



FETI

DRILL GUIDE



Topic: Portable Master Stream Rapid Deployment - One Engine Reverse Lay-out

Reference #: DG 16-05 (org 13-02) Date: May 18, 2016 (December 15, 2013)

Level of Instruction: In-service personnel

Time Required: 3 Hours

INSTRUCTOR PREPARATION

This drill requires preparation in order for it to be conducted successfully. Preparation includes having a safe and large area location to conduct the drill, and a site where water can be discharged from a portable master stream monitor without property damage. See "Set Up" for further detail. Safety is a must for the duration of this drill.

Goals:

The goals of this drill are:

- To increase the personnel's familiarization with, and confidence in deploying a master stream monitor remote from the pumper.
- To improve proficiency to expedite an evolution during what can be a stressful and dangerous operational situation on a fireground.

Materials:

- Pumper with a portable master stream monitor,
- Traffic cones and traffic control equipment to protect participants and property/on-lookers including downrange from the master stream.

References:

- IFSTA Essentials of Fire Fighting 5th Edition chapter 15 , or
- Jones & Bartlett Fundamentals of Fire Fighter Skills chapter 22,
- NFPA 1410: Standard on Training for Initial Emergency Scene Operations

Instructor Set-up:

This is a relatively simple drill that doesn't take much time to set up and involves a minimal amount of equipment. A good variation is to have the apparatus turn a corner while laying hose, a frequent reality. It is worthwhile to repeat several times rotating crews to practice setting up the portable master stream and at the hydrant to do local hook-up procedures for maximum flow.

Student Motivation:

The rapid deployment of a master stream can reduce the chance of an explosion or reduce fire spread protecting life and property. This is not an evolution we frequently need to do. Efficiency and expediency reduces the exposure time for firefighters and can make a significant difference in the overall success of a fire operation.

Drill:

1. **Review the types of scenarios** in your area that could require the expedient deployment of a portable master stream monitor away from the pumper such as:
 - To cool a railcar or tanker truck, or to attack a fire in the same
 - For a rapidly moving structure fire, liquid or gas line rupture, etc.
 - To protect structural or other exposures.

These scenarios can expose firefighters to high radiant heat and other hazards. The deployment of the master stream should be completed in a rapid, but safe manner to minimize the exposure to firefighters.



Figure A - Above: older style “multiversal appliance” deluge gun supplied by multiple hoselines on top of a pumper

Figure B - Below: newer style two piece with the upper assembly connected to a discharge port that can be quickly removed from the discharge and placed on a portable base



Figure C - Below: upper assembly set on ground monitor base.



Locations of where such incidents may occur in your district or when providing mutual aid should be determined and planned for.

2. **Review the mounting or storage of portable master stream monitor on the fire apparatus.** This varies considerably and can be:

a. Top mount

- i. Older “deluge gun” or “multiversal appliances” often mounted on a rotating base high on apparatus for use there with less obstruction. The deluge gun is sometimes supplied by an adjacent discharge with a short section of hose to the inlet, or hoselines are used from side discharges (Figure A). Even the aluminum versions are heavy. To reduce the chance of injury, be careful when removing the multiversal and handing it down to firefighters on the ground. This generally takes two or three firefighters.

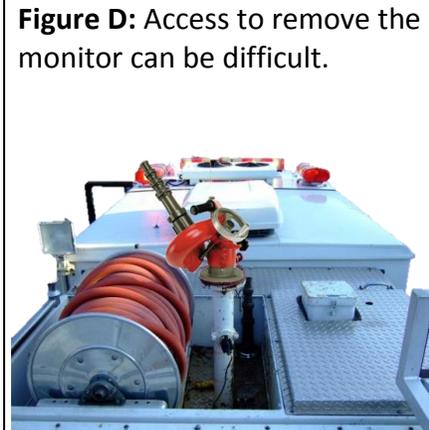


Figure D: Access to remove the monitor can be difficult.

- ii. Many newer ground monitors are in two pieces, allowing the removable upper assembly to be directly connected to permanent plumbing to allow use as a “deck gun”. That upper assembly also connects to a ground monitor base (Figure B and C). Although much lighter, and depending on where the appliance is located on the apparatus, caution must still be exercised on removing it from the connection and handing it down to firefighters on the ground. (Figure D)



Figure E: 500 gpm “fast attack” ground monitor – one intake for 2½” coupled 2½” or 3” hose

- b. Compartment, running board or other location – much easier for one or two firefighters to retrieve device. (Figure E)

3. **Review Evolution**

A fire attack scenario utilizing a portable master stream monitor being supplied by 300’ of supply hose line (can be large diameter if the monitor accepts LDH, or two 3”, or two 2 ½” hoselines of equal length). (See Table 1) A minimum of 500 GPM must be flowing from nozzle.

Water supply method will be a reverse lay-out from master stream to hydrant location. A minimum flow of 500 GPM must be established and maintained within 5 minutes from the start of evolution.

