



SOLUTION GUIDE

CLASSROOMS

Audio Visual System Solutions for Education



CLASSROOMS

Classrooms are the bedrock of school campuses, found in nearly every building. They vary in size and serve a variety of departments, faculty members and students. While academics differ widely by degree, audio visual technology needed in classrooms to support instruction is similar. The AV system must be designed so professors feel comfortable operating it, and every student can see and hear the information being presented. In addition, technology managers need a system that can be duplicated from room to room, so it is simple to manage. After all, the goal is to create a positive learning environment!



COMMON ACTIVITIES

- Wirelessly transmit multimedia content from tablets, phones or laptops
- Connect computers to one or more displays to view multimedia content
- Video conference with other sites
- Record lectures for online learning
- Adjust lighting and temperature controls
- Stream audio and video to overflow locations
- Receive support from an AV help desk with real-time equipment monitoring

HARMAN HAS A DIVERSE PORTFOLIO OF AV TECHNOLOGY FOR CLASSROOMS

HARMAN is the leading manufacturer of professional audio, video and control technology found in modern classrooms. Our technology seamlessly combines different AV systems under one platform that can be centrally managed to ensure the best classroom functionality. These comprehensive systems improve the quality of information delivery and lead to more effective learning.

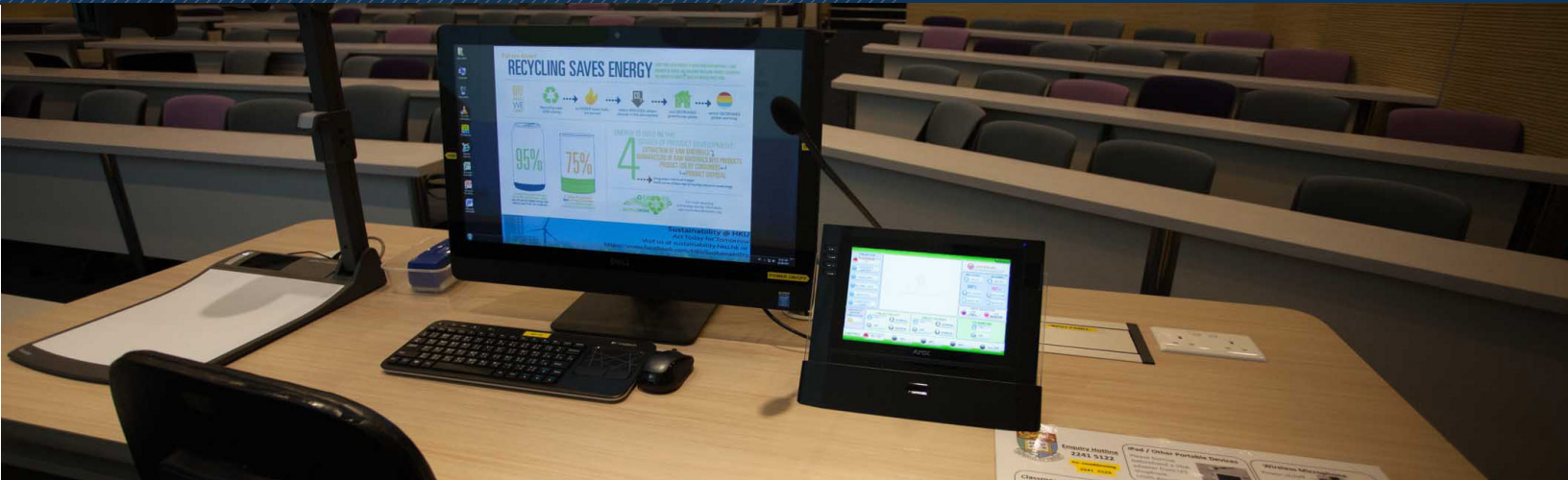


TYPES OF AV SYSTEMS OUR TECHNOLOGY CAN BUILD

- AV Control & Automation System
- Sound Reinforcement System
- Collaboration & Conferencing System
- Room Scheduling & AV Asset Management System

WHAT IS AN AV CONTROL & AUTOMATION SYSTEM?

In a classroom, the AV Control & Automation system centralizes the input and output signals from different audio, video and computer devices. It simplifies the selection and operation of various sources, so teachers, guest lecturers and students feel comfortable operating the room's technology and confident that it supports the lessons for their classes.



THE CORE BUILDING BLOCKS OF AN AV CONTROL & AUTOMATION SYSTEM WITH AMX BY HARMAN



THE USER INTERFACE

The User Interface (UI) is the remote control for the AV system. A UI can be as simple as a keypad to as sophisticated as a full-color touch panel. The purpose of the UI is to simplify the operation of the AV system with intuitive controls and automated functions (such as powering on/off several devices simultaneously or changing lighting presets). AMX by HARMAN offers a wide variety of UIs, including Modero Touch Panels and the Massio ControlPad.



