

ORS SITEPRO™ 2000

Blower/Pump Control Panel

Installation and Operation Manual

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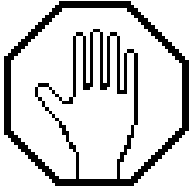
DOCUMENTATION CONVENTIONS

This manual uses the following conventions to present information:



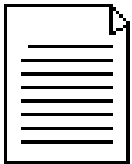
WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.



CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.



NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Quick Start Instructions

Read this section even if you don't read anything else.

The large envelope shipped with your ORS SITEPRO™2000 control panel contains Quick Start Installation and Configuration Instructions. Familiarity with the information in this envelope is absolutely essential for safe and trouble free operation of the ORS SITEPRO™ 2000 control panel.

The ORS SITEPRO™ Quick Start envelope contains the following instruction sheets:

- A Field Wiring Diagram that shows basic wiring of motors and probes.
- An Optional Feature Wiring Diagram that shows how to wire network connections, interlocks, analog sensors and other specialized devices.
- A Site Configuration Guide that explains how to lay out your site and define network interlocks.
- A Panel Configuration Guide that explains how to configure individual panels after the ORS SITEPRO™ network has been laid out.

The information in this supplement is provided to complement the ORS SITEPRO™ Installation & Operation Manual. Although we highly recommend that all users read the entire Installation & Operation manual, we also recognize that some experienced technicians may desire a quick start summary of essential information.

Please proceed as follows:

1. Refer to the Site Configuration Guide to determine the basic layout of your site.
2. Mount the ORS SITEPRO™ panel(s) and carry out basic wiring according to the generic Field Wiring Diagram.
3. Carry out additional site-specific wiring according to the recommendations and examples provided in the Optional Features Wiring Diagram.
4. Configure each panel according to the Panel Configuration Guide.
5. Document the configuration of each panel by filling out the Panel Configuration Sheet included in Appendix A of the ORS SITEPRO™ manual. Be certain that these sheets are available for reference before calling Geotech for assistance.

Observe all Warning and Cautions included in the ORS SITEPRO™ manual.

Chapter 1: System Description

Function and Theory

The ORS SITEPRO™ 2000 Blower/Pump Control Panel (figure 1) is designed for simultaneous control of one blower (Air Stripper or Soil Vapor Extraction) and one pump (influent water, transfer water or chemical feed). The controller is housed within a weather-proof **NEMA 4 (IP66)** enclosure and incorporates circuitry to receive **intrinsically safe** input from sensors deployed in hazardous locations.



Figure 1

Each control panel can be operated by itself or can be linked to as many as 15 other similar panels in a user configurable alarm communication **network**. Because each panel in the network has access to alarm inputs from all the other panels, entire sites can be tied together and configured to respond appropriately to input received by any panel in the network.

The ORS SITEPRO™ 2000 is fully instrumented and includes status displays that provide a visual representation of the pump and blower operating conditions. The panel also incorporates a self-test feature that continuously monitors line voltage, condition of the pump and blower control switches, panel temperature and probe integrity whenever the ORS SITEPRO™ 2000 is in operation. An additional self-test routine that runs at panel startup (or whenever SYSTEM TEST button is pressed), checks internal program and data memory, RS-232 serial communications, the **analog** to digital (A/D) converter, and the integrity of all panel indicators.

The standard ORS SITEPRO™ 2000 Blower/Pump Controller is equipped with terminals that allow the panel to interface with a standard ORS density actuated level sensing probe, pressure switches as well as external **interlock** devices. **Additional inputs (including those for analog devices, and a totalizer)**, become available when the telemonitoring option is installed. **Form C dry contact** outputs are also available for interfacing with additional external equipment components, buzzers, indicators and security alarm systems.

Each standard ORS SITEPRO™ 2000 Blower/Pump Control Panel is designed to run a single blower and a water pump.

Optional features include a telemonitoring package that incorporates remote monitoring and data logging as well as auto dial-out on alarm to either PC or Fax machine. Panels are available for 6 HP blowers. Pumps and blowers larger than 2-1/2 HP can be controlled by the ORS SITEPRO™, but require the use of an external contactor.

To complement the optional remote monitoring and data logging features, Geotech offers a comprehensive software package (ORS SITEPRO™ Manager) to provide graphical representations of the ORS SITEPRO™ 2000 panel as it operates on site. Optional features of this software package allow the user to generate reports, graphs and active P&IDs of remediation functions. ORS SITEPRO™ Manager is available at no extra cost when the telemonitoring package is purchased.

Modes of Operation

User Interface Modes

The ORS SITEPRO™ 2000 can be operated in any of the three modes shown in figure 2 and described briefly on the following pages.

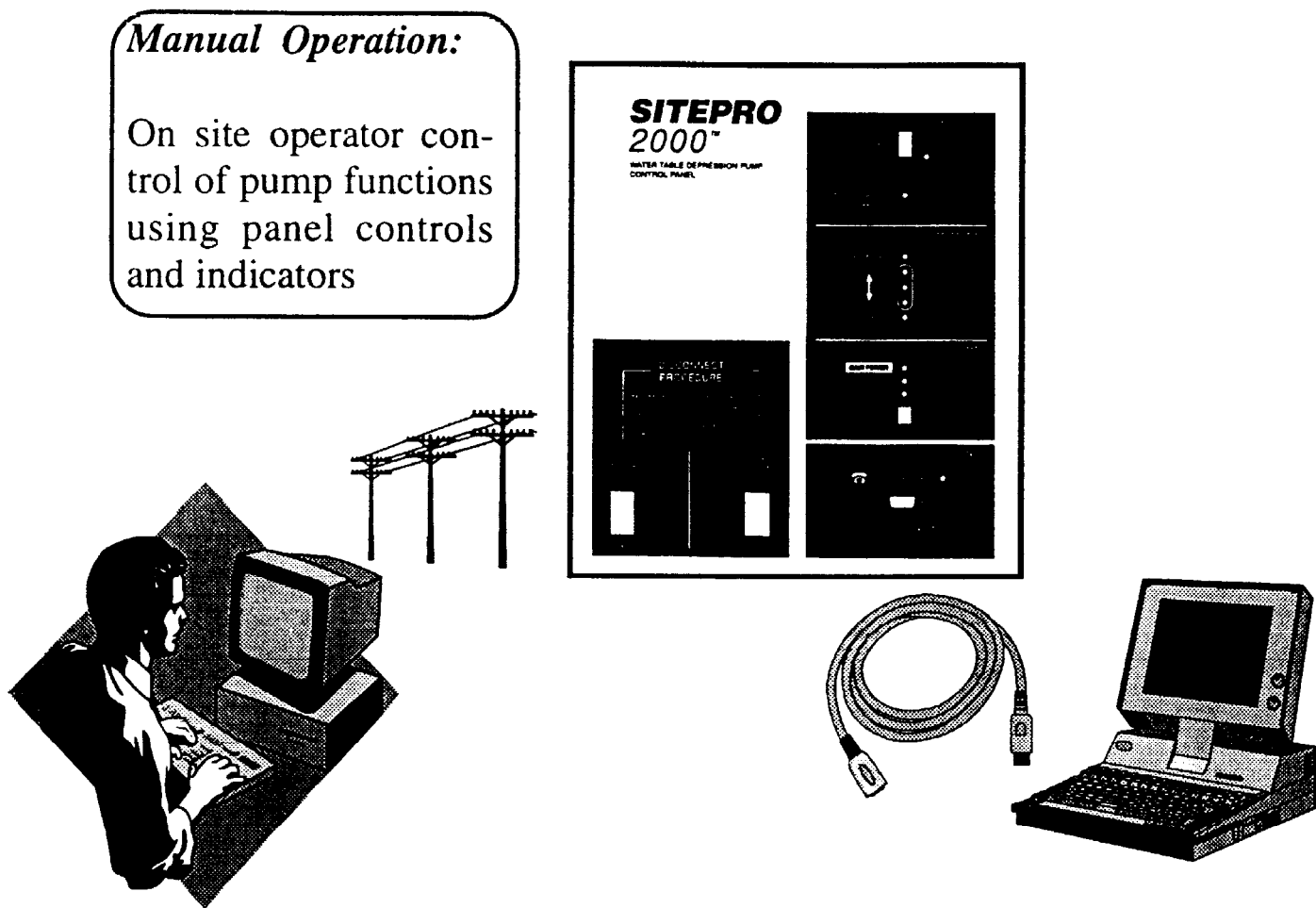


Figure 2

Manual Operation Mode

The panel is equipped with controls and indicators that permit manual operation of the pump and blower. Controls include pump and blower POWER switches that cut off all power to the motors, 3-position pump and blower CONTROL switches and a CONTROL POWER switch to cut off power to the control circuitry. A SYSTEM TEST button activates the panel's self-test feature. Refer to Chapter 4 for details of panel operation.



In ORS Sitepro™ 2000 systems without the telemonitoring option, manual operation is the only way the user can interface with the system.

Local Communication Mode

When the ORS SITEPRO™ 2000 is equipped with the telemonitoring option, the user can use a computer to communicate with the panel either remotely over a telephone line (Remote Communication Mode) or locally via the special cable to the **RS-232** serial port (Local Communication Mode).

Two basic types of operations are possible using the Local Communication Mode:

1. Set up and configure the data logging and remote monitoring features.
2. Download data from the data logger.

Procedures for using the Local Communication Mode are detailed in the manual that accompanies the ORS SITEPRO™ Manager software package.

Remote Communication Mode

The modem and associated hardware/software included with the telemonitoring option allows the user to communicate with the ORS SITEPRO™ 2000 panel from an off site computer.

Four basic types of operations are possible using the Remote Communication Mode:

1. Set up and configure the data logging and remote monitoring features.
2. Download data from the data logger.
3. Access real time graphical representations of site conditions.
4. Auto dial-out on alarm.

The Remote Communication Mode can also be used to dial out to a fax machine.

Procedures for using the Remote Communication Mode are detailed in the manual that accompanies the ORS SITEPRO™ Manager software package.

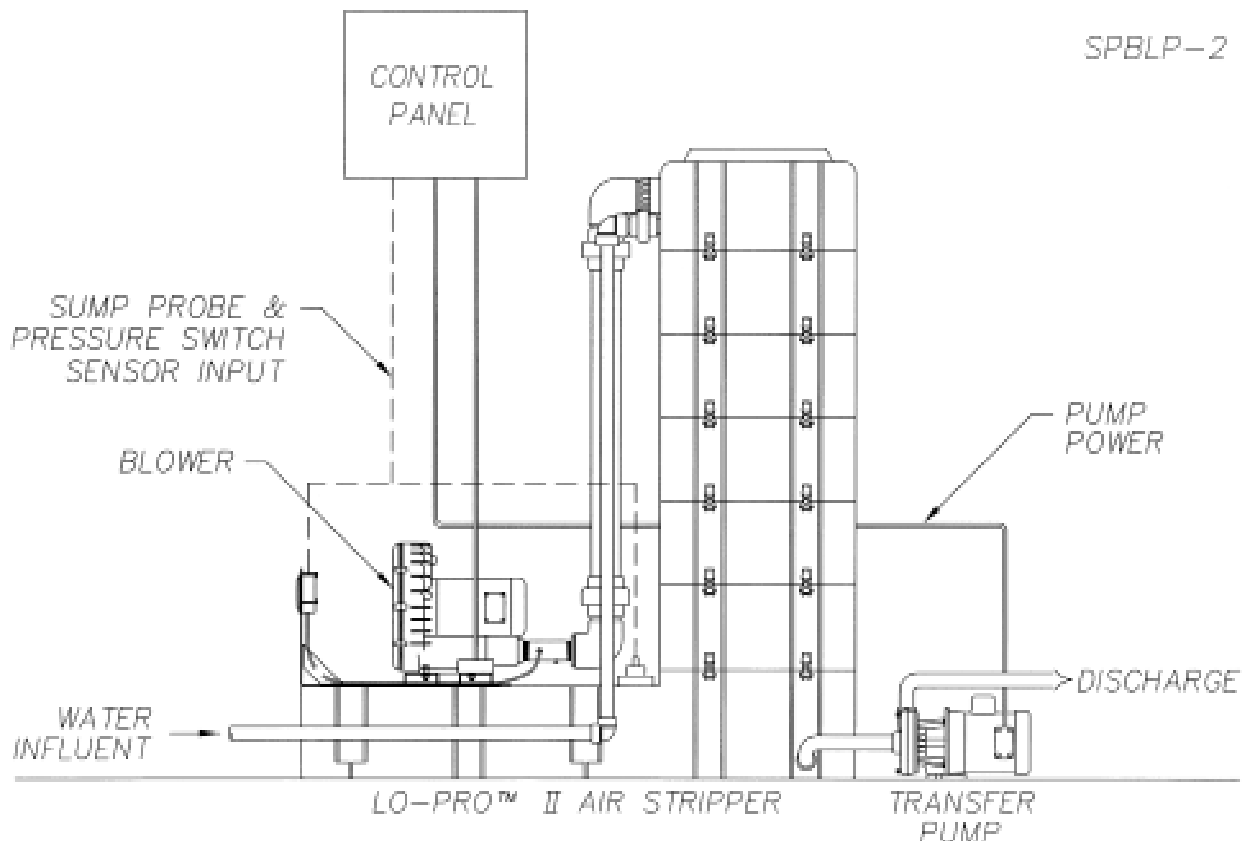


Figure 3

How ORS SITEPRO™ works

The ORS SITEPRO™ 2000 uses highly flexible **microprocessor** based electronics to provide a wide spectrum of capabilities that range from basic motor control to complex and sophisticated multi-panel networking. This built in versatility allow the ORS SITEPRO™ 2000 to be configured on site to match the unique requirements of any remediation application.

Basic Motor Control

Figure 3, shows a simple water treatment system in which an ORS SITEPRO™ 2000 Blower/Pump panel controls a LOPRO™ Air Stripper blower and a transfer pump. During normal operation, the blower runs continuously and the pump cycles on and off in response to input from the sump level probe mounted in the Air Stripper sump.

Motor Control with Interlocks

In most applications, your ORS SITEPRO™ 2000 will be integrated into a remediation system that includes additional equipment components.

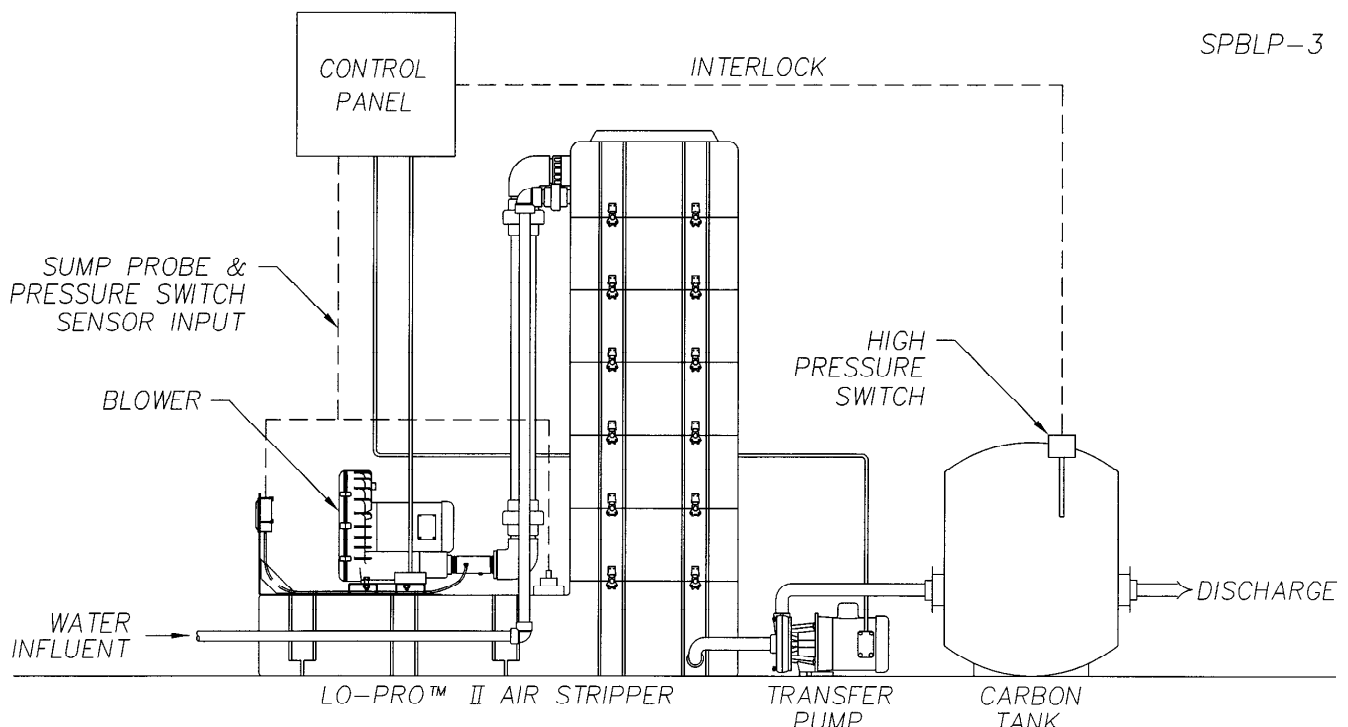


Figure 4

These components (holding tanks, hydrocarbon pumps, oil/water separators, carbon tanks, etc.) often must be interlocked to the control panel to optimize system performance and to prevent permit excursions in the event of a component failure. Figure 4, shows another simple water treatment system in which contaminated water first passes through an Air Stripper and then into a Carbon Tank. Again, the ON/OFF cycling of the transfer pump is controlled by the status of the sump probe. In this application, however, a high pressure switch is wired to the control panel shuts off the transfer pump if the carbon tank becomes clogged. Use of such external **interlock** devices (high level shut off switches, pressure switches, etc.) is facilitated by a system of internal circuits built into every ORS SITEPRO™ 2000 panel. These circuits provide four separate **alarm channels** for attachment of **interlock** devices.

