Elevator Rescue

32

Section IV - Technical Operations

Elevator Emergencies

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Revised - December 2018

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Objectives

- Describe the different types of elevator emergencies
- Describe the componenets of the traction electric elevators
- Describe the components of the hydraulic elevator
- Describe the anatomy and operation of elevators
- Explain the basic components of an elevator rescue size-up
- Explain the various types of elevator rescue tools
- Describe the various methods for gaining access into the hoistway elevator door
- Describe the method for gaining access into the elevator cab door
- Describe the hydraulic elelvator rescue techniques

Introduction

On December 7, 2011, a woman in Long Beach, California was stuck in an elevator car not aligned with a landing. The woman opened the car doors from the interior and began to climb out prior to the arrival of the Long Beach Fire Department. The elevator car moved and the woman was fatally crushed. By design, if the interlocks open, the car should not move. In this case, the elevator car did move, fatally injuring the occupant. This incident is an example of the inherent dangers associated with elevator rescue incidents and the importance of following standard operating guidelines and established safe practices; in this case securing power prior to any invasive elevator rescue.

Elevators are complex electro-mechanical devices that can and do malfunction. Safety of fire personnel and the public on any elevator rescue is of the utmost importance. The purpose of this chapter is to give firefighters a set of general guidelines and safe practices for working in and around elevators during emergencies. It will ultimately be up to the company officers to make the correct decisions for actions after a thorough risk assessment has been completed..

Elevator Emergencies

For the fire service, an "elevator emergency" can be loosely defined as persons stuck inside a inoperable elevator. That being said, rarely are the people inside the elevator car in any danger or are they having a true emergency. When determining the level of intervention or which extrication methods you will use, you must evaluate the risk versus gain of your actions. For example, non-invasive methods to reset the elevator or waiting for the elevator repair company to arrive may be the appropriate course of action for people stuck in the elevator who are irritated, but otherwise fine. A more aggressive course of action may be necessary, such as picking locks or prying doors for a person stuck in an elevator car who is experiencing shortness of breath or chest pain. The one common trait that all occupants trapped in an elevator have is that they all want out! Ultimately, the company officer must select the appropriate level of action based upon the information they are presented with.

Like all mechanical machines and devices, elevators too occasionally stop working. An inoperable elevator may be the result of a power failure, a mechanical malfunction, or a safety system designed to stop the elevator.

Mechanical Malfunction

One of the most common reasons for elevators to stop working is due to a mechanical malfunction. This generalized diagnosis may be the result of a circuit breaker tripping, sensor failure, damage to the elevator, stuck door, poor maintenance, or computer glitch. Regardless of the reason, the firefighter's course of action will generally be the same (covered later in this chapter).

Power Failures (Black Outs)

In September of 2011, San Diego experienced a county-wide power outage for nearly 12 hours. The ECDC was inundated with dozens of calls for help from people who were trapped in elevators. The greatest problem to the trapped passengers was panic from the dark and stuffy elevator cars. Although some buildings have auxiliary power or emergency generators that automatically kick in until normal power is restored, many older buildings do not.

Activation of safety equipment

Today's elevators have been equipped with several types of safety mechanisms that by design, render the elevator inoperable when encountered.

FAID - Fire Alarm Initiating Device

Heat and/or smoke detectors are now placed inside elevator machine rooms, shafts, and landing areas, commonly referred to as an FAID in the elevator industry. When activated, an FAID will cause the elevator to go into Phase I fire service operation, meaning that it will return to the designated floor (most frequently the main lobby or an alternate floor if the fire is in the main lobby) and open its doors allowing occupants to exit the elevator. In Phase I the elevator will not respond to any inputs and will remain effectively out of service. When firefighters first arrive at a building, if they see the elevators have automatically recalled and are sitting with the doors open, that is a red flag, telling you that an FAID in an elevator lobby, hoistway or machine room has been activated.

Figure 32-2 FAID found in Elevator Machine Room

Shunt Trip

Elevator controllers and braking systems are adversely affected by water. As a result, when codes changed and sprinklers were installed in elevator control rooms, shunt trips were installed. A shunt trip is a circuit breaker that trips prior to the fusing of sprinklers located in the elevator machine room, effectively removing power from the car prior to the application of water to braking and controlling systems.

Figure 32-1 Shunt Trip Device

When firefighters are using elevators during firefighting operations, the danger posed by a shunt trip activation is when power is removed from the car, the car becomes stuck trapping the occupants. To prevent this, a visual indicator has been provided in the elevator car that gives elevator occupants a warning prior to shunt trip activation. During regular Fire Service Elevator Operations, either Phase I or II, the fire helmet pictograph should be solidly illuminated, if it blinks, this means that the shunt trip is about to activate. Your immediate action should be to depress "Call Cancel." The car will stop at the next floor in the direction of travel where you should then open the doors and get out. Do not use that elevator for the remainder of the incident.

Earthquake

Earthquake sensors are installed on many modern elevators. When the car excessively shakes, either as a result of an earthquake or the occupants (often intoxicated) shaking the car, the car should stop at the next landing, open its doors and no longer be operational.

Overload

Overload sensors are placed on elevators to keep the amount of weight in a car to a safe limit. When the weight of the car exceeds the overload limit, typically an alarm will sound and the elevator will not function. Problems associated with overload sensors typically occur when the elevator car is under weight upon ascent/descent, but then is shock loaded by occupants moving inside the car which temporarily activates the overload sensor, stopping the elevator.

Over-Speed Governors

Over-speed governors detect and prevent over-speed caused by over-load or catastrophic hosting cable failure. When over-speed is detected, a wedge/cam style brake located on the underside of the car will grip the rails and mechanically stop the car. This feature only works when the car is traveling in the downward direction. This feature poses a hazard to elevator technicians who are attempting to drift a traction electric elevator car. If the car is not correctly balanced and travels in the upward direction too quickly due to the counterweights being heavier than the car, the over-speed governor will not engage. Firefighters should never attempt to drift a traction electric elevator.

For hydraulic elevators, the over-speed governor is found in the plumbing of the pit of hydraulic elevators. Within the piping, a valve will shut if the fluid is traveling too fast in either direction, (broken pipe etc.) resulting in the car stopping. For this reason, drifting of hydraulic elevator cars perfromed by firefighters can be done safely.

