FEATURES

Sixty possible zone addresses

Monitors multiple sensors per address

One DIP switch system programming

Audible/visual alarm

Two-button acknowledge/reset

Accessable lamp-test button

Custom zone identification cards

Fault supervision of each zone

Transient/short circuit protection

Communication between other SCS 30/60 systems

OPTIONS

Reset function lockout key

Thirty and sixty zone versions

Transfer of control functions

Slave annunciation with remote control (switchable)

Data logging via RS232 interface

Thirty zone LED output card

Thirty zone relay output card

MASTER PROCESSOR and ANNUNCIATOR

GENERAL DESCRIPTION

The Master Processor and Annunciator (MPA) is the heart of the Sentry Communicaton System (SCS 30/60). The MPA's flexibility and alarm management capability provides everything required to configure a safety or security system, yet system management is performed simply with a two-button acknowledge/reset action. This addressable multiplex system can stand alone, or be integrated into a higher-level system.

The annunciator panel features clean, positive tactile dome switching, and can be rack, flush or surface mounted. Each panel can monitor up to twenty sensors per zone with both visual and audible annunciation.

MPA panels are compatible with Sentry's standard ultrasonic receivers.

APPLICATIONS

With one master MPA located at a primary point of control, and another located as a remote slave (optional), activity can be monitored around the clock. The control function of the MPA at the primary point may be transferred to the slave unit by activation of a key-lock switch on the master unit. The same key-lock switch returns control to the master unit.

This flexibility in "controls design", combined with the acceptance of monitoring sensors for doors, windows, and "off-limits" or limited access space, makes the SCS system with its MPA control capabilities ideal for psychiatric and other hospitals, courts, adult and juvenile detention centers, schools, long-term care facilities and other applications.

Sentry
PRODUCTS, INC.

the logical choice whenever there is a need for personal safety

Figure 1. Rear view of MPA

P1 Connector
1 - N/C   No connection
2 - TX2   Transmit status to another system
3 - RX2   Limited receive function
4 - DCD
5 - PWR GND
6 - DTR
7 - CTS
8 - RTS

Port A (JP1)
1 - Shield
2 - Communication A+
3 - Communication A-
4 - +24 VDC
5 - N.C.
6 - N.C.
7 - PWR GND

Port B (JP2)
1 - Shield
2 - Communication B+
3 - Communication B-
4 - +24 VDC
5 - N.C.
6 - N.C.
7 - PWR GND

Power Connector (JP3)
1 - +24 VDC power supply
2 - PWR GND
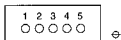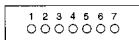3 - +24 VDC battery
4 - PWR GND battery
5 - Earth GND

ON
1 2 3 4 5 6 7 8
PROGRAMMING SWITCH

Figure 2. Power distribution
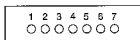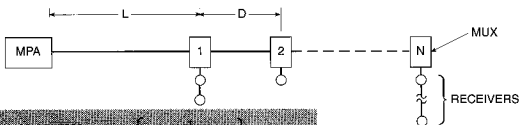
Equation 1

$$r = \frac{1500}{N(.018 - .007a)} \left[\frac{1}{L + (\frac{N-1}{2}) D} \right]$$

r = WIRE RESISTANCE IN OHMS

N = NUMBER OF MUXs (WORSE CASE IS N = 32)

a = AVERAGE NUMBER OF RECEIVERS PER MUX $(\frac{T}{N})$

L = DISTANCE FROM MPA TO FIRST MUX

D = AVERAGE CABLE LENGTH BETWEEN MUXs

T = TOTAL NUMBER OF RECEIVERS

WIRE LENGTH IS: L + (N -1) D

EXAMPLE: N = 25, T = 60, L = 100', D = 30', a = 2.4

Equation 2

$$r = \frac{1500}{25(.018 - .007 \times 2.4)} \left[\frac{1}{100 + (\frac{25-1}{2}) 30} \right] = 4.9 \text{ OHMS}$$

USE #16 WIRE. THE TOTAL WIRE LENGTH IS 820 FEET.

RS485 SIGNAL DESCRIPTION

The RS485 cable transmits and receives signals from the multiplexers (zones). The polling cycle is 3.4 msec per zone and polls four times per second for each multiplexer. Because of the RS485 inherent restrictions, and the cable capacitance, the cable length should not exceed 4000 feet. Commercial cable that meets FCC regulations is shielded twisted-pair, West Penn D291 or Belden 8761 (1 pair # 22 stranded) or equivalent is recommended for communication wiring.

