HOSE AND HOSE APPLIANCES

SAN FRANCISCO FIRE DEPARTMENT

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Hose and Hose Appliances
January 2008

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Published by:

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2310 Folsom Street
San Francisco, CA
Phone: (415) 970-2000

REVISED: January 2008

FOREWORD

The goal of this manual is to establish standard operating practices as authorized by the Chief of Department and implemented by the Division of Training.

The purpose of this manual is to provide all members with the essential information necessary to fulfill the duties of their positions, and to provide a standard text whereby company officers can:

- Enforce standard drill guidelines authorized as a basis of operation for all companies.
- Align company drills to standards as adopted by the Division of Training.
- Maintain a high degree of proficiency, both personally and among their subordinates.

All manuals shall be kept up to date so that all officers may use the material contained in the various manuals to meet the requirements of their responsibility.

Conditions will develop in fire fighting situations where standard methods of operation will not be applicable. Therefore, nothing contained in these manuals shall be interpreted as an obstacle to the experience, initiative, and ingenuity of officers in overcoming the complexities that exist under actual fire ground conditions.

To maintain the intent of standard guidelines and practices, no correction, modification, expansion, or other revision of this manual shall be made unless authorized by the Chief of Department. Suggestions for correction, modification or expansion of this manual shall be submitted to the Division of Training. Suggestions will be given due consideration, and if adopted, notice of their adoption and copies of the changes made will be made available to all members by the Division of Training.

Joanne Hayes-White
Chief of Department

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SECTION 1. FIRE HOSE

GENERAL HOSE MANUAL INFORMATION

The purpose of this manual is to present those basic standard practices which have been accepted by the Division of Training as being essential to efficient hose handling throughout the San Francisco Fire Department. The hose practices set forth in this manual are not presumed to be applicable to all firefighting situations. It is expected that efficient firefighting may often depend upon the initiative, training, ingenuity, and judgment of the company officer in the modification of a standard practice to overcome actual fire-ground difficulties.

The scope of this manual does not include those phases of hose handling operations set forth in other SFFD manuals, except where duplication is necessary for continuity of presentation, or where the subject is considered to be of such importance as to merit repeating.

Fire hose is perhaps the most essential of all fire Department equipment because it is the means by which water is carried from the source of supply to the point where it is to be used in firefighting operations. To attain the highest efficiency possible with its use, and to care for it properly in order to maintain its value, it is necessary that all firefighters have a good basic knowledge of fire hose construction and what can be expected of it.

CLASSIFICATION OF FIRE HOSE

Fire hose may be divided into two basic classifications:

1. Suction hose
   a. Hard suction
   b. Soft suction
2. Discharge hose

Suction Hose

Suction hose is used to connect a pumper to a source of water; either supplied under pressure, such as a hydrant, or to a source of water from which the pumper must draft, such as a cistern. There are two types of suction hose.

Hard Suction Hose

Hard suction hose is a non-collapsible rubber hose, 12 feet long and 6 inches in diameter. This type of hose is semi-flexible so that it can be connected to a drafting hydrant or be placed into a static water source. These hoses are rated at 30 psi

maximum. NOTE: if static pressure from a suction hydrant exceeds 30 PSI, hard suction hose is not to be used. The expansion rings on the hose fittings may separate from the hard suction hose due to excessive pressure.

A suction strainer is used on the end of the hard suction that is placed in the water when drafting from an open body of water to prevent debris from entering the pump through the unprotected end of hose.

Soft Suction Hose

Soft suction hose is carried on all engines and is used to connect the pumper to a hydrant. The soft suction hose is made of pliable rubber, 4" in diameter, and is usually 12 to 15 feet long. Each end of the hose has a 3" female swivel fitting made of Pyrolite. These female swivel fittings have hand lugs, which eliminate the need for a spanner to connect to the hydrant and pump.

DISCHARGE HOSE

Discharge hose is used to provide a flexible, watertight, and durable orifice for the conveyance of water, under pressure, from the pumper or other pressure source, to the point of discharge.

Any further use in this manual of the terms 'fire hose', 'hose', or 'ready line' shall be considered as referring to discharge hose.

There are three types of fire hose used in the San Francisco Fire Department:

1. Synthetic-jacketed, rubber-lined hose
2. Rubber-jacketed, rubber-lined hose
3. Cotton hose

Cotton hose used by the SFFD is lightweight, small diameter hose used usually to fight trash or grass fires.

Rubber-jacketed, rubber-lined hose is made of a seamless fabric tube carcass covered both on the outside and inside with rubber or a synthetic rubber material. The ends of the tube are sealed to prevent the carcass from being damaged by acids, moisture, etc. The rubber jacket provides protection against rough and sharp surfaces damaging the

carcass. This type of hose is commonly called booster line hose, hose reel hose, or the tank line and is carried on the hose reels of some pumpers, mini-pumpers, and the OES (Office of Emergency Services) pumper.

Synthetic-jacketed, rubber-lined hose is manufactured to SFFD specifications. The rubber liner is made of fully cured compounds of the highest grades of natural or synthetic rubbers, which are oxidation and ozone resistant. The outer jacket is designed to be mildew-resistant. It is supplied to the SFFD under rigid specifications designed to provide a fire hose with chemical and physical properties which will withstand deterioration and rough use, and will also provide a smooth tube through which water under pressure may be conveyed without excessive friction loss. Given proper care, it will stand up for years against the punishing usage encountered in the fire service.

SIZE OF FIRE HOSE

The standard length of fire hose used in the SFFD is 50 feet long and commonly referred to as a length of line. Other hose lengths are provided for specific equipment or specific utility use. Fire hose is classified by the size of the internal diameter.

Size	Length	Jacket / Lining	Description
1”	50' 100’	Cotton / None	Carried on some pumpers, all mini-pumps, and the OES pumper. It is commonly referred to as forestry hose because the Forestry Service uses it. It is light, easy to handle, and is used for small grass or mop-up. It is unlined single jacket hose.
1”	50'	Rubber / Rubber (booster line)	Carried on hose reels of some pumpers, mini-pumpers, and the OES pumper. The reels are pre-connected to the pump. This size hose can be easily handled by one or two firefighters. Water is discharged from the pump through all the preconnected hose, which is carried on the reel being used. This size hose is generally used for control of small exterior fires.
1-1/2”	50' 100’	Cotton / None	It has an outer jacket of cotton with an inner liner of rubber. It is commonly referred to as forestry hose because the Forestry Service uses it. Use at grass fires and wildland incidents.

Size	Length	Jacket / Lining	Description
1-3/4”	50'	Synthetic / Rubber	Carried on all pumpers, all truck companies (for use with prosser pump), and on the fireboat. This hose is most commonly used for interior firefighting where maneuverability and mitigation of water damage are paramount. It is commonly referred to by this Department as ‘small line’ hose (a bundle of 100 feet) and/or ‘ready line’ (when pre-connected to the pump of an engine).
2-1/2”	50’	Synthetic / Rubber	There is light weight 2-1/2” line used for the 2-1/2”hi-rise packs and there is heavy duty 2-1/2” line used for pre-connected line on the engines.
3”	50'	Synthetic / Rubber	Used for supply and discharge of water. Whenever the terms ‘big line’ or ‘large line’ are mentioned in this manual, it applies to 3” hose. This hose may be loaded wet. Listed below are the standard amounts of 3” hose carried on SFFD apparatus: • Pumpers carry at least 1000 feet • Aerial Ladders carry 100 feet • Front line Fireboat carries3000 feet • Attack Hose Tenders carry (HT-7,HT-21) 2000 feet (HT-13) 2500 feet
3”	50'	Cotton / Rubber	It has an outer jacket of cotton with an inner liner of rubber. It has been discontinued from front line use but is stored in reserve at this time. Refer to the hose maintenance section for proper care, particularly after use of this hose.
5”	100'	Rubber / Rubber	Carried on Standard Hose Tenders (5000 feet) as part of the SFFD's unique Portable Hydrant System.

FIRE HOSE COUPLINGS

Fire hose couplings are metal fittings attached to each end of a length of hose. They are used to join or couple hose lengths together or to connect a hose line to a pumper, hydrant, nozzle, fitting, or other hose appliance. Generally, the action of joining lengths of hose together is termed “coupling”.

Couplings on synthetic-jacketed, rubber-lined hose are of rocker-lug design made of lightweight, heavy-duty Pyrolite. Each coupling contains the threads by which the hose is coupled together or connected to an apparatus or appliance. A coupling in which the threads are cut on the outside is termed a ‘male’ coupling. A coupling in which the threads are cut on the inside of a swivel is termed a ‘female’ coupling. A rubber washer

fits snugly inside the female coupling to assure a watertight connection of the male and female coupling. The male coupling and the swivel of the female coupling are designed with three rocker lugs. The lugs provide a sure grip for hand or spanner tightening or loosening of the coupling. The rocker lug is made in the form of a semi-circle and is designed to offer little or no resistance when passing over obstacles. The primary function of the rocker lug is to avoid catching on projections when hose is being dragged or pulled out of the hose bed or through a fire building.

3” Male Coupling

3” Female Coupling

One-inch rubber / rubber hose couplings are designed to provide the least resistance when being reeled or unreeled and when passing over or around obstructions. They are not normally equipped with coupling lugs but instead are usually provided with depressions into which a special spanner wrench may be inserted to tighten or loosen the coupling. The couplings on 1“ rubber hose are known as a Bar-Way design and require a ‘Bar Way’ spanner to tighten or loosen the swivel.

1” Hose Reel Coupling

Note: Confusion has often arisen as to what dimension determines the size of a coupling or fitting. It is the internal diameter of the orifice through which the water flows that is the determining factor.

Hose Coupling Threads

All SFFD hose couplings have screw threads that comply with the National Standard Screw Threads for fire hose couplings and fittings. Compliance with the Standard has been implemented in the majority of fire Departments in the United States. In fact, some states, including California, have written in the statutes a law requiring compliance with the Standard.

The size of hose coupling threads and the internal diameter of the coupling waterway, with which the various size fire hose of the SFFD are equipped, are as follows:

Hose Couplings Sizes

Size of Hose	Internal Diameter Coupling Waterway	Coupling Size Screw Thread
1” cotton hose	1“	1” National Standard
1-1/2“ cotton-jacketed	1-1/2“	1-1/2” National Standard
1-3/4“ synthetic-jacketed / rubber-lined	1-1/2“	1-1/2” National Standard
2-1/2”synthetic jacketed / rubber-lined	2-1/2”	2-1/2” National Standard
3” synthetic-jacketed / rubber-lined	3“	3” National Standard
3” cotton-jacketed / rubber-lined	3“	3” National Standard
4” rubber suction hose	3“	3” National Standard
5” rubber hose	5“	5” National Standard
6” hard suction hose	6“	6” National Standard

FIRE HOSE IDENTIFICATION MARKINGS

All 50-foot lengths of synthetic-jacketed, rubber-lined fire hose are identified by appropriate markings. These markings are standard and all members should be familiar with the pattern in order to identify the length of hose.

The following information is found on the couplings of SFFD hose:

- Name of hose manufacturer
- Month and year of manufacture
- Serial number identifying the hose as Department property, on female coupling
- Company identification
- Date of issue (month and year), on female coupling

All small and large line hose have black letters and numbers stenciled two feet from each end of the hose coupling indicating the company to which the hose is assigned. One-inch hose is not numbered.

CARE OF FIRE HOSE

Fire hose is supplied to the SFFD under specifications designed to provide years of service, but the length of service is almost entirely dependent on the care given in its use and maintenance.

Fire hose may be damaged in several ways. The principal sources of damage to fire hose are the following:

1. Mechanical injury
2. Chemical injury

3. Heat damage
4. Mildew and mold
5. Freezing temperatures

Mechanical Injury

Cuts, snags, and abrasions from dragging hose over the ground, paved streets, or other rough surfaces account for a large amount of damage to hose. The hose jacket is designed to be resistant to such treatment, but there is a limit as to the amount of abuse the jacket material will withstand. Care in the use and handling of hose can do much to avoid failures due to mechanical injury. When hoisting hose to and over roofs, cornices, and into windows, wear on the jacket can be reduced by relieving contact between the hose and firewall, cornice, or window sill whenever possible. Dragging hose when leading into a fire often cannot be avoided, but whenever possible, dragging can be minimized by flaking (folding the hose every 7 to 8 feet) and carrying hose leads. Dropping or dragging hose couplings may result in damaged threads or jammed swivels, and, therefore, should be avoided.

Hose should not be exposed to traffic damage any more than necessary. One of the most common causes of damage to hose is the crossing of hose lines by vehicles, particularly when it lies flattened out or is under low-pressure. A hose line may not appear to be damaged after having been run over by a vehicle, but if the crossed section were to be opened up, it would probably reveal that the lining had separated from the jacket or had been torn apart. **Hose will suffer less damage if it is at working pressure when a vehicle drives over it.**

There are times when running over hose lines cannot be avoided by fire apparatus. A great deal of this can be avoided if hose leads are properly placed at fires. Whenever possible, when laying the first lead, a hydrant should be taken on the same side of the street as the fire, with the hose lead laid parallel to the curb. If the apparatus has to drive over hose, it should do so **slowly** and with a spotter posted. There have been instances where hose has gotten tangled up in the wheel-well and/or stuck between the duals and caused firefighter injuries. Any hose over 3 inches in diameter should have hose ramps if it is to be driven over.

The sudden backpressure created by shutting off nozzles or other devices too abruptly may also injure hose, and in many cases is the cause of hose failure.

Chemical Injury

It may often be difficult to avoid chemical damage to fire hose at the fire scene. Water discharged from fire hoses or sprinklers and accumulating on a floor of a fire building or flowing out of the building may have become contaminated with spilled chemicals and thus expose fire hose to chemical damage. Chemicals may be spilled on fire hose or

the hose may be dragged across spilled chemicals that the firefighters are not aware of. The most common chemicals which can cause damage to fire hose are gasoline, solvents, oils, greases, paints, and acids.

Fire hose is very susceptible to damage from contact with gasoline and solvents. These materials can easily penetrate a hose jacket and dissolve the glue, which holds the rubber lining to the jacket. This deterioration may eventually permit the lining to separate from the jacket and “bunch” in one end of the hose causing a blockage of water flow or a bursting of the hose. Oils and greases will similarly cause deterioration of a hose lining if they are allowed to soak through the jacket and come into contact with the rubber lining. Fire hose is more susceptible to damage by thin oils and greases that penetrate rather than by the thicker oils or greases that stay on the outer jacket. However, once any oil or grease penetrates a hose jacket and reaches the lining, it will remain there and destroy the lining.

Fire hose may be damaged by contact with oil-based paints. These oils may work through the jacket, dissolve the glue, and cause the lining to separate from the jacket. At the same time, they also will do serious damage to the lining itself.

Acid, even in weak solutions, may cause extensive damage to the jacket of the fire hose, but seldom affect the lining as do gasoline and oils. There are many ways in which acid can come into contact with fire hose. Hose may be exposed to acids at fires in industrial establishments, garages, repair shops, parking lots, and other places, where there is a possibility of acids being on the floor over which hose may be dragged.

Salt water, if not thoroughly flushed out of the hose lining and washed off the hose jacket, may cause chemical damage to fire hose through hardening of the rubber lining, shrinking of the jacket, and corroding of the hose coupling.

It is evident that chemical damage to hose may not be entirely avoided at fires, however, every effort should be made to prevent hose from coming into contact with gasoline, oil, grease, paint, and similar materials. If there is evidence of these materials on the hose upon return to quarters, or if it is suspected that the hose has been in contact with them, the hose should be thoroughly cleaned. Scrub with a stiff brush and warm soapy water followed by a thorough rinsing with clear water. This will prevent these solvents from working into the hose lining.

If there is suspicion that hose has been exposed to acid or acid fumes, it is essential that the hose be thoroughly washed off. The hose should then be marked and also identified in the company record so that closer inspection and testing may be done at a later date before placing the hose back in service.

Fire hose may be subject to chemical damage and contamination by exposure to radioactive materials, particularly if the exposure occurs at a fire. Hose exposed or suspected of being exposed to or contaminated by radioactive materials should not be

removed from the fire or incident area until the hazard has been evaluated by experts authorized by the SFFD. This procedure is essential to prevent further spread of contamination to materials and equipment as well as to personnel.

Heat Damage

Prolonged exposure of hose to extreme heat, or contact with direct flame in operations at fires will cause the jacket to become scorched or to burn and may cause the rubber lining to decompose or even burn. Hose jackets in contact with cinders or embers may be damaged at the points of contact; however, the lining usually remains undamaged in this type of exposure. Any prolonged exposure of hose to heat above normal room temperature will hasten the natural tendency of the rubber composition of hose lining to eventually harden and crack. Limited exposure of hose to hot water will seldom do appreciable harm.

Heat damage to hose can be largely prevented by firefighters maintaining careful watch against exposure of their hose to causes of heat damage and by proper care of hose in fire stations. In no case should hose be stored near any heat source, such as steam pipes, hot water pipes, or radiators, where the hose may absorb a great deal of heat by radiation.

Mildew and Mold

Mildew and mold damage applies to:

1. Cotton-jacketed, rubber-lined large relief hose stored in reserve
2. Cotton-jacketed, rubber-lined small hose carried on some truck companies for use with the Prosser pump
3. One-inch cotton forestry hose

This type of damage is inexcusable, as it is caused by improper care and drying of hose, thereby permitting a fungus growth to damage the cotton hose jacket. The fungus growth breaks down cotton fibers and weakens the hose jacket. Care must be observed at all times to make certain that cotton-jacketed, rubber-lined hose is thoroughly dry before storing. Cotton hose should never be coiled for storage when wet and should not be stored in a warm damp place.

No cotton-jacketed hose should be on Suppression Companies other than 1” wildland hose.

Freezing Temperatures

Temperatures in San Francisco rarely require the handling of hose in a frozen condition. Instructions are included in this manual to set proper procedure to follow in the handling of frozen hose should this condition develop in the city or if an occasion should arise

when San Francisco firefighters are sent to a community where temperatures may require the handling of frozen hose.

Frozen hose should be handled with utmost care as the fibers of the jacket are weak when frozen and may easily break. No attempt should be made to pull hose from a street, ladder, etc., when it has been frozen into position. Instead, it should be cleared by using an axe to free the ice beneath it. Any ice attached to the hose should be permitted to remain, and the hose placed in the apparatus in whatever manner requires the least bending or forcing. Handle frozen hose as little as possible. On return to quarters, frozen hose must be allowed to thaw out before it can be cleaned.

CARE OF HOSE STORED IN QUARTERS AND ON APPARATUS

The care of hose when not in use is as important as the care of hose at fires. Hose permitted to remain in a set position for any length of time may eventually harden in this position and crack when it is straightened. This tendency to harden can be checked by flushing out the hose occasionally and, in the case of cotton or cotton-jacketed hose, thoroughly drying the hose jacket afterward. This is accomplished by yearly testing of hose (which is scheduled by the Battalion Commanders) during which water is flushed through all hose on apparatus and in storage. Hose loaded in the hose bed causes sharp bends. If the fold is left in this position beyond the normal rotation time, it may eventually loose its elasticity through fatigue. When straightened out, especially under pressure, the lining at the point of bend may be in such lifeless condition that it will crack and the hose will fail. The only way to avoid these bends is to periodically change the position of hose. **This explains the Department rule requiring change of all hose (except 1" rubber hose) carried on apparatus when the hose has not been used within a period of three months.** The position of hose on racks or reels should also be changed at regular intervals. Hose on storage or drying racks should never be allowed to hang over the end of the rack.

CARE OF HOSE COUPLINGS

Couplings must be kept in good condition at all times so they can be easily screwed together by hand. Each time after hose is used, changed, or tested, the threads, swivels, and washers must be carefully examined. Any damaged or defective coupling shall be reported to the Bureau of Equipment for repair. Hand tight couplings with good, live washers will not leak under ordinary pressures and all couplings must be maintained to meet this requirement.

When a female coupling becomes hard to turn or when coupling threads cannot be coupled together easily due to grit and dirt, they must be cleaned. Remove the washer and carefully clean the coupling threads, the swivel, and the washer recess with a wire brush followed by thorough washing in a pail of warm fresh water. Swivels should be spun several times while washing. If necessary, warm, soapy water may be used but

must be followed by a thorough rinsing of the coupling in clear, fresh water. Make sure to replace the washer when finished.

Coupling washers should be of good, live material and should be replaced as often as conditions warrant. Leaking couplings result in water loss and in additional water damage if the hose line is in a building. Always make sure that proper size washers are placed in hose couplings.

Good practice requires that coupling washers should be examined every time water has been run through hose or when hose loads are changed. **Any washer that has become hard or has lost its elasticity should be replaced.**

WASHING AND DRYING HOSE

All dirt shall be thoroughly brushed off hose each time it has been used. Should it be impossible to remove the dirt by brushing, the hose shall be scrubbed with fresh, cold water using a scrub brush or broom. No soaps or solvents should be used on synthetic hose. If cotton hose has been exposed to oil or similar materials, such materials may be removed by scrubbing with soapy water followed by a thorough rinse with fresh, cold water. If salt water was used at a fire or drill, the hose, including the suction hose and all portable equipment with which the salt water has come into contact, shall be thoroughly flushed and rinsed-off with fresh water.

All dirt shall be thoroughly removed from hose reel lines by washing with fresh water, with a sponge or cloth, and by drying with a clean dry cloth or chamois before or as it is reeled in. If a hose reel line has been exposed to oil or similar materials, it shall be washed with soapy water followed by a thorough rinse with fresh water on return to the company station.

When the hose used is cotton-jacketed hose, Department regulations require that damp or wet cotton-jacketed hose shall not be allowed to remain on the apparatus more than 24 hours, unless unavoidable. Cotton-jacketed hose, after use, shall be thoroughly cleaned and dried. Hose shall not be dried directly in the sun or on streets, sidewalks, driveways or roadways. When water (even a few drops) is left lying in the rubber lining of hose for a period of time, especially when in the sun, small amounts of sulfuric acid will form. This acid solution may drop on a hose jacket and is strong enough to damage the fibers of the jacket. Hose placed on a drying rack shall be supported throughout its length and shall not be allowed to loop over at either end.

TESTING FIRE HOSE

All hose in service in the various companies, including that stored on relief and reserve apparatus, shall be tested at least once a year. Hose shall be tested at the following pressures:

Size of Hose	Test PSI
1” rubber (hose reel hose)	225 PSI
1” synthetic-jacketed / rubber-lined	225 PSI
1” rubber-jacketed / rubber-lined	225 PSI
1-1/2” cotton-jacketed / rubber-lined	250 PSI
3” cotton-jacketed / rubber-lined *	250 PSI
1-3/4” synthetic-jacketed / rubber-lined	300 PSI
2-1/2” synthetic-jacketed/ rubber-lined	300 PSI
3” synthetic-jacketed / rubber-lined **	300 PSI

* purchased before July 1987
** purchased after July 1987

Hose shall be tested using no more than five lengths at a time.

When hose is being tested, it shall be attached to the pump outlet and laid out straight without any twists. It shall then be filled with water at hydrant pressure. Particular care shall be exercised to see that all air is expelled from hose lines before the pump pressure is applied. For this reason, the nozzle shall be elevated about two or three feet above the rest of the hose prior to opening. The nozzle shall then be opened and shall be kept in the open position until the stream is solid without sputtering or air spray. The nozzles shall then be closed. Pump pressure shall be gradually applied until the maximum prescribed test pressure is attained. This pressure shall be maintained for at least three minutes. The pump pressure gauge must be observed closely so if the hose bursts the pressure at which this occurred can be accurately noted.

When testing hose under pump pressure, the discharge gates of the pumper should be adjusted back to where they are barely open. This will prevent a violent whipping action should a hose fail.

All lengths of hose to be tested shall be carefully examined for damaged or defective jackets and couplings, including the thread and the swivels of such couplings. Hose under test shall be continuously observed so any defects that develop may be immediately noted. A record of all hose tests shall be entered in the company journal. This record shall include all serial numbers, size and type of hose, and any defects noted. Defective hose shall be reported by phone to the Bureau of Equipment. The damaged hose shall be dried, rolled, tagged for repair, and stored for pickup. A copy of the defective hose report shall be attached to the hose. All company officers shall be made aware of the damaged hose. **In stations quartering two or more companies, members of all companies shall assist in testing hose.**

Battalion Commanders shall arrange yearly hose test schedules for their companies as follows:

February	Battalion 1
March	Battalion 2
April	Battalion 3
May	Battalion 4
July	Battalion 6
August	Battalion 7
September	Battalion 8
October	Battalion 9
November	Battalion 10

A copy of the schedule shall be forwarded to all companies in their district and to the Division Commanders. Annual hose tests shall be observed by the on duty Battalion Chief.

NOTE: The Department requires the change of all hose (except 1" rubber hose) when the hose has not been used within a period of three months.

HOSE STORAGE HOUSES

Filbert Street

On the east side of Telegraph Hill, the extension of Filbert Street between Montgomery and Sansome Streets consists of a flight of wooden stairs. Because of inaccessibility to apparatus and in order to provide adequate fire protection to the residents of the area, the Fire Department maintains two hose storage houses. House #1 is at the intersection of Filbert Stairs and Darrell Place; House #2 is located at the Filbert Stairs and Napier Lane. There is a high-pressure hydrant located adjacent to each hose storage house.

The inventory of these hose storage houses is:

House #1	House #2
600 feet of 3“ hose	1000 feet of 3“ hose
2 bundles (100' each) small line with 7/8” straight stream nozzles	2 bundles (100' each) small line with7/8” straight stream nozzles
2 Gleeson pressure reducing valves with high-pressure spanners	2 Gleeson pressure reducing valves with high-pressure spanners
2 Gorter Shutoffs	2 Gorter Shutoffs
2 small line wyes	2 small line wyes
1 2-1/2” x 3” increaser	1 2-1/2” x 3” increaser
1 3” x 2-1/2” reducer	1 3” x 2-1/2” reducer
2 axes	2 axes
1 small spanner	1 small spanner
1 water shutoff	
1 gas shutoff	

The hose storage houses are kept locked at all times and are opened with a fire alarm box key. It is therefore mandatory that officers responding to alarms on the Filbert Street stairs have a fire alarm box key when leaving the apparatus.

The hose storage houses are adequately sealed against moisture and are also provided with a continuously lit 100-watt light bulb to prevent the growth of mildew.

Hose Storage House #1 is maintained by Engine 2. Engine 28 is responsible for maintaining Hose Storage House #2. The hose and equipment contained in the storage house is part of the maintaining company's inventory. These companies shall inspect their respective hose houses monthly; they shall check the condition of the hose and equipment, the continued burning of the light bulb, and also make sure that the surrounding vegetation has not hampered accessibility to the storage house. Hose shall be replaced and tested annually according to Battalion hose test schedule.

Relief Hose

A storage building located at Station 33 contains 1-1/2” and 3“ cotton-jacketed relief hose.

BART/MUNI HOSE STORAGE

The hose and equipment at these stations are assigned to the companies listed below, which are responsible for their care and maintenance. A SFFD firehouse key opens the lock. Company officers shall see that the hose is rotated semi-annually during the

designated months and tested annually as per Battalion hose test schedules. (Scott bottles need not be rotated when changing hose; however, they should be inspected regularly for loss of air, hydrostatic test date, or any other defect.)

BART/MUNI EQUIPMENT ROOM LOCATIONS	
Embarcadero Station	East end on BART platform
Montgomery Station	East end on MUNI platform
Powell Station	East end on MUNI platform
Civic Center Station	East end on MUNI platform
Van Ness Station	East end on MUNI platform
Church Station	North side on Mezzanine level
Castro Station	South side on Mezzanine level
Forest Hill Station – street level	East side on Street Level lobby

Large line is stored in cabinets at various locations throughout the platform of all BART stations. This hose is for immediate use by the SFFD if it becomes necessary to charge the (DRY) undercar sprinkler system in the BART station trackway. The metal storage cabinets can be opened with a key from the BART key ring or, if necessary, easily forced open. The hose in these cabinets is to be rotated semi-annually (as per schedule) and tested annually as per Battalion hose test schedule

Embarcadero Station	Engine 35	April & October
Montgomery Station	Engine 13	January & July
Powell Station	Engine 8	February & August
Civic Center Station	Engine 1	March & September
Van Ness Station	Engine 36	April & October
Church Station	Engine 6	May & November
Castro Station	Engine 21	June & December
Forest Hill Station	Engine 20	January & July

If the BART/MUNI station is fully charged with smoke when you arrive on scene, bring your own large line, supplied directly from the engine, and a bundle down with you. This line could be your only life line back up to the surface.
Also change SCBA's to 1 Hour bottles.

For more info, refer to the Transit Manual.

SECTION 2. HOSE FITTINGS

Hose fittings are defined as any equipment, other than apparatus or pumps, used to complete a hose lead. Technically, this embraces the whole range of fire hose fittings including nozzles, couplings, reducing valves, etc. However, in order to establish commonly accepted terms, as used in the San Francisco Fire Department, appliances (such as couplings, nozzles, reducing valves, foam generators, hose tools, and permanently installed private fire protection devices, such as standpipes) are addressed separately in this manual.

ADAPTERS

Adapters are fittings made for the purpose of connecting hose or suction couplings of different size or type. In some cases they may also be referred to as increasers or reducers.

3” x 6”		This adapter is carried on all engine companies. It is a fitting with a swiveled 3” female connection and a 6” male connection. It is used on the Fulton Street emergency hydrants so that soft suction hose may be connected to the 6” outlet. This adapter is also used to connect a 6” hard suction to a 3” suction outlet.
3” x 4-1/2” Suction Adapter		This adapter has a swiveled 3” female on one end and a rigid 4-1/2” female on the other. It is used to connect 3” couplings to a 4-1/2” suction outlet of older drafting or private hydrants.
5” x 6” Suction Adapter		This adapter is cast as one fitting with a 6” female and a 5” male connection. It is used adapt 6” to 5”, 4-1/2” and 3 ” fittings.

