

**562E
Windowing
Expander/
Gate**

562E



User's Guide

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 **Symetrix**

Typical gate setups, such as drum miking or cleaning up multitrack recordings, all face the same difficulty: how to apply a precise trigger to imprecise, organic signal sources. Much to the frustration of audio engineers, instruments and vocalists produce natural audio waveforms, and nature is rarely consistent. When nature meets machine in audio processing, the results can sound like the snap, crackle and pop you'd prefer in your cereal, not your audio. Most gates offer only one solution to this problem: open faster. While they measure performance in microseconds of "how fast", Symetrix is rewriting the rules on how to open. The dual channel **562E Windowing Expander/Gate** exploits our newly-developed, proprietary technology to enhance gating and expander control. Ultimately the 562E delivers unparalleled fidelity to any audio signal.

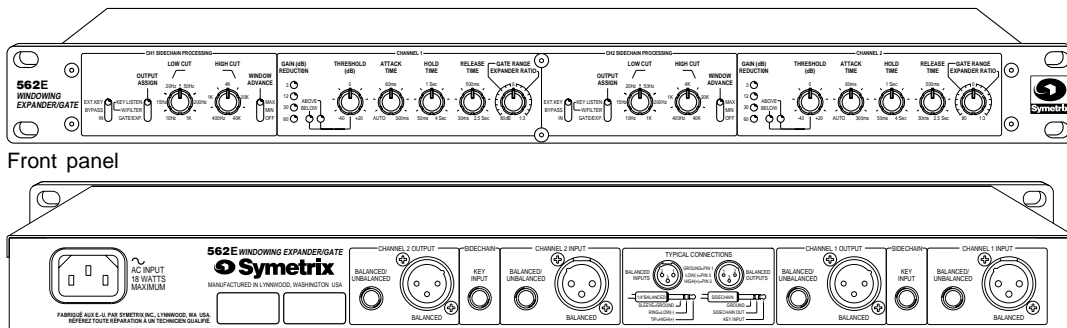
GATING: Gates may be used to clean up virtually any type of musical instrument or audio sound effect, but perhaps their most common use is on drum and percussion tracks. The 562E employs two unique tools for detecting and controlling these audio events.

Window Advance is a proprietary system for recognizing the signal to be gated. In simple terms, it virtually creates the impossible: a gate that opens just ahead of the audio signal. It creates this impression by moving the statistical energy center of the gated signal forward in time. **Window Advance** permits the user to subtly delay the signal energy, centering it within the envelope. Through this function, the 562E's gate passes the entire leading edge of the audio waveform. It accomplishes this because the gate opens before the signal passes through the VCA. **Window Advance** eliminates the noises and chopped-off waveforms created by traditional gates that struggle to open as quickly as possible after the signal arrives.

AutoWindowing is a processing technique that allows the user to maintain better control of the gate envelope parameters. Its dynamic smoothing process reduces "pops" and "clicks" that can occur at fast attack settings. These nasty noises are typically produced by envelope edges, overshoot and instabilities. Even gates that claim to open within microseconds fail to recognize the reality underlying these problems: naturally occurring waveforms do not have consistent leading edges. In contrast, **AutoWindowing** derives its trigger signal from the "time center" of the leading edge of the audio waveform. This reduces trigger uncertainty, jitters, and attack distortion. **AutoWindowing** yields an envelope that is consistent and natural-sounding. It also increases envelope consistency by eliminating the artificial "drop off" that occurs in most gates at the end of the release cycle. In the 562E the signal smoothly and continuously decreases at the end of the release cycle, creating a much more pleasing sound.

EXPANSION: The 562E also permits users to have a distinctive choice between gating and expansion. A downward expander is similar to a gate, but the expander substitutes **RATIO** control for the gate's **RANGE** control. The expander is ideal for tasks requiring more subtle control. To all possible uses for an expander, the 562E delivers superior performance through unique technology. Even the 562E's ratio circuitry is special. The ratio automatically reverts to 1:1 when the signal approaches 25dB below the threshold. This prevents any low level modulation of the expanded signal.

For the first time, open your ears to all the clear audio you wanted without any revenge from the processor. Experience a quantum leap forward in gate technology with the Symetrix **562E Windowing Expander/Gate**.



Front panel

Rear panel

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The information in this summary is intended for persons who operate the equipment as well as repair personnel. Specific warnings and cautions are found throughout this manual wherever they may apply.

The notational conventions used in this manual and on the equipment itself are described in the following paragraphs.

Equipment Markings



WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE

AVIS: RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR

SEE OWNERS MANUAL. VOIR CAHIER D'INSTRUCTIONS.
No user serviceable parts inside. Refer servicing to qualified service personnel.
Il ne se trouve a l'interieur aucune piece pouvant entre reparaee l'usager.
S'adresser a un reparaateur competent.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the 562E (i.e. this manual).

Caution *To prevent electric shock, do not use the polarized plug supplied with the 562E with any extension cord, receptacle, or other outlet unless the blades can be fully inserted.*

Terms

Several notational conventions are used in this manual. Some paragraphs may use Note, **Caution**, or **Warning** as a heading. Certain typefaces and capitalization are used to identify certain words. These are:

Note Identifies information that needs extra emphasis. A Note generally supplies extra information to help you to better use the 562E.

Caution Identifies information that, if not heeded, may cause damage to the 562E or other equipment in your system.

Warning Identifies information that, if ignored, may be hazardous to your health or that of others.

CAPITALS Controls, switches or other markings on the 562E's chassis.

Boldface Strong emphasis.

Power source - This product is intended to operate from a power source that does not apply more than 255Vrms between the power supply conductors or between either power supply conductor and ground. A protective ground connection, by way of the grounding conductor in the power cord, is essential for safe operation.

Danger from loss of ground - If the protective ground connection is lost, all accessible conductive parts, including knobs and controls that may appear to be insulated, can render an electric shock.

Proper power cord - Use only the power cord specified for the product. Use only a power cord that is in good condition.

Operating location - Do not operate this equipment under any of the following conditions: explosive atmospheres, in wet locations, in inclement weather, improper or unknown AC mains voltage, or if improperly fused.

Stay out of the box - To avoid personal injury or injury to others, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

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Fast First-Time Setup

Follow these instructions to get your 562E up-and-running as quickly as possible. The intent of this section is fast setup. If you need something clarified, then you'll find the answer elsewhere in this manual.

- 1 Connect the line-level signal source to either the female XLR connector or the 1/4-in. TRS (tip-ring-sleeve, stereo, 3-conductor) input jack. If the source is unbalanced, then use a 1/4-in. TS (tip-sleeve, mono, or guitar) plug fully inserted into the TRS input jack.
- 2 Connect the line-level signal return to either the male XLR connector or to the 1/4-in. TRS output jack. If you use the 1/4-in. jack, then use a TRS plug for balanced circuits or use a TS plug for unbalanced circuits. Additional information on the signal connections may be found on pages 12-13 of this manual.
- 3 Repeat for the second channel. Ignore the SIDECHAIN (KEY INPUT) connections for now.
- 4 Connect the AC input to an AC power source of the proper voltage and frequency, as marked on the rear of the unit.

Caution: *Failure to connect the 562E to the proper AC mains voltage may cause fire and/or internal damage.*

Warning: **Lethal voltages are present inside the chassis. There are no user serviceable parts inside the chassis. Refer all service to qualified service personnel or to the factory.**

- 5 Make your initial switch and control settings as follows:

SWITCH	SETTING
EXT.KEY/BYPASS/IN	IN
KEY LISTEN//W/FILTER//GATE/EXP.	GATE/EXP.
LOW CUT (CCW)	10Hz
HIGH CUT (CW)	40K
WINDOW ADVANCE	MAX
THRESHOLD	-10
ATTACK TIME	AUTO
HOLD TIME (GATE ONLY)	50ms
RELEASE TIME	300ms
GATE RANGE (IF GATING)	80dB
EXPANDER RATIO (IF EXPANDING)	1:3

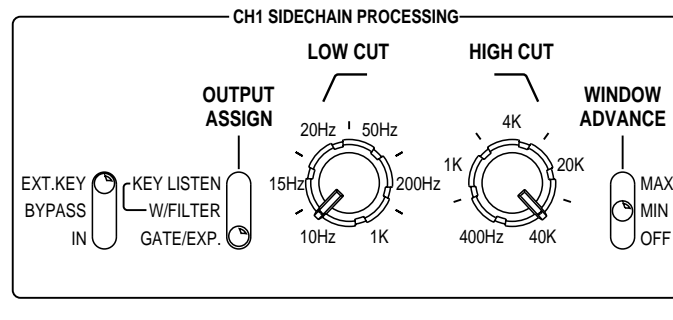
With the 562E's controls and switches now set according to the preceding section, the 562E should pass signal. Fast setup is complete.

