
If you have an older rig without digital signal processing (DSP), or a limited range of DSP options, consider two DSP solutions from GAP Antenna Products: the “Hear It” line of DSP speaker and inline module. Contributing Editor WB6NOA has our review.

CQ Reviews:

The GAP DSP “Hear It” Speaker and Inline Module

BY GORDON WEST,* WB6NOA

GAP Antenna Products is well-known for its major-size, vertical HF antennas, such as the Challenger, Eagle, Voyager, and an antenna I happen to own, the Titan DX. These exceptional antennas have been nicknamed “the ultimate verticals,” and the dramatic increase in receive capabilities they provide has led GAP to introduce two digital signal processing (DSP) noise-elimination “black boxes” (literally) which we recently tested: the “Hear It” speaker and inline module. Designed by and imported from BHI in England, each product incorporates some exclusive GAP engineering that perfectly suits each DSP box to literally *any* type of receiver, including my Kenwood TS-570, which already has two levels of audio DSP built in. The multi-level GAP DSP units offered more variations in specific DSP levels.

Digital signal processing subtracts unwanted noise that routinely surrounds incoming high-frequency signals. First the analog audio is converted into digital logic. Then the DSP chips magically enhance the desired voice syllables and data signals while subtracting the rush of high-frequency noise that is riding along with the desired modulation you are attempting to decode in your brain or via computer. The DSP circuit is actually a powerful computer that has been preset to lower that high-frequency noise floor.

However, the DSP circuits are not completely magic; for mobile applications you should do everything you can to minimize ignition static as well as other vehicle noise that may creep in with the desired high-frequency signal. For maritime-mobile operation, DSP noise-canceling circuits work well, but only after you have shut down the Morse-Code-sounding Danfoss refrigeration system controller, as well as inverters and battery chargers. DSP noise-elimination circuits work best on atmospheric noise, *not* with mobile noise associated with your vehicle or boat. It’s the same thing with home installations: The frying-eggs power-line noise and pending heterodynes of BPL won’t magically disappear with even the best digital signal processing circuit, whether in the audio



Photo A— The “Hear It” speaker from GAP Antenna Products includes a built-in digital signal processing (DSP) filter and audio amplifier.

chain or down in the intermediate-frequency (IF) stage of your modern HF transceiver. Certainly, IF DSP noise elimination has advantages over audio DSP circuits, but as you will see from our tests, the GAP audio DSP black boxes worked very well!

“Hear It” Speaker

This GAP “black box” builds everything into a common rectangular external speaker box. The DSP circuitry and built-in audio amplifier require 12 volts from a common 2.1-mm power connector, center-pin positive and fused. Typical power consumption is a half amp. You must have 12 volts feeding the box for the built-in quality speaker to work, and be careful when you plug in the power cord. If you have the speaker grounded to the top of your transceiver, plugging in a “hot” power connector requires precise alignment so you don’t accidentally touch the center of the connector to the grounded metal nut surrounding the jack. Plug the cord into the speaker first, and then into the 12-volt source! You will

*CQ Contributing Editor, 2414 College Dr., Costa Mesa, CA 92626
e-mail: <wb6noa@cq-amateur-radio.com>

be greeted with a red indicator light that shows the GAP “Hear It” speaker is powered up.

GAP also supplies the 3.5-mm mono jumper plug cable that goes between the radio speaker output and the speaker input. The supplied cord is nearly 7 feet long, so you should have plenty to reach between the speaker and your high-frequency rig. Of course, the “Hear It” speaker will work with any type of receiver, including scanner, shortwave, multi-mode VHF/UHF satellite, and even a common CB radio.

The Hear-It speaker with DSP noise elimination offers you eight discrete levels of DSP, set by a group of DIP switches on the back (see photo B). It comes from the factory preset to level 6, a moderate amount of DSP noise elimination that tends to make voice signals sound a bit rolling and metallic, as would any DSP noise-elimination system set to above-medium level. Level 6 would be good for pulling out a digital signal such as PSK31 or CW from a high atmospheric noise level on 80 meters. But for working voice on 20 meters or 15 meters, level 4 sounds much better.