Interlock & Pick-up Rollers

Interlock and pick-up rollers are located on the inside of each hoistway door at each landing. The interlock prevents hoistway doors from being opened by building occupants when there is no elevator car in the landing zone. If building occupants were able to open hoistway doors without an elevator car present, they could fall into the hoistway. When an elevator arrives at a landing zone, the car door marries itself to the hositway door via a clutch mechanism on the outside of the elevator car door and a set of pick-up rollers on the inside of the hositway door. The elevator car door and the hoistway door are now effectively one unit. The door motor on top of the car activates allowing both doors to open. Whenever a hoistway door at any level is opened or an elevator car door is opened, the interlocks are activated and the car should not move.

Figure 32-3 Interlock & Pick-up Rollers

Limit Switches

A limit switch is an electrical switch mounted in the elevator shaft that is designed to cut off power to the motor. Limit switches remove power when the car travels to the desired landing and/or when at the extremes of the elevator shaft (bottom or top)

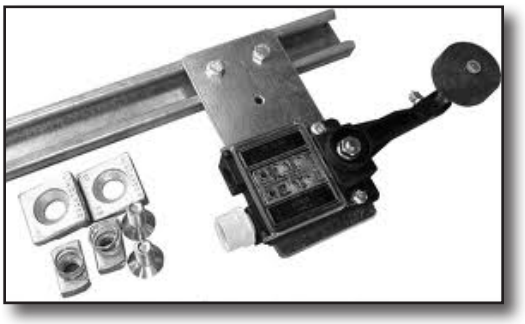


Figure 32-4 Limit Switch

Elevator Types

The two most common types of elevators used for transporting passengers and freight are the traction electric elevator and the hydraulic elevator. Successful use of elevators during emergency operations depends upon the knowledge of elevator systems, their components, and the hazards associated with each type of elevator.

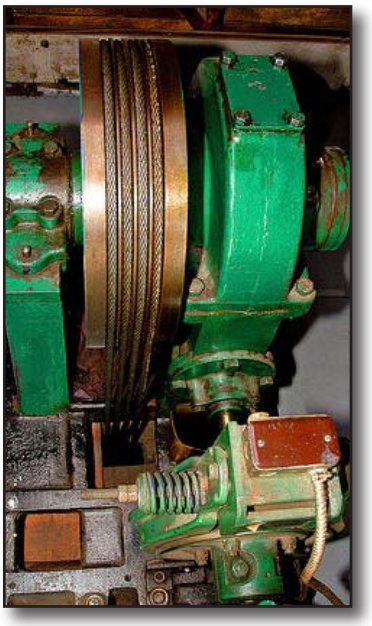


Figure 32-5 Traction Electric Hoist Motor

Traction Electric Elevators

Traction electric elevators are most commonly found in tall buildings, generally over six stories. These elevators operate by way of an electric motor, cables, and a counterweight. The elevator car is attached to cables at one end that pass over a traction sheave/drum attached to an electric motor located in the elevator machine room. On the other end of the cables are counterweights to help balance the weight of the car and make it easier for the electric motor to operate. The elevator machine room is typically located, but not always, above the hoistway (elevator shaft).

Hydraulic Elevators

Hydraulic elevator systems differ from traction electric systems in several distinct areas. Hydraulic systems do not require a penthouse or an area above the hoistway for equipment. They are less complex and do not have counterweights, speed governors or hoist ropes. Hydraulic elevators typically service buildings with heights of six stories or less. These systems are cheaper to install but move slower than the traction electric elevators.

Figure 32-6 Hydraulic Elevator Ram

A hydraulic elevator works on the basic principle of using fluid, specifically hydraulic oil, to lift the elevator. A hydraulic pump, typically driven by an electric motor, pumps oil from a hydraulic fluid reservoir to a cylinder. As hydraulic fluid is forced into the lifting cylinder, the piston lifts and moves the car upward. The car descends by way of an electrically operated valve that opens to allow the hydraulic oil to be forced back into the reservoir using the weight of the car to descend to a lower level.

Hydraulic elevators are limited to the overall operating length of the hydraulic ram or piston, however, telescoping rams do exist that require less room for installation. Most hydraulic elevator installations have the machine room located at or below the lowest level of elevator service. In large high-rise buildings with multiple banks of elevators, the elevators that only service lower levels or parking garages are often the hydraulic type.

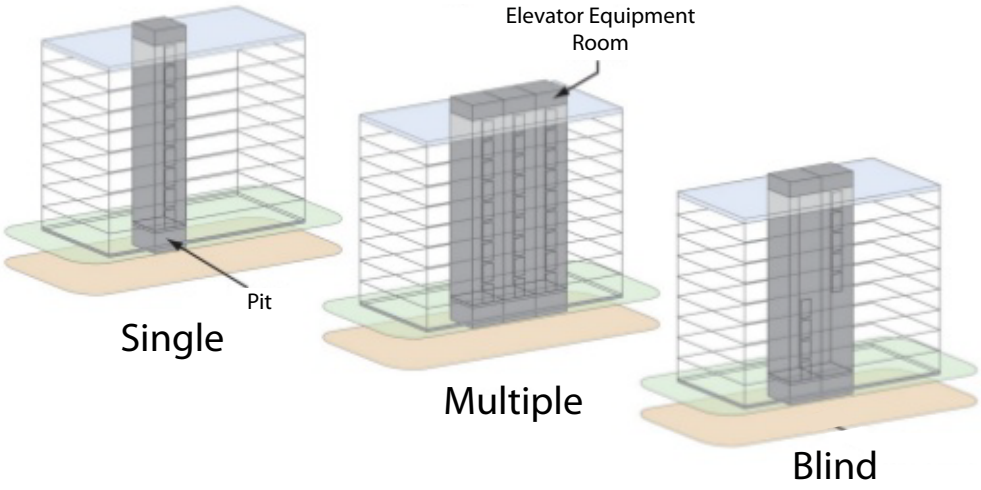
Elevator Anatomy & Operation

To perform a safe and effective elevator rescue, firefighters must have a solid understanding of the components that are found on elevators. The following components are generally found on both hydraulic and traction electric type elevators except where noted.

