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GT500 Mic Pre Instruction Sheet

Introduction:

Well done for purchasing a hand-built, all discrete class A circuitry GT500 Mic Pre! It is designed to give you years of superb sounds and service.

Unpacking Instructions:

Carefully unpack the unit and check the gain settings are low before plugging it into the 500 series rack unit. Always plug in and remove any module from a 500 series rack with the power turned off as arcing on the power contacts could burn away the gold plating and make the module unusable.

Operating Guide:

1. Preamplifier and High Pass Filter

The GT500 can accommodate any signal you care to throw at it, including highlevel line inputs. The sensitivity switch provides 100dB of gain adjustment from +80dB to –20dB 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 overdrive.

If you have to turn the pot below ½ way, the sensitivity switch must be adjusted at least 2 clicks more to restore the signal level at the expense of input headroom! Operating the unit with the output level at maximum ensures that you keep the headroom in the designed 26dB region.

The D.I. input overrides the normal input and 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.

The High Pass Filter is selected by moving its toggle switch to the right and a blue LED will glow to indicate section. Four frequencies are provided with 47Hz, 82Hz, 150Hz and 270Hz for the selections.

2. LED Level Indicators

Three level indicating LEDS are provided to assist in setting up the gain structure...

Green = -20dBu signal presence so turn the input gain or output level pot up!

Amber = 0VU = +4dBu = 1.228 volts ac = approx -18dBf (see below).

When using the GT500, set the output level pot to maximum and, talking or singing or playing an instrument, increase the red input gain control until the amber LED lights. Leave the settings there because that is the optimum recording level to use to maintain headroom.

Red = is set at +24dBu which is approaching the clipping region of the GT500. It could be well after the digital clipping point of your converter!

N.B. The GT500 should **not** be operated with the **Red** LED **constantly** lit. Besides most likely being above the clipping point of the A to D converter (and digital distortion sounds horrid!) it can lead to damage to the circuitry from overheating. For good headroom, the **Red** LED should never flash and occasional flashes are an indication of loss of signal headroom.

3. Using analogue equipment in a digital world!

E.G. Analogue versus Digital levels

In my technical/design background in analogue circuitry, spanning over 40 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 also 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 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 operating the 48v switch as applying this voltage may involve a switch on thump, especially if set to high gains.

4. GT500 Specifications

Input Impedance = 1.2Kohm balanced and floating, transformer coupled.

DI Input impedance = 10Mohm unbalanced

Output Impedance = <75ohm balanced and floating, transformer coupled

Output drive capability = >+24dBu into a load of 600 ohms and => +27dBu bridging loads

Frequency response = 20Hz to >75KHz ± 3dB

Total Harmonic Distortion = < 0.1% @ 0dBu I/P @ 1KHz (Typically 0.025%)

Noise = < -45dB filtered 20Hz to 20KHz @ +80dB gain (Typically <-47dB)

DC Current = <=90mA both rails to <=120mA both rails all switch functions selected.

Warranty: ONE YEAR PARTS AND LABOR LIMITED WARRANTY

Aurora Audio LLC warrants this GT500 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 GT500. 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 for proper disposal.