GCS
Global Control Solutions

Basyx / TriComm
Graphical Interface Software

System Operation Manual

Operators manual Contents.

Connect using the GCS to PC connection and Software kit

This kit is designed to connect a PC or Lap top Computer to a GCS control card. Do not use this kit for any other purpose.

Supplied Components.
One RJ45 connection lead Note if you need a longer lead you can purchase a longer cable as a telephone extension cable. One RJ45 to 9 pin RS232 plug. One Program CD with instruction manual and soft ware on.

Connection Instructions.
Connect RS232 plug into 9 pin RS232 (serial) socket on your PC.
Connect one end of the connection lead onto the RS232 plug and the other end into the socket with the word "DIRECT" next to it on the GCS control board. **Do not connect to socket on the corner of the GCS board.**

Note if your PC or Lap Top does not have an RS232 output port you can Purchase a USB to RS232 converter at leading electronic stores such as Jaycar, Altronics and some computer sales outlets.

Software installation instructions.
Ensure the GCS unit is working i.e. A light will be flashing on the GCS board.
Insert the GCS CD in to your PC and locate the file called "Set up. Exe".
Follow on screen instructions.
After soft ware is loaded locate the working file on the CD. For commercial systems this will be the name of the site, drag and drop this file to the following location on your PC.
C:/Program files/triangle micro systems/BASYX/
Locate the BASXY icon on your desktop screen and double click it. A screen will open up click on the name of the site file you loaded, then click on "exit" then shut down the BASXY software. This causes the site file to be registered on your PC and does not need to be performed again unless you are installing the software on to another PC

Click on the "BASXY" icon again to start the software, then click on the name of the site file that you placed in the BASXY directory. You should now see a list of several files on the upper left of the screen.

Where you see the direct window enter the port number of your RS232 output plug this will probably be 1 or 2 but with USB to RS232 converters it could be a number as high as 20. In the Baud rate window enter 19200 from the pull down list.

Note to locate the correct port number go to "control panel, system, Device manager. Ports (COM & LPT), next to the wording communication port you should see the words "COM1" if com 1 is used. If you are using a USB to RS232 converter look for a reference to the converter double click on it and look for the Com port used by it.

After entering the correct data click on direct connect after a few seconds you should see the words connected and the date and time, click on the word exit, you are now ready to use your BASXY software.

For commercial systems.
This instruction Manual and site details are included on this CD. You should also have received site specific instructions from your installation company.\

Un-installing the Software

Do not delete the BASYX folder from the windows explorer. The install shield uninstall information is located in this folder.
To remove the TriComm Installation and Setup Program:
1. Start Windows® 95/98/NT/XP Operating System
2. Close all open program windows.
3. Select the Settings folder from the Start Menu
4. Select the Control panel Icon
5 Select the ADD/REMOVE programs Icon.
6. Select BASYX from the scroll bar.
7. Click on Add/Remove Programs button
8. The program will automatically remove the files and settings created during setup.

Overview:

The BASYX© PSC stand-alone controller is an inexpensive alternative to a full direct digital control system. The unit provides direct digital control and environmental monitoring along with complete electrical system monitoring and reporting. The BASYX© system contains all on-board firmware, clock and memory for complete stand-alone operation.

Pre-programmed Control Strategies:

The BASYX© is simple to control and operate and has the following algorithms ready for your use:

Basic Time Schedule Control
Lighting Control
Air handler control
Heat pump control
Setpoint Control
Unoccupied Setup/Set Back Control Setpoints
Heating/Cooling Outdoor Air Reset Control
Holiday Schedule Programming
Electrical Load Shedding
Power monitoring and Sub-Metering
Power Billing
System Alarm
Push button Timed overrides
Interlock control
0-10vdc Damper and Valve Control
Lead Lag Pump Control
History (Temperature and Power) Data Recording
Outdoor air reset control

Hardware Configuration:

The PSC controller contains eight (8) triac outputs for on/off control, eight (8) universal inputs for temperature and contact monitoring and four (4) electric or pulse meter inputs.
The PSC may be connected to additional BASYX© PSC controllers through a twisted pair cable, with a total system configuration of 256 controllers. This network will allow single point access through 1 modem or direct connection.

BASYX© Options: (Communication)

An optional 2400 baud plug-in modem module allow remote interrogation and data retrieval for all controllers connected to the communications loop.
An optional infrared interface which provides programming and monitoring capabilities through a palm-top or other infrared compatible device.
3. A keypad interface with digital display to allow system access, limited monitoring and control interface.

Software Interface:

The BASYX PSC controller is accessed through a Windows interface program, and will allow text and graphics interface, along with a complete polling package for off-site retrieval of monitoring and point data.

System Requirements:

Before you set up the BASYX© BASYX PSC Installation and Setup Program ™ software, take a few minutes to make sure your computer meets the minimum requirements needed to run

and connect to the BASYX PSC controller.

To use the Installation and Setup Program for the BASYX[©] BASYX PSC controller, you need the following:

1. IBM-Compatible personal computer with an 80486 or Higher processor.
(Pentium 130 or higher recommended)
2. Hard disk with 4 megabytes of free space
3. Microsoft mouse® or other compatible pointing device.
4. VGA or compatible display capable of 800x600 resolution
(Super VGA or higher recommended)
5. Eight megabytes of random access memory.
6. Microsoft Windows® 98/NT/XP.
7. CD ROM Drive
8. Unused Serial Port or Modem connected to an outside telephone line.
9. Cable/Phone Connection to BASYX[©] BASYX PSC controller.

Connecting your Computer to the Basyx System.

When you start the soft ware you may be prompted to enter a pass word, enter the pass word here then press the logon button. If you enter an invalid pass word the screen will not change.
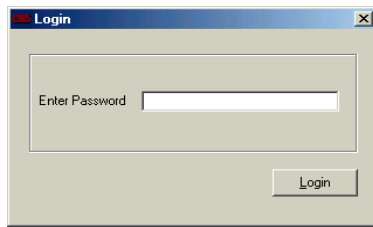
You will then see the following screen.
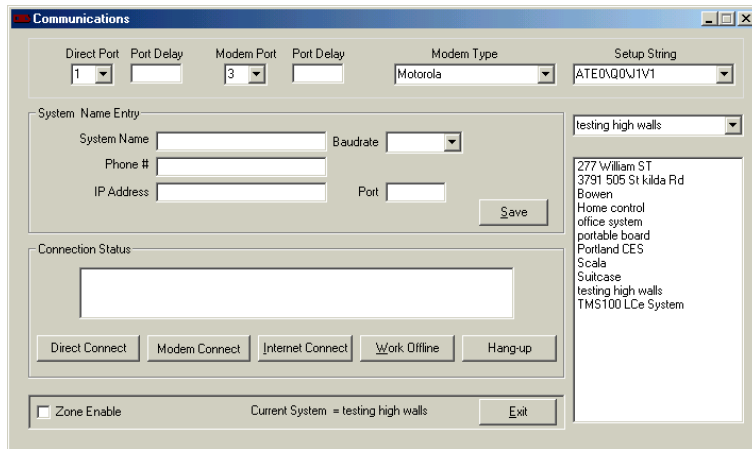
On the right hand side you will see a list of all preprogrammed systems currently on your computer please click on the one you need to connect to. Next make sure the connection details are entered on the screen.

For direct connect use.
Ensure that the baud rate is set to 19600 and the direct port of your computer you are using for connection is shown in the top left hand window. *Your computer must be connected to the GCS system via a direct connection to the RS-232 RJ-11 Jack and the Serial Port of your computer.*

For Modem connect use.
Ensure that the coms port that your modem is using is shown in the modem port window, the phone number is shown in the correct window and the correct type of modem you are using is shown in the modem type window.

For internet connection.
Ensure that the IP address and port number is shown in the correct window.

You can also choose to work off line (no connection to a system) be clicking on the work off line button.
 Push the button for the type of connection you are using and look at the window shown on the lower part of the screen to see when communication has been established. When it has you will see the current data and the words CONNECTED TO PSC. you can now click on the EXIT icon to leave the current screen and start working with the GCS automation system.

Operating the system.

The pass work you entered will dictate what parts of the system you will be able to enter and manipulate. There are 3 operating levels of passwords and 3 programming level passwords as follows.
Operator levels.
Level zero allows you to look at the graphic screen.
Level one allows you to look at the Graphic screen and change set points
Level two allows you to look at the status screens and change time/date
Programming levels.
Level three allows you to program the unit.
Level four allows you to change passwords and enter logic program mode.
Level five allows you to reset meters.

Operator level passwords.

Level Zero.
At level zero you may click on the graphic icon at the top of the screen and enter the graphics screens.
On the right of the screen you will see a vertical row of buttons those with names on are connected to a graphic window which will allow you to see what is happening with the system. Clicking on any of these buttons will bring up the appropriate window. You will now see the graphic image with control windows on top. When you open a window the computer will examine the GCS control system and then display the information on the screen. This may take some time if many boards are connected to the system. You will now be able to view any inputs and outputs placed during programming mode.

Level one. Changing data.
At level one password you will be able to change set points and time schedule data shown within the graphic screens.
To change set points or time schedule data. Click on the green **edit** button at the lower right of the screen you can now change data. When finished click on **send to controller** located where the edit button was.
Note when entering time data please use the format 00:00

Level two
At level two you will be able to view all of the status screens. First highlight the name of the board you want to see on the left of the screen, then at the top of the screen click on status then click on the item you need.

Status Menu

Viewing Board Status

Digital Input Status - Shows current On/Off status of all four inputs.

Time Accumulation - Shows the total amount of time, all four digital inputs have been ON.
The Enable button must be highlighted for this operation to work. To enable or disable Click **Auto Update** then Click Enable or Disable then press the Reset button.

**Universal inputs** - Shows Current Temperatures and on/off if input is shorted or open.

Digital Outputs Status - Shows Current Output ON/OFF Status and what it is controlled by.

Analogue Output Status - Shows Current Analogue output position 0% - 100% (0vdc - 10vdc)
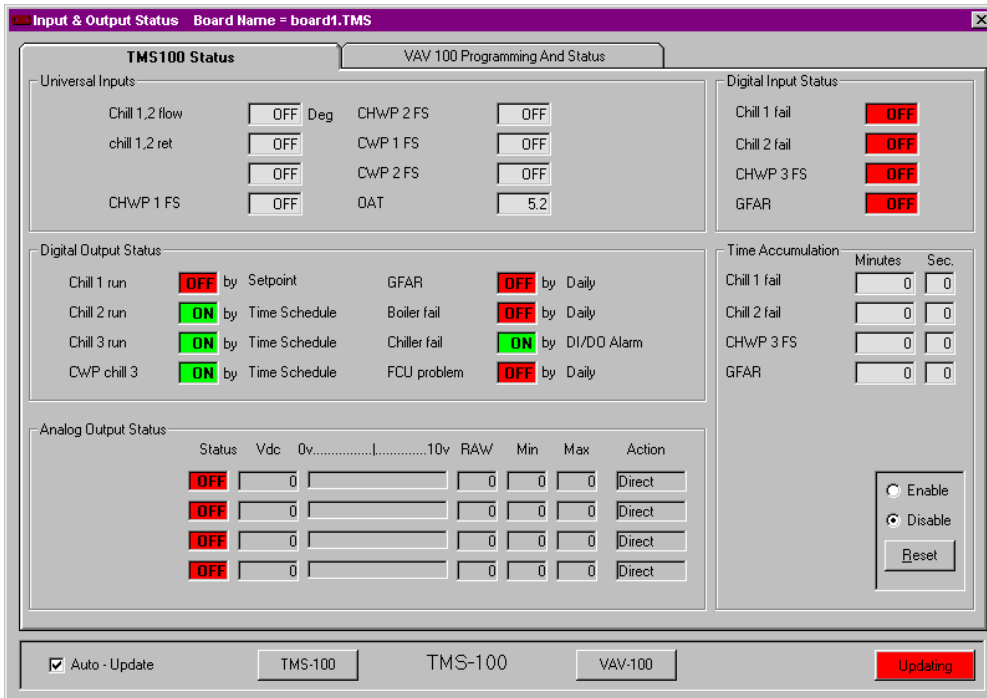
View System Status

System Status gives the current status of all boards connected on the communications bus. Use this function to get a quick overview of the entire system.
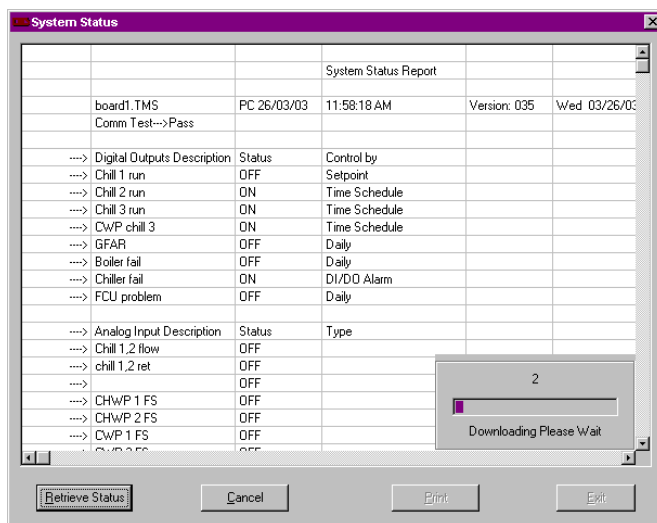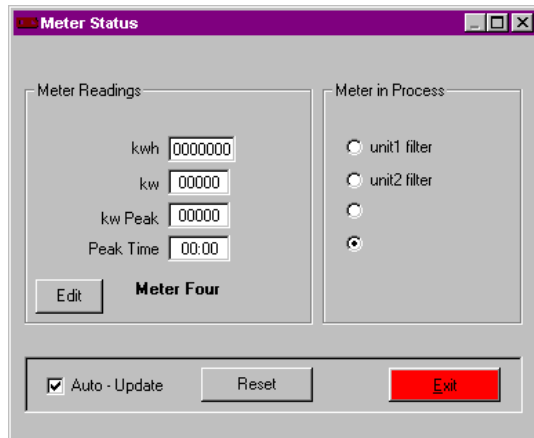
View Meter Status

Meter Status shows the current reading for Kw, KWh, KW peak, and time of occurrence.

The Edit Button Allows you to customise the Unit Type you are monitoring with the ability to change to names.

