DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to physical injury.

Safety Instructions (or equivalent) signs indicate specific safety-related instructions or procedures.
Proper Usage

**WARNING** The information disclosed herein includes proprietary rights of the manufacturer. Neither this document nor the information disclosed herein shall be reproduced or transferred to other documents, used or disclosed to others for manufacturing purposes, or for any other purposes, except as specifically authorized in writing by the manufacturer. If this manual is supplied in connection with the sale or delivery of manufacturer’s equipment, it is to be used solely for maintenance, repair, or installation of such equipment.

The Model CA was manufactured in the United States. The Installation Manual was printed in the United States.

You must read and fully understand the following information pertaining to the proper use and limitations of your Model CA:

- The Model CA must be installed by qualified personnel only.
- The Model CA must NOT be used on full revolution presses or any machine that cannot be commanded to stop at any time.
- **Never use Outputs 1 & 2 to control standard relays, contactors, or valves!**
- **Always wire Outputs 1 & 2 to Safety Relays (EDM option must be enabled), Safety Relay Module (like the SSSR), or a “Control Reliable” Safety PLC (like the Pinnacle Safety Hub).**
- The mechanical power press on which the Model CA is installed must meet ANSI B11.1-2009 and OSHA 1910.217 regulations. These include inspection and maintenance procedures that must be followed to comply with the regulations. The manufacturer will NOT take responsibility for improperly maintained machinery.
- Point of operation safeguarding is defined in ANSI B11.19-2010. This regulation is used to determine a safe distance to place your Model CA. The manufacturer takes no responsibility for injury as a result of improper safeguarding or improper safe distances.
- The Model CA may not be able to safely stop a press which has a faulty stopping mechanism. The manufacturer cannot be held responsible for an improperly maintained or faulty stopping mechanism.
- The Model CA must be checked before put into operation. Follow instructions provided in this manual for procedures on how to do this.
- The Model CA should never be modified or repaired except by qualified personnel and upon authorization of the manufacturer. Never operate machinery that is not in full working order.
- Make sure that all maintenance people, machine operators, die-setters, foreman, and supervisors have read and understood this manual and all procedures have been and will be followed.
- All procedures in this manual must be followed. The manufacturer cannot take responsibility for operation if all procedures and warnings in this manual are not followed.

**Warranty**

Manufacturer warrants that this product will be free from defects in material and workmanship for a period of one year from the date of shipment thereof. Within the warranty period, the manufacturer will repair or replace (at our discretion) any product that is disclosed as defective upon examination by the manufacturer and is returned with shipping charges prepaid. This warranty will not apply to any product that has been subjected to misuse, negligence, accident, restriction, and use not in accordance with manufacturer’s instructions or which will have been altered or repaired by persons other than the authorized agent or employees of the manufacturer.

**Disclaimer**

The provisions of the warranty are the sole obligations of the manufacturer and exclude all other warranties of merchantability, expressed or implied. Further, there are no warranties that extend beyond the above warranty.

**Limitation of Liability**

In the event of any claim for breach of any obligations of the manufacturer under any order, whether expressed or implied, and particularly in the event of any claim of a breach of the warranty or warranties contained in the paragraph “Warranty” or of any other warranties, expressed or implied which might despite the paragraph entitled “Disclaimer,” be determined to be incorporated in any order, the company shall under no circumstances be liable for any consequential or special damages, either in law or in equity, or for losses or expenses or claims for the same arising from the use of, or inability to use, the products of the manufacturer for any purpose whatsoever.

We have designed our equipment to the very highest performance and safety standards known to the current technological state of the art. However, the installation, usage, suitability, and fitness of our equipment for any purpose, known or unknown, is interdependent upon the performance of other equipment not manufactured, installed, or secured or maintained by the manufacturer. We cannot and do not accept responsibility for any overall system performance when factors, such as these, are beyond our control.

We will not supply individual component parts of any circuit board but will supply the individual circuit board complete. Individual detectors or emitters are available as a complete tested unit.
The entire machine safety system must be tested at the start of every shift. Machine testing should include: (1) proper machine operation and stopping capability; and (2) verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.

FILL THIS INFORMATION OUT IMMEDIATELY

Purchase Date: ____________________________
Model No.: _______________________________
Options: __________________________________
Purchased From: ___________________________

Serial No.: _______________________________

Microprocessor Revision No.: __________________

This information will be needed in the event you need assistance.
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Introduction

Model CA Product Overview
Cascading safety light curtains provide the user the ability to connect additional sets of light curtains by daisy chaining multiple emitters and receivers together. The interconnecting cables are factory supplied and the user defines length. The cascading of safety light curtains provides multiple areas of guarding in any plane (X, Y, Z), while utilizing the control reliable dual safety outputs from the Category 4 safety device for the safety outputs to the machine control. The ability to guard multiple areas on irregular shaped machines by cascading safety light curtains reduces wiring and provides a lower cost yet effective machine guarding solution.

The Model CA Cascading Safety Light Curtain is an infrared safety light curtain that is designed to the IEC 61496 standard. When properly installed, it protects the machine operator by passing an invisible infrared light beam across an area to be guarded and examining whether or not the light beam(s) are blocked. If the light beam(s) are blocked, monitored solid state outputs will open, issuing a “STOP” command to the machines normally closed (N.C.) “STOP” circuit. The Model CA System is composed of transmitting units (EMITTERS), and receiving unit (RECEIVERS). The entire system is control reliable Category 4 (per IEC 61496). A single fault anywhere within the Model CA will not prevent at least one of the solid state outputs from opening up, (allowing a “STOP” command) when either a beam is broken or an internal fault occurs.

Theory of operation.
The Model CA Cascading Safety Light Curtain protects an area by projecting a curtain of infrared light. The infrared emitters and receivers face each other across the field to be protected. Each LED pair is spaced along the length of the pylons at regular intervals from .5” (12mm), up to 8” (203mm) depending on the application. The smaller spacing are for finger guarding, the larger spacing are for body protection. The emitter/receiver pairs are scanned sequentially (one at a time) by a very short pulse of infrared light starting from bottom (cable end), and working up to the end, until every beam pair has been scanned. Two 16 bit computers in the first emitter pylon and two 16 bit computers in the first receiver pylon control the operation, as well as cross check each pylon.

The System.
The Model CA Cascading Safety Light Curtain employs infrared technology in a small sealed NEMA 4 (IP 67) aluminum housing with an infrared passing (daylight filtering) acrylic lens. This system provides harmless invisible protection and an unobstructed view of the guarded area. There are two parts to the Model CA: An Emitter pylon and a Receiver pylon. The Emitter pylon has no outputs. The Receiver pylon contains two monitored solid state 24vdc outputs. Both pylon sets are synchronized to each other electronically as they are connected together with the interconnect cables to the top and bottom of the next set of pylons.

System Safety.
The Model CA Cascading Safety Light Curtain incorporates redundant, and diverse technology that provides a backup for every system that could cause an unsafe condition.

External Device Monitoring (EDM).
A method in which the Model CA Category 4 cascading safety light curtain logic monitors the state of various external control devices. The control devices are external and not part of the Model CA light curtain pylons. A lockout or stop signal will result if an unsafe state is detected in an external device. The External Device Monitoring (EDM) is an optional function of the Model CA safety light curtain for monitoring the status of external devices such as gate and door switches, safety switches or the main control element of the drive (MPCE). Solid state outputs are turned on separately to be checked and to assure neither output has been shorted, before fully turning on.

Design Criteria.
Designed to meet IEC 61496-1 & 2, UL 1998, UL subject 491, OSHA, ANSI, CSA, ANSI-RIA R15.06-2012

- Microprocessor redundancy for both Emitter and Receiver pylons
- Redundant, monitored, 24vdc solid state outputs (PNP)
- Watchdogs on CPU’s and outputs prevent unintentional output during lockups
**Input Power**
*Emitter pylon:* 24vdc @ .125A  
*Receiver pylon:* 24vdc @ .125A (solid state outputs are PNP which may draw up to .25A additional)

**Internal fuses**
*Emitter Pylon:* F1 @ 1A  
*Receiver Pylon:* F1 @ 1A, F2 @ 1/2A, F3 @ 1/2A

**Outputs (OSSD)**
*Receiver pylon:* monitored, 2 outputs, solid state PNP (24vdc when GREEN, float when RED/off). Max .25A draw each.

**Indicators**
*Emitter pylon:* Yellow, Red, Green.  
*Receiver pylon:* Yellow, Red, Green.

**Construction**
Painted aluminum extrusion with Acrylic IR lens and Viton Seals providing NEMA 12,13 protection.  
Optional Polycarbonate tubes (sleeves) over the pylons provides NEMA 4 protection.  
Cables are both 21’ (6400mm) long with an in-line connector 1’ (305mm) from the base of each pylon.  
*Emitter pylon:* Four conductor 24AWG  
*Receiver pylon:* Six conductor 24AWG  
Pylons: Yellow  
Cables: Black

**Temperature**
0 to 50c (up to 95% humidity, non-condensing)

**Dimensions**
1.45" (36.8mm) square X selected length (see tables for lengths)

**Beam Spacing & Minimum Object Sensitivity (MOS)**
<table>
<thead>
<tr>
<th>Beam Spacing</th>
<th>MOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>.5” (12.7mm)</td>
<td>.55” (14mm) MOS</td>
</tr>
<tr>
<td>1” (25.4mm)</td>
<td>1.18” (30mm) MOS</td>
</tr>
<tr>
<td>4” (101.6mm)</td>
<td>5”</td>
</tr>
<tr>
<td>(special order, 4” (101.6mm) active area followed by a 4” gap)</td>
<td>8” (203.2mm)</td>
</tr>
<tr>
<td>(special order, 4” (101.6mm) active area followed by a 8” (203.2mm) gap)</td>
<td></td>
</tr>
</tbody>
</table>

**Response Time and Scanning Frequency**
< 30 mSec total, 10 khz

**Shock**
Tested to withstand high vibration (using shock mounts)

**Self-Checking**
Every 15mSec

**Scanning Distance**
From 1’ to 20’ (305mm-6,096mm) standard (depending on model ordered)  
From 21’ to 50’ (6400mm-15,240mm) extended range (optional)  
The range is stated as a two digit number within the Model #
Standard Features
Model CA Cascading Safety Light Curtain

Solid State Outputs (OSSD)

**Description:**
Two optically isolated solid state PNP outputs (.25A output max each). Each output is monitored to assure that 24vdc is not present when the output is turned OFF, and is present when turned ON.