Refining Your Settings

Refine the THRESHOLD setting so that the expander/gate reduces the gain when the input signal falls below the threshold setting. Adjust the ATTACK TIME, HOLD TIME and RELEASE TIME controls to suit the audio that is being fed to the 562E. Percussive sounds usually call for fast attack, hold and release times; speech and music generally work best with slower times. You can make the expander/gate stay open for momentary lapses in signal by increasing the setting of the RELEASE and/or HOLD TIME control. This also affects the rate-of-release once the signal falls below threshold. If you feel that the expander/gate is dropping the signal too much, try a lower GATE RATIO/EXPANDER RANGE setting. Remember these settings are just guidelines; you can use whatever settings work best for you.

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Sidechain Processing Section



EXT. KEY/BYPASS/IN switch - The EXT. KEY switch position activates the KEY INPUT on the rear of the 562E, and allows externally-triggered gating/expansion. The EXT. KEY switch position must be chosen in order to use an external signal, applied to the KEY INPUT, to control the gating and expanding action, or to route the external key signal to the

output of the 562E. The BYPASS switch position disengages the expander and gate functions. The IN switch position engages the expander and gate functions, using the 562E’s internal sidechain signal to control the gating and expanding action. The IN switch position also allows you to route the internal sidechain signal to the output of the 562E. **The IN switch position is the normal operating switch setting for the 562E.**

Note If you set the EXT.KEY /BYPASS/IN switch to the EXT.KEY position, with no audio applied to the KEY INPUT jack on the rear of the 562E, the 562E’s gate/expander will release (close).

OUTPUT ASSIGN switch - The KEY LISTEN switch position allows you to route the external key audio or the internal sidechain audio to the output of the 562E. This is useful for monitoring an external signal that you are applying to the KEY INPUT or for monitoring the internal sidechain signal. It is also helpful in fine tuning any EQ changes that you are making to the external signal before it reaches the KEY INPUT of the 562E. The W/FILTER switch position allows you to monitor the external key audio or the internal sidechain audio at the output of the 562E, *after it has been processed by the Low Cut and High Cut filters*. This is helpful in fine tuning the effect of the Low Cut and High Cut filters on the key/sidechain audio. The GATE/EXP. switch position routes the gated/expanded audio to the output of the 562E. **The GATE/EXP. switch position is the normal operating position for the 562E.**

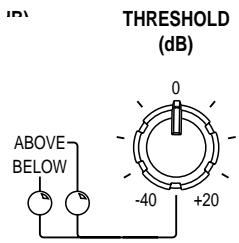
Low Cut control - Adjusts the cutoff frequency (3dB-down point) of a high-pass filter that is applied to the sidechain audio. Sidechain audio at frequencies above the cutoff frequency is uniformly passed. Use the Low Cut control to rolloff any rumble and other low frequency information that you do not want the 562E to use for control.

High Cut control - Adjusts the cutoff frequency (3dB-down point) of a low-pass filter that is applied to the sidechain audio. Sidechain audio at frequencies below the cutoff frequency is uniformly passed. Use the High Cut control to rolloff high frequencies that you do not want the 562E to use for control (example: use it to filter out the hi-hat cymbals when you are using the 562E to gate the toms on a drum set).

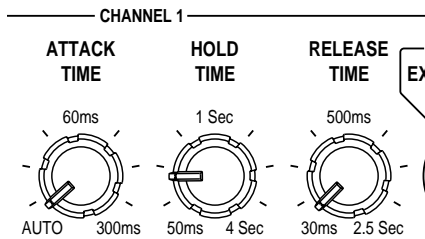
WINDOW ADVANCE switch - Subtly delays the audio signal *energy* that is fed to the expander/gate, relative to the audio signal in the sidechain. It permits the expander/gate to open before the audio signal passes through the VCA, thereby preventing the expander/gate from clipping the leading edge of the audio signal waveform. Use the MAX switch setting for more delay (good for drums), and use the MIN switch setting for less delay (great on cymbals). The OFF position bypasses the WINDOW ADVANCE feature.

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The Expander/Gate Controls



THRESHOLD control - Sets the signal level below which the expander/gate begins to operate. When the input signal falls below the level indicated by the THRESHOLD control, the expander/gate begins reducing the gain. The GAIN REDUCTION LED display indicates how much the expander/gate has reduced the gain.

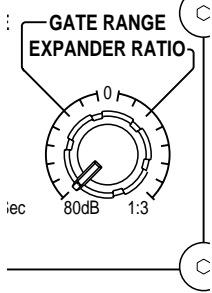


ATTACK TIME control - Determines the speed at which the expander/gate reaches zero attenuation when the input signal rises above threshold. The "AUTO" ATTACK TIME setting is meant to be used in conjunction with the 562E's WINDOW ADVANCE feature, to give you an effective attack time of zero.

HOLD TIME control - Determines the amount of time that the gate continues to stay open (the amount of time that the gate continues to pass signal at zero attenuation) after the input signal has fallen below threshold. When the audio source is speech, use long

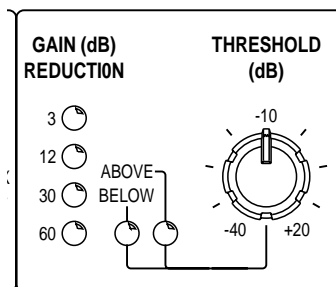
HOLD TIME settings to prevent the gate from closing during short pauses between words.

RELEASE TIME control - Determines the speed at which the expander/gate closes (i.e. returns to full attenuation) when the input signal falls below threshold, at the end of the HOLD TIME.



GATE RANGE/EXPANDER RATIO control - This control determines the amount of attenuation that occurs during gating or expansion of the input signal. For gating, use the settings from 0 (twelve o'clock) to 80dB (counterclockwise). These settings define the number of dB below unity gain that the gated signal will be dropped, when gating occurs. For expansion, use the settings from 0 (actually 1:1, at twelve o'clock) to 1:3 (clockwise). These settings define how much the output level will change in relation to changes in the input level. For example, at the 1:3 setting, a 5 dB drop below threshold in the input signal would result in a 15dB drop in the output signal. When this control is set to twelve o'clock, you will not have any expander or gate action, because the twelve o'clock position

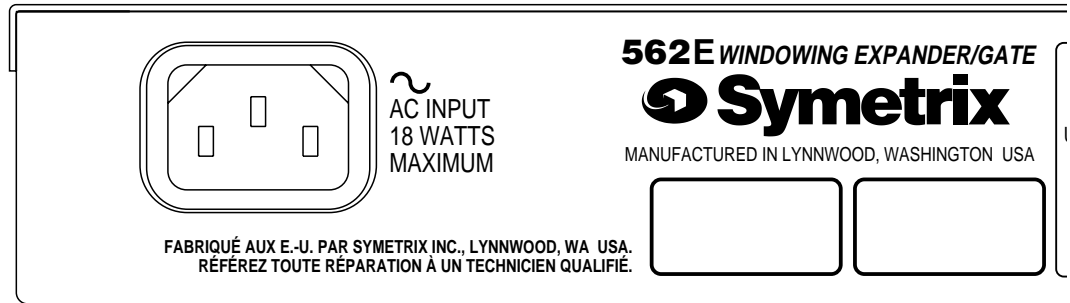
corresponds to 0dB change for gating, and to a 1:1 ratio (change in input equals change in output) for expansion.



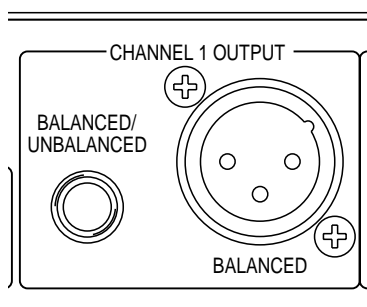
GAIN REDUCTION LED display - The GAIN REDUCTION display indicates how much the expander/gate has reduced the level of the input signal.

ABOVE/BELOW LED display - The ABOVE LED indicates that the input signal is above threshold. The BELOW LED indicates that the input signal is below threshold.

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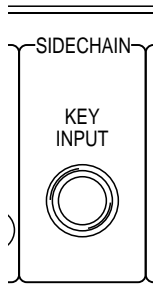


Power Cord - IEC power receptacle. Connect the power cord to an appropriate source of AC power. Observe the marked power supply voltage on rear panel.



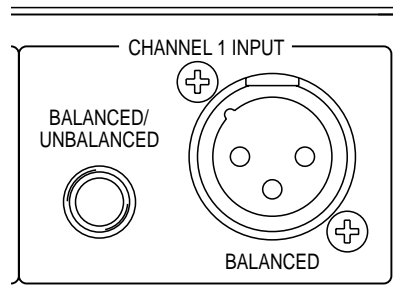
BALANCED/UNBALANCED OUTPUT - 1/4-inch tip-ring-sleeve (TRS) phone jack, wired tip=high(+), ring=low(-) and sleeve=ground. Use this jack when you need a 1/4-inch balanced or unbalanced output. The nominal signal level here is +4 dBu. The wiring diagram for the BALANCED/UNBALANCED OUTPUT connector is reproduced on the back panel of the 562E. Note: connecting an unbalanced cable here will result in an output level that is 6dB lower than the output level you get if you use a balanced cable.

BALANCED OUTPUT - XLR-3 male connector, wired Pin 1=ground, Pin 2=high(+) and Pin3=low(-). Use this connector when you need a balanced XLR output. The nominal signal level here is +4 dBu. The wiring diagram for the BALANCED OUTPUT connector is reproduced on the back panel of the 562E.