3/4” x 1-1/2” City Park Adapter		This adapter is provided for connection of 1-3/4” hose to 3/4” hose faucets found in Golden Gate and McLaren parks. It is cast as one fitting with a 3/4” city park thread female connection and a 1-3/4” SFFD NST male coupling for connection of 1-3/4” fire hose.
City Park and Freeway Quill (Adapter)	 Freeway  Park	There are two quills, the City Park Quill and the Freeway Quill. These Quills are used for hose connection to below grade lawn sprinkler connections. The freeway quill is 10” in overall length and is adapted for connection of 1” hose. The Park Quill is 14” in overall length and is usually adapted for connection of a 1-3/4” hose line. The supply side of the quill has two pins, which when placed in slots in the riser will turn the water on and keep the quill in place. Each tube is also provided with a metal handle to assist in connection of the quill to the water supply. Either 1” or 1-3/4” hose can be used on either quill with the use of the appropriate adapter. When making connection with either quill, always connect the hose line first, as the water will flow as soon as the quill is connected to the supply outlet. Connection to the supply is made by lifting the flush cover, inserting the quill into the below grade outlet, and turning in a clockwise direction. This latter action opens a float type valve, which permits flow of water.

ONE-INCH HOSE LINE ADAPTERS

These adapters are provided for connection of 1” hose reel line to hose couplings or pipe connections other than 1” National Standard Thread. They consist of the following size adapters:

1” NST x 1-1/2” Square Thread or NST		Used to connect 1-1/2” hose couplings to 1” hose couplings or connections. It consists of a 1” female connection, National Standard Thread and a 1-1/2” male NST or SFFD Square Thread.
1-1/2” x 1” NST Square Thread		Permits connection of 1” hose couplings to 1-1/2” hose couplings or connections. It consists of a 1-1/2” female connection, SFFD Square Thread, and a 1” male connection, National Standard Thread.
1-1/2” x 1” Nat. Std. Thread		Permits connection of 1” hose couplings to 1-1/2” hose couplings or connections. It consists of a 1-1/2” female connection, National Standard Thread, and a 1” male, National Standard Thread.
3” x 1”		Primarily used for connection of 1“ hose line to low-pressure hydrants for cleanup of equipment.

DOUBLE MALE AND DOUBLE FEMALE FITTINGS

A double male fitting is used to connect two female couplings of the same size. A double female fitting is used to connect two male couplings of the same size. The SFFD provides double male and double female fittings in 3-inch size only.

3” Double Male		Cast as one fitting with 3” National Standard Male threads on each end. It is used when 3” female to female connection is needed.

3” Double Female		3” female swivels on each end. Each swivel is provided with a washer. It is used when 3” male to male connection is needed. Before making any connection of double females, the swivel at each end should be checked for washers.

INCREASERS

An increaser is a fitting cast in one piece with male and female threads. The male coupling thread diameter is larger than the inside diameter of the female coupling thread. It is used to facilitate connection of a larger size coupling or fitting so as to increase the size of the waterway. Department increasers are of the following sizes 1” x 1-1/2”, 2-1/2” x 3”, and 3” x 3-1/2”. Each fitting is equipped with pin lugs and each female side is provided with a washer.

1” x 1-1/2” Increaser		This increaser permits connection of 1-3/4” hose to 1” hose or outlet. On this fitting the 1” female is a 1” National Standard Thread to match the threads of the 1” hose reel lines. The male thread of each increaser is either NST or SFFD 1-1/2” square thread.

2-1/2” x 3” Increaser	  	Cast as one fitting with a 2-1/2” female inlet and a 3” male outlet, both NST. Used to connect a 2-1/2” male to 3” hose or appliance. A good example illustrating this point is found in the connection of a large hose line Gorter shutoff to a standpipe inlet.
3” x 3-1/2” Increaser		Cast as one fitting with a 3” female inlet and a 3-1/2” male outlet, both NST. Due to the large outside diameter of the fitting, use of the high-pressure spanner is required for tightening. It is used where connection of 3” to 3-1/2” is necessary. An example would be to connect a Gleeson valve to a low-pressure hydrant for a drill or test purpose.

REDUCERS

A reducer is a fitting cast in one piece with male and female threads. The inside diameter of the female coupling thread is larger than the male coupling thread diameter.

It is used to connect a smaller diameter hose or appliance to a larger diameter appliance, hose, or fitting so as to reduce the size of the waterway. Department reducers are of the following sizes: 3” x 1-1/2”, 3” x 2-1/2”, and 3-1/2” x 3”. Each reducer is fitted with pin lugs and each female connection is provided with a washer.

3” x 1-1/2” Bell Reducer		Equipped with a 3” female inlet, and a 1-1/2” male outlet with National Standard Thread. This reducer is commonly referred to as the “Bell Reducer” because of its shape resembling that of a bell. It is primarily used to connect 1-3/4” hose to a low-pressure hydrant outlet for utility operations such as washdowns, filling water tanks, etc.
3” x 2 _” Reducer		Cast as one fitting with a 3” female inlet and a 2-1/2” male outlet, both NST. It is most commonly used in connecting a wye with a 2-1/2” inlet to a standpipe outlet of 3”, and in connecting a circulator with 2-1/2” inlet to a 3” hose coupling.
3 1/2” x 3” Reducer		Fitted with a 3-1/2” female inlet and a 3” male outlet, both NST. It is primarily used for connection of a Trojan valve to a high-pressure hydrant outlet or standard hose tender outlet.

The 3” x 3-1/2” increaser and the 3-1/2” x 3” reducer may be connected together and used to extend a Gleeson Valve outlet to accommodate a suction hose with large hand lugs.

WYES

A wye is an appliance designed to divide the flow of water from one hose line supply into two or more hose lines. The small line wye has a 2-1/2” female swivel inlet and two 1-1/2” gated male outlets.

AKRON WYE

ELKHART WYE

Engine companies carry at least two small line wyes on their pumpers.

One wye is pre-connected to a Gorter shutoff, which is connected to the hose in the right-hand hose bed of the pumper.

The second wye has a 3” x 2-1/2” reducer **loosely connected** to the female inlet swivel for connection to a standpipe outlet. It is provided with a strap through the assembly for carrying up a fire escape or ladder (in SFFD jargon it is called the “officer’s wye”). There also should be at least 1 large spanner on the strap of the officer’s wye, as well. Some officer’s add a small spanner to the officer’s wye just in case the person hooking up the wye drops one of the spanners off of the fire escape or they come upon a situation where you might need the smaller one for tight quarters

SFFD fire practice requires that whenever a 1-3/4“ hose line is to be connected to a Gorter shutoff, such connection must be made with the small line wye. This practice allows for connection of a second 1-3/4” hose line to the large line if needed.

SIAMESE FITTINGS

A siamese is an appliance that combines the flow of two or more hose lines into one hose line. SFFD uses two different siamese fittings; the ladder nozzle siamese and the hydrant jumper siamese.

LADDER NOZZLE SIAMESE
(3” double male is connected to 3” female swiveled outlet)

Ladder Nozzle Siamese

The ladder nozzle siamese is used to combine the flow from three large hose lines into a single hose line supplying an aerial ladder nozzle. The appliance consists of three 3” female swivel inlets, a gated control valve, a 3” female swivel outlet, a pressure gauge that registers up to 300 psi, and a bleeder valve. Each 3” swiveled inlet is provided with a clapper valve. The whole assembly is mounted on a specially designed metal frame to provide stability and to elevate the Siamese approximately two-inches off the ground.

Aerial ladders equipped with ladder nozzles are provided with 100 feet of large line hose for supply to the ladder nozzle. The hose is carried in a special frame compartment on

the right side of the apparatus parallel to the bed of the aerial ladder. The hose line is pre-connected to the ladder nozzle for quick operation when removing the ladder nozzle from its carrier then securing it to the aerial ladder fly.

Ordinarily, an increaser 2-1/2" x 3" is coupled into the two exterior swiveled inlets of the ladder nozzle siamese to permit connection of hose lines with Gorter shutoff. The 2-1/2" x 3"'s should bo put on the outside inlets to allow companies to disconnect the controlled leads later in the fire if hand lines are needed. Also,using the gorter shutoffs to gradually charge and shut down the lines leading into the ladder nozzle siamese causes less stress to the ladder than water coming from an uncontrolled source. This is up to the the **Officer's** discretion.

A 3" double male is coupled into the 3" swiveled outlet to permit connecting the female coupling of the ladder nozzle hose length to the 3" female swiveled outlet. BOE has double males that have a bleeder assembly on them that facilitates bleeding the hoseline on the ladder without having to stick an axe into one of the inlets of the Siamese.

When putting this ladder siamese into operation, it should be placed on the ground close to the turntable on the side of the truck opposite the fire.

Effective streams depend upon adequate water volume and pressure. Two supply lines are the minimum required, but three supply hose lines to the ladder nozzle siamese will be necessary to obtain maximum results. The first supply lead into the Ladder Nozzle Siamese should be hooked up at the **center inlet** to facilitate the 2nd lead being hooked up. **Pressure for ladder nozzle streams will be 150 psi at the siamese. The old pressure 160 psi should no longer be used because tests at the DOT have shown that anything over 150 psi blows out the seals.**

When using the ladder pipe at a fire, better results are attained when the hose stream is directed up into the building hitting the ceiling of the room or rooms on fire. Ideally if the fire is on the top floor and in the attic, (which would probably be the case if you're using ladder pipes) try to breach the ceiling on the top floor to extinguish attic space.

Hydrant Jumper Siamese

The hydrant jumper siamese is a siamese equipped with two 3" female inlets NST and a 3" male outlet NST. The siamese is provided with a clapper valve, which swings horizontally to prevent water from backing out of the unused inlet. A petcock bleeder threaded into the waterway of one of the inlets is also provided. The hydrant jumper assembly also includes an 8-foot length of large hose with the male coupling connected to the siamese inlet equipped with the petcock bleeder. The bleeder is provided to relieve the pressure in the 8' jumper hose should it be necessary to disconnect the hose from the hydrant. The siamese has a hexagonal nut on one side of the inlet box. This nut indicates the topside of the Siamese and shall be placed facing upward to facilitate

operation of the clapper valve. Refer to the Pump Operations Manual for explanation of and procedures for the use of the hydrant jumper.

Standpipe Bleeders

Dry standpipes that have been charged must be drained of water after the fire has been extinguished. Engine companies whose response area contains a large number of buildings equipped with Class 1 dry standpipes carry a special fitting known as a 'standpipe bleeder' designed for the purpose of draining dry standpipes.

SFFD practice requires that any dry standpipe used shall be drained. This responsibility is usually assigned to the last company using the standpipe. The procedure is as follows:

A lead of large hose, usually one length, is connected to the lowest outlet. The outlet of the hose is placed at or near the street gutter. A roof outlet of the standpipe is then opened to provide an air inlet, followed by opening the outlet to which the large hose is connected. When the standpipe is thoroughly drained to the indicated level, the outlet is closed, the hose is disconnected, and the outlet cap is replaced. The roof outlet is also closed and the cap is replaced. This last procedure is very important because if the roof outlet is left open, considerable water damage may occur at a subsequent use of the standpipe through unnoticed flow of water.

The water remaining in the standpipe between the lowest standpipe outlet and the standpipe inlet siamese is then drained by an engine company equipped with a standpipe bleeder. The standpipe bleeder is connected and operated as follows:

The threaded stem of the standpipe bleeder is backed off to a position flush with the 3" male coupling. The outlet valve is closed. The male coupling is connected to the lowest inlet of a vertical standpipe or to any inlet of a horizontal dry standpipe. The threaded stem is then threaded into the inlet to lift the clapper valve from its seat by turning the stem clockwise (facing the inlet), use the valve handle to assist in turning the stem. A length of 1-3/4" hose is then connected to the bleeder outlet (using a 1" to 1-1/2" adapter if necessary) to drain the water to the street gutter and the standpipe is drained of the trapped water by opening the outlet valve. Should an excessive leak occur at the 3" coupling it may be corrected by tightening the packing nut. When drainage is

complete, disconnect the 1-3/4” hose, the standpipe bleeder, and replace the standpipe inlet cap.

NOTE:
Company identification numbers will be found on hose, nozzles, fittings, and other SFFD equipment to identify the company to which they are assigned.

Ames Cross-Connection Device

The Ames Cross-Connection Device is a check valve consisting of a 3” swivel inlet and a 3” male outlet. Its purpose is to prevent the accidental back flow of potentially harmful liquid into a potable water supply during a fire. The 3” female swivel inlet connects to a Fire Hydrant and the male outlet to a 3” Fire Hose. The valve utilizes an internal loaded spring check valve that will close when the hose demand falls to zero.

During fire fighting operations, SFFD equipment may be connected to both the domestic water system and the AWSS (High-Pressure) simultaneously. The State Department of Health Services determined that these actions constitute direct cross-connections between approved potable and unapproved non-potable water sources, and expose water users to undue health hazards. Further, such cross-connections are prohibited under Title 17 California Code of Regulations (CCR) and are in violation of Section 116555 of the California Health and Safety Code.

Department policy states that there shall be no cross connection between the low-pressure and AWSS system at any time.

It is MANDATORY that every connection to a low-pressure hydrant includeds an Ames Cross-Connection Device at the outlet of said hydrant. There are no exceptions.

Each Engine, Attack Hose Tender, and 5” Hose Tender carries three (3) Ames Cross-Connection Devices.

If any defects, damage, missing washer and / or deterioration of the washer are found the Bureau of Equipment shall be notified immediately. The BOE is responsible for

pickup and replacement of the device. The Bureau of Water Supply is responsible for repairs to the Ames Cross-connection Device.

SECTION 3. HIGH-PRESSURE REDUCING VALVES

A high-pressure hydrant of the auxiliary water supply system does not have the ability to control the flow or regulate the pressure from each outlet of the hydrant without the use of a pressure-reducing valve. These pressures are far too high to use on hand held hose lines, and must be reduced to a safe and manageable firefighting pressure. This is done with a device known as the Gleeson pressure-reducing valve, commonly called the Gleeson valve. The use of the Gleeson valve is mandatory when high-pressure hydrants provide supply. They may be connected to any large hose line or high-pressure fitting when necessary to control flow pressure such as in a hose line lead into a sprinkler inlet or discharge from a portable hydrant system. Information relative to the use of high-pressure hydrants, Gleeson valve, and the operation of the high-pressure system is contained in the San Francisco Fire Department manual of Water Supplies and the SFFD Drill Manual.

GLEESON VALVES

Gleeson valves are carried on all Engine companies, attack hose tenders, and standard hose tenders. The Gleeson valve is made of brass and weighs 96 lbs.

<u>The Eight Gleeson Valve Components</u>

1. The 3-1/2" female swivel inlet, with washer, connects the Gleeson valve to the high-pressure hydrant outlet.
2. Two 3" male gated outlets are the discharge outlets for two 3" hose lines.
3. Two locking gate outlet controls independently open and close the two 3" male gated outlets and lock when in the open position.
4. Two gate bleeders independently bleed the hose line or lines.
5. The pressure regulator controls the pressure to both Gleeson outlets. Readings on the sliding scale are graduated in 20 pounds per square inch increments from 0 to 300 psi.
6. The tickler valve is a hydro mechanical metering device that is used to free sediment from the pressure regulator. It also controls the intake and discharge water pressure in the Gleeson valve.
    - At times, the tickler valve may get clogged with sediment, causing a discharge pressure less than indicated on the pressure regulator. If

this occurs, first reduce the pressure-regulating valve to 80 PSI, then pull and release the tickler valve 2 or 3 times only. Pressure should increase. If pressure does not increase, the Gleeson valve should be replaced.

- **Never, under any conditions, push in on the tickler valve. This will instantly admit full water pressure and create maximum 'water hammer' causing severe damage to the hydrant and Gleeson valve.**

7. The telltale discharge indicates that water is getting to the Gleeson valve, and that the regulator setting is not exceeding the hydrant pressure.
8. The emergency shut off lever immediately shuts down the discharge from the Gleeson valve. This lever is to be used ONLY in an EXTREME EMERGENCY. Operating the emergency shutoff while the Gleeson valve is flowing water can seriously damage and possibly break the high-pressure hydrant, the main, and even the Gleeson valve itself. The pressure regulator must be returned to 0 psi before the emergency lever is reset.

Detailed procedures for Gleeson Valve operation is described in **Section 3 of the SFFD Water Supplies Manual.**

WARNING: Due to the extremely high water pressures in the high-pressure system, hose lines are *NEVER* connected directly to a high-pressure hydrant. A Gleeson Valve must always be used when using a high-pressure hydrant!

SECTION 4. FIRE NOZZLE DESIGN

The purpose of any nozzle is to provide a restriction of the flow to build pressure. This restriction, and subsequent created pressure, provides a usable velocity to project the water stream.

Fire nozzles are classified as either conventional or automatic.

The SFFD has no automatic nozzles.

CONVENTIONAL NOZZLES

Current conventional nozzles (‘conventional' refers to a nozzle with a fixed size or manually adjustable opening) come in two basic types: smooth bore and peripheral jet (more commonly known as fog nozzles). To allow for changing water conditions and to add greater flexibility, some smooth bore nozzles are also available with stacked tips of increasing size.

Smooth Bores

- Fixed opening sized from 3/8” to 1-1/4” for handline firefighting operations
- Master stream nozzles with tip size 1-1/2“ or larger
- Used for interior fire attack

Fog Nozzles

- Fixed or limited gallonage
- Requires correct pump discharge and tip pressure for best results
- Adjustable from straight to fog stream
- Do not use for interior fire attack (but may be used during overhaul phase in order to cause less water damage)

LIMITATIONS OF CONVENTIONAL NOZZLES

When a conventional nozzle is supplied with less than the rated flow, the result is a weak, less effective stream. This situation may be caused by poor water supply, long hose lays, improper selection of tip size, or pump operator error. This under-pressured stream may waste water because the velocity needed to reach the seat of the fire is not produced. Little, if any, knockdown capability is achieved. Poor water supplies are often blamed for poor fire streams, however, more often poor streams result from the inability to match the correct nozzle size to the water supply that is available.

On the other hand, if more than the required flow is being delivered to the conventional nozzle, excessive nozzle pressure will result. The higher nozzle reaction will make the hose line more difficult to handle. It may jeopardize the safety of the nozzle crew in an environment that is already unsafe.

Any attempt to control the over-pressured line, by the nozzle operator cutting back at the nozzle, results in a fire stream that is broken and erratic. A partially open ball valve creates turbulence, which reduces the stream's effectiveness. The nozzle crew must make a decision: fight the hose line and the fire, or fight the fire with a broken ineffective stream.

SECTION 5. NOZZLES

STRAIGHT-STREAM NOZZLES

Straight-stream nozzles produce a stream that penetrates super-heated gases, so you can rake the ceiling of the fire area and more efficiently prevent the possibility of flashover.

7/8” tips straight-stream nozzle shall be on all 1_” ready lines and 1_” bundles and high-rise packs!

1-1/8” tip straight-stream nozzle on 2_” lines

FOG-PATTERN NOZZLES

Fog patterns are dangerous for interior attacks because of steam production, possibility of steam burns, depending on the stage of the fire.

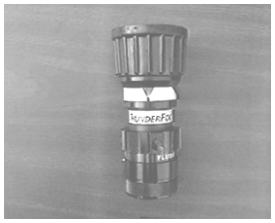
NOZZLES FOR SMALL LINES

The following nozzles are designed for 1-3/4” hose lines.

7/8” Straight Stream

Used on all 1 _” ready lines, 1 _” hi-rise packs and bundles for interior fire attack. 120 to 150 psi at the pump panel, 60 psi at the tip will give you 175 gpms.

Thunder Fog

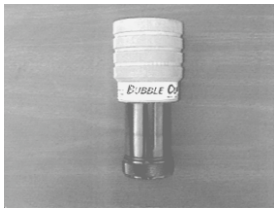


This nozzle is carried on all engine companies and should never be connected to a “ready line, hi-rise pack nor bundle for fire atteck. This nozzle can be on the bumper line. The bumper line is usually ideal for dumpster fires, auto fires, wetting down exposures. This nozzle is also a good choice to use during overhaul operations because it causes less water damage, so after fire is under control switch nozzle tips. This nozzle operates by rotating the tip clockwise for a straight stream, counterclockwise for a spray stream. The Thunder Fog nozzle will not shut off at the tip, and is therefore used with the KK shutoff. The nozzle will deliver 200 gpm with a tip pressure of 120 psi.

Red Foam Nozzle

This nozzle is going to take the place of the bubble cup. It’s the new foam nozzle.More literature to follow when this manual is revised in the near future. At this time you can use this nozzle with your pre-plumbed **“A” foam.** You can also use it with the eductor for class **“B” fires, with 3X3 foam.**

Bubble Cup Foam Nozzle



This nozzle is designed for use with the Elkhart foam eductor. The recommended factory tip pressure of **100 psi** is obtained by having **200 psi at the eductor** and no more than 150' of small line attached to the nozzle. This nozzle has only one flow setting.

This tip design, when used with a ball type shutoff, will have the capability of extending the line. The nozzle is compatible only with the 95-gpm foam eductor. To operate this nozzle, turn the tip counterclockwise to open and clockwise to close. The nozzle has a straight stream and spray settings in both the retracted and extended positions. When the outer sleeve is in the retracted position, the nozzle operates as a standard straight stream and fog nozzle. **To get the best foam production** and to use the aspirating feature of the nozzle, **the operator must slide the outer sleeve forward.** If an immediate wide protective fog pattern is needed, the sleeve can be retracted instantly to its regular position.

BALE SHUTOFF FOR SMALL LINE NOZZLES

KK Shutoff

The KK shutoff can be used with all 1-3/4" small line nozzles. It is normally used with the KK Thunder Fog nozzles.

The KK shutoff is a ball-type shutoff that operates by pulling the bale backward to open and pushing the bale forward to close.

The KK shutoff with 7/8" tip will flow 160 gpm at 70-psi tip pressure.

Akron Shutoff

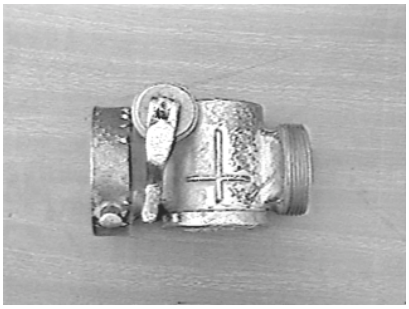
The small Akron shutoff is to be used only with the Bubble Cup Foam Nozzle. It is a ball-type shutoff and operates by pulling the bale backward to open and pushing the bale forward to close. The large Akron shutoff shall be with the 1 1/8” tip.

LARGE LINE NOZZLES

The nozzle in this classification is connected to 2 _” and 3” hose for hand-held operations.

Large Akron Shutoff with 1 1/8” tip.

Gorter Shutoff



The Gorter shutoff consists of a shutoff valve, using a hinged control crank handle. It has a 3” female inlet and a 2-1/2” male outlet. The crank handle operates a worm gear, which opens and closes the shutoff valve. This handle is always operated in a clockwise movement. This clockwise rotation prevents the worm gear packing nut from unscrewing and becoming non-operable. The only time permitted to rotate the crank handle in a counter clockwise direction is when closing the shutoff from a partially opened position such as when bleeding air from the hose line or when correcting excess clockwise rotation toward a closed position. An indicator on top of the shutoff indicates closed when at right angle to the hose and open when parallel with the hose. **Do not use as a bail with hand lines! Use ball type bail shutoff with 1-1/8” tip for large line operation.**

CIRCULATOR NOZZLES

Circulators, as the name might imply, are nozzles designed to distribute water in a circular pattern. They are designed to direct hose streams on a fire in a below-grade area, such as the sub-structure area of piers, basements, cellars, sub-basements, holds of ships, etc., which cannot be reached by hand-held streams. They may also be used in attic or other confined building areas to which access is obstructed or is not provided.

Circulators are operated through holes either cut through the grade or already provided, as in pipe casing holes and archways of ships. They must be carefully observed while in use as they discharge considerable volumes of water, which may cause excessive water damage if not properly controlled. There are two types of circulators in service in the S.F.F.D.: a spray type, called the Federal circulator; and two revolving types, the Gorter and the Bresnan. The spray type operates on the principle of discharge diffusion through a cluster of small size orifices and against a diffusion plate. The revolving type operates on the principle of discharge or nozzle reaction, which causes the barrel to revolve.

Federal Circulator

The Federal circulator consists of a brass shell equipped with a 2-1/2” female-inlet with washer and a circular diffusion plate mounted at the outlet. Around the shell, near the outlet, are eighteen small orifices arranged in two banks and are designed to project discharge upward. There is a small space between the outlet of the shell and the diffusion plate designed to deflect discharge in a horizontal direction. On the bottom and in the center of the diffusion plate there are seven very small orifices through which water is projected downward and to the side.

Gorter Circulator

The revolving barrel of the Gorter circulator has two 7/8” orifices and four 3/4” orifices. The two larger orifices are designed to discharge water on a horizontal plane. Two of the smaller orifices project upward; the other two project downward. The inlet is equipped with a 2-1/2” swiveled female coupling with washer.

Bresnan Circulator

This circulator, which is similar in design to the Gorter circulator, is carried on the fireboat. There are nine orifices. Three of the orifices are 3/4“ and six are 1/2”.

Circulator Hook-Up And Operation

Circulators should always be connected to a separate length of large hose, using a 3” x 2-1/2” reducer to connect the circulator to the hose male coupling. The separate length of large hose should always be connected to a hose lead equipped with a Gorter shutoff using a 2-1/2” x 3” increaser to connect the circulator hose length female coupling, to the male outlet of the Gorter shutoff.

Engine companies carry, in a canvas bag, a pre-assembled Federal circulator.
The assembly consists of a Federal circulator, a 3” x 2-1/2” reducer, a 5-foot length of large hose, and a 2-1/2“ x 3” increaser. Included in the bag is a pipe-casing hook.

S.F.F.D. practice requires that whenever circulators are used at a fire, the Federal circulator shall normally be used first. The revolving type Gorter circulator shall normally be used only when no Federal circulators are available. Because circulators require considerable flow and pressure, not more than one Gorter circulator shall be supplied from one pumper and not more than two Federal circulators shall be operated simultaneously from one pumper. The source of water supply must be adequate and hose leads as short as possible.

CELLAR NOZZLES

The cellar nozzle serves very much the same purpose as a circulator nozzle. The biggest difference is that the cellar nozzle does not require the placement of hose through the opening. The Woods cellar nozzle, with which the SFFD is equipped, is a straight pipe type cellar nozzle consisting of a straight 1-7/8” (outside diameter) pipe connected to an elbow adapter with a 2-1/2” NST female swiveled inlet. The outlet of the nozzle consists of a series of orifices designed to discharge water in varying angles of an outward, upward, and downward spray pattern. The overall length of the nozzle is 57”; the length of the nozzle pipe is 54”. The nozzle may be placed through a minimum 2” diameter hole. Nozzle discharge is approximately 500 GPM at 50 psi and 600 GPM at 80-psi nozzle pressure. The diameter of the spray pattern discharge at the operating nozzle pressures is approximately 40 feet. This type nozzle can be placed through a small opening and may be left unattended when properly positioned.

As with circulator nozzles, full efficiency from a cellar nozzle cannot be obtained with inadequate water supply. Not more than one Woods cellar nozzle shall be supplied from any one pumper, and in no case shall a pumper be required to supply both a cellar and a circulator nozzle. Preference for the use of the Woods cellar nozzle shall be at the discretion of the Incident Commander. Refer to Chapter 10 for further information.

The Woods cellar nozzle is carried on truck companies.

LADDER NOZZLE

The ladder nozzle is a portable lightweight nozzle designed to be clamped to the fly of an aerial ladder for use as an aerial ladder water tower. Variations occur in the ladder nozzles supplied to aerial truck apparatus due to individual manufacture design, but basically all such nozzles have the following features:

The nozzle is equipped with an inlet pipe that has a 2-1/2” or 3” swiveled female inlet. This section of the nozzle is held in collars to which clamps are attached. The clamps are used to attach the nozzle unit in position to the ladder rungs. A yoke is provided to which the inlet pipe and nozzle are connected. Swivels in the yoke permit vertical movement of the nozzle and a swivel at the upper portion of the inlet pipe permits limited horizontal movement. The nozzle consists of a barrel and tip. The barrel is equipped with vanes to reduce turbulence of water flow. Each nozzle is provided with three tips, which vary in size of orifice by 1/8-inch or 1/4-inch. One set of tips is 1-1/4”, 1-1/2”, and 1-3/4”. The other set is 1-1/4”, 1-3/8”, and 1-1/2”.

The Ladder nozzle may be directed manually from the ladder, by guide ropes or by cables from the ground. If using guide ropes or cables the handle and the ladder nozzle should be slightly angled downward. Manual direction is made by use of a detachable handle connected to the nozzle yoke. A locking device is provided to limit horizontal sweep. A collar located just behind the tip connection and a ring attached to the directional control handle is provided to which guide ropes may be tied for vertical direction of the nozzle from the ground. In this case, horizontal movement is controlled by rotation of the aerial ladder turntable.

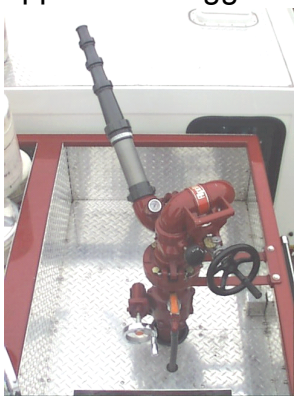
MONITOR NOZZLES

Nozzles grouped in this classification are deluge type nozzles provided with tips that range in orifice size, from 1 _" to the 3" fireboat monitor tip. A monitor nozzle primarily differs from a deluge nozzle in that it is permanently mounted in a stationary position on various apparatus, and that it's supply comes from the pump in the case of the fireboat, or from a multiple series of inlets, as in the case of a standard hose tender.

Explanation of the various type monitor nozzles is found in the Manual of Standard Practices for Fireboats.

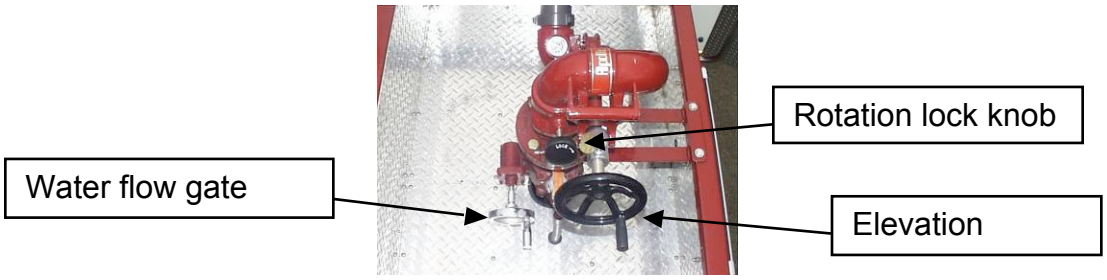
Deck Gun

The deck gun or portable deluge gun is a master stream nozzle attached to SFFD Engines. The deck gun consists of a barrel and four tips. Tip sizes are 1-3/8", 1-1/2",1-3/4", and 2". The barrel contains in-line vanes to reduce water flow turbulence. The deck gun is supplied by a gated outlet from the pump with a gauge on the pump panel to show flowing pressure. It can flow up to 1,200 GPM in the deck mode on the apparatus. Suggested flowing pressures for the tip sizes are as follows:



Tip Size	Pressure	GPM
1 3/8"	100 psi	562
1_"	100 psi	668
1_	70 psi	760
2"	50 psi	840

The deck gun can be removed from the apparatus for portable use by removing two locking pins at the flange and attaching it to a portable base unit, therefore it's a multiversal.



