WattMaster VAV

Control Systems

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WattMaster VAV Component & System Wiring - Technical Guide

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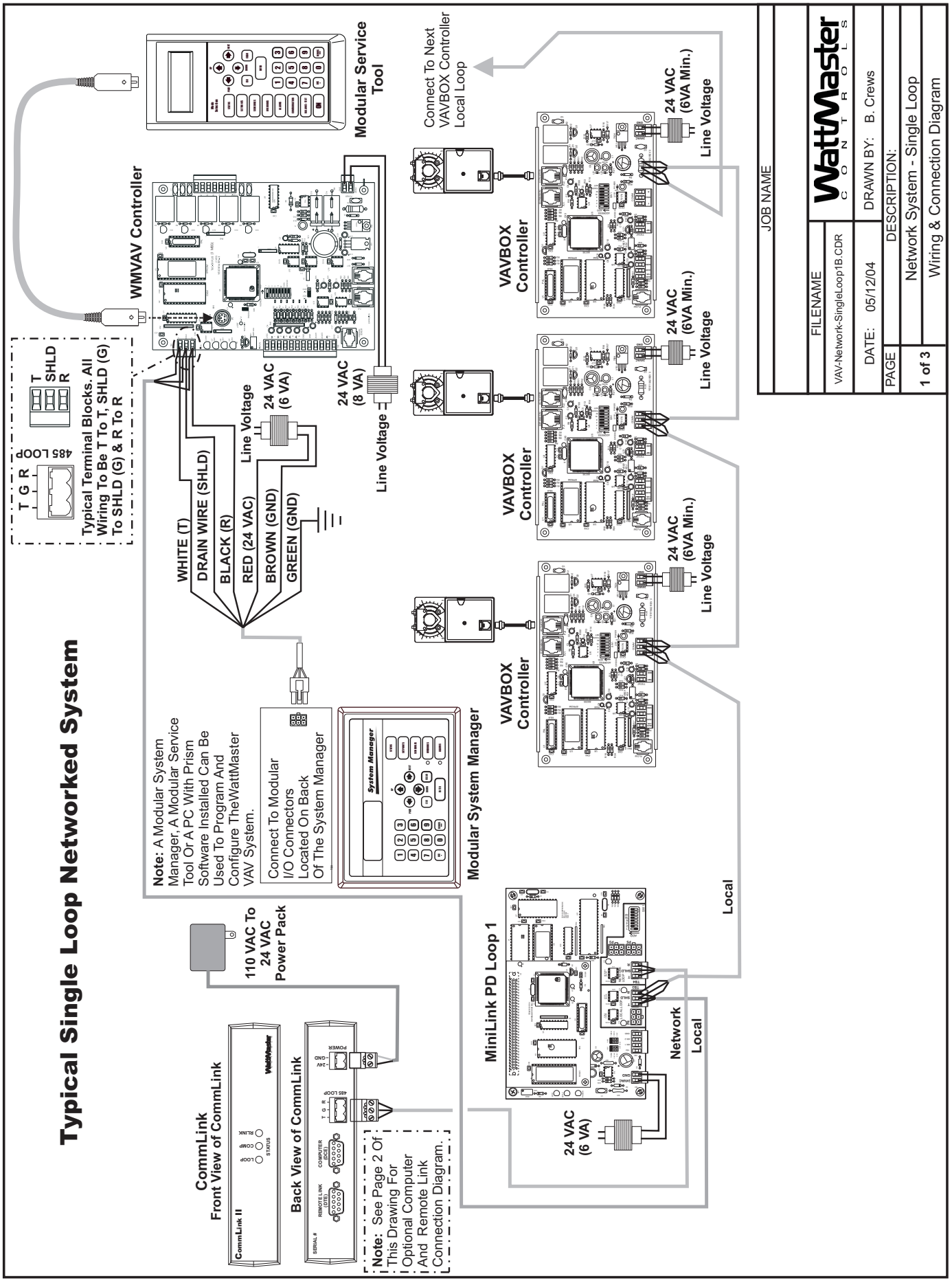
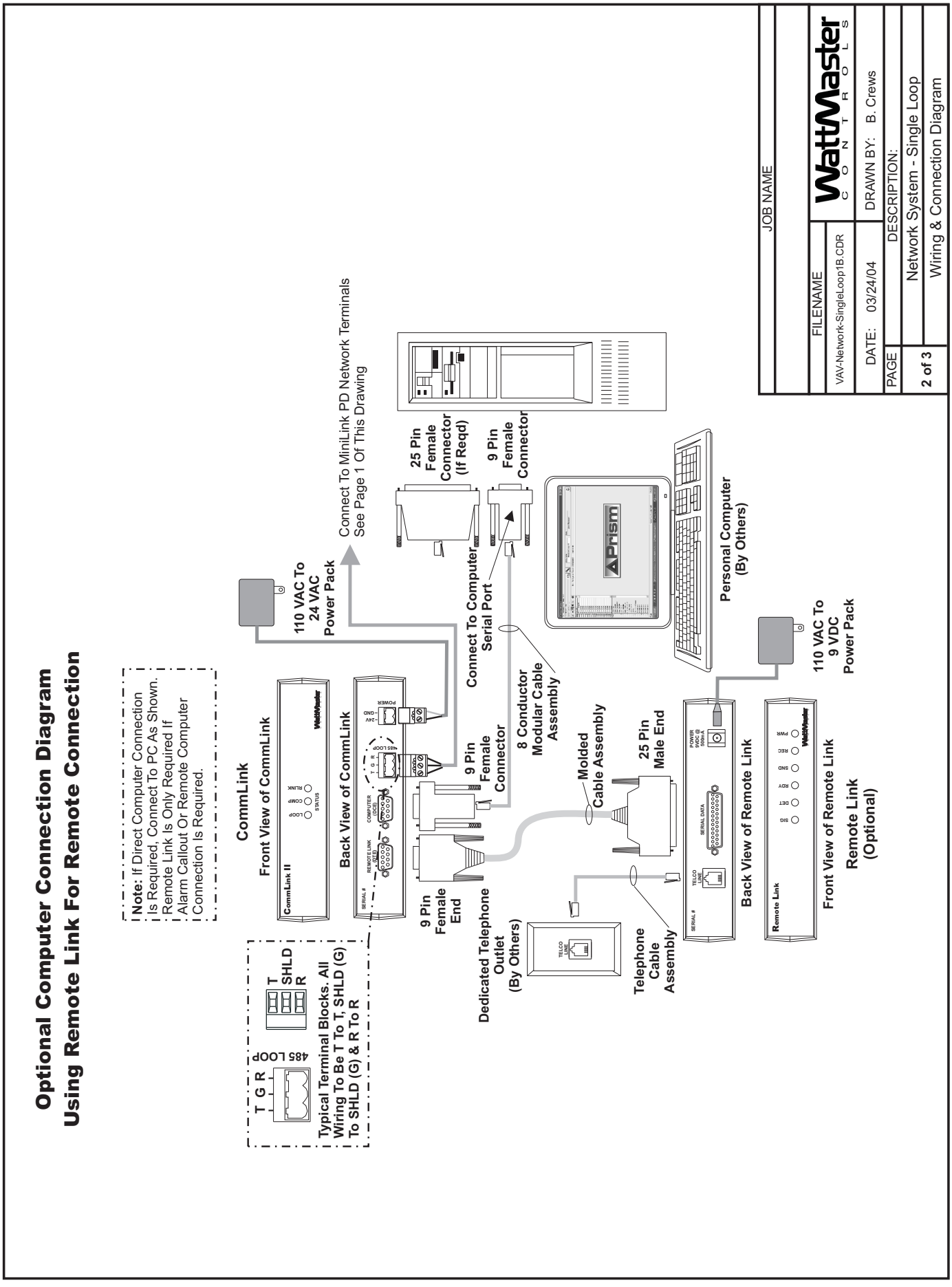
System Configurations Installation & Commissioning

Networked Single Loop System



Networked Single Loop - Computer Connection With Remote Link

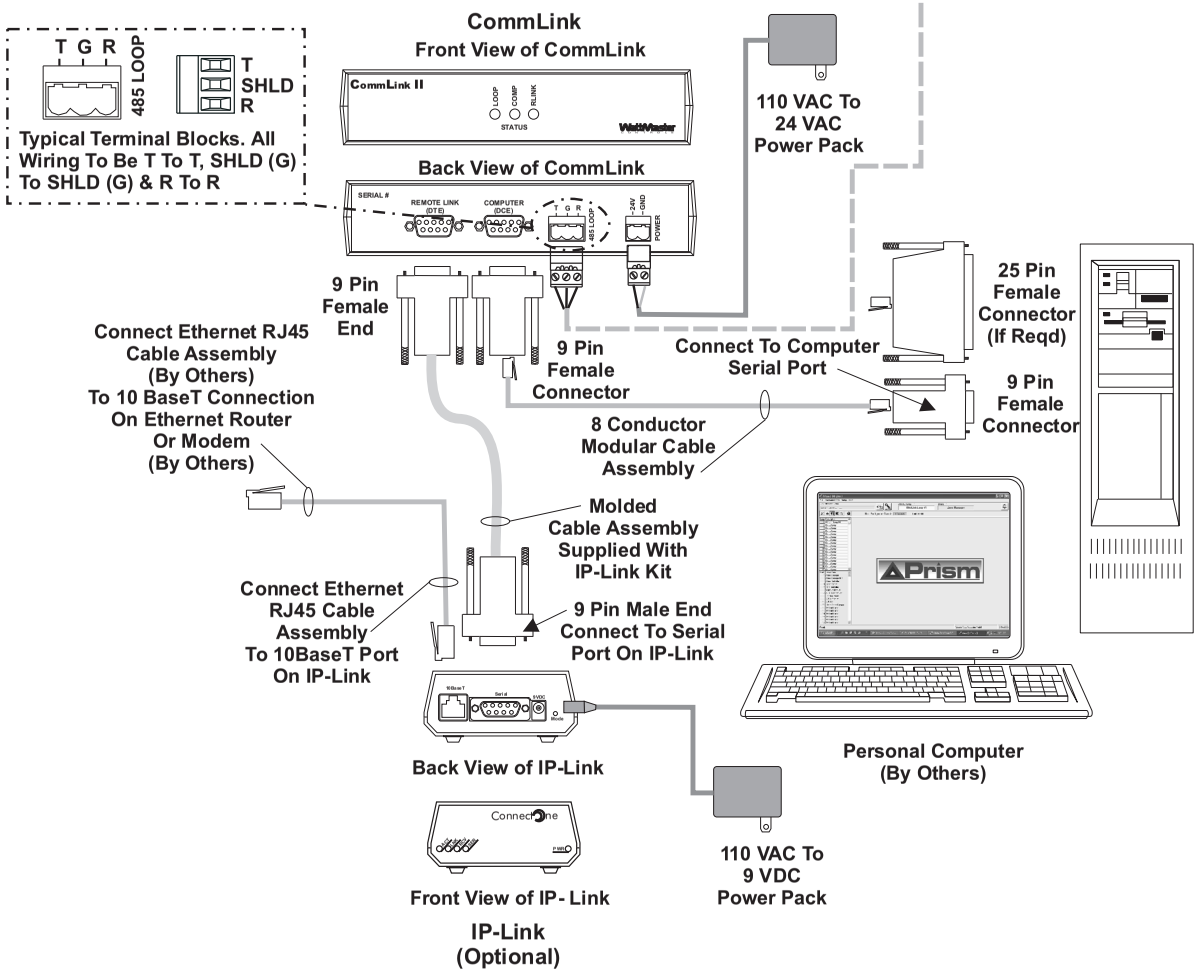


Optional Computer Connection Diagram
Using IP-Link For Remote Connection

Note: If Direct Computer Connection Is Required, Connect To PC As Shown. IP-Link Is Only Required If E-mail Alarm Notification Or Remote Computer Connection Is Required.

Note:
1.Set CommLink Internal Switch To"Multi"
2. Replace CommLink EPROM With IP-Link EPROM Supplied With IP-Link Kit

Connect To MiniLink PD Network Terminals
See Page 1 Of This Drawing



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VAV-Network-SingleLoop1B.CDR	
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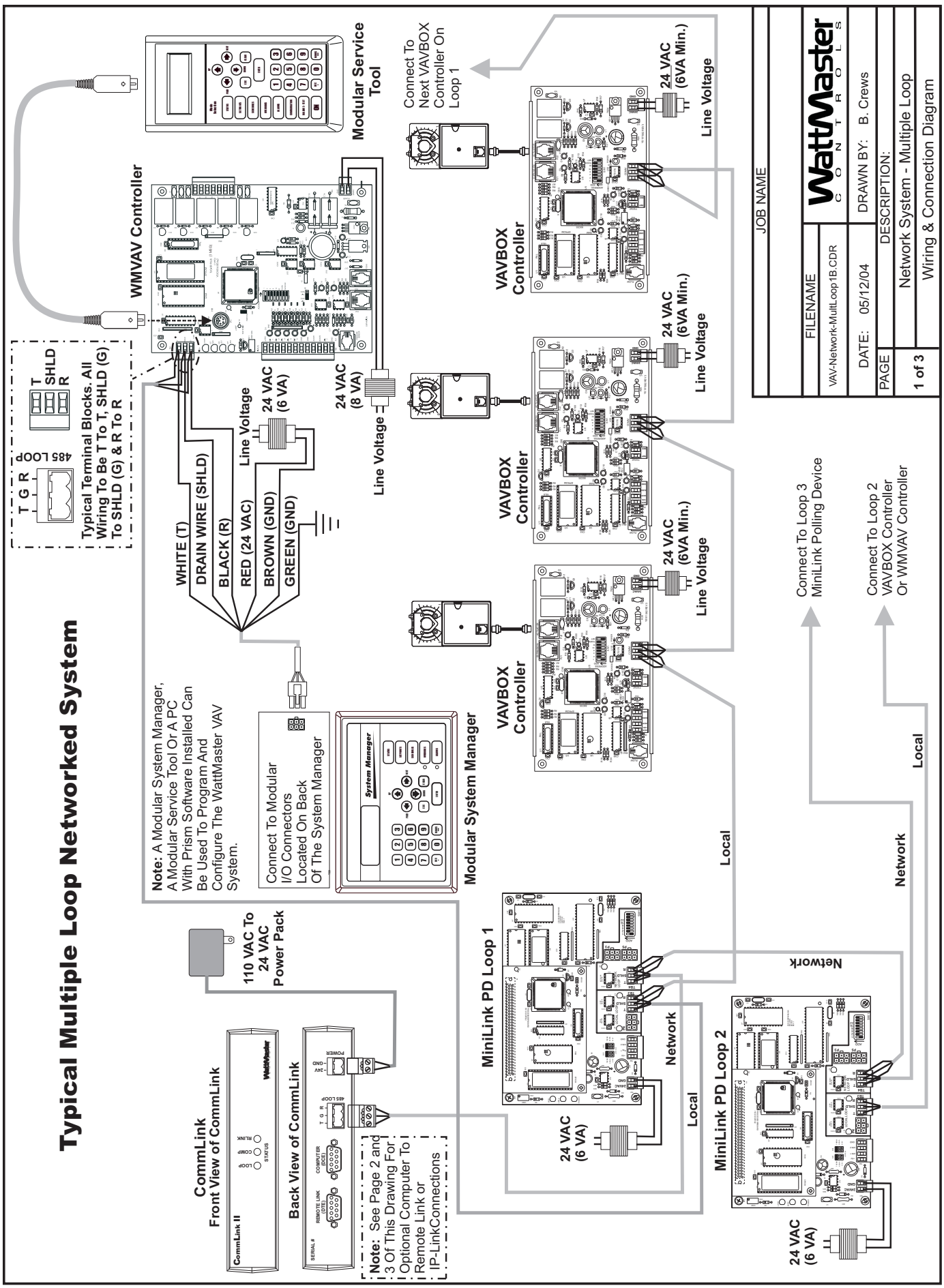
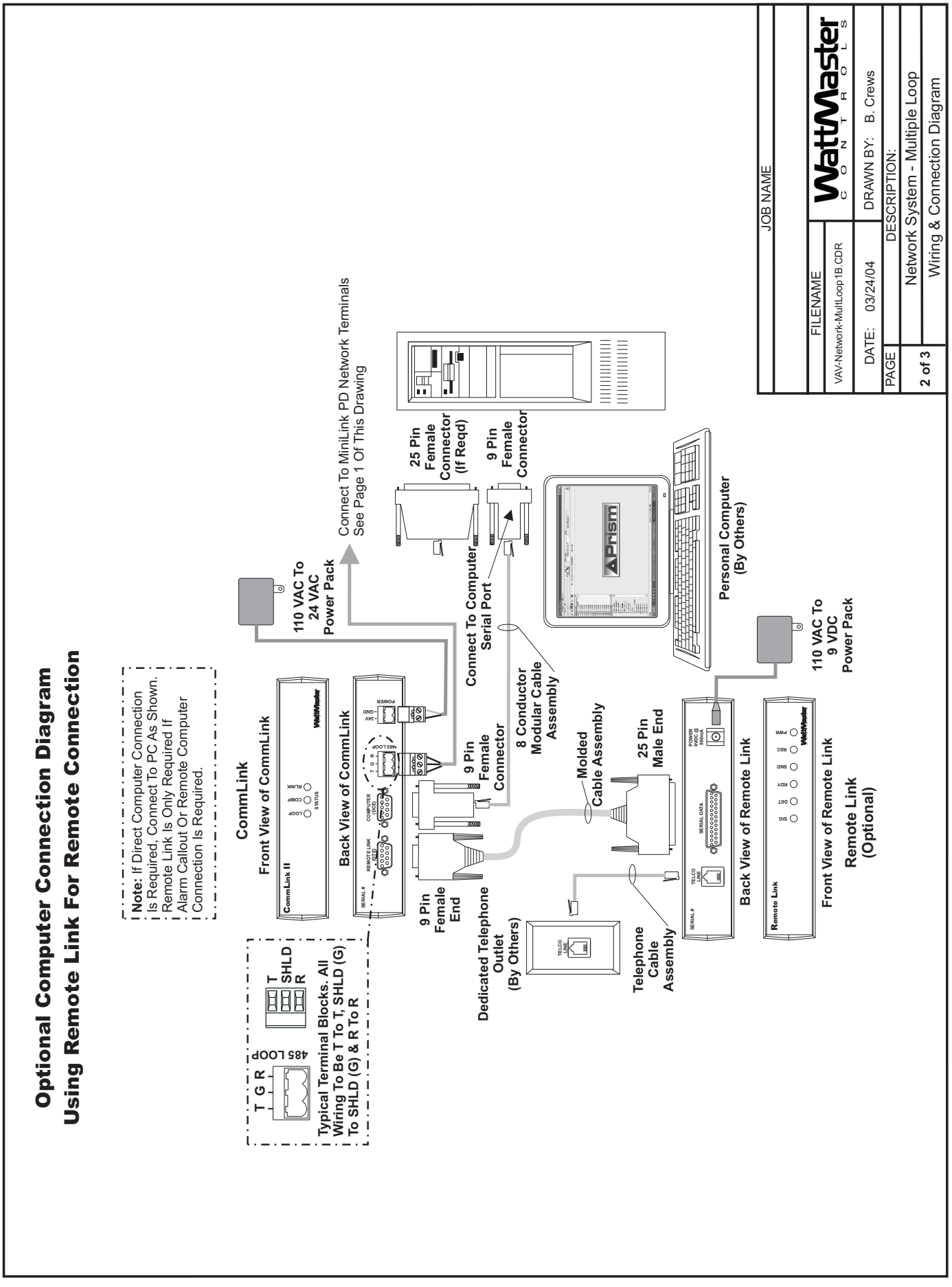
3 of 3	Network System - Single Loop Wiring & Connection Diagram

Networked Multiple Loop System



Networked Multiple Loop - Computer Connection With Remote Link



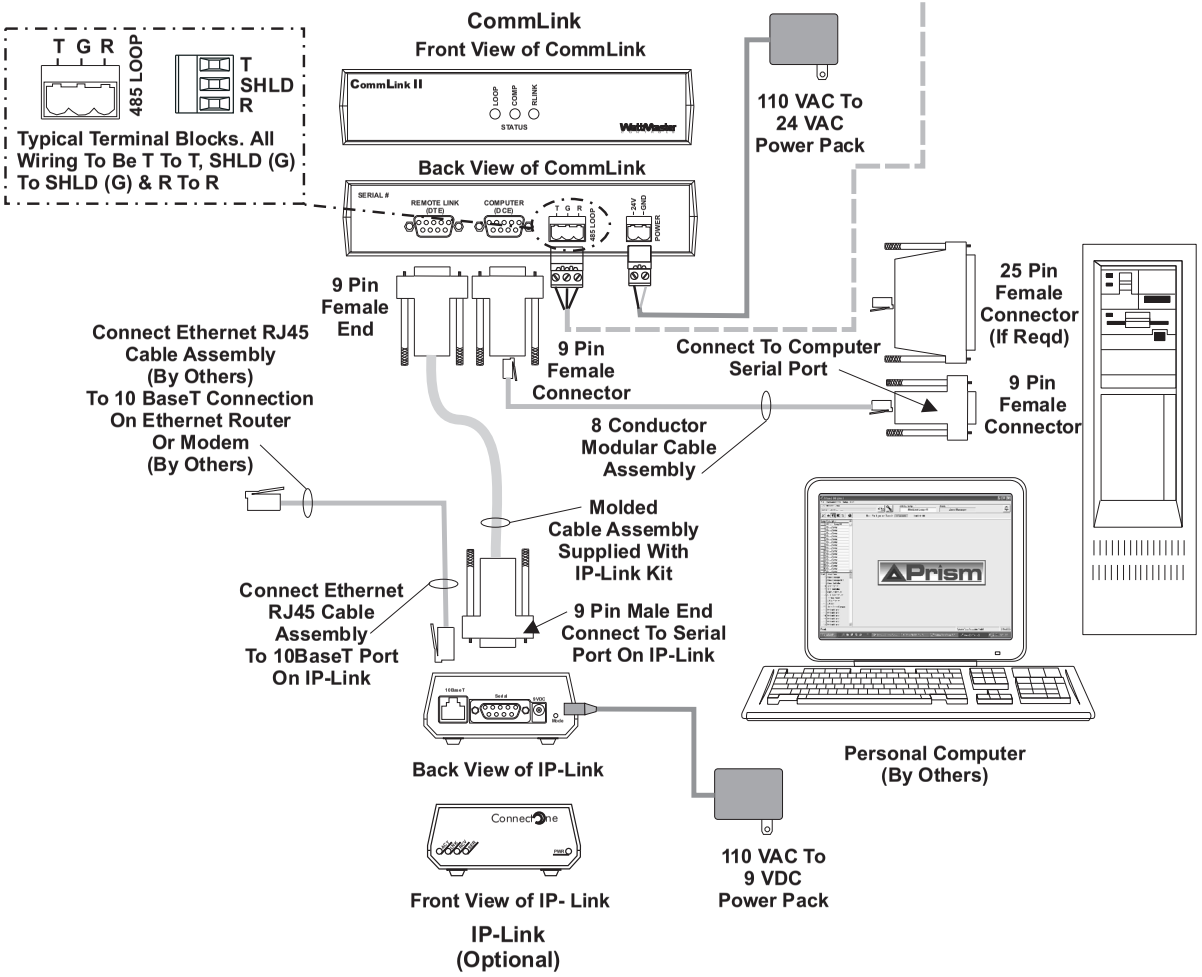
Networked Multiple Loop - Computer Connection With IP-Link

Optional Computer Connection Diagram Using IP-Link For Remote Connection

Note: If Direct Computer Connection Is Required, Connect To PC As Shown. IP-Link Is Only Required If E-mail Alarm Notification Or Remote Computer Connection Is Required.

Note:
1.Set CommLink Internal Switch To"Multi"
2. Replace CommLink EPROM With IP-Link EPROM Supplied With IP-Link Kit

Connect To MiniLink PD Network Terminals
See Page 1 Of This Drawing



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3 of 3	Network System - Multiple Loop Wiring & Connection Diagram

Systems Overview

General Information

The WattMaster VAV system components can be configured into different types of systems depending on the type and number of controllers required. It is a good idea to become familiar with the types of systems and their architecture by reading the information in this section and looking at the configuration diagrams in the System Configurations Installation & Commissioning section of this manual. The information below is designed to help you understand how the system components integrate with each other and the available configuration options.

System Types

Two different system configurations are available depending on the type and number of controllers that you have on your system.

1. **Networked Single Loop**
   (See Pages 6 Through 8 For Connection Diagrams)
2. **Networked Multiple Loop**
   (See Pages 9 Through 11 For Connection Diagrams)

System Type Definitions

Networked Single Loop

The Networked Single Loop system, as its name implies, consists of a single communications loop. The system can consist of the following controllers and devices.

