Rural Fire Command

by

Larry Davis

Installment 30 — May 2005

Fluid Motion, Part 8

No Strain, No Gain: suction strainer innovations

RFI
RURAL FIREFIGHTING INSTITUTE

Training America's Rural Fire & Emergency Responders

A Message the Author, Larry Davis

In October 2002, I started writing the monthly "Rural Fire Command" column for *FireRescue Magazine*. Since that time, the RFC column has been carried in just about every subsequent issue of the magazine.

As time has passed, several readers have contacted me about obtaining back issues of the column. Some expressed an interest in acquiring the articles in Powerpoint format for use in training programs.

This led to, my adaptation of the RFC columns to the PowerPoint format. These PowerPoint programs are being made available through the combined efforts of *FireRescue Magazine* and the Rural Firefighting Institute.

Fluid Motion — Part 8
Suction Strainer Innovations

Throughout this series, I have focused on factors that impact drafting operations with regard to getting big water fast. Thus far, I have discussed all of the major factors and components that influence the output from a drafting operation. Now, it's time to talk about the suction strainers and how they can influence performance.

Figure 1. This 1250-gpm pumper is drafting from a shallow stream using dual suctions. The key to its being able to deliver over 1800 gpm was not only the dual suction lines but also the use of the strainers (as shown in Figure 2) designed for the specific drafting situation.

Figure 2. For the drafting operation shown in Figure 1, floating strainers are the perfect solution. Since strainers of this type draft from the underside of the strainer, they work very well in shallow water.

The Barrel of the Acorn?

Today's rural firefighters are fortunate in that they have a wide variety of types and sizes of suction strainers available to them. It wasn't very long ago that the only choice firefighters had in strainers was whether they wanted a barrel strainer an acorn strainer, or a box strainer.

Today, rural firefighters can select the strainer(s) they need based on their specific needs. If they are faced with winter drafting operations that involve cutting through ice, they can purchase an ice strainer. If they have to draft from porta-tanks in water shuttle operations, they can purchase low-level strainers designed specifically for use in porta-tank operations. And, if they need a strainer for drafting from shallow streams or ponds, they can purchase a floating strainer from numerous designs and manufacturers.

