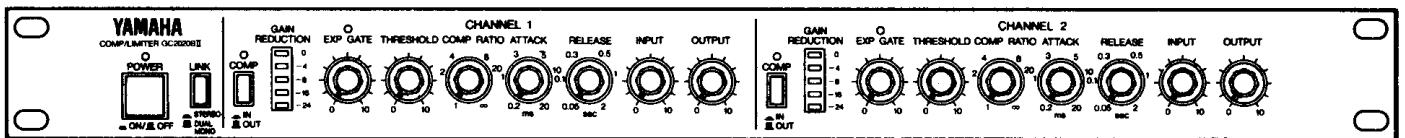


YAMAHA

2-Channel Compressor/Limiter Compresseur/limiteur 2 voies 2-Kanal Kompressor/Limiter

GC2020BII

Operating Manual
Mode d'emploi
Bedienungsanleitung



Congratulations on your purchase of a Yamaha GC2020BII 2-Channel Compressor/Limiter.

The GC2020BII is a high-performance 2-channel compressor/limiter that can be effectively used in recording, sound reinforcement, and other production applications. The GC2020BII offers a wide variety of control features for precise tailoring of compression and limiting parameters, and it also features an expander type noise gate in each channel for effective noise reduction. Further, the GC2020BII offers all this with exceptionally high audio quality – full 20Hz to 20kHz frequency response and no more than 0.05% total harmonic distortion.

To ensure that your GC2020BII gives you optimum performance, be sure to read this manual thoroughly before attempting to operate the unit.

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IMPORTANT NOTICE FOR THE UNITED KINGDOM

Connecting the Plug and Cord

IMPORTANT. The wires in this mains lead are coloured in accordance with the following code:

BLUE : NEUTRAL

BROWN : LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

PRECAUTIONS

- Avoid placing the unit in locations exposed to direct sunlight or high temperatures, excessively high or low humidity, high dust concentration, or vibration.
- Be sure to connect to an AC power supply that meets the power supply specifications listed on the rear of the unit.
- If there is any danger of lightning occurring nearby, remove the power plug from the wall socket in advance.
- To avoid damaging your speakers and other playback equipment, turn off the power of all related equipment before making connections.
- Do not use excessive force in handling control switches and knobs.
- To avoid broken cords and short circuits, be sure to unplug all connectors by grasping the respective plugs— NOT the cords.
- Remove the power plug from the AC mains socket if the unit is not to be used for an extended period of time.
- Remove all plugs and connections if the unit is to be transported, to prevent damage to the cords and jacks.
- Do not use solvents such as benzene or paint thinner to clean the unit. Do not use insecticides or other pressurized spray products in proximity to the unit. Wipe off the exterior with soft cloth.
- The XLR (Cannon) type Input and Output connectors are wired in the following configuration: Pin 1: GROUND. Pin 2: HOT. Pin 3: COLD. Ensure that all equipment connected to the GC2020BII matches this wiring.

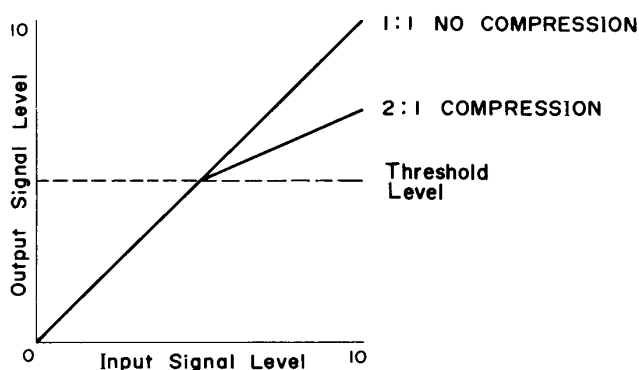
COMPRESSION AND LIMITING

The GC2020BII is capable of performing both compression and limiting functions. Though both compression and limiting work on basically the same principle, the actual effect is quite different.

COMPRESSION

Generally, a compressor is used to fit a large signal into a small space. Specifically, in a situation where the dynamic range of the original audio signal is larger than the electronic reproduction equipment which is to process it can handle, a compressor can reduce the dynamic range of the signal to fit neatly within the limits of the recording or reproduction equipment. Of course, this must be done without adding distortion to the signal itself.

