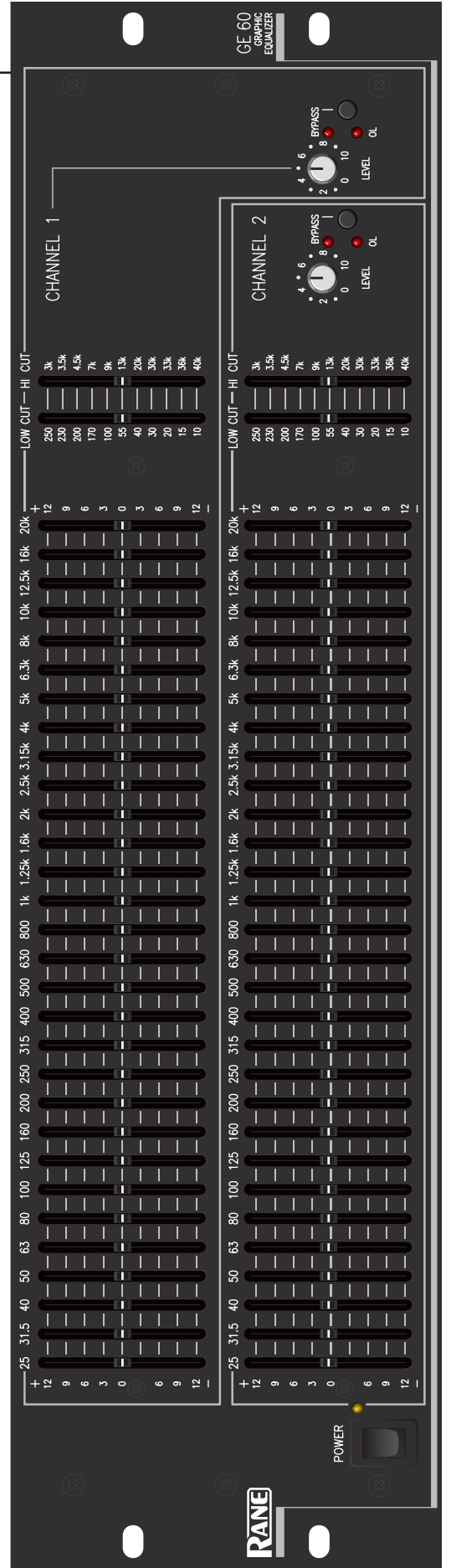




GE 60

GRAPHIC EQUALIZER



IMPORTANT SAFETY INSTRUCTIONS



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 dry cloth.
 7. Do not block any ventilation openings. Install in accordance with manufacturer's instructions.
 8. Do not install near any heat sources such as radiators, 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 third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
 10. Protect the power cord and plug from being walked on or pinched particularly at plugs, convenience receptacles, and the point where it exits from the apparatus.
 11. Only use attachments and accessories specified by Rane.
 12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When 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 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. The plug on the power cord is the AC mains disconnect device and must remain readily operable. To completely disconnect this apparatus from the AC mains, disconnect the power supply cord plug from the AC receptacle.
 16. This apparatus shall be connected to a mains socket outlet with a protective earthing connection.
 17. When permanently connected, an all-pole mains switch with a contact separation of at least 3 mm in each pole shall be incorporated in the electrical installation of the building.
 18. If rackmounting, provide adequate ventilation. Equipment may be located above or below this apparatus, but some equipment (like large power amplifiers) may cause an unacceptable amount of hum or may generate too much heat and degrade the performance of this apparatus.
 19. This apparatus may be installed in an industry standard equipment rack. Use screws through all mounting holes to provide the best support.
- WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.

NOTE: 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 to correct the interference by one or more of the following measures:

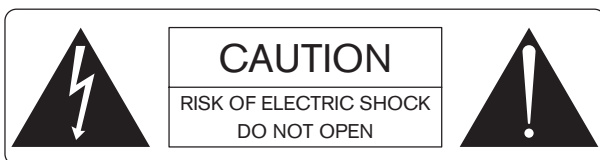
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Changes or modifications not expressly approved by Rane Corporation could void the user's authority to operate the equipment.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

WARNING



To reduce the risk of electrical shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.

