Application Guide

for

Yamaha Installation Series Speakers

Ver.1.0

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Table of Contents

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Index by application

Introduction

This application guide shows system design examples of the Yamaha Installation Series Speakers.

Here, typical speaker layouts comprising single loudspeakers and speaker clusters suited to the size, geometry and application of the room are shown.

We hope that by applying the examples shown in this guide, this application guide may assist your speaker system design

The IF2112 (12" LF) and IF2115 (15" LF) models featured in this first edition are higher power models. Various examples using 12" & 15" LF medium power models and three way high power models will be provided in the forthcoming second edition.

Important parameters such as coverage area, SPL and frequency response of speaker arrays can be worked out easily by using "Y-S^3" – Yamaha Speaker System Simulator software.

Common Loudspeaker Format (CLF) data such as frequency response, balloon data, polar pattern, directivity, and impedance response of each speaker model is provided in the free downloadable "CLF Viewer". An introduction to Y-S^3 and the CLF Viewer follows at the end of this guide.

Also U-brackets, Array frame and Pin out are introduced. Yamaha prepares many kind of bracket to fit various uses.

Yamaha Installation Series Speakers pursue the goal of being "truly arrayable". Yamaha considers this to be not only physically arrayable by providing suitable array frames, but also "acoustically arrayable" by ensuring maximum phase coherence and minimum destructive interference.

In order to realize the goal of being "Acoustically Arrayable", Yamaha unified the phase curve for the whole Installation series, thereby minimizing SPL cancellations caused by phase difference between speakers in a speaker array.

A further benefit of this unified phase response is the sonic consistency when different models are used in the same room, resulting in less 'muddiness'.

We hope that Yamaha Installation Series Speakers help you to improve your projects' sonic environments!
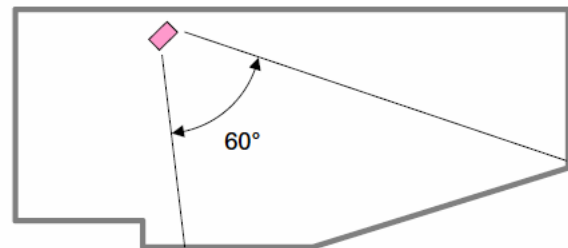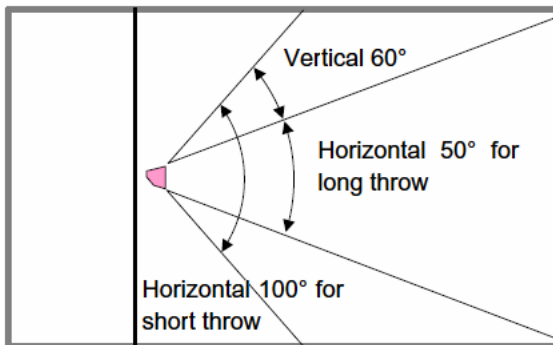
Small Installation: Simple Center Cluster

This small installation example represents a typical simple center cluster application.

Applications
- Small Hall
- Small Church
- Meeting Room
- School Gymnasium
- School Auditorium

Speaker Layout

Speaker System Overview
- IF2115/AS is a good choice for a simple center cluster for small venue for speech system.
- Asymmetric CD horn can provide the narrow dispersion for far field and the wide dispersion for near field.
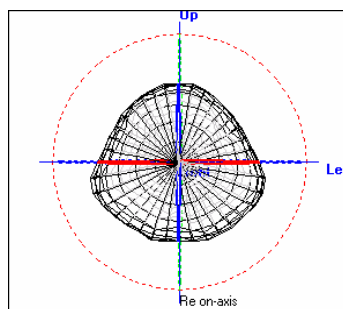
Asymmetric horn   Conventional horn
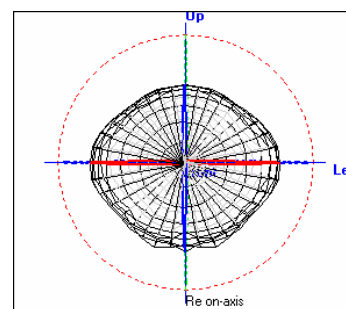
- Asymmetric CD horn is rotatable, allowing the speaker to be installed in either vertical or horizontal orientation. Switchable between bi-amp or passive mode.

System Diagram

- Speaker Processing Component
    1 x SP2060 (or DME24N)
- Power Amplifier
    1 x XP7000

- Center Cluster
    1 x IF2115/SP2060

SP2060 Configuration Example

Small Installation: Left/Right Cluster + Mono Sub

This small installation example represents a typical Left/Right Cluster and Mono Sub application.

Applications

- Small Hall
- Small Church
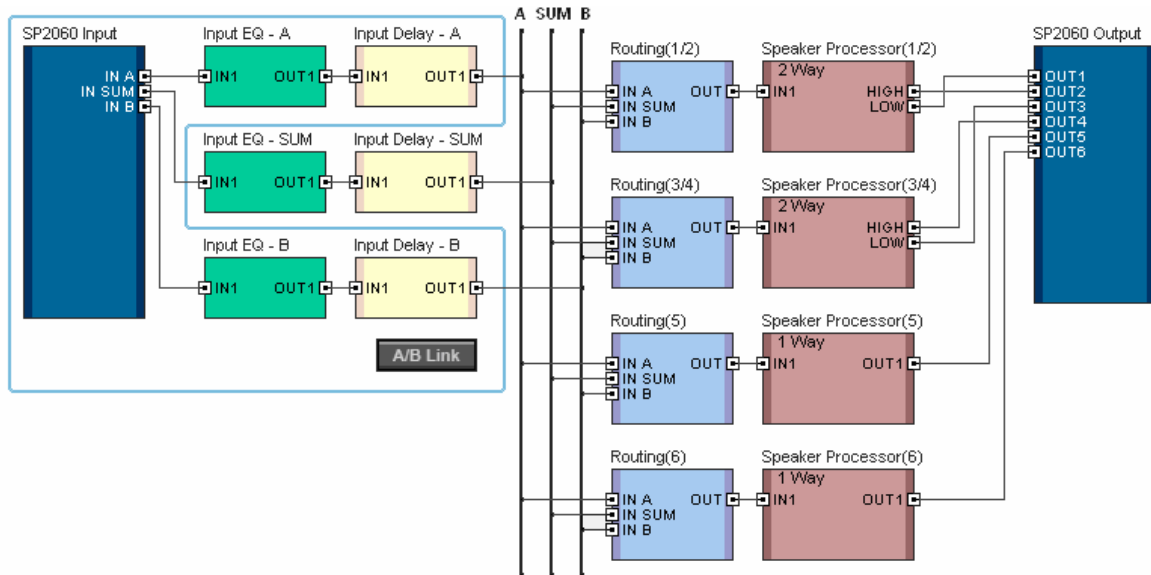- Small Live Venue
- Meeting Room
- School

Speaker Layout
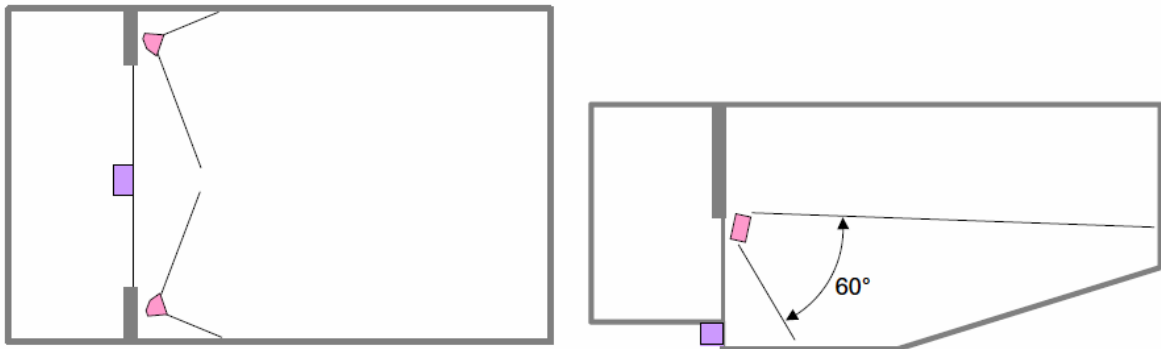
Speaker System Overview

- IF2112/AS for Left/Right cluster + IS1118 Sub system is a good choice for small venue for not only speech but also speech + music systems.
- Rotatable Asymmetric CD horn can provide the narrow dispersion for far field and the wide dispersion for near field, allowing the speaker to be installed in either vertical or horizontal orientation.
- IS1118 Subwoofer allows for extended low frequency bandwidth to meet music applications.
- Switchable between bi-amp or passive mode for IF2112/AS.

System Diagram

- Speaker Processing Component
  - 1 x SP2060 (or DME24N)
- Power Amplifier
  - 2 x XP7000

- Left/Right Cluster
  - 1 x IF2115/AS for each
- Subwoofer
  - 1x IS1118 (Bridged)
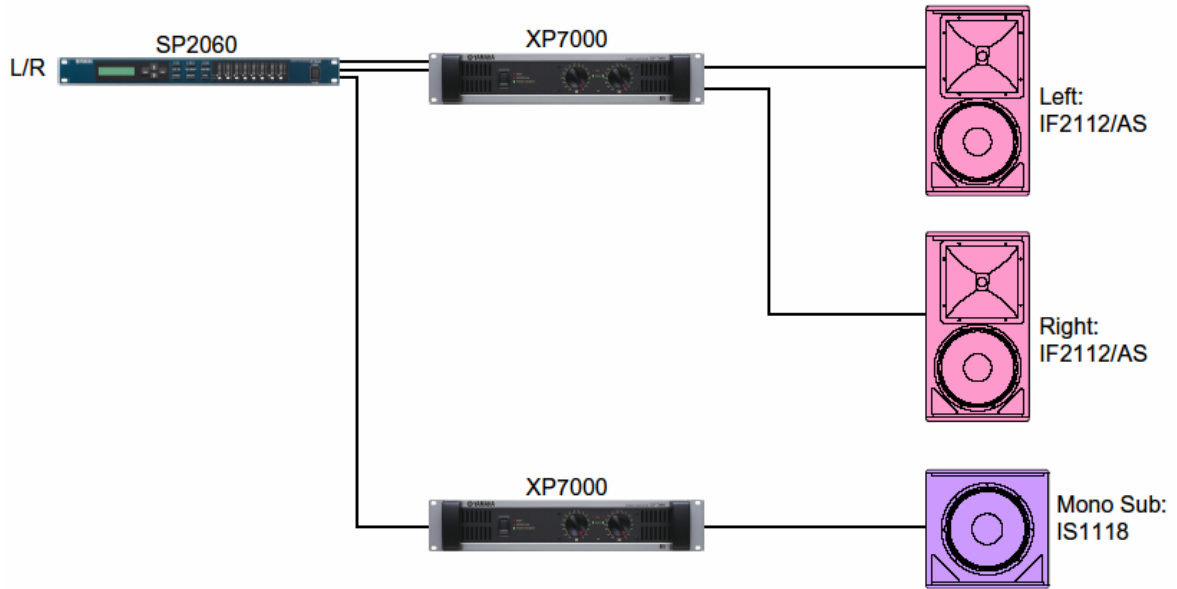
SP2060 Configuration Example

Small Installation: 5.1ch Surround

This small installation example represents a 5.1ch Surround application.

Applications

- Small Hall
- Meeting Room
- School

Speaker Layout
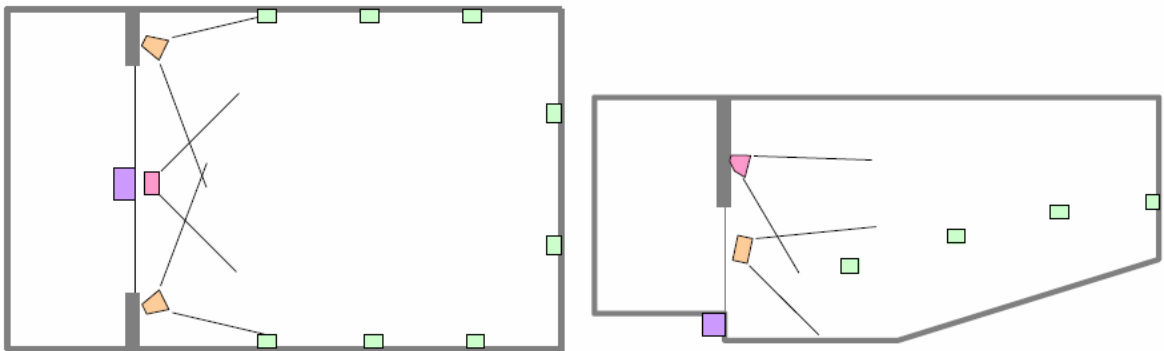
Speaker System Overview

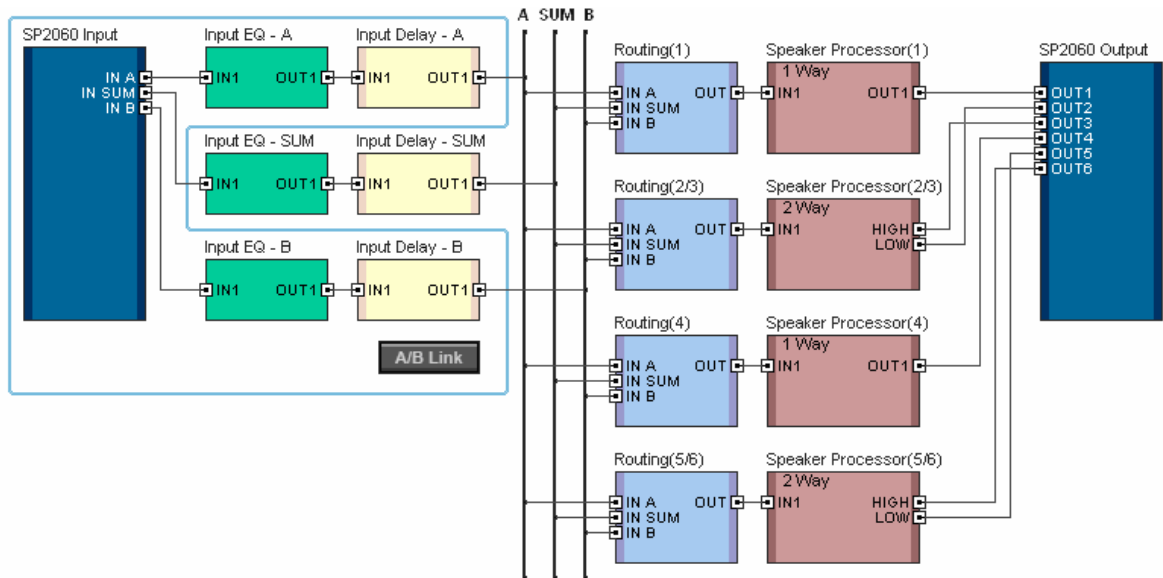- IF2112/95/AS for Left/Right/Center cluster, IS1215 for LFE, IF2108 for Surround is a good choice for 5.1ch Surround system for small venue.
- All two-way and three-way models include a rotatable horn, allowing the speaker to be installed in either vertical or horizontal.
- U-brackets are available for horizontal configuration.
- M8 screw nuts allow wall mounting in both horizontal and vertical orientation by using 3rd party wall mount hardware such as Omni-Mount, Power-Drive.
- IF2112 can be operated in bi-amp or passive mode.
- IF2108 is designed for passive mode only.
- IS1215 can be operated in discrete or parallel mode.
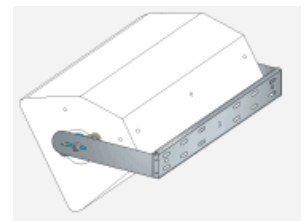
U-Bracket