ARCHITECTURAL CONNECTIVITY

Bring Your Own Device (BYOD) has become a standard practice throughout many schools. Connecting personal devices to a classroom AV system requires different types of AV cables. The AMX HydraPort consolidates all of the cables and ports needed to connect to the AV system inside a sleek, surface-mounted enclosure. HydraPorts are customizable with swappable input modules, power outlets, keypads and retractable cables



SWITCHING & CONTROL

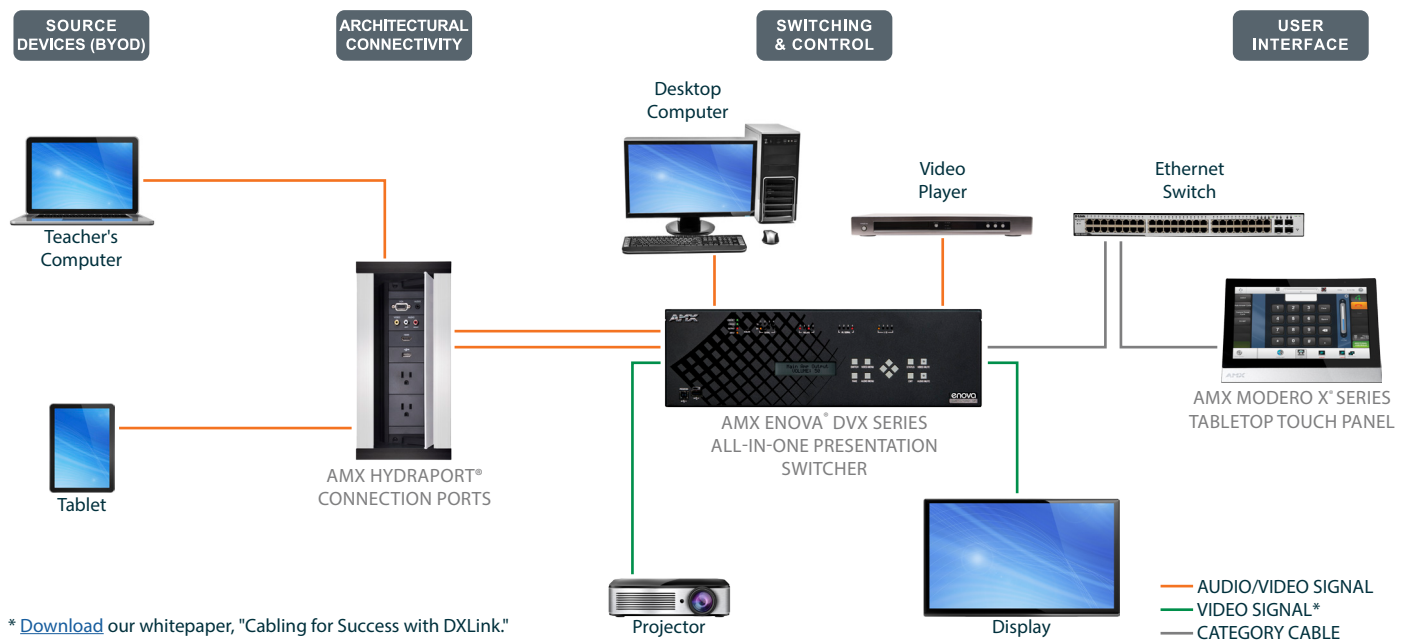
The Audio Video Switcher and Master Controller are the central hub of classroom AV systems. The AV Switcher brings in all audio and video sources, manages the signals, automatically scales the video to the optimum resolution and routes them to displays or other devices. The Master Controller is the brain of the system, which coordinates functionality with the user interface and communicates to other AV devices. The AMX Enova DVX series of AV Switchers combines the Master Controller, video scaling, microphone mixer and AV Switcher into one box, making it the perfect core for an AV system.

Enova® DVX

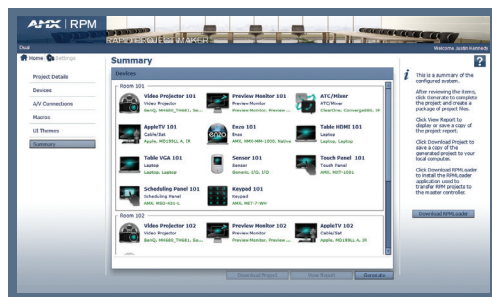
TIPS FOR DESIGNING THE AV CONTROL & AUTOMATION SYSTEM

- Make a list of all the necessary source devices in the AV system, including each device's inputs and outputs. This defines the minimum size of the Audio Video Switcher and Master Controller needed to serve the classroom.
- Determine the functions users require to operate each source device in the system. This determines the minimum number of buttons the user interface requires and the presets to program.
- Decide where users connect their devices to the switcher. For example, will the connection be made at a HydraPort in the lectern or an AV plate in the wall? Consider the cable types needed for connectivity, the length of these cables and any potential tripping hazards.
- Decide if you want to have the help desk accessible from the user interface. Being able to call the help desk directly from the user interface alleviates users' fears if they need assistance while using the system.

AMX AV CONTROL & AUTOMATION SYSTEM CONCEPT FOR CLASSROOMS



RAPID PROJECT MAKER HELPS YOU BUILD THE PERFECT AV CONTROL & AUTOMATION SYSTEM



RAPID PROJECT MAKER

Rapid Project Maker, or RPM, is a cloud-based software application that guides you through the process of selecting, configuring and connecting your devices, such as switchers, touch panels and displays. With RPM, you can program your AV controller and create an elegant user interface with no programming skills, and save hours of time versus traditional code-based programming. This software is free to our registered users.

