Rural Fire Command

by

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Mighty Mini, Part 2

Non-traditional Pump Solves Traditional Pump Problems

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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.

Mighty Mini — Part 2
Non-traditional Pump Solves Traditional Pump Problems

In the July installment, we talked about some of the unique capabilities of the Kuiken Hytrans Mini HFS Hydrosub, or the “pump in a box.” In this installment, we’ll complete our discussion on this non-traditional pumping system, which offers rural firefighters a much simpler way of accessing static water sources that otherwise may be inaccessible.

Figure 1. One of the Mini's major advantages is its ability to lift water without suction hose, a strainer, or a pump primer. During this test, the unit discharged through 100 feet of 5" hose to fill a tanker at just under 1000 gpm.

Performance Tests

One of the major issues with regard to the Mini was that of determining its dicsharge capabilities. While the sales literature developed in Holland stated that the Mini could deliver 1000 gpm @ 45 psi, we knew that the pump, like all pumps had some type of performance curve. So we first conducted a series of performance tests.

The first tests we set about conducting was a series of performance tests.

Figures 2 and 3 show the test set-up used to conduct the performance tests of the Mini.

The table in Figure 4 shows the pump's perrformance at various test points. As you can see from Figure 4, the pump can deliver much more water than 1000 gpm.

Figure 2. To measure the discharge pressure at the pump, a 5” in-line gauge was attached between the pump and the 5” discharge hose. The yellow coiled hose is 50 feet of 1/4” air hose to allow reading the discharge pressure while the pump was in the water.

Figure 3. The Mini discharged through 100 feet of 5” to a 2000-gpm pumper which then supplied a TFT Crossfire and a TFT Blitzfire equipped with smoothbore nozzles to allow pitot readings to be taken to measure flow.

Mini Pump Performance

The table in Figure 4 shows the pump perrformance at various test points. As can be see, the pump can deliver much more water than 1000 gpm.

292 gpm	@ 115 psi
481 gpm	@ 105 psi
600 gpm	@ 90 psi
837 gpm	@ 70 psi
1016 gpm	@ 50 psi
1192 gpm	@ 34 psi
1500 gpm	@ 24 psi
1919 gpm	@ 7 psi

Figure 4. The results of the performance tests show the actual discharge at the pump, corrected for the elevation difference between the gauge connection to the pump and the pressure gauge.

Lifting Water

Figures 5 though 9 document a test in which the Mini had to lift water a vertical distance of 33 feet from water in an otherwise inaccessible stream to the top of a bridge rail.

With this lift, drafting via a conventional pumper is impossible and the deployment of several portable pumps would be extremely difficult, if not impossible.

The Mini comes equipped with a bridge deployment mechanism (attached to the bridge railing in Figure 6) that allows the Mini to be dropped into the water.

Figure 5. The problem: a very good water supply for either a relay operation or a tanker-filling operation but because of the 33-ft lift it is of little use.

Figure 6. The bridge deployment mechanism attached to the bridge.

Figure 7. The Mini with gauge connection attached prior to the 4” discharge being connected.

