Matt Mays and El Torpedo soundcheck while opening for Blue Rodeo at Vancouver's beautiful Orpheum Theatre. Photo: Ashley Maile

# Live Sound

## A Musician's Guide to Sound Systems

by Don Barber

As a musician it can be incredibly nerve-wracking and frustrating to know that no matter how good a player or singer you are and how great your band might be it won't matter a hoot if you're not coming out of the sound system properly. If your audience can't hear what you're doing, or you can't hear yourself or your mates because the monitors suck, there's not a lot of point to it all.

If you're going to be an opening act or part of a multi-band program at a bar, or maybe you'll have an opportunity to play at a summer festival main stage or a side stage, or you might get hired to do a corporate event or even a church fund-raiser, these are some suggestions and pointers for musicians starting out to do live shows or even those who have been doing it for awhile and would like to know how they can improve their overall sound through the PA and monitors making it better, easier and more consistent from gig to gig.

## It All Starts On Stage

In fact, the most important part of getting a good PA sound is getting a good, clean stage sound, which is very much within your control. The first step is to make sure your own gear is straight. To state the obvious, a sound system can't tune your guitar for you. Furthermore, it's not going to get rid of hums and buzzes – in fact it's going to amplify them. There is no EQ for a squeaky kick drum pedal and there's no magic electronic solution for flabby, poorly tuned drums; a rattling bass cabinet is only going to rattle louder through the PA system. So, your instruments and personal equipment have to be in good shape. Let's take that as a given.

Your kit should be as self-contained as possible; what will make you friends and influence people is if you can get in and on-stage quickly. If you get a sound check, and, even more importantly, if you don't get a sound check, you don't want to be wasting time trouble-shooting your gear. This requires proper packaging – which does not mean it has to be expensive. I'm not talking about road cases for a truck tour – that's a whole other league, and hopefully if you've reached that stage you've got some professional help that's going to insist and ensure that everything is properly racked and cased for quick transport and consistent and reliable operation every night. No, at this point I'm assuming you're going to the gig in the family car and you're going to be relying on the house sound system or whatever the venue is supplying.

## Electrical Power

A guitar, bass or keyboard player should only need one A/C plug – don't expect the house sound person or stage tech to be supplying you with outlets for all your stomp box wall warts. All your electrical should be consolidated into one power bar requiring a single plug. The problem with wall warts is that they're wider than a standard outlet and most power bars are oriented so that one wart covers two outlets. Furman makes a Plug-Lock power bar that has five outlets spaced wide enough apart and oriented so that the warts all fit nicely. There's a clamp down assembly that makes sure they don't fall out as well.

You need to search a bit, but for less money you can find power bars in your local hardware store that are designed for a combination of warts and standard plugs, they don't have the clever clamps, but that's why they invented tape to lash them all down – a cheap investment for convenient and reliable power.

Speaking of stomp boxes, having them floating around the stage and trailing after your guitar cord and getting unplugged when you travel too far is not good form. Get them mounted together on a panel – wood, Plexiglas or aluminum, it doesn't really matter.

