

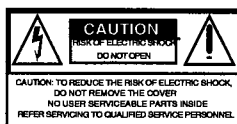
KURZWEIL

DIGITAL FX

OPTION



User Manual



The lightning flash with the arrowhead symbol, within an equilateral triangle, is intended to warn the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The enclosure shall have an equivalent weight to that of the user to the presence of important operating and maintenance (warning) instructions in the literature accompanying the product.

IMPORTANT SAFETY & INSTALLATION INSTRUCTIONS

INSTRUCTIONS PERTAINING TO THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS

WARNING - When using electric products, basic precautions should always be followed, including the following:

1. Read all of the Safety and Installation Instructions and Explanation of Graphic Symbols before using the product.
2. This product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This product is equipped with a power supply cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet which is properly installed and grounded in accordance with all local codes and ordinances.

DANGER - Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Do not modify the plug provided with the the product - if it will not fit the outlet, have a proper outlet installed by a qualified electrician. Do not use an adaptor which defeats the function of the equipment-grounding conductor. If you are in doubt as to whether the product is properly grounded, check with a qualified serviceman or electrician.

3. **WARNING** - This product is equipped with an AC input voltage selector. The voltage selector has been factory set for the mains supply voltage in the country where this unit was sold. Changing the voltage selector may require the use of a different power supply cord or attachment plug, or both. To reduce the risk of fire or electric shock, refer servicing to qualified maintenance personnel.

4. Do not use this product near water - for example, near a bathtub, washbowl, kitchen sink, in a wet basement, or near a swimming pool, or the like.

5. This product should only be used with a stand or cart that is recommended by the manufacturer.

6. This product, either alone or in combination with an amplifier and speakers or headphones, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.

7. The product should be located so that its location or position does not interfere with its proper ventilation.

8. The product should be located away from heat sources such as radiators, heat registers, or other products that produce heat.

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

10. This product may be equipped with a polarized line plug (one blade wider than the other). This is a safety feature. If you are unable to insert the plug into the outlet, contact an electrician to replace your obsolete outlet. Do not defeat the safety purpose of the plug.

11. The power supply cord of the product should be unplugged from the outlet when left unused for a long period of time. When unplugging the power supply cord, do not pull on the cord, but grasp it by the plug.

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

13. The product should be serviced by qualified service personnel when:

- A. The power supply cord or the plug has been damaged; or
- B. Objects have fallen, or liquid has been spilled into the product; or
- C. The product has been exposed to rain; or
- D. The product does not appear to be operating normally or exhibits a marked change in performance; or
- E. The product has been dropped, or the enclosure damaged.

14. Do not attempt to to service the product beyond that described in the user maintenance instructions. All other servicing should be referred to qualified service personnel.

15. **WARNING** - Do not place objects on the product's power supply cord, or place the product in a position where anyone could trip over, walk on, or roll anything over cords of any type. Do not allow the product to rest on or be installed over cords of any type. Improper installations of this type create the possibility of a fire hazard and/or personal injury.

RADIO AND TELEVISION INTERFERENCE

Warning: Changes or modifications to this instrument not expressly approved by Young Chang could void your authority to operate the instrument.

Important: When connecting this product to accessories and/or other equipment use only high quality shielded cables.

Note: This instrument 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 instrument 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 instrument does cause harmful interference to radio or television reception, which can be determined by turning the instrument 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 instrument and the receiver.
- Connect the instrument into an outlet on a circuit other than the one to which the receiver is connected.
- If necessary consult your dealer or an experienced radio/television technician for additional suggestions.

NOTICE

This apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

AVIS

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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Chapter 1

What is KDFX

Introduction

KDFX puts the power of an entire studio—equalizers, signal processors, and mixers—inside your Kurzweil K2500. It allows you to define processing functions, signal paths, and balances, on sounds created by the K2500 and, in Live Mode, sounds from *any* source. Using FX Modulation routings, you have real-time control over any aspects of your studio, from the buttons, sliders, wheels, and pedals on your K2500, or from any MIDI source at all, like a sequencer or a dedicated controller.

KDFX provides up to five individual signal effects processors. Four of these are designed to operate on their own individual buses, and the fifth, the “Auxiliary” processor, is designed to be global.

When the K2500 is being used multi-timbrally, KDFX can provide separate processors for each of several instruments. For example, let's say four K2500 channels are in use, under the control of a sequencer. Each instrument on each channel can have its own processing: flanger for the piano, delay for the sax, compression for the bass, and tight reverb for the drums. Then all of these signals would go through a global “Aux” processor, where they would be given a room reverb. At the outputs of the K2500, the reverb would show up on one pair, while the other instruments' dry or processed (pre-reverb) signals would show up at the others, either in mono or stereo. Or the entire mix, carefully balanced and panned, could appear at a single pair, ready to be recorded or played through a PA.

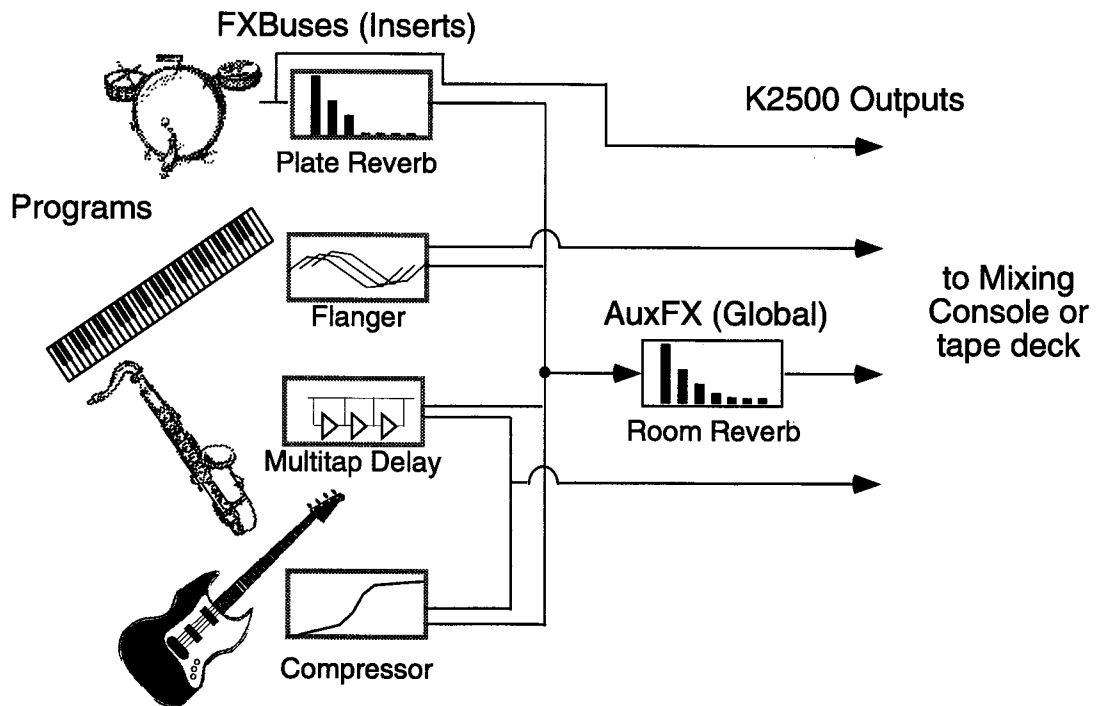


Figure 1-1. A typical KDFX Studio

Alternatively, in a live performance setting, you can use the KDFX in Setup mode as an entire orchestra, with different instruments layered on top of each other and mapped to different parts of the keyboard, all with their own signal processing; and that signal processing can change completely in an instant when you call up a new Setup.

These are just two of the huge variety of scenarios possible with KDFX. The structure of KDFX is so flexible that you should never run out of ideas for how it can be used.

KDFX Terms

Before starting to work with KDFX, it would be good to go over some important terminology that you will be confronting. Understanding the words will help you get the concepts quickly. Read this chapter first, and refer to it later if something isn't clear.

Studio

A Studio is the entire KDFX environment, consisting of **Inputs**, **FX Buses**, an **AUX Bus**, **FX Presets**, **Parameter** settings, **Overrides**, and **Outputs**. One Studio is current at a time in KDFX. Studios are objects, like K2500 programs, and have a number. They can be linked to Programs or Setups using the **FXMode setting**. KDFX comes with a large number of useful Studios, and users can modify them or create new ones and store them in RAM.

FX Bus (also called "Insert FX Bus")

A signal path with some kind of processing—a delay, reverb, flanger, etc.—on it. It has stereo inputs and outputs, and contains an **FX Preset** which determines the kind of processing that will be applied. A **Studio** has four insert FX Buses, each with its own FX Preset, as well as a fifth FX Bus, known as the **Aux FX Bus**.

Aux FX Bus

A separate FX Bus from the **Insert FX Buses**, which is placed in the signal path after the output of the Insert FX Buses, so that it can act as a "global" processor.

FX Preset

An FX Preset determines the type of signal processing that is present on an **Insert FX Bus** or the **Aux FX Bus**. FX Presets consist of an **Algorithm**, plus the settings of the **Parameters** associated with that Algorithm. More than one FX Preset can use the same Algorithm. KDFX comes with a large number of FX Presets, and users can modify them or create new ones and store them in RAM. Algorithms, however, are stored in ROM and are not changeable by the user. Each FX Bus and the Aux FX Bus gets its own FX Preset, so up to five FX Presets can be active in a studio at a time.

Algorithm

A specific type of signal processing, like a hall reverb, plate reverb, chorus, flanger, pitcher, compressor, rotary speaker, etc., which is at the core of an **FX Preset**. KDFX comes with a large variety of Algorithms, which are stored in ROM, and are not changeable by the user. Additional Algorithms, supplied by Kurzweil, can be loaded in from disk when they become available. Algorithm **Parameters** (RT60, delay feedback, pitch change, etc.) are changeable by the user, and those user-controlled parameters are stored in RAM as part of an FX Preset.

Size/PAUs

How big an Algorithm is, in terms of how much processing power it needs to operate. Size is measured in Processor Allocation Units, or "PAUs". Some simple algorithms require only 1 PAU, while more complex ones require 2, 3, or even 4. The total number of PAUs available to the four **Insert FX Buses** is 4. PAUs can be allocated automatically as **FX Presets** are assigned to FX Buses, or manually by the user. The **Aux FX Bus** has its own set of 3 PAUs, which are not shared with the Insert FX Buses.

Parameters

Refers to the user-controlled settings for the different characteristics of an **Algorithm**. For example, the user can set the reverb time (RT_{60}) of an Algorithm to 3.5s, or the delay feedback of a delay line to 90%, or the dynamic ratio of a compressor to 10:1. Parameters are stored, along with the Algorithm they modify, as part of an **FX Preset**. In certain cases, the parameter settings within a Studio can be overridden, either using **FXMODs** or **Bus Overrides**.

FXMODs

FXMODs allow the **Parameters** within a **Studio** to be controlled in real time. Parameters on any of the pages of the **Studio Editor** can be controlled by MIDI commands, such as sliders or ribbons or sequencer data, or by internal K2500 functions, such as LFOs, envelopes, clocks, or key states. FXMODs are not set up in the Studio, but rather in a K2500 Program or Setup that will be associated with that Studio. These links are created on seven "FX" editing pages in the K2500's Program or Setup editor. Up to 18 FXMODs can be set up in a Program or Setup for controlling a Studio. In addition, Programs and Setups now contain two dedicated LFOs, two ASR envelopes, and four FUNCTIONS just for KDFX control. FXMODs are stored as part of a Program or Setup, not as part of a Studio or FX Preset.

Bus Overrides (or BusMods)

Bus Overrides allow **Parameters** within an **FX Preset** to be controlled on the **FX Bus Editor** page in the Studio Editor, outside the **FX Preset editor** page. Any two parameters in an FX Preset can be brought out to its **FXBus** page. Bus Overrides are stored as part of the Studio, not as part of the FX Preset. They are useful when an existing FX Preset is close to what you want, so that you can tweak it without having to create a new FX Preset.

FXMode setting

This parameter, which is found on the K2500's "Effects" Mode page, determines whether the parameters in a KDFX Studio will be controlled internally or externally—in other words, whether **FX Mods** will be active. If it is set to "Program", "Setup", or "Auto", then as you change the Program or Setup, a different KDFX Studio will load, and any links between that Program or Setup and the Studio will be active. If it is set to "Master", then the KDFX Studio must be chosen manually, and will not change when the Program or Setup changes, and any FXMODs in the current Program or Setup will be inactive.

Studio Editor

The Studio Editor section is accessed by going to the “Effects” mode page, highlighting the current Studio, and pressing “Edit”. It consists of the following pages:

Input Editor, where signals coming from the K2500’s four stereo output buses are routed to one or more FX Buses in KDFX.

FX Bus Editor, where FX Presets are assigned to the four FX Buses and **Overrides** are set up.

Aux FX Editor, where an FX Preset is assigned to the Aux FX Bus and **Overrides** are set up.

FXPreset Editor, which is accessed from the **FX Bus Editor** and the **Aux FX Editor** by highlighting the name of the FX Preset and pressing “Edit”. This is where Algorithms are chosen and Parameters are set for the FX Presets, and where FX Presets are loaded, named, and saved.

Output Editor, where the signals coming from the FX Buses and Aux FX are routed to the K2500’s eight physical outputs (analog and digital).

Name, Save, Delete, and Dump, for file management of KDFX Studios.

The Studio Editor can also be accessed in Program and Setup modes, when a Studio is under the control of a Program or Setup.

Dependent objects

In KDFX, as in K2500 programs, dependent objects are those software objects which make up part of larger objects: in a **Studio**, the dependent objects are its **FX Presets**. In a **Program**, a Studio is one of the dependent objects, along with Keymap, Samples, and **Internal Effect**.

Internal Effects

The original K2500 effects processor chip is still usable in a KDFX-equipped unit, and functions essentially the same as it always has, quite independently from KDFX (except that the **FXMode Setting** applies both to it and to KDFX). When we refer to Internal Effects in this manual, we’re talking about that one-in, two-out effects processor.

The Structure of KDFX

The Studio

All of KDFX's functions are contained in a **Studio**. Only one Studio is active at a time.

Four stereo or eight mono inputs feed a Studio. The sources for these inputs are the four output pairs available on the Output pages in the K2500's Program and Setup Editors: A, B, C, and D. Instead of going directly to the K2500's physical outputs, these program outputs now feed KDFX, and only after going through KDFX do they appear at the physical outputs. The inputs to the Studio can come from one multi-layered program, or from several programs, or from the K2500's own Sample input when the instrument is in Live Mode.

The input signals pass through an input routing system—the **Input Editor**. Here, the signals go through individual two-band equalizers, or **EQs**. Then each input, mono or stereo, is routed to any two of the four **FX BUSES**.

Each of the **FX BUSES** contains its own signal-processing program, called an **FX Preset**. Each FX Preset has a set of parameters: for example the RT_{60} value on a reverb, or the Feedback level on a delay line. These parameters can be fixed as part of the FX Preset, or they can be externally controlled, from one of two different places. The four FX Buses are also called "**Insert FX**", because in a conventional studio, that's where they would be found: in the insert loop of a mixer, between the channel input and the mix bus.

There is also a fifth FX Preset, which is located on the **Auxiliary FX Bus**. The Aux FX Bus follows the four main FX Presets in the signal path, and is normally configured as a "global" processor.

Each FX Preset is based on an **Algorithm**. An algorithm is a processing function, like a reverb, flanger, or compressor; or a combination of processing functions in a particular order, like a flanger followed by a delay followed by a reverb. The Algorithms themselves are fixed in ROM, like Kurzweil ROM samples, but the values of their operating parameters can be changed.

☛ **The selection of an Algorithm + its user-controlled parameters = an FX Preset.**

Each Algorithm requires a certain amount of processing power, which is expressed in "Processing Allocation Units" (or **PAUs**). Simple Algorithms will require 1 PAU, while more complex Algorithms will require up to 4 PAUs. The amount of processing power available in each FX Preset is set by its **Allocation** parameter. When you are selecting an FX Preset for an insert bus, the number of PAUs its Algorithm requires appears on the display, so you can keep track of how many PAUs are in use.

PAUs are shared among the four insert buses. There is a limit to the total number of PAUs that the insert buses can use, and that limit is 4. PAUs can be manually pre-assigned to specific FX Buses, or using "Auto" mode they can be assigned automatically as FX Presets are assigned to the buses. The Auxiliary FX Bus has a separate set of PAUs—3 of them—which are *not* shared with the insert buses.

Finally, the outputs of the FX Presets are passed through to an output routing system—the **Output Editor**—where they are sent to the physical outputs of the K2500.

☛ **EQs + Input Editor settings + FX Presets + Output Editor settings = a Studio**

On the following page is a schematic overview of a Studio's structure.

What is KDFX

The Structure of KDFX

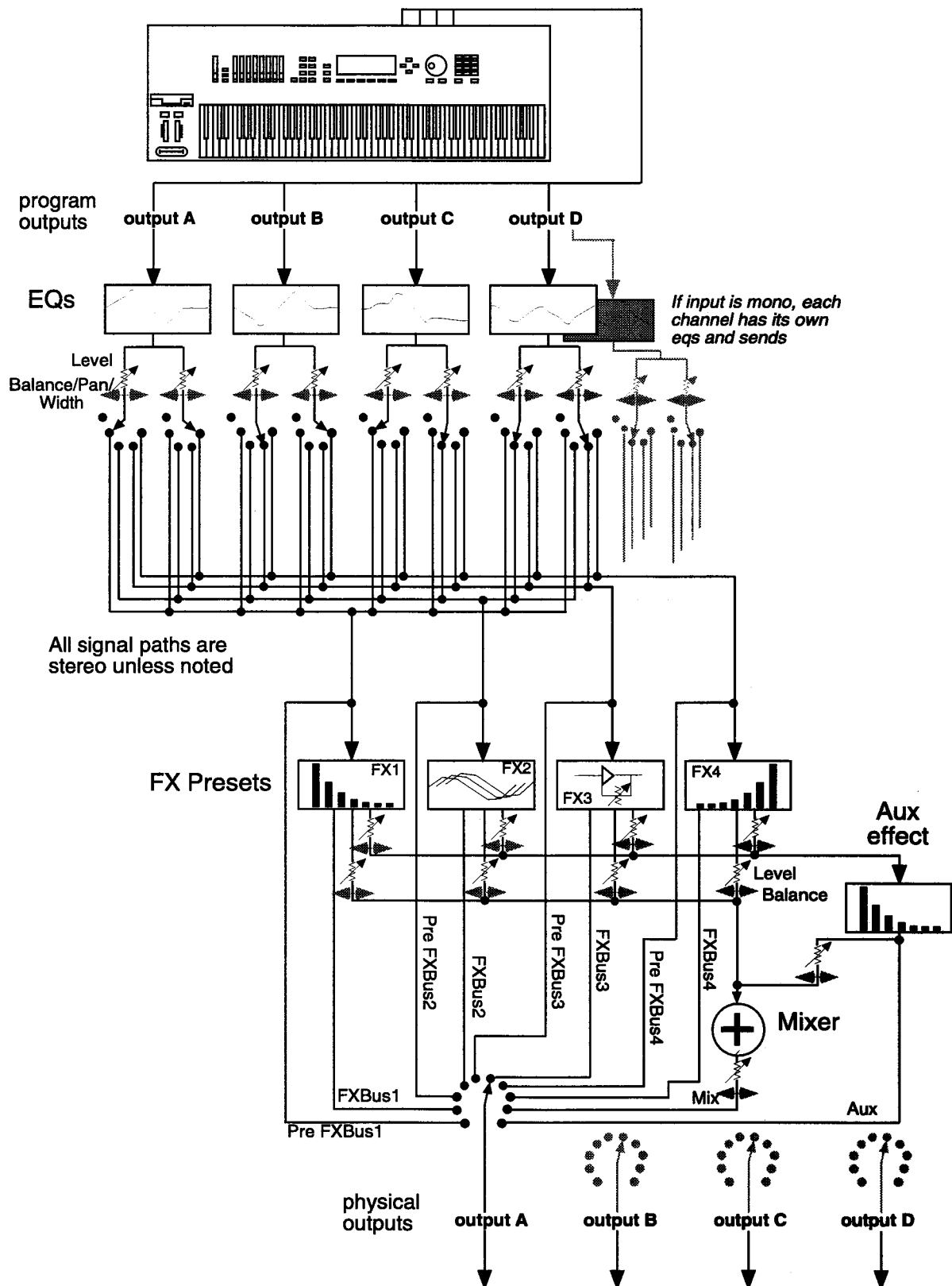


Figure 1-2. KDFX structure

Normal Studio Structure

Many of the Studios provided in ROM follow an overall organizational plan, which uses KDFX's resources efficiently and clearly. While by no means are you required to follow this structure when creating your own studios, it's a good idea to get familiar with it, and see how Kurzweil's own engineers have approached the issue of Studio organization.

- Inside the ROM Programs and Setups, the outputs KDFX-A through KDFX-D are assigned based on the type of effects processing that would most likely be appropriate for that sound.
- Input A/FXBus 1 contains a relatively simple reverb with a low Size requirement.
- Input B/FXBus 2 contains an effect which does not increase the "length" of the sound (i.e., not reverb or delay), which could include chorus, flange, distortion, pitcher, EQ, etc.
- Input C/FXBus 3 contains effects which take up lots of time, such as delays, and delays with reverb.
- Input D/FXBus 4 is dry.
- The AUXFX Bus contains a larger reverb (Size:3), a compressor, or a graphic EQ.

Software Organization

Like K2500 Programs, the software user interface of a Studio is organized in a "top-down" way: A Studio is an "Object" in K2500 terms, and the FX Presets within a Studio are also Objects, "dependent" to the Studio, the way a Keymap is to a Program. Studios and FX Presets that are modified or created by the user are stored in Program RAM. A Studio contains up to five FX Presets. The same way that one Keymap can be used in multiple Programs, a particular FX Preset can be used in multiple Studios.

Like ROM Samples in the K2500, KDFX Algorithms are stored in ROM and are unchangeable. Each FX Preset contains one algorithm. Just as you can use the same Sample in more than one Keymap, you can use the same algorithm in as many FX Presets as you like. Although you cannot modify Algorithms, additional KDFX Algorithms will be available from Kurzweil on disk, which can be loaded into KDFX.

To get inside a Studio, you use the **Edit** button to reveal the input/EQ, FX Presets, and output pages. To get inside an FX Preset, use the **Edit** button to access the Algorithm that the FX Preset uses, and its associated parameters.

To leave the FX Preset editor, press **Exit**. If you have made any changes, you will be prompted to Save the new FX Preset. Then to go back to the Studio's main page, press **Exit** again. If you have made any changes in the other parameters in the Studio, or in the name or number of the FX Preset, you will be prompted to Save the new Studio.

Controlling KDFX

Studios can be called up from the K2500 front panel or, like the original K2500 Effects, they can be assigned to specific K2500 Programs or Setups. If you set the FX Mode parameter on the K2500's Effects mode page to "Program", "Setup", or "Auto", then changing a Program (if the current channel agrees with the FX Channel) or Setup will select the Studio associated with the new Program or Setup. Of course, just as you can use the same Keymap in multiple Programs, you can use the same Studio in multiple Programs or Setups. Setting FX Mode to "Master" means that the Studio will not change with the Program or Setup.

Studio parameters are set in the Studio editor and are initially set up with fixed values, but they can be also be controlled in real-time by a wide range of control of sources, including K2500 on-board knobs, sliders, and ribbons; various internal software functions; and external MIDI commands like those coming from a sequencer or a dedicated controller.

Real-time control of parameters in a Studio is not handled in the Studio editor—it's handled in a Program or Setup that is associated with a Studio. There are several new pages in Programs that contain these controls, known as Effects Modulation or FXMod pages. It's here that the links are set up between real-time control sources and Studio parameters.

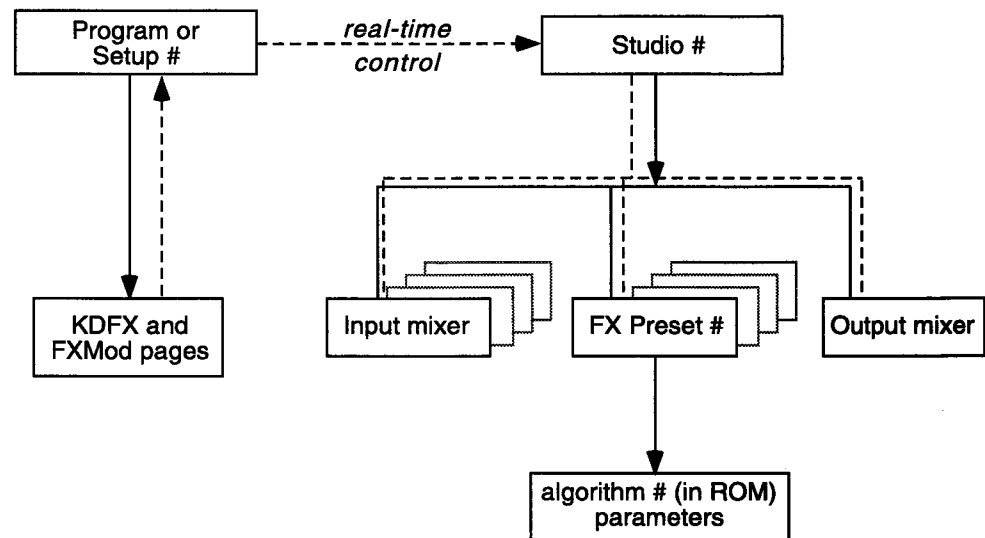


Figure 1-3. KDFX Software organization

Controlling KDFX with a Sequencer

A useful technique for sequencer users is to set up the Program controlling the Studio parameters to be an "empty" program with no Keymaps but with all of the FX Mods you need in place—this program produces no sound by itself, and exists only to control the Studio. That way you can use a dedicated MIDI channel for Studio control. More on this in Chapter 4.

Chapter 2

A Tour of KDFX

Let's take a tour through several KDFX Studios. After you do this, you should have a pretty good idea of what it's like to work with KDFX. You will still, of course, have many questions—answering them is the job of the rest of this manual.

Load the Tutorial files

From the KDFX Objects disk that came with your K2500 or KDFX upgrade, load the file "TUTOR1.K25" into bank 200...299. You can use a different bank if you like, but then your numbers and the ones in this chapter will be different.

Insert the disk into the drive
Press **Disk** to go into Disk mode
Set **Current Disk** to "Floppy"
Press **Load**
Cursor down to "TUTOR1.K25"
Press **OK**
On the "Load this file as:" screen, select **200...299**
Press **OK**
Press **OverWrt**
Press **Exit** to get back to Program Mode.

A Simple Studio

Call up Program #199 on your K2500. In Program mode, either scroll the Alpha wheel to Program 199 ("Default Program"), or press **1-9-9-Enter** on the Alphanumeric pad.

Now go into Effects Mode by pressing the **Effects** button, and you'll see this screen:

```
EffectsMode  Xpose:0ST  <>Channel:1
FX Mode:Master
FX Chan:None
Studio :199 Default Studio
Effect :1 Sweet Hall
Wet/Dry:0%Wet
Dither :Flat      DigOut :16 Bit
Octav- Octav+ Panic Chan- Chan+
```

If the screen looks very different from this, then put the cursor on the **FX Mode** parameter and scroll the Alpha wheel until it says "Master". Now use the down-arrow button to highlight the **Studio** parameter. Scroll the Alpha wheel until it says "200 Simple".

FXBus Editor

Now press EDIT, and this page appears:

```

EditStudio:FXBUS Size:1 Free:3 <>FXBus:1
FX1→200*4 Tap BPM → Aux → Mix →
Wet/Dry      :35%wet   Lvl:3.5dB Lvl:-4.5d
Tempo       :120BPM   Bal:0%   Bal:0%
Allocation:Auto
<more> INPUT FXBUS AUXFX OUTPUT <more>

```

This is the **FXBus editor** for FXBus1. It is where an FX Preset is assigned to the FXBus. Put the cursor on the box containing “200*4 Tap BPM”—this is the current FX Preset, a four-tap delay whose speed is expressed in terms of tempo (Beats Per Minute). Use the Alpha wheel to scroll through the many other FX Presets that come with KDFX. Like all K2500 objects, those that are in RAM (like this one) will have an asterisk in their name, and those that are in ROM will not. There are three more FX Buses, which can be accessed by pressing the Chan/Bank buttons. In this studio they are all empty (“No Effect”).

Go back to “4 Tap BPM” on FXBus 1, and play the piano sound from your keyboard. The arrow next to “FX1” flashes, showing that there is audio passing through this FXBus. The arrow keeps flashing as long as the FX Bus is processing audio.

Below the FX Preset selector is a **Wet/Dry** control, which determines how much of the signal will pass through the FX Preset. Below that is a **Tempo** control, which sets the timing of the delays. These parameters are called “Bus Overrides”, because they override parameters which are actually inside the FX Preset itself—these parameters can be adjusted from inside the FX Preset, or they can be set from out here, where they are much more convenient. If you change FX Presets, these values change, because their values inside the various FX Presets are all different. More about Bus Overrides a little later, and in Chapter 3.