1. A single WMVAV controller used as a VAV controller and it's associated VAVBOX controllers. Other WMVAV controllers used for constant volume units and/or and Add-on Devices may also be connected as long as the total of all controllers on the loop does not exceed 59. Only one VAV controller with it's VAVBOX controllers can be installed per loop. If more than one VAV controller with VAVBOX controllers is required, you must have a separate loop for each.

This system requires one CommLink communications interface and one MiniLink Polling Device. Programming and status monitoring are accomplished by the following methods.

1. By using an operators interface. This can be either a Modular System Manager, a Modular Service Tool or both devices. The System Manager or Modular Service Tool can connect to any controller on the local loop.
2. A computer interface can also be used in conjunction with the other operators interfaces listed above, or by itself. This requires a personal computer with the Prism computer front end software installed. The PC connects to the CommLink via a supplied cable.

Networked Multiple Loop

This Networked Multiple Loop System consists of two or more loops, each being called 'Local Loops', with one 'Network Loop' that ties the "Local Loops" together. Each of these local loops can consist of the following controllers and devices.

1. A series of WMVAV controllers for constant volume units and/or Add-on devices without any VAVBOX controllers. Up to 59 controllers may be connected on the loop in this manner.
2. A single WMVAV controller used as a VAV controller and its associated VAVBOX controllers. Other WMVAV controllers used for constant volume units and/or and Add-on Devices may also be connected as long as the total of all controllers on the loop does not exceed 59. Only one VAV controller with its VAVBOX controllers can be installed per local loop.

To form the Networked Multiple Loop System the following network devices are required.

1. A MiniLink Polling Device is required per loop (Local Loop). This allows the controllers to share information that is broadcast from one controller to all controllers on that local loop and also provides alarming and trend logging capabilities.
2. One CommLink is required for the entire system. It resides on the Network Loop and allows for communications between all the local loops and provides for global broadcasts to all controllers on the entire system.

Programming and status monitoring are accomplished by one or more of the following methods.

1. By using an operator interface. This can be either a Modular System Manager, a Modular Service Tool or both devices. The System Manager or Modular Service Tool can connect to any controller on any "Local Loop" on the entire system.
2. A computer interface can also be used in conjunction with the other operators interfaces listed above, or by itself. This requires a personal computer with the Prism computer front end software installed. The PC connects to the CommLink via a supplied cable.

Network Communications Devices

MiniLink Polling Device

1. This device is required for all Networked Single loop systems.
2. One of these device is required on each local loop of all Networked Multiple Loop systems

CommLink

1. One CommLink is required on all Networked Single Loop or Multiple Loop Systems
2. Up to 60 local loops can be connected to the CommLink

Installation Procedures

The installation procedures that follow are based on recommended methods of wiring connection and controller installation. Installation procedures vary depending on the which Networked system you are installing. The system you are installing could be "Networked Single Loop" or a "Networked Multiple Loop" system. The Networked Systems also have installation variations based on the type of components you are installing for that system. The following information explains the procedures for all of these systems. Please find the system and components that closely match your system and follow the outlined procedures.

Networked Single Loop Systems

See the "Networked System - Single Loop Wiring" on pages 6 through 8 of this manual for detailed wiring information. Also see page 16 for wire and transformer sizing information. You should review these diagrams before attempting connections or powering up the controller or interface devices.

1. Connect all WMVAV or Add-on Device controllers in a daisy chain or star ring format by connecting from each controller's communication terminal block to the next using 18 gauge, 2 conductor shielded cable. Install a separate 24 VAC, transformer for each controller and wire from each controller's power terminal block to its transformer using 18 gauge minimum, 2 wire cable for power. See Wire and Transformer Sizing section on page 16 for detailed transformer and wire sizing information. Observe polarity on all board power wiring. Install a separate 24 VAC, 6 VA minimum, transformer for each VAVBOX controller on the loop and wire from each controller's power terminal block to its transformer using 18 gauge minimum, 2 wire cable. Observe polarity on all boards! As an alternative, a single transformer that connects to all VAVBOX controllers may also be used. It must be sized to handle the minimum load of 6 VA per VAVBOX controller connected to it. **When using this method, the polarity of all wiring between the transformer and the VAVBOX controllers is extremely critical and must be maintained to prevent damage to all boards connected!** See the wire and transformer sizing information on page 16 of this manual for complete wire and transformer sizing information.

Warning: If polarity between controllers is not maintained, severe damage to the controllers may result. WattMaster recommends using a separate transformer for each controller in order to eliminate the potential for damaging controllers due to incorrect polarity.

2. Using 18 gauge 2 conductor shielded cable, connect from the WMVAV controller's 3 wire communications connector to the MiniLink PD's 3 wire communications connector marked "Local Loop".
3. Connect 2 conductor shielded cable from the MiniLink PD's 3 wire communications terminal blocks labeled "Network Loop" to the CommLink's 3 wire communications terminal block located on the back of the CommLink. Find the 110 VAC/24 VAC power supply furnished with the CommLink and connect the 2 stripped wire leads to the 24 VAC terminals on the back of the CommLink. The CommLink's internal jumper must be set to "Multiple" for all WattMaster VAV systems. See page 45 of this manual for complete CommLink wiring and jumper setting information. After determining all wiring and jumper settings are correct, connect the power supply plug-in transformer to a 110 V receptacle.
4. Install a 24 VAC, 6 VA minimum, transformer for the MiniLink PD and wire it to the 24 VAC power terminal block on the MiniLink PD using 18 gauge minimum, 2 wire cable. See page 46 of this manual for complete MiniLink PD wiring diagrams and instructions.
5. When the Modular Service Tool is to be used for programming and monitoring of the controllers it can be connected to the WMVAV controllers using the supplied cable with DIN connectors on both ends. The DIN connector on the WMVAV controller is located near the communications terminals. To connect the Modular Service Tool to a VAVBOX controller first unplug the 3 wire communication terminal block from the VAVBOX controller. Connect the DIN to terminal adapter terminal end to the communication terminals block socket on the VAVBOX controller then connect the DIN connector side of the adapter to the Modular Service Tool cable DIN connector. See page 44 of this manual for complete Modular Service Tool connection diagrams and instructions.
6. The Modular System Manager comes supplied with a 12 foot modular cable pigtail with a modular connector on one end and stripped wires on the other. Plug the modular connector end into the System Manager modular connector. Run 18 gauge, 2 conductor shielded cable for communications from the MiniLink PD or any controller on the local loop by connecting one end of the controller's or MiniLink PD's 3 wire "Local Loop" communications terminal block to a junction box located within 12 feet of the System Manager. Run 18 gauge, 2 wire, power wires supplied by a separate 24 VAC, 6 VA minimum transformer into the junction box. Splice the stripped modular cable ends from the System Manager to the communications and power wire inside of the junction box using solid connections made with wire nuts or butt-splice connectors. See Modular System Manager wiring on pages 42 and 43 of this manual for wiring color coding and complete wiring instructions. The Modular System Manager MUST always be connected on the "Local Loop", never the "Network Loop".

Networked Multiple Loop Systems

See the "Networked System - Multiple Loop Wiring" on pages 9 through 11 of this manual for detailed wiring diagrams. Also see page 16 for wire and transformer sizing information. You should review these diagrams before attempting connections or powering up the controller or interface devices.

Loop(s) with WMVAV Controllers without VAVBOX Controllers

1. For each local loop on the system, connect all controllers in a daisy chain or star ring format by connecting from each controllers communication terminal block to the next using 18 gauge, 2 conductor shielded cable. Install a separate 24 VAC, 8 VA minimum, transformer for each controller and wire from each controller's power terminal block to its transformer using 18 gauge minimum, 2 wire cable for power. Observe polarity on all boards.
2. Select one of the local loops and connect 2 conductor shielded cable from one of its WMVAV controller's 3 wire communications terminal blocks to it's associated MiniLink PD's 3 wire communications terminal block marked "Local Loop". Repeat this procedure for all loops on the entire system.

3. Connect 2 conductor shielded cable from one of the systems MiniLink PD's 3 wire communications terminal blocks labeled "Network Loop" to the CommLink's 3 wire communications terminal block located on the back of the CommLink. Find the 110 VAC/24 VAC power supply furnished with the CommLink and connect the 2 stripped wire leads to the 24 VAC terminals on the back of the CommLink. The CommLink's internal jumper must be set to "Multiple" for all WattMaster VAV systems. See page 45 of this manual for complete CommLink wiring and jumper setting information. After determining all wiring and jumper settings are correct, connect the power supply plug-in transformer to a 110 V receptacle.
4. Connect 2 conductor shielded cable for network communications between each MiniLink PD on the system including the one that was just connected to the CommLink. This is accomplished by connecting between each MiniLink PD's 3 wire communications terminal block labeled "Network Loop" and the next MiniLink PD's communications terminal block labeled "Network Loop". Install a 24 VAC, 6 VA minimum, transformer for each of the MiniLink PDs on the system and wire each transformer to the 24 VAC power terminal block for its respective MiniLink PD using 18 gauge minimum, 2 wire cable. See page 46 of this manual for complete MiniLink PD wiring diagrams and instructions.
5. When the Modular Service Tool is to be used for programming and monitoring of the controllers it can be connected to the WMVAV controllers using the supplied cable with DIN connectors on both ends. The DIN connector on the WMVAV controller is located near the communications terminals. See page 44 of this manual for complete Modular Service Tool connection diagrams and instructions.
6. The Modular System Manager comes supplied with a 12 foot modular cable pigtail with a modular connector on one end and stripped wires on the other. Plug the modular connector end into the System Manager modular connector. Run 18 gauge, 2 conductor shielded cable for communications from the MiniLink PD or any controller on the local loop by connecting one end the controller's or MiniLink PD's 3 wire "Local Loop" communications terminal block to a junction box located within 12 feet of the System Manager. Run 18 gauge, 2 wire, power wires supplied by a separate 24 VAC, 6 VA minimum transformer into the junction box. Splice the stripped modular cable ends from the System Manager to the communications and power wire inside of the junction box using solid connections made with wire nuts or butt-splice connectors. See Modular System Manager wiring on pages 42 and 43 of this manual for wiring color coding and complete wiring instructions. The Modular System Manager MUST always be connected on the "Local Loop", never the "Network Loop".

Loop(s) with WMVAV and VAVBOX Controllers

1. Select one of the local loops on your system. Connect all WMVAV or Add-on Device controllers in a daisy chain or star ring format by connecting from each controller's communication terminal block to the next using 18 gauge, 2 conductor shielded cable. Install a separate 24 VAC, transformer for each controller and wire from each controller's power terminal block to its transformer using 18 gauge minimum, 2 wire cable for power. See Wire and Transformer Sizing section on page 16 for detailed transformer and wire sizing information. Observe polarity on all board power wiring. Install a separate 24 VAC, 8 VA minimum, transformer for each VAVBOX controller on the loop and wire from each controller's power terminal block to it's transformer using 18 gauge minimum, 2 wire cable. Observe polarity on all boards! As an alternative, a single transformer that connects to all VAVBOX controllers may also be used. It must be sized to handle the minimum load of 6 VA per VAVBOX controller connected to it. **When using this method, the polarity of all wiring between the transformer and the VAVBOX controllers is extremely critical and must be maintained to prevent damage to all boards connected!** See the wire and transformer sizing information on page 16 of this manual for complete wire and transformer sizing information. Repeat this procedure for each loop with VAVBOX controllers on your system.

Warning: If polarity between controllers is not maintained, severe damage to the controllers may result. WattMaster recommends using a separate transformer for each controller in order to eliminate the potential for damaging controllers due to incorrect polarity.

2. For each local loop on the system do the following. Using 18 gauge 2 conductor shielded cable, connect from one of the WMVAV controller's on the loop, 3 wire communications connector to that loop's MiniLink PD 3 wire communications terminal block marked "Local Loop".
3. To install the CommLink, connect 2 conductor shielded cable from one of the system's MiniLink PD's 3 wire communications terminal blocks labeled "Network Loop" to the CommLink's 3 wire communications terminal block located on the back of the CommLink. Find the 110 VAC/ 24 VAC power supply furnished with the CommLink and connect the 2 stripped wire leads to the 24 VAC terminals on the back of the CommLink. The CommLink's internal jumper must be set to "Multiple" for all WattMaster VAV systems. See page 45 of this manual for complete CommLink wiring and jumper setting information. After determining all wiring and jumper settings are correct, connect the power supply plug-in transformer to a 110 V receptacle.
4. The following procedure must be performed for each MiniLink PD on your system. Install a 24 VAC, 6 VA minimum, transformer for the MiniLink PD and wire it to the 24 VAC power terminal block on the MiniLink PD using 18 gauge minimum, 2 wire cable. See page 46 of this manual for complete MiniLink PD wiring diagrams and instructions. Be sure that all MiniLink PDs on the entire system are wired as required.

5. When the Modular Service Tool is to be used for programming and monitoring of the controllers it can be connected to the WMVAV controllers using the supplied cable with DIN connectors on both ends. The DIN connector on the WMVAV controller is located near the communications terminals. To connect the Modular Service Tool to a VAVBOX controller, first unplug the 3 wire communication terminal block from the VAVBOX controller. Connect the DIN to terminal adapter terminal end to the communication terminals block socket on the VAVBOX controller then connect the DIN connector side of the adapter to the Modular Service Tool cable DIN connector. See page 44 of this manual for complete Modular Service Tool connection diagrams and instructions.

6. The Modular System Manager comes supplied with a 12-foot modular cable pigtail with a modular connector on one end and stripped wires on the other. Plug the modular connector end into the System Manager modular connector. Run 18 gauge, 2 conductor shielded cable for communications from the MiniLink PD or any controller on the local loop by connecting one end the controller's or MiniLink PD's 3 wire "Local Loop" communications terminal block to a junction box located within 12 feet of the System Manager. Run 18 gauge, 2 wire, power wires supplied by a separate 24 VAC, 6 VA minimum transformer into the junction box. Splice the stripped modular cable ends from the System Manager to the communications and power wire inside of the junction box using solid connections made with wire nuts or butt-splice connectors. See Modular System Managerl wiring on pages 42 and 43 of this manual for wiring color coding and complete wiring instructions. The Modular System Manager MUST always be connected on the "Local Loop", never the "Network Loop".

System Commissioning

The following information is a brief overview of the procedures required to commission a typical WattMaster VAV System.

1. Address each MiniLink PD on the system with a unique address from 1 to 60.
2. On a loop of WMVAV controllers and/or Add-on Devices, without VAVBOX Controllers, address the controllers and devices from 1 to 59.
3. On a loop which has VAVBOX controllers, address the VAVBOX controllers from 1 to 58. Address the WMVAV controller serving the VAVBOX controllers as address 59. Address all other controllers with addresses not already used by other controllers on the loop.
4. Always apply power to the system in the following order.
   WMVAV controllers or Add-on Devices, MiniLink PD(s), CommLink, VAVBOX controllers (if used).
5. After powering up verify diagnostics LED indicator for proper operation of all controllers. See the technical guide for each specific controller for detailed information on the location of its diagnostic LED, and each controller's start-up sequence.
6. If a computer is used, install the Prism computer front end software on it and connect it to the CommLink to access all of the controllers on the entire system for programming.
7. If a computer is not used, and if a Modular System Manger is not already connected on the local loop, connect a Modular Service Tool to one of the controllers to perform programming of all controllers on the entire system.

Transformer & Wire Sizing

24VAC Power - Transformer & Wire Sizing Considerations For VAVBOX Controllers

Some installers like to use one large 24VAC transformer to power several devices. This is allowable as long as polarity is maintained to each device on the transformer circuit. **Warning: If polarity is not maintained, severe damage to the devices may result. WattMaster Controls recommends using a separate transformer for each device in order to eliminate the potential for damaging controllers due to incorrect polarity.** Using separate transformers also allows redundancy in case of a transformer failure. Instead of having 8 controllers inoperative because of a malfunctioning transformer you have only 1 controller off line. If the installer does decide to use a large transformer to supply power to several devices, the following transformer and wire sizing information is presented to help the installer correctly supply 24VAC power to the devices.

Following is a typical example to help the installer to correctly evaluate transformer and wiring designs.

Each VAVBOX Controller requires 6 VA @ 24VAC power. In the examples below we have a total of 10 VAV Controllers.

10 VAVBOX Controllers @ 6VA each..... 10 x 6VA =60VA.

The above calculation determines that our transformer will need to be sized for a minimum of 60VA if we are to use one transformer to power all the controllers. We will use a 75 VA transformer, as this is a readily available size that meets our VA load requirements.

Next we must determine the maximum length of run allowable for the wire gauge we wish to use in the installation. Each wire gauge below has a voltage drop per foot value we use to calculate total voltage drop.

18ga wire.....0.00054 = voltage drop per 1' length of wire
16ga wire.....0.00034 = voltage drop per 1' length of wire
14ga wire.....0.00021 = voltage drop per 1' length of wire

For our example we will use 18 gauge wire. WattMaster recommends 18 gauge as a minimum wire size for all power wiring.

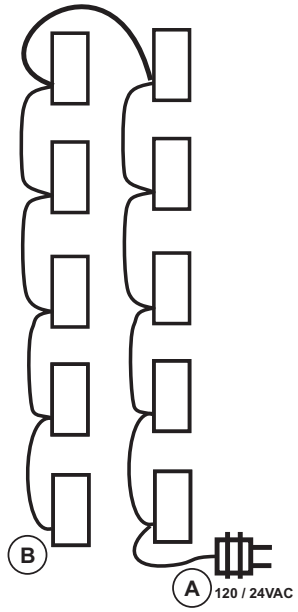
Next use the voltage drop per foot value for 18 gauge wire from the list above and multiply by the total VA load of the 10 controllers to be installed.

0.00054 (Voltage drop per foot for 18 gauge wire) x 60VA controller load = **0.0324** Volts/Ft.

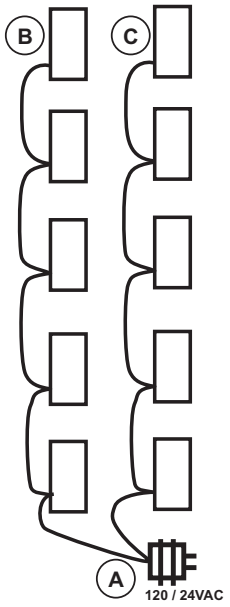
WattMaster VAVBOX controllers will operate efficiently with a voltage drop no greater than 2 Volts. Divide the total allowable voltage drop of 2 Volts by the number you arrived at above and you have the maximum number of feet you can run the 18 gauge wire with an 75 VA transformer with no more than a 2 Volt drop at the farthest controller from the transformer..

$$\frac{\text{2 (Volts total allowable voltage drop)}}{\text{0.0324 (Voltage drop per 1 ft. @ 60VA load)}} = 61.73 \text{ feet}$$

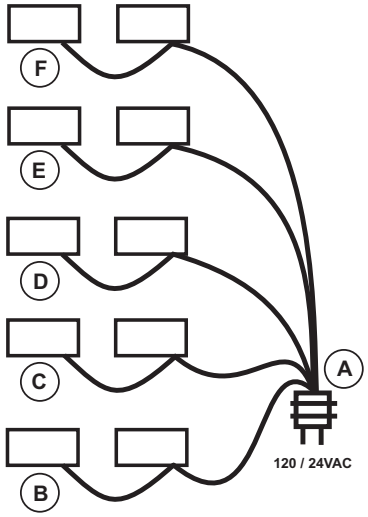
Parallel circuiting of the wiring instead of wiring all 10 controllers in series allows for longer wire runs to be used with the same size wire (as shown in our examples below). It is often necessary for the installer to calculate and weigh the cost and installation advantages and disadvantages of wire size, transformer size, multiple transformers, circuiting, etc., when laying out an installation. No matter what layout scheme is decided upon, it is mandatory that the farthest controller on the circuit is supplied with a minimum of 22 Volts and that the polarity is maintained to all controllers connected to the transformer.



Distance A to B cannot exceed 61.73 Ft.



Distance from A to B cannot exceed 123.46 Ft.
Distance from A to C cannot exceed 123.46 Ft.



Distance from A to B cannot exceed 230.40 Ft.
Distance from A to C cannot exceed 308.64 Ft.
Distance from A to D cannot exceed 308.64 Ft.
Distance from A to E cannot exceed 308.64 Ft.
Distance from A to F cannot exceed 308.64 Ft.

Component Power Requirements

VAV/CAV Controller.....8VA	GPC-17 Controller.....10VA
VAVBOX Controller.....6VA	Lighting Panel Controller 10VA
Optimal Start Scheduler.....10VA	MiniLink Polling Device..... 6VA
GPC Controller.....8VA	

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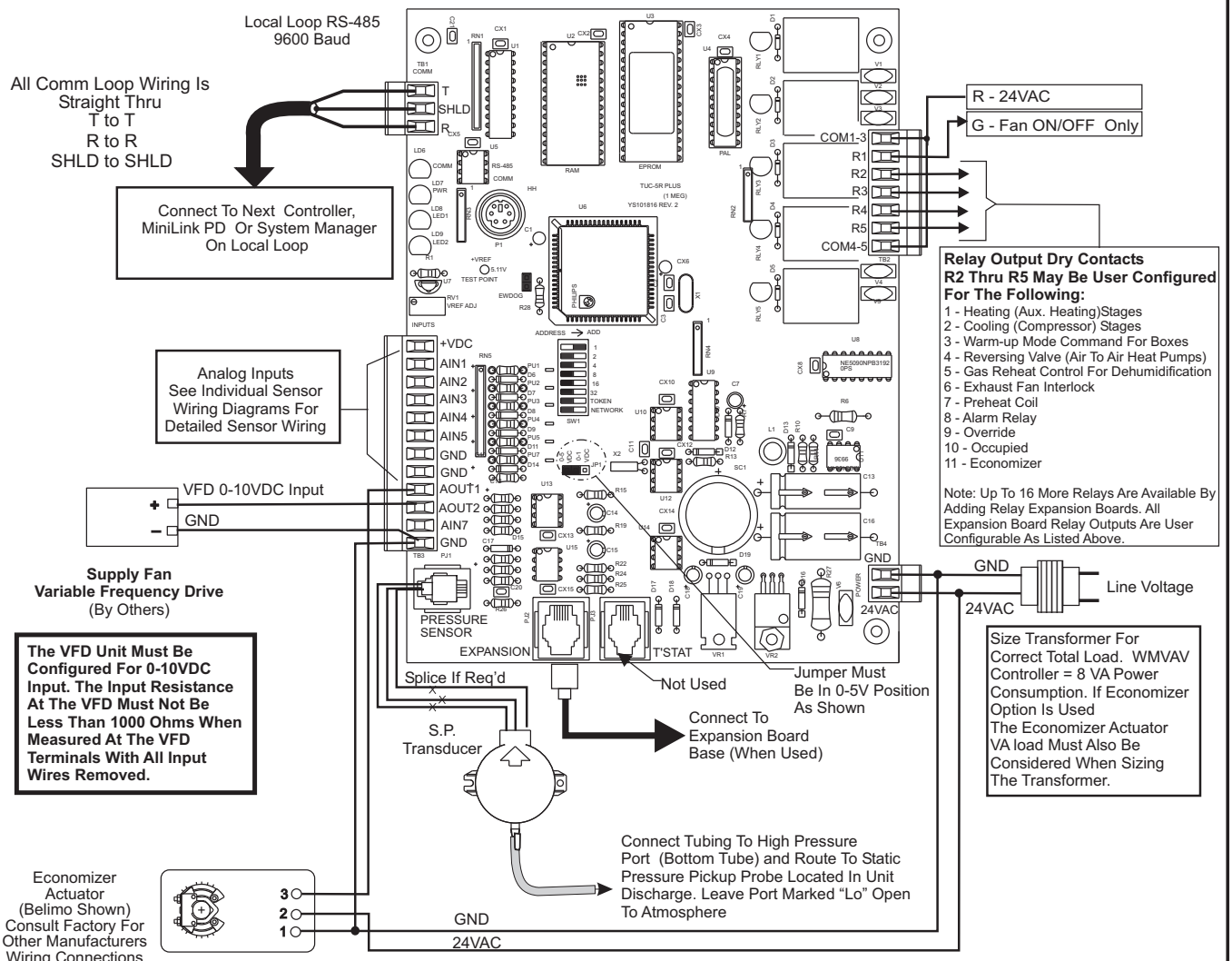
1 of 1	WattMaster VAV Wire & Transformer Sizing

WMVAV Controller Wiring

WMVAV Controller Wiring



Notes:

1.)**24 VAC Must Be Connected So That All Ground Wires Remain Common.**

2.)**All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.**

3.)**All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.**

4.)**When Humidity Sensor Is To Be Installed A 250 Ohm Resistor Must Be Installed On The Ground Side Of The Sensor And Pull Up Resistor PU5 Must Be Removed From The Controller. See Humidity Sensor Wiring Diagram In The WMVAV section of this manual.**

