

SHORTER CONTRIBUTION

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New Digital Plethysmograph with Mechano-Electronic Transducer

by

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1. Introduction

As for the digital plethysmograph various transducers had been used; that is, optical method (BURCH, 1954), photoelectric method (HERZTMAN, 1938), condenser method (YAMAMOTO, 1954), rochell salt crystal method (KAMIYAMA, 1956), and strain gauge method (KAMIYAMA, 1956).

A new digital plethysmograph was devised by employing the mechano-electronic transducer (OLSON, 1947; CLAMAN, 1951), which had been released by the Radio Corporation of America (RCA).

The new digital plethysmograph is very effective, for the transducer of the plethysmograph is capable of translating mechanic vibrations into variations of the electrical current for recording plethysmograph.

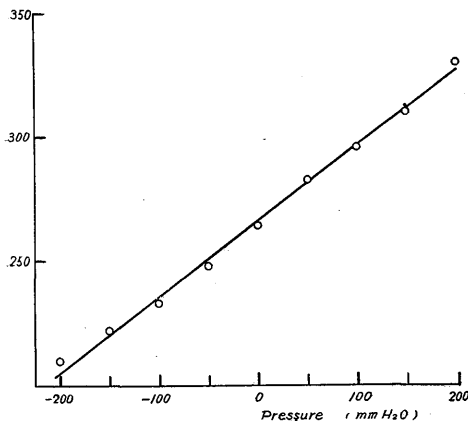


Fig. 1 Amplitude characteristic.

2. Method and principle

The mechano-electronic transducer RCA-5734 is a triode transducer with which observation can be conducted by translating vibrations directly into variations of the electric current.

This transducer is considerably small in dimensions, that is, 1-9/32" in length, 5/16" in diameter and 1.75 grams in weight.

Its output is 40 volt per degree deflection of the plate shaft. We connect the membrane of the cylinder of the plethysmograph with the shaft. In accordance

with the volume change of the finger tip, the displacements of the plate shaft

changes the distance between the fixed grid and the plate and results in a change in the plate current.

As for the amplitude characteristic, the linearity is kept up throughout a wide range of +200 (mmH₂O) to -200 (mmH₂O) as given in Fig. 1 (The scale of ordinate is arbitrary).

Fig. 2 shows that the frequency characteristic of our plethysmograph is flat over the range from low frequency to high frequency.

Fig. 3 (a) is the plethysmogram recorded with deep breathing, showing that the digital volume decreased with aspiration and reactive vasodilation appeared soon after breathing.

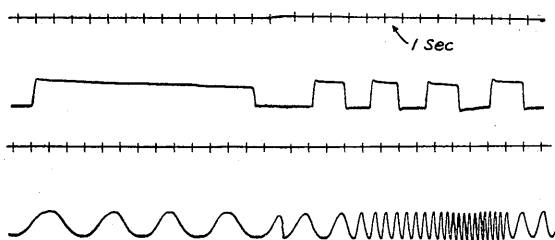


Fig. 2. Frequency characteristic.

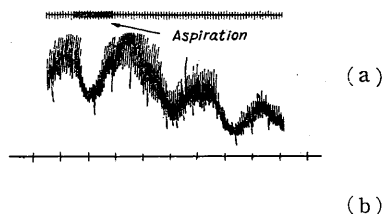


Fig. 3. Variation by deep breathing (a) and quickly rolled recording (b).

Fig. 3 (b) is the plethysmogram which was recorded while the recording paper was being rolled quickly, to depict individual pulse waves.

As shown above, the new digital plethysmogram with the mechano-electronic transducer has many merits, which makes it highly desirable for use in the field of measurements of vasomotor reflex.

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