Returns

To the right are two sets of “return” controls from the FX Preset to the output mixer. The first set, **Lvl** and **Bal**, determines how much of the sound will go to the global or Auxiliary Effects bus, and how its two channels are balanced. On this FXBus, the signal to the Aux bus is boosted 3.5 dB. The second set determines how much of the sound goes to the Mix bus. On this FXBus, the Mix signal is attenuated -4.5 dB.

Allocation

The **Allocation** parameter determines how many processor allocation units (PAUs) are reserved for this FXBus. The number of PAUs an FX Preset uses is dependent on the Algorithm at the core of the FX Preset. Algorithms can use anywhere from 1 to 4 PAUs, depending on their complexity. As you scroll through the FX Presets, the number of PAUs required by each one is shown on the top line of the display (“Size:”), along with the number of PAUs that are available (“Free:”) for other algorithms.

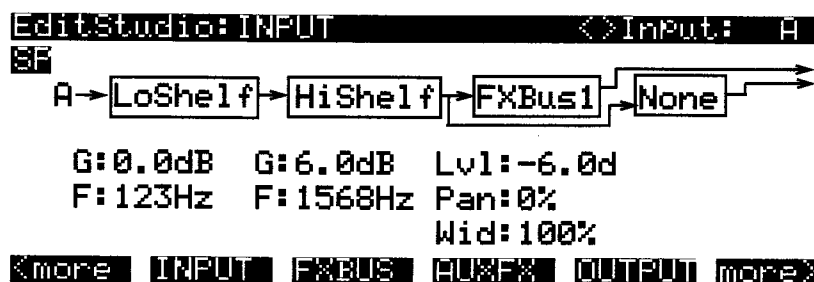
The four insert FX buses have 4 PAUs to share among them, so if any bus uses more than one PAU, it means that some buses cannot be assigned an FX Preset. This is a very common situation, as you shall see. The Auxiliary FX Bus has its own set of 3 PAUs, which are completely independent and not shared with the insert FX Bus PAUs.

You can “pre-assign” a PAU value to an FX Bus, in which case any FX Presets that require more PAUs than you have given the bus cannot be loaded into the bus. If you try to put an FX Preset into a bus that requires more PAUs than are currently available on that bus, the Preset’s name appears in parentheses—exactly the way a K2500 multi-layer drum program shows up if you try to access it on a non-drum channel.

Most often, the Allocation parameter will be set to “Auto”, in which case PAUs are assigned dynamically as you assign FX Presets to the various Buses. As you de-assign FX Presets to buses, or assign FX Presets with smaller PAU requirements, the PAUs freed up are automatically re-assigned to other buses where they are needed.

Input Editor

Press the soft button labelled **INPUT**. This page appears:



This is the **input editor**. It is showing input A, as indicated both on the left side and in the upper right corner—use the **Chan/Bank** buttons to view the other three inputs. Input A is the first stereo signal pair coming from the K2500 Program Editor’s Output section. Depending on how the K2500 is set up, this could be a single layer of a single program, or multiple layers, or multiple programs, or one or more Zones from a Setup, or the output from one or more MIDI channels.

The “S” at the upper left says that the A input is being handled as a stereo feed; this can be changed to two mono feeds. The “P” means that the stereo feed has a Pan control; you can choose to make this a Balance control instead, by setting this parameter to “SB”

If you play on the keyboard, you can see the arrow next to the letter “A” flashing, as audio is being passed through this part of the Studio. The arrow on this page flashes only as long as there is an input signal present.

Equalization

The first two blocks are the low and high EQs on the input. Put the cursor on either box and turn the Alpha wheel, and you will see the options you have available for types of EQ—these include “None”, which bypasses that EQ. The first block has more choices than the second.

The “G” underneath each block is its Gain: “0.0dB” is unity gain; the signal passes through without change. (There is no Gain parameter when a block is set to LoPass or HiPass.) “F” is the equalizer’s frequency. In this Input section, the high frequencies are boosted 6.0 dB above 1568 Hz.

Sends

The third and fourth blocks determine the destinations of the Input A signal: each block can be set to route the signal to any of the four insert FXBuses, or to "None". You cannot, however, set both blocks to the same destination.

The "Lvl" control is the FXBus "send": it sets the level of the signal to the FXBus above it. In this Input section, the level is backed off 6.0 dB, to compensate for the treble boost in the equalizer, so that the signal doesn't overload the FXBus.

Pan determines the position of the signal respective to the left and right sides. **Width** (which is not shown when you are using mono inputs) determines how much the left and right sides' signals will be separated or blended.

Auxiliary FXBus Editor

Press the AUXFX soft button below the LCD screen. This screen appears:

```

EditStudio:AUXFX Size:3 Free:0

Aux→204*Big Chamber→[Mix]→

Wet/Dry   :58%wet           Lvl:0.0dB
Out Gain  :1.5dB            Bal:0%

<more> INPUT FXBUS AUXFX OUTPUT <more>

```

This is the global AuxFX editor, and shows us what is happening on the Auxiliary Effects bus. The AuxFX bus is a second processor, which follows the four insert FXBuses. It has its own FX Preset, with Bus Overrides, and level and balance controls to feed it into the Mix bus. Its PAU allocation is fixed at 3, so it doesn't need an Allocation parameter. It can also be routed all by itself to an output, as we shall see. In this Studio, the Aux FX bus contains a chamber reverb.

Output Editor

Press the OUTPUT soft button.

```

EditStudio:OUTPUT

Mix Lvl:0.0dB           Output A:Mix
Mix Bal:0%              Output B:FXBus1
                        Output C:Off
                        Output D:Off

<more> INPUT FXBUS AUXFX OUTPUT <more>

```

The **Output editor** page is the interface to the real world. It determines which of the signals going through the various KDFX buses show up at the K2500's four sets of *physical* outputs: A, B, C, and D. These four outputs, all stereo, are both analog and digital (through the KDS bus). Output A also goes to the K2500's AES/EBU digital output.

In this Studio, **Output A** is carrying the Mix, that is, the combination of the outputs of the four FXBuses (only one of which is in use) and the AuxFX bus. Output B is carrying FXBus1, which is the signal after it passes through the delay on FXBus1, but before it gets to the reverb on the Aux bus. The other outputs are carrying no signal.

Here's a diagram of what this Studio looks like:

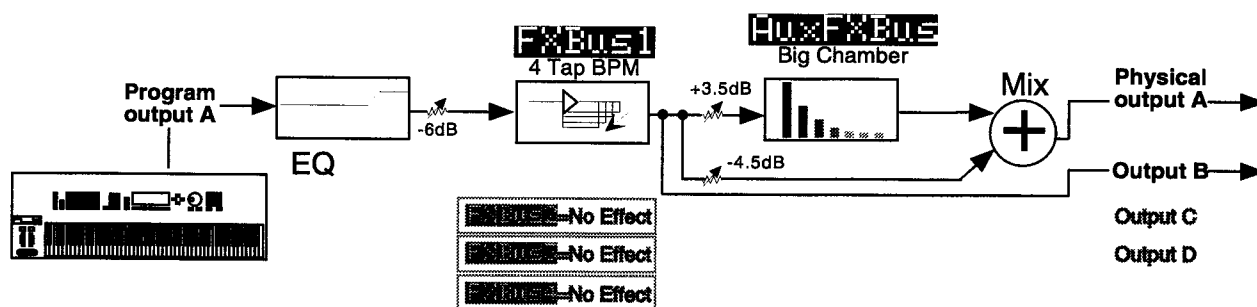


Figure 2-1. Structure of Studio 200*

A more complex Studio

Press **Exit** to get to the Effects page, and again to get to Program mode. Call up Program 201, **ElecPno/Distgtr**. This is a split keyboard program: On Layer 1, which has been assigned to the KDFX-A outputs, is an electric piano, whose key range goes up to B4. On Layer 2, which goes to the KDFX-B outputs, is a distorted guitar, whose key range starts at C5.

Press **Effects** and call up Studio 201, **RngMd/PFD/Plt**. Press **Edit** to look inside of this Studio.

FX Bus 1

On the first FX Bus is an FX Preset called **201*Tut Ring Mod**. The Algorithm this uses is a ring modulator, which is a processor that takes the sounds coming into it and combines them with static waveforms by adding and subtracting their frequencies, thereby creating interesting non-harmonic effects. Notice that this FX Preset uses 1 PAU.

```
EditStudio:FXBUS Size:1 Free:1 <>FXBus:1
```



```
Wet/Dry    :100%wet  Lvl:0.0dB Lvl:0.0dB
Out Gain   :0.0dB   Bal:0%   Bal:0%
Allocation:Auto
```

```
<more INPUT FXBUS AUXFX OUTPUT more>
```

As you play on the lower part of the keyboard, the arrow next to “FX1” flashes, but as you play on the upper part it doesn’t. That’s because the upper part of the keyboard (the guitar sound) is routed to a different FXBus.

Bus Overrides

There are two FX Preset parameters on this page: **Wet/Dry** mix and **Output Gain**. These parameters actually exist inside the FX Preset, and are placed on this page so you can control them without editing the FX Preset itself. As we saw earlier, these are called “Bus Overrides”. You can change both the value of the Override parameter *and* the name of the parameter that shows up in the Bus Override: to select a different parameter, simply highlight its name and scroll the Alpha wheel. As you do so, you will see the other parameters inside the FX Preset which can be brought out to this page.

These Overrides (that is, which parameters are available, and their values) are stored as part of the Studio, not as part of the FX Preset, and therefore you don’t have to create new FX Presets just because you want to change a couple of parameters. There are two Studio Overrides available for each of the four insert FX buses and the Aux FX bus.

If you don’t want any parameter control on this page, then set the Override to “None”.

The **Wet/Dry** value is 50%, and the **Output Gain** is 0.0dB—unity. The signal on this FXBus goes both to the Aux bus and the Mix bus at unity gain (0.0 dB).

FX Bus 2

Press the **Chan/Bank Up** button to get to FX Bus 2.

```

EditStudio:FXBUS Size:2 Free:1 <>FXBus:2
FX2→202+Ptc+Flg+Dly145BP→Aux→Mix→
Wet/Dry :90%wet Lvl:-9.5d Lvl:0.0dB
Out Gain :-2.5dB Bal:0% Bal:0%
Allocation:Auto
<more INPUT FXBUS AUXFX OUTPUT more>
  
```

On this bus is an FX Preset called **Ptc+Flg+Dly145BP**, which uses a combination Algorithm that has a pitch shifter, a flanger, and a delay all rolled into one. The “145BP” part refers to the fact that the delay times are based on a tempo of 145 BPM,

As you play the guitar sound, the arrow next to “FX2” flashes, and it keeps on flashing as long as the various feedback delays are sounding. It doesn’t flash when you play on the lower part of the keyboard.

This FX Preset uses 2 PAUs. Along with the 1 PAU in use on FXBus 1, this makes 3 of the 4 available PAUs accounted for, so the “Free” parameter is 1.

The output configuration of this FX Bus has the signal going to the Aux bus attenuated by -9.5 dB, and going to the main Mix bus at unity gain.

The other two FX Buses are empty, which you can confirm by pressing the **Chan/Bank** buttons a few times.

Inputs

Now let’s look at the inputs to the FX Buses. Press the **INPUT** soft button, and see this page:

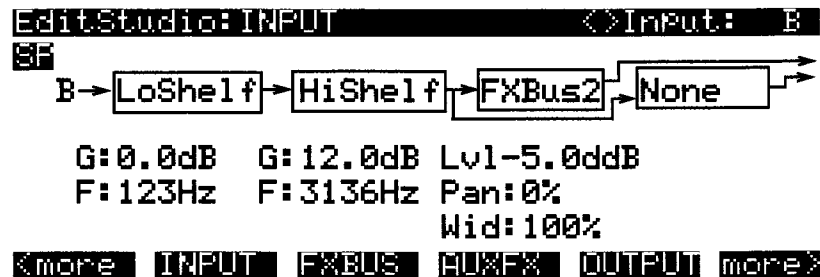
```

EditStudio:INPUT <>Input: A
SF
A→LoShelf→HiShelf→FXBus1→None→
G:12.0dB G:0.0dB Lvl:0.0dB
F:370Hz F:1000Hz Pan:0%
Wid:100%
<more INPUT FXBUS AUXFX OUTPUT more>
  
```

Input A carries the electric piano, coming from the Program’s “KDFX-A” outputs. Play on the piano part of the keyboard, and the arrow next to “A” flashes.

This Input is configured to be stereo. It has a large bass boost: 12.0 dB of everything at 370 Hz and below, which adds a strong low-frequency emphasis to the signal being ring-modulated. Its signal is being sent only to the first FX Bus. The stereo separation (Width) of the signal is at maximum.

Use the **Chan/Bank Up** button to go to Input B.



This is the distorted guitar, coming from the Program's "KDFX-B" outputs. It is also stereo. The incoming signal has a strong treble boost on it, to make it really obnoxious. It is sent directly to FX Bus 2 at -5 dB below unity gain (to compensate for the treble boost), and full width. Play on the guitar part of the keyboard, and the arrow next to "B" flashes.

The other two Inputs, C and D, are not assigned to any FX Bus.

AuxFX Bus

Now let's look at the Auxiliary FX Bus. Press the **AUXFX** soft button to look at its page.



Here is an FX Preset called "MedWarmPlate," which is just what it sounds like: a medium-sized, warm-sounding plate reverb. It has two Bus Overrides, Wet/Dry mix, and Output Gain. The Aux bus is sent to the main Mix bus at unity gain.

Since both Insert FXBuses have signal going to the Aux FX Bus, the arrow next to "Aux" will flash as long as any signal processing is going on in either of the Insert FXBuses.

Outputs

Finally, press the **OUTPUT** soft button to get to the Output page. Here we see that the four physical output pairs all are passing different parts of the studio. If the outputs are connected to an external mixer, you can treat each of them separately: recording them on different tracks of a tape deck, sending them to different outboard processors, or mixing them differently in a monitor mix.

EditStudio:OUTPUT

Mix Lvl:0.0dB

Mix Bal:0%

Output A:Mix

Output B:FXBus1

Output C:FXBus2

Output D:AuxFX

<more INPUT FXBUS AUXFX OUTPUT more>

Output A has the Mix bus. This is the combined output of the two FX Buses, plus the reverb on the AuxFX bus. Its gain and balance are at unity.

Output B has the output of FXBus1, that is, the ring-modulated piano, without any reverb.

Output C has the output of FXBus2, the delayed / flanged / distorted guitar, without any reverb.

Output D has the output of the AuxFX bus, which is *just* the reverb signal, with no dry component.

Here is the overall structure for this Studio:

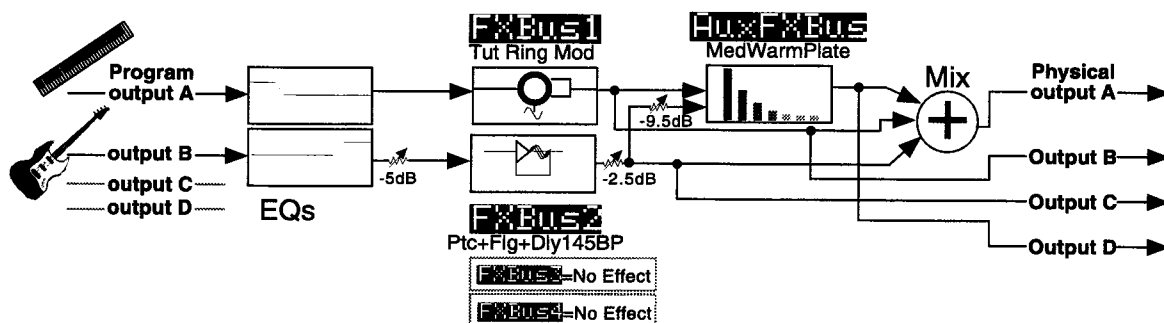


Figure 2-2. Structure of Studio 201

A complex Studio with real-time control

The third Studio we will look at is a very complex one, which allows real-time control over MIDI. Just like the original K2500 Effects, in order to enable MIDI control, the Studio has to be associated with a particular Program or Setup. The assignments of parameters to be controlled are made within the Program or Setup, and the Effects mode must be in Program or Setup (or Auto).

In this example, we'll work with Setup control—the procedure for working with Program control is almost exactly the same.

Setting the FX Mode

To enable real-time control from the Setup of KDFX parameters, we have to put the K2500 in the right Effects mode. Go to the main Effects page, and set FX Mode to "Setup". FX Channel will automatically go to "None".

```
EffectMode  %Pose:0ST  <>Channel:1
FX Mode:Setup
FX Chan:None
```

```
Dither :Medium  DigOut  16 Bit
Octav- Octav+ Panic Chan- Chan+
```

If you were in Master FXMode, you'll notice that the Studio disappears from the screen. When FX Mode is set to Setup, you can't view the KDFX Studio except from inside the Setup. This is so you can't make any changes in the Studio which the Setup doesn't know about, which could cause all kinds of conflict and confusion.

The Setup

Now let's look at the Setup that we're going to be controlling our Studio with. Press **Setup** to go into Setup mode, and select number 200, "KDFXCombo".

This is a three-layer Setup, with bass and drums at the bottom, electric piano in the middle, and a breathy-flutey sound on the top. Each layer goes to a separate KDFX output, so they can all get different processing.

If you Edit the Setup and look at the various Zones, you'll see this:

- Zone 1: Gtr Jazz Band, a layered bass and drum program, going to KDFX-A
- Zone 2: Two Live Bass, also going to KDFX-A. This and the previous Zone are active from the bottom of the keyboard up to A3.
- Zone 3: E Grand & Pad 9, an electric piano and pad program, going to KDFX-B, which is active from Bb3 to F#5.
- Zone 4: Hybrid Breath, going to KDFX-C, and active from G5 and up.

Looking at the Studio

To view the Studio, press **Edit**, and **more>** three times, and then the **KDFX** soft button. The name of the Studio associated with this Setup, 202*Complex, will appear.

```

EditSetup:KDFX All Zones
Studio:202*Complex

Bus: Param: Adjust: Source: Depth:
FX1 In/Out Out SoftPd 1
FX1 Aux Lvl -50.0dB MIDI27 52dB
FX2 L Fdbk Lvl 0% MIDI26 120%
<more> KDFX FXMOD2 FXMOD3 FXMOD4 <more>

```

Put the cursor on the Studio's name and press **Edit**, and let's dig into this Studio.

Press **INPUT** if you'd like to look at the Input pages. These are all set up straightforwardly, with Input A going to FXBus1, Input B going to FXBus2, etc.

On the FX Bus pages

Press **FXBUS** to look at the FX buses. On FXBus 1 is 205*CompresHK, a hard-knee compressor.

```

EditStudio:FXBUS Size:1 Free:0 <>FXBUS:1

FX1→205*CompresHK→Aux→Mix→

In/Out :FXMod Lvl:FXMod Lvl:0.0dB
None : Bal:0% Bal:0%
Allocation:Auto
<more> INPUT FXBUS AUXFX OUTPUT <more>

```

Look at the "In/Out" parameter. This is a Bus Override, meaning this parameter is actually inside the FXPreset but it can be changed from here. However, instead of saying "In" or "Out" it says "FXMod". This means that this parameter isn't controlled from inside the Studio at all—it's controlled by something else entirely outside the studio.

As it happens, it's controlled by the soft pedal, controller number 67—Switch Pedal 3 for K2500 keyboard users. We'll see how this is done in a moment. Pressing this pedal will cause the compressor to kick in, squashing the sound. The MakeUpGain inside the compressor is set to 6.0 dB, so the level doesn't change much when the compressor is engaged.

This type of control is useful on this program, because it uses velocity-switching to change drum sounds. Normally as you play harder, the drum sounds change, and they also get louder. With the compressor engaged, however, the drum sounds can change *without* getting louder.

There's another FXMod, which is assigned to the Aux bus send level. On the Aux bus is a reverb, so this FXMod controls how much of the signal coming through here will get reverbed. It is under the control of Slider G, controller number 27. Play the bass and drums and move that slider, and hear the reverb go in and out.

How are these controls set up? That's back on the KDFX page in the Setup. Exit the Studio (if you have made any changes, don't save them—that will only confuse things!) and look at the settings here:

```

EditSetup:KDFX All Zones
Studio:202*Complex

Bus: Param: Adjust: Source: Depth:
FX1 In/Out Out SoftPd 1
FX1 Aux Lvl -50.0dB MIDI27 52dB
FX2 L Fdbk Lvl 0% MIDI26 120%
<more KDFX FXMOD FXMOD FXMOD FXMOD4 more>

```

On FX1 bus, the In/Out parameter has an initial value ("Adjust") of "Out", which means that normally it is not engaged.

The controller that controls this parameter is the "Source", and in this case, it is the Soft Pedal/Switch Pedal 3, MIDI controller 67. The amount the Source can change the parameter is the Depth, and here it is "1".

On a parameter that has only two positions, like "In/Out", the Depth can only have three values: 1, 0, or -1. If it is set to 1 or -1, then changing the source puts the parameter into its other state—in this case, going from Out to In. (If it's set to 0, then nothing that the Source does will change the value of the parameter.)

Also on the FX1 bus, the Aux Lvl is initially -50 dB. The Source, MIDI controller 27, can raise that level by as much as 52 dB, to put it at +2 dB—and in fact, that's what you're hearing as you move Slider F.

Let's go back into the Studio and look at FXBus 2. Here's our piano and string pad, going through an FX Preset called 206*Fast&RichChorus.

```

EditStudio:FXBUS Size:2 Free:0 <>FXBUS:2

FX2→206*Fast&RichChorus→Aux→Mix→

L Fdbk Lvl:FXMod Lvl:FXMod Lvl:0.0dB
R Fdbk Lvl:FXMod Bal:0% Bal:0%
Allocation:Auto
<more INPUT FXBUS AUXFX OUTPUT more>

```

The two Bus Overrides are L Fdbk Level (Left Feedback Level) and R Fdbk Level, and they are both under FX Mod control. The Aux Lvl, as on FXBus1, is also under FX Mod control. If you now go inside the FX Preset and Press PARAM3, you'll see that the Left and Right LFO1 Rates are *also* under FXMod control.

```

EditFXPreset:PARAM3 Dual Chorus 2
L LFO1Rate:FXMod R LFO1Rate:FXMod
L LFO2Rate: 0.50Hz R LFO2Rate: 0.50Hz
L LFO3Rate: 0.50Hz R LFO3Rate: 0.50Hz
L LFO1Dpth:9.5ct R LFO1Dpth:9.5ct
L LFO2Dpth:10.0ct R LFO1Dpth:10.0ct
L LFO3Dpth:5.0ct R LFO1Dpth:5.0ct
<more PARAM1 PARAM2 PARAM3 PARAM4 more>

```

Go back out of the FXPreset and the Studio, to the Setup's KDFX page, above. Here we see that on FX Bus 2, L Fdbk Lvl has a starting value of 0%, and will change, using MIDI controller 26 (Slider F), up to 120%.

Press **FXMOD2** to go to the next page of FXMods, and you'll see the same slider changing the R Fdbk Lvl, only in this case the Depth is -120%, meaning the feedback on this channel will be out of phase with the main signal.

```

EditSetup:FXMOD2                                     All Zones
Bus: Param: Adjust: Source: Depth:
FX2 R Fdbk Lvl 0% MIDI26 -120%
FX2 L LFO1Rate 0.50Hz MIDI25 8.25H
FX2 R LFO1Rate 0.52Hz MIDI25 8.25H
FX2 Aux Lvl -15.5dB MIDI27 15dB
FX3 L Feedback 17% MIDI24 120%
<more> KDFX FXMOD2 FXMOD3 FXMOD4 FXMOD5 more>

```

Further down the FXMOD2 page are the assignments to the LFO rates: MIDI controller 25 (Slider E) is assigned to the left and right LFO1 Rates, with minimum values of 0.50 and 0.52 Hz, respectively, and maximum change of 8.25 Hz. Set the feedback level high and you can really clearly hear the LFO rate changing.

Finally on this bus, MIDI Controller 27, our old friend Slider G, also controls the Aux Level send, thereby determining how much reverb will appear on the signal on this bus as well as the signal on FXBus 1. There are no limits to how many FXMods a single Source can be assigned to. (In fact, there are also no limits on how many different Sources can be assigned to the same Parameter, and you may find uses for that feature somewhere—but not here.)

On to FXBus 3. Here's where our breathy flute sound is, and it's going through a delay FXPreset called 207*Adj Delay.

```

EditStudio:FXBUS Size:1 Free:0 <>FXBUS:3
FX3 → 207*Adj Delay → Aux → Mix →
L Wet/Dry :50%wet Lvl:FXMod Lvl:0.0dB
L Wet/Dry :50%wet Bal:0% Bal:0%
Allocation:Auto
<more> INPUT FXBUS AUXFX OUTPUT more>

```

Go inside the FXPreset, and press **PARAM2**, and on that page, you'll see that the left and right Delay times and the left and right Feedback settings are all under FXMod control.

```

EditFXPreset:PARAM2 Dual ModeDelay
L Delay :FXMod R Delay :FXMod
L LFO Mode:ChorTri R LFO Mode:ChorTri
L LFO Rate:0.90Hz R LFO Rate:0.50Hz
L LFO Dpth:9.6% R LFO Dpth:9.6%
L Feedback:FXMod R Feedback:FXMod
L HF Damp :25088Hz R HF Damp :25088Hz
<more> PARAM1 PARAM2 more>

```

Go back out to the Setup, and look at the bottom of the FXMOD2 page. Here we see the L Feedback parameter is under the control of Controller 24 (Slider D), with a minimum of 17% and a maximum of 17+82=99%. Go to the FXMOD3 page and you'll see the same assignment is in place for the R Feedback parameter.

EditSetup:FXMOD3				All Zones
Bus:	Param:	Adjust:	Source:	Depth:
FX3	R Feedback	17%	MIDI24	82%
FX3	L Delay	50.0ms	Foot	200.0
FX3	R Delay	74.0ms	Foot	200.0
FX3	Aux Lvl	-61.0dB	MIDI27	62dB
None	None		OFF	
<div> <div>more</div> <div>KAFX</div> <div>FXMOD3</div> <div>FXMOD3</div> <div>FXMOD4</div> <div>more</div> </div>				

Also on this page, the Left and Right Delay times are controlled by the Foot Pedal, controller 4—CC Pedal 1 for K2500 keyboard users. Here it varies the left decay time between 50 and 250 ms, and the right decay time between 74 and 274 ms.

Finally, the Aux Level from this bus, controlling the reverb send, is once again assigned to MIDI controller 27, Slider G.

So here's a summary of the FXMods in this studio:

- Soft pedal puts compression on the bass and drums.
- Slider F controls the feedback on the chorus on the piano/string pad. Slider E controls the LFO speed on that chorus.
- Slider D controls the feedback on the delay on the breathy flute.
- Foot Pedal controls the delay time on the breathy flute.
- Slider G controls the reverb send for all three Zones.

A Note about KDFX in Setups

This applies primarily to K2500R users who are playing their units with a conventional MIDI keyboard. In order to play Setups, which normally require a multi-zoned/multichannel keyboard like the K2500 or PC-88, the K2500R includes a parameter called "Local Keyboard Channel" (LocalKbdCh), which is found on the **MIDI:Receive** page. If you set this parameter to the transmitting channel of the keyboard, then the K2500 takes all incoming MIDI data on that channel and treats it as if it was coming from a local keyboard—that is, it plays all the Zones in the Setup.

However, when you use this feature, the K2500 will only respond to certain MIDI commands coming in on this channel if the command has been specified as a "Destination" on the controller assignment pages in the Setup (**SLIDER**, **SLID/2**, etc.)—and then, only if it has been assigned to its customary physical controller in the Setup.

For example, Slider A is customarily Data (MIDI Controller 6), but if on the Setup's **SLIDER** page, Slider A has been reassigned to something else, then Data commands coming from the external keyboard on the local channel will not be recognized. Therefore, any MIDI command that is not in its customary place in the Setup cannot be used as a KDFX Source, because the Setup will not recognize it.

This is not an issue in Program mode, or when using the K2500 with a sequencer. In those cases the LocalKbdCh should be set to "None", and there is no restriction on the MIDI data passing through. More on this in Chapter 4.

Building your own

Now that we've walked you through a very complex studio, here are some hints on how to go about building your own.

First, you want to decide whether you want the Studio to be static, or to be dynamic under KDFX control from the K2500 keyboard and/or an external MIDI source. If it's to be static, the Effect mode must be Master, while if it's to be dynamic, the Effects mode must be Program, Setup, or Auto, depending on how you want to approach it.

