User Manual

VIRTUALIZER 3D FX2000

High-Performance 3D Multi-Engine Effects Processor

behringer

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Table of Contents

Thank you

In purchasing the BEHRINGER VIRTUALIZER 3D you have acquired an extremely efficient multi-effects processor that offers first class reverberation effects and a number of other algorithms. The FX2000 has 71 new effects types, and thanks to its logically structured user interface, it can be used easily and intuitively.

EN Important Safety Instructions

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CAUTION
RISK OF ELECTRIC SHOCK!
DO NOT OPEN!
ATTENTION
RISQUE DE CHOC ELECTRIQUE!
NE PAS OUVRIR!

Terminals marked with this symbol carry electrical current of sufficient magnitude to constitute risk of electric shock. Use only high-quality commercially-available speaker cables with ¼" TS plugs pre-installed. All other installation or modification should be performed only by qualified personnel.

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. Please read the manual.

Caution
To reduce the risk of electric shock, do not remove the top cover (or the rear section). No user serviceable parts inside. Refer servicing to qualified personnel.

Caution
To reduce the risk of fire or electric shock, do not expose this appliance to rain and moisture. The apparatus shall not be exposed to dripping or splashing liquids and no objects filled with liquids, such as vases, shall be placed on the apparatus.

Caution
These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operation instructions. Repairs have to be performed by qualified service personnel.

1. Read these instructions.

2. Keep these instructions.

3. Heed all warnings.

4. Follow all instructions.

5. Do not use this apparatus near water.

6. Clean only with dry cloth.

7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11. Use only attachments/accessories specified by the manufacturer.

12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15. The apparatus shall be connected to a MAINS socket outlet with a protective earthing connection.

16. Where the MAINS plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

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EN

LIMITED WARRANTY

§ 1 Warranty

① This limited warranty is valid only if you purchased the product from a MUSIC Group Authorized Reseller in the country of purchase. A list of authorized resellers can be found on BEHRINGER's website behringer.com under "Where to Buy", or you can contact the MUSIC Group office closest to you.

② MUSIC Group* warrants the mechanical and electronic components of this product to be free of defects in material and workmanship if used under normal operating conditions for a period of one (1) year from the original date of purchase (see the Limited Warranty terms in § 4 below), unless a longer minimum warranty period is mandated by applicable local laws. If the product shows any defects within the specified warranty period and that defect is not excluded under § 4, MUSIC Group shall, at its discretion, either replace or repair the product using suitable new or reconditioned product or parts. In case MUSIC Group decides to replace the entire product, this limited warranty shall apply to the replacement product for the remaining initial warranty period, i.e., one (1) year (or otherwise applicable minimum warranty period) from the date of purchase of the original product.

③ Upon validation of the warranty claim, the repaired or replacement product will be returned to the user freight prepaid by MUSIC Group.

④ Warranty claims other than those indicated above are expressly excluded.

PLEASE RETAIN YOUR SALES RECEIPT. IT IS YOUR PROOF OF PURCHASE COVERING YOUR LIMITED WARRANTY. THIS LIMITED WARRANTY IS VOID WITHOUT SUCH PROOF OF PURCHASE.

§ 2 Online registration

Please do remember to register your new BEHRINGER equipment right after your purchase at behringer.com under "Support" and kindly read the terms and conditions of our limited warranty carefully. Registering your purchase and equipment with us helps us process your repair claims quicker and more efficiently. Thank you for your cooperation!

§ 3 Return materials authorization

① To obtain warranty service, please contact the retailer from whom the equipment was purchased. Should your MUSIC Group Authorized Reseller not be located in your vicinity, you may contact the MUSIC Group Authorized Fulfiller for your country listed under

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"Support" at behringer.com. If your country is not listed, please check if your problem can be dealt with by our "Online Support" which may also be found under "Support" at behringer.com. Alternatively, please submit an online warranty claim at behringer.com BEFORE returning the product. All inquiries must be accompanied by a description of the problem and the serial number of the product. After verifying the product's warranty eligibility with the original sales receipt, MUSIC Group will then issue a Return Materials Authorization ("RMA") number.

(2) Subsequently, the product must be returned in its original shipping carton, together with the return authorization number to the address indicated by MUSIC Group.

(3) Shipments without freight prepaid will not be accepted.

§ 4 Warranty Exclusions

(1) This limited warranty does not cover consumable parts including, but not limited to, fuses and batteries. Where applicable, MUSIC Group warrants the valves or meters contained in the product to be free from defects in material and workmanship for a period of ninety (90) days from date of purchase.

(2) This limited warranty does not cover the product if it has been electronically or mechanically modified in any way. 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. This limited warranty does not cover any such modification/adaptation, regardless of whether it was carried out properly or not. Under the terms of this limited warranty, MUSIC Group shall not be held responsible for any cost resulting from such a modification/adaptation.

(3) This limited warranty covers only the product hardware. It does not cover technical assistance for hardware or software usage and it does not cover any software products whether or not contained in the product. Any such software is provided "AS IS" unless expressly provided for in any enclosed software limited warranty.

(4) This limited warranty is invalid if the factory-applied serial number has been altered or removed from the product.

(5) Free inspections and maintenance/repair work are expressly excluded from this limited 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, crossfaders, potentiometers, keys/buttons, guitar strings, illuminants and similar parts.

(6) Damage/defects caused by the following conditions are not covered by this limited warranty:

- improper handling, 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;

- damage/defects caused by acts of God/Nature (accident, fire, flood, etc) or any other condition that is beyond the control of MUSIC Group.

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

(8) If an inspection of the product by MUSIC Group shows that the defect in question is not covered by the limited warranty, the inspection costs are payable by the customer.

(9) Products which do not meet the terms of this limited warranty will be repaired exclusively at the buyer's expense. MUSIC Group or its authorized service center will inform the buyer of any such circumstance. If the buyer fails to submit a written repair order within 6 weeks after notification, MUSIC Group 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.

(10) MUSIC Group Authorized Resellers do not sell new products directly in online auctions. Purchases made through an online auction are on a "buyer beware" basis. Online auction confirmations or sales receipts are not accepted for warranty verification and MUSIC Group will not repair or replace any product purchased through an online auction.

§ 5 Warranty transferability

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

§ 6 Claim for damage

Subject only to the operation of mandatory applicable local laws, MUSIC Group shall have no liability to the buyer under this warranty for any consequential or indirect loss or damage of any kind. In no event shall the liability of MUSIC Group under this limited warranty exceed the invoiced value of the product.

§ 7 Limitation of liability

This limited warranty is the complete and exclusive warranty between you and MUSIC Group. It supersedes all other written or oral communications related to this product. MUSIC Group provides no other warranties for this product.

§ 8 Other warranty rights and national law

(1) This limited warranty does not exclude or limit the buyer's statutory rights as a consumer in any way.

(2) The limited warranty regulations mentioned herein are applicable unless they constitute an infringement of applicable mandatory local laws.

(3) This warranty does not detract from the seller's obligations in regard to any lack of conformity of the product and any hidden defect.

§ 9 Amendment

Warranty service conditions are subject to change without notice. For the latest warranty terms and conditions and additional information regarding MUSIC Group's limited warranty, please see complete details online at behringer.com.

1. Introduction

In order to generate an extremely natural reverberation, we at BEHRINGER have developed new kinds of algorithms for virtual acoustics. These algorithms will help you calculate all room and reverberation parameters with absolutely professional quality and naturalness.

In spite of this extensive and calculation-intensive work performed by the 24-bit processor in the FX2000, the VIRTUALIZER 3D is very easy to handle. Changing parameters to achieve a specific sound is simple. There are 100 presets available to store your own programs.

The FX2000 includes excellent reverb and delay programs, but that's not all. Besides the classic plate reverb simulations, the VIRTUALIZER 3D will impress you with its excellent modulation effects (like chorus, flanger and phaser), which were extended to include special variations like a musical pitch shifter, a tremolo, and a rotary speaker simulation. The FX2000's dynamic and psycho-acoustic effects allow you to do without a number of additional pieces of equipment. The FX2000 also offers you a series of distortion and amplification sounds that are combined with a speaker simulation. Thus, as a guitarist in recording situations, you can achieve an excellent sound on tape or hard disk, even without a speaker cabinet. Besides its logical and simple operation, the VIRTUALIZER 3D's technical equipment is also impressive. The following points ensure signal processing at a professional level:

- Extremely low-noise and exact 24-bit A/D and D/A converters.
- A professional sample rate of 46 kHz guarantees a high signal resolution for a frequency response of 20 Hz to 20 kHz.
- The 24-bit processor features dual engine software; these two sections process audio input independently.
- As for all BEHRINGER products, the highest quality components and controls are used.
- ◊ **The following instructions will give you a brief run-down on the terminology and functions of the VIRTUALIZER 3D. After reading, please store this manual in a safe place for future reference.**

1.1 The concept

BEHRINGER uses an uncompromising selection of components. The heart of the BEHRINGER VIRTUALIZER 3D is a 24-bit DSP, which, due to its exceptional technical specifications, is regarded as one of the finest building blocks. With it come the first class 24-bit A/D-D/A converters, guaranteeing a precise conversion of audio signals. Narrow-range tolerance resistances and capacitors, high-grade switches, and other selected components are all very high in quality.

The VIRTUALIZER 3D was manufactured on the basis of SMD technology (Surface Mounted Device). The use of sub-miniature building blocks known from space flights allows not only an extreme packing density but also ensures an increased dependability. The FX2000 was manufactured under ISO9000 certified management system.

1.2 Before you get started

The VIRTUALIZER 3D was carefully packed in the factory to ensure safe transport. Nevertheless, if the box shows signs of damage, please check the equipment immediately for any signs of external damage.

◊ **Damaged units should NEVER be sent directly to us. Please inform the dealer from whom you acquired the unit immediately as well as the transportation company from which you took delivery of the unit. Otherwise, all claims for replacement/repair may be rendered invalid.**

◊ **To assure optimal protection of your FX2000 during use or transport, we recommend utilizing a carrying case.**

◊ **Please always use the original packaging to avoid damage due to storage or shipping.**

◊ **Never let unsupervised children play with the FX2000 or with its packaging.**

◊ **Please dispose of all packaging materials in an environmentally-friendly fashion.**

The BEHRINGER VIRTUALIZER 3D requires one standard 19" rack unit of space (1 ¾"). Please leave an additional 4" installation depth to allow connections at the rear side.

Make sure that there is adequate ventilation and do not place the VIRTUALIZER 3D on top of an amplifier, which could cause overheating.

◊ **Before connecting the VIRTUALIZER 3D to the mains, carefully check that your equipment is set to the correct voltage:**

The fuse holder on the female mains connector has 3 triangular markings, with two of these triangles opposing each other. The VIRTUALIZER 3D is set to the operating voltage printed next to these markers and can be set to another voltage by turning the fuse holder by 180°. **CAUTION: This instruction does not apply to export models exclusively designed, e.g. for 120-V operation!**

Connection to the mains is made by a mains cable with an IEC receptacle that complies with the required safety regulations.

◊ **Please make sure that the unit is grounded at all times. For your own protection, you should never tamper with the grounding of the cable or the unit itself. The unit shall always be connected to a mains socket outlet with a protective earthing connection.**

◊ **Installation and operation of this equipment must be carried out by competent staff only. Both before and after installation, the staff using the equipment should make sure that it is properly grounded since otherwise electrostatic discharge etc. can lead to an impairment of its operation. For more information, see chapter 6 "Installation".**

The BEHRINGER VIRTUALIZER 3D is equipped with electronically servo-balanced inputs and outputs. The circuit design features automatic hum suppression for balanced signals and thus ensures trouble-free operation, even at the highest operating levels. Externally induced mains hum, etc. can therefore be effectively suppressed. The automatic servo-function recognizes the presence of unbalanced connectors and adjusts the nominal level internally to avoid level differences between the input and output signals (6-dB correction).

The MIDI connectors (IN/OUT/THRU) are standard DIN plug connections. The data communication is isolated from ground by opto-couplers.

1.3 Online registration

Please register your new BEHRINGER equipment right after your purchase by visiting http://behringer.com and read the terms and conditions of our warranty carefully.

Should your BEHRINGER product malfunction, it is our intention to have it repaired as quickly as possible. To arrange for warranty service, please contact the BEHRINGER retailer from whom the equipment was purchased. Should your BEHRINGER dealer not be located in your vicinity, you may directly contact one of our subsidiaries. Corresponding contact information is included in the original equipment packaging (Global Contact Information/European Contact Information). Should your country not be listed, please contact the distributor nearest you. A list of distributors can be found in the support area of our website (http://behringer.com).

Registering your purchase and equipment with us helps us process your repair claims more quickly and efficiently.

Thank you for your cooperation!
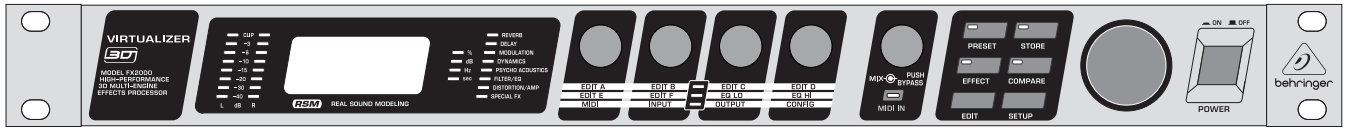
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1.4 Control elements

Fig. 1.1: VIRTUALIZER 3D front panel

The BEHRINGER VIRTUALIZER 3D's front panel includes five edit controls (non-intermittent rotary controls), a jog wheel (big rotary control), six parameter keys, an LED display and a mains switch. Each of the two fully independent channels can be monitored with an 8-digit LED meter.
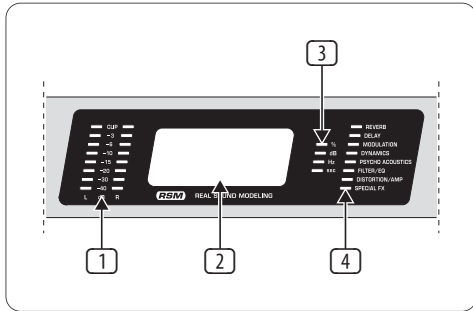

Fig. 1.2: Display section of the VIRTUALIZER 3D

(1) Both the LED chains display the intensity of the input signal in dB in relation to the nominal level, which is selected on the rear panel with the OPERATING LEVEL switch.

