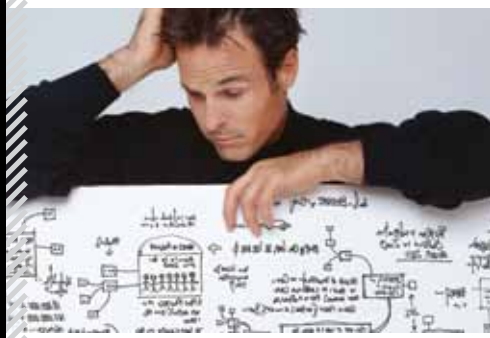


Commercial INTEGRATOR

THE BUSINESS HANDBOOK FOR TECHNOLOGY PROFESSIONALS



THE BUSINESS OF MIC INTEGRATION

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Matching Mics WITH CLIENTS

Knowing how to best address common systems will help integrators solve clients' microphone needs. *by Mark Coxon*

THERE ARE QUITE A FEW THINGS to consider when designing an A/V system that includes microphones. The ramifications of choosing the wrong hardware or even installing the right hardware in the wrong places are huge.

Here are a few scenarios that I have seen over the years, ranging from the questionable to the well thought out.

An A/V Receiver and Wireless Microphone

I have seen this frequently along with the same mistakes. The typical setup is as follows:

A wireless microphone receiver is hooked via line-out to an unused input on the residential, Zone 2 A/V receiver and named "Microphone." The Zone 1 Speakers are connected to the A Channel left and right outputs and/or surround outputs of the A/V receiver and two additional speakers are connected to the Zone 2 powered speaker outputs. The customer is trained to turn zone 1 to their main audio and then to turn on Zone 2 and switch that source to "Microphone" and adjust the volume accordingly for speech reinforcement.

Although this works, the main issues are that the system is a nightmare to control, like switching between Zone 1 and Zone 2 sources and volumes. It also separates the voice reinforcement from the program audio, giving a very uneven mix of the two. I have also seen the integrator put the speakers for Zone 2 right over the area that the speaker is presenting from, causing a huge feedback loop with no real way to mitigate it.

An A/V Receiver and Commercial Microphone Mixer Amplifier

OK, so I did this once myself in a design five-plus years back, (I feel better now that it's on the table). The way I have seen it and designed it once was this:

A wireless microphone receiver and/or wired microphones are connected to the microphone mixer amplifier. The residential A/V receiver is connected via the tape out line level port to the program audio line level input of the microphone mixer amplifier. Speakers are connected to the A Channel left and right outputs and/or surround outputs of the A/V receiver and two additional speakers are connected to the powered speaker outputs of the microphone mixer amplifier.

This is a little easier to use, as the mixer amp allows you to control mic levels and program audio from one platform. It is slightly more flexible, in that it aids in adding wired and wireless mics, and setting different mic gains, etc. It allows program audio and microphones to come out a common set of speakers as well, creating a more even mix of sound.

Not ideal, but marginally acceptable.

Boundary Microphones

These are used a lot in large areas where a large number of people may need to be heard for a conference call, etc. Microphones with a certain coverage pattern are placed throughout the ceiling of the room, or in a table, etc. These typically come back to a DSP or a microphone mixing console where individual gains and EQ levels can be set for each microphone, and multiple settings can be stored for different types of events.

One thing to remember is that distributed audio rarely works well in these situations.

I was recently in a conference room, where boundary microphones and ceiling speakers were alternately installed: mic, speaker, mic, speaker, etc. The potential new client said that the ceiling speakers had been disabled, and I instantly knew why ... feedback. The speakers were playing directly into the microphones for the most part. To his credit, the former integrator had come back and installed two speakers on the wall in the front of the room and in that arrangement, centralized speakers at the front and boundary microphones over the tables, it worked.

However, the client most likely paid for quite a bit of labor and eight speakers that they never utilize, as they can only be turned on when the mics are disabled.

Professional Conferencing System

Go to a town council meeting or a high-end boardroom and this is what you will find.

