

CLX-440

Compressor / Limiter / Expander

Reference Manual

2001

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Welcome!

Thank you for making the Alesis CLX-440™ a part of your studio. Since 1984, we've been designing and building creative tools for the audio community. We believe in our products, because we've heard the results that creative people like you have achieved with them. One of Alesis' goals is to make high-quality studio equipment available to everyone, and this Reference Manual is an important part of that. After all, there's no point in making equipment with all kinds of capabilities if no one explains how to use them. So, we try to write our manuals as carefully as we build our products.

The goal of this manual is to get you the information you need as quickly as possible, with a minimum of hassle. We hope we've achieved that. If not, please drop us an email and give us your suggestions on how we could improve future editions of this manual.

We hope your investment will bring you many years of creative enjoyment and help you achieve your goals.

Sincerely,
The people of Alesis Studio Electronics

How to Use This Manual

This manual is divided into the following sections describing the various functions and applications for the CLX-440. While it's a good idea to read through the entire manual once carefully, those having general knowledge about studio equipment should use the table of contents to look up specific functions.

Chapter 1: Quick Start. If you're already familiar with recording, this will get you started using the CLX-440 right away. It's a short guide to the essential elements of connections and operation.

Chapter 2: Connections. This section gives detailed instructions for connecting the CLX-440 to a variety of typical audio systems.

Chapter 3: Basics of Compression. This section explains what a compressor does and explains the function of each of the controls.

Chapter 4: Basics of Expansion. This chapter explains the other major feature of the CLX-440, expansion, and each of the front panel controls dedicated to this function.

Chapter 5: Applications. Skip to this section for tips on using the CLX-440 with a variety of audio sources.

Chapter 6: Troubleshooting. Refer to this chapter if you experience any problems while using the CLX-440.

Helpful tips and advice are highlighted in a shaded box like this.

The names of specific controls or connectors on the CLX-440 are printed in a special font, i.e., the **BYPASS** button.



When something important appears in the manual, an icon (like the one on the left) will appear in the left margin. This symbol indicates that this information is vital when operating the CLX-440.

Important Safety Instructions

Safety symbols used in this product:



This symbol alerts the user that there are important operating and maintenance instructions in the literature accompanying this unit.



This symbol warns the user of uninsulated voltage within the unit that can cause dangerous electric shocks.



This symbol warns the user that output connectors contain voltages that can cause dangerous electrical shock.

Please follow these precautions when using this product:



1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a damp cloth. Do not spray any liquid cleaner onto the faceplate, as this may damage the front panel controls or cause a dangerous condition.
7. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.



9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. When the provided plug does not fit

into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Use only attachments or accessories specified by the manufacturer.
12. Use only with a cart, stand, bracket, or table designed for use with professional audio or music equipment. In any installation, make sure that injury or damage will not result from cables pulling on the apparatus and its mounting. If a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.



14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. This unit produces heat when operated normally. Operate in a well-ventilated area with at least six inches of clearance from peripheral equipment.
16. This product, in combination with an amplifier and headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
17. Do not expose the apparatus to dripping or splashing. Do not place objects filled with liquids (flower vases, softdrink cans, coffee cups) on the apparatus.
18. **WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.**

Instructions de Sécurité Importantes (French)

Symboles utilisés dans ce produit



Ce symbole alerte l'utilisateur qu'il existe des instructions de fonctionnement et de maintenance dans la documentation jointe avec ce produit.



Ce symbole avertit l'utilisateur de la présence d'une tension non isolée à l'intérieur de l'appareil pouvant engendrer des chocs électriques.



Ce symbole prévient l'utilisateur de la présence de tensions sur les raccords de sorties, représentant un risque d'électrocution.

Veillez suivre ces précautions lors de l'utilisation de l'appareil:



1. Lisez ces instructions.

2. Gardez ces instructions.

3. Tenez compte de tous les avertissements.

4. Suivez toutes les instructions.

5. N'utilisez pas cet appareil à proximité de l'eau.

6. Ne nettoyez qu'avec un chiffon humide. Il est potentiellement dangereux d'utiliser des pulvérisateurs ou nettoyeurs liquides sur cet appareil.

7. Installez selon les recommandations du constructeur.

8. Ne pas installer à proximité de sources de chaleur comme radiateurs, cuisinière ou autres appareils (dont les amplificateurs) produisant de la chaleur.



9. Ne pas enlever la prise de terre du cordon secteur. Une prise murale avec terre deux broches et une troisième reliée à la terre. Cette dernière est présente pour votre sécurité. Si le cordon secteur ne rentre pas dans la prise de courant, demandez à un électricien qualifié de remplacer la prise.

10. Evitez de marcher sur le cordon secteur ou de le pincer, en particulier au niveau de la prise, et aux endroits où il sort de l'appareil.
11. N'utilisez que des accessoires spécifiés par le constructeur.
12. N'utilisez qu'avec un stand, ou table conçus pour l'utilisation d'audio professionnel ou instruments de musique. Dans toute installation, veillez de ne rien endommager à cause de câbles qui tirent sur des appareils et leur support.
13. Débranchez l'appareil lors d'un orage ou lorsqu'il n'est pas utilisé pendant longtemps.



14. Faites réparer par un personnel qualifié. Une réparation est nécessaire lorsque l'appareil a été endommagé de quelque sorte que ce soit, par exemple lorsque le cordon secteur ou la prise sont endommagés, si du liquide a coulé ou des objets se sont introduits dans l'appareil, si celui-ci a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.
15. Puisque son fonctionnement normale génère de la chaleur, placez cet appareil au moins 15cm. des équipements périphériques et assurez que l'emplacement permet la circulation de l'air.
16. Ce produit, utilisé avec un amplificateur et un casque ou des enceintes, est capable de produire des niveaux sonores pouvant engendrer une perte permanente de l'ouïe. Ne l'utilisez pas pendant longtemps à un niveau sonore élevé ou à un niveau non confortable. Si vous remarquez une perte de l'ouïe ou un bourdonnement dans les oreilles, consultez un spécialiste.

Beim Benutzen dieses Produktes beachten Sie bitte die folgenden Sicherheitshinweise: (German)



1. Lesen Sie die Hinweise.
2. Halten Sie sich an die Anleitung.
3. Beachten Sie alle Warnungen.
4. Beachten Sie alle Hinweise.
5. Bringen Sie das Gerät nie mit Wasser in Berührung.

6. Verwenden Sie zur Reinigung nur ein weiches Tuch. Verwenden Sie keine flüssigen Reinigungsmittel. Dies kann gefährliche Folgen haben.
7. Halten Sie sich beim Aufbau des Gerätes an die Angaben des Herstellers.
8. Stellen Sie das Gerät nicht in der Nähe von Heizkörpern, Heizungsklappen oder anderen Wärmequellen (einschließlich Verstärkern) auf.
9. Verlegen Sie das Netzkabel des Gerätes niemals so, daß man darüber stolpern kann oder daß es gequetscht wird.
10. Benutzen Sie nur das vom Hersteller empfohlene Zubehör.
11. Verwenden Sie ausschließlich Wagen, Ständer, oder Tische, die speziell für professionelle Audio- und Musikinstrumente geeignet sind. Achten Sie immer darauf, daß die jeweiligen Geräte sicher installiert sind, um Schäden und Verletzungen zu vermeiden. Wenn Sie einen Rollwagen benutzen, achten Sie darauf, das dieser nicht umkippt, um Verletzungen auszuschließen.
12. Ziehen Sie während eines Gewitters oder wenn Sie das Gerät über einen längeren Zeitraum nicht benutzen den Netzstecker aus der Steckdose.



13. Die Wartung sollte nur durch qualifiziertes Fachpersonal erfolgen. Die Wartung wird notwendig, wenn das Gerät beschädigt wurde oder aber das Stromkabel oder der Stecker, Gegenstände oder Flüssigkeit in das Gerät gelangt sind, das Gerät dem Regen oder Feuchtigkeit ausgesetzt war und deshalb nicht mehr normal arbeitet oder heruntergefallen ist.
14. Dieses Gerät produziert auch im normalen Betrieb Wärme. Achten Sie deshalb auf ausreichende Lüftung mit mindestens 15 cm Abstand von anderen Geräten.
15. Dieses Produkt kann in Verbindung mit einem Verstärker und Kopfhörern oder Lautsprechern Lautstärkepegel erzeugen, die anhaltende Gehörschäden verursachen. Betreiben Sie es nicht über längere Zeit mit hoher Lautstärke oder einem Pegel, der Ihnen unangenehm ist. Wenn Sie ein Nachlassen des Gehörs oder ein Klingeln in den Ohren feststellen, sollten Sie einen Ohrenarzt aufsuchen.