4. Evaluation Criteria:

- All lines shall be completely deployed from hosebeds.
- All nozzles shall be flowing minimal acceptable pressures. Master Streams 80 psi
- All types of master stream appliance available to department should be used in evolutions.
- Time begins at signal from training officer until water is flowing at required pressure from master stream and supply line has been established.
- Recommended Maximum time: 5 minutes

parts herein for section 3 and 4 are from Volume 22, Number 258 "Weekly Fire Drill" at www.firefighterclosecalls.com

5. Evolution:

a. Prepare portable master stream device

In a safer location away from where the portable master stream monitor is to be used, prepare the portable master stream device. Complete any assembly required, select the correct tip and connect the hose(s) to the device's intakes. Leave the monitor and any necessary equipment secure on the tailboard. (Figure F)

Figure F: assemble monitor, select correct tip and connect hoselines before approaching location for monitor.



- b. Back the engine to the desired location. Remember large diameter hose will elongate significantly. Backing allows the apparatus to change direction quickly should conditions change without turning around first, and likewise to lay the hose out without having to turn around in a more exposed location. Firefighters should walk in sight of the driver.
- c. At the site the portable master stream monitor can be quickly removed and put in position. Hoselines straightened and the monitor secured and prepared in accordance with manufacturer directions.
- d. Initiate a "reverse lay" with two firefighters remaining with the portable master stream monitor until it is charged.

6. Know your portable master stream device

- a. The set up varies by the type of monitor and by manufacturer. **Know and follow pressure/flow limitations and set up requirements set by the manufacturer for your monitor.**
- b. General: in all cases refer to the manufacturer's manual for your monitor.
 - i. New, lighter devices should be anchored with the supplied safety chain. The safety chain should be attached to the portable base per the manufacturer's directions, and secured around a substantial stationary object, such as a stake, parking meter, fence post, etc., the anchor should be positioned between the monitor and the intended target. Generally the center of the base should directly face the intended target. The monitor should never be used with any slack in the safety chain.
 - ii. Older deluge guns should only be directed 15 degrees each way off center, or there is danger of the monitor flipping over. Newer devices have a much wider range of safe movement, again refer to the manual.
 - iii. Most of the newer, smaller monitors are limited to 500 gpm, with the larger monitors limited to 1000 gpm.
 - iv. Never lower the discharge below the safety stop in portable mode.
 - v. Never attempt to move the monitor's portable base while flowing water.

General Information From Elkhart Brass Stinger 2.0 Break-Apart Portable Monitor Manual

- All personnel who may be expected to use this equipment must be thoroughly trained in its safe and proper use.
- Before flowing water from this device, check that all personnel (fire service and civilian) are out of the stream path. Also, check to make sure stream direction will not cause avoidable property damage.
- Become thoroughly familiar with the hydraulic characteristics of this equipment, and the pumping system used to supply it. To produce effective fire streams operating personnel must be properly trained.
- Open water valve supplying this equipment slowly, so that piping and hose lines fill slowly, thus preventing possible water hammer occurrence.
- Master streams are extremely powerful. Therefore, great care must be taken in directing such streams to avoid injury to personnel and unwanted damage to property.

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Review:

Clean up the equipment and return to service. Then come together in the meeting room or location of choice and take the time to have open discussions on what worked well and what

difficulties were encountered. By doing this you assist in ensuring that the firefighters learn from each other's experiences.

Table 1 - Determining Flow Capabilities		
<p>This is one of those scenarios that shows the value of large diameter hose (LDH). The flow of 500 gpm is very minimal and of course a 300 foot hose lay is short for real situations, but to show the engine pressure required for different examples of hose diameter follow. In reality, the hoselays will be longer, especially for rail cars and liquid or gas storage tanks. Different brands of hose have different inherent friction loss and friction loss formulas are only a standard to work from. Also different appliances require different pressure and the condition of the hose and appliances also makes a difference.</p> <p>FL = C Q²L FL = friction loss in psi C = friction loss coefficient Q = quantity of water flowing or flow rate in gallons per minute divided by 100 L = hose length in hundreds of feet</p>	Hose Diameter and Type (inches)	Coefficient (C)
	1½ " hose	24
	1¾" hose with 1½" couplings	15.5
	2 ½" hose	2
	3" hose with 2½" couplings	0.8
	3" hose with 3" couplings	0.677
	4" hose	0.2
	5" hose	0.08
<p>5" Large Diameter Hose C Q²L 0.08 X 5² X 3 = 6 psi friction loss (2 per 100')(rarely a problem at this flow regardless of length)</p>		
<p>4" Large Diameter Hose C Q²L 0.2 X 5² X 3 = 15 psi friction loss (5 per 100') (rarely a problem if less than 2000' long – shorter length possible at higher flows)</p>		
<p>3" Hose C Q²L 0.8 X 5² X 3 = 60 psi friction loss (20 per 100') (limit approx. 600' for 1250 gpm pumper)</p>		
<p>Two 3" Hoselines divide the flow equally and calculate 0.8 X 2.5² X 3 = 15 psi friction loss (5 per 100') (rarely a problem if less than 2000' long – less at higher flows)</p>		
<p>Two 2 ½" Hoselines divide the flow equally and calculate C Q²L 2 X 2.5² X 3 = 37.5 psi friction loss (12.5 per 100') (limit approx. 1000' for 1250 gpm pumper)</p>		
<p>One 2 ½" Hoseline is not recommended for this purpose C Q²L 2 X 5² X 3 = 75 psi friction loss (25 per 100') (limit approx. 250' for 1250 gpm pumper)</p>		

