Enter the Matrix

A basic how-to guide for “on site”, live matrix recordings
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1) Preface

A matrix recording, as referred to in this document, is a live recording made by blending multiple sources from the same performance together into a single recording.

There are many different ways to record a matrix recording. The simplest and most common technique in use, is done by patching a soundboard feed and 2 mics into a mixer and mixing down to a two-track recording device. It is this technique that will be taught in this guide.

Some more advanced techniques include the use of multiple board feeds… sometimes a complete patch out from every channel on the board. Some people run from backstage monitor feeds, split each line from the stage before it goes to the board, and some people will put mics all over the stage. The source possibilities are truly endless.

In addition, some people will record each source individually using multi-channel recording devices such as mixers with built-in hard drive recorders, or multiple input capture devices connected to a laptop. Some will even take two sources, from 2 different recording devices and mix them together after the fact.

For our purposes here, we will discuss the use of a soundboard feed and 2 microphones mixed in the field down to a single 2-channel recording device. This is by far the most commonly used technique for amateur matrix recordings, and the place where most people start. It is assumed that anyone reading this has a basic understanding of how field recording/audio equipment works.

2) What you need to get started

Your basic equipment needs are as follows, 2 mics, a recording device, a mixer, a set of closed back headphones, assorted microphone and patch cables, mic stand(s), and every audio adaptor known to man.

Please keep in mind that for this type of recording, you are often sharing the sound booth with the sound engineer, and space is usually at a premium. Size should be a big consideration in making your selections. You don't EVER want to cause the sound engineer grief!

It is almost never a problem to get 110 power from the venue when doing this type of recording, so battery power isn't the most important thing for this type of concert recording. The selection for affordable, high quality, battery powered mixers is slim at best, so I would go for the quality, and not worry so much about the power on this part of the equation. The rest of your components should be as portable as possible so you have other taping options if your matrix plans get squashed. Sometimes things go wrong and a backup plan is always a good idea.

The best way to actually choose your specific equipment is to talk with people who use it, and obtain copies of recordings done with specific equipment. A great source for free, searchable, high quality recordings is the live music archive www.archive.org/audio/ Many tapers, myself included, list their e-mail address in the text file that accompany the music files on the archive. I can only speak for myself, but I never have a problem with someone contacting me to pick my brain about equipment or techniques. As long as someone is nice, and not too demanding of my time, I find it a great compliment.

There are many brands, types, styles and price ranges of these items so please don't look at the following as a complete listing of equipment available.

a. Mics

There are many different mics on the market. For this type of recording you should have a pair of quality, condenser microphones. Depending on what sound you are looking for, and where exactly you set your mics, all polar patterns are used. The most common are

omni or cardioid, and having the option for both is best. If you only have one set of "all purpose" mics, I would have to recommend the cardioids.

You should spend as much as you can afford, and don't be afraid to buy used to step up in quality. "A chain is only as strong as it's weakest link". A quality set of mics will hold much of their value, and only improve the quality and listen-ability of your recordings. The only thing I don't recommend is a one-piece stereo mic, as this type will limit your mic placement opportunities.

b. Recording devises

The three most popular recording devices in use for matrix recordings are computers, DAT recorders and hard drive recorders. DAT recorders are easy enough to find. The portable units by Sony, and Tascam are the most common. Hard drive recorders are getting more and more common because of their renewable data storage, ease of transfer to a computer, and in many cases their much lower cost. Many tapers have turned to the *Creative Labs Nomad Jukebox 3*. Otherwise known as a JB3 or NJB3, this portable unit has large storage capacity, and is about the size of a personal cd player. There are also many professional field recording units made by Tascam, Fostex, Alesis and others that use anything from hard drives to memory cards. New devices are coming onto the market all the time.

The biggest considerations in digital recording devices are storage capacity, the bitrate, sample rate, and the quality of the A/D conversion. Most HD or DAT recorders will record at CD quality (44.1khz/16bit). Most will also do 48/16, which is a little bit better, and some are ready for the future of audio by recording at a full 24 bit. For HD recorders and laptops, you will need a minimum of 2 Gig of storage for a typical show recorded in stereo at 16bit, and about 6 Gig for a show recorded in stereo at 24bit

With the assumed onset of DVD-A, 24-bit playback equipment may soon be in everyone's living room, so recording at 24bit (or even 48khz/16bit) is a great way to archive for the future. Most commonly used amateur field recording equipment however is limited to 16 bit. It is for this reason that some people use laptop computers to record with. That old laptop sitting on the floor of your office may be all the recording device you need. For more information on the use of laptops for field recording see the laptop recording section of the taperssection.com guide to taping. Additionally people may use mp3 recorders, minidisk, cd burners, or even cassette. You can record with most anything, but cd quality or better is the common choice.

c. Mixers

There are many ways to mix your signals. This may be the most important piece of equipment you buy. Many people already doing audience recordings are using various mic preamps, or capture devices that allow more than a 2-channel input (such as an Edirol UA-5). As long as your unit allows a 2-channel output (or you have the ability to record more than 2 tracks simultaneously) these devices will work. In most cases however their lack of adjustability and monitoring make them a poor choice.

The most commonly used piece of equipment is a small mixer. There are many usable mixers on the market today. Some have the ability to connect directly to a computer, and some have HD recorders built directly into them. Some have built-in A/D conversion, digital effects such as delay or reverb, and some are fully digital mixers.

Of the mixers in use for matrix recordings, most are typical analog mixers with at least 2 mic preamps, and anywhere from 4 to 16 channels. You can add an outboard mic

preamp if your mixer doesn't have preamps, or if their quality is less than that of your other available equipment, and many people will use an outboard a/d converter as well.

When selecting a mixer there are many things to consider. Unless you plan on using an outboard mic preamp, a mixer with 48v phantom power, and high quality microphone preamps are very important. This is one of the toughest things to find in a small footprint mixer. The overall quality of all the components is important. You don't want to be adding a bunch of noise to your recordings because your mixer has poor quality electronics in a pretty case. I would say that the overall sound quality of the mixer is the most important thing to look for. But regardless of this, there have been many good recordings made on inexpensive mixers. Work with what you can afford!

