

**TOWER LADDER OPERATIONS****CONTENTS**

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1. **INTRODUCTION**

- 1.1 In the past, the New York Fire Department placed primary reliance on the use of aerial ladders as an exterior means of access to the upper floor of buildings. It also placed full reliance on metal aerials for developing elevated large caliber streams when water towers were phased out.
- 1.2 The Tower Ladder (TL) was introduced to the fire service several years ago. Its full potential is still being developed. The effectiveness of this apparatus in ladder company operations on the exterior of buildings for access to the interior, and for rescue purposes is without question. In addition, it also provides a superior elevated large caliber stream capability.
- 1.3 In regard to its large caliber stream capability, it must be emphasized that this apparatus does not change FDNY firefighting policy, which is based primarily on aggressive interior attack. The use of masks plus the benefit of improved ventilation capability has relegated exterior streams to an inactive or minor role in routine fire suppression practices. The need for effective exterior streams in certain cases, however, must be recognized whenever conditions, as evaluated by the officer in command of operations, indicate their use.
- 1.4 This tactics and procedure manual was formulated to establish standards and guidelines for the use of TLs at fires and emergencies. It will be supplemented by the Bureau of Training Manuals for the particular model assigned to units. Together they will provide a complete operating manual.

2. **GENERAL FEATURES OF TOWER LADDERS (TL)**

2.1 Stabilizer Supports

- 2.1.1 The chassis is supported at six points while the boom is in operation, i.e., two hydraulically operated jacks are located at the front and two at the rear of the vehicle (total of four), and two out-rigger type jacks in the middle of the apparatus. All supports have a direct frame attachment to bypass the apparatus suspension and provide a rigid operating base.
- 2.1.2 When the stabilizer supports are lowered for boom operation, hydraulic "holding" valves lock the fluid in each cylinder, thus each cylinder becomes a rigid member to support the apparatus under all conditions of operation.

- 2.1.3 To eliminate any possibility of stabilizer support collapse brought about by loss of fluid from a cylinder, a mechanical lock is also provided at each jack and outrigger. These locks (pins) must be inserted manually.
- 2.1.4 All jacks and outriggers must be lowered until each reaches the end of its stroke. Exception : If apparatus is not level, lower the jacks and outrigger on the low side first, then the jacks and outrigger on the high side until unit is level as possible.
Note: Raising the high side fully before raising the low side, or raising only one side when on level ground, can cause damage to the suspension system.
- 2.1.5 When encountering streets that are narrow and lined with parked cars, the apparatus may have to be parked so that the outrigger can be placed between parked cars. A guide man is necessary to enable the chauffeur to position the apparatus so that the outriggers will clear parked cars or other obstructions. The guide man is to remain in position until the outrigger is fully lowered on the operator's blind side. Some additional clearance can be obtained by the guide man tilting the hinged outrigger pad.
- 2.1.6 Outriggers can easily be placed between parked cars when necessary. Jacks and outriggers must be on firm ground and locked.
- 2.1.7 To judge that outriggers will clear all obstructions, a 6-ft. hook may be used as a gauge.
- 2.2 **Boom Assembly**
The boom assembly consists of four box sections which telescope within each other. The first section is alloyed steel and the three telescope sections are aluminum alloy. The extension mechanism consists of two double acting cylinders which provide power in extension and retraction. The boom hydraulic system has hydraulic "holding" valves, which will prevent the boom from moving in the event of a hydraulic line failure.
- 2.3 **Basket**
The basket is constructed of alloy aluminum and has a floor area of approximately 15 sq. ft. Permanently mounted on the front surface of the platform is a Stang Intelligent Nozzle, permitting flexibility in water tower operations. The underside of the floor and the front railing of the basket may be covered with a fire resistant shield.
- 2.4 **Pedestal controls - Turntable**
 - 2.4.1 Three controls similar to those on a metal aerial ladder are provided on the turntable. These controls are for raising and lowering, extending and retracting, and rotating the boom assembly. Operating controls at the pedestal allow for smoother positioning than the controls in the basket.

- 2.4.2 Master Power Switch - Supplies electrical power for the Master Control Valve, Master Console panel lights, engine start, deadman control and platform (basket) controls.
- 2.4.3 Engine Start Button - allows engine to be re-started in case of stall from the Master Control Console.
- 2.4.4 Platform Control (Basket) - Activates the basket control station.
- 2.4.5 Deadman Control - Depressing the foot pedal at base of console (pedestal) activates the system and the engine throttle control. This movement also deactivates the basket controls by activating the hydraulic system in case of electrical failure. The use of the platform control switch is necessary whenever members or civilians enter or leave elevated basket. This is to insure against movement of basket by accidentally touching the platform control handle.

CAUTION:

1. There is a possibility that a malfunction in one or more of the three boom movements e.g., 1) lower-raise, 2) extend-retract, 3) rotation, can occur in the operating controls of the Tower Ladder causing the elevated boom (basket) to move in the direction of the malfunction. The release of either of the "deadman" controls (foot switch on pedestal, trigger on basket assembly) will immediately halt all boom movement.
 2. In the area at the base of the boom and turntable are three sets of manually operated isolation valves, one pair for each hydraulic circuit, e.g., 1) raise-lower, 2) extend-retract, 3) rotation. Should one of these 3 control valves malfunction for any reason, the isolation valves for the particular function can be closed leaving the other systems operable.
- 2.4.6 Accessories - Controls light on Master Console front and optional accessories.
 - 2.4.7 Pressure Gauge - Indicates system pressure during operation.
 - 2.4.8 Communication Switch - Controls intercom system between basket and pedestal.
- 2.5 Basket Controls (Platform)
- 2.5.1 Single handle controls all functions: with a "Dead Man" trigger in the handle, which must be depressed before the system operates.
 - 2.5.2 Intercom - Open circuit, controlled from pedestal.

2.6 Escape From Basket

- 2.6.1 When no other solution is possible, member may escape from the basket by means of the fixed telescoping ladder mounted on top of the boom sections or by life saving rope in conjunction with the Personal Harness, which ever is most appropriate for the situation.

Note: There exists under some conditions of partial elevation and extension, a possibility of boom section adjustment, gradual shifting with one section extending and another section retracting the same distance with no effect on the position of the basket. This results in rungs moving in relation to each other. Because of this possibility, utmost caution must be exercised while using the escape ladder.

2.7 Water System

- 2.7.1 Boom rotation permits water system coverage of 360 degrees.

2.7.2 A specially designed water manifold is located on the rotation axle. The water system consists of four telescoping sections of stainless steel pipe, operating through conventional "U" cup seals and packing glands. Diameter of smallest section is 3 ½". Suitable swivel elbows, fittings, and additional pipe connect this telescoping system, from the basket mounted Stang, through the rotating swivel in the superstructure, to the waterline connections on either side of the apparatus frame.

- 2.7.3 The water system hook-up consists of a 3" x 3" gated siamese on the left side and a 4-½" inlet on the right side.

Note: There are various model TLs in the field and companies involved must refer to their manuals for specifics.

2.8 Communications

- 2.8.1 The TL is provided with an intercommunication system (intercom), allowing for basket to pedestal communications and vice versa, which is the most effective means of communications between basket and pedestal.

- 2.8.2 Difficulty when transmitting orders dealing with basket movements is due primarily to misunderstood terminology. To alleviate this problem the following terms shall be used when transmitting orders from basket to pedestal man:
- A. "EXTEND BOOM" - Reach out with boom.
 - B. "RETRACT BOOM" - return outstretched boom.
 - C "RAISE BOOM" - Increase angle of elevation
 - D "LOWER BOOM" - Decrease angle of elevation
 - E "BOOM LEFT" - rotate boom to pedestal man's left.
 - F. "BOOM RIGHT" - Rotate boom to pedestal man's right.
- Note:** In some models, the basket control man faces the opposite direction in relation to the pedestal man. It is for this reason that the reference point is the pedestal and not the basket position.
- 2.8.3 When the Basket is being controlled from the pedestal, it is most important to keep the pedestal man informed regarding the results of the basket movement, as the pedestal man is incapable of judging the exact distance the basket is from an object. For example, the basket man can direct the pedestal man in the following manner: "Boom left some ten feet, now at 8 feet, 6 feet, 4 feet, 2 feet, 1 foot, careful, 6 inches, stop." These directions through the intercom must be utilized whenever the need arises for accurate steady movements.
- 2.8.4 Since the pedestal controls allow smoother movements, the pedestal man should, in most cases, perform delicate operations if visibility permits.
- 2.8.5 The intercom between pedestal and basket should be used for operational control of apparatus to achieve the desired coordination.
- 2.8.6 Emergency operations dealing with strategic action and tactical usage of TL require instant communications between officer in command and members in basket. Most effective means is to have man at pedestal monitor all the Handie-Talkie communications and relay orders or other pertinent information to basket via intercom. Handie-Talkie is difficult to hear due to noise in basket especially if stream is in operation. Handie-Talkie is prone to malfunction when wet and also picking up communications from other operations when boom extended at or over roof levels in immediate area thereby causing some confusion. Handie-Talkie should be utilized in basket operation if basket man operating alone for venting or search purposes as a means of coordinating operations with interior forces or as means of communication should he leave basket for any reason, such as search or rescue.
- 2.8.7 During daily check of apparatus and at initial stages of placing TL into operation, a test of the intercom system shall be made. If results are negative, members shall rely on Handie-Talkie for communication from pedestal and basket.

- 2.8.8 By monitoring Handie-Talkie transmissions the pedestal man can be continuously aware of changing fire conditions, location of other units during operations, orders issued by officer in command of fire or company officer, or any information regarding safety of members and fire extinguishment that will effect TL operation. He can relay these communications via intercom to basket or, from basket to officer in command of operation should Handie-Talkie at basket be ineffective.
- 2.8.9 In the event of failure of both intercom and Handie-Talkie communications, unit should have a preset plan by which pedestal man can relay orders or information vocally or by hand signal, e.g., tap boom with tool or move boom slightly to attract attention to the pedestal.

2.9 General Precautions

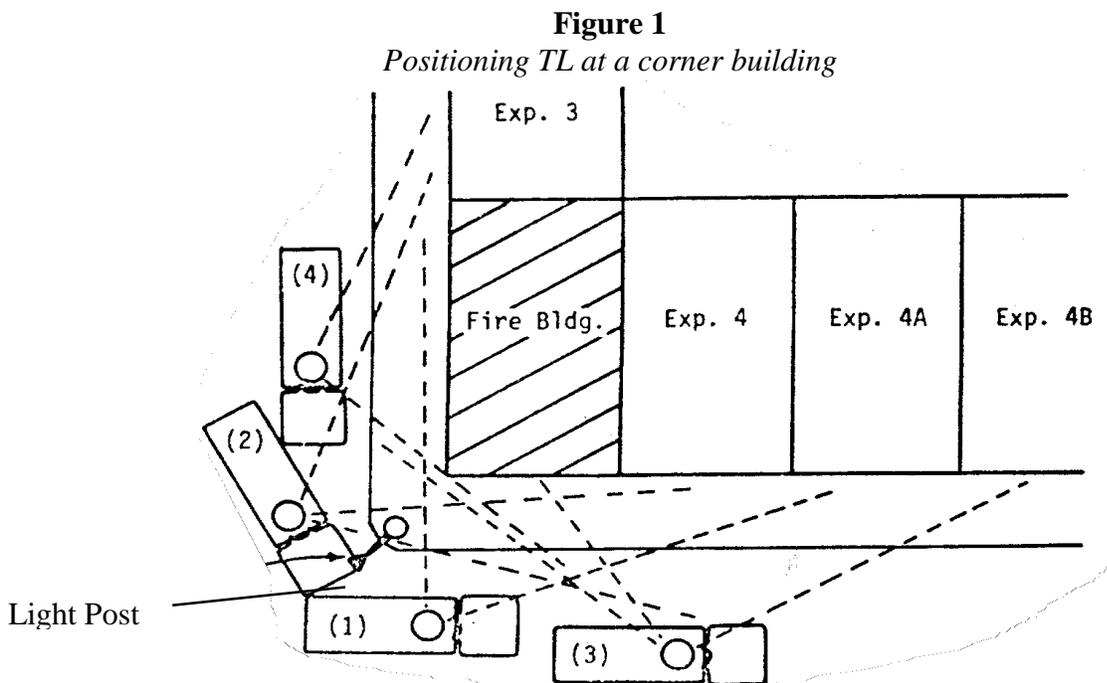
- 2.9.1 For relief of basket man during extended periods of operations or overhauling, the use of the escape ladder shall not be resorted to due to possible rung movement.
- 2.9.2 Detailed members cannot operate on pedestal unless they are presently assigned to a Tower Ladder Unit or are qualified Chauffeur-Tillermen (QCT, School Trained).
- 2.9.3 No member shall operate in the basket unless he is wearing the installed safety belt or a life belt or Personal Harness which is secured to a substantial part of basket. If this is too confining, it is possible to provide working room by forming a loop, one foot in diameter, in a life saving rope around a substantial part of the basket using a bowline to secure the loop, then hook the life belt or Personal Harness onto this loop.

