A SIMPLE CIRCUIT FOR CONTACT RESPONSES

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The circuit shown in Fig. 1 involves a minimum number of parts, is economical, and can be run directly from a 24-28v dc supply. It can be used to operate a contact device whether the contact is made by the animal's foot, nose, or tongue. Thus, it can be used to measure operant responses, or general activity.

The heart of this device is a 2N525 (P-N-P) junction transistor which has an amplification ratio of 50. In the circuit described it requires approximately 20-40 microamps (μ a) to activate the input. The output is attached to an inexpensive 5,000 ohm Sigma relay. If the sensitivity of the Sigma relay is properly adjusted, it may still be activated when the resistance of the animal is as high as 1.5 megohms.

This circuit eliminates the use of lever switches or other devices which can clog or break. It has been used successfully with a touch button on monkeys' home cages and also on plates which record the movement of mice.

Figure 2 shows the effects of different amounts of current upon the activity of mice. Subjects (Ss) were tested in a box with four plates arranged on the floor in checkerboard fashion so that current would pass through the

S between adjacent plates whenever they were touched simultaneously. Two of the plates were grounded and the other two connected to the base of the transistor through a resistor.

A total of 36 Ss, three at each shock level indicated, were placed in the box for 3 min each. They received no shock for the first 30 sec, in order to reduce the variability due to initial habituation, but the current was turned on for the remaining 2.5 min. The values shown in the graph are the averages of the last 2.0 min.

The curve is essentially flat until about 60 μ a. At this value, the current had some effect in depressing activity, and the degree of suppression was progressively greater with higher values. Above 1,000 μ a there was no movement at all. Thus, it appears that the operation of the transistor circuit has no effect on the number of responses the S makes within the region of current for the operation of the transistor.

Fig. 1. Contact Circuit. The S activates the transistor and relay by grounding the base through a resistor.

Fig. 2. Relationship between activity and shock level. Three CF-1 mice were tested at each of the current values shown. Note that Ss were sensitive to shock levels from 60 to 1,000 μ a. The transistor operates with a minimum value of 30 μ a and the maximum value passing through a mouse is approximately 45 μ a.