STEREO GRAPHIC EQUALIZER

OPERATING GUIDE

INTRODUCTION

The purpose of this manual is to acquaint the user with the operating controls and practical applications of the Peavey ten-band Stereo Graphic Equalizer. Please read this manual carefully as the equalizer is a precision electronic equipment component that will provide years of satisfactory service if properly maintained and operated.

GENERAL DESCRIPTION

The Peavey ten-band Stereo Graphic Equalizer consists of two independent graphic equalizer sections, each with continuously variable 12 dB per octave high and low cut filters.

The equalizer circuitry provides 15 dB of boost or cut at ten center frequencies which are as follows: 30 Hz, 60 Hz, 120 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz. The low cut filter is adjustable from 20 Hz to 500 Hz, and the high cut filter is adjustable from 5 kHz to 30 kHz. These active filters have been optimized for minimum peaking and wide dynamic range operation.

The equalizer is impedance and level compatible with most commercial sound reinforcement, industrial, and consumer type equipment. The inputs include both low impedance XLR and high impedance ¼" phone type connectors. All outputs have a source impedance of less than 600 Ohms with both balanced XLR and unbalanced ¼" connections provided for ease of installation. Protection is provided at all inputs and outputs for accidental overvoltage and short circuit conditions. The power supply is extremely rugged using "state-of-the-art" voltage regulators which will provide a stable voltage source even under extreme power line variations.

The graphic equalizer's circuitry is designed for use under a wide range of input signal levels. The combination gain/attenuator level control provides 15 dB of boost or cut. This control allows level matching in almost any type of operating environment. A bypass switch allows the graphic and filter system to be removed from the circuit without disturbing the built-in level match system. The unit can be used as a high quality line amplifier providing more than +20 dBM into 600 Ohms at the balanced output.

INSTALLATION AND ADJUSTMENT

The Stereo Graphic Equalizer is designed to be mounted in a standard 19" rack. The unit must be secured by the use of four mounting screws for optimum mechanical stability. The equalizer does not generate any appreciable heat and is not adversely affected by externally generated fields from power transformers due to the unit being completely enclosed in a metal enclosure. For maximum reliability and useful service life, the unit should not be mounted directly over large tube type power amplifiers or other high operating temperature equipment. The heat developed by this type of equipment could degrade performance and shorten component lifetime.

NOTE

ALL SIGNAL CONNECTIONS MADE TO THE GRAPHIC EQUALIZER MUST BE MADE USING SHIELDED CABLES.

The graphic equalizer has both low impedance unbalanced XLR type and high impedance ¼" type inputs. In most professional applications, the XLR type input should be used as a matter of installation convenience and a means of correctly terminating professional equipment. If the XLR connectors are not available at the mixer, either of the parallel high impedance ¼" phone jack inputs (approximately 50 K Ohms) can be used. Most modern electronic equipment has outputs that are characterized as having a very low output impedance. This impedance is typically 600 Ohms or less. What this means is that connecting cables may be quite long without any noticeable loss in signal quality. If, however, you have a hum or radio frequency (R.F.) problem after trying the ¼" jack system, it may be necessary to use equipment driving the equalizer which has balanced low impedance output. It can be connected to the unbalanced female XLR connector with excellent success. Under extreme conditions, it may be necessary to balance the inputs of the graphic equalizer with appropriate external transformer plug-in's.

The graphic equalizer outputs are low impedance (600 Ohms or less) and are capable of driving low impedance loads to +14 dBV or greater. A balanced output is provided from a standard XLR male type connector. This type of output allows the use of very long cables in critical commercial sound reinforcement applications. Several hundred feet of twisted pair cable can be used with very little signal degradation or hum and noise pickup.

NOTE

ALL XLR TYPE CONNECTORS ARE WIRED IN ACCORDANCE WITH AMERICAN N.A.B. PROCEDURES. PIN 1 IS SHIELD, PIN 2 IS COMMON, AND PIN 3 IS POSITIVE WITH RESPECT TO PIN 2. IF YOU ARE INTERFACING WITH A EUROPEAN SYSTEM (D.I.N.), THE WIRING OF PINS 2 AND 3 MUST BE REVERSED.

In a recording studio or home stereo application, there is little need to use a completely balanced output system. The two parallel ¼" phone jacks are provided for these applications. There is no requirement to terminate any output from the graphic equalizer.

There is a potential problem that could be encountered in interfacing the equalizer in sound reinforcement applications. This note of caution exists for all equipment used in this type of application. Whenever you feed a stereo or split monaural signal to stage right and stage left, it is possible to create a ground loop between the mixing console and the power amplifiers located at the stage or between the power amps themselves. If a 60 Hz hum results when the equalizer is connected in this configuration, the best cure is to eliminate the ground loop by taking your A.C. feed for the console, equalizer and power amps from the same point. If at all possible, run an A.C. feed for the console and all associated equipment from the stage power amplifier feed point. Also, feed both power amplifiers from the same box.

