TDM
AUDIO

30GE-1
30GE-2

GRAPHIC EQUALIZER
OWNER'S MANUAL

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IMPORTANT!

*** Read Before Using ***

CAUTION: The following *must* be observed to prevent malfunctioning and/or possible equipment damage.

- Before plugging the unit into the main AC line, make sure that all of the equipment following the equalizer output lines is turned off or all of the inputs are turned down.
- The unit should be plugged in only when it has been established that the main AC line is supplying the correct voltage and frequency. US models are set up for 110 VAC at 60 Hz.
- Keep the unit away from excessive moisture.
- Allow only authorized technicians (consult your dealer) to open the unit. TDM Audio assumes no liability for damage or injuries.

Table of Contents

Introduction

Thank you for purchasing the TDM 30GE series graphic equalizer. These units are made from the finest components and engineered to exacting standards. Precision components are used in all critical circuitry for the finest sonic quality and performance. To get the most out of your new equalizer, please take a few minutes to review this manual and familiarize yourself with the proper operation of the unit.

Description

The 30GE series are high-performance, 1/3 octave, constant-Q graphic equalizers. The 30GE-2 provides two channels of equalization in a three-rack-space package while the 30GE-1 provides one channel in a two-rack-space package. Three 1/6 octave, sweepable notch filters are provided for each channel. Special circuitry is used to limit adjacent band interaction making the TDM 30GE series graphic equalizers easier to adjust than most.

About This Manual

This manual attempts to provide enough information for the novice user. Professionals should skim through or skip the sections that provide technical background information while making sure to read the sections that deal with the specifics of TDM 30GE series equalizers.

Fundamentals

An equalizer is used to alter the balance of frequencies in an audio signal. In some cases this is done to compensate for the poor acoustic characteristics of a room or the inaccurate frequency response of a speaker system. In other cases it is done to change the characteristic sound of a particular signal source such as a voice or a musical instrument. TDM 30GE series equalizers can be used for either purpose.

There are several different kinds of equalizers, but they all use *filters* to change the frequency balance of an audio signal. Filters let the operator reduce or increase the levels of certain ranges of frequencies in the signal. TDM 30GE series equalizers are *graphic* equalizers. Graphic equalizers provide a series of sliders, one for each range of frequencies that the equalizer can influence. They are called graphic equalizers because the sliders form a graph of the frequency response of the equalizer.

Why Equalizers are Needed

Speaker systems and acoustic environments interact in complex ways. The result is that a particular audio system in a particular room or environment will usually have less-than-ideal frequency response characteristics. Speaker system designers do their best to manage the tradeoffs involved and produce the best products they can for a particular purpose, but no speaker system is ideal in all environments and situations. Many factors beyond the control of speaker designers and audio engineers influence audio system performance. These factors can include ambient temperature, air movement, and the number of people in an area. Additionally, some rooms just have poor acoustics because of other practical considerations. Acoustics are often not the first consideration when designing a space that will accommodate spectator events (consider a high-school gymnasium for example). Because all of these factors beyond our control can change the frequency characteristics of audio systems in undesirable ways, we use equalizers to compensate—to try to adjust the signal electronically, to "equalize" its frequencies.

Equalizers are also used to adjust the frequency balance of a particular signal such as an instrument or voice, either to compensate for some problem or to achieve a particular effect. For example, an acoustic guitar with a pickup will produce a signal that is not generally an accurate representation of how the guitar sounds acoustically. An equalizer might be used to make the signal sound more natural. Perhaps an electric bass player likes a sound with a lot of presence and attack. Many electric basses do not naturally have this kind of sound so an equalizer might be used to achieve this effect.

There are a lot of applications for equalizers, but they all involve changing the balance of frequencies in a signal so that it *sounds better*. It is important to remember when setting up electronic audio equipment that the goal is to achieve good sound. Sometimes a good sanity check is to bypass the equalizer at some point during the sound check (don't do this during a live event!) and compare the sound. If it doesn't sound better with the equalizer *in* then you are not getting any benefit from equalization. Be aware that if you bypass the equalizer where you have a lot of frequencies cut, the sound will get a lot louder so be prepared for this.

