

# GENZ·BENZ

E N C L O S U R E S

## GBE 600

SIX HUNDRED

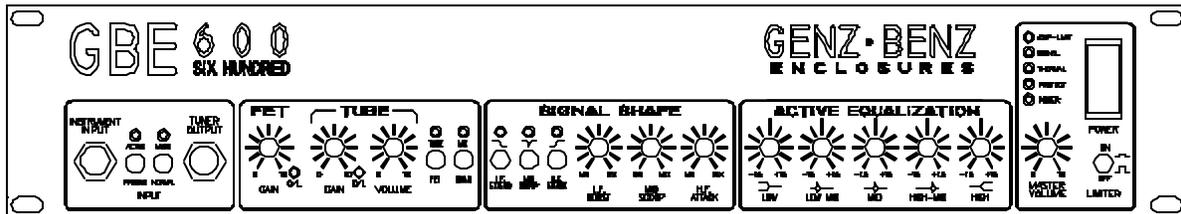
# TECHNICAL MANUAL

### DESIGN PHILOSOPHY

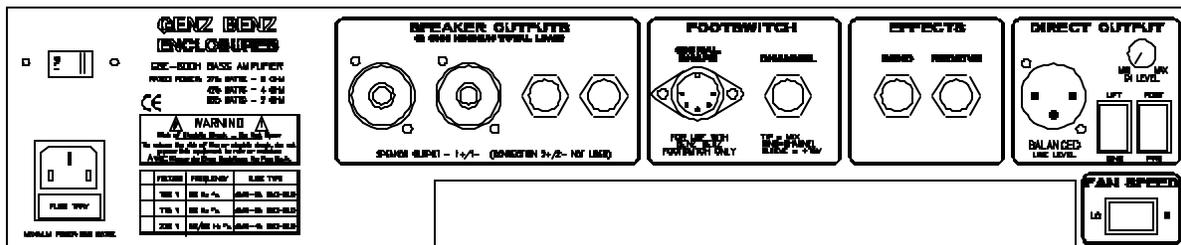
With many years of experience designing and manufacturing both bass guitar speaker cabinets and amplifiers, it became obvious that there is a large market for a bass amplifier line that reproduces the natural tone of the instrument itself, while allowing for personalization of tonal texture.

As with our speakers, Genz Benz amplifiers strive to maximize your instrument's natural tone and feeling without imparting additional coloration or reducing impact and playability. This results will always be true to your instrument's basic natural qualities and your personal tonal signature.

The circuit design, features and physical construction have been carefully calculated to give you, the experienced player, the best performance and value in bass guitar amplification. Featuring sturdy jacks and controls, 12AX7 TUBE and solid state FET front end pre-amps, foot switchable channels and shaping filters, 5 band active eq, a balanced direct output and an industrial duty bipolar power amplifier with toroidal power transformer, the Genz Benz GBE-600 bass amplifier gives you the tools and versatility necessary to sound your very best on stage.



GBE-600 FRONT PANEL



GBE-600 BACK PANEL

## TECHNICAL INFORMATION

The first stage of the GBE-600 preamp uses a low noise bi-fet linear scaling amplifier with a 2 pole low cut point at 23 Hz to prevent excessive speaker cone excursion and intermodulation distortion. Additional bandwidth roll-off is provided at 20 kHz for RFI suppression. The variable gain stages are a feedback-divider type control, one of which is all solid state and the other utilizing a cathode follower (tube), each providing a maximum gain of about 30 dB. On the tube stage, variable non-linear loading creates a smooth and natural sounding overdrive rich in harmonics. These foot-switchable and blendable gain stages feed 3 foot-switchable, user adjustable signal shaping filters and the 5 band active equalizer. These EQ filters provide over 12dB of boost and cut, with center position flat. The output amplifier feeds the master volume control and fully protected power amplifier. A low noise differential drive output amplifier is provided for the direct output (switchable pre/post eq and ground lift) and is phantom power protected.

The power section consists of a low distortion bipolar power amplifier with integrated limiter which allows gradual overload without sudden loss of feedback control of the speakers. The output is rated at 275 watts RMS at 8 ohms, 425 watts RMS at 4 ohms and 625 watts RMS at 2 ohms. The amplifier topology is low feedback class A-B with servo control of bias and DC offset.

Also provided is on board output limiting, dual slope integrated VI limiting, solid state thermal protection, short circuit load protection, dc fault protection and RFI suppression. All amplifier status points are indicated on a dual color led array. This amplifier uses heavy duty copper based bi-polar power transistors directly mounted to a 2 speed fan cooled extruded aluminum heatsink tunnel. The output section sports a combined rating of 1600 watts and 128 amps to insure a conservative and reliable design.

