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ELECTRONIC RELEASE SYSTEM FOR DROP NETS

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ABSTRACT

A release system for drop nets was developed to eliminate the danger and noise associated with blasting caps and prima cord. Components include five, electrically activated cargo releases, a six-piece electrical-cord harness, a 24-volt power supply/control box, and a manual trip mechanism. A remote, radio-controlled trip mechanism is optional. The release system eliminates the use of blasting caps, minimizes-net reset time, and improves the chances for several productive drops per day.

INTRODUCTION

Sufficient radio frequency (rf) energy induced into the shunted or unshunted leads of an electrical blasting cap can cause detonation (Johnston 1978). A telephone repeater and mobile radios, sources of rf energy, are within 440 m (1/4 mi) of the Whiskey Basin, Wyoming bighorn sheep (Ovis canadensis) trap sites during trapping operations. Wind and snow usually accompany trapping operations and can be sources of static electricity that add to the chance of premature cap detonations (Blaster's Handbook 1969). The blasting cap and prima cord release system used from 1974 to 1977 at Whiskey Basin did prematurely detonate on several occasions. This problem and it's potential threat to personnel stimulated the development of a release system for drop nets that did not incorporate blasting caps.

CONSTRUCTION AND DISCUSSION

The electronic release system consists of five electrically activated cargo releases, an "H"-shaped electrical cord harness, a 24-volt power supply-control box, and a manual trip mechanism. A remote, radio-controlled trip mechanism is optional. The 12-volt, 10-amp, vertical-cable cargo releases (Model 2A-15E) are available from Eastern Rotocraft, P.O. Box 110, Doylestown, PA. They can be used as manufactured if purchased with the electrical connector option. However, the connector

cord is fragile and it is difficult to connect to the release in cold weather. The manufacturer's connector system can be replaced with 2 conductor 18, S.O. cord with one end wired directly into the release, and the opposite end fitted with a 3-prong, twist-lock plug for easy connection to the harness.

A fixed point of attachment is required for each of the five releases to keep them stationary after each net drop. A portable, rigid superstructure (Figure 1) provides these attachment points. The superstructure is composed of four 3.7 m (12 ft.) steel corner poles and a 6.1 m (20 ft.) steel center pole made of 5.1 cm (2 in.) interior diameter, 0.5 cm (3/16 in.) tubing. Two 1.3 cm (1/2 in.) steel rings are welded near the top of each corner pole (Figure 2) and six steel loops are welded to the top of the center pole (Figure 1) for guy wire, pully, and release attachment. The base of the center pole is screwed into a collared fitting cemented into the ground. The base can be set over a stake driven into the ground if there is need for a portable trap site. The base of each corner pole is set over a stake. The top of the center pole is secured to the top of each corner pole with a 16.8 m (55 ft.), 0.5 cm (3/16 in.) wire rope guy, and each corner pole is secured to the ground with two or three 4.6 m (15 ft.), 0.5 cm (3/16 in.) wire rope guys. One end of each center-pole guy wire is permanently attached to the top of the center pole (Figure 1). The opposite end, that attaches to the corner pole, is fitted with a 1.0 cm (3/8 in.) shank cast, eye-and-eye steel turnbuckle for final length adjustment and a carabiner for quick attachment (Figure 2). Each corner-pole guy wire is fitted with a carabiner at one end for easy attachment to the corner pole and a 1.0 cm (3/8 in.) shank cast, hook-and-eye steel turnbuckle for final length adjustment and quick attachment to a deadman.

The entire superstructure can be erected in two hours by four men. The poles and guy wires can be erected in one hour or less by four men, once the corner stakes, center stakes, and deadmen are driven. Take down time is approximately 30 minutes. The superstructure is capable of holding a 21.3 x 21.3 m (70 x 70 ft.) net suspended in winds up to 64 km (40 mi.) per hour.