(2) After you switch on the VIRTUALIZER 3D, you can read the name of the last used effect on the LED display. When editing, the LED display shows the parameter's name along with a 4-digit alpha-numeric display that shows the absolute parameter's value.

(3) To the right of the LED display are four STATUS LEDs which indicate the type of value you are working with. You may do any of the following:

- set the absolute value of an effect parameter ("%"),

- increase or decrease the amplitude or determine the threshold point of the compressor ("dB"),

- modify a frequency ("Hz") or

- modify a time parameter ("sec").

(4) The ALGORITHM GROUPS LED CHAIN indicates which category the selected effect belongs to. Altogether the FX2000 offers eight different algorithm groups.
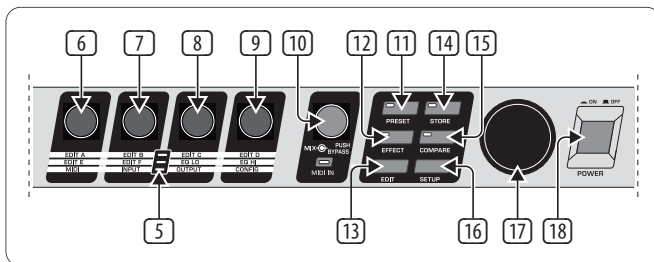

Fig. 1.3: Function keys, controls and jog wheel

(5) Every preset in the FX2000 allows you to edit at least four effect parameters. The EDIT-LED-CHAIN indicates which parameters are adjusted by the four EDIT CONTROLs. If the top LED lights up, (6) controls the parameter EDIT A, (7) controls EDIT B, (8) helps in changes of parameter EDIT C and with (9) you change the setting of parameter EDIT D. If the middle LED of the EDIT-LED-CHAIN lights up, the four EDIT CONTROLs modify the parameters that are arranged to its left and right. The lower LED functions correspondingly.

◊ **For the exact meaning of the individual effect parameters, see chapter 7.1.**

(6) With the **1st EDIT CONTROL** (non-intermittent rotary control) you change the values of the first (**EDIT A**) and fifth (**EDIT E**) effect parameters. You can also select MIDI functions (**MIDI**) with the 1st EDIT CONTROL. Press the EDIT key (13) to switch from EDIT A to EDIT E and vice versa. You reach the MIDI function by pressing the SETUP key (16).

(7) The **2nd EDIT CONTROL** allows you to modify the values of effect parameters **EDIT B** and **EDIT F**. When you select the **INPUT** parameter with the help of the SETUP key, you can specify whether the FX2000 functions mono or stereo mode (see chapter 3.6.2 for more information).

(8) The **3rd EDIT CONTROL** modifies the values of effect parameters **EDIT C**, **EQ LO**, and the global **OUTPUT** parameter (see chapter 3.6.3). Here, as well, you select among them using the EDIT and SETUP keys.

(9) With the **4th EDIT CONTROL**, you modify the values of effect parameters **EDIT D**, **EQ HI**, and the global parameter **CONFIG** (see chapter 3.6.4). Use the EDIT and SETUP keys to choose between the parameters.

◊ **During editing, you can rotate one of the four EDIT CONTROLs minimally to display a brief description of the current parameter active. This can help you know that, for example, EDIT A controls the pre delay for all reverb effects of the VIRTUALIZER 3D. After approximately one second the name is erased and the parameter's current value is displayed. This function can be used only by operating one of the controls that has not yet been selected.**

(10) By turning the **MIX/BYPASS CONTROL** the effect levels of most effect algorithms are set in the range from 0 to 100%. If you select 0%, the signal at the inputs of FX2000 is transferred directly to the outputs without adding any effects (the signal is completely dry). If you select 100%, only the effected signal is sent to the outputs (the signal is completely wet).

◊ **If you use the FX2000 in the aux bus with your mixing console, you should always set this value at 100%. if you're using the FX2000 with a guitar amplifier (in a serial effects loop), we suggest settings between 20 and 50% (depending on the amplifier type).**

◊ **Please note that, for the effects "parametric" and "graphic EQ", the MIX/BYPASS CONTROL allows a gain correction by rotation.**

To bypass the FX2000's effects, press the MIX/BYPASS CONTROL. This allows you to compare between the original and the effected signals. Press the MIX/BYPASS CONTROL again to deactivate the bypass and return to your chosen effect. When the MIDI IN LED below the control flickers, it indicates that MIDI data is arriving at the MIDI IN port.
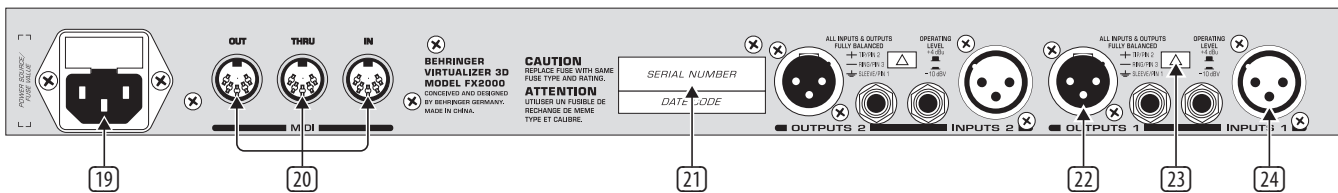
Fig. 1.4: VIRTUALIZER 3D rear panel

◊ **Both the MIX/BYPASS CONTROL and the four EDIT CONTROLs react dynamically. This means that, depending how fast you rotate the wheels, the present parameter is changed in steps of 1, 2, 5 or 10. The faster the rotation, the greater the change in the parameter value.**

⑪ To select one of the 200 presets, press the **PRESET** key once, then rotate the JOG WHEEL ⑰.

⑫ To select one of the 71 basic effect algorithms, press the **EFFECT** key once, then rotate the JOG WHEEL. For information on the parameter values that are set for the basic effect algorithms, see chapter 7.4.

⑬ To select the EDIT CONTROL function (see ⑥ - ⑨), press the EDIT key.

⑭ When you make changes to a user preset, the **STORE** key's **LED** begins to blink. The FX2000 comprises 100 user presets for your own settings and 100 factory presets (see separate preset sheet). To save your changes, press the STORE key. Select a storage space (number) with the Jog Wheel and confirm it by pressing the STORE key again.

⑮ If you have made changes to a preset and the LED of the STORE key is blinking, you can press the **COMPARE** key to temporarily restore the preset's original settings. While these settings are loaded, the COMPARE key's LED blinks and "COMP" appears in the LED display. Press the COMPARE key again to return to edit mode and store your changes.

⑯ To enter SETUP mode, press the **SETUP** key. In setup mode, you can access the parameters shown below the four EDIT CONTROLs. For more information about SETUP mode, see chapter 3.6.

⑰ To change a parameter's value, rotate the **JOG WHEEL**. To increase the value, turn the wheel clockwise. To decrease the value, turn the wheel counterclockwise. If none of the edit functions is selected, you can select a program directly with the Jog Wheel. When you do so, a spot lights up in the LED display. As long as the spot is illuminated, a program can be selected without making the corresponding settings immediately audible. This brief signal suppression means that during quick selection of presets with the Jog Wheel, not every preset is activated directly. If the Jog Wheel is not turned for a second, the spot in the LED display disappears and the program is loaded.

⑱ Use the **POWER** switch to power up your FX2000. The POWER switch should always be in the "Off" position when you are about to connect your unit to the mains.

◊ **To disconnect the unit from the mains, pull out the mains cord plug. When installing the product, ensure that the plug is easily accessible. If mounting in a rack, ensure that the mains can be easily disconnected by a plug or by an all-pole disconnect switch on or near the rack.**

⑲ **FUSE HOLDER / VOLTAGE SELECTION**. Before connecting the FX2000, confirm that the voltage display matches your local mains voltage. When replacing the fuse, you must always use the same type. In many units the fuse holder can be installed in one of two positions, allowing you to switch between 230 V and 120 V. If you wish to operate a unit outside Europe at 120 V, then a stronger fuse must be used. (For more information, see chapter 8 "SPECIFICATIONS"). The mains connection is made via the IEC receptacle. An appropriate mains cable is included.

⑳ The FX2000 has wide-ranging MIDI implementation. **MIDI IN**, **MIDI OUT**, and **MIDI THRU** connectors are available for transmitting MIDI commands.

㉑ **SERIAL NUMBER**. Please complete and return the warranty card within 14 days of the date of purchase. Otherwise, you will lose your right to the extended warranty. Alternatively, you can register online at our website under behringer.com.

㉒ The FX2000's balanced **OUTPUTs** are designed as ¼" TRS and XLR sockets.

㉓ To switch between -10 dBV (home recording level) and +4 dBu (professional studio level), use the **OPERATING LEVEL SWITCH**. When you switch between the two, the level displays are automatically changed to the nominal level and the VIRTUALIZER 3D operates in its optimal working range.

㉔ Both of the VIRTUALIZER 3D's **INPUTs** are also available as balanced ¼" TRS and XLR sockets.

2. Effects Algorithms

All effects of digital effects equipment are based on various algorithms. An algorithm for a reverb effect, for example, is programmed differently than a chorus algorithm. Each effect has a certain algorithm with which the digital input signal is processed. The processing takes place within the digital signal processor (DSP). After the effect is generated and the input signal is mixed, the digital signal is converted back into an analog signal with a D/A converter.

You can edit up to seven parameters for each preset in the VIRTUALIZER 3D. The changes you make will influence the sound in different ways. An overview of the FX2000's various effects algorithms follows.

FX REVERB

2.1 Reverb algorithms

REVERB: As the term suggests, a "reverb" is a reverberation effect. The reverb can be considered as the most important effect in a mix-down or a live event. The FX2000 offers 12 different reverberation programs so that you have a suitable reverb for every situation. **Cathedral** simulates the dense, long reverberation of a large cathedral, which is appropriate for solo instruments or vocals in slow pieces. **Gold Plate** simulates the sound of plate reverberators and hence is a classic for drums (snare) and vocals. **Small Hall** simulates a small, lively (strongly reflecting) hall. With **Room**, you can clearly hear the walls of the room. **Studio** represents a small- to middle-sized room. With **Concert**, you can select between a small theater and a large hall. **Stage** is well suited to dissipating the sound of a keyboard or an acoustic guitar. **Spring Reverb** simulates a classic spring reverberation. **Ambience** reproduces a room impression without late reflections. With **Early Reflections**, the initial reflections of a room are clearly audible.

GATED REVERB: This effect synthetically cuts off reverberation after a period of time. It is famous in the song "In the Air Tonight" by Phil Collins.

REVERSE REVERB: This is a reverberation in which the envelope is reversed—it slowly gets louder.

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Parameter	Function
Pre Delay	Time until arrival of first reflection(s)
Decay	Duration until the reverb tail is damped
Hi Decay Damping	Damps high frequencies in the reverb tail
Size	Size of the plate reverb/the room impression
Diffusion	Degree of wall diffusion (reverb density)
Wall Damp.	Degree of damping of the wall material
Bass Mul.	Amplification/damping of low frequencies in the reverb tail
Low Cut	Frequency of Low Cut Filter[1] at the input stage
Metal Resonance	Intensity of metal resonances
Reflections	Number of initial reflections
Shelver Damp.	Damps Shelving Filter[2] at the input stage
High Cut	Frequency response of spring reverb (**Spring Reverb**)
Stereo Width	Stereo depth of the effect
Reverb Mod.	Modulation intensity of the reverb tail
ER/Rev.	Intensity ratio between initial reflections and reverb tail
Density	Intensity of reflection envelope build-up (**Gated / Reverse Reverb**)

Tab. 2.1: Functioning of the reverb effects' parameters

1 High pass filter, allows the frequencies above a specific cut-off frequency to pass and damps the frequencies below that."

2   Upper or lower cut-off frequency of an equalizer.

FX DELAY

2.2 Delay algorithms

STEREO DELAY: A delay of the input signal. Different tempo settings allow interesting delay effects.

TAPE ECHO: Similar to the stereo delay, with the difference being that the repetitions have less presence. This simulates the character of the original tape echo that was used before the digital era and can be thought of as a "Vintage Sound". The tape echo's reflections include high and low pass filters.

PING PONG: A delay effect with changing stereo positioning, where the time intervals between the repetitions can be changed.

Parameter	Function
Delay Left	Length of left delay (**Tape Echo** / **Ping Pong**)
Delay Left Coarse	Length of delay time (left) in 100 ms steps
Delay Left Fine	Length of delay time (left) in 1 ms steps
Delay Right	Length of right delay (**Tape Echo** / **Ping Pong**)
Delay Right Coarse	Length of delay time (right) in 100 ms steps
Delay Right Fine	Length of delay time (right) in 1 ms steps
Feedback	Repetition(s) for both channels
Feedback Left	Repetition(s) for the left channel
Feedback Right	Repetition(s) for the right channel
Feedback Delay Left	Delay of the left feedback
Feedback Delay Right	Delay of the right feedback
Feedback HP	High pass cut-off frequency of repetition(s)
Feedback LP	Low pass[1] cut-off frequency of repetition(s)
Damping	Low pass frequency within the delay feedback loop (Tape Echo)

Tab. 2.2: Functioning of the delay effects' parameters

1 Filter, allows the frequency below a particular cut-off frequency to pass and damps the frequencies above that."

FX MODULATION

2.3 Modulation and pitch shifter effects

FLANGER: The word "flange" means "tape spool", and this explains the characteristics of the effect. Originally the flanger effect was generated with two tape recorders which ran synchronously. The same audio signal was recorded on both machines. If you put a finger on the left spool of one of the machines, the spool and the playback speed are slowed down. The generated delay results in phase shifting of the signals. **Vintage Flanger** simulates a guitar flanger effect pedal and **Jet Stream Flanger** sounds like a classic analog flanger.

