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# *MiniSafe 4800 Series Safety Light Curtains*

## *Installation and Operating Manual*



***Important Note:***

This manual provides installation and operating information on the following models:

Where information is common to all models the term “MS4800 system” will be used. Where information is given for a specific model the model number will be used.

<b>Advanced</b>	<b>Basic</b>	<b>Standard</b>
MiniSafe MS4800A-14	MiniSafe MS4800B-14	MiniSafe MS4800S-14
MiniSafe MS4800A-20	MiniSafe MS4800B-20	MiniSafe MS4800S-20
MiniSafe MS4800A-30	MiniSafe MS4800B-30	MiniSafe MS4800S-30
MiniSafe MS4800A-40	MiniSafe MS4800B-40	MiniSafe MS4800S-40
MiniSafe Cascaded MSF4800A-14	MiniSafe Cascaded MSF4800B-14	MiniSafe Cascaded MSF4800S-14
MiniSafe Cascaded MSF4800A-20	MiniSafe Cascaded MSF4800B-20	MiniSafe Cascaded MSF4800S-20
MiniSafe Cascaded MSF4800A-30	MiniSafe Cascaded MSF4800B-30	MiniSafe Cascaded MSF4800S-30
MiniSafe Cascaded MSF4800A-40	MiniSafe Cascaded MSF4800B-40	MiniSafe Cascaded MSF4800S-40

## ***MS4800 Series Safety Light Curtain***

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# 1 IMPORTANT SAFETY WARNINGS

**▲ WARNING!** *Read and understand this section prior to installing an MS4800 system.*

An MS4800 system is a general purpose presence sensing device designed to guard personnel working around moving machinery.

Whether a specific machine application and MS4800 system installation complies with safety regulations depends on the proper application, installation, maintenance and operation of the MS4800 system. These items are the responsibility of the purchaser, installer and employer.

The employer is responsible for the selection and training of personnel to properly install, operate, and maintain the machine and its safeguarding systems. An MS4800 system should only be installed, verified and maintained by a *qualified* person. A qualified person is defined as “*an individual who understands, is trained on, and demonstrates competence with the construction, operation or maintenance of the machinery and the hazards involved.*” (ANSI/PMMA B155.1-2006)

To use an MS4800 system the following requirements must be met:

- The guarded machine must be able to stop anywhere in its cycle. Do not use a safety light curtain on a press with a full-revolution clutch.
- The guarded machine must not present a hazard from flying parts.
- The guarded machine must have a consistent stopping time and adequate control mechanisms.
- Severe smoke, particulate matter and corrosives may degrade the efficiency of a safety light curtain. Do not use an MS4800 system in this type of environment.
- All applicable governmental and local rules, codes, and regulations must be satisfied. This is the employer’s responsibility.
- All safety-related machine control elements must be designed so that an alarm in the control logic or failure of the control circuit does not lead to a failure to danger.
- Additional guarding may be required for access to dangerous areas not covered by the MS4800 system.
- Perform the Omron STI test procedure at installation and after maintenance, adjustment, repair or modification to the machine controls, tooling, dies or machine, or the MS4800 system.
- Perform only the test and repair procedures outlined in this manual.
- Follow all procedures in this manual for proper operation of the MS4800 system.

The enforcement of these requirements is beyond the control of Omron STI. The employer has the sole responsibility to follow the preceding requirements and any other procedures, conditions and requirements specific to his machinery.

# 2

## 2 SIGNIFICANT FEATURES

The MS4800 light curtain family is available in three versions. These versions are identified as the MS4800A, MS4800B and the MS4800S. The set-up of the MS4800 A and B versions can be changed through the use of an external device called the Programming and Diagnostic Module (PDM). The MS4800S is configured through selector switches located under an access cover.

### 2.1 MS4800 SERIES FEATURE COMPARISON

Table 2-1 Feature Comparison

Feature	MS4800A	MS4800B	MS4800S
Flex Bus, Multi-Segmented Head Configurations	X	X	X
Scan Code for Cross-Talk Mitigation	X*	X*	X
EDM External Device Monitoring (MPCE Monitoring)	X**	X**	X
PDM (Programming & Diagnostic Module) Port	X	X	
Adjustable Mounting Brackets and T-slots	X	X	X
Non-shielded Main Cables	X	X	X
2-box Design	X	X	X
Two PNP Safety Outputs	X	X	X
Operating Mode	X*	X*	X
Machine Test Signal (MTS)	X*	X*	X
Auxiliary Output (PNP or NPN)	X*	X (PNP/Follow only)	X (PNP/Follow only)
Muting through RM-6 Resource Module	X*		X***
Floating Blanking	X*		X
Fixed Blanking	X*		X
Monitored Blanking	X*		
Reduced Resolution	X*		
Range Selection	X*	X*	X
Start Input Type	X*		
Response Time Adjustment	X*		
* Configured via the use of the Programming and Diagnostic Module (PDM)			
** Configured via the PDM or wiring connections.			
*** Simple two sensor muting			

