



SGA 107 & SGA 310

Graphic Amplifiers

OPERATOR'S MANUAL



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INTRODUCTION

The **sun** SGA 107 and SGA 310 are combined single channel cut and boost graphic equalizers and mono power amplifiers. These valuable tools are ideal for powering many types of speaker systems including stage and studio monitors, instrument speakers, bi-amplified systems and high fidelity speakers. The graphic equalizer section is capable of 15dB of cut and boost, centered on standard octave intervals. A normal and clip **LED** are provided to indicate amplifier operating status.

A level slider is included which controls the output from off to full gain. Other features include an all steel rack-mount chassis and an equalizer output for patching the equalized signal to other systems.

THE SGA 107 is designed for unbalanced signal operation and uses a 7 band graphic equalizer combined with a 100 watt [at 4 ohms] amplifier. The amplifier is convection cooled and fits into a standard 3½" E.I.A.

The SGA 310 has been designed to accept either balanced or unbalanced input signals. This unit combines a 10 band graphic equalizer with a 300 watt [at 2 ohm] amplifier. The power amplifier is fan cooled and fits into a standard 5¼" E.I.A. standard rack space.

UNPACKING

The **sun** SGA graphic amplifiers have been packed in a protective container. Keep this packing carton and the protective foam end supports for any future shipping needs. After unpacking this unit, check it for any damage that may have occurred during shipping. If any damage to this unit is found, you must notify your dealer immediately. Only your dealer may initiate a claim with the carrier for shipping damage. Be sure to save this packing container as evidence of damage for the carrier's inspection.

INSTALLATION

The SGA's have been designed to allow the option of rack mounting. These units will fit any E.I.A. standard 19" rack and can be installed with four #10x32x½" machine screws. It is best to install this unit while the rack is lying on its back.

sun provides a full line of portable E.I.A. standard racks and accessories. These racks can be used with any standard rack mount equipment.

The amplifier mounting placement should be chosen to insure an adequate air flow to prevent over-heating of the unit. In portable applications heavier units should be mounted near the bottom of the rack to provide a lower center of gravity for better stability.

SGA 107 SPECIFICATIONS

EQ Filter Frequencies: 125, 250, 500, 1K, 2K, 4K, 8K
 125 affects frequencies 32-125HZ
 8K affects frequencies 8K-16KHZ
 Others are band pass center frequencies.

Filter Range: $\pm 15\text{dB}$

Sensitivity: [EQ flat, level max.] .7Vrms for full output

Frequency Response: +0, -3dB 10-55KHZ

Signal-to-Noise Ratio: Greater than 95dB at full output
[A Weighted]

Distortion: THD, [20 - 20KHZ] Less than .08%
IMD, [60HZ: 7KHZ, 4:1] Less than .05%

Output Power: 70Wrms, 8 ohms
 100Wrms, 4 ohms

Input Impedance: [EQ] 10K ohms

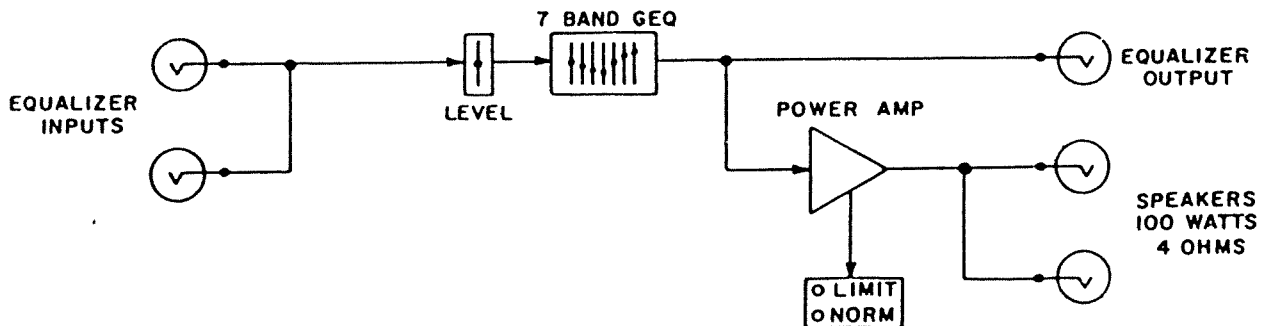
Output Impedance: [EQ] 150 ohms

Weight: 17.25 lbs., 7.9 kg.

