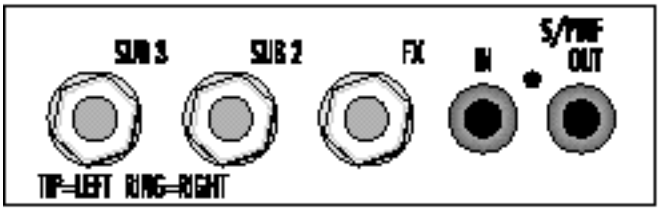
10 Appendix

Effects

ESI TURBO

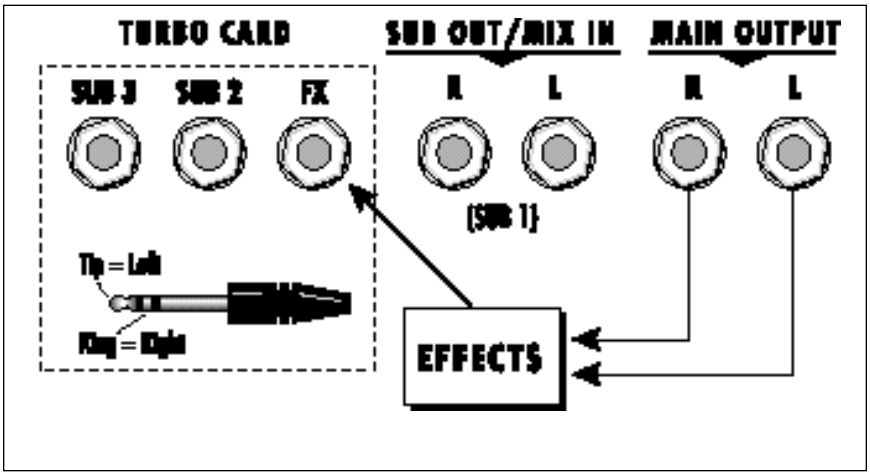
The ESI Turbo option adds exciting new capabilities to your ESI including: two 24-bit stereo digital effects processors with over 70 effect algorithms; S/PDIF digital I/O for interfacing with other digital equipment; and two additional pairs of submix outputs which allow external processing of specific sounds.

The rear panel of the Turbo option contains five jacks.



The three phone jacks are the FX and Submix outputs. These are Stereo jacks. The Left channel is on the Tip of the jack and the Right output is on the Ring conductor. Use a stereo “Y” cable to access both channels of these outputs. One stereo Y-cable is included with the Turbo option. Additional Y-cables are available from Radio Shack or from your local electronics supplier.

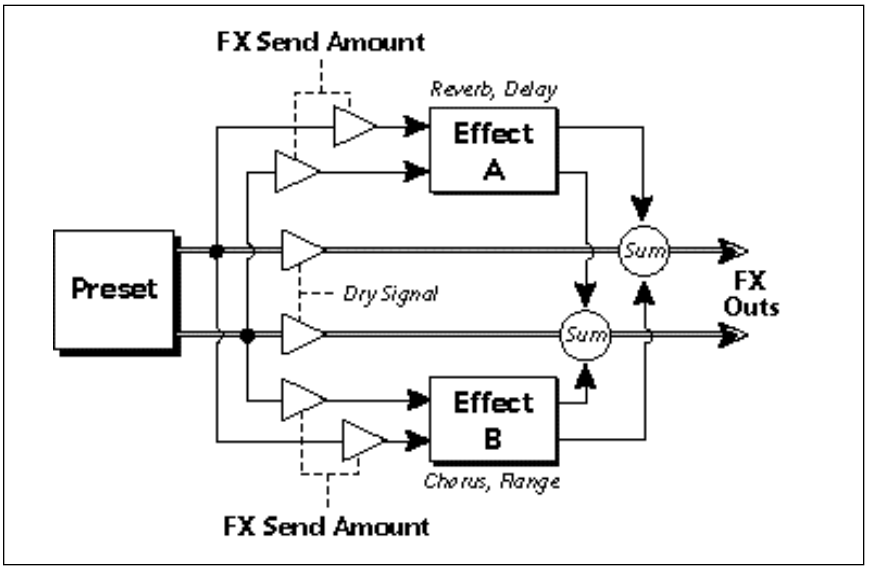
The FX Output is a copy of the Main Output run through the effects processors. When MIDI channels or Zones are programmed to “Main,” they appear at both the FX and Main outputs. The submix outputs incorporate “plug sensing” which reroutes signals to the FX outputs if a plug is not inserted into the submix jack.



The S/PDIF Input and Output allows the ESI to transfer digital audio back and forth with other digital devices equipped with S/PDIF digital I/O. Keeping the signal in the digital domain is desirable to keep the signal to noise level as high as possible. Using the digital input, you can sample directly from a DAT recorder or external A/D converter. The digital output reflects the data at the FX output and is always active.

