Inertia Crossbar System

DEMCO **INSTALLATION INSTRUCTIONS**

TYPE 973 (6V and 12V)
15 ZONE LATCHING MONITORS
using
TYPE 982 (6V and 12V)
LATCHING SENSORS

TABLE A: MODEL DESIGNATIONS				
TYPE 973 15 ZONE LATCHING MONITORS		TYPE 982 LATCHING SENSORS*		
Cat. No.	Voltage	Cat. No.	Color	Voltage
973-6	6VDC	982-6WH 982-6BR	WHITE BROWN	6VDC
973-12	12VDC	982-12WH 982-12BR	WHITE BROWN	12VDC

*Use with like-voltage latching monitor.

INDEX:

Sections:

Tables and Diagrams:

GENERAL INFORMATION:

The Inertia Crossbar System Type 973 15 Zone Latching Monitors can individually annunciate up to 15 like-voltage Type 982 Latching Sensors. Additional sensors may be connected, if desired, but without zone annunciation. For ease of servicing, a maximum total of 30 sensors (including those that are zone annunciated) is recommended.

The resultant forced-entry (shock) detection system can be used alone or can complement other forms of perimeter protection. The system possesses the ability to detect attacks **before** an intruder gains entry to the premises.

Each sensor's sensitivity can be individually adjusted. Blows applied to the surface area that is protected (a succession of small shocks, a smaller number of larger attacks, or a single gross attack) will trip and latch the sensor and in turn trip and latch the monitor and place it in alarm.

The "system" LED above the reset switch on the monitor will light and so will the monitor's individual zone LED(s) corresponding to the sensor(s) that tripped. The LED on each tripped sensor will light as well to pinpoint the source(s) of alarm.

A fault in the sensor loop will trip the monitor and light its system LED, but no zone or sensor LEDs will light. When the fault clears, the monitor will restore and its system LED will go out.

The monitor's SPDT alarm contacts can be connected into any protective circuit. Reset is accomplished by momentarily operating the RESET switch on the face of the monitor.

The No. 973-6 Monitor requires 6V. DC (60 ma). The 973-12 requires 12V. DC (40 ma). Current drain is **not** dependent on how many sensors are connected.

Except where otherwise indicated, the information contained herein applies to 6V **and** 12V monitors and sensors.

DESCRIPTION:

Type 973 15 Zone Latching Monitors:

Each monitor is composed of a two gang switch/LED plate to which is mounted two bracket assemblies. One bracket assembly contains a monitor board with RESET switch, tamper switch, alarm relay and system LED and an annunciator board containing 5 LEDs. The other bracket assembly contains two annunciator boards, each with 5 LEDs. An end-of-line resistor (1K ohm) is included for connection at the end of the sensor loop.

The monitor board also contains terminals and leads for connection of:
a) Two wire supervised sensor circuit with end-of-line resistor, b) separate tamper loop (if desired), c) protective circuit and d) DC power (6V or 12V, as required). See diagram 4 or 5.

Each annunciator board also contains terminals for the connection of the zone leads from the individual sensors and for power.

The bracket assemblies are intended to be mounted in a standard two gang electrical box (flush or surface) and covered by the accompanying switch/LED plate.

Type 982 Latching Sensors:

Each sensor's tampered housing contains a shock sensing module a "trip level" (sensitivity) adjustment potentiometer and terminals for connection of the two wire, end-of-line resistor supervised sensor loop and (if required) a separate tamper loop. The housing is designed for surface mounting. An LED is visible through its cover.

Each sensor contains a "time/pulse integrator" processing circuit which has been designed for optimum response to attempts at forced entry through most building materials. See Diagram 1. The alarm trip level is reached after the sensing of a succession of light shocks (e.g.: gentle prying of a door or window) or a smaller number of heavier shocks (e.g.: hitting or pounding on the building structure). A gross attack (very large single shock including breaking of glass) or fault in the sensor loop will trip the system **immediately**. The time/pulse integrator circuit provides good immunity to lower level **occasional** shocks such as may be caused by building expansion or contraction of other transient occurrences.

