

Pro Player Stadium

(formerly Joe Robbie Stadium)

The reinforcement system for the home of the Miami Dolphins is built around the M4 driver



The 75,000 seat Pro Player Stadium of Miami, Florida is host to one of America's favorite football teams, the Miami Dolphins. After 21 successful years at the Orange Bowl, the Dolphins required a venue with some additional facilities, including a better sound system.

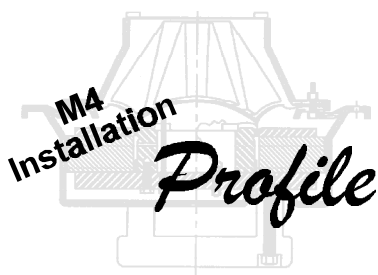
Suitable loudspeaker locations for outdoor stadiums are difficult to come by. Distributed and central cluster systems aren't practical since there is no ceiling structure from which to suspend loudspeakers. Locating loudspeakers in several locations can result in severe delay problems, since these locations can be hundreds of feet (and milliseconds) apart. The solution for Pro Player Stadium was to attempt coverage from a single location high above an end zone, requiring massive acoustic power generation to overcome the extremely long throw distance. Large-format pattern control horns would serve to deliver this acoustic energy equally to all seating locations.

The elaborate system was designed and specified by Christopher "Topper" Sowden. The three-way main loudspeaker system consists of twenty (20) low-frequency enclosures operating from 60 Hz to 300 Hz, ten (10) Community M4 midrange drivers with PC1542M pattern-control horns operating from 300 Hz to 3 kHz, and thirty-nine (39) JBL high-frequency horn/drivers to extend the frequency response from 3 kHz to 16 kHz.

The end-zone cluster provides the powerful, clean sound that is necessary for playback of full-range music and high-level speech reinforcement over the extreme levels of crowd noise present at a typical Dolphins game, while exhibiting the durability and reliability needed to withstand the harsh south Florida climate.

The massive end zone array is located above the scoreboard in an 80 x 16 x 10 foot room.





The Georgia Dome

Twenty-two distributed loudspeaker arrays are built around the M4 driver, making communication with 75,000 people possible in this massive space.

The 75,000 seat Georgia Dome of downtown Atlanta was built with all of the known acoustical problems inherent in domed stadiums. Long reverberation times and crowd noise levels in the 90dBA range meant that the sound system would play a crucial role in the usability of the space.

One of the primary goals of this type of system is maximizing the direct-to-reverberant energy ratio at each listener seat. When considering the energy from the sound system, this means that directivity (Q) must be used to focus the energy into the audience. A live audience has an absorption coefficient of about .7, meaning that 70% of the energy that strikes it will be absorbed and only 30% returned to the environment. This means that the direct sound energy can be reduced by about 6dB before being reflected into the space and causing reverberation.

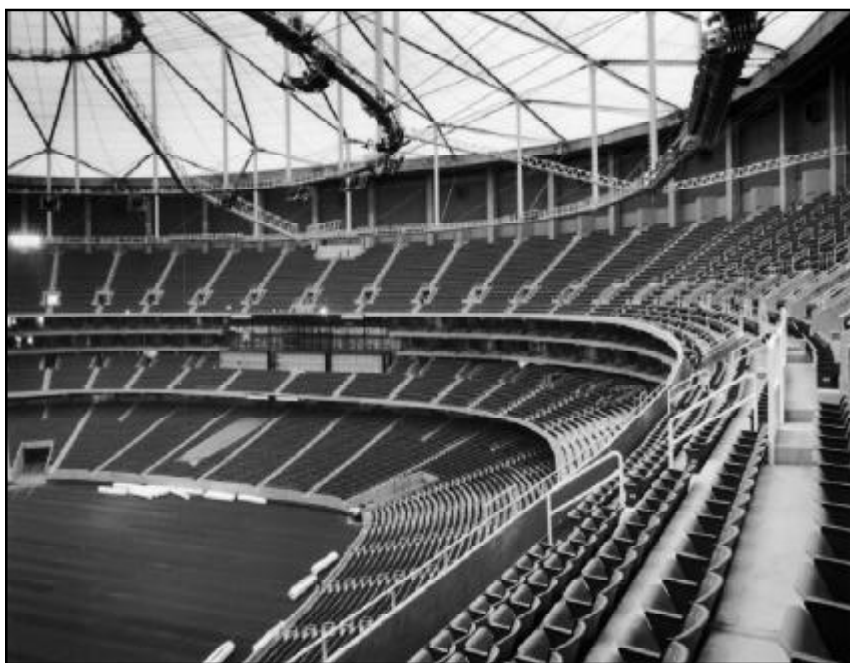
The massive design project was placed in the hands of consultant Ron Baker, who used his experience and computer modelling to arrive at the optimum design for the dome. Baker determined that 22 distributed loudspeaker clusters would be required to generate the high SPL's required. Each cluster would be a three-way design, utilizing a dual 15-inch direct radiator enclosure for the lows, large-format horn/driver combinations for the midrange, and a high-frequency horn/driver combination to match the coverage pattern of the midrange.

