

# ACOUSTIC LEAK LOCATOR - ALL™



*Does your boiler  
have a leak?*

Locate high pressure leaks using the  
Acoustic Leak Locator for the following:

- Boilers
- Steam piping
- Feedwater Heaters
- Headers
- Valves
- Pressure Vessels

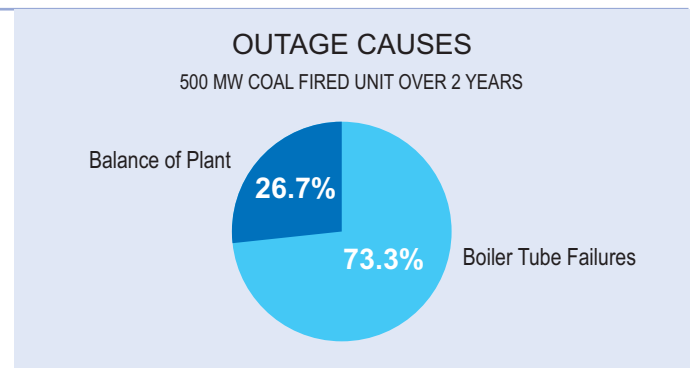


# The Beginning

In 1982, the Babcock & Wilcox Company developed hardware parameters for leak detection in high pressure boilers. After promising results B&W contracted Hartford Steam Boiler Technologies (HSBIT) to design a reliable system to their particular specifications. HSBIT'S Michael Shaw was given the task of designing the system - Acoustic Leak Locator (ALL™). In 1991, B&W purchased HSBIT and created Total SCOPE Products & Services for boiler operating efficiency. Mike Shaw moved to B&W and continued with ALL™ System until 1997 when B&W sold the assets of the ALL™ system to Michael Shaw, thus, Acoustic Monitoring International Inc was established. Through the years more than 2000 sensors have been installed in over 10 countries.

# The Problem

High pressure leaks cause extensive damage to adjacent components. Normal detection methods (manual inspection, makeup water use, temperature monitoring) can only find leaks of significant size that are already causing major damage. Undetected leaks can cause unexpected downtimes. Downtime cost can be significant, based on: the number of tubes needing repair, the type of repairs needed, the amount of outage hours the unit is off-line and unavailable. Downtime at peak hours incurs high replacement power costs.



# The Need

- Early detection of high pressure leaks for minimum damage
- Advanced notice of leak problems to minimize damage costs
- Controllable downtimes for repairs to lower replacement costs

High pressure leaks can cause extensive damage



# The Solution

ALL™ is a leak detection and warning system designed for the on-line monitoring of pressurized systems and valves. ALL™ can detect leaks as small as 5 mils-long before make-up water alarms.

ALL™ tells you that problems are developing before the situation becomes serious.

ALL™ provides the detailed data needed to know whether to make immediate repairs or simply schedule future maintenance at an opportune time.



# The Benefits of ALL™

- Vital early warnings
- Significant cost savings-get return after just one leak
- Accurate leak detection
- Modular in design: 2 to 16 channel per control unit
- Can be expanded as per requirement
- Multiple leak detection capability
- Easy to use



# How ALL™ Works

ALL™ detection technology is based on high-frequency acoustic emissions emanating from sites of gas or fluid leakage through orifices, cracks and corrosion in pressurized systems.

Sensitive piezoelectric sensors mounted to the structure on waveguides transform these acoustic waves to electronic voltage signals, which are amplified, filtered and processed to determine energy content.

The signal output is monitored continuously on each channel and alarm levels can be defined independently by channel to know time and location of leak.

## System Layout

**Acoustic Sensors:** AMI has designed acoustic sensors mounted on the ends of waveguides. The waveguides are mounted on boiler access doors, observation doors or unused sootblower ports. The waveguide provides a smooth continuous acoustic path (much like an ear canal) to the sensor and provides thermal protection by eliminating the direct radiant heat of combustion that could overheat the sensor. A secondary purpose of the waveguide is to prevent fly-ash or wash water from directly contacting the sensor diaphragm.

The sensor is a highly sensitive pressure transducer utilizing piezoelectric crystals with acceleration compensation circuitry to minimize extraneous signals due to mechanical vibrations. This is specially designed for detection of leaks in high pressure and/or high temperature environments on the gas side of furnaces and convection passes of boilers.