5.)**If The Slide Adjust Option Is Used On The Room Sensor , The AUX Connection Must Be Wired To AIN7. The Fan Proof Of Flow Switch, Which Normally Connects To AIN7, Is Not Available For Use When The Slide Adjust Option Is Used.**

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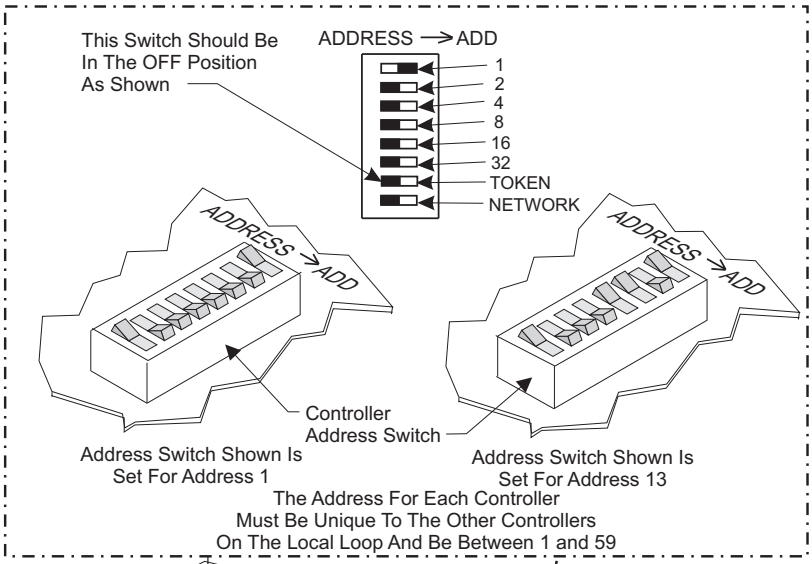
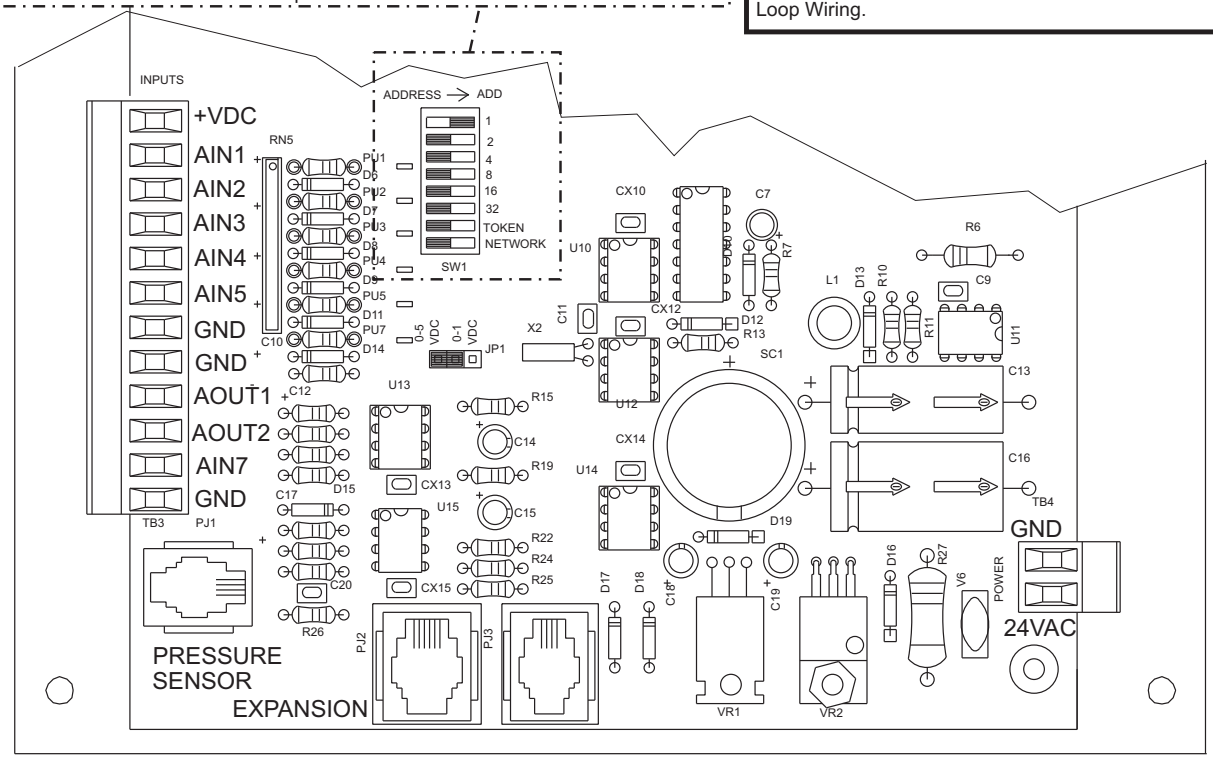
1 of 2	WMVAV Controller
	Component Wiring Diagram

WMVAV Controller Addressing



Note:
The Power To The Controller Must Be Removed And Reconnected After Changing The Address Switch Settings In Order For Any Changes To Take Effect.

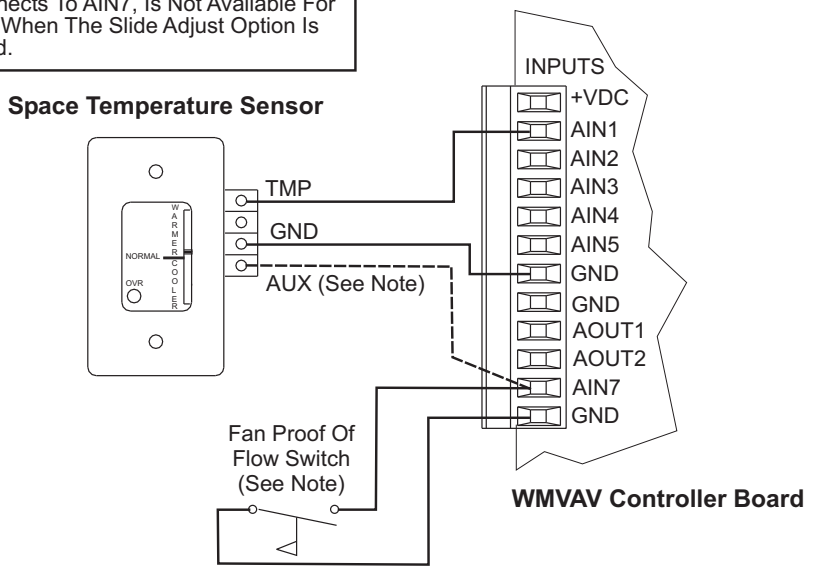
Caution
Disconnect All Communication Loop Wiring From The Controller Before Removing Power From The Controller. Reconnect Power And Then Reconnect Communication Loop Wiring.



JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-WMVAVWIR1A.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
2 of 2	WMVAV Controller
	Component Wiring Diagram

Space Sensor Wiring

Note:
If The Slide Adjust Option Is Used On The Room Sensor The AUX Terminal Must Be Wired To AIN7. The Fan Proof Of Flow Switch, Which Normally Connects To AIN7, Is Not Available For Use When The Slide Adjust Option Is Used.



Space Temperature Sensor Information

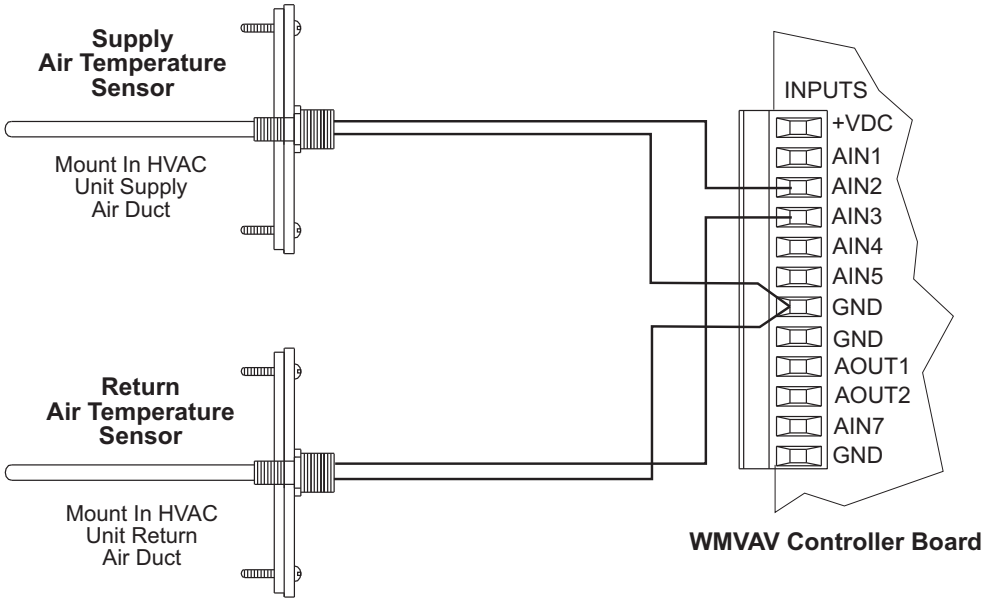
The Space Temperature Sensor is typically used for constant volume HVAC unit applications controlling one zone. The Space Temperature Sensor is a 10K Type III thermistor sensor. The Space Temperature Sensor should be mounted approximately 5 ft. above the floor in the space that is to be controlled. The Space Temperature Sensor is available in a sensor only, sensor with override button, sensor with slide adjust and sensor with slide adjust and override configurations. If the Space Temperature Sensor with Slide Adjust option is to be used, the Fan Proof of Flow Switch cannot be used.

Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-SpaceTempWire1.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Space Temperature Sensor To WMVAV Controller Wiring

Supply & Return Sensor Wiring



Supply & Return Sensor Information

The Supply and Return Air Temperature Sensors must be wired as shown in the illustration below for proper operation. The Supply and Return Air Temperature Sensors are 10K Type III thermistor sensors. The Supply Air Temperature Sensor should be mounted in the unit discharge plenum or in the supply air duct. The Return Air Temperature Sensor should be mounted in the return air duct. If the system has a bypass damper installed, be sure the return air sensor is located upstream of the bypass duct connection.

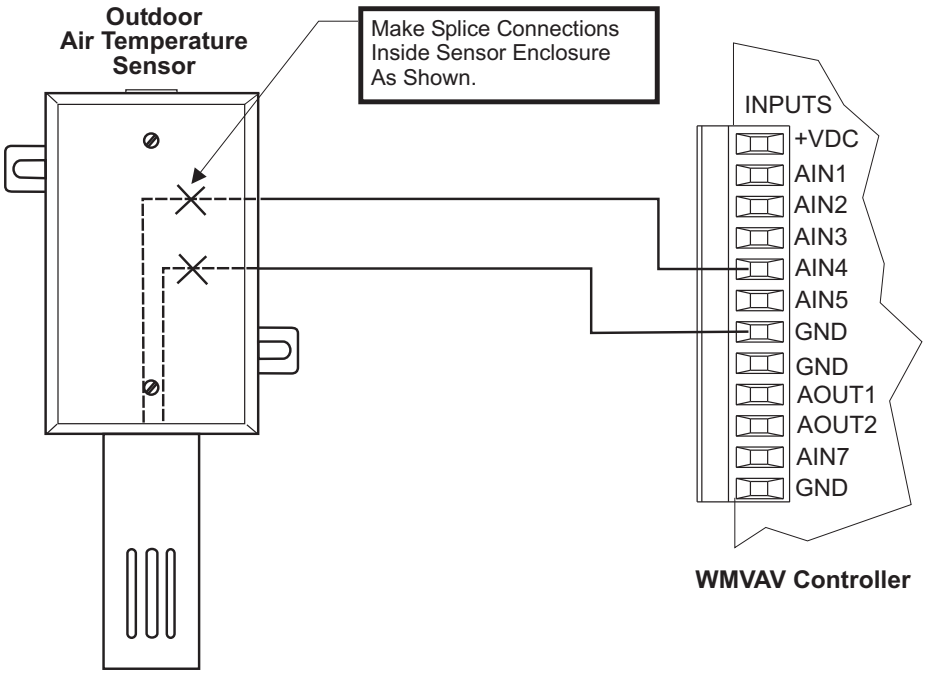
Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-SupRetTempWire1.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Supply & Return Air Temperature Sensor To WMVAV Controller Wiring

Outside Air Sensor Wiring

Caution: Be sure to mount the Outside Air Sensor in an area that is not exposed to direct sunlight. A shaded area under the eve of the building or under the HVAC unit rainhood is normally a good location. If sensor is not located as specified, erroneous outside air temperature readings will result. Unused conduit opening(s) must have closure plugs installed and must be coated with a sealing compound to provide raintight seal. Water can damage sensor!



Outside AirTemperature Sensor

The Outside Air Sensor must be wired as shown in the illustration above for proper operation. The Outside Air Temperature Sensor is a 10K Type III thermistor sensor. The sensor should be mounted in the upright position as shown, in an area that is protected from the elements and direct sunlight. Be sure to make the wiring splices inside of the Outside Air Temperature Sensor weathertight enclosure.

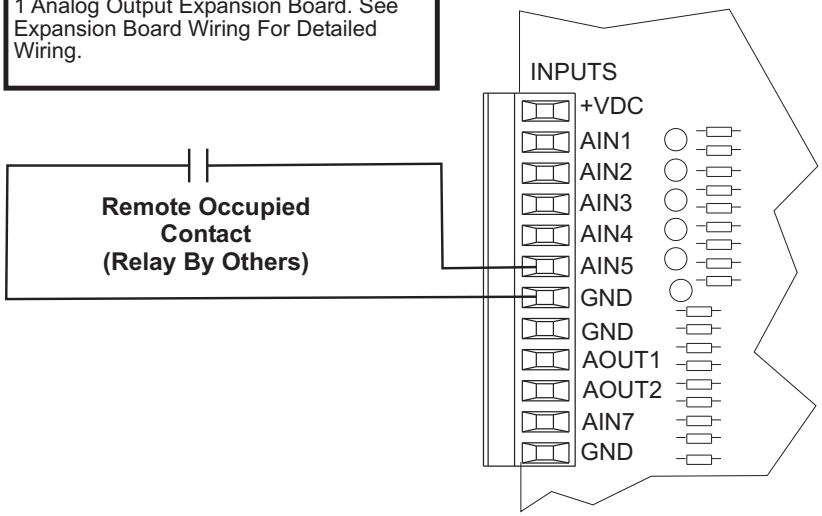
Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OATempWire1.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Outside Air Temperature Sensor To WMVAV Controller Wiring

Remote Occupied Contact To WMVAV Wiring

Note:
If Remote Occupied Contact Is Required When Humidity Sensor Is Used, The Remote Occupied Contact Must Be Relocated To AIN2 On The 4 Analog Input 1 Analog Output Expansion Board. See Expansion Board Wiring For Detailed Wiring.



WMVAV Controller Board

Notes:

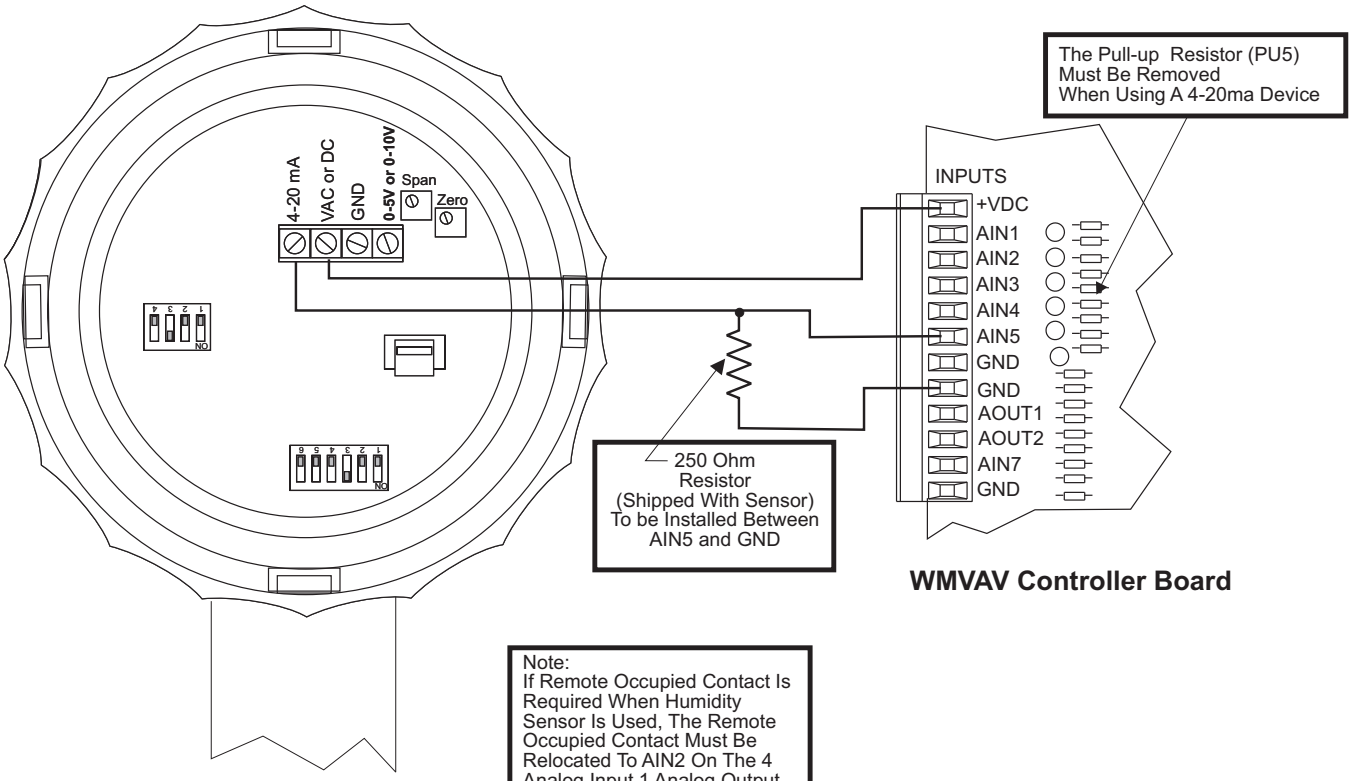
1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-RemoteOccConWire1.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Remote Occupied Contact To WMVAV Controller Wiring

Humidity Sensor Wiring

Warning:
It is very important to be certain that all wiring is correct as shown in the wiring diagram below. Failure to observe the correct polarity will result in damage to the Humidity Sensor or controller.

Outdoor Air Humidity Sensor - 4-20mA



Note:
If Remote Occupied Contact Is Required When Humidity Sensor Is Used, The Remote Occupied Contact Must Be Relocated To AIN2 On The 4 Analog Input 1 Analog Output Expansion Board.

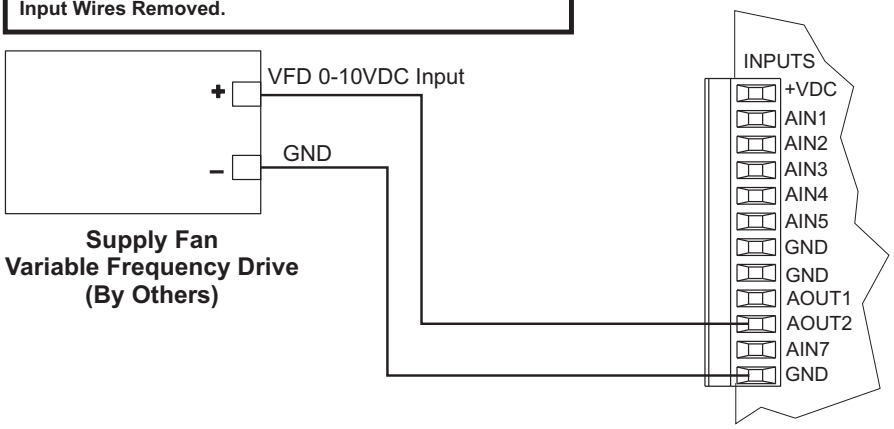
Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-HumidSensorWire1B.CDR	
DATE: 02/21/08	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Humidity Sensor To WMVAV Controller Wiring

Supply Fan VFD Wiring

The VFD Unit Must Be Configured For 0-10VDC Input. The Input Resistance At The VFD Must Not Be Less Than 1000 Ohms When Measured At The VFD Terminals With All Input Wires Removed.



Supply Fan Variable Frequency Drive (By Others)

WMVAV Unit Controller Board

Caution:
Variable Frequency Drive Units Can Cause Large Transient Noise Spikes Which Can Cause Interference To Be Propagated On Other Electronic Equipment. Use Shielded Wire Wherever Possible And Route All Sensor/controller Wiring Away From The Variable Frequency Drive And The Air Handling Unit Electrical Wiring.

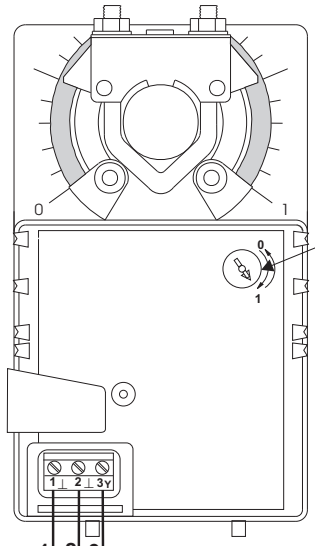
Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-SupplyVFDWR1.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Supply Fan VFD To WMVAV Controller Wiring

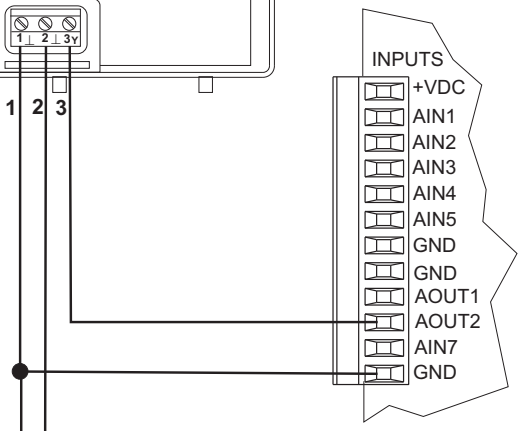
Bypass Damper Actuator Wiring

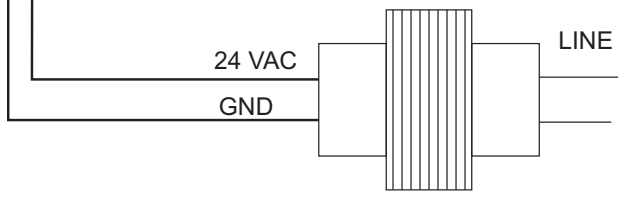
OE281-04 Bypass Damper Actuator



Set Rotation Switch To Correct Damper Operating Rotation. Standard WattMaster Rotation Is Counterclockwise To Open (1) As Shown.

WMVAV Unit Controller Board





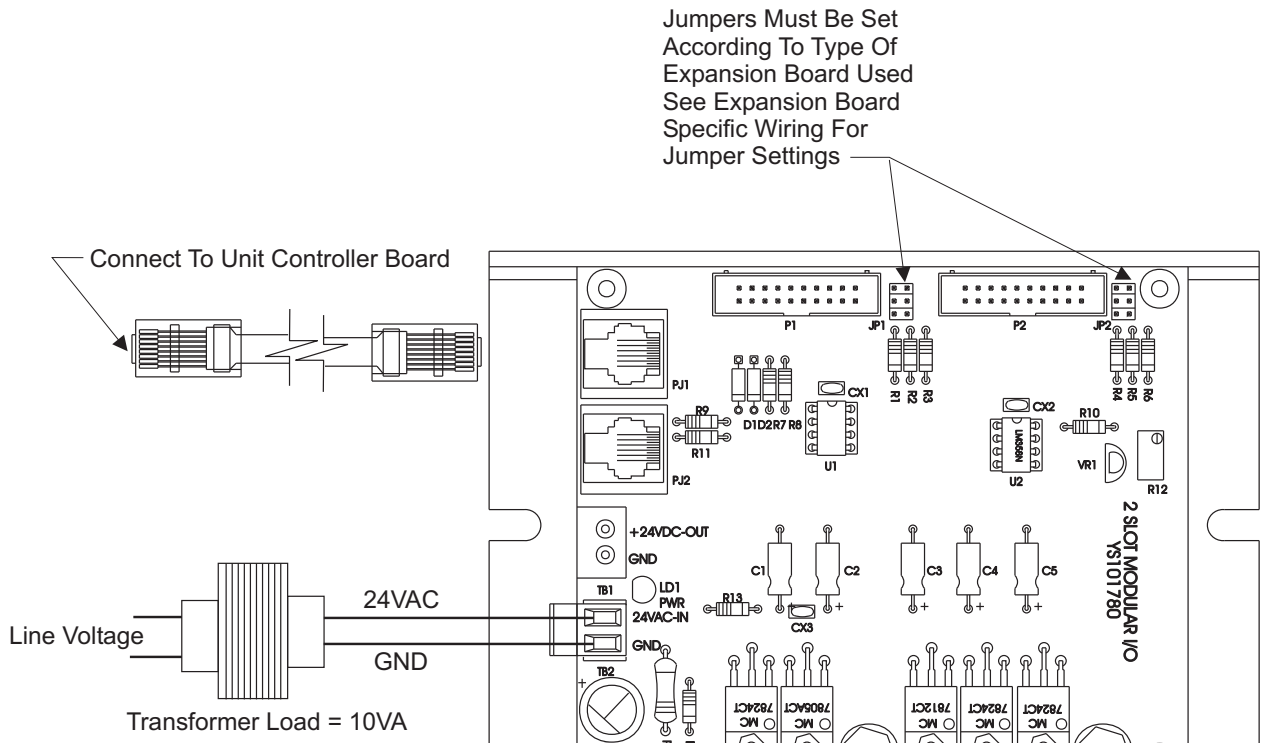
Transformer - 8 VA Minimum

Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-BypassActuatorWire1B.CDR	
DATE: 02/20/08	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	Bypass Damper Actuator To WMVAV Controller Wiring

2 Slot Expansion Base Board Wiring



WARNING!!