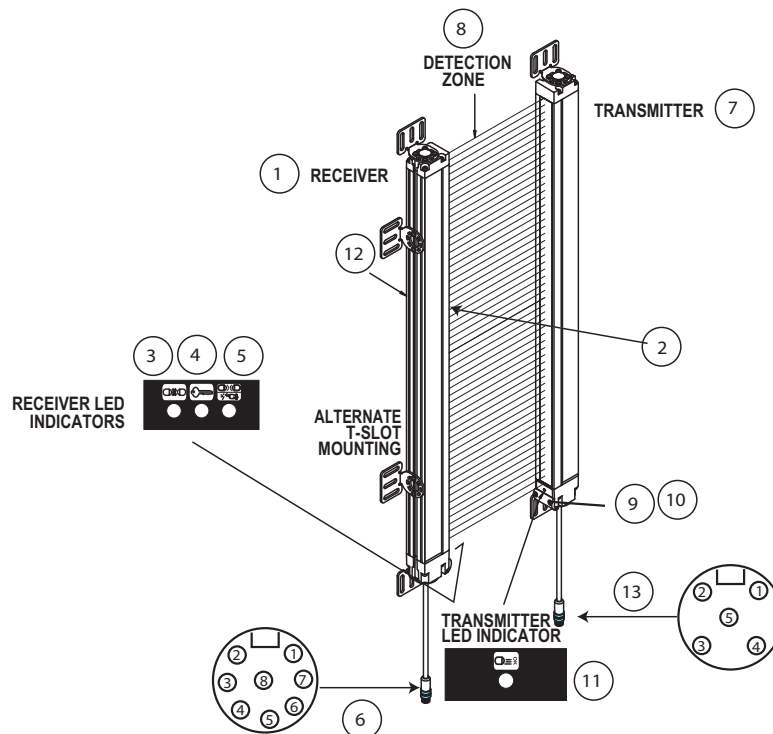


# 3

## 3 SYSTEM COMPONENTS AND INDICATORS

**Table 3-1 System Components Identification**

Chart #		Chart #		
1	<b>RECEIVER</b>	7	<b>TRANSMITTER</b>	
2	Individual Beam Indicators (one for each beam) - Red	8	Detection Zone	
3	Blanking Active - Amber	9	Flip door. Access to configuration switches (on both receiver & transmitter) MS4800S version only	
4	INTERLOCK or ALARM Indicator - Yellow	10	Programming Port for PDM (on both receiver & transmitter) MS4800A and B versions only	
5	MACHINE RUN/STOP Indicator - Green/Red	11	Status Indicator - Yellow	
6	<b>RECEIVER CONNECTIONS M-12 (Male)</b>	12	Side Mounting T-Slot	
	1	+24 VDC - Brown Wire	13	<b>TRANSMITTER CONNECTIONS M-12 (Male)</b>
	2	0 VDC - Blue Wire	1	0 VDC - Blue Wire
	3	Earth - Green Wire	2	+24 VDC - Brown Wire
	4	OSSD 2 - White Wire	3	MTS - White Wire
	5	Start or EDM (Mode Select) - Yellow Wire	4	MTS Return - Black Wire
	6	EDM - Red Wire	5	Earth - Green Wire
	7	Auxiliary Out - Pink Wire		
	8	OSSD 1 - Black Wire		


**Figure 3-1 System Components**

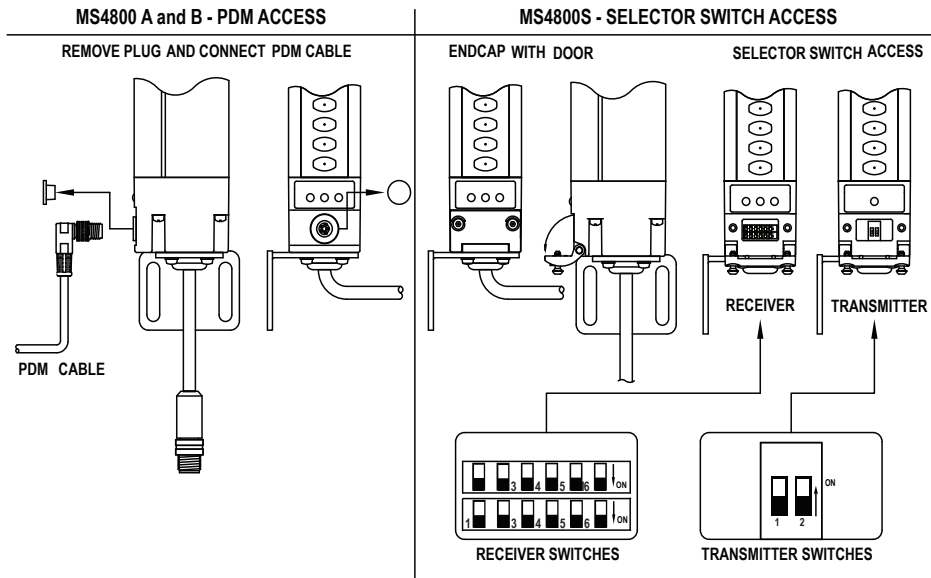


Figure 3-2 MS4800 Access to Features

# 4

## 4 SYSTEM OPERATION

The MS4800 system is a microprocessor-controlled, infrared, transmitted-beam safety light curtain. The system consists of a receiver assembly and a transmitter assembly. The receiver and transmitter assemblies are not physically interconnected.