System Diagram

- Speaker Processing Component
    - 1 x DME24N
- Power Amplifier
    - 2 x XP7000
    - 2 x XM4180
- Left/Right Cluster
    - 1 x IF2112/95 for each
- Center Cluster
    - 1 x IF2112/AS

- Subwoofer
    - 1x IS1215
- Surround speaker
    - 8 x IF2108
- Mounting Hardware
    - 2 x OmniMount120.0 for L/R Clusters
    - 1 x UB2115 for Center Cluster
    - 8 x UB2108 for Surround speakers
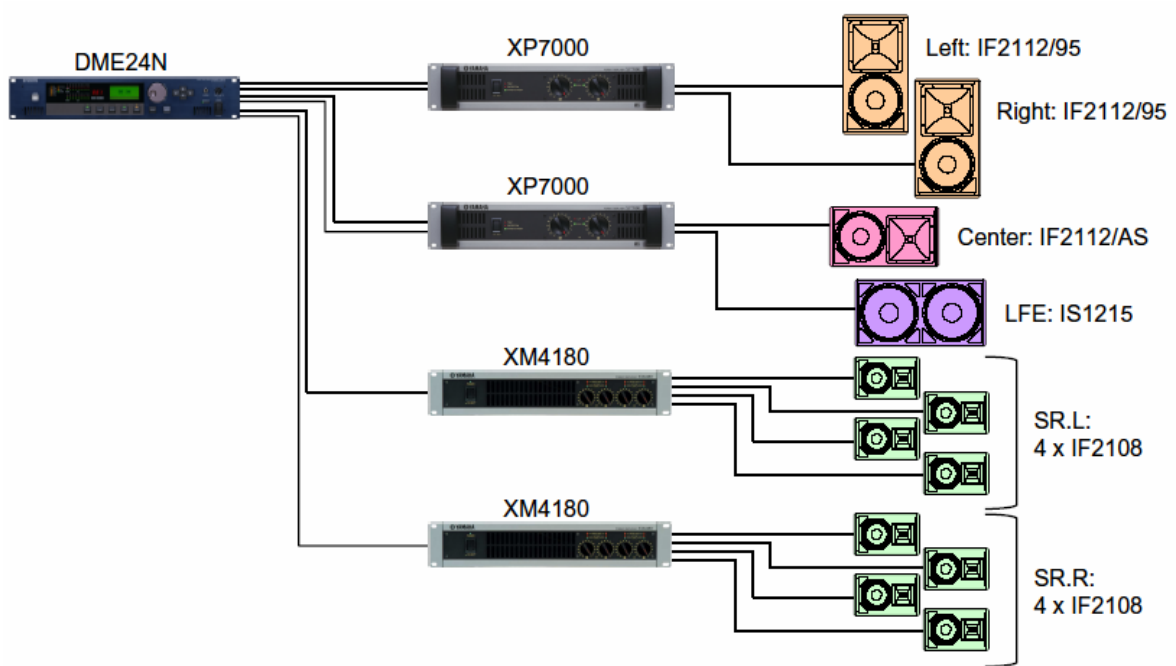
DME Configuration Example
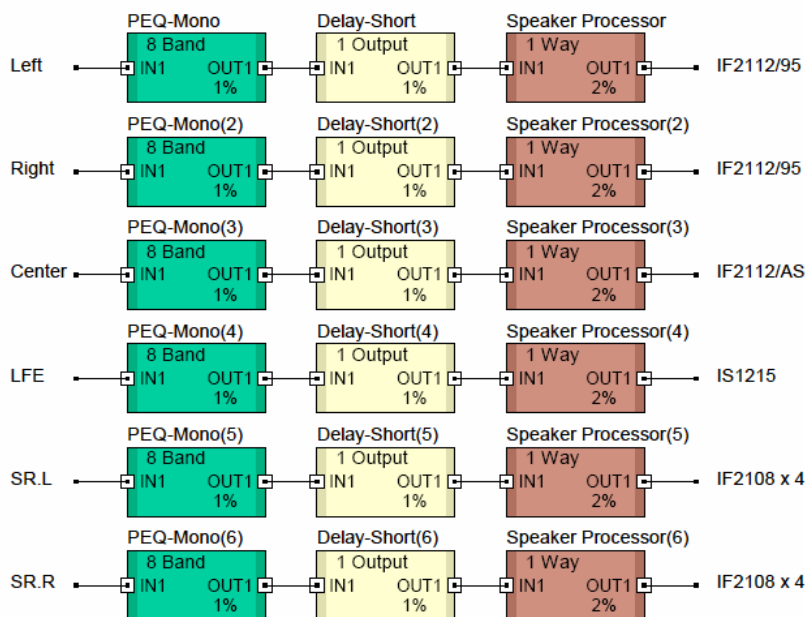
Small Installation: High Ceiling Distributed System

This installation example represents a Distributed application.

Applications

- Exhibition Hall
- Ball Room
- Meeting Room
- School
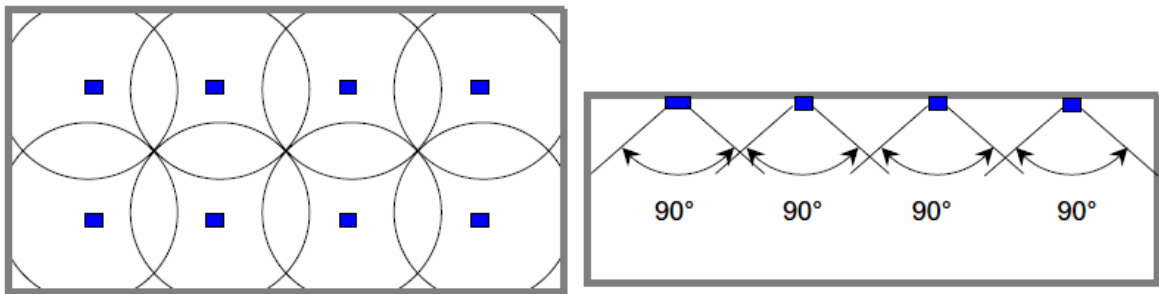
Speaker Layout

Speaker System Overview

- 90° x 90° symmetrical coverage pattern is a good choice for distributed applications with very high ceilings and reverberant rooms.
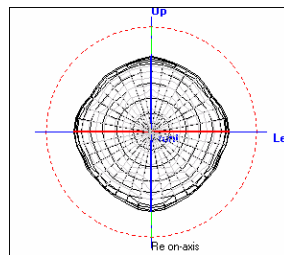
2 kHz

- Conical coverage area of 90°x90° horn makes speaker layout easier.
- Large format constant directivity horn and compression driver can provide enough power for high ceiling venue and good pattern control for reverberant rooms.
- Switchable between bi-amp or passive mode.

System Diagram

- Speaker Processing Component
  - 1 x DME24N
- Power Amplifier
  - 2 x XM4180

- Ceiling Mounted Speaker
  - 8x IF2112/99
- Mounting Hardware
  - 8 x UB2112

DME Configuration Example

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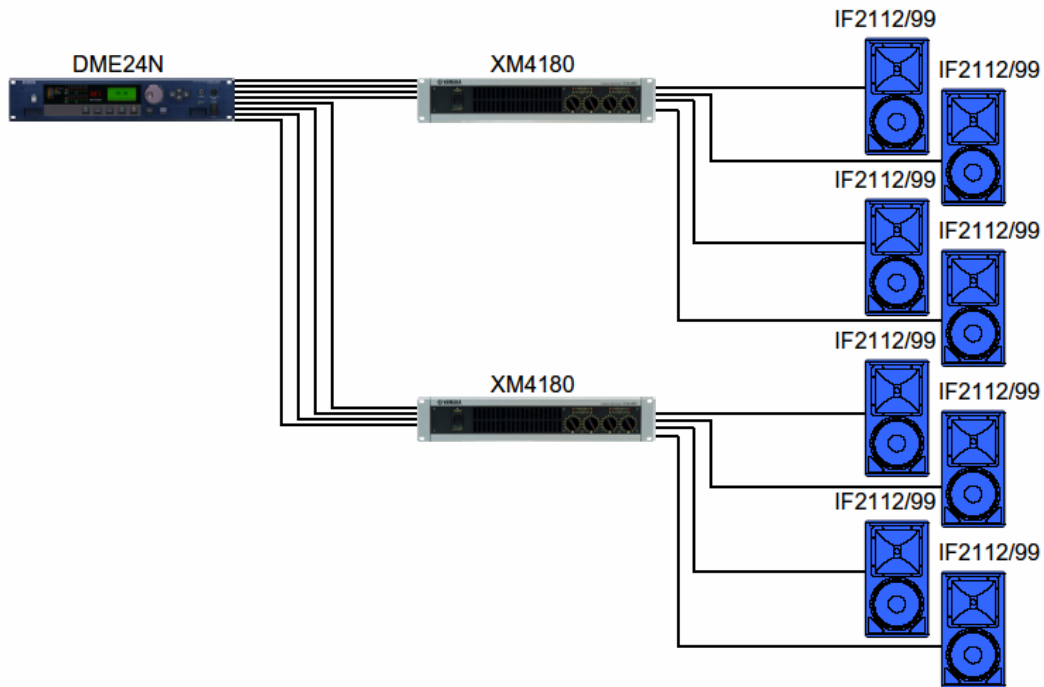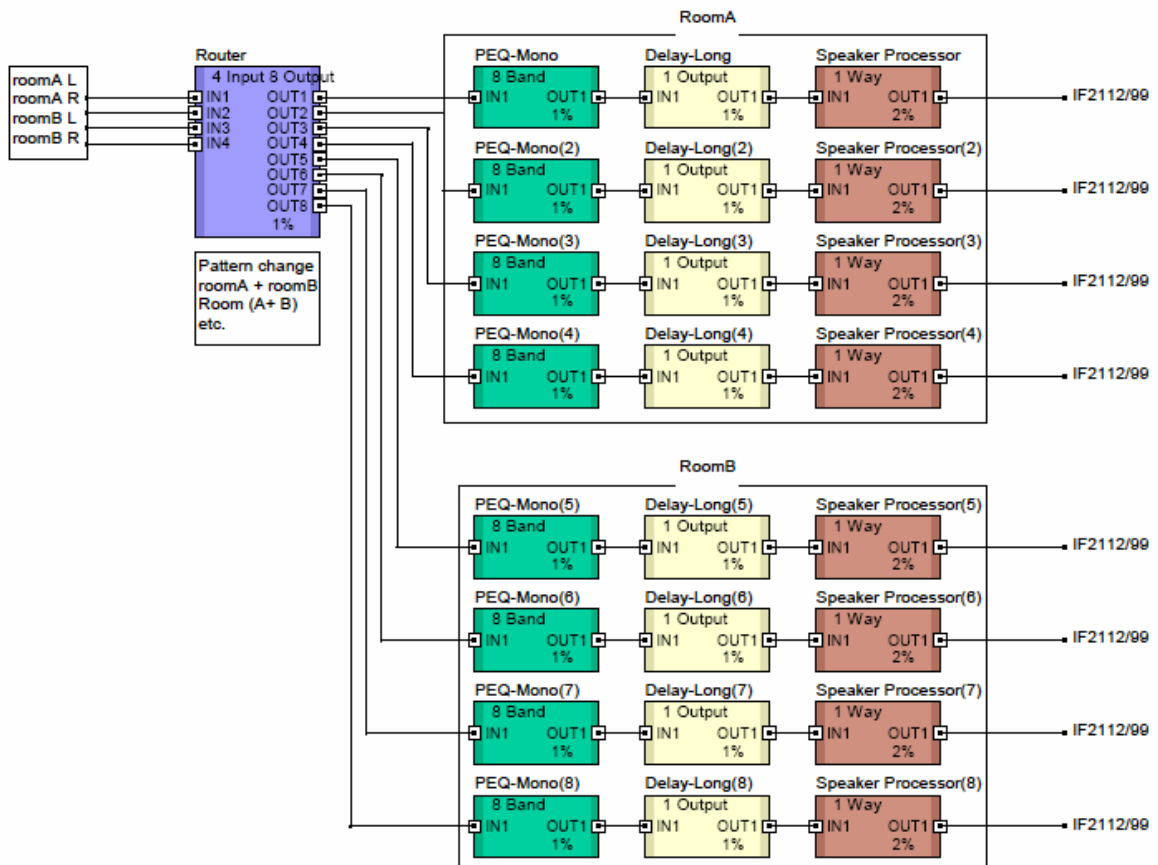
Medium Installation: House of Worship

This installation example represents a medium sized sound system.

Applications

- House of Worship

- Hall

- Performing Arts Center

Speaker Layout
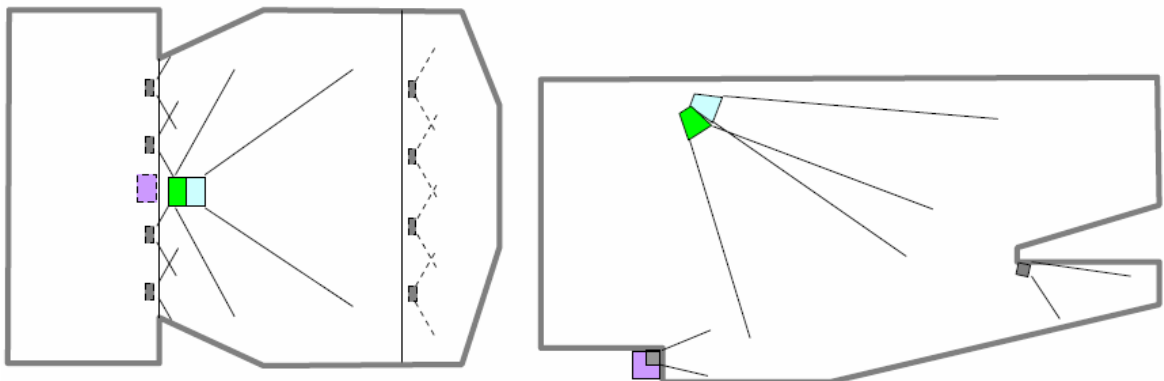
Speaker System Overview

- This simple center cluster is a very good choice for medium size room needed wide vertical coverage.
- Center Cluster is composed of IF2115/64 for long throw and IF2115/95 for short throw.
- Two speakers in center cluster are combined by Vertical array frame and easy to install.
- Small front fills, IF2205, cover the front of stage area. 6 inch height of IF2115 is designed to fit for stair step.
- Under balcony area is covered by IF2205 having 90x60 CD horn and 1" high power compression driver.
- IS1218 dual 18" subwoofer allows for extended low frequency bandwidth to meet music applications.

