SAN FRANCISCO FIRE DEPARTMENT
DIVISION OF TRAINING

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TOPIC: ELEVATOR RESCUE

GENERAL DISCUSSION:

Nearly every commercial building over three stories contains an elevator and it is estimated that there are some 350,000 passenger units operational in the United States at this time. Even though vertical transportation provides the safest form of public transportation, there are increacing chances that firefighters will have to perform an elevator rescue, when someone is trapped within a car they are often the first to arrive on the scene.

Under normal circumstances, it is much wiser to leave the passenger within a stalled elevator until they can be released by an experienced elevator technician, however firefighters need to know how an elevator operates and what they can and cannot do with the equipment. They should become familiar with the elevator installations in their area, the locations of the machine rooms and have a basic knowledge of elevator door interlocks. In order to attempt any rescue, it is imperative that the rescue party have ready the proper tools and equipment and be trained in their proper use.

Although an elevator is a very safe and convenient mode of public transportation, problems can and do develop which causes it to stall. This unexpected stopping of an elevator can be caused by human error, equipment malfunction, application of an electric or mechanical safety device of a power failure.

No matter why the elevator is stalled, the principal consideration must be for the safety of the passengers. The handling of an incident of this type requires a planned procedure and a direct plan of action by company officers. The untrained, inexperienced rescuer will create problems rather than eliminate them.

TYPES OF ELEVATORS:

(1) Electric (2) Hydraulic

ELECTRIC:

Electric elevators are powerd by an electric motor driving a drum or sheave to raise or lower the hoisting cables. Most modern elevators are of the traction type. Counterweights are found on traction elevators, located on the Hoist Ropes at the opposite end from the car.

HYDRUALIC:

Hydraulic elevators depend upon an electric-powered pump to furnish fluid pressure for operation. The plunger-type of pump works like the grease rack hoist for a service station. The car rides on top of a tall piston. The piston cylinder extends deep into the ground and water and oil pressure is used to raise and lower the piston and elevator car. The car is also supported by steel wire and cables that pass over a sheave and then down to a set of counterweights.

MOVING HYDRAULIC ELEVATORS:

Some hydraulic elevators may be moved to a lower level by bleeding off the pressure in the machine room. When the floor landing level is reached, the doors should automatically open, provided the car still has electric power. This method should not be attempted unless someone who is familiar with the system is on the scene.

ELECTRIC POWER:

Although complete power failure rarely happens today, it can immobilize an entire city. When responding to a stalled elevator incident, check whether there is a general power failure. The problem may be a blown fuse or circuit breakers have tripped in the building's main power panel. Many hi-rise buildings are equipped with emergency generators to provide lighting and to return one car at a time to ground level in the building. With a general power failure, a serious problem could exist with many trapped persons in elevators. If the building appears to have electrical power and lights but none of the elevators are operating, check the building's main electrical panel to insure that circuit breakers have not tripped or that fuses are not blown.

PROCEDURES ON ARRIVAL SUPPLEMENTAL INFORMATION:

Upon arriving at an elevator incident, several things need to be done immediately. Communications must be established with trapped passengers. The elevator mechanic must be called and the building manager or security personnel must be contacted. While all of these things are being done, the Company Officer or the Incident Commander must be performing a size-up of the situation.

The first thing to try to do is, contact the person who called the fire department. The person who called should be able to indentify which elevator is stuck, the location of the stuck elevator, what has been done for the trapped passengers, and how long the people have been trapped.

During the size-up the Incident Commander needs to consider the age and general condition of the building. For example, in newer buildings, the machine room will be above the hoistway, while in older buildings it may be in the basement. In buildings up to six stories, the elevator may be hydraulic with all of the equipment in the basement, and often times a good way from the hoistway. If the

building is turn-of-the-century, the elevators may be D.C. and overloading will cause the car to stop below the landing and out of the landing zone which may be the reason for the stall.

The first action in all elevator emergencies is to shut off the electric power to the elevator at the machine room and make sure that the elevator car STOP switch is activated.