Individual microphones at each seat, a push to talk system, speaking requests, and more are all built into these microphones. These systems typically employ local speakers for voice reinforcement, that when coupled with the DSP or Microphone Mixing platform, can do a mix-minus where the level of audio coming from the speaker in front of you, is determined by your proximity to the person actually talking. These types of systems use directional microphones and small speakers to mitigate gain over feedback, and provide a very flexible and highly customizable system. Program audio can also be mixed through the small speakers and dually played through a centralized or distributed system also installed in the room without issues if set up properly. **CI**

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How to READ MIC SPECS

They may read like hieroglyphics, but when properly evaluated mic specifications provide useful objectivity for integrators.

WHEN INTEGRATORS READ microphone specifications, it is extremely important to understand how to interpret them. For assistance, *CI* turned to our sister publication *ProSoundWeb*, which recently posted a handy piece by Mikkel Nymand aimed at demystifying the specs.

"In most cases, the specifications can be measured or calculated in many different ways," he writes.

"While microphone specifications provide an indication of a microphone's electro-acoustic performance, they will not give a total appreciation of how it will sound. Specifications can detail objective information but cannot convey the subjective sonic experience.

"For example, a frequency response curve can show how faithfully the microphone will reproduce the incoming pure sinusoidal frequencies, but not how detailed, well dissolved or transparent the result will be.

Visit ProSoundWeb.com for full-length explanations by Nymand, but following are some key points:

The deciBel (dB) Scale

The basis for most microphone specifications is the decibel scale. The dB scale is logarithmic and is used because of its equivalence to the way the human ear perceives changes in sound pressure.

Further, the changes in dB are smoother and more understandable than the very large numbers that might occur in pressure scales (Pascal, Newton or Bar). The dB scale states a given pressure in proportion to a reference pressure, mostly 20µPa.

The reference pressure 20µPa is chosen equal to 0 dB. Please

note that 0 dB does not mean that there isn't any sound; it only states the lower limiting sound pressure level of the average human ear's ability to detect sounds.

Frequency Response

The frequency response curve illustrates the microphone's ability to transform acoustic energy into electric signals, and whether it will do so faithfully or will introduce coloration. Take care not to mistake frequency response for frequency range.

The microphone's frequency range will only give a rough indication of which frequency area the microphone will be able to reproduce sound within a given tolerance. The frequency range is sometimes also referred to as bandwidth.

Multiple Frequency Response Curves

Manufacturers of professional equipment will always provide more than one frequency response curve, as it is essential to see how the microphone will respond to sound coming from different directions and

in different acoustic sound fields.

On-Axis Response

The on-axis response demonstrates the microphone's response



The microphone's frequency range will only give a rough indication of which frequency area the microphone will be able to reproduce sound within a given tolerance.

to sound coming directly on-axis towards its diaphragm (0 degrees).

Be aware that the on-axis response may be measured from different distances, which may influence the response on directional microphones because of the proximity effect.

Diffuse Field Response

The diffuse field response curve will illustrate how the microphone will respond in a highly reverberant sound field.

This will be an acoustic environment where the sound has no specific direction, but where all directions are equally probable.

The reflections from walls, floor and ceiling are as loud or louder than the direct sound, and the sound pressure level is the same everywhere.

This is especially interesting when considering omnidirectional microphones, because they are able to register the full-frequency range in the lower frequencies.

The diffuse field response will show a roll-off in the higher frequencies, partly due to the air's absorption of higher frequencies.

Off-Axis Response

The off-axis responses will reveal the microphone's response to sound coming from different angles.

This is particularly interesting when you want to discover how a directional (i.e. cardioid) microphone will eliminate sound coming from other angles than directly toward the diaphragm.

Even though the off-axis responses are attenuated on directional microphones, it is extremely important that these curves also show a straight frequency response, as it will otherwise introduce off-axis coloration (curtain effect).

Polar Response

A polar diagram is used to show how certain frequencies are reproduced when they enter the microphone from different angles.

The polar diagram can provide an indication of how smooth (or uneven) the off-axis coloration will be.