CE Declaration of Conformity

See the Internet site:

www.alesis.com

Instructions to the User (FCC Notice)

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Chapter 1

Quick Start Guide

If you can't wait to get started:

The Alesis CLX-440™ is a unique product, but its basic hookup and operation is similar to other compressors in most respects. If you're experienced with signal processors, this chapter is a "shorthand" guide for those who want to start using the CLX-440 right away. If you have questions about any of the features, don't worry – later chapters will unveil the mysteries of the CLX-440's special features.



If you're new to signal processing, start with the more detailed instructions for hookup and operation starting in the next chapter.

Step 1: Hook it up to a mixer

1. Pull the CLX-440 out of the package.
2. Plug the **POWER** jack on the back of the CLX-440 into a grounded AC power source with the supplied power cable. Press the **POWER** button to turn it off.
3. Using a pair of insert cables, plug the insert sends of the mixer to the **CHAN A INPUTS** on the back of the CLX-440.
4. Connect the insert cable return plugs to the **CHAN A OUTPUTS** of the CLX-440.
5. Press the **POWER** switch on the front of the CLX-440 to power up the unit.

For more information on connecting the CLX-440, see chapter 2: **Connections**.

Step 2: Try some compression

Play some signal into the unit

While learning the unit, you should play a CD or a multitrack source into the compressor. Choose a song or part that doesn't change much, so that you can take your time experimenting with the different features.

1. Turn the **CHAN A INPUT** all the way down so that you don't distort the unit.
2. Begin playing your source material. Turn the **INPUT** knob clockwise until the average level is around -15 on the **INPUT** meter. Make sure that the **EXPANDER RATIO** knob (bottom row) is set to 1:1
3. Set the compressor **RATIO** knob (top row) to 1:1. Adjust the **OUTPUT** knob so that the **OUTPUT** meter matches the **INPUT** meter.
4. Set the compressor **RATIO** knob to 6:1 or higher. Set the **THRESHOLD** knob at 0dBfs and gradually turn it down. You will notice the lower you set the threshold, the more the **GAIN REDUCTION** meter will light.
5. Press the **BYPASS** button to hear your signal without the compression effect. Press it again to return to the compressed signal.

If you aren't hearing any effect, try turning the **ATTACK** and **RELEASE** knobs to their fastest settings. If you still can't hear anything, turn the **RATIO** knob to a higher setting.

Step 3: Try some gating

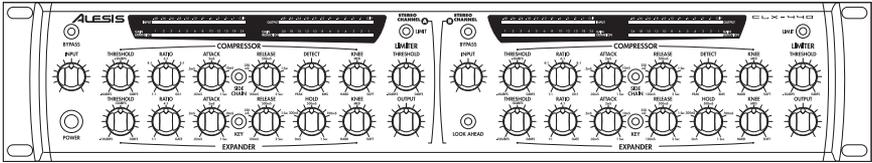
Find a "peaky" signal

For this exercise, you'll need some signal that has a lot of peaks. For example, a full mix with a drum part, a jangly guitar part, or a conga with room reverb on it. This will show you how to set the controls so that only the peaks go through the unit.

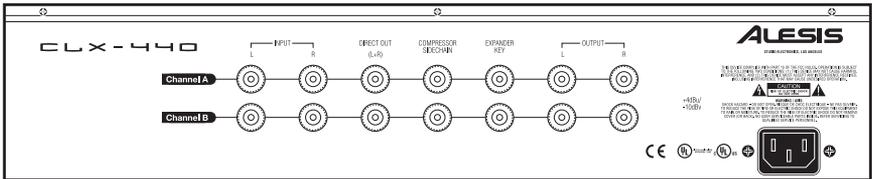
1. Set the expander **RATIO** (bottom row) to infinity to 1 ($\infty:1$). Set the **ATTACK**, **HOLD** knobs to their minimum settings and the **RELEASE** knob at 12 o'clock.
2. Begin playing your source material. Turn the **INPUT** knob clockwise until the average level is around -15 on the **INPUT** meter. Set the **COMPRESSION RATIO** at 1:1. Adjust the **OUTPUT** knob so that the **OUTPUT** meter matches the **INPUT** meter.
3. Set the expander **THRESHOLD** knob at 0dBfs. The gain expansion meter should be fully lit and no signal should pass through the unit. Now, gradually turn down the threshold. You should be able to find a range where only the peaks come through and clamp the music shut on the beat.
4. Press the **BYPASS** button to hear your signal without the gated effect. Press it again to return to the gated signal.

This effect is especially fun on dance music.

Front Panel Diagram



Rear Panel Diagram



Chapter 2

Connections

Unpacking and Inspection

Your CLX-440 was packed carefully at the factory. The shipping carton was designed to protect the unit during shipping. Please retain this container in the highly unlikely event that you need to return the CLX-440 for servicing.

The shipping carton should contain the following items:

- CLX-440 with the same serial number as shown on shipping carton
- Power Cable
- This instruction manual

Installing in a Rack

The CLX-440 may be simply set on a table, or installed in a standard 19" audio equipment rack. The rack ears are integral to the unit.

Thermal Considerations in Rack Mounting

The CLX-440 can be mounted in an equipment rack (taking up 2 rack spaces) or placed on a table or shelf. When you install it, keep in mind that heat is the major enemy of electronic equipment. Please observe the following:

- The CLX-440 is designed to perform properly over a range of ambient temperatures from 10° C to +40° C (50° F to 104° F), in up to 80% non-condensing humidity. These are not absolute limits, but Alesis cannot guarantee that the CLX-440 will meet its published specs or remain reliable if operated outside of these ranges.
- Always allow adequate ventilation behind the CLX-440. Do not seal any enclosure that holds the CLX-440. It is not necessary to leave an empty rack space above or below the CLX-440 unless it runs hot enough to affect equipment above or below it. If your environment is unusually warm and not air conditioned, space between units will help the units run cooler.

Power



Make sure you read the initial Important Safety Instructions chapter at the front of this manual.

AC Power Hookup

Plug the female end of the power cord into the CLX-440's **POWER INPUT** socket and the male (plug) end into a good quality, noise-free AC power source of the proper rating.

Tip: It's good practice to not turn on the CLX-440 until all other audio cables are hooked up as well. Make sure your amplifier or powered speakers are switched off when turning the CLX-440 on or off to avoid damage.

The CLX-440 works with any standard line voltage from 100 to 230 volts and comes with a detachable AC line cord suitable for the destination to which the unit is shipped.

AC Grounding

The line cable is an IEC-spec AC power cable designed to be connected to a grounded 3-pin outlet, with the third, round pin connected to ground. Do not substitute any other type of AC cord; IEC-spec cables of various lengths may be purchased from electronics stores or your Alesis dealer.

The ground connection is an important safety feature designed to keep the chassis of electronic devices such as the CLX-440 at ground potential. Unfortunately, the presence of a third pin does not always indicate that an outlet is properly grounded. You may use an AC line tester to determine this. If the outlet is not grounded, consult with a licensed electrician. When AC currents are suspected of being highly unstable in VAC and Hz, a professional power conditioner should be used.



Do not operate any electrical equipment with ungrounded outlets. Plugging the CLX-440 into an ungrounded outlet, or "lifting" the unit off ground with a three-to-two wire adapter, can create a hazardous condition. Alesis cannot be responsible for problems caused by using the CLX-440 or any associated equipment with improper AC wiring.

