

ALG Output Upgrade:

The ALG output upgrade does three things for the GR-300: more output, more sustain and increased dynamic range.

The upgrade does not effect the tone, timbre or sound quality of the GR-300 in any way, except to make it better.

Why is the GR-300 so quiet? Why is the output level so low compared to the standard guitar output?

To understand why the stock GR-300 is so quiet, let's remember what amplification equipment was commonly available around 1978, the approximate time the GR-300 was being developed.

There were two kinds of amplifiers: guitar amps, and bass amps. There were virtually no keyboard amplifiers, inexpensive line mixers, or full-range amplification systems for musicians. Even the PA systems of the day were limited in their frequency response.

From a practical point of view, a Roland design engineer had to imagine that the GR-300 would be plugged into a guitar amplifier, and had to design for the input sensitivities of a guitar amplifier. If the GR-300 had the typical line-level output found on modern guitar synthesizers and keyboards, the signal would grossly overdrive in the input stage on the amplifier.

Rather than sounding like the distinctive GR-300, the result would have been an over-saturated fuzz sound. And guitar players would be asking themselves why they should pay thousands of dollars for a custom guitar, cabling, and synthesizer, with a sound that reminded them of stomp box distortion.

So the output level of the GR-300 is intentionally designed to be quiet. It does not have to be that way. While the output of the divided hex pickup can be measured in millivolts, the synthesizer signals output by the guitar electronics card are quite strong. In fact, the levels are so high that Roland did not even use shielded wire for the 24-pin cabling! While modern Roland guitar systems use a plus-minus seven volt power supply, the GR-300 has a beefy plus-minus fifteen volt power supply, and the actual synthesizer signals from the guitar can have a voltage swing well over twenty-five volts.

And once this powerful signal hits the GR-300, it is used to drive the direct synthesis system that is the magic of the GR-300. And the high levels of operation continue throughout the internal signal chain in the GR-300, until the final output stages, when the signal is intentionally reduced to a fraction of its original level.

It is at this point that I change discrete components in the output stage to bring the GR-300 up to a modern, line-level output.

ALG Development

I originally developed the ALG Output Upgrade because I always had to crank the input gain on my audio interfaces to get a decent recording of the GR-300. But adding ten or fifteen dB of gain also added more noise and hiss, degrading the quality of the sound. Even with 24-bit recording technology, if you are barely hitting the meters when recording, you are capturing sound at only 8 or 10 bit quality, far from the true potential of the GR-300.

After studying the GR-300 schematic, I began experimenting with alternate components in key positions. I called the upgrade the “Audio Lab of Georgia” output upgrade, because ALG was one of the few places that sold the discrete, high fidelity parts I needed.

At the end of the day, the process of development was as much experimentation as calculation. I wanted to increase the level, but did not want to overly exaggerate the output of the GR-300. When you use the balance control to compare the GR-300 synthesizer output to the standard guitar output, I believe you will hear a much better balance of the two sounds.

More output, more sustain, increased dynamic range

This is the way the signal path works in the GR-300: after the modified output stage, the signal passes through an unmodified noise gate. When the output level falls below the noise gate threshold, the gate closes, and the GR-300 becomes silent. The ALG Output Upgrade increase the level of the signal coming into the noise gate by around ten decibels. If you play a note and let it sustain, it will take longer for the level of the note to fall below the threshold, silencing the note.

This means you get more sustain from a GR-300 with the ALG Output Upgrade. This also means the level between the loudest note a GR-300 can play, and the softest note, has also been increased by 10 dB. This is an increase in the dynamic range by at least 10 dB. More output, more sustain, increased dynamic range.

Getting the Best Sound from the GR-300

One final note on getting the best sound from the GR-300. It is important to have all the gain stages in the GR-300 calibrated properly, whether you have the ALG Output Upgrade or not. This process starts with the divided hex pickup. It has been my experience that the pickup should sit around 1 mm away from the strings. You want the pickup to be as close as possible to the strings without interfering with the physical vibration of the string. By having the pickup close to the string, you reduce stray RF interference, and decrease crosstalk between strings.

After adjusting the pickup height, you want to set the output trimmers in the guitar to the appropriate level. This level varies depending on the synthesizer you are using. For the GR-300, you want the LEDs to light brightly when playing strongly, and to dimly glow with soft picking.

Typically, a guitar calibrated in this manner will have an output signal too hot for the Roland GM-70. I believe the GM-70 has greater input sensitivity to match the GK-1. The Roland GR-700 falls somewhere between the two.

I mention the importance of calibration, because I did an ALG Output Upgrade on a GR-300. The owner reported the unit sounded fantastic, but said he was now overdriving his amplifier with the GR-300, and consequently he lowered the level of the input trimmers in the guitar, to reduce the GR-300 output.

The better solution would have been to turn down the volume level on the guitar, or get an amplifier with an input with the dynamic headroom to handle the stronger output from the upgraded GR-300. Any modern amplifier or audio interface that has line-level inputs will work great. The ALG Output Upgrade transforms the GR-300 from a guitar-level device, to a line-level device.