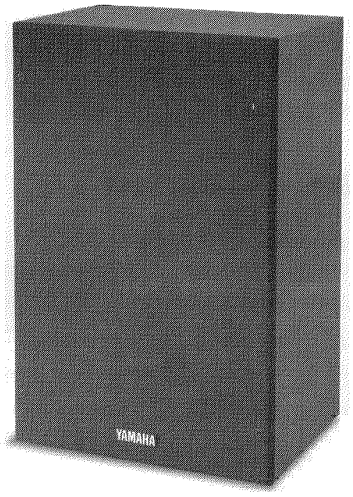
YAMAHA®

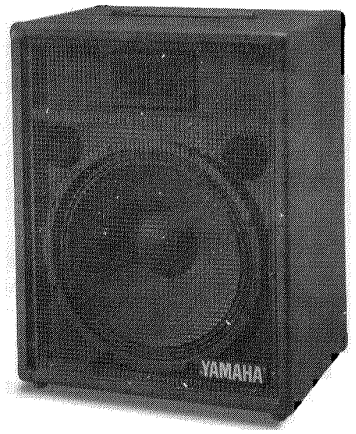
Club Series III
Oak Series III
Piezo Series III

Sound Reinforcement Speakers

CLUB SERIES III
S115III
S115IIIA
S112III
SM15III
SM12III
SW118III



OAK SERIES III
S115III-OAK
S115IIIA-OAK
S112III-OAK
S110III-OAK
SM12III-OAK
SM10III-OAK
SW118III-OAK



PIEZO SERIES III
S110PHIII
S112PHIII
S115PHIII
SM12PHIII

Operating Manual

This product, when used in combination with amplification and/or additional loudspeakers may be capable of producing sound levels that could cause permanent hearing loss.

DO NOT operate at high volume levels or at a level that is uncomfortable. If you experience any discomfort or ringing in the ears or suspect any hearing loss, you should consult an audiologist.

CAUTION!

Recommended for use with: Ultimate Support Systems Inc. Model TS-30 or TS-33 speaker stands only.

- **Use only ONE speaker per stand.**
- **The loudspeakers and stands must always rest upon a solid, level surface.**
- **Improper installation or usage could result in the loudspeaker falling and causing injury.**
- **SW118™ and SW118™-OAK sub-woofers have a metal socket to allow mounting of a satellite speaker. Do not use a pole longer than 56".**

ATM Fly-Ware™

Model S115IIIAT and S115IIIAT-OAK

These loudspeakers are supplied with ATM Fly-Ware™ rigging hardware installed. The following notes explain how to ready these speakers for suspension.

IMPORTANT! ***This material does not explain how to suspend.***

To properly suspend any speaker, a knowledge of structural engineering and structural rigging is REQUIRED. Suspending loudspeakers requires special tools and techniques. Do not attempt to suspend any speaker system unless you have received specific training to do so.

The improper installation of flying speakers can result in bodily Injury or death.

Always consult a licensed engineer to verify the design of any suspended system. In addition, please follow these safety steps:

- **Use only hardware specifically designed for this application.**
- **Always use an independent safety suspension system as a failure backup.**
- **Get professional help.**

To prepare these speakers for suspension:

1. Remove the flathead screws from the top of the speaker.
   Note: The 3/8" flathead screws use a 4.5 mm (7/32") hex wrench. Take care not to remove both screws from each corner as the internal bracket will fall inside the loudspeaker.
2. Apply a drop of thread locking adhesive to the end of the threads of the eye bolts.
   Note: Please use the supplied eye bolts found in the carrying handle of the speaker. If you use any part other than that supplied be sure it is Load Rated and know that it will be de-rated if not suspended so that the pull direction is in-line.
3. Install the eyebolts into the holes on top of the speaker and finger tighten.
4. Securely tighten the eyebolts. Generally half a turn will suffice.
5. Inspect the other six (6) flathead screws, making sure they are tightened down.

Table of Contents

Introduction

Thank you for purchasing Yamaha Club Series III™ Oak Series III™, or Piezo Series III™ loudspeakers. These products have been designed to provide many years of trouble-free, high-performance service.

This owner's manual contains important information designed to help you obtain the exceptional performance and satisfaction these loudspeakers can deliver. We recommend a complete reading of this manual before attempting to operate these products.

➪ ***Please refer to the Important Safety Information on page 2.***

If you just can't wait to hear how your new system sounds, ***please*** skip to the section titled **"Setting up the System"** on page 8.

Throughout this manual, you will find technical terms marked with ✎. These terms are defined in the Glossary on page 15.

Overview

The redesigned, third generation of these sound reinforcement loudspeakers boasts many new features.