There are so many useful features available on mixers that I can't possibly cover them all. The most important features to look for are monitoring features. For starters you should have a good headphone amp. 250 mwatt is typical and is satisfactory. Much less and you will never be able to hear your recording over the music around you. Level meters are important. If possible, get a mixer that has level meters for both the main output and each individual channel. Another really useful feature is the ability to select channels to monitor individually. This is a good way to tweak your mics and your board feed separately as well as together.

Digital effects are a nice feature to have. The only effect commonly used is delay. Unless you put your mics on stage (or very close) you will need to delay the soundboard feed to match up with your mics. More about the use of delay in **Chapter 6, Setting up your rig**.

Other features such as built in A/D conversion is nice if it is better quality than your recording device, computer connections such as usb or firewire are nice if you are using a laptop to record, and battery power options are no big thrill. If you are getting everything else you need to do your matrix, you will most likely get power from the venue as well.

Brands such as Allen & Heath, or Mackie tend to be the most popular choices. The Mackie "Onyx" line is a good choice, they have all the monitoring features listed above, as well as a fantastic preamp section, although they are a little bulky.

d. misc

This could get a little lengthy! First and foremost you will need every adaptor and cord required to get from the soundboard to your mixer. You can usually get within 10' of the FOH console, so that is usually sufficient. The sound engineer may give you an XLR feed, ¼" , RCA jacks, or if worse comes to worse you may have to take a patch off of a headphone jack! Be prepared with every adaptor you may need. You should also have turnarounds for your xlrs. A turnaround will convert male to female or female to male. A pair of each is a good investment. A pair of phase converting XLR cables (pins 2 & 3 reversed on one end) are also helpful for some stage micing techniques.

If you are going to use 110 power you should be prepared with an extension cord and a power strip. A 3-way outlet converter is a good idea, as is a 2-prong to 3-prong converter. I carry a 20' extension cord that rolls onto a reel, and the reel has a 4-outlet box in the center of it. These are available at most home improvement stores and are very handy.

Mic stands are another absolute need. If you are going to be micing with a stereo mic configuration you only need one, but if you are micing stage corners, or split omnis on stage, you will need 2. For a single stand, many tapers already own a tall mic stand or converted lighting stand. For micing the stage corners, 2 conventional mic stands work great. Single mic clamps (usually sold for stage lighting use) may come in handy as well. You may not always have a place to set your stand. I personally carry 2 clamps, a taller

lighting stand, and 2 typical “boom” mic stands. This will give you every mic placement option possible. I don’t like to use the booms unless I have to, but they can be used as extensions for your clamps off of balcony rails or house lighting trusses if need be.

Mic cords are another must have. As stated before, “A chain is only as strong as it’s weakest link”, and you should buy the best you can afford. It is a good idea to learn how to make your own. You can make a high quality 20’ cable, the quality of which would cost you $35 through a sound wholesaler for about $12 by buying the components online and making your own. Even if the engineer allows you to use 2 spots on his snakes, you will need a minimum of three 20’ cables, and two 10’ if you plan on micing the stage. Often times you will need far more than that. Don’t ever count on the crew or engineer to provide cables for you. I personally carry 2@ 50’, 2 @ 15’ and 2@ 20’, plus I have another 200’ that I carry around incase I can’t get a spot on the snakes or I have to get real creative on my mic placement. Another good practice is to mark each of your cables so they don’t get mixed up with those of the venue/band. I use colored electrical tape for this because it isn’t often done by pros.

Headphones are a must. The two things to look for in headphones are good, accurate sound, and isolation. A “closed back” design will keep out the ambient noise (music) around you, and allow you to better monitor your recording. Many headphone manufactures rate the “attenuation” of their headphones. The more outside noise that is blocked, the better off you are.

Other needs are gaffers/duct tape, flashlight, a backup flashlight, paper, pens, sharpie, colored electrical tape, small tape measure, and don’t forget your Velcro or rubber cord ties!

3) Asking the band, management and venue for permission

It is funny… for some people this is the easy part and for some it is tougher. The biggest thing you can do to get permission is to be nice, and speak with confidence. Please remember that you will ultimately need the permission of the band and/or band management, the venue, and sound engineer. You don’t usually get permission from all 3 before you hit the show, but sometimes one will get you the rest. The bands permission is mandatory for this type of recording, and should be your primary focus.

Most of us already know that just because a band is pro-taping they don’t necessarily allow soundboard access or matrix recordings. Many times this is posted on their website, or on general tape trading sites such as the archive and etree. Most also know that just because a band says it’s OK, doesn’t mean that the venue will let you tape. Some venues think tapers wreck it for all the other people, or multiple bands at the same event or festival may discourage the venue from allowing it. Even if you get band and venue permission the sound engineer may say he doesn’t want to deal with you! If this happens to you please don’t get mad and cause a scene. It is OK to calmly try to help them see the error of their ways, but any more than a little bit of pleading can really ruin it for the next guy who tries, and certainly won’t help you on that night. This may be a good night to just pull out the mics and do an audience recording.

Email makes things very easy in most cases. If possible you should start weeks or months in advance of your show. It is easy to drop a line to a venue, band (or the bands management) and often times you will get a response. If not, it is a good idea to follow up with a phone call a few days later. If you do get a good response by e-mail, print it out and take it to the venue as it will help you get through the door, and then eventually hooked up and running. If it is a phone call that got you your permission, you should ask for the person’s full name and their position

with the establishment, then ask if they will be there that night. That may help you get your gear in as well, but permission in writing is the best.

Another good practice is to build a relationship with a venue, sound engineer, or band. Things are always easier when someone recognizes you. If you tape the same band or venue you can always bring your last recording with you and give them a copy. It is painfully rare that a band, sound engineer, or venue owner ever get a copy of the shows that were recorded (by any method). Showing up with a copy in hand is a sure way to have somebody want to see you again. It is a great feeling when you are setting up your gear and someone in the band comes up to you to see how you are doing and compliments you on the last cd's you gave him. It makes you feel really good about what you are doing, and if ever someone gives you trouble at the door or at the soundboard just ask him to talk to your buddy in the band and you will soon see the red carpet unfurl!

