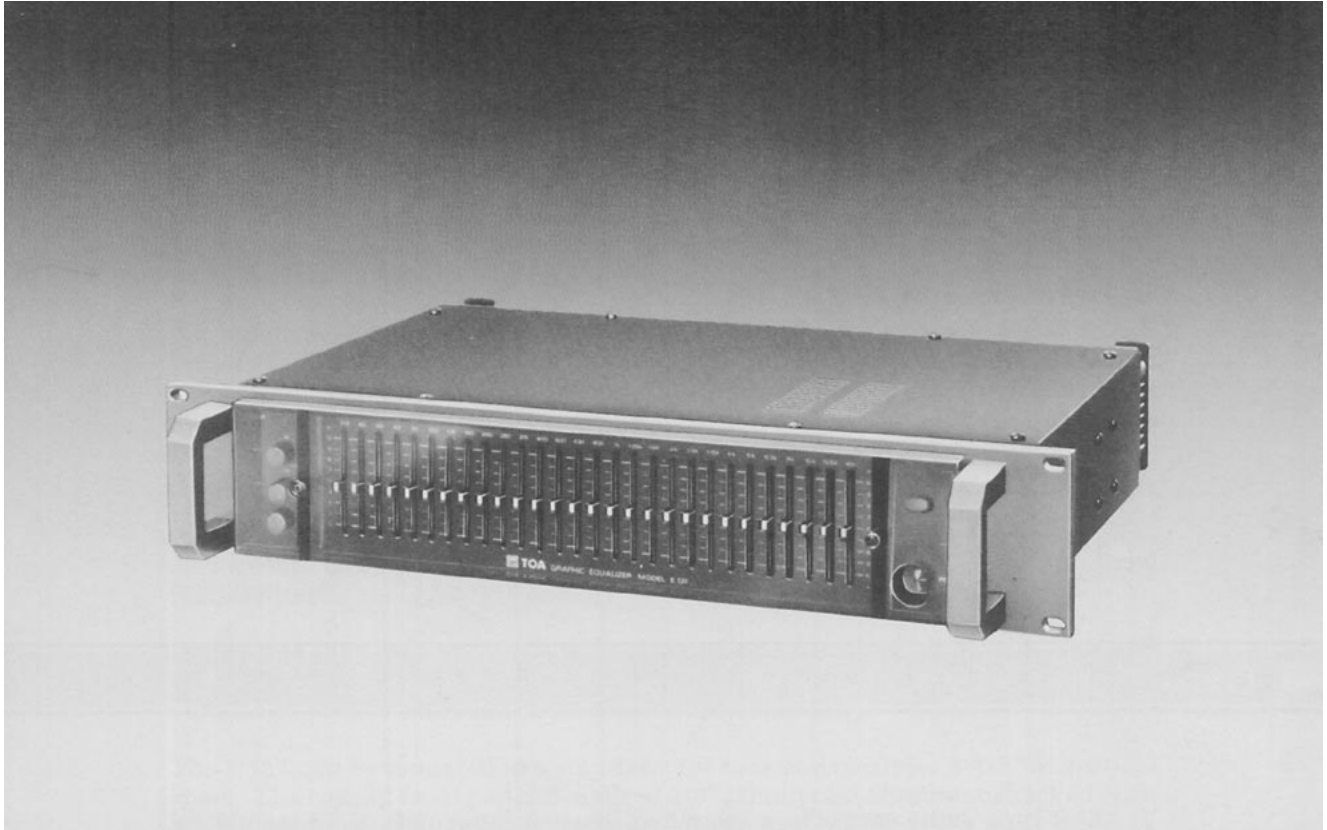




TOA PROFESSIONAL GRAPHIC EQUALIZER

Model E 131



TOA ELECTRIC CO., LTD.
KOBE, JAPAN

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Precautions

1. XLR type audio connectors are wired in accordance with NAB standards. Pin 1 is ground (shield), pin 2 is cold (low, minus), and pin 3 is hot (high, plus).
2. The E 131 has two versions, 120V AC operation only and 220/240V AC operation with a voltage selector. The voltage selector on the rear panel of the 220/240V version should be checked for proper setting prior to operation as improper setting causes trouble. The voltage selector is set for 240V operation at the factory.
3. Do not operate the E 131 from power mains which exceeds the indicated mains voltage by more than 10%.
4. Do not expose the E 131 to corrosive chemicals or liquids such as soft drinks, salt water, etc.
5. Always refer the E 131 to qualified technical service personnel. There are no user serviceable parts inside.

General Description

The TOA E 131 is a single channel, 1/3 octave active graphic equalizer designed to allow clean, accurate audio equalization for stage, studio, or commercial applications.

The E 131 provides 12 dB of boost or cut at each of its 28 frequencies, which are centered at ISO 1/3 octave increments from 31.5 Hz to 16 kHz. Its signal to noise ratio is over 120 dB making the E 131 one of the quietest equalizers on the market.