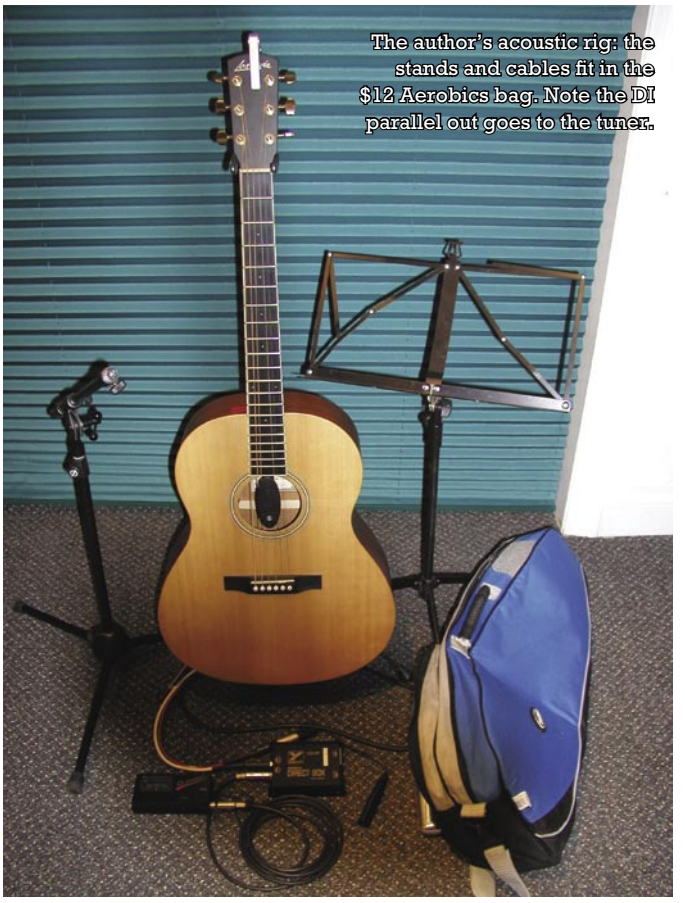
Velcro works amazingly well for laying them out, and it allows you to reposition them easily or change your pedal configuration.

Get your gear in a case or a bag. You can get a decent aluminum briefcase-style box for under $20 at the hardware store. Gator makes a whole line of soft-shell bags from about the same price that can accommodate all sorts of different gear.

Take care of your cables – 90 per cent of sound problems are caused by faulty cables. Hand wrap them – elbow wrappers should be shot – the cables don't behave or lie flat and they will fatigue and fail after awhile. Get some Velcro wraps or tie line (I like leather boot lace) and label the cables with your name or an identifying marker – colour tape works OK, but a lot of people seem to like blue tape. P-Touch labels work really well. My experience is that cables don't usually get stolen; if someone picks up a cable that is clearly identified they know it's not theirs. If they pick up a cable that's not identified the benefit-of-the-doubt theory says they might just think it is theirs ('cause they don't know who it belongs to). The tie wraps should be at the male end of the cable – you don't want them dangling in front of your face on a mic cord, it also means you can tie up any excess at the receiving end. On AC cables you can wrap the connection to the outlet or conduit to ensure it doesn't get pulled out.

## Sending Your Signal

You should be able to provide a single balanced feed to the sound system. A balanced line can travel considerable distances with no frequency loss and no noise interference. There may be enough channels available to accommodate a number of feeds, but don't count on it. Bass players should invest in a good active DI box; it's guaranteed to be the best, cleanest, most accurate signal with the best frequency response. DIs do not have to be expensive – they're reliable and fast to set up. A mic on your speaker cabinet is a nice option, but it's not going to match the quality of an active DI.



The author's acoustic rig: the stands and cables fit in the $12 Aerobics bag. Note the DI parallel out goes to the tuner.

For acoustic bass the best sounding pickup I've heard is the Schertler, it's actually a moving coil element that fixes to the body using green soya gum. There's a resonant frequency that you have to EQ out, but after that, it's brilliant, with great isolation and no feedback – not inexpensive, but so much better than any of the thumpy bridge pickups I've ever heard.

Electronic keyboard players should be able to provide a good balanced signal out in both stereo or mono. This can come from a mixer or a DI box.

Acoustic guitars, violins, mandolins, etc., should have a direct pickup out to a DI box.

Acoustic instruments sound best with a good quality condenser mic for proper tonal pickup. However, condensers can be problematic in high heat and humidity, so at outdoor festivals, for instance, you can't always rely on them working or being available.

The direct feed doesn't feedback the way a mic will so you are guaranteed a good sound and indefinite gain before feedback until the actual instrument itself is feeding back. The DI can be active or passive – these instruments don't have the bass response concerns that the keyboards and bass guitar have, so even a middling passive DI will do a decent enough job. This way you'll get the monitor level you need. Then if there's a good quality condenser mic you can also get the quality and tone your acoustic instrument is capable of.

