

CAPTURED LIVE! by John Nady

Simultaneous live sound and recording techniques

Although studio recordings are probably best as a band's basic demo, most musicians are also interested in hearing what they sound like in front of an audience — as recorded live — especially in a good-sized venue. Live recording is often the ideal way to capture a band's true excitement and energetic sound. Most musicians agree that they often play their finest in front of a receptive, responsive audience, and look to live recordings to capture their band's most magical moments.

A TYPICAL LIVE RECORDING SCENARIO

Live recording always presents challenges and requires careful planning in order to achieve satisfactory results. Of course there are numerous levels at which you can undertake such recording projects, ranging from live albums at large concert venues, to garage bands in small clubs or even rehearsal rooms. Although there are techniques common to all of these projects, there are also some critical differences and considerations depending on the circumstances. Although (due to space issues) we'll focus on just one scenario in order to discuss in detail the various techniques and criteria involved in executing a successful recording project outside the confines of the recording studio, you'll find many of the ideas presented here also apply to other sizes and types of live recording projects.

Here are the guidelines for the live recording project we'll be discussing:

- We'll assume a live, five-piece rock band with vocals, guitar, bass, electronic keys, and drums.
- To make this project as practical as possible, the recording will "piggy-back" off a typical setup expected at a midsize nightclub or hall, 750–1500 capacity. Most likely this will include

both an FOH main mixer and a separate house monitor mixer, each controlled by a sound technician. Each mic or DI will go through a stage input Y-split to feed both mixers simultaneously. No separate additional recording mixer is required.

- Given the venue size, the FOH main mixer will be 24–36 channels or more. The simultaneous live recording will be fed from this mixer, not the house monitor mixer. For our particular scenario, the basic rule of thumb is: The larger the mixer's channel capabilities, the more options there are for achieving optimum recording results as channels not used for the PA will be available (as described later) to augment the recorded sound.
- The mix will go straight to a stereo digital recording device (e.g., a WAV/MP3 recorder or a CD recorder), and not to a multitrack. As a result, the house mixer and separate recording mix engineer will need to get the proper sound and mix "on-the-fly" while recording, using primarily the same mics and DIs set up for the live sound. Special care must be taken, as there will be no chance to "fix in the mix" later with dubs or overdubs.
- We'll assume that proper interfacing signal levels exist between the equipment used. As described below, this necessitates a proper sound check for both the live PA and recording mix prior to the performance. For best results, a stereo peak limiter (10:1 or 20:1) should be used on the recording mix going to the recorder.

TYPICAL MIXER SETUP FOR SIMULTANEOUS PA AND LIVE RECORDING

It's important to properly segregate the recording mix as much as possible from the main house mix, as the two have different acoustic requirements dictated by

room size, audio reflections, etc. The easiest way to achieve a separate recording stereo mix is by using the two pre-fader aux sends as the left and right outputs to the stereo recorder. Larger boards generally have at least two pre-fader aux sends, along with a number of post-fader sends (often as many as eight) which are typically used for augmenting selected channels with effects. For best separate control of the recording mix EQ, the pre-fader sends should also have optional pre/post EQ select buttons.

The signal from each channel to be recorded is then selected and effectively panned L/R into the stereo mix that's sent to the recorder by the aux send level controls for that channel. For better control of the wet/dry mix of channel signals augmented via the post fader aux sends, the return signal from the effect typically feeds back into unused mixer channels. Thus, these effects can also be controlled separately for the recording mix, again by the L/R pre-fader aux sends of these channels with the returned effects signals. In this way there is more complete control, separate from the FOH mix, for the stereo signal output being sent to the digital recorder.

Depending on the FOH mixer features, there may also be other ways to generate a separate feed for live recording, such as using the channel insert jacks. These are generally pre-fader, but may require special cabling and introduce other complications as they may already be used with signal processors for the live PA mix. Also, many larger mixers generally have a subgroup bussing system (typically eight separate buses). If each bus has pre-fader individual controls on every channel, the buses not needed for the live mix can be used in the same way as the aux sends described above.

