



GC400

**Dual Frequency Conscious
Noise Gate & Auto Compressor**

Operation Manual

March 2003

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The GC400 is a professional 4 channel processor with 2 channels of frequency conscious noise gating and 2 channels of auto compression. All of the processors can be used independently or linked for stereo operation. In Link mode, Channel 1 of the Compressor and Gate provides Master control.

Key Gate Features:

- 4 channels of Frequency Conscious Noise Gating
- Variable Hi and Low Pass side chain Filters
- Fully variable Threshold and Release
- Fast and Slow Attack modes
- Range switching between -20dB and -80dB
- Side chain Listen facility
- Stereo linking
- Side chain inserts

Each of the Gate channels has fully variable controls for filter Frequency, Threshold and Release. Range is switchable to provide either full muting (-80dBu) or a more subtle level of signal attenuation (-20dBu).

Two Attack modes are available; Fast or Slow and Release is manually adjustable. In-built sidechain 'auto-level-sensing' and Hold circuitry ensure that false triggering and chatter are kept to a minimum. High and Low pass filters are included and can be used for a wide range of frequency conscious gating applications. A LISTEN facility allows the filters to be easily tuned by ear. Each channel also has a sidechain insert with front panel indication when an External Key jack is plugged in.

Led indicators are provided for Above-Below Threshold, Bypass and Link.

Key Compressor Features:

- 4 channels of Auto compression
- Soft or hard knee compression slopes
- Fully variable Threshold, Ratio, Release and Gain
- Auto Attack/Release and Program Dependant Attack with manual Release modes
- Low frequency Program filter
- Stereo linking
- Side chain inserts

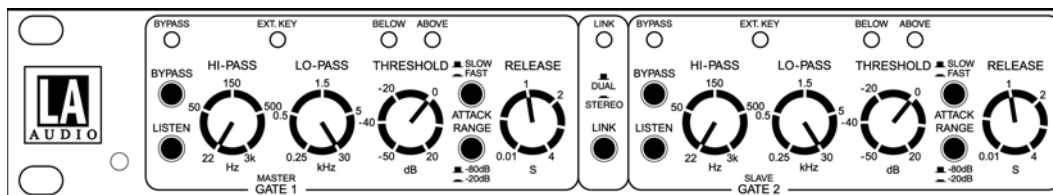
Each compressor channel has fully variable controls for Threshold, Ratio, Release and Gain. Compression slope can be switched between Hard or Soft knee, with Hard knee providing tight control of compression Ratio and Soft knee a more progressive style of compression.

Two Attack/Release modes are available; Auto Attack/Release or Program Dependant Attack with manually adjustable Release. A low frequency Program filter can be switched into the sidechain to reduce the effects of bass heavy material causing over compression.

Each channel also has a sidechain insert on TRS jack to allow connection of external processing such as an equaliser. Gain Reduction is displayed on an 8 segment LED bargraph. The Bypass and Link switches also have led indicators.

All inputs and outputs are electronically balanced and can be switched between +4dBu and -10dBV operating levels.

2.0 DESCRIPTION OF GATE CONTROLS



2.1 **BYPASS** switch

Pressing **BYPASS** cancels gating by removing the side chain voltage from the voltage controlled amplifier (VCA). The Input-Output and level change circuitry remain in the signal path.

The **BYPASS** led lights when the compressor is Bypassed.

2.2 **LISTEN** switch

This facility allows the side chain signal to be monitored at the channel output. This is useful for tuning the side chain filters by ear.

2.3 **HI-PASS** control

This control sets the cut off frequency of the high pass filter in the side chain signal path. Side chain signals at frequencies below the cut off frequency are attenuated and so will not operate the gate.

Use this control to prevent low frequency signals, such as a miked up bass drum, opening the gate.

