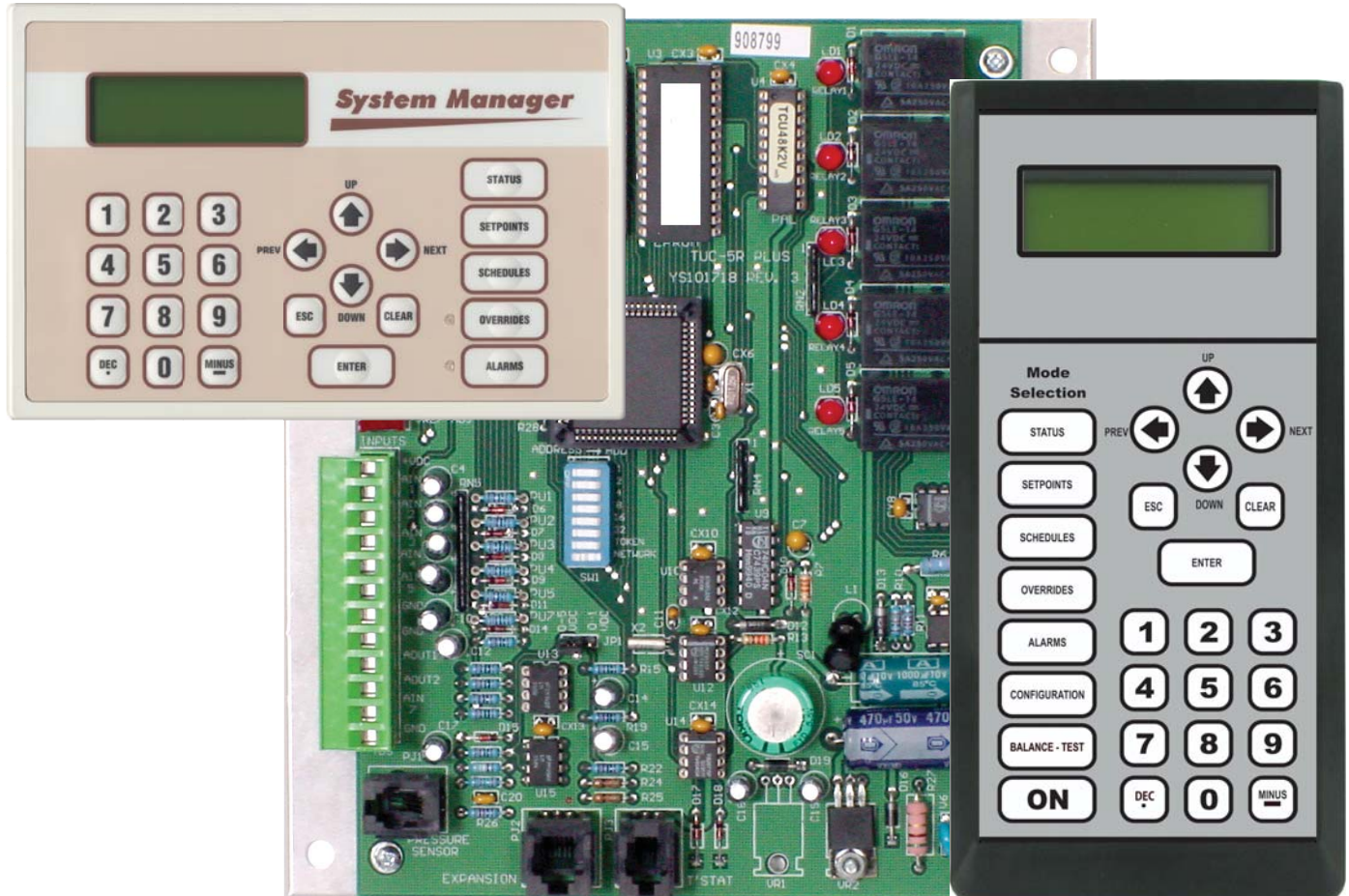




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VAV/CAV/MUA II Controller Operator Interface SD Technical Guide

VAV/CAV Controller Code: SS1003
MUA II Controller Code: SS1004
VAV/Zone Controller Code: SS1001, SS1005, SS1025
Requires Modular Service Tool SD Code: SS1063
Requires Modular System Manager SD Code: SS1064



IMPORTANT NOTICE

This technical guide provides instructions for using the Modular Service Tool SD and Modular System Manager SD with the VAV/CAV, MUA II & VAV/Zone Controllers only. If you are using a different controller, you can download the applicable SD Technical Guide listed below from our website at <http://orioncontrols.com/literature-new.html>. The technical guides can also be printed from the SD card.

VCM-X & VCM-X E-BUS Controller - OR-VCMXRNEOISD-TGD
VCM Controller - OR-VCMOISD-TGD
RNE Controller - AA-VCMXRNEOISD-TGD
SA E-BUS Controller - AA-SAOISD-TGD
VCB-X Controller - OR-VCBXOISD-TGD

SD CARD UPDATING INSTRUCTIONS

The Modular Service Tool and Modular System Manager are equipped with an SD memory card. This SD card can be removed and easily updated through a computer by downloading updates, as they become available, from our website to your computer.

In order to perform any updates, your computer needs an SD card drive or you will need to purchase an SD card adapter.

Download instructions are found in Appendix B on page 68 of this manual.



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Modular Service Tool SD

Modular Service Tool SD

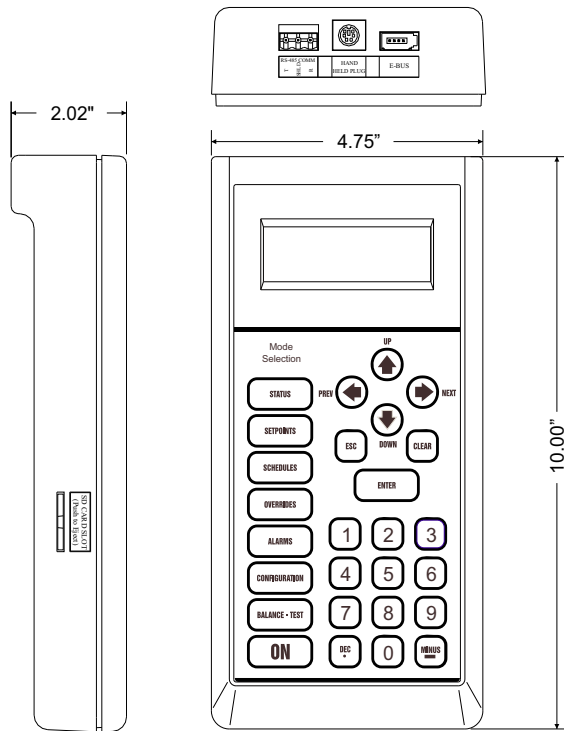


Figure 1: Modular Service Tool SD Dimensions

The OE391-12 Modular Service Tool SD is a system operator interface that provides a direct link to enable the system operator to view the status, configure, and adjust the setpoints of the VAV/CAV, MUA II, VCM, VCM-X, VCM-X E-BUS, RNE, VCB-X, SA E-BUS or VAV/Zone Controller on the control system communications loop. However, this manual only applies to VAV/CAV, MUA II, and VAV/Zone Controllers. See note in the inside front cover for the list of manuals that pertain to other controllers.

The Modular Service Tool is housed in an attractive black plastic enclosure. The display area is covered with a clear plastic bezel for protection of the display screen. The Modular Service Tool has a 4-line-by-20-character display panel with adjustable contrast control and a 27-key membrane keypad for data selection and entry. All keypad operations are simple and straight forward, utilizing non-cryptic plain English language messages. Menu-driven programming allows for easy setup and operation without the need for specialized training. The Modular Service Tool is supplied with a programmable 4 Gigabyte SD memory card, with (4) AA 1.5 V batteries, a wall mount a DC power supply, a mini-Din communication cable, and an E-BUS communication cable. The mini-Din cable allows you to connect the Modular Service Tool to any Orion controller which has a mini-Din connector socket for programming, monitoring, and troubleshooting purposes.

The Modular Service Tool is also equipped with an EBC E-BUS port and an RS-485 three conductor terminal block port. The E-BUS port and included E-BUS cable are used for updating E-BUS Module software (described in Appendix C). The RS-485 port is used for hard-wiring to older controllers that do not have a mini-DIN connector socket.

The Modular Service Tool is designed to be hand-carried. Its rugged plastic housing provides superior protection for the electronic components housed inside. The Modular Service Tool is a top-quality service tool that will stand up to the demands of the typical job site environment for many years.

Modular Service Tool SD

Whether you have a Stand Alone, Interconnected, or Networked Orion Controls System, the Modular Service Tool always connects to the controller or a VAV/Zone Controller via a prefabricated cable that is supplied with the service tool. The Modular Service Tool cable is terminated on both ends with a mini-DIN connector. Attach one end to the Modular Service Tool and the other end to the mini-DIN connector on the controller. If this is an Interconnected System, all controllers that are interconnected with communications cable can be programmed from any controller on the loop. If this is a Networked System, all controllers on the entire Networked System can be programmed from one controller.

Be sure that the Modular Service Tool's SD memory card is inserted correctly and that the Modular Service Tool has fresh batteries installed or that it is connected to a power source using the supplied power pack before attempting any programming of the controller. See **Figure 2** for connection details.

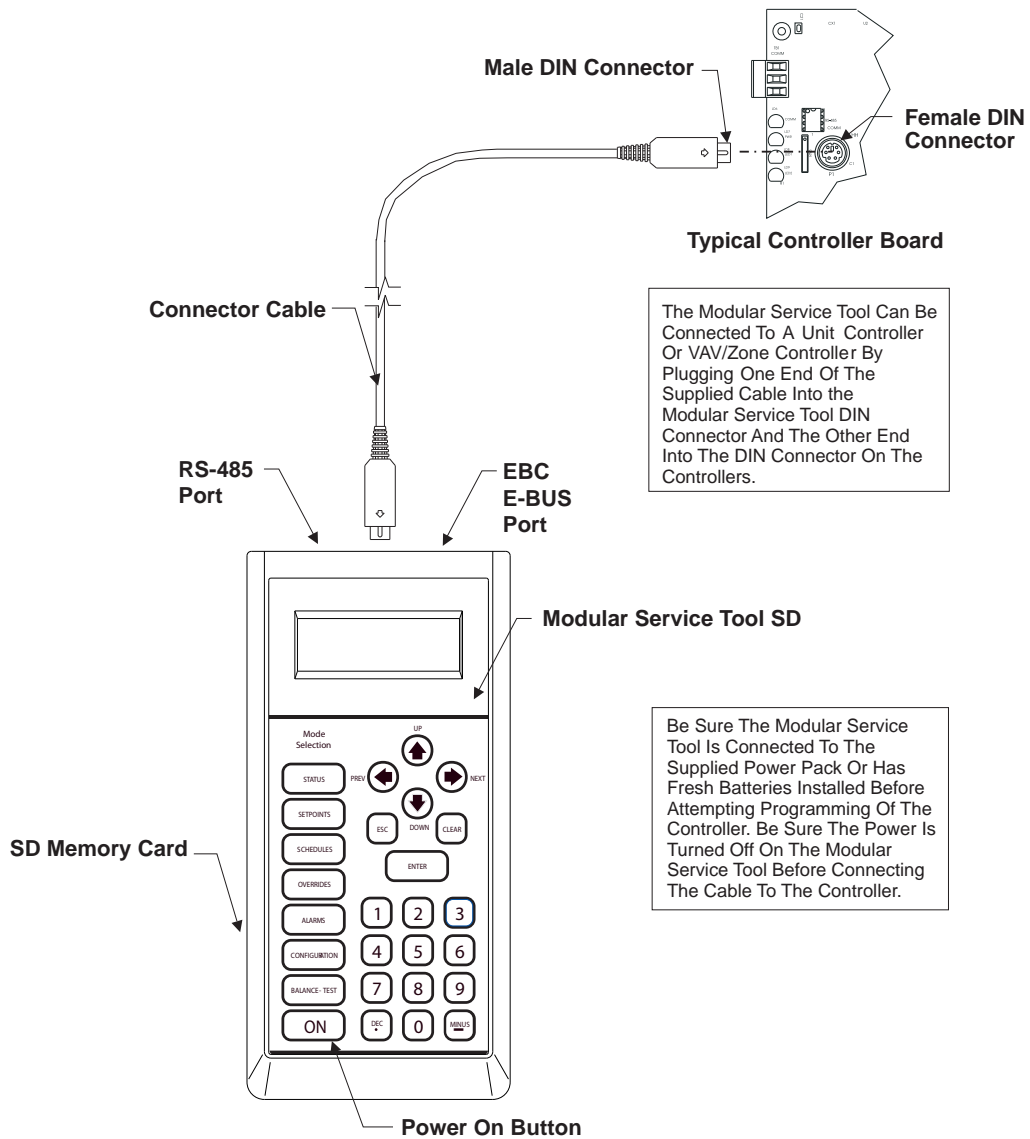


Figure 2: Modular Service Tool SD

Modular System Manager SD

Modular System Manager SD

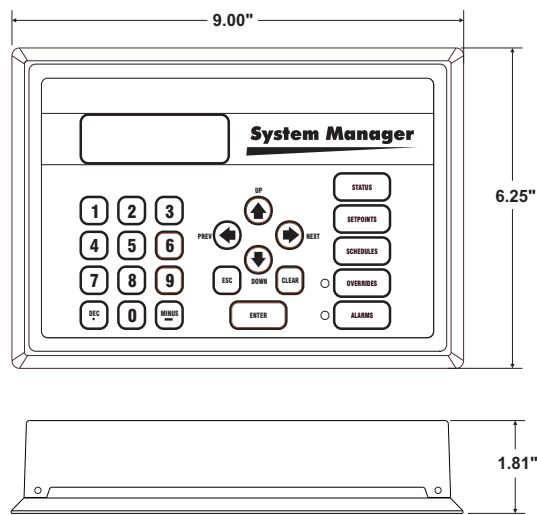


Figure 3: Modular System Manager SD Dimensions

The OE392-12 Modular System Manager SD provides a direct link to enable you to view the status and adjust the setpoints of the VCM-X, VCM-X E-BUS, VCB-X, RNE, SA E-BUS, VCM, VAV/CAV, MUA II or VAV/Zone Controller on the control system communications loop. The System Manager SD is housed in a beige-colored plastic enclosure. The System Manager has a programmable 4 Gigabyte SD card and is equipped with a 4-line-by-20-character backlighted display panel and a 24-key membrane keypad for data selection and entry. All keypad operations are simple and straight forward, utilizing non-cryptic plain English language messages. Menu-driven programming allows for easy setup and operation without the need for specialized training. The System Manager also has 2 integral LEDs for user notification of system alarm conditions and override initiations. Protection from unauthorized users is provided by the System Manager's integral multi-level passcode authorization programming.

On a Networked System, the Modular System Manager is connected to the communications and power loop of the system via modular cables that simply plug into the System Manager board and the Power/Comm Distribution Board. This virtually eliminates wiring errors and makes installation fast and easy. When it is to be connected to a Stand-Alone system, a cable with modular connectors on one end and stripped wire ends on the other end is provided to facilitate connecting communications and power to the Modular System Manager from the 24 VAC power source and the HVAC unit controller communication wiring terminals.

The Modular System Manager is designed for wall mounting. Mounting holes are provided to attach the Modular System Manager to a standard handy box. It is recommended that the System Manager be mounted at approximately eye level to allow for ease of programming and reading of the display. The System Manager is typically mounted in the building manager's or superintendent's office or in an equipment room. The attractive enclosure is quite suitable for mounting in any location.

Modular System Manager SD Network Connection

Network Connection

As previously described, when you are connecting the Modular System Manager to a Networked System, the Modular System Manager is connected to the communications and power loop of the system via modular cables. These cables simply plug into the System Manager board and to any device with modular connectors on any local loop on the system. Devices with modular connectors include the Power/Comm Distribution Board, VAV/Zone controller, and MiniLink Polling Device. By using these plug-in connections, wiring errors are virtually eliminated and system installation is fast and easy. See **Figure 4** below for typical connection information. See **Figure 5 on page 8** for typical Power/Comm board wiring and connection information.

When the System Manager is to be connected to a Stand Alone system, a 12-foot cable with modular connectors on one end and stripped wire ends on the other end is provided for this purpose. This is used to facilitate connecting communications and power wiring to the Modular System Manager from a 24 VAC power source and to the HVAC unit controller communication wiring terminals. See **Figure 6 on page 9** for wiring details. If the supplied cable wire is not long enough for your installation, a standard modular cable of the correct length can be purchased through WattMaster and one of the modular connectors can be cut off to allow for the transformer and communication terminal wiring connections. It is recommended that you do not splice the communications wire if at all possible. The transformer should be rated at 6 VA minimum power output.

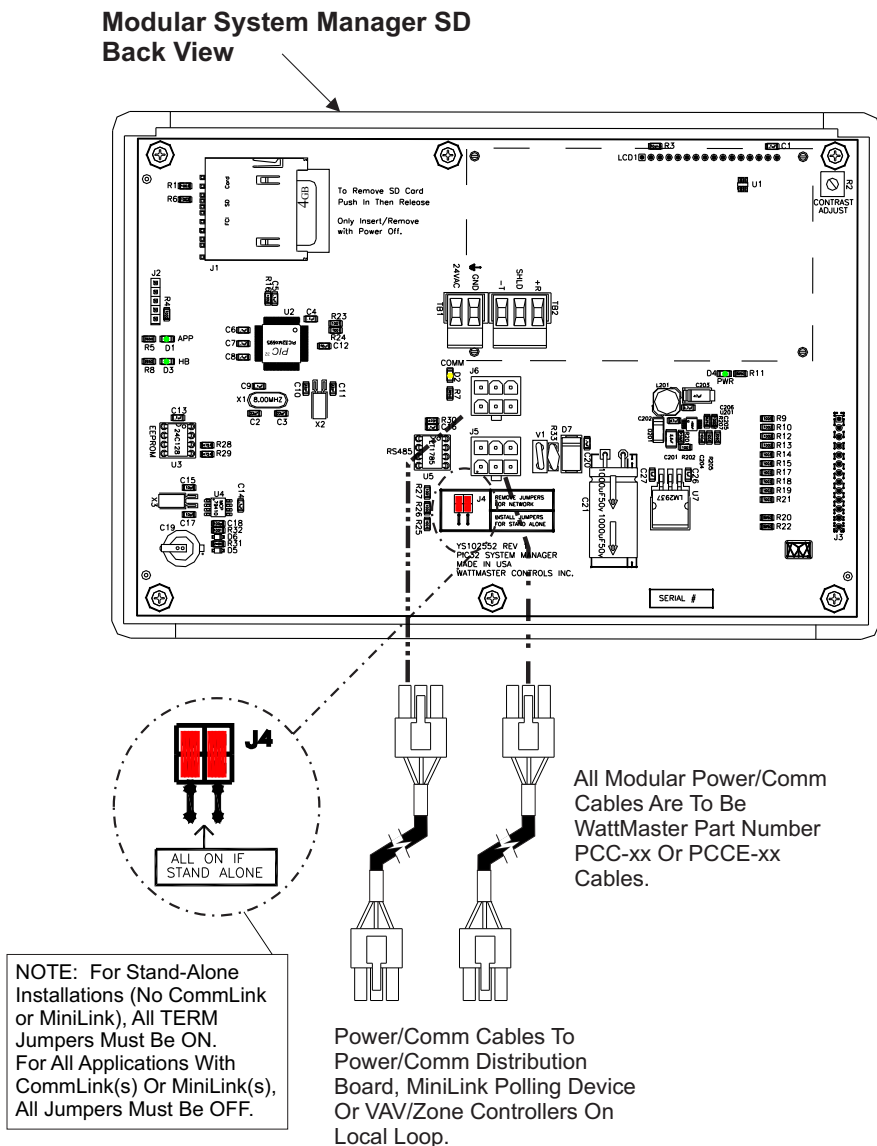


Figure 4: Modular System Manager SD - Network

SYSTEM CONNECTION

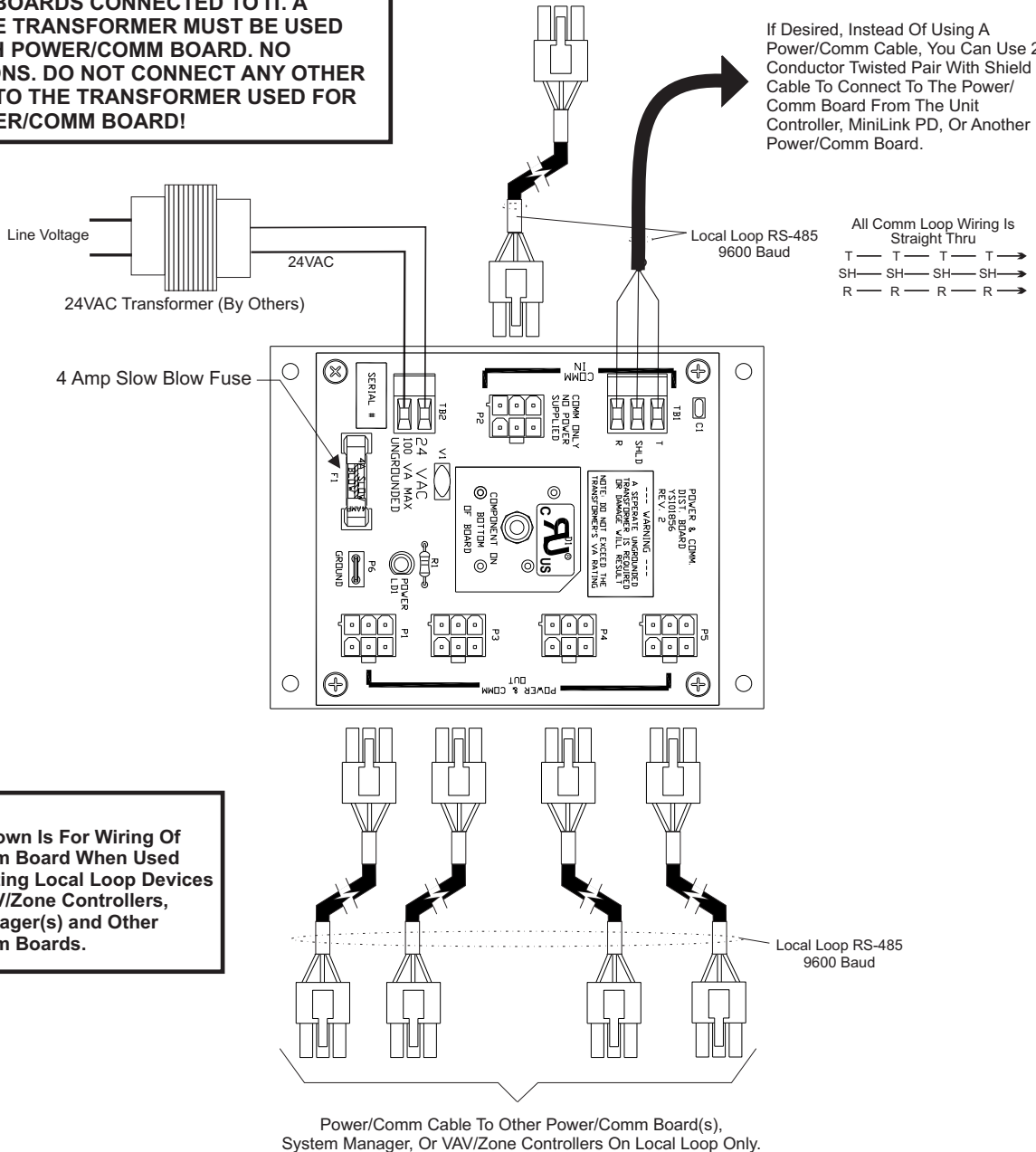
Power/Comm Board Wiring

WARNING!