A carabiner is used to attach one cargo release to the top of each of the four corner poles (Figure 2). Each release is suspended away from the pole with a nylon strap tied to the center-pole guy wire. The nylon strap prevents the release from smashing against the pole when the net is dropped. A rubber pad is wrapped around the top of the pole to provide additional protection. The fifth cargo release is attached to the top of the center pole by a carabiner with a thick rubber pad wrapped around the pole for cushioning.

Power is supplied to the releases by an "H" shaped, six piece, electrical cord harness (Figure 3). The first piece, 6.1 m (20 ft.) long, is permanently threaded through the center pole from a hole near the bottom of the pole to a hole near the top of the pole. The protruding ends are

adapted for connection to the center pole release and the remainder of the harness. The "cross" piece of harness is a 22.9 m (75 ft.) cord adapted at the midpoint for connection to the center pole section of the harness, adapted at one end for conection to two "legs" of the harness, and adapted at the other end for connection to the remaining two "legs" and the control box. The four "legs" are 13.7 m (45 ft.) cords adapted at one end for connection to the "cross" piece and adapted at the opposite end for connection to a release. The harness is made of 2 conductor 14, S.O. cord. Three prong, twist-lock sockets and plugs are used in all connection adaptions for easy assembly and disassembly. Connection adaptions at the midpoint and two ends of the "cross" piece require wire splices. Soft solder and protective wire nuts are used for the wire splices and a junction box encloses each splice.

Two 12-volt batteries connected in series provide the 24-volt power supply. The batteries are enclosed in a control box with the receiver mechanism for the optional remote, radio controlled trip. The control box is designed for both a test and fire mode, and recharging (trickle and full) capability. A wiring schematic is provided in Appendix A. The manual trip consists of a 183 m (600 ft.) 2 conductor 12, S.O. cord, stored on a spool. One end is adapted for connection (2-prong, twist-lock socket) to the power supply box and the other end is fitted with a normally open push button.

The releases are desiged to trip with a short burst of 12 volts, but a 24-volt system is required to overcome the resistance in the harness wire and deliver sufficient voltage to the two releases furthest from the power supply. The 16 to 18 volts received by the releases closest to the power supply is within release tolerance. Sustained current flow, however, damages the coil enclosed in the releases, therefore sufficient safeguards should be built into the mechanism to prevent this from occurring.

The center of the drop net is tied to a steel ring that slides up and down the center pole. The net is normally laid out prior to the erection of the center pole so the pole can be threaded through the center of the net. The center of the net is then tied to the center ring. The pully and rope system, attached to the top of each superstructure pole, is used for hoisting the net for attachment to the center pole and three corner-pole releases. The net is attached to the cargo releases with a carabiner that is tied onto the four corners (Figure 2) and center ring of the net. A hand operated winch is required to hoist the last corner of the net. The tightness of the suspended net eliminates the need for side poles and reduces net flopping caused by wind.

Although initial cost of the release system is high (Table 1), the system is extremely reliable, efficient, and eliminates the danger associated with blasting caps. The prevention of one lost eye or hand is worth the cost. Rapid net reset time (15 minutes or less) and elimination of net release noise also improves the chances for several productive drops per day.

Special thanks is extended to Ed P. Novotny for building the superstructure components, and the U.S. Forest Service and Bureau of Land Management for buying the cargo releases.