KEY INPUT - 1/4-inch tip-ring-sleeve connector, wired tip=return, ring=send and sleeve=ground. To trigger the expander/gate from an external audio source, use the tip of this connector to connect the audio signal that you wish to use as a key signal to trigger the expander/gate. To externally process the sidechain signal, use the ring of this connector to feed the sidechain signal to an external processing device, and use the tip as the return from the external processing device. The wiring diagram for the KEY INPUT connector is reproduced on the back panel of the 562E.

Note: Remember to set the front panel EXT. KEY/BYPASS/IN switch to the EXT. KEY position when using the KEY INPUT.



BALANCED/UNBALANCED INPUT - 1/4-inch TRS phone jack. This connector is wired in parallel with the XLR input connector. Connect either balanced or unbalanced sources here. Use a tip-sleeve plug for unbalanced sources and a tip-ring-sleeve (stereo) plug for balanced sources.

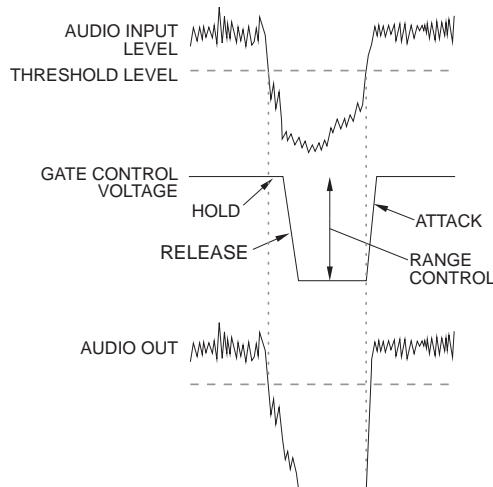
BALANCED INPUT - XLR-3 female connector. This connector is wired in parallel with the TRS input connector. Use this connector when you need a balanced XLR input.

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Threshold

The THRESHOLD control of the 562E sets the audio signal level at which the expander/gate begins working. The expander/gate begins working once the signal has fallen below the threshold level.

The THRESHOLD control setting also determines the degree or amount of gain reduction (in conjunction with the GATE RANGE/EXPANDER RATIO control). An expander/gate with a high threshold setting will expand or gate the signal much more than an expander/gate with a low threshold setting. Clockwise rotation of the THRESHOLD control (i.e. setting a higher threshold level) raises the level that the signal must exceed to trigger the expander/gate to open, so that the signal can pass through untouched.



The expander/gate has the effect of “shutting off” the signal once it falls to, and then drops below, the threshold level. The amount that the signal is “shut off” is determined by the GATE RANGE or EXPANDER RATIO control setting.

Expander Ratio

The 562E uses a *downward* expander, which only acts on signals that are below threshold. The EXPANDER RATIO of the 562E dictates how much the output changes for a below-threshold change in the input. A linear amplifier (like a simple preamp) has a ratio of 1:1 because a change of 1 dB at its input results in a 1 dB change at its output.

A downward expander magnifies output changes for a below-threshold input change. Thus, once the input signal falls below threshold, the expander changes the output by the amount dictated by the ratio. The 562E’s downward expander allows the user to vary the ratio of the expander from 1:1 to 1:3. When the EXPANDER RATIO control is set to 1:3, a below-threshold input signal that gets 5 dB quieter causes a 15 dB decrease at the output. In other words, a small drop in the input signal level (5 dB), occurring below threshold, turns into a much larger drop in signal level at the output (15dB).

A special feature of the 562E’s ratio circuitry is that the ratio automatically reverts to 1:1 when the input signal approaches 25dB below threshold. For example, let’s say that you set the THRESHOLD control to “0dB”, and the EXPANDER RATIO control for a 1:3 ratio. Once the input signal falls below 0dB, for every 1dB that the input signal drops, the output will drop by 3dB. As the input signal approaches -25dB, the output signal will approach -75dB. However when the input signal reaches -25dB, the ratio will revert to 1:1 **from that point on**. This means that, with the EXPANDER RATIO set to 1:3, when the input drops to -26dB, the output will drop to -76dB. When the input decreases to -27dB, the output will decrease to -77dB, and so on. This is to prevent any low level modulation of the expanded signal. (Such modulation can be very annoying.)

Gate Range

The range of a gate is the amount that the output level drops when the gate is triggered “closed” by the input signal dropping below threshold. The gate range of the 562E is adjustable from 0 to 80dBu. If you set the GATE RANGE control to 80dBu, and set the THRESHOLD control to -10dBu, then every time that the input signal to the 562E drops below -10dBu, the gate of the 562E will drop the signal by 80dBu. Thus an input signal of -12dBu would result in -92dBu at the output of the gate. Obviously, when the input signal level is so low that engaging the gate causes it to drop to a level that is lower than the noise floor of the unit, the output signal level of the 562E will no longer decrease by 80dBu from the input signal level.

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Attack

The attack control of a gate/expander allows the user to shape the leading edge of the sound envelope by manipulating the attack time. The `ATTACK TIME` control setting can make the transfer between silence and sound graceful, or it can make the transfer abrupt.

The attack time represents the amount of time that an expander or a gate needs to react to an input signal rising above threshold. Generally, gating is associated with short attack times and expansion is associated with longer attack times. For expander applications, such as removing background noise from speech, you do not want to make the attack time lightning fast because it can make the audio sound “chopped up”. A slower `ATTACK TIME` setting is preferable, so that the expander makes a more graceful transition between silence and speech, retaining a more natural character to the audio.

For gating applications, such as isolating drum kit microphones, a faster attack time is desired, so that the gate can open quickly when the input signal rises above threshold (when the drum is struck). Since much of the audio signal in this case occurs at the moment of impact, a gate that opens slowly would miss most of the audio signal.

Note The fastest attack time setting on the 562E is the “AUTO” position, which is meant to be used in conjunction with the `WINDOW ADVANCE` feature. The 562E’s `WINDOW ADVANCE` feature is designed to open the gate *before* the audio signal passes through the VCA. Engaging the `WINDOW ADVANCE` feature and setting the `ATTACK TIME` control to “AUTO” will ensure that the gate will not miss any of the impact portion of the audio signal generated when the drum is struck.

Release

The release control of a gate/expander allows the user to shape the trailing edge of the sound envelope by manipulating the release time. The `RELEASE TIME` control setting can make the transfer between sound and silence graceful, or it can make the transfer abrupt.

Release time is the length of time required for the gain to recover to the no-signal state. When you are using the 562E in `GATE` mode, release time is the length of time required for the gate to close, because the no-signal state for an audio gate is the closed state. When an above-threshold signal disappears, the `RELEASE TIME` control governs how long it takes for the expander or gate to reduce the gain to the no-signal state.

The `RELEASE TIME` control permits tailoring of the expander’s or gate’s recovery time to the program material. Generally, gating is associated with short release times and expansion is associated with longer release times.

For gating applications, such as isolating drum kit microphones, a faster release time is desired, so that you can achieve better isolation and less leakage into the microphone from the other drums in the drum kit. In the case of drums, a “choppy” sound can also be used as a desired effect (like the infamous gated reverb, commonly used on a snare drum).

Hold

The `HOLD TIME` control sets the amount of time that the gate passes audio before it begins to release. A long hold time will give a more natural sound. For example, when the program material is speech, a long hold time can be used to prevent the gate from releasing (closing) between words. A short hold time gives tighter control over the audio.

Note: The `HOLD TIME` only functions in the gate mode.

Hint: If you hear “jitter” (the gate rapidly toggling between the open and closed state), it means that you have set the `HOLD TIME` too short, and you need to use a longer hold time setting (unless, of course, you *want* that sound).

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Interpreting the Displays

The 562E has ABOVE and BELOW LED's on each channel. These are indicators to show you whether the signal at the input to the 562E is above or below the threshold. When the BELOW LED is lit, and either the ratio is set for greater than 1:1, or the range is set for greater than zero, gain reduction is occurring. When the ABOVE LED is lit, the signal is above threshold, and gain reduction is not occurring.

The 562E also has one GAIN REDUCTION LED display per channel. The GAIN REDUCTION indication displays the amount of attenuation, in dB, that the 562E is applying to the input signal (how far the gain is being reduced from unity). Here's another way of looking at this: if the GAIN REDUCTION display says 12dB of gain reduction, switching the unit to bypass will result in a 12dB increase in the output level.

Using the Sidechain Key Input

The sidechain KEY INPUT is a patch point in the control circuit of a dynamic range processor, which provides access to the part of the circuitry that tells the VCA what to do. The 562E's sidechain is routed through a TRS jack labeled KEY INPUT, which is located on the rear panel. This is an input for any line level **audio** signal (*not* a DC voltage) that you may wish to use as a key signal, to control the opening and closing of the expander/gate. The KEY INPUT jack also functions as a sidechain insert point, providing send and return paths for external processing of the 562E's sidechain signal.