Manual On / Off

The Manual On/ Off Menu Can Override any output On or Off at anytime, By pressing the ON or OFF buttons. The Auto Button Releases the Output from manual control. Remember the status boxes show the status of the button pushed and not the board status. If you want to see the current board status use the board status menu. If you have turned an output on via manual control the output will show on/off according to your control.
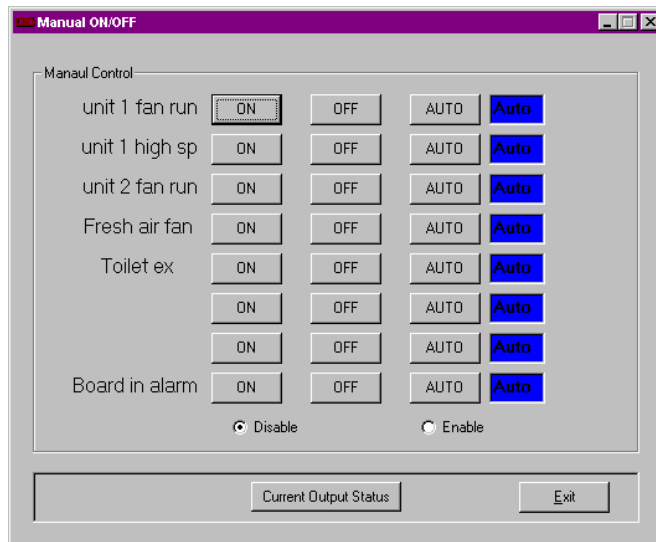
Note: if you have used the logic program to control outputs you may be unable to operate the point via the Manual screen and the coloured bad at the right of the screen may show white.

Timed Override

The occupied status may be overridden during unoccupied periods by utilising the BASYX©
timed override algorithm. This feature works in conjunction with the push button override
algorithm and may be used to override the system in advance of unoccupied hours or remotely.
This feature is designed to be used once for each override event and will be cleared when the
override time has elapsed.

Note: If a push button override has been assigned to the desired point, the push button will
override any time value that has been entered into the timed overrides input box with the
programmed value of the push button override program.

Go to the STATUS menu and select TIMED OVERRIDE

To enable Timed Override function of the BASYX© controller, you may access the timed override
screen from the STATUS menu and selecting the TIMED OVERRIDES option. Press the Edit
button then Select the input box next to the point you wish to change or override. Enter 0 to clear
a override or any other number of minutes to change the remaining time each point will be in the
occupied status. Press the Send to Controller button to download the information to the system
board.

Time And Date

Go to Program, time/date.

To Program Time and Date You Must First Press the **Edit** Button

Next, Manually Enter the Time, Date, and Day or Week or Press the **Display Computer Time** Button.

To Save **Press the Send To Controller** Button (see fig 2).

If you want to save the Time ,Date and Day of Week to all the boards Connected Press the
Synchronise All Clocks Button.

History menu

Note, in order to retrieve history data you first have to program what data you wish to retrieve in the history set up window, see programming guide.

Retrieving the History Data

The history data makes the BASYX system a very powerful stand alone controller. The history may be retrieved in 10 ways. Each mode will change which data the system will retain in the comma separated file (csv) .

Click the data you wish to receive then enter the Start Date and End Date.

Choose to retrieve data from one board or all boards.

Next, Press the Retrieve Data Button

A dialog box will open select the Folder you would like to keep the File data in then enter a file name.

Remember Basyx Program will automatically add the .csv extension just enter in the file name example: test . After the file name is entered Press the open button.

Sub Metering Setup

Sub metering allows you to bill each tenant using Ct's or separate power or water meters. The BASYX sub metering program will then allow you to generate a separate bill for each meter in your system.

Programming steps.

To program sub metering hold the ALT key down and press the <M> key. You will then see the screen shown above.

Ensure that the meter you wish to program is high lighted on the right side of the window.

Enter the tenants name and address details on the billing header part of the window.

Enter the price you wish to charge for each Kw of power of litre of water.

Enter the billing date, this is the date you are down loading the billing data.

Enter the due date, this is the date you wish the bill to be paid by.

Then press <Save to file> and continue programming the next metre by high lighting the meter on the right side of the screen.

Note if you have other meters on other boards press <exit> high light the next board file and again press <ALT> <M> to program those meters. Continue this way until all of your meters are programmed.

Down loading sub metering data.

Under the history pull down menu click on <retrieve history data to file>. Follow the instructions on page 10 but place a tick in the Sub-metering window. Make sure you tell the system if you want to retrieve from one or all boards. Press <retrieve data> and follow the prompts, make sure you give the CSV down load a file name.

The computer will tell you when the history down load is complete.

Look at the place on your computer that you down loaded the file to, you will notice a separate CSV file for each meter.

Use Microsoft Excel © to view each file you will now be able to add any more details you need on the bill and print it out.

Section two programmers manual

Section three Advanced programming structure.

Section two Programming levels
Software Main Menu's

File -The File menu allows you to create, save, or close the project information located on your PC, which will interact to the BASYX system.

Program - The Programming menu allows you to program the desired setpoints or control functions for the BASYX System.

Status - The Status menu is an online function which will give you the status information for the BASYX panel to which the system is connected and communicating.

History - The History mode menu is used for data logging of information with the BASYX system.

Communications - The Communications menu is used to connect to a specific PSC controller and is also used to download program information from the PC file to the controller.

Help - Help Basyx Operations Manual

File Sub Menu's:

New Job - Create a new Job Folder

Open Job - Open an existing GCS BASYX file.

Edit Job - Edit existing GCS Basyx File

Print Job - Print Basyx Board File Data

Close - Close the current GCS BASYX panel file.

Save - Save the current information in the PC Database to a BASYX File

Pass words – Set pass word protection off/on and enter new pass words.

Exit - Exits the system without a save.

Program Sub Menu's:

Point Assignment - Used to give meaningful names to Hard wired points.

Time/Date - Sets the current time and date for the System

Daily Schedule - Sets occupied periods for the points connected.

Setpoint Occupied - Sets occupied and Unoccupied target temperatures.

Special Schedule - Sets up to four occupied periods for each point connected Such as outside lighting.

Reset Control - Used for boiler or Chilled water control to reset the temperature based on another temperature input such as outside air.

Holiday Schedule - Disables occupied setpoints for any points which fall on the scheduled holiday.

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KWH/Interval - *Used for power meter demand pulse setup.*

KWH Shedpoint - *Used for Demand load shedding to shed loads when the current estimated usage is projected to set a new peak demand.*

Alarms - *Used to the alarm point and activation levels for critical points.*

Push Button Override - *Sets the number of minutes the sensor pushbutton will activate the system points.*

Output Interlocks - *Used to tie system points together for proper operation.*

Analog Output Setup- *Used in conjunction with the GCS AO board for valve 0-10vdc valve control and 0-10v motor control.*

Lead / Lag Control- *Used to control boiler or chilled water pumps.*

Sensor Setup- *Used to set Sensors as Thermistor,0-10vdc or 4-20ma with scaling*

History Mode - *Used to set the desired data logging format for the internal history log.*

Status Sub Menu's:

Board Status - *Shows status of the current system points.*

System Status-*Shows status and created a report of all Points current status.*

Meter Status - *Shows the current status of the demand load shed.*

Manual ON/OFF - *Manual locks in the on or off position.*

Timed Override - *Software initiated override of unoccupied areas.*

History Sub Menu's:

Retrieve History Data - *Retrieve comma delimited file of the system history.*

Sub- Metering - *Used to setup Tenant information for power billing.*

Communications Sub Menu's:

Connect-*Used to connect and download system information.*

Restore System Data -*Used to Send PC File Data To Controller*

Hang up - *Disconnect current communications session.*

Control Hierarchy

The BASYX© controller has a predefined control hierarchy. There are only two schedules that can put an output into occupied mode. Special schedule and Daily schedule, the rest of the control algorithms are designed to turn the output OFF. When trouble shooting the system operation be sure to review all control hierarchy below: (The higher algorithms will dictate turning the status of the point off.)

The hierarchy of the BASYX© PSC is as follows:

- Manual On/Off
- Output Locking Control
- TimeWatch Control
- Pushbutton timed override
- Keypad Access Override (not in use at this time)
- Timed override
- Temperature Alarm Schedules
- Temperature Unoccupied Schedules
- Demand Load Shedding
- Holiday Schedules
- Lead Lag Schedules
- Special Schedules
- Set point Occupied
- Daily Schedules.
- Each section above has been included to aid you in setting up your BASYX© controller.

File Menu

Open New Job File

To Add a New Job or System select **NEW** from the file menu .

Enter the name of the Job (**System name**) you wish to use to identify the system files.

Enter the System **Phone Number**. (only for phone line communication).

Enter the **number of boards** which are physically connected to the 485 communication bus.

Then Press Save.

Now Press Exit.

Working with Existing Files.

Selecting a file:

To modify or change information in an existing file select FILE and **Open** from the Menu bar. Select the sub folder which will match the 10 Character name you entered for the project when you first entered the job data. Select the board number you wish to work with and press the APPLY button.
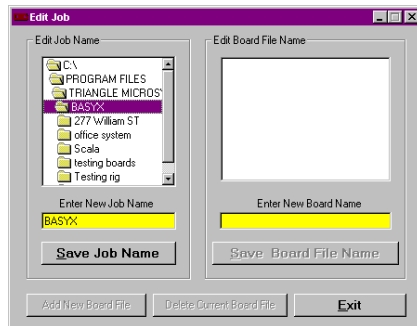
Once the Apply Button has been pressed the Software will automatically open the Communications Window you must connect to the Basyx controller to **program.**

Press **Exit** To Cancel.

Edit Existing Job Name and Job File

To edit existing Job or System name select **Edit Job** from the file menu .
To edit the Job Name Double Click on the job you wish to edit (see fig1).
The job name should be displayed in the Enter **New Job Name** Box.
Edit Job Name then Press **Save Job Name** Button

Edit Board File Name

To edit existing Board File Name Double Click on the job name which holds the
Board Files you wish to edit .
The Single Click the Board File Name You wish to edit.
The Board File name should be displayed in the **Enter New Board Name** Box.
Edit Board File then Press **Save Board File Name** Button.
Note your new board file name should be followed by an under score and the board number, for example a new name for board 2 would be **newname_2.GCS**

Adding Board File Names

To Add a new Board File Name Double Click on the job name which holds the
Board Files you wish to add .
The Single Click any Board File Name this will enable the **Add New Board File** Button .
Then Press **Add New Board File** Button.

Deleting Board File Names

To Delete a Existing Board File Name Double Click on the job name which holds the
Board Files you wish to delete.
The Single Click any Board File Name you wish to delete this will enable the **Delete Current Board File** Button .
Then Press **Delete Current Board File** Button.

Print Board File Data

To print Board File Data select **Print Job** from the file menu .
To select the data you want to print Single Click the selection box a check mark should be displayed (see fig1).
Then press the **Print** Button.

Note the Basyx program uses Windows default printer settings if any error occurs check
Your windows printer settings .

Pass words

To use this section you must have the preset pass word for level 4. Contact your distributor to obtain this pass word.
Enter pass words for levels 1 to 4 and meter pass word then tick the enable pass word box.

Level zero allows you to look at the graphic screen.

Level one allows you to look at the Graphic screen and change setpoints
Level two allows you to look at the status screens and change time/date
Level three allows you to program to unit.
Level four allows you to change passwords and enter logic program.
Note meters can only be reset to zero by turning passwords off.

Password Setup

Password Setup

Meter Reset	RESET
Level 0	zero
Level 1	one
Level 2	two
Level 3	three
Level 4	four

☑ Enable Passwords

Save To File   Exit

Program Menu.

Point Assignments

Point assignments are 15 character labels of text, numbers or spaces which are designed to help you identify the hardware connections to the BASYX controller. The DO's AI's ,AO's and DI's are assigned labels with this function. See the screen shown below for a sample of point labels.

To save your work to a file:

Press the **Save Data To File** Button.

Note: This Data is saved in the PC File Only
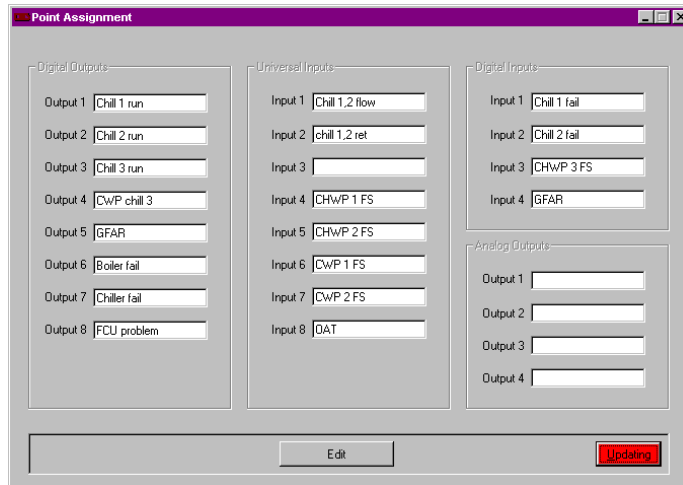
Time And Date

To Program Time and Date You Must First Press the **Edit** Button

Next, Manually Enter the Time, Date, and Day or Week or Press the **Display Computer Time** Button.

To Save **Press the Send To Controller** Button (see fig 2).

If you want to save the Time ,Date and Day of Week to all the boards Connected Press the **Synchronise All Clocks** Button.
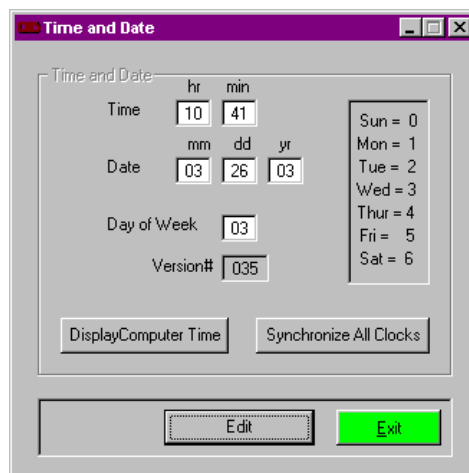
Time schedules (Special Schedules)

The special schedule is used to set up four separate occupied periods for a point. The special schedule will enable the **Set point occupied** temperature control program to maintain the desired occupied setting.

Press the **Edit** button to start programming

Enter your ON and OFF times in the **Enter Schedules** Section

Press the Output you wish to program

The OUTPUT IN PROCESS selection circle will be filled in for the output

Enter the Schedule Numbers or zero For Monday

Repeat previous step for each day.