## Electric Guitar Players, Listen Up

The guitar amp and speaker are integral to the sound of an electric guitar, so a DI is not a good option. Typically a directional dynamic mic is placed in front of the guitar amp. Personally, I think this is a poor idea for three reasons. Directional mics exhibit proximity effect, which is a boost in the bass response when placed close to the sound source. The mics most often used are actually vocal mics which usually have a response tailored for voice, this entails a boost in the upper midrange response. A directional mic is going to focus on a specific area of the speaker; if it's placed in the centre it will "hear" predominantly upper frequencies, if it's placed to the outside it will "hear" predominantly lower frequencies. The net result is that the tone of the guitar will tend to be artificially boosted in the bass and upper-mid frequencies and be largely dependant on positioning. I too often find the mixer channel for the guitar with the EQ carved out in the bass and upper-mid to compensate. To me, this is like pressing the gas and the brake at the same time.

A further problem is that the guitar player typically stands some distance from the cabinet so what they hear and the tone they're going to work with is not what the mic "hears" inches away from the speaker.

My solution is to use an omni condenser mic. Omni mics inherently have flat response with no proximity effect so they are not very critical about mic placement. A further benefit is if you use a small lavalier mic you can just drape it over the grille cloth – no mic stand required, so it's cheaper and much quicker to set up with no stand to get knocked over or pulled by a guitar cord. Dynamic mics also pick up hum from magnetic fields like those emanating from amplifiers and speakers. Condensers don't do this, so they're also quieter.

Guitars are notoriously over-poweringly loud – "but that's my sound, man."

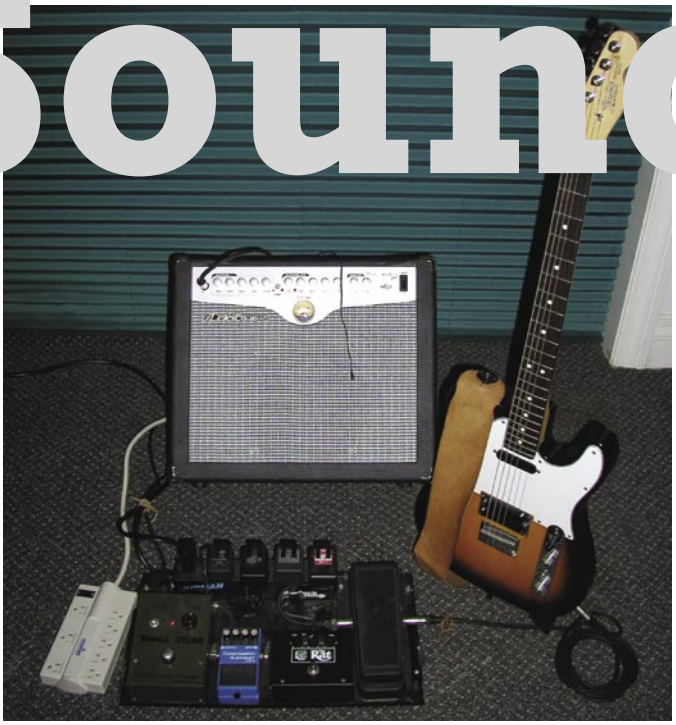
I don't understand why players think they need so much power. Eric Clapton and Jimmy Page did all their earliest recordings with 15-watt amps and a single 12" speaker. Anything larger for other than an arena stage is more size, weight and money than anyone really needs to deal with. I did one show with a reggae band where the guitarist used a Pig Nose. Now admittedly, all he wanted was that chika-chika reggae "riddim" sound, but we had a major PA and Monitor system so a mic and some gain gave us all the level we needed.

Electric guitars also tend to overpower the stage sound. Often the reason is the guitar amp is on the ground firing into the back of the players knees – tilt the amp back like a monitor and aim it at the ears and it's amazing how the volume comes down – it's also not firing into open vocal mics. Another solution is to position the guitar amps on the side of the stage firing across and not out from the backline. In this way the guitars can be heard on stage with minimal mic bleed and they aren't taking off the heads of the punters in the first rows. If the guitars are coming off the stage too loudly, they don't get into the mix so only the seats in the direct line of fire hear them – the rest of the room hears mostly mud.

