



# K Family Application Guide

---

## Installed Sound

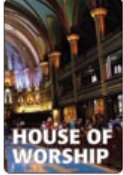

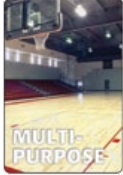



# Contents

## Section 1 : The K Family

P.3	Introduction
P.4-5	DMT™ - A Quick Guide
P.6-7	DMT™ - How Far Do They “Throw?”
P.8-11	K Family - Subwoofer Selection
P.12-14	K Family - Rigging
P.15-18	K Family - Wiring
P.19	Other Considerations : Painting   Outdoors
P.20-21	Block Diagrams

## Section 2 : Application Suggestions

House of Worship			
P. 22	Small Chapel	Up to 200 people	
P. 23	Medium Church Hall	200-400 people	
P. 24	Fan Shaped Auditorium	400-800 people	
Performing Arts			
P. 25	Playhouse Theatre	Up to 200 people	
P. 26	Community Theatre	200-400 people	
P. 27	Proscenium Theatre	400-800 people	
Multi-Purpose			
P. 28	Fitness Studio	Up to 100 people	
P. 29	Gymnasium	100-400 people	
P. 30	School Auditorium	400-800 people	
Nightlife			
P. 31	Bar	Up to 200 people	
P. 32	Dance Club	200-400 people	
P. 33	Live Music Club	400-800 people	
Other			
P. 34	Monitor Systems		
P. 35	QSC Application Engineering Contacts		

# Section 1: The K Family

## Introduction

Installing quality sound reinforcement is your business. The QSC K Family of products (with 10 models from which to choose from) is designed to offer users unparalleled performance in flexible, easy-to-use configurations. Ideal for a broad range of installation applications, K Family loudspeakers also feature long-term durability and a clean, professional appearance that is at home in any situation. With K Family loudspeakers in your portfolio, the next time a customer asks, "Have you got something that will...?" your answer will undoubtedly be YES!

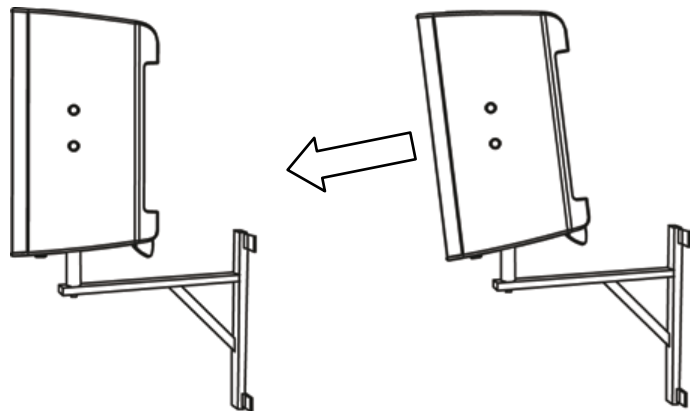


K Series

KLA Series

KW Series

QSC's K Family of products offer several unique features including Tilt-Direct™ pole cup mount on all our two-way loudspeaker models. With a simple turn of the dial, the Tilt-Direct engages a downward tilt (-7.5° on K / KW models and -9° on KLA12) focusing the acoustic energy on the audience and off of reflective surfaces. This is ideal for applications where maximum coverage is desired from a high stand-mounted loudspeaker. KW153 includes a standard pole cup for convenience.



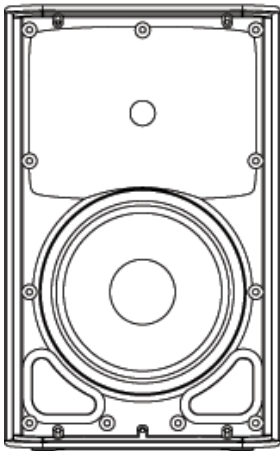
# Section 1: The K Family

## DMT™ A Quick Guide

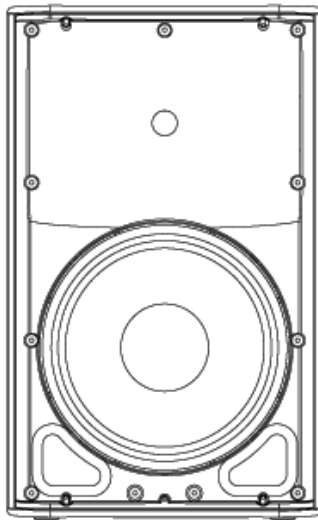
In the history of professional audio, the birth of Directivity Matched Transition (DMT™) has been one of those light bulb events, that makes us all wonder why nobody ever thought of it sooner.

It's all quite logical – here's a quick overview;

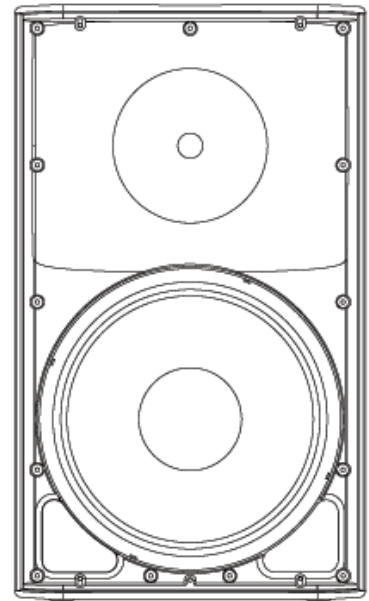
- Smaller woofers beam less at crossover, and therefore need to be matched with much wider waveguides (90° - 105°). On the other hand larger woofers beam more at crossover, and therefore need to be matched with much narrower waveguides (60° - 75°).
- Smaller woofers have lower sensitivity, but guess what - the matching wider waveguides disperse energy over a wider area, therefore on-axis sensitivity is lower by the same order of magnitude. By comparison, larger woofers have higher sensitivity, and you guessed it - the matching narrower waveguides also have higher on-axis sensitivity by the same order of magnitude!



8" Woofer  
105°



10" Woofer  
90°



12" Woofer  
75°

- When you only match the width of the waveguide to the woofer but not the height of the waveguide, then the vertical off-axis response will still be gnarly, and affect your overall power response at the listening position (power response = sum of anechoic frequency response PLUS echoic early reflections). However when you match BOTH the width & height of your waveguide to the woofer, then you will have far smoother off-axis response, and therefore optimized power response.

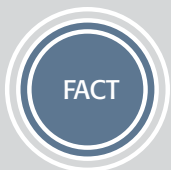
And here's the real kicker; for short-throw applications (front-fill, delay-fill, console monitors, vocal monitors, etc) you actually want to be using a small woofer model to keep the footprint down, AND you want to be using a wider coverage waveguide, BUT you don't necessarily want to sacrifice power or headroom. This is why DMT™ has captured so much attention!

# Section 1: The K Family

## DMT™ A Quick Guide

The following chart provides a quick-guide to selecting the right K family loudspeaker for the right application, based on the DMT™ concept:

DMT™ – Application:	120°	105°	90°	75°	60°	SUB
Small venue, corporate function, lounge-bar, distributed front-fill / delay-fill / balcony fill, DJ monitor, console monitor		K8				
All purpose P.A., mid-size venue, mid-throw, vocal wedge or keyboard wedge, backline acoustic amp			K10			
All purpose P.A., mid-size venue, longer-throw, drum or keyboard wedge, backline acoustic amp				K12 KW122		
High SPL, large venue, long-throw, highly array-able & modular building block, centre-cluster, drum-fill or side-fill	2x KW152				KW152	
High SPL, large venue, long-throw, horn-loaded midrange for increased vocal clarity, or side-fill on large stage				KW153		
Band pass sub, maximum bang-for-buck, ideal for playback music (i.e. DJ or small bar), minimal footprint, stackable, highly transportable						KSUB
Direct radiating sub, flattest response, highly modular building block, ideal for live reinforcement						KW181



Interesting Fact: EVERY K family full-range loudspeaker, from the smallest model to the largest, features Intrinsic Correction™ EQ, which employs FIR linear phase filters, more commonly found on high-end DSP processors.



## Section 1: The K Family

### DMT™ - How Far Do They “Throw?”

The term “throw” is perhaps the biggest misnomer in the professional audio industry, and is commonly used to describe the relative distance at which a loudspeaker can produce an intelligible signal at a volume level sufficient for the application.

The reality is that sound does not throw, but rather sound “propagates” through the air, and will simply attenuate by 6 decibels with every doubling of distance (inverse square law). Other factors such as air absorption can additionally & progressively attenuate the higher frequencies, however the distance over which the sound propagates and still remains intelligible basically depends on the ratio of signal-to-noise at the listener’s location.



Because the audio industry has widely adopted the term “throw” we will continue to employ the same terminology for the purposes of this guide:

**Short-throw loudspeakers** tend to have very wide dispersion, and are typically operated at low to medium SPL levels simply due to the audience proximity, therefore woofers tend to be smaller. These speakers typically have very flat frequency response over a wide bandwidth, and wide horizontal dispersion is necessary in order to cover the audience seated within a close arc of the loudspeaker. Air absorption is seldom a problem here as the distances are so short. Examples of QSC short-throw speakers include the K8 & K10 loudspeakers.

**Medium-throw loudspeakers** exhibit moderate narrowing in horizontal and vertical dispersion. Due to the slightly greater distance needing to be covered, a higher Maximum SPL is required, and this is typically achieved by increasing the woofer cone size to 12" or 15", thereby increasing the loudspeakers sensitivity. Examples of QSC medium-throw speakers include the K12 and KW122 loudspeakers.

**Long-throw loudspeakers** have a very narrow dispersion (60° or less) – the narrower horn pattern increases on-axis sensitivity and this in turn is matched by the higher sensitivity of a larger woofer cone – the net result is more acoustic output within the coverage pattern. When used on their own, these are great for covering large distances, however one of the major benefits of these narrow dispersion loudspeakers is that they array extremely well - with minimal overlap & comb-filtering. This makes them the perfect modular “building block” for creating arrays of varying sizes. Examples of QSC long-throw speakers include the KW152, KW153 and KLA12 loudspeakers.

# Section 1: The K Family

## DMT™ - How Far Do They “Throw?”

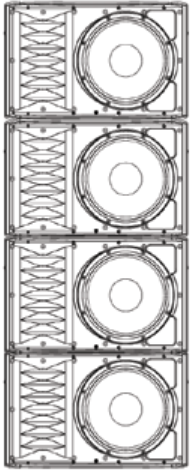


Figure 1. Vertical Array of 4x KLA12s

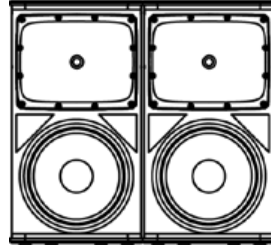


Figure 2. Horizontal Array of 2x KW152s

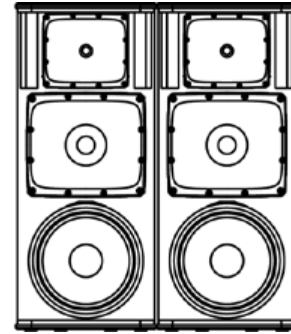


Figure 3. Horizontal Array of 2x KW153s

There are basically two methods for horizontally arraying enclosures; (as shown in figure 2 and 3) the “planar” array where the two boxes are hard-packed against each other and aimed down as a single object, or the “spherical” array where the loudspeakers are independently aimed outwards & downwards. The spherical method is far more desirable as you get improved coverage to the audience areas, and you are also able to de-couple the HF waveguides to minimize comb filtering.



There are a couple of 3<sup>rd</sup> party rigging solutions for 2-box Spherical arrays;

1. The Polar Focus “XY Grid” system <http://www.polarfocus.com/clusters.html>
2. The Adaptech “Steerables” system <http://www.atmflyware.com/Two-Way-Array.html>

The chart below illustrates the nominal Sound Pressure Level (C-weighted) at four arbitrary distances (4m, 8m, 16m, 32m) which have been calculated from the 1m Long-term or Continuous Maximum SPL for each K-family loudspeaker or array. Please note this does not factor in any losses which may result from air absorption of the upper high frequencies.

Model:	Coverage	1m (3ft)	2m (6ft)	4m (13ft)	8m (26ft)	16m (53ft)	32m (105ft)
K8	105°	121 dB	115 dB	109 dB	103 dB	97 dB	91 dB
K10	90°	123 dB	117 dB	111 dB	105 dB	99 dB	93 dB
K12	75°	125 dB	119 dB	113 dB	107 dB	101 dB	95 dB
KW122	75°	125 dB	119 dB	113 dB	107 dB	101 dB	95 dB
KW153	75°	128 dB	122dB	116 dB	110 dB	104 dB	98 dB
KW153 x2	75 x 150°	131 dB	125dB	119 dB	113 dB	107 dB	101 dB
KW152 x1	60°	127 dB	121dB	115 dB	109 dB	103 dB	97 dB
KW152 x2	60 x 120°	130 dB	124 dB	118 dB	112 dB	106 dB	100 dB
KLA12 x1	90 x 18°	125 dB	119 dB	113 dB	107 dB	101 dB	95 dB
KLA12 x2	90 x 36°	128 dB	122 dB	116 dB	110 dB	104 dB	98 dB
KLA12 x4	90 x 72°	131 dB	125 dB	119 dB	113 dB	107 dB	101 dB

# Section 1: The K Family

## Subwoofer Selection

### Choosing the Appropriate Sub

There are three options for Subwoofers when utilizing full-range enclosures from QSC's K Family catalog;

1. The first option is the KSub. The KSub is a double 12" band-pass sub enclosure. It is only 14" (355.6mm) wide by 26" (660.4mm) tall, so it fits into some very tight spaces – especially when laid on its side and slid under a riser platform stage.
2. The second option is the KW181 subwoofer. The KW181 is a single 18" front-loaded / dual ported sub enclosure. Its larger enclosure and bigger woofer gives a deeper bass response than the KSub (39Hz vs. 44Hz). The size, weight and lower center-of-gravity also makes for a more stable base when pole mounting the larger and heavier KW or KLA full-range models on top of it.
3. The third option is the KLA181 subwoofer. The KLA181 is also a single 18" front-loaded enclosure but with four ports/vents and a slightly larger enclosure. It contains integral rigging hardware that specifically allows it to hang at the top of a KLA12 line array. The larger box volume and quad port design gives a slightly additional bass extension over the KW181 (33Hz vs. 39Hz).

All three sub models share these same attributes:

- A Class D 1,000 watt internal power module with DSP
- Internal 100Hz cross-over (Low Pass Filter)
- A threaded M20 pole mount receptacle for "sub/sat" deployments
- The KSub and KW181 both ship with a threaded 35mm pole (optional for KLA181)



KSub



KW181



KLA181



# Section 1: The K Family

## Subwoofer Selection

### So, How Many Subs Will I Need?

To anyone in the industry this is like asking “how big is a fish.”

The number of subs required for any given system deployment depends on many of the same considerations made when choosing which DMT™ top box to use. For example:

- Content – Live Sound Reinforcement or Play-back (recorded) music?
- Space constraints – limited room for deployment?
- Desired bass extension and SPL (Sound Pressure Level)?
- Budget constraints?

Other considerations include (but are not limited to):

- Will the subs be flown, ground-stacked or combination?
- Type of content – rock; jazz; rap; reggae, etc?
- Stereo Left-Right deployment or mono block in center?
- Indoor or outdoor?