Dual Effects Processors

The ESI Turbo option contains two stereo effects processors which serve the entire machine. When playing presets one at a time, the two processors can be programmed as part of the preset. When in multimode, a global effects assignment is used. The diagram below shows how the effects are integrated into the signal path using a parallel effects send/return model, similar to a mixing console.



Effects processor “A” contains Reverb and Delay effects and Effects processor “B” contains Chorus, Flange and Distortion effects. There are 44 “A” effects and 32 “B” effects. In addition to the effect type there are user adjustable parameters for each effect. The “A” effects have user programmable Decay Time and High Frequency Damping. The “B” effects have user programmable Feedback, LFO Rate and Delay Time.

The Effects Sends

◩ Note: Unlike a mixing console, the dry signal begins to be attenuated as the Send Amount is increased beyond 50%. This allows a mix of 100% effect.

On a mixing console you can control the amount of signal each channel Sends to the effects bus. This allows each channel to be placed in a slightly different “sonic space” which can create an airy, open sound.

ESI uses this basic concept, but works in a slightly different manner. There are 4 effects busses: Main, Sub 1, Sub 2, and Sub 3. Zones or MIDI channels (you determine which), can be directed to one of the four busses. Each effects processor contains four Send Amounts which allow you to set the wet/dry mix on each of the four busses going into the effect. A setting of 0% is completely dry (no effect). A setting of 50% contains an equal mix of effected and dry signal.

Dynamic Processing, Channel Assignment (9).

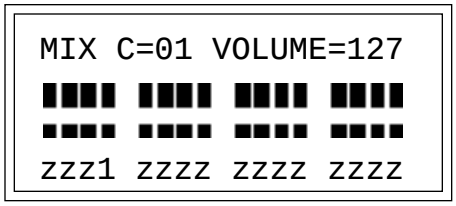
```
CHANNEL ASSIGNMENT

AssignGroup:Poly All
Submix:          main
```

! Caution: You must be in Multimode in order to change channels in the MIDI Mix screen.

The submix bus selection can be programmed by Zone in the Dynamic Processing, Channel Assignment screen. These settings can be overwritten in the Master by changing the submix setting from “Z” (Zone) to “Main, Sub 1, 2 or 3” which routes the preset on that MIDI channel to the selected submix bus.

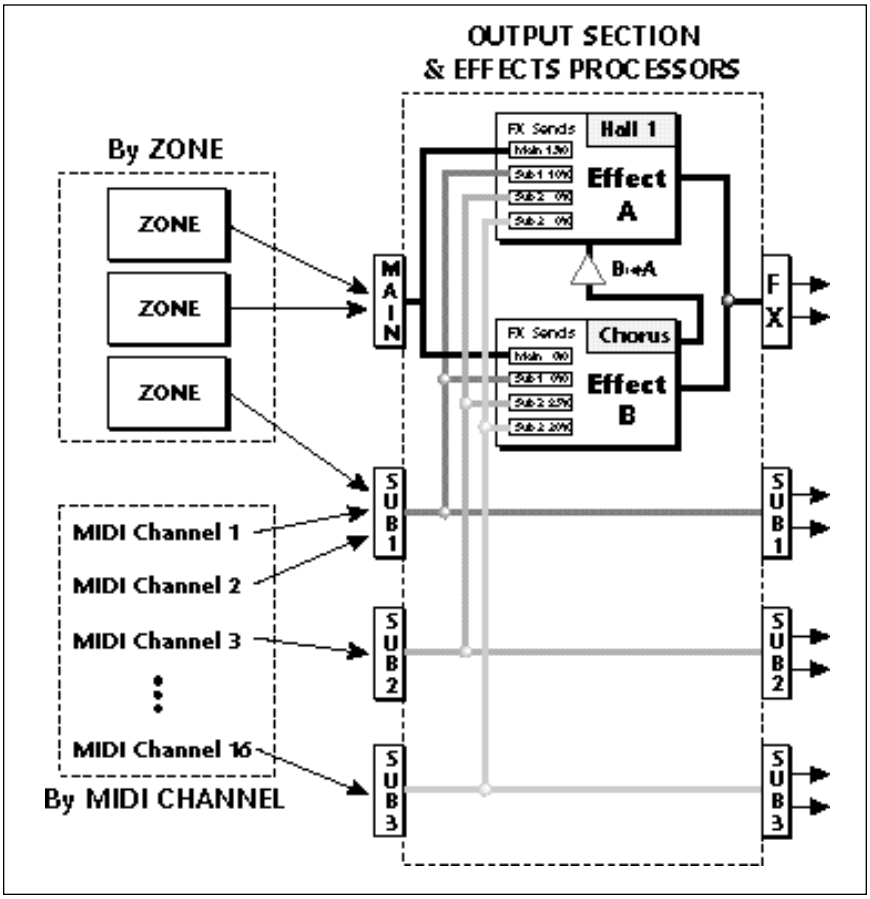
In the screen below, MIDI channel 4 is programmed to the submix 1 bus. MIDI channels 2, 3 and 5 obey the submix routing as programmed in each zone.