Equalizer Terminology

- **Filter:** An electronic circuit that changes the levels of some frequencies without altering the levels of others.
- **Frequency Band:** The range of frequencies that a particular filter operates on. Graphic equalizers have one slider for each frequency band that they can control.
- **Band Width:** Specifies how broad a range of frequencies is encompassed by a frequency band. Audio band widths are often given in octaves. TDM 30GE series graphic equalizers operate on fixed bands that are 1/3 of an octave wide. That is why they are called 1/3 octave equalizers.
- **Boost and Cut:** Boosting a range of frequencies raises their level relative to the overall level of the signal. Cutting a range of frequencies lowers their level relative to the overall signal level. The amount of boost or cut is given in Decibels (dB). TDM 30GE series graphic equalizers can provide up to 12 dB of boost or cut for each frequency band.
- **Bypass:** Bypassing a piece of signal processing equipment means electronically removing it from the signal path. When you press the bypass switch, the unit internally disables all signal processing. Thus it has the effect of simply routing the input to the output as though the equipment were not there.
- **Constant-Q:** A design requirement for some equalizers that says that the band width and characteristic *shape* or *sound* of filters remains constant as the center frequency varies. In graphic equalizer design this means that each of the filters has the same effect on its range of frequencies as all of the other filters have on theirs. TDM 30GE series graphic equalizers are constant-Q designs.
- **Interaction:** Because of the way most equalizers work, adjacent bands *interact.* In other words, changing the level of one band affects the levels of frequencies in adjacent bands. This interaction makes it more difficult to adjust equalizers accurately because you need to keep going back and readjusting the levels of some bands after changing the adjacent levels.

30GE Series Special Features

- **Hard-Wire Bypass:** When you engage the bypass switch on the TDM 30GE series graphic equalizers, the inputs are electrically "hard wired" directly to the outputs with no intermediate circuitry. This means that in a bypassed state the unit is truly, completely removed from the signal path. Many equalizers have a bypass switch that simply deactivates equalization. The signal still goes through the equalizer's electronics. The hard-wire bypass is very useful when diagnosing system problems, and it works even when no power is applied to the unit.
- **Non-Interactive Adjacent Bands:** Special circuitry in the TDM 30GE series graphic equalizers reduces adjacent band interaction until it is virtually nonexistent. Each filter's characteristics are electrically dependent on the settings of adjacent bands so the filters automatically compensate for interaction. This makes the TDM 30GE series equalizers easier to adjust than most.

- **Notch Filters:** Three sweepable 1/6 octave notch filters per channel provide up to 40 dB of selectable cut on a sweepable center frequency. These notch filters let the operator zero in on a problem frequency and remove it from the signal with minimum effect on neighboring frequencies.

Mounting the Unit in a Rack

TDM 30GE series equalizers can be mounted in any standard 19” rack. The 30GE-2 requires 3 rack spaces while the 30GE-1 requires only 2. To make mounting easier, lay the rack on its back with the equipment front panels facing up. Remove any rack screws from the part of the rack where you are planning to mount the equalizer. Position the TDM 30GE series equalizer in the rack as desired. Make sure the mounting holes in the equalizer line up with the screw holes in the rack rails. Use four standard 10-32 rack screws for each equalizer. We recommend that the rack screws have plastic washers to prevent damage to the paint on the face of the equalizer. Install each screw loosely through a mounting hole in the equalizer and into the rack. Do not tighten the screws until they are all in place. After all four screws are installed loosely, make sure the equalizer is placed exactly as you desire and then tighten the four screws until they are nice and snug, but not overly tight.