A reference point on the outer circle is often defined by a 1 kHz sinusoidal tone aimed directly toward the microphone's diaphragm (0 degrees = on top of the circle).

Each shift between the circles normally indicates a -5 dB step, unless otherwise indicated.

In this way, it is easy to determine how much weaker the signal will be around the microphone for certain frequencies, commonly 5 kHz, 10 kHz, 15 kHz and 20 kHz.

The response curves should be smooth and symmetric to show an uncolored sound.

Extreme peaks and valleys are unwanted, and the response curves should not cross each other.

From the polar diagram, it is also easy to see how omnidirectional microphones usually become more directional at higher frequencies.

Sensitivity

Sensitivity expresses the microphone's ability to convert acoustic pressure to electric voltage. The sensitivity states what voltage a microphone will produce at a certain sound pressure level.

A microphone with high sensitivity will give a high voltage output and will therefore not need as much amplification (gain) as a model with lower sensitivity.

In applications with low sound pressure levels, a microphone with a high sensitivity is required in order to keep the amplification noise low.

According to the IEC 268-4 norm, the sensitivity is measured in mV per Pascal at 1 kHz (measuring microphones at 250 Hz).

Be aware that the on-axis response may be measured from different distances, which may influence the response on directional microphones because of the proximity effect.

As an alternative, the sensitivity can be submitted according to the American tradition, which states the sensitivity in dB, relatively to 1V/Pa, which will give a negative value.

A serious microphone manufacturer will also state tolerances in sensitivity, according to production differences (such tolerances would normally be in the region of 2 dB).

SPL Handling Capability

In many recording situations, it is essential to know the maximum Sound Pressure Level (SPL) the microphone can handle.

Please note that, in most music recording, maximum peak SPL easily supersedes the RMS value by more than 20 dB. The RMS value indicates an average SPL and will not show the true SPL peaks.

It is important to know:

1. The SPL where a certain Total Harmonic Distortion (THD) occurs.
2. The SPL where the signal from the microphone will clip, that is the waveforms will become squares. This is the term: Max SPL and it refers to peak values in SPL.

A commonly used level of THD is 0.5 percent (1 percent is also often seen), which is the point where the distortion can be measured, but not heard.

Ensure that the THD specification is measured for the complete microphone (capsule and preamplifier), as many manufacturers only specify THD measured on the preamplifier, which distorts much less than the capsule.

The distortion of a circular diaphragm will double with a 6 dB increase of the input level, so other levels of THD can be calculated by using this factor. **CI**

» Find a full version of Mikkel Nyman's "How To Read (And Better Understand) Microphone Specifications" on ProSoundWeb.com «

SHURE SM58+X2U USB DIGITAL BUNDLE

THE SKINNY: Podcasting has shown to be one of the most effective forms of communications within today's social media. Through the rapid development and evolution of a new generation of products, like Shure's SM58+X2u bundle, it's easier than ever for businesses and individuals to create podcasts that don't sound like they're being recorded in someone's basement.

THE SPECS: Shure's SM58+X2u USB Digital Bundle allows users to employ its popular SM58 microphone for podcasting and other types of digital recording. The SM58 is a dynamic microphone that employs a cardioid polar pattern and has a rated frequency response of 50Hz to 15kHz. The X2u is an XLR-to-USB converter that incorporates a built-in preamp with Shure's Microphone Gain Control to give users the ability to adjust the strength of the input signal. Shure adds the device also offers users its Zero Latency Monitoring technology for real-time playback and multitracking of content without having to deal with any possible disorientation.

THE SOLUTIONS: The SM58+X2u is ideal for digital recording applications, including portable iPad and laptop recording sessions for mobile users. www.shure.com



SENNHEISER SKM 5200-II

THE SKINNY: A-list entertainers generally get their choice of products and solutions, so it says a lot for a company like Sennheiser that someone like pop queen Katy Perry uses one of its products for on-stage performances. The company's SKM 5200-II wireless microphone system is a popular solution for artists who want the ability to freely roam the stage without sacrificing sound quality.

