

Omnia[®] VOLT[®]



MULTI-USE AUDIO PROCESSOR INSTALLATION AND USERS GUIDE

Software Version 2.0 DSP|Cores: FM Stereo, AM, HD-Pro, SG User Manual • May 2020

For Part Numbers 2001-00439, 2001-00489, 2001-00496, and 2001-00497

User Warnings and Contact Info

The installation and service instructions in this manual are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel

This instrument has an autoranging line voltage input. Ensure the power voltage is within the specified range of 100-240VAC. The ~ symbol, if used, indicates an alternating current supply.



This symbol, wherever it appears, alerts you to the presence of uninsulated, dangerous voltage inside the enclosure – voltage which may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions. Read the manual.

CAUTION: HAZARDOUS VOLTAGES

The instrument power supply incorporates an internal fuse. Hazardous voltages may still be present on some of the primary parts even when the fuse has blown. If fuse replacement is required, replace fuse only with same type and value for continued protection against fire.

WARNING:

The product's power cord is the primary disconnect device. The socket outlet should be located near the device and easily accessible. The unit should not be located such that access to the power cord is impaired. If the unit is incorporated into an equipment rack, an easily accessible safety disconnect device should be included in the rack design.

To reduce the risk of electrical shock, do not expose this product to rain or moisture. This unit is for indoor use only.

This equipment requires the free flow of air for adequate cooling. Do not block the ventilation openings on the rear and sides of the unit. Failure to allow proper ventilation could damage the unit or create a fire hazard. Do not place the units on a carpet, bedding, or other materials that could interfere with any panel ventilation openings.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

USA CLASS A COMPUTING DEVICE INFORMATION TO USER.

WARNING:

This equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used as directed by this manual, it may cause interference to radio communication. This equipment complies with the limits for a Class A computing device, as specified by FCC rules, part 15, subpart j, which are designed to provide reasonable protection against such interference when this type of equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. If it does, the user will be required to eliminate the interference at the user's expense. Note: objectionable interference to TV or radio reception can occur if other devices are connected to this device without the use of shielded interconnect cables. FCC rules require the use of shielded cables.

CANADA WARNING:

“This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian department of communications.”

“Le présent appareil numérique n’émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de Class A) prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère des communications du Canada.”

CE CONFORMANCE INFORMATION:

This device complies with the requirements of the EEC council directives:

- ◆ 93/68/EEC (CE MARKING)
- ◆ 73/23/EEC (SAFETY – LOW VOLTAGE DIRECTIVE)
- ◆ 89/336/EEC (ELECTROMAGNETIC COMPATIBILITY)

Conformity is declared to those standards: EN50081-1, EN50082-1.

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Links to the GNU GPL and other modules used under license can be found in the About screen of the VOLT Remote Control web interface.

Updates

Omnia VOLT’s features and operations are determined largely by software. The Telos Alliance strives to provide the most stable and feature-rich software available. We encourage you to check for software updates from time to time by visiting our website or by contacting us directly.

Feedback

We welcome feedback on any aspect of our products or this manual. In the past, many good ideas from users have made their way into software revisions or new products. Please contact us with your comments or suggestions.

We support you...

By Phone/Fax

You may reach our Omnia Support Team in emergencies by calling +1 216-622-0247. For billing questions or other non-emergency technical questions, call +1 216-241-7225 between 9:00 AM to 5:00 PM USA Eastern Time, Monday through Friday.

By Email.

Non-emergency technical support is available at Support@TelosAlliance.com.

By Web

The Omnia Web site has a variety of information that may be useful for product selection and support. The URL is <http://www.Telosalliance.com/Omnia>.

SERVICE

You must contact Telos Alliance before returning any equipment for factory service. We will need your unit's serial number, located on the back of the unit. We will issue a return authorization number, which must be written on the exterior of your shipping container. Please do not include cables or accessories unless specifically requested by the Technical Support Engineer. Be sure to adequately insure your shipment for its replacement value. Packages without proper authorization may be refused. US customers, please contact Telos Alliance Technical Support at +1-216-622-0247. All other customers should contact local representative to make arrangements for service.

WARRANTY



For the latest Telos Alliance warranty, visit: telosalliance.com/warranty

REGISTER YOUR PRODUCT

Register your product today to get the full benefits of our warranty, support, and product updates.

telosalliance.com/product-registration/

The Telos Alliance

1241 Superior Ave. Cleveland, OH 44114 USA
+1 (216) 241-7225

Support:

24/7 telephone +1 (216) 622-0247

Email support@telosalliance.com

Web <https://www.telosalliance.com/support-request>

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Creating the Most Exciting and Engaging Audio Experiences Imaginable

Congratulations on your new Telos Alliance product!

The gang here at Telos is committed to shaping the future of audio by delivering innovative, intuitive solutions that inspire our customers to create the most exciting and engaging audio experiences imaginable.

We're grateful that you have chosen audio tools from Telos® Systems, Omnia® Audio, Axia® Audio, Linear Acoustic®, 25-Seven Systems®, and Minnetonka Audio®. We're here to help you make your work truly shine. We hope that you enjoy your Telos Alliance product for many years to come and won't hesitate to let us know if we can help in any way.

Telos Alliance

1 Omnia VOLT Overview

Nobody knows processing like Omnia...

For more than thirty years, we've been at the front of broadcast audio processing. In that time Omnia has earned a reputation for market-leading loudness and a clean, undistorted on-air sound.

...and nobody knows broadcast DSP like Telos

We've also been Digital Signal Processing pioneers, introducing the first DSP-based Telephone Talk Show system, the Zephyr ISDN codec, and the first all-digital FM airchain processor.

And we've continued to lead, with Axia—the first AoIP audio and control networking system designed specifically for broadcasters, with our ground-breaking Voltair watermark enhancement systems, with our Linear Acoustic loudness and surround management products, and more.

Though it all, we've maintained one goal for Omnia: to apply cutting-edge technology, giving your station a competitive, exciting, market-leading sound that gets and holds listeners.

Now, with Omnia VOLT, we've gone even further!

We've *rewritten the rules for broadcast DSP*, fine-tuning our algorithms to bring you:

- ◆ Unprecedented processing power and sound in a one-rack-unit package,
- ◆ Easy setup without sacrificing your ability to customize exactly the sound you want, and
- ◆ Future-proof versatility.

Omnia VOLT is... a signal that jumps out of listeners' radios. With the pristine, warm Omnia sound broadcasters love.

- ◆ A new generation Frank Foti-designed Clipper for stronger on-air sound without grunge.
- ◆ **Six Separate AGC Sections:** One wideband, plus five separate time-aligned narrow band sections, each with separate controls for every important parameter. Plus a tunable mid-band crossover. Give your station the loudness and consistent sound you want!
- ◆ **Five Separate Time-Aligned Limiter Sections,** each with separate Drive, Hold, Threshold, and Attack/ Decay controls. They give you protection against over-modulation while maintaining a loud signature sound.

- ◆ **Variable Deep Bass, Phat Bass, and Warmth enhancers.** Get that meaty Omnia sound, fine-tuned the way you want.
- ◆ **Bass Pre-Clipper.** Fully adjustable with *Tightness* and *Girth* controls. You'll have strong, listener-pleasing bass without worrying about intermodulation distortion.
- ◆ **Clipper *Silk* adjustment.** If your format is prone to treble distortion, you can add just enough *Silk* to clean up those high frequencies.
- ◆ **Variable high-pass and switchable phase rotator.** Special processing in VOLT's input makes sure that ultra- low frequencies, too low to be perceived as bass by listeners, don't rob you of on-air power.
- ◆ **Stereo Enhancement for FM Analog, without adding multipath.** You'll get a wider, more exciting signal that jumps out of the radio.
- ◆ **Automatic mono "dry voice" sensing.** Ideal for FM Analog Stereo stations using extreme processing: it keeps an extra hand on the clipper, to stop distortion when the L+R channel gets boosted by mono signals.
- ◆ **Adjustable low-latency FM signal path** lets you fine-tune the tradeoffs between processor latency and ultra-high quality.
- ◆ **Adjustable BS-412 Threshold and Processing** for full compliance with ITU standards.
- ◆ **Advanced single sideband suppressed carrier processing [SSBSC],** for reduced multipath and more robust HD transmission.
- ◆ **"One Louder" stereo pilot embedding** gives you the effect of 10% more modulation... without exceeding legal limits!
- ◆ **Narrow or wide bandwidth** helps get the fullest AM signal for your format.
- ◆ **Additional Pre- and post-limit HF equalization** lets you add "life" to any AM station's sound.
- ◆ **Asymmetrical modulation** for maximum AM power.
- ◆ **Adjustable Tilt compensation** to improve your signal when using older plate-modulated transmitters.
- ◆ **Multiple selectable bandwidths for digital data streams.** More than simple low-pass filters, HD Pro also modifies the VOLT's crossover to get the best results for any bitrate.
- ◆ ***Sensus*[®] processing for digital program streams.** Omnia's exclusive *Sensus* algorithms actually predict how HD, DRM, or multicasting data reduction will affect your sound. They *pre-condition* your signal, making digital compression sound better—even at low bitrates.
- ◆ Some of the features above are designed for specific transmission media. That's one of the reasons we give you separate firmware for FM Analog, HD/DAB/streaming, and AM Analog¹. This separation lets us allocate processing power where it'll do the most good.

Omnia VOLT is... fast setup and ease-of-use, while giving you absolute control of every important parameter.



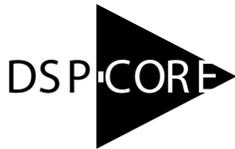
We've built VOLT for users who need to get results fast, and for those who like to customize their station's sound. You can get VOLT on the air in minutes, select presets that have been designed for today's stations and programming, create a unique sonic personality with just a few nudges of the QuickTweak™ sliders, fine-tune it with a comprehensive Graphic User Interface, save settings for your automation to trigger at different dayparts, and share those presets with other VOLT users in your group.

- ◆ Choose from some of the best factory presets on the air. They're designed by Omnia's processing experts, and by our favorite "insider" guest programmers.
- ◆ Then use Omnia VOLT's exclusive *QuickTweak* system, to fine-tune your sound fast. Get exactly the processing you want, while you're on the air, right from the front panel or a connected computer.
 - ◇ Nobody knows processing like Omnia. We drew on decades of processing experience to design the QuickTweak system. It links complex and interactive parameters—some of which can't be reached by normal processor controls—to create a core set of "meta" controls.
 - ◇ QuickTweak is easy to understand: controls are intuitive, you can tune them by ear, and you hear the results instantly.
 - ◇ You can use QuickTweak on the factory preset processing, or on your own custom processing.
 - ◇ You can save your own preset file after using QuickTweak, and recall it instantly.
 - ◇ You can continue to use QuickTweak, or fine-tune your settings with VOLT's deeper controls, even after you've saved a file.

QuickTweak combines fast access with the power of total processing freedom!

- ◆ Customize a unique sound for your station and market. Omnia VOLT's Graphic User Interface is easy to navigate, but gives you the precise and flexible control you need.

Omnia VOLT is future-proof versatility, at no extra charge!



VOLT's *DSP|Core* firmware modules let you rearrange and modify VOLT's internal architecture, as your needs change:

- ◆ Use the *VOLT: FM DSP|Core* for analog stereo processing at the station, with high-quality, low-distortion clipping to feed uncompressed STLs. Or use *VOLT: FM* at the transmitter, which combines that processing with a high quality, versatile composite signal generator. *VOLT: FM* also lets you select BS-412 processing or a low-latency mode, to comply with local standards.
- ◆ Use *VOLT: AM Broadcast*, specially designed for the challenges of AM radio. Versatile pre- and post-limiting equalization plus presets created for today's AM stations give you the cleanest and most powerful signal on the band. Asymmetrical Modulation and Tilt, applied after the clipper, help you get better performance even from older transmitters!
- ◆ Use *VOLT: HD PRO* for HD/DRM/DAB/Web and other compressed media, as well as syndicated program and studio productions. Selectable bandwidths and crossover points, plus our exclusive Sensus algorithms, reduce compression artifacts even at low bitrates. Put it in your syndicated program production chain and do a fast setup: every episode will be clear, clean, and have a consistency listeners can recognize.
- ◆ Use *VOLT: SG (Stereo Generator)* when you want to split your system between a main processor—usually at the station—and a dedicated MPX stereo generator with advanced composite features at the transmitter. *VOLT: SG* can be used with any audio processing system: *VOLT: FM* or one of our other fine Omnia processors, or any other loudness control from another manufacturer.

DSP|Cores *aren't* extra cost add-ons!

- ◆ Download the DSP|Core firmware package you need for free, from Telos' website...
- ◆ Transfer it to your VOLT from any network computer, and...
- ◆ Reboot. It's that simple!

You can switch applications whenever your needs change. Or keep a spare Omnia VOLT as backup for every one of your standby processors—and your stereo generator—in all your stations!

DSP|Core is *almost* something for nothing! There are just two small caveats:

1. Some Omnia VOLT features are designed for specific transmission media. (Obviously, you don't need dual composite outputs on a processor you're using for webcasting.) Each DSP|Core firmware package has a feature set that's fine-tuned for its application, and allocates DSP where it's needed most.
2. Some DSP|Core firmware versions are still being tested and refined. Check our website for new ones, and for updates on the DSP|Cores you're running.

Omnia VOLT installs quickly, with setup and convenience features for today's broadcaster:

- ◆ VOLT includes a built-in HTML-5 server for full control from any computer, tablet, or smartphone... it doesn't need Java or special plug-ins, so there's no worry about those vulnerabilities.
- ◆ **Totally flexible signal path.** You can choose analog, AES/EBU digital, or Livewire inputs; choose which channel to use for mono inputs; use analog, AES/EBU digital, Livewire, or composite outputs... or all the outputs at the same time. There are separate volume and channel balance trims, and flexible "flip-phase options", on each input. You can save and recall custom input/output setups for different applications.
- ◆ **Switchable insert points lets you optimize Voltair, watermark encoders, and other downstream encoding.** You can feed encoders with a pre-processed signal from VOLT's multiband AGC and limiters. That way, your encoder sees a stronger, more reliable signal. Then feed the encoder's output back into VOLT, for post-encoding clipping that protects you against over-modulation.
- ◆ **Automatic "failover" signal switching.** You can specify a backup input for use if your main signal drops out. VOLT can switch to this source automatically, with adjustable sensitivity, or you can trigger the changeover via contact closure or Livewire GPIO as needed.
- ◆ **Rugged one-rack-unit construction** fits any control room, technical center, or transmitter shack, with easy-to-see LED meters.
- ◆ **Fanless operation.** Feel free to use VOLT near critical monitoring or live mics.
- ◆ **Built-in tone generator.** It lets you verify meter readings and signal path quickly.

In addition, VOLT's FM Stereo DSP|Core includes a high-quality stereo generator with:

- ◆ **Flexible Pre-Emphasis Switching** on audio inputs and outputs. This makes it easy to fit VOLT into any existing airchain.
- ◆ **Dual Variable Composite Outputs** to feed a main and backup transmitter.
- ◆ **Variable Pilot Level and Phase** let you adjust the signal for transmission.
- ◆ **Adjustable SCA input** for additional services including RDS, reading for the blind, and specialty networks. **19 kHz sync output** to synchronize external generators.
- ◆ **BS-412 and Low Latency settings** that can be turned on as needed.

VOLT's AM DSP|Core includes:

- ◆ **Extra equalization** to control or enhance highs in two critical places, both before and after the multiband limiter.
- ◆ **Wide and Narrow bandwidth options** to let you get the best combination of coverage and quality for your station's format.
- ◆ **Adjustable Tilt** to compensate for low-frequency 'droop' in older plate-modulated transmitters.

VOLT's HD Pro DSP|Core is optimized for data-reduced HD, DRM, DAB, Webcasting, and syndicated program distribution, with:

- ◆ **Variable Sensus processing**, Omnia's exclusive signal conditioner actually reduces the distortion added by psychoacoustic compression schemes.
- ◆ **Switchable bandwidths** with eight choices between 4 kHz – 24 kHz. They reconfigure VOLT's multiband processing frequencies as well as limit high frequencies, to give you the cleanest signal for your distribution medium.
- ◆ **Look-ahead wideband limiter** in addition to five fully adjustable band limiters, to guard against quick transients that can add distortion.

VOLT's Stereo Generator DSP|Core takes the advanced composite features of our Omnia.11 G-Force processor, and puts it into convenient and versatile VOLT hardware. It leverages the VOLT DSP normally used for audio processing, to give you one of the most powerful standalone stereo generators available. Use an FM+SG VOLT pair to create an even more powerful airchain than a single Volt alone, or use VOLT: SG as a companion stereo generator for any processor back at the studio. VOLT: SG includes:

- ◆ **SSBSC support** lets you select Single Sideband suppressed carrier for more multipath immunity, less noise, and more robust HD radio.
- ◆ **One Louder** to embed the stereo pilot directly into the composite signal. This frees up power, giving you a decibel more loudness—effectively, 10% additional modulation—without exceeding legal limits.
- ◆ **Flexible Composite Limiter** can be calibrated to control overshoots from nonlinearities in your STL.
- ◆ **Pilot Phase adjustment** of $\pm 32^\circ$, compared to the 38 kHz suppressed carrier, to compensate to timing errors elsewhere in your system.

2 VOLT in a hurry!

We understand there are times you need to get equipment up and running quickly, and don't have time to learn all it can do². This chapter, or alternately, the specific Quick Start Guide unique to each DSP Core is for those times.

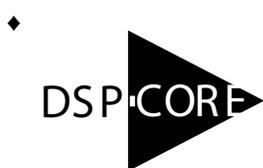
VOLT is a fully tunable and sophisticated processor that can be set up for AM or FM, analog or digital broadcasting, Web and other compressed media, or studio and program production.

- ◆ With VOLT, you can achieve a market-leading sound using just our factory presets.



- ◆ Then you can customize the sound easily, right from the front panel, with our exclusive *QuickTweak* feature: six intuitively labeled sliders, designed by processing experts, each controlling specific aspects of your sound—some of which can't be adjusted by normal processor controls. You can fine-tune them in real-time, hear the results as you do, and save the ones you like as your own personal presets.

- ◆ But VOLT also lets you go deep. More than 140 easily accessible and interactive processing and routing adjustments let you get just the sound you want. They let you choose, balance, and condition input signals from analog, AES/EBU digital, or Livewire sources. They allow automatic “failover” signal switching if your main program source fails. They let you insert watermark ID encoders and our Voltair watermark processor *after* your signal has been processed for strength and reliability, but *before* the protection and loudness of VOLT's ultra-clean clipper.



- ◆ VOLT can even become totally different processors whenever your needs change! Our four free, downloadable DSP|Core firmware packages re-allocate VOLT's internal resources for your purpose. You can have an FM analog processor with complete Omnia control and internal composite stereo generator today... turn it into a fully featured digital streaming processor with exclusive artifact-reducing Sensus processing tomorrow... an ultimate AM processor with sophisticated bass and asymmetry enhancement a day later... or an ultra high quality, feature-filled standalone composite generator after that! Any VOLT DSP|Core package can be loaded at any time, as your needs change.

Omnia VOLT is a lot of processor. We couldn't put all of it into an introductory, quick-start chapter. To learn all it can do for you, you'll have to read the rest of this book. (If you don't have enough time to do that, at least scan the table of contents, and see which chapters will be most useful.)

Quick Step-By-Step

These dozen (or fewer, depending on setup) steps assume you're running VOLT from its front panel. There's a tutorial on using the red jog wheel, and maps of VOLT's LCD menus, in the Front Panel chapter³.

1. Install VOLT in your rack, connecting audio input and outputs appropriate for your system.
2. If you're using the composite multiplex stereo generator in VOLT: FM or VOLT: SG, connect one of the BNC composite outputs to your FM exciter or composite STL.
3. Connect AC power. There is no power switch. Wait for the system to stabilize and the LCD to say `Omnia VOLT`.
4. Navigate to `Input/Output > Input` and select the appropriate `Input Src` (input source).
5. Feed regular program material at your station's normal level (usually 0 VU on the console meters). Adjust VOLT's appropriate `Level` control so the input LEDs are peaking up to about -18 to -12 regularly.
6. Navigate to `Input/Output > Output` and adjust the appropriate `Level` for the next device; if you're using a digital output, set `Sample Rate` to lock to VOLT's internal 48 kHz clock, the digital input's rate, or an external digital clock reference⁴.

If you're running VOLT's FM Stereo DSP|Core:

7. Navigate to `Output > FM Options`, and select the `FM Pre-emph` (pre-emphasis) setting required for your country or region.
 - ◆ If BS-412 power limiting is required, turn it on in this menu.
 - ◆ If you've chosen an audio-frequency input device in step 6, select the appropriate `Deemph` for that device's signal.
 - ◆ If you're feeding an uncompressed digital STL, or want to use an audio output to feed the exciter, turn `De-emph` off for that output. This means VOLT's FM Pre-emph, selected at the start of this step, stays as part of the signal to the STL or exciter.

VOLT should be the only device that provides pre-emphasis or limiting. This means you should disable any additional pre-emphasis or limiting in the exciter.

8. If you're using a composite output, navigate to `Input/Output > Stereo Generator`, then adjust `Comp 1` or `Comp 2` for 100% modulation as read on your modulation monitor or STL/exciter metering, and `Pilot Lvl` for between 8% - 10%. Exit back to `Main Menu`.
9. Standard latency through VOLT: FM is 18.7 ms, when all its advanced processing and

highest quality clipping options are turned on. You can reduce latency down to 10.3 ms by turning off various options, using the Web remote control interface. See the Remote Control chapter for details.

