EOS 4.6 Software Addendum

Congratulations on your purchase of EOS version 4.6. This software update adds some fabulous new features to your Ultra, especially if you have the E-MU RFX card installed.

New Features in EOS Software Version 4.6

- Ensoniq Import - Import ASR-10 and EPS sounds from CD or floppy

The following features are only available with the RFX card installed.

- External audio input to MIDI trigger conversion (note-on, note-off)
- Improved Multimode with RFX
  - You can now override all 4 voice sends at the MultiSetup
  - 4 new MIDI CC's for send levels in Multimode
  - You can now select an external input in Multimode
  - All MIDI continuous controllers (A-L) are now visible
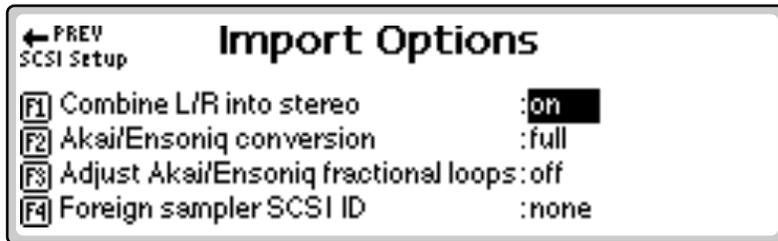- MIDI modulation of RFX parameters

Contents

Import Options

✎ *When browsing Roland disks, only Samples referenced by the selected Preset are displayed, unlike the Emulator where all Samples contained in the Bank are displayed.*

EOS can read Akai™ S1000, S1100, S3000 disks; Roland™ S-700 disks; and Ensoniq ASR-10, EPS CDs or floppies. Samples, partials, patches, performances and volumes are automatically mapped into the appropriate Emulator parameters.

There are a few differences between these samplers and the Emulator. For this reason, some program parameters may be ignored during the conversion process. In most cases however, the converted programs and samples should sound and behave very much like the originals.

```
← PREV          Import Options
SCSI Setup

F1  Combine L/R into stereo          :on
F2  Akai/Ensoniq conversion          :full
F3  Adjust Akai/Ensoniq fractional loops:off
F4  Foreign sampler SCSI ID          :none
```

👓 *Complete Roland Volumes cannot be loaded because they may contain multiple Multimap. Load "All Patches" instead.*

In the Roland disk structure, objects are allowed to exist outside of a containing parent object. For example in EOS, Samples are contained by Presets, which are contained by Banks and so on. In the Roland, samples can be saved by themselves outside a bank. To deal with this difference, a special browser item is added at the end of the Folder, Bank, Preset and Sample lists. These special objects are labeled "All" (as in All Patches) and contain all items of a particular type on the disk. This allows all objects on the disk to be browsed, including stray samples, presets or banks.

The following are descriptions of the EOS import options.

Combine L/R into Stereo: When this option is enabled, the Akai or Roland key groups are scanned for left/right samples that can be combined into a single stereo sample. If the first ten characters of the 12 character sample name match, and the last two characters are "-L" and "-R", as in Akai stereo samples, they will be combined into a single stereo sample (if the loop lengths match, otherwise the samples will be kept separate, as they are in the Akai.)

Roland Stereo Conversion - Program parameters for the new stereo sample are taken from the left sample. The right side parameters are ignored. When this function is disabled, each sample is placed in a separate voice.

Akai/Ensoniq Conversion: Allows you to select between a basic or full conversion.

- **Akai Basic** - Converts samples and key maps only. Use this option when you just want the samples converted and placed on the keyboard. (Without all the preset programming.)
- **Akai Full** - Assembles complete presets, simulating the originals as closely as possible.

- **Ensoniq Basic** - Loads only Ensoniq Patch 00
- **Ensoniq Full** - Loads all four Ensoniq Patches (00, 0X, X0, XX)

Adjust Akai/Ensoniq Fractional Loops: The Akai and Ensoniq samplers implement sample looping differently than the Emulator. Because of this difference, some loops may "tick" slightly or appear out of tune after being transferred from Akai or Ensoniq. This function automatically repairs any incorrect sample loops after being transferred. Be advised that the transfer may take slightly longer (up to 15% more time) with Adjust Fractional Loops turned enabled.

Foreign Sampler SCSI ID: If you have a brand of sampler other than the Akai or Roland connected to the SCSI bus, EOS needs to know its SCSI ID in order to avoid SCSI conflicts. The Foreign SCSI ID should be entered before physically connecting the sampler onto the SCSI chain. You do NOT have to set this parameter for Akai or Roland formatted storage devices. EOS recognizes them automatically.

☞ **To Set the Import Options:**

1. Press the **Master** button. The LED illuminates and the Memory Statistics screen appears.
2. Press the **Setup** function key. A second row of function keys appears.
3. Press the **Import** function key. The Import Options menu appears.
4. Move the **cursor** to the desired option using the cursor buttons and change the parameter using the Data Entry Control or the INC/DEC buttons.
5. Press the **Exit** button twice to return to the Memory Statistics screen.

Limitations for Roland Imports
- Supports 512 byte/sector devices only.
- Translates tuning, key map, velocity switching and positional crossfade only. No envelopes, modulation filter settings cords, etc.
- Imports only one forward loop.

Notes & Limitations for Ensoniq Imports
- Imported Wavesamples become EOS Voices.

- Ensoniq Wavesamples can contain different loop data but use the same wave data. Since EOS does not support this type of architecture, it duplicates Ensoniq samples which have different loop points but the same sample data. This uses more memory on EOS, but preserves the loop data.

- When EOS imports Ensoniq Wavesamples with backwards, or forward-backward loops, it manipulates the sample data to create new samples with backwards, or forward-backward loops built in to the sample.

- Ensoniq's filter structure is different than the Z-Plane filters on EOS. When importing, EOS automatically chooses a filter type which is most similar to the Ensoniq filter mode.

- EOS supports the following types of Ensoniq drives: 800K, 1600K, and DOS (computer) 1.4 MB.

E-MU/Ensoniq File Names

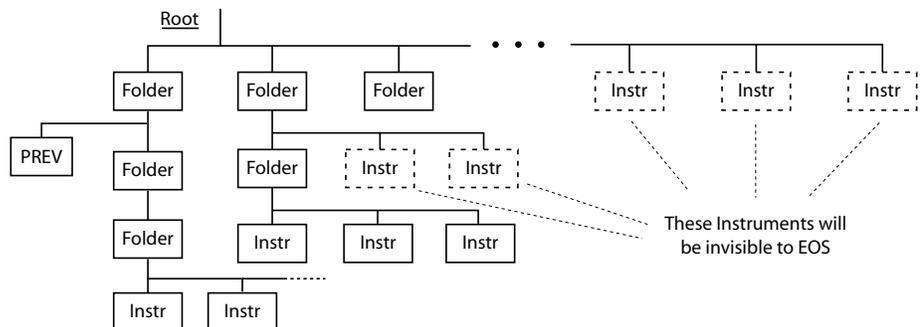| EOS	Ensoniq
Folder	Directory
Bank	Directory
Preset	Instrument
Sample	Wavesample

When browsing Ensoniq disks, only Samples referenced by the selected Preset are displayed, unlike the Emulator where all Samples contained in the Bank are displayed.

• Ensoniq Banks, Songs, Sequences & Effects cannot be loaded into EOS.

Special Note about Ensoniq directories:

The Ensoniq user interface allows the user to create directories which contain both Subdirectories and Instruments at the same directory level. When browsing a disk with EOS on this type of "mixed" directory, the Instruments will be ignored (invisible). It is therefore imperative that the good housekeeping procedures be followed on Ensoniq disks that will be read by EOS. Folders within folders on Ensoniq disks can be backtracked by selecting the "PREV" icon.

New Multimode Screen

Current Multisetup

Submix Select

```
Multi: M000 Arrival              volume pan  submix pitch  mod
Ch 1  P003 Strang Thang          127   +0   mixer 0     0
Ch 2  P005 Organ                 127   +0   Bus1  0     0
Ch 3  P007 Talking               100   -27  voice 0     0
Ch 4  2049 Audio Thru            127   +0   mixer 0     0
      Seq   MSetup   View   Load...  Save...  Mode...
```

Multisetup Manage/Edit
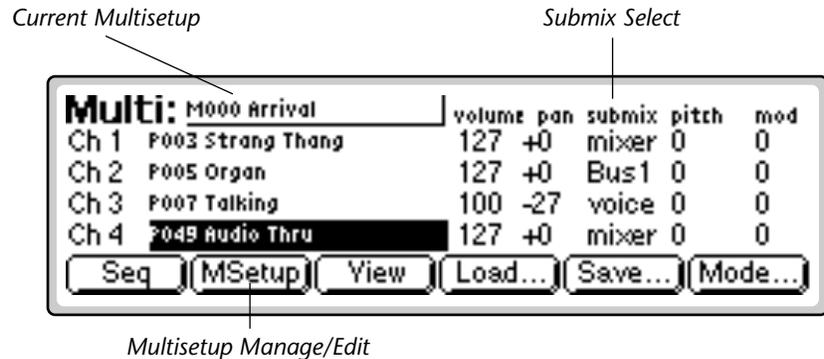
The Multimode screens have been significantly enhanced in a number of ways. A powerful mixer mode now allows you to program four RFX bus sends per MIDI channel without modifying the preset.

Furthermore, the level of each bus send can be individually controlled using a MIDI continuous controller. The four MIDI controllers for the RFX Mixer are specified globally, but MIDI controllers are channelized. Therefore with 4 faders and 32 MIDI channels, you have (4 x 32 =) 128 fader channels. This powerful addition allows your Emulator to function as a multi-bus, automated digital mixer.

Another new feature is the ability to set initial values for the 12 global MIDI continuous controllers (A-L). This screen also doubles as a MIDI monitor since incoming controller changes are displayed in realtime.

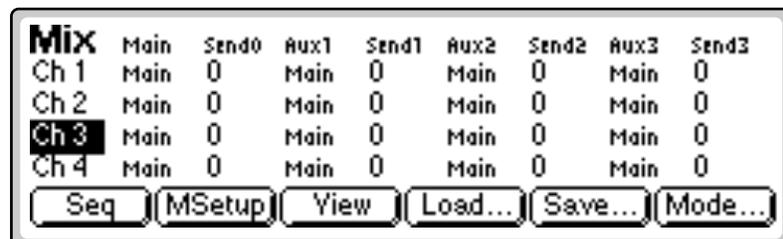☞ **To access the Multimode screen:**

1. From single preset mode (Whole mode), press the **Mode** button.

2. Press the **Multi** button. The Multimode screen shown above appears.

☞ **To access the RFX Mixer screen:**

You must have the RFX card installed to view the RFX mixer display.

1. From the Multimode screen shown above, set one or more Submix sends to "mixer".

2. Press the **Next** page key. The following screen appears.

```
Mix   Main  Send0  Aux1  Send1  Aux2  Send2  Aux3  Send3
Ch 1  Main  0      Main  0      Main  0      Main  0
Ch 2  Main  0      Main  0      Main  0      Main  0
Ch 3  Main  0      Main  0      Main  0      Main  0
Ch 4  Main  0      Main  0      Main  0      Main  0
      Seq   MSetup   View   Load...  Save...  Mode...
```

A general description of the RFX-32 system can be found starting on page 19. Complete instructions for using RFX are found in the RFX-32 Operation Manual.

3. Press the **Next** page key again. The following screen appears.

The channel number of incoming MIDI Data is shown in the upper right corner of the display.

```
MIDI  A   B   C   D   E   F   G   H   I   J   K   L
Ch 1  7   0   16  85  0   0   0   0   0   0   0   0
Ch 2  0   0   0   0   0   0   0   0   0   0   0   0
Ch 3  0   0   0   0   0   0   0   0   0   0   0   0
Ch 4  0   0   0   0   0   0   0   0   0   0   0   0
   [  Seq  ][MSetup][  View  ][ Load...][ Save...][Mode...]
```

This screen shows the current MIDI continuous controller (CC) values for controllers A-L. These values can be programmed here using the cursor keys and data entry control. Incoming MIDI controller data will update these values. The global MIDI CC numbers for A-L are set in the Master menu (Master, MIDI, Cntrls2).

Multisetups

A Multisetup is a group of parameters that you might associate with a particular sequence or song. It's like a "snapshot" of the current MIDI channel configuration along with a few other key parameters. There are 100 RAM locations and 100 Flash locations for Multisetups.

A Multisetup includes ALL the following parameters:

- Preset/External Input/Volume/Pan/Submix, *plus* initial Pitch/Mod/ initial MIDI A-L values for each of the 32 MIDI channels.
- Multisetup Name
- Current Sequence pointer
- Master Tempo
- RFX Setup pointer

☞ **To Select & Edit a Multisetup:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)
2. Press the **Multi** function key. The Multimode screen appears.
3. Set the Multimap parameters the way you want them for all 32 MIDI channels.
4. Press the **MSetup** function key. The display asks, "Write edited multimap to…".
5. Press **OK** to overwrite the selected MultiSetup or **Discard** to go into Multisetup without saving the Multimap parameters.
6. **Select the desired Multisetup** using the numeric keypad, data entry control, inc/dec buttons, or the left/right cursor keys.
7. Press the **Multi** function key to edit the Multisetup. Press **MSetup** to return to the main Multisetup screen.

It's a good idea to Write your MultiSetup before saving the bank..

> **M** (upper case) indicates a **RAM** location.
> **m** (lower case) indicates a **Flash** location.

Utilities

Erase Multisetup
This function allows you to erase the currently selected Multisetup from RAM or Flash.
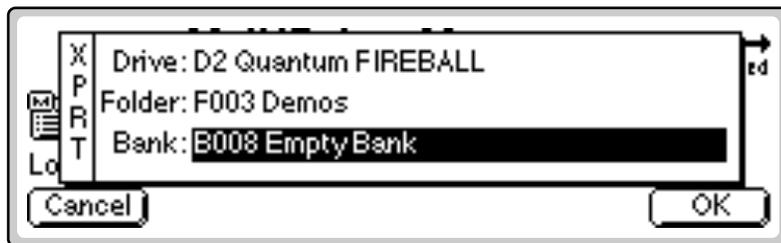

☞ **To Erase a Multisetup:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. **Select the Multisetup** you wish to erase using the numeric keypad, data entry control, inc/dec buttons, or the left/right cursor keys.

5. Press the **Utils** function key. Another row of function keys appears.

6. Press the **Erase…** function key. A pop-up dialog box appears asking you if you want to erase the current Multisetup from the bank.

7. Press **OK** to erase the Multi or **Cancel** to cancel the operation.

Export Multisetup

✎ *After exporting a Multisetup, it can be Loaded or Merged with another bank.*

This function allows you to export a Multisetup as a bank.

☞ **To Export a Multisetup:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. **Select the Multisetup** you wish to export using the data entry control, inc/dec buttons, or the left/right cursor keys.

5. Press the **Export…** function key. A pop-up dialog box appears asking you to select the destination for the Multi.

6. **Select the destination drive**, **folder** and **bank** using the cursor keys and data entry control. You cannot write into an existing bank without erasing it. Usually you will choose an empty bank.

7. Press **OK** to export the Multisetup or **Cancel** to cancel the operation.

Get Info
This function displays the size of the Multisetup in bytes and shows its location (RAM or Flash).

☞ **To Get Information about a Multisetup:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. **Select the desired Multisetup** using the data entry control, inc/dec buttons, or the left/right cursor keys.

5. Press the **Info…** function key. A pop-up window (shown above) appears with information about the Multi.

6. Press **OK** to return to the Multisetup Manage screen.

Name Multisetup

This function allows you to name or rename the current Multisetup.

☞ To Name the Current Multisetup:

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. **Select the Multisetup** you wish to erase using the numeric keypad, data entry control, inc/dec buttons, or the left/right cursor keys.

5. Press the **Name…** function key. A pop up dialog box appears asking you to enter the new Multisetup name.

6. **Name the Multisetup.** Select letters using the numeric keypad, data entry control, inc/dec keys and cursor keys, or using an ASCII keyboard.

7. Press **OK** to confirm the new name or **Cancel** to cancel the operation.

New Multisetup

This function creates a new Multisetup location. There are 100 RAM locations and 100 Flash locations for Multisetups.

☞ To Create a New Multisetup:

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. Press the **New…** function key. A pop-up dialog box appears asking you to select the destination for the Multisetup. (RAM: M000-M099; Flash: m100-m199)

5. **Select the destination** using the data entry control or inc/dec buttons. Another pop-up dialog box appears asking you to enter the name of the new Multi.

6. **Name the Multisetup.** Select letters using the numeric keypad, data entry control, inc/dec keys and cursor keys, or using an ASCII keyboard.

7. Press **OK** to create a new Multisetup or **Cancel** to cancel the operation.

Copy Multisetup

Multisetups can be copied to other RAM or Flash locations. M000-M099 are RAM locations; m100-m199 are Flash locations.

☞ **To Copy the Current Multisetup:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. **Select the Multisetup** you wish to copy using the data entry control, inc/dec buttons, or the left/right cursor keys.

5. Press the **Copy…** function key. A pop-up dialog box appears asking you to select the destination for the Multi. (RAM: M000-M099; Flash: m100-m199)

6. Select the destination using the data entry control or inc/dec buttons.

7. Press **OK** to copy the Multisetup or **Cancel** to cancel the operation.

Multisetup Edit

This submenu contains three miscellaneous parameters which are also saved with the Multisetup.

Sequence Select

This function selects a current sequence for the Multisetup. The current sequence will begin playing upon reception of a MIDI Song Start command or if the Sequencer Play button is pressed. Any sequence number can be selected (RAM: s000-s049; Flash: z050-z099), or the Current Sequence can be used "Use Current Sequence".
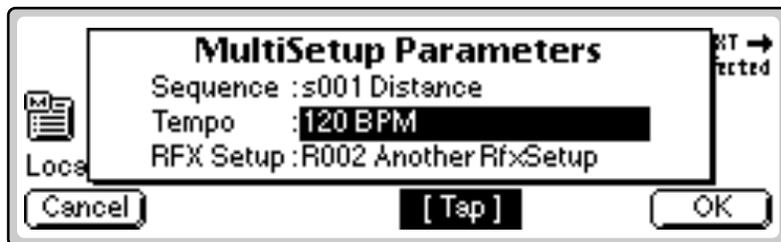

☞ **To Select a Multisetup Sequence:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. Press the **Edit…** function key. A pop-up window (shown above) appears allowing you to select the Multisetup Sequence.