Figure 32-7 Common Elevator Hoistway

Hoistway

Hoistways, also referred to as shaft-ways or elevator shafts, are vertical shafts where the elevator cars travel within. They are generally located in the core of the building and are made of fire resistive materials, such as sheet rock, cinder block, or brick. In modern life-safety buildings, the hoistways are completely enclosed and can be pressurized by the HVAC system when alarmed to reduce the spread of fire and superheated smoke and gas.



3 Types of Hoistways

Hoistways can be divided into three different types.

Single Hoistway

Single hoistways contain only one operating elevator. They are usually found in smaller, low-rise buildings.

Multiple Hoistway

Multiple hoistways contain multiple elevators. There is typically no separation between elevators within a multiple hoistway and are very common in larger, high-rise buildings.

Figure 32-8 Blind Hoistway

Blind Hoistway

Blind hoistways do not have normal openings, except at the very bottom and top levels that the elevators serve. This type of hoistway is common in very large high-rise buildings where there are express elevators that travel from the main lobby at the ground level to an upper lobby, or sky lobby. Because hoistway doors are not located within the blind hoistway except at the top and bottom, a stalled elevator within the blind hoistway can present a challenging rescue.

Hoistway/Lobby Doors

The hoistway, or lobby doors, are the doors visible from the lobby/landing of the building. These doors are not attached to the elevator car and simply serve the purpose of keeping people from entering or falling into the hoistway when the elevator car is not at their floor. The hoistway door is part of the building and there is one on each floor/landing. *See elevator car doors in the following paragraphs for more information.*

Figure 32-9 Elevator Counter Weights

Hoisting Ropes

Hoisting ropes are the steel wire rope/cables that attach to the elevator car, then pass through the traction motor, and attach to the counter weights on the other end. Hoisting ropes are also found within the hoistway.

Counter Weights

Counter weights are attached to the other end of the hoisting ropes and serve the purpose of balancing out the weight elevator car and it's passengers to assist the traction motor.

Elevator Car

The elevator car carries the passengers and consists of the doors, control panel, escape hatches, and inspection station.

Doors

Modern elevators utilize two sets of doors for operation and passenger ingress/egress. The door on the car is referred to as the cab door and travels with the car. The door that is seen from the hallway of each floor is the hoistway door (see hoistway door above). Elevator doors can be opened or closed by electric motors, or manually for emergency incidents. Interlocks and rollers are located at each landing to prevent inadvertent door openings and to prevent a car from moving unless a door is in a closed and locked position. All types of doors are designed with a safety feature that causes a car to stop whenever a door is opened.

Elevator doors are normally opened by a power unit that is located on top of the car. When an elevator car is at or within a few inches of the floor level, known as the zone, the power unit moves the car door open or closed. A pick-

up arm contacts rollers on the hoistway door that releases the door latch on the hoistway door, opening both sets of doors.

Door restrictors have been installed on elevators since 1980 that prevent the cab doors from being opened more than four inches when the elevator is not within its landing zone. The elevator landing zone is typically 18" above or below the floor landing.

There are four basic types of doors used on elevators, the center-opening door, two-speed door, single-slide door, and the swing-hall door.

Single Sliding
Power operated, single-panel door that slides either to the left or right.

Two Speed
Two speed doors consist of two power-operated panels that are geared together. One door moves twice as fast as the other door so that both doors will meet concurrently in the open or closed position.

Center Opening
Center opening doors consist of two power-operated panels that part simultaneously with a brisk, noiseless motion.

Swing Door
Swing style elevator doors may be manually operated, or a combination of both manual and power operated. The hoistway door is typically swung open manually to expose a car door that uses a manual sliding gate or a power operated sliding door. These doors are found in older, non-life safety buildings.

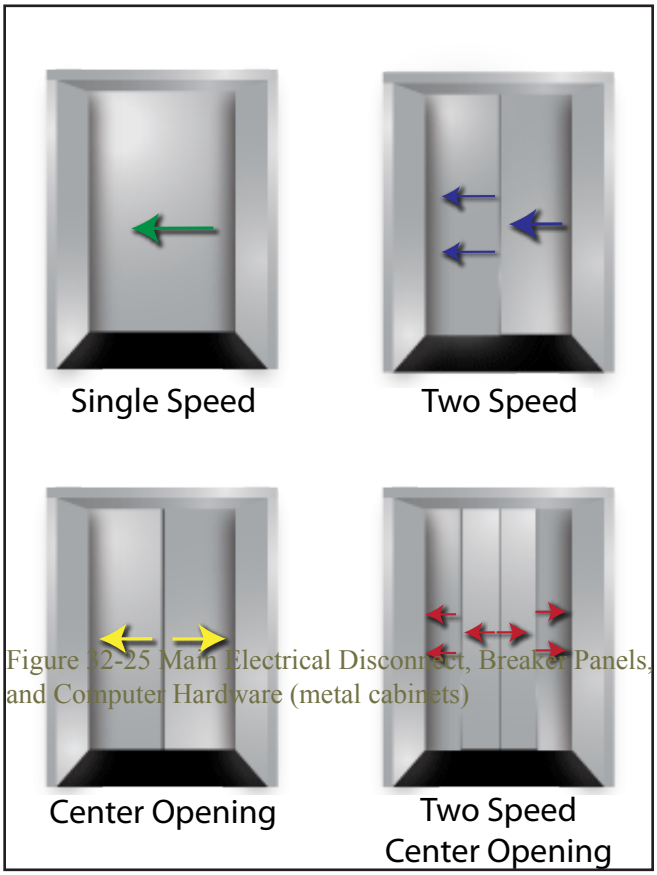


Figure 32-25 Main Electrical Disconnect, Breaker Panels, and Computer Hardware (metal cabinets)

