Terminus™
SHOCK DETECTION PRODUCTS

Four Zone Processor Installation

SP3274 Four Zone Processor

SP3273 Four Zone Expander

Installation Manual

SECURITY UL 639 LISTED

This Product is Listed by
UNDERWRITERS LABORATORY INC.

FCC Notice

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These Limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and the receiver.
- Connect the equipment into an outlet or circuit different from the one in which the receiver is connected.
- consult the dealer or an experienced radio - TV technician.

Notice

This digital apparatus does not exceed the class b limits for Radio Noise Emissions from digital apparatus set out in the Radio Frequency Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectricques depassant les limites applicables aux appareils numeriques de la class B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communication du Canada.

Notice to Installers and Users

Under FCC regulations, changes or modifications to this product without permission of the manufacturer could void the user's authority to operate the equipment.

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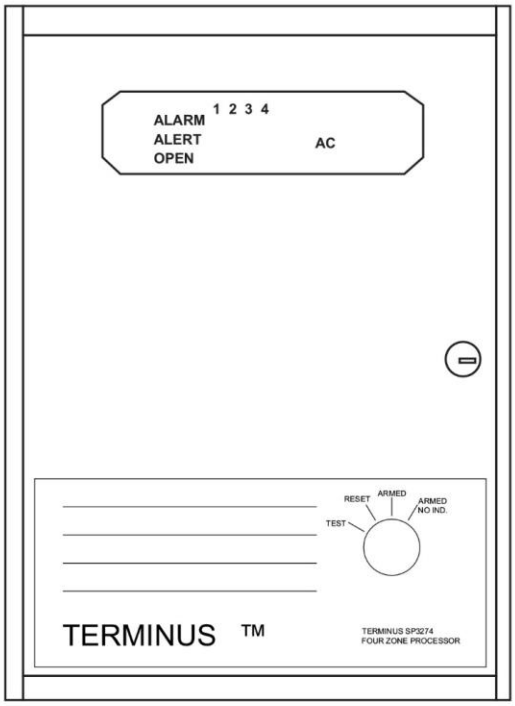
Introduction

The Terminus SP3274 (4-zone) Processor and the SP3273 (4-zone) Expander are designed to allow the security specialist to monitor Terminus shock sensors in a wide variety of installations and conditions. For example plate glass, multi-pane windows, fences, masonry or wallboards all have different responses to shock disturbances which may indicate intrusions into a secured area. These processors allow the installer to tailor a zone's adjustments to the shock characteristics of any of these types of material in a very efficient manner. Sensitivity settings may be set to respond to the slightest shock on one zone and to violent agitations on another zone.

This manual includes the installation and operation of both the SP3274 (4-zone) processor and the SP3273 (4-zone) expander. The SP3274 is used to monitor the first four zones, and one SP3273 is required for each four additional zones. The installation of each processor is described separately.



Specifications

Cabinet Dimensions: 13.5 inches high
9.6 inches wide
3.25 inches deep

Power Requirements: Primary: 16.5 VAC 50 VA --60 Hz (transformer supplied)
Secondary: 12V DC, 5.0 Ah Minimum Gel-Cell Battery (Supplied)

Current Drain: 160 mA (All zones armed)
268 mA (All zones in alarm)

End-Of-Line Terminating Resistor: 4700 Ohms 1/4 Watt (supplied)

Environmental:
Temperature: 0º to 120º -F
Humidity: Less than 95%, non-condensing

Relay contacts rating: 2 Amp at 30 V AC/DC Fail-safe** SPDT relay

Cabinet Tamper Switch: Normally Open (NO) & Normally Closed (NC)
Uncommitted. Usually wired NC into the supervised Sensor Loop.

Note: All output circuits are Class II power limited.

Terminus intrusion detection devices that can be used with the SP3274/3273 include:

SP3223
SP2539
SP2549
SP3227
SP3237 Suffixes: None, D, JB, JBT, DJBT

Part Number Suffixes Legend:

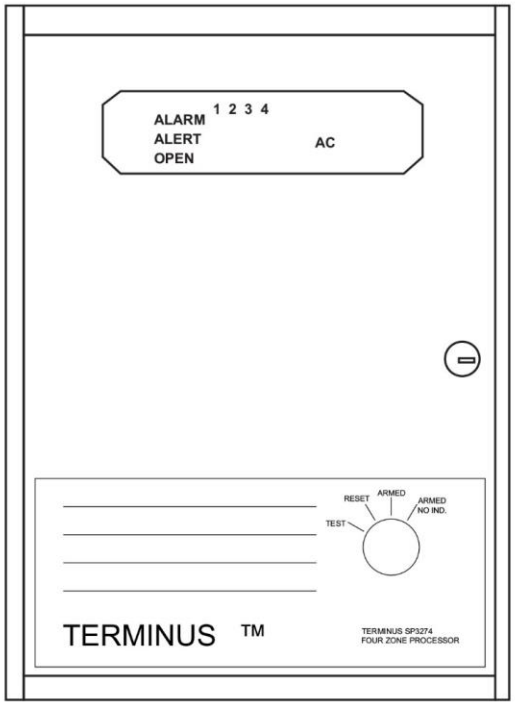
None = undamped,
D = damped,
JB =junction box,
T = tamper switch included.