CHORUS: This effect slightly detunes the original signal. A very pleasant detune effect is created in connection with the pitch variation. The chorus effect is quite often and extensively used for dispersing signals. **Analog Chorus** simulates a guitar chorus effect pedal, while **Vintage Chorus** imitates a classic analog studio chorus. **Ultra Chorus** creates the sound of an eight-person vocal chorus.

PHASER: With the phaser, a second, phase shifted signal is added to the original audio signal. The resulting sound is thicker and above all livelier. This effect is often used for guitar sounds and keyboards. In the 70s, it was also extensively used for other instruments like electric pianos. Here, **Vintage Phaser** represents a guitar phaser effect pedal. **Dual Phaser** processes the left and the right channels separately.

LESLIE: The simulation of a classic effect that is normally generated with a very heavy enclosure with a (slow or fast) rotating speaker: The bass speaker (drum) is covered by a partly opened rotating cap, while both of the high pitch horns (horn), displaced by 180°, revolve around the same perpendicular axis. Here, the physical principle of the Doppler effect for modulation of signals is used.

PITCH SHIFTER: This effect changes the pitch of the input signal. You can generate musical intervals and harmonies or simply a single voice. Detuning by several semitones upward alienates voices (and is used often in cartoons). Here, you can choose among a stereo, two, and three vocal pitch shifter. At the left stop of Edit C the pitch shifters 1 and 2 are synchronized to a stereo pitch shifter. Pitch shifter 3 can be switched off by turning Edit E fully counterclockwise.

VIBRATO: For this effect, the peak frequency of a tone is periodically and uniformly changed (quickly or slowly). It is often used for guitar playing.

TREMOLO: This effect was originally found on guitar amplifiers, and is once again trendy. It is a fast or slow periodic variation of the volume.

AUTO PANNING: This sound effect, which was very popular in the beginnings of stereo technique, is achieved by allowing a sound source (often the lead guitar or a synthesizer) to wander from one end of the stereo image to another or by just letting it wander repeatedly.

Parameter	Function
Speed	Speed of modulation
LFO[1] Wave	Sets the curve of the modulation (triangular, sinusoidal, rectangular)
Depth	Modulation depth (L & R)
Delay	Length of delay
Feedback	Routes back the processed signal to the input stage
Wave	Sets the curve of the LFO (Sine, Tri, Opto, Square, Saw Up, Saw Down)
Semitones 1	Pitch Shifter 1: detuning in semitones
Semitones 2	Pitch Shifter 2: detuning in semitones
Semitones 3	Pitch Shifter 3: detuning in semitones
Cents 1	Pitch Shifter 1: detuning in cents
Cents 2	Pitch Shifter 2: detuning in cents
Cents 3	Pitch Shifter 3: detuning in cents
Drum Depth	Intensity of amplitude modulation of the bass loudspeaker (**Leslie**)
Horn Depth	Intensity of amplitude modulation of the high pitch horn (**Leslie**)
Balance	Volume ratio between horn and drum
Stereo Spread	Stereo effect intensity
Stereo Phase	Phase angle between left and right modulation
Wideness	Parameter variation (**Ultra Chorus**)
Base	Starting point of modulation
Drive	Intensity of tube distortion
Mode	Selects various effect modes or between three modes with increasing modulation intensity (**Stereo Phaser**)
Auto Modulation	Influences LFO frequency (dependent on input level)
Feedback LP	Low pass cut-off frequency of feedback
Damping	Limits frequency range to simulate older chorus units (**Stereo / Vintage Chorus**)

Tab. 2.3: Functioning of the modulation and pitch shifter effects' parameters

1 (Low Frequency Oscillator): determines the speed and nature of modulation effects.

FX DYNAMICS

2.4 Dynamic effects

COMPRESSOR/LIMITER: When the signal level exceeds the level control limit of the signal-processing unit, it must be limited dynamically to avoid distortions. This is achieved by installing a compressor or a limiter. The limiter abruptly limits the signal above a specified threshold, while a compressor acts "softly" over a large range. The **Analog Compr/Limiter** is modeled after a famous analog compressor unit.

EXPANDER: Background noises of all types (noise, humming etc) limit the dynamic range of the actual signal. As long as the level of the actual signal lies significantly above the background noise, the noise is inaudible. The interference signal in this case is masked by the actual signal. The expander is used to effectively expand the dynamic range of signals. Signals with small amplitudes (such as background noise) can be weakened, thereby reducing the background noise.

GATE: On stage and in studios, there are diverse applications where a noise gate is needed. For example, microphones that tend to cause feedback can be "defused". In addition, you can use a gate to eliminate unwanted noise. When used on vocals, for example, the signal is simply masked during pauses, thus eliminating all noise. Needless to say, a gate used on vocals has to open very quickly—otherwise, the first syllables of soft or whispered passages would not be audible.

ULTRAMIZER: The ultramizer function divides the sound spectrum into two frequency bands and, as a result, allows inaudible but extremely effective compression. This is especially helpful during mix-down. The FX2000 analyses the received audio material and automatically adjusts input gain and compression parameters.

DENOISER: The denoiser is used to eliminate or reduce noise and other interference.

DE-ESSER: A problem often encountered in recording situations, is the sibilant (Ssss) sound of the human voice. The de-esser is used to remove strong hissing sounds from the audio signal.

WAVE DESIGNER: Using this effect, you can influence the envelope of a signal by specifying its volume. A (= Attack) indicates the time a tone needs to reach its full volume. R (= Release) determines how long it takes before a tone dies away.

Parameter	Function
Ratio[1]	Degree of compression (Compressor) / expansion (Expander)
Threshold	Threshold point of Compressor / Expander / Gate
Limiter Threshold	Threshold point of Limiter
M-Gain	Make-up gain
Gain L	Make-up gain for left channel
Gain R	Make-up gain for right channel
Soft Knee	Bending of the characteristic curve[2] at the threshold point
Attack[3]	Response time
Attack L	Response time of left channel (Wave Designer)
Attack R	Response time of right channel (Wave Designer)
Release[4]	Release (right stop activates auto mode for Compr./Lim.)
Release L	Release of left channel
Release R	Release of right channel
Hold[5]	Time until release process sets in
Range	Degree of damping (Gate); dynamic limitation (Ultramizer)
Density	Degree of compression (Ultramizer)
Speed	Recovery time (the higher the faster)
Split Frequency	Split point between high and low band
Stereo FX	Intensity of the stereo enhancer
Enhancer Frequency	Frequency of the HF[6] enhancer
Band	Separates low, high band & wide (Ultramizer / De-Esser)
LP Frequency	Basic frequency (Denoiser)
LP Depth	Controls the amount of influence on the signal level (Denoiser)
LP Speed	Recovery time of low pass modulation (Denoiser)
Gate Hold	Time until the gate process sets in (Denoiser)
Gate Response	Gate recovery time (Denoiser)
Gate Threshold	Amount of signal needed to open the noise gate (Denoiser)
Frequency	Lower cut-off frequency of compression process (De-Esser)

Tab. 2.4: Functioning of the dynamic effects' parameters

1 Ratio determines the relation of input to output level for all signals which exceed the threshold point.

2 The Soft Knee characteristic curve prevents a high compression rate (high ratio) from sounding unnatural.

3 Attack determines the time which the processor requires to react to signals which exceed the threshold point.

4 Release determines the time that the processor needs after falling below the threshold point to reach the original level.

5 Hold determines the time before the release process sets in (release sets in after the signal falls below the threshold point).

6 High frequency.

FX PSYCHO ACOUSTICS

2.5 Psycho-acoustic effects

EXCITER: An exciter works with psycho-acoustic principles to add artificially generated overtones to the original signal, thereby increasing its presence and loudness (the subjective volume impression) without any significant increase of the signal level.

ENHANCER: The enhancer works like a dynamic pitch equalizer. Its effectiveness depends on the associated high frequencies and the intensity of the input signal.

ULTRA BASS: This awesome combination of sub-harmonic processor, bass exciter, and limiter adds a final touch to your music production.

STEREO IMAGER: This effect is used to process stereo main signals. The signal is first subdivided into middle and side signal (MS Matrix). Both parts can then be amplified when desired and placed on the stereo image.

ULTRA WIDE: This effect is suitable to pep up speaker systems with an especially broad stereo image.

BINAURALIZER: The binauralizer also extends the stereo image. Additionally, it compensates for inter-channel cross talk of both speakers (left loudspeaker on right ear and vice versa).

Parameter	Function
Gain	Gain correction
Frequency	Cut-off frequency of the side chain high pass filter[1] (**Exciter**)
Filter Q	Resonance of the high pass filter (emphasizes cut-off frequency for **Exciter**)
Timbre	Ratio of straight and unstraight harmonics (**Exciter**)
Harmonics Kick	Activates an amplification of harmonics dependent on the input level (**Exciter**)
Mix	Controls amount of harmonics (**Exciter**)
Bass Gain	Degree of the bass enhancer
Sub-bass Frequency	Cut-off frequency of the sub-bass low pass filter (**Ultra Bass**)
Sub-bass Level	Degree of sub-harmonics
Harmonics	Degree of synthetic harmonics (**Exciter**)
Harmonics Density	Density of harmonics (**Ultra Bass**)
Bass Gain	Degree of original bass signal (**Ultra Bass**)
Spread	Controls the influence on the stereo signal (**Stereo Imager**) / degree of stereo expansion (**Ultra Wide**)
Spread Mode	Selects between two different spread variations (**Stereo Imager**)
MS Balance	Ratio of middle and side signal (**Stereo Imager**)
Stereo Balance	Balance of stereo signal (**Stereo Imager**)
Mono Balance	Balance of mono signal (**Stereo Imager**)
Center	Amount of center impression in the stereo signal (**Ultra Wide / Binauralizer**)
Xover Frequency	Frequency of the crossover filter for the center signal (**Ultra Wide**)
Space	Degree of stereo wideness (**Binauralizer**)
Mode	Selects between headphones and speaker operation (**Binauralizer**)
Speaker Distance	Run time / speaker distance (**Binauralizer**)
Speaker Compensation	Degree of crosstalk compensation (**Binauralizer**)
High Frequency	Split frequency of the crossover filter for the side chain (**Enhancer**)
High Gain	Amount of added high frequencies (**Enhancer**)
Bass Width	Character of added bass frequencies (**Enhancer**)
Mid Q	Bandwidth of added mid frequencies (**Enhancer**)
Mid Gain	Amount of added mid frequencies (**Enhancer**)
Harmon. Freq.	Frequency of added bass harmonics (**Ultra Bass**)
Harmon. Level	Amount of added bass frequencies (**Ultra Bass**)

Tab. 2.5: Functioning of the psycho-acoustic effects' parameters

1   High pass filter, which allows frequencies above a specified cut-off frequency to pass and damps the frequencies lying below it.

FX FILTER/EQ

2.6 Filter/EQ effects

FILTER: Filters, in general, influence the frequency response of a signal. A low pass filter allows low frequencies to pass and suppresses high frequencies, while a high pass filter allows high frequencies to pass and suppresses low frequencies.

PARAMETRIC EQ: The parametric equalizer is the most highly-developed form of equalization. You can control the three parameters which define the so-called gauss equalizer curve: bandwidth, frequency and amplitude boosting or lowering.

GRAPHIC EQ: Eight filter bands are arranged next to each other for this graphic equalizer. In contrast to the parametric equalizer, frequency and bandwidth are pre-determined here.

Parameter	Function
Base Frequency	Cut-off frequency
Depth	Degree of influence
Resonance	Resonance of the filter
Type	Operating mode of the filter
Attack	Response time of the envelope follower
Release	Release time of the envelope follower
Speed	Speed of the LFO
Wave	Sets the curve of the LFO
Gain 1/2	Boost/cut (param. EQ)
Freq. 1/2	Mid frequency (param. EQ)
Q 1/2	Q factor (param. EQ)
200 Hz	Boost/cut at 200 Hz (graph. EQ)
400 Hz	Boost/cut at 400 Hz (graph. EQ)
800 Hz	Boost/cut at 800 Hz (graph. EQ)
1.6 kHz	Boost/cut at 1.6 kHz (graph. EQ)
3.2 kHz	Boost/cut at 3.2 kHz (graph. EQ)
6.4 kHz	Boost/cut at 6.4 kHz (graph. EQ)
Mix	Gain correction (Auto Filter / LFO Filter)
Gain	Output gain of the filter block (parametric / graphic EQ)

Tab. 2.6: Functioning of the filter/EQ effects' parameters

FX DISTORTION/AMP

2.7 Distortion effects and amp simulations

VOCAL DISTORTION: This effect is very hip when used on vocals and drum loops, and is combined with a delay and flanger.

TUBE DISTORTION: This effect simulates the sound of different tube types. When an analog tube, as found in a guitar amplifier, is overamplified by raising the input signal (e.g. of a guitar), the original signal is mixed with the harmonic overtones. With rising overmodulation (also known as saturation of tubes), the original signal is distorted and the sound is fresh and full. This is a classic sound in rock music.

GUITAR AMP: This effect simulates the sound characteristics of a complete guitar amplifier. You can connect a guitar or bass (after appropriate pre-amplification) directly to the VIRTUALIZER 3D, and from there to a mixing console or recording device.

TRI FUZZ: This is a special guitar distortion type. Jimi Hendrix was one of the first guitarists to recognize the appeal of this broadband transistor overmodulation. The humming distortion of the FUZZ BOX has again become popular with alternative rock and grunge. The VIRTUALIZER 3D's fuzz works in three different frequency bands.