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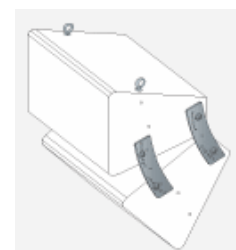
Vertical Array Frame

System Diagram

- Speaker Processing Component
    - 1 x DME64N
- Power Amplifier
    - 3 x PC9501N
    - 2 x XM4180
- Center Cluster
    - 1 x IF2115/64
    - 1 x IF2115/95
- Subwoofer

    1x IS1218
- Front Fill
    - 4 x IF2205
- Under Balcony
    - 4 x IF2205
- Mounting Hardware
    - 1 x VAF2-2115 for Center Cluster
    - 8 x UB2205 for Front Fill and Under Balcony
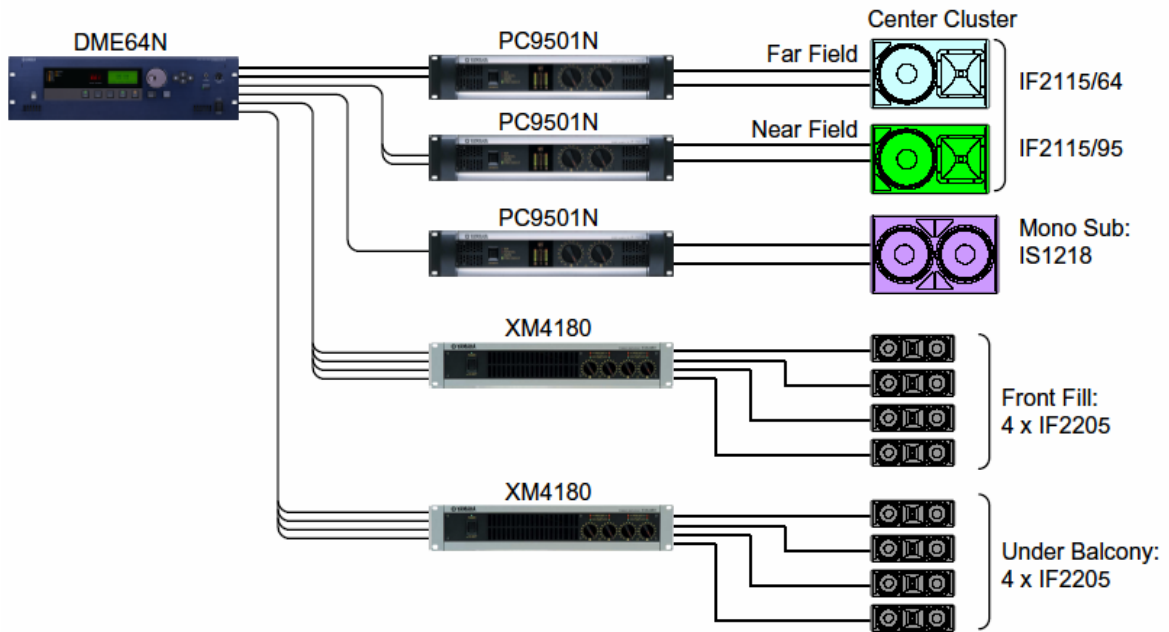
DME Configuration Example
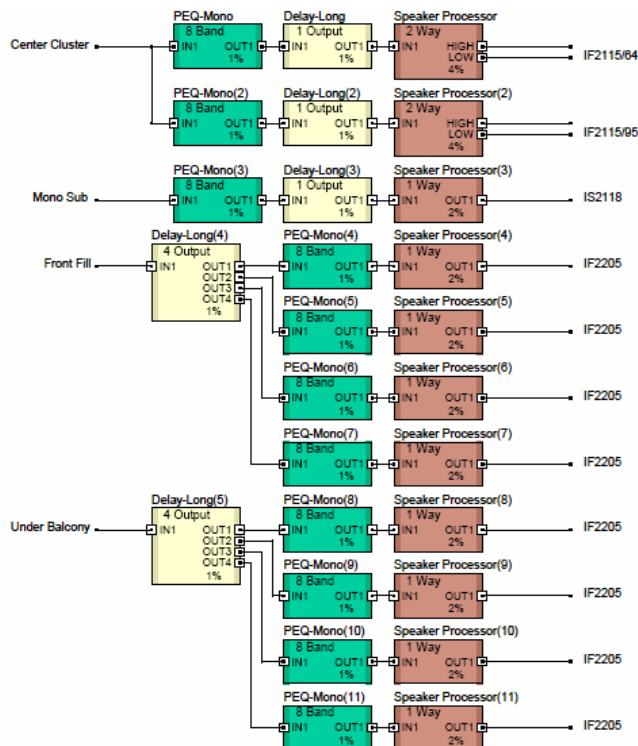
Medium Installation: Cruciform Shaped House of worship

This installation example represents a sound system for reverberant Cross Shaped Room.

Applications

- House of Worship

Speaker Layout
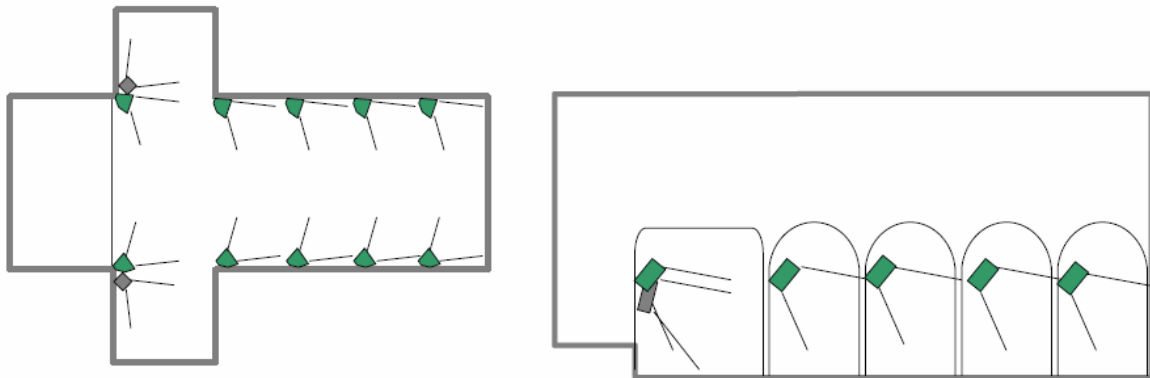
Speaker System Overview

- Distributed speakers located in close proximity to listeners maximize speech intelligibility.
- IF2205 and IF2208 having dual woofers are very good choice for reverberant rooms.
- Dual woofers models provide better low frequency pattern control.
- Narrow vertical dispersion is achieved when dual woofer models are installed in vertical configuration.
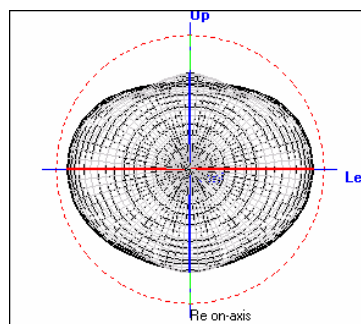
500Hz

System Diagram

- Speaker Processing Component
    1 x DME24N
- Power Amplifier
    3 x XM4180

- Distributed Speakers
    2x IF2205
    10xIF2208
- Mounting Hardware
    2 x OmniMount20.5 for IF2205
    10 x OmniMount60.0 for IF2208
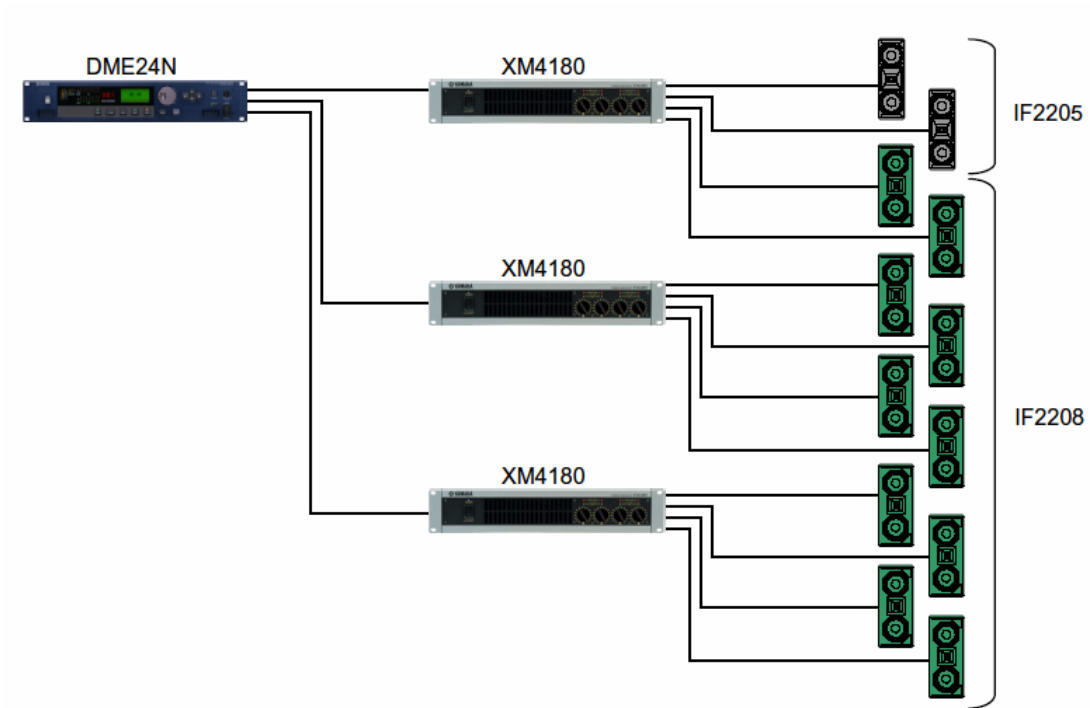
DME Configuration Example
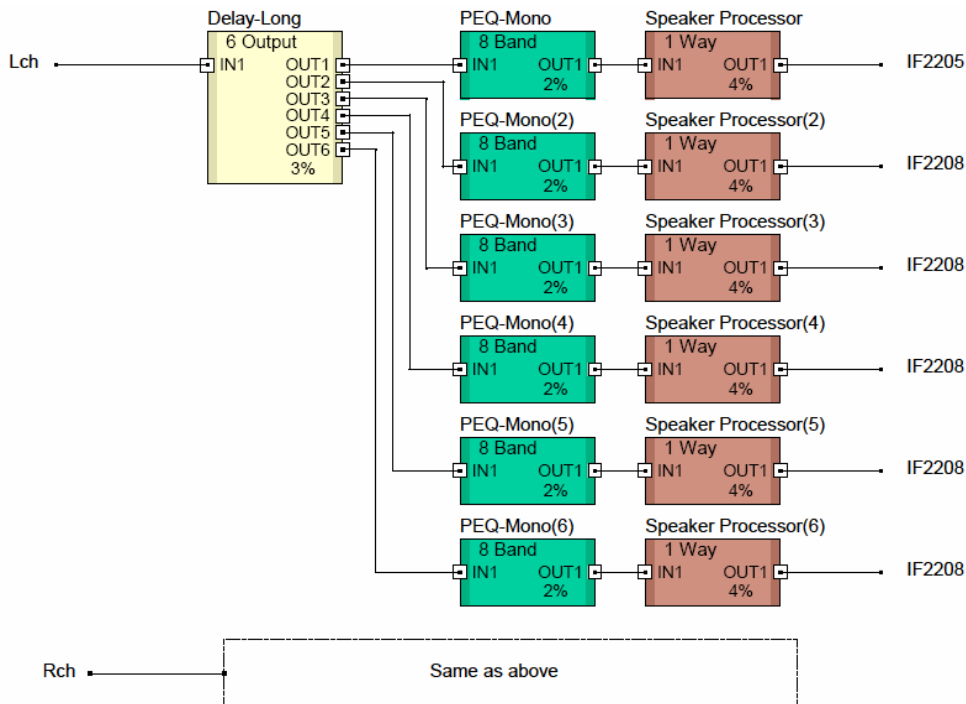
Medium Installation: Fan Shaped #1

This installation example represents a sound system for Fan Shaped Room covered by three clusters.

Applications

- House of Worship
- Hall
- Performing Arts Center
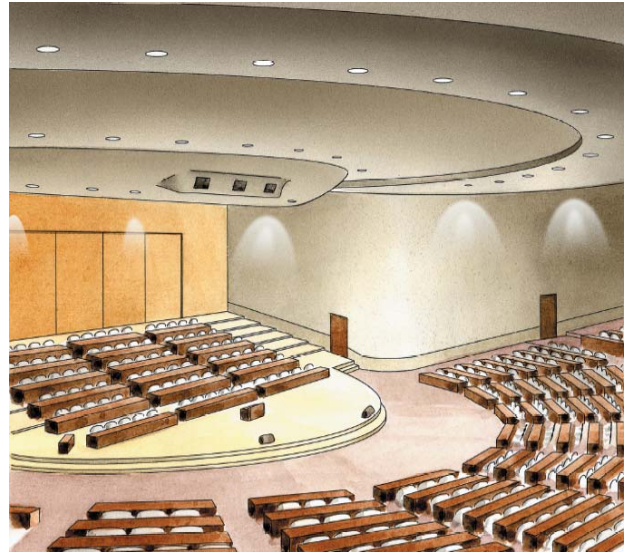
Speaker Layout
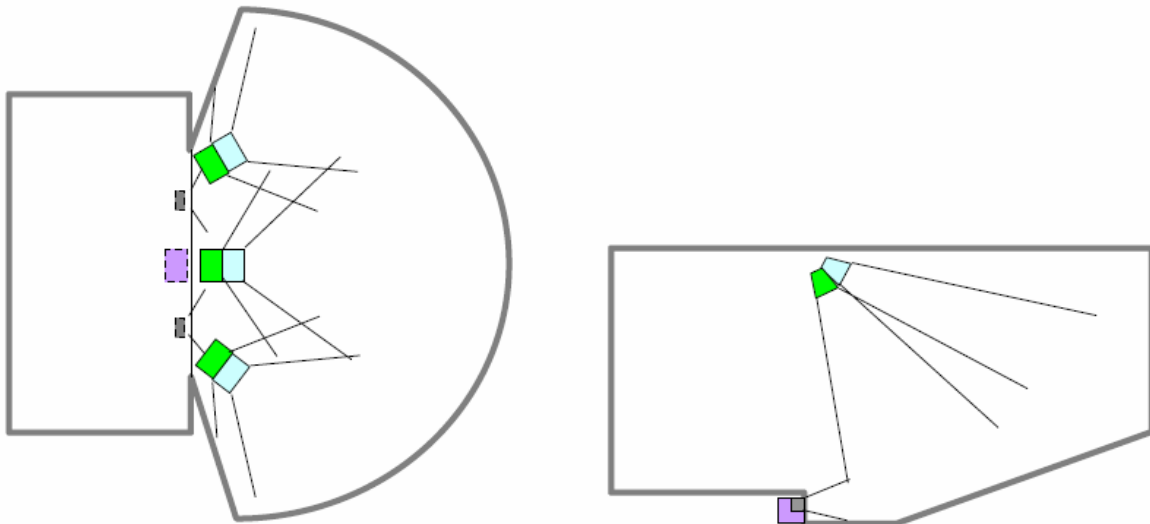
Speaker System Overview