Whoever is engineering the recording can monitor the signal input from the mixer to the recording machine using

closed-back headphones with good sound isolation. Normally these would connect to the headphone outs provided by the recording equipment, however the engineer may need a more powerful headphone feed in order to overcome the ambient noise. A separate headphone amplifier can achieve good results, or you can simply feed back the recording device's L/R output into two unused channels of the mixer. As long as the faders for these channels are always turned off (to avoid feedback into the main house mix), the engineer can comfortably use the mixer's (generally) more powerful headphone output via the solo buttons for those channels. This will provide a good mono feed of the signals being recorded. Some higher-end mixers also have Solo-in-Place capability that allows stereo monitoring.

To get the full ambient feel of a live recording, it's generally a good practice to also use one or two room mics with unused channels on the FOH mixer. Cardioid dynamic mics, or a single end-addressed XY stereo condenser mic, pointed away from the stage toward the audience should work well. Place these mics close to the stage so that any band sound pickup doesn't have too much echo or reverberation, as would be the case if they were toward the back of the hall. This room sound can be blended into the recording mix via the (L/R) pre-fader aux sends, again taking care to shut down the associated faders so as not to interfere with the FOH mix.

The setup described here is quite basic; with some imagination (and available setup time), you can augment it further for better control of the recording mix from the separate FOH mix. For example, if there are enough available unused mixer channels, you can split those signals that require more complete separation of the recording mix from the house mix (e.g., lead vocals or guitar) with a Y-splitter to separate channels on the mixing board. By using a Y-splitter, one channel of each pair of inputs can be controlled totally separately from the FOH mix for the recording mix, so added features such as channel inserts

can be used separately. A good example of this would be using different compression/limiting or source processing on a selected signal source for the FOH vs. the recording mixes.

STAGE SETUP

Eliminating spillover and ensuring separation is a challenging aspect of live recording, given the limited choices for instrument and mic placements and other stage setup constraints. Leakage is generally not a problem with mics aimed at the guitar amp or the drums, as they sit relatively close to the source where the primary signal is loudest.

Two important criteria for stage setup is that vocal mics not be aimed at backline amps, and that the singer's stage monitor be aimed at the vocal mic's polar pattern dead or null zone (i.e., at the back of the cardioid mic, or approximately 180° off-axis). Using cardioid pattern mics whenever possible simplifies problems associated with mic placement. Also note that while hypercardioid and supercardioid mics are "unidirectional," they are sometimes more difficult to use in this context since their null zones are at angles to the mic direction, approximately 110° and 125° off-axis, respectively.

Another important rule in stage setup is to separate drum and backline amps as much as possible. Whenever feasible, also add acoustic insulation/absorbing material at the back of the stage to reduce reverberation.

MIC SETUP AND PLACEMENT TECHNIQUES

When recording live with the feed from the FOH mixer as described, it's usually best to start with the same unidirectional mics already being used for the PA. This will simplify matters if there's a time constraint and will help ensure optimum results for the PA mix. Without a good PA mix, chances of obtaining a good overall sound are much less likely and, of course, this also affects the ability for band members to play at their best. As described below, the use of additional secondary mics, routed only to the

recording mix, will generally yield better results. Whenever possible, use such mics strategically to augment the recording sound.

If time and logistics allow, some changes can be made to the standard live PA setup to ensure the best live sound in the room and also optimize the recorded sound. For example, for drums, use a high-quality drum mic kit that includes an assortment of specialized snare, tom, and bass drum mics. Several of these kits also include small diaphragm condenser mics for drum overheads. For ease of setup and great recording drum sound, you can also use convenient clip-on condenser drum mics; for the best kick drum sound, use a large diaphragm dynamic bass drum mic.