Club Series III

- Trapezoid box shape allows smooth array arcs.
- Lightweight, extremely durable, carpet-covered speaker cabinet with relocated carrying handles for easier lifting and carrying.
- Rugged metal corner protectors and metal input jack plate.
- Parallel ¼" input jacks allow the signal to be fed to two cabinets.
- Compression driver with non-resonant 60° x 40° horn on all models except PH Series.
- Design of 2" compression driver with a rugged, deep radius titanium diaphragm reduces the harmonic distortion caused by the "ringing" of shallower diaphragms.
- Advanced crossover network increases power handling and improves crossover smoothness.
- Poly Switch - a self-resetting device for protection against damage from excessive power.
- Stand mount socket for TS-30 or TS-33 speaker stands from Ultimate Support Systems Inc.
- The S115IIIAT and the S115IIIAT OAK have ATM Fly-Ware™ pre-installed at suspension points that are carefully balanced around the center of gravity. A pair of forged shoulder eyebolts is included.
- New to the Club Series and Oak Series are 18" sub-woofers delivering compact, high-power, low-frequency reinforcement. A handy socket accepts a pole for mounting the main speaker.

Oak Series III

- These speakers share many of the advantages of the Club Series plus:
- A lighter cabinet than previous Oak Series models.
- A new Oak veneer with a color and pattern that will look great in any installation.

Piezo Series III

- Piezo Series models feature a new piezo driver horn assembly.
- Improved sound quality from a new woofer.

Matching Loudspeakers to Amplifiers

Why are power ratings important?

Matching amplifier power to loudspeaker capacity is very important since a driver may be destroyed by an amplifier with *too much* or *too little* power. In fact, an amplifier with insufficient power may actually be more hazardous to a high frequency driver than an amplifier with sufficient power.

How can too little power damage a loudspeaker?

Loudspeakers are susceptible to two types of damage or failure. First, overheating of the voice-coil and second, physical damage caused by the cone or diaphragm attempting to operate beyond its physical (mechanical) limits (over-excursion). Voice-coil heating is dependent upon the *average* power dissipated, whereas excessive peaks - even momentary ones, may cause physical damage or rupture.

Normal program material tends to contain less energy at higher frequencies. In fact, with most music or voice program material, the energy is often halved with each doubling of frequency. So the high frequency driver may only be rated to receive 40 watts, while the woofer can handle 200 watts.

When an amplifier reaches its maximum output level, **clipping** ✎ occurs. Clipping has two results. First, extremely high levels of high frequency harmonics are generated and second, although the *maximum* level cannot be exceeded, the signal will remain at the maximum for a greater percentage of each cycle. This increases the *average* power and thus the heating effect. For example, a 50 watt amplifier driven into extreme overload will have the same heating effect on the voice coil as an undistorted 100 watt amplifier. In addition, even if the overload is caused by a low frequency peak, the distorted signal will contain a much greater amount of high frequency energy (harmonics) and a passive crossover will direct a larger proportion of this signal to the high frequency driver.

Under normal circumstances, a 100 watt amplifier may feed 75 watts to the woofer and 25 watts to the tweeter, while a severely overloaded 50 watt amplifier might have the equivalent heating effect of feeding 60 watts to the tweeter and 40 watts to the woofer - at least until the tweeter's voice coil burns up and goes open circuit.

If a more powerful amplifier is used, care must be taken to avoid driving it at too high a level, thus exceeding the power capacities of the speakers and drivers.

How much power is sufficient?

The specifications of Club Series III, OAK Series III and Piezo Series III loudspeakers show three different power ratings, for example the S112III has the following ratings:

Noise:	100 watts
Program:	200 watts
Maximum Peak:	400 watts

What do these ratings mean?

"Noise" power is the maximum, *long term average* power that the loudspeaker can handle. It is also called "continuous" power and results in the maximum heating of loudspeaker voice coils.

"Program" power corresponds to the heating effect of actual program material, which would contain many peaks and dips that may be "averaged" over a period of a minute or more to yield a "real world" rating.

"Maximum" power is the absolute maximum *instantaneous* power that the loudspeaker can handle for very short periods - generally less than 1/10 second.

Examine the power ratings of potential amplifiers and choose the one whose ratings most closely match those of the loudspeaker to be used. For example, the Yamaha P2500 power amplifier will deliver 250 watts into an 8 ohm loudspeaker, so this would be a good match for the S115III, S115IIIAT, S112III, SM15III, SM12III, S115III-OAK, S115IIIAT-OAK, S112III-OAK, SM12III-OAK, S112PHIII, S115PHIII, or SM12PHIII loudspeakers.

Using Multiple Loudspeakers

The Club Series III speaker cabinets are trapezoidal in shape and form an arc of 30° when placed together in an array.

For best results, use only the loudspeaker cabinets necessary to achieve the desired SPL or coverage goals. Increasing the array size will increase SPL but at the expense of intelligibility and transient detail. An array will normally sound better if you reduce overall SPL expectations in favor of a "cleaner", more intelligible sound, especially if the program contains high frequency transient detail.

Group loudspeakers in tight clusters and do not aim multiple cabinets at one particular location. This will help reduce interference or cancellation of various frequencies as the outputs of individual cabinets combine.

Split-Source and Multi-Channel (Stereo) Arrays

Split loudspeaker sources are the normal configuration for entertainment systems. Many split systems are also mixed to two channels, which can improve the sound quality by reducing interference between clusters, and enhance auditory perspective for most of the audience. The most successful split cluster arrays provide complete house coverage from each cluster location, and are not widely separated.

The number of channels is optional. Excellent results can be obtained with three channel systems, (left, center, right) by spreading the instruments, while sending vocals and intelligibility-demanding detail to the center array only. By separating sounds between a greater number of smaller, separate arrays, interference within and between clusters will be minimized, while creating the desired acoustic energy and auditory perspective within the performance space.