To learn more about RPM, visit www.amxrpm.com.

WHAT IS SOUND REINFORCEMENT IN A CLASSROOM?

The Sound Reinforcement (or Public Address) system is a means to control the volume of speech or music and distribute the sound, so it can be heard intelligibly by the audience. Based on the size of the classroom, this system can be simple or moderately complex, based on the needs and/or the challenges presented by the room itself. What do users really need in the classroom?

THE INSTRUCTOR needs a hands-free wireless microphone to wear while lecturing, so he or she can move about freely. Additionally, instructors need the ability to connect a laptop, video player or other device to share presentations or play multimedia and high-definition movies.

STUDENTS depend on the Sound Reinforcement system to hear their instructor, especially when seated farther away. In larger classrooms, students benefit from having boundary microphones installed into their desks for question-and-answer sessions. In smaller classrooms, a wireless handheld microphone is an acceptable solution to pass around if students need a microphone. The use of a listening assist system is important for ADA compliance.

TECHNOLOGY MANAGERS want a Sound Reinforcement system that is “set it and forget it.” These managers depend on a setup that can’t be tampered with and know when a dedicated sound engineer is required to operate the system.

For a more in-depth discussion on Sound Reinforcement systems design, we recommend [AUDIO ENGINEERING FOR SOUND REINFORCEMENT](#), by John Eargle and Chris Foreman. Find more information on this textbook here: http://www.jblpro.com/press/audeng_book/book.html.

THE CORE BUILDING BLOCKS OF A HARMAN SOUND REINFORCEMENT SYSTEM FOR CLASSROOMS



WMS Series
Wireless Mic
Systems

DAM Series
Gooseneck Mic
Systems



MICROPHONES

In classrooms with 30+ seats, a Wireless Clip-On (or lavalier) microphone is traditionally used for the roaming instructor, a Gooseneck for speaking at a lectern and a boundary microphone or wireless handheld microphone for students in their seats. AKG by HARMAN is a leading manufacturer of high-quality microphones. For more information, visit www.akg.com.



JBL Commercial Mixer Amplifiers (CSMA)



MIXER & MIXER-AMPLIFIERS

A small rack mount mixer is an appropriate solution for small sound reinforcement systems in a classroom. A sound reinforcement system is considered small when the total number of audio inputs is less than eight; total number of outputs is less than three channels; and the power requirements are equal to or less than 120W per channel. JBL Commercial has created a family of high-quality mixer and mixer-amplifier products, based on our Crown and dbx technology, that provides clean, high-quality, reliable power and processing in a small, energy-efficient footprint. For more information, visit www.jblcommercialproducts.com.



ComTec DriveCore™ Series Amplifiers



AMPLIFIERS

To power passive loudspeakers, you need a reliable amplifier. Crown by HARMAN manufactures a broad range of two-, four- and eight-channel amplifiers, which include models that are networkable and have onboard DSP. For more information, visit www.crownaudio.com.



Installed Sound Loudspeakers



LOUDSPEAKERS

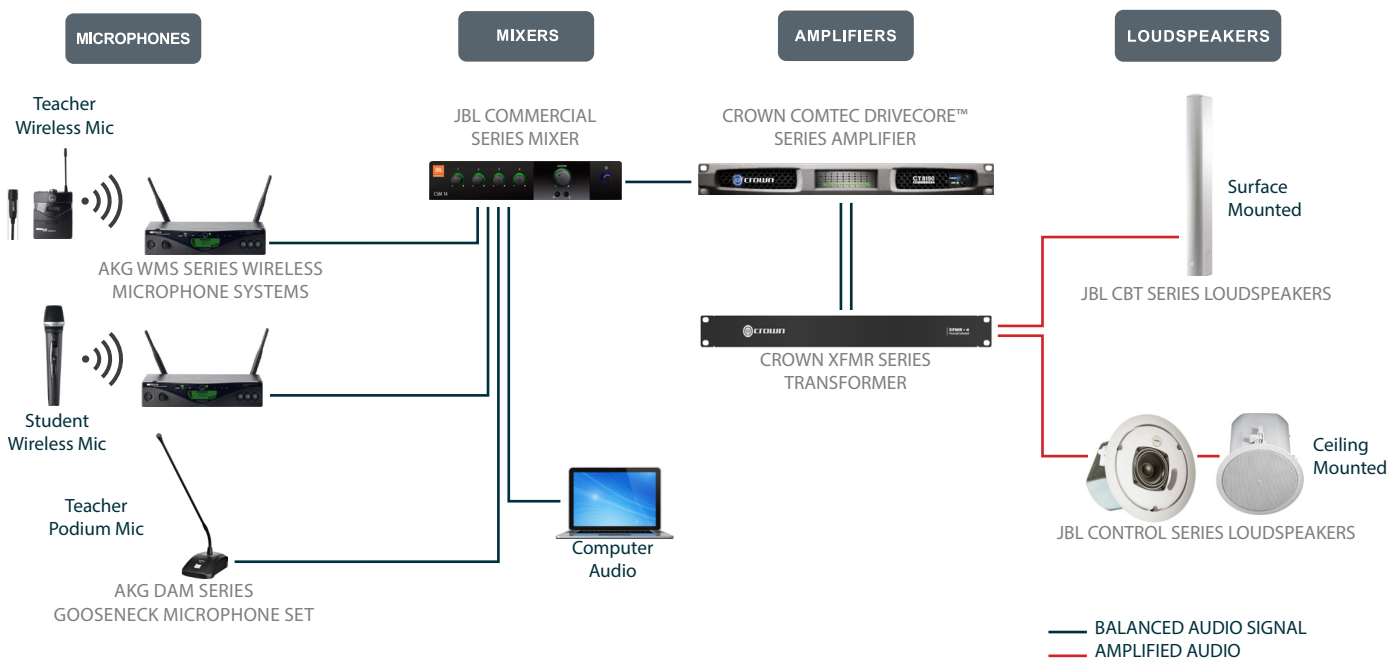
A classroom may have several different loudspeaker requirements, such as ceiling speakers for distributed audio and front of house speakers for music/voice. JBL by HARMAN is trusted by professionals around the world for manufacturing high-quality, installed sound loudspeakers. For more information, visit www.jblpro.com.