Vertical movement of the deck gun is controlled by a worm gear operated by a hand wheel. The maximum range of the gun is 90 degrees above horizontal and 15 degrees below horizontal. A safety stop pin is located on top of the worm gear shaft to prevent inadvertent lowering of the gun below an angle of 35 degrees above horizontal. This 35-

degree point is considered the lowest point of safe operation when the monitor is removed from the apparatus and used as a portable unit. Due to nozzle reaction, operating below 35 degrees exerts a powerful horizontal force, which will tend to make the portable gun unmanageable. Operation of the gun below the 35-degree safety point is permitted only when the unit is firmly secured to its base mounted on the apparatus.

Horizontal movement of the deck gun is accomplished by releasing the friction knob (counterclockwise to unlock and clockwise to lock). When the gun is rotated horizontally, it will lock every 45 degrees. Rotation is a full 360 degrees on the apparatus and 180 degrees if in the portable base unit.

When operating the deck gun in the direct connect base or portable base the two connecting pins must be fully engaged at all times.

When changing from the apparatus to the portable base, be sure the monitor is set above 35 degrees. An adjustable safety chain with a hook is provided in the front of the portable base as an additional safety precaution. Connect the hook and chain to a rigid stationary object in front of the unit (such as a parking meter, utility vault cover, car wheel, etc.) and tighten the chain. To release the hook and/or lengthen the chain, hold the spring-loaded latch open and pull the chain through the eye of the hook.

When the monitor is used in the portable base, the unit should not be operated at more than 500 GPM with one hose line and 800 GPM with two hose lines.

The recommended hose arrangement for this unit when portable is to bring two hose lines straight back from the siamese parallel to each other. Loosely tie the hoses together 10 feet from the Monitor with a hose and shoulder strap, rope, etc.

Portable Base

When the unit is operating in the portable base, do not attempt to move or pick up any part of the base itself or the 10 feet of supply hose closest to the unit. If you have the room to form a loop with the hoses, then tie them together, this will take up some of the back pressure.

When the unit is stored in the direct connect base it is recommended that the nozzle or tips be lowered against a rigid support during transportation. When using master streams to protect exposures, the water stream must hit the fire itself or be applied directly to the exposure building to cool it off. Putting a “blanket” stream in between the fire building and the exposure building accomplishes nothing, because the radiant heat goes right through the “blanket” stream and the exposure will catch fire.

SECTION 6. TOOLS

SPANNERS

Spanners in the SFFD are special wrenches designed for tightening and loosening hose couplings, fittings, and nozzles.

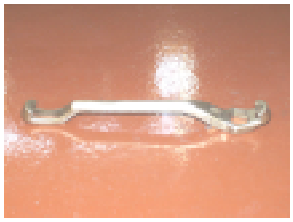
The most commonly used SFFD spanners are:

1. Small Spanner
2. Large Brass Spanner
3. High-Pressure Spanner

Small Brass Spanner

The small brass spanner can be used on both large and small hose line couplings and fittings. One end is designed for use on 3” fittings and couplings and the other end is designed for 1-1/2” couplings. A pentagon shaped wrench for use on low-pressure hydrant spindles is at the 1-1/2” side of the spanner. This spanner is normally carried attached to the hose and shoulder strap and on certain style truck belts

Large Brass Spanner



One end is equipped with a combination coupling pin lug wrench for use on 3-1/2“ or 3“ couplings. This end also has a pentagon wrench for use on low-pressure hydrants. The opposite end is designed to provide a coupling pin / lug wrench for use on 1-1/2“ couplings. This spanner is considerably longer than the small spanner, which provides more leverage.

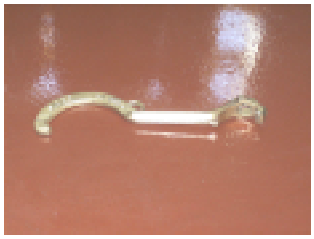
High-Pressure Spanner

The high-pressure spanner is carried strapped to a Gleeson valve. It can be used on couplings and fittings from 1-1/2” to 3-1/2” in size and also operates the valves controlling high-pressure hydrants. One end of this spanner is provided with a pin-lug and / or rocker-lug wrench for use on both 3” and 3-1/2” applications. Also at this end is a pentagon wrench primarily for use on hydrant caps. The opposite end of the high-pressure wrench has a dual purpose head:

1. One side is a square socket wrench used to operate the high-pressure outlet gate valves.
2. The other side is a pentagon wrench used to operate the high-pressure king valve spindle.

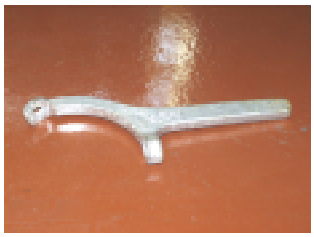
Miscellaneous or less commonly uses spanners include:

Suction / Large Diameter Hose Spanner (Rocker Lug)



This spanner is used to tighten the 6” couplings on hard suction hose on pumpers and large diameter hose carried on standard 5-inch hose tenders. This spanner also loosens 6” inlets with rocker lugs.

Pin Lug Spanner



For use on tightening or loosening the 6” pin lug swivel of the Keystone valve on some on pumpers.

Universal Spanner

This spanner is for use on the “Multiversal” or deck gun and is used to tighten or loosen the barrel and tip connections.

Adjustable Spanner

This spanner adjusts to different size hydrant spindles for use on hydrants installed by private contractors or when response is made into another community where standard SFFD spanners will not fit. With the ability to be adjusted, this spanner can also be used on city hydrants where the spindle has been damaged.

1” Barway Spanner

This spanner is designed for the tightening or loosening of 1” couplings on the rubber-jacketed rubber-lined hose reel hose. It is approximately 6 inches in length.

Monitor Spanner

This spanner is for use on the barrel and tip of the monitor on a standard hose tender.

COMBINATION HOSE AND SHOULDER STRAP

The combination hose and shoulder strap is designed to assist firefighters with maneuvering and holding large hose lines at fires. It consists of two separate leather straps: a hose strap and a shoulder strap.

Hose Strap

The hose strap consists of a leather strap with a large metal hook. This hook is designed for attaching the hose strap to a ladder rung or fire escape balcony. The hose strap has a “nap-hook” riveted in position at one end of the strap and a split metal link riveted in position at the other end. The snap hook provides a means for attaching the hose strap to the metal ring of the shoulder strap. The split link enables the hose strap to be secured around the fire hose.


Comb. Hose & Shoulder Strap


Shoulder Strap


Hose Strap

Shoulder Strap

This strap is leather, approximately 6 feet in length, with a buckle and strap keeper riveted in place at one end. A large metal ring, a metal snap hook, and a sliding leather strap keeper complete the assembly. The strap's metal ring provides a place for attachment of the hose strap. The shoulder strap can be used as a back-up hose strap when the metal ring is connected to the snap hook of the shoulder strap. The primary purpose of the snap hook on the shoulder strap is to hold a small spanner.

The hose strap must be connected to the large metal ring of the shoulder strap.

It is SFFD practice that members at all incidents wear the hose and shoulder strap where it is evident that the handling of large hose lines is required.

The primary uses for the hose and shoulder strap are:

1. Holding large hose lines against nozzle reaction
2. When hose lines will be used for an extended period of time.
3. To carry hose leads up ladders, fire escapes, and stairways.
4. To secure hose leads to ladders, fire escapes, and balconies.

5. Operations of circulators and cellar nozzles

Refer to Chapters 9 and 10 for further instructions on use and operation of hose and shoulder strap.

TRUCK BELT

The truck belt is a wide adjustable leather belt designed to:

- carry an axe (blade protected in a leather sheath)
- carry a rolled up hose strap
- carry a small spanner

It is worn by a member of a truck company at emergency scenes and can be used as a hose strap if necessary.

Note: To adapt the truck belt for use as a shoulder strap, remove the pick axe from the belt, remove the belt from the body, and rebuckle at the last strap hole to provide maximum available length. Use in the same manner as the combination hose and shoulder strap.

When carrying the irons, put the flat-head axe in the truck belt instead of the pick-head axe. When the Halligan tool is fitted with a shoulder strap, use caution when carrying it up ladders. There have been instances when the strap has come off and the Halligan has fallen.

MISCELLANEOUS TOOLS AND EQUIPMENT FOR HOSE HANDLING

Hose Clamp

A hose clamp is a tool designed to stop water flow through hoses for two principal reasons:

1. To shut off the flow of water in a hose line without returning to the source
2. To permit the charging of a hose line before the discharge end has been controlled

Hebert Hose Clamp

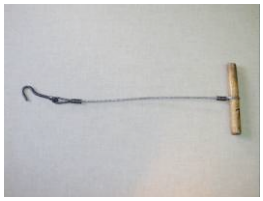
This clamp, when applied tightly, is used to stop the flow of water in double-jacketed hose up to 3” in diameter. It is hinged on one side and has a locking lever on the other which enables the clamp to be opened and placed around a hose. A T-handle on the top is turned counterclockwise to raise the clamp (flow water) and clockwise to tighten (stop water flow). The clamp is most often used on the supply lead from a hydrant jumper where it is placed on the hose approximately 10 feet back from the rear step of the Engine. To remove the clamp, three quick half turns are made counterclockwise followed by releasing the locking lever by kicking it by foot. The first turns should be made as rapidly as possible to minimize air-burn damage to the hose lining. **Stand clear of the clamp when releasing with foot.**

HOOKS AND MISCELLANEOUS

Pipe Casing Hook

Used to raise and remove the covers of pipe casing holes provided in buildings for use of circulator nozzles. This hook is normally carried in the circulator bag.

Cistern Hook



Used to raise the cover of street cisterns. This hook can also be used to raise the covers of suction holes located on pier decks.

Hose Coupling Shield

Carried on engine companies, the hose coupling shield is made of heavy grade soft leather, approximately 12” in size, with a buckle and strap, which secures it to the hose, and a snap hook which holds a large brass spanner. The hose coupling shield is designed to protect the threads of the double male fitting from damage by contact with hard surfaces on a reverse standpipe lead. It is standard practice to use this coupling shield on the open female coupling on the left side hose bed of the pumper.

Adjustable Suction Saddle

The suction saddle is made of leather with two adjustable straps. The primary use of the saddle on a hard suction is to prevent chafing when the suction hose comes in contact with a pier stringer, suction hole, or other hard object when drafting.

Small Hose Web Strap

The strap is designed to hold securely a 100-foot roll of 1-3/4” hose line when made up as a bundle or ‘doughnut roll’. When the bundle is untied, the strap is usually secured around the waist of the member who untied the hose bundle to prevent loss of it.

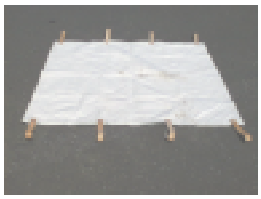
High-Rise Pack Harness

The high-rise pack harness is a canvas case with velcro straps on each side to secure the hose. The harness is designed to hold 100 feet of small line.

Rubber Mallet Hammer

The rubber mallet is used to strike an object without causing damage to it. It is used to tighten or loosen the large hand lugs on the female swivel of the Keystone valve, Navarro valve, or hard suction hose equipped with hand lugs.

Carry-All



Made of canvas with leather straps and used to haul debris.

Hydrant Shutoff Wrench Sets

These tools are designed to operate the street branch valve shutoff, which controls the flow of water to a hydrant. There are two sets of wrenches in the Department:

1. The low-pressure set, which is used with the low-pressure hydrant branch gate valves.
2. The high-pressure set, which is used with high-pressure hydrant gate valves.

Low-Pressure Shutoff Wrench

This set consists of three separate parts:

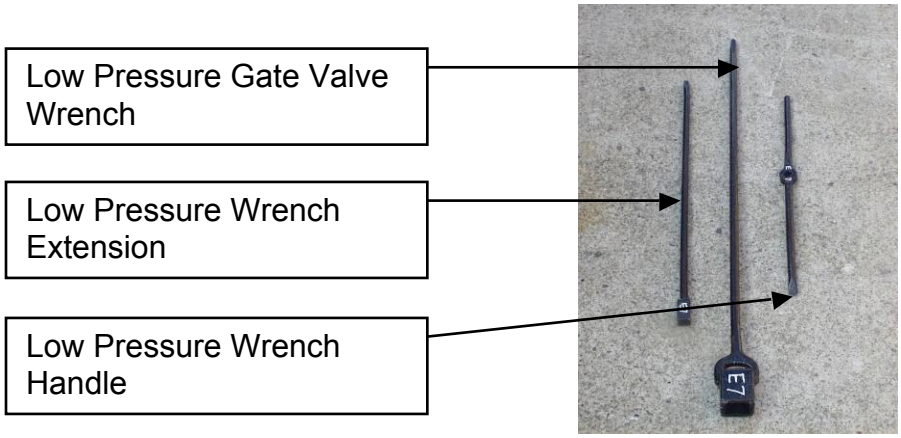
1. The **branch gate valve wrench** is approximately 4-1/2 feet long with a square female socket on one end to fit the street shutoff and a tapered shaft on the other to accept the handle or extension.
2. The **wrench extension** is approximately 3 feet long, and is used to extend the reach of the wrench if necessary.

The **"T" handle** attaches to the wrench or extension, and is used to turn the gate valve wrench by hand. It is approximately 30 inches long and has a tapered end on one side which can be used as a pry bar to remove the shutoff cap located in the street.

High-Pressure Shutoff Wrench

The set consists of two parts:

1. The **branch gate valve wrench** is a hollow metal shaft approximately 9 feet long with a socket on one end and a square fitting on the other to accept the handle.
2. The **"T" handle** is provided with a square opening to engage the shaft of the gate wrench. The "T" handle is turned by hand.



HYDRANT BRANCH SHUTOFF PROCEDURE

The low and high-pressure hydrant branch valve shutoff procedures are explained in detail in Sections Two and Three of the Water Supply Manual. Information on high-pressure hydrant mains and valves is given in the Valve Operations Manual. The general procedure for shut-off is repeated in this section as follows:

Low-Pressure Hydrant:

1. Locate the hydrant branch gate valve shutoff as indicated on the hydrant.
2. Remove the cover (remove pavement if paved over).
3. Attach the low-pressure wrench to the gate valve stem.
4. Attach the handle to the wrench and turn counterclockwise 16 to 28 turns to stop the flow of water. (Note some hydrants in Battalions 8 and 9 were installed with a shutoff that operates in a clockwise rotation).

High-Pressure Hydrant:

1. Locate the hydrant branch valve shutoff as indicated on the hydrant.
2. Remove the cover (labeled Hydrant-H.P.F.S.) and dust cover below.
3. Insert the shutoff wrench and handle.
4. Turn valve 35 turns clockwise to stop the flow of water.

SECTION 7. PRIVATE FIRE PROTECTION DEVICES

Private fire protection devices are a part of a building or its contents and are an aid to the Fire Department in effecting prompt control or extinguishment of a fire.

STANDPIPES

A standpipe system is an arrangement of piping, valves, hose connections and allied equipment designed to provide water at specified pressures for firefighting purposes. These systems eliminate exhausting and time-consuming hose leads, which would have to be made between the ground floor and other floors of buildings involved in fire. Standpipes are required in all buildings four or more residential stories in height and in some buildings of lesser height, such as theaters and large exhibition halls, where long hose leads would be required. Standpipes could be required in other buildings if required by the Fire Marshall (example large 2-story residential complexes).

Standpipe systems are divided into four classifications:

1. Class I Dry Standpipe
2. Class II Wet Standpipe (house line only, no FDC inlets)
3. Class III Combination (Wet standpipe W/ FDC's and a houseline)
4. Combined Sprinkler / Wet Standpipe System

There normally is a sign identifying Fire Department inlet connections. Some older buildings have no sign or no lettering. The sign should have raised letters at least one inch in size and cast on a plate or fitting stating STANDPIPE.

- Class I will usually read: DRY STANDPIPE.
- Class III will usually read: COMBINATION STANDPIPE.
- A Combined System will usually read: STANDPIPE AND AUTOSPRINKLER.

CLASS I STANDPIPES

A Class I standpipe system is a dry system designed for Fire Department use only. A water supply to the system is obtained by making a hose connection from an engine company to the Fire Department standpipe connection (FDC). These standpipes are provided with two or more 3” female swivel inlet connections, usually at ground level near the front of the building and usually adjacent to a fire escape or near the exit from

Class 1 Standpipe Inlets

3” Outlet

the enclosed stairwell containing the DSP outlets. Each inlet is equipped with a clapper valve. A removable threaded plastic plug, threaded metal cap or metal caps connected by 2 screws protects the female threads and swivels. If you can’t unscrew the threaded plastic plugs you can use a mallet or large spanner to knock them out. The screws with the eyeloops can easily be broken off, as well. Inlet connections are arranged either vertically or horizontally. Three-inch male gated outlets are provided on each floor level and the roof, starting above the first floor. Caps secured to the outlet by a metal chain protect the male outlet threads.

Older multiple standpipe installations in a building were independent of each other. Newer multiple standpipe installations in a building are required to be interconnected.

Companies need to canvas their first alarm areas to become familiar with standpipe and sprinkler inlet locations. Pump operators need to be aware, if they're going to charge a DSP that they have enough water in their tank. Newer buildings have interconnected DSP's that will require a lot of water to fill it up; pump operators need to address their supply before charging if there's any question in their minds their tank won't do the job. For instance, large buildings, tall buildings, newer buildings. Newer installations of multiple Class I standpipes require that all such standpipe risers be interconnected at the base. Each riser has a FDC, and pump operators are capable of supplying water to all risers and outlets through any inlet.

Buildings may be equipped with one or more Class I standpipes. Older buildings with multiple standpipe risers are usually not interconnected. In this case firefighters must be aware of the possibility that the standpipe outlet they are connecting to may not be charged with water. Some Class I systems are color-coded. The FDC will be colored the same as the outlets it serves. The Incident Commander shall make sure that the proper standpipe riser is supplied with water. The company making the first lead should ensure their own safety by going up the stairwell nearest the DSP being charged.

It's also critical for companies to find out where and how they can gain access to the enclosed stairwells that contain the standpipe outlets they will be using to attack a potential fire. Communicate to the I.C. and incoming companies which stairwell is being used for fire attack and how to get there if not obvious. Obtain keys from lock box or Building Control Station to gain access to the stairwell from the outside and prop door open for access of other companies or gain access from inside the building. You may also need keys to gain access to the fire floor. (Stairwell doors in residential Hi-Rise buildings run by the Housing Authority open with your firehouse key.)

The main point is, the more pre-fire planning you do on buildings equipped with standpipes in your district, the smoother your fire attack will go.

CLASS II STANDPIPES

A Class II standpipe system is a wet system directly connected to a water supply and only equipped with I-1/2" controlled outlets intended for use by building occupants. Attached to the outlet is usually 100' of 1-1/2” hose equipped with a nozzle. The nozzle may or may not have a shutoff. The outlet, hose, and nozzle are usually located in a cabinet on each floor of the building (both above and below grade). The hose cabinets are spaced so no area on any floor is beyond 130' of a cabinet.

House Line

The water supply to Class II standpipe systems may come directly from the city water system, a roof tank, or a pressure tank. Many older Class II systems rely on roof tanks for their water supply which provides only a marginal supply of water pressure to the upper floors. In fact, some of these systems have been found to have only a few pounds of water pressure at these levels. **SFFD practice is to disconnect the houseline and hook up our own 1 _” line, if this outlet is going to be used for fire attack.**
Note: If sprinkler protection is provided for the floor, in most cases, the Class II standpipe may be removed. Refer to Administrative Bulletin 4.9 for further information.

CLASS III STANDPIPES

A Class III standpipe system is a wet standpipe system directly connected to the city's domestic water supply system. A building fire pump usually provides the system water pressure. It is equipped with 1-1/2” outlets (house lines) intended for use by the building occupants and 3" outlets intended for use by the Fire Department. When a company charges this system they’re charging the S/P and the house line. These systems are rare.

A Class III standpipe system must have an FDC. If the pump operator needs to charge such a standpipe, then charge it up to 200psi maximum on orders of I.C.

Class III standpipe installations for new buildings are extremely rare.

Note: Some of these “wet” outlets give unreliable pressures. Always have straight stream nozzles on high-rise packs to give you maximum gpm’s at minimal pressures.

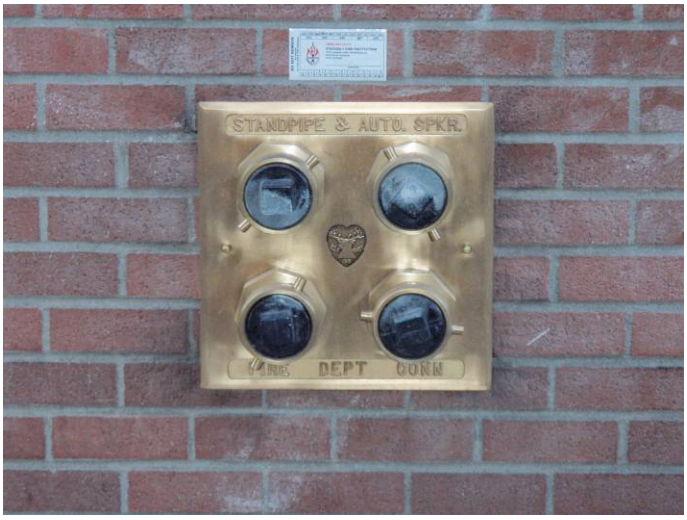
House Line

Building Fire Pump

COMBINED WET STANDPIPE/ SPRINKLER SYSTEMS

A combined standpipe system is a wet system that serves both the 3” outlets for Fire Department use and the building’s automatic sprinkler system. The combined standpipe system water is supplied by the city domestic water system. A fire pump may be required to supply adequate pressure.

The 3” outlets are usually located in enclosed stairways or in vestibules of pressurized stair enclosures. The 3” caps on some of these outlets are made with a smaller 1-1/2" male outlet with a cap to utilize a small hose line. In order to use two small lines from the outlet, SFFD standard operating procedure is to connect a wye to the 3" outlet rather than one small hose to the cap.



Combined System Inlets

A combined standpipe system must have a FDC. SFFD practice is for ‘dry hose leads’ to be connected to this FDC and charged only on the orders of the Incident

Commander. **You no longer need a gorter or a Gleeson in the equation**. **If there's a working fire and companies need more pressure from the outlets, charge it.** You can charge these systems up to 150 psi. The BFP tests sprinkler systems at 200psi, most systems are built to withstand up to 300 psi.

AUTOMATIC SPRINKLERS

Automatic sprinkler systems are designed to apply water to a fire through sprinkler heads, attached to permanently mounted pipes, when activated by the heat of the fire. Sprinkler systems are required in buildings as specified in the Building and Fire Codes. Refer to the SFFD Salvage Manual, Section VI, for a description and operation of different sprinkler systems.

Sprinkler System Inlets

SFFD practice requires that 'dry hose leads' be connected to a sprinkler inlet and charged only on the orders of the Incident Commander. NFPA recommended pressure supplied into the sprinkler inlet is 150 psi, unless the system is posted for a different pressure. BFP tests at 200 psi; system can handle 300 psi.

You no longer need to use a gorter or a Gleeson valve. Hook your 3" line directly to the system. **At working fires, Incident Commanders should not be reluctant to charge sprinkler system inlets.**

For informational purposes the following is reprinted from the National Fire Code #1231, F-4.1.2 Use of Fire Department Connection:

> "The standard operating procedures (SOP) of each rural fire Department should require one of the first-due pumpers to pump to the fire Department connection of the sprinkler system. **In this way, water pressure and volume to the system can be increased, making the sprinklers more effective. Also, the fire**

Department connection ties into the system beyond all valves that might be shut off; therefore, even with the valve controlling the water supply to the sprinkler system shutoff, sprinkler heads can always be supplied with water through the FDC. After the assessment by the IC, the word to charge the system might be warranted. The pressure available from the fire Department pumper will not burst the piping or heads of the sprinkler system, as all parts of the system are designed and tested to withstand at least **200 psi."**

MULTIPLE SYSTEMS

The two pictures above are **not combined systems**. Both pictures are pictures of two separate systems, a dry standpipe and a separate sprinkler system.

The picture on the left has discs denoting which is which. The picture on the right has no labels, hence the need for pre-fire planning.

PIPE CASING HOLES

Pipe casing holes are breaches in the first floor and roof of Type I construction when required by the building code. The pipe casing is of metal construction and has an internal diameter of 8”. A round metal cover, with a recessed handle in its center, seals the hole. A pipe-casing hook is inserted into this handle for removal of the cover. When hose lines cannot be immediately led to the affected area, circulators are placed into pipe casing holes to attack a fire in the area directly below. Some waterfront piers are provided with pipe casing holes in the pier deck and apron for circulator access to substructure areas.

REFRIGERANT DIFFUSERS

Certain types of refrigerating plants, as specified in the San Francisco City Fire Code, are equipped with diffusers consisting of a mixing chamber in which the refrigerant is absorbed by water and drained into the sewer. This device is provided for use in emergency disposal of the refrigerant that might arise from leakage.

A service box is usually located on the exterior street wall of the building in which the refrigerating plant is located. It contains the water supply emergency valve, the refrigerant emergency control valves, and a single 1-1/2” female swiveled inlet for connection of Fire Department 1-3/4” hose. Three hand wheel control valves are provided: one controlling flow of water from the building water system, one controlling flow of refrigerant from the system high-pressure side, and one controlling flow of refrigerant from the system low-pressure side. When it is necessary for the fire Department to diffuse the refrigerant contained in a refrigerating system, a 1-3/4” hose line should be led from an engine company and connected to the inlet of the diffuser. Supply pressure should be regulated so as not to exceed 50 psi at the diffuser inlet. The procedure for connection to a refrigerant diffuser is as follows:

1. Immediately start diffusion by:
   a. Opening building system water valve
   b. Opening high-pressure refrigerant valve
   c. Opening low-pressure refrigerant valve

Note: Water must be flowing before refrigerant control valves are opened.

2. Lead 1-3/4” hose line to diffuser inlet
3. Remove plug from diffuser inlet
4. Connect male coupling of 1-3/4” hose lead to diffuser inlet, spanner tight
5. Charge 1-3/4” hose lead to diffuser

SECTION 8. FOAM

DESCRIPTION

Foams currently used in the fire service are known as “mechanical foam”. These mechanical foams must be proportioned (mixed with water) and aerated (mixed with air) before they can be used. To produce quality fire fighting foam, foam concentrate, water, air, and mechanical aeration are needed. These elements must be present and blended in the correct ratios. Removing any element results either in no foam production or a poor quality foam.

Foam concentrate is the raw foam liquid as it rests in it’s storage container before the introduction of water and air.

Foam proportioner is the device that introduces foam concentrate into the water stream to make the foam solution.

Foam solution is the mixture of foam concentrate and water before the introduction of air.

Foam is the completed product after air is introduced into the foam solution (also known as finished foam).

Aeration should produce an adequate amount of bubbles to form an effective foam blanket. Proper aeration should produce uniform-sized bubbles to provide a long lasting blanket. Aeration in the SFFD is achieved by using combination or foam (“bubble cup”) nozzles.

To be effective, foam concentrates must also match the fuel to which they are applied. Class A foams are to designed to extinguish type A fires. Likewise, Class B foam is for type B fires.

Foam extinguishes and/or prevents fire by the following methods:

Separating – creates a barrier between the fuel and the fire.
Cooling – Lowers the temperature of the fuel and adjacent surfaces
Suppressing / Smothering – prevents the release of flammable vapors and therefore reduces the possibility of ignition or re-ignition.

(from IFSTA, Pumping Apparatus Driver/Operator Handbook, First Edition, pp.356-357).

Foam can be divided into 2 categories: Class A & Class B. Hybrid A/B foam is available on the market, but the SFFD uses only Class A and Class B foam.

CLASS "A" FOAM

Class A foam is used on Class A fuels (ordinary combustibles). It is effective for wildland settings, basements, and other incidents involving deep-seated fuels. Remember that a Class A fuel can be categorized as any fuel that leaves an ash.

It is important to note that CLASS A FOAM IS TO BE USED ON CLASS A FUELS. IT IS NOT FORMULATED FOR FIGHTING CLASS "B" FIRES,(exception: you can use it for initial attack on Type B fuel fire, however, Class B foam will need to be utilized as soon as possible).

Class A foam in the fire service is deployed by either nozzle-aspirated foam systems (NAFS) and compressed air foam systems (CAFS). CAFS utilize large amounts of compressed air and small amounts of water to make foam. The SFFD uses NAFS. Combination nozzles are a key component to make foam.

The objective of Class A foam is to "make water work better". Class A foam concentrate is a surfactant, or a "surface active" agent. When this agent is added to water, it reduces the surface tension of the water. This allows the water to spread into a thin sheet, increasing its surface area. Because heat is only absorbed by the surface, the increased surface area leads to quicker absorption of heat. Reduced surface tension also allows the solution to penetrate better into fuels. Surfactants have an affinity for carbon. Adding surfactant to water makes the water "carbon loving.". This keeps the water in contact with the fuels longer, providing more heat absorption and an increase in fuel moistures.

Foam bubbles are created by agitating air into the foam solution. These bubbles can be made in various forms. Wet to fluid to dry, depending on the tactical application required.

Wet foam (.1%) (also known as "thin foam") resembles melted ice cream…it is wet and sloppy and water drains out of it quickly. It is used for extinguishing fire, mopping up, and raising fuel moistures. **Overhaul!**

Fluid foam (.3%) looks like and feels like shaving cream. It holds water much longer and is **used for direct attack** its primary use is to hold water in place to inhibit fuel ignition.

Dry foam **(1.0%)** (also known as "thick foam") contains a large volume of bubbles with very little water content. It can be used to fill void spaces such as attics or areas under decks. **It is also ideal for exposure protection because it creates foam that can cling to vertical surfaces for extended periods.** Once the foam starts to evaporate you need to re-apply it.