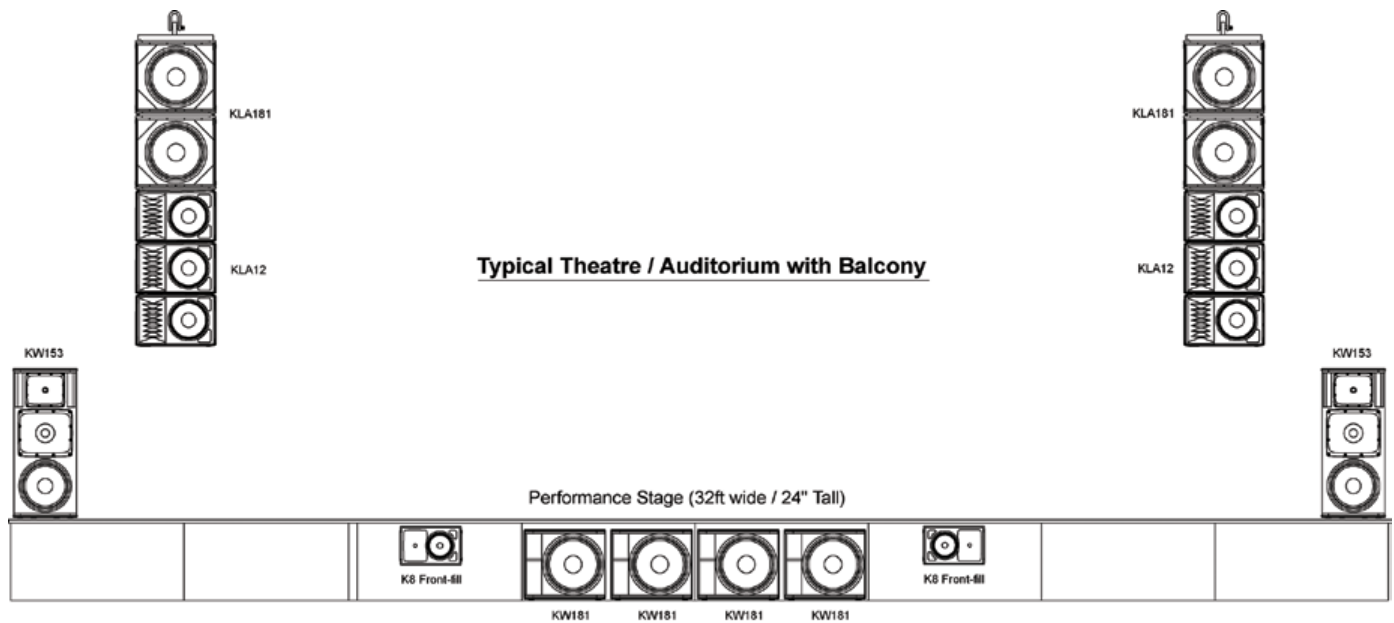
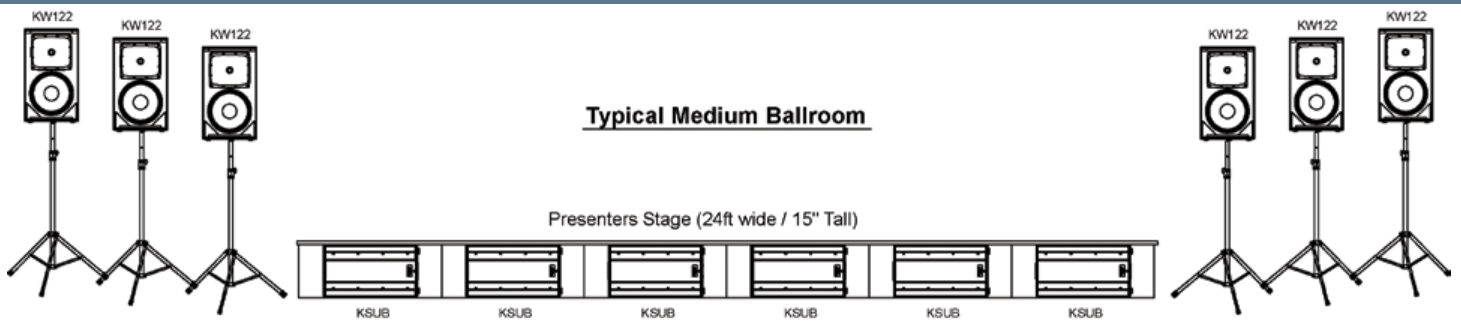
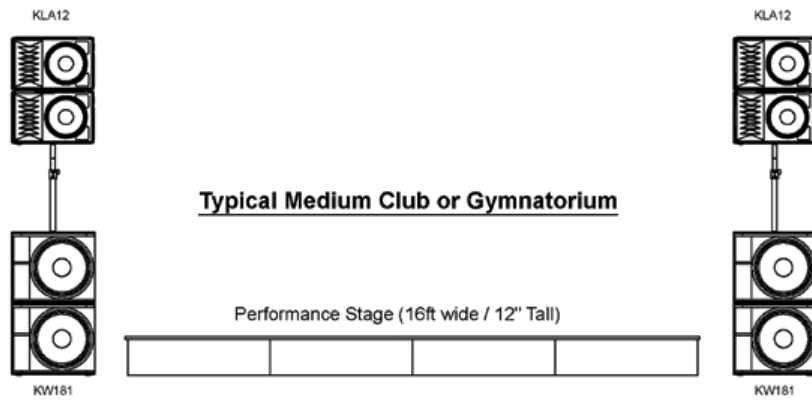
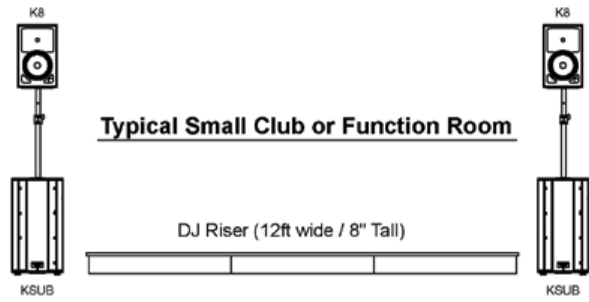
Until these questions are answered, a proper “top to sub” ratio cannot be accurately predicted by a “one size fits all” formula. There are, however some basic rule-of-thumb combinations to keep in mind when planning a system that requires full-range performance down into the low 40Hz region and below:

As you can see in the application suggestions on the following page, a safe top-to-sub ratio with K family products is typically 1:1. For outdoor applications where no wall or ceiling boundaries exist, it is recommended to double the subwoofer quantity and use a 1:2 ratio.



# Section 1: The K Family

## Subwoofer Selection

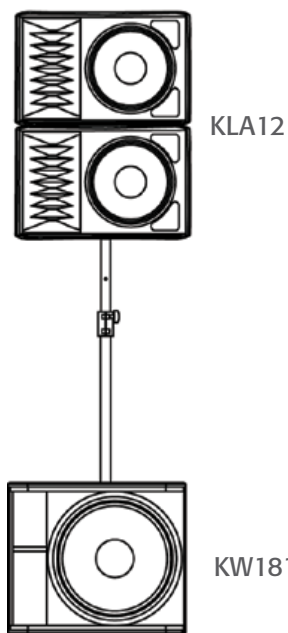


# Section 1: The K Family

## Subwoofer Selection

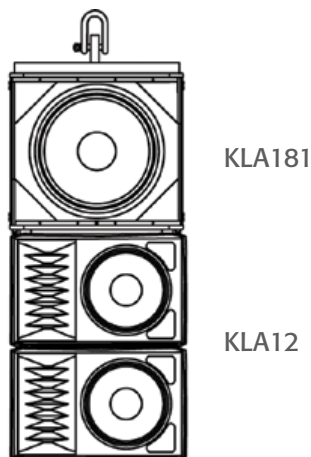
### Ground-Stacked vs. Flown Subwoofers

With KLA series you have the choice of using ground-stacked subwoofers (KW181/KLA181) or flown Subwoofers (KLA181 only). Both subwoofer models have similar performance however the KLA model offers the extra ability to be flown as part of an array as well as ground-stacked. Here are some reasons why you might choose one configuration over the other for certain applications;



**Ground-Stacked Subwoofers:** (KW181 or KLA181). This is the simplest configuration to set up and deploy. The obvious benefit of any ground-stacked system is the ground-plane coupling which occurs, providing an additional 3dB of “free” bass. Setup and load-out times are also greatly reduced. Wiring is also simplified – audio loop thru from the subs to tops can be employed and easily adjusted to suit.

The only real downside to ground-stacked subwoofers is that the SPL in the front of the audience will be much greater than the SPL in the rear of the audience, but sound-engineers have been living with this compromise for decades.



**Flown Subwoofers:** (KLA181 only). This is obviously a more complex configuration to set up and deploy, however the known benefits can certainly make for a rewarding experience, both to you and your client. A flown subwoofer array offers the major benefit of uniform SPL across the audience area (front to back). In addition, flown subwoofers just seem to “hook up” better with the rest of the system.

The first disadvantage to flown subwoofers is the obvious deployment time and effort required. However the results can certainly make the effort worthwhile. The second disadvantage to flown subwoofers is the loss of a substantial surface (floor or wall) with which to plane couple, although in some instances the ceiling will serve as a boundary.

**NOTE**

In some applications (i.e. balcony auditoriums or theatres) it is common to employ BOTH flown & stacked configurations , however careful DSP alignment is required.



# Section 1: The K Family

## Rigging & Suspension

The K Family of loudspeakers offer several methods for permanently suspending or flying in an installation; K Series - There are two methods for suspending each full-range model (K8, K10 & K12). Integrated threaded M10 points on the top, back and side facilitate both vertical (HF on top) and horizontal suspension. Use only rated, forged-shoulder eyebolts. For your convenience, these are available from QSC in a pack of three eyebolts – P/N “K Series M10 Kit”.



Each full-range model also offers an optional “Yoke” system that can mount either to the sides of the cabinet or to the top and bottom. These yokes allow for rigid mounting to structures and flexible rotation of the speaker system.

Figure 1 illustrates how the K Series may be permanently fixed to a wall using the Yoke bracket, to achieve either Pan or Tilt.

Figure 1. Wall mounted

Figure 2 illustrates how the K Series may be permanently fixed to the ceiling, with the horn either inside or outside (when oriented horizontally), and the horn top or bottom (when oriented vertically).

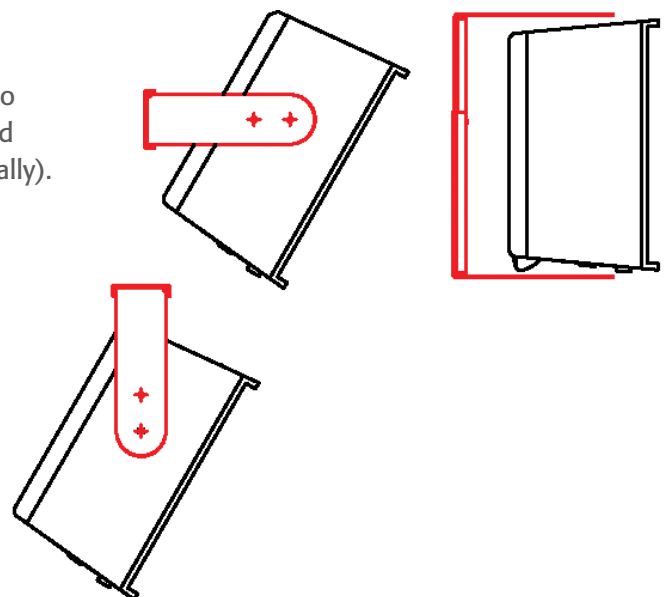
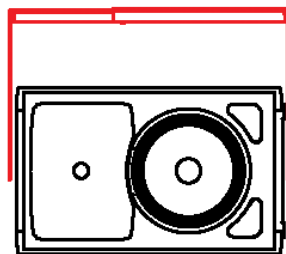
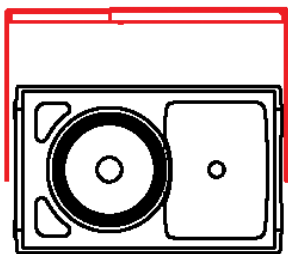


Figure 2. Ceiling mounted

# Section 1: The K Family

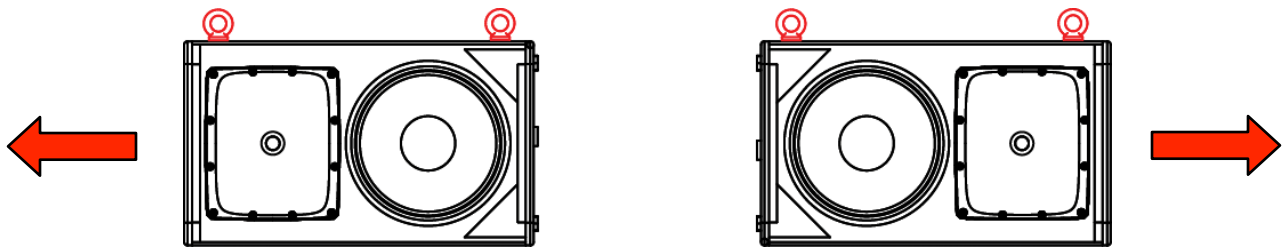
## Rigging & Suspension

### KW Series

The KW122 has the following installation M10 suspension points:

- Two on the top (vertical orientation)
- Two on each side (horizontal orientation)
- One on the rear (pullback)

The KW122 can be suspended vertically via the top M10 pick points with the rear M10 point available as a pullback for proper accurate angling. The KW122 can also be suspended horizontally using the optional KW122 Suspension Kit. This kit includes two M10 forged eyebolts and a pull-back "bar". When suspending horizontally, the eyebolts may be fitted to either side allowing you to orient the HF waveguide to the inside or outside.



The KW152 and KW153 both feature the same installation M10 suspension points:

- Two on the top (vertical orientation – horn up)
- Two on the bottom (vertical orientation – horn down)
- Two on each side (horizontal orientation)
- Three on the rear (including a center pick point for horizontal orientation)

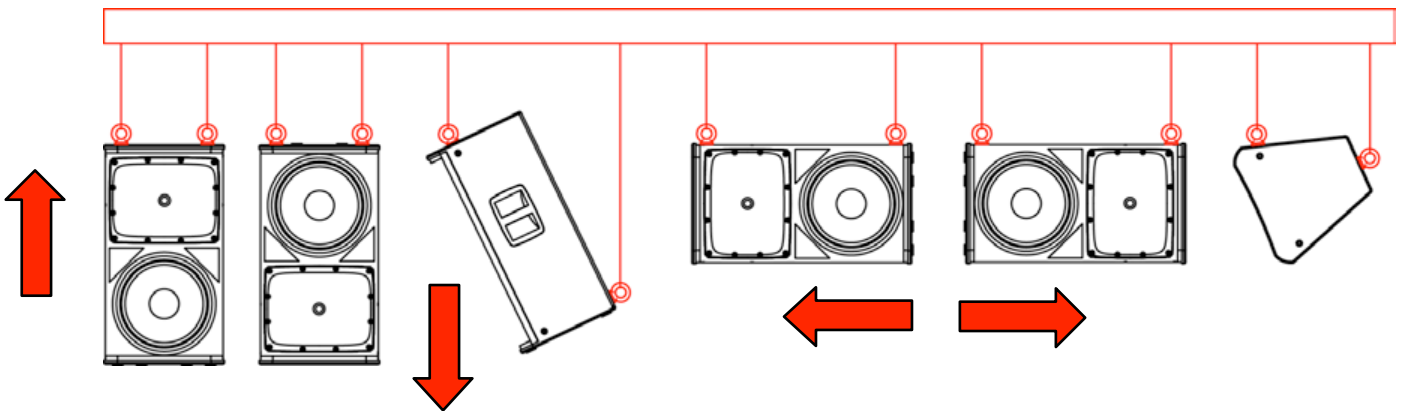


Figure 1. KW152 or KW153 oriented vertically

Figure 2. KW152 or KW153 oriented horizontally



When suspending a loudspeaker near a hard reflective surface such as a plaster ceiling, it is recommended to invert the enclosure so that the high frequency waveguide is at the bottom, as shown above in Figure 1. This has two major benefits – firstly it helps to better couple the woofer to the ceiling to increase bass output, and secondly it helps to place some "distance" between the reflective ceiling and the high frequency driver, where the reflected energy from the ceiling will usually create comb-filtering throughout the critical vocal range, often resulting in "smeared" speech intelligibility. Ideally the distance between the ceiling and the high frequency driver should be two feet or greater.