**Relay will open on loss of power.

Installation of the SP3274/SP3273

Cabinet Installation

In this section, the cabinet installation of the SP3274 and SP3273 is covered in detail. The SP3274/3273 cabinet, as shown below, is a hinged metal box designed for wall mounting in a secure indoor location. As viewed from the front, a hinge on the left side allows the door to swing through 180 degrees when opened providing easy access to the board and connections. The chamfered box allows the cabinet to be mounted close to other control boxes. The cabinet is equipped with a key lock and a tamper switch. The SP3274 is also equipped with a key switch on the front panel that is not found on the SP3273.



One knock out for ½ inch conduit on each side, top and bottom.

Figure 1

NOTES:

The cabinet must be electrically connected to a good cold water ground (CWG).

Do not mount the cabinet in an outdoor environment.

Do not mount the cabinet near AC power mains, transformers, air conditioners or other heavy electrical equipment.

Carefully plan access to wiring runs before mounting the cabinet.

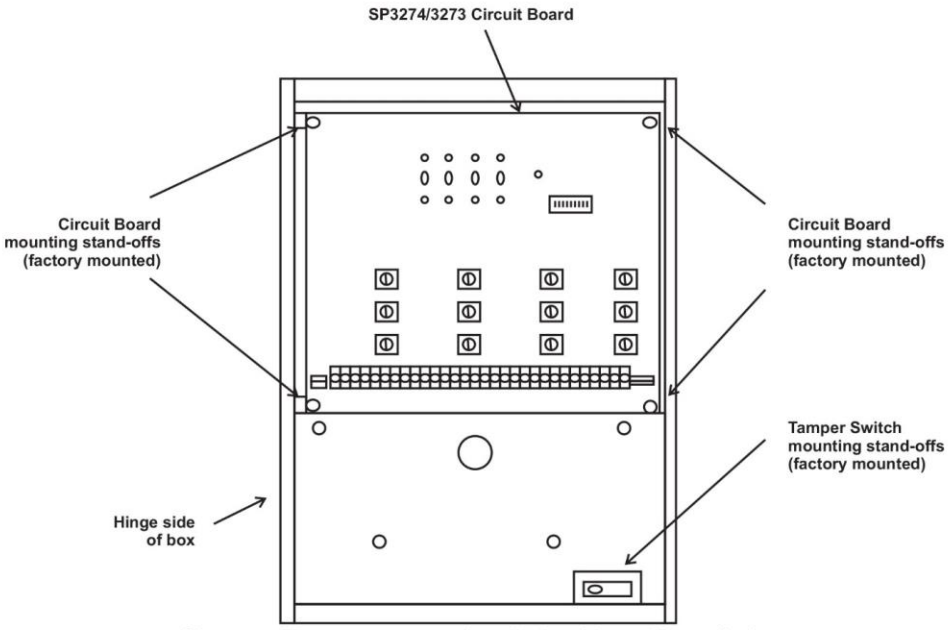
1. Unpack the unit. Included in the shipping container with the SP3274 are the following:

1	12 volt 5.0 Amp-hour minimum Gel-Cell Battery
1	Pre-mounted Normally Open Tamper Switch
1	16.5 VAC 50VA Transformer
4	4700 Ohm 1/4 Watt Resistor
1	Battery Cable

Included in the shipping container with the SP3273 are the following:

1	12 volt 5.0 Amp-hour minimum Gel-Cell Battery
1	Pre-mounted Normally Open Tamper Switch
4	4700 Ohm 1/4 Watt Resistor
1	Key Switch adapter module with cable
1	Battery Cable

2. Remove the circuit board. The SP3274 comes shipped to you with its circuit board installed on its stand-offs. You will need to remove the circuit board prior to mounting the cabinet on the wall. The circuit board is attached to two metal brackets with four metal stand-offs using hex nuts. Care should be taken when removing the nuts from the circuit board so as not to damage the electronics on this board.