An MS4800 system is used where personnel protection is required. Typical applications include mechanical power presses, robotic work cells, filter presses, injection molders, food processing equipment and automated assembly equipment.

### 4.1 OPERATING STATES

The operating condition of an MS4800 system is described in terms of states. The following operating states exist for an MS4800 system.

#### 4.1.1 MACHINE RUN

The two receiver safety outputs are in the ON state, the green MACHINE RUN indicator is lit, and the auxiliary output is in a state consistent with its configuration. The protected machine is allowed to operate. Pressing and releasing the start button has no effect.

#### 4.1.2 MACHINE STOP

The two receiver safety outputs are in the OFF state, the red MACHINE STOP indicator is lit, and the auxiliary output is in a state consistent with its configuration. The protected machine is not allowed to operate.

#### 4.1.3 INTERLOCK

The two receiver safety outputs are in the OFF state, the red MACHINE STOP indicator and yellow INTERLOCK indicator are lit. The auxiliary output is in a state consistent with its configuration. The INTERLOCK state does not allow the protected machine to operate until the detection zone is clear of obstructions and the start button is pressed and released.

#### 4.1.4 ALARM

The two receiver safety outputs are in the OFF state, the red MACHINE STOP indicator is lit, the yellow INTERLOCK indicator is flashing, and the auxiliary output is in the OFF state. The alarm state does not allow the protected machine to operate. The primary difference between alarm and INTERLOCK is that the MS4800 system will remain in the alarm state until the alarm is corrected, regardless of power cycling or an external start button press and release.

### 4.2 OPERATING MODES

System operating modes determine the start-up and operating behavior of an MS4800 system. Operating mode definitions rely on the operating states presented above. Operating mode selection may be performed via a Programming and Diagnostics Module (PDM) on the MS4800A and MS4800B or via configuration switches on the MS4800S in the receiver and transmitter.

**NOTE!** *If internal alarms are detected by the system during power-up or operation, it will enter the ALARM state with its safety outputs in the OFF state.*

#### 4.2.1 **AUTOMATIC START**

Automatic Start is available on MS4800A, MS4800B and MS4800S systems.

The MS4800 will power-up with its safety and auxiliary outputs OFF, and, if the detection zone is not obstructed, enters the MACHINE RUN state. In this state, when an object is sensed entering the detection zone, the MS4800 system will change from MACHINE RUN to MACHINE STOP and remain in this state until the obstruction is removed. Once the detection zone is clear, the MS4800 system will automatically change from MACHINE STOP to MACHINE RUN.

#### 4.2.2 **START INTERLOCK**

Start Interlock is only available on MS4800A systems.

The MS4800A will power up with its safety outputs off and enter the INTERLOCK state if the detection zone is clear (or the Fixed or Monitoring Blanking pattern is satisfied, if enabled) and no alarms are detected. To initially enter the MACHINE RUN state the operator must press and release the Start button. Once in the MACHINE RUN state, when an object is sensed entering the detection zone, the system will change to MACHINE STOP state. When the detection zone is cleared, the system will automatically change to MACHINE RUN.

#### 4.2.3 **START/RESTART INTERLOCK**

Start /Restart Interlock is available on MS4800A, MS4800B and MS4800S systems.

The MS4800 will power up with its safety outputs off and enter the INTERLOCK state if the detection zone is clear (or the Fixed or Monitoring Blanking pattern is satisfied, if enabled) and no alarms are detected. To initially enter the MACHINE RUN state the operator must press and release the Start button. Once in the MACHINE RUN state, when an object is sensed entering the detection zone, the system will change to the MACHINE STOP state. When the detection zone is cleared, the system will not automatically change to MACHINE RUN but enter the INTERLOCK state instead. The operator must always press and release the Start button to enter MACHINE RUN. If the detection zone is not clear the Start button will have no effect.

**NOTE!** *The definitions above mention a start button. See Section 12–“Connecting to the Machine Control Circuit” for wiring of the start button.*

### 4.3 **MSF4800 CASCADED SERIES**

The MiniSafe 4800 series safety light curtain is available in a “cascaded” version, referred to as the MSF4800 series. The MSF4800 series allows multiple transmitters/receivers to be “daisy-chained” in series. This type of arrangement permits the MSF4800 to guard multiple areas of a machine.

#### 4.3.1 **MSF4800 REQUIREMENTS**

The MSF4800 is offered in protective heights ranging from 240mm to 1800mm for 14/20mm resolutions, 240mm to 2120mm for 30mm, and resolutions and from 360mm to 2040mm for 40mm resolutions.

