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# NIGHT USE OF A DIRECT-CURRENT ELECTRIC SHOCKER TO COLLECT TROUT IN LAKES

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Previous attempts to use a direct-current shocker to collect fish in lakes, without pulsating the current, have been relatively ineffective (Haskell, Geduldig and Snoek, 1955; Loeb, 1955; Loeb, 1958). At the Pigeon River Trout Research Station, Vanderbilt, Michigan, a direct-current shocker has been used in small trout lakes with considerable success. The collecting is done at night, from a boat; a Homelite direct-current generator (230 volts, 9.3 amperes) provides power both for underwater illumination and for an electrical field to stun fish.

Figure 1 shows the arrangement of the gear in relation to the boat. The ground, which is dragged by a halter from the stern of the boat, is a rectangular copper screen (24 by 28 inches) in an aluminum frame. Each of the two electrodes is a wooden dowel, 6 feet long and 1 1/8 inches in diameter, with 1 1/2 feet of the distal end sheathed with copper. A safety switch to control the electrode-ground circuit (the electrical field in the water) is fastened to the left side of the boat beside the oarsman. The frame to hold the lights is thin-wall

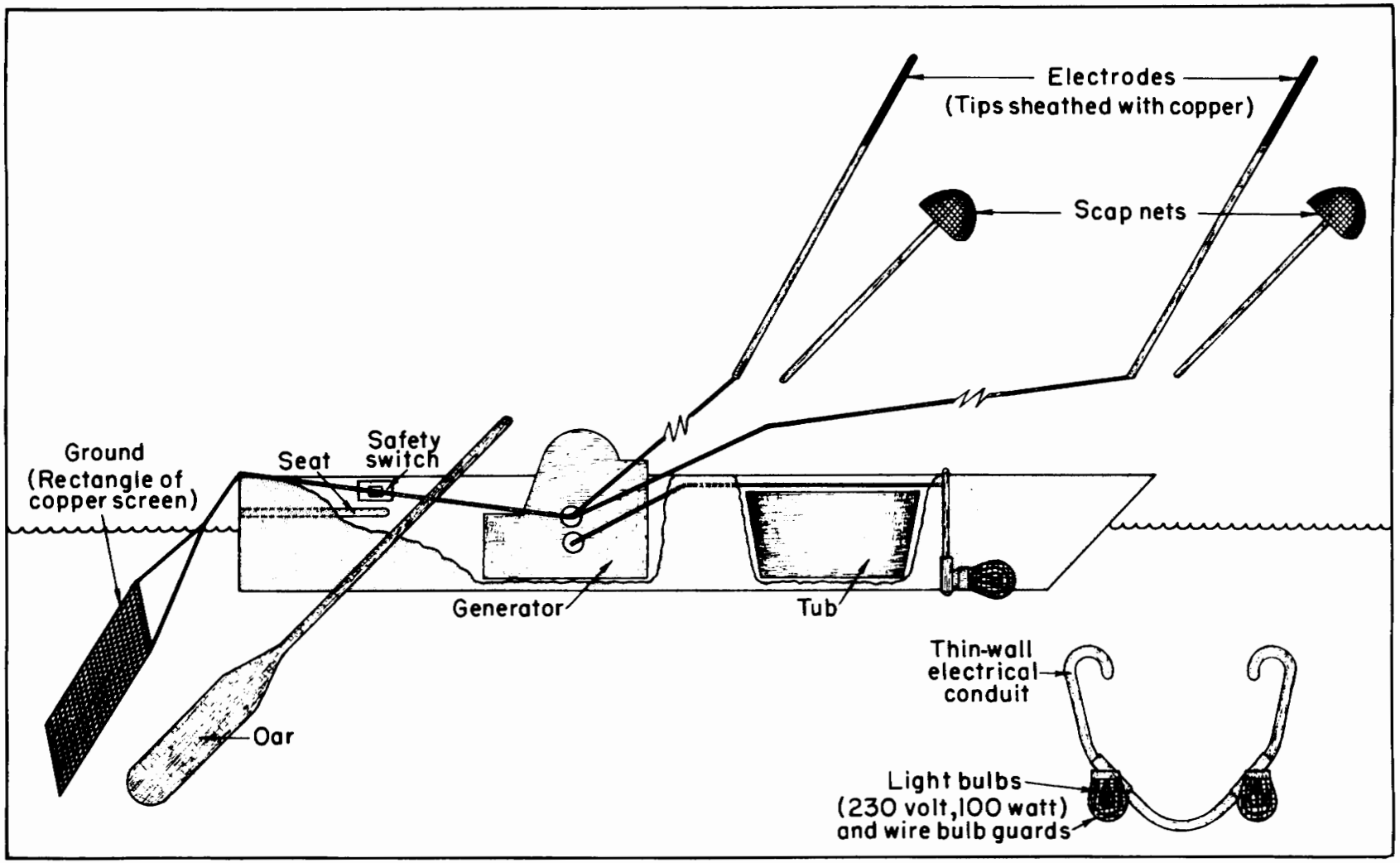


Figure 1.--Diagram showing the arrangement of gear in a boat, for collecting fish in lakes at night.

electrical conduit (3/4-inch diameter) bent to fit the contour of the boat. The two bulb sockets are of the swivel-type (to allow directional control of the light) and are attached to 4-inch junction boxes, which in turn are part of the thin-wall conduit frame. The light bulbs are protected by wire guards, and also by the keel of the boat which extends below them.