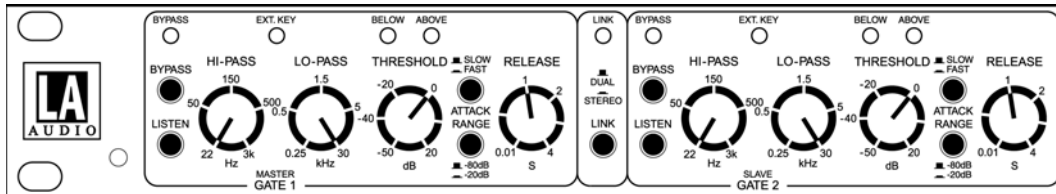
2.4 **LO-PASS** control

This control sets the cut off frequency of the low pass filter in the side chain signal path. Side chain signals at frequencies above the cut off frequency are attenuated and so will not operate the gate.

Use this control to prevent high frequency signals, such as a miked up hi-hat cymbal, opening the gate.

Please note:

The filters are always in the side chain signal path so if not required it is necessary to set the controls to their extreme frequencies to prevent them affecting the side chain signal.



2.5 EXT. KEY led

EXT. KEY lights when a jack is plugged into the Gate side chain insert on the rear of the GC400.

2.6 THRESHOLD control

THRESHOLD sets the reference level at which the gate will open and allow audio through to the output. Control range is -50dBu to +20dB.

The side chain on the GC400 has been designed with 'auto-level-sensing' and Hold circuitry to ensure that both fast transient and low frequency signals operate the gate without false triggering and/or chatter. However if the gate repeatedly opens and closes on a particular signal, reducing the THRESHOLD level can often correct this.

2.7 ABOVE-BELOW leds

These two leds indicate the relationship between the side chain signal (which is normally the same as the input signal unless the side chain insert is used) and the THRESHOLD setting.

The BELOW led indicates that the signal level is below threshold and the gate is closed. In practise, when the BELOW led lights the audio starts to fade at a rate set by the RELEASE control.

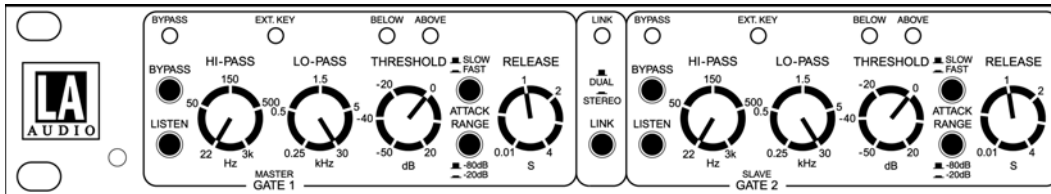
The ABOVE led indicates that signal levels are above threshold and the gate is open. When the gates closes, the ABOVE led starts to fade at a rate set by the RELEASE setting.

2.8 ATTACK switch

Two switchable ATTACK rates are available on the GC400 -

SLOW provides an attack speed which is suitable for most program material without introducing transient clicks.

FAST is intended for gating percussive instruments or signals with fast attacks transients.



2.9 RANGE switch

The RANGE switch determines the amount of signal attenuation that occurs during gating. The GC400 provides for full signal muting (-80dB) or a more subtle attenuation (-20dB).

2.10 RELEASE control

RELEASE adjusts the speed at which the gates closes once the input signal level has fallen below that set by the THRESHOLD control. Control range is 10mS to 4S.

Please note:

With instruments such as bass guitars, short RELEASE times can cause the gate to chatter. If this occurs increase the release time.

2.11 LINK switch

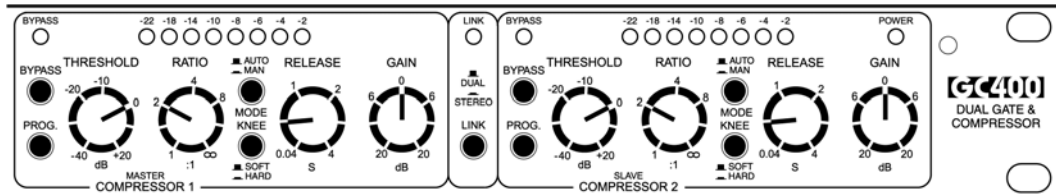
Pressing the LINK switch couples channels 1&2 for stereo operation. Channel 1 becomes the master, the controls on channel 2 are disabled.