Master/Global, MIDI (9), MIDI Mix (1).



The submix bus routings are also available at the Submix jacks on the rear panel. Note that these outputs contain only Dry signal. The Effects Processors are ONLY connected to the FX Outputs.

If a plug is inserted into a Sub Output jack, the dry signal from that bus is removed from the effects processor. This feature allows you to have three dry mixes from the Sub Outputs and an “Effects Only” mix from the Main Outputs.



The diagram above shows how individual voices or MIDI channels can be routed to the four busses. Note that the signal lines represent stereo signals.

Three-way Effects Control

The effects processor controls are very flexible. Effects can be controlled three ways to suit your personal preference and to adapt to different situations. The diagram below illustrates the three types of effect control.

1. Programmed as part of the preset when playing single presets (Omni or Poly Modes).

2. Programmed from the Master Effects Section when playing either single presets (preset Effect Type set to “Master”) or when in Multi Mode.

3. Programmed from the designated control preset when in Multi Mode. This allows effects to be changed using MIDI program change commands.

Effects Programmed in the Preset

When playing single presets (Omni or Poly mode) the effects are normally programmed as part of the preset. This allows the effects to be programmed as part of the preset. Because there are only two effects processors for the entire machine, each preset cannot be have its own effect in Multimode where up to 16 presets can be played at once.

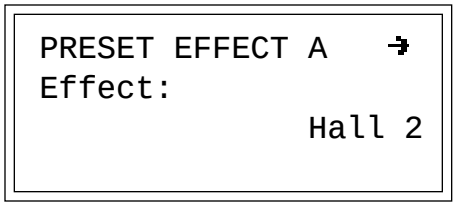
▶ To Program the Effects as part of the Preset:

1. Press the Preset Definition key. The LED illuminates and the Preset Definition screen appears.

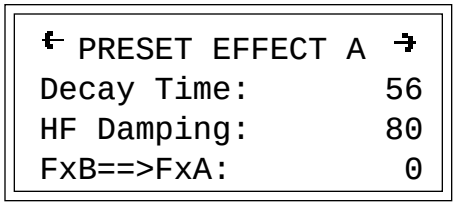
2. Select the Effects submenu (9). The Effects menu will appear.

3. Select Effects A (0) or Effects B (1).

4. Select an Effect using the Data Entry Control or INC/DEC keys. Do not use the “Master Effects” setting as this will cause the Master effects settings to be used.



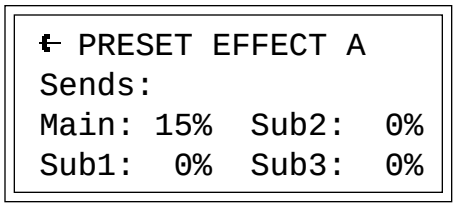
5. Press the Right Cursor key. The Effect Parameters screen will appear. Set the Decay Time and HF Damping parameters to your preference.



◩ Note: Effect parameters are described later in the appendix beginning on page 231

6. Press the Right Cursor key again to go to the Effect Sends screen.

7. Set the effect sends amounts to your preference.



8. Press the Escape key to go back to the main Effects screen. If you want to adjust the Effect B settings, select Preset Effect B (1) and adjust just as you did for the “A” effect.

9. Save the bank. The programmed effects setting will be saved along with the preset.

Master Effects

You might want the effects to be programmed on a global basis in Omni and Poly modes. You could choose your favorite reverb, for example, and have it applied to every preset you select

▶ To Program the Effects Globally for all Presets:

1. Press the Preset Definition key. The LED illuminates and the Preset Definition screen appears.

2. Select the Effects submenu (9). The Effects menu will appear.

3. Select Effect A (0).

4. Set the Effect to “Master Effects” using the Data Entry Control or INC/DEC keys.

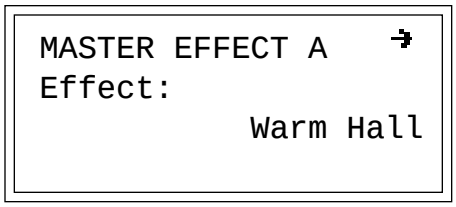
5. Press the Escape key, then select Effect B (1).