Then you need to look at how your Program outputs are arranged, so you can design the Studio intelligently. If you're using internal Setups, look at the output assignments on the various Zones, and change them so that sounds that need different effects are separated, and those that can use the same effects are grouped. If you're using a MIDI sequencer, you might want to use the Channel output overrides in MIDI mode, and arrange your sequence so that which tracks go to which FX Buses is determined by their MIDI channel assignments.

Now set up your Studio, assigning FX Presets to the Program outputs/KDFX inputs. Many of the ROM Studios follow a common organizational plan, which might be a good starting point for your Studios:

- FXBus 1 contains a relatively simple reverb with a low Size requirement.
- FXBus 2 contains an effect which does not increase the "length" of the sound (that is, not reverb or delay). Possibilities include chorus, flange, phaser, distortion, shaper, pitcher, enhancer, EQ, or EQ morpher.
- FXBus 3 contains effects which take up lots of time, such as delays, delays with reverb, or other "Lead" sounds.
- FXBus 4 is dry, especially if the first three FXBuses have probably used up all the PAUs).
- The AUXFXBus contains a larger reverb (Size: 2 or 3), a compressor, or a graphic EQ. It can often be used instead of an FXBus reverb, such as the one on FXBus1. If you use it in this way (set the Aux Lvl on FXBus 1 to 0dB or higher), it frees up FX Bus 1 for use as an Enhancer, Stereo Image, Flanger, etc.

Finally, set up your KDFX Mods in the Setup or Program you plan to use. If you are using a sequencer, you might want to dedicate a Program *just* to KDFX Mods, with no sound coming from that program.

Keep in mind that KDFX Mods don't always have to be dynamic—they can be used to assign static (Source: OFF) values to the parameters in a Studio that are different from the Studio's normal parameters. This lets you create and store multiple variations on a Studio without making each one a separate studio—when you want to call up the variation, merely call up the Program that contains the correct FX Mods.

Don't forget to Save your Studio!

And don't forget to have fun. But now, read the rest of the manual.

Chapter 3

Inside KDFX

This chapter will analyze the organization of KDFX in detail.

Personalities

KDFX can be said to have two distinct “personalities,” depending on the setting of the “FXMode” parameter on the FX Mode page.

If FXMode is set to “Master”, then all KDFX parameters are set within the Studio, and remain unchanged unless the Studio or any of its FX Presets are edited.

If FX Mode is set to anything else — “Program”, “Setup”, or “Auto”—then one or more parameters within the studio may be under the control of an outside source, such as MIDI or one of the K2500’s control sources, and can be continuously changed in real time without editing the Studio or any FX Presets.

For the sake of clarity, in this chapter, we will deal with KDFX only in “Master” mode. The issues of real-time control will be dealt with in depth in the next chapter.

☛ So for starters, set the **FX Mode** parameter on the Effects Mode page to “Master” and the **Channel** parameter to “None” before going further into this chapter.

Navigating KDFX

The largest component in KDFX is the Studio. The Studio encompasses all of KDFX’s signal routings, processing algorithms, and processing parameters. When you change any parameter in a Studio, you are potentially creating a new Studio, just as when you change a parameter in a Program, the Program is no longer the same. The user interface within a Studio is organized according to the following diagram:

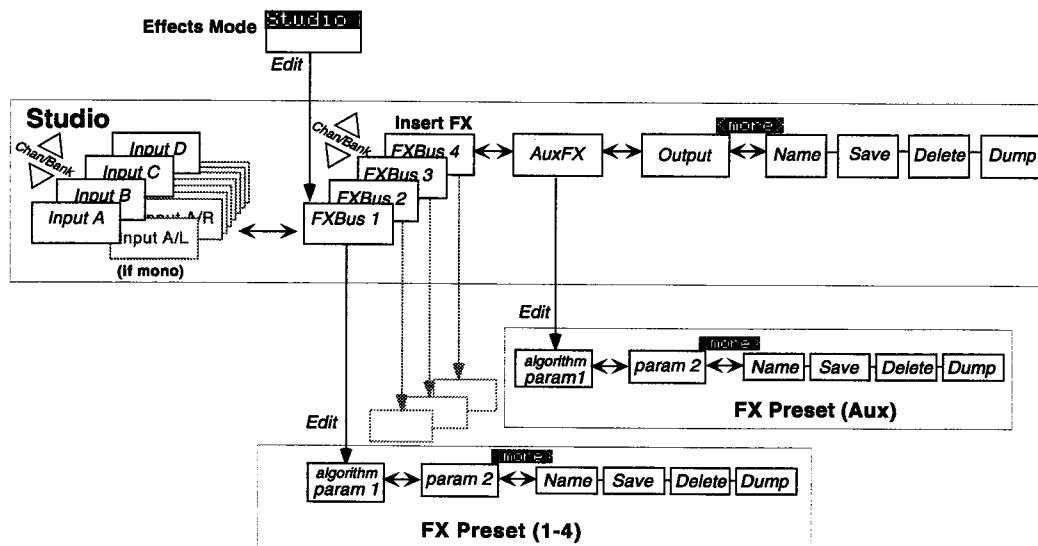


Figure 3-1. KDFX user-interface map

To select a Studio, go the main Effects page if you're not already there (from Program mode, press Effects to go into Effects mode), and move the cursor so the Studio name is highlighted.

```
EffectMode  Xpose:0ST  <>Channel:1
FX Mode:Master
FX Chan:None
Studio : 2 Hall-1nsCD Room
Effect : 1 Sweet Hall
Wet/Dry:0%Wet
Dither :Medium      DigOut :16 Bit
Octav- Octav+ Panic Chan- Chan+
```

FX Bus

When the Studio is highlighted, pressing **Edit** goes to the Studio Editor (**EditStudio**) level, and the **FXBus** page. There are four **FXBus** pages, which are selected using the **Channel/Bank Up** and **Down** buttons. If you have just entered the Studio Editor, the first **FXBus** page you see will be the **FXBus1** page. Once you are inside the Studio Editor, however, when you press the **FXBUS** soft button from another page, it will take you to whichever **FXBus** page you were *last* looking at.

```
EditStudio:FXBUS Size:1 Free:0 <>FXBus:1
```



```
Wet/Dry      :32%wet    Lvl:0ff    Lvl:0.0dB
Out Gain     :0.0dB     Bal:0%     Bal:0%
Allocation:Auto
<more INPUT FXBUS AUXFX OUTPUT more>
```

The four **FXBuses** are the equivalent of four effects processors inserted into the effects loop of a mixing console. Therefore, they are known as the “**Insert effects**”.

Parameters

When you are on an **FXBus** page, highlighting the name of the **FX Preset** (or any of the parameters directly below it) and pressing **Edit** accesses the first page of **Parameters** for that **FX Preset**. An **FX Preset** is an object within the Studio, much like a **Keymap** is an object within a Program. The same **FX Preset** can be used in more than one Studio, or more than once in the same Studio (provided you don't run out of **PAUs**).

The first **EditFXPreset Parameter** page includes the Algorithm that the **FX Preset** is based on. Additional pages of **Parameters** are accessed by soft buttons. Depending on how complex the Algorithm is, there may be as many as four **Parameter** pages in an **FX Preset**. Algorithms are in the KDFX ROM, and are not normally changeable, deletable, or saveable by the user. Like ROM samples, they are simply always there. (Additional Algorithms, however, may be loaded in from disk when they become available from Kurzweil.)

```

EditFXPreset:PARAM1      EffectSize:3/3
FXAlgorithm:5 MiniVerb
Wet/Dry   :32%wet      In Gain   :0.0dB
Rvrb Time :2.6s        Out Gain  :0.0dB
L Pre Dly :4ms         HF Damping:8372Hz
R Pre Dly :9ms
<more> PARAM1 PARAM2    more>

```

Pressing the **More** soft buttons accesses Name, Save, Delete, and Dump pages for the FX Preset.

Pressing **Exit** goes back to the FXBus page, and if you have made any changes in the FX Preset you will be prompted to save it. If the FX Preset in this bus is the same as on another bus (either in this Studio or another), then any changes you make (and save) will affect all buses using that FX Preset.

Input

From the FXBus page, or anywhere inside the Studio Editor, pressing the **INPUT** soft button brings you to the Input A page.

```

EditStudio:INPUT      <>Input: A
SF
A->LoShelf->HiShelf->FXBus1->FXBus2->
G:0.0dB G:0.0dB Lvl:0.0dB Lvl:0ff
F:123Hz F:9956Hz Pan:0% Pan:0%
Wid:100% Wid:100%
<more> INPUT FXBUS AUXFX OUTPUT more>

```

The other Input pages—B, C, and D—are selected by using the **Chan/Bank Up** and **Down** buttons. Depending on how the inputs are configured—stereo or mono—there will be from four to eight Input pages.

Similar to the FX Bus pages, the first time you look at an Input page after entering the Studio Editor, it will be the Input A page (or, if it's mono, the Input A/L page). Once you are in the Studio Editor, when you press the **INPUT** soft button from another page, it will take you to whichever Input page you were *last* looking at.

Aux FX

From inside the Studio Editor, a soft button accesses the **AuxFX** page. This is a separate effects bus, which can be used by itself, or in a chain following one or more of the insert Effects.

Like the insert FX buses, you access the FX Preset's parameters, including its Algorithm, by highlighting the FX Preset's name and pressing **Edit**. As on the insert FX buses, the FX Preset on the AuxFX bus has up to four pages of parameters, and the **More** soft buttons access Name, Save, Delete, and Dump pages for the FX Preset. The same FX Preset can be used in the AuxFX bus as in any of the insert FXBuses.


```

EditStudio:AUXFX Size:3 Free:0

Aux->3 Tabla Room      Mix
Wet/Dry   :100%wet      Lvl:0.0dB
Out Gain  :0.0dB        Bal:0%

<more INPUT FXBUS AUXFX OUTPUT more>

```

The AuxFX page can also be accessed from any of the FXBus pages by placing the cursor on the box labelled "Aux" and pressing Edit.

Pressing Exit goes back to the AuxFX page on the EditStudio level. If you have made any changes in the FX Preset, you will be prompted to save the FX Preset.

Output

In the Studio Editor, pressing the **Output** soft button accesses the **Output** page, where the KDFX's "virtual" outputs are assigned to the K2500's physical outputs.

```

EditStudio:OUTPUT

Mix Lvl:0.0dB      OutPut A:Mix
Mix Bal:0%         OutPut B:Off
                   OutPut C:Off
                   OutPut D:Off

<more INPUT FXBUS AUXFX OUTPUT more>

```

The Output page can also be accessed from any of the FXBus pages by placing the cursor on the box labelled "Mix" and pressing Edit.

Name, Save, Delete, Dump

From any of the EditStudio pages, pressing either of the **more** soft buttons accesses Name, Save, Delete, and Dump pages for the Studio. Studios are stored in RAM, like K2500 Programs, and when a Studio is recalled, all of its associated FX Presets and parameters are recalled with it. Studios in ROM occupy slots in the 0...99, 100...199, and 700...799 banks. You may override these if you like, or use the RAM banks (200-699 and 800-999) for your Studios. The ROM Studios are always there, and if you delete a Studio that you've stored in a ROM slot, the original ROM Studio will pop up in its place.

When you save a Studio, you can also rename it, using the standard naming screen:

```

EditStudio:Rename

Studio Name:   HallFln9ChD Room

Delete Insert <<< >>> OK Cancel

```

The Compare and FX Bypass Buttons

As with all K2500 objects, the **“Compare”** (Disk) button lets you switch back and forth between the last saved version of whatever you are editing and its current state.

If you are on a page at the EditStudio level, Compare toggles between the last-saved and current versions of the Studio. If you are inside an FX Preset, on the EditFXPreset level, Compare toggles between the last-saved and current versions of the FX Preset.

If you have changed any Algorithms in an FX Preset or Studio during the current editing session, the Compare button will switch back to the old Algorithms. This can create some short-term “holes” in the audio output when the signal momentarily goes dry—see the section on switching studios in real time on Chapter 4.

The **Effects/FX Bypass** button, when you are in the Studio Editor, bypasses all of the FX Presets (all of the Insert FX and the Aux FX) in the current Studio, so that you can hear the signals without processing. It does not, however, change the EQs, gains and balances, or signal routings—those will continue to affect the signal you hear.

Exploring the Studio Parameters

We’ll explore the parameters within the Studio in the order in which they affect the signal path, starting on the Input page.

Input section

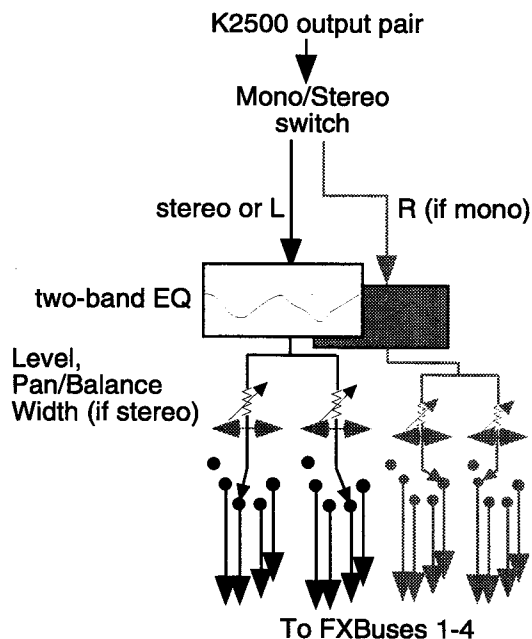


Figure 3-2. Input editor

Inputs are referred to as A, B, C, and D, and correspond to the four output buses (KDFX-A through KDFX-D) from the K2500's Program editor. These signals can be treated as stereo pairs or as individual mono signals. This is determined by the first parameter on an Input page, the Mono/Stereo switch.

If this switch is set to "M", then the left and right channels of the selected Program output pair are split up, and each is given its own Input page, with EQ and FXBus routings. If it is set to "SP" (Stereo with Pan) or "SB" (Stereo with Balance), the two channels of the pair are processed in parallel.

Selecting the Mono/Stereo mode on one Input bus does not affect any of the others, and you can have any combination of stereo and mono Inputs in a Studio. Therefore, there can be anywhere from four to eight Input pages in a Studio.

The **Chan/Bank Up** and **Down** buttons let you move among the Input pages.

The Arrow Meter

On an Input page, whenever there is signal present on its Bus, the arrow next to the letter of the Bus flashes. This is a good way to check that you have set up your Program output routings correctly. More on this later.

EQ

The input signal first passes through two equalizers. These equalizers are independent of each other, but the signal is chained: it goes through the left one, then the right one. Each equalizer has a frequency ("F") control and, depending on the mode, a gain ("G") control. The mode of each EQ module is changed by placing the cursor in the appropriate block and turning the Alpha wheel or using the + and - keys. There are eight modes on the first EQ, and six on the second:

- **None.** No effect, the signal passes through unchanged.
- **LoShelf.** Boosts or cuts frequencies below the "F" value by "G" decibels.
- **HiShelf.** Boosts or cuts frequencies above the "F" value by "G" decibels.
- **LoPass1.** Cuts frequencies above the "F" level with a 6 dB/oct (1-pole) slope.
- **LoPass2.** Cuts frequencies above the "F" level with a 12 dB/oct (2-pole) slope.
- **HiPass1.** Cuts frequencies below the "F" level with a 6 dB/oct (1-pole) slope.
- **HiPass2** (not available on the second EQ). Cuts frequencies below the "F" level with a steeper 12 dB/oct (2-pole) slope.
- **ParaMid** (not available on the second EQ). Provides a cut or boost centered around the "F" frequency. The bandwidth of the equalizer is two octaves. An illustration of the action of this equalizer mode is at the top of page 14-24 of the *K2500 Performance Guide*.

FXBus sends

Following the equalizers are the insert FXBus sends. Each Input has two sends. Change the destination of each send by placing the cursor on it and doing the usual thing with the Alpha wheel and + and - keys.

Either send can be assigned to any of the four FXBuses, or to "None", with one exception: the two sends on a particular Input cannot both be assigned to the same FXBus. So, for example, if the first send on Input B/L is assigned to FXBus2, the second send from Input B/L cannot also be assigned to FXBus2. You can, however, assign as many *different* Inputs to the same FXBus as you like—including the two channels from a mono pair.

Each of the FXBus sends has a level parameter ("Lvl") that determines the gain of the signal going to that send. Maximum level is 24.0 dB, and minimum is -79.0 dB—there is also an "Off" position. 0.0 dB is unity gain.

The FX Bus sends are stereo, and if an Input is stereo, both channels go to the send.

Mono inputs ("M")

If an Input is mono, then each of its FXBus sends has a **Pan** parameter. This determines how the signal is distributed between the left and right channels going to the FXBus: -100% is left channel only, 100% is right channel only, and 0% is both channels equally.

Stereo inputs with Pan ("SP")

If the Input is set to "SP", then each FXBus send has a **Pan** parameter and a **Width** parameter. The Width parameter determines how much separation there will be between the left and right input signals as they are sent to the FXBus: assuming Pan is set to 0%, a Width of 100% means the signals will be completely separate, while 0% means they will be combined into "dual mono". Negative numbers flip the channels around, so that -100% means the channels are separate, but with left and right reversed, while -50% means they are reversed and partially blended.

The Pan control maintains the stereo image, but "tilts" it one direction or the other. At 0% there is no change to the signal, while at 100% it all goes to the right channel. At 50%, what had been hard left will now be in the center, and what had been in the center will now be halfway between center and right. Negative values tilt the signal to the left.

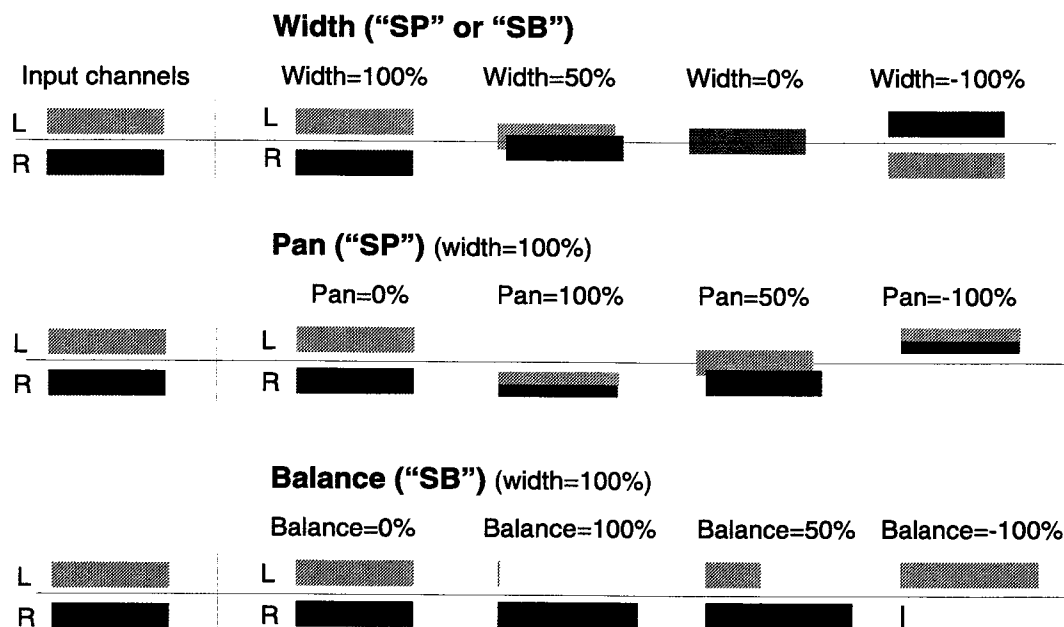


Figure 3-3. Width, Pan, and Balance controls

A word about Gain

The Pan, Balance, and Width controls all have constant power curves, so that the combined signal level doesn't change when you move the signals from side to side. However, if you use several Pans or Balances on a signal to keep the channels isolated throughout the entire signal chain (for example, if the Input send is panned 100%, and so are the Aux send, the Mix send, and the Mix output), you can increase the gain of the signal considerably.

Each stage of hard-panning adds 3 dB, so the increase in gain when the signal reaches the final output can be as high as 12 dB. In this case, you may want to trim the level at various stages to keep the signals from getting too hot.

Effects buses

The four insert Effects buses (FXBuses) receive the signals from the Input editor and process them. Press the **FXBUS** soft button to go to one of the FXBus pages—the first time you do this after entering the Studio Editor, it will be the **FXBus1** page. To go to the other FXBus pages, use the **Chan/Bank Up** and **Down** buttons. The number of the FXBus appears in the upper right corner.

The Arrow Meter

There are arrow meters on the FXBus pages as well, right next to the number of the FXBus. These tell you when signal is coming into the Bus, and also when signal is present *inside* the bus, so if you have a long reverb or repeating delay, for example, the arrow will keep flashing as long as the processing is going on.

FX Preset

The first parameter on an FXBus page is the FXBus's FX Preset. Set the cursor on it, and use the Alpha wheel to scroll through the FX Presets currently in memory. If an FX Preset name comes up in parentheses, for example, "(Really Big Plate)", it means there is not enough processing power (PAUs) available at the moment to use this FX Preset in this FXBus. We'll get to PAUs in a moment. "199 No Effect" is a "blank" FX Preset, in which all signals pass straight through without any processing. It can be used as a starting point for creating your own FX Preset. If you want to set up a "dummy" effects bus to pass signal directly to the Aux bus, use "0 None".

Bus outputs

The parameters on the right side of this page determine how the effected signal gets to the KDFX outputs. Each FXBus has four outputs: itself *pre* the FX Preset (i.e., dry), itself *post* the FX Preset, the Mix bus, and the Aux effects bus. All of these outputs are stereo.

The output to the Mix effects bus has a level control with a range of -79.0 to +24.0 dB, and an Off position. It also has a Balance control that works similarly to the Balance control on the Inputs, by setting the relative levels of the two output channels. The signal is mixed with similar signals from the other FXBuses onto the Mix bus, which can be accessed on the Output page.

The output to the Aux bus has an identical pair of controls. Its signal goes to the global Aux effects bus, where it is mixed with similar signals from the other FXBuses, and then put through the Auxiliary Effects processor. From there it can be accessed on the Output page.

There is no external level control over the output of the FXBus itself—it just shows up, in pre-effect and post-effect versions, on the Output page.

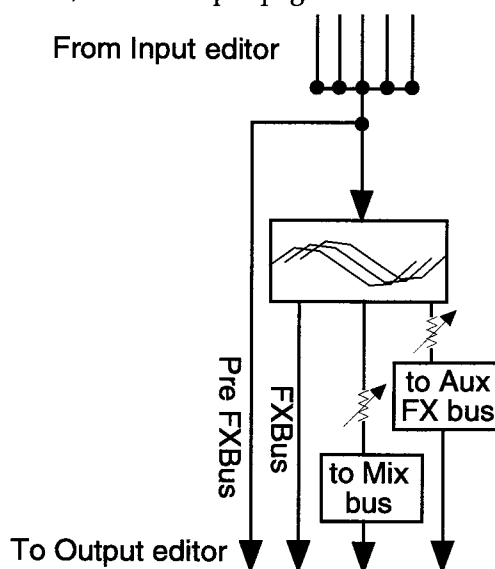


Figure 3-4. FXBus signal routing

The AuxFX bus

The Auxiliary FX bus is accessed by pressing the **AUXFX** soft button on any page in the Studio Editor. It contains an FX Preset, which is separate from those in the insert FXBuses—although it can be the same FX Preset that is in use on one or more of the Insert FX Buses. There is no Allocation parameter, because the AuxFX bus has a fixed allocation of 3 PAUs. Only a very few highly complex FX Presets require more than 3 PAUs, so as you scroll through the FX Presets here you won't see many names in parentheses.

Aux bus outputs

There are two outputs from the AuxFX bus: itself, and a feed (post-effect) to the Mix bus. The feed to the Mix bus, where it is combined with other Mix bus feeds from the four FXBuses, has level and balance controls. The AuxFX bus's own output has no post-effect controls, and goes right to the Output page.

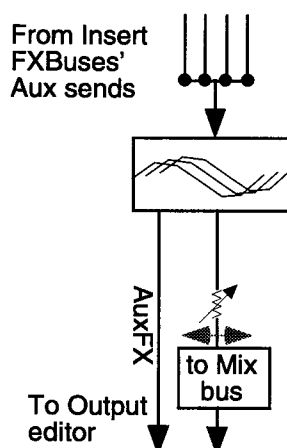


Figure 3-5. Aux bus outputs

About FX Presets

FX Presets are where the processing takes place in KDFX. Each of the insert FXBuses and the AuxFX bus have their own FX Preset, and they are all independent of each other. If you think of a Studio as being the equivalent of a K2500 Program, then an FX Preset is the equivalent of a Layer or Keymap.

In any of the FXBuses, the FX Preset is edited by placing the cursor on the name of the FX Preset and pressing **Edit**.

The first parameter page, or “PARAM1”, appears. The Algorithm that the FX Preset is based on is selected at the top of this page. Highlight the name on the “FXAlgorithm” line, and scroll through the various Algorithms. The Algorithms are in the K2500’s ROM (like ROM samples), and are not changeable by the user. As you change Algorithms, the parameters displayed on the page change accordingly.

```

EditFXPreset:PARAM1      EffectSize:3/3
FXAlgorithm:1 Pansural Room
                        In Gain  :0.0dB
Wet/Dry   :30%          Out Gain :2.0dB
Room Size :15.2m
Pre Dly   :4ms          Decay Time:1.7s
HF Damping:14080Hz
<more>  PARAM1  PARAM2  >more>
  
```

Notice also as you scroll the Algorithms, the “EffectSize” parameter in the upper-right corner changes. This parameter shows how many Processing Allocation Units (PAUs) the currently selected Algorithm requires, followed by how many are available for this FX Preset. If, for example, EffectSize is “2/3”, that means the algorithm requires 2 PAUs, and there are 3 PAUs available. More about PAUs soon.

Just below and to the right of the Algorithm name is an Input Gain parameter, which adjusts the level of the signal coming into the FX Preset from the input(s) sending to it. The relative level of the various inputs is determined on the Input pages, but you can change the overall level here—for example, if you’ve combined several inputs into one FXBus and the signal is too hot for the FX Preset, you can pad it down here. The Trim is adjustable from Off/-79.0 dB to +24 dB.

Below the Input Gain is usually (but not always) an Output Gain, which sets the level of the signal leaving the FX Preset, which can be further modified by the Mix and Aux sends on the FXBus page.

The other parameters that appear on this page are determined by the Algorithm. Each Algorithm has its own set of parameters, which may take up as many as four pages, accessed using the soft buttons **PARAM2**, **PARAM3**, etc. The parameters associated with each Algorithm are discussed in detail in Chapter 5 and Appendix A.

When you change a parameter on one of these pages, you have changed the FX Preset, and if you want the change to be permanent, you must save the FX Preset. Pressing either of the **more** soft buttons accesses Name, Save, Delete, and Dump pages for the FX Preset. FX Presets are stored in RAM, just like K2500 Keymaps. When an FX Preset is recalled, either by itself (from within the Studio Editor) or as part of a Studio, its associated Algorithm and all parameters are recalled with it.

There is another way to edit an FX Preset’s parameters without altering the FX Preset itself, and that is by using Bus Overrides.

Bus overrides (Bus Mods)

We haven't yet talked about the two parameters that are on the Insert FX and Aux FX Bus pages, directly underneath the name of the FX Preset. These are called "Bus overrides" or "BusMods", and they allow you to change parameters within an FX Preset without actually going into the FX Preset.

```
Wet/Dry      :35%  
Out Gain     :2.0dB
```

For example, the Bus overrides on FX1 are often Wet/Dry mix and Output gain. Normally, these parameters would be found inside the FX Preset, and if you changed them, you'd have to save the new FX Preset in order to keep the changes.

Instead, using Bus overrides, you can adjust these two parameters and hear what they sound like while you are adjusting them *without* going into the FX Preset. When you save the Studio, these parameter values are saved, but they are not part of the FX Preset—they are part of the *Studio*. Therefore, the FX Preset remains unchanged (and if the FX Preset is in use elsewhere, it hasn't changed there), but these two parameters *in this particular FXBus* have been altered.

"Wet/Dry" and "Out Gain" are the default Bus overrides you will encounter most often, but in some Algorithms and FX Presets, other parameters are accessed as Bus overrides. For example, on some Compressor Algorithms (as we saw in Chapter 2), the first Bus override is an In/Out switch; and on some dual-channel delay and filter Algorithms, the overrides are separate Wet/Dry controls for the left and right channels.

Making and Breaking Bus Overrides

Some Studios supplied with KDFX, when you first encounter them, have the BusMods in place, but they are not "engaged"—that is, they're not actually overriding anything, but instead simply show the values of the corresponding parameters inside the FX Preset unchanged. To see this, choose an FX Preset on the FX Bus page and look at the values of the override parameters, "Wet/Dry" and "Out Gain". Now go inside the FX Preset by highlighting the FX Preset's name and pressing **Edit**, and find those two parameters on the first parameter page (**PARAM1**). You'll see their values are the same as on the FX Bus page.