- These main speaker clusters are useful for fan shaped room needed wide horizontal coverage.
- Each main cluster is composed of IF2115/64 for long throw and IF2115/95 for short throw.
- Speakers in each main cluster are combined by Vertical array frame. The splay angle is easy to adjust in 5 degree increments.
- Small front fills, IF2205, cover the front of stage area.
- IS1218 dual 18" subwoofer allows for extended low frequency bandwidth to meet music applications

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System Diagram

- Speaker Processing Component
    1 x DME64N
- Power Amplifier
    6 x PC6501N
    1 x PC9501N
    1 x PC2001N
- Left /Right /Center Cluster
    1 x IF2115/64 for each

    1 x IF2115/95 for each
- Subwoofer
    1x IS1218
- Front Fill
    2 x IF2205
- Mounting Hardware
    3 x VAF2-2115 for L/C/R Clusters
    2 x UB2205 for Front Fill
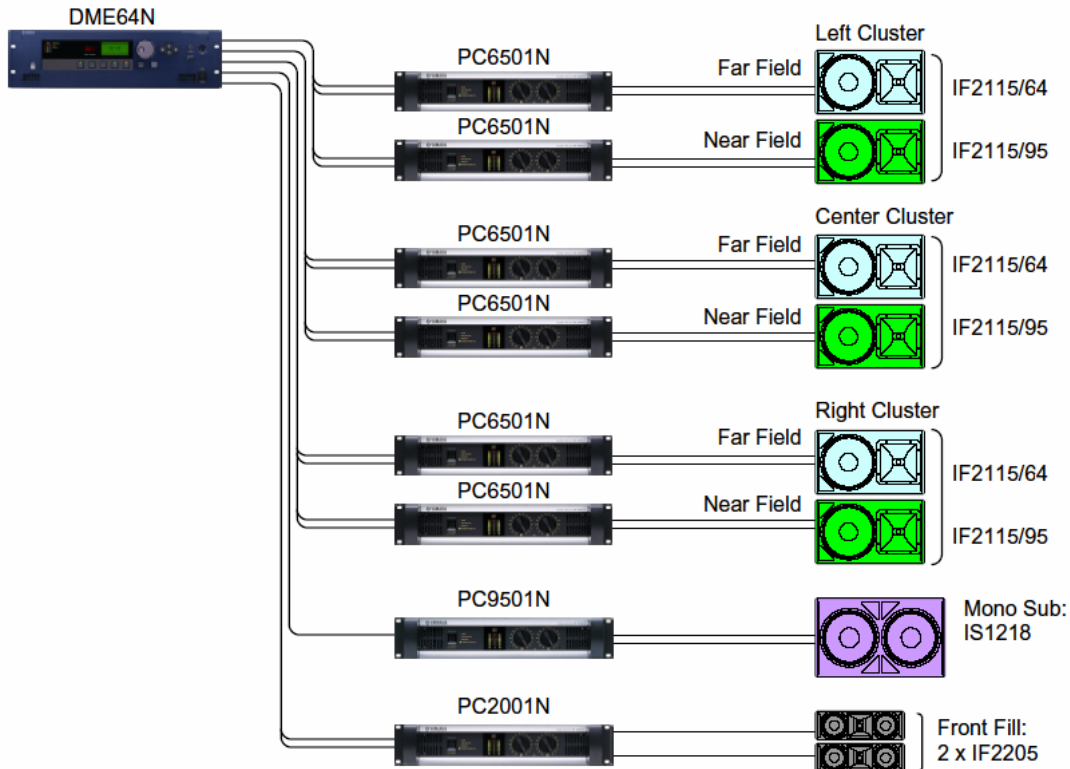
DME Configuration Example
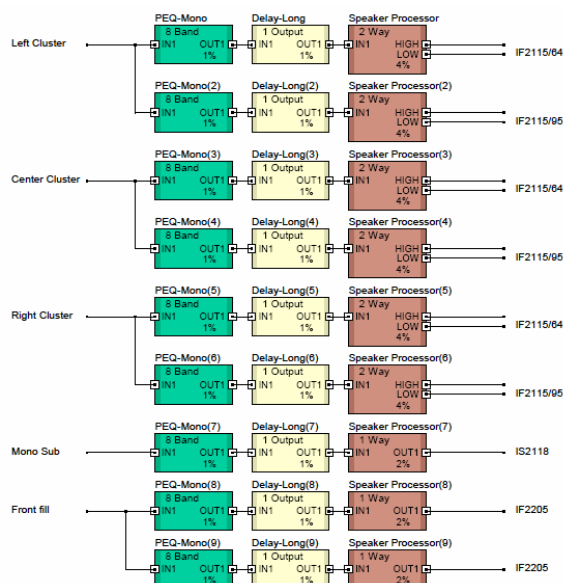
Medium Installation: Fan Shaped #2

This installation example represents a sound system for Fan Shaped Room covered by only center cluster.

Applications

- House of Worship
- Hall
- Performing Arts Center
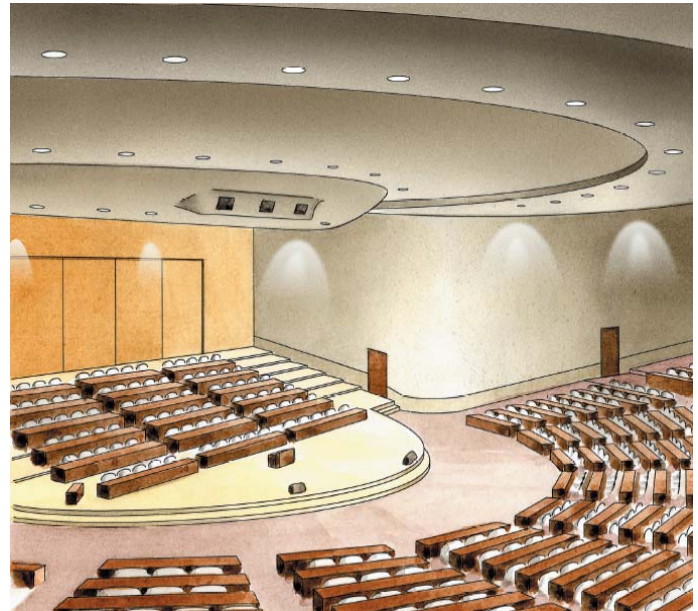
Speaker Layout
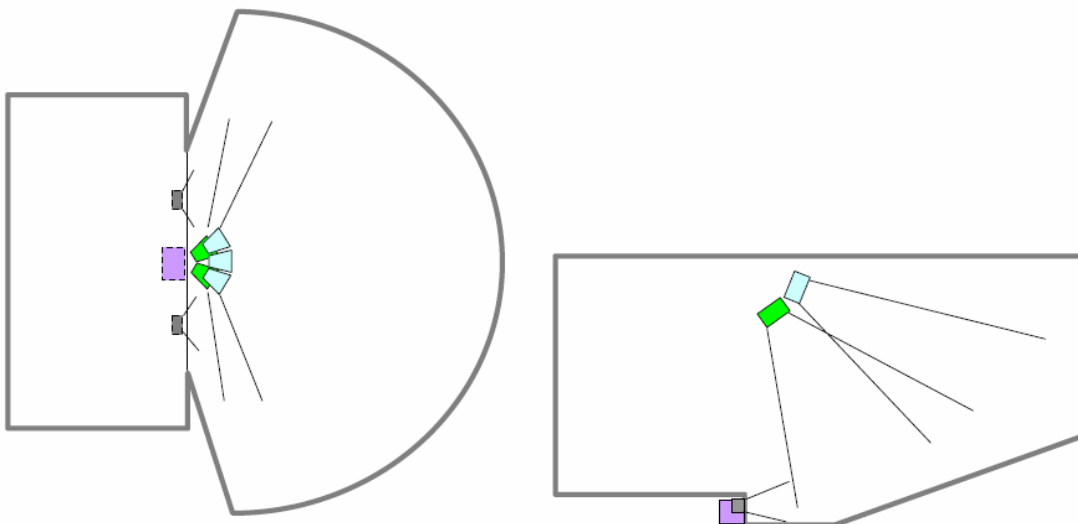
Speaker System Overview

- This center cluster is covering the wide horizontal listening area.
- Upper cluster of center cluster is composed of 3xIF2112/64 for long throw, lower cluster is composed of 2x2112/95 for short throw.
- Horizontal array frame is useful to combine 2 or 3 speakers horizontally and the splay angle is easy to adjust in 5 degree increments.
- Small front fills, IF2205, cover the front of stage area.
- IS1218 dual 18" subwoofer allows for extended low frequency bandwidth to meet music applications.

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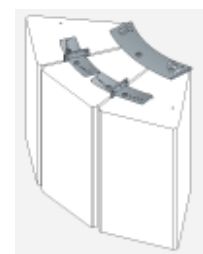
System Diagram

- Speaker Processing Component
    - 1 x DME64N
- Power Amplifier
    - 4 x PC9501N
    - 2 x PC6501N
    - 1 x PC2001N
- Center Cluster
    - 3 x IF2112/64

- 2 x IF2112/95
- Subwoofer
    - 1x IS1218
- Front Fill
    - 2 x IF2205
- Mounting Hardware
    - 2 x HAF3-2112 for Center Cluster
    - 2 x UB2205 for Front Fill
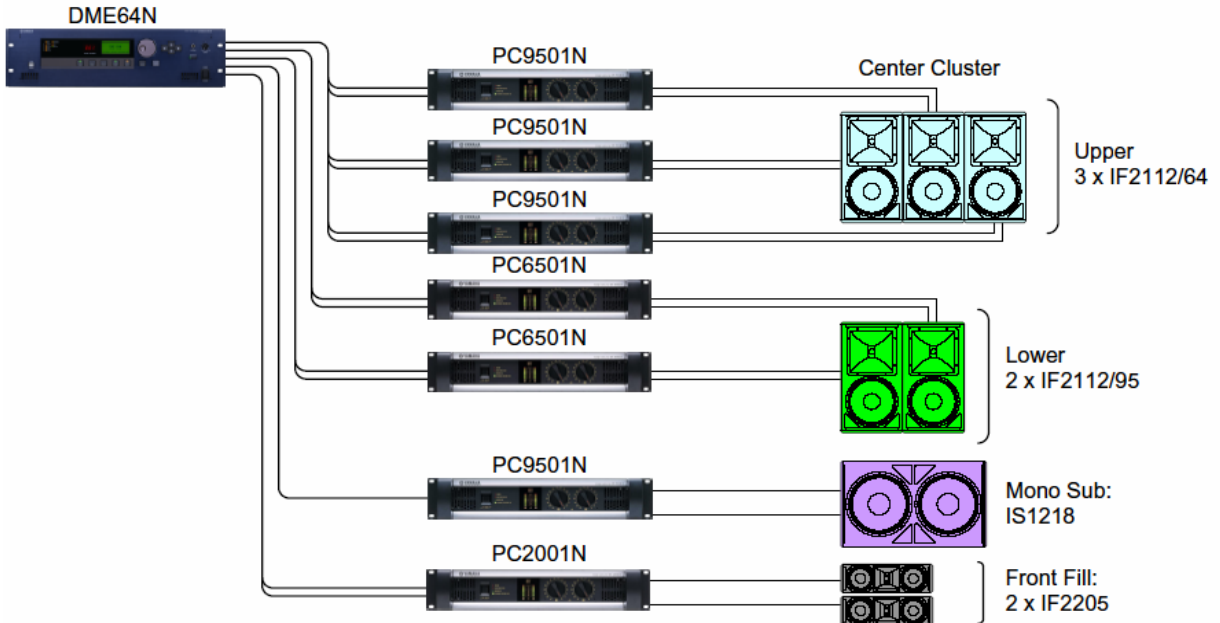
DME Configuration Example
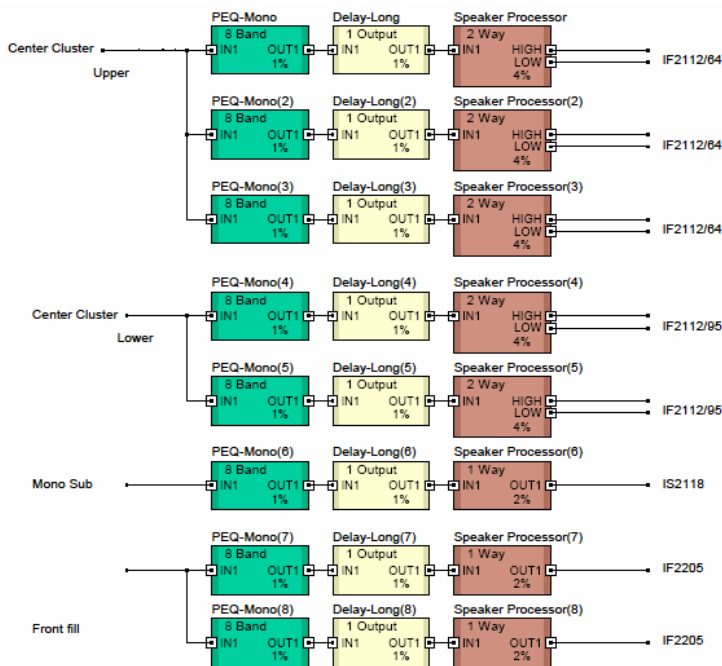
Medium Installation: Dance Club

This installation example represents a sound system for a dance club comprising of multiple zones.