DO NOT GROUND THE 24V TRANSFORMER THAT IS TO BE USED WITH THE POWER/COMM BOARDS. GROUNDING OF THE TRANSFORMER WILL DAMAGE THE POWER/COMM BOARD AND ALL BOARDS CONNECTED TO IT. A SEPARATE TRANSFORMER MUST BE USED FOR EACH POWER/COMM BOARD. NO EXCEPTIONS. DO NOT CONNECT ANY OTHER DEVICES TO THE TRANSFORMER USED FOR THE POWER/COMM BOARD!

A Power/Comm Cable Can Be Used To Connect With The MiniLink PD Instead Of Using 2 Conductor Twisted Pair With Shield Cable. You Can Also Use A Power/Comm Cable To Connect With Another Power/Comm Board, A System Manager Or A VAV/Zone Controller.

If Desired, Instead Of Using A Power/Comm Cable, You Can Use 2 Conductor Twisted Pair With Shield Cable To Connect To The Power/Comm Board From The Unit Controller, MiniLink PD, Or Another Power/Comm Board.

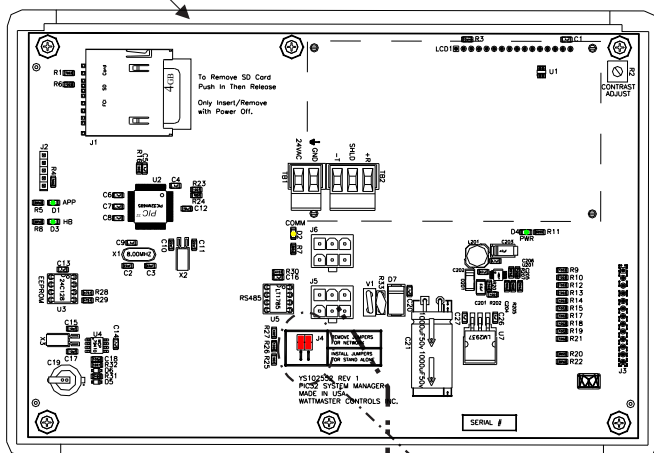


NOTE:

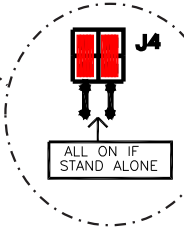
Diagram Shown Is For Wiring Of Power/Comm Board When Used For Connecting Local Loop Devices Such As VAV/Zone Controllers, System Manager(s) and Other Power/Comm Boards.

Figure 5: Typical Power/Comm Board Wiring

Modular System Manager SD
Back View



NOTE: If Desired A Power/Comm Board As Used With The Networked System Can Be Installed And Wired Instead Of Using The Pigtail Cable Wiring Shown Below. See The Networked System Wiring Diagram For Details.



NOTE: For Stand-Alone Installations (No CommLink or MiniLink), All TERM Jumpers Must Be ON. For All Applications With CommLink(s) Or MiniLink(s), All Jumpers Must Be OFF.

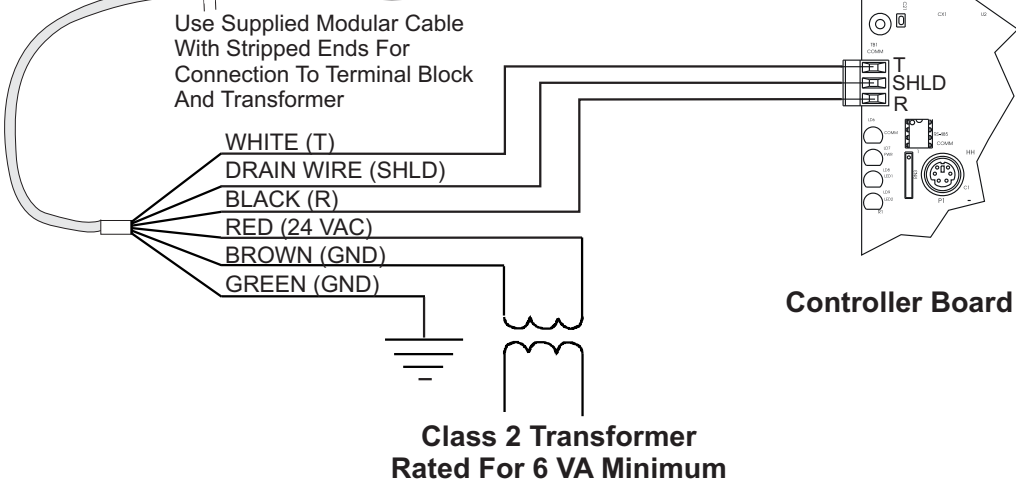


Figure 6: Modular System Manager SD - Stand Alone

Modular Service Tool Keys

Operator Interfaces

In order to configure and program the Orion System controllers, you must have an Operator's Interface or a personal computer with the Prism II computer front-end software installed. Three different Operator Interfaces are available for programming of the Orion Controls System—the Modular Service Tool SD, the Modular System Manager, and/or the System Manager TS II. These devices allow you to access the status and setpoints of the controllers on your communications loop. This manual describes the Modular Service Tool SD. If using the Modular System Manager or System Manager TS II, please see the *Operator Interfaces Technical Guide* or the *System Manager TS II Technical Guide*. If using Prism II, please see the *Prism II Technical Guide*.

The Modular Service Tool allows you to view any input or output status and change any setpoint to fine-tune the operations of the total system. All keypad operations are simple and straightforward, utilizing non- cryptic plain English messages.

Display Screens & Data Entry Keys

See the chart below for a list of the keypad descriptions and functions.

Keypad Description	Key Function
ESC	Use this key to exit from screens or from data entry or to return to the Main Menu from any screen in the system.
ENTER	Use this key to enter a new value.
Clear	If a data entry mistake is made, press this key to clear the data entry field and start over. This key also turns off the power to the Service Tool when on the Main Menu Screen
Minus	If a setpoint with a negative value is required, press this key for the minus sign.
DEC	Press this key when entering data that requires a decimal point.
← →	Use these keys to change values in the Configuration Screens as prompted.
↑ ↓	Use these keys to step backward or forward through the screens.

Table 1: Keypad Descriptions

Mode Selection Buttons

The Modular Service Tool is provided with “Mode Selection Buttons.” These buttons give you instant access to the specific mode desired without having to scroll through several menu screens to get there.

Button Description	Mode Selection Buttons
STATUS	Pressing this button takes you directly to the controller “Status” screens.
SETPOINTS	Pressing this button takes you directly to the controller “Setpoints” screens.
SCHEDULES	Pressing this button takes you directly to the controller “Schedules” screens.
OVERRIDES	Pressing this button takes you directly to the controller “Overrides” screen. See the “Override Button” section on page 13 for a description of this function. See Note 1 below.
ALARMS	Pressing this button takes you directly to the controller “Alarms” screen. See the “Alarms Button” section on page 13 for a description of this function.
CONFIGURATION	Pressing this button takes you directly to the controller “Configuration” screens.
BALANCE-TEST	Pressing this button takes you directly to the controller “Balance-Test” screens.
Notes:	
(1) The Modular Service Tool will only search the Overrides one loop at a time. You must enter the Loop number and the MiniLink PD unit ID (60).	

Table 2: Button Descriptions

Initialization & Setting the Time & Date

Modular Service Tool Initialization

Modular Service Tool Initialization Screen

After connecting the Service Tool to the controller with the supplied cable, press <ON>. The *Initialization Screen* will appear followed by the *Main Menu* as shown below. If there is no SD card installed, the second screen will display, "No SD Card Connected! Powering Down!"

```

    Initializing
  Service Tool vX.XX
  WattMaster Controls
  
```

```

  1) Set Time & Date
  2) Communications
  NEXT) More Options
  ESC) Exit Menu
  
```

```

  3) Energy Saving
  4) Update Software
  NEXT) More Options
  ESC) Exit Menu
  
```

NOTE: Once you press <ESC> while at the *Main Menu* shown above, the only way you can access it again is to cycle power.

Setting The Time & Date

The Modular Service Tool is equipped with a real time clock chip allowing it to maintain the correct time. Once you have programmed the correct time and date, the information is broadcast globally to all controllers on the entire system.

NOTE: If you are in a time zone that has daylight savings, you will need to manually adjust the time twice a year.

Programming the Time

From the *Main Menu* shown below, press <1> on your keypad to access the *Set Time & Date Screens*. (You may have to cycle power to access the *Main Menu*).

```

  1) Set Time & Date
  2) Communications
  NEXT) More Options
  ESC) Exit Menu
  
```

Although the times are displayed on the *Main Screen* in a standard 12-hour format, you must program them using the 24-hour military format. If you configured the Unit Controller to use its own Internal Schedules, the Occupied/Unoccupied modes are calculated on the basis of the current real time clock reading.

The two screens that follow will appear. To scroll through the fields, press <↓> or <ENTER>. In order to save a new value, you must press <ENTER>.

```

  Program Time/Date
  Day (Sunday=0): X
  Enter Hr. (0-23): XX
  Enter Minutes : XX
  
```

Day - Enter the Day of the Week (0 to 6)
Sunday = 0

Hours (Hr) - Enter Hours in 24-Hour Military Format
(1700 = 5:00 PM)

Minutes - Enter the Minutes
(0 to 59)

Programming the Date

To scroll through the fields, press <↓> or <ENTER>. In order to save a new value, you must press <ENTER>.

```

  Program Time/Date
  Month (1-12): XX
  Day (1-31): XX
  Year (00-99): XX
  
```

Month - Enter the Month (1 to 12)

Day - Enter the Day of the Month (1 to 31)

Year - Enter the current Year with two digits (00 to 99)

When you have finished programming the time and date, press <ESC> to return to the *Main Menu* shown below.

```

  1) Set Time & Date
  2) Communications
  NEXT) More Options
  ESC) Exit Menu
  
```

Setting the Operating Mode and Energy Saving Timer

Setting the Operating Mode

The Operating Mode is displayed on the last line of the *Main Screen* as shown below. The factory default setting for the Service Tool is **LS (Low Speed) Stand Alone Mode**. **LS Stand Alone Mode** is the correct configuration for the Unit Controller when in Stand Alone Mode.

```
Service Tool vX.XX
Wednesday Operations
01/16/13 02:21 PM
LS Stand Alone Mode
```

If you are using this Service Tool on a communications loop and have an installed MiniLink PD or CommLink, you will need to change the setting to **LS (Low Speed) Network Mode**.

If your display indicates a different mode than the one you need, *press* <2> at the *Main Menu* shown below. You will have to cycle power to get to this screen by *pressing* <CLEAR> to power down and <ON> to power back on..

```
1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
```

The *Communications Screen* will appear as shown below.

```
Stand Alone Mode
Lo Speed Connection
Use Left/Right Arrow
To Change Selections
```

Press <←> or <→> to select the proper mode of operation.

When you have made your selection, *press* <ENTER>. The following screen will appear.

```
You Have Changed The
System Mode
Press Any Key To
Continue
```

Press any key to continue. The *Main Menu* will appear as shown below:

Setting the Energy Saving Timer

The Modular Service Tool has a built-in timer that can be programmed to shut the Service Tool off after a specified period of time if no buttons are pressed. This is a very useful feature if you are powering the Service Tool from the internal batteries.

To set the Energy Saving Timer, *press* <NEXT> at the first *Main Menu* and <3> at the second *Main Menu* shown below. (You may have to cycle power to get to these screens).

```
1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
```

```
3) Energy Saving
4) Update Software
NEXT) More Options
ESC) Exit Menu
```

The *Energy Saving Screen* will appear as shown below:

```
Energy Saving
Automatic Power Down
Minutes: xx
Press ESC to Exit
```

Enter the number of minutes you want the Service Tool to stay active before it automatically powers down and *press* <ENTER>. To cancel the automatic power down, *enter* <99> and *press* <ENTER>. After you have entered a number between 1 and 99 minutes, *press* <ESC> to exit the screen.

The *Main Menu* will appear again as shown below:

```
1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
```

Modular Service Tool Alarm Search

NOTE: When you *press* the <ALARMS> button on the Modular Service Tool, it will search only the unit ID that you have entered; therefore, you must search each unit individually to access all alarms for that controller.

To search for alarms, *press* <ALARMS> while on any screen but the *Main Menu*. The *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller the Service Tool is connected to and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

One of the following screens will appear:

```
VAV/CAV/MUA   V.XXX
NO ALARMS
```

```
VAV/CAV/MUA   V.XXX
ALARMS PRESENT
SCROLL DOWN TO VIEW
```

Press <↓> to scroll through all the alarms for the controller that the Modular Service Tool is connected to.

To clear any alarms that are found, you must fix the problem indicated in the alarm. Once the problem is fixed, the alarm will clear from the screen the next time the unit is polled.

Modular Service Tool Override Search

When a space sensor with override option is used with any VAV/Zone or Unit Controller, the Modular Service Tool can determine and report any controllers that are currently operating in an override condition on a specific Loop by entering a Loop ID number and then doing a search.

NOTE: When you *press* the <OVERRIDES> button on the Modular Service Tool, it will search only the Loop number that you enter; therefore, you must search each loop individually to access all overrides.

To access the *Overrides Screen*, *press* <OVERRIDES> from the Modular Service Tool's keypad. A screen will appear asking you to enter the unit ID.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: 160
```

Enter the Unit ID for the MiniLink PD (MLPD) of the loop you wish to search. and *press* <ENTER>. The MLPD is always address 60 on each loop. So the unit ID of any particular MLPD would be the loop number followed by 60. In the example above, Loop 1, address 60 has been entered. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

If communications are successful, one of the following screens will appear:

```
VAV/CAV/MUA   V.XXX
NO OVERRIDES
```

```
VAV/CAV/MUA   V.XXX
OVERRIDES PRESENT
SCROLL DOWN TO VIEW
```

After the Service Tool completes its search, it will post a message to tell you if there are overrides present. If there are overrides, *press* <↓> and all units on the loop will be listed showing 'Override: Yes or No.' *Press* <OVERRIDES> again to access overrides on a different loop. Enter the Unit ID of the MLPD of that loop.

Schedules and Holidays

Scheduling

You can access the Unit Controller Scheduling Screens by pressing <SCHEDULES>. The *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller the Service Tool is connected to and press <ENTER>. Once communication is established, the *00* message will go away. Then press <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

Press the <↓> button and then press <ENTER> to access the scheduling function you wish to view.

```
Schedule Menu
Schedule Override
Week Schedules
Holidays
```

Week Schedules

Event #1

```
VAV/CAV/MUA Schd
Sunday Event #1
Start Time...: XXXX
Stop Time...: XXXX
```

Event #2

```
VAV/CAV/MUA Schd
Sunday Event #2
Start Time...: XXXX
Stop Time...: XXXX
```

If you are using the internal scheduling capability of the Unit Controller, set the schedule hours and holiday periods from the menu shown above. You can also force the unit to operate continuously in occupied or unoccupied mode by selecting the Schedule Override menu item and entering the desired command.

If you are using an external contact closure to signal the occupied mode, you must access the *Week Schedule Screens* and set all start and stop times to zero to prevent the internal schedule from turning the equipment on when you don't want it to operate.

The screens will step through the *Start Time* and then the *Stop Time* for each day of the week. You can quit at any point in the process by pressing <ESC>. There are two Start/Stop events available per day, so the screen will show which event is being programmed. If you need only one event, keep Event #2's times set at ZERO.

All times are in 24-hour military format, so 5:00 PM would be entered as 1700.

If both the Start and Stop Times are ZERO, the schedule is in a continuous OFF mode. (**Also, use for Remote Forced Occupied applications using the Forced Occupied Binary Input.**)

If both the Start and Stop Times are 2359, the schedule is in a continuous ON mode.

NOTE: The second line displays which day of the week is currently being programmed. The day of the week automatically increments as you exit the Event #2 screen for the day and continue to the next day's Event #1 screen.

CAUTION: The controller ships with all schedules set to zero so that the controller will not attempt to heat or cool before you have configured the system.

Holiday Start/Stop Day Selection

```
VAV/CAV/MUA Hldy
Holiday # 1
Start Mon/Day.: XXXX
[ July 4th = 704 ]
```

```
VAV/CAV/MUA Hldy
Holiday # 1
Stop Mon/Day.: XXXX
[ July 5th = 705 ]
```

The screens will step through the 14 possible holidays, one period at a time. Line 2 shows which holiday is currently being programmed. Since a holiday period can encompass more than one day, you need to program the day the holiday starts and the day the holiday ends. If your holiday only lasts one day, simply set both the Start Day and the Stop Day to the same value. Remember to combine the *month and day* into a single four-digit value.

EXAMPLE: 704 = July 4th (NOTE: Leading zero not required)
1225 = December 25th

Holiday Scheduling and Schedule Override

Holiday Start/Stop Times

```
VAV/CAV/MUA Hldy
Holiday Schedule
Start Event #1: XXXX
Stop Event #1: XXXX
```

```
VAV/CAV/MUA Hldy
Holiday Schedule
Start Event #2: XXXX
Stop Event #2: XXXX
```

The 14 holidays all use the same Start and Stop times which you program on this screen and the next. You must enter the time in 24-hour military format, the same as a regular week schedule.

Normally, the holidays will operate in an unoccupied mode or a reduced schedule mode. There are two start/stop events available on holidays to match the standard schedule number of events.

Schedule Override

```
VAV/CAV/MUA Ovrd
Schedule Override
Enter Override...: X
[0=Auto 1=0n 2=0ff]
```

If you want to force the unit to operate in a continuous Occupied or Unoccupied mode, select this menu item to activate the desired method. If a Schedule Override is active, all other methods of schedule control are ignored (Push-Button, Internal, and Remote).

As you can see on the last line of the display, *enter <1>* to run continuously in the *Occupied Mode* or *<2>* to run continuously in the *Unoccupied Mode*. To restore normal schedule operations, *enter <0>*.

This override remains in effect until canceled and does not time-out like the Output Overrides do after 10 minutes of no communications.

NOTE: Do not use the Force OFF mode in place of setting all the week schedules to ZERO if you are using a Remote Signal for your scheduling since the Override has priority over the Remote Signal.

System Manager SD Keys and Buttons

Operator Interfaces

In order to configure and program the Orion System controllers, you must have an Operator's Interface or a personal computer with the Prism 2 computer front-end software installed. Three different Operator Interfaces are available for programming of the Orion Controls System—the Modular Service Tool SD, the Modular System Manager SD, and/or the System Manager TS II. These devices allow you to access the status and setpoints of the controllers on your communications loop. This manual describes the Modular System Manager SD. If using the Modular Service Tool SD, please see the *Modular Service Tool SD Quick Start Guide*. If using the System Manager TS II, please see the *System Manager TS II Technical Guide*. If using Prism 2, please see the *Prism 2 Technical Guide*.

The Modular System Manager SD allows you to view any input or output status and change any setpoint to fine-tune the operations of the total system. All keypad operations are simple and straightforward, utilizing non-cryptic plain English messages.

Display Screens & Data Entry Keys

See the chart below for a list of the keypad descriptions and functions.

Keypad Description	Key Function
	Modular System Manager SD
ESC	Use this key to exit from screens or from data entry or to return to the Main Menu from any screen in the system.
ENTER	Use this key to enter a new value.
Clear	If a data entry mistake is made, press this key to clear the data entry field and start over.
Minus	If a setpoint with a negative value is required, press this key for the minus sign.
DEC	Press this key when entering data that requires a decimal point.
← →	Use these keys to change values in the Configuration Screens as prompted.
↑ ↓	Use these keys to step backward or forward through the screens.

Table 3: Keypad Descriptions

Mode Selection Buttons

The Modular System Manager is provided with “Mode Selection Buttons.” These buttons give you instant access to the specific mode desired without having to scroll through several menu screens to get there.

Button Description	Modular System Manager SD
STATUS	Pressing this button takes you directly to the controller “Status” screens.
SETPOINTS	Pressing this button takes you directly to the controller “Setpoints” screens and “Configuration” menu.
SCHEDULES	Pressing this button takes you directly to the controller “Schedules” screens.
OVERRIDES	Pressing this button takes you directly to the controller “Overrides” screen. See the “Override Button” section on page 21 for a description of this function. See Notes 1 & 2 below.
ALARMS	Pressing this button takes you directly to the controller “Alarms” screen. See the “Alarms Button” section on page 21 for a description of this function. See Notes 1 & 2 below.

Notes:

(1) This button only functions when the system is configured for “Network Mode” or “Multiple MGRS Mode.” It will not function in “Stand Alone Mode.”

(2) The “Search for Units” function must be performed on the System Manager upon initial system setup before this function will be available. See the “Network Mode & Multiple Managers Loop Search” on **page 20** of this manual for complete instructions on performing a loop search.

Table 4: Button Descriptions

Initialization & Setting the Time & Date

System Manager SD Initialization

System Manager SD Initialization Screen

After connecting the System Manager to the controller with the supplied cable, press <ON>. The *Initialization Screen* will appear followed by the *Main Menu* as shown below. If there is no SD card installed, the second screen will display, "No SD Card Connected! Powering Down!"

NOTE: After exiting these screens, you can access them again by pressing <ESC> and then <↵> or by cycling power.

