Kedar S. Patwardhan, An Impedance Cardiograph for Stress Testing, M. Tech Thesis, Department of Electrical Engineering, Indian Institute of Technology, Bombay, 1997.

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Abstract- The aim of this project is to design an impedance cardiograph system for non-invasively monitoring the stroke volume and the cardiac output of a subject during stress testing. The system hardware extracts the required physiological signals, namely, the electrocardiogram, impedance cardiogram and its derivative, and the phonocardiogram (PCG). These signals are then digitized and processed to obtain certain parameters which give information about heart condition during stress testing. The basic system consists of the signal conditioner hardware for extracting the physiological signals and a Personal Computer (PC), with PC bus based A/D card for signal acquisition, processing, and off-line display of the recorded signals. In order to make the system portable a notebook PC with PCMCIA bus based A/D card is also provided and can be used in lieu of the mains operated PC. For field use of the instrument, interface with a hand held data logger for digitizing and recording the signals has been provided. The data logger eliminates the need of PC at the data recording site. The signals recorded using the data-logger can be down-loaded into a PC and processed off-line. In order to facilitate easy calibration of the signal conditioning circuitry for extracting the physiological signals, a calibrator has been provided.