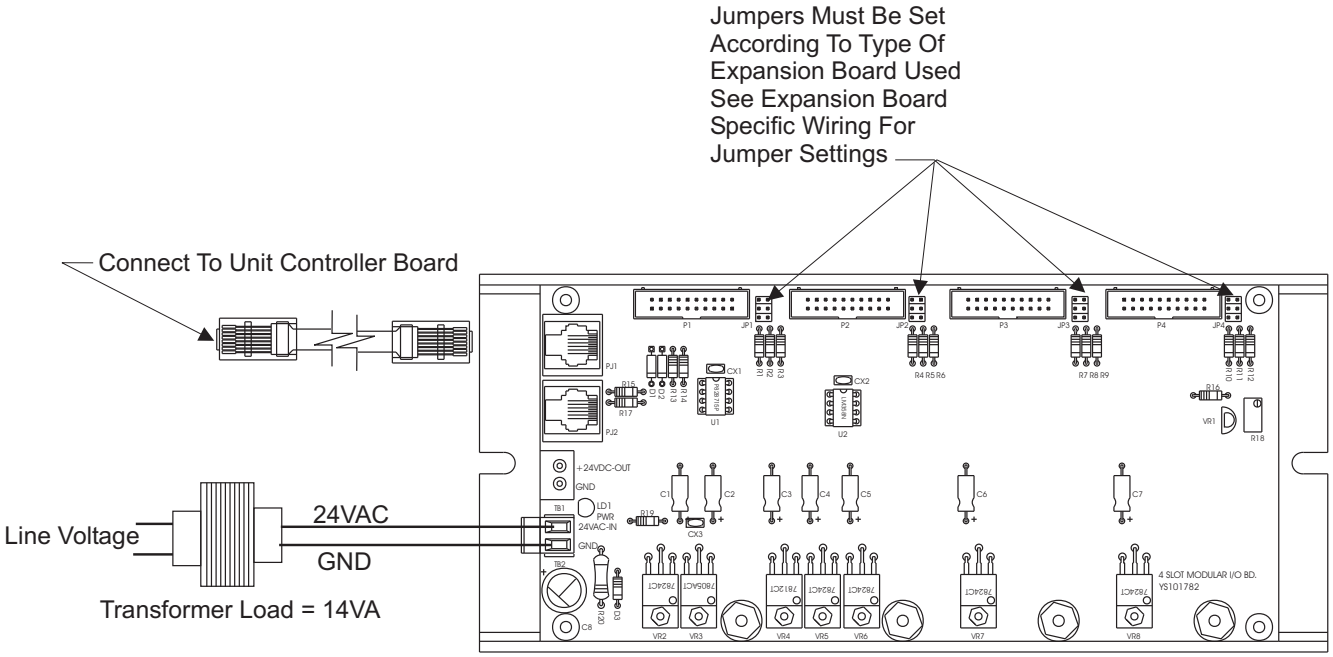
Observe Polarity! All boards must be wired with GND-to-GND and 24VAC-to-24VAC. Failure to observe polarity will result in damage to one or more of the boards. Expansion Boards must be wired in such a way that power to both the expansion boards and the controller are always powered together. Loss of power to the expansion board will cause the controller to become inoperative until power is restored to the expansion board.

Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-2SlotExpBase.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1 of 1	2 Slot Expansion Base Board
	Component Wiring Diagram

4 Slot Expansion Base Board Wiring



WARNING!!

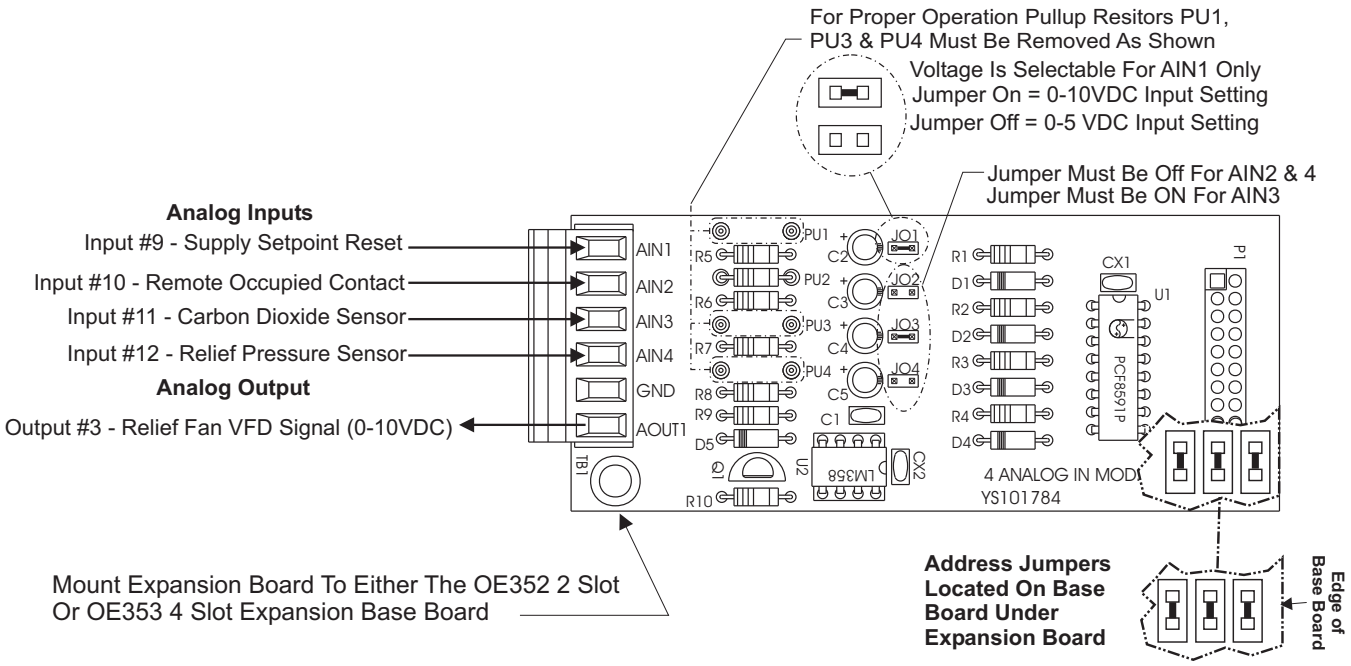
Observe Polarity! All boards must be wired with GND-to-GND and 24VAC-to-24VAC. Failure to observe polarity will result in damage to one or more of the boards. Expansion Boards must be wired in such a way that power to both the expansion boards and the controller are always powered together. Loss of power to the expansion board will cause the controller to become inoperative until power is restored to the expansion board.

Notes:

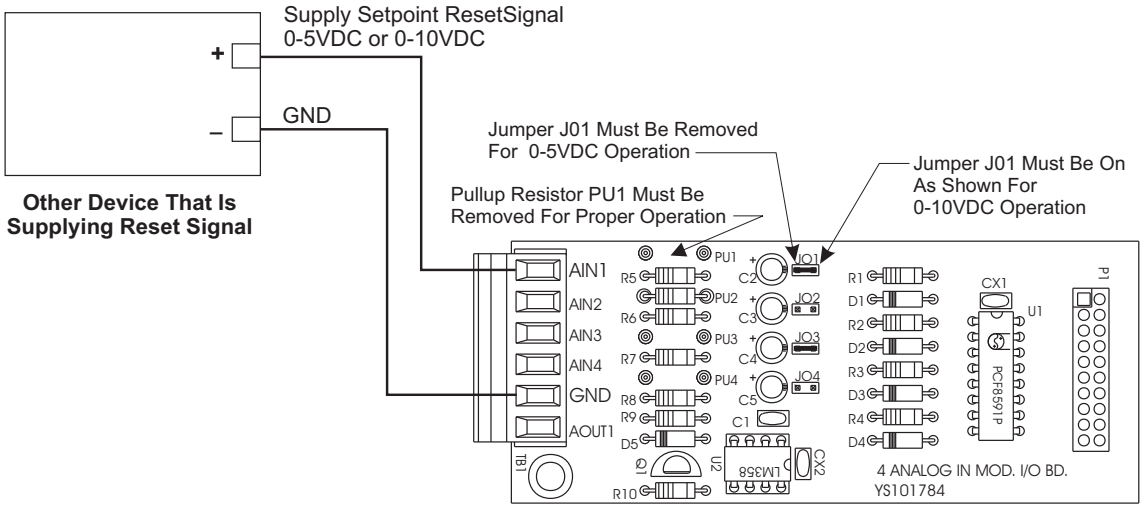
1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE353-4SLOTEXP.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	OE353 - 4 Slot Expansion Base Board
	Component Wiring Diagram

4 Analog Input 1 Analog Output Expansion Board Wiring



4 Analog Input 1 Analog Output Expansion Board Overview



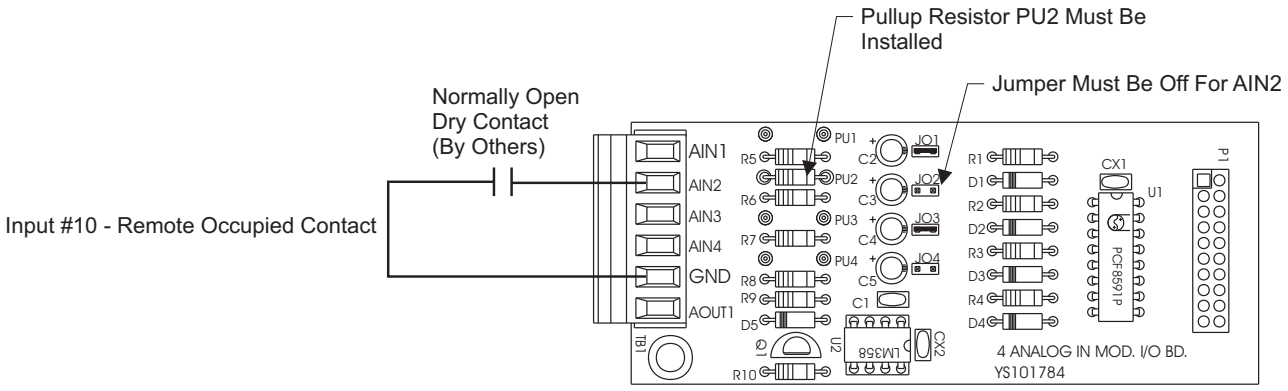
Input #9 - Supply Setpoint Reset - Wiring

Notes:

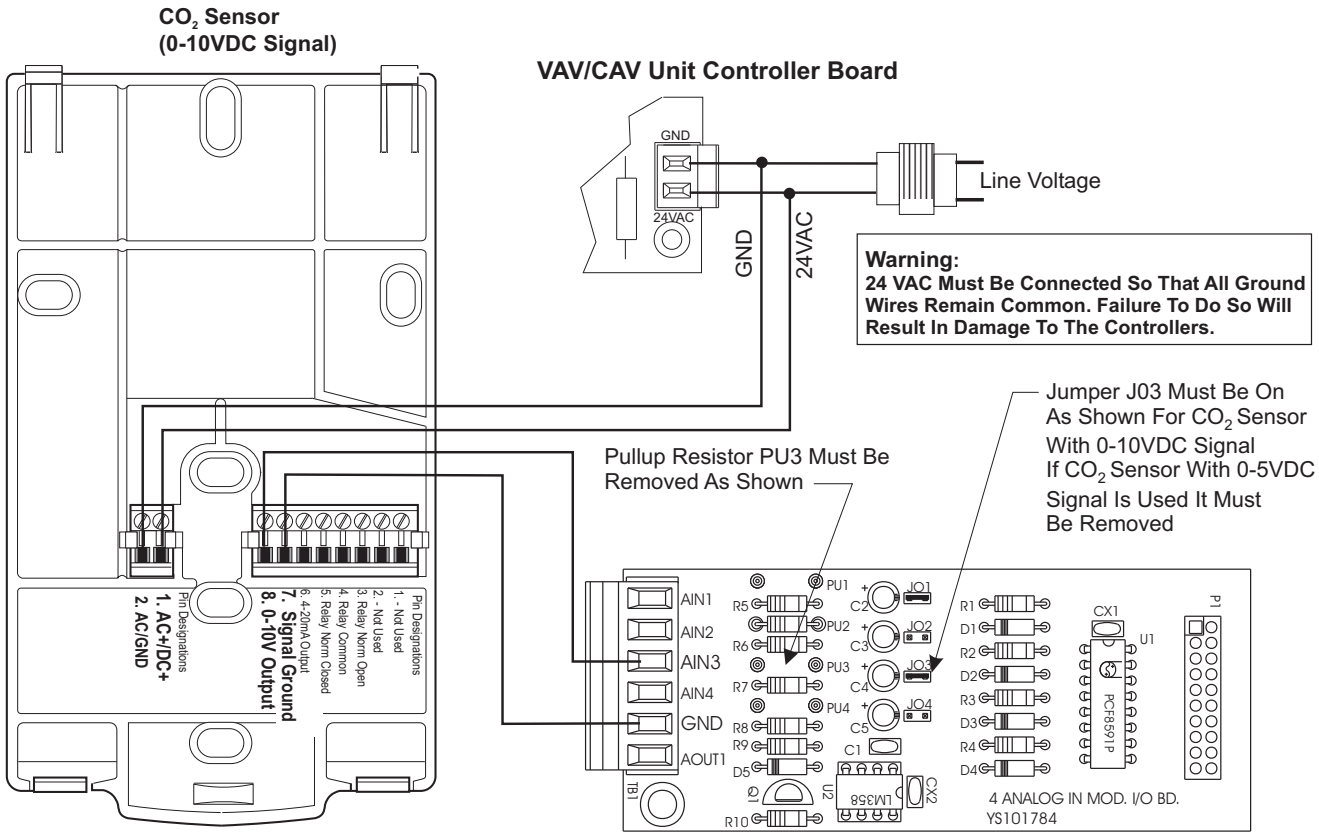
1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE354-4ANALOGIN1OUT.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1 of 3	OE354 - 4 Analog Input 1 Analog Output Expansion Board
	Component Wiring Diagram

4 Analog Input 1 Analog Output Expansion Board Wiring (Cont'd)



Input #10 - Remote Occupied Contact - Wiring



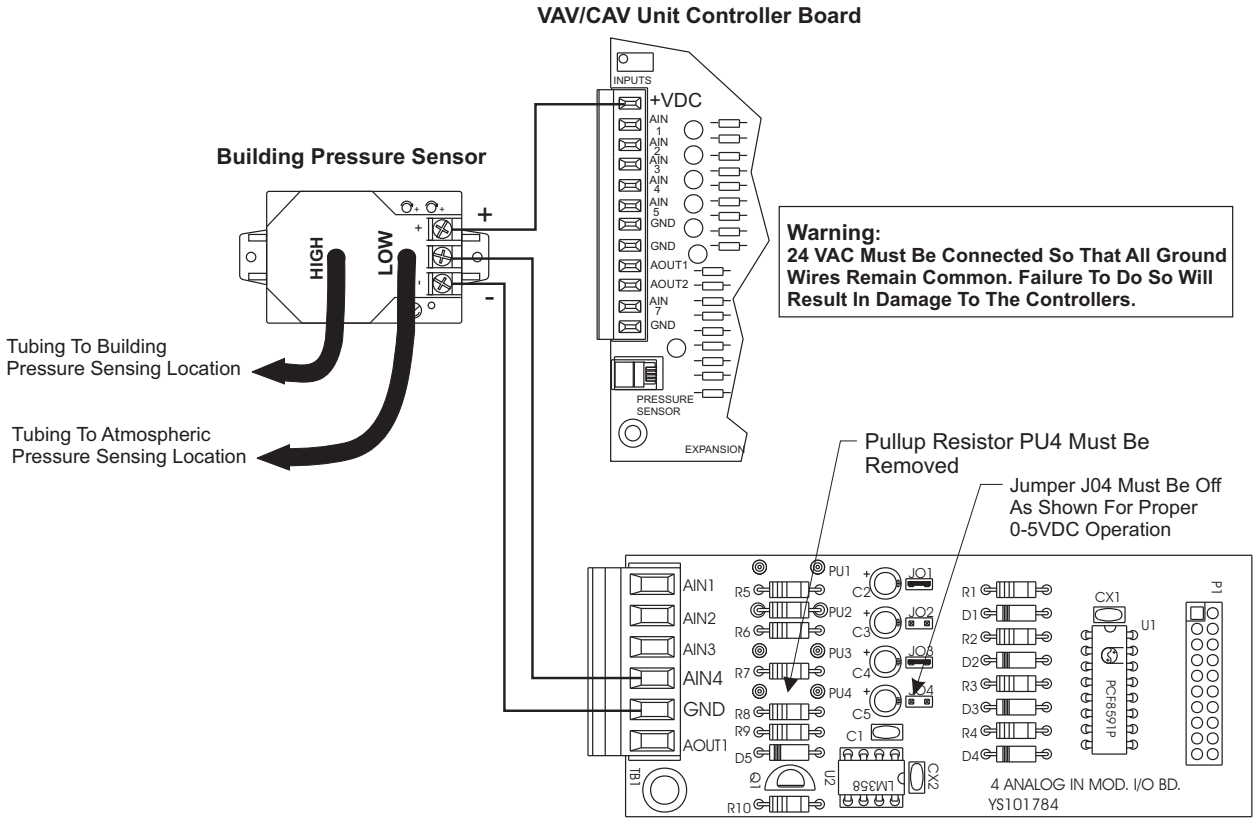
Input #11 - Carbon Dioxide Sensor - Wiring

Notes:

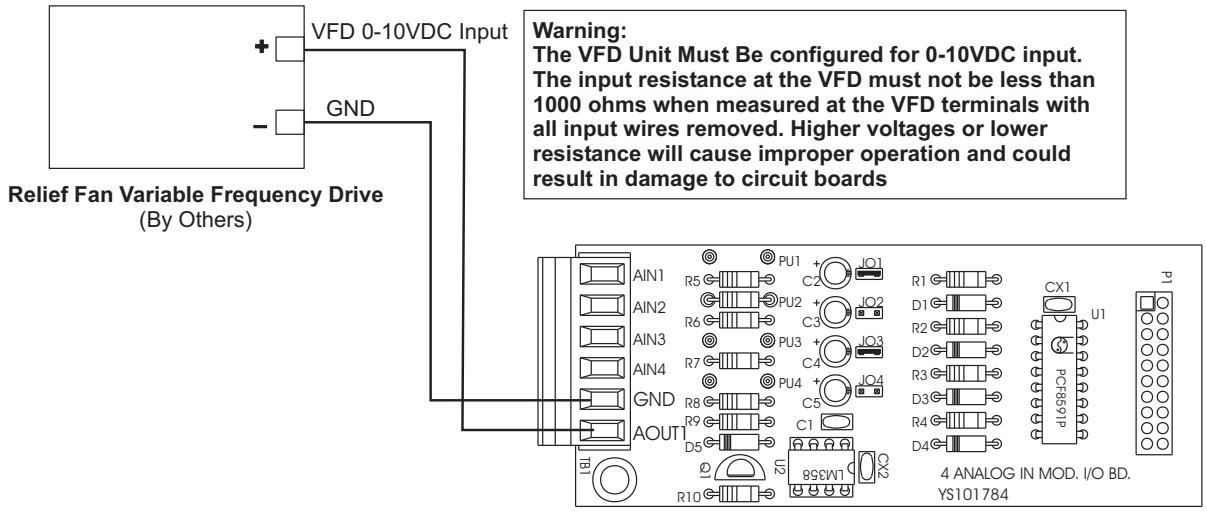
1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE354-4ANALOGIN1OUT.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
2 of 3	OE354 - 4 Analog Input 1 Analog Output Expansion Board
	Component Wiring Diagram

4 Analog Input 1 Analog Output Expansion Board Wiring (Cont'd)



Input #12 - Relief Pressure Sensor - Wiring



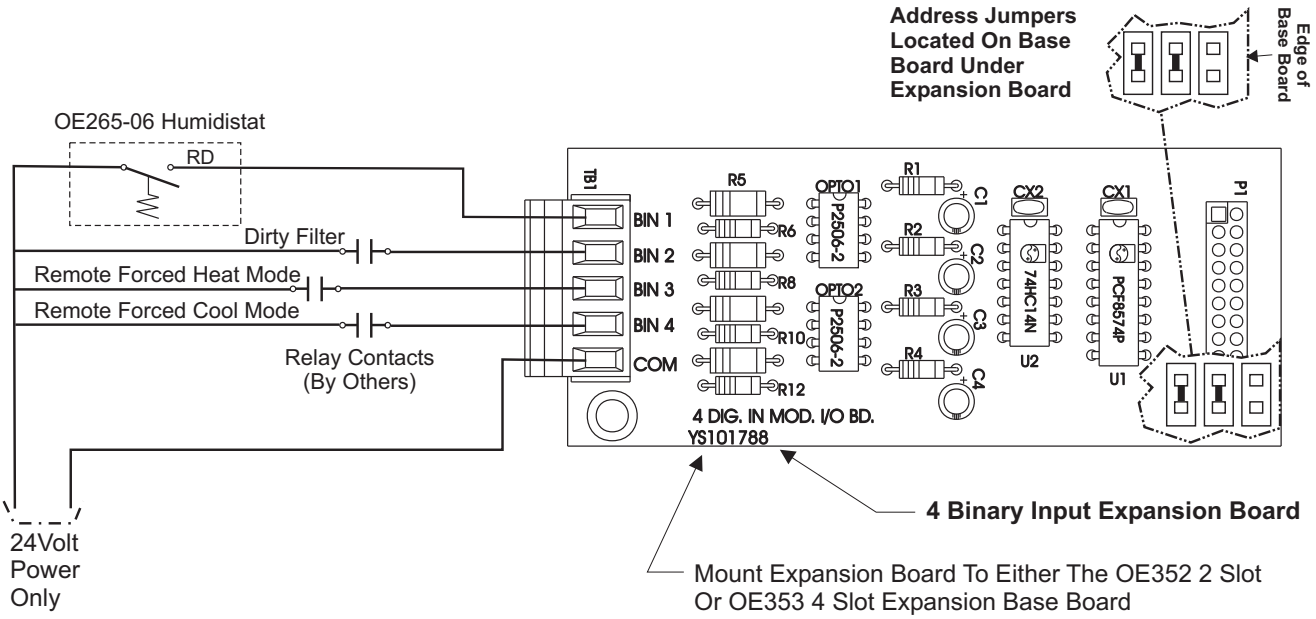
Output #3 - Relief Fan VFD Signal - Wiring

Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE354-4ANALOGIN1OUT.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
3 of 3	OE354 - 4 Analog Input 1 Analog Output Expansion Board
	Component Wiring Diagram

4 Binary Input Expansion Board Wiring



Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE356-4BINARYINPUT.CDR	
DATE: 03/24/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1 of 1	OE356 4 Binary Input Expansion Board
	Component Wiring Diagram

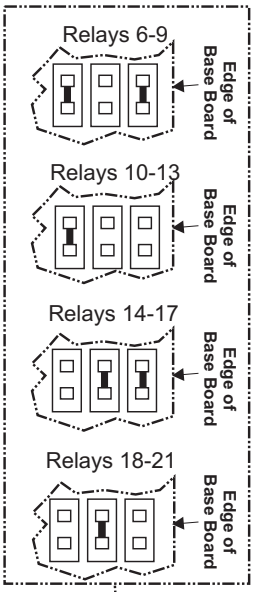
4 Relay Output Expansion Board Wiring

Relay Output Dry Contacts
R6 Through R21 May Be User Configured For The Following:

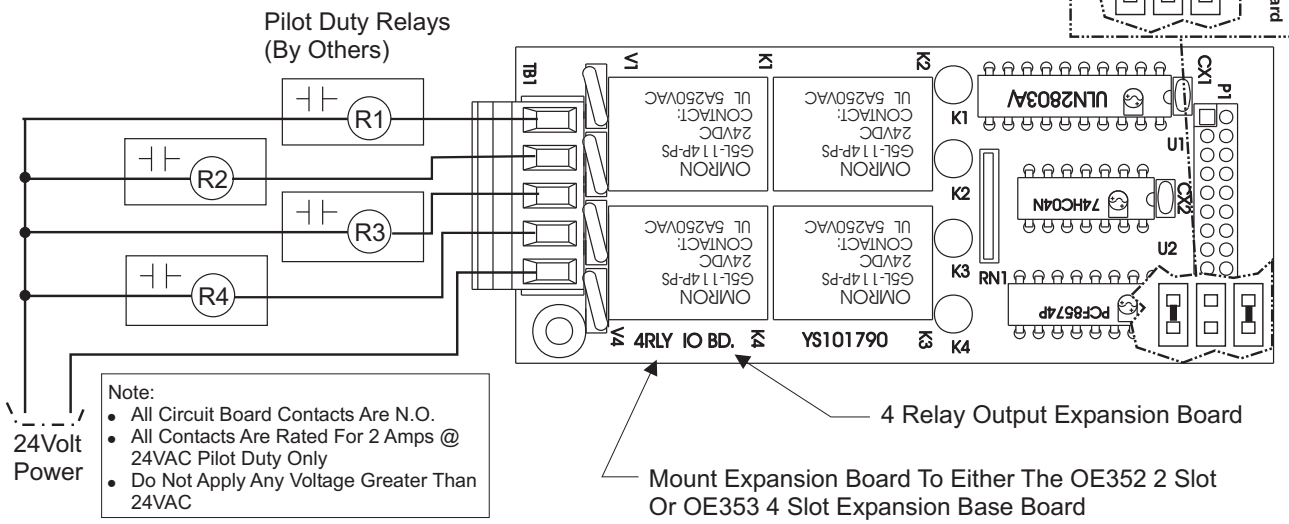
Not Used
Heating (Aux. Heating)Stages
Cooling (Compressor) Stages
Warm-up Mode Command For Boxes
Reversing Valve (Air To Air Heat Pumps)
Gas Reheat Control For Dehumidification
Exhaust Fan Interlock
Preheat Coil
Alarm Relay
Override
Occupied
Economizer

Configure Relays By Utilizing The System Manager, Modular Service Tool or Prism Computer Front End Software.