If possible, provide for an independent sub-woofer mix assignment, as there will be certain sounds that should be isolated from the sub-woofers. Different instruments will need different sub-woofer equalization, as well as different mix levels. Bass and kick drum need very subtle sub-woofer balancing so as not to be overpowering. This also enables powerful visceral effects and musical underpinnings to be created without interfering with more delicate upper frequency details and textures.

Sub-Woofers

What is a sub-woofer?

Entertainers such as performing musicians or DJ's need to produce excitement and energy in their performances. In many cases, this has meant simply making everything louder - but simply turning up the volume on systems with ordinary PA speakers cannot *create* missing energy and excitement. It is more likely to have the opposite effect, by subjecting audiences to excessively high sound levels in the mid-range and large amounts of distortion. The sensation of loudness is related to human auditory perception, and is influenced by not only amplitude (**dB SPL**) ✎, but also frequency and the duration of exposure. This can be shown by **"Equal Loudness Contours"** ✎. Low frequencies are *felt* more than heard.

Why do I need a sub-woofer?

A sub-woofer is specifically designed to reproduce very low frequencies - which full-range speakers have difficulty handling.

When a single speaker reproduces both vocal and low-bass frequencies, any distortion caused by over-excursion of the cone will be apparent as distortion of the vocal range, where our hearing is most sensitive. The use of a sub-woofer allows the lowest frequencies to be diverted from full-range speakers and reproduced at higher levels with less distortion.

This provides a method of creating excitement and energy without operating at levels that are annoying to the audience and venue management - and potentially damaging to the performers' hearing. The low-frequency output of a well-designed sub-woofer is perceptually very pleasing to an audience - much more so than excessive, distorted mid-range sound pressure levels.

A sub-woofer allows a full-range system to operate more efficiently - at frequencies it can handle without distortion. It also allows full-range amplifiers to operate more efficiently - since they are not attempting to supply high levels of power-hungry low-frequency energy, they have greater power capacity for higher frequencies.

High-efficiency, direct-radiator loudspeakers only achieve *optimum* performance over a frequency range of approximately 10:1. For example 100 to 1000 **Hz** ✎. Frequencies outside this range, are reproduced at a reduced level. A rough rule-of-thumb for woofers used in full-range PA speakers places the low frequency limit for high-power **linear** ✎ operation of 15 inch woofers between 60 and 80 Hz, and for 12 inch woofers, between 80 and 100 Hz.

Below these frequencies, typical full-range system woofers perform poorly at high power levels. When the woofers are driven beyond their linear operating limits, the sound quality is degraded. In extreme cases, when the voice coil leaves the magnetic field, the changing load inductance can activate **brick-wall protection circuitry** ✎ in some power amplifiers. When this occurs, sound quality can be damaged beyond recognition or destroyed - if only temporarily.

The solution to these problems is to add sub-woofers, a power amp and a crossover.

Multiple Sub-Woofers

The sound energy from two SW118IIIs, operated at equal power, one on each side of a stage will randomly sum to be 3 dB greater than from one unit alone. But, if the two units are placed side-by-side, their sound energy will sum coherently to be 6 dB greater than a single unit.

Boundary Conditions

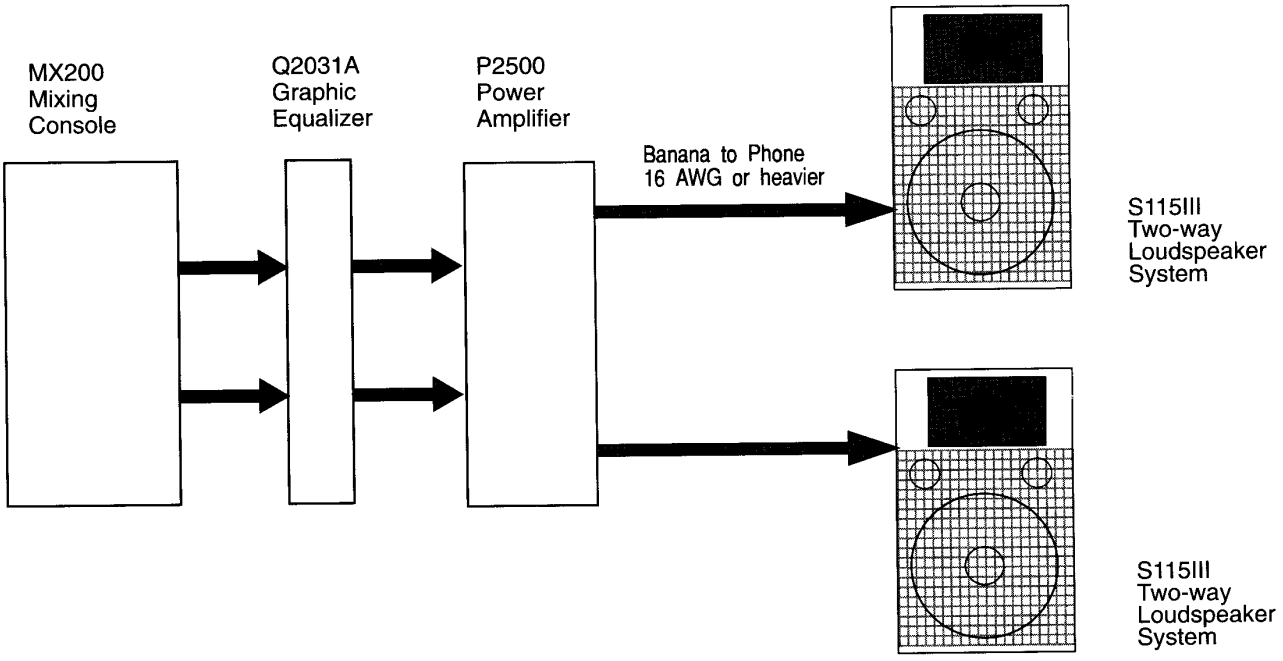
Sub-woofer systems perform best when placed on the floor. The floor in front of a stage effectively doubles the size of the array. The *real* loudspeakers are above the floor while a second *imaginary* set is located below the floor. The volume displacement will double and there will be a 6 dB increase in radiated power

