Operating Manual

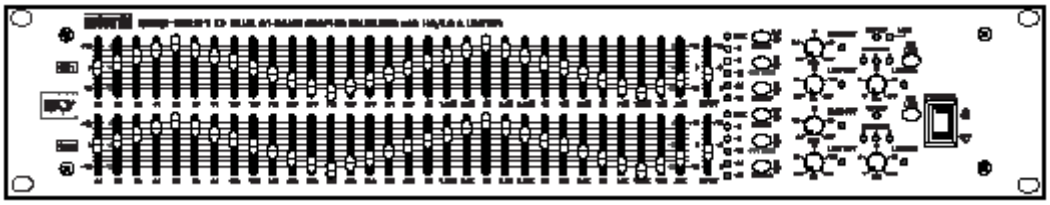
GEQ-1231D

Stereo 31-Band Graphic Equalizer with HC/LC and Limiter



GEQ-2231D

Dual 31-Band Graphic Equalizer with HC/LC and Limiter



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Welcome

Congratulations on your purchase of the GEQ-1231D/GEQ-2231D, a state-of-the-art digital graphic equalizer with extended frequency range. The GEQ-1231D/GEQ-2231D is the result of a professional collaboration between two audio industry leaders: Inter-M, known for a wide range of high-quality professional audio equipment, and Algorithmix, one of the foremost developers of signal processing and DSP hardware.

Thanks to superior 64kHz Codec technology and ultra-low-noise digital filters, the GEQ-1231D/GEQ-2231D delivers warm analog sound with the benefits of a digital feature set. The GEQ-1231D/GEQ-2231D are part of the **3E Tools** family of **E**xcellent Sound in an **E**asy-to-use Interface at an **E**conomical price.

A personal welcome to you from the management and employees of Inter-M

All of us here at Inter-M are dedicated to providing you with the highest quality products and the best value.

We sincerely trust this product will provide you with years of satisfactory service, but if anything is not to your complete satisfaction, we will endeavor to make things right.

Welcome to Inter-M, and thank you for becoming a part of our worldwide extended family!

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Unpacking

Although your GEQ-1231D/GEQ-2231D is neither complicated nor difficult to operate, we recommend you take a few minutes to read this brief manual and familiarize yourself with the important information regarding product features, setup and operation.

As with most electronic devices, we strongly recommend you retain the original packaging. In the unlikely event the product must be returned for servicing, the original packaging (or reasonable equivalent) is required.

Warnings

Environment

Never place this product in an environment that could alter its performance or reduce its service life. Such environments are usually characterized by high levels of heat, dust, moisture, or vibration.

Safety

1. Read these instructions carefully.

2. Follow all instructions.

3. Keep all warnings.

4. Do not operate this apparatus near water.

5. Clean only with a damp cloth.

6. Do not block any of the ventilation openings.

7. Install only in accordance with the instructions in this manual.

8. Do not install near any heat sources such as radiators, heat registers, stoves, or other devices (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 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 from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where it is attached to the apparatus.

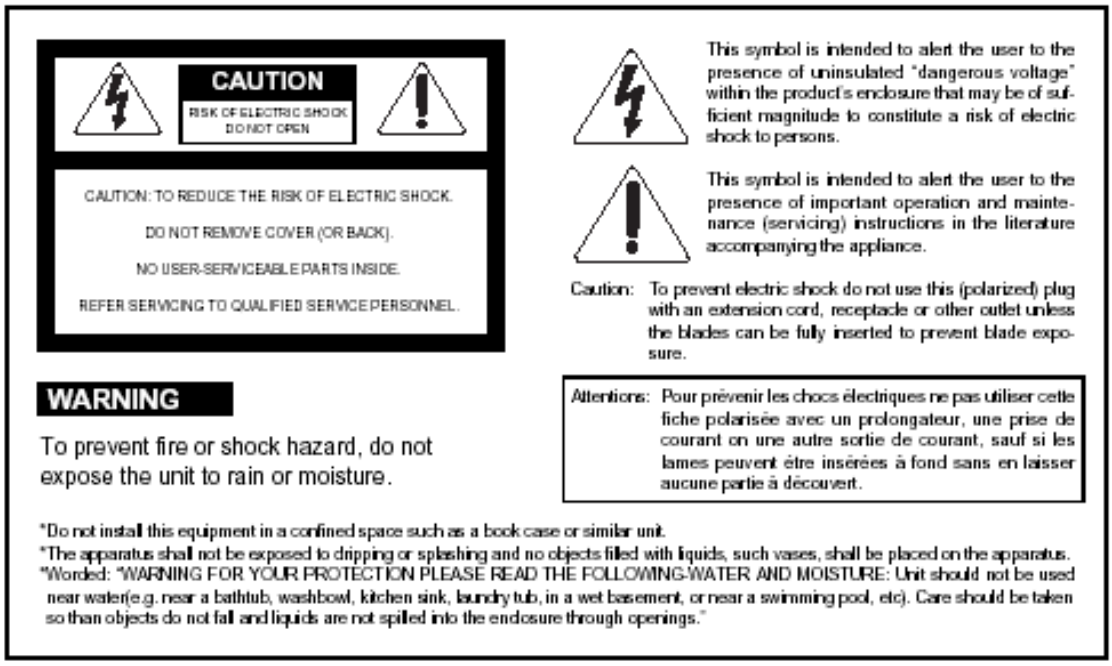
11. Use only the attachments/accessories specified.

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12. Use only with a cart, stand, tripod, bracket, or table specified, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid overturning.

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.



Operation

Make certain that speakers and input sources are properly connected before switching on.

Keep volume levels at minimum gain before switching on.

NOTE: The system's operation is delayed by approximately three seconds after pressing the AC Mains power switch. This is due to the built-in protection circuitry, designed to protect speakers and other system components.

