BUILDING SEARCH

GENERAL COMMENTS

The following information will pertain to all types of buildings, whether they be residential, apartment, commercial, high-rise, etc. Specific occupancies presenting special problems will be discussed individually.

The first consideration for rescue may require a prompt attack on the seat of the fire. This simple action alone may minimize the danger of a primary search and may prevent serious injury or loss of life.

One of the first considerations of firefighters on all fires is the prevention of panic. This is especially true where you may encounter large groups of people (theaters, schools, high-rise buildings, etc.) and groups of people who may be non or semi-ambulatory. A serious, calm, face to face confrontation by a firefighter with potential victims of panic may play a large part in quieting them down.

Another important consideration will be the accountability of persons that have occupied the involved premises. Rescuers should check with other members of the family, employers, bystanders, hotel desk clerks, supervising nurses at hospitals, etc., to determine if or where there is anyone remaining in the building. Hotel registers, classroom rosters, employee time cards, should be retrieved and checked to ascertain that all persons are accounted for. A rendezvous point should be established to expedite accountability and control of evacuated occupants.

Search is divided into two operations: Primary and Secondary. Primary search is conducted while firefighting operations are underway. The secondary search is conducted after the fire is controlled and physical punishment from heat and smoke has been reduced. The object is the same in both cases, but a more thorough search is conducted during the secondary phase because of increased visibility, reduced heat, and less danger to firefighting personnel. Speed is not an important element on the secondary search but <u>thoroughness</u> is. Usually, better results are obtained by using two different companies or persons to perform each operation.

As previously mentioned, you must formulate an organized plan with a firm objective and a pre-determined pattern. The search will usually be started in the room of involvement or as close as possible. The search is expanded outward from this area. Consider the probable location that victims may be found, depending on occupancy type and time of day. Victims are often found near a means of escape, particularly near main stairs or fire escape windows.

They may also try to move toward windows or secondary openings which provide light, ventilation, or possible escape routes. Pause from time to time to listen for crying, coughing, moaning, gasping, knocking, or any sound indicating the presence of occupants.

The most difficult victims to locate will be the "hidden" victims. During panic, children will often hide under beds, under covers at the foot of a bed, in closets, and under bureau drawers. Adults and children may be found in closets, bathrooms, bathroom showers or bathtubs, passed out behind furniture near means of egress. None of these locations should be overlooked.

When searching large or oversized rooms, it is sometimes difficult to stay direction oriented due to the distance between walls. In most instances, the search team (2 persons) will enter the room and follow the walls. If the room is larger than can be covered in this fashion, a hoseline should be used to search the center of the room. If you should become disoriented. Safety lines and hose lines may be used to find one's way to the exterior. It is sometimes possible to drop to the floor, feel for a seam in the concrete or floor covering (linoleum, wood strips), follow the seam to the nearest wall and make your way to an exterior exit.

The search team should check for and report fire extension as they move. Often by closing a door or window, they may prevent fire extension at least temporarily. They may also accomplish horizontal ventilation as they move provided it does not cause fire extension or slow the search effort.

With larger complexes such as apartments, hospitals, high-rise, commercial, to avoid duplication of efforts, areas that have been searched should be closed and marked. One of the best ways this can be done is with yellow crayon or chalk. Firefighters, after searching a room or area, should mark the door with a distinctive company identification and the letters "P.O.K." Example: "E23PPOK". This would indicate that Engine Co. 23 made the primary (P) search and everything is O.K. The secondary search team would mark the door "E49SOK". Same indication except the letter "S" indicates secondary search.

Personnel assigned to primary search are usually working under extremely adverse conditions caused by heat, smoke, poor visibility and fatigue. Therefore, a secondary search must be started as soon as practical to locate possible victims that may have been overlooked during the primary search. As with the primary search, this search must also be well organized and conducted in an extremely thorough manner.