3. POSITIONING OF APPARATUS

3.1 General

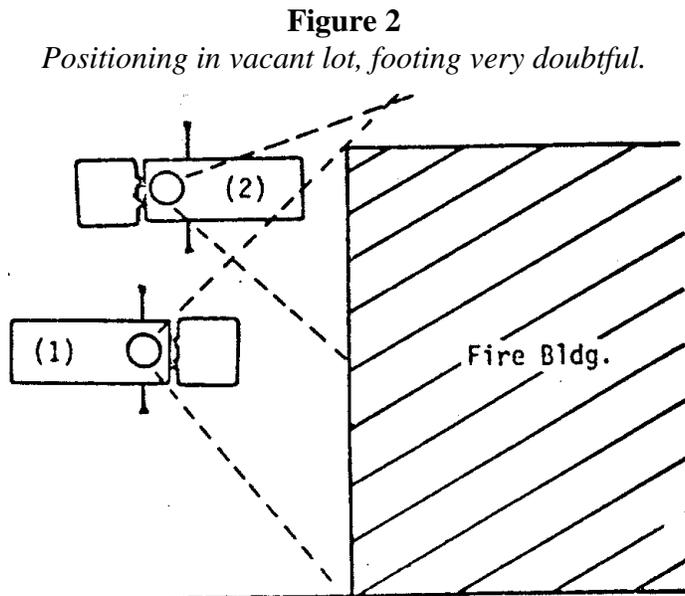
- 3.1.1 Generally placement depends upon conditions encountered on arrival. The Officer in Command of a fire should give specific instructions regarding the placement of apparatus and the operations to be performed. In the absence of a superior, the TL officer must base his decision for placement of the TL on the following conditions:
 - A. What wall to work on - based on the life factor.
 - B. Fire conditions location and extent of fire.
 - C. Type of occupancy - time of day.
 - D. Type of structure - height and area. (Remember height limitation of TL.)
 - E. Street conditions - traffic encountered. Overhead wires, trees.
 - F. Location of pumper and hydrants.
 - G. Condition and stability of building.
 - H. Ground stability.

- 3.1.2 Arriving first provides the choice of positions best suited for initial operations.
- 3.1.3 Arriving second requires positioning that will not block out other first alarm units. It may be necessary or advantageous to circle the block and come in from the opposite end of the street, if such action will improve the effective "scrub area". "Scrub area" is defined as that area of a building wall which can be touched by the basket.
- 3.1.4 Generally the apparatus should be parallel to the building. Occasionally the scrub area of the bucket will be reduced by the cab of the apparatus. This condition can be corrected by parking the apparatus with the front end angled about 15 degrees from the building line. This will put the cab portion of the apparatus farther away than the rear portion, and in this way the boom can be operated the full extent of its scrub area.
- 3.1.5 Positioning at a corner building affords coverage on two fronts. This enables coverage over a much wider area, permitting greater access and observation points to check stability of building, etc. Notice shall be taken of location of street lights, traffic signals and electrical utility poles and wires at street corners (or other locations). Placement of TL shall be made to retain as much effective operating area of the basket as possible on both fronts of the building. (See Fig. 1)
- 3.1.6 Positioning apparatus perpendicular to building will considerably reduce scrub area and should be avoided whenever possible. However, where the ground is of doubtful stability, such as vacant lots or other unpaved areas that may have hidden voids, and plank pads for outriggers are deemed not substantial enough, it may be more advantageous to position apparatus perpendicular or nearly perpendicular to the fire building. This will tend to equalize pressure on outriggers resulting from lateral movement of the boom thereby reducing the possibility of the apparatus "pole vaulting" should the footing of an outrigger collapse. (See fig. 2)
- 3.1.7 Regardless of initial placement, it must be realized that as conditions change, repositioning may be required and may be accomplished quickly and safely with proper training and planning.

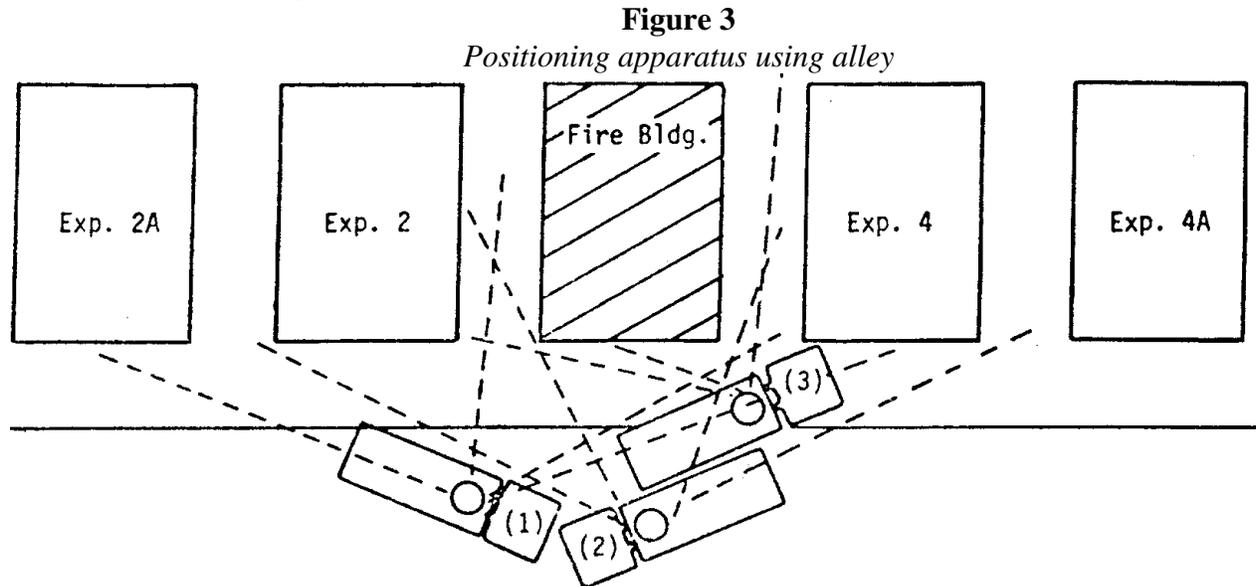


- Position #1: Affords stream coverage of two sides of fire building, all floors, and effective stream coverage of Exp. #4, Exp. #4A and some coverage of #4B if boom brought parallel to building front.
- Position #2: Affords coverage of 3 sides of fire building with stream, limited coverage of Exp. #4, 4A and 4B ... boom must be raised to clear obstruction or brought under obstruction thereby increasing angle of attack and reducing effect of stream of Exp. #4 & 4A.
- Position #3: Affords coverage of front of fire building and effective coverage of Exp. #4, 4A, 4B, and partial stream coverage of Exp. #2 side of fire building.
- Position #4: Affords coverage of Exp. #2 side of fire building and Exp. #3 with coverage of #1 side of fire building and partial coverage of Exp. #4.

- A. Lateral movement of boom limited to avoid placing excessive weight on jacks and outriggers on either side; keeping stress distributed as equally as possible on all supports.
- B. Backing apparatus into position would insure coverage of lower floors.
- C. Positioning apparatus closer to rear line of building will naturally afford effective stream operation on most floors through rear windows. (Position #2)



- 3.1.8 During operations at one and two family private dwellings or any structure with an alleyway between the fire building and an exposure, placing the TL turntable in line with the alley affords frontal coverage and also coverage into the alley for exposure protection, extinguishment, rescue, ventilation, search and entry. (See Fig. 3)

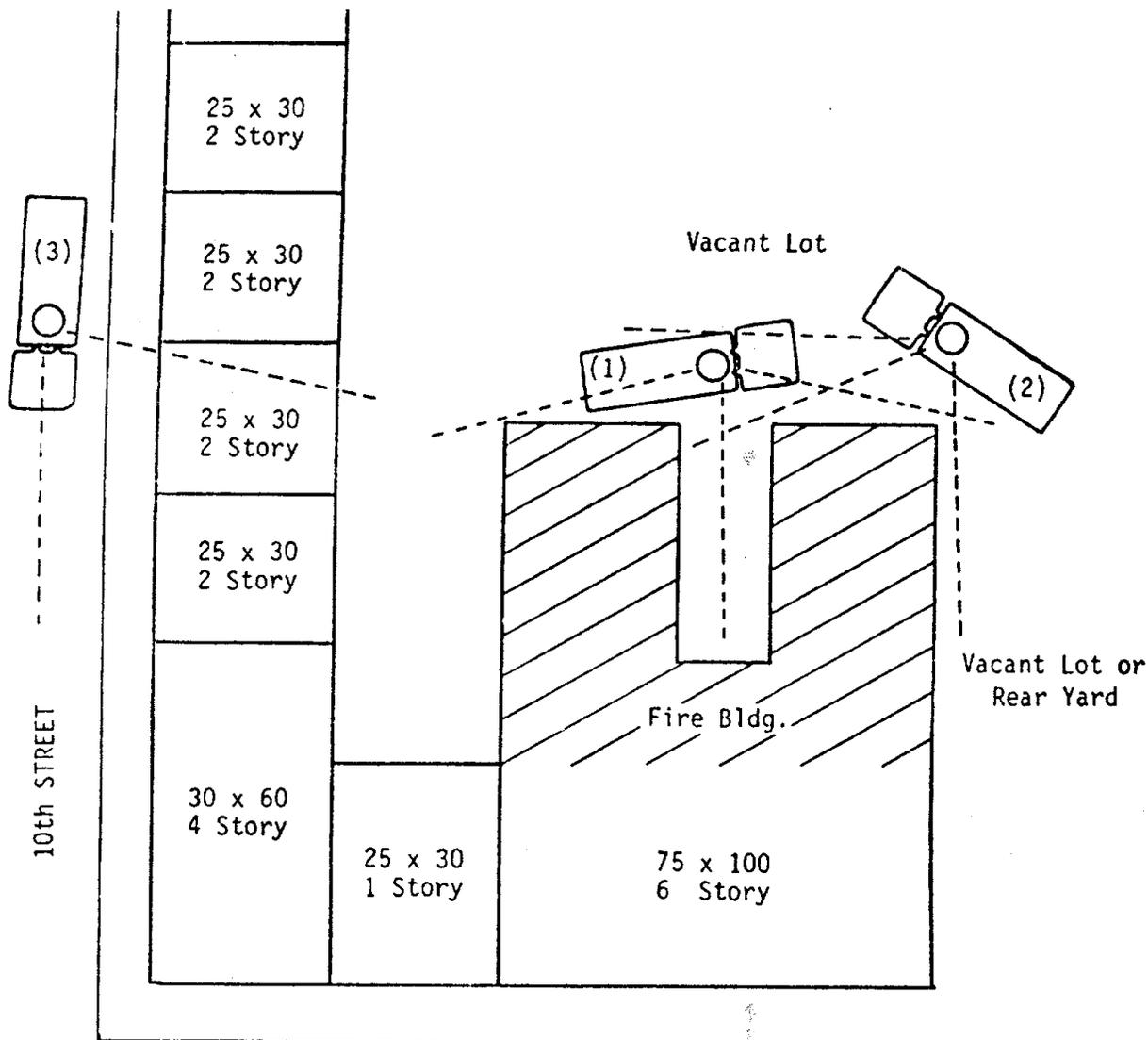


- Position #1: Affords extension into alley for ventilation and/or rescue and bldg. front, also stream coverage in alley, Exp. #2 & possibly 2A.
- Position #2: Affords frontal coverage of fire building, stream coverage via alley #2 & #4 sides, some stream coverage of Exp. #2 & #4.
- Position #3: Affords frontal and alley coverage for rescue and/or ventilation. Involves positioning on sidewalk. Affords stream coverage of rear of fire building.
- Note:** a. Presence of obstructions such as lamp post, utility pole and/or trees, autos, may limit choice of position and/or limit operation.
- b. Potential life hazard and/or direction of fire travel dictates positioning of apparatus.

