Database.
- Now click Save All Changes to VAV.

# All Points

This screen gives you all of the point configurations, which could come in handy when adding points in CBAS. The points change depending on the protocol chosen in the initial setup screen. So, if you have the box setup as OPTO, then the points will be OPTO points. BACnet and Siemens protocols work the same way.



The screenshot shows a window titled "All Points" containing a table with three columns: "Point", "Position", and "Value". The table lists various system parameters and their current values. At the bottom of the window, there is a button labeled "Close All Points".

Point	Position	Value
Box Mode	BD 26	COOLING
Application Running	BD 27	YES
Fault Code	BD 28	
EMERGENCY SHUTDOWN	BD 29	no
Run Days	BD 30	111
Heat Mode Starting	BD 31	1
Time is Valid	BD 32	1
Application Version	BD 33	102
Serial Address	BD 34	1
Run System	BD 35	1
Report Now	BD 36	0
Unoccupied Run	BD 37	0
S3 Setpoint	BD 38	72
S3 Occupied	BD 39	1
S3 Programmable Value	BD 40	0
Setpoint Auto-Hand	BD 41	HAND
S4 Fan Speed	BD 42	0
S4 Stat Mode	BD 43	0
S4 Fan Speed	BD 44	0
Occupied	BD 45	OCCUPIED
Schedule Cmd	BD 46	Use Local
Overtime	BD 47	0
Internal Schedule	BD 48	0
Setpoint Override	BD 49	73
Space Temp Alarm	BD 50	1
Space Temp Alarm Lockout Minutes	BD 51	0
Occ SP on Change of State	BD 52	0
Unocc SP on Change of State	BD 53	0
No Comm Timeout	BD 54	0
Ram Setpoint 1	BD 55	0
Heat Loop Auto-Hand	BD 56	Auto
Force Occupied	BD 57	0
Extra 10	BD 58	0

# Chapter 4 » CBAS Configuration

## Adding VAV-B to the Database

VAV-B controllers can be added to the following channel types at this time: OPTO 485 over TCP/IP (same as N2), OPTO-22 on Controller (also N2), BASnet 485 over TCP/IP, Siemens FLN, BACnet 485 over TCP/IP (BACnet MS/TP) and BACnet on Controller. Of course, you must match the CBAS Protocol selection to the one that you chose earlier in the VAV-B Utility program and then saved to the controller.

*The advantage of an “On Controller Channel” is that the database points of the controllers on the channel are contained in the database of the Host controller as well as the Server PC. So, all software points and the logic, schedules, etc. should be programmed on the Host controller, making the entire channel head-end independent or stand-alone.*

Either of the OPTO channels would be preferred and would also work if the site had an existing channel of Johnson Metasys controllers that you would like to add a VAV-B to. BASnet would only be preferred if the site had an existing channel of Computrols VAVs or UNI-Bs and you were replacing one with a VAV-B, or needed to add an additional VAV-B to the channel.

## Add Channel to the Host Controller

These instructions assume that you have already learned how to add a controller to the TCP/IP for Controllers channel.

- In Editor Mode, Hardware View, TCP/IP for Controllers channel, locate the controller that will host the VAV-B channel.
- Click the controller, then Channels.
- Click Add A Channel to either the Host or Secondary 485.
- Give the channel a name and choose the protocol configuration.
- Click Add Channel Now.
- If the channel is an “On Controller” channel, click the channel just created to add a controller to it.
- If not, escape to the main Channel screen in Hardware View to find the channel.

## Add a VAV-B

- Click the Channel, then Controllers.
- Click Add a Controller on the line that contains the address you want to use. (The address can later be changed on the controller program screen if necessary)
- Give the controller a name similar to the one you gave it in the Utility program.
- For configuration, choose VAV-B (-AP, -P, -X).
- If adding to a BASnet channel, then you have a choice of adding from a Template or Copy from Another Controller. BASnet Templates are included in the CBAS19\VAV-B Package folder or you can obtain from Computrols Tech Support.
- Click Add Controller Now.
- If adding to OPTO or OPTO22, a popup box will ask if you would like to import the points.
- If the channel is OPTO or BACnet, answer YES.
- The next screen will allow you to browse to the location where you saved the configuration from the VAV Utility program or you can choose an export file from another location if you made an export before.
- Choose the txt file with either OPTO or BACnet in the name, then click OPEN.
- You will be prompted to enter a prefix for the point names. Click Yes and you can enter the prefix which will differentiate these points from the points of another controller.
- Press the ENTER key and CBAS will verify how many points were imported.
- Click OK, and you can now click the controller and view the points.
- Subsequent controllers can be added the same way.
- You can also manually add or remove points and make your own template or export.
- Templates reside in C:\CBAS19\Templates\VAVB folder.