LITERATURE CITED

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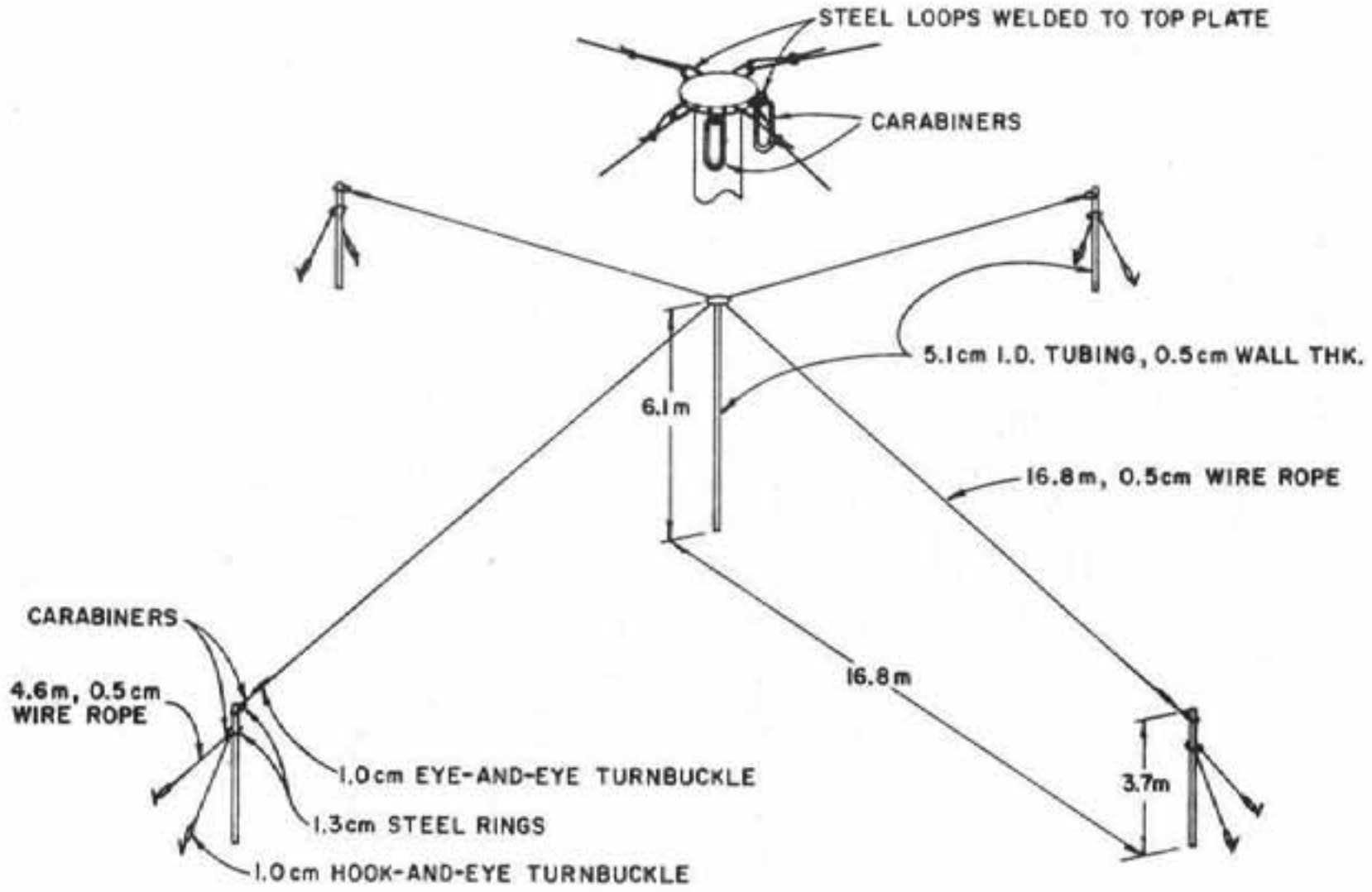

Figure 1. Sheep trap superstructure components, and center-pole attachments for guy wires, pully system (carabiner), and cargo release (carabiner).