If you're running VOLT's AM DSP|Core:

7. Navigate to In/Out > Input > Mono Mode and select the desired routing. Mono L feeds the left input's audio to both of VOLT's internal channels and its outputs; Mono R does the same thing using the right channel input. Mono L+R sums both channels. Select an appropriate Invert if your input signal has a polarity error.
8. Send VOLT typical program material at your normal operating level. Navigate to In/Out > Input and adjust the appropriate Level and Right Trim until the Input meters are peaking up to about -18 to -12 regularly.
9. Navigate to In/Out > Output > Out Options. Set appropriate LPF frequency⁵ and Tilt⁶ for your installation.
 - ◇ Set `Asym Mod`, in this menu, if you want to use asymmetrical modulation. Use a modulation monitor or scope to verify that only positive peaks are increasing when you turn the control up (it may be easier to see those peaks if you temporarily set the `Processing > QuickTweak > Clip Drive` to a high level). If the `Asym Mod` control is increasing the *negative* peaks when you turn it up, flip the appropriate output's `Polarity` to the other setting.
10. Navigate to In/Out > Output and set the appropriate Level for the equipment VOLT is feeding. If it's a transmitter, make sure negative peaks never hit full cutoff (100%). If you're using asymmetrical modulation, make sure positive peaks don't go beyond 120% or so. If necessary, touch-up the `Asym Mod` control.

If you're running VOLT's HD Pro DSP|Core:

7. If you are using your Volt as a processor for HD Radio, DAB, streaming, or syndicated program production, you're ready for powerful processing right from the front panel. In addition, VOLT's Web-based remote control lets you adjust these options from a connected computer:
 - ◇ You can set the bandwidth and Sensus processing to get the best results from any data reduction codecs in your digital broadcast, streaming, or distribution channel;

For details, see the chapter on Remote Control.

- ◇ You can reduce latency by turning off various options, using the Web remote control interface. See the Remote Control chapter for details.

If you're running VOLT's Stereo Generator [SG] DSP|Core:

VOLT: SG is a powerful stand-alone stereo generator. It's designed to be used in split processing situations where the main FM audio processor is at the studio, and audio is sent to the transmitter location via STL. VOLT: SG leverages DSP power, to give you SSBSC for additional multiplex

⁵ Narrow LPF frequency will be active only when a narrow-mode preset is selected. Similarly, Wide LPF frequency will be active only when a wide-mode preset is selected.

⁶ Tilt is normally used only with older plate-modulated transmitters.

immunity and a more robust HD signal, and “One Louder” to give you the effect of 10% more modulation without exceeding legal limits.

Because VOLT: SG is a special case, we recommend you read that DSP|Core’s specific Quick Start Guide. There’s a copy packed with the hardware, and you can download the latest version from our website.

Since VOLT: SG is designed to take a processed signal from your station’s audio processor, accurate input calibration is critical. This can avoid composite clipping, and control overshoots introduced by nonlinearities in your STL.

Please use the following calibration procedure (which also appears in the Quick Start Guide) :

7. Using typical program material, temporarily turn up the main clipper drive on your audio processor to provide “worst-case” level at the input of the VOLT SG.
8. If you’re feeding VOLT: SG via AES or Livewire, set your processor’s peak output level to –12 dBFS. If you’re feeding VOLT: SG via analog, set your processor’s peak output level to 10 dBu. –12 dBFS.
9. Set VOLT’s In/Out > Input > Level for the input you’re using to 0.0 dB, as a starting value. Feed typical program material, and fine-tune VOLT’s input level so the meters are just flashing only the -12 LED. (If your processor or STL has some overshoot, it’s acceptable to flash a slightly higher LED. But don’t allow more than a dB or so of overshoot.)
10. Ideally, any output de-emphasis of your audio processor should be defeated, so VOLT: SG receives a pre-emphasized, 16 kHz band-limited signal. If this isn’t possible, navigate Stereo Generator > Adjust SG and set Emph Std (50us or 75us), Pre-Emph (OFF or ON) and Input LPF (OFF or ON) as appropriate for your broadcast chain.

VOLT:

SG versatility gives you lots of other options. See the chapters on Front Panel Control and Remote Control for more details on this DSP|Core’s settings.

Next steps for DSP|Cores with audio processing:

1. Navigate to Processing > Preset, feed normal program material, and choose a preset for your initial setup. You’ll be able to change the preset and/or fine-tune its settings later.
2. [FM or AM Only] Navigate to Processing / QuickTweak > Clip Drive and set the drive for the best compromise between loudness and distortion. It should always be set as low as possible for the loudness needed. You’ll be able to refine this and the other QuickTweak adjustments later. Exit back to Main Menu.
3. Navigate to Save Preset, and provide a name for the settings you just created. This can serve as a baseline while you do final step #4:
4. *Find the absolute best VOLT settings for your programming.*
There are quick tips in the Processing chapter of this manual.

Next Step for VOLT: SG:

1. Navigate to Stereo Gen > Save SG Config, and provide a name for the composite generator setup you just created.

Final Steps for all DSP/Cores:

1. Navigate to In/Out > Save IO Config, and provide a name for the signal routing setup you just created.
2. *Read the rest of this manual.*
3. Learn how to shape your sound with the best Omnia processing for your station and market. Take the time to experiment, and enjoy the results!

3 Installation and Rear Panel

Physical Installation

Studio or Transmitter?

Obviously, if you're using VOLT:FM or VOLT:SG's internal stereo generator with composite output, it should be close to the transmitter (s)⁷. All operating functions can be controlled easily over a network, so you've got complete flexibility to tune a transmitter's VOLT from the studio.

But if you're planning to locate VOLT at the studio and feed Left / Right audio (with no subcarrier) to a transmitter via STL, we urge you to use a linear STL that does not have data reduction or compression. This may be non-intuitive: after all, today's best compressed STLs can sound pretty good. The problem is that lossy compression algorithms are designed for normal, unprocessed speech and music in normal listening situations. VOLT optimizes your signal for transmission, and the clipper is designed to create maximum loudness with minimum distortion when broadcast. This can create waveforms that sound great on the air... but break the lossy compression schemes in some STLs. The result is that the STL will create extra distortion and lack of clarity, before the signal even gets to the transmitter.

This warning also applies to HD and DRM transmission using VOLT's HD Pro DSP|Core. Our exclusive Sensus processing can actually eliminate some of the distortions of those compressed media. But "double compression"—first, through a lossy STL, and then through a compressed digital media transmitter—can create unpredictable interactions that even Sensus can't fix.

Increasingly, facilities with high bandwidth fiber links between their studios and transmitter sites are discovering that Livewire AoIP can be used as a high reliability, lossless STL. It lets you feed a VOLT at the transmitter using Livewire Xnode at the studio, or use VOLT at the studio to send processed AoIP audio to the transmitter. The Livewire capability built into every VOLT lets you take advantage of today's faster and cheaper IP bandwidth, with ever-increasing STL options.

Rack mounting

VOLT is only one rack unit high, and can mount almost anywhere.

Like most sophisticated equipment, it can be damaged by extreme heat.

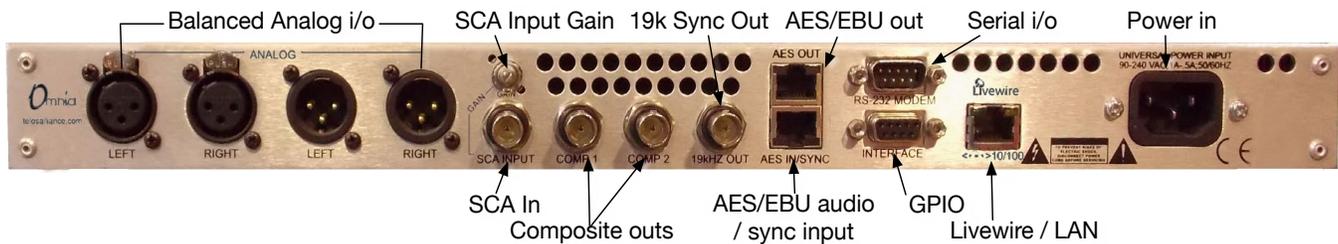
- ◆ Do not mount it directly above or below equipment that normally runs warm. For best air circulation, make sure whatever is mounted below it is very shallow: a blank panel, or something like a patchbay that doesn't generate heat.
- ◆ Do not block the ventilation grills on VOLT's sides. There should be at least an inch of air space on both sides of the unit. Most racks provide this.
- ◆ Do not block the ventilation holes on VOLT's back.

There's a lot of electronics in VOLT's chassis, so it has to be fairly deep: about 11ft" plus connectors. While it's not particularly heavy, that depth has to be cantilevered by the one-unit front panel: To prevent damage to the front panel, always mount with four rack screws. If you must use only two screws temporarily, use both *bottom* screw holes. That distributes the weight better.

Live studio?

VOLT does not have an internal fan, and can be located near a live mic. This makes our HD Pro DSPiCore version ideal for high quality podcasting and other small operations.

Hookup



Audio connections

We designed VOLT's audio routing to be extremely flexible:

- ◆ You can connect VOLT via balanced analog, AES/EBU digital, or Livewire AoIP. Each input can have a different program stream, and you can select which input gets broadcast on the front-panel LCD or from a connected computer. You can also designate one input for automatic or manual "failover" backup of the same programming, if the main link is disrupted.
- ◆ Each input and output can be adjusted independently: you can set any level between -12 and +12 dB of nominal, or trim the channel balance ± 3 dB, in precise .1 dB steps.
- ◆ Each input can also be adjusted independently for polarity⁸ with normal or inversion on either or both input channels. Input signals can be independently set for normal L/R or flipped R/L stereo, or mono from either channel or both summed.

Insert Points [sometimes called "Patch Points"]

8 Sometimes referred to as "phase".

Normally, all of VOLT's audio outputs will carry the fully processed output⁹. You can use them to distribute analog to nearby monitors, for example, while sending digital audio to a control room via AES/EBU or Livewire.

However, you can also break VOLT's internal signal path for use with a third-party watermark identification or EAS generator, or for our 25-Seven Voltair watermark enhancement and management system. This lets you optimize your program stream for the most reliable encoding.

- ◆ The external device will be fed from VOLT's multiband Limiter, after all enhancement and AGC. This way, watermark encoders can take advantage of Omnia presets that boost the critical frequencies for electronic ratings systems.
- ◆ The external device or Voltair output is applied directly to VOLT's drive control of the final clipper or limiter¹⁰. This way, you don't have to worry about an encoder's added signal driving your transmitter into over-modulation.

VOLT's insert output becomes the "send" for your external device, and can be any one of VOLT's three audio outputs. The insert input ("return" from the external device) can be any input you're not using for the main program input stream or secondary [aka "failover"] backup source. Insert input and output don't have to be the same mode—one can be analog, for example, while the other is AES/EBU—though this rarely occurs in practice.

Insert points are configured using VOLT's network Remote Control. See that chapter for details.

Analog connections

These are balanced input and output, +4 dBu nominal. At nominal level, there is +18 dB of headroom available.

Inputs can be fed from any transformer or electronically balanced sources. The input impedance is 10k Ω . Outputs are electronically balanced, for any load of 600 Ω or higher.

We do not recommend using VOLT in an unbalanced environment. If you must hook it up to unbalanced equipment, use a buffer amp or transformer.

Connectors are standard XLR-3 male and female: pin 1 ground, pin 2 "hot", pin 3 return.

AES/EBU connections

Input is stereo; transformer isolated and balanced 110 Ω nominal per AES/EBU standard; 24 bit resolution. Input automatically locks to any sample rate between 32 kHz and 96 kHz.

Output is stereo per AES3 professional standard; transformer isolated and balanced 110 Ω nominal. Output sample rate can be locked to the input, locked to an external sync source, or use VOLT's internal 48 kHz clock. AES/EBU output level is -18 dBFS nominal; like all VOLT's outputs, it can be adjusted over a 24 dB range.

Connectors are RJ-45 female, EMI-suppressed and wired according to the StudioHub+[®] stan-

⁹ VOLT: SG is designed for advanced FM Stereo generation at the transmitter, with a separate audio processor feeding it (usually via an STL from the station). It does not do any internal audio processing. Its audio outputs monitor the input signal, and input level adjustment or de-emphasis being applied.

¹⁰ Depending on which DSP|Core version is loaded.

dard. AES/EBU program input and output appear on pins 1+2 of the corresponding RJ-45, with pin 4 as ground. StudioHub+ adapters are included with VOLT¹¹: use the XLR connectors with a green color sleeve.

If you want to apply an external sync signal for AES/EBU, use pins 3+6 of the input RJ-45; this is the XLR female with a red color sleeve on our adapter. Sync source should be an AES/EBU stream (often called “digital black”); VOLT does not sync to an unbalanced 75Ω word clock.

Livewire

Connect a Livewire Audio-over-IP network to the Livewire/LAN RJ-45 jack. Livewire must be configured from a connected computer; see the chapter on Remote Control.

Don't Know Jack?

StudioHub+ inputs and outputs, and Livewire or Ethernet LAN, all use identical RJ-45 connectors. You can't tell which is which by feel. Before connecting, look at the back-panel silk screening or the photo in this chapter to make sure you've got the right one.

Check the Polarity!

It's commonly agreed that when sound is converted to electricity, increasing air pressure is represented by more positive voltages, and rarefaction by more negative ones. Unfortunately, wiring or equipment problems can scramble this relationship. Errors in audio polarity — sometimes called “phase” — can hurt your processing.

If both channels of a stereo input don't have the same polarity, Space-Efx won't function and VOLT:FM's or VOLT:SG's stereo generator can't create an effective sub-carrier. If you're doing digital broadcasting or streaming, polarity errors can force the codec to waste bits where they're not important, and cause extra distortion for the listener. In mono AM broadcasting, a single polarity flip can make asymmetrical processing waste power and drive the transmitter into illegal over-modulation.

Even if you're just using VOLT to feed recorders and headphones in your station, a polarity error on either or both channels can generate complaints from the talent. That's because their phones won't match the bone conduction they're used to hearing when they talk.

VOLT lets you correct polarity errors, both on audio inputs and outputs. We also built this correction ability into digital I/O, even though polarity errors are almost impossible with AES/EBU or Livewire transmission. That way, you can use VOLT to correct errors that occur in analog parts of your program stream.

Polarity adjustments are available both at VOLT's front panel and on its web Remote Control. See the appropriate chapter.

Composite BNC Connections

¹¹ Get additional adapters from your local dealer or <http://www.radiosystems.com>. Some stations prefer to run AES/EBU over Cat-5 or Cat-6 cables with RJ-45; full connection details are at <http://www.studiohub.com>.

These are usable only if your VOLT is running the FM or SG (Stereo Generator) DSPICores.

Composite Outputs

These are two BNC outputs, to feed VOLT’s multiplex signal to your transmitter (s) . Each is separately adjustable from 0 V to 10 V p-p in .05v steps. Pre-emphasis curve and mode, pilot level and phase, and stereo separation are also adjustable. See the chapters on Front Panel operation or Remote Control for details.

SCA Input and Gain

This BNC input can be used for Subsidiary Communications (SCA) such as reading for the blind or data casting. A signal from an external SCA or RDS generator, at this input, is mixed into both composite outputs.

The Gain trimmer lets you adjust between -29 dB and +2.6 dB, accommodating signals between 10V and .25 V p-p for 8.6% injection on a 3.6 V composite output.

19k Sync Out

This is a TTL-level 19 kHz square wave, locked to VOLT’s stereo pilot, for use as a reference for most RDS or SCA generators that operate at multiples of the 19 kHz pilot frequency.

Data Connectors

Serial I/O

This is a DB9-M for factory maintenance; it is not used in normal VOLT operation.

GPI

This is a DB9-F for remote control input, using contact closures or other logic-level systems.

Pin 1	+5VDC Out
Pin 2	Input Common +
Pin 3-6	Trigger input #1 - #4
Pin 7,8,9	GND

The action for each input is controlled by the GPIO/Events tab in the Remote Control.

If using pushbuttons or relays, each GPI activates by momentarily connecting its Trigger input to Ground, while pin 1 is tied to pin 2. (For noise immunity, you may wish to pull the input line “normal high” by connecting it to the +5V supply through a 1kΩ resistor.)

If triggering from a logic source, the source’s continuous positive voltage should go to pin 2, and

each output should pull its corresponding input pin low when active. Systems using TTL levels can be connected directly. Systems working at higher voltages will require a dropping resistor in series with each input:

Input Voltage	Required Resistor
5 VDC	none
6 VDC	none
12 VDC	680 Ω , ¼ Watt
24 VDC	1.8k Ω , ½ Watt
48 VDC	3.9k Ω , 1 Watt

The source must be capable of providing up to 40 mA.

General Purpose Inputs and Outputs are available through a Livewire network.

LIVEWIRE / LAN

This is an RJ-45 for 10Base-T and 100Base-T Ethernet connection. It can be used for Livewire audio and GPIO, Web remote control, or both. See the Remote Control chapter of this manual, and your Livewire documentation, for details.

Power Connector

VOLT automatically adapts to 50 or 60 Hz power at any voltage between 90 – 240 VAC. Nominal power is 1A at 110 V, .5A at 240 V. Actual consumption is around 15 watts during normal operation.

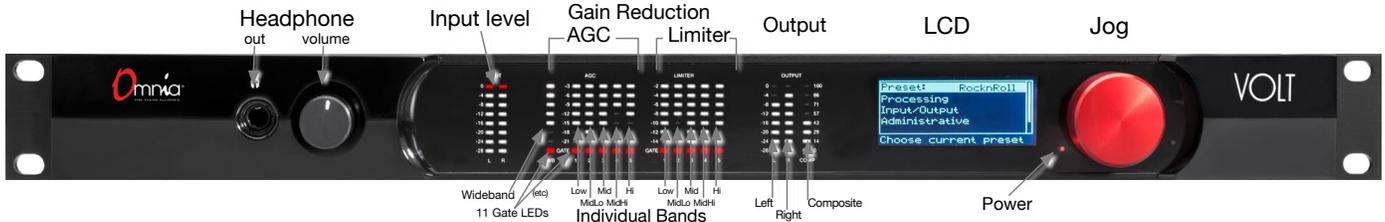
VOLT should be connected to a grounded outlet, according to local codes. VOLT does not have a power switch, but may be installed in a rack with switched power.

4 Front Panel and LCD

You can get VOLT operational, select a preset, and flexibly adjust it for your station’s sound and market ...in minutes... entirely from the front panel!



Omnia’s exclusive QuickTweak system lets you completely customize important internal processing parameters, including some that can’t be reached through normal processing controls, with “master controls” designed specifically for broadcast processing. Choose any preset. Use QuickTweak to fine-tune its density, spectral balance, stereo sound-stage, clipping, and more. You can hear the results as you adjust the six QuickTweak controls... and then name and save your customized “tweak” as a new preset.



All of these front-panel functions, and more, are accessible via password-protected login from networked computers, tablets, or smartphones. There are more than 140 individual routing and processing adjustments and selections available, along with comprehensive higher resolution metering, preset management, firmware update, DSP|Core installation, and maintenance functions. See the chapter on Remote Control.

Front Panel Headphone Jack

VOLT’s fl” TRS stereo headphone jack monitors the processed signal. It is driven by a separate high quality DAC and amplifier, independent of the analog XLR outputs. It has a separate volume control on the front panel.

How are they listening?

You can use headphones to verify signals or as a rough check on VOLT's processing. But we don't recommend using phones for fine-tuning your station's sound... In our experience, dynamics perceived through headphones are different from those heard over speakers, and adjustments made over headphones may be too subtle for loudspeaker use.

For critical adjustments, listen to VOLT through high quality monitors in a studio situation. Or though speakers roughly equivalent to how your listeners will be hearing the station: some processing gurus do their most critical tuning while sitting in their cars! Don't rely on headphones for fine-tuning, unless you're sure the listeners are using headphones as well.

Front Panel Meters

VOLT's left-most two meters are Left and Right processor input, with LEDs stepped from -28 to 0 dBFS. These behave like standard digital level meters. The top (red) LED lights when the signal reaches -0.05 dBFS or higher.

VOLT: SG has higher resolution input meters.

Input calibration is particularly critical with this DSP|Core, since it's designed for program levels that have already been controlled by a separate Omnia VOLT or other audio processor.

When running VOLT: SG, the front-panel input LED meters above -12 dBFS light for each 0.4 dB, rather than each 4 dB.

The next 11 meters read the Gain Reduction ["GR"] in each of VOLT's AGC and Limiter sections, calibrated between -3 and -24 dB. The red LED at the bottom of each stack lights when that section's Gate is activated. There are 6 AGC meters (wideband, then the five individual frequency bands), and 5 Limiter meters (one for each frequency band).

About GR Meters

The operation of a Gain Reduction meter might seem backwards, compared to the normal meters on consoles and amplifiers. When an AGC or limiter's input signal is soft, the gain control algorithm doesn't need to lower the gain: only the top LED will be lit, showing 0 dB reduction. As the signal gets louder, more reduction is applied, so LEDs below the top one start to light up. The meter "fills downward" as volume increases.