(from "Lather Up" by Keith Klasser, Summit Fire District, Flagstaff, AZ)

SFFD apparatus that carry Class A foam are the OES Engine, mini-pumpers, and newer engines that have pre-plumbed proportioners (2006 American LaFrance engines). The proportioners are the Foampro 2000 series and 2001 series units.

Phos Check is the recognized trade name for wildland fire retardant and foam. This is what the SFFD uses.

<u>Never mix A foam and B foam together in concentrated form. This causes coagulation.</u>

<u>Never use or add Class A foam to fixed water systems such as standpipes, sprinkler systems, tanks.</u>

<u>Never use in pumping operations from one engine to another.</u>

General applications:

Direct Attack 0.3%
Overhaul 0.2 %
Exposure Protection, Trash fires, Car fires and pre-treatment of brush 1.0%

NEVER EXCEED 1%

Use combination nozzles for exposure protection, pre-treatments, and overhaul. A smooth bore nozzle can be used for exposure protection (to be used only in an emergency, when there is not enough time to change nozzles on a pre-connected line). Smooth bore stream will benefit from a decrease in water's surface tension, but will not bubble like a combination nozzle. It is important to change to a combination nozzle, as soon as knockdown is completed.

If a substitute brand of Class A foam is given (such as on a strike team assignment), run foam level (in the tank) to a minimum before filing substitute concentrate. Drain substitute foam concentrate, flush with water, and refill with Phos-Check WD 881 as soon as possible after the incident.

HI-EXPANSION FOAM

A second type of Class A foam is used in the SFFD. It is High Expansion Foam. It is different than Phos-Check WD 881, as High Expansion Foam is detergent based. Because Hi-Expansion foam has a low water content, it minimizes water damage. Also, its low water content is useful when runoff is undesireable. High Expansion Foam units are ideal in concealed spaces such as basements and ship fires. It is mostly used in Class A Fire Application, however can be used for Type B fires, as well (using Class B foam).

Hi Expansion foam units are found on Attack Hose Tenders.

CLASS "B" FOAM

Class B foam is used to extinguish fires involving flammable and combustible liquids (Type B fuels). It is also used to suppress vapors from unignited spills of these liquids.

The fire service uses numerous types of foam. The SFFD uses Aqueous Film Forming Foam (AFFF) for Type B applications. But the AFFF is being phased out; soon all rigs will be carrying 3x3 foam for hydrocarbon and polar solvent fires. Eductor setting at 3%.

Type B fuels can be divided into two categories: polar solvents and hydrocarbons

- *Hydrocarbon* fuels are petroleum based, and float on water. Crude oil, fuel oil, and gasoline are examples of hydrocarbons.

- *Polar solvent* fuels are miscible (or mix) in water. Lacquer thinner, and alcohol are examples of polar solvents. Note that gasoline blended with 10% or more solvent additive is considered a polar solvent.

It is important to identify the type of fuel involved prior to foam application. Once the fuel is identified, proportion Type B foam at 1% to 3% for hydrocarbons, and 3%-6% for polar solvents.

When using the eductor to combat an unknown type "B" fire start at 3% which is okay for both hydrocarbons and polar solvents.

Inline eductors use the Venturi Principle to draft or pull foam concentrate into the water stream. As water at high pressure passes over a reduced opening, it creates a low-

pressure area near the outlet side of the eductor. This low pressure area creates a suction effect, called the Venturi Principle. The eductor pickup tube is connected to the eductor at this low pressure point. A pickup tube submerged in the foam concentrate draws concentrate into the water stream, creating a foam solution.

There are important operating rules to be observed when using eductors. Failure to follow these rules lessens the performance of the eductor.

1. *The eductor must control the flow through the system*. In other words, the flow through the eductor should not exceed the rated capacity of the eductor. SFFD uses Elkhart brand eductors. These units are calibrated to flow optimally at 200 p.s.i. inlet pressure. **Flowing more than 200 p.s.i will end up with a lower percentage of concentrate than desired. Flowing less than 200 p.s.i. at the eductor will result in a richer foam concentrate than desired**. Elkhart Eductors are designed to give the lowest possible pressure drop through the venturi.
2. *The nozzle must match the flow rate of the eductor*. The optimal nozzle to use is the KK Bubble cup foam nozzle or the new red nozzle. It matches the flow rate of the eductor of 95 gpm. Other combination nozzles that flow > 95 gpm will work as well, however, the effective reach of the resulting stream will be diminished. Nozzle shut-off should be fully open during foam operations, It is important not to use low-flow forestry nozzles. Their discharge rates (20-40 gpms) will cause the eductor not to pick up concentrate.
3. *The eductor will pick up concentrate whenever the outlet pressure is less than 65% of the inlet pressure*. Friction loss through the eductor can be calculated by subtracting the following three factors from the inlet pressure: (a) nozzle pressure, (b) friction loss of the hose between the eductor and the nozzle, and (c) any pressure change due to a difference in elevation between the eductor and the nozzle. Also, maximum hose lay between the eductor and nozzle is 150' of small line.
4. *Eductors must be properly maintained and flushed after each use*. Flush the eductor for at least one minute, and thoroughly clean and check the eductor after each use.
5. *The foam concentrate inlet to the eductor should not be more than 6 feet above the liquid surface of the concentrate*. If the inlet is too high, the concentrate will be very lean, or foam may not be inducted at all.

Foam Application

Roll-on Method directs the foam stream on the ground near the front edge of the liquid pool. The foam then rolls across the surface of the fuel. It may be necessary to move the stream to different positions along the edge of a liquid spill to cover the entire pool.

Bank-down Method makes use of an elevated object near or within the area of the spill. The foam stream is directed off the object, allowing the foam to run down onto the surface of the fuel.

Rain-down Method is used when the first two methods are not feasible. The stream is directed into the air above the fire or spill, and allows the foam to float gently down on the surface of the fuel.

Tactics for Engines w/ pre-plumbed "A" Foam

0.3% foam is used for **Direct Attack,** it causes less water damage and will suppress the fire. Leave the 7/8" straight stream tip on the hoseline. **DO NOT USE COMBINATION NOZZLE FOR INTERIOR ATTACK!**
1.0% is used for **Exposure Protection and "B" fires.** The foam will adhere to vertical surfaces and will protect the exposure better than just water. Use combination, bubble cup, or red nozzles when using foam for exposure protection.

0.2 % foam is used for mop up or **Overhaul**. You should be using a combination nozzle for overhaul operations whether you're using foam or just water.

1.0% foam is used for **Brush (Pre-Treatment).**

The more times you use the foam the more likely you'll remember the percentages. If you can't remember the percentages at time of **Emergency** operation go with **.5%**. You can copy and laminate this section and stick it near the foam controls.

All of the above are examples of usage for type "A" fires.

Using the pre-plumbed "A" foam Engines for initial attack on type "B" fires.

Can be used for initial attack on type "B" fires, using combination nozzle.

Procedures:

1. Use combination, bubble cup or new red nozzle
2. Set proportion at 1%
3. Lob foam onto fire, (or deflect)

While "A" foam is being applied to fire, other firefighters need to be simultaneously setting up the in-line eductor with the bubble cup nozzle for class "B" fire suppression, and put into operation as soon as possible. **When using "A" foam on "B" fires there is a time limitation as to how long there will be vapor protection, usually 15 minutes**. "**B" foam needs to be applied with the eductor set-up to give you a better**

seal on the vapors, as soon as possible! Even after “B” foam has been applied to “B” fire be aware there is the possibility of re-ignition.

If the product on fire is flowing down the street, it’s considered to be an “A” fire. With the new pre-plumbed Engines, the fastest way to knock down the fire is to apply “A” foam with a combination nozzle or even better, the bubble cup nozzle or the new red nozzle.

“B” fires are pools of product on fire whether it’s hydrocarbon or polar solvent. As soon as possible, the 3x3 foam should be used with the eductor.

Never put “B” foam into the foam reservioirs of pre-plumbed Engines! “A” and “B”, when mixed in concentrated form, congeal and clog up the works. **You can apply a “B” foam blanket over an “A” foam blanket.** The foam once applied is obviously no longer in its concentrated form.

The “A” foam shelf life in the reservoirs is supposed to be indefinite unless it’s an unusually hot environment.

- ***Foam on new Engines are to be used for “A” fires primarily. They can be used on “B” fires with combination nozzle initially, but the “A” foam will only provide a limited time of vapor protection***

- ***Eductors are good for primarily “B” fires and sometimes effective on “A” fires***

- ***All Engines need eductors,bubble cup or new red nozzle, and 3x3 foam for use on Class “B” fires***

SMALL LINE FOAM APPLIANCES

Elkhart Foam Eductor

The Elkhart foam eductor is carried on engine companies for use with 1 3/4“ hose lines. It is to be used in conjunction with the KK Bubble Cup nozzle or the new red nozzle. Engines should strap the eductor and either bubble cup or new red nozzle together,so when emergency operation is called for, no time will be lost searching for equipment. To insure efficient foam generation, the pressure should be **200 psi at the eductor** and no more than 150 feet of small line from

the Eductor. The foam solution 3X3 should be used with the eductor set at the following setting 3%.

3% using 3x3 foam is effective for both hydrocarbon and polar solvent fires.

Operation of the Elkhart Eductor

1. Place all equipment needed (Large line with Gorter shutoff and wye, eductor, small line, foam, nozzles, etc.) near operation point and lead engine to source of water.

2. Connect eductor to wye, small line to eductor (150' maximum), and Bubble Cup nozzle to small line. **DO NOT Connect a second small line to the other outlet as the protection line. Use a separate small line with the Thunder Fog nozzle and don't open bale completely if pressure is too high.**

3. Supply water from the pump to the hose line with a pressure of **200 psi** at the eductor. Open gorter, open wye and open nozzle away from fire and listen for whistling, if no whistling your eductor is not working.

4. Insert eductor pick-up tube if whistling into the foam container. Flow water from the nozzle away from the fire, depress knob, and adjust the eductor to appropriate foam percentage.

5. Apply foam to fire gently by bouncing off a wall, deflection, or lobbing, rather than applying directly.
6. The 95 gpm Elkhart eductor set at 6% will exhaust a 5-gallon foam container in approximately 60 seconds.
7. After use, the eductor and pick-up tube must be flushed with clean water to prevent the foam from drying in the appliance and causing a blockage.

LARGE LINE FOAM APPLIANCES

Foam appliances for use with large lines are stored with the Foam Unit.

Akron In-Line Proportioner and Foam Nozzle

1. It is designed for use with large hose lines, hand-held or from an aerial ladder operating as a foam tower.
2. The proportioner is equipped with a 2-1/2” inch NST female thread, swivel inlet and a 2-1/2” inch NST male thread outlet, a calibrated metering valve, and a pickup tube. A check valve prevents back-flow of water into the foam solution container. It may be attached directly to the pump discharge outlet or at any desired location in the hose line.
3. The metering valve is calibrated for five settings and water will flow through the proportioner at any setting.
   a. At "0" the valve will not pick up any solution.
   b. At "1" the valve meters for production of "wet water".
   c. At "2", "3", and "6", the valve meters 2%, 3%, or 6% mechanical foam solution as required. The metering valve must be set at "6" when operating from 5 gallon foam solution cans supplied to the SFFD.
4. The foam nozzle is a separate unit equipped with a 2-1/2”inch NST female thread swivel inlet and a 2-1/2” inch discharge orifice. The nozzle and proportioner are engineered to be used simultaneously. No other nozzle may be substituted.
5. Recommended pressures are 200 psi at the proportioner to produce 100 psi at the nozzle. While it is possible to lay 1200 feet of hose from the proportioner outlet to the foam nozzle, it is recommended that the lead from the proportioner discharge outlet be kept to a workable and comfortable minimum.
6. Lower pressures may be used but may produce ineffective foam consistency and range. Insufficient pressure at the proportioner results in a foam consistency containing a water content that is too high.

7. The approximate operating characteristics of the Akron proportioner and foam nozzle at 100 psi are as follows:

GPM of water	120
GPM of Foam solution	10
GPM of Mechanical foam	900-1000
Effective Range in feet	45-50
Operating time (5 gal can)	30 seconds

8. General operating instructions and precautions include:

   a. Maintaining adequate pressure at the in-line proportioner is mandatory. On hand-held lines or ground level operations, 200 psi at the proportioner is normally sufficient.

   b. Aerial ladder foam tower operations require additional pressure at the proportioner to over come the backpressure created by the elevation of the ladder. Normally, the aerial ladder inclination should not exceed 45 degrees and the height of the foam nozzle above ground level should not exceed 45 feet. A good formula for determining proportioner pressure is to provide 1 pound additional pressure for each foot of ladder elevation. Nozzle operation from the ladder is optional either directly at the nozzle or by guide rope operation from the ground or turntable.

   c. Pump pressures of 220-230 psi should be adequate to produce 200 psi at the proportioner primarily because the required 120-gpm flow will not create critical friction loss in the supply line to the proportioner. Excessively long hose line leads and aerial foam tower operations will require adjustment of these recommended pump pressures.

   d. The rapidness with which 5-gallon foam cans are used in these operations (approximately 30 seconds) requires an adequate supply at the proportioner with cans open and ready for immediate use. Rapid changeover of the pickup tube from can to can is necessary to produce as continuous a flow of foam as possible and requires alertness. Placing blocks under the proportioner will facilitate this operation.

   e. <u>All appliances, fittings, and hose used in these foam-producing operations must be thoroughly flushed with fresh water after use to prevent deterioration and damage.</u>

   f. The proportioner and pickup tube maintenance requires special attention to cleanliness of screens, lubrication of springs in the metering valve (3-in-1 oil or equivalent) and complete inspection to detect and remove all sediment or obstructions.

g. Fresh water or salt water may be used through the proportioner to produce foam. Water flows through the proportioner to pick up or siphon the foam solution through the pickup tube. The solution is introduced into the discharge hose line where it flows in proper proportion. The foam is produced at the foam nozzle as the water solution passes the aspirator by entraining air to form the foam. This evolution differs from chemical foam, which is produced at the foam generator and flows as foam in the discharge hose line and is discharged through the Underwriters' Laboratory Play Pipe or high-pressure nozzle.

h. In all operations using the foam proportioner with the foam nozzle, a time delay will exist before the water foam solution leaving the proportioner discharge outlet reaches the nozzle aspirator to form the foam. During this period, water only will flow through the nozzle; the time depends upon the hose length lead from the discharge outlet of the proportioner. Good operating procedures dictate that during such periods when water only is being discharged, the nozzle should be directed away from the objective and re-directed as foam is produced.

9. Wet Water Operations: The Akron In-Line Proportioner may also be used to produce "wet water". The operation is essentially the same as described for foam application with the following important variations:

a. The metering valve is set at "1".

b. “Unox" penetrant foam or other wet water agent supplied in 5-gallon cans is substituted for 6% mechanical foam solution.

c. 1-3/4” hose lines equipped with McLaughlin nozzles having _” tips and not exceeding 150-feet in length are used from the discharge side of the proportioner.

d. The shut-off nozzle must have an adequate orifice to insure proper velocity and flow in accordance with the engineered principle of the proportioner. The 120 GPM proportioner will require an orifice not less than _”. Use of smaller orifice nozzles may create sufficient backpressure to operate the check valve of the proportioner, thereby shutting off the supply of "Unox" or wet water agent.

e. This operation should be used to meet the requirements of deep penetration into mattresses, cotton bales, or similar water repellant class “A” materials. It is particularly valuable in overhauling baled materials.

ANGUS 450 COMBAT FOAM EDUCTOR AND NOZZLE

The Angus 450 will generate foam with pressures ranging from 60 to 150 psi at the foam eductor. For optimum foam generation, the inlet pressure at the eductor should be 100 psi. This will generate 120 gpm of foam solution with a range of approximately 70 feet. Foam rate is adjustable between 1% and 6%. The maximum length of hose lead is 1,200 ft. when using a large line hose lay. A 55-gallon drum of foam concentrate will last approximately 5 minutes with this eductor and nozzle; therefore, it is imperative that a sufficient supply of foam be on hand when using the Angus 450. Additional supplies of foam for large incidents may be obtained from the Bureau of Equipment. Supply of foam can also be facilitated by dumping the small 5 gallon containers from engine companies into the 55 gallon empty drums carried on the foam unit. This will establish a reservoir of foam that can be used during the incident.

The proper nozzle must be used with the designated foam eductor for optimum performance. When nozzle shutoffs are used with any foam appliance, they must be fully opened for optimum foam generation. If the shutoff is partially closed, it will not only restrict the flow but will cause sufficient backpressure so the eductor will not generate foam correctly. A seriously kinked hose line will have the same effect.

Whenever possible, foam application should be directed against a vertical surface and allowed to flow over the burning surface. If this method is not possible, the foam should be applied so it will fall lightly upon the burning surface and continue to be applied until the affected surface is completely covered. Should an interruption of foam discharge occur due to an inadequate supply of foam concentrate, the nozzle discharge should be directed away from the foam blanket as soon as water only is discharged. Changing the pick-up tube from one foam can to another, if done quickly, does not interrupt the flow of foam sufficiently to disrupt the foam blanket.

In foam operations be aware of protecting exposures and confining the fuel spill. When operating a foam nozzle, always have a 1-3/4” charged line with a fog nozzle in place for backup protection.

Nozzle

Angus 450 Foam Eductor

FOAM UNITS FOUND ON ATTACK HOSE TENDERS

Hi-Ex Foam Units—Specifications

Capacity and requirements: The Model P-500 Kidde Hi-Ex Portable Foam Generator produces 5,000 cubic feet per minute of 1,000:1 ratio foam (37,000 gpm). The unit uses 45 gallons of water per minute at a pressure of 60 psi and 0.7 gpm (1.5%) of Kidde Hi-Ex Foam Concentrate or AFFF foam concentrate. (See operating plate on unit).

Construction and technical information: The model P-500 weighs 170 pounds, is 61" long, 41" wide and 41" high and is encased in a tubular aluminum frame. A Briggs and Stratton one-cylinder, six horsepower engine drives a specially bladed fan, which is attached to the crankshaft. The aluminum frame carries the special absorbent nylon netting upon which the foam is formed and the canvas adapter section to which the discharge tube is zippered. The opposite side of the net frame is bolted to a plenum chamber housing four spray nozzles. The fan, mounted on the inlet end of the chamber, drives the mixture through the netting, forming the foam, which is then carried through the adapter section and discharge tube to the fire.

Water is supplied to the unit through a 1-3/4 inch hose line. An inline proportioner draws the Kidde Hi-Ex foam concentrate from its container through a metering orifice into the water stream.

The mixture of foam concentrate and water is sprayed at about 12 psi onto the nylon net. By creating a constant airflow through the fabric as well as a constant spray pattern for even wetting, a mass of bubbles of uniform size is formed. The foam thus formed is delivered to the fire through a 3-foot diameter muslin tube.

Controls: Water supply to the P-500 is controlled by a 1-1/2 inch ball valve with a quarter turn shutoff lever. A calibrated pressure gauge measures water flow through the spray nozzles. Engine speed is maintained by a screw handle control. A small fan on the air inlet, which rotates a metered tachometer generator, supervises air quantity. With this system, the operator can maintain uniform generation even though backpressure may vary.

Hi-Expansion Foam Unit (Kidde P-500)

The Kidde P-500 operating instructions are as follows:

1. Connect a 1-3/4 inch hose line to the unit and charge the line. Supply may be from any source. Fresh or salt water may be used.
2. Insert the pickup tube into the Kidde Hi-Ex foam concentrate container, a supply of which is carried on the attack hose tender.

3. Place the discharge tube in position where most effective foam application will be obtained.
4. Open inlet water valve until pressure gauge reaches marked point.
5. Start engine and accelerate until the air flow meter indicates within the "green zone".
6. During operation maintain gauges at marked points.

KIDDE P-500

The stainless steel pickup tube is fitted with a fine screen to prevent the entrance of foreign matter into the metering orifice. The end of the pickup tube is cut at an angle to facilitate piercing the plastic seal on the concentrate container.

The water pressure gauge reading should be held constant even though the supplying pressure varies. Should this reading fall below the marked point, check the supply pressure. If increasing the pressure at the source fails to provide adequate pressure, shut down, disconnect and check the inlet screen for obstruction.

Foam formation starts simultaneously with engine actuation. Engine speed should be regulated immediately to assure proper foam formation and delivery, and readjusted promptly to meet varying conditions.

Discharge tubes: Discharge tubes are constructed of sturdy, mildew resistant muslin sections joined to the unit and to each other by heavy duty metal zippers. There are three discharge tubes supplied with each unit.

1 - 50' (green stripe identification)
1 - 25' (red stripe identification)
1 - 20' Flared for doorway (20' x 12') (yellow stripe identification)
Tubes are 3' in diameter.

Foam in the tube and backpressure within the burning structure cause the tube end to swell, forming a tight seal in the opening. This sealing process can be further facilitated by optional use of the flared section.

Maintenance

After the P-500 has been used, the discharge tube should be cleared of residual foam. A convenient way to clear the tube is to have two firefighters, one on either side, pass a rope under the tube, raise it slightly and walk its entire length from the generator to the open end while running the fan at high speed.

The tube should be hung up to dry thoroughly after use and rolled so that the guide rings are on the inner end of the roll and the zipper slide on the top. This will allow the tube to be rolled out correctly by fan pressure the next time the unit is used.

The proportioner and pickup tube should be flushed with clear water after use. Check the screen on the pickup tube for cleanliness. Run water through the nozzle to be sure it is not clogged and check the screen at the hose inlet.

Foam concentrate cans should be kept closed to prevent contamination or dilution with water.

Fuel: Use regular grade gasoline.
Oil: Use 10-30 detergent oil.

Jet X-2 Generator

The Jet X-2 generator is much smaller than the KIDDE P-500 is. It is used in similar situations and in much the same manner. Because it is smaller and lightweight, it may be more suitable in some areas than the Kidde P-500.

The Jet X-2 has a capacity of approximately 2000 C.F.M. and weighs 50 pounds. Its shape is that of a cylindrical body flaring out to a rectangular front section. In the cylindrical section is mounted a water driven fan and spray nozzles. The rectangular section contains the foam baffles. Water is fed into the unit through a 1-3/4” hose line connected to a proportioner consisting of an adjustable metering valve and pickup tube.

The proportioner should be setup similar to the Elkhart eductor at the wye and not directly to the generator inlet. That way, if the generator needs to be moved, the foam supply will not have to be moved along with the unit. The proportioner can be up to 150 feet (three lengths) back from the generator. The pressure at the generator should be approximately 100 psi, which will be adequate to drive the fan and also supply the spray to the foam baffles. The operator of this unit should check to make sure that the metering valve is set to the 1-1/2% position so the High-Ex foam will be of the proper concentration for a good effectiveness and maximum duration.

This unit is also adaptable to the AFFF "Light Water" type of foam that is carried on Engine Companies. The metering valve shall be set at “6” when using this AFFF (Aqueous Film Forming Foam). Depending on the foam used, the setting may vary between 3% or 6%.

JET X-2 GENERATOR

Fire attack with Hi-Ex foam

- Mass Effect: The tremendous volume of foam being discharged into an area involved in fire seals the area and prevents fresh air from reaching the base of the fire. Once the fire has been overcome, the foam continues to exclude fresh air and holds the steam and oxygen deficient atmosphere around the fire.
- Steam Effect: When the thin water film of the bubble wall approaches a fire, radiant heat vaporizes the water in the foam front. The one part water in 1000 parts air expands 1700 times in forming steam. The resulting steam air mixture has oxygen content of around 7.5%, well below the level required to support combustion. Large volumes of steam formed will displace hot gases and will tend to limit the fire spread.
- Cooling Effect: Bubbles cannot exist in contact with a dry surface. They break and deposit their liquid content where it is either hot or dry. As a result, Hi-Ex foam selectively wets down those spots where the water is actually needed. Dry surfaces are wetted, hot surfaces are cooled, and since the surface tension of the water in Hi-Ex foam is quite low, penetration is far deeper than would be the case with equal volumes of plain water.
- Combined Effects: Cooling and extinguishing can also be accomplished by a high steam atmosphere. All three of the effects listed above are involved here. Steam is created at 212 degrees Fahrenheit. The high steam atmosphere, in contact with a hot surface, can have its temperature raised and, in turn, can lower the temperature of the hot surface. This cooling with steam is effective if the foam is present in sufficient volume to prevent air from diluting the high steam atmosphere and to hold the high steam atmosphere in contact with the hot material. In this way, Hi-Ex foam can extinguish deep-seated fires, such as those of tightly stacked rubber tires.

- Cover the Fire: When Hi-Ex foam covers the burning material of a fire, the heat of the fire is absorbed and the fire will not spread. It is important to cover the fire as rapidly as possible to inert it, to eliminate active burning, and to minimize damage. Thus, equipment should be operated to produce foam at as high a rate as possible.
- Maintain the Cover: After the burning material has been covered, the covering must be maintained to cool the hot material. The cooling problem depends upon the amount of heat that has been built up within the structure and the material involved in a fire. Thus, if a fire has been allowed to burn for a long period, it will build up a large reserve of heat, which must be absorbed by the water carried to the fire by the foam, before extinguishment is obtained. The cooling problem also depends upon the rate at which the foam generator delivers water to the fire and the total time the equipment is operated. Obviously, the longer a fire is allowed to burn freely before control is obtained, the more foam concentrate will be used to cool it. The rate of steam emission will show the degree of cooling obtained.
- Hi-Ex Foam in the Open: Hi-Ex gives the firefighter a powerful new tool for control of Class B fires in the open. Here again, the Hi-Ex foam generator can create a tremendous volume of foam to cover, to control, and to extinguish Class B fires. If a strong wind is present, the Hi-Ex foam generator should be operated to make lower ratio foam that is heavy enough to resist the tearing action of the wind. Since the foam is visible and the effect of the wind upon the foam can be seen, the operator should adjust the fan speed to create foam able to resist the wind. Of course, heavier foam reduces total volume so it is important to make the foam as light as possible consistent with its ability to resist the wind. The weight of the foam can be increased by the careful use of water fog onto the top of the Hi-Ex foam. The fog should be as fine as possible and should be directed high and allowed to fall upon the foam like a fine rain. This addition of water to the top of foam will create a wet, heavy layer, which resists high wind very well.
- Extinguishment of a Very Low Flash Point Liquids: The accepted theory is that Hi-Ex foam can extinguish a fire of a very low flash point flammable liquid when the weight of the foam over the liquid equals the vapor pressure of the liquid. This means that the foam must be built up to a reasonable depth. Occasionally, this is not possible because there is no confinement of the foam or there may be a high wind. In these situations, water fog can be used to increase the weight of the foam so that extinguishment will be obtained.
- Getting Back into the Building: Unless there is some reason to believe that someone is trapped within the building, there is no urgency in clearing a building of foam if all exterior evidence shows that the foam application is controlling the fire. The presence of foam at doors and windows and the absence of smoke are the best evidence that the foam has the fire under control. In this situation, the most effective overhaul and the one, which will cause the least damage to the building and the least expense for the fire Department, is to keep the building

under surveillance. After the foam has deteriorated naturally in about 8 to 12 hours, it is usually possible to walk into the building without difficulty.

In some cases, the owner of the building will insist that the building be cleared of foam as soon as is reasonably possible. Additionally, it may be necessary to overhaul if some physical situation of the building prevented the foam from reaching all points of the fire.

Rapid re-entry is obtained by cutting a path in the foam with a coarse fog. Often a large amount of foam can be blown out of the building by opening the building at a low point away from the foam generator and running the fan only at a high speed, then entry with a fog nozzle is easier. It must be realized that a water fog will require many times the amount of water than that which the foam carries. Therefore the likelihood of water damage is substantially increased by using a fog stream to clear the foam.

- Breathing the Foam: Do not enter the foam when re-entering the building. The foam is opaque and it is impossible to see when one is submerged in the foam. It is dangerous to enter a building in which there was a fire if one cannot see. Use a coarse fog to cut a path in the foam. It is possible to breathe while in the foam - for one purpose only, to save life. If a person is trapped in a building and has the choice of breathing Hi-Ex foam or smoke, they should enter the foam to survive. They can breathe the foam and wearing a handkerchief over the nose and mouth may reduce discomfort. Self-contained masks (oxygen or air) may be used.

Summary of Fire Fighting with Hi-Ex Foam

1. Extinguish all exposed flame with water streams or fog.
2. If the remaining fire is hidden and looks like a job for Hi-Ex, don't hesitate. Use Hi-Ex promptly. The longer you delay, the more fire and heat the foam will have to overcome.
3. Push foam into the building as rapidly as possible. Cover the fire. Get white steam. Eliminate the smoke and the fire.
4. If the fire was large, you will have a lot of steam. Keep adding to the foam to maintain the level of foam, especially if you continue to see a lot of steam.
5. Plug up leaks such as broken windows in the best possible manner.
6. Be sure the building is vented at some high point. A vent opening should be secured to allow steam and smoke out or the foam will not penetrate the building.

7. In the open, attack the fire from an upwind point. Make the foam just heavy enough to stay in the wind.

SECTION 9. HOSE HANDLING

In order to attain efficiency in fire hose operations it is necessary that the basic practices of handling hose be uniform throughout the Department. Basic practice in the handling of hose includes the following:

- Coupling and uncoupling of hose lengths
- Connecting and disconnecting of nozzles
- Bleeding and picking up of hose after use
- Loading of hose in apparatus hose beds
- Assembling of small hose line bundles
- Use of the combination hose and shoulder strap

Whenever possible, firefighters should work in pairs. However two firefighters are not always available. For this reason the procedure for one firefighter operation is also given in the following text.

When coupling hose or making connections, it is good practice for the firefighter holding the male coupling to grasp back from the male threads in order to prevent injury to the fingers from operation of the female swivel. Hand tightening of connections is usually best made by use of the thumbs against the pin or rocker lugs and by turning the swivel half a turn at a time. All female couplings and fittings contain a washer. It should therefore be an automatic action to examine for placement and condition of the washer. When coupling male to female threads together, they must be aligned first to prevent cross-threading.

COUPLING AND UNCOUPLING HOSE LENGTHS

The coupling and uncoupling of hose is one of the most important jobs performed by all firefighters. It must be done rapidly under a variety of working conditions. When connecting hose together, the threads of the couplings must first be aligned or ‘set’ to eliminate the possibility of cross-threading. A groove in one of the rocker lugs on each male and female coupling, known as the “Higby Cut”, identifies the aligned position when in-line to each other.

