



HOSE COMPANY 2 - WESTBURY FIRE DEPT.

TRAINING EXERCISE

MASTER STREAM OPERATIONS

Types of Master Steams Available to Us:

A. Fixed
MASTER STREAM



aka - deck gun
1,000 - 2,000 GPM

B. Elevated
MASTER STREAM



aka - aerial master stream
1,000 - 2,000 GPM



aka - portable deck gun
up to 1250 GPM

C. Portable
MASTER STREAM

To be classified as a MASTER STREAM - Minimal flow is 350 Gallons per Minute to 2000 Gallons per Minute

Advantages/Disadvantages of Master Stream Use:

Advantages:

Large amounts of water

(Towers - up to 2000 gallons per min or gpm)

Allow us to operate from a **safe** distance
(5" supply = 1000gpm @ +100' @ engine idle)

Pre-Piped can be put into operation **quickly**

Defensive/Offensive ops. - hit the fire quickly with master stream while crews prepare to enter the structure.

People Trapped - Use Master Stream to keep the fire away from trapped victims.

Minimal Manning - can be put into operations with 2 firefighters, 1 if pre-piped.

Exposure fires - with fog nozzle you can cover a large area, quickly.

Hazard Vapor Releases - with fog nozzle can break up the toxic cloud from a safe distance.

(**all** if tactically deployed properly, when they are not deployed properly the master stream will become a disadvantage, at times doing more harm then good)

Disadvantages:

Large amounts of water

(water is 8lbs per gallon @ minimum 1000 gpm, with lost water, estimate adding 2 tons per minute)

Force of water often effects structural integrity of building - moving supports/beams ...
(needs to be operated from outside the collapse zone)

Flying Debris - Injuries to operating personnel, personnel not utilized in the Master stream operation need to be in a safe area.

Back pressure - the force of the water coming out of the device create a lot of back pressure and if the portable units is not secured properly it could cause serious injury.

Angle of delivery - this angle should be over 35 degrees to reduce back pressure.
(most devices have a stop pin to prevent this)

Nozzle Tips become flying object if not tighten to device - they need to be checked before the master stream is operated.

Final word - Master streams can be a very dangerous tool/operation if not done properly and tactically correct.

Master Stream Nozzle Tips Considerations:

Solid Stream Tip:

- + Good Penetration
- + Good Reach
(wider the tip - more GPM but less distance)
- + Good striking power to move debris
- No Stream conversion

Fog/Peripheral Tip:

- + Good heat absorption/expansion
- + More effective in a confined space use
- + Good in exposure protection & HazMat calls
- + Converts between tight & open stream
- + Good Area coverage
- Reaches are not as good as solid stream

Solid Stream - Master Stream Nozzle tips output:

Solid Stream output @ 80 psi

- * 1 3/8" --- 500 GPM
- * 1 1/2" ----- 600 GPM (@ 150 PSI = 800 GPM)
- * 1 3/4" -- 800 GPM (@ 120 PSI 100 GPM, @ 150 PSI = 1100 GPM)
- * 2" -----1000 GPM (@120 PSI - 1300 GPM, @ 160 PSI = 1500 GPM)
- ** 2 1/4" --- 1300 GPM
- ** 2 1/2" --- 1700 GPM
- ** 2 3/4' ---- 2000 GPM
(if water supply is adequate)

* Standard Stacked Nozzle Tips
** Individual Nozzles

Note: the smaller the tip, the more we increase the pump pressure, the gain will be minimal but the back pressure will be increased.
(Increase pressures will also effect the tightness of stream)

Fog/Peripheral - Master Stream Nozzle tips output:

Fog/Peripheral Nozzle output @ 100 psi (minimum operating pressure for fog/peripheral nozzle)

The outputs ranges on these nozzles, differ based on the nozzles rating or adjustable gallonage setting on the nozzle and can range from 500 - 1200 GPM. Some of the newer ones with a greater than 4" supply line can produce about 2,000 gpm.

