MONITORING OF FREE-RUNNING ROTATIONAL MANIPULANDA¹

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In behavioral experiments using rotating manipulanda, such as the wheel-turn apparatus in avoidance learning, rotational motion can be monitored in several ways. One of the more elaborate methods involves using the angular velocity imparted to the manipulandum by the subject to drive a concentrically-mounted generator. The momentary current produced by the generator can be measured for both incidence and rotational speed of turning (Dinsmoor, 1958). Where only the incidence of turning is desired, rotation is typically monitored through micro-switch assemblies thrown by eccentricities located somewhere on the rotating member. This requires physical contact between the rotating member and the monitoring assembly. In the author's experience, such assemblies required more than minimum attention to keep them adjusted to reliably follow high response rates. Another problem with micro-switches may be "spots of differential effort" necessary to rotate the wheel, created by the eccentric micro-switch triggers. One simple and inexpensive way to monitor incidence of wheel turning involves using magnet switches. Mulieri and Weissman (1961) using a similar switch, describe its use as a pulse source. Olson Electronics, Inc.,² markets a less expensive switch.³ The switch is composed of two flat metal blades enclosed in a glass tube in a normally open position. When a magnet or magnetic field is brought into close parallel alignment

with the blades, the induced magnetic field causes the two blades to attract each other, thus closing the switch.

The wheel-turn box application involves mounting the magnet at right angles to and on the shaft of the manipulandum. The switch is then mounted in the same plane as the magnet. As the shaft revolves, the switch is made and broken twice each revolution. When the switch operates an onset-offset pulse-former, four response counts per revolution are produced. Other rotational fractions can be obtained by following the directions enclosed with the switch. The contact rating is 250 v up to 1 amp, satisfactory for most behavioral work. Our wheel-turn boxes use a single switch to count quarter wheel-turn and to turn off CS and US. In approximately eight months of almost constant use, no readjustment has been required. Because there is no physical contact between wheel and switch, no differential effort spots exist, thus avoiding any problems which might be inherent in micro-switch monitoring devices. In this application, the switch reliably follows rates of 8 to 10 pulses per sec.

Although this report is limited to rotational manipulanda, the switch can be used in many other ways. Olson Electronics points out several applications in their instruction sheet that could be of interest to the behavioral scientist.

REFERENCES

- Dinsmoor, J. A. Advice for measuring and programming the speed of execution of a single response. *J. exp. Anal. Behav.*, 1958, 1, 57-58.
- Mulieri, L. A. and Weissman, A. A low-cost pulse source for continuous duty. *J. exp. Anal. Behav.*, 1961, 4, 118.

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²Olson Electronics, Inc., 260 S. Forge Street, Akron 8, Ohio.

³Olson SW-229, about \$1.00, including instructions and magnet.