These GR meters let you see how VOLT is conditioning your signal levels in real-time. The amount of Gain Reduction at any moment depends on your signal... as interpreted by multiple parameters provided by the preset, the QuickTweak controls, individual processor settings on the remote control, and of course the nature of Omnia's algorithms.

Experienced operators keep one eye on the GR meters and both ears on the loudspeakers while adjusting a station's sound.

The GR meters are not active when running VOLT: SG, since that DSP|Core does not provide AGC or audio limiting.

The right-most three meters indicate output levels for the Left and Right channels (calibrated from -28 to 0 dBFS), and for the composite output (calibrated 0 to 100%).

Meter Screens

There are 3 other meters available on the LCD. They can be activated by holding the Jog wheel in for more than one second. The  meter displays Stereo Enhancement, calibrated from 0 to 100%. The  and  meters show the Gain Reduction activity of the Bass and Main clippers, and are calibrated between -24 and 0 dBFS.

If the LCD meters are showing, turning the Jog Wheel to the right brings up a Livewire Status page with indicators for Link and Sync.

Tap the wheel to change the LCD back from meter or status mode to its normal menus.

All of VOLT's LED and LCD screen meters also appear when needed, in higher resolution, on the Remote Control.

Using the Jog Wheel

The big red Jog wheel is a multi-function encoder. It lets you control selections and input text or numbers on VOLT's LCD screens. You can use it in three distinct ways:

Turn the wheel



Rotating the wheel clockwise moves the highlighted selection on the LCD downward through menu options, or to the right through fields where you can enter numbers or text. When you're in one of those fields, the wheel scrolls through possible letters or numbers. Rotating it counter-clockwise does the reverse.

Tap the wheel



If you press the wheel in until it clicks, then quickly release it, the highlighted selection or field becomes active. This confirms a menu choice or option. If you do this in an entry field, you can then turn the wheel to select a value for that field. When an entry field shows the value you want, tap again to set it. Then the wheel returns to normal scrolling.

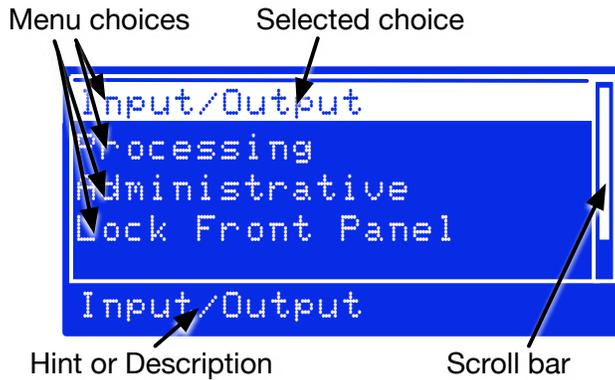
Press and hold



If you hold the wheel in for more than two seconds, and then release it, the LCD switches between menu/entry and meter screens. Meter screens add functions beyond VOLT's 16 front panel LED meters, and are described in the section immediately above.

Navigating LCD Menus

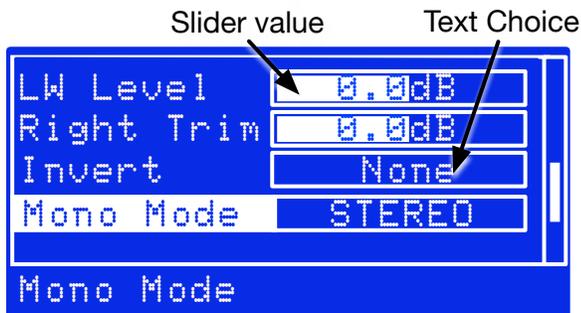
The Jog wheel lets you navigate around front panel menus, make selections, and adjust values. A screen might display possible submenus, like this one:



In this example, you'd turn the wheel to highlight one of the lines. If there are more choices than can be displayed at once on the screen, a scroll bar helps you keep track of vertical progress through the choices.

When your selected choice is highlighted, tap the wheel to enter that submenu.

Or a screen might let you choose values, like this one:



The `LWLevel` and `Right Trim` above are typical sliders. When one of them is selected, tap the wheel to adjust its value. Then turn the wheel to raise or lower the value, on the screen that appears. When you're satisfied with the change, tap again to return to the previous menu.

`Invert` and `Mono Mode` on the above are text choices. Select and tap, to bring up a screen where you can scroll through the possible values. Tap again to return to the previous menu.

About Text and Numeric Entry

A few of the simpler text choices present both options on the menu. Select the line for that choice, tap, turn the wheel to select an option, and tap again to confirm.

Some menu choices allow free entry of text (as for a preset name) or numbers (such as an IP address):

Tap on the parameter (e.g., `Name`) and the highlighted cursor will go to the space next to it. Tap again to select that space, and then turn the wheel to scroll through the available alphabetic or numeric characters for that space. When you get the one you want, tap to confirm that character and scroll to move to the next space. Tap on that space, turn to scroll through characters, tap to confirm, scroll to the next, and so on.

When the complete name or number has been entered, tap again to go to the next field. Then *don't* tap again; instead, turn the wheel to select other options on that screen (usually `Save` or `Cancel`). After you tap to select one of those options, the system will bring you back to the previous menu.

Preset names and passwords can be up to 16 characters long, alpha-numeric. Special characters and spaces are not allowed; underscore can be used to separate words.

Working with presets

VOLT can store an almost unlimited number of files for instant recall of input/output setup, processing settings, and composite generator parameters. These files can be saved, loaded, renamed, or deleted from the front panel.

- ◆ There's no practical limit to how many preset files can be resident in the system. However, presets are specific to DSP Cores. For example, a preset written for VOLT: FM processing may give you unpredictable results when loaded into a VOLT: HD.
- ◆ I/O Configuration files store settings and choices relating to VOLT's audio connections (analog, digital, and Livewire). Processing Preset files store choices relating to both audio processing and composite generation in VOLT: FM. SG Configuration files store generator settings for VOLT: SG.

Most users find it easier to work with presets from the Web Remote Control, since it can display lists better than the LCD, entering names is easier from a computer or tablet, and it lets you transfer preset files to and from your computer (where they can easily be shared with other users). There's a complete discussion of them in the Remote Control chapter.

Volt Front Panel Menu Maps

Menu functions are self-explanatory. When a hint is needed for any particular menu entry, it appears on the bottom line of the LCD when that entry is highlighted. If a feature requires more explanation, a warning and confirmation screen appears when you tap its entry.

In this manual, entering a submenu is identified with a > symbol. So if you see a line like *"To send a test tone to the output, go to Input/Output > Output > Tone Gen,"* it means *"Select Input/Output on the main menu, tap the Jog Wheel, then select Output on the submenu that appears, tap the Jog Wheel, then select and tap Tone Gen"*. This is probably intuitive to anyone who's worked with modern digital gear.

Almost all of the functions shown are also available from a networked computer. However, for obvious reasons `Remote Enable/Disable` and `Remote Composite Level Enable/Disable` aren't available remotely. See the next chapter for more details.

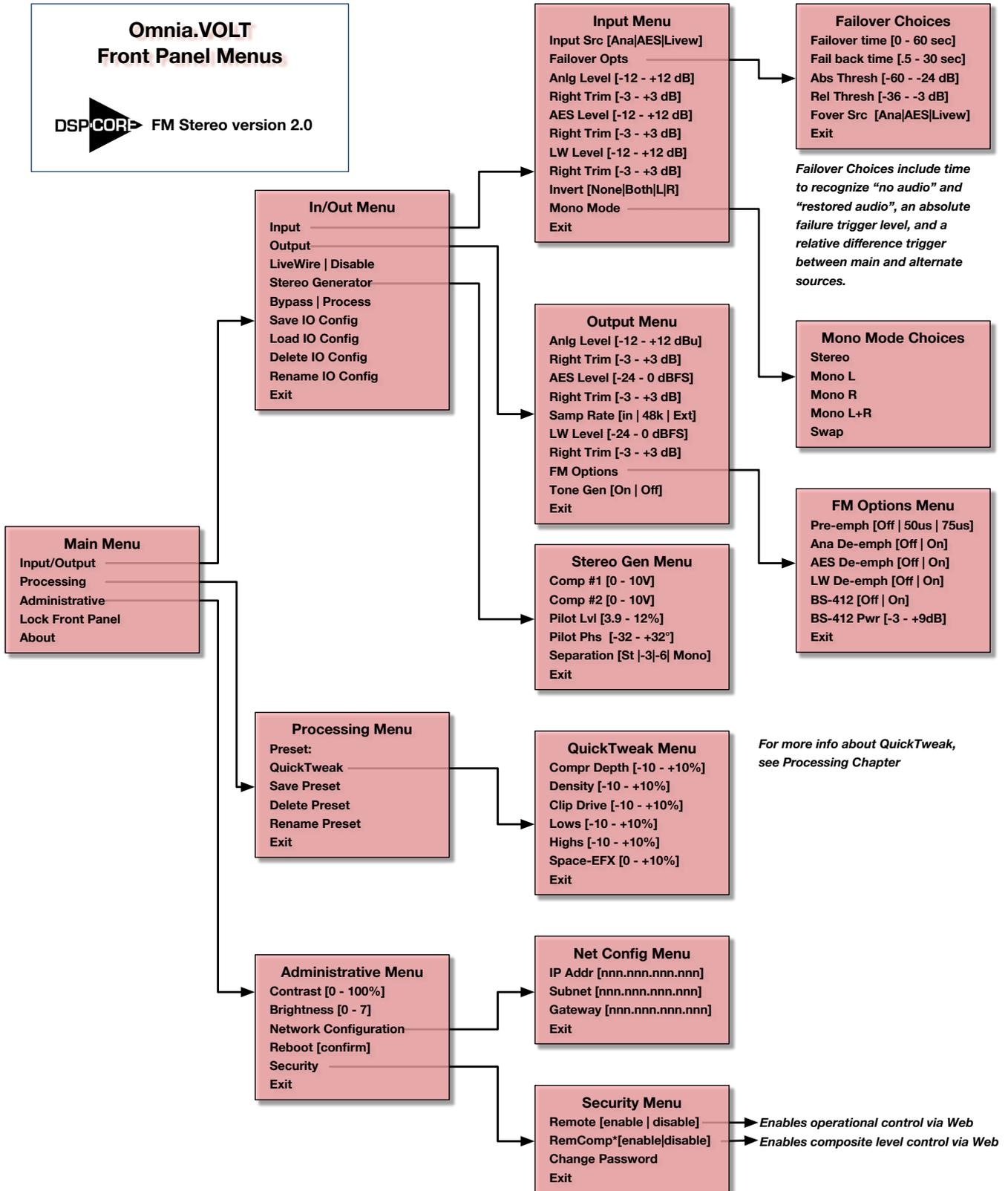
The following maps can help you find any of VOLT's front panel adjustments. Control layouts change slightly, depending on which DSP Core you've got running. (For example, there's no `75µS pre-emphasis` switch on a Core designed for AM Radio.) So only one of these maps will apply at any one time.

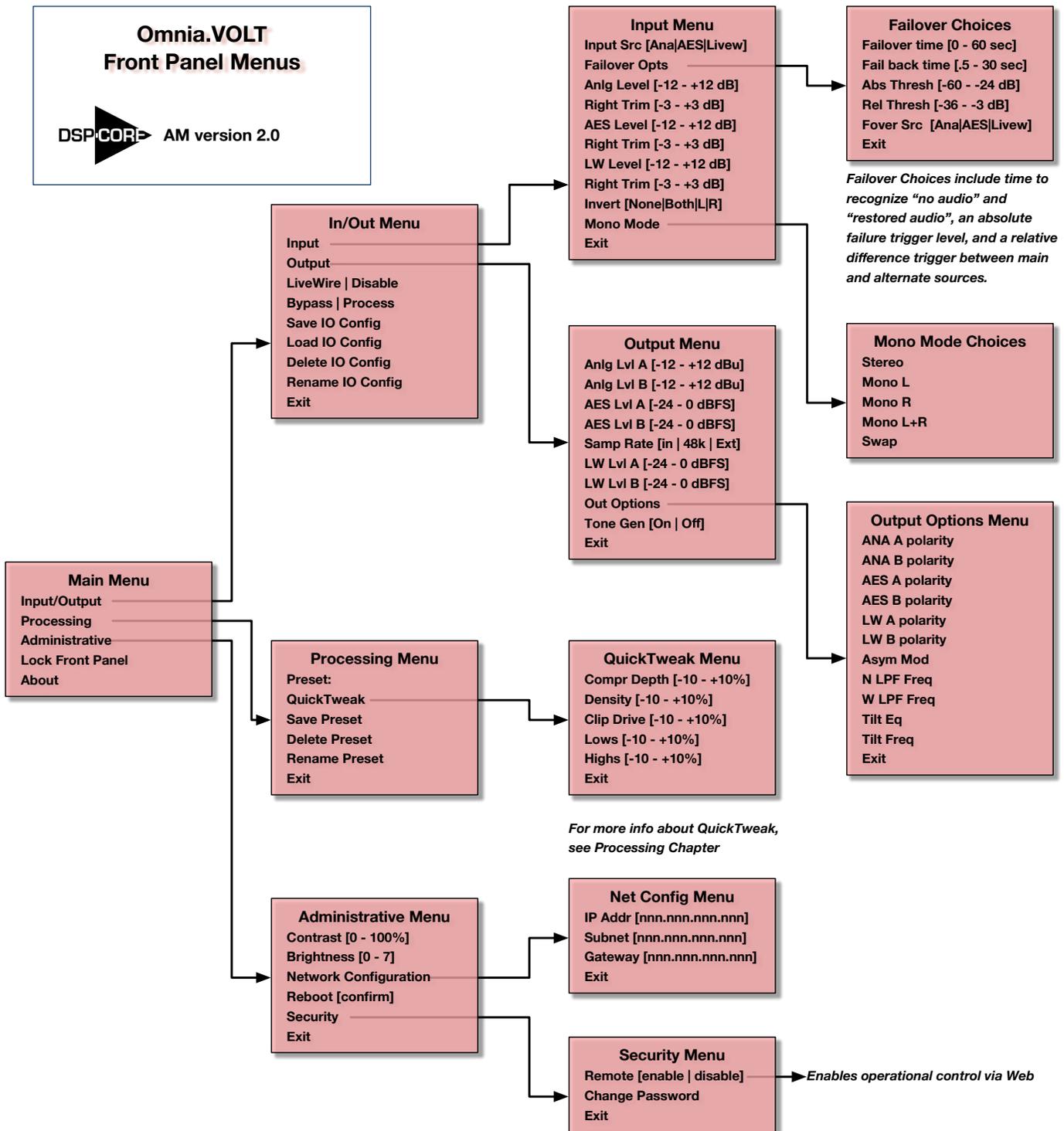
Front panel menus are designed to get you up and running quickly, with processing tuning using QuickTweak. To keep the LCD menus simple and clean, deeper layers or processing controls are available only from the Web interface. Those controls are not reflected in the LCD menu maps, but can be viewed in the Remote menu maps later in this manual.

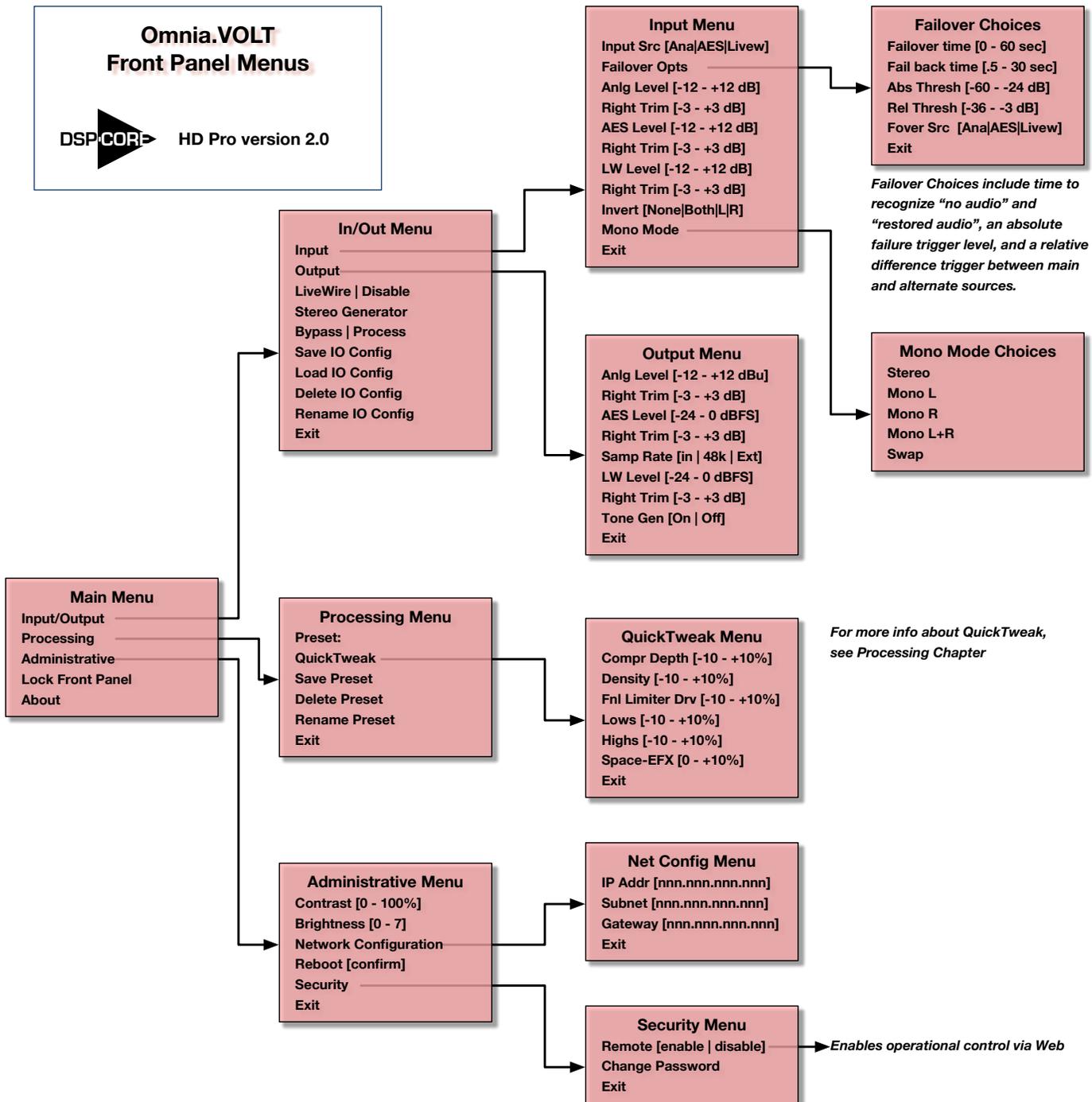
You might want to make a copy of the relevant maps, and keep them near your VOLT.

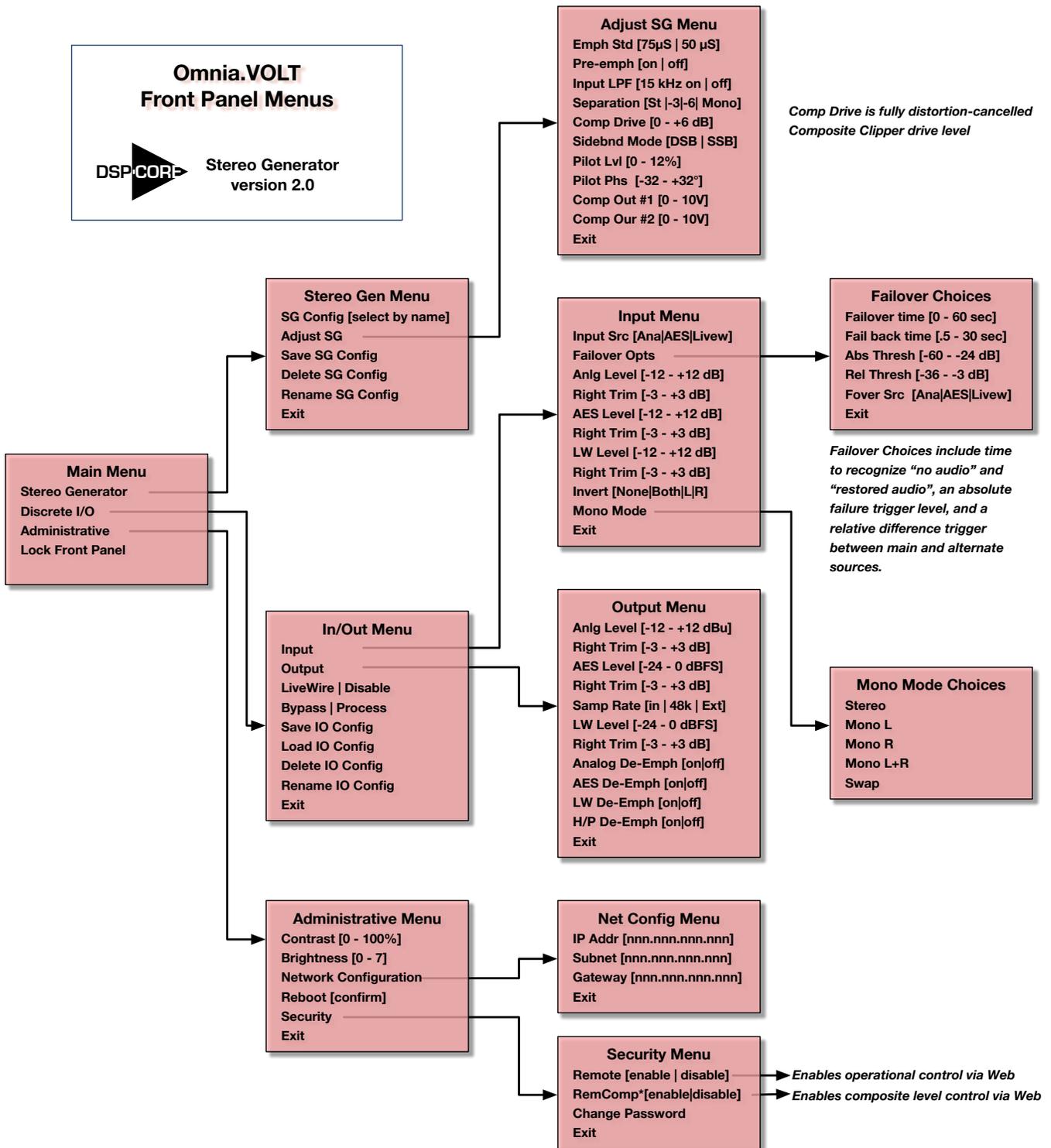
VOLT's front panel LCD menus are designed to get you up and running quickly while you're at the hardware, and let you fine tune VOLT's processing using QuickTweak.

