

Omnia.9

ALL YOU CAN IMAGINE.
AND MORE.



So, is this just another variation of an existing product with new badges and some fancy marketing? Absolutely not. Omnia.9 is based on a completely new platform which is unlike anything ever offered within the Omnia family.

For possibly the first time, there will be no need to compromise a service or a set of services to inferior audio processing and management due to space and/or budget limitations.

But consolidation is only the beginning. Omnia.9 contains breakthrough features which will actually correct over processed source material while—at the same time—allowing for an unprecedented amount of loudness free from distortion and artifacts.

Advantages



Simultaneous separate processing cores for FM and HD and (Optional) HD2 and HD3.



Exclusive "Undo" technology which removes distortion from source material.



Psychoacoustic Composite Embedder allows up to 140% audio peaks in stereo at 100% total modulation.



Streaming encoding built in for Primary Digital (HD) and (Optional) Secondary (HD2) and Tertiary (HD3)

Advantages (Cont.)



7 inch front panel touch screen



RDS encoder, dynamically updateable



Dayparting (scheduled preset selection) (future feature)



Studio Output with very low latency for talent monitoring



Dual independent power supplies



Composite pass-through (relay bypass) for your backup processor

Advantages (Cont.)

Plus:

- Each processing core is separately fully adjustable and has selectable 4,5,6 or 7 bands
- 3-stage wideband AGC with adjustable sidechain equalization
- Program-dependent multiband compression
- Multiband look-ahead limiting
- Adjustable dynamic bass clipping (future feature)
- Selectable phase linear high pass filter, 15, 30 or 45 Hz
- Full remote control.
- Multiband downward expansion (source noise reduction)
- On-screen keyboard with several layouts (QWERTY, QWERTZ, AZERTY, Dvorak and ABC sequential) for easy setup and preset name typing
- Selectable SSB (Single Sideband) stereo encoder

Omnia.9 Main Screen

The screenshot shows the Omnia.9 software interface with several callout boxes pointing to specific features:

- SPEAKER CALIBRATION**: Points to the 'Speaker Volume' control at the top right, which is set to -4.5 dB.
- EXCLUSIVE "UNDO" TECHNOLOGY**: Points to the 'Undo - Input' section on the left side of the interface.
- VERSATILE DYNAMICS PROCESSING**: Points to the 'Processing - FM - Input 1' section, which includes a 'Dynamics' graph.
- DISTORTION MASKING COMPOSITE EMBEDDER**: Points to the 'MPX Output - Multiplex' section, which displays a green spectrogram.
- MULTIBAND STEREO ENHANCER**: Points to the 'Stereo Enh' section, which includes a 'Stereo Enh' graph.
- ON BOARD DIAGNOSTIC AND ANALYSIS TOOLS**: Points to the 'Speaker Output - Left' and 'MPX Out - MPX' sections, which display frequency response graphs.
- BUILT-IN ENCODING FOR STREAMING AUDIO**: Points to the 'Streaming 1' button in the bottom row of the interface.
- SELECTABLE PATCH POINTS**: Points to the 'Studio Proc' button in the bottom row of the interface.
- RDS ENCODING**: Points to the 'RDS' button in the bottom row of the interface.
- PROCESSING FOR FM, HD, AND STREAMING AUDIO**: Points to the 'FM' button in the bottom row of the interface.
- SEPARATE STUDIO PROCESSING CORE**: Points to the 'Studio Proc' button in the bottom row of the interface.

Omnia.9 Physical Specifications

Dimensions:

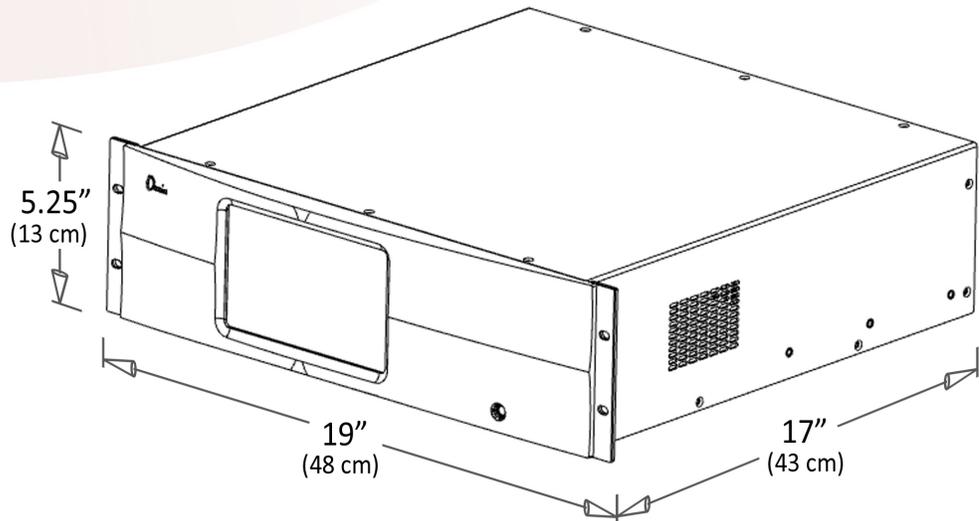
- 19" wide x 5.25" high x 17" deep (48 cm wide x 18 cm high x 51 cm deep). Unit requires three EIA rack spaces for mounting.
- Allow up to 4" in rear for connector and cable clearance.
- 18 lbs. unit weight

Shipping Weight:

- 28 lbs.

Accessories:

- Omnia.9 Manual
- Omnia.9 Quick Start Guide
- Warranty Registraton
- 120V AC power cord
- 240V AC (Euro power cord)
- Rack screws (bag of five)



Omnia.9 Back Panel



Omnia.9 Performance Specifications

Frequency Response:

- +/-0.5dB 20Hz to 15kHz, 17.5kHz in extended mode

Signal-Noise Ratio:

- Greater than -80dBu de-emphasized, 20Hz to 15kHz

System Distortion:

- Less than 0.01% THD below pre-emphasis, inaudible above

Stereo Separation:

- 65dB minimum, 20Hz to 15kHz, 70dB typical

Digital Output Level

- Adjustable from -24.0dBFS to 0.0dBFS in 0.1dB increments

Stereo Baseband Output

- Adjustable from -2dBu to +22dBu (0.1dB increments) into 600-Ohms, 20-Ohm output impedance

A/D Conversion:

- Crystal Semiconductor CS5361, 24 bit 128x over-sampled
- delta sigma converter with linear-phase anti-aliasing filter.
- Pre-ADC anti-alias filter, with high-pass filter at <10 Hz

D/A Conversion:

- Crystal Semiconductor CS4391, 24-bit, 128x oversampled
- External Sync Input
- Per AES11 Digital Audio Reference Signal (DARS), reference for digital output sample rate.

External Sync Range

- 32kHz to 96kHz

Analog I/O

- Two balanced, EMI filtered XLR connectors

Stereo Generator Connections

- Four 75-Ohm BNC female, two inputs, two outputs
- (FM style only) AES/EBU In & External Sync
- XLR-female
- AES/EBU Out
- Four XLR connectors for Main and Aux Digital programs (two stereo in, two stereo out)
- Ethernet
- Shared RJ45 supporting 100 and 1000 BASE-T Ethernet connections

Power Requirements

- 100-264 VAC, 47-63Hz autosensing

Power Connector

- IEC male, detachable 3-wire power cords supplied

Power Supply

- Internal dual redundant, hot-swappable

Environmental

- **Operating:** 0 to 50 degrees C
- **Non-operating:** -20 to 70 degrees C.
- **North America:** Designed to comply with the limits for a class A digital device pursuant to Part 15 of the FCC rules (CFR).
- Designed for U.S. and Canadian listing with UL.
- **Europe:** Designed to comply with the requirements of Low Voltage Directive 73/23/EEC and EMC Directive 89/336/EEC.
- Designed for RoHS and WEEE compliance.

A Few Words About Omnia.9 from developer Leif Claesson:

The Omnia.9 is quite a unit. What was the thought process behind creating such a full-featured box?

I think it's a combination of things. I'm a stubborn, extremely driven, easily annoyed perfectionist -- but I'm not a complainer, so when something is not as good as it can be, I actually take the time and make the effort to improve it. I also always strive to improve efficiency in everything I do -- I can't stand wasting time, I'm always optimizing the process.