SPEAKER SIMULATION: The VIRTUALIZER 3D is able to simulate various types of speakers. Typical guitar amplifying speakers as well as multimedia speakers are available. You can also use a parametric equalizer to further refine the sound.

RING MODULATOR: This effect allows a radical alienation of audio signals. Similar to the principle of FM radio, the signal is multiplied by a carrier frequency, so that frequency modulation (FM) takes place. This effect is very well suited for vocal alienation (robot voice).

LO-FI: For years, digital technique has been striving for high quality, low noise, and brilliant sounds. In the recent past there have been increasing calls for a return "to the roots" to achieve the warmth of the old analog sounds. The techno/dance group swears by vinyl and some music lovers miss the charm of good old vinyl discs and tape machines. This trend is known as Lo-Fi (instead of Hi-Fi). We have taken this tendency into account and included the relevant effect in the FX2000. Your recordings sound like 8-bit audio, complete with noise and humming like the old days! A true drum loop in TR808/TR909 style really gets going when it sounds thick and dusty.

Parameter	Function
Gain	Volume
Distortion	Distortion
Drive	Degree of tube distortion (**Tube Distortion & Guitar Amp**) / distortion at the output circuitry (**Tri Fuzz**)
Type	Nature of vocal distortion (**Vocal Distortion**) / selection of eight different loudspeakers (**Speaker Simulation**)
Delay	Length of delay
Delay Gain	Degree of delay
Flanger Level	Degree of flanger
Flanger Speed	Speed of flanger
Pre HP	Frequency of the in-series connected high pass filter
Pre LP	Frequency of the in-series connected low pass filter
Tube Selection	Selects between three tube types
Mid EQ	Mid equalizer
In Gain	Input gain
Low Fuzz	Distortion of low frequencies
Mid Fuzz	Distortion of mid frequencies
Hi Fuzz	Distortion of high frequencies
Cabinet Type	Selects between eight speaker types
Presence	Presence
Hi Damp	Damping of high frequency parts
EQ Gain	Raising or lowering of EQ
EQ Frequency	Frequency of EQ
EQ Q	Q factor of EQ
Speed	Speed of LFO
Depth	Modulation depth
Carrier Frequency	Modulation frequency
Mode	(**Ring Modulator**): LFO = The LFO modulates. ENV = Modulation through envelope follower. RAND = Modulation through random generator. SINE = The input signal is replaced by a sine tone and modulated by a random generator.
Slewing	Smoothing of modulation signal for RAND and SINE (**Ring Modulator**)
Bit Resolution	Resolution of D/A converter
Buzz Level	Intensity of the buzz level
Noise Gain	Volume of the noise
Noise HP	Lower cut-off frequency of the noise
Noise LP	Upper cut-off frequency of the noise
Damp	Frequency of low pass filter after the tube stage (**Tube Distortion**)
Tone	High frequency attenuation of input signal (**Ring Modulator / LoFi**)

Tab. 2.7: Parameter functions of distortion effects and amplification simulations

FX SPECIAL FX

2.8 Special effects

VINYLIZER: This effect adds clicks and/or noise to your audio signal, simulating old vinyl records and tape recorders.

SAMPLER: This sampler allows you to record up to five seconds of program material. Use Edit A for recording and Edit B for playback of the sampled material.

◊ **To clear the contents of the sampler, select a different effect.**

VOCODER: The vocoder, an old acquaintance, has become popular again due to the disco renaissance (hear it in "Around the World" by Daft Punk or "California" by 2Pac). A control signal (usually a voice) is used in the right channel to modulate another signal which lies on the left channel (usually a synthesizer sound). It sounds as if the synthesizer is talking (robot voice).

VOICE CANCELER: The voice canceler is a very effective Karaoke effect. It allows removal of mono vocal parts in stereo recordings. The bass part, however, remains untouched.

RESONATOR: A resonator simulates an oscillating system that amplifies a specific frequency. The resonator implemented here has a resonance frequency that can be modulated with positive and negative feedbacks of up to 100%.

Parameter	Function
Speed	Rotations per minute (Vinylizer) / playback speed (Sampler) / speed of LFO (resonator)
Clicks Level	Volume of clicks
Scratch Level	Volume of "cracks in the record"
Noise Level	Volume of noise
Noise Frequency	Frequency response of noise
Record / Stop	Start / stop recording
Play / Stop	Start / stop playback
Mode	Forward, backward playback, number of repetitions (Sampler) / Resonator: LFO modulates (LFO), modulation through envelope follower (ENV), modulation through random generator (RAND)
Sensitivity	Modulation intensity / input sensitivity
Attack	Response time of envelope follower
Release	Release time of envelope follower
Bass Frequency	Upper cut-off frequency of bass frequencies that are not effected
MS Balance	Degree of mid elimination
Treble Pan	Panorama of high frequencies
Gain	Gain correction
Depth	Modulation depth
Carrier Frequency	Modulation frequency
Feedback	Degree of feedback
Slewing	(Resonator): Smoothing of modulation signal for RAND and SINE
Tone	Frequency spectrum of input signal (Vinylizer)

Tab. 2.8: Parameter functions of special effects

FX SERIAL

2.9 Effects algorithm combinations (multi-effects programs)

Effects 61 to 71 are multi-effects algorithms, which allow different effects to be used simultaneously. Effect 61, for example, can make a solo guitar "wider" with chorus and simultaneously add a room reverb. Please note that you can modify the structure of a multi-effect (see chapters 3.1 and 3.6.4).

CHORUS & REVERB: This algorithm combines the popular chorus with a gold plate effect (as in algorithm 2).

FLANGER & REVERB: The combination of flanger and reverb effects.

LESLIE & REVERB: The input signal, modulated to a degree that you specify, is then processed with a reverb effect. This effect works especially well with keyboards and guitars.

PITCH & REVERB: The pitch shifter can be detuned in semitone or cent steps. The reverb, on the other hand, can be controlled in time and mixing ratio.

DELAY & REVERB: Delay and reverb are the most common combinations for vocals, solo guitars, etc. The reverb used here is a gold plate, a room that features a distinctive brilliance and can be used in many ways.

TREMOLO & REVERB: The intensive variation in volume of the tremolo gains more depth and wideness with the reverb.

PHASER & REVERB: The combination of a classic stereo phaser and a reverb effect.

CHORUS & DELAY: While the chorus can contribute to a wideness of the signal, interesting repetition effects can be adjusted with the delay. Vocals can be given a distinctive effect without making the voice sounding blurred.

FLANGER & DELAY: This effect is just right for creating a modern, slightly "spacey" vocal sound.

PITCH & DELAY: A repetition of the audio signal, with an oscillatory effect added by the pitch shifter.

TREMOLO & DELAY: A fast or slow, intensive variation of volume, which is additionally processed with a panorama effect.

Parameter	Function
Speed	Modulation speed
Reverb Mix	Wet/dry mix of modulation, delay and reverb effects (for algorithms 61 - 67)
Decay	Room size / duration of reverb tail
Depth	Intensity of delay, amplitude, or phase modulation
Doppler	Intensity of Doppler effect
Type	(Delay & Reverb): Selects among mono, stereo and ping pong delay or a filter in the feedback chain
Delay (Time)	Length of the delay
Delay Mix	(Chorus & Delay): Ratio of chorus and delay
Feedback	Degree of feedback
Semitones	Detuning in semitones
Cents	Detuning in cents
Auto Mod.	Influence on LFO frequency (dependent on the input level)
Hi Damp	Damps the high frequencies of the reverb programs
High Cut	Frequency range of the input signal (Pitch Shifter & Reverb)

Tab. 2.9: Parameter functions of multi-effects programs

◊ **For an overview of the parameters available in the individual programs refer to chapter 7.1.**

3. Operation

3.1 Effects structure

Algorithm No.	Effects structure
1-6, 8, 9	
7	
10	
11, 12	
13	
14	
15	
17-19, 21, 24, 26	
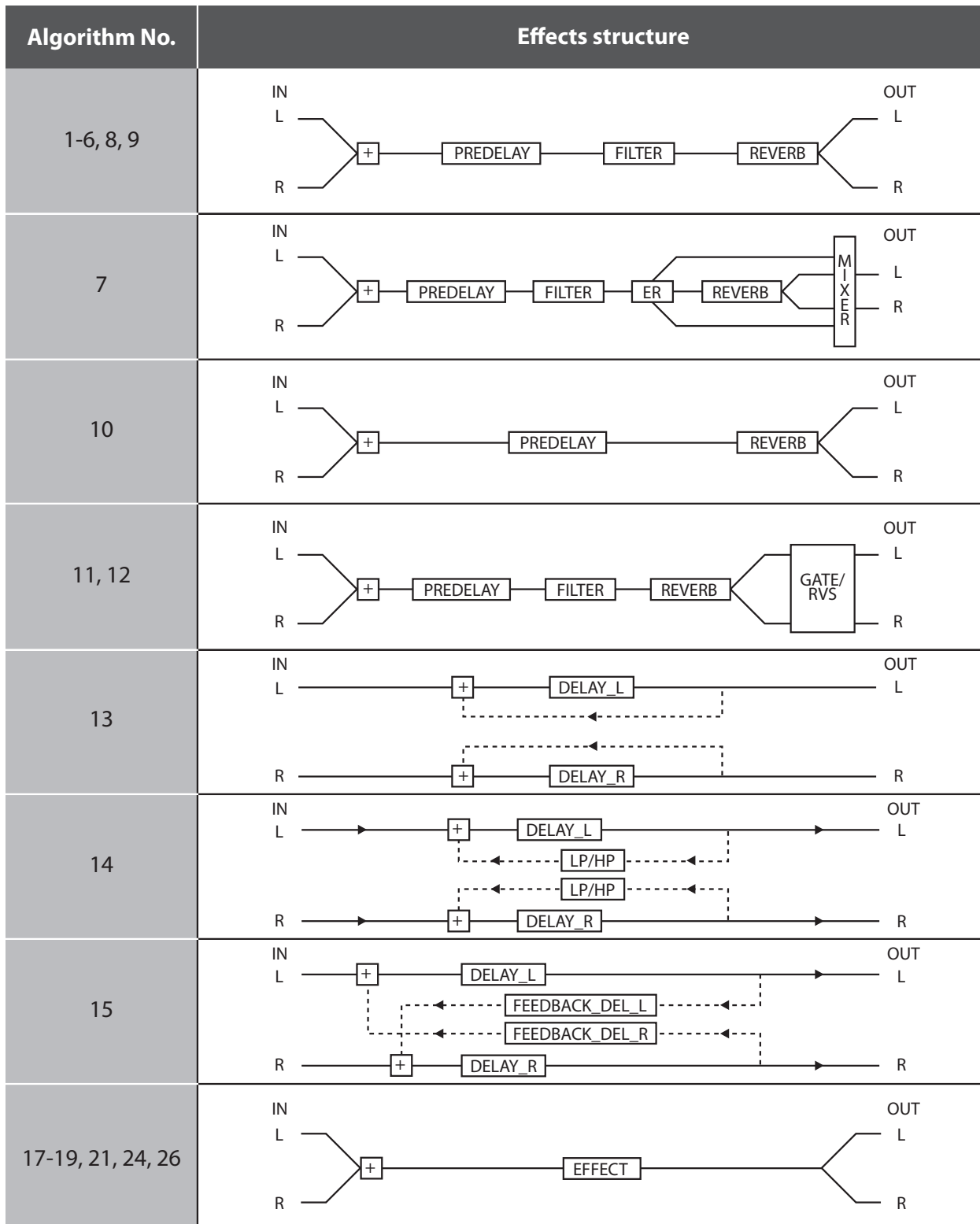
Fig. 3.1: Effects structure, part 1

EN

Algorithm No.	Effects structure
16, 20, 22, 23, 25, 28-30, 38-40, 45-48, 50, 53, 54, 57, 60	
27	
31-34	
35	
36	
37	
41	
42-44, 59	

