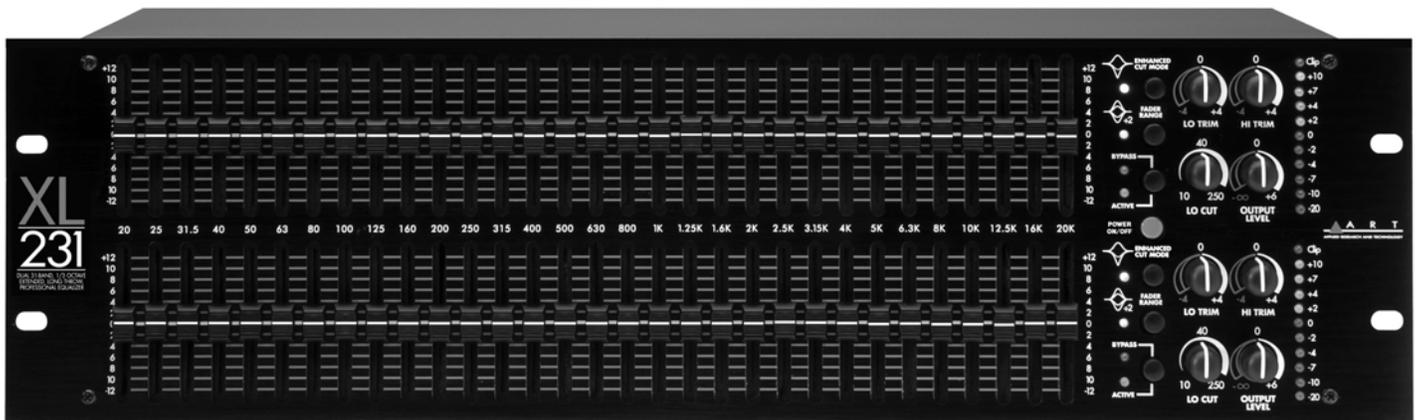


XL

231

DUAL 31-BAND, 1/3 OCTAVE
EXTENDED, LONG THROW,
PROFESSIONAL EQUALIZER



OPERATION MANUAL



IMPORTANT SAFETY INSTRUCTION – READ FIRST



This symbol, whenever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears alerts you to important operating and maintenance voltage instructions in the accompanying literature. Please Read manual.

Read instructions:

Retain these safety and operating instructions for future reference. Heed all warnings printed here and on the equipment. Follow the operating instructions printed in this Operation Manual.

Do not open:

There are no user serviceable parts inside. Refer any service work to qualified technical personnel only.

Power sources:

Connect the unit to mains power only of the type described in this Operation Manual or marked on the rear panel. The power source must provide a good ground connection.

Power cord:

Use the power cord with sealed mains plug appropriate for your local main supply as provided with the equipment. If the provided plug does not fit into your outlet consult your service agent. Route the power cord so that it is not likely to be walked on, stretched or pinched by items placed upon or against.

Grounding:

Do not defeat the grounding and polarization means of the power cord plug. Do not remove or tamper with the ground connection on the power cord.

Moisture:

To reduce the risk of fire or electrical shock, do not expose the unit to moisture or use in damp or wet conditions. Do not place container of liquid on it.

Heat:

Do not locate the unit in a place close to excessive heat or direct sunlight, as this could be a fire hazard. Locate the unit away from any equipment, which produces heat such as: power supplies, power amplifiers and heaters.

Environment:

Protect from excessive dirt, dust, heat, and vibration when operating and storing. Avoid tobacco ash, drink spillage and smoke especially that associated with smoke machines.

Handling:

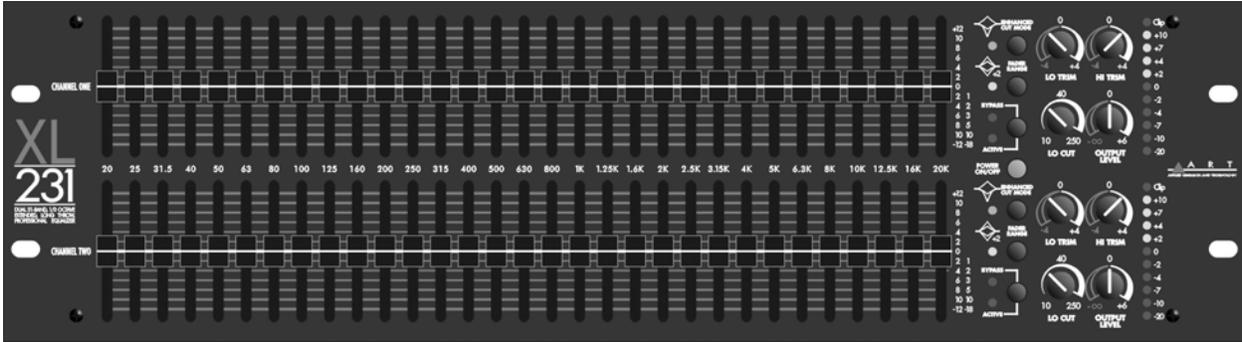
Protect the controls from damage during transit. Use adequate padding if you need to ship the unit. To avoid injury to yourself or damage to the equipment take care when lifting, moving or carrying the unit.