To keep the LCD menus clean and manageable, deeper layers of VOLT adjustment are available only from the Web Remote Control interface. These controls don't appear on this chapter's front panel maps; instead, see the Remote Control chapter of this manual for details and mapping.









5 Browser-Based Remote Control

VOLT can be controlled from a network-connected computer, tablet, or smart phone. Login is password-protected for security.

The Remote Control works in real-time. You can read all of VOLT's front-panel meters (with greater resolution than is possible with front-panel LEDs), and you can hear the results as you change processing settings.



The Remote Control includes all QuickTweak and preset functions, along with almost 140 additional deep processing and routing settings to help you get exactly the right sound for your station and market.

It also lets you:

- ◆ Set up Livewire routing
- ◆ Assign GPIO functions.
- ◆ Transfer custom presets between VOLT and your computer, plus rename and otherwise manage presets.



- ◆ Upload DSPiCore functionality and firmware updates.
- ◆ Perform system maintenance including network and password settings, selection of running firmware, and factory diagnostics.
- ◆ Provide information for factory support.

Logging In

At VOLT

Before you can access VOLT's Remote Control, you have to set up network configuration from its front panel. See the Front Panel chapter if you're not sure how to do the following:

Navigate to `Administrative > Network Configuration > IP Addr` and enter a valid IP Address on your network. If your network requires a mask or gateway address, enter those as well. Write these numbers down.

If in doubt, contact your station's IT department. VOLT does not support DHCP address assignment, so a dedicated IP address must be assigned.

Then exit `Network Configuration` and go back to the Administrative menu. Navigate from there to `Security > Change Password`.

Change the password!

VOLT's factory default password is omnia (all lower-case). We urge you to change this as soon as possible!

Hackers have been breaking into all sorts of network equipment – not only at radio stations – by assuming that users haven't changed default passwords. Please make life harder for them!

VOLT passwords can be up to 16 alphanumeric characters. Spaces and special symbols are not allowed, but words can be separated by underscore.

We suggest you mark the new network address and password on a sticky note or label near VOLT's front panel, for easy reference¹².

If you lose the password, the only way we can restore it is by opening the top cover and shorting a hardware jumper on the main system board.

You can have multiple VOLTs on the same network, if they have different IP addresses. If needed, they can share the same password.

At a Web Browser

In most installations, VOLT can be controlled by any browser on the same network, by entering the right IP address and password. Sophisticated IT users can configure the network to restrict access even with a password, or extend a virtual network beyond your station's plant. If you are attempting to access Volt through a firewall, please be sure to allow access to ports 80 and 7999.

VOLT uses HTML5, without Java or other plug-ins. Any modern browser should be able to access it from a computer, tablet, or smart phone. Log in by entering VOLT's IP address in the browser's address bar. Just the four numbers, separated by periods, are necessary. This will take you to a password entry page. Enter the password you stored in VOLT's front panel.

- ◆ Some browsers may display an **insecure password** or **Not Secure** warning when you try to enter the password. This is because VOLT does not have the kind of verified digital signature used by web commerce servers. You can ignore these warnings.



If you spend a while visiting other sites or doing other computer operations, VOLT's connection may time out. This is a security feature. You can re-establish your connection by entering the password again.

Since VOLT responds to the Remote Control in real-time, nothing gets lost if the connection times out or is dropped for any other reason. You can log back in, and pick up right where you left off.

Enter your password and click **Login**, and you'll see VOLT's Remote Control main menu with these tabs at the top. Click the one for the screen you want to use.

Remote | LiveWire | GPIO / Events | File Transfer | Update | Configuration | About | Logout

The Remote screen is the one you'll use most, and has the most interactive features. It's detailed below, followed by maps of where specific controls appear on it, depending on which DSPICore VOLT is running.

The other tabs' screens are covered later in this chapter, after the control maps.

Remote

This is VOLT's main graphic control screen. It has real-time access to all settings and meters, including QuickTweak. You can also save, manage, or load presets here.

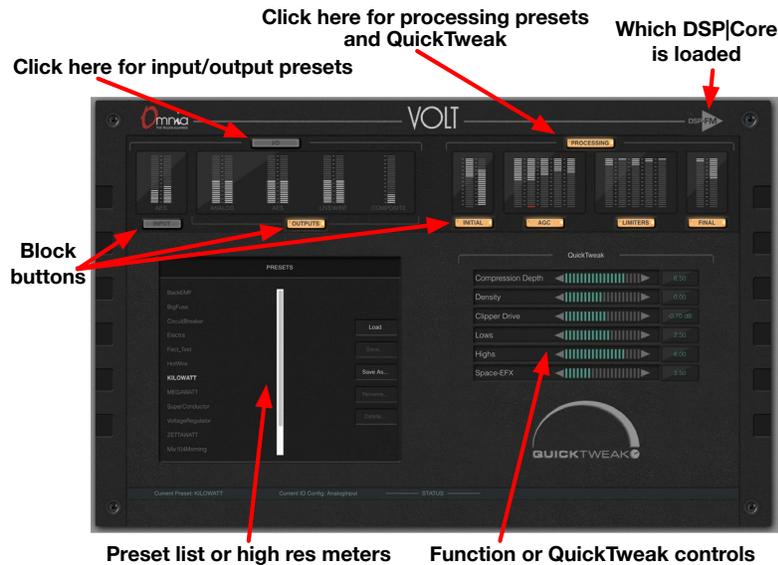
There's a lot you can do with this screen, so it takes a lot of pages in this manual. The other tabs' screens are text-based and self-explanatory, and include context-sensitive hints for operation. They're described much later in this chapter.

The Remote screen changes slightly with different DSPICore firmware, but the arrangement and control scheme stays the same.

At the top of the Remote Screen are two rectangular buttons: **I/O** and **Processing**; click on them to manage presets and QuickTweak¹³ controls. At the upper right of the screen is a reminder of which DSPICore firmware is currently loaded.

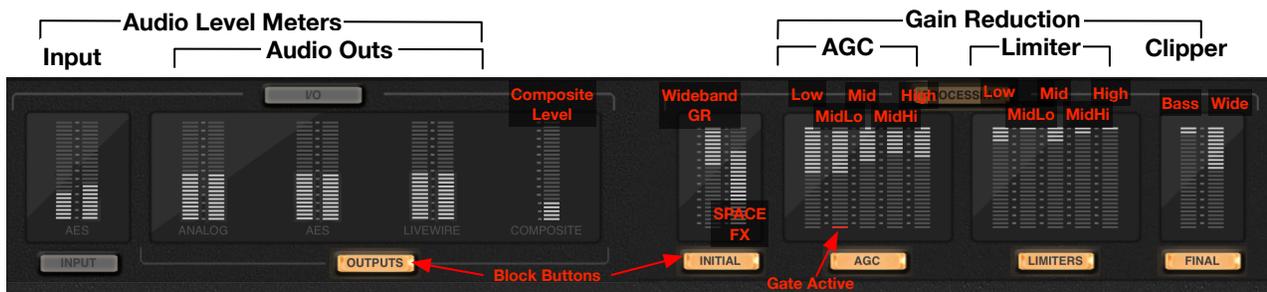
As soon as you press either of these two buttons, the bottom left of the screen lets you load, save, and manage presets for I/O or Processing. As soon as you press the **Processing** button, QuickTweak controls appear on the lower right.

¹³ VOLT processing functions, including QuickTweak and SpaceFX, are covered in the next chapter.



NOTE: The screenshots in this section are from VOLT’s FM Stereo DSP|Core. Other Cores may show other functions, but the arrangement will always be similar.

A row of small meters stretches across the top of the screen, below these two buttons. They let you quickly check levels for input, output, and processing. (Higher resolution meters appear when you’re adjusting those functions.) Below these small meters are Block buttons.



The meter pair on the left shows the selected input’s level. You choose whether this will be Analog, AES, or Livewire using the Input Config function button, described below. The next three meter pairs are stereo output level meters. All outputs are active, no matter which input has been selected.

Audio meters are at VOLT’s processor input and output, are affected by individual level and channel balance controls, and are calibrated 0 to -36 dBFS. They follow normal conventions for peak hold and color coding. Higher resolution versions of these meters appear on the lower left, when you press the Input or Outputs block button.

The other meters—showing mostly light gray bars—are *not* normal level meters.

- ◆ The **Composite** meter on VOLT : FM shows the overall composite percentage, including any subcarrier applied at the rear panel. The Composite meter is before any output level

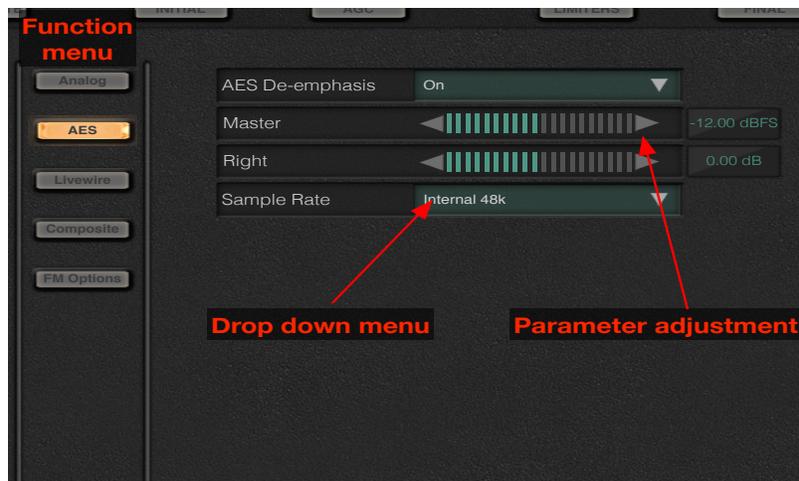
control, and is calibrated 0 – 100%

- ◆ The **Initial** meter shows Gain Reduction at the wideband AGC. All Gain Reduction meters are calibrated in amount of reduction, from 0 dB at the top (no change in volume) to -24 dB at the bottom (extreme leveling is being applied).
- ◆ If there are two meters above the **Initial** block button, the one on the right one shows the activity in the Space-EFX stereo enhancer.
- ◆ The remaining light gray meters show Gain Reduction through the five single-band AGC and Limiters, and the bass and wideband clipper.
- ◆ The bottom segment of each AGC meter turns red when automatic gating is active.

There’s a rectangular **Block Button** below each group of meters. These activate larger, higher resolution versions of that button’s meter group.

When you press the **Input** block button, you’ll see an array of larger high resolution meters on the left: Primary and Secondary (i.e., “Failover”) input level, send and return for the pre-clipper Insert (usually used for a watermark encoder or Voltair), and a zoomed-in higher resolution version of the Insert return.

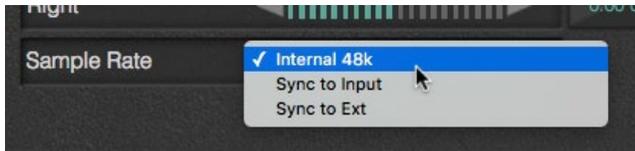
When you press a **Block** Button, a menu of related functions appears in the middle of the screen. Click any one of these function menu buttons to see controls for that function.



Function controls take two forms:

Parameter adjustments have triangles on either side of a horizontal meter. They let you increment a variable by clicking the left-facing triangle (reduce the value) or the right-facing one (raise it). You can hold a triangle down for continuous incrementing. Range, scale, and units when appropriate are displayed in the field to the right of the adjustment.





Drop down menus display text, and have a triangle on the right. Clicking on the triangle (Windows) or Holding the triangle down (MAC) displays a menu of choices. Slide the pointer to the preferred choice, then release.

Most of the function names will be familiar to any broadcast engineer. Some of the processing adjustments, however, are unique to VOLT. They're described in the next chapter.

Working with presets

When the I/O button is pressed, the left side of the screen shows a list of stored Input / Output configurations. These control switching and levels for all of VOLT's audio connections (analog, AES/EBU, and Livewire; including main and secondary sources).

When the PROCESSING button is pressed on any VOLT running any DSP/Core (except for SG), a list of processing presets appears on the left side of the screen. These control all audio processing parameters, and with VOLT: FM, they also control the composite generator parameters.

When you press VOLT: SG's PROCESSING button, a list of Stereo Generator Configuration presets appears on the left. These control separation, single or double sideband mode, composite clip drive, and the two composite output levels.

A column of buttons to the right of each list lets you Load, Save, Save As, Rename, and Delete the configurations.

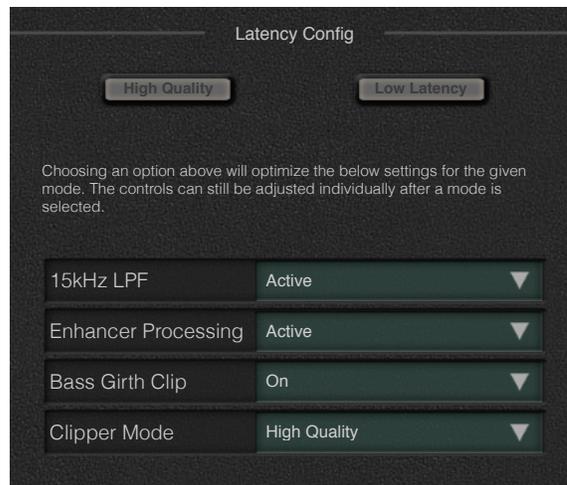
- ◆ Loading a configuration may involve changing an audio source or sample rate, so it may temporarily disrupt audio. Loading a processing or Stereo Generator preset might be transparent to listeners: this depends on the differences between it and the previously running preset.
- ◆ Use **Save** if you have loaded a user configuration and then changed it, and want to overwrite the file with its new choices. It is not available for factory configurations.
- ◆ Use **Save As** if you want to create a new file with those new choices, without erasing the original. It brings up a dialog where you can name the new version. Names must be alpha-numeric, and cannot include spaces. Underscores are allowed.
- ◆ **Rename** is allowed only for presets that have been stored by the user. You can't rename a factory preset. You *can* give a modified factory preset a new Save As name, and then treat it as a user preset.

- ◆ **Delete** is not allowed for factory presets.

Preset files can also be transferred between VOLT and your computer so you can backup important user presets, or transfer them to other VOLTs. See the File Transfer screen, later in this chapter.

About the Latency Meta-buttons

All digital processing takes time, even though a single operation might be measured in microseconds. VOLT uses *a lot* of processing. With every feature turned on, this can add up to a dozen milliseconds or more. In most applications, it won't be enough to be noticeable... but some FM situations may require less latency. VOLT: FM and VOLT: HD let you fine-tune processes, so you can best manage the trade-off between sound quality and latency for your station. When you press VOLT: FM's main **PROCESSING** button, two buttons appear on the function menu. The lower one, **Latency**, reveals a special panel with two option buttons — **High Quality** (18.7 ms latency) and **Low Latency** (10.3 ms) — plus four additional controls for specific processing functions.



The two option buttons act as “meta-controls”: they pre-set the function controls for either maximum processing (all on) or lowest latency (all off).

The processor controls on VOLT: FM's screen include:

- ◆ **15kHz LPF** turns on a very sharp Input Low Pass filter so extremely bright programming doesn't cause issues in the following processor stages,
- ◆ **Enhancer Processing** lets the Initial Enhancers add features to your sound,
- ◆ **Bass Girth Clip** turns on the Bass Girth Clipper to enhance upper harmonics of bass notes,
- ◆ **Clipper Mode** High Quality adds even more distortion cancelling to the final clipper.
- ◆ VOLT: HD's **PROCESSING** button's **Latency** option has slightly different meta-controls: HD Radio and Studio. These enable slightly different specialized mixes of these processors:
- ◆ **Enhancer Processing** and **Bass Girth** as described above.
- ◆ **Final LPF**. Disable, or set to seven filter frequencies between 4 kHz and 22 kHz, for the most efficient use of data-reduced media.

- ◆ **Final Lim Processing** bypasses the final wideband look-ahead limiter.
- ◆ **Sensus Processing** enables Omnia’s ground-breaking pre-treatment of signals to reduce distortion in data-reduced media. You don’t need it if you’re producing material for linear PCM or very gentle codec settings.

You can customize the latency settings

After using any of the meta-controls, you still can enable or disable any of the individual processors separately. For example, you might select **Low Latency** but still add Clipper High Quality if you can tolerate a few milliseconds’ extra delay. Or you can select **High Quality**, but turn off Enhancer Processing to reduce latency if your music programming doesn’t require that kind of treatment.

Unless you have a particular need for low latency, such as air talent monitoring an “off air” signal, we recommend you use **High Quality** mode and keep all the processors on this panel enabled.

After you’ve gotten latency the way you want it, you can save it as part of a Processing preset.

Remote Control Maps: where to find each function

Remote Screen functions change depending on the DSPICore in use. These next pages are reference maps for each of VOLT’s DSPICores, so you can find an adjustment quickly.

You probably won’t need the maps after a couple of uses, because we’ve kept the layout as consistent and intuitive as possible.

I/O

Clicking the I/O button also shows a list of I/O configuration presets.

INPUT

Click to show an array of input meters.

Configuration

Invert input polarity (options)
Input Source
Input Mode (stereo or various mono options)

Failover

Secondary Source
Fail Over Time

Levels

AES Input Master
AES Input Right*
Analog Input Master
Analog Input Right*
LiveWire Input Master
LiveWire Input Right*

Insert

Insert Return
Insert Send

OUTPUTS

Click to show large output meters.

Analog

Analog De-emphasis
Master
Right*

AES

AES De-emphasis
Master
Right*
Sample Rate

Livewire

LW De-emphasis
Master
Right*

*—For fine-tuning balance

Composite

Composite Out #1 Level
Composite Out #2 Level
Separation
Pilot Level
Pilot Phase

FM Options

BS-412 Engage
BS-412 Threshold
Insert Return
Insert Send
Pre-emphasis
Test Tone

PROCESSING

Clicking Processing button shows list of presets, plus two Menu items:

QuickTweak

Compression Depth
Density
Clipper Drive
Lows
Highs
Space-EFX

Latency

Latency has “meta-buttons” for High Quality and Low Latency. See text

15kHz LPF
Enhancer Processing
Bass Girth Clip
Clipper Mode

INITIAL

Large Wideband GR Space-EFX Meters

Pre-proc

HP Filter Freq
Phase Rotator
15kHz LPF

Voice Detect

Voice Gan

WB AGC

Processing Active / Bypass
Drive
Attack
Release
Accel Release
Activity
Gate Thresh
RTZ Level
RTZ Speed

Enhancers

Processing Active / Bypass
Deep Bass
Phat Bass
Warmth
Space-EFX

Xover

LowMid XO Freq
MidHigh XO Freq

(Block buttons continue next column)

AGC

Brings up five individual GR meters on the left, plus 5 Menu buttons, one for each band. Each band has separate controls for:

Drive
Attack
Release
Accel Release
Texture
Gate Thresh
RTZ Level
RTZ Speed

LIMITERS

Also brings up five band GR meters and Menu buttons:

Drive
Attack
Release
Threshold
Hold Threshold

FINAL

Brings up Bass and Main Clipper meters on the left.

Mixer

Low Mix
MidLow Mix
Mid Mix
MidHigh Mix
High Mix

Bass Clipper

Bass Filtering
Bass Tight Clip on/off
Tight Threshold
Bass Girth Clip on/off
Girth Threshold

Clipper

Mode§
Clipper Drive
Clipper Silk
Comp Clip Drive
BS-412 Drive

§ — When “High Quality” mode is selected, VOLT uses a special process to reduce clipper distortion. This requires extra processing cycles and can add a few milliseconds of latency. If extremely low latency is required, you can turn that feature off through this control, or through the controls in the Processing>Latency menu.



I/O

Clicking the I/O button also shows a list of I/O configuration presets.

INPUT

Click to show an array of input meters.

Configuration

- Invert input polarity (options)
- Input Source
- Input Mode (stereo or various mono options)

Failover

- Secondary Source
- Fail Over Time

Levels

- AES Input Master
- AES Input Right*
- Analog Input Master
- Analog Input Right*
- LiveWire Input Master
- LiveWire Input Right*
- *—For fine-tuning balance

Insert

- Insert Return
- Insert Send

OUTPUTS

Click to show large output meters.