Multi-Panel Networks

When two or more ORS SITEPRO™ 2000 panels are linked together in a **network** as shown in figure 5. The individual panel **microprocessors** are able to communicate and share information through a system of circuits called the **Interlock Communication Bus**, or ICB. Each panel in a **network** can be configured to send and/or receive alarm signals on any or all of the four **alarm channels**. In this way, alarms received locally by one panel can be broadcast on the ICB and used to shut off other panels in the **network**.

In figure 5, a feed pump and its control panel (Panel #2) have been added to the water treatment system diagrammed in figure 4. Panel #2 receives input from its own level sensing probe and Panel #1 through the **network** cable shown in the

diagram. The **network** connection allows both pumps to be shut off by the carbon tank high pressure switch and also enables the air stripper controls to shut off the feed pump in the event of a sump high level condition or a blower failure.

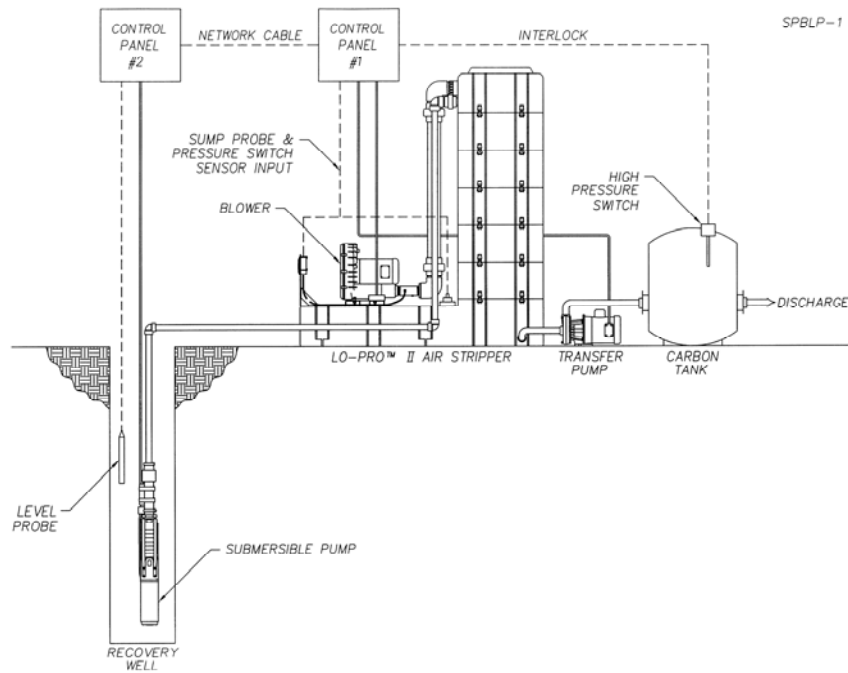


Figure 5

Network Management

Whenever a multi-panel ORS SITEPRO™ 2000 **network** is configured, one of the panels in the **network** must be designated to carry out special **Interlock Communication Bus** management functions. This panel, called the Master, controls the flow of information on the bus, assesses the **interlock** status of the other panels, called Slaves, and communicates with the host computer if the telecommunication option is installed. See figure 6 for a diagrammatic representation of the relationship between Master and Slave panels.

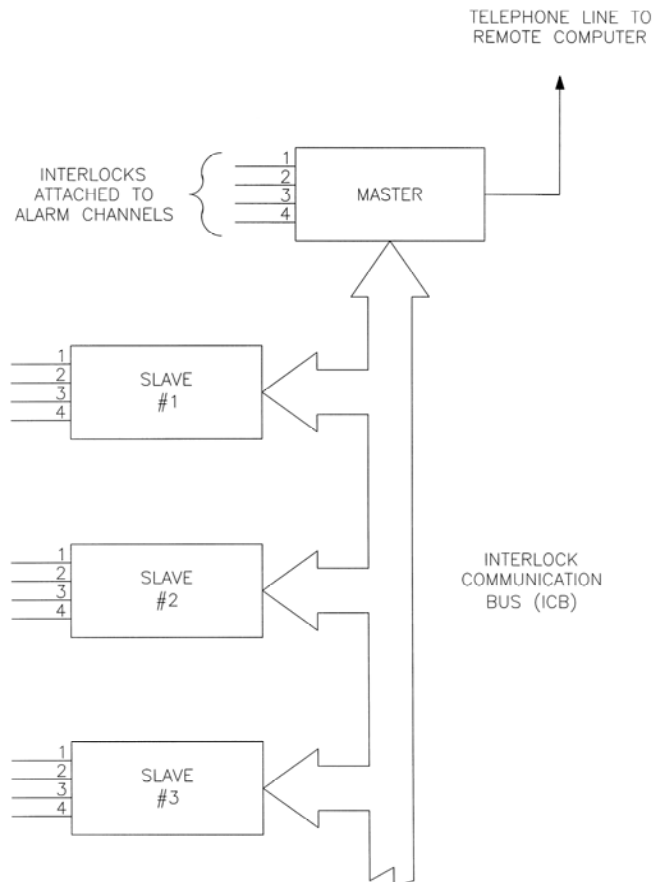


Figure 6

If the telecommunication option is installed in one of the panels in a **network**, that panel must be configured as the Master. However, if no remote monitoring is required, any panel in the **network** can be the Master. Panels are designated Masters or Slaves by setting dip switches inside each panel.

During network operation, the Master continuously polls the Slaves in a set sequence determined by the **network addresses** the user chooses for the panels. When a Slave is polled, it is temporarily given control of the **Interlock Communication Bus**. The Slave then broadcasts any current **interlock** alarms that are on **alarm channels** configured to send. All other panels in the **network** (Slaves and Master) will then respond to the alarms and shut down if they are configured to receive on these same **alarm channels**.

Step by step procedures for configuring your ORS SITEPRO™ 2000 Control Panel are provided in Chapter 3 of this manual.

Additional Applications

The examples in this chapter have shown the ORS SITEPRO™ 2000 Blower/Pump Control Panel being used to control an air stripper blower and a transfer pump. Additional ORS SITEPRO™ applications are listed on the following page:

Air Stripper w/Influent Feed Pump

When used to control an air stripper blower and an influent feed pump, the ORS SITEPRO™ receives input from the air stripper controls (sump probe & pressure switches) and a water pump level sensing probe. In this application, the normal cycling of the feed pump is controlled by the level sensing probe. When the panel is properly configured, the pump can be shut off by 1) a LOW-OVERRIDE signal from the level sensing probe, 2) a HI or LO PRESSURE signal from the blower, 3) a HI SUMP signal from the air stripper sump level probe or 4) an alarm generated by an external interlock device.

Air Stripper w/Chemical Feed Pump

When used to control an air stripper blower and a chemical feed pump, the ORS SITEPRO™ receives input from the air stripper controls (sump probe & pressure switches) and a level sensor mounted in the chemical vat. In this application, operation of the chemical feed pump is controlled by the vat level sensor. The pump can be shut off by 1) a LOW-OVERRIDE signal from the vat level sensor, 2) a HI or LO PRESSURE signal from the blower, a HI SUMP signal from the air stripper sump level probe or 4) an alarm generated by an external **interlock** device.

SVE Blower w/ Knockout Drum

When used to control a soil vapor extraction (SVE) blower with a knockout drum, the ORS SITEPRO™ receives input from a knockout drum high level switch. In this application, the blower can be shut off by the high level switch or by any external **interlock** device wired to one of the panel's **alarm** channels.

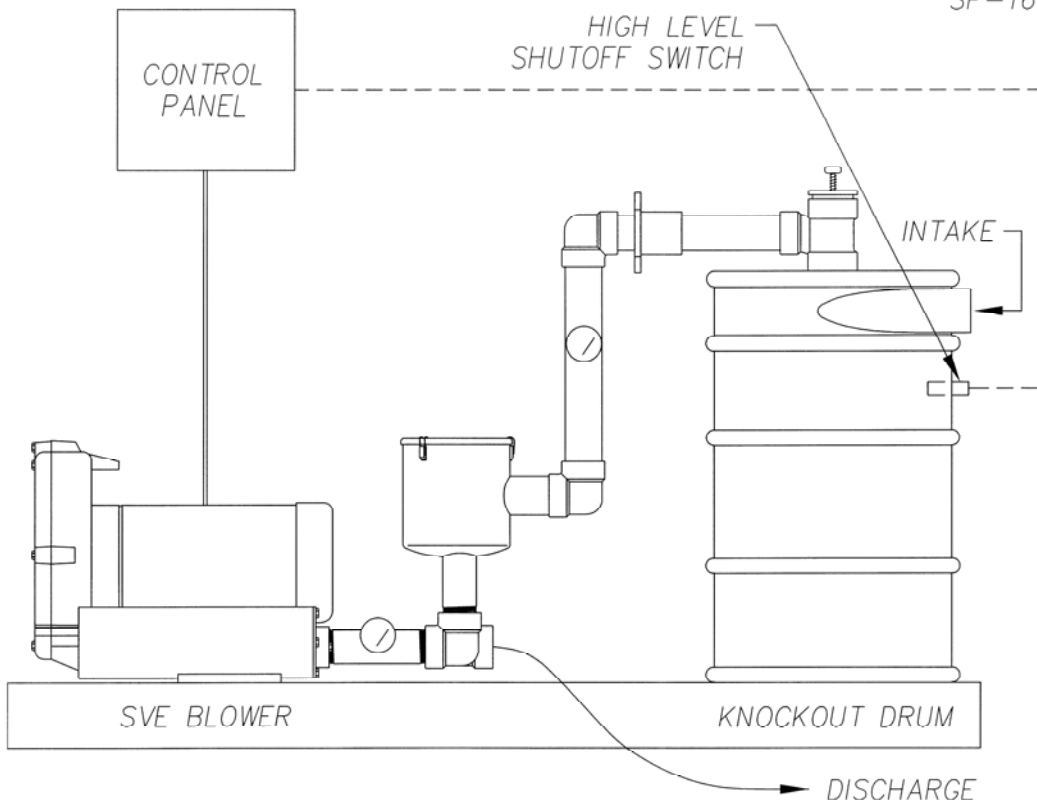


Figure 7

Chapter 2: System Installation



The ORS SITEPRO™ 2000 Blower/Pump Controller Panel must be deployed in a non-hazardous location and all conduit runs from the well head to the panel must conform to Article 501-5 of the National Electrical Code (NEC) 1993.



Before deploying the ORS SITEPRO™ 2000 refer to the System Checklist at the front of this manual and answer the following questions.

1. Is the electrical service at the site properly sized for this panel and does it conform to **NEC** and local codes?
2. Are the electrical characteristics of your pump and blower compatible with those of the panel?

INSPECTION

Inspect all equipment upon arrival. Check the contents of the packing crate against the System Specification sheet at the front of this manual. If any items are missing or damaged, make note of this on the shipping papers and immediately notify Geotech Environmental Equipment, Inc. at 800-833-7958 OR (303) 320-4764.

PANEL INSTALLATION

Mount Panel

1. Remove the panel from its packing crate and hold it against the intended mounting surface.
2. Refer to figure 2 and position the panel so that the access door will open at least 12-1/2" without obstruction.
3. If the mounting surface is wood, use wood screws to attach the panel mounting feet to the wall. If the surface is metal, use the panel as a template and mark the locations of the mounting holes. Then drill and tap the holes and use self-tapping screws to mount the panel.



Do not use nails to attach the panel, as a misdirected hammer blow could damage the enclosure.

WIRING



All wiring must be carried out by a qualified electrician and be in accordance with state and local codes. Proper grounding of the panel is necessary to maintain the intrinsically safe rating of the ORS SITEPRO™ 2000. See the following sections for panel grounding procedures.

Install Chassis Ground

Before beginning panel hookup procedures, run a wire from the panel chassis ground lug to a good earth ground such as the circuit breaker panel enclosure. The ground lug is located on the chassis behind the panel faceplate (See the ORS SITEPRO™ 2000 wiring diagram in figure 8).



Before installing wires, setting configuration dip switches or touching exposed portions of the panel circuit board, safely discharge any static electricity from your body by touching or otherwise grounding yourself to the panel chassis.

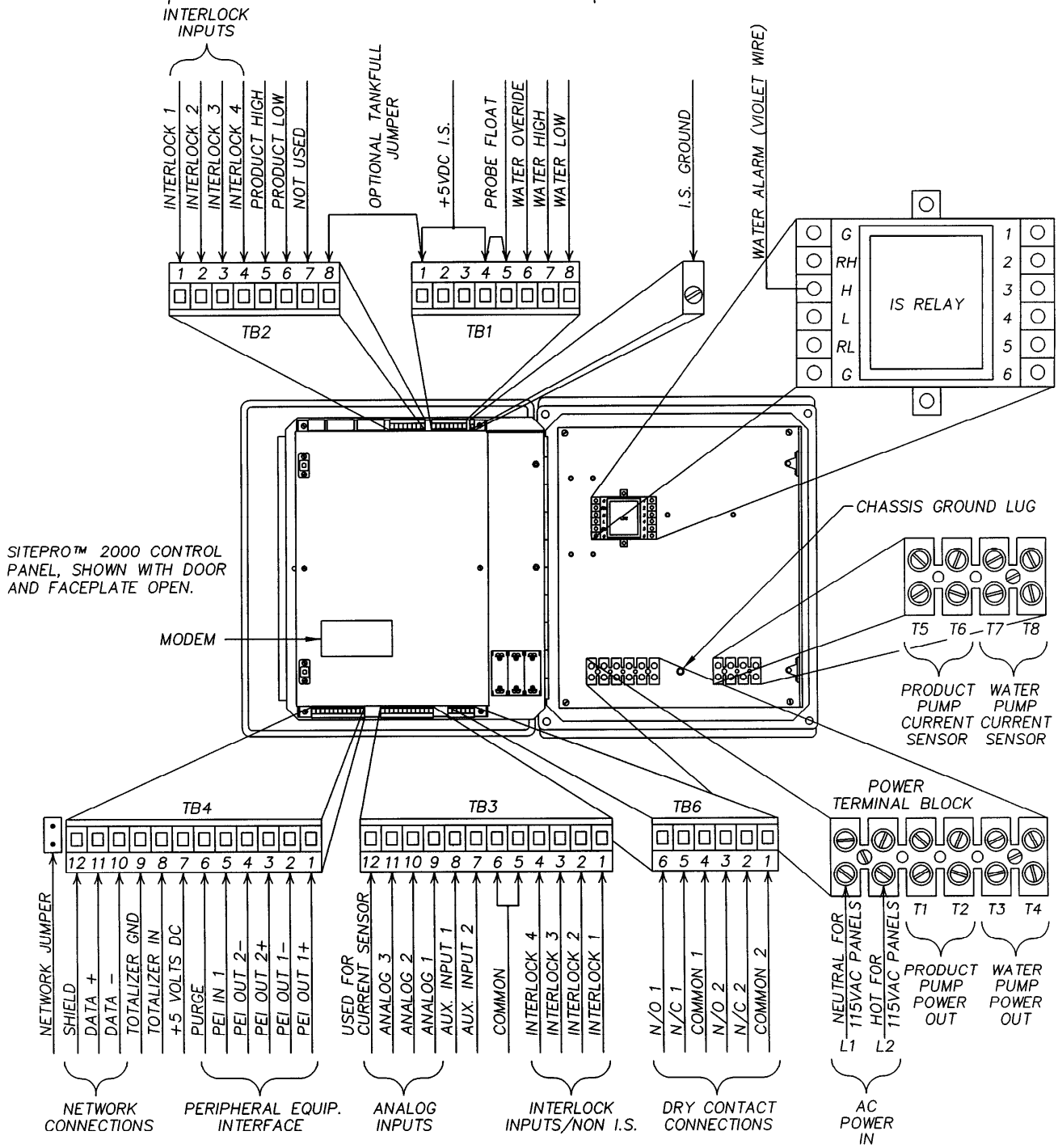


Figure 8

Install Intrinsically Safe Ground

Run a separate ground wire from the intrinsically safe ground lug to a good earth ground. The I.S. grounding lug is located next to TB1 on the back of the panel faceplate.



The *intrinsically safe* ground wire must be kept separate from the chassis ground.

The ORS SITEPRO™ panel enclosure is equipped with access ports to facilitate wiring. See figure 2 (in Chapter 1) for locations of access ports. The port on the side of the enclosure is for all ***intrinsically safe*** wiring. All other wiring, including incoming power and pump connections must be routed through the access port in the bottom of the enclosure.



To maintain the NEMA 4 weatherproof characteristics of your panel after wiring has been completed, seal all wiring access ports with weatherproofs conduit hubs.

Wire Incoming Power

Run power wires through the port at the bottom of the enclosure and attach to the terminal block on the chassis behind the faceplate (figure 8). Attach the power leads to terminals L1 and L2. In 115VAC systems, wire power leads to the “HOT” and “NEUTRAL” terminals as shown in figure 8. Attach the ground wire to the grounding lug next to the terminal block. Check tightness of terminal screws.