Use an instrument stand! Laying an instrument on the floor or propping it up against an amp is an invitation to minor disaster. Particularly on tight bar stages or busy festival stages where there's too much going on and too many things to trip on. Nobody wants to damage an instrument, but accidents do happen … on a stand it's visible, stable and safe.

I have set my mandate that I can carry my instrument and equipment in one load. Guitar in a gig bag on my back, stand bag over my shoulder, amp in one hand, pedal board case in the other. I ask the sound guy for one AC plug and say, "Here's my balanced feed to the PA, I need phantom power, please."

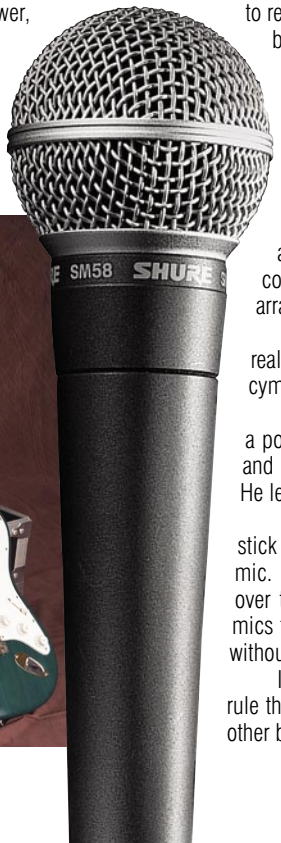
I also hand them a stage plot showing all the instruments, the vocals and the monitor positions. They usually just grin and say, "Great!"



The author's electric rig: note the omni mic on speaker grille – amp it tilted up. Furman plug lock on custom pedal board; domestic power bar (white) holds three warts plus five other outlets.

## More About Mics & Monitors

Mics are great tools. A mic that has the specific characteristics you want can really make quite a difference to your sound, they can be a relatively inexpensive investment that can be made in small increments. They're useful for both recording and live work. Mics are also relatively expensive to rent, particularly if you want something that is more than just a dynamic cardioid. There are a lot of variables to play with that can really affect your sound. There's an old adage that says "stick a 58 (Shure SM58) in front of anything and it's going to work OK," which is true, but it's boring and simplistic, also they're tailored response with the bass and mid-high frequency boost are not very flattering to most female voices. I hardly use any cardioid dynamic mics; omni, hypercardioid and even Figure-8 patterns are much more interesting and useful. I also try to reduce and eliminate as many mic stands as I can – they're bulky, heavy, expensive, and they clutter up the stage. (See DI boxes above).




Omni condensers can work well on drums – kick drum in particular. The Crown PZM is popular for this.

I once heard a show where the percussionist had a mic on each wrist – anywhere his hands went there was a microphone – it worked brilliantly! If he used sticks that were that much louder, his hands were that much further away from the drums so it acted as a built-in volume control. Two mics plus a kick mic did an entire 360-degree array of every percussion toy imaginable, and no mic stands!

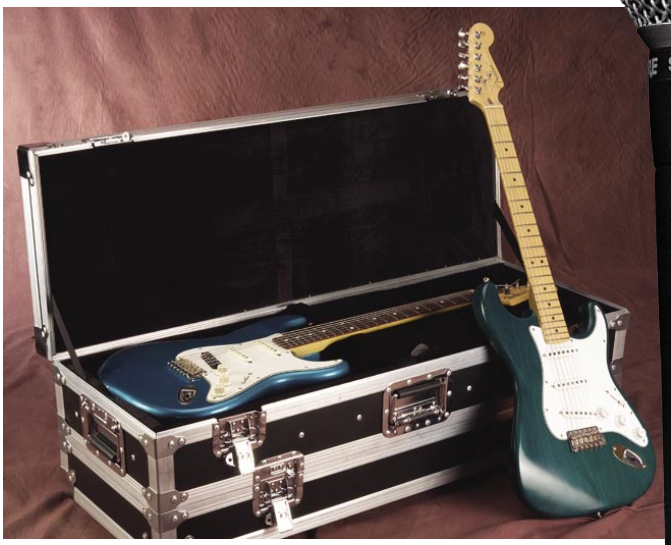
Figure-8s are not the most common mics but they work really well for picking up matched instruments like toms and cymbals while ignoring the snare below.

