



# Yamaha Installation Guide

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# Total Yamaha Solutions for Superior Installed Sound and Control

Installed sound is evolving rapidly and Yamaha is leading the field. No other manufacturer offers the total input-to-output support and quality that Yamaha provides simply because none has the background, know-how, and breadth of resources to bring to bear. The fact that Yamaha has been manufacturing musical instruments since 1887, and stands today as one of the world's largest general musical instrument manufacturers, contributes to an understanding of sound and music that plays a vital role in the design and manufacture of advanced professional audio equipment. Yamaha's track record in the commercial audio field is long and distinguished as well: 2007 marked Yamaha's 35th anniversary in the production analog mixing consoles, 30 years in the production of professional power amplifiers, and 20 years making industry-leading digital mixing consoles. Today Yamaha offers an extensive lineup of sound gear from the finest microphone preamplifiers and A/D converters to some of the best-sounding and most flexible speakers ever designed for installations, plus everything in between: mixing consoles, digital mixing engines, interfaces, audio networking devices ... just about every component you need to build state-of-the-art installed sound systems that deliver first-class flexibility and sonic performance. What's more, by going Yamaha from input to output you benefit from optimally matched performance and functionality throughout the entire system, and you know you're getting quality, reliability, and support that are second to none.

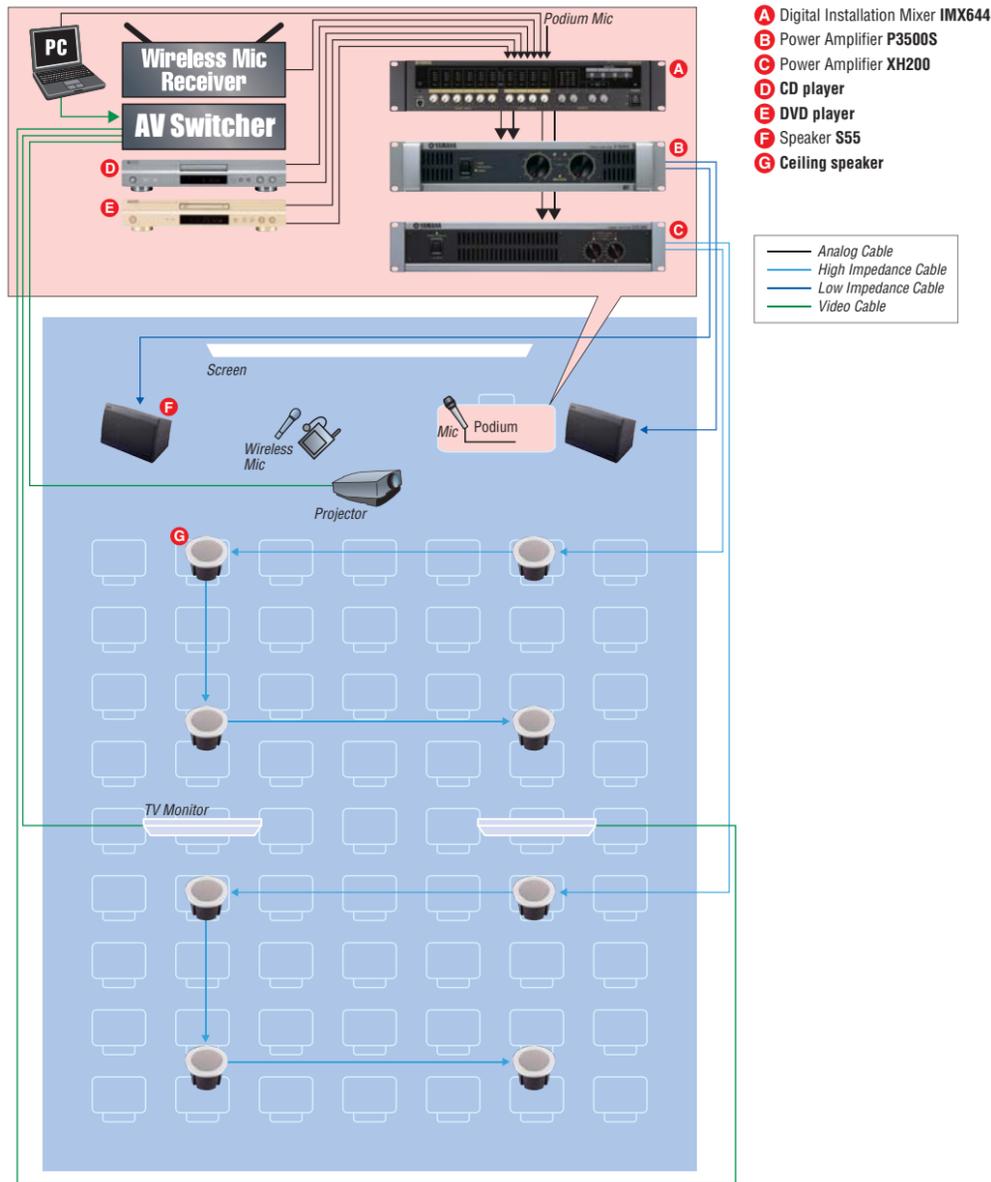
This brochure has been created to give you an idea of the range and scope of Yamaha's current commercial audio lineup, and how it can be combined and applied in a variety of venues and installations, small to large. Emphasis has been placed on describing systems that take advantage of the many benefits provided by the latest digital audio technology, including digital audio networking that can dramatically simplify and reduce the cost of the wiring infrastructure required for complex systems, and the provision of convenient, flexible control facilities that can be used even by inexperienced operators. Of course these are just examples, and the true power and capability of Yamaha commercial audio gear will be most evident in the system you design and build for your own specific needs.

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# Lecture Room (Small 1)

## Sample Application



This straightforward system is easy to set up and operate while providing plenty of power and flexibility for up to around 70 participants.

## System Details & Features

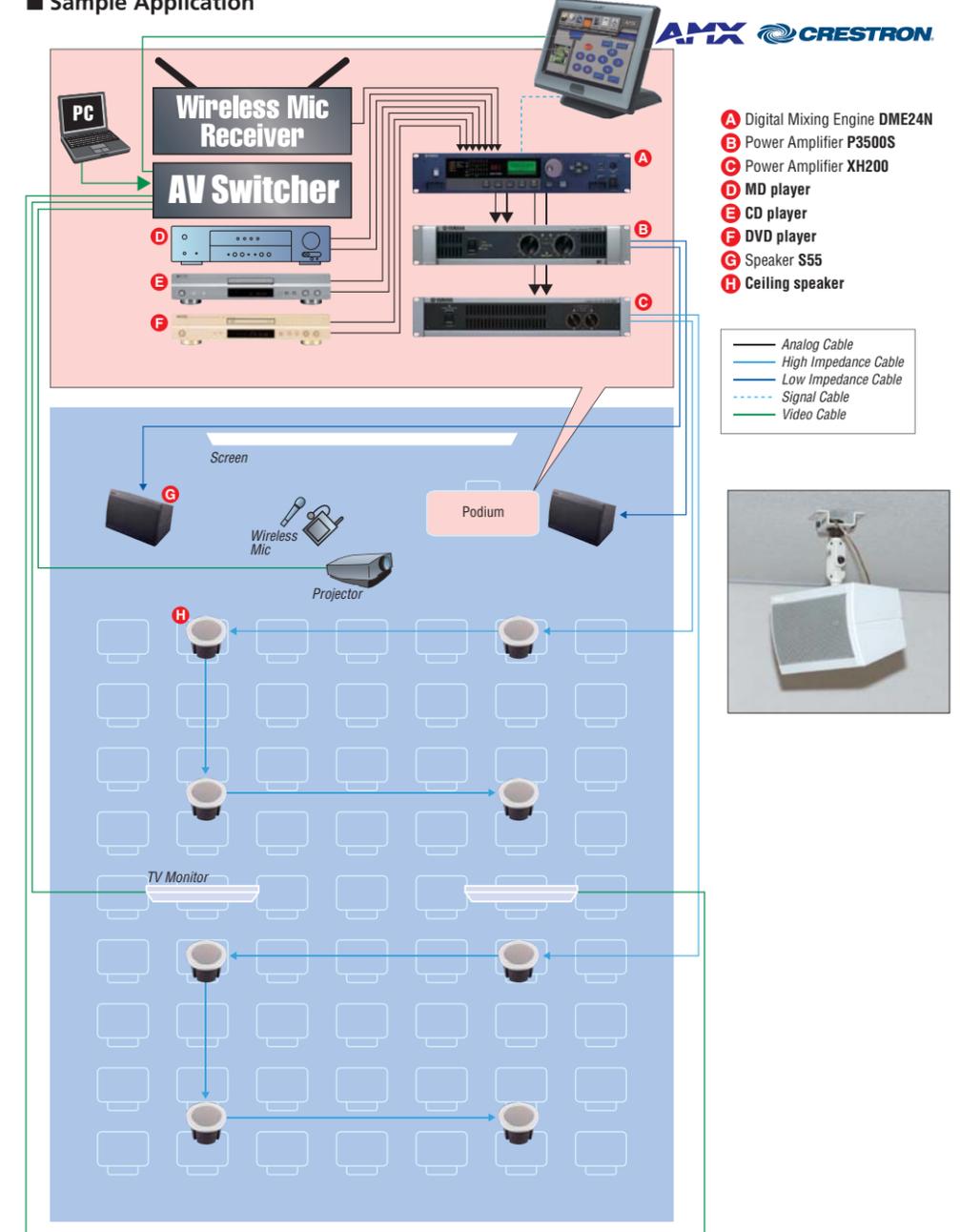
Central control is handled via a compact rack-mountable IMX644 digital mixing console featuring outstanding signal routing and control versatility as well as exceptionally high sound quality. Microphones can be connected to any of the six microphone inputs provided, or wireless mics can be handled via a separate wireless microphone receiver. Effective feedback suppression, equalization, and other signal processing functions are built right into the IMX644, so no other mixing or processing equipment is required. Other sources such as CD and DVD players can be connected to the mixer's stereo line inputs. The mixer, power amplifiers, equalizers, and input components can all be comfortably housed in a convenient rolling rack that can be positioned as required. The front speakers are a pair of compact two-way full-range S55 units powered by a P3500S power amplifier. The second speakers system is an array of eight parallel-connected ceiling speakers powered by an XH200 high-impedance distribution power amplifier. In addition to providing broad coverage, the volume of the front and rear groups of four ceiling speakers are independently driven from separate channels of the power amplifier, so the volume of each group can be adjusted separately to achieve optimum balance and intelligibility throughout the room. This surprisingly versatile sound system also complements the room's visual presentation facilities. Although the IMX644 mixer offers easy front-panel operation, it can also be used with AMX or similar touch-panel controllers if more sophisticated, integrated remote control operation is required.

Product details can be found at [www.yamahaproaudio.com](http://www.yamahaproaudio.com)

• Please observe safety regulations and procedures when installing speakers!

# Lecture Room (Small 2)

## Sample Application

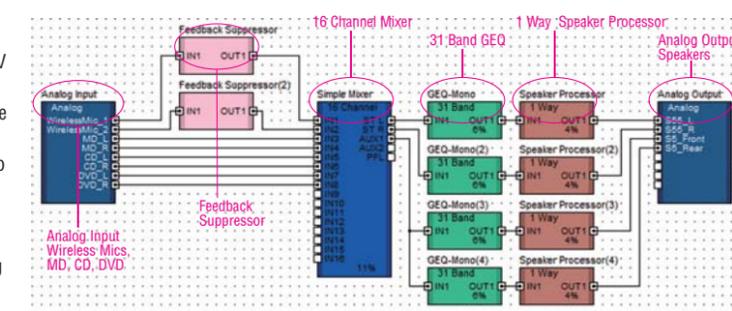


All digital core processing and touch-panel control make this system remarkably compact and easy to use.

## System Details & Features

The main difference between this system and the preceding system is that no mixer is used. All pre-amplification, processing, and signal routing is handled by a single DME24N Digital Mixing Engine with an AMX or Crestron type touch panel providing a control interface that anyone can easily use. The touch panel can also be linked to the AV switcher allowing coordinated intelligent control of audio and video functions, and even lighting and curtains if required. The power amplifiers and speaker systems are the same as those used in the preceding analog system, but the analog equalizers are omitted because the DME24N can easily handle all necessary equalization and more. Referring to the DME Configuration diagram to the right you can see that in addition to 31-band EQ components, each output also uses a speaker processor component that provides detailed speaker processing capabilities including delay, parametric EQ, limiting, and output level control. Also note the feedback suppressor components between the analog inputs and the 16-channel mixer component. The use of a DME24N in combination with a touch panel controller allows for extremely control and extensive flexibility when system adjustments are necessary, but for day-to-day use the operator can simply select the required preset functions from a menu provided on the touch panel interface.

## DME Configuration

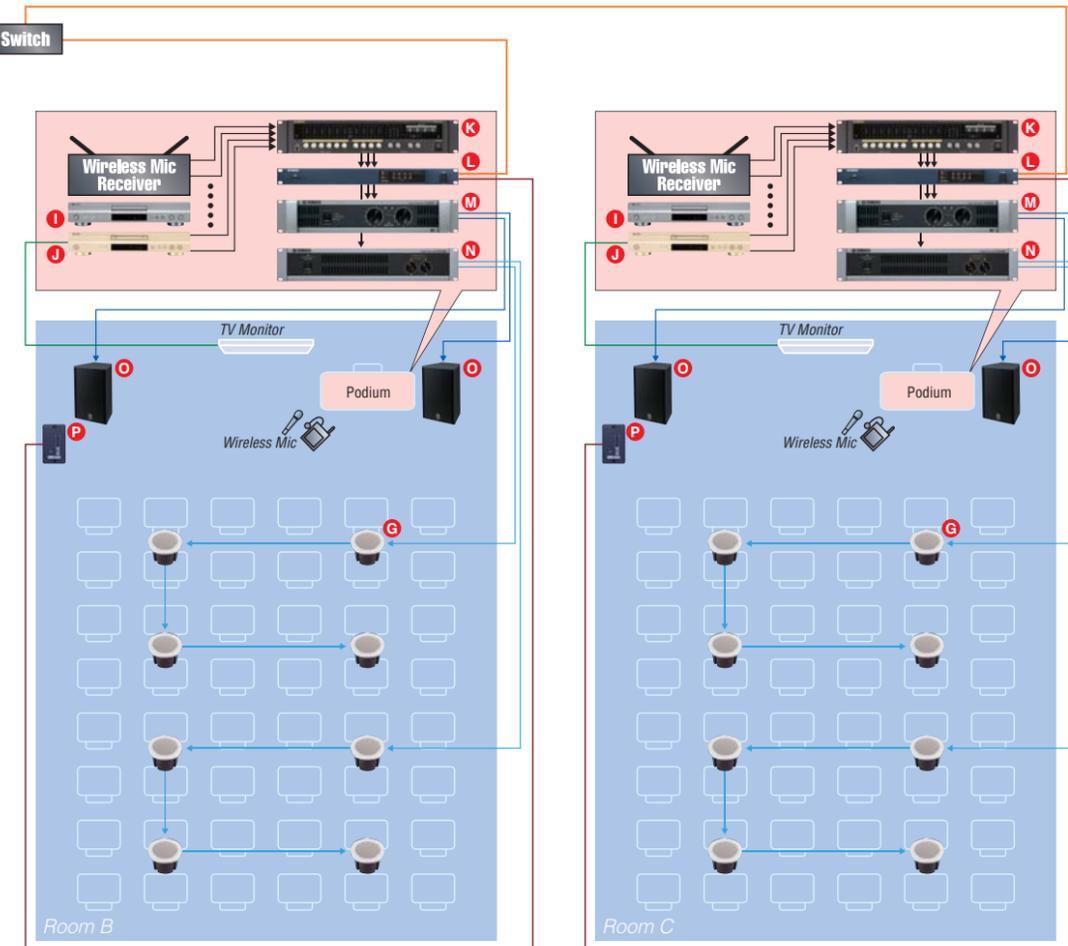
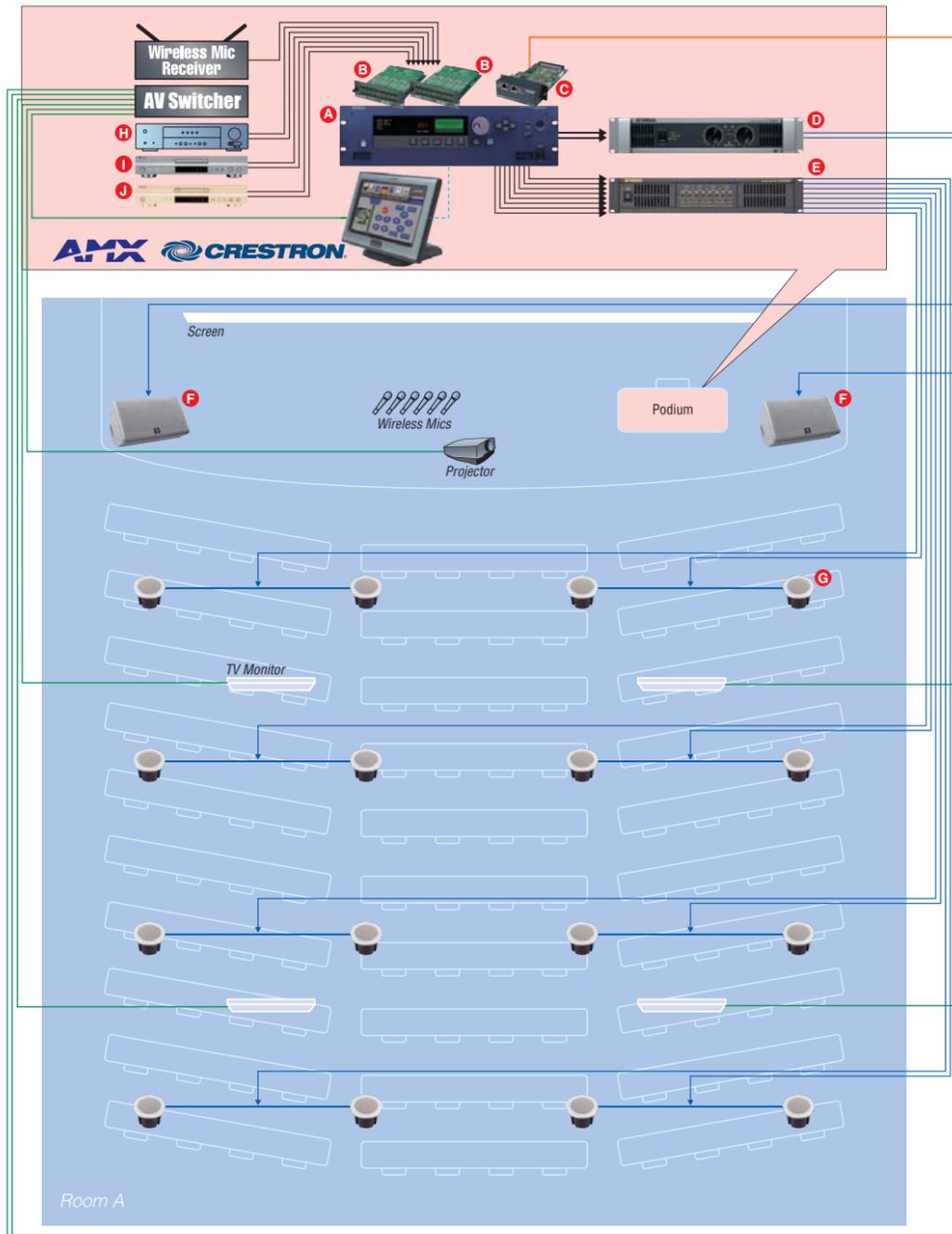


Product details can be found at [www.yamahaproaudio.com](http://www.yamahaproaudio.com)

• Please observe safety regulations and procedures when installing speakers!

# Lecture Halls: Network

## Sample Application



- A Digital Mixing Engine DME64N
  - B AD/DA Card MY8-ADDA96
  - C Digital Network Card MY16-CII
  - D Power Amplifier XP3500
  - E Power Amplifier IPA8200
  - F Speaker IF2108W
  - G Ceiling speaker
  - H MD player
  - I CD player
  - J DVD player
  - K Digital Installation Mixer IMX644
  - L Audio I/O Distribution and DSP Expansion Unit DME4io-C
  - M Power Amplifier P3500S
  - N Power Amplifier XH200
  - O Speaker C112VA
  - P Control Panel CP1SF
- Analog Cable
  - High Impedance Cable
  - Low Impedance Cable
  - LAN Cable(CAT5e)
  - GPI
  - Video Cable
  - Signal Cable

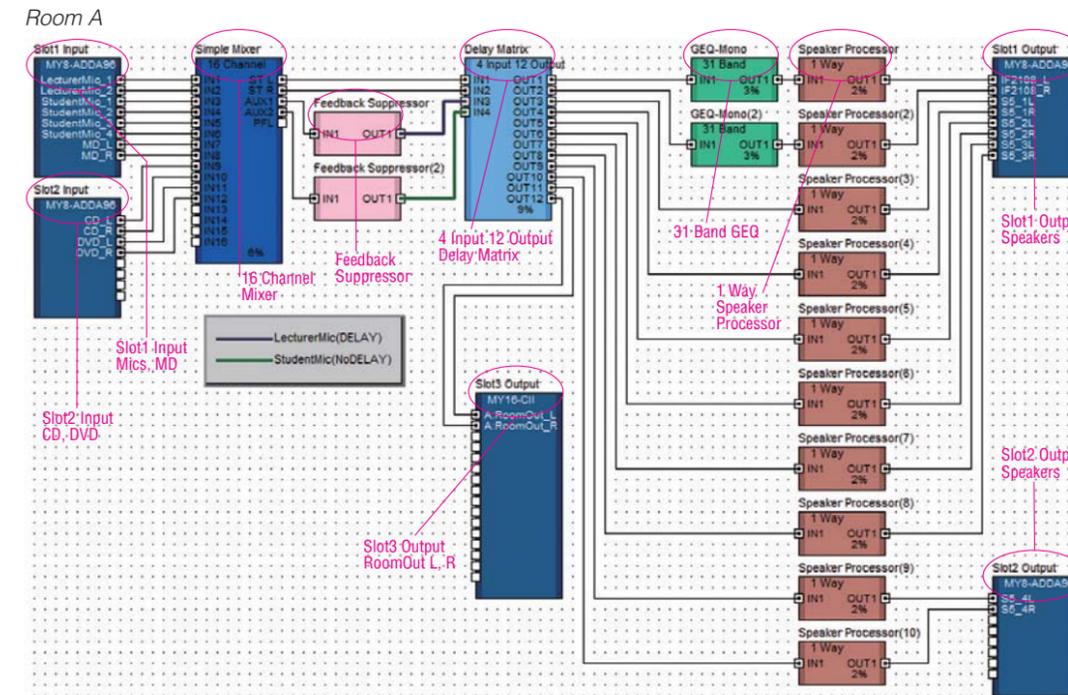


For maximum flexibility, sound systems provided in the large lecture hall and two smaller lecture rooms are linked via a CobraNet network that allows audio from the large hall to be monitored in either or both of the smaller rooms, while questions from the smaller rooms can be monitored and answered by the lecturer in the large hall. Independent video and audio capability with full local control is provided in each hall, but the system can be easily reconfigured as required to accommodate a variety of combinations.

## System Details & Features

A DME64N Digital Mixing Engine provides central control and processing in the large lecture hall. Analog inputs are connected via MY8-ADDA96 expansion cards installed in two of the DME64N's four card slots. An MY16-CII digital network card installed in one of the remaining slots allows bidirectional control and audio communication with the DME Satellite units in the two smaller lecture rooms. Easy, intuitive control of the entire system, including video functions, is provided via an AMX or Crestron type touch panel. The main IF2108W speakers in the large lecture hall are powered by a stereo XP3500 power amplifier, while the ceiling speakers are powered by an 8-channel IPA8200 amplifier. The ceiling speakers are connected in a low-impedance configuration for optimum sound quality. In addition to I/O, mixing, and speaker processing, the DME64N provides a delay matrix that can be set for precise time alignment of the hall's speaker outputs for optimum intelligibility at any listening position (see the description on the next page). The smaller lecture rooms both employ identical systems incorporating compact IMX644 digital mixers plus front and high-impedance ceiling systems powered by P3500S and XH amplifiers, respectively. The IMX644 mixers are extremely versatile, while offering easy front-panel recall of pre-programmed setups and basic level control for day-to-day use. DME Satellite DME4io-C units provide CobraNet communication with the large lecture hall as well as local output processing and convenient control from wall-mounted CP1SF control panels.

## DME64N Configuration



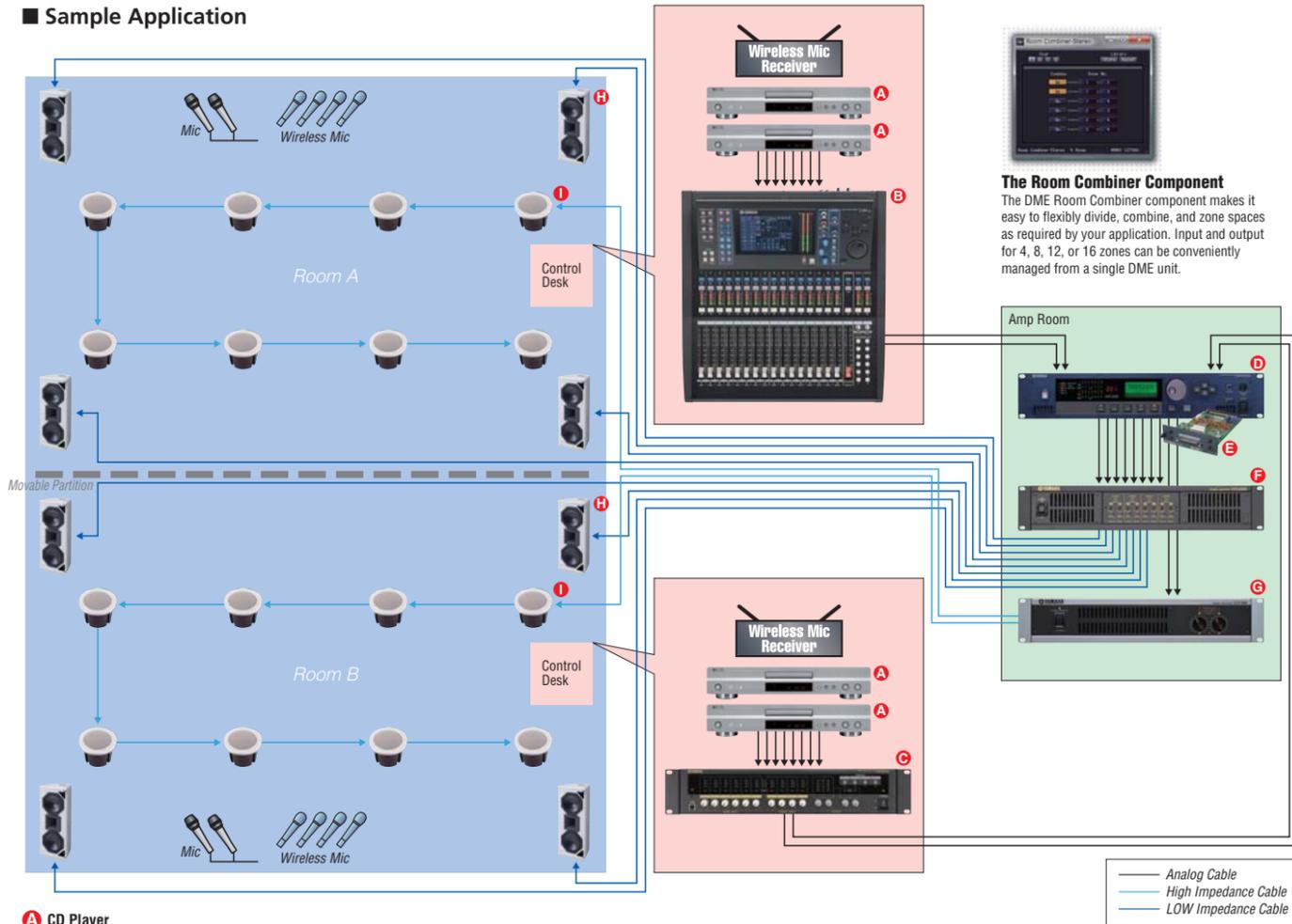
The MY8-ADDA96 cards used for analog input and output within the large lecture hall are installed in DME64N expansion slots 1 and 2, and the MY16-CII digital network card is installed in DME64N slot 3. Input via the MY8-ADDA96 cards is fed to the simple mixer component from where it goes to a delay matrix. Delay for time alignment is applied to the lecturer's microphone but not to wireless mics used by students who might be anywhere in the hall. Output from the delay matrix is fed directly to the digital networking card in slot 3 without any further processing, and to the large lecture hall outputs via GEQ and speaker processor components.

# Multipurpose Room



Here's a multipurpose room that, as its title suggests, is designed to flexibly accommodate a wide range of events from meetings to banquets to musical performance. Rooms "A" and "B" can be used independently with a capacity of about 50 persons each, or the room can be combined as required.

## Sample Application



- A** CD Player
- B** Digital Mixing Console LS9-16
- C** Digital Installation Mixer IMX644
- D** Digital Mixing Engine DME24N
- E** DA Card MY8-DA96
- F** Power Amplifier IPA8200
- G** Power Amplifier XH200
- H** Speaker IF2208W
- I** Ceiling Speaker

## System Details & Features

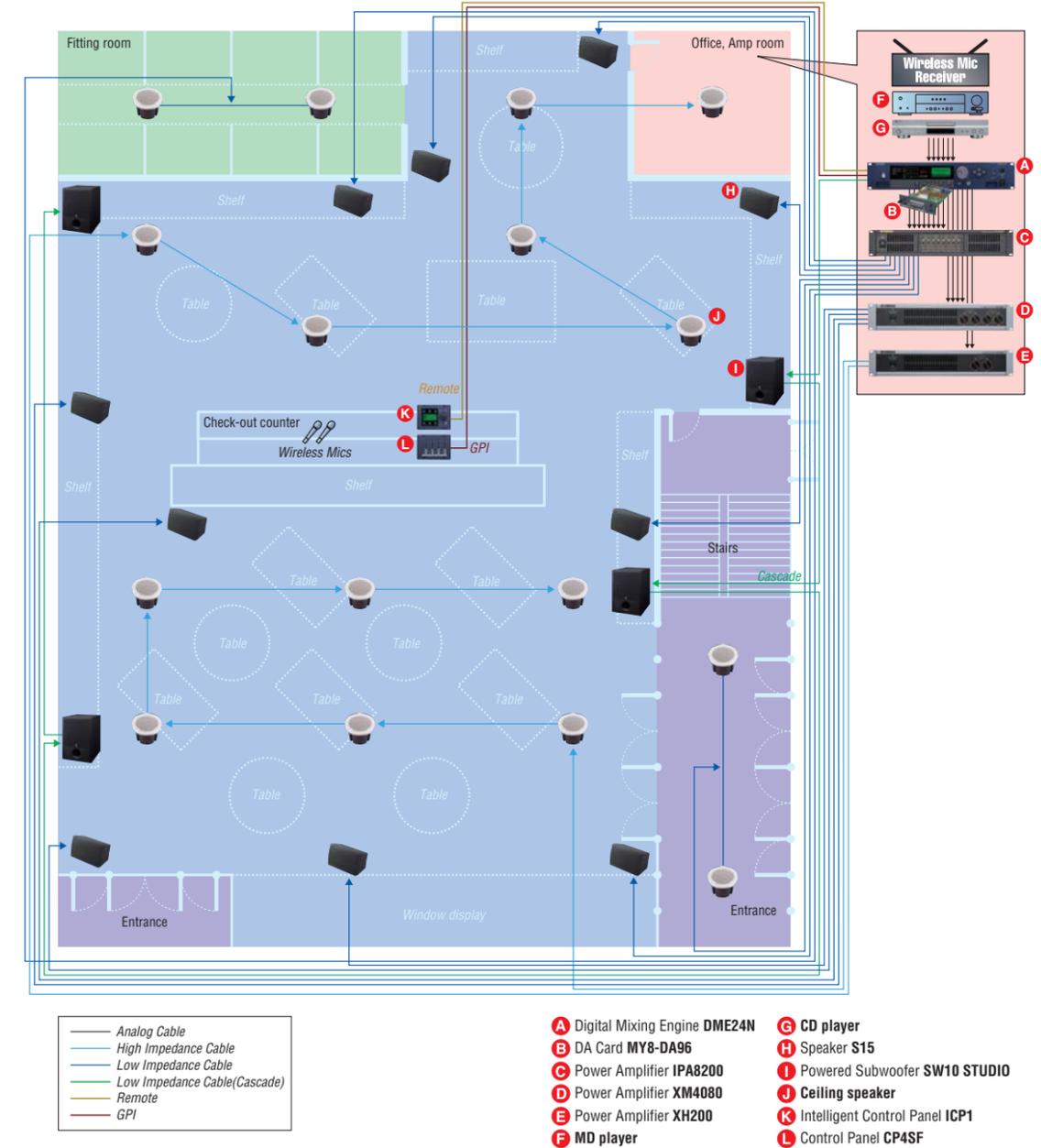
When the room is divided the sound systems in divisions "A" and "B" function independently. An LS9-16 digital mixing console in division A is ideal for events that involve live music or a large number of audio sources, while division B has an IMX644 digital mixer that offers simple, reliable operation for meetings or other speech-based events. The mixers each feed four IF2208W speakers, all of which are powered by a single IPA8200 power amplifier for the room's primary sound. An XH200 high-impedance distribution amplifier powers eight-speaker ceiling arrays in each room. CD players are provided for music playback, and a number of wired and wireless microphones are available. The key to the versatility of this system is the DME24N Digital Mixing Engine that is connected between the mixing consoles and the output systems (an MY8-DA96 card is installed in the DME24N to provide the required number of analog outputs to drive the power amplifiers). Although the systems in each division function independently when the room is divided, the entire system effectively functions as one when the room is combined, and EQ presets can be provided for a variety of different applications.