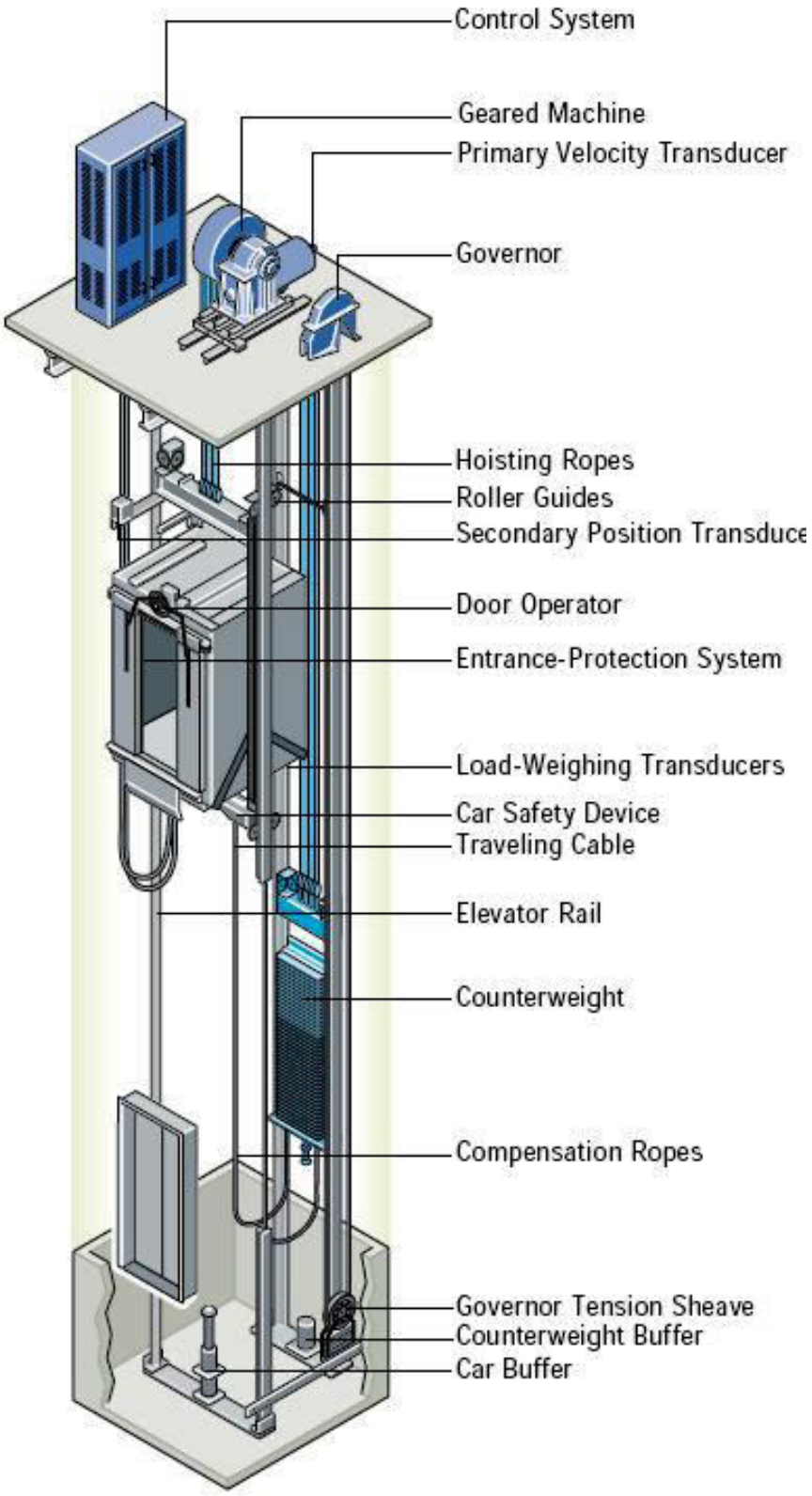
Figure 32-10 Elevator Car Door Types

Escape Hatch / Exits

Most modern elevators have an emergency escape hatch in the roof of the elevator and/or side wall. From the inside of the elevator car, this hatch may not easiliy be identified since they are typically covered by decorative or architectural features. From the exterior of the car, the hatch can readily be identified and opened.

Figure 32-11 Elevator Car Roof Escape Hatch (top view)

Components of a Traction Electric Elevator



Controls

There are several control systems within the elevator car. The common controls for passengers to use are the floor selection buttons, door close and open buttons, and emergency stop button. Firefighters are also provided control features such as the phase I and II controls and the emergency phone system/jack.

Phase I and II controls

Phase I and II controls allow firefighters to take control of the elevator system and over-ride the pre-programmed, automated features. A special "firefighter key" is required for the specific elevator and can usually be found in the knox box or with security. *See Elevator Control section of Chapter 31, High-rise Firefighting for detailed information on phase I and II operations.*

Figure 32-12 Emergency Stop Button

Emergency Stop Button

Older elevators may have a red two-way button on the control panel which is either marked "Emergency Stop" or "Run/Stop". Normally, the button is in the "up" or unpushed position, allowing the elevator to "run" in normal service. When the button is pushed, the elevator comes to an immediate stop and an alarm will typically sound. When the button is pulled back out, it resumes normal service, thus the reason for the use of the phrase "Run/Stop." The Emergency stop button for occupant use has been phased out in new elevator construction as a result of updated building codes.

Phone or Phone Jack

An emergency phone jack, and often times a red emergency phone, is provided within the elevator car for firefighter use. This is due to the fact that the firefighters radios often times have trouble receiving and transmitting messages while inside the hoistway.

Inspection Station (top of car)

Elevators have a car top inspection station that allows the car to be operated by a mechanic in order to move it through the hoistway. Generally, there are three buttons: UP, RUN, and DOWN. Both the RUN and a direction button must be held to move the car in that direction, and the elevator will stop moving as soon as the buttons are released. Most other elevators have an up/down toggle switch and a RUN button. When operating the elevator from this controller, the elevator will run at half speed. The inspection panel also has standard power outlets for work lamps and powered tools.

Figure 32-13 Inspection Station (top of elevator car)

Elevator Machine Room (Traction Electric)

The elevator machine room for a traction electric elevator is typically located above the hoistway and contains several key components that all firefighter must be familiar with.

Figure 32-14 Traction Electric Hoisting Machine/Motor

Main Electrical Disconnect

The main electrical disconnect shuts down the power to the elevator car and motor. Each disconnect is typically labeled with a number corresponding to a specific hoisting machine and the elevator to which it provides power. A 480v power supply is typically used for operating the elevator motor and system. A separate 120v power supply is used for the lighting, ventilation, communication, and alarm systems within the car and has its own electrical disconnect.