The sensing module may be rotated up to 180° about its axis to facilitate mounting on a vertical, horizontal or sloping surface and to enable sensor operation in a NORMAL or DAMPED mode, depending upon range desired, characteristics of the mounting surface and other field conditions. See Diagram 2.

At the heart of the sensing module is the inertia crossbar assembly. A high inertia mass is mounted on a highly polished gold plated "crossbar" which straddles four other highly polished gold plated elements in such a manner as to provide two parallel paths for the sensor circuit current with two sensing/contact points in each path. Optimum long term stability and reliability are provided by this multiple path arrangement.

Forced entry attempts typically produce vibrations which affect the contact points of the sensing module's inertia crossbar assembly. The resultant tiny and rapid variations in sensor circuit current are then processed by the sensor's time/pulse integrator. If a series of shocks of sufficient intensity is sensed, the trip level will be reached, the unit will trip and its LED will light steadily. The monitor's system LED and appropriate zone LED will light and the alarm will be signaled to the protective system control.

INSTALLATION AND WIRING:

Preliminary Considerations and Sensor Location:

Because of the many types of building materials and construction methods used, it is impossible to give precise sensor location information for any shock system, but Table B gives general guidelines as to the diameter of protection (DP) that might be obtained under ideal conditions for each sensor when mounted on various materials and adjusted as shown.

Up to 15 Type 982 sensors may be connected to the Type 973 monitor with individual zone annunciation. Additional sensors may be connected, if desired, but without zone annunciation at the monitor. For ease of servicing a maximum total of 30 sensors (including those that are zone annunciated) is recommended.

1. **The diameter of protection (DP) may be smaller where there are discontinuities in the mounting surface,** such as windows, doors, corners or joints between panels, or cracks. In these cases, the sensors should be mounted at ½ DP from the center of the gap. See Diagram 4 (a, b, c, d). Where the opening exceeds the DP, use sensors around the edge as shown in Diagram 4(e).
2. **Locate sensors at the most likely intrusion height relative to outside ground level.** Where the height of a wall exceeds 1½ DP, use two rows, staggered as shown in Diagram 4(f).
3. **Sensors on surfaces *below* outside ground level require half DP spacing.**
4. **Loose or rattling surfaces may give false shock signals.** In particular, check windows for loose frames or panes.
5. **Beams, studs and electrical conduit increase shock transmission.** For example, when protecting roof areas, take advantage of the shock transmitting properties of beams.
6. **Sensors on window frames should be located 2" or less from glass.**
7. **Sensors on glass should be located at least 3" in from the frame.** See Installation Procedure, Step 4b for mounting information.

Installation Procedure:

1. **Locate the monitor** either **near** the main protective system's control panel or at any other location where viewing of the zone LEDs will be convenient. The monitor is designed to be mounted in a standard two gang electrical box (flush or surface).
2. **Run wiring between the control panel, monitor and sensor locations** as indicated in Diagram 4 or, if a separate tamper circuit is desired, Diagram 5.

   Use of twisted wiring is recommended for the sensors to minimize the possibility of picking up unwanted induced voltages.
3. **Make connections to the monitor as indicated in Diagram 4 or 5** but DO NOT CONNECT DC VOLTAGE TO THE MONITOR until the sensors have been installed and all other connections have been made.
4. **Mount and connect the sensors.**
   a. **Remove the cover** by releasing the screw on its face.
   b. **Mount the backplate** via the three mounting holes provided. **IMPORTANT:** The backplate must be in close contact with the mounting surface. Where the surface is unavoidably rough, make sure that high points are close to and touching the area behind the sensing module.

      When mounting on glass, remove the identification label from the rear of the sensor and mount with double sided foam tape (not thicker than 1/16") to clean, dry glass.

      Note: Sensors must be installed so that the **axis** of the sensing module is **horizontal,** whether the unit is mounted on a vertical, horizontal or sloping surface (see Diagram 2).
   c. **Rotate the sensing module** until the line on its end is vertical, with the N (normal) or D (damped) position uppermost (see Diagram 2).
      Note: The damped mode is useful on "problem" surfaces that are exposed to public areas or other possible sources of unwanted vibration.
   d. **Make connections as indicated in Diagram 4 or 5.** Be sure to install the end-of-line resistor at the last sensor. Replace sensor covers.
5. **Connect the required DC voltage to the monitor.** Observe polarity! Incorrect polarity could blow the fuse or circuit breaker in the power source. Mount the monitor in the electrical box to be used.

