ChannelStrip|SP-MAS User Guide

ChannelStrip|SP-MAS v.1.2

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Metric Halo Laboratories
M/S 601 • Building 8
Castle Point Campus
Castle Point, NY 12511-0601
tel (914) 831-8600 • fax (914) 831-4827 • Toll Free (888) 638-4527
http://www.mhlabs.com • email: support@mhlabs.com

Congratulations

Thank you for purchasing ChannelStrip|SP. You have just transformed your Digital Audio Workstation into a mixing board with world-class processing. ChannelStrip|SP provides all of the basic channel processing features you would expect to find on a top-of-the-line mixing board in a single mono or stereo plug-in. ChannelStrip|SP combines stunning sound quality with a convenient interface designed to allow you to control all critical channel processes interactively and simultaneously - just like you would on a real console!

What is ChannelStrip|SP

ChannelStrip|SP is a plug-in for digital audio workstations which provides the essential basic channel processing found in the channel strip of a modern mixing board.

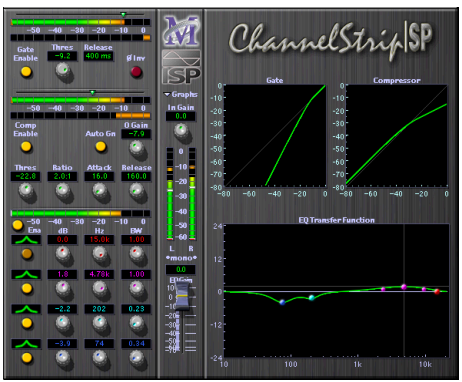


Figure 1: The ChannelStrip|SP Plug-in Window

Processing functions include:

- Input level control
- Expander/Gate
- Compressor
- 4 band Parametric EQ
- Phase Invert
- Advanced metering

ChannelStrip|SP was designed with three primary goals in mind:

1. To sound mind-numbingly good.
2. To be flexible and easy to use.
3. To be as DSP efficient as possible while maintaining stunning sound quality.

Operating the Strip

As with most channel strips, ChannelStrip|SP provides many copies of controls that are all operated in a similar manner. The ChannelStrip|SP user interface uses a few different control elements to control all of the processing. These elements are:

Control Knob

Control Knobs are used to control the value of various continuous parameters of a process. Examples of these types of parameters include: Attack time, Release Time, Threshold, etc. You can change the value of each knob in a number of different ways. Click and drag the knob to change the value continuously. Dragging up or to the right will increase the value, while dragging down or to the left will decrease the value. If you hold down the <command> key when you click, you will be able to adjust the value with finer precision. If you hold the <option> key when you click, the knob will reset to its default value.

Click on the number (readout) of the knob to pop up a text entry field that allows you to type a number in directly. The popup will remain active until you dismiss it by clicking somewhere else or hitting the <return>, <enter>, <tab>, or <command>–<period> keys. Hit <return> or <enter> to confirm the value and dismiss the popup. Hit the <tab> key to confirm the value and pop up an entry field for the next control (<command>–<tab> will pop up the entry field for the previous control). Hit <command>–<period> to dismiss the popup and cancel the change.

When you enter a number into the pop up entry, you can use a couple of abbreviations: "k" multiplies the number by 1000 and "m" divides the number by 1000. So if you want to enter 16,500 Hz you can just type 16.5k.

Toggle Button

Toggle buttons are simple on/off switches. They light up when they are on and are dark when they are off. You toggle the state of the button by clicking on it. These buttons are used to enable processor sections and to switch the order of processing within ChannelStrip|SP.

Fader

The fader is somewhat unique in that only one fader used in the interface for ChannelStrip|SP. It works in much the same fashion as the control knobs. Instead of dragging up/right or down/left to change the value, you directly drag the fader knob. The other "tricks" described for the knobs also work with the fader. The fader is used to control the output gain of the EQ section of ChannelStrip|SP. This controls a high-precision 56-bit gain stage that maintains the full precision of the 48-bit EQ algorithm provided by ChannelStrip|SP.

Filter type

Each of the 4 EQ filter band in the strip has a filter type control that allows you to choose the shape of the filter applied by that band.