Dimensions:	Height	X	Width	X	Depth
	3.5"		19"		11.25"
	12.7 cm		48.3 cm		38.6 cm

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

BLOCK DIAGRAM



SGA 310 SPECIFICATIONS

EQ Filter Frequencies: 32, 63, 125, 250, 500, 1K, 2K, 4K, 8K, 16K
 32 affects frequencies 20-32HZ
 16K affects frequencies 16K-32KHZ
 Others are band pass center frequencies.

Filter Range: $\pm 15\text{dB}$

Sensitivity: [EQ flat, level max.] 1Vrms for full output

Frequency Response: +0, -3dB 10HZ-55HZ

Signal-to-Noise Ratio: Greater than 95dB at full output
 [A Weighted]

Distortion: THD [20 - 20KHZ] Less than .08%
IMD [60HZ: 7KHZ, 4:1] Less than .04%

Output Power: 120Wrms @ 8 ohms
 200Wrms @ 4 ohms
 300 Wrms @ 2 ohms

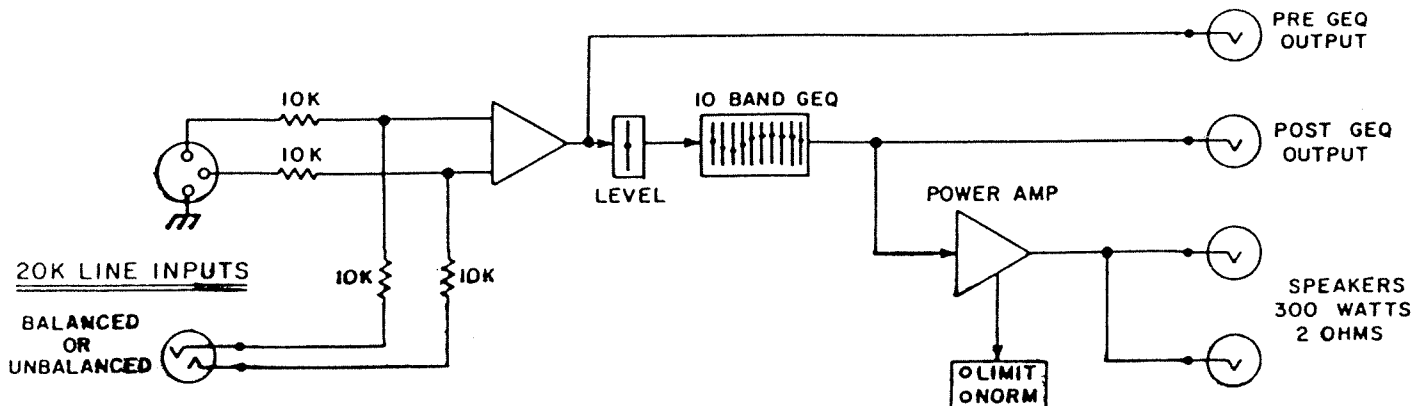
Common-Mode-Rejection Ratio: Typically greater than 40 dB

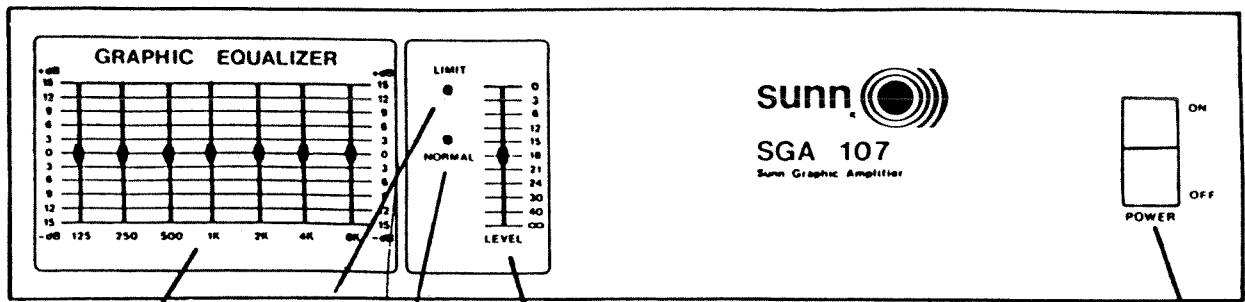
Weight: 25.5 lbs., 11.57 kg.