Shown with cover removed and circuit board installed

Figure 2

3. Remove the knockouts as needed. The required knock-outs must be removed with a screwdriver and hammer to provide wiring entrances into the cabinet. Be sure to remove the circuit board prior to removing the knock-outs.

4. Mount the Cabinet. Using the diagram below, mount the cabinet with 4 #8 screws (not provided) and wall anchors of appropriate length.

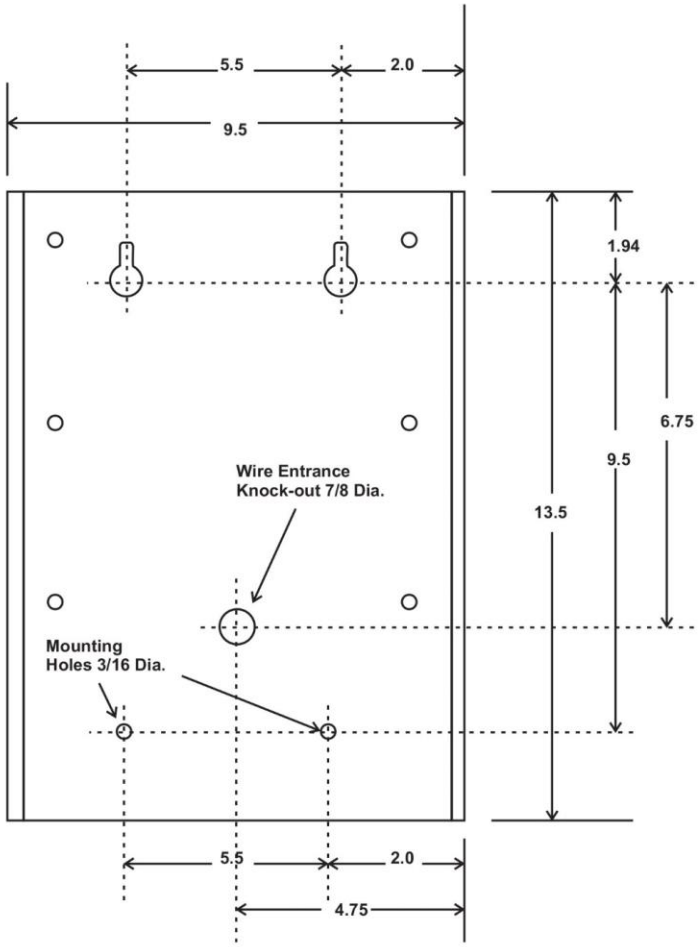


Figure 3

5. After the cabinet has been mounted, remount the circuit board on the stand-offs and tighten the hex nuts.

Electrical Installation

1. Install AC power connections. AC power is provided by a 16.5 VAC 50 VA class II transformer (Terminus P/N 2W00002100) connected to a 24 hour (unswitched) AC outlet. Wire the transformer to the two left most terminals on the terminal strip. Test AC power before proceeding.

2. Install the back-up power connections. Back-up power is supplied by a 12 volt, 5.0 Ah minimum Gel-Cell battery (Terminus Part # 2B00000400 (PowerSonic: PS 1250) connected to connector J1 on the circuit board. This is a 4 pin molded connector. Please pay attention to the position of this connector when making this connection. It will only fit in one direction and should seat with minimal pressure DO NOT FORCE. Depending on how the battery is used, it should have a life of 3 to 5 years. Test back-up power before proceeding.

3. Disconnect AC and backup battery power before proceeding.

4. Install the output relay connections. The processor is equipped with fail-safe relays which are normally pulled in giving a closed circuit on the C-NC terminals and an open circuit on the C-NO terminals for all relays. On alarm, or if there is a loss of power, the relays drop out to a C-NO condition. The circuit board is equipped with a MASTER RELAY that will follow the action of a zone relay. In addition, should the battery voltage drop below approximately 10.5 volts the MASTER RELAY will drop out to give a low battery indication. Connect all relays in a manner appropriate to the installation. (All relays are rated 2 Amp @ 30V AC/DC). For UL certificated installations, the master relay must be connected to a 24 hour trouble loop.

5. Install the Terminus sensor loop connections. As many as 50 Terminus sensors may be connected in series to each set of sensor loop input terminals. 4700 Ohm end of line resistors are provided for each zone. For each loop (zone) the end of line resistor must be wired in series with the sensors for that zone. Referring to Figure 4, you will see that Normally-Open alarm devices should be wired in parallel with the loop for a given zone, while Normally-Closed devices should be wired in series. Please note that the loop terminals are marked "-" and "+". Being aware of polarity is important for testing the loop voltage during troubleshooting procedures. However, when wiring in a loop, the polarity is not important unless you are using the SP3237D (damped) sensor. NOTE: The use of reed type switches is strongly recommended. IMPORTANT: Always use twisted pair cable when wiring Terminus loops.