Specific Occupancy Types

Various occupancy types may present specific problems, advantages and disadvantages to firefighter search teams. These occupancy types will be listed individually as follows:

Dwelling Occupancies: Less than three stories in height. Fire occurring on the second floor of a 2-story building may cause serious problems for occupants and firefighters as there are only two directions for escape. Those directions being downward and horizontal as opposed to buildings three stories and higher which may provide upward escape.

As previously mentioned, most fires involving dwelling occupancies will involve a search that is usually of short duration and may involve one search team consisting of two firefighters.

Dwelling occupancies will usually afford means of rapid emergency escape from each room (doors and windows to the exterior) in case of adverse fire conditions and for rapid evacuation of located victim.

The more difficult search operations are conducted during night time hours when victims are likely to be trapped in bedrooms in the upper story. Darkness and disorientation increase search difficulty.

Dwelling Occupancies: Three stories and higher. (Apartment buildings, high-rise apartment buildings and hotels). Conditions and procedures for rescue are similar to other dwelling occupancies with a few exceptions; there may be an added avenue of escape upward and these occupancies will frequently have balconies which may provide a safe refuge area. The biggest problem in rescue from this type occupancy is height. Victims may have to exit the premises via fire escapes, interior stairwells, elevators, fire department ladders, life lines and life nets.

In the case of hotel occupancies, there may be the added problem of disorientation of occupants due to unfamiliarity with surroundings.

High-Rise Occupancies (Office, education, dwelling and others) without horizontal safe refuge areas. One problem that frequently occurs on high-rise fires is the underestimation of the number of occupants. The best way to foresee and solve this problem is through pre-fire planning. If this information is not readily available at the time of the incident, it is not unreasonable to estimate 100 people per floor in the average high-rise office building. This type of information may sometimes by obtained from the building superintendent or building engineer. Certain facilities such as colleges and hospitals may have more than this figure. High-rise residential occupancies should have considerably fewer occupants.

The determination of just how serious the need for evacuation is will depend upon the fire location, fire intensity, extension of smoke and other factors. If you are considering total evacuation, personnel and time limitations will be working against you. As an example, during a test and drill involving the total evacuation of a high-rise building under ideal

conditions, with no fire involved, it took 20 minutes to evacuate 200 persons from a 26 story building.

Under fire conditions, it is unlikely that total evacuation will be feasible or necessary. Therefore, a method of limited evacuation and control needs to be established.

The best methods seem to be the creation of safe refuge areas. Safe refuge areas are those areas within the building where life hazards from fire, smoke, and gases can be controlled. Basically, they are areas below the fire floor, the roof or 3 floors or more above the fire. Because floors below the fire are safe, it does not mean they will not have to be cleared later in the operation to permit establishment of a staging area.

A staging area is an area two floors or more below the fire floor that is used to stage personnel and equipment prior to their assignment to engage in firefighting operations. The staging area is also used as a rest and rehabilitation area.

Areas above the fire and below the roof should be selected as necessary for safe refuge area, but some firefighters should remain with evacuees for control. Firefighters should prevent occupants from re-entering hazardous areas.

First arriving companies will be concerned with clearing stairwells that may be clogged with people. The next area of concern should be the fire floor, then the floor or floors above and then the floor below. All person occupying these areas should be removed to a safe refuge area.

The method(s) utilized to notify persons in these areas are outlined as follows:

Face to face contact - Although this is the most desirable method, it may not be utilized in many instances due to lack of rescue personnel, too large of an area to cover, and lack of time due to fire and smoke progress.

Selective area voice intercom - If available, this system of notification may be utilized to notify only certain areas of the building, thereby preventing possible confusion and panic of occupants in areas of the building that need not be concerned. The obvious advantages are speed and that it only requires one firefighter.

Hand held megaphones - If the two previous methods are not feasible or available, the hand held megaphone may be used. The obvious disadvantage is that one does not have complete assurance that all occupants have been notified and that unconcerned occupants may be unnecessarily alarmed.

