

Fire Management Tech Tips

United States Department of Agriculture
Forest Service



Technology & Development Program

July 2002

5100

0251 1315—SDTDC

Remotely Activated Structure Pump

Fred Cammack, Mechanical Engineer

Joe Fleming, Engineering Technician

Background

Firefighters now have a way to remotely activate pumps to charge sprinkler systems for structure protection. Historically, when a wildfire threatens structures, firefighting crews would prepare the structures with pumps and sprinkler systems. Once the threat was imminent, firefighters—at great risk—rushed to the structures to start the pumps often with ember showers raining down upon them.

The San Dimas Technology and Development Center (SDTDC) has developed the technology to remotely activate a pump for structure protection, avoiding this risk to firefighters. This system would work well to protect improvements in remote wilderness areas.

The Pump and Engine

SDTDC purchased a BB-4 pump because of its capability to adapt to a remote electronic starting system (figure 1). The pump produces up to 425 psi (or 110 gallons per minute), which is more than enough to operate long hose lays with significant elevation changes. The BB-4 pump end is a horizontal 4-stage centrifugal pump. An opposed twin cylinder, 18 horsepower, Briggs and Stratton engine with electric and recoil starting systems powers the BB-4. The complete pump system weighs 143 pounds and uses approximately 1.8 gallons of fuel per hour during pumping operations. When the remote start system is not connected, the BB-4 can be used for conventional operations.

The Ground Receiver and Handheld Transmitter

The electronic ground receiver system (figure 2) is housed in a plastic case. It is a commercial automotive remote starting system. Cables connect the ground receiver to the electronic starter on the BB-4. The handheld transmitter (figure 3) is compliant with Federal Communication Commission regulations regarding

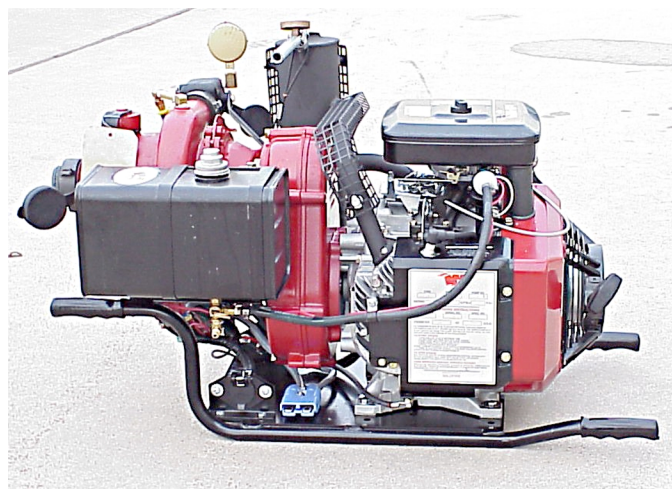


Figure 1—BB-4 pump.

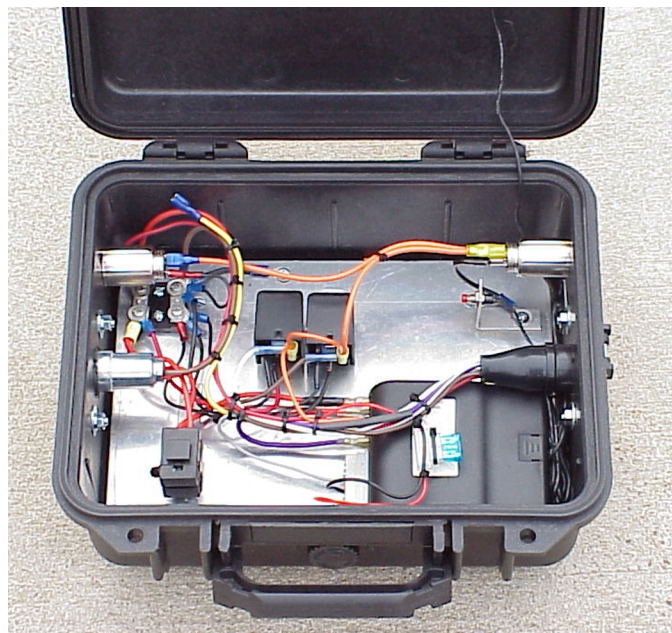


Figure 2—Electronic ground receiver system.