Compression is expressed in terms of a ratio—the compression ratio. This ratio describes how much the signal appearing at the output of the compressor changes in relation to a given change in the level of the original signal applied to the input. If no compression is applied and the input signal doubles in level, then the output signal will also double in level, precisely following the change in the input signal. This corresponds to a compression ratio of 1:1 (read “one to one”)—a change of 1 at the input produces a change of 1 at the output—i.e. no compression. Now if we apply some compression, a smaller change in the level of the output signal will be observed for the same change in input signal level. A compression ratio of 2:1, for example, would mean that the level of the output signal will change only half as much as the input signal. Expressed in decibels, a compression ratio of 20:1 would mean that a 20-dB change in the level of the input signal would result in only a 1-dB change in the level of the output signal. Thus, a compressor is able to reduce the dynamic range of an audio signal by any desired amount. (See Fig. 1)



COMPRESSION

Fig. 1

LIMITING

Limiting is basically extreme compression which is set to affect only signals above a certain level. This is particularly useful for limiting only peaks which exceed the handling capacity of the related equipment, without affecting the rest of the signal. (See Fig. 2)

Suppose we wanted to limit the peak levels in a program to a maximum of 0 dBm, in order to prevent saturation and distortion in a tape recorder. First we would set the “threshold” level to 0 dB—the threshold level is the input signal level at which the limiter will begin to operate. Then we would set the maximum (or near maximum) compression available—∞:1 (infinity compression). Infinity compression means that absolutely no change in the output level will occur no matter how much the input signal changes. As a result, all signal content below the threshold level (0 dB) will be passed exactly as it appears at the limiters input. Signals exceeding the threshold level, however, will be output at the threshold level and will rise no higher. In this case no signal exceeding 0 dB will appear at the limiter’s output. The actual audio signal remains untouched, just its average (r.m.s.) level is kept within the defined limits.

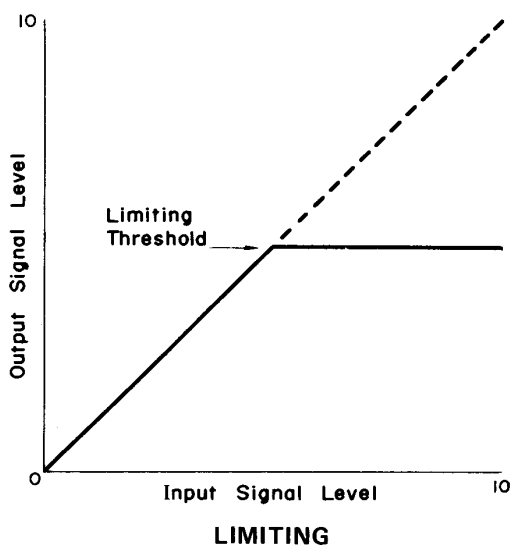
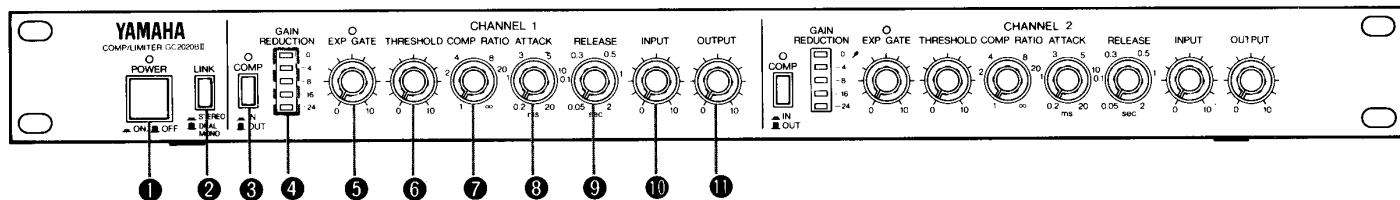


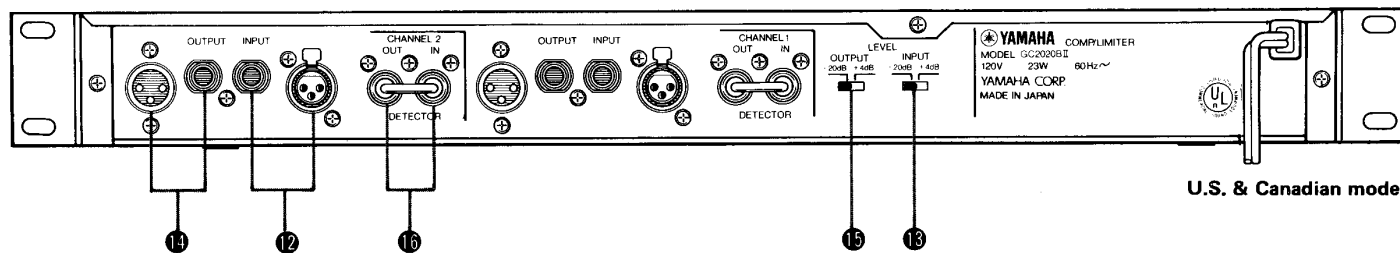
Fig. 2

CONTROLS & CONNECTIONS

• FRONT PANEL



• REAR PANEL



① POWER Switch

Press this switch to turn AC power to the power ON. The POWER indicator lamp located above the POWER switch will light to indicate that power is ON. Press a second time to turn power OFF.