# Section 1: The K Family

## Rigging & Suspension

### KLA Series

The KLA series line array modules offer one of the industry's fastest and simplest systems to rig together and suspend. KLA's unique self-contained SOLO™ (Single-Operator Logistics) Rigging System enables users to quickly assemble (and disassemble) the line array in a fraction of the time without the need for special tools or external hardware.

For suspending the array, KLA offers two solutions. For permanent installations each element has four threaded M10 points on the top of the cabinet, and one in the bottom center of the rear of the cabinet for aiming.

For installed applications where the array frequently comes down, the "KLA AF12" array frame provides speed and flexibility to the rigging process. The array frame can either mount to the top of a KLA12 full-range cabinet, or to the top of a KLA181 subwoofer when hanging subs on top of the array. The array frame can be mounted with its pick bar facing forward or backward to give the maximum flexibility in vertical focus and use of center of gravity.



5 x Box KLA12 Array



3 x Box KLA12 under 2 x KLA181



3 x Box KLA12 with eyebolts

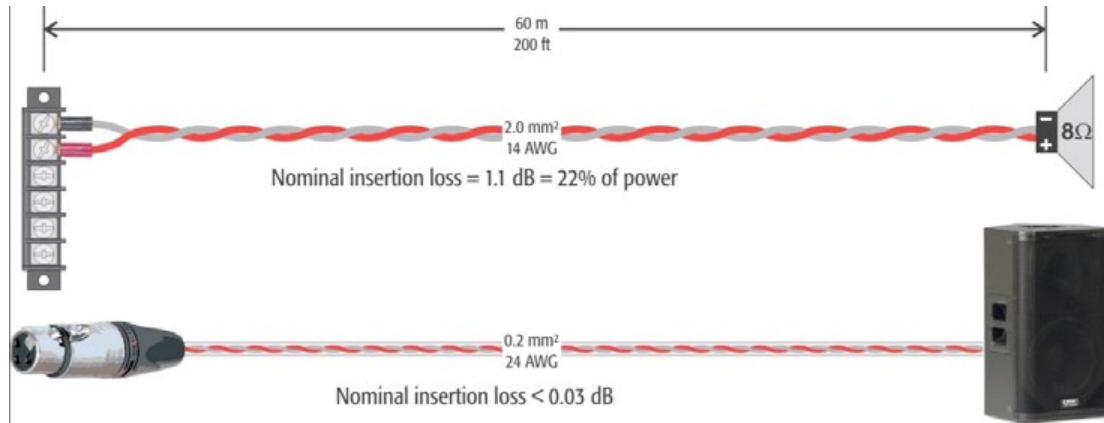


**SUSPENSION AND MOUNTING OF LOUDSPEAKERS REPRESENTS A POTENTIAL SAFETY HAZARD. QSC HAS NO KNOWLEDGE ABOUT THE ACTUAL STRUCTURAL INTEGRITY OF THE FACILITY IN WHICH THESE PRODUCTS ARE TO BE USED. THE SYSTEM USER AND/OR INSTALLER HAS SOLE RESPONSIBILITY FOR PROPERLY INSTALLING THE EQUIPMENT AND COMPLYING WITH ALL APPLICABLE STANDARDS AND REGULATORY REQUIREMENTS. ANY RIGGING OR SUSPENSION OF EQUIPMENT SHOULD ONLY BE PERFORMED BY CERTIFIED AND LICENSED RIGGING TECHNICIANS.**

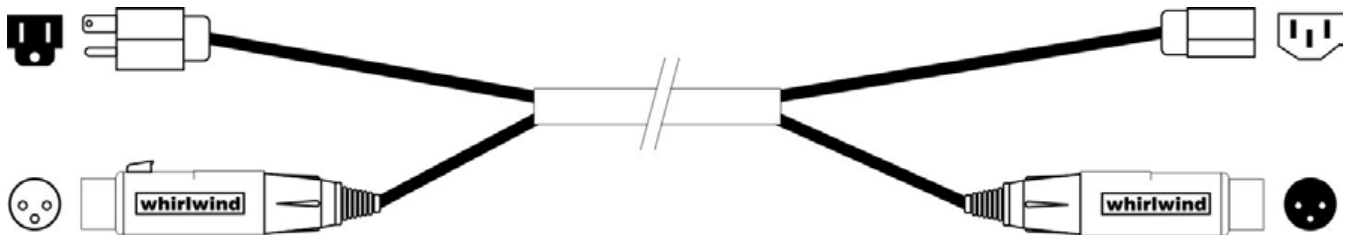
# Section 1: The K Family

## Wiring

The entire K Family of loudspeakers are ACTIVE, with internal power amplification. There are many compelling reasons why to use an active loudspeaker for your installation, and one of these is Insertion Loss, which is the loss of signal power resulting from the insertion of extra cable length and/or thinner cable gauge between your amplifier and loudspeaker. With an active loudspeaker the insertion loss is virtually eliminated, since the amplifiers are located right alongside the loudspeaker transducers within the enclosure;



Custom combination cables can be obtained from a number of 3<sup>rd</sup> party suppliers such as Whirlwind (pre-assembled MT-AC-FFE-MME cables available in 10, 15, 25, or 50ft lengths), and Proel (bulk HPC501 cable).



These custom length cables combine “no hum” AC power (IEC or powerCON®) with a separate XLR to XLR audio channel into one jacketed cable. Please note – the cable shielding does very little to cancel the hum, but rather the tight twists in the pair of conductors combined with the high performance CMR (Common Mode Rejection) circuit inside each K product’s input is why these combination cables work so well with no hum.

All of the K & KW Series loudspeakers ship with a 10 foot (3 meter) detachable locking IEC power cable. The KLA Series however, utilizes both an input and output Neutrik powerCON® AC connection on each cabinet. Each KLA12 cabinet comes with a 12 foot (3.6 meter) main power cable; a 2 foot (1/2 meter) AC jumper; and a 2 foot XLR to XLR line jumper. The KLA181 subwoofer comes with a 12 foot (3.6 meter) main power cable; a 3 foot (1 meter) AC jumper; and a 3 foot XLR to XLR jumper.

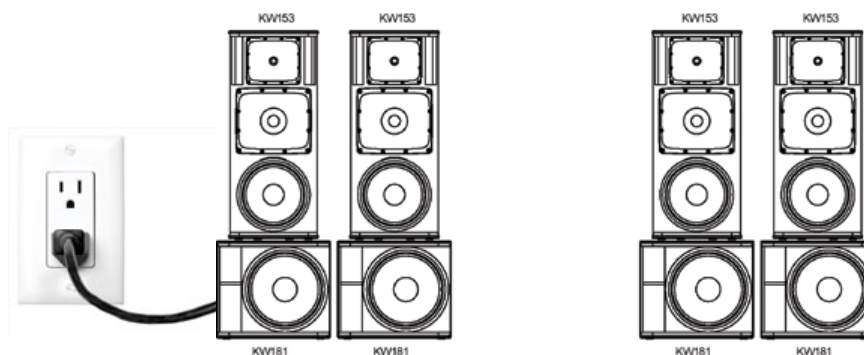
# Section 1: The K Family

## Wiring

All models of loudspeaker in the K Family lineup share the same 1,000 watt (continuous), Class D power amp module.

This power amp design is extremely efficient when it comes to AC current draw or consumption. For example, any one K family active loudspeaker when operating at 1/8 power (which is fairly loud with an occasional clip light flashing), will only draw 2.01 amps at 120V AC or 1.13 amp at 230V AC. That means you can run up to five active loudspeakers (any combination of K, KW or KLA including subwoofers) off a single 15 amp 120V AC circuit, and up to eight off a single 20amp 120V AC circuit (or 10amp 230V AC circuit)!

To put this into perspective, you can actually power an 8000 watt stereo 4-way sound system consisting of two full-range top enclosures per side (KW153), plus two subwoofers per side (KW181), all running off one single dedicated 20 amp 120V AC wall outlet (or 10amp 230V AC wall outlet overseas) as illustrated below. No need for a specialized (and very expensive) AC power distribution to run your PA.



## Green Power

Not only are the K Family power modules efficient during use, but also when not in use. If the loudspeaker sits idle (no signal detected) for over five minutes, it will automatically enter standby mode – is shutting down the amplifier. Once signal is detected again, the DSP's unique "look-ahead" feature will immediately power-up the amplifier, without any noticeable delay.

This not only saves energy, but also saves cost in installations where remote controlled AC relay switches (On & Off) are required.

1/8 power, sine wave												
Mains Voltage	1 box			2 box			4 box			6 box		
	Amps	BTU/h	kcal/h	Amps	BTU/h	kcal/h	Amps	BTU/h	kcal/h	Amps	BTU/h	kcal/h
100VAC	2.30	7.85	31.13	4.60	15.71	62.26	9.20	31.41	124.52	13.80	47.12	186.78
120VAC	2.01	6.86	27.20	4.02	13.73	54.41	8.04	27.45	108.82	12.06	41.18	163.23
240VAC	1.13	3.86	15.29	2.26	7.72	30.59	4.52	15.43	61.18	6.78	23.15	91.77

Heat losses are the thermal emissions from an amplifier while it is operating; i.e. real AC power "in" minus audio power "out".





# Section 1: The K Family

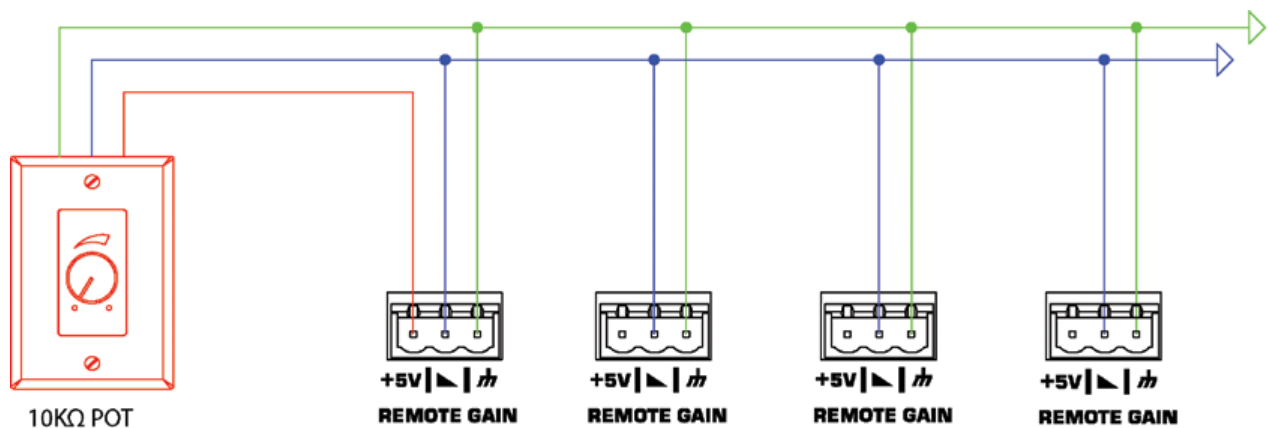
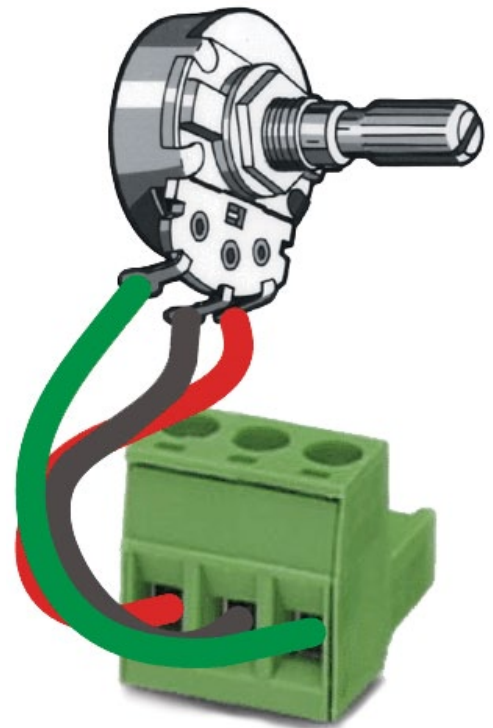
## Wiring

The entire K Family of active loudspeakers include a feature which is every installers dream, that is the ability to use an external pot (potentiometer) as a remote volume control for individual or ganged loudspeakers. This is extremely useful for applications where you have mounted the speakers to a wall or ceiling, making it difficult to access and adjust the gain knobs on the rear of the loudspeakers, or where you need to control separate zones or loudspeaker groups. You can simply mount the remote pot on a wall plate in a convenient location and wire it to the supplied Euro-style connector on the rear of each K Family loudspeaker(s).

**POTENTIOMETERS** : The value of the external pot is not critical—any pot with a total resistance of 1 kΩ up to 50 kΩ and a linear taper will be fine. These are typically quite inexpensive and available from just about any electronics parts supplier. If you do plan to connect more than 20x loudspeakers together, we recommend using a lower value potentiometer (less than 5 kΩ).

**WALLPLATES** : For your convenience, 10k volume pots already pre-mounted on single gang decora wallplates are available from QSC Audio - P/N "WCP-1".

**WIRING** : It is important to note that NO audio is passing through this pot, or its associated wiring - this is merely a control signal, therefore any convenient three-conductor cable (or two-conductor with a separate shield wire) can be used for this pot. You may choose to use more expensive shielded twisted pair (STP) microphone cable, or simply use a low cost unshielded Twisted pair (UTP) phone or data cable such as CAT5e, which is perfectly acceptable for this function.



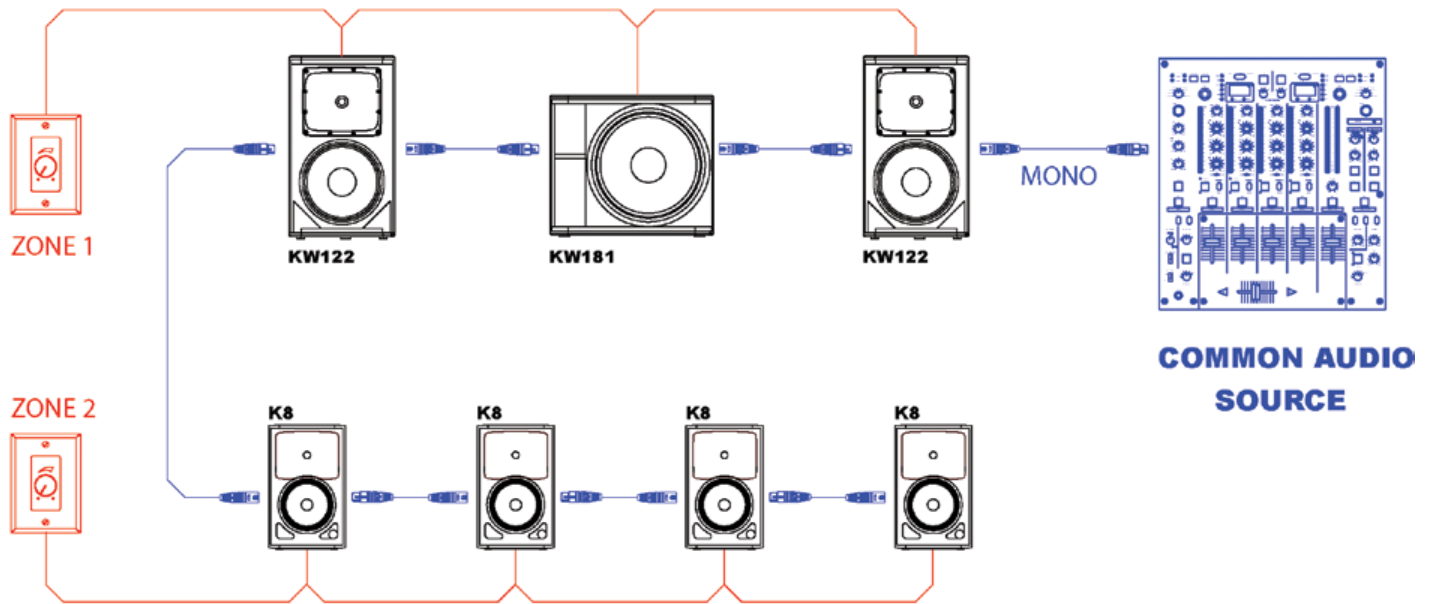
**NOTE** —when wiring a group of K family loudspeakers onto a single pot, only the first loudspeaker on the circuit requires the +5V terminal to be connected requiring 3-conductor cable (see above) . All subsequent loudspeakers can be “daisy-chained” with simple 2-conductor cable.

