

ULTRAROC®

GX110

User's Manual

Version 1.1 June 2001

ENGLISH



BEHRINGER
INSTRUMENT AMPLIFICATION

SAFETY INSTRUCTIONS

CAUTION: To reduce the risk of electrical shock, do not remove the cover (or back). No user serviceable parts inside; refer servicing to qualified personnel.



WARNING: To reduce the risk of fire or electrical shock, do not expose this appliance to rain or moisture.



This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure – voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Read the manual.

DETAILED SAFETY INSTRUCTIONS:

All the safety and operation instructions should be read before the appliance is operated.

Retain Instructions:

The safety and operating instructions should be retained for future reference.

Heed Warnings:

All warnings on the appliance and in the operating instructions should be adhered to.

Follow instructions:

All operation and user instructions should be followed.

Water and Moisture:

The appliance should not be used near water (e.g. near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool etc.).

Ventilation:

The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa rug, or similar surface that may block the ventilation openings: or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

Heat:

The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.

Power Source:

The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

Grounding or Polarization:

Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.

Power-Cord Protection:

Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, convenience receptacles and the point where they exit from the appliance.

Cleaning:

The appliance should be cleaned only as recommended by the manufacturer.

Non-use Periods:

The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

Object and Liquid Entry:

Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

Damage Requiring Service:

The appliance should be serviced by qualified service personnel when:

- the power supply cord or the plug has been damaged; or
- Objects have fallen, or liquid has been spilled into the appliance; or
- the appliance has been exposed to rain; or
- the appliance does not appear to operate normally or exhibits a marked change in performance; or
- the appliance has been dropped, or the enclosure damaged.

Servicing:

The user should not attempt to service the appliance beyond that which is described in the Operating Instructions. All other servicing should be referred to qualified service personnel.

FOREWORD

Dear Customer,

Welcome to the team of ULTRAROC users and thank you very much for expressing your confidence in BEHRINGER products by purchasing the GX110.

It is one of my most pleasant tasks to write this letter to you, because it is the culmination of many months of hard work delivered by our engineering team to reach a very ambitious goal: To present you with a really excellent practice/backstage amp that does not only produce an out-of-the-ordinary sound but also features a revolutionary design concept. Your GX110 combines highest performance with a wealth of first-class effects. The task to design the ULTRAROC certainly meant a great deal of responsibility, which we assumed by focusing on you, the discerning user and musician. It also meant a lot of work and night shifts to accomplish this goal. But it was fun, too. Developing a product usually brings a lot of people together, and what a great feeling it is when everybody who participated in such a project can be proud of what we've achieved.

It is our philosophy to share our joy with you, because you are the most important member of the BEHRINGER family. With your highly competent suggestions for new products you've greatly contributed to shaping our company and making it successful. In return, we guarantee you uncompromising quality as well as excellent technical and audio properties at an extremely favorable price. All of this will enable you to fully unfold your creativity without being hampered by budget constraints.

We are often asked how we can make it possible to produce such high-grade devices at such unbelievably low prices. The answer is quite simple: it's you, our customers! Many satisfied customers, mean large sales volumes enabling us to get better conditions of purchase for components, etc. Isn't it only fair to pass this benefit back to you? Because we know that your success is our success too!

I would like to thank the following people, whose help on "Project ULTRAROC" has made it all possible:

- ▲ The existing users of BEHRINGER equipment, whose comments and suggestions have made them the most important members of the BEHRINGER design team,
- ▲ Jan, whose passionate work has made the ULTRAROC a revolutionary Guitar Workstation,
- ▲ Thorsten who designed this marvelous manual,
- ▲ Volker for the fine mechanics,
- ▲ and all the others, who have made very personal contributions.

My friends, it's been worth the trouble!

Thank you very much,



Uli Behringer

ULTRAROC®

Ultra-flexible 30-Watt Guitar Workstation with digital multi-effects processor

- ▲ Powerful 30-Watt RMS Guitar Workstation with authentic VIRTUBE® tube simulation
- ▲ Original 35-Watt vintage 10" JENSEN guitar speaker model JCH10/35
- ▲ Two independent channels with separate volume controls and effects
- ▲ CLEAN channel delivers clean and slightly distorted tube-type sounds
- ▲ OVERDRIVE channel offers a broad range of modern crunch to high-gain sounds
- ▲ Classical 3-band EQ with excellent sound characteristics
- ▲ 24-bit stereo multi-effects processor with extremely high-resolution 24-bit AD/DA converters
- ▲ 31 original VIRTUALIZER® and MODULIZER® presets with outstanding effects such as Reverb, Delay, Phaser, Chorus, Flanger, Pitch Shifter, Speaker Simulation, Rotary Speaker, Magic Drive, Compressor, Expander, Wah-Wah, Tube Emulator and various effect combinations
- ▲ 99 easy-to-edit user presets
- ▲ Additional 8 Ohm speaker output (built-in speaker is muted automatically)
- ▲ Adjustable AUX input for playback or other line-level signals (e.g. CD player, drum computer)
- ▲ Frequency-corrected line output for recording and live applications
- ▲ Insert facility for external effects devices (stomp boxes, wah-wah pedals, etc.)
- ▲ GX110 comes with footswitch FS112 for channel selection and effect bypass
- ▲ Complete MIDI implementation for channel and effect selection as well as real time control
- ▲ Master volume control and frequency-corrected stereo headphones output
- ▲ FX MIX parameter can be stored in each preset
- ▲ Extremely rugged construction ensures long life even under the most demanding conditions
- ▲ Robust power supply ensures excellent transient response
- ▲ Manufactured under ISO9000 certified management system

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CAUTION!



It should be pointed out that extreme output volumes may damage your ears and/or your headphones. Turn down all LEVEL controls before you switch on the unit. Always pay attention to an appropriate volume level.

1. INTRODUCTION

Thank you very much for expressing your confidence in BEHRINGER products by purchasing the ULTRAROC GX110. With the ULTRAROC, you have acquired a modern Guitar Workstation that sets new standards in practice amp engineering. When developing the GX110, our top objective was to reproduce the authentic sound of classical guitar amps as perfectly as we could and combine it with latest DSP technology – while focusing on an user interface that can be operated intuitively.

BEHRINGER is an audio engineering company that has been successfully developing products for studio and live applications for many years now. Our range of products includes microphones and a variety of 19" devices (compressors, enhancers, gates, tube processors, headphone amps, digital effects devices, DI boxes, etc.) as well as various monitoring and P.A. speakers plus professional live and recording consoles. The name of BEHRINGER stands for no-compromise quality, fully-featured products and exemplary service – even years after purchase – as well as sensationally low prices, which allow any ambitious music lovers to make their musical dreams come true.

We also set great store by flexibility, which has become a particularly important factor in the music business over the past few years. Modern guitarists need to offer a broad range of sounds, but should still be able to play in different kinds of applications at short notice: home recording, studio, live concerts. For this reason, it has always been our prime concern to give you a Guitar Workstation that offers you a complete set of functions, but can still be operated intuitively and quickly – no matter what kind of style you play.

Unfortunately, conventional guitar amps are often not fully designed and developed. Moreover, many manufacturers of traditional-style guitar amps are somewhat afraid of using state-of-the-art technology. The ULTRAROC, on the other hand, is a pioneering guitar amp that has considerably more functions than any conventional 2-channel amp with a built-in spring reverb. Still, you can use the GX110 so that it mimics an excellently sounding 2-channel combo amp with an – admittedly – good spring reverb (except for that “shatter” sound when the amp gets knocked over). However, we recommend that you make yourself familiar with the ULTRAROC in full detail, so that you know what each of the many functions does and be able to fully exploit the numerous effects and control options provided.