4) Practice makes perfect(ish)

As is true with most things you do, practice is the difference between a good recording and a poor one, or the difference between a good one and a great one. Before you go to a show, set your rig up in your living room and take a patch off of your stereo while micing the room. Pop in a cd, and tape like you were at a show. Push all the buttons on your mixer, try different outputs, play with your eq, effects, EVERYTHING. Read the manual on your equipment. With the mixer for instance, different outputs may be affected in different ways. In some cases, any given output may send a signal pre eq, or pre fader, so all your "mixing", and tweaking isn't doing anything because the signal is coming out straight from the inputs with no adjustment. Know your mixer, recorder, and mics inside and out! Whether or not you plan to ever use some of these features, you should know how they work and what they do. Besides… its fun to play with your gear! I recommend you do about 10 run-throughs with at least 2 times of setting up and breaking down. A final run-through is a good idea the night before or even a few hours before your first matrix recording.

Record a few runs and listen to what you did. Try recording the same song 2 or three times while making adjustments, and then try another type of music and do it again. Listen to the recordings and try to hear where you made the adjustments. This will give you a good feel for your rig, and prepare you for your first run with a band. When using your recording device with your mixer, you should make a note of your settings for both so that you can meter from the mixer. I typically leave my recorder at zero and that is roughly the same as +7 on my mixer. I put a tiny dab of whiteout covering half of the +7 led on the mixer to easily see when I hit it. You will want your recording to peak as near the zero mark as you can without going over. This way you can set your levels on your recording device the same every time, and do all of your monitoring from the meters on the mixer.

Take notes of what worked best and review them at the venue to minimize the chance for errors.

5) Working with the sound engineer

Just like any other profession, sound engineers are all very different. Some are nice and helpful, and some are less so. This is a place where your people skills are going to come into play**. The more you know, and the less you claim to know, the better off you will be.** If you are new to this, TELL HIM! It is better to just say it, then try to B.S. him, and look like an idiot. Much of what I have learned about matrix recording has come from the engineers that have patched me out. Hopefully after reading this, you won't have to ask too many questions, but by the same token, many will volunteer information that is helpful. You should always show them respect and listen to what they have to say… even if he is the one who is BS'ing!

One thing that will always irritate an engineer, is to bug him when he is setting up. Don't bug him until he is done with his setup, or has a breather between steps. If you are waiting there patiently with a full matrix rig, he will either know what you are doing, or he will ask you. Your recording is going to be secondary in his mind, and that is how it should be. The priority of the evening is a concert, NOT your recording. Hopefully you will get there early enough to start setting up before he feels the pinch of time, and you can talk to him right away. If not, start putting your stands together and thinking about how you will position your mics. Don't start setting anything in place until you have talked to him and have his approval for exactly what you want to do.

When you talk to him, introduce yourself, and ASK him if he minds you making a recording. Hopefully you will have written permission from the band, and possibly a name to drop from the venue that said it would be OK. Show him your permission and ask him where you can set up, where you can get power, and what kind of board feed he can give you. If you are micing the stage, ask him if you can get a couple of spots on his snakes to get your mics back to the board. Without these things, you are basically dead in the water, so you need to ask these questions right off the bat.

After you and the engineer have talked, the next thing to do is set up your rig. Because you have already done this 10 times in your living room, you will look like you know what you are doing, and will work quickly so as to stay out of everyone's way.

6) Setting up your rig

Here again, this step is loaded with variables. Every venue is going to be a little different, so take this information as somewhat general. Always be sure that the engineer knows EXACTLY what you are doing before you do it.

a. Mic placement

There are three basic ways you can set your mics. This is where personal preference, and sight conditions come into play. Whether you like a lot of venue ambiance, an upfront sound, or a clean soundboard with crowd ambiance, will make a difference on how you set up.

If there is any chance of somebody tripping over your mic cords, you should tape them down securely, and in many instances you should tape your mic stands down as well. Also secure your cords to the stand. When taping to the floor I use duct or gaffers tape, when taping cords to my mic stand I like to use colored electrical tape because it makes my stands a little more distinguishable from those that the venue or band has on stage. Please remember that we are trying to stay out of everyone's way. The band, crew, engineer, and audience are more important than your recording.

When choosing mic configurations for an outdoor venue, it is good practice to take into consideration the wind, and other elements of nature that may harm your mics, or make your recording less enjoyable. When choosing mic locations for indoor use you must consider the locations of the bar, garbage cans, bathrooms (or other common chit-chat locations), and walkways. You don't want to pick up any outside noise if you can help it, and you don't want anyone knocking over your stand.

I. Stereo configuration from the audience

The first method is to set up a stereo configuration in the venue just as if you were making an audience recording. The types of stereo configurations and microphone types can be as varied as what is done for a typical audience recording. Whatever you like when recording from the audience should work well for you here as well.

This method will give you a lot of the venue ambiance. If you can find a way to get your mics in the sweet spot, you are doing well. Sometimes you can suspend your mics from a post, or from the ceiling, but these opportunities are rare. Setting up right in front of your mixer is easiest, and with the right mix, these types of recordings can sound pretty good, but do not typically produce an "upfront" sound. This configuration seems to be popular with pros, but the sound is often too spread out for my taste, unless you are in the sweet spot. This is especially true in a large venue where the mics will report a very distant sound, and to my ears this distance clashes with the upfront sound of the soundboard feed. This is a matter of personal preference, and once again I will suggest the archive for a place where you can hear many types of matrix recordings and you can make your own assessment.

The catch with micing from the audience is the speed of sound. Microphone placement greater than 15 ft from the PA speakers is going to have an echoing sound to it. This comes from the delay between the real-time soundboard feed, and the sound coming off the stacks. In order to make this mic placement work you should either have your mics within 15 ft. of the PA or have a delay set on your soundboard feed.

The general rule of thumb for delay is 1 ms per foot. Without using a delay (either an outboard unit, or built into your mixer) on your soundboard feed you will be good up to about 15 ft., a somewhat bearable echo up to 35 ft (think concert in a cathedral), and a bunch of crap if any further than that. If you lean VERY heavy on either your mics or the soundboard feed, the 30' range isn't all that bad, but the balance of the two is what most people are after in a matrix recording. I have personally gone 45 ft back with my mics and had good results, but the board feed was unusually full bodied, and I just added a tiny bit of the mics. The mics gave a bit of verb and ambiance to the recording, and effectively took away the staleness of the board feed.