   The voltage should be provided from a source that can supply 60 ma at 6VDC (40 ma at 12VDC) and that has at least 4 hrs. standby in the event of AC power failure.
6. **Proceed with TESTING AND ADJUSTMENT.**

TESTING AND ADJUSTMENT:

With the required DC voltage applied to the monitor and the sensor loop closed, the monitor's system LED and all zone LEDs should be off and its alarm contacts should be in the non-alarm position. In addition, all sensors' LEDs should be off.

Note: If the tampers have been connected in the sensor loop (Diagram 4), the monitor's cover plate and all sensors' covers must be in place (or the tamper terminals temporarily shorted).

1. **At the first sensor in the sensor loop, open the sensor loop momentarily** (Note: if the tampers have been connected in the sensor loop, the loop will be automatically opened by the releasing of the sensor's tamper switch upon the removal of the sensor cover). The monitor's system LED should light steadily and its alarm contacts should operate while the loop is open. No zone LED will light.
2. **Place a short across the sensor loop** at the sensor's terminals 2 and 4 (and hold the tamper switch depressed if it is in the sensor loop). The same alarm conditions should occur as in Step 1. Remove the short and replace the sensor's cover. Depress the monitor's RESET switch if the system has not already reset (as it will have, if the tamper is in the sensor loop).
3. **Remove a sensor cover and turn the arrow on the sensor's sensitivity adjustment pot.** to the suggested initial setting range indicated in Table B for the type of surface being protected by the sensor. Replace the cover if the sensor's tamper switch is in the tamper loop.
4. **Tap the area near the sensor with a hard object** (such as a screwdriver handle or small hammer) about once per second until the sensor's alarm trip level is reached and its LED lights.

   The **monitor's** system LED and appropriate zone LED will light and its alarm relay contacts will operate. Reset the switch.
   Note: If the tampers are in the sensor loop, reset can be accomplished at the sensor by simply removing the sensor's cover momentarily to open (release) the tamper.

   Repeat the tapping test several times at different points near the sensor.

   As explained earlier, if the sensor is properly adjusted to respond to a succession of small shocks and/or a smaller number of larger shocks it would also respond to a very large "gross" attack.

   If necessary, adjust the sensor's sensitivity pot. (clockwise to increase sensitivity, counterclockwise to decrease) until desired results are obtained. The pot's final setting does not necessarily have to be within the initial setting range indicated in Table B.

If the sensor is overly sensitive while operating in the NORMAL (N) mode, it may prove desirable to orient its sensing module in the DAMPED (D) mode and to readjust its sensitivity pot, accordingly. Conversely, a sensor with low sensitivity while in the DAMPED (D) mode may require operation in the NORMAL (N) mode.

5. **Repeat Steps 3 and 4 for each sensor** and replace all covers.

GENERAL SPECIFICATIONS:

Physical:	**Type 973 15 Zone Latching Monitors**	**Type 982 Latching Sensors**
Width:	4½" (11.4 cm)	2⅛"(5.4 cm)
Height:	4½" (11.4 cm)	3¼" (8.3 cm)
Depth:	1¾" (4.4 cm)	1⅛" (2.8 cm)

Electrical: **Type 973 15 Zone Latching Monitors**

	6V Models	12V Models
Input Voltage:	6VDC (nominal)	12VDC (nominal)
Input Current:	60 ma (nominal)	40 ma (nominal)

(Note: Input current is independent of quantity of sensors connected.)