Applications

- Restaurants
- Themed bars (e.g. sports bar)
- Dance clubs
- VIP lounges, Chill out areas
- Vertical drinking

Speaker Layout
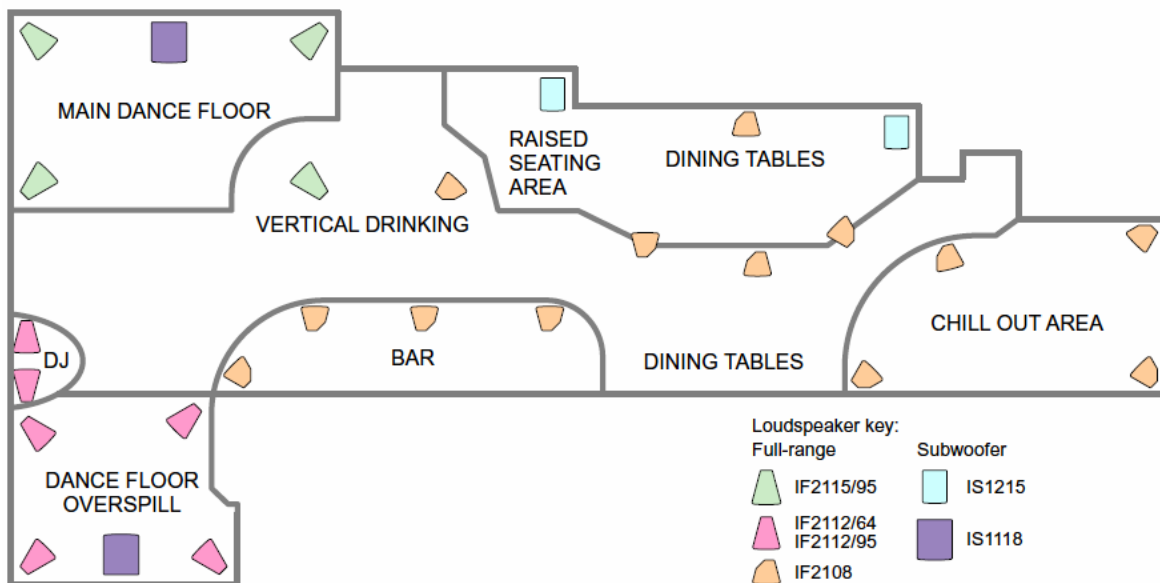
Speaker System Overview

- Necessities such as high SPL, yet carefully controlled across the different zones, and the often encountered low ceilings dictate the use of a distributed speaker design.
- IF2112/95 used for dance floor areas to provide high SPL with controlled coverage to minimize reflections from hard surfaces.
- For applications not requiring such high SPLs, the IF2112/95M medium power models can be substituted.
- IF1218 subwoofer(s) provide the sub. Driving the IF1218 in discrete mode (each 18" driver separately) from two amplifiers provides redundancy. Loosing bass in a dance bar is not an option!
- Compact 8" models such as the IF2108 and IF2208 lend themselves well for lower SPL areas such as dining, vertical drinking, chill out, VIP lounges etc.

- • IF2112/64 used for DJ booth monitor to provide high SPL low spill to adjacent dance floor
- • Family sound is essential in such an application using different loudspeaker models in close proximity.

System Diagram
- Speaker Processing Component
    1 x DME64N
    2 x MY8-ADDA96 8-channel Analog I/O cards
- Client's user control
    1 x ICP1 intelligent remote panels (Bar area)
    1 x CP1SF (DJ booth volume)

- Main Dance floor
    4 x IF2115/95
    1 x IS1218 subwoofer
    3 x PC9501N amplifiers
    4 x OmniMount 120.0 for IF2115/95
- Dance floor overspill
    4 x IF2112/95
    1 x IS1218 subwoofer
    3 x PC9501N amplifiers
    4 x OmniMount 120.0 for IF2112/95
- DJ Booth monitors
    2 x IF2112/64
    1 x PC9501N amplifier
    4 x OmniMount 120.0 for IF2115/64
- Raised seating area & Dining tables
    4 x IF2108
    2 x IS1215 subwoofer
    1 x PC3301N amplifier
    1 x PC9501N amplifier
    4 x U2108 U brackets for IF2108
- Bar
    4 x IF2108
    1 x PC4801N amplifier
    4 x IF2108
    1 x IS1215
    1 x PC3301N amplifier
    4 x U2108 U brackets for IF2108
- Chill out area
    4 x IF2108
    1 x PC3301N amplifier
    4 x U2108 U brackets for IF2108

DME64N

PC9501N

PC9501N

PC9501N

Main Dance Floor:
4 x IF2115/95
1 x IS1218

PC9501N

PC9501N

PC9501N

Dance Floor Overspill:
4 x IF2112/95
1 x IS1218

PC9501N

DJ Booth Monitors:
2 x IF2112/64

PC3301N

Raised Seating Area & Dining Tables:
4 x IF2108
2 x IS1215

PC9501N

PC3301N

Bar:
4 x IF2108

Same as above

Chill Out Area:
4 x IF2108

DME configuration example

Speaker Processor
1 Way
IN1 OUT1
2%
IF2115/95

L

Main dance floor R

Speaker Processor(2)
1 Way
IN1 OUT1
2%
IF2115/95

Sub

Speaker Processor(3)
1 Way
IN1 OUT1
2%
IF2115/95

Speaker Processor(4)
1 Way
IN1 OUT1
2%
IF2115/95

Speaker Processor(5)
1 Way
IN1 OUT1
2%
IS1218 discrete

Speaker Processor(6)
1 Way
IN1 OUT1
2%
IF2112/95

L

Dance floor overspill R

Speaker Processor(7)
1 Way
IN1 OUT1
2%
IF2112/95

Sub

Speaker Processor(8)
1 Way
IN1 OUT1
2%
IF2112/95

Speaker Processor(9)
1 Way
IN1 OUT1
2%
IF2112/95

Speaker Processor(10)
1 Way
IN1 OUT1
2%
IS1218 discrete

Speaker Processor(11)
1 Way
IN1 OUT1
2%
IF2112/64

L

DJ monitors

Speaker Processor(12)
1 Way
IN1 OUT1
2%
IF2112/64

R

Speaker Processor(13)
1 Way
IN1 OUT1
2%
2xIF2108

L

Raised seating area
& DIning tables

Speaker Processor(14)
1 Way
IN1 OUT1
2%
2xIF2108

R

Speaker Processor(15)
1 Way
IN1 OUT1
2%
IS1215 para

Sub

Speaker Processor(16)
1 Way
IN1 OUT1
2%
IS1215 para

Speaker Processor(17)
1 Way
IN1 OUT1
2%
2xIF2108

L

Bar

Speaker Processor(18)
1 Way
IN1 OUT1
2%
2xIF2108

R

Speaker Processor(19)
1 Way
IN1 OUT1
2%
2xIF2108

L

Chill out area

Speaker Processor(20)
1 Way
IN1 OUT1
2%
2xIF2108

R

Large Installation: House of Worship

This installation example represents a sound system for large sized room.

Applications

- House of Worship

- Hall

- Performing Arts Center
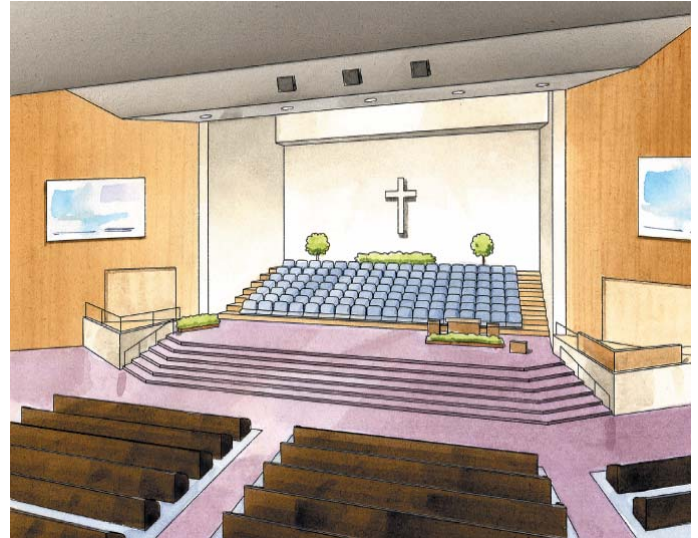
Speaker Layout
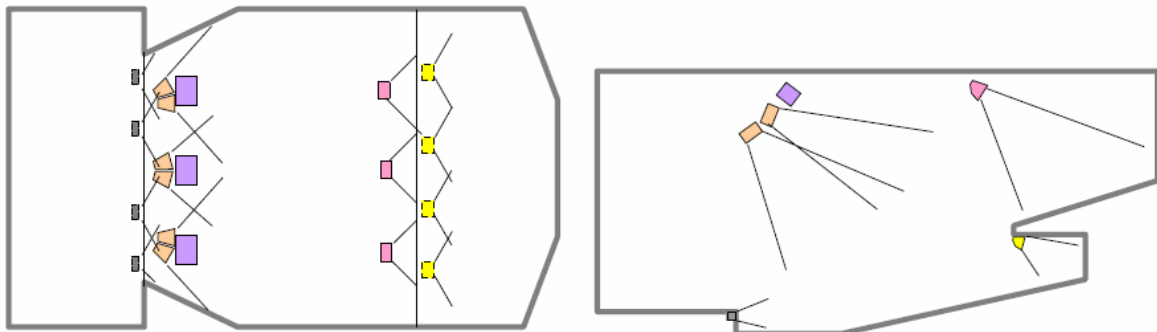
Speaker System Overview

- Left/Right/Center clusters are composed of not only full-range speaker, 4x IF2112/64, but also subwoofer IS1218 to extend low frequency.
- Balcony seats are covered by Balcony fill speakers, 3x IF2112/AS.
- Main speakers and Balcony speakers can be driven in passive mode.
- Under Balcony seats are covered by 4x IF2108.
- Small front fills, IF2205, cover the front of stage area.

System Diagram

- Speaker Processing Component
  - 2 x DME64N
- Power Amplifier
  - 15 x PC9501N
  - 3 x PC6501N
  - 2 x XM4180
- Left/Right/Center Cluster
  - 4 x IF2115/64 for each
  - 1 x IS1218 for each
- Balcony Fill

    3x IF2112/AS
- Front Fill
  - 4 x IF2205
- Under Balcony
  - 4 x IF2108
- Mounting Hardware
  - 6 x HAF2-2112 for L/C/R Clusters
  - 3 x UB2112 for Balcony Fill
  - 4 x UB2205 for Front Fill
  - 4 x UB2108 for Under Balcony
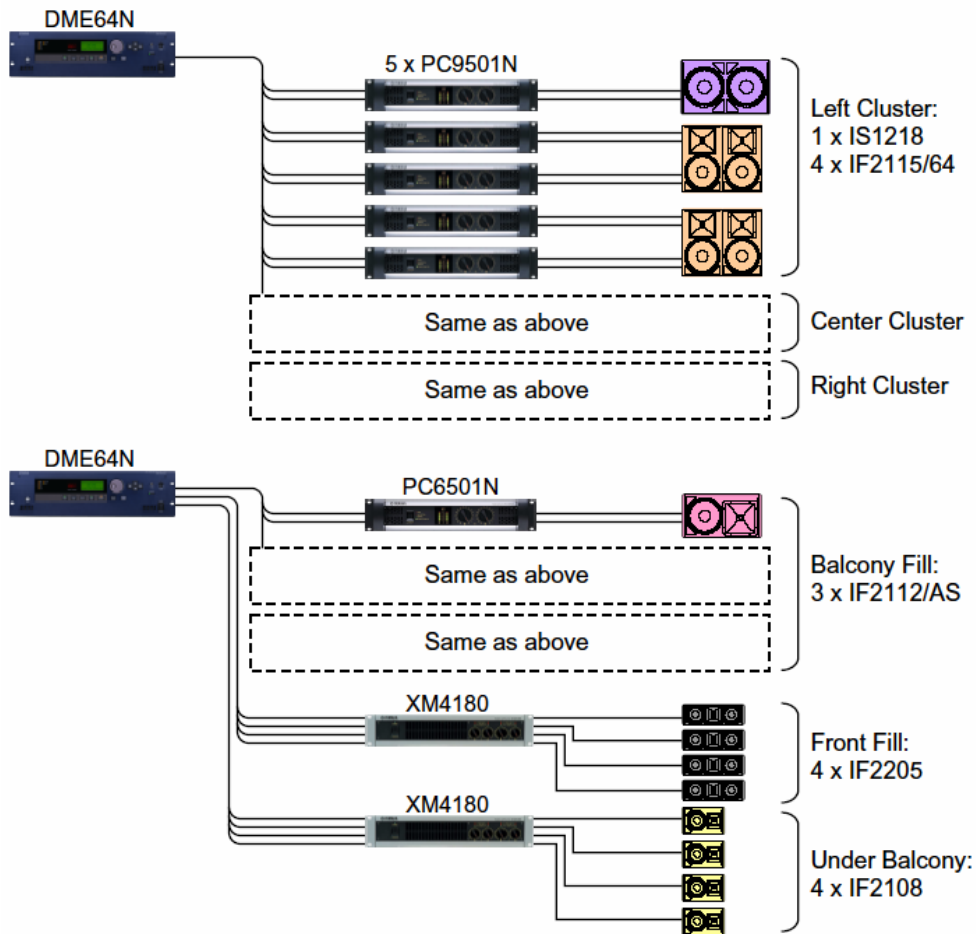
DME configuration example
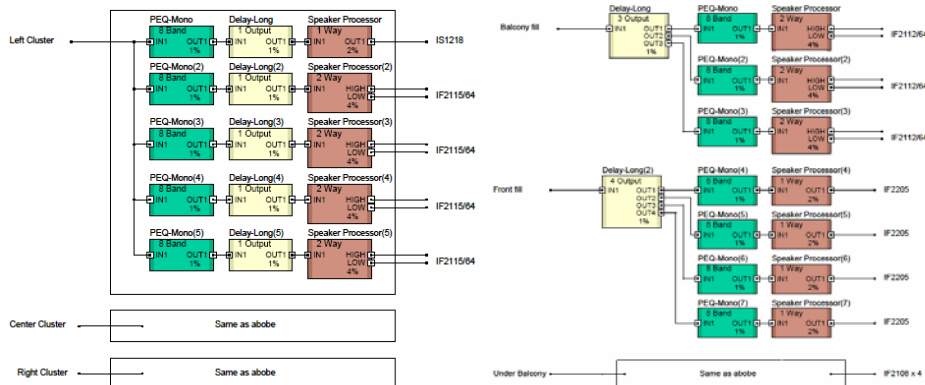
Large Installation: Theater

This installation example represents a sound system for large sized theater.

Applications

- Theater

- House of Worship

- Hall

- Performing Arts Center

Speaker Layout
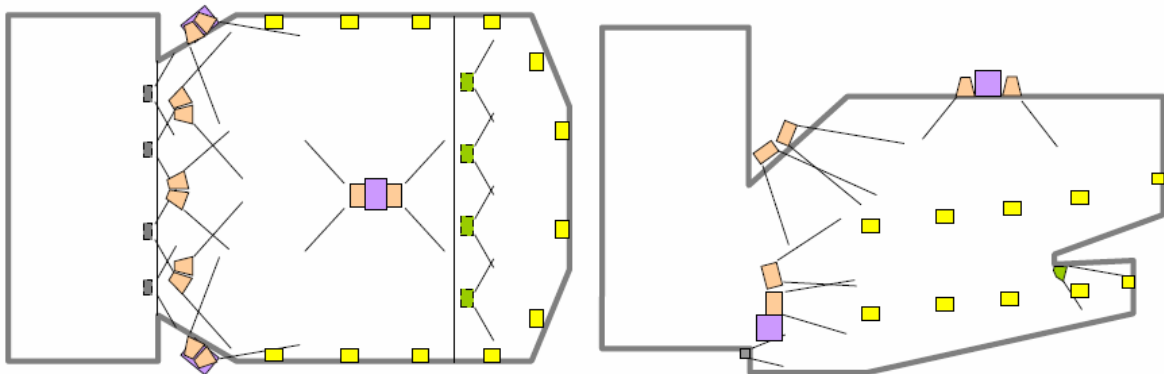
Speaker System Overview

- Left/Right/Center clusters are composed of 4x full-range speaker/IF2115/64.
- Side fills are composed of 4x IF2112 and 1x IS1215.
- Ceiling speaker and Wall speakers are installed for Sound Effect. Ceiling speaker has a subwoofer to realize like Thunder Sound.
- Under Balcony seats are covered by 4x dual 8" LF 2way/IF2208.
- The front of stage seats are covered by 4x IF2205.