The use of spanners is seldom required when connecting hose couplings together but is often required when tightening to a water supply outlet or to various hose appliances.

Uncoupling hose is the reverse of the procedure used for coupling. The rotation of the swivel when uncoupling hose is counter-clockwise. Spanners will frequently be required to free a tight connection. Consideration must be given to the care of couplings when

uncoupled. Female couplings should be examined to see that washers are in place and in good condition. **Male couplings should never be dragged on the ground!**

Connecting Female and Male Couplings (2 Firefighters):

Firefighter 1:

1. Holds male coupling on right side, waist high
2. Hands holding coupling to the rear of lugs
3. Not looking directly at other coupling (Prevents both firefighters adjusting hose end)

Firefighter 2:

4. Holds female coupling on right side, waist high
5. Coupling in left hand behind swivel
6. Right hand on swivel
7. Check for washer
8. Set threads counter clockwise
9. Turn swivel clockwise until snug
10. Use both hands on swivel to make coupling tight

Connecting Female and Male Couplings (1 Firefighter):

1. Face male coupling
2. Female coupling on right hand side of body
3. Place left foot on hose to the rear of the male coupling
4. Exert pressure on foot to tilt male coupling upward
5. Check for washer in female swivel
6. Position female coupling with left hand
7. Set threads
8. Turn swivel with right hand clockwise to tighten

9. Use both hands, while maintaining foot pressure on hose, to cinch tight

Connecting Two Male Couplings - Large Hose

The connection of two male couplings requires the use of a double female fitting. The SFFD does not provide these fittings for small line hose. The use of a spanner is required to tighten the final connection.

Use of Double Female

Two Male Couplings (2 Firefighters)

Firefighter 1:

1. Holds male coupling
2. On right side of body waist high

Firefighter 2:

3. Holds double female in left hand

4. Checks for washers
5. Sets threads counter-clockwise with right hand

6. Turns swivel clockwise with right hand
7. Fully tightens with both hands
8. Picks up remaining hose length and places male coupling to double female

Firefighter 1:

9. Changes hand position; left hand holding fitting, right hand on swivel
10. Set threads counter-clockwise
11. Tighten swivel, clockwise

<u>Two Male couplings (1 Firefighter)</u>

1. Check double female for washers
2. Face male hose coupling on first hose line
3. Place left foot firmly on hose behind coupling

4. Support double female with left hand
5. Set threads counter-clockwise with right hand on swivel
6. Turn female swivel clockwise until tight
7. Reposition body and place left foot on second hose line behind male coupling
8. Position hose with double female attached to second hose line

9. Connect in same manner as above
10. Spanner tight

Two Female Couplings (2 Firefighters)

The connection of two female couplings requires the use of a double male fitting.

Firefighter 1:

1. Holds female coupling of first hose waist high on right side of body
2. Both hands holding swivel
3. Check for a washer

Firefighter 2:

4. Places double male into coupling supported by Firefighter 1
5. Clockwise until tight
6. Picks up second hose line
7. Check for a washer
8. Sets threads to double male in first hose, (counter clockwise)
9. Turns swivel clockwise until tight
10. Uses spanner, if necessary, to secure connection

Two Female Couplings (1 Firefighter)

1. Check female couplings for washers
2. Face first hose and place left foot firmly on hose behind coupling
3. Hold swivel steady with left hand
4. Hold double male in right hand
5. Set threads counter-clockwise
6. Attach fitting to female swivel clockwise until tight
7. Connect second hose line female to the double male while maintaining foot pressure on first hose line
8. Spanner tight



CONNECTING NOZZLES

All SFFD nozzles have female thread inlets and are connected to hose lines in the same manner used to connect hose together. Before connecting a nozzle to a hose line, the nozzle should be examined for obstructions, a washer in proper position, and condition of the female threads. A nozzle equipped with a shutoff valve shall be placed in the closed position before being connected to a hose line. The use of spanners is seldom necessary when connecting nozzles since there is sufficient leverage at the nozzle for a hand-tight connection.

When nozzles are connected to female hose couplings the preferred method is to first connect a double male fitting to the nozzle then connect the nozzle to the female hose coupling as given for one or two firefighter operation.

BLEEDING AND PICKING UP HOSE

Bleeding hose is the action of draining water from the hose line after use and prior to being reloaded onto the apparatus. Pick-up is the action of collecting and carrying the drained hose to a position for reloading onto the apparatus.

Before bleeding a charged hose line, the water supply to the line must be shut down at the source and bleeders opened. To facilitate drainage of hose in a building during the process of 'backing out', uncouple the hose line outside the building near the street gutter.

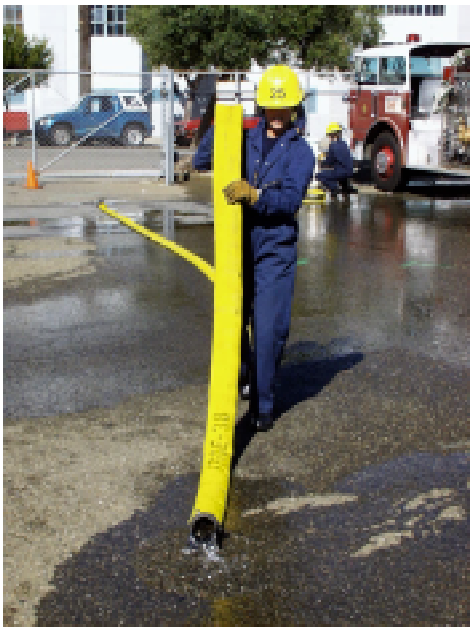
When all hose lengths have been 'backed out' to the street; remove the nozzle and fittings from the hose line and place them on the apparatus. Uncouple all hose lengths and bleed hose. Bleeding and collecting each hose length is a one-firefighter operation; carrying a folded hose to the apparatus is a two-firefighter operation. Hose lengths are bled from a higher point to a lower point on an inclined street. On a level street, hose is bled from the point nearest the apparatus to the point most distant from the apparatus, thus minimizing carrying distance of the hose.

Bleeding Hose

The procedure for bleeding 3" and 1-3/4" hose is as follows:

1. Disconnect all couplings
2. Straighten hose at point most distant from drainage
3. Take position facing drainage point
4. Grasp hose with one hand 4 feet from coupling
5. Place hose on shoulder and walk towards drainage point sliding hose over the shoulder

Avoid rough handling of the couplings to prevent damage to the swivel or male threads.



Collecting Drained Hose

The procedure for collecting drained hose to be carried to the engine is as follows:

1. Grasp coupling furthest from the apparatus
2. Walk alongside the hose approximately 8 paces
3. Pick-up a bight of hose
4. Walk to end of hose and pick-up coupling

LOADING HOSE ONTO PUMPERS

Each pumper carries at least 1000 feet of large hose and 550 feet of 1-3/4-inch hose. The large hose is carried in a hose bed divided into two compartments with each compartment carrying at least 500 feet. A ready line is a small hose line pre-connected to an engine outlet and at least 150 feet in length. Two ready lines are carried on every pumper and are loaded in compartments on the left and right side of the main hose bed where the large lines are loaded. Most engine companies run with at least one 200-foot ready line. Two small hose line bundles, loaded as either a 100-foot doughnut roll or 100-foot High-Rise Pack, are carried in a compartment in the rear of the apparatus.

For clarity purposes, the term right and left shall be with the firefighter facing the rear of the apparatus, thus the hose compartment on their right is termed the right hose bed and the compartment on their left is termed the left hose bed. **Before the pump operator charges a ready line he/she has to make sure all of the hose is out of the bed anyway, so at this time they should confirm in their head which side ready line to charge while they're facing the rear of the bed.**
The front of the compartment is the end nearest the front of the apparatus and the back of the compartment is the end nearest the rear step.
Hose is loaded on pumpers in accordance with the following standard practices. The main points to consider are:

- To load the required amount of hose in each compartment
- To have a minimum number of short bends
- To arrange the hose so that it can be removed in a smooth and efficient manner

The nylon rubber-lined fire hose can be loaded and left wet on the apparatus if it is clean.

Large line bights should be tight and the layers should be graduated back. The neater and tighter you keep your hose loads, the easier it will be to deploy when needed. This applies to ready lines, high-rise packs and/or bundles. On high rise-packs and

Minuteman loads you can stagger the bights or folds back and forth similar to wildland packs so they mesh together. Check your hoseloads every morning.

Positioning of firefighters when loading large hose into hose bed is suggested as follows:

- One firefighter at the front of the hose bed
- One firefighter at the rear of the hose bed
- Two firefighters on the rear step
- One firefighter on the ground close to the rear step

If there are less than five firefighters, the firefighter at the rear of the hose bed and/or one firefighter on the rear step may be omitted. The firefighters in the hose bed place the hose into position; the firefighters on the rear step make and hold the bends to insure neatness and tightness. The company officer shall supervise the loading and assist if necessary.

LARGE LINE—FLAT LOAD

Right Compartment

Place female coupling in right front corner of right hose bed or leave coupling just hanging out of the rear of the of the hose bed.

1. Lay hose to right rear corner - hose laying flat against hose bed
2. Make an upward bend and fold hose on top of previously laid hose

3. At front of hose bed bend hose upwards and return hose towards rear alongside previously placed hose

4. Continue procedure until first layer is full
   a. Firefighters on ground couple next length
   b. To prevent couplings from being positioned at bend or against one another and in order that all couplings will lead out straight, a short reverse bend or ”Dutchman” or “Shorty” is sometimes required to adjust the coupling

Dutchman

5. When starting a new layer on top of the base load, the bends at the rear of the bed are made a few inches in front of the bend below it forming a “Pyramid” effect. Synthetic hose slides easily and this method of loading minimizes the hose from moving in the bed on a steep hill

6. Continue until hose bed is fully loaded
7. Attach Gorter shutoff and wye to the last length of the right side hose compartment

Left compartment

The left hose bed is loaded in the same manner as the right hose bed with the exception that the male coupling is placed in right front corner or just hanging out at the rear of the hosebed. The hydrant jumper or double male is attached to the last coupling of the hose compartment.

1-3/4" READY LINE

Ready line compartments run parallel with the large hose bed. Each compartment carries a minimum of 150 feet of 1-3/4" hose with a nozzle on one end and the hose pre-connected to a gated pump outlet on the other end. The hose is laid flat in the ready line compartment. The ready lines are loaded as either a 'Standard load' or a 'Minute Man load'. When using, all hose must be removed from the ready line compartment prior to being charged with water.

Standard vs. Minuteman

Which load should our rig use, the standard or the minuteman?

In San Francisco, there are many different types of neighborhoods. Some have a majority of 4 story, type 5 buildings without a DSP. In this case, engine companies should at least have a 200' minuteman load. This load can make many turns and can reach a remote location with minimal effort.

If the majority of an engine company's district contains 2 story, type 5 buildings a 150' standard should be the choice. These are just a couple of examples.

Both loads can be standard or both loads can be minutemen or a combination of each.

Every engine company needs to drill on a consistent basis to become proficient on both loads and the leading of same. Companies can determine which loads better suit their first alarm area.

Leading of both the standard and minuteman loads and their advantages and disadvatages will be discussed in the next chapter.

BEFORE YOU LEAD ANY READY LINE, TAKE A LOOK TO SEE WHICH TYPE OF HOSELOAD YOU'LL BE LEADING!

Standard Load

Ready line in side compartment is laid flat in two row tiers.
Load as follows:

1. Connect female swivel of small line to 1-1/2" supply outlet at front end of compartment; form a bight of approximately 5 feet and place forward over shelf or onto top compartment to be replaced later.
2. The first layer is laid in a single tier from the front of the compartment and folded back at a point approximately 3 feet from the rear edge of the compartment. The short fold serves to make the first layer act as a 'skid'.
3. The outer folds of the second layer are made at a point approximately 24 inches beyond the rear of the compartment so as to form two loops. The loops formed provide a means for fast removal of the hose from the compartment by one firefighter inserting an arm through the loops.

4. The outer folds of the third and succeeding layers terminate even with the rear of the compartment.

150’ standard

200’ standard

200’ standard

The nozzle is connected to the male coupling of the last length and placed on the top of the hose load at the rear of the compartment.

5. Return the bight of hose moved forward in step one onto the top of the hose load.

<u>Minute-Man Hose Load</u>

The minute man hose load, which is designed for one firefighter to make a 200-foot hose lead, must be loaded differently than the standard load to work properly. It is loaded as follows:

1. Connect nozzle to 1-3/4” hose
2. Place nozzle connected to hose approximately 6 to 12 inches over end of hose bed on side of bed closest to large line

3. Load hose into bed starting on the side closest to the large line. At the front of the compartment fold over upwards and run hose back to the rear of the compartment with the hose moving in place next to the first layer.

4. When hose is even with the nozzle, fold over upwards and continue to load all lines alternating the left-to-right layering of hose. The alternating left to right should be done at the front of the load (front of apparatus) and the bights should be laying flat. All folds at the rear of the apparatus could be even with the nozzle or alternate bights as shown in picture above. The nozzle and the folds don't have to be as far out as the picture shown here. The 200' Minuteman normally has 5 bites on each side hanging out.the rear of hosebed. Remember to have a loop or 2 folded halfway back, on top of the load, and then connect the nozzle to the outlet. The loop or loops on top of the load give the nozzle person enough clearance to get the load out of the bed without it being pulled back off their shoulder. (similar to the standard load 4'-5'loop.)

1 _" DOUGHNUT ROLLS AND HIGH-RISE PACKS

Engine companies carry 1-3/4" hose other than ready lines in bundles wrapped in either a "Doughnut Roll' or "High-Rise Pack." The doughnut roll and high-rise pack are each made up from two 50' lengths of 1-3/4" hose coupled together with a nozzle connected to the exposed male coupling.

The doughnut roll is held together by use of the small hose web strap. The high-rise pack was created to provide a hose load that could be easily carried on the shoulder while wearing an SCBA. Although originally developed for use in a high-rise building, experience has shown it to be efficient anywhere a rolled bundle can be used. A canvas harness with Velcro straps is used to secure the hose.

Engine companies carry two bundles on the apparatus in either configuration that is best suited for that company. They are usually stored in an open compartment in the tailboard of the apparatus.

Doughnut Roll Carry

Hi-rise pack carry w/ nozzle out

SFFD practice is that when engine companies “cover-in” to the quarters of other engine companies during greater alarms, the cover company shall assemble replacement bundles or high rise packs for the regular company.

When doughnut rolls are unstrapped at fires, the strap should be either tied around the waist or placed in the turnout coat pocket to prevent the strap from being lost.

<u>How To Make A Small Hose Doughnut Roll (2 Firefighters)</u>

1. Stretch out two lengths of 1-3/4” hose on the ground
2. Double each length into a fold, hose flat with no twists
   a. Place a male coupling on top of one length, approximately 4 feet back from the female coupling
   b. Place a female coupling on top of one length, approximately 4 feet back from the male coupling

3. Roll hose
   a. Firefighter (FF) 1 starts rolling bight of either length of hose

b. FF 2 straddles the hose, approximately 3 feet from and facing FF 1
c. FF 1 continues rolling towards coupling
d. FF 2, while walking backwards guides the top hose over and in line with bottom hose
e. The second hose length is then rolled in the same manner

4. Each FF will face each other and join the inside couplings hand tight
5. The bundle is secured with a strap to secure the hose and couplings in place
6. A nozzle is connected hand tight to the male end to complete the bundle

7. Position rolls for strapping
   a. Place joined coupling in the six o'clock position
   b. Bottom of rolls together top slightly apart
   c. Held by one firefighter
8. Fold strap to form a bight
9. Pull bight through the center of both rolls from female to male side, opening of bight should face where nozzle will eventually be strapped
10. Take bitter end of strap around top of rolls and through the bight and secure to buckle which should be close to edge of bundle.

11. Pull strap back and cinch it up. Try to wrap strap around nozzle and female coupling on both sides of bundle.
12. Adjust strap to secure female and male coupling
13. Lay bundle flat
    a. Cinch up strap where needed.
    b. Tighten strap through buckle and secure bitter end with a slip knot. If you don't have enough strap secure with a half- hitch.

The finished product should look like picture below. Bundles and Hi-rise packs should be tightened and neatened up, at the very least, every morning at start of shift.

How to load the High-Rise pack

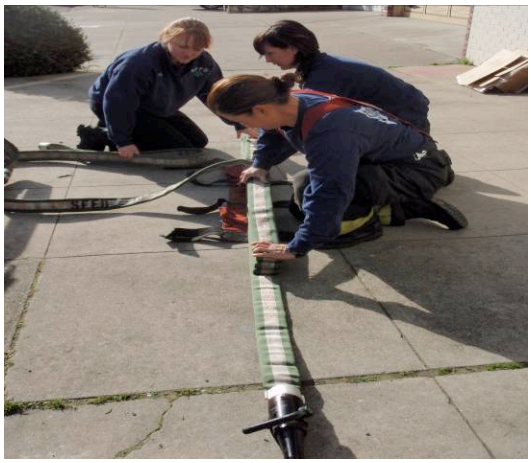
When loading the high-rise pack, the firefighter at the nozzle will be designated the front firefighter, the firefighter on the other side will be designated the rear firefighter. Each firefighter (FF) is on an opposite side of a sawhorse. The procedure is as follows:

1. Place High-Rise Pack harness onto a sawhorse or lay it flat on the ground Open Velcro straps
2. Connect two lengths of 1-3/4” hose, hand tight Connect nozzle to hose, hand tight
3. Front FF places nozzle inside pocket of harness, bale facing to the outside and runs hose over the top to rear FF. This should be done so the nozzle length is on the inside of the right shoulder of the FF carrying hi-rise pack.
4. Rear FF places first loop of hose from 8 to 10 inches beyond the end of the harness and returns the hose over the first layer to the Front FF

5. Front FF loops hose at same distance as the rear and both FF's continue to layer the hose until the first 50' is loaded

6. The second length will be loaded by folding the end of the first length over the end of the first layer and starting a layer along side the first, this should be done at the rear of pack. The hose deploys smoothly this way.
7. The remaining hose is loaded in the same manner as the first length
8. The velcro straps are attached to secure the hose

The picture below shows how to start the hi-rise pack load with the nozzle out. Once all hose is loaded, fold nozzle back over inside length and strap up.



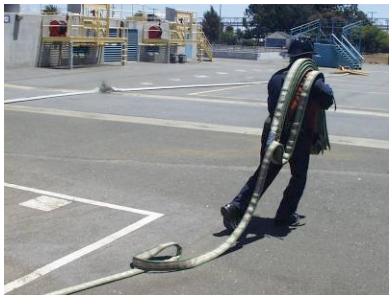
Check couplings every time when replacing high-rise packs on the engine and each morning during the daily operational check. Also tighten up hi-rise packs by laying them flat on the ground, unstrap Velcro, neaten up load and restrap Velcro.

Remember, the high-rise pack's nozzle length needs to be on the inside of the right shoulder.

Also, the high-rise pack leads better, if the cross over from the first length to the second length is at the rear of the hi-rise pack.

High-Rise Pack Carry And Deployment

The high-rise pack is carried over the right shoulder by one firefighter. High-rise packs should always be carried on the right shoulder because the radio and SCBA masks are on the left-hand side. When the high-rise pack is to be connected to a water source, the Velcro straps are unfastened by another firefighter, who will take the female coupling and connect it. The high-rise pack remains on the shoulder of the firefighter carrying the hi-rise pack . The firefighter who is carrying the hi-rise pack will then proceed to make the lead by walking towards the destination point with nozzle in hand and hose paying off of the shoulder.



Many times you're not going to need 100' from the initial lead. Another way to lead the hi-rise pack is to lay it flat on the ground behind where you're extending from, either a wye or a nozzle, anywhere from 10' to 45' back, depending on building layout.
Take the straps apart and split apart the hose lengths. The nozzle firefighter takes the nozzle and the female butt ahead to the water source.
The lay-out firefighter flakes out the remaining hose and advances as needed, trying to keep a running loop available, close to the nozzle person and the back-up officer. The officer or layout person can connect female coupling to water source.

COMBINATION HOSE AND SHOULDER STRAP USE

The use of the combination hose and shoulder strap applies to either large or small hose, dry or charged. The strap must be removed from the body, if worn, before attaching it to a hose line. The combination strap is generally attached at either the nozzle end of a hose lead, at the center of a hose length, or at a coupling connection in the hose lead.

NOTE: The narrow truck belts can be used as a shoulder strap if necessary. The procedure is to remove the pick axe from the belt, remove the belt from the body, and re-buckle at the last strap hole to provide maximum available length. Attach to hose and don in the same manner as the combination hose and shoulder strap.

How to Use the Hose and Shoulder Strap when Directing Nozzle Stream

Large hose

The procedure for attaching and donning the hose and shoulder strap on a hand-held large line (2-1/2" with a 1 1/8" tip) by two firefighters is as follows:

1. Measure distance to strap attachment by stretching it out along the hose, with the bight of strap even with tip

2 _" inch hose with 1 1/8" tip

2. Wrap the short strap around the hose and attach with the split-link opening towards water source and away from the nozzle. (FF Mullane uses this analogy, the split link is pac-man and the pacman is always thirsty going towards the water source.)

<<<<<NOZZLE

WATER SOURCE

3. Each firefighter takes a position on opposite side of hose lead at nozzle
   a. Firefighter on left side of hose holds nozzle waist high while second firefighter picks up shoulder strap, faces rear, and away from the nozzle, inserts the arm closest to the hose through shoulder strap, positions strap on shoulder, and turns outward, away from hose, to face forward holding nozzle with both hands
   b. Firefighter on left holding nozzle releases nozzle and duplicates donning procedure

4. Both firefighters adjust rear strap on hose to take up slack
5. Additional firefighters will add straps to line and alternate position on each side of the hose

Positioning of firefighter's using hose and shoulder strap on large line. Position of nozzle firefighters when directing stream is shown in the previous photo. The position of the feet is important in maintaining balance. The rear foot is approximately under the hose lead. Body weight must in a forward motion against the nozzle reaction. Safe practice requires that at least one additional firefighter with hose and shoulder strap attached to

the hose lead is positioned to the rear of the two nozzle firefighters. You also loop the hose on the ground behind area of operation; this will alleviate a lot of the back pressure the firefighters are experiencing.
`

From left to right: Combination hose and shoulder strap,
Truck belt, Shoulder strap, Webbing

The 4 different straps you can use for big line operation. They're in this position on the hose just for the picture's sake. If you were going to operate this line the straps would alternate on left side, right side, left side etc.. Distance from nozzle is determined by strap length and firefighter size. The first 2 firefighters closest to nozzle are usually close to being side to side, in a comfortable position and and in a position to control the nozzle. The third firefighter will be farther back down the line making it easier for the first two to control hose stream direction. The key is to have tension on your strap before opening the nozzle. **OPEN NOZZLE SLOWLY!** If you need to readjust strap position, shut down nozzle and readjust.

Small hose

Procedure for use of a combination hose and shoulder strap with a small hose lead is the same as that applied to large hose except that it is seldom required to position two firefighters at the nozzle.

Other Hose Lead Positions

When advancing dry hose leads over ladders, firefighters are generally positioned at the coupling connection and at the center of each hose length. If a hose strap is used, it is positioned at the rear of a coupling connection as it relates to the direction of water flow. The split-link opening of the hose strap must face away from the nozzle. Refer to Chapter 10 for further information.

CARRYING A HOSE LEAD NOZZLE

When large hose lines with a bale and 1 1/8” tip are advanced only one firefighter with a hose and shoulder strap is required to carry the nozzle. This practice is particularly useful when advancing hose lines up ladders, stairs, or fire escapes and permits free use of both hands. Procedure is as follows:

1. Position hose strap at rear of hose coupling at nozzle
   a. Pass hose strap under hose
   b. Split-link opening faced away from nozzle
   c. At rear of and close to hose coupling at nozzle
2. Engage hose strap to hose and pull tight.
   a. On right side of hose for right shoulder carry
   b. On left side for left shoulder carry
3. Pull shoulder strap forward close to nozzle.
4. Move shoulder strap sliding keeper forward past nozzle tip.
   a. Adjust strap buckle if necessary.

5. Place nozzle tip in shoulder strap loop.
6. Move shoulder strap sliding keeper towards nozzle shutoff to retain nozzle in position.
7. Place loop of shoulder strap over shoulder and advance hose line.

Note: When using the truck belt as a shoulder strap in this application the nozzle tip is placed in the pick axe handle keeper to retain the nozzle in position.

Adapting the Shoulder Strap for use as a Hose Strap

If the hose strap has been removed to secure a hose lead, the shoulder strap may be adapted for use as a hose strap.

1. Position snap hook at point of use
2. Move shoulder strap sliding keeper and metal ring away from snap hook - Sufficient distance to approximate length of hose strap
3. Pass snap hook under and over hose
4. Engage snap hook to metal ring
5. Pull strap tight and move shoulder strap sliding keeper toward ring to secure shoulder strap loop

SECTION 10. HOSE LEAD PRACTICES

GUIDELINES

Training in basic hose handling leads to proficiency in advancing hose lines to the seat of the fire. Hose lead procedures involving the laying of supply lines for pumpers is given in the manual for Pump Operators and is not included in this manual.

The majority of fires are put out with 1 _" ready lines. Becoming proficient at ready line leads should be the minimum standard an engine company is held to.

The large line lead is usually composed of a large hose line with a Gorter shut-off and a wye, which is wyed off into one or two small hose lines. The average fire inside a building usually involves the use of small hose lines because of their flexibility and the ease to be moved as the fire is followed up and extinguished.

However if the fire is extensive the initial use of large hose lines inside the building may be warranted (2 1/2 " line with a 1 1/8" straight stream tip.) Fires fought from outside the building often require the use of large hand held hose lines.

HAND SIGNALS

The need for promptly getting water to a hose lead is known to every firefighter. No matter how quickly a hose line is led there is a delay if a firefighter is required to deliver a verbal message to turn on the water. Such delays are often increased by noise on the fire ground, which may make verbal signals or radio communications indistinguishable, if not inaudible, even at short distances.

Difficulties in sending verbal messages may be overcome by the use of a simple system of signals. The signals are given by arm movements in the daytime and by a lighted flashlight at night. They cover the four important orders involved in the control of water flow to a nozzle. They are:

1. Charge a line with water
2. Shut down a charged line
3. Increase pressure
4. Decrease pressure

These four basic signals are easily learned and understood as the signal itself in each case suggests the action. It is essential that signals be understood by all firefighters. Signals made in a careless fashion are likely to be misunderstood and are worse than no signal at all. If more than one hose line is in use, the signal must be given so that it

is clearly understood which hose line the signal is intended to cover. When it is evident the signal cannot be seen or understood the message must then be delivered verbally. The pump operator must return each signal to show that it is understood. **Remember a charged open butt has the potential to cause serious injury to your fellow firefighters!** Know what line you're charging, know that the line you're charging is not an open butt, and charge every line smoothly with safe pressures. **Never ASSUME!**

The four signals are made as follows:

Charge Line

Day

Extend the arms above the head with hands joined.

Night

Raise one arm above head, hand holding a lighted flashlight. Swing flashlight horizontally above head.

Shutdown Line

Day

Extend both arms downward and swing them across each other in front of the body.

Night

Extend one arm downward hand holding a lighted flashlight. Swing flashlight horizontally across front of body.

Increase Pressure

Day

Extend arms outward and horizontally from shoulder, palms up. Slowly raise and lower arms between horizontal and 45° upward angle. Each series of moves calls for a pressure increase of 20 psi. Allow a brief interval between series for additional increase.

Night

Extend one arm outward and horizontally from shoulder, holding flashlight. Slowly raise and lower arm between horizontal and 45° upward angle. Flashlight is lighted only on upward swing. Each series of moves calls for a pressure increase of 20 psi. Allow a brief interval between series for additional increase.

Decrease Pressure

Day

Extend arms outward and horizontally from shoulder, palms down. Slowly lower and raise arms between horizontal and 45° downward angle. Each series of moves calls for a pressure decrease of 20 psi. Allow a brief interval between series for additional decreases.

Night

Extend one arm outward and horizontally from shoulder, holding flashlight. Slowly lower arm between horizontal and 45° downward angle. Flashlight is lighted only on the downward swing. Each series of moves calls for a pressure decrease of 20 psi. Allow a brief interval between series for additional decreases.

HOSE LEADS

As previously explained, each Department pumper carries large hose in a hose bed divided into two compartments, each compartment holding at least 500' feet of hose. A male coupling is available for a hose lead in the right compartment; a female coupling is available in the left compartment. The hydrant spacing in San Francisco seldom requires a hose lead to be made exceeding 500'. When a lead exceeds 500', a single lead is made until the first hose bed is emptied, the hose will be connected to the remaining hose bed load, and the apparatus will continue to the destination.

A few engine companies in the outlying areas start their 3" inch hose loads with the male and female couplings just showing a few inches out of the hose bed. They do this so they can take the top coupling of the bed they're not deploying and attach it to the

bottom of the bed coupling they are deploying. In this manner the pump operator will not have to look through their rear view mirror to see if he or she has run out of hose. Having both couplings showing gives the pump operator the option of at least a 1000' fire to hydrant lead or the more commonly used hydrant to fire lead with the luxury of not getting out of the rig halfway to their destination.

COMMON HOSE LEADS

Straight Lead - Hydrant to Fire (Hydrant Jumper, HP Hydrant)

This lead is one, which is commonly made from a low-pressure hydrant to the fire.

1. At the source of water supply, remove the hydrant jumper and the required amount of hose from the left-hand compartment of hose bed. If using a high-pressure (HP) hydrant, remove the Gleeson valve.

2. Snub the hose in the approved manner.
3. Signal the driver to proceed to fire.
4. Stop pumper at fire as directed by company officer.
5. Remove required amount of hose from left compartment. Uncouple hose and connect to pump inlet or appliance if water source is from a HP Hydrant.