```

INITIALIZING
System Manager SD
vX.XX
WattMaster Controls
    
```

```

1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
    
```

```

3) Change Passcodes
4) Loop Search
NEXT) More Options
ESC) Exit Menu
    
```

```

5) Alarm Search

NEXT) More Options
ESC) Exit Menu
    
```

Setting The Time & Date

The System Manager SD is equipped with a real time clock chip allowing it to maintain the correct time. Once you have programmed the correct time and date, the information is broadcast globally to all controllers on the entire system.

NOTE: A Level 1 or Level 2 User can set the time and date.

NOTE: If you are in a time zone that has daylight savings, you will need to manually adjust the time twice a year.

Programming the Time

From the *Main Menu* shown below, press <1> on your keypad to access the *Set Time & Date Screens*.

```

1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
    
```

Although the times are displayed on the *Main Screen* in a standard 12-hour format, you must program them using the 24-hour military format. If you configured the Unit Controller to use its own Internal Schedules, the Occupied/Unoccupied modes are calculated on the basis of the current real time clock reading.

The two screens that follow will appear. To scroll through the fields, press <↓> or <ENTER>. In order to save a new value, you must press <ENTER>.

```

Program Time/Date
Day (Sunday=0): X
Enter Hr. (0-23): XX
Enter Minutes : XX
    
```

Day - Enter the Day of the Week (0 to 6)
Sunday = 0

Hours (Hr) - Enter the Hour (0-23) in
24-Hour Military Format
(13 = 1:00 PM)

Minutes - Enter the Minutes
(0 to 59)

Programming the Date

To scroll through the fields, press <↓> or <ENTER>. In order to save a new value, you must press <ENTER>.

```

Program Time/Date
Month (1-12): XX
Day (1-31): XX
Year (0-99): XX
    
```

Month - Enter the Month (1 to 12)

Day - Enter the Day of the Month (1 to 31)

Year - Enter the current Year (0 to 99)

When you have finished programming the time and date, press <ESC> to return to the *Main Menu*.

Setting the Operating Mode

Setting the Operating Mode

The Operating Mode is displayed on the last line of the *Main Screen* as shown below. The factory default setting for the System Manager is **LS (Low Speed) Stand Alone Mode**.

```

System Manager SD
Wednesday Operations
01/16/13 02:21 PM
LS Stand Alone Mode
    
```

The System Manager must be configured for the correct mode of operation for your system. There are 5 modes of operation available for the Orion System—**LS (Low Speed) Stand-Alone**, **HS (High Speed) Stand-Alone**, **LS (Low Speed) Network**, **HS (High Speed) Network**, and **LS (Low Speed) & HS (High Speed) Multiple MGRS**.

If you are using this System Manager on a communications loop that doesn't have a MiniLink PD or CommLink connected to it and you have a single System Manager on your system, then you need to operate in **LS (Low Speed) Stand-Alone Mode**. If you are using a VCB-X Controller or GPC-XP Controller that is set for high speed, and you don't have a MiniLink PD or CommLink connected to the loop, then you will need to change the setting to **HS (High Speed) Stand Alone Mode**.

If you are using the System Manager on a communications loop and have an installed MiniLink PD or CommLink, you will need to change the setting to **LS (Low Speed) Network Mode**. If you are using a VCB-X Controller or GPC-XP Controller that is set for high speed, and are using a MiniLink PD or CommLink, then you will need to change the setting to **HS (High Speed) Network Mode**.

If you are using this System Manager on a communications loop, have a MiniLink PD or CommLink installed, and have multiple System Managers, then you need to operate in **Multiple MGRS Mode**.

If your display indicates a different mode than the one you need, *press* <2> at the *Main Menu* shown below. You will have to cycle power to get to this screen or by *pressing* <ESC> and <PREV>.

```

1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
    
```

The *Passcode Clearance Screen* will appear as shown below.

```

THIS ACTION REQUIRES
A SPECIAL HIGH LEVEL
PASSCODE CLEARANCE
Enter: XXXXXXX
    
```

Enter the seven digit passcode <2337377> to access the next screen.

You will then see the screen below displayed.

```

Stand Alone Mode
Lo Speed Connection
Use Left/Right Arrow
To Change Selections
    
```

Press <←> or <→> if you need to change the mode of operation to **LS (Low Speed) Stand-Alone**, **HS (High Speed) Stand-Alone**, **LS (Low Speed) Network**, **HS (High Speed) Network**, **LS (Low Speed) Multiple Manager** or **HS (High Speed) Multiple Manager** and then *press* <ENTER> to save your selection. If you are not using Multiple Manager Mode, *press* <ESC> at the screen below and continue scrolling right and left.

```

Multiple Manager
Unit Address: 0

Press ESC to Exit
    
```

For **Multiple MGRS Mode**, enter the address at which you want this particular System Manager to be set.

When multiple System Managers are used on a local loop, each must be set with a unique address different from any other device on that loop. You must perform this same operation again for each System Manager installed. If you want one of these System Managers to be able to indicate alarms and overrides for the entire system, you must *select* either **LS** or **HS Network Mode** on that particular System Manager.

Once you have the correct number per the display above displayed, *press* <ENTER>. The following screen will appear telling you that you have changed the system mode:

```

You Have Changed The
System Manager Mode
Press Any Key To
Continue
    
```

Press any key on the keyboard to exit this screen.

System Manager Passcodes

Changing the mode of operation, updating software, changing schedules, and changing setpoints and configurations require passcode clearance. The screen below will appear if this action requires passcode clearance.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

The System Manager has three levels of user access. All users can view Status Screens. Level 1 users are limited to changing the Time and Date and Operating Schedules. Level 2 users have complete system access. Any status or setpoint field can be read or reset from the System Manager.

These two levels of passcodes are programmable by any Level 2 user. The default Level 1 passcode is "1111" and the default Level 2 passcode is "2222."

If you wish to change either Level 1 or Level 2 passcodes, please see the instructions that follow.

From the *Main Status Screen*, press <ESC> and then press <PREV>. The following screen will appear:

```
1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
```

Press <→> for the Next Menu. The following screen will be displayed:

```
3) Change Passcodes
4) Loop Search
NEXT) More Options
ESC) Exit Menu
```

Press <3> for Change Passcodes. The following screen will be displayed:

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

Passcodes can only be changed by a Level 2 user. Enter the passcode and press <ENTER>. The following screen will appear:

```
Enter New Passcode
Level 1.....: XXXX
Level 2.....: XXXX
[Must Be 4 Digits]
```

This screen allows you to enter new Level 1 and/or Level 2 passcodes. Passcodes must always be four digits in length, so the usable range of numbers is 1000 to 9999.

CAUTION: If you change the Level 2 passcode and cannot remember what it is, you will be locked out of your system!

Loop Search and System Alarm Search

Network Mode & Multiple Managers Loop Search

When the System Manager is configured for Network Mode, a loop search must initially be performed for the System Manager to recognize alarms or overrides. Also, when you have a system that has multiple System Managers and you have one of the System Managers set to (63) Network Mode for alarm and override indication, you must also perform a loop search for that System Manager. This allows the System Manager to be aware of all alarms and overrides for all local loops on the entire system.

To access the *Loop Search Screen*, from the *Main Menu Screen*, press <ESC> and then press <PREV>.

```

1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
    
```

Press <↔> for Next Menu. The following screen will be displayed:

```

3) Change Passcodes
4) Loop Search
NEXT) More Options
ESC) Exit Menu
    
```

Press <4> for Loop Search. The following screen will be displayed:

```

Loop Search
Current Loop = XX
Loops Found = XX
Searching
    
```

The System Manager will now proceed to search all loops to find the MiniLink PDs that are connected to the system. The screen will display the current loop being searched and the number of loops currently found.

Once the search is completed, the following screen will be displayed:

```

Loop Search
Finished
Loops Found = XX
Press ESC to Exit
    
```

The screen will display the number of loops found on your system. The information will be saved into the System Manager's memory. No further loop searches will be required unless you add an additional MiniLink PD to the Network System.

System Alarm Search

The System Manager can be used to search for all active alarms on the system. You must configure the MiniLink PD to allow for "Alarm Polling" for each controller you want polled for alarms. See the MiniLink PD programming section on **page 63** of this manual for setting information.

This option will alert you of the number of alarms present on individual units, but will not tell you what type of alarm are present. You will have to perform an individual unit alarm search for detailed alarm information.

To access the *Alarm Search Screen*, from the *Main Menu Screen*, press <ESC> and then press <PREV>.

```

1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
    
```

Press <↔> for Next Menu. The following screen will be displayed:

```

3) Change Passcodes
4) Loop Search
NEXT) More Options
ESC) Exit Menu
    
```

Press <↔> for Next Menu. The following screen will be displayed:

```

5) Alarm Search
NEXT) More Options
ESC) Exit Menu
    
```

Press <5> for Alarm Search. The entire system is searched from this point. The following screen will be displayed:

```

Alarm Screen

SEARCHING!
    
```

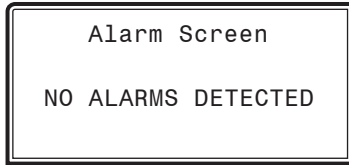
Once the Alarm Search is complete, one of the following screens will display:

```

Alarm Screen

XX ALARMS ON UNIT XX
    
```


Unit Alarm Search and Override Search

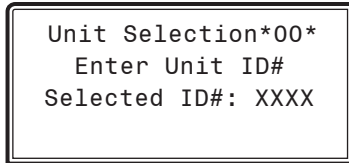


To check controllers individually for alarms, use the <ALARMS> button on the Main Display.

Unit Alarm Search

The System Manager can be used to search for all active alarms one controller at a time.

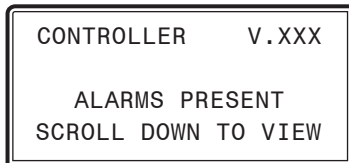
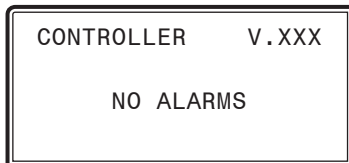
Press <ALARMS>. The *Unit Selection Screen* below will be displayed.



Enter the Unit ID of the controller you wish to search and press <ENTER>. Once communication is established, the *00* message will go away. Then press <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will appear. The System Manager will search for any active alarms on the unit and one of the following screens will appear:



Press <↓> to scroll through all the alarms for the controller that the Modular Service Tool is connected to.

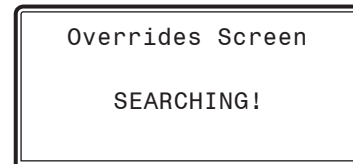
To clear any alarms that are found, you must fix the problem indicated in the alarm. Once the problem is fixed, the alarm will clear from the screen the next time the unit is polled.

System Manager Override Search

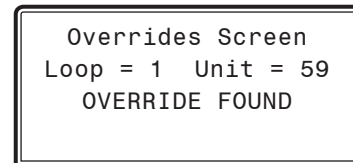
NOTE: In order for the Override Search to work, a Loop Search must be performed first. See **page 20** for details.

When a space sensor with override option is used with any VAV/Zone Controller or Unit Controller, the System Manager can determine and report any controllers that are currently operating in an override condition. This function requires that a MiniLink PD is installed on each loop where the controllers may be located. The MiniLink PD must be configured to allow for "Alarm Polling" for each controller that Override Polling Enabled is desired for this function to work. See the MiniLink PD programming section on **page 63** of this manual for setting information.

To access the *Space Sensor Overrides Screen*, press <OVERRIDES>. The following screen will appear.



After the System Manager completes its search, it will list the first unit on the system that is currently in the override mode. Press the <↓> button to scroll through all units that are in the Override Mode.



Schedules and Holidays

Scheduling

You can access the Controller Scheduling Screens by *pressing* <SCHEDULES>. The screen below will appear because Scheduling requires passcode clearance. A Level 1 or 2 passcode can change schedules.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The *Unit Schedule Menu* will be displayed.

```
Schedule Menu
Schedule Override
Week Schedules
Holiday Schedules
```

Press the <↓> button until the cursor is on the desired option and then *press* <ENTER>.

Week Schedules

From the *Unit Schedule Menu*, select Week Schedules. The following two screens will appear in order:

Event #1

```
Schd
Sunday   Event #1
Start Time..: XXXX
Stop Time...: XXXX
```

Event #2

```
Schd
Sunday   Event #2
Start Time..: XXXX
Stop Time...: XXXX
```

If you are using the internal scheduling capability of the Controller, set the schedule hours and holiday periods from the menu shown above. You can also force the unit to operate continuously in occupied or unoccupied mode by selecting the Schedule Override menu item and entering the desired command.

If you are using an external contact closure to signal the occupied mode, you must access the *Week Schedule Screens* and set all start and stop times to zero to prevent the internal schedule from turning the equipment on when you don't want it to operate.

The screens will step through the *Start Time* and then the *Stop Time* for each day of the week. You can quit at any point in the process by *pressing* <ESC>. There are two Start/Stop events available per day, so the screen will show which event is being programmed. If you need only one event, keep Event #2's times set at ZERO.

All times are in 24-hour military format, so 5:00 PM would be entered as 1700.

If both the Start and Stop Times are ZERO, the schedule is in a continuous OFF mode. (**Use for Remote Signal Contact.**)

If both the Start and Stop Times are 2359, the schedule is in a continuous ON mode.

NOTE: The second line displays which day of the week is currently being programmed. The day of the week automatically increments as you exit the Event #2 screen for the day and continue to the next day's Event #1 screen.

CAUTION: The controller ships with all schedules set to zero so that the controller will not attempt to heat or cool before you have configured the system.

Holiday Scheduling and Schedule Override

Holiday Start/Stop Day Selection

From the *Unit Schedule Menu*, select Holiday Schedules. The following four screens will appear in order:

```

Hldy
Holiday # 1
Start Mon/Day.: XXXX
[ July 4th = 704 ]
    
```

```

Hldy
Holiday # 1
Stop Mon/Day.: XXXX
[ July 5th = 705 ]
    
```

The screens will step through the fourteen possible holidays, one period at a time. Line 2 shows which holiday is currently being programmed. Since a holiday period can encompass more than one day, you need to program the day the holiday starts and the day the holiday ends. If your holiday only lasts one day, simply set both the Start Day and the Stop Day to the same value. Remember to combine the *month and day* into a single four-digit value.

EXAMPLE: 704 = July 4th
 (NOTE: Leading zero not required)
 1225 = December 25th

Holiday Start/Stop Times

```

Hldy
Holiday Schedule
Start Event #1: XXXX
Stop Event #1: XXXX
    
```

```

Hldy
Holiday Schedule
Start Event #2: XXXX
Stop Event #2: XXXX
    
```

The fourteen holidays all use the same Start and Stop times which you program on this screen and the next. You must enter the time in 24-hour military format, the same as a regular week schedule.

Normally, the holidays will operate in an unoccupied mode or a reduced schedule mode. There are two start/stop events available on holidays to match the standard schedule number of events.

Schedule Override

From the *Unit Schedule Menu*, select Schedule Override. The following screen will appear:

```

OvrD
Schedule Override
Enter Override...: X
[0=Auto 1=ON 2=OFF]
    
```

If you want to force the unit to operate in a continuous Occupied or Unoccupied mode, select this menu item to activate the desired method. If a Schedule Override is active, all other methods of schedule control are ignored (Push-Button, Internal, and Remote).

As you can see on the last line of the display, *enter <1>* to run continuously in the *Occupied Mode* or *<2>* to run continuously in the *Unoccupied Mode*. To restore normal schedule operations, *enter <0>*.

This override remains in effect until canceled and does not time-out like the Output Overrides do after 10 minutes of no communications.

NOTE: Do not use the Force OFF mode in place of setting all the week schedules to ZERO if you are using a Remote Signal for your scheduling since the Override has priority over the Remote Signal.

VAV/CAV Configuration Screen Index

The available Configuration Screens for the VAV/CAV Controller are listed on the next few pages by sequential screen number. When the Unit Controller is configured for the first time, it is best to start with screen #1 and proceed to each screen in numerical order until you have viewed all available Configuration Screens. This ensures that you have seen all the available Controller configuration possibilities and have the opportunity to change or accept the defaults for each screen.

Once the unit is configured and you decide to change one of the screen options, it is helpful to know what screen number contains the configuration you wish to change. With this in mind, the following is a list of all the VAV/CAV Configuration Screens in numerical order with a brief listing of the configuration feature available on each screen.

Screen #1	Constant Volume Mode Active
Screen #2	Controlling Sensor
Screen #3	Economizer Control By This AHU
Screen #4	Fan Cycle Mode Needed
Screen #5	Proof of Flow Switch Installed
Screen #6	OA Humidity Sensor Installed
Screen #7	Dehumidification Installed
Screen #8	Relief Pressure Control Installed
Screen #9	Relief Pressure Control Reverse Acting

Screen #10	Supply Air Setpoint Reset Source
Screen #11	CO ₂ Sensor Installed
Screen #12	CO ₂ Sensor Maximum Reading
Screen #13	Air to Air Heat Pump Control
Screen #14	Broadcast Time Clock To Loop Units
Screen #15	Broadcast Outside Temperature
Screen #16	Broadcast Supply Temperature
Screen #17	Broadcast Humidity Reading
Screen #18	Broadcast Internal Schedule
Screen #19	Broadcast Status Fan & Heat
Screen #20	Broadcast VAV Boxes Force To Max
Screen #21	Broadcast VAV Boxes Force To Fixed
Screens #22-41	Relay Configuration Relays 2-21

Configuration Screens

In order to correctly set up the Unit Controller, you must first configure several parameters in regard to the type of HVAC unit and system you have installed. Most of these values and operating parameters are only set once at the initial system setup and are never changed.

Modular Service Tool Instructions

No matter what screen or menu you're in, *press* <CONFIGURATION>. The *Unit Selection Screen* will appear, shown below, requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the Unit Controller you want to configure and then *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see *Unit Configuration Screen #1*. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll down to the 'Configure Unit' option and *press* <ENTER>. This will take you to the first Configuration Screen shown below.

Configuration Screen #1 - Constant Volume Mode Active

```
VAV/CAV Cnfg ID 0001
Constant Volume Mode
Active: No
Use < Or > To Change
```

This HVAC unit can be configured to operate as a Constant Volume or VAV unit. The Constant Volume Mode does not provide Static Pressure Control. You can install a Duct Pressure Sensor on a Constant Volume unit and only monitor the Static Pressure. This is the only mode that supports dehumidification. Default is No.

Configuration Screen #2 - Controlling Sensor

```
VAV/CAV Cnfg ID 0001
Controlling Sensor
SUPPLY AIR
Use < Or > To Change
```

The third line displays which sensor has been selected as the Controlling Temperature for the VAV/CAV Controller. Default is SUPPLY AIR.

Available selections are as follows:

SUPPLY AIR	Supply Air Sensor (Occupied Cooling with Morning Warmup)
OUTDOOR AIR	Outdoor Air Temperature Sensor (Occupied Cool, Heat & Vent)
SPACE TEMPERATURE	Space Temperature Sensor (Occupied & Unoccupied Cool, Heat & Vent)
RETURN AIR	Return Air Sensor (Occupied Cool, Heat & Vent)
LOCAL ANALOG VALUE	Local Analog Value

VAV/CAV CONTROLLER CONFIGURATION

VAV/CAV Configuration Screens

Configuration Screen #3 - Economizer Control

```
VAV/CAV Cnfg ID 0001
Economizer Control
By This AHU: Yes
Use < Or > To Change
```

If your AHU has Outdoor Air Dampers, it is recommended that you allow the VAV/CAV Controller to modulate these dampers in the Economizer Mode so that it can be used as the first stage of cooling. If you don't have Outdoor Air Dampers, or you decide to let a separate controller maintain these dampers, select No for this option. Default is Yes.

Configuration Screen #4 - Fan Cycle Control

```
VAV/CAV Cnfg ID 0001
Fan Cycle Mode
Needed: No
Use < Or > To Change
```

Select YES if your system requires Fan Cycle Control. Default is No.

Configuration Screen #5 - Proof of Flow Switch Installed

```
VAV/CAV Cnfg ID 0001
Proof of Flow Switch
Installed: No
Use < Or > To Change
```

If you need Proof of Airflow before allowing any Heating or Cooling stages to operate, install a differential pressure switch with a contact closure that is connected to analog input #7 and select this option. If this option is not selected, the VAV/CAV Controller assumes there is adequate airflow any time the fan is running and ignores this signal. Default is No.

Configuration Screen #6 - Outdoor Air Humidity Sensor Installed

```
VAV/CAV Cnfg ID 0001
OA Humidity Sensor
Installed: No
Use < Or > To Change
```

If your Economizer Control requires the use of the Wetbulb Temperature to enable or disable it, you must install a Humidity Sensor on analog input #5 and select this option. If you require the Remote Signal to determine the Occupied Mode of operation, you will need to move the Remote Signal to analog input #2 on the Analog Input Expansion Board. Default is No.

Configuration Screen #7 - Dehumidification Control

```
VAV/CAV Cnfg ID 0001
Dehumidification
Installed: No
Use < Or > To Change
```

You can monitor a wet contact closure on the first binary input #1 on the 4 Binary Input Expansion Board, and whenever it closes, the Gas Reheat relay will be activated. This assumes you are in Cooling Mode. The Gas Reheat does not activate if the VAV/CAV Controller is in the Heating Mode. The option is only available on units that are configured for Constant Volume Mode. If you are controlling Static Pressure (VAV Mode), then this option is ignored. Default is No.

Configuration Screen #8 - Building Pressure Control