The ORS SITEPRO™ 2000 circuit board shield (behind faceplate) is equipped with a label that shows the locations of all terminals and configuration dip switches. Refer to this label (and figure 8) throughout the panel wiring procedures described in this chapter.



Do not run power wires within two inches of ***intrinsically safe*** (IS) wires or terminals. Refer to figure 8 for location of IS terminals (at top of panel), and reference ***NEC*** Article 508 for relevant codes.

Wire Pump

Run the pump power wires through the port at the bottom of the enclosure and attach to the PUMP POWER OUT terminals (figure 8). Attach the ground wire to the chassis grounding lug next to the terminal block. Check tightness of terminal screws. For wiring instructions specific to your pump and blower, refer to the blueprint Field Wiring Diagram these items.



Refer to your pump manual and heed all relevant Warnings and Cautions.

Wire Blower

Run the blower power wires through the port at the bottom of the enclosure and attach to the BLOWER POWER OUT terminals (figure 8). Attach the ground wire to the chassis grounding lug next to the terminal block. Check tightness of terminal screws. For wiring instructions specific to your pump and blower, refer to the blueprint sized Field Wiring Diagram provided with these items.



Refer to your air stripper or SVE manual and heed all relevant Warnings and Cautions

Wire WTDP Probe

The ORS SITEPRO™ 2000 Blower/Pump Control Panel is designed for use with either a standard density actuated WTDP probe or an ORS LO-PRO™ Air Stripper sump level probe. When the ORS SITEPRO™ is being used to control a blower and an influent feed pump, the WTDP probe is wired to the panel as shown in figure 9. This probe uses three separate switches (HI, LO, & LO-OVERRIDE) to monitor water level in the well. The HI and LO switches control the normal ON/OFF cycling of the pump while the LO-OVERRIDE switch shuts off the pump in the event of a control system failure.

Run the probe cable through the access port on the side of the enclosure and attach its leads to IS terminal strips TB1 & TB2 as shown in figure 9.



Conductivity actuated probes can be used only with the addition of a relay. Call Geotech for further information.

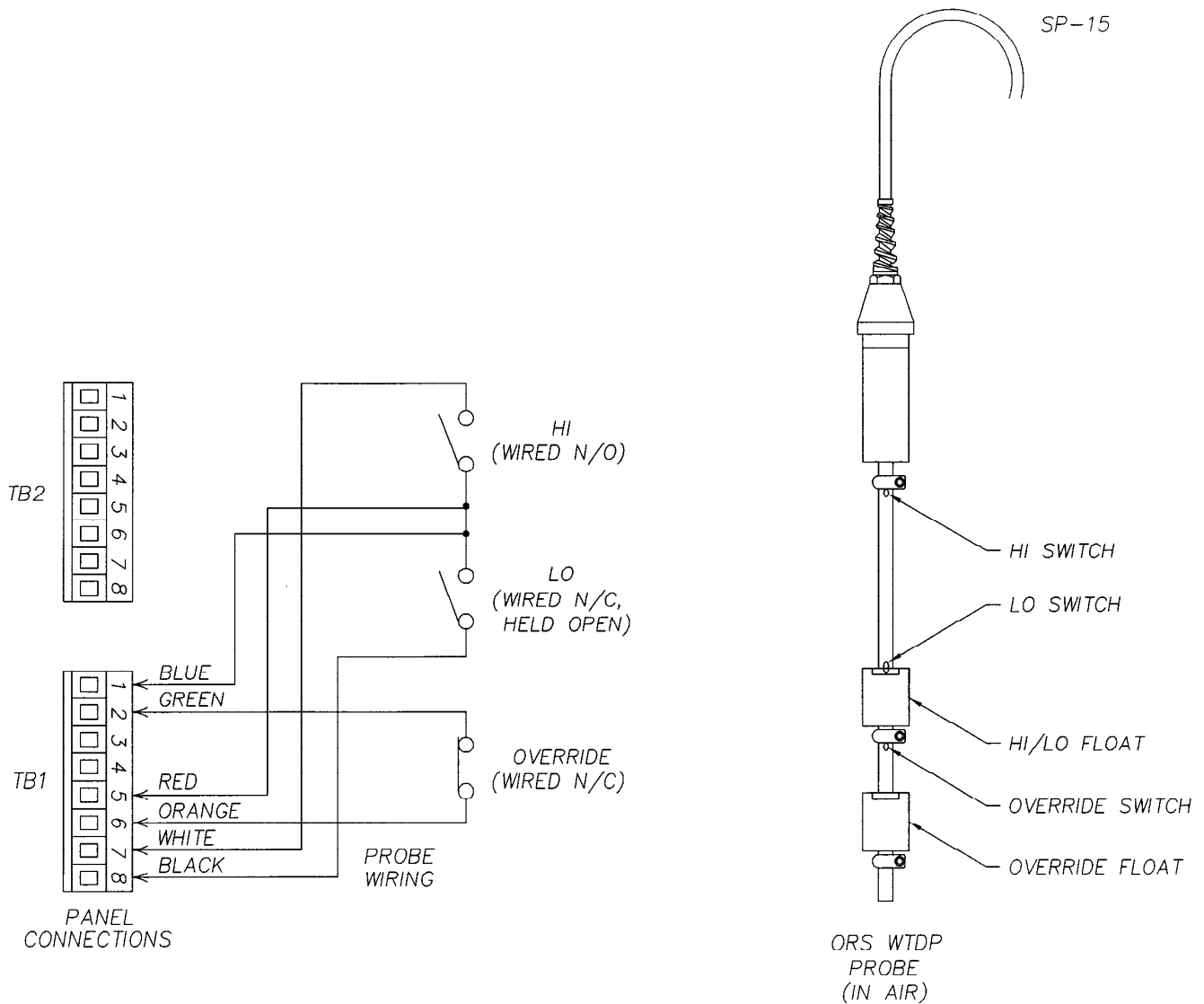


Figure 9

Before wiring an older ORS probe to the ORS SITEPRO™ panel, it will be necessary to cut the connector from the probe cable. After wiring the probe to the panel as shown in figure 9 (above), attach a jumper wire from terminal #5 on TB2 (red wire) to any of the +5VDC I.S. terminals on TB1.

Wire Sump Probe & Pressure Switches

When the ORS SITEPRO™ is being used to control an air stripper blower and a transfer pump, the ON/OFF cycling of the pump is controlled by a sump level probe mounted in the air stripper sump. The probe also has a HI-OVERRIDE sensor that can shut off an optional feed pump if the water level in the air stripper sump rises too high and threatens to flood the blower.

If your ORS SITEPRO™ 2000 Blower/Pump Control Panel is being used with an ORS LO-PRO™ II Air Stripper, the sump probe and the pressure switches are pre-wired into a junction box as shown in figure 10. Wire from the junction box to TB1 and TB2 inside the ORS SITEPRO™ panel as shown in figure 10.

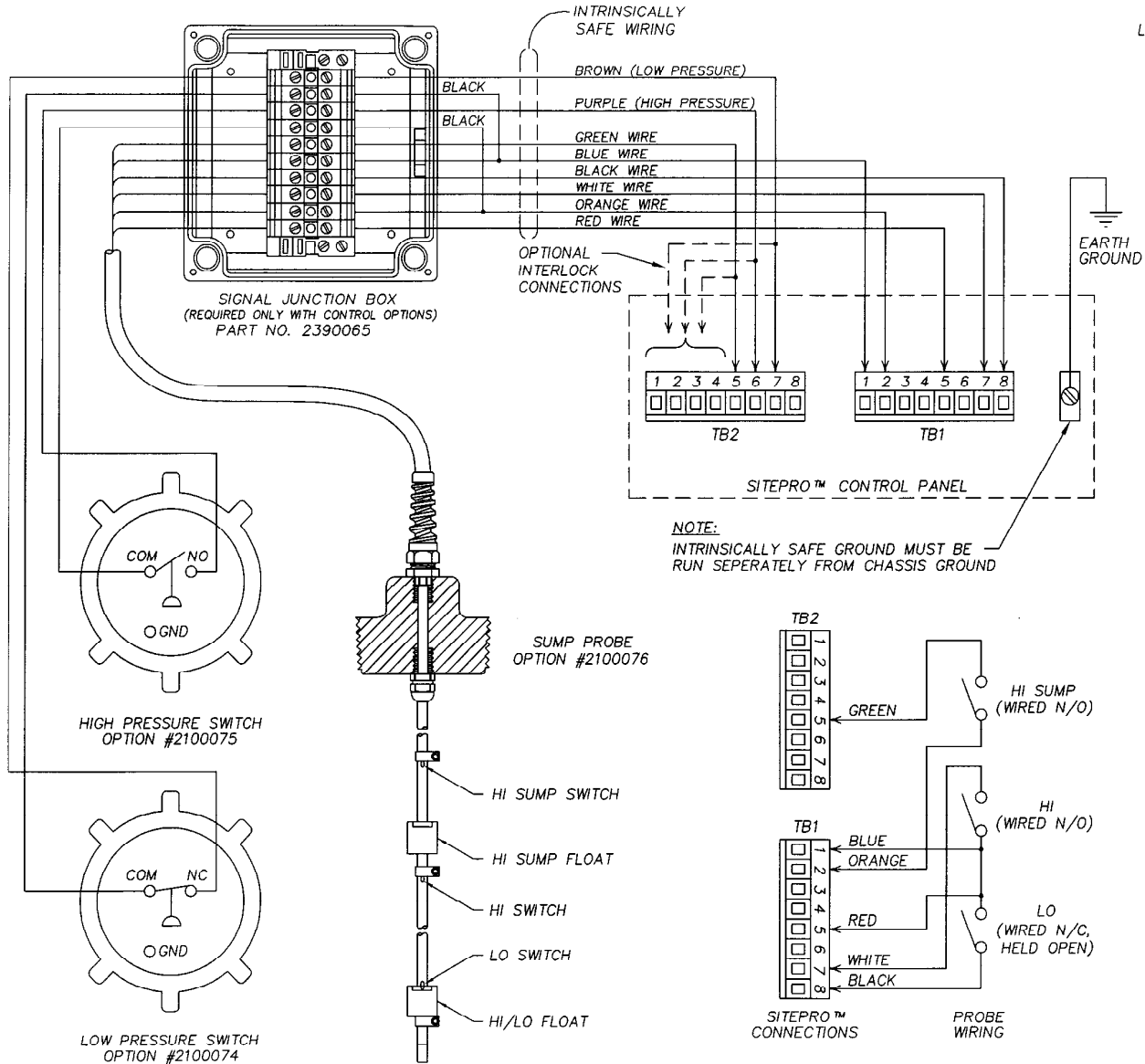


Figure 10



To shut off an optional feed pump in the event of a High Sump Level or High/Low Pressure condition, the inputs for each of these functions must be jumpered to an **alarm channel** as explained in Appendix D: Application Notes.

Wire Interlocks

The ORS SITEPRO™ 2000 has four **intrinsically safe** and four non-intrinsically safe **interlock** inputs available for attachment of external **interlock** devices to the panel **alarm channels**. Geotech suggests that a maximum of two interlocks be wired to a channel, when two interlocks are wired to the same channel, both must be wired either **Normally Open**, or **Normally Closed**. If both switches are wired normally closed, however, both switches must open for the panel to respond with an alarm on that Interlock channel.



Never wire both a **Normally Open** and a **Normally closed interlock** device to the same channel. Doing so could cause the panel to either lock in alarm or be unable to read an alarm.



Wire each **interlock** device to the ORS SITEPRO™ panel as follows:

1. Run the **intrinsically safe** interlock wires through the access port on the side of the ORS SITEPRO™ enclosure. Run non-intrinsically safe **interlock** wires through the port at the bottom of the enclosure. Use 20-25 AWG wire in all cases.
2. For **intrinsically safe interlocks**, attach one wire to terminal 1, 2, 3 or 4 of TB2 and the other to one of the +5VDC intrinsically safe terminals on TB1. For non-intrinsically safe **interlocks**, attach one wire to terminal 1, 2, 3 or 4 of TB3 and the other to one of the COMMON terminals on TB3.

Refer to figure 11 (below) for an example of interlock wiring.

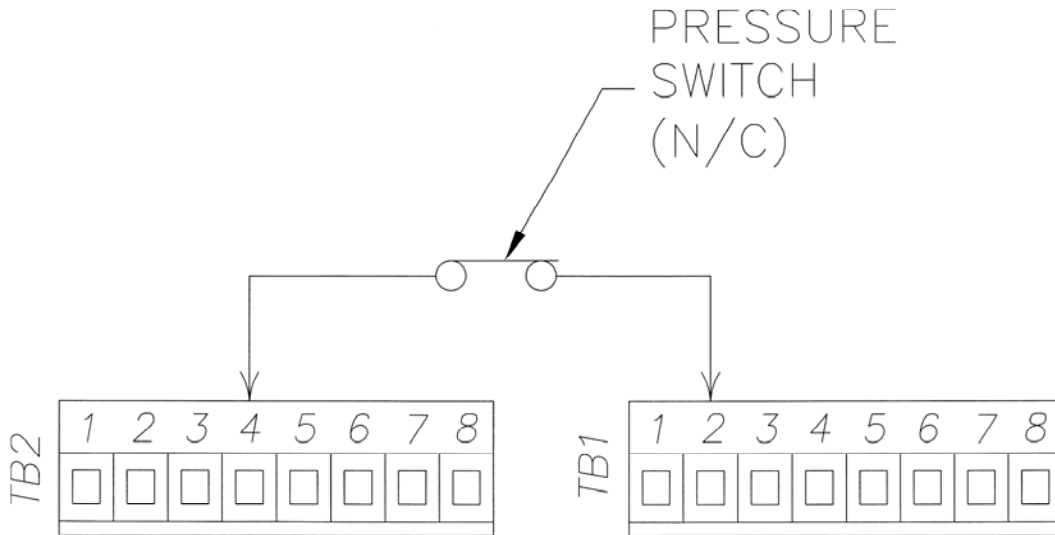


Figure 11



In this example, **Normally Closed** pressure switch is wired to **intrinsically safe** terminal strips TB1 and TB2. Because the switch is wired to terminal 4 on TB2, an alarm will be generated on Channel 4 when the switch opens. The second wire from the switch could be attached to any of the +5VDC **intrinsically safe** terminals on TB1.

As your interlocks are installed, keep track of which ones are wired **Normally Open** and which are **Normally Closed**. This information will be required for completion of the system configuration procedures described in Chapter 3.

Wire Network Connections

To wire two or more ORS SITEPRO™ panels together into a network, use a high quality shielded twisted pair cable and wire as shown in figure 12 (below). Wire the conductors from terminals 10 & 11 of TB4 on one panel to the same terminals on the next. On all but the last panel in the network, connect the shield to the terminal 12 on TB4. Do not splice shield segments together.

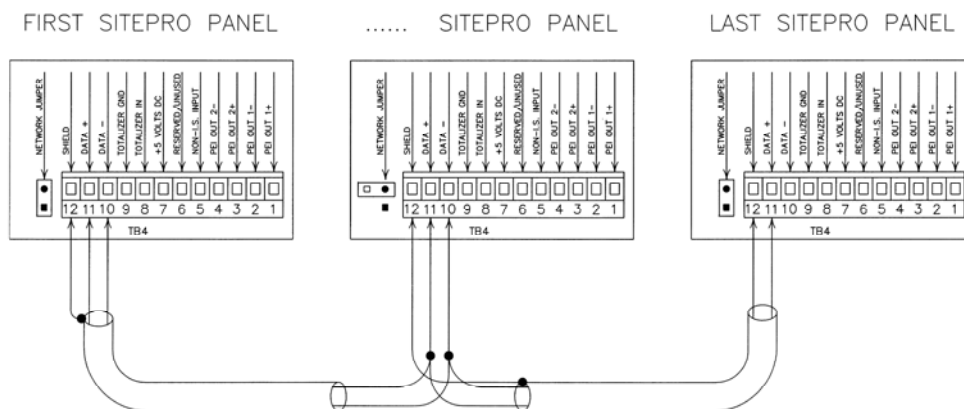


Figure 12

Always wire number to number (color to color) when establishing network connections between panels. The maximum network wire run cannot exceed 3000' (1000M).

After the **network** wiring connections have been made, the start and termination of the network must be designated by installing jumpers on the first and last panel in the **network**. Each ORS SITEPRO™ 2000 panel is equipped with a 2-pin jumper located next to TB4 (see figure 12). On the first and last panel in the **network**, lift the jumper cap from the pins and reinstall it so that both pins fit into the cap.

Wire Dry Contact Outputs

The ORS SITEPRO™ 2000 features **Normally Open** and **Normally Closed** 100 mA **dry contact** outputs that can be used to trigger a wide variety of external devices including relays, visual indicators, buzzers, and security system alarms. Two sets of **Form C dry contact** outputs are provided on TB6. The example in figure 13 shows a security system alarm panel wired in a **Normally Closed** configuration to TB6 of the ORS SITEPRO™ 2000. The **Form C** outputs are shown schematically (dashed box).

