VOICE 1

MULTI-FUNCTION DSP VOICE PROCESSOR/CONTROLLER

VOICE 1

INPUT
EXPANDER
DE-ESSER
COMPRESSOR
OUTPUT

BACK

+48V   LINK

AUDIOARTS ENGINEERING

Multi-Function

DSP VOICE Processor/Controller

TECHNICAL MANUAL

Wheatstone Corporation

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VOICE 1 Digital Mic Processor Technical Manual 1st Ed.

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Attention!

Federal Communications Commission (FCC) Compliance Notice:

Radio Frequency Notice

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

> ⚠️ **This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.**

This equipment must be installed and wired properly in order to assure compliance with FCC regulations.

Caution! Any modifications not expressly approved in writing by Wheatstone could void the user's authority to operate this equipment.

$C \epsilon$ (RoHS Compliant · 2002/95/EC)

General Information

**A Brief History of Audioarts
and Wheatstone Audio Processors**

Wheatstone was originally founded as Audioarts Engineering and spent its early years designing custom audio processing and mixing products for the music and entertainment industries. An Audioarts product's high quality, exacting attention to detail, and unsurpassed audio performance and reliability drove an ever-increasing demand for a wider variety of its products.

Audioarts products are designed and manufactured by its parent company, Wheatstone Corporation, and are designed and built to the same rigorously high standards. Research and development, manufacturing, testing, and quality control are all accomplished in Wheatstone's large state-of-the-art facility in the historic city of New Bern, North Carolina.

Our design and manufacturing processes operate together to retain complete control over all facets of product creation. From the birth of a product idea to the shipping of the finished product to customers, everything happens in house. Further, by not relying on any offshore manufacturing Wheatstone remains true to its pledge of "Made in the USA".

A dozen experts with deep experience in Digital Signal Processing, broadcast audio and other highly technical engineering disciplines make up our audio processing team. Led by audio processing specialist and broadcast engineering veteran Jeff Keith, the team combines their creative skills to design and build audio processors that achieve a higher standard for on air sound quality.

Our new Voice1 voice processor takes our ever-popular M-1 and updates it to combine the very latest audio processing and audio transport technologies into a compact half-rack, 1RU enclosure. Equipped with our SQ (Super Quiet) microphone preamp, high gain pre-amplifier, WheatnetIP and AES67 audio transports, remote GPIO capability and analog, digital and AOIP audio outputs, Voice1 is right at home in any studio. The included factory presets give any user great "Hear by Example" starting places for creating their own sound with on board storage for up to 100 user presets.

Each Audioarts and Wheatstone Audio Processor can be remotely controlled by a Windows® software-based Graphical User Interface. In addition, carefully crafted factory presets ensure that our audio processors can be placed into use quickly, in any size market, and with a minimum of effort – a PhD in audio processing is not required!

With thousands of our audio processors now in the field we cordially invite you to take a look at our new Voice1 microphone processor. It'll turn any voice and any microphone into that 'big gun' sound sought by pros and amateurs alike!

Before You Begin:

Included with your Voice 1 package is a document containing a web link and a QR code. You can scan the code or enter the link into your computer to be directed to a location on our website from which you can download this Quick Start, the Voice 1 manual and the Voice 1 Remote Application, which you will need in order to fully configure the Voice 1's EQ and Dynamics.

Pre-Installation Notes

- If using the rack mount kit (available from Wheatstone), the VOICE 1 Microphone Processor should be mounted in a well-grounded equipment rack using at least two, and preferably four, rack screws. When only two screws are utilized they must be installed in the two bottom holes in the VOICE 1 front panel rack ears in order to prevent undue twisting and distortion of the front panel.

- If the VOICE 1 is installed in a rack containing heat-generating equipment, particularly when it is installed above such equipment, one rack unit (1-3/4") blank rack panel should be installed above and below the VOICE 1 in order to aid natural convection cooling.

- The VOICE 1 should be connected to a source of clean AC power. If local power has a history of being unstable, it is wise to incorporate an Uninterruptible Power Source (UPS) in the AC power feed to the VOICE 1[*].

- In facilities with a history of damage or surges from lightning or other sources, it is wise to incorporate a good quality AC line surge suppressor in the VOICE 1 power feed.[*]

- Audio connections to the microphone input should be made with a high quality shielded microphone grade cable. The cable shield should be terminated at both ends of the cable to the XLR connector's Pin #1. We do not recommend the use of unbalanced connections at the VOICE 1 input.

- As far as signal input polarity is concerned, the XLR Pin #2 is "hot" and the VOICE 1 does not invert the phase of the audio.

[*] As with all computer- or microcomputer-based equipment such as the VOICE 1, clean and surge-free AC power is a must. Otherwise unpredictable and hard to identify issues may arise with the operation of that equipment, including but not limited to equipment damage or the corruption of important data.

VOICE 1
Digital VOICE Processor
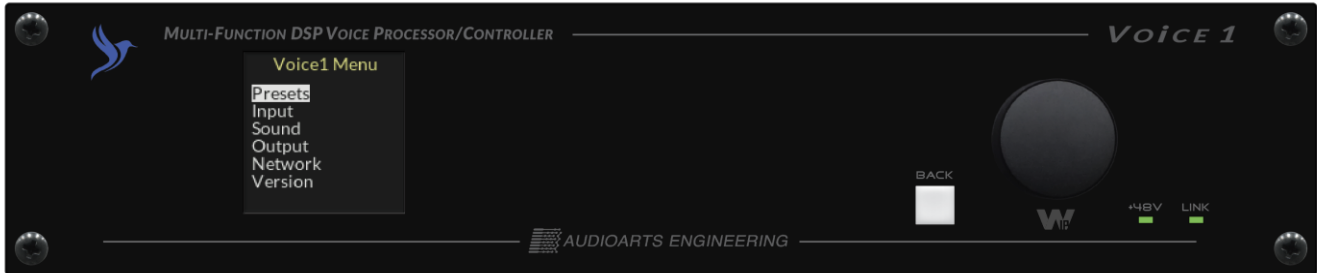
Getting Started

Before you start setting up your new Voice 1 processor, please inspect the contents of the package to ensure that the following items are present:

- AudioArts VOICE 1 Unit   - Qty 1

- AC Power Cord   - Qty 1

- Software and Documentation Download Sheet   - Qty 1

The Software and Documentation Download Sheet includes a QR code that you can scan with your phone or laptop, as well as a URL that you can visit to download the latest version of the manual, Voice 1 processor software and configuration GUI. Save this sheet in case you need to re-download the software or manual at a later date. For convenience, the QR code and link are included here:

URL Link: https://wheatstone.box.com/v/VOICE1processor

QR Code:

Install and connect the VOICE 1:

The Voice 1 is a half-width, 1RU device and may be rack mounted using a single- or dual-mount rack panel, available from Wheatstone. It may also stand alone or sit on an industry-standard rack shelf. If using a shelf or rack mount, you may install it using only two screws as long as the screws are installed using the bottom holes of the shelf or rack mount to prevent undue stress on the panel.

Rear Panel Connections

All audio input and output, control, Ethernet, and power supply connections are made via various connectors mounted on the VOICE 1's rear panel. One XLR connector is provided for mic input and two RJ-45 connectors are provided for analog and digital outputs, utilizing the Studio-Hub wiring convention (illustrated below). Two more RJ-45 connectors are provided for GPIO control and Ethernet connections. The pinout drawings below summarize all wiring connections.

Connect a microphone to the XLR female microphone input on the rear panel.

Connect either the analog out or AES digital out RJ-45 connector to your desired signal path. If using the Analog output, select whether you wish the output to be presented at line level or mic level. Wiring follows the StudioHub standard.
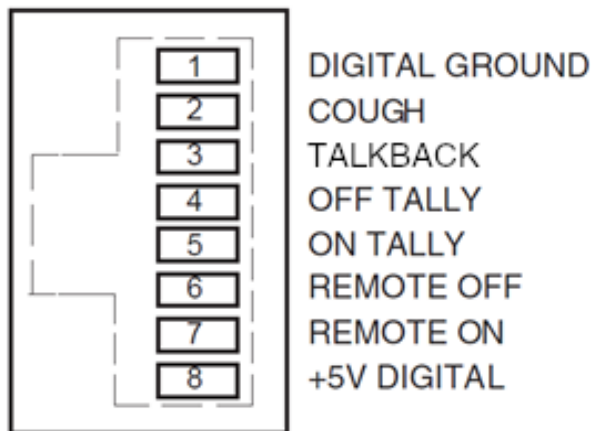
Mic In
XLR-F

PIN 1 XLR SH - MIC IN SH
PIN 2 XLR HI - MIC IN HI
PIN 3 XLR LO - MIC IN LO
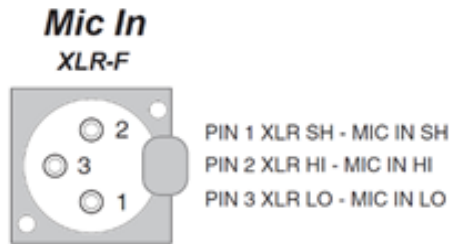
Analog and AES RJ-45

AUDIO WIRING	
RJ45 PIN (WIRES*)	SIGNAL
1 (WHT/ORG)	LEFT + / AES +
2 (ORG)	LEFT - / AES -
3 (WHT/GRN)	RIGHT +
6 (GRN)	RIGHT -
4, 5, 7, 8	UNUSED

* EIA/TIA T568B WIRE COLORS

RJ-45

Pin	Signal
1	DIGITAL GROUND
2	COUGH
3	TALKBACK
4	OFF TALLY
5	ON TALLY
6	REMOTE OFF
7	REMOTE ON
8	+5V DIGITAL

GPIO Connector

RJ-45

Pin	Signal
1	TXD+
2	TXD-
3	RXD +
4	N/C
5	N/C
6	RXD -
7	N/C
8	N/C
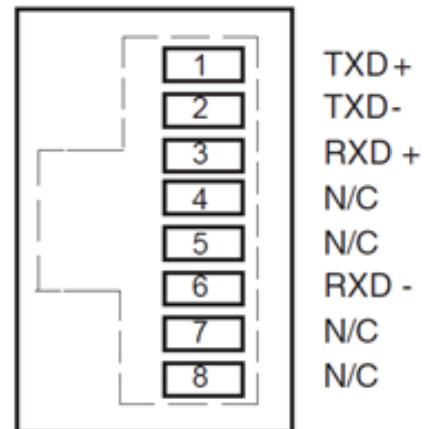
Ethernet Connector

Connect the rear panel Ethernet RJ-45 jack as appropriate for your intended use:

For direct connection to a PC running the Voice 1 Remote Application, connect your PC directly to the Voice 1 with a straight-through ethernet cable. For connecting into your Wheatnet LAN use a straight through ethernet cable from the Voice 1 to your Ethernet switch.