If we increase pump pressures, it will increase the GPM output but we don't want to exceed 200 psi on most fog/peripheral nozzles.

NOTE: with Smooth & Fog Nozzles, the size of the supply line and the pumping pressure to the device **both** effect the GPM output and the distance achieved by the device.

Suppling Water to a Master Stream Device

When we supply a master stream device: (*Pre-pipe deck gun, Portable master stream, or an Aerial device*) we want to feed these devices with the largest supply line that the device can handle, in most cases this will be a 5" line. (**note:** some portable devices only have 2.5" intakes)

To maximize the master streams output, the Engine feeding these devices should be in close proximity to the device (***within safe reason***) to reduce friction loss from that Engine to the device. Since we have little control over a hydrant pressure (60-80 psi) and there is very little friction loss on a 5" hose at hydrant pressures, but if we increased the pressure as we do in feeding a device, the friction loss would increase, requiring higher pumping pressures to get the same gpm output. This also keeps the engine from having to work at higher idle, especially over long periods of time. This is more critical when we are using multiple 2.5" to feed the device, then it is with a 5" supply line.

Realistically getting an engine close to a master stream, is rarely achieved since in most cases they are deployed later in an operation and there are already multiple pieces of equipment clogging up the street or access to the scene. So this means, most of the time, we'll be reverse laying from the master stream device to an engine on a hydrant or being relay fed from another engine on a hydrant.

If the Master Stream is being fed by multiple 2.5" lines, the ***rule of thumb*** is the devices shouldn't be more then 500' away. 500' @ 100 psi (needed for a Fog Tip) = adding 75 psi for friction loss.

Master Stream Device = Offense or Defense?

Master Steams are typically considered a Defensive tactic/tool. Before we operated them, we pull everyone out of the structure (***we NEVER want to utilize on a structure with personnel operating inside***) and the Incident Commander usually feels there is no longer a life hazard and risking firefighter inside no longer has any gain. After a period of time the IC will usually go back to Offense to mop up hot spots that the master stream can't get to.

Although, Master Streams especially pre-piped devices, can be rapidly deployed offensively. An example of this would be pulling up on a fully involves structure "with know hazards, such as propane, acetylene...", hitting the main body of fire quickly w/ the deck gun before deploying the crew inside would be an excellent offensive tactic. Garages, outside rubbish w/ exposure issues... a quick hit with a deck gun could make a big difference and can be deployed by 1 firefighter as others pull and set the line for the interior attack.

Another offensive tactic would be to use the pre-piped master stream to keep fire away from a trapped occupant as the minimal manned crew attempts the rescue. This could also be using the Master Stream to keep a Hazardous Material away from a downed victim(s).

Note: When we use a master stream on a structure, we want to check the structure's stability **before** we deploy personnel inside that structure, since the structural integrity may have been compromised during the master stream operation.



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MASTER STREAM OPERATIONS

Hands on Evolution #1 (Supplying a Tower Ladder)

- * Set up Tower 962 for Master Stream Operation
- * Reverse Lay with 969 from 962 to Hydrant
- * Familiarize members with the Nozzle Tips available and how to change from one to another.
- * Familiarize members with Nozzle controls

Hands on Evolution #2 (Pre Pipes Deck Gun Use)

- * Connect 969 to a hydrant
- * Familiarize members with Smooth Bore Nozzle Stacked Tips
- * Familiarize members with converting from the Smooth Nozzle, stored on the device, to a Fog Nozzle
- * Familiarize members with Deck Guns operational controls

Hands on Evolution #3

(Converting Pre-pipe Deck Gun to a Portable Master Stream)

- * Deploy 969 Portable Master Stream Manifold
- * Familiarize members removing Pre-piped Nozzle head and installing onto the portable manifold
- * Familiarize members on adequately securing the Portable Device and flow reducer safety.
- * Familiarize members with Nozzle Controls and 35 degree minimum safety pin.