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GTQ1 Mark 3 Instruction Sheet

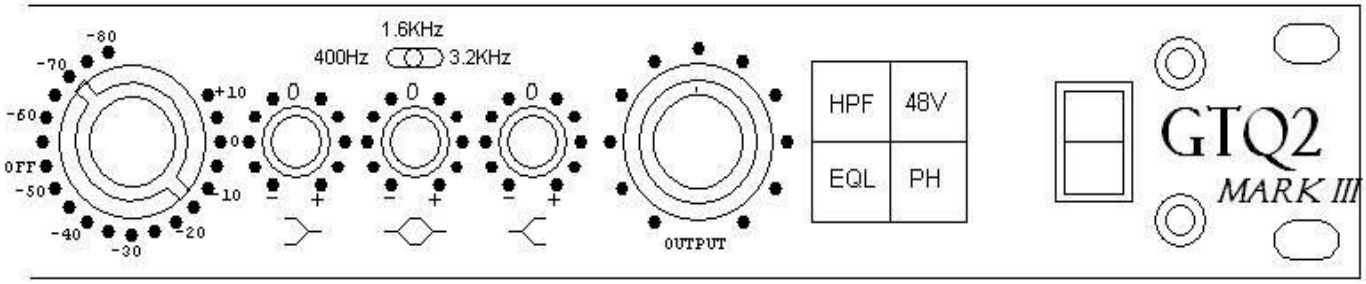
Introduction:

Well done for purchasing a hand-built, all discrete class A circuitry GTQ1 stereo microphone preamplifier! It is designed to give you years of superb sounds and service. Improvements on the Mark 3 include an extra mid frequency (1600Hz) to provide choices of 400, 1600 and 3200Hz, and impedance switching (300Ω and 1200Ω) on the XLR inputs.

Unpacking Instructions:

Carefully remove the unit from the custom foam packing. The GTQ1 uses a power supply that automatically senses the local voltage so no setting is required. For best noise performance always use a grounded 3 core / 3 pin a.c. cord. If you connect the GTQ1 to an unbalanced destination, either use the ¼" rear jack or wire to the XLR pins 2 and 3 only. Leave pin 1 high. This will help prevent ground loops.
The rear jack sockets are mono and should be connected with a mono jack. If a balanced TRS jack is plugged in, there will be a 6dB loss as there would be no signal on the ring contact.

Operating Guide:



The GTQ1 front panel is shown above. In order for the equalizer to work, the "EQL" button must be selected and the high pass filter, which rolls off frequencies below 80Hz, is selected when both "EQL" and "HPF" buttons are pressed.

The “48v” button applies 48 volts dc to the mic input XLR in order to power condenser microphones. Despite urban legends to the contrary, 48v does not harm ribbon or dynamic microphones but damaged microphone cables might... so always check that your cables are in good condition!

The “PH” button inverts the phase 180 degrees and should be used to correct any phase issues created by the mic position or any outboard equipment. Press the button and, if the stereo image sounds weird with it pressed, you know the phasing is OK and to leave the switch off!

The GTQ1 can accommodate any signal you care to throw at it, including high-level line inputs. The sensitivity switch provides gain adjustment from +80dB to –10dB and the level pot allows for fine adjustments. The level pot has an audio taper and is –20dB at half rotation. I would recommend using the level pot between ¾ and full rotation and never below ½ rotation unless part of a deliberate fade. If you have to turn the pot below ½ way, the sensitivity switch can be adjusted at least 4 clicks less! Operating the unit in this fashion ensures that you keep the headroom in the designed 26dB region.

The D.I. input has 10 Megohm input impedance and around 10dB gain. It can be used (to great effect) with musical instrument pickups, but works equally well with high-level signals like a D.A.T. or CD player. The same gain structure rules apply.

If a keyboard or similar ac powered device is connected to the DI input and causes a ground loop, make a cable with a male XLR connector such that signal goes to pin 2, shield to pin 3 and no connection to pin 1. The GTQ1's transformer balanced input will resolve the ground loop issue.

The impedance switch on the rear panel selects either 300Ω or 1,200Ω input impedances. Most of the time you will find that the 1,200Ω input works best with dynamic and condenser microphones but very low impedance microphones (e.g. ribbon type) may work better with the 300Ω input. The 300Ω input provides 6dB additional gain if sourced from a low impedance, but if a higher impedance microphone is used (e.g. close to 300Ω), the series impedance will create a 6dB attenuator that negates the 6dB gain. The switch enables the user to experiment with which input impedance best matches the microphone.

Using analogue equipment in a digital world!

E.G. Analogue versus Digital levels

In my technical/design background in analogue circuitry, spanning over 50 years, the levels of audio were calibrated in dBm, a throwback from the telephone and communications era where 0dBm was 1mW dissipated into a 600 ohm load = 0.775 volts. 0dBm was later changed for the more convenient 0dBu which is a voltage into any specified impedance.