Fig. 3.2: Effects structure, part 2

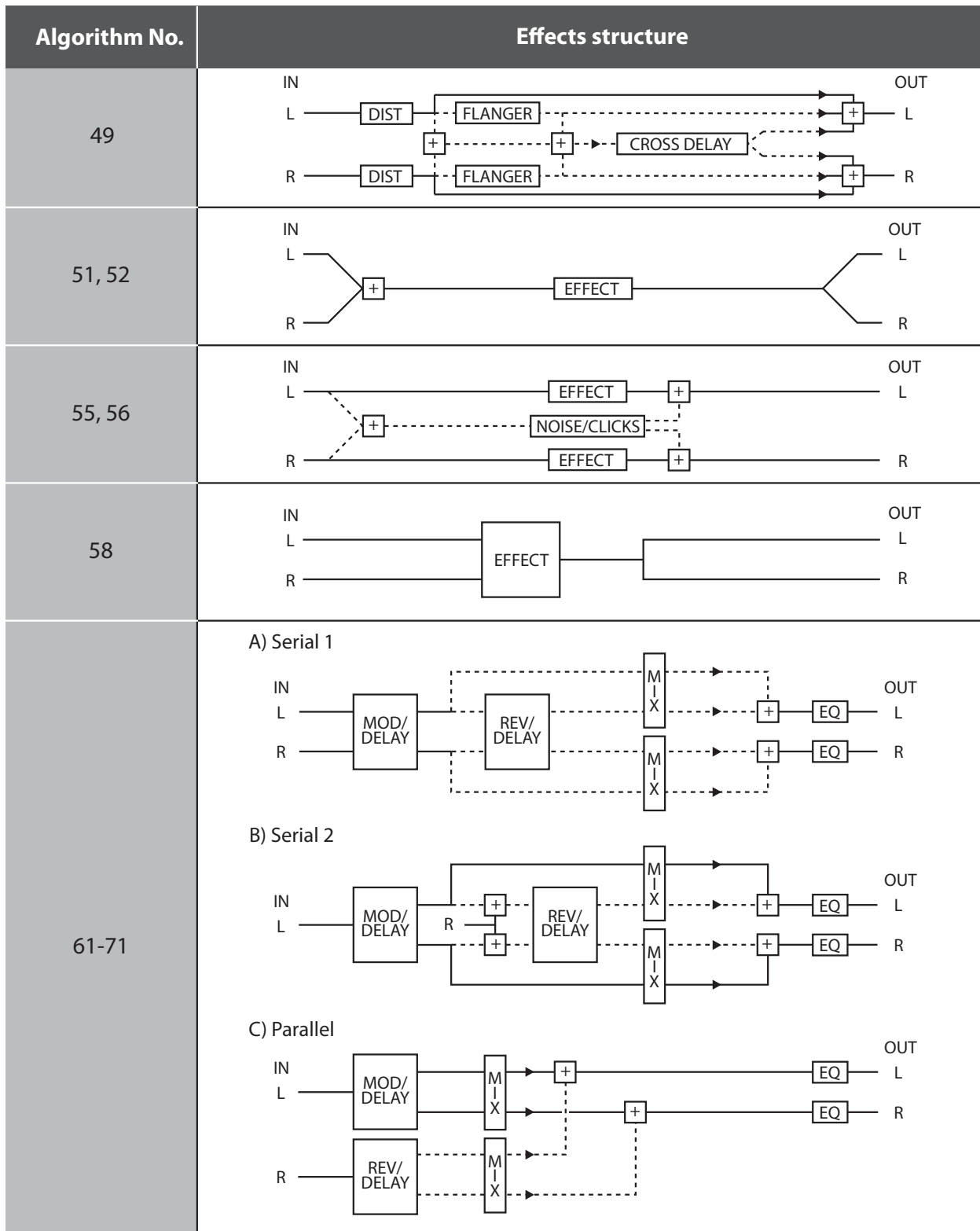| Algorithm No.	Effects structure
49	
51, 52	
55, 56	
58	
61-71	

Fig. 3.3: Effects structure, part 3

3.2 Calling up presets

The VIRTUALIZER 3D has 100 **internal presets** and 100 **user presets** that can be overwritten. The two memory banks are located one after another. The internal presets (I.000 - I.100) come first and the user presets (U.000 - U.100) follow.

After switching on the unit, the last used preset is automatically restored. To choose a different preset, press the PRESET key, then rotate the Jog Wheel. To see the presets in ascending order, rotate the wheel clockwise. To see the presets in descending order, rotate it counterclockwise.

◊ **Please note that it takes the VIRTUALIZER 3D about one second to activate each newly selected preset. The activation process is indicated by a blinking light on the display. After the new effect's data is loaded, the VIRTUALIZER 3D activates the preset and the light fades. This brief signal suppression means that during quick selection of presets with the Jog Wheel, not every preset is activated directly. Otherwise, there could be partial "shreds" of various presets at the audio outputs of the FX2000. The VIRTUALIZER 3D gives you the security that unwanted programs are not loaded. In addition, you can quickly turn the Jog Wheel and still have enough time to specifically select a preset without activating "neighboring programs".**

◊ **Please note that various effects algorithms may have different volume levels. Reduce the volume of your monitors while selecting new presets to prevent sudden changes in volume.**

3.3 Editing programs (Edit Mode)

Programs can be edited easily and quickly with the FX2000. The list on the right side of the LED DISPLAY gives you an overview of the effects algorithms that the VIRTUALIZER 3D can generate. To select these basic algorithms, press the EFFECT key and rotate the Jog Wheel.

By turning the EDIT CONTROLs and the MIX/BYPASS CONTROL, you can extensively modify the sound of an effects program. You select the EDIT CONTROL function using the EDIT key. By repeatedly pressing the EDIT key, you can (for example) specify whether parameter EDIT A or EDIT E will be changed with the 1st EDIT CONTROL.The currently illuminated LED indicates which parameters will be edited. By modifying the EQ LO and EQ HI parameters, you can put the final touch on an effect. As soon as you start editing, the LED of the PRESET or EFFECT key (depending on whether you have already loaded one of the 200 presets or have selected one of the basic algorithms) dies out. Simultaneously, the LED of the STORE key starts to blink, indicating that changes have been made.

3.4 Storing programs

To store changes to one of the 100 user presets, as described in chapter 3.3, you use the STORE key. All changes to the FX2000's parameters can be stored when the STORE key's LED blinks. For your changes to be accepted, you must press the STORE key twice. An example:

• You call up a program and make changes to it using the four EDIT CONTROLs and the MIX/BYPASS CONTROL. Each EDIT CONTROL controls two parameters that can be selected by pressing the EDIT key. During this process, the STORE key blinks, indicating that the preset's settings have been changed. However, your changes are not yet stored. If you want to overwrite the original preset, simply press the STORE key twice to store your changes. If you wish to retain the original preset, press the STORE key once. The display shows the current preset number and starts blinking. Use the Jog Wheel to select another preset, which you will overwrite. Press the STORE key again and your changes are stored in the selected preset.

◊ **If there is no input for about five seconds after pressing the STORE key, the unit goes back to edit mode.**

◊ **If you make changes in a preset and press the STORE key twice, all of the preset's original settings are overwritten and your new parameters are stored. If you want to retain the old preset, you must select another preset (using the Jog Wheel) before pressing the STORE key for the second time.**

3.5 Comparing an edited preset with the corresponding factory preset (compare function)

When you have made changes in a preset but have not yet stored your changes, the COMPARE Function allows you to load the original factory preset and compare it with your changes. To do so, press the COMPARE key while in edit mode. As long as the COMPARE key's LED blinks, further editing is (temporarily) not possible. Press the COMPARE key again to return to your edited preset. Here, you have the choice to either store your changes (see chapter 3.4), or continue editing (see chapter 3.3).

3.6 SETUP mode

In SETUP mode, you can make global adjustments to the VIRTUALIZER 3D as described in the sub-sections below. Among these are MIDI, Input mode, Output mode and dual engine configuration (CONFIG). To enter SETUP mode, press the SETUP key. The red LED below the EDIT CONTROLs lights up. The four EDIT CONTROLs can now be used to adjust the SETUP parameters. To exit this mode, press the SETUP key again.

3.6.1 MIDI control

The FX2000's MIDI editing options are shown on seven pages. Enter SETUP mode (see chapter 3.6). With the help of the 1st EDIT CONTROL, you can select seven different MIDI functions. Data input is always carried out with the JOG WHEEL. the following pages can be selected:

• CHAN: You can set the MIDI channel on the first page. With the Jog Wheel, the channel can be set from 01 to 16. If you select "OFF", the MIDI function is switched off.

• OMNI: The second page gives access to omni mode. In this case, the unit receives MIDI data on all 16 MIDI channels. "ON" appears in the display. With the Jog Wheel, select "OFF" to deactivate omni mode.

• CONT: On the third page, you can configure the controller commands. You can choose between four controller modes:

Display	Mode
OFF	No controller data are transmitted / received.
RECV	Controller data are received but not transmitted.
SEND	Controller data are transmitted but not received.
BOTH	Controller data are transmitted and received.

Tab. 3.1: Controller settings

For controller functions see table 7.4 in chapter 7 "Appendix".

• PRGM: Page four will bring you to the setup for the program changes. Once again, you have four modes to select from:

Display	Mode
OFF	Program Changes are not transmitted / received.
RECV	Program Changes are received but not transmitted.
SEND	Program Changes are transmitted but not received.
BOTH	Program Changes are transmitted and received.

Tab. 3.2: Program change settings

- STOR: On the fifth page, you can select the Store Enable mode. In the "ON" mode, the VIRTUALIZER 3D receives controller 112 as the direct storage command—the current settings are stored on the program location corresponding to the controller value without waiting for a confirmation. In the "OFF" mode, controller 112 is ignored.

◊ **CAUTION: The Store Enable mode is aimed to transfer several presets at once from an external PC to the VIRTUALIZER 3D (see also chapter 5.1). In this mode, you can very easily overwrite your program locations by unintentionally sending controller 112 values to the FX2000! Therefore, we strongly recommend to switch off this mode immediately after use. When the FX2000 is switched on, this mode is automatically set to off ("OFF").**

- DUMP: Select the System Exclusive mode ("SysEx") using the sixth page. In this mode, the FX2000 is ready to "dump" its complete storage content, including all settings, to a MIDI sequencer. Start your MIDI sequencer and turn the JOG WHEEL. The data transfer is indicated by "GO".

- DR.EN: In this mode, the FX2000 can receive SysEx data from another MIDI device. To load this data, turn the JOG WHEEL slightly so that the display blinks. Start your sequencer, and all of your settings, including preset parameter settings, are received by your VIRTUALIZER 3D. Data transfer is interrupted by turning the JOG WHEEL slightly so that "----" appears in the display.

◊ **During a SysEx data transfer, all audio functions of the VIRTUALIZER 3D are inactive.**

3.6.2 INPUT mode

With the help of the 2nd EDIT CONTROL, you can specify whether your FX2000 works as a mono ("MONO") or a stereo unit ("STER"). In mono mode, input 1 is used exclusively. Since the VIRTUALIZER 3D is a real "True Stereo" device, the DSP processes the signal for many effects separately for both channels (see chapter 7.1). For effects 13 - 15 and 38, right and left channel parameters can even be edited separately.

◊ **For effects 42 - 44, 58, and 59, a signal must be present at both inputs for optimal stereo results.**

3.6.3 OUTPUT mode

Use the 3rd EDIT CONTROL to determine the FX2000's OUTPUT mode. The selection of settings depends on your FX2000's application. If you're using the VIRTUALIZER 3D in connection with a mixing console (aux bus), activate the Mix External ("EXTN") output mode. The FX2000's output signal is then 100% wet.

If you're using the FX2000 with a guitar amplifier that has an effects loop, select the Mix Internal ("INTN") output mode. Then, use the MIX/BYPASS control to adjust the effect volume. For further information, see chapters 4.2 and 4.4.

3.6.4 Dual engine configuration (CONFIG)

You can use the 4th EDIT CONTROL to decide how the FX2000's effects combinations (presets 61 - 71) should be structured. Since the FX2000 is a true Dual Engine unit, you can choose between serial 1 ("SER1"), serial 2 ("SER2") and parallel ("PARA"). See fig. 3.1, 3.2 and 3.3 to understand how these settings influence the composition of the effects combinations.

In the example of preset 61 (chorus & reverb), you can decide, whether the chorus and reverb effects run separately from each other or whether the signal, treated by the chorus, passes the reverb effect.

3.7 Restoring the factory presets

To restore the FX2000 to its preset factory state, press and hold the STORE and PRESET keys while switching on the unit. "INIT" appears in the DISPLAY and counting takes place from R 1 to R 100.

◊ **This overwrites all changes you have made and restores the factory presets!**

4. Applications

The BEHRINGER VIRTUALIZER 3D is a flexible unit that can be used in various applications. Prior to a presentation of the FX2000's many uses, please note the following remarks on how to set signal levels correctly.

4.1 Level setting

Take care to set all levels properly on the FX2000! Low levels deteriorate the dynamics of the music signal, which results in a poor, weak and noisy sound. On the other hand, excess levels overdriving the converters in the VIRTUALIZER 3D should also be avoided. Digital distortion is (unlike its analog counterpart) extremely unpleasant, since it does not occur gradually but abruptly.

Please use the OPERATING LEVEL switch and the input level meter of the FX2000. Make sure that the Clip LEDs flickers only rarely. Ensure that they never light up all the time!

4.2 Using the VIRTUALIZER 3D in the aux bus

Using the FX2000 in the aux bus lets you feed signals from one, several or all channels of your console into the VIRTUALIZER 3D. When miking a drum kit, for example, you can use the aux controls to adjust the reverberation independently for each channel. Thus, you are able to assign a strong reverb to the snare rather than the toms. Cabling the VIRTUALIZER 3D in the aux bus should be carried out as follows:
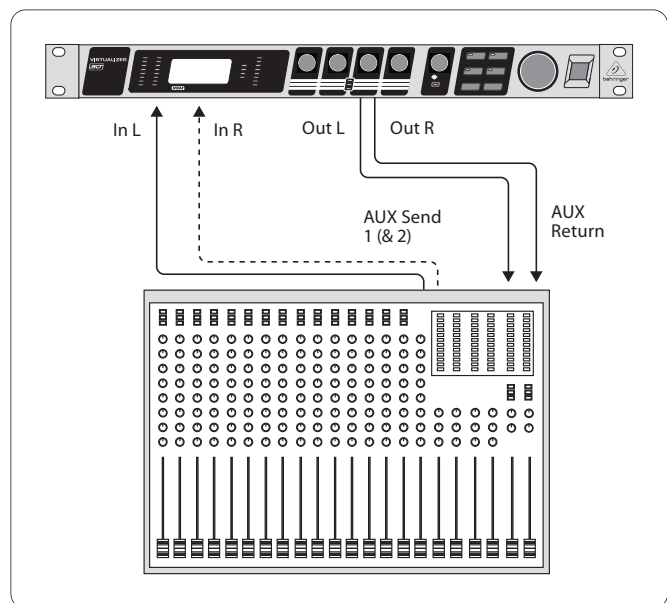

Fig. 4.1: Wiring aux busses

EN

Connect both inputs of the VIRTUALIZER 3D to the aux send outputs of your mixer. The FX2000's output socket is connected to the aux return inputs of your mixer. If you want to operate the BEHRINGER VIRTUALIZER 3D in mono, connect one of its channels (left or right) to an aux bus. As a matter of principle, effects processors should always be connected to post fader aux busses.