Connect the AC power cord to the VOICE 1 rear panel connector and then plug it into AC power. The VOICE 1 will power up.

Operating the VOICE 1 Locally

You may use the front panel encoder knob and button to make certain adjustments including setting or changing the unit's IP address, but the Remote GUI is required to fully control the processor.

Operating the VOICE 1 Remotely–Installing the GUI Software

For remote operation via the GUI software, download the VOICE 1 Remote Application GUI software from the link on the document provided with the unit and follow the steps below to install the software:

Right-click the installer file that you downloaded and select the option "Run as Administrator."
Check the box "I accept the terms of the License Agreement." The agreement that you are accepting is displayed in the window above the check box. Click "Next."
Observe the list of components that will be installed and click "Next."
The system will choose its own install folder, though you have the option to change it (not recommended). Click "Install."
The installation will complete and you can close the setup program.

To Control the Voice 1 Remotely

REMOTE ON — When taken low (connected to Digital Ground) activates the On Tally and simultaneously unmutes the VOICE 1 audio outputs. You must provide a momentary closure between Remote On (Pin 7) and Digital Ground (Pin 1) to latch the microphone audio ON. A user-supplied momentary contact switch is required.
REMOTE OFF — When taken low (connected to Digital Ground) activates the Off Tally and simultaneously mutes the VOICE 1 audio outputs. You must provide a momentary closure between Remote Off (Pin 6) and Digital Ground (Pin 1) to latch the microphone audio OFF. A user-supplied momentary contact switch is required.
COUGH — When taken low (connected to Digital Ground) temporarily mutes the microphone. You must provide a momentary closure between Cough (Pin 2) and Digital Ground (Pin 1) to temporarily mute the microphone. This is a non-latching mode so the microphone will unmute as soon as the switch is released. A user-supplied momentary contact switch is required.
TALKBACK — When taken low (connected to Digital Ground) temporarily connects the Voice 1 audio to the cue audio bus on the surface so that the talent at the microphone can talk directly to the board operator.

On and Off Tallies

ON TALLY — There is a continuous closure (via open collector) between On Tally (Pin 5) and Digital Ground (Pin 1) whenever the microphone audio is unmuted. This allows the microphone ON function to also control an on-air light or other "microphone on" indicator at a remote location.

OFF TALLY — There is a continuous closure (via open collector) between Off Tally (Pin 4) and Digital Ground (Pin 1) whenever the microphone audio is muted. This allows the microphone OFF function to also control a "microphone off" indicator at a remote location.

The ON and OFF tallies can be used to control externally powered tally lights or other functions that require a continuous closure to function. External tally lights (such as LEDs) can be powered from the tally output by connecting the external LED anode to +5V Digital (Pin 8)[*] and the external LED cathode to the On Tally port (Pin 5) or Off Tally port (Pin 4).

[*] An appropriate current limiting resistor must be used so that current drawn from Pin 8 does not exceed 30 milliamps.

Configuring the VOICE 1 IP Address[1]

Once the GUI has been installed you must configure it and the VOICE 1 so that they can communicate with each other. This requires configuration for both the VOICE 1 and the remote GUI so that they agree on the networking parameters.

The default IP address of the Voice 1 is **192.168.87.231**. It's possible that you have a Blade or PC driver in your system using that IP address and you don't want to plug the Voice 1 into your Wheatnet network and cause an IP address conflict, so please take the time to ensure that there won't be a conflict or change the IP address of the unit before joining it to your network.

The IP address can be changed from the front panel of the unit. Turn the encoder knob to the "Network" setting and press the knob. This will put you into the IP address set mode. Turn the knob to highlight "IP Address" and press. Now you can turn the knob to change each octet of the IP address, pressing it to save your settings. When all four octets are set correctly, proceed to verify or change the subnet mask and gateway. The MAC address of the unit is also displayed on this screen, but this is set at the factory and cannot be changed in the field.

[1] The VOICE 1 does not support DHCP (Dynamic Host Configuration Protocol) and therefore requires a static TCP/IP address on the network. Its presence on the network will not interfere with DHCP addressing of other network connected devices as long as the IP address that is configured for the VOICE 1 does not conflict with the address of any other device on the network. Please consult your friendly IT manager if necessary.

Now that the VOICE 1 has its own TCP/IP identity, we must configure the GUI so that it can talk to the VOICE 1. This is done by adding "devices" to the list of VOICE 1s that the GUI knows about. To do this, locate and click on the "Devices" button that is located along the right side of the GUI (outlined in red in the screenshot):
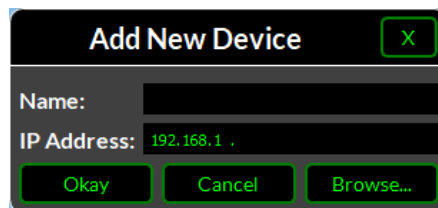
Voice 1 Remote GUI Main Screen

When this is done, the following window will pop up:
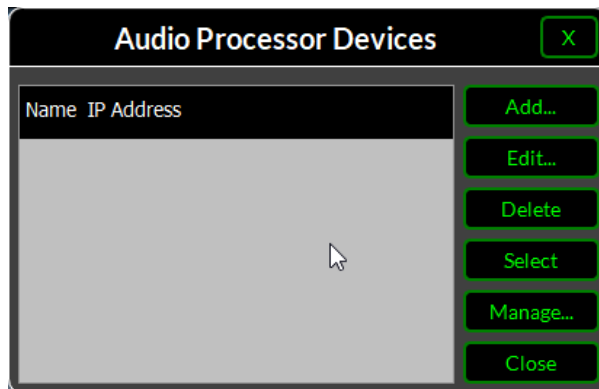
Voice 1 Device Management Window

Next, click the "Add" button and a new dialog box will appear. This is how new devices are added or the configuration of existing devices modified.

Add Device Window

Enter a unique nickname for the Voice 1 unit you are adding and enter its IP address. Please don't use any leading zeroes in the IP address field. Click OK. Now highlight the unit you just entered and click on Select (this step tells the GUI specifically which VOICE 1 you want to connect to):
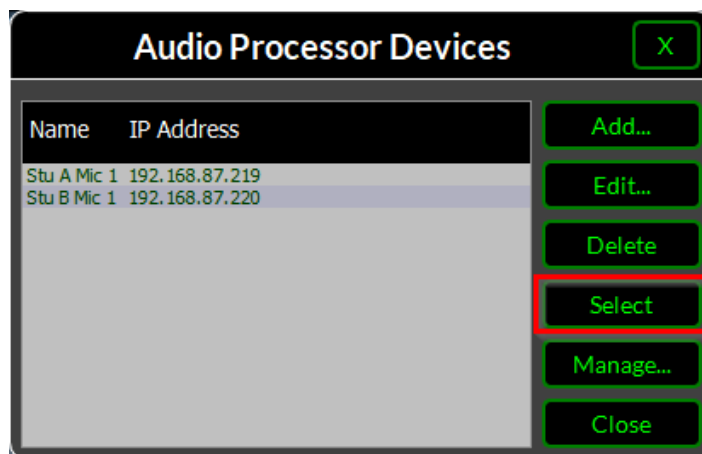
Device Management Window

The above dialog shows we have added a new device called "Stu B Mic 1", noting that there is already a configured device showing in the Devices dialog box called "Stu A Mic 1."

Next, take a look at the top of the GUI where you'll find the Status and Device indicators. The status indicator tells you whether you are "Online" with the device listed in the Device field. To go online with the processor so that you can make EQ and dynamics adjustments, click the button to the left of the Status indicator. A successful connection will turn on the green light and change the Status indicator from Offline to Online.

Online, Status and Device Indication

In the Status window you may see the message "Trying" as the GUI is handshaking with the VOICE 1. Once the handshake is complete and communication protocols are locked in the Status message should revert to "Online".

If for some reason the GUI cannot connect with the VOICE 1, the "Trying" status message will remain and will occasionally blink as the GUI retries the establishment of a connection. Under these circumstances the configuration of the GUI and VOICE 1 should be carefully examined to ensure that the destination TCP/IP address is consistent between the two. It might help to go to the Device Edit screen and completely remove the IP address you entered, then re-enter it using the "period" key on your computer keyboard to separate the octets as you enter the address (again, no leading zeroes).