**Output Configuration:**
Same States: Output1 (blue wire) & Output2 (brown wire) are both 24vdc PNP N.O. “held closed” (24vdc when Green).

**Operation:**
Same States: When the guard is GREEN, both Outputs are ON (24vdc out). When the guard is RED, Faulted, or not powered, both Outputs are OFF.

**Output Testing:**
Same States: Before the guard goes GREEN, Output1 is turned ON first and Output2 (which is still OFF) is monitored for voltage on its output. If Output2 is found OFF, then Output2 is turned ON. This takes ~20mSec between Output1 and 2 turning back ON.

WARNING: Never use Outputs 1 & 2 to control standard relays, contactors, or valves! Always wire Outputs 1 & 2 to Safety Relays (EDM option must be enabled), Safety Relay Module (like the SSSR), or a “Control Reliable” Safety PLC (like the Pinnacle Safety Hub).

Digital CAN data network

**Description:** Twisted pair data network designed for high electrical noise environments. Allows the Receiver pylon to talk to a remote operating device as well as the Emitter pylon. You should link the Emitter and Receiver pylon via CAN if you are powering up both pylons from the same supply. This eliminates the need for a sync channel (the bottom beam used to synchronize the pylons).

**Operation:** When the Emitter and Receiver pylons are connected together via this network, the Emitter pylon becomes digitally linked to the Receiver pylon. The Emitter pylon synchronizes via the CAN data network to the Receiver pylon instead of using the bottom beam (beam closest the cable). Pylon status is displayed on both pylons.

External Device Monitor (EDM)

**Description:**
Allows the CA to monitor a pair of low cost external Safety Relays as opposed to the more expensive Safety Relay Module (SSSR).

**Wiring:**
Wire the N.C. force-guided contact of each of the pair of Safety Relays in series. Wire Ground to one side and the other to the CA EDM input wire (ORANGE). (See 28-141 Drawing for details).

**Operation:**
The CA EDM input must be at GROUND when the curtain is RED (blocked or faulted), and OPEN when the curtain is GREEN (clear). If either external Safety Relay output contact remains closed, the CA EDM input will remain Open and a fault will occur when the curtain is RED. This fault will open up the remaining Safety Relay contact and lockout.

Manual Latching Reset (MLR)

**Description:**
Manual Latching Reset can be achieved 3 different ways: 1) Using the SSSR relay module itself to latch/reset its outputs (but the status lights on the pylon will not reflect the status of the SSSR module. 2) Enable the Latching feature of any RSD (Remote Status Display) module, with a jumper. (Follow instructions for the RSD on page A-3). 3) Order the built in Latching feature. (Note If an RSD is plugged in, the RSD overrides the built in latching).

When this feature is activated, the guard will stay in a RED condition when blocked, even when the blockage is removed.

**Wiring:**
Wire a N.O. push button between GROUND and the CA MLR input wire (PINK) (see 38-040 Drawing)

**Operation:**
Clear the guard of blockage and push/release the MLR button. This will reset the guard as long as the curtain is properly aligned (no blockage) and no faults.

To temporarily disable the built-in latching option (for alignment purposes) you need to plug in the optional Remote Status Display (RSD) with AutoBlank device. Cycling the AutoBlack key from OFF to Mode 3 and back to OFF will disable Latching. Unplugging the RSD will restore Latching.

As of Nov 2013, If you need to temporarily bypass the built in Latching feature without an RSD, do the following: Disconnect the ORG wire from your Safety Relays, Hold in the Relay Reset Button (Ground the Pink wire), and turn on the power to the Guard and wait for a solid RED light (after the power up sequence). Now reconnect the ORG wire back to the Safety Relays, then un-Ground the Pink wire. The Guard will now be in AUTO Relay reset mode until you cycle power.
Remote Status Display (RSD)

**Description:** Allows AutoBlank and/or FloatingBlank optional features to be added to the Model SS. Includes a four character diagnostics / status display.

**Operation:**
Allows you to view current feature modes and status as well as fault conditions. The Yellow status light indicates when you are in any blanking mode.

**Manual Latching Reset:**
Install jumper on the left 2 vertical pins of J2, to enable Manual latching reset feature.
Install a N.O. push button between J4 (right terminal) and +24vdc.
To reset after blocking the guard, you must clear the guard then push the N.O. button.

**Cincinnati Interface (manual output Test):**
If you apply +24vdc to Pin 1 of J4 (left terminal), the display will show a “CINN” and force the “RED” shutting down both outputs 1 & 2.
This allows a remote device to manually check that both outputs can and will shut OFF.

---

**Figure 1: Standard RSD**

**Figure 2a: Floating Blank**

**Figure 2b: Auto Blank**

**Figure 2c: 52-260 RSD and corresponding chart**

---

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>For AB/FB keyswitch</td>
</tr>
<tr>
<td>J2</td>
<td>Left set of pins Activates Latching Outputs when jumpered</td>
</tr>
<tr>
<td>J2</td>
<td>Center set of Pins Factory Use only</td>
</tr>
<tr>
<td>J2</td>
<td>Right set of pins Activates Cincinnati Interface when jumpered</td>
</tr>
<tr>
<td>J3</td>
<td>1 +24vdc power input (0.1A)</td>
</tr>
<tr>
<td>J3</td>
<td>2 Ground</td>
</tr>
<tr>
<td>J3</td>
<td>3 CAN_H (Green wire)</td>
</tr>
<tr>
<td>J3</td>
<td>4 CAN_L (White wire)</td>
</tr>
<tr>
<td>J4</td>
<td>1 Input from Cincinnati Interface Press</td>
</tr>
<tr>
<td>J4</td>
<td>2 Input from Latching Output Reset button</td>
</tr>
<tr>
<td>J5</td>
<td>Factory Use only</td>
</tr>
</tbody>
</table>

---

= Terminal #1
J Designators = Connectors
F Designators = Fuses
F1 = 1A slo-blo fuse
Optional Features
Model CA Cascading Safety Light Curtain

Remote Status Display (RSD) Continued

The first three numbers displayed represent the first problem beam on the guard starting from the cable end of the pylon. The fourth number represents the total number of beams blocked on the guard. Depending if your beam spacing is 0.5" or 1.0" you can determine which board in the pylon is bad.

Definitions

BEAM #: Indicates first blocked beam (from cable end). (i.e. 64 = 64" up with 1.0" beam spacing, or 32" up with 0.5" spacing)
TOTAL #: Indicates total number of blocked beams on the curtain. (i.e., 1 to 9 beams then A to F = 10 to 15 beams)

The Diagnostics Display has two modes of operation: Status and Fault. If a fault occurs, the display will scroll the fault message until the power is removed.

Status Display Messages

Normal Operation

TEST Testing internal systems
RST Unit waiting for Push of FN1 (located on control module power supply board middle left hand side)
RDY Normal operation

Obstruction

03 > 15 or more beams blocked starting 3 beams up from cable end
153 3 beams out starting 15 beams up from cable end

Floating Blank

FB1 1 beam float maximum
FB2 2 beams float maximum
FB21 2 beams float maximum, 1 beam is blocked
OBST More than 2 separate objects detected in curtain

Auto Blank

AB3 3 beams programmed in as an Auto Blank object
PENT Mode 1 penetration into guard
SIZE Total number of allowable blanked beams exceeded during programming
MOVE Auto Blank object(s) moved, uncovering beam(s)

Cincinnati Interface

CINN Guard has de-energized safety relays, forcing a false blockage mode

MULTI-PYLON (MP)

Description:
Multiple sets of light curtains operating independently can be modified to operate together to prevent infrared interference between each other, and optionally to provide a single Dual Safety Output.

Wiring:
The Pink wire of each Receiver pylon must be connected together as well as the White wires connected together.

Operation:
Standard= Each curtain uses its own Safety Outputs, but do not interfere with each other.
Single Output: Blocking 1 curtain will shut down the Safety Outputs of all connected light curtains.
Auto Blank [patent # 5,243,183]

**Description:** Allows user to program the exact size and location of an object (i.e., a conveyor, table, work piece, etc.) automatically and can detect any movement in the object causing the light curtain to shut down.

**Application:** With the obstruction in place, turn the key switch from “OFF” to any mode of operation. If the object(s) do not exceed the total allowable size, the unit will energize the safety outputs.

**Standard Operation:** If the obstruction is moved or removed, the unit will issue a “MOVE” fault, but will re-energize the safety outputs when the obstruction is returned to the original position. Standard operation allows for a total of eight beams to be blocked anywhere in the curtain (they do not have to be next to each other).

**Optional Operation:** If the obstruction is moved or removed, the unit will issue a “MOVE” fault and lockup, requiring you to re-program the obstruction.

