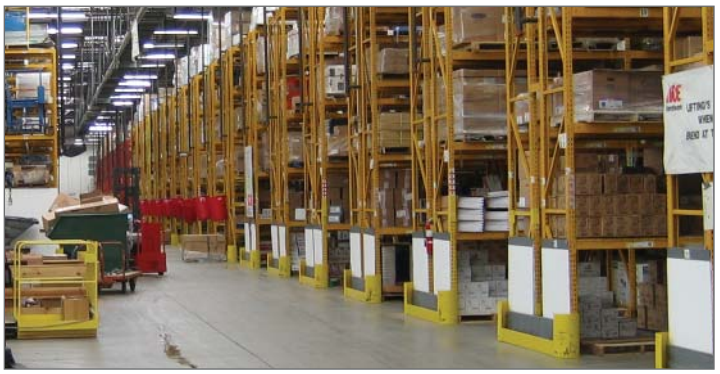
New Warehouse Sound System Improves Safety

ACE HARDWARE

Gainesville, GA

DISTRIBUTION CENTERS

Multi-Zone System



The Challenge

- Replace a poor sound system installed in 1989 in a 500,000 square foot warehouse
- Ability to separately or simultaneously page office and warehouse, and ability to independently select background music for both areas
- Ceiling is located 30 feet above a concrete floor
- Walls made of cinderblock and ceiling made of metal panels supported by steel girders
- Mezzanine area occupying about one-eighth of total area requires special placement of horns
- New sound system must deliver clear messages in case of accident, fire or tornado in English and Spanish to about 170 employees despite noise from a conveyor, other machines and vehicles used for moving hardware and checking inventory

The Solution

The objectives included installation of a paging system that would permit clear and intelligible messages and the ability to separately address employees in different areas of the warehouse or offices, or both together. There also had to be a provision for pre-recorded messages in English and Spanish.

Located in Gainesville, GA, ACE Hardware's regional warehouse's sound system was so poor that "employees would often ask, 'did you page me?' if they thought they might have been paged," said Buddy Honea, Facility Manager. With respect to background music, he added, "there was never any comment about the background music since they couldn't hear it anyway." The old speakers and amplifiers were the wrong type, according to Honea. "There were spots in the warehouse where it was difficult to hear pages, also," said Mike Clark, Technician for Black Box Network Services of Duluth, GA, who installed the new sound system. ACE Hardware wanted a sound system that would enable employees "to hear announcements clearly and distinctly, with no distortion," according to Clark. An improved sound system was installed to enhance safety and end the questioning by employees who were unsure if they have been paged.

Both office and warehouse can be paged simultaneously or separately and the background music can be set independently in both areas, according to Clark. Now managers can ensure employees hear crucial messages over the noisy conveyor and other warehouse sounds by increasing the volume to about 90 decibels (dB), the "voice of God" level, explained Clark. The 165 Bogen horn loudspeakers (SPT15A) in the warehouse can reproduce sound loud enough to ensure all employees can hear messages well despite noise from the conveyor and other warehouse equipment.

Honea considered another manufacturer's sound products but selected Bogen because of its reputation and because Bogen products were superior. Joe Menotti, a Telecommunications Specialist of ACE Hardware's Chicago headquarters, knew of Bogen Communications' good reputation and product reliability. After discussing the project with Honea, they selected new sound system equipment on the basis of solid reputation.

Installation

Tom Bisanti, Vice President, National Accounts of Bogen Communications, visited the ACE Hardware warehouse and then described the acoustic challenges to Al Gessman, Systems Design Engineer for Bogen Communications. Bisanti gave his full attention to the ACE Hardware installation, providing coordination between the installation team and the Bogen team, technical and design support and education. Honea had also sent blueprints and a completed site survey form to Gessman. Bogen offers a Free Design Service to help customers install the right sound components for the customers' needs and do it right the first time to exactly satisfy those needs cost-effectively. Bogen Communications provided design service free for the entire installation. Gessman discussed these recommendations with Clark and after the details were understood and considered, they decided on a specific plan for which components would be needed, where they would be mounted and how they would connect. "When there are special requirements, I discuss in detail design and sound components," said Clark. "It's easy to work with Bogen because the engineers are intelligent, they have years of experience and they're not dogmatic," he added.