Servicing:

Switch off the equipment and unplug the power cord immediately if it is exposed to moisture, the power cord or plug becomes damaged during a lightning storm or if smoke odor or noise is noted. Refer servicing to qualified technical personnel only.

Installation:

Install the unit in accordance with the instructions printed in the Operation Manual.



INTRODUCTION

The new ART XL 231 Dual 31 Band, 1/3 Octave Extended Long Throw Professional Equalizer has been designed and engineered to exceed extremely high standards for audio performance and functionality. This innovative, high-quality equalizer is perfect for virtually any audio application where precision frequency tailoring, reliable performance, rugged design and extremely silent processing are of the utmost priority.

Active Filter Sections

The XL 231 features active filter sections, which incorporate a constant-Q design. This constant-Q design, with its accurate precision center frequencies, ensures that the bandwidth of every individual filter will be narrow enough to prevent unnecessary interaction between adjacent filters, yet still create an equalization curve wide enough to produce the exact and precise processing of audio frequencies the user seeks.

Filter circuitry incorporates high quality low noise components including 1% resistors, and, precision high performance 2% film capacitors.

Enhanced Cut Mode

The XL 231 offers an enhanced cut mode which allows more narrow filters and deeper cut of -18dB. This helps when trying to tame resonance and minimizing overall spectral changes. Only each filter's cut mode is enhanced while their boost characteristic remains unchanged.

Precision Slide Potentiometers

The XL 231 uses 45mm precision slide potentiometers. These center-detented, metal shaft precision faders are graphically positioned on ISO center frequencies between 20Hz to 20kHz. The sliders feature a grounded center tap to assure that the filter is out of the circuit when the control is at its center detent.

Hi and Low Trim controls

These unique controls allow a gentle slope to be added, or subtracted from the overall frequency response. Both controls hinge at the middle of the spectrum and allow subtle changes to the overall sound without the need to adjust many sliders. Although similar in concept to tone controls, these differ in their well controlled precision straight curves, and, have less selectivity so the Trim controls don't have a "sound" as a typical tone control will.

Variable Low Cut Filtering

To help keep bass under control, the XL 231 Graphic Equalizer incorporates a variable swept Low Cut filter.

Automatic Relay Bypass

The XL 231 Graphic Equalizer also features automatic relay bypass of audio, an essential function if power to the unit is lost. Rugged construction and solid audio performance make this equalizer particularly well suited to fixed installation as well as touring live sound systems.

Additional Controls and Indicators

The XL 231 Graphic Equalizer includes a variable output level control, 10 segment level bar with peak hold, clip level indicator, and selectable line voltage.

Additional features include selectable Scale Switching - (High Slider Resolution $\pm 6\text{dB}$ - or Normal Resolution ($\pm 12\text{dB}$), active balanced and unbalanced input/output connectors, and RFI filtering.

A front panel Bypass switch allows direct comparison between the equalized and non-equalized signal for each channel.

Multiple Connectivity

The XL-231 Graphic Equalizer may be connected to a wide variety of audio devices. It has three sets of input and output connectors: XLR, $\frac{1}{4}$ " phone, and detachable Euroblock barrier strip connectors. The inputs are wired in parallel. The XLR and Euro block output connections are also wired in parallel. A separate output circuit is used for the $\frac{1}{4}$ " phone output. It provides a balanced connection that results in the same output level when operated with balanced, or unbalanced connections.

Durability by Design

The XL-231 Graphic Equalizer is designed and engineered to be durable and rugged. It is an ideal choice when the need for a robust equalizer is of paramount concern. It is designed for mounting in a standard 19" equipment rack or portable case.

Precision and Quality

When considering quality equalization, the XL-231 Graphic Equalizer is an excellent choice. It delivers extremely precise, powerfully flexible and simply great sounding equalization, with the quality features and reliable design criteria necessary for top-level audio performance.

GENERAL INFORMATION

Congratulations on the purchase of your new ART equalizer. This professional equalizer is perfect for virtually any audio application where frequency tailoring is needed.

INSTALLATION

This equalizer is designed for mounting in a standard 19" equipment rack or rack type portable case. It is 3 standard rack units in height or 5.25 inches. The depth is 7 inches behind the front panel.

POWER CONNECTORS

This equalizer has internal power supplies designed for operation with 120 or 240 Volt (as determined by the rear fuse block orientation), 50-60Hz mains supply. In new installations and portable sound systems, or any situation where the mains power is in question, it is wise to confirm the voltage and select the appropriate line voltage setting **BEFORE** connecting the equalizer to power sources.