Input/Output Screen

To adjust the on-screen encoder knobs, you can click on the knob with your mouse and use a rotating action around the knob while the mouse button is held, but it's much easier just to hover your mouse over the knob and use the center wheel to "turn" the knobs.

There are several input/output options available on this screen.

Input Gain Set this to an appropriate level for the microphone or other device you are using with this Voice 1 processor. Input Gain ranges from -10 to +70 dB in 1 dB steps. Note that this is the amount of gain applied to the input before any EQ or dynamics are applied. For a microphone you will probably want something in the +40 to +50 dB range. Defaults to +20db. The fine resolution of the input gain control is more than sufficient to meet the most demanding professional installation. The input gain is high enough and the preamplifier architecture quiet enough to be used with microphones having the most infinitesimal output level.

Phantom Power Turn on if needed. It is off by default.

HPF (High Pass) Freq In most applications it is usually desirable to limit the low frequency response of the microphone to minimize signals which are not related to the desired signal. The Voice 1 provides a sweepable high pass filter to enable rolloff the low frequency response as desired by the user. The lowest frequency of the control is 20Hz, while the highest possible setting is 1kHz. Many typical voice applications will have the HPF set somewhere around 100Hz or perhaps slightly lower. Special applications or special effects will have the control at other settings.

The High Pass Filter is an 18dB/octave linear phase design.

LPF (Low Pass) Freq Some intentional rolloff of the upper extremes of the audio spectrum is usually desirable in voice applications in order to reduce out of band noise. Since reduced bandwidth results in reduced noise levels, the microphone source can sound "cleaner" than it otherwise would if low pass filtering were not employed.

Depending on the setting of other controls, low pass filtering may also be effective at reducing or avoiding high frequency feedback when microphones are operated near speakers carrying the microphone's signal. Typical applications will see the LPF set somewhere below 20kHz, sometimes as low as 10kHz or perhaps even lower depending on the application, the microphone being used, or the artistic desires of the talent or
engineer. The minimum frequency setting is 1 kHz and the upper limit is 20kHz.
The Low Pass Filter is an 18dB/octave linear phase design.

Output Gain Set the output gain of the Voice 1 to the desired level to feed your system. Output Gain defaults to 0dB. This control sets the output gain for the analog, AES3 and AES67 outputs simultaneously. The range of the control is -80dB to +18dB in hald dB steps about -60, and one dB steps below -60.

Streaming The Voice 1 can be used as a standalone voice processor, as part of any AES67 audio system, or it can be used as part of your Wheatnet network audio system. On the In/Out screen you will select whether to enable WNIP or AES67 streaming. Setting this to WNIP will cause the Voice 1 to generate the standard .25 ms packets native to Wheatnet. Setting it to AES67 will produce AES67 1 ms packets. This setting can be used with any AES67-compliant system including Wheatnet. (If you use this setting in a Wheatnet system, the system will receive 1ms packets which have additional latency compared to the .25 ms packets normally used in the Wheatnet ecosystem.)
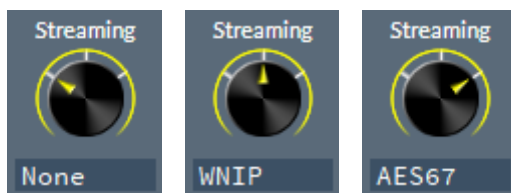
Setting the Streaming control to "None" will disable the stream transmitter so no packets are sent out through the unit's ethernet interface. If you plan to use the Voice 1 as a standalone mic processor to be interfaced with an analog or AES3 console or mixer, you should choose this option.
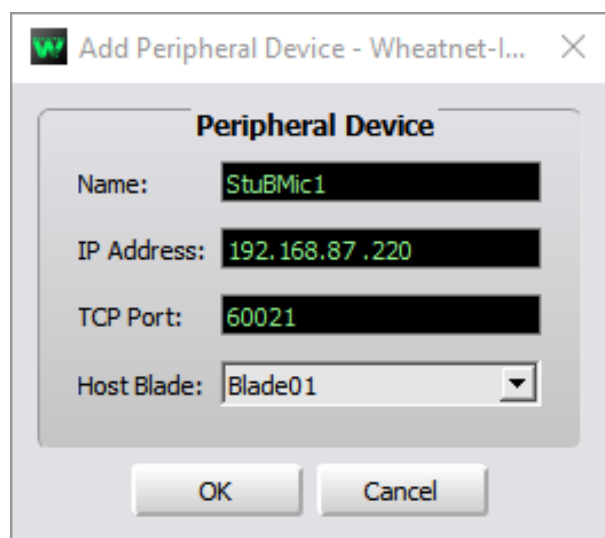
If you are using the Voice 1 as part of your Wheatnet system, enable the WNIP stream option on this screen. You will also need to add the Voice 1 as a Peripheral Device. This is done in Navigator. From the Devices | Peripheral Devices tab, select the Add button and give the new Voice 1 an identifying name. Enter its IP address (leave the TCP Port field at the default value unless you know for certain you should change it) and select a host blade. Click OK. The device should appear in the device list with a green light.

In WNIP Streaming Mode, two new items open up on the INPUT/OUTPUT screen: These are **WNIP Settings** and **WNIP Status**.

WNIP Settings Only one control appears under WNIP Settings. This is the GPIO Mode setting. Options are Internal and WNIP LIO. GPIO settings were discussed in the section XX Operating the Voice 1 remotely. This setting allows you to choose whether the GPIOs are to be received by the rear panel RJ45 GPIO connector (Internal) or through the Wheatnet network (WNIP LIO).


WNIP Status The WNIP Status item shows the IP address of the host blade and the sample rate (this is not adjustable here; rather it comes from the Wheatnet clock master blade.
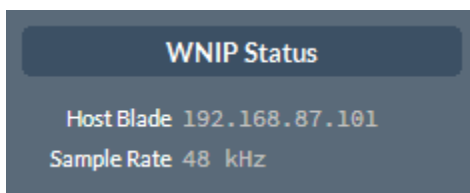
WNIP Status

AES67 Streaming Mode If you need a 1ms AES67 stream for use with a non-Wheatnet device, turn on the AES67 Streaming option. The device will no longer be syncing to the Wheatnet metronome, but rather to your AES67 PTP Grandmaster Clock. The Voice 1 Remote App will present you with the information you need to configure the receiving AES67 device including the assigned multicast address, port number and packet type you will need to enter there:


PTP Locked	**PTP Unlocked**
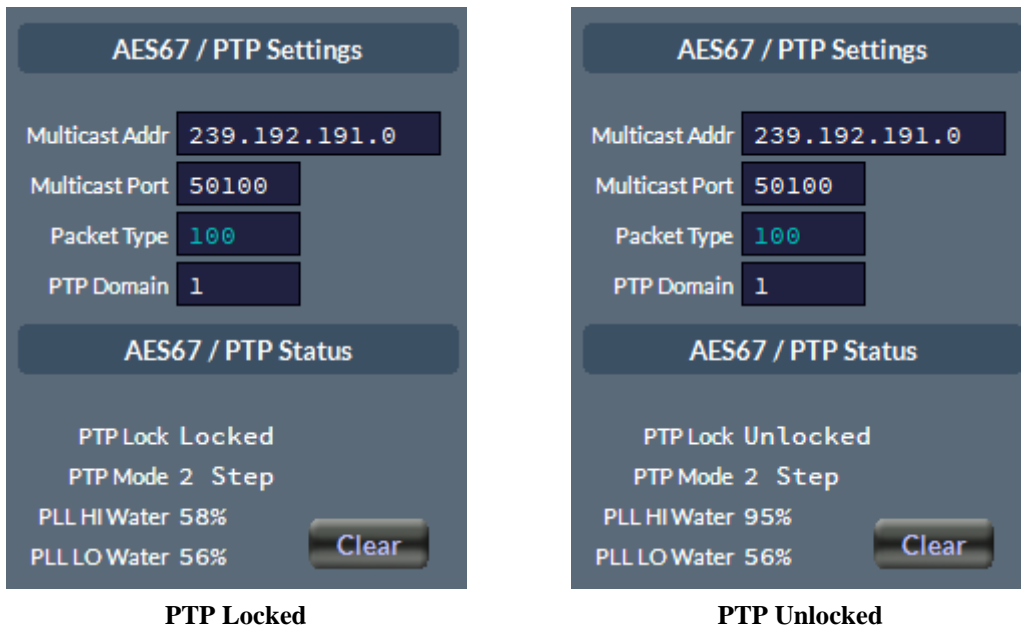
When using AES67, some issues with poor audio can be traced to PTP clocking. Therefore, we have included some basic diagnostics that can help you troubleshoot problems with PTP master clocks.

In the screenshots above, the left image shows a PTP Status of Unlocked and the right one shows a status of Locked. This simply indicates whether your Voice 1 is synchronized to the PTP clock signal.

The Mode will either be "1 Step" or "2 Step." This is a function of your Grandmaster clock and doesn't indicate anything about the quality of your Grandmaster clock and simply refers to how the PTP event messages are timestamped. Your clock's operating mode is detected by Voice 1 and reported here. If you have issues and require assistance from Wheatstone Tech Support, we may ask if your clock is a 1 Step or a 2 Step clock.

The HI and LO Water marks accumulate over time and help to indicate the stability of the clocking system. This is dependent not only on the clock itself but also the network traffic and switches. In the "Locked" screenshot above, those two numbers are relatively close to each other. This is what we would expect to see in a high-quality PTP Grandmaster clock and a well-designed network. The numbers represent the largest and smallest amounts of deviation between clock ticks.