5. **Select the desired Multisetup Sequence** using the numeric keypad, inc/dec keys or data entry control.

6. Press **OK** to confirm your choice or **Cancel** to cancel the operation.

Sequence Tempo

This function sets a new Master Tempo when the Multisetup is selected. The Master Tempo is used for the sequencer, arpeggiator, and clock divisors. If you don't want the Multisetup to change the current Master Tempo, set this field to, "Use Current Tempo".

☞ **To Set the Multisetup Tempo:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. Press the **Edit…** function key. A pop-up window (shown above) appears allowing you to set the Multisetup Tempo.

✎ *You can also enter the Tempo using the Tap button.*

5. **Set the desired Multisetup Tempo** (or select "Use Current Tempo") using the numeric keypad, inc/dec keys or data entry control.

6. Press **OK** to confirm your choice or **Cancel** to cancel the operation.

RFX Setup Select

🕶 *You must have the RFX card installed to select an RFX setup.*

This function selects the RFX Setup for the Multisetup. If you don't want the Multisetup to change the current RFX Setup, set this field to, "Use Master Effects Setup".

The Master Effects Setup (Master, FX, Setup) contains a parameter called "Multimode Effects Control". Multimode Effects Control can be set either to "master settings" in which case the Master *TwoFX Mode* is used, or to "preset on MIDI channel 1-16", in which case the RFX Setup located in Preset Globals is used. This allows the preset on a specific MIDI channel to control the RFX Setup. A preset change command on the specified MIDI channel can thus change the RFX Setup.

☞ **To Set the Multisetup RFX Setup:**

1. From the Main Screen (in Omni or Poly modes), press **Mode**. (If the Emulator is already in Multimode, go to step 3.)

2. Press the **Multi** function key. The Multimode screen appears.

3. Press the **MSetup** function key. The Multisetup Manage screen appears.

4. Press the **Edit…** function key. A pop-up window (shown above) appears asking you to set the Multisetup RFX Setup.

5. **Set the desired RFX Setup** (or select "Use Master Effects Setup") using the numeric keypad, inc/dec keys or data entry control.

6. Press **OK** to confirm your choice or **Cancel** to cancel the operation.

7. Remember to **save the bank** if you want to keep your settings.

Processing External Inputs
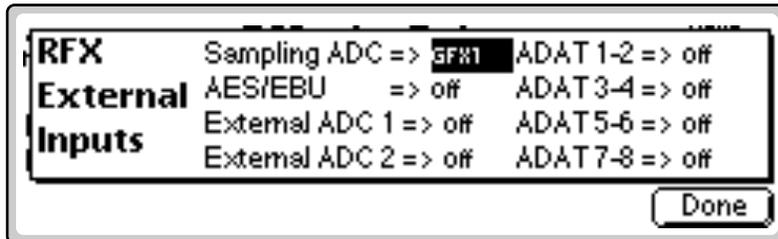
One of the coolest features of the RFX-32 is it's ability to process external signals. You can use the RFX-32 just as you would use an external effects unit, or external inputs can be treated as if they were samples, processed through the Emulator's voice architecture and Z-plane filters before being passed through the RFX system.

Signals can be input to the Emulator via the analog sampling ADC jacks, the AES/EBU port, the optional 24-bit analog input jacks, or the optional ADAT interface.

All digital inputs must be word-clock synced to E4. The E4 can sync to inputs, but all digital signals must share same clock rate. As long as AES and ADAT are synced, E4 can use either ADAT or AES as its word clock source.

☞ **To Bind an External Input onto a specific RFX Bus:**

Use these instructions if you want an external input ALWAYS routed through a specific RFX Bus regardless of the RFX Setup that is selected. This mode lets you use the RFX like an external effects processor. Selecting RFX Setups via the RFX Setup menu or by selecting Presets will change the effects and effect routings.

Once an External Input is assigned in this menu, you CANNOT use the same External Input for Live Samples.

1. Press the **Master** key. The LED illuminates and the main master screen appears.
2. Press the FX function key. Another row of function keys appears.
3. Press the **Setup** function key. The Effects Setup screen appears.
4. Press the **Ext In** function key. The screen shown above appears.
5. Select the RFX Bus for any of the external inputs. If you don't have any of the RFX option cards, you can input signals through the Sampling ADC or the AES/EBU port.
6. The External Inputs you assigned will now be routed into the selected RFX busses.

☞ **To Connect External Inputs by MIDI Channel in Multimode**:

See "Connecting External Inputs to the Vocoder" on page 50.

Live Samples™

This is one of the coolest features ever. The external inputs can be assigned and processed just as if they were samples in the Emulator. Remember that each voice can have 4 programmable effect sends and the levels of these four sends can be modulated by any modulation source. The external inputs are routed through Ultra's Z-plane filters and VCAs before being passed on to the RFX system. Remember that this is for each voice!
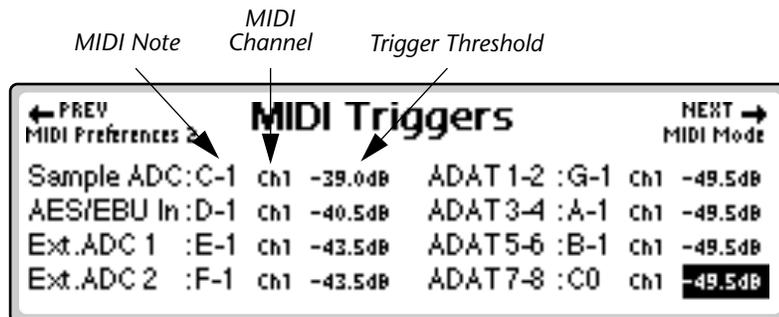
With a different voice assigned to each key on the keyboard, you can "play" the Live Samples through different synth voices and RFX routings. An external input behaves like a voice in Solo mode—the last key pressed determines which voice is used. You can also velocity crossfade or switch between several external inputs using the Voice Key, Velocity and Realtime windows.

Each External Input is assigned to one "hidden" voice. Only one key at a time can trigger an External Input.

```
Voices-Main            volume pan  ctune ftune xpose orig
V1   G1  Sampling ADC        +0   +0    +0    +0    B3


   [ Utils▲ ][ SZone▲ ] [ Global    Links    Yoices ][EditSmpl]
```

☞ **To Program the External Inputs in a Voice:**

1. Press the **Preset Edit** key. The LED illuminates and the Voices-Main screen appears.

2. Move the cursor to the **Voice Select** field using the cursor keys (as shown above).

3. **The External Inputs are located below S000.** You are now presented with several choices for Live Sampling inputs — Sampling ADC, AES/EBU Input, External ADC 1. External ADC 2, ADAT chan 1-2, ADAT chan 3-4, ADAT chan 5-6, ADAT chan 7-8.

4. **Select a Live Sample input.** The voice must be keyed in order to hear the input. Use "Latch Mode" if you want the voice to remain on. *(See Preset Edit, Voice Setup, Latch in the EOS manual.)*

5. **Select the RFX Bus** for any of the external inputs. If you don't have any of the RFX option cards, you can use the Sampling ADC or the AES/EBU port.

The Sampling ADC has adjustable gain and is perfect for use with low level signals such as guitars and basses.

MIDI Triggers

MIDI Note   MIDI Channel   Trigger Threshold

```
← PREV                  MIDI Triggers           NEXT →
MIDI Preferences 2                               MIDI Mode
Sample ADC:C-1  Ch1 -39.0dB   ADAT 1-2 :G-1  Ch1 -49.5dB
AES/EBU In:D-1  Ch1 -40.5dB   ADAT 3-4 :A-1  Ch1 -49.5dB
Ext.ADC 1  :E-1  Ch1 -43.5dB   ADAT 5-6 :B-1  Ch1 -49.5dB
Ext.ADC 2  :F-1  Ch1 -43.5dB   ADAT 7-8 :C0  Ch1 -49.5dB
```

The RFX card must be installed to use the MIDI Triggers.

MIDI Triggers allow you to trigger MIDI notes using audio inputs. This has a variety of applications including, drum sound replacement, processing audio through the Emulator's Z-plane filters or creating MIDI sequences from audio drum tracks.

Using the MIDI Triggers is easy. You simply select a MIDI note and channel, then set the Trigger Threshold to trigger on the desired peaks. EOS performs sophisticated signal processing and slope detection to ensure accurate tracking and velocity response.

Input Levels

- **Sample ADC** - These inputs will accept low level signals such as electric guitars or microphones. The input gain can be set from -18dB to +30 dB. *(Select "New" sample in the Sample Manage menu, then adjust the ADC Gain)*
- **AES/EBU** - This input accepts AES digital from other digital audio equipment.
- **Ext ADC** - These inputs accept balanced (or unbalanced) pro line level signals of +4 dB or greater.
- **ADAT** - These inputs accept digital inputs from the ADAT optical interface (if installed).

☞ To Set up the MIDI Triggers:

1. Connect the audio source to the E4.
2. Press the **Master** button. The LED illuminates and the Memory Statistics screen appears.
3. Press the **MIDI** function key. A second row of function keys appears.
4. Press the **Triggers** function key. The screen shown above appears.
5. Set the MIDI note, channel and Trigger Threshold for each input you wish to use.

MIDI Trigger How-to's, Tips & Tricks

☞ **To Process Audio through the Z-Plane Filters & VCA:**

MIDI triggers work best with program material with prominent transient peaks such as drum tracks. Poor tracking will result if your program material is too complex or if the transients do not rise far enough above the average sound level.

Choose the audio input you wish to use…

1. Connect your audio source to a pair of analog inputs. (If you're using the analog and NOT the sampling inputs, jump to step 3.)

2. If you're using the Sampling ADC inputs, select "New" sample in the Sample Manage menu, then adjust the ADC Gain to match your input level. Set the ADC Gain so that the level meters peak at about 3/4 scale of a little more.

✎ **Tip:** *You can use the Sample Input meters to measure the level of any unknown signal.*
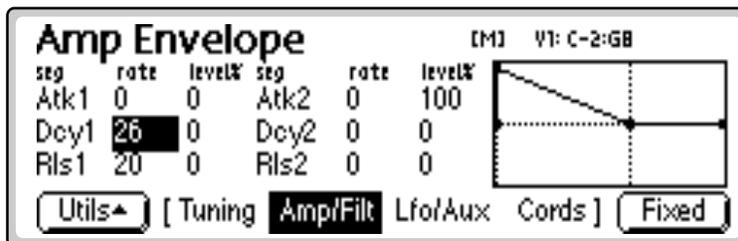
Create a new Preset…

3. Press **Preset Manage**, then **New**. Name your Audio Through preset to avoid confusion later.

Program your new Preset…

4. Press **Preset Edit** and turn the data entry control counter-clockwise to access the external inputs. Select your audio source input.

5. Press the **EditVce** function key.

   The external audio signal runs through the Filter and Amplifier and either or both can be modulated by the envelopes, LFOs and velocity.

6. Program the filter type, frequency and Q, then adjust the filter envelope generator. Set the envelope generators for a fast attack and medium decay to start. This will let you hear if the envelopes are being properly triggered. The settings shown below might be a good starting point.


```
Amp Envelope              [M]   V1: C-2:G8
seg   rate  level% seg    rate  level%
Atk1  0     0      Atk2   0     100
Dcy1  26    0      Dcy2   0     0
Rls1  20    0      Rls2   0     0
[ Utils▲ ] [ Tuning  Amp/Filt  Lfo/Aux   Cords ]  [ Fixed ]
```

Set up the MIDI Trigger…

7. Press **Master**, then **MIDI**, then **Triggers**.

8. Turn on the MIDI Trigger for the input you wish to use by selecting a MIDI note. Since you're using an external audio signal, it doesn't matter which MIDI note you choose. Adjust the Trigger Threshold until you get a reliable trigger for your program material.

9. Continue to refine and adjust your Filter and Amplifier settings to your heart's content. That's it!

☞ Drum Sound Replacement with MIDI Triggers:

Drum sound replacement is the process of replacing sounds on a recorded drum track with other sampled sounds. MIDI Triggers work best with a program material containing strong transient peaks such as a monophonic percussion track such as from a multitrack recorder. Multi-instrument signals with complex program material are usually not suitable for MIDI Triggering.

Once you have reliable triggering, ANY sound can replace the percussion track. Stereo samples can also replace mono tracks. Remember to patch in key velocity to volume to either preserve or modify the dynamics of the track.

1. Choose a Bank and Preset containing the chosen replacement sound.

2. Follow steps 1-2 in the Z-Plane Filter how-to, then…

Set up the MIDI Trigger…

3. Press **Master**, then **MIDI**, then **Triggers**.

4. Turn on the MIDI Trigger for the input you wish to use by selecting a MIDI note. Adjust the Trigger Threshold until you get a reliable trigger for your program material.

5. Re-record the new sound onto another track of your recorder.

6. *Alternatively…* you can record this as a MIDI sequence on the EOS sequencer. (Make sure the recorder and EOS are synchronized using MTC first.)

Background: RFX Architecture

Getting a Signal into the RFX

There are 3 ways to route signals in to the RFX system. Any four effects busses can be selected for each voice of each MIDI channel.

1. **RFX busses programmed as part of the preset.** The submix bus selection can be programmed for each voice in the Preset Edit, Amplifier screen.

2. **RFX busses programmed by MIDI Channel.** If you change the multimode submix setting from "Voice" to one of the RFX busses, the preset on that MIDI channel will be routed to the selected RFX bus. The following diagrams relate the input portion of the RFX block diagram to the EOS screens where you actually program the routing.
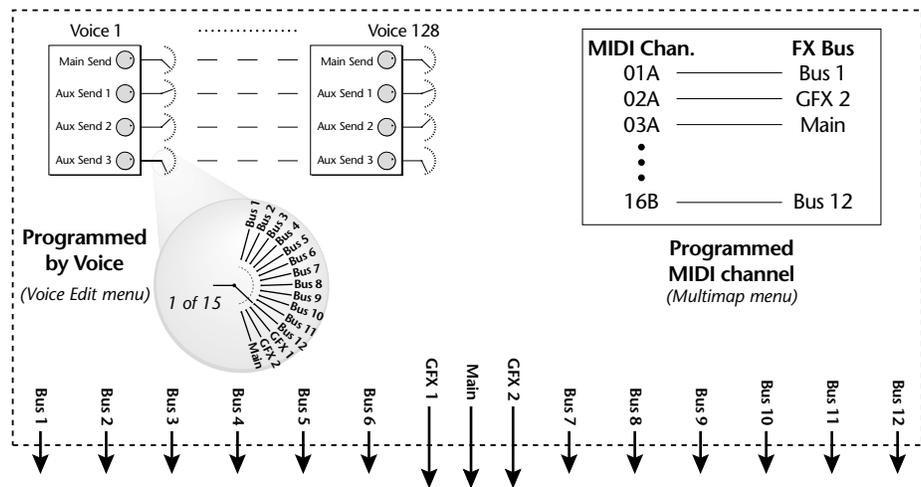
FX Send Programmed in the Voice

FX Send Programmed by MIDI channel

```
Multi: M000 Empty MultiSetup | volume pan submix pitch  mod
Ch 1   P017 Synth Bass 3       127  +0   GFX1 0      0
Ch 2   P007 El. Guitar         127  +0   Bus1 0      0
Ch 3   P025 Brass Section      127  +0   Bus2 0      0
Ch 4   P034 Organ Plus         127  +0   voice 0     0
      [ Seq ][ SetBCh ][ View ][ Load... ][ MSetup ][ Mode▲ ]
```
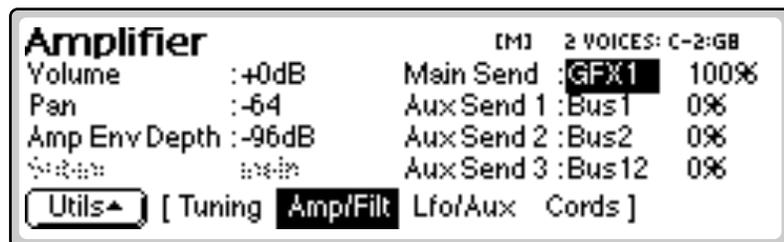
👓 *You must have the RFX card installed to use RFX mixer mode.*

3. The RFX Mixer. Setting the Multimode Submix send to "Mixer" enables a third entry point into the RFX. This method has several advantages.

- You can change effects and amounts without modifying the preset.
- You have full MIDI control of up to four effects per MIDI channel.
- Your effects routing can be saved with the Multisetup and Bank.
- Using a MIDI sequencer, the RFX can function as a powerful digital mixer with 15 busses, up to 16 effects & realtime effects control.

FX Send Programmed by MIDI Mixer

In the Multimode screen, set the Submix for the desired MIDI channel to "Mixer".

```
Multi: M000 Arrival           | volume pan submix pitch  mod
Ch 1   P004 Multi Key           127  +0   mixer 0     0
Ch 2   P003 Strang Thang        127  +0   Bus1  0     0
Ch 3   P005 Organ               127  +0   GFX1  0     0
Ch 4   P015 Synth Bass 1        127  +0   voice 0     0
      [ Seq ][ MSetup ][ View ][ Load... ][ Save... ][ Mode... ]
```

Pressing the **Next** Page key on the E4 reveals the following screen.

```
Mix   Main  Send0  Aux1  Send1  Aux2  Send2  Aux3  Send3
Ch 1  GFX1  77     Bus1  0      Main  0      Bus3  0
Ch 2  Main  127    Bus2  0      Main  0      Main  0
Ch 3  Main  0      Bus5  127    Main  0      Main  0
Ch 4  Main  51     Main  0      GFX2  127    Main  0
      [ Seq ][ MSetup ][ View ][ Load... ][ Save... ][ Mode... ]
```

For each of the four FX Sends per channel, you can change the RFX bus routing, and the current volume or send amount. The term "current volume" was used because incoming MIDI CC data will overwrite these settings. The MIDI Continuous Controller (CC) numbers are programmed in the MIDI Controllers 2 screen in the Master menu.