Given all of the requirements of the project, Baker chose the M4 driver as the heart of the system. "The Community large-format midrange horn enhanced the speech clarity in the Georgia Dome's reverberant space to a great degree," Baker said. "We have used it in several indoor and outdoor facilities with success, and continue to think of it as a special product for these types of applications."

The arrays are located about 130 feet above the lower audience seating areas, and are separated from each other by roughly 50 feet along the sides of the dome, and about 30 feet on the ends.

The system was installed by Ancha Electronics of Norcross, Georgia and was completed in time for the Atlanta Falcons football season in September. Operating in mono, the system provides intelligible speech as intended, along with music quality approaching full-blown concert-level systems. "We didn't intend to get 115dB out of the system," says Baker, "but in the end it could easily produce 105 to 110dB peaks."

Directivity control can be more useful than acoustical treatment in such spaces, and the M4 allows the absolute optimum performance possible for the midrange, providing the needed SPL's with low distortion, using the smallest possible amount of amplifier power and producing the least amount of heat.



The arrays for the Georgia dome are suspended from catwalks, and tower 130 feet over the lower audience area.

The Pennsylvania Convention Center

This multi-purpose ballroom utilizes M4 CoAx systems in the main cluster.

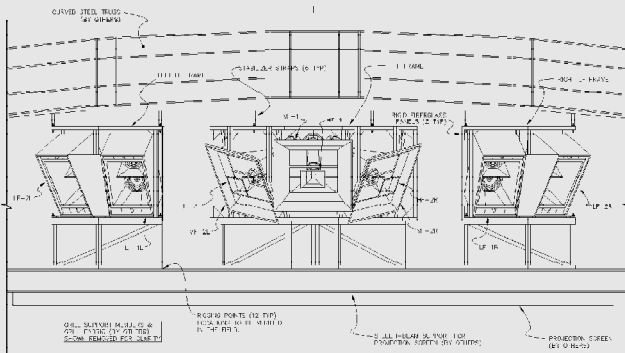
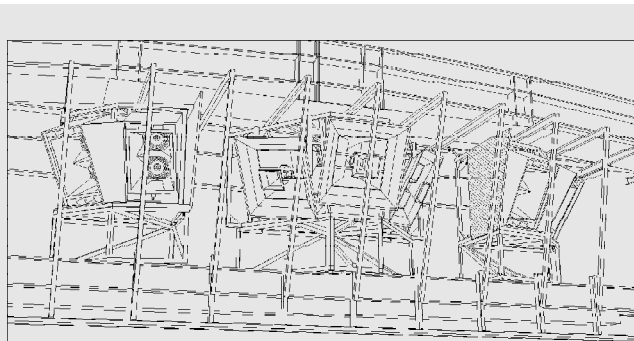
Convention centers are especially challenging to the system designer. Not only must the system work for many types of events, each performer expects the system to operate as though it were designed specifically for their use. This requires the system designer to balance many criteria when combining excellent performance with versatility.

The Pennsylvania Convention Center is just such a multipurpose facility. Its 30,000+ square-foot ballroom hosts many types of events, from concerts to corporate parties. The ballroom stage is located on a long wall of the rectangular venue. A full-range loudspeaker array is located over the stage, and is called upon for reinforcement when acoustic localization to the stage is required.

