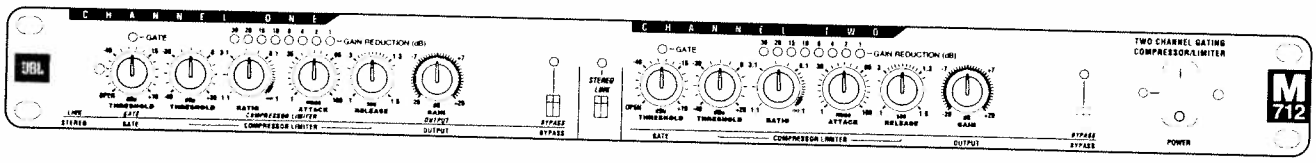
M712 Two Channel Gating Compressor/Limiter

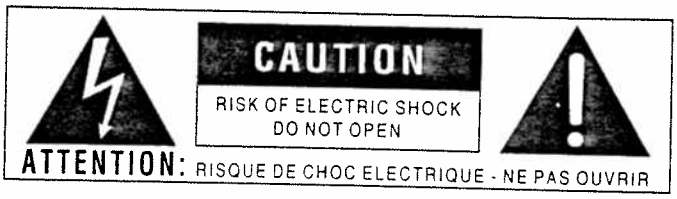
Owner's Manual



Safety Precautions

IMPORTANT!

FOR YOUR PROTECTION, PLEASE READ THE FOLLOWING:



The symbols shown above are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowhead symbol within an equilateral triangle warns that there are hazardous voltages and the risk of electric shock within the unit. The exclamation point within an equilateral triangle alerts the user to refer to important information in the user manual.

THESE SYMBOLS ARE A WARNING THAT THERE ARE NO USER SERVICEABLE PARTS INSIDE THIS EQUIPMENT AND THAT THERE ARE HAZARDOUS VOLTAGES PRESENT.

DO NOT OPEN THIS EQUIPMENT YOURSELF. REFER ALL SERVICING TO QUALIFIED PERSONNEL. DO NOT MAKE ANY INTERNAL ADJUSTMENTS OR ADDITIONS TO THIS EQUIPMENT AT ANY TIME. DO NOT TAMPER WITH THE INTERNAL ELECTRONICS.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE A SHOCK HAZARD AND MAY VOID WARRANTY SERVICE TO THIS EQUIPMENT.

This equipment should be operated only at the voltage indicated on the rear panel. Replace the fuse only with the same type and rating as indicated on the top panel.

This equipment must be grounded for correct operation. Do not defeat the safety ground by using a ground lift adapter or by physically removing the ground prong from the plug.

The power cord should be routed so that it cannot be walked upon or pinched by items placed upon or against it. The power cord should be unplugged from the outlet when the equipment is to be unused for a long period of time.

This equipment should be located away from heat sources and should be properly ventilated.

Do not expose this equipment to rain or moisture.

Table of Contents

Introduction

Product Description

The JBL M712 Two Channel Gating Compressor/Limiter combines smooth, soft-knee compression and limiting with a transparent, easy-to-use noise gate.

Each channel has controls for: Gate threshold; Compressor threshold, ratio, attack and release controls, adjustable over a wide range. An eight segment LED meter indicates gain reduction from 1 to 30 dB and an LED which indicates when the gate is closed. Each gate can be independently bypassed by the threshold control setting. Individual switches control "hardwire" by-pass on each channel. Signal flow is maintained in the event of a power loss. A stereo link switch allows common control of stereo signals.

The M712 has been designed for optimum operation. Extremely short signal paths using only two low-noise operational amplifiers and a low-noise VCA, factory trimmed to remove distortion, make the M712 transparent to the signal when the gate is open. DC control voltages are used for all functions so the audio signal does not pass through the front panel controls, but remains near the input and output jacks. Input noise is substantially reduced by balanced differential input circuits and RFI filters. All outputs are electronically servo-balanced and maintain a constant level into balanced or unbalanced loads.

Feed-forward design techniques, used for gain control of the audio signal help eliminate signal overshoot and deliver accurate transient response.

The rear panel connectors include balanced XLR and ¼" TRS input and output connectors for the audio signals. Side Chain inputs and outputs allow external access to the M712 detector circuits or processing of the side chain signal.

A two-terminal barrier strip allows optional separation of signal and chassis grounds.