Alarm Contacts: SPDT, 300 ma, 30VDC, 100VAC, 30 W (max. ratings)
Tamper Contacts: 0.1A, 125V (max. ratings)
Sensor Loop: 60 ohms permissible resistance (plus 1K ohm end-of-line resistor)

Type 982 (6V and 12V) Latching Sensors

Sensor Ratings: 30 ma, 50 V, 100 mW (max. non-inductive)
Tamper Ratings: 0.1 A, 125V (max. ratings)

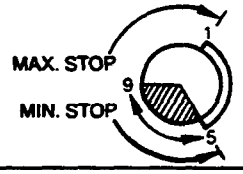
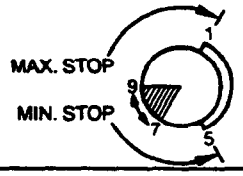
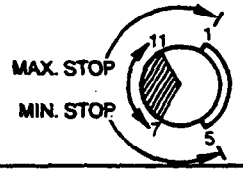
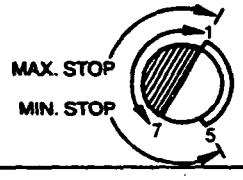
TO THE INSTALLER

Regular maintenance and inspection (at least annually) by the installer and frequent testing by the user is vital to continuous satisfactory operation of any alarm system.

The installer should assume the responsibility of developing and offering a regular maintenance program to the user as well as acquainting the user with the proper operation and limitations of the alarm system and its component parts. Recommendations must be included for a specific program of frequent testing (at least annually) to insure the system's proper operation at all times.

***TABLE B**

COVERAGE AND SENSITIVITY ADJUSTMENT GUIDELINES

MATERIAL	DIAMETER OF PROTECTION (DP) NORMAL (N) MODE	DIAMETER OF PROTECTION (DP) DAMPED (D) MODE	SENSITIVITY POT. SUGGESTED INITIAL ADJUSTMENT "O'CLOCK" SETTING RANGES (SHADED AREAS)
Heavy Metal Sheet Metal	15 ft 10 ft	9 ft 7 ft	
Plate Glass Wood Paneling Hardboard	12 ft 8 ft 8 ft	8 ft 6 ft 6 ft	
Multi-Pane Glass Plaster Board	10 ft 8 ft	7 ft 5 ft	
Concrete Block (Hollow) Cinder Block (Hollow) Concrete (Solid) Cinder Block (Solid) Brick	12 ft 12 ft 10 ft 10 ft 9 ft	8 ft 8 ft 7 ft 7 ft 6 ft	

***IMPORTANT**: This table is for guidance and comparison only. Actual coverage obtained and final sensitivity pot. setting required will vary because of differences in materials, construction methods and other field connections and will not necessarily fall within the boundaries shown here.