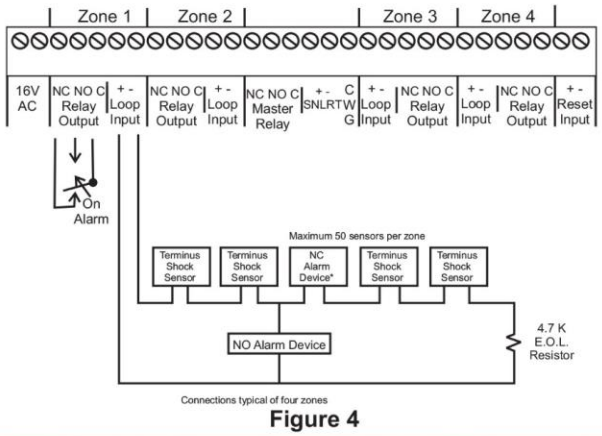


Figure 4

6. Make the SNLRT (sonalert) connections. This output is provided for connection to an audible signaling device with a rating of 12 volts 50 mA or less. The SNLRT output is 12 VDC and is activated by an alarm signal from any zone. Controlled by the zone Auto-Reset switches, the SNLRT is reset automatically after an alarm condition has been reset. This output is for a local door alarm and is not to be used as a burglar alarm.

7. Install the remote reset connections. These terminals may be connected to an external reset switch. This reset switch must be a Normally Open switch. A momentary closure across the reset terminals will reset the SP3274/3273 processor just as if you moved the reset key switch on the SP3274 cabinet from Armed to Reset. Wire length for this switch cannot exceed 1000 feet and wire gauge cannot be smaller than 22 gauge. Note: this switch is not to be used for UL certificated installations.

8. Install the Cold Water Ground (CWG) connections. Use this terminal for wiring the unit to a GOOD EARTH GROUND -- usually through a cold water pipe.

9. Install the reset key connections. Supplied with the SP3274 processor is a 4 position key switch. This switch connects to the SP3274 circuit board at connector J2 (on the left end of the terminal strip). This should have come to you installed, but was removed along with the circuit board while installing the cabinet. Make sure the key switch is connected to the circuit board properly. This connector is a 4 pin molded connector. Please pay attention to the position of this connector when making this connection. It will only fit one way and should seat with minimal pressure. **DO NOT FORCE**.

SP3273 Installation Steps

Follow the steps for mounting the cabinet and zone wiring for the SP3273 as shown in the SP3274 section.

Then connect the SP3273 expanders. Expanders are connected to the key switch on the SP3274 panel through the control adaptor supplied with each SP3273 Expander as follows.

STEP 1. Place the Control Adaptor circuit board in the SP3274 cabinet and unplug the SP3274 key switch cable from the SP3274 circuit board.

STEP 2. Plug the SP3274 key switch cable into the connector on the Control Adaptor circuit board you have installed in the SP3274 cabinet.

STEP 3. Connect the short cable from the Control Adaptor circuit board to the SP3274 circuit board key switch connector (P1).

STEP 4. Connect the long cable from the Control Adaptor circuit board to the circuit board of the key switch connector (P1) on the circuit board of the expander unit.

STEP 5. Using a minimum of 12 AWG wire, connect the AC power transformer to each SP3273 unit. This will be a parallel connection for all processors on one transformer. The transformer supplied with the SP3274 is capable of supporting 2 additional SP3273 slave units. The AC wires can be routed from cabinet to cabinet through the knock-out holes provided. Please keep this wire as short as possible with no excess wire looped up behind the circuit board.