- 3.1.9 During operations at building fires, the Officer in Command should be made aware of the accessibility of vacant lots, alleys, or driveways adjacent to or to the rear of the fire building where placement of a TL would facilitate operations.

- 3.1.10 The positioning of a TL in the courtyard or rear lot of an "H" type building can be used to prevent the spread of fire across the throat of the building, extinguishment of fire on either or both sides of throat and, depending on space available and positioning of apparatus, afford coverage of throat, rear, and a considerable area of exposure #2 and #4 sides. The possibility of operating from an adjacent street over the top of lower buildings into the throat, rear or side of the fire building should not be overlooked. (See Fig. 4)

Figure 4
Positioning TL in rear lot of an "H" type building



- Position #1: Affords full coverage of "throat", rear and partial coverage of sides. A good stream will, in most cases, remove partitions allowing full stream coverage of floor by unit operating in "throat". Ceiling penetration by use of stream exposes cockloft for extinguishment of fire therein.
- Position #2: Affords partial stream coverage of "throat" to limit fire extending due to auto-exposure or radiation. Affords full coverage of rear and partial coverage of side.
- Position #3: Some extinguishment possible depending on location of fire and effectiveness of the stream. If fire on lower floors, this position is most effective for protection of exposures on 10th Street.

3.1.11 During all operations, the pedestal man shall:

- A. Remain at pedestal until properly relieved by member trained in unit's pedestal operation.
- B. Maintain and monitor Handie-Talkie communications and relay orders and pertinent information to basket via intercom. He shall also relay information received from basket via intercom to Officer in Command at fire.
- C. Watch movement of boom and be prepared to over-ride basket controls if boom in danger of striking obstacle, e.g., corner of building, light post, wires, traffic sign or cab of apparatus.
- D. Over-ride if cable reel in danger of striking object or cab of apparatus. Fluorescent paint or tape on cable drum would be an aid during night operations.
- E. Be prepared to take over controls should basket controls become erratic or inoperative.
- F. Take steps as outlined in Section 2.4.5 if boom control malfunction should occur.
- G. Frequently assess footing of apparatus Jacks and outriggers for signs of undermining and/or street pavement collapse.
- H. Monitor operating hydraulic pressure for signs of possible hydraulic leak which might cause loss of boom movement. Loss of fluid from main reservoir due to broken line is rapid and boom will lock in position.
- I. Advise basket if change in water supply is anticipated, e.g., switching source of supply, burst length, Engine Co. apparatus overheating, etc.
- J. If member(s) leave basket for search or roof operations, he shall not move boom unless member(s) are advised of his intentions and they in turn give approval, or a visible life hazard should occur.

3.1.12 Unit commanders shall have all members trained to:

- A. Place apparatus in P.T.O. and set up apparatus for boom operations.
- B. Be adept in operation of basket controls and pedestal controls and console.
- C. Be adept in control of Stang nozzle.
- D. Be familiar with basic emergency procedures in the event of a malfunction, e.g., apparatus stalling, basket control malfunction, etc.
- E. Be capable to assume position of pedestal man with regard to operations of apparatus and maintaining communications.
- F. Stretch supply lines to unit and procedure to enable efficient and rapid repositioning of apparatus.

3.2 Specific Details

- 3.2.1 A properly positioned TL provides wall coverage from grade level or below, up to a maximum basket floor elevation of 70' (approximately), at the maximum 75 degree angle.
- 3.2.2 The basket while touching a point 32 feet horizontally from center of turntable can reach a basket floor elevation of 65 feet.
- 3.2.3 TL scrub area covers the front of a building 60 feet high and 50 feet wide, and will cover a 100 foot frontage on the lower three floors of a building.
- 3.2.4 TL has a scrub area of approximately 7750 square feet when the center of the turntable is 32 feet from building wall and cab is at a 15 degree angle to the building line.
- 3.2.5 The basket can also reach points 10 feet below grade.
- 3.2.6 Apparatus may be placed on the sidewalk either fully or partially to reach upper levels or to gain better vantage points. In this situation verify the condition under the sidewalk and make certain that the stabilizers are on a firm foundation.
- 3.2.7 When the center line of turntable is 25 feet from a building, there will be sufficient room for basket to be dropped below the horizontal with the boom perpendicular to the side of the apparatus.
- 3.2.8 Ideal horizontal distance from objectives is 32 feet. At 32 feet from center line of turntable to building, allowance is made for sidewalks, outriggers and parked vehicles.
- 3.2.9 While 75 feet is the nominal height, the actual working height (the bottom of the basket at its highest elevation), is little more than 70 feet when boom is at the maximum angle of 75 degrees.

3.3 Overhead Obstructions

- 3.3.1 Elevated Trains and Elevated Highways
 - A. Apparatus should be maneuvered so that it is parallel to the objective and the basket is in line with target, close to the building line.
 - B. At intersection with overhead obstructions, TL should be positioned so that the boom can be raised between them.
- 3.3.2 Overhead wires may interfere with TL operations. Officer in Command of operations should have wires removed by the utility company involved when fire conditions warrant.

- 3.3.3 When trees obstruct operations, it is possible to extend or raise boom through light branches. However, retraction or lowering of the boom through branches may present a problem and some cutting may be required.
- 3.3.4 Unit commander shall have unit practice, during Multi-Unit Drill or Company drills, positioning apparatus for operation with over head obstructions in the area in order to familiarize personnel with limitations of apparatus function under these conditions and possible alternatives, such as placing apparatus on sidewalk and precautions necessary, at corner and extending boom parallel with front of building. Also practice at intersections with lightposts, traffic signs or signals, intersecting overhead wires, etc. in order to enable personnel to judge where and how apparatus to be positioned for maximum coverage under similar circumstances.

3.4 Positioning on Hills

- 3.4.1 Position apparatus parallel to the direction of slope so that boom operations will be in the "up-hill" direction. If possible, apparatus should be facing "down-hill" , e.g., if facing downhill, turntable past the objective. If facing uphill, turntable before objective.
- 3.4.2 Set the parking brake and chock all four wheels to assure that apparatus does not move prior to setting of all jacks and outriggers.
- 3.4.3 Deleted
- 3.4.4 All operation of boom should be performed at low speed and delicately while on steep inclines. Sudden stops in maneuvering can cause damage to apparatus and/or cause apparatus to "skip" downhill. Maneuvering in the downhill direction must be done delicately and with extreme caution avoiding sudden starting and stopping. All "violent" reactions should be avoided so that excessive "shock" loads are not applied to the apparatus.

Note: Sudden starts and stops should be avoided under all operating conditions.

- 3.4.5 Retracting and/or raising of the boom may be required for "up-hill" operation. By retracting and/or raising the boom, the load will be rotating on a shorter radius, thereby reducing the torque requirements for uphill rotation. See charts for illustration of boom positioning when operating on various grades.

Note: Grades up to 4% slope may be treated as level ground.

3.4.6 Disregard for the above recommended procedures and practices may cause serious damage to the apparatus and could cause an accident involving personnel.

Note: Grades up to 4% slope are considered to be level for operation of a TL. When the apparatus is in other than a "level configuration" its performance, stability and safety factors are reduced in proportion to the degree of deviation. For example, the rotation system was designed for level operation. When the chassis is on a slope (from front to rear) the rotating function now includes the work of "lifting" the boom system uphill. If the boom is retracted and raised to its greatest elevation this added load is at its minimum value.

When the boom is extended and in a horizontal position, this added load is at its maximum. The degree of the slope adds to the "lifting" force required in either configuration. Therefore, under certain conditions the operator may have to retract the boom, raise the boom or both in order to rotate uphill on steep inclines. Because of this added "load" the operator must never rotate at high speeds when on a slope and must always "feather" his controls when starting or stopping in order to avoid shock loads.

The maximum "slope" for TL operation has been set at 15% grade by the manufacturer for safe performance of apparatus. SEE ATTACHED CHARTS. (Fig. 6 & 7)

- Note:** 1. In short, it is recommended that operations be conducted in "uphill" quadrant. (See Fig. 5)
2. A difference of slightly over 5-1/2 feet from front to rear of apparatus approximately 15% slope.