To use the CLX-440 in another country:

The CLX-440 has what's called a "switching power supply". That means it works with any AC voltage from 90 to 250 volts, 50 to 60 Hz. This eliminates the need for transformers or voltage switches when you travel from country to country. Your CLX-440 was supplied with the correct power cord for your country or local area. If you plan to travel with it to another country, obtain an IEC-spec AC power cable compatible with the outlets used in the other country and use it in place of the supplied cable. The following alternative power cords are approved for use with it:

- For 100-120 VAC 50/60 Hz operation in the US, Canada and/or Japan, use Alesis UL/CSA power cord #7-41-0001.
- For 230 VAC 50 Hz operation in England, use Alesis Power cord #7-41-0004.
- For 220 VAC 50 Hz operation in Europe and Scandinavia, use Alesis EU power cord #7-41-0002.
- For 230 VAC 50 Hz operation in Australia, use Alesis AS power cord #7-41-0003.

Do you hear an AC hum in your system? For detailed tips on how to get rid of "ground loops" that cause hum, see page 44.

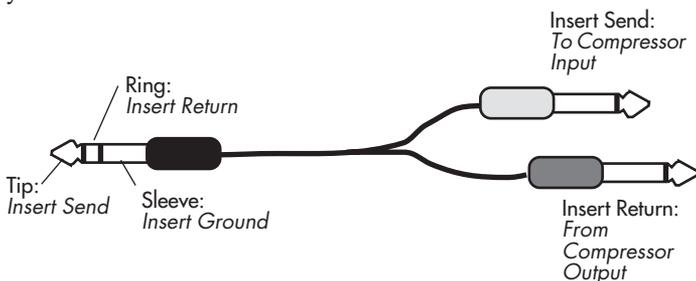
Connecting inputs and outputs

★ *When connecting audio cables and/or turning power on and off, make sure that all devices in your system are turned off and the volume controls are turned down.*

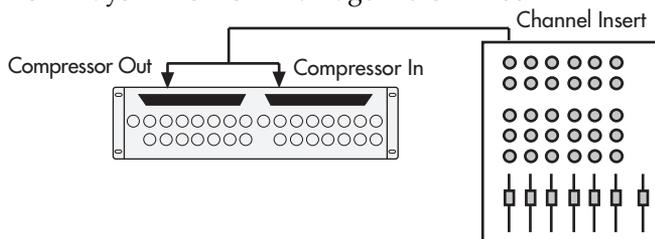
Connecting to the Channel Inserts of a mixing console:

Unbalanced I/O

Most recording consoles have a jack near the mic and line inputs labeled "Insert". This is typically a TRS jack with the send and return on the same jack. To use the CLX-440 as a channel insert, you will need an insert cable (not included).



This cable splits the TRS insert jack into two unbalanced mono connectors. Usually, the tip is connected to the **INPUT** of the compressor and the ring is connected to the **OUTPUT** of the compressor. However, this may be reversed on some recording consoles. Check your mixer's Reference Manual to be sure or just try it both ways – this won't damage the CLX-400.



This example shows you how to connect the CLX-440 to one mono source. You can use this method to connect two mono or stereo sources to the CLX-440. You would need up to four insert cables to make these connections.

Balanced I/O

Some recording consoles have balanced sends and returns for each channel. If your recording console has these connections, use a balanced TRS cable to connect the insert send to the **INPUT** of the compressor, and another balanced TRS cable to connect the compressor **OUTPUT** to the insert return.

Connecting to the Main Inserts of a mixing console:

Unbalanced I/O

In addition to channel inserts, most mixing consoles have main insert jacks near the main outputs. You can use insert cables to connect the CLX-440 to the main L/R bus the same way you connect it to a pair of channels. Simply connect one insert cable to the left main insert of the mixer, and connect the two mono jacks to the left **INPUT** and **OUTPUT** of the CLX-440. Use another insert cable to connect the right main insert to the right **INPUT** and **OUTPUT** of the CLX-440.

Tip: Use both channels Since the CLX-440 has two stereo channels, A and B, you can connect two independent stereo sources. Try using channel A to compress the bass guitar, and channel B to compress the main output bus. Or use channel A on the drum room mics and channel B for the snare drum.

Balanced I/O

Some recording consoles have balanced sends and returns for the main output bus. If your recording console has these connections, use a balanced TRS cable to connect the left main insert send to the left **INPUT** of the compressor, and another balanced TRS cable to connect the compressor's left **OUTPUT** to the left insert return. Repeat these steps for the right main insert.

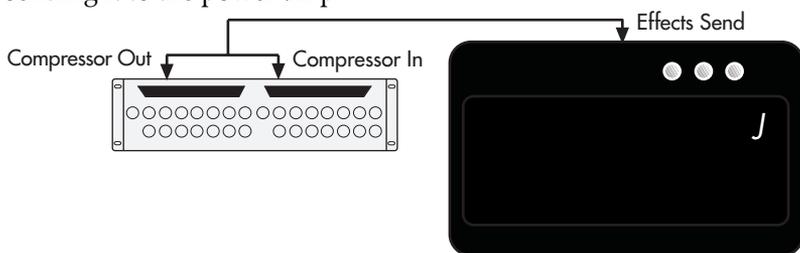
You can also simply connect the balanced main outputs of the mixer to the inputs of the CLX-440, then connect the outputs of

the compressor to the inputs of your mixdown recorder, monitor system, etc. However, if you connect the CLX-440 this way and use the mixer's master fader to fade out and the end of a song, the sound will change as you fade out and less compression occurs. In this case, either fade the song post-compressor (using the compressor's **OUTPUT** knob or the mixdown recorder's input controls), or use the mixer's main inserts instead.

Connecting to the inserts on an instrument amplifier:

Unbalanced I/O

The insert sends on a guitar or bass amp are usually labeled "effects send and return" or "insert send and return". This allows you to amplify your instrument before compressing it and sending it to the power amp.



Another method would be to insert the CLX-440 between the preamp and the power amp, if you are using a two-piece system. You should never put the compressor between the power amp and the speaker, the high-powered levels created by the power amp will destroy the circuitry of the CLX-440.

Connecting to equipment with XLR inputs and outputs:

If you are connecting the CLX-440 to a product with XLR balanced inputs and outputs, you will need to convert this signal to a TRS balanced connector. Make sure that **Pin 2** of the XLR connector is connected to the **Tip** of the TRS adapter, and **Pin 3** is connected to the **Sleeve**.

Don't use line transformers: Many XLR-to-1/4" adapters sold at electronics stores are NOT adapters, but transformers (and very low quality transformers at that). Don't use these on the output of the CLX-440—they're unnecessary and generally sound awful because they don't have the headroom to handle the CLX-440's output. Get a hard-wired adapter or cable from your professional audio dealer, or make one yourself from components.

About Audio Cables

The connections between the CLX-440 and your studio are your music's lifeline, so use only high quality cables. These should be low-capacitance shielded cables with a stranded (not solid) internal conductor and a low-resistance shield. Although quality cables cost more, they do make a difference.

Route cables to the CLX-440 correctly by observing the following precautions:

- Do not bundle audio cables with AC power cords.
- Avoid running audio cables near sources of electromagnetic interference such as transformers, monitors, computers, etc.
- Do not place cables where they can be stepped on. Stepping on a cable may not cause immediate damage, but it can compress the insulation between the center conductor and shield (degrading performance) or reduce the cable's reliability.
- Avoid twisting the cable or having it make sharp, right angle turns.
- Never unplug a cable by pulling on the wire itself. Always unplug by firmly grasping the body of the plug and pulling directly outward.

And most importantly, keep connectors clean. Every few months, unplug them and wipe off oxidation with a clean cloth soaked in alcohol or contact cleaner. Insert the plugs in the jacks a few times, to clean the internal jack contacts. Although Alesis does not endorse any specific product, chemicals such as Tweek and Cramolin, when applied to electrical connectors, are claimed to improve the electrical contact between connectors.

The CLX-440 is wired according to the modern standard of "Pin 2 (tip) = Hot". Some older equipment was wired with Pin 3 hot; check to make sure correct polarity is maintained throughout your system.

Dual Channel Operation

Remember that the CLX-440 is a dual-channel stereo compressor. That means that channels A and B can be used as two independent stereo compressors. It also means that audio from one channel does not affect the other unless you use the sidechain (discussed in Chapter 3). Remember to plug audio into the Left or Right input of the channel you are using.

Basics of Compression

This section will explain how compression works, and explain the functions of the CLX-440's controls.

What is compression?

A compressor essentially turns down the volume of any audio which is louder than a set level. This level is called the compressor threshold level. If the input signal stays below the setting of the threshold level, nothing will happen. When the input signal is louder than the compressor threshold, this signal is reduced in volume.

