Radio-controlled Mechanical Drop-net Trigger

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Abstract: We developed a simple device to remotely trigger a drop-net without the use of blasting caps. It uses standard telemetry equipment and allows release of the net from a distance limited only by transmitter range. The device proved reliable and safe for capturing white-tailed deer (*Odocoileus virginianus*) and significantly increased trapping efficiency and success.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 43:492–496

Drop-nets have been used successfully for capturing turkeys (*Meleagris gallopavo*) (Glazener et al. 1964, Davis and DelMonte 1986), white-tailed deer (Rongstad and McCabe 1984, Conner et al. 1987), and axis deer (*Axis axis*) (Ramsey 1968). One problem with drop-nets is that at least 1 observer must wait in a blind near the net to pull the trigger wire. Trapping in the early morning is difficult because the observer cannot reach the blind without disturbing deer near the trap. Time spent waiting in the blind also adds to the manpower needed.

Ramsey (1968) adapted a radio-controlled release device for the drop-net that had been described by Grieb and Sheldon (1956) for the cannon-net. In this device the mechanical corner triggers (Glazener et al. 1964) were replaced by electric blasting caps. These are potentially dangerous because they can be ignited unexpectedly by electrical interferences such as lightning, radio-transmission, and high voltage powerlines. Davis and DelMonte (1986) recently pointed out the danger of electric blasting caps to personnel that handled drop-nets and suggested a nonelectrical releasing technique. Their approach, however, cost about twice as much per drop as the electric cap technique and did not allow remote control.

In this paper we describe a trigger device for the drop-net that is released

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remotely by a standard wildlife telemetry transmitter and receiver. It works with the mechanical corner triggers originally described by Glazener et al. (1964).

We thank the volunteers who helped us with trapping. M. T. Craigo designed and built the amplifier-relay circuit. T. D. Faust helped to prepare the wiring diagram. This study was supported by Friends of the National Zoo, the German Academic Exchange Service, and McIntire-Stennis Project No. GEO–0030-MS-H.

Methods

Trigger Construction

The trigger device consists of 3 components (Fig. 1): 1) a standard telemetry transmitter with magnetic on/off switch; 2) an antenna, receiver, and amplifier-relay circuit; and 3) a solenoid-controlled trap door that releases a weight to pull the trigger wire. The concept is that once the magnet is removed from the transmitter, the receiver picks up the signal and amplifies it to close the relay controlling the power supply to the solenoid. The solenoid then opens the trap door, which releases the weight connected to the trigger wire of the drop-net.

The amplifier-relay circuit consists of basic electronic parts that can be wired easily according to the diagram in Fig. 2. The amplifier-relay circuit is connected to the headphone jack of the receiver and connected to the solenoid at the trap door. The power is supplied by a 12-volt flashlight battery. Cost of the amplifier circuit

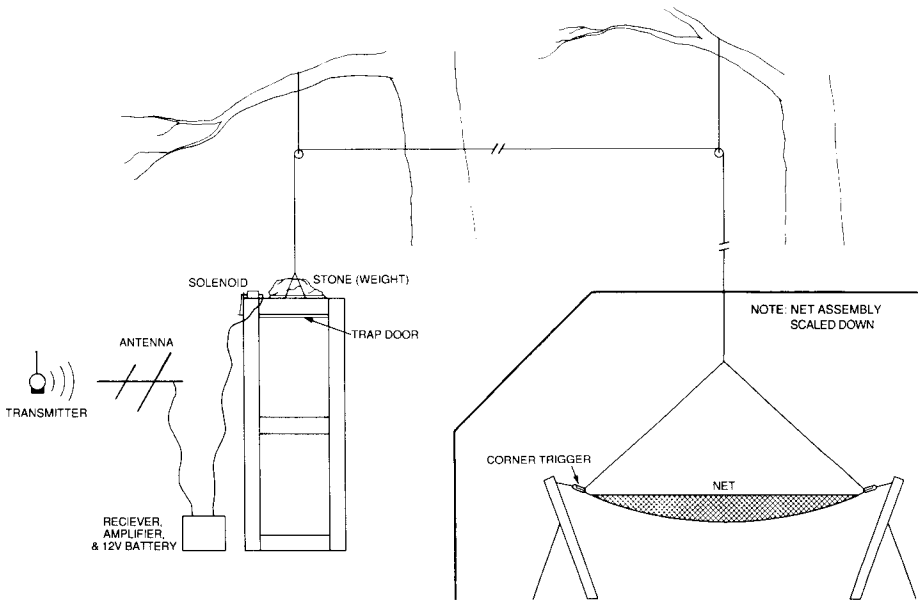

Figure 1. Components of the radio-controlled trigger device for drop-netting. See text for details.

