

# Field Guide

## Broadcast Warehouse DSP-X

by Mike Erickson

[NEW YORK CITY, New York - August 2004] Quality audio processing on a budget. For many years, this was the claim from audio processor manufacturers when introducing low priced devices.

But more often than not, you get what you pay for, and end up needing two or three support processors (Prisms, Compellers etc.) to make the inexpensive stand-alone unit sound *almost* like the big boys. Needless to say, it takes a lot of money to get the flexibility and cut-to-cut consistency.

### ANOTHER CONTENDER

When I saw the ad from Broadcast Warehouse for another low priced “wonder,” I was very skeptical. For only \$1,000, I – as a beta user – could help shape the design of this box and, for my input, would be able to keep the box after the beta program concluded. The eventual MSRP was to be \$3,000 so, even if I did not like it, I figured someone on eBay would buy it from me and I would break even. What the heck, I went for it.



The unit arrived with Version 0.92 beta software loaded. My initial observations were that the unit was promising but there were problems. The clipper quickly got nasty and the pre-emphasis control with the HF limiters was poor. Also the bass was quite thin and the multiband AGCs overcorrected the audio (especially the highs, where the audio would get dull on some material with lots of HF content).

I immediately got into an e-mail exchange with Scott at Broadcast Warehouse and expressed my concerns. Soon V 0.93 arrived. It got a little better. The bass now had a parametric EQ attached and the HF limiter had a limit/clip tradeoff adjustment (similar to the 8100) but there were still issues with the AGC and the overall clipper was still not up to the task.

### ALMOST READY FOR PRIME TIME

V 0.94 came after Christmas 2003 and what a present it was! The clipper was much cleaner, the AGC was improved with adjustable ratios and coupling features in *all* parameters (AGC and limiting). The wideband AGC had window gating so the AGC does not hunt for noise (or overcorrect) and the peak clipper was multiband with a main summing clipper and composite clipper.

There was also a look ahead limiter available in the digital output (for HD) and the analog output was selectable for digital (look ahead limiting with de-emphasis), analog (audio with or without pre-emphasis; clipped without the composite clipper and stereo generator) or the “DJ” low delay mode (selectable de-emphasized audio for talent headphones – the throughput delay varies from 5-9 ms ... you will see why later).

It was at this point the DSP-X Version 1.0 came out, which was a final tweak on the main clipper and a few other odds and ends. The current layout of the box has audio entering and conditioned with a low-pass filter and phase rotator. The wideband AGC is

next, with adjustments for drive, attack, decay (another word for release), gate and the ability to have the band rest when gated at a preset level (like -4 or -8) called RTR level. There is also an adjustment for how fast the band returns to rest (called RTR speed).

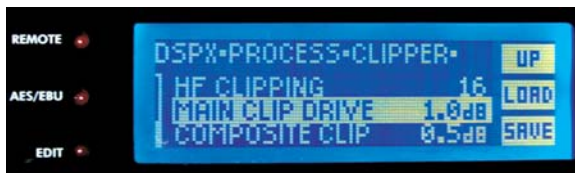


After the wideband AGC, the selectable insertion of pre-emphasis (which is later defeatable on certain outputs) and the parametric bass EQ follow. Then comes the four-band AGC. Like the wideband AGC, the four-band AGC has adjustments for drive, attack and release, ratio, gate, RTR level and RTR speed. There are also coupling functions that make the unit a three, or even two-band AGC depending on how close you set the parameters.

The multiband limiter has different settings: Drive, Average Attack and Decay (similar to compression) and Peak Attack and Decay. There is a hold button (which freezes the band like a gate) but there is no RTR level or speed. There is a threshold control to indicate where activity in the selected band should start, and the HF limiter has the tradeoff clip/limit control which helps tame the pre-emphasized audio without tearing the audio or sounding too busy.

A mixer follows which lets you fine-tune the tonal balance. There is not much leeway here because there is no protection before the final clippers so adjustments are very small. Most EQ changes should be made by adjusting the drive to the AGC and limiters.

For the composite output, there are two clippers: the multiband clipper that sums the bass and midrange into one clipper, while the presence and HF bands have their own respective clippers. For the bass clipper, there are two options: hard or soft clipping. Soft clipping adds look-ahead (which makes the overall throughput delay approx 9 ms) for a clean, full bass effect that plays out with Urban, CHR and Dance formats. Hard clipping is closer to real time (the units throughput is approx 5 ms) and adds a little more bass, better for harder hitting rock formats.



All three clippers in the multiband section have threshold controls and the entire section has a drive control. The main clipper follows with its own threshold control and the idea is to tradeoff clipping in the various multiband stages over the main to find a sound that has good peak control with the least amount of artifacts.

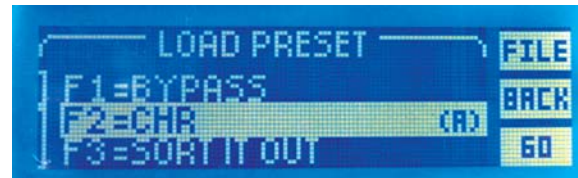
A composite clipper follows for an added dB or two of sheer loudness and the pilot is inserted after the clipper. Finally, the system output is standard BNC.

(The digital output has a look ahead limiter in place of the clipper stages that features attack and release and drive for each band.)



The metering is all LEDs, and all parameters are visible at once.

The DSP-X stores multiple processing setups. There are currently 8 user presets and 10 factory presets. You can save and import presets thru HyperTerminal using the COM port on your computer. When PC software control becomes available from Broadcast Warehouse, importing and exporting presets and software will be much easier.



Future software will also include a clock for dayparting, the ability to control the unit via PC from a remote location and software for an AM version.

### CRANKING IT UP

Now, how does it *really* perform? At home, with my QEI exciter into a dummy load, I was able to match the sound of local stations running the expensive boxes. Loudness was equal and modulation was in check and it looked really good on the scope.

I put the box through its paces with different genres of music from CHR to Classical, Jazz, Oldies and Classic Rock and the box performed each time. My findings about the unit’s ability to maintain loudness against the big boys were verified in a demonstration putting the DSP-X up against one of the big boys on a Hot AC station in a very competitive situation. Programming had been dealing with an older digital box and was very interested and impressed in this little box that did the job without breaking the bank.

### WISH LIST

Are there downsides? There have to be compromises with an inexpensive box. The bass still could be a bit better, or should I say, easier to “extract.” Adjustable crossovers will help that in future versions, but if you tweak enough, the bass does come out to play. The menus and display are also not as easy to navigate as the more expensive boxes, but with PC software coming, that should also improve.

Right now, the unit is in the “all expert, all the time” mode, so there is no easy way for non-technical individuals to make small changes without risking the end of the world. With the menu system the way it is, it also takes some time to get used to how to save presets and it is very easy to make a mistake and erase your work. Fortunately, the factory presets do give you a decent starting point.

If you are looking to replace that analog box, older digital box or an alternative to the expensive boxes that seem like they are out of range for small budgeted stations, the DSP-X deserves a lot of attention. Even for those looking for two separate boxes for HD and FM (or an internet stream and FM), you can afford it with the DSP-X! From LPFM to 50 kW flamethrower the DSP-X is the first inexpensive box that – for me – lives up to the big box promise.

Their website is at: [www.broadcastwarehouse.com](http://www.broadcastwarehouse.com)

Mike Erickson is an engineer and audio enthusiast in the NYC area. We are pleased to report that after his test-drive of the DSP-X, his ears still work. Contact Mike at [wirelessmedia@computermail.net](mailto:wirelessmedia@computermail.net)