Other features include:

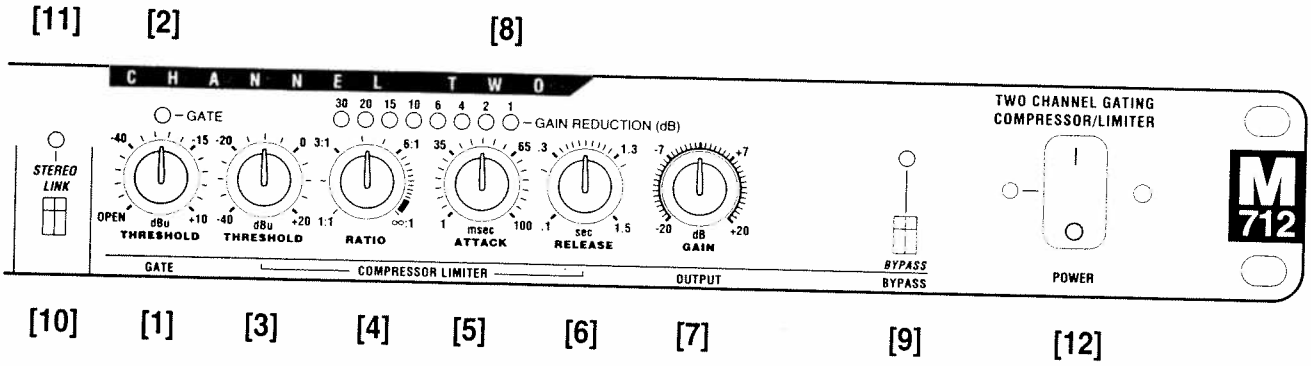
A toroidal power transformer minimizes AC hum radiation.

Luminous pointer knobs and high-contrast yellow and white on black markings aid setup in low light situations.

The M712 is housed in an industry standard, 1U, EIA, 19" rack-mount chassis.

An optional security cover may be installed to protect the front panel control settings.

Front Panel



Channels One and Two are identical.

GATE CONTROLS

[1] THRESHOLD Determines the signal level below which the gate begins to close.

[2] GATE LED Indicates that the signal is below the gate threshold (the gate is closing or is closed).

COMPRESSOR LIMITER CONTROLS

[3] THRESHOLD Determines the level at which compression occurs when the input signal increases to this threshold level.

[4] RATIO Adjusts the ratio of the change in input level in dB to the change in output level in dB.

[5] ATTACK Sets the time taken by the compressor to react to the input signal, once the signal level reaches the set threshold.

[6] RELEASE Sets the time taken for the compressor to return to unity gain as the signal falls below the threshold level.

[7] OUTPUT GAIN ±20 dB of gain for level matching.

[8] GAIN REDUCTION LEDs Indicate the amount of gain reduction caused by the compressor. This is the difference in dB between the input signal and the compressor output.

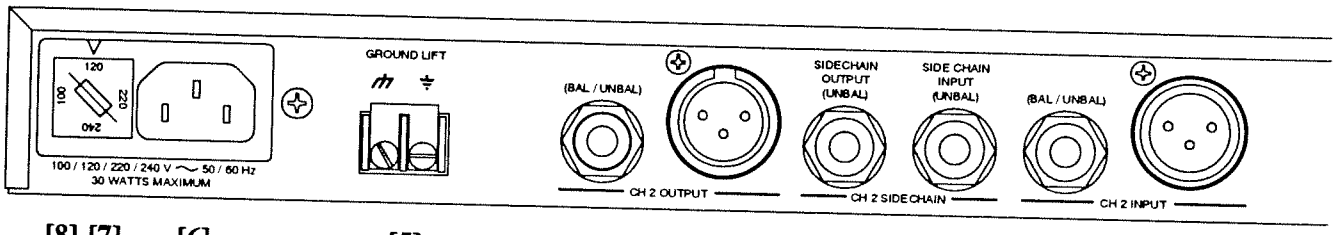
[9] BYPASS SWITCH +LED Directly connects the input to the output, bypassing all active circuitry, even when the power is off. LED indicates when a channel is bypassed.

[10] STEREO LINK SWITCH Links Channels One and Two together for stereo operation. Channel One's controls affect both channels while its gate LED and Gain reduction meter, indicate the status of both channels. All controls for Channel Two, with the exception of the bypass switch and bypass LED, become inoperative.

[11] STEREO LINK LED Yellow LED indicates that Channels One and Two are linked and that the controls of Channel One (marked in Yellow italics) should be used.

[12] POWER SWITCH + LED Switches both sides of AC line, to give added protection from miswiring.