Traction Hoisting Machine

The traction hoisting machine is the piece of equipment that moves the elevator up and down. The machine consists of an electric motor that turns a traction sheave; a large grooved wheel that moves the hoisting ropes to raise and lower the elevator.

Motor Generator

The motor generator converts the buildings AC, alternating current, power supply to DC, or direct current power supply, which is used to power the traction hoisting machine.

Over-Speed Governor

The over-speed governor acts as an elevator safety mechanism. The device prevents the modern elevator car from falling and crashing down to the bottom of the hoistway if the hoisting-ropes fail. (See over-speed governor section discussed earlier in this chapter.)

Controller

Passenger elevator cars are completely automated and under the control of an electronic computer that constantly evaluates the needs and demands of the system. The computer, or controller, constantly makes adjustments and moves the car to the area of greatest need. When cars are not needed, the controller allows the elevator to rest or sleep

Elevator Machine Room (Hydraulic)

Within the machine room of a hydraulic elevator are the following main components that firefighters must be familiar with, main electrical disconnect, controller, and hydraulic pump and reservoir.

Main Electrical Disconnect

The main electrical disconnect on a hydraulic elevator shuts down the power to the hydraulic pump, thereby securing movement of the elevator car.

Controller

Serves the same purpose as the controller for a traction electric elevator (see previous paragraph).

Hydraulic Pump and Reservoir

The hydraulic pump pumps oil from a hydraulic fluid reservoir to a cylinder. As hydraulic fluid is forced into the lifting cylinder, the piston lifts and moves the car upward. The hydraulic pump has a manually operated valve to release pressue should lowering the elevator car be necessary.

Figure 32-15 Hydraulic Elevator Machine/Pump

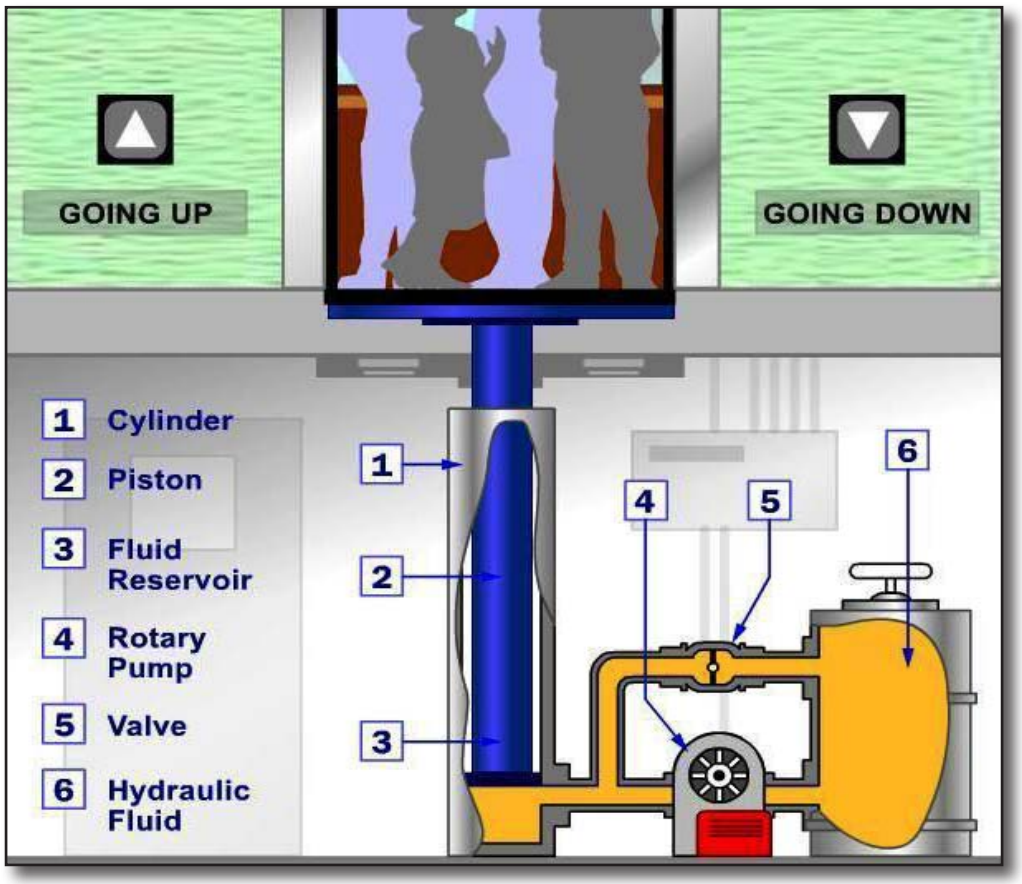


Figure 32-16 Hydraulic Elevator Machine Room Components

Elevator Rescue Size-Up

1. Determine if there is an inoperative elevator
2. Determine if the elevator contains trapped occupants. If so, determine their condition.
3. Determine if an elevator repair person has been notified and is responding. ETA.
4. Determine the location of the elevator car (between floors or at a landing)
5. Determine the type of elevator (traction electric or hydraulic)
6. Determine the location of the elevator machinery room.

Elevator Rescue Procedures

When it is determined that there is an inoperable elevator with trapped occupants, rescue procedures should commence and extrication techniques should progress from the simplest, least invasive techniques, to the more difficult techniques.

1. Make face to face contact with the building representative and retrieve the elevator keys from the knox box or security/maintenance personnel.
2. Position personnel with portable radios at the floor where the elevator extrication procedures will take place and in the elevator machine.
3. Establish voice contact with the trapped occupants and the number trapped
   - 3.1. Through the doors
   - 3.2. Emergency telephone within the elevator if present
4. Determine if trapped passengers are injured or in need of medical assistance.
5. Communicate with passengers on a regular basis to keep them informed of your progress.
6. If the alarm bell has been activated, have the passengers silence the alarm to allow for better communication.
7. Have the trapped passengers verify the status of the emergency stop switch in the elevator. If the emergency stop button is pulled out or activated, phase I operations and recycling the power will not reset the elevator to a working condition.

Figure 32-17 When activated, the Emergency Stop Button (red pull switch) will not allow Phase I operations and resetting the power to restore the elvator to a working condition.