# Retail Store



Music can play a major role in setting the mood in retail outlets, and this setup is a good example of how a sound system might be implemented for maximum flexibility and utility in such an application. The sound system is used for background music, announcements, and regularly scheduled "chimes" to mark opening and closing times.

## Sample Application



- A** Digital Mixing Engine DME24N
- B** DA Card MY8-DA96
- C** Power Amplifier IPA8200
- D** Power Amplifier XM4080
- E** Power Amplifier XH200
- F** MD player
- G** CD player
- H** Speaker S15
- I** Powered Subwoofer SW10 STUDIO
- J** Ceiling speaker
- K** Intelligent Control Panel ICP1
- L** Control Panel CP4SF

## System Details & Features

The nucleus of the entire system is a DME24N Digital Mixing Engine that handles all input, processing, and output. An MY8-DA96 card is installed in the DME24N to provide analog output to one 8-channel IPA8200 power amplifier and one 4-channel XM4080 power amplifier that drive S15 speaker units strategically located around the room as well as ceiling speakers in the entrance and fitting room, and an XH200 high-impedance distribution amplifier that powers the main ceiling speaker arrays. The use of IPA8200 and XM4080 power amplifiers to provide 12 channels of amplification achieves a significant reduction in the rack space required. SW10 STUDIO powered subwoofers are also placed at key locations for enhanced bass output. CD and digital audio players are provided for music playback, and a wireless microphone receiver allows wireless mics to be used for announcements at the sales counter or anywhere in the store. The store is divided into four zones – entrance areas, main sales floor, fittings rooms, and office (indicated by the colors in the diagram) – to which volume levels can be individually controlled. Since complex control is not required in a system of this sort, simple control panels are installed at the sales counter where they can be easily accessed and operated by the staff. Automatic ducking is implemented so that the background music level is automatically reduced when an announcement is made, and the DME Event Scheduler is used to play sound files at preset times to mark opening and closing times, for example.

## Meijo University (Nagoya, Japan)



Meijo University is located in Nagoya city in Japan's Chubu region, and is known for the many eminent graduates it continues to produce in a variety of fields. In July of 2005 a new lecture hall complex was completed to enhance the universities education, research, and student welfare facilities while adapting to today's information-driven society. All classrooms in the new 6-floor structure (one floor underground and five above) feature the latest AV equipment including connectors for computer input and projectors, all controlled via touch panel interfaces. Each classroom also has a DME24N Digital Mixing Engine for audio I/O and processing, and a total of 36 DME24N units are employed throughout the building. The DME24N was chosen for its reliability and easy operation. It also offers more than enough power and performance for future system modifications and expansion.



This lecture hall on the 1st floor of the new structure is the largest, providing seating for up to 600 students. It features a DLP projector and 300-inch screen, plus an additional two LCD projectors and 250-inch screens. Easy operation is provided via touch-panel controllers.

A DME24N, switcher, booster, and other gear in the equipment rack are operated from the touch-panel controller.



AV equipment is controlled in the same way by intuitive, easy-to-use touch panels in all classrooms. Whether in a classroom for 600 or 180 students, all touch panels implement the same display design and operating procedures so that any teacher can operate the equipment in any classroom without problems. Communication between the touch panels and AV equipment is handled via RS-232C protocol so that appropriate operation-related messages and help can be displayed as required.

The DME24N provides an extremely broad range of sound processing capabilities, and allows extraordinary freedom on setting up input and output configurations. Furthermore, an extensive range of controllers – faders, equalizers, and more – are provided, and additions and upgrades are already being planned. External controllers can be connected via USB (for connection to a personal computer), GPI, MIDI, RS422/232C, and Ethernet. Both flexible controllability and the capacity for easy modification after installation offer enormous advantages for schools and other public facilities.



This 180-capacity classroom is also on the 1st floor. The equipment rack and control console can be seen at the front of the room to the left. The movable console includes a cassette player and other facilities for the convenience of the lecturer. A 120-inch main screen and two 60-inch sub-screens are provided for visual presentations.



A DME24N is shown in the rack with a switcher. The number of channels provided by the switcher has been selected to match the size of the classroom or lecture hall.

## Nashville Courthouse (Tennessee, USA)



Allied Sound supplied Yamaha DME24N systems for speech reinforcement within each of the 16 courtrooms at the Nashville Courthouse. Multiple zones also feed the judges' offices and workspaces. In the courtrooms, the judge has priority over all other audio sources and can, at will, mute any other source when he speaks. 16 Yamaha ICP1 intelligent control panel units were installed that are virtually identical to the controls on the DME in the judges' bench area. The ICP1 control panel has an LCD screen which allows customization and labeling by the judge or judge's assistant.

The courtroom can hear the judge's normal commands, however, if private conferencing with an attorney is required, he has the ability to press a conference preset that mutes all microphones and can add masking noise on the speakers. Once private conferencing has ended, the system recalls the standard courtroom trial settings. The all-mute function and volume control allow for playing back line level audio from such sources as a DVD or VCR that may be used in a court setting.



## Edit Macy Conference Center (New York, USA)



The Edith Macy Conference Center, Briarcliff Manor, N.Y. Boulevard Production Specialists Inc. designed and installed updated sound and video systems for the Center's 185-seat auditorium, dining area, and common area.

Set among 405 wooded acres in the heart of Westchester County, New York, the Edith Macy Conference Center is a place for nature as well as productive meetings. Owned by the Girl Scouts of the USA, the facility has served as a learning center for Girl Scout volunteers and staff members since 1926. Its six corporate conference rooms, a 185-seat auditorium, and rustic lodges are open to both non-profit and for-profit organizations for training events and executive corporate retreats.

Systems contractor and design/installation firm, Boulevard Production Specialists Inc. (Oradell, N.J.) recently upgraded the 185-seat Peter F. Drucker Auditorium's video systems so that control of LCD projection, DVD, and PowerPoint could be handled directly from the auditorium podium instead of from the control room located at the rear of the room. And, in December of 2005, Boulevard completed an audio system upgrade for the auditorium and the Center's common and dining areas.

System design for the auditorium was based around four Yamaha Installation loudspeakers and a Yamaha 01V96 digital mixing console. "The Yamaha console is exactly what I was looking for," says the Center's Supervisor for Conferences and A/V, Carlos Oliveras. "We have five pre-set scenes for various setups in the auditorium that we can recall at anytime. It's very easy to use, and the sound is great." "The first five rows of seating are tables, each with a microphone," says Boulevard Production principal, James Cioffi. "We installed new microphones each of the tables. But the Yamaha 01V96 was the key to the new system. That brought the Center from 1985 technology to 2006 in one move." Each area is a separate zone and covered by four wall-mounted Yamaha IF2205 (two for each area), with a Yamaha Q2031 stereo graphic EQ. The equipment rack for this subsystem is located inside the auditorium, adjacent to the common area. Music feed is via satellite, and a lav or hand-held mic is available to speakers in either zone, with automatic music ducking.

Yamaha Installation Series detail.

[http://www.yamahacommercialaudio.com/ca/uk/10\\_news/20\\_installed\\_sound/45\\_multipurpose\\_halls/archive/2006\\_09/19\\_macy\\_centre/index.html](http://www.yamahacommercialaudio.com/ca/uk/10_news/20_installed_sound/45_multipurpose_halls/archive/2006_09/19_macy_centre/index.html)

## Westfield London (London, UK)



With an audio specification that many live music venues would be envious of, the brand new Westfield London retail complex in London's Shepherd's Bush is substantially raising the bar when it comes to the facilities for in-house entertainment. With a Yamaha DME24N digital mix engine and M7CL mixing console at the heart of the system, at Westfield London, shopping really is the new rock'n'roll!

One of the most impressive spaces at Westfield London is The Atrium, a large, multi-purpose performance space, which features a highly advanced technical production system.

The key requirement of the system is versatility, so it is equipped with a comprehensive audio network for both digital EtherSound and analogue audio, with facilities panels allowing connection of a range of equipment throughout the area. This means that performances can take place in a range of different locations in the area, with staging able to be constructed at the end of the space, along the side or in the middle for 'in the round' performances.

The hub of the system is a Yamaha DME24N digital mix engine, which not only controls The Atrium's audio network, but also acts as the interface between it and the audio systems throughout the rest of Westfield.

"We had some fairly stringent demands," says Lee Dennison, project manager for audio installer Delta Sound. "We needed a system which can handle everything from a full production with monitoring via the M7CL console, to just a microphone on stand for an announcement, without having to use the console.

"But, the same time, we needed something that would interface with the building's emergency system, so the production system can be automatically overridden and muted for evacuation messages. This also made complete reliability absolutely essential. The DME24N was the ideal solution because of its power, versatility and the way it can seamlessly integrate with the rest of a system using both digital and analogue audio, the latter being used for background music and playback."

All audio for The Atrium is routed via the DME24N, which is connected via AES/EBU and an NAI48-ES interface to the main control room. The EtherSound network connects it from there to the M7CL console, which is used to mix both front of house and monitors as required, via another 48 input / eight output NAI48-ES stage rack, fitted with AD8HR and DA824 interfaces.

In the opposite direction, the DME connects via AES/EBU to the main FOH system of Lab.gruppen amps and an EM Acoustics line array, as well as the onstage monitors. "It is a highly complex, multi-directional system," adds Nick Pemberton, Yamaha Technical Sales Specialist.

"We had meetings with Lee and Darren at Delta Sound to discuss their ideas, how to make the system extremely versatile but also for it to be cost effective. Delta has already installed multiple DMEs in other locations, so they know its capabilities. As well as fulfilling all of their requirements, it also occupies just a 2U rack space and it allows a complex system to be very easily controlled, via the ICP Intelligent Control Panel."

The M7CL was chosen as the mixing console for performances, partly because of its combination of excellent facilities in an extremely portable package, but also because of the range of acts and events that Westfield wants to attract. It had to be a desk which was as well-known as possible.

"The M7CL is really the standard mixing console for medium scale events," says Lee Dennison, project manager for audio installer Delta Sound. "We needed a 'rider friendly' desk, it's well known and it's thoroughly well-proven. The stage rack also gives us exactly what we need. It ticked all the boxes."

Nick Pemberton adds, "Most sound engineers are familiar with using Yamaha digital consoles and it is very easy to learn, making it straightforward for one of Westfield's technical team to teach anyone who isn't familiar with it.

"It's a versatile desk, takes up very little room, has high quality onboard effects and the sound quality is excellent."

Working very closely with Delta Sound, Yamaha's highly-regarded pre- and post-sales support is, of course, very much to the fore at this most prestigious of installations. Both Nick Pemberton and DME specialist Scott Fraser have been closely involved, ensuring that the installation and programming of the equipment has been as straightforward as possible.

With the opening ceremony also having featured a pair of Yamaha PM5D consoles, shoppers at Westfield London may not be aware of the Yamaha equipment as they enjoy the entertainment provided in The Atrium, but they will certainly be aware of the audio quality it is providing.

## Mondovicino outlet village (Cuneo, Italy)



### Yamaha's Grand Design For Italy's Biggest Retail Park

With an ultimate retail floor space of 26,500 m<sup>2</sup>, Italy's Mondovicino outlet village, retail park and shopping centre will be the biggest of its kind in the country. And with Yamaha audio equipment bringing the best audio quality to shoppers, it is certain to offer the ultimate retail experience.

Yamaha Commercial Audio is seeing rapid growth in the retail sector. The flexibility and audio quality inherent in Yamaha's DME series digital mix engines, amplifiers and loudspeakers are maximised by using Cobranet and EtherSound audio distribution networks. This makes them the ideal solution for shopping centres, where necessarily large and complex zoned networks also need to be controlled very easily by potentially inexperienced members of staff.

Located near the town of Mondovi, in the province of Cuneo, north west Italy, the first phase of Mondovicino - with about 60 stores - has opened, with the rest of the development progressively opening in the near future.

Sound designer Adriano Zigante and his company Alto Gradimento won the contract to design and install the audio system at the complex. Adriano specified a comprehensive Yamaha system, which will deliver high quality audio via a highly flexible, multi-zone system.

The indoor shopping centre forms the first completed phase of the development and features four audio zones, utilising 12 Yamaha DME80-C satellite units and 24 XM4080 four channel power amplifiers delivering sound to 120 S15 and S55 speakers, installed throughout the walkways and circulation areas of the building.

Music and announcement signals are fed from a master 'broadcast' zone, which features the day's MP3 playlist on a playout server and feeds the audio signals to the three other zones via Cobranet. Each local DME zone then manages the XP power amps which feed the speakers.

"The overall sound distribution is of very high, uniform quality," says Sandro Chinellato, Commercial Audio Application Engineer at Yamaha Musica Italia. "It is already proving a great success and the same type of system will be installed in Phase 2 of the Mondovicino development.

"A multi-purpose hall is also being included in the complex, which will also see a major installation of Yamaha Installation Series speakers, XP amplifiers and DME24N digital mix engines.

"Retail developments can be acoustically challenging but, by working very closely with Adriano and his team, we are ensuring that the Yamaha system provides quality audio which seamlessly complements the quality throughout the Mondovicino shopping experience."



## The Ninkasi Gerland (Lyons, France)



Like many large French cities, Lyons has an increasing number of music bars and restaurants, of which the Ninkasi cafes are a good example. When the largest one in Gerland was recently extended, DME Satellites were installed to control a sound system based on the audio network concept and comprising Yamaha speaker boxes. This was its first appearance in France in this sector.

The Ninkasi chain of establishments has an interesting history. The company, founded in 1997, is based on an original concept: customers can see how the beer is made and the machinery involved from where they are sitting - from the bar/restaurant itself located in the heart of the Gerland quarter in Lyons.

The cafe has 400 seating places in total and an outside terrace. Music is a key element, with a mix of DJ sets and live music. It was very successful; concert programming was therefore handed over to an outside group firmly established in the Lyons music scene. A decision was then made to build a 600-seater venue, the Ninkasi Kao, next door to the Ninkasi. This is quite an unusually large venue for Lyons and is highly suitable for its target output. The latest development at Ninkasi Gerland is an extension to the restaurant/café, called 'le Snack'.

The first installation was completed by Fa Musique, from Vaulx-en-Velin, in the Lyons suburbs. They chose to set up a sound system in the café on the ground floor and in the restaurant on the mezzanine, using Yamaha S55 2-channel speaker boxes and Crown CTS amplifiers and controlled by a DME24N. This is to provide ambient music (from CDs and videos produced by the in-house channel Ninka Television); the sound level is pretty low in the restaurant and sometimes a bit higher in the bar, which has a sound system comprising six wall-mounted S55. "These speaker boxes are actually ideal for this application; compared to what is offered by other makes, I think they represent a good compromise," explains Pierre Matillat, Senior Account Executive at Fa Musique. "The specification didn't require the speaker boxes to be hidden. This is in a music bar, and they are on view, that's great!"

"The extension to the premises meant making a step change: setting up an audio network, defining the various sound system zones, and being able to control the various sources," continues Pierre Matillat. "We were the first in France to buy DME Satellites. We have the DME4io-C model, which we use to manage 4 inputs/4 outputs. The idea was to be able to retrieve sounds or re-inject them with others in any part of the building, for example mic, DJ mixing desk output, etc. We therefore added two Satellites to the central DME24N for piping, controlling, inserting delays etc. As the EtherSound model was not available at the time, and as there was no latency requirement in this configuration, we chose the CobraNet solution, which greatly facilitated wiring. The central DME manages the sound system in the concert hall, the first Satellite manages the restaurant, and the second Satellite, manages the Snack."

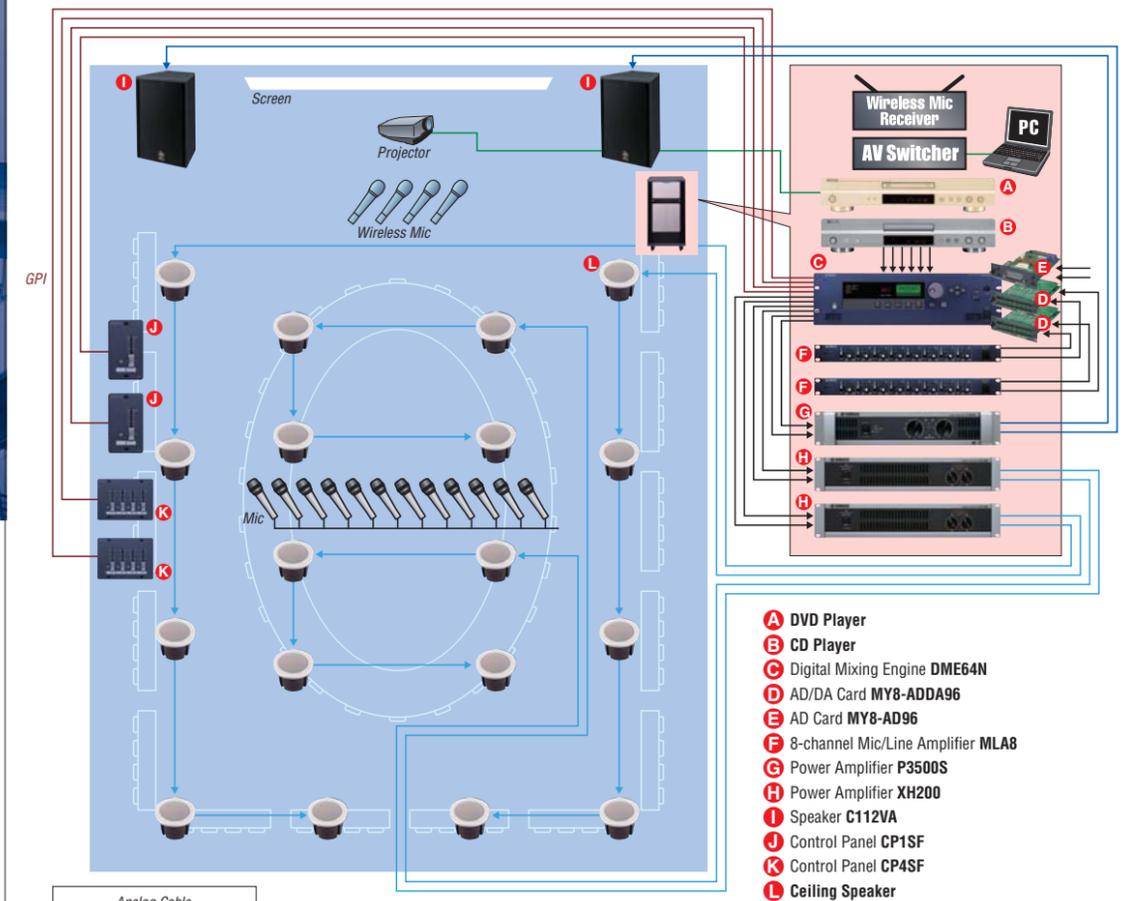
Wall-mounted CP1SF and CP4SW control panels enable the barman to choose the source and intuitively adjust the sound levels. "We blocked off the maximum levels in the DME to make it safer. We will definitely be installing more sophisticated ICP1s in the future."

There are four other Ninkasi cafes in Lyons and two in Saint-Étienne. In other words, Fa Musique is virtually in constant demand. "Ninkasi is an ongoing business for us. We also hire out the equipment in the Kao, the concert hall next to the Ninkasi Gerland, where quite a few local productions are staged. After Gerland, we fitted out their smaller bars in the town centre, where small-scale DJ sets and concerts are sometimes held. And the creators of the Ninkasi concept always have one or two other projects up their sleeve; their cafes could be rolled out elsewhere at anytime!"

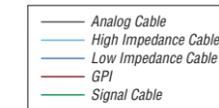


## Conference room: Medium

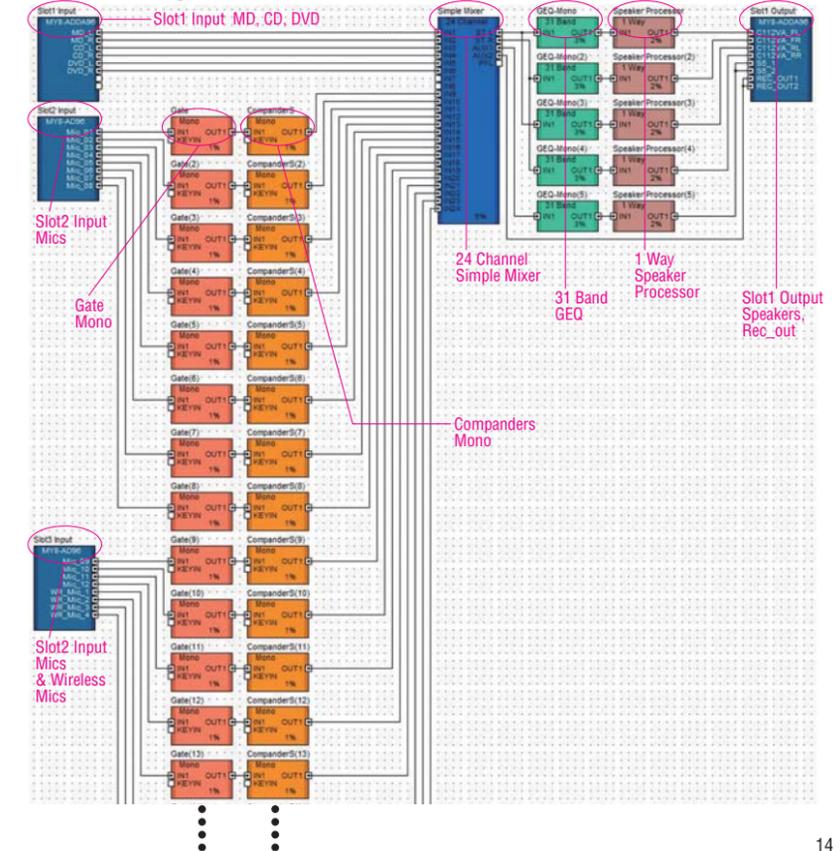
### Sample Application



One of the main requirements for a conference room sound system is easy control of a large number of microphone inputs. Overall intelligibility is important as well, so care is taken to provide effective gating and compression of all microphone inputs as well as uniform, optimally tuned output.



### DME Configuration



### System Details & Features

The DME64N Digital Mixing Engine that serves as the core of the system is fitted with three I/O cards: two MY8-ADDA96 cards that provide 16 analog inputs and outputs combined, and an MY8-AD96 card that provided an addition 8 analog inputs, for a total of 24 inputs and 16 outputs. Of the 16 microphones, 12 are direct wired to 8-channel MLA8 Mic/Line Amplifiers, and the remaining four are wireless. Levels and muting can be controlled via convenient surface-mounted CP1SF and CP4SF control panels. In addition to a pair of C112VA full-range speakers powered by a P3500S amplifier, high-impedance arrays of 18 ceiling speakers powered by two XH200 distribution amplifiers provides seamless coverage of the entire room. Referring to the DME64N Configuration diagram you can see that gate and compander components are applied to all microphone inputs. The gate components "close down" independent microphone inputs when no input is detected, reducing extraneous noise that can degrade intelligibility. The compander components maintain uniform levels even in the face of widely varying voice levels and speaker-to-microphone distances. All inputs are combined via the simple mixer component, and output processing is provided by 31-band EQ and speaker processor components that include delay, parametric EQ, limiting, and output level control facilities.

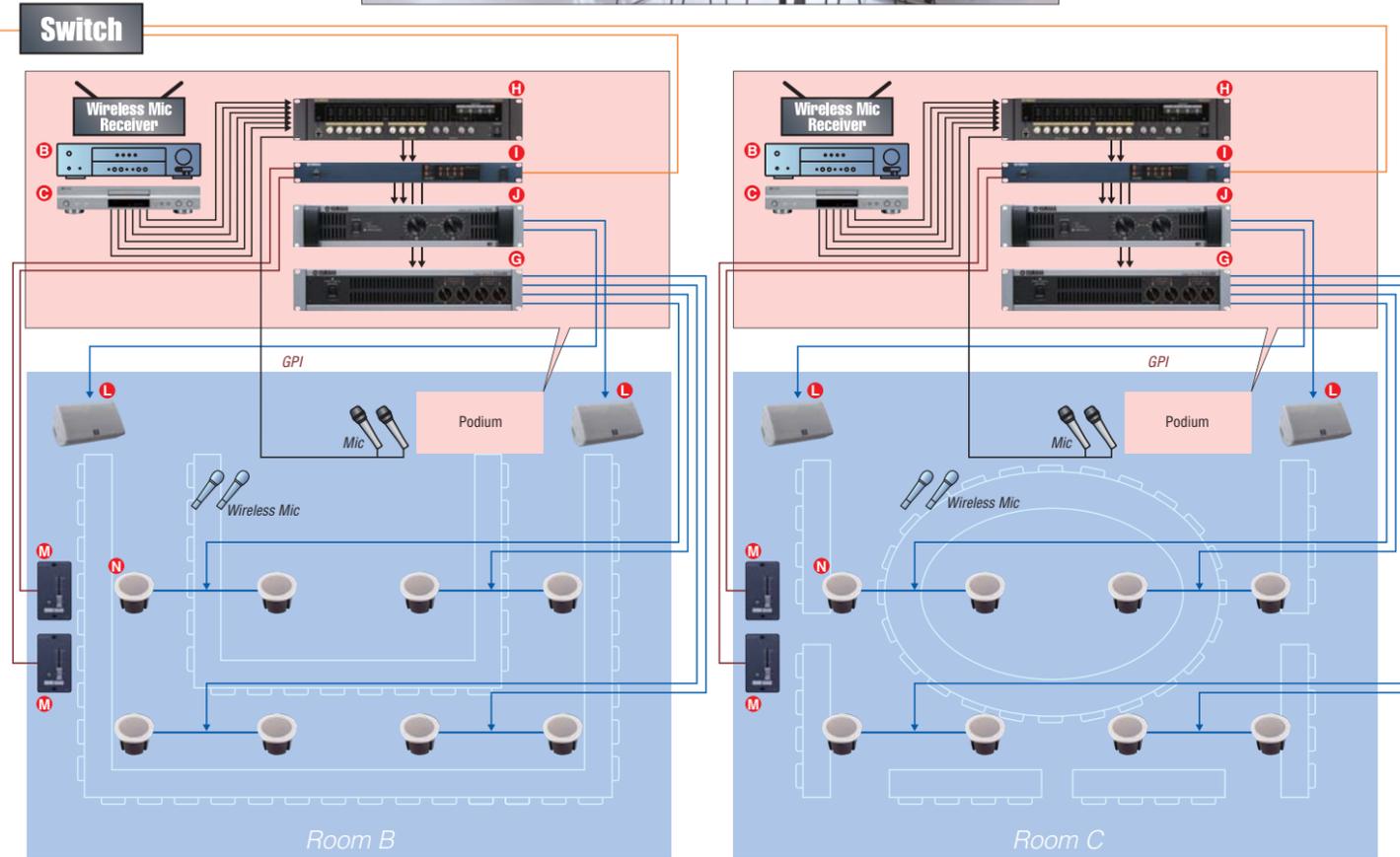
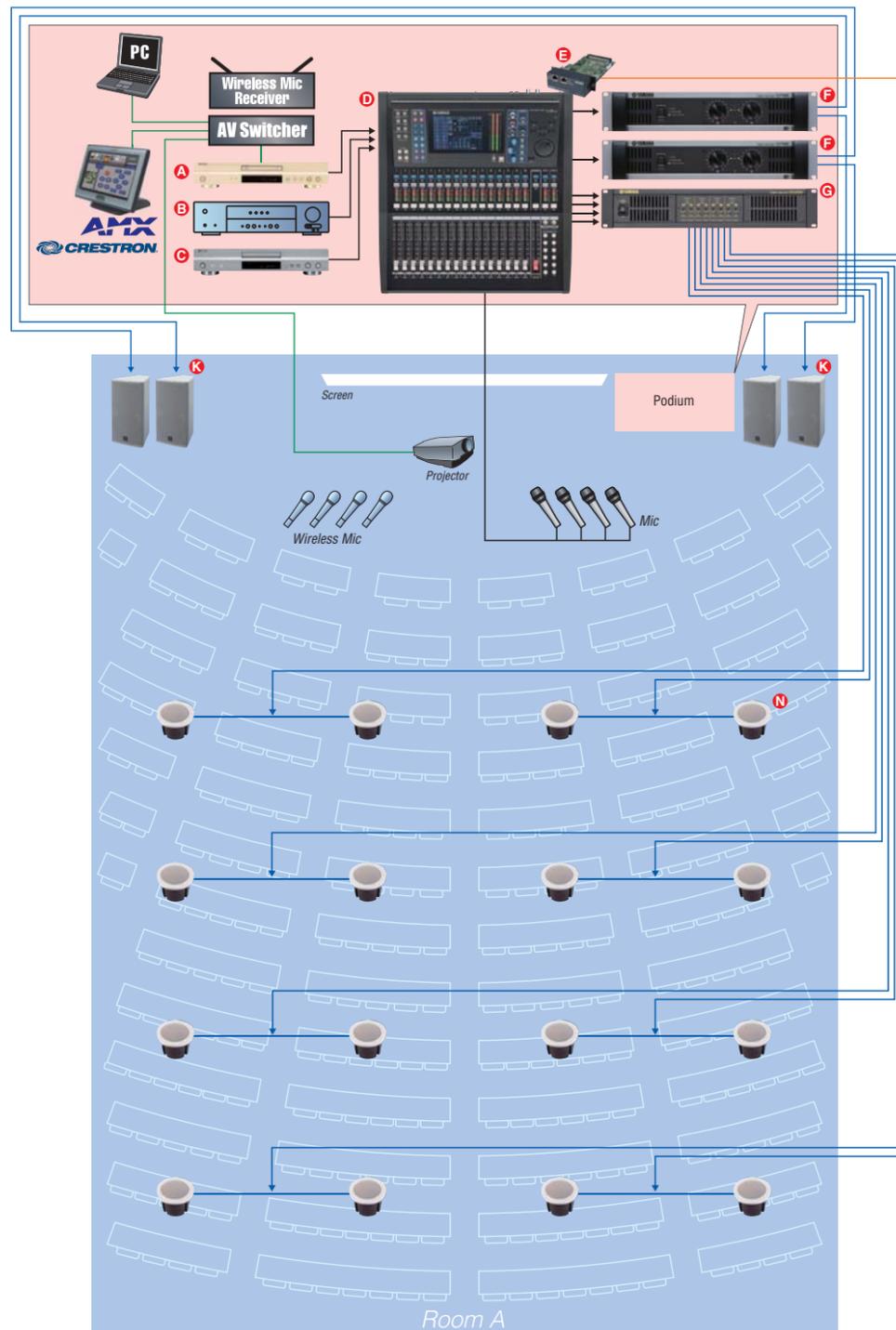
Product details can be found at [www.yamahaproaudio.com](http://www.yamahaproaudio.com)

• Please observe safety regulations and procedures when installing speakers!