Each band provides 5 different types of filter shapes: Peaking/Parametric, Low Cut, High Cut, Low Shelf, High Shelf. You can select from these types via two different methods. Each time you click on the Filter Type control, the band will switch to the next type in the list (and wrap to the beginning when you hit the end of the list). If you click and hold the mouse button, a pop-up menu listing all of the types will appear after about 1/4 of a second. You can select the type directly from this popup menu. If you want to access the menu without having to wait, hold down the <command> key when you click.

Graphs disclosure control

The Graphs disclosure control allows you to show and hide ChannelStrip|SP's display graphs. This allows you to maximize screen real-estate while still providing details on the processing when they are needed. Click on this control to toggle the visibility of the graphs. ChannelStrip|SP will automatically make the plug-in window smaller when you hide the graphs.

ChannelStrip|SP also uses a number of standard visual representations to give you feedback about what is happening within the processor. These elements are:

Peak Meter

ChannelStrip|SP provides a peak-reading meter at the input stage of each processing block. The meter uses the fast PPM standard for decay time (0.9 seconds per 20 dB) and the digital PPM standard legend for calibration. For the dynamics sections the processor threshold is indicated by the green arrow above the input peak meter. This green arrow can be manipulated directly with the mouse. The top segment of the meter (above 0dB) is used as a clip indicator and is illuminated red if the input section of the processor detects an over. The clip light remains illuminated until you click on the meter. <option>–click any meter to reset the clip lights on all of

the meters in ChannelStrip|SP. When ChannelStrip|SP is running in stereo mode, this meter shows the higher of the two input levels and will detect an over on either input channel.

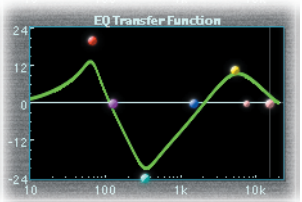
Gain reduction meter

The gain reduction meter, which has an orange bar and grows down from 0 dB, shows the amount of attenuation being applied by its associated dynamics processor at any given time. Please note that the dynamic range of this meter is 60 dB which is huge as compared to most gain reduction meters on other processors. We provided such a large dynamic range because the dynamics processors in ChannelStrip|SP are capable of providing tremendous amounts of gain reduction without artifact or distortion. Since the dynamic range is so large, it is possible to compress a signal fairly aggressively without seeing much activity on the gain reduction meter. Please refer to the knee diagram for feedback in this case.

Peak, RMS, VU output meter

For the main output stage of ChannelStrip|SP we have provided meters driven with SpectraFoo metering technology. These meters show, in addition to the peak metering provided for the input stages, RMS level and VU level. The peak level is represented by the floating colored bar, the RMS level by the solid colored bar and the VU level by the overlaid gray bar. Both the Peak and RMS level are represented with fast PPM ballistics. The VU meter shows IEEE standard 300 ms RMS average level. When ChannelStrip|SP is on a mono insert both output meters show the mono channel output. When ChannelStrip|SP is running in stereo mode the left meter shows the left channel output level and the right meter shows the right channel output level. The output section clip lights activate if there is an over in the output stage or in any of the processing section input stages. It is reset by clicking on the meter; <option>–click to reset the clip lights on all the meters.

EQ Transfer Function



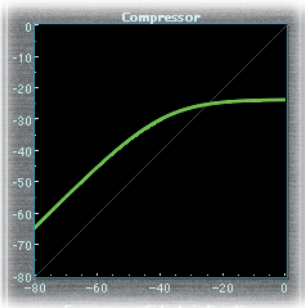
The EQ transfer function is a combination of a visual representation of how the EQ is processing the signal and an intuitive controller for the associated filter bands. This display is sometimes called a "Cartesian Graph" by other EQ manufacturers.

The horizontal axis provides frequency calibration in Hertz (Hz). The vertical axis provides level calibration in decibels (dBr). The heavy green line indicates the relative change in level at each frequency that is created by the combined effects of all of the active bands in the equalizer. Each EQ band is represented by a colored dot in the transfer function. The color of the dot matches the color of the numeric readouts of the knobs for the corresponding EQ band.

The band that is currently being edited will have a light gray crosshair centered under it. If the associated band is a parametric filter there will also be two smaller colored dots that can be used to control the bandwidth of the filter. Clicking on a large colored dot and dragging will allow you to adjust the frequency and gain of the associated band. <command>–click the dot to toggle the band enable. <option>–click the dot to adjust the bandwidth (dragging right increases the bandwidth, left decreases the bandwidth). <command><option>–click the dot to switch the band filter type. Click and drag the smaller dots associated with a larger dot to adjust the filter bandwidth.

