

ACCELEROMETER-EKG CLIP COMBINATION CHEST WALL MOTION SENSOR

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ABSTRACT OF DISCLOSURE:

This invention is a noninvasive heart examination instrument and monitoring system wherein a miniature accelerometer is mounted to a clip which attaches mechanically and electrically to a conventional EKG electrode. The resulting electro-mechanical sensor can be used to obtain electrical and mechanical information concerning heart function simultaneously at the same position on the surface of the chest wall overlying the cardiac organ.

FIELD OF INVENTION:

This invention relates to medical technology and more particularly to noninvasive cardiac examination and monitoring equipment.

THE INVENTION :

The accelerometer type of cardiac sensor has, by virtue of its inertial reference frame, the ability to monitor a true parameter of motion of the chest wall such as velocity. It is often necessary to obtain information about chest wall velocity at exactly the same location on the chest that must be used to obtain the electrocardiogram. It is an object of this invention to provide a convenient and practical means of simultaneously obtaining this electrical and mechanical information at the same position on the chest wall. Even in situations where the electrocardiogram is not being obtained from this position on the chest wall, the ability of the accelerometer-EKG clip to attach to the conventional electrocardiogram electrode provides an improved means of consistently placing the accelerometer in the same position on the chest wall each time it is attached. This is because the electrocardiogram electrode can be left on the patient's chest throughout his stay at the hospital. It is therefore another object of this invention to provide an improved method of assuring consistent placement of the accelerometer at the same position on the chest wall each time it is applied to the patient. This is important since the signal from the accelerometer is very sensitive to its placement on the chest wall. This invention is intended for use in the coronary care unit, intensive care unit, emergency room, the patient's room in the hospital, or in the exercise stress test room.

Figure 1 is a schematic of the preferred embodiment of this invention. Miniature accelerometer(1) is mounted to an EKG clip(2) so as to become a single structural entity. This clip can be fabricated or molded so as to accept the miniature accelerometer. The accelerometer



is a commercially available device utilizing a miniature cantilever beam and a seismic mass with a full balanced semiconductor bonded strain gauge Wheatstone Bridge. This device is sold by Entran Devices Inc. of New Jersey. Electrical connection wires (3) lead away from the clip and carry the electrical and accelerometer signals. This information, along with the signals from the other conventional EKG electrodes, is processed by suitable electronic circuitry and monitored and recorded. The clip is designed to accept the "male" or "button" portion of the standard prejelled adhesive EKG electrode. This electrode can be attached to the patient's chest throughout the course of his stay at the hospital. The clip can be attached to this electrode intermittently to study the electrical and/or the mechanical information reaching the skin at this position from the heart.

WHAT IS CLAIMED:

1. An improved clip for attaching a miniature accelerometer to the chest wall of the patient by attachment of the clip to a conventional adhesive EKG electrode, the attachment being only mechanical.
2. The device of claim 1 in which the clip also attaches electrically to the EKG electrode so that both electrical and mechanical signals are obtained simultaneously from the same position on the chest wall.

The present invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the Claims are intended to be embraced therein.

I, Damon Smith, being the sole inventor of this invention, sign this document in order to preserve my future rights to patent the invention.

Damon Smith  
Damon Smith

2-20-81  
date

Damon Smith appeared before me on this the 20<sup>th</sup> day of Feb., 1981 and signed this Disclosure Document which consists of 3 (three) pages and 2 (two) claims.

Karen L. Lane  
signature of notary public

2-20-81  
date

my commission expires on 9/8/85