To apply a key signal to the 562E, set the EXT. KEY/BYPASS/IN switch to the EXT. KEY position. Then, connect your key signal source to the KEY INPUT jack of the 562E. Now you can adjust the THRESHOLD and GATE RANGE/EXPANDER RATIO controls for the amount of gating/expansion that you want. You can then fine-tune your sound, using the ATTACK, HOLD and RELEASE TIME controls, as well as the WINDOW ADVANCE feature. A typical application for using the KEY INPUT in this manner would be: passing the bass guitar track through the 562E while using the line-level output of a kick drum trigger to control the gating action.

If you want the 562E to respond more (or less) to certain frequencies in the key signal, the key signal can be equalized to accentuate or diminish certain frequencies before it reaches the 562E's key input. This makes the action of the 562E's expander/gate frequency dependent. Because the audio signal and the control signal remain completely separate, you can equalize the sidechain without changing the EQ in the main audio path.

To make the 562E more sensitive to high frequencies in the key input signal, use an equalizer (graphic or parametric), inserted in the key signal path after the key signal source, and before the 562E, to boost the high frequencies in the sidechain signal. This increases the sensitivity of the control circuits to those particular frequencies, so the expander/gate responds more to those frequencies than any others.

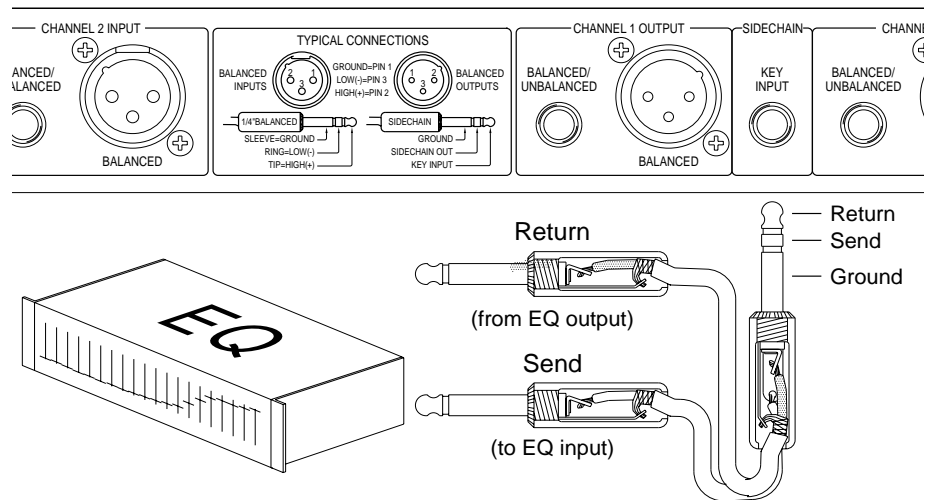
Cutting a frequency creates the inverse effect, making the 562E less sensitive to the frequencies that are removed from the control signal. The 562E provides you with overlapping Low CUT and HIGH CUT sidechain filters for this purpose. These filters cover the frequency spectrum from 10hz to 40Khz. If you prefer, you can use the inserted equalizer to perform the function of cutting selected frequencies.



Frequency ranges of the Low CUT and HIGH CUT sidechain filter controls.

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The 562E's internal sidechain signal can also be equalized in this manner. To insert an equalizer in the sidechain, set the EXT.KEY/BYPASS/IN switch to the EXT. KEY position. Connect an insert cable from the KEY INPUT of the 562E to the input and output of your equalizer as illustrated in the drawing below.



The 562E's KEY INPUT jack is wired: TIP=RETURN, RING=SEND, and SLEEVE=GROUND.

If the expander/gate is being triggered by an unwanted high frequency signal (such as a squeaky kick drum pedal), you can prevent the expander/gate from responding to that portion of the key signal by cutting high frequencies and/or boosting low frequencies in the key signal. This can be accomplished by careful adjustment of the corresponding threshold control, combined with the boost/cut provided by the HIGH CUT filter and/or the EQ in the sidechain.

Note See also "Preventing False Triggering by Hi-hat and Kick While Gating a Snare Drum" on page 15.

If low frequency signals transmitted through a desk or podium are triggering the 562E's expander unnecessarily, use the Low CUT filter to remove the low frequencies from the control signal, or use an equalizer in the sidechain to boost the voice-range frequencies in the control signal.

Hint: You can save time, and make your life easier, by listening to the equalized external key signal or to the equalized internal sidechain signal (instead of the 562E's GATE/EXP. output). When using an external equalizer, listen to the equalized key/sidechain signal by setting the EXT.KEY/BYPASS/IN switch to the EXT.KEY position, and the OUTPUT ASSIGN switch to the KEY LISTEN w/FILTER position. If you are not using an external equalizer, and you want to hear the effect of the Low CUT and HIGH CUT filters on the internal sidechain audio, set the EXT.KEY/BYPASS/IN switch to the IN position, and the OUTPUT ASSIGN switch to the KEY LISTEN w/FILTER position. Listening to the EQ'd key/sidechain signal allows you to hear the signal that will control the 562E, and to more easily find the range that you wish to emphasize or de-emphasize. When you are done listening to the EQ'd key/sidechain signal, return the OUTPUT ASSIGN switch to the GATE/EXP. position for normal operation.

Keep in mind that the threshold level becomes a function of the amount of overall gain through the equalizer, including the boost. If you increase the overall gain in the sidechain signal, by boosting selected frequencies with the equalizer, you will need to also raise the THRESHOLD setting, in order to maintain the same signal level: threshold level relationship that you had before boosting the frequencies.

Note There is no substitute for good mic technique. The more that you isolate the desired signal from any undesired signal, using the rear-axis rejection characteristics of a directional mic to your advantage, the easier it will be for you to achieve optimum gating performance. For example, when miking a snare drum that is to be gated, it is generally a good idea to mic the snare drum with the rear of the mic towards the hi-hat cymbal, to reduce the amount of hi-hat leakage into the snare mic, thus reducing the possibility of the gate being falsely triggered by the hi-hat. The sound picked up by each mic should be primarily the sound of the desired signal.

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Matching Levels vs Matching Impedances

In any audio equipment application, the question of “matching” inevitably comes up. Without digging a hole any deeper than absolutely necessary, we offer the following discussion to (hopefully) clarify your understanding of the subject.

Over the years, we have all had impedance matching pounded into our heads. This is important only for ancient audio systems, power amplifiers, and RF. Technically speaking, the reason is power transfer, which reaches a maximum when source and load are matched. Modern audio systems are voltage transmission systems and source and load matching is not only unnecessary, but undesirable as well.

- ❑ Ancient audio systems operate at 600 ohms (or some other impedance value), and must be matched, both at their inputs and at their outputs. Generally speaking, if you are dealing with equipment that uses vacuum tubes, or was designed prior to 1970, you should be concerned about matching. These units were designed when audio systems were based on maximum power transfer, hence the need for input/output matching.
- ❑ Power amplifiers are fussy because an abnormally low load impedance generally means a visit to the amp hospital. Thus, it’s important to know what the total impedance of the pile of speakers connected to the amplifier really is.
- ❑ RF systems are matched because we really are concerned with maximum power transfer and with matching the impedance of the transmission line (keeps nasty things from happening). Video signals (composite, baseband, or otherwise) should be treated like RF.

Some folks seem to believe that balanced/unbalanced lines and impedances are related; or even worse that they are associated with a particular type of connector. **Not so.** Unbalanced signals are not necessarily high-impedance and balanced signals/lines are not necessarily low-impedance. Similarly, although 1/4 inch jacks are typically used for things like guitars (which are high-impedance and unbalanced), this does not predispose them to only this usage. After all, 1/4 inch jacks are sometimes used for loudspeakers, which are anything but high-impedance. Therefore, the presence of 3-pin XLR connectors should not be construed to mean that the input or output is low-impedance (or high-impedance). The same applies to 1/4 inch jacks.

So, what is really important? Signal level, and (to a much lesser degree), the impedance relation between an output (signal source) and the input that it connects to (signal receiver).

Signal level is very important. Mismatch causes either loss of headroom or loss of signal-to-noise ratio. Thus, microphone inputs should only see signals originating from a microphone, a direct (DI) box, or an output designated microphone-level output. Electrically, this is in the range of approximately -70 to -20 dBm. Line inputs should only see signals in the -10 to +24 dBm/dBu range. Guitars, high-impedance microphones, and many electronic keyboards do not qualify as line-level sources.

The impedance relation between outputs and inputs needs to be considered, but only in the following way - *Always make sure that a device’s input impedance is higher than the output source impedance of the device that drives it.*

Some manufacturers state a relatively high-impedance figure as the output impedance of their equipment. What they really mean is that this is the minimum load impedance that they would like their gear to see. In most cases, seeing a output impedance figure of 10,000 (10K) ohms or higher from modern equipment that requires power (batteries or AC) is an instance of this type of rating. If so, then the input impedance of the succeeding input must be equal to or greater than the output impedance of the driving device.

Symetrix equipment inputs are designed to bridge the output of whatever device drives the input (i.e. to be greater than 10 times the actual source impedance). Symetrix equipment outputs are designed to drive 600-ohm or higher loads (600-ohm loads are an archaic practice that won’t go away). You don’t need to terminate the output with a 600-ohm resistor if you aren’t driving a 600-ohm load. (If you don’t understand the concept of termination, you probably don’t need to anyway.)