Remember that although you specify four MIDI controller numbers globally, you actually have four separate controllers for EACH MIDI channel. With 32 MIDI channels you have 32 x 4 = 128 fader channels!

The following diagram illustrates how mixer mode works.
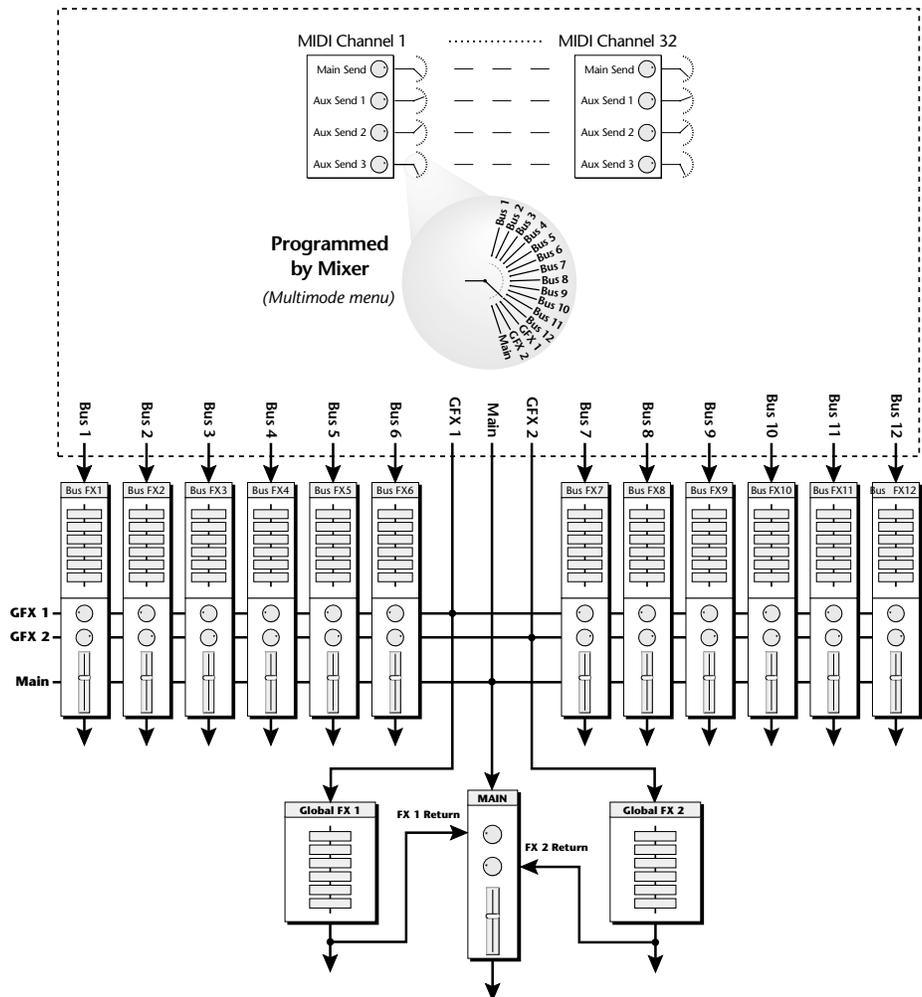
Each MIDI channel has four Effect Sends which can be routed to any of the 15 RFX busses. The Effect Send amounts can be controlled via four MIDI continuous controllers on each channel.

4. Selecting "Mixer" in the Multimode screen overrides any Effect Send routings made in the Voice. After creating your multitrack sequence, you can program the RFX Mixer and effects, then control everything from your sequencer for complete automated mixdown and effects control.

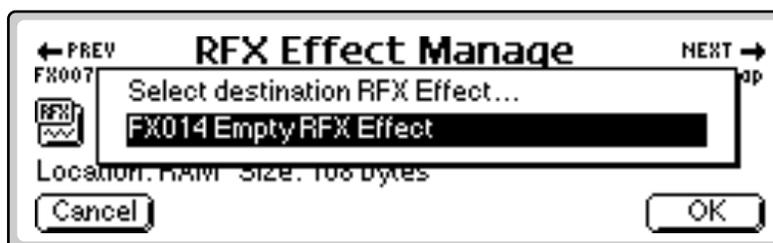# Putting it all together

OK, enough theory. Here's the steps you'll use to put together an RFX setup. We'll walk you through the three main steps of the process.

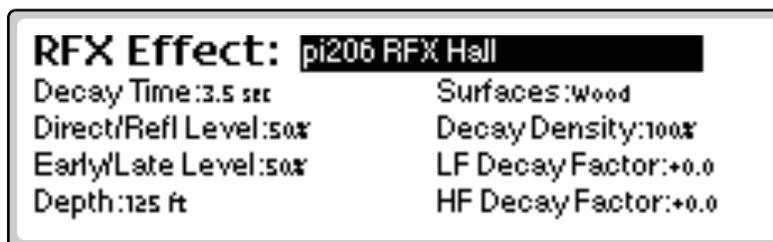## ☞ Step 1 - Create a new Effect:

Before you can program an RFX Setup, you'll need at least one effect preset. If you already have Effect presets in the bank, skip to step 2.

1. Press the **Master** button. The memory screen appears

2. Press the **FX** function key. Another row of function keys appears.

3. Press the **REffect** function key. The RFX Effect Manage screen appears.

4. Press the **New…** function key. A popup dialog box appears asking you to select the location for the new Effect. Select a location and press **OK**.

You might want to wait and name your Effect after you've programmed it.

> ← PREV   **RFX Effect Manage**   NEXT →
>
> FX007
> Select destination RFX Effect...
>
> 🔲 FX014 Empty RFX Effect
>
> Location: RAM Size: 108 bytes
>
> [Cancel]   [OK]

5. Press the **Edit** function key. The RFX Edit screen similar to the one shown below appears. (Another effect may be shown.)

> **RFX Effect:** pi206 RFX Hall
> Decay Time:3.5 sec   Surfaces:Wood
> Direct/Refl Level:50%   Decay Density:100%
> Early/Late Level:50%   LF Decay Factor:+0.0
> Depth:125 ft   HF Decay Factor:+0.0

While you are editing, the effect is automatically patched into the signal path with a wet/dry mix of 50%.

6. The cursor will be placed over the Plug-in selection field. Select the desired Effect Plug-in using the data entry control or inc/dec buttons.

7. Program the effect parameters as desired, then press the Exit button when you're finished. *(The effect can be custom edited later in the Setup.)*

8. Name your Effect to avoid confusion later. Press the **Name** function key. A pop up dialog box appears asking you to enter the new RFX Effect name.

9. **Name the Effect.** Select letters using the numeric keypad, data entry control, inc/dec keys and cursor keys, or using an ASCII keyboard.

10. Press **OK** to confirm the new name or **Cancel** to cancel the operation.

☞ **Step 2 - Build an Effect Setup:**

Now that you have an Effect preset, you need to assign it to the RFX bus.

1. Press the **Master** button. The memory screen appears

2. Press the **FX** function key. Another row of function keys appears.

3. Press the **RSetup** function key. The RFX Setup Manage screen appears.

4. Press the **New…** function key. A popup dialog box appears asking you to select the location for the new Setup. Select a location and press **OK**.

5. **Name the Setup** to avoid confusion later. Select letters using the numeric keypad, data entry control, inc/dec keys and cursor keys, or using an ASCII keyboard.

6. Press **OK** to confirm the new name or **Cancel** to cancel the operation.

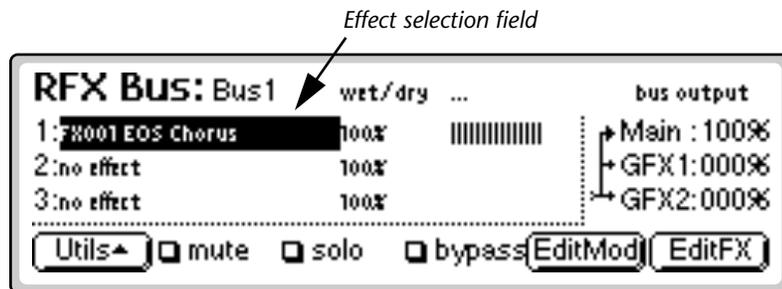7. Press the **Edit** function key. The RFX Bus Editing screen shown below appears.

Bus selection field

```
RFX Bus: Bus1      wet/dry  ...              bus output
1:no effect              100%              ┌►Main :100%
2:no effect              100%              ├─GFX1:000%
3:no effect              100%              └─►GFX2:000%
┌──────────────────────────────────────────────────────
│ Utils▲ │□ mute  □ solo  □ bypass│EditMod│ EditFX │
```
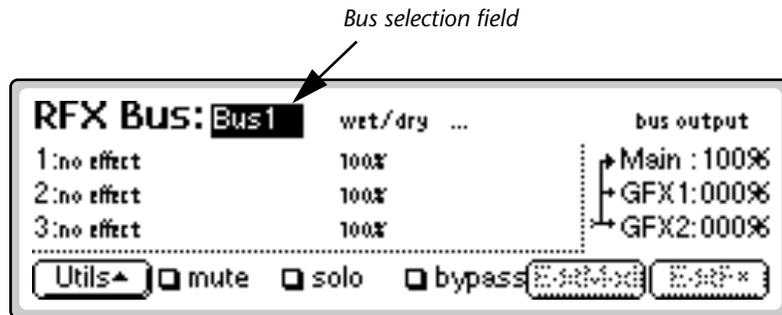
8. Refer to the RFX diagram on page 19 and the RFX Setup screen description on page 27 to help you understand the bussing structure. The cursor is already over the Bus Selection field. Turn the data entry control or inc/dec buttons to select the desired effects bus.

9. For the purpose of this exercise, select **Bus 1**, then move the cursor down to the first effect as shown below. This is where you assign Effect presets to the Effect busses. **Select an Effect.**

Effect selection field

```
RFX Bus: Bus1      wet/dry  ...              bus output
1:FX001 EOS Chorus      100%   |||||||||||  ┌►Main :100%
2:no effect              100%              ├─GFX1:000%
3:no effect              100%              └─►GFX2:000%
┌──────────────────────────────────────────────────────
│ Utils▲ │□ mute  □ solo  □ bypass│EditMod│ EditFX │
```
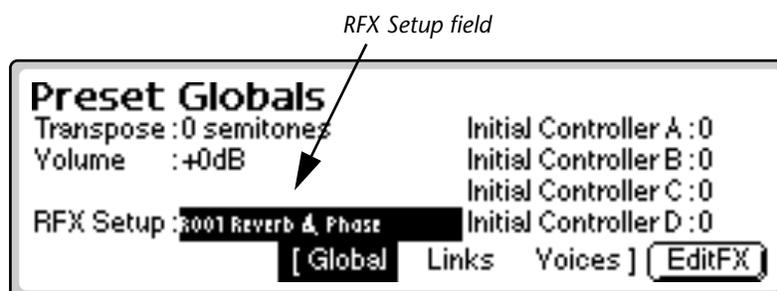
10. The **bus output** field is already set to **Main:100%**. This means that 100% of Bus 1 will be routed to the main outputs. Good!

•   We're not quite finished yet. Now we have to connect the synthesizer voice to RFX Bus 1 using one of the four Effects Sends.
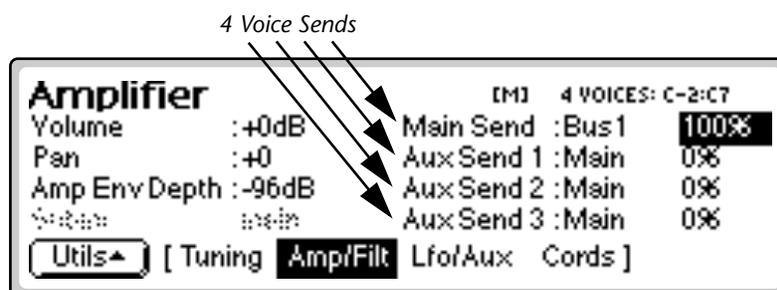
☞ **Step 3 - Program the Effect Sends by Voice:**

Effect Sends can be programmed by Voice or MIDI channel. We'll start by programming by voice. Before you begin, set the E4 into **Omni** or **Poly** mode. (From the main screen press **Mode**, then **Whole.**)

1. Select a Preset of your choice.

2. Press the **Preset Edit** button. The Voices-Main screen appears.

3. Press the **Global** function key. The Preset Globals page appears.

RFX Setup field

```
Preset Globals
Transpose : 0 semitones        Initial Controller A : 0
Volume    : +0dB               Initial Controller B : 0
                               Initial Controller C : 0
RFX Setup : 001 Reverb & Phase Initial Controller D : 0
                     [ Global   Links   Voices ] ( EditFX )
```
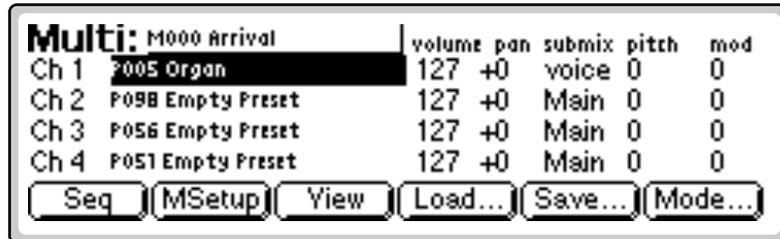
4. Move the cursor down to the **RFX Setup** field and select the RFX Setup you created in step 2.

5. Move the cursor off the RFX Setup screen. Note that the **EditFX button** (F6) changes to **EditAll**.

6. Press the **EditAll** function key. This selects *all* the Voices in the Preset and takes you to the Voice Editing level of the Preset Edit menu.

7. Press the **Amp/Filt** function key. The screen shown below appears.

4 Voice Sends

```
Amplifier                    [M]   4 VOICES: C-2:C7
Volume        : +0dB       Main Send  : Bus 1   100%
Pan           : +0         Aux Send 1 : Main     0%
Amp Env Depth : -96dB      Aux Send 2 : Main     0%
                           Aux Send 3 : Main     0%
 ( Utils▲ ) [ Tuning  Amp/Filt  Lfo/Aux   Cords ]
```

8. Set one of the Sends to **Bus 1** *(the bus you programmed with the Effect in step 2)* and set the amount to 100%. This is shown in the screen above, although you can choose any of the four Sends since they're all identical. What we've just done is sent 100% of the output of all voices to Bus 1.

9. Now everything is connected! Note that we've only used one Send and one RFX Bus. Now please consider the following points:
   - Each voice can be sent to up to four busses at once.
   - Each of the four send amount can be modulated by *any* mod source.
   - Each voice can have it's own effects routing. You could program a different effects routing for each key. *(Actually up to 32 per key!)*

☞ **Step 4 - Program the Effect Sends by MIDI Channel:**

Programming Effect Sends by MIDI channel is even easier. Before you begin, set the E4 into **Multi** mode. (From the main screen press **Mode**, then **Multi.**) The Multimode screen is shown below.

```
Multi: M000 Arrival        volume pan submix pitch  mod
Ch 1  P005 Organ            127   +0  voice  0      0
Ch 2  P098 Empty Preset     127   +0  Main   0      0
Ch 3  P056 Empty Preset     127   +0  Main   0      0
Ch 4  P051 Empty Preset     127   +0  Main   0      0
   [ Seq ][MSetup][ View ][ Load...][ Save...][Mode...]
```

1. Select a preset of your choice on the MIDI channel your keyboard is transmitting.

2. Move the cursor to the Submix field and select **Bus 1**.

```
Multi: M000 Arrival        volume pan submix pitch  mod
Ch 1  P005 Organ            127   +0  Bus1   0      0
Ch 2  P098 Empty Preset     127   +0  Main   0      0
Ch 3  P056 Empty Preset     127   +0  Main   0      0
Ch 4  P051 Empty Preset     127   +0  Main   0      0
   [ Seq ][MSetup][ View ][ Load...][ Save...][Mode...]
```
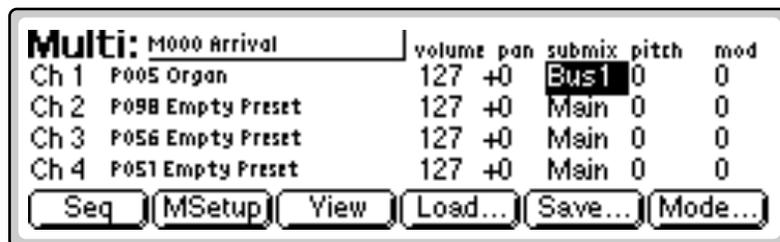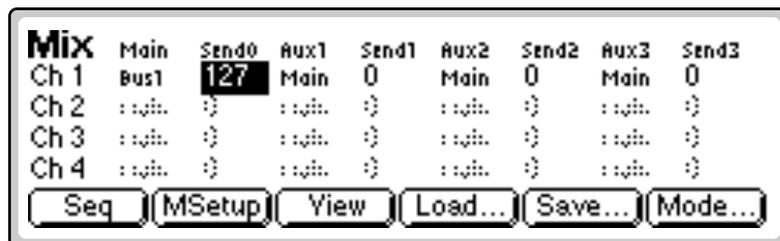
3. That's all there is to it. The multimode submix setting *overrides* the voice programming you did on the previous page. To go back to the voice settings, select voice again.

☞ **Step 5 - Program the Effect Sends by MIDI Mixer:**

The next logical extension is to use the Multi mode Mixer to program each Effect Send.

1. Set the Submix to **mixer**.

2. Press the **Next** page key. The following screen appears.

✎ *The four sends can be controlled by MIDI Continuous Controllers. See page 20 to learn how to change the CC numbers.*

```
Mix  Main  Send0 Aux1  Send1 Aux2  Send2 Aux3  Send3
Ch 1 Bus1  127   Main  0     Main  0     Main  0
Ch 2 :.gh. 0     :.gh. 0     :.gh. 0     :.gh. 0
Ch 3 :.gh. 0     :.gh. 0     :.gh. 0     :.gh. 0
Ch 4 :.gh. 0     :.gh. 0     :.gh. 0     :.gh. 0
   [ Seq ][MSetup][ View ][ Load...][ Save...][Mode...]
```

3. Select Bus 1 and set an initial amount as shown above. You can program up to four RFX busses and amounts for each MIDI channel.