As technology advances, you've got to keep track of latest technological breakthroughs to avoid falling by the wayside. We, too, have continuously improved this amp and included many of your valuable suggestions. We have spared neither expense nor effort to test different types of circuitry and speakers until the results gave us complete satisfaction. After all, we really want to give you fully designed and developed products that meet your expectations in every respect. The ULTRAROC shall be an useful tool for years to come, which is why we've equipped the effects modules of our Guitar Workstation with EPROMS that can be updated. In this way, we can keep working on new algorithms and considering your ideas and suggestions. The resulting software updates will be made available for free on the Internet, so as to ensure that your amp will never be outdated.

We've packed our entire experience into this latest generation of guitar amps. Many people contributed to this project of intense development: studio musicians, collectors of vintage guitar amps, music and guitar lovers alike. We even invited guitar amp tuning experts to help us develop an amplifier that gives you the best of all worlds:

- ▲ Sophisticated analog technology with a “feel factor” only analog technology can provide.
- ▲ The perfect emulation of tube-specific nuances to make up for the drawbacks encountered in tube designs (noise, hum, etc.)
- ▲ Latest DSP technology to give you a broad range of modern high-gain and vintage-type effect sounds.
- ▲ Rugged and solid construction which even withstands roughest handling.
- ▲ Intuitive operation, so that you can focus your mind on what is most important to you: your music!

 **This manual first describes the terminology used, so that you can fully understand the ULTRAROC and its functions. Please read the manual carefully and keep it for future reference.**

1.1 The design concept

The philosophy behind BEHRINGER products guarantees a no-compromise circuit design and employs the best choice of components. The operational amplifiers used in the ULTRAROC are exceptional: they boast extreme linearity and very low distortion characteristics. To complement this design, the choice of components includes low-tolerance resistors and capacitors, high-quality potentiometers and several other stringently selected elements.

The ULTRAROC uses SMD technology (Surface Mounted Device). These subminiature components adapted from aerospace technology allow for an extreme packing density to further improve the overall reliability.

The super-robust steel-plate enclosure of your ULTRAROC, with its generously dimensioned power supply, ensures that your GX110 will never fail on the stage – even when the going gets tough. The enclosure is made of high-grade and non-polluting MDF wood, which consists of multiple tongued layers.

1.1.1 VIRTUBE technology

Tube preamps usually have three to five triode stages in series producing various degrees of distortion, dynamic compression and frequency response modification. In addition to the characteristic curve, along which the signal is distorted, also the order of filters and distortion stages play a vital role. While clean and slightly distorted sounds may be a pleasure to hear when the signal has lots of bass prior to the distortion stage, this configuration would lead to a muddy, fuzz-like sound when hi-gain settings are used. For this reason, tube amps have passive, and usually simple filters switched between the individual amplifier stages. These filters determine which frequencies contribute to the distorted sound.

After the distortion stages, too, filter circuits are used to provide a perfect blend of output signal and generated harmonics. Our VIRTUBE circuits have been optimized to mimic this sophisticated interaction with solid-state components. EQ and filters between the single stages are the same as those used in classical tube amps. The non-linear characteristic curves are simulated by means of specific diode types. The result is an amplifier that gives you sounds with a very pronounced tube character.

1.1.2 JENSEN loudspeaker

Since Peter Jensen produced the first loudspeakers in 1923 JENSEN reshaped the communications industry. As the demand for new electric guitar and bass amplifiers increased, so did the need for JENSEN speakers in the 50's and 60's. JENSEN represented the worldwide industry standard for speaker products and their sound was in fact the sound of Rock 'n' Roll. Still these vintage speakers are highly valued by top musicians and collectors around the world. Famous american and british brands choose JENSENs for their top-of-the-line products. There is no doubt about the tremendous impact the loudspeaker has on the sound of electric guitar amplifiers. Consequently, JENSEN has put into production those legendary speakers again that contributed so much to the history of modern music, using the most sophisticated and modern facilities Europe has to offer. You will find them in top-of-of-the-line guitar amps.

1.2 Before you begin

Your BEHRINGER ULTRAROC was carefully packed in the factory and the packaging is designed to protect the unit from rough handling. Nevertheless, we recommend that you carefully examine the packaging and its contents for any signs of physical damage, which may have occurred during transit.

 **If the unit is damaged, please do not return it to BEHRINGER, but notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted. Shipping claims must be made by the consignee.**

Be sure that there is enough space around the unit for cooling and please do not place the ULTRAROC on high temperature devices such as radiators etc. to avoid overheating.

 **Before you connect your ULTRAROC to the mains, please make sure that your local voltage matches the voltage required by the unit!**

The mains connection of the GX110 is made by using the enclosed mains cable and a standard IEC receptacle. It meets all of the international safety certification requirements.

 **Please make sure that all units have a proper ground connection. For your own safety, never remove or disable the ground conductor of the unit or of the AC power cable.**

The MIDI connection (IN) is made over standardized DIN plug-in connectors. An optocoupler has been used for isolated data communications.

You will find additional information in chapter 5 "INSTALLATION".

1.3 Control elements

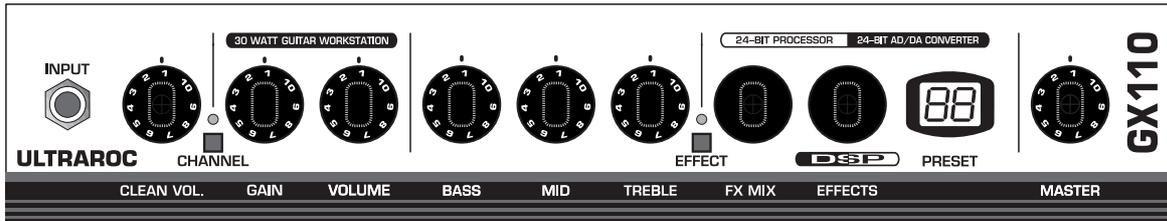


Fig. 1.1: The front panel of the ULTRAROC

The BEHRINGER ULTRAROC GX110 features nine controls, two push-buttons and one 2-digit, 7-segment LED display on its front panel. Additionally, there is one 1/4" jack for input.

1.3.1 The front panel

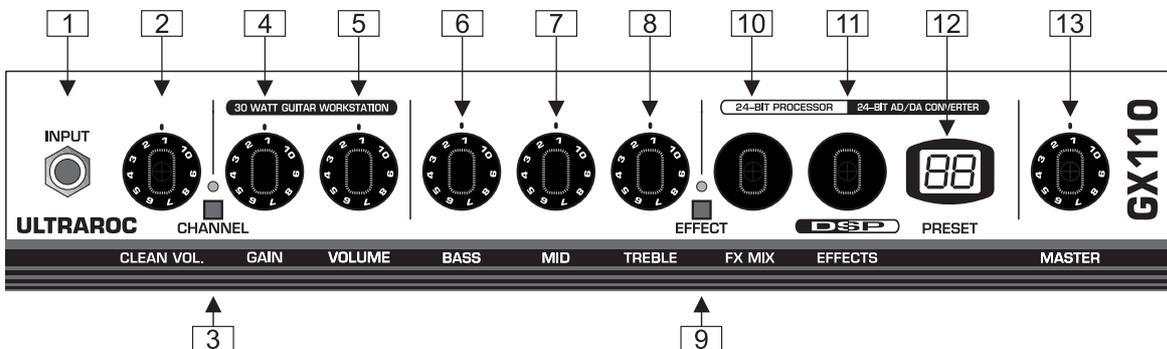


Fig. 1.2: The front panel control elements

- 1 **INPUT** is the ULTRAROC's 1/4" jack input for your guitar. Use a commercial 1/4" jack mono cable (no DIY, better ask your specialized dealer), with good mechanical and electrical shielding, so as to avoid unpleasant surprises during rehearsals or concerts.
- 2 The **CLEAN VOLUME** control sets the volume for the clean channel.
- 3 The **CHANNEL** button allows you to toggle between the CLEAN and OVERDRIVE channels. When OVERDRIVE is on, the corresponding LED lights up.
- 4 The **GAIN** control determines the degree of distortion in the OVERDRIVE channel.
- 5 The **VOLUME** control sets the volume for the OVERDRIVE channel.
-  Use both **VOLUME** controls to optimize the volume ratio of the two channels, so that no volume differences can be heard when switching from one channel to the other. This setting is also effective on the level-dependent digital effects!
- 6 The **BASS** control in the EQ section allows you to boost or cut the bass frequencies.