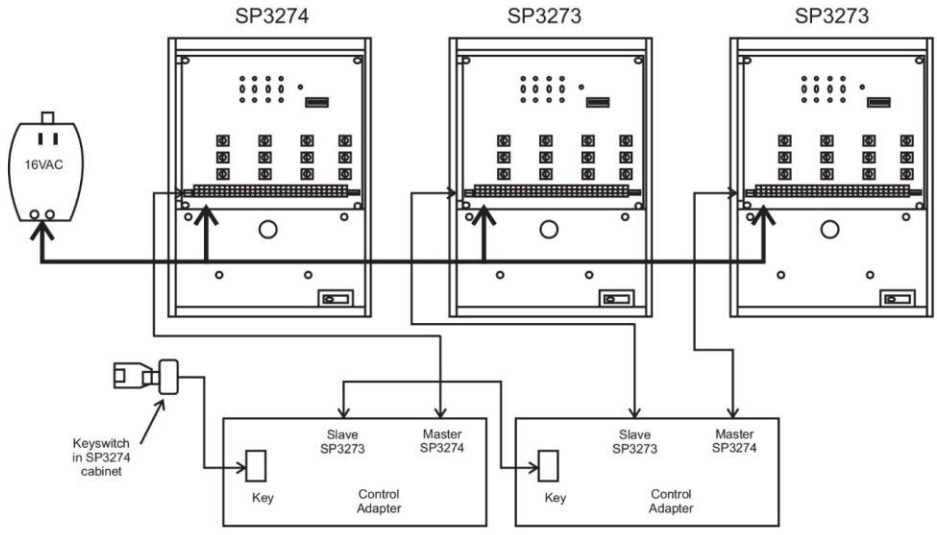


Figure 11

Processor Adjustments

General Explanation of Shock Sensing Process

Shock sensors produce short electrical pulses on the protective loop in response to disturbances. The number of pulses is proportional to the amount of activity in an attempted intrusion; the size (length) of the pulses is proportional to the vigor of the attack (see figure 5).

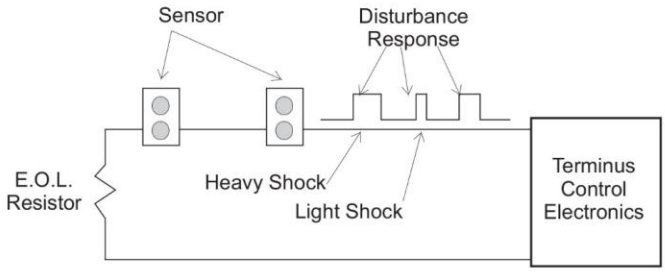


Figure 5

The sensitivity circuit filters sensor pulses according to how long they are (how vigorous the attack is). For a given sensitivity setting only pulses which are long enough are passed on to the other processing circuits. Terminus electronic controls are able to detect pulses at least as short as 100 microseconds when set on most sensitive. (see figure 6)

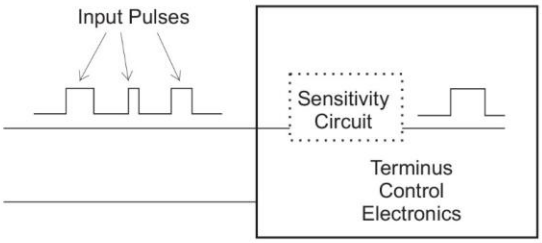


Figure 6

After passing through the sensitivity circuit, pulses go to the pulse width circuit. The pulse width circuit permits pulses to pass through it only at predetermined intervals. (see figure 7).

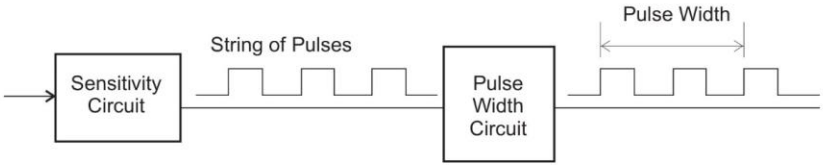


Figure 7

Once the preset counter setting has been reached, the alarm circuit is tripped. However, there is still one more important timing circuit not mentioned yet. If it was not for the count interval circuit the counter would continuously accumulate pulses over hours or even days. With random disturbances (birds, sleet, hail, wind, etc.) continuous counting could lead to false alarms.

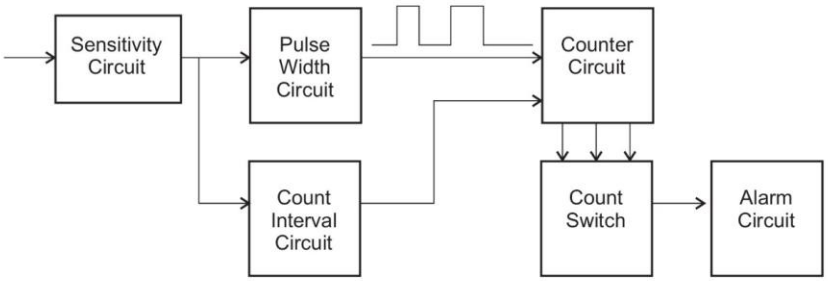


Figure 8

The count interval circuit limits how long the counter remembers. For best performance this time is typically between 15 seconds and 2 minutes depending on the application and the Terminus processor used.