INPUT/OUTPUT CONNECTIONS

The XL 231 has three sets of input and output connectors. These connections include XLR, 1/4" balanced or unbalanced phone, and detachable Euroblock barrier strip connectors. The inputs are wired in parallel. The XLR and Euroblock output connections are also wired in parallel. A separate output circuit is used for the 1/4" phone outputs which provides the same output level when used with either balanced, or unbalanced connections.

For optimum performance use balanced connections. Balanced connections help eliminate external sources of electrical noise.

EUROBLOCK CONNECTIONS

Insert the wires, and then snug down with the set screw. The entire barrier strip can be detached for quick service without disconnecting the individual wires.

SIGNAL LEVELS

Signal levels from -10dBu to +4dBu are considered normal with maximum levels of approximately +24dBu. Do not connect microphones directly to the equalizer. Most microphones, as well as instrument pickups, require a preamp to get the signal level up to a line level.

The outputs of the equalizer are also designed to connect into line level inputs and should not be connected into sensitive microphone or instrument inputs for best results.

Please refer to the APPLICATION NOTES for more information on operation levels.

OPERATING INSTRUCTIONS

Before starting to equalize your sound system there is some information you should know and procedures you should follow. Your equalizer is equipped with a bypass switch. The bypass switch, when activated, lights the bypass red LED and cancels all equalization settings while allowing signal to flow directly through the unit at unity gain. When in the active state, the green LED is on.

Also included is a range selection switch. Normal range is $\pm 12\text{dB}$ ($+12/-18$ when Enhanced Cut Mode is active). When Fader Range is set to $\div 2$, the yellow LED is illuminated and the range is cut in half to $\pm 6\text{dB}$ ($+6/-9$ when Enhanced Cut Mode is active). In addition to the range selection switch there is an output level control potentiometer. The level control operates between off and $+6\text{dB}$.

Note: If there is too much input signal, or, the equalizer has many filter bands boosted, the red LED Clip indicator will indicate when signals are within 6dB of clipping. If the Clip LED flashes occasionally, this is okay, but if this LED is steadily on you should reduce the input signal level or the amount of boost in the filter bands. Reducing the output level will not reduce clipping if it occurs.

INITIAL SET UP

Here are some tips to help you with the initial set up:

1. Set channel output levels to the center 0dB on the front panel.
2. Select the Bypass switch to bypass the equalizer (Note: The red LED is on).
3. Set the frequency band slide controls to the center detent (0dB).
4. Set the Low Cut filter to 10Hz.
5. Select the $\div 2$ range (Note: The yellow LED is on).
6. Apply signal to the system and if the Clip LED is on, reduce your signal to the unit.
7. Release the bypass switch (Note: The red LED is off, the green LED is on.).
8. You may now start equalizing your system.
9. If you do not have enough equalization control, release the Fader Range switch to the out position, yellow LED off.

FRONT PANEL CONTROLS

POWER SWITCH

To turn the equalizer ON or OFF, press (and release) the POWER ON/OFF button.
CAUTION: Always turn on your mixer and equalizer BEFORE your power amplifiers are turned on, and always turn off your equalizer AFTER your power amplifiers have been turned off.

FILTER LEVEL CONTROLS

Each of these sliders controls the signal level of each of the 31 bandpass filters. A detent at the center position helps center the controls for a flat response.

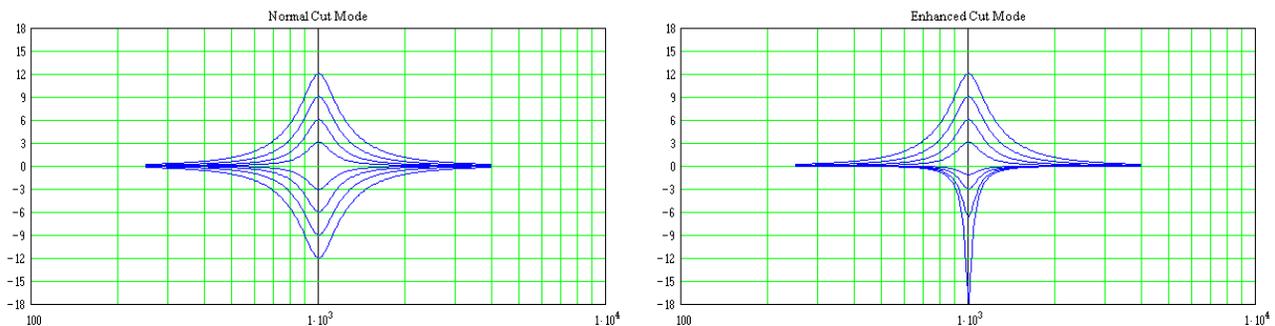


FILTER RANGE SWITCH & INDICATORS

The gain range of the filter sliders is switchable (as a group) for maximum boost/cut flexibility. Normal range is ± 12 dB ($+12/-18$ when Enhanced Cut Mode is active). When Fader Range is set to ± 2 , the yellow LED is illuminated and the range is cut in half to ± 6 dB ($+6/-9$ when Enhanced Cut Mode is active).

