

How to Create a Basic Man Trap System

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What Is A Mantrap System?

A mantrap (otherwise known as a security interlock system) is a locking system that prevents one door opening before another is closed. One very popular application for a mantrap is on a clean room, where it is vital to control the flow of air (and dust) in and out of the secured space.

Every mantrap I have helped design is based on electromagnetic locks (AKA magnets or maglocks). There is a good reason for this. Maglocks are very good for this application because they are inherently fail safe, and, except in detention applications, it is desirable to use fail safe electrified locks in a mantrap application.

Typically a mantrap is used on two consecutive openings (see illustration below):

How it Works

As long as the magnets are supplied with power, they are locked.

1. To enter the secured space, a person activates the access control (keypad, pushbutton switch, keyswitch, prox reader, etc.).
2. The access control closes a contact on the mantrap relay for perhaps 10 seconds, telling it to unlock the first door for that amount of time.
3. The person opens the door, changing the state of the door position switch, which tells the mantrap relay to keep the second door locked.
4. When the first door closes, the door position switch on the first door returns to its original state, which signals the mantrap relay to release the second door.
5. When the person opens the second door, it changes the state of the door position switch on the second door, which tells the mantrap relay to keep the first door locked.
6. When the second door closes, and the door position switch on the returns to its original state, the mantrap relay relocks both doors.

Similarly from the inside, pressing the first request to exit button releases the inside door while simultaneously locking the outer door. The outer door cannot be opened until the inner door is shut.

[SDC 1511S Series Exit Check Single Aluminum Integrated Delayed Egress Electromagnetic Lock with Key Switch, 12 VDC, 1650 lbs Holding Force, 11" Length x 2-3/4" Height x 1-9/16" Depth \(Pack of 1\)](#)

Where are Security Interlocks Used?

Man traps or security interlocks are used at the entrances to "clean rooms" - typically rooms that must be kept as dust free as possible, for example, for biomedical research or for the manufacture of micro-electronic components; they are also used for high security applications such as cash counting rooms or sensitive government facilities. In the case of the clean room the interlock need only ensure that the second door cannot be opened until the first is closed. In high security applications the term, "man trap", becomes more applicable, since the purpose of the system is to trap a potential threat between doors. Therefore in addition to the door position switches and lock sensor switches, there will usually be another means, such as a remote switch in a guarded location, that must be activated before the second door can be opened.

Another main difference between high security man traps and clean room security interlocks is lock strength. The high security application must anticipate the use of force whereas the clean room application is untroubled

by this consideration.

Usually a high security man trap system will operate partly automatically and partly under supervision, and its chief function is to give security personnel extra time to react should a threat present itself.

Security Interlocks and Life Safety

Like delayed egress systems, fire and life safety regulations may affect or restrict the way man trap systems are used. In a clean room, for example, the security interlock system will usually be connected to the building fire alarm. In the event of an alarm, the man trap is disabled to allow free egress.

In high security applications, connection to the fire alarm system in this way is an obvious weak link, however, without the approval of the fire marshal, building inspector or other authority having jurisdiction (AHJ), the system must allow unrestricted egress in an alarm condition. Therefore it is imperative to get the approval of the AHJ prior to installing any man trap system.

Many companies make power supplies and relays that are supplied with directions on how to use them to create a man trap or security interlock. Here are some:

- Security Door Controls
- Schlage Electronics
- Altronix
- Securitron
- Rutherford Controls