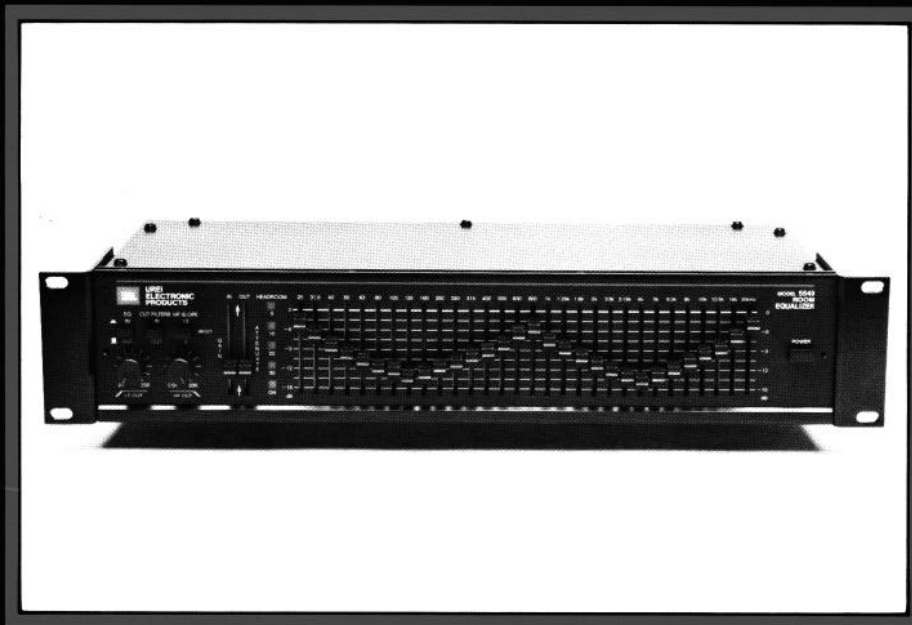


# 5549A

## ROOM EQUALIZER



### FEATURES:

Thirty adjustable Cut Only Bands on ISO one-third octave center frequencies.

Fully active—custom hybrid amplifiers in filter circuits.

Unique gain structure controls optimize headroom and signal to noise ratio for different signal level environments.

High and low frequency tunable end cut filters.

Active and passive bypass modes.

XL, phone jack and barrier strip connectors.

Rugged, reliable, roadable.

At last, a One-Third Octave fully active Room Equalizer with performance levels that equal or exceed the best passive units, but at a new low price. Announcing the new JBL/UREI Model 5549A Room Equalizer.

In recent years several other manufacturers have produced one-third octave equalizers using simulated inductor circuits. JBL/UREI has held back because we knew of the noise and distortion problems inherent in these traditional op-amp implementations of the simulated inductor.

But we have now developed a circuit which allows us to make an active one-third octave room equalizer with performance that equals and in some cases surpasses that of the best units using passive components. To that circuit we have added a list of

**JBL**

**UREI  
ELECTRONIC  
PRODUCTS**

user-requested features including tunable end cut filters, active and passive bypass, a unique headroom control circuit, and more that makes this new equalizer more than "just another graphic." Look at the features designed into the Model 5549A. You will see that versatility, ease of installation and use, high performance, and reliability are not optional—they're designed in.

## THE FILTERS

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UREI has been manufacturing Professional One-Third Octave Equalizers since 1972. Up to the present time all have been designed using real inductors in the filter section. That is because, for a professional product, true inductors offer substantial benefits to the user. First, if well manufactured, real inductors have almost no failure modes. Second, they can be designed to handle large voltage swings with low distortion. This is important in any L-C equalizer where the Q of the circuit has a multiplying effect on the voltage applied to the inductor. Thirdly, a wire-wound inductor does not add noise to the circuit.

We have for many years also manufactured a series of octave-band Graphic Equalizers. Unlike the one-third octave units, however, they have not contained real inductors. Instead they use a circuit which simulates the electrical characteristics of the inductor using an operational amplifier, a capacitor and a couple of resistors. The primary reason for using the simulated inductor is that it costs less than a real one. In an octave-band equalizer the limitations of the simulated inductor do not significantly degrade the performance level of the equalizer. This is because the Q of the circuit is low which minimizes distortion problems in the simulated inductor, and because of the low Q and the small number of circuits (nine or ten) the noise addition is not great.