For initial adjustment of the DSP speaker, start out at level 1 (the minimum level) with the DIP switches on the rear all in the “on” position. Run your radio volume at normal level for a normal sound out of the speaker, and then switch the top DSP switch to “on.” Now adjust the sensitivity control (marked “volume”) to about three-quarters full, which is a counter-clockwise turn of the little pot on the top of the speaker.

Next tune into a weak transmitting station on HF and listen to the difference in background noise as you turn noise cancellation off and on. Even level 1 should give you some relief from the atmospheric noise that rides along with the desired signal. Level 4 provided remarkable noise suppression, without making the SSB signal sound hollow and brassy. Level 6 is good for CW and data modes, while levels 7 and 8 offer about 20 dB of noise elimination but are really too much for most DSP work. We found the best settings for our needs to be between levels 4 and 6.

If the speaker is going to be installed in your mobile unit, you probably will not need to do any more adjustment of the DSP levels after you have found the level that’s best for you. However, if you really like to play around with DSP levels, the archaic DIP-switch technique for level changes is cumbersome. It reminds me of the old days of CTCSS tone selection on the back of my HT. I would have preferred a rotary switch.

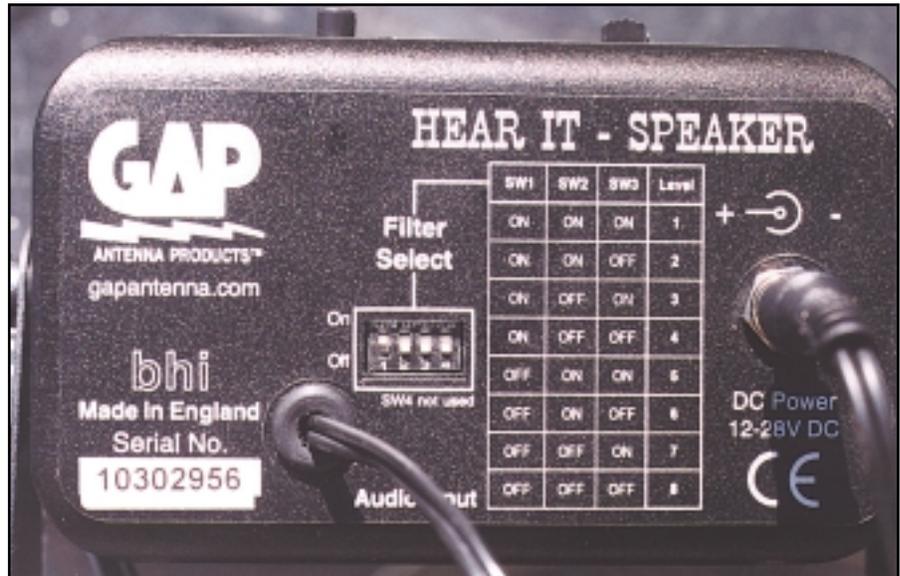


Photo B— DIP switches are used to control the DSP setting on the GAP “Hear It” speaker. Level 1 is minimum DSP, while level 8 is maximum.

However, since mobile installation of this speaker is most typical, you probably only need to work the switches once or twice.

“Hear It” Inline Module

Here is where the GAP “Hear It” inline module (photo C) comes into play – the same DSP chip-engine on the inside, but specifically designed to drive your existing mobile or base speaker system. The “Hear It” module runs with the common 12-volt plug, center-tip positive. It has a

plastic ring around the entire jack, so you won’t need to worry about accidentally blowing a fuse if you should fumble the power-plug connection.

Unplug your speaker from your main HF transceiver, and plug a patch cable from the transceiver’s speaker jack into the audio input jack on the “Hear It” inline module (see photo D for cable connections). Use the selector switch to select speaker output audio. There’s also a position for line input for specific base-station applications. Your speaker plug, which you just removed from



Photo C— The GAP “Hear It” inline module is intended to provide the same levels of DSP noise elimination for setups in which you don’t want to replace your current speaker.