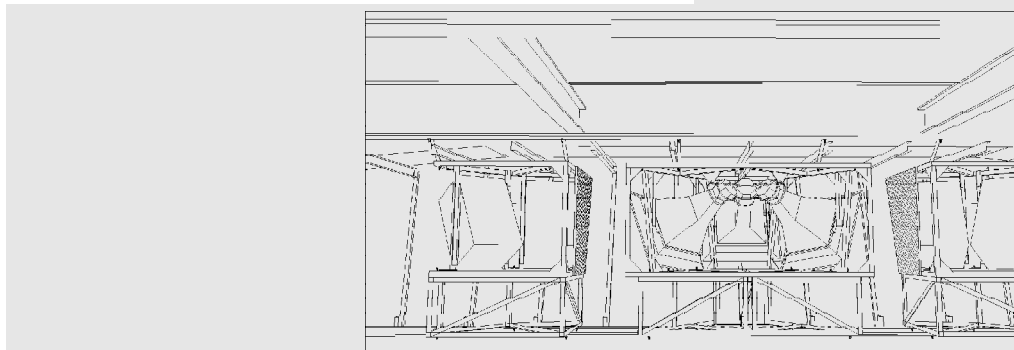
Stephen Siegel of Acentech explains that the ballroom can be subdivided into two smaller rooms by a moveable partition wall. When this occurs, the main array is isolated from the smaller section, and the distributed overhead system is used. When an event utilizes the stage, the main array is used because it provides sufficient level and coverage to handle about any event that requires sound reinforcement.

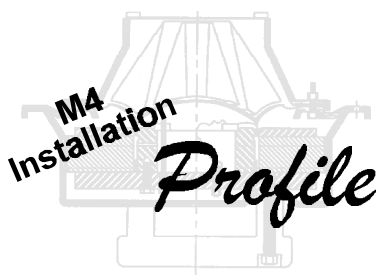
The main array consists of three (3) M4 CoAx systems, and four (4) dual-fifteen inch bass enclosures, located in an elaborate support truss. The three Coax systems provide a full 180 degrees of horizontal coverage.

Pattern control and reliability were the main reasons for choosing the M4-based system, and, according to Siegel, the powers that be at the Pennsylvania Convention Center are very pleased with the choice.



*Design and drawings by Washington Professional Systems,
Mt. Laurel, NJ*





Jacobs Field

The M4 brings the game to the fans of the Cleveland Indians, in their newly constructed 42,400 seat "baseball only" stadium.

Jacobs Field, a 42,400 seat "baseball only" facility, is the home of the Cleveland Indians. When the time came to outfit the facility with sound, the call went to WJHW of Dallas, a well-known audio and acoustical consulting firm affectionately known within the industry as "The Radio Station." Ron Baker of WJHW is an industry leader in designing sound reinforcement systems for such facilities, his success being attributed to his ability to repeatedly design reliable systems that get the job done.

The audio requirements for Jacobs Field were not unlike those of the other large, outdoor sports facilities in existence. They needed a full-range reinforcement system that could generate high SPLs over long distances with good speech intelligibility. To meet these design goals, Baker designed an elaborate distributed loudspeaker system. He chose to build the system around the midrange, the M4 compression driver being the device of choice. The M4's, coupled to PC1542M horns, were installed in openings within the up-

per deck canopy about 40 feet apart. From this location they effectively provide coverage to the first 12 rows of lower level seating.

Upon its introduction, the M4 provided the professional sound industry with a tool that has led to the development of new design philosophies for stadiums and other applications. Systems simply sounded better when the proper attention was given to the critical midrange decade. In summing up the performance of the M4 design employed at Jacobs Field, Baker states that "the balance of the main loudspeaker system is very good. Particularly with the way that the M4s firing from the canopy blend in so well with the more localized enclosures. Upper deck volume levels are well under control."

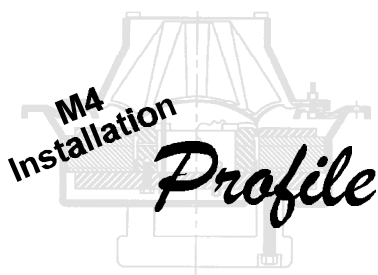
Installing contractor Ed Simon adds, "Reliability is crucial, because when you're making a service call 250 feet in the air in 30 degree weather with a 25 mph wind, while standing on an eight-inch beam, the best service call is one you don't have to make."



