A DEVICE FOR ANALYZING ELECTROCARDIOGRAMS

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Diagnosis of cardiovascular diseases requires meaningful interpretation of cardiac activity records. The interpretation requires quantitative identification of diagnostic parameters which, unlike traditional characteristics, cannot be extracted from the records by direct measurement of wave height or interval length, but should be determined by calculations based on preliminarily measured quantities or even by the construction of graphs [2, 3, 8]. Microprocessors can be also applied to calculate these diagnostic parameters [4, 5], but such methods for estimation of diagnostic parameters of cardiovascular diseases are difficult to apply in practical medicine.

We have developed a device (Fig. 1) designed to facilitate manual processing of signals recorded on coordinate paper. Using the geometrical-mechanical analogy inherent in its construction, the device allows direct determination of a number of quantitative parameters of the cardiovascular system activity from various types of recorded signals [1].

The device is intended for measuring not only the height and width of electrocardiographic waves and interval duration, but also for determining such kinetic and relative parameters of the recorded processes as:

— from electrocardiograms: heart rate (HR), stroke volume index, kinetic indices of the myocardial repolarization phase (maximal rates of rise and decay of potential gradient, respectively, and ratio of maximal rates (RMR));
— from echocardiograms: mean rate of myocardium contraction and relaxation, velocity of uncovering of anterior mitral (tricuspid) valve, velocity of early diastolic closing of anterior mitral valve, ratio of rates of contraction and relaxation of posterior wall of the myocardium of the pulmonary ventriculus and interventricular septum;
— from kinetic, ballistic, and dynamic cardiograms, apexocardiograms, polycardiograms, esophagiograms, sphygmograms, rheograms, rheovasograms, and differential curves of central pulse: relative coefficients, indices, and rates.

Fig. 1. Device for analysis of electrocardiograms and other types of records of cardiovascular activity.
The device facilitates amplitude analysis of recorded curves.

The curves to be analyzed should be recorded on the 50 mm/sec time scale and against a calibrating signal of 1 mV per 10 mm.

The device (Fig. 2) consists of a base (1) made of transparent material. Scales 2, 2', 3, 3', 4, 4', and 5 and a curve of the functional dependence between the $R-R$ interval of the electrocardiogram and heart rate (6) are engraved on the base. A guide slot (7) perpendicular to axis 2 is cut at the zero point of this axis. A shaft (8) with lever (9) moves along the slot. The opposite end of the lever is linked to a stationary pin (10) which is fixed on the base on the axis at a distance of one unit of scale 2' from its zero mark. A pointer (11) is attached to the movable shaft, rotation and fixation of the pointer being adjusted...