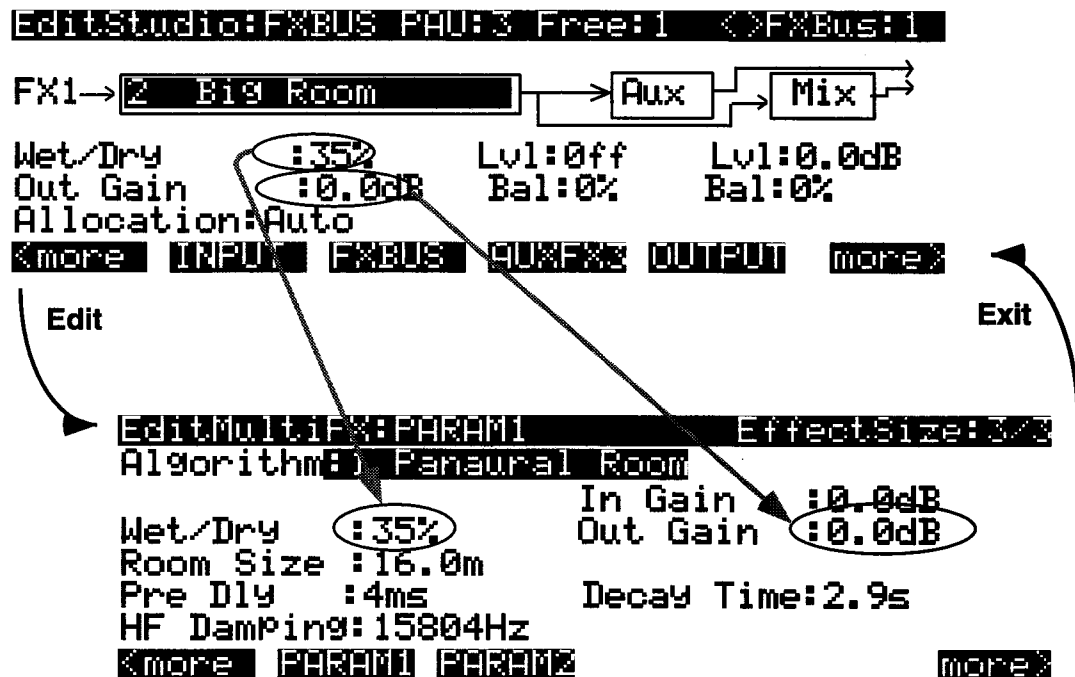


Figure 3-6. Bus Overrides in place, but not engaged

Press Exit to go back to the FXBus page.

To engage a Bus override, you have to use it, which you do by moving the parameter away from its nominal value on the FXBus page. Do that, and then go back inside the FXPreset. You'll see that the value of the parameter you've changed is now shown as "BusMod", meaning that the FXPreset parameter is under the control of the Bus override.

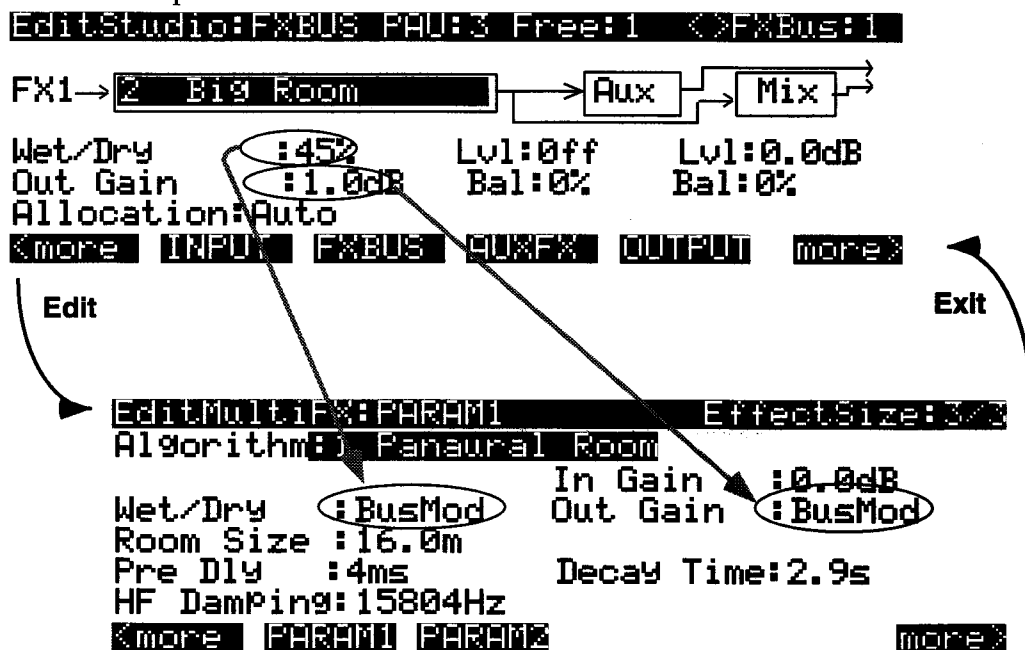


Figure 3-7. Bus overrides engaged

If you now change the parameter value from *inside* the FX Preset, it *breaks* the Bus override. By doing this, however, you have changed the FX Preset, and when you leave the FX Preset you will be asked if you wish to save it. If you then save the FX Preset, the Bus Mod will be permanently broken, but if you *don't* save the FX Preset, it remains in its previous state, which means the Bus Mod *remains intact*.

Since Bus overrides are part of the Studio, they are not saved permanently until the Studio is saved.

Changing the Bus overrides

The default Bus overrides that come up when you are working in a Studio are often convenient, but you aren't required to use them as they are. You can assign *any* two of the FX Preset's parameters to the Bus overrides: Decay Time, Room Size, Pre Delay, etc., etc. (You cannot, however, assign both Bus overrides to the same parameter.) When you save the Studio, the parameter *choices* you have made for the Bus overrides on each FX Bus are saved, along with their *values*.

If you set up a Bus override and adjust a parameter's value, and then change your mind and assign a *different* parameter to that override, the value of the first parameter (the one no longer assigned to a Bus override) will revert to its original value—that is, the value set *inside* the FX Preset. This can be a helpful feature, in that it means you can use Bus overrides as a “window” into an FX Preset by scrolling through the various parameters. But keep in mind that you can't use this method to tweak parameters, because as soon as you move on, the parameter you tweaked gets “un-tweaked”.

Allocation

Understanding Allocations and how they work is very important for using KDFX to its fullest potential.

What's a PAU?

The basic unit of signal processing in KDFX is the Processing Allocation Unit, or PAU. There are a total of 4 PAUs that can be split among the four insert FXBuses, and another 3 PAUs for the AuxFX bus. These two sets of PAUs are distinct and not interchangeable.

The number of PAUs on an FX bus is determined by the Algorithm inside its FXPreset. Different Algorithms require different numbers of PAUs, as shown in the “Size” parameter at the top of the screen when you are on the FXBus edit page:

```
EditStudio:FXBUS Size:2
```

or inside an FX Preset:

```
EditFXPreset:PARAM1 EffectSize:2/1
```

A simple delay, flanger, compressor, exciter, or small reverb, will need only 1 PAU. A complex phaser, pitcher, or multiband tone control will need 2 PAUs. A really complicated reverb or graphic equalizer may require 3 PAUs. Only a handful of really wild Algorithms require 4 PAUs.

The **Allocation** parameter on each FXBus page determines how many PAUs will be available for the FX Preset assigned to that bus. If the parameter is set to “1”, then only FX Presets which use Algorithms requiring 1 PAU will be available for the bus. If you try to assign an FX Preset that requires more PAUs, its name will show up in parentheses, and the sound will pass through the bus unprocessed.

If you know you want a certain FX Preset in a particular FXBus, you can select it, and then set the Allocation parameter for that bus to match the PAU requirements of the FX Preset.

A PAU is a terrible thing to waste

Be careful not to set the Allocation parameter *too* high. If you set it on some bus to 3, for example, and you are using an FX Preset on that bus that only requires 1 PAU, the other 2 PAUs are being wasted, since they are not available to be assigned to other buses. The other buses' Allocation parameters will not go higher than 1, and therefore no FX Presets whose Size is greater than 1 can be selected for any of them.

PAUs are normally allocated on a "first-come, first-served" basis. If you set one FXBus to a PAU of "3", then you will only be able to set the Allocation on the next Bus you set to "0" or "1". If you then set that second Bus to "1", then you won't be able to set a value greater than 0 for *any* of the other Buses.

If you know you will not be using an FXBus, or you will be using it only as a "dummy" to route signals somewhere else, you can set its Allocation to "0".

Auto Allocation

On any of the buses, you can set Allocation to "Auto". Auto means that the PAU allocation for that Bus will automatically adjust itself to the currently selected FX Preset. However, "Auto" obviously cannot create PAUs when they are in use elsewhere, and Allocations that have been manually set take precedence over Auto Allocations. So for example, if you set the Allocation of FXBus1 to "3", and set the Allocation of FXBus2 to "Auto", the maximum number of PAUs available to FXBus 2 is still only 1, and if you try to load a Size-2 FX Preset into FXBus2, it won't work and the FX Preset's name will show up in parentheses.

If *all* Buses' Allocations are set to Auto, then PAUs are not allocated first-come, first-served, but instead are allocated in *numerical* Bus order: if an FX Preset requiring 3 PAUs is loaded into FXBus1, then only 1 PAU will be available for the other Buses, regardless of which FXPreset got assigned to which bus first.

A "Free" parameter is shown at the top of every FXBus page, telling you how many PAUs are currently unassigned to any buses and therefore available.

Effect Size

While you're editing an FX Preset and selecting Algorithms for it, you are also kept apprised of the PAU situation with the "EffectSize" parameter in the upper-right corner of the screen. The first digit in this parameter is the number of PAUs the currently selected Algorithm requires, and the second digit is the number that have been allocated to the bus, either manually or automatically. If the first digit is larger than the second, the Algorithm is not available, and if you choose it, its name will show up in parentheses and the sound will pass through unprocessed—just like an unavailable FX Preset on an FXBus page.

If the FXBus's Allocation is Auto, when you change the Algorithm inside the FX Preset editor, *both* digits of the EffectSize display will change. If you call up an Algorithm that requires more PAUs than are currently available, the second digit will change to "0"—since the Algorithm can't be loaded, the PAUs are freed up for use elsewhere.

Designing with PAUs

One simple way to use Allocations when designing a KDFX Studio is to put all of the Buses in "Auto", and start with your most complex processing on FXBus 1, then assign other FX Presets to the other Buses as they are available.

PAUs on the Aux Bus

The Aux Bus is a whole separate processor with 3 of its own PAUs. It has none of these issues, since its 3 PAUs are assigned to it permanently. (There is a fourth PAU in the Aux Bus, but it is used for mixing and routing, and so it's not available.)

Any FX Preset with a PAU requirement of 1, 2, or 3 can be used. When editing the AuxFX, there's no need for an Allocation parameter or a Free parameter. However, when you are scrolling through Algorithms, the "EffectSize" parameter will be displayed, with its second digit always "3". Should you try to access an Algorithm on the AuxFX bus which requires 4 PAUs, the name of that Algorithm will be displayed in parentheses.

The Aux bus is generally used as a global processor, but it doesn't have to be. You can set up one FXBus as a "dummy"—set its FXPreset to 0 ("None")—and send its output to the Aux bus, and at the same time turn off the Aux sends from all the *other* buses. Now the Aux bus can function as an insert FX Bus, with 3 PAUs all its own. So if you run into trouble with PAUs on the insert FX buses and can sacrifice a global effect, this is one solution.

Metering

All Input and FXBus pages have rudimentary signal meters, as we've seen. On the Input pages, the arrow next to the input letter flashes when there is signal present at the input. On the Insert and Aux FXBus pages, the arrow next to the FXBus number flashes as long as there is signal being processed—in effect, it's an output meter. The arrows flash whenever the signal level exceeds 14 bits below full scale, which is -84 dB relative to the maximum level the KDFX can handle. Since typically the K2500 is operated with about 20 dB of headroom, this translates to about -64 dB relative to normal operating level



In addition, a number of KDFX's Algorithms include a fast visual metering system for monitoring what the Algorithms are doing. Many of these Algorithms deal with dynamics control like compression and limiting. An example is Algorithm 950, HardKneeCompress. Meters are most often found on the PARAM2 page of the FXPreset Editor:



In this Algorithm, the meter is showing the gain reduction that the compressor imposes on the signal coming into it.

Metering is also used for other purposes in some other Algorithms, for example 902 LFO Sweep Filter. In this Algorithm, the meters show the current center frequency of the left and right filters as they sweep up and down the spectrum:

```

EditFXPreset:PARAM2 LFO Sweep Filter
FilterType:Lowpass Min Freq :58Hz
Resonance :20dB Max Freq :8372Hz
L Phase :0.0deg R Phase :0.0deg

0Hz 2k 4k 6k 0Hz 2k 4k 6k
<more> PARAM1 PARAM2 >more>

```

Meters use up a certain amount of KDFX's processing power, although less than a whole PAU, and so they are only used in Algorithms where extra power is available. If an Algorithm would need to increase its Size—say, from 2 PAUs to 3—with the addition of metering, then metering has not been included in that Algorithm. This is to ensure that the maximum amount of processing power is available for actual signal processing.

Output section

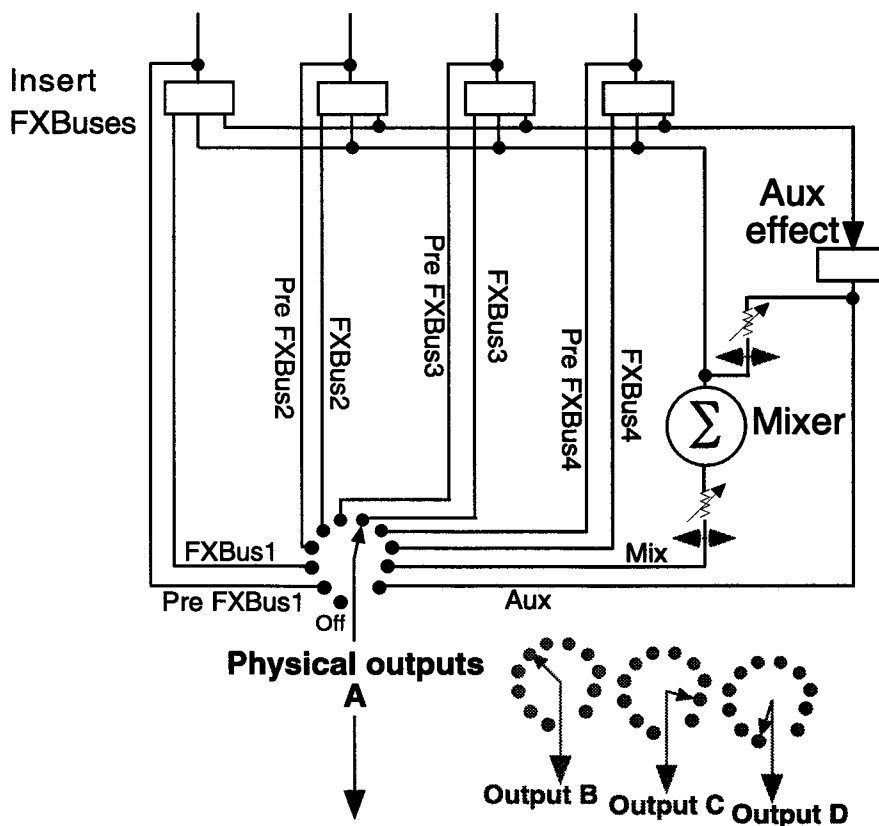


Figure 3-8. Outputs

In the Output section, the various signal paths are routed to the K2500's physical outputs. Each of the four output pairs, A, B, C, and D, has a selector switch to determine which signal it will carry. All signals are stereo. The choices are:

- **Off.** No output.
- **PreFX n** , which is the signal coming *into* the FX Preset on FXBus1, 2, 3, or 4. All of the EQs and pan/width/balance settings of the Input modules that are assigned to FXBus n are active on this signal path, but the FX Preset is not.
- **FXBus n** , the direct output, post-FX Preset, from any of the four insert FXBuses.
- **Mix**, the signal from the Mix output, which can include the sum of any or all of the insert FXBuses, and/or the Aux Bus. The Level and Balance parameters on this page control this output.
- **AuxFX**, the outputs of the Aux Effects bus.

There are no restrictions on the settings. If you like, all four outputs can be carrying the same signal: PreFX1, for example.

Separate Analog and KDS Outputs

The K2500's separate analog outputs (the four pairs) and KDS outputs (also four stereo pairs) are wired in parallel and are "live" at all times. The selectors on the Output page affect both the separate analog and KDS outputs.

Analog Mix Output

The K2500's analog Mix output, as it always has, combines the four output pairs into a single stereo analog pair. If a plug is inserted into any of the *other* analog output jacks, however, the signal going to that output jack is removed from the analog Mix bus, and does not appear at the analog Mix output.

The Internal Effects processor is still active on the "A" output bus of the K2500's Program Editor, and can be used in conjunction with KDFX. For more information, see Chapter 6.

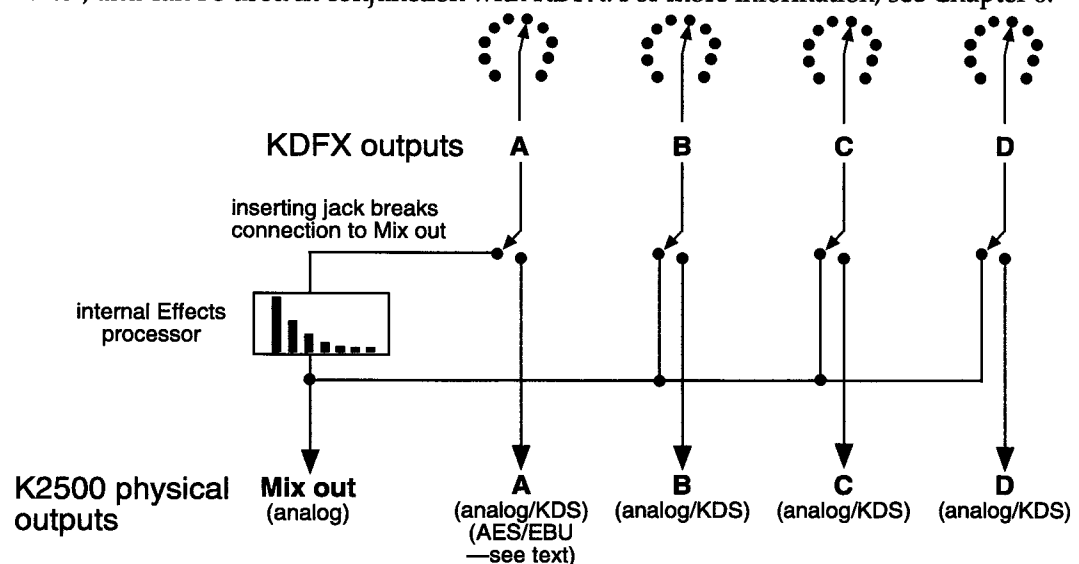


Figure 3-9. Analog, KDFX, and AES/EBU outputs

AES/EBU Outputs

The AES/EBU digital output of the K2500 (a single stereo pair) is normally in parallel to output pair A. It gets whichever signal is assigned to that pair.

However, if you have the Sampling Option, you have more options. These options are determined on the SampleMode page—from the Program or Setup mode, press the “Sample” soft button.

```
SampleMode Samples:18432K Memory:219K
Sample:None Src:Ext
Input:Digital Time:5s Out:A/D
```

If the “Out” parameter on the SampleMode page (which you can only see when the “Input” switch is set to “Digital”) is set to “Dir” (Direct), then the AES/EBU output behaves normally and is in parallel to output A.

However, when the Out parameter is set to “A/D”, then it is mirroring whatever signal is coming into the sampler’s analog input. This is set by the “Src” parameter in *Analog input mode*. (In Digital input mode, the “Src” parameter has a different function.) If this parameter is set to “Int”, then the signal from the K2500’s Mix output is being *fed back into the sampler*—and thus the AES/EBU outputs will carry the identical signal that the analog Mix outputs are carrying. This is useful when you want to be able to use the internal effects processor with the digital outputs. More on this in Chapter 6. This feature is also used for re-sampling the K2500—sampling its outputs to create a new, more complex sample.

If the Analog Src parameter is set to “Ext”, then the signal that appears at the AES/EBU output is the signal coming into the K2500’s *external analog inputs*, and the K2500 is acting as a very fancy, very high-quality A/D converter.

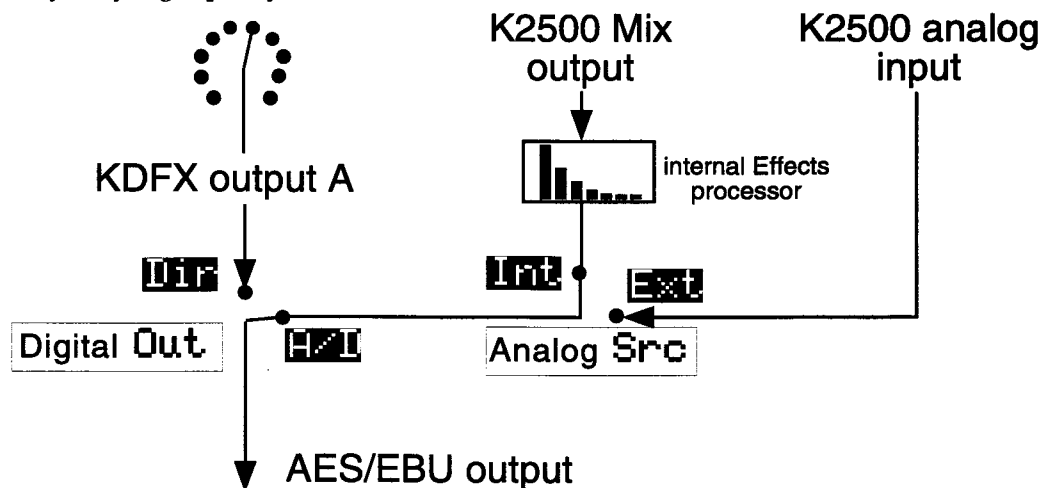


Figure 3-10. AES/EBU output configuration.

Table 3-1. AES/EBU output switch settings

Digital "Out" switch	Analog "Src" switch	What's on the AES/EBU output
Dir	n/a	KDFX output A
A/D	Int	K2500 Mix output
A/D	Ext	K2500 analog input

Digital Word Length

The K2500 is capable of producing 20-bit digital audio signals. While normal 16-bit digital audio provides a maximum dynamic range of about 96 dB, adding the extra four bits adds some 24 dB to the dynamic range. There are an increasing number of products on the market that can handle 20-bit digital signals, including tape and hard-disk recorders, mixers, and signal processors, and the K2500 can talk to these devices with the highest degree of fidelity.

The "DigOut" parameter at the bottom right corner of the EffectsMode page turns on this feature, and selects between 16-bit and 20-bit operation.

This setting determines the word length on the KDS eight-channel output, and also on the AES/EBU output, provided it is in "Direct" mode (as set on the **SampleMode** page—see the previous section).

If you are using the K2500 with a Kurzweil DMTi, this switch should be set to "16 Bit", since the DMTi currently operates only in 16-bit mode. However, if you are connecting the AES/EBU output to a 20-bit (or more) capable device, set the switch to "20 Bit" and you can take advantage of the significantly reduced noise floor.

Note that the switch does not affect any of the K2500's inputs: those are always operating in 16-bit mode.

Dither

Dithering is a technique whereby a small bit of noise is added to a digital signal to give the effect, paradoxically enough, of lowering the apparent noise floor. The Dither parameter at the bottom left of the EffectsMode page allows you to select between different digital noise floor characteristics. No setting is superior to another—each one is a tradeoff between perceived noise level and artifacts. Here is a brief explanation of each setting:

Flat—the digital noise floor is spectrally flat, so it's a good choice for resampling the K2500's own output, as there will be no adding of noise in the process. This is sometimes known as "triangular" dither.

Minimum, Medium, Maximum—these utilize noise-shaping in varying degrees. The noise floor has been essentially equalized to make it softer at midrange frequencies, and louder at bass and treble frequencies. The overall power level of the noise is actually higher than at the Flat setting, but due to the ear's spectral response at low levels, the noise floor appears lower at these settings.

They are not as good a choice as Flat for resampling, since the boosted noise may become quite noticeable if the sample is played transposed down a couple of octaves. In addition, repeated resampling would cause build-up at the boosted frequencies.

None—no dither. This is provided primarily for completeness. You generally never want to use this setting, unless you are studying dither in a classroom, or you want to specifically hear digital artifacts. Low level signals are extremely distorted using this setting.

Saving Studios and other objects

Saving

Saving a Studio or an FX Preset is handled the same as any other K2500 object—see Chapter 5 of the K2500 Performance Guide if you need help with this.

To save an object, from any of the editing pages within the object, press **<more or more>**, until you see the file-management pages:

<more Name Save Delete Dump more>

Name lets you rename the object, using the standard K2500 naming window. **Save** lets you save the object to its present slot or to a different one, and also gives you the option of Renaming it before saving it, or accessing the Object utilities—see Chapter 13 of the Performance Guide.

Delete deletes the object from RAM. If it is in a slot where there is a ROM Studio or FX Preset, then the slot will revert to the ROM Studio or FX Preset.

Dump performs a MIDI System Exclusive dump of the object over the MIDI Out cable for external storage.

The Save option is automatically invoked if you have done any editing within an object and you press **Exit**.

Do I Always Have to Make a New Studio?

While it may sound as if every time you make a change in a Studio parameter, you have to create a new Studio to save it, this is not necessarily true. Studios do take up room in Program RAM, and although the number of Studios that can be maintained inside the K2500 is large, it is not unlimited. Besides, it can be very cumbersome keeping track of a large number of Studios which have only small differences between them.

A way to avoid this problem is to use Program or Setup mode, and use “FXMods”—Studio parameter controls that live inside a Program or Setup—to make changes in the Studio parameters. When you load the Program or Setup, the Studio changes accordingly. This means you don’t have to save each variation in the Studio as a separate Studio; the variations live in the Program or Setup.

More on this in Chapter 4.

Disk Functions

Studios and FX Presets are loaded from and saved to disk exactly the same as other K2500 objects. FX Presets are dependent objects within Studios, so when you save a Studio, you are given the opportunity to save the dependent FX Presets as well. (Algorithms are in ROM, so they don’t need to be saved.) Again, see Chapter 13 of the Performance Guide if you need help.

Chapter 4

Real-time Control of KDFX

KDFX Studios can be static, as we saw in the last chapter, but they don't have to be. One of the most powerful features of KDFX is the ability to change any of the operating parameters in a Studio in real time. Mix levels and pans, eq values, effects parameters, and almost any other settings can be controlled dynamically and smoothly, giving KDFX a high degree of flexibility in performance and automation.

KDFX parameters can be controlled from:

- the K2500's sliders, wheels, ribbons, and pedals
- external MIDI sources like another controller or a sequencer
- internal functions like LFOs, envelopes, and FUN generators.

Real-time control of a Studio is called "Effects Modulation", and a link between a Program or Setup and a Studio parameter is called an "FXMod".

Linking to Programs and Setups

If you're familiar with real-time control of the original internal K2500 Effects, you'll be happy to know that real-time control of KDFX Studios works the same way.

Real-time KDFX Studio control normally originates within a Program or Setup. For the link between a Studio and a Program to work, the **FX Mode** parameter on the **Effects** page must be set to "**Program**". If you want to link a Studio and a Setup, the FX Mode parameter on the Effects page must be set to "**Setup**". Setting the FX Mode parameter on the Effects page to "**Auto**" means that it will follow whatever mode the K2500 is in—Program or Setup—which can be particularly useful when you are switching between Programs and Setups in a Quick Access bank, or when you just don't want to worry about which mode you're in.

```
EffectMode  Xpose:05T    <>Channel:1
FX Mode:Program
FX Chan:1
```

```
Dither :Medium    DigOut :16 Bit
Octav- Octav+ Panic Chan- Chan+
```

Notice that when FX Mode is set to Program or Setup, the Studio is not shown, as it is when the FX Mode is set to Master. So you can't go into a Studio and edit it from this page—you have to go through the Program or Setup, from its KDFX page. (The Internal Effects aren't shown either, and the procedure for editing them is the same.)

Note: When FX Mode is set to Auto, then FX Mode follows the K2500's operating mode—it's either in Program or Setup. When you are on *this* page, however, FX Mode is actually in *Master*. But don't screw up your brain thinking about this—we'll get back to it at the end of the chapter.

• For the sake of clarity, during most of this chapter we will only talk about linking KDFX to a Program. The procedures for linking KDFX to a Setup are essentially identical, except for the setting of the FX Mode.