The cable can be installed between multiplexers with mixed serial (daisy chain) and parallel connections. When configuring your site it is suggested that an addressing scheme be planned. For example, Port A can be used for the multiplexers in the north and south quadrants of the site, and Port B used for the east and west quadrants. The maximum number of multiplexers or drops on any one port is 32.

RS232 SIGNAL DESCRIPTION

The RS232 cable transmits at 19,200 BAUD. This option is available for logging data on a PC.

MASTER/SLAVE OPERATION

The MPA 30 or MPA 60 can be operated as master/slave pairs. The master MPA annunciator has a key switch allowing transfer of the acknowledge and reset functions to a slave unit. Under normal operation, the slave unit can only silence itself. A supervisor with the proper key can transfer the acknowledge and reset function to the slave unit. Now, the master unit can only silence itself. This function is particularly useful for day/night operation where system control needs to be transferred to another location.

The key switch also allows the reset function to be locked out. After acknowledgement, only a supervisor with the proper key can reset the system.

POWER REQUIREMENTS

A power connector (JP3) supplies +24±10% VDC at 3 amp maximum. Ports A and B supply +24 VDC at 1.5 amps per port.

BATTERY BACK-UP

All power supplies should have battery back-up. The size of the batteries depends on the customer requirements for operating on batteries. The PS-103 power supply has circuitry and current capacity to maintain charge of lead-acid gel-cell type batteries. The charging current is limited to 1.1 amperes.

THREE MOUNTING CONFIGURATIONS

Three different trim rings are available, allowing the MPA 30 or MPA 60 to be either rack mounted, flush mounted, or surface mounted. The mounted dimensions for a MPA 60 (30) are:

Rack mount	19 x 8 3/4 x 2 inches
Flush mount	22 (14) x 10 1/4 x 4 inches
Surface mount	20 (12) x 8 3/4 x 4 inches

WIRING

Attention must be given to the selection of wire size for the proper power distribution. Because the wiring is usually daisy-chained from zone to zone, care must be given that there is not an excessive voltage drop. The voltage at the end of the line should not be less than 22 volts, with one or more zones in alarm.

If the number of receivers are fairly well distributed throughout the installation (Figure 2), the wire size can be calculated using Eq.1. If the distribution is skewed toward the end of the line, the calculated wire size will be too small. If the calculated wire size is larger than #14, or if it is desired to run smaller wire, a power supply (shown in the dotted box) can be installed at the end of the line.

Since each power supply is now supplying current for approximately one-half the receivers and about one-half the wire length, this has the effect of increasing the allowable resistance by three to four times, or a reduction of about two wire sizes.

In a multistory building, between groups of zones on each floor there is an additional length of cable between floors. This adds a voltage drop which is not accounted for in Eq. 1 or in Figure 1. It is best if a vertical cable runs centrally up the building, and the zone wiring on each floor runs out radially like spokes. If one or more floors has a large number of zones and receivers or sensors, that floor should have its own power supply.

In a multiple building installation, a power supply in each building is recommended unless the number of zones and receivers in each building is very small. If each building has its own power supply it is only necessary to take the communication cable between buildings.

The capacitance between one conductor and all other conductors connected to the shield of the communication cable should not exceed 47 picofarad per foot. Two suggested cables that meet this specification are West Penn D291 or Belden 8761 (1 pair #22 stranded). The power wire should be #18, #16, or #14 and does not need to be shielded.

COMMUNICATIONS FORMAT

This protocol allows a customer's system to interface with the SCS system.