ENHANCED CUT MODE

The XL 231 offers an Enhanced Cut mode which has a more narrow filter bandwidth and additional cut range of -18 dB. This helps when trying to tame resonance and minimizing overall spectral changes. When Enhanced Cut is used with the ± 2 range, the maximum cut is -9 dB instead of -18 dB. As can be seen in the graphs below, only filter cut shapes are affected, boost curves are the same regardless of cut mode.



BYPASS SWITCH

When the red Bypass LED is illuminated, this indicates that the unit or channel is in the bypass mode. Signal is routed directly from the input to the output without passing through any circuitry (often referred to as "hard-wire bypass"). Use this switch to compare equalized and unequalized material, or to bypass the EQ section in the unlikely event of total unit failure.

LEVEL BARS AND CLIP INDICATOR LED

Clip Indicator

This red LED illuminates if any section of the equalizer is near clipping. Occasional flickering of this LED is acceptable, but if it remains on more than intermittently you should reduce the output level of the preceding equipment, or if that is not possible, reduce the amount of boost in the equalizer filter bands. Reducing output level will not prevent clipping of the equalizer circuitry.

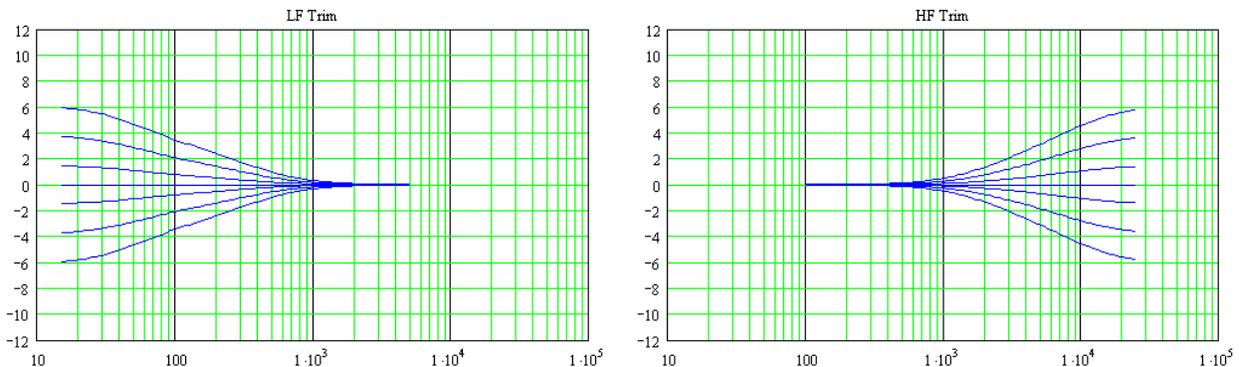
Level Bars

The 10 segment Level Bars provide an easy to read indication of signal levels at the output of the equalizer. The Level Bars also provide a peak hold function. This allows viewing both the peak level as well as the average signal level in a glance. Peak level is especially important when driving power amplifiers or A-D converters which tend to clip hard. The peak level indicator helps to set level in a manner that will avoid this harsh clipping.

LOW-CUT FILTER FREQUENCY CONTROL

To cut down on unwanted low frequency signals, this control determines the roll-off frequency of the Low Cut Filter. The roll-off frequency can be adjusted from below 10Hz to 250Hz by turning this knob. Because of its high roll-off slope, the filter can be efficiently used to cut down hum and low frequency noise from preceding devices, or to reduce low frequency resonance when speakers are installed in an enclosed acoustic environment. It is also very effective at removing power robbing and potentially destructive rumble.

HI AND LO TRIM CONTROLS



These unique controls allow a gentle slope to be added, or, subtracted from the overall frequency response. Both controls hinge at the middle of the spectrum and provide subtle changes to the overall sound without the need to adjust many sliders. Although similar in concept to tone controls, these differ in their well controlled precision straight

curves, and, have less selectivity so the Trim controls don't have a "sound" as a typical tone control will.