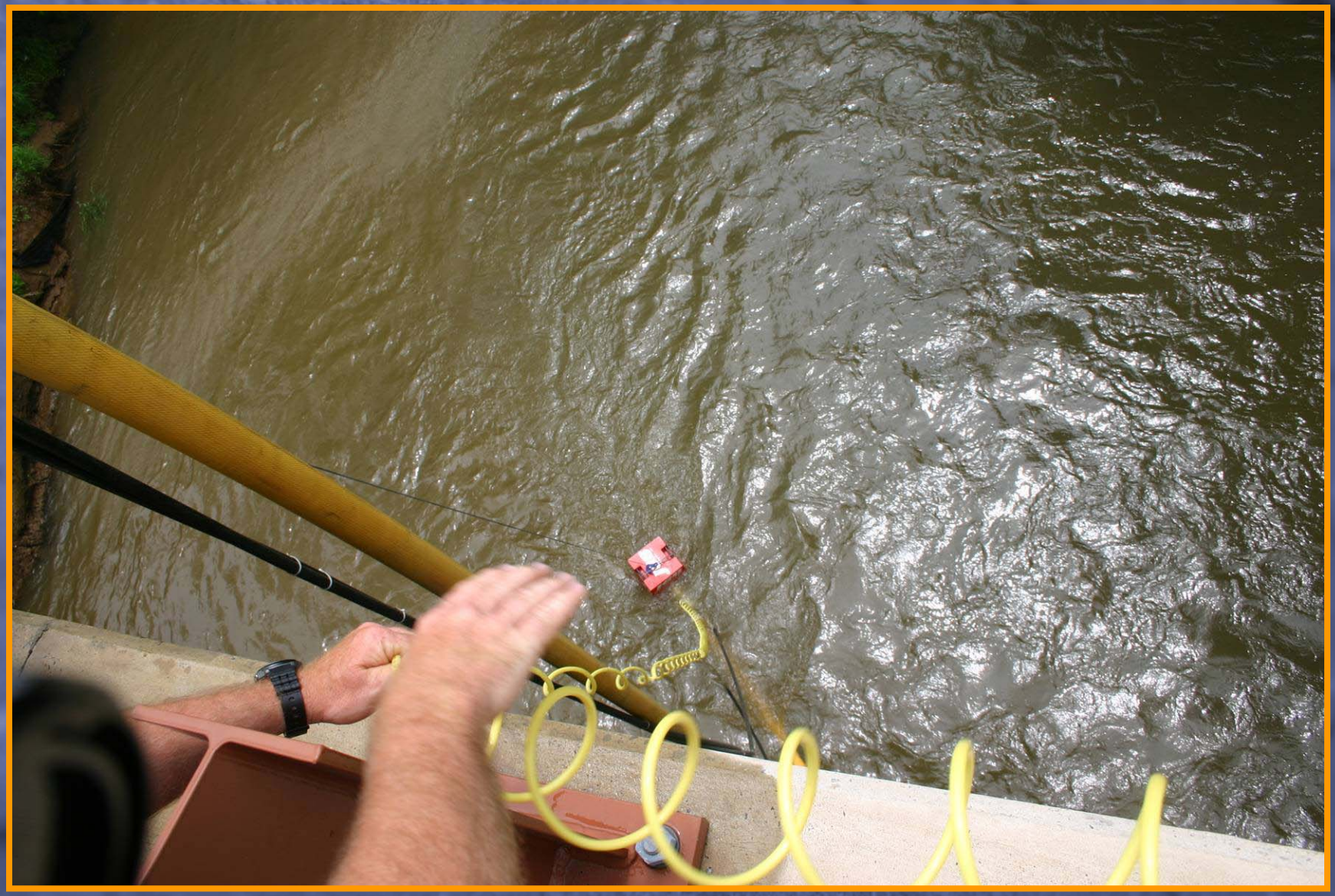

Figure 8. The Mini in operation, pumping throiugh 100 feet of 4” hose in relay to a 1500-gpm pumper.

Figure 9. In this relay operation, the pumper is discharging 994 gpm from its deck gun. Naturally, a higher flow could have been achieved if 5” hose were used instead of 4”. Not bad for a water supply that is otherwise inaccessible.

Dealing with Vegetation

One of the major problems rural departments often face during drafting operations involves vegetation clogging strainers.

Figures 10 through 14 show another benefit of the Mini's hydraulically-driven submersible pump, which avoids this conventional problem because id doesn't operate under a vacuum.

Figure 10. This pond equipped with a dry hydrant is the sole water supply in an area that a few years ago was farmland but is now populated by $1 million homes. As you can see, the pond is loaded with vegetation.

Figure 11. During a water supply drill, two pumpers using three suctions with floating strainers were used to draft water from the pond to fill tankers.

Figure 12. A major problem arose when the vegetation clogged and actually collapsed the metal strainer portion of the floating strainers. This occurred in a matter of a couple of minutes because of the force of atmospheric pressure pushing the vegetation as well as water into the suction hose when the pumpers were drafting.

Figure 13. The Mini was placed in the same pond to see how vegetation would affect it.

Figure 14. After 10 minutes of supplying 1000 gpm, the Mini was shutdown and pulled from the water. Notice there is no vegetation on the strainer. This is because the pump is not operating under a vacuum which allows atmospheric pressure to force the vegetation to plug the strainer.

Relay Pumping

The final test we conducted used the Mini as the primary water supply for a live-fire training session in an acquired structure in Winfield, Maryland. We dropped the Mini into a stream and floated a 5” discharge line through a culvert under one side of the road to the other side to avoid blocking traffic.

The Mini then pumped through 600 feet of 5” hose to a 1000-gpm pumper, which in turn supplied a 5” hoseline to supply attack and back-up lines for the live burn. The secondary water supply came from a 3500-gal/1500-gpm tanker/pumper.

The beauty of this operation was that it took two people to place the Mini into operation, but once in the water, it required only one operator.

The Mini was started and allowed to run at its maximum rpm for the duration of the drill. As demand at the fireground decreased, the Mini’s hydraulic system automatically cut back. In essence, it’s virtually operator-free.

Although the unit is very simple to operate, it requires the same level of maintenance as any piece of machinery. After operating continuously for about 4 hours, the engine overheated requiring the unit to be shut down. The reason: low cooling fluid. Fortunately, the back-up water supply from Tanker 14 was readily available.

