Florida Dept. Health and Rehabilitative Services. 1979. St. Louis encephalitis and other selected arthropod-borne viruses. H. R. S. Manual 150–2. March 1, 1979. 19 p.
Sudia, W. D., R. D. Lord and R. O. Hayes. 1970. Collection and processing of vertebrate specimens for arbovirus studies. Public Health Service, U. S. Dept. Health, Education and Welfare. 65 p.

A SIMPLE, YET EFFICIENT AIRCRAFT CHEMICAL LOADING SYSTEM

W. E. HUDGINS, R. D. NUNEZ AND L. G. TERRACINA

Calcasieu Parish Mosquito Control, Building #6 Chennault, Lake Charles, LA 70601

Calcasieu Parish Mosquito Control has been operating its own aerial spray program since 1982. As with all programs, much trial and error goes into the development of all related systems. Such was the case in the development of a simple yet efficient loading system.

When operations first began, a gasoline powered engine pumping system was utilized. The system proved adequate, but many times engine problems developed, causing delays and the need for a backup system. The heat generated by the engine and the need to carry extra gas was also considered a safety hazard. A search was begun for a more efficient loading system during the fall of 1982. The end result was the development of such a system (Fig. 1). The main components used in our system included:

1) One Ace continuous duty solenoid
2) One Sherwood pump (BBV-5)
3) One rebuilt automotive starter (35–1055 Arrow)
4) Two gauge battery cable with eye terminals (footage will vary)
5) Fourteen gauge wire with necessary terminals (footage will vary)
6) Two FC 75× 5/8 hubs
7) One B075 spider
8) Thirty foot 3/4" polybraid hose
9) Three sets brass quick couplings
10) Three foot brass pipe and elbow

Brand names associated with these materials are the ones we used because of their local availability. Substitute parts of equal quality would probably suffice. The total cost of the above merchandise was less than $350.00.

The system is set up on the rear of a one-ton flat bed, pickup truck (Fig. 2). The base is fabricated out of two 3" × 18" pieces of channel iron welded together (Fig. 3). This is bolted to the wooden bed with 4 stainless steel hex-head bolts. The entire base sits approximately 1" off

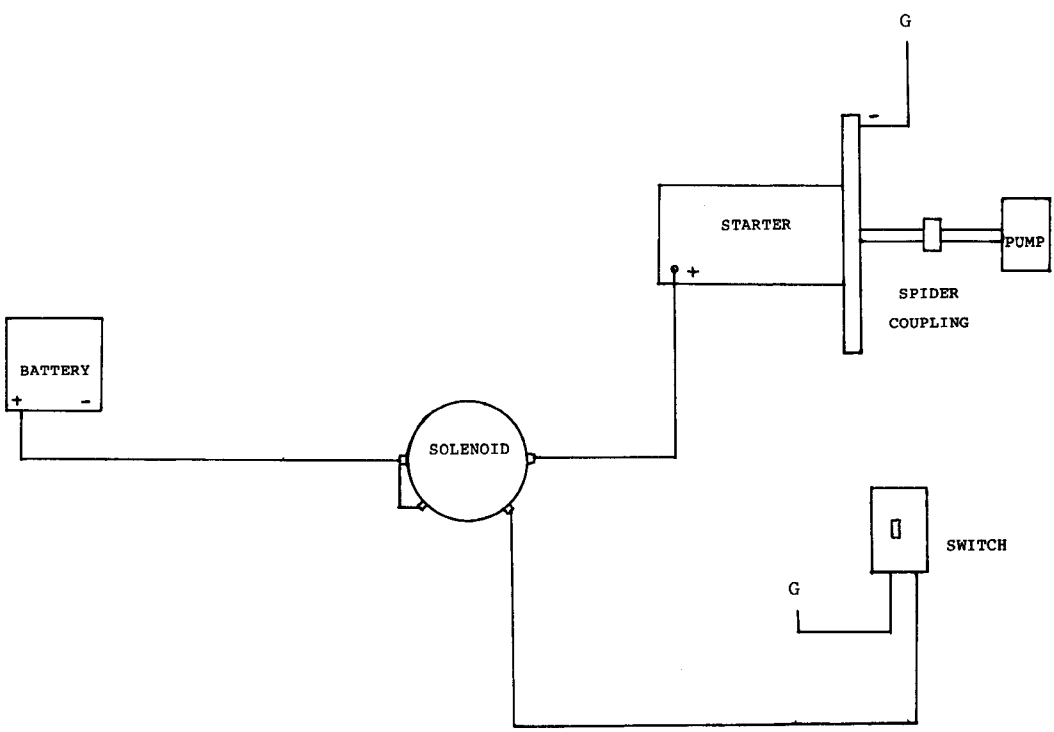

Fig. 1. Schematic drawing of loading system.

