

Stop The Presses – Photoelectric Detector Applications

When using photoelectric detectors for motion detection, there are several different installation techniques that can make the system more versatile. One technique is to stack units on top of one another to form what is called a “beam stack.”

Beam Stacking

There are two reasons for using photoelectric detectors in a beam stack configuration. One application for beam stacking is a redundant coverage stack which reduces false alarms by forcing more than one beam to be broken to initiate an alarm.

Use of the DS452 or the DS455 is recommended for this type of application, but the DS415, DS445 and DS435 may also be used. In this configuration, the transmitters should be on the same wall as shown in Figure A. The transmitters should be mounted no further than one foot from each other to insure that detection of an actual intruder is not jeopardized. The alarm relays should be wired such that only an activation of both receivers would cause an alarm. If normally closed alarm contacts are used, the contacts should be wired in parallel, if normally open contacts are used they should be wired in series.

Another reason for using a beam stack is to give a wall of protection by stacking several beams at different heights and providing an alarm activation on blockage of any single beam.

The preferred detector for use in this type beam stack application is the DS435 using the pulse gate wiring technique. The DS415 may also be used but with some risk of accidental set up. The DS445 is not recommended for this type of beam fence application because its broader beam makes it more vulnerable to accidental set up.

Figure B shows the proper installation technique for a beam stack setup of this type. Note that the system is installed with both a transmitter and receiver at each end. This eliminates the possibility of a receiver being covered by more than one transmitter as it might be with a redundant coverage setup. There should not be two transmitters on the same wall looking in the same direction in this type of beam stack application.

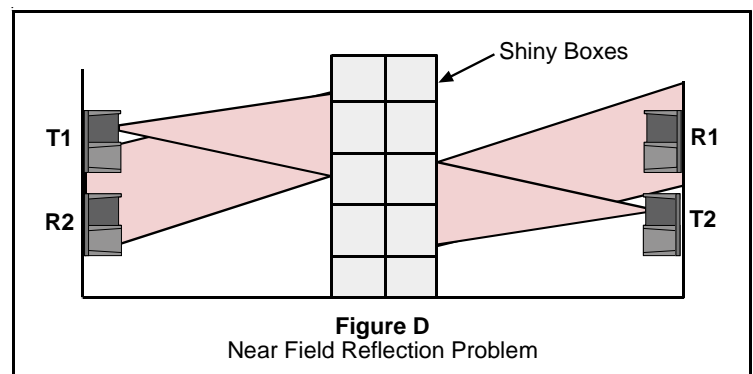
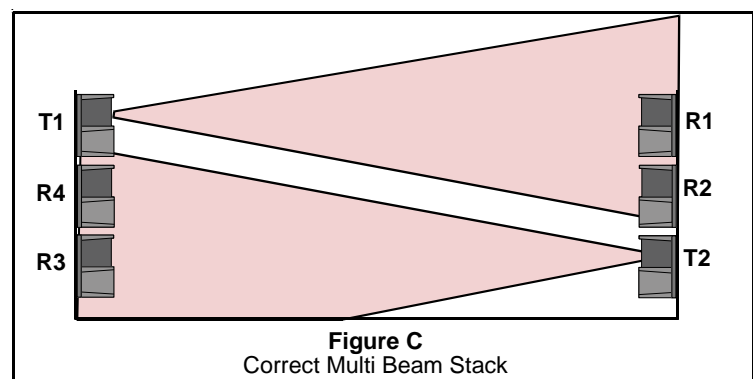
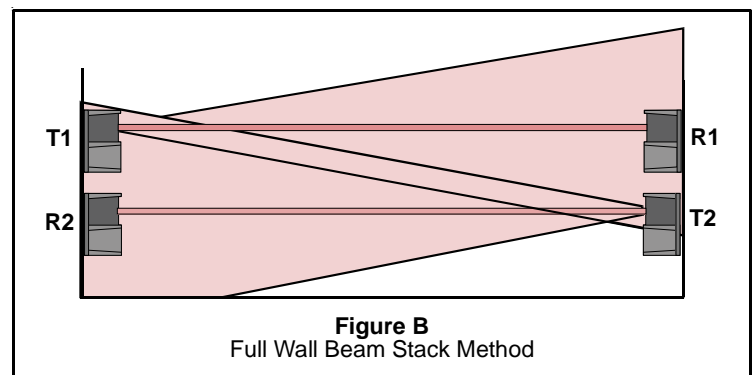
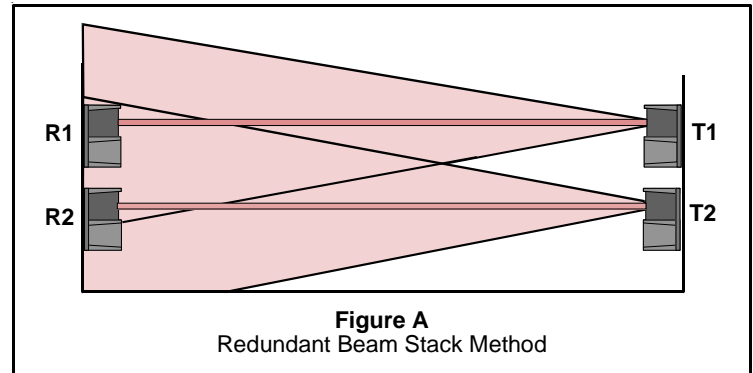
It may be desirable to have more than two sets of beams in order to give a taller stack. This can be done by adding receivers as shown in Figure C. Note that the beam from each transmitter is covering two receivers. The maximum separation between the receivers (S) can be calculated by dividing the distance between transmitter and receivers (D) by 20.