```
VAV/CAV Cnfg ID 0001
Relief Pr. Control
Installed: No
Use < Or > To Change
```

If you need to control Building Pressure, select this option and connect the Relief Pressure Sensor to analog input #4 on the Analog Input Expansion Board. The Relief Fan VFD Signal is also on the Analog Input Expansion Board as the only analog output on that board. Default is No.

Configuration Screen #9 - Reverse Acting Building Pressure Control

```
VAV/CAV Cnfg ID 0001
Relief Pr. Control
Reverse Acting: No
Use < Or > To Change
```

Select Yes if Reverse Acting Building Pressure Control is needed. Reverse Acting Building Pressure Control can either be On/Off or Modulating Control. Modulating Control is normally used for this configuration. On a decrease in Building Pressure, below the Building Static Pressure Setpoint, the Outdoor Air Damper will modulate open to increase pressure. Default is No.

Configuration Screen #10 - Supply Air Setpoint Reset Source

```
VAV/CAV Cnfg ID 0001
Reset SAT Stpt Using
Input Voltage Signal
Use < Or > To Change
```

Select the desired method of resetting the Heating/Cooling Supply Air Setpoint. Default is Input Voltage Signal. Available selections are:

- **Input Voltage Signal**
- **Outdoor Air Sensor**
- **Space Sensor**
- **Fan VFD Percentage**
- **Local Analog Value**
- **Return Temp Sensor**

Configuration Screen #11 - Type of CO₂ Sensor Installed

```
VAV/CAV Cnfg ID 0001
CO2 Sensor Installed
Sensor Type: NONE
Use < Or > To Change
```

You can install a CO₂ Sensor on this HVAC unit to monitor the Carbon Dioxide levels and/or to provide for Indoor Air Quality (IAQ) control. If you only want to monitor the level, enter the same Maximum Economizer Position that you set for the Minimum Position and it will not be reset as the CO₂ level increases. If you do want IAQ control, set the desired Maximum Economizer Position to reset up to during high levels of CO₂. The VAV/CAV Controller needs to know what type of CO₂ Sensor signal output is being provided. Select either VDC (0-10) or mA (4-20) as the CO₂ Sensor signal. Select NONE if no CO₂ sensor is used. Default is NONE.

Configuration Screen #12 - CO₂ Sensor Maximum Reading

```
VAV/CAV Cnfg ID 0001
CO2 Sensor Maximum
Reading: 2000ppm
Enter 0 If No Sensor
```

The VAV/CAV Controller needs to know the CO₂ Sensor scaling for proper reading of the CO₂ Sensor output. The Standard CO₂ Sensor should be scaled to 2000 PPM. Enter <0> if no CO₂ Sensor is being used. Default is 2000ppm.

Configuration Screen #13 - Air to Air Heat Pump Control

```
VAV/CAV Cnfg ID 0001
Air to Air Heat Pump
Control: No
Use < Or > To Change
```

The VAV/CAV Controller can be configured to operate as an Air To Air Heat Pump Controller. If you make this selection, the same relays are used to stage the compressors in both the Heating and Cooling Modes. The only difference is that a separate Reversing Valve relay will activate in the Heating Mode to enable Heating to occur. You must configure at least one relay for the reversing valve.

You can also configure for an Auxiliary Heat relay that will activate whenever the Supply Air drops below the Supply Setpoint by 5°F to provide Heat when the Outdoor Air is too cold for the Heating Mode to operate correctly. Default is No.

Configuration Screen #14 - Broadcast Time Clock to All Loop Units

```
VAV/CAV Cnfg ID 0001
Broadcast Time Clock
To Loop Units: No
Use < Or > To Change
```

This setting enables the VAV/CAV Controller to send its real time clock information to all controllers on the local loop. This must be used when connecting VAV/Zone Controllers on the local loop, but can be used to synchronize clock time in all controllers on the local loop.

Configuration Screen #15 - Broadcast Outdoor Temperature

```
VAV/CAV Cnfg ID 0001
Broadcast Outside
Temperature: No
Use < Or > To Change
```

This setting enables the VAV/CAV Controller to send its Outdoor Air Temperature reading to all other controllers on the entire system. It is specifically used when more than one HVAC unit is installed and only one Outdoor Air Sensor is used to supply its signal to all controllers. Default is No.

VAV/CAV CONTROLLER CONFIGURATION

VAV/CAV Configuration Screens

Configuration Screen #16 - Broadcast Supply Temperature

```
VAV/CAV Cnfg ID 0001  
Broadcast Supply  
Temperature: No  
Use < Or > To Change
```

This setting enables the VAV/CAV Controller to send its Supply Air Temperature reading to all controllers that do not have their own sensor on the local loop. This is standard for VAV/Zone applications. Default is No.

Configuration Screen #17 - Broadcast Humidity Reading

```
VAV/CAV Cnfg ID 0001  
Broadcast Humidity  
Reading: No  
Use < Or > To Change
```

This setting enables the VAV/CAV Controller to send its Relative Humidity reading to all other controllers on the entire system. It is specifically used when more than one HVAC unit is installed, and only one Relative Humidity Sensor is used to supply its signal to all controllers. Default is No.

Configuration Screen #18 - Broadcast Internal Schedule

```
VAV/CAV Cnfg ID 0001  
Broadcast Internal  
Schedule: No  
Use < Or > To Change
```

This setting enables the VAV/CAV Controller to send its Occupied and Unoccupied status to the VAV/Zone Controllers on the local loop. Default is No.

Configuration Screen #19 - Broadcast Fan & Heat Status

```
VAV/CAV Cnfg ID 0001  
Broadcast Status  
Fan & Heat: No  
Use < Or > To Change
```

This setting enables the VAV/CAV Controller to send status information on whether the HVAC unit Main Fan is running or if it is in Heat Mode to the VAV/Zone Controllers on the local loop. This enable is required when VAV/Zone Controllers have heating stages or are fan-powered.

Configuration Screen #20 - Broadcast VAV Boxes Force to Max

```
VAV/CAV Cnfg ID 0001  
Broadcast VAV Boxes  
Force To Max: No  
Use < Or > To Change
```

When YES is selected, all VAV/Zone Controllers connected to this VAV/CAV Controller will be forced to their "Maximum Airflow" position during the Morning Warmup Mode of operation. Select No if you do not want this to occur. See *VAV/Zone Controller Setpoint Screen #6* on **page 57** for setting the Maximum Airflow position. Default is No.

Configuration Screen #21 - Broadcast VAV Boxes Force to Fixed

```
VAV/CAV Cnfg ID 0001  
Broadcast VAV Boxes  
Force To Fixed: No  
Use < Or > To Change
```

When Yes is selected, all VAV/Zone Controllers connected to this VAV/CAV Controller will be forced to their "Fixed Airflow" position during the Morning Warmup Mode of operation. Select NO if you do not want this to occur. See *VAV/Zone Controller Setpoint Screen #10* on **page 58** for setting the Fixed Airflow position. Default is No.

Configuration Screens #22-41 - Relay Configuration Screens

VAV/CAV Cnfg ID 0001
 Relay Configurations
 Rly xx: Not Used
 Use < Or > To Change

The 20 Relay screens allow you to set the 4 relays on the VAV/CAV Controller and up to 16 additional relays when relay expansion board(s) are used.

The first relay on the VAV/CAV Controller is always reserved for the Supply Fan. Relays #2 through #21 can be individually configured. by *pressing* the left and right arrow keys to change the relay to the desired configuration. This should be enough to handle up to 8 stages of Heating and 8 stages of Cooling on large HVAC units. Only the Heating and Cooling relays can be configured with multiple outputs. If any other option is selected more than once, it will simply activate redundant relays, but no multiple staging will occur.

Available options are:

- **Not Used**
- **Pre-Heater**
- **Heat Stage**
- **Reserved**
- **Cool Stage**
- **Alarm Relay**
- **Warmup Mode**
- **Override**
- **Rev Valve**
- **Occupied**
- **Gas Re-Heat**
- **Economizer**
- **Exhaust Fan**

The VAV/CAV Controller does not require you to start configuring your Heating or Cooling Stages first nor does it require that you utilize consecutive relays until all Heating or Cooling Stages have been defined.

This method allows the greatest flexibility in the field, but it requires close attention to the wiring of the Heating and Cooling Stages to prevent incorrect and possibly harmful operation.

The controller assumes there will only be one relay configured for Morning Warm-Up Mode although it doesn't prevent multiple relays from being selected. Since this relay is used to send a signal to VAV boxes to drive to their maximum airflow position, redundant relays are not required.

VAV/CAV Setpoint Screen Index

Setpoint Screen Index

The available Setpoint Screens for the VAV/CAV Controller are listed on the next few pages by sequential screen number. When each VAV/CAV Controller is configured for the first time, it is best to start with screen #1 and proceed to each Setpoint Screen in numerical order until you have viewed all available Setpoint Screens. This ensures that you have seen all of the available VAV/CAV Controller Setpoint possibilities and have the opportunity to change or accept the defaults for each screen. Once the unit Setpoints are configured and you decide to change one of the screen options, it is helpful to know what screen number contains the configuration you wish to change. With this in mind, the following is a list of all the VAV/CAV Setpoint Screens in numerical order with a brief listing of the Setpoint feature available on each screen:

Screen #1	HVAC Mode Setpoints	Screen #15	Static Setpoint, Deadband & Control Rate
Screen #2	Unoccupied Setbacks	Screen #16	Relief Setpoint and Deadband
Screen #3	HVAC Mode Select Deadband	Screen #17	Set SAT Cool Reset
Screen #4	SAT Setpoints—Cooling & Rest Offset	Screen #18	Set SAT Heat Reset
Screen #5	SAT Setpoints—Heating & Reset Limit	Screen #19	Start Fan Delay Timer
Screen #6	Both Heating/Cooling Supply Control Use Deadband Of	Screen #20	Mechanical Heat Cool Failures Occur After No Change In
Screen #7	Morning Warmup Setup—Target Temp and Max Length	Screen #21	AHU Scheduled By Schedule Number
Screen #8	Outdoor Air Lockouts—Cooling & Heating	Screen #22	Maximum Economizer Position if High CO ₂ Level Occurs
Screen #9	All Cooling Cuts Off If Supply Air Temp Drops Below	Screen #23	CO ₂ Protection Limit
Screen #10	All Heating Cuts Off If Supply Air Temp Exceeds	Screen #24	Push Button Override Duration
Screen #11	Heating Stages Off If Supply Fan VFD is Below	Screen #25	Slide Offset Sensor Setpoint
Screen #12	Pre-Heat Output ON Continuous Below OAT Level	Screen #26	Air to Air Heat Pump Delay Before Using Aux Heating
Screen #13	Economizer Setpoints OAT/WB Enable	Screens #27-30	Cooling and Heating Stage Delays
Screen #14	Economizer Setpoints Min Position & Control Rate	Screen #31	Sensor Calibrations For SPC, SAT & RAT
		Screen #32	Sensor Calibration For OAT

Setpoints - General Procedures

Modular Service Tool Instructions

From any menu screen, *press* <SETPOINTS>. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the Controller you want to change Setpoints for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see Setpoint Screen #1. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll to the 'Change Setpoints' option and *press* <ENTER>. This will take you to the first Setpoints Screen shown below.

Setpoint Screen #1 - HVAC Mode Setpoints

```
VAV/CAV Spts ID 0001
HVAC Mode Setpoints
Cooling.....: 74°F
Heating.....: 65°F
```

If the controller is configured for Space Temperature, Return Air Temperature, or Return Air with Day Heating control, the unit attempts to maintain these Cooling and Heating Setpoints.

If you are using a remote BAS to activate the Heating or Cooling Modes with contact closures on the 4 Binary Input Board, set these two setpoints to zero and select the Supply Air Temperature Sensor as the controlling sensor.

Description	Minimum	Default	Maximum
HVAC Mode Setpoints Cooling	0°F	74°F	90°F
HVAC Mode Setpoints Heating	0°F	65°F	90°F

Setpoint Screen #2 - Unoccupied Setbacks

```
VAV/CAV Spts ID 0001
Unoccupied Setbacks
Cooling SetUp: 10°F
Heating SetBk: 0°F
```

During the Unoccupied Mode these values will be added to the Cooling Setpoint and subtracted from the Heating Setpoint. These settings are only used if the controller has been configured to utilize a Space Temperature Sensor.

Description	Minimum	Default	Maximum
Unoccupied Cooling Setup	0°F	10°F	30°F
Unoccupied Heating Setback	0°F	0°F	-30°F

VAV/CAV CONTROLLER SETPOINTS

VAV/CAV Setpoint Screens

Setpoint Screen #3 - HVAC Mode Select Deadband

```
VAV/CAV Spts ID 0001
HVAC Mode Select
Deadband.....: 1.0°F
```

The HVAC Mode Select Deadband is the amount of error from setpoint required to activate the Heating or Cooling Mode of operation.

This assumes the Return Air or Space Temperature are the controlling sensors. If the Supply Air Temperature Sensor is the controlling sensor, then this setpoint is not used.

Description	Minimum	Default	Maximum
HVAC Mode Select Deadband	0.1°F	1.0°F	10.0°F

Setpoint Screen #4 - SAT Cooling Setpoint & Reset Offset

```
VAV/CAV Spts ID 0001
Supply Air Setpoints
Cooling.....: 55°F
Reset Offset...: 0°F
```

If no Reset of the Supply Air Temperature (SAT) Setpoint will be used, then set the Cooling SAT Setpoint here, and leave the Reset Offset at 0. If SAT Reset will be used, enter a Reset Offset value that will be added to the Cooling Setpoint to create the upper limit for the Reset function. Reset is always upward from the SAT Cooling Setpoint (lowest value) to the SAT Cooling Setpoint plus Offset (highest value). This Cooling Reset configuration will be completed on *Setpoint Screen #17* on **page 34**.

Description	Minimum	Default	Maximum
SAT Cooling Setpoint	40°F	55°F	70°F
Cooling Reset Offset	0°F	0°F	20°F

Setpoint Screen #5 - SAT Heating & Reset Limit Setpoints

```
VAV/CAV Spts ID 0001
Supply Air Setpoints
Heating.....: 140°F
Reset Limit...: 140°F
```

If no Reset of the Supply Air Temperature (SAT) Setpoint will be used, then set the Heating SAT Setpoint here, and set the Reset Limit to the same value. If SAT Reset will be used, set the Heating Setpoint as the lowest Supply Air Setpoint Temperature desired, and set the Reset Limit as the highest SAT desired. Reset is always upward from the Heating Setpoint to the Reset Limit. This Heating Reset configuration will be completed on *Setpoint Screen #18* on **page 34**.

Description	Minimum	Default	Maximum
SAT Heating Spt	60°F	140°F	200°F
Reset Limit Spt	60°F	140°F	200°F

Setpoint Screen #6 - Heating/Cooling Supply Control Use Deadband Of

```
VAV/CAV Spts ID 0001
Both Heating/Cooling
Supply Control Use
Deadband Of: 1°F
```

All Heating and Cooling stages are staged up and down as the Supply Air rises above or falls below the Supply Setpoint by an amount equal to the number of stages divided into the Deadband Setpoint.

If you have 2 stages and a 1°F deadband, the staging begins at 0.5°F above the setpoint for Stage 1 and 1°F above the setpoint for Stage 2.

Description	Minimum	Default	Maximum
Deadband Setpoint	0°F	1°F	20°F

Setpoint Screen #7 - Morning Warm Up Setup

```
VAV/CAV Spts ID 0001
Morning WarmUp Setup
Target Temp: 72°F
Max Length.: 60 Min
```

If you need a Morning Warm-Up period on your HVAC unit, enter the Target Temperature you want the Return Air Temperature to achieve and the Max Length of time you want to spend in Warm-Up Mode trying to achieve the Target Temperature. If you don't need Morning Warm-Up, simply ignore the Target Temperature Setpoint and enter a '0' for the Max Length value.

Description	Minimum	Default	Maximum
Target Temperature	50°F	72°F	90°F
Max Length	0 Min	60 Min	240 Min

Setpoint Screen #8 - Outdoor Air Lockouts

```
VAV/CAV Spts ID 0001
Outdoor Air Lockouts
Cooling.....: 50°F
Heating.....: 75°F
```

The Unit Controller will Lockout Mechanical Heating or Cooling when the Outdoor Air (OA) Temperature is above or below these setpoints. On Heat Pump units, Compressor Cooling and Heating can only operate if the OA Temperature is above the Outdoor Air Cooling Lockouts.

If the Outdoor Air Temperature drops below the Cooling Lockout setpoint by 1°F, the DX cooling will be locked out until the Outdoor Air Temperature rises 1°F back above the Lockout Setpoint. The same 1°F deadband applies to the Heat Lockout Setpoint except the Outdoor Air locks out the Heating when it is above the lockout instead of below the lockout.

Description	Minimum	Default	Maximum
OA Lockouts Cooling	-30°F	50°F	80°F
OA Lockouts Heating	50°F	75°F	90°F

Setpoint Screen #9 - Low Cutoff Temperature

VAV/CAV Spts ID 0001
All Cooling Cuts Off
If Supply Air Temp
Drops Below: 40°F

If the Supply Fan VFD drops below this value, the Heat will stage off. The Supply Fan VFD will not be allowed to drop below this value while the unit is in Heating Mode unless the static pressure rises 0.5" above the static setpoint See the *VAV/CAV Controller Technical Guide* for detailed information on the Low Supply Air Temperature Cutoff sequence of operation.

Description	Minimum	Default	Maximum
Lo SAT Cutoff	30°F	40°F	60°F

Setpoint Screen #10 - High Cutoff Temperature

VAV/CAV Spts ID 0001
All Heating Cuts Off
If Supply Air Temp
Exceeds: 170°F

If the Supply Air Temperature ever exceeds this value, all Heating stages are immediately cutoff, regardless of run time. See the *VAV/CAV Controller Technical Guide* for detailed information on the High Supply Air Temperature Cutoff sequence of operation.

Description	Minimum	Default	Maximum
Hi SAT Cutoff	60°F	170°F	250°F

Setpoint Screen #11 - Supply Fan VFD Percentage

VAV/CAV Spts ID 0001
Heating Stages Off
If Supply Fan VFD Is
Below: 30%

If the Supply Fan VFD drops below this value, the Heat will stage off. The Supply Fan VFD will not be allowed to drop below this value while the unit is in Heating Mode unless the Static Pressure rises 0.5" above the Static Setpoint.

Description	Minimum	Default	Maximum
Below Setpoint	0%	30%	100%

Setpoint Screen #12 - Low Ambient Protection

VAV/CAV Spts ID 0001
Pre-Heat Output ON
Continuous Below
OAT Level: 0°F

If your air handler has at least one Heating stage and you require a Low Ambient Protection or Preheating of the air stream, you can enter a Supply Air Temperature value that causes one stage of Heating to come on and remain on continuous if the Outdoor Air Temperature drops below this level. If you don't want this protection, do not configure any relays for this function.

Description	Minimum	Default	Maximum
Low Ambient Level	-50°F	0°F	70°F

Setpoint Screen #13 - Economizer OAT/WB Enable

VAV/CAV Spts ID 0001
Economizer Setpoints
OAT/WB Enable: 55°F

If an Outdoor Air Humidity Sensor is not connected to the Unit Controller and the Outdoor Air Temperature falls below this Setpoint, the Economizer can be used for Free Cooling. If an Outdoor Air Humidity Sensor is connected to the controller, then a Wetbulb Temperature will be calculated and used instead of the Outdoor Air Drybulb Temperature to determine when Free Cooling can be used.

Description	Minimum	Default	Maximum
Economizer Setpoints OAT/WB Enable	-30°F	55°F	80°F

VAV/CAV CONTROLLER SETPOINTS

VAV/CAV Setpoint Screens

Setpoint Screen #14 - Economizer Minimum Position & Control Rate

```
VAV/CAV Spts ID 0001
Economizer Setpoints
Min Position.: 10%
Control Rate.: 90
```

The Economizer (OA Damper) Min Position Setpoint is maintained during the Occupied Mode even if the Economizer is disabled due to the OA Temperature or Wetbulb Temperature being above the Economizer Enable Setpoint. The Control Rate Setpoint allows you to adjust the Economizer to modulate the OA Damper Actuator faster or slower as desired. The Control Rate Setpoint range is 10-99. Larger numbers make the Economizer Outdoor Air Damper Actuator modulate faster; smaller numbers make the Outdoor Air Damper Actuator modulate slower.

Description	Minimum	Default	Maximum
Economizer Min Position	0%	10%	100%
Economizer Control Rate	10	90	99

Setpoint Screen #15 - Static Setpoint, Deadband & Control Rate

```
VAV/CAV Spts ID 0001
Static Spt...: 0.50"
Deadband.....: 0.10"
Control Rate.: 10s
```

For VAV units, a Supply Fan VFD or Bypass Damper Actuator is used to maintain the Duct Static Pressure Setpoint. The Static Pressure Output Signal varies to control the Static Pressure Setpoint. If the Duct Static Pressure is above the Static Setpoint plus the Deadband, the Static Pressure Output Signal will be reduced at every Control Rate interval. If the Static Pressure is below the Static Setpoint minus the Deadband, the Output signal will be increased at every Control Rate interval.

The Duct Static Pressure Control Output Signal is a non-configurable Direct Acting Signal (0-10 VDC). This can be used to directly connect to a Supply Fan VFD without any modifications.

When you are using a Bypass Damper Actuator to control the Duct Static Pressure, you must set up the Bypass Damper Actuator or the Bypass Damper so that it is Reverse Acting in operation. The Output Signal increases (closes Bypass Damper) if the Duct Static Pressure is below the Duct Static Pressure Setpoint by the Deadband amount and the Output Signal decreases (opens Bypass Damper) if the Static Pressure is above the Setpoint by the Deadband amount.

Description	Minimum	Default	Maximum
Static Spt	0.10" WG	0.50" WG	3.0" WG
Deadband	0.01" WG	0.10" WG	1.0" WG
Control Rate	1 Sec	10 Sec	30 Sec

Setpoint Screen #16 - Building Pressure Setpoint & Deadband

