BINARY RECORDING OF VOCALIZATION AND GROSS BODY MOVEMENT IN PSYCHOPHYSIOLOGICAL STUDY OF DOGS[1, 2]

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Vocalization and gross body movement by an animal can generate artifacts in cardiorespiratory recordings. To provide for automatic identification of these events, we have developed two devices for use in the laboratory.

For recording occurrences of barking and similar vocalizations, activation of a 115-v AC Automatic Electric Type BFA relay is accomplished by an Argonne AR-53 crystal microphone and a sound-controlled switch. Shown in Fig. 1,[3] the microphone, *M*, is glued to a sleeve, *S*, which is slipped over the neck strap, *NS*, made from a length of Sanborn rubber electrode strap. Replacing the dog's collar during experimental sessions, the entire assembly is fastened about its neck as a throat microphone. To allow for the stretching of the rubber neck strap, the microphone cable is attached snake-like with loops of thread. It is wired to a two-pin Cannon connector, *CC*, which plugs into the input receptacle of the sound-controlled switch when the animal is placed in the restraining apparatus.

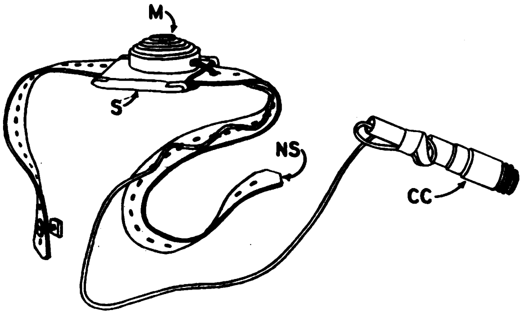

Fig. 1. Throat microphone and neck strap.

A schematic diagram of the switch is presented in Fig. 2. The amplifier section responds to frequencies between 40 and 4,000 cps. A Sarkes-Tarzian F-2 silicon rectifier provides a DC signal proportional to the AC input from the microphone, and the relay driver section of the circuit incorporates a network of transistors (2N1545 and 2N224) and silicon diodes (either TAB no. T5A or 1N536 may be used) which acts as an on-off switch. When the amplitude of the DC pulse rises above a threshold level set by the gain control and remains there for 8 msec or more, the switching network activates the relay via the output transformer leads. Release time of the switching network is increased to 30 msec or more by especially loud or long barks—*i.e.*, by DC pulses well above threshold or of long duration, 50 to 100 msec or more.

These temporal features, the limited frequency response of the amplifier, and the throat microphone arrangement enhance the unit's discrimination of barking from clicks and other ambient noise likely to occur in the chamber containing the animal.

In the area of gross body movement, we concentrate on vertical motions, since, in our dog restraining device—described in a previous report (Kaplan, Campbell, Martin, Wulp, and Lipinski, 1962), (a) the animal is free to stand or sit, and (b) the bulk of broad movements tend to be limited to or eventually result in this type of action. The apparatus referred to has been modified in the manner shown in Fig. 3. A micro switch, *SW*, has been mounted on the left side block, *SB*, of the dog's chest

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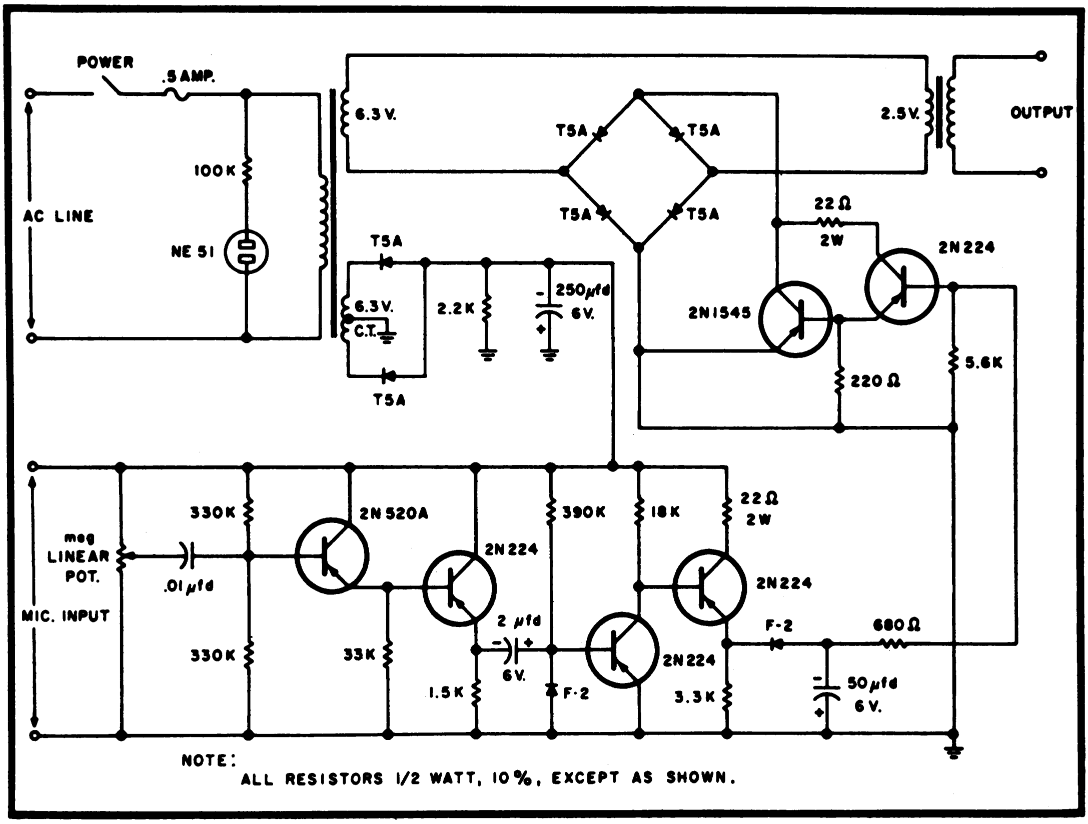
[2]Robert S. Feldstein, Scientific Prototype Manufacturing Corporation, designed and prepared the circuit for the sound controlled switch. We are indebted to him for his interest and helpful cooperation.