Paging or all call voice systems - This is the least desirable method. This system notifies all occupants of the building even though that may not be the desired effect.

The two most common methods of evacuating building occupants are elevators and stairways. Elevators, when used, must be placed on manual control and have firefighter operators. They must only be used in areas below the fire floor when stairwells are not available or if they are far removed from the fire side of the building. Operators must have knowledge of elevator operations and procedures under fire conditions. Stairwell evacuation will require sufficient firefighters to keep the people moving and prevent panic while maintaining control of building re-entry areas.

Another method of evacuation may be the use of helicopters. With this type of operation, outside agency (military, police, etc.) aircraft may have to be utilized. This will require prearranged coordination with assisting agencies. Roof areas will have to be cleared of obstructions. Evacuee control is mandatory.

During and after evacuation, search and rescue operations must be conducted to ascertain that all occupants have escaped the danger areas.

Hospitals

Although hospitals have many other exterior openings in patient residence areas, these openings may not be useable due to the non-ambulatory condition of some patients.

It will be an absolute necessity to utilize hospital personnel for guidance and assistance in evacuating patients from hospitals as so many special hazards and conditions can be encountered.

Patients may be immobile and non-ambulatory and have to be moved in wheelchairs, beds, gurneys, stretchers, iron lungs and surgical operating tables.

There is also the possibility that they may be on intravenous connections, oxygen and other medical gas connections. To remove these connections without medical personnel supervision could cause the death of the patient.

The firefighter may also encounter the special hazards created by the storage of medicines, chemicals, toxic substances and flammable liquids and gases.

Patient and personnel accountability are of the utmost importance.

If the hospital building is of the high-rise type, the added hazards and problems of this type of construction must be dealt with.

A very diligent pre-planning effort must be carried out for hospitals and frequent disaster and evacuation drills should be carried out.

Another problem that must be dealt with is what to do with patients once they have been evacuated. Although it is the responsibility of hospital officials to re-locate the patients, it is not uncommon for this task to fall upon fire and other public officials due to the lack of a pre-arranged plan. The firefighter must be prepared for such an eventuality.

Convalescent and Rest Homes

These types of occupancies usually present the same problems encountered in hospitals.

Residents of these occupancies are frequently older and can become emotionally unstable during fire emergencies. Therefore, the firefighter must consider panic prevention as a primary function.

Older people will sometimes revert to childlike ways during emergency situations. They may hide in unusual places which may make them hard to locate during a search operation.

Another problem sometimes encountered is a lack of facility personnel to assist in search and evacuation. This will be especially critical during night hours. This may necessitate the utilization of additional firefighters to accomplish the operation.

These same conditions and problems may be encountered during operations involving "retirement" or "senior citizen" communities where there are dense concentrations of older people.

Theaters, Auditoriums and Churches

These types of occupancies allow large concentrations of people in relatively small areas. Therefore, the problem of rapid evacuation and panic control is greatly compounded.

It has been observed that most people will try to leave a building the same way they entered. This is especially true in an emergency or panic situation. In some cases, they will often overlook or simply not try to use emergency exits.

Most fires occurring in this type occupancy do not start in the auditorium during occupancy. They usually start in projection booths, closets, backstage, offices, lobbies, rectories, and

other areas peripheral to the auditorium area. In order to prevent panic, an immediate and aggressive attack must be made on the fire to prevent spread to the auditorium. Every possible effort must be made to prevent smoke from entering as the odor of smoke alone may cause panic.

All areas of the building must be searched. Special attention should be given to the area below seats in the auditorium. Some persons may have fainted, suffered a heart attack, or been overcome by smoke and become concealed in these areas.

Night Clubs, Restaurants, Saloons

Some of the same problems outlined in theaters, auditoriums and churches may be encountered in this type occupancy. Overcrowding, lack of strategically located emergency exits, the placement of tables and chairs can be additional problems. In some cases, they may be located above ground level and frequently on the top floor of high-rise buildings. Some of the occupants may be intoxicated. There is a tendency to use decorations composed of flashy fuel which will cause an accelerated rate of fire spread.