- An MSF4800 system has a maximum size limitation based on the number of beams. A single master segment cannot exceed 180 beams and the total of the combined segments cannot exceed 256 beams.
- A single slave segment cannot exceed 128 beams.
- An MSF4800 system may have up to four daisy-chained segments, including the first segment. As long as the total number of beams does not exceed 256.
- The interconnect cable length limitation between any two segments is 10 meters.
- It is possible to mix segments with different resolutions within an MSF4800 system.

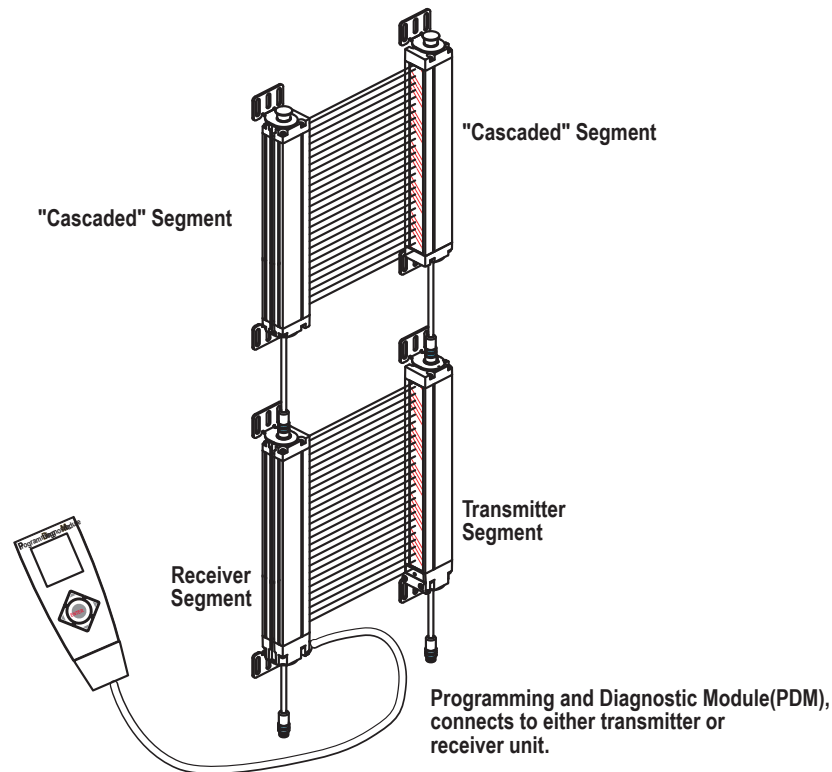


Figure 4-1 Connecting PDM to MSF4800

#### 4.3.2 MSF4800 SEGMENT REDUCTION RESTART PROCEDURE

If you reduce the number of cascaded segments while power is on, you cause a flex bus fault. The MSF4800 will enter a fault condition, indicated by error code "95" on the PDM and on the IBIs as well. After power cycling the system to clear the flex fault, fault code "100" will be displayed. If the number of segments is reduced while power is off, the light curtain will power on with fault code "100". This fault code indicates that there was a reduction in the number of cascaded segments. There are two possible methods to clear this fault and restore operation on the reduced size MSF4800. The PDM or the Start input line can be used.

When a PDM is available, the fault code "100" will be cleared when you load the configuration from the light curtain and save the new reduced system configuration.

If a PDM is not available the start input can be used. The start switch needs to be pressed while the power is applied. The three indicator LEDs (red, yellow, amber) will flash for approximately three seconds. The start switch must be released within 2 seconds, while the LEDs are flashing to clear fault code "100". Since the MSF4800 has a configurable start input, care must be taken to ensure that the correct contact configuration is used and that it is wired properly.

The transmitter will not fault if the number of segments is reduced. However, to operate normally the transmitter must always match the receiver in the number of segments and beams.

# 5 DETECTION OPTIONS

**▲ Warning!** Use of Fixed or Floating Blanking, Floating Blanking and Reduced Resolution will make an MS4800 system less sensitive to objects in the detection zone. Improper use of these features can result in severe injury to personnel. Fixed Blanking may require a hard barrier guard. Fixed Blanking, Floating Blanking and Reduced Resolution may require an increase in the safety distance. Read the following section carefully.

## 5.1 FIXED BLANKING

Fixed Blanking is only available on MS4800A and MS4800S systems.

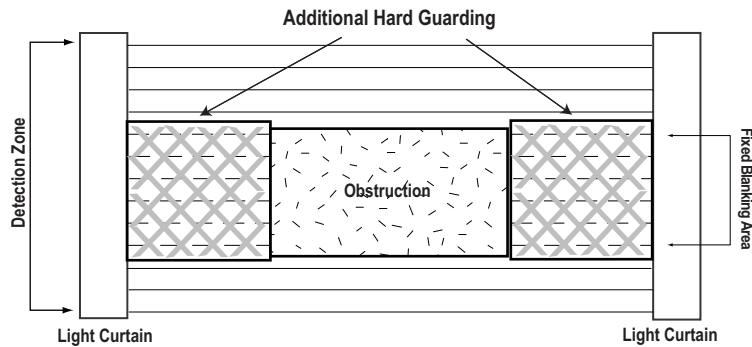


Figure 5-1 Adding Hard Guarding to Light Curtain when Using Fixed Blanking

Fixed Blanking allows a system to blank optical beams and record the exact pattern. A system can record and store a single pattern. The protected zone's object detection is then based on the stored pattern. All obstructed optical beams recorded during the selection must remain blocked and all clear beams recorded during the selection must remain clear for the system to enter or remain in the MACHINE RUN state.