The amount of reduction is determined by the **compression ratio**. A ratio of 2:1 means that for every 2 dB above the threshold level, the output will only get 1 dB louder. If the ratio is 8:1, the input signal will have to be 8 dB louder than the threshold to get 1 dB louder after compression. If the ratio is infinity to one ($\infty:1$), this is referred to as limiting. Limiting means that the output will never get any higher than the threshold setting.

Compression is used for:

- Keeping recording levels under control so that the recorder doesn't distort
- Keeping vocal or instrument performances in the same general level range so that they're easier to mix with other instruments
- Compressing the mix output so that it doesn't exceed a certain technical maximum in broadcast or post production
- In live sound reinforcement, keeping the volumes under control so that they don't distort
- Making tracks sound "punchy"

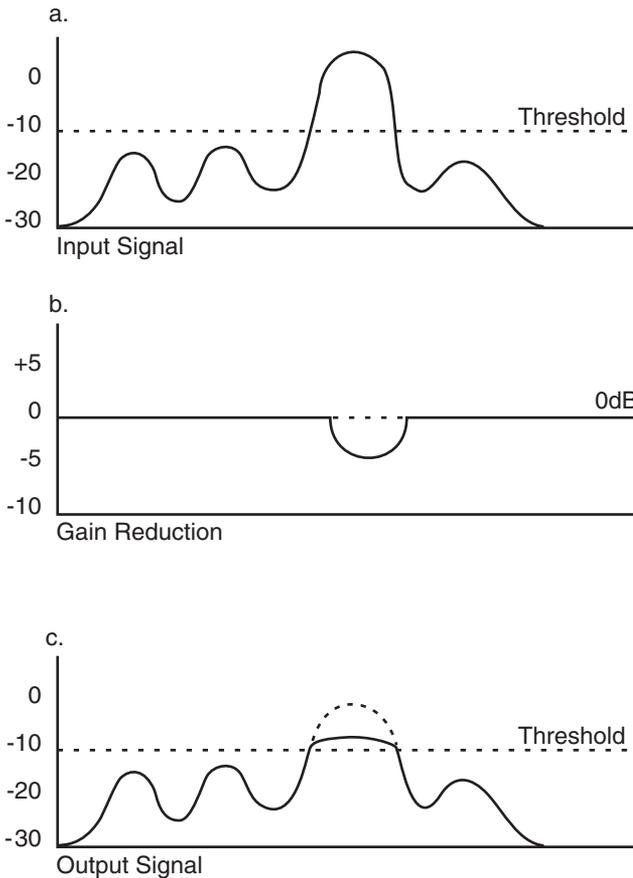
Compressors can make your recorded tracks sound polished and professional. Chapter 5 will give specific example settings for various instruments.

Description of Controls

There are six knobs on the top row of each channel of the CLX-440, labeled **COMPRESSOR**. Their function is as follows:

Threshold

The **THRESHOLD** knob sets the level where compression will begin. As long as the input signal level is below the Threshold level, the CLX-440 will do nothing to the signal. Once the input signal crosses the Threshold, the CLX-440 will begin compressing at an intensity set by the **RATIO** control.



In the diagram above, the top figure (a) shows the input signal to the CLX-440. In this example the compressor Threshold is set for

-10dB and the Ratio is set for 4:1. When the third peak of the input signal crosses the Threshold, the CLX-440 starts to reduce the signal level, as shown in the figure (b). Figure (c) shows the output signal level, with the original signal shown with a dotted line.

Ratio

The **RATIO** knob controls the amount of compression that will happen once the input signal crosses the **THRESHOLD** level, described above. Ratio controls how much the input signal will be reduced as a ratio of the input signal level. For example, if the compression ratio is set for 6:1, the input signal will have to cross the threshold by 6 dB for the output level to increase by 1dB.

The tick marks around the Ratio control show several ratio settings for reference. These are, in clockwise order: 1:1, 2:1, 4:1, 8:1, 10:1, and ∞ :1. The far right setting, ∞ :1 (Infinity to 1), is used for Limiting. This means that the input signal won't go above the threshold at all.

Attack

The **ATTACK** knob controls the amount of time between when the input crosses the threshold and when compression begins. The range of this control is 0.02 milliseconds to 1 second. Longer attacks are useful for percussive sounds, where shorter attacks are good for melodic parts like vocals and strings. The Attack control is also useful for keeping the transients on percussive drum or bass sounds. Experiment with different short attack times on snare drums to get more or less of the "stick" attack.

Release

The **RELEASE** knob controls the amount of time the compressor takes to stop compressing as the signal crosses under the threshold. The range of this control is 1 ms to 2 seconds. Short release times are good for percussive, punchy sounds, where longer release times can make compression less obvious on vocals. Adjusting the release time may be necessary when using extreme compression and "pumping" or "breathing" is audible, or if lower level signals after peaks are getting lost.

Detect

The **DETECT** knob varies the compressor's detection between Peak and RMS. When set all the way to **PEAK**, the compressor is looking for peaks in the input level. For example, if your tape

recorder overloads every time the kick drum hits, you can use Peak limiting to keep the kick from peaking above the rest of the music.

When set to **RMS** compression, the CLX-440 works by detecting a signal's average level, much like our ears adjust to loud or soft sounds. In RMS mode, your source can have more of a dynamic, transparent sound (because short peaks don't clamp down the overall level) but still be prevented from getting too loud.

Generally, if you're trying to raise the apparent volume of the track for radio or mixdown, set the detect knob closer to RMS compression. If you're trying to stop peaks from distorting your tape recorder or amplifier, use Peak compression.

Knee

The **KNEE** knob is used to vary between Hard and Soft knee compression styles. When the CLX-440 is set for **HARD** knee, the compression ratio applies only to signals above the threshold level. If the CLX-440 is set for **SOFT** knee, the compression ratio gradually increases from 1:1 to the currently selected ratio over a range of approximately 5 dB, so that the transition from uncompressed to compressed is more gradual. The difference between Hard Knee and Soft Knee is more obvious at high compression ratios. Once the input signal crosses the Threshold, the unit will compress the signal at the full ratio level.



Soft knee compression is useful when performing high-ratio compression or limiting on a signal. When the compression gradually fades in, it doesn't sound as obtrusive as when it suddenly starts limiting the signal. If you're looking for a "brick wall" limiter, the switch should be set for Hard knee to stop any transients from slipping through without affecting lower level signals. Lower Ratio levels may require a hard knee setting so that the compression slope isn't too narrow and you lose some of the compressive "punch".

Compression Artifacts

When you apply a lot of gain reduction (6dB or more), you may hear some problems on the output. Here are a few common side effects to applying a lot of compression and some ways to avoid them.

Pumping and Breathing

When a compressor is making large changes to the input signal (10 to 12 dB or more), the noise floor will also rise and fall with the signal level. When this noise signal rises and falls drastically between signals, such as a heavily compressed, noisy drum track, you might hear the noise level "breathing" between drum hits. One solution to this breathing problem is to turn up the release time. This way, the noise floor won't have time to rise between drum hits.

However, if the Release time is too long, lower level signals after the peak will be lost as the compressor slowly stops reducing gain. This is called "pumping" as the lower level signals (noise included) slowly fade back up to their normal signal level. The secret to avoiding these problems is to achieve a balanced release time on the input signal.

Clicking or "Zipper Noise"

You may also hear clicking if you are doing a lot of compression with a very short attack or release time. If this is the case, try raising the attack or release time to stop the clicking.

Reduced Gain Structure

As you compress the signal more and more, the output level will be lower as a result. Use the **OUTPUT** knob to make up for the gain you've lost during compression. By watching the **INPUT**, **OUTPUT** and **GAIN REDUCTION** meters, you should be able to set the **OUTPUT** knob so that the input and output levels roughly match.

Limiting

Limiting is compression with a very high Ratio setting (10:1 or more). It is typically used for stopping peaks in the signal from distorting the rest of the chain without affecting the dynamic range of the signal. When you are using the CLX-440 as a limiter, the threshold should be set high enough so that it only effects the highest momentary peaks in the signal.