- 7 With the *MID* control you can boost/cut the midrange frequencies.
- 8 The *TREBLE* control governs the upper frequency range.
-  **Please note that with all three EQ controls set fully to the left, there will be no signal sent to the speaker, which is due to the classical and extremely efficient EQ circuit used in the ULTRAROC.**
- 9 Use the *EFFECT* button to activate/deactivate the selected effect.
- 10 The *FX MIX* control determines the ratio of original vs. effect signal.
- 11 The *EFFECTS* control allows you to select an effects preset from 1 through 99. The selected preset will be loaded approximately 1 sec after releasing the control.
- 12 The *DISPLAY* reads either the program number of the selected preset or the value of the parameter selected with the *FX MIX* control.
-  **When you start editing a preset, the decimal point in the 2-digit display starts flashing. Press the *EFFECT* button for a while to overwrite the factory preset and save your own effect setting. To restore the factory presets, simply keep the *EFFECT* button pressed while you switch on your ULTRAROC.**
- 13 The *MASTER* control determines the overall and headphones volume level of your ULTRAROC.
- ▲ MIDI: You can control your ULTRAROC via MIDI. To select the MIDI receive channel on the ULTRAROC, press and keep the *EFFECT* and *CHANNEL* buttons for about 1 sec. Then, use the *EFFECTS* control to select the MIDI channel of your choice (1 through 16, "On" = Omni; "OF" = Off). Confirm your selection with the *EFFECTS* button. "OF" means that all MIDI functions are off. While you select the MIDI receive channel, the display flashes. The decimal point in the *DISPLAY* flashes as soon as MIDI data are being received.
-  **When the MIDI functions are inactive, one effect can be stored for each of the two channels on your ULTRAROC, which allows, for instance, to select a *DELAY* effect for the *OVERDRIVE* channel and assign a *REVERB/CHORUS* effect to the *CLEAN* channel. The corresponding program numbers will be stored with the channels and can be recalled using the footswitch or the front panel buttons. When MIDI is on, this assignment feature will be disabled, so that in this mode both channels and effects can be selected separately.**

1.3.2 The rear panel

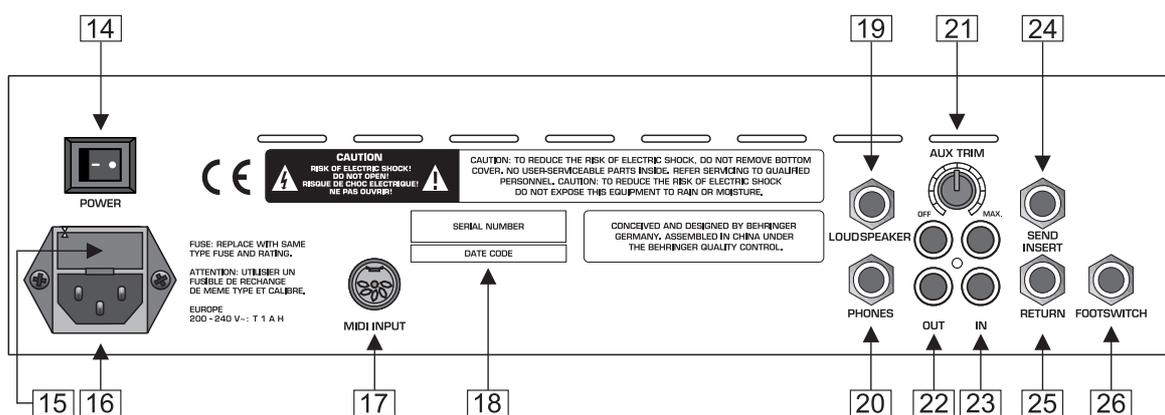


Fig. 1.3: The rear panel connectors

- 14 Use the *POWER* switch to put the ULTRAROC into operation.

- 15** *FUSE HOLDER/VOLTAGE SELECTOR.* Please make sure that the voltage indicated on the unit, matches your local voltage, before you attempt to connect and operate the ULTRAROC GX110. Blown fuses may only be replaced by fuses of the same type and rating. Some models allow for inserting the fuse holder in two different positions, in order to switch over from 230 V to 115 V operation, and vice versa. Please note that for 115 V operation outside Europe, you need to use a fuse of a higher rating (see chapter 5 "INSTALLATION").
- 16** Use the enclosed power cord to connect the unit to the mains.
- 17** *MIDI IN.* This connector gives you MIDI remote control over your ULTRAROC. You can change parameters using controller information, switch over effect programs, change channels and bypass the effects module by means of program change instructions.
- 18** *SERIAL NUMBER.* Please take the time to have the warranty card filled out completely by your specialized dealer, and return it within 14 days after the date of purchase, so as to be entitled to benefit from our extended warranty.
- 19** Use the *LOUDSPEAKER* jack to connect a supplementary speaker to your ULTRAROC. Optimum adaptation is ensured with 8 Ω speakers. Inserting a plug into this jack will mute the built-in speaker.
- 20** The 1/4" jack *PHONES* allows you to monitor the ULTRAROC's audio signal with a pair of commercially available headphones. Connecting the headphones will mute the built-in speaker.
-  **Since speakers can have quite an impact on the sound of a guitar amp, both the headphones and LINE OUT signals are frequency-corrected (Speaker Emulation). Without this frequency correction extreme treble frequencies would deteriorate the sound. You can still tap the unprocessed signal directly after the pre-amp (INSERT SEND jack), without interrupting the signal path in the amplifier (INSERT RETURN jack may not be used in this case). Starting with a certain volume level, low-impedance headphones may begin to produce distortion. In such a case, please reduce the volume by turning down the VOLUME controls.**
- 21** The *AUX TRIM* control determines the volume of AUX signals fed into the ULTRAROC via the AUX IN jacks on the rear (e.g. drum computer, playback).
- 22** The *LINE OUT* provides the ULTRAROC's audio signal, for example, to send it to a recording machine. This output is frequency-corrected (Speaker Emulation).
- 23** The *AUX IN* allows you to feed in additional signals, for example, to play with a drum computer or some sort of playback. Additionally, you can use the AUX IN in combination with the INSERT SEND as a parallel effect path: connect the INSERT SEND to the input and the AUX IN to the output of the effects device (INSERT RETURN jack should not be used in this case!). Thus, the signal path in the amplifier will not be interrupted and you can add the effect portion from the external device, using the AUX TRIM control. Please note that the external effects device must be set to 100% wet for this purpose.
-  **When you connect the INSERT SEND to the AUX IN using a short patch cord, you can add the direct signal to the effect signal via analog circuitry. Advantage: The direct signal will be provided all the time, even while the DSP is loading a new effects program. However, it should be noted that all FX mixes in the presets should be set to higher values, so as to make the effect signal heard.**
-  **Since the entire signal processing circuitry in the ULTRAROC is configured in mono, both the LINE OUT and the headphones output provide the same signal on both (stereo) sides.**
- 24** The ULTRAROC also features a serial insert path for external effects such as a compressor or wah-wah pedal. This is the *INSERT SEND* jack you need to connect to the input of the effects device.
- 25** This is the *INSERT RETURN* jack that can be connected to the output of an external effects device.
-  **Please note that when using the serial effects path, the external effect should not be set to 100% wet (100% effect signal); otherwise, there will be no direct signal portion fed back to the ULTRAROC.**
- 26** Connect the enclosed footswitch via its stereo plug to the *FOOTSWITCH* jack. The footswitch allows you to change channels or disable the effects module.

2. WIRING EXAMPLES

2.1 Standard setup consisting of guitar, footswitch and external effects device

To use your ULTRAROC for rehearsals or on stage, please wire up the unit as shown in fig. 2.1. Of course, you can also use a wah-wah or other pedal effect instead of the external 19" effects unit, or simply work with the internal effects without having to use the insert path at all. Connecting the headphones will mute the built-in speaker.