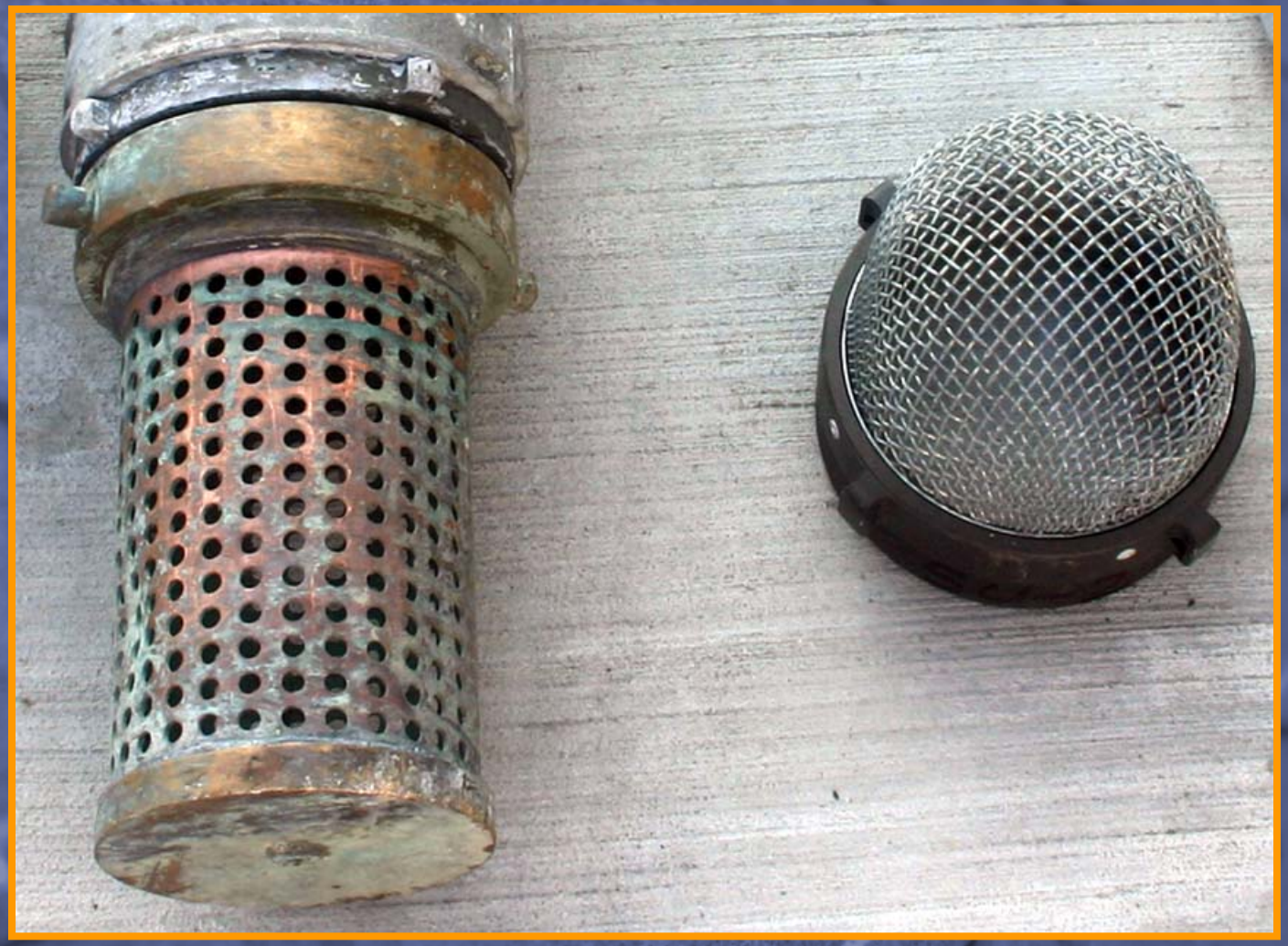

Figure 3. Both the barrel strainer on the left and an the acorn strainer on the right perform well as long as the water sources are deep enough so air is not drawn into them and they do not sit on the bottom where they can draw in debris and become clogged.

*Today rural firefighters are, **fortunate** in that they have **a wide variety** of suction strainers available to them, so they can elect one based on their **specific needs**.*

Ingenuity & Innovation

In many departments where a drafting operation is rarely needed other than the annual pump service test, suction strainers aren't given much thought. In those departments where drafting operations are routinely needed, you can often find both ingenuity and innovation in strainer design and use.

The photos that follow show a variety of strainers that have been developed to meet special drafting needs. Most of these were developed by rural firefighters who, because of their specific needs, figured how to design a strainer to meet that need.

In many cases, the selection of the type of strainer(s) used is a matter of department preference. What's the best strainer? The one that best performs the task required and delivers the water needed.

I should also point out that when it comes to strainers, there is no free lunch. From my experience, the best performing strainer is the acorn strainer. Any other type of strainer, like an intake valve, generally introduces a friction loss that reduces flow to some extent.

While some people get overly concerned about the reduction in flow associated with a given strainer, the solution isn't to try and tweak the strainer. If getting additional water into the pump is that critical, the solution is to get a second suction line in operation. This will enhance the delivery much more than simply tweaking a strainer's performance. Figure 15 shows how this can be done to allow a 1500-gpm pumper to increase its delivery by 50%.