A corner location will introduce another boundary, effectively re-doubling the array size from that of mid-room floor placement.

The SW118III and SW118III-OAK Sub-Woofers

SW118III and SW118III-OAK make the benefits of sub-woofers available at moderate cost. They add a new dimension of excitement and loudness energy to systems of Yamaha speakers, as well as other full-range speakers. The added bass energy contributes so significantly to the overall energy-frequency envelope that users frequently report actually *reducing* the output level of their full-range cabinets when these sub-woofers are used.

Setting Up the System



The following examples assume the use of a dual-channel (stereo) system comprised of Yamaha components:

1	**MX200**	Stereo mixing console
1	**Q2031A**	Dual-channel 1/3 octave equalizer
1	**P2500**	Dual channel 250 W per channel power amplifier
2	**S115III**	Two-way sound reinforcement speakers

Cables and Connectors

Be certain to use high-quality, shielded cables for all connections between mixer, equalizer, crossover (if used) and amplifiers. For internal rack wiring and permanent wiring in fixed installations, foil-shielded cabling may be used. It's economical and easy to strip. Cables that are handled frequently should have a braided shield. Use unshielded cable with stranded conductors between amplifiers and speakers. Cable gauge is an important factor in speaker performance, especially for sub-woofers. Use 16 AWG (or heavier) for the S115III etc. and 14 AWG (or heavier) for high power loudspeakers such as the SW118III sub-woofer. For extremely long speaker cable runs, even heavier wire is recommended. Don't sacrifice the performance of hundreds or thousands of dollars in sound equipment to save a few dollars on cables. Narrow gauge and/or long cables cause a power loss in the cable and also reduce the **damping factor** ✎ which results in poor definition in the bass response. Use the *heaviest* and *shortest* cables that are practical. Use high quality ¼" phone plugs for the speaker inputs. Under no circumstances use "guitar cords" to connect the amplifier output to loudspeakers. It is also a good idea to mark your cables at both ends with colored tape or heat-shrink tubing to help avoid confusion and improper cross-connection.

Connections and disconnections should always be performed with audio levels down to prevent shock noise or (worse) electrical oscillations caused by ground loops or ground interruptions.

Poor housekeeping can create unforeseen hazards. Keep equipment working areas free from cables and power cords that may be tripped over and accidentally disconnected.

Equipment Racks

For transportable applications, Yamaha strongly recommends that all rack-mount equipment be properly installed in an equipment rack designed to withstand the rigors of transport. A rack will protect your equipment investment and the internal rack wiring will have to be done only once - instead of every time the system is set up. This means less wear and tear on the cables and connectors and less chance of misconnecting the system.

Polarity

Polarity is critical when loudspeaker systems are combined.

Full-Range Cabinets

If two cabinets stacked side-by-side are connected in opposite polarity their outputs will tend to cancel at lower frequencies, resulting in *reduced* bass response!

Bi-Amplified Systems

Frequencies around the crossover point will be reproduced by both LF and HF drivers. Use the polarity setting that delivers the greater sound level around the crossover frequency and the smoothest frequency response.

Sub-Woofers

When using Yamaha Club Series III full-range systems with SW118III sub-woofers, frequencies around the crossover point will be reproduced by both the full-range cabinet and the sub-woofer. It's possible that the best performance may be obtained with the sub-woofer connected in reverse polarity. Experiment by reversing the polarity of the SW118III connections and use the setting which delivers the greater sound level around the crossover frequency.

Stacking the System[1]

- **The loudspeakers must always rest upon a solid, level surface.**
- **Never stack speakers on an uneven surface.**

For stacked speakers, we strongly recommend the use of a webbing ratchet-strap to tie the system together. These straps are available at hardware and automotive supply stores and are designed for use as cargo restraints in light trucks. Strapping a system together in this way is a common practice among touring sound companies.

Note - These straps and the handles of any Yamaha Club-Series speaker system are not designed for suspending the cabinets and should not be used in this way.

Ultimate Support System Stands[1]

All models except OAK Series, have sockets that accept Ultimate Support Systems stands - model TS-30 or TS-33.