When you wish to use a guitar tuner, please connect it to the INSERT SEND of your ULTRAROC. If there is no further effects device connected, you can leave the INSERT RETURN as it is. However, to use an external effects device, place the tuner before the effects in the signal chain, so that it works on unprocessed signals only.

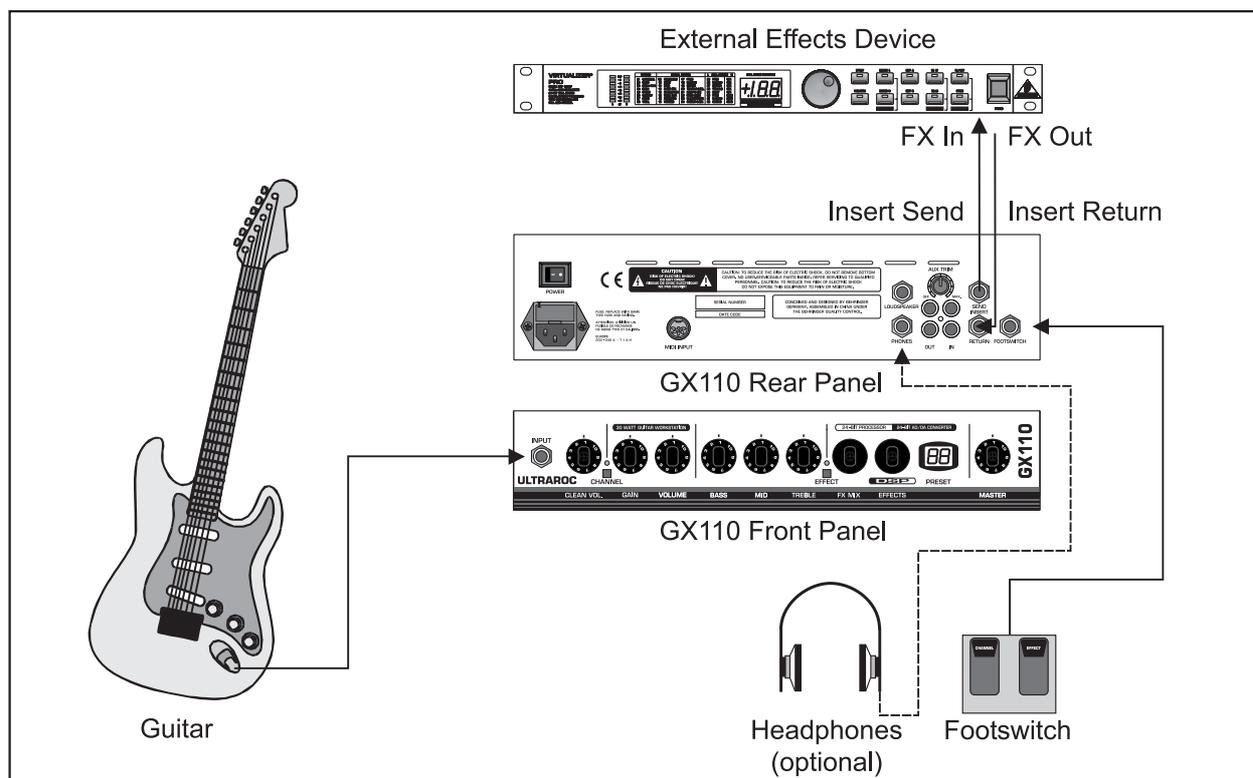


Fig. 2.1: Standard setup

2.2 Expanded setup with MIDI foot controller, playback source and mixing console

To use your ULTRAROC for advanced applications, please consider the following suggestions. Of course, the expanded configuration suggested in fig. 2.2. builds on the standard setup described in chapter 2.1.

Use the MIDI foot controller to change presets and/or channels, set volume and wah, etc. The line out signal can be fed into a P.A. or recording console, and the AUX input can be used to play back e.g. cassette recorder signals through the GX110.

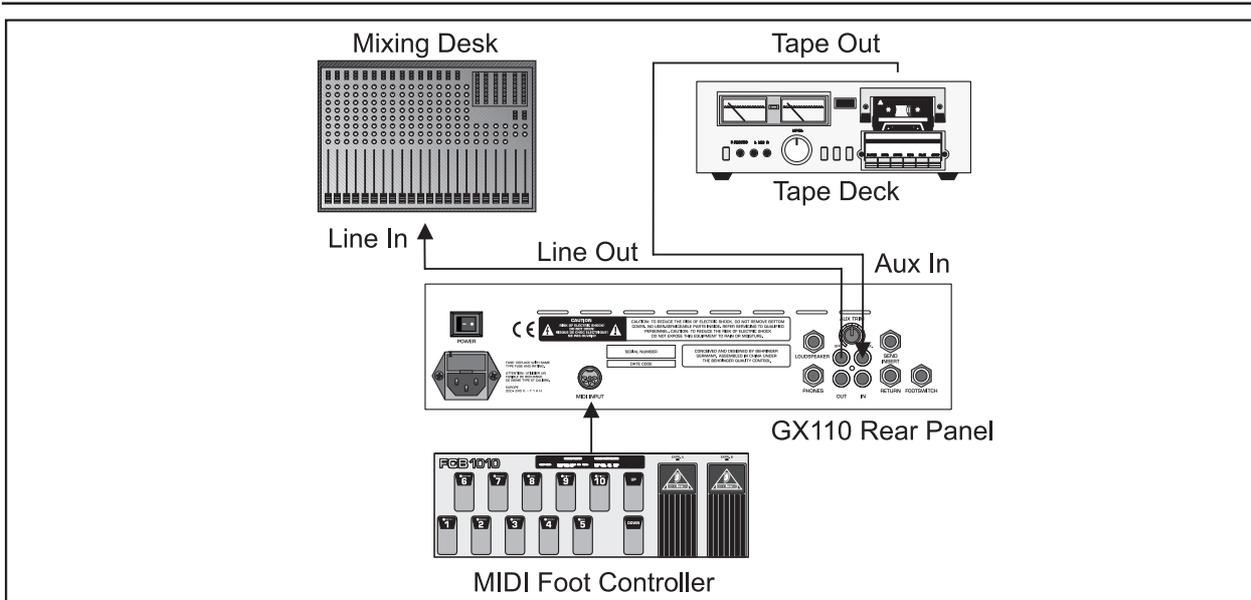


Fig. 2.2: Expanded setup

3. EFFECTS PROCESSOR

A very special feature of your ULTRAROC is its built-in effects processor, which offers the same audio quality and algorithms as our popular 19" effects devices VIRTUALIZER PRO and MODULIZER PRO, however, here completely in mono. This effects module provides 31 different groups of first-class effects such as Reverb, Chorus, Flanger, Delay, Pitch Shifter, Compressor, Expander, Wah-Wah variations, various combination effects and even Tube and Speaker Emulation. The latter, in particular, can make a guitarist's life much easier in home recording studios, because they allow you to record the amp's signal without having to use a microphone. A total of 99 presets gives you a broad range of versatile effects, which can be edited in one parameter each. The FX MIX control determines (with a few exceptions) the mix of original and effect signals. As a rule of thumb, values (adjustable in steps of 2%) between 20% (moderate effect) and 40% (clearly audible effect) should deliver good results. In the case of Reverb and Delay presets, the mix ratio is adjustable from 0% through 50% in steps of 1%. Additionally, the multi-effects processor provides different effects variations, which are permanently linked to the presets. The FX MIX setting can be stored with each preset. To restore the factory default settings, simply keep the EFFECT button pressed while you power up the ULTRAROC.

Use the EFFECTS control to select a preset which will be activated after a short delay. The display reads the number of the currently active preset. As soon as you edit a preset with the FX MIX control, the display will read the respective parameter value. After about three seconds the display switches back to the program number. Whenever a parameter has been changed, the decimal point in the 2-digit display starts flashing. To save your edits and overwrite the existing preset, simply press the EFFECT button for about two seconds.