A poorly-designed or malfunctioning clock might have a large gap between the HI and LO Water mark numbers. See the screenshot below.
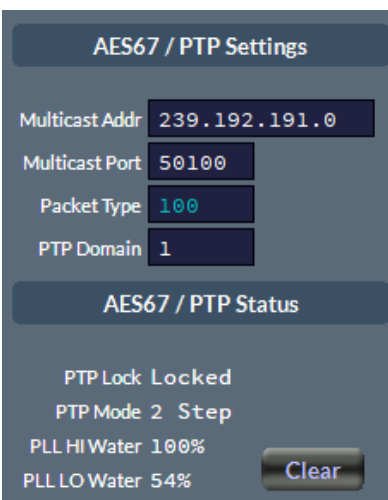
**Wide Variance Between
HI and LO Water Marks**

When troubleshooting audio issues, a check of the clock stability is in order. Look at the HI and LO water marks and note the numbers. Press the Clear button on the PTP Status in order to reset water marks. Then watch to see that they stay relatively close to each other. A wide variation might indicate that your unstable clock could be the cause of the audio problems.

If you are just using the Voice 1's AES or Analog outputs, you can turn the streaming off. In this case the Sample Rate setting will appear. Set it to the desired sample rate.

Input/Output Screen with Sample Rate

AES Out Mute There are three options:

- No Mute – Both left and right channels of the AES3 digital output carry the monophonic audio output of the VOICE 1.
- Right Mute – Only the left channel of the AES3 digital output carries the monophonic audio output of the VOICE 1.
- Left Mute – Only the right channel of the AES3 digital output carries the monophonic audio output of the VOICE 1.

These modes are useful when it is desired to route and then mix two VOICE 1 signals into one digital stream.

Dynamics Screen

The Voice 1's Dynamics Screen consists of three sections: the Expander, the De-Esser and the Compressor. On the left side of the screen are radio buttons to enable/disable each of these dynamics functions. The radio button is yellow when the function is enabled.
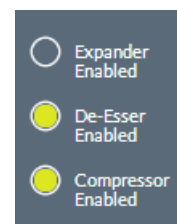
Expander

Sometimes called "downward expansion," or "noise gate," its purpose is to reduce the output signal once the input signal has fallen below a chosen threshold. It is commonly used to "gently" turn down an input signal when there is no input present or when it is too low to be useful.

Typical expander uses include suppression of room noises from open microphones, reducing prominent breath noises in speech, and muting of noise on a low-quality codec connection.

Depth The maximum amount that the expander is permitted to reduce the output signal level when the input signal level falls below the Expander Threshold. Typical users will have this control set between 10dB and 16dB. The full range of the control is from 0dB (no expansion) to 40dB.

Threshold Controls the input level below which the automatic attenuation will start to take effect. This control is adjusted to taste, and ranges from -60dB up to 0.

Close Close is the rate at which the expander circuit attenuates the output signal once the input signal has fallen below the threshold. This control is adjusted to taste, and ranges from 50 milliseconds to 3 seconds.
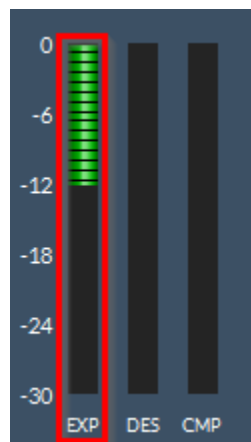
Metering This bargraph meter indicates gain-reduction being applied to the signal by the expander.

Expander Operating Hint Almost always, the trick is to carefully set the threshold of the expander below where it starts to attenuate the input signal—basically high enough to capture the noise, but not too high as to snatch at the lower levels of the voice as this can make the operation of the expander "obvious," a generally undesired result.
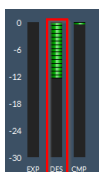
De-Esser

The de-esser is a dynamic equalization section designed to automatically restrict the output level within a chosen frequency range depending on the signal level. The basic idea is to dynamically restrict the sometimes prominent and objectionable sibilant "hissy" noises in speech, particularly if poorly recorded or subject to poor microphone technique. It should be noted that not all voices require de-essing. There are three operating controls involved.

Frequency Adjusts the frequency where the de-esser is most sensitive. With few exceptions, most human speech sibilant artifacts fall between 4kHz and 6kHz, although we've allowed the control to be adjustable over the entire 20Hz to 20kHz audio bandwidth so that it may also be used for special effects.

Threshold This is the signal level within the de-esser's selected bandwidth (as set by the Frequency control) at which the de-esser constrains the output level within the de-esser's bandwidth. In other words, a signal within the de-esser's frequency band will not be allowed to exceed this threshold level. The threshold is adjustable over the range of -60dB to -10dB, and controls the amplitude where the de-esser begins to take effect.

Release Release, or "release time," is the control that determines how fast the de-esser returns the gain to normal after chasing a sibilant sound in voice. Faster release times are less audible than slower ones, which may under certain circumstances "punch holes" in the audio—an obvious reduction in output level for a time longer than was necessary to actually process the event that was controlled. Release can be varied from 50mS to 500mS.

Metering The bargraph meter shows the instantaneous gain reduction occurring in the de-esser and can display a maximum gain reduction of 30dB.

Compressor
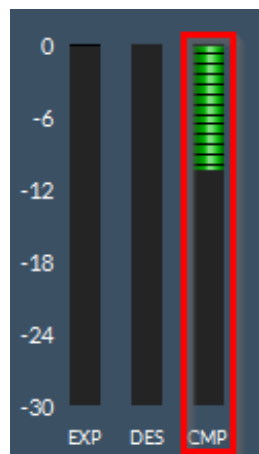
The compressor is an envelope dynamics modifier that controls the overall voice energy from the VOICE 1 (not to be confused with the Output control!).

This stage compresses the dynamic range of voice signals, making soft sounds louder and loud sounds softer. With proper adjustment it can create a consistent output level from a talent's voice and can do it subtly—or it can do it with a lot of "energy" if that is the sound desired. Essentially, the compressor allows the overall volume of the sound to be tailored to taste while the input level naturally varies as the talent speaks.

The VOICE 1 compressor is a broadband feed forward architecture utilizing special program-related dynamics control algorithms specially designed by AudioArts. There are only four operating controls plus an IN/OUT switch, making compressor operation easy and intuitive.

Attack This control determines how quickly the compressor responds to a signal exceeding the threshold. The control is adjustable between 0.2 milliseconds and 1 second and is adjusted to personal preference. Faster attack times catch signal peaks more quickly but may make the sound "mushy" and without detail. Operation at faster attack, below approximately 10 milliseconds, causes the compressor to operate more like a peak limiter than an average responding compressor. Conversely, slower attack times allow more peaks to escape uncontrolled, making the sound more relaxed. The caveat is that slower attack times allow peaks to escape that might cause problems further downstream.

Threshold Threshold is the signal level at which the compressor begins to constrain the output level. A signal exceeding this level will have its gain reduced in a manner determined by the Ratio control (see below). The threshold is adjustable over the range of -50dBFS to -10dBFS (decibels Full Scale). More negative setting cause gain reduction to begin at lower audio levels, while higher (less negative) settings cause gain reduction to begin at higher audio levels.

Release This parameter determines how fast the compressor returns the gain back to normal after chasing an audio peak. Faster release times increase the average audio energy but might sound "busy" if too fast. Slower release times make the sound more natural and relaxed, but lower the average sound level. Release time is adjustable between 33.0 milliseconds and 1 second.

Ratio The Ratio setting controls the steepness of gain reduction once the audio has reached the Threshold. A ratio of 1 (or 1:1) results in no compression at all, and at the other extreme a ratio of 20 (or 20:1) makes it operate more like a limiter. In the latter case, once the threshold is reached the output level of the compressor will only increase 1dB when the input level increases 20dB. The ratio control, while adjusted to taste, will typically be set somewhere between 3:1 and 6:1 for most voices. Special effects of course may call for radically different settings.

Metering This meter indicates gain-reduction being applied to the signal by compressor, from 0dB to -30dB.

Compressor Release Time Operating Hint

While the compressor's attack time and ratio are typically adjusted to provide peak protection for equipment following the VOICE 1, the setting of the release time control is largely an artistic decision. Please allow us to offer three of the most common caveats of operating a compressor with extremely fast release times.

- A very fast release time increases the amount of intermodulation distortion, or IM. This is because when the compressor release time is set fast enough to "follow" every cycle of a low frequency signal, the lower amplitude higher frequency signals "go along for the ride." This results in modulation of the high frequencies by the low frequencies, or intermodulation.[*]
- A very fast release time exaggerates reverb, whether artificially created by electronic or electromechanical means, or due to the natural early sound reflections from the hard surfaces of the room where the microphone and voice talent are located.
- A very fast release time accentuates of the speaker's breath sounds or other unwanted background sounds that would otherwise be inaudible.

[*] The sound of intermodulation distortion ranges from a subtle "thickening" of the sound, to downright muddy or even "gurgling" audio at the extreme.

Equalization Functions

Parametric EQ The VOICE 1 equalizer section has two identical fully parametric equalizers. It also has two shelving filters at the audio band frequency extremes that may be used as desired to shape the overall frequency response.

The two parametric sections are fully adjustable in three ways—center frequency (20Hz-20kHz), bandwidth (0.2 to 3 octaves), and boost/cut (plus or minus 14dB).

The high and low shelving filters can be adjusted from 2kHz to 20kHz and 20Hz to 200Hz respectively, with +/-14dB of boost or cut. These filters are further described on the following pages.