II. Stereo configuration on-stage

The next mic placement option is to set a stereo configuration on stage. This method will give you a very upfront sound, and for those who like a realistic soundstage, this can be the ticket. When done well, a listener should have the perspective of someone leaning on the stage watching the band! This is usually done center stage, or on the corners facing in and can be done with any stereo configuration that will work with an onstage audience recording. Different configurations are best with certain polar patterns, so if you have experience stage micing for audience recordings, you can do what has worked for you in the past. I have even set mics BEHIND the band and had great success. But remember if your mics are pointing toward the audience, you should be using a phase converting adaptor. (Read the next section "Mic'ing the stage corners for ambiance" for more information on making a phase reversing adaptor.)

This method is used mostly for loud rock bands in small clubs, or instrumental groups that amplify their instruments on stage and mic their amplifiers (as opposed to running their instruments directly into the PA system). If the band patches their instruments directly into the board, this method is a bad idea.

With this method you don't need to worry about delay, but what you do need to worry about is the vocals. If you are in a small venue with a loud rock band, the board feed will be heaviest on the vocals, because the sounds from the individual instruments are already so loud that the PA doesn't need to amplify them any further. This way you are getting your vocals from the board, and your

instruments from your mics. This is a great scenario if there is room on the stage (or overhead) for your mics.

In the case of a medium to large indoor venue, or any outdoor venue, this is usually only a good method if the band doesn't have vocals.

Stage monitors can provide vocals, and additional instrument fill, but you shouldn't rely on the monitors for your sound. The mix on the monitors is often abrasive, and for the most part the sound coming off the stage monitors will detract from a good recording. Keep in mind that the monitors are often out of phase with the actual instrument amplifiers on stage. Out of phase meaning that they are facing the opposite direction, yet wired the same. Try facing your home stereo speakers face to face and you will see what I mean. It destroys the sound by the two sources canceling each other out. In fact, you should try to avoid the monitors as much as possible by going between them and over them. If you are micing center stage, and have your mic stand much higher than 2-3' off the stage, you can count on the band or venue shutting you down, so be very careful with your mic placement. No stage monitors is the best-case scenario for this method.

One neat thing about this method is that you can get a little more control over your mix. Lets say we are recording a 3-piece jazz band, with a center stage stereo configuration. We have keyboards to the left, drums center, and bass to the right. By adjusting my left mic channel higher (and compensating by dropping my left board feed a bit) I can make the keys more predominant in the mix, or the opposite will pull the bass up a bit. This is a difficult little trick to master, but the results can be awesome.

Surprisingly you get decent crowd ambiance with this method, and the crowd feels somewhat behind you which gives you the "leaning on the stage" feeling, but only if you are mixing a lot of mic in or raising the level between songs. A downside here is that you may get sounds off the stage that you don't want. The biggest examples would be the buzz from the snare drum, the hum from the guitar player's overdriven amplifier, or the monitors as mentioned above. Often it is a fair tradeoff, but sometimes, like anything, it bites you.

III. Micing the stage corners for ambiance

This is probably the most commonly used method, and is what I do most of the time. You can use either omni, or cardioid pattern mics, but omnis are generally preferred unless you have a lot of noise on the stage such as large fans. Mic placement is usually on the extreme corners of the stage, at anywhere from 5 to 8' in the air, pointing at the audience. Your mics can be under, over, behind, or in front of the stacks. Each placement will tailor the sound a little differently, all are fine, but you don't generally have much choice, and you usually have to take what you can get. The mics should be pointed slightly toward the center of the middle of the venue (give or take).

The concept is to take the bulk of your music from the soundboard feed, and the ambiance and crowd reaction from your mics. Surprisingly, even though you are not micing the PA directly, you get a lot of sound off the stacks, as well as a fair amount off the stage itself. Many straight soundboard recordings are heavy in the mids, without the highs and lows. You will find that your mics, even with this method, will fill the gap nicely. Mics placed between the band and the PA will pic up the non-directional sounds (lower frequencies), and the loudest stage instruments (drums, bass and guitar). Many tapers will also push the mic level up slightly (~6db) between songs to really emphasize the "roar" of the crowd. You will note this little tweak on most of my live matrix recordings.

If you plan to do this type of recording you should have a pair of "phase reversing adaptors" in your bag of tricks. These can be easily made by anyone who has ever made a mic cable. All you do is reverse pins 2 and 3 on one end of the cable. This can be done with a full-length cable but I recommend using only about 4"-6" . The purpose for this is that the mics on stage (that are supplying your board feed) are pointing toward the band and your mics are pointing toward the audience. This is similar to the monitor phase situation we discussed in the stage micing section, and can make a big difference in your recordings. This effect is far reduced with the use of omni microphones, but I always use the adaptors regardless.

b. Setting up your mixer

This is another part of the process that is completely loaded with variables. Many times the sound engineer will invite you or allow you to come behind the board with him if he has enough space. More often than not, the sound both will be elevated, and this will help you keep an eye on the band to know when they are getting ready to start, and will also get you out of the way of "dancing fools" and flying beers. The downside is that the typical hollow floor of the sound booth amplifies the bass response and can make your ears play tricks on you! It is sometimes better to be on solid ground in front, or along side of the board. If I have the option, I will usually take a spot in the booth. More on the bass abnormalities associated with being on a raised platform in **chapter 7, Adjusting your levels**. When placing your mixer, make sure you are close enough to your power source, board feed, and mic feed. These are the most important things when setting up.

Another thing that can be done is to set up near the stage or even back stage. In this scenario you will need to have the board feed sent back to you on the snakes. This is one of those cases where you will need a set of turnaround adaptors because you will be running backwards on the snakes.

Now that we have set up our mixer in the living room 10 times, and carried it into the venue, every button and knob that we had preset has been bumped around and moved. So as you are waiting to patch the board, pull out your notes from the living room training session and set your initial settings based on your notes from home. Keep in mind that the mic levels that you used at home (unless you have one hell of a stereo) are going to be vastly different than what you encounter here. The board feed will differ as well, but your mics will be the biggest thing to watch at first. Plan on starting LOW on the mics and move up after the show gets underway.

c. Patching into the snakes

This is usually an easy step. In most cases the snakes will be fed to you just like your mics (Male XLRs to your mixer), and you just run XLR's from the snake to your mixer, but in some cases these are reversed. It is rarely done in a typical setting, but in a situation where the monitors are being mixed by another engineer backstage this may be the case. This is usually only done at large venues. This is another good reason to have turnaround adaptors.

