AUTOMATIC COMPENSATOR OF DRIFT IN dc AMPLIFIERS DURING PROLONGED RECORDING

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A description is given of the circuit of an instrument simultaneously recording signal amplitude and the position of the isoelectric line.

The use of dc amplifiers in experimental physiology imposes on the investigator the need to pay careful consideration to the effects of natural amplifier drift on the amplitude of the recorded parameter.

Since the original zero line in work with a dc amplifier is established by the experimenter himself, and is thereafter taken to be constant, any displacement of the isoelectric line resulting from drift introduces errors into the parameter investigated, and in prolonged experiments this may exaggerate the amplitude of the useful signal. In such experiments it can be very difficult to check the magnitude of the drift and introduce the necessary corrections.

The writers have developed and tested an instrument which records signal amplitude and position of isoelectric line simultaneously. In this scheme any change in amplitude of the test signal produces a simultaneous displacement of the isoelectric line, so that the amplitude of the signal measured from the isoelectric line remains constant. This eliminates the need for verification and measurement of the magnitude of the drift and introduction of corrections.

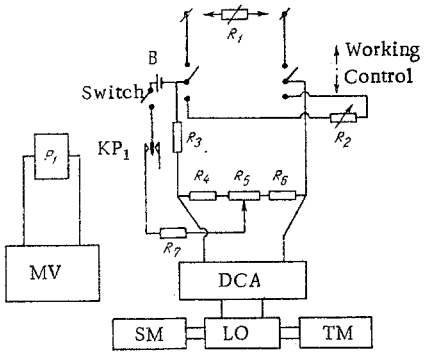

Fig. 1. Scheme of instrument automatically compensating for drift in a dc amplifier. R_1) MT-54 thermistor; R_2) 10 kΩ; R_3, R_4, R_6) 3 kΩ; R_5) bridge balancer; P_1) polarized relay of RP type; KP_1) contacts of relay P_1; B) 4.5 V battery; MV) multivibrator; LO) loop oscillograph; DCA) dc amplifier; SM) stimulation marker; TM) time marker 30 sec.

The instrument consists of a switch connecting or disconnecting the power supply to the bridge alternately (Fig. 1). Since changes in the position of the switch are effected by a symmetrical multivibrator, with a frequency much higher than the speed of the recorder winder, two continuous lines are seen on the recording instrument (the isoelectric line and the curve of amplitude of the process tested).

A bridge circuit, one arm of which consisted of a thermosensitive resistor, was used in the investigation described.

Before the experiment the bridge was balanced and only the isoelectric line could be seen on the recording screen. Absence of a second line indicates balancing of the bridge and constancy of the original temperature. With a change in temperature of the segment tested, the thermistor changes its resistance and thus throws the bridge out of balance. The dc amplifier, via the commutator, records the magnitude of the imbalance, from which the temperature in the investigated seg-

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ment can be estimated. Any drift of the amplifier acts on both recorded lines, so that the amplitude measured by the distance between the lines remained constant.

This method of recording, with a visible isoelectric line, can be used with any other transducers (tensometric, photoelectric), and, if the amplifier sensitivity permits, with thermocouples and thermoelectrodes. The instrument can be used to measure a parameter at one point or to record the difference between parameters at two points.