## Make a BASnet VAV-B Template

In Hardware View, go to the BASnet Channel that contains the VAV-B. Click the channel then Controllers. Click the Controller then click Save Controller Database as A Template. Follow on-screen directions.

## **Make an OPTO VAV-B Export**

In Hardware View, go to the OPTO Channel that contains the VAV-B. Click the channel then Controllers. Click the Controller then click Export Database and follow on-screen directions.

OPTO points can be added to the VAV-B manually and the point configurations can be found at the end of this manual in Appendix A. There is also a spreadsheet in the CBAS19\VAV-B Package\Documentation folder.

## **Make a BACnet VAV-B Export**

Click the controller in Hardware View and click Export Database. The points can also be added manually in CBAS.

BACnet points can be found later in this manual in Appendix C.

## **Make a Siemens VAV-B**

Click the controller in Hardware View and click Export Database. The points can also be added manually in CBAS.

Siemens points can be found later in this manual in Appendix D.

## **Proceed to Real Mode and Begin Monitoring the VAV-B**

### **Commanding the Setpoints**

There is a NETWORK SPACE TEMP point that you can command at any time. A command to this point will override the space temp sensor. The space temp will remain at the commanded value until the user commands the point to 0. Zero releases the space temp. This is only used for simulation purposes. Do not forget to release it.

The NETWORK SETPOINT is the point you command to change the Active Setpoint. It can be changed from the S3 or Potentiometer. If you command this point from CBAS it overrides the internal setpoint in the VAV-B. The setpoint point may behave differently if the VAV-B is using an S3 or 10K potentiometer. When using a S3 the NETWORK SETPOINT point will go back to 0 after the command. But when using a 10K potentiometer, it will retain its value. For the 10K potentiometer, you would have to command to 0 to release the setpoint override. That is because when using a S3, the user can override the commanded value. But when using 10K potentiometer, you can slide the potentiometer all you want, but as long as there is a NETWORK SETPOINT command it will keep the network setpoint value.

## Reburning the Application Firmware

The Application Firmware contains the programming code for each of the VAV Applications that you can choose in the Pre Box Setup screen of the Utility program. If Computrols makes a change to one of the applications, it may be necessary for you to upgrade the firmware. Obtain the firmware file from Computrols Technical Support. New VAV-B controllers are shipped with the most recent firmware.

It's rare now to have to change firmware. The most common reason is if you need to use the Fan Coil Application. As stated in the first section, Fan Coil cannot be included with the firmware that includes the Dual Duct Application:

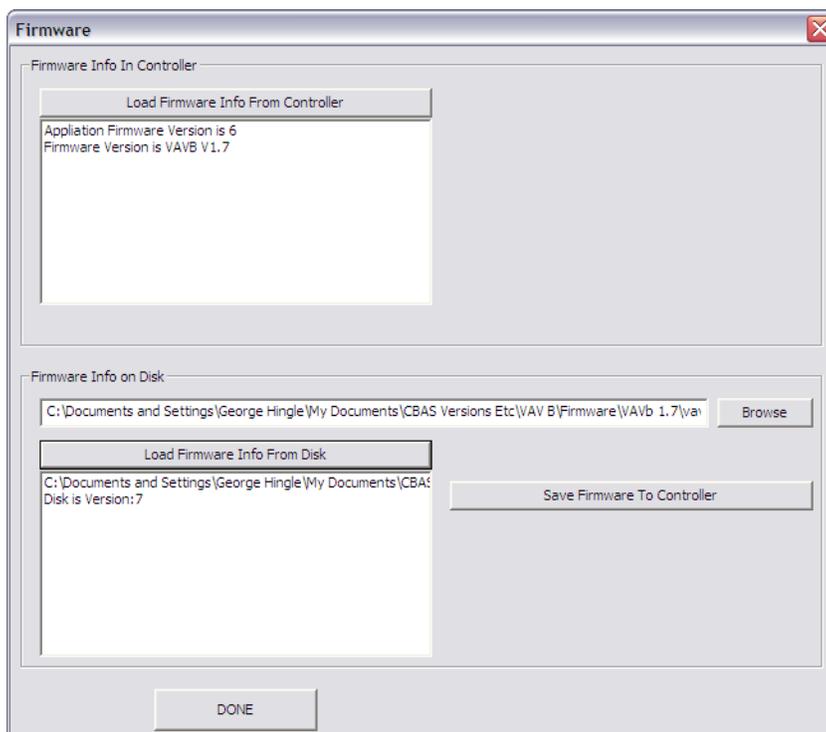
The last firmware that had Dual Duct is 1.22.21: To get this new Fan Coil application to fit, Dual Duct has been removed from the firmware. So, this firmware set (Application 22) will do regular VAV boxes OR Fan Coils. If you need to program Dual Duct you will need to use Application version 21.