Placing ticks in the Binary output link boxes will save you from repeating the steps for any other outputs on the board that are to operate with the same time schedule.

To Save Press the **Send To Controller** Button.

Duty cycle

Also within the Time schedule window is the duty cycle it works as follows.

An hour is divided up into to four 15 Min intervals.

check box 1 = 0-15min

check box 2 = 16-30min

check box 3 = 31-45min

check box 4 = 45-60min

any one of the check boxes enabled will cause the output to be off for that 15 minute interval every hour.

Setpoint Occupied

The BASYX© controller is designed to maintain comfort levels during occupied periods. The comfort level is a temperature setpoint which the system will operate to maintain during the times the points are Scheduled as occupied. A control point is scheduled to the occupied mode when the time schedule for the current day has a start time less than the present system time and less than the scheduled stop time. When a system is in the Occupied mode. The occupied setpoint will be used as the target temperature for the system.

The BASYX© controller also increases the energy efficiency of the system by allowing for reduced setpoints in the heating season or raised setpoints in the cooling season for unoccupied periods of the building. These setpoints are utilised for any point where the current time falls outside the scheduled occupied time periods.

To enable the Temperature Control Function.
Select PROGRAM from the menu selection and choose Setpoint Occupied.
Press the Output you wish to program.
The OUTPUT IN PROCESS selection circle will be filled in for the output.
Choose the control mode by clicking on the selection circle so that it is filled in with a black dot.
The control modes operate as follows and must be set up for proper operation:

Heating - The heating control mode will only be allowed to activate (Energise) when the system is indexed to the heating mode.(Outside air below entered switch-over set point).
Cooling - The cooling control mode will only be allowed to activate (Energise) when the system is indexed to the cooling mode.(Outside air is above entered switch-over set point).

Heat/Cool - This control mode will active (energise) the point when the temperature is above the entered setpoint plus the offset above and when the temperature is below the entered setpoint minus the offset below.
*Note:- The heating/cooling Changeover is set from the **Output locking** selection from the Program Menu.*

Analog input number eight must be the outdoor air temperature sensor. The system will be in the cooling mode when the outside air temperature is one (1) degree above the setpoint entered and will index to the heating mode when the outside air temperature is one (1) degree below the setpoint entered.

¬ Choose the input sensor that will be evaluated against the desired setpoint.
¬ Enter the setpoint or target occupied temperature for this point.
¬ Enter the offset temperatures which act as a deadband to prevent unit cycling. (1 degree is recommended for each).
¬ Unoccupied Temperature control - Enter the Night Setback temperature for cooling or heating. Note You Cannot Enter A Cooling And Heating Setback Temperature at the same time Enter Either a Cooling Setback Or a Heating Setback (zero disables).
¬ This function will work similar to the occupied temperature control, but uses a raised setpoint in cooling seasons and a reduced setpoint in heating seasons.
¬ Repeat for additional temperature control points for this controller.
To Save Press **The Send To Controller** Button.

Slide Control function

To use the slider on the wall sensors to reset the set point for an output the following setup instructions must be observed.

First go to **sensor input/output setup,** locate the input you are using for the adjustment and set the sensor type 0-400ohm. Then set the sensor low/high to the minimum and maximum of the range that you wish to use (example 150 Min to 300 max = a temperature range of 15 to 30 degree's

Next go to **setpoint linking** in the **stat link** box place the number of the input where the slider is connected. On the right of the screen place a number one in the **setpoint box** of any output you wish to control. If you now look at the **set point occupied box** located on the **set point occupied** screen and move the slider you will see the set point change according to your set up information. You can now set any off sets you need to provide you with a dead band between heating and cooling set points. This can be done by placing the number of degrees you need to off set by in the **off set** part of this screen or by placing the data in the **set point occupied** screen. Notes, by using the number 1 in the set point box as shown here you are using the cooling set point box shown on the top

right hand part of the screen. If you put say 2 in that box your set point will have 2 added to it or –2 will have 2 removed from it this means that you can also use this box to add offsets ie put –1 in the cooling box and 1 in the heating box. So that all output set point boxes that you place 1 in will have 1 deg removed from the slider set point and all output set point boxes that you place 2 in will have 1 deg added to it.

Reset Control function

Many systems require the ability to change the setpoint automatically when the outside air temperature changes. Systems that might utilise such a strategy are chilled water systems or heating systems. The BASYX controller allows for very simple and effective means to use reset control for your points.

Reset control automatically changes the setpoint for the occupied temperature control schedule. The set point will be calculated based on a simple proportional relationship. Enter the minimum and maximum outside air temperature. Enter the minimum and maximum setpoint levels. Select direct for a reset calculation that will raise the setpoint as the temperature measured increases or reverse which will lower the temperature setpoint as the temperature measured increases.

Programming Reset schedules for Analog outputs

Many systems require the ability to change the Analog Outputs setpoint automatically when the outside air temperature changes. System that might utilise such a strategy are chilled water Valves. The BASYX controller allows for very simple and effective means to use reset control for your Analog Outputs.

Reset control automatically changes the Analog Output Setpoint for the occupied control schedule. The Analog Output setpoint will be calculated based on a simple proportional relationship. Enter the minimum and maximum outside air temperature. Enter the minimum and maximum setpoint levels. Select direct for a reset calculation that will raise the setpoint as the temperature measured increases or reverse which will lower the temperature setpoint as the temperature measured increases. Then Select Analog Output Reset Mode so the controller knows that you wish to reset the Analog Output Setpoint. Use Analog Output P - Mode when you need absolute proportional control of the analog Output it does not change the setpoint instead is directly resets the position of the analog output. The Setpoint Range is the analog output Position (0-255 / 0vdc - 10vdc).

Example

To use an input to reset the set point for an output the following setup instructions must be observed.
First go to **sensor input/output setup,** locate the input you are using for the adjustment and set the sensor type to the type in use. Then set the sensor low/high to the minimum and maximum of the range that you wish to use (example –50 min to 50 max = 5 deg below set point to 5 deg above set point). This will set the max range of the output.

Next go to **Reset control** click on the output you wish to be controlled by the input. Select the input you are to use. Under **setpoint range** set the minimum and maximum temperatures wish to control over and then under **temperature range** set the maximum and minimum distance that the slide will travel (must be within your settings on the sensor input/output table). For instance if you set the range on the sensor input/output table from **–5 to 5** and you set the temperature range from **–2.5 to 2.5** then your setpoint range would swing from minimum to maximum in half of the sliders travel. You can also set a delay in seconds in order to restrict the speed of the action.
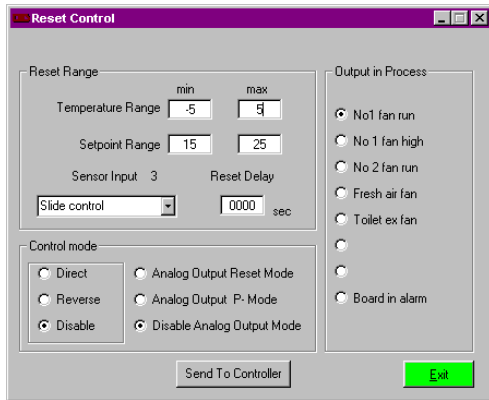
Holiday Schedule function

The holiday schedule is used to override the daily schedule for a point. The holiday schedule is only used for scheduling unoccupied periods. Up to 15 holiday dates may be entered for the holiday schedules. Select the points which will follow (be indexed off) for the holiday periods. Enter the Month (1-12) in the first entry box and enter the month day (1-31) in the second entry box. Repeat this for all desired holiday schedules.
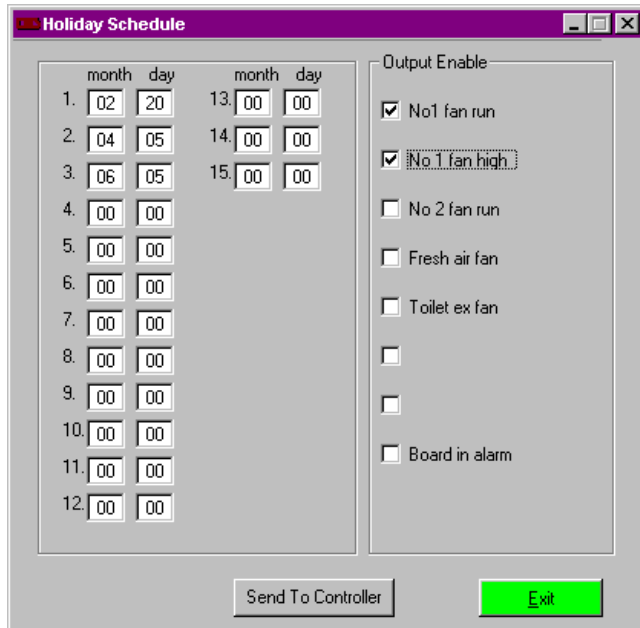
Press the **Send to Controller** Button to save.

Kwh Interval and pulse per unit

Select PROGRAM from the menu selection and choose Kw interval.

You must enter the KWH/Pulse which your utility company uses for demand calculations.

If you do not know this number, contact your local utility company for this information.

Fill in the selection circle for 15 or 30 minutes to match your demand period. If you are on a 30 minute demand period you may still use the 15 minute selection for quicker system shedding response.

Press the **Send to Controller** Button to save.

Demand Load Shedding Func**tion**

The BASYX load shed control function is a program designed to save you energy expense. The load-shed function will monitor the current electrical usage and will turn points off when the projected usage is forecasted to exceed the demand setpoint.

Select PROGRAM from the menu selection and choose KW Shed point to enter the load shed information.

First Enter KW Shedpoint . (This is the target KW demand you do not wish to exceed)

Select the points which will be shed when your current estimated usage is forecasted to exceed your entered shed point KW. Select the point by clicking on the check box next to each point. This will enable the load shed routine for these points.

Select the point priority (1-8) for each load. The priority tells the BASYX system in which order to shed the system points. Priority 1 is shed first, followed by two and so on.

Next Enter the estimated load of each priority entered. For example if you assign point three (AHU Fan) as a priority one load shed, enter the estimated KW usage for the AHU Fan under the first priority load demand. If two or more points are assigned as a priority one, add the KW estimates for each and enter under the priority one load demand.

Understanding PSC load shedding
The load shedding Schedule uses Meter one (Digital Input 1) to estimate the current KW usage.
Meter one is the only meter that can be used for load shedding. The KW readings are estimated
readings based on the current KW pulse feedback from the utility meter. This number is used to
project the KW usage over the next hour. The Estimated KW Value is used by the load shedding
Schedule to assist in protecting you from setting a new KW peak demand. Only the points which
are enabled by the system load shedding program will be shed and therefore care should be
taken to add all high electrical usage equipment to the BASYX control system.
Note: A five minute delay is built in between shedding stages. This feature is to protect you from
duty cycling your equipment.

Push Button Timed Override: Analog Input
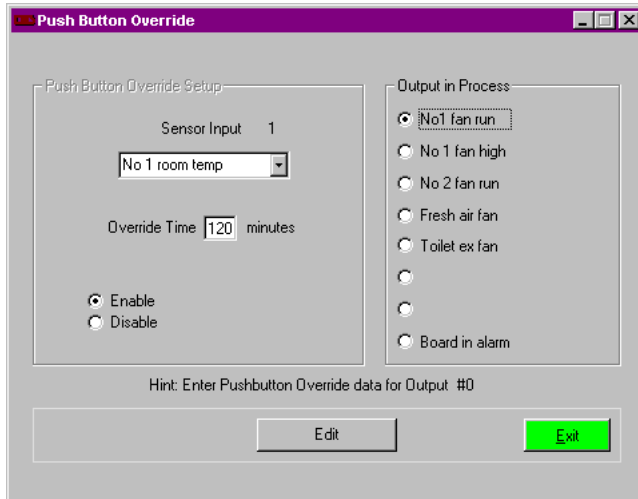
The occupied status may be overridden during unoccupied periods by utilising the BASYX© push
button timed override algorithm. This feature is set up through the setup software and will index
all the assigned points to the OCCUPIED status. See the application notes on using timed
overrides for systems.

Note: Pushbutton Override will not work unless Timed Overrides are enabled!!!!!
To enable the Analog Input (Push Button) Timed Override function of the BASYX© controller:
Go to the PROGRAM MENU and select PUSHBUTTON OVERRIDE
Press the output you wish to program
The OUTPUT IN PROCESS selection circle will be filled in for the output.
Click on the ENABLE selection circle so that it is filled in with a black dot.
Click on the OVERRIDE TIME input box and enter the number of minutes you wish the system to
override.
Click on the SENSOR SELECTION choice box and enter the space sensor or input number
which the system will monitor for a momentary push button or short circuit.
Press **Send To Controller** To Save

Displaying or Clearing a pushbutton override from the system:
To display or clear a timed override from the system, you may access the timed override screen
from the STATUS menu and selecting the TIMED OVERRIDES option. Select the UPDATE
button to view the time remaining for all the push button or timed overrides. To clear a timed
override, select the input box next to the point you wish to change. Enter 0 to clear the override or
any other number of minutes to change the remaining time in minutes for all points you wish to
change. Press the SET button to download the information to the system board.
Note: The push button will override any time value that has been entered into the timed overrides
input box with the programmed value which was set in the step previous.

*Note:- from firmware version 0.3.6 if you push the push button override button a second time after
at least 1 Min from the first push the override will be cancelled after a further 1 Min delay.*

Digital Input Overrides

Note:- lead/lad is on the same screen.

Select PROGRAM from the menu selection and choose Lead Lag Control.
Enter your override time in seconds (64k max input).
Enter in your Binary Output Code this code represents the outputs you want in Occupied Mode
when a contact closure is across the specified digital input (see Chart Below).
Press the Send to Controller Button to save.

Look up Table for Binary number entry Alternate method to find code value for override

POINT	DO8	DO7	DO6	D05	DO4	DO3	DO2	DO1	Binary code
# TO ADD FOR OVERRIDE	128	64	32	16	8	4	2	1	
VALUE				1	0	1	1	1	10111
EXAMPLE				16	0	4	2	1	23

Entering 23 will override points 1,2,3 and 5 into the occupied mode

A zero indicates point is under normal control -1 indicates point is in override (occupied mode)
Order is DO(8,7,6,5,4,3,2,1)

Output lock **Interlocking points for operational control.**

Often points on a control panel are part of a larger system such as an air handler or rooftop unit. These points must operate as a system for proper mechanical operation. Good mechanical practice dictates that the units be interlocked through the relays such that the cooling circuit will not be enabled if the fan is not operational. The BASYX controller allows for you to indicate which points must operate together. An example would be a fan and heating or cooling point on an air handling unit.