# Conference Rooms: Network



## Sample Application



- Analog Cable
- Low Impedance Cable
- GPI
- LAN Cable(CAT5e)
- Signal Cable
- USB Cable

- A** DVD Player
- B** MD Player
- C** CD Player
- D** Digital Mixing Console LS9-16
- E** Digital Network Card MY16-CII
- F** Power Amplifier XP7000
- G** Power Amplifier IPA8200
- H** Digital Installation Mixer IMX644
- I** Audio I/O Distribution and DSP Expansion Unit DME4io-C
- J** Power Amplifier XP3500
- K** Speaker IF2112W
- L** Speaker IF2108W
- M** Control Panel CP1SF
- N** Ceiling Speaker

Here a large conference room and two smaller conference rooms are provided with separate sound systems that can be used independently or networked as required. When necessary audio from the large conference room can be monitored in either or both of the small rooms, and questions from the small rooms can be monitored in the large room.

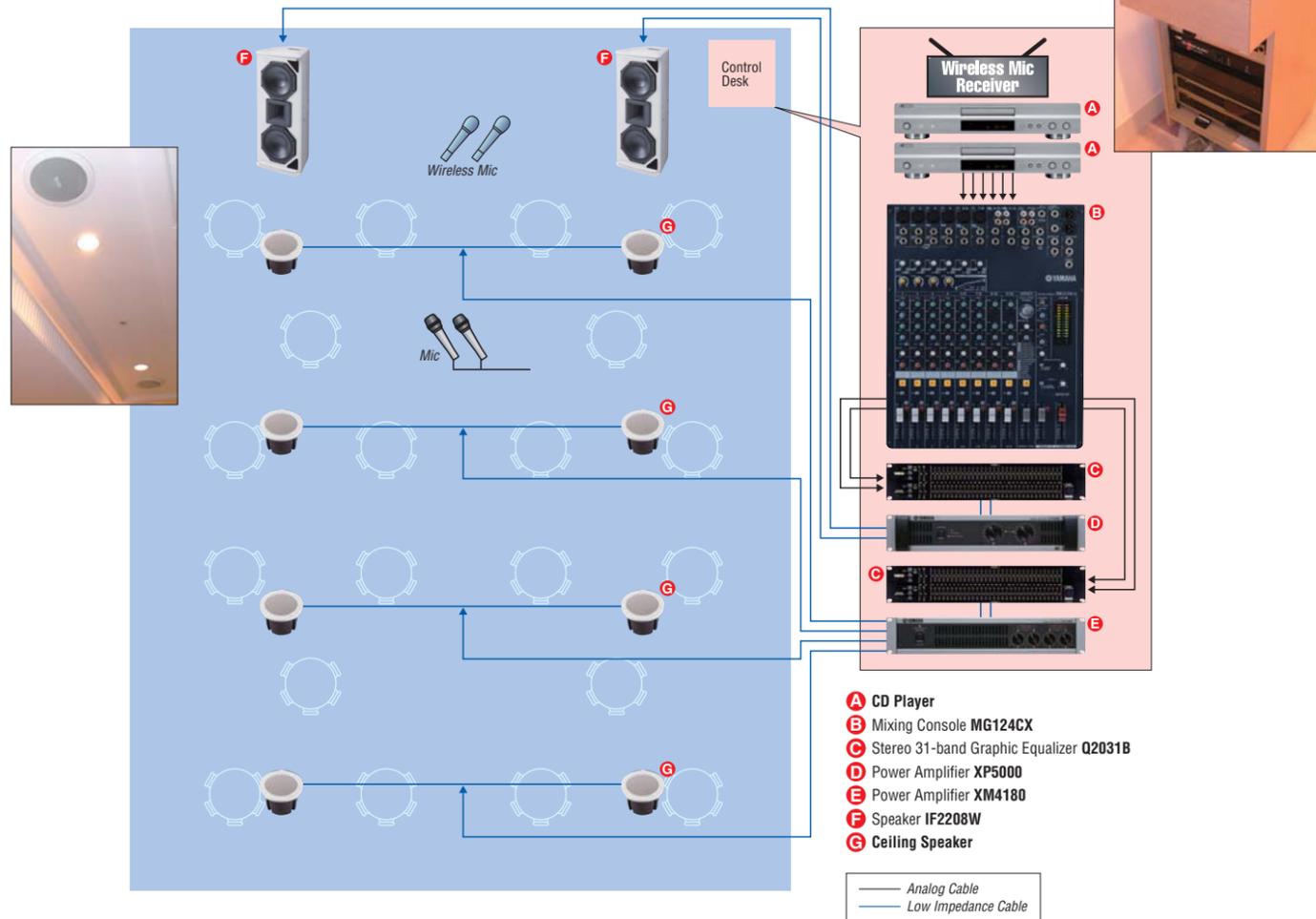
## System Details & Features

Control and processing for the large conference room is handled by a compact but very versatile LS9-16 Digital Mixing Console. Two of the six outputs provided by the LS9-16 feed XP7000 power amplifiers in parallel mode, driving two pairs of IF2112W full-range speakers at the front of the room. An array of 16 speakers is organized into groups to allow time alignment for optimum intelligibility. The ceiling speakers are driven by a single 2U-size 8-channel IPA8200 power amplifier for significant space saving. The LS9 console also provides direct recording capability to USB memory devices, for convenient recording of conferences and presentations. A MY16-CII digital network card installed in the LS9-16 expansion slot allows CobraNet communication with DME Satellite DME4io-C units in the two smaller conference rooms. The smaller conference rooms use compact rack-mounted IMX644 digital mixers that provide easy front-panel control of local input and mixing. The IMX644 mixers feed the corresponding room's power amplifiers via the DME Satellite unit that also receives digital audio from the large conference room. All equalization and speaker processing required for the small rooms is handled by the local DME Satellite units, which also allow convenient control from wall-mounted CP1SF control panels. The small rooms have main IF2108W speakers up front powered by an XP3500 amplifier, and an array of eight ceiling speakers driven by a compact IPA8200 power amplifier.

# Banquet Room: Small

Small "banquet rooms" may be used for a variety of purposes requiring different layouts: receptions, parties, meetings, and other events. The sound system needs to be compact, portable, and flexible enough to adapt to a wide range of situations while at the same time being easy to use.

## Sample Application



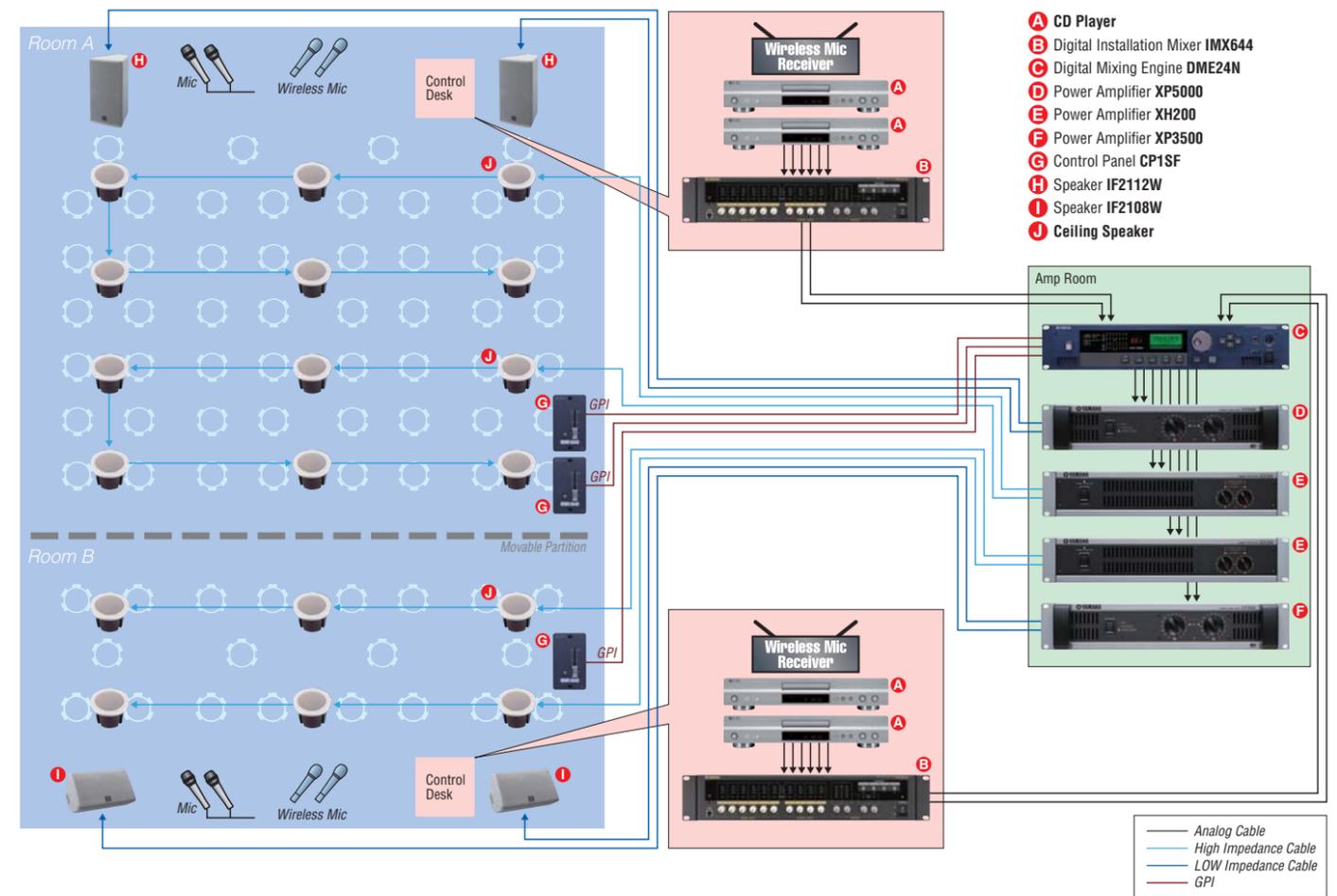
### System Details & Features

All components other than speakers and microphones are comfortably housed in a compact rolling "sound wagon" than can be positioned conveniently for different situations. Since the system requirements are relatively simple, and no extended low-level signal runs are required, easy-to-use, inexpensive analog gear can be used throughout. The MG124CX mixer that provides central control is easy to operate and gentle on the budget while offering outstanding sonic performance. The mixer accepts direct stereo line input from CD players or other music sources, and a wireless microphone receiver allows unrestricted positioning and movement for wireless microphones. Two speaker systems are provided: a pair of two-way full-range IF2208W speakers at the front of the room for performances or speeches, and eight ceiling speakers for BGM and general distribution. The speakers systems can be used independently or combined as required. The IF2208W speakers are driven by a stereo XP5000 power amplifier, while the ceiling speakers are connected in a low-impedance array that is powered by a multi-channel XM4180 power amplifier. Low-impedance distributed drive delivers the highest sound quality in systems of this type. Separate Q2031B graphic equalizers are inserted before each power amplifier, allowing the speaker systems to be individually tuned for optimum response in the room.

# Banquet Room: Medium

This medium-size banquet room can be divided into two separate areas or opened up to provide one large space with a capacity of around 350. The sound system is designed so that it can be instantly reconfigured to handle the divisions independently or the entire room as one.

## Sample Application



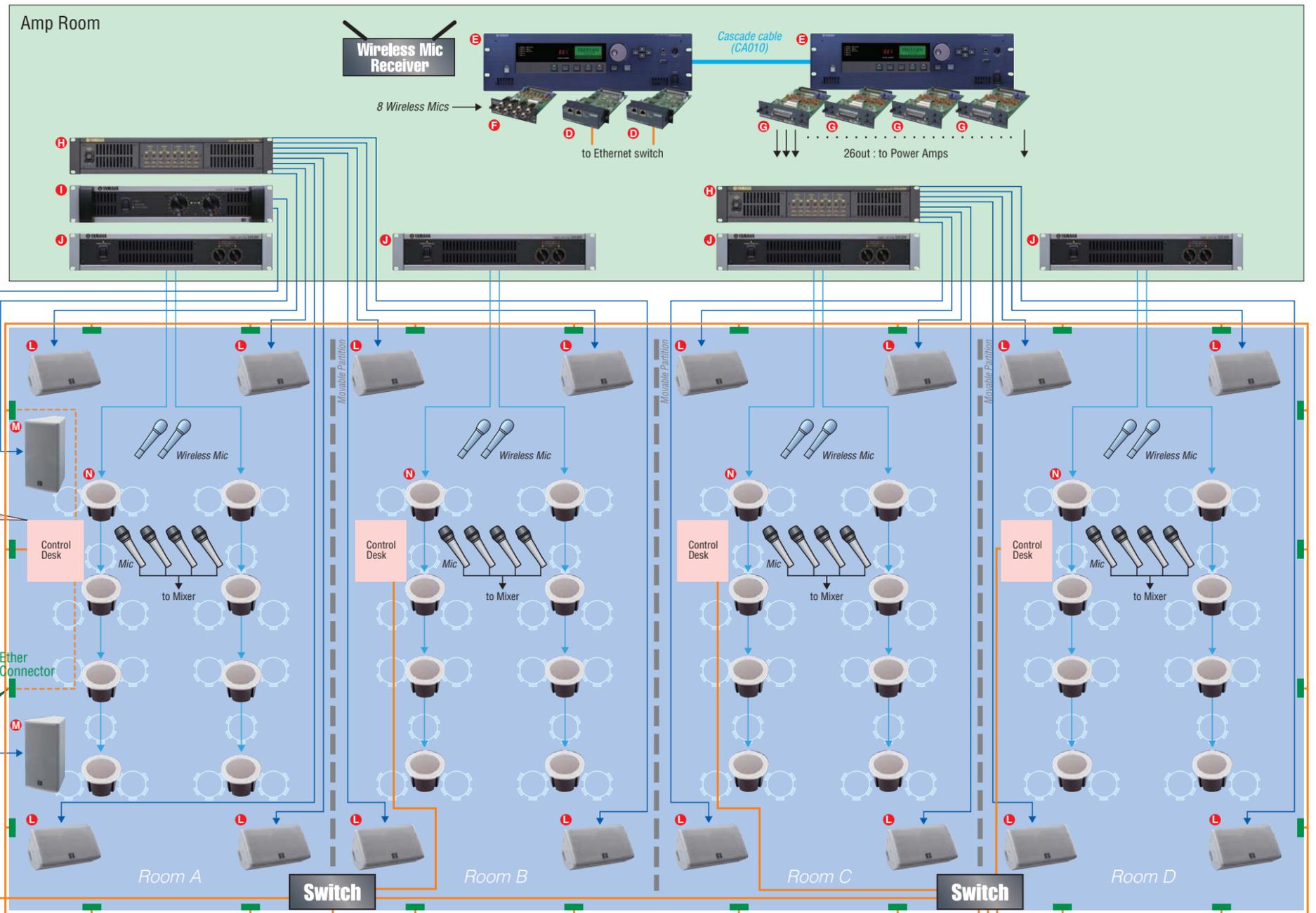
### System Details & Advantages

This system employs rack-mounted IMX644 digital mixers for primary control. In addition to extensive mixing versatility the IMX644 offers features that are ideal for banquet situations, such as automatic feedback suppression and ducking, with a simple front-panel control interface that even inexperienced staff will quickly become comfortable with. The output from both mixers is fed to a DME24N Digital Mixing Engine that allows instant switching between control configurations according to room usage: each mixer feeds a separate output system for its own area when the room is divided, or both mixers feed the overall output system when the entire room is used. The DME24N also provides speaker processing for the four speaker systems used, and allows convenient volume control from wall-mounted CP1SF control units. When the room is divided the larger "A" area is serviced by a pair of two-way full-range IF2112W speakers up front powered by a stereo XP5000 power amplifier, and high-impedance array of 12 ceiling speakers powered by an XH200 distribution power amplifier. The smaller "B" area has a pair of two-way full-range IF2108W speakers driven by a stereo XP3500 power amplifier, and a high-impedance array of six ceiling speakers driven by a second XH200 distribution amp. No separate equalizers are required since all necessary EQ can be provided by the DME24N. Although the "A" and "B" area output systems are totally independent when the room is divided, they function as one perfectly coordinated output system when the whole room is used thanks to the advanced processing capabilities and versatility of the DME24N.

# Banquet Room: Large



## Sample Application



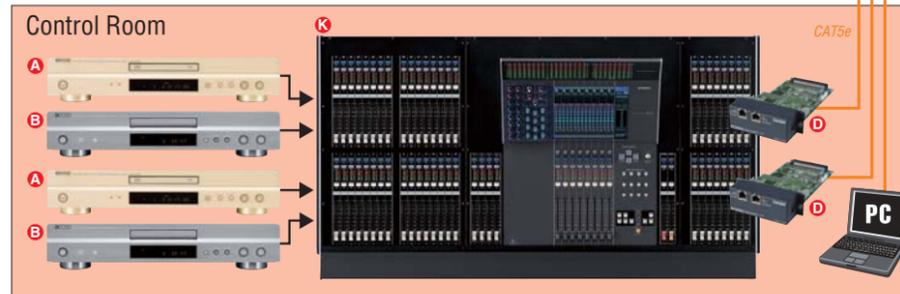
The system shown here provides unbeatable flexibility in a large banquet room comprised of four smaller divisions that can be combined in a variety of configurations. Capacity is approximately 100 guests per division, or a total of 400 guests for the entire room.



Rack with 01V96 can be moved to any location as far as Ethernet connector is available.

## System Details & Features

This system is designed so that all four divisions can be used independently or in the following configurations: A+B with C and D as independent rooms; A+B+C with D as an independent room; or A+B+C+D for one big room. Independent 01V96 Digital Production Consoles are provided for each division, and a separate master M7CL-48 console is used for combined divisions or the entire room. The 01V96 consoles and M7CL-48 console are all on a CobraNet network, connected via MY16-CII digital networking cards and Ethernet switch. Also on the network is a pair of cascaded DME64N Digital Mixing Engines that handle all of the system's input and output as well as processing. Each division has four IF2108W full-range speakers driven by half of an 8-channel IPA8200 power amplifier, and a high-impedance array of eight ceiling speakers driven by an XH200 distribution amplifier. The use of only two IPA8200 power amplifiers to drive the IF2108W speakers in all four divisions reduces the total number of amp units as well as the rack space required. One end of the overall room also features a pair of IF2112W full-range speakers driven by an XP7000 amplifier to service larger combinations of divisions or the entire room when opened up. That's a total of seven power amplifiers, which are housed in a separate amp room along with the DME64N units. Although complex in appearance this system is actually quite easy to operate, and can be instantly reconfigured to suit any of the possible configurations.



- A** DVD Player
- B** CD Player
- C** Digital Production Console 01V96
- D** Digital Network Card MY16-CII
- E** Digital Mixing Engine DME64N
- F** AD Card MY8-AD24
- G** DA Card MY8-DA96
- H** Power Amplifier IPA8200
- I** Power Amplifier XP7000
- J** Power Amplifier XH200
- K** Digital Mixing Console M7CL-48
- L** Speaker IF2108W
- M** Speaker IF2112W
- N** Ceiling Speaker

- Analog Cable
- High Impedance Cable
- Low Impedance Cable
- LAN Cable(CAT5e)
- Cascade Cable

Product details can be found at [www.yamahaproaudio.com](http://www.yamahaproaudio.com)

• Please observe safety regulations and procedures when installing speakers!

## Swissôtel Zurich Convention Centre (Zurich, Swiss)



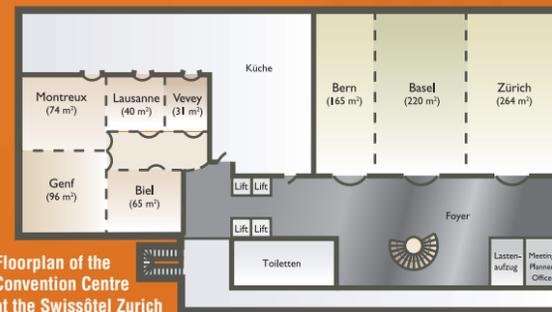
The Swissôtel Zurich in the Oerlikon district



The audio technology for the *Deutschschweiz* area

Beware of the misconception that providing pro audio for a few conference rooms is a straightforward task! The new installation of complex audio and media technology at the Convention Centre of the Swissôtel Zurich is a good example of the impressive flexibility of Yamaha's DME64N Digital Mixing Engine and of how simple the control of highly complex systems can be for the user when all the stops are pulled out during the design and programming stages.

The Swissôtel in Zurich's Oerlikon district is a large top class hotel with 347 rooms on 31 floors. In 2007, the Convention Centre on the first floor was refurbished and completely re-equipped with new technology, making it the most modern conference centre in Zurich. Here, *Deutschschweiz* and *Westschweiz* (as the German and French speaking parts of Switzerland are referred to locally) cover only a few hundred square meters. In fact the names refer to the two conference areas, the rooms of which are named after cities in the two regions. A generous foyer with an exclusive atmosphere connects the two areas, which house three large and five smaller conference rooms. The highly flexible spatial concept allows the rooms to be combined or divided into a number of configurations - from a small conference room operating independently of the events in the other rooms, through to a large 650m<sup>2</sup> hall holding up to 800 people. At the same time, this concept represents a real challenge in terms of the media technology installed, which of course has to be adaptable to the room configuration selected. Moreover, this must be possible without requiring specialised technical personnel.



Floorplan of the Convention Centre at the Swissôtel Zurich

The contractor for the conception, planning and installation of the audio and video technology - as well as programming of the remote control (AMX) - was the communications technology specialist Kilchenmann Telematik, a company with some 140 employees based at three locations in Switzerland. External support was called in for the complex programming of the five DME64N systems installed: Andreas Baumann, Managing Director of Mediensystemhaus in Zurich, was entrusted with the task of providing sophisticated scenarios for every imaginable room configuration. These can be easily recalled

via AMX touch panels during everyday conference proceedings. The user merely has to press a button in order to activate a complex background signal processing setup consisting of routing, equalisation, delay compensation, dynamics processing and many other components, which is fully implemented in the DME64N units.

### Rooms and technology

Three separate DME64N units are responsible for the rooms Bern, Basel and Zurich, which together cover some 650m<sup>2</sup> in the *Deutschschweiz* area. The five rooms in the approximately 300m<sup>2</sup> *Westschweiz* area are served by a further two DME64Ns. The combined DSP performance of the five DMEs, which are connected to one another and to the other audio components via an EtherSound audio network, ensures optimum acoustic conditions in every situation.

The complete setup comprises four MLA8 eight-channel microphone front ends and six Yamaha digital mixing consoles (an LS9-16, an LS9-32 and four 01V96 V2s). Further features of the system include comprehensive wireless technology by Shure and other top of the range media technology such as video/data projectors with a luminance of up to 10,000 ANSI lumen, 35m<sup>2</sup> projection screens, large-format plasma screens, video conferencing, wireless LAN, cabins for simultaneous interpreters, and a 360° LED light projection facility.

### Simplicity for the user

Today, a professional audio solution for a conference centre must work perfectly in standard situations even when there is no engineer sitting at the desk. At the Swissôtel Zurich Convention Centre, this is ensured thanks to Kilchenmann's sophisticated programming of the AMX room control, operated by touch panels which are installed in each of the eight rooms, as well as the DME units which are controlled using the touch panels via RS232. The system, for example, 'knows' the location of the speaker giving the presentation and controls the priority and time-alignment of the individual loudspeaker groups, assigning the manual volume controls on the touch panel to the correct signal outputs. The video/data projector, projection screen, lights and air conditioning are also made accessible to the user in accordance with the selected configuration.

**AMX** Each room features its own AMX touch panel for controlling all the audiovisual technology



### Background complexity

The programming by Andreas Baumann - with the aid of Yamaha's Designer software - of the five DME64N units took several weeks and is one of the most complex DME setups ever undertaken. As is often the case when the user interface needs to be as simple as possible, the behind-the-scenes hardware and software is necessarily very complex. The solution for the *Deutschschweiz* area was comparatively easy to implement, as each room is equipped with a DME64N controlled via the appropriate presets with the necessary matrixing.

The task becomes rather more involved when a DME64N unit is responsible for several rooms, as is the case in the *Westschweiz* area. If the units are used both independently and simultaneously for different purposes, the simple switching of presets is no longer an option as this could, for example, lead to undesirable signal interruptions in another room controlled by the same engine. Andreas Baumann explains, "The greatest challenge during programming of the *Westschweiz* area was to enable all the required scenarios to be called up without modifying the parameters for the rooms which were not to be affected. We solved this problem via matrices, and have utilised the processing power of the two DME64Ns as efficiently as possible."

The assignment of the individual signal processing operations to the individual DSP modules of the DME64N represented a problem for the *Westschweiz* area, so the task could not be performed in the usual manner by means of an automatic compiler. During programming, Andreas employed several user modules in the Designer in order to keep the layout as clear as possible. These user modules are independent switching blocks which, in contrast to the many preset signal processing options available in Designer, can be freely assigned by the user to the required modules, for example for equalisation and dynamics processing. As they combine several individual modules in a 'black box', and only show their contents when double clicked, they contribute significantly to simplifying the overall layout. In this manner, for instance, Andreas provided an input module for each room, which includes components such as microphone signal processing, a printer, matrixing and summation. On the output side, the input modules provide the system with a stereo sum of the media involved as well as a mono sum of the microphone signals.

A further user module defines which media and microphone sums from the five rooms have to be linked together in the various scenarios: for instance, if three rooms are joined together for an event, the levels of just these rooms have to be controlled in unison when accessed by the user, while the remaining rooms remain unaffected. The output signals are then supplied via output matrices for each room and a source selector for each of the three sums to an individual speaker processing circuit integrated in the DME64N, for the loudspeakers in use. In total, the DME programming for the *Westschweiz* area comprises more than 250 individual modules.

In the end, all this high-tech and hard work combines to achieve a single, but highly desirable goal. Unintelligible speeches, howling microphones and surprise acoustic attacks at disco volumes are annoyances from which the guests of the Swissôtel Zurich Convention Centre will definitely be spared in future!

### Kilchenmann AG Telematik

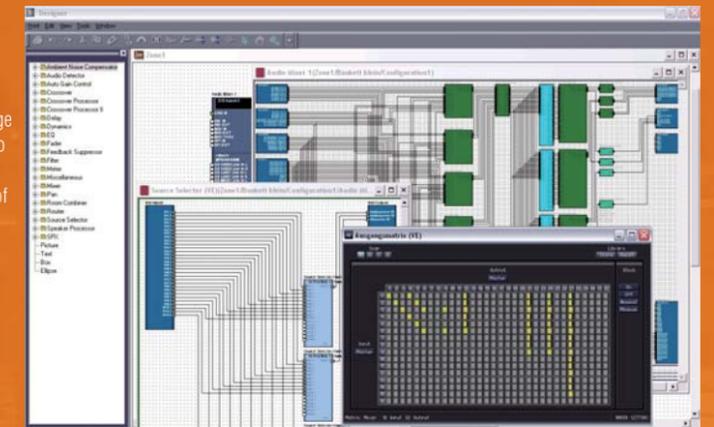
The Swiss company Kilchenmann AG employs a staff of around 140 at its three locations in Kehrsatz, Arlesheim-Basel und Zurich, of which some 80 are involved in the telematics segment. The company provides complete audiovisual solutions in the fields of IT and communications technology, whereby the range extends from training and conference rooms through to broadband cable networks, large format image projections and presentation systems. Kilchenmann employs five staff for the programming of touch panels for media control alone. In addition to telematics, the company also operates a media service for event technology and a specialist retail outlet for high-end multimedia technology aimed at private households.

[www.kilchenmann.ch](http://www.kilchenmann.ch)

### Mediensystemhaus GmbH Zurich

The Mediensystemhaus GmbH, founded by Christoph Jäger and Andreas Baumann, designs and implements partial and complete systems for the transmission, processing, monitoring and control of audio and video signals. These systems are used by broadcasting companies, recording studios and cinemas. The company's specialist fields include the configuration and programming of DSP.

[www.mediensystemhaus.ch](http://www.mediensystemhaus.ch)



The Designer software for configuring the DME64N systems, here part of the programming for the *Westschweiz* area



Grouping of the sums from the five rooms in the *Westschweiz* area in accordance with the room configuration was solved by means of so-called fader scenarios

## Grand Hotel Palazzo (Livorno, Italy)



### Spectacular sound in spectacular surroundings – Yamaha DME system helps deliver the ultimate guest experience at the Grand Hotel Palazzo.

Enjoying spectacular sea views and opulent luxury, the 123 room Grand Hotel Palazzo in the Mediterranean port of Livorno, Italy, is the ideal place to stay for both the high powered businessman and the tourist who wants to holiday in the most sumptuous surroundings.

Recently the hotel has been completely refurbished, returning it to its 19th century glory but with many 21st century refinements. Key amongst the latter has been a Yamaha DME24N-controlled CobraNet audio network, which subtly adds to the hotel's atmosphere of decadence with a highly controllable background music system.

Designed and installed by Livorno-based Benedetti Delta Service, the company's Massimo Corsi specified the DME24N and other Yamaha equipment thanks to the combination of its reliability, flexibility and seamless integration with CobraNet at an advantageous price point, plus of course Yamaha Commercial Audio's excellent pre and post sales technical support.

The DME24N manages the distribution of background music throughout the hotel - including the pool on the 5th floor - via the CobraNet network and Yamaha MY16-CII interfaces. DME4io-C satellite terminals then carry the audio signals to the amplifiers and loudspeakers, allowing for a highly controllable, zoned system.

The DME24N is programmed with event lists to manage content and different day and night volume levels, controlled by an intuitive user panel. This means that the system is always at the optimum level for maximum guest comfort and can be changed, if necessary, quickly and easily by any authorised member of the hotel staff.

Meanwhile, the 200 capacity Salone Feste conference room features a 16 channel Yamaha LS9-16 mixing console, to ensure that any kind of corporate or entertainment presentation has the best quality sound.



"Optimum sound quality and flexibility were the most important factors in the refurbished hotel's new audio system," says Sandro Chinellato, Commercial Audio Application Engineer at Yamaha Musica Italia. "The DME24N-based system is very easy to control, but offers many options depending on what is most appropriate at any given time.