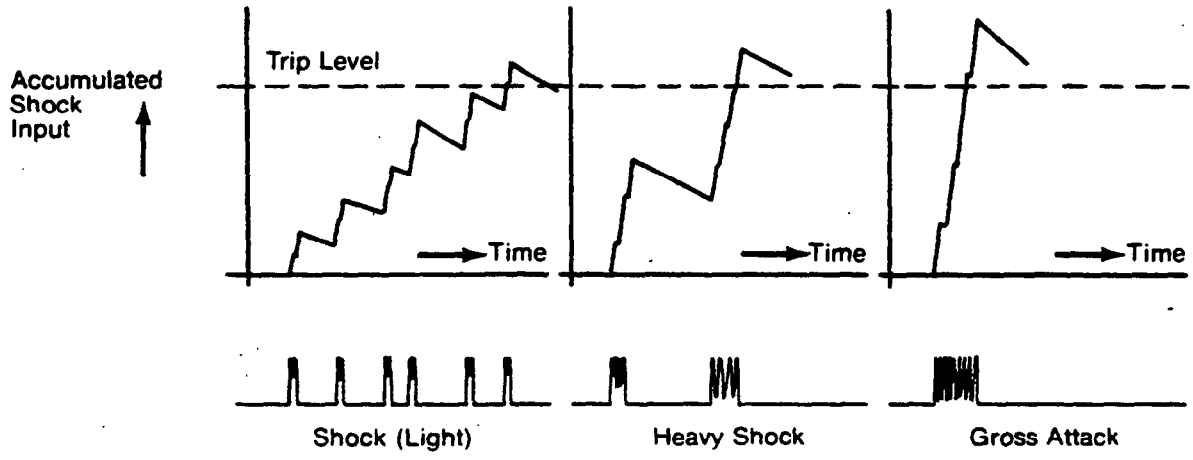


Diagram 1: TYPE 982 LATCHING SENSOR, TIME/PULSE INTEGRATOR SHOCK RESPONSE

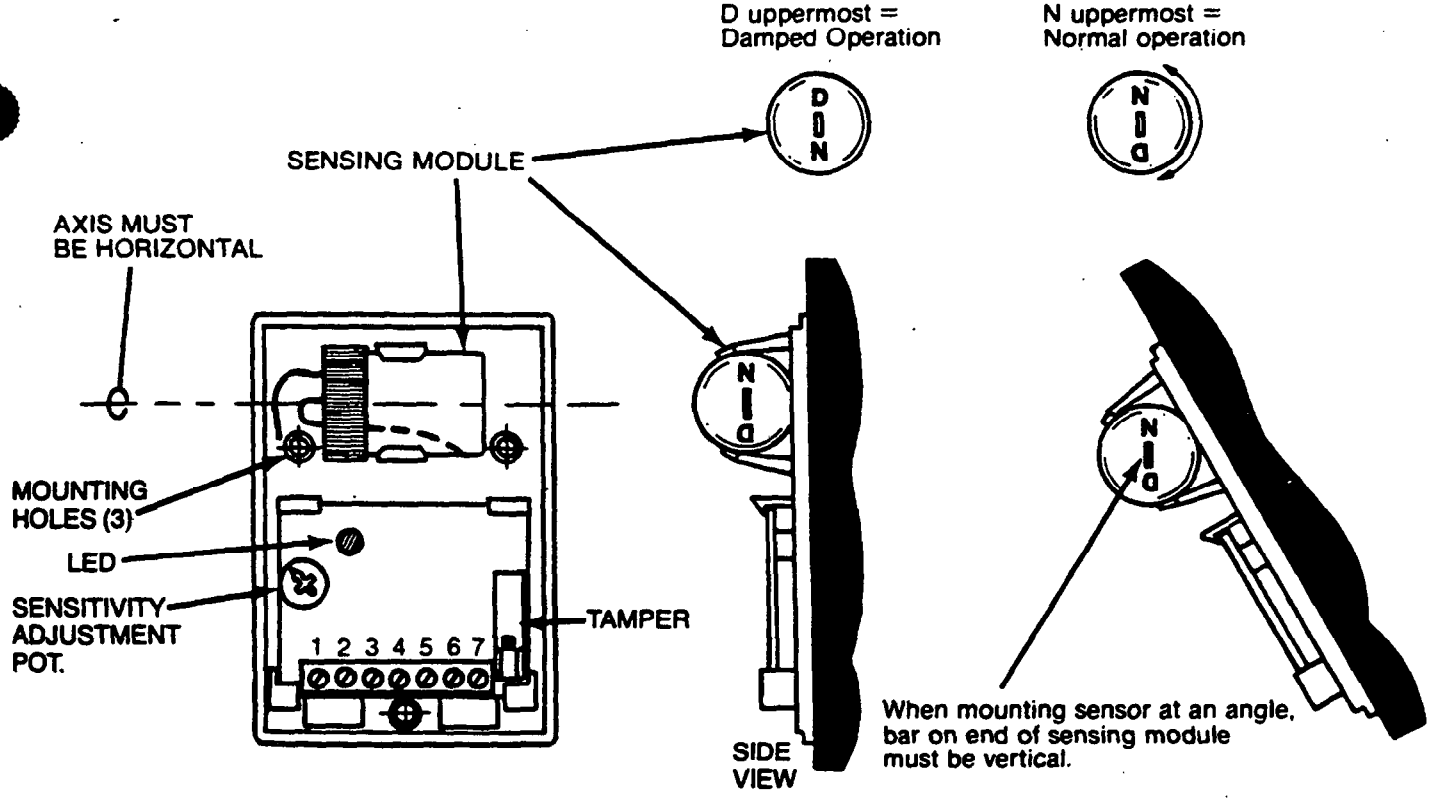
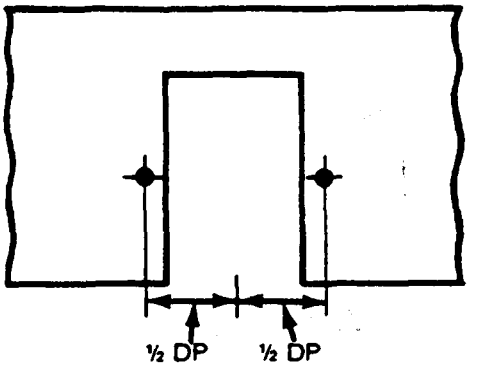
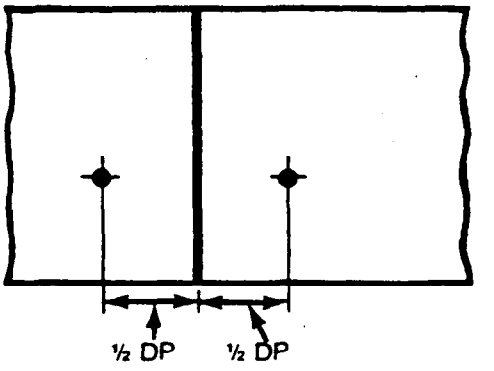