All Terminus controls have the above processing circuitry. External adjustments of all these circuits is possible on some Terminus processors, while only count and sensitivity are adjustable on others. The SP3274 and SP3273 are two of the control panels that have all of these settings. They are outlined as follows:

Processor Control Adjustments

Sensitivity

The ten position sensitivity control sets pulse intensity registered as disturbances. Position 0 is the maximum sensitivity setting and sets for approximately 1 millisecond. The minimum sensitivity setting is position 9 and sets for approximately 60 milliseconds. This control should be adjusted to the least sensitive point where effective detection occurs.

Count Interval

The ten position count interval switch sets the time in which a preset count must occur to cause an alarm. The following table gives the interval for each switch setting.

Switch Setting	0	1	2	3	4	5	6	7	8	9
Time (seconds)	1	1.5	3	5	10	15	30	50	90	150

Pulse Width

The ten position pulse width switch sets the required interval between sensed pulses. The table below shows the pulse width for each switch setting.

Switch Setting	0	1	2	3	4	5	6	7	8	9
Time (seconds)	0.050	0.075	0.100	0.150	0.200	0.300	0.500	0.750	1.000	1.500

This control is used to eliminate the effects of ringing in a live structure such as a metal building. With the circuit set correctly only the blow is detected, not the reverberations. This control should be adjusted for the shortest time which will give good protection.

Warning: It is possible to set the pulse width and the count interval too low relative to each other for all signals to be detected. If this occurs, the unit will detect the error and cause all three LEDs for that zone to blink at a ½ second interval.

Count/Function Select

A 10 position switch for each zone allows selection of count or glass break mode. The same switch allows the installer to set for any count from 1 to 9 while in count mode. Set in coordination with other adjustment options, various switch settings allow you to tailor each shock detection zone to different kinds of materials or sensor environments.

Mode Select -Setting this switch to position 0 selects the glass break mode. Any other setting selects the count mode as described below.

Count Select -Position 1 through 9 place the zone in the count mode. Each of these settings corresponds to the number of shock events that must occur within a count interval selected to cause an alarm.

Zone Enable Switch
SW1 Positions 1,4,7, and 10. When these switches are On, zones 1, 2, 3, and 4 respectively will be enabled. When this switch is Off, the alarm, alert and open LEDs will not function and the alarm relay will remain in its non alarm state regardless of any activity on the sensor loop.

Automatic Reset Time Switch
SW1 Positions 2,5,8, and 11. If these switches are On, the alarm relay will reset after 5 seconds. If these switches are Off, the alarm relay will reset after 4 minutes. If the loop remains faulted after this period, the relay will not reset until the condition clears. The LED latches on until the unit is reset.

Entry-Exit Delay Time Switch
SW1 Positions 3,6,9, and 12. If these switches are On, all activity on the sensor loop will be ignored for a period of 40 seconds after the zone is armed to give the user time to exit the premises. Similarly, the unit will delay alarming on entry to allow the user time to reset it and abort the alarm.

	Zone Enable	Auto Reset	EE Delay
Zone 1	Switch 1	Switch 2	Switch 3
Zone 2	Switch 4	Switch 5	Switch 6
Zone 3	Switch 7	Switch 8	Switch 9
Zone 4	Switch 10	Switch 11	Switch 12

Starting Points for Installers

To help you get your system ready for operation we recommend you set your SP3274/3273 processor adjustments to these starting points:

For Walls:
- Count Interval --4
- Pulse Width --5
- Sensitivity --1 (see below)
- Count Switch --3

For Fences:
- Count Interval --5
- Pulse Width --5
- Sensitivity --1 (see below)
- Count Switch --3

For Glass:
- Count Interval --0 (ignored)
- Pulse Width --0 (ignored)
- Sensitivity --0 (see below)
- Count Switch --position 0

Determine that each sensor in a loop will respond to a shock administered at a point on the glass that is most remote from the sensor. Having done that, adjust the Sensitivity Control --toward decreasing sensitivity -- to get the kind of response you should be getting from the processor. Processor sensitivity should not be greater than that necessary for a sensor to register a heavy shock on glass that is on the edge of its area of responsibility.

Adjusting the sensitivity of your system is a matter of finding a level that will ignore most ambient shocks; that is, you want the system to be insensitive to rain, wind, thunder, passing trucks, and so on. On the other hand you want it sensitive enough to register shocks that may signal an intrusion. To find the right level of sensitivity, make sure sensors are registering shocks. Refer to the installation manual for the sensor that you are using for testing procedure.

Operating the SP3274

The SP3274 Four Zone Processor includes a four-pole, four-position, key operated system function switch. The switch selects the operating mode for your SP3274 and any associated expanders. As you will note in Figure 11, the four switch positions are: TEST; RESET; ARMED, and ARMED-NO IND.