There are two ways to use the CLX-440 as a limiter. The first is to set the compression **RATIO** control to 10:1 or higher (about 3 o'clock). If you set the ratio to ∞ :1, the output signal will not go any higher than the threshold level.

Limiters Threshold

The other way to use the CLX-440 as a limiter is to use the dedicated limiter on the output. In addition to the compression and expansion circuits in the CLX-440, there is a dedicated limiter on the output. This limiter has only one setting: **THRESHOLD**. You can use this limiter in addition to the compressor. An example would be compressing a vocal performance at 4:1 to keep the dynamic range narrow while setting the limiter threshold to -3 dBfs to avoid distorting the recorder.

If you need more control over the limiter, such as adjustable attack and release time, knee or detection, you should use the compression circuit as a limiter with a high ratio setting.

Stereo Detection

The CLX-440 takes the greater of both left and right sides of each channel before they are detected for compression or expansion. The reason for this is so the two sides of a stereo signal are not gain reduced differently.

For example, if a guitar was panned to the right and went above the threshold level, and the left and right sides were not linked, only the right side would be gain reduced. In this case, the stereo image of anything panned center would shift to the left.

To keep this from happening, the left and right detectors of a channel are always simultaneously checked. This is why you should use the left and right sides of a channel - rather than sending the left side of a signal to compressor channel A and the right side to channel B. In addition to wasting a compressor channel, you may cause the center imaging of your signal to wander.

Look Ahead Compression

The CLX-440 has a feature called **LOOK AHEAD**. This feature uses an audio delay to provide immediate compression.

When a signal is input, the detector takes 0.02ms to determine its level and apply gain reduction at it's fastest attack setting. In some applications, this allows a quick transient to be passed through the compressor before gain reduction is applied. Look Ahead Compression delays the signal by 2ms to give the detector time to apply compression. In most applications, this delay is not noticeable and the gain reduction will appear to be instantaneous.

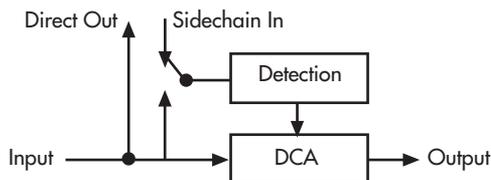
This feature is especially useful as a mix compressor, making sure that the stereo mix does not overload the mixdown recorder.

Sidechain

There are a pair of balanced jacks on the rear panel which can alter the way the compressor functions, Direct Out and Sidechain.

The **DIRECT OUT** jack sums the signal from the input and sends it out without compression. Using this jack by itself does not affect the rest of the compressor circuit. The input signal is sent both to the direct out and the rest of the compression circuit. This jack is designed for use with the sidechain, but may also be useful for recording a performance both with and without compression.

The **SIDECHAIN** input is connected to the detector. It is provided so that a modified version of the signal, or a different signal altogether, can affect the compression. The most common uses for the direct out and sidechain features are de-essing and ducking.



In the diagram above, you can see that the input signal goes both to the DCA (Digitally Controlled Amplifier) and the Direct Out. The Sidechain In and Input signal both feed into the detector. The Front Panel SIDECHAIN button determines which of these sources is sent to the detector, which controls the DCA.

For more information on De-essing and Ducking, see Chapter 5, "Compressor Applications using the Sidechain".

Basics of Expansion

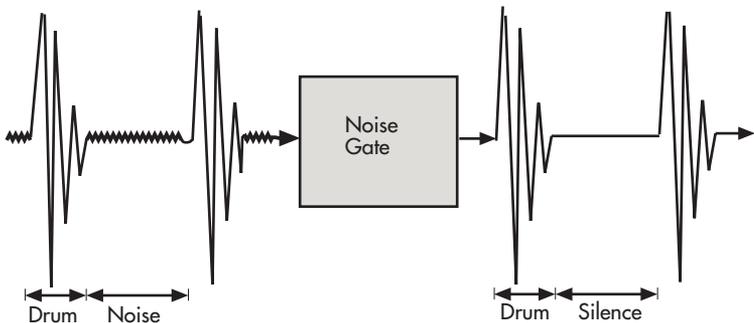
This section explains the expansion features of the CLX-440.

What is expansion?

An expander reduces gain the opposite way a compressor does. When the input signal level is below the threshold level, that audio will be attenuated according to the ratio setting. If the expansion ratio is 4:1, then audio that is 1dB under the threshold will be attenuated so that it is 4dB below the threshold.

When the ratio is set to ∞ :1, this is referred to as gating. This is the most common use for an expander. In many recordings, there is an unacceptable amount of noise in the recording. This may be tape hiss, AC hum, chair squeaks, or anything else which is distracting to the signal. A noise gate can be used to silence the source when it is not actually playing. The threshold should be set so that it opens when the instrument plays then closes when it is finished playing.

Gating is most effective on signals with a quick attack and a strong signal level. Some examples are electric guitar, snare drum, piano or voice. Some instruments that may be more challenging to effectively gate would be strings, flute, synth pads and cymbal rolls.



Description of Controls

There are six knobs on the bottom row of each channel of the CLX-440, labeled **EXPANDER**. Their function is as follows:

Threshold

The **THRESHOLD** knob sets the level where expansion will begin. As long as the input signal level is above the Threshold level, the CLX-440 will do nothing to the signal. Once the input signal crosses below the Threshold, the CLX-440 will begin expanding at an intensity set by the **RATIO** control.

For example, if the threshold level is set to -30dBfs , the ratio is set to 2:1 and the input is -35dBfs , the output signal will be -40dBfs . Since the input level is 5dB below the threshold, the 2:1 ratio doubles this gap to 10dB.

Ratio

The **RATIO** knob controls the amount of expansion that will happen once the input signal crosses the **THRESHOLD** level, described above. Ratio controls how much the input signal will be reduced as a ratio of the input signal level.

For example, if the threshold level is set to -30dBfs , the ratio is set to 2:1 and the input is -35dBfs , the output signal will be -40dBfs . Since the input level is 5dB below the threshold, the 2:1 ratio doubles this gap to 10dB.

The far right setting of the Ratio control, **GATE** is used for gating. This means that there will be no output signal when the input is below the threshold.

Knee

The **KNEE** knob is used to vary between Hard and Soft knee expansion styles. When the CLX-440 is set for Hard knee, the expansion ratio applies only to signals below the threshold level. If the CLX-440 is set for Soft knee, the expansion ratio gradually increases from 1:1 to the currently selected ratio over a range of approximately 5 dB, so that the transition from unexpanded to expanded is more gradual.

The difference between Hard Knee and Soft Knee is more obvious at high expansion ratios (gating). Once the input signal crosses the Threshold, the unit will compress the signal at the full ratio level.



In most cases, you will want to use the Hard Knee setting for Gating. This gives you a punchy sound on percussion and other transient sounds. Soft knee expansion can be useful if the gate is too noticeable. Softening the knee lets the gate gradually fade in, instead of cutting in and out.

Attack

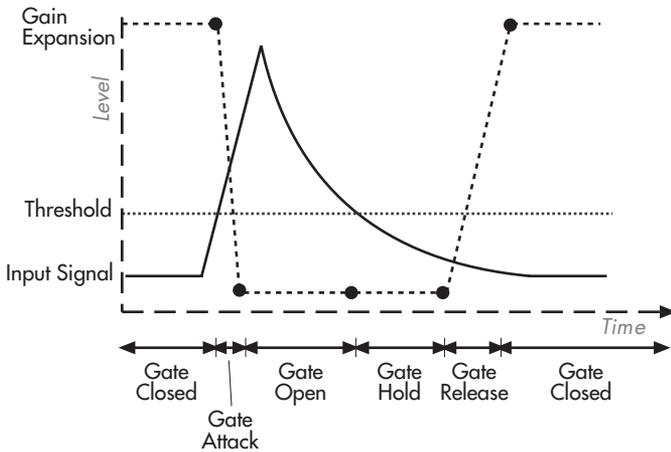
The **ATTACK** knob controls the amount of time it takes for the expander/gate to open. The range of this control is 0.02 milliseconds to 1 second. Short attacks are useful for percussive sounds, where long attacks are good for melodic parts like vocals and strings. Use a longer attack time when a short attack is drawing attention to the sudden presence of noise. Use a shorter attack when the input itself has a fast attack, such as a snare drum.