TIPS FOR SOUND REINFORCEMENT SYSTEMS IN CLASSROOMS

- Wireless microphones should be available for instructors and students. Gooseneck microphones should be mounted onto the AV furniture (if applicable). It is a best practice to provide a charging dock for wireless microphone transmitters to avoid problems with batteries.
- Loudspeakers should provide high intelligibility and thorough coverage for all seated listeners.
- Basic control of volume and audio source selection should be available for classroom users.
- Assisted Listening System should be compatible with the Sound Reinforcement system.
- Emergency Paging System should be capable of muting room PA system.
- Sound Reinforcement system should be expandable to provide future input and output connections.

For more help on finding resources for HARMAN audio brands, visit <http://info.harmanpro.com>.

HARMAN SOUND REINFORCEMENT SYSTEM CONCEPT FOR LARGE CLASSROOMS



SOUND REINFORCEMENT SYSTEM RESOURCES

AKG Installed Sound Application Guide: http://www.ake.com/media/db/10249/1308_akginstallsoundcatalogue_en.pdf

Crown Amplifier System Design Tools: <http://www.crownaudio.com/en-US/tools/calculators>

JBL Professional Speaker Selector Tool: <http://www.jblpro.com/www/product-support/speaker-selector>

JBL Speaker System Design Software: <http://www.jblpro.com/www/products/installed-sound/system-design-software>

JBL Commercial Education Application Guide: http://jblcommercialproducts.com/en-US/support_downloads

WHAT IS A COLLABORATION & CONFERENCING SYSTEM?

Collaboration & Conferencing Systems facilitate presentations through screen mirroring of wireless devices, provide access to cloud-based services, like web conferencing and file sharing, and enable the ability to record lectures for online archiving or real-time streaming.

FOR INSTRUCTORS, the presentation system provides secure access to content and applications. When a class concludes, the instructor can easily share files via a QR code, eliminating the need for paper handouts. A Lecture Capture Encoder allows instructors to record their lesson content in real-time to create video files for their students to watch before future classes and/or to stream live over the web to distance learners. Web conferencing enables instructors to connect their classes with other sites for expanded learning opportunities.

STUDENTS benefit from the presentation system, because it empowers them to collaborate proactively with the rest of the class through their own wireless devices (BYOD), using screen mirroring. Thanks to QR code sharing, students can instantly pull down presentation content from the instructor to their devices for independent study. Web conferencing gives students a chance to connect with classmates in distant locations.

TECHNOLOGY MANAGERS like collaboration systems, because they can replace the room PC. This reduces energy use, software license costs and maintenance/startup time. The conferencing system can also be managed remotely through the help desk.

THE CORE BUILDING BLOCKS OF A HARMAN COLLABORATION & CONFERENCING SYSTEM



Enzo®

CONTENT SHARING PLATFORM

Enzo® by AMX is a PC replacement that allows users to present directly from their devices through wireless screen mirroring. Enzo includes onboard web-based applications, like a web browser, Skype®, MirrorOp® and document viewers.



Sereno™

VIDEO CONFERENCING CAMERA

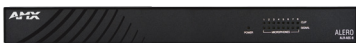
Using a Sereno at each student table can be a cost-effective option for individual web conferencing, where a Pan-Tilt-Zoom Camera is cost prohibitive. The Sereno is a simple video conferencing camera with a 120-degree field of view, a retractable shutter and USB connectivity.



H.264 Encoder

LECTURE CAPTURE ENCODER

The AMX H.264 Encoder connects directly to sources, including PCs, cameras and set-top boxes, and provides the onramp to stream video on a network. Once video is on a network, it can be played back in a variety of situations, such as on displays throughout a building, in a window within a digital signage message or used with a network media server, like AMX's Vision 2. Connect an H.264 Encoder to a camera to capture lectures, make them available live and record them for future playback. Users can also stream lectures to students watching live throughout the world on conference room displays, PCs or mobile phones. These robust encoders offer standardized, bandwidth-efficient encoding for SD and HD sources.



