Bharat Ashok Nihalani, Development of an impedance cardiograph, M. Tech. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 2002.

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Abstract **-**Impedance cardiography (ICG) is the study of cardiac function determined from measurements of the electrical impedance of the thorax. It is an inexpensive, easy and non-invasive technique for determining stroke volume (SV) and cardiac output (CO). The aim of this project is to develop an impedance cardiograph instrument. Towards this end, earlier hardware and software development carried out as part of M.Tech. projects at IIT Bombay have been used as the basis. In particular, the hardware developed by Babu Kuriakose in 1999 and software modules of Kedar Patwardhan in 1996 have been used. The hardware measures the signal providing thoracic impedance z(t), its derivative dz/dt, base impedance of thorax Zo and differentiated electrocardiogram d(ECG)/dt. There is a thorax simulator as a separate unit to calibrate the impedance measurement unit. The analog signals from the hardware are acquired by a PC based data acquisition card. These signals are then fed to the offline signal processing program to get the heart rate (HR), stroke volume and cardiac output. Signal processing modules have been extremely tested using synthesized waveforms.