ELEVATOR MECHANIC:

An elevator mechanic can do more in five-minutes than the whole rescue crew can do in one-hour. The mechanic can manually over-ride all the automatic circuits and bring the elevator to a floor in a matter of minutes. The problem in many cases is that the elevator mechanic is not called initially. The elevator mechanic should be called if people are trapped. The elevator maintenance company usually has a sign posted on the mechanical room door listing the emergency phone numbers. A problem arises when a building does not have a maintenance contract with an elevator company. In such a case, the building owner, manager, or agent has the authority to order a repair. The fire department cannot order a mechanic on its own authority.

Should the incident commander call for an elevator mechanic with permission from the building owner; he or she should state that the call is for the owner. State the owner's name and address, and state the owner should be billed.

LOCATING STALLED ELEVATOR:

If no one is available to point out the stalled elevator the rescue company must find the stalled elevator car. Often the alarm bell will be ringing in the stalled elevator hoistway.

Once the elevator hoistway is found, the floor the car is stalled near must be established. The position indicator panel can sometimes be used to locate the elevator.

Another way to find the stalled elevator is to go upstairs floor by floor, part the hoistway doors as much as possible, and sight through the crack between the hoistway doors. While looking into the hoistway for the stalled elevator car, call out to the passengers and they will help you locate the elevator.

A stalled elevator can also be located by observing the selector in the machine room. Floors levels are usually numbered on the selectors or can be counted from the lowest level up. The selector is the most accurate way of locating the elevator in the hoistway.

PASSENGER COMMUNICATION:

Communications with trapped passengers is extremely important. Many people, when confined to a small place, will panic. Passengers should be assured that help has arrived and rescue procedures are under way. Although communications with trapped passengers may be by intercom, telephone, or shouting, the main thing to remember is to

keep the stalled passengers calm. Ascertain the number of passengers and each passengers physical and mental condition. Check to see if the light and fan are operating in the elevator car and how long the car has been stalled.

PSYCHOLOGICAL CARE OF PASSENGERS:

It is imperative that emergency personnel reach the scene of a stalled elevator quickly; panicky passengers or helpful bystanders have complicated simple emergencies by taking unnecessary actions; sometimes with tragic results.

While the passengers may be physically safe, their mental state must be given serious consideration. In any rescue situation, the first responsibility of emergency personnel is to reassure the passengers that they are not in any danger and convince them that they will be freed as soon as possible. Prevent panic by reassuring the passengers that they are in no danger; let them know that their troubles are known and understood, and that everything possible is being done to speed their release.

ELEVATOR CAR DOORS/HOISTWAY DOORS:

The elevator car doors are the doors that are attached to the elevator car to keep occupants safely in the car. The hoistway doors are doors which are installed to protect opened hoistway when the elevator car is not at that landing.

OPENING HOISTWAY DOORS:

Interlocks - The most difficult part of an elevator rescue is opening the HOISTWAY DOORS. The doors are designed and engineered to stay closed and prevent accidental entry into the hoistway.

Hoistway doors are held closed by a device known as an interlock. The interlock mechanically holds the doors together and electrically completes the door-close-safety circuit so the elevator will run.

Very few doors are alike. Even though two elevator installations may be manufactured by the same company in the same year, both are likely to be different. Therefore, what may work to open one set of hoistway doors will probably not open another

All interlocks for hoistway doors are located at the TOP OF THE DOOR whether single or double door. If forcible entry into the hoistway door is necessary, use tools at TOP OF DOOR.

INOPERATIVE ELEVATOR LOCATIONS:

Locations - Elevator cars can become inoperative due to mechanical or electrical failure. Basically, a car can become stalled or "stuck" in five locations:

1) At the floor
2) In the landing zone - usually 18" above or below the floor.

3) Out of the landing zone but accessible through the hoistway and car doors.
4) Out of the landing zone between floors and not accessible through car doors.
5) In a blind hoistway.

