

TECHNICAL NOTES

A Low-Cost Simulator for Testing the Respiratory Gating Function of the Brattle Physiological Synchronizer

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Occasionally during the use of a synchronizer, faulty operation is obtained. In most cases this is due to defective patient electrode connections. In some instances, however, it is due to instrument failure. To determine whether the instrument is operating properly, one needs a device that will simulate a normal patient, as seen by the equipment through its patient leads.

In the case of cardiac synchronization, a number of simulators are currently being marketed. For respiratory gating, however, no simulator appears to be available.

This article describes a simple two-dollar device that can be used to simulate the patient as seen by the Brattle Synchronizer during operation in the respiratory mode. The device is convenient to use and provides excellent operation.

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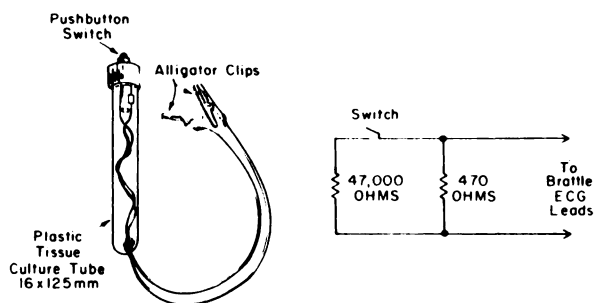
During the past few years, gated cardiac studies have become a common procedure in many nuclear medicine departments. In many instances, the synchronizing signal required for the gating of the scintillation camera or computer has been obtained from a Brattle Physiological Synchronizer.

At the present time, much interest is developing in respiratory gating, since it has been found that there is a significant amount of abdominal organ motion with each respiratory cycle. To eliminate the effects of this motion on scintillation-camera images, one needs a signal that is synchronized with the patient's breathing. Fortunately, the Brattle unit already has the respiratory gating function built in and, therefore, may be used for this application also.

Occasionally, when using any synchronizer, faulty operation is obtained. Sometimes no gating occurs; at other times the gating is grossly intermittent and irregular. In most cases these problems are due to defective or improperly placed patient electrodes. Occasionally the problem is due to broken signal leads or instrument failure. The technician needs a simple way of determining which of these causes is responsible for the loss of a proper synchronizing signal. The best way of doing this is to attach the synchronizer's patient leads to an electronic circuit that simulates a normal patient. The operator can then determine whether the problem is due to instrument failure or other causes.

Currently there are a number of simulators that can be used to test ECG gating. These devices produce an output signal similar to that obtained from a normal patient. In this way the operation of the complete system may be checked and a decision made as to whether equipment service is necessary.

In a similar way, one would like to have a test circuit that would simulate the patient as seen by the respiratory synchronizing part of the instrument. Such a simulator is shown in Fig. 1. It is entirely passive and consists of two resistors, a switch, two alligator clips, and a tissue-culture tube. Holes were drilled in the bottom of the plastic tube and in its cap. The switch was mounted in the cap, and output lead wires were brought out through the hole in the bottom.



BRATTLE RESPIRATION SIMULATOR

FIG. 1.

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The remainder of the circuitry was placed inside of the tube.

The total parts cost for the simulator is less than two dollars and the configuration is very convenient to use. The operator merely connects the simulator to the patient leads using the alligator clips. The plastic tube may be conveniently held in the hand and the pushbutton sequentially depressed and released.

When the switch is open, the circuit resistance is 470 ohms and when it is closed the resistance drops to 465 ohms. The higher re-

sistance corresponds to inspiration and the lower resistance to expiration.

As shown in the figure, the inspiration phase is the normal condition and expiration is simulated by depressing the pushbutton. If a normally closed switch were used, the converse operation would be obtained.

The circuit described here is convenient to use, simple to make, low in cost, and has been found to be very useful in testing the respiratory synchronization function of the Brattle equipment.

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October 9-12, 1980

Airport Marriott Hotel

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ANNOUNCEMENT AND CALL FOR ABSTRACTS FOR SCIENTIFIC PROGRAM

The Scientific Program Committee welcomes the submission of abstracts of original contributions in nuclear medicine from members and nonmembers of the Society of Nuclear Medicine for the 5th Annual Western Regional Meeting. Physicians, scientists, and technologists—members and nonmembers—are invited to participate. The program will be structured to permit the presentation of papers from all areas of interest in the specialty of nuclear medicine. Abstracts by technologists are encouraged and will be presented at the Scientific Program.

GUIDELINES FOR SUBMITTING ABSTRACTS

The abstracts will be printed from camera-ready copy provided by the authors. Therefore, only abstracts prepared on the official abstract form will be considered. These abstract forms will be available from the Western Regional Chapter office (listed below) after March 1, 1980. Abstract forms will be sent to members of the Northern California, Pacific Northwest, Southern California, and Hawaii Chapters in a regular mailing in early May, 1980. All other requests will be sent on an individual basis.

All participants will be required to register and pay the appropriate fee. Please send the original abstract form, supporting data, and seven copies to:

Justine Parker, Administrative Coordinator
5th Western Regional Meeting
P.O. Box 40279
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DEADLINE FOR ABSTRACT SUBMISSION: POSTMARK MIDNIGHT, JULY 3, 1980

The 5th Annual Western Regional Meeting will have commercial exhibits and all interested companies are invited. Please contact the Western Regional SNM office (address above). Phone: (415) 647-1668 or 647-0722.

Invited Guest Lecturers are David Rollo, M.D., Ph.D., Director of Nuclear Medicine at Vanderbilt University and H. William Strauss, M.D., Director of Nuclear Medicine at Massachusetts General Hospital.

The Special Program will be "Instrumentation for the 80's" Panelists: John Verba, Ph.D., Michael Phelps, Ph.D., Leon Kaufman, Ph.D., David Williams, Ph.D., David Rollo, M.D., H. William Strauss, M.D., with L. Stephen Graham, Ph.D. serving as the moderator.