Address Jumpers Located On Base Board Under Expansion Board



Typical Wiring For Relay Outputs - 6 Through 21



Note:
- All Circuit Board Contacts Are N.O.
- All Contacts Are Rated For 2 Amps @ 24VAC Pilot Duty Only
- Do Not Apply Any Voltage Greater Than 24VAC

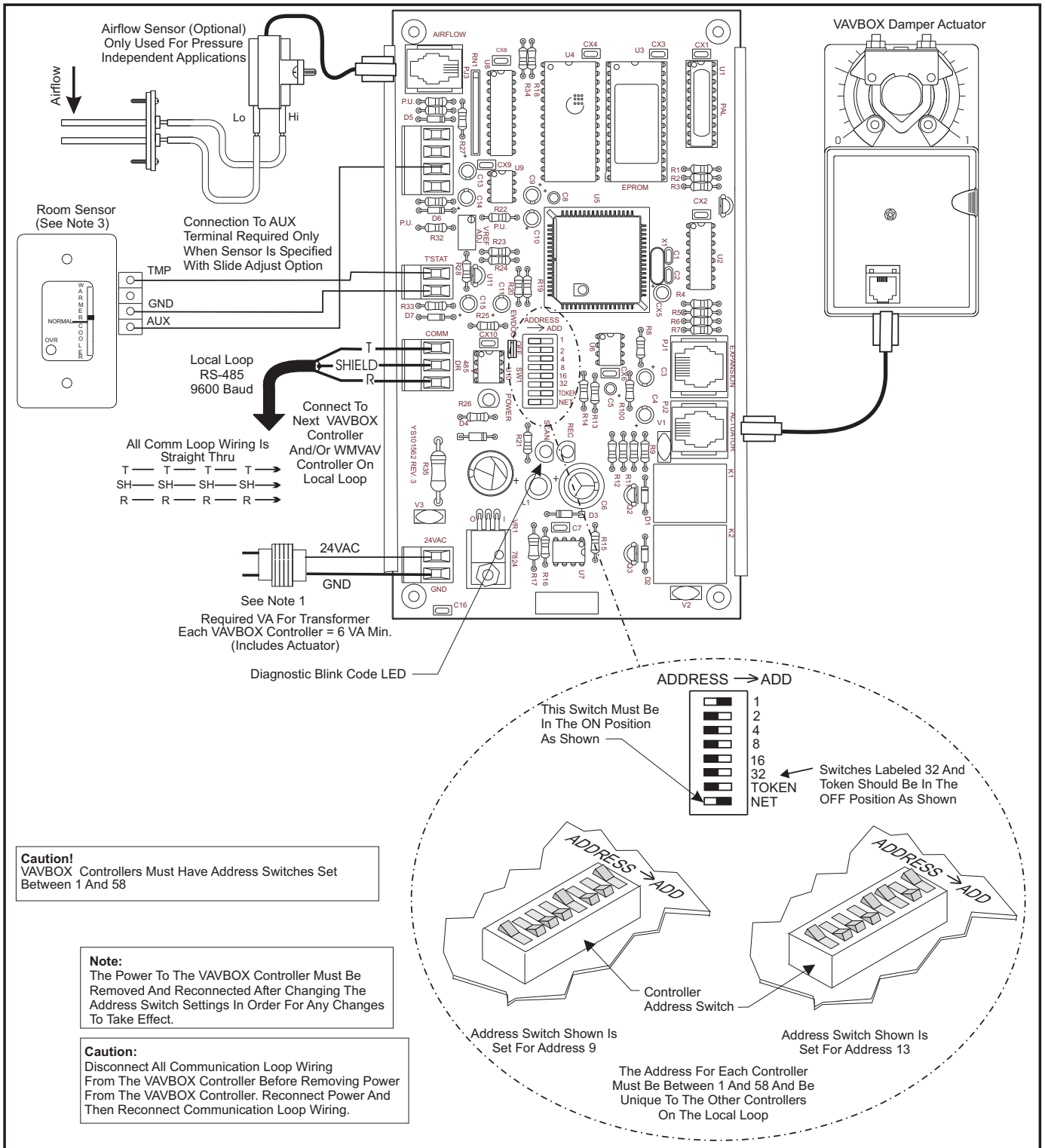
Notes:

1.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE357-4RELAYOUT.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1 of 1	OE357 4 Relay Output Expansion Board
	Component Wiring Diagram

VAVBOX Controller Diagrams

VAVBOX Controller Wiring



Caution!
VAVBOX Controllers Must Have Address Switches Set Between 1 And 58

Note:
The Power To The VAVBOX Controller Must Be Removed And Reconnected After Changing The Address Switch Settings In Order For Any Changes To Take Effect.

Caution:
Disconnect All Communication Loop Wiring From The VAVBOX Controller Before Removing Power From The VAVBOX Controller. Reconnect Power And Then Reconnect Communication Loop Wiring.

Notes:

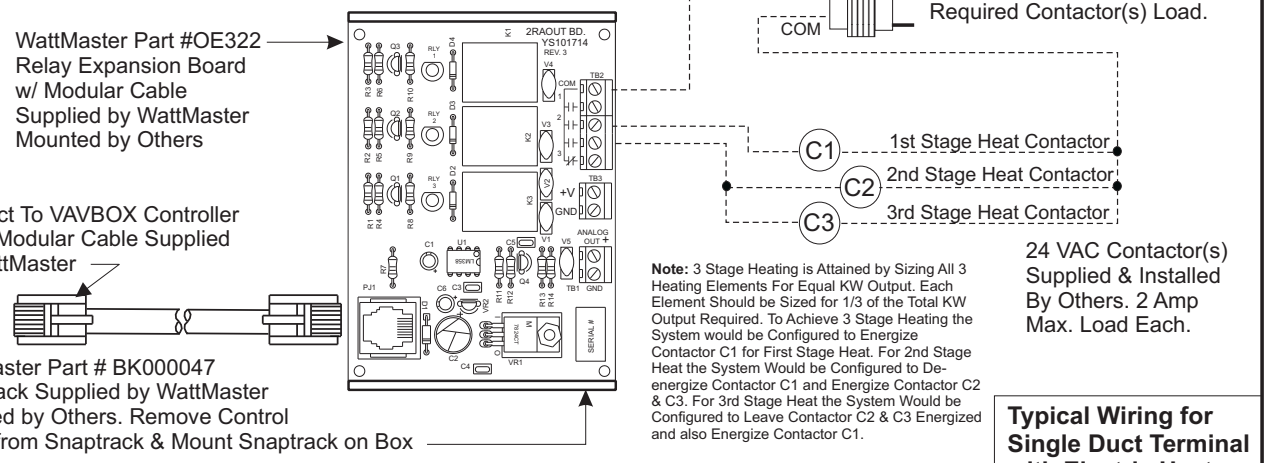
1.) All wiring to be in accordance with local and national electrical codes and specifications.

2.) All communication wiring to be 2 conductor twisted pair with shield. Use Belden #82760 or equivalent.

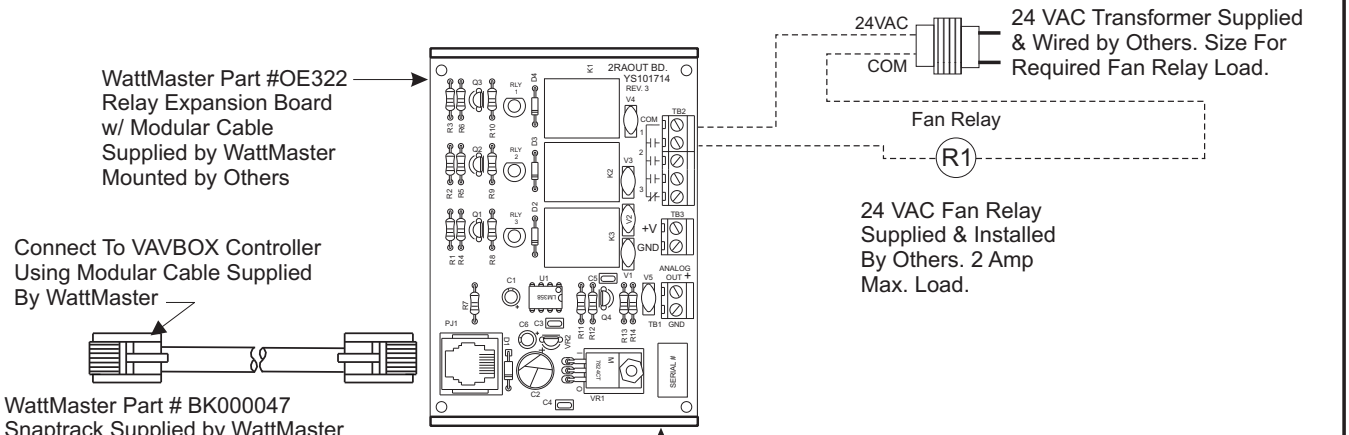
3.)The Supply Air Sensor is not required when the VAVBOX Controllers are connected with WMVAV Unit Controller boards. A global supply air temperature is broadcast by the one of the WMVAV Unit Controllers. The Supply Air Sensor is only required if the VAVBOX Controller is required to operate as a "Stand Alone" controller.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-VAVBOXWire1.CDR	
DATE: 05/12/04	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1 of 1	WattMaster VAV System VAVBOX Controller

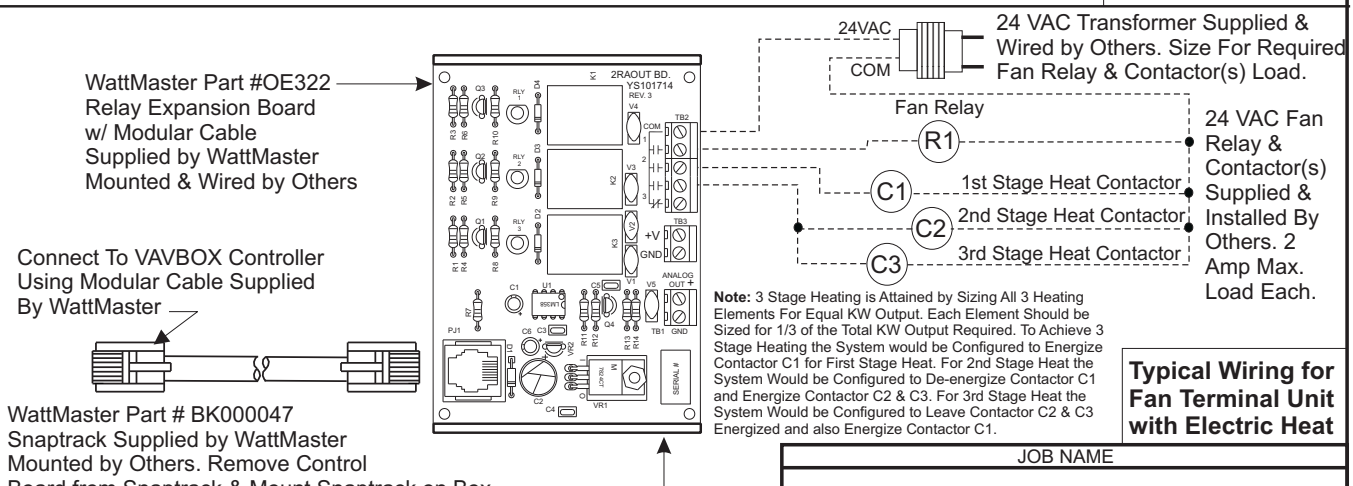
3 Relay Output Expansion Board Wiring



Typical Wiring for Single Duct Terminal with Electric Heat



Typical Wiring for Fan Terminal Unit with Cooling Only



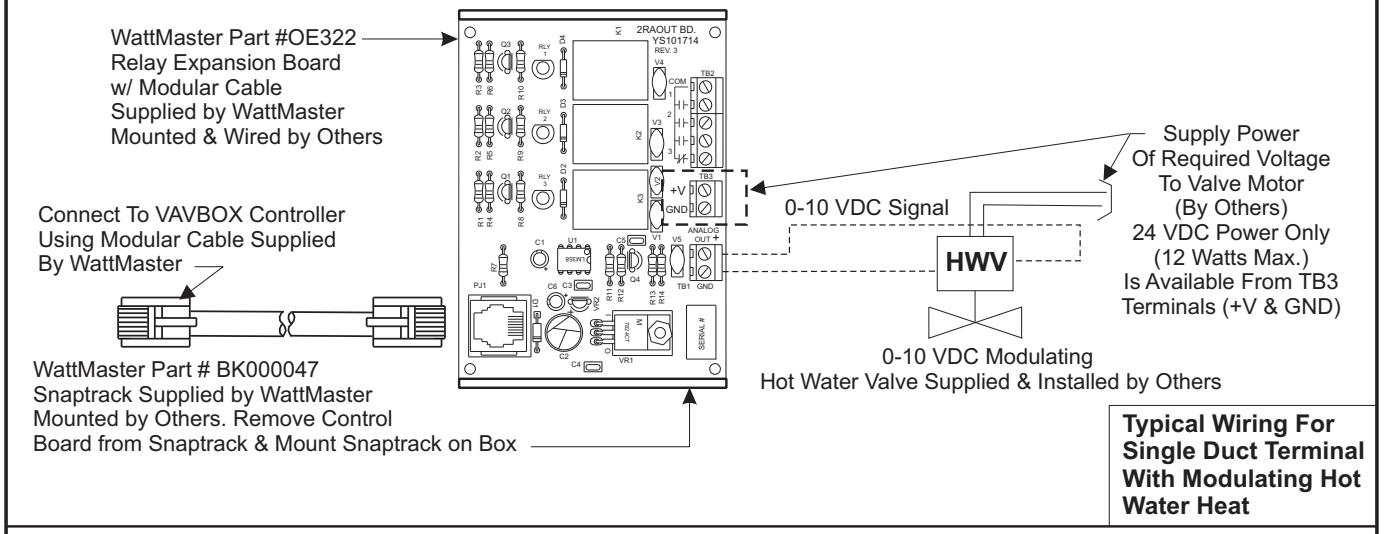
Typical Wiring for Fan Terminal Unit with Electric Heat

Notes:

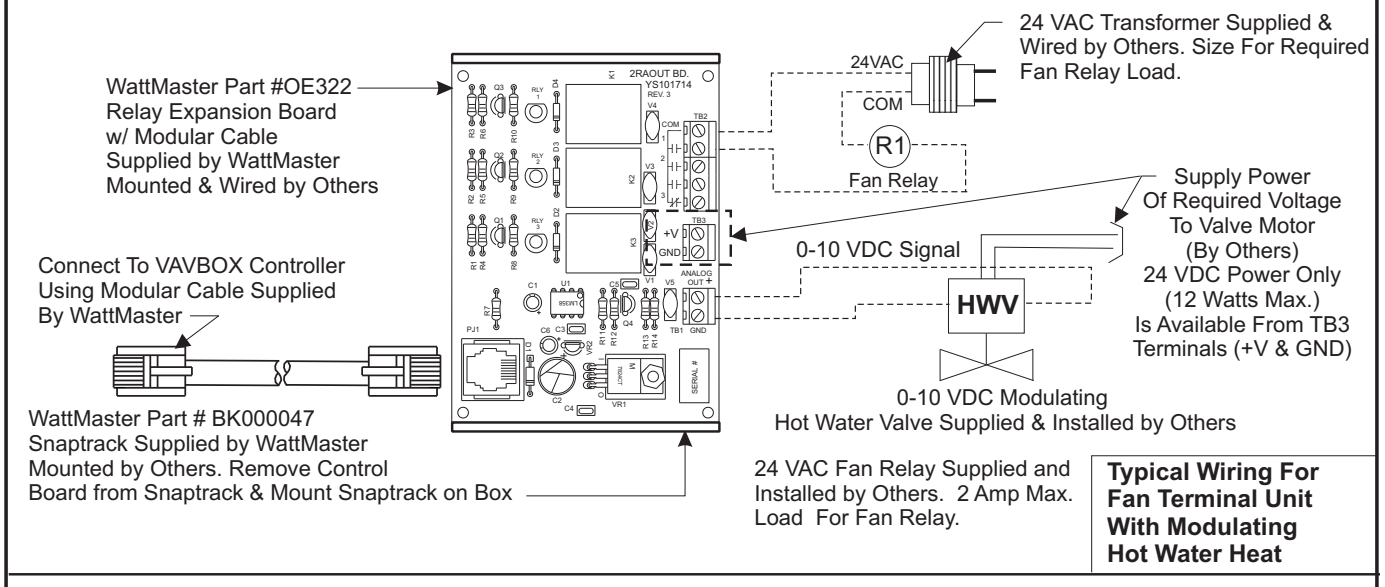
1.) All Wiring to be in Accordance With Local & National Electrical Codes & Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE322-3RELAY1OUTBD.CDR	
DATE: 09/26/06	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1 of 3	OE322 - 3 Relay -1 Analog Output Board
	Component Wiring Diagram

3 Relay Output Expansion Board Wiring (Cont'd)



Typical Wiring For Single Duct Terminal With Modulating Hot Water Heat



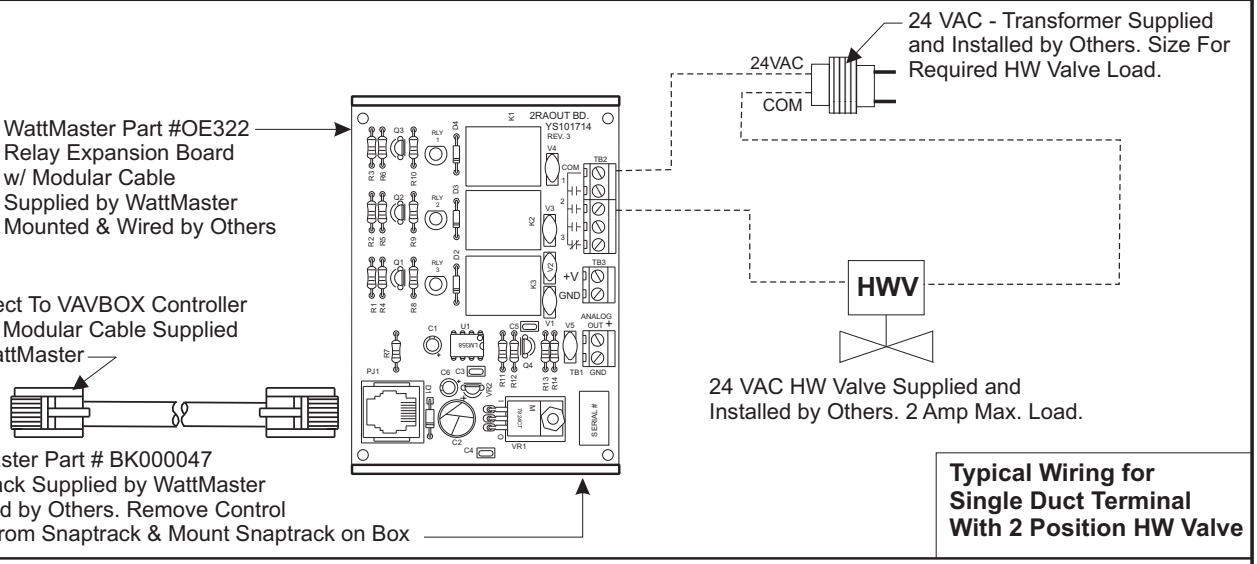
Typical Wiring For Fan Terminal Unit With Modulating Hot Water Heat

Notes:

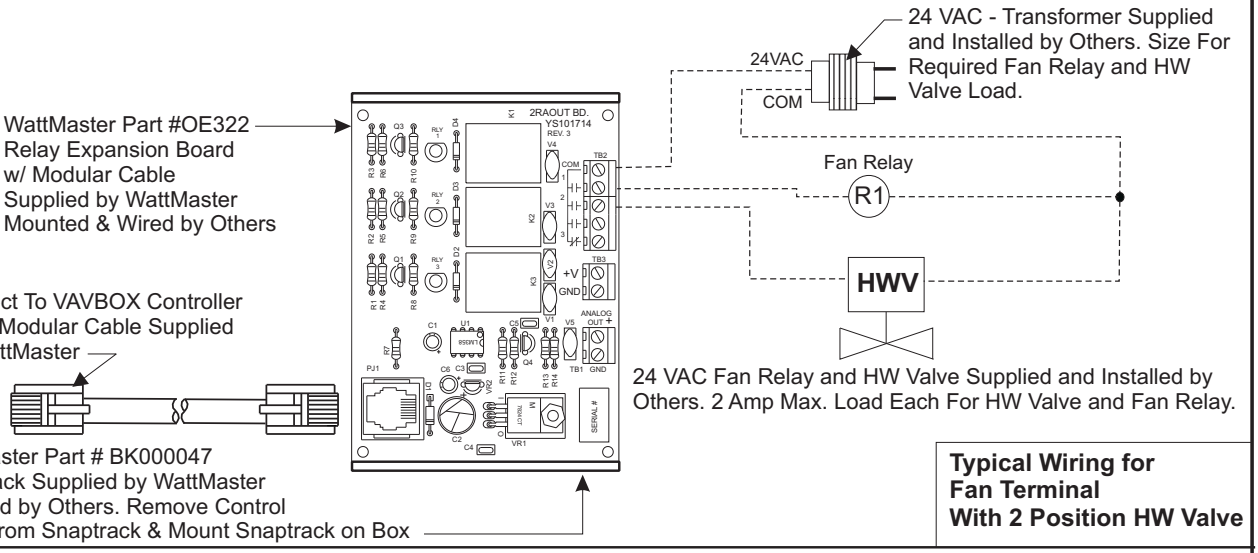
1.) All Wiring to be in Accordance With Local & National Electrical Codes & Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE322-3RELAY1OUTBD.CDR	
DATE: 09/26/06	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
2 of 3	OE322 - 3 Relay -1 Analog Output Board
	Component Wiring Diagram