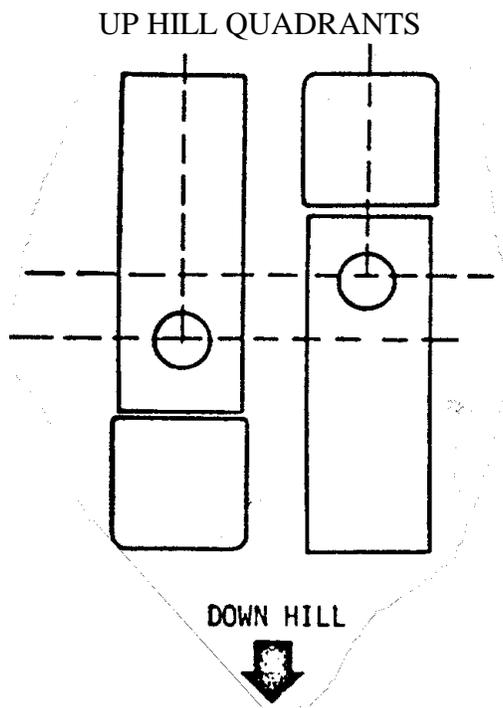


Figure 5

Figure 6

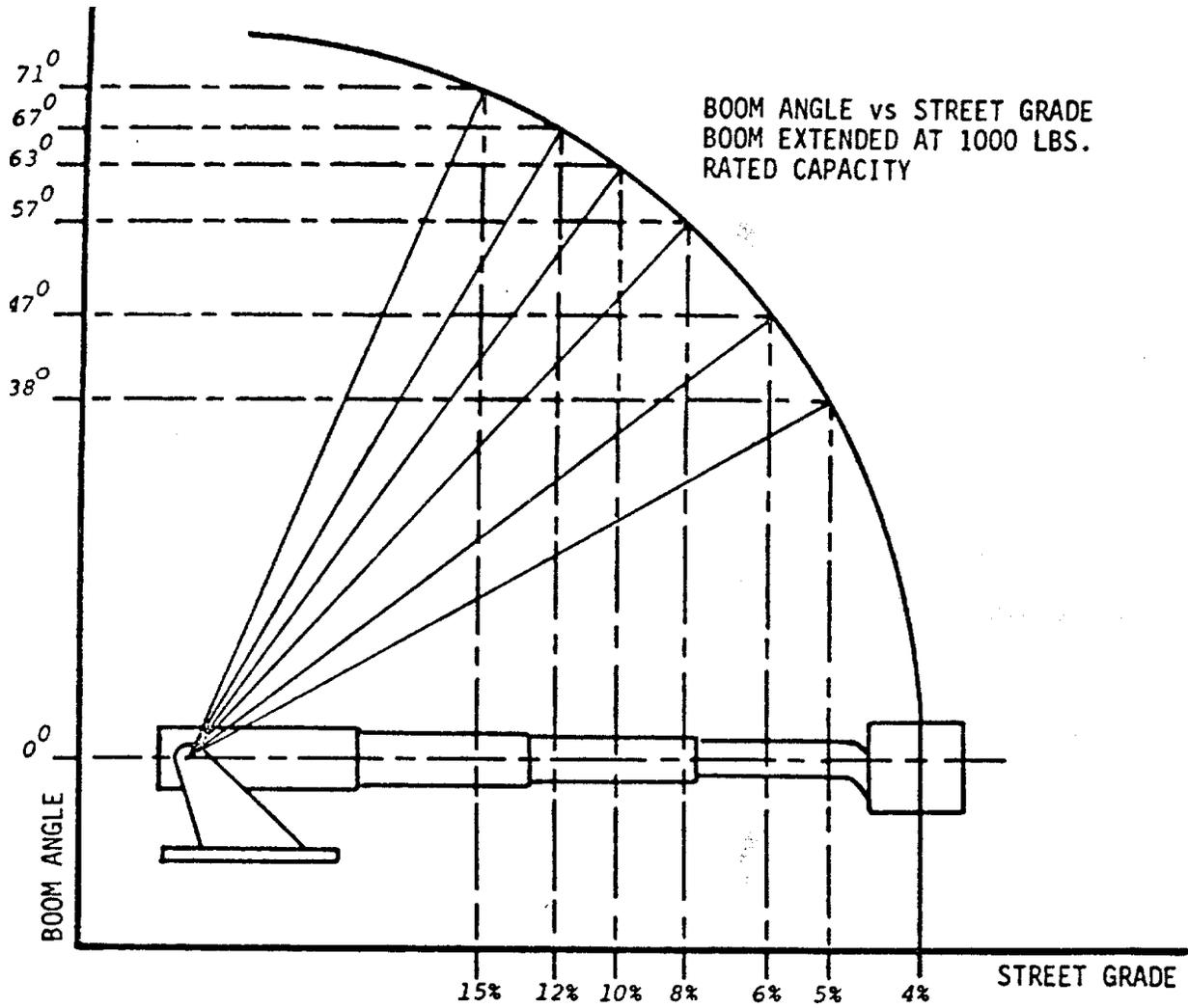
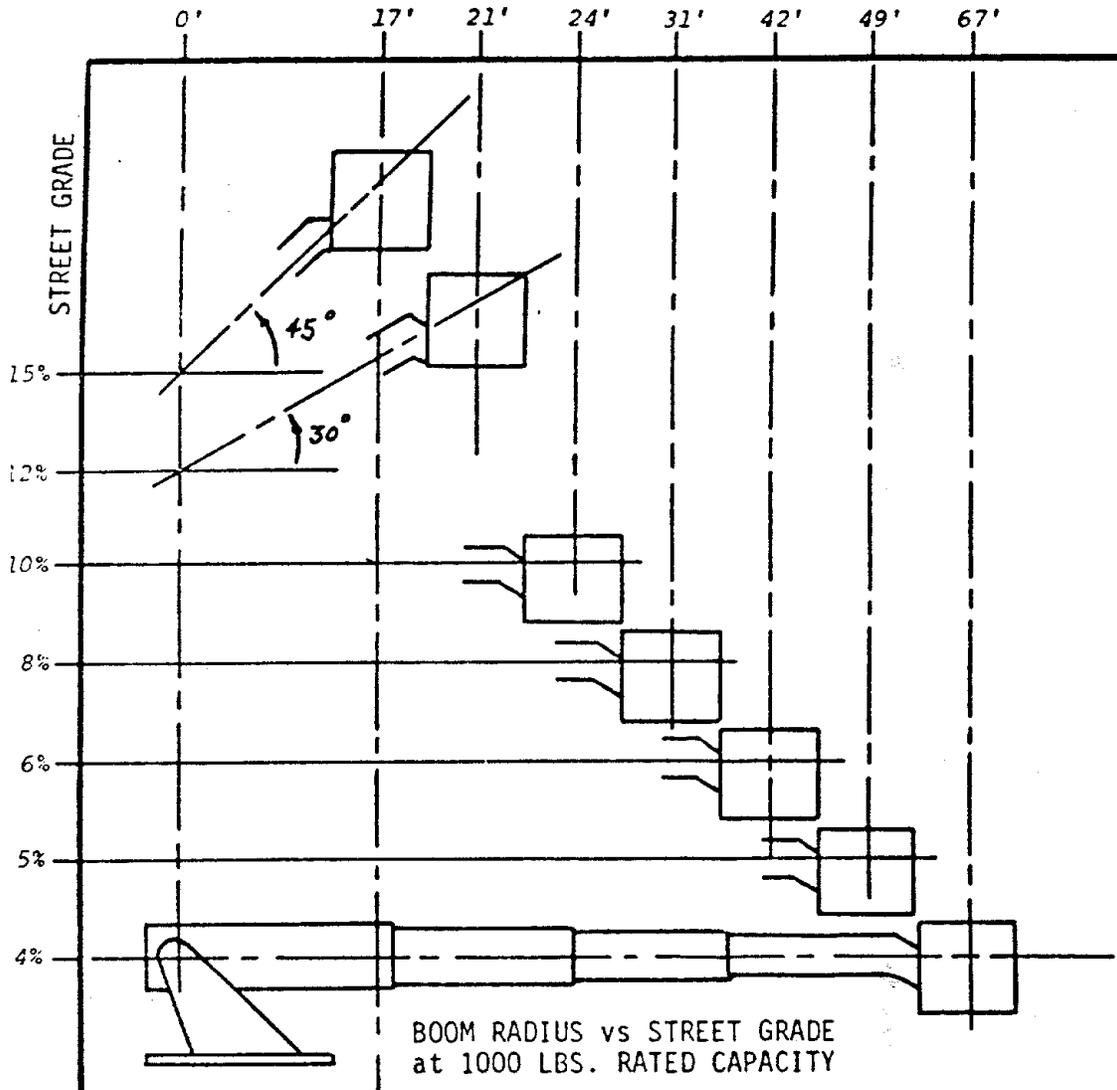


Figure 7



3.5 Winter Operations

- 3.5.1 Winter operations require extra surveillance to insure that sufficient lubriplate is on moving parts of boom and waterway, jacks and jack housing well oiled, to prevent ice build up and allow freedom of movement.
- 3.5.2 During normal operations frequent boom re-positioning prevents ice build up. However, if operation is of a stationary nature during freezing weather, frequent extension and retraction of boom will help prevent ice build up on boom, escape ladder, waterway, cable and cable reel drum.
- 3.5.3 On iced surfaces, use of rock salt or ashes under and around jack and outrigger pads will help prevent slipping. Some slipping will occur on fairly level surfaces on movement of the boom. Sudden starting and stopping of rotation and/or rapid changing of stream direction will induce sliding.
- 3.5.4 In deep snow, when attempting to position apparatus and chains are of no help, such as in an unplowed street or lot, jacks and outriggers can be lowered raising the apparatus sufficiently to allow boards or planks to be placed under the wheels for the apparatus to ride upon toward desired operating location. Place planks so as to obtain maximum riding distance. Lower apparatus onto planks and proceed until unable to continue. Repeat this process until desired positioning of apparatus is attained. This procedure is also effective on sand and mud.
- 3.5.5 On taking up, boom shall be raised to a 60 degree angle, drains of waterway and the gated inlets opened to drain system of water. On bedding of boom the drain plugs on waterway around base of platform shall be removed to insure entire system properly drained.
- 3.5.6 During extreme cold weather, units engaged in outside operations shall keep apparatus engines running, to prevent congealing of diesel oil.
- 3.5.7 During extreme cold weather officer in command should allow for periodic relief of members in the basket to prevent over exposure to the elements.

3.6 Height Limitation

- 3.6.1 When arriving first at a scene where rescue operations may be required above the 75 foot level, the TL officer should allow an aerial ladder (100 foot aerial) to effect the rescue operations, unless it is obvious that the aerial ladder company will be seriously delayed. In addition, the number of Tower Ladder Units in the Department has increased to a degree that there are many boxes when only Tower Ladder Units will respond on the First Alarm. This reduces the height capability of rescue operations below that of aerial ladder apparatus.

3.6.2 In an effort to regain some of the lost height capability, the following method, "Portable Ladder Used From TL Basket" is presented. This method does not preclude the use of life saving ropes where they are necessary; however, with proper instruction and practice, the operation described herein could prove more efficient, safer and faster than life saving ropes.

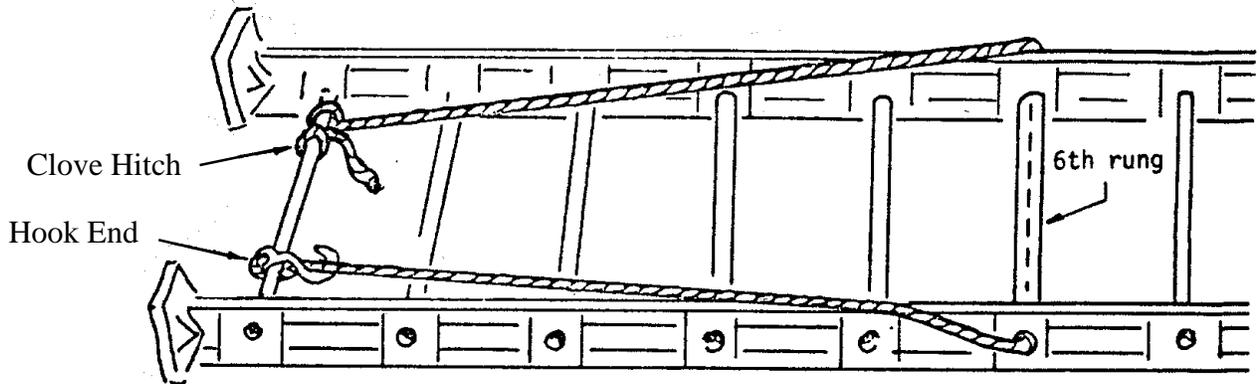
3.6.3 The purpose of the following operation is to extend the height capability of TL apparatus for LIFE SAVING PURPOSES ONLY UNDER EXTREME EMERGENCY CONDITIONS.

3.6.4 Operation of portable ladder from basket as follows:

A. EQUIPMENT

- ◆ One Tower Ladder
- ◆ One 20 Ft. Portable Ladder (preferably a combination ladder * Note 7)
- ◆ Life belt or Personal Harness for each member in basket if installed safety belts are not used.
- ◆ 15' of 1/2" rope fitted with hose strap hook at one end. (Fig. 8)
- ◆ Referred to as Basket Ladder Securing Rope.
- ◆ Stored on apparatus with 1/2" rope as shown.

Figure 8



B. OPERATIONS

1. Tower Ladder is positioned in accordance with instructions of Bureau of Training and Section 3 of this Publication, (Ladders 6) and basket lowered to street level.
2. 2 members proceed to basket, open basket gate.
3. 2 members remove portable ladder from bed and raise it to vertical position at a point just beyond the TL basket gate.
4. Members in basket, with the assistance of one member who raised ladder in street, take ladder into basket via open gate.