System Diagram

- Speaker Processing Component
    - 3 x DME64N
- Power Amplifier
    - 25 x PC9501N
    - 8 x XM4180
- Left/Right/Center Cluster
    - 4 x IF2115/64 for each
    - 1 x IS1218 for each
- Left/Right Side fill Cluster
    - 4 x IF2112/64 for each
    - 1 x IS1215 for each
- Ceiling Cluster
    - 4 x UB2205 for Front Fill
    - 4 x UB2208 for Under Balcony

      2 x IF2112/64 for each
      1 x IS1218 for each
- Wall
      24 x IF2108
- Front Fill
      4 x IF2205
- Under Balcony
      4 x IF2208
- Mounting Hardware
      6 x HAF2-2115 for L/C/R Clusters
      2 x UB2112 for Ceiling
      24 x UB2108 for Wall
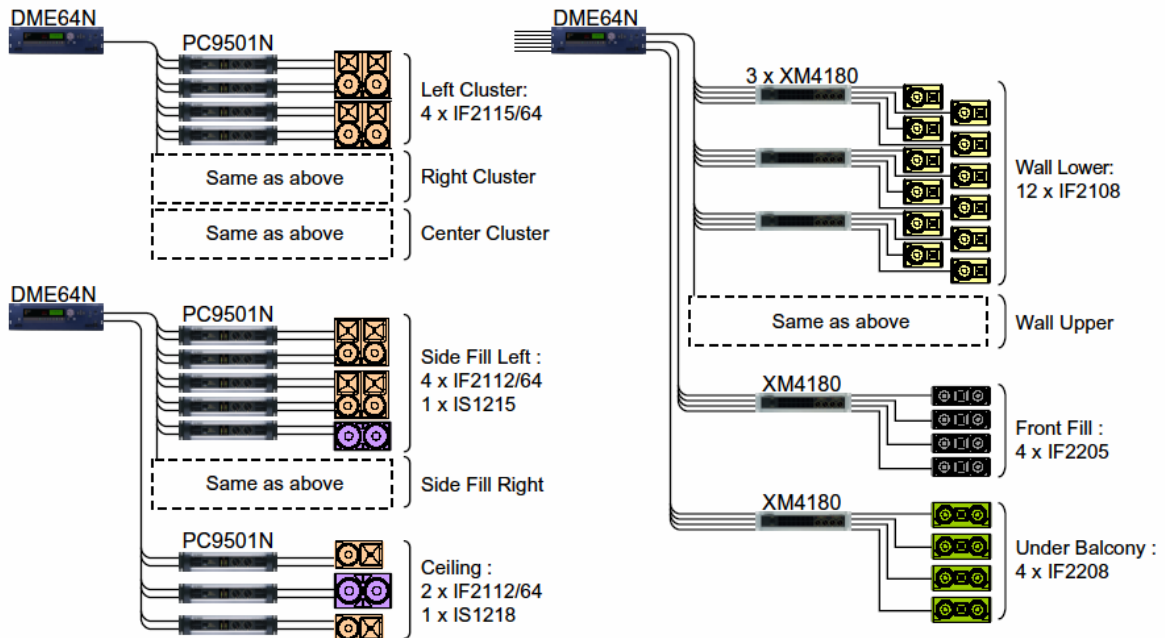
DME Configuration Example
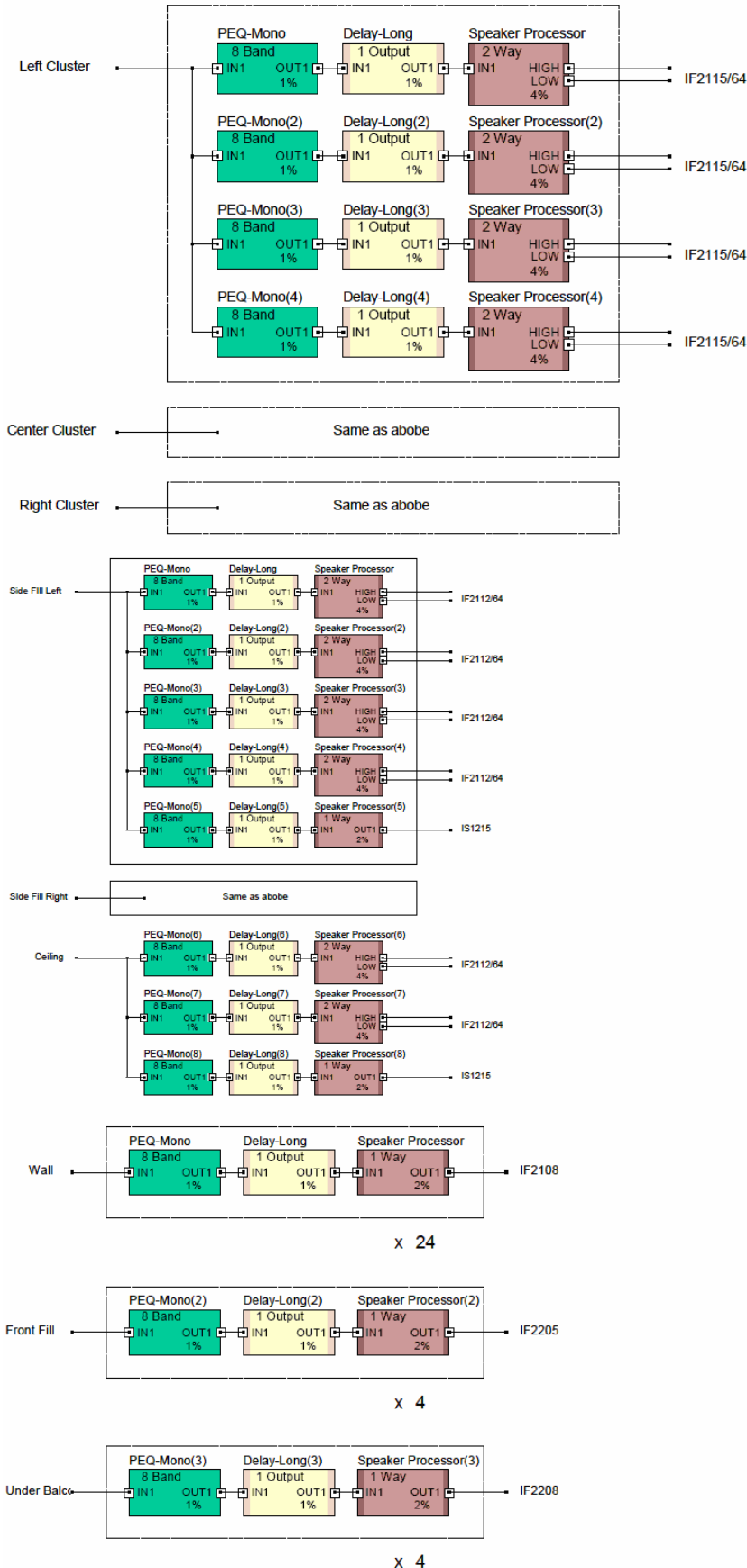
Mounting Brackets

M10 Shoulder Eye-bolts

4xM10 Shoulder Eye-bolts are attached for all models except IF2205

⚠ CAUTION

When using the eye bolts, make sure that the suspension angle is within the range of 0 to 45 degrees, as shown below.

0° (740kg)
45° (185kg)
90° (148kg)
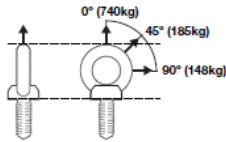
⚠ CAUTION

Do not suspend the eye bolts as shown in the diagram below.

U-bracket

Speaker	IF2115/64/95/99/AS	IF2112/64/95/99/AS	IF2108	IF2208	IF2205
U-Bracket	UB2115	UB2112	UB2108	UB2208	UB2205
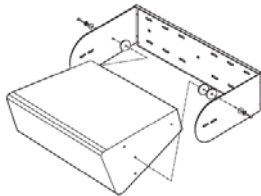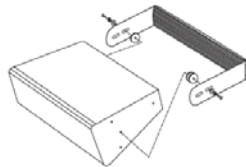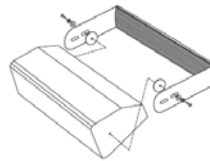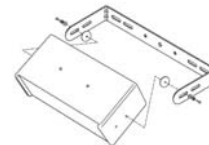
UB2115   UB2112   UB2108, UB2208   UB2205

Horizontal Array Frame

Splay angle is easy to adjust in 5 degree increments.

Speaker	2xIF2115/64/95/99	2xIF2112/64/95/99	3xIF2115/64/95/99	3xIF2112/64/95/99
U-Bracket	HAF2-2115	HAF2-2112	HAF3-2115	HAF3-2112
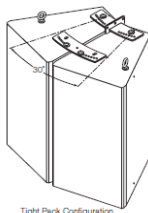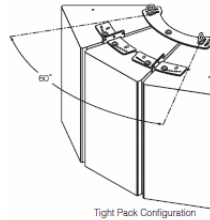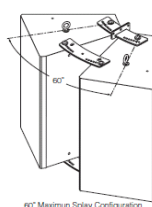
HAF2-2115, HAF2-2112   HAF3-2115, HAF3-2112
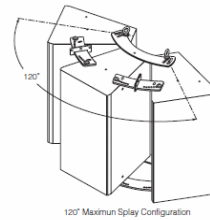
Vertical Array Frame

Splay angle is easy to adjust in 5 degree increments.

Speaker	2xIF2115/64/95/99	2xIF2112/64/95/99
U-Bracket	HAF2-2115	HAF2-2112
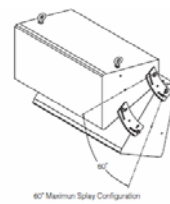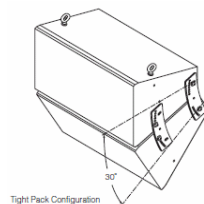
VAF2-2115, VAF2-2112

Connector Pinout Guide

3-way Full-Range (bi-amp/tri-amp selectable)

IF3115/64/95

Connectors: 1x Neutrik NL8 Speakon,
1x Neutrik NL4 Speakon and 1x Terminal
strips, wired in parallel

NL8	NL4	Bi-Amp	Bi-Amp
1+/1-	1+/1-	Low	Low
2+/2-	2+/2-	Mid-High	Mid
3+/3-	-	(Through)	High
4+/4-	-	n/c	n/c

2 -Way Mid-Highs (passive/bi-amp selectable)

IH2000

Connectors: 1x Neutrik Speakon
and 1x Terminal strips, wired in parallel

NL4	Passive	Bi-Amp
1+/1-	Full-Range	Mid
2+/2-	n/c	High

12"/15" LF 2-Way Full-Range (passive/bi-amp selectable)

IF2115(M)/64/95/99,
IF2112(M)/64/95/99

Connectors: 1x Neutrik Speakon
and 1x Terminal strips, wired in parallel

NL4	Passive	Bi-Amp
1+/1-	Full-Range	LF
2+/2-	n/c	HF

12"/15" LF 2-Way Full-Range with AS Horn (passive/bi-amp selectable)

IF2115/AS, IF2112/AS

Connectors: 2x Neutrik Speakon
and 1x Terminal strips, wired in parallel

NL4	Passive	Bi-Amp
1+/1-	Full-Range	LF
2+/2-	(Through)	HF

1x8" / 2x8" LF 2-Way Full-Range

IF2108, IF2208

Connectors: 2x Neutrik Speakon
and 1x Terminal strips, wired in parallel

NL4	Passive
1+/1-	Full-Range
2+/2-	n/c

2x5" LF 2-Way Full-Range

IF2205

Connectors: 1x Terminal strips

IS and IL Single-Driver Models

IS1118, IL1115

Connectors: 1x Neutrik Speakon
and 1x Terminal strips, wired in parallel

NL4	Passive
1+/1-	LF
2+/2-	n/c

IS 2x15"/2x18" Dual-Driver Subwoofers (parallel/discrete selectable)

IS1215, IS1218

Connectors: 1x Neutrik Speakon
and 1x Terminal strips, wired in parallel

NL4	Parallel	Discrete
1+/1-	LF1 and LF2	LF1
2+/2-	n/c	LF2

Yamaha Sound System Simulator   Y-S^3

Trial and error is one approach to setting up a sound system, but proper analysis and planning can make the job go a lot faster, and you're much more likely to achieve professional results requiring a minimum of post-setup tweaking. Yamaha's innovative Y-S^3 (Yamaha Sound System Simulator) software application employs advanced acoustic modeling technology to precisely simulate the sound pressure level distribution, frequency, and other characteristics of a specified acoustic space.

It can also automatically generate optimum system configurations and processing profiles for the specified space, eliminating guesswork and providing accurate guidelines that can help you to set up the perfect system with minimum effort and expense.

The Y-S^3 application features an advanced graphical interface that makes it easy to specify the shape and other pertinent characteristics of the target space – right down to average ambient air temperature and humidity – with equally comprehensive output that provides a graphic representation of the actual sonic distribution within the specified area. There's even an "auralization" function that lets you hear the simulated direct sound response of the coverage with your own ears.

Simulation output can be saved in DME format files that can be directly imported into the DME Designer application, minimizing the time and effort required to set up a Yamaha DME-N Digital Mixing Engine. Y-S^3 automatically suggests   optimum speaker choice and system arrangements (Auto tuning Function), including the array pan, tilt, splay angle, EQ and gain required to deliver uniform SPL throughout the listening area. A preset "Installation Series" library ensures faultless system planning when using Yamaha Installation Series Speakers with PC-1N or XP series power amplifiers and DME24N/DME64N Digital Mixing Engines.