Fan Coil 1.22.22

Dual Duct 1.22.21

BACnet or Siemens VAV-Bs should be ordered specifically and the latest firmware will be applied.

Connect to the controller using the VAV Utility program. The last button is labeled Firmware. Click Firmware and you will see the following screen.



- To check the firmware on the controller, use the first button.
- Click Browse and select the firmware file, which will have a .bin extension.

- To check the version of your firmware file, click Load Firmware Info from Disk.
- Click Save Firmware to Controller. After the process is complete, the controller will reboot and reconnect to the Utility Program.
- When complete, click DONE to exit.

## Setup Program

To burn both the Application and non-Application firmware, a program called Setup.exe is required. Firmware file, VAV7 xxxx.bin, contains both firmwares.

- Open the Setup Program by double clicking Setup.exe.
- Click the Alpha Set button then Comm Port Config. and choose your comm port. This is the port number that the USB to 485 Commissioning cable uses.
- Click “Put Controller into Bootload” and you will see 3 lights blinking in succession on the controller.
- Click VAV7 Setup button and point to the bin (firmware) file.
- Click VAV7 Burn then Start.
- Once finished, open Utility program to verify firmware versions.

## VAV Utility through CBAS

This allows you to commission VAV-Bs through the 485 channels.

- VAV\_Utility.exe must be in the C:\CBAS19 folder.
- Add a VAV-B Commission point to the Workstation channel in CBAS. This facilitates the connection between CBAS and the Utility program.
- In Real Mode, go to the channel containing the VAV-B you want to work with.
- Once the controller has Normal communication, click the VAV-B controller, then click Run VAVB Utility.
- The Utility Program will pop up and connect to the VAV-B automatically as long as the controller is online.
- From there, everything is the same as described earlier in this manual.
- Don't forget to Save All Changes and Save/Export the Database.

# Appendix A » VAV-B Points in CBAS

BASNet and OPTO template files can be obtained from [techsupport@computrols.com](mailto:techsupport@computrols.com). The preferred method for adding BASnet points is from template.

CBAS Name (Suggested)	BASnet Name	OPTO Position	Commandable
Essential			
Occupied Command	Occupied	BDM46	YES
Occupied Feedback	Box Occupied	BDM45	
Space Temp	Space	ADF3	
Space Temp Setpoint	Setpoint	ADF23	
Space Temp Setpoint Com	Network Setpoint	BDM49	YES
Space Temp Error	Space Err	ADF19	
Space Temp Alarm	Space Alm	BD50	
CFM	CFM	ADI17	
CFM Setpoint	CFM SP	ADI21	
Box Mode	Box Mode	BDM26	
Damper Feedback	Dampr FB2	ADF6	
Damper Position	Dampercmd	ADF39	
Supply Temp	Extra Temp	ADF5	
Humidity	Humidity	ADF17	
Non-Essential			
Occupied Schedule	Net Sched	BDM46	YES
Overtime Command	Overtime	BD47	YES
Emergency Shutdown	Emer Shut	BD29	YES
Heat Control Loop Disable	Heat LP Dis	BD56	YES