*An important and not commonly discussed specification is the power amplifier's ability to deliver rated power into a reactive load. All speakers present a reactive load to the amplifier, reducing real world driving ability. The power section of the GBE-600 amplifier is rated to deliver full power into a reactive load with a 45 degree (leading or lagging) power factor phase angle. This is one important reason Genz Benz amplifiers sound so big.*

## FEATURES

The following feature set is included on the **GBE-600 Bass Amplifier**. These features were developed based on usability and are the result of input from veteran players from around the country. It is important for an amplifier to reflect the real needs of the players using them. We feel that this amplifier does just that.

**Input** — The ¼" *input* has switchable sensitivity. With the switch in the *passive* position, the preamp presents a higher gain and input impedance which is tailored to the characteristics of *passive pickups*. Two distinct types of passive pickup exist (there are some exceptions which aren't important for this discussion). A *passive magnetic pickup* consists basically of a permanent magnet (or one for each string), called a pole piece, with a wound wire coil around it. As the string interrupts the magnetic field, the coil picks up the changes, or disturbances, in the magnetic field and translates these changes into a small electrical signal. (This is the same principal as the large electrical generator used by your utility company to power your rig on stage!) In order to develop a strong enough signal to drive an amplifier, the number of windings on the coil(s) must be very large. Additionally, in order to keep the efficiency of the pickup high, the dimensions of the wire coil must be small and the magnet flux density kept very high, thus, a small diameter wire is used. The end result is a signal that has significant output impedance due to the size and length of the wire used in the pickup's windings. A *passive piezo-ceramic or piezo-film pickup* is made of a piezo-ceramic crystal (or distorted Kynar film). When this material is moved by the vibration of instrument's body, the resulting strain on the crystal or film is converted to voltage via the "piezo-electric effect". The output impedance of a piezo type pickup is typically higher than the magnetic pickup. The input impedance of the amplifier's *passive input* is set high enough to prevent interaction with the high output impedance of all commonly used *passive pickups*, including magnetic, piezo-ceramic and piezo film types.

With the switch in the *active* position, the preamp presents a lower gain and input impedance which is tailored to *active pickups*. An *active pickup* is, for all practical discussions, any pickup that uses pre-amplification between the pickup element and the amplifier input. The purpose of this pre-amplifier is to buffer the high impedance signal from the pickup element (magnetic, piezo-ceramic, piezo-film etc) and convert it to a higher level, lower impedance form. It is common for a bass with active pickups to have higher output level and longer sustain because only a small portion of the energy required to make the electrical signal comes from the vibrating string. The majority of the energy comes from an external power source such as a battery. Additional features may be provided with the active pickup, such as equalization, volume control and compression.

**Input Signal Mute Switch** — The input on the **GBE-600 bass amplifier** includes an “*input mute*” switch. With this switch, you can place the amplifier (and the direct output) in standby mode between sets without having to change any of your volume settings. This feature is especially handy during the set when using the tuner output since you will still be able to use your tuner without having sound come from the amplifier or P.A. system. No more re-patching or fumbling in the dark! A red LED turns on when the input mute is active, reminding you that you are in “stand-by” mode. This feature is also controlled by the optional 4 button footswitch.

**Input Gain Controls & O/L LEDs** — The “*input gain*” controls, in conjunction with the signal and clip LEDs, allow you to adjust the preamp input gain sensitivities to the instrument you are playing. Bases can have an output level from a few thousandths of a volt to several volts. Generally, you want to see only an occasional flash of the red clip LED when you really hit the string hard, then adjust the *master volume control* for playing volume. Distortion of the preamp gain stage will occur when the red clip LED is illuminated, so plan accordingly. The best signal to noise ratio will result with the above method. Setting your playing volume will be a combination of the “*FET gain control*” (FET channel), “*TUBE gain control*” and “*TUBE volume control*” (TUBE CHANNEL) and the “*master volume control*”, depending in part on individual preference. Intentional overloading of the tube channel may be desirable and the O/L LED indicates that you are operating the tube preamp stage in the overdrive mode. The FET and TUBE preamps are switchable and mixable. These features are also controlled by the optional 2 button footswitch. Both *CHANNEL O/L LEDs* are active at all times monitoring each channel’s audio level, independent of channel switch position.