Dimensions:	Height	X	Width	X	Depth
	5.25"		19"		10.5"
	14 cm		48.3 cm		26.7 cm

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

BLOCK DIAGRAM





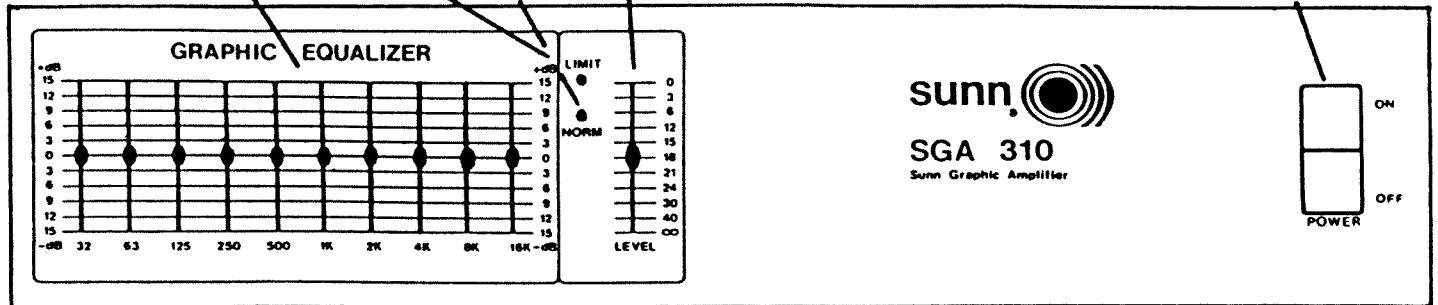
1

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1. FILTER CIRCUITS

The equalizer filter circuitry is where the frequency response alterations take place. Each equalizer control varies the level of the signal over a band of frequencies known as an octave. The filters have been optimized for accuracy and ease of front panel adjustment to insure that you will be able to obtain the frequency response you want with a minimum of trial and error. It is wise to use these controls sparingly since the filters are the combining type and can produce gains of 27 dB if several adjacent bands are boosted. Extreme control settings will result in loss of headroom, make clipping occur more easily, and should not be used except as special effects.

2. LIMIT LED INDICATOR

The red LED will be off during normal operation and will come on if the amplifier reaches clipping, or distortion is detected from shorted or improper loads.