Another thing you may find is the engineer may run your mics through a phantom box, or even a mic pre. My very first matrix recording, the engineer sent me back my mic leads from the stage as ¼" and it really confused me! I said, "This won't work… these need phantom power!". But he assured me that he already had them powered for me, and it would work just fine. I didn't want to seem stupid, so I

didn't ask any further (proof that I WAS stupid!), and never did ask him if they were going through a preamp or just being powered. In 20/20 hindsight I should have asked him after the show what he ran it through. But I was embarrassed that I didn't know, and nervous about the whole recording. Either way the recording came out great, and based on the quality of the mixer I was using at the time, he provided me a big advantage.

d. Patching into the board

There are many different ways to patch into a soundboard. The connectors that you will need as well as the information being sent to you will differ in each situation. Some engineers will say "this is what you get" and some will ask you what you want. NEVER patch yourself into the board unless the engineer has instructed you to do so. You do not want to touch what is not yours! Don't make him walk around the consol to help you if he tells you where to patch, but by the same token, if he is speaking a language that you don't understand, tell him. You don't want to toast a FOH console because you were too afraid to say you didn't know how to do it. He may turn his nose up at you, but next time you will know. Whatever you do though, don't disrespect the engineer by helping yourself!

The different connectors that you may need are XLR, ¼", or RCA. In an extreme case you may not get any of these and the only thing you can get is a headphone patch. Most large mixing consoles have very clean headphone amps and this isn't all bad, but I would call this a last resort! When patching back to your mixer you can usually patch into your XLRs, ¼" or RCA. I always patch back to my ¼" so as to avoid the preamp section of the mixer. All preamps will add some color and some won't be able to handle the level of the patch.

The other consideration for your board feed is what type of signal he is sending you. This may be pre fader, (which means you are getting straight signals and none of the level adjustments the engineer is making) or post-fader (which means you are getting the signal after his level adjustments). You may also be getting a signal that is pre-effects (this means the signal doesn't include any of the effects that the engineer is using). The effects that are usually used by the engineer are usually reverb, compression/expansion, noise gates and EQ. With a band that is using a "house" engineer, there will most likely be very little effects being used, because the engineer isn't familiar enough with the band, or their music to know how to properly utilize these effects. The house engineer is usually "winging" it somewhat with the same generic effects he uses for all rock bands or all string bands, etc. He is just trying to make the room sound good.

With a bands personal engineer there are usually many effects in use and by not having them as part of your mix, you may be missing out on a lot of the "intent" of the music. It is a good practice to always ask the engineer if your feed is pre/post fader, and if it is pre/post effects. In most cases, if you have the option , go POST-fader (but PRE the main fader), and POST-effects.

If the sound engineer asks you about levels ask him for – 0 – DB, or "unity" setting . This means that the signal is neither amplified nor attenuated, and this will be the cleanest feed you can get. You will adjust the levels from your mixer.

There are 4 basic types of feeds from a typical mixing console that you may get:

I. Tape out

This is usually an RCA out. If you are getting an RCA out chances are you are being sent the tape feed. This may be pre fader, or post-

fader. If you have an option POST-fader is far better. A tape feed will usually include all of the effects that the engineer is using (post-effects).

II. Aux send

The Aux send line is supposed to be used for running effects through the board, or for supplying the monitor feed. This feed is almost always ¼". The board will send out a signal to a processor (like eq, compression, etc) and the processor sends the adjusted signal back to the Aux return, then back to the channel that the effects are supposed to modify. The engineer can ad as many or as few channels to this send as he wants, but it will be pre-effects and can be either post or pre-fader.

The different channels can be adjusted with a separate knob on the console, but don't expect the engineer to run a separate mix for you. If he gives you this type of feed, you will most likely get whatever he sends and just have to deal with it for the show. This type of feed is rather dicey, and is not the preferred type unless the engineer is planning on monitoring the feed and adjusting the levels during the show. In a typical club, or small outdoor setting the engineer will be running monitors as well as the main mix and these sends will most likely be in use.

III. Main out

This is the same feed that is being sent to the amplifiers that power the P.A. speakers. Most boards have at least one pair of XLR main, and at least one pair of ¼" main. It will have all the effects, all the channels, all the fader adjustments, and also will be adjusted by the main level control slider. A main feed is great, but you have to keep a close eye on your levels because after the sound engineer is feeling the crowd get into the show he may increase the volume in the venue and this will change your output volume as well. Many engineers that travel with the band will play with the main volume control slide more because they aren't used to the venues P.A system, and they don't want to overdrive the speakers. Second set is often a substantial volume increase. House engineers are less likely to mess with the main volume after the first song or so.

IV. Matrix feed

Well, hopefully this won't confuse you too bad! A matrix feed from a mixing console is an adjustable conglomeration of all the channels, effects and fades. With this feed the engineer can put channels, or effects in or out of the mix to you. Now remember we aren't going to be a pain in the engineers neck, so we are not going to nit-pick his settings! Just ask him to set it all to -0- DB (unity), set one hard left, one hard right and you will be fine. This will make your feed basically the same as that of the main output and will give you a little bit cleaner signal because your signal is not going through the main volume adjustment slider, and that is one less circuit the signal passes through before it gets to you. This is the feed to get if you can.

7) Adjusting levels

This one is riddled with personal preference. If you are lucky enough to be recording your sbd and mic sources separately onto a multitrack recorder you should disregard much of this because you will be better off making these adjustments in post production. For the rest of us however, we are challenged with two COMPLETELY different sources that we want to compliment one another and we only have this very moment to get it right! It is true that you can make some general adjustments in postproduction, but if, for instance, you have a severe bass hum coming from your mics, you aren't going to be able to remove that without removing the bass form the whole recording. I think however, that after reading this article you have either caught up on some valuable sleep, or you are prepared to handle this little task! A good general tip is to only make adjustments between songs unless you are avoiding a clip on one of your channels. The first song is somewhat of a free-for-all between you and the engineer, but after that you should try to only modify your adjustments between songs.

a. Gain/Fader Adjustments

The first thing you should do is set your gain settings on your inputs. This will be very different from what you did in the living room… especially on the mics. Start LOW and move your way up. Most mixers have a clip light on each channel, and you should have one eye on that at all times during the onset of the show. Be prepared to hit that gain knob if it is glowing! Even better is a mixer equipped with a vu meter for each channel.