The KDFX pages

If you look inside any Program, you will see several new pages to handle the Studio and KDFX control assignments. Open up a Program with the **Edit** button and press **more>** until you see this at the bottom of the display:

```
<more> KDFX FXMOD1 FXMOD2 FXMOD3 FXMOD4 more>
```

These are the FXMod setup pages, and in fact there are eight of them—press **more>** again to see the others.

```
<more> FXLFO FXASR FXFUN ImpFX more>
```

Go back to the first set (press **<more>**), and press the **KDFX** soft button to look at the first of the FXMod setup pages:

```
EditProg:KDFX All Layers
Studio:278 Hall+flange+rm

Bus: Param: Adjust: Source: Depth:
FX1 Wet/Dry 12%wet MWheel 40%wet
FX2 Fdbk Level 25% MIDI23 60%
InA EQ1 Bass G 0.0dB MIDI24 21dB
<more> KDFX FXMOD1 FXMOD2 FXMOD3 FXMOD4 more>
```

The top line tells us we're in the KDFX section of the Program Editor. The second line shows the Studio that is linked to this Program. Any changes made on this page do not directly affect the Studio, they only affect this Program's *control* over the Studio.

The last three lines (ignoring the Soft buttons) show us which FXMods are active in this Program: one is controlling Wet/Dry mix on insert FX bus 1, one is controlling feedback level on insert FX bus 2, and one is controlling the Bass Gain on the first EQ of Input A.

Looking into the Studio

You can go into this Studio, to see what the parameters are doing—a good idea when you are setting up FXMods so you understand them in context—or to alter a fixed parameter. You can do this without leaving the Program Editor: highlight any parameter on this page and press **Edit**. When you are done with the Studio, pressing **Exit** will bring you back to this page. If you have made any changes in the Studio, you will be prompted to save the Studio, and if you don't do so, the changes will be disregarded.

If you do save the Studio, either in the same numbered location or a new one, the new Studio will now be linked to this Program. If you have changed the Studio's number, then you'll also have to save the Program when you leave the program editor, so that the Program knows which Studio to link to the next time you call it up.

Setting up FXMods

The KDFX page allows three different FXMod control assignments to be made. More FXMod assignments are available on the **FXMOD2**, **FXMOD3**, and **FXMOD4** pages, each of which has five setups. This gives a grand total of 18 Studio parameters that can be subjected to real-time control. Don't worry, you don't have to use them all.

Bus assignments

The first column lets you choose which Bus inside the Studio you want this FXMod to control: Input A, B, C, or D (if any of the Inputs are set to Mono, you will get to choose individual channels, for example A/L and A/R); FXBus 1, 2, 3, or 4; the AuxFX Bus; or the Mix bus.

Parameter assignments

The second column chooses the specific parameter on the selected Bus that you want to control. Scrolling through the choices shows that this selection is context-sensitive: it shows only parameters that are being used in the current Studio on the selected Bus, so you can't make assignments to irrelevant or non-existent parameters. It "knows" which EQs are active, and what modes they are set to; which Input sends are assigned and whether the sends are in Pan or Balance mode; what parameters are being used in the FX Preset on the particular Bus; etc. If you need to know more about how the Studio is set up, you can go into it and look around, as explained above.

Here's an example: set the FX Studio to **201*RngMd/PFD/Plt** which we looked at in Chapter 2. Set the **Bus** on the first line to **InA**. Set the cursor under "Param:" and scroll the choices. They correspond exactly to the parameters available in the Input Editor page: level and frequency for the two EQs, and SendLvl, Pan, and Width for the two FX sends. Note that you *cannot* change the FXBus assignments on an Input from here; you must do that within the Studio itself.

Change the Bus to **FX1**, and now all of the parameters from the FX Preset on FXBus 1 are available for selection, including Mod Mode and the various settings for the Preset's internal oscillators, as well as the bus's output controls: Mix Level, Mix Balance, Aux Level, and Aux Balance. Change the Bus to **AuxFX**, and the Aux bus's parameters are available: levels, delays, room types, etc.

Setting the Bus to **Mix** makes available the Level and Balance controls from that page.

What can't be controlled

You cannot change any parameters through KDFX that would involve a major reconfiguration of the Studio:

- Bus assignments on the Input pages
- Selecting FX Presets on the FXBus pages
- Allocation on the FXBus pages
- Selecting Algorithms within the FX Presets
- Bus assignments on the Output page

If you want to be able to change any of these in real time, you will have to create a new Studio, link it to a different Program or Setup, and then call it up using a Program Change command.

In addition, there are a few parameters that can cause serious glitching if they are changed in real time. The most common of these are the "Room Type" settings in reverb Algorithms. While there is nothing in the software to prevent you from assigning an FXMod to Room Type, you need to be aware of the potential consequences. See "Static FX Mods" later in this chapter.

“Adjust” setting

The “Adjust” setting is the starting value of the selected parameter when it is under KDFX control, similar to the Entry value of a controller in a Setup. This might very well be different from the value of the parameter when the Studio is *not* under FXMod control, so don’t get confused. If you are in Program mode, and this is the current program, the **Adjust** value takes precedence over the Studio’s fixed value, and it’s the Adjust value that will be called up when you call up the Program.

Source

The **Source** parameter determines which real-time control—internal, MIDI, etc.—is going to affect the selected Studio parameter. As with all K2500 real-time controls, the range of control sources is very large:

- OFF (the parameter is not affected by any source and stays at its “Adjust” value)
- ON (the parameter is set to the maximum value determined by adding the Adjust and Depth values)
- MIDI Continuous Controllers 1-95*
- Channel State
- Pressure
- PitchWheel
- the usual software controllers, as described in Chapter 6 of the K2500 Reference Guide: ASRs, FUNctions, Clocks, LFOs, Internal Controls, Random Generators, etc.

*Under some circumstances, particularly when the K2500 is in Setup mode, there are certain restrictions on which MIDI sources you can use. This is explained later in this chapter, in the section “Enabling Controllers in Setups and Programs”.

Dedicated FXMod control sources

A few new control sources, usable only within FXMods, have been added to the list:

- FXLFO1, FXLFO1ph, FXLFO2, and FXLFO2ph—two LFOs and their phases.
- FXASR1 and FXASR2—two three-stage (Attack/Sustain/Release) envelopes with selectable triggers and Normal, Hold, and Repeat modes.
- FXFUN1, FXFUN2, FXFUN3, and FXFUN4—Functions. Yes, more Fun with KDFX!

The ASRs, FUNs, and LFOs work exactly the same way they do in any other part of a Program, except these are extra control sources for use *only* with FXMods, and are not available for other Program functions. They are global for all of KDFX—each Bus does not have its own.

Their parameter values are saved with the Program. As we saw earlier, you get to the pages for their parameters by pressing the **more>** soft button until you see these soft buttons:

more FXLFO FXASR FXFUN IMPF more

As usual in the Program Editor, you can also get to these pages directly from the KDFX page or one of the FXMOD pages: select one of those parameters as a Source, and then press **Edit**.

Tempo-based parameters

There are several different ways KDFX can respond to tempo information, from the internal sequencer or an external one. These are discussed later in this chapter.

Depth

The **Depth** parameter lets you specify a range of change in values that the real-time control will make, using the **Adjust** value as a minimum or starting point. This range can be positive or negative, and the values are displayed in the context of the Studio Parameter: seconds, dB, %, Hz, cents, etc.

At the maximum setting of the Source (for example, Mod Wheel all the way up), the value of the parameter = Adjust + Depth. So if the parameter is Out Gain, the Adjust is 1.0 dB, the Source is Mod Wheel, and the Depth is 4.0 dB, then at the Mod Wheel's highest point, the output gain will be 5.0 dB.

For Source values less than maximum, the formula is: parameter = Adjust + (Depth x Source), where the Source is considered to be varying between 0 and 1 (or in some cases, such as Pitch Wheel, between -1 and +1). So using the same example, when the Mod Wheel is halfway up (MIDI value 64), the gain is $1.0 + (4.0 \times 1/2) = 3.0$ dB, and when it is all the way down (MIDI value 0), the gain is $1.0 + (4.0 \times 0) = 1.0$ dB.

The formula works the same way for negative Depth values. Given the same example, but with a Depth of -4.0dB, at the Mod Wheel's minimum point, the gain will be 1.0 dB; at its halfway point it will be -1.0 dB ($1.0 + (-4.0 \times 1/2)$); and at its maximum point it will be -3.0dB.

Showing who's in control

When you are in Program or Setup mode and you look inside the current Studio or its FX Presets, any parameters that are under FXMod control will not display numerical values, but instead will say "FXMod". Don't touch any of those parameters for now—we'll explain why in a moment.

```

EditFXPreset:PARAM1 EffectSize:3/8
Algorithm:1 Panaural Room
Wet/Dry :FXMod In Gain :0.0dB
Room Size :FXMod Out Gain :2.0dB
Pre Dly :4ms Decay Time:1.7s
HF Damping:14080Hz
[more] PARAM1 PARAM2 [more]

```

•Note that if you look at the Studio when FX Mode is in "Master", the FXMods will not be displayed, because the FXMods are not in effect! So don't get confused.

Breaking the Links

When FX Mode is in "Program" (or "Setup") and you are in the Studio Editor, if you change a parameter that has been assigned an FXMod, it "breaks" the link—the parameter is no longer under FXMod control, but is now a static value. If you now save the Studio (either in the same location or a different one), the link stays broken. However, if you leave the Studio *without* saving it, and go back to the FXMod pages of the Program editor, the link automatically re-establishes itself.

If you change the FX Preset on an FXBus, the FXMod links to the Preset on that bus may or may not break. If the Preset you're calling up uses *the same Algorithm* as the Preset you're leaving, the links will stay intact. If it uses a different Algorithm—even a similar one—the links will break.

On the other hand, if you are inside a Preset, and you change its Algorithm, that breaks the links. Again, the links will be re-established if you leave the Preset without saving it.

Links to the Aux and Mix parameters on an FXBus do not get interrupted when you change the FXPreset on that bus.

The same rule applies when you are on the **KDFX** page in a Program or Setup and you change the Studio. Links to the Input and Output pages and the Level parameters on the FXBus pages will be retained, but links to processing parameters will only be retained on a given FXBus if the Algorithm inside the Preset on that bus isn't changed.

What about Bus Overrides?

Bus Overrides are transparent, as far as KDFX is concerned. Any FXMods that involve a parameter inside an FX Preset are set up directly between the Program and the FX Preset itself. If the parameter happens also to be assigned a Bus Override, it doesn't make a difference to KDFX—the Program will control the parameter as if the Bus Override wasn't there.

However, Bus overrides are still active *within a Studio*, and changing a Bus override value in a Studio will, as usual, change its associated FX Preset parameter. If there happens to be an FXMod *also* controlling that parameter, *the FXMod link will be broken*, just as if you reset the parameter from inside the FX Preset.

Using FX Mods so you don't have to change Studios

In the previous chapter, we mentioned that FX Mods are a good way to get around the need to create a new Studio every time you want to make a small change in a Studio's parameters. The same Studio can be used for many different purposes if you use FX Mods to control it. FX Mods can set the gain of the signals going to the various FXBuses, set panning and output levels of the signals from the Buses, configure the mix going to the Aux bus, and even turn FXBuses on or off, as well as set processing parameters.

Since any parameter except the ones that re-configure a Studio (see "What Can't Be Controlled", earlier) can be under FXMod control, the amount of variation between the various Program- or Setup-controlled versions of a single Studio can be very great.

Static FX Mods

Static FX Mods, that is, FX Mods that are just going to be used to "set and forget" Studio parameters when a Program or Studio is called up (as opposed to dynamically controlling them), are easy to set up. On the FXMOD page, select the Bus and Parameter you want to control, set the **Adjust** value to the Parameter value you want, and set **Source** to "OFF". When you are done, Save the Program or Setup normally. Now whenever you select the Program or Setup, the Parameters in the FXMods will be immediately reset to the values you've specified.

Room Type and other potentially glitch-producing parameters work much better as static FX Mods than they do under dynamic control. If you need to change a Room Type in a reverb when you change a Program, you can do so with a static FX Mod without hearing horrible glitches, as long as you make sure there is no signal passing through the reverb at the moment of the Program change.

Importing Studios from another Program or Setup

If you have a killer Studio with FX Mods set up in one Program (or Setup) and you want to use the same Studio and FX Mods in a different Program, you don't have to rebuild the Studio by hand: you can copy Studios between Programs or Setups in one operation.

Press the **ImpFX** soft button, and you'll see this:

```

Edit Program:Import KIFX

From Program 200*119 Orchestral Studio
              (Studio 41 auxChorTube Plt  )

Prog Setup Import Cancel
  
```

Use the soft buttons at the left to select either a Program or a Setup as the source for the Studio and FXMods you are importing. Select the number of the Program or Setup you want to import from. As you change the Program or Setup, the Studio associated with each Program or Setup will display in parentheses below the Program or Setup.

The Studio will also kick in, so you can hear it affecting the Program you're listening to.

When you've chosen a Program or Setup to import a Studio from, press the **Import** soft button. "KDFX from...imprtd" will flash on the screen, and you will be returned to the Program Editor of the Program or Setup you are working on.

Studios from Setups can be imported into Programs without restriction, and vice versa.

FX Mods on Imported Studios

If you have imported a Studio into a Program, the FX Mods that were in the Program you've imported *into* are now all gone. They are replaced with the FXMods associated with the Program you imported *from*. It doesn't matter if there were more FXMods in the old Program than in the new—even if the new Program has *zero* FXMods, the old ones are all erased.

Using KDFX live from the K2500 keyboard

The sliders and wheels on the K2500 keyboard, and the pedals connected to the keyboard, can be extremely useful with KDFX, if you assign FXMods to the K2500's controllers. The ribbon, for example, can be used in a "Pitcher" FX Preset to change the pitch of the signal, while sliders and pedals (as we saw in Chapter 2) can be used to control reverb time, flanger feedback, eq, or any of the myriad parameters available in KDFX.

KDFX in Setup Mode

If you are playing the K2500 in Setup mode, then it's probably a good idea to have KDFX in Setup mode (**FX Mode:Setup**) as well. This can help prevent confusion that can arise when mixing modes.

Like Programs, every Setup has a set of FX Modulation routings associated with it. These are identical to the routings available in Programs: there are four FXMod pages, three dedicated FX function pages, and an Import FX page. The procedure for setting up the routings is the same as in a Program. KDFX settings can be imported into a Setup from either another Setup or a Program.

When KDFX is under Setup control, any FXMods in the Programs *within* the Setup are ignored. If you have a Program that contains a Studio and FXMods that you would like to use while playing a Setup, Import the KDFX from the Program into the current Setup.

MIDI Control and Setup Mode

You'll notice that when you set FX Mode to "Setup", **FX Chan** goes to "None", and can't be changed. The MIDI receive channel for controlling KDFX is not determined here, it's determined in the Setup itself: it's the channel that Zone 1 of the Setup is receiving. Any incoming MIDI commands on other channels, while they may play *sounds* in the Setup, will not affect KDFX parameters.

If for some reason you don't want KDFX to be in Setup mode while you are playing a Performance Setup—for instance, if you want it to be under control of an external MIDI device and not change Studios when you change Setups—you can set the **FX Mode** to "Program". In this case the *Program that is in the Zone assigned to the FX Channel*, which may or may not be part of the Setup, will control KDFX.

So for example, say a Setup has three Zones, which are assigned to channels 2, 4, and 6 respectively. If **FX Chan** is set to 6, then the FX Mods in the Program in Zone 3 will be active. If none of the Zones' channel assignments match the FX Channel—say it's set to 16—then nothing you do on the K2500 will control the FXMods. However, an external MIDI source, like a sequencer, sending on channel 16 *will* control the FXMods, and the Program that is on channel 16 will determine what they are.

This technique can be useful when you want to have a sequencer control KDFX, while you are also playing along on the K2500 keyboard in Setup mode.

Using an External Keyboard with Setup mode

As we mentioned in Chapter 2, there is a peculiarity when you are using a K2500 (or more commonly, a K2500R) with an external MIDI keyboard. If you are not in this situation, you are advised to skip this section, because it gets a little hairy (unless you are morbidly curious about such things, in which case, read on!)

Playing a Setup with a single-channel keyboard

Playing Setups normally requires a multi-zoned / multichannel keyboard like the K2500 itself or a Kurzweil PC88. However, it is also possible to play Setups from a conventional, single-channel MIDI keyboard, thanks to a parameter called "Local Keyboard Channel" (**LocalKbdCh**), which is found on the **MIDI:Receive** page. If you set this parameter to the transmitting channel of the external keyboard, then the K2500 takes all incoming MIDI data on that channel and treats it as if it was coming from a local keyboard—that is, it plays all the Zones in the Setup.

However, when this feature is enabled, the K2500 will only respond correctly to the MIDI commands on Table 4-1 coming in on this channel under the following conditions:

- That command has been specified as a "Destination" on the controller assignment pages in the Setup (**SLIDER**, **SLID/2**, etc.)
- The command has been assigned to its *customary* physical controller in the Setup.

If these conditions are not met, then one of two things will happen:

- if the customary physical controller is assigned no destination, then the incoming command will be ignored
- if the customary physical controller is assigned a *different* MIDI command than normal, the incoming command will be mapped to the MIDI command that is *in its place*.

How Remapping works

Here's an example: Slider A is customarily Data (MIDI Controller 6). If on the Setup's **SLIDER** page, Slider A is assigned to **Data**, then Data commands will be accepted by the Setup and passed on to wherever they have been assigned, either as VAST modulators or KDFX modulators.

If, however, Slider A has been assigned to something else, say **MIDI 31**, then Data commands coming from the external keyboard on the local channel will be treated as if they are actually MIDI Controller 31 commands. If Slider A is set to "Off", then Data information will simply be ignored.

Here's another example. Let's say that on the **CPEDAL** page of the Setup, you have assigned "MWheel" to CPed1 instead of the customary "Foot". Any incoming Foot Control messages (MIDI controller 4) will be remapped to Modulation Wheel (MIDI controller 1) messages. When you send a Foot Control message, any KDFX Mod that is set to respond to Foot will *not* change, but any KDFX Mod that is set to respond to MWheel *will* change. (The Modulation Wheel still behaves normally—unless you've reassigned MWhe1 on the **WHEEL** page.

Watching Remapping in action

You can confirm that this reassignment is going on by assigning a MIDI controller to a physical controller, and then using Intuitive Entry on a different parameter to see how it responds. Use the example above: assign MWheel as the Destination for CPed1. Then go down to the Destination for CPed2, hold down the **Enter** key, and move the Foot Pedal. Instead of "Foot" popping into the "Dest" column, you'll see "MWheel", since the incoming Foot commands are being remapped to Modulation Wheel.

You can also see this happening if you go right from Setup mode into **Master:Utility** mode and ask to display MIDI. Any incoming events that are being re-assigned to "Off" by the current Setup will not display at all, and any events that are being remapped will show up in their modified form.

Do I Need to Worry About This?

In many ROM Setups, the Sliders, Wheels, and Pedals are assigned to their normal physical controllers, but in others, they are not. In the Default Setup (99), only the pitch wheel, modulation wheel, channel pressure, and the sustain, sostenuto, and soft pedals are assigned. So if you have started building a Setup from Default Setup, you will have to assign any other controller you plan to use to its customary physical controller.

On the positive side, you only have to do this in one Zone: the one defined by the Local Keyboard Channel (**LocalKbdCh**) on the **MIDI:Receive** page.

Here's a list of the Physical and MIDI control assignments:

Table 4-1. Physical and MIDI Control assignments

Slider A	Data (6)	Slider E	MIDI 25	Foot Sw1	Sustain(64)
Slider B	MIDI 22	Slider F	MIDI 26	Foot Sw1	Sostenuto(66)
Slider C	MIDI 23	Slider G	MIDI 27	Foot Sw1	SoftPed(67)
Slider D	MIDI 24	Slider H	MIDI 28	Foot Sw1	Tap Tempo
CPedal 1	Foot (4)	SmPrs	MPressure	PSwitch 1	Arpeg On/Off(116)
CPedal 2	Breath (2)	Pitch Whl	BendUp	PSwitch 2	MIDI 29
SmRib	AuxBend2 (15)	Mod Whl	MWheel (1)	Pressure	MPressure

Finally, keep in mind that this is not an issue in Program mode, nor when using the K2500 with a sequencer. In those cases the LocalKbdCh should be set to "None", and there is no restriction or remapping on the MIDI data coming into the K2500.

KDFX in Program Mode

If you are playing the K2500 in Program mode, then you must make sure that the Current channel of the K2500 (at the upper right of the Program Mode screen) agrees with the FX Channel (on the Effect Mode screen). Otherwise the local keyboard commands, while they will control the other current Program parameters, will not address KDFX. If **FX Chan** is set to "Current" then you don't have to worry about this.

Control Setups and on-board controllers

Control Setups are a special type of Setup that is used only in Program mode. Although Control Setups have KDFX modulation routings in them, they are actually ignored, in favor of the KDFX modulation routings of the Program that you are using.

So why bother with them? Here's why: In every Setup, as we have seen, there are several pages where the real-time functions of the physical controllers—sliders, footswitches, control pedals, wheels, ribbons, switches, channel pressure (aftertouch), velocity maps, and arpeggiator—are set. When you are in Program mode, Programs don't contain that information. It has to come from somewhere, however, and so that's where a **Control Setup** comes in—it's where all the real-time controller settings can be found when you are in Program mode.

The Control Setup is accessed from MIDI mode—press **MIDI**, then the **XMIT** soft button, and the Control Setup ("CtlSetup") is displayed on the top line of the screen.

Note that when you are in Setup mode, this Control Setup is ignored, in favor of the controller settings within the Setup itself. If you happen to go into MIDI mode from Setup mode, the K2500 automatically *goes out of Setup mode* and into Program mode, and the settings in the Control Setup on the display go into effect.

```

MIDI Mode: TRANSMIT
CtlSetup: 97 ControlSetup: 013
Channel : 1          ProgCh9 : On
TransPos: 0ST        Buttons : Off
Control : Both       Ch9Setups: KeyUp
VelocMap: 1 Linear
PressMap: 1 Linear
MIDI REC CHARLS ProgCh RsetCh Panic

```

Editing the Control Setup

You can change the parameters of the current Control Setup, and save your settings into the same Control Setup or a new one, so that you can have different Control Setups for different playing environments.

On the **MIDI:Transmit** screen, select the name of the Control Setup and press **Edit**. You will see a group of parameters pertaining to the current Control Setup. Press **more>** and you'll see a series of soft buttons pertaining to the sliders, footswitches and control pedals:

<more SLIDER SLID/2 FOOTSW CPEDAL more>

press **more>** again and you'll see the pages for the ribbons, wheels, switches, and pressure:

<more RIBBON WHEEL SWITCH PRESS more>

See the table in the previous section for the customary Destination settings for all of the various real-time controls.

From here you can also Save and Load other Control Setups.

Unlike a Performance Setup, a Control Setup only affects the real-time operation of the on-board controls and arpeggiator, and *nothing else*—not programs, internal effects, or KDFX Mods. But because it is a "Setup", it has all of these other parameters in it, and you may well wonder what you're supposed to do about them when you are working on a Control Setup. The answer is: **Ignore them!** They have no meaning when the Setup is being used as a Control Setup in Program mode.

A perverse question

So what happens when the K2500 is in Program mode, and the FX Mode is "Setup"? There's really no reason why you should ever be in this situation, but for the perverse among you who want to try it, the FX Mods that are in effect will be those that are in the Setup which is displayed when or if you put the K2500 into Setup mode. This is generally the *last Setup called* when the K2500 was in Setup mode—but even if you've never used a Setup in your life, there's still one in there, as you can see if you go to Setup mode. Hey, you asked.

Modes table

Here's how to tell what's controlling what, depending on the various Performance and FX modes:

Table 4-2. What's in control

K2500 Mode	Effects Mode	What's determining what the sliders, wheels, etc. do	What's controlling KDFX	MIDI Channel for external KDFX control
Program	Program or Auto	Control Setup	Program's FX Mods	FX Chan
Setup	Setup or Auto	Setup	Setup's FX Mods	Receive channel of Program in Zone 1*
Setup	Program	Setup	FX Mods of Program in Zone assigned to FXChan*	FX Chan
Program	Setup	Control Setup	the last Setup that was selected in K2500 Setup mode	Receive channel of Program in Zone 1 of the last Setup
Program	Master	Control Setup	nothing	Sysex on FX Chan*
Setup	Master	Setup	nothing	Sysex on FX Chan*

**see below*

Using KDFX with a Sequencer

If you use an external MIDI sequencer, you are probably thinking about how powerful it will be putting KDFX under sequencer control. Certainly being able to record, edit, and automate a Studio's parameters as part of a MIDI sequence is one of the most attractive aspects of KDFX.

Any Program on any channel can be the one that controls KDFX. On the **Effects** page, put **FX Mode** into "Program", select the **FX Channel** you want to control KDFX with, and put your KDFX-controlling Program on that MIDI channel. Now any MIDI commands coming from the sequencer on that MIDI channel will be sent to KDFX.

Dedicating a Program and Channel

Perhaps the most efficient and least confusing way to do this is to have a dedicated program that *only* controls KDFX, on a channel that is otherwise not being used to play music. Many K2500 and K2000 users know this trick for automating the old internal effects, but it becomes even more important given the complex nature of KDFX. It requires sacrificing a MIDI channel, but few users should have a problem with that.

Again, go to the **Effects** page and, keeping the **FX Mode** set to **Program**, set the channel you're going to use as an **FX Chan**—in this case, 16 is often a good choice. Go to **Program Mode** and select Program 199, Default Program. Press **Edit**, and then **KEYMAP**, and set the Keymap to "0 None". This program will now make no sound in response to MIDI notes, and use up none of the K2500's polyphony. Use the **more** keys to get to the KDFX page, and start setting up your Studio and FXMods, or, if you have another program already set up with the Studio and FXMods you want, use **Import FX** to bring that Studio and FXMods into the current Program.

Now Save the Program to a new location, giving it a name like "Studio Controller1". You can now use this Studio with your sequencer: start by calling up its bank and Program number, and then put appropriate MIDI commands into the sequencer for controlling the Studio's parameters.

If the MIDI sources for the FXMods are also K2500 on-board controllers, then you can record your parameter changes from the K2500 into the sequencer.

Changing Studios with a sequencer

If you need more than one Studio available in a piece, or you want a selection of Studios to use in different pieces, simply create new programs the same way, which call up the different Studios on their KDFX pages. To switch from one to the other, send an appropriate program change command on channel 16 from your sequencer.

Setting up static FX Mods in different programs, all of which address the same Studio, as we saw earlier, is a good way to make one-shot changes in KDFX parameters without having to construct a bunch of different Studios.

Also as we saw earlier, this technique can be useful even when you are playing the K2500 in Setup mode along with a sequencer. If **FX Mode** is "Program", and the **FX channel** is 16, the sequencer can control the FXMods independently of which Setups are in use on the keyboard.

Preventing glitches when changing Studios

As with any digital effects unit, you need to take some care when you are sending real-time commands to KDFX which radically alter the nature of the processing it is doing. The trickiest situations will occur when you are changing Studios, and calling up new FX Presets, Algorithms, and/or signal routings.

Under the best of circumstances, the transition between two Studios can be seamless, and the effects in one will “morph” into the effects of the other. Under the worst of circumstances, there will be a momentary “hole” in the sound, as the effects from the first Studio are cleared out and the effects of the second Studio build up.

The chances of a smooth transition between Studios will be highest if the Algorithms on the FXBuses in the two Studios are the same. (In some reverb Algorithms, the **Room Type** parameter should also be the same.) For example, if FX1 in Studio *n* uses an FX Preset based on the reverb in Algorithm 4, and FX1 in Studio *m* uses a different FX Preset based on the same reverb Algorithm 4, then when you switch from Studio *n* to Studio *m*, the signals going through FX Bus 1 should experience a smooth reverb change.

However, if the FX1 Bus’s FX Preset in Studio Y uses a *different* Algorithm, say a multitap delay in Algorithm 35, then at the moment the Studio changes, the reverb effect will ramp down quickly, there will be a very brief point at which the signal will pass dry, and then the multitap will quickly ramp up. This ramping will take place any time the two Algorithms (or Room Types) are different—even if on the surface they seem very similar, like a Room and a Hall.

Even if the Algorithms are the same, however, there is a chance that the transition will not be completely smooth. Some parameters cause glitches if they are changed in real time even within a Studio—delay lengths, for example—and so if a parameter like that changes when you *switch* Studios, the software will clear it out as the Studio changes, and a small hole will appear. In some cases, instead of a hole, you will hear a momentary pitch shift as the Studio changes. A bit of experimentation will help you determine how to achieve acceptable transitions between Studios.