**Preamplifier:** The ALL™ preamplifier housed in conduit box between the sensor/waveguide and the ALL™ control system provides the first stage of signal conditioning. An operating boiler

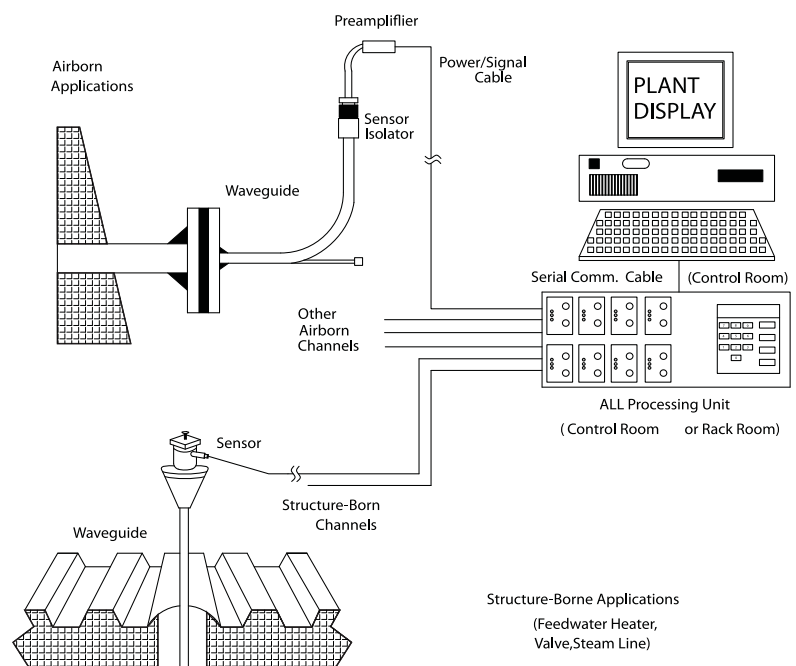
## Key Features

- Airborne/structure borne or combined applications
- Modular design 2 to 16 channels per enclosure
- Dual signal processing module
- Microprocessor control in each module
- Programmable gain of 60dB in 2dB steps
- Bandwidth from 1Khz to 500Khz, unfiltered
- Jumper selectable airborne/structure borne filter range
- Continuous RMS signal processing on each channel
- Programmable Hi & Lo alarm thresholds, delays for each channel
- Solid state alarm output relays (optional)
- 4-20 ma/0 -5Vdc analog outputs for each channel
- Local keypad or PC controlled remote settings
- Key lock protection of parameter settings
- Internal memory to save setting due to power loss
- RS 232 or RS 422 serial I/O communication option
- TCP/IP convertor optional
- All modules are bus connected for ease of trouble shooting

with no leaks has a characteristic low frequency (1KHz) rumbling sound due to high combustion noise. The ALL™ Preamplifier is designed to filter frequencies below 1 KHz and amplify acoustic frequencies above 1Khz to improve the signal to noise ratio of the system, allowing the system to be set to higher sensitivities for detection.

**Processing Unit:** ALL™ is a self-contained processing unit where acoustic signal and signal conditioning is completed for suitable processing. The dual signal processing unit receives the analog acoustic activity signal, processes it and compares it to preset level and timing parameters. The results are available on plant's existing computer system in required format.

## Typical ALL™ System Layout



## Companies using ALL<sup>TM</sup>

- ALBAMA POWER - CE BOILER
- AES THAMES - B&W BOILER
- GEORGIA POWER - B&W BOILER
- MISSISSIPPI POWER
- AMERICAN ELECTRIC POWER
- BALTIMORE GAS & ELECTRIC
- DAYTON POWER & LIGHT
- CINERGY POWER

### Partners in progress



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Empowering Industries

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### COMBUSTION MONITORING GROUP A Comprehensive Solution Provider

 <small>Acoustic Monitoring International Inc.</small>	Acoustic Monitoring International Inc, USA <a href="http://www.acousticmonitoring.com">www.acousticmonitoring.com</a>	Online Acoustic Boiler Tube Leak Detection System
	Lenox Instrument Co, USA <a href="http://www.lenoxinst.com">www.lenoxinst.com</a>	Flame Cameras
 <small>BONNENBERG + DRESCHER                  Projektentwicklung</small>	Bonnenberg + Drescher GmbH, Germany <a href="http://www.budi.de">www.budi.de</a>	Acoustic Pyrometer for Furnace Exit Gas Measurement Systems