**Signal Shaping Switches and Controls** — There are 3 separate shaping filters on the **GBE-600**. The “*L.F. EXTEND*” lowers the low frequency roll-off response of the preamp (between 30 and 45 Hz) to allow the full effect of 5+ string and extended scale instruments. The amount of extension is adjustable depending on the setting of the corresponding control. Use this function with care due to the power of this amplifier. The “*MID SCOOP*” function introduces a midrange scoop at approximately 800 Hz, with a lower “Q” than typical equalization provides. The amount of scoop is adjustable with the corresponding control. The “*H.F. ATTACK*” function increases brightness and sparkle (approximately 4KHz) of the signal, allowing exaggeration of percussive effects and string sound. The amount of attack is adjustable with the corresponding control. All 3 filters are footswitchable by the optional 4 button footswitch.

**Active 5 Band Equalization** — The “*active 5 band equalization*” used in the **GBE-600** amplifiers is composed of 1 shelving low frequency control, 3 peaking midrange controls and 1 shelving high frequency control. These filters are not interactive and are effective as an advanced tone control system. The filters have a cut/boost range of +/- 12dB and a smooth, musical sounding response.

- Low Frequency - 80 Hz
- Low-Mid Frequency - 200 Hz
- Mid Frequency – 500 Hz
- High-Mid Frequency – 1250 Hz
- High Frequency - 4000 Hz

**Tuner Output Jack** — The “*tuner output jack*” is provided to allow a tuner to remain plugged into the amplifier while playing. This output remains active when the “*mute switch*” is pressed, allowing for tuning your instrument while not sending signal to either the “*direct output*” or the speaker. Signal level of -30dB (typical hot bass level) will drive all known tuners.

**Effects Insert Jacks** — The “*effects insert jacks*” are provided to allow access to the pre-equalization signal for the purpose of inserting signal processing equipment such as compressors, chorus, delay & reverb processors. “*Send*” (output) and “*return*” (input) are nominal +4 dB level. “*Series*” devices (such as compressors and gates) require that the signal flow out from the send jack on the amplifier, through the processing device and back into the return jack on the amplifier. Parallel or mixed signal devices (such as chorus, delay and reverb processors) require that the signal flow out of the send jack on the amplifier, through the unit where it is split into a dry (unaltered) signal and a wet (processed) signal. On the processing unit, you will use the mixed signal output to return the signals (both wet and dry) to the return jack on the amplifier. The ratio between the wet signal and the dry signal is heard as the amount of effects added back to the original signal, which is controlled by the mix knob (also called “*balance*”) on the effects processor. This may be a real knob (as in the Alesis Microverb), or software controlled (as in the Yamaha SPX-90, SPX900 or SPX 990). Set the input sensitivity on the effects processor according to the processor manufacturer’s instructions. The “*effects send jack*” may also be used as an auxiliary output to drive a direct box, tape deck etc. This output is pre-equalization, and pre master volume. The “*mute switch*” will shut this output down when engaged.

**Master Volume** — The “*master volume control*” is post-eq, and adjusts the signal level sent to the power amplifier. Best results are usually obtained when this control is set between the 9 o’clock and 3 o’clock position.

#### **Master Section Status Indicators —**

- The “*power LED*” indicates that the amplifier is on and the low voltage regulated power supplies are active.
- The “*protect LED*” indicates that the amplifier is in “*protect*” mode and the output relay is de-energized. This LED will illuminate for approximately 3 seconds during power switch-on and switch-off. It is normal for this LED to glow while continuing to monitor the internal conditions for about 3 seconds after the protection relay has closed. It will also illuminate during any internal fault condition. If this happens, turn the amp off and consult a repair technician.
- The “*thermal LED*” indicates that the amplifier has overheated, engaged the protection circuit and shut down. This circuit is self-resetting when the offending condition (blocked air vents, foreign body stuck in fan, etc) is corrected. This LED will also flash for a brief time at turn-on and turn-off, indicating that the amplifier protection circuits are operating. An additional feature of this LED is that it will illuminate about 15 degrees F. before amplifier shut-down, as a reminder that the fan should be in the high speed position for this type of extended high power operation.
- The “*signal LED*” indicates that the power amplifier is receiving signal (over several watts output) and all is well!
- The “*limit LED*” indicates that the power amplifier has reached maximum power and the limiter threshold has been crossed. Driving 6dB beyond this point, the amplifier will gradually begin to clip.
- The “*output limit switch*” engages or bypasses the internal soft clip limiter. This limiter allows simulation of output saturation as the amplifier nears its maximum power. The limiting action is particularly musical sounding, even when driven hard.

**Fan Switch** — The **GBE-600** is a fan cooled high powered rack mount device. A 2 speed rear panel mounted “*fan switch*” is provided to allow the reduction of fan speed and corresponding fan noise during recording and low power playing. Operating the fan at high speed is recommended anytime the amplifier is driving 2 ohms, 4 ohms at high levels, high ambient temperatures and when the “*thermal*” LED illuminates, indicating a reduction of thermal headroom.

