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**SABINE
SWM7000
Wireless
Microphone**



Sabine SWM7000 Wireless Microphone System



By Loren Alldrin

Initially known for its groundbreaking feedback suppression products, Sabine has expanded its professional sound line in recent years to include equalizers, digital delays, reference mics and wireless mic systems. With the SWM7000 wireless mic system, Sabine's innovative engineers breathe new life into the "me-too" world of cordless mics.

The SWM7000's notable features include a nickel metal hydride (NiMH) rechargeable battery in the transmitter; a receiver with built-in FBX feedback suppression, mic modeling and other signal processing; RS-232 computer control from software; full 20 Hz – 20 kHz response for optimum sound quality; and a full range of microphone elements and other accessories.

Above and Beyond

The SWM7000's most notable characteristic may be its frequency range. The Sabine system rises above the crowded VHF and UHF spectrums to operate in the relatively new 2.4 GHz band, an unlicensed slice of radio real estate populated primarily by cordless phones, wireless routers, and wireless video cameras. Higher frequencies generally require less transmission power, and each channel takes up less bandwidth. As a result, Sabine reports that up to 70 SWM7000 systems can coexist without conflict on the same stage.

The SWM7000 uses a true diversity system, silently switching to the stronger of the receiver's two antennas as signal conditions change. As with all wireless

systems, the mic's reception is best when the transmitter has a line-of-sight shot at the receiver. The mic's optional external antennas can greatly improve reception in challenging environments.

Both handheld and beltpack transmitters are available. The handheld microphone comes in three capsule flavors: a Sabine condenser, Audix OM-3 dynamic or Audix OM-5 dynamic. The beltpack transmitter will work with the Sabine omni lav, cardioid lav or miniature cardioid lav mics, as well as a headset mic and instrument cable. The beltpack's standard mini-XLR connector also allows the connection of a wide variety of microphones from other manufacturers.

Managing transmitter batteries is one of the greatest hassles of wireless mic systems, a reality that Sabine attacks head-on with its Tireless Wireless technology. The rechargeable NiMH battery in each transmitter is resistant to battery "memory," a condition that reduces battery life as a result of frequent partial-discharge cycles. The SWM7000's intelligent charging system does its part as well, analyzing battery state and reconditioning or charging as required. Battery run time shows on the transmitter, blinking as the end of the battery's useful life approaches (around the eight-hour mark with the supplied battery).

In the "it's about time" category falls the Sabine's nifty battery gauge that appears in the receiver's display. Being able to keep tabs on the transmitter's battery state from the sound booth is a godsend, to say the least. Sabine is not the first to offer this wonderful feature, and I hope it begins to appear on wireless systems at all price points. Another slick feature is a charging mic clip for the handheld mic. When the wireless mic is in its clip, the charger is active.

The Sabine transmitter boasts an external, configurable switch as well as controls that sit under a flip-up panel. The external switch will operate in three different modes, including on/off, on/mute or on/on (which effectively disables the switch). This gives the sound engineer control over the mic's operating modes. Under the cover, buttons step through and adjust a handful of configuration options: channel, mic attenuation (four steps), and low-cut filter (75 Hz, 12 dB/octave). Relevant information appears on an inset LCD panel on the body of the mic or beltpack.

Wide Receiver

The SWM7000's single-rackspace receiver is available in four configurations: single- or dual-channel, with or without digital output and daisy chain computer control capabilities. Front-panel controls are simple. Sabine opted to use dedicated knobs and buttons

instead of a more flexible (though less efficient) menu system. Up to 10 complete setups can be saved and recalled from memory.

There's more to control on the SWM7000 receiver than on any other wireless system, thanks to an extensive array of onboard processing. Super Mic Modeling alters the response of the mic to match that of other popular mics. Available only with the handheld transmitter, the SWM7000 offers four different mic models for the dynamic head and three for the condenser. More mic models will be made available by download from the Sabine web site. The SWM7000's "adaptive" de-esser reduces problem sibilance, its level of reduction being controlled by a single knob. The receiver's compressor makes mic levels more consistent; front-panel controls include ratio, threshold, and attack time.

FBX processing uses narrow notch filters to detect and eliminate feedback. Seven or eight of the system's 10 filters (the manual can't make up its mind) are assigned to problem frequencies through a simple setup process. The remaining filters "float" to eliminate feedback when and where it occurs, detecting that telltale whine even with program audio flowing through the system. Unless something changes in the placement of mic or monitors, FBX setup should be a one-time operation.

Plug a computer into the SWM7000 receiver with a standard DB-9 serial cable, and a graphical software application delivers additional control over numerous parameters. Up to 70 SWM7000-ND receivers (with digital output and pass-through serial connectors) can be daisy-chained for control from one computer.