The filter sections in the Model 5549A are designed using proprietary hybrid transistor amplifiers optimized to simulate the function of the inductor. The transistors used in the amplifiers are low noise and are operated with higher power supply voltages to allow a wider dynamic range than conventional op-amp realizations. The result is greater headroom in the filter circuit and lower noise at the output of the device. These benefits don't show up on a product data sheet where noise and distortion are typically measured under "flat" conditions. But they do show up in your sound system.

The vast majority of jobs for which the one-third octave equalizer is used can be divided into two classes—corrective and creative. The corrective equalization task is primarily that of tailoring the

electrical response of a sound system to match the acoustical characteristics of a particular acoustical space. In this application the use of boost equalization has been found to be inappropriate for two reasons: excess boost can be heard and does not sound natural, and many acoustic deficiencies are not amenable to correcting by "filling in the holes" with more power. It is better to pull down the high spots in the acoustic response curve to achieve the desired result. It invariably sounds better. For this application the Model 5549A Room Equalizer with a cut-only characteristic is recommended. The 15dB range of each filter section allows the unit to correct most acoustic response problems for which an equalizer is the appropriate tool.

## INPUTS AND OUTPUTS

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Both Input and Output may be wired for balanced or unbalanced operation to match the needs of the system. Input and Output connections may be made through three pin XL-style, three-conductor ¼ inch phone jacks, or to barrier strip with bare wire or lug connection. All standard. Choose the connector type that suits *your* needs. The connectors are wired in parallel allowing "loop-thru" connections.

Both input and output amplifiers have been used in a wide variety of UREI products for many years and have proven to be reliable, insensitive to Radio Frequency Interference, and stable with a wide variety of sources and loads. The Output is short-circuit protected and is transformer isolated for the ultimate in isolation from ground loops.

## GROUND LIFT JUMPER

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Chassis Ground and Signal Ground connect together through a jumper on the rear panel barrier strip. Ground loop problems may sometimes be alleviated by removal of this jumper. The chassis ground always remains connected to the AC Power Ground through the line cord for safety.

## TWO TYPES OF BYPASS

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**PASSIVE** The Input is connected directly to the Output by a relay when no power is supplied to the unit. A delayed turn-on circuit ensures that no power on/off transients get to the rest of your system.

**ACTIVE** A Front panel EQ Bypass switch makes it easy to determine the effect of equalization while still retaining Input and Output amplifier buffers and gain control.

## TUNABLE END CUT FILTERS

Continuously variable filters at each end of the frequency spectrum control the available bandwidth of the system with a 12 dB per octave slope. The high frequency slope is switchable to 6 dB per octave to aid in contouring, and a bypass switch removes them from the circuit completely.



Active and passive filter bypass, switchable and continuously variable LF and HF rolloffs with selectable slopes, and a unique headroom control circuit.

## RACK EAR PLACEMENT

The Equalizer chassis provides for placing the Rack Mounting Ears in either of two positions. When shipped, the rack ears will be in the rearward position for normal flush mounting. The forward position may be used to either recess the controls or to allow the accessory security cover to be installed flush with the rack ears.

## HEADROOM CONTROL

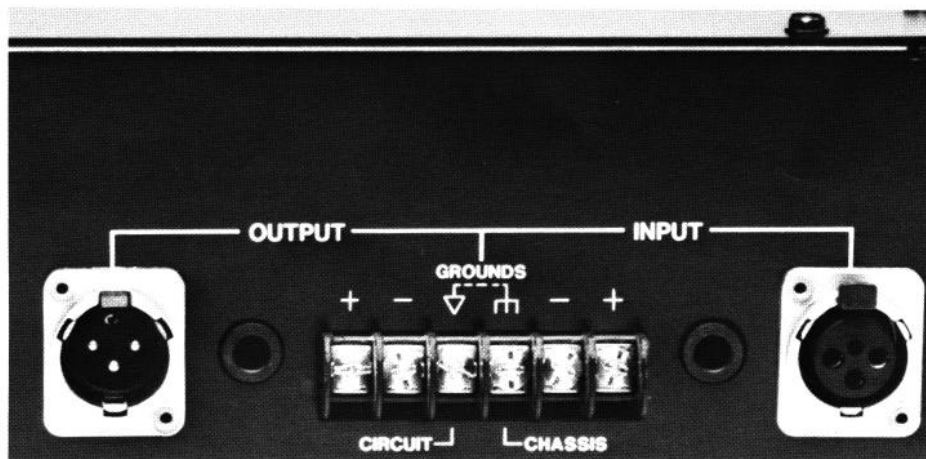
The Headroom Control circuit is unique to the JBL/UREI Equalizers. The combination of an input amplifier gain control, output attenuator and headroom LED display allows the signal level through the equalizer to be easily and quickly optimized for best signal-to-noise and headroom in *your* system.