CAUTION

DO NOT REMOVE THE THIRD WIRE GROUND PIN FROM YOUR A.C. LINE CORDS. THIS IS NOT A SAFE FIX FOR A.C. GROUND LOOPS. IF NECESSARY, USE A SUITABLE PLUG ADAPTOR AND GROUND THE GREEN WIRE

In all cases, total hum and noise elimination is only possible if a completely balanced system is employed at each end of the distribution system.

WARNING

TO PREVENT ELECTRICAL SHOCK OR FIRE HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. BEFORE USING THIS APPLIANCE, READ BACK COVER FOR FURTHER WARNINGS.

OPERATION

Operation of the Stereo Graphic Equalizer is quite simple. You should always begin operation with the equalizer bypass switch in the bypass position and the gain control adjusted to the "0" or 12:00 o'clock position. Adjust your preamplifier and power amplifier gains as required and then make the final gain adjustment on the graphic equalizer. With all the equalizer sliders in the center of their operating range, place the equalizer in the circuit by use of the equalizer IN/OUT switch. Now adjust the equalizer for the desired results. It is wise to avoid excessive cutting of large segments of the audio passband since this tends to reduce the dynamic range of the system. Also it is better to raise the level control rather than use a majority of the equalizers in the boost position since a better overall signal-to-noise ratio will result.

NOTE

IF YOU ARE USING THE EQUALIZER IN AN APPLICATION WITH MARGINAL HEADROOM, IT IS QUITE POSSIBLE THAT YOU WILL FORCE YOUR POWER AMPLIFIER INTO CLIPPING WHEN LARGE AMOUNTS OF EQUALIZATION ARE USED. PLEASE REMEMBER THAT 15 dB OF BOOST IS EQUIVALENT TO MULTIPLYING A VOLTAGE BY A FACTOR OF 5.62 OR A POWER BY A FACTOR OF 31.62. AS AN EXAMPLE, IF YOU ARE USING A POWER AMPLIFIER THAT IS DELIVERING 100 WATTS AT A FREQUENCY OF 120 Hz AND YOU BOOST THAT FREQUENCY 15 dB, THE POWER AMPLIFIER WILL BE CALLED UPON TO DELIVER A POWER OUTPUT OF OVER 3100 WATTS!

The high and low cut filters are very useful for the removal of unwanted energy contained in the extreme low and high frequency segments of the audio spectrum. One such example of usage of the equalizer filters is to contour the sound of a vocal channel. In a typical on-stage environment, there is considerable leakage into all microphones. Two of the main offenders are the bass guitar and the drum set. Most of the energy from the human voice is contained in the 100 Hz to 3 kHz frequency range and the use of a wide bandwidth channel compounds the problem, as well as uses up unnecessary power at the frequency extremes. With some experimentation, you will find that you can narrow the bandwidth and still have a quality vocal system with more output than before. Another obvious use of the filters is to remove turntable rumble and high frequency hiss. Obviously, boosting the frequencies with the graphic and rolling them off at the same time with the filters should be avoided. All this does is limit headroom and can lead to severe distortion. As with any equalization device, careful experimentation and a little common sense can yield the desired results.

SPECS

GAIN:
Unbalanced line in to unbalanced line out, EQ flat. Adjustable from -15 dB to +15 dB, unity gain at 0 dB level setting, balanced output gain +6 dB

INPUT IMPEDANCE:
Greater than 50 K ohms unbalanced at phone jacks, XLR jack terminated with 2.7 K ohms, unbalanced

INPUT DYNAMIC RANGE:
5 V RMS max. @ 0 dB level setting
7 V RMS max. @ -15 dB level setting

OUTPUT SOURCE IMPEDANCE:
470 ohms @ unbalanced output
Less than 200 ohms @ balanced output

OUTPUT LEVEL, UNBALANCED OUTPUT:
7 V RMS into 10 K ohms
5 V RMS into 600 ohms

OUTPUT LEVEL, BALANCED OUTPUT:
Terminated in balanced load
12 V RMS, +22 dBV into 10 K ohms
8 V RMS, +20 dBM into 600 ohms

OUTPUT LEVEL, BALANCED OUTPUT:
Terminated in unbalanced load
7 V RMS, +17 dBV into 10 K ohms
5 V RMS, +16 dBM into 600 ohms

EQUALIZATION:
+-15 dB @ 30, 60, 120, 250, 500 Hz
1K, 2K, 4K, 8K, and 16 kHz, average Q of 2

LOW CUT FILTER:
Adjustable from 20 Hz to 500 Hz
12 dB/octave rolloff

HIGH CUT FILTER:
Adjustable from 5 KHz to 30 KHz
12 dB/octave rolloff

The following specifications measured @ unbalanced output, terminated in 10 K ohms, with level control @ 0 dB, equalization in, graphic set flat @ 0 dB, Low cut @ 20 Hz, high cut @ 30 KHz.