Since the GC2020BII inputs and 3-pin outputs are electronically balanced, no signal is delivered to the outputs when the power is OFF.

② LINK Switch

This switch determines whether the GC2020BII functions in the DUAL MONO or STEREO mode.

DUAL MONO Mode: This is the normal operation mode in which CHANNEL 1 and CHANNEL 2 function independently – the GC2020BII can be thought of as two separate compressor/limiter units. In this mode, two completely different signals can be processed using independent compression or limiting characteristics.

STEREO Mode: In this mode channels 1 and 2 are “linked” together so that both channels operate simultaneously. The control parameters of the two channels are linked in the following way:

- * The lowest EXP GATE level and the highest THRESHOLD level set apply to both channels.

- * The shortest ATTACK time and RELEASE time set apply to both channels.

- * If a channel’s COMP switch is set to the out () position, that channel will not be linked.

- ** The INPUT and COMP RATIO controls for both channels must be set to the same value when the STEREO mode is used. Compression and/or limiting occurs simultaneously in both channels in response to the input signal in either channel. This mode is particularly useful in processing a stereo program, thereby keeping the overall level of the entire program uniform. If the channels were to function independently when processing a stereo program, different compression parameters in the two channels would play havoc with stereo imaging, resulting in an unnatural sound.

③ COMP IN/OUT Switch and LED Indicator

This switch either activates or bypasses the compressor/limiter circuitry. When IN, the compressor/limiter circuitry is on, and when OUT, the compressor/limiter circuitry is completely bypassed, so the signal applied to the input terminals is sent directly to the corresponding output terminals. The COMP LED indicator located above the COMP switch lights when the compressor circuitry is IN.

④ GAIN REDUCTION Meter

This 5-segment LED meter indicates how much compression or limiting is being applied to the processed signal in terms of gain reduction in dB. The 5 LEDs indicate 0, –4, –8, –16 and –24 dB of gain reduction.

⑤ EXP GATE Control and Indicator

This function of the GC2020BII is independent from the compression and limiting functions. Each channel features an EXPANDER GATE (often called a “noise gate”) with variable threshold level which is extremely effective in eliminating background hiss and noise during no-signal portions of a program. The gate works by muting the corresponding channel when no signals above the preset threshold level are present. Normally the gate level will be set below the lowest program levels so that is “opens” to pass all program material. Hiss and noise falling below the gate level will be effectively muted. (See Fig. 3 and 4) The adjustable gate level range depends on the setting of the described below. With INPUT set to “0” and the rear-panel INPUT LEVEL switch **13** set to “–20 dB,” the gate threshold level can be varied between –24 and –64 dB; with INPUT at its center position gate level can be varied between –49 and –89 dB; and with INPUT at “10” the gate level can be varied between –64 and –104 dB. With the INPUT LEVEL switch set to “+4 dB,” the gate level ranges are as follows: INPUT “0”, 0 to –40 dB; INPUT center, –25 to –65 dB; INPUT “10”, –40 to –80 dB.

The EXP GATE LED indicator located above the EXP GATE control lights when the gate is open. Rotating the EXP GATE control fully counter-clockwise disengages the gate function.

To set the EXP GATE, start with the control set at "0" and the source connected, but with no signal applied. Monitor the output from the appropriate channel of the GC2020BII at a level high enough that you can hear any hiss and noise in the system. Gradually rotate the EXP GATE control until you hear the noise suddenly stop, then rotate a few degrees more. Now listen to the source program through the gate to check that the gate is not unnaturally cutting off the lower-level program signals. If the gate "chatters"—produces a buzzing sound—on program signals near the gate level, the gate level should be reduced until this problem disappears.