Many factors influence the choice of operating level in a particular audio system or section of that system. No matter what your requirements the Model 5549A can accommodate them.

Briefly the operation of the headroom circuit is as follows: the gain of the input amplifier is adjustable from unity to +20 dB and the output amplifier is preceded by an attenuator with a range of unity to -20 dB. The two controls are linear action slide pots mounted next to each other so that they may be operated together with one finger. This allows the gain through the equalizer to remain at unity while the internal gains are simultaneously optimized for best headroom and signal-to-noise ratio. A multi-point sensing headroom circuit with LED display of signal level aids in the adjustment of these controls. No external test equipment is required.

## RUGGED, RELIABLE, ROADABLE

If you have been looking for a good equalizer for your road system, look no farther. Starting with the all steel chassis with rugged aluminum rack ears, the 5549A Equalizer has been designed to handle road use *and* road abuse. There are no internal connectors to oxidize or to get knocked loose in transit. Front panel graphics not only look good but they won't rub off under hard usage because they are printed on the back side of a protective polycarbonate overlay. Locking washers and/or chemical screw holding methods are used on all threaded fasteners.



Rear Panel Connections

## ARCHITECTS AND ENGINEERS SPECIFICATIONS:

The active room equalizer shall contain 30 filters on ISO center frequencies from 25 Hz to 20 kHz. Each filter section shall provide up to 15 dB cut at center frequency. The filters shall be minimum-phase combining with filter skirts designed for minimum ripple over a wide range of control settings. The amount of cut shall be controlled by linear slide type controls which will present a graphic display of the equalization curve.

The equalizer shall also contain High Pass and Low Pass Filters with the following specifications: High Pass — 12 dB/octave with — 3 dB point adjustable from 20 Hz to 250 Hz. Low Pass — 12 dB/octave with — 3 dB point adjustable from 20 kHz to 3.5 kHz. Frequency adjustment shall be with front panel rotary controls. A switch on the front panel shall enable the Low Pass Filter Slope to be changed from 12 dB/octave to 6 dB/octave. A further front panel mounted switch shall be provided to remove both the High Pass and Low Pass Filter sections from the signal chain.

The unit shall provide a front panel EQ bypass switch to remove all equalizers and end cut filters from the signal chain. With the switch in the Out position the input and output amplifiers and the gain controls shall remain in circuit.

The input circuit shall be active and shall accept either balanced or unbalanced sources. Input impedance shall be 10 k ohm in the unbalanced wiring configuration and 20 k ohm wired balanced.

The output circuit shall be transformer isolated, floating and capable of driving a load of 600 ohms or higher.

The unit shall contain a relay circuit which bypasses all internal electronics in the event of power failure. The circuit shall have a delayed turn-on / immediate turn-off characteristic to prevent any power on / off transients generated within the unit from being transmitted to succeeding equipment.

The unit shall allow for removal of an external connecting link to separate signal ground and chassis ground.

Barrier strip, 3 pin XL style and ¼ inch phone jack connectors shall be provided for input and output signal wiring.

The unit shall provide a front panel power switch with LED indicator showing Power On status.

The input amplifier shall be provided with a gain control allowing adjustment from unity to +20 dB. The output amplifier shall be provided with a level attenuator allowing adjustment from unity to —20 dB. The two controls shall be adjacent front panel linear slide action type arranged such that simultaneous and equal movement of both controls shall allow the equalizer to retain a nominal unity gain through while being adjusted to match system headroom requirements.

The equalizer shall provide an LED display of equalizer headroom in four 10 dB steps.