The E 131's active bandpass/bandreject filters are designed for minimum phase shift, and feature smooth slide controls with center detents for easy and accurate adjustment. The filters are summed in parallel for reliability, so that the failure of one filter does not interrupt operation of the others.

In addition, continuously variable high-pass filters are provided on the front panel. The high-pass filter has a slope of 18 dB per octave and is variable from 15 Hz to 120 Hz, while the low-pass filter has a 12 dB per octave slope and is variable from 8 kHz to 25 kHz.

An input level control on the E 131 gives 12 dB of adjustment to allow a wide variety of input sources. An LED indicator illuminates when either the input or the output comes within 6 dB of clipping. In addition to the usual EQ in/out switch, an automatic EQ bypass function provides complete equalization bypass in the event of loss of AC power, and an output muting function suppresses turn-on/turn-off transients.

A smoked plastic security cover is included with the E 131 to guard against accidental disturbance, or intentional tampering when used in fixed installations.

Inputs and outputs are transformer-isolated and balanced, with both XLR and 1/4" stereo phone jacks. Ground lift switches are provided at both inputs and outputs to reduce hum and prevent ground loops.

The E 131 can be mounted in a standard 19" rack and occupies 3-1/2" of vertical space. The rugged front panel is made of 1/8" (3mm) cast aluminum, backed with a 1/8" (3mm) steel liner for added durability.

Features

1. 28 filters on ISO 1/3 octave center frequencies from 31.5 Hz to 16 kHz.
2. 12 dB boost or cut at each center frequency, continuously variable.
3. Signal to noise ratio greater than 120 dB.
4. High quality, low phase-shift active filters.
5. Precision calibrated, noiseless slide controls with center detent.
6. Equalizer In/Out switch.
7. Continuously variable high- and low-pass filters.
8. LED peak indicator to detect clipping at input or output levels.
9. Variable input level control to accept variety of input sources.
10. Automatic EQ bypass circuitry.
11. Transformer-isolated balanced inputs and outputs with XLR connectors and phone jacks.
12. Ground lift switches on input and output.
13. Smoked, plastic security cover is included.
14. Heavy aluminum die-cast front panel, standard 19" rack mountable.

Specifications

Frequency Response

±1dB, 20Hz to 20kHz

Total Harmonic Distortion

Less than 0.2% at 1kHz, all sliders at 0 position, rated output

Equalization Center Frequencies

31.5Hz to 16kHz

31.5Hz, 40Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz

Rated Input Level

+4dB (INPUT LEVEL CONTROL set for 0 position)

Rated Output Level

+4dB with 600-ohm load

Maximum Input Level

+24dB at 1kHz

Maximum Output Level

+24dB with 600-ohm load

Input Impedance

10k ohms (balanced)

Output Impedance

600 ohms (balanced)

Hum and Noise

-103dB (EQ in, all sliders at 0 position, IHF-A weighted)

Input Connectors

One "female" XLR connector; pin 1 "shield", pin 2 "cold", pin 3 "hot".

XLR is balanced and in parallel with one tip-ring-sleeve (standard) phone jack.

Output Connectors

One "male" XLR connector; pin 1 "shield", pin 2 "cold", pin 3 "hot".

XLR is balanced and in parallel with one tip-ring-sleeve (standard) phone jack.

Indicators

A red LED for output clipping

A green LED for equalizer IN

A green LED for power ON

Controls

Equalizer Sliders

±12dB

Input Level Control

±12dB

High Pass Filter

18dB per octave

Adjustable Cutoff Frequency: 15Hz to 120Hz

Low Pass Filter

12dB per octave

Adjustable Cutoff Frequency: 8kHz to 25kHz

AC Line Voltage

AC mains, 50Hz/60Hz

Power Consumption

14 watts

Finish

Black painting

Dimensions (W×H×D)

483X89X370 (mm)

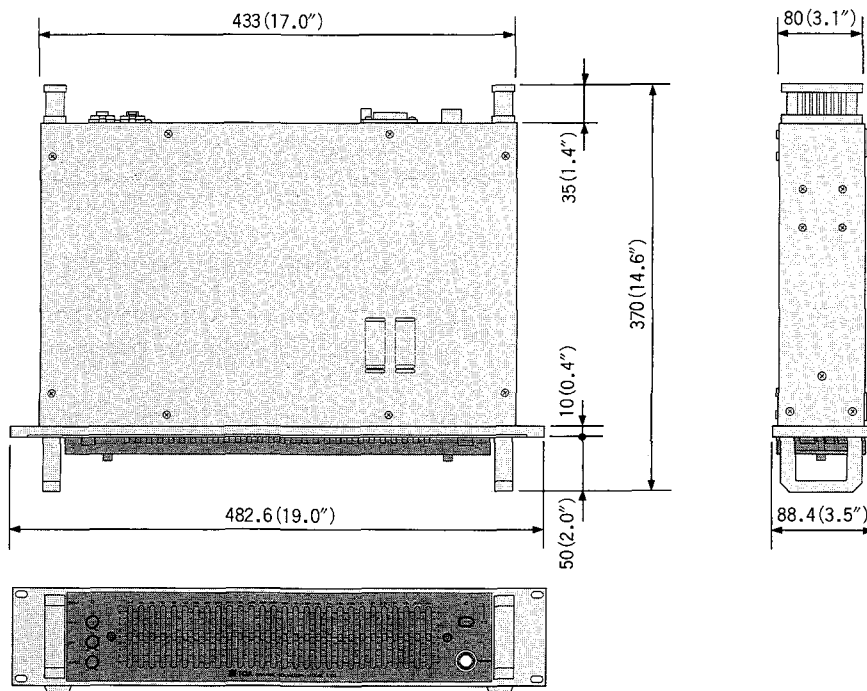
19X3-1/2X14-1/2 (inches)