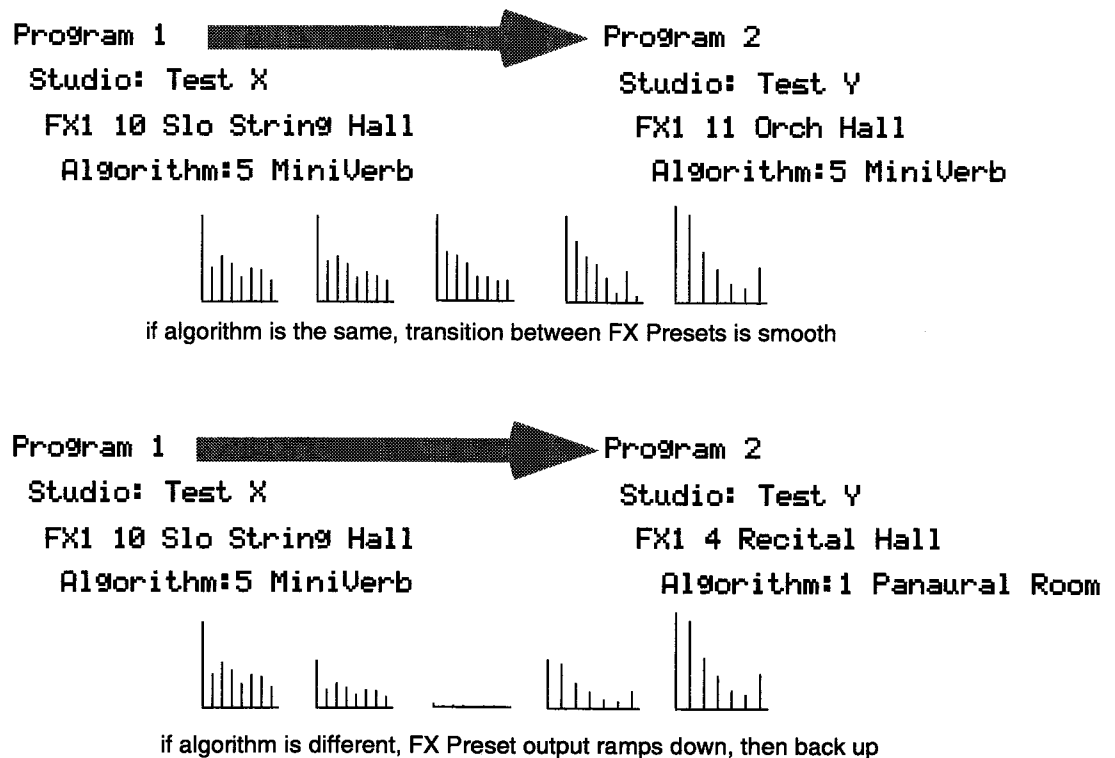


Figure 4-1. Transition between different FX Presets with the same and different Algorithms

Changing PAU Allocations

There are other circumstances under which using the same Algorithm will not ensure a smooth transition. If for any reason the PAUs have to be re-allocated when you move from one Studio to another, then even if the Algorithms on a given FX Bus are the same in both Studios, there will be a ramp-down/ramp-up. This can happen when there is a change in the *number of PAUs* being used in any FX Bus that has a *lower number* than the FX Bus you want to have a smooth transition. That's because re-allocating PAUs on the fly forces some of the processors to re-configure themselves, inasmuch as they are now being called upon to do different functions.

Here's an example: say Studio X's FX1 Bus uses a Flanger that requires 2 PAUs, while the FX2 Bus has a small reverb that uses 1 PAU. In Studio Y, the FX1 Bus has a Chorus that uses only 1 PAU, while FX2 uses the same small reverb as Studio X. When you switch from Studio X to Studio Y, one of the PAUs that was previously being used for FX1 is now being used for FX2—it's been re-allocated. Since it's not the *same* PAU that's handling the reverb, the transition isn't going to be smooth—even though the Algorithm hasn't changed.

There are a couple of ways around this. First is to set up your studios so that any transitions between them that are going to force changes in PAU allocations occur in the *higher-numbered* FX Buses—if the situation just described were reversed, and the reverb was in FX1, there would be no problem, because that same PAU would be used in FX1 in both Studios. A second method is to *manually* allocate the PAUs in the lower-numbered FX Buses, rather than using Auto allocation. Using the same example, if Studio Y had 2 PAUs hard-assigned to FX1, even though the FX Preset is only using one of the PAUs, then that second PAU would not get reassigned to the reverb, and the reverb's transition would be smooth.

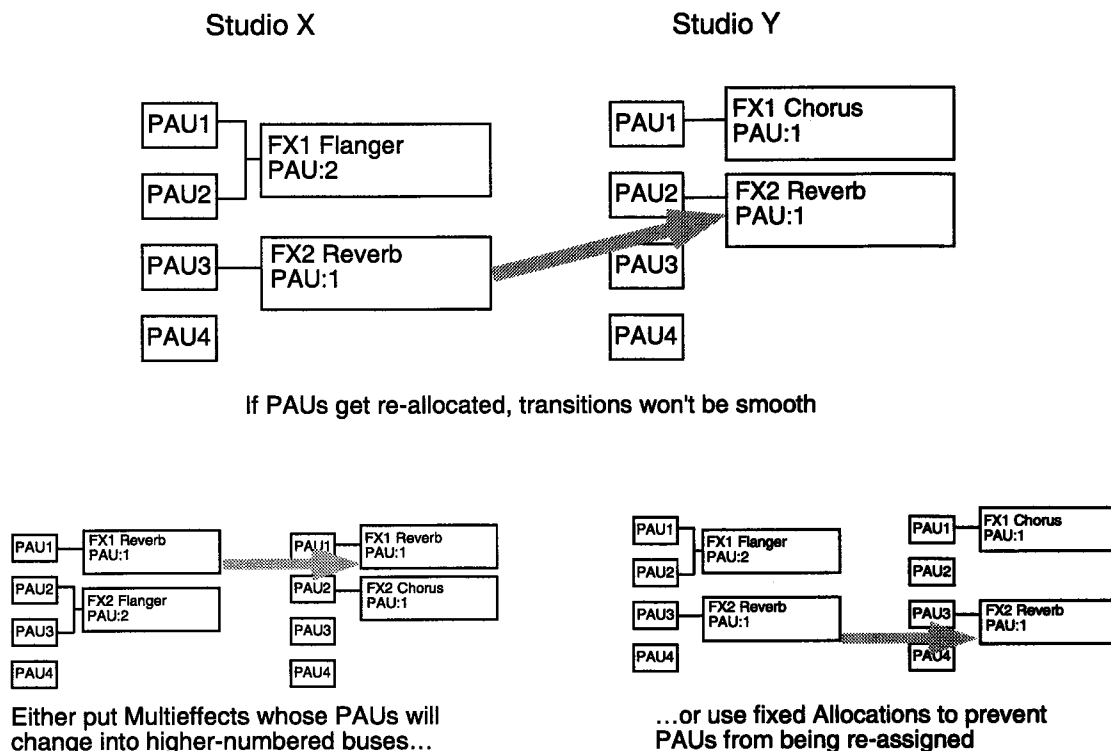


Figure 4-2. Avoiding transition problems when PAUs get re-allocated

Tempo-based control of KDFX

Many parameters within KDFX can be set up to respond to musical tempo. The tempo information can come from a number of sources: it can be fixed within a Studio, it can come from the K2500's internal sequencer, or it can come from an external MIDI sequencer which has been configured to send MIDI Timing Clocks to the K2500.

The procedures for using tempo from the internal sequencer and from an external sequencer are essentially the same, with one crucial difference in one setting: in **Song** mode, on the **MISC** page, the **Clock** parameter must be set to "Int" when using the internal sequencer and to "Ext" when using an external sequencer. In either case, the "Sync" parameter must be set either to "Recv" or to "Both".

Note that MIDI Timing Clocks (otherwise known as "MIDI Sync") is not the same as MIDI Time Code (or MTC). MIDI Sync, which is used for syncing sequencers together, changes its speed in response to tempo changes; MIDI Time Code, which is used for syncing a sequencer to an audio or video tape or disk system, does not. KDFX (and the K2500 in general) responds to MIDI Timing Clocks, but not to MIDI Time Code.

Tempo within an FX Preset

Some Algorithms have a "Tempo" parameter, which allows certain time-based functions, such as LFOs, envelopes, or delay lengths, to be expressed in beats per minute (BPM). A second parameter immediately below Tempo, "Period", multiplies or divides the tempo. The Period is expressed in beats ("bts") and ranges from 1/24 (the actual time is 24 times faster than the Tempo) to 32 (the time is 32 times slower than the Tempo) in a sliding scale based on 24ths of a beat. So for example, if an LFO has a Tempo setting of 120 BPM and a Period of 12/24 bts, the LFO will oscillate 240 times per minute, or 4 Hz.

Variable tempos using "System"

You can also have these parameters respond to tempo in real time, by setting the Tempo parameter to "System", which is set by scrolling below 1 BPM (or pressing "0" and "Enter" on the numeric keyboard). Now instead of Tempo being a fixed value, it will vary according to the system clock—which, depending on the setting of the Clock parameter on the Song mode's **MISC** page as described above, will either be the internal sequencer's clock, or tempo coming from an external source of MIDI Sync. The System Tempo will be multiplied or divided by the Rate or Beats setting, to determine the parameter's actual speed, just as if it were a fixed value.

If the Clock setting is "Int", then the current tempo of the internal sequencer (as shown on the Song Mode's **MAIN** page) will be in effect *whether or not the sequencer is running*.

If the Clock setting is "Ext", the external sequencer (assuming it is sending MIDI Timing Clocks) controls the Tempo parameter. If *no* MIDI sync is being received by the K2500, the tempo will not go to "0"; instead, it will retain the last valid value it saw—either the tempo of the internal sequencer at the time when you switched the Clock to "Ext", or the last tempo sent by an external sequencer before it stopped.

Tempo as an FXMod Source

KDFX Algorithms that don't have a "Tempo" parameter can also respond to tempo information, using FXMods.

In the Source list, there is now a source parameter called "Tempo," located at number 55. This source reads the current tempo (fixed or variable, internal or external) and turns it into a numerical value between 0 and 1, which is then applied to the parameter under the control of the FXMod. The "virtual" range of this parameter is 3.75 to 240 BPM—that is, a tempo of 3.75 BPM (or less) will set the parameter value to 0, while a tempo of 240 BPM (or greater) will set it to 1. Of course, most parameters don't actually vary between 0 and 1, so you have to scale the real values appropriately.

This can get pretty confusing, but there is a relatively simple method to follow when using this feature: set the "Adjust" value of an FXMod to the value of the parameter that you want when the tempo is 3.75 BPM, and set the "Depth" value so that the sum Adjust+Depth equals the value that you want when the tempo is 240 BPM.

For example, let's look at an Algorithm that has an LFO Rate parameter in Hz. Let's say we want the LFO speed to be twice as fast as the tempo. Here are the values for the FX Mod:

Parameter: LFO Rate

Adjust: The slowest vibrato we want is $(3.75 \text{ BPM} / 60) \times 2$, or 0.125 Hz. **0.13 Hz** is the nearest value available.

Source: Tempo

Depth: The fastest vibrato we want is $(240 \text{ BPM} / 60) \times 2$, or 8.00 Hz, so this parameter is 8.00–0.13, or 7.87 Hz; the nearest value available is **7.80 Hz**.

The Tempo parameter exists in Control Source lists throughout the K2500's operating system, not just in FXMod pages, so you can use it for controlling just about any function, including pitches of sample loops, envelope lengths, filters, volume, and more.

Tap Tempo

A real-time tap on a footswitch or button can also be used to control the tempo of a parameter in KDFX. Like the Tempo parameter, Tap Tempo is not KDFX-specific, but can be used throughout the K2500's operating system, including the Sequencer.

"Tap Tempo" is on the Destinations list for any controller in a Setup or Control Setup, located at number 39. Tapping or pressing on a controller that is set to "Tap Tempo" sends tempo information, based on the average time between taps, to the Internal Clock.

It takes four taps to determine the tempo—if you tap fewer than four times, no information is sent. If you tap more than four times, the average of *all* of your taps is continuously calculated and sent to the Clock. Later taps are weighted more heavily than earlier ones, so that if you change the rate at which you tap, the tempo information being sent will change accordingly, but there is a "flywheel" effect, and the Clock's tempo changes will lag somewhat behind the changes in your tapping rate.

In order for Tap Tempo to have any effect, the Clock parameter on the **Song Mode:MISC** page must be set to "Internal".

KDFX in Master mode

So far we've been telling you that setting FX Mode to "Master" on the Effects page disables real-time control over KDFX, but this is not strictly true. In that mode, KDFX will respond to specific system-exclusive (Sysex) commands. If you are a serious Sysex jockey, you can take advantage of this by using Sysex commands.

Sysex, in fact, can be used to control KDFX *regardless* of the FX Mode setting, so if you need to tweak certain parameters in real time without setting up an FXMod to do it, you can use Sysex and also use the FXMods in a Program or Setup.

Internal Effects in Master mode

The internal effects processor, which normally is controlled through a Program or Setup in one of those modes, can also be controlled in Master mode. Unlike KDFX in Master mode, this is done through Continuous Controller commands, not Sysex. The table that shows how to address the parameters is in Chapter 3 of the *K2500 Reference Guide*.

For these Controller commands to work with internal effects, the K2500 *must* be in Master mode, which means that Program or Setup control over the internal effects cannot be used simultaneously.

KDFX in Auto Mode

When the **FX Mode** is set to "Auto", then control of KDFX changes according to where you take the K2500: either Program mode or Setup mode. But when you are on the Effects Mode page itself, you are actually in *Master* mode. Therefore, you can go into the Studio whose name appears on the page and tweak its parameters, but you won't see any FX Mods that might be in place. You can change a parameter that has an FX Mod link through a Program (or Setup), but, unlike when you are going into the Studio through a Program, that link will *not* be disturbed.

When you leave the Studio, and then go into Program or Setup mode and call up a Program or Setup that links to that Studio, any changes you have just made in the Studio will show up, and any FX Mods previously in place will also still be there.

From Auto Mode to Song Mode

When you are on the Effects page and if FX Mode is set to "Auto", and then you go into Song Mode, something slightly different happens: KDFX is now under control of the Program that is on the Effect Channel within the song—from **Song** mode press **Edit** and look at the "EffectChan" parameter.

The Effect Channel is saved with the song, so make sure that it is set so that the program that you want to be in control of KDFX is active.

Chapter 5

Using the Algorithms

This Chapter will discuss the processing Algorithms found in KDFX: what their parameters mean, and how to use them. It is designed to be read through so that you can get a general understanding of the Algorithms. A more complete reference, with every Algorithm and the meaning and range of every Parameter, arranged in the order they appear on the screen, is available separately.

But first, a word about how the KDFX Studios in ROM are organized.

Conventional Studio Structure

Many of the Studios provided in ROM follow an overall organizational plan, which uses KDFX's resources efficiently and clearly. While by no means are you required to follow this structure when creating your own Studios, it's a good idea to become familiar with it, and see how Kurzweil's own engineers have approached the complex issue of Studio organization. And certainly it can serve as a good starting point when you strike out on your own.

The organization of the ROM Studios follows the following guidelines:

- ROM Programs and Setups are assigned to an output (KDFX-A through KDFX-D on the **Program:Output** or **Setup:CH/PRG** page) based on the type of effects processing that would most likely be appropriate for that sound.
- All Inputs go to their respective FXBuses (Input A to FXBus 1, Input B to FXBus 2, etc.), and *only* to their respective FXBuses—the Lvl parameter for the second FXBus on each Input page is turned Off.
- FXBus 1 contains a relatively simple reverb with a low Size requirement.
- FXBus 2 contains an effect which does not increase the "length" of the sound (that is, not reverb or delay). Possibilities include chorus, flange, phaser, distortion, shaper, pitcher, enhancer, EQ, or EQ morpher.
- FXBus 3 contains effects that take up lots of time, such as delays, delays with reverb, or other "Lead" sounds.
- FXBus 4 is dry (since the first three FXBuses have probably used up all the PAUs).
- The AUXFX Bus contains a larger reverb (Size: 2 or 3), a compressor, or a graphic EQ. It can often be used instead of an FXBus reverb, such as the one on FXBus 1. If you use it in this way (set the Aux Lvl on FXBus 1 to 0dB or higher), it frees up FX Bus 1 for use as an Enhancer, Stereo Image, Flanger, etc.

General Parameters

Some Parameters show up in all Algorithms, and we'll deal with those first.

Wet/Dry balances the levels of the processed and unprocessed signals passing through the FXPreset. The range is 0% wet (the signal is unprocessed) through 100% wet (no dry signal is present). A setting of 50% wet means the dry and processed signals are equal in level. In some Algorithms, separate Wet/Dry parameters are provided for the Left and Right input channels.

In Gain sets the level of the signal coming into the FXPreset from the Input page. As with most Gain controls in KDFX, the range is -79.0 dB to 24.0 dB, and there is an "Off" position. 0.0 dB is unity gain.

Out Gain sets the level of the signal after it passes through the FXPreset. From here the signal goes directly to the Output page, if one of the Outputs is set to "FXBusn". The level can be further changed before it goes to the Mix and/or AuxFX buses.

In/Out enables or disables the effect. It's like a Wet/Dry parameter with only two positions: 100% (In) and 0% (Out).

HF Damping is the cutoff (-3 dB) frequency of a 6dB/octave lowpass filter that's inserted before the processor. In the case of processors where multiple iterations of the signal are heard, such as in a delay, each iteration of the signal will pass through the filter, and will therefore be duller.

XCouple (Cross Couple). In stereo effects, this controls how much of any signal which is being fed back goes to the channel opposite to the one where it first appeared. At 100%, all feedback from signals at the left input goes to the right channel, and vice versa, causing a "spreading" or in the case of delay lines, a "ping-pong" effect. At 0%, fed-back signals stay with the channel they came in on.

A->B cfg (configuration). In combination Algorithms that contain two components, and whose name uses "<>", as in 727 "Reverb<>Compress", the order in which the signal passes through the two components can be changed. For example, this Algorithm can be configured so the signal passes through the reverb first and then the compressor, or through the compressor first and then the reverb. The **cfg** parameter determines the configuration, and its value is context-sensitive—in this example, the choices would be "Rvb->Cmp" and "Cmp->Rvb".

A/Dry->B is also found in many combination Algorithms, and controls the amount of signal that will pass dry (unprocessed) through the first component into the second component. Different combination Algorithms use different variations on this parameter, depending on the context. The range is 0 to 100%.

Reverbs

Room Type changes the configuration of the algorithm to simulate a wide array of room types and sizes including booths, small rooms, chambers, halls and large spaces can be selected. You can just use this parameter to change reverbs—if all other parameters remain at their nominal values, what you get when you change this parameter will always sound great. Because this parameter changes the structure of the reverb algorithm, it cannot be assigned an FXMod. Room types in different Algorithms with similar names do not necessarily sound the same.

Rvrb Time is the RT_{60} —the time it takes for the reverb to decay to 60 dB below its initial level—in seconds. It is accurate assuming that several other parameters (HF Damping, Diff Scale, Size Scale, and Density) are at their nominal levels. It is adjustable up to Inf, which creates an infinitely-sustaining reverb.

LateRvbTim adjusts the basic decay time of the late portion of the reverb after diffusion.

L/R Pre Dly (Pre-Delay) is the time between the start of a sound and the output of the first reverb reflections from that sound. Longer pre-delays can help make larger spaces sound more realistic. Longer times can also help improve the clarity of a mix by separating the reverb signal from the dry signal, so the dry signal is not obscured.

EarRef Lvl adjusts the mix level of the early reflection portion of Algorithms offering early reflections.

Late Lvl adjusts the mix level of the late reverb portion of Algorithms offering early reflections.

Diff Scale scales the "diffusion" of the early reflections, that is, how spread out they are as a group over time. At very low settings, the early reflections start to sound quite discrete, and at higher settings the early reflections are seamless. It is adjustable from 0.00 to 2.00, with 1.00 being nominal for the given Room Type.

Density controls how tightly the early reflections are packed in time. Low Density settings group the early reflections close together, while higher values spread the reflections for a smoother reverb. It is adjustable from 0.00 to 4.00, with 1.00 being nominal (and usually optimal) for the given Room Type.

Expanse controls the amount of late reverb energy biased toward the edges of the stereo image. A setting of 0% will bias energy towards the center. Moving away from 0% will bias energy towards the sides. Positive and negative values will have a different character.

Build adjusts the envelope of certain portions of the reverb. Positive values speed up the envelope, and negative values slow it down.

Size Scale changes the size of the current room. Altering this parameter will cause a subtle coloration of the reverb. It is adjustable from 0.00 to 4.00, with 1.00 being nominal (and usually optimal) for the given Room Type.

InfinDecay, when turned "On", causes the reverb tail to decay indefinitely. When it's "Off", the decay time is determined by the "Rvrb Time" or "LateRvbTim" parameters.

Wet Bal (Wet Balance). Some reverb Algorithms are actually two stereo reverbs in one, with each one receiving a different mono signal. This balances the outputs of the two reverbs—0% means they are being mixed equally.

Delays

There are two types of taps in the Multitap delays: The "Loop" tap, which can be repeated, and the numbered taps, which play a single iteration.

Fdbk (Feedback) **Level** controls the repeating function of the Loop Tap. A setting of 0% means there will only be a single delay, while a setting of 100% means the signal keeps repeating without ever stopping.

Both types of taps are individually adjustable from 0 to 2.55 seconds. The **Loop Crs** and **Tap n Crs** (n being the number of the tap) parameters set the coarse value of the loop in 20-ms increments, while the **Loop Fine** and **Tap n Fine** parameters set the fine value in 0.2-ms increments.

In Delay Algorithms that use tempo to determine tap lengths, there is a **Tempo** parameter which can be set from 1 to 255 BPM or to "System". The **Loop Length** and **Tap n Delays** are then expressed in beats relative to that overall Tempo. See Chapter 4 for more information about tempo control of KDFX parameters.

Hold is a switch that, when turned on, "locks" any signal currently in the delay and plays it until Hold is turned off. When Hold is on, no signal can enter the delay and Feedback is set to 100%.

Dry Bal (Balance) is the left/right balance of the dry signal. At -100%, only the left dry signal goes to the left output, while at 100% only the right dry signal passes to the right output, and at 0%, equal amounts of the left and right dry signals pass to their respective outputs.

Tap n Level is the level of each numbered tap, from 0% to 100%, relative to the overall output of the effect.

Tap n Bal is the left/right balance of each of the numbered taps. At -100%, only the left tap goes to the left output, while at 100% only the right tap goes to the right output, and at 0%, equal amounts of the left and right taps pass to their respective outputs. In some delays, pairs of taps (1 and 5, 2 and 6, etc.) are controlled together as stereo pairs.

DelayScale lets you change the lengths of all the taps together. Its range is 0 to 10x.

☛ Note that it is possible for KDFX to run out of delay memory with over-generous settings of DelayScale or very slow Tempos. If this happens, delay times will be automatically cut in half.

Complex Echo

This Algorithm has two feedback taps per channel as well as three independent taps, and also a feedback diffuser for "smearing" the delays. Feedback line 1 feeds the signal back to the delay input of the same channel, while feedback line 2 feeds the signal back to the opposite channel.

FB2/FB1>FB is a balance control between feedback lines 1 and 2. 0% (minimum) turns off feedback line 2, only allowing use of feedback line 1. 50% is an even mix of both lines, and 100% (maximum) turns off line 1.

L Diff Dly and **R Diff Dly** adjusts the delay lengths of the diffusers. Range is 0 to 100 ms.

Diff Amt adjusts the diffuser intensity. Range is 0 to 100%.

N Fdbk n Dly adjusts the delay length of the N channel's n th feedback tap, fed back to the N channel's delay input. Range is 0 to 2600 ms.

Spectral Multitap Delays

These 4- and 6-tape delays have their feedback and output taps modified with shapers and filters. In the feedback path of each tap are a diffuser, hipass filter, lopass filter, and imager. Each delay tap has a shaper, comb filter, and balance and level controls.

Fdbk Image sets the amount the stereo image is shifted each time it passes through the feedback line. Range is -100 to 100%.

Tap *n* Shapr adjusts the intensity of the shaper at each output tap. Range is 0.10 to 6.00 x.

Tap *n* Pitch adjusts the frequency of the comb filter at each output tap. Range is C-1 to C8, in semitones.

Tap *n* PtAmt adjusts the intensity of the comb filter at each output tap. Range is 0 to 100%.

Equalizers (EQ)

KDFX has both Graphic and Parametric EQ Algorithms. Parametric EQ sections are also available on a number of combination Algorithms.

The **Graphic** equalizer is available as stereo (linked parameters for left and right) or dual mono (independent controls for left and right). It has 10 bandpass filters per channel, each of whose gain is adjustable from -12 dB to +24 dB.

Like all graphic equalizers, the filter response is not perfectly flat when all gains are set to the same level (except at 0 dB), but rather has ripple from band to band. To minimize this ripple, it is best to center the overall settings around 0 dB.

The **Parametric** equalizer ("5-Band EQ") has two bands of shelving filters and three bands of true parametric EQ.

Treb Freq and **Bass Freq** set the center frequencies for the shelving filters. Both of these are adjustable over the full range of 16 to 25088 Hz, in increments of a semitone.

Treb Gain and **Bass Gain** control the amount of cut or boost above (Treb) or below (Bass) the center frequency. The range is -79 to +24 dB.

Mid*n* Gain sets the cut or boost for the parametric band *n*, with a range of -79 to +24 dB.

Mid*n* Freq sets the center frequency for parametric band *n*, with a range of 16 to 25088 Hz, in increments of a semitone.

Mid*n* Width set the bandwidth of the filter on band *n*, with a range of 0.01 to 5 octaves.

Enhancers

Enhancers modify the spectral content of the input signal by boosting existing spectral content, or stimulating new ones. Two- and three-band versions are provided.

Drive adjusts the input into each band. Increasing the drive will increase the effects. Range is -79.0 to 24.0 dB.

Xfer adjusts the intensity of the transfer curves. Range is -100 to 100%.

EQ Morpher

This Algorithm uses two four-band bandpass filters, A and B, and moves between them, which among other things, can produce a very convincing simulation of a human vocal tract.

FreqScale offsets the filter frequencies for each set of filters. After setting the filter parameters (**Freq**, **Gain**, and **Width**), the FreqScale parameters will move each of the four filter frequencies together by the same relative pitch. Range is -8600 to 8600 cents.

Morph A>B. When set to 0% the "A" parameters are controlling the filters, and when set to 100%, the "B" parameters control the filters. Between 0 and 100%, the filters are at interpolated positions. When morphing from A to B settings, the A filter #1 will change to the B filter #1, A filter #2 moves to B filter #2, and so on. Range is 0 to 100%.

Compressors, Expanders, and Gates

A wide range of Compression and Expansion effects is available in KDFX. The various Algorithms include different combinations of:

- compressor with either soft-knee or hard-knee characteristic
- expander
- multiband compressor that breaks the signal up into three frequency bands and compresses them all separately
- sidechain or output EQ
- reverb and compressor in combination
- gate
- gated Reverb

All of the Compression Algorithms use these parameters:

FdbkComprs (Feedback Compression) selects whether to use feed-forward (set this to "Out") or feedback (set this to "In") compression. The feed-forward configuration uses the input signal as the side-chain source. The feedback configuration uses the compressor *output* as the side-chain source. Feedback compression tends to be more subtle, but it does not allow instantaneous attack compression.

Atk (Attack) **Time** for the compressor is adjustable from 0.0 to 228.0 ms.

Rel (Release) **Time** for the compressor is adjustable from 0 to 3000 ms.

Smooth Time smooths the output of the expander's envelope detector by putting a lowpass filter in the control signal path. Smoothing will affect the Attack or Release times only when this parameter is longer than one of the other times. The range is 0.0 to 228.0 ms.

Signal Dly (Delay) puts a small delay in the signal relative to the sidechain processing, so that the compressor (or gate) "knows" what the input signal is going to be before it has to act on it. This means the compression can kick in before an attack transient arrives. In a compressor, it is only really useful in feedback configuration (FdbkComprs is "In"). The range is 0 to 25 ms.

Ratio is the amount of gain reduction imposed on the compressed signal, adjustable from 1.0:1 (no reduction) to 100:1, and Inf:1.

Threshold is the level in dBFS (decibels relative to full scale) above which the signal begins to be compressed. Adjustable from -79.0 to 0 dB.

MakeUpGain allows additional output gain to compensate for gain reduction in the compressor. It works in conjunction (additive, in dB) with the Out Gain parameter. The range is -79.0 to +24.0 dB.

Expansion

Algorithms containing Expanders have these controls:

Exp Atk (Attack), how fast the expander turns off when the input signal rises above the threshold level, adjustable from 0.0 to 228.0 ms.

Exp Rel (Release), how fast the expander turns back on after the signal drops below the threshold level, adjustable from 0 to 3000 ms.

Exp Ratio, how much the gain is reduced below the expansion threshold, adjustable from 1:1.1 (slight downward expansion) to 1:17 (extreme downward expansion).

Exp Threshold, the level below which the signal is expanded, adjustable from -79.0 to 0 dB.

In addition, the two-segment compressors with expander have separate **Ratio** and **Threshold** controls for each of the compression segments.