3.1 Description of effects



01-02 Spring Reverb: Even a guitar amp with a digital multi-effects processor should allow you to use a spring reverb. This algorithm emulates the typical sound of a spring reverb, as it is known from numerous guitar amps. However, here you don't have the typical shatter sound when your amp gets knocked over.

03-04 Studio: This effect simulates the characteristics of middle-sized rooms. With its natural sound it can be used for a great variety of applications.

- 05-06 Chamber:** You can clearly hear the sound as it bounces back from the walls of this “room”. The program is particularly suited for diffuse types of reverb or to make a dry guitar sound more natural.
- 07-08 Stage:** A fine reverb e.g. to liven up and widen a clean guitar.
- 09-10 Concert:** Here, you can choose from a small theater (preset 9) or a large concert hall (preset 10). Compared to the STUDIO reverb program, these algorithms sound more lively and have more treble frequencies.
- 11-12 Plate:** The sound of an ancient plate reverb. A classic algorithm that makes your guitar sound wonderful and enchanting.
- 13-14 Gated Reverb:** This reverb is cut off abruptly and became famous through Phil Collins’ “In the air tonight”.
- 15-16 Ambience:** The reverb of any room consists of so-called “early reflections” and the reverb “tail”. This algorithm emulates the first 15 of these early reflections. Since our ears use these reflections to determine the room size, they can be employed to create subtle and impressive reverb densities, without clouding the overall signal with long reverb tails. This effect is particularly impressive when played through a pair of headphones.



- 17-19 Wah/Delay/Distortion:** In general, filters are used to provide some static equalization of a signal's frequency response. The wah effect-combined with delay and distortion in this preset-allows the mid-range frequencies to pass, while it more or less suppresses the remaining frequency ranges. Guitarists such as Jimi Hendrix and Eric Clapton made this effect popular, and it still hasn't gone out of fashion. Using MIDI controller #15 you can edit the operating range of the wah effect, e.g. via a MIDI foot controller. In this way, it is possible to use the wah effect like an analog wah foot pedal. Adjustable parameter: delay intensity.
- 20 Delay/Reverb:** This effect produces a normal delay that passes a reverb whose mix ratio can be edited.



- 21-29 Delay:** This algorithm delays the input signal and generates several repeats. The presets produce various delays with different lengths and repeats. Adjustable parameter: effect mix.



- 30-33 Phaser:** From a technical point of view, phasing is a modulation effect producing a multi-stage phase shift between direct and effect signals. As the frequency-dependent phase shift is controlled by an LFO (low-frequency oscillator), the various frequency ranges of the signal are raised or lowered in their amplitudes. Depending on the setting you choose, the resulting phasing effect is either slightly modulating in character or produces heavy sound coloration reminiscent of a continuously modulated filter.
- 34-37 Chorus:** Imagine a string quartet, with each musician playing the same notes. As a matter of fact though, no musician is able to play with an intonation accuracy of 100%. Consequently, slightly detuned signal portions are produced which overlap in the time domain. To emulate this effect, chorusing uses copies of the original signal, which are then delayed by 20 to 40 msec, detuned slightly and modulated by the LFO. The result is a detune effect that is very pleasant in character. As this effect is used so frequently and in such a variety of signal-widening applications, any recommendation given here would mean a restriction of its uses.



38-42 Chorus/Reverb: Here, the signal passes a chorus effect with various intensities and then a reverb. Adjustable parameter: reverb mix.

43-47 Chorus/Delay: First, the signal is chorused with various intensities, then follows a delay effect with various feedback levels and adjustable delay time. Adjustable parameter: delay mix.



48-51 Flanger: An LFO constantly modulates the pitch of the effect signal up and down by a few cents and then sends the effect signal back to the input. This effect can be excellently combined with distorted guitar sounds.



52-56 Flanger/Reverb: Here, a flanger with various intensities is followed by a reverb. Use the FX MIX control to edit the reverb mix.

57-61 Flanger/Delay: The first element is a flanger with various intensity levels, then comes a delay effect. Adjustable parameter: delay mix.



62-63 Tremolo: Tremolo is a more or less fast, intensive variation of the signal amplitude.



64-66 Tremolo/Delay: A more or less fast, intensive amplitude modulation complemented by a delay effect. Use the FX MIX control to edit the tremolo mix parameter.



67-68 Rotary Speaker: This is the quintessential simulation of the classical organ effect normally produced by speakers that rotate at slow/fast speed in a bulky and extremely heavy speaker cabinet. This effect uses the physical principle known as Doppler effect.

69-70 Magic Drive: This is an absolutely up-to-date effect combined with a delay. As a little extra, this effect includes an LFO-controlled notch filter. Adjustable parameter: delay mix. With its high volume level this effect is perfectly suitable for solo work.



71-72 Auto Wah: Auto Wah is a velocity-sensitive effect that allows low frequencies to pass, while high frequencies are more or less suppressed. FX MIX controls the filter depth. Select a low value when you prefer playing in low registers. The higher the register, the higher the depth value should be (FX MIX).

73-74 LFO Wah: In the LFO Wah effect the LFO governs the speed of frequency modulation. Here, you can produce wah-wah effects that are repeated at regular intervals. The LFO Wah delivers astounding results.



75-81 Pitch Shifter: This effect shifts the pitch of the input signal and can be used to produce musical intervals and harmonies or simply to widen a single voice. Heavy detuning by several semi-tones up creates a Mickey-Mouse-type effect. The preset variations include various fixed intervals.



82-85 Pitch/Reverb: Here, a pitch shifter set to various cent and semi-tone intervals is followed by a reverb. Adjustable parameter: pitch shifter mix.

86-89 Pitch/Delay: First, the signal passes the pitch shifter set to various intervals. Then, a delay effect is added. Use the FX MIX control to edit the pitch shift mix parameter.



90-91 Compressor: To make an audio signal heard in the mix, it often needs to be limited in its dynamic range. This job is done by compressors and/or limiters. Limiters abruptly limit the signal above a specific threshold, while compressors provide for a “soft” control process over a wider range. The FX MIX control allows you to adjust the compressor threshold. Use this effect to give your guitar longer sustain, or to make the attack sounds of funky guitar licks (Chicken Scratch) clearly audible.

92-93 Expander: All sorts of background noise and hum limit the dynamic range of the wanted signal. As long as the level of the wanted signal is considerably above the noise floor, background noise is inaudible: the interference signal is masked by the music. Expanders can be used to efficiently expand the dynamic range of signals. Small signal amplitudes are cut additionally, which at the same time reduces background noise. Use the FX MIX control to determine the expander threshold.



94-96 Guitar Combo: This effect simulates the sound characteristics of a complete guitar amp, mimicking not only two tube stages, but also cabinet and speaker. Use the FX MIX control to adjust the mix of direct and combo signals.

97-99 Speaker Cabinet: This algorithm emulates three different types of speaker cabinets. Additionally, you can shift the speaker’s main resonance peak. Use the FX MIX control to edit the filter frequency.

3.2 Controlling the ULTRAROC via MIDI

With its built-in MIDI interface you can integrate your ULTRAROC into any MIDI setup. The GX110 is capable of receiving both program change and MIDI controller information. So, you can change programs via MIDI using a MIDI foot controller or a computer-based sequencer software. Our MIDI foot controller FCB1010 gives you precisely these and more options, and is a perfect match for all BEHRINGER guitar amps. For example, you could wire the ULTRAROC as follows:

Connect the MIDI IN jack of your ULTRAROC to the MIDI OUT jack of a MIDI foot controller (see fig. 2.2). Now, enable the MIDI functions on your ULTRAROC by pressing the EFFECT and CHANNEL buttons for about one second. Use the EFFECTS control to select a MIDI channel (1 through 16, “ON” = Omni mode, “OF” = off). Confirm your selection with EFFECT. Omni mode means that your ULTRAROC receives and processes MIDI information on all channels. Of course, you should select the same channel both on your MIDI foot controller and ULTRAROC (see MIDI foot controller user’s manual).