THE SPECS: The SKM 5200-II provides up to 184MHz of switching bandwidth to enable engineers to find a frequency that is noise free. It incorporates a switchable power output, audio sensitivity adjustment that ranges in 1dB steps up to 40dB, and the company's HiDyn Plus noise suppression system. Sennheiser says the HiDyn technology is designed to reduce RF noise to deliver a wide dynamic range and clean sound. Sennheiser offers the microphone in four versions — L, N, N-US and P — and in three colors: black, nickel and steel blue. The company supports the unit with battery pack options, as well as a choice of compatible capsules.

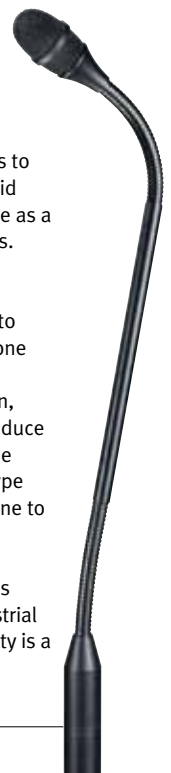
THE SOLUTIONS: Sennheiser says the microphone is well suited for live stage performance and live broadcast situations. www.sennheiser.com

AUDIO-TECHNICA AT808G

THE SKINNY: Audio-Technica is among the most diverse microphone manufacturers when it comes to product range. The company's AT808G Subcardioid Dynamic Console Microphone is designed to serve as a talk-back microphone in a variety of environments.

THE SPECS: The AT808G is a dynamic subcardioid microphone with a frequency response of 200Hz to 5kHz. Audio-Technica manufactures the microphone to comply with RoHS standards, and through its frequency response and subcardioid polar pattern, the microphone rejects ambient noise to help produce clearer audio. Other features incorporated into the AT808G include the ability to plug into an XLR-type of connector, and a design allowing the microphone to handle the rigors of daily use.

THE SOLUTIONS: Audio-Technica says the AT808G is designed for entertainment, commercial and industrial applications, particularly where speech intelligibility is a priority. www.audio-technica.com



BLUE MICROPHONES YETI

THE SKINNY: Blue Microphones' products include everything from consumer-level iPod solutions to state-of-the-art recording studio mics. Blue's Yeti is part of the company's desktop/USB line and can provide podcasters, video conferencers and mobile device users with a versatile microphone for mono and stereo recordings.

THE SPECS: The Yeti offers a 16-bit/48kHz bit and sample rate and incorporates three proprietary 14-mm condenser capsules, as well as a control switch that allows users to choose a cardioid, bidirectional, omnidirectional and stereo polar patterns. The company adds the microphone has a 20Hz to 20kHz frequency response and a maximum SPL rating of 120dB. Blue points out the microphone is compatible with PCs running Windows 7, Windows Vista, Windows XP Home Edition and Windows XP Professional Edition. Apple computer owners must use OSX version 10.4.11 or better, and both PC and Mac users must use a minimum of 64MB of RAM.

THE SOLUTIONS: The Yeti can be used for desktop applications such as podcasting and other digital recording activities such as GarageBand and other iPad-friendly apps. www.bluemicro.com





LAUTEN AUDIO FC-357 FET

THE SKINNY: Despite the increased availability and reduced cost of digital products, many recording industry veterans are seeking out the classic sound of analog recordings. Lauten Audio is helping recording professionals capture that sound through products like its FC-357 FET condenser microphone.

THE SPECS: The FC-357 FET is engineered to offer recording professionals the qualities of a classic FET microphone with modern updates to provide users the best of both worlds. The microphone incorporates a choice of cardioid, omni and figure-8 polar patterns, -10dB attenuation and +10 gain switches, and a foam windscreen that supports its use as a studio microphone. Lauten Audio says the microphone has a frequency response of 25Hz to 20kHz, a dynamic range of 120dB, an impedance of less than 200 ohms, and a 48-volt phantom power requirement.