"In addition, the LS9 console not only provides all the facilities of a digital console for corporate presentations and private parties, but it is also very simple for any user to get the most from. Added to that, its small footprint and light weight mean that it can be easily transported for used in any of the hotel's six conference rooms."

## Angel Parte (Hiroshima, Japan)



The spacious, domed grand salon at the Angel Parte multi-purpose banquet hall in Hiroshima, Japan, posed a significant challenge for the sound system designers. Music is such an important part of banquet style events in Hiroshima that the quality of reproduction can affect the reputation and therefore the business prospects of a banquet facility. Achieving superior sound and uniform coverage in this large domed space meant that speaker quality and placement were a critical aspect of the system's design. Yamaha Installation Series speakers were chosen for the job, and eight IF2208 units and two IS1118 units were combined in a center cluster suspended just below the peak of the dome. The speakers are all powered by Yamaha XP-series amplifiers located in a separate amp room. The result is smooth, natural reproduction of all types of music, with uniform coverage throughout the room. Client response has been overwhelmingly positive.



## Bersa Bar (Göteborg, Sweden)

A very popular location in Sweden's second largest city, Göteborg (Gothenburg), is the Bersa Bar, located in the city's central Kungportsplatsen where the well-known statue 'Kopparrarna' stands. Recently the venue underwent a complete renovation, with the key objectives of excellent sound quality and reliability. Design was also very important, and the owners of Bersa employed interior designers who had to approve everything from a visual standpoint.

Four Installation Series IF2208 mid-high speakers and two IS1215 sub were installed in the venue's main disco area, complemented by four S55 mid-highs and a SW115V sub for the adjacent bar. These are powered by XP7000 power amplifiers, with speaker processing provided by an SP2060 digital processor. The outdoor area features two C115VA full-range speakers and an SW115V sub, also powered by XP7000 amplifiers. The new system required new wiring, so additional cabling was installed for future system expansion. This turned out to be a wise move as almost all the extra cabling has already been used just six months after the bar reopened! According to Mats Eriksson of local Yamaha dealer Prosona AB, two high profile French DJs who were flown in to perform at the reopening of Bersa bar were skeptical when they saw that there was a Yamaha sound system in the disco. But, Mats says, "Then they cranked up the volume and were quite literally blown away!" With the new system now having been in daily use for six months, Mats reports that the owners are really happy with it. "The owners are very excited about the sound system and have heard from several people that it is considered to be one of the best sounding systems in Göteborg. Indeed, if you look at how little it cost, it is probably the best," he says. "It is not a low price system by any means, but compared to other things I have installed it is ridiculously good value. I have spoken to many DJ's that are so impressed by it and, apart from some inevitable adjustments that had to be done in the first few weeks, it has worked perfectly." He concludes: "This has proved that Yamaha is not just about excellent amplifiers, processors and mixing consoles any more. Now they are really up there with their new loudspeakers too."



Photo: Emelie Lager



Photo: Emelie Lager



Photo: Emelie Lager

[http://www.yamahacommercialaudio.com/ca/uk/10\\_news/20\\_installed\\_sound/40\\_commercial\\_installation/archive/2007\\_12/25\\_bersa\\_bar/index.html](http://www.yamahacommercialaudio.com/ca/uk/10_news/20_installed_sound/40_commercial_installation/archive/2007_12/25_bersa_bar/index.html)

## Blush Ultraclub (Winnipeg, Canada)



BLUSH is the largest and newest nightclub to open in downtown Winnipeg and a major contributor to the city's downtown revitalization program. Owned and operated by Sam Colosimo and Jack Salvaggio, who also run Desire nightclub in the downtown historic Exchange District. The new club held its official opening in December 2007, and is fast becoming one of the downtown's most popular nightclubs. The building, which had been vacant for the past ten years, was completely gutted, and a multimillion dollar renovation transformed the space into Winnipeg's most stunning nightclub. The owners wanted to add a live music component to supplement its dance music core. Having worked on the highly successful downtown "Empire" nightclub, Integrated Entertainment Technologies (IET) was awarded the project to provide the audio and lighting support systems. "When we had our initial meetings with the owners, we realized that we had our work cut out for us," states Glen Jonatchick of IET. "The owners wanted to create a seamless transition from live music to dance music without compromising either system and also to stay within a modest budget." From a speaker perspective, Jonatchick says the Yamaha Installation Series was a perfect fit. "We had used these boxes for a previous client and the system sounded great and very musical." At under 130dB for each enclosure, the Yamaha IF Series has the capacity to handle the high levels and large dynamic range of live popular music. "There are not many speaker products that offer both the musical timbre and high level capacity, and even fewer at this price point, so the owners were extremely happy with the decision to use the IF Series." In fact, Jonatchick notes, "patrons and industry professionals that have come to the club want to know what brand of speakers were used and comment on how good the system sounds." The speakers are managed by the powerful Yamaha DME24N processor. In order to provide the best sound for the entire room, the DME24N manages 16 different speaker locations. The system's remotes provide a simple single control to time fade

between band and DJ as well as control of the exclusive VIP area. (14) IF2115/64 speakers and (4) IS1218 sub bass cabinets were installed for house and DJ speakers. (2) Yamaha IF2108 speakers were provided for DJ monitors. The front of house area is equally powerful, yet simple with a Yamaha LS9-32 channel console. The operator can mix the entire band on one layer and view all the powerful tools the console offers on a 22-inch LCD screen as well as on the board itself. "The LS9 is extremely intuitive for even the most apprehensive operator, and with its 12 auxiliaries, an operator can mix monitors from the FOH position or utilize the monitor mix position which includes a Yamaha MG32/14 FX mixer," adds Jonatchick. The monitor mix position uses (5) Yamaha C112V floor wedges (and a Yamaha C215V for drum monitor) powered by Yamaha P3500S amplifiers and is also controlled by the DME24N processor. Six channels of Yamaha Q2031B equalizers are also provided for the operator that wants to tailor each mix. A total of 17 Yamaha P Series amplifiers were installed: (3) P3500S and (14) P7000S. The BLUSH sound system uses a Digiflex Splitter Snake along with a total of 14 Shure microphones including six SM57, six SM58s, a Beta52A and three KSM109 stage microphones. IET also provided a Rane TTM 57SL DJ mixer. For more information on Integrated Entertainment Systems, contact (866) 774-3004 or visit

<http://www.ietcanada.com>.

For more information on Yamaha Commercial Audio Systems products used in this installation, write Yamaha Commercial Audio Systems, Inc., 6600 Orangethorpe Avenue, Buena Park, CA 90620; telephone 714-522-9011; e-mail [casales@yamaha.com](mailto:casales@yamaha.com); or visit <http://www.yamaha.com/ca/>

## Hanamaki Spa (Iwate, Japan)



In 2005 the Hanamaki Onsen Hotel in Iwate prefecture, Japan, upgraded the sound system of it's large banquet hall with an 01V96 Digital Mixing Console and DME24N Digital Mixing Engine. The 1000 square meter hall was the first of it's kind in the country to adopt a Cobranet digital audio network.

### In the Words of the Event Chief: Mr. Hitoshi Ozawa

We'd been using analog equipment all along, and when it came time to renew the system I wasn't sure whether moving to digital was a good idea. But the more I discussed it with people the more I realized that by adopting digital technology it would be possible to create a system that could be easily used by anyone. I'm very happy with the way it has turned out, and work with it more to create great sound.

An analog sound system in a hall of this size requires a huge amount of cabling, and there's always the danger of problems such as microphone sound cutting out due to faulty connections. Greater complexity also means that only operators who are thoroughly familiar with the system can use it properly. It can be very difficult to even get sound out of the system if a knowledgeable operator isn't available. By going digital with the 01V96 console and other components the danger of unexpected problems has been significantly reduced while flexibility has been enhanced.

Event chief Mr. Ozawa says that "going digital has increased reliability and improved sound quality." Cobranet allows simultaneous bidirectional transmission of up to 128 channels of uncompressed digital audio over a single CAT5 Ethernet cable, so converting from analog to a digital system required only a bare minimum of installation work and expense. The clear merits of digital systems and digital audio transmission will undoubtedly result in wider adoption in the future.



Similar systems, including the 01V96 console, are provided in the control room and in a movable rack located in the hall itself. Wall-mounted connectors, including connectors for the Cobranet Ethernet cables, minimize the need for long cable runs around the room. The DME24N is mounted in a rack in the control room along with four AD8HR AD converters, an NHB32-C digital audio interface, and six P2500S power amplifiers.



## Teatro alla Scala (Milan, Italy)



### Yamaha helps legendary opera venue to reach new high note

The issue of sound reinforcement for opera and classical music is still a rather thorny one with many aficionados of those art forms. So how do you approach providing the best quality sound reinforcement in one of the world's most historic and architecturally delicate opera venues? You ask Yamaha to help.

The 230 year old Teatro alla Scala in Milan is a byword for operatic excellence and grandeur, selling out performances months in advance and setting the standard for the genre worldwide.

But modern productions expect modern facilities and so the building has just undergone an extensive, two year, €75m rebuild which has transformed the theatre's backstage facilities and added a significant Yamaha upgrade to its audio system

"However, this isn't a typical theatre where a decision is taken to upgrade and you can just hang a couple of line arrays," says Nicola Urru, the opera house's director of audiovisual facilities. "There are a lot of different considerations – architectural, historical, musical, political."

Urru has a long association with Yamaha, going back to his first encounter with the PM1D on a tour of Japan. As a result, in 2003 he persuaded the venue's management to invest in a 96-channel PM1D, which now resides in a completely rebuilt AV suite, hundreds of metres from the auditorium itself.

"The desk is dedicated to the show, but its precise role depends on the production," says Urru. "It drives all the microphones and is used to process spot FX. But in some productions singers may only require miking up if they begin singing while they are off-stage; in other operas they may not need miking up at all. Everything has to be considered on a case-by-case basis."

"In the past, the theatre tended to rent audio equipment as and when it was needed," adds Nicola Zucchini, sales engineer for Yamaha Musica Italia's Commercial Audio Division. "We are gradually changing the mentality, but the nature of the venue is such that you can't just come in and fit a load of equipment. La Scala has its own installation team, and you need several layers of approval before anything can be done. Every new cable run has to be approved."

As part of the most recent upgrade, the venue has seen the installation of additional sound reinforcement in the auditorium, comprising three pairs of white-painted Installation Series IF2205, placed vertically either side of the proscenium, with IS1118 subs and amplified with XP2500 and XP7000 amps. A DME24N digital mixing engine acts as a complex crossover for the system.

"Everything has to be very discreet," says Zucchini. "We needed special permission to place the IF enclosures between the proscenium and the wooden wall which adjoins it, and La Scala insisted on the speakers being finished in white."

"The solution is small-scale but very capable. You have to remember that the dynamic range of a typical operatic or orchestral performance is between 50–100dB – much wider than a typical rock concert. The system has to accommodate that."

A new FOH position was also created in the hall, from which a 32-channel LS9 console acts as a sub-mixer for orchestral strings and for the venue's unique organ arrangement – an ageing electronic organ housed in one of its rehearsal rooms, deep inside the backstage area.

The signal processing power of the DME24N is used to create different EQ and effects settings for each organ sound, the processed audio being fed to a pair of IF2115/64 speakers, flown backstage in such a way that the sound reflects off the back wall and out into the auditorium – simulating the effect that a real organ would have on performers and audience alike.

"It's the kind of solution that our relationship with La Scala allows us to develop," adds Yamaha Musica Italia's commercial director Marco Papini. "We see a very strong parallel between the theatre's ongoing use of digital audio technology and our own diversification into working closely on distributed audio projects."

As Nicola Urru says: "All of us here in the AV team are musicians. We wouldn't be working here otherwise. So it's great to have a relationship with a company that offers not just specific answers to our audio problems, but which understands music as well."



## Trappan (Norrköping, Sweden)



Situated on the Baltic coast, the city of Norrköping and its neighbour Linköping together form Sweden's fourth largest urban region, with nearly half a million inhabitants and 36,000 companies based there. Together the cities are booming, with IT a particularly successful business area. This is partly due to Linköping University, which has a major campus in both cities. With 25,000 students distributed over three faculties - Arts and Sciences, Technology and Health Sciences - and close ties with both the private and public sectors, Linköping University also has become a major Swedish research base.

5500 of the students are based at the Norrköping campus, a number that has grown rapidly in the past decade. The University's first Student Union facility in Norrköping was built in 1997. But the premises quickly became too small and, in 2000, the operation was moved to a new location. This 'new' facility quickly became very popular among students and the number of hosted activities grew significantly, leading to another, even bigger, venue being required. The three actual Student Unions active at the University – LinTek, Consensus, and StuFF – all wanted to improve the project further, unifying students from the different courses under one roof and also to create an attractive and appealing base for contacts with trade and industry. In late 2006, the new Student Union facility was opened in a refurbished former 19th century spinning mill. Featuring a restaurant, café, pub, and a main hall with a stage for musical performances, the new facility is named 'Trappan' (The Stairway) and is very popular with both students and industry representatives.

In order to ensure that Trappan's audio specification matched its facilities, a Yamaha distributed audio system was installed by Åke "Myggen" Wennersten of PADAB Ljud & Ljus AB, Sweden. Åke is a senior and successful Yamaha contractor in Scandinavia, with a huge number of projects behind him. These include the Gothenburg City Theatre and the De Geer Concert House in Norrköping.

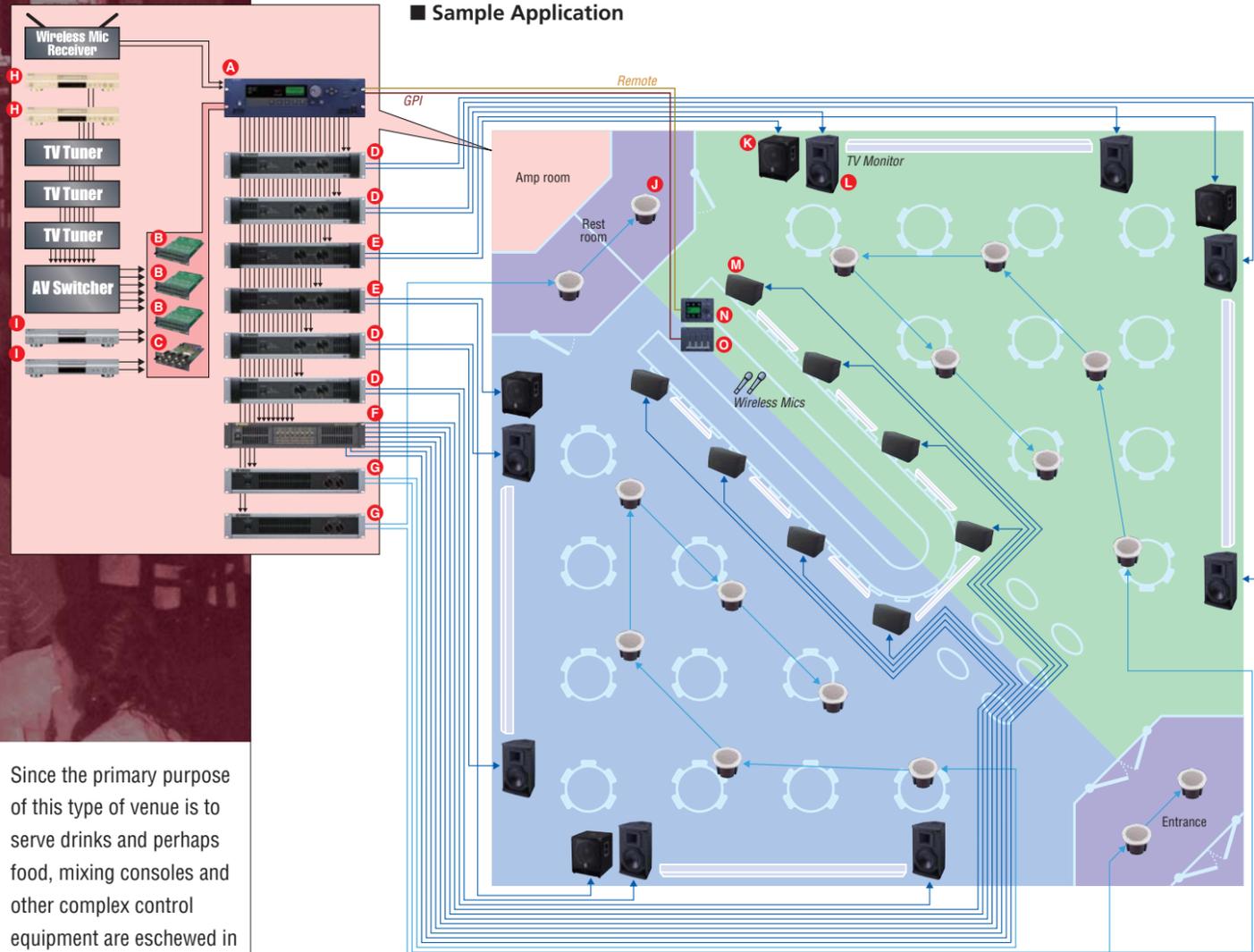
A DME24N Digital Mixing Engine, with four PC9501N and one P7000S power amplifiers drives a range of critically acclaimed Yamaha Installation series speakers, including four IF2115/64W mid/highs, two IF2115/99W mid/highs and four IS1218 subs. The system is installed in Trappan's main hall, and is designed to provide sound reinforcement for live music, conferences, and DJs. In addition to the main system, loudspeakers are also provided in a small bar behind the main hall, plus a bigger pub on a lower floor. There are also audio inputs located in the big pub as well as in the permanent DJ booth, which can be broadcast through all the system's loudspeakers.

Åke Wennersten comments: "I have been working with Yamaha products for over 10 years and our relationship has always been excellent. I know I can trust the equipment completely. "Yamaha has a wide range of products and all are of very high quality with regard to both sound quality and reliability," he continues. "In addition their customer service is second to none, from pre-sales through to after care. These factors make Yamaha a very reliable and trustworthy partner to work with, which is of great value to both us and our customers."

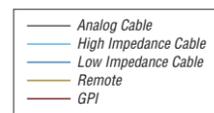


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# Bar: Medium



Sample Application



- A** Digital Mixing Engine DME64N
- B** AD/DA Card MY8-AD96
- C** AD Card MY8-AD24
- D** Power Amplifier XP3500
- E** Power Amplifier XP7000
- F** Power Amplifier IPA8200
- G** Power Amplifier XH200
- H** DVD player
- I** CD player
- J** Ceiling speaker
- K** Speaker SW115V
- L** Speaker IF2108
- M** Speaker S15
- N** Intelligent Control Panel ICP1
- O** Control Panel CP4SF

## System Details & Features

An amp room at the rear of the establishment houses a DME64N Digital Mixing Engine that serves as the system's input/output and processing core along with audio, video, and television sources as well as power amplifiers that drive multiple speaker systems located in and around the main room. The DME64N is fitted with three MY8-AD96 cards and one MY8-AD24 card that provide a total of 32 analog inputs and 24 analog outputs. IF2108 speaker systems with SW115V subwoofers flank each of the room's four large wall-mounted video screens, and compact S15 speakers provide local sound for the seven smaller video screens located around the central bar. The IF2108 speakers and SW115V subwoofers are powered by XP3500 and XP7000 amplifiers, respectively, while all eight bar speakers are powered by a single 2U-size IPA8200 amplifier. Ceiling speakers driven by high-impedance XH200 distribution amplifiers are provided in the main room as well as the entrance hall and rest room area. The room is divided into "zones" (shown by the colored areas in the diagram), and the volume in each zone can be conveniently controlled from surface-mounted ICP1 and CP4SF control panels located in the bar area where they are easily accessible by the staff. The intelligent ICP1 control panel can be set up to control a range of additional parameters as well. Wireless microphones are provided for announcements.



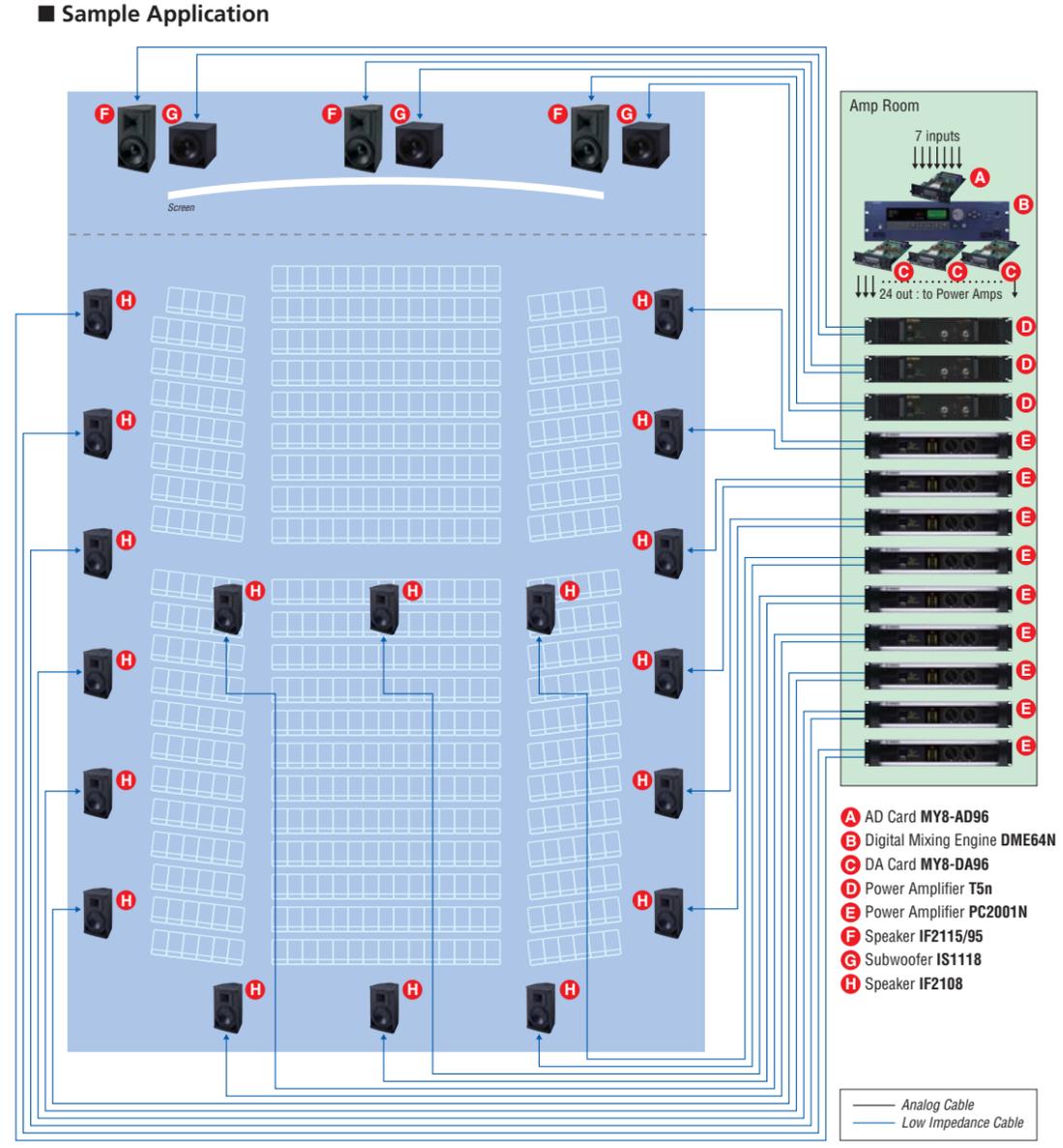
Photo: Emelie Lager

Product details can be found at [www.yamahaproaudio.com](http://www.yamahaproaudio.com) • Please observe safety regulations and procedures when installing speakers!

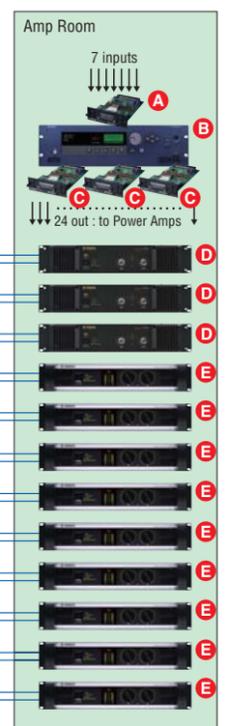
# Movie Theater



Fidelity and impact are essentially in a movie theater sound system, and this setup fits the bill nicely. In addition to a first-rate L-C-R speaker setup for the screen, an extensive surround system immerses the entire audience (500 ~ 600 seats) in an utterly believable sonic experience.



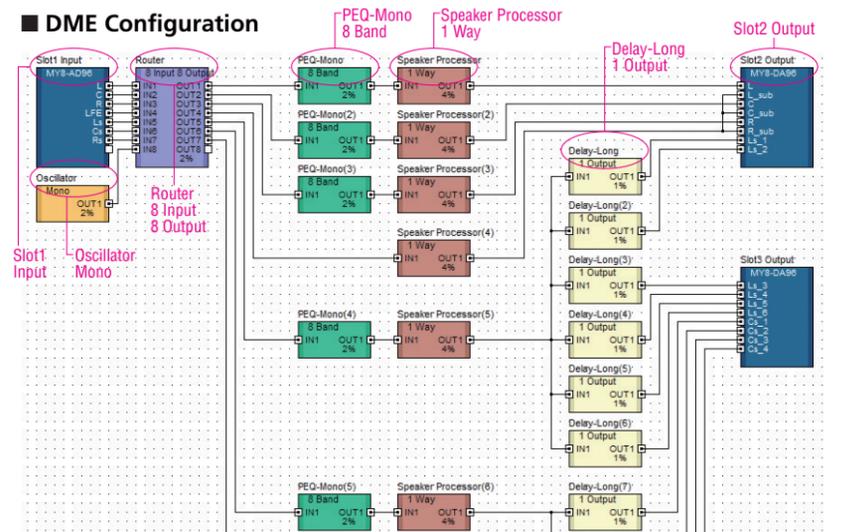
Sample Application



- A** AD Card MY8-AD96
- B** Digital Mixing Engine DME64N
- C** DA Card MY8-DA96
- D** Power Amplifier T5n
- E** Power Amplifier PC2001N
- F** Speaker IF2115/95
- G** Subwoofer IS1118
- H** Speaker IF2108

## System Details & Features

Three IF2115/95 speaker units are flown from the ceiling for front-of-house sound while three IS1118 subwoofers deliver the tangible lows that great theater sound demands. Each IF2115/95 plus IS1118 pair is powered by an advanced T5n power amplifier that provides all necessary speaker processing built in. In addition to the FOH speakers and the three T5n amplifiers that drive them, nine PC2001N power amplifiers power an extensive surround system consisting of eighteen IF2108 speakers. Processing and distribution for the FOH and surround systems is handled by a single DME64N Digital Mixing Engine equipped with an MY8-AD96 card to handle the seven analog inputs, and three MY8-DA96 cards to provide 24 outputs to the power amplifiers. Of course the DME64N is essential for processing and delivering the surround sound that will bring the theater's movies to life.

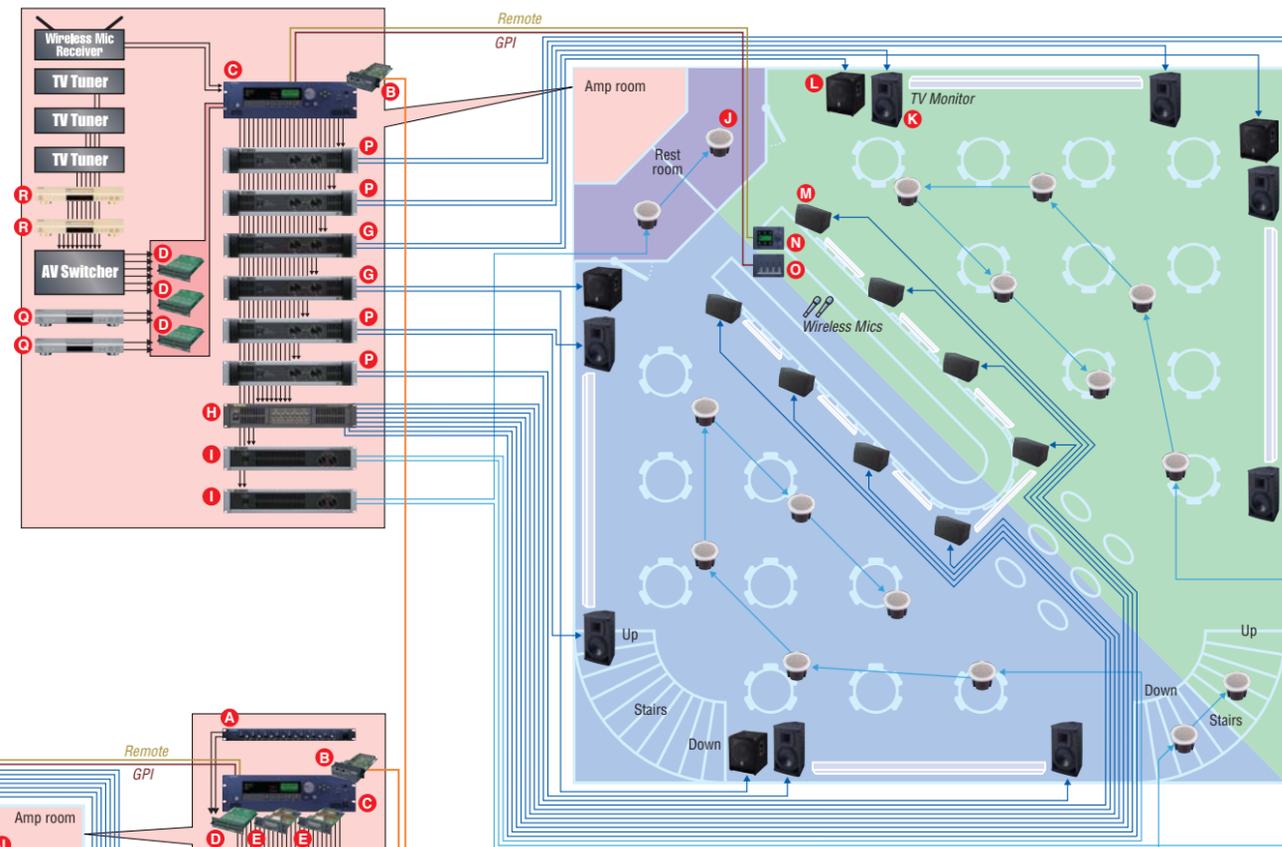


Product details can be found at [www.yamahaproaudio.com](http://www.yamahaproaudio.com) • Please observe safety regulations and procedures when installing speakers!