In any live PA recording situation, the main miking problems are feedback, pickup of undesirable room acoustics and amp noises, leakage from other instruments, and improper mic placements. Following some simple rules will ensure best results. For example, when using the same mics for both the PA and the recording, the drum and backline amp mics should be placed as closely as possible to the drums and backline amp speakers, generally no more than 2" away at most from each drum, and 4" from the speakers. Also, make sure amps are grounded properly to minimize unwanted buzzing or humming noises. The following sections cover some suggested miking techniques for recording our typical band.

MIKING BACKLINE AMPS

If you're trying to create a very specific sound from your backline, especially from the guitar amp, more time may be needed to focus in on the nuances and variations that can be achieved by slight changes in mic placement with respect to the speakers being miked. The key issues are mic orientation and distance from the speaker. Close miking not only results in more bass due to the proximity effect of unidirectional mics, but also less room sound (natural echo). Although very close placement (about

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1") results in the best feedback immunity for the PA mix, it also tends to take away from the natural presence that a mic 4" or more away would more likely yield. Slightly farther placement also results in a sound with more midrange and less high frequency detail that can sometimes add too much edgy harshness, especially if there's a lot of distortion in the guitar tone. If you can EQ channels with such very close miking separately in the recording mix, you can often compensate for unwanted proximity and other effects to restore a more natural sound.

Generally speaking, farther placement more accurately reproduces the guitar tone and is therefore often preferred in a live rock recording. But a mic that's placed too far away will become problematic in terms of PA feedback unless the stage guitar amp is very loud to begin with — but that would result in unwanted leakage into other mics. However, mixing in a second mic only for the recording, placed up to even 10 feet away (depending on the stage setup restrictions and leakage), along with the close cabinet mic can give a great composite "live" guitar tone. With the mic placed any farther away, the room-reflected sound level can approach that of the direct sound, causing the recorded sound to be too "echoey." Experiment as much as possible during sound check to identify the best mic placements.

Also consider mic orientation with respect to speaker cones, which have their own acoustic characteristics. Generally, mics aimed at the outer cone tend to have a duller sound with less high-end transient detail and crispness than mics oriented toward the center of the speaker cone, which tend to sound more natural and balanced (particularly if the mic is about 4" from the grille cloth). Mics placed close to the floor can also add more bass if needed. Placing mics at angles to the source can introduce off-axis coloration that tends to limit pickup of highs that may not be desirable, producing a more "mellow" sound.

In studio recordings, recording engi-

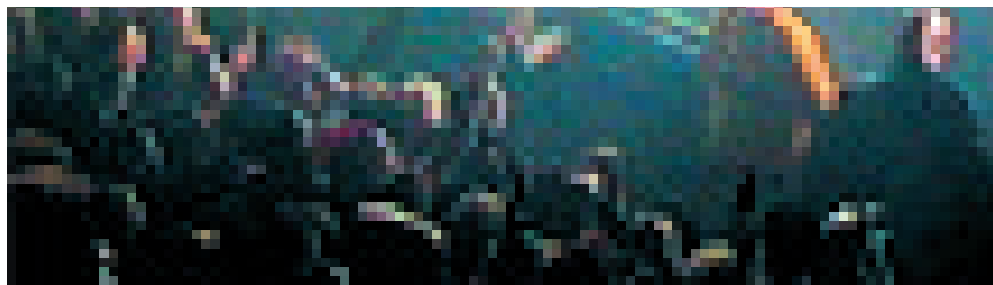
neers frequently use two or more mics (often different types) at different placements and orientations to the cabinet's speakers, often in a trial-and-error process, to come up with the desired tone. For example, with open-back cabinets, mics 180° out of phase with each other can help get certain desired recording tones. As this process can be fairly time-consuming, however, it is often not practical for the type of live recordings described here.