New RFX Setup Screen

The screen below shows all the major features of the first RFX Setup screen. Refer to the RFX block diagram on page 29 frequently as you learn the RFX system.

Currently Selected RFX Bus *Wet/Dry mix (initial state)* *Wet/Dry meter (current state)* *Bus Output Level*

Up to 6 FX in series

(Cursor down for 4-6)

Effects can be Muted, Soloed or Bypassed while constructing the Effects Setup *MIDI Modulation of Effect parameters* *Effects can be Custom Edited in the Setup*
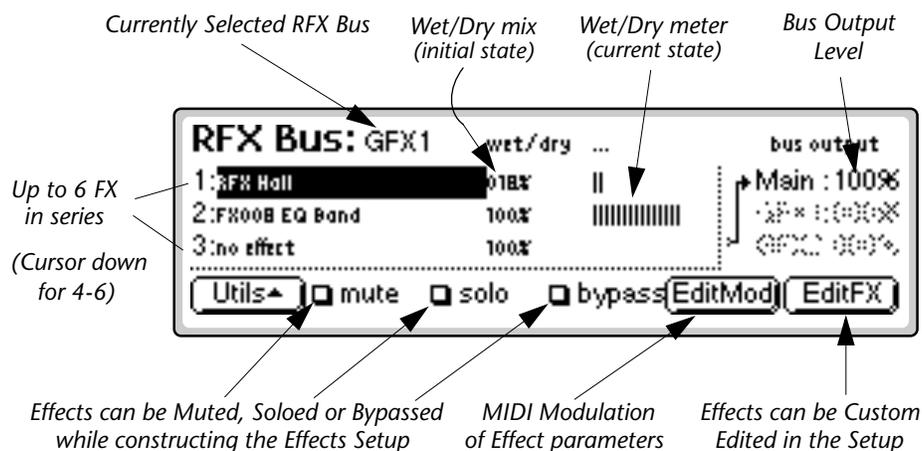
When an Effect is selected as in the screen above, the Mute, Solo and Bypass functions become active. These controls work differently depending on whether the cursor is over the RFX Bus field or the Effect field.

When the Cursor is on an RFX Bus Field:

- **Mute**   Silences the entire RFX Bus output
- **Solo**   Effects on all other busses will be BYPASSED (0% wet). Effects on the current bus will not be affected.
- **Bypass** All Effects on the bus will be BYPASSED (wet/dry = 0%).

When the Cursor is on an Effect Field:

- **Mute**   Silences the input to the selected Effect.
- **Solo**   Effects with Solo turned on will be heard normally and all others on the selected bus will be BYPASSED. Effects on other busses are not affected.
- **Bypass** The selected effect will be BYPASSED (wet/dry = 0%). All other effects on the bus will be heard normally

Mute, Solo and Bypass are temporary controls which are turned off whenever you leave the Setup Edit menu.

Effect parameters can also be edited from the RFX Setup screen, since you might want to make some adjustments to the Effects themselves while programming the Setup. **Press EditFX** to bring up a pop-up effect edit window. Use the up/down cursor keys to scroll through all available parameters.

Any changes made to the Effect program from this location only apply to the particular effect in this current Setup because you are working on a *Copy* of the original RFX Effect. **The source Effect stored in the Bank or in Flash is NOT affected.** Whenever you change the Effect assigned to a Bus, a new copy of the stored Effect is reloaded, and so any Edits you have made in this screen will be lost.

This feature allows you to use the same Effect on several busses and adjust the parameters differently for each. When you save the Bank, the Setup and all Effects settings are saved, just as you programmed them.

MIDI Modulation of Effects

Effect parameters can be modulated via MIDI controllers. MIDI Modulation controls *scale* the settings of effect parameters. Set the maximum range of a parameter when programming the effect, then use the MIDI modulation controls to vary the settings up to this limit. The number of MIDI parameters varies with the type of effect. *See the individual effect descriptions for lists of the MIDI modulation parameters.*

MIDI Controllers
Off
Pitch Wheel
FX Output Level
Pedal
MIDI A-L
Send 0-3
Footswitch 1-3
F-F Footswitch 1-3
Volume
Pan

MIDI Controller   MIDI Channel   Effect Parameter   Modulation Amount scaling
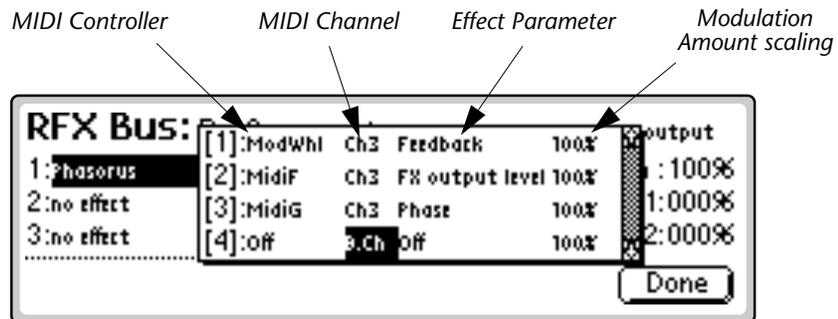
☞ **To Access the MIDI Modulation Patchbay:**

1. From the RFX Setup, Edit screen, move the cursor to the Effect (name) you wish to modulate.

2. Press the **EditMod** function key. The screen shown above appears.

3. Select the MIDI Controller, MIDI Channel, Effect Parameter and Modulation Scaling Amount.

4. Press Done when finished to return to the RFX Setup, Edit screen.

RFX Block Diagram

Voice 1 · · · · · · · · · Voice 128

| Main Send |
| Aux Send 1 |
| Aux Send 2 |
| Aux Send 3 |

MIDI Chan 1 · · · · · · · · MIDI Chan 32

1 of 15

Bus 1 Bus 2 Bus 3 Bus 4 Bus 5 Bus 6 Bus 7 Bus 8 Bus 9 Bus 10 Bus 11 Bus 12 GFX 2 Main

MIDI Ch.	FX Bus
01A	Bus 1
02A	GFX 2
⋮	
16B	Bus 12

**1. Programmed
by Voice**
(Voice Edit menu)

**2. Programmed by
MIDI channel**
(Multimode menu)

**3. Programmed
by MIDI Mixer**
(Multimode menu)

Bus 1 | Bus 2 | Bus 3 | Bus 4 | Bus 5 | Bus 6 | GFX 1 | Main | GFX 2 | Bus 7 | Bus 8 | Bus 9 | Bus 10 | Bus 11 | Bus 12

Bus FX1 | Bus FX2 | Bus FX3 | Bus FX4 | Bus FX5 | Bus FX6 | Bus FX7 | Bus FX8 | Bus FX9 | Bus FX10 | Bus FX11 | Bus FX12

GFX 1
GFX 2
Main

Global FX 1 **FX 1 Return** **MAIN** **FX 2 Return** Global FX 2

- All buses are stereo
- Up to 6 effects per bus
- 16 effects maximum

Bus 1 Bus 2 Bus 3 Bus 4 Bus 5 Bus 6 Bus 7 Bus 8 Bus 9 Bus 10 Bus 11 Bus 12 GFX 1 GFX 2 Main

1 of 15

MAIN | SUB 1 | SUB 2 | SUB 3 | SUB 4 | SUB 5 | SUB 6 | SUB 7

*Standard Analog Outputs
and ADAT 1-8 Out*

*Analog Expansion Card
and ADAT 9-16 Out*

RFX Output Map

*(Press Right Page key from **RSetup, Edit**)*

New RFX Plug-ins *(shown in bold)*

FAT Effects

EOS Chorus	EOS Reverb	**Quad MuXster**
RFX Hall	**Vocoder**	BPM Delay
Long Delay	Rhythmic Delay	Stereo Delay
10-band EQ		

Thin Effects

EOS Chorus (lite)	**MuXster**	**RFX Phaser**
Ring Modulator	Slap Delay	Stereo Slap
Param/Shelf EQ	4-band Split EQ	Simple Reverb

pi202 - EOS Reverb Types

Room 1-3	Hall 1 & 2	Plate
Delay	Panning Delay	Multitap 1
Multitap Pan	3 Tap	3 Tap Pan
Soft Room	Warm Room	Perfect Room
Tiled Room	Hard Plate	Warm Hall
Spacious Hall	Bright Hall	Bright Hall Pan
Bright Plate	BBall Court	Gymnasium
Cavern	Concert 9	Concert 10 Pan
Reverse Gate	Gate 2	Gate Pan
Concert 11	Medium Concert	Large Concert
Large Concert Pan	Canyon	DelayVerb 1-3
DelayVerb 4-5 Pan	DelayVerb 6-9	

pi201 - EOS Chorus Types

Chorus 1-5	Doubling	Slapback
Flange 1-7	Big Chorus	Symphonic
Ensemble	Delay	Delay Stereo
Delay Stereo 2	Panning Delay	Delay Chorus
Pan Delay Chorus 1 & 2	Dual Tap 1/3	Dual Tap 1/4
Vibrato	Distortion 1 & 2	Distorted Flange
Distorted Chorus	Distorted Double	

RFX Phaser

The RFX Phaser is composed of two separate 12-stage phase shifter sections. The phase shifter can be configured either as a true stereo 12-stage phase shifter with completely separate signal paths on each channel or a mono 24-stage phase shifter using only the left channel.
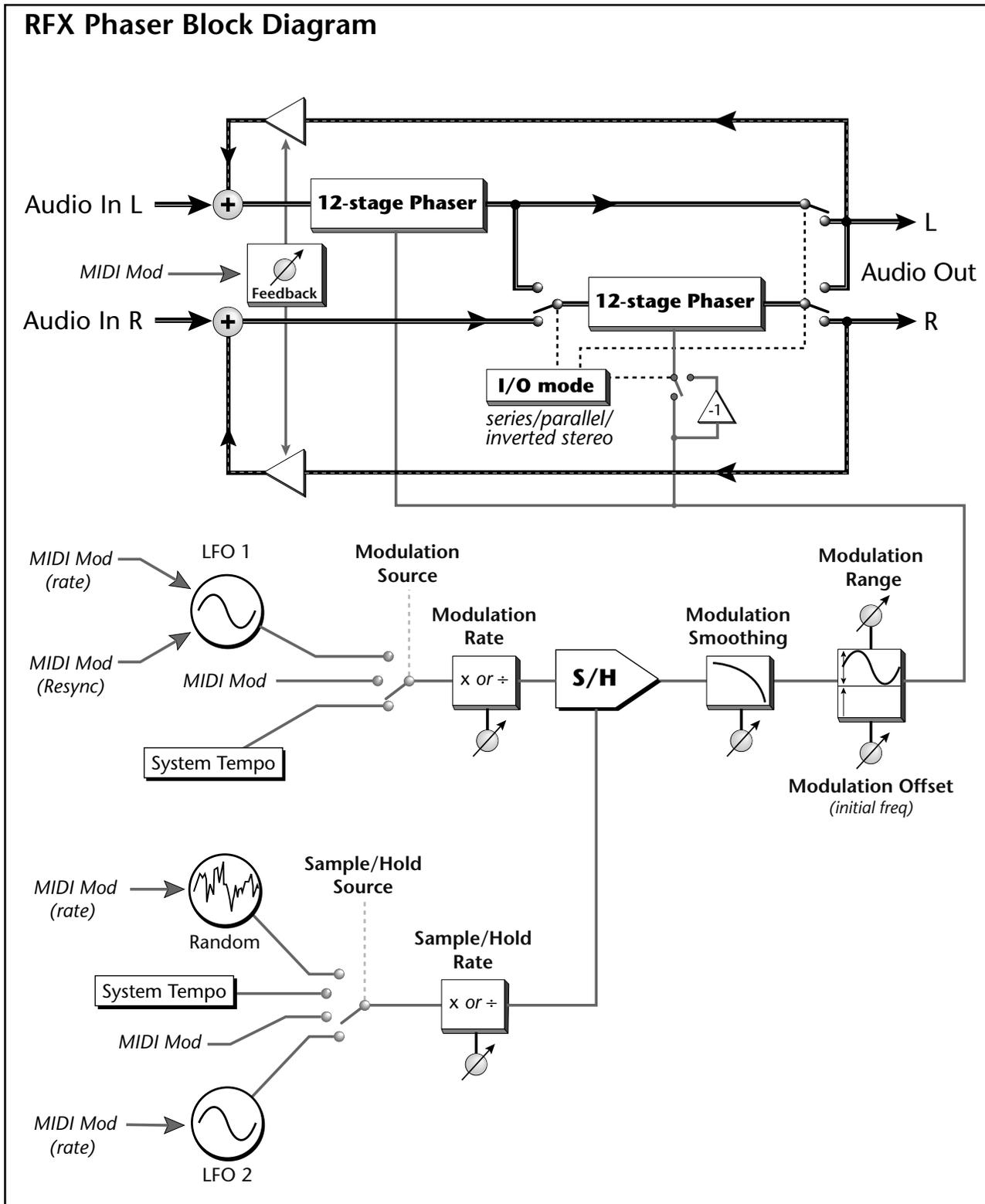
Stereo (12-stage)

Left ⟶ 12-stage Phaser ⟶

Right ⟶ 12-stage Phaser ⟶

Mono Left (24-stage)

Left ⟶ 12-stage Phaser ⟶ 12-stage Phaser ⟶
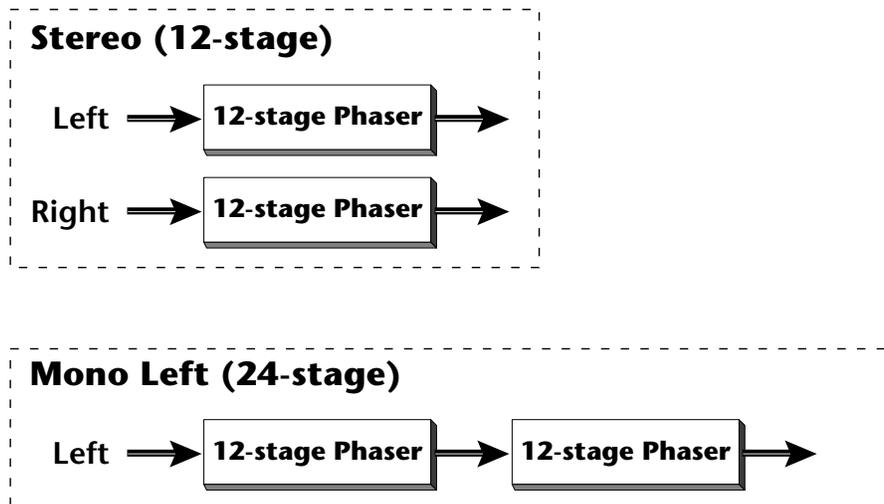
A phase shifter creates a series notches in the audio spectrum similar to, but sounding very different than, an audio flanger. A phase shifter's notch spacing remains constant with frequency, unlike a flanger where the notch spacing is a harmonically related function of delay time. The RFX Phaser can produce up to 12 notches when connected in series or 6 notches in true stereo mode. Feedback is used to increase the depth of the notches and intensify the phase shift effect.

In "inverted stereo mode" the RFX Phaser is configured in true stereo but with the modulation source inverted on the right channel. This causes the peaks and notches on the left and right channels to be swept in opposite directions.

The RFX Phaser modulation section is composed of two LFOs, a Sample and Hold, a Lag processor and a Random source. The system clock or MIDI clock can also be used as a modulation source or used to control the LFOs and Sample and Hold. In addition, MIDI continuous controllers can be used to control various parameters such as LFO rates, phase shift frequency, feedback, sample & hold trigger and LFO resync.

Phase shifters are typically characterized by the number of phase shift stages they contain. More stages are generally considered more desirable to create a richer effect. For example, a "stompbox" guitar effect phase shifter might have 3-6 stages, while a studio quality unit could have as many as 12-stages.

RFX Phaser Block Diagram

Audio In L

12-stage Phaser

MIDI Mod

Feedback

Audio In R

L

Audio Out

12-stage Phaser

R

I/O mode

series/parallel/
inverted stereo

-1

MIDI Mod
(rate)

LFO 1

Modulation
Source

Modulation
Range

Modulation
Rate

Modulation
Smoothing

MIDI Mod
(Resync)

MIDI Mod

S/H

System Tempo

Modulation Offset
(initial freq)

MIDI Mod
(rate)

Random

Sample/Hold
Source

Sample/Hold
Rate

System Tempo

x or ÷

MIDI Mod

MIDI Mod
(rate)

LFO 2

Background - Sample & Hold: The modulation section of the RFX Phase Shifter utilizes a Sample and Hold processor. A sample and hold is a device which tracks and holds the instantaneous value of the input signal whenever triggered by the sample input. On the RFX Phaser, the input is passed through unchanged value if the value on the sample input is below 1. When the sample input changes from 0 to 1 or greater, the instantaneous value of the input signal is held on the output. The resulting stepped output can produce a wide variety of signals depending on the input content and the frequencies of both signals.

Sample & Hold
The input is sampled when the Sample Input changes and is greater than zero. When the Sample Input is below 1, the input is passed unchanged.
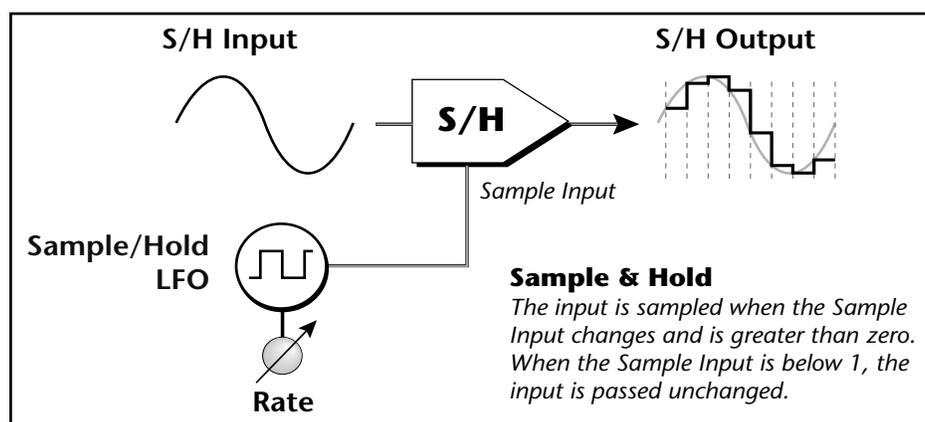
RFX Phase Shifter Parameters:
Please refer to the Phase Shifter block diagram on the previous page to better understand the effect and modulation routings.