The graphic below shows how equalizer settings are depicted in the Dynamic Display region of the GUI. As you make changes to boost/cut or frequency settings, you will see them reflected in this display.
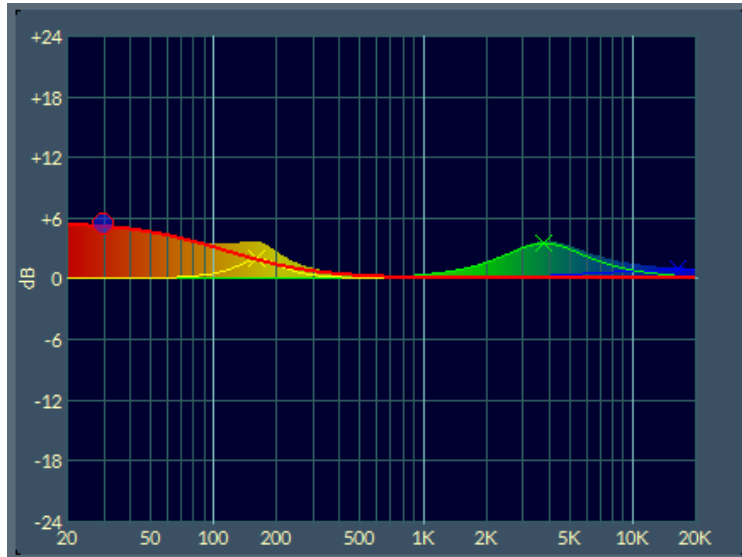
Graphic representation of EQ settings

EQ Enabled When this button is illuminated the equalizer section is switched in. When it is not illuminated the equalizer section is not in the signal path. The button has a toggle action behavior – pressing it changes the state of the EQ IN function.

EQ PreComp When this button is illuminated the parametric equalizer is inserted into the signal path prior to the compressor stage. When the button is not illuminated the equalizer is inserted into the signal path after the compressor.
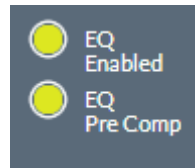
Why? Completely different processing textures may be designed by the user by placing the parametric equalizer stage where it creates the intended artistic effect.
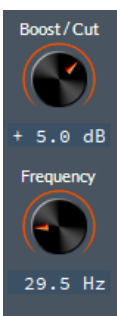
Low Shelf Equalizer This is a second order type with adjustable Frequency and Gain adjustments, and behaves similarly to the "Baxandall" tone controls found on many types of common audio equipment.

The Low Shelf FREQ control is adjustable between 20Hz and 200Hz, allowing the turnover point to be placed precisely where it will do the most good. The Boost/Cut control allows the shelf gain to be set anywhere between 14dB of cut to 14dB of boost.

High Shelf Equalizer Like the Low Shelf Equalizer, the High Shelf Equalizer is a second order type with adjustable Frequency and Gain adjustments and behaves similarly to the "Baxandall" tone controls found on many types of common audio equipment.

The High Shelf FREQ control is adjustable between 2kHz and 20kHz, allowing the turnover point to be placed precisely where it will do the most good. The Boost/Cut control allows the shelf gain to be set anywhere between 14dB of cut to 14dB of boost.
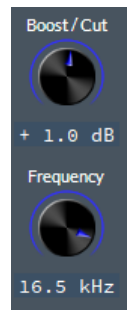
Scheduler Screen

Voice 1 includes a scheduling system that makes it easy to automate the switching of processing presets for various talent. For example, perhaps you have a morning show host who needs a little bottom boost and a fair amount of compression, but a midday host who has a natural booming voice. The same preset may not work for both talents so you can actually schedule the presets you have developed for each talent to be automatically applied just prior to the beginning of each show. You could then, if desired, have a more generic preset in effect for the rest of the day if your other announcers don't need specific EQ and dynamics settings.

In order for the automatic scheduling to work, please see the next section on the System screen for information on setting the Voice 1's internal clock.

Voice 1 Weekly Scheduler Screen

The Scheduler screen has two sections: Weekly and Long Term. The Weekly section is intended for scheduling preset applications that change during the week. The Long Term section is for presets that will take place on a particular date and stay in effect until changed.

Click on "Weekly" to see the various weekly presets that are scheduled to take effect at a glance. The screenshot above shows two presets "MaleVoice_1" and "BigShot_1" set for Monday through Friday at 4:58 AM and 9:58 Am respectively.

Voice 1 Long Term Scheduler Screen

Click on "Long Term" to see presets scheduled by date.

To schedule a preset to be automatically applied, choose either Weekly or Long Term and click the **Add** button. You will be presented with a window allowing you to select by day(s) or by date and time. Set the days or the date, highlight the preset you wish to be applied at that time and click the **Okay** button.
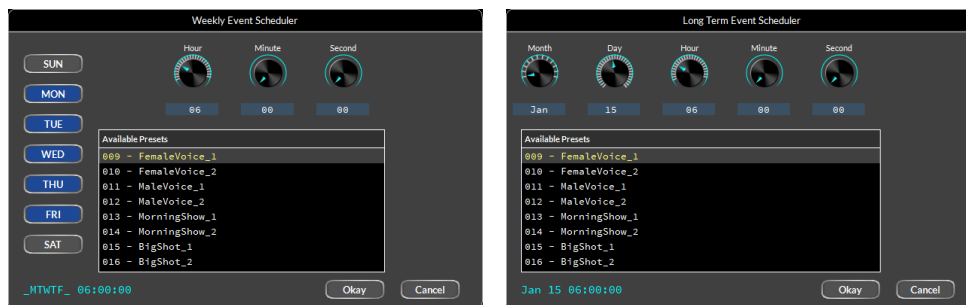
You can Add another event, edit an existing event or delete an even by using the appropriate red button.

System Screen

The Voice 1's System Screen contains a number of settings and some informational sections that will be helpful in the event you need technical support.

Processor Version If you require assistance from the Wheatstone Tech Support department, you may be asked for the "version" of software that is installed on your Voice 1 processor. Here is where you will find that important piece of information.


Processor Version Info Screen

Processor Status This section of the System Screen displays the operating temperature of the Voice 1's CPU, the current system date and time, the IP address of the unit and the MAC address of the Voice 1's NIC.
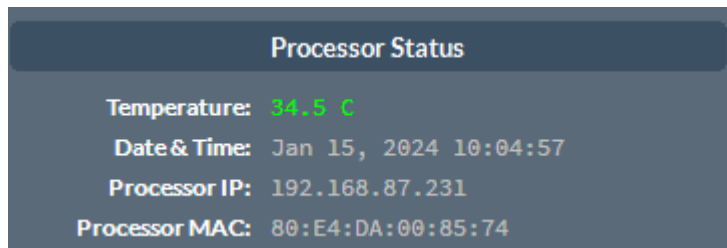
**Processor Status Info Screen**

GUI Version This section shows the version of the Voice 1 Remote GUI as well as the IP address of the NIC that is running the GUI. There is also a button labeled "Set NIC" that should be used to select which of the computer's NICs is connected to the Wheatnet Network.
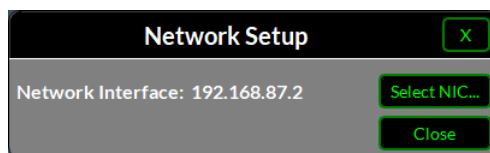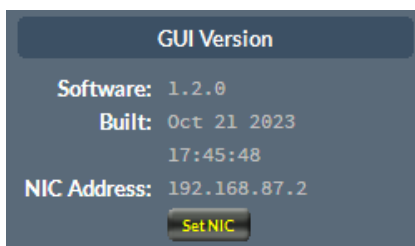
Miscellaneous This is where you will set the system time. As mentioned earlier, in order for Scheduled Presets to take effect at the intended time(s) and on the intended day(s), the system time will need to be set correctly.

There are two ways to set the system time. You can set it manually, or you can use the PC's clock to set the time for the Voice 1 automatically.
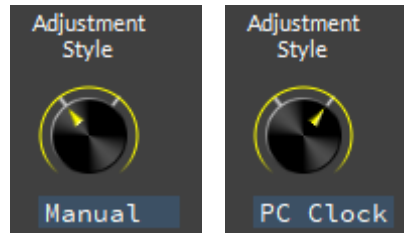
To set the clock manually, select Manual adjustment style, then select whether to use a 12-or 24-hour format. You can then use the dials to set the date and time to the exact second. When satisfied with your settings and the time you have preset arrives, press Okay to set the time.

To set the time and date from the PC's internal clock, select the PC Clock adjustment style and the 12- or 24-hour format, then press Okay to set the time. See screenshots below for the two time and date setting options.


The screenshot on the left shows the manual date/time adjustment screen. The one on the right shows the PC Clock time-setting method.

Security Voice 1 is equipped with a multi-layer security system which, when enabled, can be used to prevent unauthorized access to the Voice 1 hardware or remote access via the GUI software.

Remote Login

If a Remote Login password is enabled whenever a remote GUI attempts to connect to the Voice 1 hardware a password prompt will appear and unless the correct password is entered, Voice 1's hardware will refuse the connection.