# Section 1: The K Family

## Wiring

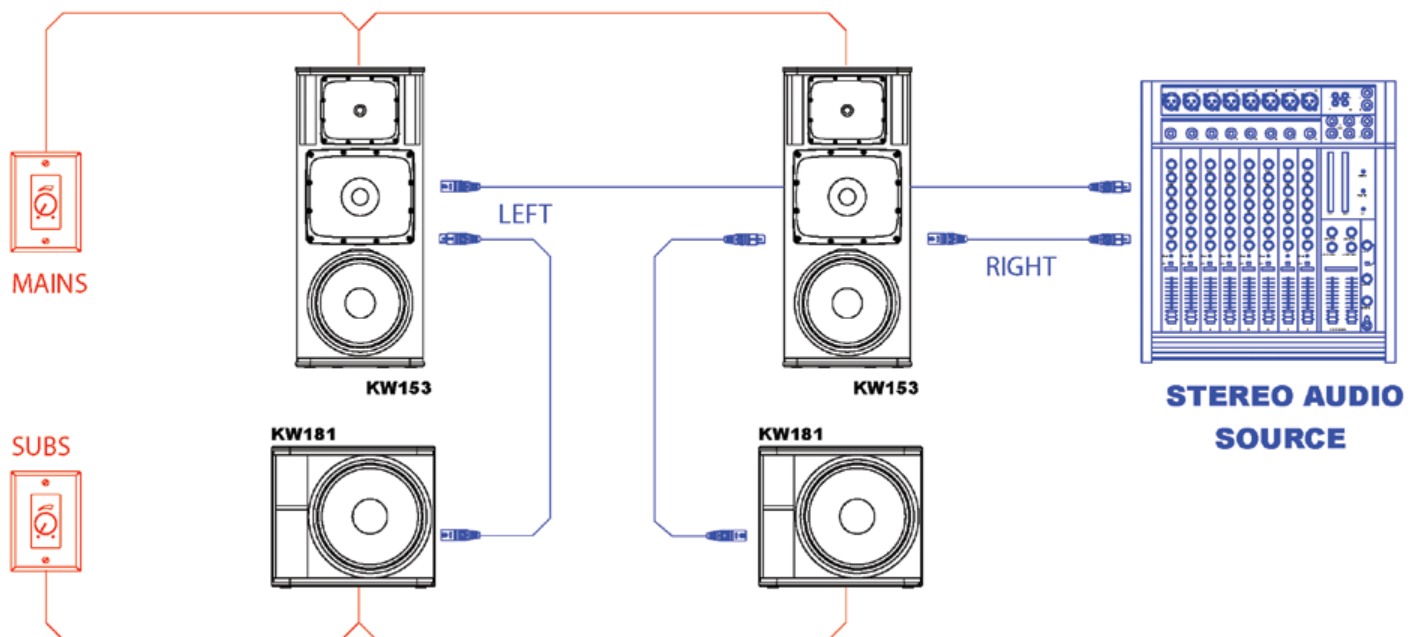
### EXAMPLE 1:

Here we are using a common mono audio source to feed a distributed system in a typical venue (i.e. bar, club, fitness center, etc.), while we simultaneously use two wall-plate potentiometers to independently control the volume of two zones.



### EXAMPLE 2:

Here we are using a common stereo audio source to feed the venue (i.e. Live club, house of worship, etc.), while we simultaneously use two wall-plate potentiometers to independently control the volume of the Subwoofers relative to the Main Loudspeakers. Note that remote gains do pass any audio, therefore do not discriminate between left or right, subs or highs!



# Section 1: The K Family

## Other Considerations : Painting | Outdoors

**PAINTING** – The K Family of ABS & plywood enclosures can in fact be spray painted to match an existing décor or venue theme, HOWEVER some hardware components used on the enclosures (such as the tilt-direct plate and the polypropylene handle cups) can prove to be quite difficult to paint, and would require special “treatment” beforehand from a qualified painting professional. Special care must also be taken when painted the perforated grills.

Please contact QSC Technical Services for more advice.

**OUTDOOR USE** – The K Family of products are NOT designed to be permanently installed in outdoor environments.

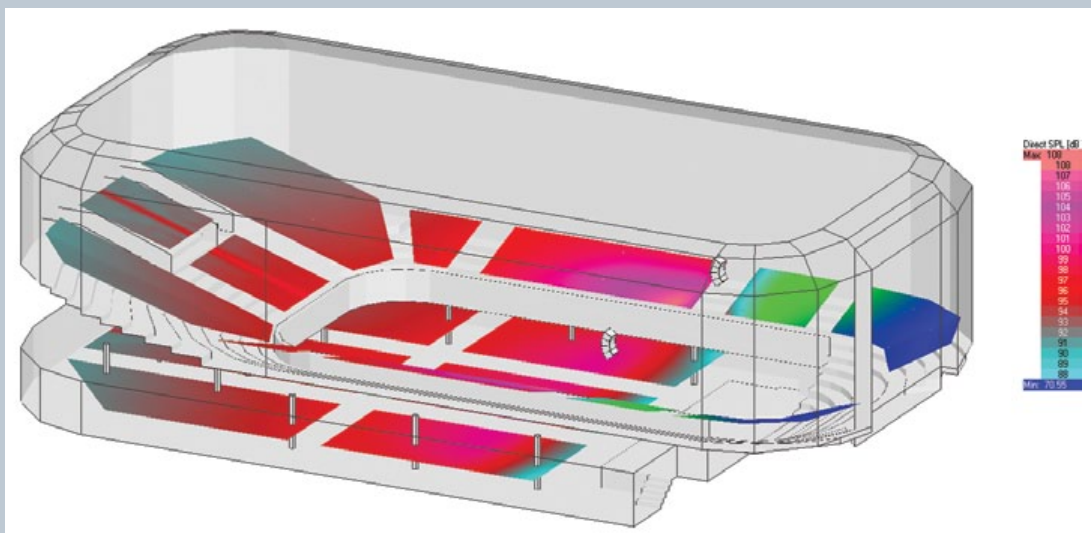
For these applications we would strongly recommend the QSC AD-S series of loudspeakers.

**EASE & CAD FILES** – A full complement of EASE files (SPK & GLL) and DXF files (2D & 3D) are available for download from the QSC Audio website.

Please follow these link: <http://www.qscaudio.com/houseofk/resources.php>



**APPLICATION ENGINEERING TEAM (AET)** - QSC Audio has enhanced customer support with a dedicated team of application specialists worldwide. They are here to assist with the selection and implementation of QSC products into your project, including EASE, EASE Focus & EASE Address modeling services.

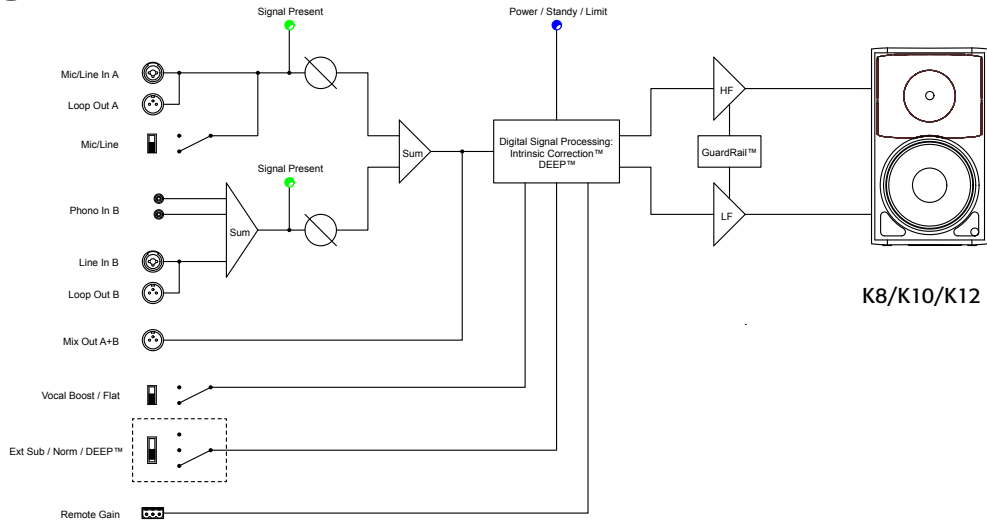


The AET team includes staff with specialized experience to provide guidance for a wide range of projects such as large to medium scale installations, live performance, concert/production, and public address systems. They have extensive knowledge of network audio, digital signal processing, power amplification, and loudspeakers. For more information, please check out the AET services offered at: <http://www.qscaudio.com/support/aet/>

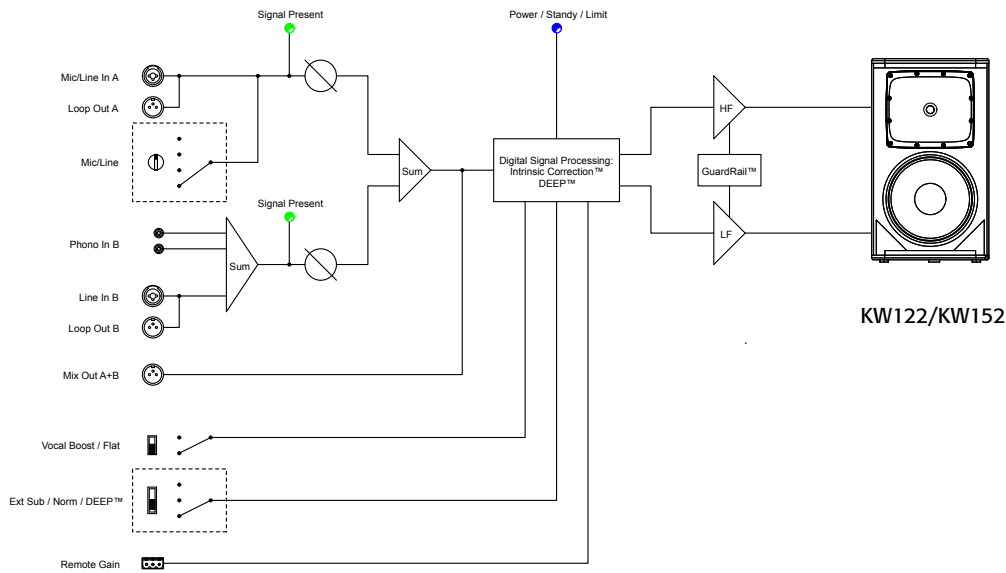


# Section 1: The K Family

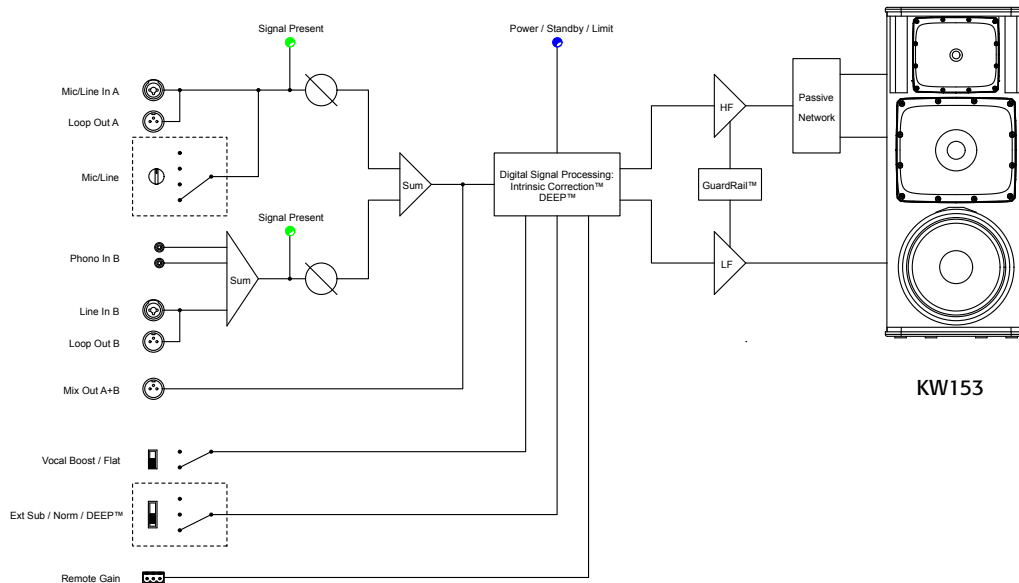
## Block Diagrams



K8/K10/K12



KW122/KW152

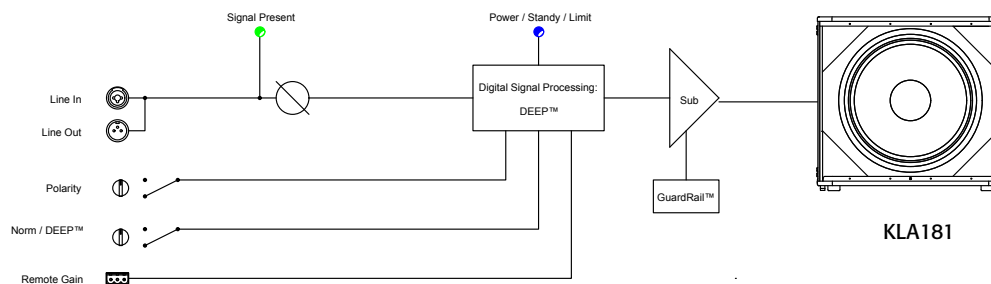
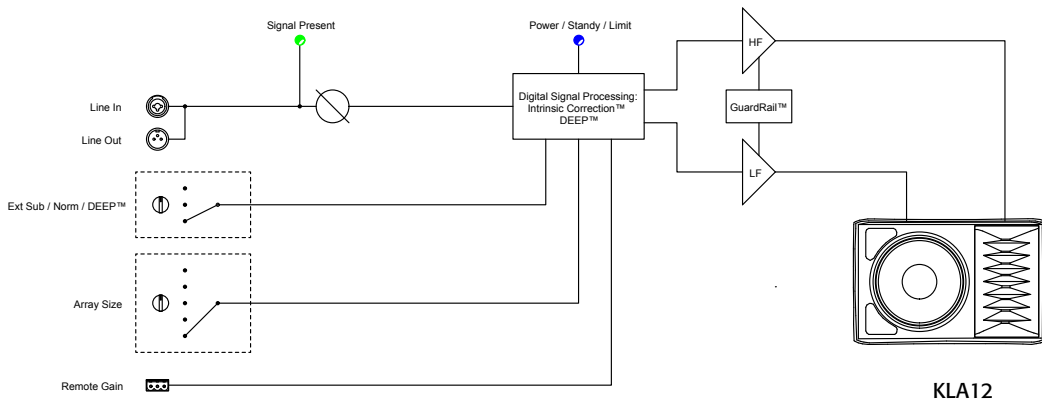
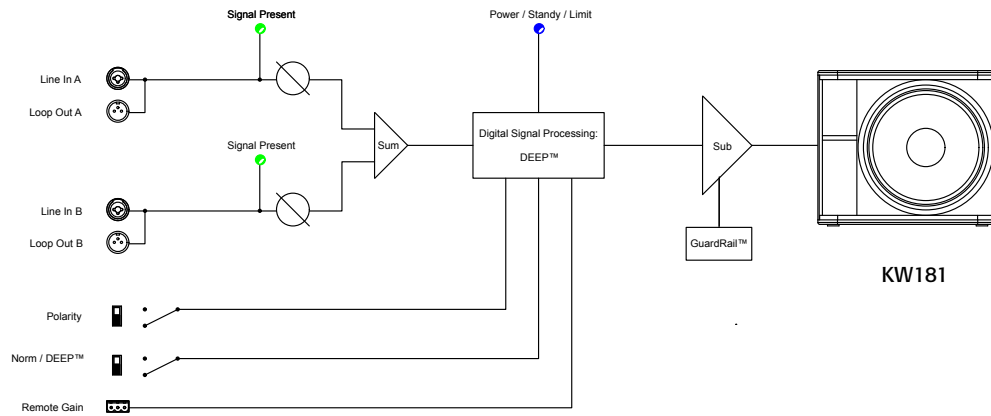
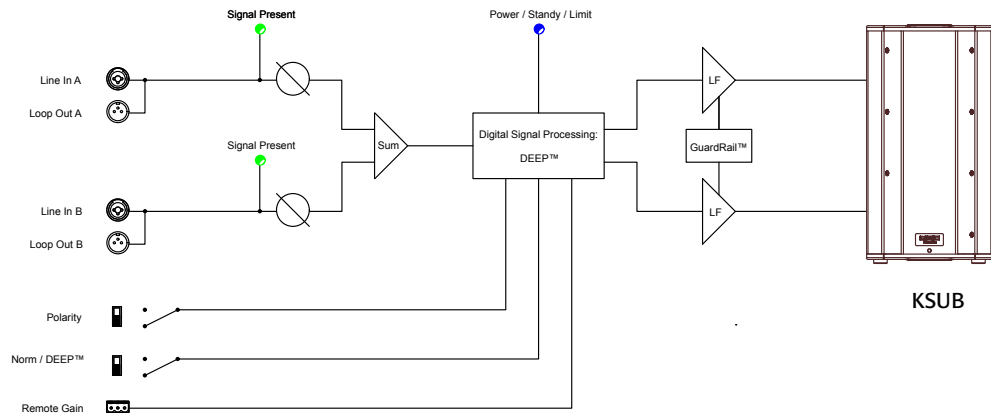