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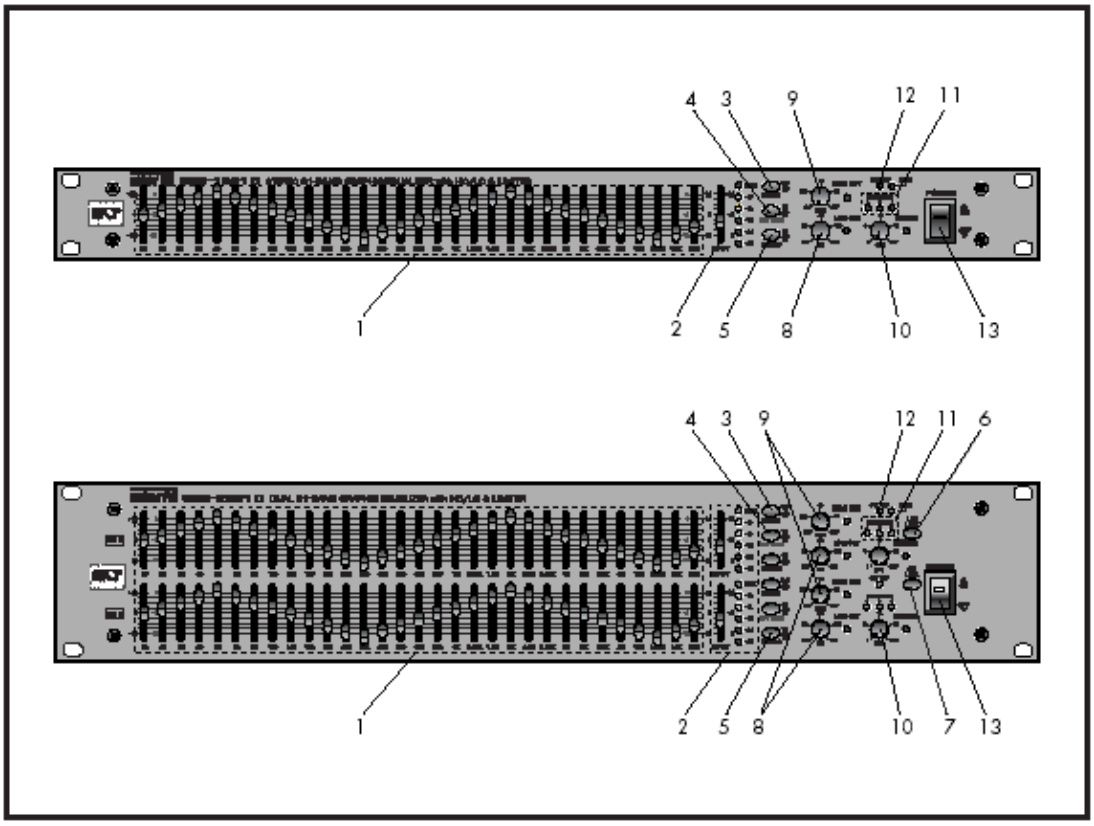
GEQ-1231D/GEQ-2231D
31-Band Graphic Equalizer/Limiter

Features

- **Traditional warm analog sound coupled with state-of-the-art digital signal processing**
- **Balanced XLR & 1/4 TRS inputs and outputs (unbalanced compatible)**
- **Stereo 31-Band graphic equalizer in a compact 1RU form factor (GEQ-1231D)**
- **Dual-Channel 31-Band graphic equalizer in a compact 2RU form factor (GEQ-2231D)**
- **Constant-Q 1/3-Octave low-noise digital filter bank**
- **5-LED input signal level display with peak indicator**
- **Selectable GEQ range: ±12dB, ±6dB and -12dB(cut only)**
- **High-cut filter for hiss seduction**
- **Low-cut filter for rumble suppression**
- **Reliable peak limiter with threshold and 3-LED gain reduction meter**
- **Permanent stereo channel link**
- **Soft-clip function**
- **Output clip indicator**
- **ON indicators for low-cut, high-cut, and limiter**
- **Extended frequency response(up to 31.5kHz)**
- **Hard bypass relays**
- **High-resolution processing engine: 24-Bit AD/DA converters, 64 kHz sampling frequency, 40-bit Internal signal path**

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Front Panel Controls



1. EQ Cut/Boost Controls

Separate Cut/Boost sliders are provided for each of the 31 1/3-octave frequency bands. Each slider covers a maximum cut/boost range of ±12dB or ±6dB, depending on the position of the Range switch (3).
In the GEQ-1231D, each slider controls the level of both left and right channels. In the GEQ-2231D, two rows of sliders are provided to allow independent control of both channels. If the CH LINK button (7) is active, only the upper row of sliders is active, affecting both channels simultaneously.

For certain applications (e.g., sound reinforcement), a cut-only mode is preferable. Pressing the Cut Only button (4) will activate this mode, effectively doubling the resolution of the slider adjustment. Depending on the position of the Range switch (3), the range in cut-only mode is either 0 to –12dB or 0 to –6db. NOTE that in cut-only mode, all sliders must be in the upper position to achieve flat frequency response. (The corresponding level scale for cut-only mode is indicated in red on the front panel.)

2. Input Gain Control and Input Level Meter

The Input Gain Control allows for optimal gain adjustment and highest sonic quality. Optimal dynamic range is achieved in the 0dB position. Therefore it is

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important to achieve sufficient signal level to light all green and yellow LEDs of the Input Level Meter. Avoid lighting the red (overload) LEDs except on rare occasions and for short duration.
If the source level is too low, input gain may be increased with the Input Gain Control, with only minimal signal degradation.
For more information on setting up input/output gain structure, see the notes on Unity Gain mode in the DIP Switch Selector section on page 11.
In the GEQ-1231D, a single Input Gain Control is provided.
In the GEQ-2231D, two independent Range switches are provided.

3. Range Switch

The Range switch selects the operational mode of the 31 frequency-band slider controls, which can operate over a ±12dB or ±6dB range. The ±6dB range will provide a more precise range of adjustment, and is sufficient for most applications.
In the GEQ-2231D, two independent Range switches are provided.