For further information, contact:

Ultimate Support Systems Inc.,
2506 Zurich Drive,
Fort Collins, CO 80524

Oak Series III cabinets

To preserve the attractive oak appearance of these cabinets, socket mounts for stands have been omitted. These mounts may be installed in the field on all OAK Series III cabinets except SW118III-OAK. An installation kit (NCA 8136) is available from Yamaha. This kit includes a tripod support mount, rubber feet and necessary mounting hardware. One loudspeaker may be mounted on each stand.

[1] Please see important Warning Notes on Page 2

Poly Switch

All full-range loudspeakers are fitted with a self-resetting poly switch that protects the high-frequency driver from damage caused by excessive power.

If a loudspeaker cabinet loses high-frequency output, immediately remove power from the unit and wait for two to three minutes. This should allow the poly switch to reset. Re-apply power and check the performance of the high-frequency driver before continuing with the power reduced to a level that does not cause the poly switch to interrupt the signal.

SW118III and SW118III-OAK sub-woofers

The Poly Switch protects the woofer and a similar routine should be followed if its output is lost.

Operating the System

Checkout

Check that all components are wired correctly and that all connections are secure.

Before turning on the system components, adjust your control settings as follows:

(These notes assume you are using **Yamaha** components - if your system contains other components, adapt these directions as needed.)

1. Bring the input level controls of all power amplifiers to minimum (fully counterclockwise).
2. If you are using a graphic equalizer, "Zero" the response, by setting:
   - All frequency cut/boost controls to the "flat" or center position.
   - Input level control to "unity gain" (all the way up).
   - The rear-panel +4 / -20 switch to +4.
   - High Pass Filter (HPF) out.
3. "Zero" the console by setting:
   - All channel and master faders to minimum (all the way down).
   - All EQ controls centered.
   - Aux. Send controls (channel and master) at minimum (fully CCW).
   - Aux. Return controls at minimum (fully CCW).
   - Input pads out.
   - Input Gain controls at minimum (fully CCW).
4. Connect a music source (CD, tape, keyboard etc.) to the console inputs.

Now it's time to begin the "power-up" sequence for your system. The important point here is that ***the power amplifiers should always be turned on last***. This assures that no turn-on transients or "spikes" are passed through the amps, thus damaging the speakers. For this same reason, the power amps should be the first thing you turn off.

Remember - Power Amps: last-on, first-off.

At this point, listen! You should hear no hums or buzzes from the system. A small amount of noise may be heard, if you put your ear near the high-frequency horn. This is normal. If any high-level noises are heard, power-down and check for faulty cables, connectors, or other improper wiring, before powering-up and listening again.

5. With the music source playing, monitor the input channels' CLIP LEDs (if the LEDs are lit most of the time, switch in the Pad). Rotate each channel input GAIN control until the CLIP LED flickers only briefly.
6. Bring the Channel Fader to nominal (about ²/₃ of the way up).
7. Set the channel Pan controls as needed.
8. Bring the Stereo LEFT and RIGHT faders to nominal (also about ²/₃ of the way up).
9. Check the STEREO output meters. Ideally, you should see the PEAK LED flicker occasionally and the meter needle moving vigorously around the 0 VU mark. On Yamaha consoles, the PEAK LED does not indicate clipping. It indicates that brief, transient peaks are approaching (but not necessarily exceeding) clipping.
   Check your console owner's manual for details on what this indicator is telling you.

   At this point it may seem that you are running your mixing console much "hotter" than normal. The fact is that many sound system operators tend to run their mixers far below the mixer's capabilities. The result is reduced dynamic range and excessive residual noise (mostly hiss—background noise energy independent of the sound levels of the actual performance).
10. Gradually bring up the input level controls of the power amplifier until slightly **less** than the expected maximum performance level is reached.

    ***Note** - It is a common misconception that the level controls of a power amplifier affect the maximum output power of the amplifier. In fact, these controls simply adjust the input sensitivity - not the amount of gain. In other words, the input level controls determine how much input signal is required to drive the amplifier to maximum output level. A 200-watt amplifier will still produce 200 watts even if the input level control setting is reduced* - provided that sufficient signal level is applied.
11. Double check the system output level and balance between speakers. Adjust the amplifier input level controls as needed.
12. Proceed with system equalization and sound check as usual.

Stage Monitor Speakers

Monitor speakers allow performers to hear themselves and/or their fellow musicians. Unfortunately, they also allow numerous microphones to pick up the same signal and feed it to the main, audience loudspeakers. Monitors can be a life-saver or a nightmare, it all depends on how they are positioned and how they are used.

Let 's take the example of the lead singer's monitor(s). The aim is to allow the singer to hear his or her voice along with any other instruments or other vocals *necessary for a good performance.*

If we look at a some typical problems, perhaps we can see what to avoid.

Problem #1

The lead singer has difficulty singing in tune and "needs" to hear the rest of the band, "with lots of drums - for excitement!"

Incorrect Solution

✗ Feed all the band instruments into the monitor, with extra level on the lead vocal and plenty of drums "for excitement." This immediately causes Problem #2.

Problem #2

The singer can't hear himself, the vocal microphone is feeding back and the sound in the audience is hollow, booming and poorly defined with the drums much too loud.