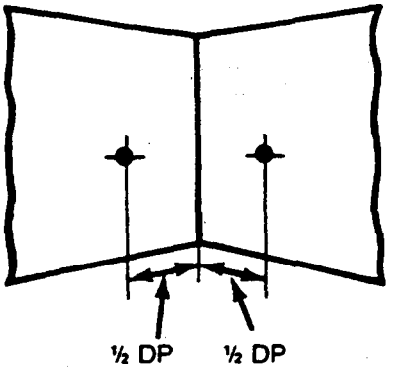
Diagram 2: TYPE 982 LATCHING SENSOR, INSTALLATION DETAILS



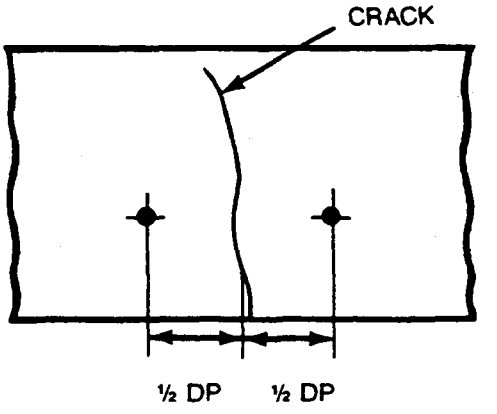
a. Sensors mounted to either side of door opening.



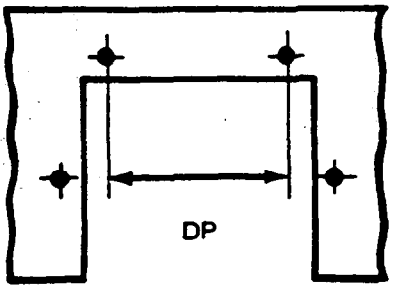
b. Sensors mounted close to gap in partitioning.



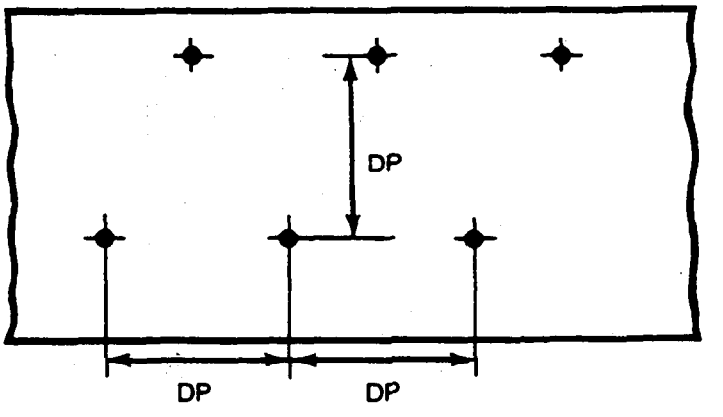
c. Sensors mounted close into corner.



d. Sensors mounted adjacent to crack.