4. Cut-Only Switch

When this switch is activated, the 31 frequency-band slider controls will function as attenuators (no EQ boost), from 0dB (flat) to –6dB or –12dB, depending on the position of the Range Switch (3). The corresponding level scale for cut-only mode is indicated in red on the front panel.
Cut-only mode is particularly useful in notching out specific frequencies for feedback reduction.
In the GEQ-2231D, two independent Cut-Only switches are provided.

5. Bypass Switch

This switch functions as a true hardware bypass – that is, it directly connects the unit's inputs and outputs, and is therefore useful in the event of a power outage. The Bypass Switch is useful for quick comparison of the original sound with EQ'ed sound.
In the GEQ-2231D, two independent Bypass switches are provided.

6. Limiter Link Switch (GEQ-2231D only)

This switch will couple the peak limiter modules in both channels of the GEQ-2231D for stereo operation. The limiter circuitry in each channel still functions independently, but the higher gain reduction is applied synchronously to both channels.
When Limiter Link is deactivated, both channels function independently, in dual-mono mode.

7. Channel Link Switch (GEQ-2231D only)

This switch will allow the GEQ-2231D to function in stereo mode. When the Channel Link Switch is activated, the integrated LED will light, and the tone control and limiter functions of both channels will function synchronously. The lower row of controls is deactivated, with all EQ functions governed by the upper row of controls, and the Limiter Link Switch (6) is automatically activated.

8. Low-Cut Filter Frequency Control

This knob controls the range of the low-cut filter, from approximately 12.5Hz to 200Hz. The filter is designed to aid in cutting unwanted low frequencies, such as

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rumbles and wind noise, while leaving other frequencies unaffected. When the filter is activated the associated LED lights. Rotating the knob to the Off position removes the filter completely from the signal path.
The GEQ-1231D has only one low-cut filter control for both channels, while the GEQ-2231D provides independent controls for each channel.

9. High-Cut Filter Frequency Control

This knob controls the range of the high-cut filter, from approximately 3.3kHz to 29.5kHz. The filter is designed to aid in cutting unwanted high frequencies, such as hiss and noise from other equipment, while leaving other frequencies unaffected. When the filter is activated the associated LED lights. Rotating the knob to the Off position removes the filter completely from the signal path.
The GEQ-1231D has only one high-cut filter control for both channels, while the GEQ-2231D provides independent controls for each channel.

10. Limiter (Threshold) Control

This knob controls the Threshold level of the integrated peak limiter circuitry. The GEQ-1231D/2231D is equipped with a state-of-the-art digital peak limiter, utilizing look-ahead circuitry, soft clipping function and automatic, source-dependent attack and release time calculation to maximize its effectiveness in critical dynamic usage.

The Threshold level can be set within a range of 0dB to +19dB, referenced to the output level. When the signal peak exceeds the threshold, the gain will be decreased to avoid overload and clipping. Rotating the Threshold level to the extreme right position will switch off the limiter circuitry.

A soft-clipping function is provided after the limiter circuitry, providing a much smoother limiting function more closely resembling an analog limiter. It is activated when very sharp (usually non-audio) transients such as clicks and spikes appear at the unit's inputs. Its operation is indicated by the Out Clip LED (12).

The GEQ-2213D is equipped with two independent Threshold controls, while the GEQ-1231D utilizes a single control for both channels.

11. Gain Reduction Meter

The Gain Reduction Meter monitors the activity of the limiter, displaying the degree of attenuation. For best performance do not allow reduction to exceed –3dB.

12. Out Clip Indicator

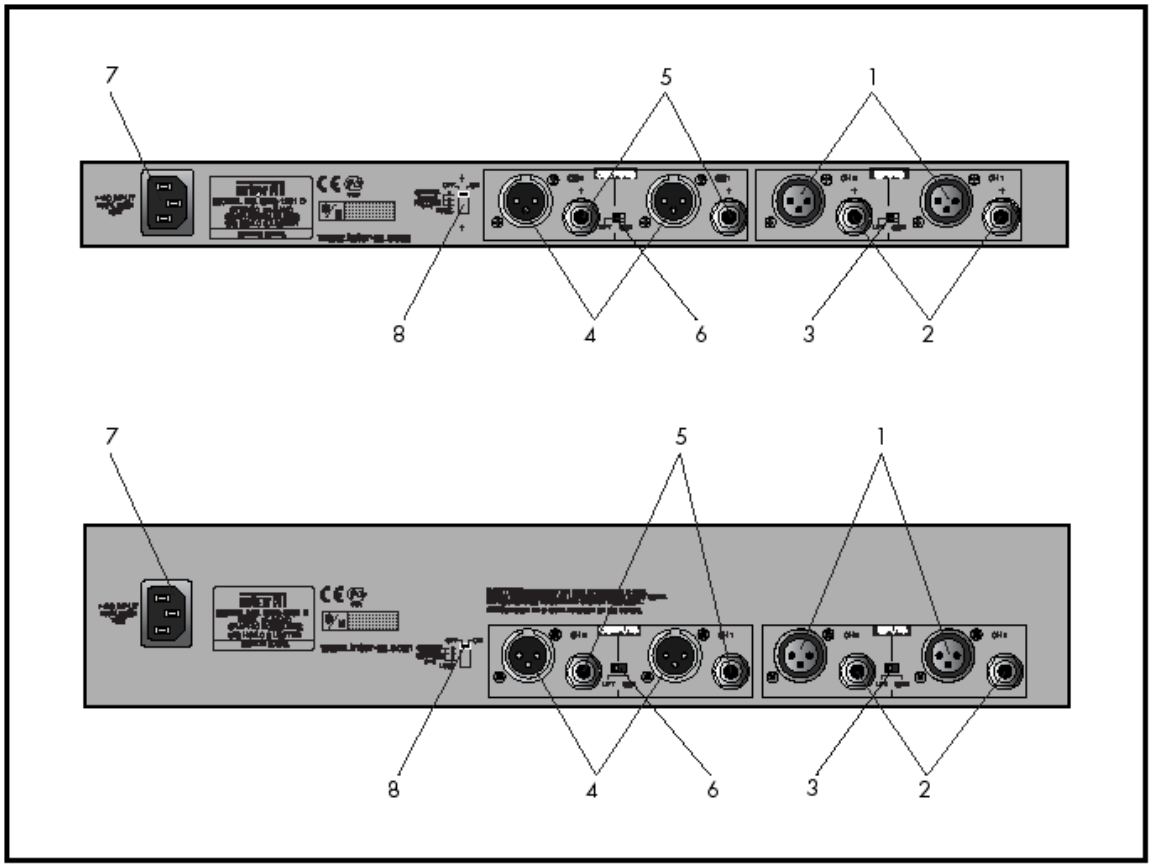
This LED lights when the output signal has reached the soft clipping threshold beginning at –1dB, typically corresponding to 19dBu on the analog outputs. While occasional flashing of this indicator is acceptable, frequent or steady lighting indicates clipping, in which case it is advisable to lower the input gain or raise the limiter threshold.