AT THE LANDING:

The first action is to order a firefighter to turn off the power in the machine room. The firefighter should have a portable radio in order to communicate with the crew at the installed elevator. Have the passenger/s activate the stop switch and turn the elevator to the stop position. The passenger/s can then open the car door which will open the hoistway doors at the same time. Firefighters should be able to assist in opening the hoistway doors from outside the elevator car. Passengers should be assisted out of the car by firefighter since trapped passengers become very nervous in this situation. IF PASSENGERS ARE IN DANGER, and cannot open the doors, they must be opened by the fire/rescue team using the best method available.

IN THE LANDING ZONE:

Turn off the power in the machine room and have a firefighter equipped with a portable radio standby. Once the power is off, the doors can be opened by the passenger/s and/or the fire/rescue personnel. The car door and hoistway door should be opened as a unit as long as the car is within the landing zone, which is usually about 18" above or below the floor. The doors should not be fully opened, but held open just enough to let a firefighter enter the car to assist the passengers. Trapped passengers should not be allowed to rush out of the elevator car. If a large step exists in exiting from the car, firefighters should assist all passengers from the car.

OUT OF THE LANDING ZONE:

If the elevator becomes inoperative about three to four feet above or below a landing zone, extrication of passengers becomes more difficult and hazardous. As in all stalled elevators, the power should be turned off at the machine room and in the elevator.

If the elevator is stuck above a landing zone the passengers should be able to open the car door and release the interlock on the hoistway door. A ladder should be extended about three feet into the car and a rescuer sent into the car to assist passengers onto the ladder. Another rescuer should be at the foot of the ladder to assist passengers to the floor. The opening in the hoistway below the stalled elevator should be protected so that neither rescuers nor passengers could slip or fall into the hoistway. Protecting this opening may require ingenuity on the part of the officer on the scene -IT MUST BE PROTECTED.

When the elevator is stalled below a landing zone, the interlock will be difficult to reach. Rescuers will most likely have to resort to force. Once the hoistway door is opened, a ladder should be

lowered into the car, and a firefighter should climb down into the car to assist passengers. SAFETY IS THE KEYNOTE.

OUT OF THE LANDING ZONE - NOT ACCESSIBLE THROUGH THE CAR DOORS:

When an elevator car is stalled so that the car door is opposite a wall in the hoistway, or the opening is too small to easily get through, extrication must be accomplished through the top of the car. Since the passengers cannot help open the hoistway doors, firefighters will have to rely on various methods to open hoistway door above the stalled elevator car.

Before starting the rescue procedures, the power should be turned off in the machine room and in the elevator car. Open the hoistway door above the stalled elevator car, using forcible tools and get on top of the car. If it is necessary to put a ladder down to the top of the car, make sure that the butt of the ladder is secured against a stationary part of the top of the car so it cannot slip.

One rescuer should descend the ladder to the car top, wearing a safety belt tied off to a life line. He should open the car-top exit and reassure the passengers of their safety. A second ladder should then be lowered and placed through the car-top exit opening. This should extend three feet above the exit opening to ease entry into and exit from the car. A second rescuer should then descend to the car top wearing a safety belt and lifeline and proceed down into the car. Once inside the car he should double check the emergency stop switch and reassure the passengers of their safety. Prior to going up to the car top via the ladder, the passenger should be placed in a safety belt and tied to a lifeline. The rescuer in the car should then help the passenger up the ladder. Rescuers should keep the life line taut and clear of obstructions until the passenger is safely at the landing. Passenger should be assisted on and off all ladders in any rescue.

Kernmantle rope shall be used for all rescue situations. It is the only rope approved by O.S.H.A. when engaged in any type of rescue operation.

IN A BLIND HOISTWAY:

Passengers trapped in a blind hoistway are very difficult to rescue. Basically, the passengers can only be removed, three ways:

1. Move the elevator to a landing.
2. Transfer the passengers from one car to another.
3. Breach the hoistway wall.

By far the easiest way to rescue passengers is to have an elevator mechanic manually move the elevator to a landing. As in any other elevator incident, if the passengers are not sick or panicking, the time should be taken to wait for an elevator mechanic.