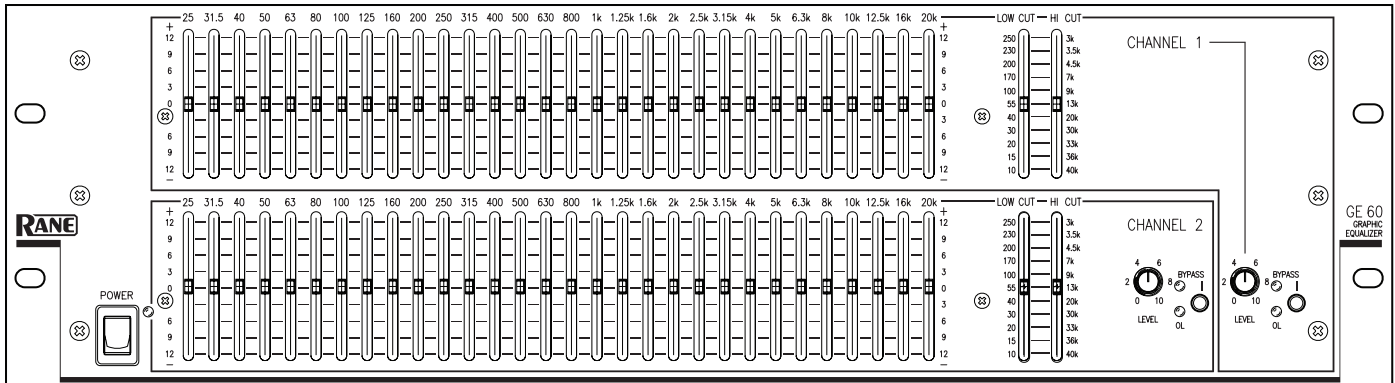
The symbols shown below are internationally accepted symbols that warn of potential hazards with electrical products.



This symbol indicates that a dangerous voltage constituting a risk of electric shock is present within this unit.



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



QUICK START

Okay, Know-it-all. So you don't need to read the manual. Well do your mother a favor and read this section. You don't have to read anything else. Ever. Now turn MTV off.

Hook-up is intuitive. Just follow the silkscreened instructions on the rear of the unit. All three Inputs are wired in parallel (they do *not* sum, smarty pants); and all three Outputs are wired in parallel. Use any *one* Input and any or all Outputs. Polarity convention is per IEC/ANSI/AES standards of pin 2 positive, pin 3 negative and pin 1 shield. The GE 60 does not invert the signal.

Set the **LO CUT** and **HI CUT** controls as necessary to restrict bandwidth. Full frequency response results from positioning them all the way to the bottom.

Anyone familiar with other graphic equalizers finds the GE 60 just as familiar. Setting curves is as easy as it is on all Rane graphics thanks to our innovative interpolating constant-Q circuitry. If you feel you want more information on setting up your curves, please see the back page.

OK, MTV back on, I'm outta here.

GE 60 CONNECTION

When first connecting the GE 60 to other components, *leave the power switch off until the very last*. This gives you a chance to make mistakes and correct them without damaging your fragile speakers, ears and nerves.

INPUTS

All three Inputs are wired in parallel and are actively balanced. Each works equally well, but use only one, they do not sum. Choose strictly from a required hardware point-of-view, there will be no performance trade-offs. The wiring convention adheres to American, British and International standards of pin 2, or tip being hot, pin 3, or ring being return, and pin 1, or sleeve being shield. It is not necessary to short any Inputs to ground—it doesn't hurt, it's just not necessary. Use pin 1, or the shell, for shield ground. Unbalanced operation involves using only pin 2, or tip as signal and pin 1, or sleeve as shield and ground.

OUTPUTS

The Outputs mimic the Inputs. Balanced output requires using pin 2, or tip, and pin 3, or ring for the signal. It does not require pin 1 or shield. The signal exists differentially between the two balanced leads; ground is not involved. For hum-free systems ground is used only for shielding. Unlike the Inputs, you may use multiple Output jacks simultaneously to drive different devices.