◊   **If your mixing console has aux busses that feature one jack for the aux send, use audio channel 1 on the FX2000. In this case, you must choose the mono mode (see chapter 3.6.2).**

◊   **To avoid damage to your equipment, turn down the volume level on your amplifier when making connections. Switch off the devices that you want to connect to one another until plug connections have been completed as described.**

Let's assume you want to operate the FX2000 in a live situation in connection with a mixing console, and use a chorus to enhance the guitar sound.

Connect the VIRTUALIZER 3D to the aux busses of your mixing console (fig. 4.1). Make the mains connection and set the operating level if necessary. Switch on the unit. In SETUP mode (output), select "EXTN" to ensure that the Mix External mode is activated. Press the effect key and use the Jog Wheel to select the stereo chorus effect (no. 16). Turn up the aux busses slowly till you have mixed the desired effect with the guitar signal. After this, you can start fine tuning. You will probably want to specify the chorus' modulation. Turn the 1st EDIT CONTROL to determine the speed of the modulation. To adjust the modulation depth, turn the 2nd EDIT CONTROL. Proceed further following this principle. If you want the 1st EDIT CONTROL to change EDIT E, you must first press the EDIT key. After all the parameters have been changed as you wish, you can store the modifications in the original (or a different) preset.

4.3 Using the VIRTUALIZER 3D in the insert path

Generally, you can use the FX2000 on channel or subgroup inserts, using a standard insert cable. Connection to a channel insert makes sense when you want to process very specific signals (e.g. vocals) with the VIRTUALIZER 3D, or when all other options for connecting the FX2000 are already used by other units. For compressors, expanders and gates, the channel insert is the best choice.
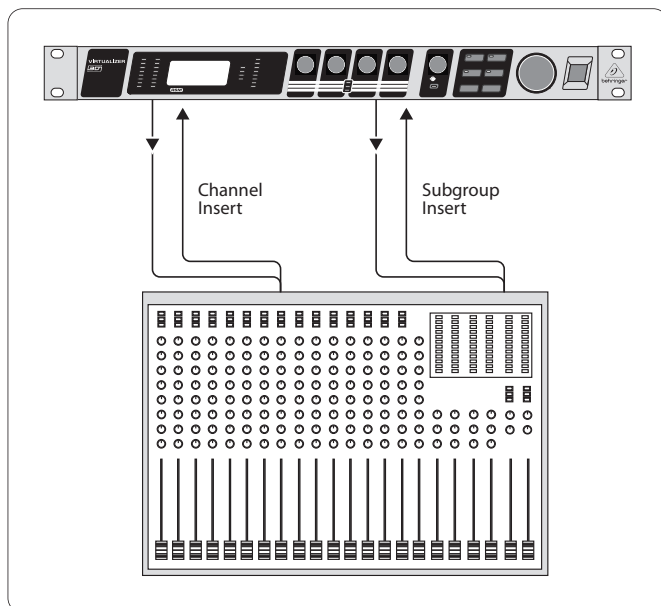
Fig. 4.2: Wiring the VIRTUALIZER 3D in the insert path

4.4 Using the VIRTUALIZER 3D as an effects device for instruments

Due to its MIDI implementation, the VIRTUALIZER 3D can also be used as multi-effects unit in a guitar rack. Naturally, the VIRTUALIZER 3D can be cabled both as mono and as stereo unit. The following examples show how to use the FX2000 with a guitar setup.
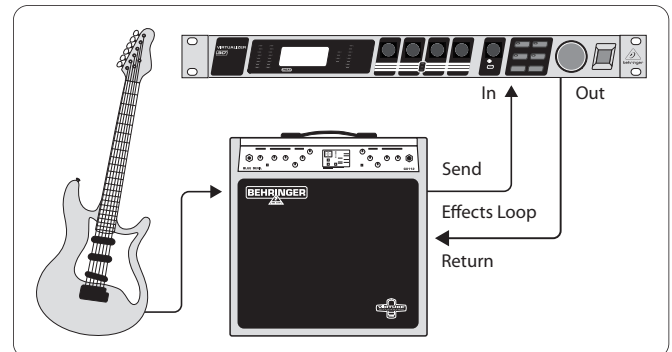
Fig. 4.3: Connecting the VIRTUALIZER 3D to a guitar amp (send/return mono)

Fundamentally, the following applies: The VIRTUALIZER 3D should be connected between preamp and output stage of your amplifier. For this purpose, most of the guitar amplifiers offer an effects loop, which allows the preamp signal of your amplifier to pass on to the audio input stage of the FX2000. Then, in the VIRTUALIZER 3D, the preamp signal is processed and sent back to its amplifier through the amplifier's return jack (Power Amp In). If you use a stereo rack system for amplification, you can also set up the VIRTUALIZER 3D in stereo mode. Connect the preamp to the audio inputs of the FX2000. Each of its audio outputs (left/right) is connected to a channel (left/right) of your amplifier.

◊   **Since most guitar amps only feature a serial effects loop, you should make sure that the VIRTUALIZER 3D is set to Mix Internal mode. In Mix Internal mode, you can control the effects intensity that is applied to the guitar signal. If, however, your amp is equipped with a parallel effects loop, which allows for adding the effects signal portion (similar to an aux bus in a mixing console), then you should set the VIRTUALIZER 3D to Mix External mode. In this case, the effects intensity present at the outputs of the VIRTUALIZER 3D is 100%.**

Instrumentalists can benefit from a variety of advantages offered by the VIRTUALIZER 3D's MIDI implementation. With a MIDI foot controller, e.g. the BEHRINGER MIDI FOOT CONTROLLER FCB1010, you can transfer program changes via MIDI. Connect the MIDI out port of your foot controller to the MIDI IN port of the VIRTUALIZER 3D. If the FX2000 does not respond to your foot controller's program changes, check your MIDI channel settings. Determine which MIDI channel your foot controller uses to send program changes (in most of the cases: omni mode). Set the VIRTUALIZER 3D's MIDI channel to the same number and switch program change receive mode on (see chapter 3.6.1).

If your MIDI foot controller can send MIDI controller data, you can change parameters while playing. For example, you can change the effect from 0% to 100% with the controller while playing. Set controller No. 116 to the Mix Internal function (value 1) and increase the effect (value 0 - 100) with controller No. 111. In this way, you can provide a guitar solo with chorus and delay, before removing the effects for a dry rhythm sound. You can even control the bypass function with your controller (contr. 113, value 0 = OUT, value 1 = IN). Bypassing the VIRTUALIZER 3D can be activated this way if you need an unprocessed signal. These procedures are generally possible with all MIDI devices which are capable of transmitting controller commands (like keyboards, sequencers, etc.).

The FX2000 can also be used between the outputs of your keyboard and the inputs of your mixer. If necessary, adjust the operating level with the corresponding switch on the rear panel of the unit.

4.5 Using the VIRTUALIZER 3D in a MIDI setup

Thanks to the integrated MIDI interface, you can incorporate the FX2000 in a MIDI setup. The VIRTUALIZER 3D can receive and send both program changes and controller changes. Thus, you can use program changes using MIDI with a sequencer or with any other MIDI device. Connect the FX2000 e.g. as follows:
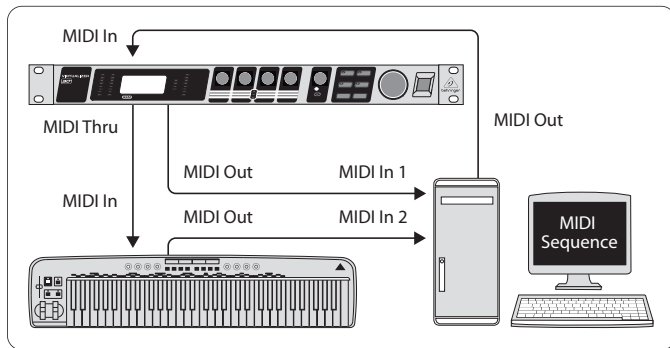
Fig. 4.4: VIRTUALIZER 3D in MIDI connection with a sequencer (computer) and a keyboard

5. MIDI Functions of the FX2000

Due to the complete implementation of the MIDI interface, it is very easy to integrate the VIRTUALIZER 3D in a MIDI System.

- MIDI IN

All MIDI data that are sent to the FX2000 (sequencer, MIDI foot controller, etc.) are received at the MIDI IN port. If you want to use the FX2000 as an effects unit in a guitar rack, you can connect a MIDI foot controller to the MIDI IN socket, and use it to change the program presets. If you are simultaneously operating another MIDI device, you can transfer the control commands of the MIDI foot controller using the MIDI THRU socket of the VIRTUALIZER 3D.

- MIDI THRU

The MIDI THRU socket allows you to loop through incoming MIDI signals. All control commands that arrive at the MIDI IN socket can be passed on to other MIDI devices and instruments using the MIDI THRU socket.

- MIDI OUT

Use the MIDI OUT to send data to a connected computer or other VIRTUALIZER 3D.

5.1 Saving data via MIDI

To store all presets outside the VIRTUALIZER 3D, you can use a special form of MIDI communication called system exclusive data (SysEx). With SysEx, the VIRTUALIZER 3D sends information about its manufacturer, unit type, and all parameter settings for all presets to a sequencer or MIDI file recorder. To activate this very practical function, press the SETUP key in SETUP mode. Turn the 1st EDIT CONTROL to select "DUMP". Your VIRTUALIZER 3D is now ready to transfer your system exclusive data. Select a track on your MIDI sequencer, get ready for recording, start the recording and turn the JOG WHEEL. The data transfer is indicated by a "GO" in the display.

To load the data back into the FX2000, select "DR.EN" in SETUP mode (see chapter 3.6.1). Turn the JOG WHEEL until "DR.EN" blinks. Now, start your MIDI sequencer and the preset data is automatically transferred to the FX2000. In this mode, information sent from the MIDI sequencer is automatically stored while receiving, without asking for confirmation.

6. Installation

6.1 Mains connection

Before connecting the VIRTUALIZER 3D to the mains, please carefully check that your equipment is set to the correct voltage! The fuse holder on the mains socket has 3 triangular markings. Two of these triangles are located opposite each other. The VIRTUALIZER 3D is set at the operating voltage indicated beside the markings and can be changed by turning the fuse holder by 180°. **CAUTION: This is not applicable for export models, which were designed only for a mains voltage of 120 V!**

Connection to the mains is made by means of a mains cable with an IEC receptacle which complies with the required safety regulations.

◊ **Please note that all pieces of equipment must be grounded. For your own safety, under no circumstances should you remove or deactivate the grounding of the equipment or the mains cable.**

6.2 Audio connections

As standard, the BEHRINGER VIRTUALIZER 3D features electronically servo-balanced inputs and outputs. If possible, connect the unit to other devices in a balanced configuration to allow for maximum interference immunity.

◊ **Installation and operation of this equipment must be carried out by competent staff only. Both before and after installation, the staff using the equipment should make sure that it is properly grounded since otherwise electrostatic discharge etc. can lead to an impairment of its operation.**

For connection of balanced and unbalanced plugs, ring and sleeve have to be bridged at the stereo plug.

Balanced use with XLR connectors

input

1 = ground/shield
2 = hot (+ve)
3 = cold (-ve)

output

For unbalanced use, pin 1 and pin 3 have to be bridged
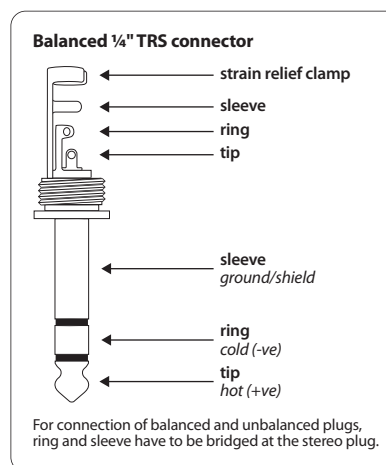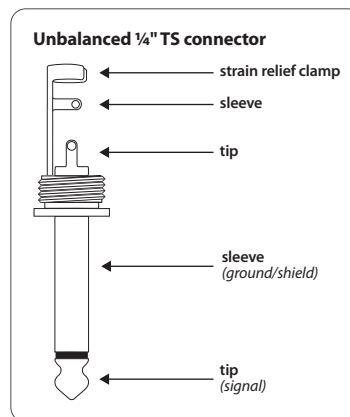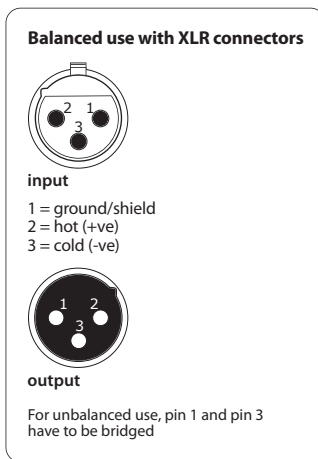
Fig. 6.1: Different plug types

6.3 MIDI connections

The MIDI connectors at the rear panel of the unit are equipped with internationally standardized 5 pin DIN sockets. You'll need a MIDI cable to connect the VIRTUALIZER 3D with other MIDI devices. As a rule, standard ready-to-use cables can be used. With a two core shielded cable (e.g. microphone cable) and two possible stable 180 deg. DIN plugs, you can also solder a MIDI cable yourself: Pin 2 (middle) = shield, pin 4 and 5 (right and left of pin 2) = Inner conductor, Pin 1 and 3 (both lying outside) remain free. MIDI cables should not be longer than 15 meters.

MIDI IN: is used for receiving MIDI data. The receiving channel is selected in the SETUP menu.

MIDI THRU: At the MIDI THRU socket, the MIDI data that arrive at the MIDI IN socket can be looped through. Several VIRTUALIZER 3Ds can be linked using MIDI THRU sockets.

MIDI OUT: Via MIDI OUT, you can send data to a connected computer or to other VIRTUALIZER 3Ds. Program data and status information are transmitted for signal processing.

