

Chandra Kant Singh, A Microcontroller based Audiometer, M. Tech. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 1997.

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Abstract – An audiometer is an electro acoustic instrument for quantifying hearing impairment and for diagnosing its causes. Using it, the test tones of different frequency and levels are presented to the subject and hearing thresholds are determined after judging the responses of the subject. In conventional audiometers, the frequency and levels of the tones are changed by manually switching the circuit components in the oscillator and attenuator. In more recent designs, digitally controlled oscillators and attenuators are used. In this project, a microcontroller based simple diagnostic audiometer is developed which does not have any manually operated switches and moving parts, is compact in size, and will give maintenance free operation. It has two channels, one for pure and other for masking noise. Facility for both types of noise, wide band and narrow band noise is provided.

Here a programmable oscillator is designed using a switch capacitor filter, and frequency of sinusoidal oscillation is proportional to that of the digital clock input, thus needing only one control line. For programmable attenuators, monolithic logarithmic D/A converters are used. Wide-band noise is generated by low filtering of the output of a pseudo random binary sequence generator and is shaped to a narrow band noise by a switched capacitor band pass filter. The instrument also has a serial port interface for transferring the test result to a printer or computer. The instrument can be used either as conventional operator controlled audiometer or as an automated audiometer. In operator controlled audiometer, the operator has full control over stimulus parameter selection and threshold determination. In automated mode, the threshold parameters are determined by monitoring the subject response to the stimulus in accordance with audiometric procedure.