

# ACTIVE NOISE CONTROL CONTROLE ACTIF DU BRUIT

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## RECENT TECHNICAL INNOVATIONS IN THE HARDWARE AND APPLICATION OF ACTIVE NOISE CONTROL FOR INDUSTRIAL EQUIPMENT.

Active Noise Control has been used since the late 1980's to solve low frequency duct-borne noise problems facing industry. Early efforts consisted of complex, narrowly applied systems that often required custom engineering to meet the requirements of a particular application.

These initial efforts were followed by strong engineering efforts concentrating on two fronts: development of robust, inexpensive hardware and development of accurate application guidelines. This paper will provide an overview of the results of these efforts.

The basic components of an industrial active noise control system (Figure #1) consist of a digital controller/amplifier, cancellation loudspeakers, and detection microphones.

The dsp based controller/amplifier uses adaptive filtering techniques to make an electronic representation of the duct acoustics. The controller computes the delay and amplitude changes from the input microphone to the loudspeaker and determines the appropriate cancellation signal. A downstream microphone provides the controller with feedback on the level of performance being achieved. On-line calibration is also used to maintain optimum cancellation under changing conditions. Integrated into the controller package are eight high powered amplifier modules. The controller has front panel failure lights to indicate any system problems to the customer.

The cancellation loudspeakers are capable of matching the sound power generated by the noise source (fan, pump, or engine). An acoustically transparent diaphragm is often used to isolate the driver from the exhaust environment.

The detection microphones are able to measure high sound pressure levels (150 dBspl) without significant distortion. They are designed to perform continuously in wet, corrosive exhaust streams.

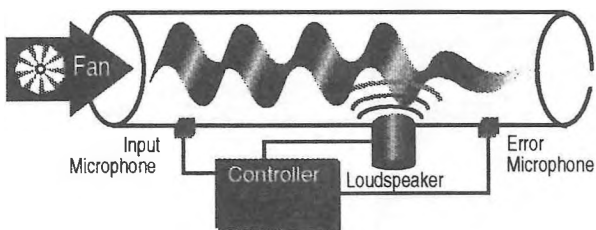


Figure #1: Component Layout of Active Silencer

Although hardware improvements have played a major role in making this technology more competitive with existing technology, the accumulation of substantial amounts of field knowledge has also played an important role. This knowledge has allowed for the development of a fairly broad application window.

A summary of the current application guidelines for active silencers:

- \*Tonal & Broadband reduction of 10 -30 dB.
- \* Performance from 31- 500 Hz.
- \*Upper temperature limit of 400 degrees F.
- \* Flow velocity of <8000 fpm.
- \* Maximum sound power of 135 dB.

The silencer can now be placed directly downstream of the noise source or packaged with an absorptive silencer for additional mid frequency noise control. All hardware is placed outside the flow stream and imparts no additional pressure drop on the system. Figure #2 depicts a typical industrial installation on a large centrifugal fan application. On fan applications it is often possible to place all active components in the first duct diameter from the fan.

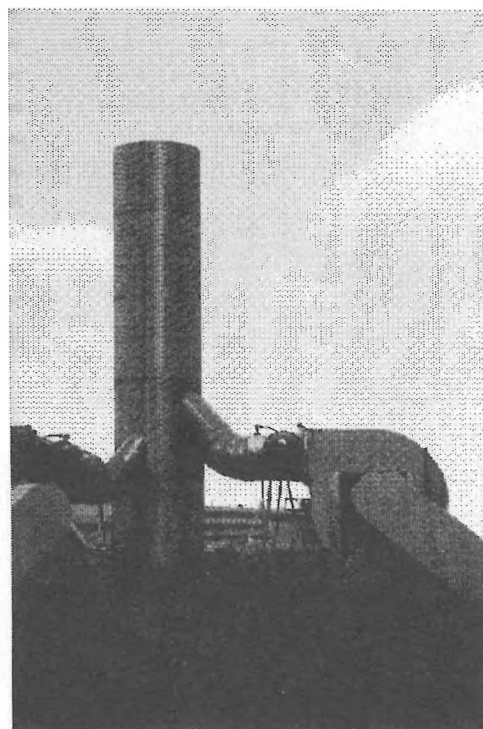


Figure #2: Field Installation of Active Silencer