In order to increase the real-time performance of changing EQ parameters, the transfer function graph switches to a lower resolution mode while you are changing parameter values. You may find that the graph "jumps" slightly when you are editing narrow parametric filters.

Dynamics Knee

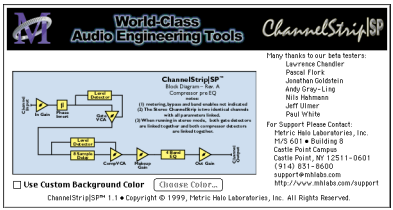


ChannelStrip|SP contains a Dynamics Knee diagram for each gate and each compressor processing section. The diagram provides feedback on the response of the associated dynamics processor. Both the horizontal and vertical axes are calibrated in dBFS. The horizontal axis corresponds to the input level and the vertical axis represents the output level. The heavy line shows the quiescent dynamical response of the associated processing block. This means that if you sent in a sine wave at a given input level, the output level would be equal to the level shown on the graph. When the processor is working with real dynamic signals, the graph is a good approximation of the response when the attack is fast and the release is slow.

About Box

ChannelStrip|SP provides an"About Box" that tells you all about the software. To show the about box, click on the Metric Halo logo or the ChannelStrip|SP logo on the control surface. This will bring up a dialog box with copyright and contact information for Metric Halo Labs. This about box also names the beta testers who helped Metric Halo test the product (these people deserve thanks from all of us – ChannelStrip|SP is a better product due to their efforts). The block diagram shows the signal flow through

the processor (this diagram changes based upon the current ordering of the processing blocks).



Click anywhere else or type a character to dismiss the about box.

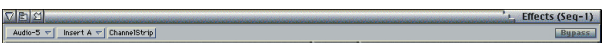
Working with Performer/AudioDesk™

Your MAS-based DAW software provides a standard interface for controlling various aspects of MAS plug-ins. While you should refer to your Performer/AudioDesk documentation for a complete description, we will summarize the most important points here.

When you insert ChannelStrip on your audio channels, you should try to place each ChannelStrip on the same insert point in each audio channel. This will allow you to easily navigate between the ChannelStrips on various project channels.

Plug-in Window

The illustration below shows the standard MAS plug-in window header.



If you have inserted ChannelStrip as we suggested above you can click on the channel name popup in the upper left hand corner of

the window (labeled “Audio-5” above) to switch from channel to channel.

The next popup in the window (labeled “Insert A” above) allows you to switch to another insert on the same channel. You would use this to switch to another plug-in on the same channel.

The bypass button allows you to bypass the effects of ChannelStrip. When the bypass is turned on all of the processing sections, including the user-configured delay, of ChannelStrip are bypassed. When the strip is bypassed there is still a 16 sample delay through the processor but all samples pass through unchanged.

The Digital Performer/AudioDesk editor/librarian window popup button (the small menu icon in the window title bar) provides access to a popup menu that allow you to manage presets for ChannelStrip and also allows you to load ChannelStrip presets as the current state. Use this menu to save libraries. See your MOTU documentation for more information.

This popup menu shows the active preset name (in italics if the current settings do not match the library). Click this popup to select from the available presets.

The presets that you store using the MAS preset menu are saved within the current project. You can use the Digital Performer/AudioDesk “Load…” command to copy presets from one project to another. See your MOTU documentation for more information.

ChannelStrip also provides an external file format for saving and loading presets. This external mechanism allows you to share presets between the MAS implementation of ChannelStrip and the Pro Tools/TDM implementation of ChannelStrip. In addition,

you can use this mechanism to easily move presets between projects without having to provide access to the original project file.

To load a preset from an external preset file, click on the "Load" button that is just below the Input Gain knob. You will be presented with a Standard Open File dialog. Only valid preset files will be shown. Choose the preset file and click the "Choose" button to load the preset.

To save the current state as a preset file, click on the "Save" button that is just below the Delay knob. You will be presented with a Standard Save File dialog. Navigate to the desired destination, type in the preset name and click the "Save" button to save the preset.