Damper 1 Disable	Damp Dis	BDM64	YES
Damper 2 Disable	Damp Dis	BDM65	YES
Cooling Setpoint	Cool Sp	ADF29	
Heating Setpoint	Heat SP	ADF30	
Pressure	Pressure	ADF27	
External Pressure	Pressure 2	ADF28	
Multiplexor			
Binary Output 1 (Fan)	BO1 FAN	BD20	YES
Binary Output 2 (Heat 1)	BO2 HEAT1	BD21	YES
Binary Output 3 (Heat 2)	BO3 HEAT2	BD22	YES
Binary Output 4 (Heat 3)	BO3HEAT3	BD23	YES
Analog Output 1	VOLT OUT 1	ADF14	YES
Analog Output 2	VOLT OUT 2	ADF15	YES
Internal Pressure Sensor	PRESSURE	ADF2	
Wall Sensor	WALL STAT	ADF3	
External Resistive Input 1	RES INPUT 1	ADF4	
External Resistive Input 2	RES INPUT 2	ADF5	
Internal Resistive Input	INT RES INPUT	ADF6	
External Voltage Input 1	VOLTIN 1	ADF7	
External Voltage Input 2	VOLTIN 2	ADF8	
Internal Voltage Input	INT VOLTIN	ADF9	
Not Needed			
Internal Sched	Int Sched	BDM48	
Application Running	app running	BD27	
Application Error	app error	ADI2	
Fault Code	fault code	BDM28	
Cooling Damper Position	Damper Position 1	ADF39	

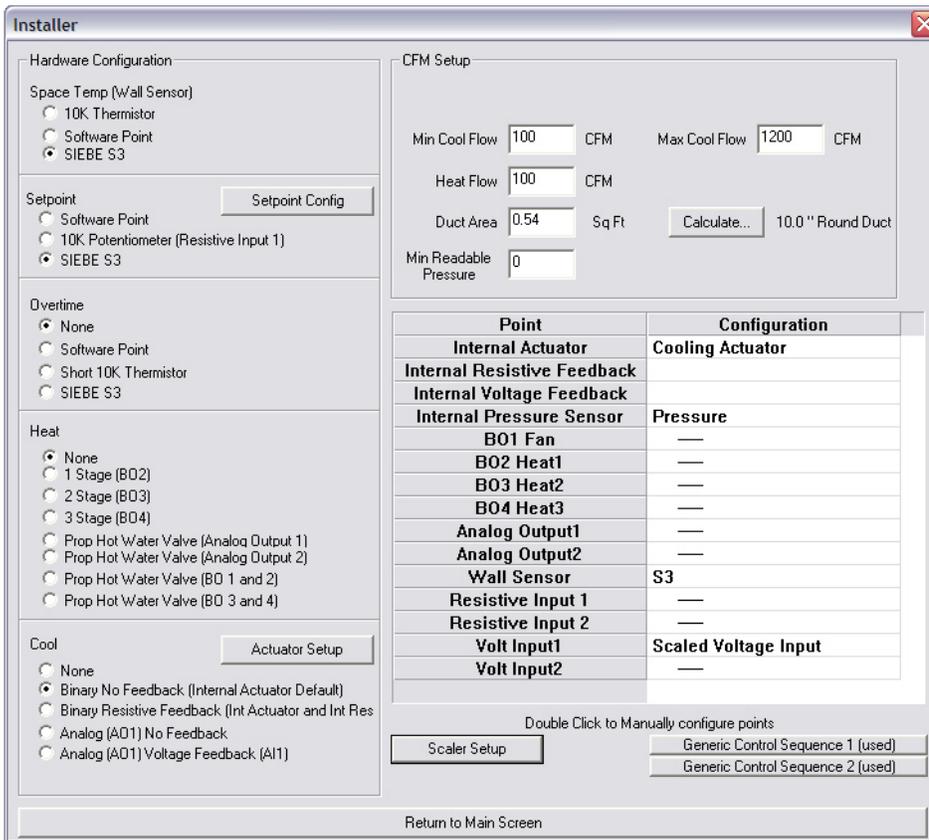
Heating Damp/HWV Pos	Damper Position 2	ADF40	
Internal Press Sensor DP	Internal Press Sensor	ADF27	
External Press Sensor DP	Voltage Input 2	ADF28	
Damper 1 Moving	Damp Mov	BDM68	
Damper 2 Moving	Damp Mov	BDM69	
Damper 1 Runtime	Damp Run	ADF55	
Damper 2 Runtime	Damp Run	ADF56	