Hooking Up the Equalizer

Once your TDM equalizer is installed in the rack, you are ready to hook it up to your equipment. The method used to hook up any equalizer depends on how it will be used. We will try to give you the basics in this manual, but you may need to tailor the methods described here to your particular application.

What You'll Need

To connect your 30GE series equalizer to your equipment, you will need the following.

- **Power:** A power outlet should be located close enough to the unit so that you can plug it in. The 30GE series equalizers require a grounded (3-prong) outlet. If an outlet is not close enough, an extension cord or power strip may be used. Check the power rating on the extension cord or power strip to make sure that it exceeds the power requirements of all units plugged into it combined. TDM units have their power requirements marked on the rear of the unit.
- **Signal Cables:** You need one cable to connect your signal source to the input of each equalizer channel that you will be using, and one cable to connect each equalizer output to your crossover or amplifier input.

The Basic Hook-Up

Plug the power cord that emerges from the back of the unit into an electrical outlet capable of supplying the correct voltage, current, and frequency. This information is printed on the rear panel of your TDM 30GE series equalizer.

Before connecting the equalizer signal cables, make sure that any power amplifiers are off or their input levels are all the way down.

The normal way to connect an equalizer is between your sound signal source and your limiter, crossover or amplifier. For each channel, the output of the signal source is fed into the equalizer. The equalizer output is then connected to the input of the limiter, crossover, or amplifier. If you are using a limiter, the equalizer goes before it in the chain. Otherwise the output of the equalizer feeds the input of the crossover (in a multi-amped system) or the power amplifier (in a passive system).

Instrument Equalization

To equalize a specific signal source such as an instrument or vocal at the mixing console, insert the equalizer into the signal path at the instrument's channel on the console. Consult the documentation for your mixing console to determine the proper way to do this.

If the equalizer will be used at the signal source (in the instrument rack, for example), then there are many possible ways to connect it. You will need to experiment to determine the best configuration for your needs. Generally, equalizers are inserted in the signal path—they are not usually used in an effects loop. They are usually inserted after an instrument or microphone preamp, and they most often go before compressors or limiters. They can go before or after

chorus or flanging units depending on the effect you are trying to achieve. They are typically inserted before delay and reverb units, though they are sometimes used to equalize just the return of a reverb or delay unit to achieve certain special effects.

Operating the Equalizer

Once you have mounted your TDM 30GE series equalizer in a rack and connected all of the cables, the unit is ready for operation. At this time, make sure the input levels of the amplifiers are all the way down. Next, turn all equipment on. It is always best to turn the equipment on in the order of the signal path from input to output and to turn it off in exactly the reverse order. For example, in a live sound reinforcement setup, you might turn on the mixer and effects units first, followed by the equalizers, then any limiters, the crossover, and finally the amplifiers.

It is not absolutely critical that you use this ordering, but it *is* absolutely critical that the power amplifiers are the last to be turned on and the first to be turned off. If the power amps are on when any of the other equipment is turned on or off, a loud pop through the speakers can result. This pop can very easily damage speakers. This is especially true in multi-amped systems (using active crossovers). After all equipment is powered up and you are sure that everything is set correctly, raise the levels on the amplifiers to their operating positions. Make sure the controls of the TDM 30GE series equalizer are set to their nominal operating positions before raising the amplifier levels (the next two sections describe how to do this).

Front Panel Controls

At this time, familiarize yourself with the controls on the front panel of the unit. The 30GE-2 has two channels while the 30GE-1 has only one. All channels are identical, so you only need to understand how a single channel works. Here is a list of the controls for a single channel of the 30GE-2 or 30GE-1.