3. NORMAL LED INDICATOR

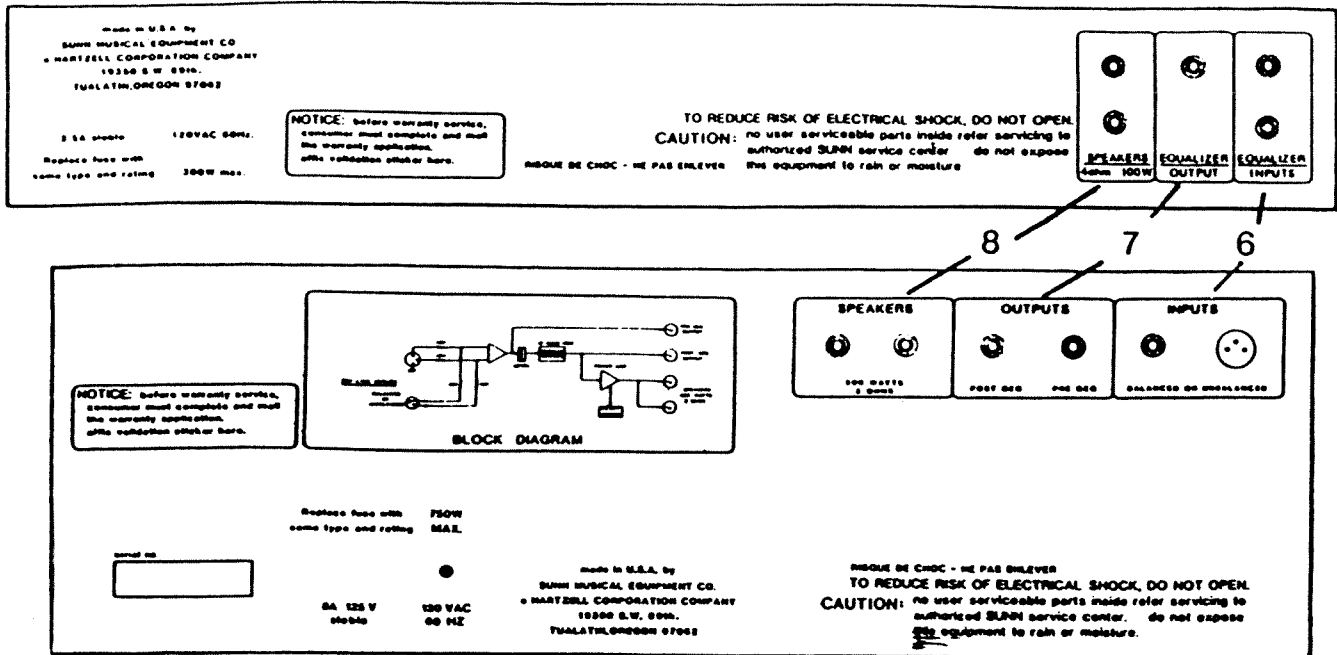
This green LED should come on when the amplifier is turned on and remain on during normal amplifier operation.

4. LEVEL CONTROL

The level control adjusts the amount of signal going into the graphic EQ and power amp. Always start with the level control down [off] then raise it to the desired operating level.

5. POWER SWITCH

This switch is used to turn on and off the power to the amplifier. When the switch is turned on, a light located in the switch should come on.



6. INPUT CONNECTIONS

The SGA 107 has two 1/4" phone input jacks designed to accept unbalanced input signal. Use only one of these jacks for the input signal. The other jack can be used to patch the input to another unit.

The SGA 310 has one 3 pin audio connector and one 1/4" stereo phone jack designed to accept balanced or unbalanced input signal. Use only one of these jacks for the input signal. The input jack not used for the input signal can not be used for signal patching.

7. OUTPUT CONNECTIONS

The EQUALIZER OUTPUT in the SGA 107 has a 1/4" phone jack for unbalanced signal operation. This output allows an equalized signal to be patched from the SGA 107 to other units.

The SGA 310 has two output jacks. Both jacks are 1/4" phone jacks designed for unbalanced output signals. The PRE GEQ output will deliver a signal before the graphic section in the SGA 310. This output allows an unequalized signal to be patched from the SGA 310 to other units. The POST GEQ output will deliver an equalized signal from the SGA 310 which can be patched to other units.

Use single conductor shielded cable when patching from the EQUALIZER OUTPUT in the SGA 107, PRE GEQ and POST GEQ outputs in the SGA 310. To avoid loss or distortion of signal when using these outputs, loads below 2K ohms should not be used.

8. SPEAKER OUTPUTS

The SGA 107 and SGA 310 have two output jacks used to patch the output signal from the SGA amplifiers to the speaker enclosures. Use two conductor zip cord for speaker wire. The minimum speaker load that can be used with the SGA 107 is 4 ohms. The minimum speaker load that can be used with the SGA 310 is 2 ohms. See SPEAKER LOAD and SPEAKER WIRE section for further details.

ACOUSTIC FEEDBACK AND ROOM EQUALIZATION

Acoustic feedback in a sound system can easily be recognized as a ringing sound occurring regardless of the input signal. It is caused by an open microphone in the presence of a speaker that is reproducing the sound of that microphone. The microphone will receive a sound, the speaker will reproduce the sound, and the microphone will receive it again. This is what causes feedback howl. It is especially noticeable in monitor systems, but also occurs in any system that amplifies a signal from a sensitive receiver [microphone, guitar pickup, etc].