Weight

6.6kg (15 lbs)

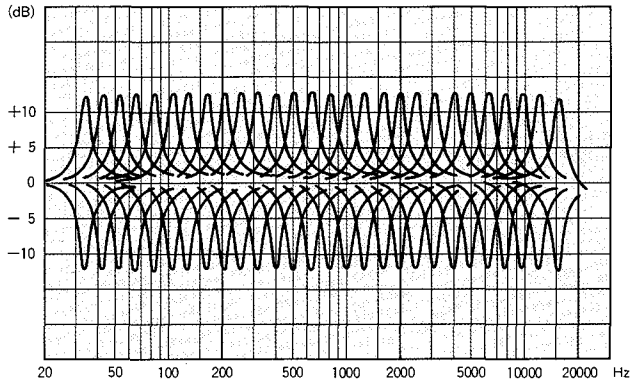
Note: 0dB is referenced to 0.775 volts RMS.

Appearance

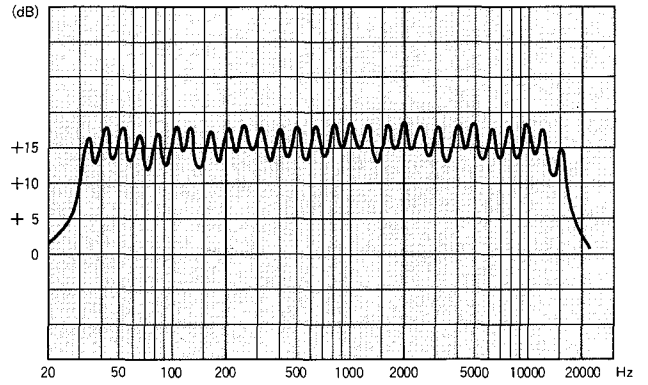


Performance Graphs

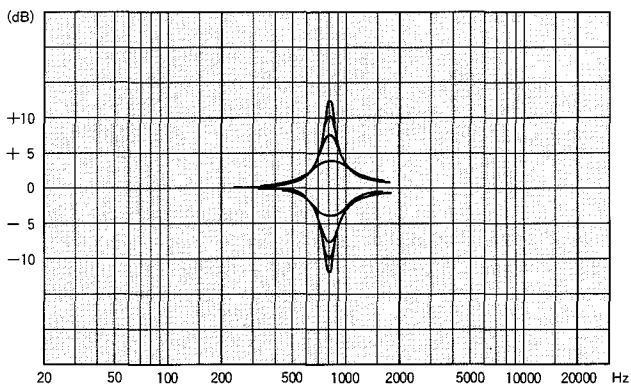
Frequency Response
(Each slider is set at a max or min position)



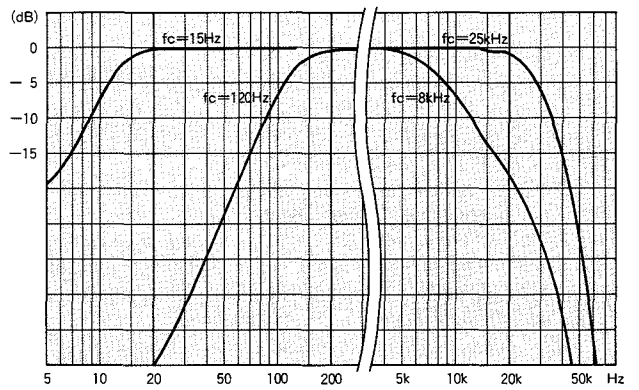
Frequency Response
(All sliders are set at a max position)