EXPANDING

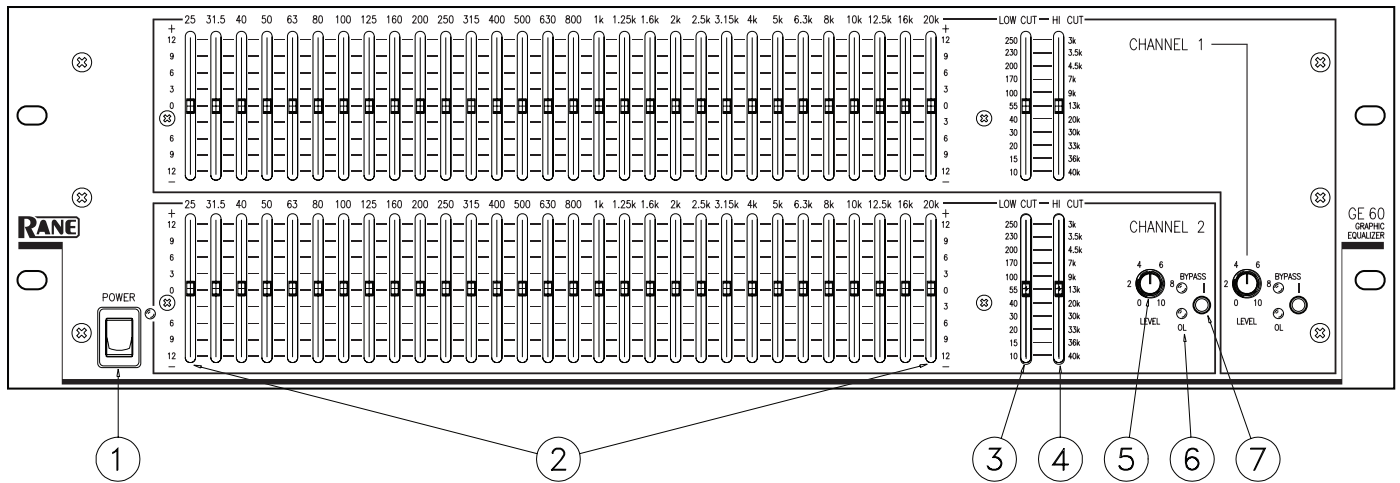
Expanding and/or daisy chaining the Inputs and Outputs normally uses the 1/4" jacks. Three parallel Input connectors allows driving a second signal processor or amplifier without special cabling.

SIGNAL LEVELS

Signal levels from -10 dBV to +4 dBu are considered normal and within range (at least 20 dB of headroom exists above these levels). Do not directly connect microphones into the GE 60. These require a mic preamp.

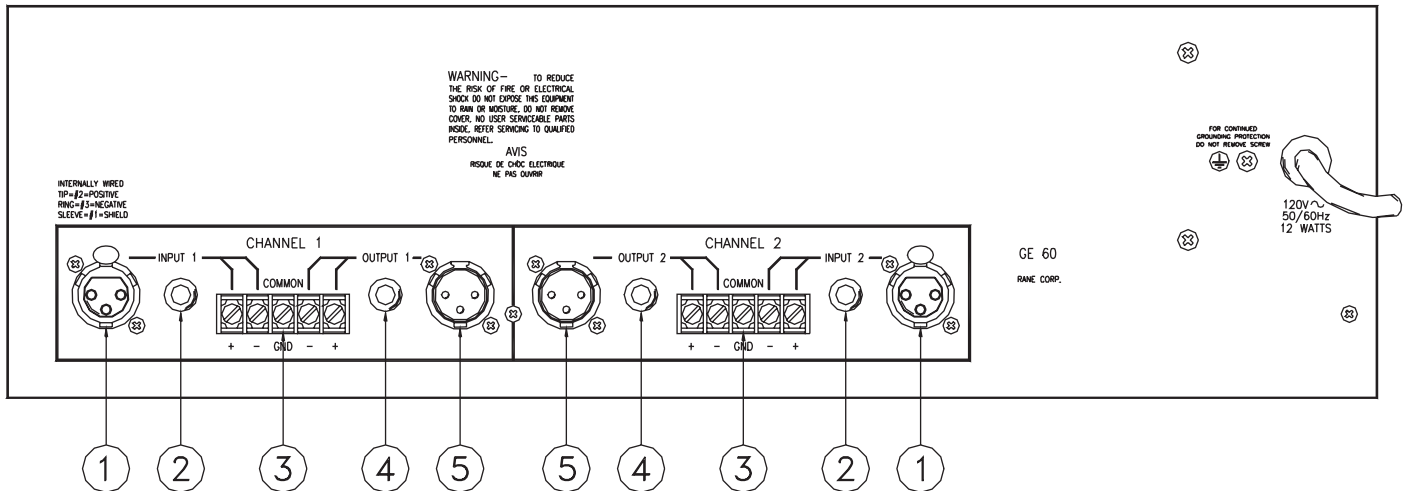
WEAR PARTS: This product contains no wear parts.