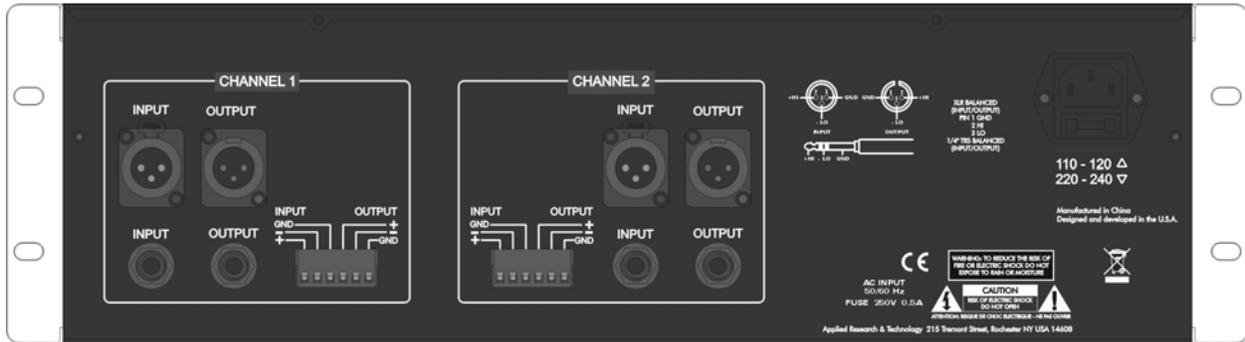
The Trim controls are typically used after the overall equalization has been set, yet the balance between highs, mids, and lows needs to be adjusted. For example, when providing sound at a venue, the equalizer may be set during a sound check. When the audience later fills the room, the sound may get duller due to the added high frequency absorption. The HI trim may be increased to eliminate the dullness without the need to re-equalize the entire system. Note also that in either indoor or outdoor events, changes in temperature or humidity can affect high frequency absorption and the Trim controls are useful to help compensate for these changes.

LEVEL CONTROL

This controls the output signal level from the equalizer. Unity gain can be set by adjusting this knob so that as you toggle the Bypass switch the overall level sounds the same.

Signal levels should be kept normalized through the equalizer. That is, the signal level, when bypassed, should be the same (or a little lower) than when active. One reason for this is if the equalizer loses power (which causes the unit to go into bypass), the signal will be equal or lower than the active equalizer gain. This will ensure that a signal with undesirably higher levels will not be passed inadvertently.

REAR PANEL CONNECTORS



POWER CORD

This cord is used to connect the AC power source to your equalizer. **CAUTION:** Equipment for USA installation includes a power cord with a three pin polarized plug. **DO NOT REMOVE THE CENTER GROUNDING PIN.**

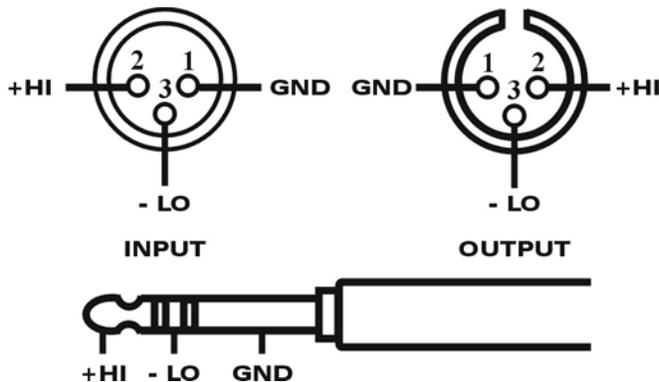
FUSE HOLDER

This fuse holder contains the AC primary fuse. This fuse should be replaced with the same type fuse if it is blown. If fuses continuously blow, stop replacing them and refer servicing to qualified personnel. **CAUTION:** After checking the AC supply voltage, be sure that the correct fuse is in the fuse holder - 0.5Amp for 95-125VAC, as well for 220-240VAC. The orientation of the fuse holder determines the line voltage range and is labeled on the rear of the holder. When changing the fuse, make sure that you insert the holder in the correct orientation for your local line voltage.

INPUT/OUTPUT CONNECTORS

Although the XL 231 may be used with unbalanced connections, for optimum performance use balanced connections. Balanced connections help eliminate external sources of electrical noise.

Only one of the 3 inputs should be used per channel. Any combination of output connectors may be used.



1/4" TRS Phone

The TRS (Tip Ring Sleeve) 1/4" phone connections may be used balanced or unbalanced. When balanced, the tip is High (+), the ring is Low (-) and the sleeve is ground. To use unbalanced use a mono 1/4" phone cable, this will automatically ground the ring to the sleeve.

The TRS 1/4" Phone connector is balanced and wired as:

- Tip = High (+)
- Ring = Low (-)
- Sleeve = Ground.

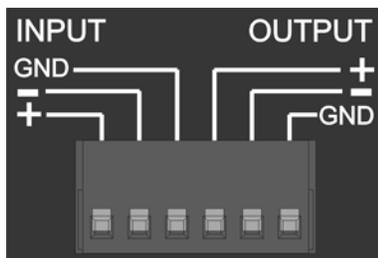
XLR

The XLR input connector is balanced and wired as:

- Pin 2=High (+)
- Pin 3=Low (-)
- Pin 1=Ground.

EURO BLOCK

The detachable Euroblock connections are wired as shown on the rear panel.



APPLICATION NOTES

Graphic equalizers may be used wherever modification of the frequency contour of a sound system is needed. A graphic equalizer is a solution to any number of sound problems or creative urges.

