channel APPLIED MICROBIOLOGY, Nov. 1975, included:

changes water instrument temperature range; spans narrow measurements within each channel of this instrument this paper.

Temperature recorders are often used in laboratories where temperature data is needed for experiments or monitoring processes. The recording instrument is a sensitive and reliable tool that provides accurate temperature measurements over a wide range of temperatures. It is designed to operate in environments where temperature stability is crucial for the success of experiments or industrial processes.

Materials and Methods

Cost. Commercial temperature recorders are widely available in a variety of models. Prices range from $50 for a single-channel recorder to $1000 or more for a multi-channel recorder with advanced features. The cost of a temperature recorder depends on factors such as accuracy, range, and additional features like data logging or remote monitoring.

The commercial temperature recorder features a linear calibration curve that ensures precise and consistent temperature readings. The device is compact and portable, making it suitable for use in various laboratory settings. It is equipped with a digital display that provides real-time temperature readings and allows for easy monitoring.

Temperature probes are precision thermistors that are supplied with the recorder. They are available in a broad range of sensitivities and can be selected based on the specific requirements of the experiment.

The instrument is designed to operate in a wide temperature range, typically -50°C to +150°C. It is equipped with a 4 to 20 mA output, which facilitates remote monitoring and data logging.

The temperature recorder is ideal for monitoring temperature variations in biological or chemical reactions, ensuring that the conditions are maintained within the desired range. It is also useful in environmental monitoring, quality control, and process control applications.

Although different types of digital recorders are available, the dual-channel temperature recorder is described in this paper as it provides accurate and reliable temperature measurements over a wide range of temperatures. The instrument is designed to operate in environments where temperature stability is crucial for the success of experiments or industrial processes.
s in a well-stirred water bath and 25 s in still air. Each thermistor is furnished with 3-inch (ca. 7-cm) bare leads that we have connected to an 8-foot (ca. 244-cm) cable. The splice is waterproofed with silicone rubber adhesive sealant (Stauffer-Walker, Adrian, Mich.) and shrinkable tubing. Longer leads may be used when necessary to gain access to remote areas. The sensitive tip area of the probe is sealed in glass, while the remaining body section is flexible and encased in a 2-inch (ca. 5-cm) length of chemically inert Teflon. The body of the probe can be formed to coincide with the contour of the surface area to be monitored.

The recorder is a model 291 dual channel direct current recorder (Rustrak Instrument Division, Manchester, N.H.). Each galvanometer suspension has a sensitivity of 0-1 mA. The basic recorder chart speed is 1 inch (2.54 cm)/h, and the chart paper Y axis is calibrated directly to the time of day. Under continuous operation of the recorder, the chart rolls will last for 31 days. Extra gear train drive units are available that can be easily interchanged to modify the chart speed.

RESULTS AND DISCUSSION

Instrument calibration can be accomplished very quickly by simply referring to the resistance versus temperature chart. Position the selector switch to the calibrate left position. Decide on an appropriate temperature range and set toggle switch SW1 to encompass this range. Dial the upper temperature resistance reading on the calibration potentiometer. (The calibration potentiometer dial is divided into 1,000 divisions and can be read directly from 0 to 10,000 ohms.) Adjust the span control for recorder full-scale deflection. Then dial the resistance reading for the lower temperature desired. Adjust the zero control for recorder zero deflection. Alternately adjust the span and zero
Fig. 2. Schematic diagram of the electronic circuitry of the dual channel temperature recorder.
selector switch to the calibrate right position and repeat the calibration procedure. After this calibration of both channels, the selector switch must be returned to the operate position for normal operation.

Figure 3 is a typical temperature recording of an environmental chamber being maintained at 22°C. Each channel has a span of 20 to 25°C. The right channel recording indicates temperature excursions that occur with the thermistor probe exposed in free air. The left channel probe was immersed in a plastic tube containing 5 ml of a 25% sucrose solution located within 1 inch of the first probe. This record illustrates the capability to monitor accurately and to record temperature variations of a small fraction of a degree.

We have found numerous applications for this temperature recorder and have duplicated its construction for other laboratory experimenters. It has proven to be reliable, stable, accurate, and a very useful device for day to day laboratory temperature measurements.

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