6. Set the Effect to “Master Effects” using the Data Entry Control or INC/DEC keys.

7. Press the Master/Global key. The Master/Global menu will appear.

8. Select Effects (4). The main Effect screen will appear.

9. Select Master Effect A (0). The following screen will appear.



10. Press the Right Cursor key. The Effect Parameters screen appears. Set the effect parameters to your preference.

◩ Note: Effect parameters are described later in the appendix beginning on page 231

```
← MASTER EFFECT A →
Decay Time:       40
HF Damping:       64
FxB==>FxA:         0
```

11. Press the Right Cursor key again to go to the Effect Sends screen. Set the effect sends amounts to your preference.

```
← MASTER EFFECT A
Sends:
Main: 20%  Sub2:  0%
Sub1:  0%  Sub3:  0%
```

12. Press Enter to save the system.

If you want to adjust the Effect B settings, press the Escape key to go back to the main Effects screen. Select Master Effect B (1) and adjust just as you did for the "A" effect.

Using Master Effects Settings in Multi Mode

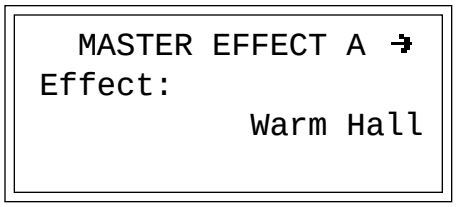
In Multi Mode, the two effects processors can be controlled from the Master Effects settings, or they can follow the effects settings of the preset on a special MIDI channel. In this example, the Master Effects will be used. Use this setting if you don't need to change the effects during the song.

▶ To Use the Master Settings in Multimode

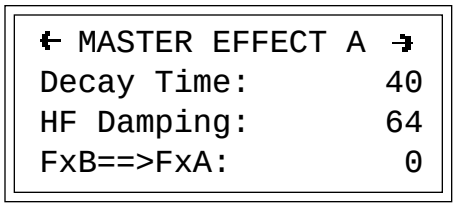
1. Press the Master/Global key. The Master/Global menu appears.
2. Select Effects (4). The main Effect screen will appear.
3. Select Effects Setup (2). The following screen will appear.

```
   EFFECT SETUP
Effects:     Enabled
Multimode Control:
     master settings
```

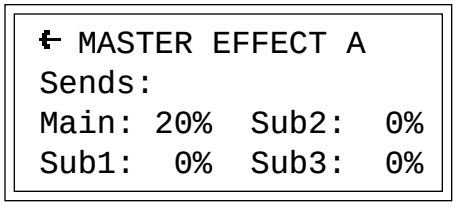
4. Select "master settings" from the "Multimode Control" field. This causes the Master effects settings to be used.
5. Press Enter to lock in the change.
6. Select Effects (4) again to adjust the Master Effects. The main Effect screen will appear.
7. Select Master Effect A (0). The following screen will appear.



8. Press the Right Cursor key. The Effect Parameters screen will appear. Set the effects parameters to your preference.



9. Press the Right Cursor key again to go to the Effect Sends screen. Set the Effect Send amounts to your preference.



10. If you want to adjust the Effect B settings, press the Escape key to go back to the main Effects screen. Select Master Effect B (1) and adjust just as you did for the "A" effect.

11. Press Enter to save the system.

▶ To Assign MIDI Channels to the Main Output or to a Submix Bus

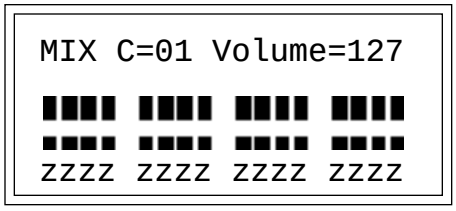
★ Tip: Refer to the routing diagram on page 217.

In Multimode each MIDI channel can be assigned to the main outputs or to one of the submix busses. If a plug is inserted into a Sub Output jack, the dry signal from that bus is removed from the effects processor. This feature allows you to have three dry mixes from the Sub Outputs and an "Effects Only" mix from the Main Outputs.

This lets you to program a different effect amount for several presets using the same effect. For example, you might want just a touch of reverb on the piano and more on the drums.

1. Select the MIDI submodule (9) from the Master/Global module.

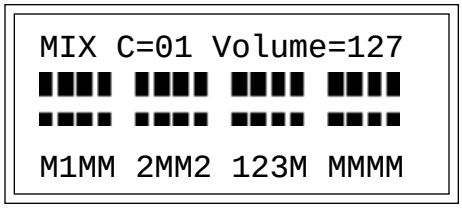
2. Select MIDI Mix (1). The following screen will appear.



! Caution: You must be in Multimode in order to change channels in the MIDI Mix screen.