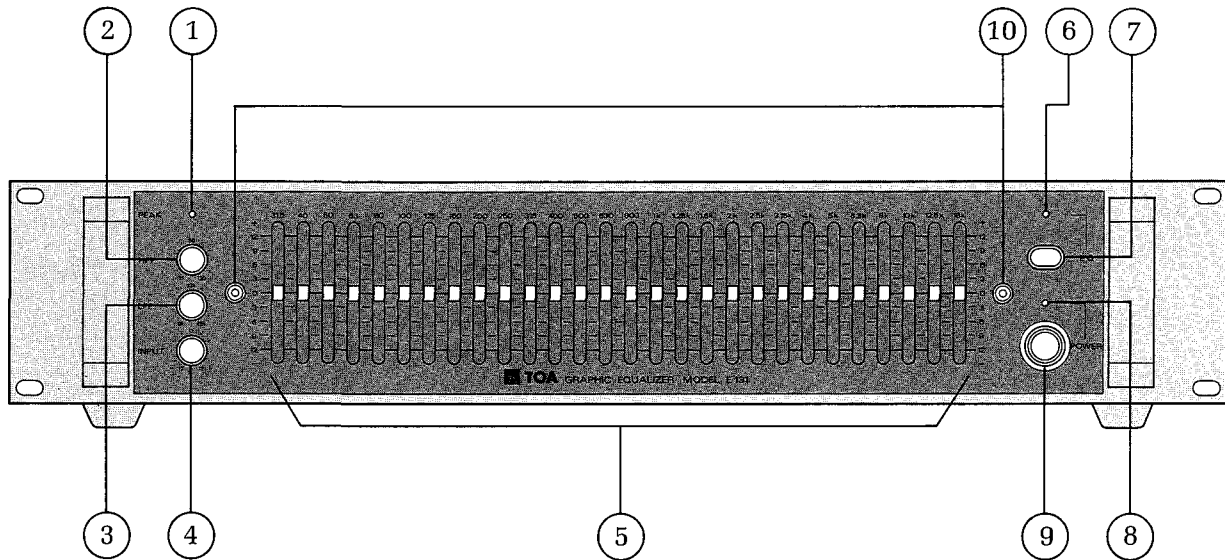
Frequency Response (ex. 800Hz slider)



High pass & Low pass Filters



Front Panel



① **Peak Indicator LED**

The peak indicator LED will glow when the output level reaches 6dB below clipping. It is quite common for the LED to flash on and off during high level operation. However, if the LED remains steadily lighted, the input level control or the output level of associated equipment should be lowered until the LED only flashes at the highest peaks.

② **High Pass Filter Control**

This shelving-type filter provides an 18dB per octave rolloff between 120Hz and 15Hz. It is especially useful for reducing stage or turntable rumble, AC hum, wind noise, and other subsonic components that waste amplifier power and tax speakers.

③ **Low Pass Filter Control**

This is also a shelving-type filter that provides a 12dB per octave rolloff above 8kHz and up to 25kHz. Its main purpose is to stop high frequency noise, oscillation, and certain types of RF interference from damaging tweeters. It is also useful in reducing excessive background noise, such as that produced by old phonograph records.

④ **Input Level Control**

This control adjusts the input gain by ± 12 dB to allow the use of a wide range of input sources. To insure the best S/N ratio possible, adjust this control so that the peak LED flashes only occasionally.

⑤ **Equalizer Sliders**

These sliders are adjusted to tune or equalized the overall frequency response of a sound system.

⑥ **Equalizer Indicator LED**

The indicator LED turns on whenever the equalizer IN/OUT switch is "in".

⑦ **Equalizer IN/OUT Switch**

Equalizer switch puts the input signals either in circuit or out of circuit of the equalizer except high- and low-pass filters. The "out" position provides flat audio response no matter what the position of the equalizer sliders.

⑧ **Power Indicator LED**

The green LED glows when the power switch is "on".

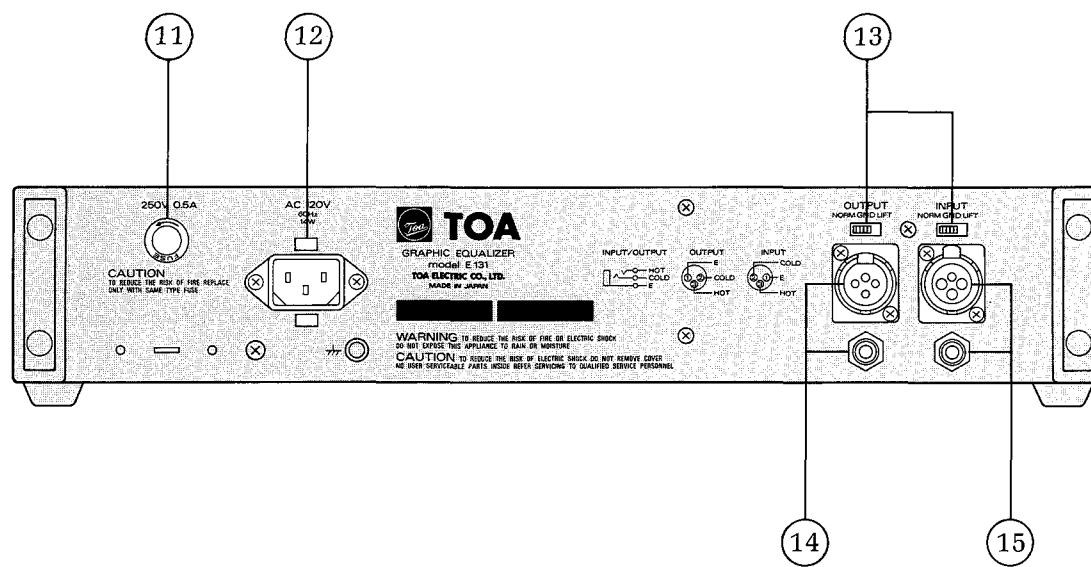
⑨ **Power Switch**

Pushbutton alternately switches the AC power on and off.