Photo D— Audio input and output cables plug into the side of the “Hear It” module. There are audio-level and line-level connections for both input and output.

the radio, now plugs into the audio output jack. As soon as you turn on your rig, you will hear audio that is bypassed direct to the speaker. DC power is not required at this point.

Now adjust radio volume to normal, and set both the input level and the output level on the GAP module to about mid-scale. Turn your radio volume down, turn on the GAP’s power switch, and adjust both input and output volume levels to your normal levels. Double-check that you are not lighting the red LED for input level, which indicates you are overdriving the input by turning up the volume too high on your transceiver.

Next tune in a noisy station, adjust the DSP filter level to 4, and then turn on

the noise-cancellation switch. It takes about 3 seconds for the unit to electronically identify the target signal, deduce the constant atmospheric noise, and subtract it from the audio output stage. Once this is done, adjust the DSP level for your preferred amount of noise reduction.

During our tests, we tuned around and found an extremely weak signal coming in at a level 5 on the GAP DSP in-line module. When we switched out the DSP noise-cancellation circuit, we couldn’t believe our ears; that weak little signal completely disappeared into the hash. However, flip the circuit back on, wait a couple of seconds, and magically the GAP noise-cancellation circuits pull the signal out of the noise and reduce the noise dramatically. We were impressed!

For home-station use, most hams will regularly fiddle with the DSP levels. Therefore, I was surprised to see that the level control on the in-line module is a tiny, hard-to-grasp finger control. I would have figured it would have been a natural-size knob like the input and output level controls. The input and output levels seldom change, so I would hope GAP gets enough feedback that it takes the 8-level DSP control and makes it a decent-size knob.

Overall Impressions

Other than that, both the little black box speaker and the in-line module from GAP worked well. If your present mobile rig doesn’t have a lot of audio output driving the speaker, both of these units have built-in amplifiers to dramatically boost output volume. There is also a nifty AGC (automatic gain control) built in so that extremely strong signals won’t blast you out of the car, and extremely weak signals cleaned up by the built-in DSP circuitry are pulled up to a normal volume level. All this takes place without your having to reach over and adjust

the volume control of the main rig.

While I have seen one other “black box” speaker with built-in DSP, it only offers two levels of DSP as opposed to the GAP unit, which offers seven levels of DSP plus an eighth position for amplifying the audio without adding DSP. It’s the same thing for the in-line module—seven levels of adjustable DSP plus amplified straight-through audio.

The seven DSP levels are spaced apart just far enough so that you won’t need to worry about any level in between a specific level. Also, the seven levels are placed just right on the DSP curve so that level 1 is minimum DSP, with level 7 and 8 being about the maximum you would ever want. Again, 4 to 6 were my favorite levels for both voice and data.

If you wire the GAP speaker into your vehicle, keep in mind that it will continue to draw a half-amp even after you have turned off your radio. The red indicator light will remind you to disconnect the fuse if you plan to leave the vehicle for a week or two without running it. I don’t recommend unplugging the little plug on the back of the “Hear It” speaker, because you could accidentally short out the plug when trying to reattach the cable without actually eyeballing the connection for proper alignment.

The GAP “Hear It” DSP noise-elimination speaker is seen selling for \$159, and the GAP in-line module for DSP noise elimination for \$199. For more information and the full spec sheet, log onto <<http://www.gapantenna.com>>, or call 772-571-9922. GAP is located in Fellsmere, Florida and is a regular attendee at large hamfests, where company representatives set up their antennas and provide live demos. Most important, they are available at every hamfest they attend to spend time with us, the prospective buyers of their products. I always enjoy the GAP experience, and they are just as friendly on their telephone help line as they are in person. ■

(Reprinted with permission from CQ Communications, Inc.)