If the elevator is jammed in place and the elevator mechanic cannot move the car, passengers can transfer cars in the hoistway by going out the top of the stalled car, crossing over to the operable car and descending into the car to safety.

ELEVATOR RESCUE EQUIPMENT:

A good basic assortment of elevator rescue tools to be carried into a building in response to an elevator incident would include a Chicago Door Opener, Crow or Heeler Bars, Axes, assorted blocks, Porta-power pump with large wedge preconnected.

If the stalled elevator is stuck between floors or in a blind hoistway a various assortment of tools will be needed. The equipment listed below represents a good assortment.

1. Elevator car keys.
2. Kernmantle rescue ropes.
3. Forceable entry tools - assorted.
4. Resuscitator.
5. Ladders - Attic Extensions.
6. Porta-power tools.
7. Life belts - "Swiss Seat."
8. "Hurst" power tool - if all else fails.

SAFETY:

Safety cannot and must not be ignored during any elevator rescue incident. All safety precautions must be followed to ensure the safety of the passengers or victim, fire/rescue personnel, and bystanders. Every plan or action should be based on sound, logical safety practices.

The safety cycle during an elevator incident includes protecting the passenger/s or victims, fire/rescue personnel, hoistway opening and preventing unauthorized or undesired movement of elevators.

ACTIVITY SEQUENCE:

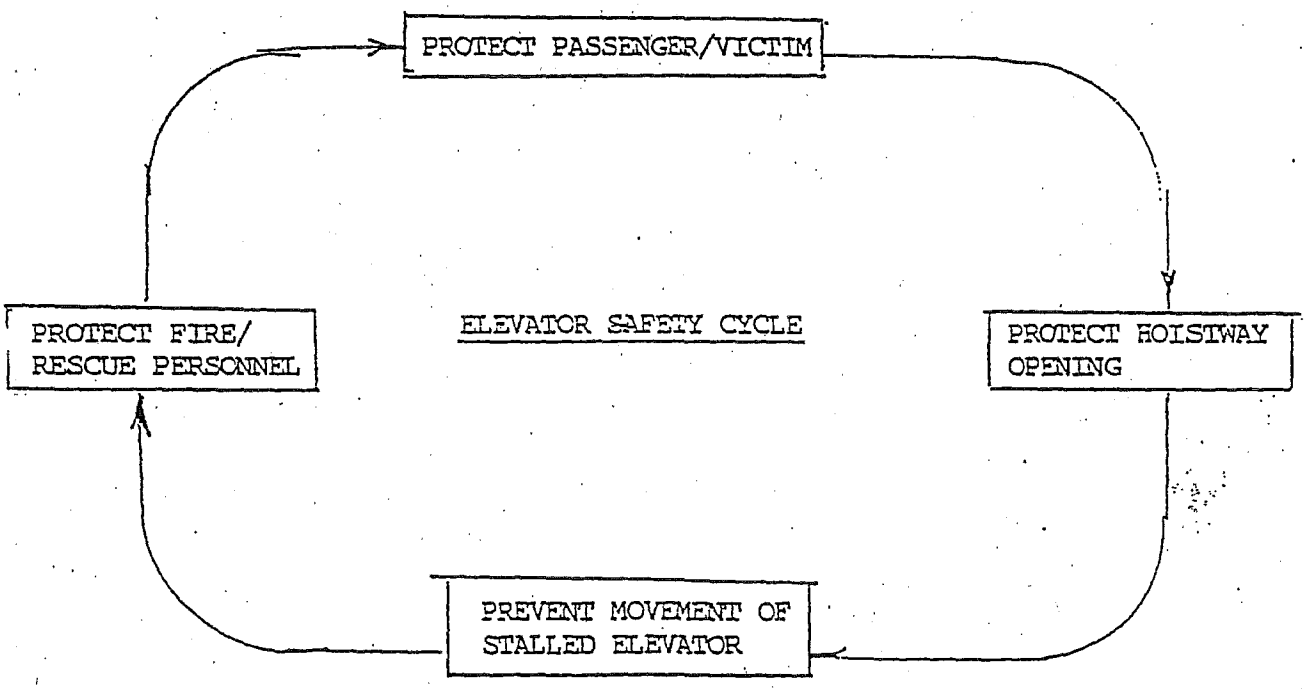
Upon entering a building with the initial elevator rescue equipment, the following steps should be followed:

Elevator emergencies - general operating guidelines

Step 1

Determine the location of stalled elevator.