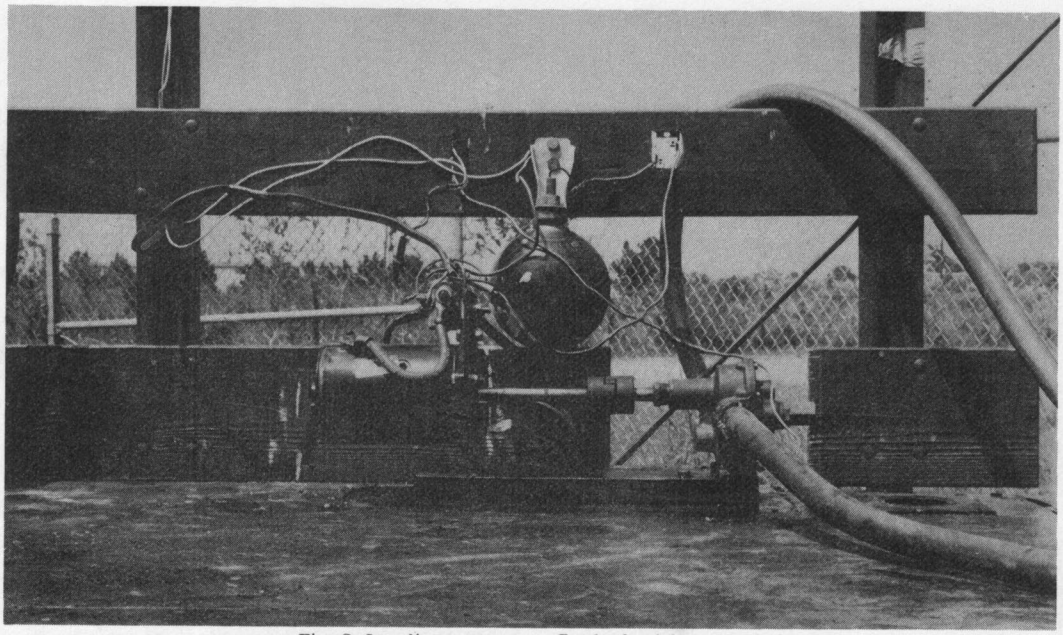

Fig. 2. Loading system on flat bed, pickup truck.

the bed, allowing for easy assembly of the remaining parts.

Near the cab end of the base, a 3/16″ × 6″ × 10″ piece of flat iron is welded perpendicular to the base. The pump is set (not mounted) on the base plate, and the center of the shaft is marked on the 3/16″ piece of flat iron. This enables a hole to be cut around the center mark just large enough to mount the starter, and at the same time maintain perfect alignment with the pump shaft. Alignment of the two shafts is a must for proper operation. The solenoid is mounted above the starter on the 3/16" plate.

The starter and plump shafts are connected together by a 5/8″ hub and spider. Enough