 **Once you activate the MIDI functions, the automatic effect-to-channel assignment feature will be disabled, i.e. changing channels does not automatically load the previously set effect. As this assignment feature would cause some confusion when controlling the ULTRAROC via a MIDI foot controller, it makes sense only when it is controlled from the enclosed footswitch or directly from the ULTRAROC's front panel. To operate the ULTRAROC without MIDI remote control, please disable the MIDI functions (display reads "OF").**

You can select presets via MIDI using program change instructions. Since the range of program change numbers is 0 through 127, program change instruction 0 corresponds to preset 1, #1 to preset 2, and so forth (see table 6.2 in the appendix). After changeover the preset is activated immediately, i.e. it will not be affected by previously adjusted bypass settings.

Channel changes can be effected with controller #10. Sending value 0 via this controller will activate the CLEAN channel, while value 1 activates the OVERDRIVE channel. Program change instructions can also be used to change channels. Program change #123 activates the CLEAN channel, program change #124 selects the OVERDRIVE channel of your ULTRAROC. In addition to changing channels, you can also disable effects, by sending the value 0 via controller #11. Value 1 enables the effect. Alternatively, you can bypass the effect section by sending program change instruction #127.

MIDI controller #7 adjusts the input sensitivity of the effects module, enabling you to set the overall volume of your ULTRAROC as desired. Since this controller has no influence on the Master Volume control, you should adjust the maximum volume before with the Master Volume control, then use MIDI controller #7 to reduce the volume. This function is also known as "Volume Controller".

The effect-specific parameter that can be edited with the FX MIX control, can also be remotely controlled from a MIDI sequencer or foot controller, using MIDI controller #12.

The operating range of the wah-wah effect is governed by MIDI controller #15.

Of course, you can also control the ULTRAROC from a computer-based sequencer software, particularly in a home recording environment. Specific environments for popular MIDI sequencer programs will soon be available from our web site (www.behringer.de).

4. HISTORICAL BACKGROUND by Neville Marten (Guitarist Magazine)

The guitar amp: your tone generator

Many guitar players think of their amplifier as the least important link in their musical chain. Sure, everyone needs the right guitar, with the right finish, pickups and tremolo; and of course effects these days are so important in looking and sounding cool.

But what of the humble guitar amp? Is it just an ugly box that stands behind you, a heavy hindrance that's just a drag to get into and out of the car? No, it's your powerhouse, a tone generator that should work as an equal member with you, your guitar and effects in the creation of the best possible sound.

Ever since the 1940s, when a radio repairman in Orange County California started customizing tube radio circuits for the new breed of electric guitarists, guitar amps have been evolving into what we see today. Great American names like Fender™, Ampeg™ and Gibson™ supplied small-output amplifiers to the guitarists of the '40s and '50s, creating the sound of electric jazz, rock'n'roll and country music; a sound that's still as fresh as ever at the dawn of this new millennium.

As the '50s became the '60s, the British sound was born with Vox™ producing small-powered valve amps for groups like The Shadows, then later The Beatles and The Rolling Stones, The Hollies and The Hermits. Then, in the mid-'60s a drummer from London was asked by some budding musicians to build them some amplification. Jim Marshall™ took the basic American design and using British components and speakers, created higher Wattage amps and multi-speaker cabinets to give bands like The Who, Cream and The Jimi Hendrix Experience the power to begin their assaults on the rock stadiums of the world.

Amp design has come a long way since then. Multi-channels and cascading gain stages, as pioneered by Randall Smith and his Mesa Boogie™ amps, are found in the majority of stacks and combos built by amp manufacturers all over the world today. Modern, solid-state circuits and digital effects are now commonplace and in some instances work successfully on their own, or hand-in-hand with classic tube designs, to create versatile performing instruments for working guitarists. Other manufacturers are looking back to the old ways, with hand-wired, vintage-style "boutique" amps than can cost the earth.

Whichever option you choose, the ears of discerning musicians recognize that, behind the bells, whistles and hype, there must be a great-sounding amplifier – a real musical tool that not only uses the best of today's technologies, but pays its respects to the great pioneers that have gone before.

(We would like to thank Mr. Neville Marten, the editor of Guitarist Magazine, for this little essay about the history of guitar amp development.)

Fender™, Ampeg™, Gibson™, Vox™, Marshall™, Mesa Boogie™ and the names of musical artists and groups are all registered trademarks of their respective owners, which are in no way associated or affiliated with BEHRINGER.

5. INSTALLATION

Your BEHRINGER ULTRAROC was carefully packed in the factory and the packaging is designed to protect the unit from rough handling. Nevertheless, we recommend that you carefully examine the packaging and its contents for any signs of physical damage, which may have occurred during transit.

 **If the unit is damaged, please do not return it to BEHRINGER, but notify your dealer and the shipping company immediately, otherwise claims for damage or replacement may not be granted. Shipping claims must be made by the consignee.**

5.1 Mains connection

Please ensure that the ULTRAROC is set to the correct supply voltage before connecting the unit to the AC power system! Three triangular markings can be found on the fuse holder at the AC power connection socket. Two of these three triangles will be aligned with one another. The ULTRAROC is set to the operating voltage shown next to these markings and can be switched over by twisting the fuse holder by 180°. **IMPORTANT: This does not apply to export models designed only for 115 V ~!**

The mains connection of the ULTRAROC is made by using the enclosed mains cable and a standard IEC receptacle. It meets all of the international safety certification requirements.

 **Please make sure that all units have a proper ground connection. For your own safety, never remove or disable the ground conductor of the unit or of the AC power cable.**

5.2 Audio connections

The BEHRINGER ULTRAROC is installed with 1/4" mono jacks. Only the headphones output and the line/aux inputs/outputs are available via a 1/4" stereo jack.

 **Please ensure that only qualified persons install and operate the ULTRAROC. During installation and operation the user must have sufficient electrical contact to earth. Electrostatic charges might affect the operation of the ULTRAROC!**

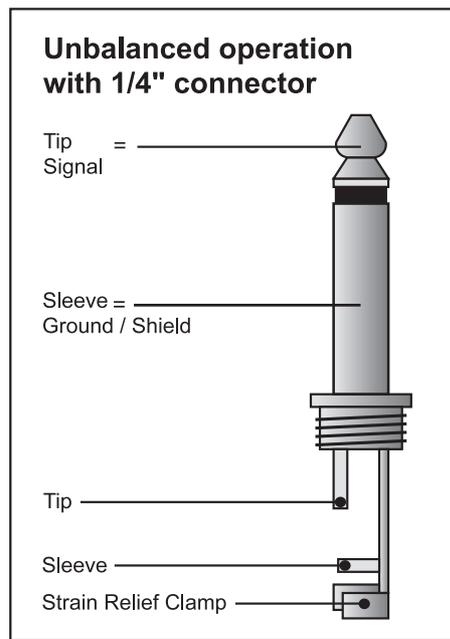


Fig. 5.1: Wiring of a mono 1/4" plug

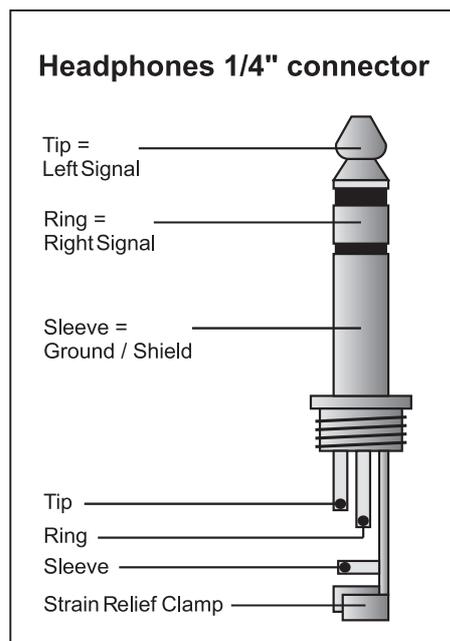


Fig. 5.2: Wiring of a stereo headphones 1/4" plug

5.2.1 Loudspeaker connector

Your GX110 features a speaker jack that allows you to hook up a supplementary speaker. Optimum adaptation is ensured with 8 Ω loudspeakers.