**Direct Output** — The **GBE-600** includes a studio quality, fully active transformerless balanced “*direct output*”, with “*pre-post equalization switch*”.

With the “*pre/post switch*” in the “pre” position, the direct output receives its signal directly from the pre-amp input buffer amplifier with no tonal modifications. This is a pre gain control, pre eq output, with the best signal to noise ratio. Most recording and sound reinforcement companies will want to use this position since changes you make to your stage sound will not affect this output.

With the “*pre/post switch*” in the “post” position, the direct output receives its signal from the output of the 5 band equalizer. This feature allows for additional flexibility in some situations, but is often not desired for recording or live sound reinforcement.

A “*ground lift switch*” is provided which opens pin 1 (shield) on the direct output to prevent ground loops. Use the position that results in a minimum of noise.

The output level is nominal line level (adjustable between -50 and -10 dB), pin 2 hot. This output is fully protected from the effects of phantom power provided by the mixing console and does not require phantom power to operate.

**Output Jacks** — The **GBE-600** features 2 standard 1/4” speaker jacks plus 2 Neutrik™ “Speakon” NL-4 connectors. Minimum recommended total load impedance is 2 ohms provided adequate ventilation for the heatsink area is provided. The “Speakon” is wired using pins 1+ and 1-, pins 2+ and 2- are not connected.

**Foot Switches** — The **GBE-600** is fitted with jacks for 2 different types of footswitch. The 2 button footswitch controls “*channel switch*” and “*channel mix*” functions. Any standard latching 2 button footswitch with TIP-RING-SLEEVE connector will work, provided there are no LEDs in the switching path. The 4 button footswitch uses a 5 pin “DIN” connector and controls the “*mute*” and “*shape filters*”. This footswitch is unique to Genz Benz due to the complex nature of the functions and must be factory supplied.

## GENERAL SAFETY INFORMATION

**Power** is supplied to the amplifier through an IEC type detachable cord set with a mains connector, fuse holder and internationally rated 115/230 Volts - 50/60 Hz toroidal power transformer. For our international touring players, an external mains line voltage switch is provided, with a fuse size chart printed on the rear of the unit denoting the power supply configuration and fuse size that the unit has been rated for. International IEC type cord-sets are available for a variety of international power supply sockets. The main’s fuse (and a spare) is located in a slid-out drawer in the bottom half of the IEC connector.

**Common sense** (as well as the law) dictates that you do not operate the unit where it will be exposed to moisture or rain, excessive ambient heat (over 115 degrees F / 40 degrees C) or without a properly grounded A.C. power source. Never remove the ground pin from the A.C. power connector.

**Ventilation** is required to keep this amplifier from overheating. Do not block air flow over heat-sinks at the rear of the unit.

## CAUTIONS

- Never set an amplifier on anything that will tip over or collapse under its weight.
- These amplifiers are capable of producing sound pressure levels that may cause permanent hearing loss.
- There are no user serviceable parts inside these units. Always consult a qualified service repair facility for service. THE HEATSINK MAY BECOME VERY HOT!!! WARNING!! DO NOT TOUCH

The use and operation of this device constitutes an agreement of full release of any and all liability connected with its use. Only persons familiar with the operation of high-powered audio equipment should attempt to operate this device. In addition, by the use of this device, user agrees to hold both GENZ BENZ ENCLOSURES, INC and its designers, sales agents and all other affiliates and related parties harmless in the event of any accident, injury, damage or loss resulting from such use. Manufacturer's sole responsibility is to provide a warranty on the specified performance of the product under normal conditions for a period of 3 years.

## THREE YEAR LIMITED WARRANTY TRANSFERABLE

Genz Benz Enclosures warrants the GBE 600 speaker enclosures and electronics to be free from defects in materials and workmanship, for a period of 3 years from the date of purchase, when purchased from an authorized Genz Benz dealer.

This warranty does not cover wear and tear incurred from the normal designed use of the product.

This warranty is only effective if a copy of the original sales receipt is presented at the time of warranty service.

This limited warranty is completely transferable to any subsequent buyer as long as the original sales receipt is transferred to such subsequent buyer. See your warranty card for all details.

ALL WARRANTY SERVICE MUST BE PERFORMED BY A GENZ BENZ AUTHORIZED SERVICE CENTER. Before returning any unit to the manufacturer for service, a RETURN MERCHANDISE AUTHORIZATION (RA#) must be obtained by calling 480-941-0705.

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