Factory Presets

ChannelStrip provides one built-in factory preset: **Factory Default**. This preset sets the ChannelStrip parameters to the standard state. You can always use this preset to return the settings to the "neutral state". In addition, the ChannelStrip plug-in automatically scans the folder named "CSSP Presets *f*" (that is placed in the same folder as the ChannelStripMAS plug-in file) for external file format presets. Each file that it finds will automatically be added to the MAS settings menu as a Factory Preset. MHL uses this mechanism to provide a variety of factory default for your use. You can also use this to store presets that you would like to be available to all sessions (e.g. you can uses this as a repository for "Global" settings).

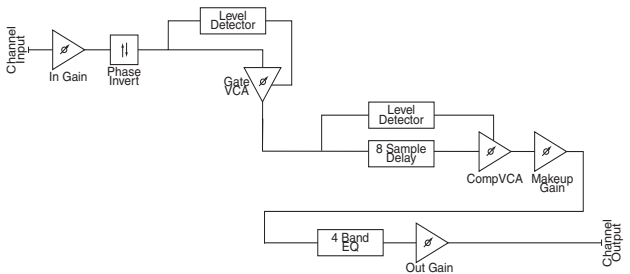
Automation

Automation in ChannelStrip is controlled using the standard MAS automation mechanisms. All plug-in parameters are autom-

atable. Please consult your MOTU documentation for more information about plug-in automation.

The Processing – A Detailed Description

In this section we discuss the what each processing block does and how the controls work. ChannelStrip|SP is unique among MAS plug-ins in that it provides all the basic channel processing that you need in a complete package. It accomplishes this through a combination of elegant user interface design and incredible DSP coding.



The block diagram above illustrates the overall structure of the processing system provided by ChannelStrip|SP. This diagram does not indicate the various metering blocks.

Now lets examine the various processing blocks indicated in the diagram.

Input Conditioning

After the signal is routed to ChannelStrip|SP it runs through an input gain block that provides input gain of up to +15 dB. You can use this gain to condition signals that are low in level.

This input gain may also be used to pad out signals by up to -15 dB. While you may find this attenuation useful to just bring down the level through the strip simply and quickly, you must realize that this gain is applied after the signal reaches ChannelStrip|SP and will not pad out any clipping that occurs in the A/D converters or in a plug-in that is inserted before ChannelStrip|SP.

The input gain is controlled by the “In Gain” knob.

After the input gain/pad section, there is a phase invert block. This block is controlled by the “ø Inv” switch. When the phase invert is enabled the polarity of the signal will be flipped. The signal is cross-faded between the uninverted and inverted states so the signal level will drop briefly when you flip the state of the phase invert switch, but it will not introduce a glitch or click into your audio.

Gate/Expander

The next processing block is the Gate. The gate is used to adjust the low level dynamics of the signal being processed.

Theory of Operation

The signal being processed is measured by a level detector that determines the instantaneous level of the signal (in the case that ChannelStrip|SP is running in stereo mode the detector is linked with the other channel in the stereo pair and the higher level of the two channels is used).

When the gate is enabled using the orange “Enable” button the signal will be attenuated based on how much the detected level is below the threshold you set with the “Thres” knob.

The dynamic behavior of the gate is controlled with the gate’s “Release” control.

Gate Enable

The gate enable button enables the gating action. If this button is off, no gating will occur.

Threshold control

The “Thres” knob controls level at which the gate opens and closes. When the detector level is above the threshold level the gain through the gate is 0 dB. When the detector level is below the threshold level, the gain reduced at a ratio of 1:2. This means that if the detector is 3dB below the threshold the signal output will be 3dB below the input level.

The gate threshold level is also indicated by the green arrow above the gate input meter. You can adjust the threshold level using this indicator as well as by using the “Thres” knob.

Release control

The “Release” control allows you to choose the release time of the gate. This parameter is measured in milliseconds and can be set to 80ms, 400ms or 1200ms. The release time controls how quickly the gate closes after the detector drops below the threshold value.

Compressor

The next block in the signal processing chain is the compressor. The compressor is used to adjust the high–level dynamics of a signal.

Theory of Operation

The operation of the compressor is very similar to the gate.

The signal being processed is measured by a level detector that determines the instantaneous level of the signal (in the case that ChannelStrip|SP is running in stereo mode the detector is linked with the other channel in the stereo pair and the higher level of the two channels is used). The channel signal is delayed by 8 samples relative to the detector signal to allow the compressor to have an instantaneous attack when the “Attack” parameter is set to 0.

When the compressor is enabled using the orange “Comp Enable” button the signal will be attenuated based on how much the detected level is above the threshold you set with the “Thres” knob and what compression ratio is set with the “Ratio” knob.