So if the distance between transmitter and receiver were 100 ft. (30.5 m), the maximum separation between receivers would be $100 \div 20$ or 5 ft. (1.5 m).

$$S = D/20 \quad S = 100/20 \quad S = 5$$

One potential problem when using photoelectric in a beam stack is “Near Field Reflection”. Near field reflection is caused when a reflective object is placed in the line of sight of the detectors and causes the signal to be reflected back to the incorrect receiver as shown in Figure D.

The only way to completely eliminate a near field reflection problem would be to use DS435s with the pulse gate wiring technique.



Perimeter Protection

When protecting the perimeter of an installation, a good technique is to mount the units at 90° angles around the coverage area as shown in Figure E. Note that the beams are mounted so that they cross each other so an intruder can't enter the area through any of the corners by walking between units.

When installing systems with multiple transmitters and receivers, the system should always be tested with all the receivers powered up, but with each individual transmitter powered up only one at a time. A transmitter should only set up its own receiver.

Receivers in very close proximity to transmitters may set up even if the transmitter is not pointed at them. This is caused by the close proximity field emitted from the transmitter. (See Figure F)

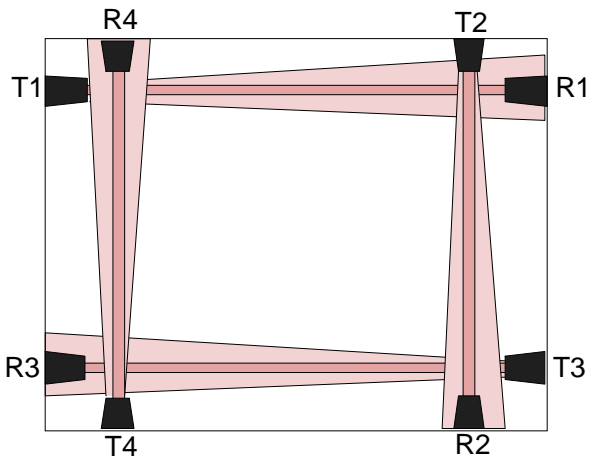


Figure E
Perimeter Protection

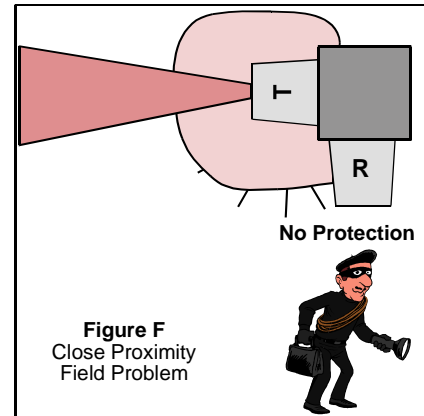


Figure F
Close Proximity
Field Problem

If it is found that a receiver is being set up by the wrong transmitter, the signals can usually be eliminated by masking the sides of the transmitter and receiver using electrician's tape or duct tape inside the enclosures window.