To set up the interlock control, select the PROGRAM menu tab and choose the OUTPUT LOCK Selection.

Each point is listed with an entry box following. To interlock a point, enter the associated output which would need to be energised along with the current point. For example, if the fan is point number one, (DO 1) and you wish to interlock it with the heating on point two (DO2) enter a one (1) in the second box. This will force point one to the energised (on) state when ever point number 2 is called to be energised.

Setup Output Locking

No1 fan run	0	Toilet ex fan	1
No 1 fan high	0		0
No 2 fan run	0		0
Fresh air fan	2	Board in alarm	0

Outdoor Air Lockout

○ Enable   Cooling Mode Above Offset 00.0
◉ Disable   Setpoint 00.0
       Heating Mode Below Offset 00.0

Stat Link

Stat Input Number 00

Setpoint Link Setup

1. Cooling Setpoint 00.0
2. Heating Setpoint 00.0

	Setpoint	Offset
No1 fan run	00	00.0
No 1 fan high	00	00.0
No 2 fan run	00	00.0
Fresh air fan	00	00.0
Toilet ex fan	00	00.0
	00	00.0
	00	00.0
	00	00.0
Board in alarm	00	00.0

Send To Controller   Exit

OAT change over

Heating/Cooling Mode
The heating/cooling mode of operation uses analog input number eight (AI-8) for the outside air sensor. To utilise this function, the outside air sensor must be connected to this physical point. Enter the Switch over setpoint which will toggle the system to heating mode if one degree below the given value and to cooling mode when one degree above the given value. The screen above shows the system is set to be in heating mode below 49 degrees Fahrenheit and in cooling mode at 51 degrees Fahrenheit.

The digital outputs may be assigned with the following modes of operation:
heating- The heating control mode will only be allowed to activate (Energise) when the system is indexed to the heating mode.(Outside air below entered switch-over setpoint)

Cooling- The cooling control mode will only be allowed to activate (Energise) when the system is indexed to the cooling mode.(Outside air is above entered switch-over setpoint)

Heat/cool- This control mode will active (energise) the point when the temperature is above the entered setpoint plus the offset above and when the temperature is below the entered setpoint minus the offset below.

Automatic-This control mode will automatically switch the point control mode to heating if the system is in heating and to cooling when the system is in the cooling mode.

Disable-Ignores temperature control function. Recommended for points not utilising temperature control.

Daily Schedule Function
As an alternative to the time schedule function you may choose to use the Daily Schedule function
The daily schedule is used to set up occupied periods for a point. The daily schedule will enable the occupied temperature control program to maintain the desired occupied setting.
Press the Output you wish to program
The OUTPUT IN PROCESS selection circle will be filled in for the output
Enter the ON and OFF hour and minute for Monday
Repeat previous step for each day.

Press The **Send To Controller Button** To Save Data

Analog Output Schedules

The BASYX© controller is designed to maintain comfort levels during occupied periods. The comfort level is a temperature setpoint which the system will operate to maintain during the times the points are Scheduled as occupied. A control point is scheduled to the occupied mode when the time schedule for the current day has a start time less than the present system time and less than the scheduled stop time. When a system is in the occupied mode, the occupied setpoint will be used as the target temperature for the system.

The BASYX© controller also increases the energy efficiency of the system by allowing for reduced setpoints in the heating season or raised setpoints in the cooling season for unoccupied periods of the building. These setpoints are utilised for any point where the current time falls outside the scheduled occupied time periods.

To enable the Analog Output Control Function.

Select PROGRAM from the menu selection and choose Analog Output Setup.

Press the Output you wish to program

The OUTPUT IN PROCESS selection circle will be filled in for the output.

The control modes operate as follows and must be set up for proper operation:

Select the Input (**Sensor Input**) You Would Like to Control Press the Down Arrow For your choices.

The **Normal Check Box** Should Be left unchecked

Check the **Enabled/ Disabled** Check Box if the check box shows Disabled The analog output schedules will not operate.

The **Reverse/Direct** Acting Check Box works as followed. Select direct for a reset calculation that will raise the Analog RAW value percentage as the temperature measured increases or reverse which will lower Analog RAW value percentage as the temperature measured increases.

Off Position 0%- Off Position 100% - This Check Box is used when you have linked the Analog Output to a Digital output. When Digital Output is ON (Occupied) then the Analog output schedule is ON . When the Digital Output is OFF the Analog output Raw Value defaults to Either 0% (0vdc) or 100% (10vdc) which ever you choose.

Enter the **setpoint** or target occupied temperature for this point.

Enter the **Delay** in seconds. This is the delay between each calculation use this to either slow control or speed up control.

Enter **Gain** . The analog output position = (error X gain) + the original analog output position. A High gain can cause erratic control. A gain of one is recommended.

Output Link Allows you to turn the analog output schedule ON(Occupied) and Off via a Digital Output with a Daily Schedule.

Set the **Min/ma**x positions you want the output to control to (max position = 255)

Programming Lead Lag Schedules:

The Lead Lag schedule is most commonly used in Dual Pump configurations Digital Inputs one through four are used, allowing you to control two pump pairs. The Lead Lag Algorithm will not operate unless the Digital Outputs are in Occupied Mode. On Initial Start up of the lead pump #1, If Digital Input #1 is not ON within 30 seconds the Lag Pump #1 will be powered ON , If Digital Input #2 is not On within 30 seconds Lead pump 1 is turned ON again. The Pumps will cycle until one of the digital inputs are switched ON. By connecting the pump flow switches and thermal over loads to the digital inputs you can maintain both a lead/lag and pump back up configuration. The same for Lead Lag Pump 2.

Cycle Days automatically changes from Lead to Lag or from Lag to lead. For example if you were to enter 2 in the Cycle days text box the Pumps would cycle from lead to lag and lag to lead every 2 days.

Lead Lag / Digital Inputs Override				☒
Lead Lag Setup		**Digital Input Overrides**		
	Digital Output		Override	Binary Output
No1 filt block	`01` Lead 1	No1 filt block	`00000` sec.	`000`
No2 Filt block	`02` Lag 1	No2 Filt block	`00000` sec.	`000`
	`00` Lead 2		`00000` sec.	`000`
	`00` Lag 2		`00000` sec.	`000`
Cycle Days `10`		☐ Enable		

Send To Controller   Exit

Temperature Averaging Setup.

Sensor Averaging allows you to Average up to 4 temperatures sensor values....The averaged value is displayed in sensor input Position 6 or 7 if do not want to use a sensor position the averaged values can read using Basyx Logic Positions:

AVG_AI6   EQU   1865   ;AVG ANALOG INPUT POSITION 6
AVG_AI7   EQU   1867   ;AVG ANALOG INPUT POSITION 7

Sensor Inputs 6 or 7 must be set to Average if you want the value to be displayed on the status screen or to be used as a control input.

1. Set Input 6 or 7 to Average.
2. Under **Sensor Averaging Setup** Select the inputs you want to average.
3. Send To Controller
4. You are Finished

Above Sensor Position 6 Will show the Averaged Value of Sensor Input 1 and 2.
Above Sensor Position 7 Will show the Averaged Value of Sensor Input 3 and 4.

Programming Sensor Setup:

The Sensor Setup allows you to read voltage and current sensors or for example pressure sensors.

Thermistor is the standard 10k@77deg F or 10K@25 deg C temperature sensor a Low and High value should not be entered the sensor table is preloaded in the Basyx system. Just Enter the Units DEG or C and your done.

0-10VDC is for 0 to 10vdc sensors enter in the Low and High Sensor Value then enter in the Unit type such as PSI and your Done. Please note to use this function you must change the dip switch setting for the input you are using. The dip switch are located at the edge of the BASYX PSC control board next to the Analogue inputs. When operated the dip switch turns off the 10VDC the BASYX PSC applies to each input, if you leave it on you will not read the correct value on the system.

4-20ma is for 4 to 20ma sensors you will need to acquire a 499 ohm resistor to go across the sensor input use for proper readings. Then Enter in the Low and High Sensor Value next enter in the units and your done. Please note to use this function you will need to operate the dip switch as shown above and also operate the dip switches in the next block to them. These dip switches apply a resistor across the input in question to enable them to be read as 4-20ma instead of 0-10VDC.

Virtual is to enable you to read from the corresponding input on board 1.

Average Please see averaging instruction shown on previous page**.**

0-400ohms to read from the slide control on the sensor, set min and max readings ie. –100 to 100 = remove 10DEG from setpoint or add 10 DEG to set point.

0-10K/0-5VDC To enable the reading of straight resistance.

Min on/off

Under the sensor set up screen you will be able to set up minimum on/off times for each digital output. This is especially useful with compressors where you may not want them to be turned of to quickly or wish them to stay off for a minimum time to prevent short cycling.
Note:- if you set both a min on and min off time the output will act as a re cycle timer.

Reverse action

To the reverse the action of a digital output go to Sensor set up screen and tick the box of the output you wish to reverse.
To reverse the out put of an analog output go to the Analog output setup screen and tick the box of the output you wish to reverse.

Global Sensors

To enable global communications and point sharing set the corresponding points to on.
To read an input from board one at any other board on the system. Set the input on the board you want to read at to virtual, the input will now display the data from the corresponding input at board 1.

Global Communication.

Enable Global Communications: This turns on the global communications program, which allows global information to be passed along the data bus (always used).

 Enable Global OAT: This enables the program which allows sensors on board 1 to be read on additional boards through the virtual sensor setup (almost always used).

 Enable Global KW: This program passes information obtained through the meter input on board 1 to be used for demand control on additional boards (used only for global load shedding).

 Enable Global Alarms: This activates the program that looks at all boards for an alarm status, and allows board 1 to dial out through the pager program .

 Enable Global Overrides: Enables Global over dire timer see Global commands in logic Variable 1054 to 1961.

 VAV Time Schedules: This allows any schedule on board 1 to be sent to VAV controllers, which have a box in the setup program labeled Time Schedules (1-12).

 Enable Global Time: This box activates the program which performs clock synchronization between 4-5:00am every day (same as manual command).

 Board Count: Lets board 1 know how many boards to look for communication with.

 Zone Address: This is for addressable repeaters for projects larger than 256 controllers.
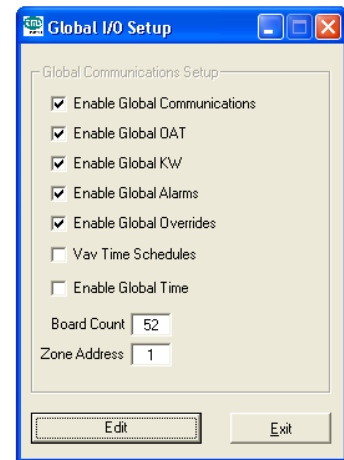
History Mode

The history mode makes the BASYX system a very powerful stand alone controller. The history may be logged in one of three intervals. Each mode will change the number of days the system will retain and the interval in which the temperature readings are set

To set up history recording, select PROGRAM from the menu tab and choose HISTORY MODE selection.
Press the Edit Button then Click on the check boxes you wish to record. Then move the days slider to the number of days you wish to record for. Finally move the interval tab to your desired setting. The bar graph shows the amount of memory you are going to use, if it says our of range ether reduce the number of days you are going to record over or increase the interval. Then Press the **Send to Controller** Button to save.
You must check the global box if you are using global. This moves the history up to a higher address to allow space for the global file. If you do not check this, your global and histories write to the same memory address, causing problems primarily with the history files.
At the bottom left of this screen there is a tick box. When you place a tick in it and press send to controller you will reset all history data. This should be done at any time you change the information displayed on the screen. If you fail to do this the history's may not work correctly.

Notes:-
1) time accumulation is only possible if you first go to the board status screen and enable time accumulation. To do this first stop auto update then click on enable (bottom right) then click on reset, after which allow auto update to continue.

The recorder works on last in first out that is when you go to down load the history data and the memory has over flowed you will see only the most resent data.
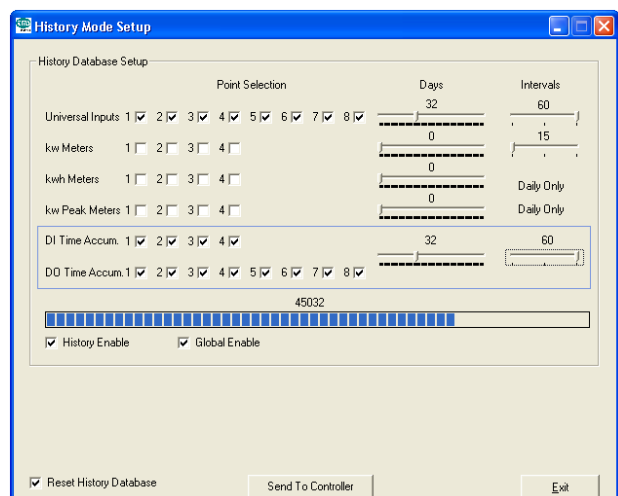
Graphic menu

Once within the graphic screen you can enter programming mode or Status mode. Status allows you to click on any one of the screen buttons located on the left of the screen and view the graphic within that screen.

Status Mode

Open the graphic screen by clicking on graphics. Click on one of the buttons located on the right of the screen. You will now see the graphic image with control windows on top. From here you can view any inputs and outputs placed during programming mode.

Changing data.

