MULTI-SCREEN® System Semi-Annual Checkout

This commissioning checkout must be done by a *qualified person* who possesses all of the manufacturer-provided information on the MULTI-SCREEN® System and guarded machine and who, by possession of a recognized degree or certificate of professional training or who, by extensive knowledge, training, or experience, has successfully demonstrated the ability to solve problems relating to the installation, operation, and maintenance of optoelectronic machine guards.

A copy of checkout results should be kept in the employer's files: see OSHA 1910.217(e)(1).

The *qualified person* must:

1) Examine the guarded machine to verify that it is of a type and design that is compatible with the MULTI-SCREEN System. See page 2 of the MULTI-SCREEN manual, (p/n 42492) for a list of misapplications.

2) Verify that the minimum separation distance from the closest danger point of the guarded machine to either defined area is not less than the calculated distance (see Figure 1, below).

3) Verify that access to the dangerous parts of the guarded machine is not possible from any direction not protected by the MULTI-SCREEN System, hard guarding, or supplemental guarding, and verify that all supplemental guarding devices and hard guarding are in place and operating properly.

WARNING. . .
A shock hazard exists while the lockable enclosure is open. Before continuing, verify that the enclosure is closed and latched.

The formula used to calculate the separation distance is:

$$Ds = K \times (Ts + Tr) + Dpf$$

where:

WARNING. . .
Calculate the separation distance carefully. Failure to maintain appropriate separation distance can result in serious bodily injury or death.

Ds = the separation distance;

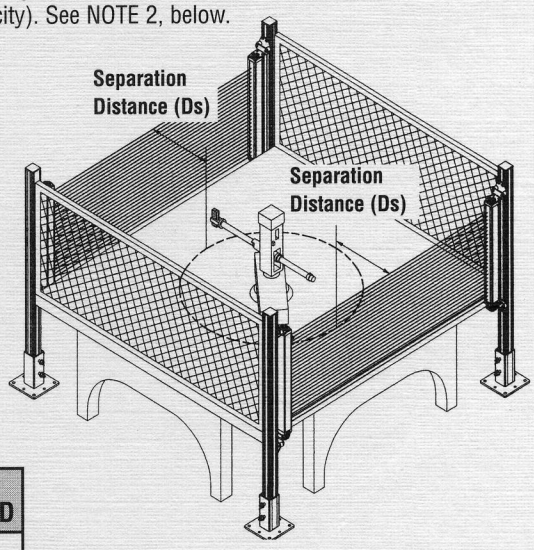
K = the OSHA-recommended hand speed constant of 63 inches per second (NOTE 1, below);

Ts = the overall stop time of the machine measured from the application of the "stop" signal to the final ceasing of all motion (including stop times of all relevant control elements, and measured at maximum machine velocity). See NOTE 2, below.

Tr = the response time of the MULTI-SCREEN System:

Determine the value of Tr for each of the two sensor pairs and use the GREATER value in the separation distance formula.

T_r	MINI-SCREEN Sensors	MACHINE-GUARD Sensors
.048 sec.	4.5 in. to 16 in. sensors	6 in. to 24 in. sensors
.060 sec.	20 in. to 32 in. sensors	30 in. to 48 in. sensors
.072 sec.	36 in. to 48 in. sensors	54 in. to 72 in. sensors



Dpf = the added distance due to depth penetration factor, as prescribed in OSHA 1910.217 and ANSI B11 standards:

Blanking Program	MINI-SCREEN 9 m (30 ft) Sensors	MINI-SCREEN 18 m (60 ft) Sensors	MACHINE-GUARD
Floating Blanking "Off"	Dpf = 1.6 in	Dpf = 2.5 in	Dpf = 4.0 in
One-beam Blanking	Dpf = 3.3 in	Dpf = 4.2 in	Dpf = 7.0 in
Two-beam Blanking	Dpf = 5.0 in	Dpf = 5.9 in	Dpf = 9.0 in

The value for Dpf may be different for each of the two sensor pairs.

NOTES:

1) The OSHA-recommended hand-speed constant K 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 consider all factors, including the physical ability of the operator, when determining the value of K to be used.

2) Ts is usually measured by a stop-time measuring device. If the specified machine stop time is used, we recommend that at least 20% be added as a safety factor to account for clutch/brake system deterioration.

3) Use of floating blanking will always cause the required Ds to increase.

4) Verify that it is not possible for a person to stand between either defined area and the dangerous parts of the guarded machine. Or, verify that supplemental presence sensing devices, such as safety mats, are in place and functioning properly in any space between the defined area and any danger point which is large enough to allow a person to stand undetected by the MULTI-SCREEN System.