I LOVE music -- always have, always will, and I'm listening to something nearly all the time. I listen to so many different genres -- from pop, rock, electronic music (house and trance in particular), some jazz, some classical, some rap, country, and right this second Dutch 70s schlager pop. You get the idea.

However, the more I listen, and improve my listening environment, the more critical my ears have become, and I get better and better at picking up artifacts, whether I like it or not. It's truly an occupational hazard. To be able to get to the bottom of any issue I hear, I've had to develop my own tools in software so that they're always handy. RTAs, spectrum analyzers, oscilloscopes -- I really need all of them, to properly be able to make decisions on how to adjust any kind of processing. There's that efficiency / time-wasting thing again -- hooking up hardware takes a lot of time that could be better spent listening, experimenting and adjusting. For that reason, even if it means laying all the cards on the table, I feel they have to be included in the product -- if I myself need them (and I wrote the algorithms myself so I know exactly how they work!), how could I possibly expect a customer to be able to use and adjust it without having these instruments available? Working blind just won't do it -- listening alone is not enough when there are this many things going on. Once we use our eyes as well as our ears, it becomes much easier to figure out what's really going on. This is why Omnia.9 has a nice set of measurement tools with a huge amount of patch points, built right into the product. It's not a complete set yet, but it will improve - spectrogram (voiceprint) is coming, and so is an X-Y oscilloscope.

A shorter but equally accurate answer to the above question might have been: "Because I could."

Tell me about the encoding capabilities. You mean this unit will also encode my internet streams, including the separate HD streams?

Omnia.9 can indeed encode your internet streams! It has completely separate processing cores for analog and digital, and all popular codecs are built in. Setting up internet streams is usually a royal pain in the neck -- audio interface issues, driver issues, buggy software. I thought, why not put good, stable encoders right in the audio processor? It makes sense -- the audio is there already, it's on the network already, and we have plenty of CPU left over to do it. Let's face it -- many stations have awful sounding internet streams, and this way, not only does it make setup a breeze, it also ensures the absolute highest audio quality, because there is no chance of glitches or audio degradation beyond what the chosen codec itself does.

Omnia.9 also has digital outputs to feed your existing HD encoders, however it does itself do the HD encoding, because even if it did, there would be no way to get the signal through to the transmitter, as IBOC is not a subcarrier but rather separate carriers, and must be inserted into the RF, not the MPX.

What if I don't have an HD-2 or HD-3 service? Can I purchase and Omnia.9 without the extra HD processing and encoding capabilities?

Absolutely! The introductory base model has Analog (FM + AM, simultaneously if you like), Digital output (for HD / DAB / DRM) and Internet streaming.

The premium version also includes separate HD-2 and HD-3 processing, as well as multiple separate encoders.

RDS, too? Tell me about this.

Indeed! Omnia.9 has a full dynamic RDS encoder, and with the Psychoacoustic Composite Embedder also having access to the RDS signal, we can take it into account, and actually insert the RDS without losing loudness. Adding the RDS to the composite signal adds overshoots which must then be compensated for by turning down the average modulation, and this means a 0.7dB loudness loss for 8% RDS injection. In today's competitive radio environment, every little bit counts, so being able to turn up the RDS (for increased coverage) while still maintaining loudness and signal-to-noise ratio (again for increased coverage) is a win-win.

A Few Words About Omnia.9 from developer Leif Claesson: (Cont.)

The RDS encoder can be controlled from the front panel or remote application, as well as from the built-in HTTP server, for example for displaying the currently playing song, important messages, or advertisements.

The Omnia.9 does so much. What do you say to people who are nervous about having all of their eggs in one basket, so to speak, in terms of reliability?

Omnia.9 was built for years of trouble-free operation, both the software and hardware. It has dual independent hot-swappable power supplies (and can run on just one), software and hardware watchdogs, and MPX relay bypass for your backup chain. We have years of experience in building reliable systems for broadcast, both TV and radio, so we have learned how to build reliable systems. Computers are more reliable than ever before. We're confident in the Omnia.9.

Is the Omnia.9 difficult to set up and manage?