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The two facts that you need to derive from this discussion are:

- Match signal levels for best headroom and signal-to-noise ratio.
- For audio, impedance matching is only needed for vintage equipment and power amplifier outputs. In all other cases, ensure that your inputs bridge your outputs (meaning the inputs are in the range of 2 to 200 times the output source impedance) .

Signal Levels

The 562E is designed around studio/professional line levels: +4 dBu or 1.23 volts RMS. The unit is quiet enough to operate at lower signal levels such as those found in semipro or musical-instrument (MI) equipment (-10 dBu or 300 millivolts).

I/O Impedances

The 562E is designed to interface into almost any recording studio or sound reinforcement application. This includes:

- 600-ohm systems where input and output impedances are matched.
- Unbalanced semiprofessional equipment applications.
- Modern bridging systems where inputs bridge and outputs are low source impedances (voltage transmission systems).

The 562E's input impedance is greater than 20-kilohms balanced or 10K unbalanced. The inputs may be driven from any source (balanced or unbalanced) capable of delivering at least -10 dBu into the aforementioned impedances.

The 562E's output impedance is 600 ohms balanced, 300 ohms unbalanced. The output line driver delivers +22 dBm into 600-ohm balanced loads or +18 dBm into 600-ohm unbalanced loads.

Polarity Convention

The 562E inputs and outputs use the international standard polarity convention of pin 2 hot. Therefore, if your system uses balanced inputs and outputs, and uses the 562E this way, then the polarity convention is unimportant. If your system is both balanced and unbalanced, then you must pay attention to this, especially when going in and coming out through different connector types (like input on an XLR, output on a phone jack).

XLR	1/4" Phone	Signal
Pin 1	Sleeve	Ground
Pin 2	Tip	High
Pin 3	Ring	Low

Input and Output Connections

The illustration on the next page shows how to connect the 562E to balanced and unbalanced sources and loads.

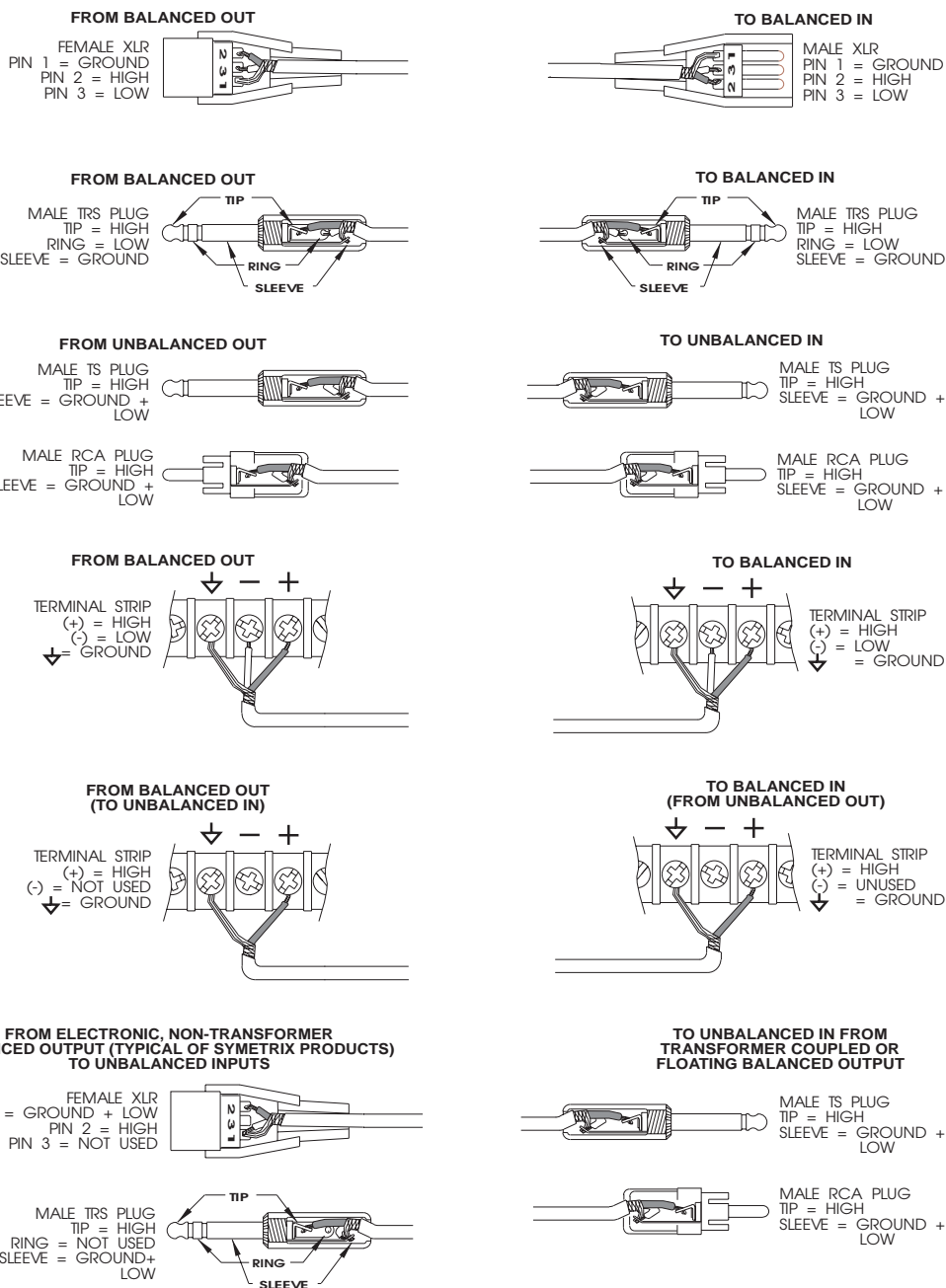
To operate the 562E from unbalanced sources, run a 2-conductor shielded cable (that's two conductors plus the shield) from the source to the 562E. At the source, connect the low/minus side to the shield, these connect to the source's ground; connect the high/plus side to the source's signal connection. At the 562E, the high/plus wire connects to pin 2, the low/minus wire connects to pin 3, and the shield (always) connects to pin 1. This is the preferred method as it makes best use of the 562E's balanced input (even though the source is unbalanced). The other alternative shown in the illustration converts the 562E's balanced input into an unbalanced input at the input connector. This works, but is more susceptible to hum and buzz than the preferred method. There is no level difference between either method.

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You can drive unbalanced loads with the 562E's outputs by using the XLR connector with pin 3 left open. In an emergency (the show must go on), you can ground pin 3, but if you have the choice...leave it open. If you must ground pin 3, it is must be grounded at the 562E, rather than at the other end of the cable. The price, regardless of whether or not pin 3 is grounded is 6 dB less output level. If your system is wired with pin 3 hot, and you are driving an unbalanced load, **pin 2 must float**.

The 1/4-inch input jack is paralleled with the XLR-input. In a large installation, it is permissible to use one of the connectors as the input connection and to use either or both of the remaining connections for paralleling other inputs with the 562E.

The 1/4-inch output jack is a TRS (tip-ring-sleeve) jack wired for balanced operations. This jack may also be used for unbalanced operation. The unbalanced output is always 6 dB lower in level than the balanced output.



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The 562E Auto Windowing Expander Gate can provide signal processing capabilities ranging from essential to esoteric. Some of the following techniques are standard and straightforward. Other techniques may be used less commonly, but are worthy of investigation. These examples are intended to give you some sample setups that you can use right away, but they are not intended to represent every possible use of the Symetrix 562E.

Perhaps the most common use for gates in music production is on drum and percussion tracks. In addition, gates may be used on virtually any type of musical instrument or audio sound effect to remove unwanted room noise and ambience, to modify reverb and other time-related effects, and to create special effects.

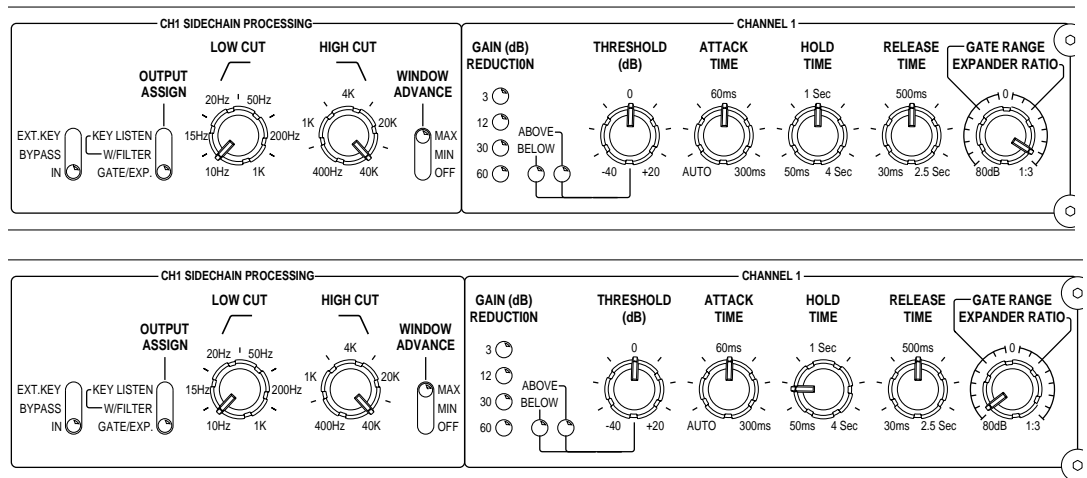
The downward expander is ideal for tasks requiring more subtle control. Expanders can provide single-ended noise reduction for tape recorders, workstations, effects devices, companding (when used with a compressor), and noise and interference suppression for studio and live sound.