Reverse Lead- Fire to Hydrant

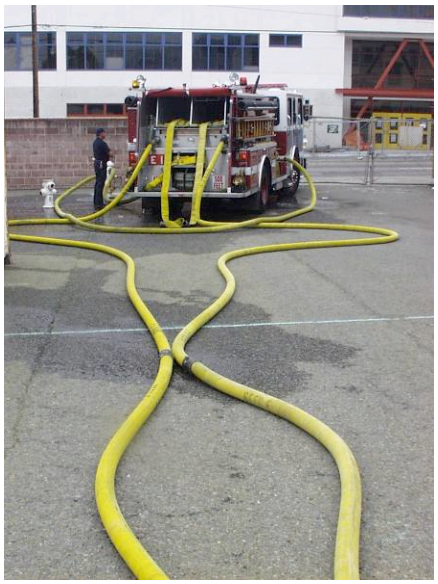
The reverse hose lead from fire to hydrant is made in the following manner:

1. Stop the pumper near the fire as directed by the company officer.
2. Make the lead from the right hand compartment of the hose bed. Unload the two bundles of small hose line. One firefighter unloads the Gorter

shutoff and wye, which is attached to the large hose in the right side bed and removes the required amount of hose to reach the destination point. Then snub the attack line directly behind the Engine.

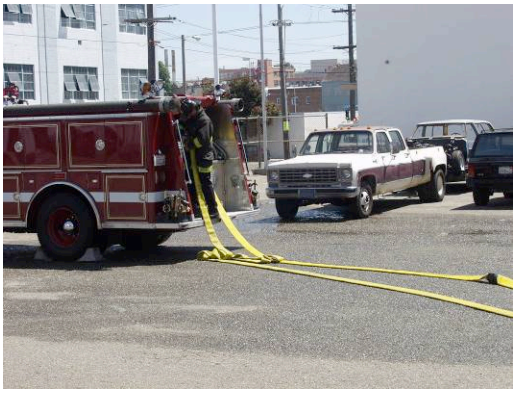
3. The other firefighter pulls off the left side and snubs the supply line for the second engine, usually pull off an extra 50’ and snub directly behind the engine.

4. Signal driver to proceed to hydrant.



Double Hose Line Lead

This hose lead involves large hose led simultaneously from each compartment such as when required to provide two supply leads, two leads led into a standard hose tender, attack hose tender, or siamese manifold inlet. It may be led either from hydrant to fire or from fire to hydrant; one lead being a reverse lead, the other a straight lead.



Single Leads Requiring More Than One Compartment Load of Large Hose Line

When a lead requires more large hose than the amount carried in any one compartment of the hose bed, the pumper must be stopped and the hose in the second compartment must be connected to the last coupling in the first compartment. For this reason some outlying companies start their 3" hose loads with the coupling of each bed slightly hanging out the back of the hose bed. If the driver anticipates using more than one bed to reach their destination they can connect the top line of the hosebed that they're not deploying to the bottom line of the hosebed they are initially deploying, creating at least a 1000' lead, thus eliminating the need to stop and connect. If available, a firefighter follows the apparatus down the street to watch the hose and to signal the driver to stop as the last length is being led out. This prevents the last coupling from dropping to the street. If the driver does not have an assistant to signal, then they must be careful to stop in time to avoid damaging the hose couplings. After coupling the hose together the pumper then continues the lead to the destination.

Snubbing Hose When Making a Lead

When leading hose from the apparatus it will be necessary to snub the hose in order to prevent it from being dragged. Whenever possible, snub the hose around some substantial object such as a hydrant, electric pole, traffic sign pole, under the wheel of a car or truck, etc. If no such substantial object is available the hose shall be anchored by a firefighter. The procedure is to:

1. Remove the required amount of hose necessary to reach the snubbing objective
2. Position the hose 12 feet from rear and to the side of the apparatus
3. Hold hose with both hands and kneel on the hose with one knee off to the side of the apparatus in view of the driver (via mirrors)
4. Signal driver to move when ready

Care must be taken to see that there is no slack hose between the hose bed and the firefighter kneeling on the hose. Drivers shall avoid driving the apparatus away quickly, since the firefighter anchoring the hose may be injured if the hose catches in the hose bed. The firefighter anchoring the hose shall be aware not to place themselves in a position where they could be caught in a kink or bight in the hose.

When snubbing hose to a hydrant or other substantial object, make one full turn around the hydrant or other object,then hold on to the hose until it is certain that the apparatus will not drag the hose away.

Large Hose Used as a Soft Suction Hose

Normally a 50-foot length of large line is not used as a primary soft suction hose unless it is impossible to reach the hydrant with the regular suctions. Under these circumstances, a length or more of large hose line can be used as a soft suction. It is common practice to use a 50-foot length of large line to supplement the initial supply by utilizing the second unused outlet of the low-pressure hydrant and connecting it to an additional inlet.

How to use large hose lengths as a soft suction hose

1. Remove sufficient large hose from left side of hose bed to reach hydrant
2. Uncouple the hose line at apparatus
3. Connect the female coupling to hydrant
4. Connect the male end to the pump inlet with the use of a fitting if necessary

STANDPIPE AND SPRINKLER LEADS

Use of Dry Standpipes

A dry standpipe, in many cases, eliminates the necessity for an exhausting and time consuming hose lead up interior stairways or up ladders to the windows of a building. When fires are in the upper floors of tall buildings, standpipes provide the only practical means of supplying water to combat the fire. The steps necessary to put a dry standpipe system to work are:

1. Lead hose line or hose lines into the standpipe inlet manifold at sidewalk level and charge the standpipe with water
2. Take the necessary lengths of hose and fittings to the designated floor
3. Connect wye complete to the standpipe outlet and lead hose line to fire
4. Open gate valve on standpipe outlet to charge hose line

Outlet with Wye

Either large or small hose lines may be led from standpipe outlets. In most cases, when standpipes are used to supply water to combat fires inside buildings, small hose lines are used because of their flexibility. However, where there are large undivided floor areas or circumstances where the extent of the fire warrants the use of large hose lines to gain control, a large hose may be led from the standpipe outlets. If the fire is located some distance from the standpipe outlet, large hose lines from the standpipe outlets may be used to supply wyed hose lines. This may be particularly necessary when the lead must be made from a floor below the fire, wherein the required length of the small hose line would be too great for efficient streams. Whenever large hose lines are used to gain control of a fire inside a building, small hose lines should be available for a quick changeover when the large lines are no longer required. Overloading the fire floor with water, and water damage to lower floors are important factors to be considered. For this reason, the changeover to small hose lines should be made as soon as practicable.

Standpipe Inlet Leads

When leading into standpipe inlets, it is necessary to remove all inlet caps before charging the standpipe because leaking inlet clapper valves may build up so much pressure against the caps that their removal may be very difficult and dangerous. If the inlet swivels are stuck or if the caps are jammed or corroded, it may be necessary to use two spanners to remove the caps.

Vertical Inlet Horizonal Inlet

If the inlets of the manifold are arranged vertically, connect the first lead to the bottom inlet and each succeeding lead to the next inlet. If the manifold inlets are arranged horizontally, make the first lead into the nearest center inlet and each succeeding lead into the open inlet nearest the center in the direction from which the lead is made to the inlet manifold. Following this lead pattern will facilitate turning of the standpipe swivels and use of spanners to tighten connections.

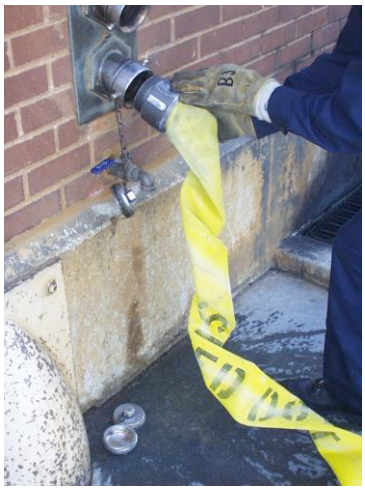
When a hose lead is to be made into a standpipe inlet, the objective is to get water into the standpipe as quickly as possible. The quickest method is to lead in with an open coupling.

Since there is always the possibility that the standpipe inlet swivels may be stuck, it is wise to anticipate this situation and plan to overcome it. A reverse lead, with a double male connected to the female hose coupling, will greatly facilitate standpipe inlet connections as previously explained.

Reverse Standpipe Lead

Connection of a male hose coupling to a stuck standpipe swivel

1. Turn the hose and coupling six half-turns counter-clockwise
2. Put the male coupling into the stuck inlet swivel
3. Turn the hose coupling clockwise until the hose is untwisted and the connection is tight
4. Spanner tighten the fitting



Stuck Swivel

Leaky Clapper Valve

If a standpipe inlet clapper valve is leaking so badly that it is difficult or impossible to connect a lead to it, using a Gorter shutoff with a 2 1/2” x 3” increaser as follows can stop the leak:

1. Open the Gorter shutoff and connect the increaser to it
2. Thread the increaser end of shutoff into the standpipe inlet
3. Close the Gorter shutoff
4. If an increaser is not available, use a double male fitting in the female end of the Gorter Shutoff to accomplish the same objective by connecting the double male to the standpipe inlet

Reverse Lead to Standpipe

The quickest lead into a standpipe inlet, and the preferred first lead made by each company, should be the reverse lead. This lead is completed as follows:

1. Lead sufficient hose from left side of hose bed to reach the standpipe inlet manifold
2. Be sure that the double male fitting is loosely threaded to the female coupling on the hose
3. Remove all caps from manifold inlets
4. Inspect swivels
5. Select proper inlet
6. Insert the lead into inlet (turn female hose swivel and double male clockwise at same time until double male is tight)
7. Tighten all connections spanner tight

Reverse Lead

Straight lead into a standpipe inlet

When a hydrant jumper is pre-connected, the hose needs to be disconnected from the siamese and a double male is installed prior to being connected to the standpipe inlet.

Some engine companies with rear discharge outlets now run with a pre-connected 50-foot length of large line stored at the rear of the apparatus. This serves as a reverse standpipe lead.

<u>Straight Lead to Standpipe Inlets - Controlled Lead</u>

1. Lead sufficient hose from right side of hose bed to reach standpipe inlet manifold
2. Remove wye and connect a 2-1/2” x 3” increaser to Gorter shutoff
3. Remove all caps from inlets and inspect inlet swivels
4. Connect male end of increaser to inlet and turn standpipe swivel until tight
5. If a straight lead without a shutoff is required, remove the wye and Gorter shutoff as a unit and lead into the proper inlet

Controlled Lead

In an emergency, if access to the standpipe inlet manifold is blocked, it is possible to lead a supply into an outlet above the ground floor.

Sprinkler Inlet Leads

Inlets to a sprinkler system have 3-inch female swivel connections equipped with a clapper valve. A thin cast-iron frangible cap held on by metal clips normally protects the inlets. It is not unusual however, to find sprinkler inlets protected by caps identical to those used on standpipe installations. The frangible cap is designed to be broken easily when hit with a spanner.

Straight and reverse leads are made to sprinkler inlets in the same manner as those led to standpipe inlets. All caps or plugs must be removed, and inlets must be inspected for washers and obstructions before connecting leads.

Unloading, Carrying, and Advancing Hose Leads

Efficient hose lead advancement requires that the method of unloading hose from the pumper and carrying hose for leads be uniform throughout the Department. Mistakes on the part of any one firefighter will throw the operating company off-balance and waste valuable time.

Estimating the Amount of Hose Needed

When the pumper is stopped at the point where a hose lead to the fire is to be made, a sufficient amount of hose shall be removed which will reach the fire. Additional hose may be required for follow up in more remote parts of the building, and to guard against the spread of fire. **It is always better to have an extra length of hose rather than to be short one length.** The officer shall distinctly specify how much hose, what size hose, what nozzles, and the objective to which the hose line shall be led. The officer should also state the route which is to be followed when leading in.

If the fire is on the first floor of an average building, remove sufficient hose to reach the rear of the building even though the fire appears to be only in the front portion of the building. If the building is of a larger than average area, such as a warehouse, allow sufficient hose to reach the fire plus an allowance for the possible spread of the fire.

When removing hose to make a lead into a basement fire, particular attention must be paid to where entry to the basement is to be made in relation to the location of the fire. In many cases it will be necessary to lead in the front door on the ground floor, proceed to the rear stairway to the basement, and then advance to the front of the basement to reach the fire. In this instance, it will be necessary to remove approximately **double** the amount of hose from the entrance to the rear stairway to reach the fire. If there are trap doors, open them up and secure them before hoseleads are advanced to basement.

When hose is advanced up a stairway, allow one length of hose for each floor, from the lowest stair of the stairway to the fire floor. Allow one length of hose for each three stories when hose is advanced up a ladder. In addition, provide sufficient hose to attack

and follow up the fire. In either case, always provide sufficient hose to reach from the ladder to a stairway or from a stairway to an exterior window in order to provide protection for an emergency escape.

Excess hose should be flaked out into a working bight near point of attack for later advancement.

In a situation where an engine will lead from a fire to a source of water, the required amount of hose and all other necessary equipment shall be removed before signaling the driver to proceed. This equipment may include SCBA's, ladders, nozzles, axes, forcible entry tools, and fittings. When the required amount of hose has been unloaded, the officer shall designate one firefighter to snub the hose and then signal the driver to proceed to the water supply source. In most cases, when sufficient staffing is available, the hose lead may be started while the hose is being unloaded.

If large hose is led to a fire, both bundles of small hose line must be removed from the apparatus and placed near the fire scene for eventual use, even if the fire is attacked with large hose lines. Be sure to leave a small line wye with the small hose lines.

If the fire is to be fought with small hose lines, both bundles shall be made available at the wye. This is particularly important when making small hose line leads to areas above the ground floor, because in many cases, there is a possibility that the 100 feet of small hose line may not be sufficient to reach the fire. The second bundle can then be used to extend the lead. In many cases, it may be possible to put both small hose lines to work.

Unloading Large Hose

When removing large hose from the hose bed, do not pile it on top of the small line hose, fittings, or nozzles previously removed from the hose bed. The procedure described below will remove the hose in folds and lay it out behind the pumper so as to avoid kinks, tangles, and to permit fast calculations of the amount of hose removed.

1. Stand on rear step
2. Grasp hose and coupling or wye

3. Pull hose and coupling or wye toward body
4. Step off rear step carefully
5. Pull hose off hose bed
   a. Hold hose at hip level, arms extended
   b. Walk to rear
   c. Pull hose until it clears the rear step by 5 or 6 feet
   d. Lay hose and coupling or wye on street

WRONG!

6. Make additional hose pulls as required
   a. Grasp one bight or fold from center of layer with each hand as described in 2 above and proceed as in 3 and 4
   b. Lay each subsequent pull of hose on street alongside hose previously removed, progressing away from hose line lead to fire

ADVANCING LARGE HOSE (SHOULDER DRAG)

As soon as the required large hose and equipment have been removed from the pumper at the fire scene, the crew shall begin advancing the hose line towards the scene of operations (both advancing and unloading can be carried on simultaneously if sufficient personnel are available).

The company officer shall designate one firefighter to carry the nozzle. On the proper side of the body (usually right side) the hose is brought forward under the armpit and over the shoulder so that the nozzle will rest high on their back. The nozzle firefighter advances. The nozzle firefighter should proceed by a direct route to the point as ordered by the company officer. They must be watchful not to go around obstacles in such a way that subsequent movement of the hose line will be restricted.

The next firefighter picks up the hose about 25 feet back from the nozzle and places it on their right shoulder. The next firefighter picks up the hose at the coupling and places it on their right shoulder with the coupling just forward of their shoulder. Each succeeding firefighter shall take a position on the hose line 25 feet behind the preceding firefighter. All firefighters must place the hose on the same shoulder. If there are not enough firefighters to carry the hose 25 feet apart, the available firefighters shall be spaced at the couplings to avoid dragging couplings. The advancement should be continued until the amount of hose required for the working hose line is brought to the scene of operations. It is much easier to carry and position the hose while it is still dry.

Hose Drag with Adequate Resources

When short-staffed on extra long advances, it may be desirable to have the first firefighter at the nozzle, the second firefighter at the first coupling back, and subsequent firefighters skipping a coupling so there will be 100 feet of hose between them and the firefighters ahead. When advancing hose in this method, and, if the last firefighter finds the pull too great to proceed, the firefighters should place the hose thus far advanced on the ground and return for another load. When the second load has been carried as far as is possible, place it on the ground and pick up the first load and advance it to the fire.

ADVANCING LARGE HOSE (SHOULDER CARRY)

When a hose line is to be advanced up a stairway or over very rough or cluttered terrain, or where there are many turns to be made, it may require strenuous and time-consuming labor to drag the hose. By carrying the hose in shoulder loads, the hose can be advanced as fast as a firefighter can walk. The formation of shoulder loads consumes very little time and the entire operation of making the lead will be quicker than by dragging the hose. The two-firefighter method of loading hose for a shoulder carry is preferred to the one firefighter method.

Shoulder Carry (One-Firefighter Method):

1. Lay the desired number of hose lengths, with nozzle connected, on ground. One firefighter is required to carry each hose length.
2. Nozzle firefighter places nozzle against chest, tip down, and hose over right shoulder. He/she walks toward next coupling passing a layer of hose over shoulder and forms a loop of hose at knee level front and back.
3. Nozzle firefighter continues passing hose over the shoulder making layers of hose 'accordion style' on his/her shoulder until within about 10 feet of the next coupling. Top layer of hose must pay off front of shoulder.
4. All other firefighters place hose on same (right) shoulder with coupling just forward of shoulder. Repeat operations of folding and loading as in steps 2 and 3 above.
5. When hose is loaded, all firefighters make a left about-face turn and grasp slack hose at rear with left hand. Drop partial loop in front so that hose will pay off top layer to rear of firefighters.
6. When all hose is loaded, all firefighters proceed toward the objective, following the same route as the nozzle firefighter.

Shoulder Carry (Preferred Two-Firefighter Method):

1. First firefighter stands on rear step of pumper facing away from hose bed.
2. First firefighter places nozzle on second firefighter's chest with hose over right shoulder. Load hose on second firefighters shoulder ‘accordion style’. Make loops at knee level front and rear.
3. Load hose until coupling is about 10 feet away.
4. Second firefighter moves forward about 10 feet.
5. Next firefighter places coupling against chest and places hose over right shoulder.
6. First firefighter loads hose on firefighter's shoulder as in steps 2, 3, and 4 above.
7. When the desired amount of hose is loaded, all firefighters then proceed toward the destination with the nozzle firefighter in the lead.

How to unload shoulder carry

1. Last firefighter carrying hose pays off hose from top layer on shoulder when hose lead behind them is fully stretched.
2. Pay out hose only as required. Leave no surplus hose, which will cause kinks. Lay coupling down gently.
3. When the last firefighter has unloaded the entire shoulder load, they call to the firefighter ahead to begin paying out hose. Last firefighter then follows hose to position as ordered, removing any hose kinks as they proceed.
4. Each succeeding firefighter repeats above operation until nozzle reaches objective.

ADVANCING SMALL HOSE LEADS FROM LARGE HOSE

Small hose leads, other than ready lines or leads made from a standpipe outlet, are wyed from a large hose lead. Such leads are made either for initial attack on the fire or for control of a fire after large hose line nozzles are no longer required.

When initial attack is made for small hose leads the large line with Gorter shutoff and wye pre-connected is led to a position ordered by the company officer. The placement of the wye should be close enough to the fire to permit the 100-foot small hose line to reach and follow up the fire.

Leading the Bundle from Large Line Wye

The bundle is carried to the wye, opened, connected to the wye, and advanced as follows:

1. Lay bundle or doughnut roll on floor near wye.With nozzle and strap buckle on topside.
2. Unbuckle and remove strap. Tie strap around waist or place in pocket.
3. Connect female coupling of small 100-foot hose line to wye outlet, Gorter shutoff indicator and wye control handle, facing up.
4. Carry top layer of small hose with nozzle connected toward fire.
5. Allow lower layer of doughnut roll to uncoil fully.
6. When lower layer is uncoiled, place top layer on floor.
7. Advance nozzle toward fire.
8. When water is ordered, open the wye outlet to which hose is connected first, and then open the Gorter shutoff slowly.

If your point of attack isn't far from the wye, you can also roll the bottom bundle back once connected to the wye and you can roll the top bundle forward, towards your point of attack.The top bundle being your running or working loop.

Leading the Hi-Rise Pack from Large Line Wye

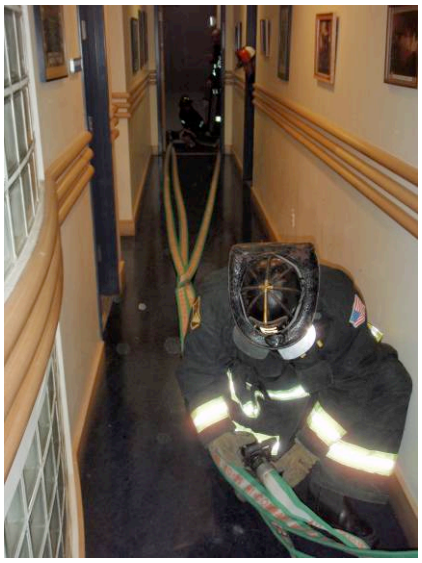
The Hi-Rise pack can be lead two different ways from the wye depending on location of attack. If attack point is remote from water source, break Velcro straps while on nozzle person's shoulder, lay-out person takes a bight or 2 with female coupling and attaches same to wye. Nozzleperson can then lead accordingly towards remote point of attack. Lay-out person charges line when ordered to do so by Officer, who should be flaking out hose and laying a running loop near point of attack.

If the point of attack is close to water source you should break the hi-rise pack behind the water source, (back down a stairway landing, back down a hallway e.g.). To accomplish this, the nozzle person will lay the hi-rise pack down flat and remove the Velcro straps, flip the sides over and grab the nozzle and the female butt and proceed to the wye or bale the hirise pack is being extended from.The Officer should be at the wye or nozzle that the hirise pack is being extended from and take the female coupling from the nozzle person and connect same to wye or bale. The lay-out person should make sure the coupling is tight connecting the two lines of the hi-rise pack and pull it back if needed or start advancing line as needed. Once Layout person has flaked out line he/she will charge the line, once called for by the officer. Once the line of the hi-rise pack line is charged, layout person will secure bale or wye handle in the open position with webbing or Velcro strap. If there is more than one crew in the hallway or stairwell help each other and lead lines consecutively rather than both at once.

Lay hi-rise pack flat behind nozzle or wye

Open it and split it

Grab nozzle and female coupling and go



Connect female coupling to water source and secure same,once charged

Help advance line as needed Layout FF in picture is feeding hose to attack team

ADVANCING READY LINES AND FIRST-IN PROCEDURES

Officer

Ready the MDT and relay any pertinent information to crew:

- TAC channel, area of alarm of reported fire or smoke
- Victims or people trapped and where
- Invalids

The calmer and more composed you are, the calmer your crew will react. Make sure you're leading your line into the correct building. If it's not blatantly obvious where or how far you need to make the initial hose lead, take a quick peak into the fire building, if tenable, and then make the call as to which line to deploy. Look for stairwell holes, floor lay-outs, and obvious smoke and fire conditions. Ask people standing out front if they know of anyone still in the building and relay any pertinent info to the I.C. You can also ask occupants out front if they know where the fire is located if it's not obvious.

The officer in most cases should be directly behind the nozzle person (back up). The officer is also assisting the nozzle person by flaking, dragging, and taking out kinks if necessary. If the nozzle person has a minuteman load on their shoulder, pull bights off from behind if getting close to the point of attack. Once at the point of attack and the line is flaked out, order pump operator to charge line.

Pay attention to worsening conditions. What you see, what you hear, and what you feel should dictate what you do. If it gets real bad real quick, get your crew out and don't

worry about saving a hoseline—although you might need it to get out. Most times though, a hoselead correctly made to a correct point of attack will keep your crew safe.

In most cases, you never want to go above the fire with the primary lead. The officer should direct the nozzle person where to direct the hose stream. Always be aware of a fire getting behind you or extending above your crew. Check for overcome occupants if conditions are visible.

Communicate via the TAC channel needs and conditions to the I.C. and arriving crews.

Engine Driver

Before leaving firehouse, know where you're going and know how you're going to get there. Remember, you as the driver have the safety of your crew in your hands whether you're responding to a greater alarm or just out checking hydrants. **The most important thing to remember, gain control of all intersections, meaning you've checked all lanes that could possibly cross in front of you, right and left. Never assume the other driver sees you and is going to stop!**

Put your portable radio on the correct TAC channel.

Pull rig past the fire building so the back bumper is at the property line, in most cases, to leave enough room for the Truck's aerial shot.

After putting rig into pump, chock wheels.

If securing own supply is not a concern, grab irons if needed and bring to front entrance.

Open gate and/ or front door and secure both with either door chocks, bungee cords, or webbing. Lieutenant Gibson,who used to be the driver of Engine 2, would carry a 25lb. Hexagon dumbbell that worked great for propping open iron gates or doors quickly.
If the first lead at a working fire is going to be made into a garage entrance, disable the door or track.

Once the crew starts leading the line into the building, make sure ready line has completely paid out of bed (Making sure the loop isn't stuck under hosebed cover on standard loads. It's happened.) and then follow the line from the outlet to the front entrance, if necessary, and flake out the line. Be cognizant of 2 areas hoseleads tend to encounter problems, under car tires and under the the front door or gate.

Charge line when directed to do so by officer. Get a supply before charging any additional lines. If there's a mechanical problem or anything that's going to affect your crew inside getting adequate water when ordered, let them know.

Lay-Out Person

This position can be the most important member of the hose lead crew. You might never get to the actual nozzle or the attack team.

Assist nozzle person getting hose load out of bed. Lay-out person is also responsible for laying out and flaking up to the front door from the outlet and then from the front entrance to area of attack.

Try to maintain a working or running loop behind attack team at point of attack or just 1 corner or turn behind them. If you need to advance line, you want the working loop close by. Once line is charged make sure there are no kinks!

Communicate with attack team if they need-to advance or hold.

Remember, you have a set of eyes, if attack team is getting too deep and passing fire, let them know. They might miss it or it could re-ignite behind them, depending on the fire conditions.

Don't over-advance the hose; this may cause a kink. Officer will give directions when to advance or hold.

In upper story fires, the ideal location for excess hose is the floor below the fire.

The working loop can be on the front stairs, down a hallway, along a wall in a vertical loop, on a stairwell below, basically anywhere close by.

Nozzle Person

There are 3 things you need to know before you pull the hoseload out of the hose bed.

1. **What type of hose load are you leading?**
   The type of hoseload should have been answered at beginning of shift, if your're first in. If you're second in, where's the nozzle, top or bottom?
2. **Where is your likely point of attack?**
   You might not know exactly where you're going with the hoselead, but try to gain an approximate idea from evident conditions and size-up from your officer.
3. **When am I going to don my SCBA or facemask?**
   If it's a standard load usually you can drop the load in a tenable area and Scott up. If it's a Minuteman it's a little trickier. You can't dump a minuteman load off your shoulder because you will be left with a mess. When leading the minuteman load you should Scott up before putting it on your shoulder, or at the very least you should don your facemask, hood

and helmet and disconnect the regulator and reconnect in a tenable area, keeping the integrity of the hoseload on your shoulder.

The nozzleperson's job is to get the nozzle to the point of attack with the assistance of the officer and the lay-out person or lay-out people depending on how far or difficult the lead is going to be.

If you have a 200' minuteman on your shoulder, you don't want 150' of hose on your shoulder when you get to the point of attack.The standard lead is easier for the nozzle person because all the nozzle person usually does is grab a couple of bights and the rest of the load is taken care of by the people behind him/her. With Minuteman loads the whole load is on the nozzle person's right shoulder and can't be dumped, unless someone assists the nozzle person and they carefully flip it over or they pull it back off their shoulder bight by bight down a hallway or down a stairwell.

Once nozzle person is at point of attack and the line is charged, open nozzle and rake ceiling of fire area. Listen for orders from you officer.

All Engine personnel should be equipped with door chocks, webbing or Velcro straps, a sharp knife, and a small spanner.

All firefighters should remove any kinks encountered and flake out any uncharged hose left in a mess!

Generally, Engine crews leading secondary lines into the building should wait for the 1st line to be charged before making their lead. There are times when the 1st company needs assistance with the first lead and you don't want to end up with 2 tangled uncharged lines!

The building above is a good example of the where first-in crew might need help leading the first lead if the fire is in the rear of the building on the top floor or the floor below the top. This building has a tight stairwell, there's very little room for excess hose. If companies encounter heavy smoke when they reach the front of the unit, but the fire is in the rear of the flat, they are going to need help advancing the line to the rear. The working loop will generally lay down 2 stair landings, maybe even down a hallway in a flat below or flat next door. Whatever the plan is, it's going to be very difficult to make the rear if the 2nd- in company starts leading the 2nd lead over the 1st uncharged lead.

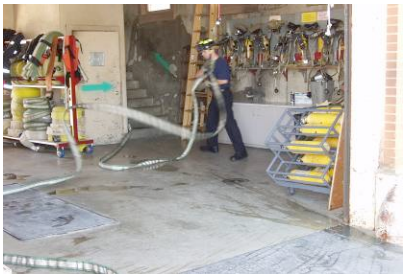
A simple radio communication between the the first-in and second-in engine officer can be the difference in either making a quick stop or letting the fire make enough headway to warrant a greater alarm.

Mistakes to Avoid

Over congestion of fire crews at point of attack on a stairwell or in a hallway is bad fire practice. The majority of structure fires we encounter can be contained with 1 or 2 well placed hoseleads in conjunction with truck crews doing ventilation vertical/ horizontal, opening ceilings and search and rescue operations. This is not to say we won't encounter large fires where multiple hoselines are the answer, but even then you can't make successful hoseleads when crews are running over each other.
Over congestion behind the first crew fighting the fire blocks the only safe means of egress they have if they need to bail. The first crew in, if they've made the right lead, is taking the majority of the beating, so it doesn't help when a mass of people behind them are pushing them in deeper or trying desperately to jump over them with their own line.

Fire Attack should keep in mind that hallway management of personnel is critical to firefighter safety. Later arriving companies need to check in to the I.C. at the command post to see where they're needed or even if they're needed inside.





Standard Ready Line Hoselead


Minute Man Ready Line Hose Lead

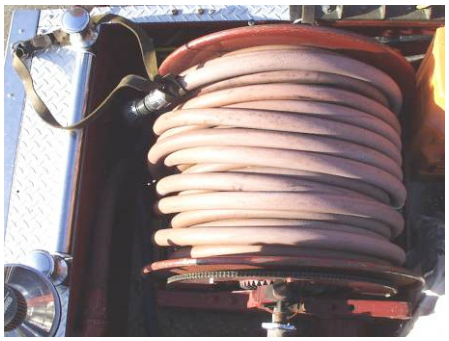
1_-Inch "Bumper Line"

Many pumpers have a 1_' hose preconnected and stored on the front bumper. The hose length carried is 50 feet. Use a combination type nozzle on the bumper line for trash fires, car fires, after fire clean-up and exposure protection.