Rear Panel



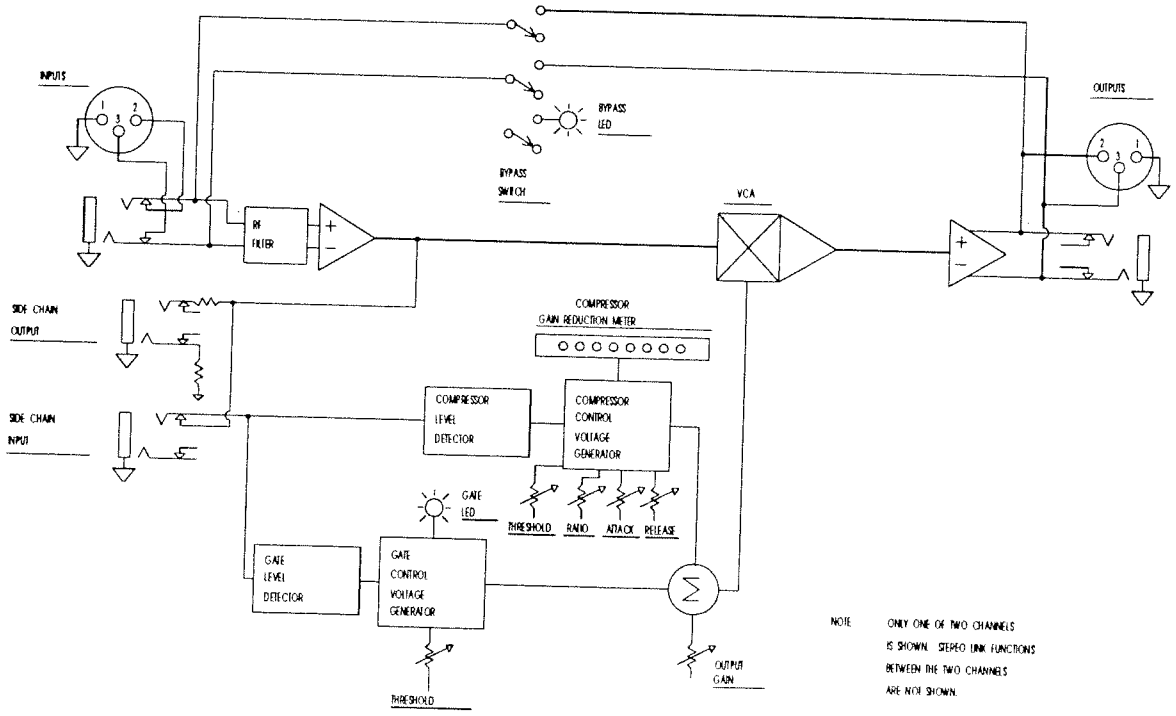
[8] [7] [6] [5] [2] [4] [3] [1]

Channel One and Channel Two's inputs and outputs are identical.

[1]	**SIGNAL INPUT**	XLR and ¼" TRS connectors feed electronically-balanced input.
[2]	**SIGNAL OUTPUT**	XLR and ¼" TRS connectors. Servo-balanced output maintains constant level into balanced or unbalanced connections.
[3]	**SIDE CHAIN INPUT**	¼" unbalanced jack for direct access to the detector circuit of the M712. Inserting a plug into this jack opens the internal side chain path so that the detector will only respond to the signal input at this jack.
[4]	**SIDE CHAIN OUTPUT**	Single-ended, impedance-balanced ¼" TRS jack. This is normally used in conjunction with the Side Chain Input jack to modify the detector signal for special applications such as de-essing, but may also be used to feed the input of the M712 to other devices since it is merely a buffered version of the input signal.
[5]	**GROUND LIFT**	Barrier-strip allows separation of audio and chassis grounds.
[6]	**AC RECEPTACLE**	accepts IEC NEMA 515P TYPE cord, included (N. America).
[7]	**VOLTAGE SELECTOR**	Allows operation on 100, 120, 220 or 240 V.
[8]	**FUSE**	**USE ONLY THE FUSE VALUE INDICATED ON THE TOP PANEL.**

Circuit Description

BLOCK DIAGRAM (Simplified)



Each channel has two signal paths: an audio path and a control path. The circuitry of the audio path is quite simple and extremely short to preserve signal integrity. Control of the audio signal is dependent upon the individual control settings and the signal feeding the detector.

The gate may be controlled in either of two ways:

1. By the level of the signal itself.
2. By a separate signal fed to the Side Chain Input jack.

Audio inputs and outputs use Balanced XLR and ¼" TRS jacks. The Input signal first passes through a filter to eliminate RFI and then to a differential amplifier which provides common mode rejection. The signal is fed to the VCA and also to the Side Chain Output and Input jacks. The side chain input and output are unbalanced ¼" TS jacks. Unless an external signal is inserted here, the audio signal also feeds the gate and compressor detectors. The Side Chain Output and Input connectors allow the side chain signal to be modified by an external processor, such as an equalizer. Alternately, an external signal may be inserted into the Side Chain Input so that the gate and compressor functions are dependent on the dynamics of the external signal instead of the audio signal.

The M712 has independent gate and compressor detectors, The detectors analyze the audio (or side chain) signal to determine its level. Each detector has a time constant which determines the time taken to detect the signal level. The time constants are optimized for gating and compressing functions. The level information from the detectors feeds their respective control voltage generators. Based on the signal level and the position of the Compressor Threshold, Ratio, Attack and Release controls, this control voltage generator controls the compression characteristic of the VCA and drives the gain reduction meter.

Also based on the signal level and the Gate Threshold setting, the Gate control voltage generator, causes the VCA to gate and turns on the indicator LED. The compressor and gate control voltages are summed with a voltage from the output gain control to control the VCA.