The frequency that feedback will occur at depends on the characteristics of the speaker, microphone and room. Without an equalizer you would just have to accept the loudness of the system before feedback. With an equalizer you can reduce the level of the system only where it feeds back. Then the overall level can be increased above where feedback would normally occur. By continuing to reduce the level of the feedback frequency and raising the overall level, a much louder, cleaner sound can be achieved.

TYPICAL PROCEDURE FOR FEEDBACK EQUALIZATION

1. Set up the system as it would normally be used. Best feedback suppression will be achieved if the players are in position on stage, since they will cause sound reflections themselves.
2. Initially, many feedback problems can be eliminated by making sure microphones are not pointed directly into speakers.
3. Use directional [uni-directional, cardioid] mics whenever possible. These reject sound from the back and accept sound from the front. Omni-directional mics should be avoided in conjunction with a monitor system. These are typically used in studio recording and will promote feedback.
4. Slowly increase the level of the signal, be careful to quickly recognize feedback because it will rapidly increase in level, and can easily cause hearing and speaker damage if allowed to continue. It will also occur more quickly if a person's head or hands are near the microphone. This is a good test for feedback.
5. When feedback occurs, lower the EQ control that best removes the feedback until the ringing has stopped.
6. Again, slowly increase the overall level until feedback occurs. Adjust the equalizer to remove feedback. Continue this procedure until you have sufficient level for your application.
7. Systems often are over-equalized until the sound is not understandable. Be sure to stop the equalization process when a usable level has been reached.

EQUALIZER, OTHER APPLICATIONS

Aside from feedback suppression, the SGA Equalizer can be used as a sophisticated accurate tone control system. Many speaker systems can be greatly improved in sound by adjusting their frequency response with the SGA Equalizer. It can also be used to accent or complement characteristics of vocals, guitars or any signal you would like to adjust. As before, try to avoid extreme boost of the controls as this may easily cause amplifier clipping or speaker failure.

SPEAKER LOADS

The following two charts show what the total impedance will be when connecting 2 speaker cabinets in parallel or in series. Chart A shows what impedance load will result when connecting two cabinets in parallel. Chart B shows what impedance will result when connecting two cabinets in series. Each chart gives an example of patching two cabinets together and the mathematical formula used to derive the total impedance.

CHART A
Parallel Impedance

$$RT = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} \dots \frac{1}{R_t}}$$

Cabinet B Impedance	16	1.8	3.2	5.3	8
	8	1.6	2.7	4	5.3
	4*	1.	2	2.7*	3.2
	2	1	1.3	1.6	1.8
		2	4	8*	16
		Cabinet A Impedance			

*Example - Cabinet A is 8 ohms, Cabinet B is 4 ohms. The total impedance when connected in parallel is = $\frac{1}{\frac{1}{8} + \frac{1}{4}} = 2.7$ ohms.

CHART B
Series Impedance

$$RT = R_1 + R_2 \dots R_t$$

Cabinet B Impedance	16	18	20*	24	32
	8	10	12	16	24
	4	6	8	12	20
	2	4	6	10	18
		2	4*	8	16
		Cabinet A Impedance			

*Example - Cabinet A is 4 ohms. Cabinet B is 16 ohms. The total impedance when connected in series is = $4 + 16 = 20$ ohms.

SPEAKER WIRE

Use two conductor stranded zip cords for speaker wire, minimum 18 gauge. Do not use **SHIELDED CABLE** for speaker wire. **sun** recommends that the following chart be used to select the speaker wire gauge according to the length of speaker wire needed and speaker impedance.

	2 OHMS	4 OHMS	8 OHMS	16 OHMS
0 - 25 Feet	14 Gauge	16 Gauge	18 Gauge	18 Gauge
25 - 50 Feet	12 Gauge	14 Gauge	16 Gauge	18 Gauge
50 - 100 Feet	12 Gauge	12 Gauge	14 Gauge	16 Gauge

OPERATING HINTS AND PRECAUTIONS

1. Avoid subjecting this unit to moisture, rain and drinks that may be spilled.
2. Use care in patching all connections in the sound system. Incorrect patching can cause noise problems and component failure.