6.4 Selecting the operating level

The BEHRINGER VIRTUALIZER 3D allows you to switch the internal operating level with the Operating Level switches on the rear panel of the unit. Thus, you can choose between the homerecording level (-10 dBV) and the professional studio level (+4 dBu). With this adjustment, the VIRTUALIZER 3D is adapted to the optimal operating level. Use the input level meter on the front panel to find the appropriate operating level.

7. Appendix

7.1 Parameter overview

EN

#	Name	A Min.	A Def.	A Max.	B Min.	B Def.	B Max.	C Min.	C Def.	C Max.	D Min.	D Def.	D Max.	E Min.	E Def.	E Max.	F Min.	F Def.	F Max.	Mix Min.	Mix Def.	Mix Max.
Reverbs																						
1	Cathedral		Pre-Delay			Decay			Hi Decay Damping			ER/Reverb Balance			Low Cut			Rev. Mod.			Mix	
		0.000	0.072 s	0.200	2.00	5.11 s	8.00	0	10%	100	0	60%	100	20	53 Hz	400	1	9	20	0	35%	100
2	Gold Plate		Pre-Delay			Decay			Hi Decay Damping			Low Cut			Shv. Damping			Diffusion			Mix	
		0.000	0.010 s	0.200	1.000	2.368 s	4.000	0	20%	100	20	83 Hz	400	0	20%	100	1	20	20	0	35%	100
3	Small Hall		Pre-Delay			Decay			Hi Decay Damping			Size			Shv. Damping			Low Cut			Mix	
		0.000	0.002 s	0.050	0.050	0.114 s	0.404	0	20%	100	1	26	50	0	20%	100	20	83 Hz	400	0	40%	100
4	Room		Pre-Delay			Decay			Hi Decay Damping			Size			Shv. Damping			Diffusion			Mix	
		0.000	0.015 s	0.100	1.000	1.509 s	2.388	0	20%	100	1	30	50	0	20%	100	1	20	20	0	40%	100
5	Concert		Pre-Delay			Decay			Hi Decay Damping			Bass Mul.			Shv. Damping			Rev. Mod.			Mix	
		0.000	0.020 s	0.200	1.00	1.91 s	5.00	0	20%	100	-10.0	-1.0	+10.0	0	20%	100	1	9	20	0	35%	100
6	Studio		Pre-Delay			Decay			Hi Decay Damping			Spread			Shv. Damping			Diffusion			Mix	
		0.000	0.002 s	0.050	0.100	0.602 s	1.000	0	10%	100	1	25	50	0	10%	100	1	20	20	0	45%	100
7	Stage		Pre-Delay			Decay			Hi Decay Damping			Size			Shv. Damping			ER/Reverb Balance			Mix	
		0.000	0.030 s	0.100	0.600	2.000 s	3.000	0	15%	100	1	30	50	0	20%	100	0	60%	100	0	40%	100
8	Spring Reverb		Pre-Delay			Decay			Hi Decay Damping			Metal Reso.			Hi Cut			Diffusion			Mix	
		0.000	0.003 s	0.050	0.800	1.795 s	5.000	0	20%	100	0	70%	100	0	4	50	1	5	20	0	40%	100
9	Ambience		Pre-Delay			Decay			Hi Decay Damping			Size			Low Cut			Diffusion			Mix	
		0.000	0.020 s	0.100	0.100	0.300 s	0.755	0	15%	100	1	35	50	20	83 Hz	400	1	20	20	0	45%	100
10	Early Reflections		Pre-Delay			Size			Wall Damping			Reflections			Stereo Width			Diffusion			Mix	
		0.000	0.030 s	0.200	1	35	50	0	30%	100	1	15	15	0	100%	100	1	10	20	0	40%	100
11	Gated Reverb		Pre-Delay			Decay			Hi Decay Damping			Density			Low Cut			Diffusion			Mix	
		0.000	0.010 s	0.200	0.150	0.725 s	0.950	0	15%	100	1	15	20	20	121 Hz	400	1	20	20	0	35%	100
12	Reverse Reverb		Pre-Delay			Decay			Hi Decay Damping			Density			Low Cut			Diffusion			Mix	
		0.000	0.000 s	0.200	0.150	0.650 s	0.950	0	20%	100	1	10	20	20	104 Hz	400	1	20	20	0	30%	100
Delay																						
13	Stereo Delay		Delay Left Coarse			Delay Left Fine			Delay Right Coarse			Delay Right Fine			Feedback Left			Feedback Right			Mix	
		0.050	0.350 s	5.450	0.000	0.050 s	0.099	0.050	0.450 s	5.450	0.000	0.050 s	0.099	0	35%	100	0	25%	100	0	30%	100
14	Tape Echo		Delay Left			Delay Right			Feedback			Damping			Feedback HP			Feedback LP			Mix	
		0.000	0.190 s	0.635	0.000	0.205 s	0.635	0	20%	100	100 Hz	2.40 kHz	20.0 kHz	20 Hz	176 Hz	10.0 kHz	100 Hz	5.32 kHz	20.0 kHz	0	35%	100
15	Ping Pong		Delay Left			Delay Right			Feedback Left			Feedback Right			Feedb. Delay L			Feedb. Delay R			Mix	
		0.000	0.320 s	0.635	0.000	0.240 s	0.635	0	45%	100	0	40%	100	0.000	0.320 s	0.635	0.000	0.160 s	0.635	0	30%	100
Modulation																						
16	Stereo Chorus		Speed			Depth			Delay			Stereo Phase			LFO Wave			Damping			Mix	
		0.050	0.247 Hz	5.000	0	50 %	100	5.0	20.2 ms	50.0	0	180°	180	Triangle	Triangle	Sine	0	0	20	0	50%	100
17	Analog Chorus		Speed			Depth			Delay			Stereo Spread			—			—			Mix	
		1	33	50	1	20	20	1	6	20	1	14	20	—	—	—	—	—	—	0	50%	100
18	Vintage Chorus		Speed			Depth			Delay			Damping			—			—			Mix	
		1	13	50	1	20	20	1	20	20	0	4	20	—	—	—	—	—	—	0	50 %	100
19	Ultra Chorus		Speed			Depth			Delay			Wideness			Stereo Spread			Damping			Mix	
		1	25	50	1	21	50	1	30	50	1	17	20	0	20	20	0	5	20	0	50%	100
20	Stereo Flanger		Speed			Depth			Feedback			Delay			Stereo Phase			Feedback LP			Mix	
		0.050	0.285 Hz	5.000	0	90%	100	0	80%	100	1.00 ms	2.34 ms	10.0 ms	0	45°	180	500 Hz	8.13 kHz	20.0 kHz	0	50%	100
21	Vintage Flanger		Speed			Depth			Feedback			Delay			—			—			Mix	
		1	13	50	1	16	20	1	18	20	1	11	20	—	—	—	—	—	—	0	50%	100
22	Jet Stream Flanger		Speed			Depth			Feedback			Delay			—			—			Mix	
		1	19	50	1	12	20	1	20	20	1	20	20	—	—	—	—	—	—	0	50%	100
23	Stereo Phaser		Speed			Depth			Feedback			Stereo Phase			Mode			—			Mix	
		0.100	0.543 Hz	10.00	0	80%	100	0	60%	100	0	20°	180	Md-1	Md-1	Md-5	—	—	—	0	100%	100
24	Vintage Phaser		Speed			Depth			Feedback			Base			—			—			Mix	
		1	33	50	0	100%	100	0	50	50	1	1	50	—	—	—	—	—	—	0	66%	100
25	Dual Phaser		Speed			Depth			Feedback			Base			—			—			Mix	
		1	25	50	0	75%	100	0	32	50	1	12	50	—	—	—	—	—	—	0	100%	100
26	Leslie		Speed			Drum Depth			Horn Depth			Drive			Balance			—			Mix	
		1	46	50	0	60%	100	0	60%	100	0	20%	100	50:00	45:50	00:50	—	—	—	0	75%	100
27	Pitch Shifter		Semitones 1			Cents 1			Semitones 2			Cents 2			Semitones 3			Cents 3			Mix	
		-12	+2	+12	-50	+0 Cent	+50	Ste, -12	Stereo	+12	-50	Stereo	+50	Off, -12	Off	+12	Off, -50	Off	+50	0	100%	100
28	Vibrato		Speed			Depth			Wave			Auto Mod.			—			—			Mix	
		0.50	1.27 Hz	20.00	0	50%	100	Triangle	Sine	Opto.	0	25%	100	—	—	—	—	—	—	0	100%	100
29	Tremolo		Speed			Depth			Wave			Auto Mod.			—			—			Mix	
		0.50	2.20 Hz	20.00	0	75%	100	Sine, Tri., Opto.	Opto.	Square, Saw Up, Saw Down	0	15%	100	—	—	—	—	—	—	0	100%	100
30	Auto Panning		Speed			Depth			Wave			Auto Mod.			—			—			Mix	
		0.50	3.21 Hz	20.00	0	80%	100	Sine, Tri., Opto.	Sine	Square, Saw Up, Saw Down	0	0%	100	—	—	—	—	—	—	0	100%	100

Tab. 7.1: Overview of the individual parameters of effects types (continued on next page)

#	Name	Edit A			Edit B			Edit C			Edit D			Edit E			Edit F			Mix		
		Min.	Def.	Max.	Min.	Def.	Max.	Min.	Def.	Max.	Min.	Def.	Max.	Min.	Def.	Max.	Min.	Def.	Max.	Min.	Def.	Max.
Dynamics																						
31	Compressor		Ratio			Threshold			Makeup-Gain			Soft Knee			Attack			Release			Mix	
		1.25	3.75	100	-60	-28 dB	0	+0.0	+3.0 dB	+24.0	0	4	6	0.005	0.037 s	0.200	0.050	0.183 s	1.000	0 (off)	100%	100 (on)
32	Expander		Ratio			Threshold			Makeup-Gain			Soft Knee			Attack			Release			Mix	
		1.25	3.25	100	-60	-9 dB	0	+0.0	+4.5 dB	+24.0	0	3	6	0.005	0.049 s	0.200	0.050	0.243 s	1.000	0 (off)	100%	100 (on)
33	Gate		Hold			Threshold			Attack			Release			Range			—			Mix	
		0.001	0.054 s	1.000	Off, -59	-12 dB	-1, Mute	0.005	0.005 s	0.200	0.005	0.031 s	0.500	Mute, -59	Mute	-1, 0 dB	—	—	—	0 (off)	100%	100 (on)
34	Analog Compr./ Limiter		Ratio			Threshold			Makeup-Gain			Limiter Thresh.			Attack			Release			Mix	
		1.50	3.00	100	-48	-24 dB	0	+0.0	+6.0 dB	+24.0	-24.0	0.0 dB	0.0	0.001	0.020 s	0.150	0.050 s	Auto	0.977s, Auto	0 (off)	100%	100 (on)
35	Ultramizer		Density			Range			Speed			Split Frequency			Stereo FX			Enhancer Freq.			Band	
		1	36	100	0	9 dB	24	1	38	100	50	190 Hz	10.0 k	0	20%	100	2.50 k	12.5 kHz	15.0 k	Low	Wide	High
36	Denoiser		LP-Frequency			LP-Depth			LP-Speed			Gate Threshold			Gate Hold			Gate Resp.			Mix	
		40	916 Hz	20.0 k	0	75 %	100	0.001	0.243 s	2.000	Off, -59	-30 dB	-1, Mute	0.001	0.035 s	1.000	0.005	0.037 s	0.200	0 (off)	100%	100 (on)
37	De-Esser		Ratio			Threshold			Makeup-Gain			Frequency			Attack			Release			Band	
		1.50	3.00	100	-48	-36 dB	0	+0.0	+6.0 dB	+24.0	500	2.78 kHz	15.0 k	0.001	0.020 s	0.150	0.050 s	Auto	0.977s, Auto	Low	Wide	High
38	Wave Designer		Attack Left			Release Left			Attack Right			Release Right			Gain Left			Gain Right			Mix	
		-50	-25	+50	-50	+25	+50	Ste., -50	Stereo	+50	Ste., -50	Stereo	+50	Auto, -24	Auto	+24 dB	Auto, -24	Auto	+24 dB	0 (off)	100%	100 (on)
Psycho Accoustic																						
39	Exciter		Frequency			Filter Q			Harmonics			Timbre			Harmon. Kick			—			Mix	
		1.00	7.09 kHz	10.0	1	1	20	0	25%	100	0	50%	100	Off	On	On	—	—	—	0	40%	100
40	Enhancer		High Freq.			High Gain			Bass Width			Bass Gain			Mid Q			Mid Gain			Gain	
		1	42	50	0	30 %	100	-50	+30	+50	0	35 %	100	1	30	50	0	10%	100	-16	-1 dB	+16
41	Ultra Bass		Subbass Freq.			Subbass Level			Harmon. Freq.			Harmon. Level			Harmon. Density			Bass Gain			Mix	
		80.0	130.6 Hz	150.0	0	25 %	100	30.0	201.2 Hz	250.0	0	50%	100	1	7	7	0	60%	100	0 (off)	100%	100 (on)
42	Stereo Imager		Spread			MS-Balance			Spread Mode			Gain			Stereo Balance			Mono Balance			Mix	
		0	50%	100	0	75%	100	Spread	Space	Space	-6.0	+1.0 dB	+6.0	0	50%	100	0	50%	100	0 (off)	100%	100 (on)
43	Ultra Wide		Center			Spread			X-Over Frequ.			Gain			—			—			Mix	
		0	25%	100	0	50%	100	100	511 Hz	10.0 k	-12.0	-6.0 dB	+12.0	—	—	—	—	—	—	0 (off)	100%	100 (on)
44	Binauralizer		Center			Space			Mode			Gain			Speaker Distance			Speaker Compens.			Mix	
		0	40%	100	0	32%	100	Phones	Speakers	Speakers	-12.0	+5.0 dB	+12.0	0	4	18	25	50 %	100	0 (off)	100%	100 (on)
Filter / EQ																						
45	Auto Filter		Base Freq.			Depth			Type			Resonance			Attack			Release			Mix	
		100	368 Hz	15.0 k	0	30 %	100	LP.12, LP.24, HP.12, HP.24	BP.12	BP.12, BP.24	1	34	50	0.005	0.022 s	2.000	0.005	0.061 s	2.000	0	100%	100
46	LFO Filter		Base Freq.			Depth			Type			Resonance			Speed			Wave			Mix	
		100	485 Hz	15.0 k	0	85%	100	LP.12	LP.12	LP.24, HP.12, HP.24, BP.12, BP.24	1	35	50	0.10	4.84 Hz	20.00	Sine, Triangle	Saw Down	Saw Up, Saw Down, Square	0	100%	100
47	Parametric EQ		Gain 1			Freq. 1			Q 1			Gain 2			Freq. 2			Q 2			Gain	
		-16	+4 dB	+16	200	489 Hz	10.0 k	0.50	1.16	10.00	-16	+6 dB	+16	200 Hz	2.58 kHz	10.0 kHz	0.50	1.03	10.00	-16	-3 dB	+16
48	Graphic EQ		200 Hz			400 Hz			800 Hz			1.6 kHz			3.2 kHz			6.4 kHz			Gain	
		-16	+3 dB	+16	-16	-1 dB	+16	-16	+3 dB	+16	-16	-1	+16	-16	+1 dB	+16	-16	+3 dB	+16	-16	-2 dB	+16
Distortion / Amp Simulation																						
49	Vocal Distortion		Distortion			Delay Gain			Delay			Flanger Level			Type			Flanger Speed			Mix	
		1	51	100	0	30%	100	0.050	0.187 s	1.000	0	100%	100	1	3	3	0.050	0.202 s	2.000	0	100%	100
50	Tube Distortion		Drive			Pre HP			Pre LP			Damp			Tube Select			Mid EQ			Mix	
		1	50	100	50	120 Hz	1.00 k	1.00	2.07 kHz	15.0	15.0	7.11 kHz	1.00	1	2	3	-16	-1 dB	+16	0	100%	100
51	Guitar Amp		In Gain			Drive			Presence			Gain			Cabinet Type			Mid EQ			Mix	
		1	60	100	1	70	100	1	70	100	1	75	100	1	2	8	-16	0 dB	+16	0	100%	100
52	Tri Fuzz		In Gain			Low-Fuzz			Mid-Fuzz			Hi-Fuzz			Drive			Hi Damp			Mix	
		1	80	100	1	51	100	1	55	100	1	51	100	1	65	100	1	50	100	0	100%	100
53	Speaker Simulation		Type			EQ-Gain			EQ-Frequency			EQ-Q			—			—			Mix	
		1	5	8	-16	0 dB	+16	200 Hz	1.44 kHz	10.0 kHz	0.50	2.24	10.00	—	—	—	—	—	—	0	100%	100
54	Ring Modulator		Speed			Depth			Carrier-Freq.			Tone			Mode			Slewing			Mix	
		LFO: 0.10 Hz ENV: 0.005 s RAND + SINE: 1.0 Hz	0.40 Hz	LFO: 10.00 Hz ENV: 0.500 s RAND + SINE: 100.0 Hz	0	25%	100	100 Hz	308 Hz	10.0 kHz	200 Hz	2.00 kHz	20.0 kHz	LFO	LFO	ENVELOPE, RANDOM, SINE	0	0%	100	0	100%	100
55	LoFi		Bits Resolution			Tone			Buzz Level			Noise Gain			Noise HP			Noise LP			Mix	
		24	7 bit	6	20.0 kHz	6.96 kHz	400 Hz	0	30%	100	0	35%	100	20	159 Hz	20.0 k	400 Hz	10.3 kHz	20.0 kHz	0	100%	100