Panic prevention, rapid and controlled evacuation, preventing smoke spread and rapid fire extinguishment are key factors in this type occupancy. Accomplishing these actions will require large numbers of firefighting personnel. This may require the calling of additional firefighters and apparatus as quickly as possible.

Schools

Little difficulty has been reported in search and rescue during firefighting operations in schools of modern non-high rise construction. The major problems occur in school building of older construction especially if they are two stories or higher.

Elementary and high schools will routinely have an evacuation plan which they are required to practice on a regular basis. Firefighters should take advantage of this and allow a pre-arranged evacuation to take place unless fire and smoke conditions prevent it.

As in hospitals, school personnel should be heavily relied upon to assist or conduct the evacuation and to account for all students evacuated. It is also their responsibility to arrange for their re-location after evacuation. Firefighters may have to arrange for their care if school officials are not prepared to handle it.

The fact that a school has an evacuation plan will not relieve the firefighter of the responsibility for making a thorough search of each room after or during evacuation.

There could be a possibility that normal pre-planned evacuation routes may be blocked by fire, smoke, or building collapse. In this event, it may be necessary for firefighters to personally re-route the evacuation to uninvolved areas and hold fire and smoke away from these alternately selected evacuation routes.

Colleges, universities (public or private), and some private learning institutions will not normally have pre-established evacuation plans and drills. In these cases, procedure previously outlined for public assemblage occupancies will be utilized.

Industrial and Commercial (Factories, stores, shopping centers and malls)

The inherent problems in these type occupancies include: large open areas, (easy to become disoriented in poor visibility situations), lack of strategically located emergency exits, heavy stock and machinery on weakened floors, numerous concealed spaces, heavy fuel loads, building construction types that are prone to collapse in fire situations, high density worker and customer populations, lack of properly fire stopped safe refuge areas, lack of built-in fire protection facilities, no pre-planning for evacuation, little or no brigade training and high-rise construction problems in some instances.

Fires in these types of occupancies usually require large numbers of firefighting personnel to accomplish panic prevention and/or control. Rapid evacuation is a must early in the first stages of the fire. This will require the calling of additional firefighters and apparatus as quickly as possible.

Pre-planning of these types of occupancies should be considered a necessity by any modern and progressive fire service agency.

As previously mentioned, large open spaces in these types of occupancies will make it difficult to locate trapped or lost persons and greatly increase the firefighter's chances of becoming lost and disoriented especially in cases of poor visibility.

To avoid these risks, the use of safety lines and breathing apparatus is mandatory and several teams should be assigned to the search and rescue operation.

Firefighters must constantly be alert to the possibility of building collapse in these types of occupancies. Some indications of possible building collapse are:

1. Cracks in walls and in mortar bonding between bricks in brick walls.
2. Wall bowing in or out.
3. Windows that crack or break suddenly for no obvious reason.
4. Steam, heat, and smoke radiating out of walls.

5. Discoloration due to excessive heating of walls, doors, roofs, and windows.
6. Girders, beams, and other structural support members that appear to be displaced.
7. Softness, sponginess, or other unusual conditions appearing on roof or floor areas.

If signs of imminent building collapse are evident, all personnel should be withdrawn from within the premises and moved to a distance to the exterior 1-1/2 times the distance of the highest wall on the building. If headway on control of the fire is not contained within twenty minutes of arrival at scene, building collapse should be anticipated and countermeasures instituted. It will then become a job of exterior suppression efforts and exposure protection.

Here again, be reminded that many of these occupancies are housed in high-rise buildings and the techniques of high-rise search, rescue and fire suppression may have to be employed.

Basements, Tunnels, Underground Passageways, Tanks and Other Closely Confined Areas.

