



A P P L I C A T I O N G U I D E
f o r
Multi-Purpose Auditoriums



New Victory Theater

SITE .. New York, NY

APPLICATION .. Small Performing Arts

DEVICES USED .. JF200, JF80, KF300, SB330

CONSULTANT .. Jaffe, Holden, Scarbrough



Eastern Acoustic Works Application Support Guide: An Introduction

This is the third installment in the Eastern Acoustic Works Application Support Guide series. The goal of this series is to offer concise, accurate guidance on the utilization of various EAW loudspeaker products for specific applications. Of course, no general handbook can address every situation you might encounter, or realistically cover the full range of options available from EAW to the consultant/designer/installer.

Using the most commonly employed design concepts, we discuss the pros and cons of each option, and suggest a range of EAW products that could be applied to each design.

This chapter will focus on Multi-Purpose Auditoriums of all types including high school and college facilities, civic theaters, with seating capacities from less than 500 to more than 1200, as well as similar types of facilities including larger Houses of Worship (see the EAW Application Guide on those facilities for more information). As with each facility type this one presents its own unique challenges and problems for the sound system consultant/designer/installer. EAW's goal, for this and all other application types is to provide you with a comprehensive set of tools that you can use to solve specific application problems.

General Design Criteria for Multi-Purpose Auditoriums

The primary design criterion for a multi-purpose venue sound system is that it allow the venue to accommodate the widest possible diversity of programs. No matter what the stated or typical program material may be, the systems installed will need to service other types of material. Therefore, a sound system should be user-configurable to meet the many known and as-yet-unknown needs of the venue.

Naturally, there is a limit to how well each of these types of material can be accommodated. A sound system designed for a venue featuring touring Broadway musicals should be able to accommodate the orchestral score for a ballet fairly easily but will need supplementation when a big rock band comes to town.

Aesthetic considerations also play a major role in this type of system design. One current trend is the conversion of disused "movie palaces" into performing arts centers. In such a case, the stark look of black boxes above the proscenium clash with the ornate filigree typical of 1940's era cinemas. EAW can work with the sound system designer to solve aesthetic problems and can use any Pan-Tone color when painting special-ordered loudspeakers.

The skillful consultant/designer, therefore, will need to balance each of the different applications the system is designed to accommodate against both budgetary and physical restrictions to achieve the most versatile overall installation. Increasingly, automation and computer technologies applicable to sound systems for multi-purpose auditoriums offer viable solutions not feasible in any other way. (The application and use of these technologies goes beyond the scope of this application guide.)

Program Material

The wide variety of program material found in multi-purpose spaces can cover the entire range of audio requirements. Everything from monophonic speech to full bandwidth, high level live music or surround channels for motion pictures may be encountered. The savvy designer will strive to meet the most rigorous of these requirements while remaining within the budget allotted.

The old rule-of-thumb is: Assume that management has given you only 50% of the requirements (at best), and whatever they say they will never do will be required on opening night.

General Design Concepts

The basic design options for Multi-Purpose auditoriums and similar spaces consist of central cluster/multi-cluster approaches and some mix of distributed systems. Venue size will play a major factor in influencing which option is best suited to the particular project, but given the wide variation in day-to-day needs, it is wise to slightly over-design where feasible.

In larger spaces a combination of both methods is often employed, and it is also quite common to see several distributed systems used to provide coverage in less accessible areas such as under balcony spaces or adjunctive overflow spaces as well as the lobbies, waiting areas, back stage areas, and so forth. The use of digital signal delay systems is now the norm for this type of system to insure that listeners covered by distributed loudspeakers perceive the sound to be coming from the stage.

Acoustically speaking, the central cluster or multi-cluster options offer the designer the best degree of localization and pattern control options. EAW's AS, KF and MQ Series products provide a large number of enclosure sizes and configurations and output level capabilities to meet these needs.

Often the acoustics of Multi-Purpose Auditoriums leave a great deal to be desired, being more reverberant than desirable for maximum speech intelligibility and less reverberant than desirable for symphonic music. Reinforcement systems must both improve the former and subtly enhance the latter. EAW's MK and AS Series of smaller two- and three-way systems can offer the designer great adaptability to meet both aesthetic and spaces limitation criteria.

Without question Multi-Purpose Auditoriums will require more than one system, and these auxiliary systems often present design problems as difficult as those of the main system. EAW's JF and UB Series of compact and ultracompact, high output systems will enable the designer to produce systems with fewer overall devices, thus keeping budgets in line.

