Elevator Circuits and Required Shunt Trip Disconnect — A Simple Solution.
When sprinklers are installed in elevator hoistways, machine rooms, or machinery spaces, ANSI/ASME A17.1 requires that the power be removed to the affected elevator upon or prior to the activation of these sprinklers. This is an elevator code requirement that affects the electrical installation. The electrical installation allows this requirement to be implemented at the disconnecting means for the elevator in NEC® 620.51(B). This requirement is most commonly accomplished through the use of a shunt trip disconnect and its own control power. To make this situation even more complicated, interface with the fire alarm system along with the monitoring of components required by NFPA 72 must be accomplished in order to activate the shunt trip action when appropriate and as well as making sure that the system is functional during normal operation. This requires the use of interposing relays that must be supplied in an additional enclosure. Other requirements that have to be met include selective coordination for multiple elevators (620.62) and hydraulic elevators with battery lowering [620.91(C)].

There is a simple solution available for engineering consultants, contractors, and inspectors to help comply with all of these requirements in one enclosure called the Cooper Bussmann Power Module™.

Elevator Selective Coordination Requirement
In the 2005 NEC®, 620.62 states:
Where more than one driving machine disconnecting means is supplied by a single feeder, the overcurrent protective devices in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective devices.

A design engineer must specify and the contractor must install main, feeder, sub-feeder, and branch circuit protective devices that are selectively coordinated for all values of overloads and short circuits.

To better understand how to assess if the overcurrent protective devices in an electrical system are selectively coordinated refer to the Selective Coordination Section of this booklet. Below is a brief coordination assessment of an elevator system in a circuit breaker system (example 1) and in a fuse system (Example 2).

The Power Module contains a shunt trip fusible switch together with the components necessary to comply with the fire alarm system requirements and shunt trip control power all in one package. For engineering consultants this means a simplified specification. For contractors this means a simplified installation because all that has to be done is connecting the appropriate wires. For inspectors this becomes simplified because everything is in one place with the same wiring every time. The fusible portion of the switch utilizes Low-Peak LPJ-(amp)SP fuses that protect the elevator branch circuit from the damaging effects of short-circuit currents as well as helping to provide an easy method of selective coordination when supplied with an upstream Low-Peak fuse with at least a 2:1 amp rating ratio. More information about the Cooper Bussmann Power Module can be found at www.cooperbussmann.com.
Selective Coordination

Elevator Circuit

Example 1 Circuit Breaker System
In this example, molded case circuit breakers (MCCB) will be used for the branch and feeder protective devices and an insulated case circuit breaker (ICCB) will be used for the main protective device.

Example 2 Fusible System
In our second example, LPJ-(amp)SP fuses will be used for the branch protection, LPS-RK-(amp)SP fuses will be used for the feeder protection, and KRP-C-(amp)SP fuses will be used for the main protection.

Looking at the time current curves for the circuit breaker in the figure above, where any two circuit breaker curves overlap is a lack of selective coordination. The overlap indicates both devices open. If any fault current greater than 750A and less than 3100A occurs at EL-1, EL-2 or EL-3, the 200A circuit breaker will open as well as the 100A branch circuit breaker - this is not a selectively coordinated system and does not meet the requirements of 620.62. This lack of selective coordination could result in stranding passengers in elevators or not having elevators available for fire fighters. Fault currents above 3100A will open the 400A circuit breaker as well and faults above approximately 16,000A will open the 1600A circuit breaker - which further illustrates the lack of coordination. For a better understanding of how to assess circuit breaker coordination, see the section on Circuit Breaker Coordination in this book. A system that is not in compliance may result in needlessly stranding passengers and creating a serious safety hazard.

To verify selective coordination, go no further than the Fuse Selectivity Ratio Guide in the Fuse Selective Coordination section in this book. The Low-Peak fuses just require a 2:1 amp rating ratio to assure selective coordination. In this example, there is a 4:1 ratio between the main fuse (1600A) and the first level feeder fuse (400A) and a 2:1 ratio between the first level feeder fuse and the second level feeder fuse (200A). As well, there is a 2:1 ratio between the second level feeder fuse and the branch circuit fuse (100A). Since a minimum of a 2:1 ratio is satisfied at all levels for this system, selective coordination is achieved and 620.62 is met.

As just demonstrated in the prior paragraph, the fuse time current curves do not have to be drawn to assess selective coordination. For illustrative purposes, the time current curves for this example are shown above.