

I'm Doug Fearn and this is My Take On Music Recording

My first experience with recording goes back to when I was 14 and I obtained a mono consumer tape recorder built in the 1950s that someone was throwing out because it didn't work. I got a lot of electronic stuff that way early in my career, either from friends and neighbors, including old radios and TVs put out for trash pickup.

The tape machine was easy to repair. It was typical of the home tape recorders of the day in that the speed changed somewhat throughout the reel, and it was full of wow and flutter. It came with its own microphone. The machine was mono, of course, and ran at 7.5 or 3.75 inches per second on quarter inch tape on 7-inch reels.

I recorded a lot of stuff with that crummy machine, including some music. I learned how to position the microphone to balance the musical instruments and voices. And I learned about how lousy room acoustics can make the recording sound awful.

When I got to high school, it was expected that I would join the school's FM broadcast station staff. Frankly, I wasn't too interested in that at first. I preferred the Amateur Radio club at my junior high school, which had its own station in a small room, with an outside antenna that allowed us to contact other radio amateurs by Morse code. I liked the idea of two-way communications better than broadcasting.

But once I got involved in the high school FM station, I was quickly attracted to the technical and creative aspects of the operation. The station had some of the most beautiful and well-made equipment I had ever seen.

The station broadcast most of the school orchestra and band concerts, as well as sports events. And an occasional radio drama produced by the students.

I was looking forward to recording the orchestra for broadcast. I spent much of my youth hearing the Philadelphia Orchestra in the Academy of Music in Philadelphia, so I knew what an orchestra in a great concert hall should sound like.

Of course, the school orchestra was not very good, and the auditorium was about as bad acoustically as you could imagine.

The recordings were made with one omni mic hanging from the auditorium ceiling, out from the stage about 20 feet. I was appalled by how bad it sounded.

I wanted to experiment to see if there was a better way to record the orchestra. We didn't have a huge collection of mics, but enough to try mic'ing the orchestra much closer, with multiple mics along the stage.

The faculty orchestra leader would not allow me to have mic stands on stage for the concert, but he did let me set them up during rehearsals. The auditorium was empty, of course, which made the acoustics even worse. But I liked the way the orchestra sounded when the mics were closer.

I also noticed that the phase problems from multiple mics made the orchestra sound worse the more mics I had open. This was all mono back then.

When I started recording rock bands in the radio station's largest studio, I realized that I had the same problem. A single mic pickup made the room dominant, and that room sounded as bad as the auditorium, only smaller.

Next, I tried multiple mics and it became apparent that positioning the mics to minimize the sound leakage from one instrument to another sounded better than when the isolation was poor.

Fast forward a few years, when I had my own recording studio and a growing collection of mics and a room that was almost totally dead. The dead room made it easier to get good sound out of a small studio. And I had enough mics to have a separate mic on each instrument, plus many mics on the drums.

That was the style in the late 1960s – very isolated instruments with multiple mics as needed. And that style has largely persisted to this day.

Don't get me wrong – putting 15 mics on a drum kit can yield a wonderful sound. It's like having your ear inches away from each drum, and that can be quite compelling and exciting to listen to.

My first studio, with its small drum booth, really could not take advantage of any alternative approach to mic'ing.

A few years later, I moved the studio to a much bigger building, with a studio that was about 35 by 25 with a 12-foot ceiling. After recording in small, dead studios, and doing location recording in some great and not-so-great auditoriums and halls, I had a pretty good idea of what I wanted in my new studio.

For one thing, I wanted it to be live-sounding, without excessive absorption. And I did not want to have any iso booths. Those are two requirements that sometimes conflict, but I thought the advantage of a reverberant room made the lack of isolation a trade-off I was willing to accept.

I was still recording the drums with many mics, but I also put a stereo pair, usually in X-Y, out from the drum kit and recorded those on a separate pair of tracks. Often, I preferred the sound of the simple stereo pickup to the sound of the many mics, and so did my clients.

But then, bleed from other instruments was an issue. But I didn't worry about that too much. Sure, you could hear a bit of everything that was going on in the room on each track, but it didn't hurt the overall sound most of the time.

My record company clients were usually OK with that, although I did do some disco records where the producer wanted total isolation between every instrument so he could make multiple versions with some instruments dropping out in places. That was a legitimate requirement, and we solved it by overdubbing everything on separate tracks. This, too, had its appeal from an engineering point of view, but it surely made some sterile-sounding records.

When I worked on my own productions, I approached the session with the goal of using as few mics as possible and embracing the bleed and room sound. I was able to do that with some of my record company clients, too, and that sound actually generated a lot more business, and other projects from the label.

But sometimes the bleed creates problems that can't be repaired. This occurs mostly with instruments that are incompatible in level, or musicians who do not play at the appropriate loudness. This can lead to some awful-sounding instruments in the mix.