- **Input Level:** This lets you adjust the overall level of the channel. By turning this level up or down, you can adjust the volume of all frequencies for a single channel simultaneously.
- **In/Out "Bypass" Switch:** When this switch is in the "Out" position the unit is operational. When it is pressed in, the unit is bypassed and no equalization is happening. This is a hard-wire bypass so the signal path will be complete even when there is no power supplied to the unit.
- **6 dB/12 dB Range Switch:** This is used to select the amount of boost or cut available on each frequency band. When it is in the "Out" position the range is +/- 6 dB. This means that each frequency band can be boosted or cut by up to 6 dB in this mode. When this switch is pressed in the range is +/- 12 dB which permits boosting or cutting up to 12 dB on each band.
- **Frequency Sliders:** Each slider controls the amount of boost or cut on a single frequency band. When the slider is in the center there is no boost or cut. As the slider is raised, progressively more boost is dialed in on the given frequency. Lowering the slider below the center point dials in progressively more cut on this frequency. The center point can be identified by a slight "catch" in the action of the slider.
- **Notch Filter Frequency Sliders:** There is one of these for each of three tunable notch filters. These sliders are used to select the center frequencies for the notch filters. Each

filter has a different range of available frequencies. The high and low points of the range are marked at the top and bottom of the frequency sliders.

- **Notch Filter Cut Sliders:** Each notch filter's cut slider determines the amount of cut from 0 dB (all the way up) to 40 dB (all the way down). When you are not using a notch filter, its cut slider should stay in the full up (no cut) position.

Adjusting the Equalizer

Begin by setting equalizer to a "flat" state. Set the level slider to the zero position. Set each frequency slider to the center position. Raise the notch filter cut sliders all the way up signifying no cut. Make sure the bypass switch is out so that the equalizer is operational. In this state the equalizer is said to be "flat" because a plot of its gain vs. frequency characteristic would yield a flat line. In other words, there is no boost or cut selected on any frequency. Notice that in this state the curve described by the frequency sliders is also a flat line. A graphic equalizer's sliders can generally be thought of as describing the gain vs. frequency curve of the unit. Although this is not always entirely accurate, it makes intuitive sense and it is the reason this type of equalizer is called a *graphic* equalizer.

It is important to realize that the center positions of the frequency sliders are special. If you were to set every slider one notch down from the center, the curve described by the sliders would still *look* flat, but in fact the response of the unit would not be truly flat. This is due to the way graphic equalizers and filters work, and it is true of all graphic equalizers by all manufacturers. For this reason you want to always start with the equalizer "flat" as described above. Boosting and cutting are done as needed from there. At this time, raise the levels of your power amplifiers to their regular operating levels. You can verify that the unit is set truly flat by running a sound source through the system, bypassing the unit, and listening for any change in the sound. You should hear no change in the character of the sound when the unit is bypassed (although you might hear a very slight change in level). Make sure to un-bypass the unit before continuing.

Next, choose a setting for the range switch. The +/- 6 dB position provides a finer level of control over each frequency while the +/- 12 dB position gives you the ability to change the frequency response more radically. It is crucial that you choose a setting before you start adjusting the equalizer and then stay with it. If you change the setting of this switch you will need to go back and readjust the equalizer again because it completely changes how the unit works. If you are unsure of how to set this, we recommend trying the +/- 6 dB setting for PA equalization and the +/- 12 dB setting for instrument equalization. If you find you need more than 6 dB of cut when equalizing a PA, try a notch filter for this frequency. You will almost never need more than 6 dB of boost with a PA.

The process of setting the equalizer to optimize the response of a particular PA system in a particular room or environment usually involves identifying frequencies that are ugly or problematic and then cutting them just enough to eliminate the ugliness or problem. It can take years to become a true expert at this; however, with a little experimentation the amateur can usually achieve favorable results. One way to identify which frequency is causing a problem is to try boosting each frequency in turn until you find the one you are looking for. When you hear the ugly frequency become more prominent as you boost a slider, that slider represents the frequency that you need to cut to eliminate the problem. Cut each problem frequency just enough to resolve the problem and no more.