These areas present extremely dangerous search and rescue problems for several reasons. In most cases, there is only one point of entry and/or exit which makes it very easy to become trapped or cut off by fire. The point of entry is frequently above the fire. Visibility is extremely poor due to lack of ventilation and lack of natural sunlight. The work is usually done in very confining and close quarters. These areas are frequently used for the storage of hazardous materials and may have heavy concentrations of toxic and flammable gases due to lack of ventilation.

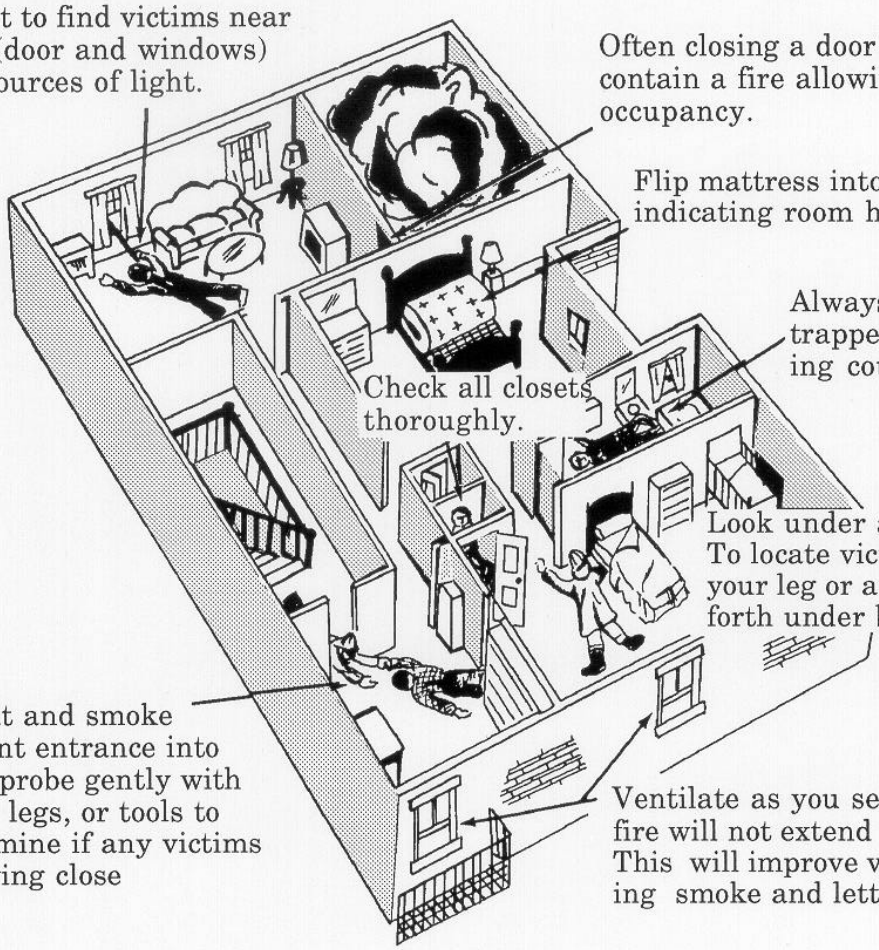
Prior to entry into these areas, atmospheres should be checked for concentrations of explosive gases. If such gases are detected, the area should be thoroughly ventilated prior to entry.