• **EXP GATE Function**

INPUT SIGNAL

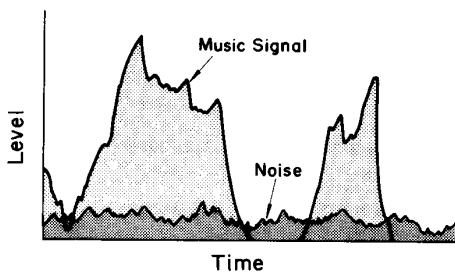


Fig. 3

OUTPUT SIGNAL

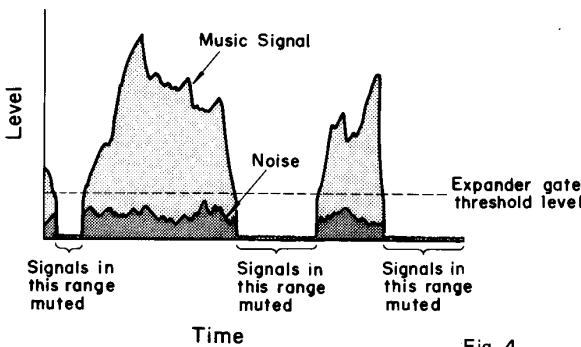


Fig. 4

⑥ **THRESHOLD Control**

This control determines the signal level at which compression/limiting begins. The THRESHOLD control range depends on the settings of the INPUT level control and rear-panel INPUT LEVEL switch, described below. In the INPUT level control is set to "0" and the INPUT LEVEL switch is set at "-20 dB," the THRESHOLD range is from -4 to -19dB; when INPUT is set at its center position the THRESHOLD range is from -4 to -44 dB; and when INPUT is set to "10" the range is from -19 to -59 dB. With the INPUT LEVEL switch set to "+4 dB," the THRESHOLD ranges are as follows: INPUT "0", +20 to +5 dB; INPUT center, +20 to -20 dB; INPUT "10", +5 to -35 dB.

All signals below the set threshold level will be passed as received at the input terminals, with no compression/limiting applied, while signals falling above the set threshold level will be compressed/limited according to the settings of the COMP RATIO, ATTACK and RELEASE controls described below. The more the THRESHOLD control is rotated clockwise—towards "10" on the scale, the smaller the signal peaks that will be affected by compression/limiting.

THRESHOLD RANGE

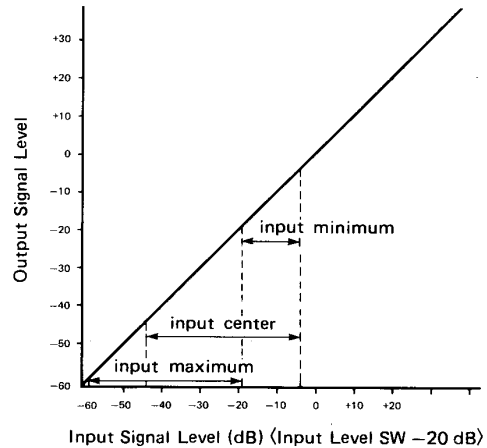


Fig. 5

⑦ **COMP RATIO Control**

This control determines the compression ratio applied to the processed signal above the threshold level set by the THRESHOLD control. The compression ratio is expressed in terms of the amount of change in the level of the input signal in relation to the corresponding amount of change in the level of the output signal. A compression ratio of 1:1, therefore, implies no compression—a change of "1" in the level of the input signal produces a corresponding change of "1" in the level of the output signal. A compression ratio of 2:1, however, means that for a given change in the level of the input signal ("2") the level of the output signal will only change half as much ("1"). The extreme would be a compression ratio of ∞:1 (infinity: one), meaning that no matter how much the input signal level changes the output signal level will remain constant. The ∞:1 compression ratio is most commonly used in hard limiting applications where the signal level must be prevented from exceeding a specific value (frequently 0 dB). Extremely high compression ratios in the range of 20:1 can add sustain to instrument sounds—especially electric guitar and bass—as well as creating a contemporary drum sound. Lower compression ratios—from less than 2:1 to 8:1—are useful for making vocals sound smoother and minimizing the level variations that occur when a speaker or singer moves closer to or further away from a microphone. (See Fig. 6)

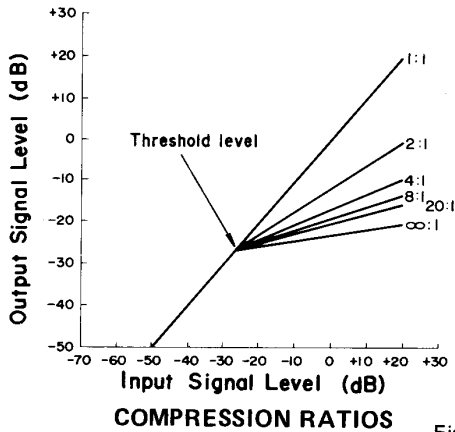


Fig. 6

8 ATTACK Time Control

This control determines how long it takes—in milliseconds—before the full amount of compression is applied once threshold level is exceeded. The ATTACK time range is from 0.2 milliseconds, a very fast attack, to a relatively slow 20 milliseconds. (See Fig. 7)

The attack time setting will depend largely on the type of signal being processed and the type of effect desired. A very fast attack, for example, will compress the initial attack of an instrumental note making it sound “flat”. High levels of compression are sometimes used on electric guitar, for example, to give the sound greater sustain. In this application it is often better to set a longer attack time so that the crisp attack of the guitar note “gets through” before full compression is applied. Set the attack time to accommodate the natural attack of the sound being processed.