3 Relay Output Expansion Board Wiring (Cont'd)



Typical Wiring for Single Duct Terminal With 2 Position HW Valve



Typical Wiring for Fan Terminal With 2 Position HW Valve

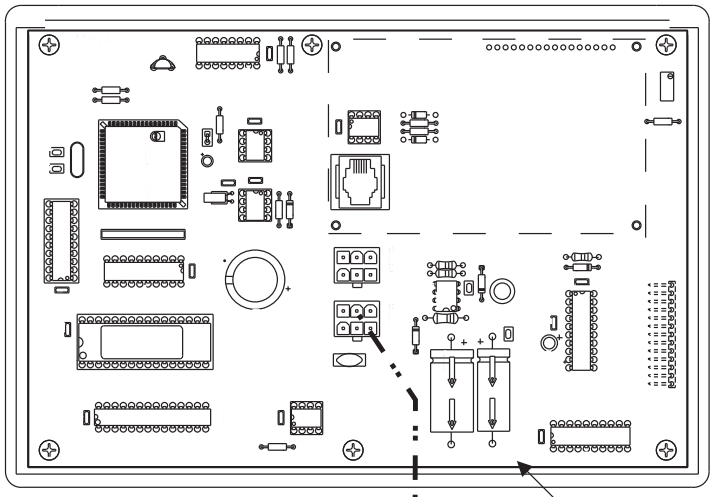
Notes:

1.) All Wiring to be in Accordance With Local & National Electrical Codes & Specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE322-3RELAY1OUTBD.CDR	
DATE: 09/26/06	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
3 of 3	OE322 - 3 Relay -1 Analog Output Board
	Component Wiring Diagram

Communication Devices Diagrams

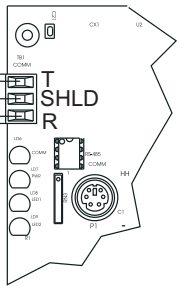
System Manager Modular Cable Pigtail - Wiring Schematic



Modular System Manager
Back of Front Cover

Use Supplied Modular
Cable With Stripped Ends
For Connection To Terminal
Block And Transformer

WHITE (T)
DRAIN WIRE (SHLD)
BLACK (R)
RED (24 VAC)
BROWN (GND)
GREEN (GND)



Controller Board

Class 2 Transformer
Rated For 6 VA Minimum

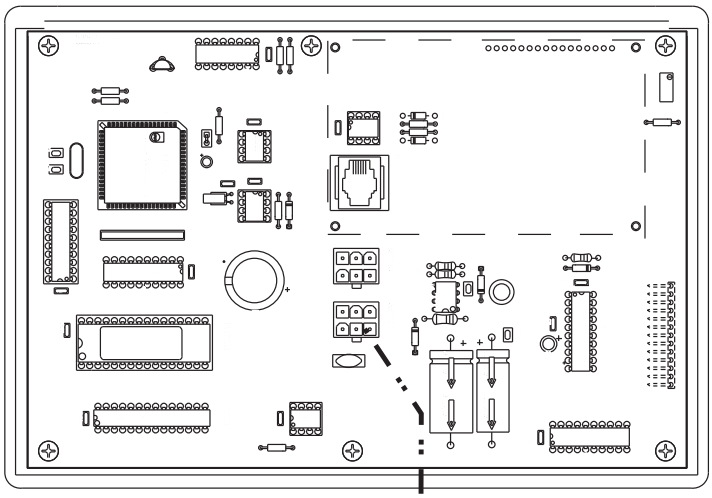
System Manager Wiring Schematic For Using The Pigtail

See Page 2 of this Diagram for Additional Pigtail Wiring Details

Notes:
1.) All wiring to be in accordance with local and national electrical codes and specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-SYSTEMMGRWIRE1A.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews, B. Light
PAGE	DESCRIPTION:
1 of 2	OE392 Modular System Manager
	Component Wiring Diagram

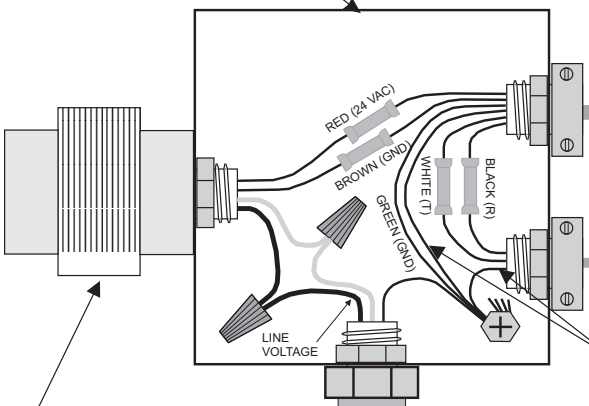
System Manager Modular Cable Pigtail - Wiring Detail

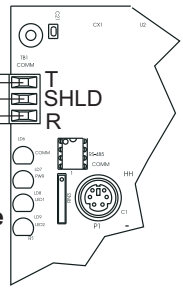


Modular System Manager
Back of Front Cover

HZ000121
Modular Pigtail Cable
Supplied With System Manager

Handy Box , Conduit, Fittings, Wire Nuts, Butt Splices Etc., (By Others)





2-Conductor Shielded 18-Guage Communications Wire

Controller Board

Drain Wire (Shld)

Class 2 Transformer Rated For 6 VA Minimum (By Others)

LINE VOLTAGE

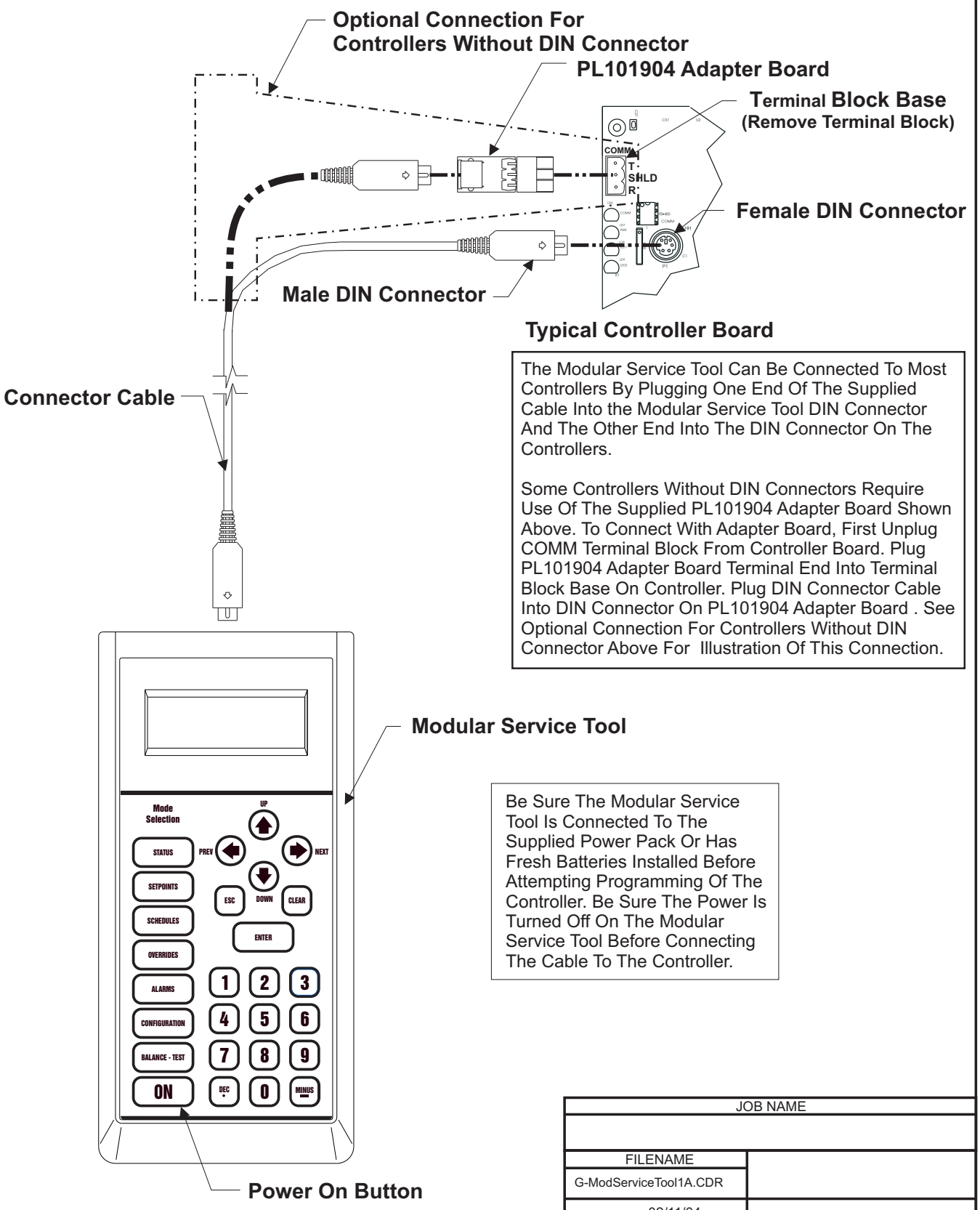
System Manager Wiring Details For Using The Pigtail

See Page 1 of this Diagram for Pigtail Wiring Schematic

Notes:
1.) All wiring to be in accordance with local and national electrical codes and specifications.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-SYSTEMMGRWIRE1A.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews, B. Light
PAGE	DESCRIPTION:
2 of 2	OE392 Modular System Manager
	Component Wiring Diagram

Modular Service Tool Connections



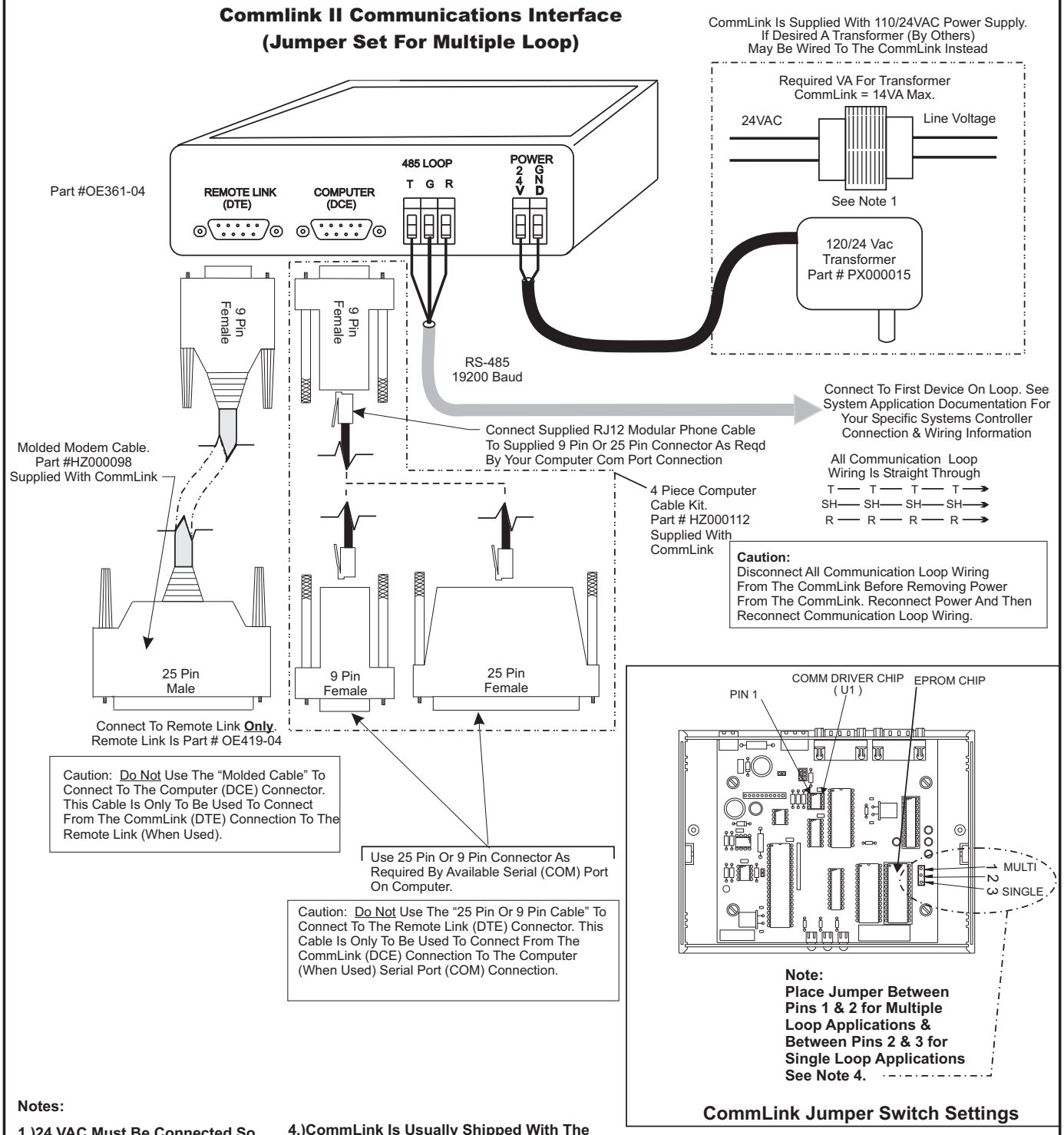
The Modular Service Tool Can Be Connected To Most Controllers By Plugging One End Of The Supplied Cable Into the Modular Service Tool DIN Connector And The Other End Into The DIN Connector On The Controllers.

Some Controllers Without DIN Connectors Require Use Of The Supplied PL101904 Adapter Board Shown Above. To Connect With Adapter Board, First Unplug COMM Terminal Block From Controller Board. Plug PL101904 Adapter Board Terminal End Into Terminal Block Base On Controller. Plug DIN Connector Cable Into DIN Connector On PL101904 Adapter Board . See Optional Connection For Controllers Without DIN Connector Above For Illustration Of This Connection.

Be Sure The Modular Service Tool Is Connected To The Supplied Power Pack Or Has Fresh Batteries Installed Before Attempting Programming Of The Controller. Be Sure The Power Is Turned Off On The Modular Service Tool Before Connecting The Cable To The Controller.

JOB NAME	
FILENAME	
G-ModServiceTool1A.CDR	
DATE: 02/11/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1 of 1	OE391 Modular Service Tool Connection Diagram

CommLink II Wiring & Cabling Connections



Notes:

1.)**24 VAC Must Be Connected So That All Ground Wires Remain Common.**

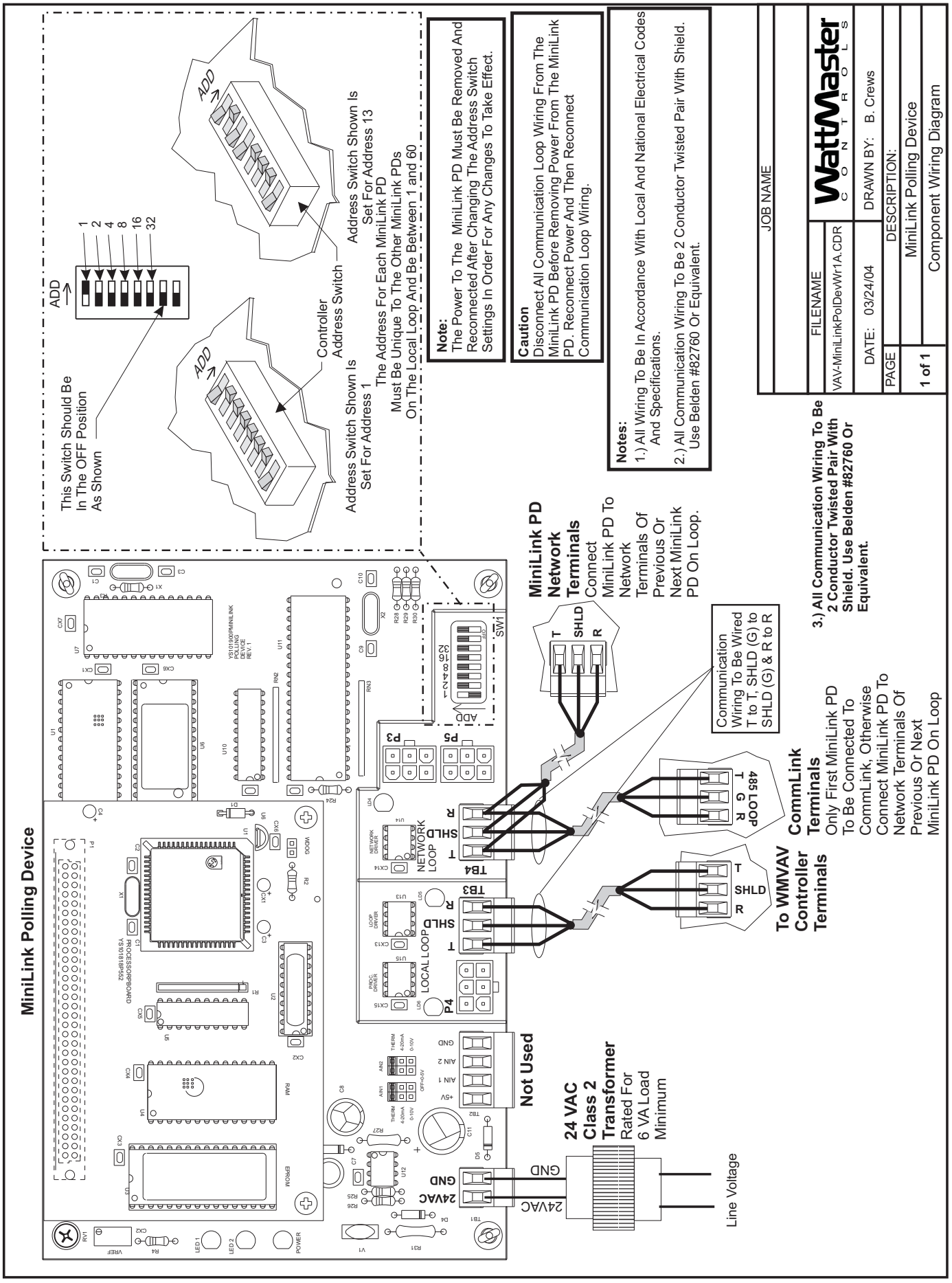
2.)**All Wiring To Be In Accordance With Local And National Electrical Codes And Specifications.**

3.)**All Communication Wiring To Be 2 Conductor Twisted Pair With Shield. Use Belden #82760 Or Equivalent.**

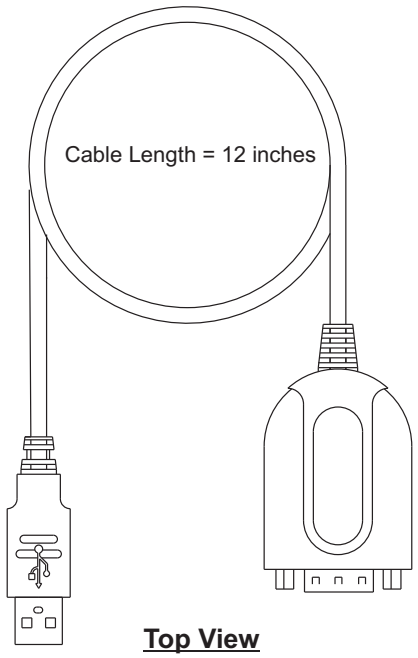
4.)**CommLink Is Usually Shipped With The Jumper In The Multiple Loop Configuration. Check The Application Documentation For Your Specific System For Correct Jumper Position Setting.**

JOB NAME	
FILENAME	
G-CommLinkWire.CDR	
DATE: 02/11/04	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1	OE361-04 CommLink II Wiring

MiniLink Polling Device Wiring Using Wire Terminals



RS-232 Serial Port To USB Port Converter



Top View

End View

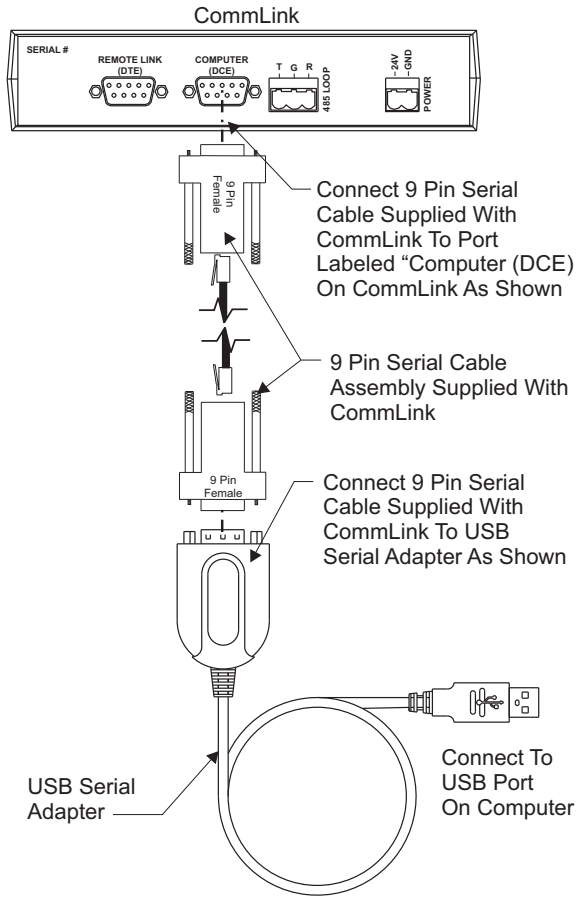
Features & Specifications:
Converts a USB port into a 9-pin male RS-232 serial port capable of speeds up to 115 Kbps.
The USB Serial Adapter is designed to make serial port expansion quick and simple.
Installs as a standard Windows COM port,
Full RS-232 modem control signals,
RS-232 data signals; TxD, RxD, RTS, CTS, DSR, DTR, DCD, RI, GND
Self Powered by USB port
Supports Windows 98/SE, ME & 2000 and XP

Packages Includes:
USB-232 Converter cable with short 12inch USB Type A end
Installation Instructions
USB Driver CD for win98/ME/2K/XP

Installing the USB adapter
Follow the instructions provided inside the USB Serial Adapter package for installation and driver setup of the USB Serial Adapter. A CD-ROM is included that contains the correct drivers.

Changing the COM ports:
To change the COM port to a different COM port is accomplished by changing the COM port I/O range in the Windows Device Manager.

Right-click on "My Computer"
Click the "Device Manager" tab.
Click the "+" by "Ports"
Select "USB to Serial Port (COM5)"
Click the "Properties" button
Click the "Resources" Tab.
Uncheck the box that says "Use automatic settings".
Select the "Input/Output range"
Click the "Change Settings " button.
Click the little arrows until you find an appropriate setting.
"02E8-02EF" should give you a COM4 setting after you restart the computer.
Make sure to click "OK" on all screens.
Use the following settings to get the following COM ports:
COM1 - 3F8h-03FFh
COM2 - 2F8h-02FFh
COM3 - 3E8h-03EFh
COM4 - 2E8h-02EFh



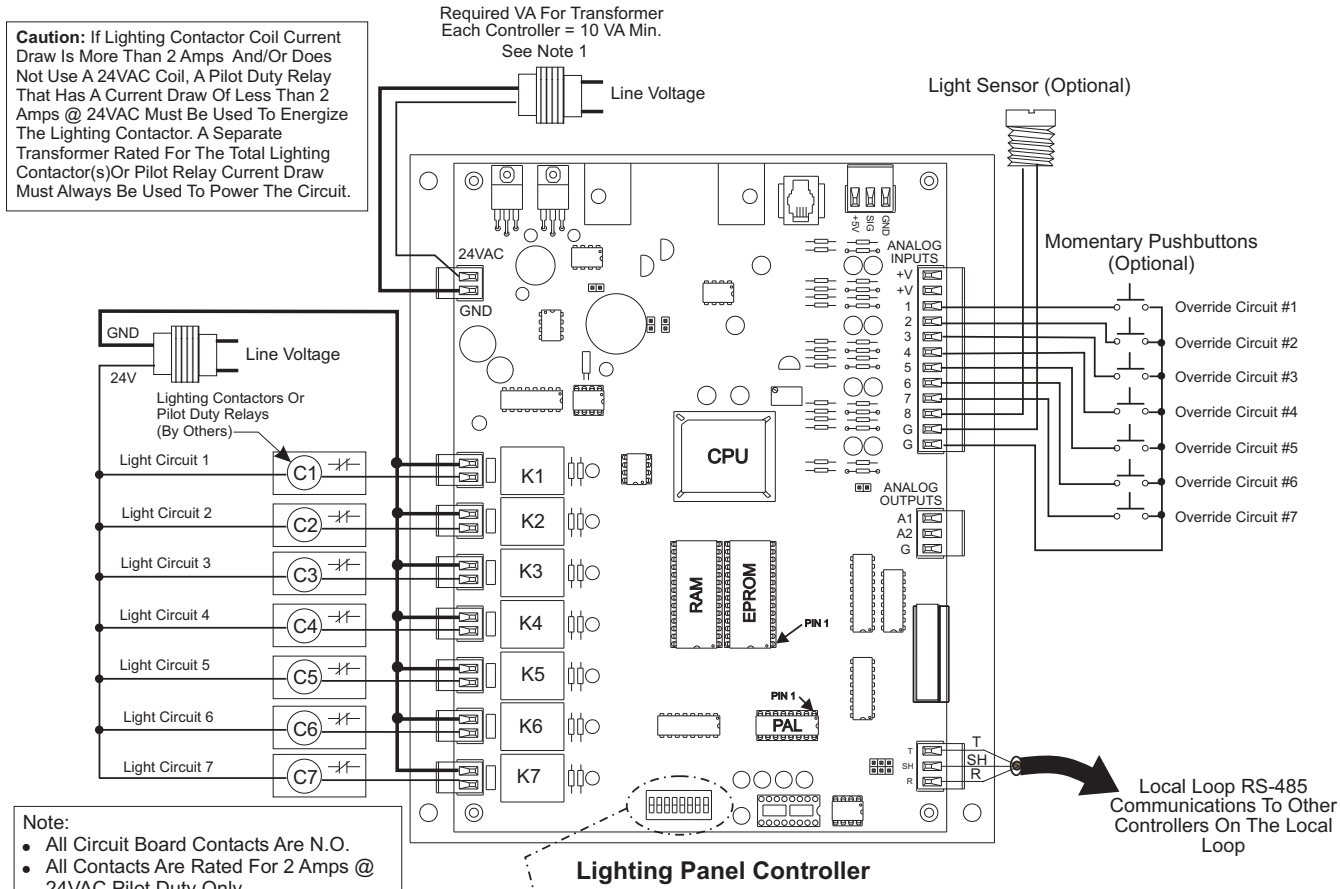
Connection Detail

JOB NAME	
FILENAME	WattMaster CONTROLS
USB-RS232Cnvrt1A.CDR	
DATE: 08/20/03	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1	OE299
	RS-232 to USB Converter

Add-On Devices Diagrams

Lighting Panel Wiring For Standard Lighting Contactors

Caution: If Lighting Contactor Coil Current Draw Is More Than 2 Amps And/Or Does Not Use A 24VAC Coil, A Pilot Duty Relay That Has A Current Draw Of Less Than 2 Amps @ 24VAC Must Be Used To Energize The Lighting Contactor. A Separate Transformer Rated For The Total Lighting Contactor(s)Or Pilot Relay Current Draw Must Always Be Used To Power The Circuit.