> To change set points or time schedule data. Click on the green **edit** button at the lower right of the screen you can now change data. When finished click on **send to controller** located where the edit button was.
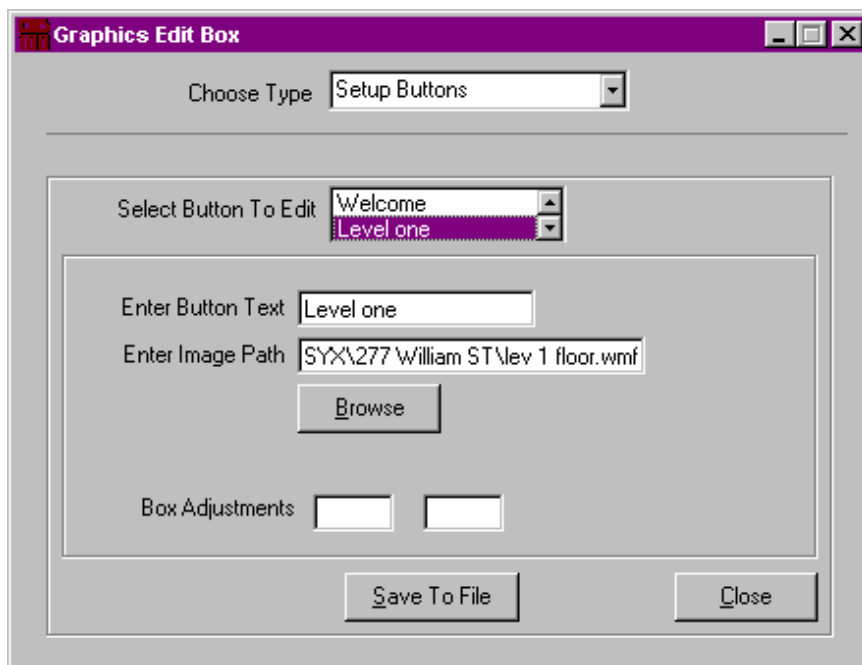
Programming mode

Open the graphic mode screen and click on the Program mode button click on the edit graphic button then click on edit graphic. A screen will open up, click on choose type Set up Button.

Set up Button

> This is used to set up a new graphic screen. Once you have clicked on this box choose one of the graphic side bars by number, enter the name you wish to call it and enter the path to the graphic image you wish to use. *Note:- Windows Meta files work best.*

Once you have set up a side bar graphic you can place the following information windows on to it by clicking on the wording and clicking on add new. Enter the name you wish to call the button, the board number and the point it is going to get information from. Click on create label. A button will appear on the upper middle left of the screen. Place you pointer just below the button and hold down the left mouse button. You will now be able to move the button to where ever you wish on the screen.

Programming control boxes.
Choose the type of control box you wish to program. *See following picture.*
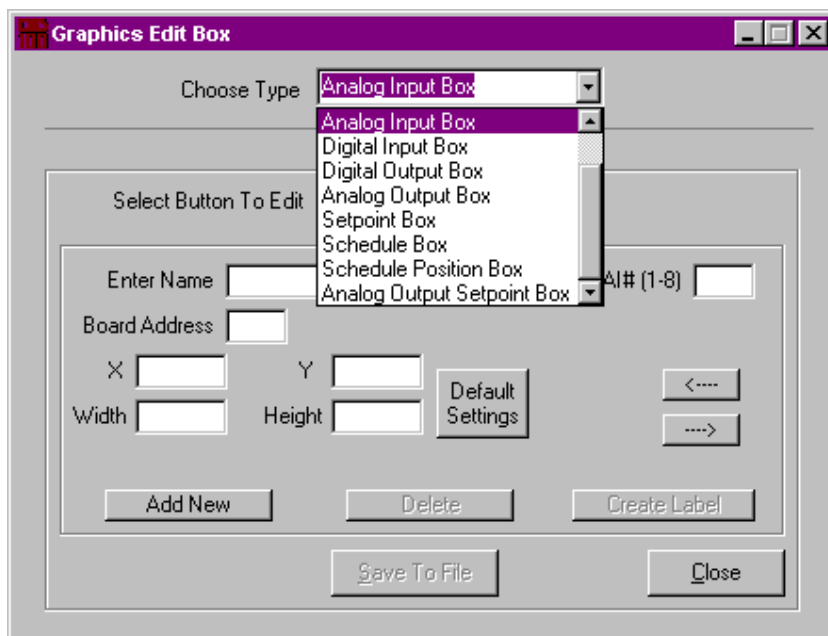
Click in add new.
Enter the name you wish to call it, the input, output number or logic address and the board number. Then click on create label.
The control box will appear in the top left part of the screen.
Use you mouse to move the box to where you want it.
Click on save to file.
Continue with the above until all your control boxes are on the screen.

Modifying or fixing a graphic file.
Do not do it unless you have to then keep a copy of the original just in case.
Use the extra program "BASXY graphic file converter" to convert the file to a readable/changeable note pad file. After converting you will find a file called "graphics_converted.txt" under the same sub directory as the original graphics file. Open it with note pad, keep the total number of lines the same and do not delete any blank lines. The following rules apply

The first screen file name must be on LINE 34 of the text file....

The first of the 2 zeros must be on LINE 67 of the text file....

The number of lines in the file must be on LINE 101 of the text file.

The lines which put data on the screen must begin with increment 101, then the lines must be in numerical order. The number of lines shown on line 101 must always be one more than the increment in the last line of the file.

If you delete any lines you must re increment the line number the location of the line number is shown in the example below line 118 shown.

1,LOGICVAR,z3 SP,2,63793,3437.5,5242.5,655,255,**118**,0,000.0

This line will put a box on the second screen "1" it will be a "LOGICVAR" called "z3 SP" from board number '2' using logic variable "63793" at location "3437.5,5242.5" the size will be "655 by255" and the decimal point will be displayed as "000.0".

Analog Input box. Used to display the data from one of the Analog inputs.

Digital input box. Used to display the data from one of the Digital inputs.

Digital output box. Used to display the data from one of the Digital outputs.

Analog output box. Used to display the data from one of the Analog outputs.

Analog output set point box. Used to display and change the set point for the four analog outputs.

Set point Box. Used to display the set point of one of the Digital outputs. This point can be changed from display mode.

Logic Variable. Used to display the contents of any memory location within the TSM150. You can also set a decimal position or make the window show ON or OFF instead of a value. Note of logic variable is Zero OFF will be displayed if Logic Variable is grater than Zero then ON will be displayed.

Schedule box. Used to display time schedules. This point can be changed from display mode. Schedule one on time = Schedule 0, Schedule one off time = schedule 1. Schedule two on time = Schedule 2, Schedule two off time = schedule 3 etc.

Schedule position box. Used to display the number located in one of the schedule number boxes in the time programming window as follows.

Meter Boxes. Used to display the metering values.

output one	1	2	3	4	output two	1	2	3	4
Monday	0	1	2	3	Monday	28	29	30	31
Tuesday	4	5	6	7	Tuesday	32	33	34	35
Wednesday	8	9	10	11	Wednesday	36	37	38	39
Thursday	12	13	14	15	Thursday	40	41	42	43
Friday	16	17	18	19	Friday	44	45	46	47
Saturday	20	21	22	23	Saturday	48	49	50	51
Sunday	24	25	26	27	Sunday	52	53	54	55

output three	1	2	3	4	output four	1	2	3	4
Monday	56	57	58	59	Monday	84	85	86	87
Tuesday	60	61	62	63	Tuesday	88	89	90	91
Wednesday	64	65	66	67	Wednesday	92	93	94	95
Thursday	68	69	70	71	Thursday	96	97	98	99
Friday	72	73	74	75	Friday	100	101	102	103
Saturday	76	77	78	79	Saturday	104	105	106	107
Sunday	80	81	82	83	Sunday	108	109	110	111

output five	1	2	3	4	output six	1	2	3	4
Monday	112	113	114	115	Monday	140	141	142	143
Tuesday	116	117	118	119	Tuesday	144	145	146	147
Wednesday	120	121	122	123	Wednesday	148	149	150	151
Thursday	124	125	126	127	Thursday	152	153	154	155
Friday	128	129	130	131	Friday	156	157	158	159
Saturday	132	133	134	135	Saturday	160	161	162	163
Sunday	136	137	138	139	Sunday	164	165	166	167

output seven	1	2	3	4	output eight	1	2	3	4
Monday	168	169	170	171	Monday	196	197	198	199
Tuesday	172	173	174	175	Tuesday	200	201	202	203
Wednesday	176	177	178	179	Wednesday	204	205	206	207
Thursday	180	181	182	183	Thursday	208	209	210	211
Friday	184	185	186	187	Friday	212	213	214	215
Saturday	188	189	190	191	Saturday	216	217	218	219
Sunday	192	193	194	195	Sunday	220	221	222	223

Meter boxes

	DI1	DI2	DI3	DI4
Kwh	1	2	3	4
Kw	5	6	7	8
Kw peak	9	10	11	12
Kw peak time	13	14	15	16

History menu

Retrieving the History Data

The history data makes the BASYX system a very powerful stand alone controller. The history may be retrieved in 10 ways. Each mode will change which data the system will retain in the comma separated file (csv) .

Click the data you wish to receive then enter the Start Date and End Date.

Choose to retrieve data from one board or all boards.

Next, Press the Retrieve Data Button

A dialog box will open select the Folder you would like to keep the File data in then enter a file name.

Remember Basyx Program will automatically add the .csv extension just enter in the file name example: test . After the file name is entered Press the open button.

Communications menu

Connecting to Basyx

When Communicating via Modem a setup string must be entered or use the Default string. Next Enter the communication port your modem is setup on. Then Press the Modem Connect Button. Remember the Basyx Program will not let you connect unless the current system name and system file name match. If you have trouble communication just try a different Modem type.

When communicating via Direct Connect enter the communications port the Basyx system is connected to then press the Direct connect button.

Once communication is established you can exit the communications menu and view the system. **Note**: when connecting the program looks for the first board in the list and will fail to start if it cannot be found. If you need to connect to a system where board one is not on line go to <file> <edit job> double clock on your job, click on an active board file and add 00 to the start of the name. Exit the program and restart. The program will now look for that board file instead of board one.
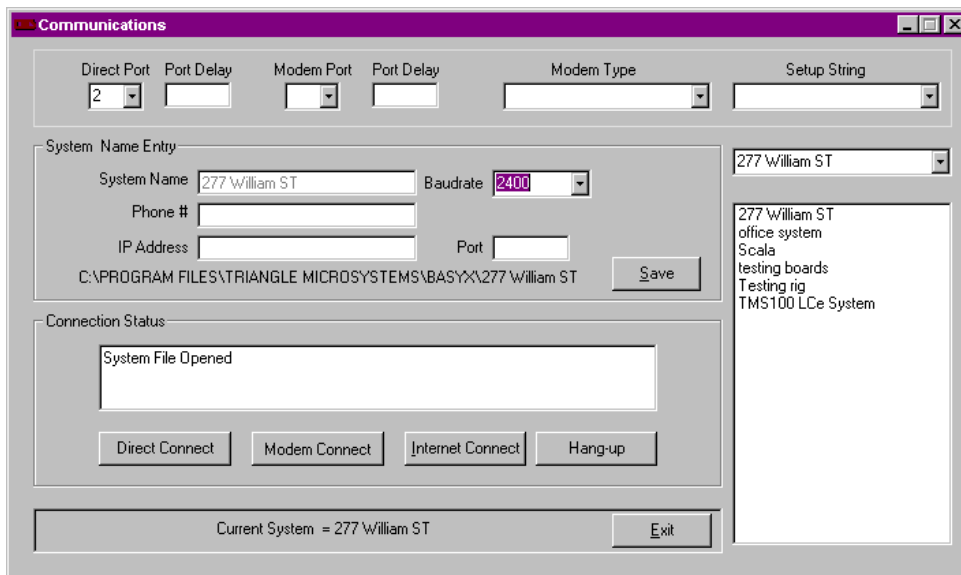
Restore System Data

Use the restore system data window when the Basyx system database becomes corrupt choose the data that needs to be restored and press the Restore system Data Button.

Note with a few minutes of communicating with a system the PSC boards will send data to the PC. If you wish to up load data to the PSC system do so as soon as you establish communication.
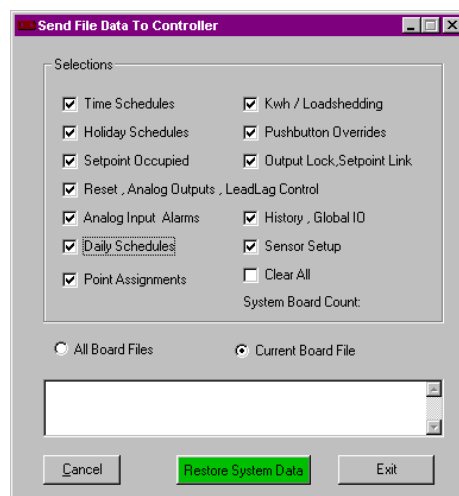
Alarm menu

The BASYX© controller allows for eight different alarm levels to be monitored and alarmed. Occurrence of any alarm will cause the designated alarm output to be turned ON during the period the alarm is active. The designated output may be connected to an automatic dialer for notification of alarms during unoccupied hours or to a point enabling the building lights for security purposes.

To enable the Temperature Alarm function
select ALARM from the menu selection and choose ALARM DIAL OUT from the options.
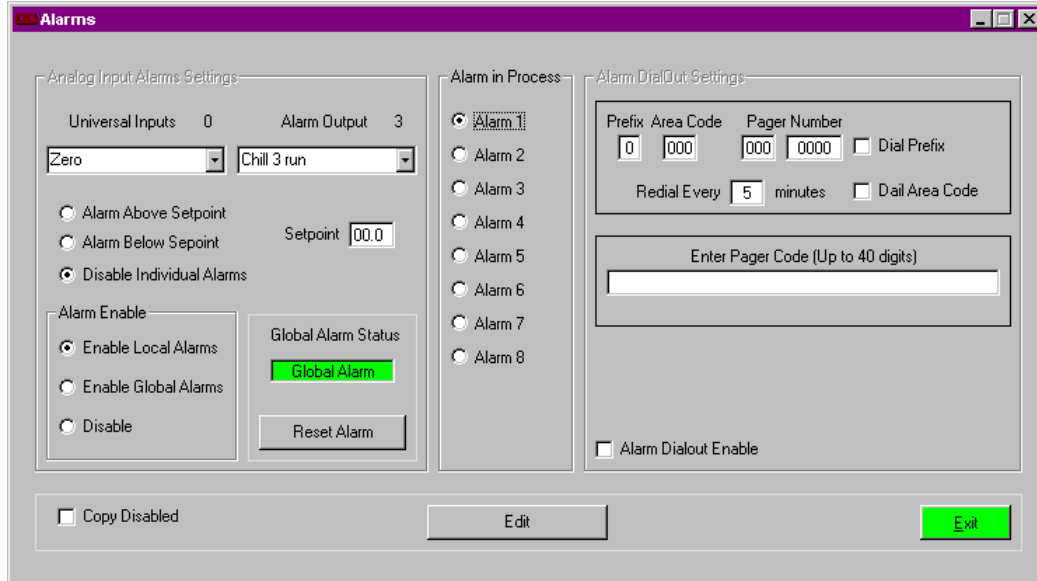
Press the edit button.
Select one of the alarm in progress buttons.
Press the Output you would like to program.
Select the input you wish to examine.
Select alarm above or below set point and enter the set point.
Select ether enable local or global alarms.
Press the send to controller button.