[3]We wish to thank Richard Sparer for his drawings of the apparatus.



SOUND CONTROLLED SWITCH

Fig. 2. Schematic diagram of the sound controlled switch.

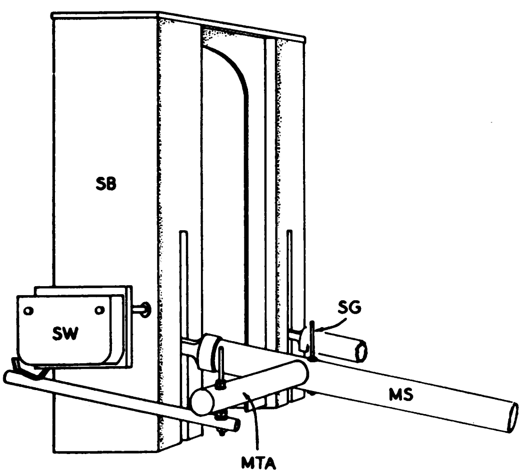


Fig. 3. Mechanism for recording body movement.

harness support. Projecting from the left tubular metal shaft, *MS*, that is attached to the dog's body along its long axis, a motion translation assembly, *MTA*, trips the micro switch and thereby activates correlated recording equipment when the shaft (and, therefore, the dog) moves downward. Control of the exact degree of downward motion required for tripping the switch is accomplished through rotational adjustment of the motion translation assembly with the aid of the sighting guides, *SG*.

In addition to binary indexing of these events on oscillographic records for manual readout, such switch closures can facilitate complex operations in automatic processing of analog data, *e.g.*, telling a computer which portions of cardio-respiratory records are to be rejected because of artifacts. Another use, illustrated in Fig. 4, is provision of quantitative information showing the time course of adaptation to the restraining apparatus. These re-

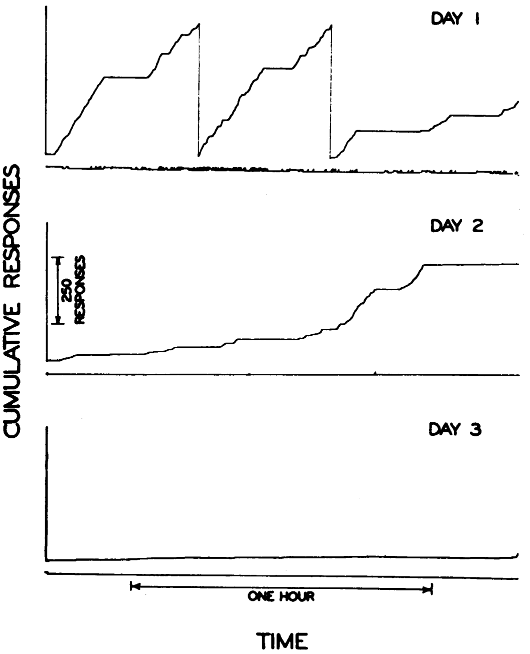


Fig. 4. Cumulative barking responses and discrete body movement responses during adaptation of dog ONR-1 to the restraining apparatus. Upward movement of the event pen indicates sitting.

sponse records for dog ONR-1—cumulative for barking, discrete for sit-down movements—show the decline of the disrupting behaviors with successive adaptation sessions, and the record for day 3 clearly indicates to the experimenter that he may safely proceed with cardio-respiratory recording from the animal in the restraining device.

REFERENCE

Kaplan, M., Campbell, S. L., Martin, J. M., Wulp, D. G., and Lipinski, C. E., Jr. A restraining device for psychophysiological experimentation with dogs. *J. exp. Anal. Behav.*, 1962, **5**, 209-211.