Alero

WEB CONFERENCING AUDIO MIXER

The AMX Alero Web Conferencing Audio Mixer is a dedicated microphone mixer for up to eight microphones, designed specifically for web conferencing applications, such as Lync® or Skype®. It also supports video teleconferencing (VTC) and audio conferencing systems.



Boundary Microphone Gooseneck Microphone

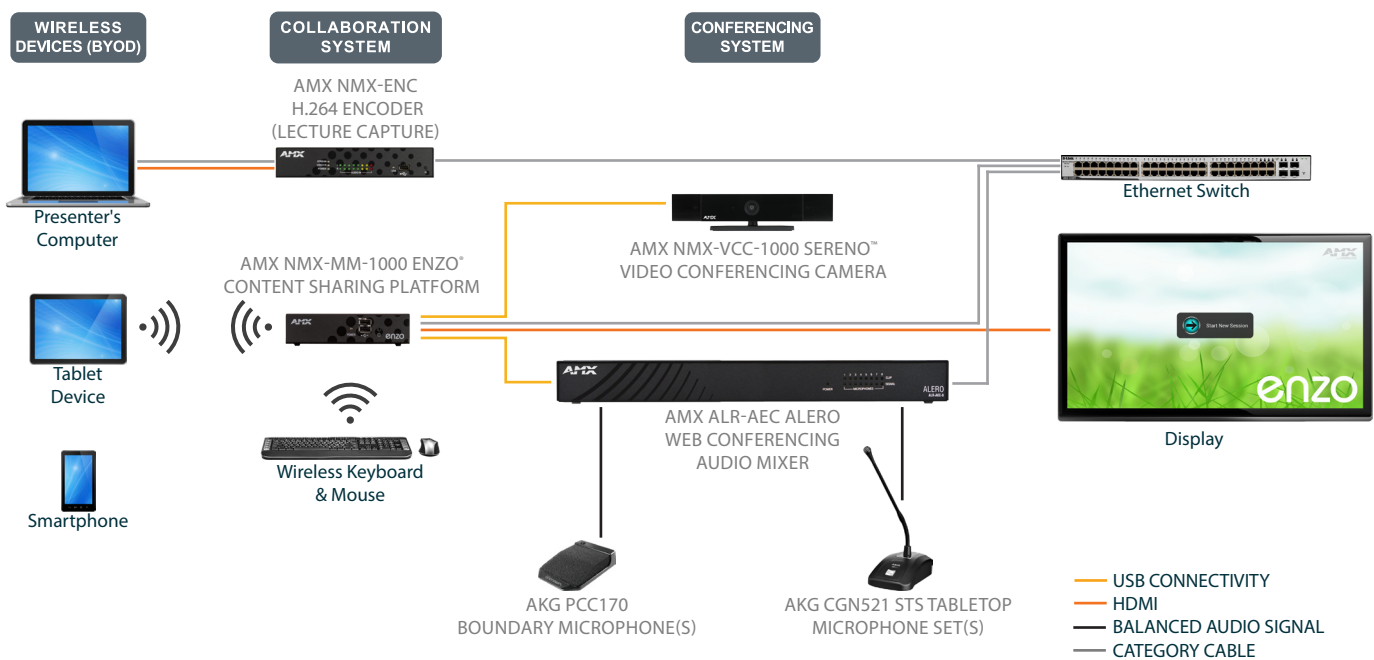
BOUNDARY & GOOSENECK MICROPHONES

Boundary microphones provide a wide pickup pattern for picking up multiple people seated close to each other. Gooseneck microphones are preferred for individuals who require their own microphones. They provide excellent isolation between seats. AKG by HARMAN has a diverse offering of Boundary and Gooseneck microphones that are perfect for conferencing systems.

TIPS FOR COLLABORATION & CONFERENCING SYSTEMS IN CLASSROOMS

- Provide at least one Boundary or Gooseneck microphone for every two seats.
- If using a camera for video conferencing, note line-of-site issues.
- If using a Pan-Tilt-Zoom camera, provide a button on or near the Boundary or Gooseneck microphone for a presenter to push, so the camera can zero-in on their location.
- Plan network permissions before installing Enzo, so presenters and students have access to files and can use the onboard applications.
- Provide appropriate AV cables for the collaboration system at student tables if wireless screen-sharing capabilities are prohibited.