Multiband Compression

The Multiband Compression Algorithm has **Attack**, **Release**, **Smooth**, **Signal Delay**, **Ratio**, **Threshold**, and **MakeUp Gain** parameters for each of the three bands ("Low", "Mid", and "High"). In addition, it has:

Crossover1 and **Crossover2**. These set the frequencies which divide the three compression frequency bands. The two parameters are interchangeable, so either may contain the higher frequency value. The range is 16 to 25088 Hz, in increments of a semitone.

Gates

SC Input lets you select which input channel(s) will control the sidechain, which is responsible for opening and closing the gate. It can be set to L, R, or the average of the two channels, (L+R)/2.

Gate Time is the time that the gate will stay open when the sidechain signal reaches the Threshold. Its range is 0 to 3000ms.

Ducking reverses the action of the gate. Normally this is set to "Off", and the gate opens when the input signal rises above the threshold. But when this is "On", the gate *closes* when the input signal rises above the threshold.

Env Time is the amount of time it takes for the sidechain signal envelope to drop below the threshold. If this time is too short, the gate can close and open too quickly from amplitude modulation in the sidechain signal. If it is too long, the gate may stay closed until the envelope has a chance to fall, and some signals would not get through. This parameter is only in effect when **Retrigger** is Off.

Retrigger determines whether the gate timer will reset itself each time the sidechain signal goes above the threshold. If it is "On", the timer resets itself, and therefore the gate stays open as long as the signal is above the threshold, or keeps going above the threshold, within the interval specified by **Gate Time**. If it is "Off", the gate closes down after **Env Time** has elapsed, regardless of the sidechain level, and the sidechain level must fall below the threshold and come back up again before the gate will open again.

Chorus

Chorus is an effect which gives the illusion of multiple voices playing in unison. The effect is achieved by detuning copies of the original signal and summing the detuned copies back with the original. Low frequency oscillators (LFOs) are used to modulate the positions of output taps from a delay line. The delay line tap modulation causes the pitch of the signal to shift up and down, producing the required detuning.

The choruses are available as stereo or dual mono. The stereo choruses have the parameters for the left and right channels ganged, while the dual mono choruses have separate left and right controls.

Fdbk Level is the level of the feedback signal from the LFO1 delay tap into the delay line. Negative values polarity-invert the feedback signal.

Tap Lvl sets the levels of the LFO-modulated delay taps. Negative values polarity-invert the signal. Setting any tap level to 0% effectively turns it off.

Tap Pan sets the stereo position for a given tap's output. The range is -100% for fully left to 100% for fully right.

LFO Rate sets the speed of modulation of the delay lines with a range of 0.01 to 10 Hz.

LFO Dpth sets the maximum detuning depth of the LFO-modulated delay lines, with a range from 0 to 50 cents (1/2 semitone).

Tap Dly adds extra delay in front of the LFO modulated delay taps from 0 to 230 ms.

L/R Phase or **LFO~~n~~ LRPhs** adjusts the relative phases of the LFOs for the left and right channels in the stereo Choruses.

Flanger

Flanging is the process of adding or subtracting a signal with a time-displaced replica of itself, which results in a series of notches in the frequency spectrum, generally referred to as a comb filter. In KDFX, the flanger is a multi-tap delay line, all (but one) of whose taps can have their lengths modulated up and down by a low frequency oscillator (LFO). The rate of the LFO is expressed in Tempo (see Chapter 4).

StatDlyLvl (Static Delay Level) is the level of the first, non-moving tap. Negative values invert the polarity of the tap. The range is -100 to 100%; 0% turns the tap off.

DlyCrs and **DlyFin** are the coarse and fine length controls for the Static delay (**StatDly...**) and for the minimum value of the moving delays (**Dlyn...**). The coarse range is 0 to 228 ms, and the fine range adjusts the coarse range in samples (1/48,000 sec, or 20.8μsec) from -127 to 127.

Xcurs Crs and **Xcurs Fin** determine how far the LFO-modulated delay taps can move from the center of their ranges. The total range of the LFO sweep is twice the excursion. If the excursion is set to 0, the LFO does not move and the tap behaves like a simple delay line set to the minimum delay. The coarse range is 0 to 228 ms; the range 0 to 5 ms is most effective for flanging. The fine range adjusts the coarse range in samples from -127 to 127.

Quantize + Flange

The Quantize portion of this Algorithm produces digital distortion known as quantization noise by limiting the number of bits available to the signal.

DynamRange (dynamic range) controls how many bits to remove from the signal data words. At 0 dB the hottest of signals will toggle between only two bit (or quantization) levels, thereby producing a square wave. Every 6 dB added doubles the number of quantization levels, reducing the noise and getting closer to the original signal. If the signal has a lot of headroom (available signal level before digital clipping), then not all quantization levels will be reached. Range is 0 to 144 dB.

Headroom sets the available signal level before digital clipping. Use this in conjunction with **DynamRange** to keep the signal level from getting too loud at low levels of **DynamRange**. Range is 0 to 144 dB.

DC Offset adds a positive DC Offset to the input signal, which allows you to alter the position where digital zero is with respect to your signal. At low **DynamRange** settings, this can cause the output to "sputter". Range is Off/-79.0 to 0.0 dB.

LaserVerb

LaserVerb is a new kind of reverb which produces a delayed train of closely spaced reflections, or impulses. As time passes, the spacing between the impulses gets wider, which creates a discernible buzzy pitch that gets lower as the spacing increases. The signal can be fed back into itself to extend the effect.

Dly Coarse is the overall delay length, which controls the duration or decay time. 0.5 sec is a good starting point. Range is 0 to 1.3 seconds in the 2 PAU version of the Algorithm, and 0 to 2 seconds in the 3-PAU version.

Dly Fine adjusts the delay with a resolution down to 0.1 ms. Range is -20.0 to 20.0 ms.

Spacing determines the starting pitch of the descending buzz and how fast it descends, by setting the initial separation of impulses and the subsequent rate of increasing impulse separation. The spacing between impulses is given in samples (20.8 μ s), with a resolution of 0.1 sample. At low values, the buzz starts at high frequencies and drops slowly, while at high values the buzz starts at a lower pitch and drops rapidly. Range is 0.0 to 40.0 samples.

Contour controls the overall shape of the reverb. When set to a high value, sounds passed through the reverb start at a high level and slowly decay. As the control value is reduced, it takes more time for the effect to build up before decaying. At a value of around 34, the reverb behaves like a reverse reverb, building up to a hit. When it is set to zero, the Algorithm acts like a simple delay. Range is 0 to 100%.

Filters

There are four types of Resonant Filter Algorithms in KDFX.

Resonant Filter

Filter Type (or **FiltType**) can be Lowpass, Highpass, Bandpass, or Notch (band-limit).

Frequency (or **Freq**) is the resonant frequency of the filter. Its range is 58 to 8372 Hz.

Resonance is the resonance of the filter, adjustable from 0 to 50 dB.

Envelope Filter

Envelope Filter is a resonant filter whose center frequency can be made to vary according to the level of the incoming signal.

Filter Type can be Lowpass, Highpass, Bandpass, or Notch (band-limit).

Min Freq is the minimum resonant frequency of the filter, that is, the filter frequency when the input gain is below the triggering threshold. Its range is 58 to 8372 Hz.

Sweep determines how far the resonant frequency moves when the input level increases. At positive levels it moves up in pitch, and at negative levels it moves down. The highest possible resonant frequency is 8372 Hz; the lowest is 0 Hz. This parameter's range is -100% to +100%.

Resonance is the resonance of the filter, adjustable from 0 to 50 dB.

Atk Rate adjusts the upward slew of the attack portion of the envelope detector. Range is 0 to 300.0 dB/sec.

Rel Rate adjusts the downward slew of the release portion. Range is 0 to 300.0 dB/sec.

Smooth Rate slows down the envelope follower. If it is set to a lower rate than **Atk Rate** or **Rel Rate**, it can dominate those parameters. Range is 0 to 300.0 dB/sec.

Trig Filt

The Triggered Filter is a sweeping resonant filter that triggers when a certain input threshold is reached, and then follows its *own* envelope, consisting of an instantaneous attack and an exponential release, rather than the envelope of the input signal.

Max Freq is the resonant frequency of the filter at the peak of the internal envelope. It can be set lower than **Min Freq** (above), in which case the filter will sweep downwards, then back up. Range is 58 to 8372 Hz.

Trigger is the input-signal threshold at which the envelope detector triggers. Range is -79 to 0 dB.

Retrigger is the input-signal threshold at which the envelope detector resets, so that it can trigger again. This parameter is only useful when it is set below the value of **Trigger**. Range is from -79 to 0 dB.

Env Rate is the envelope detector decay rate. This can be used to prevent false triggering. When the signal envelope falls below the retrigger level, the filter can be triggered again when the signal rises above the trigger level. Since the input signal can fluctuate rapidly, it is necessary to adjust the rate at which the signal envelope can fall to the retrigger level. The range is 0 to 300.0 dB/sec.

Rel Rate is the downward slew (release) rate of the triggered envelope generator. The range is 0 to 300.0 dB/sec.

Smth Rate slows down the envelope follower. If set lower than the release rate, it will dominate it. You can also use the smoothing rate to lengthen the attack of the internal envelope. The range is 0 to 300.0 dB/sec.

LFO Filter

The LFO filter is continuously swept between two resonant frequencies over a period of time. The LFO frequency, expressed in BPM and beats, can be fixed or set to follow **System tempo**. (See Chapter 4 for more information about tempo control of KDFX parameters.)

Min Freq and **Max Freq** are the low and high limits of the resonant frequency as the filter is swept. It actually doesn't matter which is higher; the effect will be the same. The range for both is 58 to 8372 Hz.

LFO Shape is the waveform type for the LFO. Choices are Sine, Saw+, Saw-, Pulse, and Tri.

LFO PlsWid (Pulse Width). When the LFO Shape is set to Pulse, this sets the pulse width as a percentage of the waveform period. When the width is set to 50%, the result is a square wave. This parameter has no effect if other waveform types are chosen. Range is 0 to 100%.

LFO Smooth smooths (removes the higher harmonics from) the Saw+, Saw-, and Pulse waveforms. A Sawtooth wave looks more like a triangle wave, and a Pulse wave looks more like a sine wave. Range is 0 to 100%.

Distortion

Distortion Algorithms on KDFX may include a parametric equalizer or a cabinet simulator.

Dist Drive applies a boost to the input signal to overdrive the distortion algorithm into soft clipping. Since distortion drive will make your signal very loud, you may have to reduce the Out Gain as the drive is increased. Range is 0 to 96 dB.

Warmth is a lowpass filter in the distortion control path. This filter may be used to reduce some of the harshness of some distortion settings without reducing the bandwidth of the signal. Range is 16 to 25088 Hz.

Highpass allows you to reduce the bass content of the distortion content in the smaller distortion algorithms that don't have true parametric EQ. Range is 16 to 25088 Hz.

Cab Preset selects from eight cabinet simulations which have been created based on measurements of real guitar amplifier cabinets. The presets are: Plain, Lead 12, 2x12, Open 12, Open 10, 4x12, Hot 2x12, and Hot 12.

Cab Bypass switches on and off the cabinet-simulation part of the algorithm. When this is set to "In", the cabinet simulation is active; when it is "Out", there is no cabinet filtering.

Cabinet HP and **Cabinet LP** are highpass and lowpass filters to set the frequency response limits of the cabinets. Range of both filters is 16 to 25088 Hz.

Polydistort

This is a more complex distortion Algorithm that provides two, four, or six stages of distortion.

Curve *n* controls the curvature of the individual distortion stages. 0% is no curvature (no distortion at all). At 100%, the curve bends over smoothly and becomes perfectly flat right before it goes into clipping. Maximum value is 127%.

LP *n* Freq are shelving frequencies for one-pole lowpass filters on each of the distortion stages. LP0 Freq handles the initial low pass prior to the first distortion stage. The other low pass controls follow their respective distortion stages. Range is 16 to 25088 Hz.

Rotating Speakers

An Algorithm that includes Rotating Speakers breaks the signal into two frequency bands, "rotates" each band separately through a virtual speaker, and then combines the outputs with a pair of virtual "microphones" whose angle relative to the speakers is adjustable.

Xover (Crossover) is the frequency at which high and low frequency bands are split and sent to separate rotating drivers. The range is 16 to 25088 Hz.

Lo Gain and **Hi Gain** are the gains of the signal passing through the rotating woofer or tweeter, respectively. The range is Off / -79.0 to 24.0 dB.

Lo Rate and **Hi Rate** are the rotation rates of the rotating woofer and tweeter. Each driver woofer can rotate clockwise or counter-clockwise, which is determined by the sign of this parameter: assuming the microphones are positioned in front of the driver and the microphones are panned positively (positive numbers go to the right), then a positive value for this parameter causes the driver to spin clockwise when viewed from the top. The range is -10.00 to 10.00 Hz.

Lo Size and **Hi Size** are the effective sizes (radius of rotation) of the rotating speakers in millimeters. This affects the amount of Doppler shift or vibrato of the low frequency signal. The range is 0 to 250 mm.

Lo Trem and **Hi Trem** control the depth of tremolo (amplitude modulation) of the signals. It is expressed as a percentage of full scale tremolo. The range is 0 to 100%.

Mic Angle is the angle of the virtual microphones in degrees from the "front" of the rotating speaker. For the left microphone the angle increases clockwise (when viewed from the top), while for the right microphone the angle increases counter-clockwise. You should not assign an FXMod to this parameter because adjustments to it will result in large sample skips, which will cause clicks in the signal passing through. The range is 0 to 360.0 degrees.

LoResonate and **HiResonate** are simulations of cabinet resonant modes express as a percentage. For realism, you should use very low settings. The range is 0 to 100%.

Lo Res Dly and **Hi Res Delay** are the number of samples of delay in each resonator circuit in addition to the rotation excursion delay. The range is 10 to 2550 samples.

LoResXcurs and **HiResXcurs** are the number of samples of delay to sweep through the resonator at the rotation rate of each rotating speaker. The range is 0 to 510 samples.

ResH/LPhs sets the relative phases of the high and low resonators. The angle value in degrees is somewhat arbitrary and you can expect the effect of this parameter to be rather subtle. The range is 0 to 360.0 degrees.

Vibrato/Chorus

The Vibrato/Chorus Algorithm (and also the KB3 Effects Algorithm) simulates the vibrato and chorus effects on a Hammond organ, and is used in conjunction with the Rotary Speaker. It has several unique parameters:

VibChInOut is an in/out switch for the Vibrato/Chorus effect.

Vib/Chor is the type of Vibrato/Chorus effect to be used. The choices are from three vibratos, "V1", "V2", "V3", or three choruses, "C1", "C2", "C3".

Roto InOut engages or bypasses the rotary speaker effect.

Lo Beam W and **Hi Beam W** set the acoustic radiation patterns ("beam width") of the two drivers in the rotating speaker. If you imagine looking down on the rotating speaker, this angle is the angle between the -6 dB levels of the beam. The range is from 45° to 360°. At 360°, the driver is omnidirectional.

There are four virtual microphones, with two each on the woofer (**LoMic A** and **LoMic B**) and on the tweeter (**HiMic A** and **HiMic B**). Each microphone has:

Pos (position), the angle of the microphone from the front of the virtual speaker, from -180 to 180 degrees;

Lvl (level) from 0 to 100%; and

Pan, the left/right panning of the microphone's output, from -100% (full left) to 100% (full right).

Tremolo and AutoPan

Tremolo is amplitude modulation using an LFO. AutoPan moves the signal between the left and right channels, using an LFO. They have several parameters in common and several unique parameters.

LFO Rate is the rate of the LFO. The range is 0 to 10.00 Hz, or in Tremolo BPM Algorithm, 0 to 12.00 x the tempo.

Rate Scale multiplies the speed of the LFO rate into the audio range. The range is 1 to 25088 x. When above 19x, the values increment in semitone steps. These steps are accurate when LFO Rate is set to 1.00 Hz.

LFO Shape is the waveform type for the LFO. Choices are Sine, Saw+, Saw-, Pulse, and Tri.

LFO PlsWid or **Pulse Width**. When the LFO Shape is set to Pulse, this sets the pulse width as a percentage of the waveform period. When the width is set to 50%, the result is a square wave. This parameter has no effect if other waveform types are chosen. Range is 0 to 100%.

Origin (AutoPan) determines the axis for the panning motion. At 0%, the panning is centered between the speakers. Positive values shift the axis to the right, while negative values shift it to the left. At -100% or +100% (the range limits), there is no panning action.

ImageWidth (AutoPan) is the width of the original input program material before it is auto-panned. At 0% (minimum), the input image is shrunk to a single point source, allowing maximum panning excursion. At 100% (maximum), the original width is maintained so no panning can occur.

Pan Width(AutoPan) controls the amount of pan excursion. It is the percentage of total panning motion available after Origin and ImageWidth are set. Range is 0 to 100%.

CentrAtten (Attenuation) (AutoPan) is the amount the signal level drops as it is panned through the center of the stereo image. For the smoothest tracking, a widely accepted subjective reference is -3dB. Values above -3dB will cause somewhat of a bump in level as an image passes through the center, while values below -3dB will cause a dip. Range is -12 to 0 dB.

Depth (Tremolo) controls the amount of attenuation applied when the LFO is at its deepest excursion point. Range is 0 to 100%.

LFO Phase (Tremolo BPM) shifts the phase of the tremolo LFO relative to the beat reference. It is most useful when Tempo is set to "System". Range is 0.0 to 360.0 degrees.

50% Weight (Tremolo) is the relative amount of attenuation added when the LFO is at the -6dB point. This causes the LFO shape to bow up (positive values) or down (negative values). Range is -16 to 3 dB.

L/R Phase sets the phase relationship of the channels. "In" flips the left channel's LFO out of phase, with the result that the effect turns into an auto-balancer. "Out" leaves the left LFO alone.

Pitch Shifter (Pitcher)

Pitcher shifts the pitch of the incoming signal to the specified note.

Pitch. The fundamental pitch imposed upon the input, in MIDI note numbers from C-1 to G9.

Pitch Offset is an offset from the pitch frequency in semitones, from -12.0 to 12.0. It can be useful to assign pitch bend or a continuous controller to this parameter through an FXMod.

Odd Wts, Pair Wts, Quarter Wts, Half Wts are parameters that control the exact shape of the frequency response of Pitcher. An exact description of what each one does is, unfortunately, impossible, since there is a great deal of interaction between them. For more information and examples, see the Algorithm documentation.

Ring Modulation

Ring modulation multiplies two signals (the "carrier" and the "modulator") together to produce unusual, often non-harmonic, overtones. The Ring Modulator Algorithm in KDFX has two modes: "L*R" in which two mono signals are modulated together; and "Osc", in which the input is stereo, and it is modulated with the sum of five waveforms which are generated within the Algorithm itself. Four of these are sine waves, and one (Oscillator 1) has a configurable waveform.

Wet/Dry. In L*R mode, the left signal is passed dry through this control.

Mod Mode selects between the two modes.

Osc1 Lvl is the level of Oscillator 1, from 0 to 100%.

Osc1 Freq is the frequency of Oscillator 1, from 16 to 25088 Hz.

Osc1 Shape is the waveshape of Oscillator 1, selectable from Sine, Saw+, Saw-, Pulse, and Tri.

Osc1PlsWid (Pulse Width). When **Osc1 Shape** is set to Pulse, this sets the pulse width as a percentage of the waveform period. When the width is set to 50%, the result is a square wave. This parameter has no effect if other waveform types are chosen. Range is 0 to 100%.

Osc1Smooth smooths (removes the higher harmonics from) the Saw+, Saw-, and Pulse waveforms. A Sawtooth wave looks more like a triangle wave, and a Pulse wave looks more like a sine wave. Range is 0 to 100%.

The other four oscillators, **Sine2** through **Sine5**, each have **Lvl** and **Freq** controls.

SRS (Sound Retrieval System)

SRS, which is used under license from SRS Labs, Inc., is a single-ended processing system that produces a fully immersive, three-dimensional sound image from any audio source—mono, stereo, surround sound or encoded with any other audio enhancement technology—with two or more standard speakers.

The four parameters control the ambience of the image, and may have different optimal settings depending on the amount of stereo content in the inputs. To match the optimal settings specified by SRS Labs, the bass and treble gains should be set to 0 dB. This Algorithm will have no effect on mono signals. All ranges are -79.0 to 24.0 dB.

Center varies the amount of “center channel” in the output. It has an “Off” position.

Space controls the width of the image. It, too, has an “Off” position.

Bass Gain and **Treb Gain** set the amount of ambience added to the low and high frequencies, respectively, in the signal. Setting both of these to 0 dB gives a best match to the optimizations of SRS Labs.

Stereo Simulation

The Mono to Stereo Algorithm converts a monaural input to simulated stereo output.

In Select selects the input signal to be “stereo-ized”. It can be Left, Right, or both $((L+R)/2)$.

CenterGain is the level of the summed left and right channels. Range is Off/-79.0 to 24.0 dB.

Diff Gain is the level of the difference signal produced, which is the spatial component of the stereo signal. Range is Off/-79.0 to 24.0 dB.

DiffBassG is a gain parameter for a bass-shelf filter on the difference signal. By boosting the low frequency components of the difference signal, you can increase the sense of acoustic envelopment. Range is -79.0 to 24.0 dB.

DiffBassF is the transition frequency for the bass-shelf frequency. Range is 16 to 25088 Hz.

The processed signal is split into three frequency bands—Lo, Mid, and High—each of which can be delayed and panned separately.

Crossover1 and **2** are the two Crossover frequencies at which the band-split filters split the signal into three bands. The two parameters are interchangeable: either may have a higher frequency than the other. Range is 16 to 25088 Hz.

Pan band sets the pan position for each band. Range is -100% (fully left) to 100% (fully right.)

Delay band sets the delay for each band. Range is 0 to 1000 ms.

Stereo Analyze

In this Algorithm you can look at the two channels of a stereo signal, and also their inversions, sums, and differences. You can adjust their gains, and apply small delays to either or both channels.

L Invert and **R Invert** inverts the phase of the channels.

L Out Mode and **R Out Mode** determines which signal is going to be metered and sent to the output of each of the channels. The choices for each are: "L" (left), "R" (right), "(L+R)/2" (normalized sum), "(L-R)/2" (normalized difference), and polarity inverted versions of these.

L/R Delay "time balances" the two signals. At negative values, the right channel is delayed, while at positive values, the left channel is delayed. The range is -500 to 500 samples.

RMS Settle controls how fast the RMS meters can rise or fall with changing signal levels. Range is 0 to 300 dB/second.

The Stereo Image Algorithm borrows some features from this Algorithm and some from Mono to Stereo, and provides a stereo correlation meter.

FXMod Diagnostic

This Algorithm allows you to view the current levels of any data sliders, MIDI controls, switches, or internally generated VAST LFOs, ASRs, FUNs, etc. which are available as modulation sources. It has no effect on any signal being routed through it.

Up to eight modulation sources may be monitored simultaneously. Meters #1 through #4 can monitor bipolar sources, meaning sources that can have both positive and negative values. The range of the bipolar meters is -1 to +1. Four monopolar meters #5 through #8 provide better resolution, but the range is limited to 0 through +1. Use the monopolar meters for sources which you do not expect to go negative.

Eight parameters are provided to connect modulation sources to the meters. The parameter values are fixed at "NoDpth" and have no function except to connect sources to meters. To use the algorithm, save an FX Preset and Studio containing the Algorithm, then go to one of the FXMod pages of your Program or Setup (with the Studio selected). Select the FX bus which contains the FXPreset using the FXMod Diagnostic algorithm, and choose one of the meter parameters (Bipole N or Monopole N). You will not be able to modify the Adjust or Depth fields, but you can select any source you want. Finally press the Edit button to re-enter the Studio and Multieffect editor where you can view the meters on parameter page 2.

Bipole1 through **Bipole4** attach bipolar modulation sources (those that can go positive or negative) to the bipolar meters. The parameters are not adjustable.

Monopole5 through **Monopole8** attach monopolar modulation sources (can go positive only) to the monopolar meters. The parameters are not adjustable.

Chapter 6

Special Topics

Live Mode

One of the most exciting aspects of KDFX is that its use is not restricted to sounds coming from the K2500. If you have the Sampling Option installed in your K2500, then you can also use KDFX with any *external* sound sources using the K2500's "Live Mode" feature. The modified sound will be available through the K2500's mix outputs.

To use Live Mode, go to the **Sample** page, from Program or Setup mode. Move the cursor down to the **Mode** parameter, and move the Alpha wheel clockwise until it says "LiveIn". Now go up to the **Input** parameter and choose between analog and digital inputs. You can also set gain if you are using the analog inputs (the sampling rate is essentially irrelevant); or the cable and signal format if you are using the digital ones. The **Time** parameter has no effect in this mode. Also, be careful if you set the "Src" parameter to "Int", since this can create a feedback loop.

There are Programs in the ROM set that comes with KDFX that utilize Live Mode. They are located at numbers 740 to 749.

If you want to create your own Live Mode Programs, you can do so by assigning Keymaps 197 and/or 198 to a Program. 197 is for use with the left input and 198 is for the right. The input signals are treated exactly like ROM or RAM samples: you can use most real-time VAST functions on the input signals, as well as KDFX processing. To create the program, play C4, then input the audio source that you want to run through Live Mode. For alternative ways of triggering the sound (e.g., with assignable controller buttons or pedals), edit the Control Setup.

(Hint: Set "VelTrk" on the EditProg F4 AMP page to 0 dB; otherwise, the velocity with which you strike C4 will affect your output.)

Live Mode requires that there be between 1.0 and 1.5 Mbytes of free sample memory. If there is not enough sample RAM available, you will get an error message.

Can I sample and use Live Mode together?

Sorry, no. Since the two functions use the same K2500 components, you can't have both running at once. But you can certainly play back RAM samples and have Live Mode active at the same time.

Song Mode

We've referred to the special aspects of KDFX in Song mode elsewhere in the manual. Here is a summary of what's been said, along with some new information.

FX Mode in Song Mode

If **FXMode** on the **Effects** page is set to "Program", and you put the K2500 into Song mode, control of KDFX will remain with the Program that is on the current FX Channel, as set on the Effects page. However, if FX Mode is set to "Auto", and you put the K2500 into Song Mode, KDFX will now be under the control of the Program that is on the Effect Channel *within* the

song—from Song mode press **Edit** to go to the **EditSong:COMMON** page, and look at the **EffectChan** parameter.

The Effect Channel is saved with the song, so make sure that it is set so that the Program that you want to be in control of KDFX is active on that channel.

Clock Setting for tempo-based parameters

The clock setting in Song mode determines how tempo (BPM)-based parameters behave. If you are using the K2500's internal tempo clock, the **Clock** parameter on the **MISC** page in **Song** mode must be set to "Int". If you are using an external MIDI timing source, such as a sequencer, then that parameter must be set to "Ext". In either case, if you are using BPM-based parameters, the "Sync" parameter on this page must be set either to "Recv" or to "Both".

If you are using Tap Tempo as a tempo source, then the **Clock** parameter must be set to "Internal".

Recording a Setup in Song Mode

In order to record a Setup into the internal sequencer, you first need to set the **RecTrk** parameter on the **MAIN** Song page to "Mult". (If you are using an external keyboard that sends on only one MIDI channel, you must also go to the **Receive** page in **MIDI** mode and turn on the **LocalKbdCh** parameter, setting it to agree with the MIDI Out channel of your keyboard.)

There is a complication, however, if you want to record KDFX Mods while you're recording your track using the Setup. The sequencer will faithfully record all of your controller movements, but when it plays them back, it plays them as part of a single track. That track contains a Program, not a Setup, because the sequencer doesn't know how to play Setups.

Since all of the KDFX Mods were part of the Setup, even though the data on the track is being played back, it's not going anywhere, and no KDFX Mods are being played.

The solution is to have a *Program* playing back the data you've just recorded, which has the identical KDFX Studio and FXMods as the Setup you used to record with. The data has been recorded on the MIDI channel of Zone 1 of the setup. Find the Program on that channel, press **Edit** to get inside it, and then import the KDFX Studio from the Setup you used originally—that's what the **ImpFX** function is for.

Now save that Program (in the same location or a new one) and go back to the song. Make sure that the Program's channel and the song's EffectChannel agree. The KDFX Mods should now all play correctly.

Studios and Songs in Master Mode

When you are using KDFX in Master mode, the Studio does not get saved with the Song, since it is not a dependent object of the Song, or of anything in it. Therefore, if you want to recall a Studio whenever you load in a particular Song, you either have to:

- remember to recall the Studio by hand, or
- go into FXMode: Program, and save the Studio as part of a Program which is on one of the tracks of the Song.

Remember, just because you are in FXMode:Program doesn't mean you *have* to use FXMods—you can leave the Studio alone, just as you would in Master mode.