Noise Elimination

The 562E is capable of eliminating noise on a track or channel that becomes objectionable when not masked by the desired signal. For general and gentle noise suppression (especially on voice), use expansion. For more “hardline” noise suppression, use gating.

You can use the 562E to reduce body noises picked up by an announce microphone, to reduce amp noise from a noisy guitar amp, or to reduce the amount of room sound in a guitar track that was recorded a little too loosely in a room that was a little too noisy. For sound reinforcement, the 562E is useful for tending an announce mic that needs to be left on, when you really don’t want it picking up every whisper in its vicinity or going into feedback.

Setup for these applications is easy. With no signal and the GATE RANGE/EXPANDER RATIO control either clockwise (for expanding) or counterclockwise (for gating), adjust the THRESHOLD control counterclockwise until you begin to see gain reduction on the LED display. Continue until you hear the degree of expansion/gating that you want. When the signal is present, you may need to refine the setting so that the 562E doesn’t reduce the gain during momentary pauses. You can slow things down a bit via the HOLD and RELEASE controls, which help prevent expansion/gating during momentary pauses. Remember: The HOLD control only functions while gating.



Isolating and Tightening Up Drum Sounds

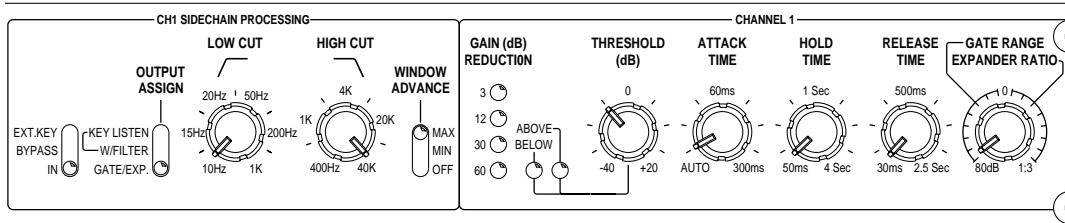
The damping effect achieved by applying duct tape to a drum head is very similar to the effect of applying gating or expanding to the drums. The duct tape reduces the decay (sustain) of the instrument, and helps get rid of annoying ring frequencies. Using the 562E to reduce the decay of individual drums allows the drummer to play with the full power of his or her drums, at live perfor-

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mance levels, while providing the engineer with the kind of control that is necessary for a good, tight track.

In a live sound reinforcement situation, gating drums can tighten up the drum sound. Equally important, gates allow the sound engineer to turn up the drums louder than would normally be possible without feedback. This is because a correctly set gate can suppress feedback while the feedback is at a lower level than the setting of the gate's threshold (before the feedback has a chance to take off).

Careful adjustment of the ATTACK and RELEASE controls allow the relative balance between the drum's impact and decay to be changed. Short ATTACK, HOLD and RELEASE times emphasize the impact portion of the sound, but may sound artificial in some situations. Longer ATTACK, HOLD and RELEASE times generally sound more natural, but allow more ringing and feedback. The WINDOW ADVANCE feature can be used to ensure that the gate opens in time to catch all of the impact portion of the sound. The GATE RANGE/EXPANDER RATIO will affect the ATTACK and RELEASE times, so use as much attenuation as needed, but no more than necessary. Be prepared for some serious fine tuning of these controls.



Note Be sure to select microphones with good off-axis rejection (including high frequencies) and use the directional patterns of your microphones to isolate the desired signal as much as possible at the source. The sounds picked up by the microphones must be primarily the desired sounds, or the gate won't be able to discriminate between the desired sound and an unwanted sound.

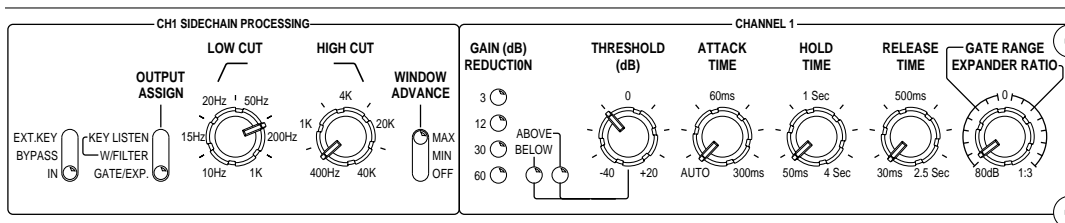
Preventing False Triggering by Hi-hat and Kick While Gating a Snare Drum

A common problem that engineers run into when they try to gate a snare drum is false triggering. This is most often caused by audio leakage into the snare mic from the hi-hat and/or kick drum. The 562E's Low CUT and High CUT filters are designed to eliminate just such a problem.

First, and foremost, employ good mic technique to reject as much of the sound that is causing the false triggering as possible. Start with the 562E's Low CUT knob in the full counterclockwise position, the HIGH CUT knob in the full clockwise position, the THRESHOLD knob in the counterclockwise position and the GATE RANGE knob in the full counterclockwise position. While the drummer plays just the snare and hi-hat, adjust the THRESHOLD control clockwise until gating occurs (even though the hi-hat may trigger the gate at this point).

Next, set the OUTPUT ASSIGN switch to the KEY LISTEN W/FILTER (center) position. Rotate the HIGH CUT control to its full counterclockwise position. The hi-hat should now be much less audible, and the snare should be a muffled "thud".

Set the OUTPUT ASSIGN switch to the GATE/EXP. position. You may need to readjust the THRESHOLD control slightly to make the gate trigger properly. The snare should now be gated without any



false triggering by the hi-hat.

With the OUTPUT ASSIGN switch still in the GATE/EXP. position, have the drummer play the snare again, but this time with kick drum accompaniment. If the kick drum is falsely triggering the snare gate, rotate the LOW CUT control towards the clockwise position until the kick drum no longer triggers the gate.

Gated Reverb

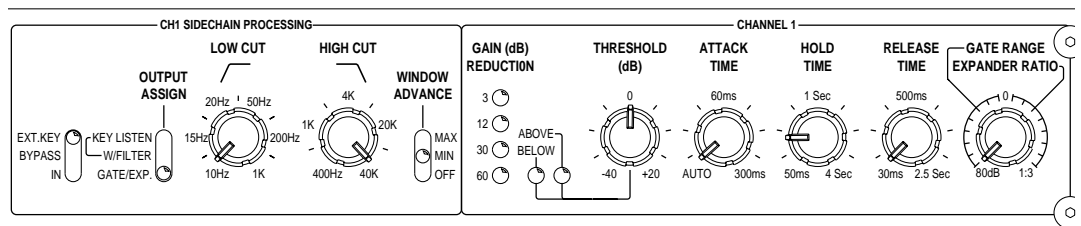
You knew this was coming, didn't you?

The obvious method to gate reverb is to feed the reverb to the input of the 562E, and to use the internal triggering. However, if you use a HOLD TIME setting that is too short, you can run into jitter problems when the reverb signal starts to decay.

To avoid this, and still be able to use a short HOLD TIME setting, feed a separate send of only the dry signal to the KEY IN of the 562E. Set the EXT. KEY/BYPASS/IN switch to the EXT.KEY position. Feed the reverb to the audio input of the 562E. This will give the gate a trigger with a well-defined beginning and end.

Be sure to experiment with the WINDOW ADVANCE feature, especially on instrument sounds with a sharp attack, such as drums.

Set the other controls as shown in the following illustration.



Noise Reduction and Feedback Control In Vocal Monitors

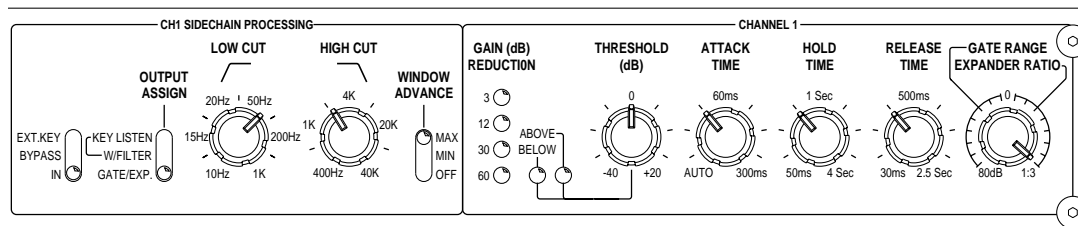
Here is one of the golden uses of the 562E - increasing gain before feedback and cleaning up the audio in stage monitor systems. This use of the 562E requires some fine tuning of the THRESHOLD, LOW CUT and HIGH CUT controls, but it can make a huge contribution towards ease of life for the monitor mixing engineer.