⑩ **Security Cover Stud Screw**

The stud screws are provided to mount the smoked plastic security cover, which prevents inadvertent control changes after all controls are properly set.

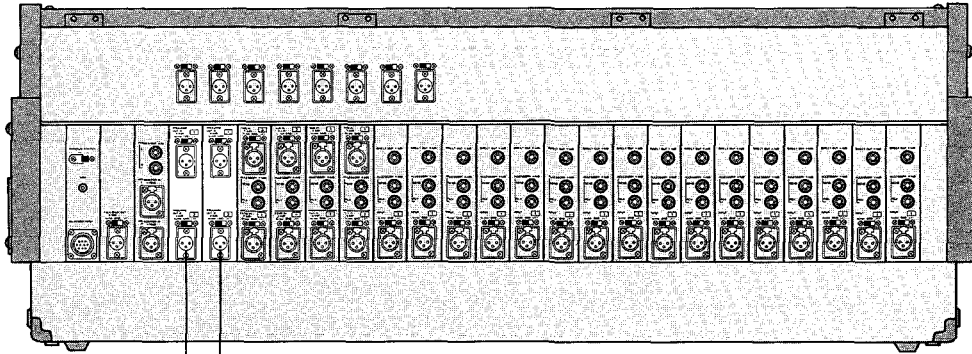
Rear Panel



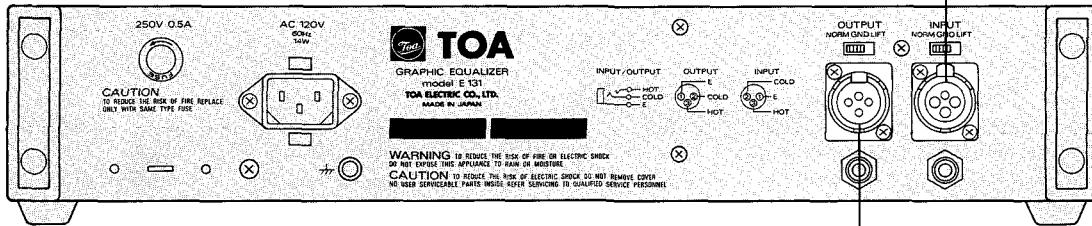
- ⑪ **Power Fuse (Fuse 0.5A, 0.3A)**
Fuse for 220/240V AC operation should be 0.3A and 0.5A for 120V AC.
- ⑫ **AC Inlet**
The power cord must be plugged into it.
- * **Power Cord Clamp**
A plastic covered metal clip is provided to prevent accidental disconnection of the AC power cord.
- ⑬ **Ground Lift Switch**
The ground lift switch is effective to avoid ground loops that are often caused in connection with other equipment and that may induce hum. Sliding the ground lift switch from a NORM position to the LIFT position cuts ground loops and may reduce hum. For most applications it should be set to the NORM position.
- ⑭ **Output Connectors**
The XLR output connector is balanced and is wired in parallel with the phone jack that can accept tip/sleeve as well as a tip/ring/sleeve type of plug. The output impedance is 600 ohms.
- ⑮ **Input Connectors**
The XLR input connector is balanced and is wired in parallel with the phone jack that can accept tip/sleeve as well as a tip/ring/sleeve type of plug. The input impedance is 10k ohms.

Input / Output Connections

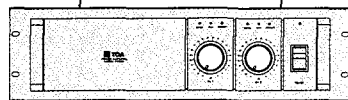
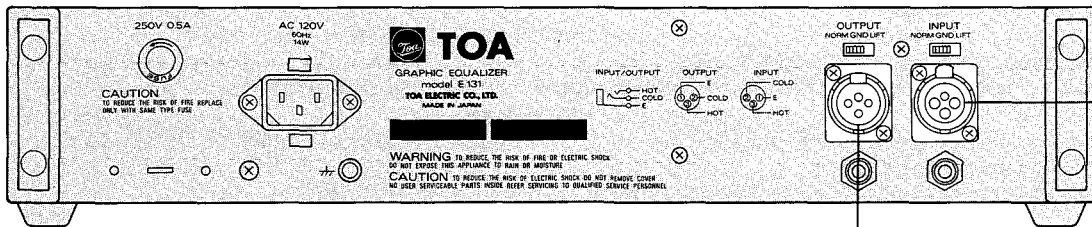
Mixing Console (RX-7)