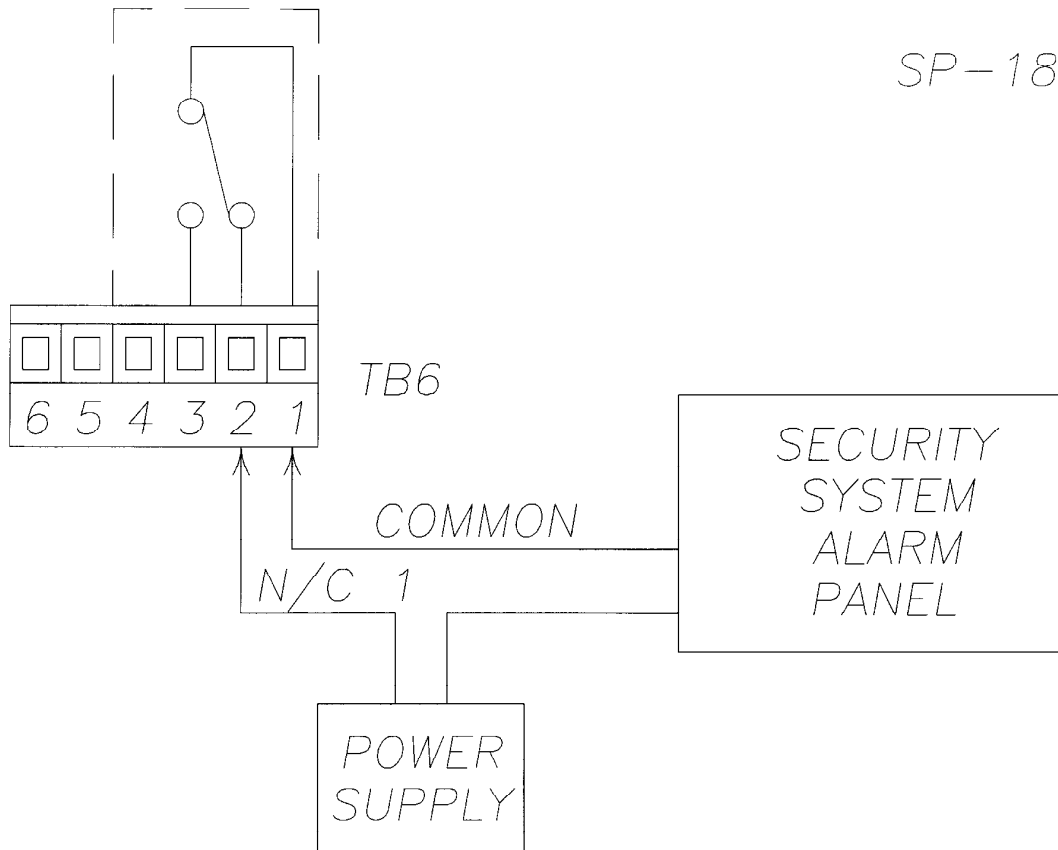


Figure 13

Wire Analog Inputs

Analog input devices (pressure transducers, thermocouples, etc.) can be interfaced with the telemonitor equipped ORS SITEPRO™ 2000 if they are wired into the **analog** input connections on TB3 (see figure 9). Figure 14 shows how a pressure transducer might be wired to the ORS SITEPRO™. Note that the transducers power supply must be provided by the customer or purchased from Geotech.

Wire Totalizer

Terminals 8&9 on TB4 are available for wiring a totalizer to an ORS SITEPRO™ panel that is equipped with the telemonitoring option. Totalizers must supply a 0 to 5-24VDC pulse to the control panel. The pulse should be generated by a solid state device (i.e. an open collector output). The pulse should be 1 msec wide minimum. The maximum rate of pulses accepted by the panel is 120 pulses/gallon at 20 gpm this corresponds to 40Hz.

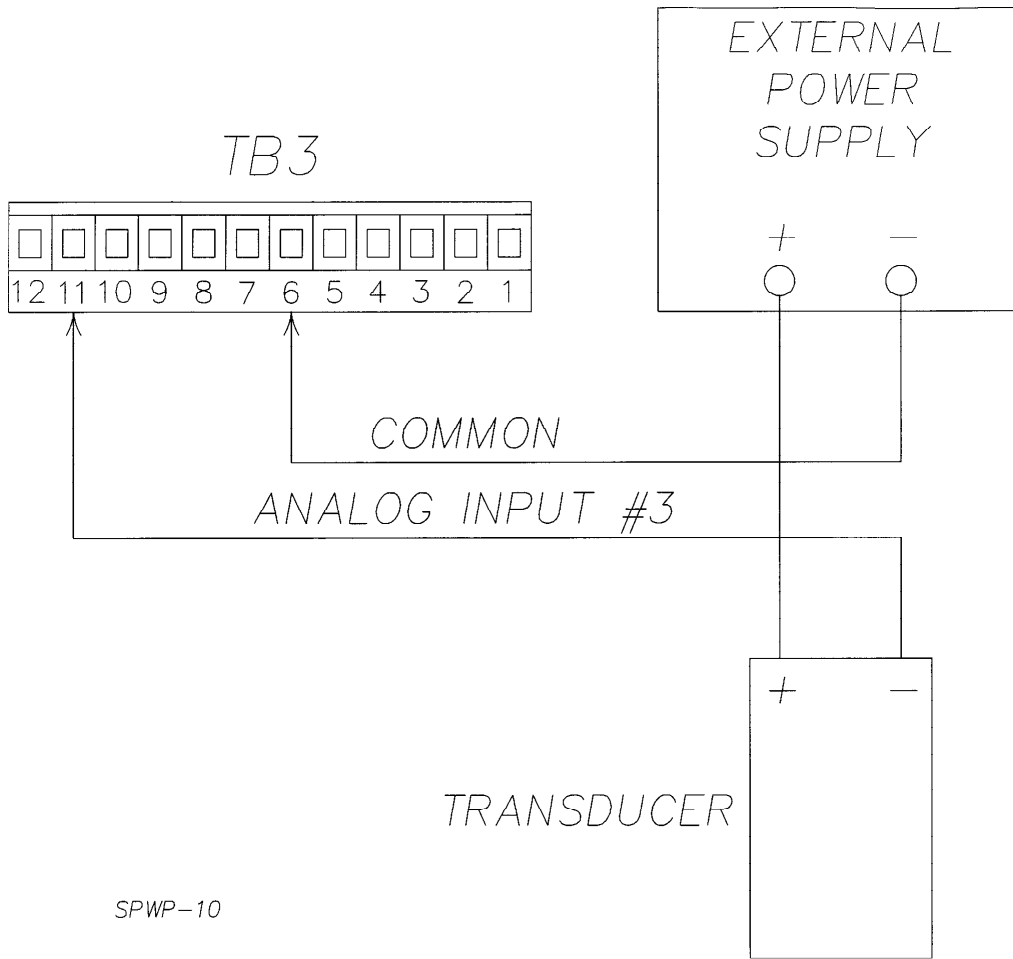


Figure 14

Connect Modem

If your ORS SITEPRO™ 2000 is equipped with the telemonitoring option, plug your phone jack into the receptacle of the panel modem. Refer to figure 9 for location of modem connections.



In lightning prone areas, have your electrician install a phone line lightning arrester. Contact your telephone company for further information.

Wire Current Sensors

To provide current sensing for 3-phase blowers or pumps, install the current sensors included with the control panel. Each sensor must be installed around one leg of the blower or pump motor power wiring as shown in figure 15. Then run the sensor leads into the ORS SITEPRO™ control panel and wire to the terminal block provided. Secure the current sensor with a nylon tie wrap.



A sensor for single phase pumps is already mounted inside the control panel (if the motor is less than 2-1/2 HP @ 230VAC or 1 HP @ 115VAC). When wiring the pump to the panel, run one leg of the pump power wiring through the current sensor as shown in the Field Wiring Diagram.

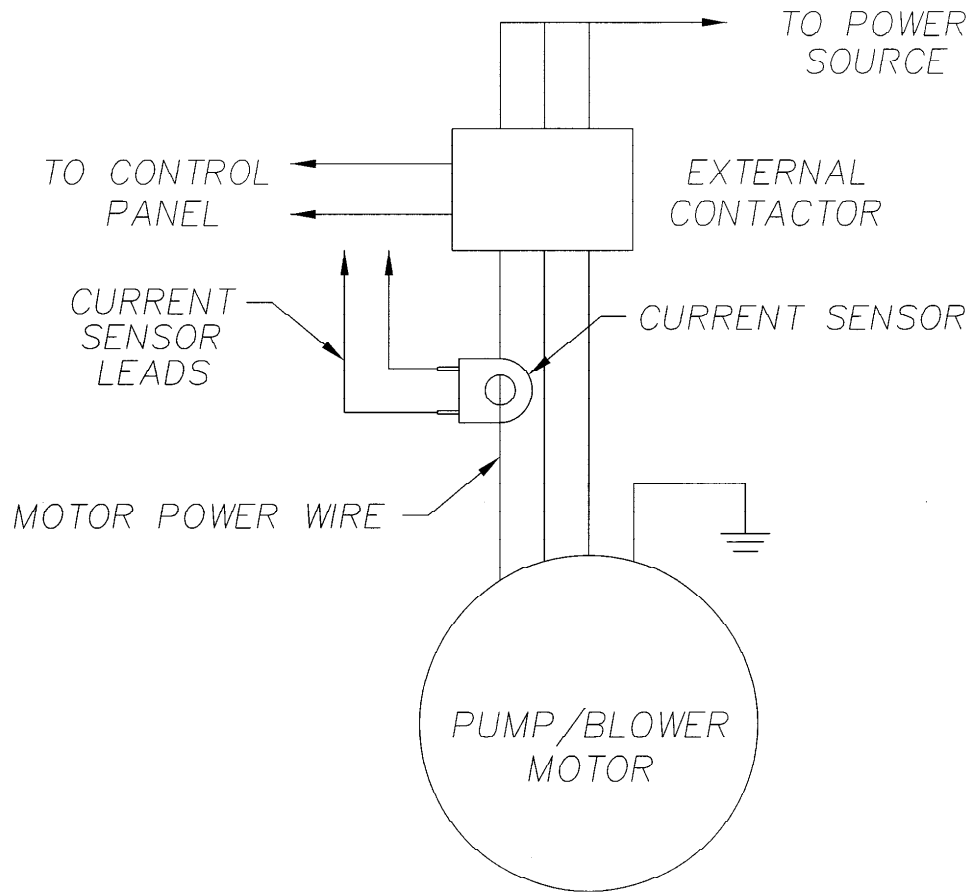


Figure 15

Wire Thermal Overloads

Additional thermal overload protection for your blower can be obtained by wiring from the Normally Closed thermal overload contacts of your blower external motor starter to the ORS SITEPRO™ panel. Wire to input terminals 5 and 7 on TB3 after removing the existing jumper.



When a blower thermal overload is sensed (blower thermal overload contacts open), the blower will shut down and the THERMAL OVERLOAD indicator on the panel will be illuminated.

Set Blower Time Delay

As delivered from the factory, the panel is wired to shut down the blower 3 minutes after a High or Low Pressure condition is detected. The time delay can be reduced to 7 seconds by installing a jumper between terminals TB4-5 and TB4-7.

Chapter 3: System Configuration

Introduction

The ORS SITEPRO™ 2000 has a wide range of capabilities and can be configured on site to match your specific remediation requirements. As you will see as you work through this chapter, the panel configuration procedure is quite straightforward and simple. However, before configuring panels that are part of a complex multi-panel network, it will be necessary to carry out a certain amount of planning and site organization.

Network Configuration Sheet

To aid you in the design and configuration of multi-panel networks, Geotech provides a Network Configuration Sheet (See Appendix A). This sheet allows the user to specify **network addresses**, **interlock** hookups and **network** connections for up to 16 ORS SITEPRO™ control panels. Once the Network Configuration Sheet has been filled out, it can be used as a guide for configuration of the individual panels in the **network**.



Before attempting to configure your ORS SITEPRO™ panel, read all the information in this chapter and then fill out the Network Configuration Sheet included in Appendix A at the back of the manual.

Panel Configuration Sheet

During the panel configuration procedures described in this chapter, you will be changing the settings of some of the dip switches shown in figure 16. Geotech recommends that you carefully document the final configuration of each of your ORS SITEPRO™ 2000 panels by using the blank Panel Configuration Sheet provided in Appendix A at the back of this manual. Once filled out, this sheet will be a permanent record of your configuration and can be used as a check against inadvertent or unauthorized configuration changes. Being sure to update this sheet is essential to troubleshooting and must be available for reference whenever you call Geotech for technical assistance.

CONFIGURATION SWITCHES

The configuration process is a simple matter of setting the CONTROLLER ADDRESS, LOGIC and SEND/RECEIVE dip switches mounted on the back side of the panel faceplate. See figure 16 for switch locations.

CONTROLLER ADDRESS SWITCHES

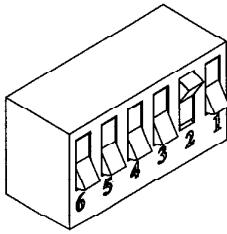
Function:

The CONTROLLER ADDRESS switches (mounted on switch S3) are used to 1) configure the panel as either a Master or a Slave, and 2) provide a **network address** for each panel in the **network**. The six individual dip switches are labeled 1-6. Switch 2 is used to configure the panel as a Master (switch set to ON) or as a Slave (switch left in OFF position). Dip switches 3-6 are used to set the **network address** of each Slave panel or, if the panel is a Master, to indicate the total number of Slave panels in the network. Switch 1 is not used.

When Used:

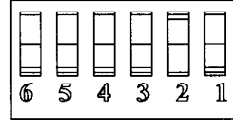
Set the CONTROLLER ADDRESS switches only when the panel is part of a multi-panel **network**.

CONTROLLER
ADDRESS SWITCH
MASTER/SLAVE
SWITCHES



OFF
↑
ON

1 2 4 8
VALUE VALUE VALUE VALUE
ADDRESS ADDRESS ADDRESS ADDRESS
MASTER/SLAVE
NOT USED



SW3

LOGIC Switches

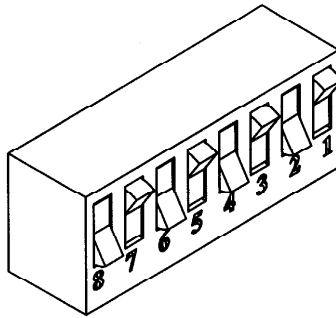
Function:

The LOGIC switches (mounted on switch S5) are used to configure the ORS SITEPRO™ to interpret the **Normally Open** (N/O) or **Normally Closed** (N/C) status of the interlock devices wired to the panel. Each of the four pairs of dip switches is associated with one of the four **alarm channels**. As delivered from the factory, the LOGIC dip switches are set in the N/C position as shown on the left.

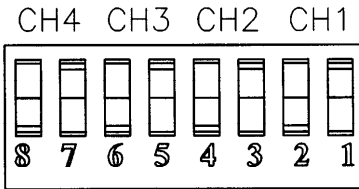
When Used:

Set the Appropriate LOGIC switches whenever external interlock devices are wired to the panel.

LOGIC SWITCH



OFF
↑
ON



SW5

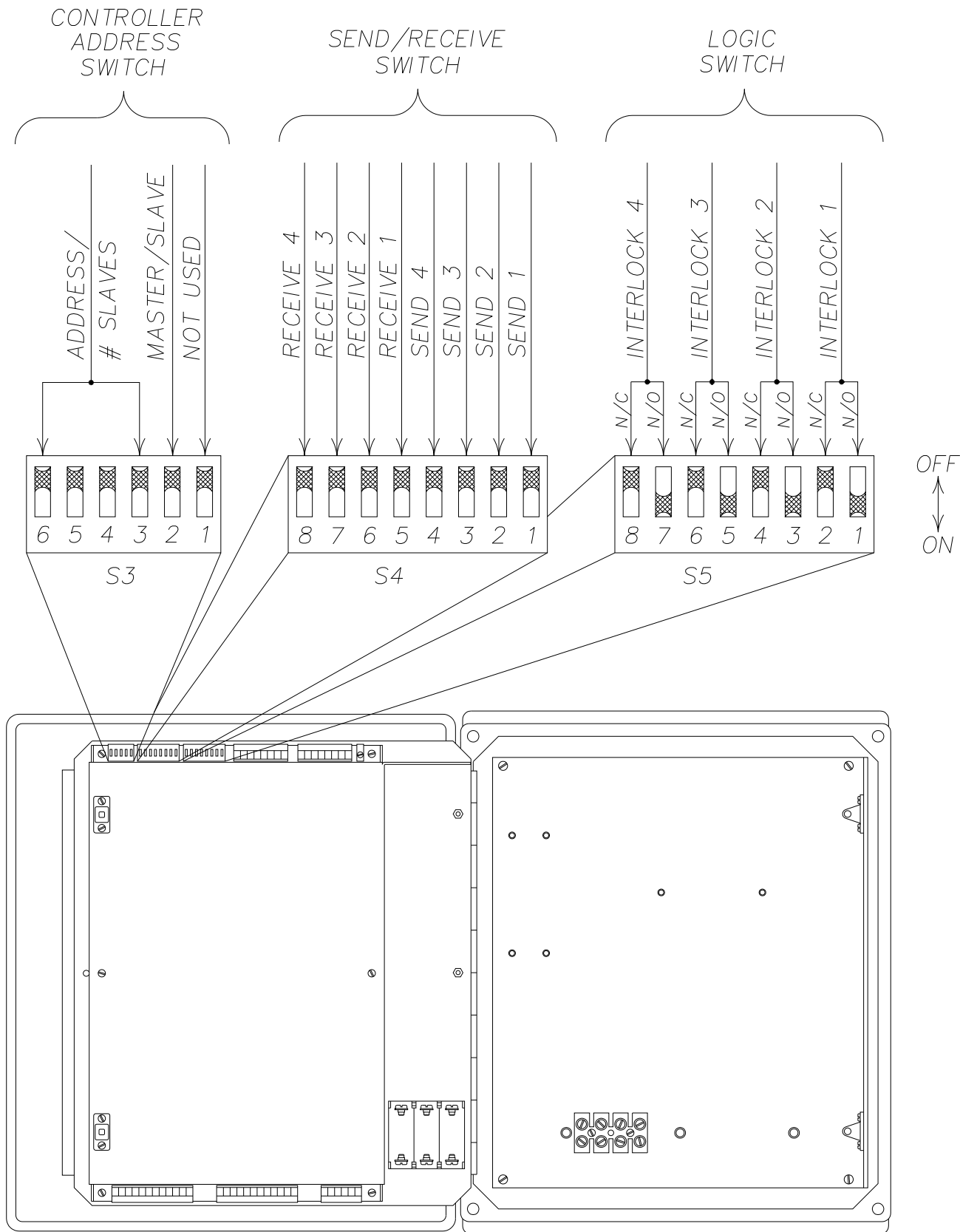


Figure 16

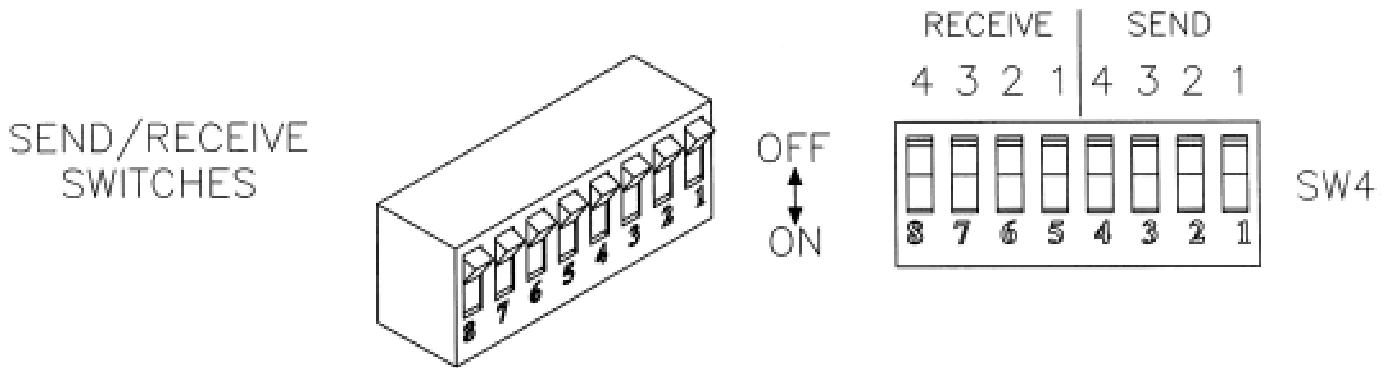
SEND Switches

Function:

The SEND dip switches are mounted along with the RECEIVE dip switches on switch S4 (see figure 16). The settings of the SEND switches determine whether or not alarms are broadcast to other panels on the **Interlock Communication Bus**. The four SEND dip switches are numbered 1-4 and correspond to ORS SITEPRO™ **alarm channels 1-4**, respectively.

When Used:

Set one or more SEND switch whenever a panel requires the capacity to shut off other panels in a multi-panel network.



RECEIVE Switches

Function:

The settings of the RECEIVE dip switches determine whether or not a panel is shut off by alarms generated locally by external interlock devices or received from other panels over the Interlock Communication Bus. The four RECEIVE dip switches are numbered 5-8 and correspond to ORS SITEPRO™ alarm channels 1-4 respectively.

When Used:

Set one or more RECEIVE switch when you want a panel to be shut down either by a local interlock device or by an alarm received from another panel.

PANEL CONFIGURATION PROCEDURES

The following sections provide step by step instructions for configuring your ORS SITEPRO™ 2000 panel. Throughout the remainder of this chapter, refer to figure 16 for locations of all configuration switches and to the System Configuration Flowchart (figure 17) for an overview of panel configuration procedures.



Before changing the setting of any configuration dip switch, turn the CONTROL POWER switch to OFF. After configuring the panel, turn the switch back to ON.

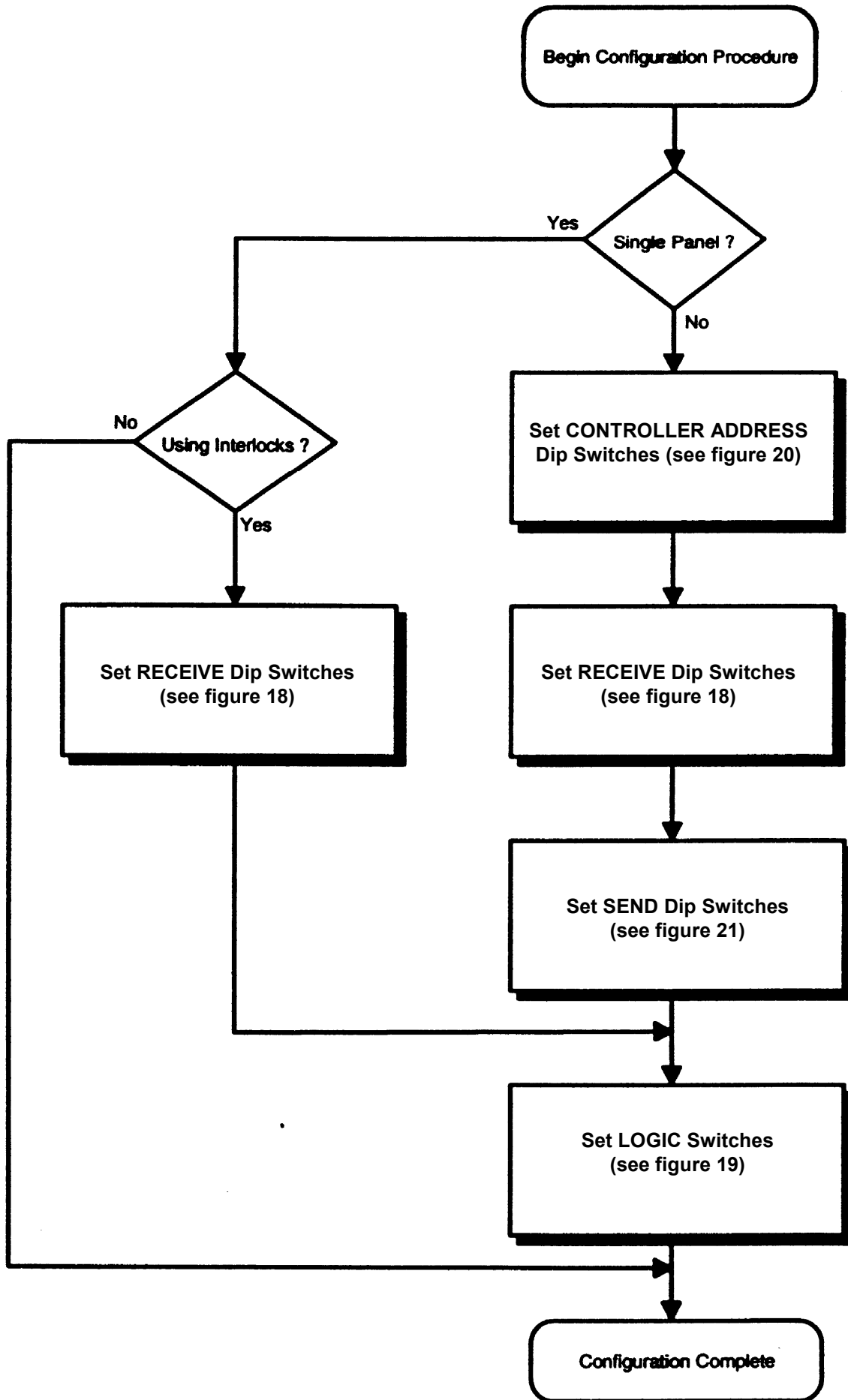


Figure 17

Single Panel Applications

Basic Pump Control

If you have a single ORS SITEPRO™ panel that is being used strictly as a blower/water pump controller and has no external interlock or network connections, no system configuration is required. Proceed directly to Chapter 4 for startup and operation instructions.

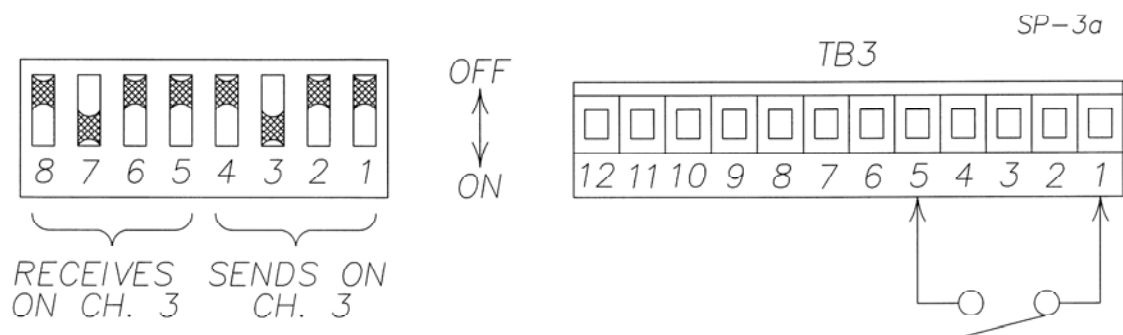
Configuring for Interlocks

If you are using a single ORS SITEPRO™ panel with external interlock devices, the panel must be configured to receive the sensor input and react appropriately. This is accomplished by setting the RECEIVE and LOGIC dip switches as detailed in the flowcharts in figures 18 and 19.

Set RECEIVE Switches

Set the RECEIVE switches according to the flowchart figure 18.

The four dip switches on the RECEIVE switch are numbered 5-8 and coincide with **alarm channels** 1-4, respectively. The switches also coincide with **interlock** input terminals 1-4 on terminal strips TB2 and TB3. See figures 8 and 16 for terminal and switch numbering. For example, if an external **interlock** device is wired to terminals 1 and 5 (common) on connector TB3, turn RECEIVE dip switch 5 to the ON position as shown below.



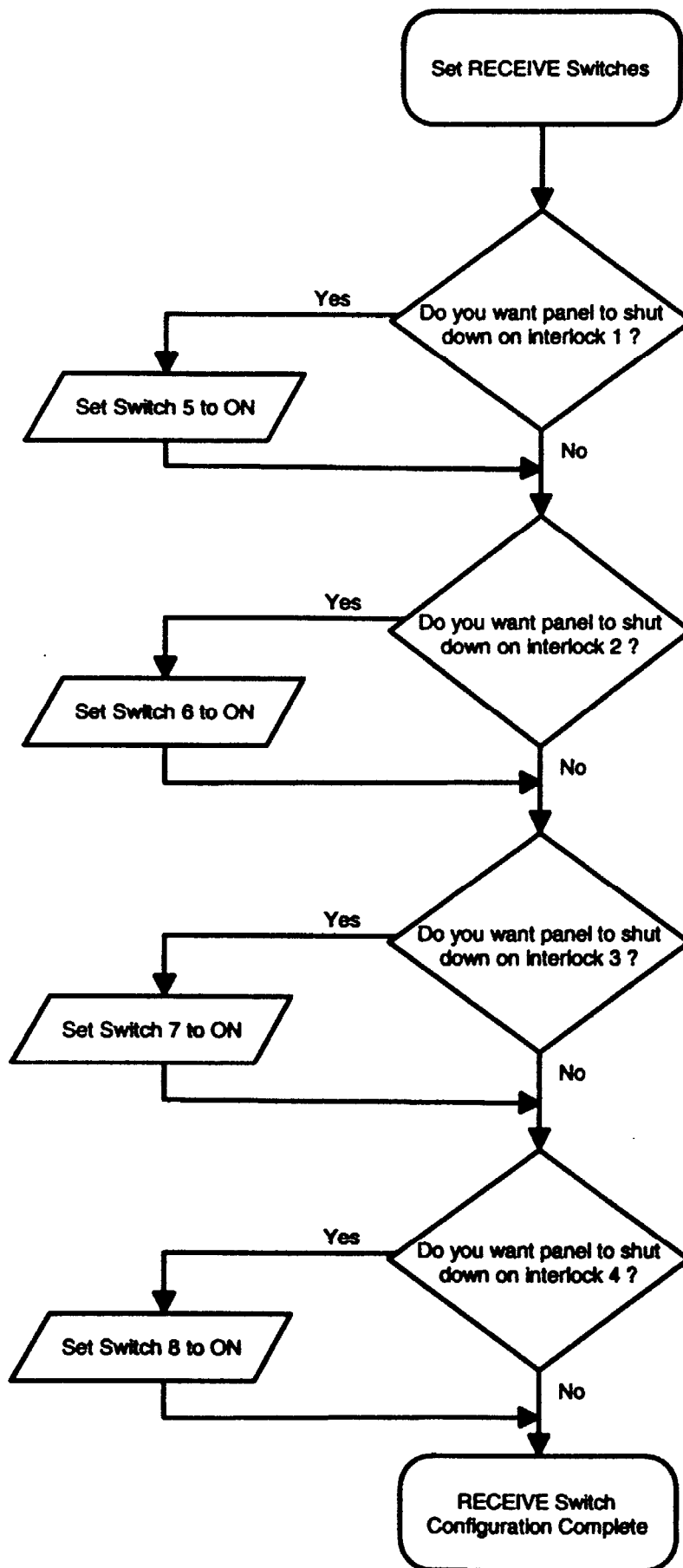


Figure 18

This will connect the external **interlock** device **alarm channel** 1 and will permit the panel to react to signals generated by this device.



When setting dip switches, use the tip of a ball point pen to move the switch levers.



If a RECEIVE dip switch for a particular **alarm channel** is left in the OFF position, the panel cannot be shut down by an alarm on that channel. However, it is important to understand that even if a RECEIVE dip switch is set to the OFF position, any alarms on that channel will enter the panel and can then be broadcast to other panels in the **network**, (as long as the send switch for that channel is set to ON). In other words, the RECEIVE switches do not control the flow of information on the **network**, rather they determine how each panel reacts to incoming information.

Set LOGIC Switches

Set the LOGIC dip switches according to the flowchart in figure 19.

Each external interlock device attached to the ORS SITEPRO™ 2000 is wired either **Normally Open** (N/O) or **Normally Closed** (N/C). The LOGIC switches are used to configure the panel to interpret the switching status of these devices and incorporate two dip switches (N/O and N/C) for each of the four **alarm channels**.

Configuring the LOGIC switches is a simple matter of selecting either the N/O or N/C setting for each channel to which an external **interlock** device is attached. For example, if a **Normally Open interlock** device is wired to **alarm channel** 3, locate the channel 3 section of the LOGIC switch (dip switches 5 & 6) and set the N/O switch (dip switch 5) to the ON position. Turn the N/C switch (dip switch 6) OFF.

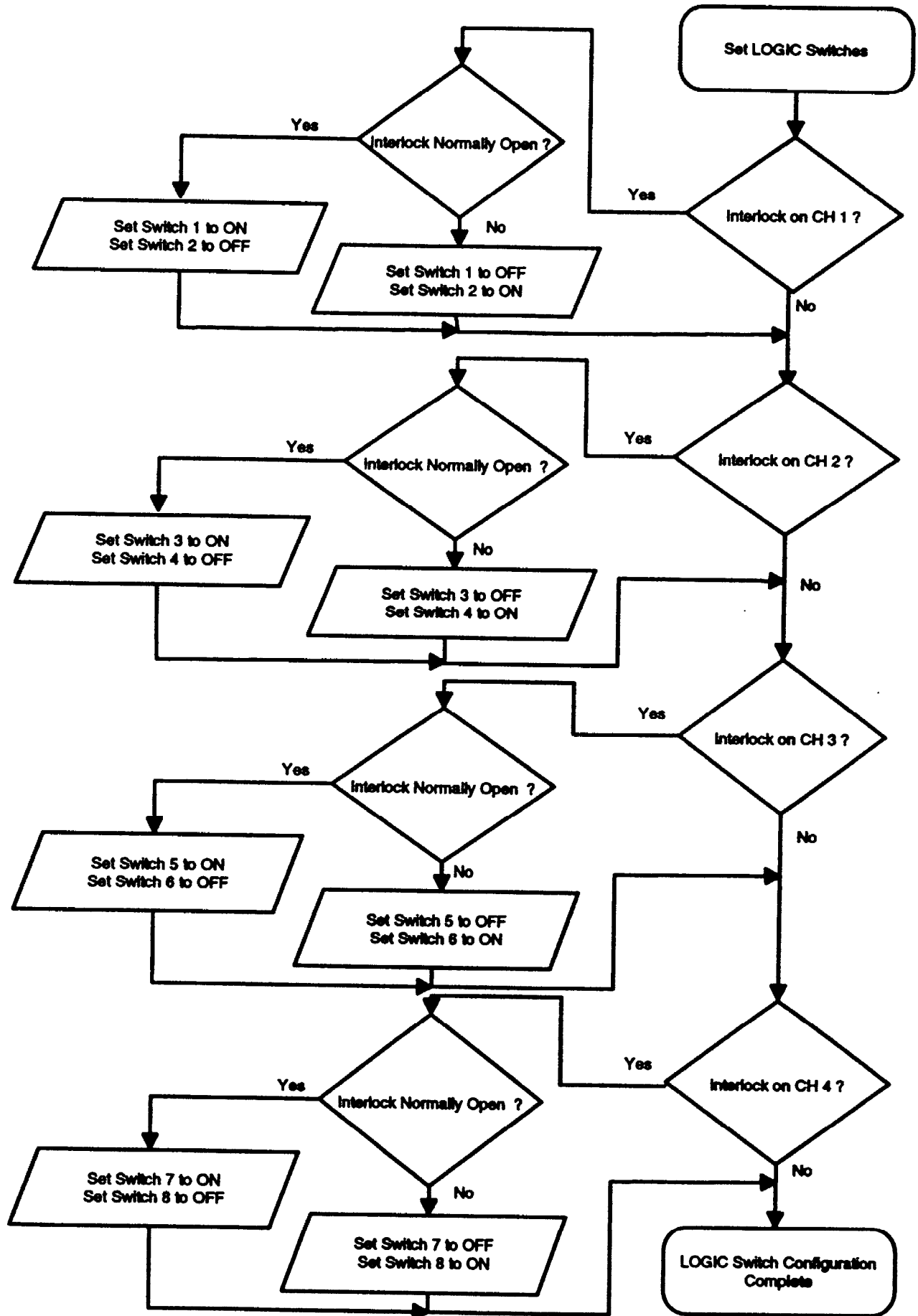


Figure 19



If possible, wire external **interlock** devices **Normally Closed** so that they open on alarm. Such circuits are fail safe in that an alarm will be generated if a wire is broken.