First, set up the 562E, using the downward expander, with a fairly fast release time. The threshold should be set to trigger on normal level speech.

Set the OUTPUT ASSIGN switch to KEY LISTEN W/FILTER. If the stage setup does not include a drum kit, you can skip the next step.

If the stage setup includes a drum kit, start turning the HIGH CUT control from fully clockwise toward counterclockwise until you have eliminated as much of the sound of the cymbals as possible, without detracting from the vocals.

If you wish, apply some rolloff to the lows using the LOW CUT control. This will help prevent the downward expander from triggering if the singer likes to rock the mic stand.



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Return the OUTPUT ASSIGN switch to the GATE/EXP. setting and do your final threshold adjustments as well as any filter fine tuning.

You may prefer to use the 562E's gate if the downward expander is not providing enough signal attenuation for you.

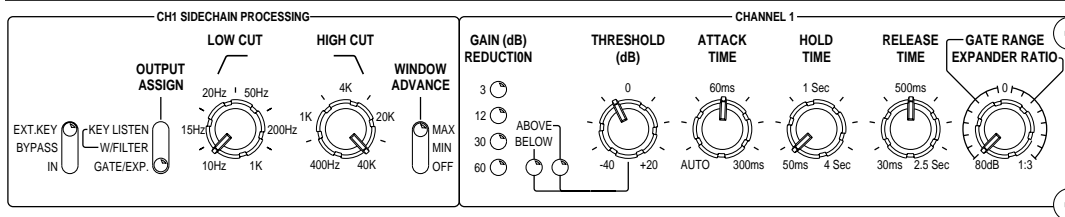
Cleaning Up Backing Vocals

A common problem with recording backing vocals, especially when layering multiple tracks of them, is that the beginnings and endings of lines or phrases can get sloppy. All it takes is for a singer to be a fraction of a second early in starting or late in stopping. The following technique, using the 562E, won't help with timing differences during the line or phrase, but it will help greatly in tightening up backing vocals with uneven starts and stops. This can make a valuable contribution to your mix, as the beginnings and endings of lines and phrases are the points when timing problems are most obvious to the listener.

Mix all of the backing vocals into one subgroup (two for stereo), and feed the subgroup output(s) to the 562E input(s). Select the backing vocal track with the best timing, and send it to an auxiliary mixer output. Feed this auxiliary output into the KEY INPUT of the 562E. This will be the signal that you use to trigger the gate.

Set the EXT.KEY/BYPASS/IN switch to EXT.KEY, set the OUTPUT ASSIGN switch to GATE/EXP. and set the WINDOW ADVANCE switch to MAX. Set the THRESHOLD control counterclockwise, set the ATTACK TIME and RELEASE TIME controls to a medium setting, set the HOLD TIME counterclockwise, and set the GATE RANGE control counterclockwise.

Begin rotating the THRESHOLD control clockwise until gating occurs. Then, fine-tune the THRESHOLD, ATTACK TIME and RELEASE TIME controls for the best sound.



Midi Control Of The 562E

OK, you can't directly control the 562E by MIDI. However, there is a clever trick you can use to control it indirectly, if you have a midi-controlled synthesizer output that you can spare.

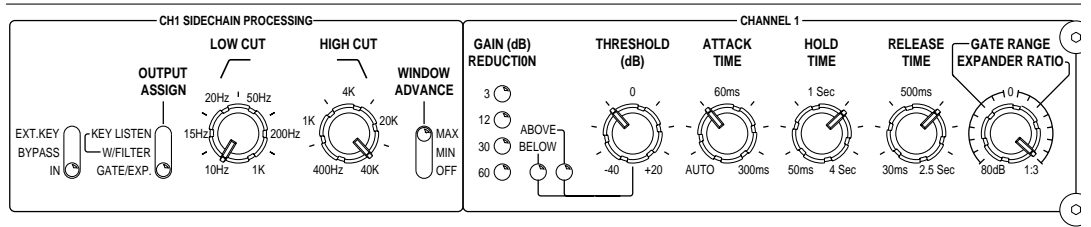
Connect the synth output to the KEY IN of the 562E, and set the EXT.KEY/BYPASS/IN switch to EXT.KEY. Now, when the synthesizer plays a sustained note at a constant level, with fast attack and decay, it will act as a switch to turn the gate off and on. Simply write your midi program so that the synthesizer is playing a note for the duration of the time that you want the 562E to be passing signal.

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Noise Reduction for Effects Returns

One of the most overlooked noise sources in sound reinforcement or recording systems is signal processing. Devices such as reverberation units, digital delays, harmonizers, etc. all have the potential to enhance the sound, but each device added to the signal chain is going to add a certain amount of noise, thus diminishing the overall signal-to-noise ratio. The very nature of compressors and limiters raises the apparent noise floor of a signal as the dynamic range is squashed.

The 562E's downward expander can help you overcome this problem. Try patching the 562E between the effects sends and the effects returns on the console. Use slower HOLD TIME and RELEASE TIME settings to preserve the natural decay times of reverbs, etc.

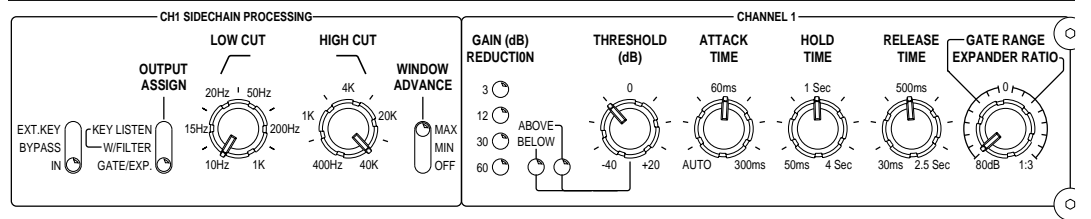
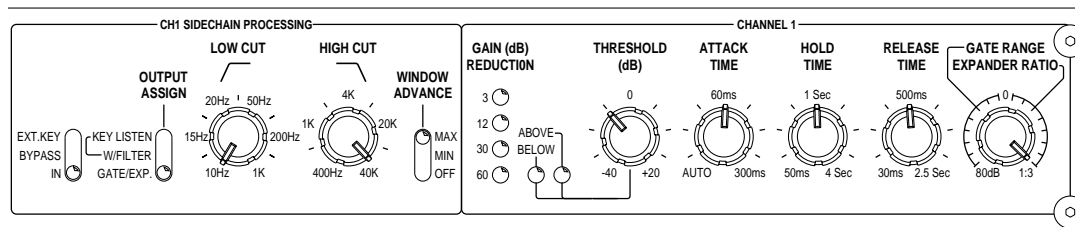


Noise Reduction for Console Outputs

If you have a noise problem at your console outputs, it is best to find the source of the noise problem, and fix it at the source. However, in a crunch, the 562E can greatly improve the apparent signal-to-noise ratio of sound reinforcement consoles. One 562E can be used to gate the mono or stereo output of the board, or multiple 562E's can be used to gate the subgroup outputs.

When using the 562E on the main output(s) of the console, use gating with a mid to slow release time, or use downward expansion.

When using the 562E on the subgroup outputs of the console, use gating for the outputs carrying a fast transient signal (for example: drums or percussion). For subgroup outputs dedicated to signal sources with gentler dynamics, such as vocals, use slower ATTACK TIME, RELEASE TIME and HOLD TIME settings when gating, or use downward expansion.



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Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE
No output	Check cables and connections. Are inputs driven by outputs, and outputs driving inputs? Verify cables, source and load by patching input and output connections together, at the unit. Check for AC power presence. Did you connect the input cable to the KEY IN jack, instead of the INPUT jack? Check input by plugging headphones halfway into the Key In jack and listening for input signal. Check output by plugging headphones into output connector.
Hum or buzz in output	Check input and output connector wiring (refer to page 13). Ground loop: check related system equipment grounding. Are all system components on the same AC ground?
Distortion	Check input signal. Is it too hot, or is it already distorted? Check the output loading. It should be above 600 ohms. Is the input of the device following the 562E clipping? Is something else clipping?
Noise (hiss)	Check input signal levels. The 562E is intended to operate at or near “line” level (-10 dBu or greater). Make sure that the signal you are feeding to the 562E is a line level signal, not mic level. Check gain settings on downstream equipment. The system gain structure should be such that the 562E operates at or near unity gain. Is the input signal already noisy?
No gating or expansion	Did you connect the output cable to the KEY IN jack, instead of the OUTPUT jack? Is the EXT.KEY/BYPASS/IN switch set to BYPASS? Is the EXT.KEY/BYPASS/IN switch set to IN? If the EXT.KEY/BYPASS/IN switch is set to EXT.KEY, check cable connections at KEY IN and at the output of any audio source that is being used as a trigger, or at the input and output of any external device that is being used to process the sidechain signal (i.e. an EQ). Check that any audio source or external device that is connected to the KEY IN has power and is turned on. Check that any cable that is plugged into the KEY IN is also connected to an audio source or external processing device.
No LED display	Is the unit plugged in, and turned on? Is the AC outlet OK?
“Jitter” when gating	Use a longer HOLD TIME setting. Longer ATTACK TIME and RELEASE TIME settings may also be necessary.
Unit not plugged in, but works anyway	Call us.