KB3 Effects

In the K2500's KB3 mode, KDFX processing is being used to its utmost. Several Studios have been included for use with KB3, which have a special characteristic: the insert and Aux FX buses are made to be used together, forming a "virtual" single processing Algorithm with 7 (count 'em) PAUs.

There are two Algorithms that are designed for this special use: Algorithm 736 (to be used on an insert FX Bus) and Algorithm 735 (to be used on the Aux bus). They don't work very well individually, and should probably not be used that way.

Using the Internal Effects

The original Internal Effects processor on the K2500 is in the signal chain *after* the KDFX Studio. It is only connected to the "Mix" analog physical outputs (not to be confused with KDFX's Mix bus output). Without KDFX, all sounds assigned to the "A" outputs go through the Effects processor on their way to the Mix physical outputs (analog only). With KDFX this is still true, although sounds first go through KDFX and *then* are assigned to the A output pair on the Studio's Output page.

As always, if there are any plugs inserted into the "A" physical outputs, the A signal is disconnected from the Mix outputs, and the Effects processor will not be heard. This is true of all of the outputs: inserting a plug into any of them disconnects that pair from the Mix outputs. See chapter 18 of the K2500 Performance Guide for more information.

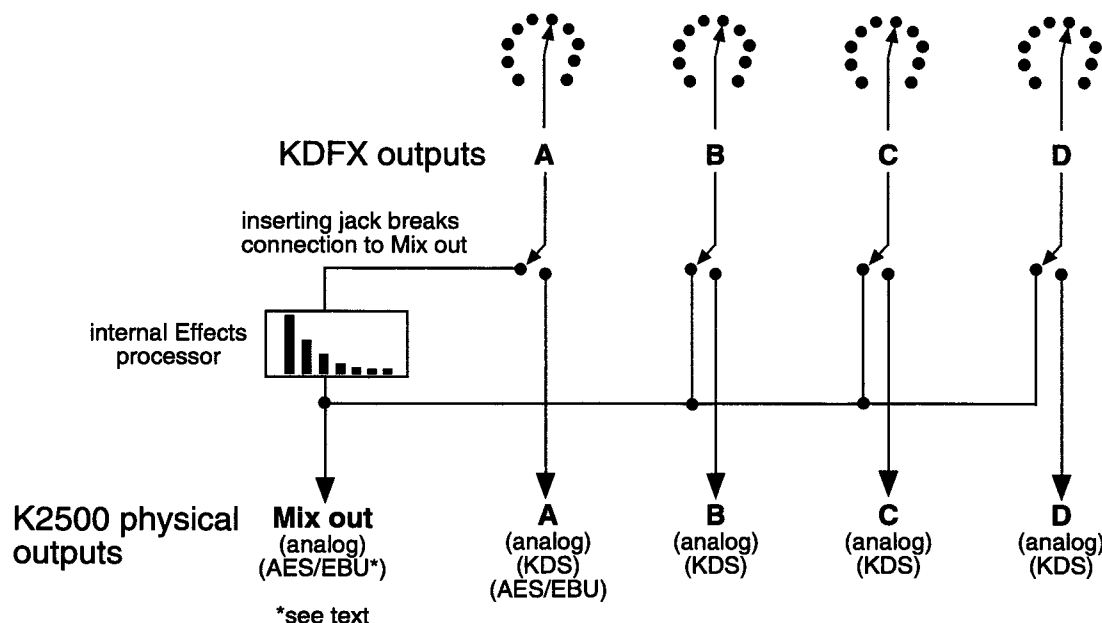


Figure 6-1. KDFX and the K2500's physical outputs

Getting the Effects onto the AES/EBU digital output

Although normally the AES/EBU output does not carry the signal from the internal Effects processor, there is a way to get it to do so. This is useful when you want to record the K2500 digitally, and want to use the internal Effects.

Here's how: From Program Mode (or Setup or Master), go to the Sample page by pressing the **Sample** soft button. Set the Input to "Analog", and set the desired Sample Rate—29.4, 32, 44.1, or 48 kHz. Then adjust the Gain control. In this context, the Gain control sets the level of the signal going to the AES/EBU output. Normally there is lots of headroom going through this stage, so you want to set this control fairly high—14 or 21 dB—to maximize the signal going to the AES/EBU outputs.

Now set Input to "Digital". The Gain and Rate parameters disappear, but don't worry. At the upper right, set the Source ("Src") to Internal ("Int"), to route the K2500's own Mix output into the Sampler, and set the Output ("Out") to "A/D". You have now set up a signal path where the K2500's Mix output is going back into the Sampler, is converted to analog, passed through the internal Effects processor, converted back to digital, and out the AES/EBU output.

Appendix A

KDFX Objects

KDFX Algorithms

Number	Algorithm Name	Number	Algorithm Name
REVERB		CHORUS/FLANGE/PHASER	
1	MiniVerb	150	Chorus 1
2	Dual MiniVerb	151	Chorus 2
3	Gated MiniVerb	152	Dual Chorus 1
4	Classic Place	153	Dual Chorus 2
5	Classic Verb	154	Flanger 1
6	TQ Place	155	Flanger 2
7	TQ Verb	156	LFO Phaser
8	Diffuse Place	157	LFO Phaser Twin
9	Diffuse Verb	158	Manual Phaser
10	OmniPlace	159	Vibrato Phaser
11	OmniVerb	160	SingleLFO Phaser
12	Panaural Room	COMBINATION	
13	Stereo Hall	700	Chorus+Delay
14	Grand Plate	701	Chorus+4Tap
15	Finite Verb	702	Chorus<>4Tap
DELAY		703	Chor+Dly+Reverb
130	Complex Echo	704	Chorus<>Reverb
131	4-Tap Delay	705	Chorus<>LasrDly
132	4-Tap Delay BPM	706	Flange+Delay
133	8-Tap Delay	707	Flange+4Tap
134	8-Tap Delay BPM	708	Flange<>4Tap
135	Spectral 4-Tap	709	Flan+Dly+Reverb
136	Spectral 6-Tap	710	Flange<>Reverb

KDFX Objects

KDFX Algorithms

Number	Algorithm Name	Number	Algorithm Name
711	Flange<>LasrDly	SPECIAL FX	
712	Flange<>Pitcher	900	Env Follow Filt
713	Flange<>Shaper	901	TrigEnvelopeFilt
714	Quantize+Flange	902	LFO Sweep Filter
715	Dual MovDelay	903	Resonant Filter
716	Quad MovDelay	904	Dual Res Filter
717	LasrDly<>Reverb	905	EQ Morpher
718	Shaper<>Reverb	906	Mono EQ Morpher
719	Reverb<>Compress	907	Ring Modulator
720	MonoPitcher+Chor	908	Pitcher
721	MonoPitcher+Flan	909	Super Shaper
722	Pitcher+Chor+Dly	910	3 Band Shaper
723	Pitcher+Flan+Dly	911	Mono LaserVerb
DISTORTION		912	LaserVerb Lite
724	Mono Distortion	913	LaserVerb
725	MonoDistort+Cab	STUDIO/MIXDOWN FX	
726	MonoDistort + EQ	950	HardKneeCompress
727	PolyDistort + EQ	951	SoftKneeCompress
728	StereoDistort+EQ	952	Expander
729	TubeAmp<>MD>Chor	953	Compress w/SC EQ
730	TubeAmp<>MD>Flan	954	Compress/Expand
731	PolyAmp<>MD>Chor	955	Comp/Exp + EQ
732	PolyAmp<>MD>Flan	956	Compress 3 Band
TONE WHEEL ORGAN		957	Gate
733	VibChor+Rotor 2	958	Super Gate
734	Distort + Rotary	959	2 Band Enhancer
735	KB3 FXBus	960	3 Band Enhancer
736	KB3 AuxFX	961	Tremolo
737	VibChor+Rotor 4	962	Tremolo BPM
		963	AutoPanner

Number	Algorithm Name	Number	Algorithm Name
964	Dual AutoPanner		
965	SRS	TOOLS	
966	Stereo Image	998	FXMod Diagnostic
967	Mono -> Stereo	999	Stereo Analyze
968	Graphic EQ		
969	Dual Graphic EQ		
970	5 Band EQ		

KDFX Presets

Number	Preset Name	Algorithm
1	NiceLittleBooth	alg 1
2	Small Wood Booth	alg 4
3	Natural Room	alg 5
4	PrettySmallPlace	alg 4
5	Sun Room	alg 5
6	Soundboard	alg 7
7	Add More Air	alg 10
8	Standard Booth	alg 8
9	A Distance Away	alg 6
10	Live Place	alg 8
15	BrightSmallRoom	alg 1
16	Bassy Room	alg 1
17	Percussive Room	alg 1
18	SmallStudioRoom	alg 4
19	ClassRoom	alg 5
20	Utility Room	alg 5
21	Thick Room	alg 5
22	The Real Room	alg 5
23	Sizzly Drum Room	alg 5
24	Real Big Room	alg 5
25	The Comfy Club	alg 9
26	Spitty Drum Room	alg 7
27	Stall One	alg 7
28	Green Room	alg 7
29	Tabla Room	alg 12
30	Large Room	alg 7
31	Platey Room	alg 14
40	SmallDrumChamber	alg 1

Number	Preset Name	Algorithm
41	Brass Chamber	alg 1
42	Sax Chamber	alg 1
43	Plebe Chamber	alg 1
44	In The Studio	alg 4
45	My Garage	alg 4
46	School Stairwell	alg 4
47	JudgeJudyChamber	alg 7
48	Bloom Chamber	alg 7
55	Grandiose Hall	alg 1
56	Elegant Hall	alg 1
57	Bright Hall	alg 1
58	Ballroom	alg 1
59	Spacious Hall	alg 5
60	Classic Chapel	alg 5
61	Semisweet Hall	alg 5
62	Pipes Hall	alg 704
63	Reflective Hall	alg 5
64	Smooth Hall	alg 5
65	Splendid Palace	alg 5
66	Pad Space	alg 11
67	Bob'sDiffuseHall	alg 9
68	Abbey Piano Hall	alg 7
69	Short Hall	alg 13
70	The Long Haul	alg 7
71	Predelay Hall	alg 9
72	Sweeter Hall	alg 7
73	The Piano Hall	alg 7
74	Bloom Hall	alg 9
75	Recital Hall	alg 12
76	Generic Hall	alg 12

Number	Preset Name	Algorithm
77	Burst Space	alg 9
78	Real Dense Hall	alg 7
79	Concert Hall	alg 9
80	Standing Ovation	alg 11
81	Flinty Hall	alg 7
82	HighSchool Gym	alg 7
83	My Dreamy 481!!	alg 9
84	Deep Hall	alg 9
85	Immense Mosque	alg 7
86	Dreamverb	alg 10
87	Huge Batcave	alg 12
95	Classic Plate	alg 5
96	Weighty Platey	alg 5
97	Medm Warm Plate	alg 7
98	Bloom Plate	alg 9
99	Clean Plate	alg 9
100	Plate Mail	alg 11
101	RealSmoothPlate	alg 9
102	Huge Tight Plate	alg 9
103	BigPredelayPlate	alg 7
110	L:SmlRm R:LrgRm	alg 2
111	L:SmlRm R:Hall	alg 2
112	Gated Reverb	alg 3
113	Gate Plate	alg 3
114	Exponent Booth	alg 10
115	Drum Latch1	alg 10
116	Drum Latch2	alg 10
117	Diffuse Gate	alg 9
118	Acid Trip Room	alg 10
119	Furbelows	alg 9

Number	Preset Name	Algorithm
120	Festoons	alg 9
121	Reverse Reverb	alg 15
130	Guitar Echo	alg 130
131	Stereo Echoes1	alg 130
132	Stereo Echoes2	alg 130
133	4-Tap Delay	alg 132
134	OffbeatFlamDelay	alg 132
135	8-Tap Delay	alg 134
136	Spectral 4-Tap	alg 135
137	Astral Taps	alg 135
138	SpectraShapeTaps	alg 136
150	Basic Chorus	alg 152
151	Chorus Comeback	alg 152
152	Chorusier	alg 152
153	Ordinary Chorus	alg 152
154	SlowSpinChorus	alg 152
155	Chorus Morris	alg 152
156	Everyday Chorus	alg 152
157	Thick Chorus	alg 153
158	Soft Chorus	alg 153
159	Rock Chorus	alg 153
160	Sm Stereo Chorus	alg 150
161	Lg Stereo Chorus	alg 151
170	Big Slow Flange	alg 154
171	Wetlip Flange	alg 154
172	Sweet Flange	alg 154
173	Throaty Flange	alg 154
174	Delirium Tremens	alg 154
175	Flanger Double	alg 154
176	Squeeze Flange	alg 154

Number	Preset Name	Algorithm
177	Simply Flange	alg 155
178	Analog Flanger	alg 155
190	Circles	alg 156
191	Slow Deep Phaser	alg 157
192	Manual Phaser	alg 158
193	Vibrato Phaser	alg 159
194	ThunderPhaser	alg 159
195	Saucepan Phaser	alg 160
199	No Effect	alg 0
700	Chorus Delay	alg 700
701	Chorus PanDelay	alg 700
702	Doubler & Echo	alg 700
703	Chorus VryLngDly	alg 700
704	FastChorusDouble	alg 700
705	BasicChorusDelay	alg 700
706	MultiTap Chorus	alg 701
707	ThickChorus no4T	alg 701
708	Chorused Taps	alg 702
709	Chorus Slapbacks	alg 705
710	MultiEchoChorus	alg 705
711	ChorusDelayHall	alg 703
712	ChorDlyRvb Lead	alg 703
713	ChorDlyRvb Lead2	alg 703
714	Fluid ChorDlyRvb	alg 703
715	ChorLite DlyHall	alg 703
716	ChorusSmallRoom	alg 703
717	DeepChorDlyHall	alg 703
718	Chorus PercHall	alg 703
719	Chorus Booth	alg 703
720	ClassicEP ChorRm	alg 703

Number	Preset Name	Algorithm
721	ChorusMedChamber	alg 704
722	Vanilla ChorRvb	alg 704
723	Chorus Slow Hall	alg 704
724	SoftChorus Hall	alg 704
725	ChorBigBrnPlate	alg 704
726	Chorus Air	alg 704
727	Chorus HiCeiling	alg 704
728	Chorus MiniHall	alg 704
729	CathedralChorus	alg 704
730	PsiloChorusHall	alg 704
731	GuitarChorLsrDly	alg 705
732	Flange + Delay	alg 706
733	ThroatyFlangeDly	alg 706
734	Flange + 4Tap	alg 707
735	Bap ba-da-dap	alg 707
736	Slapback Flange	alg 706
737	Quantize+Flange	alg 714
738	FlangeDelayHall	alg 709
739	FlangeDelayRoom	alg 709
740	SloFlangeDlyRoom	alg 709
741	FlangeDlyBigHall	alg 709
742	Flange Theatre	alg 710
743	FlangeVerb Clav	alg 710
744	FlangeVerb Gtr	alg 710
745	Flange Hall	alg 710
746	Flange Booth	alg 710
747	Flange->LaserDly	alg 711
748	FlangeTap Synth	alg 708
749	Lazertag Flange	alg 711
750	Flange->Pitcher	alg 712

Number	Preset Name	Algorithm
751	Flange->Shaper	alg 713
752	Shaper->Flange	alg 713
753	Warped Echoes	alg 715
754	L:Flange R:Delay	alg 715
755	StereoFlamDelay	alg 715
756	2Dlys Ch Fl Mono	alg 716
757	LaserDelay->Rvb	alg 717
758	Shaper->Reverb	alg 718
759	MnPitcher+Chorus	alg 720
760	MnPitcher+Flange	alg 721
761	Pitcher+Chor+Dly	alg 722
762	Pitcher+Fling+Dly	alg 723
763	SubtleDistortion	alg 724
764	Synth Distortion	alg 727
765	Dist Cab EPiano	alg 725
766	Distortion+EQ	alg 726
767	Burnt Transistor	alg 728
768	TubeAmp DlyChor	alg 729
769	TubeAmp DlyChor2	alg 729
770	TubeAmp DlyFlinge	alg 730
771	TubeAmp Flange	alg 730
772	PolyAmp Chorus	alg 731
773	PolyAmp DlyFlinge	alg 732
774	VibrChor Rotors	alg 733
775	SlightDistRotors	alg 734
776	Rotostort	alg 734
777	VibrChor Rotors2	alg 733
778	Full VbCh Rotors	alg 737
779	KB3 FXBus	alg 735
780	KB3 AuxFX	alg 736

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900	Basic Env Filter	alg 900
901	Phunk Env Filter	alg 900
902	Synth Env Filter	alg 900
903	Bass Env Filter	alg 900
904	EPno Env Filter	alg 900
905	Trig Env Filter	alg 901
906	LFO Sweep Filter	alg 902
907	DoubleRiseFilter	alg 902
908	Circle Bandsweep	alg 902
909	Resonant Filter	alg 903
910	Dual Res Filter	alg 904
911	EQ Morpher	alg 905
912	Mono EQ Morpher	alg 906
913	Ring Modulator	alg 907
914	PitcherA	alg 908
915	PitcherB	alg 908
916	SuperShaper	alg 909
917	SubtleDrumShape	alg 910
918	3 Band Shaper	alg 910
919	LaserVerb	alg 913
920	Laserwaves	alg 913
921	Crystallizer	alg 913
922	Spry Young Boy	alg 912
923	Cheap LaserVerb	alg 912
924	Drum Neurezonate	alg 911
925	LazerfazerEchoes	alg 911
950	HKCompressor 3:1	alg 950
951	DrumKompress 5:1	alg 950
952	SK FB Compr 6:1	alg 951
953	SKCompressor 9:1	alg 951

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954	SKCompressr 12:1	alg 951
955	Compress w/SC EQ	alg 953
956	Compress/Expand	alg 954
957	Compr/Expnd +EQ	alg 955
958	Reverb>Compress	alg 719
959	Reverb>Compress2	alg 719
960	Drum Compr>Rvb	alg 719
961	Expander	alg 952
962	3Band Compressor	alg 956
963	Simple Gate	alg 957
964	Gate w/ SC EQ	alg 958
965	Graphic EQ	alg 968
966	5 Band EQ	alg 970
967	ContourGraphicEQ	alg 969
968	Dance GraphicEQ	alg 969
969	OldPianoEnhancer	alg 959
970	3 Band Enhancer	alg 960
971	3 Band Enhancer2	alg 960
972	Extreem Enhancer	alg 960
973	Tremolo	alg 962
974	Dual Panner	alg 964
975	SRS	alg 965
976	Widespread	alg 966
977	Mono->Stereo	alg 967
998	Stereo Analyze	alg 999
999	FX Mod Diag	alg 998

KDFX Studios

Number	Name	Bus1 FX Preset	Bus2 FX Preset	Bus3 FX Preset	Bus4 FX Preset	Aux Bus FX Preset
1	RoomChorDly Hall	16	156	714	0	78
2	RmChorChRv Hall	17	154	722	0	69
3	RoomChorCDR Hall	16	156	714	0	76
4	RoomChor Hall	23	157	0	0	78
5	RoomChrCh4T Hall	22	156	706	0	72
6	RoomFingCDR Hall	42	170	711	0	75
7	RoomFlgEcho Hall	21	176	131	0	85
8	RmFingStlmg Garg	19	172	976	0	45
9	RmFlgChDly Room	20	172	151	0	24
10	ChmbFlgGtRv Hall	42	170	112	0	75
11	RoomFingCDR Hall	16	172	718	0	87
12	RoomFingLsr Echo	22	172	925	0	119
13	RmFlgFXFing Flng	23	174	173	0	171
14	SpaceFing Hall	58	170	0	0	30
15	ChmbFingCDR Verb	42	170	711	0	83
16	RoomPhsrCDR Hall	16	190	712	0	76
17	RmPhsrQuFlg Hall	19	190	737	0	76
18	RoomPhsr Space	25	191	0	0	114
19	RmEQmphEcho Comp	17	912	131	0	954
20	RmEQmphEcho Hall	17	912	131	0	65
21	RmEQmph4Tp Space	17	912	133	0	5
22	RmEQmph4Tap Hall	17	912	133	0	65
23	RmSweepEcho Hall	15	906	130	0	69
24	RoomResEcho Hall	3	909	131	0	71
25	RmRotoFl4T CmpRv	15	777	734	0	959
26	RoomSrsCDR Hall	16	975	712	0	75
27	RoomSRSRoom Room	17	975	15	0	29
28	RoomSRSchDI Hall	22	975	700	0	78
29	RoomSrsCDR CDR	16	975	712	0	711
30	RmStlmgChDI Hall	22	976	700	0	73
31	RoomSRSRoom Chmb	17	975	15	0	47
32	RoomSRSRoom Hall	17	975	15	0	78

KDFX Objects

KDFX Studios

Number	Name	Bus1 FX Preset	Bus2 FX Preset	Bus3 FX Preset	Bus4 FX Preset	Aux Bus FX Preset
33	ChmbCompCDR Hall	42	953	711	0	75
34	RoomCmpChor Hall	15	951	152	0	78
35	RoomComp Hall	27	951	0	0	79
36	RoomComp Hall	7	953	0	0	67
37	BthComp SRS Hall	2	952	0	975	63
38	RoomCmpCh4T Hall	23	951	706	0	78
39	RmDsRotFI4t RvCm	15	776	734	0	959
40	RoomRmHall Hall	22	17	55	0	100
41	Room Room SRS2	22	0	44	0	975
42	RoomRmHall Hall	22	17	55	0	78
43	Room Room Hall	22	0	44	0	75
44	Room Hall Hall	23	0	61	0	78
45	Room Room Hall2	22	0	23	0	79
46	Room Room Hall2	22	44	0	0	85
47	Room Room Hall2	22	0	44	0	85
48	Room Hall Hall2	22	0	62	0	85
49	Sndbrd Room Hall	6	0	15	0	68
50	Sndbrd Rm Hall2	6	0	15	0	73
51	Room Room Hall3	22	0	15	0	68
52	auxChrMDly Room	0	158	753	0	30
53	auxFIngChRv Room	0	170	723	0	28
54	auxShp4MDly Hall	0	917	756	0	63
55	auxDistLasr Room	0	763	920	0	29
56	auxEnhSp4T Class	0	970	136	0	19
57	auxDistLasr Acid	0	767	924	0	118
58	EnhcManPhs Room	970	192	0	0	27
59	EnhrFlg8Tap Room	969	170	135	0	15
60	EnhcCmpFIng Room	969	950	177	0	24
61	CompEQmphCh Room	952	912	153	0	4
62	BthQFlg4Tap Hall	2	737	133	0	76
63	ChmbTremCDR Room	42	973	715	0	29
64	ChmbCmpFIRv Hall	41	952	744	0	69
65	ChamDstEcho Room	41	764	131	0	28
66	ChamFlg4Tap Hall	41	173	136	0	75
67	ChmbEnv4Tap GtRv	42	903	134	0	112

Number	Name	Bus1 FX Preset	Bus2 FX Preset	Bus3 FX Preset	Bus4 FX Preset	Aux Bus FX Preset
68	CmbrShapLsr Hall	42	916	922	0	69
69	auxPtchDst+ Chmb	0	914	772	0	48
70	auxChorFIRv Cmbr	0	150	742	0	42
71	auxChorFIRv Cmb2	0	155	742	0	42
72	auxChorFIRv Cmb3	0	150	745	0	42
73	auxChorFIRv Cmb4	0	150	742	0	18
74	HallFlgChDI Room	56	177	700	0	29
75	HallPtchLsr Hall	57	915	922	0	75
76	HallGateFI4T Bth	55	963	748	0	1
77	HallChorFDR Room	55	707	739	0	29
78	HallPtchPtFI Lsr	57	915	760	0	919
79	HallFing8Tp Room	56	176	135	0	29
80	HallChrEcho Room	55	158	132	0	31
81	HallChorCDR Hall	55	152	715	0	55
82	HallRsFltChDI Rm	46	909	700	0	18
83	Hall ChDly Hall	56	0	704	0	30
84	HallFlgChDI Hall	56	177	700	0	65
85	Hall Room SRS	75	0	17	0	975
86	Hall Room Room	78	0	15	0	22
87	Hall CmpRvb	67	0	0	0	958
88	Hall Fing Hall	63	177	0	0	86
89	HallRoomChr Hall	46	15	151	0	82
90	auxPhsrFDR Hall	0	193	741	0	75
91	auxChrDist+ Hall	0	150	768	0	75
92	auxFlgDist+ Hall	0	170	769	0	75
93	auxChrDst+ Hall	0	150	768	0	76
94	auxChorMDly Hall	0	159	755	0	76
95	auxChorSp6T Hall	0	152	138	0	75
96	auxChorChDI Hall	0	153	702	0	64
97	auxPhasStlm Hall	0	195	976	0	95
98	auxFingCDR Hall	0	172	713	0	65
99	auxPhsrFldblHall	0	193	175	0	75
100	auxSRSRoom Hall	0	975	25	0	78
101	auxFILsr SwHall	0	170	922	0	72
102	auxEnh4Tap Hall	0	972	133	0	79

KDFX Objects**KDFX Studios**

Number	Name	Bus1 FX Preset	Bus2 FX Preset	Bus3 FX Preset	Bus4 FX Preset	Aux Bus FX Preset
103	EnhcChorCDR Hall	969	152	716	0	56
104	EnhChorChDI Hall	970	156	703	0	61
105	EnhcChor Plate	971	152	0	0	98
106	CompFlgChor Hall	952	173	153	0	63
107	ChorChorFlg Hall	159	150	170	0	55
108	ChapelSRS Hall	60	975	0	0	79
109	ChapelSRS Hall2	60	975	0	0	85
110	Chapel Room Hall	60	0	23	0	78
111	PltEnvFI4T Room	43	903	735	0	25
112	PlatEnvFI4T Flt	43	903	735	0	907
113	PltEnvFI4T Plate	43	902	735	0	103
114	PltTEnvFlg Plate	43	905	170	0	31
115	PlateRngMd Hall	102	913	0	0	95
116	auxDist+Echo Plt	0	772	130	0	31
117	auxEnvSp4T Plate	0	904	136	0	31
118	auxShap4MD Plate	0	918	756	0	31
119	auxChorDist+ Plt	0	156	768	0	31
120	auxShFlgChDI Plt	0	752	710	0	103
121	auxMPFlgLasr Plt	0	760	923	0	103
122	auxShap4MD Plate	0	917	756	0	31
123	FlgEnv4Tap Plate	173	904	133	0	31
124	EnhrrFlgCDR Plate	969	170	712	0	96
125	auxRingPFD Plate	0	913	762	0	97
126	GtRvShapMDI Room	112	916	754	0	29
127	GtdEnhcStlm Room	112	969	976	0	17
128	Gtd2ChrEcho 2Vrb	112	151	130	0	110
129	GtdEnhcStlm Hall	112	969	976	0	72
130	auxEnvSp4T GtVrb	0	904	136	0	112
131	GtRbSwpFlt Lasr	112	908	0	0	924
132	GtRbSwpFlt FIDly	112	907	0	0	733
133	ChRvStlEcho Hall	724	976	130	0	75
134	ChorChorCDR Spac	151	152	715	0	58
135	ChDIDstEQ Hall	701	767	0	0	83
136	auxDPanCDR ChPlt	0	974	713	0	725
137	AuxChorFlng CDR	0	157	173	0	712

Number	Name	Bus1 FX Preset	Bus2 FX Preset	Bus3 FX Preset	Bus4 FX Preset	Aux Bus FX Preset
138	auxEnhcSp4T CDR	0	970	136	0	711
139	auxPtchDst+ ChRv	0	914	772	0	721
140	EnhcChorChDI PCD	970	156	703	0	761
141	auxPoly FDR	0	764	0	0	738
142	EnhcChorChDI FDR	970	156	703	0	740
143	EnhcChrChDI FDR2	970	156	705	0	740
144	auxRotoSp4T FIRv	0	777	136	0	743
145	auxRotaryFDR Plt	0	774	739	0	97
146	RotoOrgFX Hall	778	0	0	0	59
147	CmpRvbFIDI Hall	960	0	732	0	86
148	auxEnhSp4T CmpRv	0	971	136	0	958
149	auxPtchRoom RvCm	0	914	17	0	958
150	PhsrChorCDR Phsr	194	151	717	0	194
151	ChDISp4TFIDI Phs	151	137	732	0	192
152	auxFigDst+ ChLsD	0	170	769	0	709
153	auxFigDst+ ChLs2	0	170	771	0	709
154	RoomRoomSRS CmRv	4	15	0	975	960
155	RoomRoom Room	5	18	0	0	27
156	GtRvPlate Hall	113	96	0	0	82
157	RoomRoom SRS	17	26	0	0	975
158	EnhcSp4T Hall	970	136	0	0	61
159	Room RoomChr SRS	17	0	15	157	975
160	KB3 V/C ->Rotary	779	0	0	0	780
161	EQStlmg 5BndEQ	199	965	976	199	966
162	aux5BeqStlm Hall	199	966	976	199	78
198	Digitech Studio	0	0	0	0	0
199	Default Studio	0	0	0	0	0

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