Still, if possible, it's generally a good idea to use a second mic in this way with unused channels of the FOH mixer to have the best chance of capturing the desired sound and tone. Such second mics can be used just for the recording, thereby eliminating feedback problems. Of course, if the instrument amp being miked is a stereo chorus amp, you'll definitely need two mics — one on each speaker — to capture the full stereo effect.

MIKING DRUMS

Presenting advanced techniques for optimizing the miking of individual drums is beyond the scope of this article. As a common rule, however, note that for maximum isolation of recorded sound for different drums you should aim the null/dead zone (*i.e.*, the back of the cardioid mic) toward the drums you want to isolate from the drum being recorded.

Drum overheads placed several inches away and between the cymbals are also needed for both the PA and recording mix to capture the ambience of the drum kit and highlight the cymbal crashes. As these overheads are farther from the sound source than the other mics, they are more likely to pick up leakage from other sources, especially if the backline guitar, bass, and keyboard amps and stage monitors are pointing directly at them and cannot be moved. Experiment during the sound check to minimize leakage from these sources, because this can cause problems for both the PA and recording mixes.



If there are unused channels in the FOH mixer and properly-oriented backline amps and monitors, a drum overhead can be suitable for miking the entire drum kit solely for recording. For this, try a single condenser mic placed about 12" over the drummer's head and pointing down at the kit. The result should be an effective blend and better overall ambient drum mix.

MIKING VOCALS

Mic placement and overall technique are critical when trying to satisfy both PA and recording criteria. In the studio, the vocalist might be 6" or more from the mic and use a pop filter. In our live recording scenario, the quality of the vocal recording will ultimately depend largely on the singer's mic technique. Although rock vocalists commonly sing live with their lips touching the mic ball ("eating the mic") for the most immunity to feedback, this technique is not recommended for recording purposes.

Instead, use a foam windscreen placed over the mic ball. The singer's lips should barely touch the foam while singing, thus ensuring a uniform sound with no variation in the bass proximity tonality and a minimum of "pop" noises. Any additional separation may result in feedback issues, as that channel's gain for the PA mix would need to be higher to compensate for the lower level vocal signal picked up by the mic.

Condenser mics are good for recording vocals; a selectable low-cut filter (e.g., 80Hz, 12dB/octave) helps to eliminate undesirable low-frequency noises and breath pops.

USING DIS

For the best clarity in recording — with full bandwidth, optimum separation, and minimum leakage or spill — both the bass and keyboards should be DI'd into the FOH mixer. The signal source for these DI boxes can be any of the following:

- Direct from the instrument, with the parallel output driving the backline amp (if the direct feed is not amplified solely

in the PA)

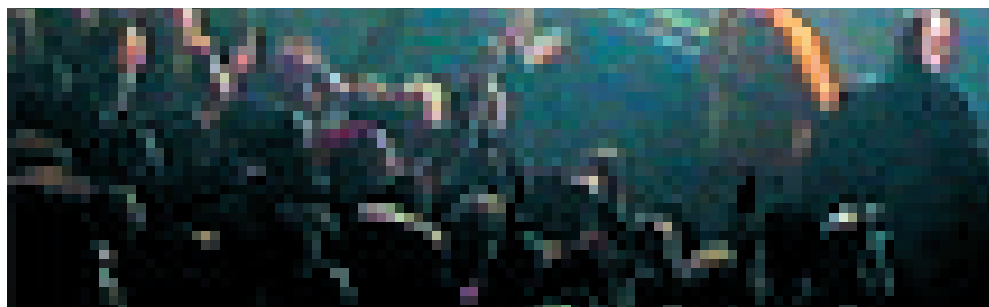
- From the instrument amp's preamp out (if available)
- From the speaker terminals of the bass or keyboard amp speakers

It's also acceptable in many cases to close mic the bass or keyboard cabinet using the same principles as outlined above for guitar cabinet miking and use that instead, or mix it in with the DI signal. The decision as to which method to employ is a subjective one; keep in mind that for most recording techniques there are never any hard and fast rules, only suggestions. Experimentation and experience can help guide you, but ultimately you have to trust your ears and instincts to achieve the sound you seek.