For additional information, contact: Fire Management Program Leader, San Dimas Technology & Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198; Phone: 909-599-1267; TDD: 909-599-2357; FAX: 909-592-2309
IBM: WO SDTDC@FSNOTES FS web: <http://fsweb.sdtdc.wo.fs.fed.us> E-mail: mailroom_wo_sdtcdc@fs.fed.us



Figure 3—Handheld transmitter.

communication interference. It is a low power FM device similar to those used in automotive keyless entry and antitheft systems. The display on the handheld transmitter was intended to indicate when a car is running, but it can serve to indicate that the pump is running. All electronic components are commercially available automotive-grade hardware.

The Battery Pack

The battery pack (figure 4) is a 12-volt, power booster capable of providing 400 amp-hours. The stock alligator clips were removed and replaced with a commercial disconnect plug. This facilitates connection while making it impossible to cross polarity and damage the electronics or starter. A 12-volt car battery could be used if caution were taken to ensure proper polarity before connecting.



Figure 4—Battery pack.

The Lights

Once the pump develops pressure, lights (figure 5) flash to indicate that the pump is operating. SDTDC is currently testing several lighting systems and colors to determine which types of lights and colors are better seen through smoke. The Center is also investigating strobe light technology to improve pump visibility. Figure 6 shows the pump, as it would look during normal operating conditions.

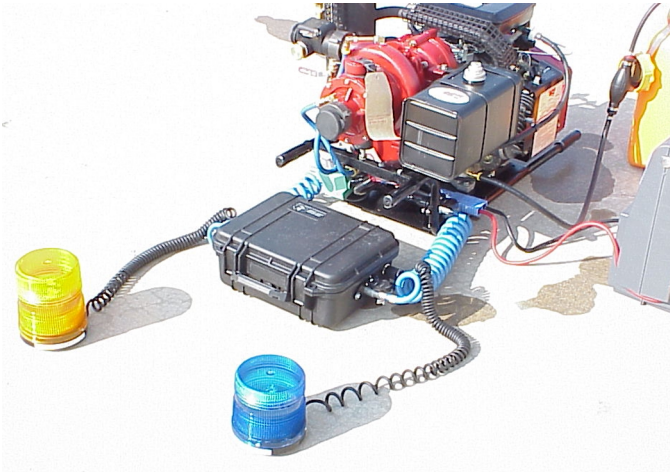


Figure 5—Lights flash to indicate pump is operating.



Figure 6—The pump during normal operating conditions.

The Test

On March 14, 2001 the remote pump system was tested at SDTDC using a helicopter from the Angeles National Forest (figure 7). Following a detailed test plan, the pump was tested at the maximum test height of 2,000 ft. The test plan called for three successful pump starts at this altitude. The pump was successfully started at each attempt. It was a critical part of the test to see how the remote handheld transmitter worked among the electronic systems of a firefighting helicopter. No interference with the helicopter electronic systems, including the air to ground radio systems, were identified. The technician in the helicopter keyed the remote handheld transmitter from inside the ship and did not have to lean out or position himself in any special way to activate the pump below. It is also important to note that the remote pump can be activated from a ground position as long as the line of sight is clear of obstacles.



Figure 7—Testing remote pump system from a helicopter.

Field Evaluation

Field evaluation is a critical step of the testing process. The pump and a structure protection kit will be located at SDTDC. Our goal for the next fire season is to test the pump during wildland fire conditions where structures are threatened.

Information

All of the hardware to build this remote starting pump is commercially available. Contact the SDTDC fire program leader at 909-599-1267 x234 for specifications, cost, plans, diagrams, or other information.

Information contained in this document has been developed for the guidance of employees of the Forest Service, United States Department of Agriculture (USDA), its contractors, and cooperating Federal and State agencies. The USDA assumes no responsibility for the interpretation or use of this information by other than its own employees. The use of trade, firm, or corporation names is for the information and convenience of the reader. Such use does not constitute an official evaluation, conclusion, recommendation, endorsement, or approval of any product or service to the exclusion of others that may be suitable.



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.