Finally, the sound system must provide foldback/stage monitoring capabilities for performers/presenters of all types. Off-axis radiation from the main cluster(s) can offer one option to meet this need, but the use of wedge type floor monitors can optimize both overall coverage as well as help control feedback and system gain problems. Another option is the use of a concealed, distributed, signal delayed system to provide this capability.

Small Multi-Purpose Auditoriums

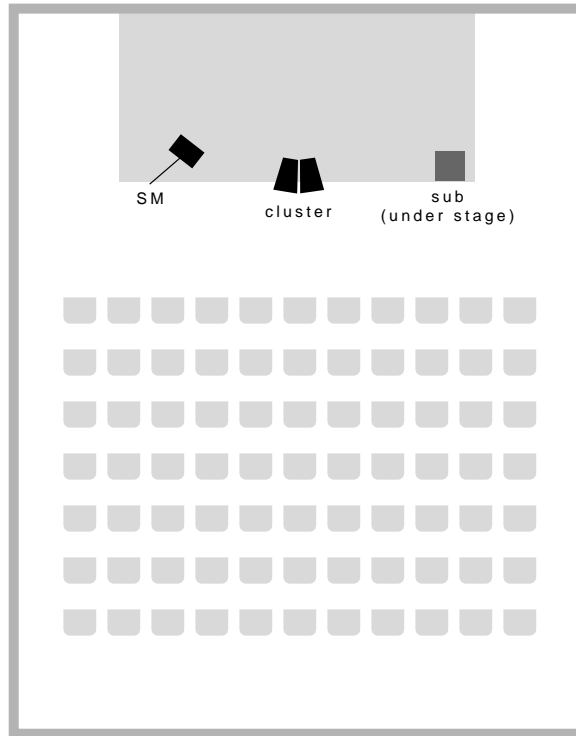
These are defined as facilities with less than 500 seats, and as having no balcony or similar auxiliary seating tiers. Because all seating is thus in a single plane, minimal sound reinforcement will be needed. A single cluster of smaller loudspeakers, such as the EAW AS660i or MK5164, will provide the naturalness of sound quality that is most important in this type of space.

Extended deep bass capabilities are usually not required, unless the programming options for the space include popular music events, drama with sound effects or other performances that would have that need. If so, a limited number of carefully positioned SB Series subwoofers can provide the signal.

Usually, digital signal delays are not required unless the space's configuration is unusually deep relative to its width. If so, the UB Series or smaller members of the JF Series of two-way loudspeakers offer a range of solutions.

Small SM Series floor-wedge systems will provide accurate foldback monitoring if that is required. Particularly thrifty venues may consider the use of a JF100e or JF200e on its side for such a purpose, allowing the system to be used in other ways when monitoring is not required.

Small Theater, plan



**RECOMMENDED
MAIN CLUSTER
LOUDSPEAKERS:**

- AS300e
- AS460
 - w/ AS415
 - w/ AS422
- AS490
 - w/ AS415
 - w/ AS422
- AS660i
- AS690i
- ASR660
- ASR690
- ASR665
- ASR695
- MK2164
- MK2194
- MK5164
- MK5194

**RECOMMENDED
STAGE MONITORS:**

- JF100e
- JF200e
- SM122e
- SM155e
- SM200iH
- SM260iV

**RECOMMENDED
SUBWOOFERS:**

- AS625
- SB150
- SB180
- SB250

**RECOMMENDED
DELAY
LOUDSPEAKERS:**

- JF50S
- JF60
- JF80
- UB12Se
- UB22i
- UB42
- UB72
- UB80
- UB82

Medium-Sized Multi-Purpose Auditoriums

Containing somewhere between 500 and 1200 seats with no more than a single balcony, this configuration makes up the vast majority of such spaces.

A single central cluster or an L/C/R arrangement are the usual choices, with an additional distributed system to cover the balcony, under the balcony and related areas. With clusters usually 25 to 35 feet above the seating area, the high output capabilities of the selected loudspeakers must be balanced with effective pattern control to keep sound off reflective surfaces and out of microphones that may be used onstage. When combined with an MQ or TD Series LF system, EAW's MQ Series of large format mid/high systems will provide both the necessary output as well as effective pattern control. The AS Series of three-way systems offers a variety of configurations that can solve most space limitation/system configuration problems. The KF Series are also popular choices for these applications.

If pattern control is not an issue, or budget limitations become a consideration, then the MK Series of two-way systems can provide alternative design options.