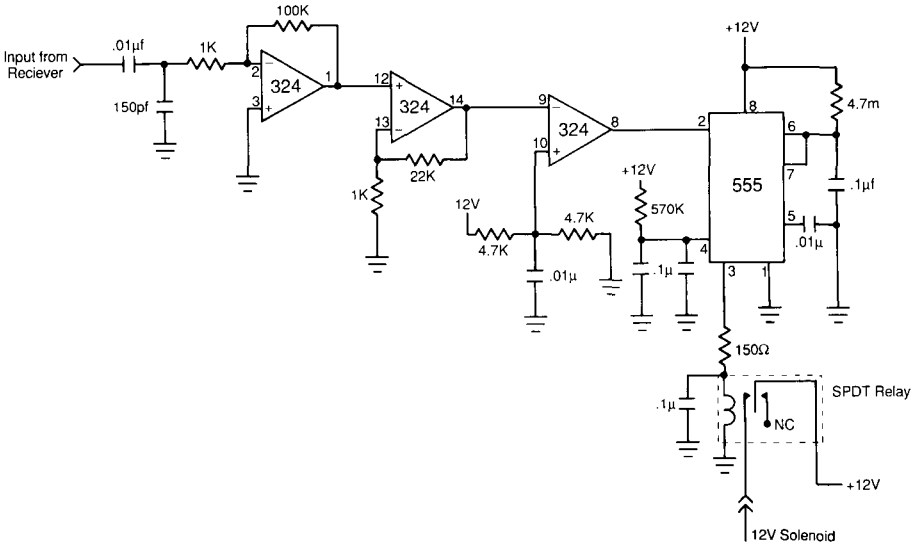

Figure 2. Wiring diagram of the amplifier-relay circuit used to control the solenoid.

components was about $15 in 1987. It was stored together with the receiver and battery in a plastic box for weather protection.

We used 2 x 4 lumber to build the frame for the trap door (Fig. 3). The frame is 60 cm wide and 120 cm high to allow for some slack in the trigger wire. A plywood trap door is hinged to the frame and held closed by a metal wire running over a hinge that is used as a lever arm. Movement of the hinge is controlled through a metal wire that is held back by the piston of the solenoid. The piston inserts through the hole of a piece of metal to insure the hinge wire is stripped off of the piston

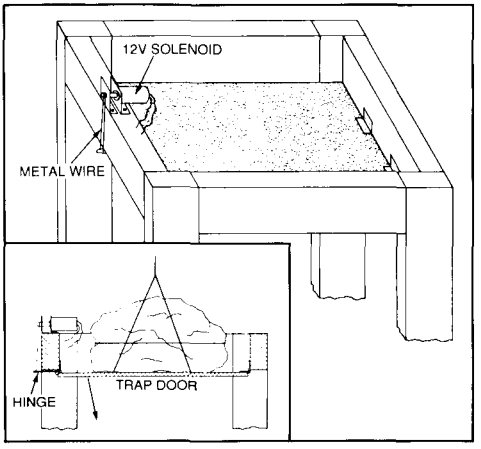

Figure 3. Frame with hinged trap door controlled by the solenoid.

when the solenoid is activated. Any heavy material is adequate as a weight. We used a rock weighing about 10 kg.

The trigger device was used with a 15 x 15-m drop-net that had no center pole. The 4 trigger wires were connected above the net, and a wire was connected to the trap door through 2 pulleys that were fixed to overhanging branches (Fig. 1). If no suitable branches were available the center pole of the drop-net and a wooden tripod attached to the frame of the trap door could be used to support the pulleys. We found that the corner triggers released the net most evenly when the trigger wires were pulled up instead of along the sides of the net. We attached bags filled with sand to the corners of the net as weights.