3. Use the left/right cursor keys to select a MIDI Channel. Use the Up/Down Cursor keys to select Volume, Pan or Submix output for each MIDI channel. For now move the cursor to the lower line. Each column represents a MIDI channel from 1 to 16, left to right.

4. Use the Data Entry Control or INC/DEC keys to select a submix bus (Main, 1, 2, or 3) for each channel. The amounts for each bus are adjusted in the Master, Effects menu.



The submix busses can also be programmed by keyboard zone. Using this feature you could assign a different effect to each half of the keyboard or change the effect amount as you play up the keyboard. On a preset containing a drum set, you could have four different effect mixes to assign to each drum. A zone can be any range of keys.

▶ To Program Submix Busses by Zone

Set the submix bus to “z” using the Data Entry Control or INC/DEC keys. Now the submix bus will be determined by the zone assignments in the preset assigned to that MIDI channel.

▶ To set up Submix Assignments in the Preset's Zone:

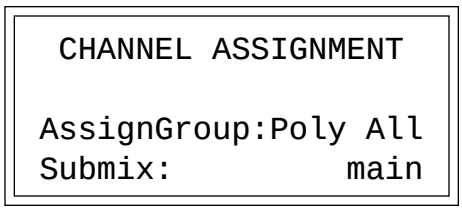
1. Exit the Master module.

2. Select the Preset assigned to the channel you set to “Zone” (z).

3. Press the Dynamic Processing key. The LED will illuminate and the Dynamic Processing screen will appear.

4. Select a Zone (0). Define a range of the keyboard by pressing the low key when prompted and then the high key of the range you want.

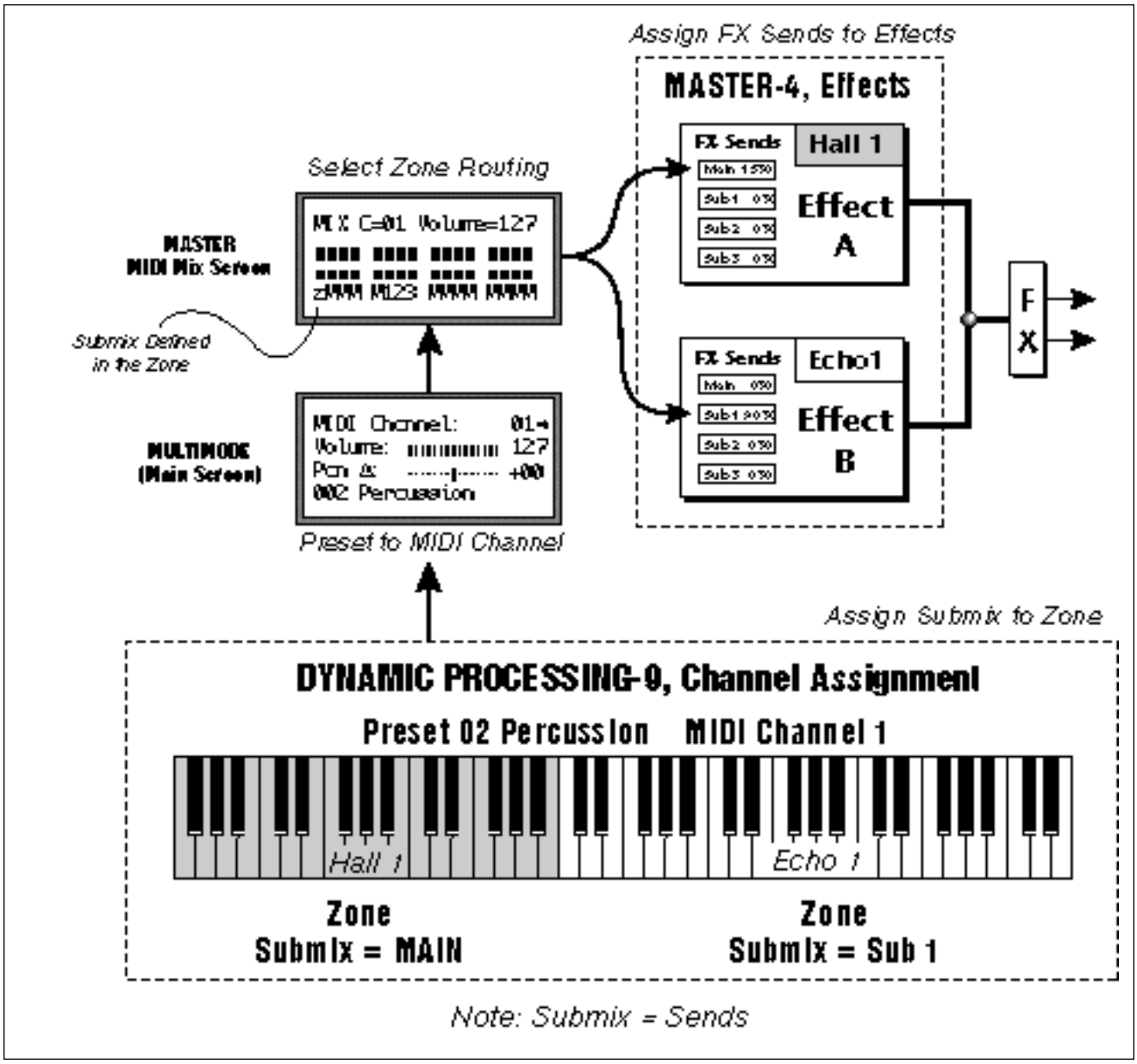
5. Select the Channel Assignment submodule (9). The following screen will appear.