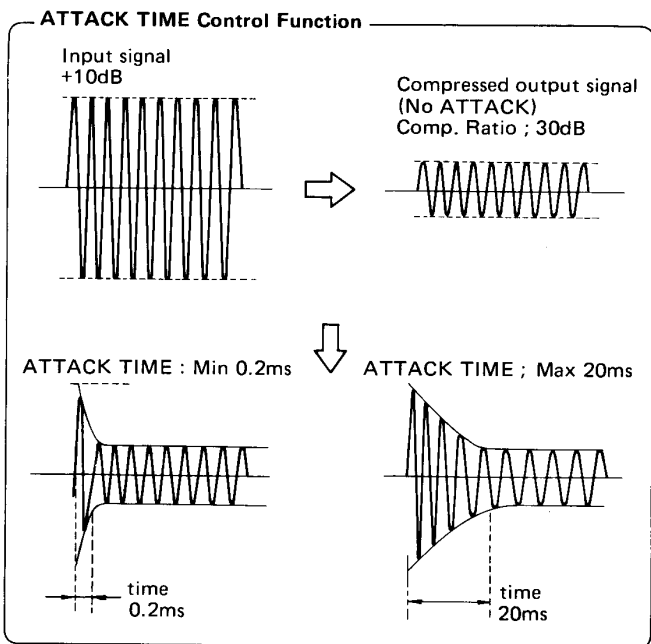


Fig. 7

9 RELEASE Time Control

This control determines how long it takes for the amount of compression to return to zero once the audio signal falls below the threshold level. The RELEASE time range is from 50 milliseconds (0.05 seconds) to 2 seconds. Like the ATTACK control, the RELEASE control setting will depend on the type of signal being processed and the desired effect. (See Fig. 8)

The main reason for this control is that if compression stopped abruptly the instant the signal fell below threshold level there would be a corresponding abrupt and unnatural change in the level of the audio signal—particularly with musical instruments that have a long, gentle decay slope. Unless a particular effect is desired, set the RELEASE time to accommodate the signal being processed.

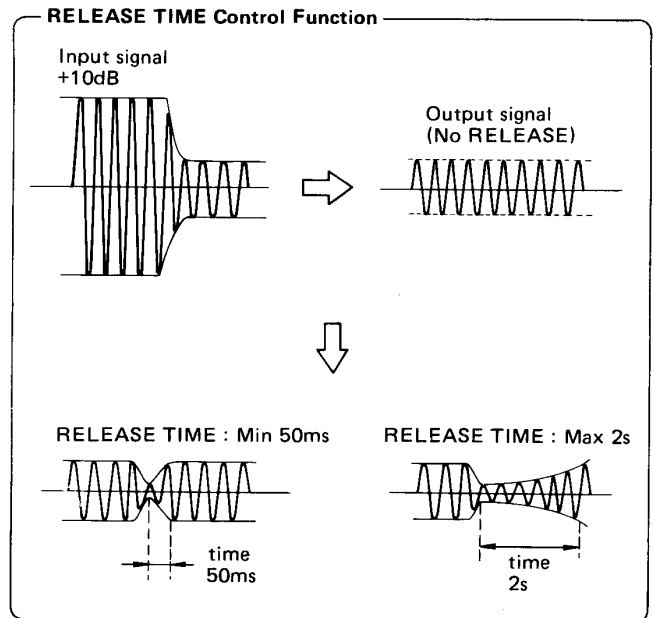


Fig. 8

10 INPUT Level Control

This control adjusts the input sensitivity of the GC2020B-II, allowing it to accept a wide range of input signal levels.

11 OUTPUT Level Control

This control sets the output level of the GC2020BII. The control range is the same as the INPUT level control.

12 INPUT Connectors

Both balanced (3-pin female XLR type connectors) and balanced (1/4" TRS phone jacks) input connectors are available. A 600 ohm line should be used for both. Use the INPUT LEVEL switch to set the rated input level to either +4 dB or -20 dB.

13 INPUT LEVEL Switch

Use this switch to set the rated nominal input level to correspond to the rated output level of the equipment to be connected.

14 OUTPUT Connectors

Both balanced (3-pin male XLR type connectors) and unbalanced (1/4" phone jacks) output connectors are available. A 600 ohm line should be used for the balanced XLR's and a 10k ohm line for the unbalanced 1/4" phone jacks. Use the OUTPUT LEVEL switch to set the rated nominal output level to either +4 or -20 dB.

15 OUTPUT LEVEL Switch

Use this switch to set the rated nominal output level to correspond to the rated input level of the equipment to be connected.