Through software, the compressor section offers control over release time and knee characteristics (defaults are 500ms and medium-soft respectively). Variable high- and low-pass filters appear in the software interface as well. Perhaps most impressive is the level of control the software gives you over the FBX filters. You can change the default filter width, switch fixed filters to floating and vice-versa, as well as convert any or all filters to fully parametric EQ bands. Equalization is accomplished on a large frequency graph that shows EQ changes as they affect the actual system (capsule) response. Create a parametric filter, and you can left-click on its dot on the graph to adjust frequency and gain. A right-click adjusts bandwidth.

Another nice feature is the SWM7000 software's RF scan feature. With it, you can scan the full 2.4 GHz spectrum and plot problem frequencies. You can even do analysis over time for specific channels, lock out problem channels, output the data to other programs and more. About all it won't do is let you listen in on a neighbor's cordless phone conversation.

In Use

Though the SWM7000 comes with one of the best (and most comprehensive) manuals I've seen, you won't likely need it much. Operation of the system is intuitive

and straightforward, thanks in large part to the receiver's large, detailed LCD window and dedicated controls.

My only complaint with the receiver's controls is the "Tweak-n-Peek" system. It switches the display to show the parameter of the knob being rotated, then quickly reverts to the default channel display. The revert delay needs to be much longer, or the system needs to offer the option of not reverting at all. One could argue that staying on the last parameter edited makes more sense than showing the RF channel.

How a microphone system sounds is clearly very important, and the SWM7000 delivers very good sound quality—with a few caveats (more on those later). The handheld transmitter (as tested with Audix OM-3 capsule) offers clear, crisp sound that is on par with the best dynamic mics available. Thanks to its broad bandwidth and low noise floor, the Sabine comes extremely close to the lofty goal of delivering "wired" sound from a wireless mic. Within the SWM7000's generous working range, the system's sound was free from pops, clicks, dropouts, noise or other such distractions. The transmitter powers off and on again silently, something that a surprising number of high-dollar wireless systems can't seem to get quite right.

Super Mic Modeling allows the Sabine handheld mic to take on the sonic characteristics of other microphones. The effects are subtle, but largely true to the modeled mics. Perhaps most striking is the tonal similarity between the models — all have a characteristic presence boost and bass roll-off. Still, the sonic differences will give you a good head start on dialing in the optimum vocal tone from a variety of voices.

Little needs to be said about Sabine's proven FBX feedback reduction process. The SWM7000 receiver quickly clamps feedback almost before it's audible in setup mode, and works nearly as quickly with program audio flowing. The end result is at least 6 dB of feedback-free gain, more in many cases. When you consider that the SWM7000's dedicated processing approach puts 10 filters to work on a single mic signal (without affecting any other channels), the story just gets better.

Where the Sabine's sound quality deteriorates is with its internal processing. The SWM7000's "adaptive" de-esser may be too smart for its own good — it affects the overall level in a distracting fashion at any setting above just a few decibels of correction. In one instance, hi-hat bleed from a nearby drum kit caused significant pumping in a vocalist's signal. The de-esser's attack and release times seem much too slow, and there's no way to change them — even in software. I've heard much more transparent results from simple side-chain analog de-essers.

Unfortunately, the system's compression algorithm doesn't fare much better. Compression artifacts and dulling become audible above moderate gain reduction settings on speaking or singing voices, and adjusting the knobs doesn't do much to fix the

problem. For starters, the default release time of 500 milliseconds is quite slow. Dropping this closer to 100 ms (with software only) helped some, but the pumping never fully went away. The compressor's gain reduction meter is calibrated to handle obscene amounts of gain reduction — flickering more than one of the six elements on the compression meter almost guarantees a squashed signal. How much gain reduction does one element indicate? There's no telling, as the gain reduction meter doesn't have dB markings. Nor does the compressor offer a makeup gain control (though the manual mentions it).

Back to Basics

Sabine needs to go back to the drawing board on their de-esser and compression algorithms, perhaps in consultation with one of the many companies doing these processes well in the digital domain. In contrast, Sabine's implementation of feedback control, mic modeling, and equalization is spot-on. It's important to keep the de-esser and compressor problems in perspective — these two effects would be the icing on an already very tasty cake.

In overall sound quality, ease-of-use and innovative features, the SWM7000 system is a winner. The engineers at Sabine clearly thought long and hard about how to smooth off as many rough edges in wireless mic performance as possible. Overcoming feedback problems, dying batteries, limited capsule options and crowded VHF/UHF frequencies in one product is no small feat. And though most churches probably won't ever connect a computer to the SWM7000's receiver, the prospects of computer control of one (or many) wireless mic systems is a compelling one.

If your church is looking to step out on the leading edge of wireless microphone technology, the Sabine SWM7000 system has effectively brought the wireless mic into this millennium. At a list price of \$1,250 (U.S.), you can certainly find less expensive wireless systems — but you won't find one with more innovative and thoughtful features than the Sabine SWM7000.

Loren Alldrin is a regular contributor to Church Production Magazine.

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Dial the QUICK-LINK # and reference: CHURCH PRODUCTION MAGAZINE

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