When adjusting the balance between your mic feeds and your board feeds, there is no real rule of thumb. I have heard many people say that 60% board and 40% mics is best, but trying to determine that ratio in the field can be tough on some mixers, and it may not be the best sound. The best bet is to use your ears. Different venues, bands, or microphone placement scenarios will require different settings. Also your personal preference comes into play. I personally like my matrix recordings to sound somewhat seamless. That is to say that I don't like to be able to easily distinguish the sounds from the mics from the sounds of the board feed. In my opinion it should sound like a single balanced source when it is all done.

One popular trick is to push the level of your mics up between songs. This will have the effect of exploding crowd reaction. Even in a room where the crowd is small, this can be a great addition to a recording. This is something I do in most cases. If the crowd by your mics is already going crazy, it is less necessary, and if your mics are near the bar, trash cans, bathrooms or other sources of noise you should not do this… maybe the opposite would work best!

I like to drop all of the sliders for channels I'm not using on the mixer to the bottom so that in a dark club I can easily distinguish them from the channels I am using.

b. Monitoring through headphones

This is a very important part of producing a good matrix recording. This part is much easier if you have a mixer that allows you to monitor different channels independently, but simple mixers can yield similar results once your ears know what to listen for. Hopefully you are using a pair of headphones that have good attenuation (blocking out the sound around you), and accurate sound reproduction. Headphones are used to mix the balance of the mics and soundboard feed, as well as fine tuning the sounds using eq or other effects.

It is pretty easy to balance the vocals and guitar by tweaking your eq a bit, but if you can't hear a guitar player at all, it will be tough to make him reappear with EQ. It doesn't hurt to try a little bit, but anything more than a slow, minor change in EQ settings will be obvious in your recording. this is especially true in the mid and high

areas, as that is where most of our distinguishable sound will come from. In many cases you can adjust your mic levels to bring these things out more effectively.

The hardest part to tweak in the field is the bass response. Bass will not be blocked by your headphones (or be reproduced very well by them), and is unidirectional. The only way to completely separate yourself from the bass at a rock show is to leave the building, and although that may be practical in some cases, it is not practical in most. Leaving the building also seems rather counterproductive when you are at a concert! When monitoring and attempting to balance the bass end of your recording, keep these things in mind:

Because bass is non-directional it is not the end of the world to modify this in your postproduction, although it is more work before you can get the recording out the door, and it still may never sound right. If your mics are producing bass that is sloppy and overpowering, and your board feed is producing almost no bass, this CAN work out to be the same as having nice tight bass response for each. It is sometimes hard to distinguish, but a heavy bass or treble response in your mics may just fill the gap on that midrange heavy soundboard feed. Often times all you need to do for EQ is to adjust your mix of mics and sbd. In some cases however, you are adding undesirable sounds to your recording. By adjusting the bass in postproduction, you may simply have a lower or higher level of crappy sounding bass.

A good trick for monitoring bass in medium to large venues is using the speed of sound. While concentrating on the kick drum and bass lines, determine if you are hearing the same sound timing through the headphones as you are hearing with the headphones off. If the sound timing is the same, then you are not getting enough bass to your recording. Remember from our microphone placement section, that if you are more than 30-35 ft from the PA speakers you will hear a very substantial delay. When monitoring your mix this far back from the stage you should hear this delay through your headphones on the “initiation” of notes or passages from the bass and kick drum. If it is overpowering mush, you most likely are getting too much bass on your recording, if it sounds tight, there is not enough. You should be somewhere in the middle. Bass should seem a little sloppy but not mush. In a situation where you are 50ft or more, you should hear a clear difference of the two when wearing the headphones. I don’t know how to say it better than that… it is something that you have to learn by doing it, and knowing your rig. The effect is, of course, greater the further away you are from the stage.

c. EQ

When making a recording of two separate sources and mixing them together on-site into 2 channels, you will not have the opportunity to adjust them independently after the fact. The easiest recording will be a combination of two pristine sources, but alternately 2 sources that compliment each other is just as good. Unfortunately, the mix that comes off the board is not often perfect without adjustment. Larger outdoor venues, indoor venues with bands that have little to no stage volume, and medium-large clubs with puny sound systems are the typical exceptions to this rule. The typical goal for a matrix recording is to produce the best sounding recording possible, by manipulating multiple sources. This differs from the typical goal of an audience recording, which is to reproduce the concert just as the patrons heard it.

The best way to know how to set your initial settings, is to simply know your rig. This will come from running it a lot in the field. Another good practice is to do your homework on the band, and the venue. Many shows are available for download at the archive, and by listening to straight soundboard recordings and straight mic recordings

at any given venue, you can get a feel for what the room will produce. Then for the band, check out soundboard recordings. By running an untouched soundboard recording of a particular band at that particular or similar venue (if it is available), through your mixer you can make adjustments to your eq settings on your mixer to compensate for room abnormalities, and or stage volume issues, and then incorporate those settings at the venue. Not to imply that all things will be the same each time, but it is a very good place to start. See the **"tips and tricks**" chapter for a few general rules of thumb for soundboard eq settings. A few things thing to keep in mind are that if you are micing the sweet spot (or on stage in an ideal, non-vocal scenario) you are most likely getting a pristine, full range mic feed and you will want to compensate the board feed to match this. If you are micing the stage corners toward the audience you are getting mostly highs and lows and this will most likely compliment your board feed with no eq on either. If you are micing a band with loud stage sound in a small club from the sweet spot or on stage, you are getting primarily vocals from the board and you shouldn't usually need any EQ for this scenario either. If you are micing from near the FOH console you are usually getting a full range, yet distant prospective and you may find that bumping the treble/upper mids up on your mics will give you a little more "presence" , then you should compensate your board feed to match the full range of your mic feed.

