Benchmark Media Systems, Inc.

RGC-06 Instruction Manual

Description

The RGC-06 is a remote gain control daughter board that uses a voltage controlled amplifier (VCA) chip for the gain control function.
for single and two channel System 1000 modules. It is most often used with the DA-101 Mono Audio Distribution Amplifier, and the DA-102 Stereo Audio Distribution Amplifier. However, the RGC-06 may be used with both of the microphone preamplifier DAs and some of the other System 1000 modules. Check with the factory for specific applicability.

The RGC-06 has a control range of approximately –100 dB to +20 dB. The RGC-06 is controlled with a variable DC voltage that feed to the differential control port input. The voltage controlled amplifier has been scaled to operate with a nominal control voltage rang of –10 to +2 volts. Each volt will effect approximately a 10 dB change in gain

Signal Flow

The RGC-06 daughterboard is inserted into the signal path of the motherboard, similar to the insert of an external processor via an "insert point" on a console or other piece of audio equipment. The insert point on line level DAs is after the input and the gain stages but before the output power amplifier.

Generally speaking, since the VCA will be most commonly used for occasional gain adjustments that may be required to bring signals to their proper output level, it is best to operate the VCA at or close to unity gain. Audio from the mother board should be "normalized or pre-scaled" for the correct nominal output level when operating the VCA at unity gain.

For example, if you know that the level coming into the motherboard module will consistently be 10 dB lower that the house reference, of say +4 dBu, the variable gain stage on the input of the motherboard should be set for 10 dB of gain. This will feed the correct nominal unity-gain amplitude to the input to the VCA daughterboard. When measuring these amplitudes at any unbalanced signal point on the motherboard or daughter board, you will notice the measured signal level is 6 dB lower than the expected output level. This is because a 6 dB loss has been taken at the input stage and is made up by the balanced output stage.

The audio signal that feeds the input of the "Left channel" VCA comes from one of the two sets of header posts. The signal comes into the daughter board on Pin-9 of the 10-pin top set of headers, and "Right channel" comes in on Pin-7 of the bottom 8-pin set. The input to the daughterboard and return to the motherboard is an AC (audio) voltage. The audio signal is returned by header Pin-10 of the top set and Pin-8 of the bottom set.

The VCA chip itself is a current-in, current-out device. Earlier motherboard modules from Benchmark, returned the signals to the mother board as a currents. Unfortunately, crosstalk between input and return pins on the headers, was significant. If your RGC-06 is intended to be used with older modules, (pre 1995) please consult with a tech representative at Benchmark.

Control Voltage Port

The control port input is a differential operational amplifier. The advantage of a differential input at this point is two fold. The first advantage is that it allows the use of "forward referencing" to reduce the problem with AC voltage differences between the control point and the RGC-06. This is most applicable over long distances, i.e. over 25'. For further information on "forward referencing" see "A Clean Audio Installation Guide" by Allen H. Burdick, a Benchmark Media Systems application note that is available at the Benchmark web site. http://www.benchmarkmedia.com/appnotes-a/caig/default.asp

The second advantage is both positive and negative input polarities are available. Normally, the positive polarity input is used when there is a single ended control voltage source, such as the RGC-P. The RGC-P is a control voltage generator that creates a –10 to +2 volt DC control voltage. See the instructions for the RGC-P for more information.

When mixing various control signals in an inverting DC mix amplifier, the output of an inverted DC signal from such a mixer may directly feed the negative (inverting) input of the differential pair while the positive input must be tied to ground to maintain the proper scaling factor.

Please Note

The DC output of the control voltage amplifier, U1 and U2, feeds the negative input of the VCA chip. Therefore, the inverting input to the differential amplifier, which might normally be assumed to be the inverting input of the VCA is, in reality, the positive control voltage input to the daughterboard.

Wiring the Control Port

The following table gives the pin assignments for the control port inputs.

Balanced Input	Left Channel Positive Input	Left Channel Negative Input	Right Channel Positive Input	Right Channel Negative Input
Aux Line Identification	Aux Line a	Aux Line c	Aux Line b	Aux Line d
Motherboard Header Location	Header P2 Pin 6	Header P2 Pin 4	Header P2 Pin 5	Header P2 Pin 3
Card Frame Motherboard	Card Edge Pin 59	Card Edge Pin 60	Card Edge Pin 61	Card Edge Pin 62

Fig 2. Connection Port Location Table

The following diagram is an implementation of the forward reference technique that is found in the “A Clean Audio Installation Guide” as recommended above.

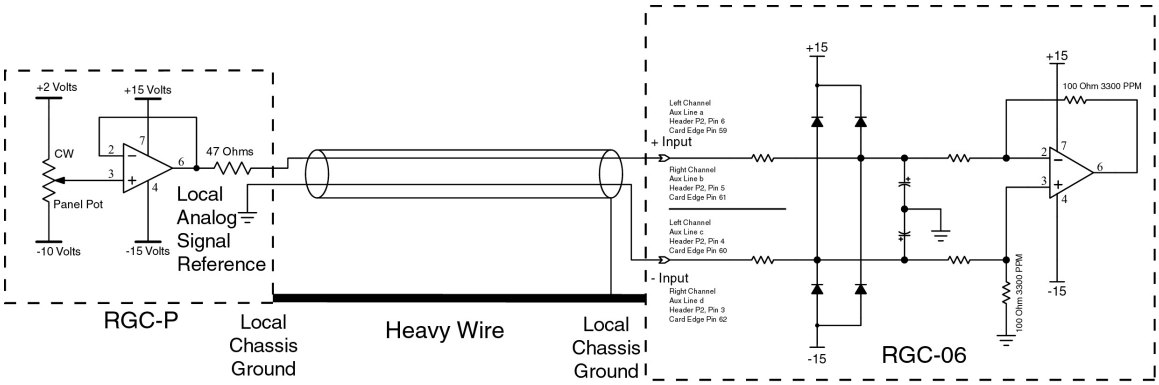

Fig 1. RGC-P Wiring Example

Daughterboard Setup

There are two variable resistors for each channel on the RGC-06. The first is a DC offset null, a part of the control amplifier circuitry. The second is a THD null which is set for the lowest Total Harmonic Distortion at the maximum gain of the amplifier. Both of these controls have been preset at the factory for proper operation. **Do not change the settings of these controls.** These are not user controls. The only time the THD trim potentiometer should be adjusted is when the VCA chip itself is replaced. The THD control requires a THD distortion analyzer for proper setup. This completes the RGC-06 instruction manual.

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