13. Power Switch

This switch is used to switch the unit on and off. When the unit is on, the integrated Power Indicator LED is lit.

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Rear Panel Controls



1. **XLR Input Connectors**
   Balanced three-pin XLR connectors.

2. **TRS Input Connectors**
   Balanced three-conductor 1/4" TRS connectors.

3. **Input Ground Lift Switch**
   In the Lift position this switch is useful in eliminating ground loops and other electrically induced hum from equipment connected to the unit's inputs.

4. **XLR Output Connectors**
   Balanced three-pin XLR connectors.

5. **TRS Output Connectors**
   Balanced three-conductor 1/4" TRS connectors.

6. **Output Ground Lift Switch**
   In the Lift position this switch is useful in eliminating ground loops and other electrically induced hum from equipment connected to the unit's outputs.

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7. AC Power Input

Connect a standard three-pin AC cable to this connector.

8. Dip Switch Selector

The four-bit DIP Switch provides additional features to tailor the unit to a specific system environment. Bits 1 through 3 address output gain attenuation and unity-gain mode. Bit 4 addresses locking the front-panel settings.

Pin Number				Attenuation/ Maximum Output Level
1	2	3	4	
OFF	OFF	OFF	X	0dB/20dBu
ON	OFF	OFF	X	-3dB/17dBu
OFF	ON	OFF	X	-6dB/14dBu
ON	OFF	OFF	X	-9dB/11dBu
OFF	OFF	ON	X	-12dB/8dBu
ON	ON	ON	X	-15dB/5dBu
OFF	ON	ON	X	-18dB/2dBu
ON	ON	ON	X	Unity Gain
X	X	X	ON	Device Lock

The Device Lock function is useful for protecting the unit against unwanted or unauthorized changes. Setting Device Lock will activate the Lock LED on the front panel; any adjustment of front panel controls has no effect. NOTE that if Device Lock is deactivated the unit will immediately readjust to the actual parameters reflected on the front panel.

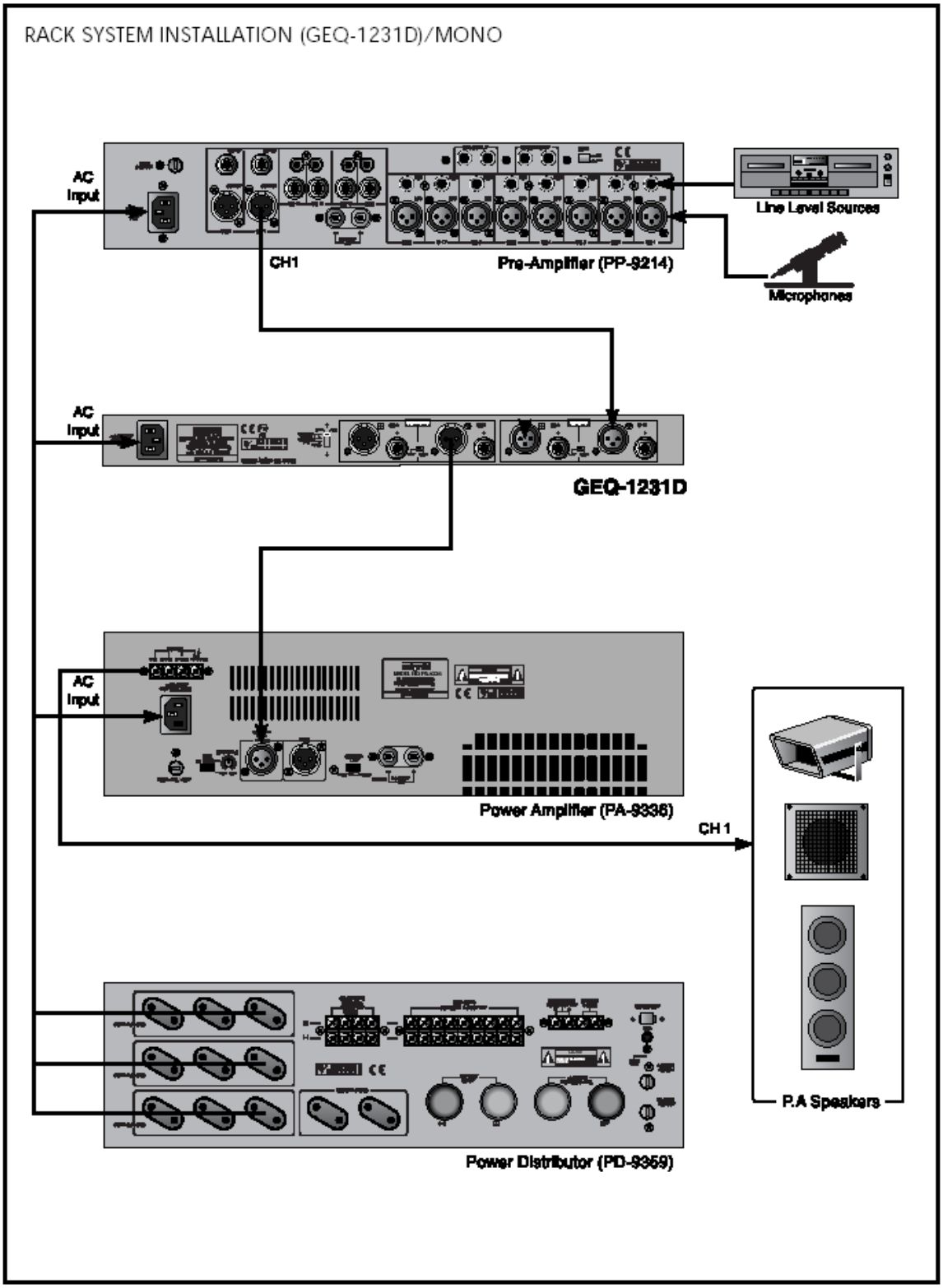
The three-bit Output Level Attenuator is used to select the nominal maximum output level and increase headroom. When working with very high input levels, excessive clipping and limiting may result when boosting particular frequencies. While it is possible to increase headroom by decreasing the input level, this will also decrease signal-to-noise ratio and degrade the input signal. By adjusting the maximum output level with the DIP switch, internal headroom may be increased, thereby creating more range before the limiting and clipping circuitry are activated.