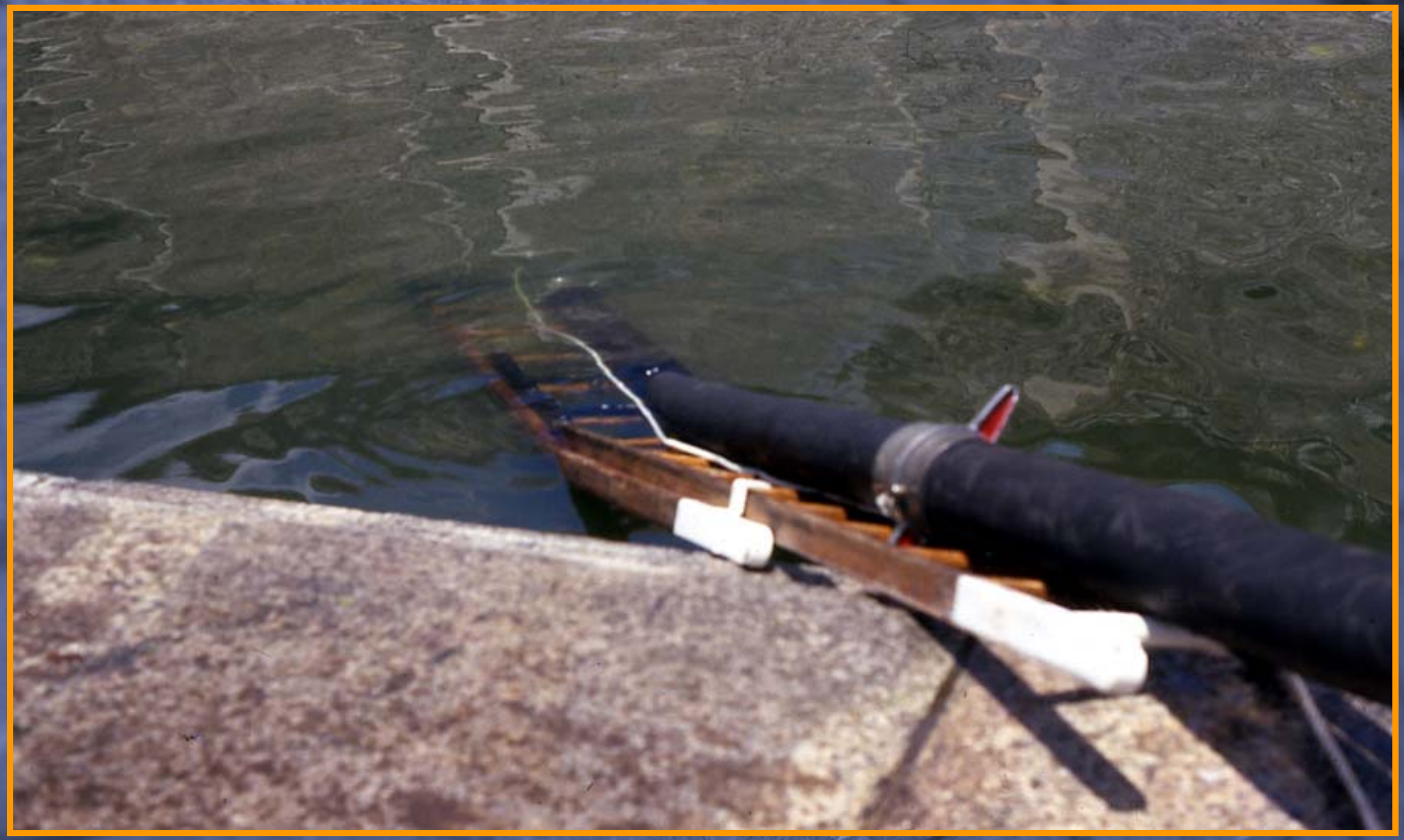

Figure 4. The traditional method of keeping the barrel or acorn strainer off the bottom has been to use a ladder to support the suction hose and hold the strainer off the bottom.

Figure 5. Many departments carry their suction strainers neatly tucked into compartments. Those who are serious about drafting generally carry suction strainers preconnected. A key component of any barrel or acorn strainer is the rope attached to it to help in positioning and retrieving the strainer.