8. Instruct the passengers to push on the cab doors to ensure they are closed.
9. Instruct the passengers to push on the "door open" button if equipped. FF's can simultaneously push the floor button in the hallway as well.
10. Instruct the passengers to reselect the desired floor.
11. If the elevator is equipped with the fire service control, use the firefighter's key and place the elevator in Phase I to recall the elevator to the lobby. If the doors do not open, instruct the passengers to press and hold the door open button.

Figure 32-18 When turned to "ON" the Fire Service Elevator switch can place the elevator in Phase I to recall the car to the lobby.

12. Personnel in the machinery room shall take the following steps until the occupants are out:

Figure 32-19 Typical Main Power Disconnect in Elevator Machine Room

13. Check the electrical circuits (disconnect switches, breakers, etc.) to verify power is on or off to the elevator. Occasionally circuits can be tripped due to overheating and can safely be reset.

14. If there is power to the elevator, turn the power off for at least 30 seconds. This may allow the relays to reset and gives enough time for the computer to reset.

15. Shut off the main power supply (480 volts).

16. Consider keeping the 120 volt power supply on as this controls the lighting, ventilation, and communication system within the elevator car.

17. Turn the power back on after 30 seconds. If there is a door open button in the elevator, instruct the passengers to again push the button.

Figure 32-20 When activated, the Emergency Stop Button (red pull switch) may allow passengers to manually open doors from the inside if the card door is within 18" of the floor

18. If the elevator car is within a few inches of the landing (door lock zone), turn off the main power again and instruct the passengers to manually open the cab door from the inside of the car. This may require some effort because the cab door operates the hoistway door through a clutch mechanism. However, cab doors are designed to move with about ten pounds of force. Moving the cab door should release the latch on the hoistway door and allow both doors to be opened. Note: The power should be off for safety and the energized electric motor creates resistance to opening.

19. If the previous steps were unsuccessful in extricating the trapped occupants, then elevator extrication techniques will be required.

Note: The top picking tool may or may not be effective depending on the date and manufacturer of the elevator. Some elevator companies place protective plates blocking the push rod to prevent top picking tools from working.

Elevator Rescue Tools

The following tools are included in the standardized elevator rescue kit found on all SDFD Truck Companies:

- Top Picks (assorted sizes)
- Side Picks (short, med, long)
- "T" handled paddle tool
- Pole Pick (for common hoist ways)
- Wedges/door stops

Figure 32-21 Standardized Elevator Rescue Kit found on all SDFD Truck Companies

Elevator Rescue Techniques

Selection and use of the following operations should be based on the needs and conditions of each incident and the expertise of personnel. Do not attempt to rescue trapped passengers from an inoperative elevator unless power to the elevator has been disconnected and all lock/out tag/out procedures have been implemented. A firefighter should be assigned to guard main line power disconnect switch until the extrication has been completed to prevent it from being inadvertently powered back on.

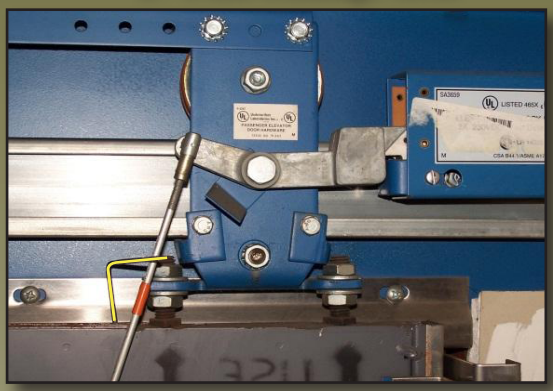
Top Picking

Top picking tools are used to manipulate the push rod attached to the hoistway door interlock.

1. Insert Pick

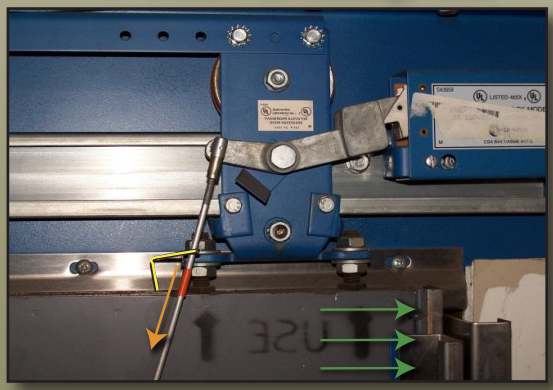
Insert the top pick above the hoistway door. Elevators vary in their design so be aware there may be bolts, plates or other obstructions to work around.

2. Find Linkage Rod



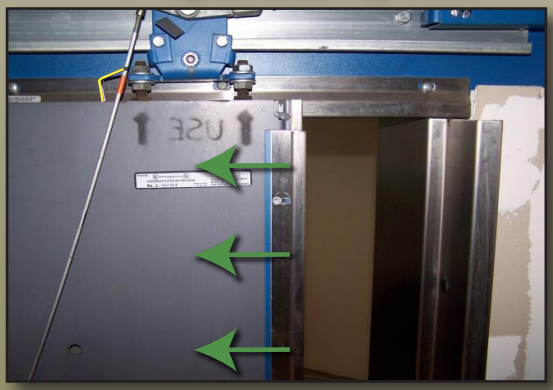
Slide the top pick horizontally until you can feel the linkage rod. The linkage rod runs vertically behind the hoistway doors and attaches to an interlock lever at the top.

3. Push/Pull Linkage Rod



Apply pressure to the linkage rod with the top pick then pull downward (or upward depending on elevator design) to release interlock. Additionally, having an additional person apply pressure to keep the doors closed may help release the interlock (green arrows)

4. Open Hoistway Door



Once interlock has been unlatched, apply pressure to open the hoistway door.

Side Picking

The side picking tool can be used to activate the rollers on the hoistway door in order to unlock the hoistway door lock.

1. Insert Pick

Determine which way the door opens, then slide the side pick behind the door as high as possible.

