

bhi Desktop Amplified DSP Noise Cancelling Speaker

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The bhi Desktop is the size and shape of many compact stereo speakers and will fit nicely on many an operating desk. If the DSP function is turned off, it will act just like many other amplified two-way speakers with its 4-inch bass driver and 1-inch tweeter and VOLUME control. Switch on the DSP filtering and you get your choice of eight noise reduction and automatic beat or heterodyne reduction levels. With an input level of 350 to 3500 mV_{p-p} from your radio speaker jack (or a line level input of 160 to 1600 mV_{p-p}), it can supply up to 10 W output, making it a good companion for some compact and DSP transceivers that don't provide speaker level audio.

What it Does

While the bhi Desktop looks like a bookshelf high-fidelity speaker, the manufacturer warns that it is designed to reproduce speech, not music. I believe that is more a function of the processing than about the speaker itself, but if you are after an entertainment speaker, there are many less expensive choices out there that don't offer the noise reduction possibilities.

The speaker has a coaxial type power jack for the dc supply, perhaps provided by an accessory output from your radio. It requires 12 to 18 V dc at typically 125 mA, but is specified at up to 2.5 A peak, possibly pushing the limits of many radio accessory power sockets. A cable is provided with a matching plug for the speaker end and bare wires on the other end, ready to be set up with the appropriate connector for your power supply. The cable includes an in-line fuse.

The audio input connections are provided by a pair of terminals that can accept banana plugs, spade lugs, or even bent wires. A cable is provided that has banana plugs on one end and a 3.5 millimeter mono phone plug on the other. A separate LINE



LEVEL input uses a 3.5 millimeter stereo jack that can accept mono or stereo signals. Stereo signals are electronically combined into a mono signal before processing.

The unit may be used as a table-top speaker, or an included bracket can be used for wall or under-shelf mounting. Select your mounting location so that the right side panel is within reach, so that the controls can be easily manipulated.

Noise and Tone Reduction

The bhi Desktop is specified to reduce tones by 4 to 65 dB in eight steps while

it simultaneously reduces noise by 9 to 35 dB. There is no provision to perform the functions separately.

The unit has two controls. Both controls are combination level controls and push button ON-OFF switches. The VOLUME knob adjusts the level of the speaker or connected headphones and includes a toggle push on-off POWER function. If the unit is powered on, a multicolor LED indicator is illuminated. There is no pass through with the power turned off.

The FILTER knob provides DSP level adjustment in eight steps. Pushing the FILTER knob turns the DSP processing on (multicolor LED turns green) or off (red). The unit emits variable level beeps to signal each cycle step, providing the operator feedback on the amount of processing selected.

The documentation doesn't say much about how and how quickly the noise reduction attacks and cancels tones, so I was initially concerned to see if it would cancel out CW signals, a phenomenon of some of these devices in tone cancellation mode. I found that it seemed to take several tenths of a second for cancellation to occur, allowing normal-speed CW to pass through without problems. Of course this may be viewed differently by a phone operator, who may want instantaneous noise reduction. It also makes it a bit difficult to decide which level of reduction you want, since the attenuation takes some time to complete processing after you have selected a level.

Note that there are multiple combinations of the radio and speaker VOLUME controls that can provide any desired speaker (or headphone) output level. If the drive signal to the speaker system is too high an OVERLOAD indication is reportedly provided by the LED changing from green to red and flashing three times. I couldn't get enough output from my receiver to cause the overload indication, but at high radio volume clipping and distortion were

Bottom Line

The bhi Desktop Speaker delivers the goods in both noise reduction and tone elimination. If your receive or transceiver doesn't provide these functions, you will likely find this upgrade worthwhile.

evident. Low audio from the radio may be more difficult to identify, but if there isn't enough signal level into the processor analog-to-digital converter, it won't have enough dynamic range to completely perform the processing. The input level sweet spot seems quite wide, but be aware that it needs to be taken into account. I found good performance with the radio level set to comfortable volume before connecting the DSP.

Even though the documentation doesn't discuss the tone reduction, its capabilities are quite good. While I could only generate a single tone in the passband, which the reduction removed very nicely, I found some complex multi-tone warbling signals that the tone reduction also eliminated. It took the processor about 1 second to eliminate a single tone and 2 seconds to eliminate two or three. It was effective against multiple tones of similar amplitude, as well as tones of different amplitude. This could be very handy all by itself.

How it Plays

With no processing, this speaker sounds better to me than internal speakers in most radios, and perhaps even better than the compact bookshelf speakers that I use with my main and sub-receivers.

Both the white noise reduction and tone reduction functions definitely work. I compared the noise reduction to the single choice NR function of a high-end transceiver I was testing, as well as the multiple levels found on my usual transceiver, and found the capabilities generally comparable. If your radio offers built-in DSP noise and tone reduction, any improvement will



See the Digital Edition of *QST* for a video overview of the bhi Desktop Amplified DSP Noise Cancelling Speaker.

likely be small. On the other hand, if your radio doesn't include these features, this would make a significant improvement in capability.

In evaluating the unit, I found that if the signal were strong to start with, so the noise (due to AGC action) was fairly low, the different reduction levels didn't sound very different. It took a weak broadcast station with a low signal-to-noise ratio, to convince me that each additional level made additional improvement. As with all DSP systems that I've encountered, the additional levels also brought additional artifacts and distortion, mostly noticeable in the top two or three levels. Interestingly, the artifacts were most noticeable if there was just noise present — appearance of a signal seemed to make them much weaker. The improvement clearly could make the difference between being able to understand a voice signal or not. It's also important to wait a fraction of a second at each step before deciding how well it is helping, since it takes a bit for the speaker to adjust the pro-

cessing to the new level. This also seems to happen more at the higher levels than at the lower levels that have less processing.

Documentation

The unit comes with an eight-page instruction booklet that does an adequate job of describing the speaker and how to use it. It also briefly describes the noise reduction function, but assumes you understand what tone reduction is all about. Perhaps if you didn't, you wouldn't buy it. The manual provides troubleshooting and support information and a set of Frequently Asked Questions. I think it will meet the needs of most users.

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