With PA equalization, avoid boosting altogether if possible. It is sometimes advisable to boost the extreme lows (50 and 63 Hz) or the extreme highs (12.5 kHz and 16 kHz) to deal with a PA system that lacks extension on the ends of the spectrum, but if you do this, use only a slight boost. Excessive boosting of low frequencies can eat up amplifier headroom quickly without providing much benefit to the overall sound. It can also damage some low-frequency speakers from overexcursion. Excessive boosting of high frequencies can damage high-frequency speakers, ears, or both. Any boosting can cause problems with feedback. The rule with boosting is to use extreme discretion and make sure you know what you are doing.

Use as little equalization as you can get away with to achieve good sound. Equalization can easily make things worse if not used carefully. The "if it's not broken, don't fix it" rule applies here. If it sounds good flat, then leave it flat (although in practice, most systems can be enhanced using at least some equalization).

When using the unit for instrument equalization, a different set of rules applies. Boosting is often used with instruments to achieve a particular effect. Also, it is typical to see radical equalization curves used with electronic instruments. In these cases, the equalizer can actually be considered part of the instrument: It helps create the sound. Be careful with acoustic instruments and especially microphones and acoustic guitar pickups because a lot of boosting can still cause feedback problems.

Using the Notch Filters

When a particular frequency is problematic (for example, a frequency where feedback is a problem), a *notch filter* can be used to eliminate it from the signal. Notch filters are different from regular graphic equalizer bands in four ways.

1. Their frequency bands are 1/6 of an octave wide instead of 1/3 of an octave. This means that they cut frequencies much more selectively.
2. They provide up to 40 dB of cut instead of 12.
3. Their center frequencies are sweepable. This lets you zero in on the exact frequency causing the problem.
4. They are for cutting only. Boosting is not an option.

Notch filters should be used whenever you need to zero in on an exact frequency and cut it drastically without affecting nearby frequencies. They are called notch filters because when you plot their frequency vs. gain characteristic you see a deep, thin, notch at the selected frequency. The TDM 30GE series graphic equalizers provide 3 sweepable notch filters per channel. Each notch filter provides control over a different range of selectable frequencies. The high and low points of the ranges are printed at the top and bottom of the notch filter frequency sliders. During normal operation, the cut sliders for these filters are all the way up signifying no cut. To use a notch filter, set its frequency slider to the frequency that you want to cut, then lower its cut slider to select the amount of cut. After selecting the amount of cut, you can go back and fine-tune the frequency slider "by ear" to get the exact frequency that you want.

Troubleshooting and Support

This section details various problems that you might encounter when using your equalizer, and the possible causes and solutions. It also tells how to contact TDM when you need service or support for your 30GE series graphic equalizer.

No Signal Output

Make sure that the unit is plugged in and that the power light on the front panel is illuminated. If the unit is plugged in but the power light does not come on, try plugging some other piece of equipment into the same outlet to make sure it works. If it does work, but you still don't get the power light with the unit plugged in, check the fuse on the rear of the unit. **WARNING: Make sure the unit is unplugged from the power outlet before removing the fuse!**

Try bypassing the unit by pressing the bypass (in/out) switch. If there is no signal output normally, but you are getting a signal with the unit bypassed, the unit is probably malfunctioning. Contact your vendor, or call TDM for support and/or service (see *Contacting TDM*).

Check the signal source to make sure it is working correctly. Try plugging it into some sound reinforcement equipment that is known to work (such as a monitor system). If you do this and there is still no signal, the problem is that the signal source is not providing one.

If the signal source is not providing a signal to the equalizer, check the cabling between the source and the equalizer. Try substituting another cable that is known to be good. If this fails, it's likely that your signal source is malfunctioning, or that there is some problem with the way the individual components of the source are connected.

If the signal source is providing a signal to the equalizer, but you are still getting no output signal, check to make sure that the problem is not with the power amps, speakers, or cables. The most common cause this kind of problem is either a bad cable, or an incorrect hookup. The best way to trace down a bad cable is to replace each cable in turn with one that is know to be good and then check if that fixed the problem. If you cannot find the problem, contact your vendor, or call TDM for support and/or service (see *Contacting TDM*).