2. Manipulate Pick

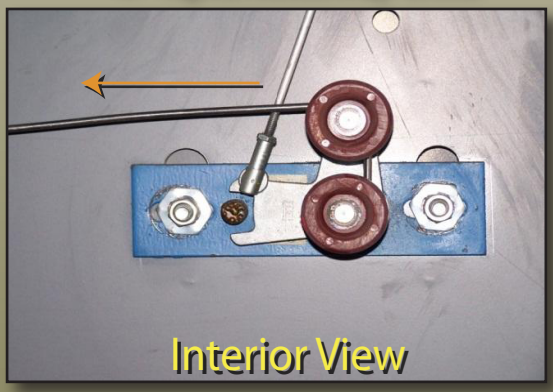
View from inside the hoistway looking at the side pick inserted behind the door

3. Slide pick in then down

Manipulate the side pick so that it slides past the rollers of the door then slide the tool downward to hook the rollers.

Note: Not all rollers are on the door, Otis and Kone elevator mount rollers above the door. If sliding pick down and you don't hit the rollers, reverse the tool and go up.

4. Open Hoistway Door



Once the side pick has hooked the rollers, pull backward on the pick to engage the lever and move the linkage rod, which will then unlock the interlock so that the hoistway door may be opened.

Elevator Paddle Tool

Insert the paddle tool between the two doors.

Make sure to insert the tool deep enough so that the paddle makes contact with both the hoistway door and elevator car door.

Twist the paddle in either direction to pry open the doors.

Paddle Tool

The elevator paddle has been in service on many of our truck companies for years. The paddle is to be used on elevators equipped with *center opening doors only and in situations where the car is disabled in a landing zone. Remember the landing zone is a zone extending 18" above or below the landing.*

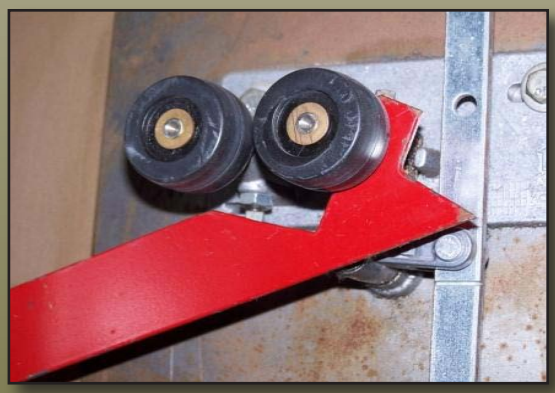
When the car is in the landing zone the clutch assembly located on the elevator car door exterior has interfaced with the interlock/pick-up roller assembly on the interior of the hoistway door. The two sets of doors are now married together; opening is initiated by the elevator car doors movement. The paddle is designed to be inserted in between the hoistway doors until it contacts the elevator car door. By turning the paddle 90 degrees the car door will be nudged causing it to open bringing the hoistway door along with it; this is how it's designed to work during normal operations.

Remember that you shall secure the elevator power prior to any door opening and/or picking operations. An additional benefit of having the power off is that the resistance to door opening created by the energized electric door opening motor will be negated and the effort required to imitate opening the car door will be in some cases significantly less. In fact, once power is secured if the trapped occupants can follow directions you may direct them to attempt to open the car door from the interior. If the car is in the landing zone this will often work and may be used on side or center opening doors.

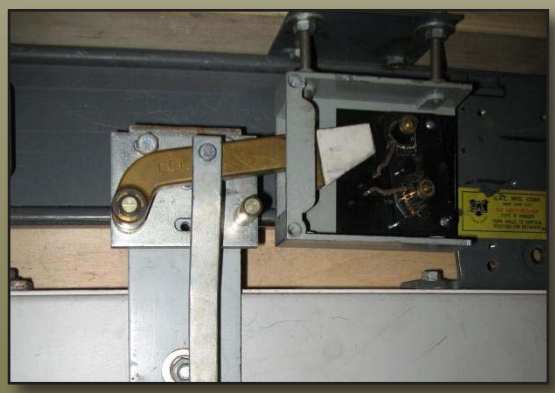
Pick From A Common Hoistway

From the adjacent open hoistway door, slide the pole pick between the elevator cars and the hoistway walls.

Attempt to place the tip of the pick on the rollers of the hoistway door that will not open.



The tool is designed to both pull the rollers together (pictured above) or push the rollers until it activates the linkage rod.



The linkage rod conncects to the interlock at the top of the doors. Once this interlock is raised, the hoistway doors can be opened.

Pick from Common Hoistway

Another new tool in our kit is a long pole with a specially fabricated end piece that will enable you to activate interlock linkage/pick-up rollers and open a hoistway door from a distance. When would you do that? If for example you had two hoistways next to each other you could reach across from one to other with the pole and open the door. Or maybe you can access the hoistway above a stuck car; you could reach down with the pole and manipulate the linkage/ pick-up rollers. Below are a few photos of the pole in action. Remember the power shall be secured prior to attempting this.

Forcible Entry

Airbags

Air bags can be used to force open center opening doors by inserting a haligan, or other pry tool at the top portion of the door and creating big enough for a small air bag to be inserted. Instruct the passengers to move to the back of the car, face the rear of the car, then slowly inflate the airbag. This operation will break the interlocks at the top of the doors and cause little or no damage to the doors. The broken interlocks are easily repaired.

Pry Tools

Figure 32-22 The use of a forcible entry tool can often provide enough force to overide/break the interlock and allow the doors to open while causing minimal damage

Pry tools can be used in the same manner as the air bag method to pry center opening doors. The disadvantage of the pry tools over the air bag method is that the metal pry tool will often damage, bend, or scar the door during prying.