In a broadcast studio, Peak Program Meters were used that were calibrated from 2 to 7. Mark #4 equated to 0dBu and Mark #6 equated to +4dBu.

The level +4dBu is 1.228 volts a.c. and also the 0VU reference point on a VU meter. This is, coincidentally, #6 on the PPM meter and a typical line up level for an analogue tape machine.

Most consoles and pre-amplifiers have a maximum output level before clipping of around 26dBu. This gives them 22dB headroom above 0VU = +4dBu. Driving the console and pre-amplifier "hotter" than +4dBu output reduces the headroom proportionately.

At the other end of the scale, the consoles/pre-amplifiers usually have +80dB gain and produce noise figures in the –45 to –48dBu region and an Equivalent Input Noise of -125 to -128dBu. The noise floor from a 200 ohm source at 20 degrees C is –129dBu so the amplifier is adding 1dB of noise to the absolute noise floor. As the gain is reduced, the difference between the signal and the noise floor widens as the noise is pushed further down.

Reminder:- *Increasing the gain amplifies the signal AND raises the noise floor.*
Running the device at hotter levels than usual reduces the headroom.

In the digital world measurement criteria differ. Instead of using a reference level that relates to a particular power or voltage (like 0dBm) the 0dBf reference is the maximum signal that the analogue to digital converter can accept before the onset of clipping.

The 0dBf level is usually somewhere in the region of +18dBu to +24dBu in the analogue world…. It is **NOT** the same as 0VU (+4dBu) on an analogue VU meter.

It's very important to use an A to D input level that maximizes the headroom and minimizes the noise in the analogue world.

E.G. *If an attempt was made to drive the console or preamplifier high enough to hit the 0dBf (+24dBu) reference level on the A to D, the amplifier would be running at over 20dB greater than it's normal operating level. This raises the noise floor by 20dB (ten times louder) and reduces the analogue headroom to around 2dB. A microphone normally needing 40dB gain would need 60dB gain and any peaks would drive both the pre-amplifier and the A to D into clipping. Not good!*

Depending on the reference level recommendations of the A to D manufacturer, the analogue levels on its input should be typically around –18dBf. This will optimize both the signal to noise ratio and the headroom of the analogue signal. A degree of variance, say –16dBf, is acceptable but higher levels will begin to degrade the analogue performance with no improvement to the quality of the sound.

When using condenser microphones requiring +48v, be sure to turn the volume control down before pressing the 48v switch as applying this voltage may involve a switch on thump, especially if set to high gains. The complex relay switching for the alternate mid frequencies involves a similar small click and the volume should be turned down before either function is switched.

Input impedances : XLR Input = 1200 ohms.
Transformer balanced and floating

D.I Input = 10Mohm into a "super-transistor" class A amplifier.
Unbalanced mono jack socket input disables the rear XLR input.

Balanced Output impedance : < 50 ohms.

Transformer balanced and floating. **Unbalanced**

O/P impedance :

<30ohms

Unbalanced

Frequency response : 20Hz to 50KHz ± 1dB ref 0dBu @ 1KHz

Input Headroom : >+26dBu

Total Harmonic Distortion: < 0.075% @ 1KHz @ +20dBu (Typical <0.025%)

Equivalent input noise: At +80dB gain < -125dB (typical -127dB)

(Input terminated 200 ohms, measured 22Hz to 22KHz

NB If, when mounting in a 19" rack, the top cover screws impede fitting, the screws on the top face of the cover can be removed as the panel is still retained by six screws in the sides.

Warranty: ONE YEAR PARTS AND LABOR LIMITED WARRANTY

Aurora Audio LLC warrants this GTQ1 unit against defects in workmanship for a period of one year and parts for a period of one year from receipt by the original end user. This warranty shall not apply to damage resulting from misuse including water damage, in-transit damage, fire damage, improper maintenance, dropping the unit and operation or storage outside the environmental specification for the product.

Do not try to repair this GTQ1. Only qualified Aurora Audio LLC technicians are authorized to repair this unit. WARRANTY VOID IF CASE IS OPENED **ROHS Directives**

The ROHS Directive stands for "the restriction of the use of certain hazardous substances in electrical and electronic equipment". This Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

The restrictions took effect in the E.U from 1st July 2006.

It is very important that the owner of any piece of equipment that contains even microscopic amounts of the listed hazardous substances (in relation to the weight of the unit) realize that the responsibility of its disposal rests with them. The unit should not just be thrown away at the end of its lifetime, whether that's 10, 20 or 30 years hence.

Please contact us and we will provide you with the necessary information to return the unit to us for proper disposal.