The Audio Spectrum, a Reference

In general, what we hear extends over a range of frequencies from 20 Hertz (Hz) to 20 Kilohertz (KHz). This equates to roughly ten and one third octaves, an octave being a factor of two. The most perceived range lies between 300Hz to 3KHz, the region where most voice information occurs. The audio spectrum may be divided into seven frequency ranges. We will define these ranges in the following text.

Low Bass: 20Hz to 40Hz

This is the lowest of normally audible octaves. Below these frequencies, sounds are more felt than heard. These subaudible frequencies are produced by earthquakes, building vibrations, elephants and huge organ pipes. Low bass information include the fundamental frequencies of the lowest keys on organs, synthesizers and pianos. Mechanical rumble also falls within the range below 40Hz. These low bands on the equalizer may be useful for tailoring the low frequency response of some speakers and microphones.

Bass: 40Hz to 160Hz

These two octaves are normally perceived as the bass frequencies. Instruments such as the electric and string bass, tuba, bass drum and the lower notes of keyboard instruments fall within this range. The bottom end of most music is reflected here.

Mid Bass: 160Hz to 315Hz

In this octave, the transition between bass and midrange occurs. Low frequency crossover points in speaker systems are usually selected in this range. Modification of voice and drum fundamentals as well as the character of the upper bass and lower brass instruments can be achieved by manipulating the levels of these frequencies.

Mids: 315Hz to 2.5KHz

The fundamental frequencies of voice and musical instruments occurs within these three octaves. The upper harmonics of bass instruments also falls within this range. The intelligibility of speech falls within this range of frequencies. Just as a point of reference, these three octaves are about the same bandwidth as a telephone.

Upper Mids 2.5KHz to 5KHz

In this octave, what we perceive as presence, definition and attack are subject to control. Boosting these bands adds crispness while cutting them eliminates vocal sibilants such as hiss. Your ear is most sensitive in this frequency range.

Highs: 5KHz to 10KHz

Brilliance, vocal fricatives and intensity of the sound are adjusted in this frequency range. The snap of percussive instruments especially cymbals and the harmonic

overtones of guitar are intensified in this octave.

Upper Highs: 10KHz to 20KHz

The upper limits of hearing fall within this octave. Since only the upper harmonics of some instruments are in this range, you may often cut these bands to reduce hiss without affecting the overall sound quality. Brightness of cymbals and synthesizer harmonics may also be controlled. Boosting this range can add “air” to the instruments being equalized.

PA Systems – power amp operating levels

It is common to use 31 band equalizers for FOH (Front of House) as well as monitors. If the Equalizer is the last piece of equipment before the power amps, there is a risk of operating at less than optimal levels. While under these conditions, it is common for power amp level controls to be set to maximum sensitivity. The problem with this approach is that the operating levels through the equalizer will end up being quite low. Power amplifiers set to maximum sensitivity results in approximately 0dBu for full power. Since the system has headroom, the actual operating level could end up being -20dBu. The XL231 has an extremely high dynamic range of 123dB, yet even under these conditions, it may be possible to hear noise out of the speakers.

To correct this problem, set the power amplifier input level controls for much less gain. Reducing the gain of the power amp by 12 to 20 dB will allow increasing the operating level through the equalizer.

The goal is to have the operating level in the range of the front panel level bars. Rather than turning the gain controls all the way up on the power amplifier, try setting gain controls half way up as a start.

Tuning a sound system

What is the best way to use an equalizer to tune a sound system? If you ask 10 sound engineers the best way to do this, you may get more than 10 different answers. In the following we discuss two common methods.

There are a number of different ways to tune a room. Some use spectrum analyzers or other computer based tools to try to measure what the room is doing, and then correct the response with the equalizer. These are useful methods and allow one to gain insight into the process.

One aspect that many engineers agree on is that listening is the key. Regardless of the method used, before they are “done”, they listen to a recording they are very familiar with and walk around the venue checking for coverage, and overall sound. The final tweaks to the equalization are determined from this process.

One other item to keep in mind. Acoustic environments change with temperature and humidity. When doing an evening show after a mid day sound check, one must be prepared to make adjustments just before the show.

Tuning a sound system by ear.

To tune a room by ear also makes sense. Test equipment won't always indicate what sounds best. Acoustic environments are very complex and many tradeoffs are made. System performance can vary quite a bit from one listening position to another. Not only does frequency response vary, reverb decay times versus frequency can vary also. The human hearing system is quite complex and often is the best piece of test equipment when it comes to room tuning.

Select Source Material:

Choose a piece of source material. You may want to experiment with trying different sources such as:

- 1) a music CD that uses a lot of the audio spectrum. If the system is being set up for a particular performer, then a recording of that performer may be a good choice.
- 2) A music CD that the user is very familiar with.
- 3) A pink noise generator.