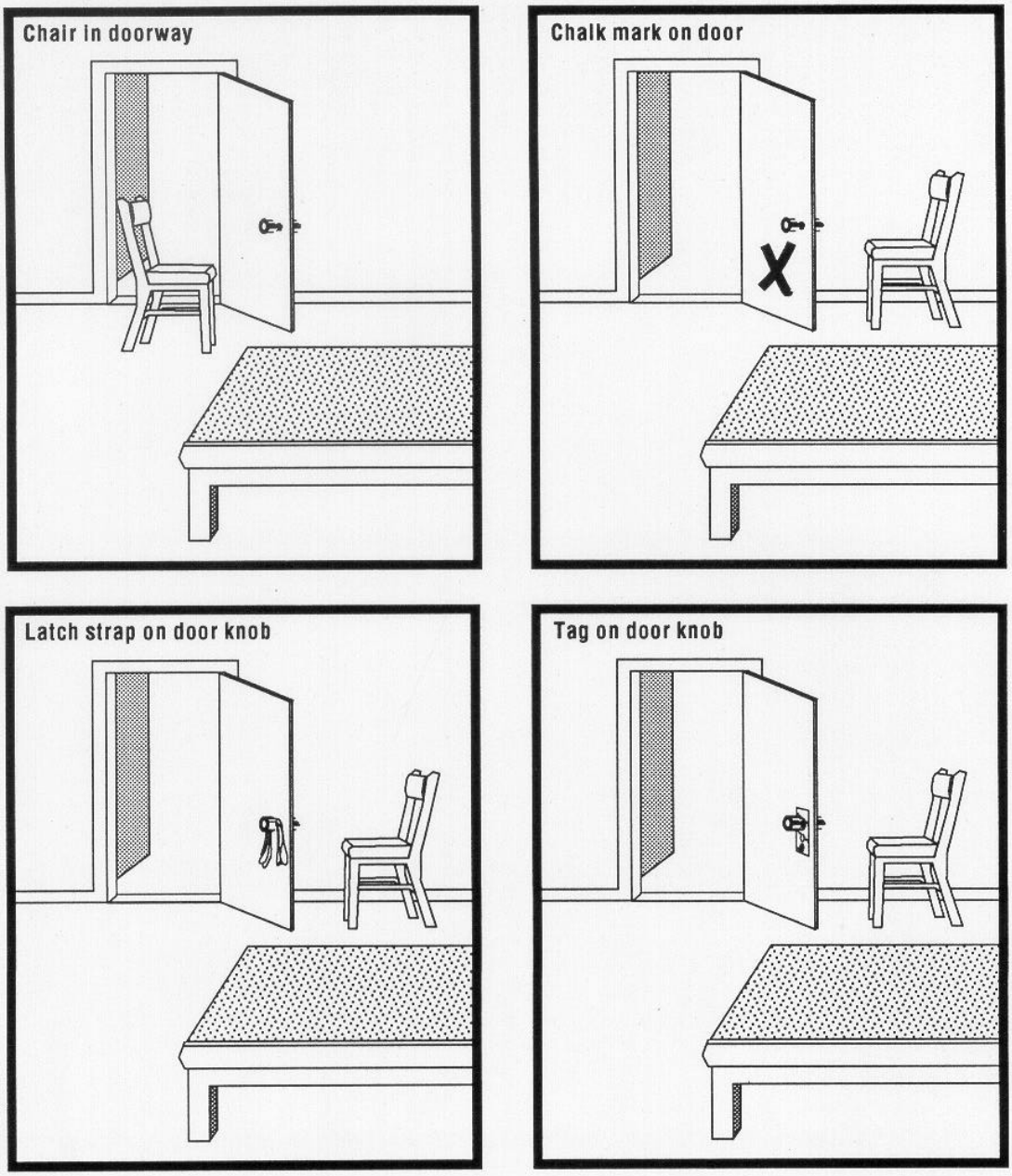
All personnel entering must wear breathing apparatus and utilize safety lines. Back up teams should be standing by.

Do not wander aimlessly—Plan your search.

Search *every* room—*every* time!