BYTE	POLL	BYTE	RESPONSE
1	ST A1 A3 A5 AD SP A0 A2 A4 0 PT	4	ST A1 A3 A5 AD SP A0 A2 A4 1 PT
2	ST M1 M3 M5 CI SP M0 M2 M4 M6 PT **MASTER STAT TO MUX:** M0 = 0 M1 = 0 M2 = 0 M3 = RESET ZONE X MUX. M4 = ACK IN PROGRESS M5 = AUDIO ON M6 = BRIDGE MUX ALARM SOURCE	5	ST S1 S3 S5 CI SP S0 S2 S4 S6 PT **MUX STAT TO MASTER:** S0 = ZONEX ALARM STATUS S1 = ZONEX SUPRV STATUS **SLAVE BUTTON AND STATUS TO MASTER:** S2 = SLAVE ON BATTERY S3 = SLAVE RESET ZONE X S4 = SLAVE SENDS ACK S5 = SLAVE AUDIO ZONE X ON S6 = BRIDGE MUX ALARM SOURCE
3	ST C1 C3 C5 CI SP C0 C2 C4 C6 PT **MASTER UPDATES SLAVE:** C0 = ZONE X RED = ON C1 = RED BLINKING (/ACK) C2 = YELLOW ON (BLINKING) C3 = MASTER TRANS CONT. C4 = 0 C5 = 0 C6 = 0	6	ST T1 T3 T5 CI SP T0 T2 T4 T6 PT **SLAVE TO MASTER ZONE X ADDRESS RESET/AUDIO BUTTON:** T0 = A0 T1 = A1 T2 = A2 T3 = A3 T4 = A4 T5 = A5 T6 = 0

DEFINITIONS

ST	START BIT
SP	STOP BIT
PT	PARITY = ODD PARITY BIT
A0 - A5	ADDRESS BITS
AD	ADDRESS IDENTIFIER - 1
CI	COMMAND IDENTIFIER - 0
UNUSED BIT	0 - DEFAULT
SIGNAL HI	FUNCTION ASSERTED

ADDRESSES

SLAVE ANNUNCIATOR ADDRESS = ZERO
MUX ADDRESS = 1 - 60

COMMUNICATIONS

RATE = 19.2K BAUD
DATA BYTE = 11 BITS (INCLUDING START,
                      PARITY, & STOP)
METHOD = RS485

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. Annunciator green LED not lit.	- No power. - DIP switch in error.	- Check AC power source and battery. - Check switch settings per installation.
2. Battery's yellow LED remains lit.	- Low voltage or no AC power.	- Check AC power to system.
3. Annunciator yellow zone LED remains lit.	- No polling response from multiplexer, sensor/receiver signal loop is broken.	- Check wiring to multiplexers. - Check multiplexer address. Each multiplexer address should be unique. - Be sure multiplexer has been set to this address.
4. Annunciator red LED remains lit.	- Miss-wired sensors at multiplexer.	- Go to multiplexer and check status: GRN should be lit YEL supervision should be off RED alarm should be off
5. Annunciator displays yellow supervision for all multiplexers off same port.	- System current overloaded so, PolySwitch® went to low current. - Communication open or shorted.	Take load off the port in question by: Pull connector Let system cool for 15 seconds Plug RS485 back in port If problem persists check wiring for short circuits.

INSTALLATION

The simplicity of the MPA annunciator makes installation uncomplicated and straight forward. Perform the following steps in the sequence recommended.

1. On back of annunciator insert the power cord in JP3, the RS485 cable in JP1 (port A) and JP2 (port B), and the optional RS232 cable in P1 (to interface with a PC for data logging).

2. Run the RS485 cable to the location of each multiplexer (zone). Multiplexers are typically mounted with or near the location of the receivers (sensors). Each multiplexer (zone) can monitor multiple sensors.

3. Set the DIP switch, located on the rear of the annunciator, to the number of multiplexers configured for the system, and the type of annunciator (single annunciator system or master/slave configuration).

4. Connect the power cord JP3 to a PC power supply, and the stand-by batteries. The annunciator panel green LED will light to indicate the unit is in operation.

5. Install the MPA in a rack, on a work surface or flush in a wall using the hardware shipped with your unit(s).

6. Proceed to OPERATION.

ZONE LABELING

A white card has been inserted from the top of the unit into a slot behind the front layer of the annunciator panel. To identify the zone reset switch, first remove the card. The dotted lines are typing guides. The windows are one-half inch. A single line of text should be centered one-quarter inch above the dotted line and typed one-half space above and below. There is space for two lines of ten characters each.

PROGRAMMING (ANNUNCIATOR)

The annunciator is programmed by the "programming" switch on the back of the MPA. Use switches 1 through 6 to set the address (in BCD code) for the number of zones in the system. Switch 7 tells the annunciator there is a slave annunciator. Switch 8 tells the annunciator that it is a master or slave. For a system with 22 zones and no slave annunciator, the switch settings would be:

ON								
	1	2	3	4	5	6		

0+2+4+0+16+0=22
1 2 3 4 5 6

For a 45 zone system with a master and slave annunciator, switches 7 and 8 on the master are off (down) and all switches 1 through 8 on the slave will be on (up).