Y-S^3 can be freely downloaded from the Yamaha website:
http://www.yamahaproaudio.com/
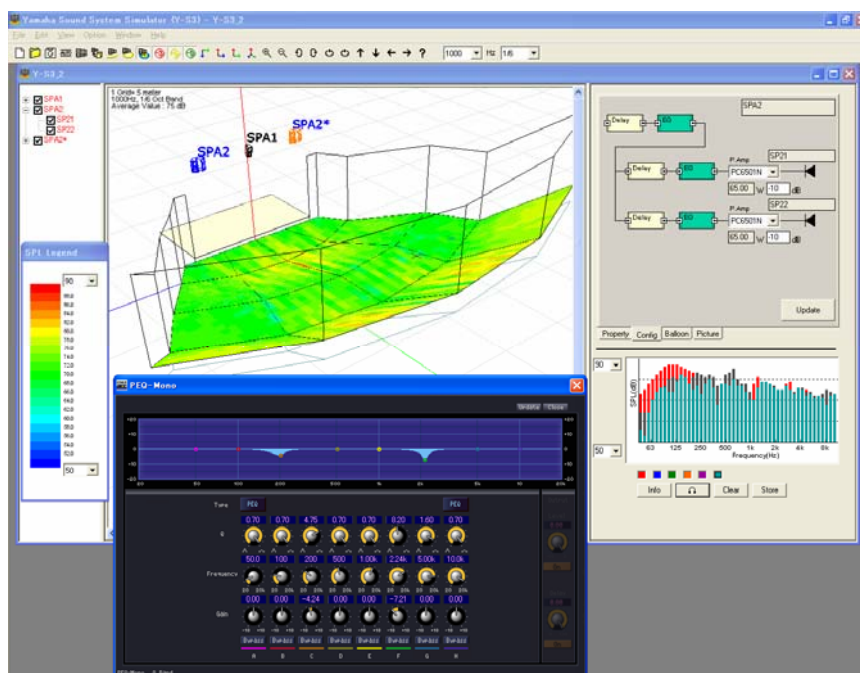
CLF Viewer

CLF Viewer provides Frequency response, Balloon data, Polar patterns, Directivity, and impedance response of each Installation Series Speaker model.

CLF Viewer can be freely downloaded from the CLF Group.
http://www.clfgroup.org/
CLF data can be freely downloaded from the Yamaha website.
http://www.yamahaproaudio.com/

CLF viewer
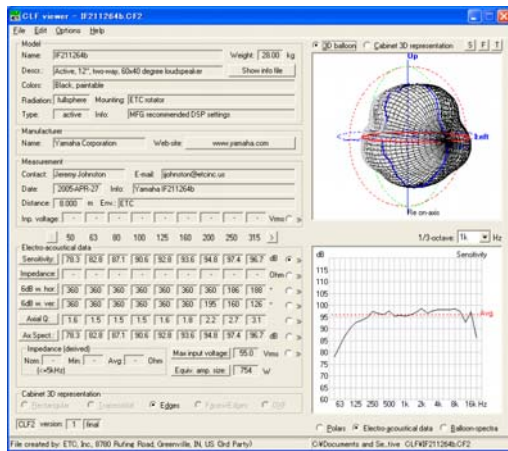
Cabinet 3D representation	Axial spectrum	Balloon spectrum	Impedance
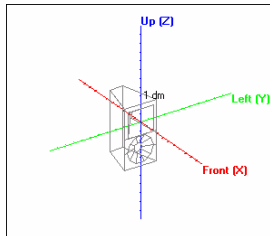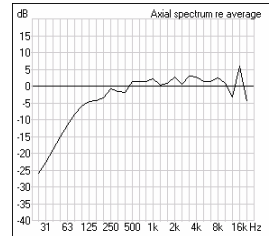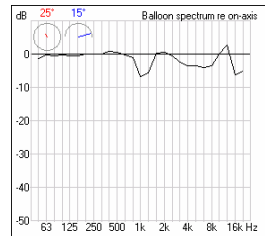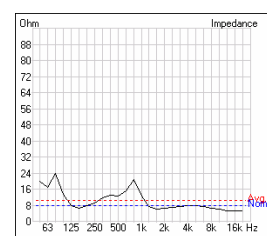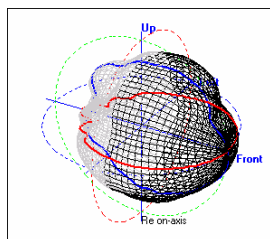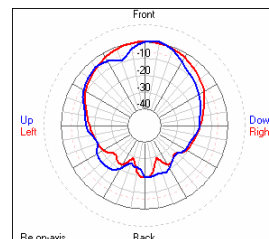
3D balloon	Polars	6dB-width horizontal	6dB-width vertical
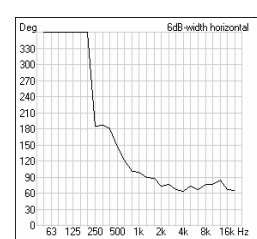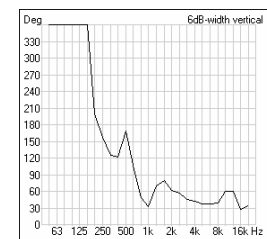
Axial Q
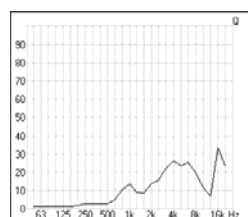
Recommended Amplifier

Although there is no single correct answer to the question of which amplifier to select, we can offer some simple suggestions. The table in the following pages shows two different options and gives recommended power ratings along with examples of possible choices of models. One option is to maximize speaker performance, giving priority to sound quality, while the other gives priority to using your speakers in a safe manner. The former will give better sound, but increases the risk of speaker damage from signals received in an uncontrolled environment. The latter may increase the probability of signals from the amplifier being clipped. But if you can ensure the signals from the amplifier will not be clipped, it reduces the chance of damage to your speakers.

Although the table in the following pages shows only recommended values for matching speakers and amplifiers, you should also consider the sound pressure level needed when selecting an amplifier. Lower sound pressure level requirements allow you to use amplifiers with lower power ratings. Using identical amplifiers can be beneficial as it allows for greater sonic consistency, and can simplify maintenance and inventory. When using multiple loudspeaker types simultaneously, or driving speakers in bi-amp or tri-amp mode, you may be using power amplifier channels with higher power ratings than required (i.e. unsued headroom). However, when the HF is driven by the same amplifier as the LF, you must take precautions to prevent excessive power reaching the driver(s). Therefore, in order to avoid damage , you should set an appropriate attenuation level and limiter level.

Regardless of which of the above options you select, it is impossible to eliminate the possibility of speaker damage caused by factors such as microphone feedback, aggressive EQ, continuously clipped signals from amplifiers, processors, and mixers, and sine waves played back for extensive lengths of time. As such the recommendations listed here are not a guarantee of trouble-free operation.

<Terminology used in the table>
Rcmd Pwr: The recommended power ratings of the amplifier.
(A) Amp: An amplifier recommendation for maximizing speaker performance when in a well-controlled environment.
(B) Amp: An amplifier recommendation for using speakers safely when in an environment where there is a high probability of excessive signal input.

2 -Way Full-Range Speaker

		Passive	Bi-Amp	
			LF	HF
IF2115	Rcmd Pwr	600W - 1200W	700W – 1400W	110W – 220W
	(A) Amp	T5n 1ch PC9501N 1ch XP7000 1ch	T5n 1ch PC9501N 1ch	XP1000 1ch PC2001N 1ch for 2(Parallel)
	(B) Amp	T3n 1ch PC4801N 1ch XP5000 1ch	T3n 1ch for 2(Parallel) XP7000 1ch PC9501N 1ch for 2(Parallel)	XM4080 1ch XP1000 1ch for 2(Parallel)
IF2112	Rcmd Pwr	600W - 1200W	700W – 1400W	110W – 220W
	(A) Amp	T5n 1ch PC9501N 1ch XP7000 1ch	T5n 1ch PC9501N 1ch	XP1000 1ch PC2001N 1ch for 2(Parallel)
	(B) Amp	T3n 1ch PC4801N 1ch XP5000 1ch	T3n 1ch for 2(Parallel) XP7000 1ch PC9501N 1ch for 2(Parallel)	XM4080 1ch XP1000 1ch for 2(Parallel)
IF2112M	Rcmd Pwr	350W - 700W	350W – 700W	60W – 120W
	(A) Amp	T3n 1ch PC6501N 1ch XP7000 1ch	T3n 1ch PC6501N 1ch XP7000 1ch	XP1000 1ch XP2500 1ch for 2(Parallel)
	(B) Amp	PC3301N 1ch XP3500 1ch	PC3301N 1ch XP3500 1ch	XM4080 1ch XP1000 1ch for 2(Parallel)
IF2115M	Rcmd Pwr	350W - 700W	400W – 800W	60W – 120W
	(A) Amp	T3n 1ch PC6501N 1ch XP7000 1ch	T3n 1ch PC6501N 1ch XP7000 1ch	XP1000 1ch XP2500 1ch for 2(Parallel)
	(B) Amp	PC3301N 1ch XP3500 1ch	PC3301N 1ch XP3500 1ch	XM4080 1ch XP1000 1ch for 2(Parallel)
IF2208	Rcmd Pwr	200W – 400W	n/a	n/a
	(A) Amp	PC3301N 1ch XP3500 1ch	n/a	n/a
	(B) Amp	XM4180 1ch	n/a	n/a
IF2108	Rcmd Pwr	100W – 200W	n/a	n/a
	(A) Amp	PC2001N 1ch XP2500 1ch XM4180 1ch	n/a	n/a
	(B) Amp	XP1000 1ch XM4080 1ch	n/a	n/a
IF2205	Rcmd Pwr	100W – 200W	n/a	n/a
	(A) Amp	PC2001N 1ch XP2500 1ch XM4180 1ch	n/a	n/a

	(B) Amp	XP1000 1ch	n/a	n/a
		XM4080 1ch		

3 -Way Full-Range Speaker

		LF	MF(Tri-Amp) / MF+HF(Bi-AMP)	HF (Tri-Amp)
IF3115	Rcmd Pwr	700W – 1400W	125W -250W	110W – 220W
	(A) Amp	T5n 1ch PC9501N 1ch XP7000 1ch	PC2001N 1ch XP2500 1ch	XP1000 1ch PC2001N 1ch for 2(Parallel)
	(B) Amp	T3n 1ch PC6501N 1ch XP7000 1ch	XP7000 1ch PC9501N 1ch for 2(Parallel)	XM4080 1ch XP1000 1ch for 2(Parallel)
IH2000	Rcmd Pwr	n/a	125W -250W	110W – 220W
	(A) Amp	n/a	PC2001N 1ch XP2500 1ch	XP1000 1ch PC2001N 1ch for 2(Parallel)
	(B) Amp	n/a	XP7000 1ch PC9501N 1ch for 2(Parallel)	XM4080 1ch XP1000 1ch for 2(Parallel)
IL1115	Rcmd Pwr	700W – 1400W	n/a	n/a
	(A) Amp	T5n 1ch PC9501N 1ch XP7000 1ch	n/a	n/a
	(B) Amp	T3n 1ch PC6501N 1ch XP7000 1ch	n/a	n/a

Subwoofer

		Discrete (Single for IS1118)	Parallel
IS1215	Rcmd Pwr	700W x 2 – 1400W x 2	1400W – 2800W
	(A) Amp	T5n 2ch PC9501N 2ch	T5n 1ch PC9501N 1ch
	(B) Amp	T3n 2ch PC6501N 2ch XP7000 2ch	T3n 1ch PC6501N 1ch XP7000 1ch
IS1118	Rcmd Pwr	700W – 1400W	n/a
	(A) Amp	T5n 1ch PC9501N 1ch	n/a
	(B) Amp	T3n 1ch PC6501N 1ch XP7000 1ch	n/a
IS1218	Rcmd Pwr	700W x 2 – 1400W x 2	1400W – 2800W
	(A) Amp	T5n 2ch PC9501N 2ch	T5n 1ch PC9501N 1ch
	(B) Amp	T3n 2ch PC6501N 2ch XP7000 2ch	T3n 1ch PC6501N 1ch XP7000 1ch

Recommended Limiter Setting

Note that the figures are not a guarantee of protection for your speakers. Please refer to them on the understanding that they are provided as a guideline only.

Limiters allow you to provide speakers with maximum protection from unpredictable signal overload. We have provided the following table as a list of threshold figures, which should give you a starting point to work from. When configuring threshold settings, you will need to know the power ratings of the speakers and the gain of the amplifier to which they are connected.

The table in the following pages provides figures for amplifier gain levels of either 26 dB or 32 dB. For amplifiers with gain levels other than those listed here, deduct the positive difference of the gain from the figures listed for the 26 dB settings to calculate the correct setting. For example, for a gain level of 30 dB, subtract 4 dB from the figures provided for a 26 dB gain level to calculate each threshold.

For amplifiers with specifications displayed in terms of input sensitivity, calculate the gain from the power and input sensitivity figures, then use the calculation method above to obtain the correct threshold.

"DME library data for Installation Series Speakers" provides processor settings for Yamaha's "Installation Series Speakers" in the form of library data for DME24N/64N "Speaker Processor Components." Limiter settings (enabled by default) have been added to each library file.

The settings assume maximum output gain of DME (excluding DME24N's analog output) is +24dBu and 26dB voltage gain of Amplifier (based on Yamaha PC series amplifier used at -6dB attenuation) for start point.

If the set up differs from this, please check the level diagram and change the threshold parameters before using limiter.

E.g. If +18dBu output cards such as MY4-DA or MY8-DA96 are used, raise the threshold by 6dB.

E.g. If amplifiers with 30dB voltage gain are used, turn the threshold 4dB down.

"DME library data for Installation Series Speakers" can be freely downloaded from the Yamaha website. http://www.yamahaproaudio.com/

Speaker Processor "SP2060" also contains these library files for Installation Series speakers as default presets.