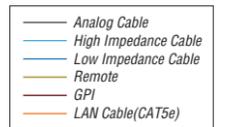
# Leisure Complex

## System Details & Features

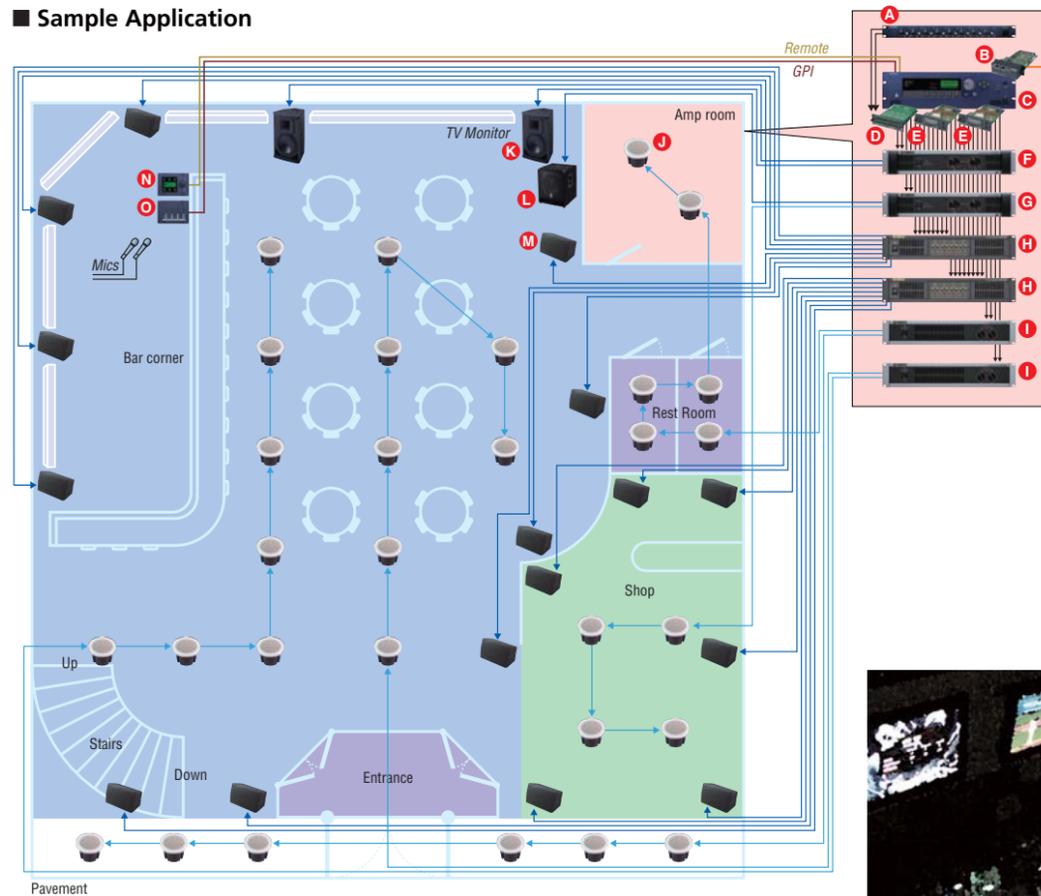
Each floor of this leisure complex has an amp room containing an independent sound system with a DME64N Digital Mixing Engine for input and output as well as processing, and all power amplifiers necessary to drive the speaker systems on the corresponding floor. Installation Series speakers – IF2108 full range speakers, SW115W subwoofers, and S15 compact full range speakers – are powered by XP5000, XP7000, and IPA8200 amplifiers, respectively. The use of compact 8-channel IPA8200 power amplifiers makes an important contribution to reducing the overall rack space required. High-impedance ceiling speaker arrays are powered by XH200 distribution amplifiers. Each DME64N is fitted with expansion cards appropriate to the input and output requirements of the facilities on the corresponding floor. Although each of the sound systems can be operated independently, all three DME64N units are fitted with MY16-CII digital network cards and are linked via a CobraNet network so that control and audio can be shared as required. The entire system can be controlled from the remote ICP1 and CP4SF control panels installed in the bar area on the second floor, for example. In addition to overall volume control, volume level in each of the venue's zones (indicated by the colored areas in the diagram) can be independently adjusted via the control panels. Although not shown in the diagram, video networking is handled via a VLAN system using the same Ethernet cabling as the audio system.



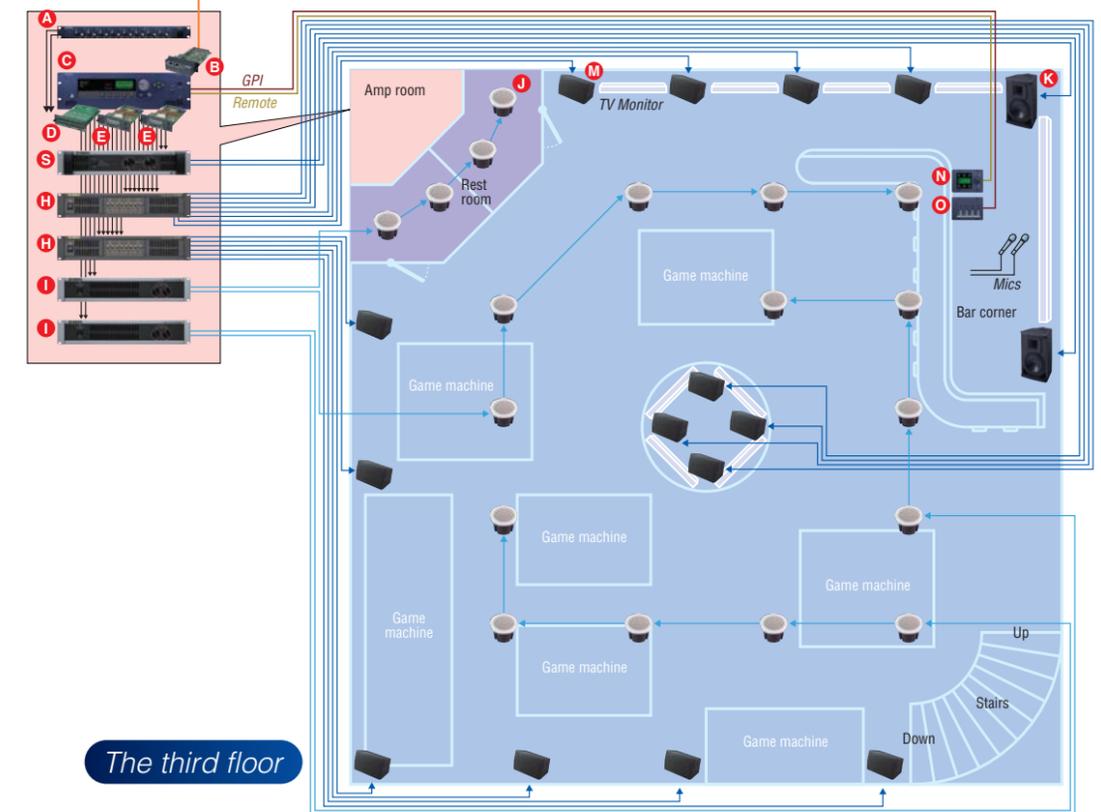
- A 8-channel Mic/Line Amplifier MLA8
- B Digital Network Card MY16-CII
- C Digital Mixing Engine DME64N
- D AD/DA Card MY8-ADA96
- E DA Card MY8-DA96
- F Power Amplifier XP5000
- G Power Amplifier XP7000
- H Power Amplifier IPA8200
- I Power Amplifier XH200
- J Ceiling speaker
- K Speaker IF2108
- L Speaker SW115W
- M Speaker S15
- N Intelligent Control Panel ICP1
- O Control Panel CP4SF
- P Power Amplifier XP3500
- Q CD player
- R DVD player
- S Power Amplifier XP2500



## Sample Application



The first floor



The third floor

This three-floor leisure complex includes shops and offices, bars, and a game room with extensive audio and video distribution in all areas.

# Arena: Medium



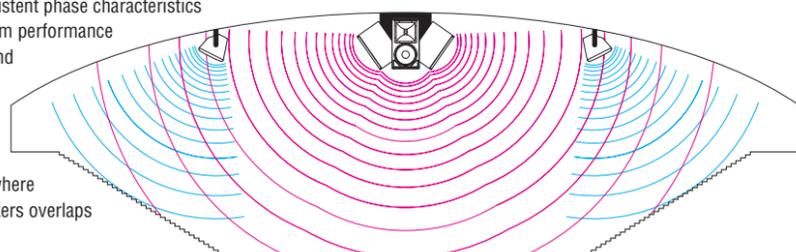
Whether you define this room as an “arena” or a “two-court gym,” it’s still a large space that requires a serious sound system for consistent high performance and coverage.

## System Details & Features

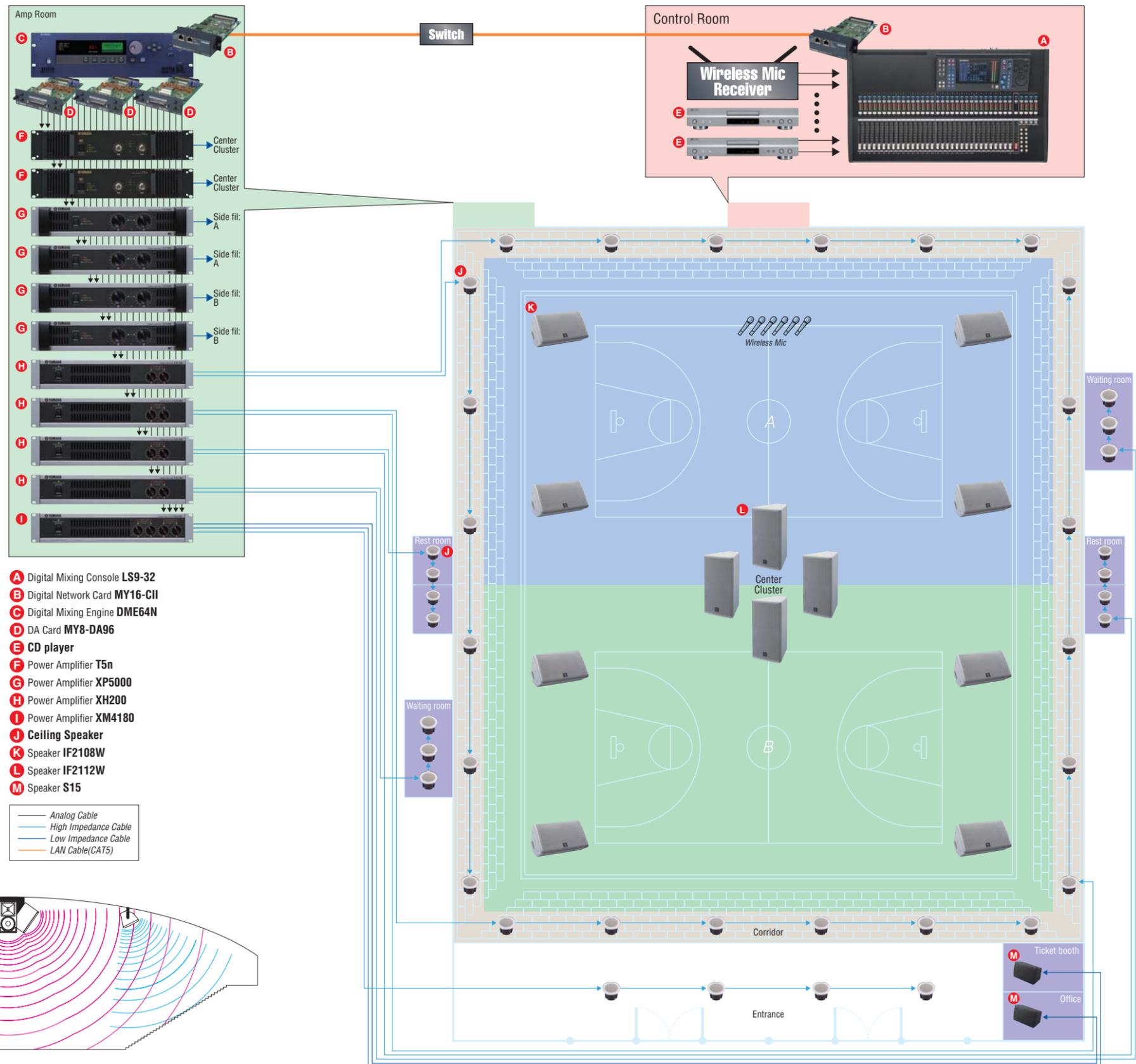
The main speaker system for this approximately 800-seat venue is a center cluster of four IF2112W speakers supported by eight IF2108 units for side fill. The center cluster is powered by a pair of T5n amplifiers, while four XP5000 amplifiers provide power for the side fill units. Additional coverage is provided by four high-impedance arrays of ceiling speakers running parallel to each of the room’s walls, plus additional ceiling speakers installed in rest rooms and waiting rooms. The ceiling speaker arrays are all powered by XH200 distribution amplifiers. Compact S15 full-range speaker units powered by an XM4180 amplifier are provided in the ticket booth and office as well. All of the system’s amplifiers are housed in a dedicated amp room along with a DME64N Digital Mixing Engine that handles output distribution and processing for the entire system. Input and control are handled by an LS9-32 Digital Mixing Console located in a separate control room. Both the LS9-32 console and DME64N unit in the amp room are fitted with MY16-CII digital network cards allowing them to be simply linked via standard Ethernet cables and a Ethernet switch.

### Uniform Phase Response

The entire Yamaha Installation Series speaker lineup has been designed to provide consistent phase characteristics so that they will deliver optimum performance in any combination, and respond smoothly to equalization for unprecedented installation flexibility and natural sound. Sound level variations and unwanted coloration in areas where the output from different speakers overlaps are effectively minimized.



## Sample Application



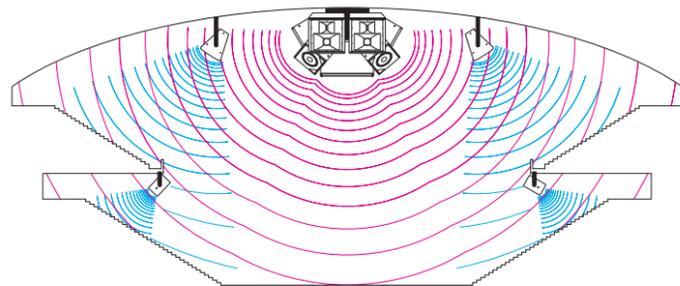
# Arena: Large



The large area and often-unfriendly acoustic conditions imposed by large arenas of this type present some challenging problems for sound system design. Advanced Yamaha speaker systems and digital sound gear make the task of delivering consistently excellent sound quality to every seat in the room relatively easily.

## System Details & Features

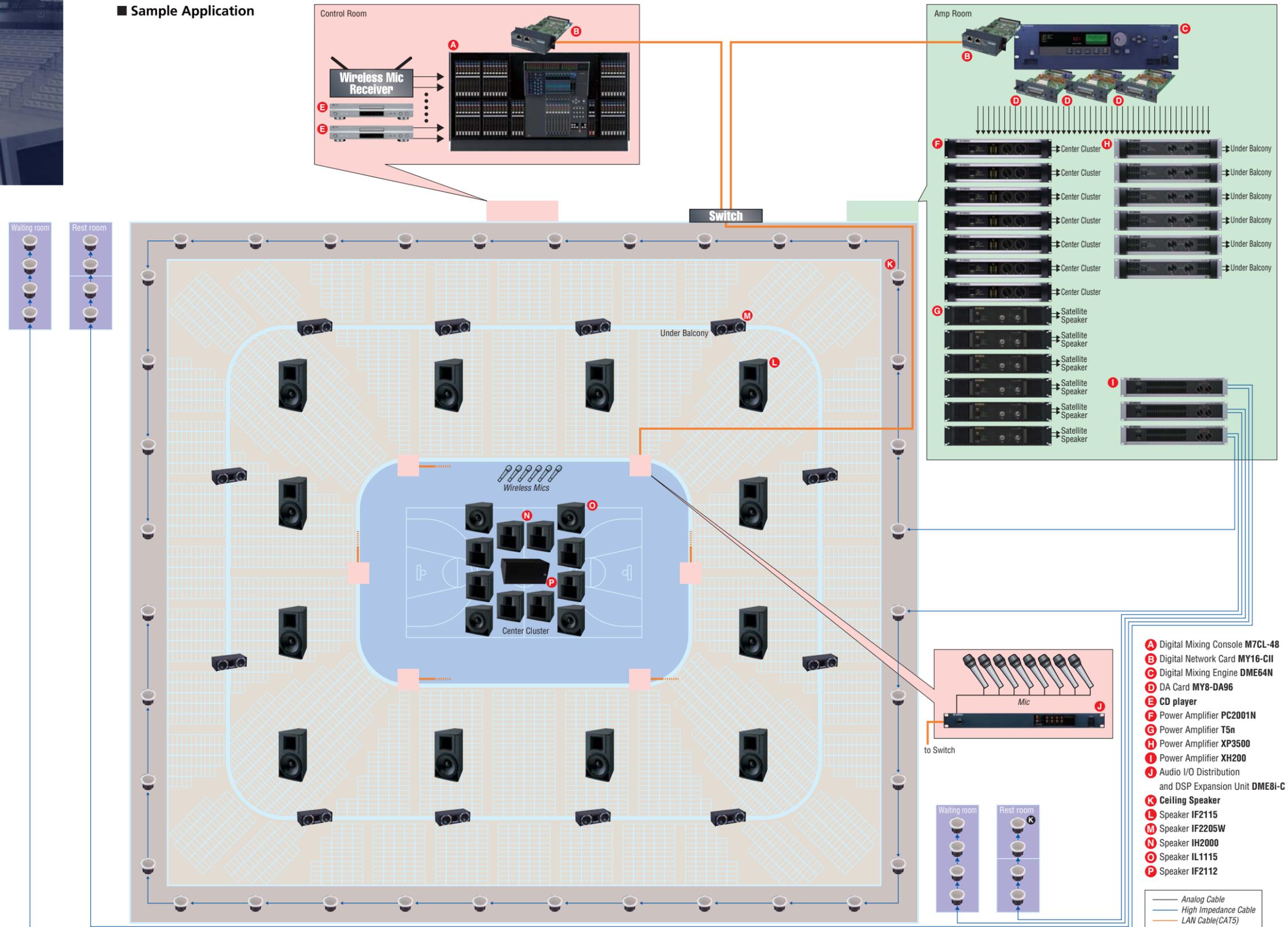
This large-scale system features a suspended center cluster consisting of IH2000, IL1115, and IF2112 speaker units driven by a bank of seven PC2001N power amplifiers. Side fill is provided by twelve IF2115 speakers powered by six T5n amplifiers, augmented by twelve under-balcony IF2205 speakers powered by six XP3500 amplifiers. Extra output is provided around the perimeter of the room by two high-impedance arrays of eighteen ceiling speakers driven by an XH200 distribution amplifier. Two more XH200 amplifiers drive ceiling arrays in the facility's rest rooms and waiting rooms. All distribution and speaker processing is handled by a DME64N Digital Mixing Engine located in the amp room along with the racks containing the amplifiers listed above. A separate control houses an M7CL-48 Digital Mixing Console with the required wireless microphone receivers and music sources. Both the console and the DME64N in the amp room are fitted with MY16-CII digital network cards to allow efficient, high-quality digital audio transmission between them. The console and DME64N are connected via an Ethernet switch that is also linked to a satellite DME8I-C unit that provides an additional eight wired microphone inputs in the arena area. Digital networking means that all major transmission lines need only single Ethernet cables, dramatically reducing the size, complexity, and cost of the required wiring infrastructure.



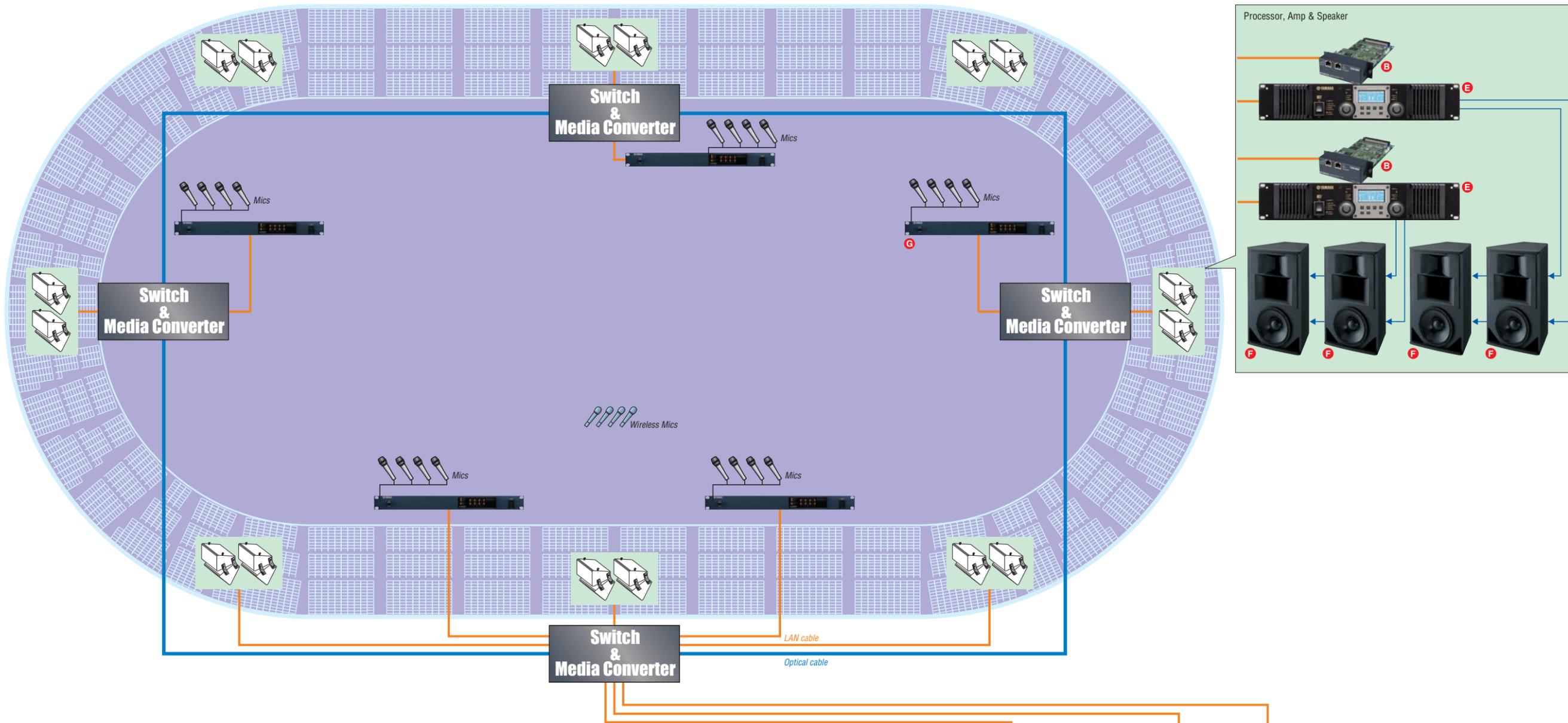
### Uniform Phase Response

The entire Yamaha Installation Series speaker lineup has been designed to provide consistent phase characteristics so that they will deliver optimum performance in any combination, and respond smoothly to equalization for unprecedented installation flexibility and natural sound. Even in a large, complex multi-speaker system of this scale sound level variations and unwanted coloration in areas where speaker output overlaps are effectively minimized.

## Sample Application



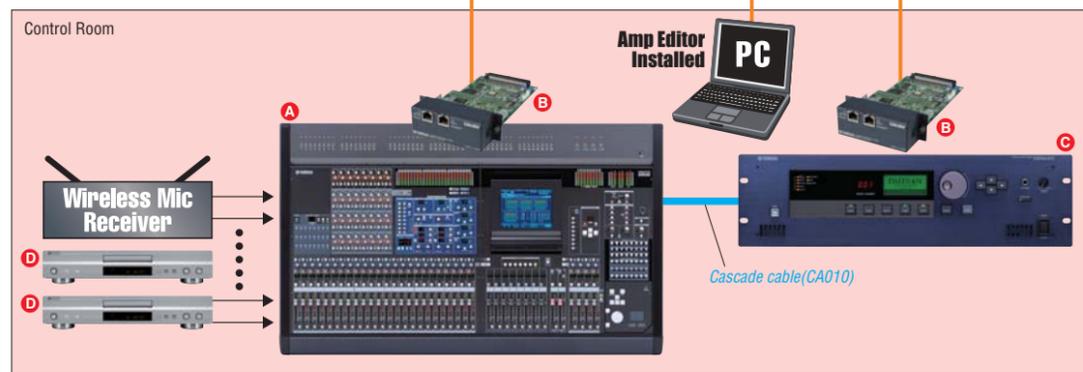
## Sample Application



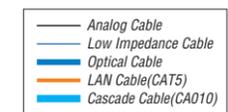
Providing uniform, high-quality sound coverage for large stadiums that can hold thousands of spectators has always been a major undertaking, but the latest audio networking technology and equipment makes installation and operation easier than ever.

### System Details & Features

Primary control and processing for the entire venue are handled by a PM5D-RH Digital Mixing Console and cascaded DME64N Digital Mixing Engine located in the stadium's control room. Music sources and wireless microphone reception equipment are also located in the control room. Both the PM5D-RH and DME64N are fitted with MY16-CII digital networking cards that connect via standard Ethernet cables to the nearest of four switch/media converters located around the stadium. From there optical cables connect to the other three switch/media converters so that no degradation of the audio signals can occur even over the extremely long distances involved. Each of the four strategically located switch/media converters directly feeds output systems consisting of two TX4n power amplifiers driving four 1F3115 3-way speaker units. The TX4n amplifiers are fitted with MY16-CII digital network cards allowing direct Ethernet connection from the switches. All speaker processing required for precise output tuning is built right into the TX4n power amplifiers, so no further output equipment is necessary. On/off switching and status monitoring of all amplifiers can be handled right from the control room using Yamaha's Amp Editor software running on a computer connected to the network. Each switch/media converter is also linked via Ethernet to one or more satellite DME8i-C units for remote microphone input capability (up to eight inputs per DME8i-C unit).



- A Speaker PM5D-RH
- B Digital Network Card MY16-CII
- C Digital Mixing Engine DME64N
- D CD Player
- E Power Amplifier TX4n
- F Speaker 1F3115
- G Audio I/O Distribution and DSP Expansion Unit DME8i-C



## Hubert H. Humphrey Metrodome (Minneapolis, USA)



A fixture in downtown Minneapolis since 1982, the Hubert H. Humphrey Metrodome is one of the busiest and visible sports facilities in the U.S. As the only air-supported dome in the major leagues, the Metrodome is covered by over 10 acres of Teflon-coated fiberglass material overhead, and can seat up to 68,000.

The demand for updated technological requirements, coupled with intelligibility problems that accompany such a large venue, led to a comprehensive overhaul of the audio system, featuring a Yamaha PM1D large format digital mixing console as the control center.

Permanently installed in the sound booth (the upper deck of the baseball press box), the PM1D acts as the control center for the entire system. The 96 input, 48 output with 12 stereo matrices console is also used as a routing switcher for all the audio signals throughout building.

## Le Diamant (Paris, France)



### Seine cruises sparkle with Yamaha sound

Along with the Eiffel Tower, the Arc de Triomphe, Notre Dame, the Louvre and Sacre Coeur, the glass-topped boats that cruise Paris's River Seine are an essential 'must do' of any tourist trip to the French capital.

Of course, just as important as what those on the boats can see is what they can hear - be it a commentary on what is visible as they cruise down the river, relaxing live music or, should anything untoward occur, emergency messages.

So, to ensure that the sound is as good on Le Diamant - the pride of the fleet run by the Bateaux Parisiens cruise company - as the sights are from it, it has been fitted with a Yamaha audio system.

Featuring 320 table settings and a dance floor, the 60m long vessel's cruises usually feature cabaret entertainment. Its previous audio system was unable to deliver the exacting standards required, so high profile French sound designer Alain Français was brought in to redesign the system.

Français' company De Preference handles many high profile shows, so having a company of this prestige on board was something of a coup for Bateaux Parisiens. It was Français' job to ensure that the ultimate sound quality was available on Le Diamant, delivered despite the relatively low headroom of the boat's glass canopy, the sound reflections that the flat areas of glass cause and ensuring maximum all-round vision for passengers.

After conducting A/B tests with loudspeakers from other leading manufacturers, Français chose 17 Yamaha IF2205 on the basis of their unique combination of



compact, discreet enclosures, coupled with ease of integration and, of course, excellent sound quality.

The IF2205 features a 90° x 60° dispersion pattern, two 5" drivers and a 1" high frequency voice coil, the latter can be rotated 90°, allowing for either vertical or horizontal mounting, an ideal solution for an environment where visual intrusion had to be kept to an absolute minimum.

The audio is managed by a Yamaha DME24N digital mix engine, controlled by an ICP1 intelligent control panel and by DME DESIGNER thanks to a specific user control page.

The DME24N is a fixture of all five boats in the Bateaux Parisiens fleet. With a house band - regularly comprising guitar, bass and keyboards - plus vocalists who use wireless mics to walk amongst the diners, the DME provides unique flexibility in that its settings can be easily changed via the ICP1 Intelligent Control Panel to mix a live band which can, on some occasions, feature an array of different musicians and singers.

In addition, at the touch of a button on the ICP1, the audio system is instantly optimised for speech, background music or - if required - emergency announcements, thanks to 50 scene memories.

The loudspeaker system is divided into three zones, with the DME24N also controlling Le Diamant's mood lighting via MIDI, ensuring that the perfect relaxed ambience is maintained throughout evening cruises, whatever the time of year.

With a Yamaha O3D console also available for band monitoring, Yamaha equipment has truly made Le Diamant's new audio system sparkle.

## Zoppas Arena (Conegliano, Italy)



### Installation Series speakers get the better of volleyball crowds

As well as being famous worldwide for its excellent Prosecco sparkling wine, and birthplace of soccer champion Alessandro del Piero, the Italian town of Conegliano also has a women's volleyball team that has made incredible progress over recent years. Founded in 1971, Spes Volley recently chalked up six consecutive promotions, passing from the third division provincial championship to national B2 Series. In 2005, it reached the national A2 Series Championship, which it won in 2008, passing to A1 from the 2008-2009 seasons, with an average crowd of 2,800 spectators at its games. Championship and cup games totalled approximately 37,500 spectators at home games, and these big crowds can now enjoy a more exciting experience at matches, thanks to a capillary new Yamaha sound reinforcement system.

Named Zoppas Arena after the team's main sponsor, the venue was inaugurated in October 2008 and Spes, the sports society running the complex, also gave advice on the work for completing the arena.

Matteo Masat, in charge of Spes communications and organization of the events hosted in the Arena, explains, "As well as being an AV technology buff, I worked for several years in the video production field, so have the job of supervising our audio, lighting and video systems, obviously with the close support of the specialized technicians involved. The project consisted essentially in the installation of sound reinforcement in the main arena and another smaller multifunction system in a room dedicated to press conferences, corporate presentations, etc."

Among the alternatives proposed by the audio contractor (Onda Teleelectronics of Bologna, which has over twenty years' experience in developing projects for audiovisual and multimedia communication, security, broadcast and education), Spes chose a Yamaha system, designed by the Bologna company and inaugurated at the beginning of 2009. Masat explains, "Mainly conceived for speech reproduction, the system had to ensure uniform audio distribution as well as the best possible intelligibility with thousands of shouting fans. We stage mainly sports events and, when the MC at the game gets excited, he shouts too, so things become even more complicated, but we have seen that the system works well and we are able to control the reinforcement effectively."

The main arena was in fact acoustically problematic, with a reverb time of over seven seconds. As well as the top tier of seating, able to host 2,500 spectators, the venue also has a series of (motorized) retractable sections, which hold 500 along the sides of the court. From a horseshoe-shaped truss rig no less than forty Yamaha Installation Series loudspeaker enclosure are flown, divided into ten groups of four: two IF 2115/64 in biamped configuration for the top seating, a central IF 2115/95, inclined to cover the court, and another (identical, but positioned horizontally) for the retractable seating. During games, the enclosures dedicated to the court are normally muted but, should the need arise, are ready for use for other types of events. Two more IF 2115/64 in biamped configuration (white versions for a lower visual impact) are installed on either side of the large LED screen on the wall at the end of the court.

The most demanding part for the designers regarded the enclosures pointing down on the retractable seating, as the sound "bounced" off the wooden flooring, creating reflection and phase problems. A lot of work was obviously done on the frequencies, cutting the low frequencies in particular and concentrating on speech frequencies, the most important for the client. All this was done using two Yamaha DME (Digital Mixing Engines) - a DME64N, which handles the processing of the biamped enclosures covering the main seating areas and those alongside the screen, and a DME24N, which controls the single enclosures covering the parterre and court.