COLLABORATION & CONFERENCING SYSTEM CONCEPT FOR CLASSROOMS



COLLABORATION & CONFERENCING SYSTEM RESOURCES

ENZO® by AMX: <http://www.amx.com/products/NMX-MM-1000.asp>

SERENO™ by AMX: <http://www.amx.com/products/NMX-VCC-1000.asp>

ALERO by AMX: <http://www.amx.com/products/ALR-AEC-8.asp>

H.264 Encoder by AMX: <http://www.amx.com/products/NMX-ENC.asp>

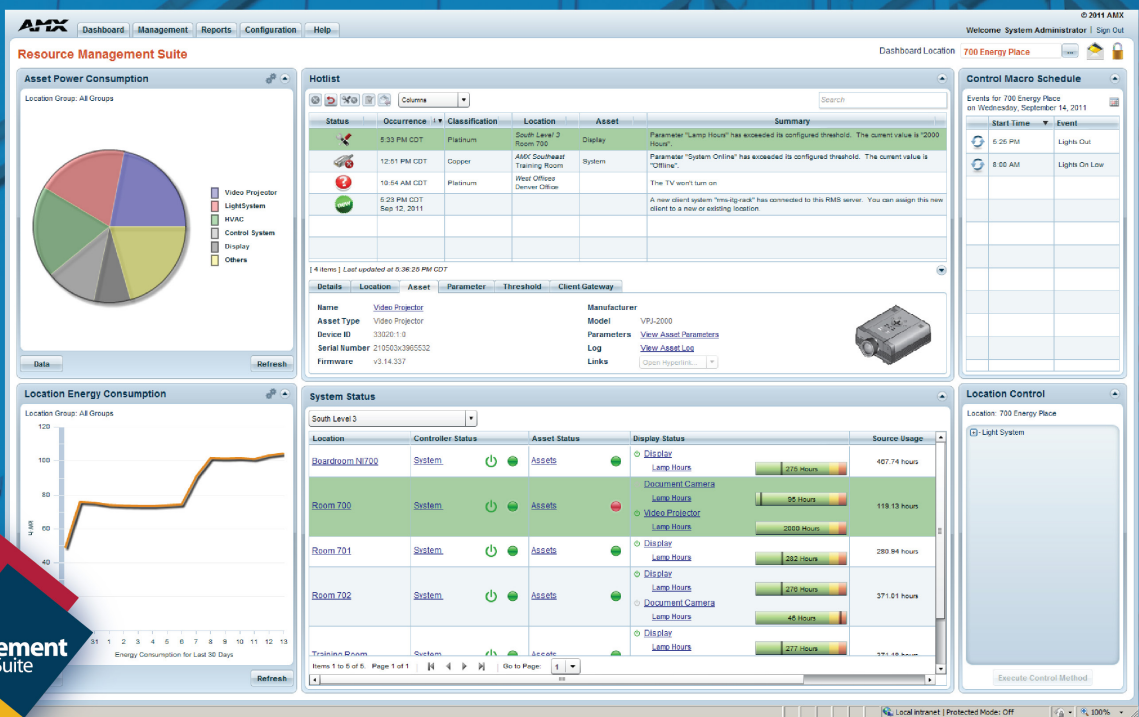
AKG Boundary Microphones: <http://www.akg.com/pro/microphones/speech-spoken-word/boundary-layer-microphones>

AKG Gooseneck Microphones: <http://www.akg.com/pro/microphones/speech-spoken-word/gooseneck-microphones>

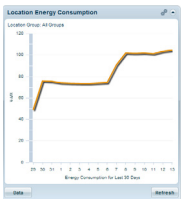
RESOURCE MANAGEMENT FOR CLASSROOMS: AV ASSET MANAGEMENT

It happens far too often. The institution invests in AV equipment, only to find that they are constantly chasing issues due to the lack of a centralized system for monitoring and managing the equipment. Even more frustrating, support personnel must visit each room in person to troubleshoot problems, since they have no way to communicate remotely with the AV equipment.

Resource Management Suite (RMS) Enterprise is scalable client/server-based software for IT and AV managers that provides remote management and scheduling capabilities for AV assets and building systems. The software features a user-friendly dashboard, making it easy to centralize the management and monitoring of AV equipment, lights, HVAC and other building functions. This allows IT and AV managers to proactively maintain AV displays before a bulb burns out and receive immediate notification when a device goes offline.

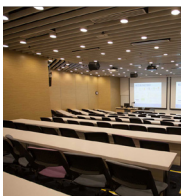


The RMS Dashboard



WIDGET-BASED GUI

RMS Enterprise includes a fully customizable dashboard layout for each secure user, including visual bar graphs, user-defined status and notifications, and hotlists displaying all current system exceptions and issues.



GO GREEN WITH ENERGY MANAGEMENT

Save money and the environment by remotely turning off equipment when the classroom is empty or on weekends. Track and run reports on energy usage for monitored assets.



CENTRALIZE THE AV SUPPORT DESK

Centrally monitor AV technology problems right from your IT support desk and remotely control AV devices in the classroom when instructors call in for help.



SOLVE TECHNOLOGY ISSUES PROACTIVELY

With active monitoring of AV technology in the classroom, AV support staff can setup automatic email alerts that give them the ability to proactively respond to issues as soon as they arise.

RESOURCE MANAGEMENT FOR CLASSROOMS: SCHEDULE MANAGEMENT

A college campus runs on classes and events, which are allocated facility resources through a master calendar. Schedule management systems, like Exchange, Lotus Notes or Google Calendar, provide a platform to centrally create and change schedules, so campuses can efficiently manage their classrooms. Once this schedule is created, however, how do students and instructors know if there is a room change, time change, cancellation or if that space is available for the next hour?

AMX's RMS Enterprise Scheduler is a comprehensive room schedule module that assists students and instructors in locating rooms by displaying the scheduled events on a touch panel adjacent to room entrances. It eliminates delays in class start times by automating the room technology, thereby eliminating the time typically spent on equipment setup.



CORE SCHEDULE SOLUTION PRODUCTS



RESOURCE MANAGEMENT SUITE ENTERPRISE SCHEDULER

Schedule rooms from any touch panel or PC. Integrate RMS with many popular scheduling platforms and display the room schedule on touch panels.



