

STANDALONE ACTIVE NOISE CONTROL SYSTEM and ACTIVE NOISE CONTROL DEVELOPMENT SYSTEM

The New EZ-ANC II



Active noise cancellation is a method of reducing low frequency noise or vibration by introducing an electronically generated canceling disturbance. The EZ-ANC II from Causal Systems makes it easy to implement an active noise cancellation system with just a basic understanding of instrumentation, acoustics and vibration. There is no need for knowledge of DSP programming, computer programming, electronics, control theory or signal processing. All of this is taken care of in the EZ-ANC II. The EZ-ANC II makes the field of active noise control accessible to engineers, architects, researchers, consultants and product designers. All of the parameters needed to optimize an active noise control system can be adjusted with the graphical user interface that operates in the familiar windows environment on any Pentium or higher PC running Windows NT or Windows '95/'98. Parameters are chosen simply from the many pull-down menus on the screen. The PC and EZ-ANC II are connected through an RS232 interface with no handshaking, using a communication protocol similar to GPIB. The EZ-ANC II can be used as a development system for consumer product development incorporating an active noise control system; it can be used by teachers as a demonstration tool for active noise cancellation; it can be used by researchers and it can be used by consultants as a stand alone, job-specific active noise controller. The EZ-ANC II works equally well with acoustics or vibration problems.

Main features of the EZ-ANC II

- Graphical windows interface for parameter selection
- High speed Analog Devices Sharc processor
- Complete system supplied, packaged in a 19-inch rack mount with variable voltage power supply
- Cost effective implementation of active noise cancellation
- Graphical display in time and frequency domains of transfer functions, reference signal, error signals, control signals and filter weights
- Anti-aliasing filters included in A/D converters
- User choice of input and output filters

Advantages of active noise or vibration cancellation with the EZ-ANC

- All features are on-board and the controller will function alone without a PC once the parameters have been set up through the RS232 communications port to a PC with the special purpose ANC windows graphical interface
- Hardware designed around the Analog Devices "Sharc" floating point processor and analog/digital signal conversion technology
- Ease of system optimization using a variety of algorithms and setups
- No custom computer programming required
- No additional electronics or power supplies required
- Easy to use



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Hardware Specifications

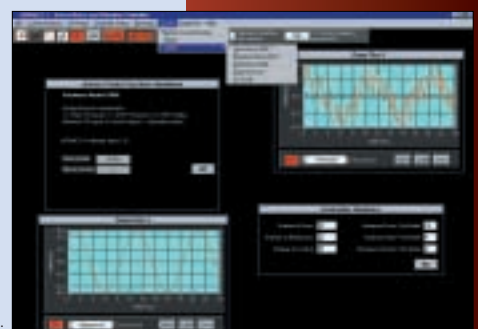
Digital Signal Processor	Analog Devices 33MHz ADSP21062 floating point processor 2 Mbit (64K of 32 bit words) on chip memory 131K of 48 bit words external memory
Analog Inputs	10 analog inputs sampled simultaneously, using 5 Analog Devices AD1847 CODECs (also used for analog output) 1Vrms input range 16 bit precision software controlled input gain high input impedance switch selectable bias voltage for electret microphones BNC front panel connectors
Analog Outputs	10 analog outputs sampled simultaneously, using 5 Analog Devices AD1847 CODECs (also used for analog input) 1Vrms output range 16 bit precision software controlled output attenuation low output impedance for driving power amplifiers BNC front panel connectors
Sampling Rate	The sampling rate range is from 81Hz to 32kHz. Hardware sampling rates are from 5.2kHz to 32kHz, in 10 steps. Sampling rates can be reduced in software by a factor of 8 or 64. Minimum of 30 sample periods
Group Delay Host Communication	RS232 connector, 3 wire connection 19200 bps, 8 bit, no parity, 1 stop bit
Power Requirements	Accepts 110V to 250V AC at 50Hz or 60Hz IEC power cord connector 12V DC power supply is optional
Size	450mm wide x 390mm deep x 90mm high

Software specifications

Software	The software for the EZ-ANC II includes firmware on EPROM's installed inside the controller enclosure and a Microsoft Windows interface that can operate on MSWindows 3.1, Windows 95/98 and NT3.0 and NT4.0
Number of Channels	10 analog input channels 10 analog output channels 4 Reference signals (from software generated signals or from analog input channels) 8 Control signals Grouping of control signals and error signals, into control systems achieved using a 8x10 matrix Error and reference signals are defined as the weighted sum of analog input channels and signal generators.
Adaptive Algorithms	Gradient descent feed-forward control Filtered-x LMS (FIR) Filtered-u LMS (IIR)
Control Filter Types	FIR IIR
Maximum Tap Length for Control Filters	Depends on the number of channels used. For 1 error, 1 control and 1 reference signal, then a FIR filter with 512 taps can be used. For a IIR filter, 512 forward taps and 512 backward taps can be used. For 10 error, 8 control and 4 reference signals, then a FIR filter with 64 taps can be used. For a IIR filter, 64 forward and 64 backward taps can be used.
Adjustable Algorithm Parameters	Convergence coefficient Leakage coefficient Cancellation path ID update rate Adaptive FIR model Control signal
Cancellation Path System Identification Cancellation Path Modeling Signal	Pseudo random noise in the control signal or added to the feedback path in the IIR filter
Adjustable Cancellation Path ID Parameters	The maximum number of taps for the model depends on the number of channels used. For 1 error, 1 control and 1 reference signal, the maximum number of taps is 512 for the Cancellation Path Model and 128 for the Extended ID model For 10 error, 8 control and 4 reference signals, the maximum number of taps is 64 for the Cancellation Path Model and 128 for the Extended ID model Convergence coefficient Leakage coefficient
Sampling Rates	The sampling rate range is from 81Hz to 32kHz. Hardware sampling rates are from 5.2kHz to 32kHz, in 10 steps. Sampling rates can be reduced in software by a factor of 8 or 64. The signals can be high pass, low pass and band pass filtered using software with 19 different filters from 1/3 to 1/100 the sampling rate. The software uses FIR filters.
Input and Output Filtering	Signal range is 1Vrms Software selectable input gain from 0dB to 22.5dB, in 16 steps. AC coupled inputs
Analog Inputs	Signal range is 1Vrms Software selectable output attenuation from 0dB to 94.5dB, in 64 steps. AC coupled outputs
Analog Outputs	AC coupled outputs
Signal Generator	3 Sine wave generators 1 Pseudo-random noise Frequency range 0Hz to 2kHz Generator signal is the summation of the sine and pseudo random signal generators. System setup can be saved to disk or in FLASH EPROM (if the hardware option is installed)
Saving Data Signal Displays	2 Channel FFT analyzer 4 time plots 1 plot of filter weights All plots can be saved to or loaded from disk Software display of over ranges in Input signals Cancellation path ID model Control output
Overflow Signals	

Specifications subject to change without notice.

2-channel and 4-channel systems also available.



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