The equalizer shall be packaged in an all steel chassis with a front panel polycarbonate overlay of control function.

The unit shall have extruded aluminum rack ears for mounting in a standard EIA rack panel. It shall be possible to move the rack ears forward to allow the controls to be recessed or to allow a security cover to be mounted flush with the rack ears.

The equalizer shall meet the following performance criteria:

Maximum Input:	+22 dBu
Maximum Output:	+22 dBm @ 0.5% THD max 20 Hz — 20 kHz, 600 ohm load
Frequency Response:	± 1 dB Hz to 20 kHz EQ out. +1, —2 dB 20 Hz to 20 kHz EQ and End Cut filters in. Controls set flat
Output Noise:	Less than —90 dBm with unity gain and EQ flat or cut
Dimensions:	3½" H x 19" EIA rack mount 8" depth with rack ears flush 9.2" depth with rack ears forward
Weight:	9.5 lb
Power Requirement:	100–120 VAC 50/60 Hz*

The equalizer shall be the JBL/UREI Model 5549A

\*The Model 5549A is available factory wired for 220–240 VAC 50–60 Hz. Order Model 5549A-220.

## SPECIFICATIONS:

ELECTRICAL:	
Filters:	Thirty one-third octave filters on ISO centers From 25 Hz to 20 kHz
Range:	0 to —15 dB at center frequency
End Cut Filters:	Low cut: 12 dB/octave. —3 dB point variable from 20 Hz - 250 Hz High cut: 6 dB or 12 dB/octave. —3 dB point variable from 3.5 kHz - 20 kHz
Filter Type:	Simulated inductor using proprietary Class A hybrid
Input:	Differential amplifier. Balanced or unbalanced bridging. Impedance 20 k ohm balanced, 10 k ohm unbalanced
Maximum Input Level:	+22 dBu
Output:	Transformer isolated
Maximum Output Level:	+22 dBm @ 0.5% THD max. 20Hz–20 kHz 600 ohm load
Frequency Response:	± 1 dB 20 Hz-20 kHz EQ out +1, —2 dB 20 Hz-20 kHz EQ and end cut filters in
Gain:	± 20 dB
Noise:	Less than —90 dBm, all controls flat Less than —90 dBm, all controls full cut Noise bandwidth 15.7 kHz with 600 ohm load
Power Requirements:	120 volts AC, 60 Hz, 20 W max*
Environmental:	0°C to +50°C operating (+32°F to +122°F) —20°C to +60°C storage (–4°F to +140°F)
CONTROLS:	
Equalization:	Thirty 45 mm (1.77 inch) vertical sliders
Input Level:	One 45 mm (1.77 inch) vertical slider
Output Level:	One 45 mm (1.77 inch) vertical slider
EQ In/Out:	Front panel pushbutton
End Cut Filters In/Out:	Front panel pushbutton
End Cut Filter Frequency:	Two rotary controls
High Cut Filter 6 dB / 12 dB:	Front panel pushbutton
Power:	Front panel pushbutton
INDICATORS:	
Power On:	One green LED, labelled 'ON'
Clip:	One red LED, labelled '0 dB' on HEADROOM indicator
Signal Below Clip:	Three green LEDs, labelled '10, 20, 30' to indicate signal level below clipping
CONNECTIONS:	
Input /Output:	Barrier, 3 pin XL-type, ¼" stereo jack Fully balanced input and transformer isolated balanced output
Power:	3 wire power cable
PHYSICAL DIMENSIONS:	
Front Panel:	88.9 x 483 mm (3½ x 19 in) EIA rack mount
Depth Behind Panel:	203 mm (8 in) with rack ears flush 234 mm (9.2 in) with rack ears forward
Finish:	Aluminum extruded rack ears Polycarbonate overlaid front panel Chassis is black painted steel
Net Weight:	4.6 kg (9.5 lb)
Shipping Weight:	5.7 kg (12.5 lb)
ACCESSORY:	SC5 Security Cover
Note:	0 dBm = 1 mW 0 dBu = 0.775 Volts

JBL/UREI continually engages in research related to product improvement. New materials, production methods and design refinements are introduced into existing products without notice as a routine expression of that philosophy. For this reason, any current JBL/UREI product may differ in some respect from its published description but will always equal or exceed the original design specifications unless otherwise stated.