Figure 6. Another traditional suction strainer, especially common in the Northeast, is the box strainer. This strainer was designed to sit on the bottom of a water source and draft water from the top.

Figure 7. This is a perfect application for the box strainer — strainer lays on bottom and drafts from top in water deep enough so no whirlpool develops.

Figure 8. Most people don't have an appreciation for the force of atmospheric pressure on a strainer connected to a suction line that has been primed. This box strainer collapsed, breaking the welds, when surface vegetation in a New England pond clogged the openings in the strainer.

Figure 9. While some departments use floating strainers in porta-tank operations, this type of strainer can't draw the water down as low as a low-level strainer. In addition, since water enters the strainer from the bottom, if the water level drops too low, atmospheric pressure can force the fabric of the porta-tank to clog the holes in the strainer and actually stop the flow.

Figure 10. Low-level strainers were invented by rural firefighters who had to draft from porta-tanks in water shuttle operations. Because of the design of the low-level strainer, water can be drawn down to within a couple of inches of the bottom of the porta-tank. The ball also plays a vital role in porta-tank drafting operations. As the water level drops to the point where a whirlpool develops, the ball sits in the whirlpool to keep air from entering the strainer and prime to be lost.

Figure 11. A Kochek ice strainer used in conjunction with a powered auger to access lake water. While a barrel or acorn strainer could be used in the same operation, the ice strainer's design simplifies the set up, requires less suction hose and eliminates the need to bend suction hose at a right angle.

Figure 12. Since the South Lynches (South Carolina) Fire Department routinely drafts from both static water sources and porta-tanks, the department's engines carry strainers preconnected. The short length of suction hose is for use on the rear suction for porta-tank operations and has a low-level strainer (1) preconnected. A barrel strainer (2) is preconnected to the squirrel tail suction for static source drafting operations. The diamond plate box (3) is an airtight float used to keep the barrel strainer at the proper distance below the water's surface.