Clicking on the Remote Login button will open the following dialog:
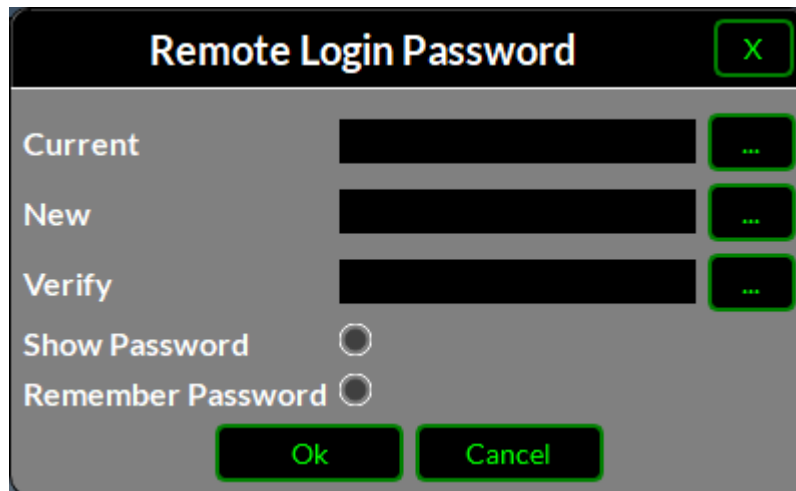
The Current Password field is only used if you wish to change or remove an existing password.

To change an existing password, enter it in the Current field, followed by entering the new password in the New and Verify fields.

If the Show Password option is enabled (highlighted), the passwords will be visible as they are entered.

If the Remember Password option is enabled (highlighted) the GUI will write the password to a hidden file on the PC running the GUI, and the password will be *automatically* entered the next time the GUI attempts a remote connection to LiON's hardware.

To remove a password, simply enter the current password followed by blank fields for those for New and Verify.

When all edits are completed in this dialog clicking the Ok button will cause LiON to store the information.

If the password is lost, Audioarts technical support can help gain access again noting that there is *no* master password *nor* is there a factory default password.
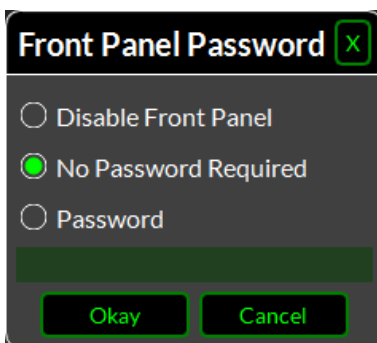
Front Panel Voice 1's front panel has built in security which, unlike the Remote Login which can use alphanumeric characters, is limited to four numerical digits (0-9) which allows 10,000 possible lock/unlock codes.

The front panel access code can be set using either Voice 1's front panel or through the GUI's Front Panel security button.

It is also possible to make Voice 1's front panel completely restricted by choosing the Disable Front Panel option. When this option is chosen, Voice 1 will only display metering on the front panel. There will be no option to gain entry using a front panel passcode.

To undo the disable front panel option or to delete an existing passcode, select the **No Password Required** option. When this option is in effect the front panel is wide open with no security.

If the Password option is chosen the shaded bar below Password will turn black and allow up to four numbers to be assigned as the front panel passcode. When Okay is clicked the dialog will close and all front panel passcode changes will immediately go into effect.

GUI Access This option allows you to set a security code that can lock the GUI controls completely out, or simply restrict making control settings changes or saving a preset (preset recall is not affected).
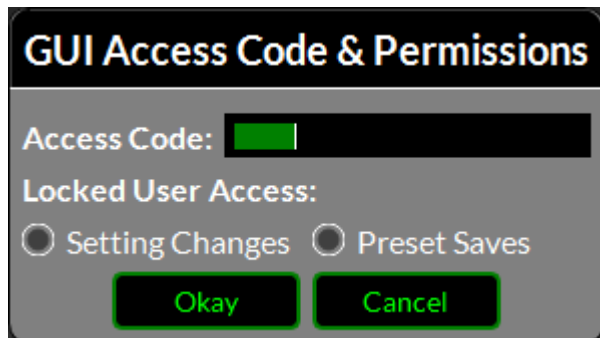
The access code dialog accepts four numerical digits, just like Voice 1's front panel.

If an access code is not assigned to **Setting Changes** and/or **Preset Saves**, those functions will not be restricted, however GUI Lock, covered next, will now function.

GUI Lock The GUI Lock feature enables the user to completely lock the GUI, and by locked we mean preventing access to *everything* except being able to *view* the GUI metering and the various GUI pages related to processing and other functions. Functions other than viewing will remain restricted until the correct passcode is entered in the GUI Access dialog.

Presets Screen Voice 1 ships with a number of factory presets that you can use as-is or as jumping-off points for creating your own presets. They are quite useful for demonstrating the extreme flexibility of the VOICE 1 Microphone Processor's features.

A preset is a snapshot of all the settings of the VOICE 1. It is desirable in many situations to have a library, or collection, of presets so that we can accommodate different audio processing needs at different times. As your library of presets grows, preset management (i.e., having presets arranged so that you can find the one you need as quickly as possible) is a major concern.

On thing can't be said often enough: if you dial up some settings that you like, **SAVE** the settings as a preset before you ever load in another preset or twiddle more dials. If you get something even better later, you can always go back and delete anything you have saved in the interim.

Three are three options on the Presets Screen:
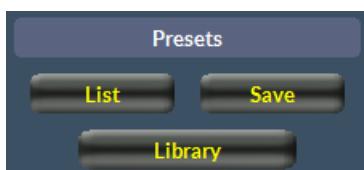
Click on the **List** button to see the presets in your Voice 1:

In the screenshot at right, only the Factory-installed presets are shown because no user presets have been saved yet. When this list is displayed, you can highlight any Preset and click the Okay button to "take" it, or you can double-click any preset in the list to take the preset. "Taking" a preset loads its settings into the Voice 1 immediately and will cause it to apply those settings to the microphone input signal. You will see the name of the preset in the "Current Preset" field at the top of the GUI. It will also be displayed on the front panel of the Voice 1.
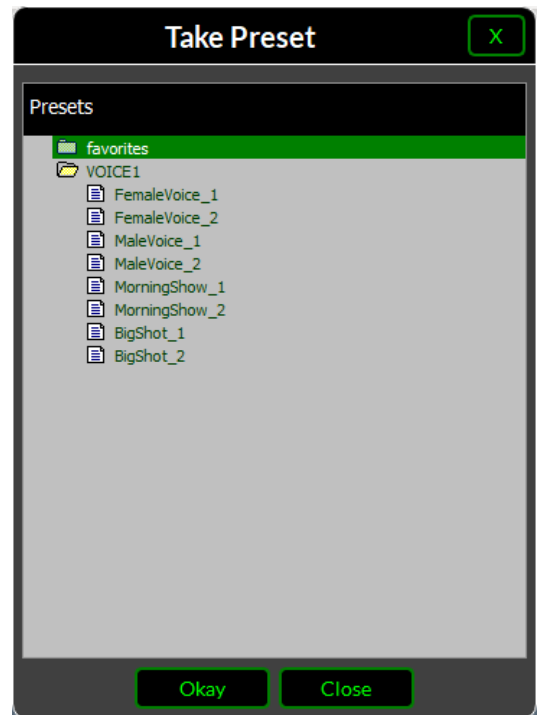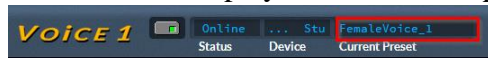
Once you have loaded a preset, you may decide to make changes to it to customize it for the intended voice. You can make your changes on the Dynamics and Equalizer screens and then use the Save button to save it as a Custom preset. Give it a descriptive name and select a custom preset slot in which to save the settings. (The system will suggest a name that includes the date, time and next available preset slot by default but you can change the suggested slot number and name as shown below.)
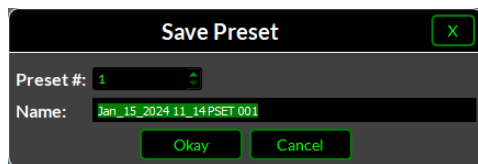
More On Presets At this point it is worthwhile to go into a little more detail about what a preset is. As stated earlier, a preset is a snapshot of all the settings on the VOICE 1. Presets are saved in a format that computer gurus call plain text. This simply means that the information can be read not only by a computer, but by a real human being as well. Presets are saved in a specific format in a text file having the extension .m1. If you were to read one of these files in a text editor such as Notepad++, you would see a list of the controls and how they are set for that particular preset. You could even use a printout of the text and enter the settings by hand into the GUI to recreate a particular setting.

Thankfully you don't have to do that. The VOICE 1 GUI is capable of saving your settings as presets with a few mouse clicks and keystrokes, and, as you've already seen, loading those presets into the GUI with a minimum number of mouse clicks. For the remainder of this document we will usually refer to both presets and preset files by the common name preset, with the context indicating whether we are referring to the presets themselves or the files that describe them.

There is another level of preset management that we will discuss in more detail later, and that is the preset package. A preset package is simply a collection of presets. When the GUI is used to create, or build, a package, what happens is that the data from a number of individual files is thrown together into a single preset package file, having an extension of .pkg. This allows you to transfer a group of presets from one VOICE 1 to another as a single file, rather than as a set of files. The preset package file is not

saved in plain text, so if you load one of them into Notepad you will not be able to read the settings of the individual presets. This file format is meant to be used only by the VOICE 1 GUI to transfer file preset collections between VOICE 1 units.

