Fire Nuggets®

Keys to Success with the "Big Line": Proper Weapons Selection

By David M. McGrail

Of the numerous "Fire Nuggets" that I have acquired over the years, one that has captured a great deal of my interest and truly driven me to further my professional development in this area, revolves around what I like to refer to as "proper weapons selection." I am specifically referring to those "weapons" that represent the arsenal of tools used by an Engine Company — hoses and nozzles.

The idea of referring to hoses and nozzles as "weapons" came to me after watching the movie *Full Metal Jacket*. This movie depicts the life of several Vietnam-era Marines. It begins with their day-to-day life in boot camp, under the antagonistic direction of a very tough, stereotypical drill sergeant.

I recall how these Marines truly learned absolutely everything about their weapons, specifically their individual rifles. Each Marine was taught how to take his rifle apart, thoroughly clean it, and then put it all back together. Unlike a father assembling a toy for his kid late on Christmas Eve, the Marine, after reassembling his weapon, would not have any mysterious spare parts lying on the ground, nor would he be wondering, "Where does this go?" Furthermore, and most importantly, each Marine was trained to completely understand the capabilities of his rifle. After all, his life depended on it!

I had to ask the question, "How well do firefighters assigned to engine companies really know and understand their weapons?" Don't the lives of firefighters depend on "proper weapons selection?" I believe they do. Unfortunately, during my research, I found that many fire departments, including my

own, had plenty of room for improvement when it came to understanding and properly selecting weapons for battle.

The drill sergeant in *Full Metal Jacket* even required his recruits to take their rifles to bed with them. I am not encouraging any firefighter to sleep with a section of hose, or a nozzle. I am merely suggesting that all firefighters, specifically those assigned to engine companies, dedicate themselves to a more thorough understanding of their respective weapons.

For the truly dedicated engine-company firefighter, and specifically fire officer, “proper weapons selection” means a thorough understanding of what size hose, and what type nozzle to select and use to stop a given fire. Much of the American fire service seems to be stuck in a “1¾-inch preconnect mind-set.” Because this valuable weapon serves us so very well for the vast majority of our work, we sometimes attempt to misapply it to larger fires, which actually require a more powerful weapon. That’s where the “big line” comes into the picture.

There are numerous individuals in the fire service who believe there are primarily two fire-ground weapons, the 1¾-inch hand line and the master stream appliance, with (unfortunately) nothing in between. However, there is also a strong and growing segment of the fire service that recognizes and truly understands that the 2½-inch hand line can be a very valuable tool and fire-ground weapon.

My good friend and fellow Fire Nuggets contributing author, Andy Fredericks, has written many an excellent article on this very subject. One of those was titled “THE 2½-INCH HANDLINE” (*Fire Engineering*, December 1996, p. 36). In this article Andy discusses the value of the 2½-inch hand line and the limitations of the 1¾-inch hand line. Andy also re-emphasizes the acronym ADULTS, which can be used as a guide for company officers to help them determine when and where to select a 2½-inch hand line for the proper weapon of choice.

A quick review of the ADULTS Acronym is as follows:

A — Advanced Fire Upon Arrival

D — Defensive Operating Mode (Defensive Operations)

U — Unable to Determine the Extent (Size) or Location of the Fire

L — Large, Uncompartmented Areas

T — Tons of Water (One ton of water per minute with a 1-1/8” tip)

S — Standpipe Operations

I truly believe that most firefighters and company officers have a good understanding and idea of when

and where they should be using this more powerful weapon. Furthermore, because great fire-service professionals like Andy Fredericks have covered the issue of when to use this weapon so well, I am not going to focus on this area. I am, however, going to address how to make this a more user-friendly option.

Let's face it, the 2½-inch hand line is, and always will be a more physically challenging weapon. In fact, the size, weight, and maneuverability issues are frequently what keeps a fire officer from selecting this weapon in the first place, even when he probably knows it would be more appropriate than a smaller weapon.

I know two fire officers in my own department (both good men) who, unfortunately, teach their firefighters that they will opt to stretch two 1¾-inch hand lines before they would even consider a “big line.” If they had a better understanding of proper weapons selection, they might understand that selecting the proper weapon to begin with, in many cases, would stop the fire much faster, eliminating the need for multiple small hand lines. Not to mention the fact that a properly supplied 2½-inch hand line can deliver more water (300gpm +), with greater reach and penetration than two 1¾-inch hand lines (@ 150gpm) put together. At the very least, a good practice is to stretch a larger, more powerful weapon as the second or back up line when the first hand line is not making positive progress in stopping the fire.