6. Move the cursor to the lower line and select one of the submix busses using the Data Entry Control or INC/DEC keys.

7. To assign another zone, press Escape and go back to the “Select Zone” screen to select a new zone. Then change the submix assignment for the new zone.

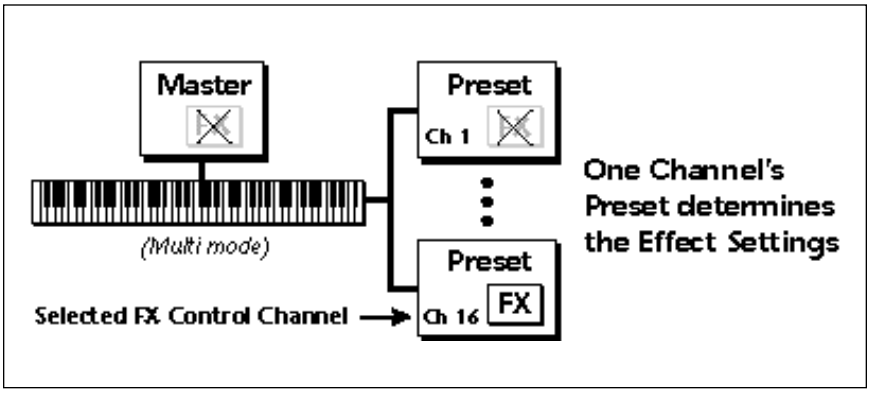
8. Save the Bank!



This diagram shows the controls and modules used to assign the effects by keyboard Zone. In this example, the keyboard is split with Reverb on the lower section and an Echo effect on the upper section.

Using the Effects Channel Settings in Multi Mode

In Multi Mode, the effects settings can follow the effects settings of the preset on a special MIDI channel. You designate one MIDI channel as the "Multimode Effects Control Channel." When this is done, the effects processors follow the effects setting made in the preset assigned to this MIDI channel. This powerful feature allows you to change effects during a sequence simply by changing the preset on the control channel.



Tip: You can create special presets without samples to be used as "Effects Presets". By assigning these effects presets to the Multimode Effects Control Channel, you can use Program Change commands to switch between effects during a sequence.

▶ To Set the Effects Control Channel:

1. Press the Master/Global key. The LED illuminates and the Master/Global menu appears.

2. Select Effects (4). The main Effect screen will appear.

3. Select Effects Setup (2). The following screen will appear.

```
   EFFECT SETUP
Effects:     Enabled
Multimode Control:
preset on channel 16
```

4. Move the Cursor down to the "Multimode Control" field. Select "preset on channel X."

5. Set the channel to the MIDI channel you want to be the effects control channel. The Effects settings programmed in the Preset on this selected channel will be used for ALL the other MIDI channels.

6. Press Enter to save the Master Settings.

Effects Bypass

This control bypasses the effects, turning them off. This feature is useful if you are using external effects at the mixing console and want to turn the effects Off for all presets.

▶ To Bypass the Effects:

1. Press the Master key. The LED illuminates and the Memory Statistics screen appears.
2. Select Effects (4). The main Effect screen will appear.
3. Select Effects Setup (2). The following screen will appear.

```
   EFFECT SETUP
Effects:     Enabled
Multimode Control:
preset on channel 16
```