When configuring the LOGIC switch for a channel, never set both the **Normally Open** and **Normally Closed** switches to the ON or OFF position. Doing this could cause the panel either to lock in alarm or be unable to read an alarm.

Network Applications

When multiple pumps or blowers are used together at a remediation site, it is often desirable to tie the control panels together into a coordinated **network**. The ORS SITEPRO™ embedded software will support networks of up to 16 control panels.

Configure the ORS SITEPRO™ 2000 for **network** operation by setting the CONTROLLER ADDRESS, LOGIC and SEND/RECEIVE switches.

Set CONTROLLER ADDRESS Switches

An important step in configuring ORS SITEPRO™ 2000 **network** is to organize the flow of information on the **Interlock Communication Bus** to prevent lost signals resulting from the simultaneous broadcast of multiple alarms. This is done by designating one panel as **network** Master and by assigning a unique **network address** to each of the remaining Slave panels.

The Master then polls the Slaves in a set sequence determined by the numerical order of the **network addresses** and allow each Slave to broadcast any alarms it has received from external **interlock** devices.

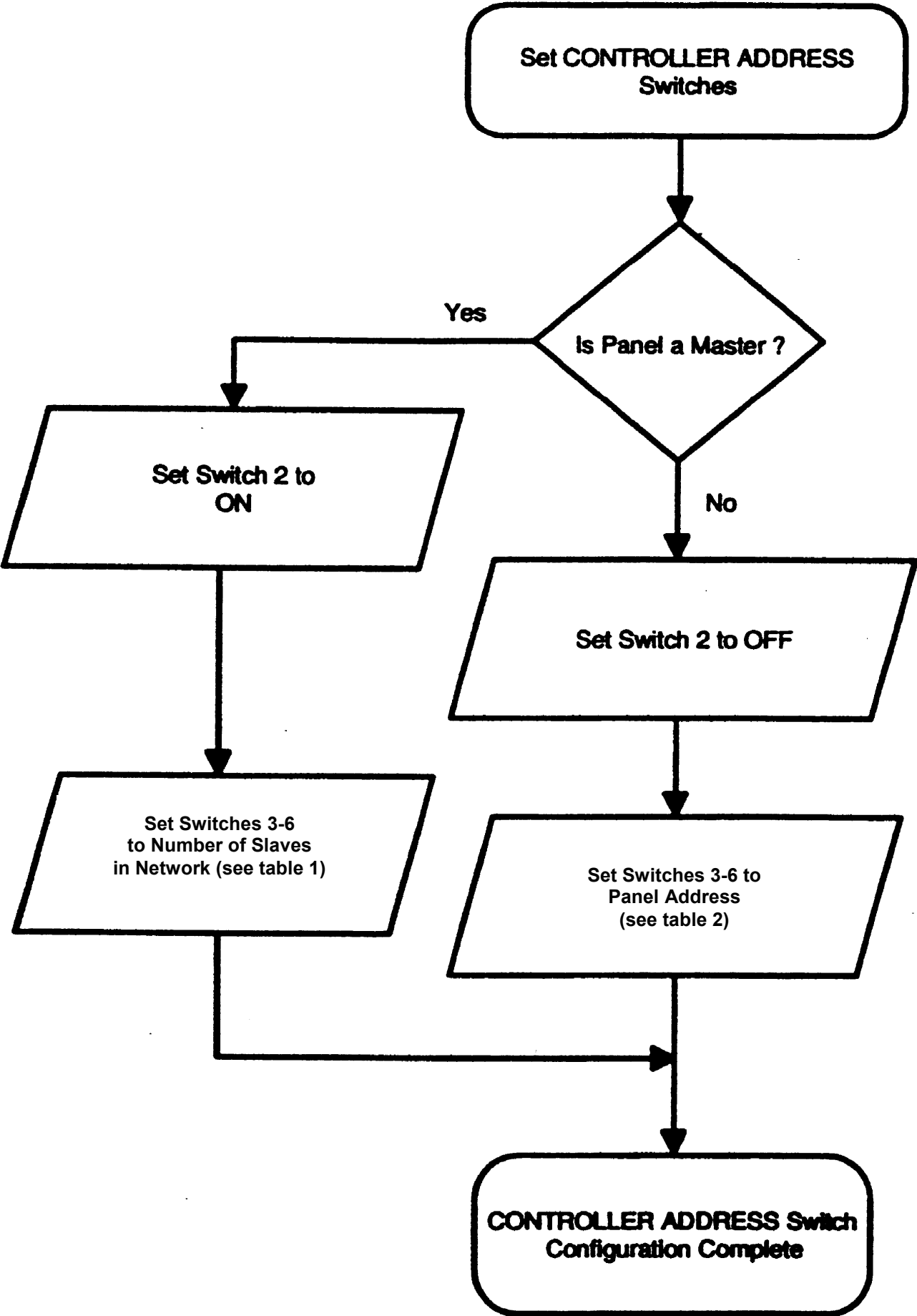


Figure 20

The settings of dip switches 3-6 are determined by using the tables below. Use Table 1 for Master panels and Table 2 for Slave panels.

If the panel is to be configured as a Master, set dip switch 2 to ON and set dip switches 3-6 to indicate the total number of Slaves in the **network** (maximum of 15). Table 1 provides dip switch settings for each of the possible numbers of Slaves in the **network**.

If the panel is to be configured as a Slave, set dip switch 2 to OFF and set dip switches 3-6 to indicate the **address** of the panel on the network. Use Table 2 to determine the settings of dip switches 3-6 on Slave panels.

MASTER PANELS

Number of Slave Panels in Network	Settings for Dip Switches 3-6			
	6	5	4	3
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Table - 1

SLAVE PANELS

Number of Slave Panels in Network	Settings for Dip Switches 3-6			
	6	5	4	3
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

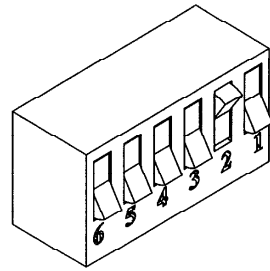
Table -2



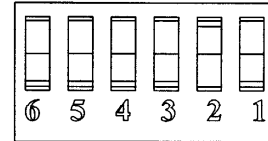
Start at the lowest address (1) and work up (top to bottom in Table 2 with each Slave panel configured.

In Example #1 the controller address switch settings indicate that the panel is a Master and that there are 12 Slave panels in the **network**.

CONTROLLER
ADDRESS SWITCH
MASTER/SLAVE
SWITCHES



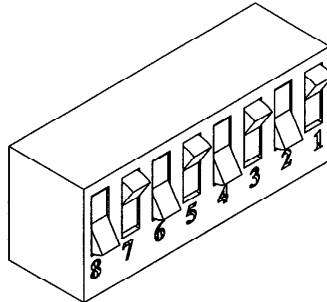
OFF
↑
ON



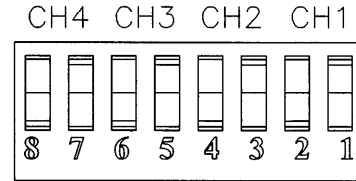
SW3

In Example #2 (below), the switch settings indicate that the panel is a Slave and that it has been allocated the **network address** of 2.

LOGIC SWITCH



OFF
↑
ON



SW5

Set Logic Switches

Configure the logic dip switches exactly as you would for single panel systems. For each external interlock device wired to the ORS SITEPRO™ panel, the corresponding logic switches must be set for either **Normally Open** or **Normally Closed** status.



As mentioned in the section on single panel configuration, wire external **interlock** devices **Normally Closed** so that they open on alarm. Such circuits are fail safe in that an alarm will be generated if wire is accidentally broken.

Set Receive switches

In multi-panel **networks**, the procedure for setting the receive dip switches is exactly the same as that used for single panel applications. However, it should be emphasized that in **network** applications, alarms can be generated either by local external **interlock** devices wired directly to the panel or by alarms broadcast by other panels on the **Interlock Communication Bus**. For example, if the Channel 1 dip switch (dip switch 5) is set to ON, the panel will be shut down if, 1) a local interlock device wired to Channel 1 generates an alarm, or 2) one of the other panels in the network broadcasts an alarm on Channel 1. Therefore, the question that must be asked when setting a panels receive dip switches is, "Under what conditions do I want this panel to shut down?" Refer to your Network Configuration Sheet and Set the RECEIVE dip switches according to the flowchart in figure 18.

Set Send switches

The settings of the send Switches determine which panels in the **network** can be shut down by alarms present on the **alarm channels** of the panel being configured. These four dip switches are labeled 1-4 to correspond with the four **alarm channels**. Refer to your Network Configuration Sheet and set the SEND dip switches according to the flowchart in figure 21.



When a send dip switch is set to the ON position, any alarm on that channel will be broadcast on the **Interlock Communication Bus**. However, only those panels on the **network** whose RECEIVE switches are configured to "listen" to that channel will react to the alarm.

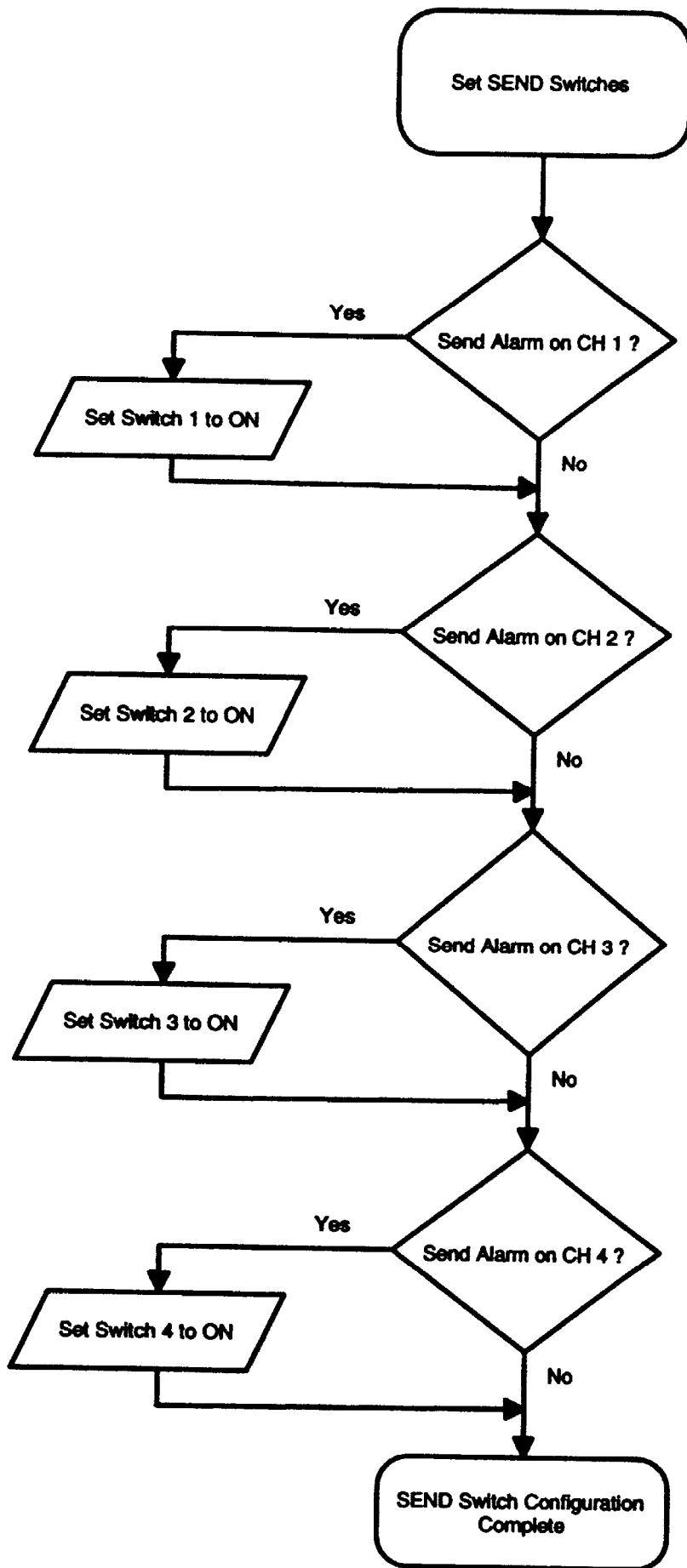


Figure 21

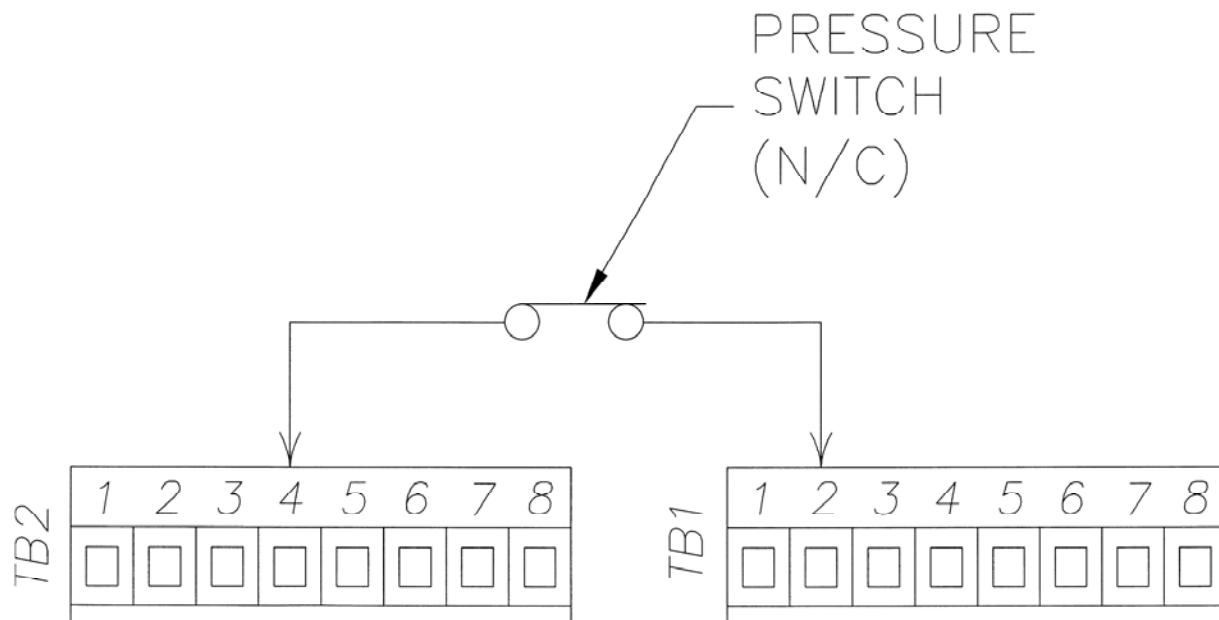
Network Configuration Example

The following example describes a simple ORS SITEPRO™ **network** and shows how the controller address, logic and send/receive switches are configured to achieve the desired system behavior.

This example refers to the simple two panel network shown in figure 5 (in chapter 1). In the example, a water pump controlled by an ORS SITEPRO™ 2000 Water Table Depression Pump Control Panel delivers contaminated water to a LO-PRO Air Stripper™. After passing through the air stripper, the water is delivered by a transfer pump to a carbon tank. The air stripper blower and the transfer pump are controlled by an ORS SITEPRO™ Blower/Pump Control Panel. A high pressure shutoff switch is mounted in the tank and wired to Panel #1 (the Master). This panel is then linked to Panel #2 (the Slave) so that a high pressure condition can shut off both panels.

Interlock & Network Wiring

The high pressure switch is wired to **intrinsically safe interlock** input 3 on TB2 and to terminal 2 on TB1 of Panel #1 as shown below. The network connection is made between terminals 10, 11 & 12 on TB4 of Panel #1 to the corresponding terminals on Panel #2.



System Operation Sequence

1. The Normally Closed high Pressure switch wired to Channel 3 of Panel #1 opens.
2. Because Panel #1 is configured to receive on Channel 3, Panel #1 shuts off.
3. Because Panel #1 is configured to send on Channel 3, an alarm is broadcast on Channel 3 of the ICB.
4. Because Panel #2 is configured to receive on Channel 3, Panel #2 shuts off.

As demonstrated above, an individual ORS SITEPRO™ panel is easy to configure. Although the example used in this chapter referred to a very simple ORS SITEPRO™ 2000 network, the switch setting procedures described are exactly those used to configure more complex networks.