BOGEN

Because this warehouse serves as a storage and distribution center (60,000 SKUs) for about 350 retail stores in eight states, the warehouse relies on 22 dock doors for inbound product and 20 dock doors for outbound items. With all the products entering the warehouse, and repackaging for retail stores, it was necessary to install the new amplifiers and speakers during weekends and some evenings. The size and complexity of this installation dictated that a 70-volt, distributed audio system would be the best approach. The Bogen M-Class Power Amplifier (M450) provides up to 900 watts of 70-volt power needed for long wire runs, massive power toroid and heat sinks, patented Back-Slope™ AC voltage stabilization, clip limiters, DC voltage, over-current, and thermal protection circuits.

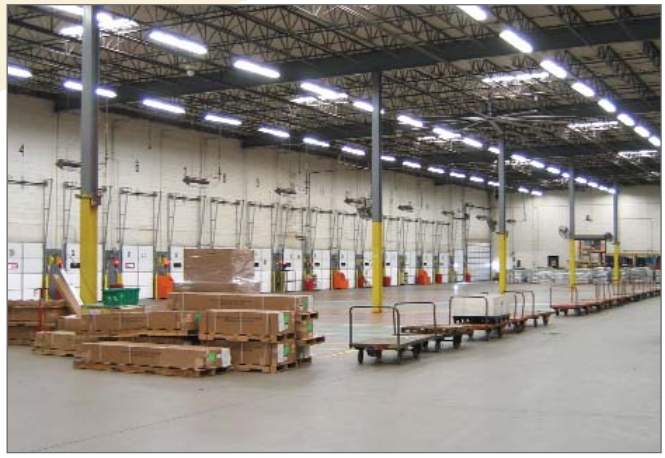
The installation occurred in phases. During the first two weekends, a five-man crew installed the new wiring, the next two weekends, the Bogen Horn Loudspeakers (SPT15A), Bogen Bi-Directional Horns (BDT30A), Metal Box Speakers (MB8TSL), a Foreground Speaker (FG15), and other equipment were installed. During the last two weekends, adjustments were made to ensure that no matter where in the warehouse a person was working, he or she could hear announcements, pages and music.

The Horn Loudspeakers (SPT15A) in the main warehouse were attached near the ceiling or 30 feet from the floor. In the upper part of the mezzanine, the speakers were located about 18 feet above the floor. Underneath the mezzanine, the speakers were put about 7.5 feet above the floor.

In the office areas, 41 Drop-In Ceiling Speakers (CSD1X2) allowed fast and simple installation, saving time, effort and cost. They easily fit into the existing suspended ceiling grid. In addition, these speakers meet the requirements of UL standard 2043 for smoke and heat release.

The project required emergency paging with tones, prerecorded messages and microphone announcements; plus time tones for shift change and break times. Four priority levels in the Bogen Power Vector Mixer (VMIX) can be set between the input modules in the VMIX. This lets different input sources, like a microphone and the Multiple Digital Message Unit (MDMU) override other less important input sources during emergencies. The versatility of the VMIX and its associated modules helps ACE Hardware meet its emergency paging requirements. The input sources include a microphone (MBS1000A), a Bogen CD player (CDC3), a Bogen Tuner (TP30D), a MDMU and satellite radio.

The Relay Input/Output Module (RIO1S) is an all-purpose interface module for external equipment. In this application, its ability to activate an override condition in the Single-Zone Universal Telephone Interface (UTI1) units when a module with a certain priority level or higher becomes active helps the customer make an emergency announcement immediately. These units are transformer-isolated and provide balanced line-level input.



"We used an Avaya Multiple Digital Message Unit (MDMU) with prerecorded announcements in Spanish and English for the emergency messages (fire and weather)," said Clark. Rather than look for a translator or have someone stand at a microphone and make the message live, ACE Hardware uses the prerecorded announcement to deliver the message.

Each message (up to 99 can be ready for playback) has a maximum length of almost four minutes. To prevent failure during power outages, this unit includes memory backup and battery backup of up to two hours.

Regarding sound system design, "Bogen Communications and Black Box did a great job," said Honea. After completing the installation, Bogen Communications and Clark offered training, manuals and user-friendly files for reference. More than just a product catalog, Bogen's *System Design & Buying Guide* provides an easy to understand system design guide.