One-Inch Hose Reel Line

Some early model Spartan pumpers and many other relief engines are equipped with 1 hose reel carrying 250 feet of 1" hose in 50-foot lengths. Standard practice for leading hose reel line is as follows:

1. Nozzle firefighter releases strap or reel clamps and grasps end of hose at nozzle.
2. Nozzle firefighter retains hold on hose and advances nozzle to point of operation (hose line charged).
3. One firefighter feeds the hose line out from the reel as the nozzle firefighter advances.
4. Protect nozzle at all times against dropping or dragging.



Hose Reel

Reloading hose reel lines

1. Close the gate valve to the hose reel. (Do not relieve pressure in hose reel line by opening the nozzle at this time. This is essential to prevent collapse of hose as it is rewound on reel.)
2. Back out hose and lay hose on ground near pumper or water tank unit so it will not to tangle when reloading.
3. Examine the hose for injury or possible weak points as it is reloaded.
4. Maintain tension on hose and guide it as it is rewound on the reel.
5. Clean hose with rag or chamois as it is being rewound.
6. When last length of hose is rewound, open nozzle sufficiently to relieve confined pressure. Close nozzle.

Advancing Dry Hose Lines Up Ladders (Combination Hose and Shoulder Strap Carry)

To advance a large dry hose line to the upper floor of a building, it often is necessary to carry the hose up a ladder. The preferred practice is to use the combination hose and shoulder strap to carry the hose.

When carrying hose over ladders with the combination hose and shoulder strap all firefighters carry the shoulder strap on the same shoulder. Which shoulder the strap is carried on is determined by the placement of the ladder in the upper floor window. If the ladder is placed (as is normal) on the left side of the window, carry the shoulder strap on the right shoulder. If the ladder is at the right side of the window, carry the shoulder strap on the left shoulder. This precaution is necessary in order to avoid stepping over the hose when entering the window, to prevent the hose from snagging on the ladder, and to avoid the possibility of the nozzle snagging on the ladder when entering the window.

When preparing to advance a hose line over a ladder, the amount of hose required to reach the objective shall be placed in an orderly manner on the ground at the side of the ladder. Be careful to place the hose in such a position that it will not snag the ladder poles or the foot of the ladder.

The first firefighter shall attach their hose and shoulder strap to the nozzle in the proper manner and succeeding firefighters shall attach their hose and shoulder straps to the hose at 25-foot intervals. One firefighter should remain at the foot of the ladder to feed the hose to the firefighter on the ladder, to prevent the hose from tangling, to straighten the hose so that it lies on the ladder, and to hold the hose in position until it is charged.

Gorter Shuoff & Wye

Each succeeding firefighter shall follow at such intervals so as to form a short loop of hose ahead and to the side of them.

It is necessary to form a hose loop in order to avoid placing the entire load on any one firefighter. This loop of hose is kept hanging outside the beam of the ladder as the hose is advanced up the ladder. (When carrying hose up an aerial ladder it is impractical to allow the hose to hang outside the beam of the ladder because of the high railing. Do not permit long loops to form so as to hinder firefighters carrying hose.)

When the nozzle firefighter reaches the window, they step into the building from the side of the ladder on which they are carrying the hose, pulling the hose with them. Never pull the hose through the rungs of the ladder. The firefighter then sets the nozzle on the floor and pulls in and flakes the slack hose as succeeding firefighters advance up the ladder.

When sufficient hose is led, the firefighter now at the top of the ladder, places their arm over the second rung below the window sill, to secure body, and hooks their hose strap to that same rung (open side of hook toward building). After the firefighter at top of ladder secures hose to ladder with hose strap, the next member below on the ladder will back down the ladder until the loop of slack hose they are carrying is straightened out. The hose is pulled back a bit from the ladder and held by 2 firefighters and the order should be given to slowly charge the hose. Once the line is charged, the firefighter at the base of the ladder would then place the strap on the hose and attach the hook on the fourth rung from ladder base with the open end facing the building.

Advancing large or small dry hose lines up ladders (shoulder carry)

An alternate method of advancing hose up ladders is the ‘shoulder carry’. This method may be used on ladders of any length but generally is used only when working with shorter ladders (less than 50 feet). The hose and shoulder strap carry is preferred when working with longer ladders.

The first firefighter carries the nozzle. Assuming that the hose is carried on the right shoulder, the hose should come under their right arm, over the shoulder, and the hose couplings should be just below the shoulder so that the nozzle will hang down their back without interfering with the legs.

As the nozzle firefighter climbs the ladder, the succeeding firefighters carry the hose over the same relative shoulder at approximately 25-foot intervals. The number of firefighters required will depend on the height to which the hose must be carried and the distance into the building which the hose must extend.

Each succeeding firefighter shall keep a small loop of slack hose extending outside the beam of the ladder. This ensures even distribution of the weight and helps to keep the hose from sliding off the shoulder. However, as previously explained, it is impractical to extend this loop outside the beam of an aerial ladder.

As each firefighter arrives at the window they step off the ladder onto the sill and into the building. The firefighter then pulls the slack hose into the building as the next firefighter advances up the ladder. The hose is pulled in at the same rate as the firefighter on the ladder advances upward in order to maintain the loop of slack hose. When sufficient hose is inside the window, secure the hose to the second rung of the ladder below the window with a hose strap.

When more than one length of hose is needed inside the building, firefighters on the ladder ‘lock in’ with their legs and pass the hose upward hand over hand.

When the advancing of hose up the ladder is completed, place and straighten the hose on the ladder rungs near the beam from the side that the hose is being led. The ground firefighter, who after placing and straightening the hose on the ladder, holds the hose in position until it is charged. That firefighter then secures it to the 4th rung up from the foot of the ladder with a hose strap and reports to their officer.

Hoisting a 100-foot Small Dry Hose Line up a Fire Escape

Hoisting a bundle up a fire escape is outlined as follows:

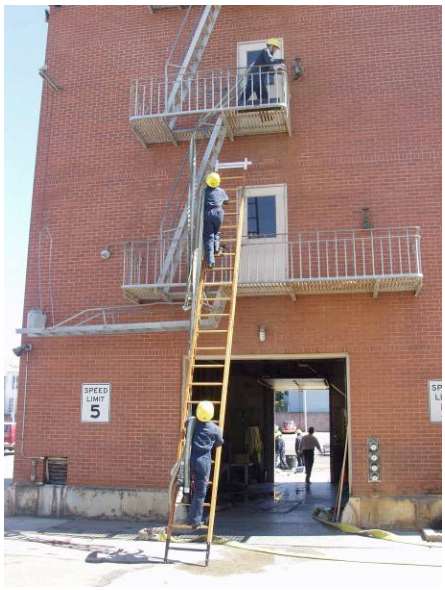
1. An officer, carrying the wye, and a firefighter, carrying the utility rope, climb the fire escape to the floor below fire floor
2. A firefighter at ground level places the bundle near the ladder, opens the bundle and exposes six feet of hose at the nozzle and female coupling ends
3. The firefighter on balcony ties-off utility rope with a clove hitch and keeper knot, then drops rope bag to ground level
4. The firefighter at the ground ties a clove hitch and keeper four feet back from the nozzle and female coupling
5. The firefighter on balcony hoists hose with rope while the firefighter on the ground guides hose as it is being hoisted, then the firefighter on the ground climbs the ladder to assist members above
6. The officer connects the wye to the standpipe outlet
7. The female end of hose is connected to the wye. The nozzle is advanced either:
   a. Through that floor balcony entrance to an inside stairway and to the fire floor
   b. OR -Up to the next floor via the fire escape and advanced to the fire.
8. The hose is secured at fire floor balcony where connected to wye with a hose strap or webbing strap to relieve excess weight on the coupling.



Small Line Fire Escape Shoulder Carry (1 Officer and 2 Firefighters)

When a small line is to be advanced up a fire escape and a rope is not available, it may be carried in the following manner:

1. Place the bundle near the base of the fire escape ladder, one firefighter removes the strap then positions nozzle and female coupling side by side.
2. Officer ascends ladder with wye and attaches it to standpipe outlet at desired location, and will assist with hose hoisting as necessary.
3. One firefighter will grasp the connected hose at the coupling to form a bight, place arm through bight, carry on the shoulder that will be nearest the building while climbing the fire escape stairway, and proceed up the fire escape to the designated level.



4. The firefighter at the nozzle and coupling end places the hose over their shoulder, leaving a small loop of hose in front, climbs the ladder, gives the female coupling to the firefighter on the balcony with the wye.
5. If the lead is to go to a balcony above the water source, the firefighter carrying the nozzle passes it to the officer at the balcony above. He/she would then follow up the fire escape and assist with hoisting the hose.
6. The firefighter connecting the coupling is responsible for charging the hose and placing the strap or webbing to support the hose on the balcony, then joining his/her crew to assist with operations.

Note: When the wye is connected on the fire floor, the same general procedure would apply except that it would not be necessary to pass the hose to the balcony above.

Carrying a High-Rise Pack (fire escape)

A high-rise pack may be carried up a fire escape by placing the pack over the shoulder, which allows the firefighter to use both hands for climbing.

Carrying One Length of Large Hose

When a length of large hose is required to be carried up a ladder or stairway, two firefighters can do the job in the following manner:

Fold the length of hose once and bring the couplings together. The first firefighter to go up the ladder or stairs carries the hose under their armpit and over the shoulder with the couplings hanging down his/her back about waist high.

The second firefighter faces the direction of the first firefighter toward the couplings and carries the hose on the same shoulder as the first firefighter. They must allow the fold of the hose to hang about 4 feet down the back from their shoulder. When carrying the hose, the second firefighter should maintain a loop of slack ahead of them to equalize the weight and to keep the hose in place on their shoulder.

Hose Position for Carry on Stairs or Ladder

Hoisting Hose with Rope

It is sometimes necessary to hoist a hose line to an upper story window, to the roof, or to an upper fire escape balcony. Standard practice for this procedure is given in the Rope Manual. Whenever possible, the hose line should not be charged for ease in hoisting.

Replacing Damaged Hose Lengths When Charged or Extending Charged Hose Leads

During operations involving the use of hose lines, it sometimes becomes necessary to replace a damaged hose length in a charged lead or to extend a charged lead. In either case, the flow of water in the hose must be shut down. The best practice is to shut down at the source of supply. However, when this is not practical, the flow of water may be controlled by 'kinking' the hose lead or by using a hose clamp. The change should be made as quickly as possible so that the hose lead will be out of use no longer than necessary.

Either using a hose clamp or 'kinking' the hose must be done on the ground or floor area where the hose will not be subject to tangling. First, bring the required amount of hose for replacement or extension, and the hose clamp, if available, to the point of operation. When replacing a damaged hose length, provide two hose lengths for replacement. Two lengths are required for this purpose because all hose lengths are not of exactly the same length, and because hose stretches when it is charged.

When using the hose clamp, proceed as follows:

1. Place open clamp on the supply side of hose length, next to the damaged hose
2. Open nozzle and close clamp slowly until water is shut off
3. Uncouple hose couplings and remove the damaged length, close nozzle
4. Connect new lengths of hose, connecting coupling toward nozzle last
5. Notify nozzle firefighter that hose is to be charged, then release the hose clamp

When kinking a hose lead, proceed as follows:

1. Position one firefighter on the outside of each kink
2. Notify nozzle firefighter to open nozzle
3. Make kink in hose nearest nozzle first. Then make second kink. Place one knee on each kink
4. Uncouple first coupling toward nozzle end of hose. Then uncouple other coupling when replacing a damaged length. Remove the damaged length. Close nozzle
5. Connect replacement lengths of hose, connecting coupling toward nozzle last
6. Notify nozzle firefighter that hose is to be charged then release kinks slowly

Kinking Hose Line

<u>Advancing Small Hose Leads from Standpipe Outlets</u>

The following text is concerned primarily with advancing hose leads from standpipe outlets located at fire escape balconies and on the roof. Standpipe outlets in the interior

of a building are usually located in the hall near a stairway. They're also DSP outlets located at each floor level of an enclosed stairwell. Connection to and leading from such outlets follows the same general procedure as connecting to and leading from standpipe outlets at a fire escape balcony. A 3" x 2-1/2" reducer and wye and small hose lines with nozzles are usually used to make a standpipe outlet hose lead.

Whenever practical, the first lead from a dry standpipe should be made from the outlet on the floor below the fire. It is often preferable to enter the building on the floor below the fire and advance the hose line up the inside stairway to the fire floor. Keeping the the integrity of the interior stairwell is paramount to occupants and fire personnel having a means of egress and preventing further vertical fire spread. By working from the building interior, it is less likely that the fire will be forced back into the building through use of hose streams from the exterior. The equipment required is a wye with a 3" x 2-1/2" reducer and 100 feet of 1-3/4" hose with nozzle connected.

Fire Escape DSP leads

If your are the first arriving Engine company at a fire building with a fire escape with a DSP and the lead you're going to make is a DSP lead, it's a good idea to walk up the interior stairwell to the floor below and access the outlet from the interior. This way you get an idea of the floor layout and the first lead will protect the integrity of the interior stairwell.
Remember though, if the fire is on one of the lower floors and you can reach the fire with a ready line, don't hesitate to go that route because it will be much more expedient getting water on the fire.

Before entering the building, take a look to see if access to the fire escape is from a common hallway or from an apartment. Also, once your crew goes up the first flight of stairs, orient yourself to the direction your crew needs to go to access the fire escape, whether it's a hallway or having to go through an apartment. However many flights you need to go up from that point, you'll still have to go in the same direction you oriented yourself to, once you reach the desired floor below the fire.

It's a good idea to bring both Hi-Rise packs or bundles to hallway or unit that leads to the fire escape from floor below the fire. 100' may not be enough to reach your objective depending on size of building.

Layout FF takes officer's wye complete and goes out on fire escape and hooks up reducer and wye and cinching both down with spanner to DSP outlet. Be careful not to cross thread reducer onto outlet, there have been instances of crossthreading and when the outlet was opened the wye blew off to the street level below. Layout FF needs to keep foot on or somehow secure at least a couple of bights of hose on fire escape while hooking up wye complete to outlet. If they don't, there have been instances where the nozzle person and the officer have taken off with the hoselead and the female coupling went along with them through the window, while the layout FF was connecting the wye.

Once Layout FF has secured wye **then hook up female coupling to outside outlet of wye and charge on officer's command. Tie charged line 4' from outlet to fire escape.**(this is to prevent kink of line from crews pulling on it to advance from interior) Then enter window and take out any kinks up to point of attack.

All members need to don SCBA's before advancing to fire floor. Nozzleperson and Officer will make the determination whether they'll have enough hoseline to make their objective; remember, you should have 200' of line if needed. If more than 100' is needed then hook bundles or Hi-Rise packs together on the floor below where it's tenable and then flake out line accordingly. Officer give layout FF order to charge line after lead has been flaked out.

The above DSP on the fire escape lead isn't the only lead a fire crew can make. You can go up the fire escape to the floor below the fire and gain access
to the interior of the building. It depends on location of fire, intensity of fire, and which arriving unit you're on.

When going up the exterior of the fire escape you should break the doughnut roll or the Hi-Rise pack on the ground and tie a rope 4' back from nozzle and female coupling and hoist the line up to floor of entry and advance hose through window. The layout FF still will have to perform wye to DSP evolution.
Place any surplus hose over the fire escape balcony railing. Open the wye when water is ordered.

Wye with Small Line

It is usually more expedient when making a lead above the third floor to hoist the hose with a rope; furthermore, the fire escape will not be blocked as it may be with the shoulder carry.

When two or more hose lengths are to be hoisted above the third floor, an additional firefighter should be stationed on at least every second balcony below the floor on which the hose is to be used. The firefighter on the lower balconies assists by hauling first on the rope and then on the hose until it passes out of their reach.

If the standpipe outlet on the desired floor is already in use and hose is connected to both wye outlets, connect the second wye to the standpipe outlet either above or below the desired floor. If it is necessary to connect the wye to the floor below, carry the hose to the balcony from which it is desired to work and lower the female hose coupling over the railing to the balcony below to make the connection there.

Advancing Hose Leads from Standpipe Roof Outlets

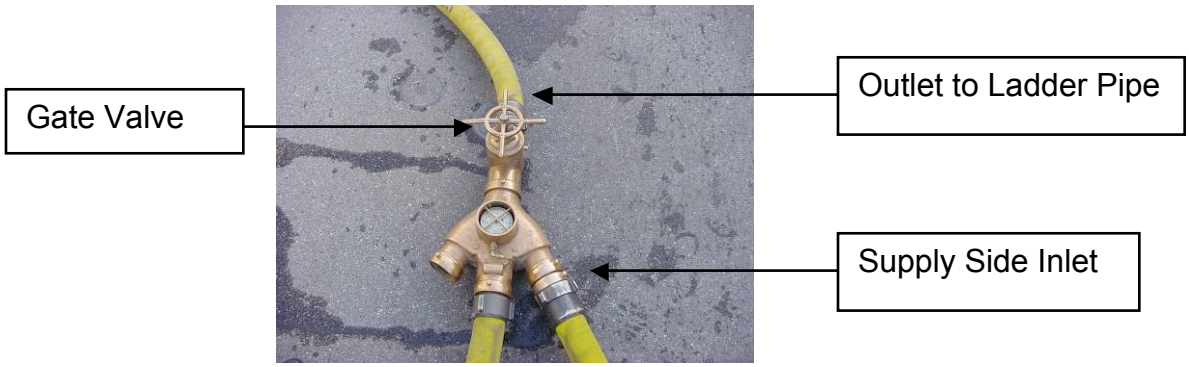
Hose lines led from standpipes may also be used to combat fires in adjacent buildings or in buildings across narrow streets or alleys. Standpipe roof outlets on exposure buildings may be used as a water supply for hose leads on the roof. Deluge sets may be put to work from standpipe roof outlets when fighting large fires in buildings across narrow streets or alleys. If a deluge set having three inlets is used on the roof, and there are only two outlets available, the third lead may be lowered over the firewall and connected to an outlet at the top or the most readily available standpipe balcony outlet of the fire escape.

In most cases, where the standpipe roof outlets are to be used for fighting fires in other buildings, the necessary equipment (hose, deluge sets, nozzles, etc.) can be taken to the top floor in the elevator. If an elevator is not available, the equipment can be carried up an inside stairway or it can be hoisted to the roof with a rope.

Leading Hose Lines to Aerial Ladder Nozzle Siamese

Hose lines which are led to supply aerial ladder nozzles are connected to the ladder nozzle siamese. The siamese will be placed on the ground near the rear wheels of the tractor, on the side of the apparatus away from the fire.

Because the three-inlet ladder nozzle siamese has a clapper valve at each inlet (eliminating the possibility of water flowing from an unused inlet), hose leads without a Gorter shutoff may be connected to any of the three inlets. However, if possible, the first hose lead should be connected to the center inlet to facilitate connection of subsequent hose leads.



When a Gorter shutoff is used to connect a lead to the siamese, a 2-1/2” x 3” increaser must be tightly connected to the Gorter shutoff outlet and then connected to the female

inlet of the three-inlet Siamese. All aerial trucks carry 2-1/2" x 3" increasers, double-males, and double-females to facilitate making these connections.

The gate valve on the ladder nozzle siamese controls the flow of water from the siamese to the nozzle. The pressure gauge, located adjacent to the inlets, is connected by a tube to the outlet side of the siamese and shows the pressure which is being delivered at the outlet.

NOZZLE OPERATION

Hand-Held Nozzles

The ease with which firefighters can hold and direct hand-held nozzles is primarily dependent on the nozzle tip and the nozzle pressure. Nozzles with small tips at low nozzle pressure can be maneuvered without difficulty. However**, large nozzles at high-pressures may be difficult to hold and direct**. It is particularly important that firefighters be familiar with the manner of handling nozzles, as they often must take a position on wet surfaces with slippery footing, sloping roofs, etc.

There is a distinct relationship between nozzle diameter and pressure, and the reaction of backpressure produced by the discharge of a fire stream. The more reaction there is, the more difficult it is to hold and maneuver the nozzle. This is the force, which tends to push the nozzle back and whip it from side to side.

Control of hand-held nozzles is strictly a matter of teamwork. The following are standard practices governing control and handling of hand held nozzle streams:

1. Always close the nozzle before connecting it to a hose line. When the hose line is charged, open the nozzle slightly to permit the air compressed in the hose line to escape. Then continue to open the nozzle slowly until it is fully open. This will reduce 'kickback' of the nozzle. **Always close a nozzle slowly to avoid serious damage to the pump or water mains.** If it becomes necessary to change the location of a nozzle, whenever possible, close the nozzle slowly, then move it to the new location. Re-open the nozzle slowly after firefighters are properly positioned. Whenever the stream is accomplishing no worthwhile purpose, the nozzle should be closed to minimize water damage.
2. The proper position of firefighters operating a 2 _" line with 1 1/8" tip is as follows: The firefighter with immediate access to the nozzle shutoff control should operate the bale, while the other firefighter controls the direction of the stream. When the nozzle is fully open, both firefighters as a team control the direction of the stream. Both firefighters take a stance with feet

braced well apart and body braced against the shoulder strap for maximum stability.

3. The hose behind the nozzle should be kept straight for at least 10 feet to help absorb nozzle reaction. Firefighters 'backing up' the nozzle firefighters should hold the hose firmly so that it leads to the nozzle in a straight line without sharp bends. They should place themselves on opposite sides of the hose line without crowding each other and they must always notify the nozzle firefighters before they let go of the hose line. All firefighters on the hose line should face toward the nozzle.

4. Once the line is charged, shape a loop about 10 feet back from the nozzle to decrease back pressure on the firefighters.

CIRCULATOR OPERATION

When it is impossible to operate a hand-held nozzle on a fire in a basement, circulators may be used. They may also be used on fires in attics, in ships' holds, under pier decking, over sides of buildings as water curtains, or in other places which may be inaccessible for hand-held nozzles. If pipe-casing holes are available, determine the location of the fire by feeling the covers and operate through those which are hottest. If pipe-casing holes are not available cut a hole at the hottest place above the fire and operate through this hole. Make the hole only large enough to accommodate the circulator, otherwise the firefighters operating the circulator will be subjected to unnecessary punishment and may be driven from their position by the heat.

If the circulator is to be used on a sub-basement fire or other fire, which cannot be reached with the 5-foot circulator length, connect a circulator to the male coupling of a 50-foot length of large hose using a 3" x 2-1/2" reducer. Connect the female coupling of this hose length to a charged large hose lead equipped with a Gorter shutoff using a 2-1/2" x 3" increaser. Never assemble or use a circulator in such a manner that the Gorter Shutoff is lowered into the hole through which the circulator is used.

When circulators are used at fires, the Federal circulators shall be used first. The Gorter circulator shall be used only when no Federal circulators are available. Because full efficiency of circulators can only be obtained with adequate water supply, not more than two Federal circulators or not more than one revolving-type circulator shall be operated from one pumper.

Standard practice for circulator operation with the 5-foot circulator hose length is as follows:

1. Lead a large hose line with Gorter shutoff attached to a location where the circulator may be advanced to the pipe casing hole or other opening. Charge the large hose lead. Bleed air from the line.

2. Connect a 2-1/2" x 3" increaser to the Gorter shutoff.
3. Connect the female coupling of the 5’ circulator length to the increaser.
4. Strap two combination hose and shoulder straps to the circulator length just below the female coupling toward the circulator with the split-link opening facing the circulator.
5. Advance the circulator to the pipe casing hole or other opening.
6. Prepare to lower circulator into hole. If a pipe casing hole, one firefighter kneels to one side of hole and lifts cover with the pipe-casing hook. Avoid bending over pipe casing hole because flames or hot gases may vent through the hole when the cover is removed.
7. Lower circulator into hole and immediately open the Gorter shutoff to prevent hose from burning.
8. Continue to lower circulator until it is about two feet below bottom of pipe casing.
9. Two firefighters hold hose and shoulder straps with their hands and alternately raise and lower circulator.

Note: If the circulator is to be used in a sub-basement, attach hose straps to hose at about ground level after circulator has been lowered two feet into operating area.

Woods Cellar Nozzle Operation

The Woods Cellar nozzle is used for fighting fires in basements, cellars, airshafts, sub-structural areas of piers and wharves, trestles, and similar areas which are inaccessible to fire stream direction by hand. Its use is very similar to that of a circulator except that it is not adaptable for use in a sub-basement fire or in other confined areas where the 54 inch nozzle is not of sufficient length to extinguish or control the fire efficiently. In this case, a circulator suspended from a length of hose would be more applicable and efficient. The main advantage of the Woods Cellar nozzle is that it can be placed through opening as small as 2-inches. It does not require the placement of hose

through the opening, and after proper placement, it may be left unattended since nozzle reaction is negligible and no suspended hose, which may burn, is involved.

Standard operation of the Woods Cellar nozzle requires connection of its 2-1/2” swiveled female inlet directly to a Gorter shutoff connected to a charged large hose lead. However, deviation from standard practice may be necessary if it is desired to control flow to the nozzle at a distance back from the nozzle. In this case, a length of large hose would be connected to the Gorter shutoff by use of a 2-1/2" x 3" increaser, and the Woods Cellar nozzle would be connected to the 50-foot hose length by means of a 3" x 2-1/2" reducer. Control of flow could then be made at a point 50 feet from the nozzle connection.

Woods Cellar Nozzle

<u>Standard Practice for operation of the Woods Cellar nozzle:</u>

1. Lead a large hose line with Gorter shutoff connected to a location where the cellar nozzle may be advanced to the pipe casing hole or other floor opening, charge the hose lead and bleed air from the hose line.
2. Connect the cellar nozzle to the Gorter shutoff with the Gorter shutoff indicator in "up" position, if possible.
3. Position one firefighter on each side of cellar nozzle connection. If available, two combination hose and shoulder straps may be strapped to the hose lead behind the Gorter shutoff.
4. Advance the cellar nozzle and hose lead to the pipe casing hole or floor opening.
5. Prepare to lower cellar nozzle through hole. Position one additional firefighter 6 feet back of Gorter Shutoff to assist with the hose lead.
    a. If cellar nozzle is to be lowered through pipe casing hole, one firefighter kneels to one side of pipe casing and lifts cover with pipe casing hook.

   b. Do not bend over pipe casing hole or other floor opening because flames or hot gases may vent through the opening.

6. Lower cellar nozzle through pipe casing or other floor opening.
   a. Approach opening from an angle. Do not place nozzle in a vertical pendent position over the opening.
   b. Guide nozzle with hands (and hose strap, if used).
   c. Open Gorter shutoff immediately as nozzle is lowered through the opening.
   d. Continue to lower Woods Cellar nozzle until hose connection rests on floor.

7. If necessary to raise or to alternately raise and lower the Woods Cellar nozzle:
   a. Assume squatting position to avoid excessive exposure to smoke and heat.
   b. Hold hose with hands (or with hose straps, if used).
   c. Raise and lower the hose in a level horizontal plane.

8. If it is necessary to cut an opening for use of a Woods Cellar nozzle, keep the opening to minimum size to avoid excessive flame, smoke, and hot gases.

The Woods Cellar nozzle will discharge 500 gpm at 50-psi nozzle pressure and will cover an area approximately 40 feet in diameter.

BACKING OUT HOSE LEADS

When ordered to back a hose lead out of a building after its use is no longer required, the first step is to shut off the water both at the nozzle and source of supply. Uncouple the lead at a point outside the building near the curb, usually at a point one length away from the building. The nozzle is then opened to permit the lead to bleed to the street. Firefighters are then spaced on the lead about 25 feet apart, with one firefighter at the nozzle. The lead is backed-out, using the shoulder carry or combination hose strap with the firefighter farthest from the nozzle leading and the nozzle backed out last. If there are insufficient firefighters to space them 25 feet apart, a firefighter is positioned at each coupling and one at the nozzle.

In an emergency, when ordered to back-out without the hose line, the nozzle shall be closed and the order shall be obeyed immediately. The company officer is responsible to see that all of the firefighters are accounted for and that the supply to the hose line is shut down, if necessary.

Backing-Out Hose Lead Over A 50-Foot Ladder:

When a hose line led over a ladder is no longer needed and is ordered to be shut down and backed-out, the nozzle is closed and one firefighter is sent to shut down the water at the source of supply. After this has been done they shall return to the base of the ladder and uncouple the first coupling nearest the gutter or away from the base of the ladder. The nozzle is then opened. The ground firefighter remains near the base of the ladder to flake the hose as it comes down the ladder. After the line has been bled, the hose in the building is flaked on the floor near the window so that it will payout easily over the windowsill.

The ground firefighter removes the hose strap at bottom of ladder. The first firefighter down ladder 'locks-in' at about the middle of the ladder, and the second firefighter 'locks-in' near the top of the ladder. At least one firefighter remains in the building to pass-out hose to firefighters on the ladder. When the hose is led from the right side of the ladder, the top firefighter on the ladder reaches through the ladder with left arm unhooks hose strap from ladder with left hand and removes hose strap from hose with right hand. (Use a reverse procedure if hose is led from left side). Ladder firefighters then pass hose hand over hand down toward the ground. Ground firefighter flakes hose, as it is passed to them, away from base of ladder and clear of any ladder poles.

When only a small amount of hose remains to be backed-out, the firefighter in the building attaches the hose and shoulder strap to nozzle and places shoulder strap on the shoulder of the firefighter at the top of the ladder. The firefighter inside the building then passes-out any slack hose remaining in the building. The second firefighter on the ladder attaches a hose strap to the hose and puts the shoulder strap on shoulder. Ladder firefighters 'unlock' and top ladder firefighter starts down the ladder. When a small loop of hose is formed at the side of the second ladder firefighter, that firefighter starts down the ladder. When backing hose down the ladder, no one should ever pull on the hose since this could pull a firefighter off the ladder.

An alternate method of handling the nozzle when backing a hose line out is to attach a hose and shoulder strap to the nozzle while it is in the building and then to use the hook to hang the nozzle on the second rung above the sill. The firefighter carrying the nozzle puts the shoulder strap on their right shoulder and grasps a ladder rung with their right hand. The firefighter then puts a left arm through the ladder over the rung above the one on which the nozzle is hooked. While raising the weight of the nozzle with right shoulder, the firefighter removes the hook from the rung with left hand. The firefighter then climbs down the ladder.