Mod Source	Selects the source of modulation • **LFO 1** - sine wave oscillator • **System Tempo** - LFO 1 synced to Seq/Arp/MIDI clock • **MIDI** - MIDI CC value controls phase shift frequency
Mod Rate	Sets the LFO 1 rate in bpm (.25-980 beats-per-minute) when selected as the Mod Source. When the Mod Source is set to System Tempo, the Mod Rate becomes a multiplier/divisor of the System Tempo (BPM/120 - BPM x 31).
Mod Range	Adjusts the amount of modulation applied to the phase shifter from 1% to 100%.
Mod Offset	Adds an initial positive value or bias to the modulation source. This allows you to move the notch frequencies to an area of interest in the audio spectrum.
Feedback	Feedback is used to increase the depth of the notches and intensify the phase shift effect. At high feedback values the phase shifter become highly resonant and will "ring" when excited by a signal with a sharp attack. Many interesting tonalities such as bell tones, log drums and resonant pipes can be produced using the phase shifter.

*✎ **Resync** - This MIDI control restarts LFO 1 whenever the controller value changes from zero to a positive number. Resync can be used to restart a long slow sweep or to synchronize the LFO with the beat of the music.*

👀 The Modulation Offset value and the Modulation Range values interact. You may have to back off on the Modulation Range when increasing the Modulation Offset to prevent LFO 1 from clipping at the upper end of the range.

MIDI Controls
Wet/Dry Mix
FX Input Level
FX Output Level
Phase
Phase LFO1 Rate
S/H LFO2 Rate
S/H Trigger
LFO Resync
Feedback

Samp/Hold Source A sample and hold can be inserted into the modulation path or turned off. This parameter selects the clock source for the sample and hold.

- **Off** - The modulation signal bypasses the Sample & Hold.
- **LFO 2** - a clock oscillator with a range of .25 to 980 bpm.
- **System Tempo** - LFO 2 synced to Seq/Arp/MIDI clock
- **MIDI** - Each time the MIDI CC value *(connected via "Edit Modulation" in the Setup Edit screen)* crosses 0 to 1 or a more positive number, the input to the S & H is sampled and held on its output until the CC value goes below1 again. At values below 1, the input is passed unchanged.
- **Random** - the clock oscillator has a random rate. The sample & hold Rate value controls the general speed of the random clock, but the sample & hold will be triggered at random times.

Samp/Hold Rate Sets the LFO 2 rate in bpm (.25-980 beats-per-minute) when selected as the S/H Source. When the S/H Source is set to System Tempo, the S/H Rate becomes a multiplier/divisor of the System Tempo (BPM/120 - BPM x 31). When the S/H Source is set to Random, the S/H Rate sets the overall rate of LFO 2, although trigger pulses will occur randomly.

Mod Smoothing is applied to the modulation signal even if the Sample & Hold is turned off.

Mod Smoothing can be used to change a random S/H signal into a smooth random control. This type of control signal can add realism to repeating drum samples as the timbre will be slightly different on each strike.

Mod Smoothing Controls the amount of smoothing from the lag processor following the sample & hold. No smoothing will be applied with a setting of 0 and the stepped output of the sample & hold will be passed unchanged. With the maximum lag setting of 10, rapid changes will be smoothed into a slowly changing control signal.

I/O Mode Changes the signal routing of the Phase Shifter to one of its three modes:

- **Mono L (24-stage)** - Both 12-stage sections are connected in series to form one 24-stage phase shifter. Only the Left input and output are used.
- **Stereo (12-stage)** - The left and right channels are routed through a separate 12-stage Phase Shifter.
- **Inverted Stereo** - Same as stereo (12-stage) mode except that the modulation source is inverted on the right channel. This causes the peaks and notches on the left and right channels to be swept in opposite directions.
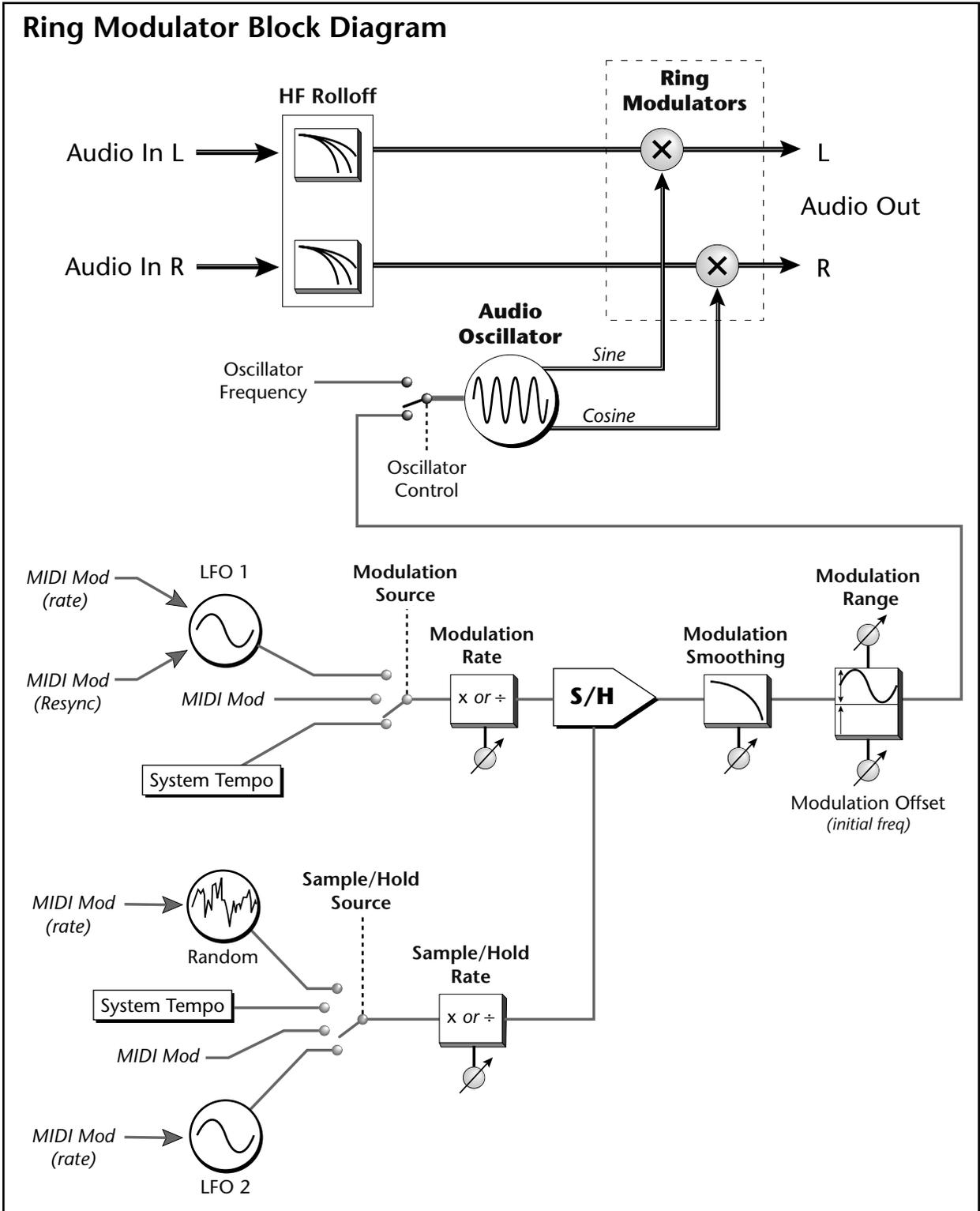
Ring Modulator

A Ring Modulator is a device which takes two signals and multiplies them together to create an output signal containing only the sum and difference frequencies of the two input waves. The original frequencies are not output. In a complex waveform, every harmonic of each signal multiplies every other according to its amplitude. Ring modulators tend to generate a lot of inharmonic frequencies, creating tones which are sometimes described as, bell-like, weird or just out of tune. In any case, the ring modulator is a useful tool which has a unique character all its own.
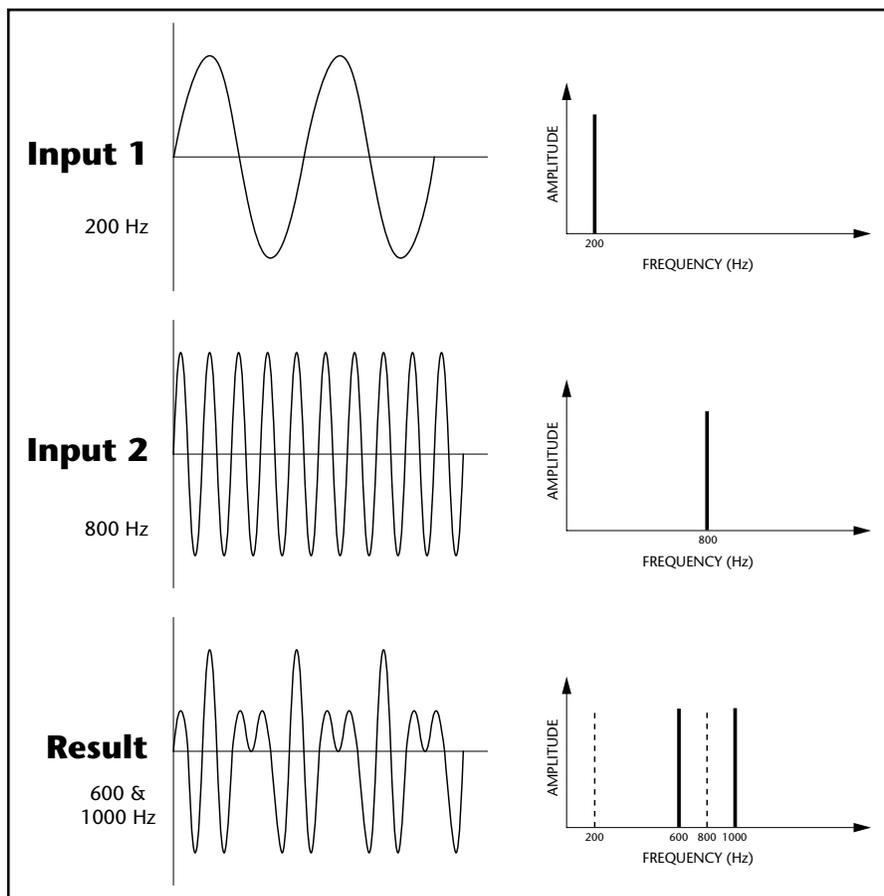
This diagram shows the result of Ring Modulating two sine waves with frequencies of 200 Hz and 800 Hz. Only the Sum and Difference frequencies of 600 Hz and 1000 Hz will be output.

The RFX Ring Modulator is a true stereo device containing a built-in sine wave audio oscillator which is ring modulated with the audio input. The two audio channels are ring modulated with sine and cosine signals which creates a stereo effect with some signals and settings. A sophisticated modulation section, including 2 LFOs and a sample & hold, provides many programming possibilities. Alternatively the modulation oscillator can be set to a fixed frequency or controlled via a MIDI controller.

Ring Modulator Block Diagram

HF Rolloff

Ring Modulators

Audio In L

Audio In R

L

Audio Out

R

Audio Oscillator

Sine

Cosine

Oscillator
Frequency

Oscillator
Control

MIDI Mod
(rate)

LFO 1

Modulation Source

MIDI Mod
(Resync)

MIDI Mod

System Tempo

Modulation Rate

x *or* ÷

S/H

Modulation Smoothing

Modulation Range

Modulation Offset
(initial freq)

MIDI Mod
(rate)

Random

Sample/Hold Source

System Tempo

MIDI Mod

MIDI Mod
(rate)

LFO 2

Sample/Hold Rate

x *or* ÷

Ring Modulator Parameters:

Please refer to the Ring Modulator block diagram on the previous page to better understand the effect and modulation routings.

Oscillator Control Selects between Manual control or Modulation.

*When the Oscillator Control is set to **Modulated**, the Oscillator Frequency option is "greyed out".*

Oscillator Freq When the Oscillator Control is set to Manual, this control sets the frequency of the audio oscillator directly.

Mod Source   Selects the source of modulation

- **LFO 1** - sine wave oscillator
- **System Tempo** - LFO 1 synced to Seq/Arp/MIDI clock
- **MIDI** - MIDI CC value controls the audio oscillator frequency.

***Resync** - This MIDI control restarts LFO 1 whenever the controller value changes from zero to a positive number. Resync can be used to restart a long slow sweep or to synchronize the LFO with the beat of the music.*

Mod Rate   Sets the LFO 1 rate in bpm (.25-980 beats-per-minute) when selected as the Mod Source. When the Mod Source is set to System Tempo, the Mod Rate becomes a divisor/multiplier of the System Tempo (BPM/120 - BPM x 31).

Mod Range   Adjusts the amount of modulation applied to the phase shifter from 1% to 100%.

Mod Offset   Adds an initial positive value or bias to the modulation source. This allows you to move the sum and difference frequencies to an area of interest in the audio spectrum.

Samp/Hold Source A sample and hold can be inserted into the modulation path or turned off. This parameter selects the clock source for the sample and hold. See "Background: Sample & Hold" on page 33 for more information.

- **Off** - The modulation signal bypasses the Sample & Hold.
- **LFO 2** - a clock oscillator with a range of .25 to 980 bpm.
- **System Tempo** - LFO 2 synced to Seq/Arp/MIDI clock
- **MIDI** - Each time the MIDI CC value *(connected via "Edit Modulation" in the Setup Edit screen)* crosses from 0 to 1 or a more positive number, the input to the S & H is sampled and held on its output until the CC value goes below 1 again. At values below 1, the input is passed unchanged.
- **Random** - the clock oscillator has a random rate. The sample & hold Rate value controls the general speed of the random clock, but the sample & hold will be triggered at random times.

MIDI Controls
Wet/Dry Mix
FX Input Level
FX Output Level
Oscillator Frequency
Mod LFO1 Rate
S/H LFO2 Rate
S/H Trigger
LFO Resync

Samp/Hold Rate Sets the LFO 2 rate in bpm (.25-980 beats-per-minute) when selected as the S/H Source. When the S/H Source is set to System Tempo, the S/H Rate becomes a divisor/multiplier of the System Tempo (BPM/120 - BPM x 31). When the S/H Source is set to Random, the S/H Rate sets the overall rate of LFO 2, although trigger pulses will occur randomly.

Mod Smoothing Controls the amount of smoothing from the lag processor following the sample & hold. No smoothing will be applied with a setting of 0 and the stepped output of the sample & hold will be passed unchanged. With the maximum lag setting of 10, rapid changes will be smoothed into a slowly changing control signal.

HF Rolloff High Frequency Rolloff controls two lowpass filters inserted into the audio path before the ring modulators. Certain signals containing a lot of high frequency energy can produce a harsh, noiselike output. In these situations, smoother and more bell-like timbres can be achieved by filtering out the higher frequencies before ring modulation.

MuXster

The MuXster is a square wave LFO controlled crossfader/chopper for dance and electronic music. The crossfader selects between the original signal and a filtered and/or delayed version of the same signal. This can have a dramatic effect on certain types of audio, notably vocals. The controlling LFO has a variety of controls and features optimized for the "slicing and dicing" of sound. Resync, Width and Lag controls, which are all controllable via MIDI, make it easy to select the proper elements for dissection and resection. The block diagram for the MuXster is shown below.
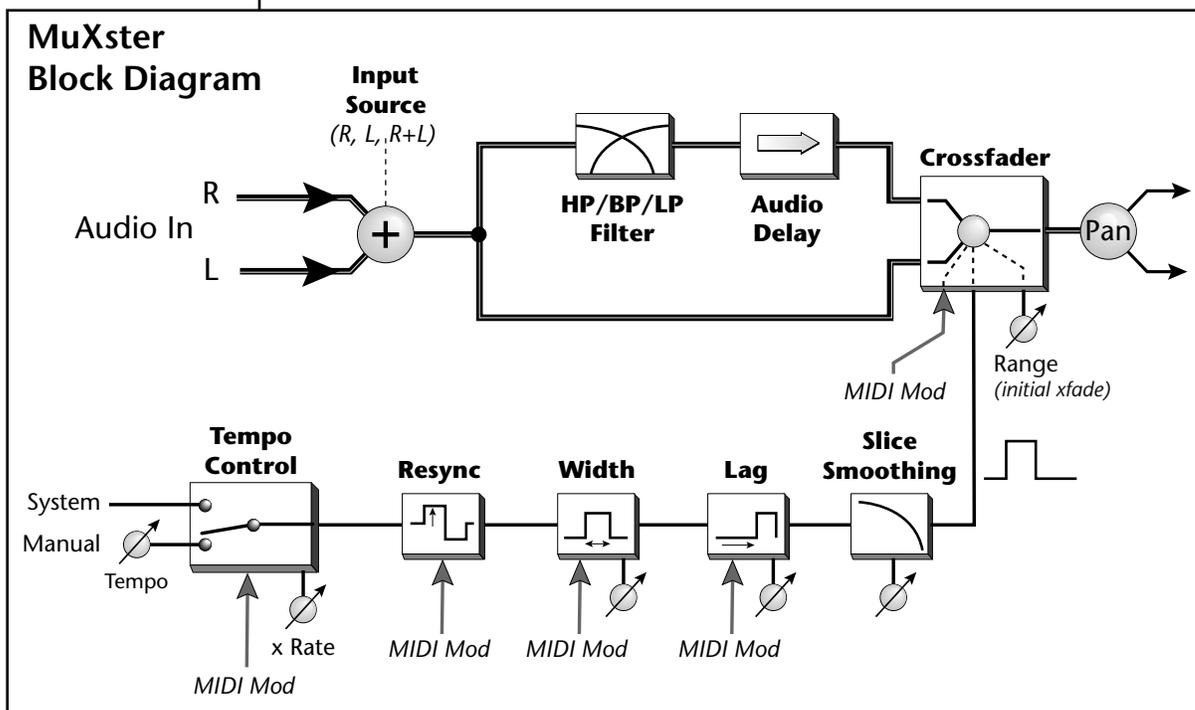
MuXster Block Diagram

MuXster Parameters:

Please refer to the MuXster block diagram on the previous page to better understand the effect and modulation routings.