**Troubleshooting:** If you get a “MOVE” fault when the obstruction did not move, it is possible that you are just barely covering a beam and either vibration or reflections are causing the beam to become uncovered. The uncovered beam then causes a fault.

**To Activate Feature:** This feature must be ordered and requires exchanging the computer chips (see Installation Procedures, “Controller Module Setup”).

**WARNING** Leave key switch in OFF/RESET position while installing, setting up, and testing the light curtain. Use Auto Blank only after you are able to get a clear signal from the curtain with no obstruction.

The term “Auto Blank” is an abbreviation which stands for Automatic Programmable Beam Blanking. Auto Blanking is controlled by a multi-position keyswitch and has three distinct modes of operation:

1) **Must be reset if auto blank obstruction moves or guard penetrated.** The AUTO BLANK obstruction must remain in its exact location permanently. Any movement in the AUTO BLANK obstruction and/or additional guard penetration will latch the light curtain in a RED condition and must be reset via the keyswitch.

   **NOTE:** If no obstructions were programmed in, the guard will still latch in a RED condition should the guard be penetrated.

2) **Must be reset if auto blank obstruction moves.** The Auto Blank obstruction must

remain in its exact location permanently. This works like Mode 1 except guard penetrations will not latch in a RED condition.

3) **Mode 2 with floating blank.** This mode works like Mode 2 with the addition of a Floating Blank which is set to allow a one beam float (see Optional Features, “Floating Blank”).

**Notice** If no obstructions were programmed in, the guard will still allow a one beam float.

**Programming:** To program, turn the keyswitch into the OFF/RESET position and place the obstruction(s) in the guarded area. Now, turn the keyswitch into the desired mode of operation. The exact size and location of the object(s) are now in memory. The Depth Penetration Factor D(pf) must be set to account for the one beam float (see Optional Features, “Floating Blank”).

**Diagnostics Display**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Auto Blank detected an object (the number indicates the size of the object).</td>
</tr>
<tr>
<td>RDY</td>
<td>No objects programmed in, keyswitch in Mode 1 or 2.</td>
</tr>
<tr>
<td>FB</td>
<td>No objects programmed in, keyswitch in Mode 3.</td>
</tr>
<tr>
<td>SIZE</td>
<td>Obstruction size exceeded a total of eight beams.</td>
</tr>
<tr>
<td>PENT</td>
<td>Penetration of the light curtain occurred while keyswitch was in Mode 1.</td>
</tr>
<tr>
<td>MOVE</td>
<td>Auto Blank obstruction moved.</td>
</tr>
</tbody>
</table>

**WARNING** Place Auto Blank keyswitch into OFF/RESET position and remove any obstructions while aligning light curtain. Do not use Auto Blank until light curtain is correctly aligned (see Installation Procedures, “Alignment Procedure”).

The keyed selector switch is designated to be supervisory controlled. After installation, the safety key should be removed and controlled only by the safety supervisor or authorized plant personnel.
Optional Features
Model CA Cascading Safety Light Curtain

Floating Blank
Description: On a press brake, the Floating Blank permits the work piece to be placed in the guarded area and can be moved around as long as it does not exceed the object sensitivity selected. A keyswitch by default allows for zero, one, two, or three beams to be blocked anywhere in the curtain as long as all the blocked beams are next to each other. The customer may request different blanking sizes for different applications. The Minimum Object Sensitivity (MOS) and the Depth Penetration Factor (DPF) change when the key switch position is changed. The DPF is used to compute the safety distance.

Location of the light curtain from the point of operation must include the depth penetration factor D(pf) equivalent to the beam spacing.

Minimum Object Sensitivity indicates the minimum size required to cause the light curtain to detect an object even if it is moving (floating). If the obstruction is slightly smaller (less than .25") than the stated number, the light curtain may blink RED/GREEN when the object is moving in the field of view. If the obstruction is smaller than the stated number by at least .25", then the light curtain will stay GREEN as long as there are no additional obstructions.

Depth Penetration Factor is the number used to compute the distance the light curtain should be placed from the point of operation (see Installation Procedures, “ANSI Standard B11.19-2010”).

Diagnostics Display:
- RDY Keyswitch is in the lowest position (Floating Blank is off).
- FB Indicates Floating Blank active and the number of blocked beams.
- OBST A second object found in the curtain (only one obstruction is allowed to float).

⚠️ WARNING Place Floating Blank keyswitch in lowest position and remove any obstructions while aligning light curtain. Do not use Floating Blank until light curtain is correctly aligned (see Installation Procedure, “Alignment Procedures”). The keyed selector switch is designated to be supervisory controlled. After installation, the safety key should be removed and controlled only by the safety supervisor or authorized plant personnel.

<table>
<thead>
<tr>
<th>Display</th>
<th>Minimum Object Sensitivity, S</th>
<th>D(pf) Depth Penetration Factor</th>
<th>Max. Floating object size less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDY (float off)</td>
<td>0.55” / 14mm</td>
<td>0.935” / 23.8mm</td>
<td>0.00” / 0.0mm</td>
</tr>
<tr>
<td>FB1 (1 beam float)</td>
<td>1.18” / 30mm</td>
<td>3.077” / 78.2mm</td>
<td>0.45” / 11.4mm</td>
</tr>
<tr>
<td>FB2 (2 beam float)</td>
<td>1.75” / 45mm</td>
<td>5.015” / 129.2mm</td>
<td>0.95” / 24.1mm</td>
</tr>
<tr>
<td>FB3 (3 beam float)</td>
<td>2.36” / 60mm</td>
<td>7.089” / 180.2mm</td>
<td>1.45” / 36.8mm</td>
</tr>
<tr>
<td>FB4 (4 beam float)</td>
<td>2.95” / 75mm</td>
<td>9.095” / 231.2mm</td>
<td>1.95” / 49.5mm</td>
</tr>
<tr>
<td>FB5 (5 beam float)</td>
<td>3.54” / 90mm</td>
<td>11.101” / 282.2mm</td>
<td>2.45” / 62.2mm</td>
</tr>
<tr>
<td>FB6 (6 beam float)</td>
<td>4.13” / 105mm</td>
<td>13.107” / 333.2mm</td>
<td>2.95” / 74.9mm</td>
</tr>
</tbody>
</table>

Table 1b: 1” Beam Spacing Pylons

<table>
<thead>
<tr>
<th>Display</th>
<th>Minimum Object Sensitivity, S</th>
<th>D(pf) Depth Penetration Factor</th>
<th>Max. Floating object size less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rdy (float off)</td>
<td>1.18” / 30mm</td>
<td>3.077” / 78.2mm</td>
<td>0.00” / 0.0mm</td>
</tr>
<tr>
<td>FB1 (1 beam float)</td>
<td>2.36” / 60mm</td>
<td>7.089” / 180.2mm</td>
<td>0.95” / 24.1mm</td>
</tr>
<tr>
<td>FB2 (2 beam float)</td>
<td>3.54” / 90mm</td>
<td>11.101” / 282.2mm</td>
<td>1.95” / 49.5mm</td>
</tr>
<tr>
<td>FB3 (3 beam float)</td>
<td>4.72” / 120mm</td>
<td>15.113” / 384.2mm</td>
<td>2.95” / 74.9mm</td>
</tr>
<tr>
<td>OF4 (4” beam scp)</td>
<td>5.90” / 150mm</td>
<td>19.125” / 485mm</td>
<td>0.95” / 24.1mm</td>
</tr>
</tbody>
</table>

Safety Relay Module
Description: Connects the two PNP solid-state outputs from the Model CA to either a Safety Relay Module, like the Model# SSSR, or to two Safety Force Guided Relays, like the #52-278.

Application: Provides the Model CA with (2) control-reliable N.O. (held closed) dry contacts which allows switching up to 240vac, and also daisy chaining Model CA guards in series with other Safety Guarding devices.

Operation: When using the Model #SSSR Safety Relay Module, see page A-15 for wiring a diagram, and make sure to Delete the –EDM option when ordering your Model CA

When using (2) 52-278 Safety Relays, see page A-14 for a wiring diagram and make sure to INCLUDE the –EDM option when ordering your Model CA.
Installation Procedures  
Model CA Cascading Safety Light Curtain

5) **CONTROL PANEL:** Mount 24vdc supply and “Safety Relay Module” inside your control panel. Both EMITTER and RECEIVER pylons require 24vdc power. Only the RECEIVER pylon requires the “Safety Relay Module.”

6) **MIRRORS:** Use mirrors to turn a corner 90deg or more, but no less. If you are using pedestals, do not permanently mount them until you have finished the installation procedure. When you have finished aligning the pylons and can achieve a GREEN indicator, bolt the stands to the floor. Make sure the bottom edge of the mirror(s) are below the bottom beam of the curtain and the top edge of the mirror(s) are above the top beam of the curtain.

7) **WIRING:** Connect the EMITTER & RECEIVER pylon ground wires together to the power supply ground (black). Connect the EMITTER & RECEIVER pylon 24vdc wires together to the power supply 24vdc output (red). Connect the EMITTER & RECEIVER pylon CAN wires together and to the Remote Status Display (RSD) if applicable (white to white & green to green). Connect both RECEIVER solid state outputs to the “Safety Relay Module” inputs (as stated by the manufacture of the module). Wire the “Safety Relay Module” safety outputs into your machines “STOP” circuit(s) (Please refer to page A-10 for wiring details).

8) **SYSTEM CHECK:** Check the curtains field of view with a round test piece (dowel rod) that has a diameter equal to the minimum object sensitivity of the curtain (see Specifications section). Move the test piece up and down the curtains field of view to make sure the curtain stays RED the entire time and that you cannot run your machine while the curtain is RED.