16 DETECTOR IN and OUT Jacks

The DETECTOR OUT jack delivers the output from the GC2020BII's first audio buffer stage, following the INPUT level control. This signal is normally applied to the compressor's level detector circuitry via the coupling bar plugged into the DETECTOR IN and OUT jacks, triggering and controlling the amount of compression applied to the audio input signal. The DETECTOR IN jack is the

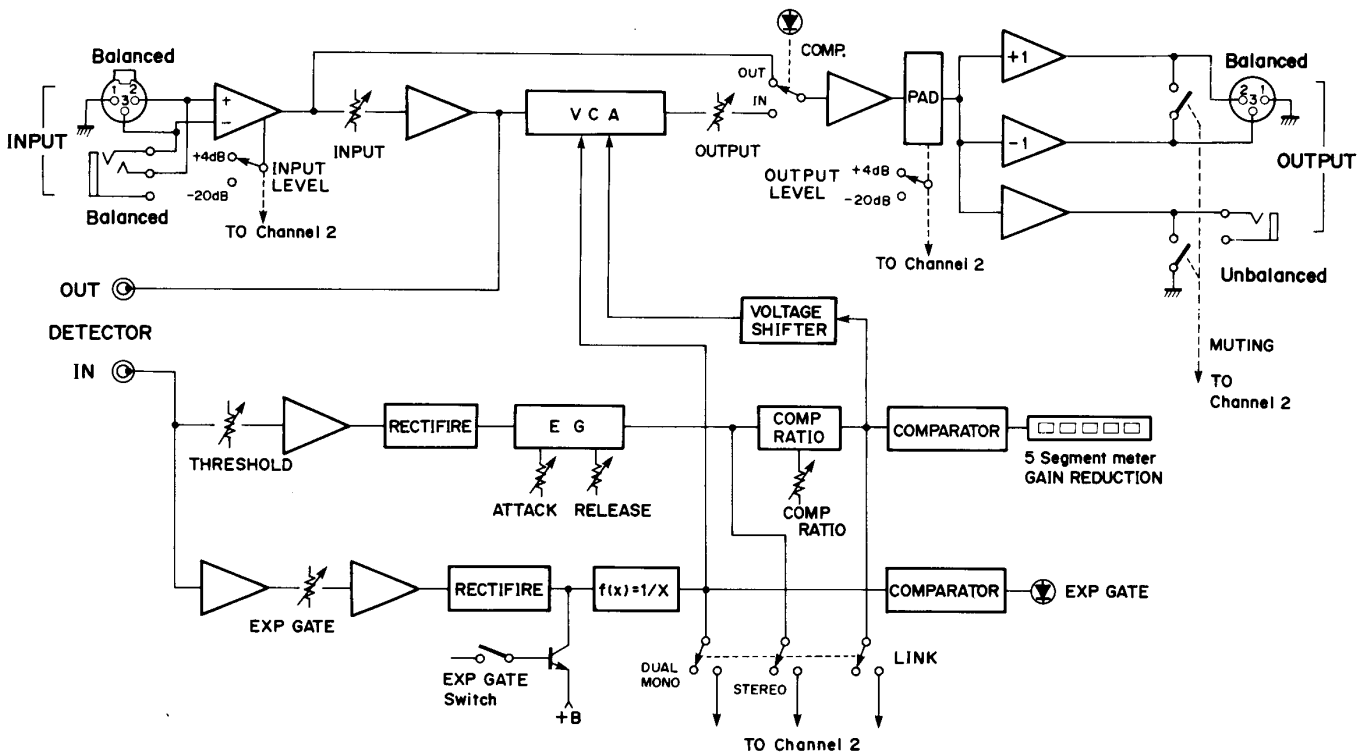
input to the compressor's level detector circuitry. The output from the GC2020BII's first audio buffer stage is usually applied here via the coupling bar inserted in the DETECTOR IN and OUT jacks.

This feature makes it possible to control the gain of either of the GC2020BII channels with an external audio signal other than that applied to the GC2020BII inputs.

One application for this feature is to remove the coupling bars from both channels and connect the DETECTOR OUT jack on channel 1 to the DETECTOR IN jack on channel 2. With this setup, channel 2 will respond to the input signal applied to channel 1, while channel 1 will be affected neither by its own signal nor the signal applied to channel 2. This setup is ideal for automatic gain riding or "ducking" for a narrator or disc jockey. The amplified signal from the DJ's microphone is applied to channel 1, and the music source is applied to channel 2—thus, the gain of the channel 2 signal will be controlled by the level of the channel 1 signal. The compression ratio of channel 2 is set so that whenever the DJ or narrator talks, the gain of the music signal in channel 2 is reduced just enough to allow the voice to be heard clearly.

Please insert the supplied shorting bars into the GC2020BII DETECTOR IN and OUT terminals when these terminals are not being used externally.