You can also connect speakers with lower impedances. However, this could trigger the power stage protective circuitry on your GX110. With too high an impedance load, the maximum power output will drop in proportion to the resistance connected.

5.3 MIDI connection

The MIDI standard (Musical Instruments Digital Interface) was developed in the early 80's to enable electronic musical instruments of different makes to communicate with each other. Over the years the range of MIDI applications has constantly expanded, and today it is completely normal to network entire recording studios using the MIDI standard.

At the heart of this network we find a computer loaded with a sequencer software that controls not only the keyboards but also effects and other peripheral devices. In such a studio you could control your ULTRAROC in real time from a computer. In particular, when playing live gigs you can use a MIDI foot controller to control both the effect parameters and channel/effect changes on your ULTRAROC.

The MIDI connector on the rear of your ULTRAROC is an internationally standardized 5-pin DIN jack. To connect your ULTRAROC to other MIDI equipment, you need a dedicated MIDI cable, which is commercially available in various lengths. However, you can solder your own cables using 2-conductor shielded cables (e.g. microphone cables) and two rugged 180° DIN plugs: pin 2 (center) = shield; pins 4 and 5 (right and left of pin 2) = internal conductor; pins 1 and 3 (the outer pins) are not used. MIDI cables should not exceed a length of 15 meters.

 **Make sure that pin 4 is connected to pin 4, and pin 5 to pin 5.**

MIDI IN: receives MIDI controller information. The receiving channel can be set with the buttons EFFECTS and CHANNEL. On = Omni, i.e. MIDI data are received and processed on all channels (cf. chapter 3.2).

6. APPENDIX

6.1 Preset list

Preset-Nr.	Effect	Variation	FX MIX	Range	Default
1	SPRING REVERB	Short	Mix	0..50	5
2		Long	Mix	0..50	8
3	STUDIO	Short	Mix	0..50	8
4		Long	Mix	0..50	8
5	CHAMBER	Short	Mix	0..50	20
6		Long	Mix	0..50	20
7	STAGE	Short	Mix	0..50	8
8		Long	Mix	0..50	8
9	CONCERT	Short	Mix	0..50	10
10		Long	Mix	0..50	10
11	PLATE	Short	Mix	0..50	10
12		Long	Mix	0..50	10
13	GATED REVERB	Short	Mix	0..50	10
14		Long	Mix	0..50	10
15	AMBIENCE	Min. Reflections	Mix	0..50	19
16		Max. Reflections	Mix	0..50	19
17	WAH / DELAY / DISTORTION	Clean	Delay Mix	0..50	5
18		Crunch	Delay Mix	0..50	3
19		Dirty	Delay Mix	0..50	5
20	DELAY / REV.	-	Reverb Mix	0..50	20
21	DELAY (long mono)	Slap Back	Mix	0..50	10
22		Min. Delay Time ↓ Max. Delay Time	Mix	0..50	10
23			Mix	0..50	10
24			Mix	0..50	10
25			Mix	0..50	10
26			Mix	0..50	10
27			Mix	0..50	10
28			Mix	0..50	10
29			Mix	0..50	10
30		PHASER	Slow	Mix	0..99
31	Bright		Mix	0..99	60
32	Medium		Mix	0..99	50
33	CHORUS	Fast	Mix	0..99	50
34		Slow	Mix	0..99	40
35		Medium	Mix	0..99	40
36	CHORUS / REVERB	Fast	Mix	0..99	40
37		Bright	Mix	0..99	60
38		Cool Short	Reverb Mix	0..50	10
39	CHORUS / REVERB	Cool Long	Reverb Mix	0..50	15
40		Ultra	Reverb Mix	0..50	20
41		Fast Short	Reverb Mix	0..50	20
42		Fast Long	Reverb Mix	0..50	15
43	CHORUS / DELAY	Short	Delay Mix	0..50	10
44		Ring	Delay Mix	0..50	10
45		Long	Delay Mix	0..50	10
46		Slap Back	Delay Mix	0..50	10
47		Hold	Delay Mix	0..50	12
48	FLANGER	Classic I	Mix	0..99	20
49		Classic II	Mix	0..99	90
50		Ultra	Mix	0..99	60
51		Fast	Mix	0..99	24
52	FLANGER / REVERB	Classic Short	Reverb Mix	0..50	10
53		Classic Long	Reverb Mix	0..50	15
54		Ultra	Reverb Mix	0..50	20
55		Intense	Reverb Mix	0..50	15
56		Light	Reverb Mix	0..50	20
57	FLANGER / DELAY	Ultra	Delay Mix	0..50	10
58		Light	Delay Mix	0..50	9
59		Slap Back	Delay Mix	0..50	20
60		Long	Delay Mix	0..50	15
61		Hold	Delay Mix	0..50	15
62	TREMOLO	Slow	Mix	0..99	80
63		Fast	Mix	0..99	60
64	TREMOLO / DELAY	Slow	Tremolo Mix	0..99	60
65		Medium	Tremolo Mix	0..99	60
66		Fast	Tremolo Mix	0..99	50
67	ROTARY SPEAKER	Slow	Mix	0..99	50
68		Fast	Mix	0..99	60
69	MAGIC DRIVE	Slap Back	Delay Mix	0..50	10
70		Spinning Echo	Delay Mix	0..50	10
71	AUTO WAH	Fast	Depth	0..63	35
72		Slow	Depth	0..63	35
73	LFO WAH	Slow	Mix	0..99	70
74		Fast	Mix	0..99	90
75	PITCH SHIFTER	-12	Mix	0..99	60
76		-5	Mix	0..99	50
77		+3	Mix	0..99	40
78		+4	Mix	0..99	24
79		+7	Mix	0..99	30
80		Detune I	Mix	0..99	46
81		Detune II	Mix	0..99	34
82		PITCH SHIFTER / REVERB	-12	Pitch Mix	0..99
83	+3		Pitch Mix	0..99	20
84	Detune I		Pitch Mix	0..99	50
85	PITCH SHIFTER / DELAY	Detune II	Pitch Mix	0..99	60
86		-12	Pitch Mix	0..99	20
87		-5	Pitch Mix	0..99	14
88	COMPRESSOR	+4	Pitch Mix	0..99	12
89		+7	Pitch Mix	0..99	20
90		Fast	Sensitivity	0..63	39
91	EXPANDER	Slow	Sensitivity	0..63	33
92		Fast	Sensitivity	0..63	40
93		Slow	Sensitivity	0..63	40
94	GUITAR COMBO	Crunch	Mix	0..99	52
95		Edge	Mix	0..99	46
96		Overdrive	Mix	0..99	68
97	SPEAKER CABINET	Stack A	Peak Freq.	0..63	34
98		Stack B	Peak Freq.	0..63	41
99		Combo	Peak Freq.	0..63	57

Tab. 6.1: List of presets

6.2 MIDI-Implementation

MIDI Implementation Chart				
Function		Transmitted	Recognized	Remarks
Basic Channel	Default	X	OFF, 1 - 16	memorized
	Changed	X	OFF, 1 - 16	
Mode	Default	X	1,2	
	Messages	X	X	
	Altered	X	X	
Note Number		X	X	
	True Voice	X	X	
Velocity	Note ON	X	X	
	Note OFF	X	X	
After Touch	Keys	X	X	
	Channels	X	X	
Pitch Bender		X	X	
Control		X	O 7, 10, 11, 12, 15	see add. table
Progr. Change			123, 124, 127	123 = CLEAN
	True #	X	O (0 - 98) 1 - 99	124 = OVERDRIVE 127 = Effect Bypass
System Exclusive		X	X	
System Common	Song Pos.	X	X	
	Song Sel.	X	X	
	Tune	X	X	
System Real Time	Clock	X	X	
	Commands	X	X	
Aux Messages	Local ON/OFF	X	X	
	All notes OFF	X	X	
	Active Sense	X	X	
	Reset	X	X	
Notes				
O = YES, X = NO				
Mode 1: OMNI ON				
Mode 2: OMNI OFF				