Having multiple sources to experiment with is useful for testing the system.

Step-by-step:

With the system up and running, start with the equalizer set to a flat position. To tune the room, with source material playing, working on one frequency band's slider at a time, move the slider very high so the signal in that band dominates the overall signal. Listen to what you hear in this band. Slowly decrease the slider to the point where you can barely hear that band. Then lower it just a bit so the energy in that band gets buried in all the other sound. Repeat this for each frequency band.

After the first tuning, try different source material and perform the tuning again. As more tuning is done, the improvements will be smaller and smaller. Stop tuning when the improvements are very small.

The tendency for users new to this is to end up with all bands boosted by some amount. Try to learn not to do this. Practice by boosting each band from center and returning it to center. The way that a single band's energy disappears in the overall sound is what you want to train yourself to hear. With practice, you will find room tuning to become easier, and, quicker.

When tuning is complete, while listening to your source material, switch between ACTIVE and BYPASS to see what you have done. Set the Level so that the overall level is approximately the same when in BYPASS or ACTIVE, that is normalized.

Ring out a Room

Setting an EQ by ringing is useful for increasing the available system gain before feedback. In a live sound system, with stage monitors and separate front of house system (FOH), only the monitors should be rung out. This is where feedback is most likely to occur. The FOH should be equalized for the best overall sound. The ringing method doesn't necessarily create the best sound.

To ring out the monitors, if available, use a limiter set to infinite slope, a low threshold, and, set the level low to save everyone's ears.

ART XL 231 Dual 31 Band, 1/3 Octave Extended, Long Throw, Professional Equalizer

Set the equalizer for the monitor channel being set to flat with all of the sliders at their center detents.

Slowly bring up the microphone gain until feedback occurs. Cut the level of the frequency band that the feedback occurs in. It takes practice to know which frequencies are in each band. As soon as the first tone disappears, increase gain more and a new tone will begin to build. Again, reduce the slider for the corresponding frequency.

Continue this procedure until tones start to come on in multiple frequencies. At this point, you are probably done. Expect to actually remove from 1 to 4 tones.

Repeat the procedure for the other monitor channels.

Additional adjustments may then be done by taste for best sound or intelligibility.

Please remember, no method is perfect, experiment.

WARRANTY INFORMATION

Limited Warranty

Applied Research and Technology will provide warranty and service for this unit in accordance with the following warrants:

Applied Research and Technology, (A R T) warrants to the original purchaser that this product and the components thereof will be free from defects in workmanship and materials for a period of **five** years from the date of purchase. Applied Research and Technology will, without charge, repair or replace, at its option, defective product or component parts upon prepaid delivery to the factory service department or authorized service center, accompanied by proof of purchase date in the form of a valid sales receipt.

Exclusions

This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. This warranty is void if the serial number is altered, defaced, or removed.

A R T reserves the right to make changes in design or make additions to or improvements upon this product without any obligation to install the same on products previously manufactured.

A R T shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights and you may have other rights, which vary from state to state.

For units purchased outside the United States, an authorized distributor of Applied Research and Technology will provide service.

SERVICE

The following information is provided in the unlikely event that your unit requires service.

- 1) Be sure that the unit is the cause of the problem. Check to make sure the unit has power supplied, all cables are connected correctly, and the cables themselves are in working condition.
- 2) If you find the unit to be at fault, write down a complete description of the problem, including how and when the problem occurs. Please write down a description of your complete setup before calling Customer Service.
- 3) Contact our Customer Service department at (716) 297-2920 for your Return Authorization number or questions regarding technical assistance or repairs. Customer Service hours are 9:30 AM to 5:00 PM Eastern Time, Monday through Friday.
- 4) Pack the unit in its original carton or a reasonable substitute. The packing box is not recommended as a shipping carton. Put the packaged unit in another box for shipping. Print the RA number clearly on the outside of the shipping box. Print your return shipping address on the outside of the box.
- 5) Include with your unit: a return shipping address (we cannot ship to a P.O. Box), a copy of your purchase receipt, a daytime phone number, and a description of the problem.
- 6) Ship only your unit (keep your manual!) to:

Yorkville Sound
4625 Witmer Industrial Estates
Niagara Falls, New York 14305
ATTN: REPAIR DEPARTMENT
RA# _____

XL231 SPECIFICATIONS

EQUALIZER

Bands	2 x 31, 1/3 Octave, ISO Spacing
Type/Accuracy	Constant Q, 3% Center Frequency
Slide Potentiometers	45 mm, Positive Center Detent, Metal Shaft, Grounded Center Tap.
Range	(± 6 dB) or (± 12 dB) Selectable
w/Enhanced Cut	(+6/-9 dB) or (+12/-18 dB) Selectable
Overall Gain Range	Off to +6 dB (sliders centered)