The GEQ-1231D/2231D provides another very unique feature, unity-gain mode. In unity-gain mode, output level is always equal to input level (assuming all EQ controls are set flat), allowing for optimal use of the unit's internal dynamic range. When in unity-gain mode, the Input Gain slider becomes a Sensitivity control, providing sufficient headroom for EQ boost of up to 12dB.

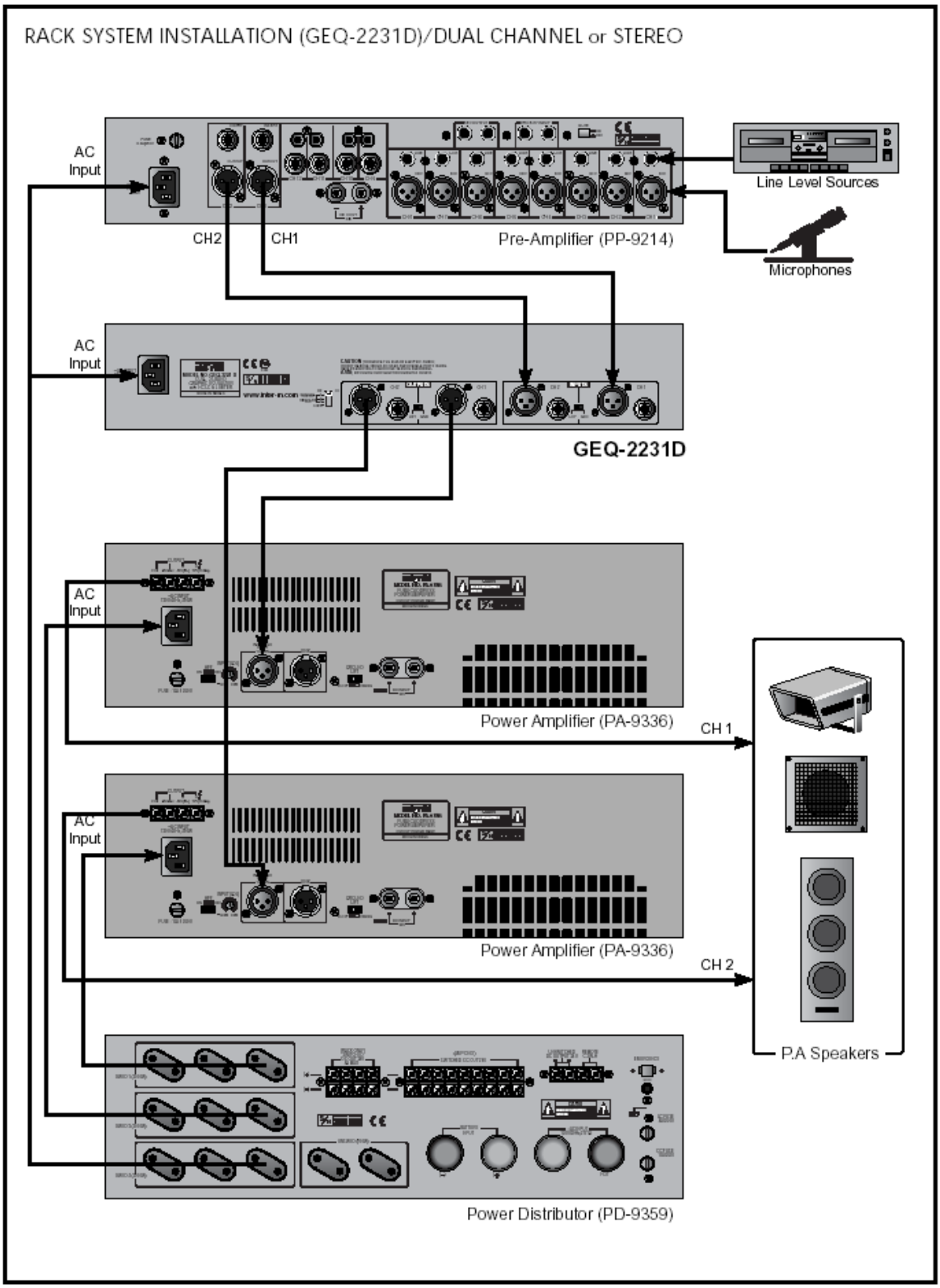
TIP: When utilizing EQ to compensate for acoustic problems and eliminate feedback, it is always best to use EQ cut, rather than boost.