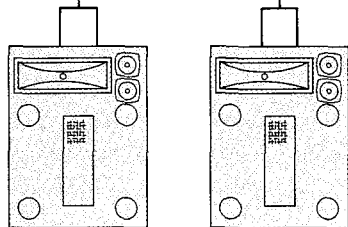
E 131 (L)



E 131 (R)



Power Amplifier
(P 150D)

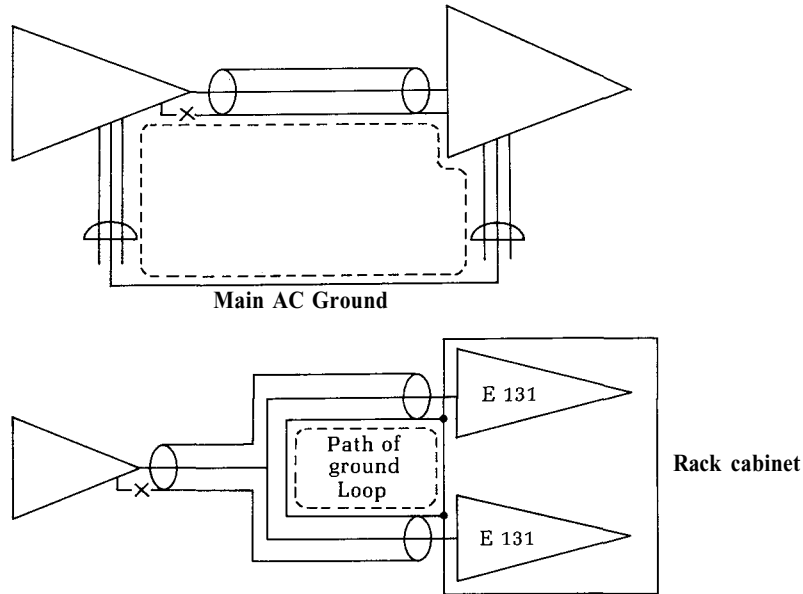


Speaker System
(38-SD×2)

Installation Precautions

Ground Loops

In any audio system, there are numerous ways by which ground loops can be created. For example, they may occur when the E 131 is mounted in a rack cabinet, or through AC ground when the E 131 is connected with preamps, mixers, etc. These ground loops may cause hum and noise if care is not taken during connection. An increase in noise from ground loops may be minimized by breaking the ground loop. Generally, the chassis ground of the signal line should be broken as shown below.

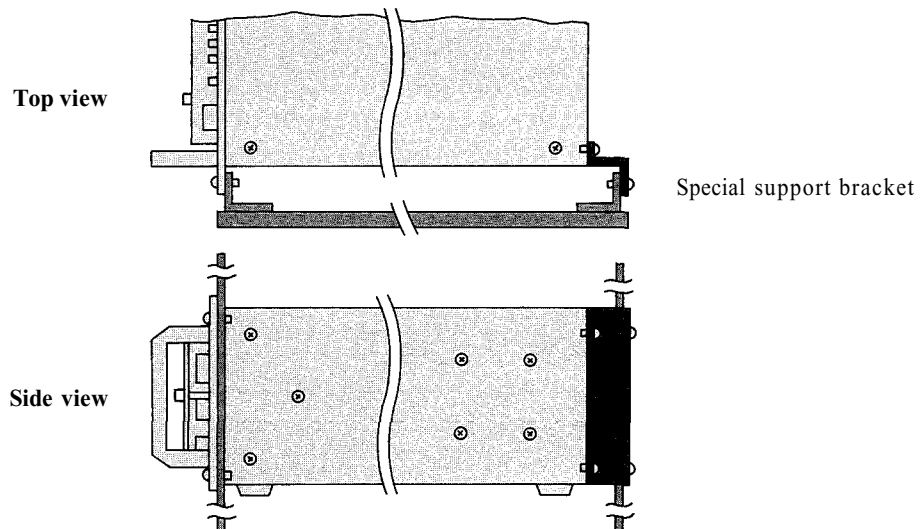


When a Y cord is used, shorten the wiring to minimize noise.

Ground lift switches are provided on the rear of the E 131. Sliding the ground lift switch from a NORM position to the LIFT position lifts ground.

On the road use

The E 131 is sturdily constructed with an aluminum die-cast front panel that is reinforced by means of an iron plate attached to its back. To ensure that strength is maintained during its transportation from one place to another, however, you should also reinforce the unit from the back of the rack with a special support bracket. This can be accomplished by removing cord-hangers on the rear panel, and screws that hold the rear panel to chassis, and fitting the special support brackets through the holes.