Indians fans expect only the best in audio and video entertainment at the Indians home games. Sound system designer Ron Baker chose the M4 driver to be the heart of this state-of-the-art stadium system.

The arrays are located about 40 feet apart, and are suspended from the canopy of the upper deck. Due to the precarious location, reliability was a key factor in choosing system components.





Concert Audio Bellville, South Africa

"The basic system we have, is to say the least, very impressive. It handles 6000 people with loud rock program, no problem!"

Chris Rossouw

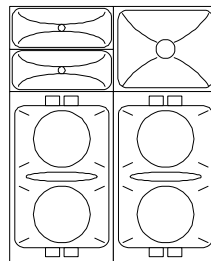
Concert sound systems must provide the fidelity and performance that superstars demand and expect, and they must do so consistently and reliably. In this highly competitive end of the audio business, poor devices identify and disqualify themselves very quickly.

Concert Audio of Bellville, South Africa has built their touring systems around the M4 driver. The M4's ability to deliver high SPLs with excellent efficiency has made it an optimum choice for this application. Since the M4 runs cooler than any other driver in its class, efficiency in this case means that there are fewer component failures. Even at a torturous 250Hz low-frequency crossover point, the M4 performs its task of low distortion midrange performance.

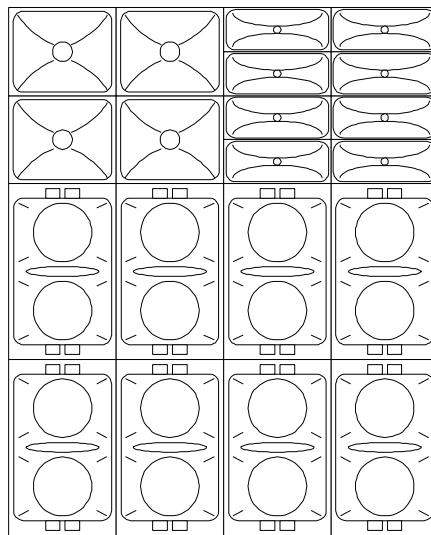
Concert Audio has experimented with many configurations of its Unibell concert system, each utilized to provide various degrees of coverage as the application demands. This "building block" approach allows the systems coverage to be modified as needed through various arrangements of devices.

This method of coverage adaptation is one of the few tools that the touring system designer has in order to adapt a system to a particular arena. Full-range cabinets are not nearly as versatile, since the various components cannot be as closely coupled due to the constraints from the box itself. With the modular approach of the Unibell system, the lows, mids and highs can be packed individually, resulting in better pattern definition.

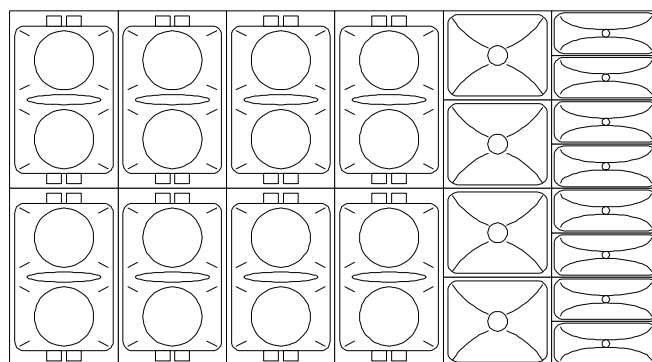
The bottom system (pictured at right) is capable of producing greater than 120dB at 25 meters. Note the ratio of mid to low-frequency devices, and the mid to high-frequency devices. Even at these levels, the M4 is operating well below its maximum output capability.