## Notes on Commanding Points

Occupied Command	0=useLocal, 1=OCC, 2=OptStart, 3=UNOCC-OvrdOFF
Space Temp Setpoint Command	Command, then 0=release
Overtime Command	Used for overtime scheduling
Emergency Shutdown	Rarely used/needed
Heat Control Loop Disable	Stops the 4 BOs from doing anything so they can be commanded via network
Damper 1 Disable	1-Stops Damp 4-104 Cmds Damp to 0-100. 2 and 3 are resvd for Box Startup
Damper 2 Disable	1-Stops Damp 4-104 Cmds Damp to 0-100. 2 and 3 are resvd for Box Startup

# Appendix B » Generic Control Sequences

The Generic Control Loop buttons are in the bottom right of the Installer screen.

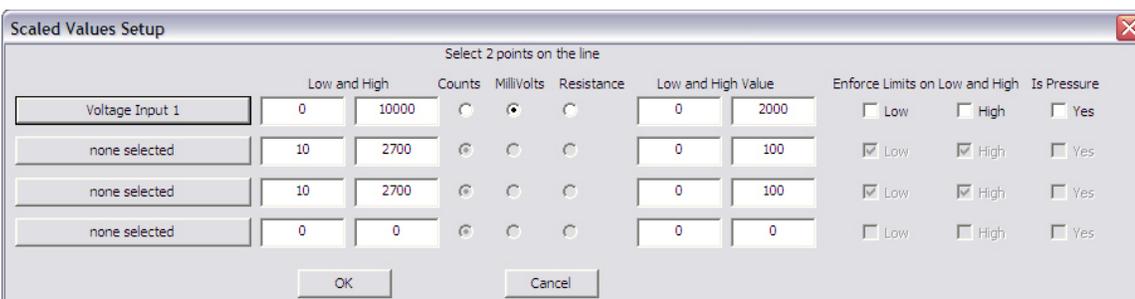


Here is an example how to setup a sequence where a CO2 sensor is used to set the CFM Setpoint to the Max CFM when CO2 level reaches a certain value.

The sensor is connected to Voltage input 1. It also needs 24V. And the Thermistor part of it will connect to Wall Sensor.

In the installer screen, click to the right of VoltInput1 and make it a Scaled Voltage Input. See above.

Then click the Scaler Setup button and set the values as seen below. I assumed that the high limit of the output from the sensor is 2000 ppm, so the Low Limit is 0 and the High Limit is 2000. The 10000 is the number of millivolts in 10 Volts. So, 0 to 10 Volts equals 0 to 2000 ppm. Click OK when done.



Then click the first Generic Control Sequence button.

Generic Control Sequence Setup

Select Input Point: Voltage Input 1    Setup: MillVolts1

Select Setpoint: None

Select Output Point: CFM Disable 1    software point - no config

Off Value: 690    On Value Min: 700    On Value Max: 700

Output Value at OFF: 0    Output Value at Min: 1    Output Value at Max: 1

Off Delay: 20 Seconds

Run Every: 1 Seconds

Emergency Value (255 for none): 0

Return to Previous Screen

You choose Volt Input1 for the input, which is CO2 Level. Leave it as None for the setpoint. Choose CFM Disable for the output. CFM Disable is the point that allows you to disable the internal programming that determines which Setpoint is used to open the damper. The output when it goes over the limit is going to be 1, which disables the internal setpoint logic and allows you to command it. It will go to 0 when the value goes below 690, which gives you a deadband of 10 ppm. This releases the point.

Click Generic Control Sequence 2 and set it up.

Generic Control Sequence Setup

Select Input Point: Voltage Input 1    Setup: MillVolts1

Select Setpoint: None

Select Output Point: CFM Setpoint 1    software point - no config

Off Value: 0    On Value Min: 700    On Value Max: 700

Output Value at OFF: 0    Output Value at Min: 1200    Output Value at Max: 1200

Off Delay: 120 Seconds

Run Every: 1 Seconds

Emergency Value (255 for none): 0

Return to Previous Screen

This time, the Input point is the same, but your Output is going to be CFM Setpoint. The limits will be the same, but the output will be whatever you want the CFM setpoint to be. I guess the same as the MAX Cooling CFM.

There is another way of doing this with a Setpoint used in the loop. That way you could command the Setpoint from CBAS. But this way is easier.