Correct Solution

✔ Explain to the singer that the output of the monitor will be picked up by the vocal microphone, amplified, modified by effects such as reverb etc. and fed to the audience loudspeakers.

Tip: If a monitor is very loud, its output will also be picked up by other open mics and will also be heard directly by the audience close to the stage. This can seriously degrade your overall sound. In addition, as more instruments or vocals are added to a monitor mix, it becomes harder to pick out and hear what is really needed.

✔ Adjust the level of the lead vocal in the monitor so that the singer can hear himself, then add keyboards or guitars etc. to the mix to give pitch information and then, if necessary, add a little kick-drum

Tip: Remember, what a singer *wants* to hear and what is best for the total sound heard by the audience are often exactly opposite. The trick is to provide the singer with what they *need* to hear, at a level that is not too loud and which does not degrade the sound heard by the audience.

Monitor Placement

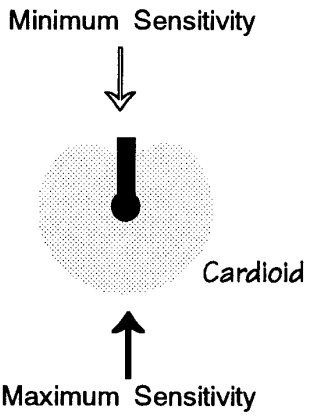
Monitor loudspeakers should be placed so that the performer can hear what is needed, while keeping feedback and stray sound pickup to a minimum.

Fortunately, loudspeakers and microphones do not reproduce all sounds equally. Loudspeakers tend to concentrate the higher frequencies into a relatively narrow beam while the sensitivity of a microphone varies with the angle of incidence of the sound. To obtain optimum performance, we should attempt to place the monitor (particularly the high-frequency horn) in the least sensitive area of the microphone's pickup pattern. Most stage mics are "Cardioid" - so-called because they have a heart-shaped sensitivity pattern - and are less sensitive to sounds from behind the microphone. A less common microphone is the "Hypercardioid" - this has a different pickup pattern with its maximum rejection at *two* points 90° apart, to the rear of the microphone, but only slightly reduced sensitivity to sounds *directly* behind the microphone. If you are using two loudspeaker cabinets for one performer, a hypercardioid microphone might provide increased rejection.

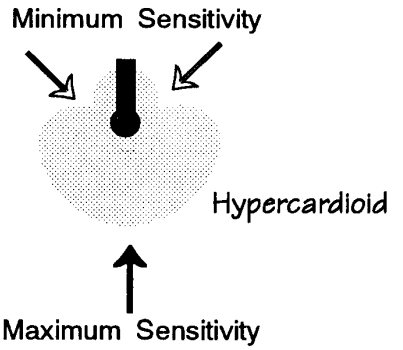
The specifications show that the Club Series III Monitors have a dispersion pattern of 60° horizontally and 40° vertically for frequencies around 2.5 kHz and above. At these angles, the sound level is already 6 dB below the level directly on-axis and reduces further as the angle increases.

Note: *In this case, "horizontal" and "vertical" refer to the cabinet when stood on end. The figures will be reversed if the cabinet is laid down as a monitor with the horn beside the woofer.*