Tempo Control Selects between Manual tempo control or the System (Seq/Arp/MIDI) clock.

Tempo When the Tempo Control is set to Manual, this control sets the Tempo directly from 20-360 bpm. When Tempo Control is set to "System", this control is inactive.

Slice Smoothing Controls the amount of smoothing applied to the pulse wave chopper (None,1-9, Max). Small values of smoothing serve to remove the audible "ticks" caused by the rapid change of amplitude. With large amounts of smoothing applied, the pulse wave becomes more sine-like and the MuXster changes from a chopper/switcher to a crossfader.

MIDI Controls
Wet/Dry Mix
FX Input Level
FX Output Level
Tempo
Resync
Slice Width
Slice Range

✏️ **Resync** - *This MIDI control restarts the clock whenever the controller value changes from zero to a positive number. Resync is useful to synchronize the Muxing with the beat of the music.*

Slice Rate	Slice Rate is a divisor/multiplier of the Tempo (Tempo/8 - Tempo x 32). There is also a "freeze" setting which locks the MuXster in bypass mode.
Slice Width	This control sets the pulse width of the slice or how much time the crossfader spends on each of the two inputs. The following widths are available: 1/32, 1/16, 1/8, 1/4, 1/2, 3/4, 31/32 slice.
Slice Lag	Slice Lag delays the pulse by the following increments: None, 1/32, 1/16, 1/8, 1/4, 1/2, 3/4, 31/32 slice. This control is helpful with some types of audio signals to "zero-in" on the desired section to be sliced.
Slice Range	This important control adjusts the relative mixture of the two inputs. With the Range set at 100%, only the processed input will be gated on and off. At a setting of 50%, the MuXster will switch (or fade) back and forth between the two inputs. At a setting of 0%, the output will be mostly unprocessed audio with slices of processed audio being heard at reduced volume.
Audio Delay	This processor delays the signal input by a fixed amount before the crossfader. Serious audio scrambling is possible when the time shifted audio is switched (or faded) back and forth with the original signal. Audio Delay is adjustable in 1/128, 1/64, 1/32, 1/16, 1/8, 3/16, 1/4 note increments.
EQ Type	This control selects which type of filter (or none) will be inserted into the processed channel: Lowpass, Bandpass, or Highpass. When using instrument sounds instead of spoken words, EQ is highly effective to differentiate the two signals.
EQ Frequency	The frequency control sets the cutoff frequency of the highpass and lowpass filters or the center frequency of the bandpass filter. The frequency is adjustable from 50Hz to 12,800Hz in 25 increments.
Input Source	Selects which channels will be used for the input to the MuXster. The choices are: Left, Right, or the sum of Left and Right channels.
Pan	The monophonic output of the MuXster can be panned anywhere in the stereo field.

✒️ *Check out the Audio Delay parameter using spoken word as the input source.*

Quad MuXster

The Quad MuXster is a MuXster times four! Now you have four slicers to chop your music all to hell. The four slices can be connected in a variety of series/parallel combinations and the output level of each slice can be controlled via MIDI.

The block diagram of the Quad MuXster is shown below.

Quad MuXster Block Diagram
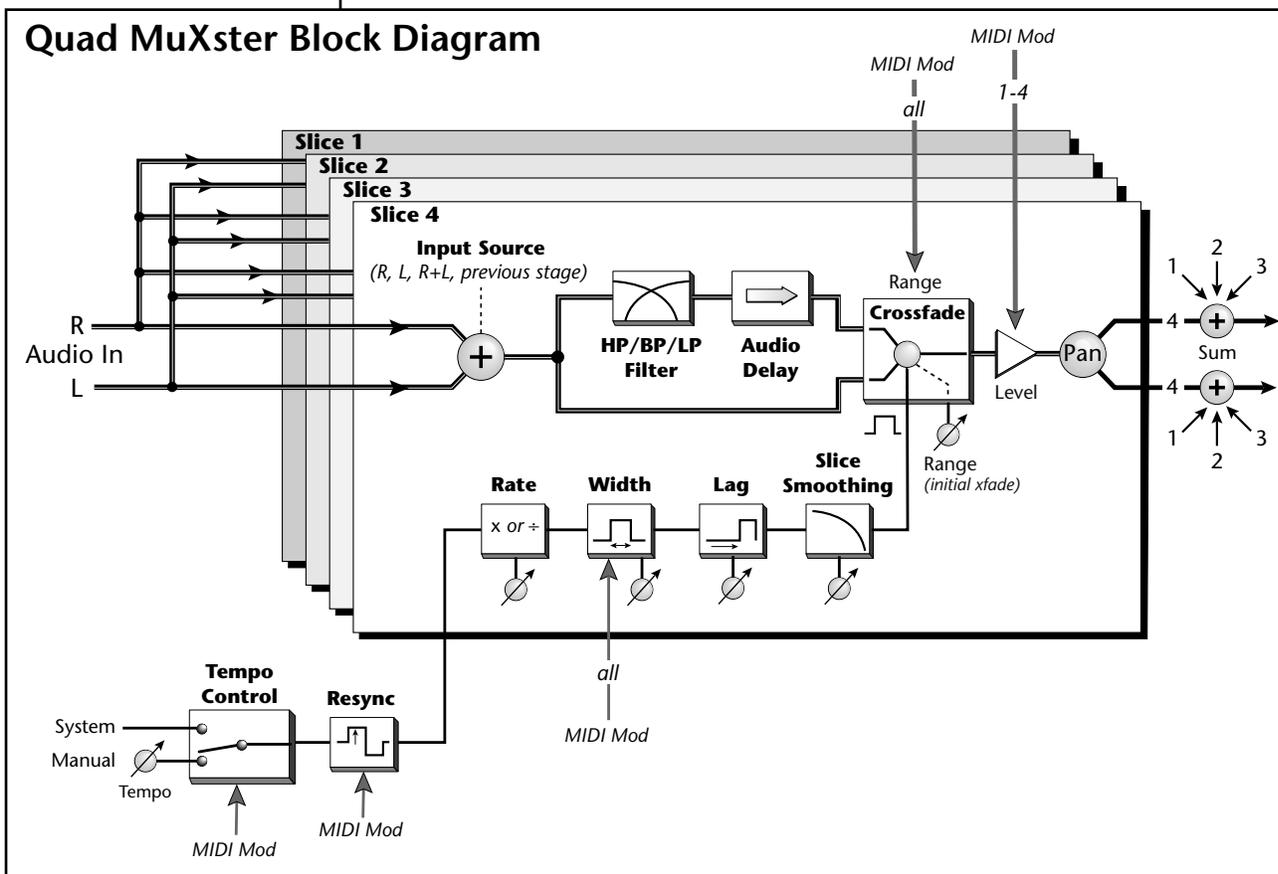
The Tempo control and Resync control are common to all four slices. Other notable differences are the "Previous Stage" selection in the Input section and the addition of a MIDI Controllable Level on each slice.

Quad MuXster Parameters:

Please refer to the MuXster block diagram on the previous page to better understand the effect and modulation routings.

Tempo Control Selects between Manual tempo control or the System (Seq/Arp/MIDI) clock.

Tempo When the Tempo Control is set to Manual, this control sets the Tempo directly from 20-360 bpm. When Tempo Control is set to "System", this control is inactive.

✎ *Resync - This MIDI control restarts the clock whenever the controller value changes from zero to a positive number. Resync is useful to synchronize the Muxing with the beat of the music.*

✎ **MIDI Controls**
Wet/Dry Mix
FX Input Level
FX Output Level
Tempo
Resync
Slice Width
Slice Range
Slice 1 Level
*Slice 2 Level*
Slice 3 Level
Slice 4 Level

📌 *Check out the Audio Delay parameter using spoken word as the input source.*

Slice Smoothing Controls the amount of smoothing applied to the pulse wave chopper (None,1-9, Max). Small values of smoothing serve to remove the audible "ticks" caused by the rapid change of amplitude. With large amounts of smoothing applied, the pulse wave becomes more sine-like and the MuXster changes from a chopper/switcher to a crossfader.

Slice # Selects which slice you want to adjust.

Slice Rate Slice Rate is a divisor/multiplier of the Tempo (Tempo/8 - Tempo x 32). There is also a "freeze" setting which locks the MuXster in bypass mode.

Slice Width This control sets the pulse width of the slice or how much time the crossfader spends on each of the two inputs. The following widths are available: 1/32, 1/16, 1/8, 1/4, 1/2, 3/4, 31/32 slice.

Slice Lag Slice Lag delays the pulse by the following increments: None, 1/32, 1/16, 1/8, 1/4, 1/2, 3/4, 31/32 slice. This control is helpful with some types of audio signals to "zero-in" on the desired section to be sliced.

Slice Range This important control adjusts the relative mixture of the two inputs. With the Range set at 100%, only the processed input will be gated on and off. At a setting of 50%, the MuXster will switch (or fade) back and forth between the two inputs. At a setting of 0%, the output will be mostly unprocessed audio with slices of processed audio being heard at reduced volume.

Audio Delay This processor delays the signal input by a fixed amount before the crossfader. Serious audio scrambling is possible when the time shifted audio is switched (or faded) back and forth with the original signal. Audio Delay is adjustable in 1/128, 1/64, 1/32, 1/16, 1/8, 3/16, 1/4 note increments.

EQ Type This control selects which type of filter (or none) will be inserted into the processed channel: Lowpass, Bandpass, or Highpass. When using instrument sounds instead of spoken words, EQ is highly effective to differentiate the two signals.

EQ Frequency The frequency control sets the cutoff frequency of the highpass and lowpass filters or the center frequency of the bandpass filter. The frequency is adjustable from 50Hz to 12,800Hz in 25 increments.

Input Source Selects which channels will be used for the input to the MuXster. The choices are: Left, Right, the sum of Left and Right channels, or the Previous Slice.

Pan The monophonic output of the each MuXster Slice can be panned anywhere in the stereo field.

Output Level Controls the volume of each MuXster Slice, variable from 0% to 100%. The default Level setting of slices 2 - 4 is 0%. **You must turn the Output Level up on Slices 2 - 4 in order to hear them.**

A few possible routing configurations

The diagrams below show just a few of the possible routing configurations for the Quad MuXster. If you crave more audio mayhem, you can always connect multiple Quad MuXsters in series or parallel in the RFX Setup Manage Screen.

Parallel

Series

Series/Parallel

Mad Slicer
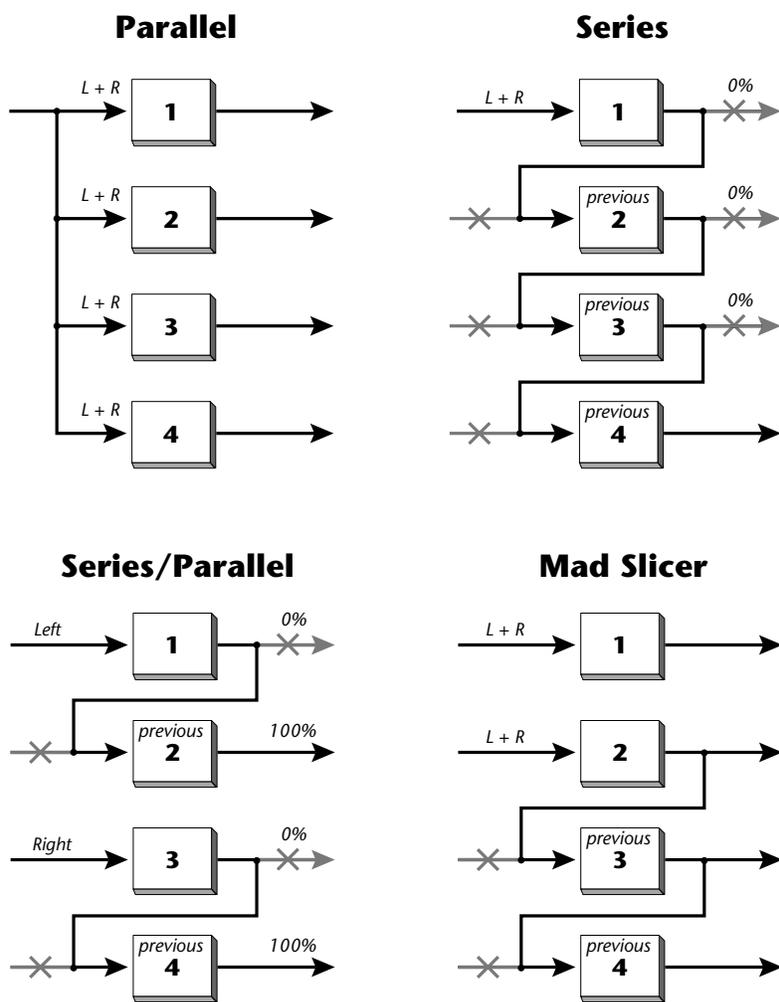
Vocoder

The name Vocoder stands for "Vocal-Coder" and was originally designed as a way to data compress speech signals for the telephone industry. In music synthesis, the vocoder is used to impose the audio spectrum of one signal onto another. The vocoder utilizes two banks of 13 matched band-pass filters linked together so that the Synthesis bank filters follow the energy in the corresponding Analysis bank filters. Speech is typically used for the *Analysis* signal in order to make the *Synthesis* signal speak. Other signals also produce interesting results, such as a drum loop on the Analysis input.

Up to four vocoders can be connected in parallel to increase the number of frequency bands and resolution. See page 56 for details.

The vocoder works best if the Synthesis channel is fed with a sound rich in harmonics. This gives the bank of filters plenty of material to work with. Buzzy, razzy sounds work well for the Synthesis signal, especially if human voice is being Analyzed. No sound will be output from the vocoder if the frequencies present in the Analysis and Synthesis banks do not overlap.

The block diagram of the Vocoder is shown below.

Vocoder Block Diagram
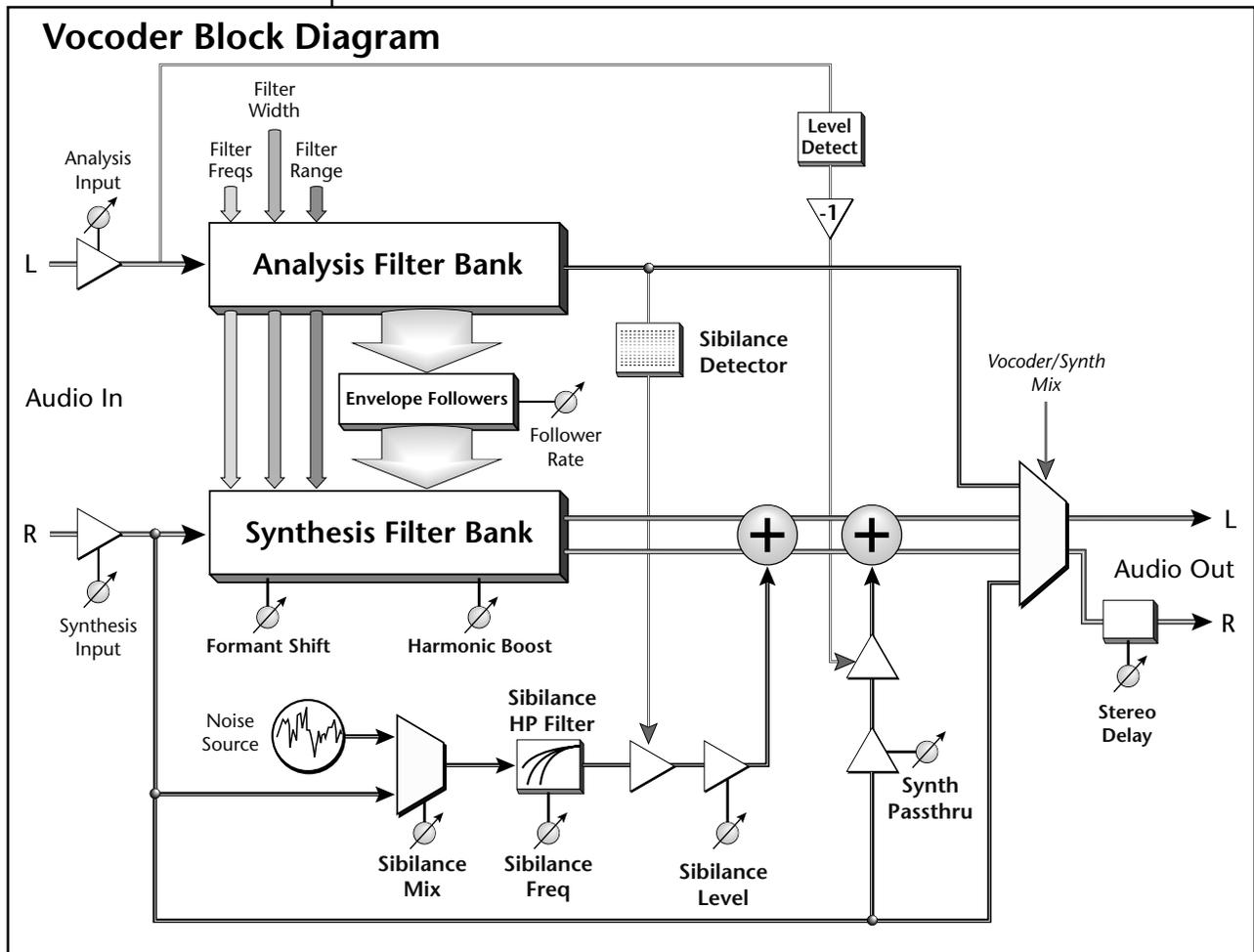
Sibilance is the hissing sound we make when pronouncing the letters "S", "Sh". "F", "Ch", "Th", etc. A special section of the vocoder is dedicated to detecting and reproducing these important speech sounds in the Synthesis output. The Sibilance detector tracks the presence of "S" sounds in the Analyzer and controls the amount of high pass filtered, noise/synthesis signal mix allowed into the output.

Vocoder Parameters:

Please refer to the Vocoder block diagram on the previous page while learning these controls.

Filter Freqs   This control allows you to set the frequency of the **lowest** Vocoder filter band. The lower band can be set to any frequency between 50Hz - 4,000Hz, and is shown as a range such as "150-3250". This is the complete frequency range of the Vocoder. The Filter Range setting, described below, sets the overall extent of the frequency range.