A Fixed Blanking pattern may consist of more than one Fixed Blanked area. Individual Fixed Blanked areas must be separated by at least one beam that is always clear. A Fixed Blanking area may not crossover between "flexible" segment boundaries.

"Each Fixed Blanked area has a size and positional tolerance of +/-1 beam to allow for small positional variations where only the beams on the edges of the blanked area are allowed to change. Because of this position tolerance, a reduction of the optical resolution occurs on the border areas of the Fixed Blanking patterns. See Table 5-1 *Tolerance Effect of Fixed Blanked area on Resolution*. The effect of this tolerance also allows the number of blocked beams to change by +/- 1 beam. For example, a Fixed Blanked area of 8 blanked beams is allowed to increase to 9 beams or decrease to 7 beams and the light curtain will remain in MACHINE RUN." If there is a one or two beam gap between objects the objects cannot use their beam tolerances to close the gap and combine into one single fixed blanking area. In addition if there is a one beam gap between objects, the object closest to the entry encap cannot use the clear beam towards its tolerance even if the adjacent object moved in the same direction by one beam.



**Table 5-1 Tolerance Effect of Fixed Blanked area on Resolution**

Standard Resolution	Effective Resolution at Ends of Fixed Blanked Area
14mm	34mm
20mm	40mm
30mm	60mm
40mm	80mm

**Note:** The tolerance does not reduce the resolution of the entire light curtain, only the ends of Fixed Blanked Areas. The user must consider the increased resolution of the two beams at the ends of each Fixed Blanked Area.

The minimum number of beams in a Fixed Blanking area is one. If only one beam is blanked, there is no positional tolerance. The beam programmed to be blocked must remain blocked. The number of blocked beams has a size tolerance of +1/-0 meaning the number of blocked beams can increase to two but the area cannot be completely eliminated.

The Fixed Blanking pattern must not prevent the light curtain from synchronizing. This means that the size of the blanked object can not exceed certain limits as long as synchronization is maintained, see *Table 5-11*.

Fixed Blanking is allowed during all modes of operation (Automatic Start, Start, Start Interlock, and Start/Restart Interlock.)

To use Fixed Blanking, the operator enables the option using either the PDM or selector switches. A new Fixed Blanking pattern is recorded when the MS4800 receiver is in MACHINE STOP, the blanking function is active and the Program function is activated. If the Fixed Blanking feature is disabled, the stored protected zone patterns are cleared.

#### 5.1.1 **SELECTING FIXED BLANKING WITH A PDM (MS4800A)**

The obstruction is placed within the detection zone and the receiver goes to a MACHINE STOP state.

An authorized user then connects the PDM to the receiver and logs in with the supervisor access level. (Config User)

The user then:

1. Loads the light curtain configuration to the PDM
2. Navigates to the Edit Configuration menu and selects Fix/Mon Blank, select Fixed Blank ON. The system enters a configuration state.
3. Saves the configuration to the light curtain.
4. Navigates to the Fixed Blanking Programming menu. (PROG FIXED BLANK in Main Menu)
5. Selects the Program option, waits until the LEDs start flashing.
6. Selects Finish, the light curtain will then automatically start-up .

#### 5.1.2 **SELECTING FIXED BLANKING WITH SELECTOR SWITCHES (MS4800S)**

The obstruction is placed within the detection zone and the receiver goes to MACHINE STOP state.

An authorized user then sets the selector switches in the receiver endcap to select Fixed Blanking Enable. The MS4800 enters a fault state and power is cycled or the Start switch is activated to clear

the fault. When the receiver powers up it will be in Fixed Blanking mode with the red and amber LEDs lit. See Figure 5-2 *Selecting Fixed Blanking Procedure 1*.

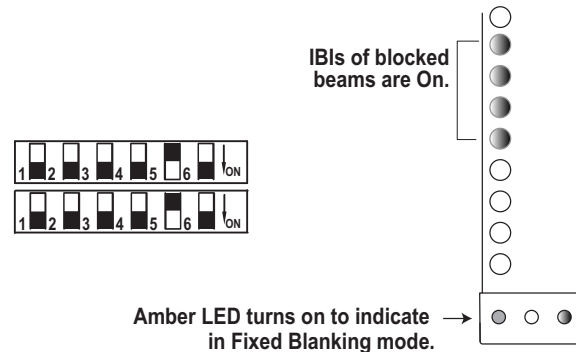


Figure 5-2 *Selecting Fixed Blanking Procedure 1*

The authorized user then enables the Program switch by setting both Fixed Blanking switches to the off position and then both to the on position. When the first Fixed Blanking switch is flipped, the red LED begins flashing at a rate of 3 Hz. When the final Fixed Blanking switch is flipped, both the red and amber LEDs and the IBIs of the blocked beams start flashing to indicate the Program switch is enabled. The authorized user has 10 minutes to complete the programming of a pattern. See Figure 5-3 *Selecting Fixed Blanking Procedure 2*.