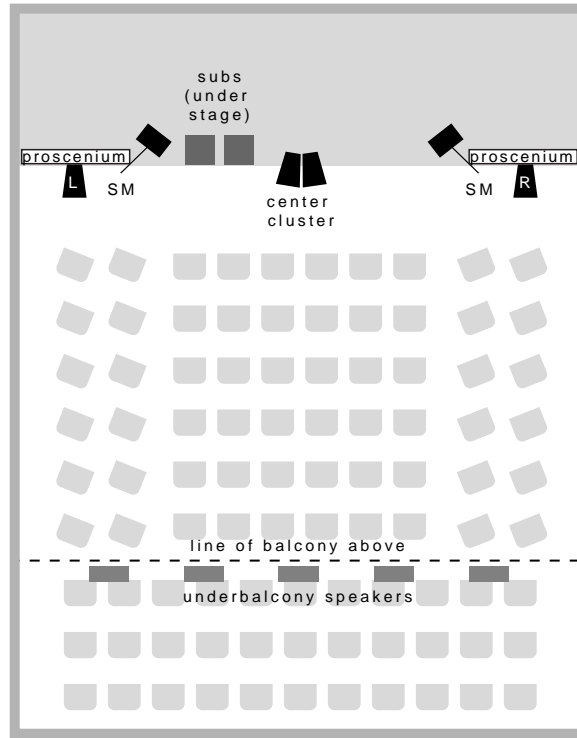
The SB Series of subwoofers offers a range of systems scaled to integrate with the various full range configurations available from EAW.

A distributed system will be required to cover underbalcony areas. The UB or smaller JF Series two-way loudspeakers have been specifically designed to provide high output, high definition sound from ultracompact enclosures that can be mounted in out of the way locations.

A set of loudspeakers to cover the stage lip area are desirable in an venue of this size. Not only will they cover the first few rows which may be on the fringe of the main cluster's coverage area, they also help "pull" the sonic image down when the main clusters are located high overhead. The UB Series as well as the smaller JF Series systems are designed specifically for this type of application.

SM Series floor-wedge systems will provide accurate foldback monitoring if that is required. The SM200 in particular is much prized for its low stage height.

Medium-sized Theater, plan



RECOMMENDED MAIN CLUSTER LOUSPEAKERS:	RECOMMENDED UNDERBALCONY/ STAGE LIP LOUSPEAKERS:	RECOMMENDED STAGE MONITORS:	RECOMMENDED SUBWOOFERS:
AS300e	JF50S	LA212	AS625
AS460 or	JF60	LA215	SB150
AS490	JF80	SM122e	SB180
w/ AS415 or	MK8196	SM155e	SB250
w/AS422	MK2164	SM200iH	SB330e
AS660i	MK2194	SM260iV	SB528eP
AS690i	UB12Se	SM400iH	SB600e
ASR660	UB22i	SM500iV	SB625P
ASR690	UB42		SB850P
ASR665	UB72		SB1000e
ASR695	UB80		
MQ1364 or	UB82		
MQ1366 or			
MQ1394			
w/ MQ1312or			
w/ TD412			
MQ2364 or			
MQ2394 or			
w/ MQ2412 or			
w/ TD415			
MK2164			
MK2194			
MK5164			
MK5194			
KF300e			
KF650e			
KF695e			
KF750P			
KF850EP			

Large Multi-Purpose Auditoriums

Defined as having more than 1200 seats and at least one balcony area, these spaces present the designer with both coverage and level capability problems to solve.

The preferred approach is to use an L/C/R cluster design with the appropriate number of subwoofer devices to provide as much extended low end as the programming mix may require.

Nominally larger loudspeaker cabinets will be needed to provide adequate horn size to insure pattern control across a wider area, and sufficient output capability to guarantee even coverage all the way to the rear of the space.

MQ Series mid/high systems combined with the TD Series Tuned Dipolar Array LF systems is the optimal choice for maximum pattern control. Similarly, AS Series three-way systems can offer excellent pattern control from a smaller, less costly loudspeaker.