Filter Range   The Filter Range sets the extent of the Vocoder filter banks, allowing you to exactly specify the portion of the audio spectrum covered by the vocoder. Whereas the Filter Freqs control sets the lowest frequency band, the Filter Range sets the distance between the lowest and highest frequency band. This control is variable from 800Hz - 10kHz.

Filter Width   This parameter sets the bandwidth of each filter band and is variable from 2% to 50%. A setting of 50% sets the -3dB point halfway to the next band. The minimum setting of 2% creates narrow metallic-sounding peaks. The default setting of 25% is probably the best choice for speech. You may want to adjust the Filter Width depending on your program material.
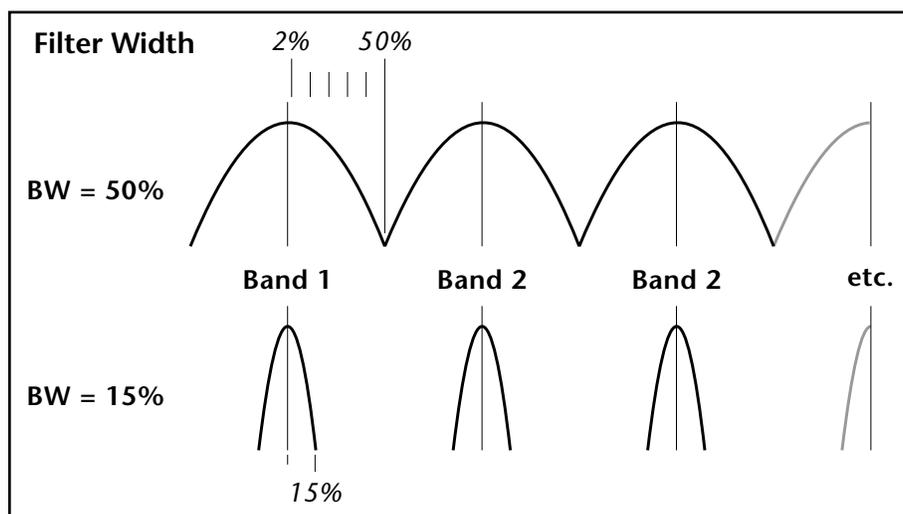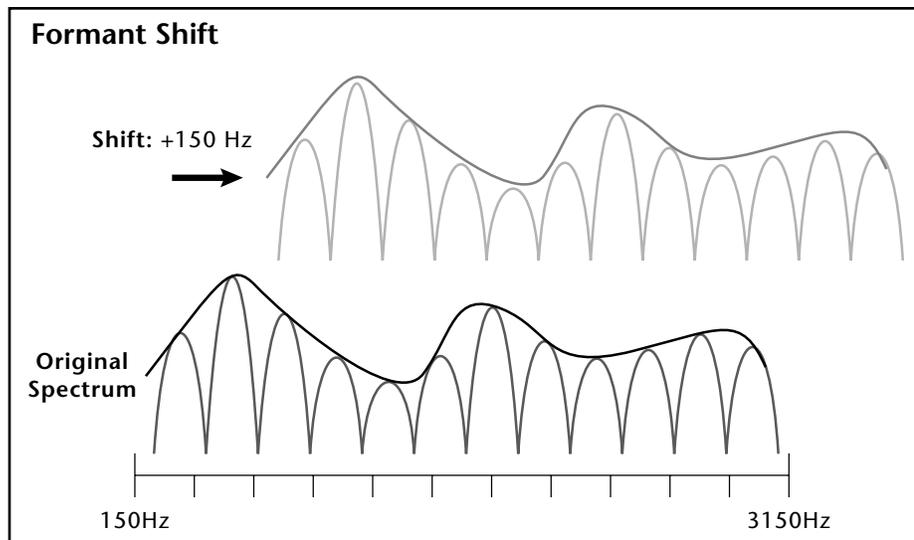
Harmonic Boost This control processes the Synthesis filter bank through a high frequency EQ to help improve the intelligibility with certain types of program material. It is particularly effective on Synthesis signals that are weak in high-frequency content. The control range is from 0 to +25 Eµ's.

Formant Shift Formant Shift allows you to offset the Analysis and Synthesis filter banks up to 1000 Hz in either direction. This has the effect of pitch shifting your voice.

The vocoder analyzes your voice *(or the input to the analysis channel)* as a continuously changing frequency response curve. The series of peaks and valleys of this curve is called a *formant*. When the Formant Shift parameter is set to "No Shift", the frequencies of the Analysis and Synthesis filter banks match. Formant Shift moves the frequencies of the Synthesis filter bank up or down so that they no longer match the Analysis bank. The response curve remains intact, but it is now applied to a different range of frequencies.

This has an effect similar to transposing the pitch, which can be useful for improving the intelligibility of the output. For example, with a high-pitched Synthesis source, you could shift your voice formant upward so that both the Synthesis bank is in the same frequency range as your voice.

Formant Shift

Shift: +150 Hz

Original Spectrum

150Hz   3150Hz

✎ **MIDI Controls**
Wet/Dry Mix
FX Input Level
FX Output Level
Vocal/Synth Mix

Sibilance Level This control adjusts the degree of sibilance or "S" sounds which are added into the output. If you're using speech as the Analysis input, careful adjustment of this control will help produce more intelligible output. When using other types of Analysis inputs, you may want to turn this control down.

Sibilance Mix This control adjusts the balance between the Synthesis signal and the Noise Source which are input to the Sibilance Highpass Filter. This parameter, in combination with the Sibilance Frequency, can be adjusted to give a more natural sibilance sound or a highly unnatural sound.

Sibilance Freq This controls the cutoff frequency of the Sibilance Highpass Filter in the Analysis and Synthesis banks in sixteen steps from 5800Hz to 11800Hz. This parameter can be tuned to increase the accuracy of the Sibilance Detector in the Analysis bank.

Synth Passthru This parameter sets the level of Synthesis signal that is allowed to pass in the absence of a Analysis signal. With the control set to 0%, both Analysis and Synthesis channels must be active in order to hear any output.

When Synth Passthru is turned up, the raw Synthesis input will be bypassed around the Synthesis filter bank in the absence of an Analysis signal. When the Analysis is detected, the bypassed signal will be turned down (or ducked) so that the vocoded signal can be heard. Refer to the Vocoder block diagram for a graphic representation of this function.

Follower Rate This parameter controls the rate of a Lag processor on the output of the envelope signals from the Analysis filter bank. The Follower Rate control can produce spectral smearing at the slowest rate (1), or a sharp, mechanical sound at the fastest rate. Intermediate settings tend to produce the most natural speech.

Stereo Delay A delay from 1 to 50 ms can be applied to the right output of the Synthesis filter bank in order to create a simulated stereo signal. Since the vocoder does its processing in mono, this control can impart a pseudo stereo image to the signal.

Analysis Input This gain cell controls the Analysis input level and is variable from -20 dB to +25 dB.

The vocoder performs best with a strong signal level (but not clipping). A weak Analysis level will result in lack of definition and low output. A weak Synthesis signal will result in low output and more noise. The wide range of the Analysis and Synthesis Input controls makes it easy to get a proper level with almost any input.

Synthesis Input This gain cell controls the Synthesis input level and is variable from -20 dB to +25 dB.

👀 *Before using the pitch wheel for Vocal/Synth Mix, you might want to first disconnect its pitch controlling function or use another MIDI channel.*

Vocal/Synth Mix

This is one of the vocoder MIDI Modulation parameters, accessible from the EditMod pop-up screen. It's operation is a bit unorthodox and so deserves an explanation.

When a bidirectional MIDI Controller, such as a synthesizer Pitch Wheel, is patched to Vocal/Synth Mix, it works as a three-way crossfader.

- **Pitch Wheel Center** - The Vocoder output is heard.

- **Pitch Wheel Down** - Only the Synthesis input is heard.

- **Pitch Wheel Up** - Only the Analysis input is heard.
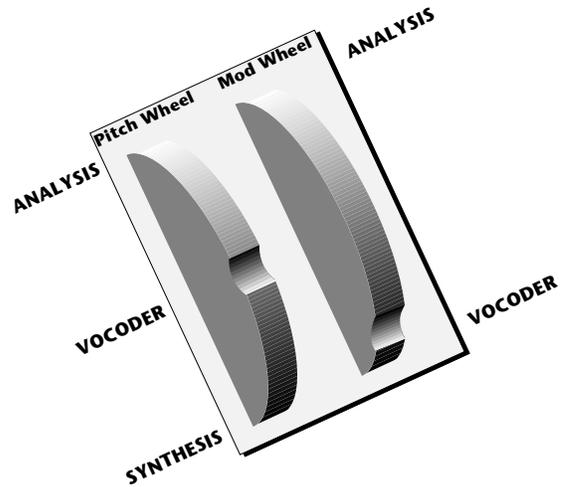
When a unidirectional MIDI Controller, such as a synthesizer Mod Wheel, is patched to Vocal/Synth Mix, it works as a two-way crossfader.

- **Mod Wheel Down** - The Vocoder output is heard.
- **Mod Wheel Up** - The Analysis input is heard.

Vocoder Tips & Tricks

1. Use abroad spectrum sounds with many harmonics for the Synthesis input. A sawtooth wave or other buzzy sound is ideal. Noise-like sounds also work well. Sine waves or thin, hollow sounds generally do NOT work well. **Avoid highly resonant sounds** as these will cause clipping.

2. **Make sure Chorus is turned OFF** in the Voice Modifiers page. Chorus works by blending the right & left channels, ruining the vocoder effect.

🖈 *The front panel volume knob can also affect the vocoder input level settings.*

3. Make use of the wide-range input level controls of the Vocoder. If the input levels are set too low, you won't hear the effect. If the levels are set too high, you may get distortion or garbled output.

4. If you're using a high or low pitched sounds for the Synthesis input, try using the Formant Shift parameter to match the speech to the Synthesis material.

5. To improve the intelligibility of the speech signal, try mixing some of the speech input into the carrier using the Vocoder/Synth Mix modulation source.

Patching into the Vocoder

The vocoder is a little different than any of the other effects because it uses the left and right channels as separate inputs. The Left channel goes to the *Analysis* input and the Right channel goes to the *Synthesis* input.

The next two sets of steps take you through the process of creating a Vocoder Effect, the Vocoder Setup and a Vocoder MultiSetup. Once these objects are created and saved, you can use them as building blocks for further experiments.

Create an RFX Vocoder Effect & Setup

1. Press the **Master** key. The LED illuminates and the main master screen appears.

2. Press the **FX** function key. Another row of function keys appears.

3. Press the **REffect** function key. The RFX Effect Manage screen appears.

4. Press the **New** function key. A pop-up dialog box asks you to select the location for the new Effect. An empty location will be selected by default. Press **OK**.

5. A pop-up dialog box asks you to name the new Effect. **Name the Effect** to avoid confusion later, then press **OK**.

6. Press the **Edit** function key. The RFX Effect edit screen appears.

7. Select the **Vocoder** Plug-in on the top line of the display.

8. Press the **Exit** button on the Emulator front panel. A pop-up dialog box will momentarily display, "Writing RFX Effect".

9. Press the **Exit** button again, then press the **RSetup** function key. The RFX Setup Manage screen appears.

10. Press the **New** function key. A pop-up dialog box asks you to select the location for the new Setup. An empty location will be selected by default. Press **OK**.

11. A pop-up dialog box asks you to name the new Setup. **Name the Setup** to avoid confusion later, then press **OK**.

12. Press the **Edit** function key. The RFX bus setup screen appears. Bus 1 will be selected on the top line of the display. *(If not, select Bus 1.)*

13. Select the Vocoder Effect you created (in steps 4-7 above) in the Effect 1 slot. Set the Wet/Dry mix to 100%. The Main Bus output should also be set to 100%.

14. Press the **Master** button on the Emulator front panel. The LED will extinguish.

15. **Save** the Bank.

✎ **Note:** *if you select location M000, the Multisetup will automatically be selected whenever you re-load the bank.*
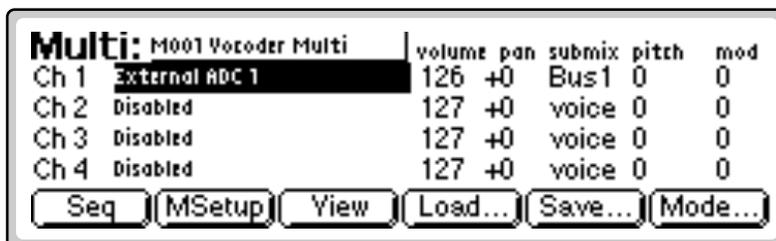
Create a Vocoder MultiSetup

1. In order to keep everything organized, let's create a new MultiSetup which points to the Vocoder RFX Setup.

2. Press the **MSetup** function key. A pop-up dialog box asks you to select a location for the Multisetup.

3. Select a MultiSetup location and press **OK**.

4. Now a pop-up dialog box asks you to name the Multisetup. Name the MultiSetup, "Vocoder Multi" or something similar. Press **OK**.

5. Press the **Edit…** function key. A pop-up selection box appears.

6. On the last line after RFX Setup, choose the Vocoder Setup you created earlier. Press **OK**.

7. **Save** the Bank.

☞ Connecting External Inputs to the Vocoder

You can use any of the Emulator's external inputs including: ADAT inputs, analog inputs from the Analog Input Card, AES/EBU input, or the sampling ADC.

The easiest way to do this is from the Multimode screen. Select **Multimode** if it's not already selected. (Press **Mode**, then **Multi** from the main screen.)

1. Make sure your Vocoder MultiSetup is selected.

2. Select the **External Input** you want to use by turning the data entry control counter-clockwise. In the example below we're using a pair of the External Analog Inputs.

3. Select **Bus 1** on the Submix Send. This is the bus on which the Vocoder was assigned earlier (page 49).

```
Multi: M001 Vocoder Multi    volume pan submix pitch  mod
Ch 1  External ADC 1         126   +0  Bus1   0      0
Ch 2  Disabled               127   +0  voice  0      0
Ch 3  Disabled               127   +0  voice  0      0
Ch 4  Disabled               127   +0  voice  0      0
   [ Seq ][MSetup][ View ][Load…][Save…][Mode…]
```

4. Connect the left and right inputs (A & B on Ch. 1 for the example above) to an audio source such as the output of a microphone pream-plifier or any line level signal.

✎ *The Synthesis channel should normally be a harmonically rich signal.*

• The **Left** input is the **Analysis** channel.

• The **Right** input is the **Synthesis** channel.

5. With both input signals playing, you should be hearing the Vocoder.

6. Go to the RFX Setup screen if you wish to edit the Vocoder effect. (Master, FX, RSetup, Edit, EditFX).

☞ **Vocoding Emulator Presets with a Microphone**

Instead of using an external microphone preamp you can use the one that's already built in to your Emulator—the sampling ADC. Before following the steps below, make sure you've created the Vocoder Effect, Setup and Multi-Setup as described on page 49.

First -> Load a bank, then Merge the Vocoder Multisetup bank

1. Load a bank containing harmonically rich sounds that you wish to process through the vocoder.

2. Merge the bank containing the **Vocoder Multisetup** you saved earlier.

3. **Select** your Vocoder MultiSetup. (Press **MSetup**, select it, then **Exit**.)

4. **Save** the Bank.

Ready

1. Connect a microphone to the **Left** Sample Input channel on the rear of the Emulator.

2. Select the **Sampling ADC** on MIDI channel 1 by first selecting the Preset field, then turning the data entry control counter-clockwise all the way, then slowly turning it clockwise until you find the Sampling ADC selection as shown below.

3. Select **Bus 1** on the Submix Send. This is the bus on which the Vocoder was assigned earlier (page 49).

```
Multi: M001 Vocoder Multi          volume pan submix pitch   mod
Ch 1  Sampling ADC                  126   +0  Bus1   0       0
Ch 2  Disabled                      127   +0  voice  0       0
Ch 3  Disabled                      127   +0  voice  0       0
Ch 4  Disabled                      127   +0  voice  0       0
      [ Seq ][MSetup][ View ][Load...][Save...][Mode...]
```

4. Select a harmonically rich preset on MIDI channel 2.

```
Multi: M001 Vocoder Multi          volume pan submix pitch   mod
Ch 1  Sampling ADC                  126   +0  Bus1   0       0
Ch 2  2001 Marcato Strings          127  +63  Bus1   0       0
Ch 3  Disabled                      127   +0  voice  0       0
Ch 4  Disabled                      127   +0  voice  0       0
      [ Seq ][MSetup][ View ][Load...][Save...][Mode...]
```

5. Select **Bus 1** on the Submix Send for channel 2.

6. Set the **Pan** control full **Right** (+63). The rich sampled sound will be our Synthesis input and we want it *only* on the right input.
(We didn't have to do this on the Sampling ADC, since it's plugged directly into the left channel only. If both channels were internal samples, you *would* pan them hard right and hard left.)

Sidebar:

👓 **Caution:** *Because a vocoder works by accentuating selected frequencies in the Analysis channel, it can be prone to feedback when using a microphone and monitoring through speakers in a room. Be careful!*

✎ **Pan Settings**
-64 = Full Left
+63 = Full Right

This is probably a good time to remind you that the Pan control in the Multimode screen *Adds* to any pan settings made in the Preset. Therefore, if the pan settings in the Preset Edit menu just happen to be panned to -64, setting the Pan control here to +63 will only return the pan position to center and the vocoder won't work correctly. You just might want to check on this before proceeding.

7. Now we'll set up the Mic input. Press the **Sample Manage** button.

8. Press the **New** function key. The Create Sample page appears.

9. Move the cursor down to the **ADC Gain** field and increase the gain using the data entry control while speaking into the microphone. You'll see the level meters respond as you speak.

☙☙ Important: *The ADC Gain setting is NOT saved with the bank. It gets reset to 0 dB each time the Emulator is powered down.*

10. Press the **Sample Manage** button again to exit the menu.

11. In the Multimode screen, highlight the Preset on channel 2 as shown in the screen in step 4 above.

12. Press the **Preset Edit** button.

13. Press the **Global** function key.

14. Move the cursor down to the **RFX Setup** field and select the **Vocoder Setup** you created earlier. It's important that "TwoFX (legacy) mode" is NOT selected.