To reduce the chances of introducing unwanted noise into your system, keep all patch cables away from AC power cords, lighting cables and speaker wire. Always use shielded cables for patching to the input of the unit, and from the GEQ output to other units.

3. Make all connections in the sound system before turning on the power amplifier.
4. The power amplifier should be the last unit in the sound system to be turned on. It should also be the first unit turned off. This prevents any turn on and off pop from other units in the sound systems from reaching the loudspeakers. Set the level control to the OFF position before turning the unit on or off.
5. Do not operate this unit with the top cover removed.
6. Never connect two amplifier output channels together, either directly or indirectly by connecting to the same speaker.
7. Do not connect a speaker output directly to ground.
8. Do not overdrive this unit, indicated by lighting of the red clip indicator. This indicates power amplifier clipping and will cause unwanted signal distortion and promote speaker failure. The red clip indicator should not come on except for momentary flashes during the loudest transients.

The red clip LED will also indicate the presence of a shorted cable or other improper load condition.

9. Any power amplifier is capable of destroying almost any loudspeaker. **sun** IS NOT LIABLE FOR ANY LOUDSPEAKER DAMAGE CAUSED BY BEING OVERPOWERED.
10. Operate domestic amplifiers [U.S. - Canada] from 60 HZ AC mains of not more than 10% above or below the specified voltage. 50/60HZ operation approved for export units only.
11. Domestic units are equipped with a three prong AC plug. In applications where a grounded AC outlet is not available, use a three prong to two prong adapter and find a suitable ground for the ground wire on the adapter. **DO NOT REMOVE THE GROUND PRONG.**
12. The back panel of the SGA 107 is made of anodized aluminum. This functions as the heat sink for the power amplifier. Under normal operating conditions, this panel may become hot to the touch.

SUNN ELECTRONICS LIMITED WARRANTY

sunn Electronics warrants new electronic products to be free from defective materials and faulty workmanship for a period of three years from the date of purchase to the original owner when purchased from an Authorized **sunn** Dealer.

Speakers carry a one year warranty from date of purchase.

Light bulbs, vacuum tubes and meters carry a 90 day warranty from date of purchase.

The following conditions apply to all **sunn** product warranties:

The purchaser is responsible for completing and mailing to **sunn**, within 15 days of purchase, the warranty application enclosed with each product. Upon receipt of the warranty application, **sunn** will issue a warranty validation sticker that must be affixed to the product. Where a warranty validation area has not been provided on a few **sunn** products, the validation sticker is to be affixed to your original proof of purchase and presented at the time of warranty service. **PROOF OF PURCHASE ON UNREGISTERED EQUIPMENT IS NOT SUFFICIENT FOR RECEIVING IN-WARRANTY SERVICE.** In the event you do not receive your validation sticker within 60 days of mailing, you are to notify **sunn** ELECTRONICS in writing immediately. The purchaser has the sole responsibility of completing and mailing the warranty application.

sunn products that have been subject to accident, alteration, abuse, rental or defacing of the serial number are not covered by this warranty. Loudspeakers and drivers misuse due to overpowering or improper installation resulting in torn, burned or charred components will not be covered by this warranty.

The normal wear and tear of appearance items such as handles, corners, casters and knobs are not covered under this warranty.

If your **sunn** product requires service during the warranty period, **sunn** will repair or replace, at its option, defective materials provided you have identified yourself as the owner of the validated product to any **sunn** authorized service center or contact **sunn** for service assistance. **Transportation charges to and from an authorized service center or factory for SUNN products and components to effect repairs shall be the responsibility of the owner. In the event a product is to be returned to SUNN for repairs, a written return authorization from SUNN must be obtained prior to shipping.**

sunn is not liable for any incidental or consequential damages resulting from any defect or failure of this instrument other than the repair of the **sunn** product subject to the terms of this warranty. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This warranty is expressly in lieu of all other agreements and warranties, expressed or implied, except as may be otherwise required by law.