KW153



# Section 1: The K Family

## Block Diagrams



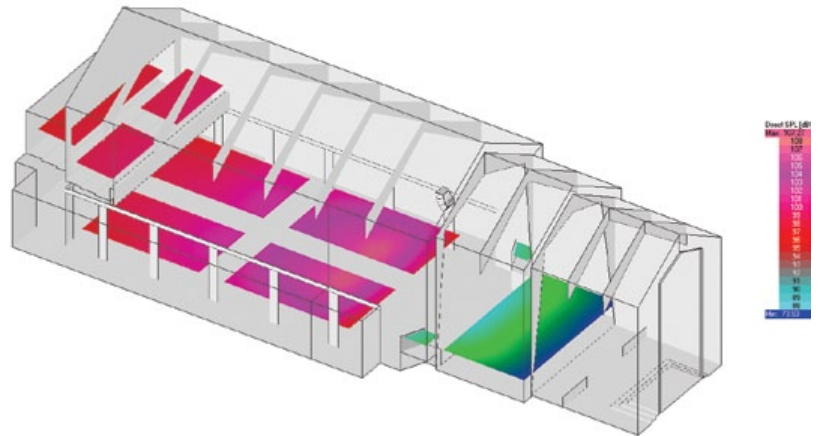
# Section 2: Application Suggestions

## Houses of Worship : Small Chapel

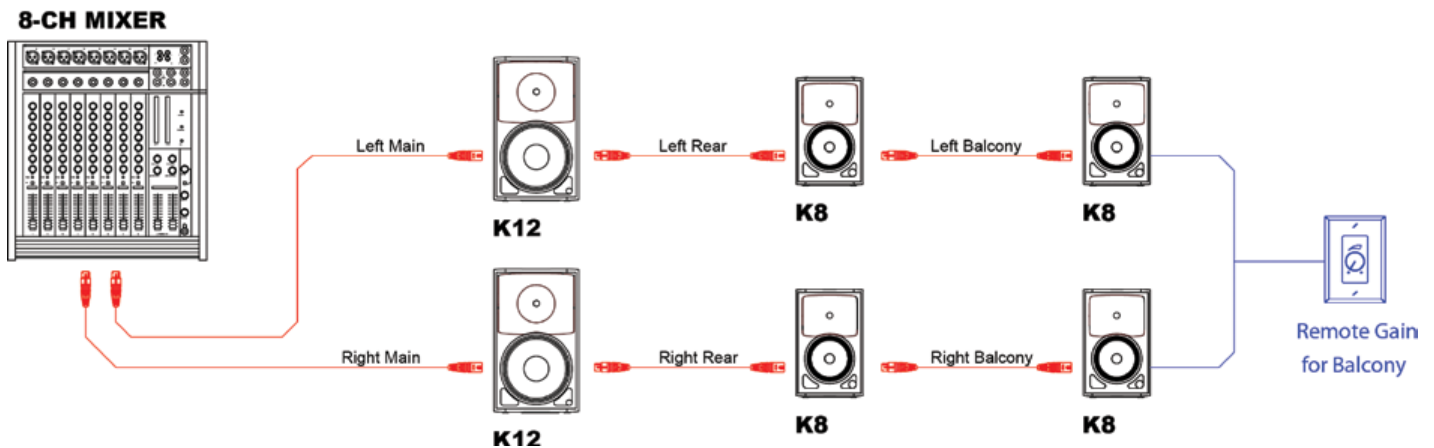
Approx. up to 200 people

This would be a typical traditional chapel or temple, with seating capacity up to 200 people. Typically these rooms have longer reverberant decays to enforce pipe organ or choral music, however these longer decay times also adversely affect the intelligibility of the spoken word, making these venues one of the more challenging when designing a sound system.

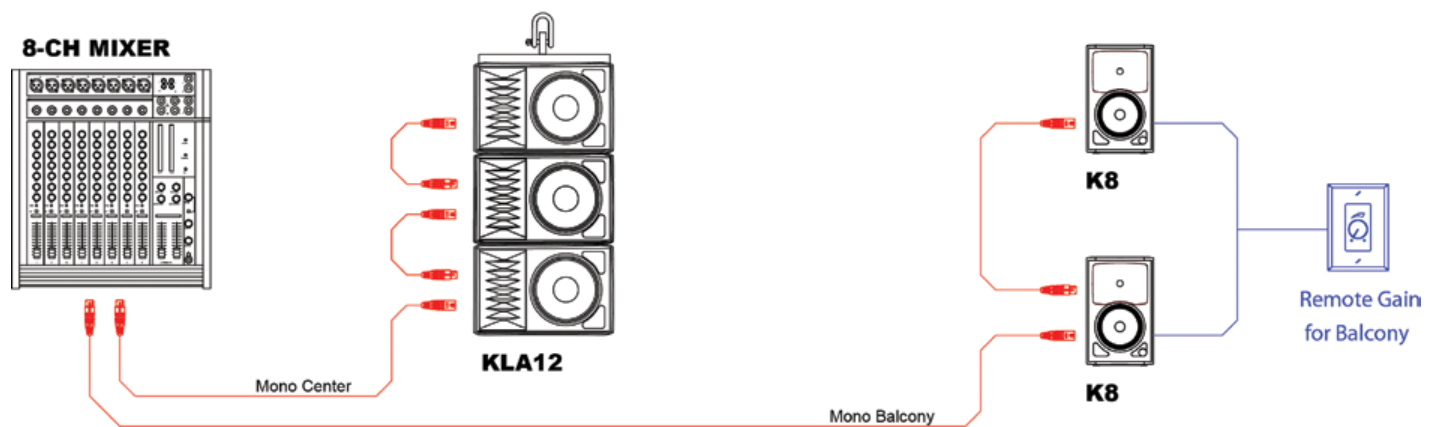
Another major challenge with this venue is loudspeaker placement – typically the ideal location for a loudspeaker happens to be right in front of a projection screen, or impeding an architectural feature such as a stained glass window or a wooden crucifix.



### OPTION #1: Stereo distributed system (wide coverage, lower volume)



### OPTION #2: Mono "center" Line Array system (narrow vertical coverage, higher volume)



# Section 2: Application Suggestions

## Houses of Worship : Medium Church Hall

Approx. 400 - 800 people

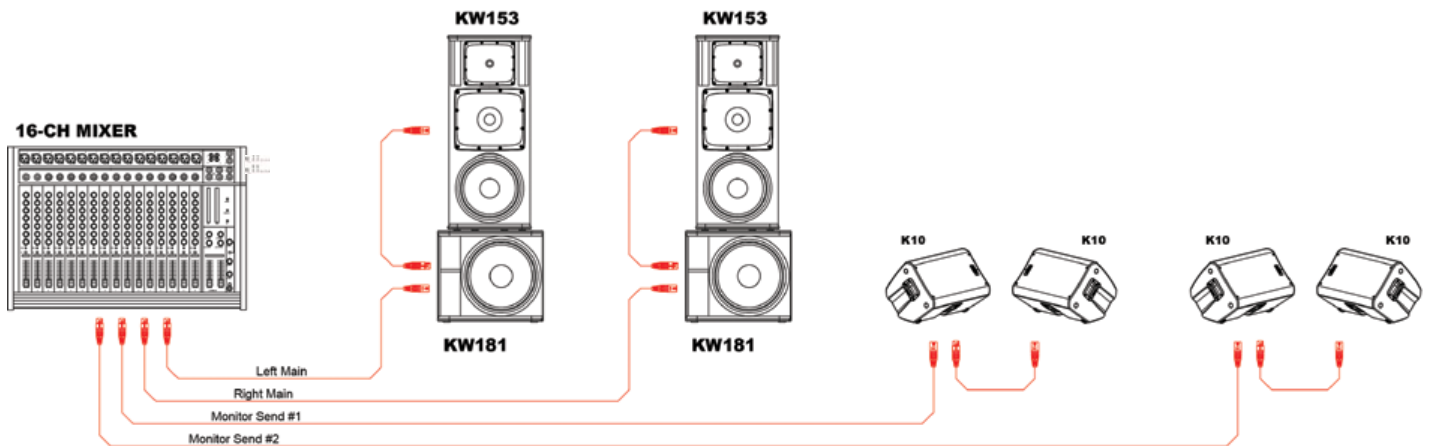
This would be a typical mid-size church hall or temple, with architecture ranging from very traditional to very modern.

While the spoken word still remains the highest priority, there is typically an expectation for contemporary music reinforcement and loud multimedia playback, preferably with subwoofer support.

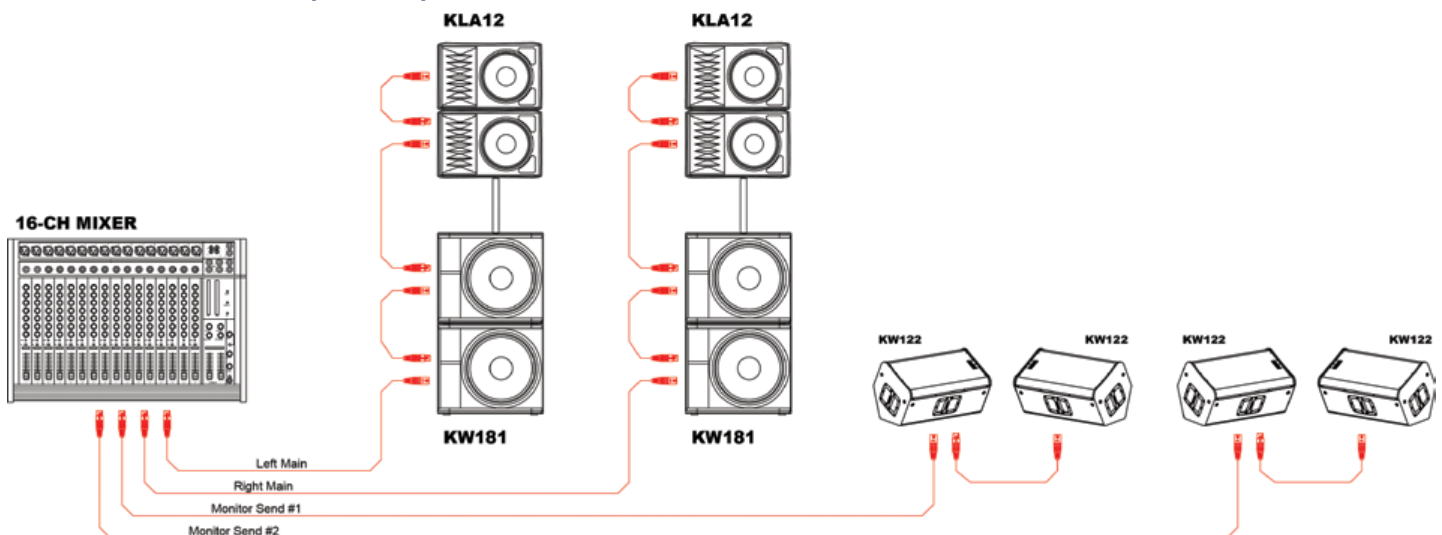
A praise & worship band will often perform on stage with floor monitoring, resulting in loud SPL from the stage volume alone. A system must therefore be designed to reinforce the stage vocalists "above" the energy spilling off the stage.



### OPTION #1: Four-way FOH system (4000watts) with active floor monitors



### OPTION #2: Three-way FOH system (8000watts) with active floor monitors



# Section 2: Application Suggestions

## Houses of Worship : Fan Shaped

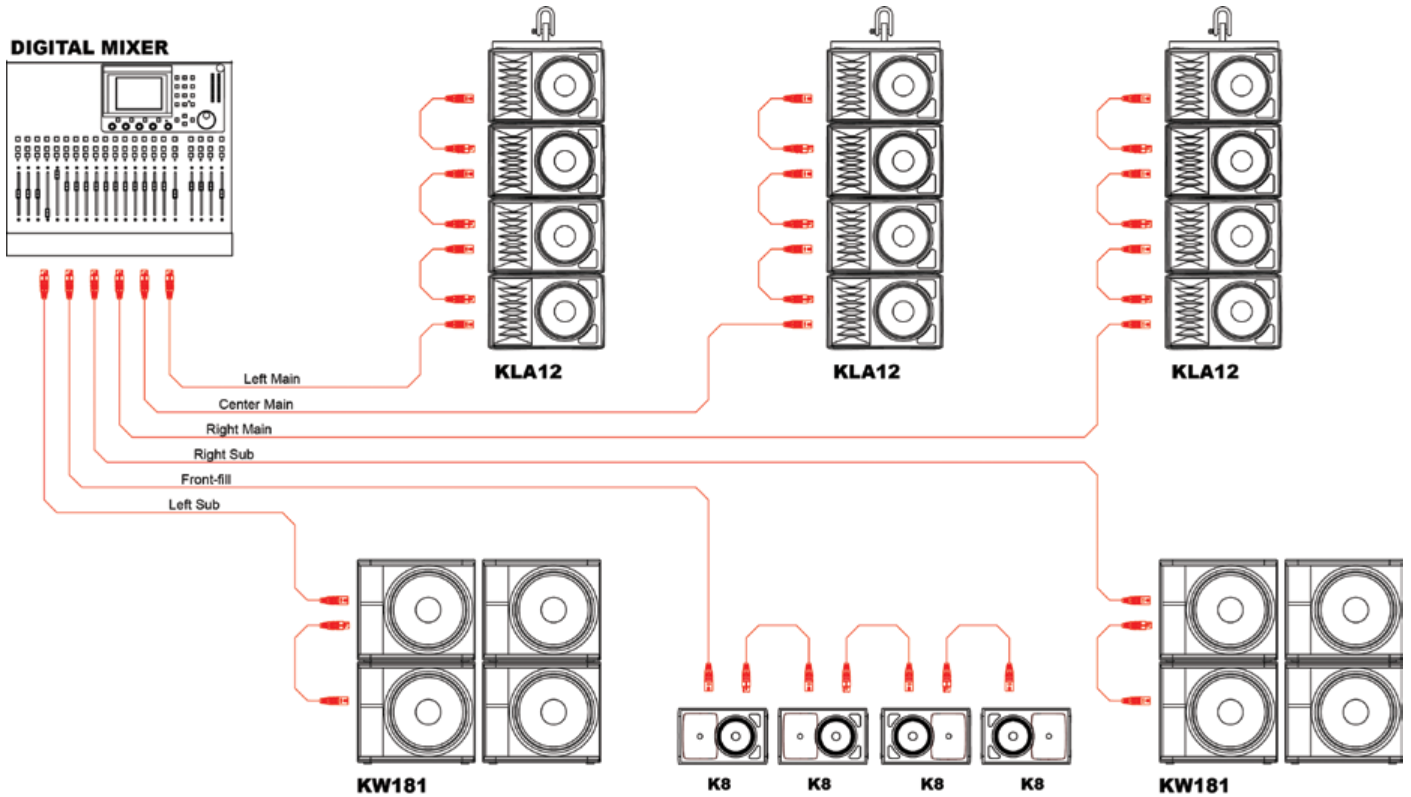
Approx. 400 - 800 people

This would be a typical large modern church auditorium, purpose built with fan-shaped seating and a gently raked floor. Larger variants of this room design may also include a balcony or even wrap-around stadium seating for greater capacity.