15. Press the **Preset Edit** button, exiting the menu.

16. Set your MIDI keyboard to transmit on channel 2 and begin playing. You should now be hearing the vocoder as you play the keyboard and speak into the microphone.

17. Go to the RFX Setup screen if you wish to edit the Vocoder effect. (Master, FX, RSetup, Edit, EditFX).

☞ **Connecting Internal Presets to the Vocoder by MIDI Channel**

Instead of using external sources, you can use two presets to feed the vocoder. To play this setup, you'll need a MIDI Keyboard which can transmit on two MIDI channels simultaneously. With your MIDI Keyboard set up with a keyboard "split", you can play the Analysis and Synthesis sounds separately. You could also set it up to play the two MIDI channels in a layered fashion, so that a single key would trigger both the Analysis and Synthesis channels.

First -> Load a bank, then Merge your Vocoder Multisetup bank

1. Load a bank containing the sounds that you want to use with the vocoder. Make sure that you have some buzzy sounds for the Synthesis channel and maybe a few drum loops or spoken word samples to use as Analyzer inputs.

2. Merge the bank containing the **Vocoder Multisetup** you saved earlier.

3. **Select** your Vocoder MultiSetup. (Press **MSetup**, select it, then **Exit**.)

4. **Save** the Bank.

Second

The quickest way to do this is from the Multimode screen. Select **Multimode** if it's not already selected. (Press **Mode**, then **Multi** from the main screen.)

1. Make sure your Vocoder MultiSetup is selected.

2. Select the Preset you wish to use for the **Analyzer Input** on MIDI channel 1.

3. Select **Bus 1** on the Submix Send. (The Vocoder is assigned to Bus 1 in the Vocoder MultiSetup.)

> **Multi:** M001 Vocoder Multi
> | | | volume | pan | submix | pitch | mod |
> |---|---|---|---|---|---|---|
> | Ch 1 | P046 Drum Loop 3 | 127 | -64 | Bus1 | 0 | 0 |
> | Ch 2 | Disabled | 127 | +0 | voice | 0 | 0 |
> | Ch 3 | Disabled | 127 | +0 | voice | 0 | 0 |
> | Ch 4 | Disabled | 127 | +0 | voice | 0 | 0 |
>
> [Seq] [MSetup] [View] [Load...] [Save...] [Mode...]

✏️ ***Pan Settings***
-64 = Full Left
+63 = Full Right

4. Set the **Pan** control full **Left** (-64). This will be our Analyzer input and we want it *only* on the left input.

5. Select a harmonically rich preset on MIDI channel 2.

> **Multi:** M001 Vocoder Multi
> | | | volume | pan | submix | pitch | mod |
> |---|---|---|---|---|---|---|
> | Ch 1 | P046 Drum Loop 3 | 127 | -64 | Bus1 | 0 | 0 |
> | Ch 2 | P047 Buzz Kill | 127 | +63 | Bus1 | 0 | 0 |
> | Ch 3 | Disabled | 127 | +0 | voice | 0 | 0 |
> | Ch 4 | Disabled | 127 | +0 | voice | 0 | 0 |
>
> [Seq] [MSetup] [View] [Load...] [Save...] [Mode...]

6. Select **Bus 1** on the Submix Send for channel 2.

7. Set the **Pan** control full **Right** (+63). The rich sampled sound will be our Synthesis input and we want it *only* on the right input.

8. Set up your MIDI Keyboard to transmit on MIDI channels 1 & 2, and you're ready to go.

• If you get bleeding between the Analyzer and Synthesis channels, check the pan settings in the Preset Edit screens to make sure they're panned correctly.

☞ **Connecting two Voices to the Vocoder**

Voices within a single Preset can also be used to feed the vocoder. This method allows you great flexibility, since each key can have a different vocoder effect. It also works with a single MIDI channel.

1. Load the bank you wish to use.

2. Put the Emulator in "Whole" mod.
(Press **Mode**, then **Whole** from the main screen.)

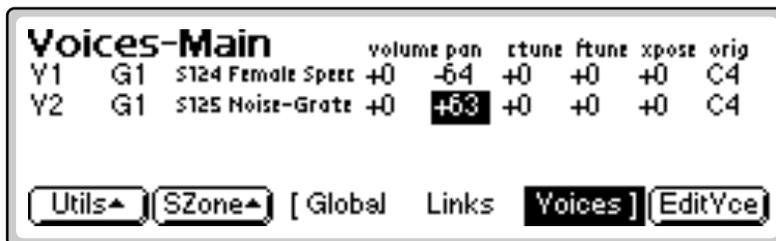*First create a new Preset. This will help keep everything organized.*

3. Press the **Preset Manage** button.

4. Press the **New** function key. A pop-up dialog box appears asking you to select the location for the new Preset.

5. Press **OK** to select the first empty Preset location. Another pop-up dialog box appears asking you to name your new Preset.

6. **Name the Preset**, then press **OK**.

Now make a couple of voices.

7. Press the **Preset Edit** button. The screen shown below appears.

```
Voices-Main          volume pan  ctune ftune xpose orig
V1   G1  S000 Empty Sam +0   +0   +0   +0   +0   C4



 (Utils▲)(SZone▲) [ Global   Links   Voices ](EditVce)
```

8. Select a sample for the **Analysis** channel on Voice 1.

9. Press the **Utils** function key. A second row of function keys appears.

10. Press the **New** function key. A new voice is added to the list

11. Select a sample for the **Synthesis** channel on Voice 2.

✎ ***Pan Settings***
-64 = Full Left
+63 = Full Right

12. Set the pan controls so that the Analysis Voice is panned hard left (-64) and the Synthesis Voice is panned hard right (+63). The screen should look something like the one shown below.

```
Voices-Main          volume pan  ctune ftune xpose orig
V1   G1  S124 Female Speec +0  -64  +0   +0   +0   C4
V2   G1  S125 Noise-Grate +0  +63  +0   +0   +0   C4


 (Utils▲)(SZone▲) [ Global   Links   Voices ](EditVce)
```

Now choose the RFX Setup and assign the Effect Send.

13. Press the **Global** function key. The Preset Globals page appears.

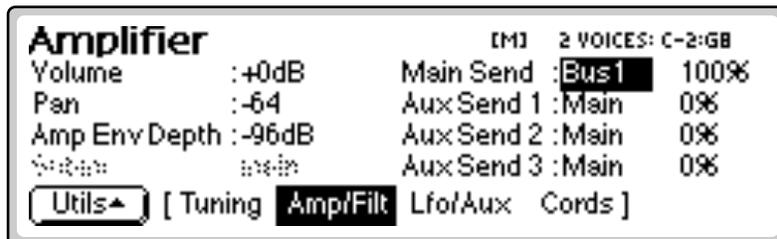14. Move the cursor down and set the RFX Setup to point to your Vocoder setup.

```
Preset Globals
Transpose :0 semitones         Initial Controller A : off
Volume    :+0dB                Initial Controller B : off
                               Initial Controller C : off
RFX Setup :001 Vocoder Setup   Initial Controller D : off
                  [ Global    Links    Voices ] [ EditFX ]
```

15. Move the cursor up off the RFX Setup field. Note that the "EditFX" button changes to "EditAll".

16. Press the **EditAll** function key. The Amplifier page appears.

17. Press the **Right Cursor** button to move the cursor to the Main Send field. *(Any of the Sends can be used, but we'll use Main in this example.)*

18. Select **Bus 1** for the Main Send with an amount of 100%.

```
Amplifier                    [M]   2 VOICES: C-2:GB
Volume        :+0dB      Main Send  :Bus1      100%
Pan           :-64       Aux Send 1 :Main        0%
Amp Env Depth :-96dB     Aux Send 2 :Main        0%
                         Aux Send 3 :Main        0%
[ Utils▲ ] [ Tuning   Amp/Filt  Lfo/Aux   Cords ]
```

19. You should now be hearing the Vocoder when you play a key on the keyboard.

20. Remember to **save the bank** if you want to keep your work.

Other tips:

• You might want to turn **Solo mode on** for the Analysis Voice, especially if you're using a drum loop or spoken word. Otherwise you'll get multiple copies of the speech when you play a chord.

• You can restrict the range of the Analysis and Synthesis Voices from the **Vces-KyWin** screen if you want to control them separately.

• Make sure Voice Chorus is turned **Off**. Otherwise you'll get audio bleeding between the Analysis and Synthesis channels.

Advanced App. - Connecting Several Vocoders in Parallel

Several Vocoders can be connected in parallel using two or more RFX busses. This provides more filter bands and finer resolution. In this example we'll connect two vocoders in parallel to form a 26 band vocoder. This technique can easily be extended to provide up to 52 vocoder bands using 4 vocoders.

☞ **To Connect 2 Vocoders in Parallel:**

Create a new RFX Setup

1. Press the **Master** key. The LED illuminates and the main master screen appears.

2. Press the **FX** function key. Another row of function keys appears.

3. Press the **RSetup** function key. The RFX Setup Manage screen appears.

4. Press the **New** function key. A pop-up dialog box asks you to select the location for the new Setup. An empty location will be selected by default. Press **OK**.

5. A pop-up dialog box asks you to name the new Setup. **Name the Setup** to avoid confusion later, then press **OK**.

6. Press the **Edit** function key. The RFX bus setup screen appears. Bus 1 will be selected on the top line of the display. *(If not, select Bus 1.)*

7. Select the Vocoder Effect you created earlier in the Effect 1 slot. Set the Wet/Dry mix to 100%. The Main Bus output should also be set to 100%.

The default frequency range setting for a single vocoder is 150-3250 Hz. We'll now divide the frequency range in half for the vocoder on Bus 1 (150-1650 Hz).

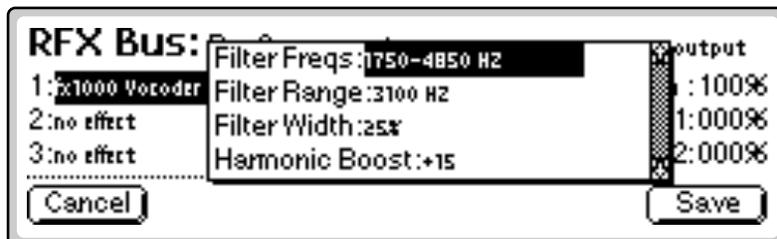8. Press the EditFX function key. A pop-up selection box appears.

9. Cursor down and turn **Advanced Parameters** on. Additional controls now appear.

10. Set the Filter Range to **1500 Hz**.

11. Press the **Save** function key.

Now we'll set up another vocoder on Bus 2 and set it's frequency range for 1750-3250 Hz.

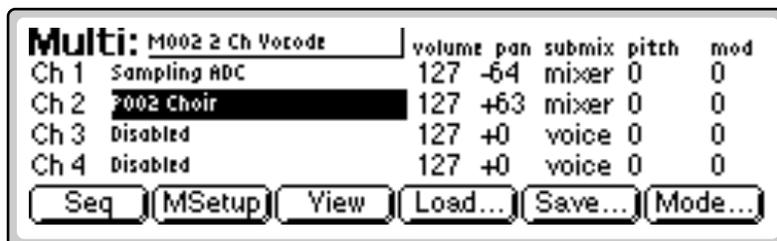12. Select **Bus 2** on the top line of the display.

13. Again, select the Vocoder Effect in the Effect 1 slot of **Bus 2**. Set the Wet/Dry mix to 100%.

14. Press the EditFX function key. A pop-up selection box appears.

15. Cursor down and turn **Advanced Parameters** on. Additional controls now appear.

16. Type in **1750 Hz** for the Filter Freq. and press the **Set** function key.

```
RFX Bus:                              output
         Filter Freqs:1750-4850 HZ
1:x1000 Vocoder Filter Range:3100 HZ        :100%
2:no effect    Filter Width:25%            1:000%
3:no effect    Harmonic Boost:+15          2:000%

 Cancel                                  Save
```

17. Set the Filter Range to **1500 Hz**. The Filter Frequency range changes to display 1750-3250 Hz.

18. Press the **Save** function key.

19. Press the **Exit** key three times to return to the Main Screen.

The frequency ranges of the two vocoders no longer overlap. Now we'll assign our Effect Sends to the RFX busses.

20. Select **Multimode** if it's not already selected. (Press **Mode**, then **Multi** from the main screen.)

21. Set up MIDI channels 1 & 2 just like you did in the previous step-by-step instructions. Pan the Analysis channel hard left (-64) and the Synthesis channel hard right (+63). As always, choose a harmonically rich sound for the Analysis channel.

```
Multi: M002 2 Ch Vocode    volume pan submix pitch  mod
Ch 1  Sampling ADC          127  -64  mixer   0     0
Ch 2  2002 Choir            127  +63  mixer   0     0
Ch 3  Disabled              127  +0   voice   0     0
Ch 4  Disabled              127  +0   voice   0     0
   Seq    MSetup    View    Load...  Save... Mode...
```
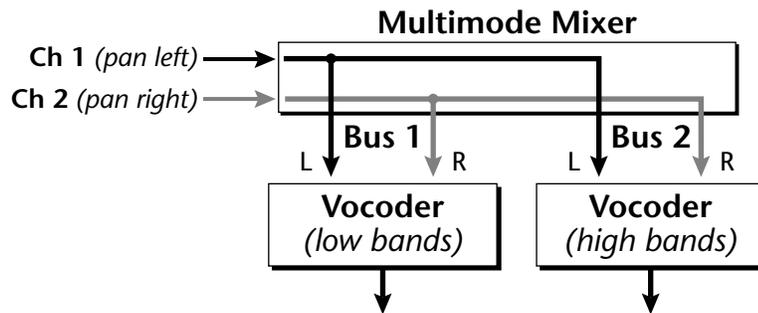
22. Set the Submix send for channels 1 & 2 to **Mixer**.

23. Press the **Next** page key. The Multimode Mix screen appears.

24. Send **channels 1 & 2** to **busses 1 & 2** with an amount of 127. Using the Mixer, we can send a channel to multiple Effect Sends.

```
Mix   Main   Send0  Aux1   Send1  Aux2   Send2  Aux3   Send3
Ch 1  Bus1   127    Bus2   127    Main   0      Main   0
Ch 2  Bus1   127    Bus2   127    Main   0      Main   0
Ch 3  :.:h.  12?    :.:h.  0      :.:h.  0      :.:h.  0
Ch 4  :.:h.  12?    :.:h.  0      :.:h.  0      :.:h.  0
      [ Seq ][ MSetup ][ View ][ Load... ][ Save... ][ Mode... ]
```

The diagram below shows how the two vocoders are patched.

Multimode Mixer

Ch 1 *(pan left)* →
Ch 2 *(pan right)* →

L   **Bus 1**   R   L   **Bus 2**   R

Vocoder
(low bands)

Vocoder
(high bands)

By patching two more vocoders to Aux Sends 2 & 3 you can add more frequency bands. Example frequency range settings for 1, 2 and 3 vocoders are shown in the chart below.

Example Frequency Range Settings

1 Vocoder	2 Vocoders	3 Vocoders
Amplitude	Amplitude	Amplitude
150 3250	100 1.5K 1.6K 5K	51 1K 1.2K 3K 3.25K 6K
Frequency (Hz)	**Frequency** (Hz)	**Frequency** (Hz)
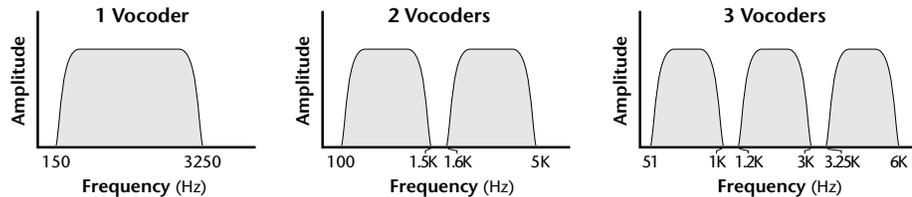
25. Press the **MSetup** function key. The MultiSetup Manage screen appears.

26. Press the **New** function key to create a new MultiSetup. A pop-up dialog box asks you to select a location for the Multisetup.

27. Select a MultiSetup location and press **OK**.

28. Now a pop-up dialog box asks you to name the Multisetup. Go ahead and name the MultiSetup so you can find it later. Press **OK**.

29. Press the **Edit...** function key. A pop-up selection box appears.

30. On the last line after RFX Setup, choose the Vocoder Setup you created in steps 4 and 5. Press **OK**.

31. **Save** the Bank.

☞ **To recall the effect:**

1. Load the Bank.

2. Select the MultiSetup

• If you're using a microphone plugged into the Sampling ADC, you may have to re-adjust the gain if you've powered down the Emulator.

More Ideas:

• Try combining MIDI triggers with the Vocoder. Speaking into the microphone can trigger voices on the Synthesis channel.

• Synthesizer Voice parameters can also be used in conjunction with the Vocoder to control the Input sources and amounts.

• You can create horrible mangling of the audio by inserting a Stereo Delay or the MuXster before the Vocoder. The MuXter or Rhythmic Delay can be used to swap the Analysis and Synthesis channels.

• Interesting effects can be produced using three vocoders and adjusting the Formant Shift parameter on the center vocoder.

Troubleshooting Chart

Troubleshooting is a normal part of using synthesizers and effects. When something doesn't work, try to be analytical and methodical in tracking down the problem. This chart may help in diagnosing some common vocoder problems.

Problem	Solution
No sound when using a microphone input to the Sampling ADC.	The ADC Gain setting is NOT saved with the bank. Go to Sample manage, new and increase the ADC Gain.
The effect works when in the Setup window but disappears when the main screen is selected.	The wrong MultiSetup is selected or the MultiSetup doesn't point to the correct RFX Setup.
The Vocoder sound is weak or in the background.	Check the Panning controls in the Voice and in the Multimode screen. Analysis should be set to -64; Synthesis should be set to +63 for all voices.
The Analysis channel is bleeding into the Synthesis channel or vice-versa.	a) Check the Panning controls in the Voice and in the Multimode screen. b) Make sure Voice Chorus is turned Off.
Output is Clipping	Clipping can occur for several reasons: a) Highly resonant input signals b) Input levels too high c) Harmonic Boost too high d) Sibilance turned up too high

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