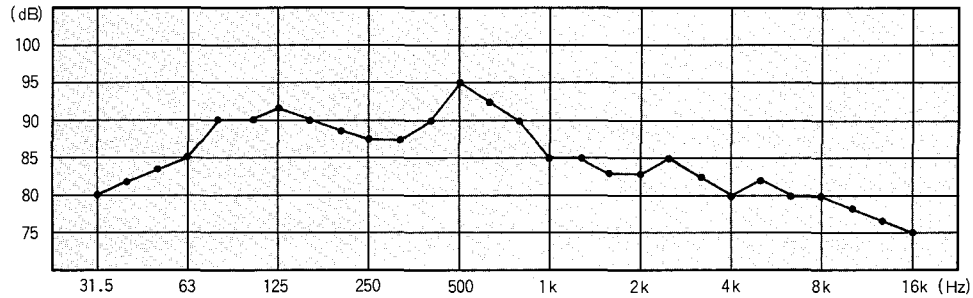


Applications

Feedback Prevention

When the overall gain of a sound system is increased, feedback will occur at frequencies where the system response has peaks. Suppose the system has an uneven frequency response like that shown in the following diagram. The frequency at which feedback will occur when gain is increased is about 500Hz. In this case, feedback may be

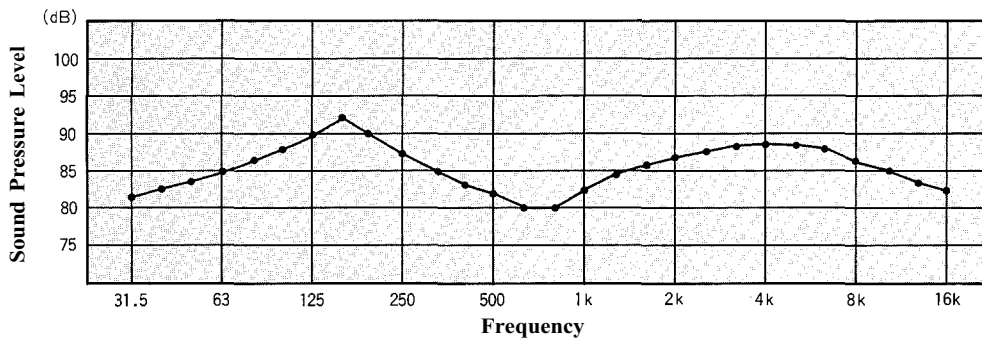
prevented by attenuating levels at 500Hz by 3dB to 5dB with the E131. If the overall gain is again gradually increased, feedback will occur next at about 125Hz. It may be stopped by attenuating the levels 2dB to 3dB at that frequency. In this procedure, sufficient gain in the sound system is obtained before feedback.



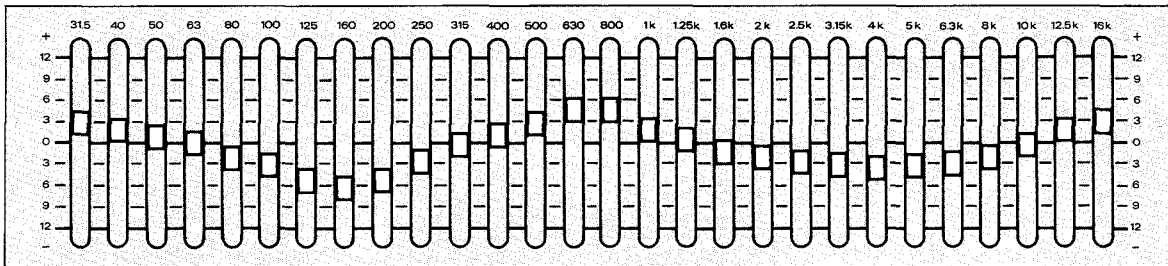
Room Equalization

In a sound reinforcement system for a room, the clarity of sound can be adversely affected by the room frequency response including standing waves (room resonances), reflections of sound, and relations between direct and indirect sound.

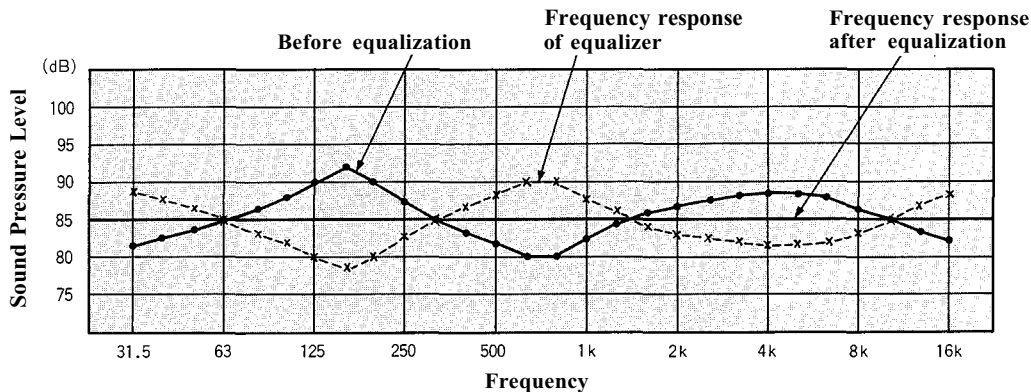
The E 131 is an effective tool to equalize the room frequency response to a flat response and improve sound clarity. For example, suppose that there is a room frequency response as shown below.



The equalizer sliders are set as shown below.



The overall response after equalization will then be as follows.