To enable digital input/digital output alarms.
select ALARM from the menu selection and choose DIGITAL INPUT/OUTPUT ALARMS from the options.
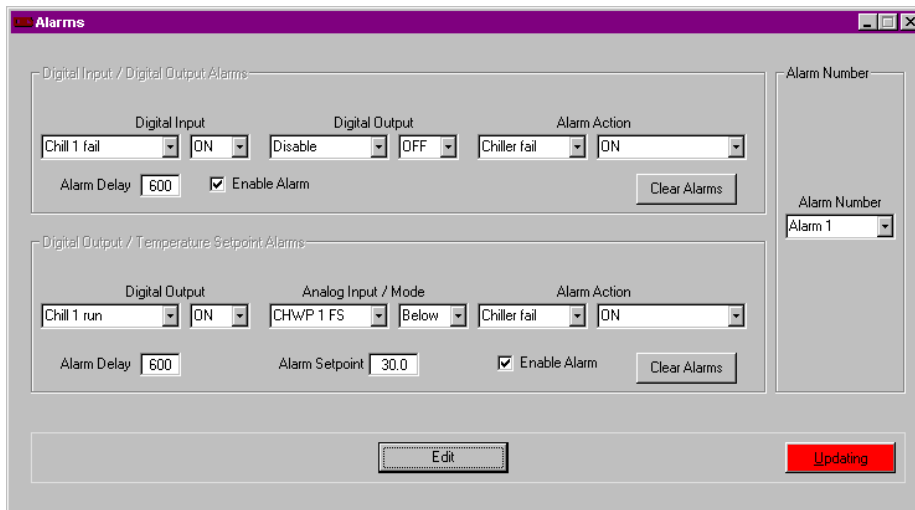
Press the edit button.
Select one of the alarm numbers on the right of the screen.
Enter the Digital input and whether on or off you wish to monitor.
Select the input you wish to examine.
Select output you wish to examine against and whether on/off.
Select the alarm out put and action.
Enter and alarm delay you need in seconds.
Tick the enable alarm button.
Press the send to controller button.
Repeat for any other alarms you need.

To enable digital input/analog input alarms.
select ALARM from the menu selection and choose DIGITAL INPUT/OUTPUT ALARMS from the options.
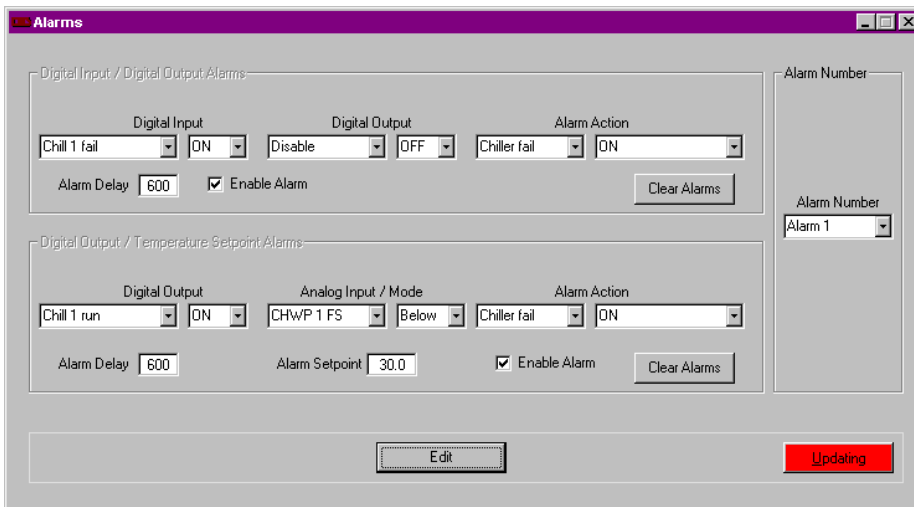
Press the edit button.
Select one of the alarm numbers on the right of the screen.
Note if you have already programmed DI/DO alarms you can use the same alarm number to add DO/AI alarms.
Enter the Digital output and whether on or off you wish to monitor.
Select analog input you wish to examine against and whether above or below.
Enter the alarm set point.
Select the alarm out put and action.
Enter and alarm delay you need in seconds.
Tick the enable alarm button.
Press the send to controller button.
Repeat for any other alarms you need.

*Note 1: Both the DI/DO and the DO/AI alarms operate like an IF/AND/THEN statement "**if** digital input one is on **and** digital out put one is on **then** turn digital output two on".*
Note 2: If you enter only one value in the left hand side of the DI/DO alarm set such entering "digital input one on" and then set an alarm out put, the alarm output will come on whenever the digital input is on.

Alarm system status
select ALARM from the menu selection and choose ALARM SYSTEM STATUS from the options.

Press edit.
Press add alarm, a new row will be added.
Enter a descriptive name for your alarm.
Enter a name of your choosing for the board.
Enter the board number the alarm is generated from.
Enter the alarm number you programmed in the previous section (1 TO 8).

When the alarm is raised the alarm state column will show the word "alarm" and the time stamp will be applied by the system. after the alarm is cleared you must click on the acknowledge button to cancel it.

When an alarm is raised any ware in your system you will see the red word "alarm" in the bottom right corner of the main screen.

Note:- When placing a number in the "alarm#" box the alarms shown in the top boxes on the above screen are 1 to 8 the alarms in the bottom boxes are alarms 9 to 16.

The alarms on this screen are numbered 17 to 24

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Advanced programming structure.

Debug program

Changing or viewing one point

By pressing Alt D you can enter the debug mode. From here you are able to change or view the points separately.
For example, view contents of AO3.
Enter 1715 in to memory location and enter 1 in data packet. Example of data received will be.
5*2*57*1*116*184*3*
command structure:
5 = start of packet, 2 = board address, 57 = packet command, 1 = packet length
116 = is data, 184 = checksum, 3 = end of packet.

You can also place data in to the memory locations by entering the memory location in the memory location box
and entering the data in to the data packet window then click on the send data box.
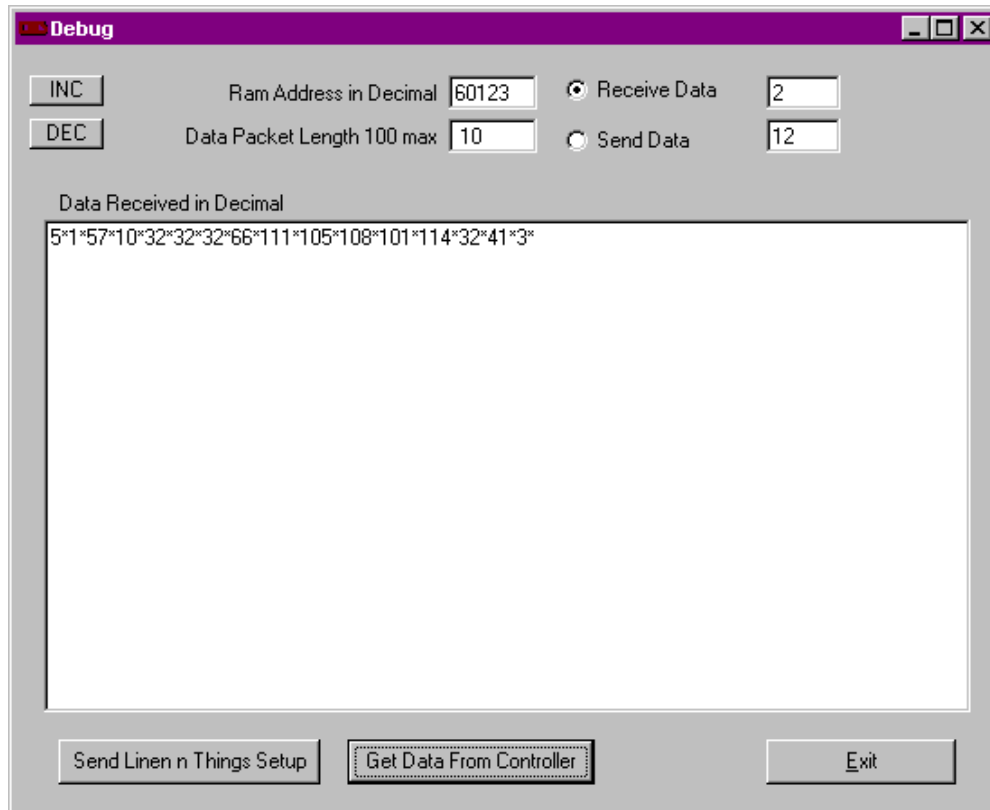
Logic programming

Note
The logic variable chart is supplied at the end of this Manual.

Program compiling
First Open Basyx Software
Click Centre of Screen.
Now Press the **ALT** and **L** key at the same time.

The Basyx Logic Program Should Appear, If Not Go to Step 1
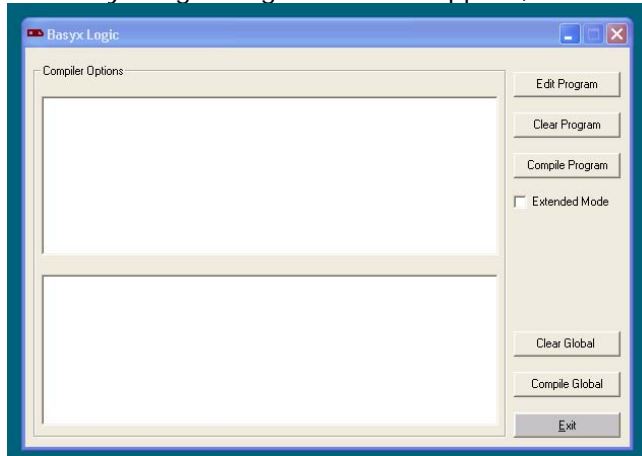
To Load a Logic Program first press the CLEAR button to remove any previous file next Press the **Compile Program** Button.

Now Select Your Logic Program (must be a .txt file) then Press the **Open** Button.
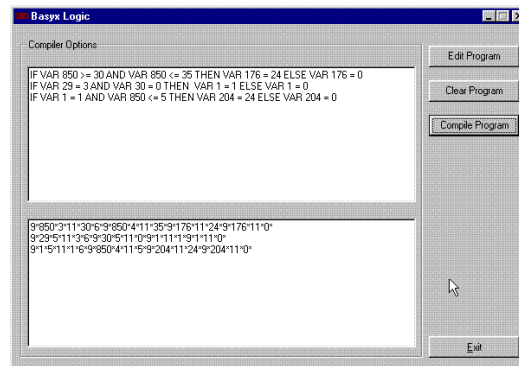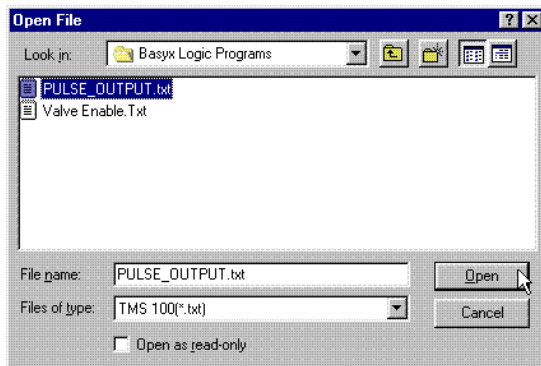
Your Program Will Compile and Then Down Load To the PSC Board.

Assembling a Logic file.

Important. To be able to understand Logic programming you will need have experience in computer programming languages. If you do not have these skills please contact you GCS supplier to manufacture the file for you. When using Logic programming be aware you will be directly affecting the GCS CPU contents if done incorrectly this can disrupt the existing pre-programmed routines. Do not under any circumstances try to affect other logic point than the one's shown in the logic table.

You write your logic file in Windows note pad.
The following commands are recognised by the system.
IF, THEN, ELSE, AND, OR, VAR.
And symbols < > =
Each line must consist of an argument (real or dummy) and an end of line command which is the symbol **;** After the end of line symbol you may choose to add comments these will be ignored by the system. SO a line may take the following format.

IF VAR 786 > 220 THEN VAR 768 = 1;   Place comments here.

The line above states if Analogue input 1 is higher than 22 Deg then Place digital output 1 into Manual on. Note you ignore decimal points when programming in logic.

In order to make your logic program easier to read you can place the program in CAPS and the comments in lower case you may also choose to add Tabs to your comments line.

The word "VAR" must proceed any logic location and each word or number must have one space between. All statements must start with the word "IF" and contain the word "THEN".

If you wish to maintain a logic location at a given value you may choose to use a dummy argument.

IF VAR 31 > 0 THEN VAR 64781 = 1;   Southern day light savings

In the above statement VAR 31 is the day of the month so will always be a number greater than zero VAR 64781 makes the BASYX PSC use the southern hemisphere day light savings routine instead of the northern hemisphere routine.

Basic Australian logic for all boards.
Following is a basic logic file used in Australia.

IF VAR 850 > 0 THEN VAR 1934 = 1;	turn on daylight savings change over
IF VAR 850 > 0 THEN VAR 64781 = 1;	enable day light savings
IF VAR 850 > 0 THEN VAR 776 = 1;	enable time over ride
IF VAR 850 > 0 THEN VAR 767 = 1;	enable man control
IF VAR 61056 = 1 THEN VAR 61054 = 0;	disable set point offsets
IF VAR 61056 = 1 THEN VAR 61025 = 1;	disable set point linking
IF VAR 850 > 0 THEN VAR 721 = 1;	set to Centigrade

Maths.
In order to perform a math routine you need to do the following.

Adding numbers together.
A number in VAR 64039 will be added to a number in VAR 64041 the result will be in VAR 64043

IF VAR 130 = 1 THEN VAR 64039 = VAR 1711;	move AI 1 to maths
IF VAR 130 = 1 THEN VAR 64039 = 10;	add 1 deg to AI1
IF VAR 130 = 1 THEN VAR 63767 = VAR 64043;	move answer to user variable
IF VAR 130 = 0 THEN VAR 63767 = 0;	reset user variable

In the above example if digital input 1 is on then the math routine will add 1 deg to the Analogue input 1 value and place the answer in to user variable 63767 when digital input 1 is off the user variable will reset to zero.