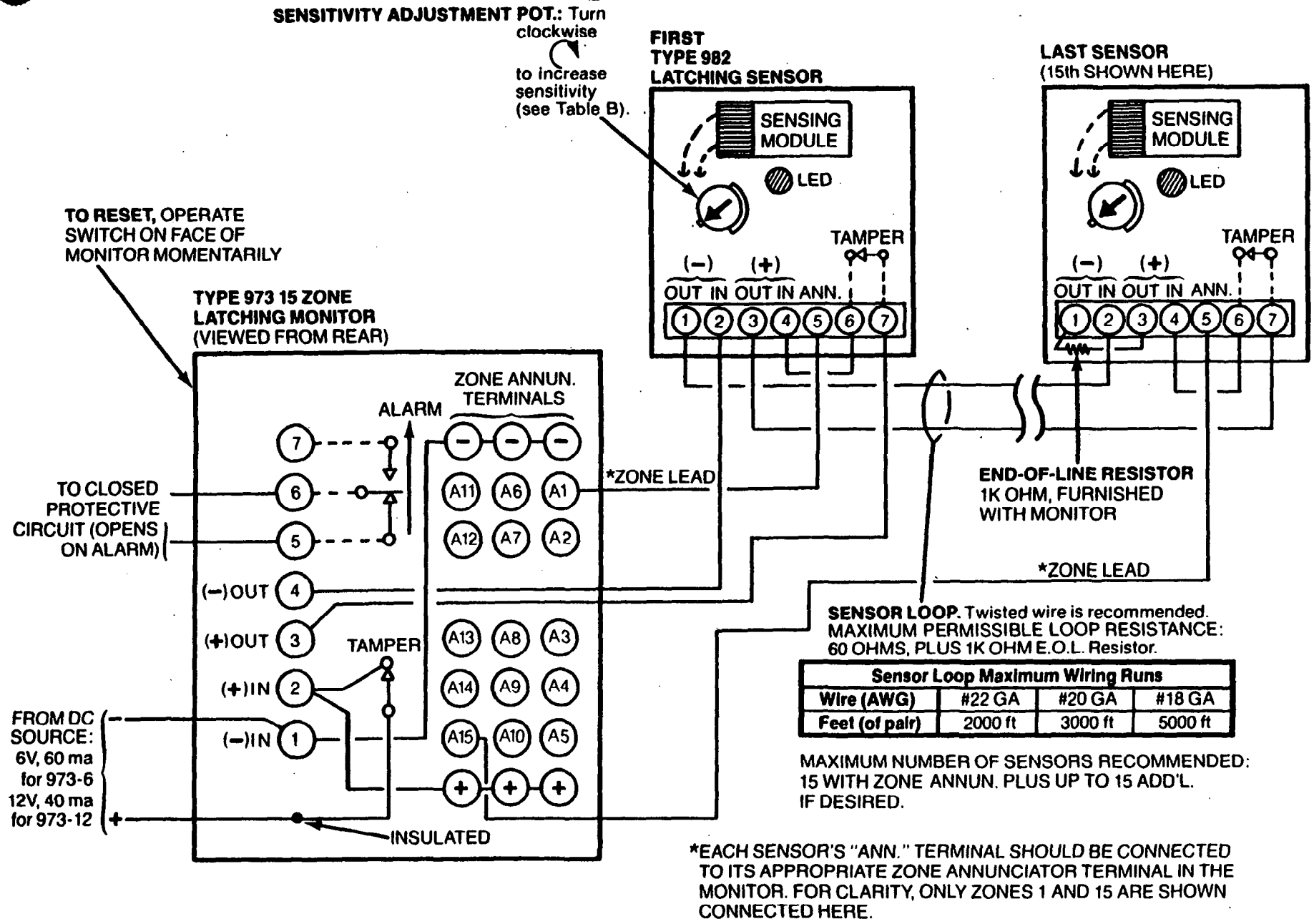


e. Sensors mounted around wide opening.



f. Sensors mounted on high wall.

Diagram 3: TYPICAL SENSOR LOCATIONS



Sensor Loop Maximum Wiring Runs			
Wire (AWG)	#22 GA	#20 GA	#18 GA
Feet (of pair)	2000 ft	3000 ft	5000 ft

Diagram 4: FIELD CONNECTIONS, *WITHOUT* SEPARATE TAMPER LOOP.