Figure 2 is a diagram of the wiring of the lights and the electrodes. For illumination, 230-volt bulbs (rather than the common 110-volt household type) are used. The two 100-watt bulbs are wired in parallel and plugged into one of the two generator plug receptacles; the electrodes are plugged into the second receptacle. The result, as shown in the wiring diagram, is that all circuits are in parallel and the voltage drop across each is the same. (Although our generator is rated at 230 volts, measured voltage was 240.)

The inside screw shell of the bulb socket is connected to the positive terminal of the generator in order to lengthen the life of the socket. If the center contact of the socket is connected to the positive terminal it soon disintegrates by electrolysis.

When the gear was tested with both electrodes in the water near the bow of the boat, the ammeter (Triplett, Model 420, 0-15 D.C. amperes) in the circuit registered 3.2 amperes; when only the lights were in the water, the meter registered 0.2 ampere; but with both the lights and the electrodes in the water, the meter reading still was 3.2 amperes. Several trials on different days and in two lakes produced essentially the same readings. Obviously, the addition of the lights to the power source did not decrease the strength of the electrical output used to stun fish.

In electrofishing with this gear, one man rows the boat. The generator exhaust is directed by a flexible pipe over the side of the boat, away from the oarsman. Two men, each with an electrode and a scap net, stand near the bow and