Analog

- Signal A Level
- Signal B Level
- Polarity Signal A
- Polarity Signal B

AES

- Signal A Level
- Signal B Level
- Sample Rate
- Polarity Signal A
- Polarity Signal B

Livewire

- Signal A Level
- Signal B Level
- Polarity Signal A
- Polarity Signal B

Output Options

- Asym Mod
- LPF Freq*
- Tilt Eq
- Tilt Freq
- Test Tone
- *— Wide or Narrow, depending on preset

PROCESSING

Clicking Processing button shows list of presets, plus QuickTweak controls:

- Compression Depth
- Density
- Clipper Drive
- Lows
- Highs

INITIAL

Shows large Wideband GR Meter

Pre-proc

- HP Filter Freq
- Phase Rotator

WB AGC

- Processing Active / Bypass
- Drive
- Attack
- Release
- Accel Release
- Activity
- Gate Thresh
- RTZ Level
- RTZ Speed

Enhancers

- Processing Active / Bypass
- Deep Bass
- Phat Bass
- Warmth
- HF-EQ Pre
- HF-EQ Freq Pre
- HF-EQ Post
- HF-EQ Freq Post

(Block buttons continue next column)

AGC

Brings up five individual GR meters on the left, plus 5 Menu buttons, one for each band. Each band has separate controls for:

- Drive
- Attack
- Release
- Accel Release
- Texture
- Gate Thresh
- RTZ Level
- RTZ Speed

LIMITERS

Brings up five band GR meters and Menu buttons:

- Drive
- Attack
- Release
- Threshold
- Hold Threshold

FINAL

Brings up Bass and Main Clipper meters on the left.

Mixer

- Low Mix
- MidLow Mix
- Mid Mix
- MidHigh Mix
- High Mix

Bass Clipper

- Bass Filtering
- Bass Tight Clip on
- Tight Threshold
- Bass Girth Clip on
- Girth Threshold

Clipper

- Clipper Drive
- Clipper Silk



I/O

Clicking the I/O button also shows a list of I/O configuration presets.

INPUT

Click to show an array of input meters.

Configuration

Invert input polarity (options)
Input Source

Failover

Secondary Source
Fail Over Time

Levels

AES Input Master
AES Input Right*
Analog Input Master
Analog Input Right*
LiveWire Input Master
LiveWire Input Right*

Insert

Insert Return
Insert Send

OUTPUTS

Click to show large output meters.

Analog

Master
Right*

AES

Master
Right*
Sample Rate

Livewire

Master
Right*

*—For fine-tuning balance

Composite

Composite Out #1 Level
Composite Out #2 Level
Separation
Pilot Level
Pilot Phase

Output Options

Test Tone

PROCESSING

Clicking Processing button shows a list of presets, plus these buttons:

QuickTweak

Compression Depth
Density
Final Limiter Drive
Lows
Highs
Space-EFX

Latency

Latency has “meta-buttons” for HD Radio or Studio. See text

Enhancer Processing
Bass Girth Clip
Final Lim Processing
Final LPF
Sensus Processing

INITIAL

Shows large Wideband GR and Space-EFX Meters

Pre-prod

HP Filter Freq
Phase Rotator

WB AGC

Processing Active / Bypass
Drive
Attack
Release
Accel Release
Activity
Gate Thresh
RTZ Level
RTZ Speed

Enhancers

Processing Active / Bypass
Deep Bass
Phat Bass
Warmth
Space-EFX

(Block buttons continue next column)

AGC

Brings up five individual GR meters on the left, plus 5 Menu buttons, one for each band. Each band has separate controls for:

Drive
Attack
Release
Accel Release
Texture
Gate Thresh
RTZ Level
RTZ Speed

LIMITERS

Also brings up five separate band GR meters, and Menu buttons:

Drive
Attack
Release
Threshold
Hold Threshold

FINAL

Brings up Bass and Main Clipper meters on the left.

Mixer

Low Mix
MidLow Mix
Mid Mix
MidHigh Mix
High Mix

Bass Clipper

Bass Filtering
Bass Tight Clip on/off
Tight Threshold
Bass Girth Clip on/off
Girth Threshold

Sensus

Processing on/off
Sensus Level
Sensus Frequency

Limiter

Drive
Release
Silk
Final LPF

The Final LPF setting is switchable between 4 kHz – 22 kHz, to avoid problems with low sample rates or low bitrate compression. It controls settings in the multi-band crossover along with the final filter cutoff.

Omnia.VOLT Remote Control Map

DSPCOR HD Pro



Version 2.0

I/O

I/O preset list and management

INPUT

Shows large primary, secondary, and zoomed input meters

Configuration

- Input Source
- Invert Input Polarity
- Input Mode
- Emphasis Standard
- Pre-Emphasis

Failover

- Secondary Source
- Fail Over Time
- Failback Time
- Absolute Threshold
- Relative Threshold

Levels

- AES Input Master
- AES Input Right
- Analog Input Master
- Analog Input Right
- LiveWire Input Master
- LiveWire Input Right

OUTPUTS

Shows large audio meters for Analog, AES, and LiveWire; 0-100% meter for Composite.

Analog

- Analog De-emphasis
- Analog Out Level
- Analog Out Right Level Trim

AES

- AES De-emphasis
- AES Out Level
- AES Out Right Level Trim
- Sample Rate

Livewire

- Livewire De-emphasis
- Livewire Out Level
- Livewire Out Right Trim

PROCESSING

Processing preset list and management

STEREO GEN

Wideband GR and Space-Efx Meters

Encoder

- Separation
- Sideband Mode

Processing

- Comp. Clipper Drive

Comp Out

- Comp Out #1 Level
- Comp Out #2 Level
- Pilot Level
- Pilot Phase

Omnia.VOLT Remote Control Map

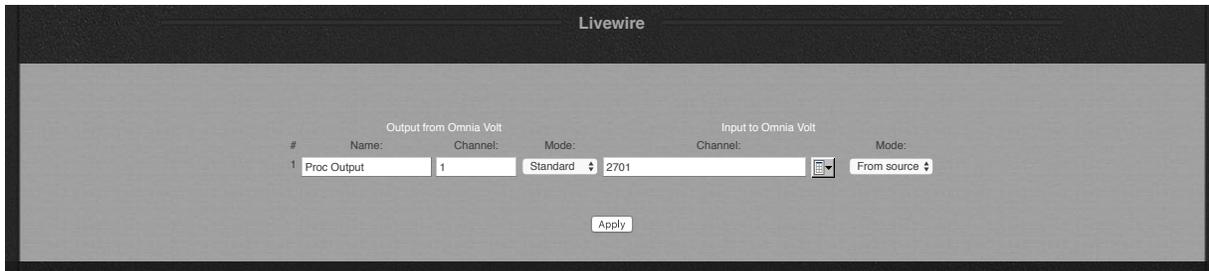


Stereo Generator

Version 2.0

Livewire

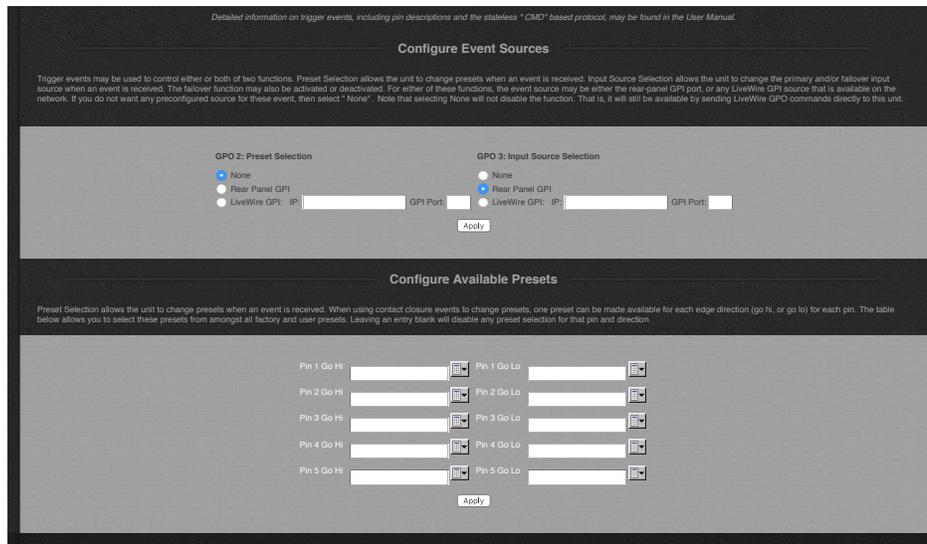
Use this screen if your station is running Livewire Audio over IP protocol, which flexibly and intuitively connects any of your audio signals—to or from consoles, processors, special effects, and other devices—using Ethernet cables and switches¹⁴. The screen includes fields for setting the name, channel, and mode for the signal coming from VOLT, and selecting a source and mode for the signal feeding VOLT.



Make your choices and click **Apply**. For details, see your Livewire documentation.

GPIO / Events

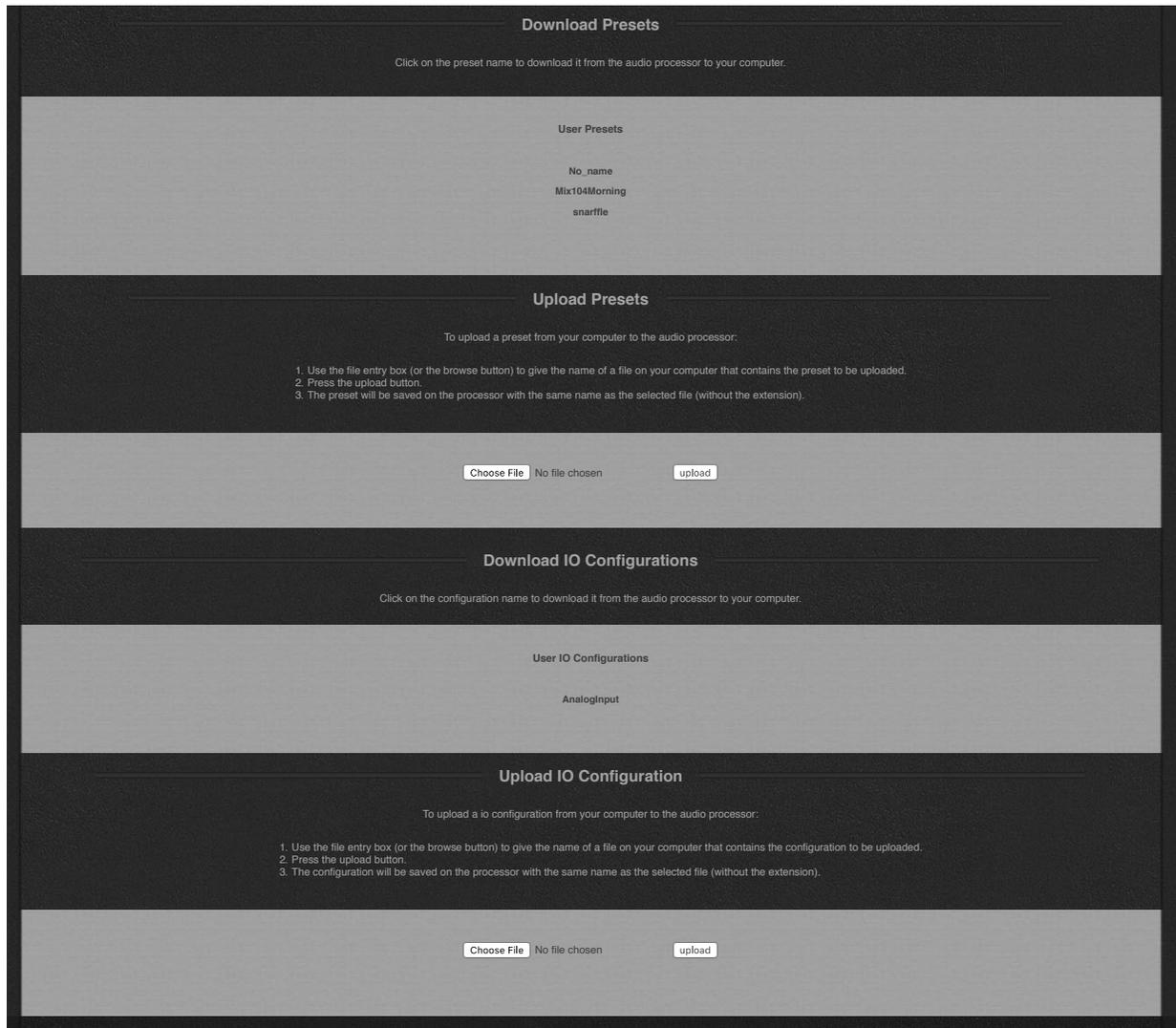
This screen generates outputs for specific events, and lets you remotely trigger up to ten selected processing presets.



For details, see GPIO setup in this manual’s appendix.

File Transfer

This screen lets you download VOLT processing presets and input/output setups to your computer, and upload additional ones as needed. The files can be easily emailed and stored, and let you share VOLT processing with other stations in your group.



Preset files contain only ASCII data and are only a few kilobytes each, so they can be easily transferred over a network or downloaded from a group's internal website or Telos' public one.

I/O configurations are saved in computers with an .oic suffix. Processing and VOLT: SG composite generator presets are saved with an .opr suffix.

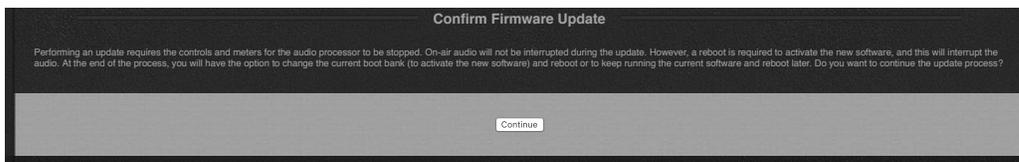
Update

You can change VOLT DSPICores easily by using the **Update** and **Configuration** pages:

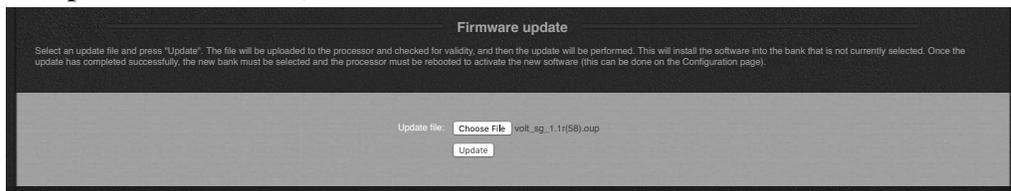
1. Go to Telos' website and download the DSPICore firmware you want. It'll be a file of about 2.5 MB, with an extension ".oup". Save the file on the computer you use for VOLT remote control.

Check Telos' website occasionally even if you're not planning to change DSPICore functionality. That's where we post firmware updates. Make sure you're running the latest versions.

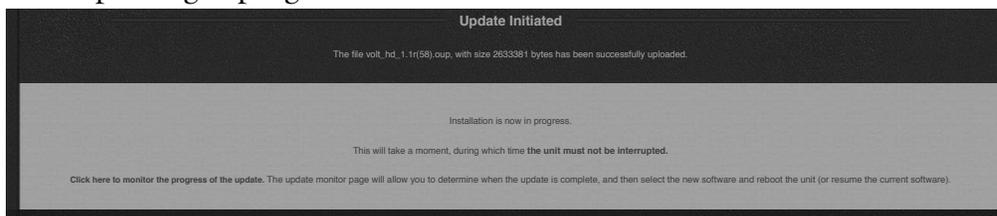
2. Launch VOLT's remote from a browser, and click the **Update** tab (above). You'll see this screen:



Confirm that you want to Update VOLT's firmware, locate the firmware file on your computer, and click **Update**.



3. VOLT will do a basic check of the file, and then upload it. The screen will then change to show updating in progress.



Updating can take a few minutes.

DO NOT DISCONNECT POWER DURING THE UPDATE! Your VOLT's front panel will be disabled during this process, but it will continue to process audio without interruption.

VOLT can hold two different DSP|Cores at the same time in two different banks. The firmware that's currently on-air will remain active while the new Core is being loaded into the unused location replacing that bank's firmware load.

The new core isn't activated until you switch banks, (using the next screen) and reboot. For safety, we recommend you *don't* install the same newly downloaded core into both banks in the same operation. That way, if a file has somehow been corrupted¹⁵, you can revert to one that you know runs properly.

If you want, you can click on the bottom line ([Click here to monitor the progress](#)) any-time during update. The screen will change to a scrolling list of the steps VOLT is going through to check, install, and verify the update. *You don't have to use this progress monitor, but you might find it interesting.*

4. The Update Screen will confirm when the new firmware is successfully loaded. The previously running firmware will continue to be active, but the screen will give you a link to activate the new firmware.

If you don't want to activate the new firmware right away, you can switch to it later by using the **Configuration** screen. The firmware will *not* have to be re-installed to do this.

SNMP

All VOLT 2.0 profiles now support MIB 2-compliant SNMP (Simple Network Monitoring Protocol) which is configured in the "SNMP" tab of the remote interface.

- ◆ The "System Location" and "System Contact" boxes are "friendly" fields used by your SNMP manager to identify the location of the unit and the contact person for alerts.
- ◆ Enter your specific "Community Name" in the appropriate field (leaving this field blank disables SNMP)
- ◆ Click "Apply" to save the configuration information
- ◆ To set the destination for notifications, enter the destination IP Address in the "Destination" field in the SNMP Notifications section and click "Apply"
- ◆ MIB files for VOLT are available to download in the SNMP MIBS section.

Readable variables including system uptime, software version, current preset, current input

source, failover state, composite 1 and 2 output levels, composite output pilot level, analog and AES master input levels, and input mode.

Settable parameters include the audio input source (analog, AES/EBU, and Livewire) and the failover state (choosing between the primary and failover audio sources). Please note that a forced input failover via SNMP works in the same way as a GPIO failover and does not defeat VOLT's internal failover logic. Specifically, if a failover source is selected and failover is enabled with a failover time greater than 0, the input will switch to the failover source then immediately back to the original source so long as audio is still present. In order for the failover source to "stick", the failover time must be set to a value of 0.

Notification traps include input source failover and preset change.

Kantar Watermarking

With the factory service center installation of the option VOLT Expansion Module (Telos PN 2011-00207), VOLT FM units can support Kantar audio watermarking. Once the board is installed, the necessary setup and installation menus in the "Watermarking" tab of the remote interface become active.

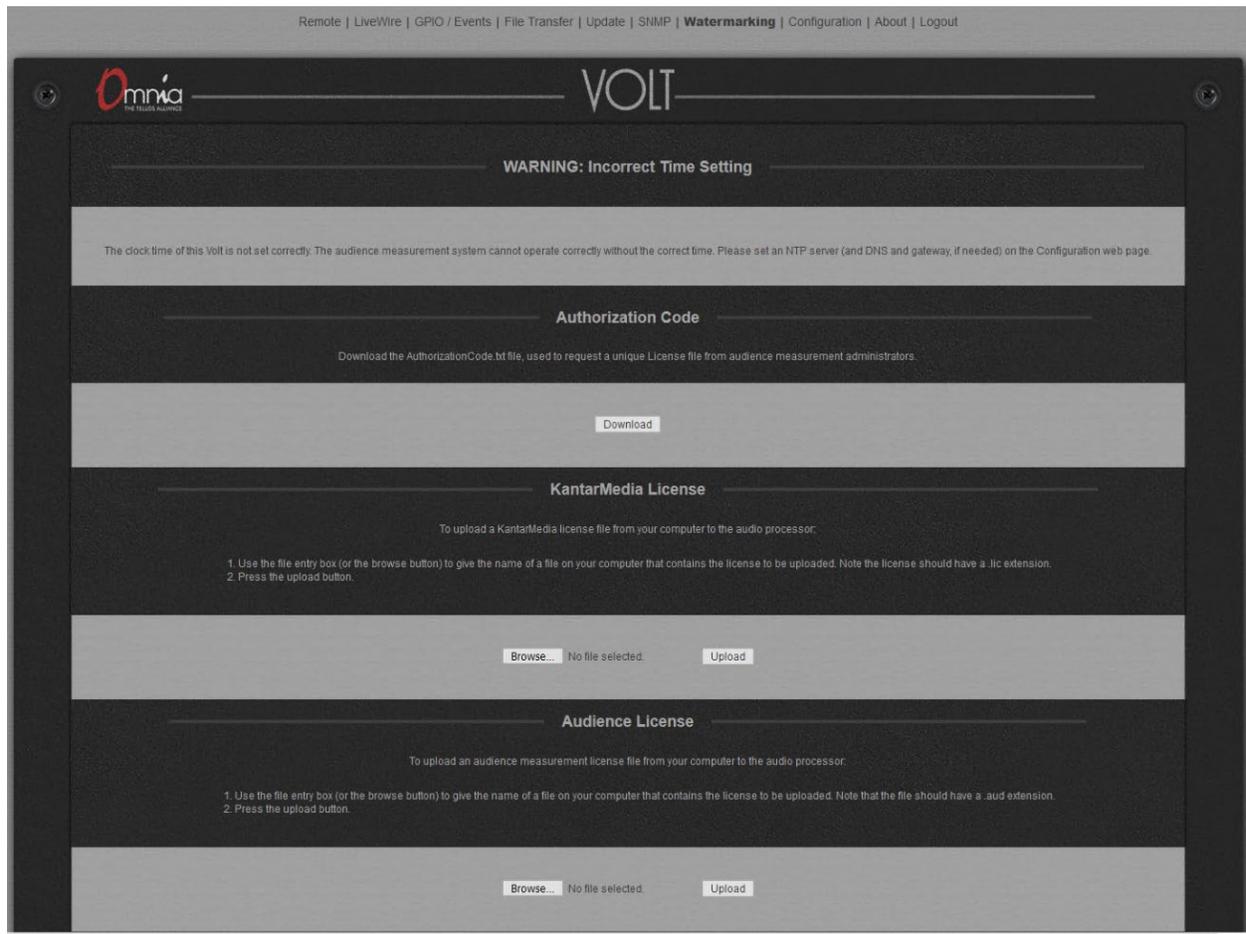
The Authorization Code required in order for Kantar to provide the necessary licenses can be downloaded by clicking the "Download" button in the Authorization Code section.