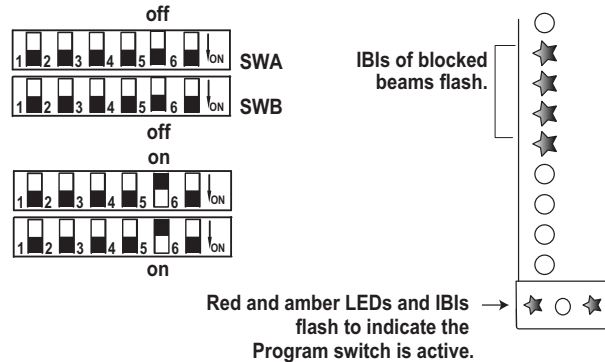


Figure 5-3 *Selecting Fixed Blanking Procedure 2*

To program a pattern, the authorized user must flip (off/on or on/off) the Program switch once. Once a pattern is programmed the yellow LED (INTERLOCK) turns on. During the 10 minute period, the user may program as many times as needed, allowing for adjustment in the placement of the obstruction. See Figure 5-4 *Selecting Fixed Blanking Procedure 3*.

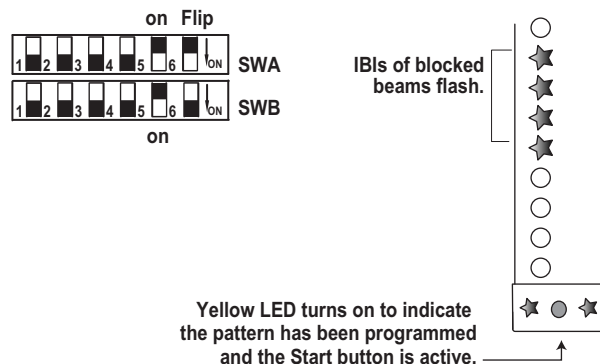


Figure 5-4 *Selecting Fixed Blanking Procedure 3*

The user must then press and release the START button or perform a power cycle. The MS4800 receiver then resets. If no faults are detected and the state of the optical beams matches the recorded Fixed Blanking pattern, the receiver will enter the INTERLOCK or MACHINE RUN condition depending upon the selected Start Mode. The amber receiver Blanking Active LED will be on. See Figure 5-5 - *Selecting Fixed Blanking Procedure 4*.

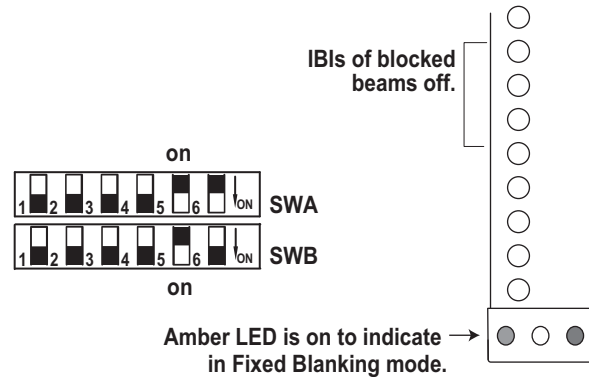


Figure 5-5 *Selecting Fixed Blanking Procedure 4*

If the 10 minute period expires, the amber LED and IBIs quit flashing and the yellow LED (INTERLOCK) goes on. The user can start another programming sequence by setting both Fixed Blanking switches off and then on. The user may start normal operation by a press and release of the Start button or by performing a power cycle. See Figure 5-6 - *Selecting Fixed Blanking Procedure 5*.

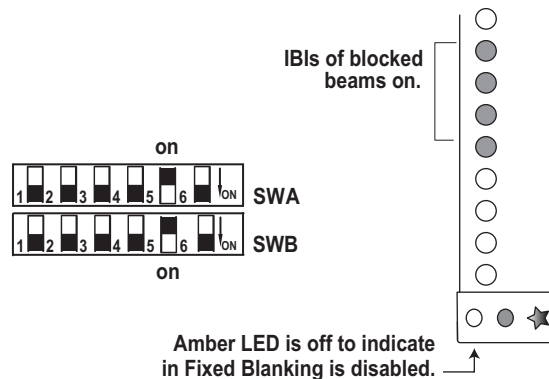


Figure 5-6 *Selecting Fixed Blanking Procedure 5*

To exit Fixed Blanking the user sets both selector switches to the off position, then either presses and releases the Start button or performs a power cycle. The receiver will power up with the amber LED off.