To manage your presets, use the **Library** button. Here you will find numerous functions related to the management of your presets.
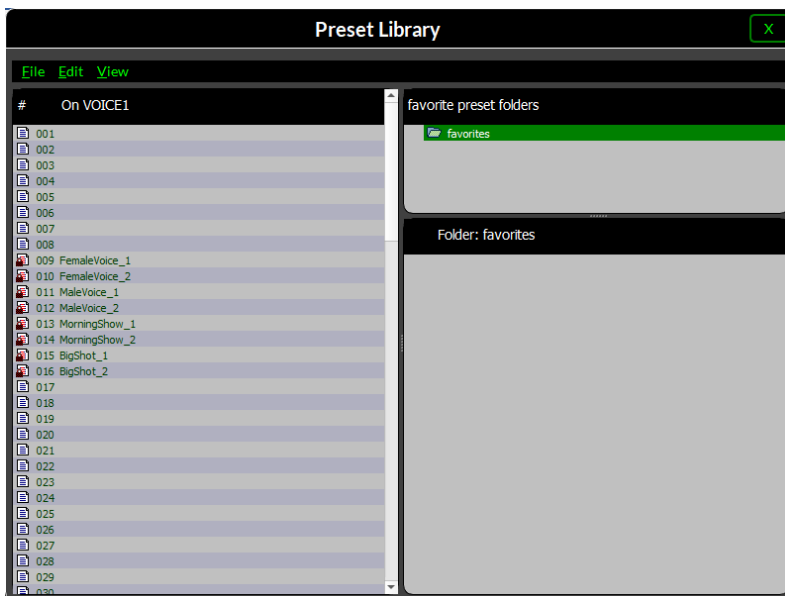
Voice 1 Preset Library Management Screen

The form shows preset folders in the upper right pane and individual preset files within the selected folder in the lower right pane. Presets loaded to the Voice 1 are shown on the left. The menu has various items depending on what you have highlighted in the upper or lower pane. From this dialog box you can take, save, rename, move, or delete presets, and you can also export and import preset packages. When you are done with this form, click the "**X**" in the upper right corner to close it. You will need to close this form before you can adjust any GUI controls.

File Menu

The File menu contents depend on whether you have a folder or preset highlighted. The following choices are possible if a folder is highlighted:

New Folder This selection brings up the "New Folder" dialog box, allowing you to create a new sub-folder within the folder you have highlighted. Enter the name for the new folder, then click the OK button. Click Cancel if you change your mind before you're done.

Install Preset Package This selection brings up the "Install Preset Package" dialog, which is a standard Windows Open dialog box. The dialog looks for files of type "Preset Packages (*.pkg)" and starts its search within the VOICE 1 install directory. A package thus imported appears in the Presets dialog box as a new package folder under favorites, having the same name as the .pkg file but without the extension. The package folder appears as a folder but has a light red coloring within the icon to distinguish it from a standard folder icon. It is possible, but not necessarily recommended, to install the same package twice

(or a second package with the same name as the first). The second import will have the same name as the first with the addition of the text " (2)."

Build Preset Package This selection brings up the "Build Preset Package" dialog, a standard Windows Save dialog box, allowing you to save all of the presets in the highlighted folder (this does not work for the default favorites folder which is "special," but works for folders you have created within it), as well as any sub-folders and their enclosed presets, as a file of type "Preset Packages (*.pkg)". The default file name, which you can change, is the name of the highlighted folder with the extension .pkg added to it, and the default location to save the file to, which you can also change, is the VOICE 1 install directory.

The following choices are possible if a preset is highlighted:

Take This selection takes the preset, just like double-clicking a filename in the "Take Preset" window.

Print This selection brings up a standard Windows Print dialog box, allowing you to print out the settings for that preset.

Edit Menu

The Edit menu contents also depend on whether you have a folder or preset highlighted. The following choices are possible if a folder is highlighted:

Copy This selection copies all presets in the highlighted folder, but not in any sub-folders, to the clipboard.

Paste This selection pastes the clipboard contents (one or more presets) into the highlighted folder. Important: there is no overwrite warning! If the highlighted folder already contains a preset of the same name as one being copied, the one from the clipboard will overwrite the one currently in the target folder.

Delete This selection deletes the highlighted folder after first asking if you are sure this is what you want to do. This menu item is grayed out if you have the top level favorites folder highlighted; you can't delete this special folder.

Rename This selection brings up the "Rename Favorite Folder" dialog box, allowing you to rename the folder. Enter the new name for the folder, then click the OK button. Click Cancel if you change your mind before you're done. This menu item is grayed out if the highlighted folder is really a preset package. It is also grayed out if you have the top level favorites folder highlighted; you can't rename this folder.

The following choices are possible if a preset is highlighted (please note that use of the Shift or Ctrl keys allows you to select multiple preset files for the following operations):

Copy This selection copies the highlighted preset(s) to the clipboard.

Paste This selection pastes the preset(s) in the clipboard to the same folder as the highlighted preset file is in. Important: there is no overwrite warning! If the target folder already contains a preset of the same

name as one being copied, the one from the clipboard will overwrite the one currently in the target folder.

Delete This selection deletes the highlighted preset(s) after first asking if you are sure this is what you want to do.

Rename This selection brings up the "Rename Preset" dialog box, allowing you to rename the preset file. Enter the new name for the preset, then click the OK button. Click Cancel if you change your mind before you're done. If you have multiple preset files selected, the "Rename Preset" dialog box appears multiple times in sequence, allowing you to rename each file you have selected. If you try to rename a file to the same name as an already existing file you will get an error message.

View Menu   File Edit View

The View menu is only available when you have a preset file highlighted. The following choices are possible:

Settings This selection brings up the "Preset View" form, which displays a list of all the settings and their values for that particular preset in two re-sizable columns: The Setting column presents the name of the control, such as "Input Mic Gain," while the Value column indicates the value that control is set to in the preset, such as "-4.0 dB." Click the "X" in the upper right corner of the form to close it.

If you have multiple preset files selected the "Preset View" form appears multiple times in succession, allowing you to view the settings of each preset in turn. Upon clicking the "X" to close the form for one preset, the form reappears for the next preset, and so on until all presets have been viewed.

Diff This selection brings up the "Preset Difference" form, which displays three re-sizable columns: Setting presents the name of the control, Current indicates the value that control is set to currently in the GUI, and Favorite indicates the value that control is set to in the saved preset.

A "Print" button at the bottom of the form allows you to produce a printout of the differences as displayed. Lines that indicate differences start with a double asterisk ("**"). On a color printer these lines will also show up in red. Click the "X" in the upper right corner of the form to close it.

If you have multiple preset files selected the "Preset Difference" form appears multiple times in succession, allowing you to view the difference information for each preset in turn. Upon clicking the "X" to close the form for one preset, the form reappears for the next preset, and so on until differences have been viewed for all presets.

The Hardware Screen

The Hardware Screen allows you to manage your fleet of Voice 1 audio processors. You may have only one, or you may have many Voice 1 units but all of them should be added to the Hardware Screen so that you can access them from the Voice 1 Remote GUI. To see the configured Voice 1 devices, click the **Devices** button.
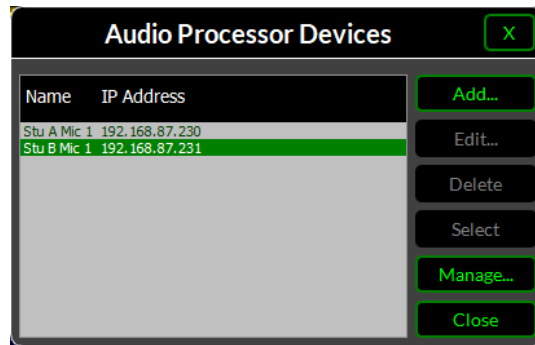

Audio Processor Device Management

In the screenshot above, we can see that this system has two Voice 1 processors. One of them is still set to the default IP address of 192.168.87.231. If using your Voice 1 processors in WNIP streaming mode, you should always change each processor you add to a different IP address to help avoid future duplicate IP address issues.

The following functions are available in the Hardware | Devices screen, depending on whether there are any devices listed and whether one is highlighted in the list: **Add, Edit, Delete, Select and Manage**. The **Close** button, of course, closes the Audio Processor Devices window.

Add When you first install the Voice 1, you will see an empty list in the Audio Processor Devices window.
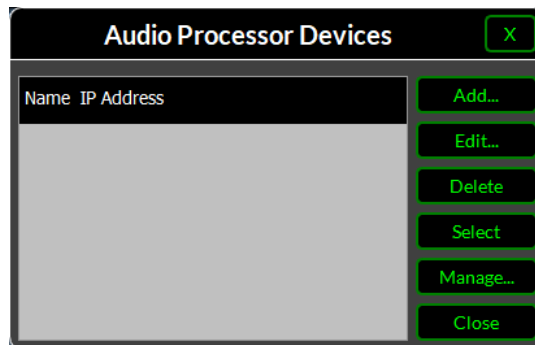
To add your first Voice 1, click the **Add** button. The Add New Device window appears.
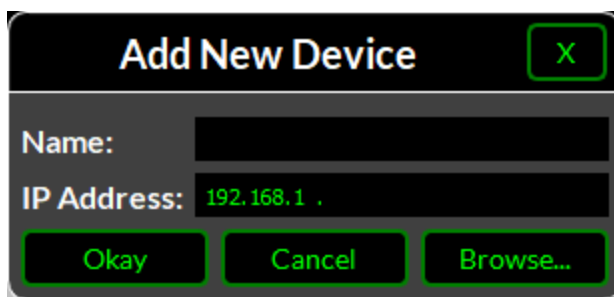

Add New Device Window

Select a descriptive name for this Voice 1 processor, such as "Studio A Mic 1." A portion of the IP address field is filled in for you, but more than likely it won't meet your needs. Consult your IP addressing documentation and select an appropriate address for this unit. Place your cursor at the end of the field and simply use the backspace key to remove any part of the IP address you won't be using. As you enter the new address, use the "." key on your keyboard or number pad to enter the dot separator between the octets. Do not succumb to the tempation to enter leading zeroes like this: **192.168.087.075**. No leading zeroes should be shown in the IP address. Once you have entered it, click the Okay button.

