CONTINUOUS RECORDINGS OF REVOLVING-CAGE ACTIVITY UNITS

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The relay system described here provides a simple method of continuously recording revolving-wheel activity and allows recording apparatus to be located at any convenient distance. The system avoids noisy microswitches, sensitivity to speed of movement, and limitation of turns to one direction.

A protruding metal rod is fixed near the periphery of the wheel. As the wheel rotates, the rod brushes across the free ends of two closely aligned, noncorrosive, fine wires, fixed to an immobile projection from the base of the

apparatus. Another pair of wires is located diametrically across the wheel. Thus, without sparking, contacts are alternatingly closed to two thyatron relays, one setting a preparatory circuit, the other operating the recorder circuit, so that a 360° excursion is necessary for each recording.

Figure 1 is a schematic diagram of the system. Ground connections should be made as shown to avoid running the "hot" 110-v line to the cage contacts. Six such units were operated in parallel from the same power sources indicated. (Tube filament connections in parallel to a single 6-v power supply are not shown here.)

Fig. 1. Circuit diagram of recording apparatus for each cage. Legend: A and B, telephone relays, 350 ohms, Western Electric No. B-365; C_1 and C_2 , condensers, 20 mfd, 150 v; D and E, 12-v relays, 110 ohms, Potter and Brumfield No. KR11D; M, constant-speed motor, geared down to 20 rpm; P. S., DC power supply, 12-v rectified line AC; R, tape recorder, coils 36 ohms, 12-v Guardian Relay 200 Series; R_1 , 300-ohm, 50-watt resistor; R_2 and R_4 , 250-ohm, 10-watt resistors; R_3 , 100-ohm, 2-watt resistor; R_5 and R_6 , 0.1-megohm, 2-watt resistors; S_1 , microswitch; S_2 and S_3 , cage contacts; V_1 and V_2 , thyatron tubes, RCA No. 2D21; batteries, 6- and 12-v automotive storage.

With 14-in. wheels adjusted to minimize physical differences, complete records for eight test periods were obtained from 34 naive, adult white rats. Each period lasted for 1 hr at the same time on alternate days. The rats were not returned to the home cage and free access to food and water until 45 min after they were removed from the wheel.

The present technique revealed a brief initial spurt of activity, which usually subsided within a few minutes. Determining whether each animal was more or less active during a given minute than during the succeeding minute, we computed the ratio of the number of rats more active to the number of rats less ac-

tive for a given minute. For the first 6 min of the eighth test period, these ratios were 10.3, 3.3, 2.0, 1.6, and 1.0. When activity units during the first and second halves, respectively, of the last 50 min of each hour were summated for test periods 6, 7, and 8 in each of 34 cases, the spit-half rho was .81. Based on a group of individuals or several tests of one individual, the cumulative-activity record during the test period approached a linear function following the initial spurt. But in some single tests of individuals, divergence from linearity was so great as to suggest possible secondary functions.