To do this successfully in an open room, you first have to know your space very well, and you have to have musicians who understand how to play so that their instrument fits in well with the others in the room.

The first time I ever recorded drums, in high school, I used a single RCA 77 in front of the drum kit. I liked the way that sounded.

Ever since then, it has been my goal was to record the drums with one mic and still keep it present and punchy. That will only work with a drummer who knows how to play to match the dynamics and overall level of the other players recording at the same time. And that applies to every drum and cymbal in the kit.

I think the fundamental problem goes back to a steady increase in the loudness of the various instruments in performance. When drums became prominent in popular music, the acoustic guitar and upright bass could no longer compete. And vocals were inaudible most of the time.

Instead of playing the drums more appropriately, the solution was electric instruments and amplified vocals.

That works well for much of the music that evolved from the new technology, and we came to expect that kind of sound from live performance and recordings.

If you go back to the big band era of the 1930s and 40s, no amplification was used, except maybe for a singer. The band played at the appropriate level so that everything mixed perfectly. Generally, only one mic was used for recording, with perhaps a second mic for the vocalist, if needed.

I'm not suggesting that we can or should go back to that style, but it does provide some interesting things to think about when working in the studio.

We can still use the instruments and amplifiers we want, but what if everyone played in the same room and balanced themselves

With a well-balanced rhythm section playing together in one room, you could have much better communications between players than if you had them all isolated and playing in booths, or overdubbing their parts. There is something magical that happens when people are making music together rather than just playing their parts in isolation.

So, how would you record them? In some cases, it is entirely feasible to record everyone with one mic, or a stereo pair, located in a position that balances all the instruments. But even if you have to use more than one mic, you can cut down drastically on the number you use.

On the downside, when it came time to mix, you wouldn't have much control over the balance. This approach requires a solid pre-conceived notion of what the final product should sound like. That's more challenging than putting everything on separate tracks and figuring out how the pieces fit together later.

One big advantage of the single-point pickup is that there are never any phase problems between the instruments. This can especially be a problem with drums with multiple mics, since it is nearly impossible to provide perfect isolation between the mics. There will always be bleed, and the time difference in the arrival times into each mic translates into a phase difference that reduces the presence of the drums.

I know that a lot of people time-align the individual mic tracks to eliminate the phase problems. I have tried that and found that it doesn't solve the problem for me. It seems to make the drum sound too unreal, almost like they are not actual instruments anymore. Other people make this technique sound great, so I know it can be done. It just doesn't fit my style.

The best drum sounds I ever got were often from mics that weren't even on the drums, but elsewhere in the room. A good-sounding room can make drums sound enormous and powerful. But many of us do not have such beautiful spaces in which to record.

My solution is to use one stereo mic, usually ribbon mics in a Blumlein configuration, placed out in front of the drum kit maybe five feet and about level with the top of the snare. In bigger rooms, you can go out farther. In order to balance the drums, I move the mic as needed, but usually centered on the kit works best, and the vertical position adjusts the kick drum balance.

I have on occasion used a separate kick drum mic, but with a good drummer, that will not be necessary.

And a "good drummer" is key to making this work.

The stereo spread of the drums is pleasant and comparable to the width of many multi-mic'd sessions.

But the sound is cohesive. There are no phase problems and the sound is very natural.

The Blumlein mic'ing arrangement goes back to the 1930s when EMI engineer Alan Blumlein was working at Abbey Road Studios, developing a stereo recording and reproducing system.

One of his inventions was the dual ribbon microphone, with the two elements arranged at 90-degrees from each other. This provided a stereo pickup that was similar in many ways to the X-Y stereo technique using two cardioid pattern microphones that were as close together as possible and aimed 90-degrees apart.

The difference is that the ribbon mics have a bidirectional pickup pattern, which means they are equally sensitive and have identical response on both sides. The resulting pattern with the mics in Blumlein looks like a cloverleaf, with four overlapping lobes around the 360-degree pickup.

At first, you would think this would provide an omnidirectional pickup pattern, and to some extent that is true. In front of the mic, you have a left-right stereo pattern, which is mirrored on the opposite side. The pickup is the same on the sides, with one major difference: the side pickup mics are out of phase

with each other. That means that if the stereo channels are combined in mono, the pickup from either side of the mic array is cancelled out.

That's why you should avoid putting anything off to the sides of a Blumlein pair of mics. Even if the recording is never heard in mono, the side images will sound strange and spacey. It's difficult for our hearing to locate a sound with out-of-phase mics. Reversing polarity of one of the mics simply shifts the out-of-phase area from the sides to the front and back.

However, in a nice acoustic environment, the out-of-phase side pickup adds a very nice representation of the room. It is sort of like blending in spaced omni mics with an X-Y main pair, except that there is no time delay.

