A SENSITIVE MULTI-PURPOSE RELAY

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The simple and versatile electronic relay shown in Fig. 1 is useful for many applications where more expensive equipment must usually be used. Transistors Q_1 and Q_2 are connected in a direct-coupled cascade amplifier, providing sufficient amplification to operate the relay, R_y , which requires about 1.5 ma, from an input signal of only $2\ \mu\text{a}$ (at 14 mv), a current gain of 750. Almost any transistor type may be used as long as its voltage and current ratings are not exceeded. The types listed below for Q_1 and Q_2 are only a few which may be used with 22.5 v. Other types and voltages may be used; however, the sensitivity of the circuit may vary accordingly.

When the input source is only a switch, B_1 supplies the necessary power. However, B_1 may

be omitted when the source supplies a sufficient signal of its own (such as a photocell).

The potentiometer, R , determines the gain of the circuit. Initial adjustment should begin with R at maximum resistance. With the input source connected, R should be reduced until R_y operates. No other adjustment is needed. The switch, Sw , turns the unit on and off.

With such a high gain, the relay may be used directly as a drinkometer, with R_y controlling response recorders. A thermistor may be used for turning the unit into a thermostat control. With electrodes placed under the bed sheet, the device becomes an enuresis indicator. When connected to an animal (even human) a drop in skin resistance can be in-

Fig. 1. Circuit diagram of sensitive relay.

Key to Components.

B_1 —1.5 v battery.

B_2 —22.5 v battery.

Sw —SPST switch, on-off control.

R —1 megohm potentiometer.

R_y —Sigma 4F or similar sensitive relay.

Q_1 —NPN transistor, such as 2N35, 2N169A, 2N167, or similar types.

Q_2 —PNP transistor, such as 2N34, 2N43, 2N586, or similar types.

licated, the size of the drop necessary to trigger R_y being determined by R . If a pressure transducer (strain gage, pressure sensitive paint, *etc.*) is used a sensitive, silent Skinner Box bar is easily made. There are many other possibilities, of course, but the above examples

give some idea of the numerous ways to use a sensitive relay.

Several circuits similar to this one, and many others which may be helpful around the laboratory, may be found in *Transistor Circuits* by R. Turner, Gernsback Library #63.