9) **ADDITIONAL GUARDS:** Install additional mechanical guards to prevent anyone from getting to the hazardous point of operation by reaching around, over or under the light curtain. Also, to prevent anyone from getting in between the curtain and the hazardous point of operation, install horizontal light curtains or safety mats.
Installation Procedures
Model CA Cascading Safety Light Curtain

Aligning Pylons
Mechanically line up the pylons so they are looking straight at each other. Twist the pylons to find the center of their sweet spot (the point at which you get a solid GREEN indicator). If you are trying to run the pylons close to the maximum operating distance, you may have to tip one end of the Emitter pylons to get a GREEN indication.

Aligning Mirrors (refer to Figure 3)
Every mirror you add reduces the maximum operating distance by 10%-15% and also increases the difficulty of alignment. Because of the width of the mirrors and the shoulders of the aluminum extrusion that protect the mirror, you cannot turn a corner less than 90°.

The vertical height of the mirror with respect to the vertical height of the pylons should be such that the mirror matches the beam area of the pylons. You should have some mirror showing above the top beam and below the bottom beam.

All mirrors and pylons should be plumb. You should be able to stand in front of one of the pylons, look straight ahead, and see the other pylon through the center(s) of the mirror(s). Depending on what the diagnostics display reads, you may have to tip one end of the mirror to get the remaining blocked beams to come in.

Figure 3: 4 Sided Guarding with Dual Stud Guard Brackets, TRM Mirrors and Model #8000 Pedestals
Operations

Examine the Model CA on a daily basis to make sure that the curtain pylons have not been moved and that any mechanical guarding has not been moved or removed.

If it is possible for someone to go through the light curtain and remain between the curtain and the hazard without blocking the curtain, you must wire your “Safety Relay Module” for manual reset, or install a safety mat or horizontal light curtain to guard this area.

1) **APPLY POWER:** The curtain (both pylons) will go through a power up test. First, both Yellow and Green lights blink 1 time. This indicates the Master and Slave processors are functioning properly. Second, both Yellow and Green lights blink 2 times. This indicates Master and Slave are now in sync with each other.

2) **SYNCHRONIZATION:** The curtain will now determine if the CAN data network is installed. Third, The Green lights will blink: 2 times for infrared synchronization between pylons, 3 times for CAN data network synchronization between pylons. If infrared synchronization is used, the Yellow status light on the Emitter pylon will be on (dim) all the time, with the Red status light blinking periodically, the Receiver pylon will indicate output status. If the CAN data network is used, the Emitter status lights will indicate the current pylon output status (just like the Receiver side).

3) **STATUS INDICATORS:** Solid Green= Curtain clear (no blockage, or faults) and outputs active (+24vdc out). Solid Red= Curtain blocked and outputs off (open). Solid Yellow= Curtain in either AutoBlank or FloatingBlank modes. Blinking lights indicate a fault condition and the outputs will be off (open) (see Fault Codes section).

Never use Outputs 1 & 2 to control standard relays, contactors, or valves! Always wire Outputs 1 & 2 to Safety Relays (EDM option must be enabled), Safety Relay Module (like the SSSR), or a “Control Reliable” Safety PLC (like the Pinnacle Safety Hub).
Installation Procedures
Model CA Cascading Safety Light Curtain

ANSI Standard B11.19-2010
Formula for calculating safety distance of light curtains from hazardous point of operation.

The effective sensing field of the device shall be located at a distance from the nearest recognized hazards such that the operator or others cannot reach the hazard with a hand or other body part before cessation of motion during the hazardous portion of the machine cycle.

The point at which a device responds to an intrusion may vary. The devices should be located or adjusted such that the device always responds to the intrusion at or prior to the safety distance. Care should be exercised when installing the device to ensure that it does not detect false signals from other devices in the area.

Usually the electro-optical presence-sensing device is used in a manner that provides a protected zone in front of the primary work area with auxiliary devices or guards used to protect secondary access areas. In some cases, however, mirrors may be used in conjunction with the device to provide 2-, 3-, or 4-sided protection.

The machine stop time should be measured with the machine running at its fastest speed with its heaviest die or tooling and the stop time being measured at the 90° position in the downstroke.

The following formula should be used when calculating the safety distance:

\[ D_s = K \times (T_s + T_c + T_r + T_{bm}) + D_{pf} \]

- **Ds** = Minimum safety distance between the device and the nearest point of operation hazard (in inches).
- **K** = Hand speed constant. This value has been determined by various studies and, although these studies indicate speeds of 63 in/sec to over 100 in/sec, they are not conclusive determinations. The employer should determine this value by considering all factors, including physical ability of the operator.
- **Ts** = Stop time of the machine tool measured by a stop time measurement device.
- **Tc** = Response time of the control system (usually is taken care of by the measurement device).
- **Tr** = Response time of the presence-sending device and its interface, if any, as stated by the manufacturer or measured by the employer.
- **Tbm** = Additional time allowed for the brake monitor to compensate for variations in normal stopping time.
- **D(pf)** = Depth Penetration Factor. Added distance as indicated by Figure 2. The minimum object sensitivity is stated by the manufacturer. If a Floating Blank is used, use the Dpf numbers found in the Floating Blank section of this manual.

**Penetration factor, Dpf, for presence-sensing devices used in a vertical application with object sensitivity less than 64 mm (2.5 inches)**

Dpf, the distance added to the safety distance due to the penetration factor compensates for varying object sensitivities of electro-optical presence-sensing devices.

When blanking features are used and when the blanked area is not completely filled by the workpiece or part, or by mechanical guarding, the minimum object sensitivity can be calculated as:

\[ \text{Minimum Object Sensitivity (S)} = \text{Size of the blanked area} + \text{Minimum object sensitivity without blanking} \]

Once this value is found, then determine Dpf.

If the entire blanked area is filled with mechanical guarding or other fixed material or guards, use the device’s object sensitivity to determine Dpf.
Installation Procedures
Model CA Cascading Safety Light Curtain

Safeguarding with Mechanical Guards
When a light system is used to protect the operator or passerby from penetration, it must be mounted and properly sized (grid length) so it is impossible to reach under, around, or over into the hazardous point of operation zone. Infrared light systems normally guard the front or feed area of a machine. The sides or the areas where the light screen does not guard must be guarded by some other means.

If the position of the safety light curtain will allow the operator or others to place themselves between the sensing field and the hazardous area, auxiliary guards or devices such as safety mats, barrier guards, or devices should be used in conjunction with the safety light curtain to prevent the operator or others from exposure to the hazardous area. If mechanical guards such as polyurethane, expanded or perforated metal, hairpins, etc. are used to guard these areas, the opening must comply with the OSHA safety distance in relationship to the openings.

After installation of point of operation guards and before a job is released for operation, a check should be made to verify that the guard will prevent the operator’s hands from reaching into the point of operation or any hazard zone.

Table 2 outlines the distances that guards should be positioned from the nearest point-of-operation hazards.

The various openings are such that for average-sized hands, an operator’s fingers will not reach the point of operation.

After installation of point-of-operation guards and before a job is released for operation, a check should be made to verify that the guard will prevent the operator’s hands or other body parts from reaching the point of operation.

Table 2: Mechanical Guards

<table>
<thead>
<tr>
<th>Distance of opening from point of operation hazard (inches)</th>
<th>Maximum width of opening (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 to 1-1/2</td>
<td>1/4</td>
</tr>
<tr>
<td>1-1/2 to 2-1/2</td>
<td>3/8</td>
</tr>
<tr>
<td>2-1/2 to 3-1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>3-1/2 to 5-1/2</td>
<td>5/8</td>
</tr>
<tr>
<td>5-1/2 to 6-1/2</td>
<td>3/4</td>
</tr>
<tr>
<td>6-1/2 to 7-1/2</td>
<td>7/8</td>
</tr>
<tr>
<td>7-1/2 to 12-1/2</td>
<td>1-1/4</td>
</tr>
<tr>
<td>12-1/2 to 15-1/2</td>
<td>1-1/2</td>
</tr>
<tr>
<td>15-1/2 to 17-1/2</td>
<td>1-7/8</td>
</tr>
<tr>
<td>17-1/2 to 31-1/2</td>
<td>2-1/8</td>
</tr>
</tbody>
</table>

Light Curtain Test Procedure
Use a dowel rod (or similar object) with a diameter equal to the M.O.S. (Minimum Object Sensitivity) of the guard you are testing. Move the rod through the field of the curtain (i.e. top to bottom for vertically mounted curtains). Repeat this test close to the Emitter pylon, close to the Receiver pylon, in the middle between the pylons, and most importantly in front of the operator position.

Make sure the curtain indicates a “Blocked” condition (RED light) when the rod is in the field of the curtain.

Check and make sure the machine cannot move when the curtain shows “Blocked”. If the machine can operate while the curtain shows a “Blocked” condition, then re-examine your wiring.

Always use both safety relays in your STOP circuit(s).

If the curtain does not show “Blocked” when the rod is in the field: Check to make sure the rod is truly in the curtain’s field, and re-check the curtain’s Minimum Object Sensitivity (including AutoBlank and Floating blank options that change the M.O.S.).

Infrared light from the curtain may be reflecting around the rod due to reflective material too close to the curtain’s field. In this case, you will have to move the curtain pylons back away from the reflective material and repeat the test over again. The curtain’s power level can also be reduced by the factory.
Installation Procedures
Model CA Cascading Safety Light Curtain

Wiring
Each pylon comes standard with 21’ (6400mm) of cable with a quick disconnect in-line connector.
Optional longer cables can be purchased (to replace the 20’ (6096mm) section). Voltages applied are to never exceed 24vdc.