1. Check floor position indicator.
2. Check with building personnel or bystanders.
3. Check each floor level visually - if practical.
4. Open hoistway door if possible.
5. Use in-service elevator to check hoistway.
6. Check machine room controls - main switch to be turned off.


PROTECT PASSENGER/VICTIM
PROTECT HOISTWAY OPENING
PREVENT MOVEMENT OF STALLED ELEVATOR
PROTECT FIRE/ RESCUE PERSONNEL
ELEVATOR SAFETY CYCLE

Step 2

Establish and maintain Communication with passenger/s

1. By direct voice contact or via elevator car telephone.
2. Reassure and calm passenger/s.
3. Determine if emergency condition exists and condition of passengers.

a) Determine the following from occupants of the car:

1. Have any switches been activated?
2. Number of occupants in the elevator car?
3. Are lights on in the elevator car?
4. Has an attempt been made to open the hoistway door?
5. Any injuries of first-aid in the car?

b) After advising occupants to stay calm and away from car door - activate the fire recall switch from the lobby.

c) If the method in item "b" does not work or if elevator not so equipped:

1. Check on E.T.A. of elevator mechanic.
2. If no E.T.A. on mechanic, or INJURIES IN CAR:

a) Send firefighter to elevator control room.

1. With portable radio.
2. To disconnet power to elevator.

a) Possible loss of lights in elevator car is not equipped with new LIFE SAFETY SYSTEM.

b) Notify elevator occupants of this.

3. Advise elevator occupants to activate emergency stop switch in elevator car.

Step 3

Develop and employ appropriate procedure/s for prompt and safe entry into elevator car and removal of passenger/s.

1. Attempt to secure cooperation with trapped passengers in order to utilize their description and manipulation of the elevator controls and inner door mechanisms.

2. Request proper equipment as necessary: and additional units.
3. Consult section on Procedures on arrival.
4. Make sure that a certified elevator mechanic has been notified, if necessary to do so.

5. Utilize adjoining elevator car (if available), for familiarization of inner-car locking devices and possible manipulation of lock mechanisms of stalled elevator cars.
6. Attempt to open hoistway doors - from inside or outside a) If forcible entry is necessary - Use tool or tools at top of hoistway door, near locking mechanism.
7. If car is above door opening.

   a) Blocking opening below car into hoistway, with ladder or any available blocks - to prevent passengers from falling into hoistway opening.

   b) Firefighter to climb into car to calm passengers.

      1. Also insure emergency stop switch activation and assist in evacuation of passengers.

   c.) Have the necessary blocks available to assure elevator car remaining stationary.

   d) If necessary, and room permits, position small ladder up to car to assist evacuation.

8. If the car is below door opening.

   a) Determine if room available to bring out passengers between floor or door opening and top of elevator car.

   b) If sufficient room, determine if small ladder would be of assistance.

   c) Have a firefighter enter car to calm occupants - assure emergency stop switch activation, first-aid, if needed, assist in evacuation of passengers.

9. If top escape hatch must be used.

   a) Position ladder from floor landing to top of elevator car.

   b) Open car top exit-door-this will activate safety switch.

   c) Provide small ladder for use from elevator car to top of car.

      1. Position firefighter in car and on top of car.

         a) To calm occupants - assist in evacuation.

         b) Use Kernmantle ropes and "Swiss Seats".

Step 4

Secure Elevator-Do not restore power to elevator

1. Insure hoistway doors are secured, locked, or barricaded.

2. Contact building supervisory personnel as to condition of elevator or relay information to qualified elevator mechanic, if on the scene.

Step 5

Critique the incident upon return to quarters

1. Operational problems or recommendations for improved operations should be addressed through the Division of Training.