The side chain circuitry on the GC400 uses true rms summing to ensure that the signals in both the linked channels are used to control the gate.

Please note:

The Hi-Pass and Lo-Pass controls are not linked and so the frequency settings will have to be adjusted individually on each channel.

3.0 DESCRIPTION OF COMPRESSOR CONTROLS



3.1 **BYPASS** switch

Pressing **BYPASS** cancels compression by removing the side chain voltage from the voltage controlled amplifier (VCA). The Input-Output and level change circuitry remain in the signal path.

The **BYPASS** led lights when the compressor is Bypassed.

3.2 **PROG.** switch

The **PROGRAM** switch inserts a low-cut filter into the side chain to remove the bass content of the program material which can cause over compression or pumping.

The filter response makes the side chain 6dB less sensitive at 100Hz.

3.3 **THRESHOLD** control

In **HARD** knee mode **THRESHOLD** sets the reference level above which signal compression starts. The **RATIO** control then adjusts the amount of compression applied to input signals above threshold.

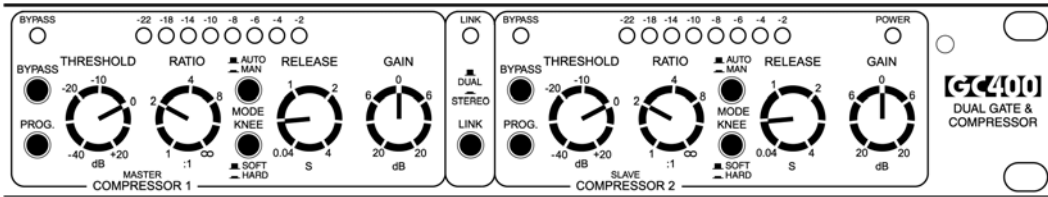
In **SOFT** knee mode, compression occurs gradually over a 10dB range of input signal level. The indicated **THRESHOLD** level is approximately in the centre of this range and the slope set by the **RATIO** control will not be reached until the signal level has increased some way above the threshold - see Fig 2.1 and 2.2.

Control range is -40dBu to +20dB.

3.4 **RATIO** control

RATIO controls how much compression is applied to an input signal once it has increased above threshold and refers to the final compression slope.

The **RATIO** markings around the control indicate how many dB the input signal must increase to cause a 1dB rise in output level. A **RATIO** of 2:1 means the input has to increase by 2dB for a 1dB change of output level. A 4:1 ratio requires a 4dB increase of input level for a 1dB change of output, etc.



A RATIO of $\infty:1$ effectively means that there is no increase in output level once the input signal has reached THRESHOLD reference i.e. limiting. The following diagrams shows the difference between HARD and SOFT knee compression at a number of different RATIOS. THRESHOLD in the diagrams is set to 0dB.

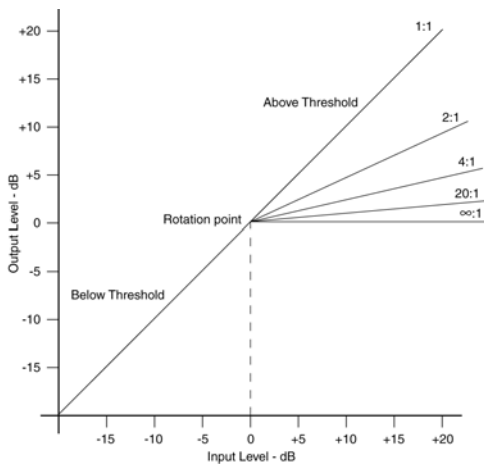


Fig 3.1: HARD knee compression

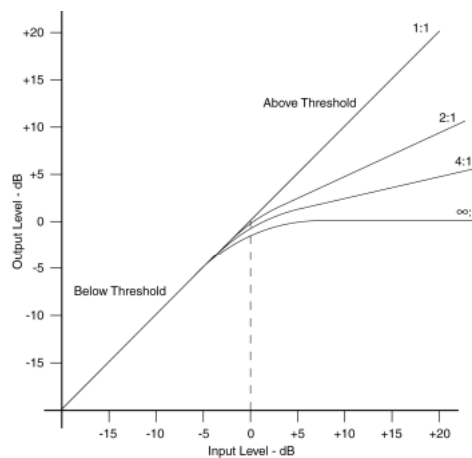


Fig 3.2: SOFT knee compression

3.5 AUTO-MAN switch

In the AUTO mode (switch out), Attack and Release times are automatically adjusted and are dependant on the dynamic content of the input signal.