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Applications

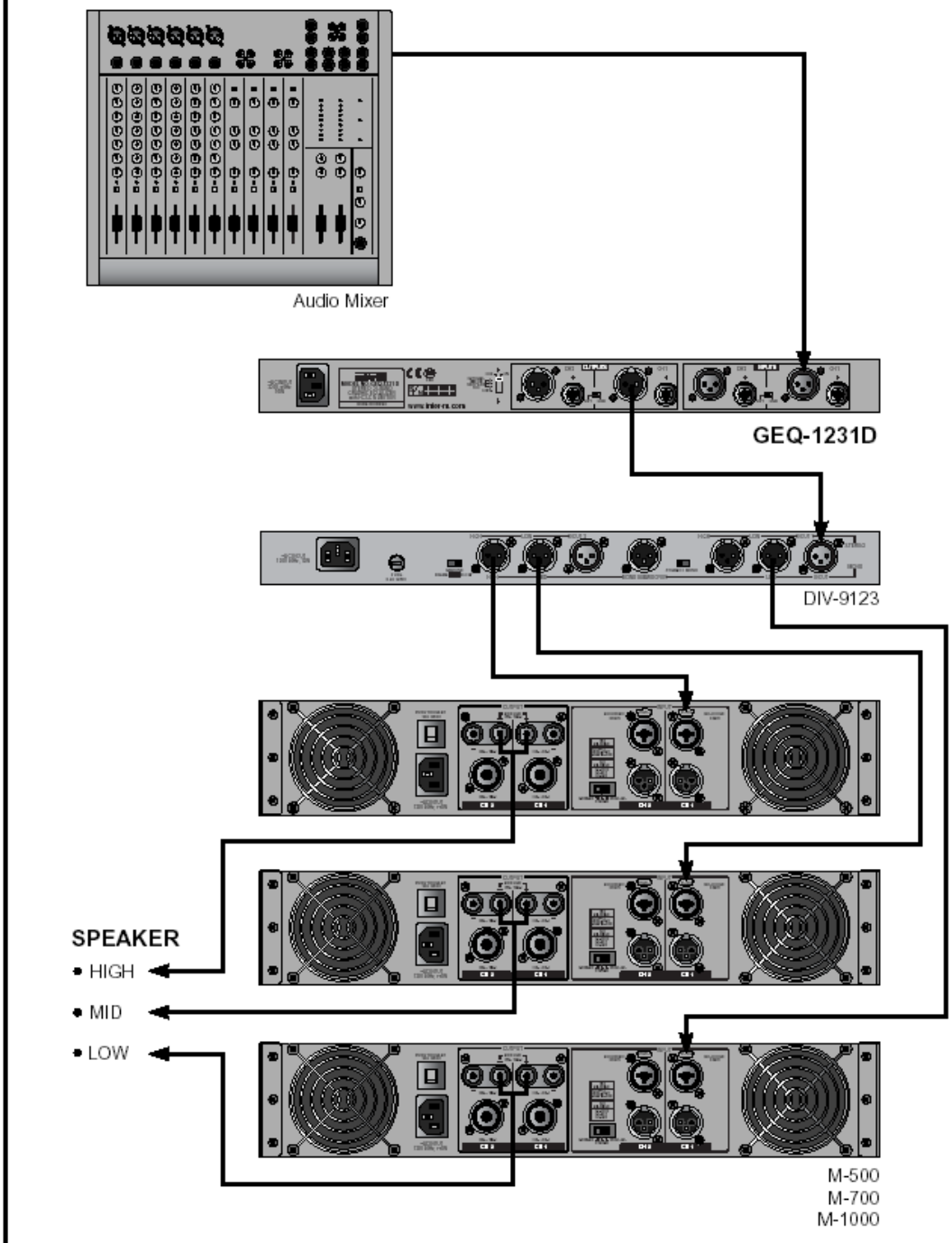


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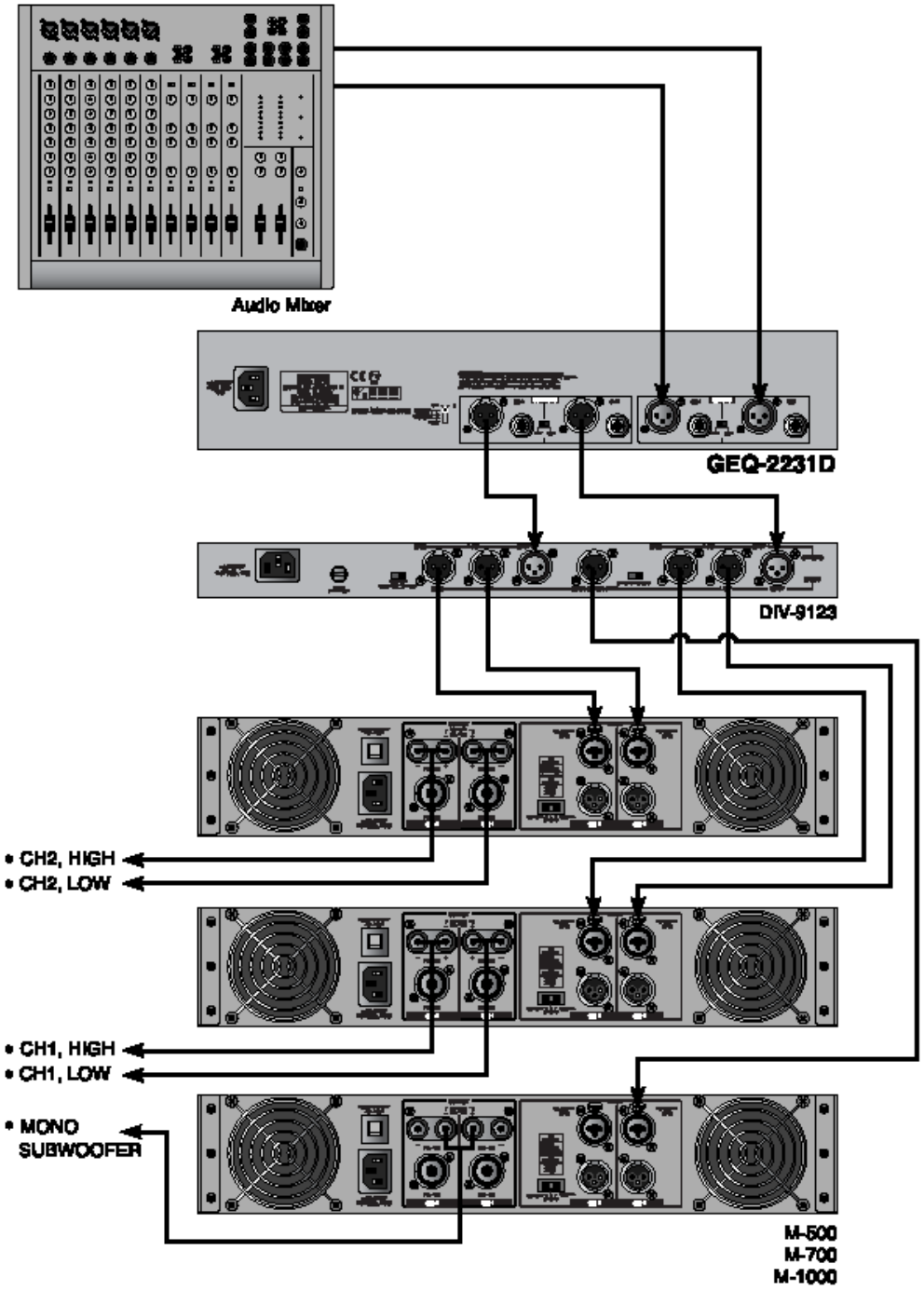
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MUSIC STAGE INSTALLATION (GEQ-1231D)/MONO 3-WAY