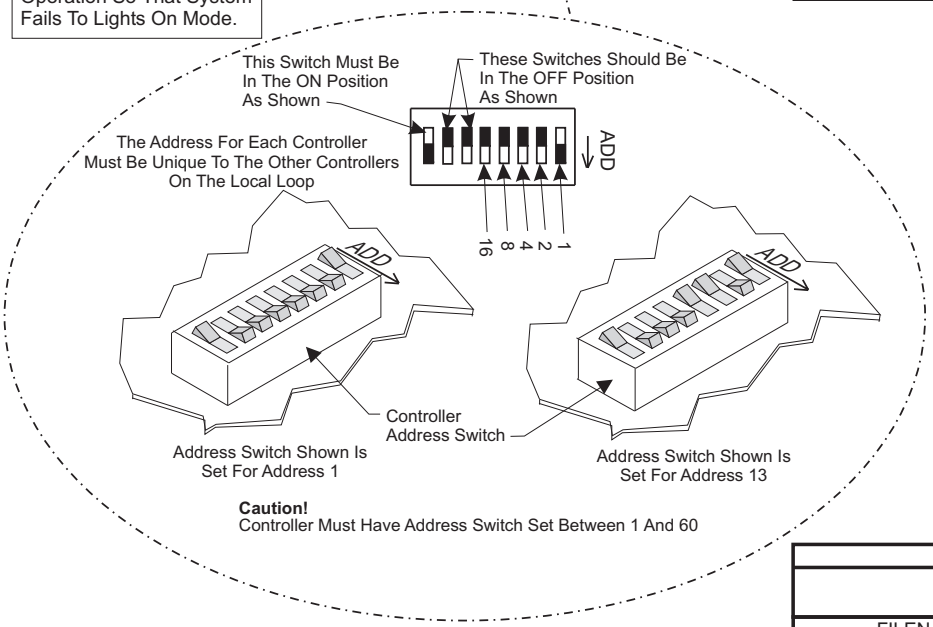


Lighting Panel Controller

Note:
- All Circuit Board Contacts Are N.O.
- All Contacts Are Rated For 2 Amps @ 24VAC Pilot Duty Only
- Do Not Apply Any Voltage Greater Than 24VAC

All Lighting Contactors Must Be Wired For N.C. Operation So That System Fails To Lights On Mode.

Note:
Set-up, Programming And Monitoring Of The Lighting Panel Controller Requires The Use Of A Personal Computer And Prism Software.



Caution!
Controller Must Have Address Switch Set Between 1 And 60

1.)24 VAC Must Be Connected So That All Ground Wires Remain Common.

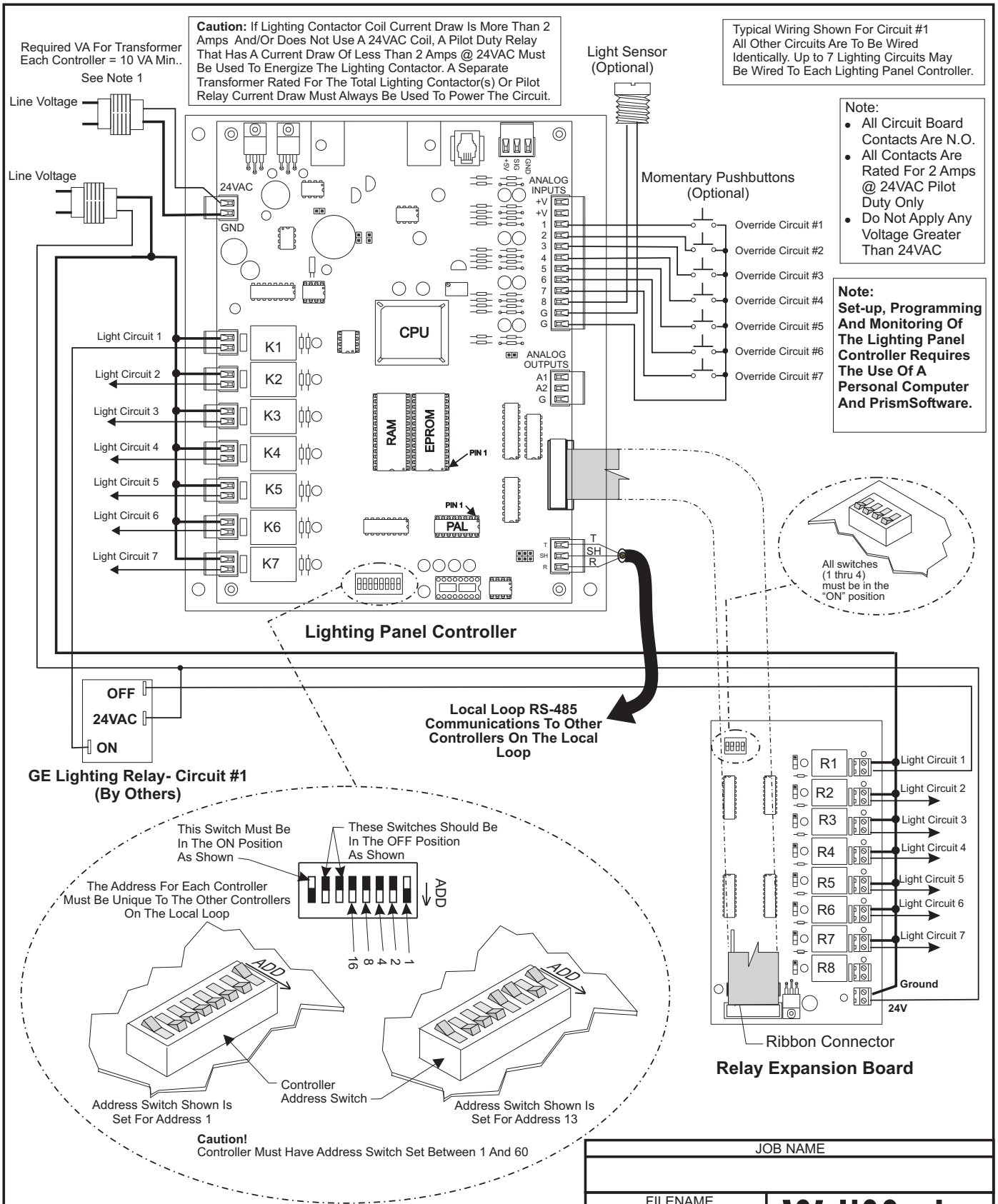
2.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

3.)All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.

4.)It Is Recommended That All Controllers Address Switches Are Set Before Installation.

JOB NAME	
FILENAME	WattMaster CONTROLS
W-LightingPnlStd1.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	OE310 Lighting Panel Controller Wiring Using Standard Lighting Relays

Lighting Panel Wiring For GE® Latching Relay Lighting Contactors



1.)24 VAC Must Be Connected So That All Ground Wires Remain Common.

2.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

3.)All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.

4.)It Is Recommended That All Controllers Address Switches Are Set Before Installation.

JOB NAME	
FILENAME	WattMaster CONTROLS
W-LightingPnl-GE1.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	OE310 Lighting Panel Controller Wiring Using GE Latching Relays

Optimal Start Scheduler Wiring

Caution: If Equipment Contactor Coil Current Draw Is More Than 2 Amps And/Or Does Not Use A 24VAC Coil, A Pilot Duty Relay That Has A Current Draw Of Less Than 2 Amps @ 24VAC Must Be Used To Energize The Equipment Contactor. A Separate Transformer Rated For The Total Pilot Relay Current Draw Must Always Be Used To Power The Circuit.

Required VA For Transformer Each Controller = 10 VA Min.

Line Voltage

See Note 1

24VAC

GND

Direct Control Of Equipment (Optional)

GND

Line Voltage

24V

Equipment Contactors Or Pilot Duty Relays (By Others)

Equipment Circuit 1 — C1 — K1

Equipment Circuit 2 — C2 — K2

Equipment Circuit 3 — C3 — K3

Equipment Circuit 4 — C4 — K4

Equipment Circuit 5 — C5 — K5

Equipment Circuit 6 — C6 — K6

Equipment Circuit 7 — C7 — K7

CPU

RAM

EPROM

PIN 1

PAL

ANALOG INPUTS

+V

+V

1

2

3

4

5

6

7

8

G

G

ANALOG OUTPUTS

A1

A2

G

Momentary Pushbuttons (Optional)

Override Circuit Schedule #1

Override Circuit Schedule #2

Override Circuit Schedule #3

Override Circuit Schedule #4

Override Circuit Schedule #5

Override Circuit Schedule #6

Override Circuit Schedule #7

T

SH

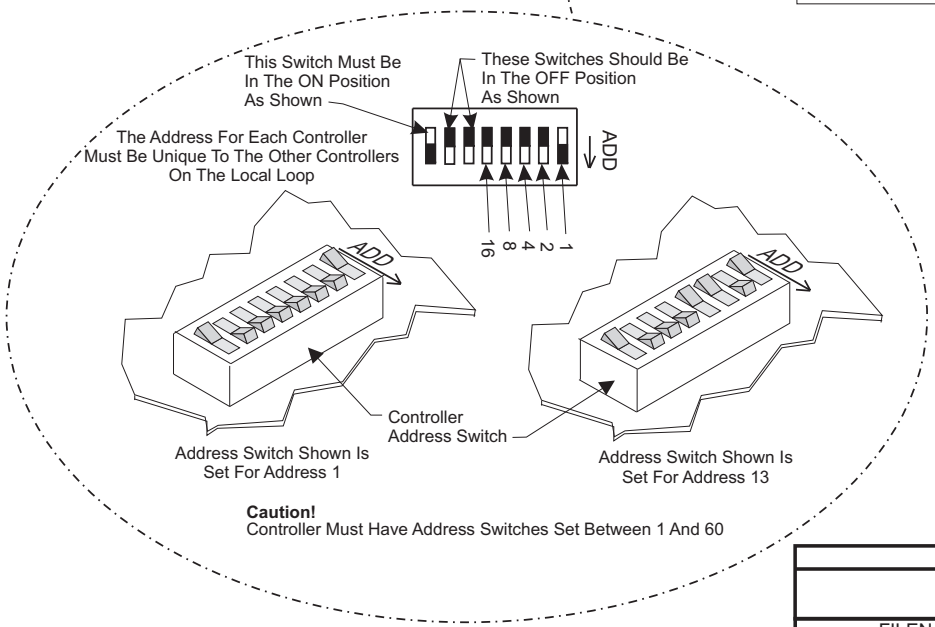
R

Local Loop RS-485 Communications To Other Controllers On The Local Loop

Note:
- All Circuit Board Contacts Are N.O.
- All Contacts Are Rated For 2 Amps @ 24VAC Pilot Duty Only
- Do Not Apply Any Voltage Greater Than 24VAC

Optimal Start Scheduler

Note:
Set-up, Programming And Monitoring Of The Optimal Start Scheduler Requires The Use Of A Personal Computer And Prism Software.



Caution!
Controller Must Have Address Switches Set Between 1 And 60

1.)24 VAC Must Be Connected So That All Ground Wires Remain Common.

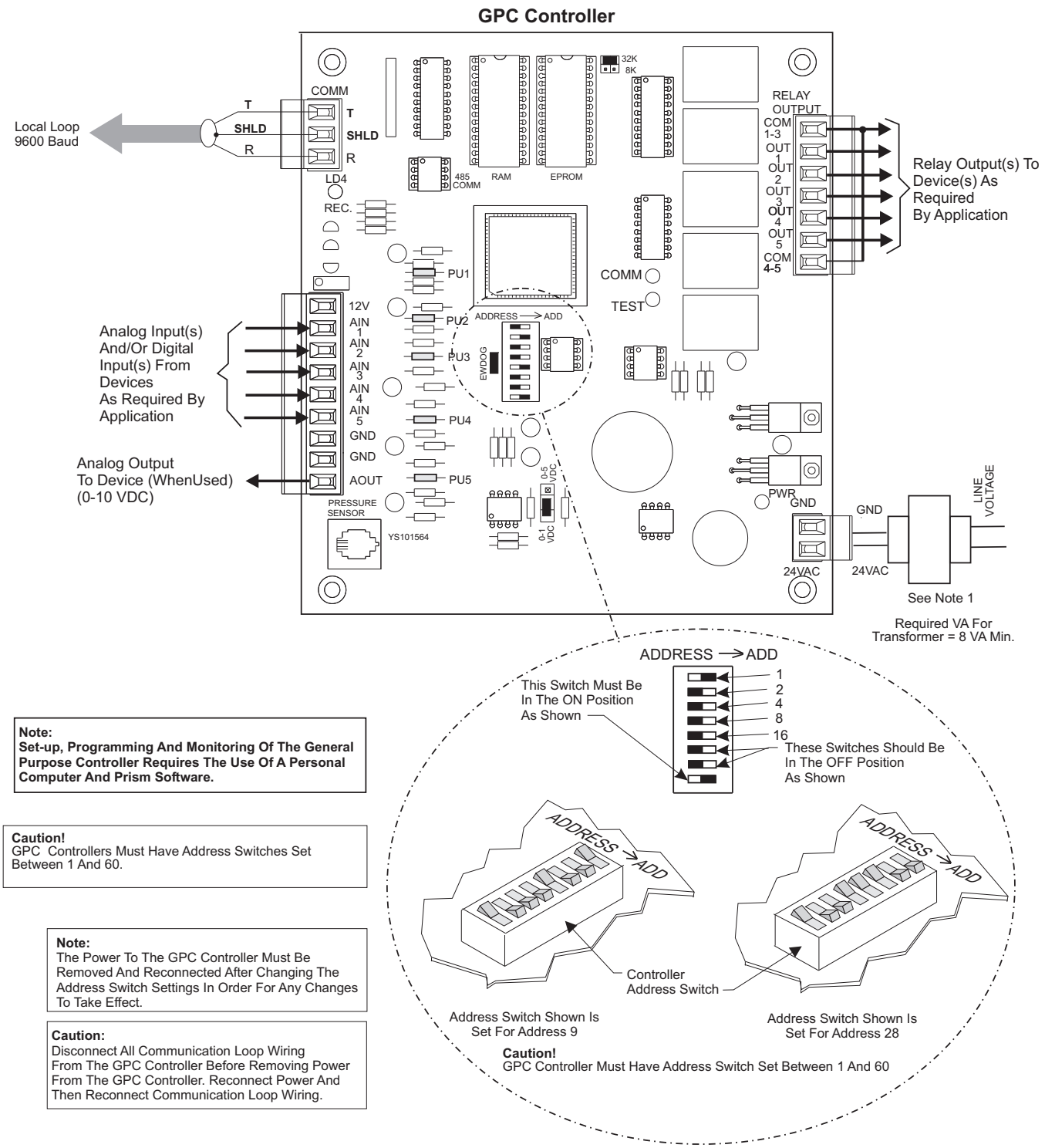
2.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

3.)All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.

4.)It Is Recommended That All Controllers Address Switches Are Set Before Installation.

JOB NAME	
FILENAME	WattMaster CONTROLS
WM-OptStartSched1.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	OE310 Optimal Start Scheduler Component Wiring

GPC Wiring



Note:
Set-up, Programming And Monitoring Of The General Purpose Controller Requires The Use Of A Personal Computer And Prism Software.

Caution!
GPC Controllers Must Have Address Switches Set Between 1 And 60.

Note:
The Power To The GPC Controller Must Be Removed And Reconnected After Changing The Address Switch Settings In Order For Any Changes To Take Effect.

Caution:
Disconnect All Communication Loop Wiring From The GPC Controller Before Removing Power From The GPC Controller. Reconnect Power And Then Reconnect Communication Loop Wiring.

GPC Controller Address Switch Setting

Notes:

1.)**24 VAC Must Be Connected So That All Ground Wires Remain Common.**

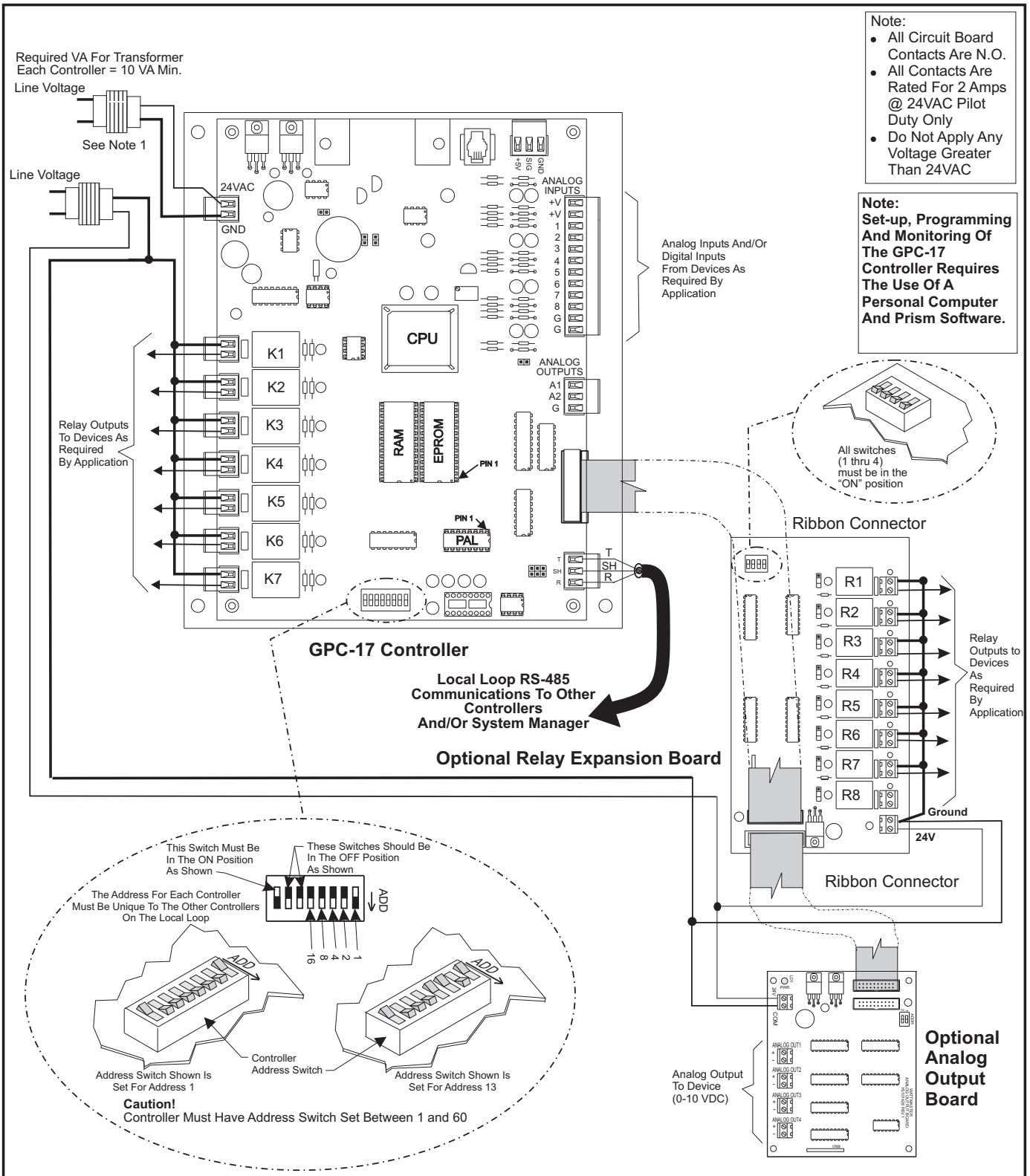
2.)**All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.**

3.)**All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.**

4.)**It Is Recommended That All Controllers Address Switches Are Set Before Installation.**

JOB NAME	
W-GPC-Control1.CDR	WattMaster CONTROLS
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	OE330 GPC Controller Wiring

GPC-17 Wiring



1.)24 VAC Must Be Connected So That All Ground Wires Remain Common.

2.)All Wiring To Be In Accordance With Local And National Electrical Codes and Specifications.

3.)All Communication Wiring To Be 18 Ga. Minimum, 2 Conductor Twisted Pair With Shield. Belden #82760 Or Equivalent.

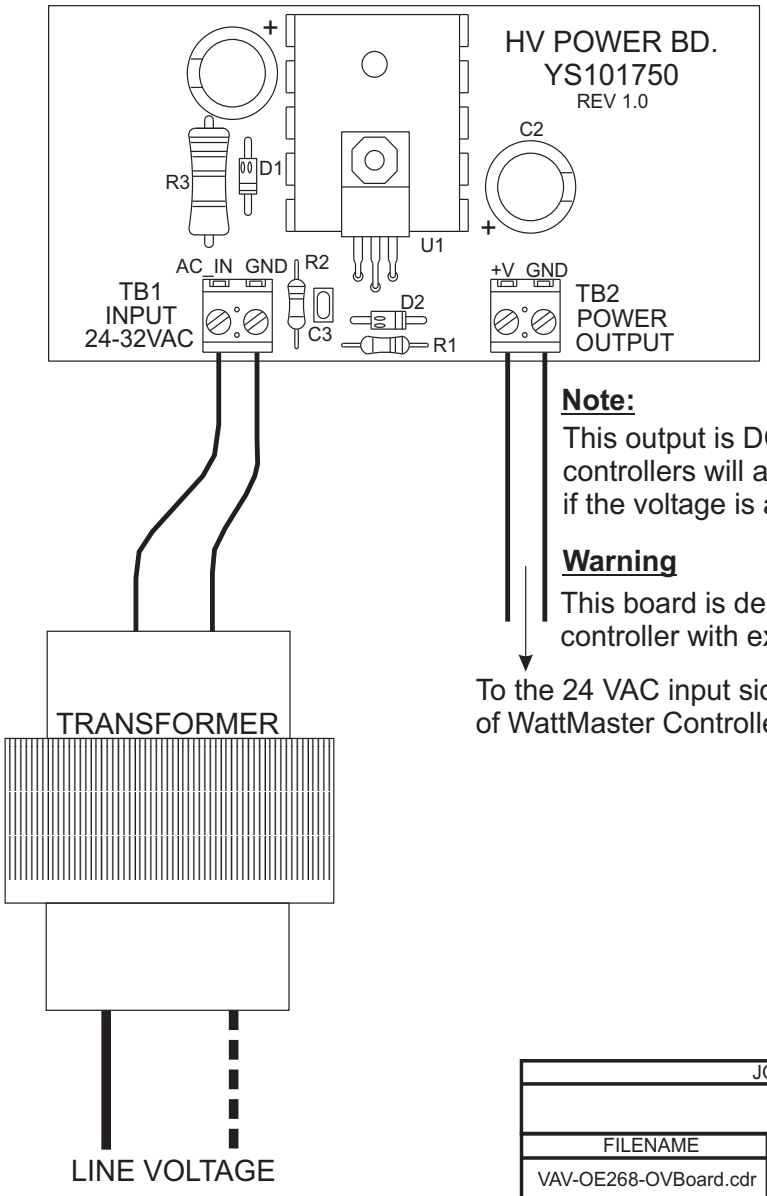
4.)It Is Recommended That All Controllers Address Switches Are Set Before Installation.