5. One raising man in street proceeds to basket to become third basket man. (One control man and two men for portable ladder operations). Other street man returns to regular ladder company duties, if required. (See Note 6)
6. Portable ladder is maneuvered to a position of tentative placement in basket.
7. Place securing rope around a substantial object in lower portion of basket, preferably the Stang pipe riser, using the hook end of the rope. The other end of the rope is set on the horizontal section of the waterway or the upper section of the rear basket main post, using a half hitch (See Fig. 9 Note 5).
8. Two men secure ladder in vertical position.
9. Basket is raised to the point of operation by control man in basket.
10. After reaching point of operation, control of basket is transferred to man at pedestal to prevent any movement of basket caused by accidental contact with controls in basket.
11. Portable ladder is adjusted so that both beams will touch building evenly.
12. Hands and feet are removed from all controls in basket and on pedestal.
13. Two men lower ladder into building.
14. Basket ladder securing rope is pulled taut and half hitch on waterway or rear post is converted to a clove hitch and binder.
15. One man butts ladder from front or rear of beams depending on the position of the ladder in the basket.
16. One man ascends ladder.
17. One man in basket renders whatever assistance is necessary.

NOTES :

1. Portable ladder is carried on apparatus with basket ladder securing rope threaded through the sixth rung from the butt. (Fig. 8)
2. A 25-foot extension ladder can be used in this evolution with difficulty. A 35-foot extension ladder presents even greater difficulty. **THESE LADDERS SHOULD BE USED WHEN NO OTHER ALTERNATIVE IS AVAILABLE.**
3. Tips of both beams of the portable ladder must rest on building. Cantilever position of the portable ladder is forbidden as it would cause dangerous stresses to be imposed on the ladder securing rope, the portable ladder, the tower ladder waterway or posts and the Tower Ladder itself.
4. At no time should the beams of the ladder touch the basket railing (Fig. 9)
5. Ropes shall not be secured to Tower Ladder gates or railing.
6. No more than three (3) men are permitted in the basket during this operation. When conditions permit, it is possible to perform this operation with only 2 men in the basket.

7. A combination ladder is a 20-foot portable metal ladder fitted with non-skid feet for use in Tower Ladder Basket. It also has hooks at the tip and standoff or offset rungs for use as a roof ladder. When used in the Tower Ladder basket, hooks are maintained in the bedded position.

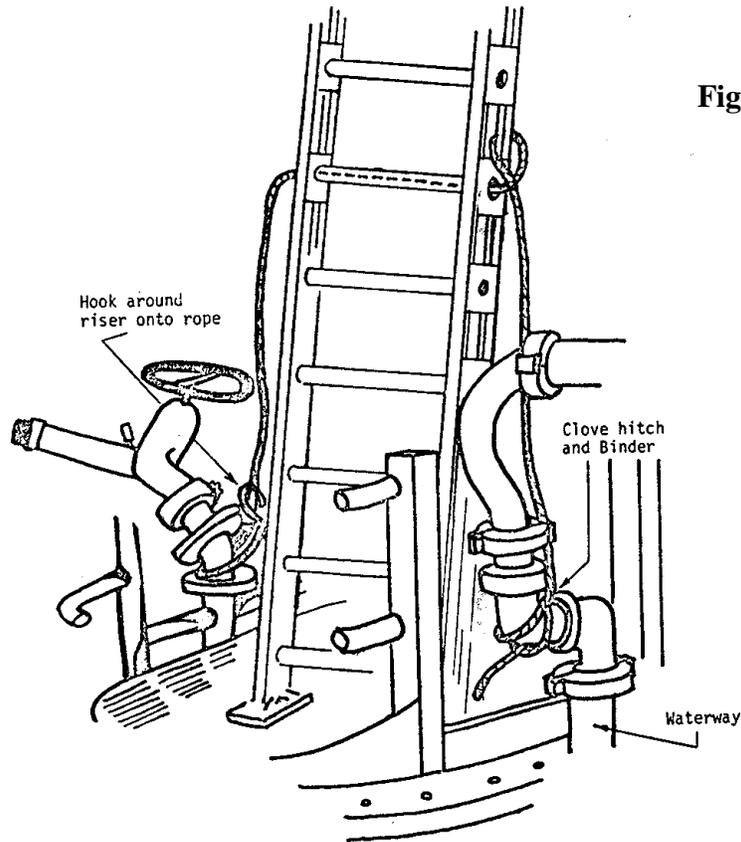


Figure 9

8. In accordance with Section 6.7.9 of this publication, Tower Ladder basket rail shall not be used for anchoring purposes.
9. A life saving rope shall be taken up in the basket if it is apparent that its use would assist operations.
10. When performing this operation during drills or training sessions, the Tower Ladder basket shall be raised to a position 2 or 3 feet above the ground.

11. Lateral basket movement induced by activity on the portable ladder can be reduced if the portable ladder can be raised in line with the boom of the Tower Ladder and the objective. In this case, the two (2) rear main posts of the basket can be used to secure ladder with the ladder securing rope. (Fig. 10)

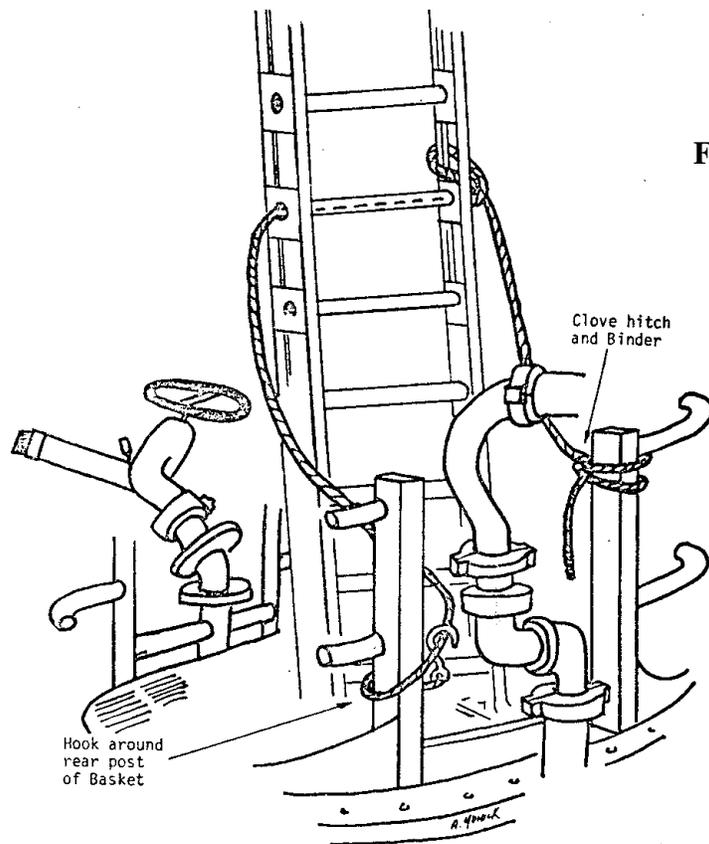


Figure 10

- 3.6.5 Revoked
- 3.6.6 Revoked

- 3.6.7 In the event a portable ladder is used from the basket to reach a victim, an assessment must be made as to whether the victim must be removed using this procedure. **AVOID THE RISK OF REMOVAL BY MEANS STATED ABOVE IF AT ALL POSSIBLE.**

NOTE:

1. The portable ladder from the basket reacts to any movement in the basket and movement on the ladder results in movement of the basket, lateral and vertical, and the portable ladder tends to "walk" especially when boom fully extended.

3.7 Special Calls

- 3.7.1 Officer in Command of fires special calling TL for use of elevated streams, shall clear access to fire building prior to arrival of TL. He shall also have supply lines stretched if possible. A supply source should definitely be designated prior to arrival of TL so that TL personnel can stretch their own supply line on arrival.
- 3.7.2 When TL is called to operate as a special unit at an incident, it should generally operate as a unit. The assigned personnel should perform duties centered around the function of this apparatus. This will allow the apparatus to be positioned, raised, operated and re-positioned without undue delay, thereby attaining the maximum efficiency possible.
- 3.7.3 The Officer in Command of fire where large caliber TL stream will be used shall consider special calling additional ladder company, or companies, to perform ladder company duties in place of TL personnel. This will allow TL's stream to be placed in operation more rapidly by use of TL personnel to stretch supply lines, permit alternating basket personnel during extended operations and have trained manpower readily available should it be necessary to re-position the TL.

3.8 Additional Factors

- 3.8.1 TL officer directs placement of apparatus. However, his area of responsibility (inside fire building) must not be neglected, particularly at tenements and other non-fireproof multiple dwellings. Prior instructions and active training of chauffeurs will assure proper operations of TL, and thereby relieve the TL officer from personally supervising operations. (Other than special called for TL operation)

4. OPERATIONS

4.1 Flat Roof

- 4.1.1 TL is a convenient, sure, safe means of access to the roof. In some cases, such as Row Frame and Brownstone buildings, it may also be the fastest means of access.
- 4.1.2 When used for ventilation purposes, an axe, halligan, power saw, 6' hook and life saving rope must be placed in bucket. Personnel shall make full use of installed safety belts and/or Personal Harness. When roof is isolated, pedestal man shall make certain that basket is not moved until all personnel are safely back in the basket and maintain Handie-Talkie contact with personnel on roof. If a life hazard should appear requiring-movement of boom, the pedestal man shall so advise roof personnel prior to movement.
- 4.1.3 When encountering a roof with an exceptionally high and/or steep cornice, judgment must be made as to the stability of the roof and, if doubtful, the use of the life saving rope from basket shall be used to get on roof. Rope will be tied to a substantial part of basket (rear metal post). It will also be of assistance in regaining position in basket especially if the cornice is sloped, steep, high or slippery.
- 4.1.4 When operating on roof of questionable stability, with hand tools or power saw, full use of the Personal Harness and life saving rope shall be used to limit travel of operator of tool to a radius of no more than ten feet from basket. Rope shall be tied to a substantial part of basket and operator shall use knot used in Section 4.3.1 C. (bowline with 15' loop) and Personal Harness. This pertains to an isolated roof where ventilation cannot be performed from an adjacent roof, without stepping fully onto the roof of the fire building. Back-up man or guide man shall have a firm hold of rope.

4.2 Peaked Roof

- 4.2.1 On most peaked roofs effective operations may be performed directly from the basket. There are some situations, however, where because of parapets or set-backs the basket cannot reach the roof surface. In these cases the use of a hook ladder in conjunction with the TL is indicated after placing the basket at a self contact point.