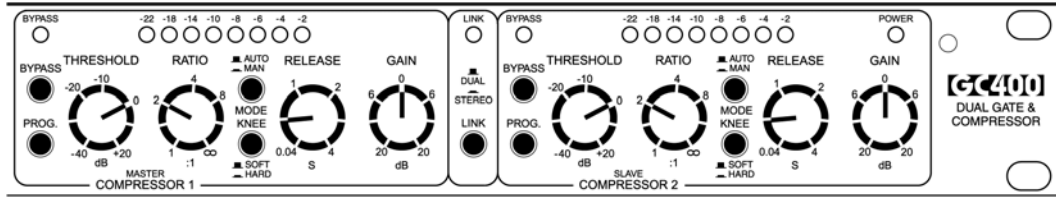
AUTO mode has been designed to work with a wide range of vocal, instrument and program sources and can therefore be used in most applications without need to adjust attack and release times.

In MAN (manual) mode (switch in) Attack becomes program dependant and the Release time is manually adjusted using the RELEASE control.

3.6 KNEE switch

Selects between HARD and SOFT knee compression curves - see Fig 3.1 and Fig 3.2.

SOFT knee gives a gradual onset of compression and can provide subtle and unobtrusive level control.



HARD knee compression provides tight control over signal levels above threshold and is useful for creative applications or where a large amount of gain reduction, such as limiting, is required.

3.7 **RELEASE** control

RELEASE is only active in MAN (manual) mode (AUTO-MAN switch in) and adjusts the release time between 40mS and 4S.

3.8 **GAIN** control

The GAIN control on the GC400 allows the output level from the compressor to be attenuated or amplified by up to 20dB. Generally used to compensate for level changes caused by the action of compression.

Please note:

As +20dB of gain can be added to the signal path it is possible to cause clipping.

3.9 **GAIN REDUCTION** display

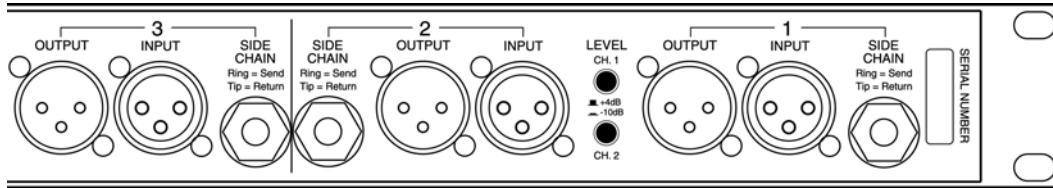
An 8 stage led bar graph meter that provides a visual indication of the amount of gain reduction being applied to the input signal.

3.10 **LINK** switch

Pressing the LINK switch couples channels 1&2 for stereo operation. Channel 1 becomes the master, the controls on channels 2 are disabled.

The side chain circuitry on the GC400 uses true rms summing to ensure that the signals in both the linked channels contribute equally to any gain reduction.

4.0 EXTERNAL CONNECTIONS



4.1 SIDECHAIN

The Side chain TRS jack allows connection of an external processor such as a parametric equaliser for more sophisticated frequency conscious gating applications. External key signals are often used for gated-reverb, rhythmic and bass enhancement effects.

The Compressor side chain insert allows connection of an external processor such as an equaliser for frequency sensitive compression e.g. de-essing.

This is an unbalanced insert with Ring wired as Send and Tip wired as Return.

Please note:

Plugging a jack into the side chain connector breaks the control signal path which must then be completed by the externally connected equipment.

4.2 INPUT

Electronically balanced Input with pin 2 wired hot (signal +).