```
VAV/CAV Spts ID 0001
Relief Spt...: 0.10"
Deadband....: 0.02"
```

The VAV/CAV Controller uses the Relief Fan VFD signal to maintain the Relief Setpoint value plus or minus the Deadband value. Adjustments to the signal are made at a rate equal to the Control Rate Setpoint on the previous Static Pressure screen. If you don't require Relief Pressure control, simply ignore these settings

Description	Min.	Default	Max.
Relief Setpoint	-0.20" WG	0.10" WG	+0.20" WG
Deadband	0.01" WG	0.02" WG	0.10" WG

Setpoint Screens #17 & 18 - SAT Cool Reset & SAT High Reset

```
VAV/CAV Spts ID 0001
Set SAT Cool Reset
Hi Rst = 0   Spt = 55
Lo Rst = 0   Ofst = 0
```

```
VAV/CAV Spts ID 0001
Set SAT Heat Reset
Hi Rst = 0   Spt = 140
Lo Rst = 0   Rst = 140
```

These screens allow you to set values for resetting the Supply Air Temperature (SAT) when the unit is in Cooling and/or Heating Mode. You can configure the HVAC unit to reset the SAT Setpoint based on the Outdoor Air Temperature, Input Voltage Signal, Space Temperature, Return Air Temperature, Fan VFD Percentage, or a Local Analog Value. On these screens you will only enter the values in the left hand column. These are the Reset Source values that will cause the SAT to proportionally reset from its minimum to its maximum value. The values in the right hand column are set in *Setpoint Screens #4 & #5* on **page 32** and automatically imported into this screen. See the examples below to set up the reset ranges.

Example: Space Temperature Setpoints are 74°F COOL and 72°F HEAT

Space Temperature Cool Reset Example:

Hi Reset = 76°F SAT Setpoint (Spt) = 55°F
Lo Reset = 74°F SAT Setpoint (Rst) = 65°F

Space Temperature Heat Reset Example:

Hi Reset = 72°F SAT Setpoint (Spt) = 90°F
Lo Reset = 70°F SAT Setpoint (Rst) = 120°F

VFD Percentage Cool Reset Example:

Hi Reset = 70% SAT Setpoint (Spt) = 55°F
 Lo Reset = 30% SAT Setpoint (Rst) = 65°F

VFD Percentage Heat Reset Example:

Hi Reset = 30% SAT Setpoint (Spt) = 90°F
 Lo Reset = 70% SAT Setpoint (Rst) = 120°F

Input Voltage Cool Reset Example:

Hi Reset = 0 Volts SAT Setpoint (Spt) = 55°F
 Lo Reset = 10 Volts SAT Setpoint (Rst) = 65°F

Input Voltage Heat Reset Example:

Hi Reset = 0 Volts SAT Setpoint (Spt) = 90°F
 Lo Reset = 10 Volts SAT Setpoint (Rst) = 120°F

Setpoint Screen #19 - Supply Fan Starting Delay Timer

VAV/CAV Spts ID 0001
 Start Fan Delay
 Timer...: 999s
 [999= Unit Addr x 5]

This is the amount of time that the main HVAC unit fan will delay before starting after an occupied signal is initiated or after a power failure. The default value is 999. With the default value, the delay will be equal to the unit address multiplied by 5.

Example: Controller ID (address) 18 would cause a 90 second delay when the default value of 999 is used. Controller ID (address) 30 would cause a 150 second delay when the default value of 999 is used.

Description	Minimum	Default	Maximum
Fan Start Delay Timer	0 Sec	999 Sec	999 Sec

Setpoint Screen #20 - Mechanical Heat/Cool Failure Time Period

VAV/CAV Spts ID 0001
 Mechanical Heat/Cool
 Failures Occur After
 No Change In 15Min

When Heating or Cooling Mode is initiated and staging is activated, if the Supply Air Temperature does not rise or fall 5°F within the Mechanical Heat/Cool Failures Occur After No Change In Setpoint time period, a Mechanical Heating or Cooling Failure Alarm will be generated. The alarm is for status reporting only. The HVAC unit will continue to run.

Description	Minimum	Default	Maximum
Mechanical Heat/Cool Failures Occur After No Change In	0 Min	15 Min	300 Min

Setpoint Screen #21 - HVAC Schedule

VAV/CAV Spts ID 0001
 AHU Schedule By
 Schedule Number: 0
 0=AHU 1-7=Scheduler

Normally, the AHU will use its own internal time clock and week schedules to set the Occupied Mode of operation. If you have several air handlers, you can connect an external scheduling device to the communications loop and program the air handler for the desired schedule to follow. If the AHU is using its internal schedule, *enter* <0> for Internal.

Description	Minimum	Default	Maximum
Schedule Number	0	0	1 to 7

Setpoint Screen #22 - Economizer Maximum Position if High CO₂ Level

VAV/CAV Spts ID 0001
 Maximum Economizer
 Position if High CO₂
 Level Occurs.: 100%

If you have configured the air handler to read a CO₂ Sensor, it will override the Minimum Economizer Position up to this position if the CO₂ level rises above its setpoint by the adjustable Reset Range amount. See *Setpoint Screen #23*.

NOTE: The Minimum Position is determined by the user-adjustable Min Position Setpoint on *Setpoint Screen #14* on page 34.

Description	Minimum	Default	Maximum
Maximum Economizer Position If High CO ₂ Level Occurs	Economizer Minimum Position	100%	100%

Setpoint Screen #23 - CO₂ Protection Limit

VAV/CAV Spts ID 0001
 CO₂ Protection Limit
 Max Level: 900 PPM
 Reset Range: 100 PPM

If you configure the air handler to read a CO₂ Sensor, the Max Level is the point at which the Economizer Minimum Position starts to reset upward. As the CO₂ level rises above the Max Level by the Reset Range amount, the Economizer will have reset its Minimum Position proportionally up to the previously defined Economizer Maximum Position in High CO₂.

Description	Minimum	Default	Maximum
CO ₂ Protection Limit Max Level	0 PPM	900 PPM	5000 PPM
CO ₂ Protection Limit Reset Range	0 PPM	100 PPM	1000 PPM

VAV/CAV CONTROLLER SETPOINTS

VAV/CAV Setpoint Screens

Setpoint Screen #24 - Push-Button Override Duration

VAV/CAV Spts ID 0001
Push-Button Override
Duration....: 2.0 Hr

If the unit controller has a Space Temperature Sensor installed and it has the Override Button option, the HVAC unit will initiate Occupied Mode any time the Override Button is pressed and held for less than 3 seconds. The Push-Button Override Duration Setpoint allows you to adjust the amount of time the Override will remain in effect when the Override Button is pressed. To cancel the Override before the Override Duration time period expires, press the Override Button for 5 to 10 seconds.

Description	Minimum	Default	Maximum
Push-Button Override Duration	0.0 Hr	2.0 Hr	8.0 Hr

Setpoint Screen #25 - HVAC Mode Sensor Slide Offset

VAV/CAV Spts ID 0001
Slide Offset Sensor
Setpoint....: 0°F

If the unit controller has a Space Temperature Sensor with the Slide Adjust option installed, the HVAC Mode Enable Heating and Cooling Setpoints can be offset by the HVAC Mode Sensor Slide Offset Setpoint value. When the Slide Adjust bar is in the middle, no offset will occur. If the Slide Adjust bar is moved all the way to the top of the Sensor, the Heating and Cooling Setpoints will be raised by the Setpoint value you have entered. If the Slide Adjust bar is moved all the way down to the bottom of the Sensor, the Heating and Cooling Setpoints will be lowered by the Setpoint value you have entered.

Description	Minimum	Default	Maximum
HVAC Mode Sensor Slide Offset	0°F	0°F	10°F

Setpoint Screen #26 - Heat Pump Auxiliary Heating Delay

VAV/CAV Spts ID 0001
Air to Air Heat Pump
Delay Before Using
Aux Heating: 3 Min

If you configured this air handler to control as an Air to Air Heat Pump unit and you have Auxiliary Heating on this unit, you can adjust how long the unit uses the compressor to attempt to provide Heating before it activates the Aux Heat to supplement the compressor.

NOTE: On Air to Air Heat Pumps, you must configure one of the relays to be used as the Reversing Valve. This output is active any time the unit is in the Heating Mode and this mode is the only time the Aux Heat will be activated, if needed.

Description	Minimum	Default	Maximum
Heat Pump Auxiliary Heating Delay	0 Min	3 Min	30 Min

Setpoint Screen #27 - Internal Schedule Optimal Start Soak Multiplier

VAV/CAV Spts ID 0001
Internal Schedule
Optimal Start Soak
Multiplier: 0.0

If you have decided to use the AHU internal schedule and have entered a '0' on *Setpoint Screen #21* on **page 35** for the schedule number, you can enable this internal schedule to perform an Optimal Start. This feature requires a Space Sensor input for the Optimal Start calculations. If you don't require optimal start or you are not using a Space Sensor, enter a '0' for this multiplier. If you do have a Space Sensor and want Optimal Start, enter a value greater than '1.0' to enable the calculations. The Soak Multiplier is used to increase the normal Optimal Start calculation whenever the building has been in the Unoccupied Mode for 24 consecutive hours or more. If you used a 1.5 multiplier and the Optimal Start had calculated a 30 minute pre-start, the Soak Multiplier would add an additional 15 minutes to the pre-start for a total of 45 minutes (1.5 x 30). The system would then start 45 minutes earlier than the normally scheduled Occupied Mode schedule to bring the Space Temperature under control.

Description	Minimum	Default	Maximum
Internal Schedule Optimal Start Soak Multiplier	0.0	0.0	5.0

Configuration Screen #28-#31 - Cool/Heat Stage Delays

```
VAV/CAV Spts ID 0001
Cooling Stage Delays
Staging Up..: 3 Min
Staging Down: 1 Min
```

```
VAV/CAV Spts ID 0001
Cooling Stage Delays
Min Run Time..: 5 Min
Min Off Time..: 3 Min
```

```
VAV/CAV Spts ID 0001
Heating Stage Delays
Staging Up..: 3 Min
Staging Down: 1 Min
```

```
VAV/CAV Spts ID 0001
Heating Stage Delays
Min Run Time..: 5 Min
Min Off Time..: 1 Min
```

Both the Heating Stages and the DX Cooling Stages utilize Staging Up and Down Delay Periods between stages and Minimum Run Times and Off Times.

Both modes have their own set of Staging and Run Delay times. The Heating timer screens look exactly the same as the Cooling except they reference the Heating instead of Cooling.

See the *VAV/CAV Controller Technical Guide* for information on how these Delays and Run Times are used.

Description	Minimum	Default	Maximum
Cooling Stage Up	3 Min	3 Min	15 Min
Cooling Stage Down	1 Min	1 Min	15 Min
Cooling Min Run Time	5 Min	5 Min	15 Min
Cooling Min Off Time	3 Min	3 Min	15 Min
Heating Stage Up	3 Min	3 Min	15 Min
Heating Stage Down	1 Min	1 Min	15 Min
Heating Min Run Time	2 Min	2 Min	15 Min
Heating Min Off Time	1 Min	1 Min	15 Min

Setpoint Screen #32 - Sensor Calibration for SPC, SAT & RAT

```
Sensor Calibration
SPC: XX.X° 0.00°
SAT: XX.X° 0.00°
RAT: XX.X° 0.00°
```

If the Space, Supply, or Return Air Temperature Sensors are reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature. Enter a positive Sensor Calibration value to raise the Space Temperature Sensor, Supply Air Temperature Sensor, or Return Air Temperature Sensor reading and a negative value to lower the Sensor reading.

Description	Minimum	Default	Maximum
Sensor Calibration SPC	-100.0°F	0.0°F	+100.0°F
Sensor Calibration SAT	-100.0°F	0.0°F	+100.0°F
Sensor Calibration RAT	-100.0°F	0.0°F	+100.0°F

Setpoint Screen #33 - Sensor Calibration for OAT

```
Sensor Calibration
OAT: XX.X° 0.00°
```

If the Outdoor Air Temperature Sensor is reading incorrectly, you can use this option to enter an offset temperature to adjust the Sensor's Temperature. Enter a positive Sensor Calibration value to raise the Outdoor Air Temperature Sensor reading and a negative value to lower the Sensor reading.

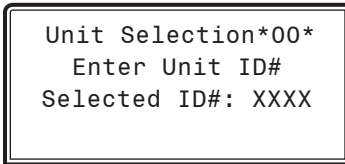
Description	Minimum	Default	Maximum
Sensor Calibration OAT	-100.0°F	0.0°F	+100.0°F

VAV/CAV CONTROLLER STATUS

VAV/CAV Status Screen Index

Status Screen Instructions

From any menu screen, *press* <STATUS>. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.



Enter the correct unit ID number of the Unit Controller you want to view Status for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see *Status Screen #1*. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

VAV/CAV Status Screen Index

Status Screen #1	HVAC Mode
Status Screen #2	Cooling/Heating/Economizer Status
Status Screen #3	Current Controlling Temperature and Cooling and Heating Setpoints
Status Screen #4	H/C Demand, Space Temperature & CO ₂ Level
Status Screen #5	Current Outdoor Air Temperature and Humidistat

Status Screen #6	Current Supply Air Temperature, Return Air Temperature, and Active Supply Air Temperature Setpoint
Status Screen #7	Current Static Pressure and Current Fan VFD Signal Percentage and Economizer Percentage
Status Screen #8	Current Relief Pressure and Current Relief Fan VFD Signal
Status Screen #9	MODGAS Output Percentage & MHGRV Output Percentage
Status Screens #10-30	Supply Fan and Other Relays
Status Screen #31	No Alarms! or Alarms Present
Status Screen #32	Bad Space Temperature, Fan Proving, Mechanical Cool Alarm
Status Screen #33	Mechanical Heat Alarm, Dirty Filter, High Control Temperature
Status Screen #34	Low Control Temperature

Status Screen 1 - Mode

```
VAV/CAV v 1.00 0001
Occupied Mode
Vent Mode
07/16/2013 05:00 PM
```

Line 2 Displays one of the following:

Unoccupied Mode	Remote Signal ON
Occupied Mode	Override Mode
Holiday Mode	Zone Demand!
Forced Schedule Mode	OUTPUT FORCE MODE!
SUPPLY AIR CUTOFF!	High CO2 Level Mode!

Line 3 If you selected Supply Air as the controlling sensor, this line will display:

Supply Air Control

If you select Space Temp or Return Air Control, the display will show one of the following:

Venting Mode	Cooling Mode
Heating Mode	Dehumidify Mode

Line 4 Displays one of the following:

MM/DD/YY HH:MM XX (XX = AM or PM)
 Fan Starting Delay and then time will display
 xx Left in WarmUp (Number of Minutes Left)

Status Screen 2 - Cooling, Heating, Economizer

```
VAV/CAV v 1.00 0001
Cooling Enabled
Heating Enabled
Economizer Disabled
```

Line 2 Displays one of the following:

Cooling Enabled
 Cooling Disabled

Line 3 Displays one of the following:

Heating Enabled
 Heating Disabled

Line 4 Displays one of the following:

Economizer Enabled
 Economizer Disabled

Status Screen 3 - Mode Enable Temperature & Mode Cooling and Heating Setpoints

```
VAV/CAV v 1.00 0001
Temperature: XX.X°F
Cooling Spt: XX.X°F
Heating Spt: XX.X°F
```

Line 2 Mode Enable Temperature

Can be the Supply Air Temperature, Return Air Temperature, Outdoor Air Temperature, or Space Temperature, depending on which one has been configured as the Mode Enable Sensor.

Line 3 Cooling Mode Setpoint

Based on the current Occupied/Unoccupied Mode of operation.

Line 4 Heating Mode Setpoint

Based on the current Occupied / Unoccupied Mode of operation. If the Supply Air Sensor is the controlling sensor, this will indicate the Night Setback Temperature that the Space Temperature uses to bring on Heat during the Unoccupied Mode.

Status Screen 4 - H/C Demand, Space Temp, and CO₂ Level

```
VAV/CAV v 1.00 0001
H/C Demand: XX.X°F
Space Tmp.: XX.X°F
CO2 Level.: 0 PPM
```

Line 2 Current Heating or Cooling Demand

Based on the comparison between the Controlling Temperature and the Heating and Cooling Setpoints. A positive number indicates a Cooling demand and a negative number indicates a Heating demand.

Line 3 Space Temperature

This sensor is only used during Unoccupied hours unless it has been configured as the Controlling Sensor.

Line 4 CO₂ Level

If you configured for a CO₂ Sensor, this line will display the CO₂ Level. Otherwise, it will remain blank.

VAV/CAV CONTROLLER STATUS

VAV/CAV Status Screens

Status Screen 5 - Outdoor Air Temperature & Humidistat

```
VAV/CAV v 1.00 0001
Outdoor Air:  XX.X°F
Humidistat  Open
```

Line 2 Current Outdoor Air Temperature

If an Outdoor Air Temperature Sensor has been installed and configured on the unit or if an Outdoor Air Broadcast has been configured on another Unit Controller on the system, the Outdoor Air Temperature will appear on this line. If not, this line will display a temperature that is half way between the Cooling and Heating Lockout Setpoints.

Line 3 Current Outdoor Air Relative Humidity

If an Outdoor Humidity Sensor has been installed and configured on the Unit Controller, the Outdoor Air Relative Humidity Percentage will appear on this line. If not, this line will display 0%.

Status Screen 6 - Supply Air Temperature & Setpoint

```
VAV/CAV v 1.00 0001
Supply Air.:  XX.X°F
Return Air.:  XX.X°F
Supply Spt.:  XX.X°F
```

Line 2 Current Supply Air Temperature

The Supply Air Temperature is always required. If a Supply Air Temperature Sensor is not installed, the controller will not operate correctly and will display 0°F.

Line 3 Current Active Return Air Setpoint

This is the Return Air Setpoint for the mode that the unit is currently operating in.

Line 4 Current Active Supply Air Setpoint

This is the Supply Air Setpoint for the mode that the unit is currently operating in. If the Supply Air Reset is configured, this is the calculated setpoint based on the current Reset Source conditions. Can be reset from an external signal if this option is selected.

Status Screen 7 - Static Pressure, Fan VFD, and Economizer

```
VAV/CAV v 1.00 0001
Static Pr.:  0.00"
Fan VFD...:  0%
Economizer:  0%
```

Line 2 Current Static Pressure Reading

Line 3 Current Fan VFD Signal Percentage

Line 4 Current Economizer Damper Percentage Open

Status Screen 8 - Relief Pressure and Relief VFD

```
VAV/CAV v 1.00 0001
Relief Pr.:  0.00"
Relief VFD.: 0%
[Relief is Optional]
```

Line 2 Current Relief Pressure

If the unit is configured for Relief Pressure Control. This will display 0.00" if you don't control Relief Pressure.

Line 3 Current Relief Fan VFD Signal.

This will display 0% if the unit is not configured for Relief Pressure Control.

Line 4 Just a reminder that this is an optional control output and may or may not have live data to display.

Status Screen 9 - MODGAS Output % & MHGRV Output %

```
VAV/CAV v 1.00 0001
MODGAS Pos...: XXX%
MHGRV Pos...: XXX%
[Optional Equipment]
```

Line 2 Current MODGAS Heating Output Signal
Indicates the percentage of the output signal being supplied to the MODGAS Controller when you have one connected to your HVAC unit. If you do not have a MODGAS Controller connected to your Unit Controller, this screen will indicate [No MODGAS Connected].

Line 3 Current MHGRV Reheat Valve Output Signal Percentage
Indicates the percentage of the output signal being supplied to the MHGRV Controller when you have one connected to your Unit Controller. If you do not have an MHGRV Controller connected to your Unit Controller, this screen will indicate [No REHEAT Connected].

Line 4 Optional Equipment
Indicates that these outputs are optional and therefore may or may not have live data to display.

Status Screens 10-30 - Relays

```
VAV/CAV v 1.00 0001
On Board Rly 1
FAN
Off
```

Line 2 Relay Status
On Board Relays 1-5, Expansion Board Relays 1-16.
On Board Relay #1 is the Fan and is not configurable.

Line 3 Relay description of what it is configured for
Possible options are as follows:

Not Used	Pre-Heater
Heat Stage	Alarm Relay
Cool Stage	Override
Warm-up Mode	Occupied
Rev Valve	Economizer (OA Damper)
Gas Re-Heat (HGR Relay)	
Exhaust Fan	

Line 4 Current relay status On or Off or FRC
FRC indicates the relay is forced to its current condition.

Status Screen 31 - Alarm Conditions

```
VAV/CAV v 1.00 0001
NO ALARMS!
```

```
VAV/CAV v 1.00 0001
ALARMS PRESENT
SCROLL DOWN TO VIEW
```

Line 2 Blank

Line 3 NO ALARMS! OR ALARMS PRESENT

If alarms are present, the screens that follow will display one or more of the following:

- Bad Space Temp
- Fan Proving
- Mech Cool Alm
- Mech Heat Alm
- Dirty Filter
- High Control Temp
- Low Control Temp

Press <↓> to scroll through all active alarms.

For Alarm Definitions, see the *VAV/CAV Controller Technical Guide*.

MUA II Configuration Screen Index

MUA II Configuration Screen Index

The available Configuration Screens for the MUA II Controller are listed on the next few pages by sequential screen number. When the Unit Controller is configured for the first time, it is best to start with screen #1 and proceed to each screen in numerical order until you have viewed all available Configuration Screens. This ensures that you have seen all the available Controller configuration possibilities and have the opportunity to change or accept the defaults for each screen.

Once the unit is configured and you decide to change one of the screen options, it is helpful to know what screen number contains the configuration you wish to change. With this in mind, the following is a list of all the MUA II Configuration Screens in numerical order with a brief listing of the configuration feature available on each screen.

Screen #1	Proof of Flow Switch Installed
Screen #2	OA Humidity Sensor Installed
Screen #3	Heat in Dehumidify Installed
Screen #4	If External Heat, Output Range
Screen #5	Is External Heat Reverse Action
Screen #6	Broadcast Outside Temperature
Screen #7	Broadcast Humidity Reading
Screens #8-27	Relay Configuration Relays 2-21

Modular Service Tool Instructions

No matter what screen or menu you're in, *press* <CONFIGURATION>. The *Unit Selection Screen* will appear, shown below, requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the Unit Controller you want to configure and then *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see *Unit Configuration Screen #1*. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll down to the 'Configure Unit' option and *press* <ENTER>. This will take you to the first Configuration Screen shown below.

Configuration Screens

In order to correctly set up the Unit Controller, you must first configure several parameters in regard to the type of HVAC unit and system you have installed. Most of these values and operating parameters are only set once at the initial system setup and are never changed.

Configuration Screen #1 - Proof of Flow Switch Installed