When necessary to 'back-out' a hose line over a ladder without use of the hose and shoulder strap, the firefighters descend to proper positions; one firefighter at top and others approximately 25 feet apart. They 'lock-in', remove hose straps, and place hose on shoulders or pass the hose down (hand over hand) as the conditions may require. The firefighter in the building, who passes the hose out the window, places the hose and Gorter shutoff over the shoulder of the firefighter who is to carry the shutoff down the ladder. When the firefighter with the Gorter shutoff starts down, the firefighter on the ladder below allows a loop to form at the side of the ladder, then starts down, maintaining the loop until off the ladder. The firefighters on the ground at the bottom of the ladder flake the hose on the ground clear of the ladder poles.

<u>Backing-Out Small Hose Line From A Fire Escape Balcony By Lowering With Rope:</u>

When backing-out small hose lines from the upper floors of a building, particularly above the third floor, the common practice is to lower the hose line with a rope. However, there are occasions where this procedure is not practical.

Small Line Lowered by Rope

When a small hose line is wyed on an upper floor from a large hose line led over a ladder, both the large and small hose may be backed down the ladder in a continuous operation as previously described for "Backing-out hose led over a ladder", with the following exceptions:

1. Both the Gorter shutoff and wye must be opened to bleed the hose.
2. One firefighter must carry the connected Gorter shutoff and wye with a combination hose and shoulder strap, the hose strap being secured to the connection at the small line swiveled inlet. This procedure is necessary to relieve the strain at the Gorter / wye connection and to keep the connection clear of ladder rungs and beams.
3. The firefighter at the small hose line nozzle secures the hose strap to the hose just behind the hose coupling connection to the nozzle. A large hose line, because of its weight, should be lowered from a fire escape only in single lengths, from above the fourth floor when two firefighters are doing the job. When a large hose line of two or more lengths is lowered from the fourth floor or below, there is only the approximate weight of one length of hose suspended at any one time during the operation. When a line consisting of two or more lengths must be lowered from above the fourth floor, a firefighter should be stationed on at least every second balcony below the fire floor to assist in holding the weight. The firefighters on the lower balconies take the same positions as for hoisting. Do not permit the hose to slide through the hands; lower it hand over hand.

When a small hose is wyed at the street and led up a ladder or stairs, it is more practical to shut down and uncouple at the wye. The hose is then bled and carried down the ladder or stairs.

When the wye is on a floor, the hose may often be bled into an outer court, floor drain, bathtub, sink, toilet, etc. After the hose is bled, the nozzle may be disconnected and the hose closed by coupling the male and female end of the hose lead together thus avoiding possible additional drainage and water damage while carrying the lead to the street. When the lead cannot be thoroughly bled before backing-out, the water remaining with the lead may be trapped as follows:

1. Lift nozzle waist high and disconnect from the hose lead.
2. Hold male coupling of hose waist high and walk to coupling of next length.
3. Disconnect couplings of 1st and 2nd length and connect couplings of the 1st length together. Hold all couplings waist high during the process of disconnecting and connecting.
4. Continue the same procedure throughout the remaining hose lengths of the lead, laying each length on the floor after it is coupled together.
5. This results in each separate length being coupled together into a loop with any remaining water trapped inside the hose. Each length is then carried or lowered to the street.

It is possible to bleed a small hose line into a standpipe when the lead is the last connected to the standpipe, and the standpipe is in the process of being bled. When the water in the standpipe is below the level of the outlet to which the lead is connected, open the wye outlet and standpipe outlet to which the lead is connected. Hold the nozzle high and open it; bleed the hose lead toward the standpipe outlet, holding the hose high, and proceeding more slowly than when bleeding hose on the ground.

Lowering Small Hose Line From Fire Escape Balconies Without The Use Of Rope

When a rope is not available to lower a small line, the hose may be lowered in the following manner:

1. Close outlets of wye and standpipe gate valve.
2. With hose line connected to wye, disconnect reducer and wye from standpipe outlet. Replace standpipe outlet cap. Do not remove supporting hose strap from balcony rail until wye is free.

3. Lower wye and reducer with hose connected to street. Firefighters on lower balconies take up weight of hose line as demonstrated. (Open wye to bleed hose when wye reaches street).

4. Continue to lower hose line until a bight of about 4 feet of hose to nozzle remains on balcony from which it was lowered.
5. Lower nozzle to firefighter on next balcony below. Firefighter reaches up as high as possible and grabs hose just above nozzle with one hand and other side of bight with the other hand.

6. Firefighter on balcony above reaches over balcony railing and tosses hose bight out and away from balcony.
7. Firefighter on balcony below retains nozzle and repeats steps # 4 and #5.
8. Firefighters on balconies below repeat steps #4, #5, and ` #6.

9. Firefighter on lowest balcony, having received the nozzle, passes the hose with nozzle downward until the nozzle is on the ground and then drops hose to ground.

Backing Out Charged Hose Lines:

This procedure is seldom a satisfactory practice. Time will more often be saved if the flow of water in the lead is shut down, kinked, or clamped with a hose clamp followed by uncoupling the lead outside the building and bleeding it before it is backed-out.

If it is absolutely necessary to back-out a charged hose lead, keep the nozzle closed at all times during the process. Provide additional firefighters to maintain safe handling and to resist the awkward stiffness of the charged hose. At least two firefighters should be positioned on the ground to lay out the hose as it is backed-out in order to relieve resistance to the firefighters backing-out the hose and to prevent entangling.

SECTION 11. HOSE TENDERS

ATTACK HOSE TENDERS ("SQUIRT")

The San Francisco Fire Department has utilized hose tenders as monitor nozzles and hose carriers for many years. The attack hose tenders or "Squrts" are equipped with an articulating boom-type water tower on which is mounted a variable stream Akron nozzle of 1000 gpm capacity. A hydraulic pump hydraulically operates the boom, outriggers, and nozzle through a power take-off from the apparatus transmission. The articulating boom is a two-piece boom of tapered box beam construction with integral waterways. The maximum vertical reach is 54 feet. The maximum horizontal reach of the boom is 45 feet. Once the power take-off is engaged, all "Squrt" operations are conducted from the rear step. Because of the potential electrical hazards of the boom or apparatus coming in contact with electric wires, etc., it is imperative that the operator conducts all operations while standing on the back step. When using attack hose tenders, you can use high RPMs to deploy jacks, but **NEVER user high RPMs when operating booms.** The boom controls are very sensitive. When operating the boom from the back bumper, be cognizant of the nozzle right above your head.

Three 3-inch gated inlets supply the monitor with efficient streams of up to 1000 gpm at 100-psi inlet pressure. This produces 90-psi tip pressure. A pressure gauge is located on the operating panel and indicates the pressure of water being supplied to the "Squrt". There is also an emergency backup hydraulic system if the main system fails. The boom is operated by a single control handle, which unfolds and folds the boom and rotates the turntable 360 degrees. The nozzle's vertical and horizontal sweep and the stream pattern are adjusted by switches on the nozzle control panel adjacent to the boom control. Both the boom and the nozzle may be operated while the monitor is in operation.

The hose bed of a "Squrt" is split into two compartments, each hose bed contains at least 1000 feet each of 3-inch hose.

Additional Equipment carried on Attack Hose Tenders

Hose tenders normally carry an assortment of fittings and appliances. Perhaps the most important appliances carried are the two Gleeson high-pressure reducing valves, which serve to make the hose tender an independent unit when operating from a high-pressure hydrant. When hose leads are made from high-pressure hydrants, both Gleeson valves must be left at the hydrant. Because straight leads are not always made to hose tenders, this apparatus is equipped with a number of double-male and double-female fittings, reducers, and increasers. The "Squrts" are equipped with a Multiversal portable deluge nozzle, which may be used in either a fixed or portable position. In addition to water tower operations, the "Squrts" are equipped with a high expansion foam capability in the form of two generators: the "Kidde P-500", a semi-portable large type generator, and the lightweight, small, and fully portable "Jet X-2" generator. Each attack hose tender carries a supply of 5-gallon foam containers. Refer to Chapter 8 for more detailed information about foam and foam operations.

Attack Hose Tender Leads

The driver of a hose tender has considerable responsibility when this apparatus is to be used at a fire. Of utmost importance is the reporting in to the Incident Commander before the tender is positioned so that it will not be driven or placed where it will be of little or no value. When operating in areas where high-pressure hydrants are available, the apparatus should be stopped at a high-pressure hydrant that is "reasonably remote from the fire", and positioned to lead-in. Operating from high-pressure hydrants permits the hose tender to be self-sufficient, although engines frequently augment the water delivered to hose tender monitor nozzles.

When an order is received to lead from a high-pressure hydrant, a minimum of two leads will be required. Both Gleeson valves should be left at the hydrant regardless of the number of hose leads made. The bridles and/or snubbing ropes are checked and then snubbed to the hydrant or other substantial object and the lead is made. When a lead is required, the Incident Commander will obtain assistance, if available. Otherwise the responsibility of hydrant connection will rest with the hose tender driver.

In areas where high-pressure hydrants are not available, hose tenders must rely on engines for their water supply. When an engine connected to a low-pressure hydrant is available at the intersection approach to a fire and is capable of supplying hose tender leads, the hose tender should stop at this engine, report in and, if ordered, lead from this engine. If the main supplying the hydrant is small (less than 8 inches), it is not advisable to lead more than two hose lines from this one source, but rather to have engines lead additional supply lines from other hydrants to provide a good monitor stream. Where large mains are available, more than two hose lines may be led from the engine; however, two engines may be required to deliver an adequate supply of water and pressure.

In some situations, at the discretion of the Incident Commander, it may be advisable or necessary to have the hose tender spotted in position with leads made to it by engine companies. This method of operation may be particularly adaptable when hose tenders report in after a number of hand-held lines have been led. However, the driver should never drive up in front of the fire without orders. It should also be kept in mind that when approaching a fire scene a hose tender might be used to better advantage on a back street or alley on another frontage of the building. The driver of the hose tender should make certain that his/her apparatus is in position to proceed in any direction.

Hose leads supplying a hose tenders should have sufficient slack hose at the tender to permit emergency movement of the apparatus, if necessary. Any movement of a hose tender with charged lines supplying the monitor nozzle is a difficult task. The nozzle must be shut down, and, in the case of "Squrts", the boom folded, outriggers retracted, and sufficient staffing provided to handle the charged hose leads to prevent pulling of or breaking the swivels at the inlet manifold. The principal advantage of providing slack hose in leads at the hose tender is to permit emergency movement of the apparatus for a short distance to a position of safety, or to move the hose tender to cover the extension of a fire.

Quite often, charged hand-held large hose lines are led into hose tenders to augment the water supply for the monitor nozzle. The Gorter shutoff may be connected to a hose

tender inlet by use of a 2 _" to 3" increaser. The preferred method of operation, however, is to connect a length of large line between the hose tender inlet and the Gorter shutoff with increaser. This permits much greater ease of operation when making the connection as well as providing some extra hose should it become necessary to move the apparatus. Shutoffs are not required on normal hose leads connected to a hose tender manifold inlet; however, when used, they do facilitate operations should it be necessary to change over the lead to a hand-held hose line.

Position of Attack Hose Tenders at Fires

To provide effective monitor nozzle streams, the hose tender must be placed in the most advantageous position possible. The position is determined by the Incident Commander. There are many considerations involved in positioning a hose tender, such as the floor into which the monitor stream is to be directed, the depth of penetration required, the size of the opening through which the stream must be directed, the hand-held lines being operated in the same area, etc.

The "Squrts" are much more versatile and efficient than either the standard hose tenders or the older style water towers but, like any apparatus to be used to the best advantage, the "Squrt" should be positioned by giving consideration to the following factors:

1. Overhead obstructions which might limit the maneuverability of the booms.
2. Overhead electrical installations and/or wires which may be dangerous to operating personnel.
3. Operating area of "Squrt" booms and nozzle so as to utilize the unit to its maximum efficiency
4. Type of terrain on which the "Squrt" will be set up. Unit should be positioned on level, solid ground where possible.
5. If necessary to operate on sloping ground, try to head the unit either up or down the slope. If this is not possible, try to spot the unit so all work will be done from the high side.

Note: How the stream is to be applied to the fire, straight or fog, as a direct stream or as a water curtain, will depend on the situation and as ordered by the Incident Commander.

STANDARD HOSE TENDERS

Refer to section 7 of the Pump Operations Manual for a description and information on Standard Hose Tenders.

SECTION 12. APPENDICES

APPENDIX A: INTRODUCTION TO 2 1/2" HOSELINE EQUIPMENT

INTRODUCTION

Considerations in using this hose pack include:

- Lightweight and compact
- Easy and comfortable to carry
- Able to be stretched and advanced quickly

Introducing the use of a **split hose pack** (50' of hose carried per firefighter) and a **horseshoe load** (carried over the SCBA air cylinder or shoulder)

I. ASSEMBLING THE HOSE PACK

1)

Starting at the female coupling, measure 32" from the outside of the female coupling up the hose. With permanent black ink, mark the 32-inch mark (32"H/R) on both sides of the hose for future use. Find the center of the length of hose and mark with a 1" stripe all the way around the hose. It is preferable that at least three firefighters be used to assemble the hose pack, to keep it as tight and as compact as possible.

2)

At the 32-inch mark, make your first bend in the hose, and return back down to a point just short of the female coupling. Do not go past the coupling; this will keep the hose pack small and compact. (Going past the coupling with the hose will make the hose pack fat and bulky at the ends.)

At this point, make another bend in the hose and return back up to the 32-inch mark, continuing all the way around the top and back down the opposite side to a point just short of the female coupling. Once again, to keep the hose pack as compact as possible, do not go past the coupling.

3)

Each time the hose reaches the point near the female coupling, stagger the folds, one long one short, similar to an accordion-type hose load. This keeps it neat and compact and maximizes space. Continue to fold the hose in a horseshoe-type configuration, keeping the entire hose pack as tight as possible, with absolutely no slack in the hose at any point.

4)

Continue folding the hose in a horseshoe-type configuration until you reach the male coupling.

5)

The final steps include connecting the couplings together to protect the male threads. In addition, any extra can be tucked back into the hose pack on the opposite side from the male coupling.

6)

To secure the high-rise hose pack, use 3 Velcro straps. These straps can be released with one hand and in dark conditions. Companies should use a minimum of three straps per hose pack.

Attach the straps, one on each side of the open end of the horseshoe and as close to the end of the hose folds as possible (this will keep the couplings tight to the hose and eliminate the chance of their flopping around). Attach the third strap near the top of the hose pack on either side.

7)

One of the hose packs will be equipped with the 2 _”shutoff and 1 1/8” straight tip in order to make operations faster when connecting the hose packs together and stretching for fire ground operations: The nozzle should be bail down, with the tip just past the end of the hose fold.

II. TRANSPORTING THE HOSE PACK

The hose pack should be carried over the SCBA air cylinder. Because it is assembled and stored in a horseshoe configuration, it fits over a typical SCBA air cylinder in a compact and well-balanced fashion.

As an engine company arrives at a high-rise or standpipe-equipped building, members of the crew remove the hose packs from their easily accessible location. Although a physically fit and well-trained firefighter can easily place the hose pack onto his SCBA air cylinder, it is best to use teamwork. Firefighters should rotate positions and assist one another in properly placing the hose pack over the SCBA air cylinder. Having another firefighter do this ensures that the hose pack will be properly positioned, balanced, and compact. This process is repeated until the hose packs have been placed on the SCBA air cylinders of two or three firefighters.

With the hose packs in place, the team of firefighters can now proceed into the building, transporting the high-rise hose pack as a team (Photo 12). Obviously, because the firefighters are going to a fire, they would be in full personal protective equipment (PPE). The horseshoe hose load carried on the SCBA air cylinder has the added advantage of leaving the individual firefighter's hands free to carry additional tools and equipment. Each firefighter should carry a spare SCBA air cylinder and a forcible entry/exit tool. One firefighter should carry the 2 1/2-inch high-rise equipment tool bag instead of a forcible entry/exit tool.

As an option for short distances only, firefighters may carry the hose pack over a shoulder. If the hose pack has been assembled and stored properly, it will also ride in a compact, well-balanced fashion. However, it will be a little more difficult to carry additional tools because one of the firefighter's free hands will be required to occasionally push the hose pack back up onto the shoulder to stabilize it and balance the weight.

III. HIGH-RISE EQUIPMENT BAG

Review all equipment in bag and their uses. Store items to protect male threads and equipment during transport

<u>Standpipe In-Line Pressure Gauge (SPG)</u>

1. The SPG should be flow tested weekly on Saturdays connecting to an Engine outlet with one length of 2 _" hose, shutoff and tip.
2. Labeling the SPG with predetermined **flow** pressures based on length of hose layout
   a. 150FT = 75PSI
   b. 200FT = 85PSI
   c. 250FT = 95PSI
   d. 5PSI PER FLOOR
3. Protect cover of SPG glass with plastic cover from can of Betty Crocker cake frosting

60-Degree Lightweight Angle Elbows
45-Degree Angle Elbows (not pictured)

One to two elbows maybe used to minimize kinks in hose layout at the standpipe outlet or cabinet

Nozzles and Tips

A second shutoff and tip can be used to extend the first line or replace a defective one during operations

1 _" to 2 _" Increaser

1. Used to extend a hose line at the 2 _" shutoff
2. Can be pre-attached to a 50' x 2 _" horseshoe pack along with 2 _" shutoff and 1 1/8" tip to be used to extend 150'hose line (Photo 16)
3. Can be used to create a second 2 _" outlet on a Class III standpipe system with
   a. a 1 _" outlet (usable only if fed from same diameter riser as standard 3" outlet)

3" to 2 _" Reducer

Attached directly to standpipe outlet before attaching SPG

Wire Brush

Used for cleaning male threads on hose valve outlets (due to paint, dirt, debris or minor burr)

Wooden Wedges (Door Chocks)

1. Use to chock open any door a hose line is pulled through
2. Use to line bottom of equipment bag thereby stored minimizing loss of space and protects bottom of bag

Door Strap/Search Markers

1. To keep door from locking behind search team
2. To identify areas that are currently being searched
3. To identify and account for those areas that has already been searched.

Markers, Grease Pens and Chalk

1. Stored in a small Tupperware to protect them
2. Used to keep track of operating units by supervisors
3. Communicate messages and to keep track of pertinent information

APPENDIX B: HIGH RISE PROCEDURES

This is the SFFD standard for a high rise hose lead in a commercial occupancy. Due to the open compartment, center core configurations, and fire load of these buildings, the greater GPM that this hose lead offers will significantly affect the fire fight in favor of the firefighters. It is also an option for the first in officer in cases such as residential (compartmentalized) high rises when:

1. The fire is not confined to the apartment of origin and has extended to the public hallway.
2. The wind is affecting the behavior of the fire and small lines are not making any head way

In these conditions, it becomes critical to have a **charged** hand line prior to advancing onto the fire floor at the entry point, which would be the door in the attack stairwell at the fire floor. This creates a margin of safety should conditions rapidly change upon entry.

The first step in effecting a proper hose pack stretch is beginning the stretch from the proper location, which is the floor below the fire floor in commercial occupancies. Firefighters must exercise discipline and initiate the hose line stretch from a safe position where control of the standpipe outlet valve can be maintained.

This practice also gives the attack team a safe place to retreat to while maintaining water flow. Therefore, it is critical to always hook up at least one floor below, even if this requires a longer hose stretch. Once again, the longer hose stretch is facilitated by the use of a 2 1/2-inch hand line because of the minimal friction loss associated with this size hand line.

SIZE-UP

- ☐ Verification of the Attack Stairwell
- ☐ Stairwell preferences:
- ☐ Stairwell preferences:
- ☐ Roof access that can be vented
- ☐ No smoke proof tower
- ☐ Stairwell checked for trapped/evacuating occupants up to the roof
- ☐ Verification of distance to fire location from entry point (door in attack stairwell on the fire floor)
- ☐ Establish length of lead (150’ is starting point) from standpipe on floor below to fire location above
- ☐ Preplanning layout problems:
- ☐ On floor below
- ☐ Problems with stairwells with a gap between the stairs and the wall
- ☐ Narrow stairwells or landings

CONNECTING HOSE LENGTHS

- Hose packs are laid out on the floor in the public hallway on the floor below with the male couplings facing toward the fire floor.
- One hose pack has the shutoff and tip pre-attached and should be the lead length
- Velcro straps are removed (keep straps to later lock bale of shutoff if extending)
- Hose packs are connected together

Engine Officer #1

- Evaluates conditions and floor layout on floor below (Locates other stairwells and if there is an access stairs between floors shared by single company)
- Will lead the attack onto the fire floor behind FFs 3 & 4
- Updates Fire Attack chief of entry on fire floor and water on the fire
- Communicates with Engine Officer #2 for advancement of hose as necessary

Engine Officer #2

- Evaluates conditions from fire floor entry point to fire
- Sizes up any forcible entry needs or use of master

building keys and calls for truck assistance as necessary

- ___ Assists with hose lead, remaining at stairwell door updating Fire Attack on attack stairwell conditions
- ___ Will relieve Engine Officer #1 as needed

Firefighter #1

- ___ Positioned at the standpipe outlet valve
- ___ Flush the standpipe outlet to clear debris and sediment (don eye protection – due to debris bouncing off other surfaces back towards firefighter)
- ___ Remove the female coupling from the last hose length and stand on a few extra feet of hose
- ___ Signal FF #2 to begin layout
- ___ Attach 3” x 2 _” reducer, SPG, 45 degree couplings if used and female hose coupling
- ___ Assist other FFs with hose layout as necessary
- ___ Open valve slowly and fully when Officer #1 calls for water
- ___ Standby at outlet valve and make adjustments to pressure once nozzle is fully open and **flowing**
- ___ Relieves FF#4 as necessary
- ___ Updates Engine Officer #2 if:
  - Water pressure is inadequate
  - smoke banks down to floor below fire in attack stairwell

Firefighter #2

- ___ Hands the female coupling and a few extra feet of hose from the last hose length to FF #1 at the standpipe outlet
- ___ Finds the midpoint on the last hose length and stretches it onto the floor below ideally straight away from the entrance stairwell into a hallway or room

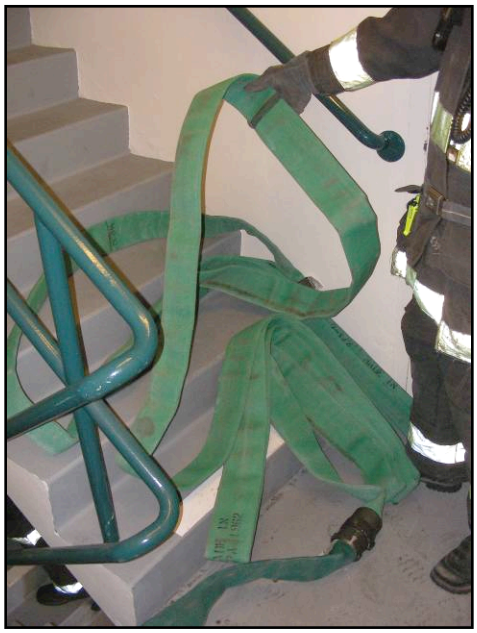
- ___ Adjusts to the floor below landing and checks hose as it is charged
- ___ Assists with pulling hose as needed once charged
- ___ Relieves FF#3 as necessary

Firefighter #3

- ___ Grabs the coupling between the 1st and 2nd lengths of hose and walks up stairwell to landing on fire floor
- ___ Checks layout to ensure hose is to the outside of stairwell at turns to eliminate kinks until reaching fire floor landing and then lays out towards interior of turn going up past fire floor landing
- ___ Adjusts to the fire floor landing and then holds the hose in place prior to charging
- ___ Dons SCBA mask and backs up FF #4 on the nozzle pulling hose as necessary
- ___ Relieved by FF # 2 below the fire floor landing

Firefighter #4

- Picks up the lead hose pack with shut off and tip and places on shoulder
- Advances to fire floor landing along with FF #3 not paying out any hose from shoulder
- Places hose pack on stairwell, 3-4 steps up from landing with the shutoff and tip facing the outside of the stairwell
- Finds the midpoint of hose and stretches out lead along stairwell above fire floor



- Lays out line going up the stairs on the interior of the stairs and the hose going down the stairs on the outside of the stairs to eliminate kinks.
- Holds hose at high point of stairwell before charging
- Adjusts to nozzle and drains out air from line
- Dons SCBA mask and then leads hose lead onto fire floor to fire
- Relieved by FF #1 at standpipe outlet

APPENDIX C: LARGE LINE PROCEDURES

This is the standard for an advanced fire upon initial arrival with a large volume of fire and large volume of material yet to burn in the fire compartment. An open-self-venting residential-garage fire with an immediate exposure problem or a Type 2 or 3 warehouse with an advanced fire upon arrival are both examples for a large line lead as your initial attack. The acronym ADULTS is a quick reminder for the types of incidents that you will use this lead.

A Advanced Fire upon arrival
D Defensive Operating Mode
U Unable to determine Extent/Location of Fire
L Large, Uncompartmentalized Areas
T Tons of Water
S Standpipe Operations

There are some considerations for the use of any large line:

1. The engine supplying the attack line must secure an immediate water source.
2. The engine in use must be a dedicated large line rig due to the high volume low pressure appliances.

Some of the advantages of the 2 _" shutoff & 1 1/8" straight tip over the Gorter complete with 7/8" tip:

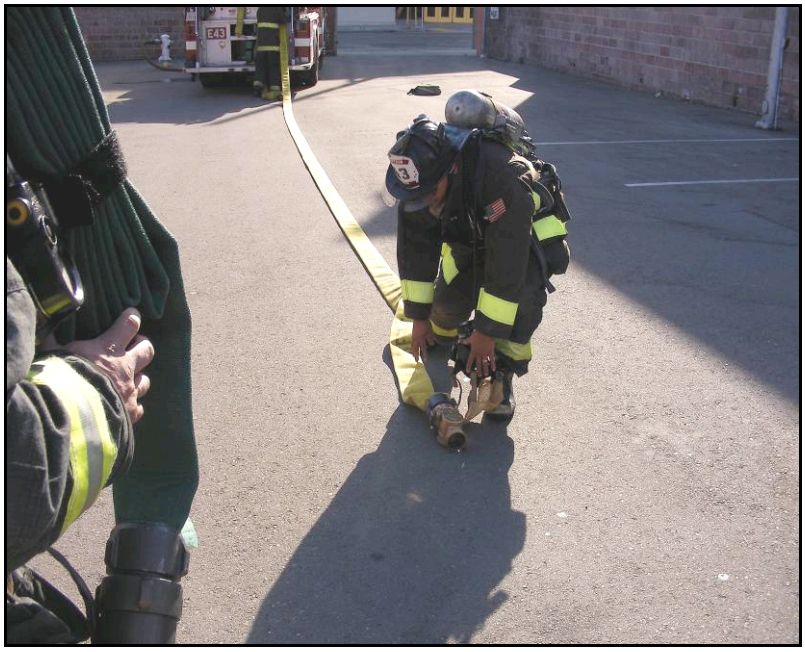
3. Efficiency:
   a. immediate shut off of the 2 _" with bale handle vs. the Gorter crank
   b. less nozzle reaction with larger tip at higher pressures than 1 _"
4. Maneuverable:
   a. able to advance the 2 _" with through multiple turns while charged
   b. can be moved with less people than 3"
5. Flexibility:
   a. can be used as an interior or exterior line as fire changes
   b. easily attached to existing attack side of hose bed on Gorter shut-off
   c. easy to extend to a smaller hose (1 _) if needed (mop up or overhaul)

SIZE-UP

- ___ Verification of an advanced fire upon arrival and communicate initial attack plan over Command channel
- ___ Securing an immediate water supply
  - proximal hydrant
  - immediate arrival of 2nd supply engine
  - hydrant jumper was called for prior to arrival at building
- ___ Proper placement of engine based on size of fire and truck placement
- ___ Establish *drop point* for Gorter shutoff and attachment of 2 _" bundles
- ___ Establish length of 2 _" lead (50' – 150')

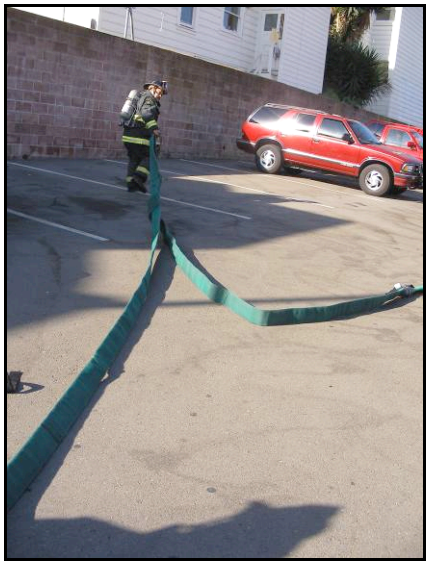
DROP POINT

- ___ Establish a safe distance back from the lead to retreat
- ___ Officer establishes Drop Point for Gorter shut-off



Engine Officer #1

- ___ Evaluates conditions, establishes drop point
- ___ Evaluates layout from drop point to fire and depth of fire
- ___ Calls for 2 - 2 _" x 50' bundles
- ___ Layouts 2nd bundle before FF #2 leads to initial attack point
- ___ Adjusts to the # 2 position in the hose lead



Driver

- ___ Positions rig
- ___ Grabs attack side of hose bed and removes wye
- ___ After Gorter shut off at drop point (one length for drill) and attaches 3" hose to outlet
- ___ Slowly charges to Gorter shut off at idle
- ___ Secures water from source (proximal hydrant, 2nd engine or HJ lead)
- ___ Gauges distance of lead and prepares to charge line at proper **flowing** pressure:
  - 150' = 75 psi
  - 200' = 85 psi
  - 250' = 95 psi
- ___ Lowers pressure to idle at the point line gets extended and refigures **flowing** pressure with additional 50' length

Firefighter #1

- ___ Places first 2 _” bundle at drop off point
- ___ Disconnects Velcro straps and disconnects couplings
- ___ Attaches female coupling of first 2 _” bundle to Gorter shut off
- ___ Waits for FF#2 to make initial stretch to attack point and then lays out remainder of hose straight back from attack point removing any sharp turns
- ___ Adjusts to Gorter shutoff and charges at officer’s signal and advances up to line
- ___ Adjusts to # 3 spot in hose lead

Firefighter #2

- ___ Places second 2 _” bundle at drop off point with male coupling in line with first bundle
- ___ Removes Velcro straps and disconnects couplings
- ___ Attaches 2 bundles together, then begins to lead to initial attack point
- ___ Once line is charged, drains air out and prepares to open up at arms length from shutoff bale