This shape room will always lend itself to nice acoustics, however this shape will also create new challenges due to the extra width of the auditorium.

Often three loudspeaker arrays or clusters are required to achieve desirable horizontal coverage, and a delay ring may also be necessary for larger rooms. Although these three arrays are often labeled "Left/Center/Right", in reality this configuration is nothing more than a simple mono distributed system, since the folks seated in the outside zones are actually too far away from the opposite loudspeaker array (and also too far off axis), to ever hear any true stereo "imaging".

As with any flown Line-array system, front-fill speakers are always recommended.





# Section 2: Application Suggestions

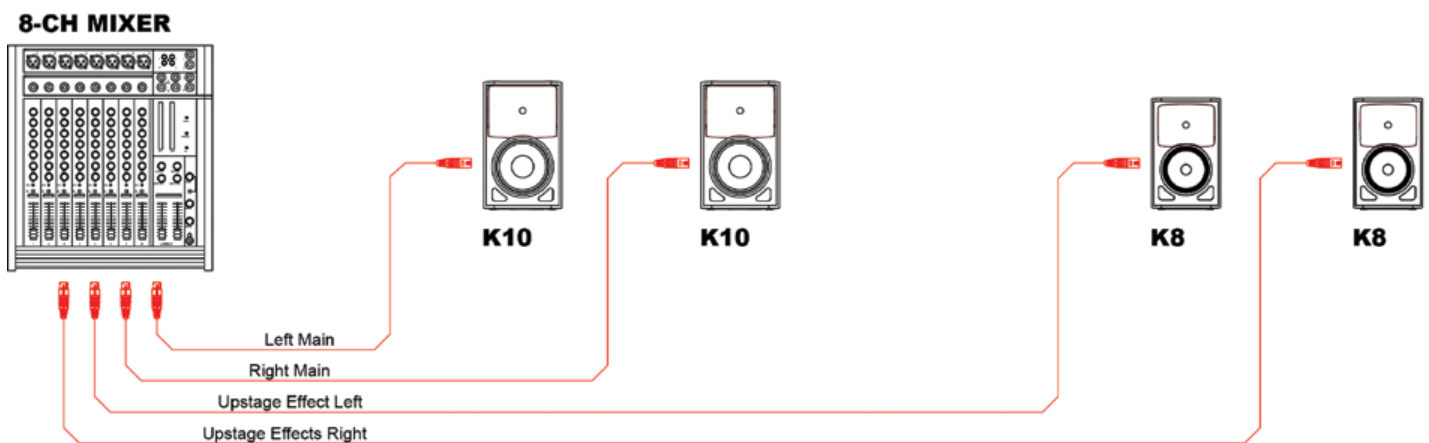
## Performing Arts : Playhouse Theatre

Approx. up to 200 people

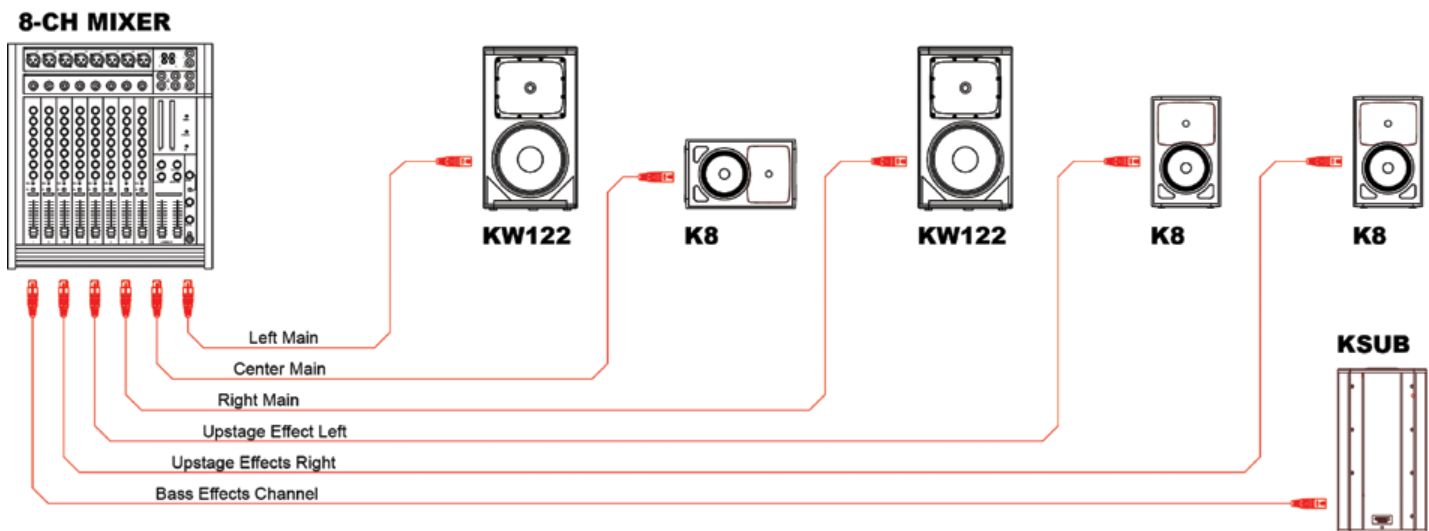
These venues are typically small local amateur playhouse or lyric theaters, basically a scaled down version of a proscenium theater. In some cases the room shape may be stylized after the modern "black-box" theater, with seats wrapping around a central stage area. Although speech does not require too much reinforcement during dramatic performances, there is still a requirement for playback of special effects. Musical theater also requires reinforcement of voice over the often loud orchestra.



### OPTION #1: Basic System with upstage effects channels



### OPTION #2: Center loudspeaker & Subwoofer added for greater flexibility



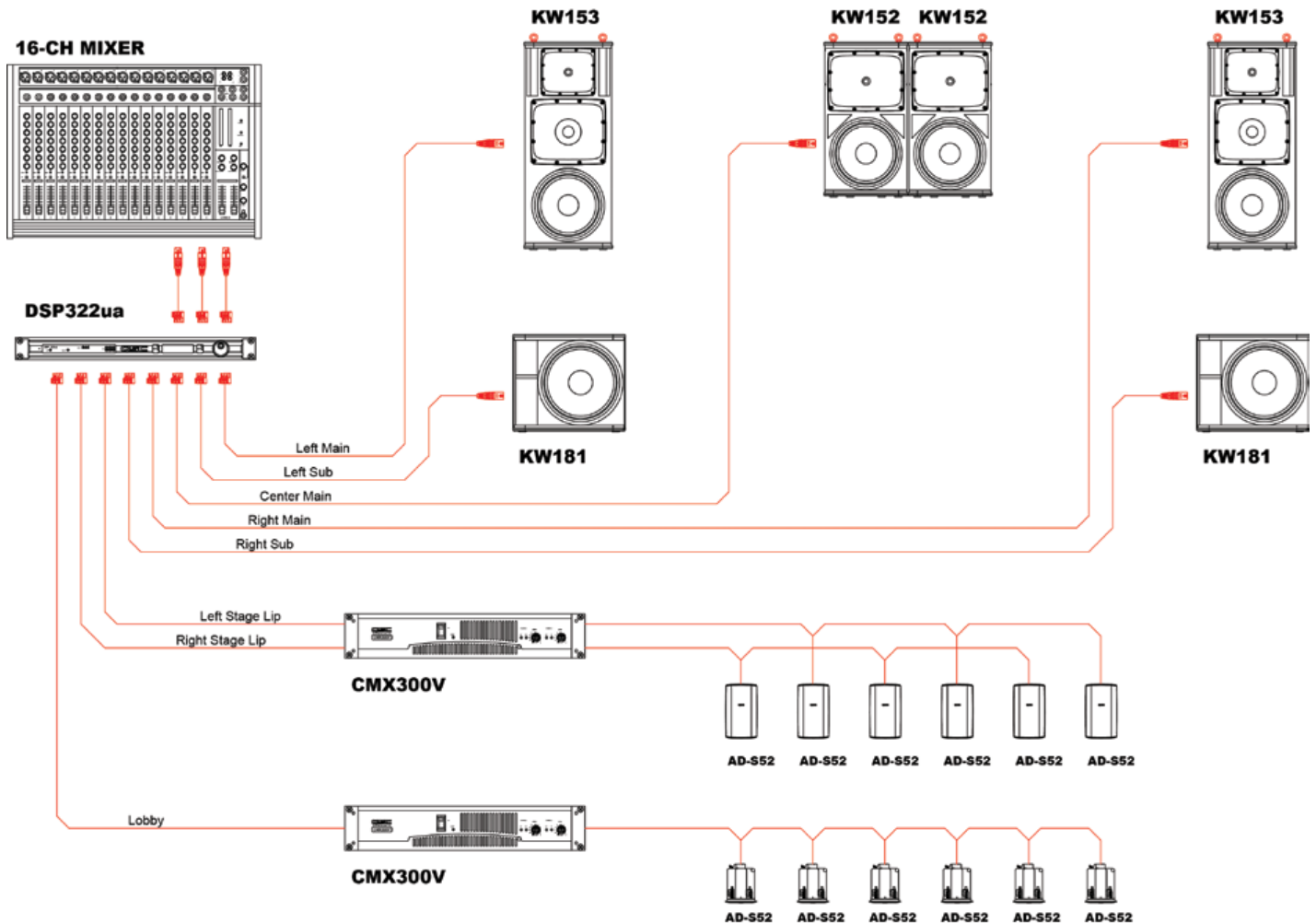
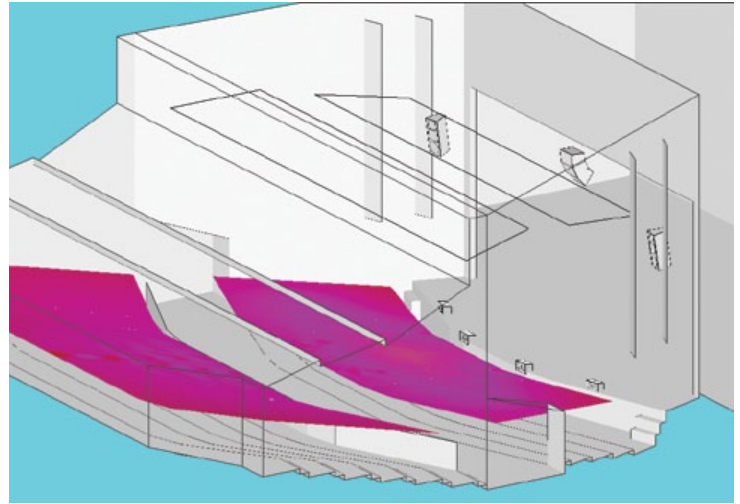
# Section 2: Application Suggestions

## Performing Arts : Community Theatre

Approx. 200 - 400 people

These venues are typically a single level theater, used for community events, meetings, shows or concerts. Whether a "converted" cinema, or a purpose-built auditorium, these rooms will often have a "House PA" primarily for basic speech reinforcement and as support for moderate level live performances. This venue will also regularly host a touring PA system, for higher SPL concerts & shows when required.

With a primary focus on vocal reinforcement, the ideal system would feature a Left / Center / Right loudspeaker configuration, with the center channel dedicated to voice. An ancillary system for the lobby is often required for making "house calls" before the show and between breaks.



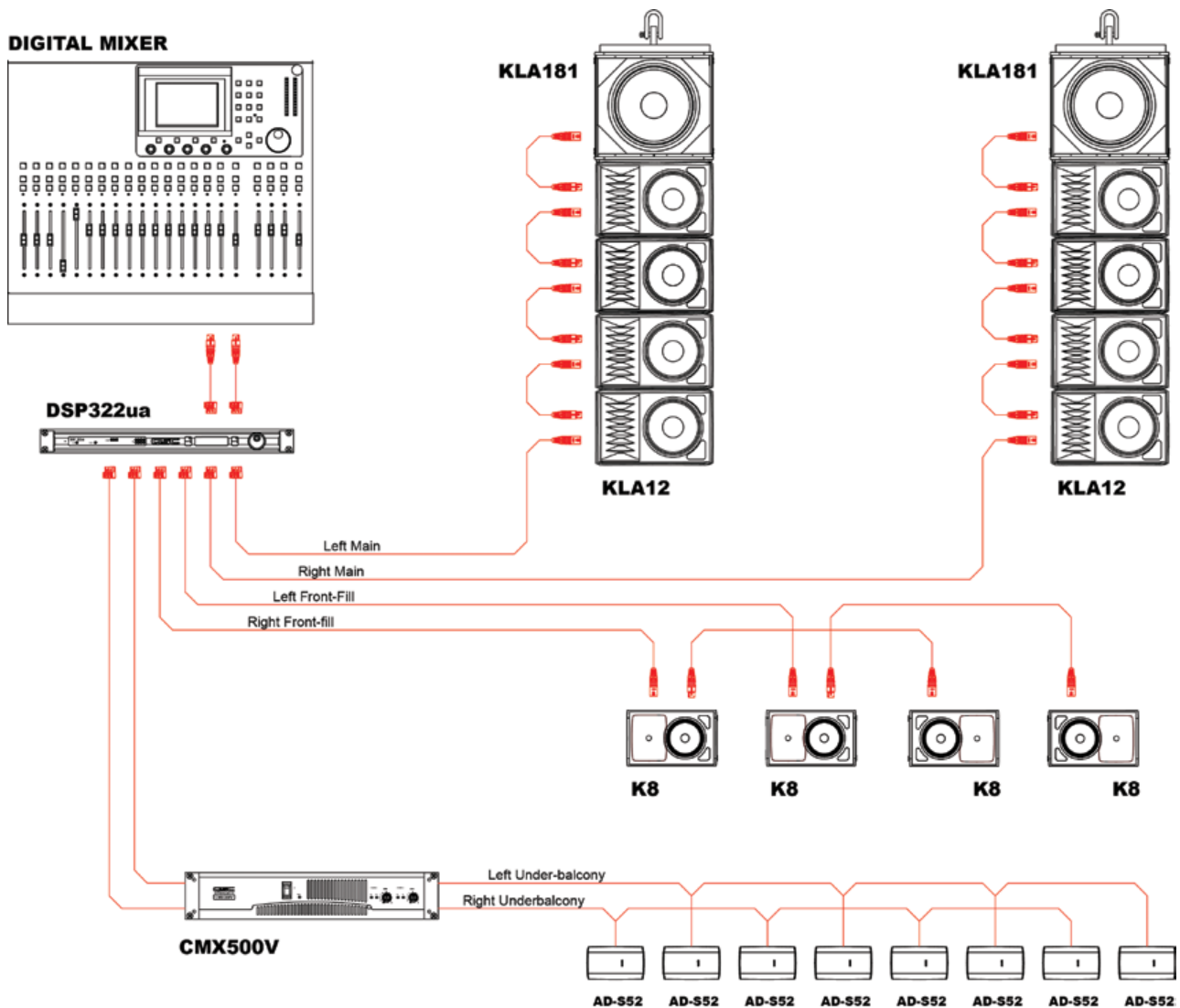
# Section 2: Application Suggestions

## Performing Arts : Proscenium Theater

Approx. 400 - 800 people

This is a traditional proscenium arched theater, with lower stalls, a middle "dress circle", and sometimes even a third level referred to as the gallery or "the gods". VIP boxes are also located to either side of the stage, but many times these are re-purposed for follow-spots or fill loudspeakers.