Unpacking and Installation

Since DC voltages are used for gain control, no audio passes through the front panel controls, and the audio signal is confined to the rear of the unit. The signal inputs are electronically balanced. The outputs are electronically servo-balanced and maintain a constant level into balanced or unbalanced loads.

For stereo applications, the channels should be linked together by engaging the stereo link switch. This maintains a stable stereo image by processing both channels identically. Without this link, a stereo image would shift from side to side if one channel were to be compressed or gated when the other was not.

In the stereo link mode, Channel One is the master channel and its knobs control both channels. Channel One's control voltage generators are connected to both channels' VCAs and all gain control functions are monitored on Channel One's LEDs. Channel Two's indicator LED's are disabled. Only the bypass switch and LED still function on Channel Two.

Additionally, both channels' detectors are linked such that when the signal level of either channel passes a threshold, both channels will react. This is not accomplished by simply summing the channels' signals, which would result in phase cancellation errors, but rather by detecting the correct level of the combined signal, which preserves stereo imaging.

UNPACKING and INSTALLATION

Thank you for purchasing this JBL compressor/limiter.

We encourage you to read and to make use of the material contained in this manual. We welcome your suggestions and comments on our products and on this manual.

Unpack the M712 and carefully inspect it for transportation damage. If any physical damage is discovered, save all of the packaging and immediately contact the dealer or distributor from whom it was purchased.

Contents of Shipping Container

The shipping carton should contain:

The JBL compressor/limiter with model number as shown on the shipping container

This instruction manual

A packet containing rack mounting hardware and Spare Fuse for 120 V operation.

AC power cord

JBL warranty card

If any items are missing, contact your dealer.

Optional Security Cover

Once the compressor/limiter is installed, adjusted, and tested, an optional security cover (JBL model SC8) may be secured to the front panel of the unit to prevent tampering with the control settings.

The cover SC8 is secured by two #6 thread cutting screws.

To install *for the first time*:

Insert the screws and turn two turns clockwise, then one turn counterclockwise to eject metal cuttings. Repeat until secure.

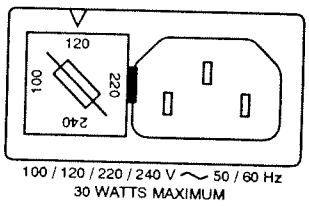
Voltage Selection and Fuse

CAUTION:

CHECK THE AC LINE VOLTAGE AT YOUR INSTALLATION AND IF NECESSARY SET THE REAR PANEL VOLTAGE SELECTOR TO THE CORRECT VOLTAGE. CONFIRM THAT A FUSE WITH THE CORRECT RATING IS INSTALLED.

IMPORTANT:

ORIENTATION OF THE FUSE HOLDER DETERMINES THE OPERATING VOLTAGE.



WARNING: REMOVE THE AC POWER CORD BEFORE REMOVING THE FUSE HOLDER

The M712 can be used with nominal power line voltages of 100, 120, 220 or 240 V, at 50 to 60 Hz. Voltage selection is accomplished by inserting the correct fuse, listed below, into the fuse block and installing the block into the IEC power connector on the back panel. Notice that the end cap on the block can be installed in four different orientations. The operating voltage is set by rotating the cap so that the supply voltage is at the top, with the triangle above, pointing to it. In the illustration above, the cap is oriented for a setting of 120 V. There is a small slot between the right side of the end cap and the line cord socket. The fuse holder is removed by inserting a small flat-bladed screwdriver under the fuse end cap into this slot and gently prying the cap outward.

Fuse Ratings:	[Size: 5 mm x 20 mm]
100 V	250 mA 250 V T type
120 V	200 mA 250 V Slow-blow
220/240 V	125 mA 250 V T type

RACK MOUNTING

Although internal circuitry susceptible to hum pickup is sufficiently shielded from moderate electromagnetic fields, avoid mounting the compressor/limiter near large power transformers or motors etc.

Install the M712 in a rack using the provided rack screws. Route the AC cord away from audio lines and plug into a convenient outlet.

Input and Output Connections

CONNECTOR WIRING

INPUT and OUTPUT CONNECTIONS

The input and output connectors are XLR and ¼" TRS. Wire mating connectors according to the tables below.

NOTE

New 1991 IEC standards for balanced wiring designate XLR Pin 2 as Positive or "Hot" with pin 3 as Negative or "Low".

The M712 conforms to these standards. Other equipment may or may not conform. Check its manufacturer's specifications.