The dynamic behavior of the opening and closing of the gate is controlled with the “Attack” and “Release” knobs.

Audio Dynamics

Compressors are important in controlling the dynamic range of the source material you are working with. While the instruments, your ears, the microphones and your digital audio workstation all have dynamic ranges that are greater than 100 dB, most reproduction and delivery media have significantly reduced dynamic ranges. Compression is used, in its simplest form, to help reduce the dynamic range of your project or elements of the project to a range that is reproducible. It does this by making the soft material louder and the loud material softer. This type of processing can also be used to change the character of the sound instead of just adjusting the dynamic range. The compressor in ChannelStrip|SP excels at both types of processing.

Compressor Enable

The "Comp Enable" button enables the compressor action. If this button is off, no compression will occur.

Auto Gain

Enabling the "Auto Gain" button causes the compressor to automatically adjust the makeup gain in the compressor output stage so that if the manual "O Gain" knob is set to 0 dB the static gain reduction for a 0 dB input level will be about 7 dB. This number was chosen because it works well with the default settings of the "Attack" and "Release" knobs to provide enough pad to not clip fast transients. The "O Gain" knob will apply additional trim to the internal automatic gain. If the threshold is set very low (e.g. – 60 dB) and auto gain is enabled, you will not be able to add very much manual gain (only about 1 – 2 dB) even though the readout on the knob will go up to + 30 dB. This is an internal limitation of the compressor.

Manual make-up gain

The “O Gain” knob allows you to manually adjust the makeup gain applied to the signal after the gain reduction applied by the compressor. If the Auto Gain switch is off, this is the amount of makeup gain applied. If the Auto Gain switch is on, then this parameter is a trim added to the internally computed makeup gain. The makeup gain is enabled and disabled along with the rest of the compressor.

Threshold control

The “Thres” knob controls level at which the compressor begins to reduce the gain applied to the signal. When the detector level is below the threshold level, no gain reduction is applied. As the detector level increases above the threshold level, the gain is reduced as indicated by the knee diagram associated with the compressor. The compressor knee is soft. The ratio increases as the difference between the detector level and the threshold increases.

The compressor threshold level is also indicated by the green arrow above the gate input meter. You can adjust the threshold level using this indicator as well as by using the “Thres” knob.

Ratio Control

The “Ratio” knob controls the ‘terminal’ ratio used to compute the gain reduction of the compressor. When the ratio associated with the soft knee hits the ratio specified by the ratio knob, the knee ‘hardens’ and remains at the same constant ratio.

Attack control

The “Attack” knob allows you to adjust how quickly the gain reduction is increases when the detector level goes above the

threshold level. This control is calibrated in milliseconds and values range from 0 to 500 ms. The compressor has an 8 sample lookahead buffer that allows it to have an "instant attack" when you set the attack time to 0. Fast attack times will control the transients of impulsive sounds. Use longer attack times to let the transients through but control the sustains.

Release control

The "Release" knob controls the release time of the compressor. This knob is calibrated in milliseconds and can range from 5 ms to 5 sec. The release time controls how quickly the gain reduction returns to zero after the detector drops below the threshold value. For settings below 40 ms or so the compressor releases pretty abruptly and may introduce unwanted artifacts into your audio, depending on the signal. In addition, be careful making the release time faster than the attack time.

Equalizer

The next processing section is the Equalizer. The equalizer in ChannelStrip|SP is a very flexible, fully parametric 4 band 64-bit double precision equalizer. Each band in the equalizer can be configured as any of the five available filter types. The entire equalizer maintains 64 bits of precision from band to band all the way out to the equalizer output gain. In addition, the parameter ranges available for each band are greater than most other EQs (matched only by esoteric pro-hardware pieces). Each parameter in the equalizer is continuously adjustable throughout its entire range, so you can set the exact EQ that you need.

Theory of operation

The equalizer in ChannelStrip|SP work just like every other EQ under the sun with the exceptions that is more flexible, more efficient and sounds better. By adjusting the various parameters associated with each band in the EQ you can control the tonal and timbral balance of the signal. The resonance effect of the peaking filters provides a facility to recreate acoustic resonances that are lacking in the source material with which you are working. One of the nicest aspects of the filters in ChannelStrip|SP is their time domain performance. These filters ring significantly less than comparable filters in other signal processors. This allows you equalize signals with out the normal time smearing that you encounter with other equalizers.