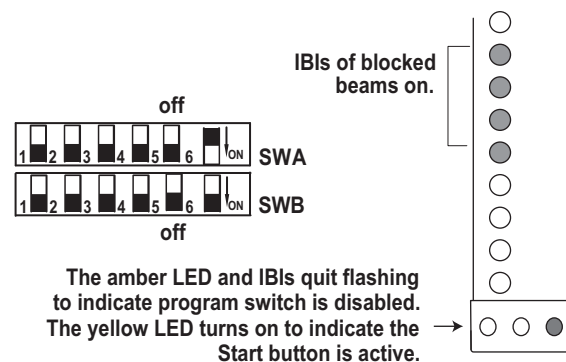


Figure 5-7 *Selecting Fixed Blanking Procedure 6*

Table 5-2 Diagram of Operation

No Fixed Blanking	Fixed Blanking Enabled	Fixed Blanking Enabled	Fixed Blanking Enabled	Fixed Blanking Enabled	Fixed Blanking Enabled
○	○	○	○	⊗	○
○	⊗	○	○	⊗	⊗
○	⊗	○	●	⊗	●
●	⊗	⊗	⊗	⊗	⊗
○	○	○	⊗	○	○
<b>MACHINE STOP</b>	<b>MACHINE RUN</b>	<b>MACHINE RUN</b>	<b>MACHINE RUN</b>	<b>MACHINE STOP</b>	<b>MACHINE STOP</b>

○ Clear Optical Channel      ● Blocked Optical Channel      ⊗ Optical Channel Selected by Fixed Blanking

**5.2 FLOATING BLANKING**

**▲ Warning!** Use of Fixed Blanking, Monitored Blanking, Floating Blanking and Reduced Resolution will make the MS4800 system less sensitive to objects in the detection zone. Improper use of these features can result in severe injury to personnel. Fixed Blanking and Monitored Blanking may require a hard barrier guard. Fixed Blanking, Floating Blanking and Reduced Resolution may require an increase in the safety distance. Read the following section carefully.

Up to two channels can be obstructed at any location in the detection zone (one channel on MS4800S) as long as synchronization is maintained, see Table 5-11.

This means that an object can freely float from one end of the protective field to the other without the MS4800 system entering the MACHINE STOP state. The obstructed channels are not fixed at a single location but “float” through the detection zone.

See Table 5-3 for a diagram of MS4800 system response during operation with Floating Blanking active.

**5.2.1 SELECTING FLOATING BLANKING WITH PDM (MS4800A)**

Using the PDM an authorized user can activate the Floating Blanking function. This allows the system to operate with up to two obstructed optical beams anywhere within the protected zone. The operator may select one or two obstructed beams. These obstructions are permitted anywhere within the protected zone and are permitted to move over time. For two-beam Floating Blanking, the two obstructed beams do not have to be adjacent. After sending the configuration to the light curtain the PDM requests that the receiver perform a reset. The receiver then enters the Power-On Self Test state and if no faults are detected enters the INTERLOCK or MACHINE RUN condition depending upon the selected operating mode. The receiver Blanking Active LED will turn on.

**5.2.2 SELECTING FLOATING BLANKING WITH SELECTOR SWITCHES (MS4800S)**

Using the selector switches an authorized user can activate the Floating Blanking function. This allows the system to operate with one obstructed optical beam anywhere within the protected zone. This obstruction is permitted anywhere within the protected zone and is permitted to move over time. After setting the appropriate selector switches, the receiver enters the Power-On Self Test state and if no faults are detected the receiver shall enter the INTERLOCK or MACHINE RUN condition depending upon the selected operating mode.

**Note:** Two-Beam Floating Blanking is not available on the MS4800S.

Table 5-3 System Response to Floating Blanking

	Floating Blanking Inactive	1 Channel Floating Blanking Active	1 Channel Floating Blanking Active	1 Channel Floating Blanking Active	1 Channel Floating Blanking Active	2 Channel Floating Blanking Active	2 Channel Floating Blanking Active	2 Channel Floating Blanking Active	2 Channel Floating Blanking Active	2 Channel Floating Blanking Active	2 Channel Floating Blanking Active	2 Channel Floating Blanking Active
Channel 1	○	○	○	○	○	○	○	○	○	○	○	⊗
Channel 2	○	○	○	⊗	⊗	○	○	⊗	⊗	⊗	⊗	○
Channel 3	⊗	○	⊗	⊗	○	○	⊗	⊗	○	⊗	○	⊗
Channel 4	○	○	○	○	⊗	○	○	○	⊗	⊗	⊗	○
Channel 5	○	○	○	○	○	○	○	○	○	○	⊗	⊗
System Response	1 Exception MACHINE STOP	0 Exception Machine Run	1 Exception Machine Run	2 Exception MACHINE STOP	2 Exception MACHINE STOP	0 Exception Machine Run	1 Exception Machine Run	2 Exception Machine Run	2 Exception Machine Run	3 Exception MACHINE STOP	3 Exception MACHINE STOP	3 Exception MACHINE STOP