QUICK RESPONSE SCHEDULING

An alternative to a touch panel, this sleek acrylic wall panel displays the room schedule on mobile devices by scanning a QR code. It is elegant looking and simple to install without wires.



MODERO S SERIES TOUCH PANEL

Modero is a cost-effective way to display schedules outside any room. Mount on virtually any surface, including glass, and easily view red/green room availability lights to determine occupancy.

For more information about Resource Management Suite, please visit: <http://www.amx.com/resourcemanagementsuite/>

BRINGING TOGETHER THE HARMAN LARGE CLASSROOM AV SYSTEM

Our diverse catalog of audio, video and control technology provides everything you need to build comprehensive audio visual systems for classrooms.

In this diagram, we demonstrate one approach to merging AV Control & Automation, Collaboration & Conferencing, Sound Reinforcement, and Room Scheduling & Asset Management systems to create one unified system.

For more technical resources on our brands and product families featured in this diagram, we suggest the following websites:



<http://www.ake.com/pro/microphones/speech-spoken-word>
<http://www.ake.com/pro/wireless/wireless-microphones>



<http://www.amx.com/productinfo/>

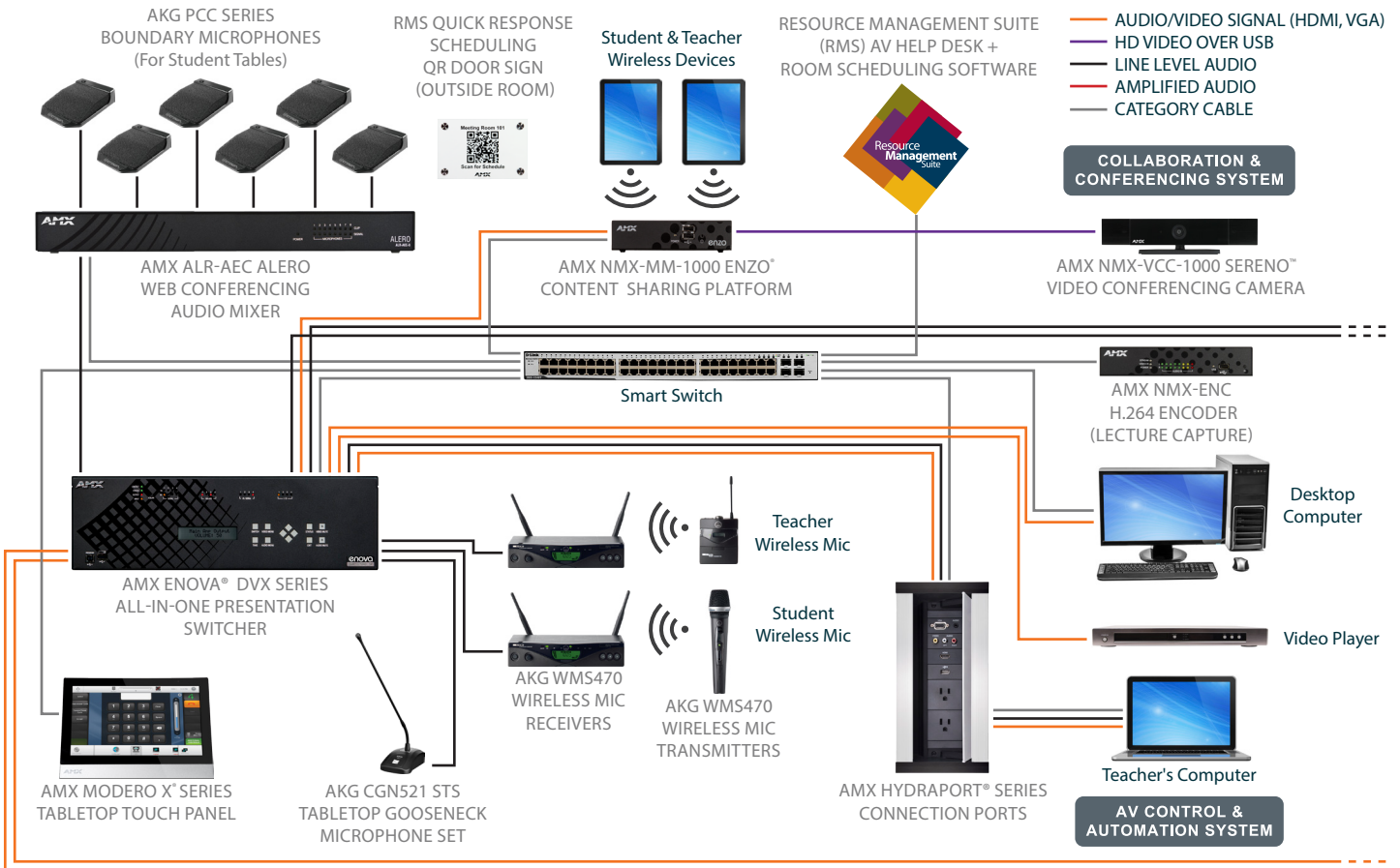


http://www.crownaudio.com/en-US/product_families/comtech-drivecore



<http://jblpro.com/www/products/installed-sound/cbt-series>
<http://jblpro.com/www/products/installed-sound/control-40-series>