Test Mode

This setting of the key switch is for testing the processor unit as well as the security system it monitors. When the setting is selected all zones will go into alarm condition and all LEDs will go on. To MEET U.L. REQUIREMENTS, YOU MUST TEST YOUR ENTIRE SYSTEM AT LEAST ONCE A YEAR.

Reset Mode

In this mode the processor acts to reset any past or present alarm conditions. When the key switch is in this position the ALARM LEDs and the zone relays will not operate. However, the OPEN and the ALERT LEDs will operate to let you see the status of each zone.

Armed Mode

This is the normal position for the key switch when your security system is in operation. Set to Armed, the system is watching for sensor pulses indicating activity on any active zone.

Armed-No Indication Mode

When the key switch is in this position the system is armed and the OPEN and ALERT LEDs, along with all zone relays, are functioning. However, the ALARM LEDs will not operate.

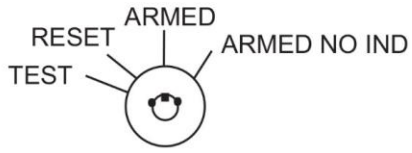


Figure 11

Glass Break Mode

When operating the processor in the Glass-Break mode, one initial shock, and a shock of any magnitude that follows within .6 seconds will cause alarm. The Pulse Width switch is ignored in the glass break mode.

Count Mode

When a zone is operating in the count mode, the number of individual shock events required to cause an alarm is set by the count select/function switch. To qualify as an event, each shock must meet the qualifications set by the sensitivity and pulse width switches. To cause an alarm, the number of events indicated by the count select must occur within the interval indicated by the count interval switch. If the number selected is not reached within this time period, the time counter will automatically reset.

Alarm LED

The alarm LED will light on alarm and latch until reset. Reset will not occur if the loop is faulted after the expiration of the reset delay. The LED will blink every ½ second during an entry or exit delay. The LED will blink every ½ second in synchronism with the alert and open LED if an illegal configuration of the pulse width and count interval switches.

Alert LED

The alert LED will light during the count interval timer out and during the glass break timeout. The LED will blink every ½ second in synchronism with the alarm and open LEDs if an illegal configuration of the pulse width and count interval switches.

Open LED

The open LED will be on steady if an open circuit is detected on the sensor loop. The LED will blink at a ½ second rate if a short circuit is detected on the sensor loop. The LED will be on while the pulse width timer is running which means that it will blink with each pulse detected on the sensor loop. The LED will blink every ½ second in synchronism with the alarm and alert LEDs if an illegal configuration of the pulse width and count interval switches.

Relay

The relay will trip on alarm for the interval indicated by the Automatic Reset Select Switch then reset. Reset will not occur if the loop is still faulted after the expiration of the reset delay.

Using the Spare Switch Pole

One section (pole) of the key switch is uncommitted and can be used by the installer to monitor the position or mode of the key switch. In Figure 12, below, you see the switch wafer viewed from the back with the terminals identified. The switch contacts are rated 1 amp, 24V AC/DC. Use only the terminals shown in the figure below for wiring in a switch position monitor. Connections made to other switch terminals may inhibit the operation of your unit.

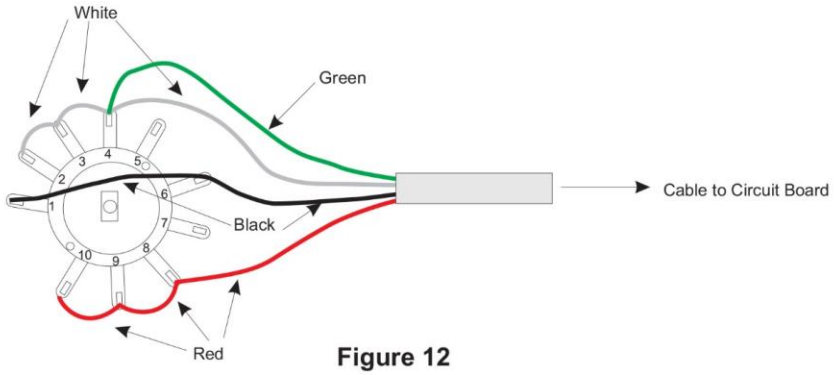


Figure 12

An example of how the key switch may be used to monitor system functions is given in Figure 13, below. Here, you see how to trip another panel if zone 1 or zone 2 of the SP3274 registers an alarm condition, or in a case where the SP3274 is not ARMED.