These are just general observations I have made, and are simply clues to help you out. Your ears, and the knowledge of your rig will help you more than anything. Here is a good exercise to help you understand the proper eq settings for a matrix recording. Copy and paste a 10 second chunk of a really good sounding studio or live recording into your wav editing software 3 times. Normalize these new wav files to about 50%. Most software programs have the ability to mix two sources easily if they are the exact same length. EQ the treble and bass out of one and see what happens when you put a full range source on top of it, and then compare to the original single source. By doubling only some of the frequencies you get louder in some frequencies and quieter in others. If you lay one full range source over another full range source, the sound is the same just louder. Lastly eq one wav to remove bass and treble then eq the second to increase bass and treble by the same degree… this will give you about the same sound as when you put two full range sources together, and is basically what we are trying to do in the field.

The biggest truth to all of this is that you will know when you get it home and listen to it there. Only then will you really know how well you did!

d. Effects

The most common effect used for simple matrix recordings is delay. If you are using your mics more than 15' away from the PA stacks, you should delay the sound board feed approximately 1 ms per foot. Use your ears to determine the exact settings but this should get you close. When using delay (assuming you are right next to your mics) everything should sound very tight, because the sound through your headphones should be just like the sound that comes to your ears with the phones off.

The only other effect worthy of a little trial and error would be compression. A little bit on the board feed may add some punch to the recording, but in general practice, this is not used unless you are mixing individual channels, and the engineer may already be compressing your feed. It is good policy to ask the engineer what he is doing before you use compression in the field.

e. Settings on your recording device

You should have already calibrated your levels on your recording device to those on your mixers VU meters at home (see **chapter 4 Practice makes perfect(ish))** . This is one thing that will be universal whether you are in your living room or at the venue. It is a good idea to occasionally monitor your recording device as well because this give you the obvious piece of mind that you are not overdriving your recorder, but also let you know that the recorder is still running and hasn't fallen subject to error or a faulty power source.

8) Postproduction

If you are willing to take the time to do it, you should feel free to utilize postproduction techniques to make your recording sound better. Remember that our goal with a matrix recording is a little different that that of an audience recording. We are trying to make the recording sound BETTER than it did at the show, and the better you are at it, the less post production you will need. I won't go into too much detail on postproduction techniques as I am no expert, but I will mention a few simple things for you to try.

a. EQ

If you are going to use postproduction EQ on your recording, it is often easiest to modify the entire file at one time. If you were tweaking a lot at the venue (or if the engineer was), you may want to do it song by song. Typically a "global" eq will fix most eq-able ailments. In select passages where a voice or one particular instrument is painfully predominant in the mix, you may be able to use the eq to tone it down a bit, but be very careful that you don't kill the things you DO want to hear. Many times, especially if your recording is heavier on the mics, you will want to take out room resonations. These are typically in the bass ranges and are essentially the frequencies that the room, or parts of the room vibrate. Most of the eq'ing I do in this regard is from 50 – 200HZ, and sometimes there will be many resonating frequencies and will require multiple filters to remove them. I typically use a sweepable midband filter that will allow for a very narrow curve in conjunction with a spectrum analyzer. Using your ears, and knowing your playback system is key here.

b. Volume adjustments

The place where I do the most level adjustments in postproduction is on the first song or two of a performance. During this first song, both you and the sound engineer are trying to get your levels set just right, and it can be a lot of up and down. Using most decent wav editing software you can manually change the levels throughout a song, and many programs will allow you to utilize an "envelope" that includes a small fade at the beginning and end to make the amplitude adjustment less noticeable. You should also keep in mind that a 1 db jump in the middle of a song is very noticeable and should be done at the point of an impact. For instance a snare hit, or loud guitar riff may be a place to "break" the track. Play around with this if you are interested. It is all trial and error.

c. **Normalizing**

If you like to normalize your recordings you should at least separate the first few tracks, and the last few to normalize separately. Once you and the engineer get through the first few songs and the little game of "dueling mixers" has subsided, the rest of the set should be more at a constant level. The end of the show is usually the loudest and should be handled separately as well. Best is to do each track individually but this takes a lot of time. A good practice (similar to above), is to break your tracks at the first impact of the song so that when making any amplitude adjustment it is less likely to get noticed. If you adjust in the middle of a constant quiet or loud part (like the crowd ambiance just before a

song starts) you are more likely to hear the jump/drop in volume from the amplitude adjustment.

d. Compression

Another helpful tool is compression. Some people are completely against the use of compression because it reduces the dynamic range of the music. That is to say that the difference between the quietest parts and loudest parts are greater if it is uncompressed. In the world of studio recording compression is used a lot. The preference for compression should mostly come from ones listening habits. If you listen to music at a moderate level, on a decent stereo system, you may find that the dynamics in an uncompressed recording are so spread apart that during the loud parts of a song the music is uncomfortably loud, and during the soft parts the subtle nuances are lost. Compression will fix this problem, and for many ears, it makes the recording much more enjoyable. I don't personally use compression on every matrix recording, but I do play with it on most, and use it on many. I recommend you play with this effect, but use it sparingly. A 2:1 compression is a good place to start. It is also a good idea to compress each song individually, and also normalize before and after your compression. This will make the effect and end level universal throughout your recording. Many times, in order to preserve the natural "ebb and flow" of the concert experience, I will compress a recording globally. I find myself doing this more and more with satisfactory results.

The other benefit of compression is it can help mesh your two different sources together, and make them sound more like one. In most recordings you will have peaks in both the board feed and your mics that are in different places. Sometimes because of adjustments by you or the engineer, and sometimes because of the room. By evening these out a bit, neither source is likely to be more pronounced, and this can make your recording sound much more like a single, well mixed source. The same holds true for individual instruments in the mix. If the bass is predominant, and the guitar is light, a little compression can help even the two out a bit.

e. Misc

Any other feature your software has, may be usable on your recordings. Use your ears and try to make the recording sound as good as you can, burn a copy, and listen to it in a few different places, on a few different stereo systems. Determine what works for each individual recording and take notes to help yourself out the next time you want to make similar improvements. Please keep in mind, that more than a few adjustments to a recording and you can be adding audible noise. Do only what you have to do to make it pleasing to your ears.

9) Preparing for your first run

Wow… we made it this far! We are going to bust out the rig, and actually record a show! By now you have practiced in your living room, read all your manuals, gotten permission from the band, and had a quick shot of Jack (the Jack is optional!). You are at the venue early, and you have talked to the engineer. He is in agreement with what you want to do. You have set up your rig and you are now waiting for the band to start. What else do you have to do? Well here are a few additional tidbits.