Applications

Equalization for music

The Graphic Equalizer is designed not only for use in preventing feedback and equalizing uneven room frequency response to be flat, but also for equalizing frequency response to your tastes and producing favourable sound for you. Fig. 1 shows each frequency band and its corresponding auditory feeling. Fig. 2 and table 1 show the relation between each musical instrument and its frequency band. They can be of great help in the equalizer operation. (They are referenced from a book entitled "Practical Guide for concert")

EQUALIZATION CHART

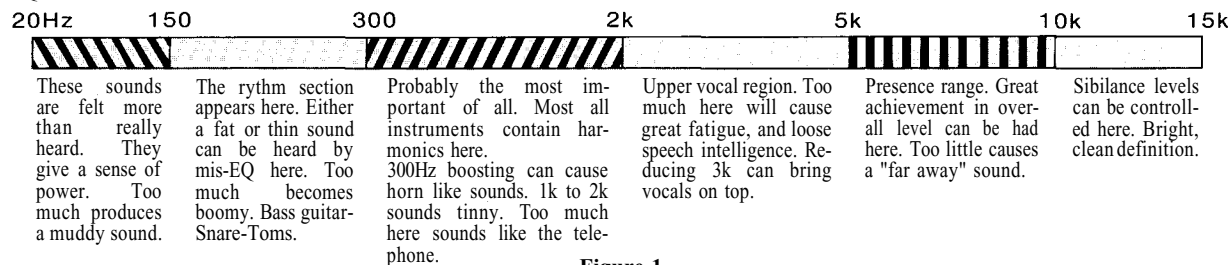
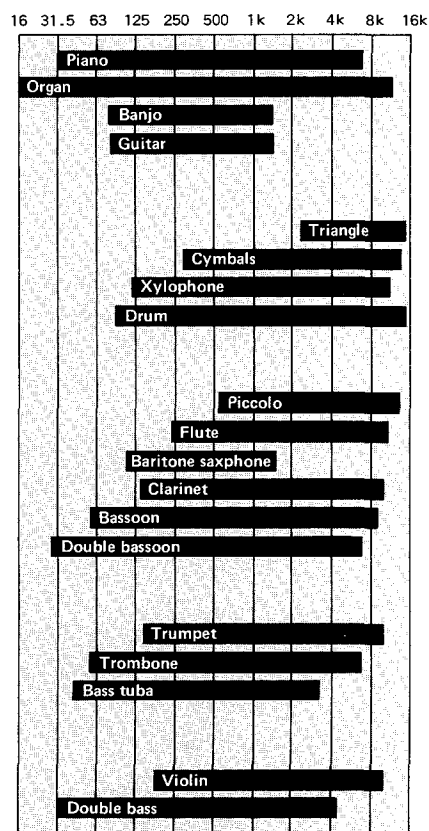


Figure 1

INSTRUMENT CHART



INSTRUMENT EQUALIZATION CHART

- Acoustic guitar** Bass strings resonate between 70 to 120Hz, body around 300Hz. Avoid boosting these to stop feedback. 3kHz and 5kHz gives great "clarity".
- Electric guitar** Resonances differ — depending on type. Good full sounds around 300 to 500Hz. Clarity at 3kHz.
- Bass guitar** Extreme lows are at 60 to 90Hz. "Pick" or "pluck" sounds are around 800 to 1200Hz. Upper harmonics clarified about 3kHz.
- Human voice** Good fullness at 150Hz. Watch for "boominess" around 250Hz. Mid-range 10kHz.
- Piano (Acoustic)** Bass strings resopnate around 100Hz. Watch for sub-harmonics at 30 to 50Hz.
- Piano (Electric)** Good mid-clarity at 3kHz to 5kHz thins out rapidly in high end. Be careful around 1.5kHz to 2.5kHz to avoid the "bar room sound".
- Organ** Usually dies under 200Hz. Has great mid-sounds around 1200 to 2000Hz. Top end cuts off at 6kHz.
- Violin** Richfullness at 400Hz. Natural mids around 1500 to 2500Hz. Avoid "scratch" sounds at 8kHz.
- Brass instruments** Watch for "hot" mids around 2kHz. Low end boost around 400Hz. Top end clarity at 6kHz.
- Bass drum** Great low "kick" at 40Hz. The mids at 2kHz gives the familiar "punch".
- Snare drum** Good fullness at 100Hz. The "crack" is boosted at 2kHz. real easy. The snares extend to above 4kHz.
- Tom Tom** The main fullness is around 200Hz. The mid punch extends to 4kHz.
- Floor Tom** Same as tom, but extends down to 80Hz.
- Hi Hat** Watch for the "gong" sound around 300Hz. Good "shimmer" sounds are around 8kHz to 10kHz.
- Cymbal overhead** About the same as hi-hat only has more low end around 150Hz.
- Talk Box** Depending on the guitar sound driving it and the resonance of each player's mouth, should have great "bite" around 1200Hz and dies above 6kHz.



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