Distortion

To determine the cause of the distortion, try systematically removing each piece of signal processing equipment from the chain, one at a time. After a piece of equipment is removed from the chain (by plugging the piece of equipment before it directly into the piece of equipment after it), listen to the system and determine if the distortion is still present. When you remove a piece of equipment and the distortion goes away, then it is likely that this particular piece of equipment is the cause of the distortion. It is easy to check if the distortion is from your TDM 30GE series equalizer: Simply bypass the unit by pressing the bypass switch. If the distortion goes away with the unit bypassed then the distortion is probably coming from the equalizer.

If you determine that the TDM 30GE series equalizer is the source of a distortion problem, make sure that the unit is plugged into a proper power source. Read the back panel of the unit for the

correct supply voltage and frequency (US models are set up for 110 VAC at 60 Hz). Using a unit designed for 220 volt operation with a 110 volt outlet can cause distortion.

One of the most common causes of distortion is improper gain staging. That means that some piece of equipment is operating at much lower than unity gain (the signal coming out of it is a lot lower than what is being fed in). Under these conditions, there is often some piece of equipment that must provide a very hot signal output to compensate. This can cause distortion in the output stages of this unit, or in input stages of the unit that it is driving. Check the +10dB red indicator light on the face of the unit. If this light is flashing often or stays on constantly then either the signal feeding the unit is too hot or the level of the unit is set too high. Excessive boosting of frequencies that are very hot in the program source can also cause distortion in the equalizer.

If the unit is plugged into the correct power source, the signal feeding the unit is clean, your gain staging is normal, and you are still getting distortion, contact your vendor, or call TDM for support and/or service (see *Contacting TDM*).

Excessive Noise

TDM 30GE series equalizers have an excellent signal-to-noise ratio. If you hear excessive noise in your system, try to determine its origin systematically. Remove each piece of processing gear from the signal chain one at a time until you hear the noise go away. If none of the signal processing units is the cause of the noise, then the noise is probably present in your signal source. You can remove the TDM 30GE series graphic equalizer from the signal path by simply pressing the hard-wire bypass switch.

If you suspect that the TDM 30GE series equalizer is the cause of your noise problem, make sure the unit is plugged into the correct power source. Read the rear panel of the unit to determine the correct voltage and frequency (US models are set up for 110 VAC at 60 Hz). Using a unit designed for 220 volt operation plugged into a 110 volt outlet can cause very noisy operation of the unit.

Make sure your gain staging is correct. If some unit in your system is running at a very low gain, or if your signal source is weak, you may be running some other unit at a very high gain to compensate. Some audio equipment produces excessive noise when running at gain levels higher than unity.

If you check all of these possible causes and you still can’t resolve the problem, contact your vendor, or call TDM for support and/or service (see *Contacting TDM*).

60 Hertz Hum or Buzz

60 Hertz hum or buzz in a system can be extremely difficult to track down because it is usually not a problem with any one piece of equipment. It is usually caused by how the entire system is connected and grounded.

To fix a hum or buzz in a system, suspect any piece of equipment that gets a ground connection from more than one place. These problems are called “Ground Loops” and the technical explanation of why they cause problems is that there is actually an AC voltage difference between the two different grounds. The problem is most often caused by a single piece of equipment grounded to two different power sources that are located some distance apart. For example, a mixing console is plugged into a grounded outlet at the back of an auditorium, and

the power amplifiers are plugged into a different outlet 100 feet away at the stage. The mixing console is connected by shielded cable to the amplifiers and the shield is grounded. This causes both the mixer and the amps to be individually grounded, and each gets another ground from the other through the shielded cable. The result is a small, 60 Hz AC current flowing through the shield.