```
MUA-II  Cnfg  0001
Proof of Flow Switch
Installed: No
Use < Or > To Change
```

If you need proof of airflow before allowing any Heating or Cooling Stages to operate, install a Differential Pressure Switch with a contact closure that is connected to analog input #7 and select this option. If this option is not selected, the air handler assumes there is adequate airflow any time the fan is running and ignores this signal causing analog input #7 to default to Space Humidity. Default is No.

Configuration Screen #2 - Outdoor Air Humidity Sensor Installed

```
MUA-II  Cnfg  0001
OA Humidity Sensor
Installed: No
Use < Or > To Change
```

This configuration screen allows you to indicate whether an Outdoor Air Humidity Sensor is to be installed and used to calculate Dewpoint settings. If you either don't have an Outdoor Air Humidity Sensor installed or have one installed but wish to use only Drybulb Temperatures for control of the HVAC unit, the setting should be set to No. If you have an Outdoor Air Humidity Sensor installed and wish to use Dewpoint calculations for unit control, select Yes. If you have a sensor installed and do not select Yes, the sensor readings will be ignored. Default is No.

Configuration Screen #3 - Heat In Dehumidify Control

```
MUA-II  Cnfg  0001
Heat In Dehumidify
Installed: No
Use < Or > To Change
```

If you need to allow Heat during Dehumidification, select this option. If this option is not selected, the controller assumes that only Reheat will be allowed during Dehumidification Mode. Default is No.

Configuration Screen #4 - If External Heat, Output Range

```
MUA-II  Cnfg  0001
If External Heat
Output Range: 0-10V
[0= 2-10V  1= 0-10V]
```

If you have an External Heating device to be controlled by the MUA II Controller, you can select between the voltage ranges that will be used to control the device. The available options are 2-10 VDC and 0-10 VDC. Default is 0-10V.

Configuration Screen #5 - Is External Heat, Reverse Acting

```
MUA-II  Cnfg  0001
Is External Heat
Reverse Acting: No
Use < Or > To Change
```

If you need the modulation of the External Heat to be Reverse Acting, select this option. If this option is not selected, the controller assumes the modulation will be Direct Acting. Default is No.

Configuration Screen #6 - Broadcast Outdoor Temperature

```
MUA-II  Cnfg  0001
Broadcast Outside
Temperature: No
Use < Or > To Change
```

If you have other unit controllers on the system, you can elect to Broadcast the Outdoor Air Temperature to these units by selecting Yes on this screen. If you don't have other controllers or they have their own Outdoor Air Temperature Sensors, select No. Default is No.

MUA II CONTROLLER CONFIGURATION

MUA II Configuration Screens

Configuration Screen #7 - Broadcast Humidity Reading

```
MUA-II  Cnfg  0001
Broadcast Humidity
Reading: No
Use < Or > To Change
```

If you have other unit controllers on the system, you can elect to broadcast the Outdoor Humidity to these units by selecting Yes on this screen. If you don't have other controllers or they have their own Outdoor Humidity Sensors, select No. Default is No.

Configuration Screens #8-#27 - Relay Configuration Screens

```
MUA-II  Cnfg  0001
Relay Configurations
Rly xx: Not Used
Use < Or > To Change
```

The following 20 screens allow you to set the 4 relays on the MUA II Controller board and up to 16 additional relays when relay expansion board(s) are used.

The first relay on the controller is always reserved for the Supply Fan. The remaining 4 relays on the main board and the additional 16 relays on the expansion relay boards can be configured by pressing the left or right arrow key to change the relay to the desired configuration.

Available options are

- **Not Used**
- **Heat Stage**
- **Cool Stage**
- **Warmup Mode**
- **Rev Valve**
- **Gas Re-Heat**
- **Exhaust Fan**
- **Pre-Heater**
- **External Heat**

The MUA II Controller does not require you to start configuring your Heating or Cooling Stages first nor does it require that you utilize consecutive relays until all Heating or Cooling Stages have been defined.

This method allows the greatest flexibility in the field, but it requires close attention to the wiring of the Heating and Cooling Stages to prevent incorrect and possibly harmful operation. The controller assumes that there will only be one relay configured for Hot Gas Reheat and one relay for External Heat Enable, although it doesn't prevent multiple relays from being selected.

Setpoints - General Procedures

Modular Service Tool Instructions

From any menu screen, *press* <SETPOINTS>. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the Unit Controller you want to change Setpoints for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see Setpoint Screen #1. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll to the 'Change Setpoints' option and *press* <ENTER>. This will take you to the first Setpoints Screen shown below.

Setpoint Screen Index

The available Setpoint Screens for the MUA II Controller are listed on the next few pages by sequential screen number. When each MUA II Controller is configured for the first time, it is best to start with screen #1 and proceed to each Setpoint Screen in numerical order until you have viewed all available Setpoint Screens. This ensures that you have seen all of the available MUA II Controller Setpoint possibilities and have the opportunity to change or accept the defaults for each screen. Once the unit Setpoints are configured and you decide to change one of the screen options, it is helpful to know what screen number contains the configuration you wish to change. With this in mind, the following is a list of all the MUA II Setpoint Screens in numerical order with a brief listing of the Setpoint feature available on each screen:

- Screen #1 Supply Air Temperature Setpoint
- Screen #2 Staging Deadbands—Cooling & Heating
- Screen #3 Unoccupied Deadbands—Cooling & Heating
- Screen #4 Systems with Re-Heat—Dewpoint Control Setpoint
- Screen #5 Enthalpy Staging—Deadband & Hysterisis
- Screen #6 Heat Delay During Dehumidification Will Occur
- Screen #7 Alarm Limits—High & Low Supply Air Temperature
- Screen #8 Supply Air Alarms If Out of Range For
- Screen #9 Set Supply Air Temperature Reset
- Screen #10 Set Dewpoint Reset
- Screen #11 Cooling Stage Delays—Staging Up & Down
- Screen #12 Cooling Stage Delays—Min Run & Off Times
- Screen #13 Heating Stage Delays—Staging Up & Down
- Screen #14 Heating Stage Delays—Min Run & Off Times
- Screen #15 External Modulating Heat—Deadband & Time Period
- Screen #16 Push-Button Override Duration
- Screen #17 Slide Offset Duration
- Screen #18 HVAC Schedule
- Screen #19 Fan Time Delay Before Activation Can Occur
- Screen #20 Sensor Calibrations For SAT & OAT
- Screen #21 Sensor Calibration Reset Sensor - Space

MUA II CONTROLLER SETPOINTS

MUA II Setpoint Screens

Setpoint Screen #1 - Supply Air Temperature Setpoint

```
MUA II  SPTS  0001
Supply Air Temp
Setpoint...: 70°F
```

The Supply Air Setpoint is the desired temperature to be delivered by the MUA II at any time during the Occupied Mode of operation.

Description	Minimum	Default	Maximum
Supply Air Temp Setpoint	50°F	70°F	90°F

Setpoint Screen #2 - Staging Deadbands

```
MUA II  SPTS  0001
Staging Deadbands
Cooling.....: 5°F
Heating.....: 5°F
```

The Cooling Deadband added to the Supply Air Setpoint is the Cooling Mode Setpoint.

When the Outside Air Temperature rises above this setpoint, the MUA II will go into Cooling Mode. The Heating Deadband is subtracted from the Supply Air Setpoint to get the Heating Mode Setpoint.

When the Outside Air Temperature drops below this setpoint, the MUA II will go into Heating Mode.

Description	Minimum	Default	Maximum
Cooling Deadband	2°F	5°F	20°F
Heating Deadband	2°F	5°F	20°F

Setpoint Screen #3 - Unoccupied Deadbands

```
MUA II  SPTS  0001
Unoccupied Deadbands
Cooling.....: 0°F
Heating.....: 0°F
```

During the Unoccupied Mode, these values will be added to the Cooling Setpoint and subtracted from the Heating Setpoint. These settings are only used if the controller has been configured to utilize a Space Temperature Sensor.

Description	Minimum	Default	Maximum
Unoccupied Cooling Deadband	0°F	0°F	30°F
Unoccupied Heating Deadband	0°F	0°F	30°F

Setpoint Screen #4 - Systems with Reheat - Dewpoint Control Setpoint

```
MUA II  SPTS  0001
Systems with Re-heat
Dewpoint Control
Setpoint...: 55°F
```

The systems capable of Dehumidification will enter this mode of operation when the Outside Air Dewpoint rises above the Dewpoint Setpoint.

Description	Minimum	Default	Maximum
Dewpoint Setpoint	40°F	55°F	80°F

Setpoint Screen #5 - Enthalpy Staging - Deadband and Hysteresis

```
MUA II  SPTS  0001
Enthalpy Staging
Deadband.....: 5BTU
Hysteresis...: 1.0BTU
```

The Enthalpy Deadband is the amount of Enthalpy in the Outside Air needed to activate an extra stage of cooling. The Enthalpy Hysteresis is used to avoid unnecessary cycling of the Cooling Stages when the Outside Enthalpy is close to the setpoint.

Description	Minimum	Default	Maximum
Enthalpy Deadband	3 BTU	5 BTU	20 BTU
Enthalpy Hysteresis	0.5 BTU	1.0 BTU	2.5 BTU

Setpoint Screen #6 - Heat Delay During Dehumidification

```
MUA II  SPTS  0001
Heat Delay During
Dehumidification
Will Occur...: 2 Min
```

If Heating during Dehumidification is configured, this is the amount of time the Heating call will be delayed after the Dehumidification is activated.

Description	Minimum	Default	Maximum
Heat Delay	0 Min	2 Min	10 Min

Setpoint Screen #7 - Alarm Limits

```

MUA II  SPTS  0001
Alarm Limits
Hi SAT Limit: 150°F
Lo SAT Limit:  0°F
    
```

If the Supply Air Temperature ever rises above the High SAT Limit or drops below the Low SAT Limit for a user-defined period of time, an alarm is generated.

Description	Minimum	Default	Maximum
High SAT Limit	50°F	150°F	150°F
Low SAT Limit	0°F	0°F	70°F

Setpoint Screen #8 - Supply Air Alarm

```

MUA II  SPTS  0001
Supply Air Alarms If
Out Of Range For
30 Min
    
```

This is the amount of time the Supply Air Temperature must be outside either the High or Low SAT Limit Setpoint before it generates an alarm.

Description	Minimum	Default	Maximum
Supply Air Alarms If Out of Range For X Minutes	0 Min	30 Min	300 Min

Setpoint Screen #9 - Set Supply Air Temperature Reset

```

MUA II  SPTS  0001
Set SAT Temp Reset
SPC = 0      Spt = 70
SPC = 0      Rst = 70
    
```

A Type III Thermistor Sensor connected to Analog Input #1 can be used to reset the Supply Air Temperature. This screen allows you to set the Reset Source Temperatures that the Reset will begin at and the new Reset Supply Air Temperature range. Determine a desired Space Temperature you would like to maintain and enter a temperature in the top SPC field that is 2 degrees higher than your desired Space Temperature. Next, using the desired Space Temperature you would like to maintain, enter a temperature in the bottom SPC field that is 2 degrees lower than your desired Space Temperature. Then enter a value in the “Rst” field on this screen that is equal to the highest Supply Air Temperature desired. Whatever Supply Air Temperature you enter for “Rst”, when added together and divided by 2, should result in a temperature value equal to your desired Space Temperature.

The “Spt” field value cannot be changed from this screen. This Supply Air Temperature Setpoint (Spt) must be set from *Setpoint Screen #1* on **page 46** and should be set to the lowest Supply Air Temperature that is desired.

Supply Air Temperature Reset Example:

*Desired Space Temperature is 70°F

Space Temperature (SPC) = 72°F SAT Setpoint (Spt) = 55°F
 Space Temperature (SPC) = 68°F SAT Setpoint (Rst) = 85°F

Description	Minimum	Default	Maximum
Minimum Range	40°F	0°F	100°F
Maximum Range	40°F	0°F	100°F
Reset	SAT Spt	SAT Spt	Spt + 50°F

MUA II CONTROLLER SETPOINTS

MUA II Setpoint Screens

Setpoint Screen #10 - Set Dewpoint Reset

```
MUA II  SPTS  0001
Set Dewpoint Reset
HUM= 0      Spt= 55
HUM= 0      Rst= 55
```

Dewpoint Temperature Reset Example:

*Desired Space Humidity is 55% RH @ 70° F

Relative Humidity (HUM) = 50% Dewpoint Setpoint (Spt) = 55° F
 Relative Humidity (HUM) = 60% Dewpoint Setpoint (Rst) = 50° F

An Indoor Humidity Sensor connected to analog input #7 can be used to reset the Dewpoint Setpoint. This screen allows you to set the Relative Humidity percentage at which the Reset will begin at and the new Reset Dewpoint Setpoint percentage range.

Description	Minimum	Default	Maximum
Minimum Range	0%	0%	100%
Maximum Range	0%	0%	100%
Reset	35°F	55°F	Dewpoint Spt

Setpoint Screens #11-#14 - Cool/Heat Stage Delays

```
MUA II  SPTS  0001
Cooling Stage Delays
Staging Up...: 3 Min
Staging Down: 1 Min
```

```
MUA II  SPTS  0001
Cooling Stage Delays
Min Run Time...: 5 Min
Min Off Time...: 3 Min
```

```
MUA II  SPTS  0001
Heating Stage Delays
Staging Up...: 3 Min
Staging Down: 1 Min
```

```
MUA II  SPTS  0001
Heating Stage Delays
Min Run Time...: 2 Min
Min Off Time...: 1 Min
```

Both the Heating Stages and the DX Cooling Stages utilize Staging Up and Down Delay Periods between stages and Minimum Run Times and Off Times.

Both modes have their own set of Staging and Run Delay times. The Heating timer screens look exactly the same as the Cooling except they reference the Heating instead of Cooling.

See the *MUA II Controller Technical Guide* for information on how these Delays and Run Times are used.

Description	Minimum	Default	Maximum
Cooling Stage Up	3 Min	3 Min	15 Min
Cooling Stage Down	1 Min	1 Min	15 Min
Cooling Min Run Time	5 Min	5 Min	15 Min
Cooling Min Off Time	3 Min	3 Min	15 Min
Heating Stage Up	3 Min	3 Min	15 Min
Heating Stage Down	1 Min	1 Min	15 Min
Heating Min Run Time	2 Min	2 Min	15 Min
Heating Min Off Time	1 Min	1 Min	15 Min

Setpoint Screen #15 - External Mod Heat Deadband and Time Period

```
MUA II  SPTS  0001
External Mod Heat
Deadband...: 5°F
Time Period: 5s
```

The External Modulating Heat Deadband is the range through which the External Heating device will proportionally modulate. The Time Period is the delay before another signal increase or decrease can be made and is user-adjustable. Short Time Periods may cause hunting of the Modulating Signal.

Description	Minimum	Default	Maximum
Deadband	1°F	5°F	30°F
Time Period	5 Sec	5 Sec	500 Sec

Setpoint Screen #16 - Push-Button Override Duration

```
MUA II  SPTS  0001
Push-Button Override
Duration....: 2.0 Hr
```

If the Unit Controller has a Space Temperature Sensor installed and it has the Override Button option, the HVAC unit will initiate Occupied Mode any time the Override Button is pressed and held for less than 3 seconds.

The Push-Button Override Duration Setpoint allows you to adjust the amount of time the Override will remain in effect when the Override Button is pressed. To cancel the Override before the Override Duration time period expires, press the Override Button for 5 to 10 seconds.

Description	Minimum	Default	Maximum
Push-Button Override Duration	0.0 Hr	2.0 Hr	8.0 Hr

Setpoint Screen #17 - HVAC Mode Sensor Slide Offset

```
MUA II  SPTS  0001
Slide Offset Sensor
Setpoint....:  0°F
```

If the Unit Controller has a Space Temperature Sensor with the Slide Adjust option installed, the HVAC Mode Enable Heating and Cooling Setpoints can be offset by the HVAC Mode Sensor Slide Offset Setpoint value. When the Slide Adjust bar is in the middle, no offset will occur. If the Slide Adjust bar is moved all the way to the top of the Sensor, the Heating and Cooling Setpoints will be raised by the Setpoint value you have entered. If the Slide Adjust bar is moved all the way down to the bottom of the Sensor, the Heating and Cooling Setpoints will be lowered by the Setpoint value you have entered.

Description	Minimum	Default	Maximum
HVAC Mode Sensor Slide Offset	0°F	0°F	10°F

Setpoint Screen #18 - HVAC Schedule

```
MUA II  SPTS  0001
AHU Scheduled By
Schedule Num:  0
0=AHU  1-7=Scheduler
```

Normally, the MUA II Controller will use its own internal time clock and week schedules to set the Occupied Mode of operation. If you have several air handlers, you can connect an external scheduling device to the communications loop and program the air handler for the desired schedule. If the MUA II Controller is using its internal schedule, enter <0> for Internal.

Description	Minimum	Default	Maximum
Schedule Number	0	0	1 to 7

Setpoint Screen #19 - Supply Fan Starting Delay Timer

```
MUA II  SPTS  0001
Fan Time Delay
Before Activation
Can Occur...:  60s
```

This is the time delay that occurs before the fan is activated when the unit switches into the Occupied Mode from Unoccupied Mode.

Description	Minimum	Default	Maximum
Fan Start Delay Timer	1 Sec	60 Sec	180 Sec

Setpoint Screen #20 - Sensor Calibration for SAT & OAT

```
MUA II  SPTS  0001
Sensor Calibration
SAT:  XX.X  0.0
OAT:  XX.X  0.0
```

The Thermistor Type III temperature sensors connected to the MUA II Controller can be calibrated using this screen. Enter a Positive value to increase a reading and a Negative value to decrease a reading

Description	Minimum	Default	Maximum
Sensor Calibration SAT	-100.0°F	0.0°F	+100.0°F
Sensor Calibration OAT	-100.0°F	0.0°F	+100.0°F

Setpoint Screen #21 - Sensor Calibration Reset for SPC

```
MUA II  SPTS  0001
Sensor Calibration
Reset Sensor
SPC:  XX.X  0.0
```

If you are using a temperature sensor connected to analog input #1 on the MUA II controller for resetting the Supply Air Temperature, the Thermistor Type III temperature sensor connected to the MUA II Controller can be calibrated using this screen. Enter a Positive value to increase a reading and a Negative value to decrease a reading.

Description	Minimum	Default	Maximum
Sensor Calibration SPC	-100.0°F	0.0°F	+100.0°F

MUA II CONTROLLER STATUS

MUA II Controller Status Screen Index

Status Screen Instructions

From any menu screen, *press* <STATUS>. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the Unit Controller you want to view Status for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see *Status Screen #1*. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

MUA II Status Screen Index

Status Screen #1	HVAC Mode
Status Screen #2	Current Supply Air Temperature, and Active Supply Air Temperature Setpoint
Status Screen #3	Current Outdoor Air Temperature and Cooling and Heating Setpoints
Status Screen #4	Current Dewpoint Temperature, Dewpoint Setpoint and Outdoor Air Humidity
Status Screen #5	Current Enthalpy, Enthalpy Setpoint, and Enthalpy Deadband
Status Screen #6	Current Space Temperature and Reset Humidity Setpoint
Status Screen #7	MODGAS Output Percentage & MHGRV Output Percentage
Status Screens #8-28	Supply Fan and Other Relays
Status Screen #29	No Alarms! or Alarms Present
Status Screen #30	No Supply Temperature, No Outdoor Air Temperature, No Outdoor Air Humidity
Status Screen #31	Fan Proving, Low SAT, High SAT

Status

The MUA Controller Status Screens are accessed by *pressing* the <STATUS> button on the Modular Service Tool or Modular System Manager. *Enter* the correct unit ID number of the MUA Controller you want to configure and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see *Status Screen #1*. *Press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

Status Screen 1 - HVAC Mode

```
MUA-II v.2.01 0001
UNOCCUPIED
Vent Mode
07/16/2013 08:00 PM
```

Line 2 Displays one of the following:

UNOCCUPIED	Remote Occupied
OCCUPIED	Holiday Operations
FORCED OCCUPIED	FORCED UNOCCUPIED
FORCED OUTPUT	

Line 3 Vent Mode Cooling Mode
 Heating Mode Dehumidification

Line 4 Displays one of the following:

MM/DD/YY HH:MM XX (XX = AM or PM)
 Fan Starting Delay and then time will display
 xx Left in WarmUp (Number of Minutes Left)

Status Screen 2 - Current Supply Air Temperature & Supply Air Setpoint

```
MUA-II v.2.01 0001
Supply Air: XX.X°F
Supply Spt: XX.X°F
```

Line 2 Current Supply Air Temperature

Line 3 Current Supply Air Setpoint

Status Screen 3 - Current Outdoor Air Temperature and Cooling & Heating Setpoints

```
MUA-II v.2.01 0001
Outdoor Air: XX.X°F
Cooling Spt: XX.X°F
Heating Spt: XX.X°F
```

Line 2 Current Outdoor Air Temperature

Line 3 Cooling Cooling Mode Setpoint

Based on the current Occupied/Unoccupied Mode of operation.

Line 4 Current Heating Mode Setpoint

Based on the current Occupied/Unoccupied Mode of operation.

Status Screen 4 - Current Outdoor Air Dewpoint, Dewpoint Setpoint & Outdoor RH

```
MUA-II v.2.01 0001
Dewpoint...: XX.X°F
Dewpoint Sp: XX.X°F
Outdoor RH.: 0.0%
```

Line 2 Current Outdoor Air Dewpoint

Line 3 Current Dewpoint Setpoint

Line 4 Current Outdoor Humidity

Status Screen 5 - Current Outdoor Air Enthalpy, Enthalpy Setpoint & Enthalpy Deadband