Hold

The **HOLD** knob controls the amount of time the expander pauses before expanding after the signal crosses under the threshold. The range of this control is 0 ms to 2 seconds. This control is useful for keeping the signal open a little longer before starting the release fade. For example, if you want to hear more of the room sound on a snare drum before clamping the gate back on, you could increase the hold time.

Release

The **RELEASE** knob controls the amount of time the expander takes to begin expanding after the signal crosses under the threshold. The range of this control is 1 ms to 2 seconds. By using the **HOLD** and **RELEASE** knobs together, you can tailor the decay of percussive sounds. Use a longer hold time for more room sound or gated effects. Use a shorter hold time with a longer release time decrease the room reverb or for a more natural sound



Here is how the three expander time settings work. Let's assume a snare drum signal is below the threshold, so the gate is on. When the snare drum is struck, the gate will open at the rate set by the **ATTACK** knob. When the input signal falls back below the threshold, the gate will stay open for the amount of time specified by the **HOLD** knob. After this time has passed, the gate will close again at the rate specified by the **RELEASE** knob.

Keyed Expansion

The expander section has a function called **KEY** which is similar in operation to the compressor's sidechain. The key input plugs directly into the detection circuit and breaks the flow of the input to the detector when the **KEY** button is pressed. This allows the input signal to be processed before the expander detects it and allows a completely different signal to key the expander.

The **KEY** button on the front panel enables and disables the key input. If a signal is plugged into the key input on the rear panel but the key button is not pressed, the expander will still look to the unprocessed input for expansion detection.

You can use the **KEY** together with the **DIRECT OUT** to filter the audio before it gets detected for expansion. You can even use a completely different audio source to key the gate.

See [Chapter 5](#) for more information on using the **KEY** function.

Chapter 5

Applications

This section is designed to get you started with the CLX-440 by giving some sample settings. These are merely suggested settings, experiment and find your own once you begin to hear what the CLX-440 does to your sound.

Compressor Applications

Vocal Limiting

Vocalists tend to be one of the most dynamic recording challenges in any studio or stage. Even though a singer may go from a whisper to a scream during the course of a song, it's the engineer's job to keep the vocal's level in line with the rest of the ensemble. You can do this by setting the compressor with a high ratio and a high threshold. This way, softer sections will go by uncompressed, and louder peaks will be kept under control.

- Threshold set so that the loudest sections get around -6 of reduction(usually around 3 o'clock)
- Ratio set for 6:1
- Attack set at 1ms
- Release set between 10 and 12 o'clock (100 ms.)
- Detection set for RMS
- Knee set for Soft

The Threshold should be set so that loud sections get compressed around 6dB and quiet passages get no compression at all.

Vocal Compression

In other cases, you may want to compress the entire dynamic range of a vocal. This is typical of pop vocals and voiceovers for radio commercials. Whenever there is signal, there is some compression taking place; just barely on the soft passages, and up to 12 dB of reduction during loud passages.

- Threshold set so that one **REDUCTION LED** (-1 dB) lights during the softest passages with signal (usually around 11 o'clock)
- Ratio set for 4:1
- Attack set to 1ms
- Release set between 10 and 12 o'clock (100 ms.)
- Detection set to RMS
- Knee set to 12 o'clock

You may need to raise the output to compensate for gain reduction

Tip: Try using these settings together with the Peak Limiter feature for simultaneous compression and limiting on vocals.

Drums

Engineers often compress drum tracks just to get a nice punchy sound in the mix. The settings below sound good on a rock snare drum:

- Threshold set so that all drum hits are compressed (around -3dB)
- Ratio set for 4:1
- Knee set for Soft
- Peak/RMS set for Peak
- Attack set around 8 o'clock
- Release set around 9 o'clock

By turning the Threshold down even more, you can "squash" the snare drum as much as you want. Turn the attack up (longer) to

get more stick out of the snare drum, and turn it down for a synth pop slap.

Bass

Since bass guitar forms the foundation of most Rock and Jazz music, it's important that the level of the Bass doesn't jump around in the mix. Also, adding compression to bass tracks (or almost anything else) can make it "punchier", generally a good thing in rock tunes. Try the settings below on a rock bass track:

- Threshold set so only the peaks are compressed (around 0dB)
- Ratio set for 4:1
- Knee set for Hard
- Peak/RMS set for Peak
- Attack set around 9 o'clock
- Release set around 10 o'clock

Electric Guitar

Funky rhythm guitar parts love compression. Not only does it make the part punch out the mix better, it evens out the volume of the muted strums. The following setting, with its low threshold and high ratio, gives you lots of compression for punching up a funky rhythm guitar part:

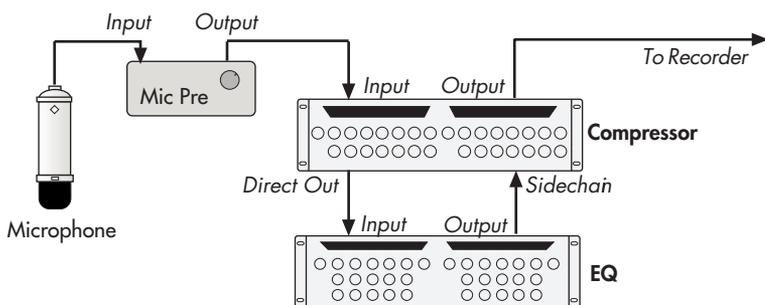
- Threshold set for constant compression (around -3dB)
- Ratio set for 6:1
- Knee set for Soft
- Peak/RMS set for RMS

Experiment with turning the Threshold up or down for a thinner or chunkier tone.

Compressor Applications using the Sidechain

De-essing

Occasionally when recording vocals, the letter "s" seems to jump out louder than the rest of the part. This is because sibilant letters, especially the letter s, have more high frequency energy than other letters. This can cause tape recorders or other components to distort, even though the level may not seem very loud. This "sibilance" can sometimes be eliminated by moving the microphone, but often a de-esser is required.



The CLX-440 allows you to perform de-essing on a track by using a sidechain. By placing an equalizer, such as the PEQ-450, in the sidechain, you can set the CLX-440 so that only certain frequency ranges trigger the unit to start compressing.

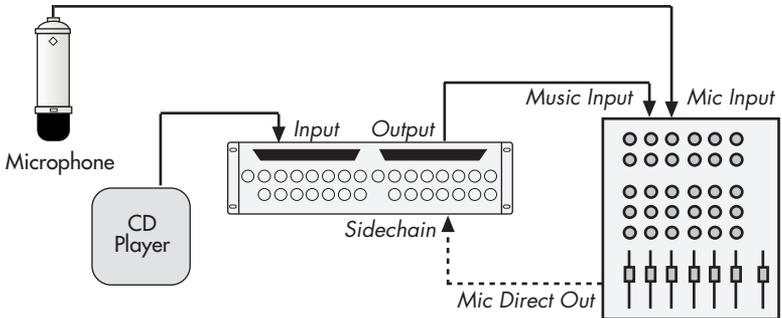
The trick is to set the EQ to cut all frequencies except for the sibilant range, between 3-6kHz. Then set the CLX-440 like this:

- Threshold set around 0dB
- Ratio set for 6:1
- Attack set at minimum (0.2ms)
- Release set around 8 o'clock
- Knee set for Hard
- Detection set for Peak

The Threshold should be set so that an "s" triggers about -3 to -6 dB of compression. If other sounds are triggering the compressor, you might need to adjust the EQ cutoff frequencies.

Ducking

Ducking is often used when doing voiceovers. It allows background music to automatically be turned down whenever an external source, such as an announcer's voice, begins to speak. You can also use ducking to have one instrument push the other out of the way, such as the bass guitar ducking every time the kick drum hits.



To make the CLX-440 into a ducker, plug the source into the inputs and plug the trigger into the **SIDECHAIN** input. The **DIRECT OUT** isn't used in this example. In the example below, the sound of a radio announcer's voice will automatically turn the music down when he speaks and it will slowly fade back in when he stops:

Set the CLX-440 controls like this:

- Threshold set for +3dB (around 3 o'clock)
- Ratio set for 6:1
- Knee set for Soft
- Peak/RMS set for Peak
- Attack set around 9 o'clock
- Release set around 2 o'clock

Plug the announcer's mic into the mixer, and feed that mic to the CLX-440's Sidechain in. When the announcer speaks, the music will duck down (turn the ratio up to duck it even lower). When he finishes speaking, the music will fade back up at a rate set by the Release knob.