○ Clear Optical Channel

⊗ Optical Channel Selected by Fixed Blanking

Table 5-4 Floating Blanking Effects on Resolution

Floating Blanking Effects on Minimum Object Resolution		
Standard Minimum Objection Resolution (No Floating Blanking)	Minimum Object Resolution with 1 Beam Floating	Minimum Object Resolution with 2 Beam Floating
14mm	24mm	34mm
20mm	30mm	40mm
30mm	50mm	70mm
40mm	70mm	100mm

### 5.3 FIXED BLANKING WITH FLOATING BLANKING

**▲ Warning!** Use of Fixed Blanking, Monitored Blanking, Floating Blanking and Reduced Resolution will make the MS4800 system less sensitive to objects in the detection zone. Improper use of these features can result in severe injury to personnel. Fixed Blanking and Monitored Blanking may require a hard barrier guard. Fixed Blanking, Monitored Blanking, Floating Blanking and Reduced Resolution may require an increase in the safety distance. Read the following section carefully.

Table 5-5 Possible Blanking Function Combinations

Function	Possible Blanking Function Combinations			
	Fixed Blanking	Floating Blanking	Monitored Blanking	Reduced Resolution
Fixed Blanking	N/A	Yes	No	No
Floating Blanking	Yes	N/A	Yes	No
Monitored Blanking	No	Yes	N/A	No
Reduced Resolution	No	No	No	N/A

When both Fixed Blanking and Floating Blanking are selected, the floating channels are allowed to occur anywhere within the detection zone except the area selected by Fixed Blanking.

**5.3.1 THE EFFECT OF FIXED OR MONITORED BLANKING OR FLOATING BLANKING ON MINIMUM OBJECT RESOLUTION**

When Fixed Blanking and/or Floating Blanking are active, the safe mounting distance is affected. Fixed and Floating Blanking desensitize the light curtain and increase the size of the minimum detectable object. The increase is equal to the beam spacing distance for each beam that is disabled.

- A MiniSafe MS4800-20 system with one beam disabled has a minimum object resolution of:  
20 mm + 10 mm = 30 mm (1.18 inches).

- A MiniSafe MS4800-20 system with two beams disabled has a minimum object resolution of:  
20 mm + 10 mm + 10 mm = 40 mm (1.57 inches).

If the size of the object detected by the system increases, the minimum safe distance must also be increased. Use the minimum object sensitivity given in *Tables 5-4 through 5-7* to determine the new figure to use when computing the safety distance.

*Note: In some cases the use of mechanical hard guards may be needed to insure that the blanked areas are adequately guarded.*

**Table 5-6 Sample S and D<sub>pf</sub> Factors for MS4800-14 System**

Total Number of Beams Disabled by Fixed and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D <sub>pf</sub> for use with ANSI Formula (D <sub>pf</sub> = 3.4 (S-.276) inches)
None	14 mm (0.55 inches)	0.93 inches (24 mm)
1 Beam	24 mm (0.94 inches)	2.26 inches (57 mm)
2 Beams	34 mm (1.34 inches)	3.62 inches (92 mm)
3 Beams	44 mm (1.73 inches)	4.94 inches (125 mm)
4 Beams	54 mm (2.13 inches)	6.3 inches (160 mm)
5 Beams	64 mm (2.52 inches)	7.6 inches (193 mm)
	>64 mm (2.52 inches)	36 inches (900 mm)

**Table 5-7 Sample S and D<sub>pf</sub> Factors for MS4800-20 System**

Total Number of Beams Disabled by Fixed and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D <sub>pf</sub> for use with ANSI Formula (D <sub>pf</sub> = 3.4 (S-.276) inches)
None	20 mm (0.79 inches)	1.75 inches (43 mm)
1 Beam	30 mm (1.18 inches)	3.1 inches (78 mm)
2 Beams	40 mm (1.57 inches)	4.4 inches (111 mm)
3 Beams	50 mm (1.97 inches)	5.76 inches (146 mm)
4 Beams	60 mm (2.36 inches)	7.1 inches (180 mm)
	>64 mm (2.52 inches)	36 inches (900 mm)

**Table 5-8 Sample S and D<sub>pf</sub> Factors for MS4800-30 System**

Total Number of Beams Disabled by Fixed and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D <sub>pf</sub> for use with ANSI Formula (D <sub>pf</sub> = 3.4 (S-.276) inches)
None	30 mm (1.18 inches)	3.1 inches (78 mm)
1 Beam	50 mm (1.97 inches)	5.76 inches (146 mm)
	>64 mm (2.52 inches)	36 inches (900 mm)

**Table 5-9 Sample S and D<sub>pf</sub> Factors for MS4800-40 System**

Total Number of Beams Disabled by Fixed and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D <sub>pf</sub> for use with ANSI Formula (D <sub>pf</sub> = 3.4 (S-.276) inches)
None	40 mm (1.57 inches)	4.4 inches (112 mm)
	>64 mm (2.52 inches)	36 inches (900 mm)

**5.4 MONITORED BLANKING**

**Monitoring Blanking is only available on the MS4800A system.**