Component Connection

Sound input sources include a Bogen CD Player (CDC3), a Bogen Tuner (TP30D), music from satellites, a Bogen Desktop Microphone (MBS1000A) and a tone-generating device programmed for shift changes. For the office, the first three feed into an input selector and it directs one input to a Bogen Telephone Paging Amplifier (TPU250) and it ports to the office speakers. For the warehouse and cafeteria, the overall connection starts with a page port from the phone system that is wired to a Bogen Digital Feedback Terminator (DFT120) and is connected to a Bogen Single-Zone Universal Telephone Interface (UTI1). Wires from

the Utility Amplifier (GA2) extend to the M-Class Power Amplifier (M450) for the warehouse and cafeteria, to the Telephone Paging Amplifier (TPU250) for the lower mezzanine and to the Telephone Paging Amplifier (TPU100B) for an aerosol can storage area where explosion-proof horns were used.

The Power Vector Mixer/Pre-amplifier (VMIX) prioritizes the microphone, Multiple Digital Message Unit (MDMU) and the bell-tone generating device using Microphone Input Modules (MIC1S) and two Transformer Balanced Auxiliary Input Modules (TBL1S). The override function provides high priority to all of the facility's areas.

A useful feature of Single-Zone Universal Telephone Interface (UTI1) units is the output limiter function. It doesn't matter if paging announcements are made by someone with a soft or booming voice because the limiter active indicator will distribute pages at a consistent volume. For application flexibility, an additional audio output provides a "page only" function.

The Results

"The sound is far better now," says Honea. The safety component in this system permits warehouse workers to hear cautionary messages in English and Spanish three times. ACE Hardware has improved the sound system to improve safety, according to Clark.

For background music, Honea can play music from conventional or satellite radio or a CD player with a three-disc changer. The Power Vector Mixer (VMIX) was designed to make connections to other sound system components as easy as possible. Its transformer-balanced output provides ground loop isolation and high noise immunity when connected to other balanced inputs of downstream components. This output can provide three output voltage ranges to accommodate just about any input type from a microphone input at –50 dBµ to a professional audio input requiring +4 dBµ, as well as a more common commercial level of –10 dBµ. "The background music is so much better now," explained Honea. "Now employees ask to listen to their favorite radio or satellite station."

The M-Class Power Amplifier (M450) contributes to sound quality through its low noise, low distortion and high slew rate. The amplifier will give years of trouble-free operation because its design incorporates DC, overload, short circuit and thermal protection circuits. To protect speakers, it includes a clip limiting circuit.

The improved communication at ACE Hardware in Gainesville may improve productivity through time-savings and eliminating miscommunication. More importantly, if an emergency ever occurs, employees will know what to do.

ACE® Hardware

Equipment List

The ACE Hardware system in Gainesville consists of four areas:

Warehouse:

- 165 Bogen 15-watt Horn Loudspeakers (SPT15A)
- 6 Bogen 1′ x 2′ Drop-In Ceiling Speakers (CSD1X2)
- 1 Bogen M-Class Power Amplifier (M450)

Mezzanine:

- 28 Bogen 30-watt Bi-Directional Horns (BDT30A)
- 22 Bogen 15-watt Horn Loudspeakers (SPT15A)
- 1 Bogen 250-watt Telephone Paging Amplifier (TPU250)

Office:

- 26 Bogen 1′ x 2′ Drop-In Ceiling Speakers (CSD1X2)
- 3 Bogen Metal Box Speakers (MB8TSL)
- 1 Bogen 15-watt Foreground Speaker (FG15)
- 1 Bogen Power Vector Modular Mixer (VMIX)
- 1 Bogen Microphone Input Module (MIC1S)
- 2 Bogen Transformer Balanced Input Modules (TBL1S)
- 2 Bogen Signal-Processing Relay Input/Output Modules (RIO1S)
- 1 Bogen Digital Feedback Terminator (DFT120)
- 1 Bogen Desktop Microphone (MBS1000A)
- 1 Bogen CD Player (CDC3)
- 1 Bogen Tuner (TP30D)
- 1 Avaya Multiple Digital Message Unit (MDMU)

Cafeteria:

- 9 Bogen 1′ x 2′ Drop-In Ceiling Speakers (CSD1X2)

Key Products

15W & 30W
Metal Horn
Loudspeakers

CSD1X2
Drop-In Ceiling Speaker
(1'x2')

MBS1000A
Desktop Paging
Microphone

MDMU AVAYA
Multiple Digital
Messaging Unit

M-CLASS
Power Amplifiers

TPU SERIES
Telephone Paging
Amplifiers

V-MIX
Power Vector
Modular Mixer

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