Master Enable button

This orange button just below the EQ input meter is the master enable for the entire EQ section. When this button is off, the EQ section will not change the signal.

Filter Type Button

This button (indicating a peaking/parametric filter in the illustration) is used to select the filter type of the single band of side chain EQ. You may choose from 5 different types of filters:

- Peaking/Parametric – a second order bell-shaped parametric boost/cut filter. Boost/cut has a range of ± 24 dB. When the boost is greater than +15 dB the filter gains a resonant quality. The center frequency of the filter can be any frequency between 20 Hz and 20 kHz. The bandwidth of the filter is continuously variable between 0.1 octaves and 2.5 octaves.
- High Cut – a 12 dB/octave high cut filter with a 3dB frequency that is continuously adjustable between 20 Hz and 20 kHz.
- Low Cut – a 12 dB/octave low cut filter with a 3dB frequency that is continuously adjustable between 20 Hz and 20 kHz.
- Low Shelf – a shelving filter that applies boost/cut to low frequencies. Boost/cut is limited to +12 dB/– 24dB. The bandwidth controls the dip/peak that is added at the end of the transition band.
- High Shelf – a shelving filter that applies boost/cut to high frequencies. Boost/cut is limited to +12 dB/– 24dB. The bandwidth controls the dip/peak that is added at the end of the transition band.

Filter Enable Button

Use this orange toggle button to enable the each filter band. When the filter band is turned off the signal will pass through the filter unchanged.

Filter Band Boost/Cut Control

Use this knob (labeled "dB" in the illustration) to adjust the gain of the filter band for the peaking, high and low shelf filter types. This parameter is ignored for the other filter types. In the shelving filters the maximum boost is +12 dB and the maximum cut is -15 dB. In the peaking filters the maximum boost/cut is ± 15 dB.

Filter Band Frequency

Use this knob (labeled "Hz" in the illustration) to adjust the characteristic frequency of the filter. For the peaking and bandpass filter types this controls the center frequency of the filter. For the high and low cut filter types this control adjusts the 3 dB point of the filter. For the shelving filters this control adjusts the shelf transition point.

Filter Bandwidth

Use this knob (labeled "BW" in the illustration) to adjust the characteristic width of the filter. This control only has effect for peaking, shelving and bandpass filter types. Please note that this parameter controls the bandwidth (measured in octaves), not the quality factor (or "Q"). If you have been using Q controls, the numbers will be backwards from what you are used to. Small numbers mean narrow filters and large numbers mean wide filters. For peaking and bandpass filter types, this parameter controls the bandwidth of the filter in octaves. For the high and low shelving filter types this parameter adjusts the amount of dip/peak and the slope of the shelf. When this parameter is set to 0.1 you will get the largest dip/slope available and when the parameter is 2.5, you will get a classic first order shelf (which has a transition band that is about 1 decade wide; e.g. if it is a high shelf

with a frequency of 10 kHz and a gain of 10 dB, the gain will be at 0 dB near 1kHz).

Controlling the EQ with the Transfer Function

As described in the control and meter guide earlier in this manual, you can control each band of the EQ directly from the EQ transfer function display associated with the 4 band equalizer.

EQ output gain

The one fader in ChannelStrip|SP's user interface controls the output gain of the EQ section. This fader is not shown in the illustration of the EQ section, but it is shown in the overall processor illustration at the beginning of this manual. The "EQ Gain" fader allows you to add up to +10 dB of gain or up to -160 dB of attenuation to the 56 bit output signal from the EQ processor block before any truncation, clipping or dither is performed. This allows you to pad out or boost the EQ section at full precision, if required.

Conclusion

After working with ChannelStrip|SP we hope you will agree that it meets or exceeds the goals that we described in the introduction of this manual. We think that you will find the flexibility, sonic quality and efficiency of ChannelStrip|SP hard to beat. While we know that there are other processors that you will use to get a specific "sound" or to accomplish processing not provided by ChannelStrip|SP we think that you'll find yourself using ChannelStrip|SP on every track.

Service and Support

Metric Halo Labs takes great pride in the reputation for customer service and support that we have built. If you have any problems, questions, or suggestions please get in touch with us at:

support@mhlabs.com

or via one of the other contact points enumerated at the front of this manual.

Please keep us informed about your successes and projects. We love to hear from you!