BLOCK DIAGRAM



GENERAL SPECIFICATIONS

Frequency Response	0 ⁺¹ ₋₃ dB 20Hz ~ 20kHz @ +4dB
Total Harmonic Distortion	Less than 0.05% @ +4dB 20Hz ~ 20kHz
Hum & Noise (Rs = 150Ω)	-85dB (12.7kHz 6dB/oct LPF Weighted, Average) -83dB (DIN AUDIO Weighted, Average) -87dB (IHF-A Weighted, Average)
Maximum Voltage Gain	+24dB (Input Level SW at -20dB) (Output Level SW at +4dB)
Compression Ratio	1 : 1 ~ 1 : ∞ (Maximum limiting 32dB)
Compressor/Limiter Threshold Level	+20 ~ -35dB (Input Level SW at +4dB) (Input Control at 0 : : +20 ~ +5dB) (Input Control at Center : +20 ~ -20dB) (Input Control at 10 : +5 ~ -35dB) -4 ~ -59dB (Input Level SW at -20dB) (Input Control at 0 : : -4 ~ -19dB) (Input Control at Center : -4 ~ -44dB) (Input Control at 10 : : -19 ~ -59dB)
Expander Noise Gate Threshold	0 ~ -80dB (Input Level SW at +4dB) (Input Control at 0 : : 0 ~ -40dB) (Input Control at Center : -25 ~ -65dB) (Input Control at 10 : : -40 ~ -80dB) -24 ~ -104dB (Input Level SW at -20dB) (Input Control at 0 : : -24 ~ -64dB) (Input Control at Center : -49 ~ -89dB) (Input Control at 10 : : -64 ~ -104dB)
Attack Time	0.2 msec ~ 20 msec
Release Time	50 msec ~ 2.0 sec
Indicators	Power "ON" RED Comp "ON" RED EXP Gate RED Gain Reduction RED 5 Segment LED meter

Controls (Per CH)	Input Level Control Output Level Control Exp. Gate Control (with ON/OFF SW) Comp. Ratio Attack Time Release Time Comp IN/OUT SW
Controls	Power SW Link SW (Stereo/Dual Mono) Input Level SW (+4/-20dB) Output Level SW (+4/-20dB)
Power Requirements	U.S. & Canadian model 120V AC, 60Hz General model 110V/120V/220V/240V AC, 50/60Hz
Power Consumption	U.S. & Canadian model 23W General model 19W
Dimensions (W x H x D)	480 mm x 44 mm x 235 mm (18-7/8" x 1-3/4" x 9-1/4")
Weight	3 kg (6.6 lbs)
Finish	Black semi-gloss

* All Controls are nominal setting for test.
 Input Level SW +4dB
 Output Level SW +4dB
 Link SW OFF (dual Mono)
 Input Level Control Center
 Output Level Control Center
 EXP. Gate Control Off
 Comp. Ratio 1 : 1
 Attack Time 0.2 mSec (minimum)
 Release Time 50 mSec (minimum)

* 0dB is referenced to 0.775V RMS.
 * Specifications subject to change without notice.

INPUT SPECIFICATIONS

CONNECTION	INPUT LEVEL SW	ACTUAL LOAD IMPEDANCE	FOR USE WITH NOMINAL	SENSITIVITY** (AT MAX. GAIN)	INPUT LEVEL		CONNECTOR***
					NOMINAL	MAX. BEFORE CLIP	
INPUT	+4dB	15k ohms	600 ohm LINES	+4dB (1.23V)	+4dB (1.23V)	+20dB (7.75V)	XLR-3-31 type PHONE JACK
	-20dB			-20dB (77.5mV)	-20dB (77.5mV)	-4dB (489mV)	

OUTPUT SPECIFICATIONS

CONNECTION	OUTPUT LEVEL SW	ACTUAL SOURCE IMPEDANCE	FOR USE WITH NOMINAL	OUTPUT LEVEL		CONNECTOR***
				NOMINAL	MAX. BEFORE CLIP	
OUTPUT	+4dB (1.23V)	150 ohms	600 ohm Lines	+4dB (1.23V)	+20dB (7.75V)	XLR-3-32 type
		600 ohms	10k ohm Lines		+18dB (6.16V)	PHONE JACK
	-20dB (77.5mV)	150 ohms	600 ohm Lines	-20dB (77.5mV)	-4dB (489mV)	XLR-3-32 type
		600 ohms	10k ohm Lines		-6dB (388mV)	PHONE JACK

* : In these specifications, when dB represent a specific Voltage, 0dB is referenced to 0.775V.
 ** : Sensitivity is the level required to produce an output of +4dB (1.23V).
 *** : All XLR type connectors are balanced.
 : Input Phone Jacks are balanced, Output Phone Jacks are unbalanced.