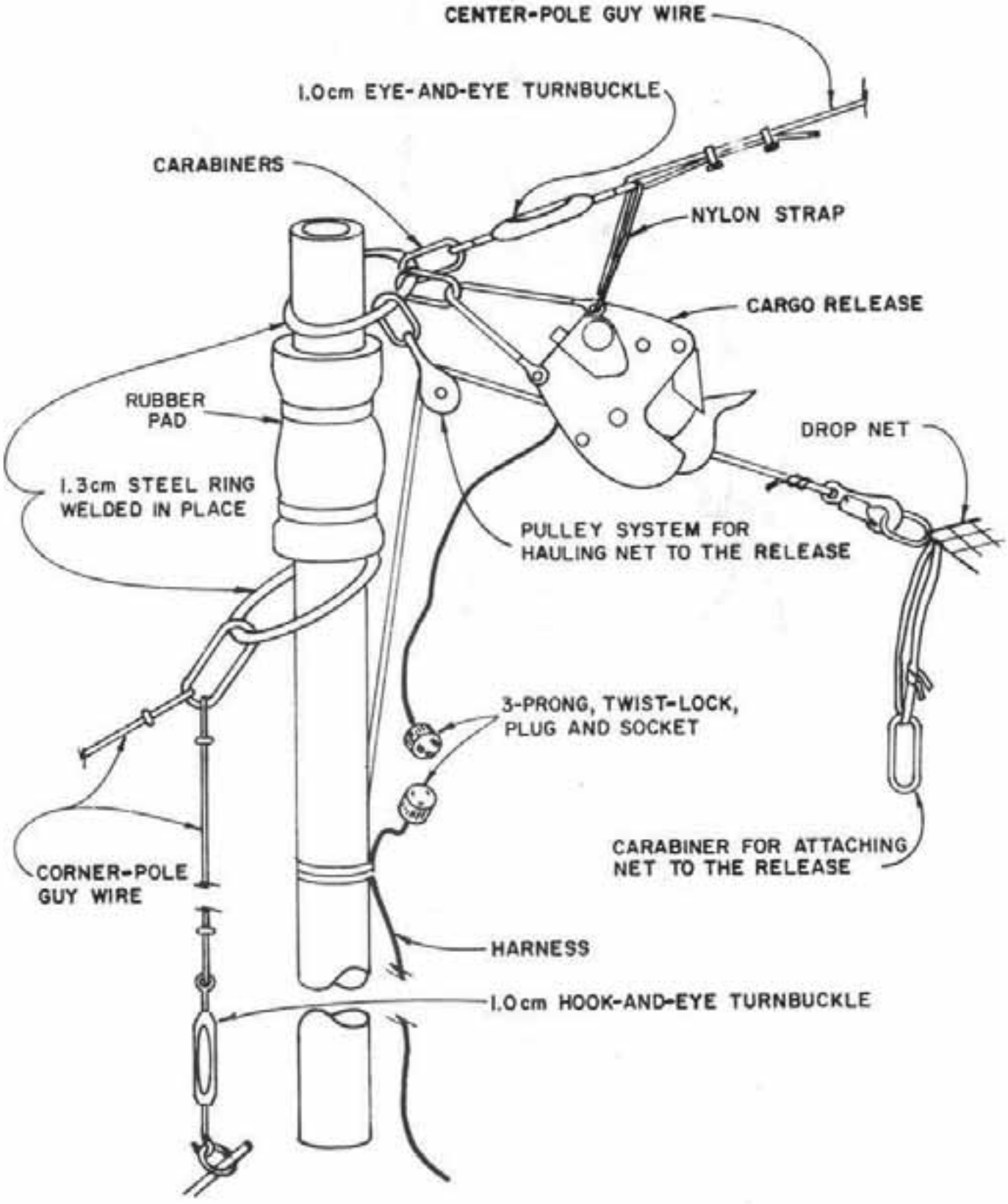

Figure 2. Corner-pole attachments for guy wires, pully system, cargo release, and harness.