ON								
	1	2	3	4	5	6	7	8

MASTER

ON								
	1	2	3	4	5	6	7	8

SLAVE

OPERATION

Observe the SCS annunciator. The LED colors will reflect the annunciator functions. They are defined as follows:

Green	Annunciator is powered up and processor is operating.
Red	Zone in alarm. Zone address of specific multiplexer sending signal will be lit on annunciator panel.
Yellow (zone 0)	Commercial AC power source is off. System is operating on battery. Other annunciator panel on battery, or master panel has communication fault with slave.
Yellow (zone X)	Supervision signal. No polling response from multiplexer or signal loop to the sensors/receivers has been broken.

Blinking

Red	Blinks when zone is in alarm but not acknowledged. Red LED is steady-on after alarm has been acknowledged.
Yellow	Blinks when zone is in fault condition. (There is no steady-on state for this color LED.)

Audible Signal

There is an audible signal (beep) for any fault condition that has not been acknowledged.

Fast intermit beep	For alarm signals, zones 1 - 60. After alarm is acknowledged, red LED goes steady-on and beeper stops.
Slow steady beep	For supervision signals, zones 0 - 60. After supervision fault is acknowledged, the audible signal will stop. The yellow LED will continue to blink if the fault condition still exists.

Clear alarm	Press acknowledge button (no beep). Press reset button. Press zone button.
Clear supervision fault	Press acknowledge (no beep) Physically restore circuit. After supervision fault is cleared, press acknowledge again to turn off yellow LED.

ENGINEERING SPECIFICATIONS

The annunciator and control unit must be an addressable multiplex controller, with capacity to monitor 30 or 60 zones. There shall be one green LED to indicate unit is in operation, and a user-accessible lamp test switch. Each zone must display an alarm with a red LED, and a supervision fault condition with a yellow LED. The alarm LED must flash until acknowledged, and be steady on until the zone is reset. To prevent accidental reset of a zone, reset must be accomplished by first pushing the reset switch and then the zone switch. The supervision fault yellow LED must continue to flash until the fault is corrected and acknowledged. Programming must be accomplished by one DIP switch only. Communication must be via an RS485 shielded, twisted-pair cable, transmitting at 19,200 BAUD, with a capability of not less than 4,000 feet cable length. Polling each MUX shall not be less than four times per second. There shall be a provision for data logging on a PC via an RS232 port. All incoming and outgoing lines must have transient and short circuit protection. The face of the unit must be of polycarbonate construction with embossed finger guides for the switches. The switches must be tactile dome. Membrane switches will not be acceptable. A trim ring must be supplied for rack, surface, or flush mounting.

SCS 30/60 SYSTEM COMPONENTS

MPA-30	30 zone control/annunciator
MPA-60	60 zone control/annunciator
PS-103	Power supply
MUX-100	Zone communicator
MUX-200	Window supervised zone comm.
BMX-100	Bridge between SCS systems
ROC-01	Any alarm relay output board
ROC-30	30 zone relay output board
LDC-30	30 zone LED driver board

RECEIVERS

RM	Rec./MUX combined
RS	Standard/dual/quad
XS	Dual frequency
WS	Weather resistant
MS	Medical/Commercial
HS	Vandal resident

TRANSMITTERS

P-105	Mechanical "pen"
LC-110	Medical
LC-210	Man-down
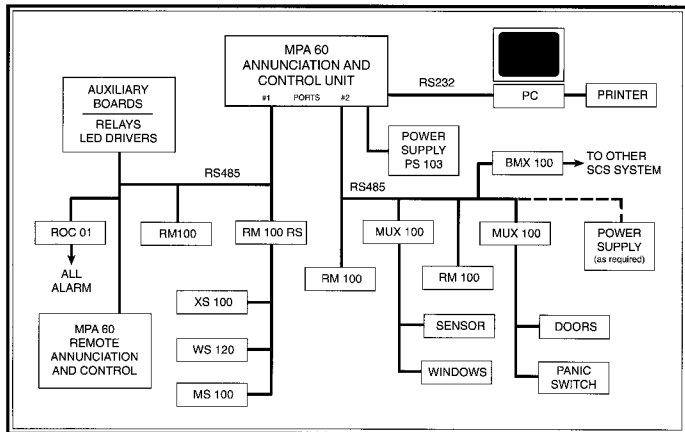
Figure 3. Example of typical SCS 30/60 system installation.