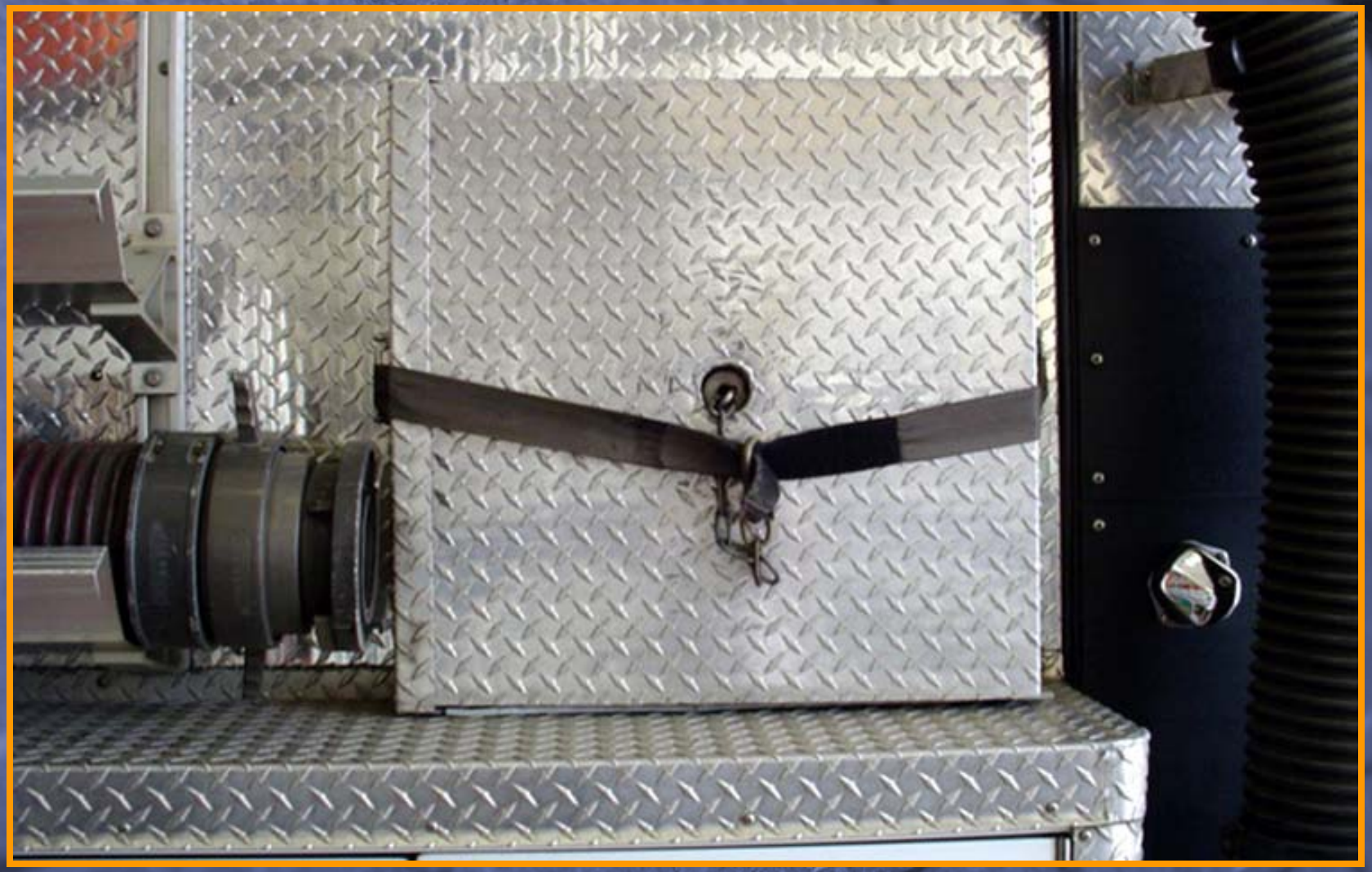

Figure 13. The float is equipped with a chain that is clipped to the barrel strainer before it is placed in the water.

Figure 14. A South Lynches engine drafts from a water source to fill tankers. The suction strainer float (red circle) can be seen in operation.

Figure 15. A South Lynches engine drafts from both a dry hydrant using 10 ft of 6" suction, and the static water source using its rear suction with its squirrel tail suction with barrel strainer and float to deliver 2250 gpm with a 1500-gpm pumper — a 50% increase in delivery.

Next Month

Next month, we'll take a look at other strainer innovations that rural departments use.

Til then, stay safe!

For Questions or comments on this or any of the Rural Fire Command articles, contact the author at ldavis@RFI411.org

About the Author

Larry Davis is a full member of the Society of Fire Protection Engineers, a Certified Fire Protection Specialist, and a Certified Fire Service Instructor II with more than 30 years experience as a fire service instructor. He is Vice President of GBW Associates, and Chairman of the Rural Firefighting Institute.

Davis has conducted more than 400 Rural Firefighting Tactics and Rural Water Supply Operations seminars throughout the United States and Canada. In addition, he has written numerous fire service texts, including *Rural Firefighting Operations*, books I, II, and III. Most recently, Davis co-wrote the *Rural Firefighting Handbook* and *Foam Firefighting Operations*, book I with Dominic Colletti.

RFI
RURAL FIREFIGHTING INSTITUTE

Training America's Rural Fire & Emergency Responders

To obtain any or all of the other PowerPoint versions of the Rural Fire Command column, contact Larry Davis at:

rfofire@stx.rr.com
or
Phone: 361.739.3414

RFI
RURAL FIREFIGHTING INSTITUTE

Training America's Rural Fire & Emergency Responders

Visit the RFI website at www.rfi411.org to learn of the other training resources available by Larry Davis.

Info@RFI411.org
or
RFI
13017 Wisteria Drive, #309
Germantown, MD 20874-2607
Phone: 800.251.4188