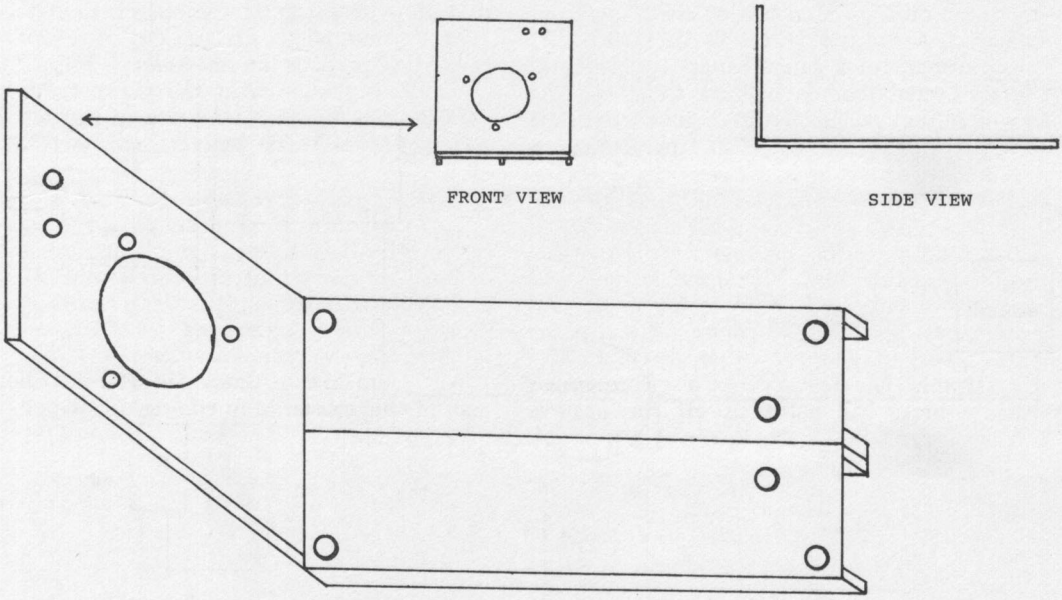

Fig. 3. Mounting base.

room is left for easy disassembly if the need for repair arises. The pump can now be permanently mounted, as the proper alignment of the shafts has been completed.

Two gauge battery cable and 14 gauge wire are used for operation off the vehicle's electrical system. Heavy gauge wires are necessary due to the large amount of voltage carried during operation of the system. Standard battery and wire terminals are used for all connections.

With the solenoid connections facing you, the left large terminal will be connected to the positive post of the battery using 2 gauge battery cable. The point of contact is not actually on the positive battery post, but on the positive connection of the starter relay. This avoids excessive corrosion on the battery post. A short piece of 14 gauge wire is used to jump from the left large terminal of the solenoid to the left small terminal of the solenoid.

A piece of 2 gauge battery cable connects the right large terminal of the solenoid to the starter post. A piece of 14 gauge wire from the right small terminal of the solenoid is connected to one side of an on-off switch. A 14 gauge wire is then run from the other side of the on-off switch back to a ground connection under one of the bolts holding the solenoid to the 3/16″ plate. The on-off switch should be mounted wherever convenient for the operation.

Many modifications can be made on the mounting of this system. If the system is to be mounted on a wooden bed or other insulated material, a ground wire will be needed. A ground made of 2 gauge battery cable should be connected from a bolt on the mounting frame to the vehicle chassis. A good ground is essential to alleviate the many problems that could develop from improper grounding of the system.

Delivery of chemical is accomplished through a 3/4″ reinforced polybraid hose. Length of the hose is approximately 20′ on the delivery end and 10′ on the intake side of the pump. All connecting points on the hose are equipped with quick coupling for easy assembly and disassembly. The delivery hose also is equipped with a brass ball valve cut-off for positive shut-off. The intake hose is fitted with a 3′ brass pipe and elbow for easy pickup of drum material. All fittings on the hoses are connected with stainless steel hose clamps. Threaded fittings are wrapped with teflon tape before connecting to prevent leakage. Also, all standard buna rubber gaskets are replaced with viton (fluorocarbon) rubber because standard gaskets tend to swell and leak when exposed to certain mosquito control chemicals.

Our operations have indicated that it is a good idea to replace the vehicle's automotive battery with a deep cycle, heavy duty marine battery. Voltage drain through regular use of this pumping system is severe and marine batteries can be maintained by recharging them with a good 10 amp automatic battery charger. Automotive batteries discharge too rapidly and are ruined by constant recharging. During use periods the vehicle should be kept running while loading.

All fittings should be of non-corrosive material such as brass or high quality stainless steel. Bolts, nuts and washers should also be of stainless steel. Gaskets should be viton or other similar materials not affected by corrosive chemicals. The less corrosion one has associated with the system, the smoother and more efficient its operation.

After use, the system should be flushed with an adequate solvent such as isopropyl alcohol. This cleanses the system and reduces corrosion. We believe this to be the major reason that our original system operated for two years before any major parts needed replacement.

This system allows for quick loading, with a rate of 30 gallons in less than 4 min. The tremendous suction from the pump collapses regular hose on the intake side of the pump, creating the need for the reinforced polybraid hose.

Overall, we believe this system to be very safe, efficient and economical for loading chemicals. Maintenance problems are few, causing less down time and continuous operation. When maintenance problems do occur, all parts can be interchanged in a matter of minutes and the system is again operative.

We would like to thank Dr. Harold Chapman for his assistance in editing this paper.