Unbalanced operation is possible by joining pin 3 to pin 1 (signal ground) and using pin 2 as signal hot (+).

Please note:

To maintain correct signal levels in un-balanced applications, pin 3 must be joined to pin 1 and not left un-connected.

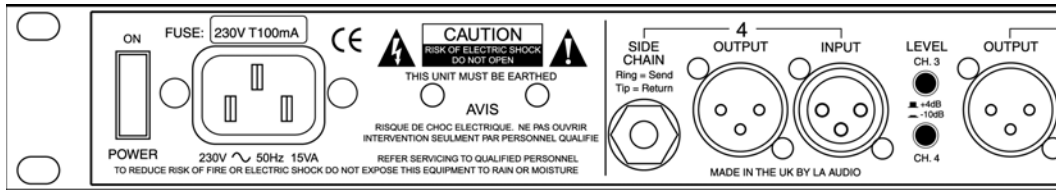
4.3 OUTPUT

Electronically balanced Output with pin 2 wired hot (signal +).

For un-balanced operation pin 3 can be joined to pin 1 i.e. pin 2 = signal hot and pins 1&3 = ground (screen).

Please note:

To maintain correct signal levels in un-balanced applications, pin 3 must be joined to pin 1 and not left un-connected.



4.4 LEVEL

These switches select the input and output operating level for each channel between +4dBu (switch out) and -10dBV (switch in).

The Side Chain insert operates at -2dBu in both +4dBu and -10dBV modes.

4.5 POWER

Mains power switch for GC400

4.6 POWER INLET

Standard IEC mains inlet for use with a detachable mains cable.

See Section 3.4 for details of power requirements and fusing.

Please note:

The mains protection fuse is inside the unit, accessed by removing the top cover. Ensure that the unit is disconnected from the mains supply before attempting to replace the fuse.

5.0 INSTALLATION

5.1 INSPECTION AND UNPACKING

The GC400 has been carefully packed at our factory in a carton designed to withstand handling in transit. Should the unit appear to have been damaged in transit, notify your dealer immediately and do not discard any of the packing. The carton should contain -

- The GC400
- Power cord - country specific, please check
- Operator Manual (this book)

5.2 OPERATING ENVIRONMENT

The GC400 is designed to operate between 0°C and 40°C (32-112°F) with relative humidity no more than 80%. Should the units be installed in an equipment rack, ensure that the ambient temperature conforms to these levels.

5.3 CE STANDARDS AND THE LOW VOLTAGE DIRECTIVE (LVD)

The GC400 has been designed to comply with the latest Electromagnetic Compatibility (EMC) regulations. However we recommend you do not operate the unit close to strong emitters of electromagnetic radiation such as power transformers, motors, mobile telephones or radio transmitters.

The unit should only be connected to a power supply of the type described in 4.4 POWER REQUIREMENTS or as marked on the unit. Disconnect the mains supply before removing any cover.

5.4 POWER REQUIREMENTS

The GC400 is factory configured for either 230V 50Hz ac or 115V 60Hz ac mains operation. Please refer to the following diagram which shows the transformer connections for 230V and 115V –



The rating of the rear panel fuse is shown on the cover -

230V
T125mA

115V
T250mA

All are slow blow type

Please note:

If the fuse requires changing at any time please ensure the correct type is fitted. An incorrect fuse could cause damage to the unit and may constitute a fire hazard.

The detachable IEC mains lead connections to the appliance are coloured in accordance with the following code:

Green-and-Yellow	Earth
Blue	Neutral
Brown	Live

WARNING: THIS APPLIANCE MUST BE EARTHED

Please note:

A protective earth connection, made by way of the earth conductor in the power cord, is essential for safe operation.

6.0 WARRANTY

Your LA Audio GC400 has been manufactured to a high standard using quality components. If correctly installed and operated the unit should give years of problem free operation.

However in the event of a defect in material or workmanship causing failure of the unit within 1 year of the date of original purchase we will agree to repair, or at our discretion replace, any defective item without charge for labour or parts. To receive service under this warranty it is necessary to return the unit to an LA Audio authorised service centre or to the factory with a dated receipt as proof of purchase. After repair the unit will be returned to you free of charge.