4. Set Effects to “Disabled” using the Data Entry Control or INC/DEC keys.
5. Press Enter to save the Master settings.

Effect Descriptions

A EFFECT 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

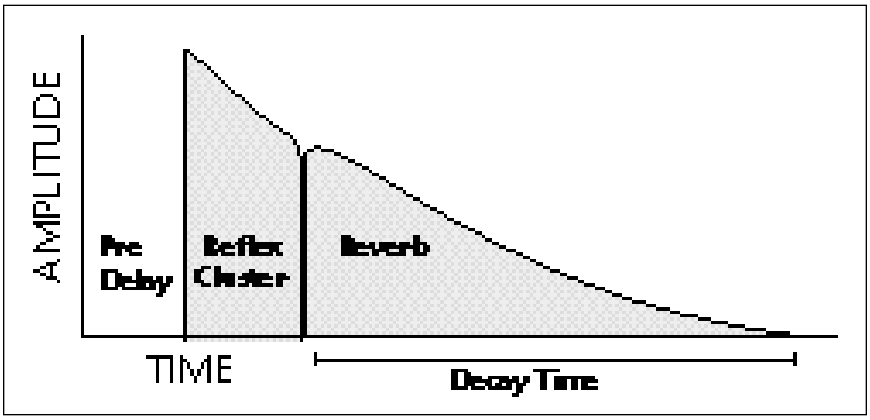
B EFFECT TYPES

Chorus 1-5
Doubling
Slapback
Flange 1-7
Big Chorus
Symphonic
Ensemble
Delay
Delay Stereo 1 & 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

Reverb

Reverberation is a simulation of a natural space such as a room or hall. The reverb effects simulate various halls, rooms and reverberation plates. In addition, there are several other reverb effects such as Gated Reverbs, Multi Tap (early reflections), Delay and Panning effects. There are two adjustable parameters on the reverb effects, Decay Time and High Frequency Damping.

Decay Time is the time it takes for the reflected sound from the room to decay or die away. The diagram below shows a generalized reverberation envelope.



After an initial pre-delay period, the echoes from the closest walls or ceiling are heard. These first echoes, or the early reflection cluster, vary greatly depending on the type of room. Roughly 20 milliseconds after the early reflection cluster the actual reverberation begins and decays according to the time set by the Decay Time parameter.

High frequency energy tends to fade away first as a sound is dissipated in a room. The High Frequency Damping parameter allows you adjust the amount of High Frequency Damping and thus change the characteristics of the room. Rooms with smooth, hard surfaces are more reflective and have less high frequency damping. Rooms filled with sound absorbing materials such as curtains or people have more high frequency damping.

General Descriptions

Room programs simulate small rooms with high frequency absorption caused by drapes and furniture.

Plates simulate plate type reverbs with their tight, dense early reflections and sharp reverb buildup.

Hall programs recreate the open, spacious ambience of large concert halls.

Gated Reverbs add ambience only while the original signal is still sounding. As soon as the signal falls below a threshold, the reverb is automatically cut off.

Delay programs can be used to create echo and doubling effects.

Multi Tap programs consist of the reflection cluster only without the reverb decay.

Chorus

The function of a chorus device is to thicken the sound or to make one voice sound like many. This effect is achieved is by mixing one or more delayed versions of the signal in with the original. The delay times used are too short to be perceived as a an echo, but long enough so that comb filtering does not occur. In addition, the delay time is varied via a low frequency oscillator to simulate the random differences that occur when multiple instruments are playing together. A slight amount of feedback improves the effect by creating multiple images of the sound as it recirculates again and again.

All the choruses are true stereo using two separate delay lines controlled by a single set of controls. The delay times are slightly different for each channel and the LFO phase is inverted on one channel to help contribute to the overall chorus effect. The LFO Rate and Depth settings are critical to achieving a realistic effect with faster LFO rates generally requiring less LFO amount and vice-versa.

Doubling

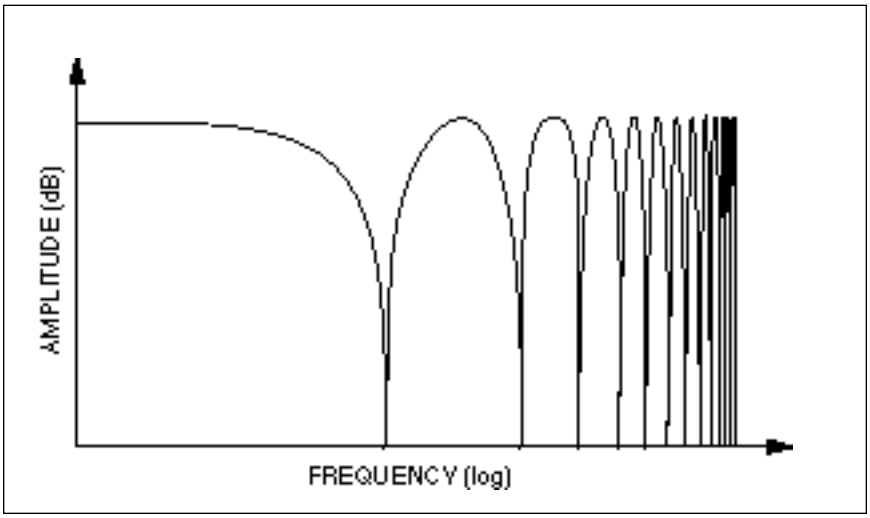
When a copy of a sound, delayed by about 26 milliseconds, is added back with the original, two audio images can be perceived by the brain. When the delayed image is slightly varied or modulated, the illusion of two voices is created.