Microphone Pick-Up Patterns

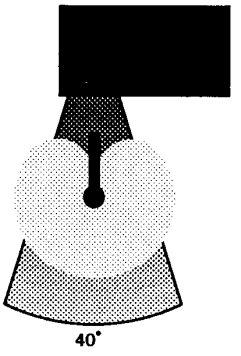


Cardioid microphone

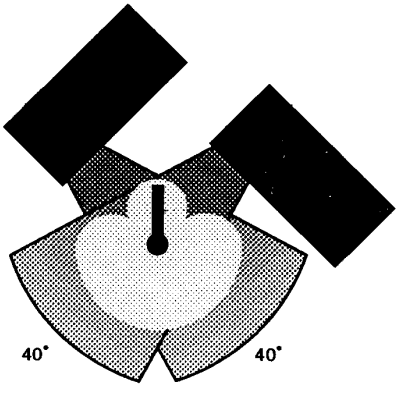


Hypercardioid microphone

Speaker Placement



Cardioid microphone
Single cabinet



Hypercardioid microphone
Two cabinets

Specifications

Application	Components HF	Components LF	Crossover Frequency	Power Handling Noise/Program/Max	Imped-ance	Sensitivity*	Frequency Response (±3 dB)	Dimensions ** (inches)	Weight (lb.)
CLUB SERIES III									
S115III	Main Front Of House (FOH)	2"	15"	1.4 kHz	100/200/400 Watts	8 ohms	99 dB	50~16 kHz	27.8 x 18.5 x 14.0	52
S115IIIAT	Main FOH ATM Fly-Ware™ Pre-installed	2"	15"	1.4 kHz	100/200/400 Watts	8 ohms	99 dB	50~16 kHz	27.8 x 18.5 x 14.0	55
S112III	Main FOH	2"	12"	1.8 kHz	100/200/400 Watts	8 ohms	97 dB	60~16 kHz	24.8 x 15.5 x 12.3	40
SM15III	Floor Monitor	2"	15"	1.4 kHz	100/200/400 Watts	8 ohms	99 dB	50~16 kHz	27.8 x 27.5 x 13.3	52
SM12III	Floor Monitor	2"	12"	1.8 kHz	100/200/400 Watts	8 ohms	97 dB	60~16 kHz	24.8 x 15.7 x 13.3	41
SW118III	Sub Woofer		Single 18"	NA	200/400/800 Watts	8 ohms	96 dB	35~2 kHz	25.6 x 21.2 x 30.8	70
OAK SERIES III									
S115III-OAK	Main Front Of House (FOH)	2"	15"	1.4 kHz	100/200/400 Watts	8 ohms	99 dB	50~16 kHz	27.3 x 18.8 x 11.6	49
S115IIIAT-OAK	Main FOH ATM Fly-Ware™ Pre-installed	2"	15"	1.4 kHz	100/200/400 Watts	8 ohms	99 dB	50~16 kHz	27.3 x 18.8 x 11.6	52
S112III-OAK	Main FOH	2"	12"	1.8 kHz	100/200/400 Watts	8 ohms	97 dB	60~16 kHz	24.4 x 15.8 x 11.6	42
S110III-OAK	Main FOH	2"	10"	1.8 kHz	75/150/300 Watts	8 ohms	95 dB	70~20 kHz	20.7 x 12.4 x 10.1	26
SM12III-OAK	Floor Monitor	2"	12"	1.8 kHz	100/200/400 Watts	8 ohms	97 dB	60~16 kHz	24.4 x 15.8 x 12.9	38
SM10III-OAK	Floor Monitor	2"	10"	1.8 kHz	75/150/300 Watts	8 ohms	95 dB	70~20 kHz	20.7 x 12.4 x 10.3	23
SW118III-OAK	Sub Woofer		Single 18"	NA	200/400/800 Watts	8 ohms	96 dB	35~2 kHz	24.9 x 21.2 x 30.4	70
PIEZO SERIES III									
S110PHIII	Main FOH	Piezo Horn	10"		75/150/300 Watts	8 ohms	95 dB	70~20 kHz	18.8 x 13.7 x 11.5	26
S112PHIII	Main FOH	Piezo Horn	12"		100/200/400 Watts	8 ohms	96 dB	60~20 kHz	20.6 x 15.6 x 12.3	31
S115PHIII	Main FOH	Piezo Horn	15"		100/200/400 Watts	8 ohms	98 dB	50~20 kHz	24.4 x 18.8 x 14.0	42
SM12PHIII	Floor Monitor	Piezo Horn	12"		100/200/400 Watts	8 ohms	96 dB	60~20 kHz	20.6 x 15.6 x 12.3	30

Dispersion = 60º x 40º @ 2.5 kHz (All models except SW118III and SW118III-OAK)

* Sensitivity = 2.83 V/1 meter.

** All dimensions are approximate and should not be used for construction of cases or critical mounting applications.

Specifications subject to change without notice.

Glossary

brick-wall protection circuitry • Amplifiers use various circuits to protect the output stage or loudspeakers. In some cases, the output power is reduced, while other circuits shut down completely and may need to be reset - this is often called "brick wall protection."

clipping • All amplifiers have an absolute limit to the maximum power that the output stage is able to deliver. Once this limit is reached, any further increase in input level will cause the waveform to be "clipped" flat since there is insufficient voltage or current to accurately reproduce the peaks. This is heard as harmonic distortion at various multiples of the fundamental frequency which gives the sound a rough or "edgy" quality.

damping-factor • A measure of the ability of the amplifier to control unwanted speaker motion. An amplifier with a *high* damping factor can act like a shock absorber and damp any overshoot of a heavy woofer cone after the input signal ceases. Damping factor is degraded by the extra resistance of light gauge speaker cables.

dB • A *ratio* of two sound levels - not a *quantity.*
In comparing voltages or SPL, 6 dB represents a doubling of voltage or SPL, 20 dB is equivalent to 10 times the voltage.
In power levels, 3 dB is a doubling of the power and 10 dB is equivalent to 10 times the power or watts. Since dB denotes a *ratio*, there are several specialized reference levels such as dBm, dBu etc. which are used to express a *quantity* with a single figure.

dBm • Expresses a power and is related to the voltage across a low impedance. The reference level of 0 dBm is 1 milliwatt which is equal to 0.775 Volts *into a 600 ohm load.*

dBu • 0 dBu is a voltage of 0.775 Volts and unlike dBm does not relate to the load impedance.

distortion • Any undesired change to a sound signal. This may be caused by an amplifier overload or in loudspeakers, by the voice-coil leaving the magnetic field or by physical breakup of the cone.

efficiency • The ratio of input level to output level. An ideal speaker would be 100% efficient, but in the real-world, speakers are usually less than 10% efficient. That means that an input of 10 watts will be required to produce an output of one acoustic watt.

equal loudness contours • Acoustical engineers use equal loudness curves to illustrate the difference in levels required for two frequencies to be considered equally loud. Our hearing is most sensitive to frequencies used in speech communication, in the range around 3-4 kHz. We are least sensitive to very low frequency sounds. This explains why the "loudness" control on a stereo system boosts the low frequencies, as the volume is reduced. For example, sounds perceived as being 'Very Loud' near 1 kHz have an SPL of about 100 dB. At a frequency of 30 Hz, sounds must reach an SPL of 120 dB to be perceived as equally loud. This 20 dB increase in SPL requires 100 times the acoustic energy - far beyond the capabilities of ordinary PA speakers designed for full-range operation.