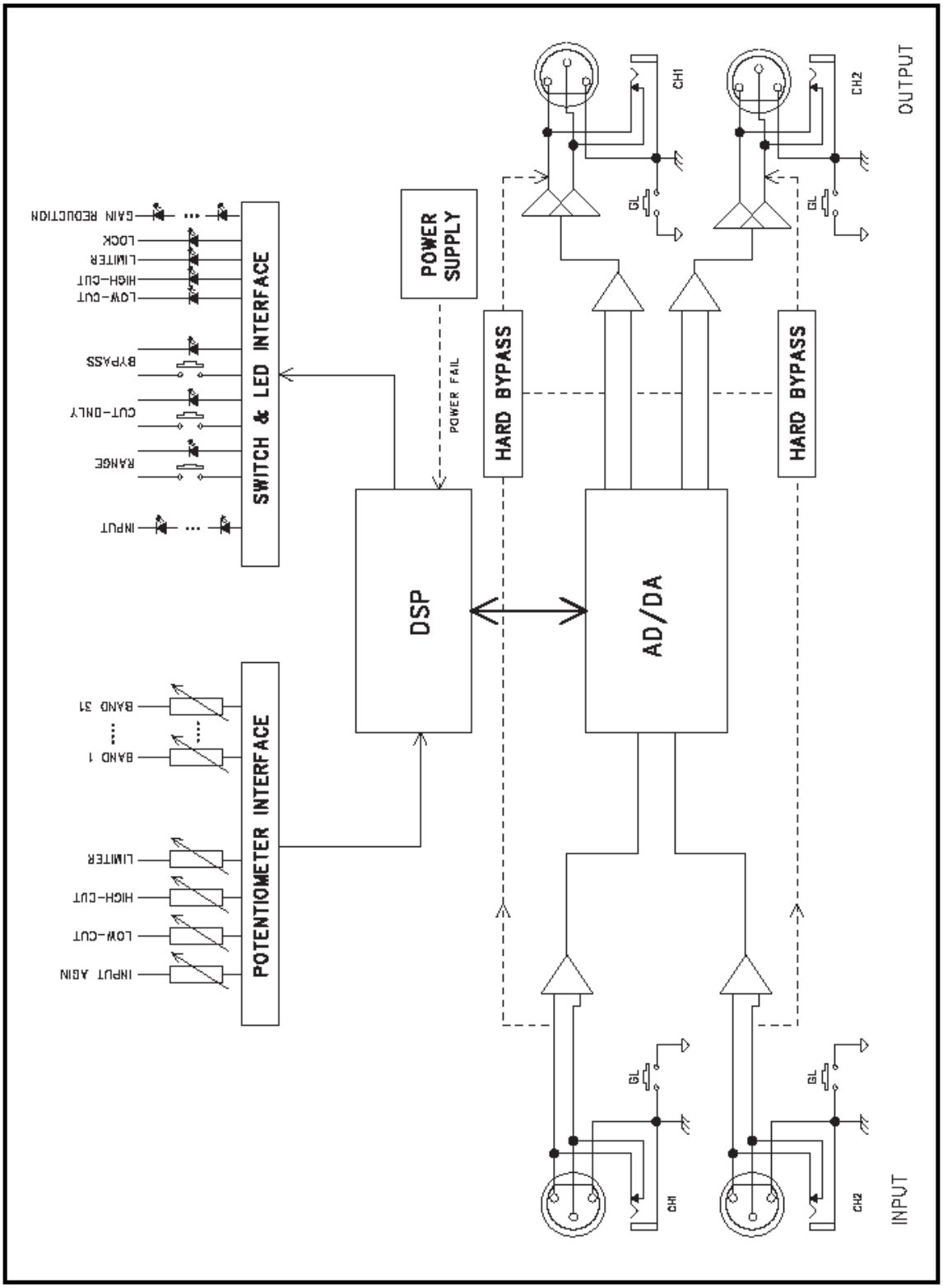
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MUSIC STAGE INSTALLATION (GEQ-2231D)/STEREO 3-WAY