JOB NAME	
FILENAME	WattMaster CONTROLS
W-GPC-17CNTRL1A.CDR	
DATE: 05/12/04	DRAWN BY: B. Crews
PAGE	DESCRIPTION:
1	OE310-21-GPC
	GPC-17 Controller

Miscellaneous Diagrams & Technical Information

OE-268 Over Voltage Board

NOTE: This board goes between the supply transformers low voltage output and the controllers low voltage input. WattMaster Controllers do not like to see more than 28 VAC on their input side. When the line voltage to the transformer is too high, generally the output side of the transformer (low voltage) is too high, thus requiring this Over Voltage Board.



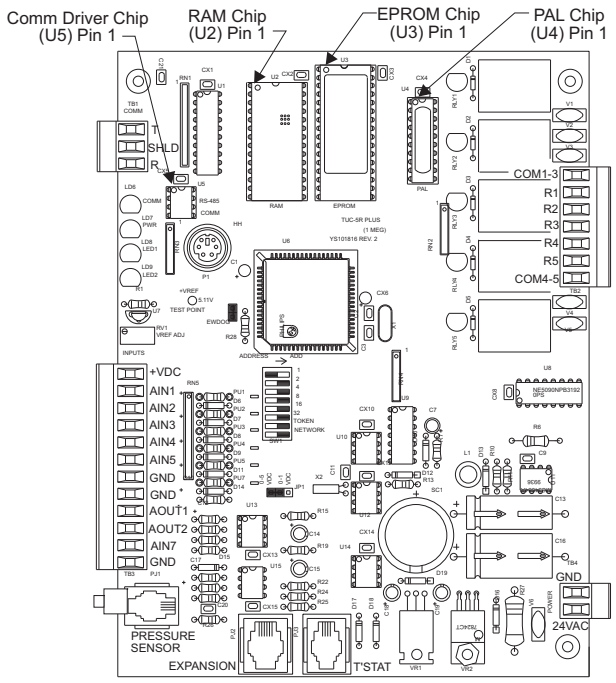
Note:
This output is DC voltage. Our controllers will accept DC voltage if the voltage is above 28 VDC.

Warning
This board is designed to power one controller with expansion boards only.

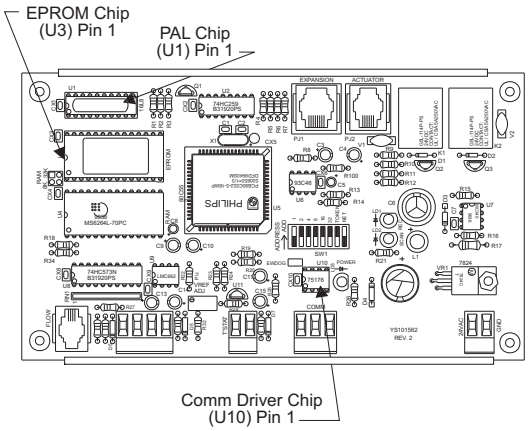
To the 24 VAC input side of WattMaster Controller

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-OE268-OVBoard.cdr	
DATE: 03/24/04	DRAWN BY: Barry Light
PAGE	DESCRIPTION:
1	OE-268 Over Voltage Board

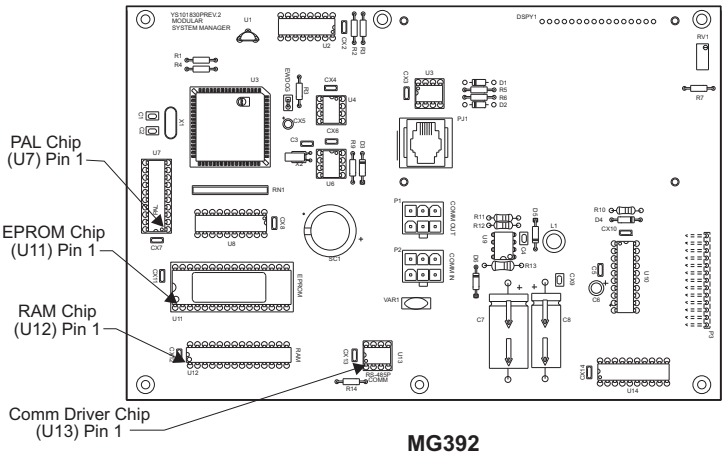
Chip Locations



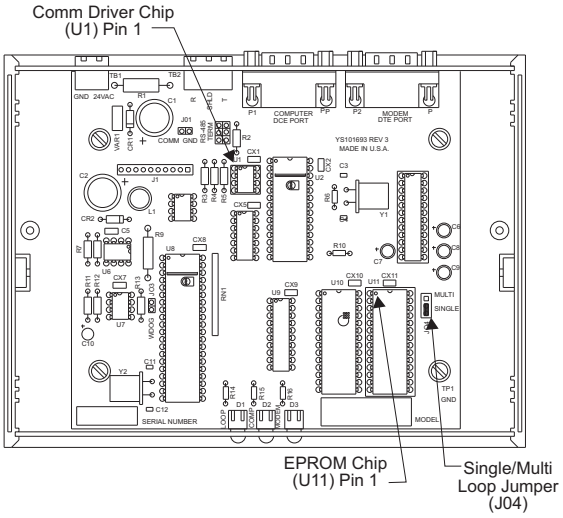
MG331-21-VAV
WMVAV Controller



MG320 - VAV
VAVBOX Controller



MG392
System Manager



OE361-04 Commlink II

Warning!
Use Extreme Caution When Removing Any Chips To Avoid Damaging Any Circuit Board Traces Which Are Under The Chip.

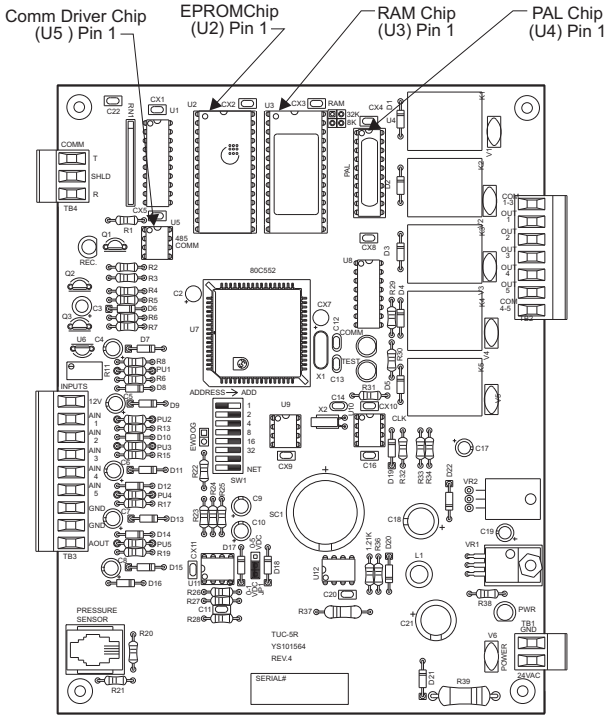
Be Sure That Any Small Screwdriver Or Other Sharp Object Used To Remove The Chip Does Not Come Into Contact With The Printed Circuit Board Surface.

A Small Screwdriver May Be Inserted Between The Chip And The Socket To Aid In Removal Of The Chip.

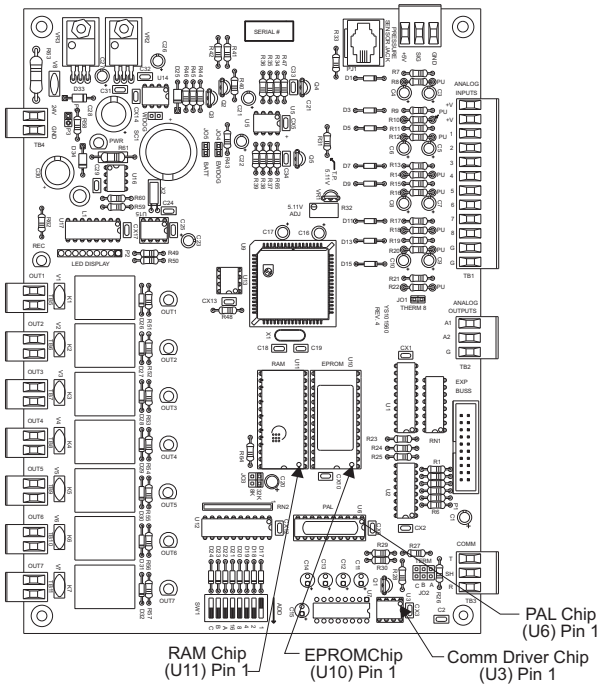
Be Very Careful Not To Insert The Screwdriver Under The Socket!! Damage To The Board Is Not Covered By Warranty.

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-DRCHPREP.CDR	
DATE: 05/12/04	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
1 of 3	WattMaster VAV Components
	Chip Replacement Information

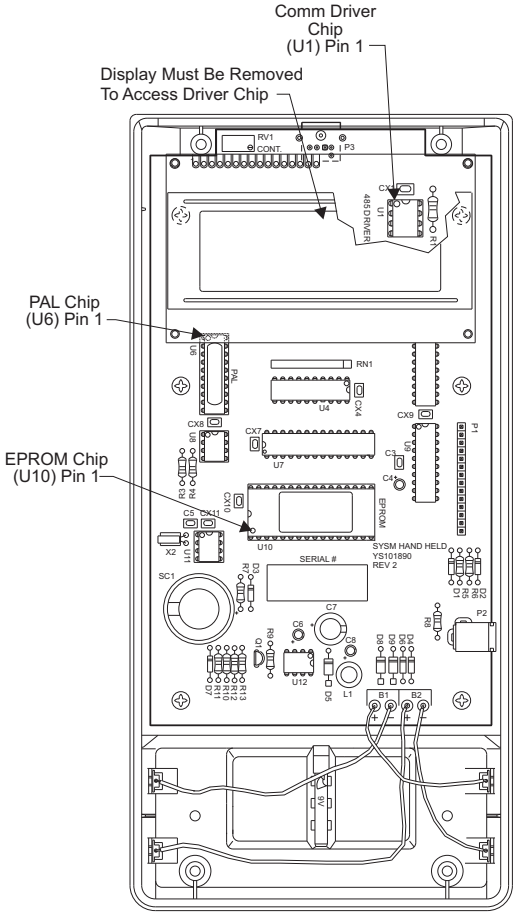
Chip Locations (Cont'd)



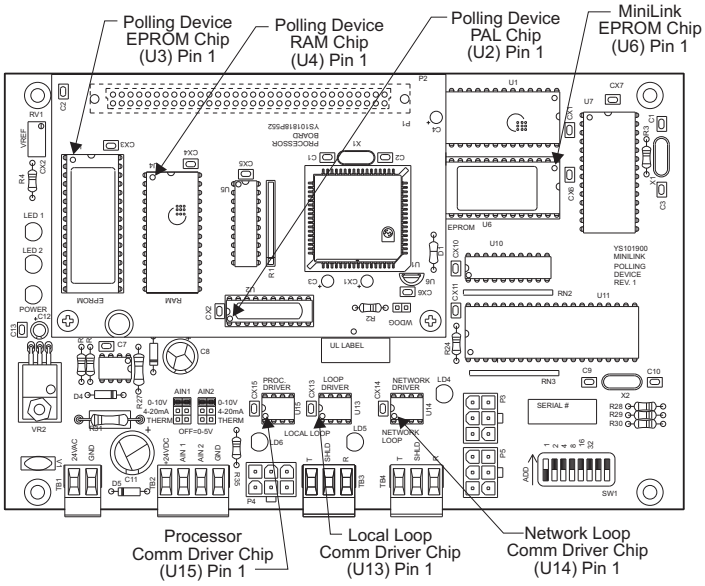
OE330 - GPC Controller



**OE310 - GPC-17 Controller,
Lighting Controller, OSS Scheduler**



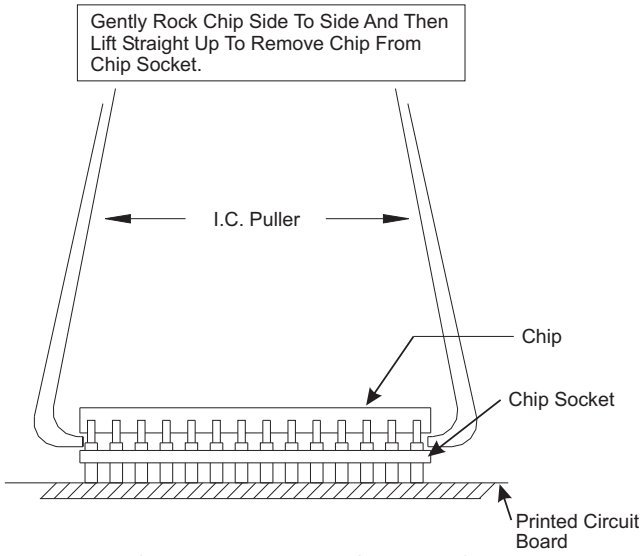
**MG391
Service Tool**



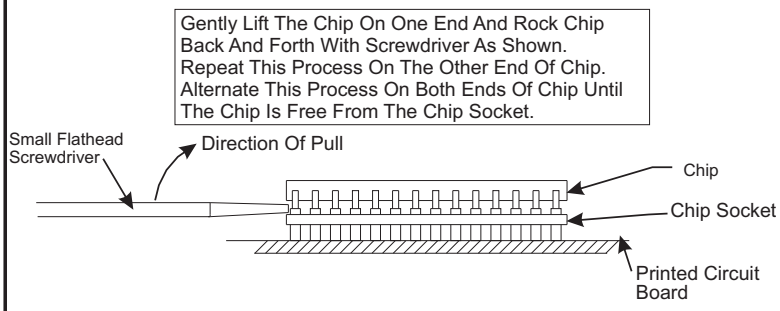
MG364-22 - MiniLink Polling Device

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-DRCHPREP.CDR	
DATE: 05/12/04	DRAWN BY: B. CREWS
PAGE	DESCRIPTION:
2 of 3	WattMaster VAV Components Chip Replacement Information

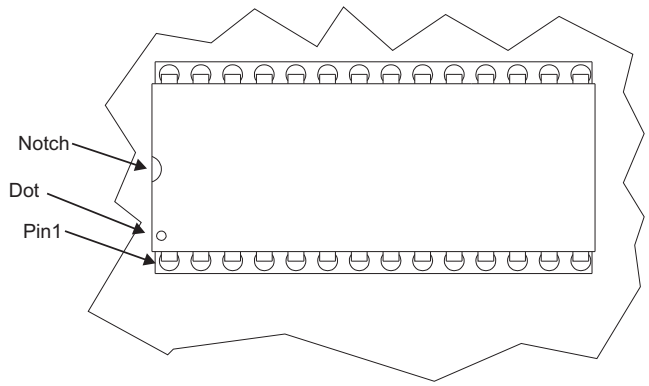
Chip Installation Procedures



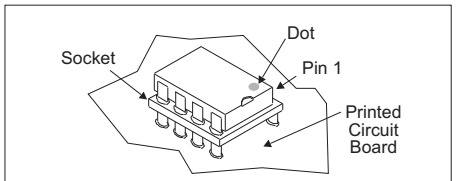
Using I.C. Puller To Remove Socketed Chip



Using Screwdriver To Remove Socketed Chip



Top View Of Socketed Chip Assembly



Typical RS-485 Communications Driver Chip Detail

WARNING!

Be sure the chip you have selected to replace is a socketed chip. Not all driver chips on the boards are field replaceable. Only socketed chips may be removed and replaced in the field. All other chips that are not socketed will require sending the board to the WattMaster factory for repair. **If you try to remove a chip that is not socketed it will destroy the circuit board.** Once you have determined that the chip needing replacement is indeed a socketed chip please proceed in the following manner.

Remove the communications loop connector and then the 24VAC power connector on the controller before attempting to change any components. **DAMAGE** will occur if components are removed or installed with power applied.

If you are unsure how to safely remove the chip or about the correct pin placement, please consult the factory before proceeding.

Damage to the board caused by failure to correctly remove or install the chip is not covered by the WattMaster warranty.

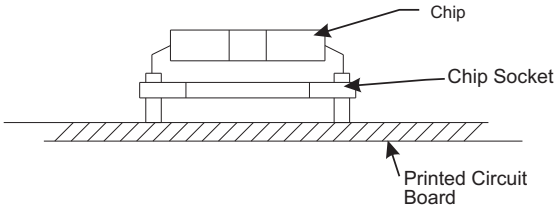
Use extreme care to avoid inserting the screwdriver or I.C. Puller under the socket. You must insert the tip of the screwdriver or ends of the I.C. Puller between the body of the chip and the chip socket.

Each chip **MUST** be installed with Pin 1 in the correct location. Installing the chip “backwards” will in most cases destroy the device when power is reapplied.

Pin 1 can be located by looking for the notch in the end of the chip. Pin 1 on "some" chips is identified with a dot.

Be certain that **ALL** pins are lined up in the socket before pressing the chip in. Failure to properly line up the pins will result in damage to the chip. This is a **VERY** common error - **BE CAREFUL.**

Only after confirming that the chip has been correctly installed with Pin 1 in the proper position and that the pins are lined up and none are bent or out of the socket, should communication or power wiring be reconnected to the board. Tp prevent possible damage always reconnect the power wiring first and then the communication wiring.



End View Of Socketed Chip Assembly

JOB NAME	
FILENAME	WattMaster CONTROLS
VAV-DRCHPREP.CDR	
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	Chip Replacement Information

Temperature & Humidity Sensor Voltage-Resistance Tables

Sensor Checks

The following sensor voltage and resistance tables are provided to aid in checking sensors that appear to be operating incorrectly. Many system operating problems can be traced to incorrect sensor wiring. Be sure all sensors are wired per the wiring diagrams in this manual.

If the sensors still do not appear to be operating or reading correctly, check voltage and/or resistance to confirm that the sensor is operating correctly per the tables. Please follow the notes and instructions below each chart when checking sensors.

Temperature – Resistance – Voltage For Type III 10 K Ohm Thermistor Sensors

Temp (ºF)	Resistance (Ohms)	Voltage @ Input (VDC)	Temp (ºF)	Resistance (Ohms)	Voltage @ Input (VDC)	Temp (ºF)	Resistance (Ohms)	Voltage @ Input (VDC)
-10	93333	4.620	60	14681	3.042	86	8153	2.297
-5	80531	4.550	62	14014	2.985	88	7805	2.242
0	69822	4.474	64	13382	2.927	90	7472	2.187
5	60552	4.390	66	12758	2.867	95	6716	2.055
10	52500	4.297	68	12191	2.810	100	6047	1.927
15	45902	4.200	69	11906	2.780	105	5453	1.805
20	40147	4.095	70	11652	2.752	110	4923	1.687
25	35165	3.982	71	11379	2.722	115	4449	1.575
30	30805	3.862	72	11136	2.695	120	4030	1.469
35	27140	3.737	73	10878	2.665	125	3656	1.369
40	23874	3.605	74	10625	2.635	130	3317	1.274
45	21094	3.470	75	10398	2.607	135	3015	1.185
50	18655	3.330	76	10158	2.577	140	2743	1.101
52	17799	3.275	78	9711	2.520	145	2502	1.024
54	16956	3.217	80	9302	2.465	150	2288	0.952
56	16164	3.160	82	8893	2.407			
58	15385	3.100	84	8514	2.352			

Thermistor Sensor Testing Instructions

Use the resistance column to check the thermistor sensor while disconnected from the controllers (not powered). Use the voltage column to check sensors while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-"(minus) lead on GND terminal and the "+"(plus) lead on the sensor input terminal being investigated.

I*f the voltage is above 5.08 VDC, then the sensor or wiring is "open." If the voltage is less than 0.05 VDC, the sensor or wiring is shorted.*

OE265-03 Relative Humidity Transmitter – Humidity vs. Voltage

Humidity Percentage (RH)	Voltage @ Input (VDC)	Humidity Percentage (RH)	Voltage @ Input (VDC)	Humidity Percentage (RH)	Voltage @ Input (VDC)	Humidity Percentage (RH)	Voltage @ Input (VDC)
0%	1.00	26%	2.04	52%	3.08	78%	4.12
2%	1.08	28%	2.12	54%	3.16	80%	4.20
4%	1.16	30%	2.20	56%	3.24	82%	4.28
6%	1.24	32%	2.28	58%	3.32	84%	4.36
8%	1.32	34%	2.36	60%	3.40	86%	4.44
10%	1.40	36%	2.44	62%	3.48	88%	4.52
12%	1.48	38%	2.52	64%	3.56	90%	4.60
14%	1.56	40%	2.60	66%	3.64	92%	4.68
16%	1.64	42%	2.68	68%	3.72	94%	4.76
18%	1.72	44%	2.76	70%	3.80	96%	4.84
20%	1.80	46%	2.84	72%	3.88	98%	4.92
22%	1.88	48%	2.92	74%	3.96	100%	5.00
24%	1.96	50%	3.00	76%	4.04		

OE265-03 Relative Humidity Sensor Testing Instructions:

Use the voltage column to check the Humidity Sensor while connected to a powered expansion board. Read voltage with meter set on DC volts. Place the "-"(minus) lead on terminal labeled GND and the "+" lead on terminal AIN4 on the Analog Input/Output Expansion Board.

Pressure Sensors Voltage-Resistance Tables

OE271 Duct Static Pressure Sensor

This sensor is used to sense duct static pressure for the WattMaster VAV system controllers. The OE271 sensor is a 0-5" W.C. pressure range, 0-5 VDC voltage range sensor. Use the table and testing information below to check for proper sensor operation.

OE271 Duct Static Pressure Sensor			
Pressure @ Sensor (" W.C.)	Voltage @ Input (VDC)	Pressure @ Sensor (" W.C.)	Voltage @ Input (VDC)
0.00	0.25	2.60	2.20
0.10	0.33	2.70	2.28
0.20	0.40	2.80	2.35
0.30	0.48	2.90	2.43
0.40	0.55	3.00	2.50
0.50	0.63	3.10	2.58
0.60	0.70	3.20	2.65
0.70	0.78	3.30	2.73
0.80	0.85	3.40	2.80
0.90	0.93	3.50	2.88
1.00	1.00	3.60	2.95
1.10	1.08	3.70	3.03
1.20	1.15	3.80	3.10
1.30	1.23	3.90	3.18
1.40	1.30	4.00	3.25
1.50	1.38	4.10	3.33
1.60	1.45	4.20	3.40
1.70	1.53	4.30	3.48
1.80	1.60	4.40	3.55
1.90	1.68	4.50	3.63
2.00	1.75	4.60	3.70
2.10	1.83	4.70	3.78
2.20	1.90	4.80	3.85
2.30	1.98	4.90	3.93
2.40	2.05	5.00	4.00
2.50	2.13		

OE271 Pressure Sensor Testing Instructions

Use the voltage column to check the Duct Static Pressure Sensor while connected to powered controllers. Read voltage with meter set on DC volts. Place the "-"(minus) lead on GND terminal and the "+"(plus) lead on the 0-5 pin terminal on (JP1) with the jumper removed. Be sure to replace the jumper after checking.

OE258 Building Pressure Sensor

This sensor is used to sense building pressure for the WattMaster VAV system controllers. The OE258 sensor is a -0.25" to +0.25" W.C. pressure range, 0-5 VDC voltage range sensor. Use the table and testing information below to check for proper sensor operation.

OE258 Building Pressure Sensor			
Pressure @ Sensor (" W.C.)	Voltage @ Input (VDC)	Pressure @ Sensor (" W.C.)	Voltage @ Input (VDC)
-0.25	0.00	0.01	2.60
-0.24	0.10	0.02	2.70
-0.23	0.20	0.03	2.80
-0.22	0.30	0.04	2.90
-0.21	0.40	0.05	3.00
-0.20	0.50	0.06	3.10
-0.19	0.60	0.07	3.20
-0.18	0.70	0.08	3.30
-0.17	0.80	0.09	3.40
-0.16	0.90	0.10	3.50
-0.15	1.00	0.11	3.60
-0.14	1.10	0.12	3.70
-0.13	1.20	0.13	3.80
-0.12	1.30	0.14	3.90
-0.11	1.40	0.15	4.00
-0.10	1.50	0.16	4.10
-0.09	1.60	0.17	4.20
-0.08	1.70	0.18	4.30
-0.07	1.80	0.19	4.40
-0.06	1.90	0.20	4.50
-0.05	2.00	0.21	4.60
-0.04	2.10	0.22	4.70
-0.03	2.20	0.23	4.80
-0.02	2.30	0.24	4.90
-0.01	2.40	0.25	5.00
0.00	2.50		

OE258 Building Pressure Sensor Testing Instructions

Use the voltage column to check the Building Static Pressure Sensor while connected to a powered expansion board. Read voltage with meter set on DC volts. Place the "-"(minus) lead on terminal labeled GND and the "+" lead on terminal AIN4 on the Analog Input/Output Expansion Board.

Notes

Notes

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