A Yamaha IM8-24 analogue console dominates the main control room, with a pair of MSP 3 monitors and, behind the sound engineer's seat, a row of racks hosts the Yamaha power amplifiers (22 XP 7000 and 12 XP 3500) and the rest of the audio equipment: the two Yamaha DME multi-channel processors are connected to CP4SF remote control panels, ensuring extremely user-friendly control of the various sections of the system: LED screen, left-hand tier, right-hand tier, control room tier, parterre, court and "journalists" (the enclosures positioned vertically in front of the control room, under which there are the desks for the journalists following that games, can be independently muted). Masat continues, "We also have a small audio/video control setup with three cameras - one fixed, with a wide-angle lens that covers the court from above, enabling game strategy to be followed, a remote controlled one with a zoom lens for screening close-ups of the crowd on the LED screen, and the third - a handheld unit - at the side of the court. A video recording is made of the games and about fifty DVDs available for fans at the end of play."

Six Yamaha IF 2108W enclosures from the Installation Series are installed in the multi-function room, where equipment also includes gooseneck microphones fitted with a "plug-on" for wireless transmission, so the speakers' table can be positioned anywhere in the room. The control rack hosts another DME24N, which, as well as processing and distributing the audio fed to the enclosures, is also used as a mixer and has a feedback suppression program. Masat adds, "After each game, there is a press conference and the audio is fed to the control room, then out into the main arena, along with the video coverage of the speakers, with a remote-controlled camera. All the spectators are therefore able to follow the event comfortably from their seats." Masat concludes, "Now that we've used the system for a few months, I must say we've achieved the best result, considering the difficulties involved in amplifying a venue of this size with four thousand shouting spectators." Giordano Bruzzi, technical/sales manager at Onda Teleelectronics, states: "The result at the Zoppas Arena, as far as speech intelligibility is concerned - at a very high volume and with very noisy crowds - is really good and that was the aim we'd set ourselves."

## Stadium:MK (Milton Keynes, UK)

Since being designated as a New Town in 1967, the conurbation that has been developed around the village of Milton Keynes, Buckinghamshire, has grown rapidly in the ensuing 40 years. One of the latest construction projects, centered on the Denbeigh district of modern Milton Keynes, is stadium:mk - a football stadium, arena and retail/hotel development. stadium:mk is also home to the MK Dons, the football club famously (and controversially) moved from its former home and incarnation as Wimbledon FC, whose chairman Pete Winkelman is the mastermind behind the stadium development. As a former music industry producer, and previously the owner of Great Linford Manor recording studios, it's unsurprising that Winkelman has taken a keen interest in the stadium's acoustics and audio system, going to great lengths to ensure that the sound quality is as high as possible for both football matches and other events at what is intended to be a true multi-purpose venue. Winkelman asked legendary live sound engineer 'Big' Mick Hughes to recommend a suitable mixing console to maintain the audio integrity of the high quality PA system. Despite being much more used to life behind larger consoles, Hughes recommended the Yamaha LS9-16, not only for its sound quality but also its versatility and ease of use. Its ability to store and instantly recall settings means that it is very fast to set up for any number of different events, which may well have inexperienced users at the helm.

The first use of the LS9-16 console illustrated the flexibility required from the system, as the Alan Ball Memorial Cup match was played between a celebrity-strewn England XI and a Rest Of The World XI. Commemorating the life of the recently-deceased England World Cup winner, the fundraising event saw the LS9 console accommodating live feeds from an outside broadcast truck, television coverage being relayed to the stadium while simultaneously broadcast on air, as well as being used for pre-recorded music and live announcements throughout the event in the stadium. The new audio system has received many favourable comments, with Pete Winkelman noting: "Putting the Yamaha LS9-16 at the front end has enhanced our quality and control of the Stadium sound system - our fans noticed the improvement straight away."



[http://www.yamahacommercialaudio.com/ca/uk/10\\_news/20\\_installed\\_sound/40\\_commercial\\_installation/archive/2007\\_12/12\\_MK\\_Dons/index.html](http://www.yamahacommercialaudio.com/ca/uk/10_news/20_installed_sound/40_commercial_installation/archive/2007_12/12_MK_Dons/index.html)

## Church at Rocky Peak (California, USA)



For the 1,100-seat Church at Rocky Peak, it was a change in music styles to a more contemporary, guitar-driven, and more participatory worship style that led to the installation of a Yamaha M7CL. The console's technology is easy enough to use for a non-professional and retains the sophisticated features of digital. "When we talked to Yamaha about a console," says one of the church's Worship Pastors, Dustin Kleinschmidt, "we had two criteria: we wanted the highest quality of sound, and technology that could be managed by a volunteer staff." The pastor sights features like the ability to program all of the EQ's and compression for worship service, to administer security levels, and ability to program the console settings offline on a laptop. Though they once considered hiring a professional audio engineer part-time to handle services, the Church at Rocky Peak decided that it really wanted to empower its own by providing proper training on the M7CL console that they never would have experienced otherwise.

## Sparkassen Arena (Hildesheim, Germany)



Eye catching: the arena in March 2007 fresh from its redevelopment

Since the 2007 world championship victory, handball fever has spread all across Germany. Over 2000 fans from Hildesheim and the surrounding area flock to the home games to enthusiastically cheer on their local team. However, their spirits were dampened for a long while by the lack of a premier league stadium specially designed for the needs of the team. The Hildesheim "Stadt- und Sporthallen-GmbH (Town and Sports Hall Company)" was aware of this problem and decided to redevelop the Pappelallee sports hall, a rather rough-looking concrete block from 1957 with room for only 900 spectators. Three million euros were earmarked to take this plain hall and create an impressive arena from it. The new stadium, now called the "Sparkassen Arena", holds a total of 2435 spectators.

Audio Werft were responsible for setting up all the event technology and rigging in the arena. At the Sparkassen Arena, Audio Werft Managing Director Matthias Mehler and Event Technology Specialist Simon Buchholz installed a complete audio system using Yamaha equipment for almost the entire signal path - something of a novelty for installations in German arenas. All the loudspeaker systems in the arena itself, the power amplifiers, loudspeaker controls/processors as well as numerous media players (CD/DVD) are made by Yamaha. The heart of the system is a Yamaha DME24N Digital Mixing Engine at which all the microphone signals (from the presenter, the control room, radio and the press) and line signals (from the media players CD, PC, DVD, etc.) arrive. The DME is used to amplify, convert, route and process signals. After that the audio signals are transmitted to the Yamaha power amplifiers (6 x XP7000, 3 x P2500S and 1 x XH200) via the DME outputs and sent from there to the loudspeaker system. In the arena itself, 18 Yamaha Installation Series full-range loudspeakers (IF2115 in passive mode) are suspended directly above the stands. In the food hall, the foyer and other areas of the stadium are additional loudspeakers (8x JBL Contractor as well as 26 x Penton 100V ceiling loudspeaker), which are also controlled by the DME24N.

The great advantage of using Yamaha DME technology is that after being installed by a specialist, a one-off process, the entire system can easily be controlled by an amateur. Before commissioning, an audio specialist will save all the planned sound scenarios for the individual zones (spectators, foyer, food hall, etc.) in the form of presets. These can then be called up as required by the arena staff. This enables the event organiser to save money and, at the same time, prevent the painstakingly installed system from being incorrectly adjusted. Should any adjustments be necessary, the Audio Support team can log on to the DME via the internet and tweak the system from their own offices. The DME unit in the Sparkassen Arena is set up so that the in-house operator can sit in the control room and remotely control all signal volumes in the various sound zones (e.g. the 4 stands, press box, food hall and foyer) via two GPI operating panels (CP4SF). No specialist knowledge is required.

The system is anything but simple, as Mehler's event technology expert Simon Buchholz explains: "We've used high quality audio technology, as the components in a Yamaha signal path are not only very well matched, they're also extremely reliable. And high reliability is the highest priority for the investor." Also, when the teams march out it's usual to play loud music to get the crowds going, adds Matthias Mehler. It's got to have that spine-tingling factor. So he opted for Yamahas Installation full range loudspeaker with its excellent bass reproduction.



The well-equipped rack with the Yamaha DME24N and the Yamaha amps



Inside the arena showing the score boards and the suspended Yamaha IF2115 installation directed towards the stands.

[http://www.yamahacommercialaudio.com/ca/uk/10\\_news/20\\_installed\\_sound/40\\_commercial\\_installation/archive/2007\\_09/20\\_hildesheim/index.html](http://www.yamahacommercialaudio.com/ca/uk/10_news/20_installed_sound/40_commercial_installation/archive/2007_09/20_hildesheim/index.html)



## Mantorptravet (Mantorp, Sweden)

In Sweden, Travsport (trotting or harness racing) is second only to soccer in terms of nationwide popularity. Huge crowds attend the races, where horses race round a dirt circuit pulling jockeys on two-wheeled buggies. When the audio system at the trotting circuit in the nearby town of Mantorp was to be upgraded, the Mediacer installation company was contracted to create a networked audio solution of unrivalled quality. The 6000-capacity Mantorp circuit is Sweden's third biggest trotting stadium and, technically, the installation was very sophisticated. The quality of the distributed sound from microphone to audience had to be excellent in both the indoor facilities and around the huge outdoor track, while ease of use for the staff was also a key priority.



Controlling and mixing the audio is an ICP1 intelligent control panel that works with a DME64N digital mixing engine equipped with two MY16-AE 16-channel AES/EBU I/O cards, one MY8-AE eight-channel AES/EBU I/O card, three DA824 8ch D/A converters and two AD8HR microphone preamps/AD converters. The DME64N is the heart of the system, controlling a range of microphone and line level sources, and allowing the triggering of sounds and pre-recorded segments via GPI. The system is set up to service 23 completely separate audio zones. 20 Concert Club series C112V speakers driven by XM4080 amplifiers are installed under an exterior roof which runs along the venue's restaurant, at the finish line. The C112Vs are complemented by the track's original horn loudspeakers, now driven by Yamaha XH200 amplifiers. Unlike the original system, however, the DME64N allows delay to be applied to these speakers to provide much more uniform and intelligible outdoor sound. The rest of the loudspeakers are installed within the track's various indoor facilities. The betting hall features eight Installation Series IF2112s driven by two XP2500 amplifiers, while 12 IF2112s and eight time-delayed IF2108s driven by six more XP2500s are located in the restaurant. Perfect audio quality is especially important here because it is where, as Mediacer's Mattias Björkman says, "the people with the big money sit!" There is also a public area featuring four further IF2112s, driven by another XP2500, while four conference areas feature two IF2205 speakers in each area, driven by an XM4080 amplifier.

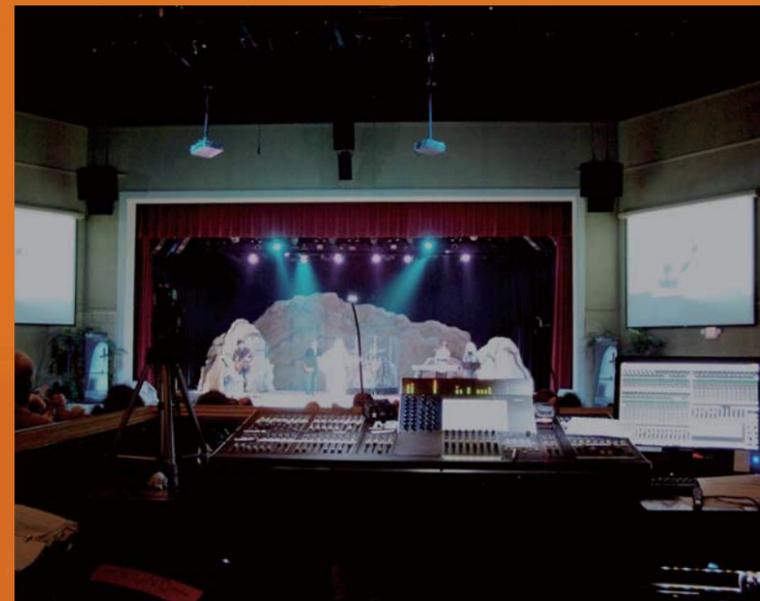
The entire system is controlled by the race host/commentator. For each event he will use the ICP1 intelligent control panel to choose one of five main "scenes" that correspond to the five race scenarios that all events at the Mantorp circuit come under. The scenes set up the audio system as required for that particular event, which makes control of the system extremely straightforward. The DME64N also sends audio to the track's own studio for internal television broadcast. This system was built by Mediacer in 2005, and broadcasts to around 70 monitors in the venue. An important role of the DME64N here is to ensure the sound is delayed slightly for perfect synchronization with the images.

The system is also used for background music and – most importantly – for the big build up to the start of each race. The race host plays suitably fanfare-like music to build up the atmosphere, then triggers an audio sample in the DME64N that counts down to the start and then actually starts the race. Four wireless microphones are provided for link sections, plus another for the restaurant chief to make announcements. As well as the race host having overall control of the system, the simplicity of operation allowed by the DME also means that the race referee has a measure of control as well when important announcements need to be made. He has three options – damping of music sources, priority over all other microphones, and priority over all audio sources.

With the winter V75 race fast approaching, the Yamaha installation was completed on time and within budget, and has performed flawlessly. "The race was a complete success," says Mattias Björkman. "The management of the stadium forwarded me a lot of mail afterwards from people saying 'I just want to say how good the audio system at the circuit sounds now.' We also had very good reports in the media, so we are very pleased."



## Crosswalk Community Church (Virginia, USA)



Onyx Engineering of Chesapeake, Virginia, recently completed the installation of a Yamaha digital Ethersound-based audio solution for the 750-seat Crosswalk Community Church, located in Williamsburg, VA. The system is comprised of two Yamaha M7CL digital audio consoles, a DME64N digital mix engine for DSP and loudspeaker management, NAI48-ES network interface, AD8HR remote preamps, A824 digital to analog converters, EtherSound Network snake, and an ADK LYVE Tracker 64-track digital recorder.

When Crosswalk Community Church moved into its new facility, originally a music theater, the existing sound system was approximately nine years old, collecting layers of dust and not maintained during the last three years it remained idle. The age of the equipment along with the lack of maintenance led to drop outs in the right output fader on the front of house console usually during a service.

"Crosswalk Community was well prepared to enter the digital audio domain, at least initially from the stand point of a mix console," states Jim Auer, CTS-Design Engineer for Onyx Engineering, Inc. "But, the system as a whole was in need of a major overhaul, one that would not benefit from simply adding a digital front of house desk. The church had miles of unidentifiable analog cable running between front of house and monitor mix positions, to a separate recording room, without any line drawings to reference. My first thought was that the time and energy necessary to figure out the analog infrastructure already in place would have depleted most of their budget before a console was even delivered."

"Since the church does not support a fulltime audio engineer, the new system was designed around Yamaha M7CL digital consoles because they really fit the need," says Auer. "An overly sophisticated console would be both cost prohibitive and overly complicated." With only 40 inputs needed at both the front of house and monitor positions, the Yamaha M7CL-48 provided the perfect blend of performance and user-friendly interaction. Installing the M7CL consoles allowed Onyx to offset labor expenses and improve the overall system by replacing the existing analog snake with an EtherSound solution consisting of a Yamaha NAI48-ES and six Yamaha AD8HR remote preamps, taking their entire audio path off of an analog infrastructure and onto a networked digital backbone.

Like most churches, Crosswalk wanted to reuse as much of their existing system as possible; the existing design was made up of reputable amplification and speaker system that were in fairly good shape, so there was something solid that could be salvaged. Unfortunately, the majority of their system's front end was in need of replacement as their existing loudspeaker DSP had taken a dive (and no longer supported by the manufacturer), and the right side of the system would shut off if touching the top of the console.

"The church had also come to me with a significant wish list, one that included what could be done to help them include multiple wireless microphone systems such as in-ear monitoring for the worship team leaders and Aviom personal monitor mixers for the rest of the band, band, all reasonable components common for the contemporary style of worship and drama that the church has become recognized for," says Auer.

"We were tasked with upgrading the entire infrastructure between the actual microphone inputs and the dedicated speaker processors," states Jeff Hathaway, Systems Engineer for Onyx Engineering. Onyx had a two-week window to complete the required work while keeping the system functional for scheduled events and regular Sunday services.

A Yamaha DME64N is used to handle signal processing and routing; a 16-channel Aviom card was installed for personal control of some of the inputs in the monitors, and the ADK Live Tracker with EtherSound card is used for 64-channel digital recording. In the past, the church tried recording multi-track events live, sub-mixing them onto older, 8-track digital recorders synced together through yet another analog console. "With ADK's LYVE Tracker, the church is now able to record services and/or performances live (up 48 tracks) and playback and/or re-mix as necessary back through their digital console without the need of an additional mix desk or operator isolated in another room," notes Auer.

"The M7CL is very straight-forward and easy to use with all of the 48 faders on the surface, and the "Centralogic" section makes navigating and adjusting the console very easy," adds Madeira. "It looks and feels more like an analog console than a digital console and it didn't take long to become comfortable using the console; all told, in as little as 10 minutes, we were well on our way. The feature set of the M7CL is extensive and provides everything needed for any mix, the compressors are very smooth and easy to set up, and the effects are some of the best I've heard. The ability to store and recall scenes on the M7CL has made changing from a traditional first service to a contemporary second service easy and fast. We have approximately 45 minutes to change the set up between services and had been spending 10 to 15 minutes of that time reconfiguring the two analog consoles. Not having a lot of time between services has always made the transition between the two very tense and stressful. Where we once were barely able to get a sound check in, much less run through an actual song, now we can be up, sound checked, and run through the majority of songs with time to spare. The new system has made the transition flow that much smoother. It's two pushes of a button on each console and they're reconfigured for the next service. And, the ability to remotely control our monitor console when we don't have a second volunteer is a real plus."

The ADK LYVE Tracker recorder has become an invaluable training tool for the Crosswalk team, and their musicians appreciate that now they can listen to their performance enabling them to make changes and improvements when necessary.

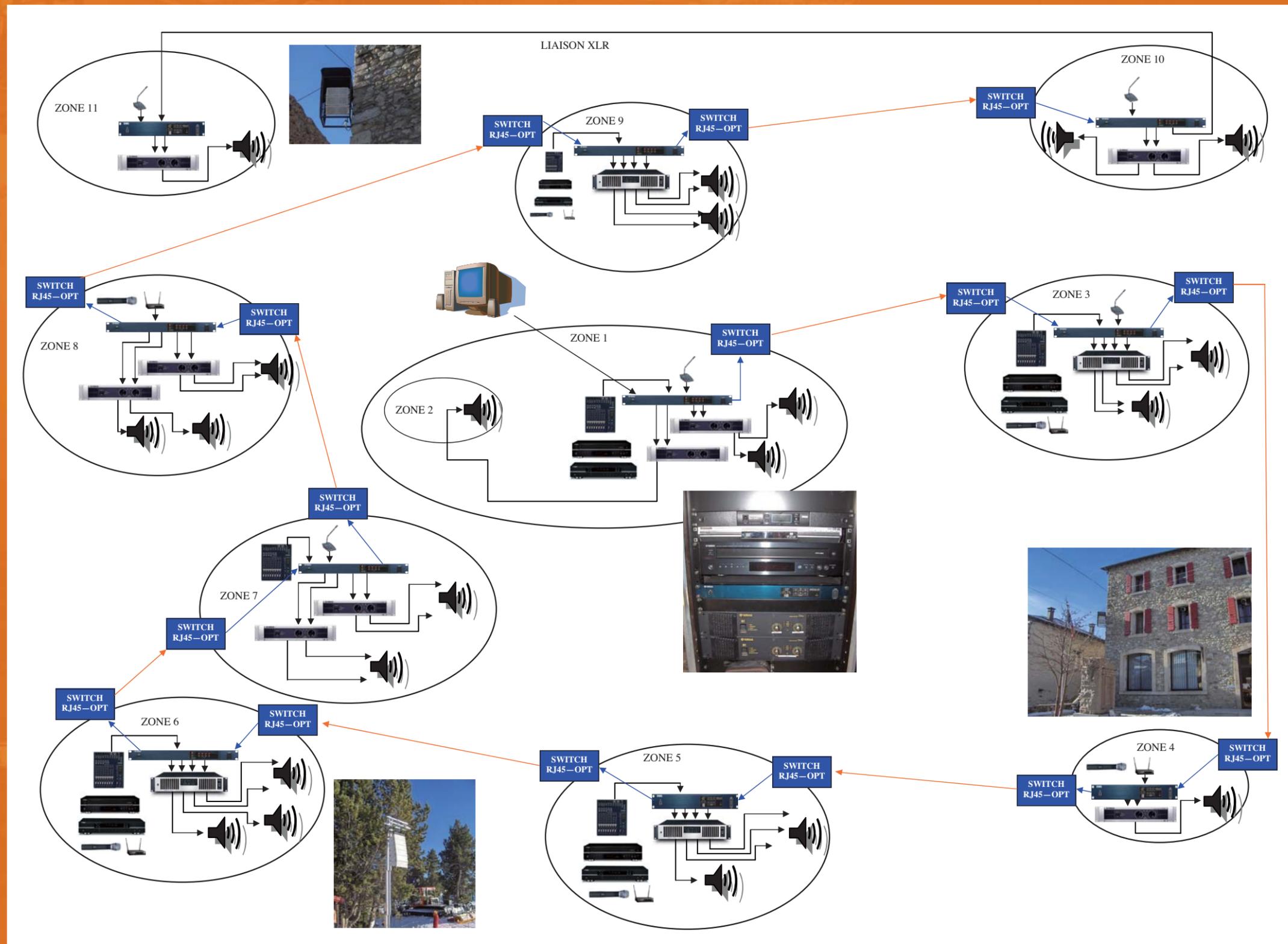
"The new sound system at Crosswalk has drastically improved the experience for me as a drummer, choir member, and as a general member of the congregation," states Scott Venable, drummer for the Crosswalk band. "Having two reliable consoles has made it much easier for us to get a reliable monitor mix on stage and a quality mix for the house enhancing the worship experience for everyone. In the past, it was evident that our sound system was a detriment to our worship congregation and frustrating the musicians on stage. That is now no longer the case and we have a system that truly contributes to the overall service rather than detracts from it."

Madeira says he would be remiss if he didn't give accolades to Crosswalk's friends at Onyx Engineering. "Jim Auer with his insight, knowledge, and wisdom was able to steer us in the right direction and make things happen, keeping the project on track and affordable; Jeff Hathaway made sure the system was installed, configured and working, and his support during and after the install has been fantastic; and Bill Disney who is very knowledgeable about the Yamaha M7CL did an excellent job of training our team and making sure that we understood the console's features."

"I know there's always room for improvement and a system may not please everyone, but I can honestly say that I am truly happy with the set up we have now and where I once used to dread having to fight the sound system, I look forward to playing, singing, and worshipping our Savior, Christ Jesus."

<http://www.onyxeng.com>

# Les Angles (France)



The Yamaha modules are DME4io-ES  
 You lay a network of single-strand fiber optic cable across the whole site (marked in red on the diagram). The maximum distance between 2 zones is 4km.  
 RJ-45 fiber optic converters are used (ref. HP PROCURVE SWITCH 2626 J4900B).

The specifications are as follows:  
 The person stationed at Zone 1 should be able to send a message (voice, music) to any of the other zones, taking precedence over them. He should be able to select which zones the message can be sent to. Each zone should be off-line the rest of the time.

There are 4 zones (zones 3, 5, 6 and 9) which are equipped to process musical as well as vocal messages. It should be possible to retransmit the message from one of these zones (zone 3, 5, 6 or 9) to the other zones, providing they have been selected by the PC in zone 1.  
 In all cases, however, zone 1 has priority.

Example 1:  
 A musical message comes from zone 3  
 This message must be retransmitted to all zones

Example 2:  
 A musical message comes from zone 3  
 This message must be retransmitted to zones 1, 2, 3, 4, 5, 6, and 7  
 Zones 8, 9, 10 and 11 stay off-line with their own message.

Example 3:  
 A musical message comes from zone 3  
 This message must be retransmitted to zones 1, 2, 3, 4, 5, 6, and 7  
 Zones 8, 9, 10 and 11 stay off-line with their own message.  
 After 1 hour, zone 1 has a priority message to process, so must take precedence over the zones it would have selected.

Zone 11 is not connected by fiber optic cable, therefore, the priority signal needs to be sent from an output on the DME4io-ES in zone 10 via an XLR cable (a 1.5 km of reinforced multi-pair cable is used on the site), which connects directly to one of the inputs on the DME4io-ES in zone 11 (the latter can be replaced by an SP 2060). In no cases can a message come from zone 11.

Please confirm that the EtherSound network functions correctly and that the diagram with the switches is ok.

## Schifferheide (Kerkrade, Netherlands)



This installation in a Crematorium in Kerkrade, Netherlands, employs a DME24N for signal routing and processing along with an AMX touch panel for control. Clients supply music they want played at cremation ceremonies in a variety of formats, so the facility provides a full range of playback devices, including multiple CD, DVD, and cassette players. The music to be played is sequenced using computer software. The AMX touch panel allows easy, error-free control during solemn ceremonies, while the DME24N reliably delivers optimum sound quality. This is only one of more than ten DME installations at crematoria in the Netherlands.



## First Baptist Ruston (Louisiana, USA)

First Baptist Ruston is located in the downtown area of a university town located on I-20 in north central Louisiana. Because of its downtown location, unique opportunities and challenges have been presented to the church over the years. As both the City of Ruston with 20,500 people and the University, Louisiana Tech, continue to grow, the church's facilities have become increasingly land locked. With the University and a population of 12,000 students only two blocks away, First Baptist's leadership staff has been focusing on creating an environment that is conducive to the diversity that the University brings to the community. In the past few years, the leadership staff at First Baptist has focused resources towards multiple style worship services that are completely adaptable and able to transform as needed to cater to the University population. Every service includes music, either traditional or contemporary in a very upbeat atmosphere.

American Audio, Inc. were chosen to make the audio enhancements, and they made system component suggestions to the leadership staff of the church who required that only the latest in technology be designed into the system. "First Baptist wanted their system to have a performance exceeding other venues in the city (theaters, cinemas, auditoriums) in order to raise the experience from standard (in terms of quality) expectation the community has for churches," states Steven Knapp, American Audio, Inc. First Baptist's leadership staff knew going into the project that too often churches are considered to have second-rate equipment which only reinforces the disconnect between churches and community. "They wanted a facility upgrade solution that allowed for the broadest diversity of applications and that it be equipped with the best manufactured brands," adds Knapp.

Of course, diversity in system architecture such as this one is highly reliant upon the audio mixer, and stacks upon stacks of audio processing equipment. With assistance provided by American Audio, Inc., a Yamaha LS9-32 console was installed enabling First Baptist Ruston to acquire higher levels of functionality of audio processing, while saving on both equipment space and costs. "The LS9 mixer was the perfect design for this system because it allowed the church to jump into the digital audio transport arena easily and cost effectively, which will have a great impact on future scalability of the audio system," says Knapp. "Many other components which would have taken much more space and resources to acquire are now housed all within the LS9 mixer, saving the church the burden of planning for additional equipment purchases down the road."



## Digital Audio Network Protocols

There is a growing need for large-scale audio systems, and with it the need for advanced networking technologies that can distribute high-quality audio quickly and reliably throughout large venues or open facilities with fully integrated control. Currently there are two major protocols that are popular for use in networked systems: CobraNet and EtherSound. Although all of the digital networking examples given in this brochure employ the CobraNet protocol, Yamaha also manufactures a number of devices and interfaces that are compatible with the EtherSound protocol. Choose the protocol that best suits your networking needs.

### About CobraNet™

CobraNet™ is a sophisticated technology that enables bidirectional transfer of up to 64 audio and control channels via Ethernet cable. As an integrated system, CobraNet allows digital data to be carried up to 100 meters\* from one port to another device by common CAT-5/100Base-TX cabling, or up to 2 kilometers by optical fiber. It is fast, with a minimum latency of 1.33ms\*\*; it is reliable, thanks to built-in redundant systems; and, with the standard cabling and connections, it is remarkably easy to use and economical.

CobraNet supports Ethernet variants. It uses standard Ethernet packets and network infrastructure, so it is compatible with commonly available and inexpensive controllers, switches and cabling. CobraNet provides transparent digital audio transmission with no degradation of the audio signal. No digital distortion or artifacts are introduced during transmission. When transmitting 24-bit audio the dynamic range is 146.24 dB and distortion is a mere 0.000049% at full level. Frequency response is 0 Hz to 24 kHz ±0 dB. In short, the performance of CobraNet is significantly better than that provided by today's A/D and D/A conversion technology.

CobraNet capability can be conveniently added to a Yamaha digital mixing console or DME unit by installing an MY16-CII digital network card in one of the device's expansion slots.

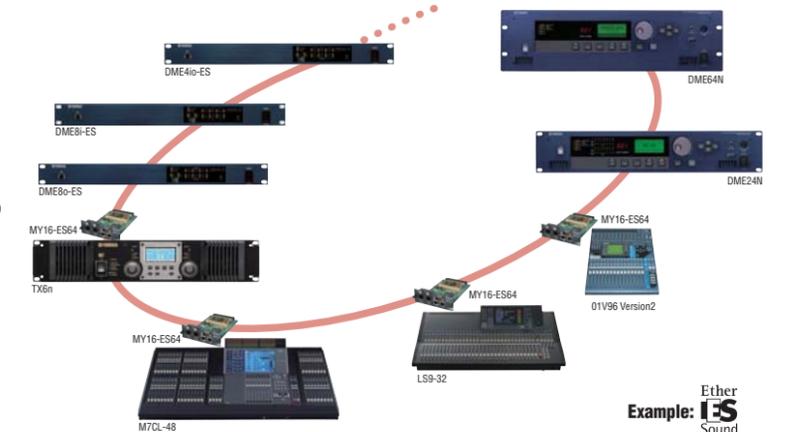
\* The actual maximum length of cables may differ depending on the quality of the Ethernet equipment or the particular settings used.  
\*\* CobraNet™ low latency mode is now supported, which enables users to choose from 5.33ms, 2.66ms and 1.33ms.



### About EtherSound

EtherSound networking technology is more suited to relatively simple sound systems with direct connections, allowing multiple channels of digital audio to be transferred over standard Ethernet cable with extremely low latency. This advanced, easy-to-manage protocol is designed to handle up to 64 channels of digital audio, and will easily transfer 48 channels of 24-bit 48-kHz audio in both directions over distances up to 100 meters with appropriate high-performance cables. As with CobraNet networks you can use standard Ethernet switch to create any network configuration that suits your needs.

The most convenient way to add EtherSound capability to a Yamaha digital mixing console or DME unit is to install one or more MY16-ES64 digital network cards in one or more of the device's expansion slots, according to the performance and channel capacity required.



# Digital Mixer Benefits for Audio Installations

Digital mixers are generally thought of as being primarily for sound reinforcement or production applications, but they actually offer a range of important advantages for installations as well. This is truer now than ever with the advent of digital audio networking capabilities that can dramatically reduce the complexity and cost of the required infrastructure while allowing easy modifications and upgrades. And there's an extensive range of models from which to choose.



## Scene Memory

The ability to instantly store and recall complete console setups can be a tremendous advantage in installed systems. The needs of many venues and facilities can be met by creating a number of presets for common situations, so that the entire system can be reconfigured as required in an instant and without any specialized knowledge. Presets can also be used as templates for more complex setups, reducing the time and effort required to program the many parameters involved.



## User Defined Keys

Many Yamaha digital consoles feature a set of keys that can be assigned just about any console function as well as trigger external events. In sound reinforcement applications these "user defined keys" might be used to mute specific groups of channels, or in studio situations they can be used control the transport functions of a recorder. But in installations they can be a powerful tool for 1-touch recall of mute or level settings, for example, as well as control of remote functions such as lights and curtains where external control is possible.