Wiring Guide for XLR Plugs			
Balanced		Unbalanced	
Pin 2	+ / Positive	Pin 2	+ / Positive
Pin 3	- / Negative	Pin 3	Connect to Pin 1
Pin 1	Shield	Pin 1	Shield

Wiring Guide for ¼" TRS & TS Plugs					
TRS Balanced		TRS Unbalanced		TS ¼" Unbalanced	
Tip	+ / Positive	Tip	+ / Positive	Tip	+ / Positive
Ring	- / Negative	Ring	Connect to Sleeve	Sleeve	- / Negative
Sleeve	Shield	Sleeve	Shield		

Unbalanced Connection

TRS: The Sleeve may be connected to Ground if that is compatible with your grounding scheme. Alternatively, use a TS jack with Signal to the Tip and Ground to the Sleeve.

XLR: Pin 1 may be connected to Ground if that is compatible with your grounding scheme.

Servo-Balanced Outputs

All outputs are electronically Servo-Balanced and maintain a constant output level whether feeding a balanced or an unbalanced load. Without servo-balancing, when one leg of a balanced output is shorted to ground, there is a 6 dB reduction in level. The M712 output circuit uses two differential amplifiers, one for each phase, connected so that the output of each amplifier also applies 6 dB of negative feedback to the input of the other.

Then, if either leg of the output is shorted to ground by an unbalanced load, the feedback is removed from the opposite phase with the result that its level increases by 6 dB thus maintaining constant level to the load. Whether a balanced TRS or XLR, or an unbalanced TS or XLR connector is inserted, the correct level is automatically maintained.

Side Chain

The Side Chain Input and Output are unbalanced ¼" TS jacks and should be wired with Signal to the Tip and Ground to the Sleeve.

Grounding and Safety

GROUNDING

Grounding is a complex subject and is critical to obtaining optimum performance from a sound system. Good grounding practices have three goals:

Safety.

Maintenance of system integrity.

The prevention of oscillation and hum which may be caused by differing potentials within the system, RFI (Radio Frequency Interference) or Electro Magnetic Induction.

SAFETY

For safe operation, the unit must be connected to a good mechanical *safety* ground. This provides a current path for any voltage which might appear on the chassis due to an electrical fault in the unit. Without this path, the unit might be a shock hazard. In addition, a good quality ground on the chassis provides shielding from external fields and minimizes radiation of internal fields to other components.

To comply with safety regulations and to protect our customers, we provide this product with a ground connection through a three-wire power cord. The rear panel barrier strip allows the audio ground to be separated from this chassis ground to eliminate hum caused by ground loops.

The major cause of ground loops is duplicate grounding, which occurs when a component is grounded via its own AC connection and has a second path to ground through a cable shield to another component's chassis ground. These different path lengths may cause a significant potential between the **audio** ground of the signal source and the **mechanical** ground to which the unit has been connected. A voltage is developed, which induces a spurious signal - usually hum - into the signal wiring.

Attention to grounding should eliminate ground loops. See also "In Case of Difficulty".

"TELESCOPING" SHIELDS

By connecting the shield at one end only, each piece of equipment may be grounded for safety while potential ground loops are avoided. Traditionally, the connection is at the destination, so that any induced signals will flow with the signal and take the most direct path to ground. Should you prefer to lift the shields at the destination and ground them at the source, you must be consistent and follow this convention throughout the system.

TWIN CONDUCTOR CABLE - Unbalanced Sources

The M712 has differential, balanced input circuits. Balanced wiring is recommended, even with unbalanced sources - especially when running long lines. This takes advantage of the ability of a balanced input to reject signals (such as hum fields) which are induced equally into each of the signal carrying conductors (Common Mode Rejection). Also, twin-conductor, shielded cable is more reliable, since it does not depend on the shield wire itself to complete the signal connection. Stranded shield wires are more vulnerable than the protected internal wires, especially in portable installations. A broken ground connection would result in a loss of audio or a very loud hum. Using twin-conductor cable, a broken shield may only result in a slight increase in noise or hum due to the lack of shielding.

Long Cable Runs

Longer input cables should be balanced or floating to reduce susceptibility to RFI and hum. If the output of the device feeding the compressor/limiter is balanced or floating, simply use a dual-conductor shielded cable. If the source is unbalanced, an isolation transformer may be necessary at the source's output, to supply a balanced signal.

Operation

USING THE M712

Always turn on the M712 before turning on the power amplifiers.

The control knobs will luminesce after being exposed to light.

Noise gate

The main function of a noise gate is to eliminate unwanted background noise when the desired signal is not present. The difference between the noise level and the signal level must be great enough for the gate to distinguish between the two.

Alternatively, an external signal may be fed to the Side Chain Input so that the gate will be controlled by the level of that signal. For example, if a drum machine's output is used as a control signal by connecting it to the key input, the audio signal through the gate would only be allowed to pass when the drum is hit.

Noise gates are also used to "tighten up" drum sounds and to prevent signal sources from intruding on each other.

Compressor/limiter

Compressors and limiters are generally used for the following purposes:

Automatically reducing signal levels that are too great to be handled by succeeding equipment, such as signal processors, recording equipment, amplifiers, and speakers.

Controlling signal levels for special effects or other modification purposes.