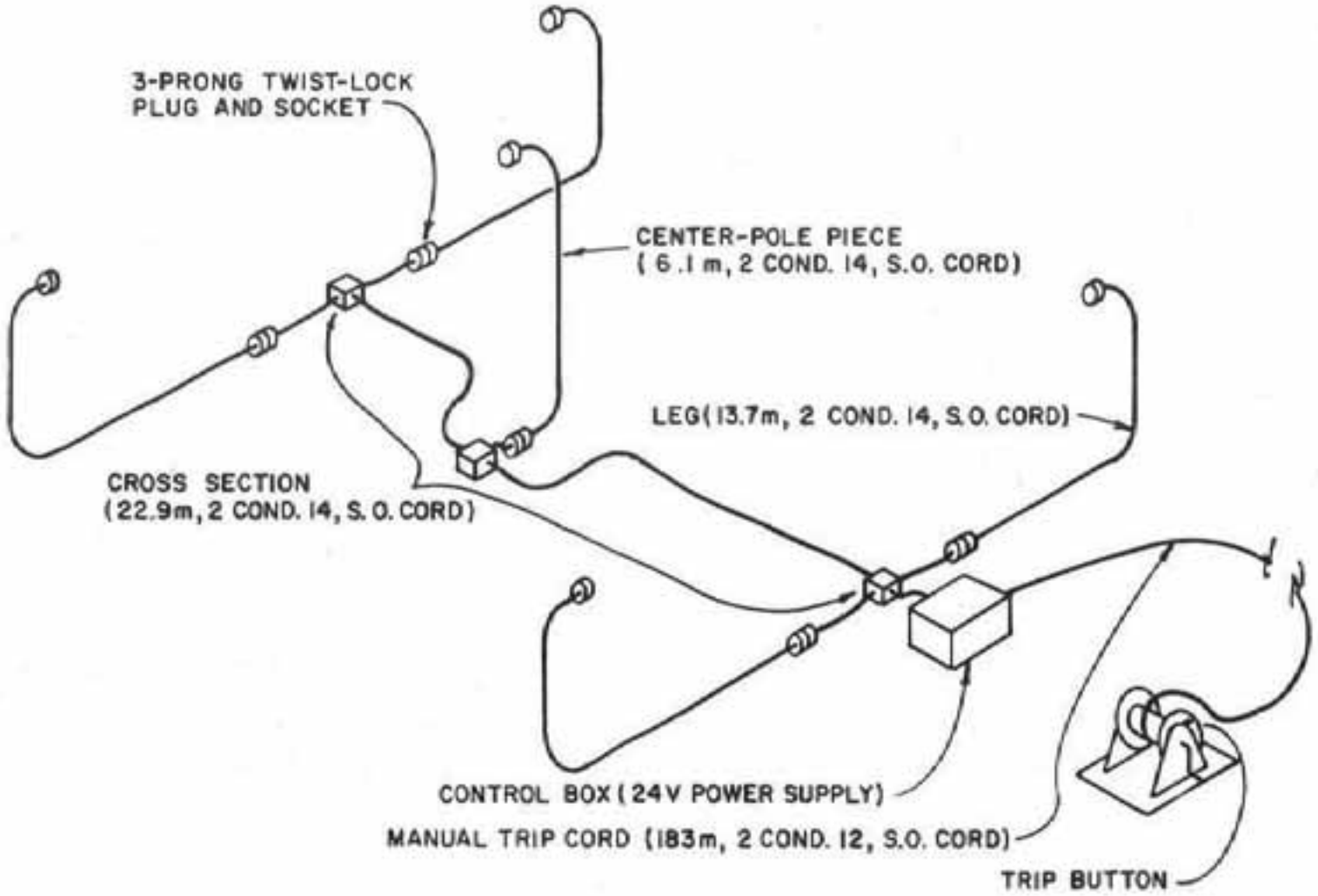

Figure 3. "H-shaped electrical cord harness, power supply, and manual trip mechanism layout.

Table 1. Cost of electronic release system components.

Component	Cost (1981) (U.S. Dollars)
Five cargo releases (model 2A-15E)	$4,530.00 ($906.00 each)
4.6 m (15'), 2 cond. 18, S.O. cord	5.00
84 m (275'), 2 cond. 14, S.O. cord	65.00
183 m (600'), 2 cond. 12, S.O. cord	180.00
Twelve sets, 3-prong, twist-lock plug and socket	100.00
Two 12-volt batteries	100.00
Misc. parts (fuses, resistors, control relays, lumber, and hardware)	200.00
Total	$5,180.00

Appendix A. Wiring schematic for power supply/control box.