Remember to Document Your Configuration

Whenever you configure an ORS SITEPRO™ 2000 panel, always record the switch settings on the Panel Configuration Sheet provided in Appendix A at the back of this manual. Good housekeeping habits are especially critical when you are configuring a complicated multi-panel **network**.

Chapter 4: System Operation

As is explained in Chapter 1 of this manual (see figure 2), the ORS SITEPRO™ 2000 can be operated in any one of the following three user interface modes:

1. Manual Operation Mode
2. Local Communication Mode
3. Remote Communication Mode

This chapter provides all the information required to manually operate the ORS SITEPRO™ 2000 Blower/Pump Controller in either single panel or network environments. If your system includes the optional telemonitoring features, refer to the ORS SITEPRO™ Manager software manual for information on operating in the Local Communication or Remote Communication modes.

PANEL CONTROL & INDICATORS

The following sections describe the functions of all the controls and indicators used by the ORS SITEPRO™. Refer to figure 21 for locations of controls and indicators on the panel faceplate.



Figure 21

The ORS SITEPRO™ 2000 Blower/Pump Control Panel combines the functions of two panels in one, the descriptions of controls and indicators presented below are organized into separate Pump and Blower sections. Controls and indicators associated with general panel functions (System Test, etc.) are described in a separate section under the heading General Panel Functions, below.

GENERAL PANEL FUNCTIONS

CONTROL POWER Switch

The CONTROL POWER switch controls distribution of power to the panel's microprocessor. When this switch is in the OFF position, no power can reach the system control circuitry, switches or indicators.

SYSTEM TEST Button

Single Panel Applications

In single panel applications, the SYSTEM TEST button activates the ORS SITEPRO™ 2000 self-test routine. Self-test is automatically activated each time the panel is powered up or is manually activated whenever the SYSTEM TEST button is pushed. Self-test consists of the following checks.

- Check all indicators. (SYSTEM FAULT indicator blinks if problem found).
- Perform RAM test. (Checks all memory locations for proper function; SYSTEM FAULT indicator blinks if problem found).
- Perform ROM test. (Checks program memory; SYSTEM FAULT indicator blinks if problem found).
- Perform A/D test. (Checks A/D converter; SYSTEM FAULT indicator blinks if problem found).
- Perform Clock test. (Checks accuracy of clock; system fault indicator blinks if problem found).
- Perform Purge test. (Checks panel purge pressure in purged panels; SYSTEM FAULT indicator blinks five times if pressure is low).

Network Applications

When your ORS SITEPRO™ panel is part of a **network**, the SYSTEM TEST button provides an additional **alarm** diagnostic feature. When the button is pressed, the ALARM ENGAGED indicator blinks the **alarm channels** of all the **alarms** present on the **Interlock Communication Bus** in the order in which they occurred, the sequence is repeated three times. If the button is pressed again, the sequence above repeats.

SYSTEM STATUS Indicators

The SYSTEM STATUS indicators provide information on the **Interlock Communication Bus** (ICB), aid in the diagnosis of system errors and display the power status of the panel. Indicator functions are described below:

MAIN POWER

When illuminated, power is reaching the system **microprocessor**. When blinking, the panel is waiting to get on the ICB.

ALARM ENGAGED

This indicator provides information on the status of the panels **alarm channels**. During routine panel operation (SYSTEM TEST button not pressed), the indicator can be in any one of the three states;

Off - No alarms are being received by the panel either from local **interlock** devices or from the **Interlock Communication Bus**.

Steadily Illuminated - The panel has been shut down by an alarm broadcast on the **Interlock communication Bus**.

Blinking - The panel has received an **alarm** from an **interlock** connected directly to the panel. The panel may or may not be shut down depending upon the setting of it's receive switch. The indicator will fast blink after a manual reset until all alarms are cleared.



In **network** applications, the ALARM ENGAGED indicator can be used to detect and trace **alarms** on the **Interlock Communication Bus**. If the SYSTEM TEST button is pressed once, the ALARM ENGAGED indicator will blink to indicate which **alarm channels** have been activated. The **alarm channel** codes (one blink = channel 1, etc.) will be displayed in the order in which they originally occurred. For example, if a tank high level **alarm** on Channel 1 shut down a pump that caused a subsequent high level **alarm** on Channel 2, the ALARM ENGAGED indicator would blink once, pause, and then blink twice. This sequence will be repeated three times.



If no alarms are present on the **Interlock Communication Bus**, the panel will go into its self-test routine when the system test button is pushed.

SYSTEM FAULT

When flashing, the panel self-test procedure has detected an error. Refer to "PROBLEM SOLVING"(Chapter 6) for error code interpretation.

REMOTE STATUS Indicators

This section of the panel faceplate is dedicated to functions related to the telemonitoring option.

CALL IN PROGRESS

This indicator is steadily illuminated whenever the modem is in use for either an incoming or outgoing call. Do not use the **RS-232** Serial Port while the CALL IN PROGRESS indicator is illuminated. Doing so will terminate any ongoing call and may cause the local access capability to malfunction. When blinking, the CALL IN PROGRESS indicator alerts the user to a fault in the telemonitoring electronics. Call Geotech for assistance.

PUMP CONTROL FUNCTIONS

PUMP POWER Switch

The PUMP POWER switch operates the circuit breaker for the pump. When this switch is turned to the ON position, power is applied to its pump whenever the control relay is closed. When the PUMP POWER switch is turned to the OFF position, power cannot be applied to the pump regardless of the settings of any other panel controls.



Before working on the pump, the operator must (1) turn the PUMP POWER switch to OFF (2) turn the CONTROL POWER switch to OFF and (3) secure the panel door according to standard lockout/tagout procedures.

PUMP CONTROL switch

This is a three position switch with hand, off and auto positions.

HAND

In the hand position, the pump control switch overrides sensor input and applies power directly to the pump.

AUTO

In the Auto position, ON/OFF switching of the pump is controlled by sensor input. The pump starts when the probe's HI/LO float is in the HI position. The pump will continue to run until the float falls to the LO position. If a probe fault prevents the pump from shutting off, the OVERRIDE float (if used) drops and de-energizes the control relay.

OFF

In the off position, the pump will not run and the PROBE STATUS indicators are nonfunctional.

PUMP CONTROL Indicators

These indicators monitor the setting of the pump control switch and provide information on the status of each pump.

AUTO

The yellow auto indicator is illuminated whenever the pump control switch is in the auto position. If the pump control switch fails, the auto indicator will blink.

WATER PUMP RUNNING

When steadily illuminated, the pump is running.

PROBE STATUS Indicators

These three indicators allow the user to monitor the status of the downwell probe (feed pump applications) or sump/drum probe (transfer pump applications). These indicators are not functional if either the PUMP control or CONTROL power switch is in the off position. Indicator functions are described below:

HIGH

When illuminated, the HI/LO float is at the top of its travel or is on its way down. The pump should be running.

LOW

When illuminated, the HI/LO float is at the bottom of its travel or is moving up. The pump should be off.

OVERRIDE

When steadily illuminated, the OVERRIDE float has dropped and shut off the pump. Reset the panel by turning the PUMP STATUS switch to OFF and then back to AUTO.



If the PUMP STATUS switch is in either the HAND or AUTO position, the AUTO, PUMP RUNNING and PUMP STATUS indicators are functional even if the PUMP POWER switch is in the OFF position. This feature facilitates probe placement during system deployment.

- FUNCTIONS

BLOWER POWER Switch

The BLOWER POWER switch operates the circuit breaker for the blower. When this switch is turned to the ON position, power is applied to the blower whenever the control relay is closed. When the BLOWER POWER switch is turned to the OFF position, power cannot be applied to the blower regardless of the settings of any other panel controls.



Before working on the blower, the operator must (1) turn the BLOWER POWER switch to OFF (2) turn the CONTROL POWER switch to OFF and (3) secure the panel door according to standard lockout/tagout procedures.

BLOWER CONTROL Switch

This is a three position switch with RESET, OFF and RUN positions.

RUN

In the RUN position, the blower runs continuously but can be shut off by a SYSTEM PRESSURE (High or Low) condition or by a THERMAL OVERLOAD. HIGH SUMP/DRUM LEVEL is monitored and can be used to shut down the blower if configured as an interlock (see Chapter 3).

OFF

In the OFF position, the blower will not run. HIGH SUMP/DRUM LEVEL is monitored.

RESET

The RESET position is used to reset the panel after a THERMAL OVERLOAD, HIGH SUMP/DRUM LEVEL or SYSTEM PRESSURE condition has occurred. To clear alarm interlocks received by the panel, the BLOWER CONTROL switch must be held in the RESET position while the PUMP CONTROL switch is toggled from AUTO to RUN, this issues a “clear interlocks” command and the ALARM ENGAGED indicator will blink quickly. Once this indicator stops blinking, the BLOWER CONTROL switch can be set back to the RUN position.

BLOWER CONTROL Indicators

These indicators monitor the setting of the BLOWER CONTROL switch and provide information on the status of the blower.

RUN

The green RUN indicator is illuminated whenever the BLOWER CONTROL switch is in the RUN position. If the BLOWER CONTROL switch fails, the RUN indicator will blink.

BLOWER RUNNING

When the blower is running the indicator will be steadily illuminated.

BLOWER STATUS Indicators

THERMAL OVERLOAD

If the blower motor thermals have been wired directly to the panel as explained in Chapter 2, the THERMAL OVERLOAD indicator will be illuminated in the event the blower shuts down because of a thermal overload. This condition is cleared by turning the BLOWER CONTROL switch to RESET and then back to RUN.



Before restarting the blower, determine and rectify the cause of the thermal overload.

SYSTEM PRESSURE

If either a High or Low Pressure signal is received by the panel, the SYSTEM PRESSURE indicator will be illuminated, the blower will shut down and the feed pump will shut down (if tied to an interlock). If the shutdown was caused by a Low Pressure condition, the indicator will blink and the blower will stop immediately. If the shutdown was caused by a High Pressure condition, the indicator will be steadily illuminated and the blower will stop after a time delay of 3 minutes.



If a jumper is installed between terminals TB4-5 and TB4-7, the blower will stop after 7 seconds.

A second time delay prevents the SYSTEM PRESSURE feature from shutting down the blower during the first 5 seconds of operation. This permits the blower to build normal pressure during startup. The SYSTEM PRESSURE condition is cleared by turning the BLOWER CONTROL switch to RESET and then back to RUN.

HIGH SUMP/DRUM LEVEL

In air stripper/transfer pump applications, this indicator is illuminated if the air stripper sump fills and lifts the OVERRIDE float on the sump level probe. In SVE/knockout drum pump applications, the indicator is illuminated if the knockout drum becomes full and activates the high level switch.

In air stripper/transfer pump applications, neither blower nor transfer pump is shut down by a HIGH SUMP signal. However, both can be shut down if the signal is tied to an interlock.

SYSTEM PRECHECK PROCEDURES

Check Wiring

Before starting the system, carry out the following precheck procedures to familiarize yourself with the controls and confirm correct operation.

1. Refer to the wiring diagrams in Chapter 2 and check all wiring connections to the panel.
2. With the PUMP CONTROL and BLOWER CONTROL switches in the OFF position, turn the PUMP POWER, BLOWER POWER and CONTROL POWER switches to ON.
3. Press the SYSTEM TEST button. All the panel indicators should be illuminated briefly as the microprocessor goes through its self-test routine.



If the SYSTEM FAULT indicator comes on after the SYSTEM TEST button has been pushed, the self-test routine has detected a fault in the panel electronics. Document the problem as instructed in Chapter 6, and call Geotech for assistance.

4. Briefly turn the PUMP CONTROL switch to HAND. The pump should start and the PUMP RUNNING indicator should be illuminated.
5. Return the PUMP CONTROL switch to OFF and completely submerge the probe in a bucket of water.
6. Turn the PUMP CONTROL switch to AUTO. The pump should start and both PUMP RUNNING and AUTO indicators should be illuminated. The HIGH PUMP STATUS indicator should also be illuminated.
7. Stop the pump by lifting the probe out of the bucket.
8. Once it has been established that the probe will shut off the pump, disconnect the pump by turning the PUMP POWER switch to the OFF position. Since all indicators will continue to function normally as long as the CONTROL POWER switch is ON, disconnecting the pump will permit further testing of the probe without the risk of damaging the pump by running it dry.
9. Completely submerge the probe in water. The HIGH probe indicator will be illuminated as will the PUMP RUNNING indicator. Slowly withdraw the probe from the bucket. The PUMP RUNNING indicator will remain illuminated until the HI/LO float drops to the LO sensor. When this happens, the LOW probe indicator will be illuminated and the PUMP RUNNING indicator will turn off.
10. Raise and lower the probe in the bucket so that the HI and LO sensors on the probe alternately switch the PUMP RUNNING indicator on and off. This sequence simulates normal ON/OFF cycling.
11. With the PUMP CONTROL switch still in the AUTO position, check the OVERRIDE function as follows. Remove the probe from the bucket. Obtain a thin piece of wire and insert it through the probe shell to hold the OVERRIDE float in the DOWN position. Turn the probe upside down in air. After a time delay of 4-7 seconds, the PUMP RUNNING indicator should go out. Reset the OVERRIDE function by turning the PUMP CONTROL switch to OFF and then back to AUTO.
12. Test the PROBE FAULT feature by disconnecting the TB2 plug from its board connector while the PUMP RUNNING indicator is illuminated. The PUMP RUNNING indicator should go out and the SYSTEM FAULT indicator will blink six times.

Use similar procedures to test the sump level probe or knockout drum high level switch.

Once precheck procedures have been completed, the ORS SITEPRO™ 2000 control panel is ready for operation.



If your panel is running a feed pump, the pump intake should be positioned at least 5' (1.5 m) below the level of drawdown. This will minimize intake of contaminated water. To prevent false OVERRIDE signals, suspend the probe at least 3' (1 m) above the pump intake.

SINGLE PANEL STARTUP

1. With the pump and BLOWER control switches in the off position, turn on the pump power, BLOWER POWER and control power switches.
2. After the panel has gone through its self-test procedure, turn the BLOWER control switch to RUN. The blower should start.
3. Once the blower is running, turn the PUMP CONTROL switch to AUTO. The pump will cycle on and off as the water level rises and falls in the well, sump or knockout drum.



Downwell feed pumps should be purged if free hydrocarbon is present in the well. To do this, place the output hose in a container and run the pump on HAND until the water runs clear. Dispose of hydrocarbon according to local codes.

4. With the pump running on AUTO, reduce the rate of cycling to a minimum by adjusting the pumping rate.

Refer to the specifications provided with your pump and confirm that the volume of water passing through it is sufficient for adequate cooling.

NETWORK STARTUP

1. On each Slave panel in the **network**, turn the PUMP and BLOWER CONTROL and POWER switches to OFF while turning the control power switch to on. Each slave will then go through its own self-test routine and will begin blinking its MAIN POWER indicator.
2. Make the same switch settings on the Master panel. After going through its self test routine, the Master will begin blinking its Main power indicator. The Master will then:
 - a. Check the number of Slaves on the **network** against the setting on its CONTROLLER ADDRESS switch. See Chapter 3 for switch configuration procedures.
 - b. Poll slaves at their pre-programmed **network addresses** until each is accounted for and connected to the **network**. The Slaves are polled in ascending numerical order as determined by their **network addresses**.

As each Slave comes on the **network**, its MAIN POWER indicator stops blinking and remains steadily illuminated. If a Slave cannot be located by the Master or suffers a fault that prevents it from coming on the **network**, the Master's MAIN POWER indicator will continue blinking until the problem is eliminated and polling can be completed.

When all the Slaves have been connected to the network, the Master's MAIN POWER indicator will stop blinking and remain steadily illuminated. The network is now ready for operation.

3. Turn each panels pump and BLOWER power switches to on.
4. Turn each panels pump control switch to auto and BLOWER CONTROL switch to RUN.

The pumps and blowers will begin functioning according to the configuration of the **network** as documented on the completed Site Network Map (in Quick Start package).

ROUTINE OPERATION

During normal operation, the blower(s) will run continuously while the pump(s) will cycle on and off in response to input from its downwell or sump level sensing probe.

If difficulties are encountered during or after startup, refer to the troubleshooting procedures in Chapter 6 of this manual.

TRACING AND CLEARING ALARMS

Single Panel Applications

In single panel applications, **alarms** can be generated only by **interlock** devices wired directly to the panel. In such cases, the ALARM ENGAGED indicator will blink the number of the **alarm channel** that carried the **alarm** (e.g., one blink = channel 1, two blinks = channel 2). Proceed as follows to restore panel operation;

1. Refer to the ALARM ENGAGED indicator to isolate the **interlock** device that generated the alarm.

2. Correct the condition that caused the **alarm**.
3. Clear the **alarm** by turning the PUMP CONTROL switch to OFF and then back to AUTO.

Network Applications

In **network** applications, **alarms** can be generated by interlock devices wired to any panel in the **network**. Depending upon the configuration of the panels send/receive switches, any number of panels in the **network** can be shut down by a single **alarm**. Also, because a panel shutdown can trigger site conditions that lead to additional **alarms**, it may not be immediately clear which **interlock** device initiated the shutdown “cascade”. Proceed as follows to restore **network** operation;

1. Locate the one panel in the **network** whose ALARM ENGAGED indicator is blinking. This is the first panel to receive the **interlock** alarm signal. The **interlock** device can then be isolated by interpreting the channel code being blinked by the indicator.

In large multi-panel **networks**, some footwork can be eliminated by using the SYSTEM TEST button to isolate the **alarm channel**. Once the **alarm channel** has been isolated, refer to your Network Configuration Sheet (Appendix A) to determine which **interlock** devices are attached to that channel.