Not at all! The user interface is clean and organized, and you get the exact same user interface in the remote control as on the front panel, including all the instrumentation, as well as dedicated audio streaming for the remote, where you can listen to the audio from any patch point in the chain. No processor has ever been so cooperative in helping you get everything set up just the way you like it.

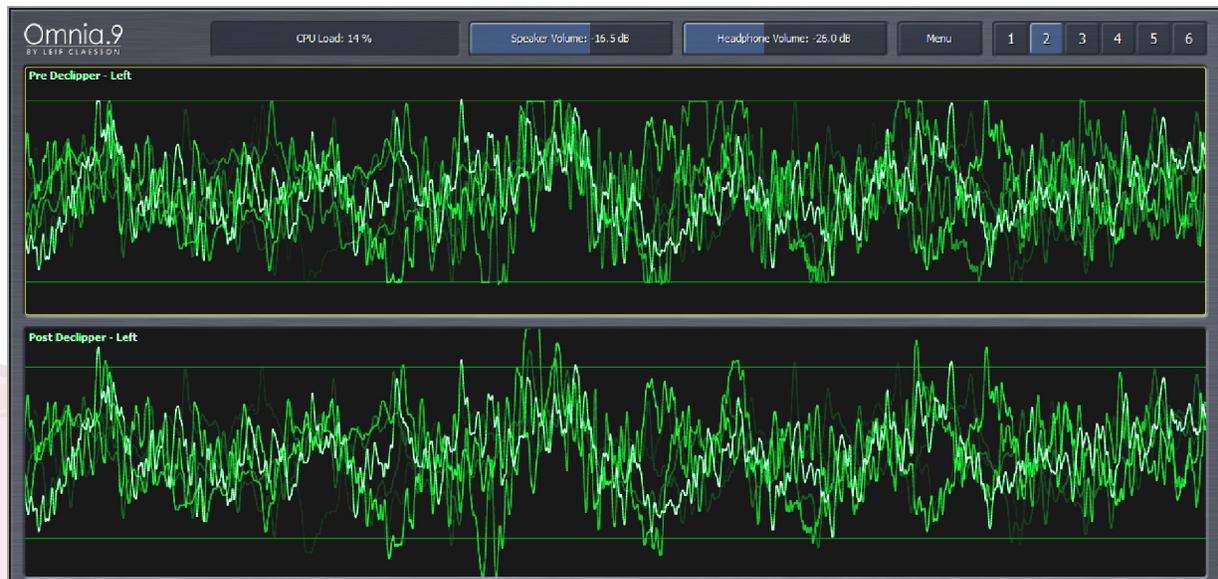
What Exactly Is Undo?

In order to understand how to best use Undo, it is helpful to understand exactly what it is and how it works. Undo is actually two separate processes - a de-clipper and a multiband expander - which work together to "undo" the poorly mastered, hyper-compressed and clipped audio found on so many modern CD's.

Take a look at the two waveforms below, captured using Omnia.9's built-in oscilloscope. The top window shows the unprocessed source audio. The bottom window shows the same audio after it has passed through the de-clipper. Notice how the peaks that were clipped during mastering have been restored by the de-clipper.

Note:

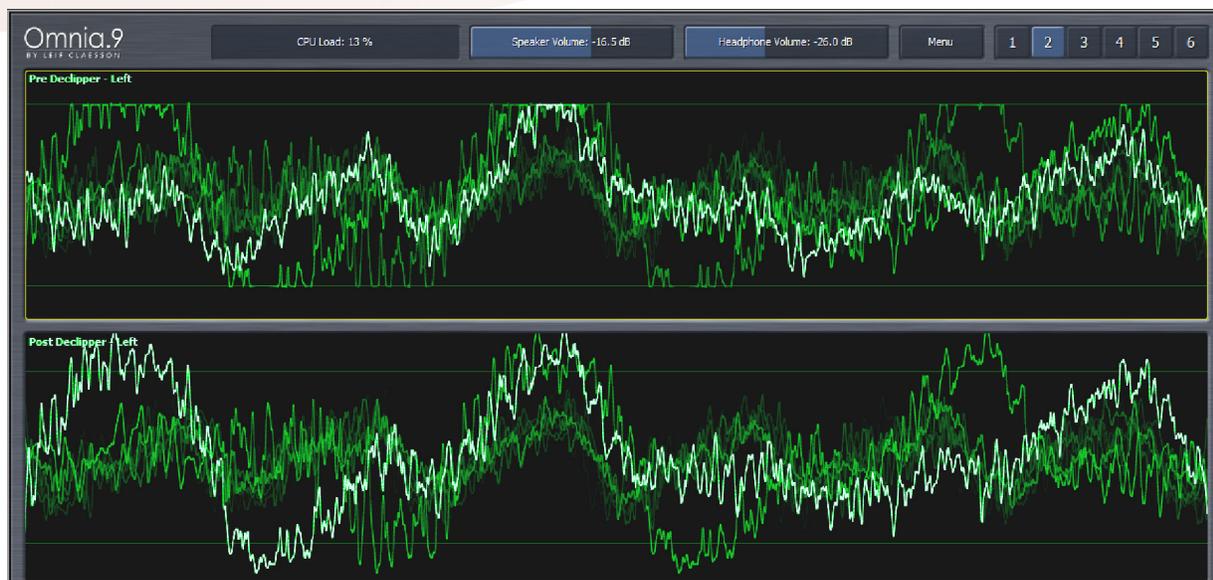
The oscilloscope gain was kept at the same level for comparison purposes, but Omnia.9 has sufficient internal headroom, and this illustrations that follow do not suggest that the audio is being clipped again by any portion of "Undo".



What Exactly Is Undo (Cont.)

The second stage of Undo is a multi-band expander that is designed to restore dynamic range to audio that has been excessively compressed. Each of the five bands of the expander has a corresponding psychoacoustic dynamics detector and a peak detector that examine the peak levels of the incoming audio, and based upon that information plus the settings of the various controls, tells the expander how much dynamic range to restore to the audio.

In the image below, the top window shows the unprocessed audio before de-clipping or expansion. The bottom window shows the same audio after it has been de-clipped and expanded.



Undo Menu

Each of the three internal audio input paths has a dedicated Undo section. From the main Undo menu, you can load and save Undo presets, enable and disable the de-clipper or multiband expander, choose which functions are displayed in the Undo meter window, adjust the amount of de-clipping, adjust the dynamics detector's ratio, weighting, and peak settings, and set the expander's levels, rates, and ratios.

A word of caution about Undo! In keeping with the "spirit" of Omnia.9, we have not blocked access to any of its controls, including those found in the Undo section. And while we would be the last ones to discourage you from making the most of everything Omnia.9 has to offer, we feel that outside of adjusting the level of de-clipping, most users will get the most out of this powerful tool by using one of the provided factory Undo presets.

Quality v. Loudness

Omnia.9 is capable of providing sound quality superior to any other processor available today, and is equally capable of being louder than the competition, too.

If loudness is your primary goal, you will find that you can match the level of your current processor while getting a much cleaner on-air sound. If high-quality audio is your goal, you will be able easily achieve that goal *and* get the extra benefit of increased dial presence.

Omnia.9, more than any other processor, minimizes the impact of the classic “quality v. loudness” trade-off by employing processes like “Undo” and an advanced psycho-acoustic distortion-masking clipper... but *no* processor can eliminate that compromise completely.

The trade-off between quality and loudness is still determined primarily by the settings of the Limiters and Clippers. Both processes can add to dial loudness, but do so in different ways with different-sounding results (and, if used to excess, different sounding artifacts).

The added short-term density provided by peak limiting can still make audio sound dull or overly-dense and create intermodulation distortion, and a little still goes a long way. The amount of limiting action is somewhat dictated by the program material itself. Audio that is already dense and has a high average level – even after being processed by Undo – will still cause less peak limiting than material that is more open with lower average levels and higher peak levels.

For example, almost any poorly mastered current CD that’s already been squashed down and has only a few dB’s of dynamic range already is not going to get the limiters moving – but a well-mastered Steely Dan song will!

Excessive clipping, on the other hand, creates harmonic distortion and can make things sound “edgy” or “torn.” It is imperative to remember that *even when all-out loudness is your goal, there will come a point when driving the clippers harder will not create additional loudness but will create more distortion, and there is no benefit to going beyond that point.*