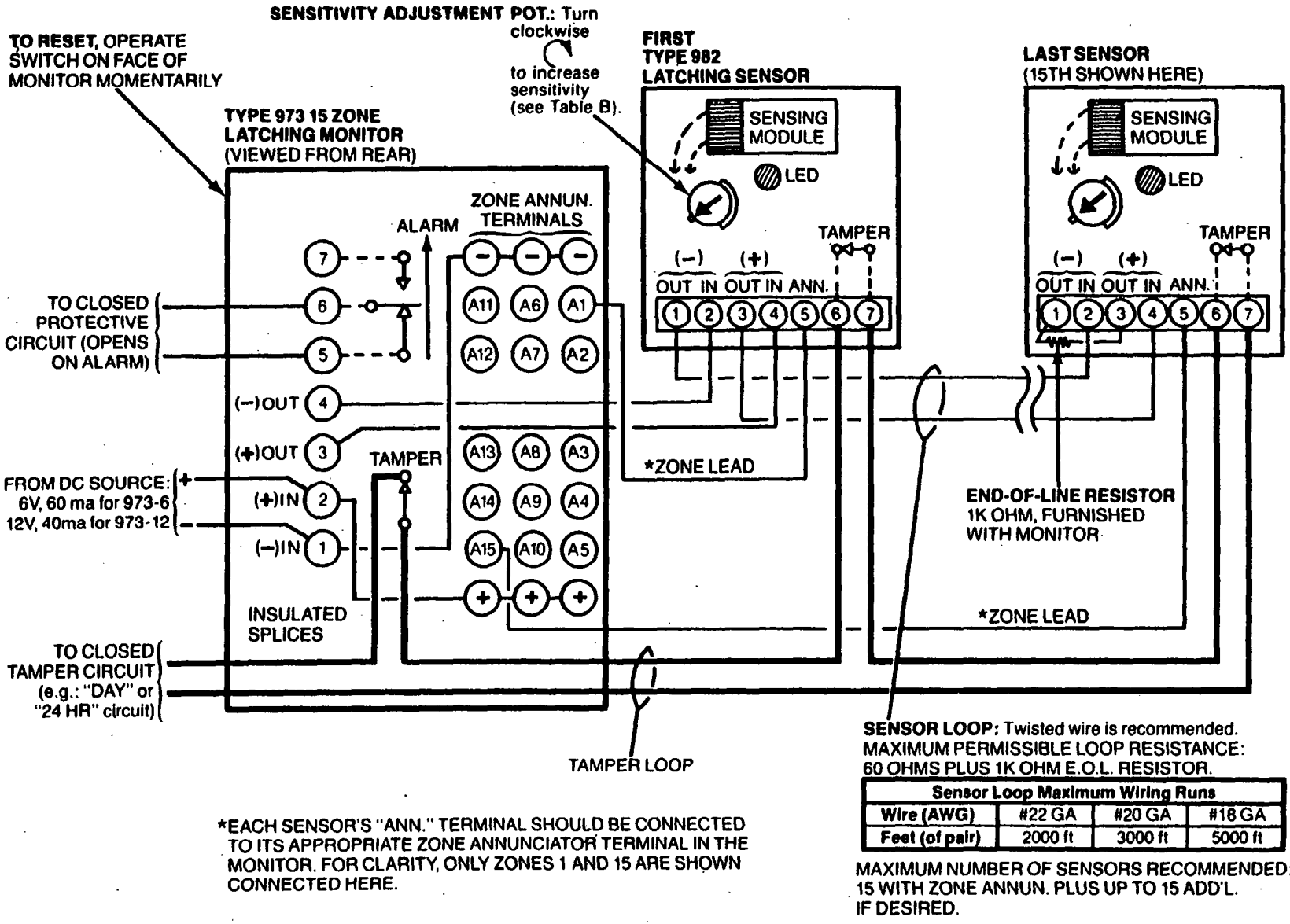


Diagram 5: FIELD CONNECTIONS, *WITH* SEPARATE TAMPER LOOP.

ADEMCO
ALARM DEVICE MANUFACTURING CO.
A DIVISION OF PITTWAY CORPORATION
4165 Eileen Way, Syosset, New York 11791
P8440 6/82