Keeping signals within a given level range.

Bypassing the Individual Effects

GATE

To bypass the gate, turn the Threshold control to OPEN.

COMPRESSOR

There are two ways to bypass the compressor:

1. Set the Ratio to 1:1
2. Set the Threshold to +20 dBu

Setting the Ratio control to 1:1 is the preferred option since it is easier to reset the Ratio control to a previous setting than to reset the Threshold control, which is more sensitive.

Sample Settings

General Compression

Gate	Threshold			
	Open to -20dB			
Compressor	Threshold	Ratio	Attack	Release
	-10 to 0 dB	3:1 to 6:1	10msec.	.3 Seconds

This provides overall output compression. Suitable for use with live music, the compression is smooth and even.

Sustain/Noise Reduction

Gate	Threshold			
	-40dB to -10dB			
Compressor	Threshold	Ratio	Attack	Release
	-10 to 0 dB	1:1 to 3:1	10 msec.	1 Second

This set up reduces background noises such as hiss or hum. It is useful when a sound is sustaining and decaying to a point where the noise and signal levels are almost equal.

Pseudo Ducker

Gate	Threshold			
	Open to -20dB			
Compressor	Threshold	Ratio	Attack	Release
	-30 to -10 dB	5:1 to 6:1	1 msec.	.3 Seconds

This set up is for broadcasting purposes to "duck" crowd noise under the announcer's voice. Connect the output signal from a microphone picking up the crowd noise to Channel One. Route the signal from the announcer's microphone to its normal destination, and also to the Side Chain input of Channel One. Adjust each individual effect separately. These examples are starting points only. If the gate is reducing the signal too early, turn the threshold control down. Similarly, if the compressor is compressing too hard, turn the ratio control down, etc.

These are just sample settings. The user should determine what works best in each situation.

Theory of Operation

Functional Description

The gain-controlling functions of dynamics processors may be represented on a plot of output level vs. input level. As shown below, the input level (in dB) is plotted on the X-axis and the output level on the Y-axis. The straight diagonal line from the lower left corner to the upper right corner represents unity gain. At any point on this line, the output level equals the input level.

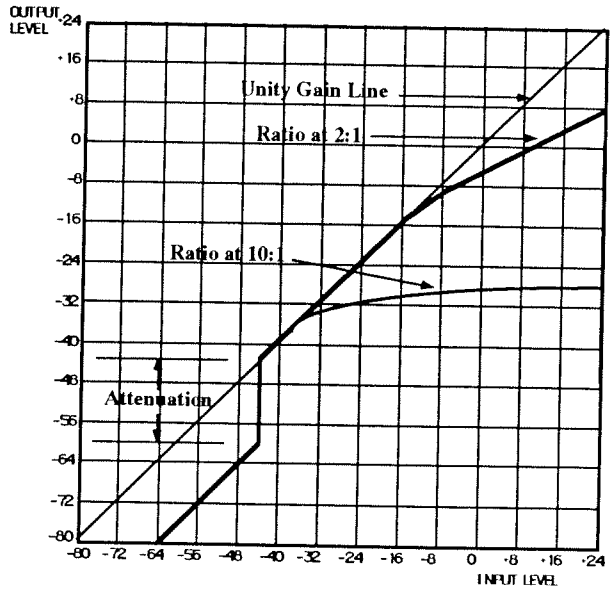


Fig. 1

The bold lines represent a deviation from unity gain caused by a dynamics processor. In Fig. 1, two plots are shown, representing gain curves of two different setups using the JBL M712. At low signal levels (up to -36 dBu), both gain curves are identical - which indicates that the Gate control settings are identical in both cases. When the input signal is above 36 dBu, the curves separate, indicating two different compressor settings.

Noise Gate: the gate does not affect the audio signal (unity gain exists) when the input signal is above the gate threshold. When the input signal drops to the gate threshold level, -44 dBu in this example, gating occurs. The amount of attenuation is preset to 54 dB in the M712. It should be noted that this attenuation does not happen immediately when the input signal drops to the gate threshold. The release time of the gate is 95 milliseconds, after a hold time of 200 milliseconds.

Compressor: Looking at the lower of the two curves, we see that the compressor threshold is set at -32 dB. When the input signal level rises above the threshold, the curves flatten out to a slope other than the 45 degree diagonal slope of the unity gain line. The ratio shown here is 10:1. For every 10 dB increase of the input signal, the output increases by only 1 dB. Compression ratios above 10:1 are normally described as limiting. Note that instead of an abrupt change in slope from the unity gain line to the 10:1 compression ratio, there is a rounded corner. This is known as a "soft knee". Soft-knee compression is more natural sounding and pleasing to the ear because there is not an abrupt change in signal dynamics when the compressor threshold is reached. In the M712, the soft knee means that compression begins gradually just below the threshold and increases gradually to full compression just above the threshold. The upper curve has a 2:1 ratio and shows the more subtle change in slope that such a ratio produces. With lower ratios, the soft knee is less apparent because there is only a minor change of slope.