INPUTS

Type	Active Balanced
Connectors	3-Pin XLR, TRS ¼" phone, Euroblock
Impedance	9.4K Ohms Balanced.
Maximum Input Level	+24 dBu, Balanced, ≤1% THD, [EQ and Level centered]

OUTPUTS

Type	3-Pin XLR, Euroblock - Active Balanced TRS ¼" phone - Impedance Balanced
Connectors	3-Pin XLR, TRS ¼" phone, Euroblock
Impedance	≤ 200 Ohms
Maximum Level	+26 dBu, Balanced, 20-20K Hz, into ≥600 Ohms, ≤1% THD

RFI Input Filters	Yes
Bypass Switching	Passive, Relay
Clip LED Threshold	3 dB below clipping. Sensed at all gain stages.
High Pass Filter	10 to 250 Hz – 12dB/Oct
High Trim	± 4 dB @ 10 KHz
Low Trim	± 4 dB @ 40 Hz

Frequency Response	[EQ and Level centered, HPF fully counter clockwise] (+0/-0.25 dB 20-20K Hz), (+0/-1 dB 17-50K Hz), (+0/-3 dB 10-80K Hz)
THD+Noise (typically 0.003% @ 1 KHz)	< 0.005%, @ +4 dBu, 20-20K Hz, 22 KHz BW, [EQ and Level centered]
IM Distortion (SMPTE)	< 0.004%, @ +4 dBu, [EQ and Level centered]
Signal to Noise Ratio	≥ 99 dB, Ref. 0 dBu, 22 KHz BW, unweighted, [EQ and Level centered]
Headroom	+24 dB, Ref. 0 dBu
Dynamic Range	≥ 123 dB, Ref: +24 dBu, 22 KHz BW
Channel Separation	≥ 90 dB @ 1 KHz, +4 dBu
Common Mode Rejection	≥ 60 dB @ 1 KHz

Line Voltage	95-125 VAC 50/60 Hz
Input AC Power	190-250 VAC 50/60 Hz 31 Watts Typical

Construction	All Steel Chassis Aluminum Front Panel
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SIZE	5.25 x 19 x 8 Inches 133 x 483 x 203 mm
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WEIGHT	12 lbs. (5.4 kg)
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Note: 0 dBu = 0.775 Vrms

XL231 Architect's & Engineer's Specification

The graphic equalizer shall be stereo (2 channels). Each channel shall consist of 31 bands centered on standard ISO frequencies at intervals of 1/3 octave and covering a frequency range of 20Hz to 20KHz. Individual frequency bands shall be adjusted by linear slide faders with 45mm travel, tactile center detent, and metal actuator shafts with dust dams. The range of equalization shall be switch selectable to one of four boost/cut modes; $\pm 12\text{dB}$, $\pm 6\text{dB}$, $+12/-18\text{dB}$, or $+6/-9\text{dB}$. The -18dB and -9dB (enhanced) cut modes shall have a more narrow bandwidth for reduced audible artifacts while performing deep frequency cuts. The equalizer shall have a gain of unity with all slide faders centered. The equalizer shall provide a rotary gain control with a range from Off to $+6\text{dB}$. Frequency response shall be $+0/-0.25\text{dB}$ 20-20KHz. Hum and noise shall be less than or equal to -99dBu and SMPTE intermodulation distortion or THD shall be less than 0.005% @ $+4\text{dBu}$. Total dynamic range shall be greater than or equal to 123dB , referenced to $+24\text{dBu}$, measured with a 22KHz bandwidth. Input impedance shall be 9.4K Ohms balanced and maximum input level shall be $+24\text{dBu}$. Output impedance shall be 100 Ohms and maximum output level into 600 Ohms shall be $+26\text{dBu}$ balanced. Inputs and outputs shall be active (transformerless) balanced type on XLR, $\frac{1}{4}$ " phone, and detachable Euroblock connectors. Individual bandpass filters shall be 3% precision tolerance constant Q design, with interleaved summing, for minimum filter interaction and accurate control setting. The filters shall be electrically removed from the circuit in the center (flat) slider position. The equalizer shall include a 12dB per octave high pass filter tunable from 10Hz to 250Hz , as well as variable Low Trim and High Trim rotary controls providing $\pm 4\text{dB}$ of gradual boost or cut below and above 1 KHz respectively. A three color 11 segment LED bar-graph with clip indicator, and peak-hold readout shall be included on each channel for visual level monitoring. There shall be a unit bypass relay which shall be activated by power failure or front panel bypass switch on each channel. The equalizer shall weigh 12 lbs. , and mount in a standard $19"$ EIA rack using 3 spaces ($5.25"$ high x $19"$ wide x $8"$ deep). The power requirement shall be $95-125\text{ VAC}$, or $190-250\text{ VAC}$, $50/60\text{ Hz}$, 31 Watts . Note: $0\text{dBu} = 0.775\text{ Vrms}$. The unit shall be the ART XL231.



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