Table 3a: Emitter Pylon Wiring

<table>
<thead>
<tr>
<th>Terminal#</th>
<th>Connector</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Black</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>+24vdc regulated input</td>
</tr>
<tr>
<td>3</td>
<td>White</td>
<td>CAN_L data network</td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
<td>CAN_H data network</td>
</tr>
</tbody>
</table>

Table 3b: Receiver Wire Colors

<table>
<thead>
<tr>
<th>Terminal#</th>
<th>Connector</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Black</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
<td>+24vdc regulated input</td>
</tr>
<tr>
<td>3</td>
<td>White</td>
<td>CAN_L data network</td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
<td>CAN_H data network</td>
</tr>
<tr>
<td>5</td>
<td>Blue</td>
<td>Output 1 (24 vdc when Green) (open when red) (.25A max)</td>
</tr>
<tr>
<td>6</td>
<td>Brown</td>
<td>Output 2 (24vdc when Green) (open when Red) (.24A max)</td>
</tr>
<tr>
<td>7</td>
<td>Orange</td>
<td>EDM (GND when RED, OPEN when GREEN)</td>
</tr>
<tr>
<td>8</td>
<td>Pink</td>
<td>Latching Relay Reset (GND, then OPEN to reset Outputs)</td>
</tr>
</tbody>
</table>

Table 3c: Optional RSD

<table>
<thead>
<tr>
<th>Terminal#</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24vdc regulated input</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>CAN_H data network</td>
</tr>
<tr>
<td>4</td>
<td>CAN_L data network</td>
</tr>
</tbody>
</table>

WARNING: You must wire both Outputs 1 & 2 to a “Safety Relay Module Control Reliable” Safety PLC, when this product is used for safety guarding.

WARNING: OUTPUTS 1 & 2 MUST BE USED WITH EITHER “CONTROL RELIABLE” PLC INPUT CIRCUITS OR A SAFETY RELAY MODULE.
Wiring Safety Relays or a Safety Relay Module

The CA guard can be wired to individual Safety Relays with the EDM option, or to the more flexible Safety Relay Module.

The Model Number SSSR Safety Relay Module has two internal Safety Relays inside and has built-in circuitry to check for contact welding. The SSSR Module also allows for Automatic or Manual Relay resetting. If you choose to wire your guard using this Module, follow the 28-142 wiring diagram page and Table 3 below. See manufactures instructions provided with the SSSR Module for further details regarding the SSSR. See Table 3 for wiring.

The Part Number 52-278 Safety Relay is a lower cost alternative to the SSSR Module, but requires two 52-278 Safety Relays and does not allow you to select automatic or manual relay resetting in the field and so requires you to choose auto/manual when you order your light curtain. Also, the Part Number 52-278 does not self-check and so requires you to order your light curtain with the EDM option. If you choose to wire the Part Number 52-278 Safety Relays follow the 28-141 wiring diagram using two Part Number 52-278 relay/socket assemblies. Mount them on a DIN-rail in your control panel.

The Model SS and Model CA light curtains do not require mechanical safety relays if you connect both solid-state SS/CA outputs (both Blue and Brown wires) to separate inputs on a control-reliable safety PLC. This configuration does not require the EDM option.

### Table 4: Safety Relay Module Wiring (for Model# SSSR module)

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
<th>Connect to</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 (1.1)</td>
<td>+Supply input</td>
<td>+24v power</td>
<td>Red</td>
</tr>
<tr>
<td>A2 (2.4)</td>
<td>-Supply input</td>
<td>Ground</td>
<td>Black</td>
</tr>
<tr>
<td>PE</td>
<td>Earth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S12 (4.3)</td>
<td>Ch1 input</td>
<td>CA Output 1</td>
<td>Blue</td>
</tr>
<tr>
<td>S31 (2.3)</td>
<td>Ch2 input</td>
<td>CA Output 2</td>
<td>Brown</td>
</tr>
<tr>
<td>S22 (2.2)</td>
<td>Ch2 input</td>
<td>S21 (2.1)</td>
<td></td>
</tr>
<tr>
<td>S35 (1.4)</td>
<td>Auto Reset</td>
<td>S12 (4.3)</td>
<td></td>
</tr>
<tr>
<td>13 (3.1)-14 (4.1)</td>
<td>N.O. (held closed) output</td>
<td>Stop circuit 1</td>
<td></td>
</tr>
<tr>
<td>23 (3.2)-24 (3.3)</td>
<td>N.O. (held closed) output</td>
<td>Stop circuit 2</td>
<td></td>
</tr>
<tr>
<td>31 (3.4)-32 (4.4)</td>
<td>N.O. (held open) output</td>
<td>Aux circuit 3</td>
<td></td>
</tr>
</tbody>
</table>

### WARNING

- You must use at least 2 output STOP circuits. If your machine has only 1 STOP circuit, you must wire 2 STOP circuits in series.
- Never use Outputs 1 & 2 to control standard relays, contactors, or valves!
- Always wire Outputs 1 & 2 to Safety Relays (EDM option must be enabled), Safety Relay Module (like the SSSR), or a “Control Reliable” Safety PLC (like...
Figure 5: Wiring Diagram

Model CA 28-141 Wiring Diagram (with EDM)
Shown with (2) 52-278 Safety Relays

**CAUTION**
Never apply any voltage greater than 24vdc to any wire of either Pylon or RSD

Customer supplied +24vdc @ 1A (minimum)
Power supply

+24vdc

Red #1
Blk #2
Wht #3
Grn #4
Blu #5
Brn #6
Org #7
Pnk #8

OPTIONAL Terminal Strip:
Never apply any voltage > 24vdc to any terminal

OSSD outputs:
24vdc = closed (grn light)
(.5A max each)
Only wire up to control reliable (non-inductive) circuits. Or Safety Relays shown

EDM: External Device Monitor. Orange Wire. You must use EDM with Safety relays

MLR: Manual Latching Relay. Pink Wire. Use RSD instead if available

**NOTICE**
The Terminal numbers shown on the safety relays below are not located in the actual physical positions around the relay.

SAFETY INSTRUCTIONS
FSD Safety Outputs wire in series with machine STOP or ESTOP circuit(s)
you can wire voltage up to 240vac through these 3 contacts

SAFETY INSTRUCTIONS
CAN: Controller Area Network. White & Green Wires. Communication between Emitter, Receiver and RSD

OPTIONAL Latching Reset Button (MLR)

RSD “Remote Status Display” provides message display, Blanking, Latching Relay, Cincinnati interface
Figure 6: Wiring Diagram

Model CA 28-142R2 Wiring Diagram (with EDM)
Shown with Model# SSSR Safety Relay Module

**CAUTION**

Never apply any voltage greater than 24vdc to any wire of either Pylon or RSD

- **WARNING**
  - Customer supplied +24vdc @ 1A (minimum) Power supply

- **Power supply**
  - Red #1
  - Wht #3
  - Org #7

- **OPTIONAL**
  - CAN: Controller Area Network. White & Green Wires.
    - Communication between Emitter, Receiver and RSD

- **OPTIONAL**
  - EDM: External Device Monitor. Orange Wire. Do NOT use with SSSR module

- **OPTIONAL**
  - RSD “Remote Status Display” provides message display, Blanking, Latching Relay, Cincinnati interface

- **SAFETY INSTRUCTIONS**
  - FSD Safety Outputs wire in series with machine STOP or ESTOP circuit(s)
    - you can wire voltage up to 240vac through these 3 contacts

- **NOTICE**
  - MLR: Manual Latching Relay. Pink Wire. Use RSD instead if available or SSSR

- **NOTICE**
  - CAN: Controller Area Network. White & Green Wires. Communication between Emitter, Receiver and RSD

- **NOTICE**
  - EDM: External Device Monitor. Orange Wire. Do NOT use with SSSR module

- **NOTICE**
  - Only wire up to control reliable (non-inductive) circuits. Or Safety Relays shown

- **CAUTION**
  - OSSD outputs: 24vdc = closed (grn light)
    - (.5A max each)
    - Only wire up to control reliable (non-inductive) circuits. Or Safety Relays shown

- **CAUTION**
  - OSSD outputs: 24vdc = closed (grn light)
    - (.5A max each)
    - Only wire up to control reliable (non-inductive) circuits. Or Safety Relays shown

- **CAUTION**
  - Never apply any voltage greater than 24vdc to any wire of either Pylon or RSD
Dimensions
Model CA Cascading Safety Light Curtain

Figure 7:

NOTE1: 21-067 WITH HOLES
21-033 WITHOUT HOLES

NOTE2: 0.442" across the flats

(4) #6 COUNTERSUNK HOLES (0.15 DIA)
(4) PEM 6-32 studs
(1) PEM 4-40 studs

0.4680
0.0500
0.8750

0.2500

Pinnacle Systems, Inc.