Despite those two disadvantages: pickup on both sides of the mic, and that out-of-phase pickup on the sides, it is a compromise I am willing to live with, given the amazing stereo image.

Just think about what the back of the mic is picking up, and what is off to the sides.

I have tried the other common stereo mic'ing techniques, like X-Y, M-S, ORTF, and spaced omnis, and they all have their place. Blumlein, carefully used in the right circumstances, always sounds best to me. There is a certain magic I hear that doesn't happen with other techniques.

Of course, there are some situations where the other stereo techniques are better.

If you use a mono mic, or a different stereo pickup, keep the polar pattern of the mic in mind as you set up your musicians. Most mics only have the stated pickup pattern over a limited range of audio frequencies. The pattern of a directional mic, for example, becomes nearly omni at low and high frequencies. I think that is one of the reasons I prefer the sound of ribbon mics, since their frequency response remains nearly the same at any point around the mic.

Let's look at some common studio sessions and see how we can use this minimal mic'ing approach.

The ultimate is to use one mic for everything. Lots of great-sounding records were made like this in the past. The audio quality may have been poor, but the recordings had presence and realism.

I have used one Blumlein pair to record an entire song, albeit with minimal instrumentation. I have posted an audio clip on my podcast web site, dougfearn.com, of a recording I made using a single Blumlein mic of guitar, piano, upright bass, dobro, simple drums, and vocal. There is also a version recorded at the same time with standard multiple mics. You can find both in the "Extras" tab.

I should also note that the single-mic version is recorded to DSD, while the multi-mic version was recorded as a PCM digital session.

Both versions are from the same take, so you can A-B them without there being any variations in the performance.

For the Blumlein single-mic pickup, I used an AEA R88 stereo ribbon mic. It was setup in the middle of the instruments, and we moved people around to get the right balance. That took about an hour of experimenting.

For the multi-mic version, I used a Horch RM2J on the vocal, ADK 67 on the guitar, Neumann U47fet on the upright bass, AEA R92 on the piano, and a Neumann SM69 stereo condenser on the drums and dobro.

We made a video of this session, which you can find with the link in the description for this episode.

For another example of a recording using minimal mic'ing, there is a video of a presentation we gave at an AES Boston Chapter meeting at Futura Studios. This recording is of a three-piece jazz ensemble with my colleagues George and Geoff Hazelrigg and a drummer. I recorded this live-in-the-studio performance using two R88s, one on the piano, and the other in between the drums and the upright bass.

We have tried over the years to record a trio like this using one mic, but that approach compromised the sound of the piano.

To understand this, we first have to look at how a grand piano produces sound.

First, think about a guitar. The tensioned strings produce the note, but without something to vibrate at the note's frequency, the sound would be very low volume. Think of a solid-body electric guitar. Sure, you can hear the notes if there is no other sound in the room, but that sound is nothing like what a guitar sounds like. For an electric guitar, that doesn't matter much because the pickups will provide an electrical signal that can be amplified and heard from a speaker.

An acoustic guitar, however, can make some useable sound, and may not need any help at all if the rest of the instruments are at an appropriate level. The top of the guitar, the thin wood under the strings and extending outwards, vibrates strongly from the sound of the strings and projects that sound out towards the audience or the microphone. The guitar bridge is used to couple the vibration of the strings to the top.

A piano works the same way. There are a lot more strings, of course, and the need to support all that tension falls on a metal harp rather than on the wood of a guitar. Positioned under the strings is the sounding board, which is analogous to the guitar top. It even has a bridge, very similar to the guitar.

If you were sitting in an audience listening to a piano with the lid closed, the sound would be muffled and quiet. That might be OK in a piano lounge as background music, but it certainly would not work if you wanted to hear the piano in all its glory.

If you remove the top of the piano entirely, the sound will go straight up, and down, and still not project out to the audience.

The solution is to prop open the lid at an angle, so that it acts as a sound reflector to direct the sound out to the audience.

Is that a great solution? Not really. It has become the sound of the piano in performance and it can sound very good in a large space that is acoustically decent.

But the sound bounces off the lid in a selective way, since the lid is angled. It also reflects some of the sound back to the sounding board and sets up a series of echoes within the piano. Still not a major problem in performance. But it makes recording the piano more difficult than it needs to be.

Our solution is to remove the lid of the piano entirely. That way, there are no destructive echoes.

But a new problem is created because the piano no longer projects out into the studio.

In a nutshell, the piano now projects vertically, both up and down, but not out, while the other instruments project horizontally, out to the audience or to a microphone.

The solution is to use two mics: one for the piano, above the sounding board, looking down at where the sound is coming from, and a second mic to pick up the bass and drums.

It's a little more complicated than a single mic for everything, but it gives me the best sound for all the instruments. You can add more instruments, and a vocalist to this setup, as long as everyone is playing so that the balance is correct in the room.

