

The Hercules Invert Spray System

PAUL R. COHEE

*Technical Sales Representative
Hercules, Incorporated
Orlando, Florida*

Maintaining control is one of the most important capabilities man must have. We see that this is true in every direction we look. The need to maintain control of weeds was recognized and led to the development of herbicides. More recently, the need to maintain control of herbicides has led us to the development of spraying systems and techniques, that would place the herbicides only where they were intended to go.

It is not enough to develop the most effective herbicides available. The means to utilize them to the best advantage must also be established and developed.

Since entering the herbicide business, Hercules has recognized the necessity of having available to applicators and consumers the means to maintain control over the herbicides we were providing. The invert herbicide formulations and the bifluid system of application was seen to offer such capabilities.

As many of you who attended previous Hyacinth Con-

trol Society meetings will recall, Dr. R. E. Ogle from Hercules in Wilmington, Delaware has reported (1) on the progress we have made in the perfection of our Rhap-Trol* aerial spraying system for invert herbicide applications. Since the need to maintain control over herbicides in surface applications was and continues to be of equal importance, a challenge existed to try and satisfy these needs also.

Initial efforts towards this goal provided us with such means, but immediately we were able to recognize basic weaknesses inherent in the specially designed handgun required for such applications.

Field trips to see what was needed and conversations with experienced and interested applicators, many of them here in Florida, to hear what was desirable in such equipment, provided us with the goals for developing the unit that it would take to do the job from a land vehicle or a boat. Chemical and mechanical ingenuity from within our

company and from our contacts in the field provided us with the ideas from which our newest invert system developed.

Figure 1 shows a schematic outline of what we now have to offer you. We use any 6 h.p. or larger engine to drive a conventional positive displacement pump of 5 to 10 gpm capacity and the Hercules invert mixer. We have a by-pass set up to permit recycling of our fluid mixture when the gun is not in operation. Our intake system is bi-fluid and accurately takes over the mixing and measuring tasks. The delivery system in this case is a conventional handgun which can be fitted with many of the standard tips available, provided they are not designed to create fines and will deliver the desirable output and coverage.

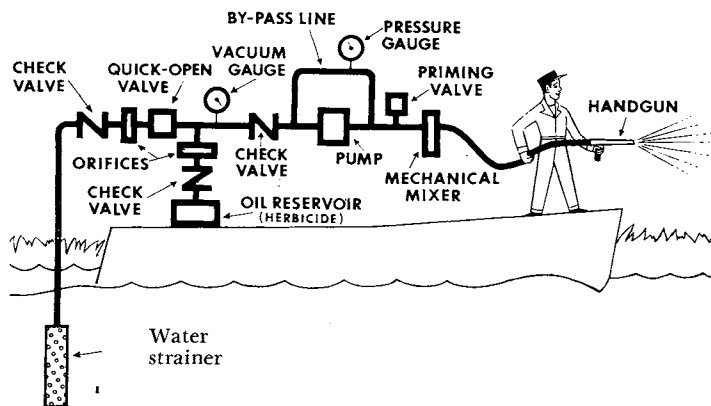


Figure 1. Schematic of Hercules Mechanical Inverter.

Referring to figure 1, you will be able to determine from the following information what takes place. Water is first drawn in, either from an overboard source or a reservoir, through a metering orifice to join with the chemical stream which has also passed through an orifice. These orifices positively control our water to oil ratio which can go as high as 19-1 water to oil. This broad range of ratios is important since it gives us the flexibility of small or large spray volumes with even the lowest of active ingredient contents, where such coverage is indicated.

The two fluids now one, but not inverted, next pass the vacuum gauge. This indicates from previously determined values the through put or gallons per minute output through the pump. The pump operates at pressures up to 250 psi. From the pump the liquid goes to the mixer where the inverting takes place before flowing out to the handgun. Recycling takes place when the gun is off but only the thin combination fluid is being recycled, not the invert.

Check valves prevent water from backing up into the chemical reservoir and vice-versa. A check valve also protects the vacuum gauge from pressure surges on shut-down of this unit.

A prime valve relieves back pressure allowing initial pump priming to take place. A quick open valve or choke permits an initial chemical rich mixture to reach the mixer on start up so as to insure immediate inverting.

Performance-wise, our system will place an invert spray stream at distances up to 70 feet. At high pressures and output, breakup will take place at 20-25 feet from the gun tip. Assuming a desired 4 lb. per acre rate and using a 2 lbs. per gallon Visko-Rhap* formulation, up to 200 gallons

spray volume can be achieved by diluting the formulation with diesel oil or kerosene. Under such conditions you would use a 19 to 1 water to oil ratio and have 2 gallons of chemical formulation, 8 gallons of diesel oil and 190 gallons of water. Sufficient coverage and control of water hyacinth were obtained with 80 gallons of spray volume with a single stream tip on the spray gun. It appears that we can reduce this gallonage by utilizing a multiple stream tip which indicates an advantage of time and water consumed in operations. Although the assortment of commercially available multiple stream tips is somewhat limited at this time, we have designed a few ourselves and expect an equipment manufacturer to design others. The lower gallonage necessary for coverage of water hyacinth indicates an advantage for the invert system in time saved in the pumping and spraying operation.

When using a water reservoir, additional chemicals can be added to the water side of our system to broaden the scope of control. All herbicides appear to work equally well. We have tried quite an assortment of commercially available wettable powders and emulsifiable concentrates with equal success. There is no reason to believe these other materials could not be introduced simultaneously into the system with the invert formulation, but as yet we have not modified our system to perform this additional service.

The original Visko-Rhap* chemical container can be ideally used as the chemical reservoir. By carrying more than one of the already available formulations with you, you can change instantly from 2,4-D, for example, to 2,4,5-T or silvex simply by removing the intake line from one can and placing it in the other. The system need not be shut off to perform this operation.

The oily invert droplets resist washoff and increase penetration. They are visible and make the sprayman immediately aware of his coverage and his progress. Fresh, salt or brackish water may be used with equal success. Evaporation is held to a minimum. Because of the self-mixing and metering feature, contamination is eliminated, spillage is nil and the operator need do nothing but open the drum and insert the intake line. The large droplets of the spray solution result in drift control. The system is very easy to clean out by merely inserting the chemical intake line on shut down into the water reservoir and running the unit for a few minutes.

Several equipment companies already have units on the market and others are working on additional ones. Minnesota Wanner of Minneapolis, Minnesota has units available. Finn Equipment Company is offering a kit to equip their hydroseeders with the invert spray system. F. E. Meyers is considering portable as well as trailer units and in Florida, Southern Mill Creek Products Company is developing one suitable for boat operations. Hercules will also make available our mixer unit for anyone desiring to adapt their existing equipment for invert spraying.

We believe we have a useful tool for herbicide spraying in this system. A tool that is capable of maintaining control of herbicides in many areas of Florida and elsewhere where spray drift has proven to be such a problem.

LITERATURE CITED

1. Ogle, R. E. 1964. The Rhap-Trol Spray System—A New Technique For Applying Invert Emulsion. Hyacinth Control Journal, Vol. 3, August 1964.