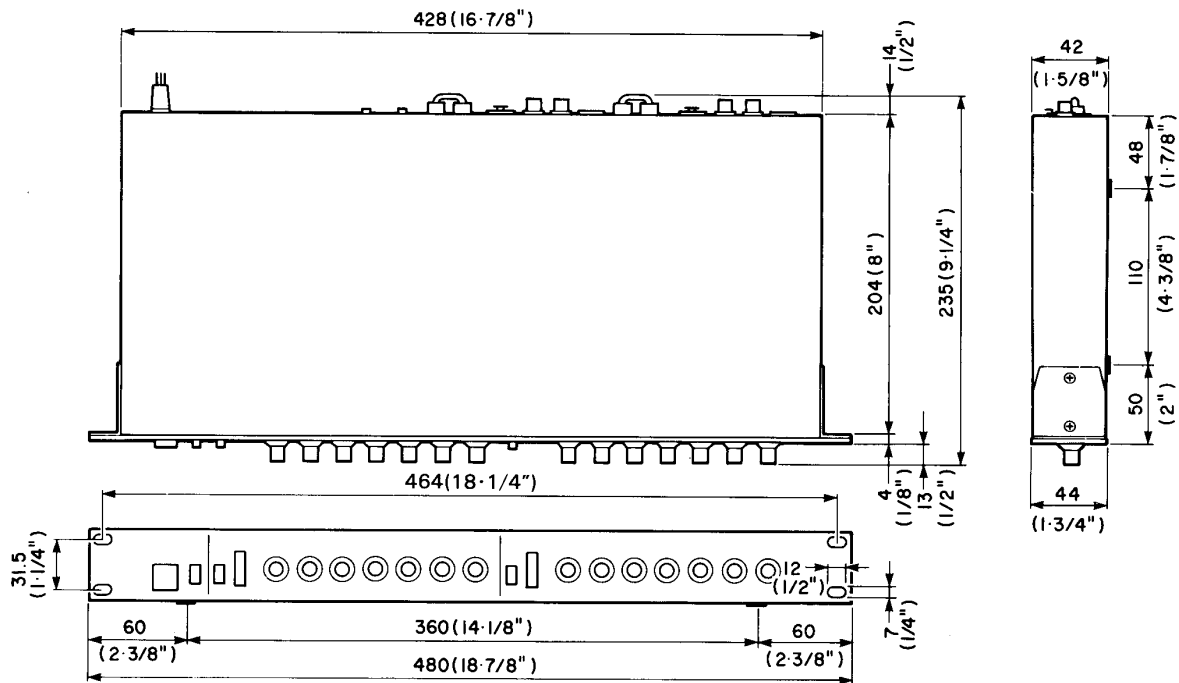
DETECTOR SPECIFICATIONS

CONNECTION	ACTUAL LOAD IMPEDANCE	FOR USE WITH NOMINAL	SENSITIVITY** (AT MAX. GAIN)	INPUT LEVEL		CONNECTOR
				NOMINAL	MAX. BEFORE CLIP	
INPUT	27k ohms	600 ohm Lines	-10dB (245mV) Lines	-10dB (245mV)	+20dB (7.75V)	RCA Pin Jack

CONNECTION	ACTUAL SOURCE IMPEDANCE	FOR USE WITH NOMINAL	OUTPUT LEVEL		CONNECTOR
			NOMINAL	MAX. BEFORE CLIP	
OUTPUT	600 ohms	10k ohm Lines	-10dB (245mV)	+20dB (7.75V)	RCA Pin Jack

* : 0dB is referenced to 0.775V.
 ** : Sensitivity is the level required to produce an output of +4dB (1.23V).

DIMENSIONS DIMENSIONS ABMESSUNGEN



Units : mm (Inch)
 Unités : mm (pouce)
 Einheiten : mm (Zoll)

YAMAHA

SERVICE

The GC2020BII are supported by Yamaha's worldwide network of factory trained and qualified dealer service personnel. In the event of a problem, contact your nearest Yamaha dealer.

SERVICE

Le GC2020BII bénéficie du réseau mondial Yamaha des revendeurs et des techniciens d'entretien spécialisés et formés en usine. Dans l'éventualité d'un problème, adressez-vous au revendeur Yamaha le plus proche.

KUNDENDIENST

Yamaha's weltweit verbreitete, fabrikgeschulte und qualifizierte Verkaufs-Kundendienstpersonal ist mit dem GC2020BII bestens vertraut. Im Falle eines Problems, treten Sie mit Ihrer nächsten Yamaha-Zweigstelle in Verbindung.

YAMAHA CORPORATION
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