

DSPE-AEC

Acoustic Echo Cancellation

Overview

DSPECIALISTS' Subband AEC cancels acoustic feedback echoes between a loudspeaker and a microphone. It enables real full-duplex communication. The cancellation filter is adaptive, thus the system follows a changing acoustical environment automatically. DSPECIALISTS' AEC is useful in a wide range of applications such as hands-free VoIP phones, teleconferencing devices and POI/POS speech frontends.

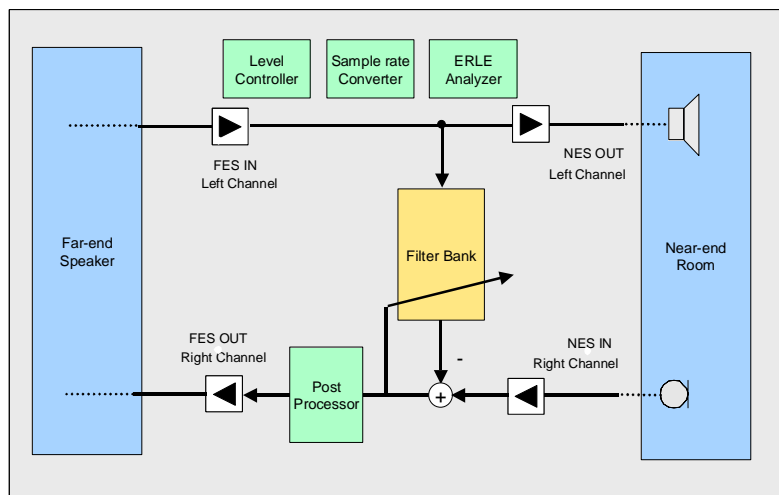
The AEC comes in a compact, robust box with analog audio inputs and outputs, with a RS232 command line interface and status LEDs.

It features 40 dB of echo attenuation with an incorporated double talk processor for full-duplex communication. In combination with the integrated non-linear processing and comfort noise techniques, the AEC is in conformance with the ITU standard G.165.

DSPECIALISTS AEC easily integrates into a wide range of applications with the help of a user interface for optimal signal level and sample rate control together with an echo attenuation (ERLE) analyzer.

Optional extensions like noise-cancellation, an equalizer and real-time audio transport over a USB or LAN interface complete DSPECIALISTS' AEC solution.

Block Diagram



Key Features

- Stand-alone echo cancellation with fast converging poly-phase sub-band technology
- Double-talk processing supplemented with comfort noise
- True 40 dB echo attenuation for single-talk; 35 dB attenuation in double-talk situations
- Due to non-linear processing, the real attenuation of the remaining echo is >60 dB
- Easy integration in analog signal paths by a supporting command line interface for optimal signal level control
- Sample rates supported: 8 kHz / 16 kHz
- Wide power supply input 4..15 VDC
- Status LEDs for power and clipping indication
- Optional extensions: Noise cancellation, Equalizer, USB audio / LAN audio, Other sample rates

Technical Specification

Signal processing technology	<ul style="list-style-type: none"> • Fast poly-phase sub-band filters with nLMS adaption • Very robust single/double-talk discriminator with look-ahead • Non-linear processing (NLP) for suppression of remaining echo • Comfort noise supplement • Real-time ERLE calculation and signal clipping indication • Hand optimized 32-bit signal processing software • State-of-the-art low-power 400 MHz digital signal processor
Echo attenuation (ERLE) without NLP	
Single talk (speech and white noise)	40 dB
Double talk (speech and white noise)	35 dB
Echo attenuation (ERLE) with NLP	
Single talk (speech and white noise)	>60 dB
Convergence time after reset (tone mix)	
10 dB	0.1 s
30 dB	0.3 s
Analog-to-analog signal latency	
FES-In to NES-Out	5 ms
NES-In to FES-Out	28 ms
Audio inputs (FES-In, NES-In)	
Full-scale level	Line-In configuration (controllable by CLI): +3 dBu (1 V _{eff}), unbalanced for both FES-In / NES-In Mic-In configuration (controllable by CLI): -40 dBu (7.5 mV _{eff}), unbalanced for NES-In +3 dBu (1 V _{eff}), unbalanced for FES-In
Bandwidth	20 Hz ... 4 kHz (-2 dB) @ 8 kHz sample-rate
THD+N	<0.02%
ADC	18-bit Sigma-Delta (4..48 kHz)
Connector type	3.5 mm stereo plug (FES-In = left, NES-In = right)
Audio outputs (FES-Out, NES-Out)	
Full-scale level	+3 dBu (1 V _{eff}), unbalanced for both FES-Out / NES-Out
Bandwidth	300 Hz ... 3.5 kHz @ 8 kHz sample-rate
THD+N	<0.02%
DAC	18-bit Sigma-Delta (4..48 kHz)
Connector type	3.5 mm stereo plug (NES-Out = left, FES-Out = right)
Command-line interface (CLI)	
Interface	RS232, Mini-DIN 115 kbps, 1 start / 8 data / 1 stop / no parity, no handshake Microsoft HyperTerminal compatible
Control Parameters	Analog levels, sample-rate / filter length, ERLE, parameter store / load
Status LED	Power, clipping, adaption
Switch / Push-Button	AEC on/off switch, AEC reset push-button
Power supply	4..15 VDC, 2.1 mm DC plug (tip = +)

mass customization • state-of-the-art DSP technology • OEM delivery

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ABOUT US

The products of DSPECIALISTS are distinguishable by the use of proven standard components. All products can be adapted to our clients' individual wishes. DSPECIALISTS offers anything from the development of customer-specific modules to complete systems. Aside from DSPs, we also make use of PC's, micro controllers and programmable logic.

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