FREQUENCY RESPONSE @ 1 V RMS INPUT:
+-1 dB, 20 Hz to 30 KHz

TOTAL HARMONIC DISTORTION @ 1 V RMS INPUT:
Less than .08% from 20 Hz to 20 KHz
Typically less than .02% @ 1 KHz

HUM & NOISE:
Greater than 80 dB below 1 V RMS output from 20 Hz to 30 KHz, unweighted, input unterminated

DANGER

EXPOSURE TO EXTREMELY HIGH NOISE LEVELS MAY CAUSE A PERMANENT HEARING LOSS. INDIVIDUALS VARY CONSIDERABLY IN SUSCEPTIBILITY TO NOISE INDUCED HEARING LOSS, BUT NEARLY EVERYONE WILL LOSE SOME HEARING IF EXPOSED TO SUFFICIENTLY INTENSE NOISE FOR A SUFFICIENT TIME.
THE U.S. GOVERNMENT'S OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) HAS SPECIFIED THE FOLLOWING PERMISSIBLE NOISE LEVEL EXPOSURES.

DURATION PER DAY IN HOURS.	SOUND LEVEL dBA, SLOW RESPONSE
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

ACCORDING TO OSHA, ANY EXPOSURE IN EXCESS OF THE ABOVE PERMISSIBLE LIMITS COULD RESULT IN SOME HEARING LOSS.
EAR PLUGS OR PROTECTORS IN THE EAR CANALS OR OVER THE EARS MUST BE WORN WHEN OPERATING THIS AMPLIFICATION SYSTEM IN ORDER TO PREVENT A PERMANENT HEARING LOSS IF EXPOSURE IS IN EXCESS OF THE LIMITS AS SET FORTH ABOVE. TO INSURE AGAINST POTENTIALLY DANGEROUS EXPOSURE TO HIGH SOUND PRESSURE LEVELS, IT IS RECOMMENDED THAT ALL PERSONS EXPOSED TO EQUIPMENT CAPABLE OF PRODUCING HIGH SOUND PRESSURE LEVELS SUCH AS THIS AMPLIFICATION SYSTEM BE PROTECTED BY HEARING PROTECTORS WHILE THIS UNIT IS IN OPERATION.

CAUTION

THIS AMPLIFIER HAS BEEN DESIGNED AND CONSTRUCTED TO PROVIDE ADEQUATE POWER RESERVE FOR PLAYING MODERN MUSIC WHICH MAY REQUIRE OCCASIONAL PEAK POWER. TO HANDLE OCCASIONAL PEAK POWER, ADEQUATE POWER "HEADROOM" HAS BEEN DESIGNED INTO THIS SYSTEM. EXTENDED OPERATION AT ABSOLUTE MAXIMUM POWER LEVELS IS NOT RECOMMENDED SINCE THIS COULD DAMAGE THE ASSOCIATED LOUDSPEAKER SYSTEM. PLEASE BE AWARE THAT **MAXIMUM POWER CAN BE OBTAINED WITH VERY LOW SETTINGS OF THE GAIN** CONTROLS IF THE INPUT SIGNAL IS VERY STRONG.

1. Read all safety and operating instructions before using this product.
2. All safety and operating instructions should be retained for future reference.
3. Obey all cautions in the operating instructions and on the back of the unit.
4. All operating instructions should be followed.
5. This product should not be used near water, i.e. a bathtub, sink, swimming pool, wet basement, etc.
6. This product should be located so that its position does not interfere with its proper ventilation. It should not be placed flat against a wall or placed in a built-in enclosure that will impede the flow of cooling air.
7. This product should not be placed near a source of heat such as a stove, heater, radiator or another heat producing amplifier.
8. Connect only to a power supply of the type marked on the unit adjacent to the power supply cord.
9. Never break off the ground pin on the power supply cord. For more information on grounding, write for our free booklet "Shock Hazard and Grounding."
10. Power supply cords should always be handled carefully. Never walk or place equipment on power supply cords. Periodically check cords for cuts or signs of stress, especially at the plug and the point where the cord exits the unit.
11. The power supply cord should be unplugged when the unit is to be unused for long periods of time.
12. Metal parts can be cleaned with a damp rag. The vinyl covering used on some units can be cleaned with a damp rag, or an ammonia based household cleaner if necessary.
13. Care should be taken so that objects do not fall and liquids are not spilled into the unit through the ventilation holes or any other openings.
14. This unit should be checked by a qualified service technician if:
    A. The power supply cord or plug has been damaged.
    B. Anything has fallen or been spilled into the unit.
    C. The unit does not operate correctly.
    D. The unit has been dropped or the enclosure damaged.
15. The user should not attempt to service this equipment. All service work should be done by a qualified service technician.

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