```
MUA-II v.2.01 0001
Enthalpy..: xx.xBTU
Enthalpy Sp: xx.xBTU
Enthalpy DB: xx.xBTU
```

Line 2 Current Outdoor Air Enthalpy

Line 3 Current Enthalpy Setpoint

Line 4 Current Enthalpy Deadband

MUA II CONTROLLER STATUS

MUA II Status Screens

Status Screen 6 - Current Reset Temperature & Humidity Reading

```
MUA-II v.2.01 0001
Space Temp: XX.X°F
Reset RH..: XX.X%
```

Line 2 Current Reset Temperature Reading

Line 3 Current Reset Humidity Reading

Status Screen 7 - MODGAS Output %, MHGRV Output % & External Heat Output %

```
MUA-II v.2.01 0001
MODGAS Pos...: XXX%
MHGRV Pos...: XXX%
External Heat: 0.0%
```

Line 2 Current MODGAS Heating Output Signal

Indicates the percentage of the output signal being supplied to the MODGAS Controller when you have one connected to your HVAC unit. If you do not have a MODGAS Controller connected to your Unit Controller, this screen will indicate [NO MODGAS DETECTED].

Line 3 Current MHGRV Reheat Valve Output Signal Percentage

Indicates the percentage of the output signal being supplied to the MHGRV Controller when you have one connected to your Unit Controller. If you do not have an MHGRV Controller connected to your Unit Controller, this screen will indicate [NO REHEAT DETECTED].

Line 4 External Heat Signal

This is the signal, 0-10 or 2-10 VDC, to an optional external modulating heating device.

Status Screens 8-28 - Relays

```
VAV/CAV v 1.00 0001
On Board Rly 1
FAN
Off
```

Line 2 Relay Status

On Board Relays 1-5, Expansion Board Relays 1-16. On Board Relay #1 is the Fan and is not configurable.

Line 3 Relay description of what it is configured for

Possible options are as follows:

Not Used	Gas Re-Heat
Heat Stage	Exhaust Fan
Cool Stage	Pre-Heater
Warm-Up Mode	External Heat
Rev Valve	

Line 4 Current relay status On or Off or FRC

FRC indicates the relay is forced to its current condition.

Status Screens 29-31 - Alarm Conditions

```
VAV/CAV v 1.00 0001
NO ALARMS!
```

```
VAV/CAV v 1.00 0001
ALARMS PRESENT
SCROLL DOWN TO VIEW
```

Line 2 Blank

Line 3 NO ALARMS! OR ALARMS PRESENT

If alarms are present, the screens that follow will display one or more of the following:

No Supply Temp	Fan Proving
No Outdoor Temp	Low SAT
No Outdoor RH	High SAT

Press <↓> to scroll through all active alarms.

For Alarm Definitions, see the *MUA II Controller Technical Guide*.

VAV Zone Configuration

In order to correctly set up the VAV/Zone Controller, you must first configure several parameters in regard to the type of system and operating parameters for the VAV/Zone Controller you have installed. Most of these values and operating parameters are only set once at the initial system setup and are never changed.

Modular Service Tool Instructions

From any *Menu Screen*, press the <CONFIGURATION> button. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the VAV/Zone controller you want to configure, and press <ENTER>. Once communication is established, the *00* message will go away. Then press <↓>. You will then see *Unit Configuration Screen #1*. Press <ENTER> to save entered data and press <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

System Manager SD Instructions

From any *Main screen*, press <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and press <ENTER>. Once communication is established, the *00* message will go away. Then press <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll down to the 'Configure Unit' option and press <ENTER>. This will take you to the first Configuration Screen shown below.

Configuration Screen #1 - Box Configuration

```
XX Box Cnfg IDXXXX
Box Configuration
COOLING ONLY BOX
Use < 0r > To Change
```

This Box Control Code will operate in one of four possible modes. The box designation will display on the top line of all screens. Select one of the following options:

- 0 = COOLING ONLY BOX (will display as CO Box)
- 1 = H/C CHANGEOVER BOX (will display as HC Box)
- 2 = SERIES FAN BOX (will display as SF Box)
- 3 = PARALLEL FAN BOX (will display as PF Box)

Configuration Screen #2 - Damper Operation

```
XX Box Cnfg IDXXXX
Damper Operating
Mode: DIRECT ACTING
Use < 0r > To Change
```

Select Direct Acting or Reverse Acting. If the damper opens in a *clockwise* direction, it is DIRECT ACTING. If the damper opens in a *counter-clockwise* direction, it is REVERSE ACTING.

CAUTION: If you change this setting, you MUST cycle power to the controller to allow it to re-calibrate the damper feedback positions for its new direction of control!

VAV/ZONE CONTROLLER PROGRAMMING

VAV/Zone Configuration Screens

Configuration Screen #3 - Voting Zone

```
XX Box Cnfg  IDXXXX
Is This Box a
Voting Zone.: YES
Use < Or > To Change
```

Select YES if this is a Zoned System so that the box can be included as a voting zone.

Configuration Screen #7 - Box Heat Allow

```
XX Box Cnfg  IDXXXX
Allow Box Heat With
HVAC Heat....: NO
Use < Or > To Change
```

Select YES to allow the Heating Relay's Controlling Box Heat to remain on even when the HVAC unit is in Supply Air Heating Mode. This is used as a method to provide supplemental heat if for some reason the HVAC heat cannot satisfy the heating demand.

Configuration Screen #4 - Pressure Independent Airflow Constant

```
XX Box Cnfg  IDXXXX
Pr Independent Boxes
Airflow @ 1" WG
Constant...: 1200 CFM
```

If this is a Pressure Independent Box, you must enter this airflow constant so that the CFM readings can be correctly calculated. This airflow constant is provided by the box manufacturer and depends on the diameter of the duct.

Configuration Screen #8 - Main Fan Status

```
XX Box Cnfg  IDXXXX
This Unit Needs Main
Fan Status...: NO
Use < Or > To Change
```

This setting only applies to the unoccupied mode of operation. Select YES to activate the heating stages only when the main fan is operating on non-fan terminal units. For series fan terminal units, if this setting is set to YES, the series box fan will only run when the main HVAC unit fan is running or when a space heating demand is made. For series fan terminal units, if this setting is set to NO, the series box fan will only run when a space heating demand is made. This setting has no effect on the parallel flow fan terminal unit.

Configuration Screen #5 - Expansion Relays Heating Stages

```
XX Box Cnfg  IDXXXX
Expansion Relays
[Optional]
Steps of Reheat.: 2
```

If you require the VAV/Zone Controller to control reheat for the zone it is installed in, you must include a relay expansion board and then configure the number of heating stages (1, 2, or 3) that it will be controlling whenever there is a heating demand in the space. Enter <0> if you don't require this option.

Configuration Screen #9 - Push-Button Override

```
XX Box Cnfg  IDXXXX
Push-Button Override
Group ID #: 1
```

During Unoccupied Mode, all zones with a corresponding Group ID # will resume Occupied operation whenever any of the zones in that group has its push-button depressed to initiate an override condition. This allows you to group zones in various areas of the building. For example, individual tenants with several offices could restore occupied mode for just their zones and not affect other zones in the building.

Configuration Screen #6 - Proportional Heating Signal

```
XX Box Cnfg  IDXXXX
Proportional Heating
Signal...: 0 - 10 VDC
Use < Or > To Change
```

Select 0-10 VDC or 2-10 VDC as the range of the proportional heat output.

The default group ID number for all VAV/Zone Controllers is set at the factory to 1. If you don't want a specific zone(s) to be part of that group, you must give each one a distinct Group ID number between 2 and 16. Setting a zone's Group ID number to 0 will disable the Space Sensor Override Button function.

If you don't want a specific zone to be a part of any group, enter <0> for its Group ID #.

Configuration Screen #10 - Dump Zone

```
XX Box Cnfg  IDXXXX
Is This A Dump Zone
(No Actuator):  NO
Use < Or > To Change
```

A “Dump Zone” is used when you want to control a duct heater or baseboard heater independently. A VAV/Zone Controller board with a relay expansion board is used for this purpose. No damper or actuator is used. If you need to control an auxiliary heater, select YES; otherwise, select NO.

Configuration Screen #11 - HVAC Unit is on Separate Loop

```
XX Box Cnfg  IDXXXX
HVAC Unit is on
Separate Loop:  NO
Use < Or > To Change
```

If this system has 1 HVAC unit controlling boxes on multiple loops and the HVAC unit is on a different loop than this box, select YES; otherwise, select NO.

VAV/Zone Setpoint Screens

VAV/Zone Controller Setpoints

Modular Service Tool Instructions

From any menu screen, *press* <SETPOINTS>. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the correct unit ID number of the Controller you want to change Setpoints for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see Setpoint Screen #1. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll to the 'Change Setpoints' option and *press* <ENTER>. This will take you to the first Setpoints Screen shown below.

Setpoint Screen #1 - Occupied Setpoints

```
XX Box Spts IDXXXX
Occupied Setpoints
Cooling.....: XX°F
Heating.....: XX°F
```

Enter the Occupied Cooling Setpoint as the maximum temperature you would like the zone to reach before modulating the damper open to bring in more cold air to cool the space. Enter the Occupied Heating Setpoint as the minimum temperature you would like the zone to reach before activating the Reheat Stages on the optional Expansion Relay board. If this is a Cooling Only box that doesn't contain reheat, this setpoint will be ignored.

Description	Minimum	Default	Maximum
Cooling Setpoint	50°F	74°F	90°F
Heating Setpoint	50°F	70°F	90°F

Setpoint Screen #2 - Unoccupied Setbacks

```
XX Box Spts IDXXXX
Unoccupied Setbacks
Cooling SetUp: XX°F
Heating SetBk: XX°F
```

During unoccupied hours, the Occupied Cooling Setpoint is adjusted up by the amount entered for the Cooling SetUp. The Occupied Heating Setpoint is adjusted down by the amount entered for the Heating SetBk.

Description	Minimum	Default	Maximum
Cooling SetUp	0°F	+10°F	+30°F
Heating SetBk	0°F	-10°F	-30°F

Setpoint Screen #3 - AHU Heat Call Space Temp

```
XX Box Spts IDXXXX
AHU Heat Call
Space Temp...: XX°F
```

This setpoint allows you to set a Space Temperature that will cause the VAV/Zone Controller to send a call for heat to the HVAC unit. This only occurs in the Unoccupied Mode.

Description	Minimum	Default	Maximum
AHU Heat Call Space Temp	50°F	70°F	90°F

Setpoint Screen #4 - Auxiliary Heat Setpoint

```
XX Box Spts IDXXXX
Auxiliary Heat
Setpoint...: XX°F
```

This setpoint allows you to set a Space Temperature that will enable the Auxiliary Heat Relay (Relay 4) on the VAV/Zone Controller Re-heat Expansion Board for heating options other than box heat, such as baseboard heat or an external duct heater. This could control a stage of electric heat or an on/off hot water valve. The Auxiliary Heat Relay will energize at .5°F below this setpoint and will de-energize at .5°F above this setpoint. The Auxiliary Heat will continue to function regardless of the HVAC Mode the unit is in and at any airflow condition.

Description	Minimum	Default	Maximum
Auxiliary Heat Setpoint	50°F	70°F	90°F

Setpoint Screen #5 - Damper Airflow Integral

```
XX Box Spts IDXXXX
Damper/Airflow Spt
Integral [Ki]...: XXX
```

The VAV/Zone Controller normally opens its damper based on a Proportional Error from Setpoint. That means if the zone temperature is 4°F from setpoint, the damper would be 100% open, or it would be modulating to provide the Maximum CFM on Pressure Independent boxes. If the error is less than 4°F, the damper may stagnate at that position and never satisfy the zone. If you add **Integral** into the damper calculation process, this will cause the damper or airflow calculations to continue to increase as long as the zone temperature is still above the setpoint. That means it can provide 100% or Maximum CFM before the 4°F error is achieved, bringing the zone under control faster than it normally would. Start with a small (5 or 10) value, if you use this, and monitor

the effect it has. If you enter too large a value, you can create “hunting” situations that can cause the damper actuator to prematurely wear out.

Description	Minimum	Default	Maximum
Integral	0	0	100

Setpoint Screen #6 - Damper Airflow Max & Vent Min

```
XX Box Spts IDXXXX
Damper/Airflow Spt
Maximum...: XXX %
Vent Min...: XXX %
```

The VAV/Zone Controller will not allow the damper or airflow calculation to exceed the Maximum setpoint while it is allowing the damper to modulate. During Vent mode when there is no heating or cooling demand, the damper or airflow will maintain at least the Vent Min amount of airflow into the zone for ventilation.

Description	Minimum	Default	Maximum
Maximum	0% or 0 CFM	100% or 1000 CFM	100% or 30000 CFM
Vent Min	0% or 0 CFM	25% or 250 CFM	100% or 30000 CFM

Setpoint Screen #7 - Damper Airflow Cool/Heat Minimum

```
XX Box Spts IDXXXX
Damper/Airflow Spt
Cool Min...: XXX %
Heat Min...: XXX %
```

During Supply Air Cooling Mode, if the space being served by this damper is satisfied and has no cooling demand, the damper will close to this Cool Min setting. This provides a minimum amount of airflow into the space for ventilation, even if the space does not require additional cooling. During Supply Air Heating Mode, if the space being served by this damper is satisfied and has no heating demand, the damper will close to this Heat Min setting. This provides a minimum amount of airflow into the space for ventilation, even if the space does not require additional heating.

Description	Minimum	Default	Maximum
Cool Min	0% or 0 CFM	10% or 1000 CFM	100% or 30000 CFM
Heat Min	0% or 0 CFM	10% or 100 CFM	100% or 30000 CFM

VAV/ZONE CONTROLLER PROGRAMMING

VAV/Zone Setpoint Screens

Setpoint Screen #8 - Damper Airflow Night Min and Fan On Min

```

XX Box Spts IDXXXX
Damper/Airflow Spt
Night Min.:      XXX %
Fan On Min.:     XXX %
    
```

The Night Min is the position the damper will move to when the system is in Override Mode and this particular damper is not part of the override group. This Night Min position only affects non-fan powered boxes. The Fan On Min is the minimum damper or airflow setting used to activate the parallel fan if installed. Pressure Independent = CFM. Pressure Dependent = %.

Description	Minimum	Default	Maximum
Night Min	0% or 0 CFM	0% or 0 CFM	100% or 30000 CFM
Fan On Min	0% or 0 CFM	25% or 250 CFM	100% or 30000 CFM

Setpoint Screen #9 - Damper Airflow Reheat Min

```

XX Box Spts IDXXXX
Damper/Airflow Spt
Reheat Min.:     XXX %
    
```

The Reheat Min is the damper or airflow setting used during the Space Reheat Mode of operation.

Description	Minimum	Default	Maximum
Reheat Min	0% or 0 CFM	0% or 0 CFM	100% or 30000 CFM

Setpoint Screen #10 - Damper Airflow Fixed Position

```

XX Box Spts IDXXXX
Damper/Airflow Spt
Fixed Pos:       XXX %
    
```

Many times while troubleshooting a system, it is useful to have the zone damper set to a specific damper position or airflow setting. This setpoint can be used to determine where the damper/airflow will remain when the VAV/Zone Controller receives a *Force to Fixed Position* command.

Description	Minimum	Default	Maximum
Fixed Pos	0% or 0 CFM	0% or 0 CFM	100% or 30000 CFM

Setpoint Screen #11 - SAT HVAC Mode Deadband

```

XX Box Spts IDXXXX
SAT HVAC Mode
Deadband.:      XX°F
    
```

If the supply air temperature is above the space temperature by this amount, the VAV/Zone Controller enters the Supply Air Heating Mode. It will remain in the Supply Air Heating Mode until the supply air drops to 2°F above the space temperature. At that point the unit enters the Supply Air Vent Mode and remains there until the supply air drops this deadband below the space temperature. At that point the VAV/Zone Controller enters the Supply Air Cooling Mode and will remain there until the supply air temperature rises to 2°F below the space temperature.

Description	Minimum	Default	Maximum
SAT HVAC Mode Deadband	0°F	10°F	20°F

Setpoint Screen #12 - Zone Alarm Offsets

```

XX Box Spts IDXXXX
Zone Alarm Offsets
Hi Zone.....:  XX°F
Lo Zone.....:  XX°F
    
```

The VAV/Zone Controller can be setup to generate an alarm anytime the box goes into the Occupied Mode and the Zone Temperature exceeds the user-defined alarm limits for a user-defined period of time. A High Temperature Alarm Setpoint is created by adding the Hi Zone Alarm offset to the current Cooling Setpoint. The Low Temperature Alarm Setpoint is created by adding the Lo Zone Alarm offset to the current Heating Setpoint. If the zone temperature exceeds either of these limits for a period defined by the Alarm Delay setpoint, the controller can generate an alarm callout if all the optional hardware components required for this to occur are installed.

Description	Minimum	Default	Maximum
Hi Zone Alarm	+1°F	+30°F	+50°F
Lo Zone Alarm	-1°F	-30°F	-50°F

Setpoint Screen #13 - Zone Alarm Delay

```

XX Box Spts IDXXXX
Zone Alarm Delay
Must Be Out Of
Limits For.:  XXX Min
    
```

As mentioned above, if you configure the controller to generate zone temperature alarms, this is the amount of time after the box goes into the Occupied Mode that the temperature must be outside the alarm limits before an alarm is generated.

Description	Minimum	Default	Maximum
Out of Limits	1 Min	30 Min	300 Min

Setpoint Screen #14 - Day/Night Schedule

```

XX Box Spts IDXXXX
Day/Night Schedule
Control #: X
0=AHU 1-5=Scheduler
    
```

This screen allows you to set the VAV/Zone Controller to operate on a remote schedule instead of the schedule that is contained in the VCM Controller. Enter <0> to operate on the AHU schedule. Enter <1-5> to use an external schedule. A GPC Plus is required for schedules 1-5.

Description	Minimum	Default	Maximum
Schedule Control Number	0	0	1 to 5

Setpoint Screen #15 - Maximum Slide Offset

```

XX Box Spts IDXXXX
Maximum Slide Offset
Effect on Spt.: X°F
    
```

If the Flush Mount Wall Sensor has the optional Setpoint Slide Adjust, this is the maximum amount you can adjust the heating and cooling setpoints up or down as the slide is moved from the center position to its full up or down position.

Description	Minimum	Default	Maximum
Effect on SP	0°F	0°F	6°F

Setpoint Screen #16 - Push-Button Override Duration

```

XX Box Spts IDXXXX
Push-Button Override
Duration : X.X Hr
    
```

If the Flush Mount Wall Sensor has the optional Push-Button Override, this is the amount of the VAV/Zone Controller will resume using its Occupied Setpoints during unoccupied mode. This will generate a call for the Air Handler to start its fan and provide heating or cooling, depending on how you configure the Air Handler.

Description	Minimum	Default	Maximum
Duration	0.0 Hr	0.0 Hr	8.0 Hr

Setpoint Screen #17 - Maximum EMS Offset

```

XX Box Spts IDXXXX
Maximum EMS Setpoint
Offset...: XX°F
    
```

If the Energy Management System (EMS) is activated, the heat and cool setpoints can be spread apart by this amount.

Description	Minimum	Default	Maximum
Maximum EMS Setpoint Offset	0°F	0°F	30°F

Setpoint Screen #18 - Sensor Calibration for Space Temp and Supply Air Temp

```

Sensor Calibration
SPC: XXX.X° XXX.X°
SAT: XXX.X° XXX.X°
[SAT Only if Sensor]
    
```

The Thermistor Type III sensor readings can be calibrated. Enter a Positive value to increase a reading and a Negative value to decrease a reading.

NOTE: The Supply Air Temperature calibration offset only operates on the reading when the VAV/Zone Controller has its own Supply Air Temperature sensor installed on the AUX2 input. If the supply temperature is received from a global broadcast, you will need to go to the air handler to calibrate the temperature reading.

Description	Minimum	Default	Maximum
SPC (Space Temp)	-100°F	0°F	+100°F
SAT (Supply Air)	-100°F	0°F	+100°F

VAV/ZONE CONTROLLER STATUS

VAV/Zone Status Screens

VAV/Zone Status

Status Screen #1 - Mode of Operation

```
XX Box v4.01 IDXXXX
Occupied Mode
Vent Mode
Belongs to Group # 1
```

- Line 2** Unoccupied Mode
- Occupied Mode
 - Override Mode
 - Override Pending*
 - Damper Calibration
 - Group Override

- Line 3** OFF Mode
- Vent Mode
 - Cooling Mode
 - Heating Mode
 - Sensor Fail Mode**

- Line 4** Belongs to Group # xx
- No Group Affiliation

* Not displayed when using a Digital Room Sensor.
** Displays for either a temperature sensor failure or an airflow sensor failure.

Status Screen #2 - Zone Temperature and Cooling/Heating Setpoints

```
XX Box v4.01 IDXXXX
Zone Temp..: XX.X°F
Cooling Spt: XX.X°F
Heating Spt: XX.X°F
```

- Line 2** Current Zone Temperature
- Line 3** Currently active Cooling Setpoint based on the current Occupied / Unoccupied mode of operation.
- Line 4** Currently active Heating Setpoint based on the current Occupied / Unoccupied mode of operation.

Status Screen #3 - Slide Offset & H/C Demand

```
XX Box v4.01 IDXXXX
Slide Offset: XX°F
H/C Demand.: XX.X°F
```

- Line 2** If the optional Setpoint Slide Adjust is installed on the Flush Mount Wall Sensor, this line will display the current amount the **Slide Offset** is affecting the Heating and Cooling Setpoints.
- Line 3** Current **Heating or Cooling Demand** in the Zone based on the current Heating and Cooling Setpoints when compared to the current Zone Temperature.
- Line 4** **Blank**

Status Screen #4 - Supply Air Temperature & Box Air Temperature

```
XX Box v4.01 IDXXXX
Supply Air: XX.X°F
Box Air..: XX.X°F
```

- Line 2** **Current Supply Air Temperature** received via broadcast from the DX Air Handler or from the Box Controller's own installed Box Air Temperature Sensor connected to the AUX input of the VAV/Zone Controller board.
- Line 3** **Current Box Air Temperature**
If you have configured the VCM Controller to broadcast the Supply Air Temperature to the VAV/Zone Controller and don't have a Box Air Temperature Sensor attached to the AUX input on the VAV/Zone Controller board, this line will display the Supply Air Temperature the same as line 2.

If you have a Box Air Temperature Sensor attached to the AUX input on the VAV/Zone Controller board, this line will display the Box Air Temperature at the location where the Box Air Temperature Sensor is installed.
- Line 4** **Blank**

Status Screen #5 - Zone Damper Position, Airflow, and Desired CFM

```

XX Box v4.01 IDXXXX
Damper FRC:   XXX %
Airflow   :   XXXX CFM
Desired    :   XXXX CFM
    
```

- Line 2** Current Zone Damper Position
If you entered a FORCE command, the letters FRC will appear. If this is normal damper operation, the FRC will not be displayed.
- Line 3** If this is a Pressure Independent box, the current Airflow will be displayed. If not, this line will display the desired damper position.
- Line 4** If this is a Pressure Independent box, this line will display the Desired CFM the box would like to provide to the zone. If not, this line will display [Controls to +/- 3%] to indicate how accurately the damper will maintain the desired position.

Status Screen #6 - Fan Status & Reheat Stages

```

XX Box v1.04 IDXXXX
Fan Status      : OFF
Heating Relay#1 : OFF
Heating Relay#2 : OFF
    
```

- Line 2** If this is a Fan Powered box, this line will display the Fan On/Off Status. On non-fan powered boxes, this line will display [Exp Relay 1 Not Used].
- Line 3** If your VAV/Zone Controller has been configured to control reheat stages, this line reflects the On/Off Status of the first stage of Reheat. If you have 3 stages of reheat, this line will display the total number of active heating stages.

Examples:
 - “1 Reheat Stages On” or
 - “2 Reheat Stages On” or
 - “3 Reheat Stages On”
 If proportional heating is used (you have no relays configured for heat), this line will display “Heating Signal: xxx %”.
- Line 4** If your VAV/Zone Controller has been configured to control reheat stages, this line reflects the On/Off Status of the second stage of Reheat. If you have 3 stages of reheat as explained on line 2, this line will be blank.

Status Screen #7 - Alarm Status

```

XX Box v1.04 IDXXXX

NO ALARMS!
    