2. Correct the condition that caused the **alarm**.
3. Clear the **alarm** by turning either pump control switch to off and then back to auto.

If the ALARM ENGAGED indicator goes out when the PUMP CONTROL switch is reset, then the **network** is free of interlocks. Normal operation can resume. However, if the indicator blinks an alarm **channel code**, additional **alarms** must be cleared. Repeat steps 1-3 above until all alarms have been cleared from the network.

In ORS Sitepro™ panels without the telemonitoring option, all **alarms** are of the **latching** type and must be manually cleared as described in the section above. When the telemonitoring option is installed, **alarms** can be remotely configured to be either **latching** or non-latching. Not-latching alarms will automatically clear when the condition that caused the **alarm** is corrected. When a non-latching alarm clears, an automatic “**CLEAR INTERLOCKS**” command is issued to all panels in the **network**, clearing all other **interlock alarms**.

Chapter 5: System Maintenance

The ORS SITEPRO™ 2000 is designed for trouble free operation with minimal maintenance required. The following simple maintenance tasks should be carried out at the specified intervals.

Vacuum Enclosure

At yearly intervals, the insides of the enclosure should be vacuumed to remove accumulated dust.

Clean Window

As needed, clean the enclosure window using a solution of soap and warm water.



Glass cleaners containing ammonia will damage the enclosures Lexan windows. Also, prevent hydrocarbons from contacting the window.

Change Desiccant

If desiccant is being used to control moisture accumulation inside the enclosure, this material should be renewed on a monthly basis or at the intervals recommended by the desiccant manufacturer.



Geotech does not supply desiccant.

Clean Probes

It is essential that the probe shafts and floats be cleaned on a regular basis. Use Alconox detergent, warm water and a soft brush. The required frequency of cleanings is highly site specific and must be determined by the user.



Failure to clean the probe will result in fouling that could cause system malfunction.

Chapter 6: Problem Solving



Do not attempt any troubleshooting procedures other than those listed in this chapter.

GETTING HELP

There are no field replaceable components inside the ORS Sitepro™ enclosure. If the troubleshooting procedures in this chapter indicate a component failure, call Geotech Environmental Equipment, Inc. after documenting the problem as outlined below:

- Read the entire manual and become thoroughly familiar with all system components and troubleshooting procedures.
- Prepare a written list of all problems encountered while operating the equipment.
- Prepare an up to date copy of your Panel Configuration Sheet and have it available while conferring with Geotech personnel.

SERVICE LOCATION

Geotech Field Service personnel are trained on all aspects of ORS equipment and are dedicated to helping you maximize the efficiency and cost effectiveness of your ORS Sitepro™ 2000 Control Panel. For technical support of Geotech products, contact the Geotech Field Service office at address listed below.

Geotech Environmental Equipment, Inc.
8035 East 40th Avenue
Denver, CO 80207
800-833-7958
Or: 303-320-4764
Fax: 303-322-7242

BASIC TROUBLESHOOTING PROCEDURES

The ORS Sitepro™ 2000 is equipped as standard with online self-diagnostic features and can be ordered with optional telemonitoring capabilities. These features make the ORS Sitepro™ 2000 significantly easier to troubleshoot than are conventional control panels. Whenever the ORS Sitepro™ 2000 is in operation, its microprocessor “brain” monitors the function of all critical system components. When an operational fault is detected, the user is alerted through a system of diagnostic messages communicated locally by one or more of the panels indicator lights. When the telemonitoring package is installed, the panel will dial out and relay diagnostic messages to a computer, fax machine, or other remote receiving device.

DIAGNOSTIC MESSAGES

In the sections below, all possible local diagnostic messages are listed and described. If your ORS SITEPRO™ 2000 is equipped with the telemonitoring option, refer to the ORS SITEPRO™ Manager software manual for remote monitoring protocol and procedures.



Before beginning troubleshooting procedures, press the SELF TEST button to confirm that all panel indicators are functional.

Diagnostic Message: Pump Control Switch AUTO Indicator Blinking

Cause: The PUMP CONTROL switch is faulty.

Remedy: Call Geotech for assistance.

Diagnostic Message: Pump Control Switch RUN Indicator Blinking

Cause: The BLOWER CONTROL switch is faulty.

Remedy: Call Geotech for assistance.

Diagnostic Message: MAIN POWER Indicator Blinking (Network Applications Only)

Cause: The panel is no longer connected to the network

Remedy: Check the network connections on TB4. If no loose connections are found, confirm that none of the other panels has fallen off the network.

Diagnostic Message: SYSTEM FAULT Indicator Blinks Once

Cause: The panel has failed the Self Test routine.

Remedy: Call Geotech for assistance.

Diagnostic Message: SYSTEM FAULT Indicator Blinks Twice

Cause: An Interlock Communication Bus failure has occurred. The panel will shut down.

Remedy: Call Geotech for assistance.

Diagnostic Message: SYSTEM FAULT Indicator Blinks Three Times

Cause: Line voltage has deviated more than 20% from specified value.

Remedy: Check power at service and restore to specifications.

Diagnostic Message: SYSTEM FAULT Indicator Blinks Four Times

Cause: The temperature inside the panel has risen over the specified maximum.

Remedy: Determine cause of problem and correct.

Diagnostic Message: SYSTEM FAULT Indicator Blinks Five Times

Cause: The panel purge pressure has dropped below the specified minimum. The panel will shut down.

- Remedy:**
1. Check for loose or disconnected purge air hose.
 2. Check function of purge air compressor.

Diagnostic Message: SYSTEM FAULT Indicator Blinks Six Times

Cause: This diagnostic message indicates a probe fault caused by one of the following conditions.

- Remedy:**
1. The probe has become disconnected from the panel.
 2. The probe has a stuck float or faulty reed switch.
 3. Check all connections between the probe and the panel.

Diagnostic Message: CALL IN PROGRESS Indicator Blinking (Telemonitoring Applications Only)

Cause: A communications fault has been detected.

Remedy: Clear the diagnostic message by turning the CONTROL POWER switch OFF, waiting 5 seconds, and then turning the switch to ON. If the diagnostic message persists, call Geotech for assistance.

ADDITIONAL TROUBLESHOOTING PROCEDURES

In addition to the diagnostic conditions described above, the following problems could cause an interruption in system operation.

Problem: PUMP or BLOWER POWER Switch Tripped OFF

Cause: A tripped circuit breaker could be caused by:

1. Breaker is too small for motor.
2. Short in wiring between panel and motor.
3. Faulty motor drawing excessive current.

Remedy:

1. Refer to the trip amps specification printed on the side of the breaker. Confirm that the breaker is properly sized for the motor being used.
2. Use an Ohm Meter to check for shorts in the motor wiring.
3. Check the motor for damage.



Before working on pump or blower, carry out the DISCONNECT PROCEDURE printed on the front of the ORS Sitepro™ 2000 faceplate.

Problem: No Panel Indicators Illuminated

Cause: Either a fuse is blown or no power is reaching the panel.

Remedy:

1. Use a voltmeter to check for power at the terminal block on the panel chassis.
2. If power is present, the problem is a blown fuse behind the circuit board shield. Call Geotech for assistance.
3. If no power is present at the terminal block, problem is a power failure at the service. Restore power and restart the system by repeating the panel startup procedure described in Chapter 4.

Chapter 7: System Specifications

Site Requirements

Door clearance for full 180° door opening:
20" W x 17" H to left of enclosure.

Enclosure footprint for wall mounting:
12 ¼" w x 15 ½" H

Line Voltage: 115VAC (+/- 20%), 50/60 Hz, 1 phase
230VAC (+/- 20%), 50/60 Hz, 1 phase

Power Consumption: 10 watts, not including motor power
Modem: Standard dial pulse or touch tone (optional)

Operating Environment

Operating Temperature -40° - 130°F
Humidity 8% to 85%, non condensing

Inputs

- (4) **Intrinsically Safe** probe inputs for single density probe
- (4) **Intrinsically Safe interlock** inputs
- (4) Non-Intrinsically safe **interlock** inputs

Additional Inputs (available with telemonitoring)*

- (8) **Intrinsically Safe** inputs for high and low pressure, high sump level and thermal overload.
- (4) Non-Intrinsically safe 4-20mA **analog** inputs with 8 bit measurement resolution
- (2) Motor current sensor for monitoring
- (1) Voltage sensor for monitoring
- (1) Temperature sensor for monitoring
- (1) **Totalizer** input for water flow measurement; input range 1-120 pulses/gallon w/20 gpm maximum. Totalizer must supply a 0 to 5-24 VDC pulse to the panel
- (2) Optically coupled Peripheral Equipment Interface inputs

Outputs

- (2) **Form C dry contact** outputs capable of handling 100 mA, 28VDC maximum non-inductive
- (2) Optically coupled Peripheral Equipment Interface outputs
- (2) Auxiliary outputs to drive small AC powered devices
- (1) Pump Motor Output for 2 ½ HP, 230VAC, 1 phase, 50/60 Hz or 1 HP, 115VACm 1 phase, 50/60 Hz
- (1) Blower Motor Output for 2 ½ HP, 230VAC, 1 phase, 50/60 Hz or 1 HP, 115VACm 1 phase, 50/60 Hz

Interlock Communication Bus

Type: **RS-485**

Capacity: Supports up to 16 ORS Sitepro™ panels over maximum distance of 3000' (1000m) using standard 24 AWG 2-conductor twisted shielded pair wire (Belden #9841)

Communications: Standard 9 pin **RS-232** serial port 300-2400 **baud** for data logging (use of special ORS Cable Assembly PN2390078 is required for local access)*

Certification/Approvals (Pending)

Factory Mutual entity approval on **Intrinsically safe** inputs

*Hardware for enhanced features built into every panel. Features become operational when panel is equipped with telemonitoring or is networked to a telemonitor equipped ORS Sitepro™ panel.

Appendix A: Panel Configuration Sheet

This Appendix consists of an ORS Sitepro™ Panel Configuration Sheet to be used to record the final configuration of your ORS Sitepro™ panel.

During the panel configuration procedures described in Chapter 3 of this manual, you will be changing the settings of some of the dip switches shown in figure 16. Geotech recommends that you carefully record the final configuration of your ORS Sitepro™ 2000 panel by penciling in the appropriate dip switch settings on the blank Panel Configuration Sheet provided in this Appendix. Once filled out, this sheet will be a permanent record of your configuration and can be used as a check against inadvertent or unauthorized configuration changes. Be sure to update this sheet whenever configuration changes are made. An up to date Panel Configuration Sheet is an essential troubleshooting tool and must be available for reference whenever you call Geotech for technical assistance.

Network Configuration



Before configuring any ORS Sitepro™ panel that is part of a complex multi-panel **network**, basic decisions must be made about the design of the network as a whole. Although remediation site design is beyond the intended scope of this manual, a Site Configuration Guide has been included in your Quick Start Installation envelope. The Site Configuration Guide is designed to help you specify panel network addresses, interlock hookups and alarm interlock assignments for up to 16 ORS Sitepro™ control panels. Fill out the blank Site Configuration Worksheet **BEFORE** configuring individual panels.

ORS Sitepro™ 2000 Configuration Sheet

Date _____

Panel Type _____

Panel Network Address _____

Appendix B: Glossary

Address

An identifying number assigned to each panel in a network. The master panel always receives the address “0”. Slaves are numbered from “1” to a maximum value of “15”. During network operation, the Master panel polls the Slaves in ascending numerical order.

Alarm

A shutoff signal generated by an interlock device wired to an ORS Sitepro™ panel.

Alarm Channel

One of four circuits in the ORS Sitepro™ that can carry an alarm signal. Alarms are carried from panel to panel on the Interlock Communication Bus.

A/D Converter

A device that converts analog signals to digital signals.

Analog Input

An input that accepts signals from pressure transducers or other analog devices. Analog signals are continuous functions and must be converted to discrete digital data before they can be manipulated by the microprocessor. This conversion is carried out by the ORS Sitepro™’s analog to digital (A/D) converter.

Baud Rate

Rate of data transfer in bits/second. A measure of how fast information is transferred over a serial communications network.

Dry Contact

An electrical switch that is isolated from any source of electrical energy. In the diagram below, the dry contacts are acted upon by a relay coil that is isolated from the switch.

Form C Contacts

A set of electrical contacts that has both Normally Open and Normally Closed poles as shown in the diagram below. See definitions of Normally Open and Normally Closed also included in this Glossary.

Interlock Communication Bus

An RS-485 network that allows the ORS SITEPRO™ to exchange information with other panels.

Interlock

A signal or alarm generated by a switching device attached to an ORS SITEPRO™ panel.

Intrinsically Safe

Incapable of carrying enough electrical current to cause an explosion.

IP 66

Enclosure intended for outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure. The international Electro-technical Commission (IEC) equivalent to a rating of NEMA 4.

Latching

An alarm that, once engaged, requires a manual reset to clear. A non-latching alarm will clear automatically when the condition that caused the alarm either corrects itself spontaneously or is corrected by operator intervention.

Microprocessor

A computer chip that is capable of executing programmed instructions; the ORS SITEPRO™'s "brain".

NEC

The NEC (National Electrical Code) is a collection of electrical safety standards compiled by the National Fire Protection Association.

NEMA 4

Enclosure intended for outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure. (See IP 66).

Network

A series of ORS SITEPRO™ panels connected by the Interlock Communication Bus.

Normally Closed

A Switch that is closed when not acted upon. See figure 9 for an example of a Normally Closed switch that is held open by a magnet embedded in a probe float. When the magnet is moved, the switch closes.

Normally open

A switch that is open when not acted upon.

RAM

RAM (Random Access Memory) is computer memory that can be both read and written to. RAM is used for temporary data storage.

ROM

ROM (Read Only Memory) is computer memory that can be read but not written to. ROM is used to store permanent programmed instructions.

RS-232

A serial communications network capable of transmitting over short distances only.

RS-485

A serial communications network capable of transmitting over long distances.

Totalizer

A device that counts electrical pulses generated by a flow meter.

Appendix C: Application Notes

The ORS SITEPRO™ 2000 Blower/Pump Control Panel is highly flexible and can be adapted for many different site remediation functions. The examples in this appendix explain how to wire and configure your ORS SITEPRO™ panel for the most commonly encountered field applications.

Application #1

ORS SITEPRO™ Blower/Pump Control Panel controlling air stripper blower and transfer pump. High Sump Level or high/low Pressure condition must shut down feed pump controlled by separate ORS SITEPRO™ WTDP panel. In order to shut down the WTDP panel in the event of a High Sump Level or High/Low Pressure alarm received by the Blower/Pump panel, the High Sump Level, High Pressure and Low Pressure inputs must each be jumpered to an alarm channel in the Blower/Pump panel. Both panels must then be configured to communicate through the Interlock Communication Bus. Proceed as follows:

Wiring

1. Wire the sump level probe and pressure switches to the ORS SITEPRO™ Blower/Pump control panel as shown in figure 10.
2. Install a wire jumper between terminal 5 on TB2 (High Sump Level) and one of the interlock terminals (1-4) also on TB2.
3. Install a wire jumper between terminal 6 on TB2 (High Pressure) and one of the other interlock terminals on TB2.
4. Install a wire jumper between terminal 7 on TB2 (Low Pressure) and one of the interlock terminals on TB2.

Refer to figure 10 or to the Field Wiring Diagrams for locations of jumpers.

Configure Blower/Pump panel

1. Set the RECEIVE switches for the interlock channels to which jumpers were attached above. For example, if the High Sump Level input was jumpered to terminal 4 (interlock 4) on TB2, set RECEIVE dip switch 8 to ON.
2. Set the SEND switches for the Interlock communication Bus channels on which the High Sump Level and High Pressure alarms will be sent to the WTDP panel. Any of the four ICB channels can be used for this purpose.
3. Configure the CONTROLLER ADDRESS Switch and LOGIC switch as explained in Chapter 3.

Configure WTDP Panel

1. Set the RECEIVE switches to correspond to the SEND switch settings chosen for Panel #1. For example, if the Blower/Pump panel SEND switches 1, 2 and 3 were set ON, set the WTDP panel RECEIVE switches 5, 6 and 7 to ON.
2. Configure the CONTROLLER ADDRESS switch and LOGIC switch as explained in Chapter 3.

Application #2

ORS SITEPRO™ Blower/Pump Control Panel controlling air stripper blower and feed pump. The feed pump must be shut down in the event of a High Sump level or High/Low Pressure Condition at the air stripper.

Wiring

1. Wire the downwell WTDP probe and pressure switches into the ORS SITEPRO™ Blower/Pump Control Panel as shown in figure 9.
2. Jumper the High and Low Pressure inputs to interlocks as explained in Application #1 above.
3. Run the High Sump Level leads (green and orange) from the air stripper sump level probe to the ORS SITEPRO™ Blower/Pump Control Panel and wire the High Sump Level switch as an interlock. Refer to Chapter 3 for a discussion of interlock wiring.

Configure Panel

1. Set RECEIVE switches for the interlock channels to which the High and Low Pressure Jumpers were attached.
2. Set the RECEIVE switch for the interlock channel to which the High Sump Level switch was attached.
3. Configure the CONTROLLER ADDRESS and LOGIC switches as explained in Chapter 3.

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958 OR 1-800-275-5325.

Model Number: _____

Serial Number: _____

Date: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used.

Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate equipment for a fee, which will be applied to the repair order invoice.

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(303) 320-4764 · (800) 833-7958 · Fax (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com