A problem like this can be fixed in several different ways. The mixer ground can be lifted. This is commonly done by plugging the mixer's three-prong plug into a two-prong grounding adapter (you can get these at any hardware store), and plugging that into the outlet. This effectively disconnects the mixer's ground lead from the outlet so that the mixer is now grounded only to the amplifiers. The ground can also be lifted at the amplifiers so that they are grounded only to the mixer. If the cable connecting the mixer to the amplifiers is a balanced (3-wire) type, the ground can be floated at either end of this cable by disconnecting the wire connected to pin 1 of the XLR adapter at one end or the other (but not both). Sometimes, because of the particular setup, you will have to try several of these options before finding one that works.

> ***CAUTION: Check local codes and regulations for rules pertaining to electrical grounding. It may be illegal in some places to lift the ground of a piece of equipment—especially if this piece of equipment is installed in a public venue.***

Another common cause of ground loops is direct input (or DI) boxes. These let you plug an instrument such as a guitar or bass directly into a microphone input. The problem is that the musician playing the guitar or bass might be using an amplifier or some other signal processing equipment on the stage that is plugged into a grounded outlet. This creates a ground loop between their rig and the grounded outlet that the mixing console is plugged into. Fortunately, many DI boxes have a ground lift switch that you can use to break this ground loop. Because they are so convenient, ground lifts on DI boxes are often the first option tried when a hum or buzz surfaces.

If you suspect that there is a problem with your TDM 30GE series equalizer that is causing a hum or buzz, try removing the unit from the system and plugging its outputs directly into power amplifiers with speakers attached. Make sure that the TDM 30GE series equalizer is plugged into the same electrical outlet as the amplifier. If the hum or buzz is still present, there might be a problem with the unit. In this case, contact your vendor, or call TDM for support and/or service (see *Contacting TDM*). If the hum or buzz is not still present, the problem is somewhere else in the system, and is probably a ground loop.

Contacting TDM

If you have a problem with your TDM 30GE series equalizer that you cannot solve using this troubleshooting guide, contact the vendor where you purchased the unit. If you need further assistance, you can call TDM at (818) 765-6200 during normal business hours (9 AM to 5:00 PM Pacific time). Our FAX number is (818) 765-8262. Our email address is support@tdmaudio.com and our Web site is TDMAUDIO.COM. Your satisfaction is our business, and we are happy to help you get the most out of your TDM 30GE series equalizer.

Specifications

Filter Type	Constant Q Non-interactive
Center Frequencies	20,25,31.5,40,50,63,80,100, 125,160,200,250,315,400, 500,630,800,1k,1.25k,1.6k, 2k,2.5k,3.15k,4k,5k,6.3k,8k, 10k,12.5k,16k.
Frequency Response	+0-1.0 dB 10 Hz - 20 kHz
Total Harmonic Distortion	
R_L > 2 kohms	<0.01% THD
Maximum Output Level	
R_L > 2 kohms	+20 dBu (6.2 volts) @ <.05% THD 20-20 kHz
Maximum Voltage Gain	6 dB
Hum and Noise (20 Hz-20 kHz)	
Av = 0 dB	<-89 dBu
Signal-To-Noise Ratio	109 dB
Controls	
Input Level	Continuously variable
Notch Q	1/6th octave
Notch cut	Up to -40db
Notch sweep	50-500, 400-4k, 1k-10k
High pass filter	Internal jumper
Slope	18 dB/octave
-3dB point	26Hz
Output Type	Floating and balanced
Connectors	XLR and 1/4 Phone
Output Impedance	300 Ohms
Input Type	Balanced and Differential
Connectors	XLR and 1/4 Phone
Input Impedance	20K Ohms
30GE-1	
Dimensions (W x H x D)	19 in. x 3.5 in. x 5.5 in.
Weight (boxed)	9.3 lbs.
30GE-2	
Dimensions (W x H x D)	19 in. x 5.25 in. x 5.5 in.
Weight (boxed)	11.4 lbs.

0 dBu = 0.775 v rms