# Appendix C » BACnet Points in CBAS

The points are listed below and are organized by point type. Import files, like templates can be obtained from [techsupport@computrols.com](mailto:techsupport@computrols.com).

// Binaries BV (Analog Value)

{"BI1"},	// 16	
{"BI2"},	// 17	
{"BO1"},	// 19	
{"BO2"},	// 20	
{"BO3"},	// 21	
{"BO4"},	// 22	
{"AppRun"},	// 26	Application Running
{"EmerShdn"},	// 28	Emergency Shutdown
{"Overtime"},	// 46	Overtime
{"CFMDisCl"},	// 59	CFM Loop Disable Cool
{"CFMDisHt"},	// 11 // 60	CFM Loop Disable Heat

// MultiStates MSV (Multistate Value)

{"Box Mode"},	// 25	BoxMode
{"RunSys"},	// 34	System Running
{"S3 SP"},	// 37	S3 Setpoint
{"S3 Occ"},	// 38	S3 Occupied Button
{"Occupd Fb"},	// 44	Occupied Read Only
{"OccupdCmd"},	// 45	Occupied Command
{"SP Ovr"},	// 48	Commandable Network Setpoint
{"HeatDisbl"},	// 55	Heat Disable
{"DampOvdCl"},	// 63	Damper Override Cool

{"DampOvdHt"}, // 10 // 64 Damper Override Heat

// Analog Integers AV (Analog Value)

{"VAVMinuts"}, // 82 Run Minutes

{"CFM Total"}, // 84 Total CFM

{"CFM SP"}, // 85 Total CFM Setpoint

{"S3 Lockut"}, // 87 S3/S4 Locked by User

{"Ot Remain"}, // 93 Overtime Remaining

{"CFMCoolAc"}, // 96 Actual CFM Cool

{"CFMHeatAc"}, // 97 Actual CFM Heat

{"CFMCoolSP"}, // 100 CFM Setpoint Cooling

{"CFMHeatSP"}, // 9 // 101 CFM Setpoint Heating

// Analog Floats AV (can be added by checking a box when importing points)

{"Pressure"}, // 161 Pressure

{"ResIn1"}, // 162 Resistive Input 1

{"ResIn2"}, // 163 Resistive Input 2

{"ResIn3"}, // 164 Resistive Input 3

{"VoltIn1"}, // 166 Voltage Input 1

{"VoltIn2"}, // 167 Voltage Input 2

{"AO1"}, // 173 Analog Output 1

{"AO2"}, // 174 Analog Output 2

{"S3 Temp"}, // 175 S3/S4 Space Temp

{"S3 Humid"}, // 176 S3/S4 Humidity

{"Temp Ovr"}, // 177 Space Temp Network Override

{"Active SP"}, // 182 10K Active Setpoint

```
{"Pres Cool"},           // 186 Pressure Cool
{"Pres Heat"},          // 187 Pressure Heat
{"SP Cool"},           // 188 Temp Setpoint Cool
{"SP Heat"},           // 189 Temp Setpoint Heat
{"DampCmdCl"},         // 198 Damper Command Cool
{"DampCmdHt"} // 18 // 199 Damper Command Heat
// 48 points total
```

# Appendix D » Siemens Points in CBAS

Import files, like templates can be obtained from [techsupport@computrols.com](mailto:techsupport@computrols.com).