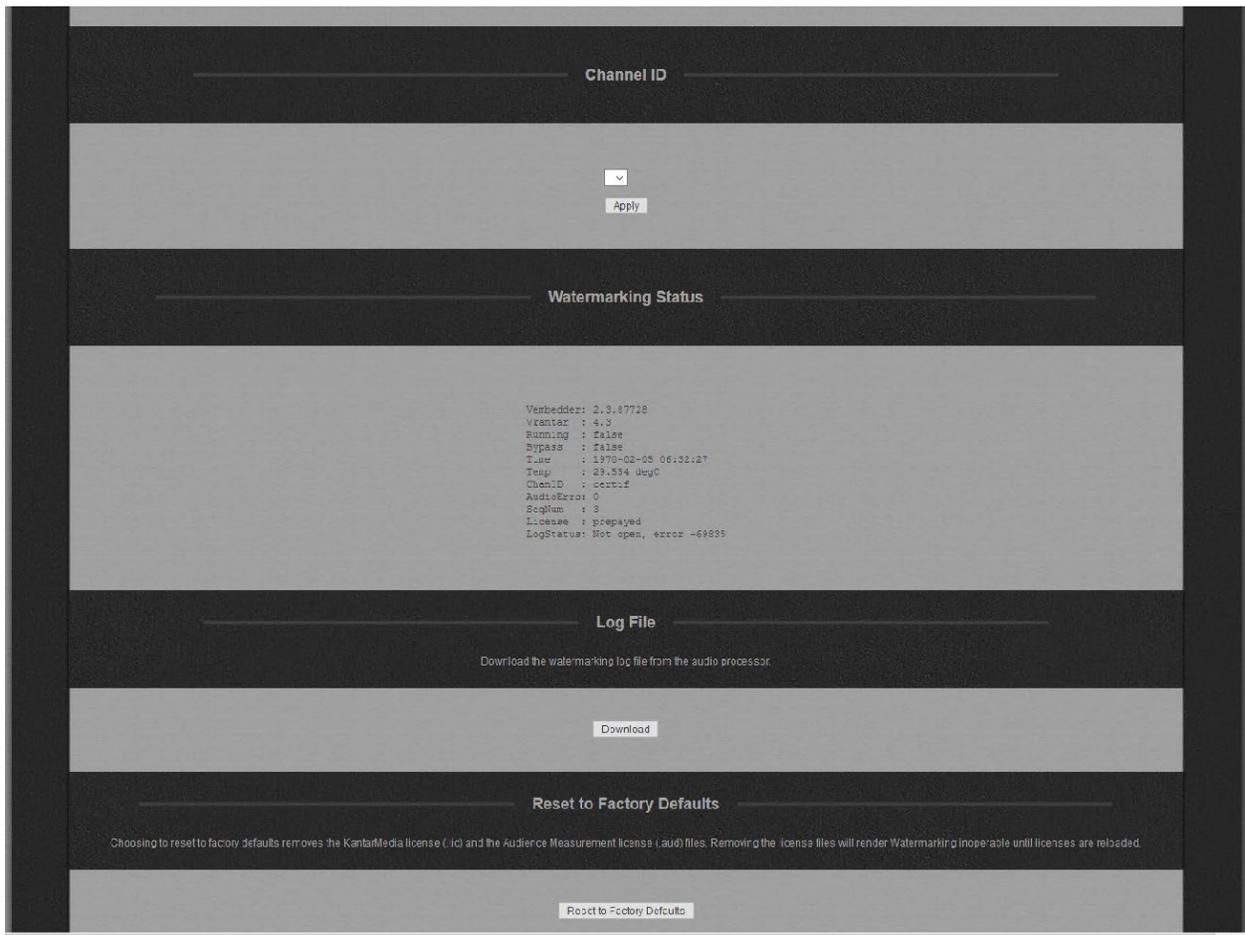
- ◆ Once they receive this code, Kantar will provide two unique license files in return – a KantarMedia License and an Audience License. Use the "Choose File" and "Upload" buttons in the corresponding sections to upload each license. Contact your Kantar Media representative if you have questions or need more information on licensing.
- ◆ With the licenses now loaded, choose the appropriate Channel ID for your station in the "Channel ID" dropdown, then click on "Apply".
- ◆ The current status of the watermark encoder is displayed in the "Watermarking Status" screen.
- ◆ A log file can be downloaded from the "Log File" section.
- ◆ To completely remove the KantarMedia and Audience Measurement licenses from VOLT, click on the "Reset to Factory Defaults" button.
- ◆ VOLT FM versions supporting Kantar watermarking must be validated by Kantar; please check the Omnia VOLT webpage for current release status

To setup the audio insertion path for the encoded signal, go to the "Remote" tab of the remote

interface, then click on the “Insert” button in the Input section of the I/O menu. Select “Watermarking” in the Insert Return dropdown, and “None” in the Insert Send menu.

Remember to reset the Insert Return to “None” if you remove the licenses so that audio is no longer router through the encoder insert point.





Configuration

This screen lets you change network settings and password, select one of the two currently installed firmware packages to be activated at the next reboot, reboot the processor, and perform diagnostics when advised by our support team.

Configure Network Settings

Host name: (letters and digits only, no spaces)

Network address:

Netmask:

Gateway:

Configure Remote Control Port

Note: The remote control actually uses two ports. The one specified here and the next incremental port (by default 4545 and 4546). Enter only the first port number.

Remote Control Port:

Change Current Password

Old password:

New password:

New password again:

Select Software Bank

Choose the software bank that will run the next time that the audio processor is re-booted. This will have no effect until re-boot, which can be done below, or by cycling power. Note that you must select the newly installed software bank after a software update in order for the new software to run.

Bank 0 Version: AM: 1.1 (58)

Bank 1 Version: FM: 1.1 (59)

Running Software: Version: FM: 1.1 (59)

Utilities

Reboot Audio Processor Restart the audio processor. This interrupts audio.

Factory Diagnostics Troubleshooting and diagnostic information.

The screenshot displays the VOLT web interface with the following sections:

- Configure Network Settings:** Fields for Host name (Omnia-VOLT), Network address (192.168.2.10), Netmask (255.255.255.0), Gateway (192.168.1.1), DNS Server (192.168.1.254), and NTP Server (0.0.0.0). An **Apply** button is at the bottom.
- Configure Remote Control Ports:** Fields for HTTP Port (80), Remote Control Port (7999), and SNMP Port (161). An **Apply Changes and Reboot Now** button is at the bottom.
- Change Current Password:** Fields for Old password, New password, and New password again. A **Change** button is at the bottom.
- Select Software Bank:** Radio buttons for Bank 0 (selected) and Bank 1. Both show Version: FM: 2.0 (80) and HD Studio: 2.0 (80). A **Running Software:** field shows Version: FM: 2.0 (80). An **Apply** button is at the bottom.
- Utilities:** Links for **Reboot Audio Processor** (Restart the audio processor. This interrupts audio.) and **Factory Diagnostics** (Troubleshooting and diagnostic information.).

Be aware of two things when using this screen:

1. If you're changing the IP address or password, the new information is set as soon as you click **Apply** in the respective field. This may disconnect you from VOLT's Remote Control, until you log in again using the changed information.

If login isn't working the way you expect after a change, use VOLT's front panel LCD display to verify or change the current information.

2. If you want to select a different software bank, you have to re-boot VOLT. This step reconfigures the DSP. Click **Reboot Processor** on the confirmation screen that appears. VOLT processing is disabled during a reboot, so make sure to be on a backup air chain during this process. In a little less than a minute, VOLT will restart with the new DSP|Core running.

VOLT processing is disabled during reboot. It will start again automatically when the firmware is loaded.

VOLT I/O configurations and processing settings are not automatically loaded when you install a different DSP Core. If you want to switch VOLT's function (EG: switching FM to AM), but might want to re-use its settings if you restore the original function, make sure you've save the i/o settings as a preset before rebooting.

I/O configuration and processing settings *are* preserved, even after reboot, when you cycle the power or install a factory update of the DSP|Core firmware currently running.

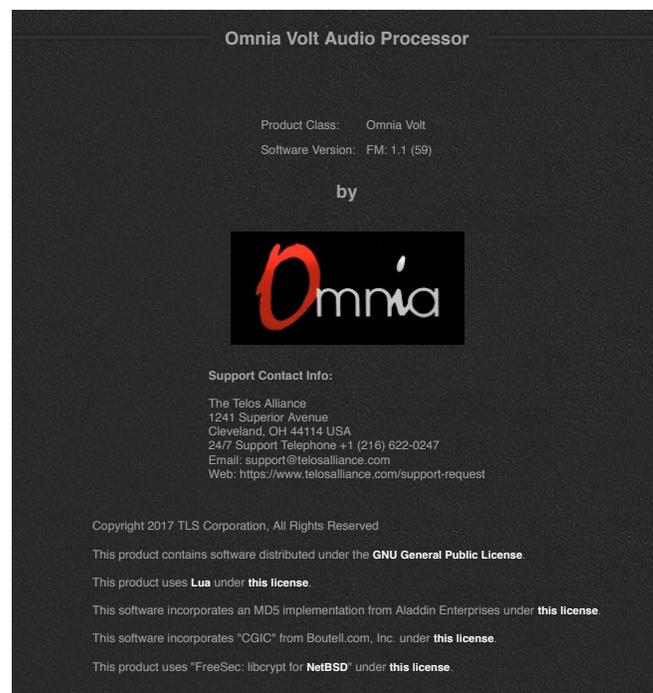
If switching DSP Cores from (for example) an FM version to a downloaded AM, HD or SG version, we recommend you load the factory IO configuration and a factory processing preset belonging to the new DSP Core. This action will insure a all parameters are cleanly matched to the newly installed DSP Core.

After a reboot, you'll have to log in again to use the Remote Control. This may require flushing your browser's cache, or starting a new session with VOLT's IP address.

You can switch back and forth between Cores as needed, by using this screen and rebooting.

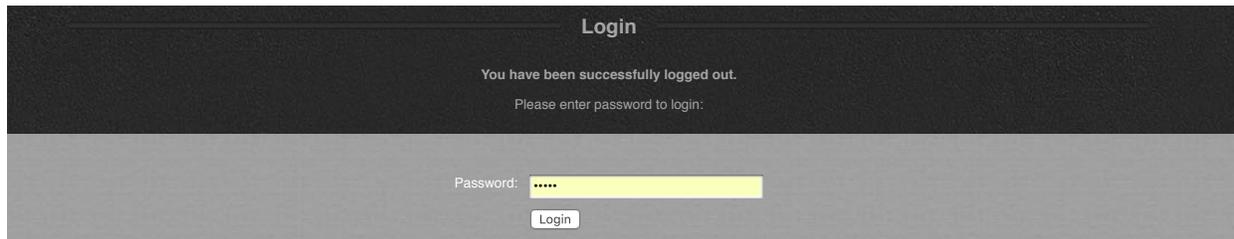
About

This screen displays information about your system software and contact information for Telos factory support.



Logout

Clicking on this tab logs you out immediately. You're then shown a Login dialog, where you can enter the password and log in again.



The screenshot shows a dark-themed dialog box titled "Login". The text inside the dialog reads: "You have been successfully logged out." followed by "Please enter password to login:". Below this text is a password input field with a yellow background and a "Password:" label to its left. The input field contains five dots. Below the input field is a "Login" button.

6 VOLT Processing

Omnia VOLT is not a plain-vanilla processor. We've taken our deep knowledge of broadcast processing and DSP, refined some of the most popular Omnia algorithms, and developed brand new ones.

The best way to learn how to adjust VOLT for your station and market is to work with it, using this chapter as a guide.

This chapter is in three parts:

- ◆ **Preset strategy and tuning, including QuickTweak.** These are the philosophies we've developed over years of working with stations, in every possible format and market size, all around the world. So even if you already know how to tune a processor, you'll probably get something out of this section. It's a quick read.
- ◆ **VOLT processing block diagram.** This will tell you what sequence VOLT uses to process your signal, so you know which algorithms will be affected by the ones that come earlier.
- ◆ **VOLT terminology.** We've used standard audio processing language whenever possible. But we had to invent new terms for some of the new algorithms. Turn to this section if you're not sure what a control is supposed to be doing.

Strange presets and controls?

If the Remote Control screen doesn't make sense for the way you're using VOLT—for example, you're broadcasting FM and can't find pre-emphasis settings—make sure you're running the proper DSP|Core.

The current DSP|Core is always identified at the upper right corner of the Remote Screen. You can load or change cores using the Update and Configuration tabs at the top of any Remote Control screen.

Preset strategy and tuning

Before listening to presets, make sure input levels are correct. You can measure and adjust them from the front panel or the Remote Control.

VOLT is designed to be used at -12 dBFS nominal; this is the level corresponding to “0 VU” on a conventional analog meter. Adjust transmitter modulation and any subcarrier according to your normal practice.

Don't skip this step, and don't try to over-drive VOLT's input in hopes of “more density”. VOLT can deliver all the density any station could ever want, while using proper input levels. Over-driving VOLT (or any other equipment) only adds distortion.

After fine-tuning thousands of Omnia installations, we've developed a strategy for getting the best results. Here are the principles:

Work offline

We recommend you experiment with VOLT's presets and controls before putting it in your airchain; that'll give you the most freedom to try different things¹⁶. Hook it up to a program feed and listen with good monitor speakers. You'll be able to audition every preset, and turn every control to its extreme, without annoying listeners.

Pick a preset.

Don't get hung up on preset names.

Our names might imply specific formats or effects, but that's often so our preset designers can keep track of them. *TalkInYourEar* might work with some music format, and *HotWire* can work with news. So try a bunch: it takes just a moment to load each preset, and loading doesn't interrupt signal flow.

In fact, listening to all of the included factory presets is the best way to get a feel for what VOLT can do. Decide which is closest to the sound you want, and use that as a starting point. Many users like to play with VOLT in their shop before racking it: they feed typical program material, try the controls, and audition all the presets. It's a good idea.

There's a complete list of presets later in this chapter.

Adjust the clipper.

Then, before you go any further, adjust the Clipper or Limiter Drive¹⁷ @ @ @ as low as possible

¹⁷ The name of this control may vary depending on if your running FM, AM, or HD Pro Cores.

for the loudness you need. This adjusts the primary tradeoff between loudness and distortion. Once it's close, you can start to use some of VOLT's many ways to *increase* perceived loudness while actually *lowering* distortion.

- ◆ Starting with the default setting for a preset, adjust **Drive** down in 0.5 dB steps until the loudness drops just below what you want. Then bring it up slightly from there.
- ◆ If getting the desired loudness means you have to adjust Drive much higher than the preset's initial value, try a more aggressive preset.

Remember: Listeners might be attracted by loudness. But they'll always be chased away by distortion.

When used properly, Omnia VOLT can generate moment-to-moment loudness with plenty of *muscle*, *density*, bass *oomph* and warmth, midrange intelligibility, treble *sparkle* and *silk*, stereo consistency, and lots of other desirable characteristics.

But VOLT also provides Omnia's famous *clarity*. That characteristic is appreciated by top programmers all over the world.

Think first. Then QuickTweak!



We've made it easy to optimize your processing for both quality and loudness. The first step—before *cranking it up*—is to just listen to the chosen preset. Rather than “turn everything to 11”, decide exactly what sonic characteristics might be lacking.

Then reach for the QuickTweak knobs.

Four of the six QuickTweak controls¹⁸—**Compression Depth**, **Density**, **Lows**, and **Highs**—can create the illusion of more loudness without overdriving the clipper. These *Interactive Algorithm Adjustments* control multiple parameters simultaneously, including some that aren't otherwise adjustable. They've been carefully crafted using our extensive processing experience and input from leading broadcasters.

Adjust them one at a time, deliberately and methodically, concentrating first on the characteristic you think needs the most help. Make the smallest adjustment you can hear; this will depend on your program material as well as the preset. Then listen critically before making another adjustment.

If you think something is close, either write it down or save it as a preset. You might want to come back to this setting, after tweaking the control more, or tweaking some other characteristic.

The other QuickTweak controls, **Clipper** or **Limiter Drive** and **Space-EFX**, mirror the identically-named settings in VOLT's deep menus. We include them here for convenience: in a lot of cases, these two knobs may be all you need along with the four main QuickTweaks. Save the

¹⁸ QuickTweak is powerful. VOLT's “Depth” control does a lot more than similarly-named knobs on conventional compressors. “Lows” and “Highs” are a lot more complex, internally, than the simple tone controls their names suggest. And we've had to invent names for some other VOLT parameters as well, because of the new algorithms they control. If you're not sure what a knob does, check the glossary at the end of this chapter.

result as a preset, and you're done.

Go deeper... if you think there's a reason.

In many cases, QuickTweak will give you the sound you want.

With some formats and markets, you might want to get a bit deeper. VOLT has more than 140 routing and processing settings. Feel free to explore all of them in your search for sonic perfection.

And don't worry about making a mistake: if you save a custom-named preset before you start adjusting individual settings, you'll always be able to come back to its baseline. For safety, factory presets are write-protected and can't be deleted.

There is no practical limit to the number of presets you can have. They can be loaded, saved, renamed, or deleted from VOLT's front panel or Remote Control. They can also be uploaded and downloaded to your hard drive, when running the Remote Control.

In a hurry?

If you're in a moderate hurry and don't have time to try every preset, it's still worth doing some off-line experiments. Pick a few presets to audition, based on their implied format or the amount of "in your face" their name suggests. Adjust the QuickTweak controls until you've found the best combination, and save it as a new preset. Then put VOLT and your custom preset on the air.

If you're in an absolute hurry and have to *Get On The Air! Now!*

1. Install VOLT in your airchain, using the Quick Start Guide. Adjust the input levels and the feed to your transmitter. Make sure audio polarities are correct.
2. Pick at least a couple of presets that might be close. Try them. You can switch among related presets while you're on the air, without losing any programming. If you do the switching between songs or before an announcement, the changes will be less noticeable to listeners.
3. Pick the closest and adjust its Clipper Drive for approximately the right loudness. Then use the other QuickTweak controls to get even closer. Save the result.
4. Come back later — perhaps during the overnight — and explore some more. Even though you're in a rush, it's worth a little extra time to create a sound that'll attract and keep listeners.

A few fine-tuning tips:

- ◆ The trade-off between quality and loudness is primarily determined by VOLT's dynamic

sections. While each function alone can generate “dial presence,” each has different advantages and side effects.

- ◆ Excessive AGC or limiting can increase intermodulation distortion, making the audio sound mushy or smeared. Adjusting the drive and time constants for each band separately can control this.
- ◆ Excessive AGC or limiting can also cause pumping or breathing, where very quiet passages are boosted too much. **Gate** and **Hold** thresholds can control this. Again, tune each band separately.
- ◆ Don’t forget the **Enhancers** . They can add warmth, extra bass, or even a feeling of more bass through smaller speakers: these low frequency effects can boost some programming without driving the dynamics sections into distortion. The **Space-EFX** enhancement can help keep your stereo soundstage consistent and exciting across a variety of different recordings.
- ◆ Take it in small doses. Plan to do a little adjusting at a time, perhaps in half-hour segments with breaks between. Too much listening, at extreme settings, can fool you into thinking a distorted or fatiguing sound is better than it really is.
- ◆ It can help to “recalibrate” your ears by listening to other stations in your market. Obviously, you want to sound the best for competitive reasons. But remember, listeners’ ideas of what’s best can be influenced by other processing they hear on the dial. It’s not a bad idea to listen and think, “Gee, an aspect of that station’s processing is something we can use.” Then, use VOLT’s QuickTweak and fine tuning to make it better.
- ◆ It can also help to recalibrate your listening situation. We recommend you do initial preset development with very good monitor speakers, so you can hear and control every aspect of VOLT’s processing. But after you’ve put your secret sauce on the air, you might want to listen in your car¹⁹! VOLT’s HTML5 Remote Control can be accessed in real-time from the browser in your smartphone or tablet, so you can make adjustments from anywhere. The Remote Control doesn’t even use large quantities of cellular data... so you may be able to use it in locations with spotty cell coverage²⁰!
- ◆ It’s okay to trade with other VOLT users in your group or corporate network. Individual presets can be downloaded to a computer and e-mailed.

A word on ITU-R BS.412 processing:

Broadcasters in countries that must operate in accordance to ITU-R BS.412 regulations (some-

¹⁹ Or sit in a lot of cars. You’ll find there are lots of different acoustics and audio characteristics.

²⁰ Sorry, we can’t actually guarantee the performance of a particular carrier in a particular location with “low bars”. But we know our Remote Control is very gentle with data usage.

times referred to as “MPX power limiting”) must enable VOLT’s BS.412 mode, set the appropriate power level for their region, and select a BS.412-specific preset.