OPTIMIZING STEREO

An important consideration for live recordings is how to best achieve a true stereo feel. Sometimes panned, close-miked instruments and vocals (which, after all, are mono point sources) do not quite blend together for an overall realistic stereo sound. For a less artificial sound, consider the following techniques — again, depending on the number of unused channels available in the FOH mixer for recording.

- Add second mics more distantly placed from the instrument cabinets, guitars, and keyboards and blend these with the close-miked (or DI) audio. Don't include these additional mics in the PA mix. This will add some natural room acoustics and increase the apparent recorded instrument "size." It will also help avoid "dead" sounding productions — the last thing you want in a live recording.
- Mix in one or more drum overhead mics for the entire drum set (as previously discussed) to get a feel of ambience. Just don't overdo it, as this can wash out some of the desired crispness of the recorded sound of individual drums and cymbals.



NADY'S RECOMMENDATIONS

Of course, there are many mics, DI boxes, headphones, and the like suitable for live recording, available from a huge variety of manufacturers. As (not surprisingly!) I'm most familiar with my own product line, the following are typical products I use for the applications described in this article.

Headphones with isolation: QH-660

Headphone amplifier: HPA-4 or HA-1X4

Cardioid dynamic mics: SP-5 or SP-9

Single end-addressed XY stereo condenser mic: CM-2S

Y-splitter DI boxes: DB-1 or ADI-1, RDI-8 (8 channels)

Drum mic kit: DMK Series

Small diaphragm condenser mics for drum overheads: CM-88 or CM-90

Clip-on condenser drum mic: CM-60

Large diaphragm dynamic kick drum mic: DM-90

Vocal condenser mics: SPC Series, particularly the SPC-10

Pan each instrument and vocal for proper stereo spread during the recording. If done correctly, with these added touches, you should be able to achieve the desired results.

LOGISTICS AND GENERAL CONSIDERATIONS

Achieving the desired results from a live recording project requires that you have adequate setup time to implement many of the ideas discussed, as well as a proper sound check for both the live and recording mixes. An experienced "soundman" can optimize the live PA sound (with someone else likely handling the separate monitor board), while a recording engineer can focus on the conditions needed for the best possible recorded sound. Since both would be working with the main FOH mixer, cooperation and good communication are essential. In a pinch, one individual could handle both the FOH and recording functions, but this would probably compromise the quality of the recorded sound as the primary focus would be to oversee the house mix for the audience.

No matter how prepared you are, there are always final adjustments to sound check levels within the first few songs, just as there generally are for the PA mix. Accordingly, if possible, the first song or two that the band plays should be the least critical in terms of the actual recording. During this phase, make any needed changes as slowly as possible so they blend in naturally. If the problem levels are relatively subtle, it's probably best to make the required adjustments between

songs. However, unlike studio or live multiple-channel recordings, there is little one can "fix in the mix" with this type of recording. Although a little reverberation may help if the recording sounds more "dead" than "live" due to improper ambient sound mic placements, no "sweetening" will ever make the music sound as clear or natural as getting things right during recording.

AND FINALLY . . .

There are many other effective, sophisticated recording methods and techniques not described here. For example, you could use a complete second set of mics for all instruments (separate from the PA entirely), or extensive multitrack mic splitters, feeding all the input sound sources to a separate mixer in an isolated sound truck. Or you could use appropriate multitrack recording so that all channels can be processed or even dubbed as necessary in the final mix. These techniques are common with professional touring band live CD projects, and provide the best results; but they're not really necessary for most smaller-scale live recording projects, and you can achieve acceptable — even phenomenal results — with the kind of limited scope described here. With a basic understanding of the recording process and setup, use of the proper gear, and attention to detail, you can effectively capture a band's essential sound and energy through live recording in a way that's never quite possible in the studio.