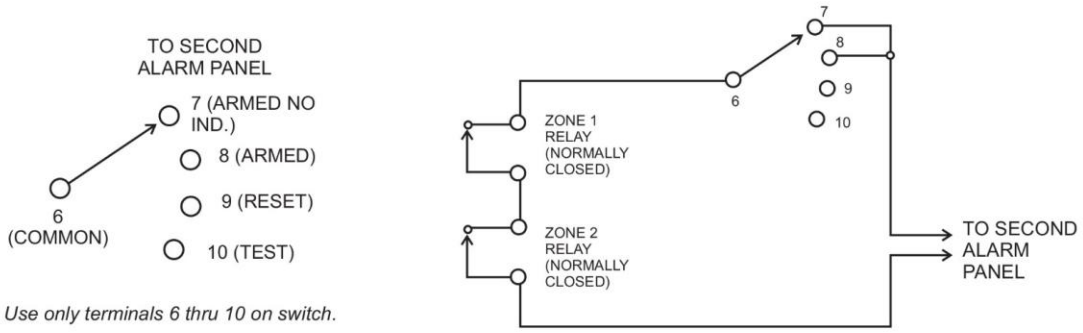


Figure 13

Troubleshooting the SP3274/3273

PROBLEM	PROBABLE CAUSE
Unit completely inoperative	1. No 16 VAC power (must come from a 24 hour, unswitched line). 2. Battery or batteries dead. 3. Fuse blown.
AC light only, but no other lights (Appears inoperative)	1. Zone enable switches off (SW1 position 1, 4, 7, and 10)
Unit operates from AC but not from battery.	1. Battery discharged. (allow battery to charge for 12-16 hours.) 2. Defective battery. 3. Battery disconnected.
Unit in alarm, will not reset.	1. Sensor loop open or shorted -loop resistance should read 4700 - 5200 Ohms when disconnected from panel. 2. Terminating resistor not installed in series in sensor loop.
Unit will not go into alarm with loop open.	1. Loop not wired correctly.
All LEDs for a zone are blinking	1. Illegal setup of sensitivity count pulse and count interval switches for selected Count.
Alert LED on steady	1. Loop Open. 2. EOL not 4.7 K.
Alert LED blinking	1. Loop Shorted. 2. EOL Resistor not 4.7K.

SP3237 Sensor Wiring

The Terminus SP3237 Shock Sensor has a jacketed four wire lead. The damped versions are polarized and the undamped versions are not. It is good practice to maintain polarity in both versions to make wiring easier and more understandable. The sensors must be wired to a Terminus processor as shown in Figure 1. The SP3237 can be used with the SP3219, SP3268, S3274 and SP3273 processors. Each processor can handle up to 50 sensors per zone. An end-of-line (EOL) resistor of 4.7K ohms is installed at the last sensor in the loop. All splices should be soldered and taped.

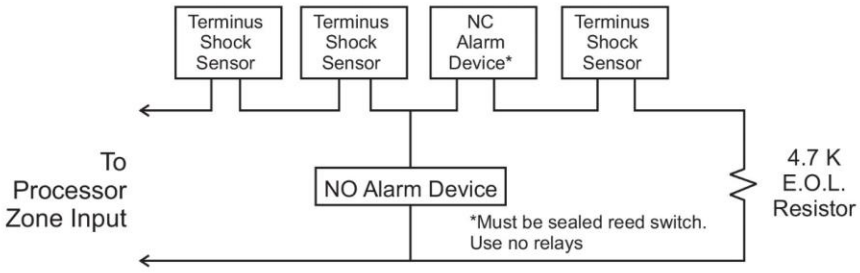


Figure 14 Typical Loop

For sensor loops less than 1500 feet in length, use 22 gauge or larger stranded twisted pair cable. For longer loops, use 18 gauge or larger stranded twisted pair. Shielded cable is not required except in rare cases.

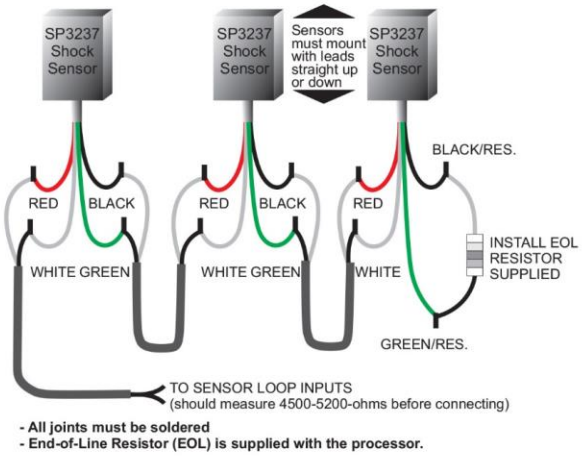


Figure 15 Sensor Wiring

Refer to the manual shipped with the sensor for placement, mounting and testing details.