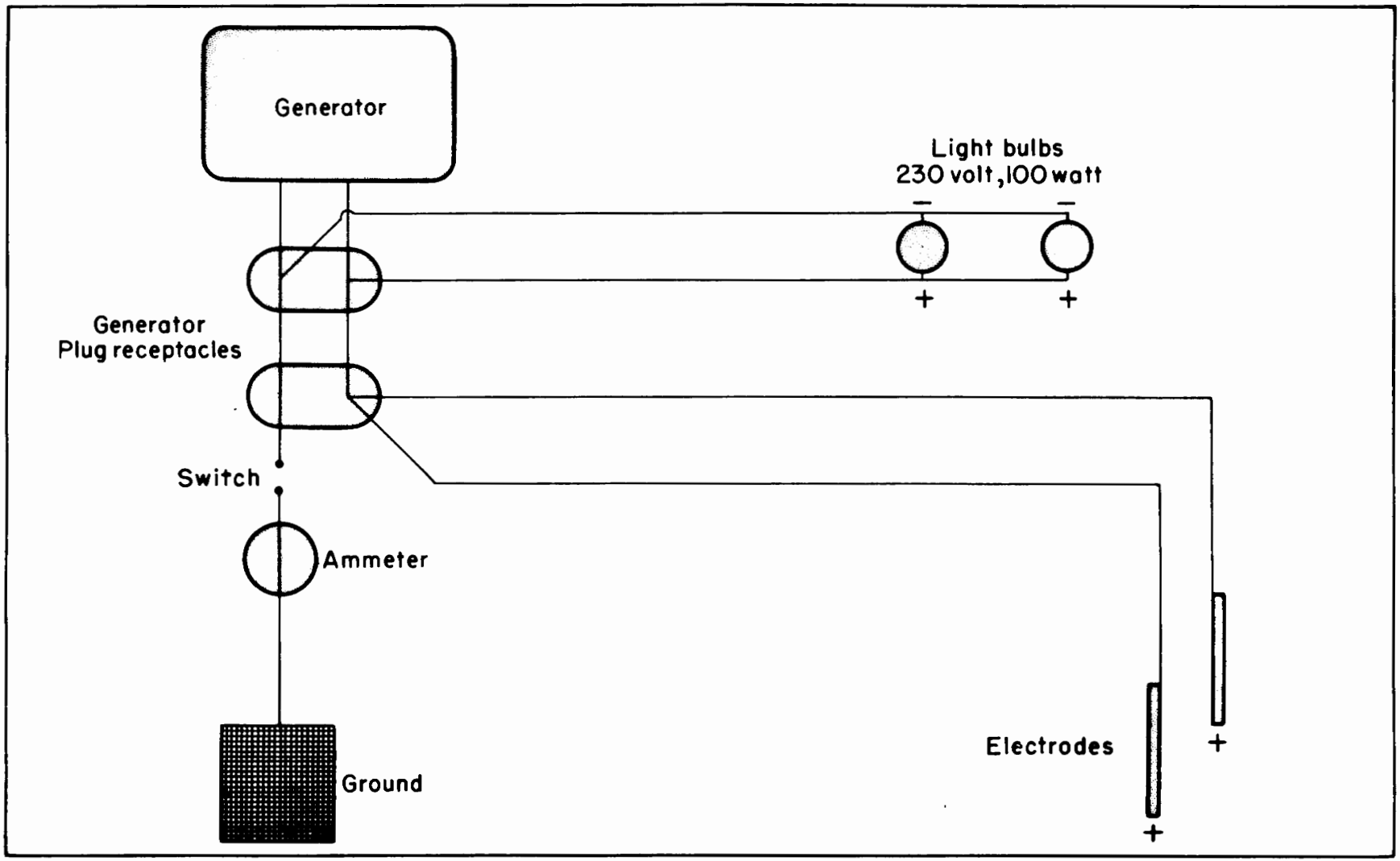


Figure 2.--Wiring diagram for the 230-volt direct-current generator which is the power source for the underwater lights and electrical field.

middle of the boat, respectively; the tub to hold the fish is between them. As a safety measure the oarsman is expected to open the switch to the electrode-ground circuit if one of the operators falls overboard. As a further precaution, the generator is not started until the lights are in position beneath the boat, the electrodes are readied, and both circuits are connected.

The water was clear in the lakes in which this gear was used. Nearly all fish were collected in water less than 6 feet deep, and were seen before an attempt was made to capture them. Some fish moved ahead of the boat at the outer edge of the field of light until they reached cover; they then stopped and became vulnerable to capture. The most efficient method of collection was by a quiet approach, with the electrode in the water, and a quick thrust when the operator came within range of a fish. (We found that a spearing or harpooning approach frightened many fish out of range.) Upon being brought under the influence of the electrical field (usually within 1 foot or less of the electrode), the fish swam toward the electrode and could easily be led to a scap net.

The two lakes in which the gear has been used contain only brook trout. Because there is no reproduction, the populations are maintained by annual fall plantings of fingerlings. The lakes are small in size but relatively deep (Ford Lake--10.6 acres, 29 feet maximum depth; Hemlock Lake--4.8 acres, 59 feet). The basin of Hemlock Lake is steep and has little shoal area; in contrast about half of Ford Lake is less than 5 feet deep. The experiments on these lakes included population estimates by the mark-and-recapture method during the spring and fall, when the trout move throughout the lake and are accessible in shallow water.

The use of hoop nets was discontinued in these lakes because of their selectivity (many small fish were able to escape [Waters, 1960]) and because this type of net is difficult to set on the steep slope of the Hemlock Lake

basin. Wire traps (made of 1/2-inch-mesh hardware cloth, triangular in cross section, 33 inches on a side, 36 inches in length, funnel at one end, similar to traps described by Lawrence [1952]) were as effective as hoop nets, but much less effective than the shocker. The superiority of the shocker over the wire traps for collecting fish was clearly demonstrated by the results of operations in the lakes in April of 1958 and 1959 (Table 1). In Hemlock Lake, 5 days of netting in 1958 with 24 wire traps (120 trap-days) resulted in a catch of 217 trout, ranging from 5.0 to 10.8 inches in total length (the population at this time was about 1,000 fish); approximately 8 hours of electrofishing at night in 1959 produced 514 fish, from 5.4 to 12.4 inches long (the population was about 700 fish). Thus, in spite of the smaller population of trout in the lake in 1959, night shocking resulted in the capture of as many trout per hour as 36 trap-days (one wire trap set for 24 hours) in 1958. Similarly, in Ford Lake, night shocking in 1959 yielded as many trout per hour as 30 trap-days in 1958.

Table 1.--Number of brook trout captured with wire traps and with a direct-current shocker in Hemlock and Ford Lakes in April, 1958 and 1959

| Lake, and dates of collection | Collecting gear | Fishing effort[1] | Brook trout collected | | Estimated total number of brook trout in lake |
|---|---|---|---|---|---|
| | | | Number | Range in total length (inches) | |
| Hemlock | | | | | |
| April 20-24, 1958 | Traps | 120 trap-days | 217 | 5.0-10.8 | 1,000 |
| April 22, 23, 29, 1959 | Shocker | 8 hours | 514 | 5.4-12.4 | 700 |
| Ford | | | | | |
| April 15-19, 1958 | Traps | 120 trap-days | 327 | 4.9-13.4 | 2,000 |
| April 20, 21, 27, 30, 1959 | Shocker | 12 hours | 977 | 5.2-17.0 | 1,400 |

[1] Fishing effort for wire traps is given as trap-days; e.g., in Hemlock Lake 24 traps were fished for 5 days, or a total of 120 trap-days.

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