Cutting the Gib Blocks

Gib blocks are attached to the bottom of the hoistway doors, ride in tracks that are in the floor landing, and are installed about every 18" across the underside of the door panel. They may be made of plastic or other similar material. Firefighters can gain entry in the hoistway by cutting the Gib Blocks as follows:

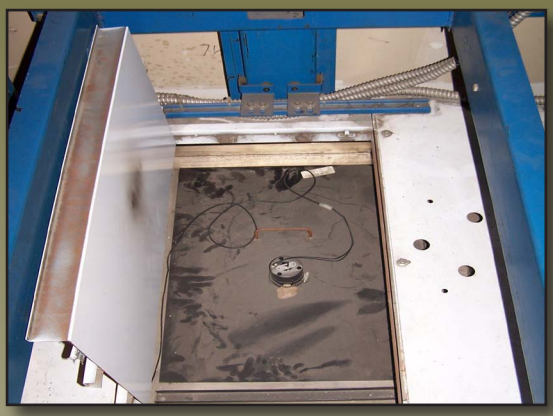
1. Secure the power to the elevator
2. On the floor above the elevator, cut the Gib Blocks on one of the hoistway doors.
    - 2.1. This can be accomplished by using a plumbers saw, hacksaw or recipro saw.
    - 2.2. If the gap between the bottom of the door is too tight, pry upward on the door with a haligan bar to create a larger space for the saw.
3. Utilizing the top of the hoistway door as a hinge, the bottom of the door may be slowly pushed inward, allowing personnel to look down the shaft and access the linkage/locking mechanism of the elevator car below with the pole tool.
4. WARNING – If the hoistway door is pushed to far, it can actually dislodge off the track from above. A good rule of thumb is to only push the hoistway door in 18" or less.
5. Once the occupants have been removed, the elevator must be secured to prevent anyone from pushing against the unsecured hoistway doors due to the lack of Gib Blocks.

Holmatro / Amkus Spreaders

As with the pry tool method, the hydraulic powered Amkus or Holmatro tool may be used to break the interlocks. This tool will bend or damage the hoistway doors in addition to the interlocks.

Hoistway Entry

Top view of emergency escape hatch on elevator cab.



Once emergency escape hatch is opened you will often have to remove a ceiling panel to access the interior of the elevator cab

A pole ladder can then be placed into the elvator cab for extraction of passengers

A second ladder may be used to assist passengers and rescuers climb out of the elevator shaft

Hoistway Entry

Entering the hoistway is extremely dangerous and should only be done as a last resort when serious injury or death is imminent. All elevators in the common shaft must be de-energized, locked out/tagged out. A ladder can be placed into the hoistway to access the top of the elevator car and the emergency hatch. Personnel must be tied off and have fall protection in place if working near the opening of the hoistway or in the hoistway itself.

Breaching

When an elevator car is stalled in a blind hoistway and after all primary means of extrication have been exhausted or extrication is immediately required due to serious injury or death, wall breach may be considered. Wall breaching requires personnel, labor, time, property damage, planning and coordination. By breaching the blind hoistway the rescuers can enter the shaft and gain access the escape hatch. Again, this is a very high risk technique and should only be considered as a last resort when all other options have been exhausted.

Opening Elevator Car/Cab Door

Figure 32-23 By pressing on the elvator car door clutch assembly you can easily open the car/cab doors

Once the outter hoistway door has been opened by one of the methods previously described, the interior elevator cab door may also need to be opened to access the victims stuck inside if the two doors didn't open together. Fortunately for firefighters, this can easily be done by depressing the elevator door clutch assembly and prying the doors open by hand. The elevator door clutch assembly is mounted on the outside of the elevator car. As the car aligns itself with the landing/floor, the clutch marries up with the interlock/pick-up roller on the interior of the hoistway door. This is what causes both doors to open simultaneously when the elevator is operating properly.

Hydraulic Elevator Rescue Techniques

The previous techniques described for entry into a traction electric elevator can also be applied to hydraulic elevators. Additionally, hydraulic elevators allow us to actually lower the car in the hoistway by opening a bleeder valve located on the hydraulic pump. The purpose of lowering the car is to bring it in line with the landing and the door lock zone to allow the inner car door to unlock and be opened using a paddle or occupant force.

To lower a hydraulic elevator:

1. Shut off all power to the elevator.
2. Have the occupants move to the rear of the car and keep the inner doors closed if they are already open.
3. Locate the bleeder valve on the hydraulic pump and open the valve slowly.
4. Coordinate with the firefighters on the landing, or the landing below by opening the outer lobby doors, to determine when the car has been lowered to the proper level . When the car is at or within several inches of the floor landing, shut the bleeder valve off to stop the car.
5. Direct the passengers to manually open the cab door or use the paddle tool. This will release the hoistway door and allow the cab and the hoistway doors to be opened.
6. If the car door opens but the hoistway door does not, direct the passengers to manually manipulate the rollers or push rod to unlock the hoistway door.
7. Secure the elevator and do not use until serviced by an elevator technician.

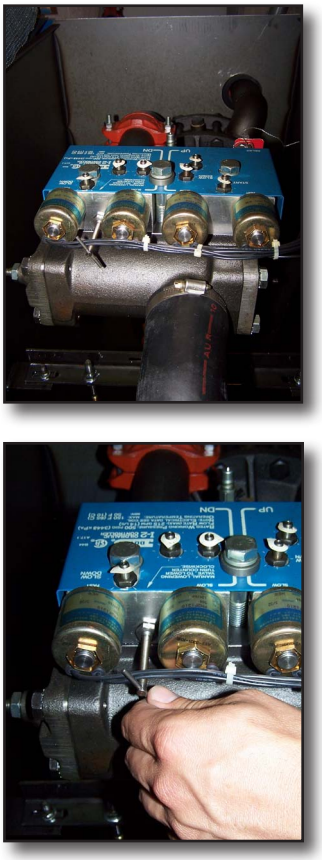


Figure 32-24 Typical hydraulic elevator bleeder valve control

Summary

The key is to familiarize yourself with as many elevator doors and systems as possible; during FCIP every elevator you encounter will provide the opportunity for a meaningful drill. With the addition of these new tools we have enhanced our operational capabilities and can better serve the public. Take the time to know how all the tools in your new elevator tool box work and practice using them.

Media & Link Index

Elevator Picking Video

References

1. Rio Hondo Truck Company Academy
2. Los Angeles City Fire Department Training Manual
3. San Diego Fire-Rescue Department Training Bulletins

Credits

Writers:

Kurtis Bennett, John Brubaker

Layout & Editing:

John Brubaker

Media:

Rio Hondo Truck Academy, LA City Fire Department, San Diego Fire-Rescue Department

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NOTE: If you have any additional information or content that you feel would be appropriate to contribute to this Chapter or would like to report any errors or misrepresentations, please contact the SDFD Training Division or email the Drill Manual Revision Staff at

SDFDDrillManualTeam@SanDiego.gov

Revisions/Updates

Date	*Revision/Update Description*