Material: 0.125" thick aluminum

(black anodized)

rev 2: add pen stud to bottom of 21-067 bracket
rev 3: change grd pen to 4-40

Pinnacle Systems, Inc.
Figure 8: Swivel Bracket Dimensions, pylon dimensions (by model), and additional cable information

Swivel mount bracket: 21-033 tap, 21-067 bolt
Labels: 26-034, 26-007, 26-008, 26-006
Note: 11-0253 extrusion, 27-004 lens

Dimensions

Model CA Cascading Safety Light Curtain - Pylon Dimensions

<table>
<thead>
<tr>
<th>Zone</th>
<th>Rev</th>
<th>Description</th>
<th>Date</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>Distance from first to last beam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>Mounting hole distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>Length of extrusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>Overall length</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMB</th>
<th>A (in)</th>
<th>A (cm)</th>
<th>B (in)</th>
<th>B (cm)</th>
<th>C (in)</th>
<th>C (cm)</th>
<th>D (in)</th>
<th>D (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS-04</td>
<td>3.5</td>
<td>8.89</td>
<td>7.93</td>
<td>20.1</td>
<td>5.35</td>
<td>13.59</td>
<td>8.93</td>
<td>22.7</td>
</tr>
<tr>
<td>SS-08</td>
<td>7.5</td>
<td>19.05</td>
<td>11.93</td>
<td>30.26</td>
<td>9.35</td>
<td>23.75</td>
<td>12.93</td>
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<td>29.21</td>
<td>15.93</td>
<td>40.42</td>
<td>13.35</td>
<td>33.91</td>
<td>16.93</td>
<td>43.02</td>
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<td>19.93</td>
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<td>23.93</td>
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<td>54.23</td>
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<td>59.69</td>
<td>27.93</td>
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<td>64.39</td>
<td>28.93</td>
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<td>31.93</td>
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<td>74.55</td>
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<td>80.01</td>
<td>35.93</td>
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<td>84.71</td>
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<td>39.93</td>
<td>101.38</td>
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<td>39.5</td>
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<td>41.35</td>
<td>105.03</td>
<td>44.93</td>
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<td>55.93</td>
<td>142.02</td>
<td>53.35</td>
<td>135.51</td>
<td>56.93</td>
<td>144.62</td>
</tr>
<tr>
<td>SS-56</td>
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<tr>
<td>SS-64</td>
<td>63.5</td>
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<td>SS-68</td>
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</tr>
<tr>
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<td>71.5</td>
<td>181.61</td>
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<tr>
<td>SS-80</td>
<td>79.5</td>
<td>201.93</td>
<td>83.93</td>
<td>213.14</td>
<td>81.35</td>
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<td>215.74</td>
</tr>
<tr>
<td>SS-84</td>
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<td>212.09</td>
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<td>88.93</td>
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<tr>
<td>SS-88</td>
<td>87.5</td>
<td>222.25</td>
<td>91.93</td>
<td>234.36</td>
<td>89.35</td>
<td>226.95</td>
<td>92.93</td>
<td>236.06</td>
</tr>
<tr>
<td>SS-92</td>
<td>91.5</td>
<td>232.41</td>
<td>95.93</td>
<td>243.62</td>
<td>93.35</td>
<td>237.11</td>
<td>96.93</td>
<td>246.22</td>
</tr>
<tr>
<td>SS-96</td>
<td>95.5</td>
<td>242.57</td>
<td>99.93</td>
<td>253.88</td>
<td>97.35</td>
<td>247.27</td>
<td>100.93</td>
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<td>257.43</td>
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<td>273.05</td>
<td>111.93</td>
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<td>277.75</td>
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<tr>
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<td>294.42</td>
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<td>287.91</td>
<td>116.93</td>
<td>297.02</td>
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<td>SS-116</td>
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<td>117.35</td>
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<td>307.18</td>
</tr>
<tr>
<td>SS-120</td>
<td>119.5</td>
<td>303.53</td>
<td>123.93</td>
<td>314.74</td>
<td>121.35</td>
<td>308.23</td>
<td>124.93</td>
<td>317.34</td>
</tr>
</tbody>
</table>

Approx 10"(25cm) permanent cable with sealed twistlock connector
TX pylon: 4 cond. (twisted/shielded). RX pylon: 8 cond. (twisted/shielded)
29"(63cm) dia cable. Connector has max. dia of .7" (.8cm)

Pinnacle Systems, Inc.
MICROGUARD PYLON (SMB)

Note: 11-0253 extrusion, 27-004 lens

Dimensions

Model CA Cascading Safety Light Curtain - Pylon Dimensions (by model), and additional cable information

Numbers in Inches / cm

Units: Inches/centimeters.
Clearances in inches.
Angles in degrees.

Check: DLK
Drawing: SW
Size: B
Drawing No.: 26-134
Rev: 1

Date: 6/93
Sheet: 1

Figure 9: Swivel Bracket Dimensions CE, pylon dimensions (by model), and additional cable information.
Figure 10: Fixed Bracket Dimensions, pylon dimensions (by model), and additional cable information.
Remote Status Display (RSD)™

Figure 11a: Remote Status Display - Auto Blank or Floating Blank

Material .062" thick steel
Painted blue

Figure 11b: Standard Remote Status Display - No Blanking

Material .062" thick steel
Painted blue
**Cornering Mirrors**

Through the use of cornering mirrors, multiple sides or work envelopes can be guarded which enhance safety and down-time related to mechanical and electrical interlock systems. Include a reflectivity loss per mirror (15% for MGM, 10% for TRM) when calculating total scanning distance of light curtain.

![WARNING] If you are using Auto Blank or Floating Blank options, you may unknowingly create a hole around your machine. Do not use mirrors with blanking unless you need blanking on all guarded sides.

### Table 5: Cornering Mirror Dimensions

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DIM A (in/mm) (hole to hole distance)</th>
<th>DIM B (in/mm) (mirror length)</th>
<th>DIM C (in/mm) (total length)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRM-04 / MGM-04</td>
<td>7.45 / 189</td>
<td>6.25 / 159</td>
<td>8.50 / 216</td>
</tr>
<tr>
<td>TRM-08 / MGM-08</td>
<td>11.45 / 240</td>
<td>10.25 / 260</td>
<td>12.50 / 318</td>
</tr>
<tr>
<td>TRM-12 / MGM-12</td>
<td>15.45 / 392</td>
<td>14.25 / 362</td>
<td>16.50 / 419</td>
</tr>
<tr>
<td>TRM-16 / MGM-16</td>
<td>19.45 / 494</td>
<td>18.25 / 464</td>
<td>20.50 / 521</td>
</tr>
<tr>
<td>TRM-20 / MGM-20</td>
<td>23.45 / 595</td>
<td>22.25 / 565</td>
<td>24.50 / 622</td>
</tr>
<tr>
<td>TRM-24 / MGM-24</td>
<td>27.45 / 697</td>
<td>26.25 / 667</td>
<td>28.50 / 724</td>
</tr>
<tr>
<td>TRM-28 / MGM-28</td>
<td>31.45 / 799</td>
<td>30.25 / 768</td>
<td>32.50 / 826</td>
</tr>
<tr>
<td>TRM-32 / MGM-32</td>
<td>35.45 / 900</td>
<td>34.25 / 870</td>
<td>36.60 / 927</td>
</tr>
<tr>
<td>TRM-36 / MGM-36</td>
<td>39.45 / 1002</td>
<td>38.25 / 971</td>
<td>40.50 / 1029</td>
</tr>
<tr>
<td>TRM-40 / MGM-40</td>
<td>43.45 / 1104</td>
<td>42.24 / 1073</td>
<td>44.50 / 1130</td>
</tr>
<tr>
<td>TRM-44 / MGM-44</td>
<td>47.45 / 1208</td>
<td>46.25 / 1175</td>
<td>48.50 / 1232</td>
</tr>
<tr>
<td>TRM-48 / MGM-48</td>
<td>51.45 / 1307</td>
<td>50.25 / 1276</td>
<td>52.50 / 1334</td>
</tr>
<tr>
<td>TRM-52 / MGM-52</td>
<td>55.45 / 1408</td>
<td>54.25 / 1378</td>
<td>56.50 / 1435</td>
</tr>
<tr>
<td>TRM-56 / MGM-56</td>
<td>59.45 / 1510</td>
<td>58.25 / 1480</td>
<td>60.50 / 1537</td>
</tr>
<tr>
<td>TRM-60 / MGM-60</td>
<td>63.45 / 1612</td>
<td>62.25 / 1581</td>
<td>64.50 / 1638</td>
</tr>
<tr>
<td>TRM-64 / MGM-64</td>
<td>67.45 / 1713</td>
<td>66.25 / 1683</td>
<td>68.50 / 1740</td>
</tr>
</tbody>
</table>

Tolerance: +/- 0.10 inches / .025cm

**Figure 12: Cornering Mirror Dimensions**

MGM Dimensions

![MGM Dimensions Diagram]

TRM Dimensions

![TRM Dimensions Diagram]
Accessories
Model CA Cascading Safety Light Curtain

Pedestal Mounting
The heavy duty, all-welded steel pedestal floor mounts can be used for mounting either the MicroGuard Metal Box or DIN-rail Controller Module or cornering mirrors. Sliding mounts on the pedestal are universal in design and are supplied standard. Unique floating base on pedestal is designed to compensate for uneven floors. Pedestal is fabricated from 12 gauge steel, the base is ¼" steel plate, and the entire unit is painted OSHA yellow.

**NOTICE**
Do not mount pedestal to floor until you have fully installed your guarding system and know it is operating properly in its current position on the floor.

**CAUTION**
Pedestals must be bolted to the floor after installation; they must not be movable.

11-183 Standard Single pedestal mounting bracket
11-184 Special Dual pedestal mounting bracket. Has two mounting studs 90deg apart. Allows both Emitter and Receiver pylon on one pedestal. Requires SMB option on pylons.

Model 9000 and 9500
Excellent method of mounting the light guard for press brakes or when the light guard is to be moved for die setups or machine maintenance. Model 9000 consists of three 180-pivot points along with light guard diagonal movement capability for virtually unlimited light guard positioning. Two-inch square tubing 3/16" thick painted OSHA yellow which mounts directly onto the machine housing and makes for a heavy duty yet versatile mounting bracket. Model 9500 consists of two 180-pivot points and one adjustable length arm.