HARMAN LARGE CLASSROOM AV SYSTEM CONCEPT

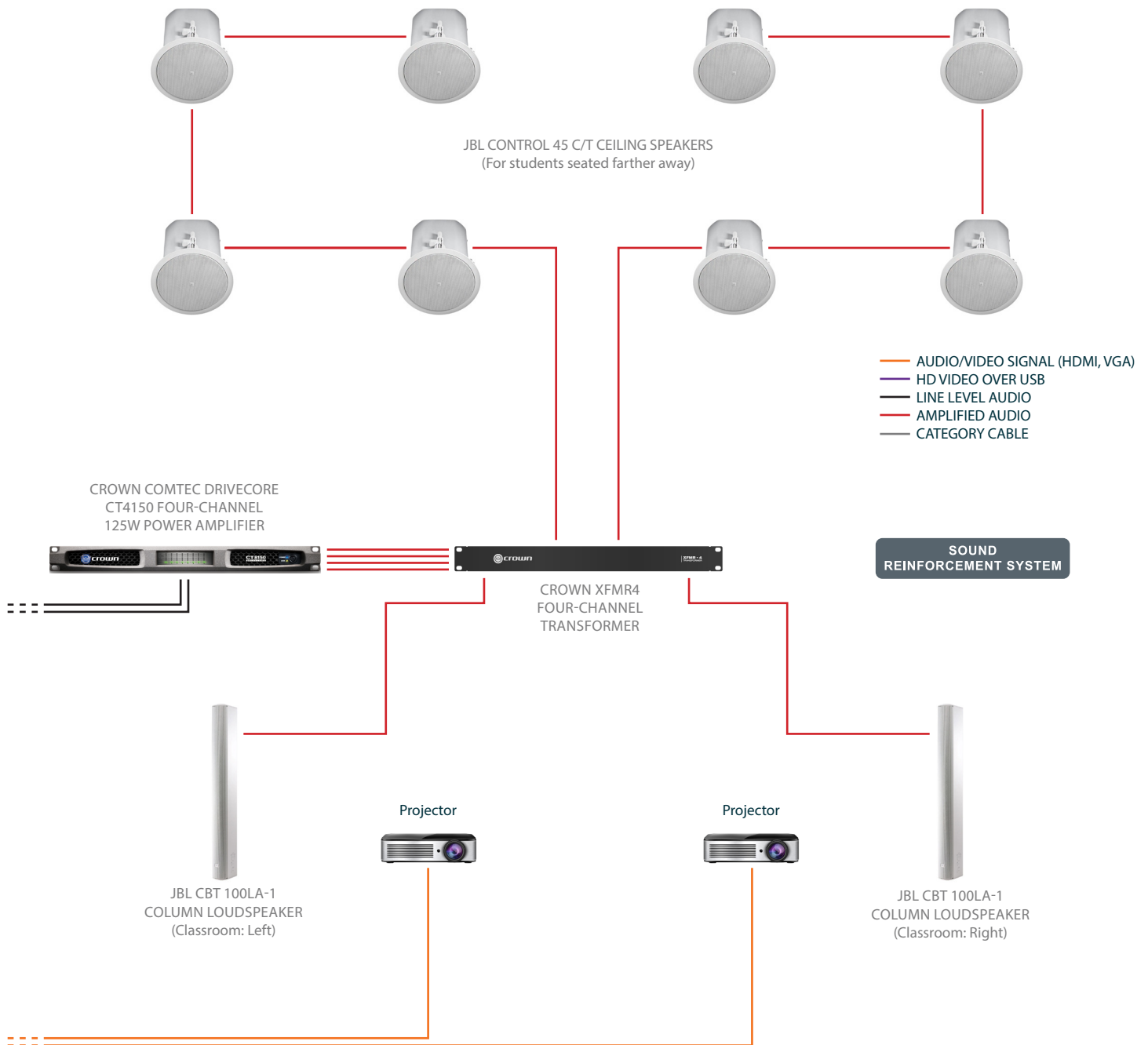


FOR MORE INFORMATION

Email us: education@harman.com

To contact a member of our Education Business Development Team, visit: <http://www.amx.com/automate/contactamx/>

HARMAN LARGE CLASSROOM AV SYSTEM CONCEPT (continued)





About HARMAN Professional Solutions

HARMAN Professional Solutions is the world's largest professional audio, video, lighting, and control products and systems company. We serve the entertainment and enterprise markets with comprehensive systems, including enterprise automation and complete IT solutions for a broad range of applications. Our brands comprise AKG Acoustics®, AMX®, BSS Audio®, Crown International®, dbx Professional®, DigiTech®, JBL Professional®, Lexicon Pro®, Martin®, Soundcraft® and Studer®. These best-in-class products are designed, manufactured and delivered to a variety of customers, including tour, cinema and retail as well as corporate, government, education, large venue and hospitality. In addition, our world-class product development team continues to innovate and deliver groundbreaking technologies to meet our customers' growing needs. For scalable, high-impact communication and entertainment systems, HARMAN Professional Solutions is your single point of contact.

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