Figure 15. The Mini operates along the south side of the road to pump though a 5” line that runs in a culvert under the road and extends 600 feet to the attack pumper.

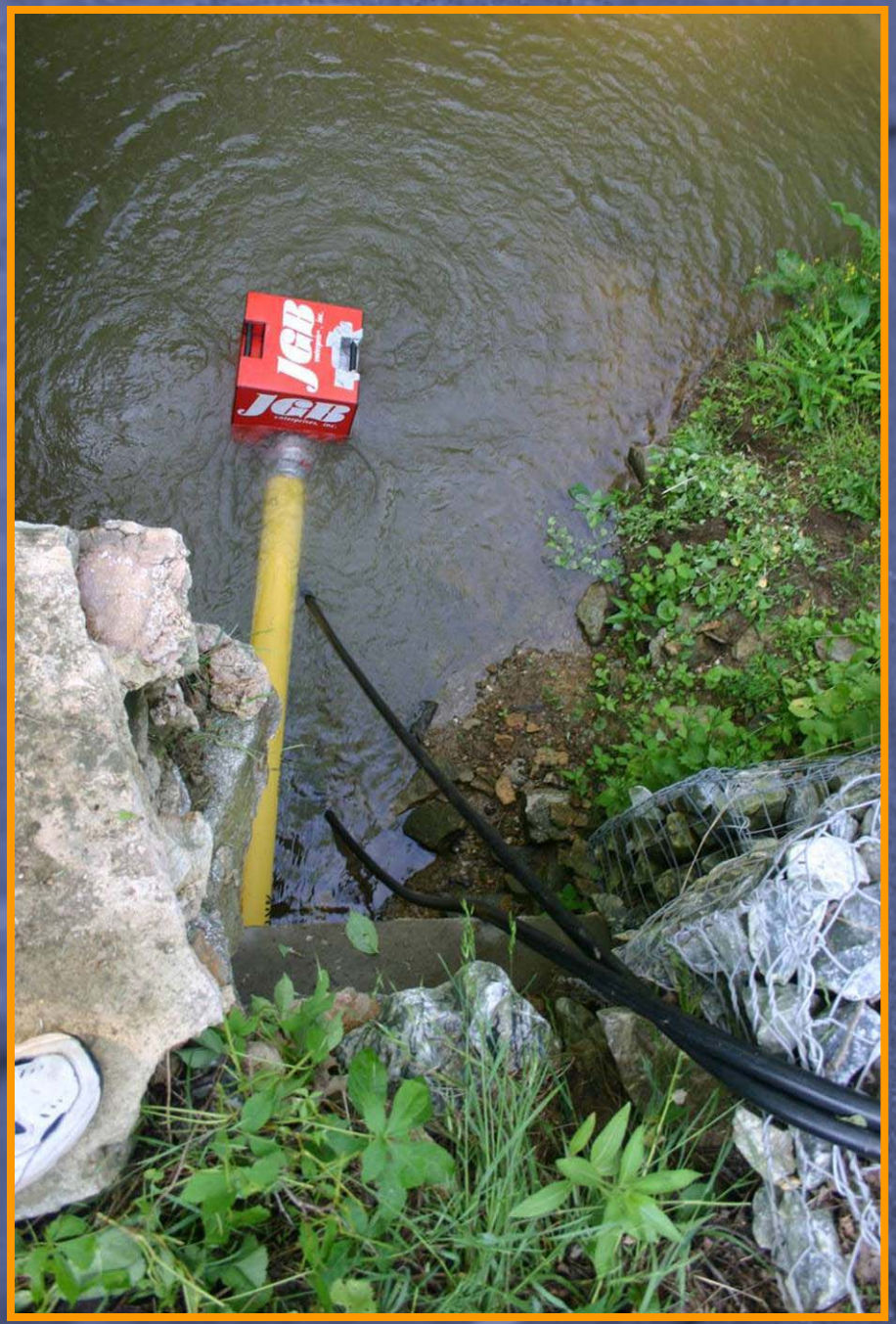

Figure 16. The Mini showing the 5” line under the road.

Figure 17. The fireground showing the structure being burned and the attack pumper.

Figure 18. The 1000-gpm attack pumper showing the 5” intake and discharge lines that allowed the Mini to supply it with full capacity when needed.

Conclusion

After having the chance to put the Mini through its paces, I was impressed; it can do things that no other pumping arrangement can either do, or do as easily.

For those of you who will be attending the Fire Rescue Expo this November in Las Vegas, you'll have a chance to play with the unit during our pre-conference seminar.

For now, if you need additional information, contact Mr. Doug MacMillan, President, LiquidTrans, at 330.464.9334.

Until next time, 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.

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

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