5) Examine the electrical wiring connections between the MULTI-SCREEN output relays and the guarded machine's control elements to verify that the requirements stated in Section 3.5.4 of the manual (p/n 42492) are met.

6) Test the effectiveness of both MULTI-SCREEN light screens with system power "on", as described in steps (a) through (e), below. The MULTI-SCREEN control box includes eight specified test pieces. Select the proper test piece based on system configuration, per the following chart:

Sensor Type	Floating Blanking	Specified Test Piece Model	Specified Test Piece Size
MINI-SCREEN 9 m (30 ft) range	None (off)	STP-2	19.1 mm (0.75 in)
	1-beam	STP-4	32.0 mm (1.25 in)
	2-beam	STP-3	44.5 mm (1.75 in)
MINI-SCREEN 18 m (60 ft) range	None (off)	STP-7	25.4 mm (1.00 in)
	1-beam	STP-1	38.1mm (1.50 in)
	2-beam	STP-8	50.8 mm (2.00 in)
MACHINE-GUARD	None (off)	STP-1	38.1 mm (1.50 in)
	1-beam	STP-5	57.1 mm (2.25 in)
	2-beam	STP-6	76.2 mm (3.00 in)

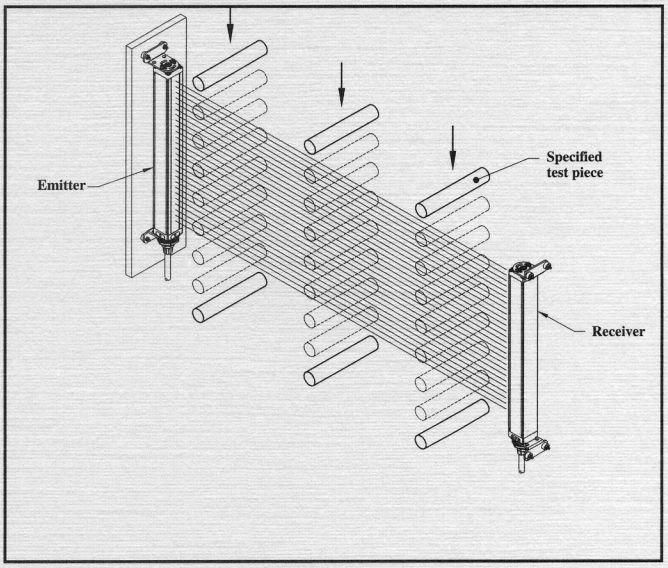


Figure 2. Use of Test Piece

a) Verify that the MULTI-SCREEN System is in the RUN mode (green and yellow status indicator LEDs "on"). See section 4.3 of the manual (p/n 42492) for RESET procedure. The green LED will flash if blanking is programmed for either light screen.

b) With the guarded machine at rest, slowly pass the appropriate specified test piece downward through the defined area at three points: close to the receiver column, close to the emitter column, and midway between the emitter and receiver columns (Figure 2, below). In each case, the red status indicator should come "on" and remain "on" for as long as the test piece is within the defined area. When the test piece is withdrawn from the defined area, the green status indicator should come "on". If the green indicator comes "on" at any time when the test piece is within the defined area, check for reflective surfaces, and do not continue until the cause is discovered and the situation is resolved.

c) Initiate machine motion of the guarded machine and, during motion, insert the appropriate specified test piece into the defined area (at right angles to the defined area). Do not attempt to insert the test piece into the dangerous parts of the machine. Upon insertion of the test piece into the defined area at any time during machine motion, the dangerous parts of the machine should come to a stop with no apparent delay. Upon removal of the test piece from the defined area, verify that the machine does not automatically restart, and that the initiation devices must be engaged to restart the machine.

d) With the guarded machine at rest, insert the appropriate specified test piece into the defined area and verify that it is not possible for the guarded machine to be put into motion while the specified test piece is within the defined area.

e) Repeat steps a through d for the second light screen.

7) Remove electrical power from the MULTI-SCREEN System. All output relays should immediately de-energize, and should not be capable of being reactivated until power is re-applied and a key RESET is performed (unless the Auto Power-up feature is "on").

8) Test the machine stopping response time using an instrument designed for that purpose to verify that it is the same or less than the overall system response time specified by the machine manufacturer. (NOTE: Banner's Applications Engineering Department can recommend a suitable instrument.)

WARNING. . .
If *all* of the above checks cannot be verified, the MULTI-SCREEN System/guarded machine should not be used until the defect or problem has been corrected (see Section 5). Attempts to use the guarded machine under such conditions could result in serious bodily injury or death.