Unfortunately, these two officers are not open-minded enough to consider the 2½-inch hand line as a viable offensive weapon. They, like many firefighters and fire officers, have probably had a bad experience with the big line. Because of that, they will likely base all of their future weapon-selection decisions on what I believe are the “correctable” problems (such as over-pressurization) that frequently plague many “big line” operations.

I believe that there are five specific “keys to success” when dealing with the 2½-inch “big line.” With these key components in place, a “big line” operation is no longer an intimidating and formidable opponent. Let's look at the keys to success in detail:

1. User-friendly Pumper Apparatus:

It seems that over the past several years, a typical pumper apparatus has grown into a large, oversized, jack-of-all-trades vehicle. In fact, many departments seem to design their pumpers around a “monster” water tank. Now don’t get me wrong: onboard water is a critical component, especially for rural operations or any area without hydrants for that matter. But all the water in the world doesn’t solve the problem of a difficult hose stretch, from a small hose bed located above the water tank, that is better than six feet off the ground, in some cases much higher than that.

There is also the Tele-Squirt, Quint, etc., issue. If the majority of the rear hose bed is eliminated to make room for a turntable and other structures associated with an elevated boom, ladder, etc., than something has to suffer. In this case, one of those things is the available space for hose, and subsequently the ease of stretching that hose. The design of some fire apparatus makes being a trapeze artist a pre-requisite for

stretching a hand line. Re-bedding the hose after use is no picnic either.

If 2½-inch hand line is going to work for your department, it starts with user-friendly apparatus. Be creative; design your water tank around the hose bed. L-shaped tanks, which lower the hose bed, are an excellent option. You don't sacrifice space for the water tank or hose bed, and you will have a more user-friendly apparatus.

If your department requires the use of Quints or similar vehicles, you must prioritize all of the things you want to be able to accomplish on the fire ground with such a vehicle. Keep in mind that multiple-use vehicles aren't a substitute for manpower. Furthermore, stretching an attack line and getting fast water on the fire may solve many of the other fire ground problems, or at the very least make them easier to deal with.

Your first priority should be to design a user-friendly hose bed. When doing so, and specifically when specifying new pumper apparatus, keep in mind there is absolutely nothing wrong with a good old-fashioned, no-frills, triple-combination pumper (pump, tank and hose bed). Regardless of what type of apparatus you choose to use, the hose bed should include plenty of room for your supply hose, preconnects, and of course the additional area necessary to carry a user-friendly load of 2½-inch hose. A reverse hose load (several hundred feet) in a static bed, with a nozzle attached is one step closer to making a 2½-inch operation a user-friendly reality.

When I was the captain of DFD Engine Co. #3, with the assistance of my crew, we designed a new hose bed for a 2½-inch reverse load. This was simply a matter of adding a divider board between the main supply hose bed and a rear preconnect bed. We made the new hose bed area two 2½-inch hose sections wide, loaded flat. We loaded it in a reverse fashion with a nozzle attached, and were able to easily carry 600 feet of hose in this new space. Furthermore, we didn't sacrifice any space in the adjoining hose beds. Shortly after implementation, we had a fire in a large commercial warehouse which required a 550-foot stretch — no problem!

2. Low Pressure, Smooth Bore/Solid Stream Nozzles:

The next critical component on the road to success with a "big line" is the proper nozzle. As with the "1¾-inch preconnect mind-set" it seems that much of the American fire service is also stuck in a "Fog Nozzle Mind-Set." The fog nozzle is a very valuable tool for certain applications, and the well-equipped engine company should certainly have a complement of fog nozzles on board. However, that same engine company should be equipped with several smooth-bore nozzles as well.

It all boils down to something we call nozzle reaction. As we all know, NR is the force pushing against us as we attempt to operate and advance a hand line. It is a function of two specific things, the weight of the water being delivered (GPM) and the nozzle pressure. Most fog nozzles, with the exception of some new low-pressure models, are designed to operate at 100psi. The smooth bore nozzle operates at 50psi.