```

```

XX Box v.104 IDXXXX

ALARMS PRESENT
SCROLL DOWN TO VIEW
    
```

- Line 2** Blank
- Line 3** NO ALARMS!

If there are one or more alarms active, the possible messages are shown below:
 - SPACE SENSOR FAILURE
 - CFM SENSOR FAILURE
 - DAMPER OPENING ALARM
 - DAMPER CLOSING ALARM
 - HI SPACE TEMP ALARM
 - LO SPACE TEMP ALARM
 - DPR FEEDBACK FAILURE
- Line 4** Blank

Press <↓> to scroll through all active alarms.

For Alarm Definitions, see the VCM Controller Technical Guide.

VAV/Zone Damper Force Modes

Damper Force Modes

Damper Force Modes are available for testing or balancing the system. These Force Modes can be accessed and programmed from either the System Manager or Modular Service Tool.

Modular Service Tool Instructions

When using the Modular Service Tool, simply *press* the <BALANCE - TEST> key. You will then see the *Unit ID Screen*. *Enter* the unit ID of the controller you wish to access and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Damper Force
Para Blocks
Load / Save / Copy
```

With the cursor on Damper Force, *press* <ENTER> to access the *Damper Force Mode Screen*.

Dampers Force Mode Screen

If the unit ID you entered is for a VCM Controller that has VAV/Zone Controllers connected to its communication loop, the Damper Force Mode will act as a “Global” Damper Force Mode. That is, all VAV/Zone Controllers on that VCM Controller’s communication loop will be forced to the same Damper Force Mode setting. If the unit ID you entered is for a VAV/Zone Controller, the Damper Force Mode setting will only apply to that VAV/Zone Controller.

```
Damper Force
Enter Force Mode: 0
0=Auto 1=Open 2=Clsd
3=Max 4=Min 5=Fixed
```

Set the appropriate Damper Force Mode by entering numbers 0 through 5. Following is a list of the force modes and their meaning:

0 = Auto This is the default setpoint. With this setting, the damper will operate normally and modulate according to the controller setpoints.

- 1 = Open This setting will force the dampers to their fully-open position.
- 2 = Clsd This setting will force the damper to its fully-closed position.
- 3 = Max This setting will force the damper to its Maximum Position Setpoint. See *VAV/Zone Controller Setpoint Screen #5* on **page 57** for complete setpoint information.
- 4 = Min This setting will force the damper to its Minimum Position Setpoint. See *VAV/Zone Controller Setpoint Screen #5* on **page 57** for complete setpoint information.
- 5 = Fixed This setting will force the damper to a fixed position based on the Fixed Position Setpoint. See *VAV/Zone Controller Setpoint Screen #8* on **page 58** for complete setpoint information.

CAUTION: The Damper Force Modes should only be used by qualified service personnel. Serious damage to the ductwork could result if the dampers are all forced closed and the HVAC unit fan is operating.

MiniLink PD Configuration

In order to correctly setup the MiniLink PD, you must first configure several parameters in regard to the type of system and operating parameters for the system it is installed on. Most of these values and operating parameters are only set once at the initial system setup and are never changed.

Modular Service Tool Instructions

From any menu screen, *press* <SETPOINTS>. The *Unit Selection Screen*, shown below, will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

All MiniLink PDs are set at address 60. Enter the correct unit loop number for the loop the MiniLink Polling Device is connected to (for Loop 1 you would enter <160>) and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

You will then see Setpoint Screen #1. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save / Copy / Restore
```

Scroll to the 'Change Setpoints' option and *press* <ENTER>. This will take you to the first Setpoints Screen shown below.

Configuration Screen #1 - System Type

```
Polling Unit Config
System Type
Selection: ZONING
Use < Or > To Change
```

Select VAV or ZONING. This screen allows you to select whether you want the system to behave as a VAV system or a Zoning System. If you select VAV, this will allow tenant logging for your VAV system.

Configuration Screen #2 - Last Polled Zone

```
Polling Unit Config
Last Polled Zone
Address: XX
[Enter Last Zone]
```

This zone is the last zone on the local loop of your zoning system that is to be included in zone voting. Valid entry is 1 to 25.

Configuration Screen #3 - Mode Changeover Time

```
Polling Unit Config
Mode Changeover Time
Minutes: XX
[Enter Period Time]
```

This is the amount of time that you want to allow between changeover from heating to cooling modes. Valid entry is 5 to 60 minutes.

MINILINK PD STATUS

MiniLink PD Configuration & Status Screens

Configuration Screen #4 - Optimal Start Target Zone

```
Polling Unit Config
Optimal Start
Target Zone.: XX
[Enter Target Zone]
```

This is the unit ID of the Zone that you want to be satisfied by the normally scheduled start time. If you enter “-1” into this box, it will average all zones instead of picking a specific zone. If you do not require Optimal Start, enter “0”. Valid entry is -1 to 58.

Configuration Screen #5 - Maverick Testing

```
Polling Unit Config
Maverick Testing
Disabled: YES
Use < Or > To Change
```

Select YES or NO. Disabling the Maverick Testing allows known troubled zone(s) to continue voting without causing a Maverick alarm. In other words, all zones are included in the voting regardless of whether they are more than four degrees from setpoint.

Configuration Screens #6-65 - Alarm Polling

```
Polling Unit Config
Enable Alarm Polling
Unit XX: YES
Use < Or > To Change
```

Select YES or NO. Enabling Alarm Polling allows any alarm from the loop to be polled. You must set this for each controller on the loop.

MiniLink PD Status

Status Screen #1 - Schedule Mode, System Status, and Minutes Left

```
Polling Device
System Occupied
Venting Mode
XXX Min Left in Mode
```

- Line 2 Current Schedule Mode**
Can be System Occupied or System Unoccupied.
- Line 3 Currently System Status**
Can be Vent Mode, Cooling Mode, or Heat Mode.
- Line 4 Minutes Left In Mode**
The number of minutes left in the current mode of operation before it can switch modes. This value is user-adjustable. See *Configuration Screen #3* on page 63.

Status Screen #2 - Mode Priority, Cool Total, and Heat Total

```
Polling Device
No Mode Priority
Cool Total.: XX.X°F
Heat Total.: XX.X°F
```

- Line 2 Mode Priority**
Can be Heat Priority or Cool Priority. This is based on the voting zones and their demand.
- Line 3 Cool Total**
Total cooling temperature demand from all zones.
- Line 4 Heat Total**
Total heating temperature demand from all zones.

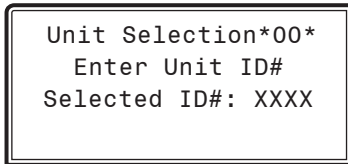
VAV/CAV/MUA II Outputs Force

Outputs Force

Outputs Force settings are available for testing or troubleshooting the system. These Force settings can only be accessed and programmed from the Modular Service Tool. The System Manager does not allow for programming of this function.

CAUTION: The Outputs Force settings should only be applied by qualified service personnel. Serious damage to the HVAC unit could result from improper use of these Outputs Force settings.

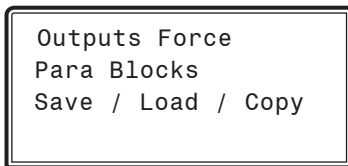
To access the Outputs Force settings, simply *press* the <BALANCE - TEST> button on the Modular Service Tool SD. You will then see the *Unit ID Screen*.



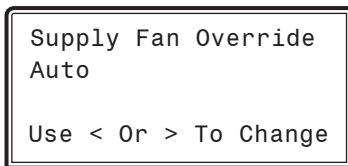
Enter the unit ID of the Unit Controller you wish to access and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>. You will then see the screen shown below. *Press* <ENTER> to save entered data and *press* <↓> to scroll through the screens.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

NOTE: The Outputs Force settings are only available for the VAV/CAV/MUA II Controller. They are not supported for the VAV/Zone Controllers or other Add-on controllers.

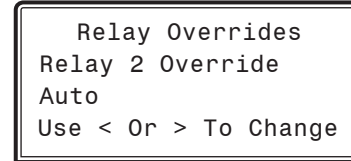


Place the cursor on Outputs Force and *press* <ENTER> to access the *Outputs Force Screen*.



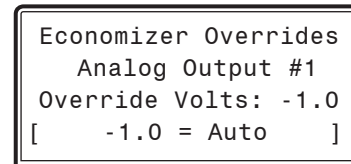
The first *Outputs Force Screen* allows the AHU fan relay to be set for Auto, Force On, or Force Off. The default setting is Auto. After you complete all troubleshooting or testing procedures, all relays should be changed back to this setting. The Force On setting will force the relay to the ON (energized) position. The Force Off selection will force the relay to the OFF (de-energized) position.

The next screen displays the Relay Overrides for Relay 2. After *pressing* <ENTER> to save any changes, *press* <↓> to have the next relay displayed. All 20 *Relay Override Screens* (including the AHU fan relay) are available by *pressing* <↓> after each setting is saved by *pressing* <ENTER> .

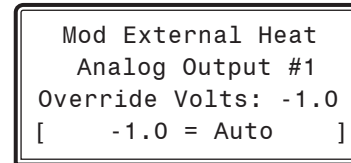


After the screen for relay 21 is displayed, the first *Analog Output #1 Override Screen* will be displayed.

VAV/CAV Analog Output #1 Screen

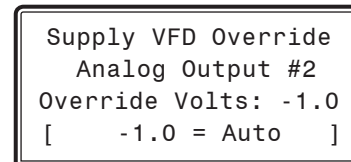


MUA II Analog Output #1 Screen

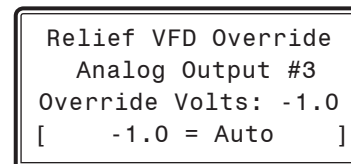


The default setting for normal operation is -1.0 volts. Voltages between 0 to 10.0 can be set for any of the Analog Output Overrides. *Press* <ENTER> after making a setting change and then *press* <↓> and the next *Analog Output Override Screen* will be displayed.

VAV/CAV Analog Output #2 Screen



VAV/CAV Analog Output #3 Screen



Saving & Copying Setpoints

Modular Service Tool Instructions

From any menu screen, *press* <BALANCE-TEST>. The *Unit Selection Screen* will appear requesting that you enter the unit ID number.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the network unit ID for the controller you want to save the setpoints from. Example, '102' for Loop 1 / Unit 2. Then *press* <ENTER>. Once communication is established, the *00* message will go away. After a brief pause, *press* <↓> to get to the *Balance - Test Screen* shown below.

```
Outputs Force
Para Blocks
Save/Copy/Restore
```

Scroll down to the 'Save/Copy/Restore' option and *press* <ENTER>. This will take you to the Save Setpoints screen.

System Manager SD Instructions

From any Main screen, *press* <SETPOINTS>. The screen below will appear because this option requires passcode clearance. Only a Level 2 passcode can change setpoints.

```
THIS ACTION REQUIRES
PASSCODE CLEARANCE
Enter Passcode: XXXX
```

If the correct passcode was entered, the *Unit Selection Screen* will be displayed.

```
Unit Selection*00*
Enter Unit ID#
Selected ID#: XXXX
```

Enter the Unit ID of the controller you wish to change schedules for and *press* <ENTER>. Once communication is established, the *00* message will go away. Then *press* <↓>.

NOTE: If the *00* remains, it indicates a communication failure to the controller.

The following screen will be displayed:

```
Change Setpoints
Configure Unit
Save/Copy/Restore
```

Scroll down to the 'Save/Copy/Restore' option and *press* <ENTER>. This will take you to the Save Setpoints screen.

Save Setpoints - Network Mode

From the *Save Setpoints Screen* shown below:

```
Save Setpoints
Press Enter To Save
```

Press <ENTER> and a setpoint file will be saved to the SD card. You will receive a message that the save was successful. This file is specific to this controller on this loop.

Copying & Restoring Previously Saved Setpoints

Copy Setpoints - Network Mode

To copy a saved setpoints file to other controllers on the network do the following:

From the *Save Setpoints Screen* shown below:

```
Save Setpoints
Press Enter To Save
```

Press <↓> once to access the *Copy Setpoints Screen* shown below.

```
Copy Setpoints
From Loop 1
From Unit 2
Press Enter to Copy
```

In the 'From Loop' field, enter the Loop of the controller you want to copy the setpoints from. In this example it is '1'. Then *press* <ENTER>.

In the 'From Unit' field, enter the Unit ID of the controller you want to copy the setpoints from. In this example it is '2'. Then *press* <ENTER>.

Now your cursor will be on the last line, and you can *press* <ENTER> once more to copy the setpoint file from unit 102 to unit 103.

You will receive a confirmation that the copy was successful.

Save & Copy Setpoints - Stand-Alone Mode

The instructions for Stand-Alone Mode are exactly the same as Network Mode, except that there is no need to enter a Loop number in the Unit ID number field and in the *Copy Setpoints Screen*, enter a zero in the 'From Loop' field.

Restore Setpoints - Network or Stand-Alone Mode

The Restore Setpoints feature is used to reload a saved setpoints file from one controller back to itself. This could be useful if setpoints or configurations were changed and need to be reset.

You can perform this function on a networked system; however, the Modular Service Tool needs to be directly connected to the controller you wish to restore previously saved setpoints to.

From the *Save Setpoints Screen* shown below:

```
Save Setpoints
Press Enter To Save
```

Press <↓> four times to access the *Restore Setpoints Screen* shown below.

```
Restore Setpoints
Press Enter to Load
```

Press <ENTER>. This will reload the setpoints from the saved file. You will receive confirmation that the setpoints were loaded successfully.

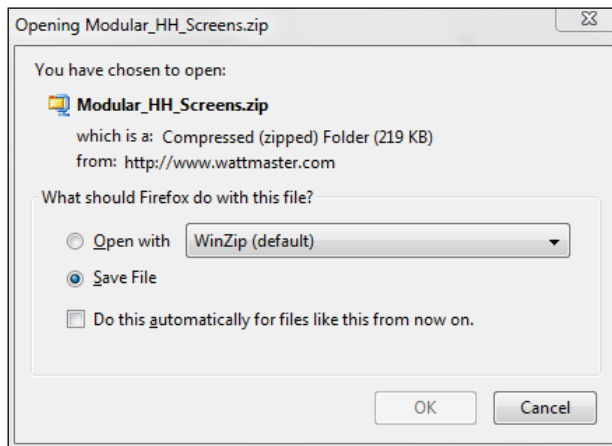
SD Memory Card Update

Updating Your SD Memory Card

You may need to update your SD memory card from time to time, either for a new release or to add data for another Controller.

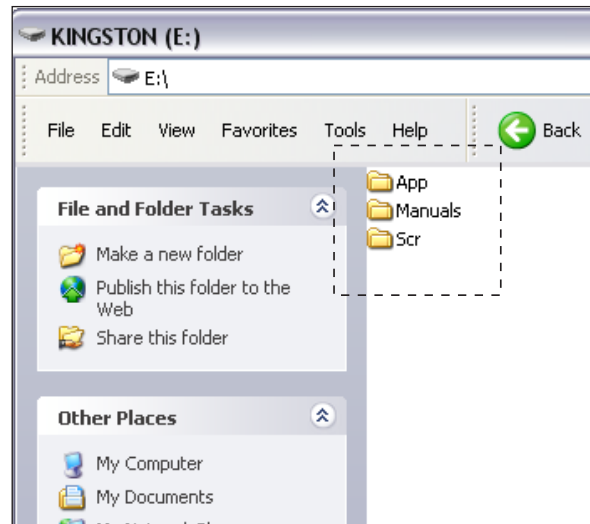
Follow the instructions below to download the update file from our tech support webpage:

1. Insert the SD memory card in your computer's SD drive and open the drive's window.
2. Open your browser and type in the address: <http://wattmaster.com/techsupport>.
3. On the Tech Support webpage, locate the file for the Modular Service Tool SD update and *double-click* your mouse on it.
4. Click <Save File> when asked to save or open the file and then *click* <OK>. This option will save the file to the "Downloads" folder on your PC.



5. *Open* the "Downloads" folder in Windows Explorer. You will find a folder labeled, "Modular_HH_Screens.zip." *Right-click* on this folder and choose "Extract All" from the options list. **NOTE:** Any compression software can be used to extract the zip folder's contents, for example, Winzip.

6. Once you unzip the file, you will see a window similar to the one below.



7. *Press* <CTRL> <A> to highlight the folders in the window—App, Manuals & Scr. *Press* <CTRL> <C> to copy the folders.
8. *Paste* the files into the SD memory card drive's window by *pressing* <CTRL> <V>.
9. *Remove* the SD Memory Card from your computer and *reinsert* it in the Modular Hand Held Service Tool.

Updating Software Using the Modular Service Tool SD

To update the software for various WattMaster controllers and E-BUS Modules, follow these simple steps.

1. Update your SD memory card with the new software file for the controller or E-BUS module you need to update. Follow the steps on **page 68** for Updating your SD memory card.
2. Connect the Modular Service Tool to the device you wish to update using the EBC E-BUS cable provided.
3. Power up the controller or E-BUS module you wish to update.
4. Apply power to the Modular Service Tool SD and *press* the <ON> button.
5. After initialization of the Modular Service Tool SD, *press* <NEXT> at the first Main Menu and <4> at the second Main Menu shown below.

```

1) Set Time & Date
2) Communications
NEXT) More Options
ESC) Exit Menu
    
```

```

3) Energy Saving
4) Update Software
NEXT) More Options
ESC) Exit Menu
    
```

6. The *Update Software Screen* will appear as shown below:

```

Select Communication
1) WattMaster Comm
2) E-BUS Module
ESC) Exit Menu
    
```

7. Follow the instructions for WattMaster Controllers or E-BUS Modules.

WattMaster Controllers

1. *Press* <1> to update a WattMaster Controller. The following screen will appear:

```

Enter Board Address
      0
Esc) Exit Menu
    
```

2. *Enter* the address of the controller you are updating and then *press* <ENTER>.
3. The *Software Version Screen* will appear as shown below. *Enter* <0> for the latest software version or enter the number of an older version given to you by Technical Support. Then *press* <ENTER>.

```

Software Version
Enter 0 for Latest
      0
Esc) Exit Menu
    
```

4. The screen will display the following messages:
 - “Resetting Unit”
 - “Load Sys Info”
5. If communications are successful, the screen will display, the name of the HEX file on the top line, “Flash Memory Erased” on the second line, and the progress percentage on the third line.

NOTE: If communications are not successful, the screen will display, “Press Any Key to Continue. Cannot Load Sys Info.” Make sure you have the right address and the right software version on your SD card. If these two items are correct and you still experience a problem, contact Technical Support.

6. When updating is complete, the screen will display, “Finish Download.”

Updating Controller & E-BUS Module Software

E-BUS Modules

1. Press <2> to update an E-BUS Module.
The following screen will appear:

```
Enter Board Address
      0
Esc) Exit Menu
```

2. Enter the address of the E-BUS module you are updating and then press <ENTER>. The following is the list of Module addresses:

```
WSHP-X - address 17
MHGRV-X - address 132
MODGAS-X - address 138
```

3. The *Software Version Screen* will appear as shown below. Enter <0> for the latest software version or enter the number of an older version if given to you by Technical Support. Then press <ENTER>.

```
Software Version
Enter 0 for Latest
      0
Esc) Exit Menu
```

4. The screen will display the following messages:
“Resetting Unit”
“Load Sys Info”

5. If communications are successful, the screen will display, the name of the HEX file on the top line, “Flash Memory Erased” on the second line, and the progress percentage on the third line.

NOTE: If communications are not successful, the screen will display, “Press Any Key to Continue. Cannot Load Sys Info.” Make sure you have the right address and the right software version on your SD card. If these two items are correct and you still experience a problem, contact Technical Support.

6. When updating is complete, the screen will display, “Finish Download.”

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