FRONT PANEL DESCRIPTION



- ① **POWER switch & indicator:** The yellow LED lights any time this switch is closed and power is, in fact, actually flowing into the GE 60.
- ② **Filter level controls** set the individual levels for each of the constant-Q filters. Their range is ± 12 dB, and the grounded center-detent design ensures individual filters are off and bypassed when positioned to their centers.
- ③ **LOW CUT FILTER control** sets the corner frequency (-3 dB point) for the low cut filter (high pass). Adjustable from 10 Hz to 250 Hz.
- ④ **HI CUT FILTER control** sets the corner frequency (-3 dB point) for the high cut filter (low pass). Adjustable from 3 kHz to 40 kHz.
- ⑤ **Channel LEVEL control** sets the overall desired gain through the unit. The range is from Off to $+8$ dB for balanced use, or from Off to $+2$ dB for unbalanced operation. Unity gain is at approximately “8” (balanced) or “10” (wide open, unbalanced). Using the highest setting (without lighting the **OL** indicator) yields the best signal-to-noise performance.
- ⑥ **OVERLOAD indicator** LED monitors all critical points for excessive signal levels. It lights whenever these levels exceed 4 dB below clipping. Occasional flickering is normal; however, it should not be allowed to light steadily.
- ⑦ **BYPASS switch & indicator:** This pushbutton switch activates the “hard-wire” bypass function. When engaged (red **BYPASS** LED *on*), all three pins of the **INPUT** connectors directly connect to the same pins on the **OUTPUT** connectors (hard-wired). Engaging this switch converts the GE 60 into a relatively expensive patch cord, but one with pretty lights.

REAR PANEL DESCRIPTION



- ① **XLR INPUT connectors.** Pin 2 is positive, pin 3 is negative and pin 1 is signal ground. For unbalanced operation, use pin 2 as hot and pin 1 as return. It is not necessary to ground pin 3.
- ② **1/4" INPUT connectors.** These 1/4" tip-ring-sleeve (TRS) connectors parallel the XLR connectors described above. Tip is positive, ring is negative and sleeve is shield.
- ③ **Screw terminal INPUT & OUTPUT connectors.** Use #6 spades. Parallels the XLR & 1/4" TRS jacks.
- ④ **1/4" OUTPUT connectors.** These 1/4" TRS connectors parallel the XLR connectors described below. As before, tip is hot, ring is not and sleeve is shield.
- ⑤ **XLR OUTPUT connectors.** Pin 2 is positive, pin 3 is negative and pin 1 is shield.

CHASSIS GROUNDING

If after hooking up your system it exhibits excessive hum or buzzing, there is an incompatibility in the grounding configuration between units somewhere. Your mission, should you accept it, is to discover how your particular system wants to be grounded. Here are some things to try:

1. Try combinations of lifting grounds on units that are supplied with ground lift switches or links.
2. If your equipment is in a rack, verify that all chassis are tied to a good earth ground, either through the line cord grounding pin or the rack screws to another grounded chassis.
3. Units with outboard power supplies do *not* ground the chassis through their line cords. Make sure these units are grounded either to another chassis which is earth grounded, or directly to the grounding screw on an AC outlet cover by means of a wire connected to a screw on the chassis with a star washer to guarantee proper contact.

Please refer to the *Sound System Interconnection* RaneNote included with this manual for correct wiring practices.

OPERATING INSTRUCTIONS

Insuring the proper level of gain though the GE 60 is just as important as adjusting the equalizer bands. Improper gain distribution is a common cause of loss of system headroom and less than optimum noise performance.

The OVERLOAD LED informs of an imminent or passed overload to the equalizer. Occasional blinking of the OL with program source material is fine, indicating optimized signal-to-noise performance. Run the GE 60 with an input signal that is as hot as possible without the OL lighting more than occasionally.