By the way, we made a video that explains our piano mic'ing technique. The link is in the description for this episode.

And that's the setup we used in our AES talk in Boston. The only difference was that we had to arrange the instruments like we would for a live performance, since there was a studio audience. In a recording session, we would arrange the players for optimum communication between themselves.

For recording, sometimes we take this a step farther and isolate the drums in a separate room. We do this if we expect that one or more of the parts will need to be replaced. In this case, our minimalist mic'ing expands to three stereo microphones.

With more complex projects, you might need even more mics. But the goal is to use as few as possible. Whenever practical, use one mic for more than one instrument, taking advantage of the microphone pickup pattern, which for me is almost always figure-8, or bi-directional, since I use ribbon mics almost exclusively.

This approach can even work in very small spaces, if you modify the acoustics of the room appropriately. The Hazelriggs record in a very small basement studio. Things are so tight that it is just about impossible to move in the room once everything is set up. For an example of a 3-mic recording in the Hazelrigg's studio, listen to a song we recorded there with jazz singer Ola Onabule. In this session, we used the usual R88 stereo mics on the piano and in between the drums and bass, plus an AEA 44C on the vocal.

Will this work with any kind of music? Probably not. Anytime you have instruments that produce incompatible levels, like a combination of acoustic and electric instruments, this approach is going to be challenging. If you have a vocalist trying to compete with loud instruments, this isn't likely to work.

Ideally, you should be able to sit in the studio and enjoy a perfectly balanced performance. If you can't do that, this technique probably won't work. There are workarounds, like using baffles, iso booths, or overdubbing later, but that compromise may still give you a better product than the traditional route.

If you are recording yourself, or working on a project where just about everything is either from a sample or each acoustic source is recorded separately, the single-mic technique is impossible. There's nothing wrong with that approach to recording, and I have done some of that myself. It gives you great control of all elements, but the results may lack the excitement you seek for the song.

I keep imagining sessions I have done in the past and figuring out how I could apply this technique. Most of the time, I can picture a way to do it, even with some styles of contemporary pop music.

I'd like to try recording a contemporary-style song this way, even with lots of electronic or sampled tracks. I would have everyone together in the room, with the synthesizer and sample tracks coming out of decent amplified speakers. I could move everyone around the central stereo mic to get the proper balance. Challenging? For sure. Especially for the musicians who probably never recorded this way before. It would take more musicians than usual, since there would be little, if any, overdubbing. But I suspect it would lead to some really good music. And I like challenging myself with projects like that.

If you have to get something useable out of the session, it would make sense to also mic each source individually so you can mix it later. Or just do the basic rhythm track this way and overdub the rest. But I suspect this all-at-once technique would work, and it would be exciting for the players and might lead to a recording with more energy and spontaneity than usual.

If the ensemble has many instruments, you will need to have the mic farther away to capture them all, and that requires a larger room. And the room acoustics will become a major factor in the sound. A lousy room is going to sound really obvious in this scenario, and you probably will not like the result.

How about if you are recording something like a singer who is also playing an acoustic guitar. That's a common situation. How about if there were other instruments on the session? This might be the finished product, or other parts might be overdubbed later. How can we apply our minimalist approach to this setup?

A single mic will almost always sound better than two mics in this situation. With separate mics on the vocal and guitar, you introduce lots of problems. First, you will never obtain anything better than about 10dB of isolation between the two sound sources, and still get good sounds on each. And all that bleed means there is going to be serious frequency response anomalies in the recording, due to the spacing between the mics. You can improve this somewhat by using very close mic placement, but neither the vocal nor guitar are point sources, and the closer you get, the less natural the sound becomes. You might like that sound, and that's perfectly legitimate, but I think there is a better way.

Using one mic, mono or stereo, farther away than you would normally place the mics, results in a very cohesive sound on both the vocal and guitar. There can be no time delay, so the recording has more presence and intimacy, even though the mics are more distant.

If that is the extent of the final recording, it's easy. But what if there are going to be other instruments added? In that case, you have to imagine the other parts and get the vocal/guitar balance to be correct in the final mix. That can be challenging, especially if new ideas come to mind and the instrumentation changes.

A possible workaround is to later replace both the vocal and guitar with new performances, either together or separately.

To sum this all up;

- a single point pickup has a very compelling, cohesive, and satisfying sound
- musicians who are playing together, all in one room, tend to play better and gain inspiration from each other
- using just one mic, stereo or mono, can eliminate the time and phase problems from bleed from the instruments into individual mics.
- often you will have to use more than one mic, but the minimalist approach can still be used
- this won't work for every session. Maybe never for the types of projects you do.
- It's just a tool that you might want to try sometime. I can guarantee you that you will be surprised at the results.

As always, thanks for your feedback. I can be reached at dwfearn@dwfearn

This is My Take On Music Recording. I'm Doug Fearn. See you next time.