Definition of terms

NOISE GATE SECTION

A **NOISE GATE** attenuates an input signal by a fixed amount whenever the signal level is below a preset threshold. In the M712, the signal is attenuated by 54dB.

THRESHOLD is defined as the level at which gating occurs. When the signal is below the threshold level the gate "closes" and the signal is attenuated. When the signal is above the threshold, the gate "opens" and allows signal to pass.

COMPRESSOR / LIMITER SECTION

THRESHOLD is the point at which compression begins. For example, if the threshold is set at -20 dB, signals below that level are not affected by the compressor. Once the input signal increases above -20 dB, the output signal will be reduced by an amount dependent on the RATIO setting and the amount that the signal is above the threshold. For COMPRESSION, the threshold is usually set quite low, so that even low level signals will activate the compression. For LIMITING, the threshold is usually set quite high, so that the dynamics of the signal are preserved, but extremely high levels are reduced to protect amplifiers, speakers or prevent tape saturation.

RATIO is the relationship between input and output level. For example, if the input signal increases by 3 dB, while the output signal increases by only 1 dB, then the compression ratio is 3:1 - Typically, **COMPRESSION** is defined as a ratio of 8:1 or less and **LIMITING** as a ratio greater than 8:1.

One problem with constant ratios, in which the ratio does not vary regardless of input level, is an abrupt or unnatural sounding compression. **SOFT KNEE Compression** eliminates this problem by making the ratio start at a very low value and gradually increase to the setting of the ratio control.

Once the signal level reaches the threshold, the time it takes for the unit to begin compressing is called the **ATTACK TIME**. Conversely, the time taken by the compressor to return to normal gain after the signal falls below the threshold level, is called the **RELEASE TIME**.

In Case of Difficulty

Symptom: No Sound

Possible Causes:

Power Off:

Check that the power indicator LED on the front panel of the compressor/limiter is lit. If it is not, confirm that the power switch is on (towards "1") and that the compressor/limiter is connected to an active AC power source.

Check that the Voltage Selector is set correctly for your AC supply and that a fuse of the correct rating is installed.

Power On, No Signal Audible:

Confirm that active audio lines are connected to the signal input(s).

Check that the threshold and attenuation controls are advanced sufficiently to allow signal to pass.

Check the Gate LED indicators to ensure the signal is not being gated.

Symptom: Weak and/or Distorted Audio

Check that a clean signal is being fed to the compressor. It is possible that the compressor/limiter is reproducing problems originating elsewhere in the audio chain.

Confirm that the input wiring is correct. If only one side of a floating audio line is connected to the input, the resultant audio will be weak and distorted, with a poor frequency response.

Check that the input line is not being loaded down by too low an impedance. This can occur if more than one terminating resistor is connected across the line, or if the same line is feeding the inputs of multiple devices without isolation, particularly if the unit feeding the line does not have a low output impedance. Confirm that the output impedance specification of the feeding device and the input impedance specifications of the device(s) connected to it are compatible.

Check by removing other devices.

Symptom: Hum and/or Buzz

Check that the grounds of the audio signal path and the chassis and power line of all units in the system are connected according to your system's grounding scheme.

Hum - Ground loop

First, separate the grounds by means of the rear panel barrier strip. Audio ground will then be isolated from the chassis and will be referenced to the signal source. The chassis ground will still be connected to mechanical *safety* ground for shock protection.

In some instances, the voltage difference between the grounds will be so great that a direct connection between grounds is not possible without hum in the output.

The use of an isolation transformer in the input signal line may allow the signal to be connected while maintaining ground isolation.

Remember, for safety you must still have a connection to chassis ground. Do not lift a safety ground or remove the ground pin from an AC power cord.

Hum - Other Possible Causes:

Check the audio at an earlier stage in the chain to confirm that the noise is not already in the input signal.

Power amplifiers have large power transformers which handle high currents, and, consequently, have significant magnetic fields surrounding them. Some low level equipment is susceptible to hum being induced from external magnetic fields. As a general rule, low level equipment should not be mounted in close proximity to power amplifiers to avoid induction of this type of hum.

Be certain that all audio wiring except for loudspeaker lines is well shielded, and that low level wiring is not run parallel to and/or in close proximity to AC power wiring, particularly high current and/or lighting lines. If the buzzing changes character or intensity when electrical lighting conditions change, the noise is being induced into the audio from the lighting equipment. It is always advisable to run lighting equipment from its own power source and the audio equipment from a separate source. The services of a qualified electrician may be required to solve such problems.

Symptom: Intermittent Audio

Check the other equipment and the wiring to make certain that the signal is not intermittent earlier in the chain and that the connectors are solidly connected to the compressor inputs and outputs.