Notes



Architects and Engineers Specifications

The Dual Channel Expander/Gate shall provide two independent channels of dynamic range expansion for wide band, wide range audio signals. The unit shall occupy one rack space (1U).

The Expander/Gate shall incorporate AutoWindowing™ and Window Advance™ circuitry to deliver virtually instantaneous attack times without any audible “clicks” or “pops”. There shall be continuously variable controls for Threshold, Attack Time, Gate Hold Time, and Release Time. Gate Range and Expander Ratio shall be continuously variable via a single front panel control.

There shall be separate, tunable high pass and low pass filters in series within the control sidechain. The cutoff frequencies shall be individually adjustable via front panel controls. There shall be an External Key input on the rear panel and a Key Listen mode shall be available that will monitor the control signal either pre or post Key Filter. There shall be a front panel control to select either External Key, Internal Key, or Bypass mode.

Each channel shall have a four segment LED meter that shall indicate gain reduction amount. The meter shall have a range of 60dB. There shall also be LED indicators that display

the input signal level relative to the Expander/Gate threshold.

Pre-filter control loop access will be available via a 1/4" TRS female jack. This shall be wired Tip=Return, Ring=Send, Sleeve=Ground.

The inputs shall be active balanced bridging designs terminated with 3-pin XLR (AES/IEC standard wiring) and 1/4" TRS connectors. The input circuitry shall incorporate RFI filters. The outputs shall be active servo-balanced designs having equal source impedances and terminated with 3-pin XLR (AES/IEC standard wiring).

The inputs shall accommodate +22 dBu signals without distortion, and the balanced outputs shall be capable of delivering +22 dBm into a 600 ohm load. Overall frequency response (+0, -1dB) shall be 20Hz to 20kHz. THD+N shall not be greater than 0.03%, 0dB g/r, 1kHz into a 600-ohm load. Dynamic range shall be 110dB.

The unit shall have a built-in power supply and operate from 117V nominal AC (105-130V) 50/60 Hz or 230V nominal AC (207-253V) 50 Hz.

The unit shall be a Symetrix Incorporated model 562E Windowing Expander/Gate.

Specifications

Number of audio channels	2	Chassis size	1.75"H x 19"W x 4.25"D
Connectors	XLR and 1/4" TRS	AC requirements	117V ac, nominal 230V ac, nominal
Maximum input level	+22 dBu	Power consumption	18 watts, maximum
Maximum output level	+22 dBu		
Input impedance	>20K Balanced, >10K Unbalanced		
Output impedance	600 ohms Balanced		
THD+Noise @ 1kHz	.03% @ +4 dBu		
Signal/Noise	94 dB		
Dynamic range	112 dB		
Frequency response	+0, -3dBm, 10 Hz to 40 kHz		
Attack time	Program Dependent to 300 milliseconds		
Attenuation	80 dB max, adjustable		

In the interest of continuous product improvement, Symetrix, Inc. reserves the right to alter, change, or modify these specifications without prior notice.
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562E Limited Warranty

Symetrix, Inc. expressly warrants that the product will be free from defects in material and workmanship for one (1) year. Symetrix's obligations under this warranty will be limited to repairing or replacing, at Symetrix's option, the part or parts of the product which prove defective in material or workmanship within one (1) year from date of purchase, provided that the Buyer gives Symetrix prompt notice of any defect or failure and satisfactory proof thereof. Products may be returned by Buyer only after a Return Authorization number (RA) has been obtained from Symetrix. Buyer will prepay all freight charges to return the product to the Symetrix factory. Symetrix reserves the right to inspect any products which may be the subject of any warranty claim before repair or replacement is carried out. Symetrix may, at its option, require proof of the original date of purchase (dated copy of original retail dealer's invoice). Final determination of warranty coverage lies solely with Symetrix. Products repaired under warranty will be returned freight prepaid by Symetrix via United Parcel Service (surface), to any location within the Continental United States. At Buyer's request the shipment may be returned via airfreight at Buyer's expense. Outside the Continental United States, products will be returned freight collect.

The foregoing warranties are in lieu of all other warranties, whether oral, written, express, implied or statutory. Symetrix, Inc.

Limitation of Liability

The total liability of Symetrix on any claim, whether in contract, tort (including negligence) or otherwise arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair, replacement or use of any product will not exceed the price allocable to the product or any part thereof which gives rise to the claim. In no event will Symetrix be liable for any incident

expressly disclaims any IMPLIED warranties, including fitness for a particular purpose or merchantability. Symetrix's warranty obligation and buyer's remedies hereunder are SOLELY and exclusively as stated herein.

This Symetrix product is designed and manufactured for use in professional and studio audio systems and is not intended for other usage. With respect to products purchased by consumers for personal, family, or household use, Symetrix **expressly disclaims all implied warranties, including but not limited to warranties of merchantability and fitness for a particular purpose.**

This limited warranty, with all terms, conditions and disclaimers set forth herein, shall extend to the original purchaser and anyone who purchases the product within the specified warranty period.

Warranty Registration must be completed and mailed to Symetrix within thirty (30) days of the date of purchase.

Symetrix does not authorize any third party, including any dealer or sales representative, to assume any liability or make any additional warranties or representation regarding this product information on behalf of Symetrix.

This limited warranty gives the buyer certain rights. You may have additional rights provided by applicable law.

tal or consequential damages including but not limited to damage for loss of revenue, cost of capital, claims of customers for service interruptions or failure to supply, and costs and expenses incurred in connection with labor, overhead, transportation, installation or removal of products or substitute facilities or supply houses.

562E

Servicing the 562E

If you have determined that your 562E requires repair services and you live *outside* of the United States please contact your local Symetrix dealer or distributor for instructions on how to obtain service. If you reside in the U.S. then proceed as follows:

At the Symetrix factory, Symetrix will perform in-warranty or out-of-warranty service on any product it has manufactured for a period of five years from date of manufacture.

Before sending anything to Symetrix, contact our Customer Service Department for a return authorization (RA) number. The telephone number is (425) 787-3222, Monday through Friday, 8AM (800 hours) though 4:30 PM (1630 hours), Pacific Time.

In-warranty repairs

To get your 562E repaired under the terms of the warranty:

1. Call us for an RA number.
2. Pack the unit in its original packaging materials.
3. Include your name, address, daytime telephone number, and a brief statement of the problem.
4. Write the RA number on the outside of the box.
5. Ship the unit to Symetrix, freight prepaid.

We do not accept freight collect shipments.

Just do these five things, and repairs made in-warranty will cost you only one-way freight charges. We'll prepay the return (surface) freight.

If you choose to send us your product in some sort of flimsy packaging, we'll have to charge you for proper shipping materials. If you don't have the factory packaging materials, then do yourself a favor by using an oversize carton, wrap the unit in a plastic bag, and surround it with bubble-wrap. Pack the box full of Styrofoam peanuts. Be sure there is enough clearance in the carton to protect the rack ears (you wouldn't believe how many units are returned with bent ears). We won't return the unit in anything but Symetrix packaging for which we will have to charge you. Of course, if the problem turns out to be operator inflicted, you'll have to pay for both parts and labor. In any event, if there are charges for the repair costs, you will pay for the return freight. All charges will be COD unless you have made other arrangements (prepaid, Visa or Mastercard).

Out-of-warranty repairs

If the warranty period has passed, you'll be billed for all necessary parts, labor, packaging materials, and freight charges. Please remember, you must call for an RA number before sending the unit to Symetrix.

562E

Declaration of Conformity

We, **Symetrix Incorporated**,
14926 35th Ave West, Lynnwood, Washington, USA,
declare under our sole responsibility that the product:

562E Windowing Expander/Gate

to which this declaration relates,
is in conformity with the following standards:

EN 60065
Safety requirements for mains operated electronic and related apparatus for household and similar general use.

EN 50081-1
Electromagnetic compatibility - Generic emission standard Part 1: Residential, commercial, and light industry.

EN 50082-1
Electromagnetic compatibility - Generic immunity standard Part 1: Residential, commercial, and light industry.

EN 55022
Limits and methods of measurement of radio interference characteristics of information technology equipment.

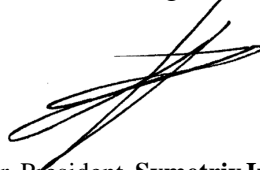
The technical construction file is maintained at:

Symetrix, Inc.
14926 35th Ave. West
Lynnwood, WA, 98037-2303
USA

The authorized representative located within the European Community is:

World Marketing Associates
P.O. Box 34
Newquay, Cornwall, TR7 1TU, U.K.

Date of issue: 15 June, 1997
Place of issue: Lynnwood, Washington, USA
Authorized signature:



Dane Butcher, President, **Symetrix Incorporated**.

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 **Symetrix**



Symetrix, Inc.

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USA

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