Slapback

Slapback is a single short echo in the range of 50-60 milliseconds. A sound delayed by this length of time is perceived as a discrete and separate image which is useful for a thickening effect or as a pre-delay for reverb simulating a hard, reflective surface such a gymnasium wall.

Stereo Flanger

A flanger consists of a short audio delay line whose output is mixed together with the original signal. Mixing the delayed and original signals results in multiple frequency cancellations called a comb filter. Since the flanger is a type of filter, it works best with harmonically rich sounds.



Flanging was originally created using two tape recorders playing identical recordings. By exactly synchronizing the two decks and then slowing the speed of one by grasping the tape reel flanges, the flanging effect was born.

The flanger is a stereo device consisting of two separate delay lines controlled by a single set of controls. A Low Frequency Oscillator (LFO) varies this initial delay setting, changing the frequency of the notches and adding animation to the sound. LFO Rate controls the rate of change and LFO Depth controls how much the LFO changes the delay.

The Feedback control sends some of the delayed signal through the delay line again. When feedback is used the comb filter notches are deepened.

Delay

Delay is an effect which can be used for doubling, reverb pre-delay, or echoes.

Delay Time is variable from 0-635 milliseconds (mS) and controls the time between echoes and Feedback controls how long the echoes continue sounding. “Infinite” delay effects are possible without the risk of runaway because of an automatic gain control in the feedback path.

Stereo Delay

Similar to delay except that the delay line outputs a stereo signal from the mono input. The two output signals are a few milliseconds apart to create a stereo image. The delay times is variable from 0-635 mS.

Panning Delay

A panning delay is similar to the normal delay lines except that the echoes bounce back and forth between the two stereo speakers.

Dual Tap

These are delay lines where the signal is “tapped off” at two unevenly spaced locations. When feedback is used, multiple complex echoes are produced. The fraction in the name (i.e. 1/3, 1/4) refers to the distance between the taps.

Vibrato

Basically, this a delay line modulated by an LFO, but with none of the original signal added in. The LFO modulation creates a Doppler shift and a resultant cyclical pitch shift. The vibrato created in this manner sounds very different than vibrato created by frequency modulating the sample.

Distortion

Distortion uses a technique called “soft-clipping” to create additional harmonics in the signal. As the level increases, the top of the waveform becomes somewhat squared. As the level increases further, it transforms into a true square wave.

Effect Parameters

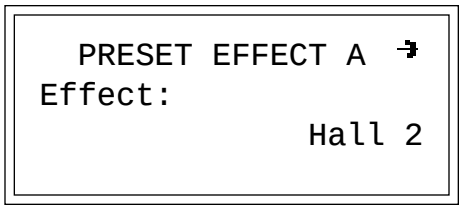
The Effect parameters allow you to control the most important aspects of the effect. The parameters for the “A” effects are: Decay Time, High Frequency Damping and Effect B through Effect A. The parameters for the “B” effects are: Feedback, LFO Rate and Decay Time.

The effects parameters are located in both the Master and Preset Definition menus. The settings used depend on whether you are using Preset Effects or Master Effects. In the following descriptions we will assume you are using the Preset Effects.

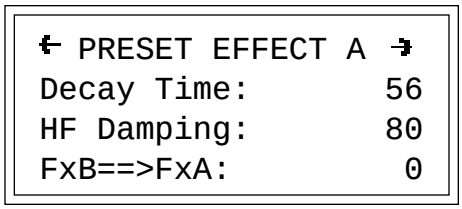
Decay Time

This parameter sets the length of time it will take an effect to fade away. In the case of reverb, decay time controls the room size and the reflectivity of the room. On a delay effect, decay time controls how many echoes are produced or how long the echoes will last.

1. Press the Preset Definition key. The LED illuminates and the Preset Definition menu appears.
2. Select Effects (9). The main Effect screen appears.
3. Select Preset Effect A (0). The following screen appears.



4. Select one of the effects using the Data Entry Control or INC/DEC keys.
5. Press the Right Cursor key. The Effect Parameters screen appears.



6. Adjust the Decay Time as desired.
7. Press the Preset Definition key to return to the main menu.

◩ Note: If the Preset Effects settings are currently selected, a pop up warning screen will inform you of this fact and ask if you wish to switch to Master effects.