Model 9000 Swing Arm Brackets
Model 9500 Swing Arm Brackets

Standard height = 72" (model 8000)
Optional height = 96" (model 8096)

Figure 13: Pedestal Dimensions

Figure 14: Swing-Arm Mounting Brackets
Flashing LED(s) indicate a fault has occurred. To find the fault you must count the number of flashes. If multiple faults have occurred, the lowest number flashed first, followed by the next higher number, after the last fault is flashed the cycle starts over again.

**NOTICE**
The “Remote Status Display” will show the actual fault message instead of flashing LEDs.

<table>
<thead>
<tr>
<th>Problem:</th>
<th>Yellow LED is ON steady on Emitter pylon. Red LED flashes every few seconds.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solution:</strong></td>
<td>The CAN data lines (white &amp; green wires) from both RX and TX pylons are not connected together. The CA guard has gone into bottom beam synchronization mode where the RX and TX pylons donot need to be wired together.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem:</th>
<th>No output on 1 or both of the Safety Outputs (blue and/or brown wires) are not reading 24vdc when the guard is GREEN.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solution:</strong></td>
<td>Check RX pylon wiring. Check RX pylon internal fuse. Allow unit to cool down, remove Outputs.</td>
</tr>
</tbody>
</table>
### Table 6a: Emitter Pylon Master

<table>
<thead>
<tr>
<th>Flashes (GRN LED)</th>
<th>RSD Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MTX Length Fault</td>
<td>Master Emitter length of pylon appears too short for what’s programmed into the computer board. Problem in Emitter pylon.</td>
</tr>
<tr>
<td>2</td>
<td>MTX Length Fault</td>
<td>Master Emitter length of pylon appears too long for what’s programmed into the computer board. Problem in Emitter pylon.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>MTX Open LED fault 1</td>
<td>Master Emitter found OPEN in LED OFF when it should be ON</td>
</tr>
<tr>
<td>5</td>
<td>MTX Open LED fault 2</td>
<td>Master Emitter found OPEN in LED ON when it should be OFF</td>
</tr>
<tr>
<td>6</td>
<td>MTX Short LED fault 1</td>
<td>Master Emitter found Short in LED when ON</td>
</tr>
<tr>
<td>7</td>
<td>MTX Short LED fault 2</td>
<td>Master Emitter found Short in LED when OFF</td>
</tr>
<tr>
<td>8</td>
<td>MTX M/S not in SYNC</td>
<td>Master Emitter CPU cannot SYNC up with Slave CPU. Problem in Emitter computer board.</td>
</tr>
<tr>
<td>9</td>
<td>MTX M/S Cannot talk</td>
<td>Master Emitter CPU cannot talk with Slave Emitter CPU. Problem in Emitter computer board.</td>
</tr>
<tr>
<td>10</td>
<td>MTX No CAN with RX Pylon</td>
<td>Master Emitter lost CAN (White &amp; Green) data connection with Receiver pylon.</td>
</tr>
<tr>
<td>11</td>
<td>CAN error at startup</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 6b: Emitter Pylon Slave

<table>
<thead>
<tr>
<th>Flashes (YEL LED)</th>
<th>RSD Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid on</td>
<td>No CAN connected</td>
<td>The CAN (White/Green) data network appears to have no connection. The RED LED on the Emitter pylon will flash 1 time every few seconds to indicate life. The Emitter pylon has gone into Bottom Beam synchronization to communicate with the Receiver pylon. If you have connected the White &amp; Green wires between the Emitter and Receiver pylons, then there is a problem.</td>
</tr>
<tr>
<td>1</td>
<td>STX Length Fault</td>
<td>Slave Emitter length of pylon does not match the programming of the computer board. Problem in Receiver pylon.</td>
</tr>
<tr>
<td>2</td>
<td>STX G Fault</td>
<td>Emitter LED’s not firing correctly. Emitter pylon fault.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>STX CLK line Fault</td>
<td>Slave Emitter CPU timed out waiting for clock signal from Master. Check Emitter computer board.</td>
</tr>
<tr>
<td>5</td>
<td>STX Open LED fault 3</td>
<td>Slave Emitter found OPEN in LED. Check Emitter pylon.</td>
</tr>
<tr>
<td>6</td>
<td>STX Short LED fault</td>
<td>Slave Emitter found SHORT in LED. Check Emitter pylon.</td>
</tr>
<tr>
<td>7</td>
<td>STX M/S bad data</td>
<td>Slave Emitter CPU cannot talk with Master Emitter CPU. Problem in Emitter computer board.</td>
</tr>
<tr>
<td>8</td>
<td>STX M/S Cannot talk</td>
<td>Slave Emitter CPU cannot talk with Master Emitter CPU. Problem in Emitter computer board.</td>
</tr>
<tr>
<td>9</td>
<td>STX MST never started</td>
<td>Slave Emitter CPU never completed power up initialization routine properly. Problem in Emitter computer board.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 7a: Receiver Pylon Master

<table>
<thead>
<tr>
<th>Flashes (GRN LED)</th>
<th>RSD Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MRX Length Fault</td>
<td>Master Receiver length of pylon does not match the programming of the computer board. Problem in Receiver pylon.</td>
</tr>
<tr>
<td>2</td>
<td>MRX Receiver Fault</td>
<td>Master Receiver circuitry is faulty. Problem in Receiver pylon.</td>
</tr>
<tr>
<td>3</td>
<td>MRX K1-K2 Output Short</td>
<td>Master Receiver circuitry is faulty. Solid-State outputs (Blue &amp; Brown wires) appear to be shorted together.</td>
</tr>
<tr>
<td>4</td>
<td>MRX TX N/A Fault</td>
<td>Master Receiver appears connected to the Emitter pylon, but cannot communicate with it. Check Cable, Check Emitter pylon.</td>
</tr>
<tr>
<td>5</td>
<td>MRX NO CAN with TX Pylon</td>
<td>Master Receiver appears connected to the Emitter pylon or RSD, but cannot communicate with it. Check Cable, Check Emitter pylon. Check RSD. If both Receiver &amp; Emitter pylons appear to function normally, then the RSD is at fault.</td>
</tr>
<tr>
<td>6</td>
<td>MRX Infrared Detected</td>
<td>Master Receiver has detected external infrared signals from another source besides its own Emitter pylon. Check for external infrared sources, if none, then repair Receiver pylon.</td>
</tr>
<tr>
<td>7</td>
<td>MRX K2 stuck OFF</td>
<td>Master Receiver solid-state output K2 is not turning on when commanded too. This output is 0.5A max. Check load on output Brown wire. There is an internal automatically resetting thermal fuse.</td>
</tr>
<tr>
<td>8</td>
<td>MRX K2 stuck ON</td>
<td>Master Receiver solid-state output K2 is not turning off when commanded too, or external voltage has been applied to this output. Check wiring of Brown wire. Check for parallel wiring on the Brown wire.</td>
</tr>
<tr>
<td>9</td>
<td>MRX M/S Cannot talk</td>
<td>Master Receiver CPU cannot talk with the Slave Receiver CPU. Check computer board in Receiver pylon.</td>
</tr>
<tr>
<td>10</td>
<td>Slave Length Fault</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Slave RX or Relay Fault</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 7b: Receiver Pylon Slave

<table>
<thead>
<tr>
<th>Flashes (YEL LED)</th>
<th>RSD Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SRX Length Fault</td>
<td>Slave Receiver length of pylon does not match the programming of the computer board. Problem in Receiver pylon.</td>
</tr>
<tr>
<td>2</td>
<td>SRX Receiver Fault</td>
<td>Slave Receiver circuitry is faulty. Problem in Receiver pylon.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clock line fault</td>
<td>Slave Receiver CPU timed out waiting for clock signal from Master. Check Receiver computer board.</td>
</tr>
<tr>
<td>5</td>
<td>RX on at wrong time</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SRX K1 stuck OFF</td>
<td>Slave Receiver solid-state output K1 is not turning on when commanded too. This output is 0.5A max. Check load on output Blue wire. There is an internal automatically resetting thermal fuse.</td>
</tr>
<tr>
<td>7</td>
<td>SRX K1 stuck ON</td>
<td>Slave Receiver solid-state output K1 is not turning off when commanded too, or external voltage has been applied to this output. Check wiring of Blue wire. Check for parallel wiring on the Blue wire.</td>
</tr>
<tr>
<td>8</td>
<td>Cannot talk to Master CPU</td>
<td>Slave Receiver CPU cannot talk to the Master Receiver CPU. Check computer board in Receiver pylon.</td>
</tr>
<tr>
<td>9</td>
<td>SRX MST/SLV not in SYNC</td>
<td>Slave Receiver CPU timed out waiting for SYNC signal from Master. Check Receiver computer board.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
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<td>14</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix “B”
Regulations and Guidelines
Model CA Cascading Safety Light Curtain

OSHA Regulations
1910.217 (C) (3) (iii)
Safeguarding the Point of Operation

(iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c) (3) (i) (a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator’s hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.

(a) The device may not be used on machines using full revolution clutches.
(b) The device may not be used as a tripping means to initiate slide motion.
(c) The device shall not be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.
(d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding.
(e) Refer to ANSI B11.19-2010 for calculating safety light curtain distance from the point of operation.
(f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence-sensing device.

1910.217 (C) (3) (iii)
Additional requirements for safeguarding

Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sensing device or Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding:

(i) The employer shall use a control system and a brake monitor which comply with paragraphs (b) (13) and (14) of this section.
(e) Inspection, maintenance, and modification of presses-
(i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and maintenance work performed.

1910.212
General requirements for all machines (covers press brakes, hydraulic and pneumatic machines not covered by mechanical power press standards).