First thing you are going to do is make sure all your initial settings on the mixer are done, and start checking the different channels for signal. Listen to each mic, and determine that you have the mics panned left and right properly, and the board feed as well. If you have the mics panned in reverse from the board feed, you can count on the absolute WORST recording you have ever heard. It will be terrible. It will sound like an AM transistor radio. You will have no bass, and no image. Try not to do this as you will be very disappointed.

Usually there is house music coming from the PA before the show, but don't use this for adjusting your EQ settings or your levels. You will usually be running much hotter when the concert starts, and the cd that is playing is usually a full range, pristine source that is running through a PA that is far different from the home stereo that the recording was meant for. You should listen to each the mics and the board feed separately, but just to make sure everything is working and in phase. Recently I was getting ready for a show to start and my left mic was much lower than my right. I wasn't sure what to think! Was it a bad cable? Was the PA running hotter on the right side? Bad Channel on the mixer? ARRRGH! Turned out I had inadvertently hit the "-10 db attenuation" switch on my left mic when I was setting up! If not for the little pre-show testing I was doing, this would have screwed me up all night!

Now we are going to get our recorder going, and make sure we are getting signal to it. Bump the house music up to your record levels on your vu meters and verify that you are not overdriving your recorder. Turn it all back down to below where you thinks you will be running for the show and WATCH THE STAGE! When the band hits the stage, it is time to play so hit the record button and get ready!!! Also watch the engineer… he will usually return to the booth just before the show is starting.

Watch your meters, and move the levels up to near peak leaving a couple of DB for headroom over where the music is already peaking. Balance your mics and sbd feed to suit your ears, and keep an eye on those meters. The engineer will most likely be messing around with the levels in the first song, so keep focused on the task at hand, get it set right, and have some fun! After the first couple of songs, you can usually relax a bit. Often the engineer, if he isn't doing anything at the moment, will want to take a listen to your mix. If you catch his eyes offer him a listen. He may have some good suggestions, or he may not, but it is a small friendly gesture.

I usually spend the whole show at my mixer because I'm watching meters and making sure somebody doesn't mess with things. I also keep the phones on for most of the show. Many people wear ear plugs when they go to concerts, and the phones with the volume turned down will have a similar effect. If you go to a lot of shows, it is a good way to protect your ears! You know what they say, "Engineers who fry their ears, find themselves with short careers." I'm sure this is just as valuable for a hobbyist!

10)Tips and tricks

Well, many of these things have been listed above, so this is a recap in some cases, but valuable enough information that one should probably hear it twice.

a. When your mics are pointing a direction opposite the stage, use polarity adaptors on your mic feed to maintain proper polarity. These adaptors can be made by making a short XLRF > XLRM cable with pins #2 & #3 reversed on one end. Also, some mixers will have a switch for this.
b. Learn to make your own cables and use high quality materials. It is FAR cheaper.
c. Running EQ on your board feed is least necessary in a large venue and most necessary in a small – medium venue. In a very small venue with a rock band there is so little instrument in the main mix that you shouldn't even bother. Your mics will be responsible for most everything other than the vocals. In the same small venue with a electric band that doesn't use on stage amplification, the problem is often reversed. Keep in mind, drums may not be mic'ed into the PA at all in a very small club.
d. In a situation where your are recording multiple bands, it is a good idea to have multiple mics placed in different locations. For instance, cards XY center stage and

omnis at stage corners. You may not want to use these all at once but having options as different bands enter the stage is a nice thing to have.

e. Mic placement suggestions

These are my PERSONAL preferences, and should be seen as my opinion only. These are also very general statements and should be looked at as such. I have listed them in the table in the order that I would choose for a given situation. Codes are as follows: **FOB** (Sweet spot in the room), **FOH** (by the main console where you would most typically set up), **OS** (on, over, or rear of stage to mic stage amplifiers/drums), **SC** (stage corners facing audience)

Venue Type	Band Type	Mic placement recommendations
Small Bar	Rock w/ stage amplification	OS, FOB, FOH, SC
	String band w/ vocals	FOB, SC, FOH
	Jazz/instrumental	OS, FOB, SC, FOH
Small Club	Rock w/ stage amplification	FOB, OS , FOH, SC,
	String band w/ vocals	FOB, SC, FOH
	Jazz/instrumental	OS, SC, FOB, FOH
Medium Club	Rock w/ stage amplification	SC, FOB, FOH
	String band w/ vocals	SC, FOB, FOH
	Jazz/instrumental	OS, SC, FOB, FOH
Large Club	Rock w/ stage amplification	SC, FOB, FOH
	String band w/ vocals	SC, FOB, FOH
	Jazz/instrumental	OS, SC, FOB, FOH
Small Outdoor	Rock w/ stage amplification	OS, FOB, SC, FOH
	String band w/ vocals	FOB, SC, FOH
	Jazz/instrumental	OS, FOB, SC, FOH
Large Outdoor	Any with vocals	SC
	Jazz/instrumental	OS, SC
Indoor Arena	Any with vocals	SC
	Jazz/instrumental	OS, SC

f. Always offer the engineer a copy of the show, and a beer or soda
g. Don't be afraid to tell the engineer that you are new to this and that you will be more than willing to listen to any suggestions he may have. Offer for him to hear your mix!
h. Let the waitress hear your mix. (Hey… what the hell! You just might get a free drink!)
i. Get to know band members, and venue owners. It will help all around.
j. Ask the doorman if you can get in early "because you are recording for the band tonight, and have a lot of gear to get set up". You would be surprised at how often that will get you in early, and get you off to a good start with the engineer. People inside the venue often assume you are with the band and they will be holding doors and offering to carry your gear. It often works out nice! This is best done accompanied by written authorization from the band.
k. If standing on a raised, hollow, platform, you should occasionally step off it with your headphones if possible. This will allow you to hear more accurate bass response from the room and will make your monitoring a little more accurate.
l. Try not to make many adjustments during a song, between songs is best.
m. Raise the level of the mics during crowd reaction if you are micing the audience/room
n. Make sure you have your mics panned the same as the PA
o. Be prepared to just make an audience recording if the matrix is impossible or impractical for the show. If you already do audience recordings, it is a good Idea to have that full rig with you whether or not it is a part of your matrix system. Sometimes things just don't pan out.