Trigger Operation

The weight is lifted to its resting position on the closed trap door and the drop-net is set. The force pulling on the metal wire that holds the hinge should be reduced to a point where the piston readily moves when the solenoid is activated. This can be done by pushing the metal wire of the trap door towards the pivot of the hinge and thus increasing the lever arm. The receiver is set to the frequency of the transmitter used with the antenna pointing toward the spot where the transmitter will be located. It is desirable to select a transmitter frequency with a minimum of interference. The gain of the receiver is adjusted high enough to ensure reception of the signal but as low as possible to prevent static noises from closing the relay. The magnet is then taped to the transmitter to shut off the signal. Finally, the solenoid is wired to the amplifier-relay circuit. The drop-net is released when the magnet is removed from the transmitter.

Results and Conclusion

We used the trigger device in deer trapping for >50 days between November 1985 and March 1987. We captured 22 deer during 17 net drops. The drop rate was low because we were trapping primarily male fawns and usually avoided capturing other deer because of limited manpower. The mechanism's design was improved as we gained experience. During early tests the net dropped prematurely twice and failed to drop 3 times. These problems were related to a rat trap we used in an earlier version. The rat trap was replaced with the solenoid.

Trapping was most efficient over long distances. However, this required sufficient light and good visibility of the trap site. Placing the bait only around the center of the net improved our judgement of when to release the net. In rare instances, deer escaped from under the net when they were close to the edge of the net at the time of release or when we tried to capture more than 3 deer at a time. We think that this problem was caused mainly by the small size of the net we used, and could probably be alleviated with a larger net. We encountered 1 case of capture myopathy in an adult female. Because myopathy seems to be related to stress and struggling during capture (Conner et al. 1987) we feel that it is important to reduce the time between release of the net and arrival at the trap site as much as possible.

The trigger device enhanced the trapping crew's efficiency and morale in several ways. No one had to wait in a blind for deer to come and feed under the net. Instead, we prepared the net and returned later to a spot from where it could be checked and released without disturbing the deer. Doing so, we saved manpower and increased our chances of success because deer were less likely to be scared away from the trap site. During other times the net was set throughout the day and periodically checked with a spotting scope from a research laboratory located approximately 1 km away. If target deer were found under the net, assistants were called, and the net was released from the laboratory. The remote trigger also allowed trapping at 2 sites simultaneously when we observed the drop-net from a blind that was located near a cannon-net. The trigger of the cannon-net was wired to the cannons and the drop-net was released remotely.

The components of this trigger device are versatile and can be used in other trapping situations as well. If no telemetry equipment is available, the solenoid of the trap door can be wired directly to a switch. This allows a longer distance between net and blind than would be practical with a mechanical trip wire. The amplifier-relay circuit can be used to ignite the charges of a cannon-net, though we recommend additional safety measures such as use of a thermostatic delay-relay (Grieb and Sheldon 1956). In combination with the solenoid, it can also be adapted for use with the corral/drive-trap net (Warren and Ford 1989).

Literature Cited

Conner, M. C., E. C. Soutiere and R. A. Lancia. 1987. Drop-netting deer: costs and incidence of capture myopathy. Wildl. Soc. Bul. 15:434–438.

Davis, B. D. and B. E. DelMonte. 1986. A non-electric method for releasing a drop net. Proc. Annu. Conf. Southeast. Fish and Wildl. Agencies 39:334–337.

Glazener, W. C., A. S. Jackson and M. L. Cox. 1964. The Texas drop-net turkey trap. J. Wildl. Manage. 28:280–287.

Grieb, J. R. and M. G. Sheldon. 1956. Radio-controlled firing device for the cannon-net trap. J. Wildl. Manage. 20:203–205.

Ramsey, C. W. 1968. A drop-net deer trap. J. Wildl. Manage. 32:187–190.

Rongstad, O. J. and R. A. McCabe. 1984. Capture techniques. Pages 655–676 *in* L. K. Halls, ed. White-tailed deer: Ecology and management. Stackpole Books, Harrisburg, Pa.

Warren, R. J. and C. R. Ford. 1989. A new corral/drive-net trap for multiple deer capture. Abstr. Annu. Southeast Deer Study Group Meet. 12:17–18.