The BYPASS switch allows comparison of equalized versus un-equalized signal. It is also useful in adjusting the level of the GE 60 for unity gain and best signal-to-noise performance. The gain of the GE 60 is optimized when there is no sound level difference between the bypassed and the active positions.

The overall gain range of the level control for the GE 60 is off to +2 dB for unbalanced operation, or off to +8 dB for balanced operation. The level difference between the equalizer in bypass or active can be significant. Adjust the LEVEL control so the signal level is the same between the bypassed and active positions of the BYPASS switch.

GETTING STARTED

Here is one method of setting your equalizer that works well. Begin with the following settings:

1. Engage the **BYPASS** switch. (switch depressed, **BYPASS LED on**.)
2. Put all sliders in their center position (0 dB). The center position has a grounded detent.
3. Position the **LEVEL** controls about “6” for unbalanced operation and “7” for balanced operation.
4. Set **LOW** and **HI CUT** filters fully down, corresponding to 10 Hz and 40 kHz.
5. Apply a signal to the system.
6. Verify the **OL LED** is not on—occasionally blinking during extreme peaks indicates an optimal setting. But if it lights up a lot or lights steadily, lower the output level of the previous device in the signal chain.
7. Release the **BYPASS** switch and begin adjusting the equalizer filters.
8. During filter band adjustments, if the **OL LED** lights more than occasionally, turn down the output of the previous device in the signal chain.
9. Once all filter bands are adjusted to your liking, compare the signal loudness with the equalizer bypassed and active. Adjust the **LEVEL** controls on the GE 60 so there is no difference between the levels of bypassed versus active.
10. The last step is to reconfirm that the **OL LED** lights only when there are large signal spikes in the program material, as in step 6 above.

For insight into how to use an equalizer, to alleviate acoustic problems or to adjust the overall tone of the program material, please read the following two sections.

ACOUSTIC COMPENSATION

A graphic equalizer may be used to correct many acoustic problems. However, one should fully understand the ramifications of doing so. Acoustic problems are generally not consistent across the entire area of sound coverage. This is much more of a problem when setting up a sound system for large venues. In a typical large room or hall, there will be areas that have acoustic reinforcement problems and other areas where certain frequencies are almost entirely canceled out. Try to seek an acoustic remedy for acoustic problems whenever possible. When this is not possible or feasible, an equalizer may be used to compensate for an acoustic problem. But the problem is only improved at the point where the measurement is taken, other locations in the room may be adversely affected by the equalizer setting. For this reason, measure the acoustic response of the system from several locations and average the equalizer's setting. Doing this helps most locations in the venue to have an equal sound quality.

The best way to “see” what the acoustic signature of the room is doing to sound is to use a real time analyzer or any of the many computerized measurement systems. Using these devices to analyze the response of the room and the sound system is the only accurate means available for setting an equalizer properly.

Equalization can be like spice in the hands of a master chef. A little goes a long way in improving sound quality, too much and the mix is spoiled. If modest amounts of equalization (6-8 dB) do not solve the problem, it is best remedied by other means. Avoid adding large amounts of boost below 63 Hz, especially when using vented bass cabinets. Boosting frequencies below the vented enclosure's low frequency cutoff can easily cause over excursion of the speaker's cone, causing premature failure. In addition, boosting low frequencies can make your power amplifier run hotter, leading to premature amplifier failure.

When equalizer adjustment is completed, compare the un-equalized sound with the equalized sound by alternately engaging the BYPASS switch. Use familiar source material and walk around in the sound coverage area to insure that no anomalies have been introduced into the sound system. If it sounds good, you're done.

TONE CONTOURING

If a GE 60 is used for tone contouring by ear, be careful about adding upper bass (63 Hz to 200 Hz) as this causes “muddiness” or loss of clear definition. (Also see the previous warning about boosting frequencies below 63 Hz). Middle frequency problems usually express themselves by vocals having a nasal quality (too much mid band boost) or vocals not being easily understandable (usually caused by mid band frequencies being under represented in the overall sound). High frequency problems show as “sizzle”— not good, and is sometimes caused by too much high frequency boosting. This is most obvious with cymbals and hi-hats. To use the cooking metaphor, high frequencies should simmer, not sizzle.