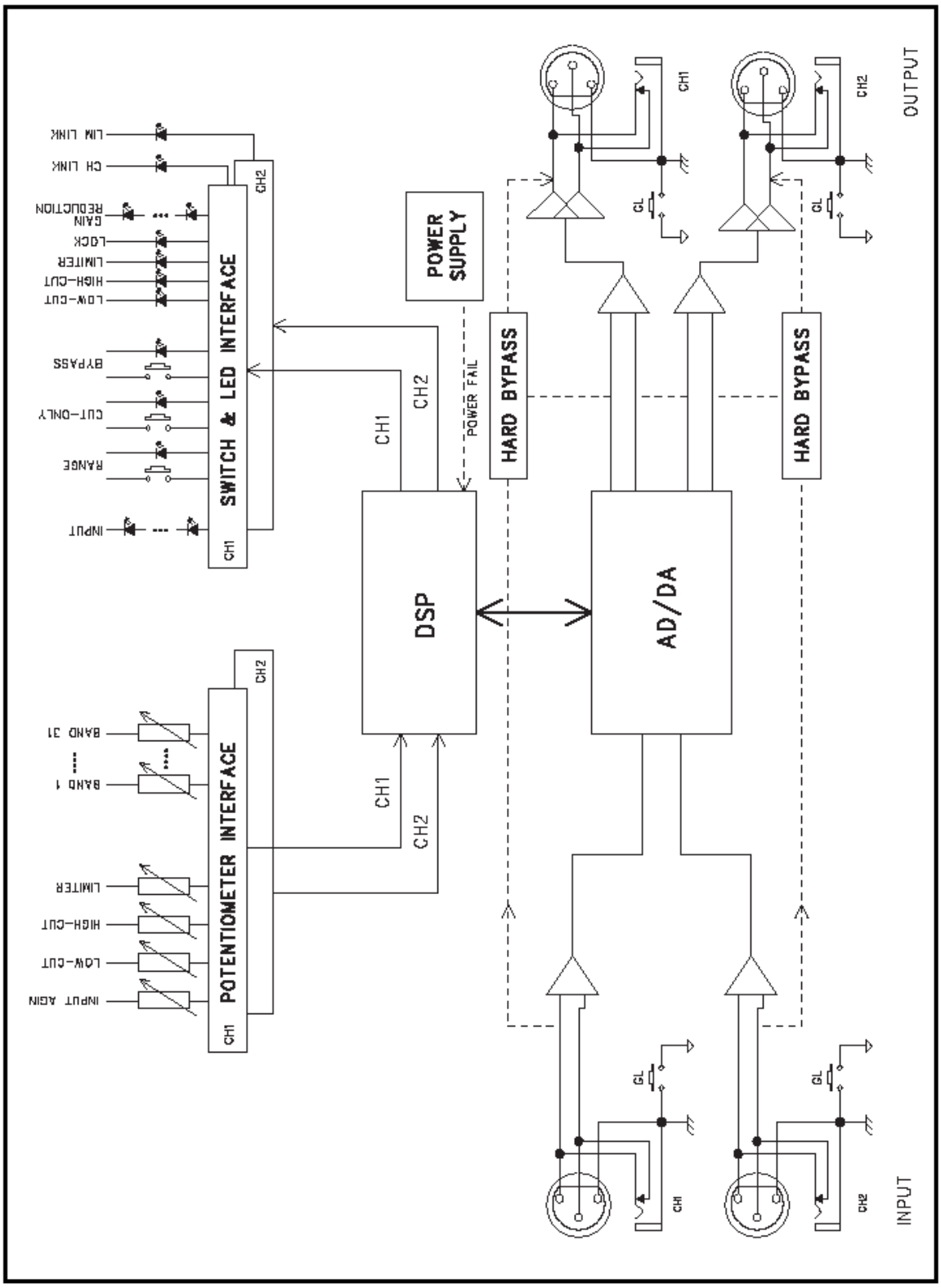
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Block Diagram (GEQ-1231D)



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Block Diagram (GEQ-2231D)



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Specifications

ELECTRICAL

Analog Input
XLR and 1/4" TRS, Electronically Balanced, RF filtered, Fully Unbalanced Compatible

Impedance	>10kΩ
Maximum Input Level	20dBu

Analog Output
XLR and 1/4" TRS, Electronically Balanced, RF filtered, Fully Unbalanced Compatible

Impedance	<100kΩ
Maximum Output Level @ >600Ω	20dBu
DIP Switch Selectable Output Attenuator	20dBu to 2dBu and Unity-Gain in 3dB steps

Graphic Equalizer
31-Band, 1/3 Octave, Constant-Q Filter

Selectable Boost/Cut Range	±12dB, ±6dB, 0 to -12dB, 0 to -6dB (cut only)
Input Gain Control	0 to +18dB
Six-LED Input Level Meter	-40dBu, -24dBu, -15dBu, -8dBu, -3dBu, Peak (> +18dBu)

Cut Filters

Low-Cut Frequency Range	12.5Hz – 200Hz
High-Cut Frequency Range	3.3kHz – 29.5kHz
Slope	18dB/octave Butterworth

Peak Limiter

Type	Maximizer with Soft Clip
Threshold	0 – 18dBF s
Three-LED Gain Reduction Meter	1, 3, 6dB
Output Clip Indicator	> +20dBu

System Performance

Frequency Response (-0.5dB)	10Hz – 31.5kHz
Dynamic Range	-95dB, A-weighted
THD+N	< 0.003%

GENERAL

Power Source	100 –240VAC, 50/60Hz
Power Consumption	10W
Weight	GEQ-1231D: 3.5 Kg (7.7 lbs) GEQ-2231D: 5 Kg (11 lbs)
Dimensions	GEQ-1231D: 482(W) x 44(H) x 280(D) mm 19(W) x 1.75(H) x 11(D) in. GEQ-2231D: 482(W) x 88(H) x 280(D) mm 19(W) x 3.5(H) x 11(D) in.

Specifications and design subject to change without notice for improvements.

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Inter-M, Ltd. (Korea) began operations in 1983.

Since then, Inter-M has grown to become one of the largest manufacturers of professional audio and commercial sound electronics equipment in the world.

Inter-M has gained worldwide recognition for its own branded products, as well as private label manufacturing of electronics sold under other names (OEM).

The company is no longer just a Korean company, but rather a global company that is truly international in scope, with factories and offices in Korea and China, and sales and marketing operations located in Japan, Europe, and the U.S.A.

With more than 850 employees around the globe, Inter-M is well-poised for further growth and expansion.

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