Reflection Problems

When installing photoelectric detectors, remember that the infrared signal may reflect off of objects (glossy floors or walls as shown in figures G and H) in the coverage area and set up the receiver when the actual line of sight between transmitter and receiver may be blocked. A thorough walk test performed at several different points within the coverage area, should be able to detect this problem. In most cases, realigning the units can eliminate this problem.

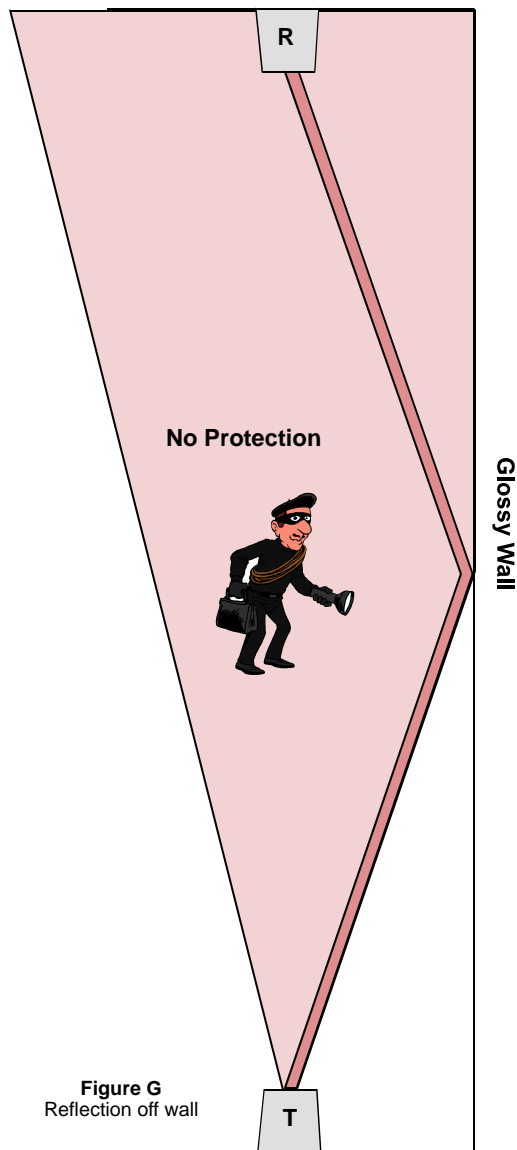


Figure G
Reflection off wall

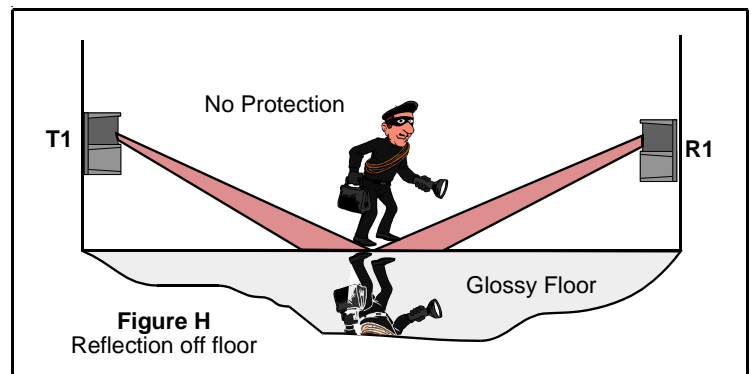


Figure H
Reflection off floor

The only way to insure proper continued protection, with any alarm system, is to perform regular walk tests of the desired coverage area.