Limitations:

This warranty does not cover damage resulting from accident or misuse. The warranty is void unless repairs are carried out by an authorised service centre. The warranty is void if the unit has been modified other than at the manufacturers instruction. The warranty does not cover components which have a limited life, and which are expected to be periodically replaced for optimal performance. We do not warrant that the unit shall operate in any way other than as described in this manual.

7.0 TECHNICAL SPECIFICATIONS

ELECTRICAL

Gate sections:

Frequency response:	20Hz to 20kHz (+0, -0.5dB)
Input Impedance:	20k balanced
Maximum Input Level:	+20dBu
Input-Output Level:	+4dBu or -10dBV
Output Impedance:	100R balanced
Max. Output Level:	+20dBu
THD:	< 0.05% (1kHz, +4dBu)
Signal to Noise Ratio:	> 90dB, +4dBu out, 22Hz- 22kHz
Threshold:	-50dB to +20dB
Range:	-80dB or -20dB
Attack:	Fast: 50uS Slow: 1mS
Release:	10ms to 4s - variable
High Pass Filter:	22Hz to 3kHz
Low Pass Filter:	250Hz to 30kHz

Compressor sections:

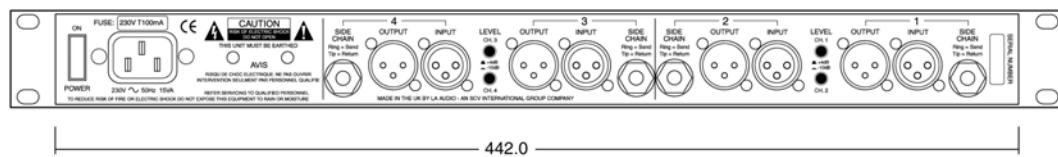
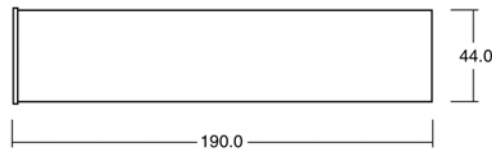
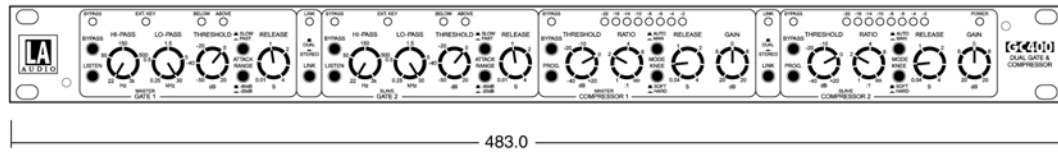
Frequency response:	20Hz to 20kHz (+0, -0.5dB)
Input Impedance:	20k balanced
Maximum Input Level:	+20dBu
Input-Output Level:	+4dBu or -10dBV
Output Impedance:	100R balanced
Max. Output Level:	+20dBu
THD:	< 0.05% (1kHz, +4dBu)
Signal to Noise Ratio:	> 90dB, +4dBu out, 22Hz- 22kHz
Threshold:	-40dB to +20dB
Ratio:	1:1 to >20:1
Knee:	Hard or Soft knee
Attack:	Auto Attack/Release or program dependant
Release:	40ms to 4s - manual mode
Program Filter:	-6dB @ 100Hz
Gain:	-20dB to +20dB

Power Requirement: 15VA, 115/230V AC, 50/60Hz

PHYSICAL

Input Connectors:	XLR 3 pin (Pin 2 hot)
Output Connectors:	XLR 3 pin (Pin 2 hot)
Power Connection:	IEC 3 pin socket, Detachable lead
Dimensions (mm):	482 (19") W 164 (6.5") D 44 (1.75") H
Weight:	2.9 kg, 6lbs
Shipping Weight:	3.6kg, 8lbs
Temperature Range:	Operating 0°C to 50°C Storage -30°C to 75°C

8.0 DIMENSIONS



In keeping with our policy of continuous improvement LA Audio reserves the right to alter specifications without prior notice.

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