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Minus numbers.
A number in VAR 64045 will have the number in VAR 64047 removed from it the result will be in VAR 64049

IF VAR 131 = 1 THEN VAR 64045 = VAR 1711;   move AI 1 to maths
IF VAR 131 = 1 THEN VAR 64047 = 10;   minus 1 deg from AI1
IF VAR 131 = 1 THEN VAR 63769 = VAR 64049; move answer to user variable
IF VAR 131 = 0 THEN VAR 63769 = 0;   reset user variable

In the above example if digital input 2 is on the math routine will remove 1 deg from analogue input 1 value and place the answer in user variable 63769. When digital input 2 is off the user variable will reset.

The math VAR locations for multiply and divide can be found in the logic variable chart.

User Variables.
User Variables are memory locations that you can use as you wish to store and manipulate data. These are VAR 63767 through to VAR 63863 they are 2 byte values only place data in the odd numbers. If you require more user variables you can choose to turn history recording off and also use VAR 10074 to 14074 use even numbers only. Normally a Logic file can only be 100 lines long but with histories disabled you may produce a much longer program you must however tick the "extended logic" box when you down load the program to the BASYX PSC.

High signal select. First enable global alarms.
This enables you to keep a count of how many boards require heating or cooling so you can decide when you require the boiler or chiller to operate.
The VAR used are.
VAR 64079 high signal counter 1 at board 1
VAR 64081 high signal counter 2 at board 1
VAR 64076 high signal 1 at slave board
VAR 64077 high signal 2 at slave board

Assuming Digital output 2 on each board is used for the heat valve and digital output 3 is used for the cool valve. Here is an example of the logic program used in each board numbered 2 upwards.

IF VAR 714 = 1 THEN VAR 64076 = 1 ELSE VAR 64076 = 0;   set counter 1
IF VAR 715 = 1 THEN VAR 64077 = 1 ELSE VAR 64077 = 0;   set counter 2

At board 1 assume digital output 1 starts the boiler and digital output 2 starts the chiller the program is as follows.

IF VAR 64079 > 4 THEN VAR 768 = 2;   set DO1 to auto
IF VAR 64079 < 2 THEN VAR 768 = 0;   reset DO1 to manual off
IF VAR 64081 > 4 THEN VAR 769 = 2;   set DO2 to auto
IF VAR 64081 < 2 THEN VAR 769 = 0;   reset DO2 to manual off

This will cause the output in question to go on if more than 4 boards call for boiler/chiller and off again if less than 2 call.

PSC auto reset
Variable 63865 enables the automatic soft reset function, which is similar to pressing the reset button on the board. Variable 63866 sets the hourly cycle for this to happen from the point at which you enable 63865. For example, if you have a system that seems to lock up for some reason, you could enable Variable 63865 at 1:00am and disable it at 5:00am and if you set 63866 to 1 it would reset the board every hour during that period - It is not based on the clock, but rather every hour from the point that the enable variable is set.

Timers. Enable by setting VAR 61056 TO 1
20 count down timers are included in the logic programming instructions they will always try to count to zero unless you keep them at a higher value.

Example.
IF VAR 31 > 0 THEN VAR 64056 = 1;	enable timers
IF VAR 714 = 1 THEN VAR 63999 = 500:	set timer 1
IF VAR 63999 > 10 THEN VAR 771 = 1;	set DO4 on
IF VAR 63999 = 0 THEN VAR 771 = 0;	reset DO4

In the above logic file if Digital output 2 is on the timer will be held at 500 (seconds) when digital output 2 is off the timer will count down until it reaches zero, when it does digital output 4 will go off. This behaves as a delay off timer for digital output 4.

Global logic.
You can also choose to form a global logic file. This file allows you to send any data to and from board 1 to any other board. Note to send data from say board 4 to board 6 you would have to send it via board 1 as follows.

In the following example we will move data from board 4 to board 6 the VAR we will move is User VAR 63767.

4,18,63767,63767
Please note you can not add comments with this form of logic. The above statement will move data from board 4 VAR 63767 to board 1 VAR 63767

6,2,63767,63767
The above statement will move data from board 1 VAR 63767 to board 6 VAR 63767

When uploading this logic file to board 1 first "**clear global**" then "**compile global**"

Example of broadcast Variable.
255,2,1711,1711
The broadcast variable sends contents of variable XXXX to all boards. The boards are constantly looking for this address (255) and will retrieve the value immediately, rather than waiting in order when done board by board. In the example shown above the contents of Variable 1711 at board 1 will be send to Variable 1711 at all other boards. This is very good for functions that require immediate operation by the boards.

Logic notes
1) logic files can be up to 100 lines long when histories are used.
2) If histories are disabled you can assemble logic files up to 1000 lines long. This the same for both standard logic and global logic files. In order for this to work you must disable histories in the board first by clicking on the "global enable" box in the history set up screen. Next when you are loading the file make sure you click on "extended mode" before clicking on "Compile program".
3) when using a GLOBAL file on board 1, you must check the box on the history setup screen which tells the system you are using a global file. This moves the history memory location to allow room for the global file. If you use the extended logic control you can not use history on board 1.

Appendix A
Notes

Special requirements for board one.
Input 8 must be the OAT sensor.
If you back wire an output to an input on board one you can use that input to set a global time schedule, by making all boards look at that input for daily schedules.

Board name change
To change the board names to the required one's use the format (*name*_2.GCS) for board 2.
If you need a system of boards to look for another board on start up instead of board 1 go to the file manager and add a leading letter A or zero to the front of the board file you wish to start up with.

Logic down loading
When down loading logic files make sure you clear any previous file first otherwise errors can be caused both to the logic file and to other set points.

Resetting board memory.
To reset board memory do the following..
- Record settings on the board dip switches.
- Turn board off.
- Put all dip switches on .
- Turn board on .
- wait until the red light flashes.
- Turn board off.
- Change the dip switches back to original settings.
- Turn board on. The board is now ready to accept a new program.

Appendix B
Start up check list.
Pre start, Examine the boards for
1. All wiring connected to the correct points and no stray wire strands shorting out to the adjacent points.
2. Dip switches set correctly (note communication will be erratic or not work at all if 2 or more boards have the same binary number).
3. Fuses installed.
4. Any add on boards correctly connected.
5. Fail safe termination installed.

Connect power to board.
1. Make sure the green light is on steady and the red light is flashing. If not reset the board.
2. Look at the board file on the PC to see if it is getting information from the board.
3. Examine the board file to see if all your wired inputs are showing the correct data.
4. Set the on board time clock to the correct setting.
5. Enter programming instructions.

Resetting a board
Set all dip switches to on press the reset button then power up the board for a few seconds, power down and change the dip switches back to there correct settings.

Appendix C

PSC Fail safe bus termination.
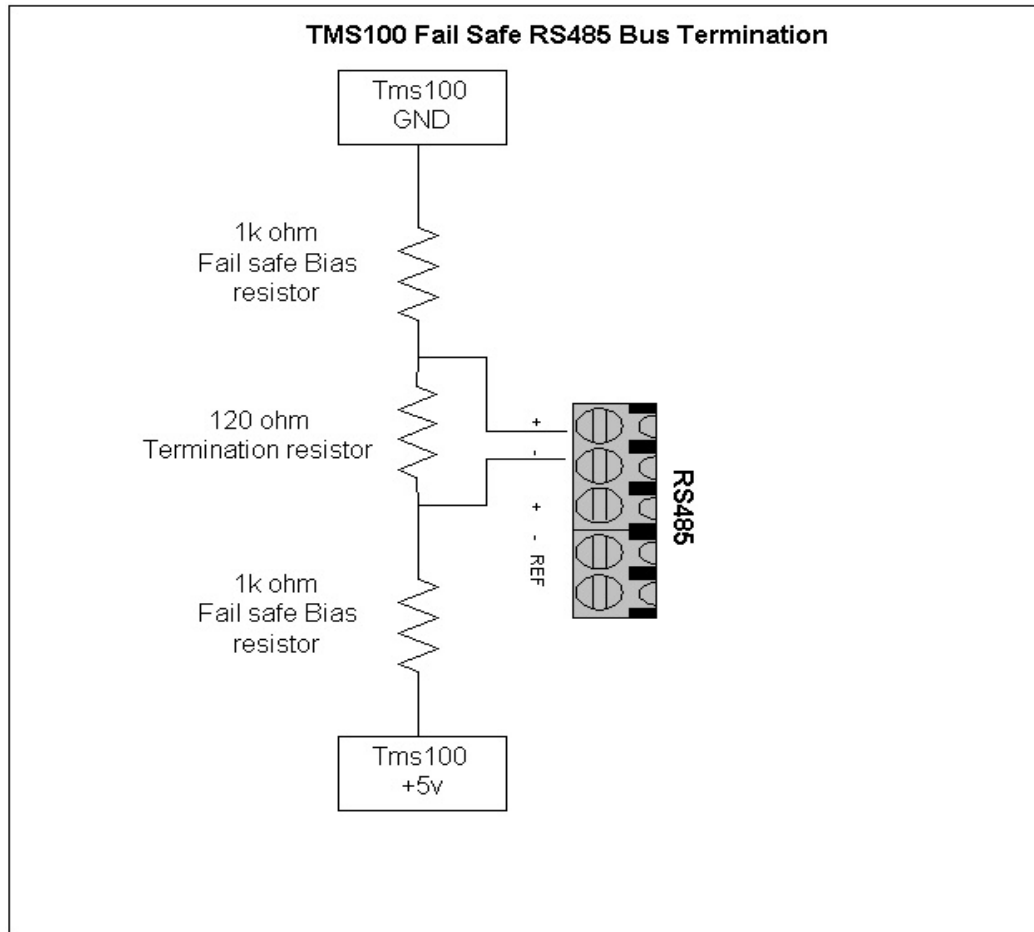
Appendix D

Update register.

PSC Firmware update revisions.
Version 0.3.6
>   Added high signal select.

Version 0.3.7
>   Changed communication from board direct to PC from 2400 to 9600 Baud

Version 0.3.8
>   Added DO status points 64631 64638

Version 0.3.9
>   **Beta version** greatly increased global command communication speed.
>   Min value can now be greater than Max value in set up screen.
>   Added 0-10V span setup so min value can be greater than max.

Version 0.4.0
>   Global speed decrease.

Version 0.4.1
>   Removed alarm dial out
>   RS484 Baud rate adjustable added
>   Removed floating point control.

BASYX PSC firmware update revisions.
Version 1.0.4.
>   Added 0-10V span setup.

Version 1.0.5
>   Decrease global speed (causing coms error)

Version1.0.6.
>   Push button reset added. Upgrade speeds Bus speed to 56600 direct connect to 19200

Software update revisions.
Version 1.9.36
>   Added 2000 user variables when histories turned off.
>   1.9.39
>   extended logic files when histories turned off.
>   1.9.40
>   Fix up for ASC100 meter reading

Appendix E
BASYX PSC requirements and notes.

The DIP switches located on the board are set as follows:

1. The row closest to the edge of the board controls the 10vdc excitation voltage for the analog inputs. This switch should always be ON except when using a low impedance self-powered voltage sensor i.e.: current sensors, etc. We have only seen a couple of instances where this would be the case.

2. The inner row of switches controls the 499 ohm resistor required for a 4-20ma input. This switch should remain OFF unless using a 4-20ma input.

Power supply modification.

The older BASYX PSC boards are full wave rectification power supples while this is a good thing it is not fully compatible with 0-10VDC and 4ma to 20ma input sensors that are half wave types (3 wire). To make the BASYX PSC compatible you need to change it to a half wave board. To do this turn the board upside down locate the 2 power supply diodes they are black and are located just below the GOWANDA unit they are directly connected to the power supply pins L1 and L2. Remove the diodes from the board then solder in a link across the diode that was connected to terminal L2. the BASYX PSC is now a half wave board and is compatible with 3 wire input devices.

Note a BASYX PSC half wave board will not talk to a full wave board or PSC's

RS484 communications.

Install 120 Ohms resister across + to _ on last board in line
Connection a PC to board 1 stops global communications, connect instead to another board.
If the PC is a long way from the boards use a USB to RS484 converter at the PC then use a RS484 to RS232 at the board end of the cable. Do not connect directly in to the RS484 loop as this can cause data corruption.

Appendix F
Fault finding.

Problem	Solution
RS484 communication loss	Install fail safe termination. This is particularly important on long cable runs. Look for open or closed circuit, one faulty board can stop all so connect boards one by one to the loop. **Note a BASYX PSC half wave board will not talk to a full wave board or PSC's**
Unusual voltages showing up on communication cables.	This can cause boards to be damaged. Possible cause is when several transformers are used on the same project. Floating voltages can be up to line voltage with respect to ground and the difference can show on RS484 loop. To fix this earth one side of all transformers making sure it is the same side. Also with rev3 boards using the ref terminals will compensate.
AO not working or not seeing the correct voltage.	Ensure that the device you are controlling and the GCS board are both referenced to the same common. If not 24VAC can be passed from the device back to the GCS board causing damage to the AO card and possible communication and control problems with the other parts of the board. *Hint on many devices* G=*24V active* GO=*24V common* Y=*control voltage (0-10V or 4-20ma)*
Data corruption	Although many causes can be attributable to this the main 2 to look out for are. 1) Soft ware caused, ensure you delete a logic file before installing a new or modified version as it may place it in different memory locations causing confusion with the original. 2) Voltage caused, Motor or contactor switching may cause a voltage spike. Install MOV's or .1uf caps over outputs and power supply input to the board.