4.2.2 When instability of the roof is suspected, exercise extreme caution:

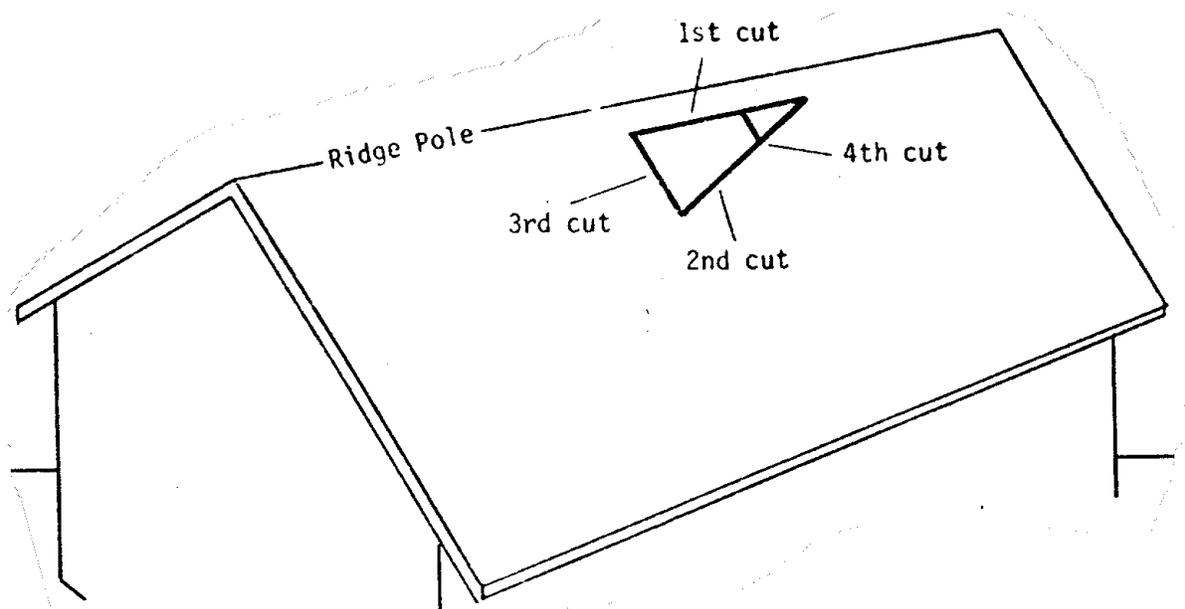
- A. Keep basket close to roof level. Secure members to basket with life saving rope. Do not engage in prolonged operations.
- B. Use portable ladder, laid flat on roof, to help distribute weight of member(s) over a greater area.
- C. If condition permits, place basket onto the roof and have members work from the basket.
- D. When operating on taxpayers and similar structures with hanging ceilings, ten foot hooks or portable ladders may be used to push down ceilings below roof openings, operating from basket.

4.3 Utilization of Power Saw from Basket

4.3.1 Power Saw can be effectively used from basket to open up peaked roofs as follows:

- A. Position basket on roof as close to ridge pole as possible. Check stability of roof with available tools.
- B. Saw is started in basket and then held outside the basket. It shall be kept outside until shut off.
- C. Operator shall wear installed safety belt. This belt gives him enough play to reach the edge of the platform and have one foot on roof. If safety belt is not used, for any reason, the Life Saving Rope shall be tied to a substantial part of the basket, other than the railing, with a bowline. The loop of the bowline shall be large enough to reach the edge of the basket platform.
- D. Saw operator hooks his Personal Harness to loop in Life Saving Rope, places one foot on roof and other in the basket. Back-up man takes a firm hold on the operator's Personal Harness or Life Belt.
- E. Make 1st cut parallel to ridge pole and follow as shown in diagram:(See Fig. 11)
- F. Proceed to remove cut roofing with 6' hooks and push down any ceiling below.
- G. Area beneath basket area shall be kept clear to prevent injuries from falling objects and tools. As an added precaution, a utility cord shall be attached to handle of saw to prevent it from falling. Cord to be lashed to basket or held by back-up man.

Figure 11



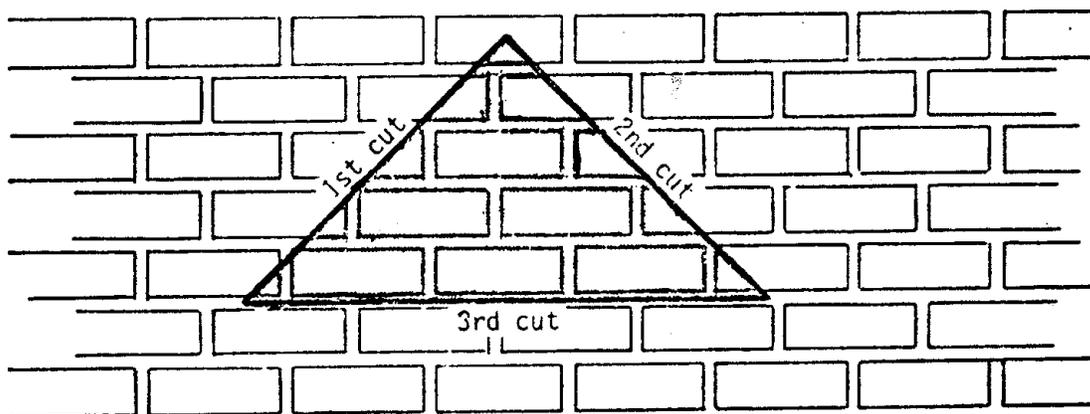
Note: The size of the cut will depend on the reach of the operator. He shall never over-extend himself. Re-position basket if larger opening is necessary.

4.4 Breaching Walls

4.4.1 Exterior walls can be breached with power tools. Breaching may be necessary to gain access for life saving or stream penetration. This is an arduous operation requiring frequent relief of saw operator.

- A. Power saw with proper blade is used for brick and concrete work.
- B. Where necessary, electric or pneumatic hammers may be used for breaching work from basket.
- C. Cuts in brick walls should be triangular form with vertex angle upward to prevent further collapse. (See Fig. 12)

Figure 12



- D. 1st and 2nd cuts should be at brickwork since easiest cut is at mortar joint and blade at this point will be worn. Cut at mortar joint may not be necessary since bricks along this plane can be loosened and removed easily with hand tools.

Note: Make opening large enough so saw can be inserted to cut inner wall if necessary. Usually on two course brick wall the second course can be remove by hand tools, or if heavy stream is to be used, by the stream itself. Opening can also be enlarged by use of the stream. Frame building shingles, siding, roof shingles and boards can also be removed by use of the stream if fire conditions pre-empt structural damage.

5. RESCUE AND REMOVAL PROCEDURES

5.1 General Removal Procedures

- 5.1.1 The full capability of the TL can be realized when there are many persons to be removed, and/or victims are unconscious, incapacitated or obese.
- 5.1.2 Rescue via basket is effectuated in several ways. Entering and exiting from basket shall be through the double-acting swinging gates. Initially the basket is elevated to a point where the middle railing of basket is level with the window ledge, or level with the top railing of the fire escape.
 - A. Middle basket railing positioning permits placement of basket flooring at a level where a person can easily step onto it without the usual straddling of window sills or fire escape railings.
 - B. To facilitate removal of incapacitated or obese victims, position the top basket rail level with the window sill or top rail of fire escape.
- 5.1.3 Positioning of basket must be such that the Stang nozzle will not interfere with the rescue operation. This will require an angular approach that will permit ease in entering or alighting from basket.
- 5.1.4 To expedite placing basket at window, place apparatus parallel to the objective so that the basket is in line with the window or target. This position will shorten horizontal travel distance, reduce time required to reach target and insure angular approach.
- 5.1.5 Parapetless roofs can be safely approached by actually placing the basket directly on the roof, if possible, especially when ice conditions are encountered, to effect removal of persons trapped thereon.

- 5.1.6 When many trips of the basket are required to remove a great number of occupants, safe removal need not necessitate delivery directly to the street level. Where time is crucial, occupants may be placed at lower levels of the fire building, an adjoining fire escape, an adjacent roof, or any other area of refuge. When necessary a member shall remain with the group so removed to prevent panic.
- 5.1.7 In order to facilitate operations and maximize safety of members, where feasible, consideration should be given to use of Tower Ladder basket to return personnel and equipment to ground level from upper levels of buildings. This is especially appropriate at vacant buildings and extensively damaged buildings where visibility is limited and stability of stairs are a problem.

5.2 Special Removal Operations

5.2.1 Removal using Stokes Stretcher

- A. Additional equipment needed:
- ◆ Blankets
 - ◆ Life saving rope
 - ◆ Resuscitator if required
- B. Speed is generally of less importance than a smooth and careful operation.
- C. A smooth operation is imperative when descending with the Stokes basket.
- D. The Stokes basket may be placed in an upright or diagonal position and leaning or lashed to a solid part of basket railing. This position enables two members to administer first aid if necessary. The Stokes may also be lashed to the top railings of the basket, however, this is more time consuming, limits administering of first aid and a conscious victim will possibly feel insecure since part of his body will be beyond rail of basket. Stability of rails to be considered.

Note: To insure smooth operation of basket maneuver, the pedestal man should perform the lowering operation, if conditions permit. (Diagonal placement easier and safer.)

5.2.2 Chair Carry Removal

Injured or incapacitated persons can be removed with a "chair carry" and delivered to the street level via basket. This carry will permit more than one such removal simultaneously.

5.2.3 Removal from Upper heights (Bridges, elevated highways, buildings under construction, etc.)

A. Place TL at a strategic location directly below area involved.

- ◆ Use as an exterior elevator.
- ◆ May eliminate the necessity of ambulance traveling on congested elevated highways thereby avoiding delay.

Note: Do not extend basket at level over highway or elevated train structure. This to eliminate possibility of basket being struck by traffic or train. Members shall use extreme care in leaving the basket to go on to an elevated roadway or rail structure.

6. STREAM OPERATIONS

6.1 Authority and Responsibility for Use of TL Streams

6.1.1 Only the officer in command of operations may order the use of TL streams.

6.1.2 Large caliber outside streams generally should not be directed into occupied buildings. Members must be warned and occupants be removed before starting water. However, in some circumstances fire conditions or life hazard may demand such use.

EXAMPLES:

1. Fire extending via cockloft and top floor untenable.
2. A stream, preferably fog used at an acute angle to building, used to protect people on the fire escapes because fire is emitting from windows below them. Use of stream at an angle, if possible, reduces forcing fire into building effecting personnel or occupants still within. The persons on the fire escape are protected by the stream while the basket moves in to remove them. Stream also used to prevent extension of fire due to auto exposure from floor to floor via windows. Fog stream reduces possibility of causing injury to persons on fire escape as opposed to solid stream.
3. In the event hand lines cannot advance due to fire conditions, a fog stream, into floors of certain type occupancies such as M.D., office, etc., where many windows are accessible to a given occupancy, a rapid traverse from window to window effects a quick knockdown of the fire. This allows the Engine Company to move in for final extinguishment. Use of fog reduces structural and water damage as opposed to a solid TL stream. It is assumed that all occupants have been removed or in a protected area prior to the decision to use the TL, whenever possible. It should be noted that with increased use and experience, a TL stream can be delicately controlled thereby reducing the adverse effects associated with the use of large caliber streams. The stream does not always require operation at its full potential in, order to be effective.

6.1.3 The air movement resulting from large caliber stream use must be considered. This air movement effect of the stream will drive heat and combustible gases into uninvolved areas of the building. It is not uncommon to see actual fire being driven into other portions of the building. Officers must make allowance for this contingency.

6.1.4 When the officer in command changes strategy from an interior attack to exterior attack which will require large caliber stream from TL, all units operating within or in close proximity to the building shall be warned by Handie-Talkie. When units are ordered out of the building or an area, they shall inform the officer in command when they have complied with the order. TL operator shall not start water until assured that all personnel are cleared of building and area at rear and/or sides of building, unless immediate life hazard deems starting water as soon as possible. In such event the stream shall be used in a manner to minimize affecting personnel not clear of building, or to protect persons or personnel seriously exposed and/or trapped by fire.

6.2 Employment of Streams

6.2.1 Developments requiring the use of TL streams shall be anticipated. Preparations for such usage shall be made as early as possible.

6.2.2 When fire building is heavily involved on several floors, heavy stream delivery should generally start at the lowest level and work upward, effecting a quick knock-down on the way up to top floor and/or cockloft area, in order to protect members in basket operating at the highest level. Prevention of fire spread upward or extension via cockloft is the prime objective. Basket personnel and pedestal man shall frequently assess conditions on lower floors previously passed. Operation into lower floors may have to be repeated in order to protect members in basket to continue operations at highest level.