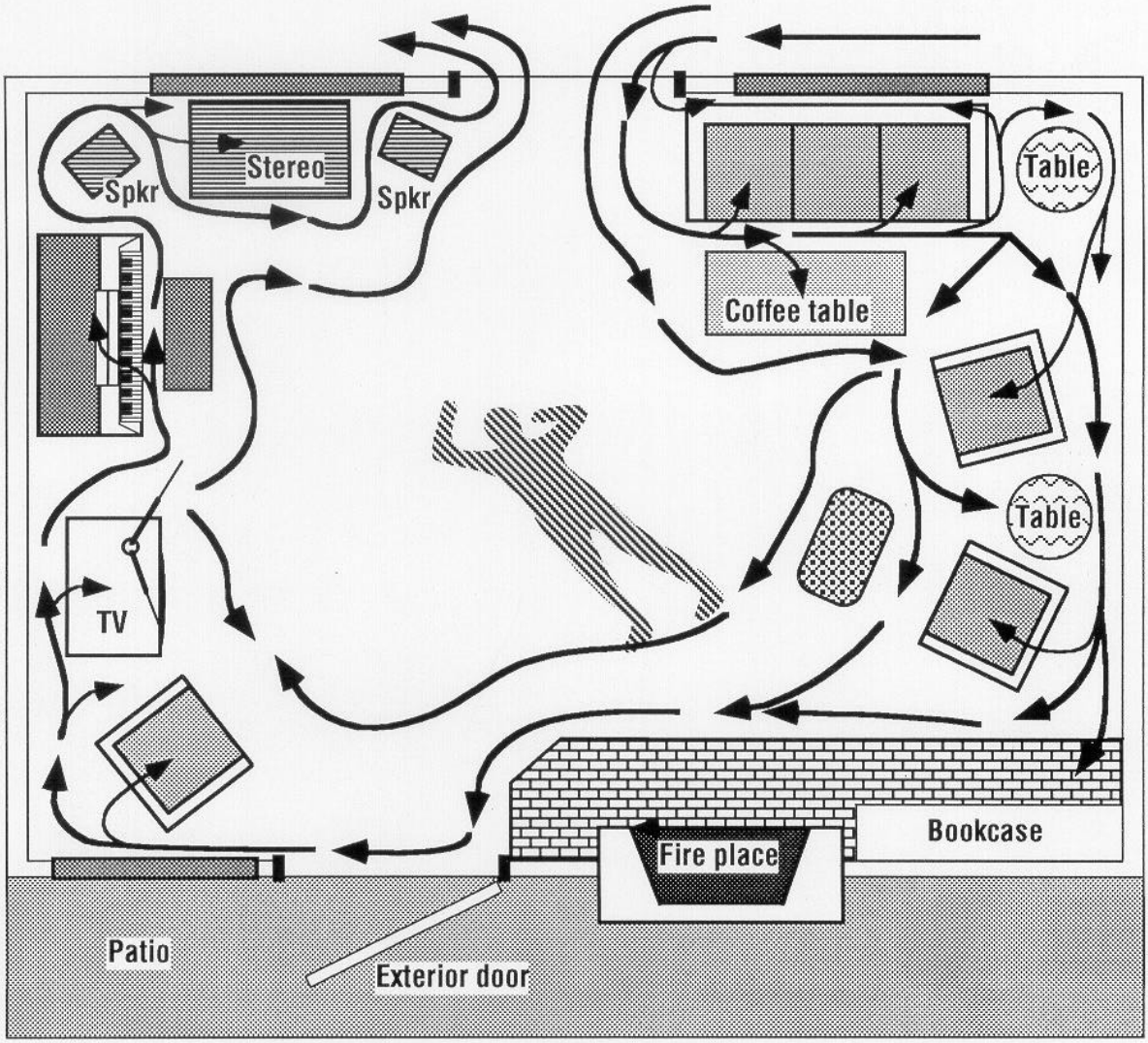
A charged line should always be taken on a search of a burning building.





Some standard method should be used to indicate that a room and certain areas in the room have been searched. This will prevent time-wasting duplication of effort. Close door after search, to prevent fire or smoke from entering room.

Decide upon a right or left search pattern and search every room in that pattern. Search is complete when you arrive at the starting point.



A thorough, careful search will help find victims that otherwise would be overlooked. The second member of the search team remains in contact with nozzle person and searches farther into the room with arms and legs extended.