25 ,MULTISTADV	,NOT_COMMANDABLE, MODE,
2 ,FLOAT	,NOT_COMMANDABLE, DEGF, SPACE TEMP,
22 ,FLOAT	,NOT_COMMANDABLE, DEG F, SPACE SETPOINT,
48 ,FLOAT	,COMMANDABLE, DEG F, SPACE (SP) OVERRIDE,
45 ,MULTISTADV	,COMMANDABLE, SCHEDULE (OCCUMPANCY) CMD,
44 ,MULTISTADV	,COMMANDABLE, SCHEDULE,
18 ,FLOAT	,NOT_COMMANDABLE, DEG F, SPACE DEVIATION,
1 ,FLOAT	,NOT_COMMANDABLE, "WC, AIR FLOW DP,
16 ,FLOAT	,NOT_COMMANDABLE, CFM, COOLING CFM,
20 ,FLOAT	,NOT_COMMANDABLE, CFM, COOLING CFM SETPOINT,
38 ,FLOAT	,NOT_COMMANDABLE, %OPEN, COOL DAMPER POS,
63 ,FLOAT	,COMMANDABLE, DAMPER OVERRIDE,
59 ,FLOAT	,NOT_COMMANDABLE, %OPEN, HEAT DAMPER CMD,
55 ,BINARY	,COMMANDABLE, AUTO-HAND, HEAT LOOP DISABLE AUTO HAND,
2 ,FLOAT	,NOT_COMMANDABLE, MIN, RUN TIME MINUTES,
4 ,FLOAT	,NOT_COMMANDABLE, DEG F, SUPPLY TEMP,
43 ,FLOAT	,NOT_COMMANDABLE, CFM, COOLING CFM MAX,
44 ,FLOAT	,NOT_COMMANDABLE, CFM, HEATING CFM MAX,
41 ,FLOAT	,NOT_COMMANDABLE, CFM, COOLING CFM MIN,
42 ,FLOAT	,NOT_COMMANDABLE, CFM, HEATING CFM MIN,
5 ,FLOAT	,NOT_COMMANDABLE, CFM, TOTAL CFM SETPOINT,
39 ,FLOAT	,NOT_COMMANDABLE, DEG F, HEAT DAMPER POS,

58 ,FLOAT	,NOT_COMMANDABLE, DEG F, COOL DAMPER CMD,
17 ,FLOAT	,NOT_COMMANDABLE, DEG F, HEATING CFM,
21 ,FLOAT	,NOT_COMMANDABLE, DEG F, HEATING CFM SETPOINT,
40 ,BINARY	,COMMANDABLE, AUTO-HAND, SETPOINT AUTO HAND,

# Appendix E » Primary Air Heat Features

## Primary Air Heat Mode

The VAV-B now supports 'Primary Air Heat' mode. This mode is used when the Air Handler is supplying heat instead of cool and you have a VAV-B that is calling for Cooling. Under normal circumstances, the controller will be expecting cool air from the AHU and will open the damper to cool the space. Of course, letting more hot air into the space will only exacerbate the heating issue.

## Standard Boxes

Internally when in Primary Air Heat mode for a standard box, the software will invert the space temp error. Then it uses the cooling parameters for heating mode and Heating parameters for cooling mode. So the CFM Setpoint will now adjust from min to max when in heating (like cooling used to do) and the CFM Setpoint for cooling will be set to the Heat CFM. CFM Setpoint calculation is the only thing that changes.

## Pressure Independent Boxes

Internally when in Primary Air Heat mode for a Pressure Independent box it also inverts the space temp error. This has the same effect as inverting the P of the PID.

## Box Mode States

The Box Mode point has the following states: Dband, Heat, Cool, MrnWarmup. Box Mode now has 3 new states: PrimaryAirHeatDeadband(5), PrimaryAirHeatHeat(6) and PrimaryAirHeatCool(7). There is no auto switchover for the VAVB. You must command the Box Mode point. Command it to PrimaryAirHeatDeadband ONCE and the internal VAVB application will auto switch it between the 3 PrimaryAirHeat Modes (Deadband,Heat and Cool). Command it back to Deadband ONCE and the internal VAVB application will auto switch between regular Deadband, Heat and Cool modes. DO NOT command it multiple times to the desired state. You will cause contention between the commands and internal application and the application will not be able to run properly!

## Commanding The Box Mode Point

The Box Mode point can be commanded in the Live Data screen of the Utility Program. However, for this to work, you must have a CBAS connection to the VAV-B, or at least a Host Controller connection using OPTO22 "on-controller" Protocol configuration. On the Host Controller, you make a software point to contain the logic that will command the Box Mode point to 5 PrimaryAirHeatDeadband.

Because the Box Mode point (BDM26) is a Multistate point (0-4), you cannot command it to 5. You must add another point at the same BDM26 position, but make it a BDM (0-255) instead of a BDM (0-4). Name it something like Primary Air Heat Mode.

So, command the Primary Air Heat Mode point to 5 and the application will switch between Heat (6) and Cool (7) depending on what is needed in the space. When the AHU is no longer in Heat Mode, command the point to 0 and it will go back to regular Box Mode and cycle between Heat and Cool.

**< END >**