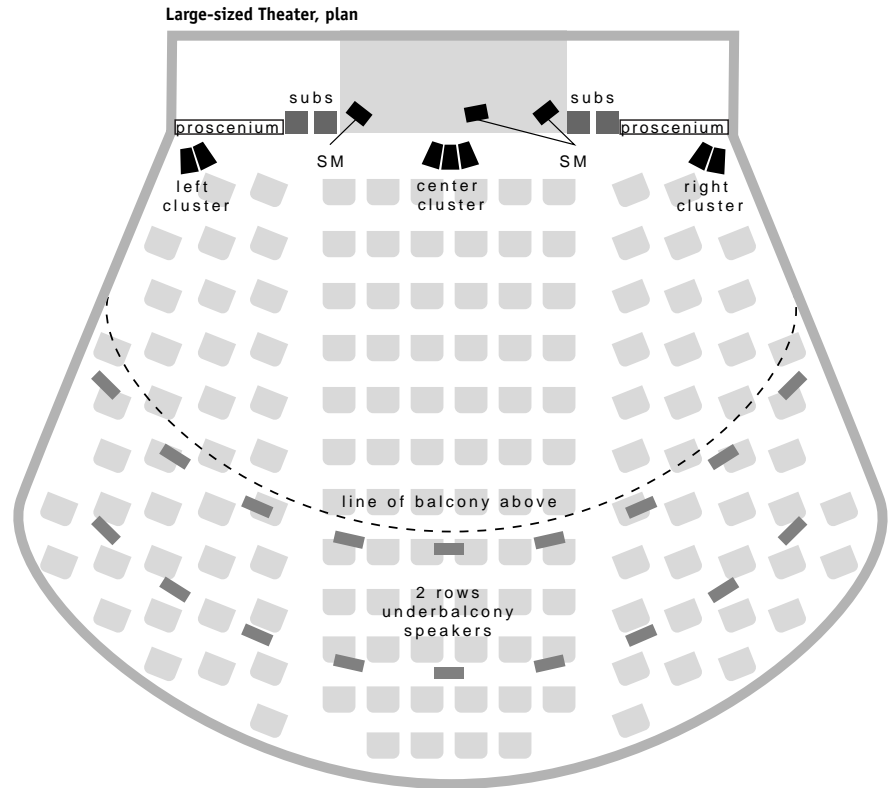
If a rock & roll style system is desired, then the EAW KF750/KF755 array is the preeminent choice. The widely accepted successor to the KF850 system is finding its way into many high profile permanent installations.

Signal-delayed, distributed systems for balcony and under balcony coverage are required as well as stage lip systems to provide coverage close to the front of the space where the main clusters can't reach. The UB Series or smaller members of the JF Series have been specifically designed to provide high output, high definition sound from ultra-compact enclosures that can be mounted in out of the way locations.

Small signal delayed mini-clusters may be a better choice for coverage in top balcony areas, depending on the overall depth of the space and the height of the balcony. Larger JF or MK Series two-way systems will provide full range coverage.

A set of loudspeakers to cover the stage lip area are desirable in an venue of this size. Not only will they cover the first few rows which may be on the fringe of the main cluster's coverage area, they also help "pull" the sonic image down when the main clusters are located high overhead. The UB Series as well as the smaller JF Series systems are designed specifically for this type of application.

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RECOMMENDED LOUSPEAKERS:	RECOMMENDED DELAY LOUSPEAKERS:	RECOMMENDED STAGE MONITORS:	RECOMMENDED SUBWOOFERS:
AS460 or	JF100e	LA212	SB150
AS490	JF200e	LA215	SB180
w/AS415 or	JF260z	JH15	SB250
w/ AS422 or	JF290z	SM122e	SB330e
w/ AS625	JF560z	SM155e	SB528eP
AS660i	JF590z	SM200iH	SB600e
AS690i	MK8196	SM260iV	SB625P
ASR660	MK2164	SM400iH	SB850P
ASR690	MK2194	SM500iV	SB1000e
ASR665	MK5164		
ASR695	MK5194		
KF650e		RECOMMENDED UNDERBALCONY/ STAGE LIP LOUSPEAKERS:	
KF695e		JF50S	
KF750		JF60	
KF755		JF80	
KF850EP		UB12Se	
KF853		UB22i	
w/BH853		UB42	
KF855		UB72	
MQ1364 or		UB80	
MQ1366 or		UB82	
MQ1394			
w/ MQ1312or			
w/ TD412			
MQ2364 or			
MQ2394 or			
w/ MQ2412 or			
w/ TD415			

Large Multi-Purpose Auditoriums (continued)

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Additional systems that will be needed in these larger facilities include stage/performer monitoring, control room monitoring, and portable effects/auxiliary speaker systems. SM Series floor-wedge systems will provide accurate fold-back monitoring if that is required. The SM200 in particular is much prized for its low stage height.