2 -Way Full-Range Speaker

	Amp Gain	Passive	Bi-Amp	
			LF	HF
IF2115	26dB	16dBu	17dBu	8dBu
		-8dBFs for +24dB output level	-7dBFs for +24dB output level	-16dBFs for +24dB output level
		-2dBFs for +18dB output level	-1dBFs for +18dB output level	-10dBFs for +18dB output level
		0dBFs for +15dB output level	0dBFs for +15dB output level	-7dBFs for +15dB output level
	32dB	10dBu	11dBu	2dBu
		-14dBFs for +24dB output level	-13dBFs for +24dB output level	-22dBFs for +24dB output level
		-8dBFs for +18dB output level	-7dBFs for +18dB output level	-16dBFs for +18dB output level
		-5dBFs for +15dB output level	-4dBFs for +15dB output level	-13dBFs for +15dB output level
IF2112	26dB	16dBu	17dBu	8dBu
		-8dBFs for +24dB output level	-7dBFs for +24dB output level	-16dBFs for +24dB output level
		-2dBFs for +18dB output level	-1dBFs for +18dB output level	-10dBFs for +18dB output level
		0dBFs for +15dB output level	0dBFs for +15dB output level	-7dBFs for +15dB output level
	32dB	10dBu	11dBu	2dBu
		-14dBFs for +24dB output level	-13dBFs for +24dB output level	-22dBFs for +24dB output level
		-8dBFs for +18dB output level	-7dBFs for +18dB output level	-16dBFs for +18dB output level
		-5dBFs for +15dB output level	-4dBFs for +15dB output level	-13dBFs for +15dB output level
IF2112M	26dB	13dBu	13dBu	6dBu
		-11dBFs for +24dB output level	-11dBFs for +24dB output level	-18dBFs for +24dB output level
		-5dBFs for +18dB output level	-5dBFs for +18dB output level	-12dBFs for +18dB output level
		-2dBFs for +15dB output level	-2dBFs for +15dB output level	-9dBFs for +15dB output level
IF2115M	26dB	13dBu	14dBu	6dBu
		-11dBFs for +24dB output level	-10dBFs for +24dB output level	-18dBFs for +24dB output level
		-5dBFs for +18dB output level	-4dBFs for +18dB output level	-12dBFs for +18dB output level
		-2dBFs for +15dB output level	-1dBFs for +15dB output level	-9dBFs for +15dB output level
IF2208	26dB	11dBu	n/a	n/a
		-13dBFs for +24dB output level		
		-7dBFs for +18dB output level		
		-4dBFs for +15dB output level		
	32dB	5dBu	n/a	n/a
		-19dBFs for +24dB output level		
		-13dBFs for +18dB output level		
		-10dBFs for +15dB output level		
IF2108	26dB	8dBu	n/a	n/a
		-16dBFs for +24dB output level		
		-10dBFs for +18dB output level		
		-7dBFs for +15dB output level		
	32dB	2dBu	n/a	n/a
		-22dBFs for +24dB output level		
		-16dBFs for +18dB output level		
		-13dBFs for +15dB output level		

IF2205	26dB	8dBu	n/a	n/a
		-16dBFs for +24dB output level		
		-10dBFs for +18dB output level		
		-7dBFs for +15dB output level		
	32dB	2dBu	n/a	n/a
		-22dBFs for +24dB output level		
		-16dBFs for +18dB output level		
		-13dBFs for +15dB output level		

3 -Way Full-Range Speaker

		LF	MF(Tri-Amp) / MF+HF(Bi-AMP)	HF (Tri-Amp)
IF3115	26dB	16dBu	9dBu	8dBu
		-8dBFs for +24dB output level	-15dBFs for +24dB output level	-16dBFs for +24dB output level
		-2dBFs for +18dB output level	-9dBFs for +18dB output level	-10dBFs for +18dB output level
		0dBFs for +15dB output level	-6dBFs for +15dB output level	-7dBFs for +15dB output level
	32dB	10dBu	3dBu	2dBu
		-14dBFs for +24dB output level	-21dBFs for +24dB output level	-22dBFs for +24dB output level
		-8dBFs for +18dB output level	-15dBFs for +18dB output level	-16dBFs for +18dB output level
		-5dBFs for +15dB output level	-12dBFs for +15dB output level	-13dBFs for +15dB output level
IH2000	26dB	n/a	9dBu	8dBu
			-15dBFs for +24dB output level	-16dBFs for +24dB output level
			-9dBFs for +18dB output level	-10dBFs for +18dB output level
			-6dBFs for +15dB output level	-7dBFs for +15dB output level
	32dB	n/a	3dBu	2dBu
			-21dBFs for +24dB output level	-22dBFs for +24dB output level
			-15dBFs for +18dB output level	-16dBFs for +18dB output level
			-12dBFs for +15dB output level	-13dBFs for +15dB output level
IL1115	26dB	16dBu	n/a	n/a
		-8dBFs for +24dB output level		
		-2dBFs for +18dB output level		
		0dBFs for +15dB output level		
	32dB	10dBu	n/a	n/a
		-14dBFs for +24dB output level		
		-8dBFs for +18dB output level		
		-5dBFs for +15dB output level		

Subwoofer

	Amp Gain	Discrete (Single for IS1118)	Parallel
IS1215	26dB	14dBu -10dBFs for +24dB output level -4dBFs for +18dB output level -1dBFs for +15dB output level	17dBu -7dBFs for +24dB output level -1dBFs for +18dB output level
	32dB	8dBu -16dBFs for +24dB output level -10dBFs for +18dB output level -7dBFs for +15dB output level	11dBu -13dBFs for +24dB output level -7dBFs for +18dB output level -4dBFs for +15dB output level
IS1118	26dB	14dBu -10dBFs for +24dB output level -4dBFs for +18dB output level -1dBFs for +15dB output level	n/a
	32dB	8dBu -16dBFs for +24dB output level -10dBFs for +18dB output level -7dBFs for +15dB output level	n/a
IS1218	26dB	14dBu -10dBFs for +24dB output level -4dBFs for +18dB output level -1dBFs for +15dB output level	17dBu -7dBFs for +24dB output level -1dBFs for +18dB output level
	32dB	8dBu -16dBFs for +24dB output level -10dBFs for +18dB output level -7dBFs for +15dB output level	11dBu -13dBFs for +24dB output level -7dBFs for +18dB output level -4dBFs for +15dB output level

DME configuration guide

Consider the example of a Left and Right cluster speaker system (e.g. page 16-17). Each cluster comprises two IF2115 (bi-amp mode).

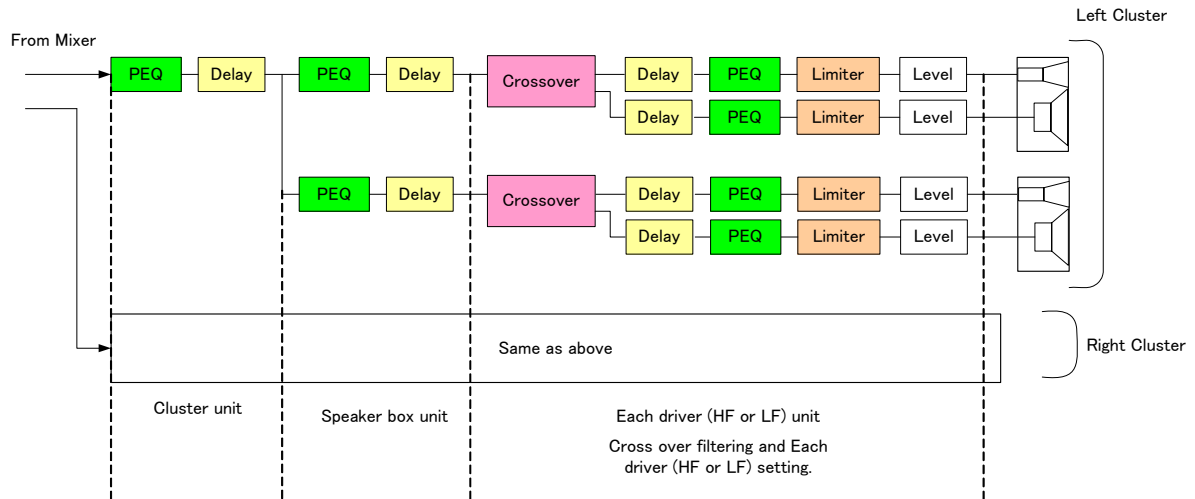Generally, output processing functions are divided as Fig. A.

Fig. A: General output processing functions

See Fig. B. Cluster EQ and Cluster Delay can be integrated to digital mixer.

Crossover, Polarity, Delay, PEQ, level and Limiter for each driver are integrated to Speaker processor component (this example, "Speaker Processor 2Way" in DME). And each parameter (Crossover frequency, etc.) is provided on the Yamaha website (http://www.yamahaproaudio.com/).
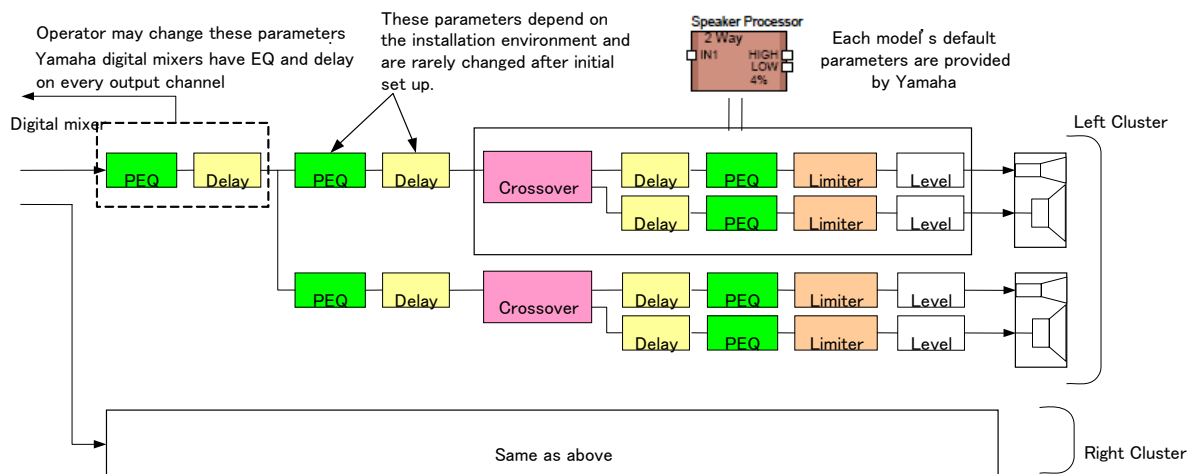

Fig. B: Rearrangement of Output processing function

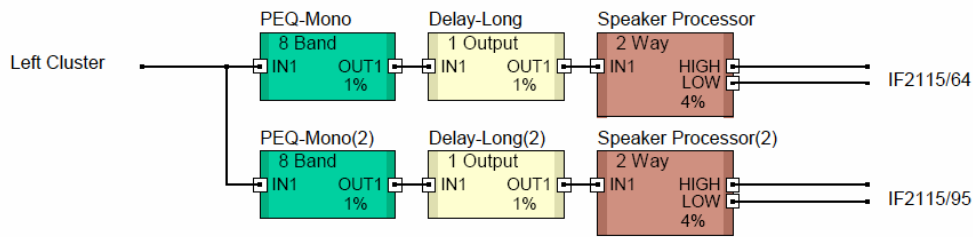So, by using DME and digital mixer, the processing configuration will be simplified as Fig. C.

Fig. C: Simplified configuration in DME.

When using Installation Series Speakers in passive mode or using Subwoofers, "Speaker Processor 1Way" is recommended. Fig. D. shows the example of two Mid-High and 1 subwoofer system. It has input level, Crossover (HPF and LPF), Delay (up to 500ms), 6 band PEQ, limiter and output level. (DME has up to 6Way Speaker Processor components)
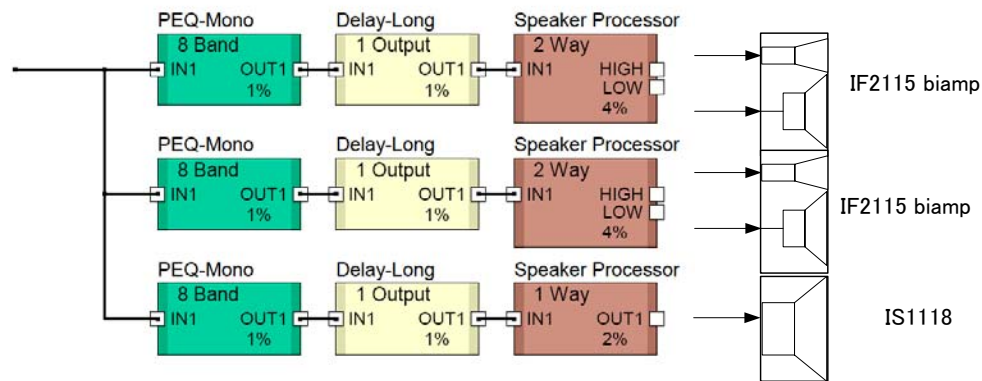

Fig. D: DME configuration example of two Mid-High and 1 subwoofer system.

In the case of the balcony speakers, stage front speakers or simple symmetrical dispersion speakers, Multi output delay will be useful because signal for each speakers is same and only delay and level is changed and also the parameters of left side and right side is symmetrical. It is easy to set the parameters using snapshot copy & paste.
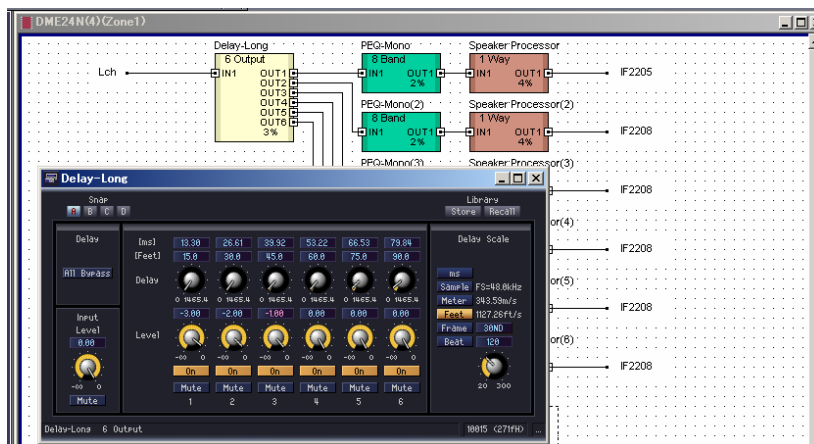

Fig. E: Example of using multi-output delay

Power Amplifiers

Yamaha Power Amplifiers are recommended for optimum results to drive the Installation series speakers. The flagship PC1N series amplifiers were used during the tuning process. For lower power applications, XP series and XM series amplifiers are also recommended, as they feature similar sound characteristics as the PC1N series.

Yamaha Power Amplifier Line up

	XM series 4ch		XP series 2ch		PC1N series 2ch		Tn series 2ch	
1300W							T5n	1350W
1200W								
1100W							T4n	1150W
1000W					PC9501N	1000W		
900W								
800W								
700W			XP7000	750W	PC6501N	700W	T3n	750W
600W								
500W			XP5000	525W	PC4801N	550W		
400W								
300W			XP3500	390W	PC3301N	350W		
200W			XP2500	275W	PC2001N	230W		
100W	XM4180	180W	XP1000	135W				
	XM4080	80W						

Output Power @1 kHz THD+N=1%, 8ohm
Stereo mode, per channel with both channels driven

Tn series (Stereo Models)

PC-1N series (Stereo Models)

XP Series (Stereo Models)

XM Series (4ch Models)

Signal Processors

When the "Installation Series Speakers" are driven in bi-amp mode, a crossover is needed to split the LF & HF frequencies. Yamaha digital signal processors such as the DME series Digital Mixing Engines, new DME Satellite or the SP2060 speaker processor are recommended for optimum results. You can download dedicated processor settings for the Installation Series Speakers into these processors from the Yamaha proaudio site (http://www.yamahaproaudio.com). This allows highly accurate settings with just a few easy steps, providing the best speaker processing with the least amount of effort!

DIGITAL MIXING ENGINE   DME SERIES

DME64N

DME24N

DME8o-C

DME4io-C

SPEAKER PROCESSOR   SP2060