## Security

In many installations it is desirable to prevent unauthorized access to the console, or restrict access to a limited set of functions. Limiting access is a great way to prevent "accidents" during critical events, for example, and can minimize the need for direct supervision of inexperienced operators. Or if you've spent hours precisely tuning the system for the room, you won't want those settings changed under any circumstances. Access management features can be a significant advantage for overall system administration. User access can be controlled either via passwords or USB memory keys on some consoles. The administrator can assign specific functions to each unique password or key, so the user only has to log onto the console with the assigned password on insert the USB key to begin operation at the assigned level.



## USB Memory Recorder/Player

The compact LS9 digital mixing consoles offer a unique feature that can significantly reduce the amount of external gear you'll need. You won't need an external CD player or other source for background music, and you won't need an external recorder to make recordings from the console because the LS9 has a versatile USB memory recorder/player built in! Several innovative playback functions are also provided for enhanced live support capability. And of course this capability is ideal for recording meetings or lectures for later reference or even uploading to the web.



## Space Savings

Digital mixers are smaller and lighter than comparable analog mixers while generally offering superior performance and control versatility. A smaller, lighter mixer is easier to handle, more portable, and takes up less space – all qualities that any system administrator would find desirable.

## Reliability & Low Maintenance

Digital mixers contribute to system reliability in a number of important ways. Fewer physical contact-based connections between system components means less chance of contact failure or degraded sound quality due to poor contacts. Less cabling means less chance of cable failures. And of course the use of internal effects means that the problems associated with external processing devices and the connections to and from them are eliminated as well.

## Sound Quality

Digital audio technology in general, and Yamaha digital audio technology in particular, has reached a level of maturity at which it not only challenges but often exceeds analog audio in terms of sound quality. And it's not only a matter of sampling rate and bit depth, but of how those characteristics are managed within the overall system and design of the console. That's where Yamaha experience and know-how come into play. For most applications 24 bits at a 48 kHz sampling rate in a Yamaha digital console is more than enough resolution to deliver audio quality that is indistinguishable from a top-quality analog system. But if you must have 24 bits at 96 kHz, Yamaha offers consoles and interfaces that will deliver the resolution you need.



# DME Benefits for Audio Installations

“DME” stands for “Digital Mixing Engine,” which is actually an understatement when applied to Yamaha’s extraordinary DME processors. They are, in fact, digital processing engines that can be configured to perform the functions of multiple audio processors – mixers, equalizers, compressors, dividing networks, speaker processors, effects, feedback suppressors, wav file players, and much more – and they can easily and quickly be interconnected as required via an intuitive software interface, and just as easily reconfigured whenever a change is needed. Compared to the alternatives, Yamaha DME systems offer significant advantages for all concerned with the creation and operation of audio installations.



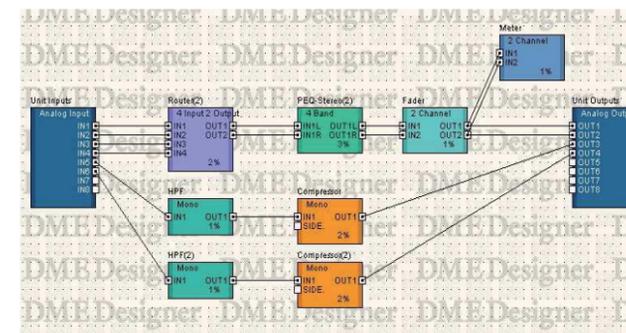
## Adaptability

Whether it’s for a meeting room, shopping center, theme park, or sports stadium, the design, construction, and operation of an audio installation is a complex undertaking. And since the needs of each facility and operator are rarely the same, each system must be flexibly crafted to suit the application. The traditional method of using discrete components is not only expensive, labor intensive and time consuming, but it provides very little leeway for alterations once the job is done. That’s why system designers and contractors are rapidly adopting versatile, networkable digital alternatives. Of those alternatives, Yamaha’s DME devices, networking solutions and software are clearly at the forefront.



## Programmability and Upgradeability

All aspects of system design, creation, and management other than actual physical hardware installation can be carried out via a unified, intuitive software interface provided by Yamaha’s DME Designer software application that will run on most Windows-based computers. This one application can be used to graphically block out the initial design, create and wire the required audio components, create specialized graphical interfaces for the end user, and control the system when it is complete. Of course this means that changes and additions are just as easy to implement at any time.



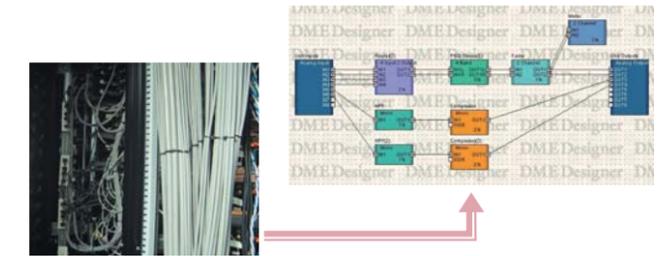
## Easy, Flexible Control

Although you have extensive, detailed control from a computer running the DME Designer application when initially setting up or modifying a DME based system, in most cases only a few basic controls are needed for day-to-day operation, especially where non-specialist operators are involved. Yamaha offers a range of convenient remote control units ranging from simple-wall-mounted panels with a single switch and fader to an intelligent multi-function control panel complete with LCD display. Original controls can also be created using GPI protocol, and third-party remote control devices such as those available from AMX and Crestron can be easily accommodated as well.



## Reliability

A DME unit is significantly more reliable and maintenance-free than a comparable analog system because the multitude of physical connectors and cables that can be so troublesome in analog systems are replaced by “virtual” connections and wiring that simply can’t break down.



## Processing Power

Yamaha DME devices employ Yamaha’s own DSP7 digital signal processing LSIs, designed and manufactured in-house under the highest manufacturing standards and quality control. This advanced LSI has gone through several generations of development over the years, and currently stands as one of the most capable and powerful for audio processing applications. Stated in simple terms this means you can do more, and more varied processing, without exhausting the system’s resources.



## Networking & I/O

Yamaha provides a number of networking options for DME systems that make it easy to construct systems of just about any size and scope. All audio and control can be transferred via CobraNet™ or EtherSound network protocol, using standard digital network cables and hardware. This dramatically simplifies cabling requirements while reducing cost and facilitating modifications. DME devices are also compatible with Yamaha’s plentiful catalog of MY-series expansion cards, providing a broad variety of input and output options in a wide range of formats. Additional control capability is provided in the form of MIDI, GPI, RS232C/422, and USB interfaces.



## Space Savings and Scalability

Not all audio systems require networking or a complex infrastructure, and the DME lineup offers efficient solutions for such applications as well. For a minimal system all you need is a single 2U rack-mountable DME24N unit and the associated audio input and output devices. That one 2U DME24N unit can replace several racks full of conventional analog gear! For more power and flexibility multiple DME and DME Satellite units can be networked with flexible grouping and zoning capabilities so that systems of just about any size and complexity can be created and managed with the utmost efficiency.



# Installation Series Speakers

Yamaha's Installation Series Speakers address a number of important issues that give them unprecedented performance and handling characteristics for permanent installations. Phase characteristics have been kept smooth and consistent throughout the entire series, so you can mix and match speakers to suit any system and venue without ending up with hot and dead spots due to phase interference. And of course sonic quality is superb throughout the entire reproduction range so the full impact of the source material reaches the audience undiluted. Yamaha Installation Series Speakers are available in black or white, finished with a durable textured paint. If basic black or white doesn't suit your visual requirements, they can be easily repainted as required.



## Uniform Phase Characteristics

Most installations involve the placement of multiple speakers at numerous locations. Normally great care must be taken in speaker matching and positioning to minimize phase anomalies that can degrade the quality of the sound as well as create hot spots and dead spots in the area of coverage. The Installation Series makes multi-speaker installation easier and more predictable than ever with a range of models that can be combined as required while delivering the most natural sound field possible, with the greatest controllability. One of the main reasons for this capability is that the entire lineup has been designed to deliver consistent phase characteristics so that any combination of speakers will deliver optimum performance without phase interference or cancellation, and without coloring the sound. Uniform phase characteristics also mean that systems composed of Installation Series speakers will respond smoothly to equalization for unprecedented tuning flexibility and natural sound.

## A Range of Horn Configurations

To allow the system designer maximum freedom and flexibility, all Yamaha Installation Series Speakers feature rotatable horns in a variety of configurations. 60°x40°, 90°x50°, and 90°x90° horns are available for the 12-inch and 15-inch models, while 60°x40° and 90°x50° horns are available for the 3-way designs. 8-inch and 5-inch models feature 90°x60° horns. Horns are made from fiber-reinforced plastic to minimize unwanted resonance.



## Rigging and Mounting

Installation Series cabinets include multiple rigging points for flexible hanging with Yamaha or third-party hardware. All enclosures are pre-fitted with M10 threaded inserts and include a kit containing four forged eyebolts. Standard U-bracket and array-frame hardware is also available for maximum convenience. U-brackets and array frames are available in black or white to match the standard speaker finishes. All models except IF2205 are equipped with handles that make moving them about comfortable and easy. The IF2112/AS, IF2115/AS, IF2108, and IF2208 models feature pole-mount sockets so they can be easily pole mounted whenever you need extra monitor or fill sound. The IS1112 subwoofer is also equipped with the pole-mount socket which allows mounting an IF2108 or IF2208 speaker on the subwoofer.



## Connectors & Mode Selectors

To match the widest possible range of systems and wiring arrangements, Yamaha Installation Series Speakers feature parallel-connected barrier-strip and Neutrik NL4 connectors (NL8 on 3-way models). The IF2112/AS, IF2115/AS, IF2108, and IF2208 models feature an additional Neutrik NL4 connector - 1 barrier strip + 2 Neutrik NL4 connectors - to facilitate wiring in monitor applications. 12-inch and 15-inch 2-way models have a selector on the rear panel that allows easy switching between bi-amp and single-amplifier drive modes. The 8-inch and 5-inch models are designed for single-amp use only. 3-way models allow switching between tri-amp and bi-amp modes. Dual-woofer subwoofers also allow switching between parallel and discrete modes for maximum system compatibility and flexibility. All mode switches are recessed to prevent inadvertent operation.



# Yamaha YS<sup>3</sup> Sound System Simulator Software

Yamaha Sound System Simulator is an innovative software program that offers precise and easy-to-use simulation of sound pressure level distribution, frequency response, and other attributes when installing speakers in any type of venue.

## The Easy Path to Professional Sound System Design

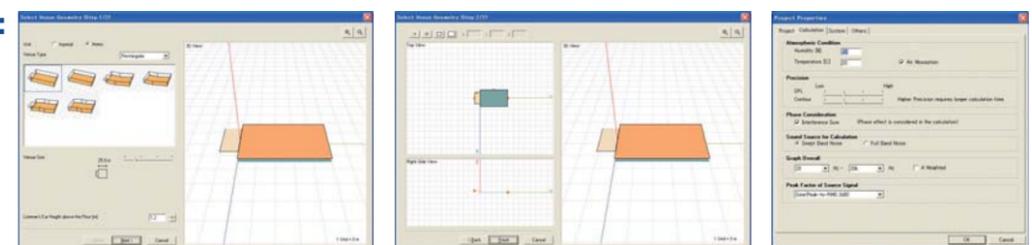
This acoustic simulation software combines the essential elements of Yamaha Professional Audio acoustic technology for all sound handled from input to output, including DSP, amps, speakers, and even the design and layout of the venue. It provides superb accuracy and reliability thanks to the knowledge and experience of the Yamaha Center for Advanced Sound Technologies: an institution that is at the forefront of global acoustic design with its original active field control and acoustic modeling technologies, which have been employed in the acoustic design of many successful and distinguished concert halls.

distribution at specified points, frequency characteristic graphs, and contour figures. YS3 also provides "auralization" capability, which lets you hear the simulated sound with your own ears using any sound source.

The built-in Yamaha Installation Series speaker library makes it easy to design systems with the Yamaha Tn, PC-N, and XP series power amplifiers; the DME64N, DME24N, DME80, and DME4io Digital Mixing Engines; and the SP2060 Speaker Processor, to facilitate total acoustic system planning. DDF and DAF data can be generated for direct export to DME64N, DME24N, DME80, DME4io and SP2060 units. Simulation results can be put to use in your actual systems quickly and with a minimum of effort. Convenient features such as automatic speakers array layout and automatic speaker parameter settings are included to facilitate the critical tasks of speaker selection, positioning, and speaker array setup.

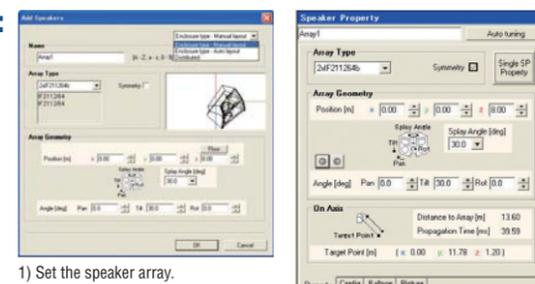
## Procedure of Use

### STEP 1:



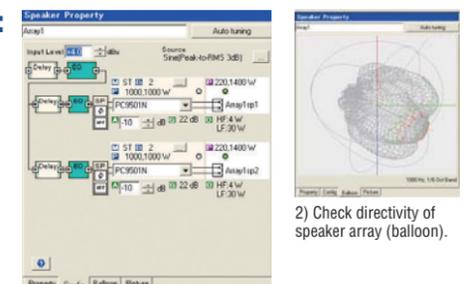
- 1) Select the Venue Geometry for Calculation.
- 2) Use Floor Edit to better determine the shape of the simulation venue.
- 3) Open "Project Properties" under the "file" menu.

### STEP 2:



- 1) Set the speaker array.
- 2) Set various conditions for the speaker array.

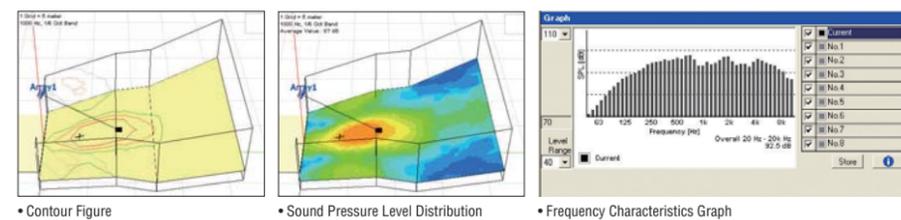
### STEP 3:



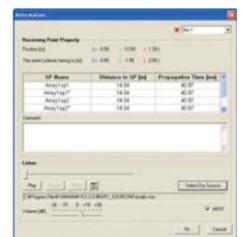
- 2) Check directivity of speaker array (balloon).

### STEP 4:

- 1) Simulation result is displayed with visualized diagrams.



• Contour Figure      • Sound Pressure Level Distribution      • Frequency Characteristics Graph



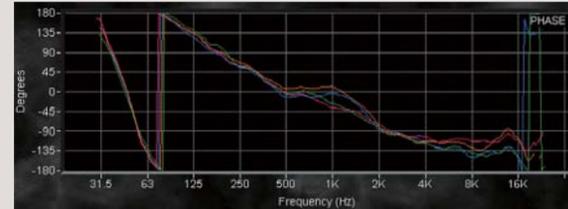
- 2) Check simulation results with your ears through auralization.

### STEP 5:

- 1) Save the configuration in DME format.  
YS-3 automatically generates an output configuration for all speaker systems that are installed, and saves it in the format of DME Designer, the application software for DME control. If you use the Yamaha Digital Mixing Engine DME64N, DME24N, DME80, DME4io or SP2060 as a speaker processor, you can efficiently construct a sound system with greater accuracy and minimal effort.
- 2) Generate a project report.  
YS-3 can generate a complete report of simulated results and system configurations in one HTML file.

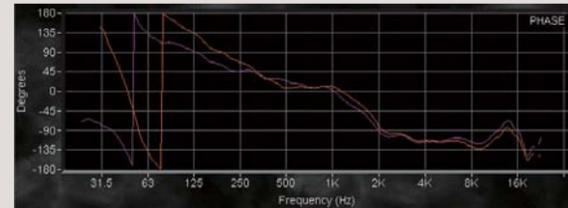
The Yamaha Sound System Simulator is available as a free download from Yamaha's pro audio web site: <http://www.yamahaproaudio.com/>

### Comparison between different directivity patterns



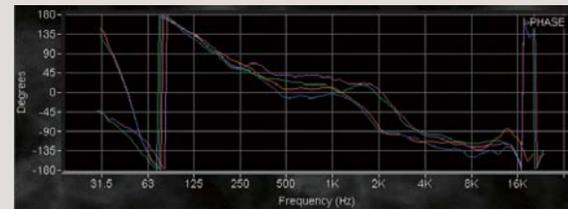
Orange : IF2115/64/bi-amp    Blue : IF2115/95/bi-amp  
Red : IF2115/99/bi-amp    Green: IF2115/AS/bi-amp

### Comparison between different drive modes



Orange : IF2115/64/bi-amp    Purple : IF2115/64/passive

### Comparison between models



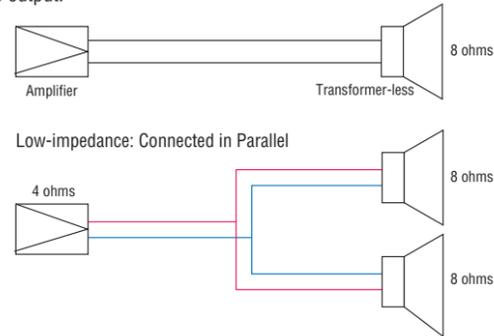
Orange : IF2115/95 bi-amp    Blue : IF2112/95 bi-amp  
Green : IF2208    Purple : IF2108  
Red : IF2205

## Low-impedance vs. High-impedance Speaker Drive

Many of the examples provided in this brochure use a combination of low-impedance and high-impedance speaker systems. What exactly is the difference? Here's a brief rundown.

### Low-impedance Speaker Drive

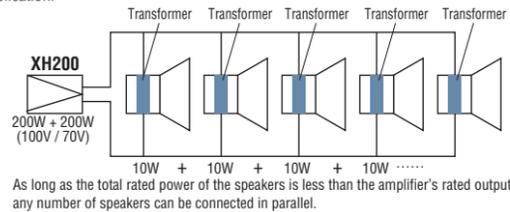
This is the most common type of speaker system, usually using speakers with a rated impedance of 4, 8, or sometimes 16 ohms. This method is commonly used to drive from one to four speakers from each power amplifier output via relatively short cable runs. There is very little loss due to cable resistance over short runs, resulting in the best possible sound. Low-impedance drive is not the best choice when extremely long cables are required, or when a large numbers of speakers are to be driven from a single output.



### High-impedance Benefit No. 1

High-impedance drive is ideal for public facilities, theaters, and other commercial systems in which it is practical or economical to drive a large number of speakers from a single power amplifier. Since amplifiers designed for high impedance drive will produce either 100 volts or 70 volts maximum output, speakers can be efficiently driven with considerably less current than required in low-impedance systems, and a large number of speaker units can be connected in parallel. The Yamaha XH200 high-impedance distribution amplifier (200 watts x 2 channels), for example, is capable of driving up to 20 10-watt speakers per channel, for a total of 40 speakers.\*

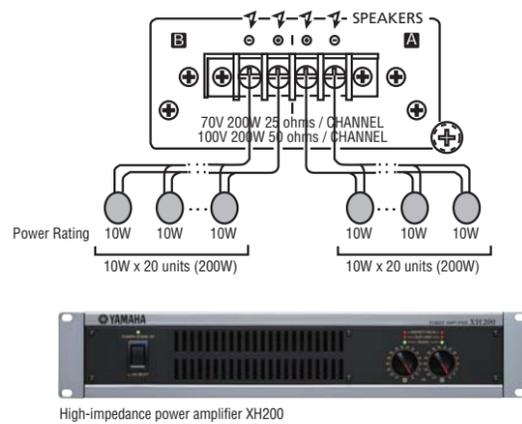
\* Speaker transformers are required to use low-impedance speakers for this type of application.



As long as the total rated power of the speakers is less than the amplifier's rated output, any number of speakers can be connected in parallel.

### High-impedance Speaker Drive

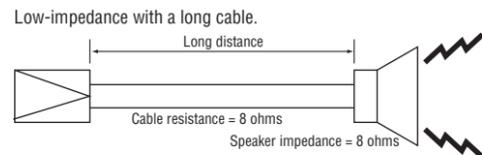
In high-impedance systems it is necessary to either use speakers with built-in impedance-matching transformers or supply an external transformer for each speaker unit in the system. With the transformer the effective impedance of the speaker will be between several hundred and several thousand ohms. Amplifiers designed to drive high-impedance speaker systems deliver a maximum output voltage of either 100 or 70 volts.



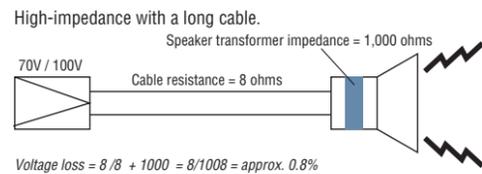
High-impedance power amplifier XH200

### High-impedance Benefit 2

Low-impedance drive is best suited for relatively short speaker cable runs. Cable resistance can be ignored as long as the cable is kept short, but it becomes a problem where very long cables are required. As shown in the diagram, if cable resistance is 8 ohms when an 8-ohm speaker is used, transmission efficiency is only 50%.

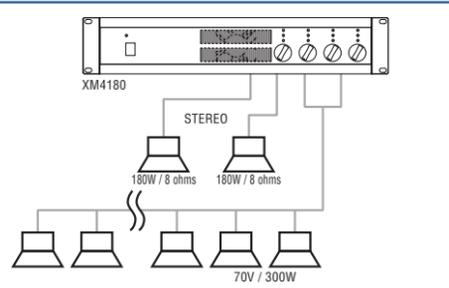


If you add a transformer to the speaker so that it has an effective impedance of 1 kHz and drive it from a high-impedance amplifier, the ratio is much greater and you end up with a transmission efficiency of almost 100%.



### The XM4180 Multi-channel Power Amplifier Includes Bridged 70V High-impedance Capability

You can simultaneously use two of the XM4180's four channels to drive a stereo pair of standard low-impedance speakers while using the remaining two channels in bridged mode to drive a 70V high-impedance array. All speakers in the high-impedance array don't even have to have the same power rating as long as the total is less than the amplifier's rated output power. In the setup shown here, for example, you could connect twenty 5-watt speakers and twenty 10-watt speakers in parallel to the amplifier's bridged 70V output for a total rating of 300 watts.



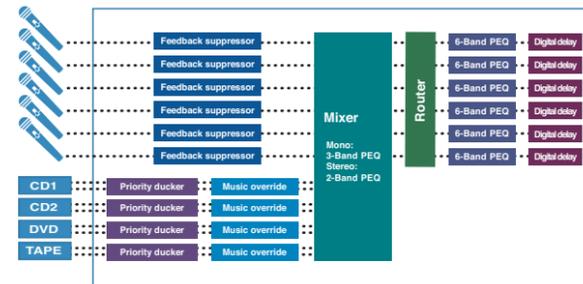
## Digital Installation Mixer IMX644 2U

- Ideal digital mixer for permanent installations
- Simple volume control and memory recall
- Equipped with a high-quality digital processor



### Various input and output connectors consolidated into its compact body

The IMX644 is equipped with six mono input connectors that can be used for microphone input. Phantom power supply (+48V) is available for condenser microphones. Furthermore, the IMX644 is equipped with four pairs of RCA jacks for input from stereo sources such as CD or MP3 players. It is also equipped with optical connectors for digital input. The built-in sample rate converter (SRC) saves you from having to specify difficult settings such as the word clock for digital connections. The IMX644 is equipped with two stereo outputs and two mono outputs as well as with REC OUT connectors for recording lectures and speeches.



High-quality, digital mixer occupies just 2U of rack space.

### Detailed configuration from a PC

Equalization and delay settings can be configured using the IMX644 Manager, a PC software application for the IMX644. Once these settings are properly configured, the end user only needs to adjust volume levels. The IMX644 Manager prevents the user from accidentally changing the settings from the front panel.

### High-quality DSP capable of precise adjustments for every application

The IMX644 is equipped with not only an input digital equalizer, but also numerous other features including digital filters for output delay and speaker processing. YAMAHA processing data can be used with YAMAHA speakers to produce high performance. Other useful features include priority ducker and feedback suppressor.

### Speaker processing data pre-installed

IMX644 Manager software has processing data for Yamaha installation speakers preinstalled. Once the system is set up, simply recall these settings for optimized audio performance.

### Priority ducker automatically fades background music in and out

Even when an audio operator is not available at a party, ceremony, lecture, or any other event, the priority ducking feature automatically fades background music in and out.

### Music override can automatically switch the sound source to a priority input

The music override feature automatically switches the input source from a music program to an emergency or evacuation signal.

### 16 memory settings can be stored for instant recall

Settings such as input level and output destination can be stored and instantly recalled to match various situations. For example, you may have your music program playing only in one room, but with a press of a button, another memory setting can be recalled, sending the same program to multiple rooms.

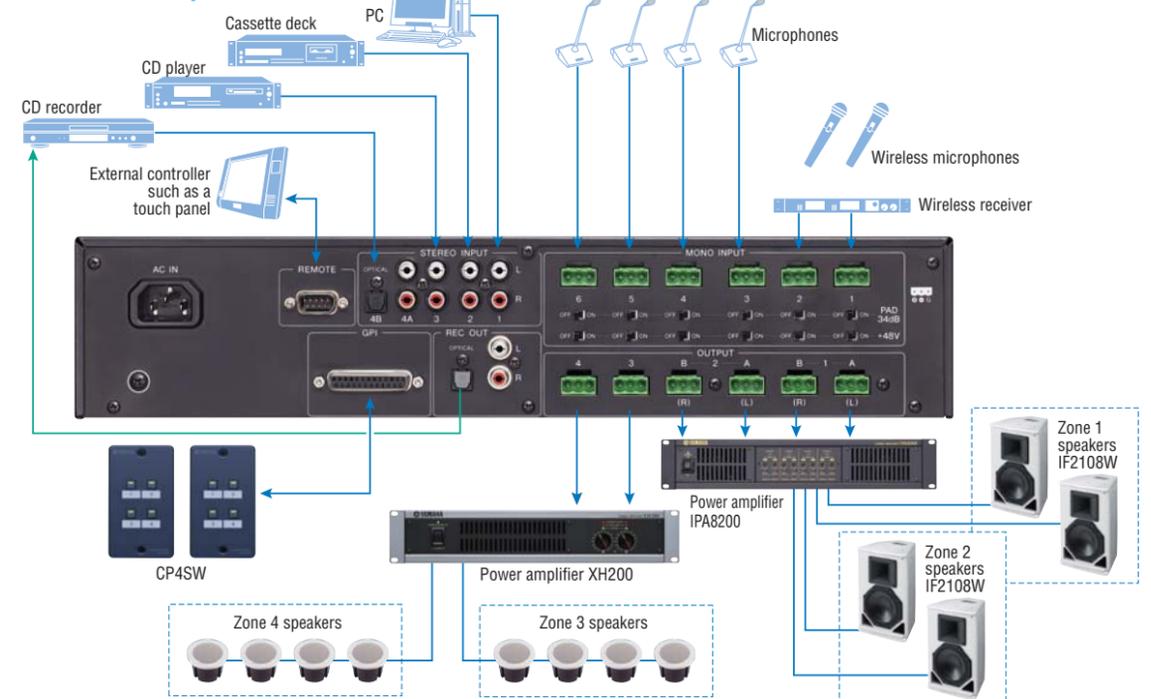


### REMOTE connector

This connector can be used to control the IMX644 with RS232-C signals. You can control the IMX644 from a PC by writing your own custom control software. The IMX644 can also be controlled via AMX or Crestron touch panel systems.



### An IMX644, IPA8200 system



### Mixing Console



**MG124C** 4 mono+4 stereo inputs

Stunning MG-series Sound Plus and Extra Margin of Input and Signal-Routing Capacity.

- 12 Input channels
- 6 Mics + 4 Stereo line inputs
- 4 Insert I/O
- 3 band EQ (ch 1-7/8)
- 2 band EQ (ch 9/10-11/12)
- 4 Compressors
- 346.2(W) x 86.1(H) x 436.6(D)mm, 3.0 kg



**MG124CX** 4 mono+4 stereo inputs SPX DIGITAL MULTI EFFECT PROCESSOR

A Versatile All-in-one Console that can Handle Up To 12 Inputs with Internal Effects.

- 12 input channels
- 6 mics + 4 stereo line inputs
- 4 insert I/O
- 3 band EQ (ch 1-7/8)
- 2 band EQ (ch 9/10-11/12)
- 4 compressors
- SPX digital multi effect
- 346.2(W) x 86.1(H) x 436.6(D)mm, 3.2 kg



**MG206C-USB** 12U 12 mono+4 stereo inputs SPX DIGITAL MULTI EFFECT PROCESSOR CUBASE AI4

Advanced Digital Live Recording Capacity and Capability.

- 20 input channels
- 16 mics + 4 stereo line inputs
- 12 insert I/O
- 3 band mid-sweep EQ (ch 1-12)
- 3 band EQ (ch 13/14-19/20)
- 8 compressors
- Rack mountable
- USB connector
- CUBASE AI4 included
- 478(W) x 105(H) x 496(D)mm, 6.0kg

### Digital Mixing Console



**01V96VCM**

Cutting-edge Performance, Capacity, Control & Compatibility.

- Precise 24-bit/96-kHz audio and high-performance head amps
- 40-input 18-bus mix capacity at 96-kHz
- 100-mm motor faders
- 4 advanced multi-effect processors
- I/O expansion slot for easy expansion in a variety of formats
- Rack mountable
- 436(W) x 150(H) x 548(D) mm, 15kg



**LS9-16** 12U

Lightweight, Compact Digital Mixers with Advanced Features and Outstanding Sound Quality.

- Lightweight and compact for superior portability and handling
- The LS9 series includes the 32-Mic/Line input 64-channel LS9-32 and the 16-Mic/Line input 32 channel LS9-16.
- No-compromise analog circuit design delivers the best sound in this class
- 16 or 32 mono input channels plus 4 stereo input channels expandable up to 32 or 64 channels in two layers
- 16 mix buses, 8 matrix buses, plus stereo and mono buses with LCR mode
- Virtual rack with top-quality effects
- Recall safe and recall focus...right down to head amp gain
- USB memory recorder/player for convenient recording and BGM or effect playback
- Detailed access management
- LS9-32: 884(W) x 220(H) x 500(D)mm, 19.4kg
- LS9-16: 480(W) x 220(H) x 500(D)mm, 12.0kg



**LS9-32**



**M7CL-48** Centralogic™

Digital Live Sound Mixing with the Comfort and Efficiency of Analog.

- Centralogic™ and selected channel control - two intuitive approaches to mixing
- Visually familiar control environment
- The M7CL-48 provides a total of 56 inputs - 48 mono Mic/Line inputs and 4 stereo line inputs
- Advanced channel functionality with a logical access structure
- Flexible mix buses and matrix
- Versatile inputs and outputs with extensive digital patching capability
- Sophisticated effects and GEQ
- Internal universal power and optional external power supply
- Recallable right down to head amp gain, plus safe and focus functions
- Access management
- 1274(W) x 286(H) x 701(D)mm, 50kg



**PM5D-RH Version2** 96 ULTRA BIT

Defining the Future of Digital Live Sound.