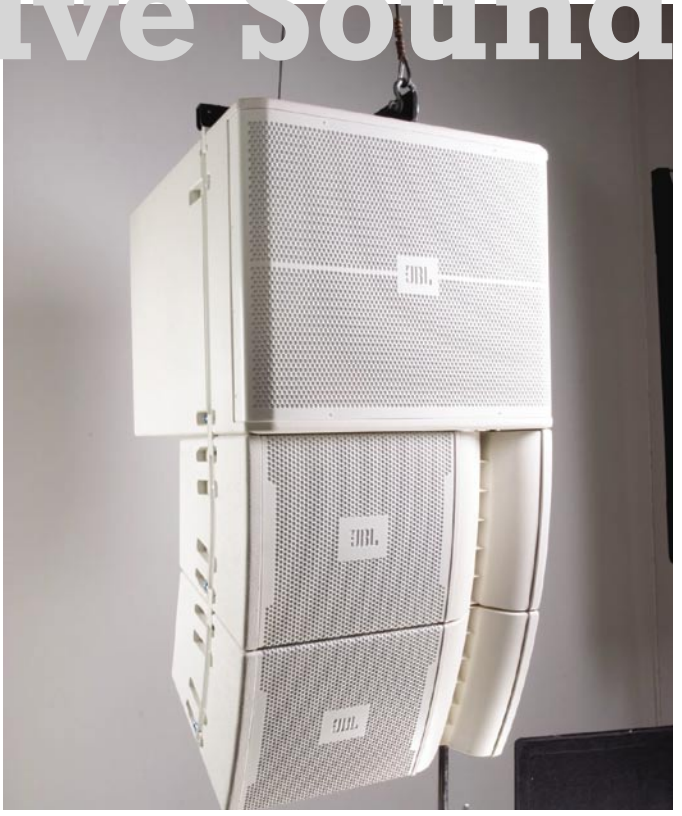
I worked with one percussionist that also sang. We found a position for a head-worn figure-8 that worked for his voice and picked up the various drums and shakers in front of him. He learned to balance his own sound.

A single omni taped to the lid of a grand piano on short stick can work perfectly. The lid acts to reflect sound into the mic. Much easier to position than trying to get a boom arm over the strings with a large mic on it. If you use directional mics their focus means you will need two mics, so positioning without phase interference is much trickier.

If you do use two mics (in any application) follow the 3:1 rule that states that the mics need to be placed apart from each other by 3 x the distance of the mic to the source.

Gator makes a variety of cases to transport your equipment safely. At right, the legendary Shure SM58.





Hypercardioids reject sound from the sides instead of the back. Main speakers are overhead and to the sides as are side-wash monitors, so you will get the best isolation and gain-before-feedback from a hypercardioid. Floor monitors can be positioned to aim at your ears not your nose and you can use two of them if you want. Monitors for keyboards pretty much have to come from the side.

I like to position the drum monitor behind the drummer, even though it's aimed at the back of the head, which isn't the perfect position for listening, the great benefit is that it's not aimed at open mics and the drummer's body also acts to block the sound from leakage. An even better solution is to have the drummer and keyboard player use headphones – they're sitting there not going anywhere so a wire isn't much of a problem, they can get a loud and clear monitor feed with no leakage whatsoever and way cheaper than a monitor speaker and amplifier.

For a lead singer I would recommend getting an in-ear monitor system as soon as you can afford it. Save your voice, save your ears, save your back (they weigh a lot less than a monitor speaker and amp).

If the stage sound is clean and clear with the volume under control you're a long way down the road to a clean PA sound, so what about the other components – the mixer and its associated controllers, and the speaker system?

