Santosh Bhandarkar, Reduction of background noise in artificial larynx, M. Tech. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 2002.

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*Abstract* - The transcervical artificial larynx is of great help to people who cannot use their natural voice production mechanism. The device is held against the neck, and the vibrations generated move up the vocal tract to produce useful speech. The resulting speech has poor quality due to the presence of background noise. The background noise is due to the leakage of the acoustic energy. The objective of the project is to investigate signal-processing techniques for reducing the background noise, thereby improving the quality of the speech output. The spectral analysis of the speech generated with a transcervical electrolarynx was carried out. An earlier proposed method estimates the impulse response of the leakage path during the training phase and then subtracts estimated noise from the noisy speech during use mode. It did not result in any significant noise reduction, possibly due to significant changes in the impulse response of the leakage path. After formulating a theoretical basis, spectral subtraction method is used for noise reduction. Average magnitude spectrum of noise, obtained with lips closed in training mode, is subtracted from the magnitude spectrum of the noisy speech and the signal is reconstructed using the original phase spectrum. It is observed that effective noise cancellation is obtained, if the noise estimation and subtraction is done using 2-pitch frames. The method improves the intelligibility of the speech output.