

ABSTRACT**Acoustic Echo Cancellation Equipped with
Howling Suppressor and Double-Talk Detector**

An acoustic echo canceller (AEC) is devised and tested in a real environment. The devised AEC puts together a number of available digital signal processing methods to make a real-time implementation of the AEC possible. The echo length coverage of the devised AEC can be as large as several hundred milliseconds. The devised AEC is based on a frequency domain implementation of the least-mean square (LMS) determination method. The fast Fourier transforms required for the implementation have been carefully selected and optimized so that a real-time implementation of the AEC is possible. In addition, two novel techniques are invented and added to the AEC to overcome two annoying serious problems commonly encountered in AEC systems. The first technique is a special howling suppressor which can successfully prevent the oscillation of the AEC under all possible practical conditions. The second proposed technique is a very simple, but yet very effective, double-talk detector. The double-talk detector is used to control the step-size of the AEC adaptation mechanism. To demonstrate a preferred embodiment of the invention, the AEC is programmed in C-language for running on personal computers. At a sampling frequency of 8 kHz, and for an echo coverage of 200 milliseconds the developed AEC program takes-up only about 40% of the CPU time of a Pentium 166 MHz processor. The proposed AEC can also be executed on other platforms.

Figure 4 is to be published.