- Advanced analog circuitry, including top-quality head amps
- Versatile configuration with flexible I/O patching capability
- 96-kHz processing for superior sound and response
- Extensive channel and output functions
- Eight effect processors and 12 graphic EQs
- Universal power supply
- Enhanced interoperability with external devices
- Supplied PM5DV2 Editor application for extended control and efficiency
- 1551(W) x 283(H) x 950(D) mm, 97kg

### Digital Mixing Engine DME series

Programmable, Networkable Mixing Engines for a Range of Audio Processing Applications



**DME64N** 3U

Processing power that is on a par with Yamaha's DM1000 Digital Mixing Console allows complex audio systems to be built around a single DME64N unit.

- Configurable as multiple audio processors for a wide range of applications - mixers, equalizers, compressors, crossovers, speaker processors, effects, feedback suppressors, wav file players, and much more.
- Easily configured and controlled via the DME Designer software application.
- Optimally-tuned 24-bit, 96-kHz digital processing.
- Cascade up to 8 DME64N units for 512 inputs and 512 outputs.
- Four rear-panel expansion slots that accommodate Mini-YGDAI I/O cards for up to 64 channels of I/O.(DME64N)

Rear-panel expansion slot accommodates Mini-YGDAI I/O card for up to 16-channel I/O expansion - a total of 24 channels including the built-in I/O.(DME24N)



**DME24N** 2U

Substantial processing power plus built-in analog I/O for fast, easy system implementation.

- CobraNet™ connectivity with optional MY16-CII card.
- Seamless control integration with compatible Yamaha digital mixing consoles.
- Up to 16 DME64N, DME24N and ICP1 Intelligent Control Panel units can be networked via their RJ45 connectors using CAT5 Ethernet cables.
- GPI, RS232C/RS422, USB, and MIDI Interfaces
- Large LCD Display with Comprehensive Panel Controls
- The DME64N, DME24N and ICP1 Intelligent Control Panel, can display scene and function names in 5 languages: English, Japanese, French, German, and Spanish.



### Audio I/O Distribution and DSP Expansion Units DME Satellite series

#### CobraNet™

DME Satellite Models for CobraNet Networking

CobraNet has become the choice for audio networking in complex, large-scale sound systems. Up to 64 channels of audio data can be carried via a single CAT5 Ethernet cable. CobraNet offers high reliability via its redundancy system with primary and secondary ports offered as standard.



**DME8i-C** 1U

**DME8o-C** 1U

**DME4io-C** 1U



Rear Panel (DME8i-C)

#### EtherSound™

DME Satellite Models for EtherSound Networking

EtherSound offers extremely low latency, and has become choice particularly for the temporary live applications. Up to 64 channels of audio data can be carried via a single CAT5 Ethernet cable so that the connection is easy and cost-effective.



**DME8i-ES** 1U

**DME8o-ES** 1U

**DME4io-ES** 1U



Rear Panel (DME8i-ES)

- Vastly expand the capabilities and capacity of a DME-based sound system, or any other networked audio devices that use CobraNet™ or EtherSound™ protocol.
- Controllable remote I/O plus powerful DSP processing capability allow distributed processing for unprecedented system design flexibility and power.
- Reduce system cabling costs while maximizing overall reliability.
- Also usable as stand-alone processors in smaller systems.
- Full 24-bit 96-kHz audio processing, plus the same highly-acclaimed analog circuitry used in the DME24N.

- Supplied DME Designer software application can be used to control, monitor, and create complete processing "configurations" in the same way as with the DME64N or DME24N.
- 8-in/4-out GPI terminals allows direct, easy connection to wall-mountable CP4SF control panels featuring four switches and four faders.

\* CobraNet™ models have a "-C" suffix. EtherSound™ models have an "-ES" suffix.



### Wall-Mount Remote Control Panels



**ICP1**  
Intelligent Control Panel

The most sophisticated of the DME series remotes, the ICP1 connects via Ethernet. Functions include scene recall and six user-defined keys at the top and bottom of the LCD screen, which can be assigned to DME parameters such as microphone and music source levels. Up to 4 sets of "pages" are available - giving up to 24 parameters. LCD display shows names and scenes and function keys in five languages - English, German, French, Spanish and Japanese.

**Maximum Connection of ICP1**  
In a DME system including one or more DME units and ICP1 units, up to 16 units can be connected in a Zone totally. For example, in a Zone, ICP1 can be used up to 15 units when one DME unit is used, or ICP1 can be used up to 14 units when two DME units are used.



**CP4SF**  
Four switches and four faders control panel  
Wall-mountable remote control panel for GPI control.  
Uses a US-type 3 gang wall box.



**CP4SW**  
Four switches control panel  
Wall-mountable remote control panel for GPI control. Uses a US-type 1 gang wall box.



**CP1SF**  
One switch and one fader control panel  
Wall-mountable remote control panel for GPI control. Uses a US-type 1 gang wall box.

Please refer the column "GPI on DME units" below about connection number for control panels including CP4SF, CP4SW and CP1SF.

*Note: Use a standard (US-type) wall box: 3-gang with depth 44mm for ICP1 and CP4SF, 1-gang with depth 44mm for CP4SW and CP1SF. It is necessary to use the included frame plate to install these remote control panels in standard wall boxes.*

### GPI on DME units

#### What is GPI

GPI stands for General Purpose Interface. This is external control interface for digital equipment and allows creating simple and affordable control system. DME64N has 16 GPI input and output terminals (Euroblock) while the DME24N has 8 input and output GPI terminal (Euroblock). And DME Satellite has 8 input and 4 output GPI terminals (Euroblock).

#### Simple and low cost

Structure of simple and low cost control system is one of the biggest advantages of GPI using only DC 5 volts and resistor without requiring complicated parts and programming. Only preparing general switches and faders compatible to 5 volts are necessary to make original controller for meeting installation facility size.

#### Parameter Control via GPI

GPI can handle on/off type switch and fader type control. Typical usage by switch is changing

on/off and scene (program) change, and usage by fader is master volume control and etc. Any parameter required to be controlled via GPI can be assigned on "DME Designer" software and controlled externally by CP series control panel of DME options as well as any GPI devices.

#### Connection number of GPI device

DME64N has 16 input and output, DME24N has 8 input and 4 output GPI terminals. GPI devices on option control panel including switches, faders, and LEDs can be connected in total 16, 8, and 12 respectively for DME64N, DME24N and DME Satellite.

	GPI Output	GPI Input
CP4SF	8	4
CP4SW	4	4
CP1SF	2	1

#### Remote control capability up to 200 meter\*

There is a report that cable for GPI could be extended up to 200 meters by using shielded cable proofed electrical interfere noise. This offers big advantage for designing installation of sound system.

(\* Distance may vary depending on cable performance and environmental conditions.)

### Stereo 31-band Graphic Equalizer Q2031B 2U



Rear Panel

- Two independent channels of graphic EQ with full 31-band control from 20Hz to 20kHz.
- Selectable  $\pm 6$  dB or  $\pm 12$  dB EQ ranges.
- Exceptionally quiet operation with less than 0.05% total harmonic distortion.
- Noise levels below -96 dB with a smooth, natural sound that is compatible with digital sources.
- Continuously variable high pass filters on both channels provide 12dB/octave roll-off below any frequency from 20 Hz to 200 Hz.
- Balanced +4 dB 1/4" phone jacks and balanced XLR jacks for both input and output.
- Independent peak indicators for each channel light when the output signal reaches 3 dB below clipping.
- EQ ON/OFF switches provide one-touch EQ bypass and instant comparison.
- Rugged 19" rack mountable design.

### Mic Line Amplifier MLA8 1U



Rear Panel

The MLA8 mic/line amplifier is an 8-channel preamplifier featuring unparalleled articulation and sound quality descended from Yamaha's internationally acclaimed digital mixing consoles. It not only offers such practical features as PAD, HPF and PHANTOM, but packs them into the compact convenience of a 1U chassis. The MLA8 also comes with a Euroblock output connector for installed sound systems and a Dsub-25pin connector compatible with the MY8-AD96 8-channel Mini-YGDAI AD card — for maximum affinity with Yamaha digital mixers.

### Yamaha Mini-YGDAI cards

Each expansion slot – DME64N, DME24N and Yamaha Digital Mixers – can be used to add up to 16 analog or digital I/O channels in a variety of formats by simply plugging in the appropriate Mini-YGDAI expansion card including CobraNet and EtherSound audio network interface cards.

#### Digital I/O Series

Digital Network Cards

**MY16-CII** 16-Channel Audio CobraNet format I/O and Control I/O

**MY16-ES64** 16-Channel EtherSound format I/O and Control I/O

**MY16-MD64** 16-Channel Audio MAD1 format I/O and Control I/O

**MY16-EX** 16-Channel Expansion Card

AES/EBU Format

**MY16-AE** 16-Channel AES/EBU format I/O

**MY8-AE96S** 8-Channel AES/EBU format I/O (with sample rate converter)

**MY8-AE96** 8-Channel AES/EBU format I/O

**MY8-AE** 8-Channel AES/EBU format I/O

**MY8-AEB** 8-Channel AES 3id-1995 format I/O

ADAT Format

**MY16-AT** 16-Channel ADAT format I/O

**MY8-AT** 8-Channel ADAT format I/O

TDIF Format

**MY16-TD** 16-Channel TDIF format I/O

**MY8-TD** 8-Channel TDIF format I/O

#### Analog I/O Series

AD/DA Card

**MY8-ADDA96** 8-Channel Analog Input/Output Card

AD Cards

**MY8-AD96** 8-Channel Analog Input Card

**MY8-AD24** 8-Channel Analog Input Card

**MY4-AD** 4-Channel Analog Input Card

DA Cards

**MY8-DA96** 8-Channel Analog Output Card

**MY4-DA** 4-Channel Analog Output Card



MY16-CII



MY8-ADDA96



MY8-AD24



MY8-DA96

### IPA8200 2U

Save Space and Energy –  
8 Channels of Audio in A Compact, Lightweight 2U Body.



- 8 x 200W (into 4 ohms) in a 2U.
- Euroblock input and barrier strip output.
- Pairs of channels can be driven in Stereo, Parallel or Bridged modes.
- Pairs of channels have separate internal power supplies; less chance of losing all eight channels in case of failure.
- Versatile gain settings: Selectable gain +26dB or 32dB, or constant sensitivity of +4dB.
- Internal HPF selectable between OFF/20Hz/55Hz.



Rear Panel

### XM4180 / XM4080 2U

Compact, Lightweight 2U Amps Provide  
4 Channels of High-Power Amplification



XM4180

- Ideal for theatre, hall, and conference room installations.
- Four independent channels of power amplification in convenient, manageable units (XM4180 = 180W per channel, XM4080 = 80W per channel).
- Stereo, parallel, or bridged operation switchable from the rear panel.
- Balanced XLR and Euroblock connectors for easy, secure input connection.
- Output connections via five-way binding posts.
- High-pass filter with a selectable 20 Hz or 55 Hz roll-off frequency.
- Precision attenuators and independent indicators for each channel allow accurate level setup and status monitoring.
- The XM4180 can also function as a distribution power amp to drive multiple high-impedance speakers via 70V line output.
- Rear-panel Monitor/Remote jack allows the amp to be monitored and controlled from an external device.



XM4180 Rear Panel

### XH200 2U

Compact, Lightweight 200W + 200W  
Distribution Power Amp for Installed Systems



- Two-channel high-output power amp can be switched between 70V and 100V line operation (200W x 2 channels into 24 ohms-70V / 48 ohms-100V).
- Designed for installations in which multiple speakers are driven in parallel.
- High-efficiency switching power supply contributes to compact 2U size and 10 kg weight.
- Rear-panel MONITOR/REMOTE connector allows the unit to be controlled or monitored from a remote location.
- dB-calibrated detented attenuators for each channel.
- A comprehensive range of protection circuitry and indicators ensures operational stability and safety under the widest possible range of conditions.
- Euroblock input connectors and barrier-strip output connectors allow simple, secure input and output connection.
- High pass filters with switchable 40 Hz or 80 Hz roll-off provide an extra margin of system flexibility.



Rear Panel

### TXn series **2U** **2-ohm drive capability** **DSP power** **MY card slot** **EEEngine** **Remote control/Monitoring**

A Brilliant Fusion of Leading Yamaha Power, DSP, and Network Technologies

- High power for tour applications: TX4n = 2200, watts, TX5n = 2,500 watts, and TX6n = 2,750 watts per channel into 2 ohms
- Stable 2-ohm drive capability is ideal for line array speaker systems.
- Yamaha DSP power brings you advanced limiter and protection functions as well as speaker processing.
- Versatile I/O using MY card slot.
- Input signal redundancy using analog XLR inputs and MY card inputs.
- Advanced remote control/monitoring capabilities with the new Amp Editor software.



TX6n



TX6n Rear Panel

### Tn series **2U** **2-ohm drive capability** **EEEngine** **Remote control/Monitoring**

A New Standard in Touring Amplifiers, Offering 2-ohm Drive Capability.

- High power for tour applications: T5n = 2500W, T4n = 2200W, T3n = 1900W.\* Stable 2-ohm drive capability is ideal for line array speaker systems.
- Certified at 2 ohms by Underwriters Laboratories Inc. and Intertek ETL SEMKO. Compliance with these safety standards prove operation safety and quality even in 2 ohm conditions.
- Extraordinary midrange and high end detail with solid, commanding bass. Exhaustive vibration-reduction measures have resulted in unprecedented sound quality.
- A durable exterior, large cooling fans and fan guards, easily replaceable filters, and other reliability features help to deliver total dependability even under demanding tour conditions.
- Original Yamaha EEEngine amp drive technology realizes a 50% reduction in power consumption compared to conventional amplifiers.
- Remote amplifier control and monitoring via the Yamaha ACU-16C Amp Control Unit.
- A variety of input terminals, removable handles, and other features for maximum installation and handling versatility.

\* Stereo, 2 ohms



T5n



T5n Rear Panel

### XP series **2U** **EEEngine** **Remote control/Monitoring**

5 Superb Amplifiers Optimized for Installation Use

- Five models with power output ranging from 700W to 100W into stereo 8 ohms loads.
- Advanced circuit design and carefully selected parts deliver quality on a par with top-line models.
- Exclusive Yamaha EEEngine technology achieves unmatched efficiency.
- +4dBu/26dB/32dB gain switch for flexible level matching.
- Lightweight, compact 2U design for easy handling and installation.
- Monitor and Remote terminals for remote monitoring and control.
- Precision 1-dB/step detented attenuators.
- A selection of terminals and features for professional connectivity.
- Frequency-switchable high-pass filter for subsonic noise reduction or subwoofer matching.
- Comprehensive protection circuits, indicators and variable-speed cooling.
- Ideal matches for the DME64N/24N Digital Mixing Engines and Installation Series speakers.



XP7000



XP7000 Rear Panel

### PC-1N series **2U** **EEEngine** **Remote control/Monitoring**

More Yamaha Milestones on the Road to Perfect Sound. Unparalleled Sound and Reliability

- Lightweight, compact design
- An advanced switching regulator and high-efficiency EEEngine technology.
- Innovative circuit layout for superior sound and reliability.
- Easy-to-read indicators and comprehensive protection circuitry.
- Three drive modes for extra flexibility.
- Multiple I/O connections and a subsonic filter.
- Remote amplifier monitoring/control via a CobraNet™ network.



PC9501N



PC9501N Rear Panel

### P series **2U** **EEEngine** **YSProcessing** **Remote control/Monitoring**

Robust Power Output, Superior Audio Quality, and Efficient Operation

- In 4 ohms bridged mode the P7000S delivers 3200 watts, the P5000S 2600 watts, the P3500S 2000 watts, and the P2500S 1300 watts.
- Yamaha's exclusive EEEngine technology significantly reduces power consumption and heat generation.
- Independent sweepable high-pass and low-pass filters on each channel so you can optimize output for subwoofer or full range systems.
- Neutrik Speakon output jacks and 1/4-inch output jacks for each channel, in addition to 5-way binding post.
- Balanced XLR and 1/4-inch TRS jacks are provided for channel input.
- Variable-speed fans offer quiet, efficient cooling.
- Comprehensive protection includes power on/off muting, DC detection, thermal protection, current limiting, and a protective cover for the attenuators.



P7000S

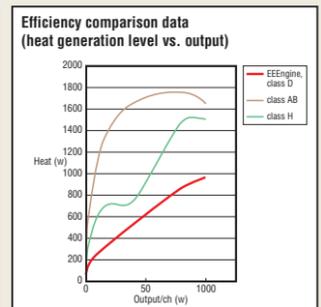
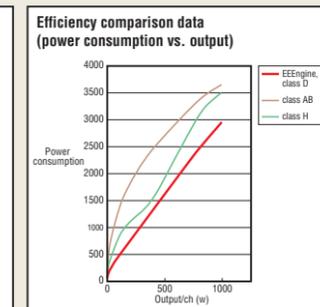
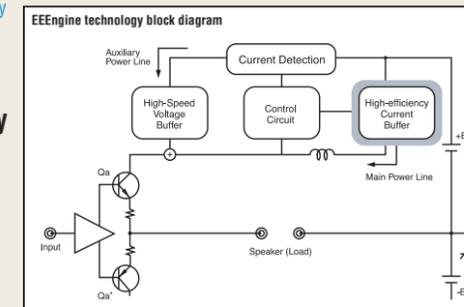


P7000S Rear Panel



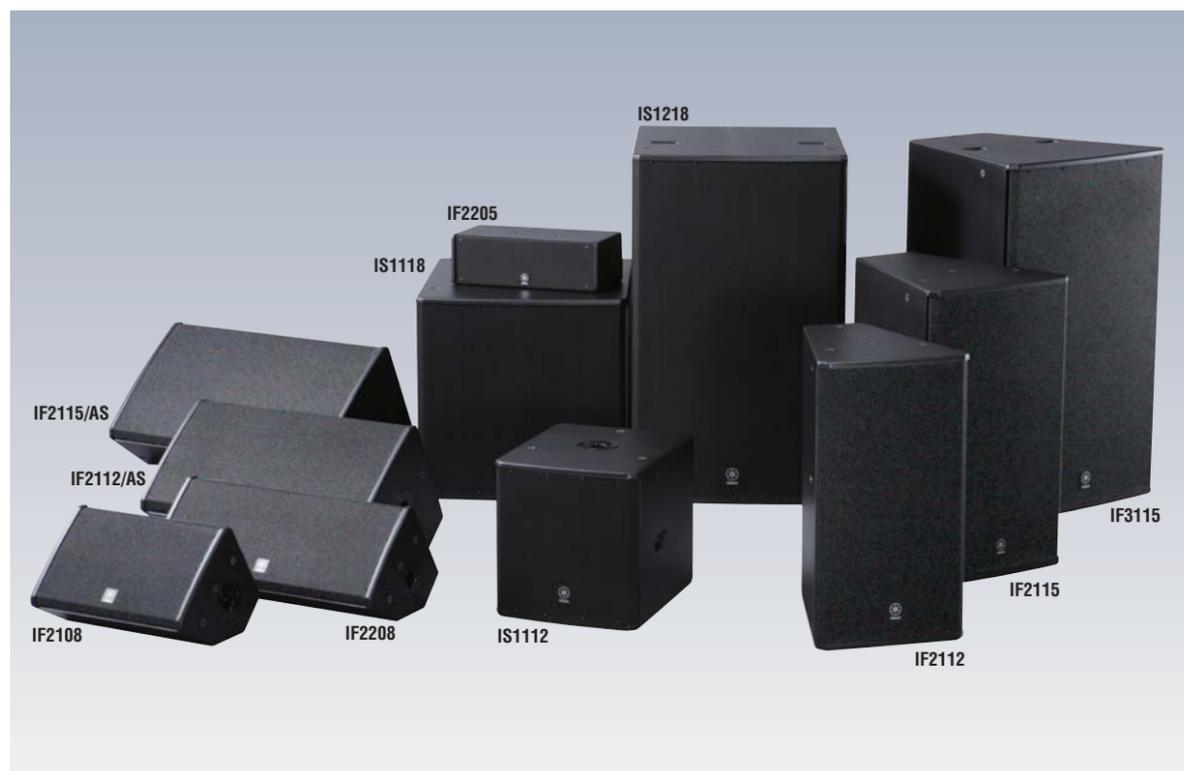
Yamaha EEEngine Technology  
A Revolutionary Power Amplifier Driving Technology

As a power amplifier's output increases, its driving mechanism becomes more significant. Yamaha's exclusive EEEngine(Energy Efficient Engine) amplifier driving technology supplies the voltage level necessary for the level of input signal through switching circuit and smoothing circuit, producing a highly effective driving mechanism. This is a revolutionary power amplifier driving technology that offers the function of a Class AB amplifier and the efficiency of a Class D amplifier. EEEngine gives you fantastic power, highly efficient driving function, and tremendous energy savings, all without sacrificing the sound quality demanded of a professional power amplifier. This technology is included in many of Yamaha's power amplifiers, and proves its utility in all kinds of situations, from sound reinforcement to permanent installation.



### Installation Series Loudspeakers

The Quest for the Best in Pro Sound



The Yamaha Installation Series includes 16 different models with speakers from 5 to 15 inches in 2-way, main, support, floor monitor, subwoofer, and other configurations. With a range of driver sizes, single and dual woofers, and a variety of external configurations, these speakers integrate easily into a wide variety of installations. The 12-inch and 15-inch models are available with four different coverage angles. By selecting and combining the appropriate models it is possible to create systems that provide any type of coverage required - from near to far, narrow to wide. Furthermore, all models feature rotatable horns to allow vertical or horizontal operation. In addition to multiple rigging points for convenient flying/hanging installation, specialized U-brackets and array frames are available to accommodate just about any installation requirements. (Four eye bolts are provided with all models except the IF2205 and IF2205W).

#### Some Important Installation Series Speaker Features

- Ideal for small to medium-scale installations.
- Uniform phase response throughout the entire series.
- Models include 3-way, 2-way, large, small, high-power, medium-power, and other variations.
- A wide selection of dispersion characteristics for long-range, short-range, and long/short-range use.
- A range of standard U-bracket and array-frame hardware available for maximum installation convenience and efficiency.
- Switchable single-amp and bi-amp drive modes (bi-amp and tri-amp modes for 3-way models).

### Club V C Series Loudspeakers

A Sophisticated Spray-finish Look with The Legendary Club V Sound

Developed and manufactured in the United States, the Concert Club series speakers have earned acclaim around the world. Club V loudspeakers with the C prefix are finished with a heavy-duty elastomer spray coating. Designed as an installation alternative to the carpeted S versions, they are an excellent match for any décor. The finish is very tough, and can be repainted to match any interior. The steel grilles are foam-lined with acoustically transparent material to provide a more unobtrusive appearance.

- A comprehensive lineup for a variety of applications as well versatile system expansion.
- Top-class parts and wood enclosures for superior sound.
- Classic design combines strength and sophistication.
- Built-in tweeter protection.
- 1-3/8 inch speaker pole sockets.
- A-type models for flying or bracket installation.



#### S55

Two-Way Design with Outstanding Linearity and Broad Coverage

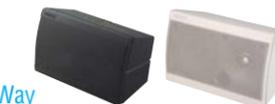
- "Wide waveguide horn" produces an ideal spherical wave that delivers consistent acoustical energy and flat frequency response.
- Advanced two-way design employs high-quality components for smooth, flat response. Emphasis on natural reproduction has resulted in luxurious lows and an extended high-frequency range. Input capacity of up to 250 watts provides plenty of playback power for medium-sized or large retail establishments, CD shops, or rehearsal/karaoke studios.
- Both woofer and tweeter are high input capacity units designed for extended reliability. A protection circuit is also provided.
- Magnetic shielding allows placement near monitor displays.
- The S55 can be positioned vertically or horizontally. A variety of installation brackets are available as options.



#### S15(W)

Compact, High-Density Two-Way Speaker Packs Cutting-Edge Technology Into Wedge Form

- "Wide waveguide horn" delivers ideal spherical-wave output, covering a broad area with well-balanced sound.
- Advanced two-way design that rivals high-end monitors, featuring a titanium dome tweeter and a cone woofer. The S15 delivers well-defined highs and ample lows that are surprising for its size, with a natural tonal character that will not cause listening fatigue. Rich, well-balanced sound, even at low volume.
- Powerful magnetic circuits are used for both woofer and tweeter in a design that resists heat-related problems. Protection circuitry is also provided.
- Wedge design blends with sophisticated interior décor, and a three-layer finish projects a sense of quality.
- The S15 can be positioned vertically or horizontally. A variety of installation brackets are available as options.



#### SW10 STUDIO

Powered Subwoofer SW10 STUDIO  
10" Bass-reflex Powered Subwoofer Delivers Solid 25Hz - 150Hz Frequency Response.

- 180 watts dynamic power.
- XLR balanced inputs (L/R/SUBWOOFER).
- XLR balanced outputs (L/R/SUBWOOFER) parallel connection with input signals.
- Level control facilitates precise system level controls.
- 40-120 Hz, 80 Hz at Center Click LPF controls.
- Phase switch simplifies phase alignment.
- Full magnetic shielding.

### Mounting bracketry Durable black or white finish brackets for the Installation series speaker range, which can be painted to match any interior.

#### Horizontal Array Frame (3 speakers)



Model name	Net weight	Available for
HAF3-2112(W)	9kg	IF2112(M)/95/64/99 x 3
HAF3-2115(W)	10kg	IF2115(M)/95/64/99 x 3
HAF3-3115(W)	14kg	IH3115/95/64 x 3 IH2000/95/64 x 3 IH2000/95/64 x 2 and IL1115 x 1 IH2000/95/64 x 1 and IL1115 x 2 IL1115 x 3
HAF3-S18(W)	29kg	IH3115/95/64 x 2 and IS1218 x 1 IH2000/95/64 x 2 and IS1118 x 1

#### Horizontal Array Frame (2 speakers)



Model name	Net weight	Available for
HAF2-2112(W)	4kg	IF2112(M)/95/64/99 x 2
HAF2-2115(W)	5kg	IF2115(M)/95/64/99 x 2
HAF2-3115(W)	6kg	IF3115/95/64 x 2 IH2000/95/64 x 1 and IL1115 x 1

#### Vertical Array Frame (2 speakers)



Model name	Net weight	Available for
VAF2-2112(W)	4kg	IF2112(M)/95/64/99 x 2
VAF2-2115(W)	5kg	IF2115(M)/95/64/99 x 2
VAF2-3115(W)	6kg	IH3115/95/64 x 2 IH2000/95/64 x 2

#### U-Brackets



Model name	Net weight	Available for
UB2112(W)	4kg	IF2112(M)/95/64/99/AS
UB2115(W)	9kg	IF2115(M)/95/64/99/AS
UB2000(W)	9kg	IH2000/95/64 IL1115
UB2208(W)	3kg	IF2208
UB2108(W)	2kg	IF2108
UB2205(W)	1kg	IF2205

\* The bracket for the UB series is designed to be used horizontally. It cannot be used vertically.

#### Ceiling-Brackets



Model name	Net weight	Available for
BCS251	2.3kg	IF2205, IF2108, IF2208, C112VA

#### Baton-Brackets



Model name	Net weight	Available for
BBS251	2.3 kg	IF2205, IF2108, IF2208, C112VA

#### Wall-Brackets



Model name	Net weight	Available for
BWS251-300	4.4kg	IF2205, IF2108, IF2208, C112VA
BWS251-400	5.2kg	IF2205, IF2108, IF2208, C112VA

#### Free-Angle Clamp



Model name	Gross weight	Available for
BAS10**	1.9 kg	S15, S55

#### Wall-Brackets



Model name	Net weight	Available for
BWS20-120**	1.2 kg	S15, S55
BWS20-190**	1.73 kg	S15, S55

#### Mic Stand Adaptor



Model name	Gross weight	Available for
BMS10A	0.294 kg	S15, S55

\* Distribution of BCS251, BWS251-300, BWS251-400, BWS20-120, BWS20-190, BBS251 differs according to countries. Please ask your local Yamaha subsidiary.  
\*\* Available in pairs.

# Quality Control

“Quality” is one of those little words that cover a lot of ground. It can mean different things to different people at different times, but at Yamaha it applies to a whole spectrum of concepts that form the backbone of a uniquely conscientious approach to product development and manufacture. Sonic quality, although it is often the first aspect that comes to mind, is only the beginning. Reliability and durability are just as important, and are in many ways more difficult to achieve with any degree of consistency. Then of course there’s safety, both personal and environmental, to which an extensive gamut of important standards apply. Unique to electronic devices is the need to prevent electrical interference, both incoming and outgoing, which is an area that requires an extraordinary level of skill combined with advanced facilities for effective management and control. And quality management must continue even after the product is sold, in the form of support and service.

To achieve the kind of quality that satisfies all conditions all of the time requires focused, unrelenting attention to detail and control right from initial product planning and design through final manufacture and packaging to post-sales support. It is not a simple task, and requires a dedicated organization and infrastructure for effective implementation. This is where many manufacturers fall short, but is where Yamaha’s commitment to delivering unequalled quality in all areas is overwhelmingly clear. And the fact that the Yamaha approach works is evident in an outstanding track record and enviable reputation.



Large EMC Test Chamber

## Overall Quality Management

Yamaha’s Quality Management System conforms to ISO 9001:2000 standards and is certified by DNV (Det Norske Veritas – an internationally recognized certification company based in Norway). The Yamaha system, however, has been customized to even more stringent criteria that reflect some very ambitious internal quality goals. The Quality Management System applies not only to operations in Japan, but to Yamaha’s factories in China and Indonesia as well. The all-inclusive scope of the system ensures that the same policies, objectives and standards are shared by all Yamaha staff and facilities, no matter where they may be, so that the required level of product and service quality can be maintained on a worldwide scale.

## The Yamaha Quality Support Center

Near the entrance to one of Yamaha’s main office and factory complexes stands an imposing, almost windowless structure that is a vital arm of Yamaha’s Quality Management System. The Quality Support Center is a world-class testing laboratory that houses some of the most advanced and sensitive testing facilities for electronic devices available anywhere, plus some tortuous durability tests that are almost shocking in their severity. The Quality Support Center complies with ISO 17025 standards: “general requirements for competence of testing and calibration laboratories.” Not many manufacturers operate an internationally accredited facility of this scale or capability.

## Factory Quality Control

Factory production can only begin after the final engineering samples have passed all tests and have been fully approved by the Quality Support Center. But that is by no means the end of quality management. Monitoring and testing continue throughout the manufacturing process to ensure that quality goals are maintained. Parts received from external suppliers must pass testing at the factory Quality Assurance Center before they can be accepted as stock or passed on to the assembly staff. Then, when assembly is complete, each and every unit undergoes a thorough final inspection right at the point of manufacture, so that if a problem is detected it can be rectified immediately and effectively. In addition to inspection and testing of every unit produced, samples are taken from every production run for even more in-depth testing. Approximately five samples will be taken per month, depending on the product, with at least one sample taken at the beginning of each production run. Sample production units are taken to a separate area of the factory where they are tested under actual-use conditions.

## The Ultimate Goal

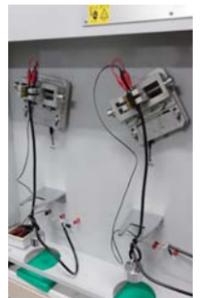
In addition to the obvious need for absolute safety, the ultimate goal of the Yamaha Quality Management System is total customer satisfaction. Total customer satisfaction can only be achieved by providing a stable supply of products of the highest quality at the lowest possible cost along with responsive and effective support. Easier said than done. Like the products themselves, quality management must continually evolve to keep pace with continuously changing markets, user needs, and technology. The Yamaha Quality Management System is right at the leading edge.



Cell Production (Made in Toyooka/Japan)



Non-destructive X-ray Tomography



Cable Durability Testing



Computer-controlled Vibration Table



Encoder Durability Testing



Drop Test