filter • A circuit that allows certain frequencies to pass while blocking others. A filter that passes low-frequencies while blocking high-frequencies is called a Low-Pass Filter (LPF). A filter that passes high frequencies while blocking low frequencies is called a High-Pass Filter (HPF). A low-pass filter and a high-pass filter can be combined so that a range (or band) of frequencies is passed while frequencies above and below that range are blocked. Such a circuit is known as a Band-Pass Filter (BPF).

gain structure • For a sound system to realize its full potential, all stages must operate at their optimum levels. If the mixer is overdriven and the amplifiers are turned down, signal peaks may be distorted. If the mixer is turned down and the amplifiers are turned up to maximum, excessive noise and interference will be heard.

Hz • An abbreviation for Hertz, which means cycles per second. 1 kHz or 1 kiloHertz = 1,000 cycles per second.

linear • When a loudspeaker reproduces *exactly* what is input to it, it is said to be linear. When the *ratio* of input signal to output level varies as the frequency or level changes, the unit is not linear.

SPL • Abbreviation for Sound Pressure Level, which is measured in dB. The lowest level of ambient noise is approximately 30 dB SPL and the threshold of pain is 130 dB SPL. (See dB)

thermal power compression • At very high power levels, a woofer's voice-coil temperature will rise. This causes its resistance to increase by 10 to 20% which will result in reduced power transfer to the speaker. In extreme cases, the power transfer could be reduced by half, followed by possible voice-coil damage.

transducer volume displacement • The volume of the air displaced by a loudspeaker in traveling from the rest position to the limit of forward excursion. Sound pressure level (SPL) is proportional to the volume displacement and the square of the frequency.

3
YEAR

WARRANTY

LIMITED PARTS AND LABOR

Club Series III™ speaker systems
Oak Series III™ speaker systems
Piezo Series III™ speaker systems

CONDITIONS OF WARRANTY

The warranty period starts on the date of sale. In the case of equipment installed by an authorized commercial sound contractor the warranty begins on the date of site acceptance. If during the warranty period your new Yamaha Pro Audio product (listed above) is found to have a defect in material or workmanship, Yamaha and/or an authorized retailer/contractor or representative will restore the product to its normal mode of operation without charge for parts or labor.

This warranty is provided for the benefit of the original consumer and is not transferable. This warranty applies only to those products distributed by Yamaha Corporation of America and sold by retailers and/or commercial sound contractors authorized by Yamaha to sell such products. Contact Yamaha directly if you have any questions in this area.

THIS WARRANTY IS APPLICABLE IN THE FIFTY (50) STATES OF THE USA AND THE DISTRICT OF COLUMBIA ONLY. IT IS NOT APPLICABLE IN THE POSSESSIONS OR TERRITORIES OF THE USA OR IN ANY OTHER COUNTRY. THIS IS THE ONLY EXPRESS WARRANTY WHICH YAMAHA MAKES IN CONNECTION WITH THE ABOVE LISTED PRODUCTS. ANY IMPLIED WARRANTY APPLICABLE TO THESE PRODUCTS, INCLUDING THE WARRANTY OF MERCHANTABILITY, IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY.

Yamaha excludes and shall not be liable in any event for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty may last. Therefore, these limitations and exclusions may not apply to you.

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

In the event any of the provisions of this warranty are found by statute or by applicable administrative or judicial entities to be unenforceable, all remaining provisions shall remain in full force

OWNER'S RESPONSIBILITIES

1. Please read the Owner's Manual completely. The information provided in this manual covers installation, operation and safety precautions.
2. Should warranty service be required, you will need to be able to provide reasonable proof of purchase. Please save your sales receipt or other similar document. In the case of contractor-installed equipment a photocopy of the site acceptance document would be considered acceptable.
3. Notify your Yamaha Pro Audio retailer or commercial sound contractor of any alleged defect promptly upon discovery. If your point of concern is not resolved within 30 days, contact Yamaha directly.
4. Return the product to an authorized Yamaha Pro Audio retailer/sound contractor, a designated service center or to Yamaha in Buena Park, California. All shipments must be PREPAID. No COLLECT shipments will be accepted. Products repaired under warranty by Yamaha or a designated service center will be returned to the sender PREPAID.
5. Products returned for service (in or out of warranty) MUST have a Return Authorization. Your local Yamaha Pro Audio retailer/sound contractor can assist you if the need should arise. You may also contact Yamaha directly.

EXCLUSIONS

1. Products sold by retailers or sound contractors NOT authorized by Yamaha to sell Yamaha Pro Audio products and those products whose trademark, name or identification numbers have been altered or removed are not covered by this warranty,
2. Products not specifically marketed for installation in areas exposed to the elements (sun, wind, rain etc.) are not covered for defects that are attributed to this type of installation.
3. Product failures that are the result of abnormal strain, abuse, modification, or accidental damage are not covered by this warranty.
4. RFI/EMI (Interference/noise) caused by improper grounding or the improper use of either certified or uncertified equipment is not covered by this warranty.

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