Tab. 7.1: Overview of the individual parameters of effects types (continued on next page)

#	Name	Edit A Min	Edit A Def	Edit A Max	Edit B Min	Edit B Def	Edit B Max	Edit C Min	Edit C Def	Edit C Max	Edit D Min	Edit D Def	Edit D Max	Edit E Min	Edit E Def	Edit E Max	Edit F Min	Edit F Def	Edit F Max	Mix Min	Mix Def	Mix Max
Special FX																						
56	Vinylizer		Speed			Clicks Level			Scratch Level			Noise Level			Tone			Noise Freq.			Mix	
		20.0	45.0 rpm	80.0	0	100%	100	0	50%	100	0	45%	100	0	30	50	0	39	50	0	100%	100
57	Sampler		Rec/Stop			Play/Stop			Speed			Mode			Rec Gain			Overdub Gain			Mix	
		Stop	Stop	Rec	Stop	Stop	Play	-1/2, Back	Fwrd.	Forward, +1/2	Loop	Loop	Once	-12	0 dB	0	-12	0 dB	0	0	50%	100
58	Vocoder		Sensitivity			Mode			Attack			Release			Frequency			Resonance			Mix	
		0	60%	100	In-L., Pulse	Pulse	Noise	0.005	0.025 s	0.200	0.005	0.040 s	0.200	0	18	50	0	25	50	0	100%	100
59	Voice Canceler		Bass Freq.			MS-Balance			Treble Pan			Gain			—			—			Mix	
		20	43 Hz	1.00 k	0	50%	100	0	50%	100	-6.0	+6.0 dB	+6.0	—	—	—	—	—	—	0 (off)	100%	100 (on)
60	Resonator		Speed			Depth			Carrier Freq.			Feedback			Mode			Slewing			Mix	
		LFO: 0.10 Hz ENV: 0.005 s RAND: 1.0 Hz	0.40 Hz	LFO: 10.00 Hz ENV: 0.500 s RAND: 100.0 Hz	0	40 %	100	200	800 Hz	10.0 k	-100	-80%	+100	LFO	LFO	ENVELOPE, RANDOM	0	0%	100	0	100%	100
Combination																						
61	Chorus & Reverb		Speed			Depth			Delay			Reverb Mix			Decay			Hi Damp			Mix	
		0.050	0.547 Hz	5.000	0	70%	100	5.0 ms	19.5 ms	50.0 ms	0	40%	100	0.50	2.51 s	5.00	0	30%	100	0	60%	100
62	Flanger & Reverb		Speed			Depth			Feedback			Reverb Mix			Decay			Hi Damp			Mix	
		0.050	0.256 Hz	5.000	0	71%	100	-80	+80%	+80	0	40%	100	0.50	2.02 s	5.00	0	25%	100	0	60%	100
63	Leslie & Reverb		Speed			Depth			Doppler			Reverb Mix			Decay			Hi Damp			Mix	
		0.50	8.00 Hz	8.00	0	90%	100	0	80%	100	0	25%	100	0.50	2.42 s	5.00	0	30%	100	0	80%	100
64	Pitch Shifter & Reverb		Semitones			Cents			High Cut			Reverb Mix			Decay			Hi Damp			Mix	
		-12	+4	+12	-50	+0 Cent	+50	0	10%	100	0	25%	100	0.50	2.02 s	5.00	0	30%	100	0	100%	100
65	Delay & Reverb		Delay			Feedback			Type			Reverb Mix			Decay			Hi Damp			Mix	
		0.030	0.235 s	0.665	0	40%	100	Stereo, Spread	Spread	Ping Pong, Tape	0	50%	100	0.50	4.02 s	5.00	0	30%	100	0	50%	100
66	Tremolo & Reverb		Speed			Depth			Auto Mod.			Reverb Mix			Decay			Hi Damp			Mix	
		1.00	4.04 Hz	10.00	0	80%	100	0	20%	100	0	50%	100	0.50	2.80 s	5.00	0	30%	100	0	70%	100
67	Phaser & Reverb		Speed			Depth			Feedback			Reverb Mix			Decay			Hi Damp			Mix	
		0.050	0.306 Hz	5.000	0	100%	100	0	70%	100	0	25%	100	0.50	3.06 s	5.00	0	20%	100	0	75%	100
68	Chorus & Delay		Speed			Depth			Mod. Delay			Delay Mix			Delay Time			Delay Feedback			Mix	
		0.050	0.318 Hz	5.000	0	100%	100	5.0 ms	17.8 ms	50.0 ms	0	30%	100	0.030	0.350 s	0.665	0	40%	100	0	65%	100
69	Flanger & Delay		Speed			Depth			Feedback			Delay Mix			Delay Time			Delay Feedback			Mix	
		0.050	0.318 Hz	5.000	0	80%	100	-80	+80%	+80	0	30%	100	0.030	0.350 s	0.665	0	40%	100	0	55%	100
70	Pitch Shifter & Delay		Semitones			Cents			High Cut			Delay Mix			Delay Time			Delay Feedback			Mix	
		-12	+4	+12	-50	+0 Cent	+50	0	0%	100	0	30%	100	0.030	0.350 s	0.665	0	40%	100	0	65%	100
71	Tremolo & Delay		Speed			Depth			Auto Mod.			Delay Mix			Delay Time			Delay Feedback			Mix	
		0.50	0.73 Hz	20.00	0	95%	100	0	25%	100	0	15%	100	0.030	0.190 s	0.665	0	40%	100	0	75%	100

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7.2 MIDI implementation

MIDI Implementation Chart				
Function		**Transmitted**	**Recognized**	**Remarks**
Basic Channel	Default Changed	OFF, 1 - 16 OFF, 1 - 16	OFF, 1 - 16 OFF, 1 - 16	memorized
Mode	Default Messages Altered	1,2,3,4 X X	1,2,3,4 X X	
Note Number	True Voice	X X	X X	
Velocity	Note ON Note OFF	X X	X X	
After Touch	Key´s Ch´s	X X	X X	
Pitch Bender		X	X	
Control		0,102 - 116	0,102 - 116	
Progr. Change	True #	0 (0-99) 1-100	0 (0-99) 1-100	
System Exclusive		0	0	
System Common	Song Pos Song Sel Tune	X X X	X X X	
System Real Time	Clock Commands	X X	X X	
Aux Messages	Local ON/OFF All notes OFF Active Sense Reset	X X X X	X X X X	
Notes				
0 = YES, X = NO				
Mode 1:	OMNI ON, POLY			
Mode 2:	OMNI ON, MONO			
Mode 3:	OMNI OFF, POLY			
Mode 4:	OMNI OFF, MONO			

Tab. 7.2: MIDI implementation chart

Parameter Name	Display Range	MIDI Control Number	Control Value Range
Bank Select	I.001 .. 100/U.001 .. 100	0	0 = ROM / 1 = RAM
Algorithm	Algorithm Name	102	0 .. 70
Edit A	Depends on effect	103	Depends on effect
Edit B	Depends on effect	104	Depends on effect
Edit C	Depends on effect	105	Depends on effect
Edit D	Depends on effect	106	Depends on effect
Edit E	Depends on effect	107	Depends on effect
Edit F	Depends on effect	108	Depends on effect
EQ Low	-16 .. +16 dB	109	0 .. 32
EQ High	-16 .. +16 dB	110	0 .. 32
Mix	Depends on effect	111	Depends on effect
Store	U.001 .. U.100	112	0 .. 99
In/Out	BYP/0 .. 100%	113	0 = BYP / 1 = MIX
Combination Mode	SER 1, SER 2, PARA	114	0 = S1 / 1 = S2 / 2 = PA
Input Mode	MONO, STER	115	0 = MONO / 1 = STER
External/Internal Mix	EXTN/INTN	116	0 = EXTN / 1 = INTR

Tab. 7.2: Controller functions with MIDI

8. Specifications

EN

Analog Inputs

Connectors	XLR and ¼" TRS
Type	RF filtered, servo-balanced input stage
Impedance	80 kΩ balanced
Nominal Operating Level	-10 dBV or +4 dBu (selectable)
Max. Input Level	+15 dBu at +4 dBu nominal level, +1 dBV at -10 dBV nominal level

Analog Outputs

Connectors	XLR and ¼" TRS
Type	Electronically servo-balanced output stage
Impedance	80 Ω balanced
Max. Output Level	+15 dBu at +4 dBu nominal level, +1 dBV at -10 dBV nominal level

System Specifications

Bandwidth	20 Hz to 20 kHz, +/- 3 dB
SNR	91 dB, unweighted, 20 Hz to 20 kHz
THD	0.018% typ. @ +4 dBu, 1 kHz, 0 dBu input, gain 1
Crosstalk	< -76 dB

MIDI Interface

Type	5-pin DIN-socket IN / OUT / THRU

Digital Processing

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

Display

Type	4-digit 14 segment alpha-numeric LED-Display

Power Supply

Voltage

USA/Canada	120 V~, 60 Hz
Europe/U.K./Australia	230 V~, 50 Hz
Japan	100 V~, 50 - 60 Hz
General export model	120/230 V~, 50 - 60 Hz
Fuse	100 - 120 V~: T 200 mA H 250 V 200 - 240 V~: T 100 mA L 250 V
Power Consumption	15 Watts max.
Mains Connection	Standard IEC receptacle

Physical

Dimensions (H x W x D)	approx. 1 ¾ x 19 x 8" / 44 x 482,6 x 204,4 mm
Net Weight	approx. 4 ½ lbs / 2 kg
Shipping Weight	approx. 6 ⅔ lbs / 3 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.

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FEDERAL COMMUNICATIONS COMMISSION COMPLIANCE INFORMATION

BEHRINGER

VIRTUALIZER 3D FX2000

Responsible Party Name:	**MUSIC Group Services US Inc.**
Address:	**18912 North Creek Parkway, Suite 200 Bothell, WA 98011, USA**
Phone/Fax No.:	**Phone: +1 425 672 0816** **Fax: +1 425 673 7647**

VIRTUALIZER 3D FX2000

complies with the FCC rules as mentioned in the following paragraph:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Important information:

Changes or modifications to the equipment not expressly approved by MUSIC Group can void the user's authority to use the equipment.

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