Most existing proscenium theaters have acoustics better suited to operatic, orchestral or choral styles, however newer construction versions may have more of a fan-shape and less reverberant decay better suited for contemporary music theater.



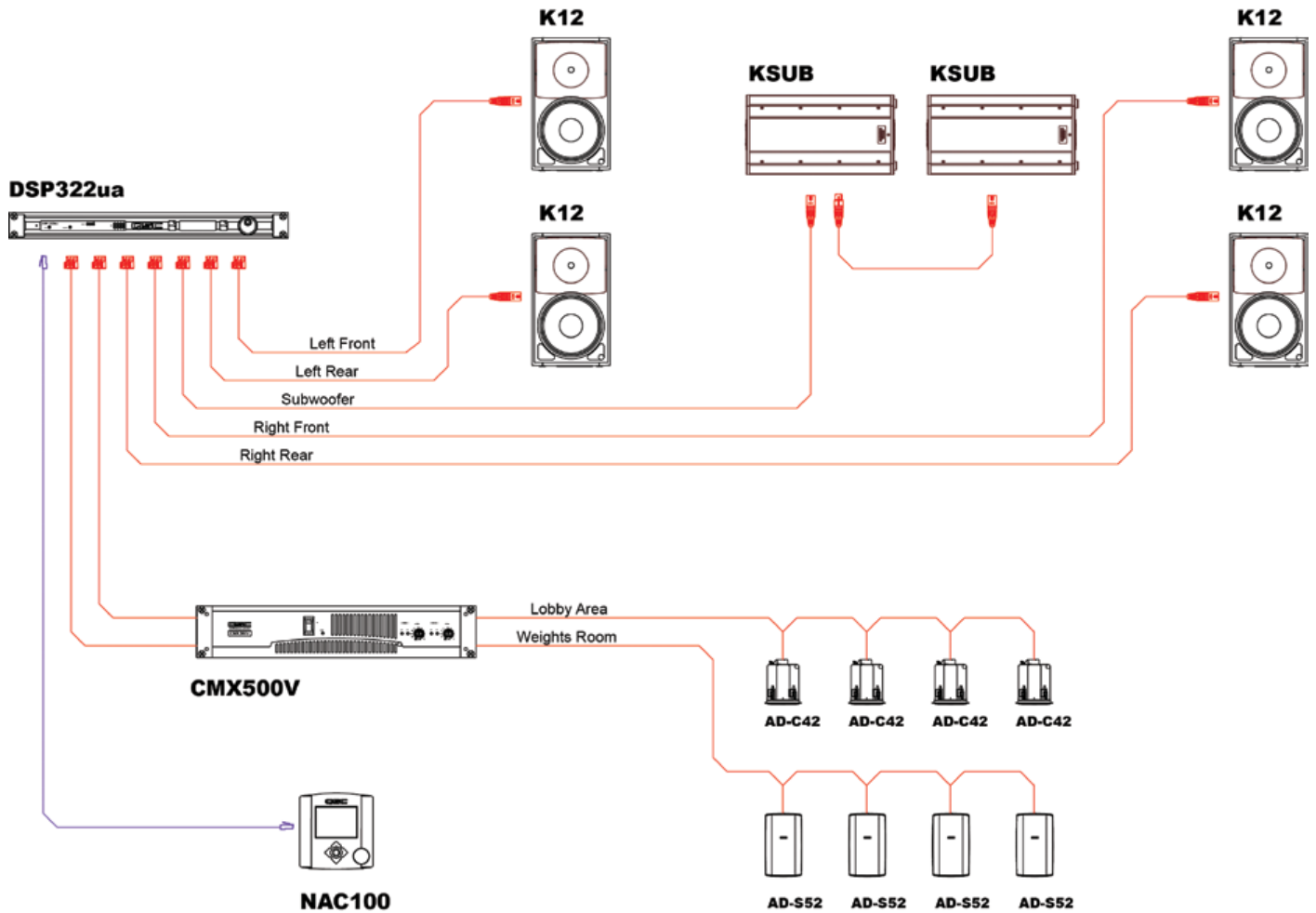
# Section 2: Application Suggestions

## Multi-Purpose : Fitness Studio

Approx. up to 100 people

These multi-purpose rooms are typically part of a larger health club or fitness centre, and can be used throughout the day for anything from Step classes, Spin classes, Pilates classes, Zumba classes, or even general dance classes.

The brief for this room is to have bass-heavy “nightclub” style music at moderate to high volumes however, the use of an instructor’s headset microphone, and the subsequently low gain-before-feedback achieved, will often determine just how “loud” the system can actually be played.



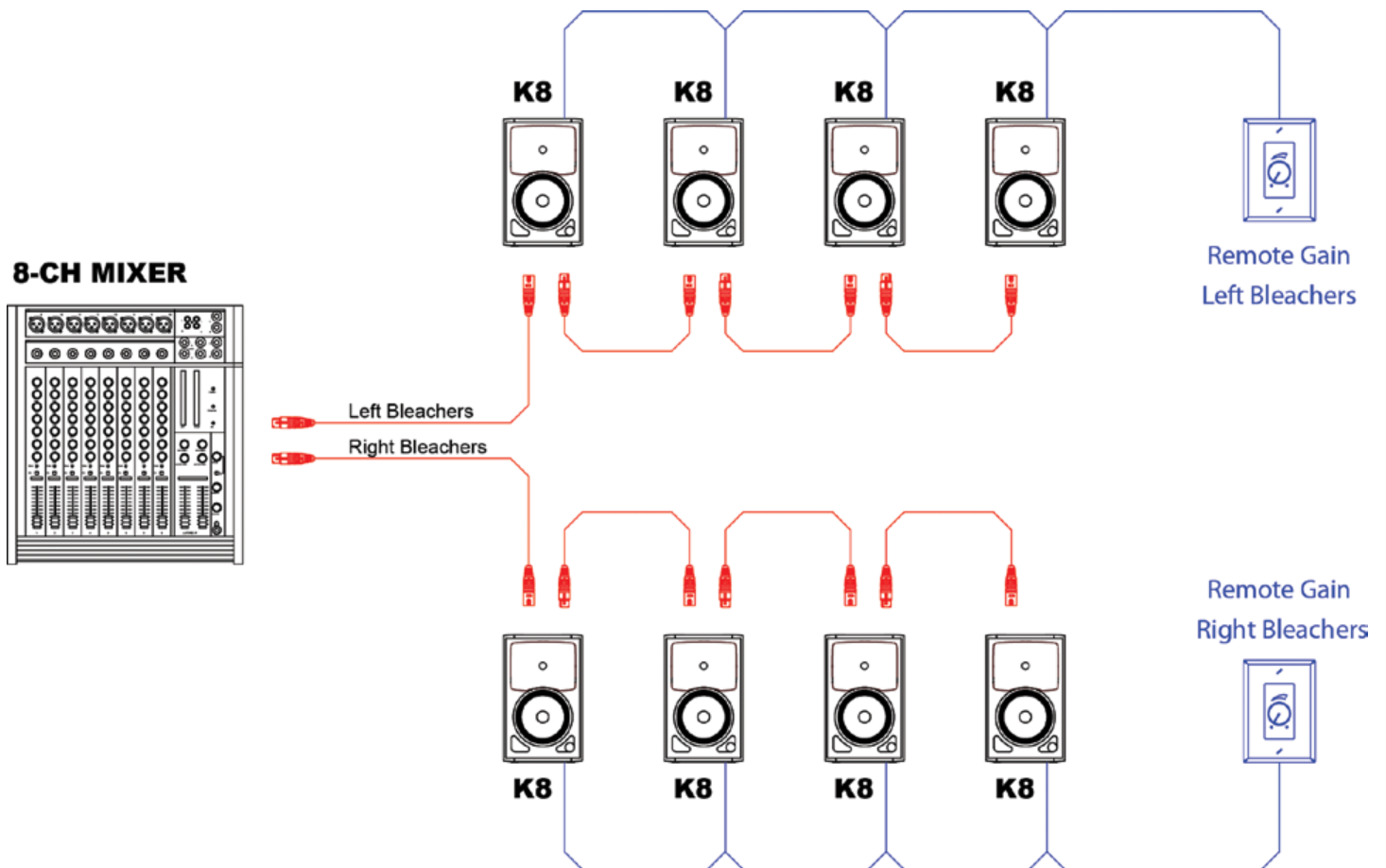
# Section 2: Application Suggestions

## Multi-Purpose : Gymnasium

Approx. 100 - 400 people

This is a typical high school, university or community gymnasium, often with retractable stadium "bleachers" facing each other down either length of the room. These gymnasiums are multi-purpose venues, and can be used for various events ranging from sports, assemblies, awards ceremonies, proms etc .

Due to the highly reverberant nature of these gymnasiums, it is preferable to employ a distributed system above the bleachers consisting of wide coverage loudspeakers such as the K8. The ability to turn down (or mute) one bleacher zone is also desirable for applications where one set of bleachers are retracted, and a stage is setup firing across to the far set of bleachers.

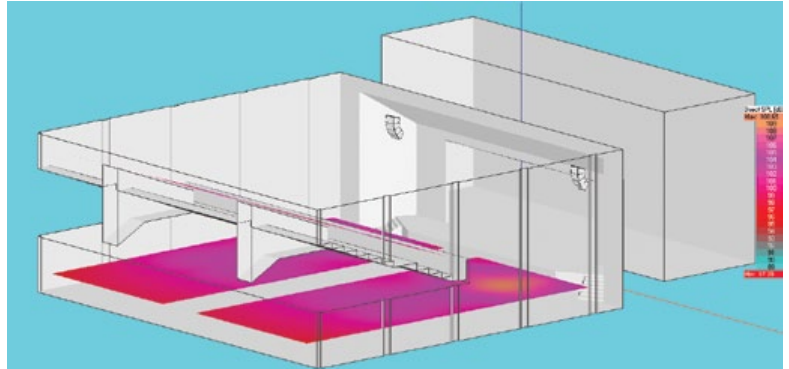


# Section 2: Application Suggestions

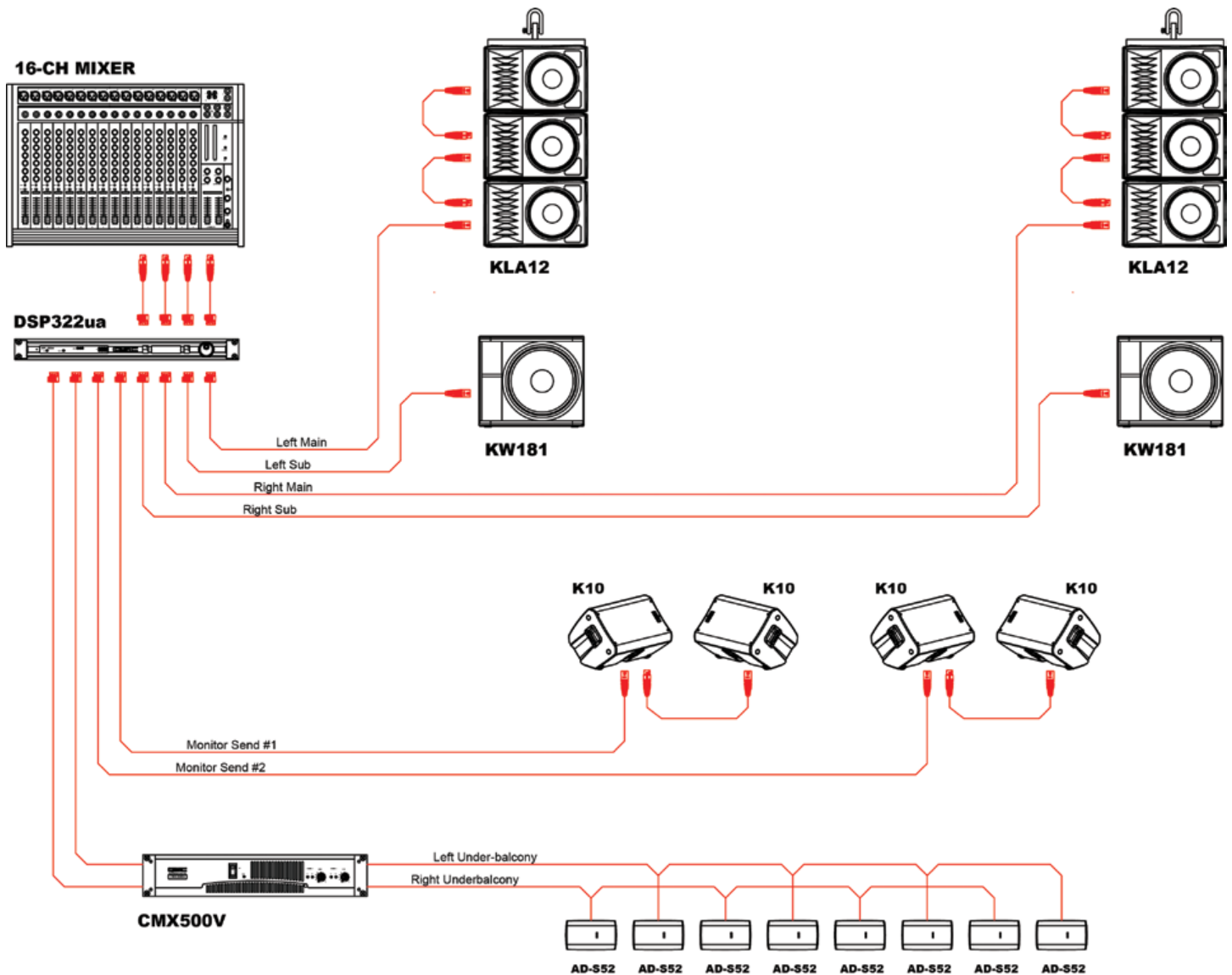
## Multi-Purpose : School Auditorium

Approx. 400 - 800 people

This is typically a purpose-built auditorium for assemblies, music recitals and dramatic performances. The room shape can vary with older retrofit designs, but most new constructions will usually have a generous stage, a gently raking floor, a balcony, and reasonable acoustics.



Due to the wide use of lavalier, headset or gooseneck microphones on stage, a system with excellent gain-before-feedback is required. The KLA is an obvious choice with its extremely tight vertical coverage pattern.



## Section 2: Application Suggestions

### Nightlife : Bar

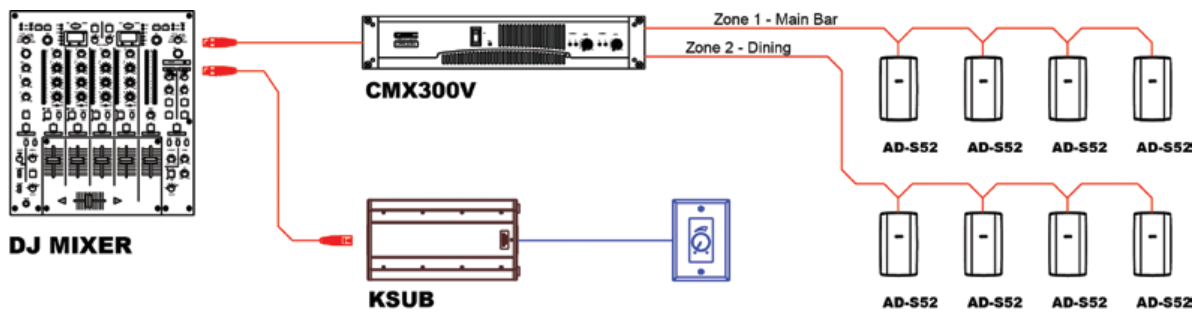
Approx. up to 200 people

This is a typical bar venue, with moderate background music playing during dining hours, and loud foreground music playing during the evening. Other varieties include Sports bars (ESPN), themed restaurants (Hard Rock Cafe), Irish pubs, micro-breweries and taverns.