In order to reduce the nozzle reaction, we have two choices: reduce the flow or reduce the nozzle pressure. Reducing the flow is not a good choice; that is, if we want to stop the fire and stop it NOW! Reducing the nozzle pressure is a good choice and an easy one at that. Simply choose the proper nozzle, and, in this case, the obvious choice for use with a 2½-inch hand line is a smooth-bore/solid-stream nozzle. Capable of delivering its rated flow at 50-psi nozzle pressure, this nozzle, along with the "big line" creates the best low-pressure, high-volume weapon available.

3. Proper Operating Pressures:

The next key to our success is that all-important individual at the pump panel. A well-trained and experienced pump operator is worth his weight in gold. Just because a 2½-inch line is larger does not mean more psi! Proper pump pressures for most 2½-inch hose layouts are relatively low, frequently much less than 100 psi. It's because of the significantly lower friction loss in the "big line" and low nozzle pressure (when using the appropriate nozzle) that accounts for a much lower overall operating pressure. Train your pump operators thoroughly, and specifically train them to NOT over-pressurize this weapon. If the line is over-pressurized, it will likely be a bad experience for those at the nozzle and they won't want to try it again!

4. Proper Stretching and Advancement:

A good engine company can mean the difference between lives saved or lives lost. It can also be the difference between buildings saved or parking lots created. A user-friendly hose bed will significantly help the engine company crew with stretching the attack line: however, it all starts and ends with the basics.

Properly stretching the "big line" before charging it will pay countless dividends during the attack. For example, one small pile of hose left unchecked equates to several kinks in the charged hose line. This makes advancement very difficult and leads to a reduced water delivery. Some individuals advocate correcting kinks by adding pressure, a very dangerous practice. Take the time necessary to stretch the line properly, the first time.

Advancing the charged 2½-inch line can be a very demanding experience, but it can be done. Obviously, extra manpower would be ideal for a "big line" operation, but for most fire departments that is not a reality. Use the manpower you have appropriately to maximize their efficiency and effectiveness. Rather than three men on three separate low-flow lines, put all three of them on a "big line" and teach them the proper techniques.

Use the ground to counter nozzle reaction. The backup man can press the line down against the ground with his weight, allowing the nozzle man to direct the stream. For advancing, the backup man picks up the hose and pulls it forward all the while working to counter the nozzle reaction. If necessary, hit and move tactics (shutting the nozzle down or partially closing the nozzle when moving) can be employed to make movement of the line easier.

The third man has the most difficult job of pulling additional hose as necessary. Once again, on the ground or floor, he can use the strength of his legs pressed against a doorjamb for example to provide added leverage, and pull the hose line in a fashion similar to that of a rowing machine. You might be surprised what three mentally prepared and physically fit firefighters can do with a “big line.”

Don’t hesitate to have two separate engine companies operate one hand line. In many cases this provides four, six, or perhaps even more firefighters (depending on a department’s manpower levels) to operate and advance the hand line. The extra manpower comes in handy, especially when making turns with the “big line” inside a building.

5. Training, Training, and More Training:

Last, but certainly not least, is the component of training. Unfortunately, training is often seen as a dirty word in the fire service. However, the truly dedicated firefighter and fire officer know that preparation is the key to success and safety. Take the time to conduct realistic and productive training drills with your 2½-inch hand line. Not once a year, or even monthly, but perhaps weekly in the beginning.

The training I am referring to is not on the front ramp of the firehouse, in gym shorts and tee shirts, and in a standing position. Use your department’s burn building or drill tower. If you don’t have these resources be creative. Use a playground to simulate obstructions typically found in a building. Perhaps you could use an abandoned building or a structure scheduled for demolition. You can even stretch hose into and through your own firehouse if necessary.

Furthermore, conduct the training drill in full personal protective equipment (PPE), with SCBA, not just for safety purposes, but to create a realistic scenario as well. Don your face piece and go “on air,” just like you would in a real fire. Get down low, operate on the ground or floor, and make your training as realistic as possible. If you can include a live burn with your “big line” training, all the better.

After you get the basics down, add some on-the-job training (OJT) to your menu. That’s right, every time you stretch the “big line” at an actual fire you will learn new lessons and ultimately develop better skills. Keep it up, and before long you will be stretching and operating a “big line” faster than many engine companies can get a small preconnect in service. As the Nike advertisement says, “Just do it!”

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