(a) Machine guarding - (1) Types of guarding. One or more methods or machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation ingoing nip points, rotation parts, flying chips, and sparks. Examples of guarding methods are: barrier guards, two-handed tripping devices, electronic safety devices, etc.

Machine Control Reliability Requirements

Control Reliability

“...control circuits shall be designed and constructed so that a single failure or fault within the system does not prevent the normal stopping action from being applied to the press when required, or does not create an unintended stroking action, but does prevent initiation of a successive stroke until the failure is corrected” (ANSI B11.1-2009).

“...control shall be designed to prevent initiation of a stroke signal in the event that a failure occurs within the press control” (ANSI B11.2-2013).
“Robots shall be designed and constructed so that any single, reasonably foreseeable failure will not cause hazardous motion of the robot” (ANSI/RIA R15.06-2012).

“...control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of the control component to function properly, including relays, limit switches, and static output circuits” (ANSI B11.1-2009).

“...control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected” (ANSI B11.1-1982).

“...the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected” (OSHA CFR 1910.217, 1988).

Safety Guidelines for Management

Operational Safety

1. Appoint a Safety Coordinator to be responsible for safety regulations, requirements, and suggestions. He must review and investigate all accidents and “close calls.”

2. Establish and issue safety rules. Inform each employee of his responsibilities. Make sure he understands them and knows what is expected of him.

3. A thorough review and an early inspection must be made of existing presses, dies, and point of operation guarding to attain the degree of responsibility required by ANSI B11.1-1988 Safety Standards and Federal State laws. Review what mandatory modifications are necessary.

4. Equipment that is no longer safe and that cannot be economically upgraded should be destroyed.

5. Never allow persons legally under age to operate or assist in the operation of machinery.

6. All personnel must be properly trained to eliminate accidents and injuries.

7. Regardless of the operator’s experience, education, or language barrier, it is the responsibility of the supervisor to give him a thorough explanation with each new job assignment.

8. No employee should be given a work assignment that he does not fully understand. Only properly instructed and thoroughly trained personnel should be assigned to work on or with any machine.

9. It shall be the responsibility of the employer to provide an adequate, clean, safe, and uncluttered work area around each machine.

10. If a malfunction is reported, stop the machine immediately, correct the problem, then resume production.

11. Investigate all accidents and close calls. Analyze the reason for occurrence. Take action to prevent recurrence. Keep records of the investigation and preventative steps that were taken.

12. Only employees who understand the machines, operation and safety requirements, and who are able to communicate this knowledge should be given the responsibility of instructing and training others to perform as operators.

13. Management must decide that personnel protective safety equipment is required to perform each job safely. Items such as safety glasses, shoes, gloves, helmets, hand pads, spats, protective sleeves and material handling equipment are common in the metal working industry. If noise levels are excessive, protective headsets and earmuffs are recommended.

14. When designing point of operation guarding, the manufacturing process should be weighed heavily in favor of operational safety.

15. Establish safe and convenient material handling methods and procedures.

16. Post in convenient areas the names, addresses, and phone numbers of physicians and hospitals, and members of the organization who are to be called in case of emergency.

17. All equipment must be electrically connected according to the National Electric Code and be consistent with other accepted practices.

18. Provide adequate and proper fire protection equipment.
Appendix “B”
Regulations and Guidelines
Model CA Cascading Safety Light Curtain

Power Press Guarding

1. Press manufacturers do not know and cannot foresee the magnitude of potential applications of power presses. Therefore, only the press user can determine the type of guards that have to be used in order to perform the job safely. It is the responsibility of the user management to make certain that point of operation guarding and other necessary safety devices are installed. The press should be guarded in such a manner that it is impossible for the operators to place their hands or any other part of the body in the die area.

2. The press user should become thoroughly acquainted with the safety devices commonly employed in power press operations.

3. Feeding devices are strongly recommended, since they remove the operator from the die area, and therefore allow more effective utilization of guards and safety devices.

4. Do not release a press for production before installing and testing all guards and covers.

5. Make frequent evaluation checks of all guarding and devices while the press is running. Correct all unsafe findings immediately.

Power Press Care through Inspection and Maintenance

1. All maintenance and inspection personnel should be specifically instructed, and must understand proper maintenance and inspection procedures contained in this manual.

2. Set up a daily, weekly, and monthly press inspection program. Use a checklist and verify that the job is done correctly.

3. Establish a preventative maintenance program. Records of all maintenance work performed must be kept.

4. Since all equipment has a limited life, quality maintenance personnel are required to obtain maximum usage of your equipment.

5. Releasing a press for production following maintenance should be the responsibility of a qualified individual assigned by management.

6. To maintain the original level of press reliability, careful inspection of mechanical, electrical, and pneumatic areas must be made. This may give an advance warning of a hazard which then can be corrected to prevent possible injuries and damage.

Safety Enforcement

In order to have an effective safety program, management at all levels must enforce every safety rule and regulation. Strong disciplinary measures are sometimes required. They should consist of a warning, written reprimand, work suspension, transfer, demotion, or possibly a dismissal. All infractions must be reported and recorded. Once an infraction is noted, it shows that an unsafe practice or condition has existed. This may be the result of poor planning or improper training and instructing. The reason for the infraction should be analyzed in order to take corrective action.

Supervisor Training

It should be the responsibility of management to instruct their supervisors on safety, giving job instructions, supervising operators, determining accident causes, and building safety attitudes among the machine operators. Accidents can occur due to inadequate training of supervisors.

Operator Training

It shall be the responsibility of management to insure proper training of operators. A specific training program should be instituted to instruct the operator in safety, proper usage of the equipment, and correct operational procedure in performing each and every job. In addition to the supervisor, the operator should be familiar with the proper guarding of the point of operation. Never permit an operator to start a job without complete instructions from his immediate supervisor.
## Pylons

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>52-254 (ref 31-092)</td>
<td>Receiver pylon computer board</td>
</tr>
<tr>
<td>52-255 (ref 31-095)</td>
<td>Emitter pylon computer board</td>
</tr>
<tr>
<td>52-272</td>
<td>Emitter cable, 1’ pig-tail (4 cond male) Shielded</td>
</tr>
<tr>
<td>52-273</td>
<td>Emitter cable, 20' (4 cond female) Shielded</td>
</tr>
<tr>
<td>52-274</td>
<td>Emitter cable, 45' (4 cond female)</td>
</tr>
<tr>
<td>52-275</td>
<td>Receiver cable, 1’ pig-tail (6 cond male)</td>
</tr>
<tr>
<td>52-276</td>
<td>Receiver cable, 20' (6 cond female)</td>
</tr>
<tr>
<td>52-277</td>
<td>Receiver cable, 45' (6 cond female)</td>
</tr>
<tr>
<td>52-260 (ref 31-097)</td>
<td>RSD computer board (for Model CA guards)</td>
</tr>
<tr>
<td>21-068</td>
<td>Cable Strain relief (for either Receiver or Emitter pylon)</td>
</tr>
<tr>
<td>21-007</td>
<td>Gasket (between bracket and pylon)</td>
</tr>
<tr>
<td>21-012</td>
<td>Top L shaped bracket</td>
</tr>
<tr>
<td>21-066</td>
<td>Bottom L shaped bracket (with grommet hole)</td>
</tr>
<tr>
<td>21-033</td>
<td>Top Swivel mount bracket</td>
</tr>
<tr>
<td>21-067</td>
<td>Bottom Swivel mount bracket (with grommet hole)</td>
</tr>
<tr>
<td>52-263</td>
<td>Standard pylon housing (painted with lens)</td>
</tr>
<tr>
<td>52-264</td>
<td>CE pylon housing (painted with lens)</td>
</tr>
<tr>
<td>27-004</td>
<td>Replaceable lens for either Standard or CE housing</td>
</tr>
<tr>
<td>32-097</td>
<td>Safety Relay Module (SSSR)</td>
</tr>
<tr>
<td>11-183</td>
<td>Standard Single pedestal mounting bracket</td>
</tr>
<tr>
<td>11-184</td>
<td>Special Dual pedestal mounting bracket. Has two mounting studs 90deg apart.</td>
</tr>
<tr>
<td></td>
<td>Allows both Emitter and Receiver pylon on one pedestal. Requires SMB option on pylons.</td>
</tr>
<tr>
<td>20-022</td>
<td>1A Slo-Blo fuse</td>
</tr>
<tr>
<td>21-019</td>
<td>Rubber Shock-Mount (Male-Female) 1” dia x 1” tall 5/16-18 thread</td>
</tr>
</tbody>
</table>
WARRANTY
Manufacturer warrants that this product will be free from defects in material and workmanship for a period of one year from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned to it with shipping charges prepaid and which will be disclosed as defective upon examination by the manufacturer. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction, and use not in accordance with manufacturer’s instructions or which will have been altered or repaired by persons other than the authorized agent or employees of the manufacturer.

DISCLAIMER
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WARNING
The entire machine safety system must be tested at the start of every shift. Machine testing should include: (1) proper machine operation and stopping capability; and (2) verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.

CHANGE IN SPECIFICATIONS
Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be reassigned to fix or establish key specifications for your application. Please consult the factory.
We have designed our equipment to the very highest performance and safety standards known to the current technological state of the art, as evidenced by our U.S.A. and foreign patents issued and pending. However, the installation, usage, suitability, and fitness of our equipment for any purpose, known or unknown, is interdependent upon the performance of other equipment not manufactured, installed, secured or maintained by Pinnacle Systems, Inc. We cannot and do not accept responsibility for any overall system performance when factors, such as these, are beyond our control.

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