Appendix G

PSC/150 logic variable chart

Time

Days and times

Day of WK	28	Day light savings on set 1934 = 0
Hour	29	BASYX PSC USA day light savings set 64781 to 0
Min	30	BASYX PSC Australian day light savings set 64781 to 1
Day	31	BASYX PSC Europe day light savings set 64781 to 2
Month	32	
Year	33	PSC Southern Hemisphere day light savings set 64801 to 1
MSB Ver no	34	
LSB Ver No	35	
Seconds	850	

Hours on and off times   **Time Schedules enable 1397**

	L1	L2	L3	L4	L5	L6	L7	L8
Mon Hr on	174	202	230	258	286	314	342	370
Mon min on	175	203	231	259	287	315	343	371
Mon hr off	176	204	232	260	288	316	344	372
Mon Min off	177	205	233	261	289	317	345	373
Tue Hr on	178	206	234	262	290	318	346	374
Tue min on	179	207	235	263	291	319	347	375
Tue hr off	180	208	236	264	292	320	348	376
Tue Min off	181	209	237	265	293	321	349	377
Wed Hr on	182	210	238	266	294	322	350	378
Wed min on	183	211	239	267	295	323	351	379
Wed hr off	184	212	240	268	296	324	352	380
Wed Min off	185	213	241	269	297	325	353	381
Thr Hr on	186	214	242	270	298	326	354	382
Thr min on	187	215	243	271	299	327	355	383
Thr hr off	188	216	244	272	300	328	356	384
Thr Min off	189	217	245	273	301	329	357	385
Fri Hr on	190	218	246	274	302	330	358	386
Fri min on	191	219	247	275	303	331	359	387
Fri hr off	192	220	248	276	304	332	360	388
Fri Min off	193	221	249	277	305	333	361	389
Sat Hr on	194	222	250	278	306	334	362	390
Sat min on	195	223	251	279	307	335	363	391
Sat Hr off	196	224	252	280	308	336	364	392
Sat min off	197	225	253	281	309	337	365	393
Sun Hr on	198	226	254	282	310	338	366	394
Sun min on	199	227	255	283	311	339	367	395
Sun Hr off	200	228	256	284	312	340	368	396
Sun min off	201	229	257	285	313	341	369	397

Schedule position boxes   **Enable time schedules Variable 1397**

Code controls 2 position boxes place a number 1 to 15 will put a number in pos box 2
by placing a number in the box 20 will put a 1 in box 1 and a 4 in box 2

	L1	L2	L3	L4	L5	L6	L7	L8
Mon 1,2	1398	1412	1426	1440	1454	1468	1482	1496
Mon 3,4	1399	1413	1427	1441	1455	1469	1483	1497
Tues 1,2	1400	1414	1428	1442	1456	1470	1484	1498
Tues 3,4	1401	1415	1429	1443	1457	1471	1485	1499
Wed 1,2	1402	1416	1430	1444	1458	1472	1486	1500
Wed 3,4	1403	1417	1431	1445	1459	1473	1487	1501
Thur 1,2	1404	1418	1432	1446	1460	1474	1488	1502
Thur 3,4	1405	1419	1433	1447	1461	1475	1489	1503
Fri 1,2	1406	1420	1434	1448	1462	1476	1490	1504
Fri 3,4	1407	1421	1435	1449	1463	1477	1491	1505
Sat 1,2	1408	1422	1436	1450	1464	1478	1492	1506
Sat 3,4	1409	1423	1437	1451	1465	1479	1493	1507
Sun 1,2	1410	1424	1438	1452	1466	1480	1494	1508
Sun 3,4	1411	1425	1439	1453	1467	1481	1495	1509

	1	2	3	4	5	6	7	8
Hr on	1510	1514	1518	1522	1526	1530	1534	1538
Min on	1511	1515	1519	1523	1527	1531	1535	1539
Hr off	1512	1516	1520	1524	1528	1532	1536	1540
Min off	1513	1517	1521	1525	1529	1533	1537	1541

	9	10	11	12
Hr on	1542	1546	1550	1554
Min on	1543	1547	1551	1555
Hr off	1544	1548	1552	1556
Min off	1545	1549	1553	1557

Timers you can read and write to both high & low bytes

	MSB	LSB
1	63999	64000
2	64001	64002
3	64003	64004
4	64005	64006
5	64007	64008
6	64009	64010
7	64011	64012
8	64013	64014
9	64015	64016
10	64017	64018

Enable timers 61056. 1 sec per digit on low byte

	MSB	LSB
11	64019	64020
12	64021	64022
13	64023	64024
14	64025	64026
15	64027	64028
16	64029	64030
17	64031	64032
18	64033	64034
19	64035	64036
20	64037	64038

Digital inputs
Digital input positions

		on/off	MSB	LSB
Never write to DI low byte	DI1	130	134	135
	DI2	131	136	137
	DI3	132	138	139
	DI4	133	140	141

Digital input time over ride

	DI1	DI2	DI3	DI4
LOW	1258	1261	1264	1267
HIGH	1259	1262	1265	1268

Digital input time accumulation

	Min		Sec
DI1	1663	1662	1661
DI2	1666	1665	1664
DI3	1669	1668	1667
DI4	1672	1671	1670

Reset KW data Base

KWH	726	727
KW	736	737
KWP	847	848
ALL	757	758

Pulse per meter

	MSB	LSB		MSB	LSB
DI1	445	446	DI3	1377	1378
DI2	1375	1376	DI4	1379	1380

Binary code for DI over ride
Example to switch DO3 & DO6= 4+32 = 36 enter 36 into box

DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
1	2	4	8	16	32	64	128

Analog inputs

Average positions

AI6,1	AI6,2	AI6,3	AI6,4	AI7,1	AI7,2	AI7,3	AI7,4
1701	1702	1703	1704	1705	1706	1707	1708

Universal input average input 6=1865, input 7 =1867

AI positions

	AI1	AI2	AI3	AI4	AI5	AI6	AI7	AI8
LSB	1711	1713	1715	1717	1719	1721	1723	1725
MSB	1712	1714	1716	1718	1720	1722	1724	1726
AI fast	1727	1729	1731	1733	1735	1737	1739	1784
	If above VAR > 150 then ON if VAR < 100 then OFF							
Virtual	1759	1761	1763	1765	1767	1769	1771	1773

You can read Virtual data within logic files without attaching it to an input providing global is enabled. This will allow you to have all 8 AI used locally but still be able to use global outside air temperature etc at the board.

Digital outputs

Digital output positions. Enable Man on 767
Timed override enable 776. DI read/write 0=off 1=on 2=auto

	DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
Read only	713	714	715	716	717	718	719	720
R+W	768	769	770	771	772	773	774	775
time in min	777	778	779	780	781	782	783	784

Push button over ride enable 785

	DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
Sensor	786	788	790	792	794	796	798	800
time	787	789	791	793	795	797	799	801

Over ride timers

	DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
Hi byte	858	860	862	864	866	868	870	872
Low byte	859	861	863	865	867	869	871	873

Min on/off

		DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
Enable	ON	1617	1619	1621	1623	1625	1627	1629	1631
1616	OFF	1618	1620	1622	1624	1626	1628	1630	1632

Set point control Mode 0=disable, 1= cool, 2=heat, 3=heat. cool, 4=auto

	DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
Mode	1775	1781	1787	1793	1799	1805	1811	1817
Sensor	1776	1782	1788	1794	1800	1806	1812	1818
Set point	1777	1783	1789	1795	1801	1807	1813	1819
DB on	1779	1785	1791	1797	1803	1809	1815	1821
DB off	1780	1786	1792	1798	1804	1810	1816	1822
Set back C	1823	1827	1831	1835	1839	1843	1847	1851
set back H	1825	1829	1833	1837	1841	1845	1849	1853

DO current mode 0=unoccupied 1=occ time sch, 2=occ override

DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
64631	64632	64633	64634	64635	64636	64637	64638

Logic control of outputs   0 = Auto 1 = On, 2 = Off

DO1	DO2	DO3	DO4	DO5	DO6	DO7	DO8
64654	64655	64656	64657	64658	64659	64660	64661

Retrieve load status. 803 to 812 1=man override, 2=pushbutton override, 3=timed override, 4=temperature alarm, 5=temperature unoccupied, 6=demand load shed, 7=holiday schedule, 8=temperature occupied, 9=daily sch, 10=timer override sec, 12=Auto/man override, 13= lead lag control, 14 time watch over ride, 15= time schedule, 16 min on/off, 17 override global, 18=global man off, 19=duty cycle, 20 Di, DO alarms, 21=Di AI alarms. 24 Logic control

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HOA switch position
current position

to get the current switch positions calculate 85 from the Manual on position

Variable 1574 outputs 1 to 4.

output	Auto add	Off add
1	1	2
2	4	8
3	16	32
4	64	128

Variable 1575 outputs 5 to 8

output	Auto add	Off add
5	1	2
6	4	8
7	16	32
8	64	128

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Analog outputs

AO position Raw value of
current position

	AO1	AO2	AO3	AO4
	1294	1295	1296	1297

AO action 0=direct, 1=reverse, link =output 1to8
Loop 0=disable, 1= enable, econ 0=disable, 1=enable

	enable	sen	set	del	act	gain	def	econ	link
AO1	1302	1303	1304	1306	1307	1308	1309	1310	1311
AO2	1312	1313	1314	1316	1317	1318	1319	1320	1321
AO3	1322	1323	1324	1326	1327	1328	1329	1330	1331
AO4	1332	1333	1334	1336	1337	1338	1339	1340	1341

^

AO positions Min and Max

		AO1	AO2	AO3	AO4
set positions	Min	1566	1568	1570	1572
	Max	1567	1569	1571	1573

Alarms

Global alarms, activate global alarms, set 1875 to 1 at slave boards, Board 1 bit 1875 will now be set you will have to reset it in a

Digital input Digital output alarms. enable 60775

	1	2	3	4	5	6	7	8
Input on/off	60776	60782	60788	60794	60800	60806	60812	60818
action	60777	60783	60789	60795	60801	60807	60813	60819
output	60778	60784	60790	60796	60802	60808	60814	60820
status	60779	60785	60791	60797	60803	60809	60815	60821
time del HI	60780	60786	60792	60798	60804	60810	60816	60822
time del low	60781	60787	60793	60799	60805	60811	60817	60823

Note. the (Input on/off) low nibble = the Digital input   the (input on/off) high nibble = action on/off

Digital input Analog output alarm. enable 60824

	1	2	3	4	5	6	7	8
DO & on/off	60825	60833	60841	60849	60857	60865	60873	60881
AI No &h/L	60826	60834	60842	60850	60858	60866	60874	60882
set point low	60827	60835	60843	60851	60859	60867	60875	60883
set point hi	60828	60836	60844	60852	60860	60868	60876	60884
output	60829	60837	60845	60853	60861	60869	60877	60885
status	60830	60838	60846	60854	60862	60870	60878	60886
reload hi	60831	60839	60847	60855	60863	60871	60879	60887
reload low	60832	60840	60848	60856	60864	60872	60880	60888

Alarm Var 60833 = 19. 19 bin = 000100111
MSB action data LSB output data therefore turn out 3 on

Action	data		LSB	Data		LSB	Data
off	0000		DO1	0001		DO5	0101
on	0001		DO2	0010		DO6	0110
Dial out	0010		DO3	0011		DO7	0111
on Dial out	0011		DO4	0100		DO8	1000
off dial out	0100						

Example **AI No &h/L** Low nibble = AI number   high nibble = above or bellow set point

Links

Output link

L1	L2	L3	L4	L5	L6	L7	L8
15	16	17	18	19	20	21	22

Set point links	cool	heat
Enable	**low**	**low**
61025	61026	61028

To disable set point inputs set 61054 = 0 and 61025 = 1.

	1	2	3	4	5	6	7	8
set point link	61030	61033	61036	61039	61042	61045	61048	61051
link offset low	61031	61034	61037	61040	61043	61046	61049	61052
link offset high	61032	61035	61038	61041	61044	61047	61050	61053

61054 adjust heating cooling set point with input   61055 input link

Outdoor air lock out

		Enable	23			
change over set point	LSB	24		MSB	25
Dead band	Cooling	26		heating	27

Logic notes.

Cause board 1 to read all global data set 1614 to 1 every so often.
Power up reset counter 1601 can read and write to.

Global Plant call signals *Enable global alarms first*
Var 64079 counter one at board one   Var 64081 counter two at board one
Var 64076 signal one enable slave boards.   Var 64077 signal two enable slave boards.
 Counter at board 1 keeps the total of slave boards that have the Variable > 0. this is used to start chillers/Boilers when there is enough demand.

Automatic soft reset.
Var 63865 1 = enable 0 = disable
Var 63866   hour reset is to occur

History reset.
Analog inputs 757 & 758 set to 0
DO/DI run times 63869 & 63870 set to 0
History disable Var 60694, set to zero to disable histories

Math's

Additions number in	**64039** added to	**64041** result in	**64043**
Minus number in	**64045** minus	**64047** result in	**64049**
Multiply number in	**64051** by	**64053** result in	**64055**
Divide number in	**64057** divided by	**64059** result in	**64061**

User Variables.
Var 63767 to 63863 Odd number only (high byte used when numbers over 255
Also Var 10074 to 14074 even numbers only. Disable histories first.

Global commands
Global over ride timer. Enable= Var 1937   Var 1963 on board 1 enable global overrides
enable global override on global I/O set up. use these Var on board address 1 only
ex set Var 1954 to 1 will turn on DO1 on all boards.

Timers.	1	2	3	4	5	6	7	8
Variable	1954	1955	1956	1957	1598	1959	1960	1961

Global script
When Global communication is enabled do not use histories at board 1.

Global Data example.
2,2,63763,63763 move B1 Var 63763 to B2 63763
3,2,63763,63765 move B1 Var 63763 to B3 63765
2,18,1771,1711 this script moves data from Var 1771 of slave board 2 to Var 1711 of board 1
2,17,1771,1711 this moves data from Var 1711 of board 1 to Var 1771 of board 2

Use 255 to broadcast a number to all boards example 255,2,1711,1711 will send contents of 1711 B1 to 1711 in all other boards

Decimal to Binary

	0	1	2	3	4	5	6	7
0 to 7	0000	0001	0010	0011	0100	0101	0110	0111
8 to 15	1000	1001	1010	1011	1100	1101	1110	1111
16 to 23	10000	10001	10010	10011	10100	10101	10110	10111
24 to 31	11000	11001	11010	11011	11100	11101	11110	11111
32 to 39	100000	100001	100010	100011	100100	100101	100110	100111
40 to 47	101000	101001	101010	101011	101100	101101	101110	101111
48 to 55	110000	110001	110010	110011	110100	110101	110110	110111
56 to 63	111000	111001	111010	111011	111100	111101	111110	111111

Appendix H
Engineering notes

Graphic file structure

From a file structure standpoint, the following applies:

The first screen file name must be on LINE 34 of the text file....
The first of the 2 zeros must be on LINE 67 of the text file....
The number of lines in the file must be on LINE 101 of the text file (311 shown below)

The lines which put data on the screen must begin with increment 101, then the lines must be in numerical order.
The number of lines shown on line 101 (311) will always be one more than the increment in the last line of the file.