6.2.3 Positioning the nozzle close to and low in the window will insure:

- A. Opening ceiling with stream to expose fire area or cockloft and extinguish fire therein. Operation into cockloft, work stream from party wall of most serious exposure toward center of building then from party wall of other exposure toward center or a roof opening.
- B. Maximum stream penetration.
- C. Good deflection off ceilings and walls.
- D. In extreme situations the stream through attic window of peaked frame dwelling can be used to ventilate by literally blowing off the roof.

- E. Removal of partitions with stream and/or moving stock to reach seat of fire.
- F. Initially reduce members in basket being exposed to escaping heat at higher level of window operations.

However, primary consideration must be given to the safety of members, particularly in commercial buildings. The TL should be positioned and the boom maneuvered in such manner that damage from falling cornices and collapsing buildings will be avoided. Where stability of the building is in doubt, the basket shall be placed in a manner minimizing the effects of falling walls, etc. even if it results in a penalty in terms of effective reach of streams, i.e., if possible, the basket should be placed at least the same distance horizontally from building as it will be vertically below the top of the wall.

- 6.2.4 Increasing nozzle pressure within allowable limits will often allow partition and sidewall penetration.
- 6.2.5 Openings made in exterior walls or cornices will often permit TL stream application on the seat of the fire. Power tools should be fully utilized.
- 6.2.6 Stang Intelligent nozzle is so constructed that the nozzle can be directed downward below the basket. This application is effective in situations where the basket is positioned above obstructions or directed into cellar areas.
- 6.2.7 The stream shaper with 1-1/4" nozzle attached shall be normally carried on the Stang nozzle to be used when a straight stream is ordered. When a fog stream is ordered, the stream shaper and tip shall be removed and the fog nozzle placed directly on the looped barrel.
- 6.2.8 When not in use the Stang nozzle shall be secured to the Stang base waterway by a short length of rope or strong elastic. It may also be secured by a short rope to one of the main posts at rear of basket, however, this limits mobility of members when nozzle not in use. Lashing of the Stang nozzle will prevent damage to the Stang nozzle due to vibration or road irregularities during apparatus response. Layers of tire inner tube around flange of Stang waterway will prevent damage to the nozzle. Securing the nozzle to the railing of the basket is not recommended since vibration can weaken railing.

6.3 Positioning Basket

- 6.3.1 The TL can direct elevated streams at angles and from positions heretofore unobtainable, i.e. , directly into windows at close range, over roof parapets, at street level, with wide lateral range and even below grade. In addition, members are at the point of stream application for control and direction. Opportunity is also provided for opening structural components to provide improved stream penetration. Should fire conditions require, the boom can be extended inside a building via a large window or other opening. If, for example, stock piled high and in danger of falling and injuring personnel with a hand line or should the floor area be of doubtful stability, the nozzle of the TL can be locked in position, personnel removed from basket and basket extended into building directing stream by maneuvering boom. However, this should only be done at the direction of the officer in command of the fire and only after the stability of the structure has been verified.
- 6.3.2 When used to provide elevated streams, care must be taken to avoid the collapse of walls on the basket or boom. If fire has been burning for a considerable period of time and stability of the building is doubtful, the following guidelines are recommended:
- A. Keep basket beyond the collapse area of the building when possible.(See Section 6.2.3).
 - B. Expose a minimum section of the boom.
 - C. Position apparatus so that basket can be placed at the edge of the building thereby limiting exposure of apparatus in event of collapse. Use two tower ladders, one at each edge if necessary, to obtain full coverage of building.
 - D. Directing a stream from above roof area into openings to attack a cockloft fire is generally counter productive, unless collapse has been extensive and an exterior attack is in progress. This practice will push fire and heat back into building and probably cause the hanging ceiling to collapse.
 - E. Using a large caliber stream onto roof of building with peaked, hip, or domed roof with a parapet could result in buildup of water at parapet if run-off is inadequate and thereby possibly cause collapse of parapet. Take steps to assure such buildup is relieved before moving to operate basket below parapet if such condition exists.
- 6.3.3 Street level attack at taxpayer most effective if stream is used to penetrate ceiling and collapse it, thereby exposing fire in cockloft and enabling extinguishment of fire therein. Time lost in breaching wall to reach cockloft could mean extension to exposures and, as stated above, attack from above through roof openings is usually counter-productive.
- 6.3.4 The encircling base of the basket also serves as the waterway to the Stang pipe. Basket and pedestal operators shall use extreme caution during operations and placement of the basket so as to prevent damage and/or rupture of this waterway.

6.3.5 When large caliber stream is to be discontinued or the direction of the stream changed, the relief and/or change of the nozzle back pressure can cause the basket to strike the building or other object, possibly causing injury to members and/or damage to basket. When operating with boom extended beyond corner of building or near other object such as a lamppost, elevated structure, etc., this movement caused by changed direction of reaction can result in boom striking the building or other object and possibly result in damage to boom and/or main waterway and/or injury to members. Judgment shall be used to keep basket and boom positioned and operation of stream controlled to avoid such incidents.

6.4 Foam Operations

6.4.1 Foam may be delivered via the tower ladder basket to previously inaccessible areas. The mobility of the TL allows foam to be applied with great accuracy.

6.4.2 Methods

- A. The Foam unit can deliver foam solution to gated siamese at the base of the tower ladder. A foam nozzle, preferably a modified Angus Foam Cannon, must be used.

6.5 Movements from One Location to Another with TL Stream Application

6.5.1 When distance is short and sufficient slack is in the line, the TL may be moved without disconnecting lines if adequate manpower is available. Men are placed along hose lines and hose carried as TL is repositioned. TL shall not be moved with boom in raised position. Water is not shut down at the TL siamese, but at the supply pumper.

6.5.2 If distance is great and hose lines must be disconnected, lines shall be stretched and ready at the new location before shutting down TL stream. Such movement must be anticipated so that little time is lost in repositioning.

6.5.3 If a TL upon arrival finds the intensity of radiant heat preventing the positioning of TL at the most advantageous position for TL operations, the Officer in Command shall have a hand line create a protective water curtain, position apparatus, raise boom and swing it away from fire until water to TL arrives. If this is not possible or feasible, he shall select a safe, temporary location of operation, allowing enough slack in supply lines to readily re-position TL after the fire has been sufficiently darkened down to permit re-positioning TL for better coverage of fire building.

6.6 Water Delivery

6.6.1 For optimum effectiveness of TL streams, the following guidelines are to be considered:

- A. A **Satellite Water** Unit is the best source of supply, if available. Largest diameter hose is used.
- B. Supply water to base of TL at 200 to 250 psi.
- C. Relief valve of TL should be set at 250 psi.
- D. Generally only one source at base of TL is used.
- E. Conventional pumpers should be placed as close as possible to the TL. If necessary, relay operations should be employed to achieve desired placement of pumper adjacent to TL.
- F. Relay pumper can take water from more than one source.
- G. Relay pumper adjacent to TL should have in excess of 80 psi intake pressure with water flowing. In this way, the relay pumper can operate in volume position and still deliver close to 250 psi.
- H. When necessary to shut down or to regulate pressures, do so at the relay pumper and not at the TL base gated siamese.
- I. Be prepared to move TL for greater effectiveness as conditions change. With proper teamwork the relocation can be accomplished within minutes.
- J. Unless operations can be greatly facilitated, do not use TL as a standpipe. This immobilizes the unit for other services. TL could be used to stretch line up exterior with Engine Co. personnel, line lashed into building and engine operations commenced, freeing TL for other operations.
- K. When stretching 3-1/2" line to TL siamese, stretch male end to TL whenever possible to avoid need of extra fittings and time loss.
- L. Whenever possible and conditions permit, water supply to TL shall be from pumper and water source other than that supplying the 1st due companies handlines.
- M. All hose connections at TL shall be spanner tight to avoid leakage:
 - 1. In winter the water freezing causes unsafe conditions.
 - 2. In summer it creates a slippery condition on diamond plate of apparatus and in street where there is usually hydraulic fluid leakage.
 - 3. May spray the pedestal operator with water, affect electrical components at pedestal control and create unsafe footing on pedestal.
 - 4. Apparatus jacks and/or outriggers could be undermined.
 - 5. After water started, connections are difficult to tighten.
 - 6. Spray from loose connections looks unprofessional.

6.6.2 Flows and Nozzle Pressure/Reactions.

- A. The basket Stang utilizes various constant flow large caliber tips:
 - 1. Imperial 1000 gpm fog nozzle.
 - 2. Elkhart 2-1/2" Select-O-Flow "sidewinder" fog, flows of 300, 550 and 750 gpm.
 - 3. Imperial Black Widow fog nozzle 700 gpm.
 - 4. Open nozzles of 1-1/4", 1-5/8", 2".
- B. Back pressures of 600 lbs. and over must be expected when dealing with greater discharges.
- C. Nozzle pressures generally should not exceed 100 psi with a relief valve setting of 250 psi. However, members operating the nozzle should note pressure variations on the Stang nozzle gauge.

6.7 Precautions

- 6.7.1 Officer in Command of operations and the TL officer should be alert to possibility of collapse when heavy stream delivery is involved. This precaution is especially pertinent when no appreciable run-off is noted. Continual observance of the depth of the water accumulating on floors is essential. Upon shutting down TL stream, it shall be the duty of the TL officer to survey each floor in regard to run-off, water laden stock, structural damage resulting from fire and/or operation of heavy caliber stream, or any other condition he might observe that could be a danger to members if interior mop up and overhaul contemplated. He shall relay his findings to the Officer in Command for consideration before committing forces for an interior attack, mop up or overhaul.
- 6.7.2 Units shall not be engaged in interior operations while TL heavy caliber stream is in operation unless life hazard is involved. If TL stream is to be used for a quick knock-down in order to enable interior forces to advance, these interior forces shall be withdrawn to the floor or floors below depending on extent of the fire and the condition of the structure. The power of the TL stream can endanger members in the stairway by sending structural material and/or heat and smoke into this area. They should seek temporary refuge in an apartment or other isolated area.
- 6.7.3 Fog nozzles require adequate openings opposite the point of stream application to accommodate the air movement that will ensue.
- 6.7.4 When a Satellite Water Unit is supplying TL, the possibility exists of excessive pressure developing in the TL water system in spite of its relief valve setting at 250 psi. The TL officer and Satellite Water Unit officer must coordinate their efforts and keep in constant communication with each other via Handie-Talkie to assure the desired results needed for safe operation. Under most conditions, the pedestal man of TL shall maintain communications with Satellite Water Unit, and members of TL not engaged in operation of basket, shall monitor incoming pressures.

The pedestal man of TL being supplied by the Satellite Water Unit, and other members of TL unit, specially if initial line is to the 4-1/2" inlet, shall prohibit other lines from Satellite Water Unit manifold, or other source, to be fed into gated siamese of TL until 4-1/2" supply shut down. Relief valve at TL will not handle excessive pressure and water, and could result in a ruptured waterway and/or possible flipping of the basket and injury to members.

- 6.7.5 Apparatus can jump out of P.T.O. due to vibration and boom will move laterally as a result of gravity and/or nozzle reaction. Controls at basket and pedestal will not respond until pedestal man, or other member, re-engages P.T.O. in cab. A cotter pin to hold P.T.O. locking lever in place will eliminate this malfunction.
- 6.7.6 Loss of control at basket can result if contacts become wet and/or Iced and/or dirty. Usually only one control movement is affected, e.g., left or right, extend or retract, etc. Depressing the control handle at basket without engaging "deadman" and rotating control handle vigorously several times usually results in restoration of control. If this procedure does not clear condition, operation must be controlled from pedestal.
- 6.7.7 Hydraulic lines to boom can be damaged if boom rotated with apparatus motor covers in raised position.
- 6.7.8 Extreme caution to be used when placing apparatus in position in vacant lots to avoid damage to undercarriage and/or hydraulic lines due to irregular terrain, broken pieces of concrete or other rubbish.
- 6.7.9 Aluminum railings installed around the basket of TL are for the purpose of safety to members operating in the basket. These railings are not designed for excessive pressures such as may be created when railing is used for anchor purposes. Use of these railings for anchor purposes or point could cause failure of railing members and/or welded joints, and serious accident/injury to personnel. Officers shall insure that these aluminum safety railings are not used for other than the intended purpose (i.e., safety).