THE SOLUTIONS: Lauten Audio's FC-357 FET condenser microphone is designed for studio recording applications. www.lautenaudio.com

AUDIX OM7

THE SKINNY: Audix says it has engineered the OM7 to purposely output lower levels than standard dynamic microphones so that the microphone acts as a "pad" at the capsule to maintain audio fidelity. For many front of house (FOH) engineers, the OM7 has been a go-to product for decades to balance on-stage demands of vocals and other instruments.

THE SPECS: The OM7 offers sound engineers a versatile dynamic microphone that includes a hypercardioid polar pattern and a frequency response of 48Hz to 19kHz. Audix says the microphone is resistant to stage feedback, and it's engineered with a low output level (8dB to 10dB) less than most dynamic microphones. The OM7 incorporates Audix's Very Low Mass (VLM) diaphragm that is said to produce a clean and punchy sound that responds quickly to transients.

THE SOLUTIONS: Audix says the microphone can be used for a variety of live applications, including lead and backing vocals, live recording, broadcasts, studios and instruments such as saxophones, guitars and drums. www.audixusa.com

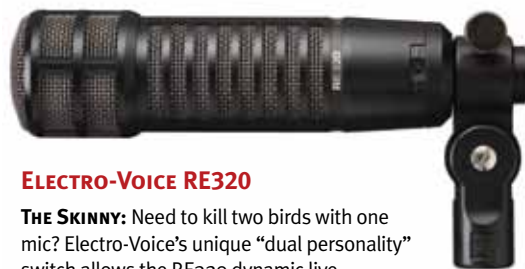


EARTHWORKS WL40V WIRELESS CAPSULE

THE SKINNY: People tend to move around while they talk or sing, so sometimes their microphone can't be tethered to a wire. Or maybe you just want to create less cable clutter in an installation. Either way, Earthworks Audio has its first-ever wireless product coming at you next year, the WL40V.

THE SPECS: The WL40V has been adapted from the SR40V Vocal Microphone released earlier this year. Designed to maintain the same signature sound as its wired counterpart, the WL40V delivers a detailed and realistic vocal sound that requires little to no EQ, the company says. Its textbook hypercardioid polar pattern and extended flat frequency response translate to a natural on- and off-axis performance, coupled with benchmark levels of clarity and detail.

THE SOLUTIONS: The wireless product seems ideal for live-performance entertainment or house of worship venues, and corporate office and auditorium presentations. www.earthworksaudio.com



ELECTRO-VOICE RE320

THE SKINNY: Need to kill two birds with one mic? Electro-Voice's unique "dual personality" switch allows the RE320 dynamic live performance microphone to create two mics in one — providing a vocal/instrument setting and a kick-drum setting, for quicker setup and less EQ work.

THE SPECS: The versatile RE320 features a cardioid polar pattern and EV's Variable-D proximity control that's said to deliver tight and consistent tonal output. An integrated humbucking coil combats EMF interference and line noise for clean and clear audio, while a high-output neodymium magnet structure capsule helps produce fast transients and detailed high-frequency response. The personality switch is said to produce open and natural details for vocals and instrumentation.

THE SOLUTIONS: Plug in the Electro-Voice RE320 for entertainment venues, houses of worship and other commercial settings that involve live performances. www.electrovoice.com

AKG D5

THE SKINNY: Anyone that's been around musicians might know the term "lead singer-itis," common to guitar players, bass players and drummers who have to deal with the quirky nature of lead singers. AKG's D5 dynamic vocal microphone can't cure all of the symptoms related to this affliction, but it can definitely enhance the overall audio quality and coverage of vocals during performances.

THE SPECS: The D5 is designed to withstand the rigors of road use while maintaining high levels of quality. The microphone features a supercardioid polar pattern and a dual-shock mount that is said to eliminate mechanical noise or other ambient sound present on stage during live performances. The microphone has a rated frequency response of 70Hz to 20kHz and it has a maximum SPL rating of 147dB.

THE SOLUTIONS: The D5 dynamic vocal microphone from AKG can be implemented for lead vocals and backing vocals in a live sound environment, such as rental and staging, house of worship and entertainment venue markets. www.akg.com