To enable BS.412 mode, turn on the “BS-412 Engage” control in the FM Options section of the Outputs menu. The setting of the BS-412 Threshold control corresponds to the MPX Power value, which varies by region. The default value is “0” as this is the level required in most (but not all) regions.

VOLT offers nine specific BS.412 factory presets based on standard FM factory presets. Each has been carefully tweaked to preserve the spectral balance and overall texture of the FM version as closely as possible while working well in tandem with the BS.412 limiter.

You may also choose a non-BS.412 preset, but doing so requires a solid technical understanding of how BS.412 works, both in theory and in practice. Some presets inherently lend themselves better to BS.412 use than others. As a general rule, more relaxed, open-sounding presets work better compared to those designed with maximum loudness in mind.

Regardless of the preset you choose, the “BS-412 Drive” control in the Clipper section of the Final processing menu adjusts the amount of drive to the BS.412 limiter. It is largely responsible for how close to the maximum power limit the signal stays on average as well balancing the tradeoff between loudness and audible pumping artifacts.

About VOLT’s factory presets

Please don’t ask us, “What preset should I use with xxx format?”

If you insist, we’ll answer that question as well as we can. Our preset creators are processing experts and experienced programmers, and we’ve fine-tuned a lot of Omnias, all over the world. But we don’t live in your market, and we’re not looking at a radio dial with your competition. Any suggestion of “use preset zzz for format xxx” is the opinion of one person, trying to solve slightly different issues than the ones you’re facing. Your mileage *will* vary.

In the real world, one person’s perfect CHR process might be another’s ideal Classic Rock... or Country... or Alternative. We see this all the time. In some markets, we’ve found *RockNRoll* or *CHRHot* was ideal for a lite AC format. If you’re in a very competitive market where everything is cranked to within an inch of its life, *RockNRoll* might sound laid back and relaxing!

Please, please explore all of the presets available to you within VOLT. Look for additional ones online on VOLT’s product specific webpage (<https://www.telosalliance.com/Omnia/Volt-Audio-Processor>) .. Presets are where the science of processing meets the art of sonic design. You can’t judge a book by just its cover, and you can’t choose a preset by its name or brief description. Your ears will tell you more than any dictionary.

With that in mind, consider the following lists just as suggestions for your first steps. Then try some other directions as well. Don’t limit your journey—or VOLT’s powerful processing—to a small subset of its possibilities.

FM Presets

Light / Purist Presets

Classical	<i>Light dynamics processing with minimal coloration.</i>
------------------	---

General Purpose presets

All_Purpose	<i>A mostly blank canvas with some reasonable loudness enhancement, intended as a start point if you want to create your own signature sound.</i>
AudioChameleon	<i>A preset designed to mimic the warm tones of its analog older sibling, Cornelius Gould's Audio Chameleon audio processor.</i>
CircuitBreaker	<i>A nod to the Omnia.6exi and a great starting point if you favor the classic sound of the 6.</i>
CGSmooth	<i>A nice starting point for light AC formats.</i>
CovertOps	<i>Excellent for correcting poor spectral balance and making up for varying input levels. Can make a big splash, but also knows when to lay low and stay off the radar.</i>
ElectraV2	<i>A good choice starting point for multiple formats where a more slightly more processed sound is desired.</i>
CosmicPlasmaV2	<i>Styled after its namesake in Omnia.11 GForce, an excellent starting point if you like natural-sounding mids.</i>
HitParade	<i>A more dense sound and texture makes it a good choice for energetic programming that needs to jump off the dial. The bass is ever-present but doesn't overwhelm the rest of the spectrum.</i>
Ohio_ValleyV2	<i>Smooth, consistent, bright, and competitively loud for a variety of formats.</i>

Medium Aggressive Presets

AC_Bright	<i>A dense, limiter-driven sound with a bright high end.</i>
ActiveRock	<i>A competitively loud preset with a solid low end and forward but open mids.</i>
BigFuseV2	<i>A good general mid-aggressive starting point.</i>
BottomsUp	<i>Unapologetically bass-heavy with more relaxed dynamics make it a good choice for dance, hip-hop, and urban formats.</i>
CHR_Bright	<i>Slightly more relaxed and warmer than AC_Bright while still maintaining a bright high end.</i>
CHR_Hot	<i>Similar in feel to CHR_Bright but with a bit more loudness and a smoother high end.</i>
ClassicHits	<i>A good choice for “Jack” style formats that want a relatively open sound without giving up loudness.</i>
ClassicRock_V2	<i>Well-suited for 70’s and 80’s classic rock formats that need more low- and high-end re-equalization.</i>
Country_V2	<i>A more relaxed texture with solid bass, vocals front and center, and a smooth high end to promote longer TSL for modern and classic country formats.</i>
EscapeVelocity	<i>Good density and loudness with a smiley-face EQ for up-front highs and a convincing low end.</i>
HotAC_Bright	<i>A big low end and excellent consistency make this bright preset a good choice for Hot AC and Top 40 formats.</i>
HotWire	<i>A nod to the HotMix presets on the traditional ‘orange’ Omnia.11.</i>
Light_AC	<i>A very open sound for that gives up some loudness in exchange for an open, easy-to-listen-to texture.</i>
Oldies	<i>Designed to provide plenty of spectral re-balancing to provide a consistent sound from music spanning the 50’s, 60’s, 70’s, and 80’s.</i>
PolyFuse	<i>Another nod to the Omnia.6. Competitively loud and consistent without being fatiguing or over-the-top.</i>
SteamTurbine	<i>Loud and dense but without being too aggressive or over-the-top.</i>
Urban_V2	<i>A massive low end with open mids for Urban and Hip Hop formats.</i>
VoltageRegulator	<i>Lots of compression and density for high-energy Top 40 and Hot AC formats.</i>

Very Aggressive presets: (Least to most aggressive, top to bottom.)

SixVoltsV2	
SuperConductor_V2	
ShockHazard_V2	
KILOWATT_V2	
MEGAWATT_V2	
ZETTAWATT_V2	
MegaAmps	<i>Similar to VoltageRegulator, but more pushed.</i>
TalkInYoFace	<i>For FM stations with lots of spoken-word programming.</i>
TalkInYourEar	
TalkLikeNPR	
TalkToMeFM	

50 μs presets

*Presets with a **50us** suffix were designed for countries where 50μs pre-emphasis is standard. But you might also want to use them in 75μs countries, if you prefer a less-bright sound.*

CHR_Loud1_50uS	
CHR_Loud2_50uS	
CHR_Warm_50uS	
Loud_80s_50uS	
RNB_50uS	
RNB_Loud_50uS	
Warm80s_50uS	

ITU-R BS.412 Presets

Presets with “412” following their name are versions of FM presets that have been optimized for use in regions employing BS.412 power limiting. Please see the list of FM presets above for individual descriptions.

CircuitBrkr_412
ClassicHits_412
ClassicRock_412
CosmicPlsmaV2_412
Country_412
ElectraV2_412
GIGAWATT_412
MEGAWATTV2_412
PolyFuseV2_412

AM Presets

NB and WB suffixes stand for “Narrow” and “Wide” band optimization. These variations are built with different crossover frequencies, and the choice will depend on the available bandwidth, listeners’ receiver characteristics, and your programming goals. Our factory default is a wideband preset.

AC_NB AC_WB	<i>A good choice for a variety of music formats, including AC and Top 40.</i>
ClassicalNB ClassicalWB	<i>This preset provides gentle level control while keeping vital dynamic range intact.</i>
CountryNB CountryWB	<i>Country on AM just “sounds right”, doesn’t it? Blake, Carrie, Luke, and Keith, as well as Garth, Dolly, Randy, and George all come through clean and clear.</i>
LatinaNB LatinaWB	<i>From south of the border, Tejano to Salsa and the Caribbean, the rich music punches through AM better than ever while high-energy personalities come through clear and lively.</i>

NostalgiaNB NostalgiaWB	<i>Well suited for standards and big-band formats from the 30's through the 50's.</i>
OldiesNB OldiesWB	<i>Order up your malts and put on the poodle skirts ! The hits of radio's golden era are on the air again.</i>
RockandRollNB RockandRollWB	<i>Rock and Roll started on AM, and still sounds great with this bright, forward-sounding preset.</i>
SpokenWordNB SpokenWordWB	<i>Designed for produced and long-form programs that include the spoken word, including radio drama.</i>
SportsLiteNB SportsLiteWB	<i>Created for network sportscasts that arrive with decent level control but still benefit from higher gate settings to avoid noise pull-up during pauses in speech.</i>
SportsMediumNB SportsMediumWB	<i>Similar to SportsLite with higher gate thresholds to keep crowd noise down during announcer pauses, but with more aggressive gain riding and limiting to tame enthusiastic announcers.</i>
TalkVeryLiteNB TalkVeryLiteWB	<i>Audio that is clean and clear in the style of public radio. Suitable for talk shows, long form content,, and even some music, this "one size fits all" and the is the most dynamic of the Talk presets.</i>
TalkLiteNB TalkLiteWB	<i>A step up loudness-wise from Talk Very Light, but still very dynamic. Well suited for non-controversial talk, long form programming, and especially suitable for keeping listener fatigue low.</i>
TalkMediumNB TalkMediumWB	<i>Crank it up a notch ! This is a rather loud preset that keeps host and caller levels evenly matched. A good choice if TalkLite isn't quite enough. It also sounds great on play-by-play sports.</i>
TalkAggressiveNB TalkAggressiveWB	<i>Kick out the jams ! Burn a hole on the dial and make sure your transmitter can take it. The competition won't know what hit them ! (Your mod monitor may never forgive you.)</i>

HD Pro presets

Some HD presets are adaptations of FM presets. If there's an FM sound you like, try its matching HD as a starting point for your HD, DAB, streaming, or syndicated production.

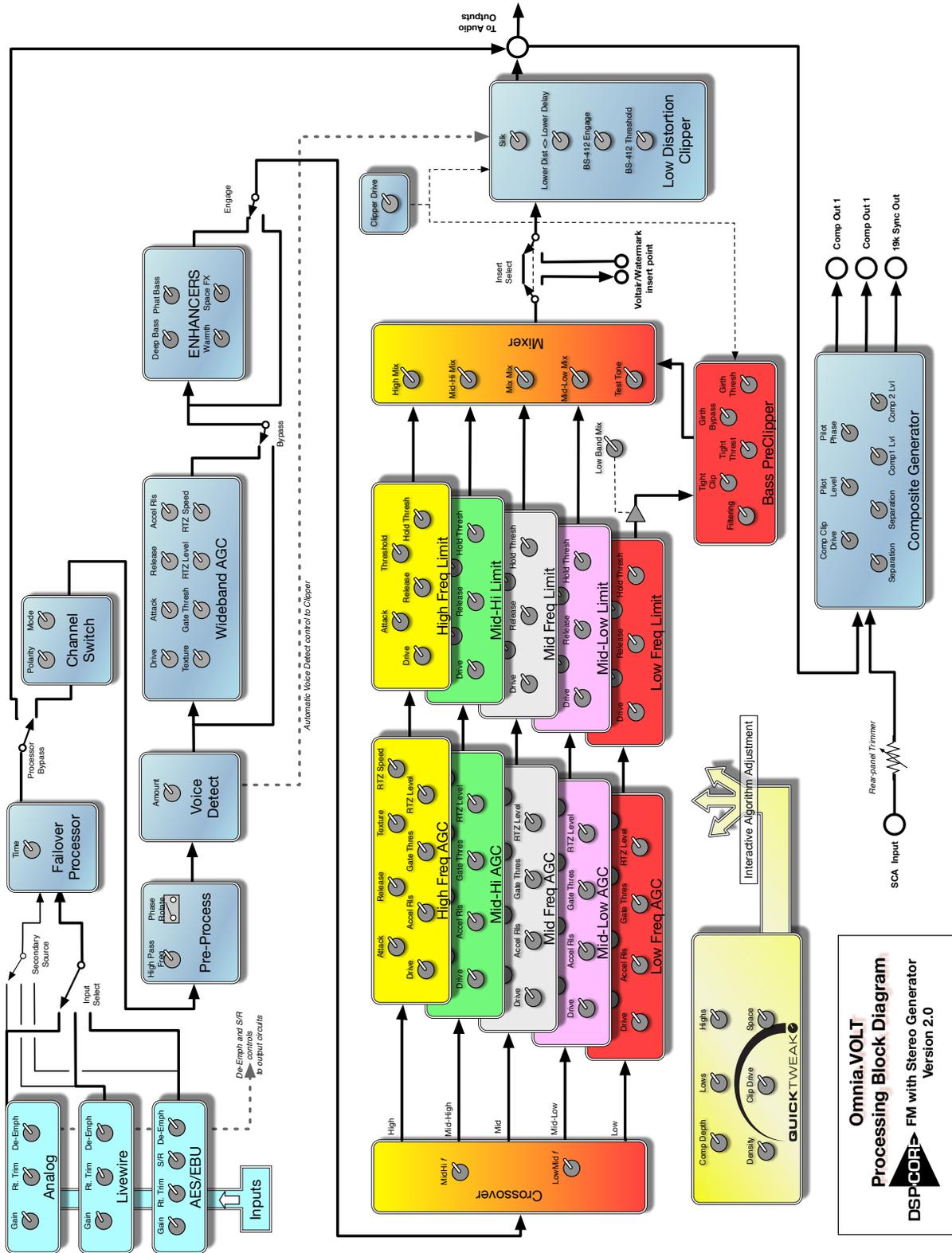
AllPurposeHD	<i>A mostly blank canvas with some reasonable loudness enhancement, intended as a start point if you want to create your own signature sound.</i>
AudioChameleonHD	<i>A preset designed to mimic the warm tones of its analog older sibling, Cornelius Gould's Audio Chameleon audio processor.</i>
BottomsUp_HD	<i>Unapologetically bass-heavy with more relaxed dynamics make it a good choice for dance, hip-hop, and urban formats</i>
CHR_HD	<i>A bit more relaxed than some other presets, with a warm overall sound and a sparkling high end.</i>
ClassicRock_HDV2	<i>Well-suited for 70's and 80's classic rock formats that need more low- and high-end re-equalization.</i>
County_HD	<i>A more relaxed texture with solid bass, vocals front and center, and a smooth high end to promote longer TSL for modern and classic country formats.</i>
CovertOps_HD	<i>Excellent for correcting poor spectral balance and making up for varying input levels. Can make a big splash, but also knows when to lay low and stay off the radar.</i>
EscapeVelocity_HDV2	<i>Good density and loudness with a smiley-face EQ for up-front highs and a convincing low end.</i>
HitParade_HD_V2	<i>A denser sound and texture makes it a good choice for energetic programming that needs to jump off the dial. The bass is ever-present but doesn't overwhelm the rest of the spectrum.</i>
KILOWATT_HDV2	<i>An HD version the preset that sits in the middle of VOLT's loudest preset group.</i>
MEGAWATT_HDV2	<i>An HD version of VOLT's next-to-loudest preset.</i>
InYoFaceTalk_HD InYourEarTalk_HD TalkLikeNPR_HD TalkToMe_HD	<i>For syndicated or streaming production of talk-based programming.</i>
Oldies_HD	<i>Designed to provide plenty of spectral re-balancing to provide a consistent sound from music spanning the 50's, 60's, 70's, and 80's</i>
Urban_HD	<i>A massive low end with open mids for Urban and Hip Hop formats.</i>

VOLT factory preset lists usually grow as successive software updates are released. There are no presets available for VOLT: SG's composite generator, since that DSP|Core doesn't have native audio processing, and its choices depend on local market and regulations as well as your station's goals.

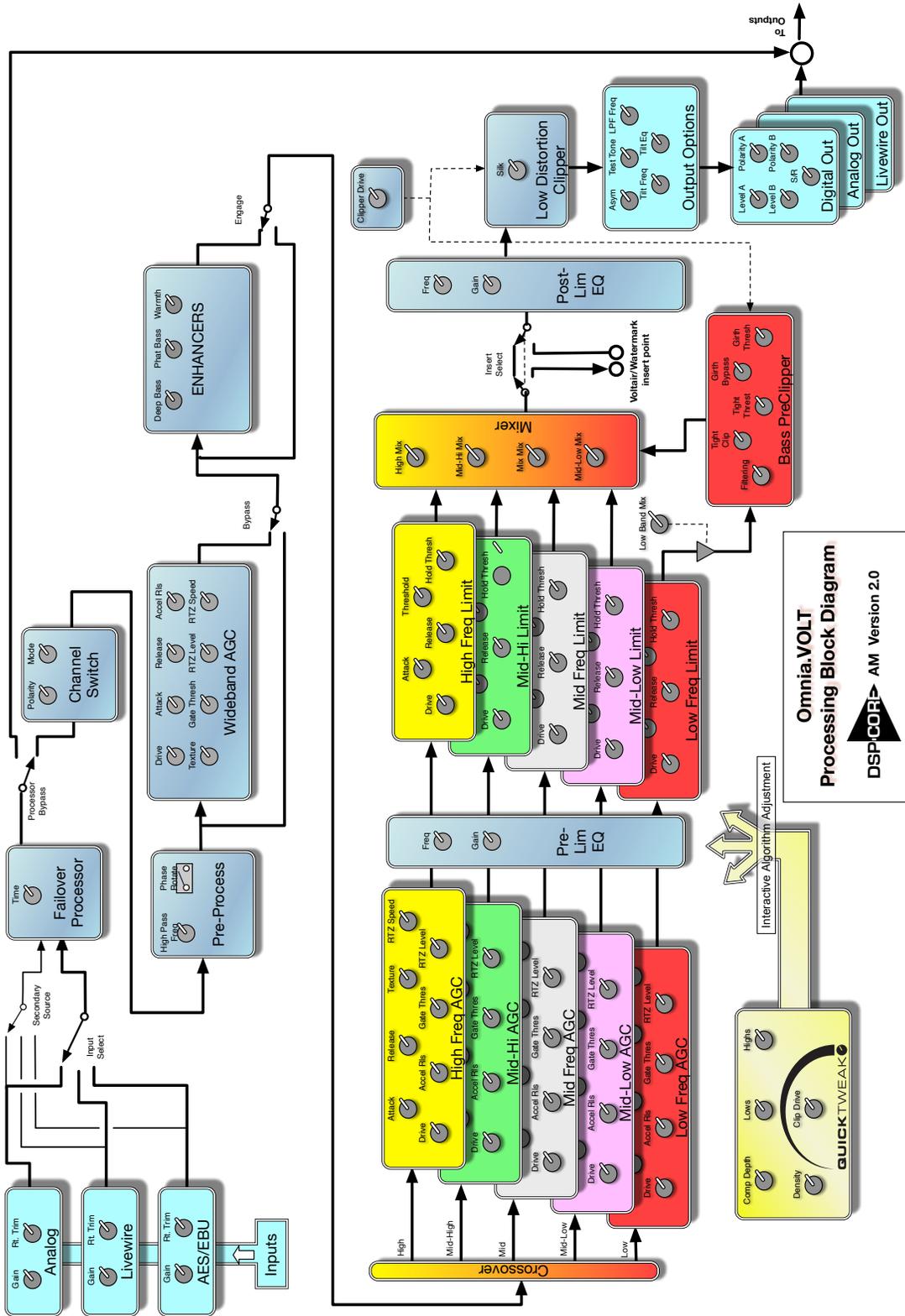
Volt Processing Block Diagrams

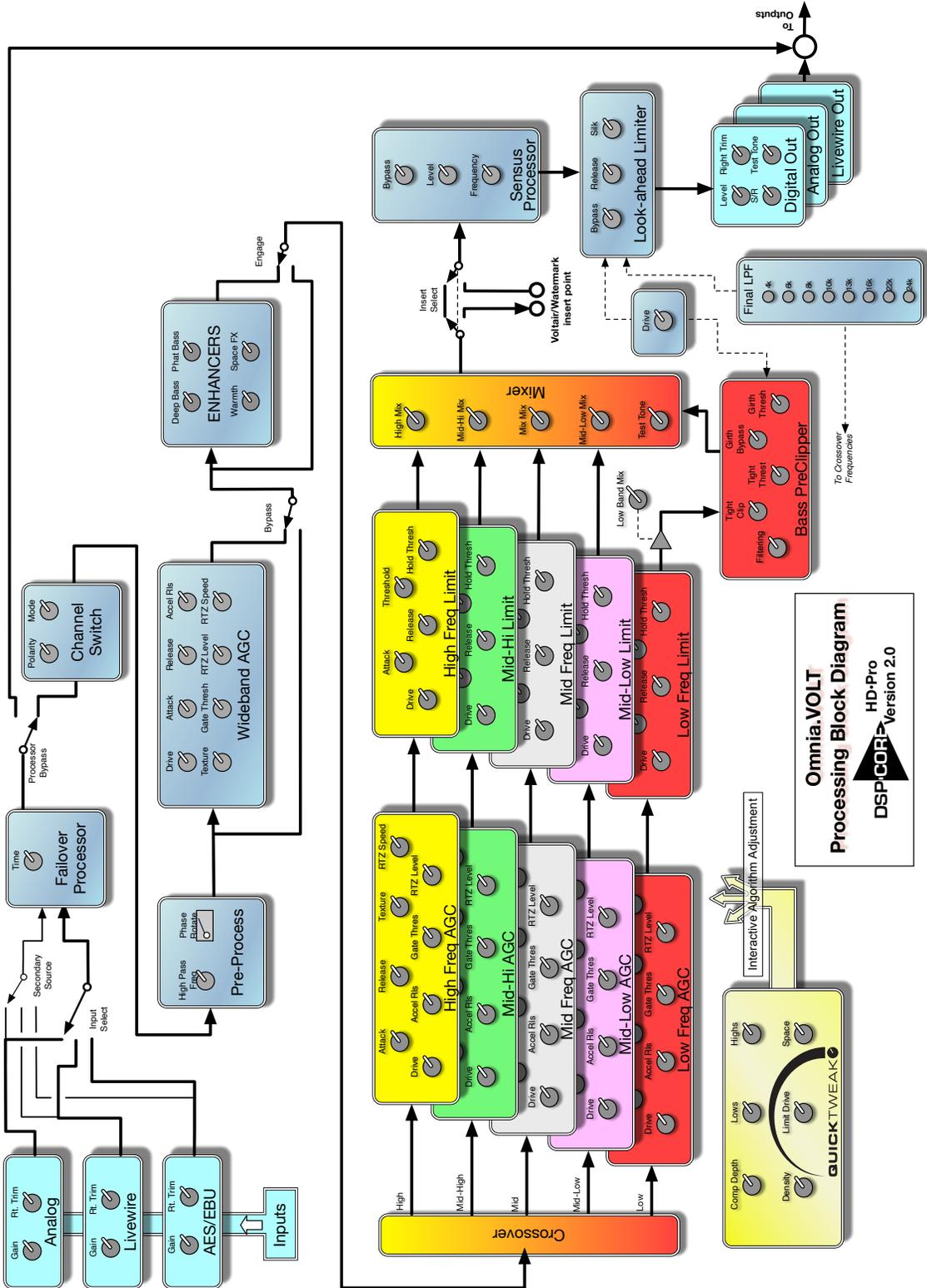
A lot of VOLT's processing power depends on how its algorithms are specialized for each different DSP|Core function, and how signals are routed from one algorithm to the next.