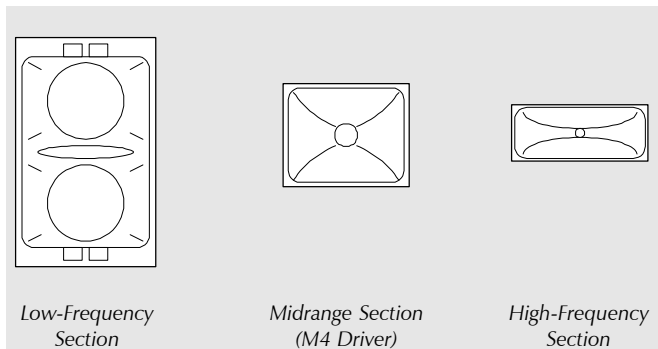
Standard full-range configuration (Total amplifier power 6400WRMS)

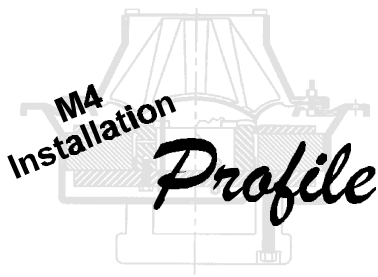


Narrow horizontal and vertical pattern for long-throw applications.(24kWRMS)



Wide horizontal pattern and narrow vertical pattern. Excellent when arrays must be placed at stage level. (24kWRMS)





Paramount Studios Theater

A cinema system utilizes the M4 to reproduce the critical midrange for motion picture soundtracks

The accurate reproduction of a motion picture soundtrack can require the accuracy of a studio monitor, but at much higher output levels. Many products are available that can provide the needed levels, but when low distortion and smooth phase response are required, the field narrows quickly.

Speech reproduction is especially important for motion picture soundtracks. For moviegoers to fully experience the motion picture, they must be able to follow the dialog. The speech must be intelligible, and it must provide proper localization to the correct area of the screen. Since localization is highly dependent upon the phase response of the transducer, crossovers (and their inherent nonlinearities) should be avoided in the speech decade. Oddly enough, the search for the optimum device led studio personnel to a transducer that was widely used in stadium and arena reinforcement.

In an effort to implement the required accuracy into their studio theater, Paramount Pictures chose the M4 driver as the device of choice to reproduce the critical midrange. The M4 provided the high levels, low distortion and smooth phase response that the theater demanded. Dialog reproduction was the main factor in choosing the M4, and the rest of the system was designed around this key component.

The system consists of five (5) full-range loudspeaker ar-

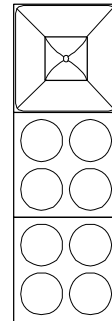
rays spaced evenly behind the projection screen. All devices are from Community Professional Loudspeakers, and are bandpassed as follows:

High Frequencies 1300 - 16kHz

Mid Frequencies 280 - 1300Hz

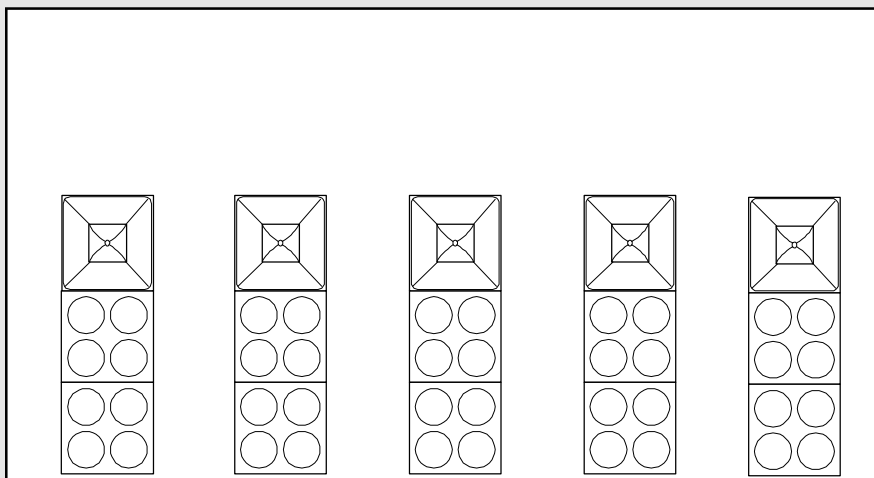
Low Frequencies 60 - 280Hz

Sub Bass 25 - 60Hz



The center array uses a 90 x 40 pattern control horn, while the side arrays utilize 60 x 40 dispersion. This configuration was chosen to help keep energy off of the side walls.

Paramount Studios is quite pleased with their choice of the M4, as the system works quite well. As the understanding of the need for accurate midrange reproduction increases, the M4 will certainly become a standard part of cinema systems worldwide.



The Paramount Studio Theater system consists of five four-way arrays spaced evenly behind the projection screen.