7. OVERHAULING

7.1 General

- 7.1.1 The platform of the basket provides a stable and secure area from which to work, and the boom a maneuverable and effective means of access for exterior overhauling when stability of the building is doubtful or when exterior access is more desirable and efficient. It also provides a ready means for lighting in overhauling operations.
- 7.1.2 The top of the basket railing should be positioned slightly below work area .

- 7.1.3 Power tools can be secured or supported by rope placed through windows above, or other substantial object above operation, or a properly placed short ladder from basket as per Section 3.6.4. Using utility rope passed over an upper rung and secured to the power tool, the back-up man holds the other end of rope with enough tension to relieve the weight of the tool thereby reducing strain on tool operator.
- 7.1.4 Area below basket shall be kept clear. Members not engaged in overhaul operation shall be used to maintain area clear.
- 7.1.5 Boom shall not be used:
 - A. To force timbers or cornices back into building or onto roof.
 - B. To pull or push objects.
 - C. As a derrick.
- 7.1.6 Basket shall not rest against building wall as the movement caused by members in basket may cause chafing action that could damage basket and/or waterway.
- 7.1.7 In extensive overhauling operations, the officer of the TL should assure adequate manpower for basket operations. For example, working on the removal of a cornice may require the services of two members and an officer, while one man working alone in basket is usually sufficient for overhauling window frames.
- 7.1.8 During overhaul stage in buildings where the stability of stairways is questionable, or stairs are missing, severely damaged or obstructed, interior hose line placement on various floors may be accomplished by use of the TL. Faster and safer washdown operation can be accomplished in this manner. Use of one length from the Stang of TL possible for washdown. However, water supply must be controlled at TL siamese or pumper and nozzle left cracked open until waterway of TL is drained on completion of the operation. If nozzle is closed during retraction of boom and boom is not drained, and/or water still being supplied, and/or gated inlets are closed, the waterway could be damaged.

Note: This practice must be closely supervised in order to prevent personnel venturing into unstable areas.
- 7.1.9 Stream from TL can also be used for the removal of shingles, siding, roofing, brickwork, or possible demolition if building condition presents serious hazard.
- 7.2 Removal of Objects that are in Danger of Falling
 - 7.2.1 Signs, timbers, or other building members may be secured with general purpose ropes or cables and tied to some substantial object inside the building or on the roof proper.

7.2.2 When materials are not too heavy and size is not prohibitive, they may be placed inside basket and lowered to street, onto floor, up to roof, whichever is most convenient. Such items should not protrude beyond basket railing.

7.3 Cornice Operations

7.3.1 Cutting, examination, removal, and stream operations.

- A. Power saw and bolt cutters are to be added to normal compliment of tools.
- B. To cut cornice into sections for examination and/or removal.
 - 1. Use power saw or ax for necessary cutting.
 - 2. Six foot hooks or general purpose rope used for holding cornice while cutting is being done.
- C. If fire conditions permit, preserve the integrity of the cornice by making openings at the ends. (Makes for easy repairs.)
- D. To free cornice:
 - 1. Use six foot hooks and general purpose ropes to hold cornice while manageable size pieces are being removed. Secure cornice and sections to be removed.
 - 2. Metal hangers of cornice may be cut with bolt cutters or power saw. (Bolt cutters usually suffice.) These hangers should be cut last.
 - 3. The sections cut are then placed on the roof, or lowered to street with basket, if necessary.
 - 4. Do not use basket to remove large sections of cornice.

7.3.2 If roof and building are safe, large sections of cornice are lashed by basket personnel and the rope given to other members on the roof. A large sign is lashed by basket personnel and rope passed by basket personnel to members on the roof or at windows directly above the sign. The rope is secured before the cornice or sign is loosened by basket personnel. The cornice or sign is then pulled to the roof or lowered to the street thereby avoiding the danger of falling pieces and/or scaling of metal sections.

8. OTHER UNUSUAL OCCURRENCES - PRECAUTIONS

8.1 Live Wires on Apparatus

8.1.1 Live overhead wires can present a problem if they fall on the apparatus. It is possible for the apparatus to be energized, particularly if the jacks and outriggers are down in place. If this should occur:

- A. No member shall touch the apparatus. Safeguard civilians and other unsuspecting members. Also consider supply line and supply pumper.
- B. Immediately notify the Officer in Command that TL is out of service.

- C. Notify the utility company and rescue to respond to cut the wire used to remove the wire from the apparatus.
Secure the wire and post a guard until turned over to the utility company.

Note: Consideration should also be given regarding operations of TL during severe lightning storms. Apparatus is grounded and usually wet during stream operations and in many instances higher than surrounding objects or buildings.

9. TAKING UP

9.1 Draining waterway and bedding apparatus

- 9.1.1 Drains on main waterway should be opened while boom elevated at a sixty degree angle, feedlines at gated siamese removed and gates of siamese opened.
- 9.1.2 After boom has been bedded the drain plugs at basket base shall be removed to insure entire system drained. Essential during winter operations.
- 9.1.3 [Stay clear of the danger area when the chauffeur is retracting the outriggers. \(See REFERENCE # 1\)](#) After retracting jacks and outriggers, the boom shall be re-bedded. The boom has a tendency to rise from the bedded position after jacks and outriggers have been retracted. If left in this position, the boom will bounce when apparatus is on the road resulting in damage and possible loss of tools carried in the basket.
- 9.1.4 Hydraulic pressure relief valve is to be opened after the boom is bedded and jacks and outriggers seated.
- 9.1.5 Apparatus to be out of P.T.O. before moving. Moving apparatus while in P.T.O. could result in damage to the drive train and hydraulic system.

9.2 Boom Limit Switch and Limit Switch Finger

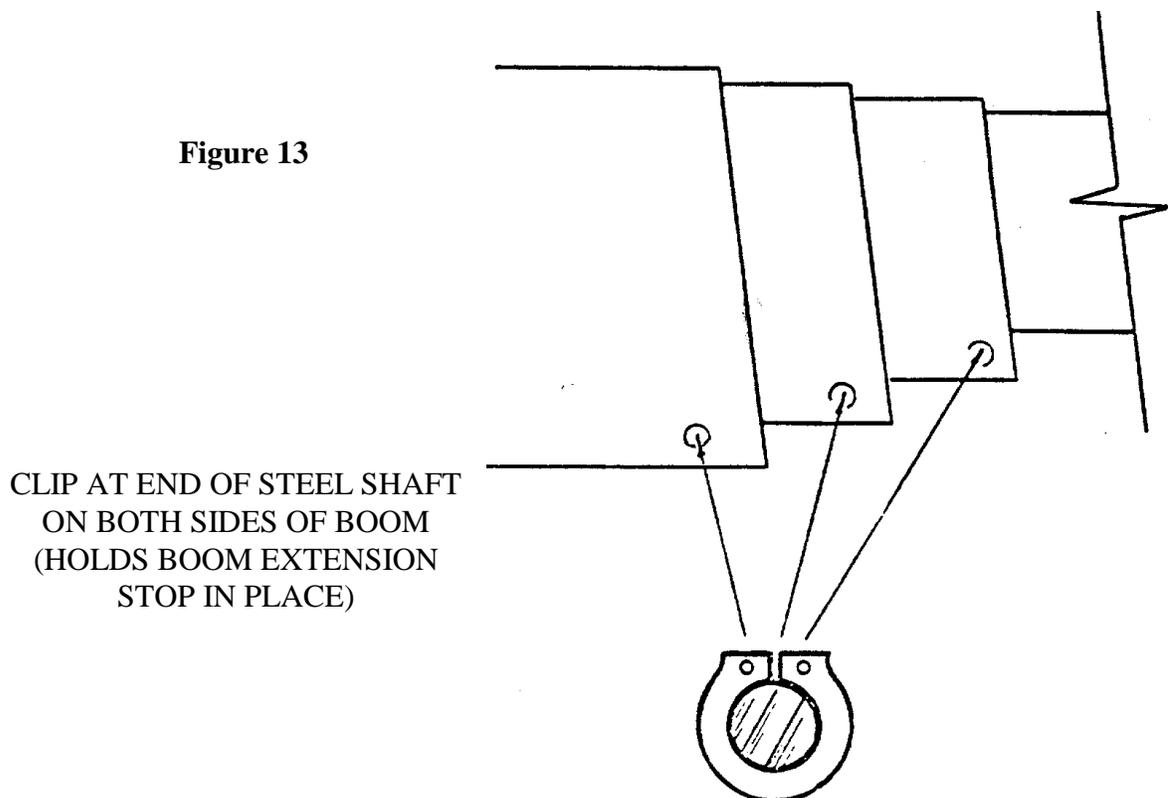
- 9.2.1 The Boom Limit and Limit Switch Finger are located on the underside of the boom where the boom sits in the apparatus cradle. When the Limit Switch Finger touches the boom cradle, it throws the Boom Limit Switch, preventing the boom from being lowered further.
- 9.2.2 The Limit Switch Finger can stick in a canted position. This can be caused by ice. If the boom is raised, it cannot be lowered.
- 9.2.3 Moving the Limit Switch Finger with a 6 foot hook can correct this condition. If necessary to move the Limit Switch Finger manually, the Fleet Maintenance Division must be notified.

10. GENERAL INSPECTION OF APPARATUS

10.1 Inspection for Safety and Maintenance

10.1.1 The following shall be inspected daily:

- A. Basket and pedestal railings, basket gates and locks for looseness or defective welds and/or cracks.
- B. Welds at base of basket riser to Stang waterway, welds at pistons at base of boom and at basket level, welds at jacks, outriggers and at turntable. Cracking of paint over welds can indicate development of hairline crack at weld.
- C. Condition of safety belts installed in basket.
- D. Test of intercom operation, and electrical outlets at basket, lights.
- E. Level of platform of basket.
- F. Evidence of hydraulic leaks at all connections.
- G. At the end of each boom section, with the exception of the last sliding section, is a steel rod held in place by a spring clip or nut. Visual check of condition of clip or presence of clip shall be performed. (See Fig. 13)



- H. Check to see that no tools or equipment carried in bed will strike cable reel.
- I. If tools carried under chauffeur's seat, precautions or provisions must be made that these tools do not come in contact with electrical unit located under seat, in order to avoid shorting out electrical system.

- 10.1.2 During Multi-Unit drill, at operations or in quarters, a visual check of compression and tension bolts at turntable 5th wheel shall be made for missing or sheared bolts. A hand check for tightness of those bolts that are accessible shall be made.

- 10.1.3 During bleeding of air brake tanks, a visual check of hydraulic lines to main reservoir shall be made, noting any developing cuts or other signs of possible failure of these lines. In addition, a visual check for broken spring sections shall be made.

- 10.1.4 The inclusion of the above mentioned inspections in addition to the normal check and maintenance, e.g., level of oil, hydraulic fluid, brakes, etc., takes only a few minutes and early detection of possible defects can make corrective maintenance easier, insure proper operation of apparatus, and most important, reduce danger of injury to personnel.

BY ORDER OF THE FIRE COMMISSIONER AND THE CHIEF OF DEPARTMENT

REFERENCE # 1
(FORMERLY SAFETY TIP # 126)

STAY CLEAR!



When chauffeur is operating the tormentors - Keep a safe distance from apparatus, as the tormentors move up, the entire rig moves downward and can cause severe injury, particularly to legs and knees.