The diagrams on the next few pages explain the internal mapping of each individual DSP|Core module for FM, AM and HD-Pro. When you understand VOLT's signal flow, you'll find it easier to intuit what each controls does. The SG DSP|Core can be viewed as a subset of FM, minus the processing blocks.



Omnia.VOLT
Processing Block Diagram
 Version 2.0
DSPCORP FM with Stereo Generator





VOLT Processing Terminology

Most of VOLT's controls are labeled with standard studio or processing definitions, and should be intuitive to any engineer. But a few names are our own invention... because they're controlling algorithms of our own invention. Here's a glossary of those terms.

Some of these functions aren't needed by every DSP|Core application, and don't appear until you've activated the relevant firmware. So you won't see a Space-EFX control, for example, if your VOLT is set up for AM broadcasting.

Outputs

Narrow/Wide LPF Frequency [AM Only]: There are two different tunable low-pass filters available in VOLT: AM, optimized for different applications. The preset determines which one will be active, and you can control its cutoff frequency. The inactive one is grayed out.

Tilt Eq and Frequency [AM Only]: This is very-low-frequency equalization (between 5 – 55 Hz), designed to compensate for “droop” when square waves are broadcast through older plate-modulated AM transmitters. You may find it helpful with a few program formats, depending on the equipment you use.

Composite Separation [FM Only]: Switchable between Stereo, Mono, or a -3 dB or -6 dB blend. This can be helpful in controlling multipath issues.

QuickTweak

Density: Controls relative drive into the limiter bands, while ratios and time constants are program-dependent.

Lows: Affects both the amount and shape of processing for the two bottom bands.

Highs: Amount and shape of processing for the two top bands.

Pre-process and Enhancers

15kHz LPF: Activates a very sharp low-pass filter on the input to protect the processing from supersonic signals present in some recordings.

Deep Bass: Adds psychoacoustic bump by enhancing just the very low frequencies, such as kick drum fundamentals.

HF-EQ Pre or Post [AM Only]: VOLT provides additional shelf equalizers, each with switchable frequency and gain, both before and after the 5-band limiter. If you need additional brightness, you may find that splitting the boost between these two stages gives you the best combination of “sparkle” and control.

Phat Bass: Actually makes the speakers in small radios (and earbuds) sound bigger. Adds harmonic overtones for frequencies those smaller transducers can't carry, fooling the ear into thinking the fundamentals are there. On larger speakers, the effect starts to disappear (because the fundamentals are there in the first place). *Be careful! Too much Phat Bass can cause excessive gain reduction in the lower bands, and might cause muddiness on certain programming.*

Warmth: Shelf boost at 150 Hz, compensating for some program material. *Be careful! The Phat Bass warning applies. Also, the resonant frequency of many automobile interiors lies in this range; too much warmth may sound tubby in cars.*

Space-EFX: Maintains a consistent stereo field, by dynamically compensating for variations in width between one song (or verse) and another.

Voice Detect: Constantly checks for mono program elements (including voice). When it hears them, it lowers the main channel by the amount you specify in **Voice Gain**. This can prevent excessive clipping because of L+R buildup.

Xover: Lets you adjust the critical crossover frequencies that affect warmth and intelligibility or brightness.

AGC [Automatic Gain Control]

Accelerated Release: Speeds up the AGC recovery time when there's a big difference between loud and soft program elements, to prevent "holes" in your dynamic profile.

Activity: Adjusts the ratio of the Wideband AGC. Because this is a feedback AGC, adjusting the ratio also interactively changes the attack and release times. Higher settings provide a more tightly controlled sound, while lower settings allow more dynamics through to the Multiband AGC section that follows.

Texture: Similar to the Activity control, but adjusts the ratio of each band of the Multiband AGCs. As these too are a feedback design, adjusting the ratio also interactively changes the attack and release times. Higher settings will sound tighter and send a less dynamic signal on to the corresponding Multiband Limiter band. Lower settings will sound more open, but may increase Multiband Limiter activity. If necessary, the Drive control for the affected Multiband Limiter band(s) can be used to compensate.

Gate Threshold: When signal falls below this threshold, GR [Gain Reduction] is frozen at its most recent level. This stops the AGC from boosting those soft but annoying sounds like talent breathing or tape hiss. GR is released when signal exceeds the threshold.

RTZ Level: [Return to Zero] Determines idling GR, for when the input is silent. This prevents the GR from falling to zero, which would cause a sudden burst of loudness when the signal starts again.

RTZ Speed: Determines how quickly GR will go from previous value to RTZ Level.

Limiter

Hold Threshold Preserves dynamics when sudden peaks are followed by moderate decreases in level, by temporarily stopping the GR from releasing. The result is a drastic reduction in inter-modulation distortion as well as a more open sound, even though the audio is still quite dense. This also works in conjunction with the AGC's Gate.

Clippers and Final Limiter

Bass Tight Clip: Hard clipper just on the bass notes, to keep them from modulating the main clipper. Usually most effective on drums.

Bass Girth Clip: More like a musician's effect; makes upper harmonics of bass notes bigger and broader.

Final LPF [HD-Pro Only]: Lets you add a sharp cutoff filter to eliminate high frequencies, to help control distortion with data-reduced media. Filter frequency is switchable to accommodate different bitrates. LPF setting also changes the frequencies used in its multi-band crossover, to give you maximum control over program loudness below the desired cutoff.

Sensus [HD-Pro Only]: Omnia's exclusive Sensus algorithms actually predict how HD, DRM, DAB, or streaming data reduction will affect your sound. They pre-condition your signal, making compression sound better—even at low bitrates. Use a lower frequency for low bitrates and the cleanest voice transmission; choose a higher one to improve the quality of music-centric programs.

Silk: Adjusts the texture of the main clipper when handling significant mid- and upper mid-range material such as lead guitar. Actually modifies our distortion-cancelling algorithm: lower-numbered settings soften (or *silken*) the effects of clipping at the expense of a small amount of perceived loudness.

VOLT: SG functions

SSB [Single Sideband Suppressed Carrier]: VOLT: SG's special **SSB** setting provides an advanced L-R signal. It can help reduce multipath and noise, and provide increased protection to the baseband spectrum and to HD signals. While SSB is compatible with just about every receiver made in the past 30 years, it might require registration with your local regulatory agency. Telos pioneered SSB for FM. For more information please see Frank Foti's white paper, available at Telos' website.

You can also set VOLT: SG to conventional **DSB**, which provides a full double-sideband, suppressed carrier L-R signal.

OneLouder: VOLT: SG's Embedded Pilot Feature allows one full dB more signal (or 10% more modulation) without exceeding legal limits. It is active at all times in VOLT: SG²¹. For more information, see Frank Foti's video on our website.

Pilot Phase: This lets you set the phase relationship between the 19 kHz pilot and the 38 kHz suppressed carrier. The system default is 0.0 degrees. The performance of VOLT's DSP stereo generator is theoretically perfect... but it can be adjusted $\pm 32^\circ$, in one degree increments, if needed to offset time domain errors in the overall transmission system. Use a calibrated modulation monitor when making this adjustment.

Comp Clipper Drive: VOLT: SG's composite clipper, when properly calibrated to the input level, can remove overshoots that have been created by nonlinearities in an analog or compressed digital STL, and give you better control over modulation. While you can also use this clipper more aggressively to add "just one more tiny bit of flat-topped loudness", we don't recommend it. Create the audio loudness profile you want through proper processing, in an Omnia or similar gear, back at the station. Then use VOLT: SG's composite clipper as final protection for your overall signal.

7 Troubleshooting and Updates

VOLT is solidly built, with rigorously tested hardware and software. Nonetheless, no electronic equipment is immune from occasional problems. These pages will help you identify which ones can be fixed quickly and locally, and which may require contacting us.

In an emergency, you can reach our Support Team anytime, by calling +1 216-622-0247.

VOLT includes factory diagnostics available on the Remote Control's **Configuration** tab. When contacting customer support, you may be instructed how to retrieve important information so it can be read or emailed to us for analysis.

For billing questions or other non-emergency technical questions, email Support@TelosAlliance.com or call +1 216-241-7225 between 9:00 AM - 5:00 PM USA Eastern Time, weekdays. There's full contact information at the end of this chapter, and at the end of this manual.

Features and operations of VOLT are determined largely by software. Telos strives to provide the most stable and feature-rich software available. We encourage you to check for software updates from time to time by visiting our website or by contacting us directly.

Contacting Us...

By Phone/Fax

You can reach our 24/7 Support Team in emergencies by calling +1 216-622-0247. For billing questions or other non-emergency technical questions, call +1 216-241-7225 between 9:00 AM to 5:00 PM USA Eastern Time, Monday through Friday.

By Email

Non-emergency technical support is available at Support@TelosAlliance.com.

By Web

The Telos Web site has a variety of information that may be useful for product selection and support. The URL is <http://www.TelosAlliance.com>. See the **Omnia** section for VOLT news and updates.

8

Technical Specifications

We are constantly working to improve our products. Specifications and features are subject to change without notice. Audio quality is measured through VOLT's entire chain but with processing controls turned off.

System

Frequency Response: User selection of flat, 50 μ s, or 75 μ s pre-emphasis curve within ± 0.50 dB, 30 Hz to 15 kHz.

System Distortion: Less than 0.01% THD, 20 Hz – 7.5 kHz (second harmonic distortion above 7.5 kHz is not audible in the FM system) .

Signal-Noise Ratio: Audio >95 dB analog, >120 dB digital i/o.

Input / Output

Composite: Single-ended and floating over chassis ground. BNC connectors with EMI suppression. Maximum cable 100' / 30M RG-58U.

Output level: separately adjustable for each of two outputs, 0V - 10V in 0.05V steps.

Pilot Level: Adjustable from 4.0% to 12.0% in 0.1% steps and OFF.

Pilot Stability: 19 kHz, ± 0.5 Hz.

S/N: -85 dB typical, 75 μ S de-emphasized across 15 kHz, at 100% modulation.

Distortion: < 0.02% THD 20 Hz – 15 kHz, 75 μ S de-emphasized @ 100%.

Stereo Separation: > 65 dB, 30 Hz – 15 kHz.

Linear Crosstalk: > -80 dB, main to sub or sub to main channel @ 100%.

Non-linear Crosstalk: > -80 dB, main to sub or sub to main @ 100%.

38 kHz Suppression: > 70 dB @ 100%.

76 kHz Suppression: > 80 dB @ 100%.

Pilot Protection: > -65 dB relative to 9% pilot injection, ± 1 kHz.

57 kHz (RDS/RBDS) Protection: > -50 dB.

Analog: Left and Right Stereo on EMI-suppressed XLR-3, balanced with “pin 2 hot”.

Input: Electronic balanced, impedance 10k Ω , nominal +4 dBu, max +22 dBu.

Output: impedance 20 Ω for >600 Ω load, +4 dBu nominal, +22 dBu peak.

Converters: 24 bit, 128x oversampled with linear-phase anti-aliasing filter.

Digital: Stereo per AES/EBU standard, 24 bit resolution. Input locks to any rate 32 kHz – 108 kHz. Output locks to input, internal 48 kHz, or separate external AES/EBU “digital black” reference 32 kHz – 96 kHz.

Livewire: Audio over IP and control per Livewire standard, on same RJ-45 used for Ethernet control.

Remote Control

GPI: EMI suppressed DB-9 at logic levels, +5 V and ground supplied.

Ethernet: 10/100BaseTX Ethernet on EMI-suppressed RJ-45. TCP/IP control via HTML-5 internal web server, password protected. Manual addressing and port selection.

Electrical/Physical

Power: 100 - 250 VAC, 47-63 Hz. < 40 VA. Typical draw 12W RMS, maximum 15W RMS.

Internal supply with overvoltage and short circuit protection. Meets EN55022, EN55011 Level B Conducted Emissions. EN61000-4-2, -3, -4, -5, -6 level 3 immunity compliant. Full international safety approval. CE marked.

EMI suppressed IEC male connector. Detachable 3-wire power cords supplied for US and European use.

Temperature: 32° to 122° F / 0° to 50° C for all operating voltage ranges.

Humidity: 0-95% RH, non-condensing.

Dimensions: 19” wide x 1.75” high x 16” deep (48.26cm x 13.335 cm x 40.64 cm) including connectors. Unit requires one EIA rack space for mounting.

Shipping Weight: 12 lbs. / 5.5 kg

9 Telos Alliance Warranty

Telos Alliance Limited Warranty



For the latest Telos Alliance warranty, visit: telosalliance.com/warranty.

A GPIO operation

Omnia VOLT offers the ability to control several functions by means of trigger events (a trigger event is either a physical contact closure or a virtual LiveWire GPIO event). Currently, presets may be selected, the primary and secondary input sources may be selected, and the failover state may be set (forcing a switch to the secondary input) or cleared (forcing a restore to primary input). Additionally, status information is available via the GPIO system when any of the above events occur for any reason (such as front panel or remote control as well as due to trigger event handling).

All of the above functionality is implemented via the LiveWire GPIO facilities that are part of LiveWire Routing Protocol (LWRP). The functions are controlled by sending GPIO messages to “virtual” LiveWire GPO ports on VOLT, and status is monitored by monitoring virtual GPI ports. These ports are virtual in the sense that they do not correspond to any physical output or input on the rear-panel, but instead initiate or report on actions that occur within the unit. Outputs ports (GPO) are used to control the unit as they are an output from the network, and can have a LiveWire GPI patched to them to make the GPI source control the Omnia. Input ports (GPI) are used to report status from the unit as they are inputs to the network and can be patched to a LiveWire GPO to produce a status output.

The GPI pins on the rear panel appear as a GPI port on the LiveWire network. Hence, this port can be patched to any of VOLT’s GPO ports making it control the corresponding function (It could also be patched anywhere on the LiveWire network instead of, or in addition to, using it locally). The “GPIO / Events” page on VOLT’s web-based interface allows this to be done easily. It also allows other LiveWire GPI ports to be patched to VOLT’s virtual GPO ports so that the corresponding function could be remotely controlled. Finally, it provides a means to specify which presets can be selected by means of GPIO events.

Full GPIO control is available by directly using LWRP on a TCP connection to port 93 of VOLT. See the LWRP documentation for a description of this protocol itself. This document explains how the GPIO ports and the pins within those ports are assigned on VOLT. In addition to the pin-based protocol, there is a stateless, text command protocol using LWRP’s GPIO “CMD:” syntax. This protocol is recommended instead of the pin-based GPIO protocol when creating software remote control functions. The command descriptions are given below, after the port and pin assignments.

The pin-based GPIO protocol was designed to be easy to use with raw contact closures (or independent logic bits). It allows a pushbutton (or toggle switch) on each pin to be useful independently of the other buttons. For example, a processing preset may be assigned to be selected by the “go-low” direction of each of the 5 pins in the port. If this is done and five normally-open pushbuttons are connected between the pins of a controlling GPI port and ground, each pushbutton will select a preset when pressed. If normally-closed pushbuttons are used, the “go-high” direction of the pins would have to be used to create the same effect. One would not typically assign both the go-low and go-high directions of the same pins at the same time. An exception might be to use a single toggle switch on a single pin to select between 2 presets, one for each direction. A little thought will show that using multiple toggle switches in this manner will lead to problems selecting the desired preset without going through intermediate presets.

The following 4 GPO ports are permanently defined. Their function cannot be changed.

GPO 1 -- reserved (because VOLT has no physical GPO)

GPO 2 -- preset selection

GPO 3 -- input/output routing selection

GPO 4 -- trigger script execution (not yet implemented)

As seen above, the action to take is tied directly to the port number.

The possible actions are:

Preset Selection: Each of the five pins acts independently of the others. Each pin can have one preset assigned to a rising edge on the pin and one preset assigned to a falling edge (or “no action” may be selected for either or both edges). Preset selection takes place only on transitions (edges). If more than one transition takes place simultaneously, the lowest numbered pin that has a transition will take precedence. Here, “simultaneously” means as part of the same command to `lwrdr`. If they are driven by physical inputs, transitions that occur within the same sampling period will be seen as simultaneous.

Input Routing: Bits 0 and 1 select the primary input. Bit 0 acts independently to select either the analog input on a falling edge or the AES input on the rising edge:

Lxxxx = analog input

Hxxxx = aes input

Bit 1 acts to select the LiveWire input on a falling edge. On a rising edge the simultaneously transmitted state of bit 0 is examined to select one of the other inputs:

xLxxx = LiveWire input

lHxxx = analog input

hHxxx = aes input

If bits 0 and 1 have simultaneous transitions, bit 1 takes precedence. So LLxxx and HLxxx switch to LiveWire.

Bit 2 is the manual failover trigger:

xxLxx = trigger a manual failover. This will cause the secondary input to be selected and the failback logic to be activated.

xxHxx = manually clear a failover. This will cause the primary input to be selected and normal failover logic to be activated.

Bits 3 and 4 select the secondary input. They work the same way as bits 0 and 1

The reporting functions works just the opposite way. When one of the above states is assumed (due to control from GPO or any other source) the corresponding transition is created on the corresponding pin of the corresponding GPI port. Virtual GPI assignments are the same as the GPO assignments listed above. For example, changing the primary input to analog will cause "GPI 2 Lxxxx" (where "x" is replaced by "h" or "l" depending on the previous state of the GPI) to be issued to interested LWRP clients.

GPI 1 is used for the physical GPI port on the rear panel. Changes in its state are reported directly using LWRP.

Because the pin-based protocol was designed for use with physical contact closures, the result of each go-high or go-low event may depend on the previous state of the pins and certain results cannot be achieved without going through intermediate states. Thus, it is not recommended for use when control is being done directly by computer software over a TCP connection. In this case, there is a stateless command-based protocol available.

The command-based protocol is also a part of LWRP, and accessed using a TCP connection to port 93. It is implemented using the LWRP GPO <n> CMD: command. Arguments are given in the LWRP command (in quotes after CMD:) to control the Omnia. Each GPO port maintains the same function as listed above for the pin-based protocol, and will only accept CMD: arguments that relate to that function. The following arguments are supported, listed by port:

GPO 2:

-- SEL <preset name> -- Select the preset with the given name, putting it on air. The names are the same ones displayed by the front panel or remote. Note: A list of names may be obtained by issuing an http GET of /cgi-bin/presetlist.cgi (from the webserver on the Omnia). This will give an http response containing a text/plain document that contains preset names, one per line.

GPO 3:

-- PRI <src> -- Select the given source, <src>, as the primary input source. <src> must be one of: ANA (for analog), AES (for AES/EBU), or LWR (for LiveWire).

-- SEC <src> -- Select the given source, <src>, as the secondary input source that will be used in case of failover. <src> options are the same as PRI.

-- FOV SET -- Force a failover to occur, putting the secondary input on-air and engaging the failback logic

-- FOV CLR -- Force a failback to occur, putting the primary input on-air and engaging the

normal failover logic. Note: if the failover function is defeated by setting the failover time to 0.0, this command will not cause it to become activated.

The corresponding GPI ports issue reports using this same syntax. Whenever a preset is selected by any means, GPI 2 will issue a “SEL <preset name>”. When the primary input is changed by any means, GPI 3 issues a “PRI <src>”, and likewise for the secondary input with “SEC <src>”. If a failover occurs, GPI 3 issues a “FOV SET”; if a failback occurs, it issues a “FOV CLR”. These reports are sent to any client monitoring the GPI port using standard LWRP procedures; see the LWRP documentation for more information. Note that these clients will also see reports of the same changes issued in the pin-based protocol at the same time.

