PLASTIC FASTENERS FOR RAPID ATTACHMENT OF RADIO TRANSMITTERS TO RATS[1]

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The attachment of collar radio transmitters to rats is facilitated by using adjustable plastic fasteners. The technique improves over those previously used by being faster under field conditions, by allowing for more precise tuning of transmitters, and by not requiring anesthesia or long restraint of animals.

Radio telemetry techniques have been used to study the movement and activity of a variety of animals in recent years, but few studies have been conducted on rats, mice and other small mammals. To some extent, this has been due to the inavailability of suitable attachment procedures for the available miniaturized transmitters. Mech et al. (1965) suggested that an ideal attachment device should have minimum weight, minimum effect on the animal, maximum protection for the transmitter, and permanence. In addition, the attachment device must have a minimal effect on the transmitter's signal. Several of the available attachment methods require soldering of leads or collar-antenna ends at the time the transmitter is placed on the animal. This must be done with the animal under anesthesia or forcibly restrained, with its neck protected from the soldering heat. We suggest that the ideal attachment device should also permit rapid attachment under field conditions and should not require anesthesia or long restraint of animals. We have developed such a device to attach a previously described 30-MHz transmitter unit (Corner and Pearson, 1972) to small mammals.

As described by Corner and Pearson (1972), the attachment collar of the 30-MHz transmitter consisted of a 1/8 inch-wide strip of copper flashing that also served as the antenna (Corner and Pearson, 1972). The antenna was tuned by adjusting the diameter of the loop for the optimum indicated signal and the minimum current drain. When the transmitters

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were made, the approximate amount of antenna overlap for a strong signal was determined and marked on the copper flashing of each unit. For field studies, a selection of transmitters with slightly different antenna diameters were stocked to fit the range of neck sizes in a test species. For attaching the collar-antenna, the designers suggested clipping the ends of the loop in position on the animal with a medical hemostat, then joining them by soldering. With some practice, this operation could be accomplished in a relatively short time, but a power source for soldering was required and the animals usually had to be anesthetized. The quality of the transmitter signal was tested before an animal was released. Sometimes, it was necessary to loosen the solder joint and readjust the antenna ends to improve the signal.

In using these units to study the activity patterns of *Rattus rattus mindanensis* in ricefields, we had found that the most convenient procedure was to bring animals out of the field for transmitter attachment. This was time-consuming and certainly could be considered behaviorally disturbing to the rats. The time and effort involved in attachment tended to limit the number of animals that could be used in a particular study. To avoid these difficulties, we developed the following method of attaching a pre-soldered collar in the field.

By examining a number of *R. r. mindanensis* carcasses, we found that a 1 3/16 inch-diameter collar can be slipped over the heads of most individuals of this species. Transmitters with this collar size were constructed by the method of Corner and Pearson (1972), except that during construction, the collar ends were adjusted to provide the best signal and were soldered in position. Before soldering, two 1/4-inch lenghts of heat-shrinkable plastic tubing were slipped over the collar.

Shortly before each transmitter was to be used, we attached batteries, then threaded a Secur-A-Tie plastic fastener, (Dennison Manufacturing Company, Framingham, Massachusetts)[3] through the pieces of shrinkable tubing attached to the collar. These fasteners are about 6 inches long and are produced for use as package or tag ties. Similar fasteners may be available from other sources, however, types which use metal clips may adversely affect the signal of some transmitters as noted by Verts (1963). To protect the transmitter assembly, we covered each unit with plastic electrical tape, and dipped it in self-priming vinyl (Carboline Series "K" Carboline Co., St. Louis, Missouri) for final sealing. This procedure also

[3] Reference to trade names on manufacturers does not imply endorsement of commercial products.

strengthened the collar attachment. We also enclosed part of the fastener with plastic tubing to avoid abrasion of the rat's neck; however, this procedure may be unnecessary. A plastic fastener and a completed transmitter unit are shown in Figure 1.

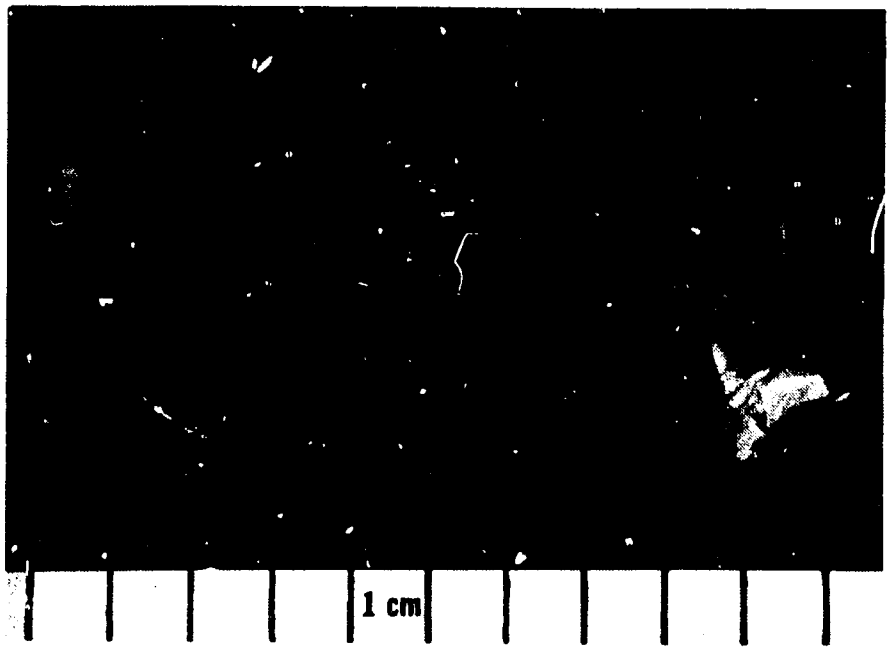

Figure 1. Plastic attachment device and completed transmitter unit.

In the field, transmitters with this modified collar can be attached in less than one minute. The copper-strap antenna is slipped over the rat's head, then the beaded fastener is gently tightened around its neck. The transmitter pack rides beneath the neck. It is helpful, but not essential, to have two people working together: one to hold the rat, the other to adjust the collar tension for the best fit. The operation requires no anesthesia, and the animal is restrained for only a short time.

We have tested these plastic fasteners on 24 rats and have found that in all cases they outlasted the small mercury batteries, which generally keep the transmitters working from 1 to 3 weeks. However, the fasteners might well deteriorate if used over long periods with a long-lasting power source. For reuse of a transmitter after recovery, the plastic fastener, battery, tape, and sealer should all be replaced.

This attachment technique greatly reduces the field time required to instrument a large number of animals. Because transmitters can be easily attached after dark, animals can be released immediately after trapping. Less handling and elimination of the need for anesthesia are additional advantages. Although we have made no quantitative tests, we feel that transmitter tuned in the laboratory rather than at the time of attachment emit consistently stronger, less variable signals. Presumably, the more precise tuning possible in the laboratory will help overcome the problem noted by Corner and Pearson (1972) of the miniature crystal being pulled off frequently by improper tuning.

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