As an alternative to entering the IP address manually, if your device is already present on the network you can use the **Browse** button to find it automatically. Click Browse and see if your device is listed:
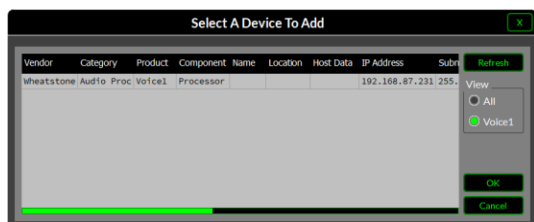
Note that if you're connected to a Wheatnet network, you can click "All" and this window will act exactly like the "Locator" function you are used to in Wheatnet, showing you all Wheatnet devices on the subnet. However, you can only Add Voice 1 devices to the Voice 1 Remote GUI.

If so, highlight it and click **OK**. You will still be prompted to give the device a name, or if it already has a name you can just click the **Okay** button to save. Your new Voice 1 will now be listed with its name and IP address.
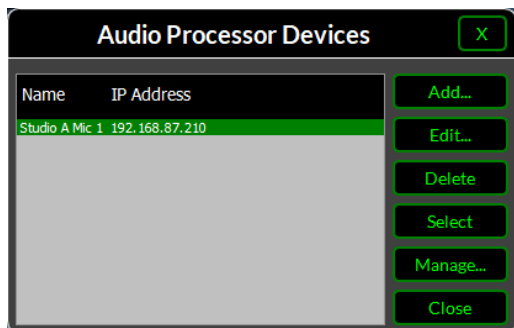
As mentioned, if you are running your Voice 1 in WNIP Streaming mode you shouldn't keep the default IP address because if a new Voice 1 is added, it will be on the same IP address. So we have changed this one to something different from the default IP address of 192.168.87.231.

Now that the Voice 1 has been added to the list of audio devices manageable by this Voice 1 GUI, you have several options available. **Edit** will allow you to change the name (or IP address if necessary) of the device. **Delete** will let you remove it and start over and **Select** causes the GUI to connect to the highlighted Voice 1 unit and close the Devices screen. If you choose Select and the device status at the top of the screen does not say "Online," make sure the connect button to the left of "Status" is green. If not, press the button to connect.

Selecting **Manage** from the Audio Processor Devices screen will, again, bring up the list of all Voice 1 units found on your network so that you can select a different one to add.

Right-Click Menu

View Option

You can right-click just about anywhere on the Voice 1 Remote screen to see a pop-up menu with several functions available, some of which have already been covered in other sections but some of which are only available via this right-click menu. We will describe these functions here.
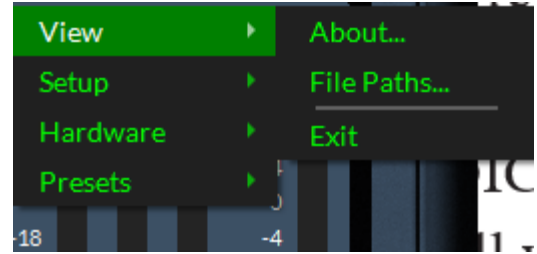
There are four primary functions on the right-click menu: View, Setup, Hardware and Presets. The View function has three options:

About Select this option to see the version number and build date of the Voice 1 Remote GUI.

File Paths This option shows you where all of the files associated with the Voice 1 Remote GUI are located. This information is helpful for troubleshooting or locating preset files and packages on your local hard drive.
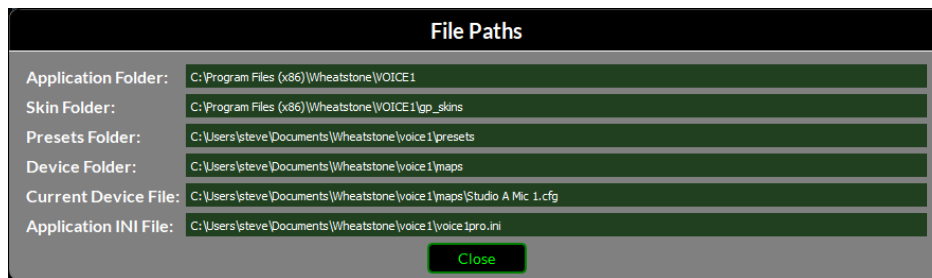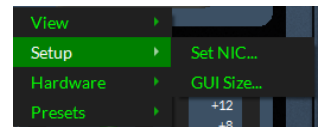
Voice 1 File Path Listing

Exit Select this option as an alternative way to exit the Voice 1 Remote GUI software.

Setup Option

There are two options under Setup.

Set NIC This option was discussed in the System Screen section. It allows you to select which NIC (if you have multiple NICs on the computer) the GUI should use to connect and manage your Voice 1 Audio Processors.

GUI Size This button presents you with a list of possible GUI sizes as determined by the available graphics card on the computer on which you are running the GUI. Select the one that works best for you or choose to keep the original GUI size.
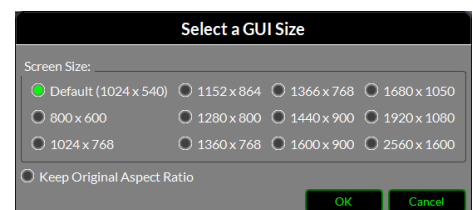
Hardware Option

This menu has several important options. The first one, **Devices**, is the same as the Devices screen we have already covered. The second one, **On-line Mode** shows whether you are currently online or now. It mirrors the status of the green online indicator at the top of the screen next to the Status line. In the screenshot above, it is checked so that means the GUI is online with a Voice 1 processor.
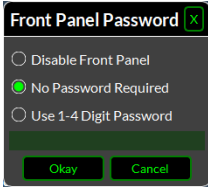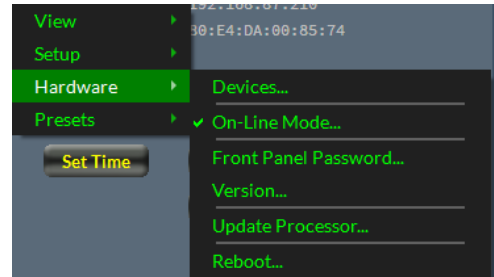
Front Panel Password allows you to set a front panel password or disable the front panel entirely. This allows you to control access to the front panel controls in cases where such security is a concern. If a password is set here, it will need to be entered on the device in order to enable the front panel controls. Note that a password can also be set via the front panel controls.

Version Option

The Version option displays more detailed information about device versions including the on-board application version, FPGA and DSP information, MAC address and GUI version. If you ever have a problem with your Voice 1 that requires tech support, you may be asked for this information.
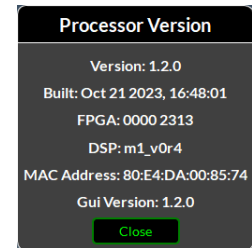
Update Processor Option

Future versions of the VOICE 1 software may be released to implement new features or correct known problems. The Update Processor menu choice opens a dialog box and prompts the user to select a file to be uploaded to the VOICE 1. Upon completion, you will be asked to restart the VOICE 1 (cycle power). Only verified updates provided by Wheatstone will work!

Parameters, Units and Ranges

Approximately following the VOICE 1's signal path, these are the values and ranges appropriate to each type of processing.

System Level

Headroom:	20dB
Nominal Operating Level:	-20dBFS
LED Input/Output Level Meter	

Input

Type:	**Electronic Differential**
Input Impedance:	> 2kohms at
1kHz Optimum Source Impedance:	200 ohm
Phantom Power	
Maximum Gain:	70dB
Minimum Gain:	-10dB
Gain Increments:	1dB
EIN:	-128dBu
FR:	+ / - 0.2dB
THD+N:	<0.03% 20Hz - 20kHz@-50dBu in
SMPTE DIM:	0.00007%

Filters

a. High-Pass Filter

Filter class:	24dB/oct. Butterworth
Frequency:	20Hz - 1kHz (default 80Hz)
Defaults:	Off

b. Low-Pass Filter

Filter class:	24dB/oct. Butterworth
Frequency:	1kHz - 20kHz (default 4kHz)
Defaults:	Off

Equalization

Four independent bands of equalization:

Low Frequency:	Shelving 20Hz - 200Hz
Mid Frequency (2 identical bands):	Parametric 20Hz - 20kHz, 0.2-3.0 octave BW
High Frequency:	Shelving 2kHz - 20kHz
Lift / Cut:	+ / - 14dB
Defaults:	All off
	Defaults When Activated
	LOW: 50 Hz, +6dB
	MID1: 800Hz, 0.5 oct., -4dB
	MID2: 2.8kHz, 0.66 oct., +3dB
	HIGH: 16kHz, +8dB

De-Esser

Type:	**Recursive-style true (not broadband) De-Esser**
Threshold:	-10 to -60dBfs (default -20dBfs)
Release:	50mS - 500mS (default 100mS)
De-Ess Frequency:	20Hz - 20kHz (default 4kHz)
Defaults:	Off
LED Gain Reduction Meter	

Expander

Type:	**Downward Expander**
Threshold:	-60 - 0dBfs (default -40dBfs)
Close:	50mS - 3Sec. (default 300mS)
Depth:	0 - 40dB (default 14dB)
Defaults:	Off
LED Gain Reduction Meter	

Compressor

Threshold:	-10 to -50dBfs (default -40dBfs)
Attack:	0.2mS - 1S (default 1mS)
Release:	33mS - 1S (default 150mS)
Ratio (soft-knee):	1:1 – 1:20
LED Gain Reduction Meter	