Expander Applications

Gating a Noisy Guitar Amp

When a rock guitar amp is set loud enough to sound good it usually creates quite a bit of hiss. These settings will mute the guitar when it isn't playing.

- Ratio set to Gate
- Attack set to minimum (.02ms)
- Hold set to minimum (0ms)
- Release set around 2 o'clock (1 second)
- Knee set to Hard

The Threshold should be set so that the Gate opens when the guitar is playing and closes when the guitar stops. Try turning the threshold all the way down when the guitar is not playing, turn it up until it opens then turn it back down a bit. Experiment with the release time to make a smooth transition from open to closed.

Expanding Live Vocal Tracks

In some cases, it may be better to use expansion than gating. For example, imagine that a band was recorded in concert. The vocal track will probably have "bleed" from the rest of the instruments on stage. If you gate the vocal, you will still hear the other instruments when the vocalist is singing. When the gate closes, the listener will be distracted by the change in tone when those instruments are no longer playing through the vocal channel. So, to expand the vocal, we will use these settings:

- Ratio set to 2:1
- Attack set to minimum (.01ms)
- Hold set to minimum (0ms)
- Release set around 2 o'clock (1 second)
- Knee set to Hard

Adjust the Threshold so that the rest of the band is attenuated when the vocalist isn't singing.

Expander Applications using the Key

Gated Reverb

A popular effect for drums is to use distant room mics or a digital reverb set to a long decay, then gate them so that the reverb suddenly cuts off. To do this we will use the snare drum as a key to open the reverb gate.

1. Plug the output of the room mics or reverb into the input of the CLX-440
2. Plug the snare drum signal into the Key input of the CLX-440

You may need to bus the snare drum signal using a direct out or effects send so you can use it in the mix and for the key signal.

3. Set the controls this way:
 - Ratio set to Gate
 - Attack set to minimum (.02ms)
 - Hold set to 12 o'clock (100ms)
 - Release set to minimum (1ms)
 - Knee set to Hard
4. Set the Threshold so that the snare drum makes the room sound open up for a moment, then close.
5. Use the Hold setting to control the length of the reverb sound.

Tip: While you're at it, try compressing the room mics a bit. On second thought, compress the living daylights out of the room mics. The more the better.

Key Filtering for a Tom Mic gate

It is often useful to filter the input before it is detected. It keeps other sounds from crossing the threshold and opening the gate. For this example, we will gate a floor tom mic. When the floor tom channel is constantly open, we hear too much of the rest of the kit. This effects the definition and imaging of the drum kit recording. The solution is to gate the floor tom and pan it hard right. However, when we try this, the snare drum is loud enough that it occasionally opens the floor tom gate. This means we need to filter the signal before it reaches the detector.

1. Plug the **DIRECT OUT** of the CLX-440 into the input of an equalizer, such as the Alesis PEQ-450.
2. Plug the EQ output into a mixer input for now so that you can hear the effects of the EQ.
3. A floor tom has a lower resonant frequency than a snare drum. Use the EQ filters to cut all frequencies except for the resonant frequency of the floor tom. This is probably around 250Hz.

Don't worry if this signal sounds ugly. This is not what the finished result will sound like. This filter is simply helping the detector ignore the snare drum.

4. Plug the output of the EQ into the **KEY** input on the rear panel of the CLX-440.
5. Press the **KEY** button for the channel you are using on the CLX-440.

The gate should now only open when the floor tom is hit, and should ignore the snare drum hits.

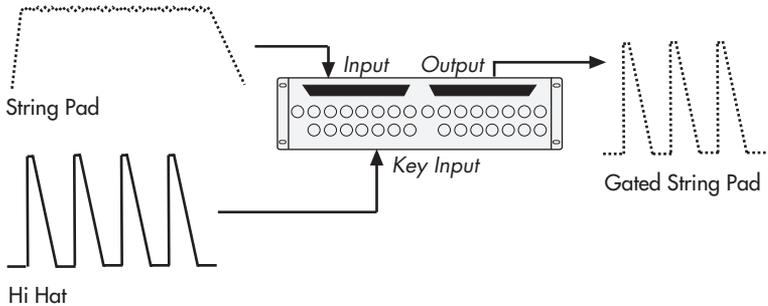
Tip: You can compress the signal in addition to gating it. Try adding a bit of punchy compression to the drum tracks.

Staccato Gating a Synth Pad

An interesting effect using the **KEY** input is to key a sustained sound from another, completely unrelated sound. This works well when the signal being keyed is a legato part that doesn't change much and the key input signal is a percussive sound.

This example will combine a simple string pad performance, playing whole notes, with a 16th note drum machine hi-hat to create a staccato synth effect.

1. Plug the synth pad track into the channel **INPUT** of the CLX-440.
2. Plug the hi-hat signal into the **KEY** input of the same channel.
3. Press the **KEY** button for the channel you are using on the CLX-440.
4. Adjust the gate controls so that the string part plays at the same staccato rhythm as the hi-hat.



Troubleshooting

Troubleshooting Index

If you experience problems while operating your CLX-440, please use the following table to locate possible causes and solutions before contacting Alesis Product Support for assistance.

<i>Symptom</i>	<i>Cause</i>	<i>Solution</i>
No audio from outputs	No input audio	Test with a known good input.
	Bad cables	Replace the cables.
	Destination is turned down	Check the connections and the level of the mixer or amp that the CLX-440 is connected to.
	Input or output control is turned down	Turn them up
	Gate is on	Decrease the Expander Threshold and Ratio until Gain Reduction lights go away
	Sidechain is on	Press the Sidechain button so that it is off (not lit).
	Power is not connected	Go take a walk
Buzz from outputs	Cables are crossing a power cable	
	Make sure that the CLX-440 and its audio cables are kept away from power cables, and wall warts.	

	Bad cables	Replace the cable with a new, high-quality cable.
	Problem with the source	Try bypassing the CLX-440 by connecting the input cables to the output cables and see if the problem remains.
AC hum	Ground loop	Use only balanced connections in the studio
		Place all equipment in the studio on a common ground (see next page)

Avoiding ground loop noise

In today's studio, where it seems every piece of equipment has its own computer chip inside, there are many opportunities for ground loop problems to occur. These show up as hums, buzzes or sometimes radio reception and can occur if a piece of equipment "sees" two or more different paths to ground. While there are methods to virtually eliminate ground loops and stray radio frequency interference, most of the professional methods are expensive and involve installing a separate power source just for the sound system. Alternatively, here are some helpful hints that professional studio installers use to keep those stray hums and buzzes to a minimum.

➤ ***KEEP ALL ELECTRONICS OF THE SOUND SYSTEM ON THE SAME AC ELECTRICAL CIRCUIT.***

Most stray hums and buzzes happen as a result of different parts of the sound system being plugged into outlets of different AC circuits. If any noise generating devices such as air conditioners, refrigerators, neon lights, etc., are already plugged into one of these circuits, you then have a perfect condition for stray buzzes. Since most electronic devices of a sound system don't require a lot of current (except for power amplifiers), it's usually safe to run a multi-outlet box or two from a SINGLE wall outlet and plug in all of the components of your system there.

➤ **KEEP AUDIO WIRING AS FAR AWAY FROM AC WIRING AS POSSIBLE.**

Many hums come from audio cabling being too near AC wiring. If a hum occurs, try moving the audio wiring around to see if the hum ceases or diminishes. If it's not possible to separate the audio and AC wiring in some instances, make sure that the audio wires don't run parallel to any AC wire (they should only cross at right angles, if possible).

➤ **TO ELIMINATE HUM IF THE ABOVE HAS FAILED:**

- A) Disconnect the power from all outboard devices and tape machines except for the CLX-440, the mixer and control room monitor power amp.
- B) Plug in each tape machine and outboard effects device one at a time. If possible, flip the polarity of the plug of each device (turn it around in the socket) until the quietest position is found.
- C) Make sure that all of the audio cables are in good working order. Cables with a detached ground wire will cause a very loud hum!!
- D) Keep all cables as short as possible, especially in unbalanced circuits.