Tab. 6.2: MIDI-Implementation

Parameter Name	Display Range	Midi Control Number	Control Value Range
Volume Controller	-	7	0 .. 127
Channel	CLEAN = 0, OVERDRIVE = 1	10	0 .. 1
Effect	OFF = 0, ON = 1	11	0 .. 1
FX MIX	0 .. 99	12	0 .. 127
Wah/Modulation Controller	-	15	0 .. 127

Tab. 6.3: MIDI controllers on the ULTRAROC

7. SPECIFICATIONS

AUDIO INPUTS

Guitar input	
Connector	1/4" mono jack
Type	RF filtered input
Guitar input impedance	approx. 1 M Ω unbalanced
Insert return	
Connector	1/4" mono jack
Input impedance	approx. 1 k Ω unbalanced
Aux input	
Connector	RCA jacks
Input impedance	approx. 10 k Ω unbalanced

AUDIO OUTPUTS

Insert send	
Connector	1/4" mono jack
Type	line level output
Output impedance	approx. 100 Ω unbalanced
Aux output	
Connector	RCA jacks
Output impedance	approx. 100 Ω unbalanced
Max. output level	+12 dBu unbalanced

LOUDSPEAKER OUTPUT

Connector	1/4" mono jack
Load impedance (nom.)	8 Ω

SYSTEM SPECIFICATIONS (Master Section)

Power amp output	30 Watts R.M.S. into 8 Ω
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MIDI INTERFACE

Type	5-pin DIN socket, MIDI IN
------	---------------------------

DIGITAL PROCESSING

Converters	24-bit Sigma-Delta, 64/128-times oversampling
Sampling rate	46.875 kHz

DISPLAY

Type	2-digit numeric LED display
------	-----------------------------

LOUDSPEAKER

Type	10" heavy-duty loudspeaker, model JENSEN JCH 10/35
Impedance	8 Ω
Power rating	35 Watts

POWER SUPPLY

Mains voltages	USA/Canada	120 V ~, 60 Hz
	U.K./Australia	240 V ~, 50 Hz
	Europe	230 V ~, 50 Hz
	General export model	100 - 120 V ~, 200 - 240 V ~, 50 - 60 Hz
Power consumption	50 Watts @ 35 Watts/8 Ohms; 90 Watts max.	
Fuse	100 - 120 V ~: T 1.25 A H	
	200 - 240 V ~: T 630 mA H	
Mains connection	Standard IEC receptacle	

PHYSICAL

Dimensions (H * W * D)	approx. 14.8" * 16.54" * 8.04"/9.66" (376 mm) * (420 mm) * (204/245 mm)
Weight	approx. 10.5 kg

BEHRINGER is constantly striving to maintain the highest professional standards. As a result of these efforts, modifications may be made from time to time to existing products without prior notice. Specifications and appearance may differ from those listed or illustrated.

8. WARRANTY

§ 1 WARRANTY CARD/ONLINE REGISTRATION

To be protected by the extended warranty, the buyer must complete and return the enclosed warranty card within 14 days of the date of purchase to BEHRINGER Spezielle Studioteknik GmbH, in accordance with the conditions stipulated in § 3. Failure to return the card in due time (date as per postmark) will void any extended warranty claims.

Based on the conditions herein, the buyer may also choose to use the online registration option via the Internet (www.behringer.com or www.behringer.de).

§ 2 WARRANTY

1. BEHRINGER (BEHRINGER Spezielle Studioteknik GmbH including all BEHRINGER subsidiaries listed on the enclosed page, except BEHRINGER Japan) warrants the mechanical and electronic components of this product to be free of defects in material and workmanship for a period of one (1) year from the original date of purchase, in accordance with the warranty regulations described below. If the product shows any defects within the specified warranty period that are not due to normal wear and tear and/or improper handling by the user, BEHRINGER shall, at its sole discretion, either repair or replace the product.
2. If the warranty claim proves to be justified, the product will be returned to the user freight prepaid.
3. Warranty claims other than those indicated above are expressly excluded.

§ 3 RETURN AUTHORIZATION NUMBER

1. To obtain warranty service, the buyer (or his authorized dealer) must call BEHRINGER (see enclosed list) during normal business hours **BEFORE** returning the product. All inquiries must be accompanied by a description of the problem. BEHRINGER will then issue a return authorization number.
2. Subsequently, the product must be returned in its original shipping carton, together with the return authorization number to the address indicated by BEHRINGER.
3. Shipments without freight prepaid will not be accepted.

§ 4 WARRANTY REGULATIONS

1. Warranty services will be furnished only if the product is accompanied by a copy of the original retail dealer's invoice. Any product deemed eligible for repair or replacement by BEHRINGER under the terms of this warranty will be repaired or replaced within 30 days of receipt of the product at BEHRINGER.
2. If the product needs to be modified or adapted in order to comply with applicable technical or safety standards on a national or local level, in any country which is not the country for which the product was originally developed and manufactured, this modification/adaptation shall not be considered a defect in materials or workmanship. The warranty does not cover any such modification/adaptation, irrespective of whether it was carried out properly or not. Under the terms of this warranty, BEHRINGER shall not be held responsible for any cost resulting from such a modification/adaptation.

3. Free inspections and maintenance/repair work are expressly excluded from this warranty, in particular, if caused by improper handling of the product by the user.

This also applies to defects caused by normal wear and tear, in particular, of faders, potentiometers, keys/buttons and similar parts.

4. Damages/defects caused by the following conditions are not covered by this warranty:

- ▲ misuse, neglect or failure to operate the unit in compliance with the instructions given in BEHRINGER user or service manuals.
- ▲ connection or operation of the unit in any way that does not comply with the technical or safety regulations applicable in the country where the product is used.
- ▲ damages/defects caused by force majeure or any other condition that is beyond the control of BEHRINGER.

5. Any repair or opening of the unit carried out by unauthorized personnel (user included) will void the warranty.

6. If an inspection of the product by BEHRINGER shows that the defect in question is not covered by the warranty, the inspection costs are payable by the customer.

7. Products which do not meet the terms of this warranty will be repaired exclusively at the buyer's expense. BEHRINGER will inform the buyer of any such circumstance. If the buyer fails to submit a written repair order within 6 weeks after notification, BEHRINGER will return the unit C.O.D. with a separate invoice for freight and packing. Such costs will also be invoiced separately when the buyer has sent in a written repair order.

§ 5 WARRANTY TRANSFERABILITY

This warranty is extended exclusively to the original buyer (customer of retail dealer) and is not transferable to anyone who may subsequently purchase this product. No other person (retail dealer, etc.) shall be entitled to give any warranty promise on behalf of BEHRINGER.

§ 6 CLAIM FOR DAMAGES

Failure of BEHRINGER to provide proper warranty service shall not entitle the buyer to claim (consequential) damages. In no event shall the liability of BEHRINGER exceed the invoiced value of the product.

§ 7 OTHER WARRANTY RIGHTS AND NATIONAL LAW

1. This warranty does not exclude or limit the buyer's statutory rights provided by national law, in particular, any such rights against the seller that arise from a legally effective purchase contract.
2. The warranty regulations mentioned herein are applicable unless they constitute an infringement of national warranty law.

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BEHRINGER Spezielle Studioteknik GmbH, Hanns-Martin-Schleyer-Str. 36-38, 47877 Willich-Münchheide II, Germany

Tel. +49 (0) 21 54 / 92 06-0, Fax +49 (0) 21 54 / 92 06-30