## Beware of Cheap Mixers…

In the too-good-to-be-true category you seem to be able to get an amazing number of sliders, knobs, and connectors with enough alternate switch functions to make your head spin for not very many dollars these days. My personal experience has been that these mixers can sound very clean and clear on individual channels and can work very well as a sub mixer for a limited number of inputs, but when we tried to mix my band (Minds In Retreat) with six vocals, two guitars, bass, drums and keyboards together the sound got totally squashed (to use a very scientific term). This was not distortion or overload per se, I know about those. I believe what happens is the summing amps that take all the inputs and group them into the outputs act as a bottleneck and can't handle the total signal. We ended up getting a 20-channel version of a concert touring-quality console. It cost three times the money but the sound quality difference was truly amazing.

For mixing from the stage you don't need faders (sliders), knobs are fine because it's not an active mix, once it's set it doesn't change much. Knobs take up less room, cost less and aren't as susceptible to dirt. Don't spill a beer on your board, but if you did sliders will corrode, knobs will likely be OK if you clean it up fast enough.

A small 6-channel mixer can work very well for your rehearsal vocals. It can then act as a sub-mixer for live work that means you only have to rent a 12- or 16-channel board. It also gives you a back-up if the main board fails – which is not as uncommon as you might think.

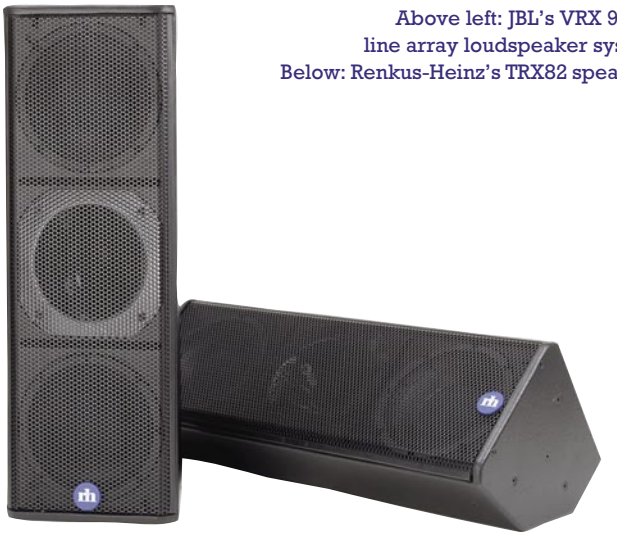
## Speakers

Vocal speakers don't need a lot of bass response, 80 Hz is the bottom range of the voice, guitar and most other instruments other than bass, piano and kick drum, so for most applications you don't need a woofer bigger than 12". Two 8" speakers have the same surface output area as a 12" so you will get just as much bottom. I'm a big fan of the Renkus-Heinz TRX82 speaker. It's a twin 8" with a horn. The Renkus horns are very accurate and they offer a variety of coverage patterns up to 120 degrees, which is not common. Their smaller boxes go as wide as 150 degrees. The horns are rotate-able, so they work vertically or horizontally on a yoke bracket.

The smaller speakers are easier to handle and easier to get up in the air on a stand or flown off the lighting rig. It is important to get the top end boxes up above the audience and aimed down. The sound will not take the heads off of the front row and will carry into the audience. Aiming down will avoid reflections off the back wall and the ceiling.

The most efficient and versatile speaker configuration is to have a 2-way top-end box over the audience's head and a sub-woofer on the ground.

Beware of plastic boxes – they're popular because they're cheap and weather resistant, but the moulding process does not allow for precision horn patterns and the boxes resonate with bass input. Many of them are specifically intended for DJ work with a bass and high end "smiley curve" bump. There's one box that seems to be everywhere that also has a pretty nasty 5K peak that is really not nice for vocals.



Above left: JBL's VRX 932LA line array loudspeaker system. Below: Renkus-Heinz's TRX82 speakers.

The new JBL VRX 932LA system has a pole mount position that tilts the box (or two boxes stacked) down at the audience. There's a single 12" speaker and 3 x 1" compression drivers that can be variably attenuated so that the nearest to farthest throw drivers can be set to different output levels.

Start with the stage – that's where you will have the most control and provide the best sound to the PA. Then if you're looking at buying PA equipment, carefully consider your needs and the feature benefits of the products. Look at what will give you the most use and long-term benefits and what can't be readily rented. Usually the cheapest is not the best option, so invest wisely. ●

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