Specifications

PERFORMANCE

Frequency Response:	<10 Hz to 50 kHz, +0/-1 dB
THD + Noise:	< 0.03%, @ +4 dBu: 20 Hz to 20 kHz, unweighted
Hum + Noise:	-94 dBu, 20 Hz to 20 kHz, unweighted
Dynamic Range:	>115 dB
Crosstalk:	Below the noise floor

INPUTS

SIGNAL INPUT	
Type:	Electronically Balanced
Connectors:	XLR + ¼" TRS (Tip, Ring, Sleeve)
Polarity:	Pin 2 + Tip "hot"
RFI Filtering:	Provided on each input
Maximum Input Level:	+24 dBu
Input Impedance	
Balanced:	33 kΩ differential
Unbalanced:	22 kΩ
SIDE CHAIN INPUT	
Type:	Unbalanced
Input Impedance:	10 kΩ
Connector:	¼" TS (Tip, Sleeve)

OUTPUTS

SIGNAL OUTPUT		
Type:	Electronically Servo-Balanced	
Connectors:	XLR + ¼" TRS	
Polarity:	Pin 2 + Tip "hot"	
Gain:	±20 dB	
Maximum Output Level	**10 kΩ load**	**600 Ω load**
Balanced:	+27 dBu	+25 dBm
Unbalanced:	+22 dBu	+20 dBm
Output Impedance		
Balanced:	102 Ω	
Unbalanced:	51 Ω	
SIDE CHAIN OUTPUT		
Differential:	200 Ω (single-ended, impedance-balanced)	
Unbalanced:	100 Ω	

NOISE GATE

Threshold:	-60 dBu (Open) to +10 dBu
Attenuation:	54 dB
Attack:	470 μsec
Hold:	200 msec
Release:	95 msec

COMPRESSOR

CONTROL RANGES	
Threshold:	-40 dBu to +20 dBu
Ratio:	1:1 to ∞:1
Attack:	1 msec to 100 msec
Release:	0.1 seconds to 1.5 seconds

AC POWER

AC Protection:	Fuse in AC receptacle (fuse size 5 mm x 20 mm)
100 V:	250 mA 250 V T type
120 V:	200 mA 250 V Slow-blow
220 / 240 V:	125 mA 250 V T type
Operating Range @120 V setting:	117 V ±11% (104 V - 130 V)

PHYSICAL

Dimensions:	19" EIA Rack Mounting, 1.75" high (45 mm) by 5.67" (145mm) deep.
Net Weight:	5.9 lbs (2.7 Kg)
Shipping Weight:	7.5 lbs (3.4 Kg)

SAFETY

Designed to comply with UL and CSA Standards

Maintenance and Warranty

CAUTION

THE FULL AC LINE VOLTAGE AS WELL AS HIGH VOLTAGE/HIGH CURRENT DC ARE PRESENT AT SEVERAL POINTS INSIDE THE CHASSIS. TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

MAINTENANCE

This JBL product is all solid state, ruggedly constructed and uses the finest components. As such it will provide years of trouble free use with normal care. All parts are conservatively rated for their application. No *special preventive maintenance is required.*

The metal and plastic surfaces of the unit may be cleaned with a damp cloth. In case of heavy dirt, a non-abrasive household cleaner such as Formula 409® or Fantastik® may be used. Do not spray the cleaner directly onto the front of the unit, as it may destroy the lubricants in the switches and controls! Spray cleaner onto a cloth and then use the cloth to clean the unit.

THERE ARE NO USER SERVICEABLE PARTS INSIDE.

REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARRANTY

This product is warranted by the manufacturer to the original USA purchaser against defects in material and workmanship for a period of two years from the date of purchase. Complete terms of the USA Limited Warranty are stated on the warranty card packed with this manual. If this product was purchased in another country, contact your JBL dealer or distributor for information on the terms of the warranty applicable in your country. We require that you retain a copy of your dated sales receipt for proof of warranty status.

USA purchasers only:

If your JBL product ever needs service, please write or telephone:

JBL Incorporated (Attn: Customer Service Department),
8500 Balboa Boulevard, P.O. Box 2200,
Northridge, CA 91329
(818 / 893-8411).

JBL may direct you to an authorized JBL Service Agency, or ask you to return your unit to the factory for repair. In either case, you will need to present the original bill of sale to establish the date of purchase. DO NOT ship your JBL product to the factory without prior authorization.

All products shipped to the factory must be accompanied by a Return Authorization (R.A.) Number and must be shipped prepaid. COD shipments will not be accepted.

Field repairs are not normally authorized during the warranty period, and repair attempts by unqualified personnel may invalidate the warranty.

Customers outside the USA should contact their local JBL Professional Products dealer or distributor for warranty assistance. Do not return products to the factory unless you have been given specific instructions to do so.

JBL Incorporated
8500 Balboa Blvd.
Northridge, California 91329 USA
A Harman International Company

Part No. 18-0415-A
(North America)