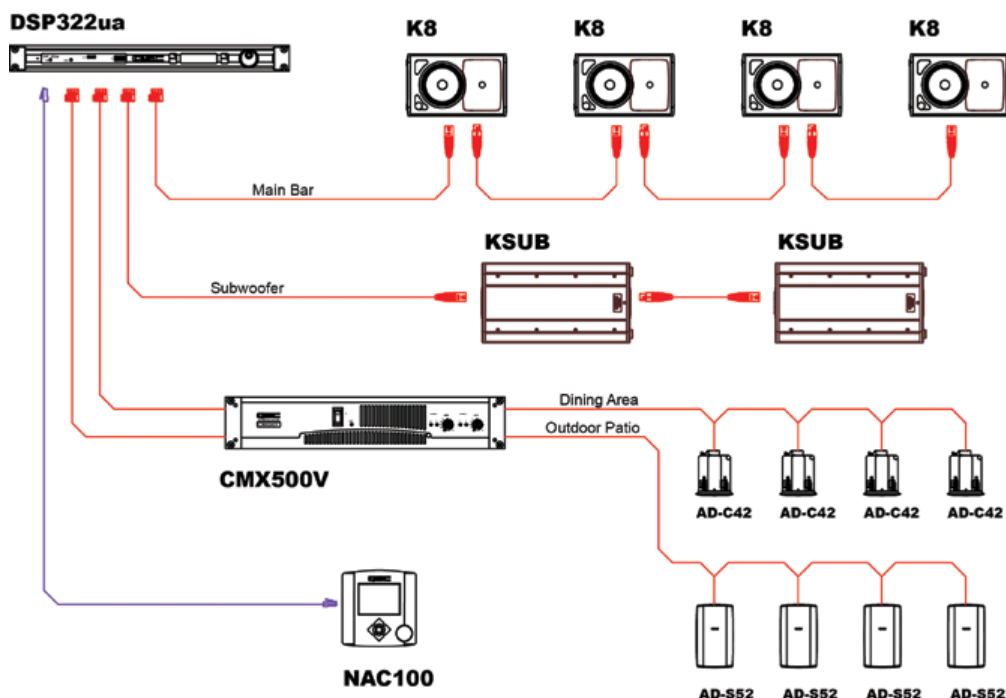
Many bars will have multiple zones such as the main bar, the dining area, the outdoor deck, the lounge area, the restrooms, and often even a small dance-floor. The ability to independently control zone volumes and sources is important.



#### OPTION #1: Basic low cost system for small Bar/Restaurant.



#### OPTION #2: Multi-zoned system for large Bar/Restaurant.



# Section 2: Application Suggestions

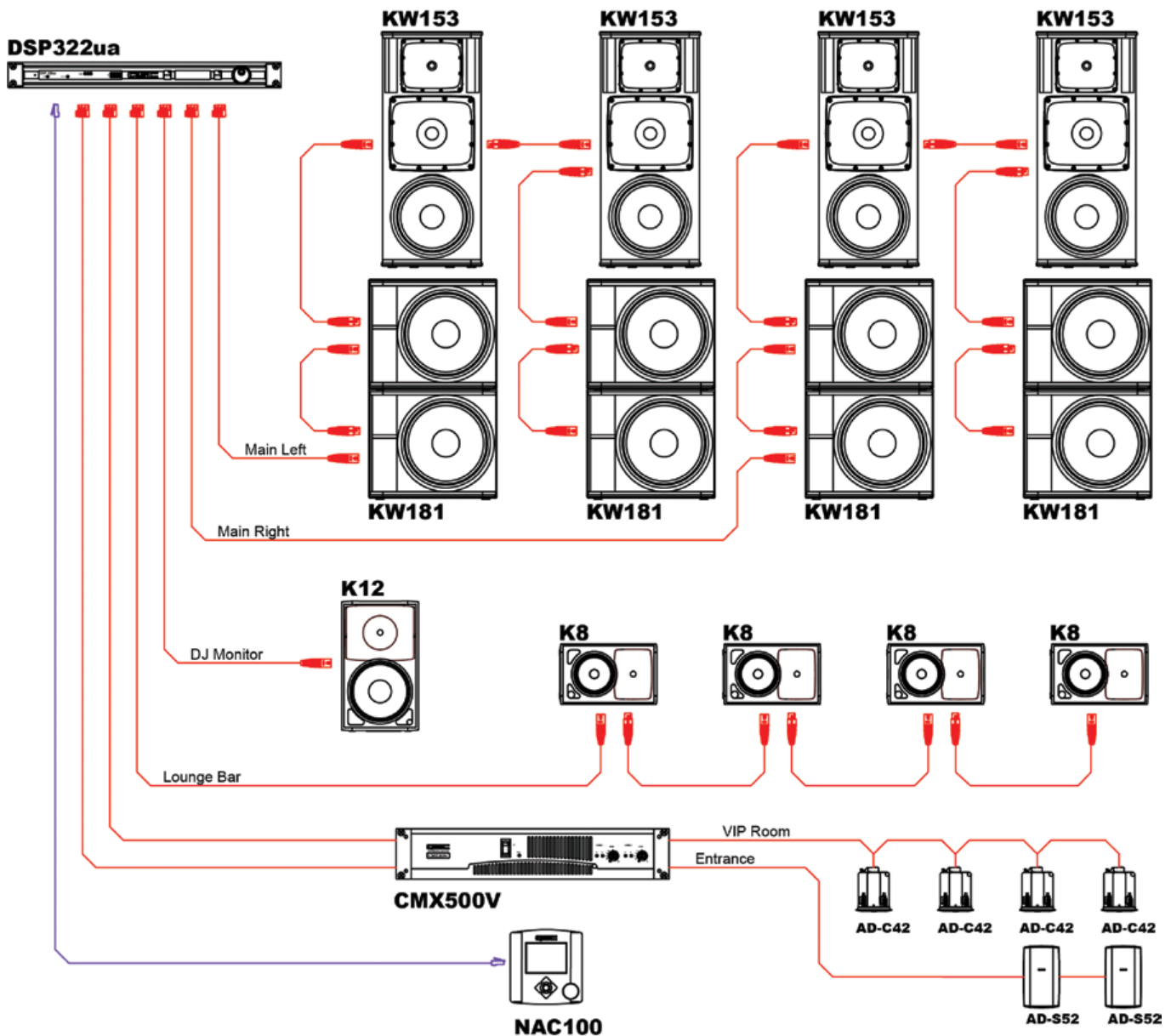
## Nightlife : Dance Club

Approx. 200 - 400 people

This is a purpose built dance-club with a main dance-floor system capable of delivering high SPL and chest-thumping bass.

Typically the main system will consist of four loudspeaker arrays or clusters located in each corner of the dance-floor. Opposite facing loudspeakers will share a common stereo feed, ensuring that stereo imaging is experienced throughout most of the dance-floor.

Other zones may include the entrance for queuing, a VIP section, a lounge area and restrooms.





# Section 2: Application Suggestions

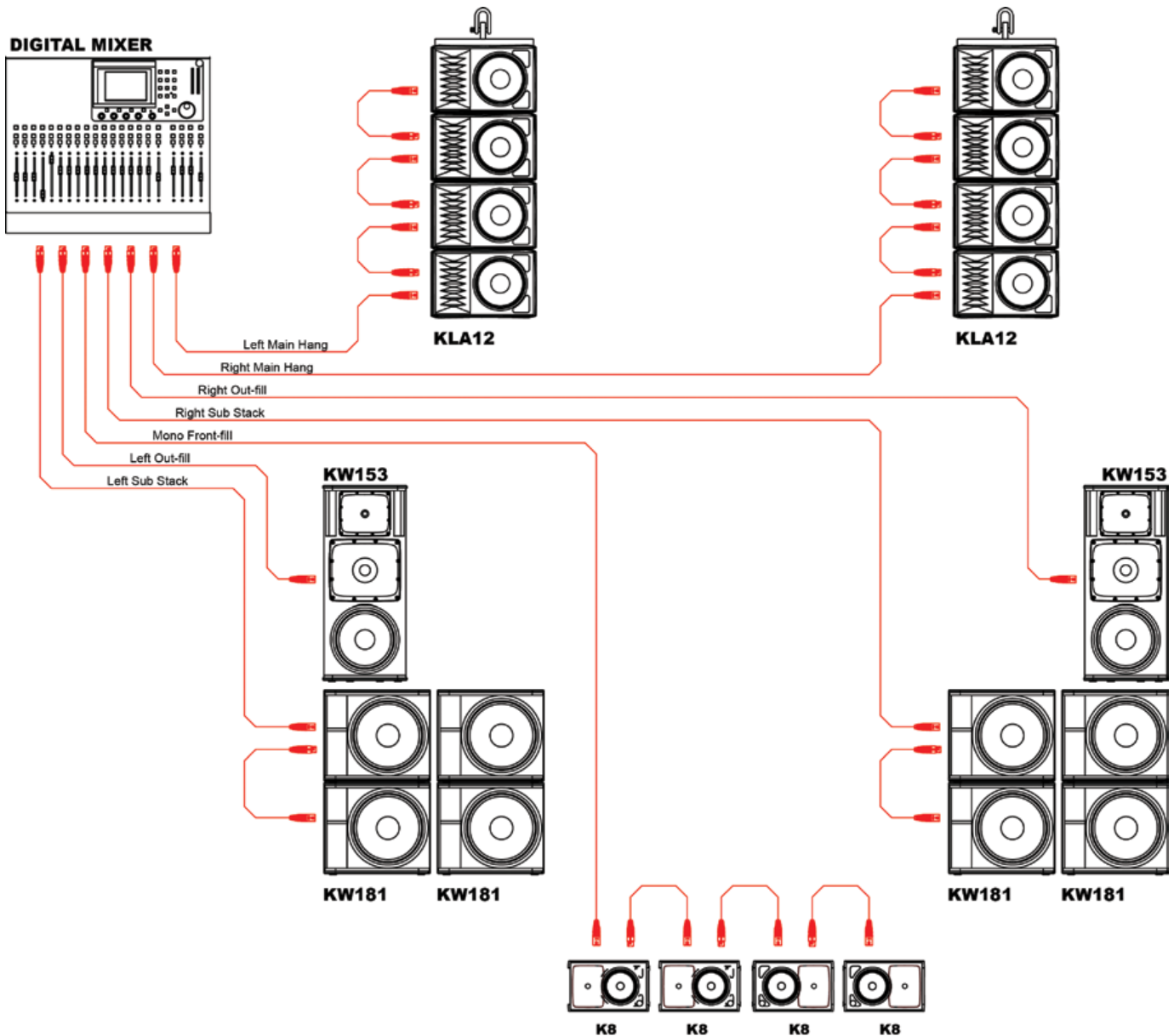
## Nightlife : Live Music Club

Approx. 400 - 800 people

This is live performance venue where local and regional artists will perform. Often part of a promoters "circuit", this venue will often have a different artist performing every single night.

The recommended system for this venue must be loud, reliable, and able to handle a wide variety of artists, music styles, and sound engineers that come through those revolving doors.

Floor monitoring must be be equally as robust.

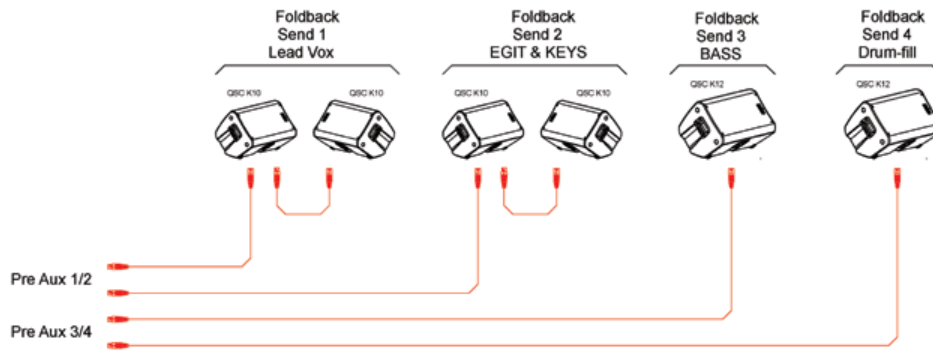


# Section 2: Application Suggestions

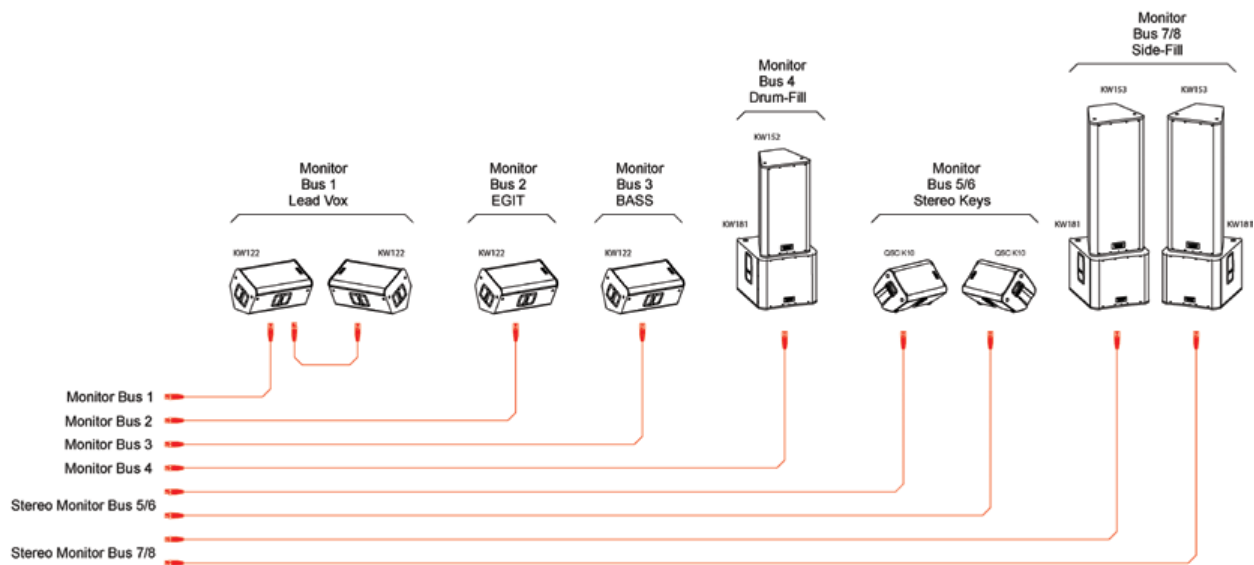
## Monitor Systems & Backline



### Small Monitor Rig



### Large Monitor Rig



Remember, you can power up to FIVE K-family products (any mix of model) from a single 15Amp circuit (120V) or 7.5Amp circuit (230V)



## Section 2: Application Engineering Contacts



### Address

QSC Audio Products., LLC.  
1675 MacArthur Boulevard  
Costa Mesa, CA 92626-1468  
USA

### Main Switchboard

Tel: (800) 854-4079  
Tel: (714) 754-6175  
Fax: (714) 754-6174  
E-Mail: [info@qscaudio.com](mailto:info@qscaudio.com)

### Application Engineering & Technical Services

Tel. (800) 772-2834  
Tel. (714) 957-7150  
Fax: (714) 754-6173  
E-Mail: [tech\\_support@qscaudio.com](mailto:tech_support@qscaudio.com)