If the basic experiments don't uncover the source of the problem, consult your dealer or technician trained in proper studio grounding techniques. In some cases, a "star grounding" scheme must be used, with the mixer at the center of the star providing the shield ground on telescoping shields, which do NOT connect to the chassis ground of other equipment in the system.

Line Conditioners and Protectors

Although the CLX-440 is designed to tolerate typical voltage variations, in today's world the voltage coming from the AC line may contain spikes or transients. These can cause audible noises, and they can stress your gear and, over time, possibly cause a failure. There are three main ways to protect against this, listed in ascending order of cost and complexity:

- Line spike/surge protectors. Relatively inexpensive, these are designed to protect against strong surges and spikes,

acting somewhat like fuses in that they need to be replaced if they've been hit by an extremely strong spike.

- Line filters. These generally combine spike/surge protection with filters that remove some line noise (dimmer hash, transients from other appliances, etc.). A good example is the Isobar™ series from Tripp Lite.
- Uninterruptible power supply (UPS). This is the most sophisticated option. A UPS provides power even if the AC power line fails completely. Intended for computer applications, a UPS allows you to complete an orderly shutdown of a computer system in the event of a power outage. In addition, the isolation it provides from the power line minimizes all forms of interference—spikes, noise, etc.

Care and Maintenance

Cleaning

Disconnect the AC cord, then use a damp cloth to clean the CLX-440's metal and plastic surfaces. For heavy dirt, use a non-abrasive household cleaner such as Formula 409™ or Fantastik™. **DO NOT SPRAY THE CLEANER DIRECTLY ONTO THE FRONT OF THE UNIT AS IT MAY DESTROY THE LUBRICANTS USED IN THE SWITCHES AND CONTROLS!** Spray onto a cloth, then use cloth to clean the unit.

Refer All Servicing to Alesis

We believe that the CLX-440 is one of the best signal processors that can be made using current technology, and should provide years of trouble-free use. However, should problems occur, **DO NOT** attempt to service the unit yourself unless you have training and experience. Service on this product should be performed only by qualified technicians. **NO USER-SERVICEABLE PARTS INSIDE.**

Obtaining Repair Service

Before contacting Alesis, check over all your connections, and make sure you've read the manual.

Customers in the USA and Canada:

If the problem persists, contact Alesis and request the Product Support department. Make sure you have the unit's serial number with you. Talk the problem over with one of our technicians; if necessary, you will be given a return order (RO) number and instructions on how to return the unit. All units must be shipped prepaid and COD shipments will not be accepted.

For prompt service, indicate the RO number on the shipping label. **Units without an RO will not be accepted.** If you do not have the original packing, ship the unit in a sturdy carton, with shock-absorbing materials such as Styrofoam pellets (the kind without CFCs, please) or "bubble-pack" surrounding the unit. Shipping damage caused by inadequate packing is not covered by the Alesis warranty.

Tape a note to the top of the unit describing the problem, include your name and a phone number where Alesis can contact you if necessary, as well as instructions on where you want the product returned. Alesis will pay for standard one-way shipping back to you on any repair covered under the terms of this warranty. Next day service is available for a surcharge. Field repairs are not authorized during the warranty period, and repair attempts by unqualified personnel may invalidate the warranty.

Customers outside the USA and Canada:

Contact your local Alesis distributor for any warranty assistance. The Alesis Limited Warranty applies only to products sold to users in the USA and Canada. Customers outside of the USA and Canada are not covered by this Limited Warranty and may or may not be covered by an independent distributor warranty in the country of sale. Do not return products to the factory unless you have been given specific instructions to do so.

Internet Address:

Important information and advice is available on our web site:

<http://www.alesis.com>

Email may be addressed to:

Support@alesis.com

Specifications

Subject to change without notice

Audio Input

Input Connectors:	4 Balanced 1/4" TRS jacks
Nominal Input Level:	Adjustable from $\leq -10\text{dBV}$ to $\geq +4\text{dBu} = -15\text{dBFS}$
Maximum Input Level:	$+20\text{dBu}$ (7.78 Vrms)
Input impedance:	10 kOhm

Sidechain/ Key Inputs

Input Connectors:	4 Balanced 1/4" TRS jacks (2 Sidechain, 2 Key)
Nominal Input Level:	$+4\text{ dBu}$ (1.23 Vrms) = -15 dBFS
Maximum Input Level:	$+19\text{ dBu}$ (6.9 Vrms) = -0 dBFS
Input impedance:	10 kOhm

Direct Output

Output Connectors:	2 Impedance-balanced 1/4" TRS jacks
Output Level-Stereo Input :	(Left In - 6.02dB) + (Right In - 6.02dB)
Output Level-Mono Input :	Left/Mono In
Output impedance:	220 Ohm

Audio Output

$+4\text{dBu}/-10\text{dBV}$ Switchable	
Output Connectors:	4 Impedance-balanced 1/4" TRS jacks
Nominal Output Level (+4dBu):	$+4\text{ dBu}$ (1.23 VRMS) = -15 dBFS
Maximum Output Level (+4dBu):	$+19\text{ dBu}$ (6.9 VRMS) = -0 dBFS
Output impedance:	220 Ohm

Audio Performance

Signal to Noise Ratio:	$>103\text{ dB}$ A-Weighted, Analog In to Analog Out
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THD+N:	<0.003%, Analog In to Analog Out
Frequency Response:	22-22 kHz \pm 0.50 dB, Analog In to Analog Out
Power consumption:	7 Watts Max (90-230 VAC / 50-60 Hz)

Mechanical

Size:	3.5" H x 19.0" W x 6" D (89mm H x 483mm W x 152mm D)
Rack spaces:	2 Spaces
Weight:	5 lbs (2.27 kg)

All measurements done over a 22 Hz - 22 kHz range with 1 kHz sine wave at -1dBFS input. Impedances are measured at 1 kHz.

Alesis Limited Warranty

ALESIS STUDIO ELECTRONICS ("ALESIS") warrants this product to be free of defects in material and workmanship for a period of one (1) year for parts and for a period of one (1) year for labor from the date of original retail purchase. This warranty is enforceable only by the original retail purchaser and cannot be transferred or assigned.

During the warranty period ALESIS shall, at its sole and absolute option, either repair or replace free of charge any product that proves to be defective on inspection by ALESIS or its authorized service representative. In all cases disputes concerning this warranty shall be resolved as prescribed by law.

To obtain warranty service, the purchaser must first call or write ALESIS at the address and telephone number printed below to obtain a Return Authorization Number and instructions concerning where to return the unit for service. All inquiries must be accompanied by a description of the problem. All authorized returns must be sent to ALESIS or an authorized ALESIS repair facility postage prepaid, insured and properly packaged. Proof of purchase must be presented in the form of a bill of sale, canceled check or some other positive proof that the product is within the warranty period. ALESIS reserves the right to update any unit returned for repair. ALESIS reserves the right to change or improve design of the product at any time without prior notice.

This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

THE ABOVE WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTIES OR REPRESENTATIONS WHETHER EXPRESS OR IMPLIED OR OTHERWISE, WITH RESPECT TO THE PRODUCT, AND SPECIFICALLY EXCLUDE ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OR OTHER IMPLIED WARRANTIES. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

IN NO EVENT WILL ALESIS BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER DAMAGES RESULTING FROM THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING, AMONG OTHER THINGS, DAMAGE TO PROPERTY, DAMAGE BASED ON INCONVENIENCE OR ON LOSS OF USE OF THE PRODUCT, AND, TO THE EXTENT PERMITTED BY LAW, DAMAGES FOR PERSONAL INJURY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

THIS CONTRACT SHALL BE GOVERNED BY THE INTERNAL LAWS OF THE STATE OF CALIFORNIA WITHOUT REFERENCE TO CONFLICTS OF LAWS. This warranty gives you specific legal rights, and you may also have other rights required by law which vary from state to state.

This warranty only applies to products sold to purchasers in the United States of America or Canada. The terms of this warranty and any obligations of Alesis under this warranty shall apply only within the country of sale. Without limiting the foregoing, repairs under this warranty shall be made only by a duly authorized Alesis service representative in the country of sale. For warranty information in all other countries please refer to your local distributor.

ALESIS
Los Angeles, CA
www.alesis.com

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